**ALLEN & MAJOR
ASSOCIATES, INC.**

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September 3, 2013

Mr. Michael Behrendt, AICP
Town of Durham
Director of Planning & Community Development
15 Newmarket Road
Durham, NH 03824-2898

RE: A&M Project #: 1925-01
Orion Student Housing
#25-35 Main Street
Durham, NH 03824
Stormwater Watershed Review

Dear Mr. Behrendt:

On behalf of the applicant Orion UNH, LLC., Allen & Major Associates, Inc. (A&M) is pleased to prepare this stormwater summary to illustrate that the project conforms to the spirit and intent of the drainage requirements of the Town of Durham Stormwater Standards and any applicable New Hampshire Department of Environmental Services requirements. This letter will demonstrate that although, there is an increase in impervious cover for the site, the peak rate of runoff from the site will mitigated through the installation of pervious pavers throughout designed to collect and infiltrate the added stormwater runoff.

The proposed parcel that is the focus of this study is three parcels identified on the Town of Durham Tax Map 5 as Lots 1-6, 1-7, and 1-8. The total land area for the redevelopment is 1.09 acres or 47,676± square feet. The proposed site redevelopment would restore 25 and 35 Main Street to their original architectural significance, demolish 27 and 29 Main Street and a barn, and construct four new residential buildings. The redeveloped 25 – 35 Main Street will function as multi-family housing primarily targeted to collegiate students.

The existing terrain scheduled for disturbance is moderately sloping with a combination of pavement and minimal landscaping. The majority of the site is paved, with some areas of grass and woodland. There are several buildings located on site, with associated parking and landscaping areas. Currently, stormwater exits the site via sheet flow at two locations. The first, being a small portion of the site along the northeastern boundary which drains toward Main Street. The remainder of the site exits the site via sheet flow toward the southwest corner of the project through a wooded buffer along the abutting parcels.

The disturbance area is approximately 52,000+/- for the improvements to the site and associated drainage systems. This disturbance includes operations associated with the construction of the site. According to The Soil Survey of Strafford County, New Hampshire, the predominate soil of the site is identified by the US Department of Agricultural (USDA) Natural Resources Conservation Service (NRCS) as SfC – Suffield silt loam and a small portion being HcB - Hollis-Charlton fine sandy loams,. For the purposes of the drainage analysis the Hydrological Soil Group were based upon the Web Soil Survey data.

The methodology is NRCS; TR-20, Type III rainfalls (2, 10, 25 & 100 year events). This is consistent with the requirements of the Town of Durham. All pertinent calculations represented in the following pages were developed utilizing HydroCAD Stormwater modeling software.

civil engineers ◆ structural engineers ◆ land surveyors ◆ environmental consultants ◆ landscape architects
www.allenmajor.com

Mr. Michael Behrendt, AICP
Town of Durham Director of Planning & Community Development
15 Newmarket Road
Durham, NH 03824-2898

A&M Project # 1925-01
September 3, 2013

Treatment & Erosion Control

Treatment of stormwater runoff is accomplished through the use of best management practices with, pervious pavers and rain gardens for roof water. Temporary erosion control measures and their locations are shown on the enclosed erosion control plan and detail drawings, and will be included in the construction plans for implementation. Construction sequencing will also be utilized to ensure grading and stabilization of the outlets and treatment structures before acceptance of any flows.

Temporary erosion control measures and their locations are shown on the enclosed Erosion Control Plans and detail drawings, and will be included in the construction plans for implementation.

SUMMARY:

The overall drainage area and flow characteristics are the same in the pre and post development conditions. Although, the proposed building and parking area will add to the impervious area of the current site, the increased stormwater flows will be mitigated within the storage capacity of the pervious paver system. Additional storage, attenuation, and infiltration will be accomplished through the construction of several rain gardens which will intercept roof runoff from the proposed buildings closest to Main Street.

The study watershed is approximately 1.2+/- acres that drains toward two design points referenced herein as SP1 and SP2. SP1 is the existing municipal/state storm drain systems within the right of way for Main Street. SP2 is the existing wooded buffer along the southwestern portion of the site adjacent to abutting parcels. The attached analysis illustrates that the construction of these stormwater management systems will also meet or exceed the objectives for peak flow attenuation, water quality and flood control.

The analysis indicates that a 10-year storm contributes approximately 4.0 cfs of runoff to a point offsite for the pre-development and approximately 2.5 cfs for the post-development. The following matrix summarizes the resulting values of the calculations herein.

Design Storm	Peak Discharge (Entire Project)		
	Pre-Development (cfs)	Post-Development (cfs)	Change (cfs)
SP1			
2-year	0.3	0.2	-0.1
10-year	0.5	0.4	-0.1
25-year	0.7	0.5	-0.2
100-year	1.1	0.8	-0.3
SP2			
2-year	2.0	1.3	-0.7
10-year	3.5	2.1	-1.4
25-year	4.7	2.8	-1.9
100-year	7.1	4.1	-3.0

We trust that this letter illustrates that the proposed re-development will not negatively affect with regards to stormwater, the existing municipal system currently in place and abutting parcels.. Should you have any questions or require additional information, please feel free to call our office.

Very truly yours,

ALLEN & MAJOR ASSOCIATES, INC.

Michael A. Malynowski, PE
Project Manager

Enclosures
Cc: William Fideli, Orion UNH, LLC
        Phillip Wills, Orion UNH, LLC
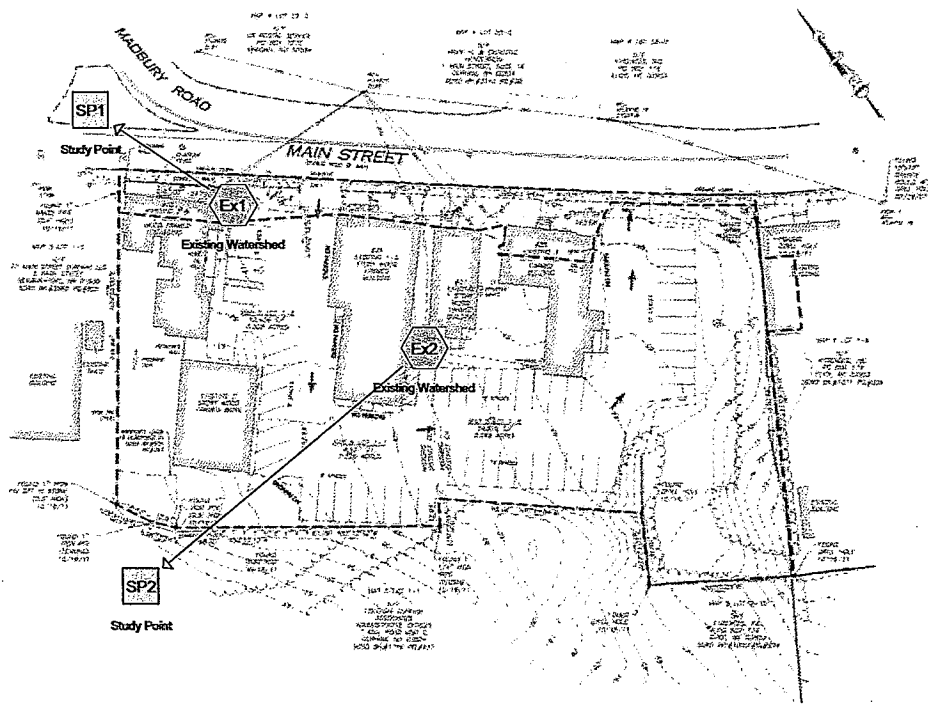
Subcat   Reach   Pond   Link

