



August 8, 2014

Ms. Jean Fraser
City of Portland Planning Department
389 Congress
Portland, ME 04101

**Subject: Congress Street Convenience Store –Portland, Maine
Comment Response # 1
Response to City of Portland Comments of Jean Fraser Dated August 1, 2014**

Dear Ms. Fraser:

We have received and reviewed the email review comments dated August 1, 2014 regarding the Amended Site Plan for the 2282 Congress Street Convenience Store project. We have completed plan revisions related to these comments as well as revisions based on the client's value engineering requests. For ease of reference, we have repeated the comments (*italics*) followed by our response.

Comment 1

The parking spaces on the Congress St. side need to be set back 10' from the MTA property line.

Response

The accompanying plans have been modified to show the shifted parking spaces meeting the setback requirements from the MTA property line.

Comment 2

Add the "future" electric charging station to the plan (at those Congress St. side parking area)

Response

The accompanying plans now include a "future" electric charging station at the Congress Street side parking area.

Comment 3

Just put the building box "future CNG building" back on the plan (does not need to work grade wise)

Response

The "future CNG building" has been re-added to the plans per the comment.

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Comment 4

David needs to review the stormwater management plan closer because it is a change of direction in scope.

Response

See response to our peer review comments from David Senus dated August 5, below.

Comment 5

Architecture-Marge needs to see the revise elevation

Response

The Applicant's architect is completing updated building elevations which we will forward to you under separate cover in a few days.

Comment 6

Floor plan- Marge needs to see the revised elevations

Response

Same as above.

Comment 7

Site Lighting- Are there alternative fixtures available?-less institutional

Response

At this time, the applicant proposes no changes to the lighting fixtures that were originally approved.

Comment 8

Waiting for Tom Errico to confirm the off-site improvement plan

Response

We have included the offsite improvement plans in the plans accompanying this letter to allow Mr. Errico's final review. In addition to addressing City Staff's comments, the plan set has also been revised to include a list of value engineering items at the request of the developer. The following responses are provided to David Senus comments dated August 5, 2014:

Comment 1:

The project will disturb over one acre; as such, filing a notice of intent to comply with the Maine Construction General Permit is required. The Applicant should clarify the status of this filing.

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Response:

The Applicant intends to complete the Notice of Intent to Comply prior to construction. Evidence of this filing will be provided to the City Planning Department for your records.

Comment 2:

The Applicant obtained a Waste Discharge Permit from the MaineDEP and the Long Creek Watershed District in October of 2013, and has noted that an amended approval is being sought concurrent with the City submission. The Applicant provides a copy of the revised permit upon receipt.

Response:

It is the Applicant's intent to supply the City with evidence of MaineDEP's approval of the Waste Discharge Permit upon receipt.

Comment 3:

In accordance with Section 5 of the City of Portland's Technical Manual, a Level III Site Plan project is required to submit a stormwater management plan pursuant to the regulations of MaineDEP Chapter 50 Stormwater Management Rules, including conformance with the Basic, General, and Flooding Standards. We offer the following comments:

- a) Basic Standard: Plans, notes, and details have been provided to address erosion and sediment control requirements, inspection and maintenance requirements, and good housekeeping practices in general accordance with Appendix A, B, C, of MaineDEP Chapter 500.*
- b) General Standard: The proposed project will provide adequate stormwater quality control in compliance with the General Standards.*
- c) Flooding Standard: The Applicant has sufficiently demonstrated compliance with Flooding Standard for the 2, 10, & 25-year storm events.*

Response:

- a) No further response is required
- b) No further response is required
- c) No further response is required

Comment 4:

The Applicant should provide a detail for the reinforced turf spillway channel.

Response:

Detail F on Sheet C-8.6 is intended to describe the installation measures for the reinforced turf spillway.

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In addition to addressing City Staff comments, the plan set has also been revised to include a list of value engineering items requested by the applicant.

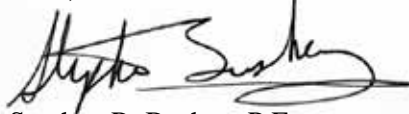
Below is a list of these plan revisions.

- The underground storage fuel tanks have been re-arranged to be stacked side by side to reduce the size of the reinforced concrete pad. See Sheet C-2.0.
- Curbing has been reduced around the perimeter of site. Grading alterations have been made to Sheet C-3.0 to accommodate these curb reductions.
- The location of the farm stand and picnic areas have been altered to reduce the size of the stone dust path. See Sheet C-2.0.
- Curb has been reduced in the parking stall island behind the ATM machine. Grading alterations have been made to Sheet C-3.0 to accommodate curb reductions.
- Curbing has been removed from the eight parking spaces along Congress Street.
- Heavy-duty pavement has been reduced in areas that will not see large truck traffic. These areas included passenger vehicle parking areas and area between the store and gas dispenser island. See Sheet C-2.0 for changes to heavy-duty pavement.
- As an option, a Focal Point™ biofiltration system has been added to the plan set. Please see attached supplemental Stormwater Report regarding what effect changing to a Focal Point™ system would have on the stormwater management system. We are including the Focal Point™ system simply as an optional treatment measure that would replace the underdrained soil filter median section of the proposed stormwater management basin.

If you have any questions regarding these responses, or require additional information, please contact this office.

Sincerely,

FAY, SPOFFORD & THORNDIKE



Stephen R. Bushey, P.E.
Senior Principal Engineer

SRB/cmd

Attachments:

- Supplemental Stormwater Report and Revised Post Development HydroCAD Results
- Focal Point™ Sizing Computations
- Revised Plans – Full Set

c: David Latulippe (electronically submitted)

**SUPPLEMENTAL STORMWATER REPORT AND
REVISED POST DEVELOPMENT HYDROCAD RESULTS**

SUPPLEMENTAL STORMWATER MANAGEMENT REPORT

CONGRESS STREET CONVENIENCE STORE AND FUEL STATION PORTLAND, MAINE

1.0 INTRODUCTION

The applicant is considering a second stormwater treatment option for the Congress Street convenience store project. This supplemental report is intended to analyze the impacts of using a Focal Point™ Bio-filtration system versus the originally proposed Grassed Underdrained Soil Filter. A Focal Point™ system has been proposed in the plan set as a Value Engineering option. The applicant may use a Focal Point™ system to reduce overall water quality filter area and overall site impacts. According to computations, using a Focal Point™ system would reduce the total filter area from 3,000 SF to 36 SF. The Focal Point™ system is designed to treat the entire water quality volume at a rate of 100 in/hr, which allows for a significant reduction in filter area. The stormwater detention basin is still designed to provide the same channel protection storage meeting the MeDEP General Standards Requirements. The open detention basin system will meet the flooding standards and manage the release of the 2, 10, and 25-year storm event to below predevelopment conditions as required by the City of Portland Stormwater Regulations. Both options consisting of a grassed underdrained soil filter or Focal Point™ filter have been designed to meet stormwater quality standards required under the general standards as outlined in the adopted MaineDEP Chapter 500 Stormwater Management Technical Manual.

2.0 WATER QUALITY DEVICE – FOCAL POINT™ BIO-FILTRATION SYSTEM

Focal Point™ Bio-Filtration systems are relatively new treatment systems. Focal Point™ systems utilize 18” inches of filter media that is placed below a specified planting arrangement. Focal Point™ systems are in the process of being able to be implemented without the need of a StormTech™ Isolator row (as comparatively required in a Filterra™ system) according to the MaineDEP. This is due to the ability of a Focal Point™ system to remove potential containments as effectively as the StormTech™ pretreatment system. The Focal Point™ system has the ability to force water through the system at a rate of 100 in/hr. This allows the water quality volume to go through the system efficiently while still providing the same level of treatment.

