

April 30, 2020

Conservation Commission
Town of Medway
155 Village Street
Medway, MA 02053

**RE: Request for Amendment to Order of Conditions
Phase II Glen Brook Way, Medway MA (CE 216-0929)**

Dear Members of the Commission:

Acting on behalf of the applicant for the above referenced project, Merrill Engineers and Land Surveyors respectfully requests that the Commission issue an amendment to the above referenced Order of Conditions. The changes to the approved plan within jurisdictional areas are minor in nature and are the result of final construction plan coordination and a final review by the various Town Departments. Specifically, the changes are as follows:

1. The width of Building C has been reduced by about 5'.
2. Rip-rap has been added to the rear of Building C to allow construction of a 4' wide gravel walkway which will provide emergency egress from the rear of the building.
3. More detailed utility connection locations have been added to the plan including the gas service to the northwest corner of Building C.
4. Roof leaders and a 6" roof drain line have been added to the rear of Building C which will direct roof runoff from the rear of the building into the infiltration basin.
5. Lastly, the Fire Department has required that the access driveway to the rear of Building C be paved in lieu of the previously approved Grasspave2 porous paving system. To provide treatment for stormwater from the access driveway, a sediment forebay and bioretention area have been designed and added to the end of the Fire Department's access. Additionally, the volume of the infiltration basin and Bioretention Area #1 have been expanded into the area where Building C was reduced in width, providing additional volume to offset the increase in flow from the new paved access driveway.

Although all of these changes are seemingly minor in nature, the requirement that the Fire Department access driveway be changed from the Grasspave2 porous paving system to bituminous concrete asphalt will add an additional 3,400± s.f. of impervious area to the site. This expansion in pavement will both increase the peak rates of runoff to a point that will exceed the existing conditions and will also require treatment to meet the requirements of the Stormwater Handbook. In order to treat the stormwater from this area, it will be directed into a sediment forebay and then into the bioretention area which has been increased in size to handle the additional impervious area (see Appendix's B & C of this letter for additional calculations). The new sediment forebay will provide the pretreatment required for the bioretention area, providing the new pavement a similar level of treatment as the previously approved parking areas.

Additional information has been provided below and although some have not changed at all, the following supporting calculations for the affected tributary area have been provided to make reviewing the minor changes easier: *APPENDIX A - Existing Conditions: 2, 10, 25 and 100 year return storm Summaries*, *APPENDIX B - Proposed Conditions: 2, 10, 25 and 100 year return storm Summaries* and *APPENDIX C - Recharge Volumes Calculation, Water Quality Volume and TSS Removal Calculations*.

In order to confirm these minor modifications to the approved Site Plan meet the requirements of the DEP Stormwater handbook, I've attached a summary of how the site will still comply with the requirements of the affected Stormwater Management Standards 2-4 below:

Standard 2 – Peak Rate Attenuation

Peak rates of runoff were calculated using the TR-20 methodology developed by the NRCS (refer to Appendices). Since the impervious area on site will be increased from the existing conditions, there will be an increase in runoff rates under the proposed conditions. In order to meet the requirements of Standards #3 & #4 for recharge and water quality requirements, one at-grade infiltration basin will provide treatment, infiltration and storage volume controls. These measures will both detain and infiltrate runoff, mitigating increased rates and volumes of runoff for the 2, 10, 25 and 100 year storms events.

The following is a summary of pre- and post-construction rates of runoff:

RETURN PERIOD	EXISTING CONDITIONS					PROPOSED CONDITIONS				
	1E - TRIB TO WEST ST (NORTH)	2E - TRIB TO HOPPING BROOK	3E - TRIB TO #39 WEST ST	4E - TRIB TO WEST ST (SOUTH)	5E - TRIB TO #28 WEST ST	1P - TRIB TO WEST ST (NORTH)	2R - TRIB TO HOPPING BROOK	3P - TRIB TO #39 WEST ST	4P - TRIB TO WEST ST (SOUTH)	5P - TRIB TO #29 WEST ST
	RATE (cfs), VOLUME (cf)	RATE (cfs), VOLUME (cf)	RATE (cfs), VOLUME (cf)	RATE (cfs), VOLUME (cf)	RATE (cfs), VOLUME (cf)	RATE (cfs), VOLUME (cf)	RATE (cfs), VOLUME (cf)	RATE (cfs), VOLUME (cf)	RATE (cfs), VOLUME (cf)	RATE (cfs), VOLUME (cf)
2YR	0.00 46	0.32 3,529	0.00 5	0.13 407	0.01 183	0.00 0.0	.25 2,105	0.00 0.0	0.00 0.0	0.00 0.0
10YR	0.05 240	2.72 13,865	0.02 336	0.35 975	0.14 815	0.00 88	1.60 7,144	0.00 7	0.00 73	0.00 97
25YR	0.14 468	6.06 25,161	0.11 896	0.55 1,499	0.35 1,530	0.03 250	3.14 16,413	0.00 48	0.02 207	0.03 274
100YR	0.37 1,080	14.48 54,054	0.76 2,649	1.00 2,692	0.88 3,399	0.16 771	14.29 54,198	0.03 219	0.13 639	0.17 844

Standard 3 – Groundwater Recharge

Runoff will be infiltrated by the infiltration basin which has been designed a minimum of two feet above seasonal high groundwater. The hydraulic conductivity was based on soil conditions found on the site via soil testing and DEP SMR Table 2.3.3 1982 Rawls Rates - values developed from Rawls, Brakensiek and Saxton, 1982. The total required groundwater recharge volume was calculated to be 3,703 cubic feet. The proposed infiltration basin will provide 26,528± cubic feet of recharge below the outlet, well above the requisite recharge volume for this project. Refer to Appendix B for infiltration system calculations and Appendix C for recharge volume calculations.

Standard 4 – Water Quality

A Long-Term Source Control/Pollution Prevention Plan (LTPPP) has been prepared and previously approved for this site. There are no new stormwater BMP's proposed as part of this Amendment, so no changes are proposed to the LTPPP. The water quality volume was calculated using the ½ inch rule as the site is not within a critical area as defined by the Massachusetts Stormwater Handbook. The total required water quality treatment volume was calculated to be 4,616± cubic feet. The volume below the outlet in the infiltration basin, which will handle all of the runoff from the parking areas, is 26,528± c.f.. well above the requisite water quality volume for the proposed site design. Refer to Appendix C for water quality calculations.

In accordance with the guidelines of the Stormwater Management Policy, the Total Suspended Solids (TSS) Removal was calculated to be 90% for the new treatment train which will handle the stormwater runoff from the proposed paved Fire Department access drive. The treatment train for this area consist a sediment forebay to provide pretreatment and a small bioretention area downgradient of the access drive. The sediment forebay and bioretention area have been designed and sized to treat 400 c.f. of runoff per impervious acre proposed to achieve the required minimum removal rate of 80% total suspended soils. This is achieved by providing a bioretention area with a surface area between 5%-7% of the contributing impervious area. TSS removal calculations are included in Appendix C.

Thank you for your consideration in this matter. We request that the Board allow us some time to discuss this matter at the May 14th Conservation Commission Hearing. Should you have any questions please do not hesitate to contact this office.