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
2,920	70	Woods, Good, HSG C (Ex2)
17,025	74	>75% Grass cover, Good, HSG C (Ex1, Ex2)
21,543	98	Paved parking, HSG C (Ex1, Ex2)
10,681	98	Roofs, HSG C (Ex1, Ex2)
52,169	**89**	**TOTAL AREA**

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Type III 24-hr 1 inch Rainfall=1.00"
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Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Ex1: Existing Watershed

Runoff Area=5,599 sf 68.21% Impervious Runoff Depth=0.32"
Flow Length=371' Tc=1.1 min CN=90 Runoff=0.0 cfs 149 cf

Subcatchment Ex2: Existing Watershed

Runoff Area=46,570 sf 60.99% Impervious Runoff Depth=0.25"
Flow Length=305' Tc=9.4 min CN=88 Runoff=0.2 cfs 982 cf

Reach SP1: Study Point

Inflow=0.0 cfs 149 cf
Outflow=0.0 cfs 149 cf

Reach SP2: Study Point

Inflow=0.2 cfs 982 cf
Outflow=0.2 cfs 982 cf

Total Runoff Area = 52,169 sf   Runoff Volume = 1,131 cf   Average Runoff Depth = 0.26"
38.23% Pervious = 19,945 sf   61.77% Impervious = 32,224 sf

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Type III 24-hr 1 inch Rainfall=1.00"
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Summary for Subcatchment Ex1: Existing Watershed

Runoff   =   0.0 cfs @ 12.02 hrs, Volume=   149 cf, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 1 inch Rainfall=1.00"

Area (sf)	CN	Description
1,780	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
2,830	98	Paved parking, HSG C
989	98	Roofs, HSG C
5,599	90	Weighted Average
1,780		31.79% Pervious Area
3,819		68.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0500	1.69		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.12"
0.6	323	0.0400	8.95	55.95	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.50' Z= 0.0 & 50.0 '/' Top.W=25.00' n= 0.013 Asphalt, smooth
1.1	371				Total

Summary for Subcatchment Ex2: Existing Watershed

Runoff   =   0.2 cfs @ 12.17 hrs, Volume=   982 cf, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 1 inch Rainfall=1.00"

Area (sf)	CN	Description
15,245	74	>75% Grass cover, Good, HSG C
2,920	70	Woods, Good, HSG C
18,713	98	Paved parking, HSG C
9,692	98	Roofs, HSG C
46,570	88	Weighted Average
18,165		39.01% Pervious Area
28,405		60.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	35	0.1300	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.12"
1.7	270	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.4	305				Total

Summary for Reach SP1: Study Point

Inflow Area =   5,599 sf, 68.21% Impervious, Inflow Depth = 0.32"   for 1 inch event
Inflow   =   0.0 cfs @ 12.02 hrs, Volume=   149 cf
Outflow   =   0.0 cfs @ 12.02 hrs, Volume=   149 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Reach SP2: Study Point

Inflow Area =   46,570 sf, 60.99% Impervious, Inflow Depth = 0.25"   for 1 inch event
Inflow   =   0.2 cfs @ 12.17 hrs, Volume=   982 cf
Outflow   =   0.2 cfs @ 12.17 hrs, Volume=   982 cf, Atten= 0%, Lag= 0.0 min

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Type III 24-hr 1 inch Rainfall=1.00"
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Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

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Type III 24-hr 2yr Rainfall=3.12"
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Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Ex1: Existing Watershed

Runoff Area=5,599 sf 68.21% Impervious Runoff Depth=2.09"
Flow Length=371' Tc=1.1 min CN=90 Runoff=0.3 cfs 977 cf

Subcatchment Ex2: Existing Watershed

Runoff Area=46,570 sf 60.99% Impervious Runoff Depth=1.93"
Flow Length=305' Tc=9.4 min CN=88 Runoff=2.0 cfs 7,471 cf

Reach SP1: Study Point

Inflow=0.3 cfs 977 cf
Outflow=0.3 cfs 977 cf

Reach SP2: Study Point

Inflow=2.0 cfs 7,471 cf
Outflow=2.0 cfs 7,471 cf

Total Runoff Area = 52,169 sf   Runoff Volume = 8,449 cf   Average Runoff Depth = 1.94"
38.23% Pervious = 19,945 sf   61.77% Impervious = 32,224 sf

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Type III 24-hr 2yr Rainfall=3.12"
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Summary for Subcatchment Ex1: Existing Watershed

Runoff = 0.3 cfs @ 12.01 hrs, Volume= 977 cf, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 2yr Rainfall=3.12"

Area (sf)	CN	Description
1,780	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
2,830	98	Paved parking, HSG C
989	98	Roofs, HSG C
5,599	90	Weighted Average
1,780		31.79% Pervious Area
3,819		68.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0500	1.69		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.12"
0.6	323	0.0400	8.95	55.95	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.50' Z= 0.0 & 50.0 '/' Top.W=25.00' n= 0.013 Asphalt, smooth
1.1	371				Total

Summary for Subcatchment Ex2: Existing Watershed

Runoff = 2.0 cfs @ 12.13 hrs, Volume= 7,471 cf, Depth= 1.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 2yr Rainfall=3.12"

Area (sf)	CN	Description
15,245	74	>75% Grass cover, Good, HSG C
2,920	70	Woods, Good, HSG C
18,713	98	Paved parking, HSG C
9,692	98	Roofs, HSG C
46,570	88	Weighted Average
18,165		39.01% Pervious Area
28,405		60.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	35	0.1300	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.12"
1.7	270	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.4	305				Total

Summary for Reach SP1: Study Point

Inflow Area = 5,599 sf, 68.21% Impervious, Inflow Depth = 2.09" for 2yr event
Inflow = 0.3 cfs @ 12.01 hrs, Volume= 977 cf
Outflow = 0.3 cfs @ 12.01 hrs, Volume= 977 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Reach SP2: Study Point

Inflow Area = 46,570 sf, 60.99% Impervious, Inflow Depth = 1.93" for 2yr event
Inflow = 2.0 cfs @ 12.13 hrs, Volume= 7,471 cf
Outflow = 2.0 cfs @ 12.13 hrs, Volume= 7,471 cf, Atten= 0%, Lag= 0.0 min