3.0 WATER QUALITY IMPACTS OF FOCAL POINT™ USE

The project requires 5,077 CF of water quality volume treatment. This is calculated based on 1” of tributary impervious area and 0.4” of tributary pervious area. The following table highlights the differences between the grassed underdrained soil filter and the Focal Point™ System with respect to water quality sizing:

TABLE 1 WATER QUALITY COMPARISON FOCAL POINT™ AND GRASSED UNDERDRAINED SOIL FILTER					
Water Quality System	Pervious Area Tributary to Treatment (SF)	Impervious Area Tributary to Treatment (SF)	Water Quality Volume (CF)	Filter Area Required* (SF)	Water Quality Depth (‘)
Focal Point™	24,454	50,748	5,077	36	1.2’
Grassed Underdrained Soil Filter	24,454	50,748	5,077	3,046	0.5’

*Filter area for Grassed Underdrained Soil Filter computed using 2% of pervious area plus 5% of impervious area. Filter Area for Focal Point™ computed assuming system can flow at a rate of 100 in/hr and thus being able to treat more volume over a smaller area.

Based on the treatment area remaining, the same the Focal Point™ system will still meet required treatment percentages according to MaineDEP Chapter 500 Stormwater Management Technical Manual. See previous report for treatment percent breakdown.

4.0 PEAK FLOW IMPACTS

The Focal Point™ system requires a maximum water ponding depth of 0.5’ in the stormwater detention basin. This requires water release controls inside of the outlet control structure A-1 to be lowered from 89.62’ to 88.92’. The change in outlet control elevations required a re-design of the outlet control structure. In order to control the 2-year peak flow a 3” orifice was computed to control the flow at the water quality elevation of 88.92’. This resulted in the following Detention Pond “0” impacts:

TABLE 2 DETENTION POND ‘0’ FOCAL POINT™ AND GRASSED UNDERDRAINED SOIL FILTER COMPARISON			
Water Quality System	25-year DET ‘0’ Peak Pond Outflow (CFS)	25-year DET ‘0’ Peak Stage (‘)	25-Year Peak DET ‘0’ Storage (CF)
Focal Point™	1.87	90.97’	12,830
Grassed Underdrain Filter	3.02	90.96’	12,745

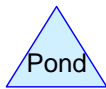
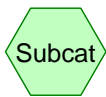
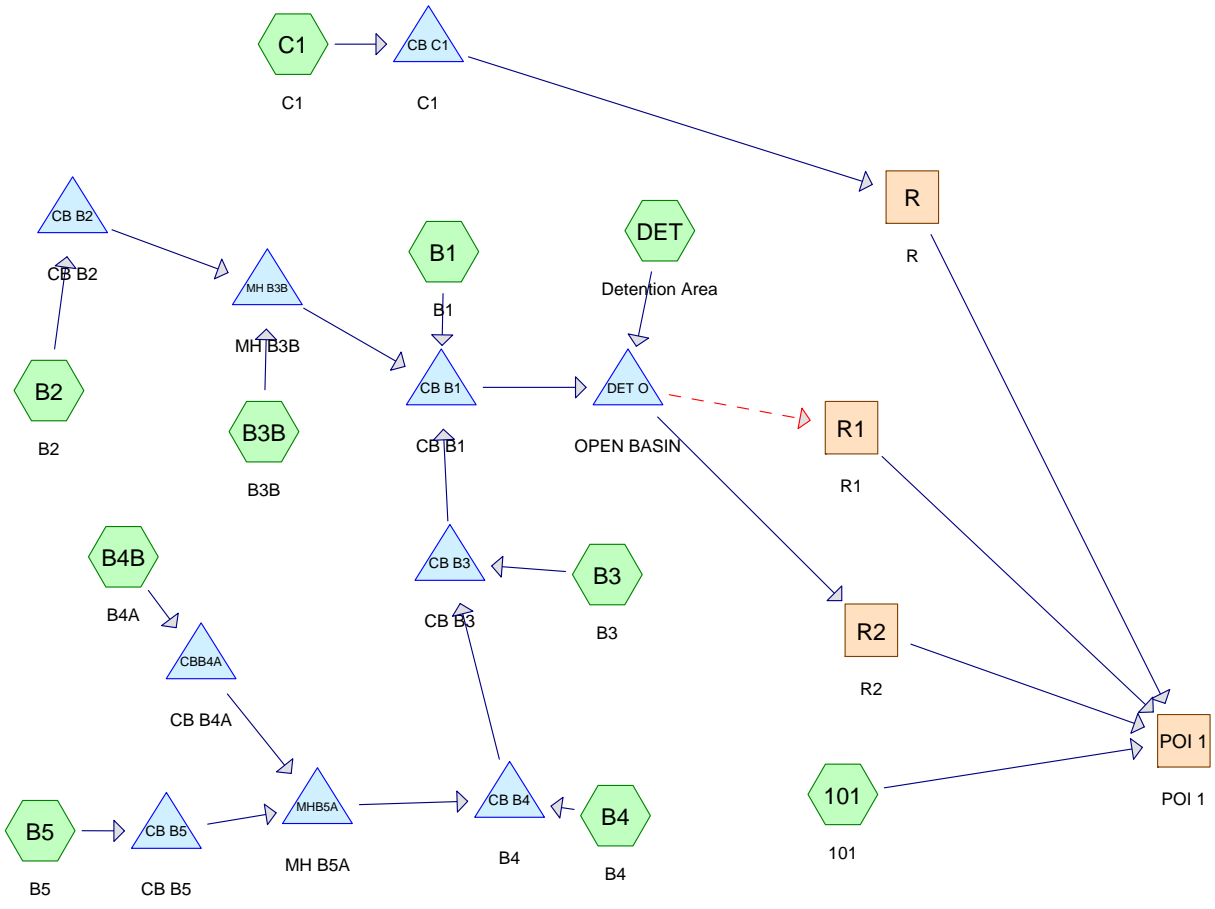
Based on the ability of the Focal Point™ system to release flow at a lower rate from the outlet control structure the following impacts on POI 1 were computed:

TABLE 3 PEAK FLOWS AT POI 1 FOCAL POINT™ AND GRASSED UNDERDRAINED SOIL FILTER COMPARISON						
Water Quality System	2-Year Pre development Flow (CFS)	10-Year Pre development Flow (CFS)	25-Year Pre development Flow (CFS)	2-Year Storm Flow (CFS)	10-Year Storm Flow (CFS)	25-Year Storm Flow (CFS)
Focal Point™ Option	2.86	7.18	9.42	2.35	5.38	7.07
Grassed Underdrain Filter Option	2.86	7.18	9.42	2.18	6.34	8.84

As shown both designed treatment systems will meet the flooding standards and manage the release of the 2, 10 and 25-year storm event to below predevelopment conditions as required by the City of Portland Stormwater Regulations.

The Applicant is requesting the right to make a selection between the grassed underdrained soil filter on the Focal Point™ system once full project pricing is practicable.

REVISED POST DEVELOPMENT HYDROCAD RESULTS



Drainage Diagram for 2014.07.25 POSTDEVELOPMENT FOCAL POINT

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.439	70	Woods, Good, HSG C (101,B2,B5)
1.016	71	Meadow, non-grazed, HSG C (101,B2,B5)
0.307	74	>75% Grass cover, Good, HSG C (B2,B4B,B5,DET)
0.743	77	Woods, Good, HSG D (101)
0.241	78	Meadow, non-grazed, HSG D (101)
0.099	89	Gravel roads, HSG C (101)
0.294	98	Paved parking & roofs (B3B,B4B)
1.160	98	Paved roads w/curbs & sewers (101,B1,B2,B3,B4,B5,C1)
4.299		TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
1.861	HSG C	101, B2, B4B, B5, DET
0.984	HSG D	101
1.454	Other	101, B1, B2, B3, B3B, B4, B4B, B5, C1
4.299		TOTAL AREA

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Type III 24-hr 2 YR Rainfall=3.00"