Very truly yours,

MERRILL ENGINEERS AND LAND SURVEYORS



Dana M. Altobello, P.E.
Senior Project Manager

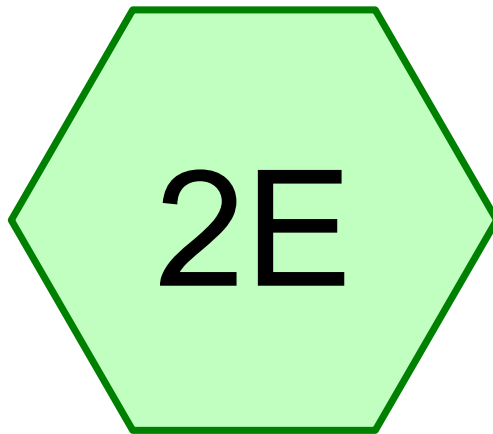
cc: Steven M. Bouley, P.E., Tetra Tech
Jennifer Van Campen
Mary Jane White, Town Clerk

H:\16-064_Phase II\Documents\Con Comm\NOI\16-064.2 CC Req for Minor Mod ltr 4-30-2020.docx

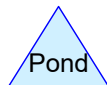
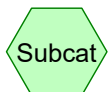
APPENDIX A

Existing Conditions

2, 10, 25 and 100 year return storm Summaries



TRIB. TO HOPPING BROOK



Routing Diagram for 16064.2 PRE-DEVELOPMENT

Prepared by MERRILL ENGINEERS & LAND SURVEYORS, Printed 5/1/2020
HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

16064.2 PRE-DEVELOPMENT

Prepared by MERRILL ENGINEERS & LAND SURVEYORS
HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Printed 5/1/2020

Page 2

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
98,018	49	50-75% Grass cover, Fair, HSG A (2E)
7,243	96	Gravel surface, HSG A (2E)
5,290	98	Paved parking, HSG A (2E)
30,261	77	Wetlands (2E)
41,780	30	Woods, Good, HSG A (2E)
27,742	55	Woods, Good, HSG B (2E)
210,334	53	TOTAL AREA

16064.2 PRE-DEVELOPMENT

Type III 24-hr 2-Year Rainfall=3.22"

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

Printed 5/1/2020

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Page 3

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2E: TRIB. TO HOPPING

Runoff Area=210,334 sf 2.52% Impervious Runoff Depth=0.20"
Flow Length=432' Tc=10.0 min CN=53 Runoff=0.32 cfs 3,555 cf

Total Runoff Area = 210,334 sf Runoff Volume = 3,555 cf Average Runoff Depth = 0.20"
97.48% Pervious = 205,044 sf 2.52% Impervious = 5,290 sf

16064.2 PRE-DEVELOPMENT

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Type III 24-hr 2-Year Rainfall=3.22"

Printed 5/1/2020

Page 4

Summary for Subcatchment 2E: TRIB. TO HOPPING BROOK

Runoff = 0.32 cfs @ 12.44 hrs, Volume= 3,555 cf, Depth= 0.20"

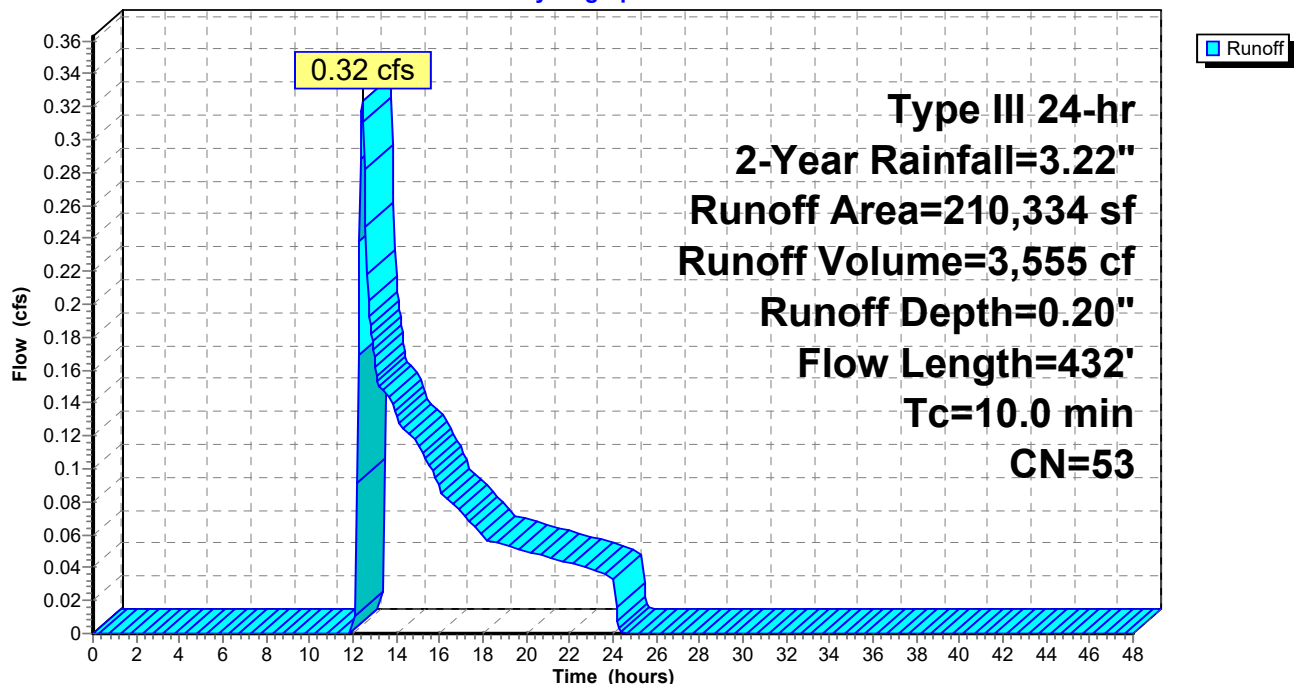
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
5,290	98	Paved parking, HSG A
98,018	49	50-75% Grass cover, Fair, HSG A
7,243	96	Gravel surface, HSG A
41,780	30	Woods, Good, HSG A
27,742	55	Woods, Good, HSG B
* 30,261	77	Wetlands
210,334	53	Weighted Average
205,044		97.48% Pervious Area
5,290		2.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
2.1	382	0.0340	2.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.4					Direct Entry,
10.0	432	Total			

Subcatchment 2E: TRIB. TO HOPPING BROOK

Hydrograph



16064.2 PRE-DEVELOPMENT

Type III 24-hr 10-Year Rainfall=4.86"

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

Printed 5/1/2020

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Page 5

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2E: TRIB. TO HOPPING

Runoff Area=210,334 sf 2.52% Impervious Runoff Depth=0.80"
Flow Length=432' Tc=10.0 min CN=53 Runoff=2.74 cfs 13,967 cf

Total Runoff Area = 210,334 sf Runoff Volume = 13,967 cf Average Runoff Depth = 0.80"
97.48% Pervious = 205,044 sf 2.52% Impervious = 5,290 sf

16064.2 PRE-DEVELOPMENT

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Type III 24-hr 10-Year Rainfall=4.86"

Printed 5/1/2020

Page 6

Summary for Subcatchment 2E: TRIB. TO HOPPING BROOK

Runoff = 2.74 cfs @ 12.18 hrs, Volume= 13,967 cf, Depth= 0.80"

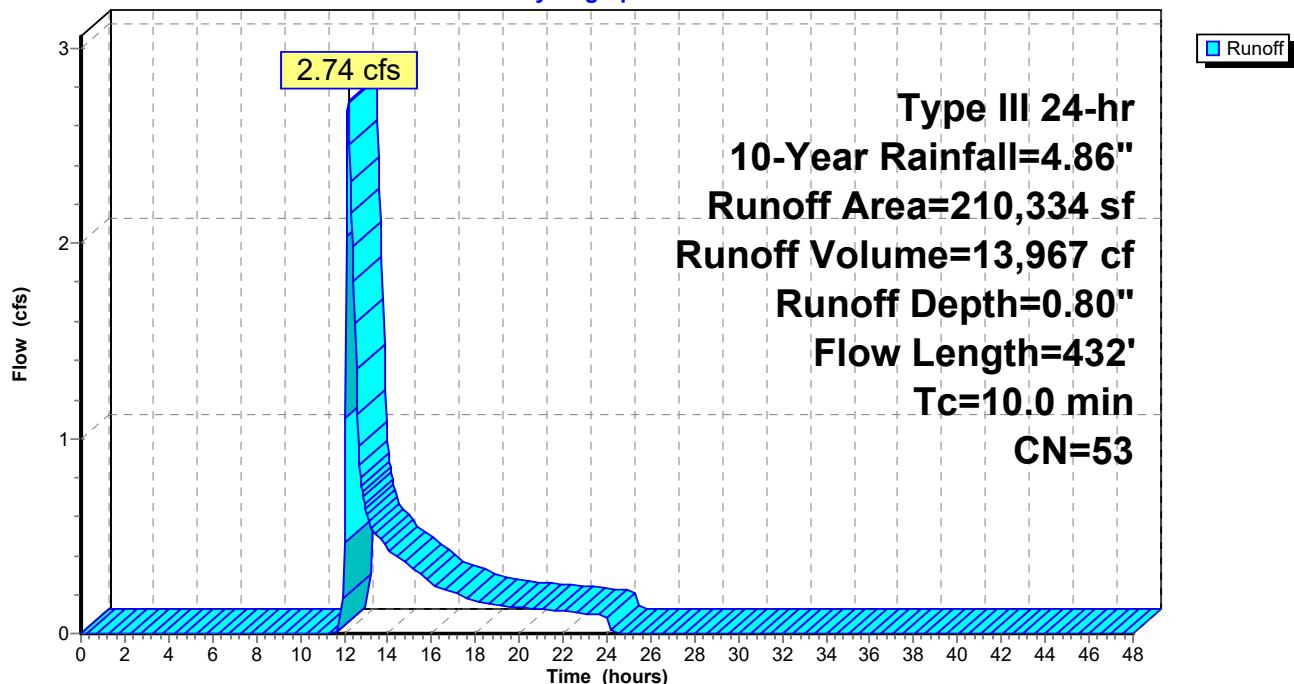
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
5,290	98	Paved parking, HSG A
98,018	49	50-75% Grass cover, Fair, HSG A
7,243	96	Gravel surface, HSG A
41,780	30	Woods, Good, HSG A
27,742	55	Woods, Good, HSG B
* 30,261	77	Wetlands
210,334	53	Weighted Average
205,044		97.48% Pervious Area
5,290		2.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
2.1	382	0.0340	2.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.4					Direct Entry,
10.0	432	Total			