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Type III 24-hr 2yr Rainfall=3.12"
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Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

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Type III 24-hr 10yr Rainfall=4.73"
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Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Ex1: Existing Watershed

Runoff Area=5,599 sf 68.21% Impervious Runoff Depth=3.62"
Flow Length=371' Tc=1.1 min CN=90 Runoff=0.5 cfs 1,687 cf

Subcatchment Ex2: Existing Watershed

Runoff Area=46,570 sf 60.99% Impervious Runoff Depth=3.41"
Flow Length=305' Tc=9.4 min CN=88 Runoff=3.5 cfs 13,246 cf

Reach SP1: Study Point

Inflow=0.5 cfs 1,687 cf
Outflow=0.5 cfs 1,687 cf

Reach SP2: Study Point

Inflow=3.5 cfs 13,246 cf
Outflow=3.5 cfs 13,246 cf

Total Runoff Area = 52,169 sf   Runoff Volume = 14,933 cf   Average Runoff Depth = 3.43"
38.23% Pervious = 19,945 sf   61.77% Impervious = 32,224 sf

Summary for Subcatchment Ex1: Existing Watershed

Runoff   =   0.5 cfs @ 12.01 hrs, Volume=   1,687 cf, Depth= 3.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 10yr Rainfall=4.73"

Area (sf)	CN	Description
1,780	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
2,830	98	Paved parking, HSG C
989	98	Roofs, HSG C
5,599	90	Weighted Average
1,780		31.79% Pervious Area
3,819		68.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0500	1.69		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.12"
0.6	323	0.0400	8.95	55.95	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.50' Z= 0.0 & 50.0 '/' Top.W=25.00' n= 0.013 Asphalt, smooth
1.1	371				Total

Summary for Subcatchment Ex2: Existing Watershed

Runoff   =   3.5 cfs @ 12.13 hrs, Volume=   13,246 cf, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 10yr Rainfall=4.73"

Area (sf)	CN	Description
15,245	74	>75% Grass cover, Good, HSG C
2,920	70	Woods, Good, HSG C
18,713	98	Paved parking, HSG C
9,692	98	Roofs, HSG C
46,570	88	Weighted Average
18,165		39.01% Pervious Area
28,405		60.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	35	0.1300	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.12"
1.7	270	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.4	305				Total

Summary for Reach SP1: Study Point

Inflow Area =   5,599 sf, 68.21% Impervious, Inflow Depth = 3.62"   for 10yr event
Inflow   =   0.5 cfs @ 12.01 hrs, Volume=   1,687 cf
Outflow   =   0.5 cfs @ 12.01 hrs, Volume=   1,687 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Reach SP2: Study Point

Inflow Area =   46,570 sf, 60.99% Impervious, Inflow Depth = 3.41"   for 10yr event
Inflow   =   3.5 cfs @ 12.13 hrs, Volume=   13,246 cf
Outflow   =   3.5 cfs @ 12.13 hrs, Volume=   13,246 cf, Atten= 0%, Lag= 0.0 min

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Type III 24-hr 10yr Rainfall=4.73"
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Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

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Type III 24-hr 25yr Rainfall=6.00"
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Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Ex1: Existing Watershed

Runoff Area=5,599 sf 68.21% Impervious Runoff Depth=4.85"
Flow Length=371' Tc=1.1 min CN=90 Runoff=0.7 cfs 2,261 cf

Subcatchment Ex2: Existing Watershed

Runoff Area=46,570 sf 60.99% Impervious Runoff Depth=4.63"
Flow Length=305' Tc=9.4 min CN=88 Runoff=4.7 cfs 17,952 cf

Reach SP1: Study Point

Inflow=0.7 cfs 2,261 cf
Outflow=0.7 cfs 2,261 cf

Reach SP2: Study Point

Inflow=4.7 cfs 17,952 cf
Outflow=4.7 cfs 17,952 cf

Total Runoff Area = 52,169 sf   Runoff Volume = 20,213 cf   Average Runoff Depth = 4.65"
38.23% Pervious = 19,945 sf   61.77% Impervious = 32,224 sf

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Type III 24-hr 25yr Rainfall=6.00"
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Summary for Subcatchment Ex1: Existing Watershed

Runoff   =   0.7 cfs @ 12.01 hrs, Volume=   2,261 cf, Depth= 4.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 25yr Rainfall=6.00"

Area (sf)	CN	Description
1,780	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
2,830	98	Paved parking, HSG C
989	98	Roofs, HSG C
5,599	90	Weighted Average
1,780		31.79% Pervious Area
3,819		68.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0500	1.69		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.12"
0.6	323	0.0400	8.95	55.95	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.50' Z= 0.0 & 50.0 '/' Top.W=25.00' n= 0.013 Asphalt, smooth
1.1	371				Total

Summary for Subcatchment Ex2: Existing Watershed

Runoff   =   4.7 cfs @ 12.13 hrs, Volume=   17,952 cf, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 25yr Rainfall=6.00"

Area (sf)	CN	Description
15,245	74	>75% Grass cover, Good, HSG C
2,920	70	Woods, Good, HSG C
18,713	98	Paved parking, HSG C
9,692	98	Roofs, HSG C
46,570	88	Weighted Average
18,165		39.01% Pervious Area
28,405		60.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	35	0.1300	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.12"
1.7	270	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.4	305				Total

Summary for Reach SP1: Study Point

Inflow Area =   5,599 sf, 68.21% Impervious, Inflow Depth = 4.85"   for 25yr event
Inflow   =   0.7 cfs @ 12.01 hrs, Volume=   2,261 cf
Outflow   =   0.7 cfs @ 12.01 hrs, Volume=   2,261 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Reach SP2: Study Point

Inflow Area =   46,570 sf, 60.99% Impervious, Inflow Depth = 4.63"   for 25yr event
Inflow   =   4.7 cfs @ 12.13 hrs, Volume=   17,952 cf
Outflow   =   4.7 cfs @ 12.13 hrs, Volume=   17,952 cf, Atten= 0%, Lag= 0.0 min

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Type III 24-hr 25yr Rainfall=6.00"
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Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

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Type III 24-hr 100yr Rainfall=8.59"
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Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Ex1: Existing Watershed

Runoff Area=5,599 sf 68.21% Impervious Runoff Depth=7.39"
Flow Length=371' Tc=1.1 min CN=90 Runoff=1.1 cfs 3,447 cf

Subcatchment Ex2: Existing Watershed

Runoff Area=46,570 sf 60.99% Impervious Runoff Depth=7.15"
Flow Length=305' Tc=9.4 min CN=88 Runoff=7.1 cfs 27,731 cf

Reach SP1: Study Point

Inflow=1.1 cfs 3,447 cf
Outflow=1.1 cfs 3,447 cf

Reach SP2: Study Point

Inflow=7.1 cfs 27,731 cf
Outflow=7.1 cfs 27,731 cf

Total Runoff Area = 52,169 sf Runoff Volume = 31,178 cf Average Runoff Depth = 7.17"
38.23% Pervious = 19,945 sf   61.77% Impervious = 32,224 sf