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 101: 101	Runoff Area=106,667 sf 7.69% Impervious Runoff Depth=1.02" Flow Length=102' Tc=16.1 min CN=76 Runoff=2.03 cfs 0.207 af
Subcatchment B1: B1	Runoff Area=8,879 sf 100.00% Impervious Runoff Depth=2.77" Tc=6.0 min CN=98 Runoff=0.59 cfs 0.047 af
Subcatchment B2: B2	Runoff Area=22,113 sf 55.19% Impervious Runoff Depth=1.66" Tc=6.0 min CN=86 Runoff=0.99 cfs 0.070 af
Subcatchment B3: B3	Runoff Area=4,242 sf 100.00% Impervious Runoff Depth=2.77" Tc=6.0 min CN=98 Runoff=0.28 cfs 0.022 af
Subcatchment B3B: B3B	Runoff Area=4,562 sf 100.00% Impervious Runoff Depth=2.77" Tc=6.0 min CN=98 Runoff=0.30 cfs 0.024 af
Subcatchment B4: B4	Runoff Area=2,843 sf 100.00% Impervious Runoff Depth=2.77" Tc=6.0 min CN=98 Runoff=0.19 cfs 0.015 af
Subcatchment B4B: B4A	Runoff Area=8,504 sf 96.88% Impervious Runoff Depth=2.66" Tc=6.0 min CN=97 Runoff=0.56 cfs 0.043 af
Subcatchment B5: B5	Runoff Area=14,208 sf 68.83% Impervious Runoff Depth=1.98" Tc=6.0 min CN=90 Runoff=0.75 cfs 0.054 af
Subcatchment C1: C1	Runoff Area=4,401 sf 100.00% Impervious Runoff Depth=2.77" Tc=6.0 min CN=98 Runoff=0.29 cfs 0.023 af
Subcatchment DET: Detention Area	Runoff Area=10,851 sf 0.00% Impervious Runoff Depth=0.91" Tc=6.0 min CN=74 Runoff=0.25 cfs 0.019 af
Reach POI 1: POI 1	Inflow=2.35 cfs 0.511 af Outflow=2.35 cfs 0.511 af
Reach R: R	Avg. Depth=0.04' Max Vel=0.19 fps Inflow=0.29 cfs 0.023 af n=0.200 L=354.0' S=0.0593 '/' Capacity=18.75 cfs Outflow=0.14 cfs 0.023 af
Reach R1: R1	Avg. Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.200 L=196.0' S=0.0306 '/' Capacity=64.45 cfs Outflow=0.00 cfs 0.000 af
Reach R2: R2	Avg. Depth=0.06' Max Vel=0.21 fps Inflow=0.30 cfs 0.282 af n=0.200 L=138.0' S=0.0435 '/' Capacity=121.42 cfs Outflow=0.30 cfs 0.281 af
Pond CB B1: CB B1	Inflow=3.67 cfs 0.276 af Primary=3.67 cfs 0.276 af
Pond CB B2: CB B2	Inflow=0.99 cfs 0.070 af Primary=0.99 cfs 0.070 af

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Pond CB B3: CB B3

Inflow=1.78 cfs 0.135 af
Primary=1.78 cfs 0.135 af

Pond CB B4: B4

Inflow=1.50 cfs 0.112 af
Primary=1.50 cfs 0.112 af

Pond CB B5: CB B5

Inflow=0.75 cfs 0.054 af
Primary=0.75 cfs 0.054 af

Pond CB C1: C1

Inflow=0.29 cfs 0.023 af
Primary=0.29 cfs 0.023 af

Pond CBB4A: CB B4A

Inflow=0.56 cfs 0.043 af
Primary=0.56 cfs 0.043 af

Pond DET O: OPEN BASIN

Peak Elev=89.80' Storage=6,232 cf Inflow=3.91 cfs 0.295 af
Primary=0.30 cfs 0.282 af Secondary=0.00 cfs 0.000 af Outflow=0.30 cfs 0.282 af

Pond MH B3B: MH B3B

Inflow=1.29 cfs 0.094 af
Primary=1.29 cfs 0.094 af

Pond MHB5A: MH B5A

Inflow=1.31 cfs 0.097 af
Primary=1.31 cfs 0.097 af

Total Runoff Area = 4.299 ac Runoff Volume = 0.526 af Average Runoff Depth = 1.47"
66.17% Pervious = 2.845 ac 33.83% Impervious = 1.454 ac

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Summary for Subcatchment 101: 101

Runoff = 2.03 cfs @ 12.24 hrs, Volume= 0.207 af, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.00"

Area (sf)	CN	Description
8,201	98	Paved roads w/curbs & sewers
4,313	89	Gravel roads, HSG C
13,704	70	Woods, Good, HSG C
37,589	71	Meadow, non-grazed, HSG C
10,508	78	Meadow, non-grazed, HSG D
32,352	77	Woods, Good, HSG D
106,667	76	Weighted Average
98,466		Pervious Area
8,201		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	90	0.0370	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.2	12	0.0400	1.00		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.1	102	Total			

Summary for Subcatchment B1: B1

Runoff = 0.59 cfs @ 12.08 hrs, Volume= 0.047 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.00"

Area (sf)	CN	Description
8,879	98	Paved roads w/curbs & sewers
8,879		Impervious Area

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

Summary for Subcatchment B2: B2

Runoff = 0.99 cfs @ 12.09 hrs, Volume= 0.070 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.00"

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Area (sf)	CN	Description
12,204	98	Paved roads w/curbs & sewers
3,238	70	Woods, Good, HSG C
5,811	71	Meadow, non-grazed, HSG C
860	74	>75% Grass cover, Good, HSG C
22,113	86	Weighted Average
9,909		Pervious Area
12,204		Impervious Area

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

Summary for Subcatchment B3: B3

Runoff = 0.28 cfs @ 12.08 hrs, Volume= 0.022 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.00"

Area (sf)	CN	Description
4,242	98	Paved roads w/curbs & sewers
4,242		Impervious Area

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

Summary for Subcatchment B3B: B3B

Runoff = 0.30 cfs @ 12.08 hrs, Volume= 0.024 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.00"

Area (sf)	CN	Description
4,562	98	Paved parking & roofs
4,562		Impervious Area

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

Summary for Subcatchment B4: B4

Runoff = 0.19 cfs @ 12.08 hrs, Volume= 0.015 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.00"

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Type III 24-hr 2 YR Rainfall=3.00"

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Area (sf)	CN	Description
2,843	98	Paved roads w/curbs & sewers
2,843		Impervious Area

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

Summary for Subcatchment B4B: B4A

Runoff = 0.56 cfs @ 12.08 hrs, Volume= 0.043 af, Depth= 2.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.00"

Area (sf)	CN	Description
8,239	98	Paved parking & roofs
265	74	>75% Grass cover, Good, HSG C
8,504	97	Weighted Average
265		Pervious Area
8,239		Impervious Area

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

Summary for Subcatchment B5: B5

Runoff = 0.75 cfs @ 12.09 hrs, Volume= 0.054 af, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.00"

Area (sf)	CN	Description
9,780	98	Paved roads w/curbs & sewers
2,175	70	Woods, Good, HSG C
868	71	Meadow, non-grazed, HSG C
1,385	74	>75% Grass cover, Good, HSG C
14,208	90	Weighted Average
4,428		Pervious Area
9,780		Impervious Area

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

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Type III 24-hr 2 YR Rainfall=3.00"

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Summary for Subcatchment C1: C1

Runoff = 0.29 cfs @ 12.08 hrs, Volume= 0.023 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.00"

Area (sf)	CN	Description
4,401	98	Paved roads w/curbs & sewers
4,401		Impervious Area

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

Summary for Subcatchment DET: Detention Area

Runoff = 0.25 cfs @ 12.10 hrs, Volume= 0.019 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.00"

Area (sf)	CN	Description
10,851	74	>75% Grass cover, Good, HSG C
10,851		Pervious Area

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

Summary for Reach POI 1: POI 1

Inflow Area = 4.299 ac, 33.83% Impervious, Inflow Depth > 1.43" for 2 YR event
Inflow = 2.35 cfs @ 12.25 hrs, Volume= 0.511 af
Outflow = 2.35 cfs @ 12.25 hrs, Volume= 0.511 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Reach R: R

Inflow Area = 0.101 ac, 100.00% Impervious, Inflow Depth = 2.77" for 2 YR event
Inflow = 0.29 cfs @ 12.08 hrs, Volume= 0.023 af
Outflow = 0.14 cfs @ 12.24 hrs, Volume= 0.023 af, Atten= 53%, Lag= 9.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 31.3 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 90.2 min

Peak Storage= 261 cf @ 12.24 hrs, Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 18.75 cfs

18.00' x 0.50' deep channel, n= 0.200 Sheet flow: Woods+light brush
Side Slope Z-value= 54.0 '/' Top Width= 72.00'
Length= 354.0' Slope= 0.0593 '/'
Inlet Invert= 95.00', Outlet Invert= 74.00'