Subcatchment 2E: TRIB. TO HOPPING BROOK

Hydrograph



16064.2 PRE-DEVELOPMENT

Type III 24-hr 25-Year Rainfall=6.15"

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

Printed 5/1/2020

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Page 7

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2E: TRIB. TO HOPPING

Runoff Area=210,334 sf 2.52% Impervious Runoff Depth=1.45"
Flow Length=432' Tc=10.0 min CN=53 Runoff=6.10 cfs 25,347 cf

Total Runoff Area = 210,334 sf Runoff Volume = 25,347 cf Average Runoff Depth = 1.45"
97.48% Pervious = 205,044 sf 2.52% Impervious = 5,290 sf

16064.2 PRE-DEVELOPMENT

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Type III 24-hr 25-Year Rainfall=6.15"

Printed 5/1/2020

Page 8

Summary for Subcatchment 2E: TRIB. TO HOPPING BROOK

Runoff = 6.10 cfs @ 12.16 hrs, Volume= 25,347 cf, Depth= 1.45"

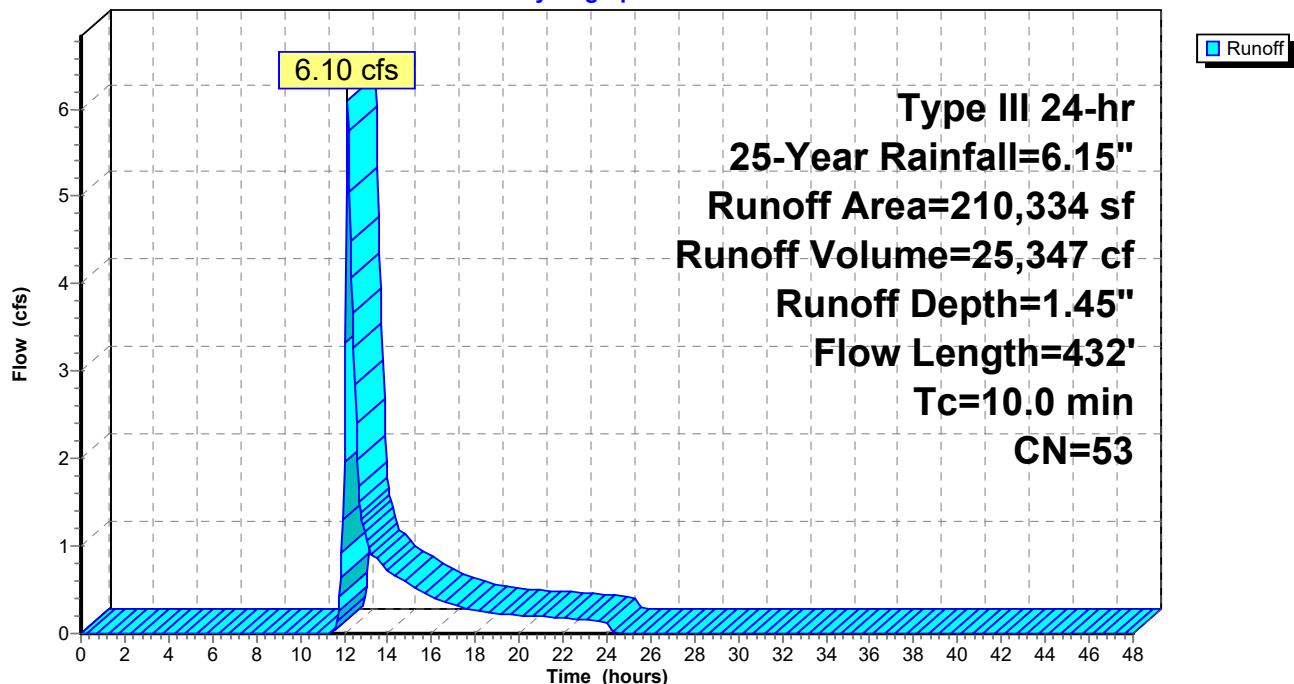
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
5,290	98	Paved parking, HSG A
98,018	49	50-75% Grass cover, Fair, HSG A
7,243	96	Gravel surface, HSG A
41,780	30	Woods, Good, HSG A
27,742	55	Woods, Good, HSG B
* 30,261	77	Wetlands
210,334	53	Weighted Average
205,044		97.48% Pervious Area
5,290		2.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
2.1	382	0.0340	2.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.4					Direct Entry,
10.0	432	Total			

Subcatchment 2E: TRIB. TO HOPPING BROOK

Hydrograph



16064.2 PRE-DEVELOPMENT

Type III 24-hr 100-Year Rainfall=8.80"

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

Printed 5/1/2020

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Page 9

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2E: TRIB. TO HOPPING

Runoff Area=210,334 sf 2.52% Impervious Runoff Depth=3.11"

Flow Length=432' Tc=10.0 min CN=53 Runoff=14.59 cfs 54,444 cf

Total Runoff Area = 210,334 sf Runoff Volume = 54,444 cf Average Runoff Depth = 3.11"
97.48% Pervious = 205,044 sf 2.52% Impervious = 5,290 sf

16064.2 PRE-DEVELOPMENT

Type III 24-hr 100-Year Rainfall=8.80"

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

Printed 5/1/2020

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Page 10

Summary for Subcatchment 2E: TRIB. TO HOPPING BROOK

Runoff = 14.59 cfs @ 12.15 hrs, Volume= 54,444 cf, Depth= 3.11"