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Type III 24-hr 100yr Rainfall=8.59"
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Summary for Subcatchment Ex1: Existing Watershed

Runoff   =   1.1 cfs @ 12.01 hrs, Volume=   3,447 cf, Depth= 7.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 100yr Rainfall=8.59"

Area (sf)	CN	Description
1,780	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
2,830	98	Paved parking, HSG C
989	98	Roofs, HSG C
5,599	90	Weighted Average
1,780		31.79% Pervious Area
3,819		68.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0500	1.69		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.12"
0.6	323	0.0400	8.95	55.95	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.50' Z= 0.0 & 50.0 '/' Top.W=25.00' n= 0.013 Asphalt, smooth
1.1	371				Total

Summary for Subcatchment Ex2: Existing Watershed

Runoff   =   7.1 cfs @ 12.13 hrs, Volume=   27,731 cf, Depth= 7.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 100yr Rainfall=8.59"

Area (sf)	CN	Description
15,245	74	>75% Grass cover, Good, HSG C
2,920	70	Woods, Good, HSG C
18,713	98	Paved parking, HSG C
9,692	98	Roofs, HSG C
46,570	88	Weighted Average
18,165		39.01% Pervious Area
28,405		60.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	35	0.1300	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.12"
1.7	270	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.4	305				Total

Summary for Reach SP1: Study Point
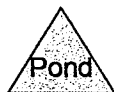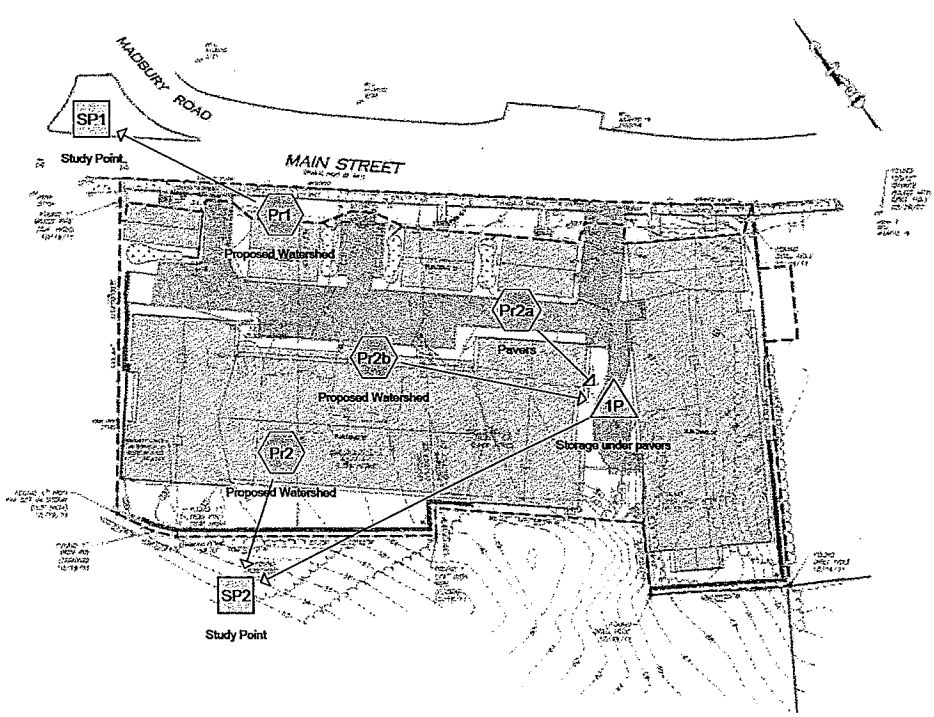
Inflow Area =   5,599 sf, 68.21% Impervious, Inflow Depth = 7.39"   for 100yr event
Inflow   =   1.1 cfs @ 12.01 hrs, Volume=   3,447 cf
Outflow   =   1.1 cfs @ 12.01 hrs, Volume=   3,447 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Reach SP2: Study Point

Inflow Area =   46,570 sf, 60.99% Impervious, Inflow Depth = 7.15"   for 100yr event
Inflow   =   7.1 cfs @ 12.13 hrs, Volume=   27,731 cf
Outflow   =   7.1 cfs @ 12.13 hrs, Volume=   27,731 cf, Atten= 0%, Lag= 0.0 min

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Type III 24-hr 100yr Rainfall=8.59"
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Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

MADBURY ROAD

SP1

Study Point

MAIN STREET

Pr1

Proposed Watershed

Pr2a

Pavers

Pr2b

Proposed Watershed

1P

Storage under pavers

Pr2

Proposed Watershed

SP2

Study Point

Subcat   Reach   Pond   Link

Drainage Diagram for Post
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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
12,880	74	>75% Grass cover, Good, HSG C (Pr1, Pr2, Pr2b)
368	80	Permeable Pavers (Pr1)
3,174	98	Paved parking, HSG C (Pr1, Pr2, Pr2b)
7,055	98	Permeable Pavers (Pr2a)
28,692	98	Roofs, HSG C (Pr2, Pr2b)
52,169	**92**	**TOTAL AREA**

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Type III 24-hr 1 inch Rainfall=1.00"
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Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Pr1: Proposed Watershed   Runoff Area=4,590 sf 40.92% Impervious Runoff Depth=0.15"
Flow Length=371' Tc=1.1 min CN=84 Runoff=0.0 cfs 58 cf

Subcatchment Pr2: Proposed Watershed   Runoff Area=21,652 sf 71.39% Impervious Runoff Depth=0.36"
Flow Length=25' Slope=0.2500 '/' Tc=1.2 min CN=91 Runoff=0.2 cfs 648 cf

Subcatchment Pr2a: Pavers   Runoff Area=7,055 sf 100.00% Impervious Runoff Depth=0.79"
Tc=790.0 min CN=98 Runoff=0.0 cfs 465 cf

Subcatchment Pr2b: Proposed Watershed   Runoff Area=18,872 sf 76.99% Impervious Runoff Depth=0.40"
Tc=790.0 min CN=92 Runoff=0.0 cfs 633 cf

Reach SP1: Study Point   Inflow=0.0 cfs 58 cf
Outflow=0.0 cfs 58 cf

Reach SP2: Study Point   Inflow=0.2 cfs 648 cf
Outflow=0.2 cfs 648 cf

Pond 1P: Storage under pavers   Peak Elev=100.00' Storage=0 cf Inflow=0.0 cfs 1,098 cf
Discarded=0.0 cfs 1,098 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 1,098 cf

Total Runoff Area = 52,169 sf   Runoff Volume = 1,804 cf   Average Runoff Depth = 0.42"
25.39% Pervious = 13,248 sf   74.61% Impervious = 38,921 sf

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Type III 24-hr 1 inch Rainfall=1.00"
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Summary for Subcatchment Pr1: Proposed Watershed