Summary for Reach R1: R1

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 64.45 cfs

18.00' x 1.00' deep channel, n= 0.200 Sheet flow: Woods+light brush
Side Slope Z-value= 54.0 '/' Top Width= 126.00'
Length= 196.0' Slope= 0.0306 '/'
Inlet Invert= 80.00', Outlet Invert= 74.00'



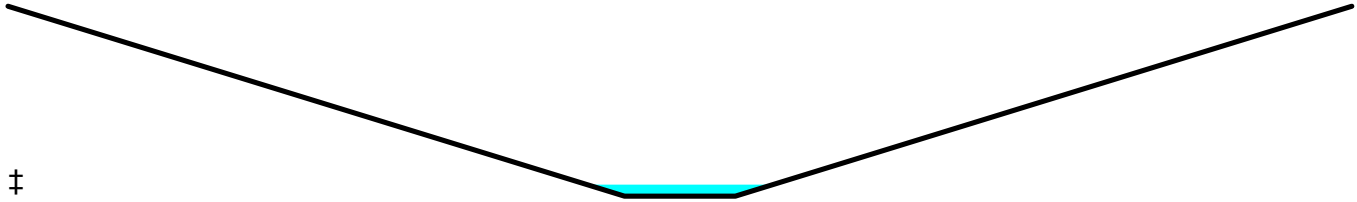
Summary for Reach R2: R2

Inflow Area =	1.749 ac, 66.60% Impervious, Inflow Depth > 1.94"	for 2 YR event
Inflow	=	0.30 cfs @ 13.37 hrs, Volume= 0.282 af
Outflow	=	0.30 cfs @ 13.52 hrs, Volume= 0.281 af, Atten= 0%, Lag= 8.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.21 fps, Min. Travel Time= 11.2 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 16.3 min

Peak Storage= 200 cf @ 13.52 hrs, Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 121.42 cfs

18.00' x 1.00' deep channel, n= 0.200 Sheet flow: Woods+light brush
Side Slope Z-value= 100.0 '/' Top Width= 218.00'
Length= 138.0' Slope= 0.0435 '/'
Inlet Invert= 80.00', Outlet Invert= 74.00'



Summary for Pond CB B1: CB B1

Inflow Area = 1.500 ac, 77.66% Impervious, Inflow Depth = 2.21" for 2 YR event
Inflow = 3.67 cfs @ 12.09 hrs, Volume= 0.276 af
Primary = 3.67 cfs @ 12.09 hrs, Volume= 0.276 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB B2: CB B2

Inflow Area = 0.508 ac, 55.19% Impervious, Inflow Depth = 1.66" for 2 YR event
Inflow = 0.99 cfs @ 12.09 hrs, Volume= 0.070 af
Primary = 0.99 cfs @ 12.09 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB B3: CB B3

Inflow Area = 0.684 ac, 84.25% Impervious, Inflow Depth = 2.36" for 2 YR event
Inflow = 1.78 cfs @ 12.08 hrs, Volume= 0.135 af
Primary = 1.78 cfs @ 12.08 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB B4: B4

Inflow Area = 0.587 ac, 81.64% Impervious, Inflow Depth = 2.30" for 2 YR event
Inflow = 1.50 cfs @ 12.09 hrs, Volume= 0.112 af
Primary = 1.50 cfs @ 12.09 hrs, Volume= 0.112 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB B5: CB B5

Inflow Area = 0.326 ac, 68.83% Impervious, Inflow Depth = 1.98" for 2 YR event
Inflow = 0.75 cfs @ 12.09 hrs, Volume= 0.054 af
Primary = 0.75 cfs @ 12.09 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB C1: C1

Inflow Area = 0.101 ac, 100.00% Impervious, Inflow Depth = 2.77" for 2 YR event
 Inflow = 0.29 cfs @ 12.08 hrs, Volume= 0.023 af
 Primary = 0.29 cfs @ 12.08 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CBB4A: CB B4A

Inflow Area = 0.195 ac, 96.88% Impervious, Inflow Depth = 2.66" for 2 YR event
 Inflow = 0.56 cfs @ 12.08 hrs, Volume= 0.043 af
 Primary = 0.56 cfs @ 12.08 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond DET O: OPEN BASIN

Inflow Area = 1.749 ac, 66.60% Impervious, Inflow Depth = 2.02" for 2 YR event
 Inflow = 3.91 cfs @ 12.09 hrs, Volume= 0.295 af
 Outflow = 0.30 cfs @ 13.37 hrs, Volume= 0.282 af, Atten= 92%, Lag= 77.3 min
 Primary = 0.30 cfs @ 13.37 hrs, Volume= 0.282 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 89.80' @ 13.37 hrs Surf.Area= 5,095 sf Storage= 6,232 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 251.8 min (1,043.5 - 791.7)

Volume	Invert	Avail.Storage	Storage Description
#1	88.42'	19,677 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
88.42	3,965	0	0
89.00	4,433	2,435	2,435
90.00	5,263	4,848	7,283
91.00	6,192	5,728	13,011
92.00	7,141	6,667	19,677

Device	Routing	Invert	Outlet Devices
#1	Primary	85.32'	24.0" x 60.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 81.50' S= 0.0637 '/ Cc= 0.900 n= 0.012
#2	Secondary	91.10'	13.0' long x 14.0' 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) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63
#3	Device 1	90.50'	1.5' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 1	88.92'	3.0" Vert. Orifice/Grate C= 0.600

#5 Device 1 85.42' 1.3" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=0.30 cfs @ 13.37 hrs HW=89.80' TW=80.06' (Dynamic Tailwater)

- ↑ 1=Culvert (Passes 0.30 cfs of 22.27 cfs potential flow)
- ↑ 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- ↑ 4=Orifice/Grate (Orifice Controls 0.20 cfs @ 4.18 fps)
- ↑ 5=Orifice/Grate (Orifice Controls 0.09 cfs @ 10.01 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=88.42' TW=80.00' (Dynamic Tailwater)

- ↑ 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond MH B3B: MH B3B

Inflow Area = 0.612 ac, 62.85% Impervious, Inflow Depth = 1.85" for 2 YR event
 Inflow = 1.29 cfs @ 12.09 hrs, Volume= 0.094 af
 Primary = 1.29 cfs @ 12.09 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond MHB5A: MH B5A

Inflow Area = 0.521 ac, 79.34% Impervious, Inflow Depth = 2.24" for 2 YR event
 Inflow = 1.31 cfs @ 12.09 hrs, Volume= 0.097 af
 Primary = 1.31 cfs @ 12.09 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 101: 101	Runoff Area=106,667 sf 7.69% Impervious Runoff Depth=2.29" Flow Length=102' Tc=16.1 min CN=76 Runoff=4.82 cfs 0.467 af
Subcatchment B1: B1	Runoff Area=8,879 sf 100.00% Impervious Runoff Depth=4.46" Tc=6.0 min CN=98 Runoff=0.94 cfs 0.076 af
Subcatchment B2: B2	Runoff Area=22,113 sf 55.19% Impervious Runoff Depth=3.19" Tc=6.0 min CN=86 Runoff=1.88 cfs 0.135 af
Subcatchment B3: B3	Runoff Area=4,242 sf 100.00% Impervious Runoff Depth=4.46" Tc=6.0 min CN=98 Runoff=0.45 cfs 0.036 af
Subcatchment B3B: B3B	Runoff Area=4,562 sf 100.00% Impervious Runoff Depth=4.46" Tc=6.0 min CN=98 Runoff=0.48 cfs 0.039 af
Subcatchment B4: B4	Runoff Area=2,843 sf 100.00% Impervious Runoff Depth=4.46" Tc=6.0 min CN=98 Runoff=0.30 cfs 0.024 af
Subcatchment B4B: B4A	Runoff Area=8,504 sf 96.88% Impervious Runoff Depth=4.35" Tc=6.0 min CN=97 Runoff=0.89 cfs 0.071 af
Subcatchment B5: B5	Runoff Area=14,208 sf 68.83% Impervious Runoff Depth=3.59" Tc=6.0 min CN=90 Runoff=1.33 cfs 0.098 af
Subcatchment C1: C1	Runoff Area=4,401 sf 100.00% Impervious Runoff Depth=4.46" Tc=6.0 min CN=98 Runoff=0.46 cfs 0.038 af
Subcatchment DET: Detention Area	Runoff Area=10,851 sf 0.00% Impervious Runoff Depth=2.13" Tc=6.0 min CN=74 Runoff=0.62 cfs 0.044 af
Reach POI 1: POI 1	Inflow=5.38 cfs 0.991 af Outflow=5.38 cfs 0.991 af
Reach R: R	Avg. Depth=0.05' Max Vel=0.23 fps Inflow=0.46 cfs 0.038 af n=0.200 L=354.0' S=0.0593 '/' Capacity=18.75 cfs Outflow=0.24 cfs 0.038 af
Reach R1: R1	Avg. Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.200 L=196.0' S=0.0306 '/' Capacity=64.45 cfs Outflow=0.00 cfs 0.000 af
Reach R2: R2	Avg. Depth=0.10' Max Vel=0.28 fps Inflow=0.86 cfs 0.488 af n=0.200 L=138.0' S=0.0435 '/' Capacity=121.42 cfs Outflow=0.84 cfs 0.486 af
Pond CB B1: CB B1	Inflow=6.26 cfs 0.478 af Primary=6.26 cfs 0.478 af
Pond CB B2: CB B2	Inflow=1.88 cfs 0.135 af Primary=1.88 cfs 0.135 af