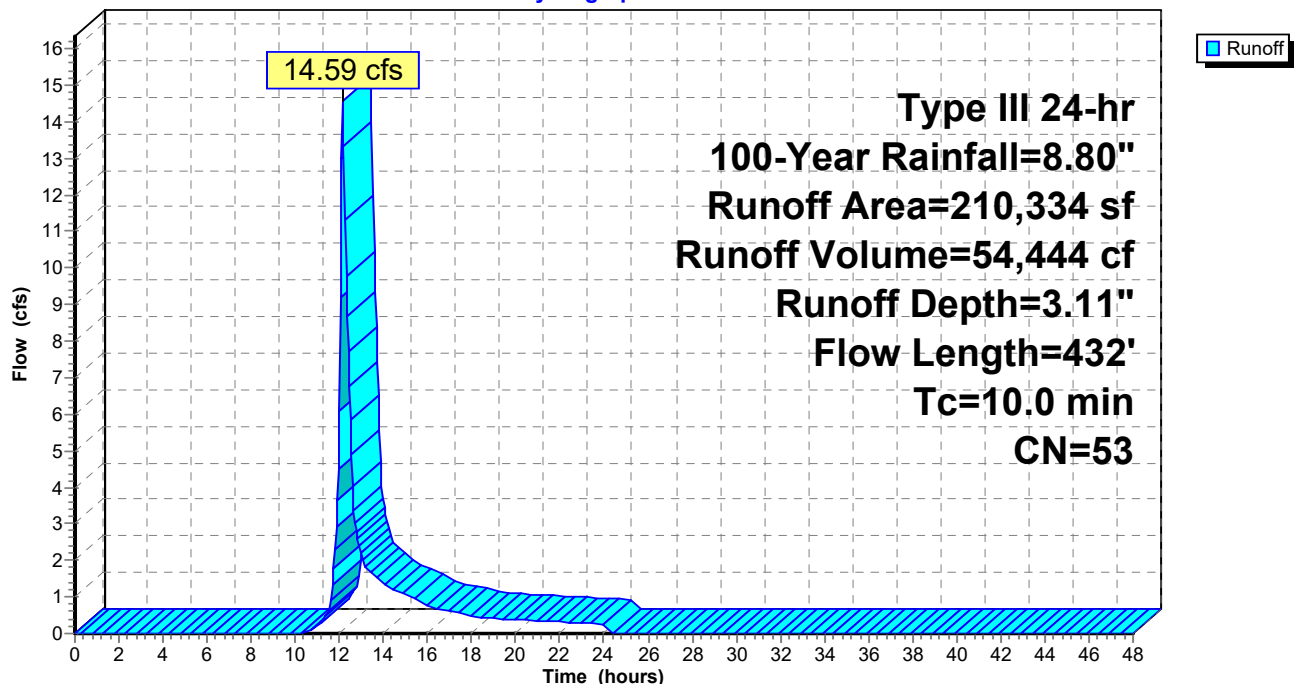
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
5,290	98	Paved parking, HSG A
98,018	49	50-75% Grass cover, Fair, HSG A
7,243	96	Gravel surface, HSG A
41,780	30	Woods, Good, HSG A
27,742	55	Woods, Good, HSG B
* 30,261	77	Wetlands
210,334	53	Weighted Average
205,044		97.48% Pervious Area
5,290		2.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
2.1	382	0.0340	2.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.4					Direct Entry,
10.0	432	Total			

Subcatchment 2E: TRIB. TO HOPPING BROOK

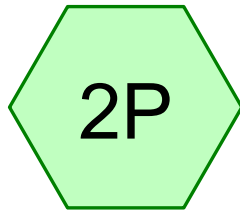
Hydrograph



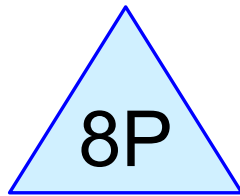
APPENDIX B

Proposed Conditions

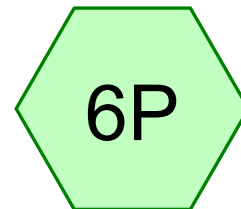
2, 10, 25 and 100 year return storm Summaries



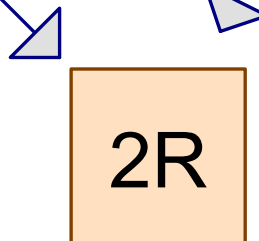
TRIB. TO
INFILTRATION BASIN



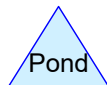
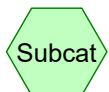
INFILTRATION BASIN



TRIB. TO HOPPING
BROOK



SUM TO HOPPING
BROOK



16064.2 POST-DEVELOPMENT_Basin 4-29-20

Prepared by MERRILL ENGINEERS & LAND SURVEYORS
HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Printed 5/1/2020

Page 2

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
42,298	39	>75% Grass cover, Good, HSG A (2P, 6P)
82,764	98	Paved parking, HSG A (2P, 6P)
28,014	98	Roof Area (2P)
30,261	77	Wetlands (6P)
26,754	30	Woods, Good, HSG A (6P)
24,760	55	Woods, Good, HSG B (6P)
234,851	72	TOTAL AREA

16064.2 POST-DEVELOPMENT_Basin 4-29-20*Type III 24-hr 2-Year Rainfall=3.22"*

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

Printed 5/1/2020

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Page 3

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2P: TRIB. TO

Runoff Area=146,503 sf 73.30% Impervious Runoff Depth=1.55"

Tc=10.0 min CN=82 Runoff=5.27 cfs 18,975 cf

Subcatchment6P: TRIB. TO HOPPING

Runoff Area=88,348 sf 3.84% Impervious Runoff Depth=0.29"

Flow Length=300' Tc=10.0 min CN=56 Runoff=0.25 cfs 2,105 cf

Reach 2R: SUM TO HOPPING BROOK

Inflow=0.25 cfs 2,105 cf

Outflow=0.25 cfs 2,105 cf

Pond 8P: INFILTRATION BASIN

Peak Elev=202.09' Storage=9,440 cf Inflow=5.27 cfs 18,975 cf

Discarded=0.39 cfs 18,975 cf Primary=0.00 cfs 0 cf Outflow=0.39 cfs 18,975 cf

Total Runoff Area = 234,851 sf Runoff Volume = 21,079 cf Average Runoff Depth = 1.08"
52.83% Pervious = 124,073 sf 47.17% Impervious = 110,778 sf

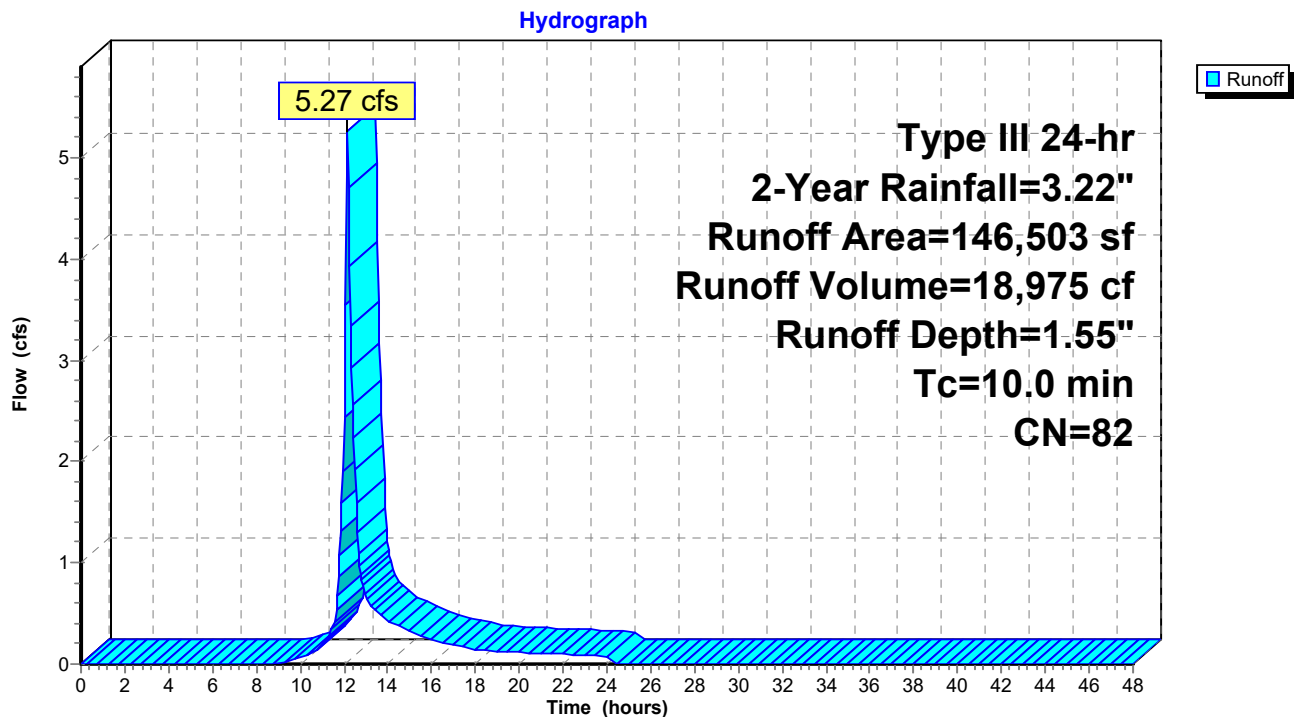
Summary for Subcatchment 2P: TRIB. TO INFILTRATION BASIN

Runoff = 5.27 cfs @ 12.15 hrs, Volume= 18,975 cf, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
79,370	98	Paved parking, HSG A
* 28,014	98	Roof Area
39,119	39	>75% Grass cover, Good, HSG A
146,503	82	Weighted Average
39,119		26.70% Pervious Area
107,384		73.30% Impervious Area