Runoff = 0.0 cfs @ 12.07 hrs, Volume= 58 cf, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 1 inch Rainfall=1.00"

Area (sf)	CN	Description
2,344	74	>75% Grass cover, Good, HSG C
1,878	98	Paved parking, HSG C
* 368	80	Permeable Pavers
4,590	84	Weighted Average
2,712		59.08% Pervious Area
1,878		40.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0500	1.69		**Sheet Flow,** Smooth surfaces n=0.011 P2=3.12"
0.6	323	0.0400	8.95	55.95	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.50' Z=0.0 & 50.0 '/' Top.W=25.00' n=0.013
1.1	371	Total			

Summary for Subcatchment Pr2: Proposed Watershed

Runoff = 0.2 cfs @ 12.02 hrs, Volume= 648 cf, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 1 inch Rainfall=1.00"

Area (sf)	CN	Description
6,194	74	>75% Grass cover, Good, HSG C
201	98	Paved parking, HSG C
14,777	98	Roofs, HSG C
480	98	Paved parking, HSG C
21,652	91	Weighted Average
6,194		28.61% Pervious Area
15,458		71.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	25	0.2500	0.35		**Sheet Flow,** Grass: Short n=0.150 P2=3.12"

Summary for Subcatchment Pr2a: Pavers

Runoff = 0.0 cfs @ 21.97 hrs, Volume= 465 cf, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 1 inch Rainfall=1.00"

Area (sf)	CN	Description
* 7,055	98	Permeable Pavers
7,055		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
790.0					**Direct Entry, Volume to Pavers**

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Type III 24-hr 1 inch Rainfall=1.00"
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Summary for Subcatchment Pr2b: Proposed Watershed

Runoff   =   . 0.0 cfs @ 22.89 hrs, Volume=   633 cf, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 1 inch Rainfall=1.00"

Area (sf)	CN	Description
13,915	98	Roofs, HSG C
4,342	74	>75% Grass cover, Good, HSG C
615	98	Paved parking, HSG C
18,872	92	Weighted Average
4,342		23.01% Pervious Area
14,530		76.99% Impervious Area

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

Summary for Reach SP1: Study Point

Inflow Area =   4,590 sf, 40.92% Impervious, Inflow Depth = · 0.15"   for 1 inch event
Inflow   =   0.0 cfs @ 12.07 hrs, Volume=   58 cf
Outflow   =   0.0 cfs @ 12.07 hrs, Volume=   58 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Reach SP2: Study Point

Inflow Area =   47,579 sf, 77.86% Impervious, Inflow Depth = 0.16"   for 1 inch event
Inflow   =   0.2 cfs @ 12.02 hrs, Volume=   648 cf
Outflow   =   0.2 cfs @ 12.02 hrs, Volume=   648 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Pond 1P: Storage under pavers

Inflow Area =   25,927 sf, 83.25% Impervious, Inflow Depth = 0.51"   for 1 inch event
Inflow   =   0.0 cfs @ 22.76 hrs, Volume=   1,098 cf
Outflow   =   0.0 cfs @ 22.76 hrs, Volume=   1,098 cf, Atten= 0%, Lag= 0.0 min
Discarded =   0.0 cfs @ 22.76 hrs, Volume=   1,098 cf
Primary   =   0.0 cfs @   0.00 hrs, Volume=   0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3
Peak Elev= 100.00' @ 0.00 hrs Surf.Area= 7,055 sf Storage= 0 cf

Plug-Flow detention time=(not calculated: outflow precedes inflow)
Center-of-Mass det. time=0.0 min (1,540.8 - 1,540.8)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	5,644 cf	**Custom Stage Data (Conic)**Listed below (Recalc) 14,110 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
100.00	7,055	0	0	7,055
102.00	7,055	14,110	14,110	7,651

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	**0.850 in/hr Exfiltration over Wetted area**
#2	Primary	102.00'	**25.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.0 cfs@ 22.76 hrs HW=100.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.0 cfs of 0.1 cfs potential flow)

Primary OutFlow Max=0.0 cfs@ 0.00 hrs HW=100.00' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir**(Controls 0.0 cfs)

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Type III 24-hr 2yr Rainfall=3.12"
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Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Pr1: Proposed Watershed

Runoff Area=4,590 sf 40.92% Impervious Runoff Depth=1.62"
Flow Length=371' Tc=1.1 min CN=84 Runoff=0.2 cfs 618 cf

Subcatchment Pr2: Proposed Watershed

Runoff Area=21,652 sf 71.39% Impervious Runoff Depth=2.18"
Flow Length=25' Slope=0.2500 '/' Tc=1.2 min CN=91 Runoff=1.3 cfs 3,939 cf

Subcatchment Pr2a: Pavers

Runoff Area=7,055 sf 100.00% Impervious Runoff Depth=2.89"
Tc=790.0 min CN=98 Runoff=0.0 cfs 1,698 cf

Subcatchment Pr2b: Proposed Watershed

Runoff Area=18,872 sf 76.99% Impervious Runoff Depth=2.27"
Tc=790.0 min CN=92 Runoff=0.1 cfs 3,577 cf

Reach SP1: Study Point

Inflow=0.2 cfs 618 cf
Outflow=0.2 cfs 618 cf

Reach SP2: Study Point

Inflow=1.3 cfs 3,939 cf
Outflow=1.3 cfs 3,939 cf

Pond 1P: Storage under pavers

Peak Elev=100.00' Storage=0 cf Inflow=0.1 cfs 5,275 cf
Discarded=0.1 cfs 5,275 cf Primary=0.0 cfs 0 cf Outflow=0.1 cfs 5,275 cf

Total Runoff Area = 52,169 sf Runoff Volume = 9,832 cf Average Runoff Depth = 2.26"
25.39% Pervious = 13,248 sf   74.61% Impervious = 38,921 sf

Summary for Subcatchment Pr1: Proposed Watershed

Runoff   =   0.2 cfs @ 12.01 hrs, Volume=   618 cf, Depth= 1.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 2yr Rainfall=3.12"

Area (sf)	CN	Description
2,344	74	>75% Grass cover, Good, HSG C
1,878	98	Paved parking, HSG C
* 368	80	Permeable Pavers
4,590	84	Weighted Average
2,712		59.08% Pervious Area
1,878		40.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0500	1.69		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.12"
0.6	323	0.0400	8.95	55.95	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.50' Z= 0.0 & 50.0 '/' Top.W=25.00' n= 0.013
1.1	371				Total

Summary for Subcatchment Pr2: Proposed Watershed

Runoff   =   1.3 cfs @ 12.01 hrs, Volume=   3,939 cf, Depth= 2.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 2yr Rainfall=3.12"

Area (sf)	CN	Description
6,194	74	>75% Grass cover, Good, HSG C
201	98	Paved parking, HSG C
14,777	98	Roofs, HSG C
480	98	Paved parking, HSG C
21,652	91	Weighted Average
6,194		28.61% Pervious Area
15,458		71.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	25	0.2500	0.35		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.12"