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Pond CB B3: CB B3

Inflow=2.97 cfs 0.229 af
Primary=2.97 cfs 0.229 af

Pond CB B4: B4

Inflow=2.52 cfs 0.193 af
Primary=2.52 cfs 0.193 af

Pond CB B5: CB B5

Inflow=1.33 cfs 0.098 af
Primary=1.33 cfs 0.098 af

Pond CB C1: C1

Inflow=0.46 cfs 0.038 af
Primary=0.46 cfs 0.038 af

Pond CBB4A: CB B4A

Inflow=0.89 cfs 0.071 af
Primary=0.89 cfs 0.071 af

Pond DET O: OPEN BASIN

Peak Elev=90.72' Storage=11,338 cf Inflow=6.87 cfs 0.523 af
Primary=0.86 cfs 0.488 af Secondary=0.00 cfs 0.000 af Outflow=0.86 cfs 0.488 af

Pond MH B3B: MH B3B

Inflow=2.36 cfs 0.174 af
Primary=2.36 cfs 0.174 af

Pond MHB5A: MH B5A

Inflow=2.22 cfs 0.168 af
Primary=2.22 cfs 0.168 af

Total Runoff Area = 4.299 ac Runoff Volume = 1.028 af Average Runoff Depth = 2.87"
66.17% Pervious = 2.845 ac 33.83% Impervious = 1.454 ac

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Type III 24-hr 10 YR Rainfall=4.70"

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Summary for Subcatchment 101: 101

Runoff = 4.82 cfs @ 12.22 hrs, Volume= 0.467 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.70"

Area (sf)	CN	Description
8,201	98	Paved roads w/curbs & sewers
4,313	89	Gravel roads, HSG C
13,704	70	Woods, Good, HSG C
37,589	71	Meadow, non-grazed, HSG C
10,508	78	Meadow, non-grazed, HSG D
32,352	77	Woods, Good, HSG D
106,667	76	Weighted Average
98,466		Pervious Area
8,201		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	90	0.0370	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.2	12	0.0400	1.00		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.1	102	Total			

Summary for Subcatchment B1: B1

Runoff = 0.94 cfs @ 12.08 hrs, Volume= 0.076 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.70"

Area (sf)	CN	Description
8,879	98	Paved roads w/curbs & sewers
8,879		Impervious Area

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

Summary for Subcatchment B2: B2

Runoff = 1.88 cfs @ 12.09 hrs, Volume= 0.135 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.70"

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Type III 24-hr 10 YR Rainfall=4.70"

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Area (sf)	CN	Description
12,204	98	Paved roads w/curbs & sewers
3,238	70	Woods, Good, HSG C
5,811	71	Meadow, non-grazed, HSG C
860	74	>75% Grass cover, Good, HSG C
22,113	86	Weighted Average
9,909		Pervious Area
12,204		Impervious Area

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

Summary for Subcatchment B3: B3

Runoff = 0.45 cfs @ 12.08 hrs, Volume= 0.036 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.70"

Area (sf)	CN	Description
4,242	98	Paved roads w/curbs & sewers
4,242		Impervious Area

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

Summary for Subcatchment B3B: B3B

Runoff = 0.48 cfs @ 12.08 hrs, Volume= 0.039 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.70"

Area (sf)	CN	Description
4,562	98	Paved parking & roofs
4,562		Impervious Area

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

Summary for Subcatchment B4: B4

Runoff = 0.30 cfs @ 12.08 hrs, Volume= 0.024 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.70"

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Type III 24-hr 10 YR Rainfall=4.70"

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Area (sf)	CN	Description
2,843	98	Paved roads w/curbs & sewers
2,843		Impervious Area

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

Summary for Subcatchment B4B: B4A

Runoff = 0.89 cfs @ 12.08 hrs, Volume= 0.071 af, Depth= 4.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.70"

Area (sf)	CN	Description
8,239	98	Paved parking & roofs
265	74	>75% Grass cover, Good, HSG C
8,504	97	Weighted Average
265		Pervious Area
8,239		Impervious Area

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

Summary for Subcatchment B5: B5

Runoff = 1.33 cfs @ 12.09 hrs, Volume= 0.098 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.70"

Area (sf)	CN	Description
9,780	98	Paved roads w/curbs & sewers
2,175	70	Woods, Good, HSG C
868	71	Meadow, non-grazed, HSG C
1,385	74	>75% Grass cover, Good, HSG C
14,208	90	Weighted Average
4,428		Pervious Area
9,780		Impervious Area

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

Summary for Subcatchment C1: C1

Runoff = 0.46 cfs @ 12.08 hrs, Volume= 0.038 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.70"

Area (sf)	CN	Description
4,401	98	Paved roads w/curbs & sewers
4,401		Impervious Area

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

Summary for Subcatchment DET: Detention Area

Runoff = 0.62 cfs @ 12.09 hrs, Volume= 0.044 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.70"

Area (sf)	CN	Description
10,851	74	>75% Grass cover, Good, HSG C
10,851		Pervious Area

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

Summary for Reach POI 1: POI 1

Inflow Area = 4.299 ac, 33.83% Impervious, Inflow Depth > 2.77" for 10 YR event
Inflow = 5.38 cfs @ 12.22 hrs, Volume= 0.991 af
Outflow = 5.38 cfs @ 12.22 hrs, Volume= 0.991 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Reach R: R

Inflow Area = 0.101 ac, 100.00% Impervious, Inflow Depth = 4.46" for 10 YR event
Inflow = 0.46 cfs @ 12.08 hrs, Volume= 0.038 af
Outflow = 0.24 cfs @ 12.22 hrs, Volume= 0.038 af, Atten= 48%, Lag= 7.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.23 fps, Min. Travel Time= 25.9 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 80.8 min

Peak Storage= 372 cf @ 12.22 hrs, Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 18.75 cfs

18.00' x 0.50' deep channel, n= 0.200 Sheet flow: Woods+light brush
Side Slope Z-value= 54.0 '/' Top Width= 72.00'
Length= 354.0' Slope= 0.0593 '/'
Inlet Invert= 95.00', Outlet Invert= 74.00'



Summary for Reach R1: R1

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 64.45 cfs

18.00' x 1.00' deep channel, n= 0.200 Sheet flow: Woods+light brush
Side Slope Z-value= 54.0 '/' Top Width= 126.00'
Length= 196.0' Slope= 0.0306 '/'
Inlet Invert= 80.00', Outlet Invert= 74.00'