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

Subcatchment 2P: TRIB. TO INFILTRATION BASIN

16064.2 POST-DEVELOPMENT_Basin 4-29-20

Type III 24-hr 2-Year Rainfall=3.22"

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

Printed 5/1/2020

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Page 5

Summary for Subcatchment 6P: TRIB. TO HOPPING BROOK

Runoff = 0.25 cfs @ 12.37 hrs, Volume= 2,105 cf, Depth= 0.29"

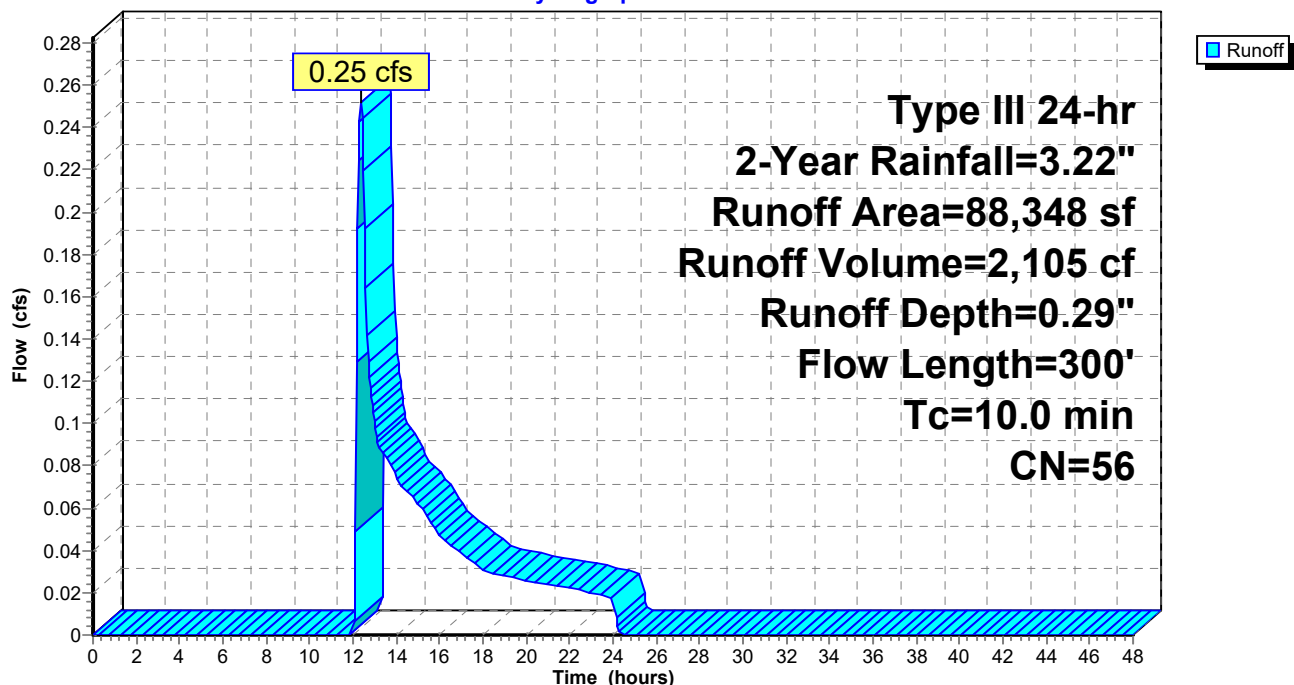
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
26,754	30	Woods, Good, HSG A
24,760	55	Woods, Good, HSG B
* 30,261	77	Wetlands
3,179	39	>75% Grass cover, Good, HSG A
3,394	98	Paved parking, HSG A
88,348	56	Weighted Average
84,954		96.16% Pervious Area
3,394		3.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0800	0.18		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
1.2	250	0.0440	3.38		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.2					Direct Entry,
10.0	300	Total			

Subcatchment 6P: TRIB. TO HOPPING BROOK

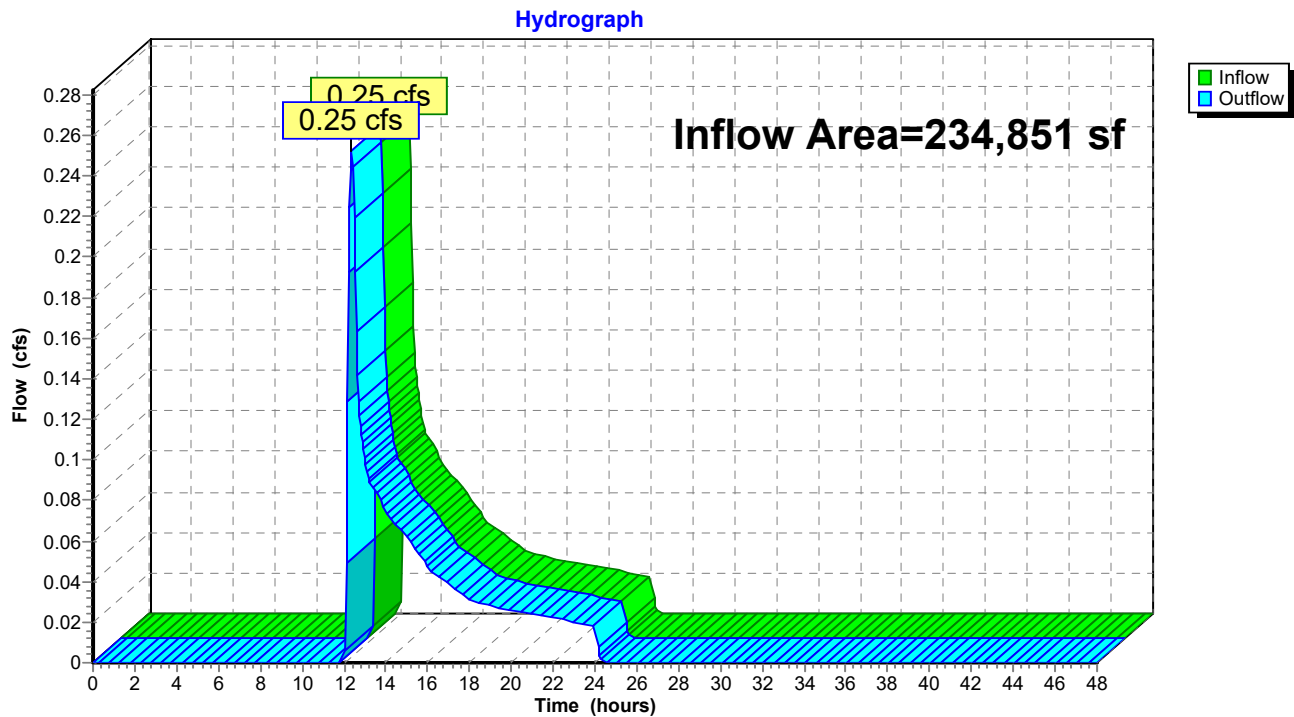
Hydrograph



Summary for Reach 2R: SUM TO HOPPING BROOK

Inflow Area = 234,851 sf, 47.17% Impervious, Inflow Depth = 0.11" for 2-Year event
Inflow = 0.25 cfs @ 12.37 hrs, Volume= 2,105 cf
Outflow = 0.25 cfs @ 12.37 hrs, Volume= 2,105 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 2R: SUM TO HOPPING BROOK

Summary for Pond 8P: INFILTRATION BASIN

Inflow Area = 146,503 sf, 73.30% Impervious, Inflow Depth = 1.55" for 2-Year event
 Inflow = 5.27 cfs @ 12.15 hrs, Volume= 18,975 cf
 Outflow = 0.39 cfs @ 14.33 hrs, Volume= 18,975 cf, Atten= 93%, Lag= 131.0 min
 Discarded = 0.39 cfs @ 14.33 hrs, Volume= 18,975 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 202.09' @ 14.33 hrs Surf.Area= 6,906 sf Storage= 9,440 cf