Summary for Subcatchment Pr2a: Pavers

Runoff   =   0.0 cfs @ 21.93 hrs, Volume=   1,698 cf, Depth= 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 2yr Rainfall=3.12"

Area (sf)	CN	Description
* 7,055	98	Permeable Pavers
7,055		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
790.0					**Direct Entry, Volume to Pavers**

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Type III 24-hr 2yr Rainfall=3.12"
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Summary for Subcatchment Pr2b: Proposed Watershed

Runoff = 0.1 cfs @ 21.99 hrs, Volume= 3,577 cf, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 2yr Rainfall=3.12"

Area (sf)	CN	Description
13,915	98	Roofs, HSG C
4,342	74	>75% Grass cover, Good, HSG C
615	98	Paved parking, HSG C
18,872	92	Weighted Average
4,342		23.01% Pervious Area
14,530		76.99% Impervious Area

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

Summary for Reach SP1: Study Point

Inflow Area = 4,590 sf, 40.92% Impervious, Inflow Depth = 1.62" for 2yr event
Inflow = 0.2 cfs @ 12.01 hrs, Volume= 618 cf
Outflow = 0.2 cfs @ 12.01 hrs, Volume= 618 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Reach SP2: Study Point

Inflow Area = 47,579 sf, 77.86% Impervious, Inflow Depth = 0.99" for 2yr event
Inflow = 1.3 cfs @ 12.01 hrs, Volume= 3,939 cf
Outflow = 1.3 cfs @ 12.01 hrs, Volume= . 3,939 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Pond 1P: Storage under pavers

Inflow Area = 25,927 sf, 83.25% Impervious, Inflow Depth = 2.44" for 2yr event
Inflow = 0.1 cfs @ 21.97 hrs, Volume= 5,275 cf
Outflow = 0.1 cfs @ 21.97 hrs, Volume= 5,275 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.1 cfs @ 21.97 hrs, Volume= 5,275 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3
Peak Elev= 100.00' @ 21.97 hrs Surf.Area= 7,055 sf Storage= 0 cf

Plug-Flow detention time=(not calculated: outflow precedes inflow)
Center-of-Mass det. time=0.0 min (1,503.2 - 1,503.2)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	5,644 cf	**Custom Stage Data (Conic)**Listed below (Recalc) 14,110 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
100.00	7,055	0	0	7,055
102.00	7,055	14,110	14,110	7,651

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	**0.850 in/hr Exfiltration over Wetted area**
#2	Primary	102.00'	**25.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

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Type III 24-hr 2yr Rainfall=3.12"
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Discarded OutFlow Max=0.1 cfs @ 21.97 hrs HW=100.00' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=100.00' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

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Type III 24-hr 10yr Rainfall=4.73"
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Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Pr1: Proposed Watershed

Runoff Area=4,590 sf 40.92% Impervious Runoff Depth=3.02"
Flow Length=371' Tc=1.1 min CN=84 Runoff=0.4 cfs 1,157 cf

Subcatchment Pr2: Proposed Watershed

Runoff Area=21,652 sf 71.39% Impervious Runoff Depth=3.72"
Flow Length=25' Slope=0.2500 '/' Tc=1.2 min CN=91 Runoff=2.1 cfs 6,713 cf

Subcatchment Pr2a: Pavers

Runoff Area=7,055 sf 100.00% Impervious Runoff Depth=4.49"
Tc=790.0 min CN=98 Runoff=0.1 cfs 2,642 cf

Subcatchment Pr2b: Proposed Watershed

Runoff Area=18,872 sf 76.99% Impervious Runoff Depth=3.83"
Tc=790.0 min CN=92 Runoff=0.1 cfs 6,017 cf

Reach SP1: Study Point

Inflow=0.4 cfs 1,157 cf
Outflow=0.4 cfs 1,157 cf

Reach SP2: Study Point

Inflow=2.1 cfs 6,713 cf
Outflow=2.1 cfs 6,713 cf

Pond 1P: Storage under pavers

Peak Elev=100.17' Storage=474 cf Inflow=0.2 cfs 8,659 cf
Discarded=0.1 cfs 8,660 cf Primary=0.0 cfs 0 cf Outflow=0.1 cfs 8,660 cf

Total Runoff Area = 52,169 sf   Runoff Volume = 16,528 cf   Average Runoff Depth = 3.80"
25.39% Pervious = 13,248 sf   74.61% Impervious = 38,921 sf

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Type III 24-hr 10yr Rainfall=4.73"
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Summary for Subcatchment Pr1: Proposed Watershed

Runoff   =   0.4 cfs @ 12.01 hrs, Volume=   1,157 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 10yr Rainfall=4.73"

	Area (sf)	CN	Description
	2,344	74	>75% Grass cover, Good, HSG C
	1,878	98	Paved parking, HSG C
*	368	80	Permeable Pavers
	4,590	84	Weighted Average
	2,712		59.08% Pervious Area
	1,878		40.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0500	1.69		Sheet Flow, Smooth surfaces n=0.011 P2=3.12"
0.6	323	0.0400	8.95	55.95	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=0.50' Z= 0.0 & 50.0 '/' Top.W=25.00' n=0.013
1.1	371				Total

Summary for Subcatchment Pr2: Proposed Watershed

Runoff   =   2.1 cfs @ 12.01 hrs, Volume=   6,713 cf, Depth= 3.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 10yr Rainfall=4.73"

Area (sf)	CN	Description
6,194	74	>75% Grass cover, Good, HSG C
201	98	Paved parking, HSG C
14,777	98	Roofs, HSG C
480	98	Paved parking, HSG C
21,652	91	Weighted Average
6,194		28.61% Pervious Area
15,458		71.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	25	0.2500	0.35		Sheet Flow, Grass: Short n=0.150 P2=3.12"

Summary for Subcatchment Pr2a: Pavers

Runoff   =   0.1 cfs @ 21.92 hrs, Volume=   2,642 cf, Depth= 4.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 10yr Rainfall=4.73"

	Area (sf)	CN	Description
*	7,055	98	Permeable Pavers
	7,055		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
790.0					Direct Entry, Volume to Pavers

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Type III 24-hr 10yr Rainfall=4.73"
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Summary for Subcatchment Pr2b: Proposed Watershed

Runoff   =   0.1 cfs @ 21.97 hrs, Volume=   6,017 cf, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 10yr Rainfall=4.73"

Area (sf)	CN	Description
13,915	98	Roofs, HSG C
4,342	74	>75% Grass cover, Good, HSG C
615	98	Paved parking, HSG C
18,872	92	Weighted Average
4,342		23.01% Pervious Area
14,530		76.99% Impervious Area

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

Summary for Reach SP1: Study Point

Inflow Area =   4,590 sf, 40.92% Impervious, Inflow Depth = 3.02"   for 10yr event
Inflow   =   0.4 cfs @ 12.01 hrs, Volume=   1,157 cf
Outflow   =   0.4 cfs @ 12.01 hrs, Volume=   1,157 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Reach SP2: Study Point