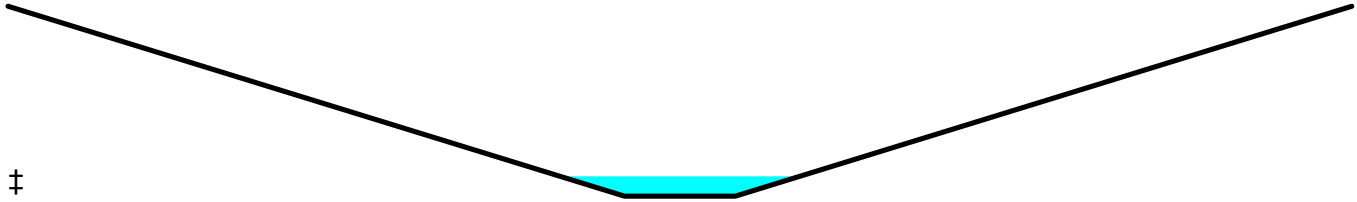
Summary for Reach R2: R2

Inflow Area =	1.749 ac, 66.60% Impervious, Inflow Depth > 3.35"	for 10 YR event
Inflow	=	0.86 cfs @ 12.67 hrs, Volume= 0.488 af
Outflow	=	0.84 cfs @ 12.83 hrs, Volume= 0.486 af, Atten= 2%, Lag= 9.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.28 fps, Min. Travel Time= 8.2 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 14.1 min

Peak Storage= 413 cf @ 12.83 hrs, Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 121.42 cfs

18.00' x 1.00' deep channel, n= 0.200 Sheet flow: Woods+light brush
Side Slope Z-value= 100.0 '/' Top Width= 218.00'
Length= 138.0' Slope= 0.0435 '/'
Inlet Invert= 80.00', Outlet Invert= 74.00'



Summary for Pond CB B1: CB B1

Inflow Area = 1.500 ac, 77.66% Impervious, Inflow Depth = 3.83" for 10 YR event
Inflow = 6.26 cfs @ 12.08 hrs, Volume= 0.478 af
Primary = 6.26 cfs @ 12.08 hrs, Volume= 0.478 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB B2: CB B2

Inflow Area = 0.508 ac, 55.19% Impervious, Inflow Depth = 3.19" for 10 YR event
Inflow = 1.88 cfs @ 12.09 hrs, Volume= 0.135 af
Primary = 1.88 cfs @ 12.09 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB B3: CB B3

Inflow Area = 0.684 ac, 84.25% Impervious, Inflow Depth = 4.01" for 10 YR event
Inflow = 2.97 cfs @ 12.08 hrs, Volume= 0.229 af
Primary = 2.97 cfs @ 12.08 hrs, Volume= 0.229 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB B4: B4

Inflow Area = 0.587 ac, 81.64% Impervious, Inflow Depth = 3.94" for 10 YR event
Inflow = 2.52 cfs @ 12.08 hrs, Volume= 0.193 af
Primary = 2.52 cfs @ 12.08 hrs, Volume= 0.193 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB B5: CB B5

Inflow Area = 0.326 ac, 68.83% Impervious, Inflow Depth = 3.59" for 10 YR event
Inflow = 1.33 cfs @ 12.09 hrs, Volume= 0.098 af
Primary = 1.33 cfs @ 12.09 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB C1: C1

Inflow Area = 0.101 ac, 100.00% Impervious, Inflow Depth = 4.46" for 10 YR event
 Inflow = 0.46 cfs @ 12.08 hrs, Volume= 0.038 af
 Primary = 0.46 cfs @ 12.08 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CBB4A: CB B4A

Inflow Area = 0.195 ac, 96.88% Impervious, Inflow Depth = 4.35" for 10 YR event
 Inflow = 0.89 cfs @ 12.08 hrs, Volume= 0.071 af
 Primary = 0.89 cfs @ 12.08 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond DET O: OPEN BASIN

Inflow Area = 1.749 ac, 66.60% Impervious, Inflow Depth = 3.58" for 10 YR event
 Inflow = 6.87 cfs @ 12.09 hrs, Volume= 0.523 af
 Outflow = 0.86 cfs @ 12.67 hrs, Volume= 0.488 af, Atten= 88%, Lag= 34.9 min
 Primary = 0.86 cfs @ 12.67 hrs, Volume= 0.488 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 90.72' @ 12.67 hrs Surf.Area= 5,936 sf Storage= 11,338 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 252.8 min (1,033.8 - 780.9)

Volume	Invert	Avail.Storage	Storage Description
#1	88.42'	19,677 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
88.42	3,965	0	0
89.00	4,433	2,435	2,435
90.00	5,263	4,848	7,283
91.00	6,192	5,728	13,011
92.00	7,141	6,667	19,677

Device	Routing	Invert	Outlet Devices
#1	Primary	85.32'	24.0" x 60.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 81.50' S= 0.0637 '/ Cc= 0.900 n= 0.012
#2	Secondary	91.10'	13.0' long x 14.0' 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) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63
#3	Device 1	90.50'	1.5' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 1	88.92'	3.0" Vert. Orifice/Grate C= 0.600

#5 Device 1 85.42' 1.3" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=0.86 cfs @ 12.67 hrs HW=90.72' TW=80.10' (Dynamic Tailwater)

- ↑ 1=Culvert (Passes 0.86 cfs of 25.06 cfs potential flow)
- ↑ 3=Broad-Crested Rectangular Weir (Weir Controls 0.45 cfs @ 1.33 fps)
- ↑ 4=Orifice/Grate (Orifice Controls 0.31 cfs @ 6.24 fps)
- ↑ 5=Orifice/Grate (Orifice Controls 0.10 cfs @ 11.03 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=88.42' TW=80.00' (Dynamic Tailwater)

- ↑ 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond MH B3B: MH B3B

Inflow Area = 0.612 ac, 62.85% Impervious, Inflow Depth = 3.41" for 10 YR event
 Inflow = 2.36 cfs @ 12.09 hrs, Volume= 0.174 af
 Primary = 2.36 cfs @ 12.09 hrs, Volume= 0.174 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond MHB5A: MH B5A

Inflow Area = 0.521 ac, 79.34% Impervious, Inflow Depth = 3.87" for 10 YR event
 Inflow = 2.22 cfs @ 12.08 hrs, Volume= 0.168 af
 Primary = 2.22 cfs @ 12.08 hrs, Volume= 0.168 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 101: 101	Runoff Area=106,667 sf 7.69% Impervious Runoff Depth=2.95" Flow Length=102' Tc=16.1 min CN=76 Runoff=6.25 cfs 0.603 af
Subcatchment B1: B1	Runoff Area=8,879 sf 100.00% Impervious Runoff Depth=5.26" Tc=6.0 min CN=98 Runoff=1.10 cfs 0.089 af
Subcatchment B2: B2	Runoff Area=22,113 sf 55.19% Impervious Runoff Depth=3.94" Tc=6.0 min CN=86 Runoff=2.30 cfs 0.167 af
Subcatchment B3: B3	Runoff Area=4,242 sf 100.00% Impervious Runoff Depth=5.26" Tc=6.0 min CN=98 Runoff=0.52 cfs 0.043 af
Subcatchment B3B: B3B	Runoff Area=4,562 sf 100.00% Impervious Runoff Depth=5.26" Tc=6.0 min CN=98 Runoff=0.56 cfs 0.046 af
Subcatchment B4: B4	Runoff Area=2,843 sf 100.00% Impervious Runoff Depth=5.26" Tc=6.0 min CN=98 Runoff=0.35 cfs 0.029 af
Subcatchment B4B: B4A	Runoff Area=8,504 sf 96.88% Impervious Runoff Depth=5.15" Tc=6.0 min CN=97 Runoff=1.05 cfs 0.084 af
Subcatchment B5: B5	Runoff Area=14,208 sf 68.83% Impervious Runoff Depth=4.36" Tc=6.0 min CN=90 Runoff=1.60 cfs 0.119 af
Subcatchment C1: C1	Runoff Area=4,401 sf 100.00% Impervious Runoff Depth=5.26" Tc=6.0 min CN=98 Runoff=0.54 cfs 0.044 af
Subcatchment DET: Detention Area	Runoff Area=10,851 sf 0.00% Impervious Runoff Depth=2.77" Tc=6.0 min CN=74 Runoff=0.81 cfs 0.057 af
Reach POI 1: POI 1	Inflow=7.07 cfs 1.239 af Outflow=7.07 cfs 1.239 af
Reach R: R	Avg. Depth=0.06' Max Vel=0.24 fps Inflow=0.54 cfs 0.044 af n=0.200 L=354.0' S=0.0593 '/' Capacity=18.75 cfs Outflow=0.29 cfs 0.044 af
Reach R1: R1	Avg. Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af n=0.200 L=196.0' S=0.0306 '/' Capacity=64.45 cfs Outflow=0.00 cfs 0.000 af
Reach R2: R2	Avg. Depth=0.15' Max Vel=0.35 fps Inflow=1.87 cfs 0.594 af n=0.200 L=138.0' S=0.0435 '/' Capacity=121.42 cfs Outflow=1.79 cfs 0.592 af
Pond CB B1: CB B1	Inflow=7.48 cfs 0.575 af Primary=7.48 cfs 0.575 af
Pond CB B2: CB B2	Inflow=2.30 cfs 0.167 af Primary=2.30 cfs 0.167 af