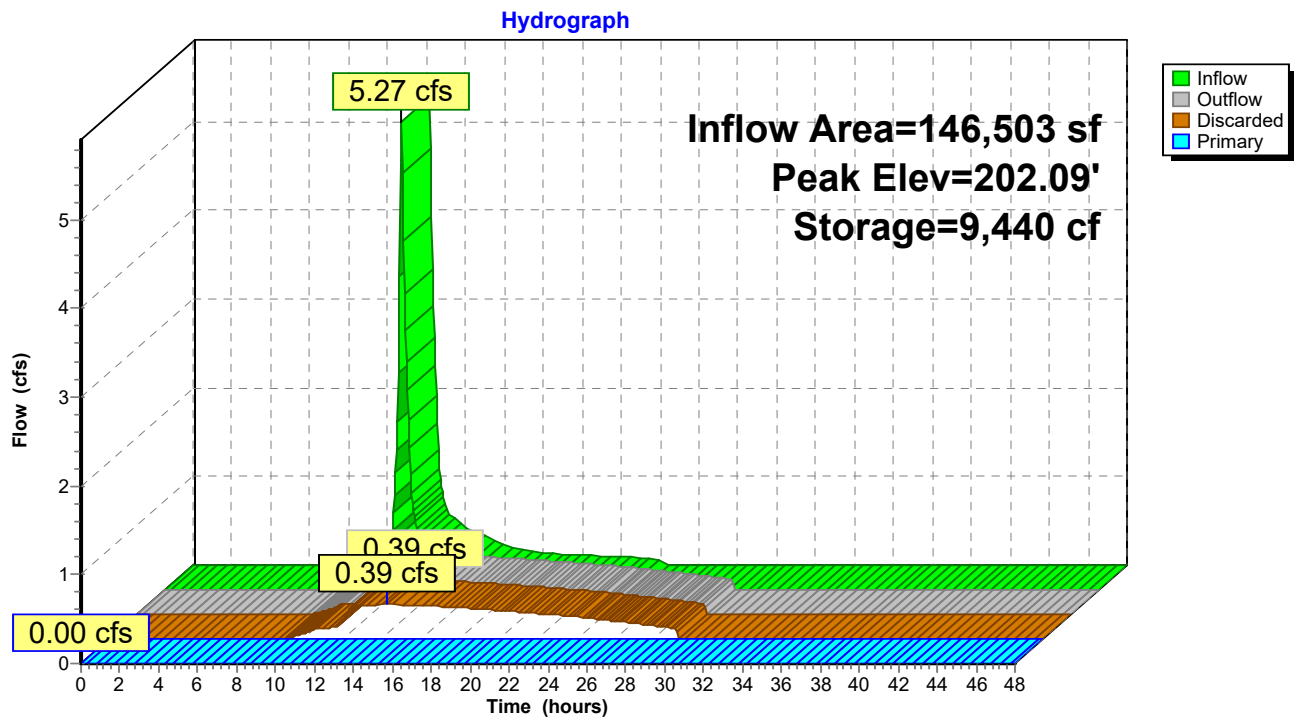
Plug-Flow detention time= 294.2 min calculated for 18,955 cf (100% of inflow)
 Center-of-Mass det. time= 294.3 min (1,133.9 - 839.7)

Volume	Invert	Avail.Storage	Storage Description
#1	199.99'	45,077 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
199.99	0	0	0
200.00	2,125	11	11
202.00	6,720	8,845	8,856
204.00	11,063	17,783	26,639
205.50	13,522	18,439	45,077

Device	Routing	Invert	Outlet Devices
#1	Discarded	199.99'	2.410 in/hr Exfiltration over Surface area
#2	Primary	204.00'	8.0' long x 1.25' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 4.0' Crest Height

Discarded OutFlow Max=0.39 cfs @ 14.33 hrs HW=202.09' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=199.99' (Free Discharge)
 ↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: INFILTRATION BASIN

16064.2 POST-DEVELOPMENT_Basin 4-29-20*Type III 24-hr 10-Year Rainfall=4.86"*

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

Printed 5/1/2020

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Page 9

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2P: TRIB. TO

Runoff Area=146,503 sf 73.30% Impervious Runoff Depth=2.95"

Tc=10.0 min CN=82 Runoff=10.04 cfs 36,066 cf

Subcatchment6P: TRIB. TO HOPPING

Runoff Area=88,348 sf 3.84% Impervious Runoff Depth=0.97"

Flow Length=300' Tc=10.0 min CN=56 Runoff=1.60 cfs 7,144 cf

Reach 2R: SUM TO HOPPING BROOK

Inflow=1.60 cfs 7,144 cf

Outflow=1.60 cfs 7,144 cf

Pond 8P: INFILTRATION BASIN

Peak Elev=203.42' Storage=20,612 cf Inflow=10.04 cfs 36,066 cf

Discarded=0.55 cfs 36,066 cf Primary=0.00 cfs 0 cf Outflow=0.55 cfs 36,066 cf

Total Runoff Area = 234,851 sf Runoff Volume = 43,210 cf Average Runoff Depth = 2.21"
52.83% Pervious = 124,073 sf 47.17% Impervious = 110,778 sf

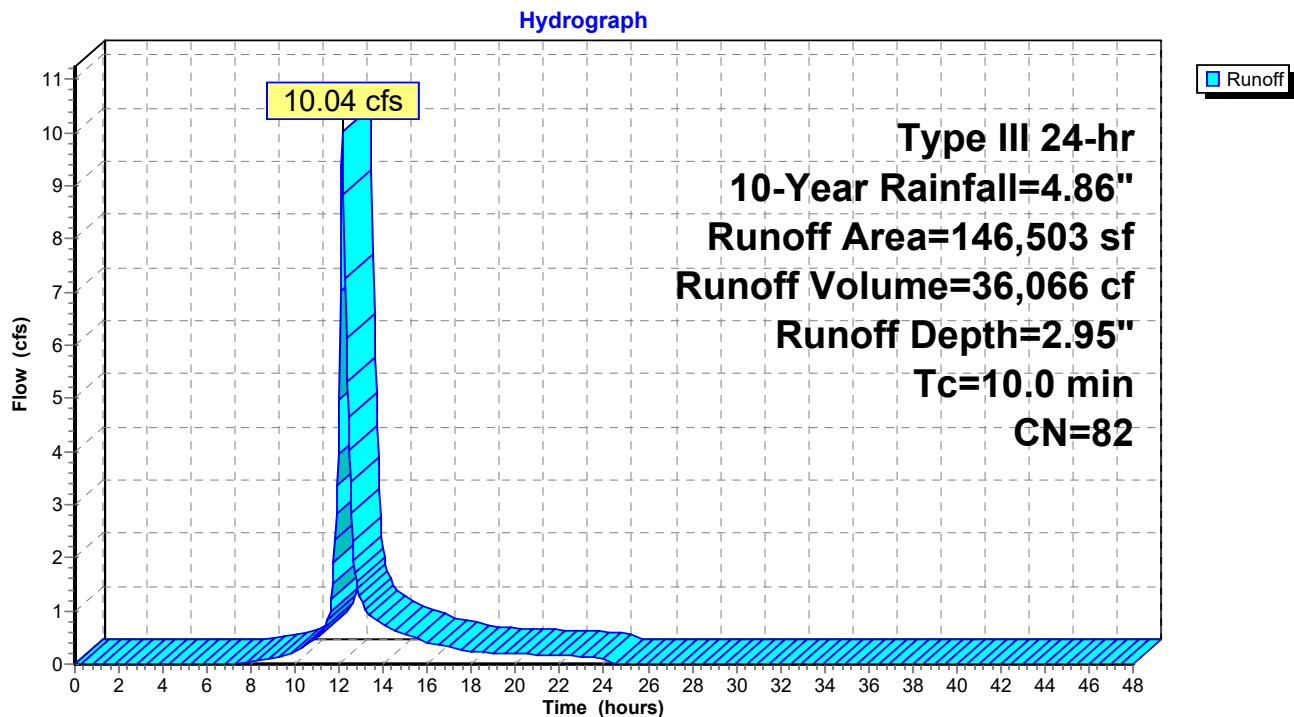
Summary for Subcatchment 2P: TRIB. TO INFILTRATION BASIN

Runoff = 10.04 cfs @ 12.14 hrs, Volume= 36,066 cf, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
79,370	98	Paved parking, HSG A
* 28,014	98	Roof Area
39,119	39	>75% Grass cover, Good, HSG A
146,503	82	Weighted Average
39,119		26.70% Pervious Area
107,384		73.30% Impervious Area