Inflow Area =   47,579 sf, 77.86% Impervious, Inflow Depth = 1.69"   for 10yr event
Inflow   =   2.1 cfs @ 12.01 hrs, Volume=   6,713 cf
Outflow   =   2.1 cfs @ 12.01 hrs, Volume=   6,713 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Pond 1P: Storage under pavers

Inflow Area =   25,927 sf, 83.25% Impervious, Inflow Depth = 4.01"   for 10yr event
Inflow   =   0.2 cfs @ 21.95 hrs, Volume=   8,659 cf
Outflow   =   0.1 cfs @ 25.56 hrs, Volume=   8,660 cf, Atten= 18%, Lag= 216.6 min
Discarded =   0.1 cfs @ 25.56 hrs, Volume=   8,660 cf
Primary   =   0.0 cfs @ 0.00 hrs, Volume=   0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3
Peak Elev= 100.17' @ 25.56 hrs Surf.Area= 7,055 sf Storage= 474 cf

Plug-Flow detention time=(not calculated: outflow precedes inflow)
Center-of-Mass det. time=20.5 min (1,512.3 - 1,491.8)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	5,644 cf	Custom Stage Data (Conic)Listed below (Recalc) 14,110 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
100.00	7,055	0	0	7,055
102.00	7,055	14,110	14,110	7,651

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	0.850 in/hr Exfiltration over Wetted area
#2	Primary	102.00'	25.0' long x 25.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

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Type III 24-hr 10yr Rainfall=4.73"
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Discarded OutFlow Max=0.1 cfs @ 25.56 hrs HW=100.17' (Free Discharge)
└─1=**Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=100.00' TW=0.00' (Dynamic Tailwater)
└─2=**Broad-Crested Rectangular Weir**(Controls 0.0 cfs)

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Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Pr1: Proposed Watershed

Runoff Area=4,590 sf 40.92% Impervious Runoff Depth=4.20"
Flow Length=371' Tc=1.1 min CN=84 Runoff=0.5 cfs 1,605 cf

Subcatchment Pr2: Proposed Watershed

Runoff Area=21,652 sf 71.39% Impervious Runoff Depth=4.96"
Flow Length=25' Slope=0.2500 '/' Tc=1.2 min CN=91 Runoff=2.8 cfs 8,944 cf

Subcatchment Pr2a: Pavers

Runoff Area=7,055 sf 100.00% Impervious Runoff Depth=5.76"
Tc=790.0 min CN=98 Runoff=0.1 cfs 3,387 cf

Subcatchment Pr2b: Proposed Watershed

Runoff Area=18,872 sf 76.99% Impervious Runoff Depth=5.07"
Tc=790.0 min CN=92 Runoff=0.2 cfs 7,973 cf

Reach SP1: Study Point

Inflow=0.5 cfs 1,605 cf
Outflow=0.5 cfs 1,605 cf

Reach SP2: Study Point

Inflow=2.8 cfs 8,944 cf
Outflow=2.8 cfs 8,944 cf

Pond 1P: Storage under pavers

Peak Elev=100.65' Storage=1,846 cf Inflow=0.2 cfs 11,360 cf
Discarded=0.1 cfs 11,376 cf Primary=0.0 cfs 0 cf Outflow=0.1 cfs 11,376 cf

Total Runoff Area = 52,169 sf   Runoff Volume = 21,910 cf   Average Runoff Depth = 5.04"
25.39% Pervious = 13,248 sf   74.61% Impervious = 38,921 sf

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Type III 24-hr 25yr Rainfall=6.00"
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Summary for Subcatchment Pr1: Proposed Watershed

Runoff   =   0.5 cfs @ 12.01 hrs, Volume=   1,605 cf, Depth= 4.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 25yr Rainfall=6.00"

	Area (sf)	CN	Description
	2,344	74	>75% Grass cover, Good, HSG C
	1,878	98	Paved parking, HSG C
*	368	80	Permeable Pavers
	4,590	84	Weighted Average
	2,712		59.08% Pervious Area
	1,878		40.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0500	1.69		**Sheet Flow,**
					Smooth surfaces n= 0.011 P2= 3.12"
0.6	323	0.0400	8.95	55.95	**Trap/Vee/Rect Channel Flow,**
					Bot.W=0.00' D=0.50' Z=0.0 & 50.0 '/' Top.W=25.00'
					n= 0.013
1.1	371	Total			

Summary for Subcatchment Pr2: Proposed Watershed

Runoff   =   2.8 cfs @ 12.01 hrs, Volume=   8,944 cf, Depth= 4.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 25yr Rainfall=6.00"

	Area (sf)	CN	Description
	6,194	74	>75% Grass cover, Good, HSG C
	201	98	Paved parking, HSG C
	14,777	98	Roofs, HSG C
	480	98	Paved parking, HSG C
	21,652	91	Weighted Average
	6,194		28.61% Pervious Area
	15,458		71.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	25	0.2500	0.35		**Sheet Flow,**
					Grass: Short n= 0.150 P2= 3.12"

Summary for Subcatchment Pr2a: Pavers

Runoff   =   0.1 cfs @ 21.91 hrs, Volume=   3,387 cf, Depth= 5.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 25yr Rainfall=6.00"

	Area (sf)	CN	Description
*	7,055	98	Permeable Pavers
	7,055		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
790.0					**Direct Entry, Volume to Pavers**

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Type III 24-hr 25yr Rainfall=6.00"
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Summary for Subcatchment Pr2b: Proposed Watershed

Runoff   =   0.2 cfs @ 21.95 hrs, Volume=   7,973 cf, Depth= 5.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 25yr Rainfall=6.00"

Area (sf)	CN	Description
13,915	98	Roofs, HSG C
4,342	74	>75% Grass cover, Good, HSG C
615	98	Paved parking, HSG C
18,872	92	Weighted Average
4,342		23.01% Pervious Area
14,530		76.99% Impervious Area

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

Summary for Reach SP1: Study Point

Inflow Area =   4,590 sf, 40.92% Impervious, Inflow Depth = 4.20"   for 25yr event
Inflow   =   0.5 cfs @ 12.01 hrs, Volume=   1,605 cf
Outflow   =   0.5 cfs @ 12.01 hrs, Volume=   1,605 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Reach SP2: Study Point

Inflow Area =   47,579 sf, 77.86% Impervious, Inflow Depth = 2.26"   for 25yr event
Inflow   =   2.8 cfs @ 12.01 hrs, Volume=   8,944 cf
Outflow   =   2.8 cfs @ 12.01 hrs, Volume=   8,944 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Pond 1P: Storage under pavers