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Pond CB B3: CB B3

Inflow=3.52 cfs 0.274 af
Primary=3.52 cfs 0.274 af

Pond CB B4: B4

Inflow=3.00 cfs 0.231 af
Primary=3.00 cfs 0.231 af

Pond CB B5: CB B5

Inflow=1.60 cfs 0.119 af
Primary=1.60 cfs 0.119 af

Pond CB C1: C1

Inflow=0.54 cfs 0.044 af
Primary=0.54 cfs 0.044 af

Pond CBB4A: CB B4A

Inflow=1.05 cfs 0.084 af
Primary=1.05 cfs 0.084 af

Pond DET O: OPEN BASIN

Peak Elev=90.97' Storage=12,830 cf Inflow=8.29 cfs 0.633 af
Primary=1.87 cfs 0.594 af Secondary=0.00 cfs 0.000 af Outflow=1.87 cfs 0.594 af

Pond MH B3B: MH B3B

Inflow=2.86 cfs 0.212 af
Primary=2.86 cfs 0.212 af

Pond MHB5A: MH B5A

Inflow=2.64 cfs 0.202 af
Primary=2.64 cfs 0.202 af

Total Runoff Area = 4.299 ac Runoff Volume = 1.280 af Average Runoff Depth = 3.57"
66.17% Pervious = 2.845 ac 33.83% Impervious = 1.454 ac

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Type III 24-hr 25 YR Rainfall=5.50"

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Summary for Subcatchment 101: 101

Runoff = 6.25 cfs @ 12.22 hrs, Volume= 0.603 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
8,201	98	Paved roads w/curbs & sewers
4,313	89	Gravel roads, HSG C
13,704	70	Woods, Good, HSG C
37,589	71	Meadow, non-grazed, HSG C
10,508	78	Meadow, non-grazed, HSG D
32,352	77	Woods, Good, HSG D
106,667	76	Weighted Average
98,466		Pervious Area
8,201		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	90	0.0370	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.2	12	0.0400	1.00		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.1	102	Total			

Summary for Subcatchment B1: B1

Runoff = 1.10 cfs @ 12.08 hrs, Volume= 0.089 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
8,879	98	Paved roads w/curbs & sewers
8,879		Impervious Area

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

Summary for Subcatchment B2: B2

Runoff = 2.30 cfs @ 12.09 hrs, Volume= 0.167 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

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Type III 24-hr 25 YR Rainfall=5.50"

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Area (sf)	CN	Description
12,204	98	Paved roads w/curbs & sewers
3,238	70	Woods, Good, HSG C
5,811	71	Meadow, non-grazed, HSG C
860	74	>75% Grass cover, Good, HSG C
22,113	86	Weighted Average
9,909		Pervious Area
12,204		Impervious Area

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

Summary for Subcatchment B3: B3

Runoff = 0.52 cfs @ 12.08 hrs, Volume= 0.043 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
4,242	98	Paved roads w/curbs & sewers
4,242		Impervious Area

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

Summary for Subcatchment B3B: B3B

Runoff = 0.56 cfs @ 12.08 hrs, Volume= 0.046 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
4,562	98	Paved parking & roofs
4,562		Impervious Area

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

Summary for Subcatchment B4: B4

Runoff = 0.35 cfs @ 12.08 hrs, Volume= 0.029 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

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Type III 24-hr 25 YR Rainfall=5.50"

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Area (sf)	CN	Description
2,843	98	Paved roads w/curbs & sewers
2,843		Impervious Area

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

Summary for Subcatchment B4B: B4A

Runoff = 1.05 cfs @ 12.08 hrs, Volume= 0.084 af, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
8,239	98	Paved parking & roofs
265	74	>75% Grass cover, Good, HSG C
8,504	97	Weighted Average
265		Pervious Area
8,239		Impervious Area

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

Summary for Subcatchment B5: B5

Runoff = 1.60 cfs @ 12.08 hrs, Volume= 0.119 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
9,780	98	Paved roads w/curbs & sewers
2,175	70	Woods, Good, HSG C
868	71	Meadow, non-grazed, HSG C
1,385	74	>75% Grass cover, Good, HSG C
14,208	90	Weighted Average
4,428		Pervious Area
9,780		Impervious Area

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

Summary for Subcatchment C1: C1

Runoff = 0.54 cfs @ 12.08 hrs, Volume= 0.044 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
4,401	98	Paved roads w/curbs & sewers
4,401		Impervious Area

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

Summary for Subcatchment DET: Detention Area

Runoff = 0.81 cfs @ 12.09 hrs, Volume= 0.057 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
10,851	74	>75% Grass cover, Good, HSG C
10,851		Pervious Area

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

Summary for Reach POI 1: POI 1

Inflow Area = 4.299 ac, 33.83% Impervious, Inflow Depth > 3.46" for 25 YR event
Inflow = 7.07 cfs @ 12.24 hrs, Volume= 1.239 af
Outflow = 7.07 cfs @ 12.24 hrs, Volume= 1.239 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Reach R: R

Inflow Area = 0.101 ac, 100.00% Impervious, Inflow Depth = 5.26" for 25 YR event
Inflow = 0.54 cfs @ 12.08 hrs, Volume= 0.044 af
Outflow = 0.29 cfs @ 12.21 hrs, Volume= 0.044 af, Atten= 47%, Lag= 7.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.24 fps, Min. Travel Time= 24.2 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 77.1 min

Peak Storage= 421 cf @ 12.21 hrs, Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 18.75 cfs

18.00' x 0.50' deep channel, n= 0.200 Sheet flow: Woods+light brush
Side Slope Z-value= 54.0 '/' Top Width= 72.00'
Length= 354.0' Slope= 0.0593 '/'
Inlet Invert= 95.00', Outlet Invert= 74.00'



Summary for Reach R1: R1

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 64.45 cfs

18.00' x 1.00' deep channel, n= 0.200 Sheet flow: Woods+light brush
Side Slope Z-value= 54.0 '/' Top Width= 126.00'
Length= 196.0' Slope= 0.0306 '/'
Inlet Invert= 80.00', Outlet Invert= 74.00'



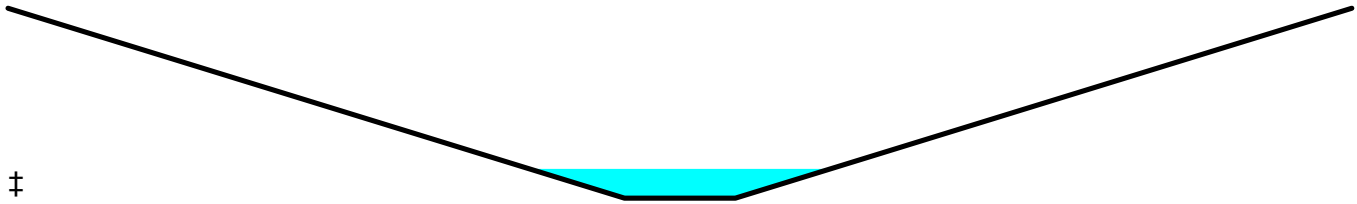
Summary for Reach R2: R2

Inflow Area =	1.749 ac, 66.60% Impervious, Inflow Depth > 4.08"	for 25 YR event
Inflow	=	1.87 cfs @ 12.49 hrs, Volume= 0.594 af
Outflow	=	1.79 cfs @ 12.58 hrs, Volume= 0.592 af, Atten= 4%, Lag= 5.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.35 fps, Min. Travel Time= 6.6 min
Avg. Velocity = 0.17 fps, Avg. Travel Time= 13.5 min

Peak Storage= 713 cf @ 12.58 hrs, Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 121.42 cfs