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

Subcatchment 2P: TRIB. TO INFILTRATION BASIN

16064.2 POST-DEVELOPMENT_Basin 4-29-20

Type III 24-hr 10-Year Rainfall=4.86"

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

Printed 5/1/2020

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Page 11

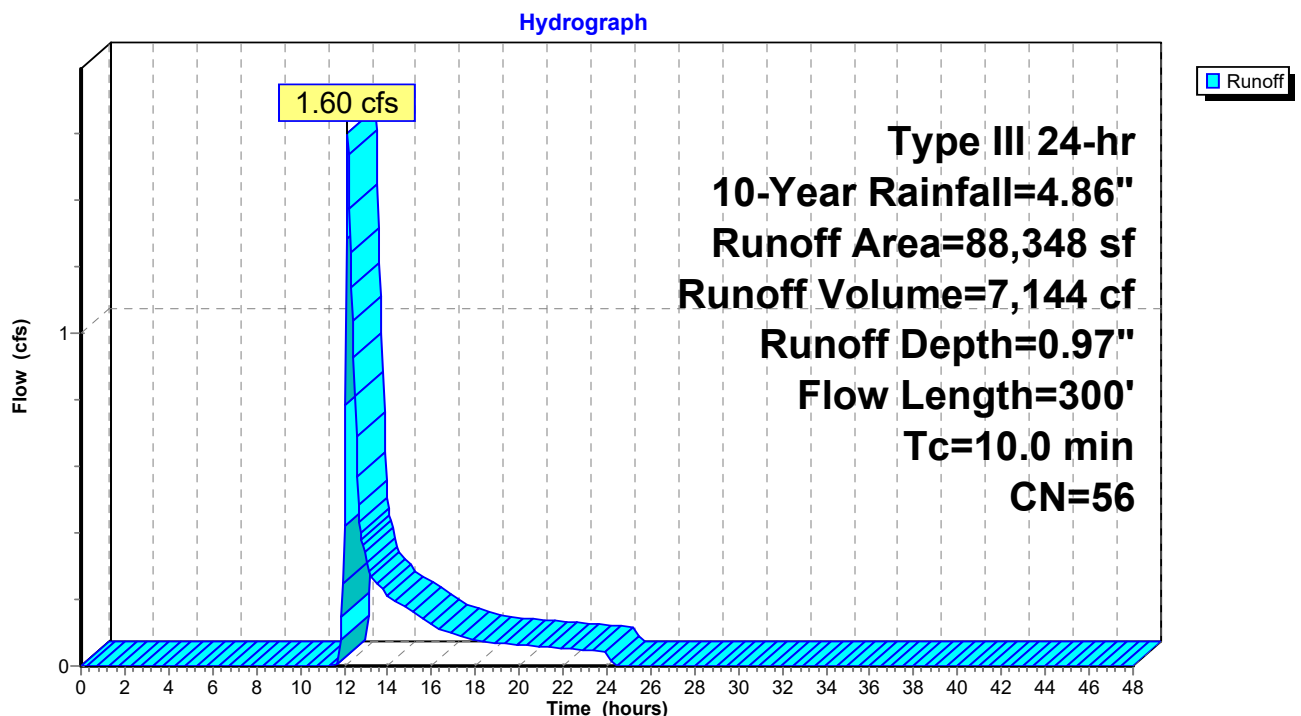
Summary for Subcatchment 6P: TRIB. TO HOPPING BROOK

Runoff = 1.60 cfs @ 12.17 hrs, Volume= 7,144 cf, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
26,754	30	Woods, Good, HSG A
24,760	55	Woods, Good, HSG B
* 30,261	77	Wetlands
3,179	39	>75% Grass cover, Good, HSG A
3,394	98	Paved parking, HSG A
88,348	56	Weighted Average
84,954		96.16% Pervious Area
3,394		3.84% Impervious Area

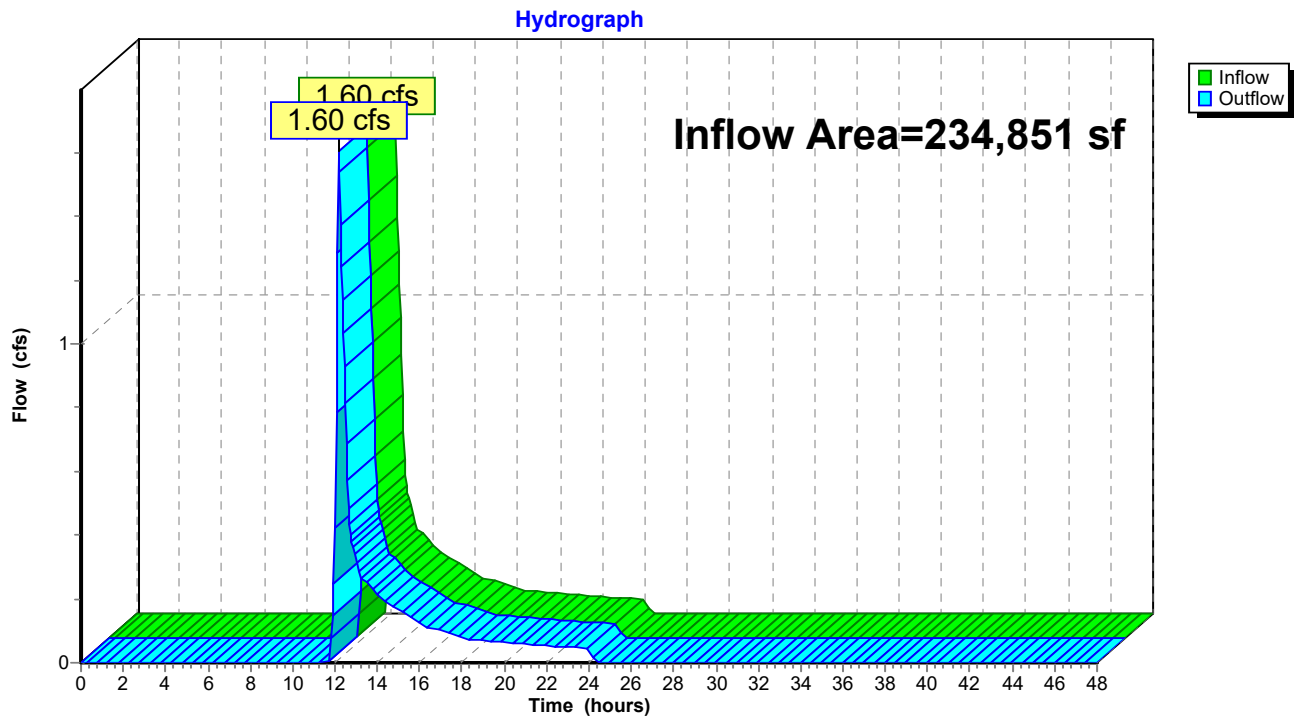
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0800	0.18		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
1.2	250	0.0440	3.38		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.2					Direct Entry,
10.0	300	Total			

Subcatchment 6P: TRIB. TO HOPPING BROOK

Summary for Reach 2R: SUM TO HOPPING BROOK

Inflow Area = 234,851 sf, 47.17% Impervious, Inflow Depth = 0.37" for 10-Year event
Inflow = 1.60 cfs @ 12.17 hrs, Volume= 7,144 cf
Outflow = 1.60 cfs @ 12.17 hrs, Volume= 7,144 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 2R: SUM TO HOPPING BROOK

Summary for Pond 8P: INFILTRATION BASIN

Inflow Area = 146,503 sf, 73.30% Impervious, Inflow Depth = 2.95" for 10-Year event
 Inflow = 10.04 cfs @ 12.14 hrs, Volume= 36,066 cf
 Outflow = 0.55 cfs @ 15.06 hrs, Volume= 36,066 cf, Atten= 95%, Lag= 175.2 min
 Discarded = 0.55 cfs @ 15.06 hrs, Volume= 36,066 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 203.42' @ 15.06 hrs Surf.Area= 9,809 sf Storage= 20,612 cf

Plug-Flow detention time= 453.1 min calculated for 36,029 cf (100% of inflow)
 Center-of-Mass det. time= 453.4 min (1,274.5 - 821.2)