Inflow Area =   25,927 sf, 83.25% Impervious, Inflow Depth = 5.26"   for 25yr event
Inflow   =   0.2 cfs @ 21.94 hrs, Volume=   11,360 cf
Outflow   =   0.1 cfs @ 27.45 hrs, Volume=   11,376 cf, Atten= 36%, Lag= 330.7 min
Discarded =   0.1 cfs @ 27.45 hrs, Volume=   11,376 cf
Primary   =   0.0 cfs @ 0.00 hrs, Volume=   0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3
Peak Elev= 100.65' @ 27.45 hrs Surf.Area= 7,055 sf Storage= 1,846 cf

Plug-Flow detention time=(not calculated: outflow precedes inflow)
Center-of-Mass det. time=105.8 min (1,591.6 - 1,485.9)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	5,644 cf	**Custom Stage Data (Conic)**Listed below (Recalc) 14,110 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
100.00	7,055	0	0	7,055
102.00	7,055	14,110	14,110	7,651

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	**0.850 in/hr Exfiltration over Wetted area**
#2	Primary	102.00'	**25.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

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Discarded OutFlow Max=0.1 cfs @ 27.45 hrs HW=100.65' (Free Discharge)
└─1=**Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=100.00' TW=0.00' (Dynamic Tailwater)
└─2=**Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

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Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Pr1: Proposed Watershed Runoff Area=4,590 sf 40.92% Impervious Runoff Depth=6.66"
Flow Length=371' Tc=1.1 min CN=84 Runoff=0.8 cfs 2,549 cf

Subcatchment Pr2: Proposed Watershed Runoff Area=21,652 sf 71.39% Impervious Runoff Depth=7.51"
Flow Length=25' Slope=0.2500 '/' Tc=1.2 min CN=91 Runoff=4.1 cfs 13,546 cf

Subcatchment Pr2a: Pavers Runoff Area=7,055 sf 100.00% Impervious Runoff Depth=8.35"
Tc=790.0 min CN=98 Runoff=0.1 cfs 4,909 cf

Subcatchment Pr2b: Proposed Watershed Runoff Area=18,872 sf 76.99% Impervious Runoff Depth=7.63"
Tc=790.0 min CN=92 Runoff=0.2 cfs 11,996 cf

Reach SP1: Study Point Inflow=0.8 cfs 2,549 cf
Outflow=0.8 cfs 2,549 cf

Reach SP2: Study Point Inflow=4.1 cfs 13,546 cf
Outflow=4.1 cfs 13,546 cf

Pond 1P: Storage under pavers Peak Elev=101.92' Storage=5,422 cf Inflow=0.3 cfs 16,905 cf
Discarded=0.2 cfs 16,923 cf Primary=0.0 cfs 0 cf Outflow=0.2 cfs 16,923 cf

Total Runoff Area = 52,169 sf Runoff Volume = 33,000 cf Average Runoff Depth = 7.59"
25.39% Pervious = 13,248 sf 74.61% Impervious = 38,921 sf

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Type III 24-hr 100yr Rainfall=8.59"
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Summary for Subcatchment Pr1: Proposed Watershed

Runoff = 0.8 cfs @ 12.01 hrs, Volume= 2,549 cf, Depth= 6.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 100yr Rainfall=8.59"

	Area (sf)	CN	Description
	2,344	74	>75% Grass cover, Good, HSG C
	1,878	98	Paved parking, HSG C
*	368	80	Permeable Pavers
	4,590	84	Weighted Average
	2,712		59.08% Pervious Area
	1,878		40.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0500	1.69		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.12"
0.6	323	0.0400	8.95	55.95	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.50' Z= 0.0 & 50.0 '/' Top.W=25.00' n= 0.013
1.1	371	Total			

Summary for Subcatchment Pr2: Proposed Watershed

Runoff = 4.1 cfs @ 12.01 hrs, Volume= 13,546 cf, Depth= 7.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 100yr Rainfall=8.59"

Area (sf)	CN	Description
6,194	74	>75% Grass cover, Good, HSG C
201	98	Paved parking, HSG C
14,777	98	Roofs, HSG C
480	98	Paved parking, HSG C
21,652	91	Weighted Average
6,194		28.61% Pervious Area
15,458		71.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	25	0.2500	0.35		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.12"

Summary for Subcatchment Pr2a: Pavers

Runoff = 0.1 cfs @ 21.91 hrs, Volume= 4,909 cf, Depth= 8.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 100yr Rainfall=8.59"

	Area (sf)	CN	Description
*	7,055	98	Permeable Pavers
	7,055		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
790.0					**Direct Entry, Volume to Pavers**

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Summary for Subcatchment Pr2b: Proposed Watershed

Runoff   =   0.2 cfs @ 21.94 hrs, Volume=   11,996 cf, Depth= 7.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 100yr Rainfall=8.59"

Area (sf)	CN	Description
13,915	98	Roofs, HSG C
4,342	74	>75% Grass cover, Good, HSG C
615	98	Paved parking, HSG C
18,872	92	Weighted Average
4,342		23.01% Pervious Area
14,530		76.99% Impervious Area

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

Summary for Reach SP1: Study Point

Inflow Area =   4,590 sf, 40.92% Impervious, Inflow Depth = 6.66"   for 100yr event
Inflow   =   0.8 cfs @ 12.01 hrs, Volume=   2,549 cf
Outflow   =   0.8 cfs @ 12.01 hrs, Volume=   2,549 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Reach SP2: Study Point

Inflow Area =   47,579 sf, 77.86% Impervious, Inflow Depth = 3.42"   for 100yr event
Inflow   =   4.1 cfs @ 12.01 hrs, Volume=   13,546 cf
Outflow   =   4.1 cfs @ 12.01 hrs, Volume=   13,546 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3

Summary for Pond 1P: Storage under pavers

Inflow Area =   25,927 sf, 83.25% Impervious, Inflow Depth = 7.82"   for 100yr event
Inflow   =   0.3 cfs @ 21.93 hrs, Volume=   16,905 cf
Outflow   =   0.2 cfs @ 29.88 hrs, Volume=   16,923 cf, Atten= 55%, Lag= 477.2 min
Discarded =   0.2 cfs @ 29.88 hrs, Volume=   16,923 cf
Primary   =   0.0 cfs @   0.00 hrs, Volume=   0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs / 3
Peak Elev= 101.92' @ 29.88 hrs Surf.Area= 7,055 sf Storage= 5,422 cf

Plug-Flow detention time=(not calculated: outflow precedes inflow)
Center-of-Mass det. time=334.4 min (1,812.2 - 1,477.8)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	5,644 cf	**Custom Stage Data (Conic)**Listed below (Recalc)
			14,110 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
100.00	7,055	0	0	7,055
102.00	7,055	14,110	14,110	7,651

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	**0.850 in/hr Exfiltration over Wetted area**
#2	Primary	102.00'	**25.0' long x 25.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

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Discarded OutFlow Max=0.2 cfs @ 29.88 hrs HW=101.92' (Free Discharge)
└─1=**Exfiltration** (Exfiltration Controls 0.2 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=100.00' TW=0.00' (Dynamic Tailwater)
└─2=**Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

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