18.00' x 1.00' deep channel, n= 0.200 Sheet flow: Woods+light brush
Side Slope Z-value= 100.0 '/' Top Width= 218.00'
Length= 138.0' Slope= 0.0435 '/'
Inlet Invert= 80.00', Outlet Invert= 74.00'



Summary for Pond CB B1: CB B1

Inflow Area = 1.500 ac, 77.66% Impervious, Inflow Depth = 4.60" for 25 YR event
Inflow = 7.48 cfs @ 12.08 hrs, Volume= 0.575 af
Primary = 7.48 cfs @ 12.08 hrs, Volume= 0.575 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB B2: CB B2

Inflow Area = 0.508 ac, 55.19% Impervious, Inflow Depth = 3.94" for 25 YR event
Inflow = 2.30 cfs @ 12.09 hrs, Volume= 0.167 af
Primary = 2.30 cfs @ 12.09 hrs, Volume= 0.167 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB B3: CB B3

Inflow Area = 0.684 ac, 84.25% Impervious, Inflow Depth = 4.80" for 25 YR event
Inflow = 3.52 cfs @ 12.08 hrs, Volume= 0.274 af
Primary = 3.52 cfs @ 12.08 hrs, Volume= 0.274 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB B4: B4

Inflow Area = 0.587 ac, 81.64% Impervious, Inflow Depth = 4.72" for 25 YR event
Inflow = 3.00 cfs @ 12.08 hrs, Volume= 0.231 af
Primary = 3.00 cfs @ 12.08 hrs, Volume= 0.231 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB B5: CB B5

Inflow Area = 0.326 ac, 68.83% Impervious, Inflow Depth = 4.36" for 25 YR event
Inflow = 1.60 cfs @ 12.08 hrs, Volume= 0.119 af
Primary = 1.60 cfs @ 12.08 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CB C1: C1

Inflow Area = 0.101 ac, 100.00% Impervious, Inflow Depth = 5.26" for 25 YR event
 Inflow = 0.54 cfs @ 12.08 hrs, Volume= 0.044 af
 Primary = 0.54 cfs @ 12.08 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CBB4A: CB B4A

Inflow Area = 0.195 ac, 96.88% Impervious, Inflow Depth = 5.15" for 25 YR event
 Inflow = 1.05 cfs @ 12.08 hrs, Volume= 0.084 af
 Primary = 1.05 cfs @ 12.08 hrs, Volume= 0.084 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond DET O: OPEN BASIN

Inflow Area = 1.749 ac, 66.60% Impervious, Inflow Depth = 4.34" for 25 YR event
 Inflow = 8.29 cfs @ 12.09 hrs, Volume= 0.633 af
 Outflow = 1.87 cfs @ 12.49 hrs, Volume= 0.594 af, Atten= 77%, Lag= 24.2 min
 Primary = 1.87 cfs @ 12.49 hrs, Volume= 0.594 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 90.97' @ 12.49 hrs Surf.Area= 6,165 sf Storage= 12,830 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 223.4 min (1,000.7 - 777.3)

Volume	Invert	Avail.Storage	Storage Description
#1	88.42'	19,677 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
88.42	3,965	0	0
89.00	4,433	2,435	2,435
90.00	5,263	4,848	7,283
91.00	6,192	5,728	13,011
92.00	7,141	6,667	19,677

Device	Routing	Invert	Outlet Devices
#1	Primary	85.32'	24.0" x 60.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 81.50' S= 0.0637 '/ Cc= 0.900 n= 0.012
#2	Secondary	91.10'	13.0' long x 14.0' 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) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63
#3	Device 1	90.50'	1.5' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 1	88.92'	3.0" Vert. Orifice/Grate C= 0.600

#5 Device 1 85.42' 1.3" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=1.87 cfs @ 12.49 hrs HW=90.97' TW=80.15' (Dynamic Tailwater)

- ↑ 1=Culvert (Passes 1.87 cfs of 25.75 cfs potential flow)
- ↑ 3=Broad-Crested Rectangular Weir (Weir Controls 1.44 cfs @ 2.04 fps)
- ↑ 4=Orifice/Grate (Orifice Controls 0.33 cfs @ 6.68 fps)
- ↑ 5=Orifice/Grate (Orifice Controls 0.10 cfs @ 11.29 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=88.42' TW=80.00' (Dynamic Tailwater)

- ↑ 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond MH B3B: MH B3B

Inflow Area = 0.612 ac, 62.85% Impervious, Inflow Depth = 4.16" for 25 YR event
 Inflow = 2.86 cfs @ 12.09 hrs, Volume= 0.212 af
 Primary = 2.86 cfs @ 12.09 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond MHB5A: MH B5A

Inflow Area = 0.521 ac, 79.34% Impervious, Inflow Depth = 4.65" for 25 YR event
 Inflow = 2.64 cfs @ 12.08 hrs, Volume= 0.202 af
 Primary = 2.64 cfs @ 12.08 hrs, Volume= 0.202 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

FOCAL POINT™ SIZING COMPUTATIONS

FOCALPOINT SIZING AND CALCULATION SHEET



PROJECT: 2282 CONGRESS ST DEVELOPMENT

PREPARED BY: ROB WOODMAN, PE – FABCO INDUSTRIES, INC.

PREPARED FOR: BO KENNEDY, PE – FAY, SPOFFORD AND THORNDIKE

DATE: JULY 24, 2014 revised JULY 25, 2014

Based on the following data provided by the project engineer, Fabco Industries has calculated the proposed sizing of the FocalPoint system and the ability of the system to treat the Water Quality Volume (W_{QV}) prior to overflow/bypass.

- Water Quality Volume (W_{QV})* = 5,077 cf ---- use **5,077 cf** for water quality goal ----

* The Water Quality Volume is based on the Maine DEP Chapter 500 requirement to treat 1.0" of runoff from impervious areas and 0.4" from pervious areas.

Using the *ACF FP and RT Calc version 1.8*, with a type III rainfall distribution. The proposed size of the FocalPoint unit shall be **36 sf** with a minimum ponding volume of **2,083.25 cf** above the unit prior to overflow. The chart below summarizes the associated calculation and performance verification.

ACF FP and RT Calc 1.8

FocalPoint BIOFILTRATION SYSTEMS		
Water Quality Volume and Design Event		Directions
Water Quality Volume (W_{QV})	5,077 ft ³	Water Quality Volume calculated from previous Sheet
Design Event	5,077 ft ³	Total event volume calculated from previous sheet
System Configuration		
Is FocalPoint used?	<input checked="" type="checkbox"/> Yes	Enter Yes if FocalPoint used. Enter No if runoff flows directly into RTank and proceed to RTank Design worksheet
Step 4 - FocalPoint Configuration		
4.1 - FocalPoint Factor of Safety	1	Enter optional factor-of-safety
4.2 - FocalPoint bed area	36 ft ²	Enter target FocalPoint footprint, 20 SF min. (See Step 4.5)
4.3 - Storage volume above FocalPoint provided	2,083 ft ³	Enter available surface storage volume (See Step 4.5)
4.4 - Desired treatment time	24 hours	Select 24, 48, 72 or 96 hrs from toggle If Yes = W_{QV} has been treated
4.5 - Water Quality Volume treated prior to overflow?	Yes	If No = larger FocalPoint bed (Step 4.2) and/or surface storage volume (Step 4.3) required
4.6 - FocalPoint drain within desired time?	Yes	If Yes = time goal has been met If No = larger FocalPoint bed (Step 4.2) required
4.7 - Flow in excess of storage volume above	To RTank	Select routing location for overflow/bypass vol. from toggle: Off site to disregard flow, RTank to store for retention / detention, harvesting, or infiltration
Step 5 - Evaluation of Design		
5.1 - Volume treated prior to overflow	No Overflow ft ³	Result = Volume ft ³ treated prior to overflow/bypass
5.2 - Total volume treated	5,077 ft ³	Result = Total Volume ft ³ treated

Based on the elevation data provided, the top of the FocalPoint could be set at elevation 88.42 with an invert out/bottom of system at elevation 85.42. Another option would be to raise the bottom of the basin up so that the top of FocalPoint is 6 inches below the first outlet control device. Note: the rate of 100 in/hr over the 36 sf FocalPoint point can be converted to a flowrate of 0.083 cfs.