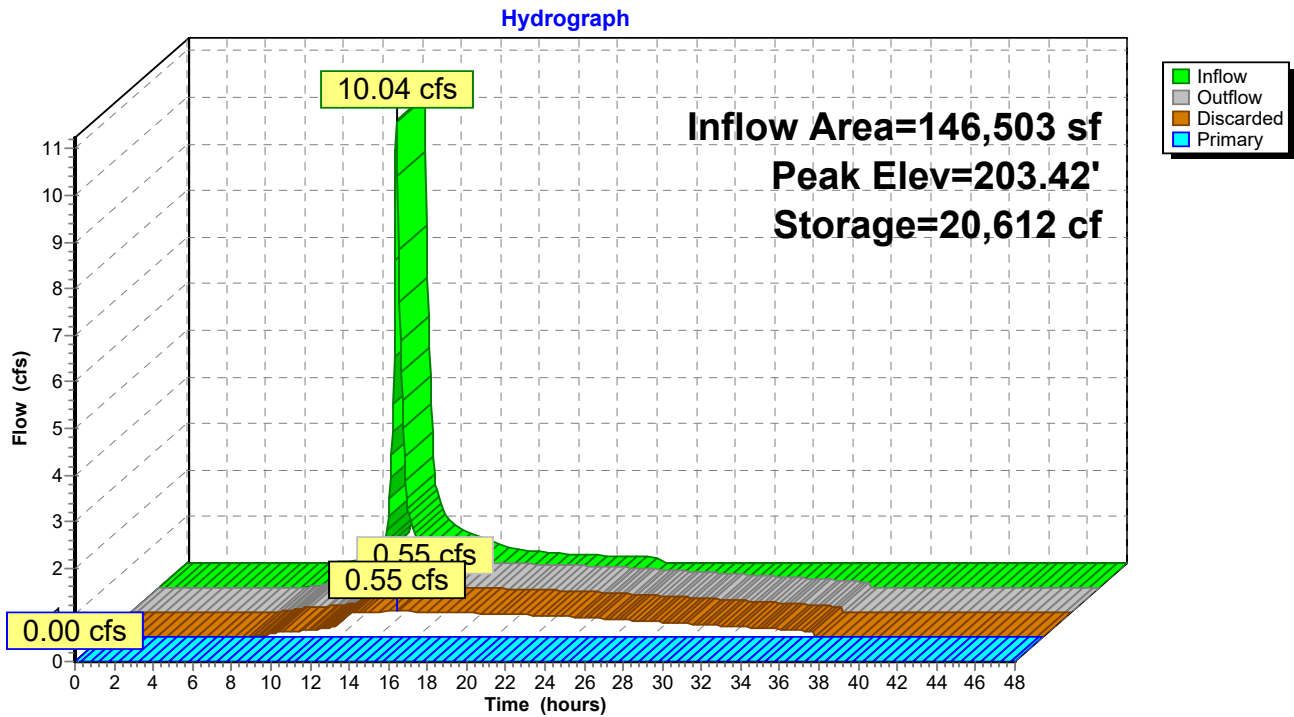
Volume	Invert	Avail.Storage	Storage Description
#1	199.99'	45,077 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
199.99	0	0	0
200.00	2,125	11	11
202.00	6,720	8,845	8,856
204.00	11,063	17,783	26,639
205.50	13,522	18,439	45,077

Device	Routing	Invert	Outlet Devices
#1	Discarded	199.99'	2.410 in/hr Exfiltration over Surface area
#2	Primary	204.00'	8.0' long x 1.25' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 4.0' Crest Height

Discarded OutFlow Max=0.55 cfs @ 15.06 hrs HW=203.42' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.55 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=199.99' (Free Discharge)
 ↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: INFILTRATION BASIN



16064.2 POST-DEVELOPMENT_Basin 4-29-20*Type III 24-hr 25-Year Rainfall=6.15"*

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

Printed 5/1/2020

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Page 15

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2P: TRIB. TO

Runoff Area=146,503 sf 73.30% Impervious Runoff Depth=4.13"

Tc=10.0 min CN=82 Runoff=13.92 cfs 50,364 cf

Subcatchment6P: TRIB. TO HOPPING

Runoff Area=88,348 sf 3.84% Impervious Runoff Depth=1.69"

Flow Length=300' Tc=10.0 min CN=56 Runoff=3.14 cfs 12,411 cf

Reach 2R: SUM TO HOPPING BROOK

Inflow=3.14 cfs 16,413 cf

Outflow=3.14 cfs 16,413 cf

Pond 8P: INFILTRATION BASIN

Peak Elev=204.09' Storage=27,603 cf Inflow=13.92 cfs 50,364 cf

Discarded=0.63 cfs 46,363 cf Primary=0.69 cfs 4,002 cf Outflow=1.31 cfs 50,364 cf

Total Runoff Area = 234,851 sf Runoff Volume = 62,775 cf Average Runoff Depth = 3.21"
52.83% Pervious = 124,073 sf 47.17% Impervious = 110,778 sf

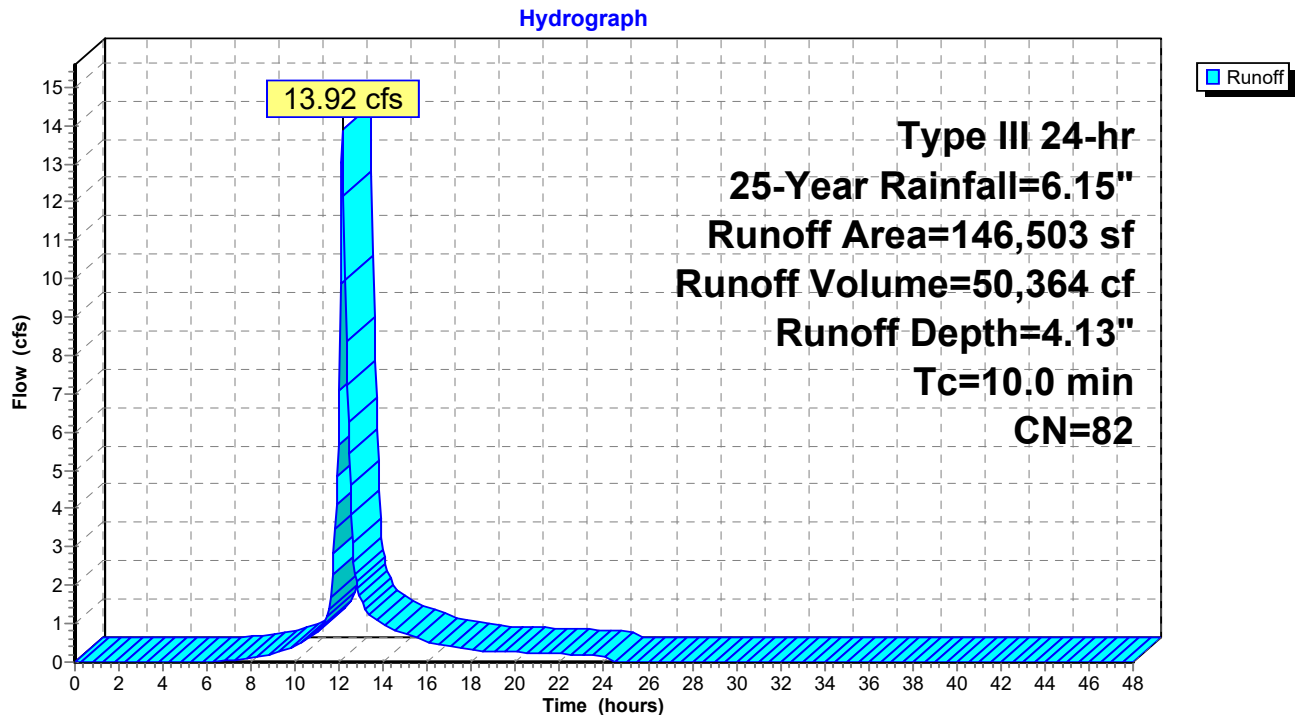
Summary for Subcatchment 2P: TRIB. TO INFILTRATION BASIN

Runoff = 13.92 cfs @ 12.14 hrs, Volume= 50,364 cf, Depth= 4.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
79,370	98	Paved parking, HSG A
* 28,014	98	Roof Area
39,119	39	>75% Grass cover, Good, HSG A
146,503	82	Weighted Average
39,119		26.70% Pervious Area
107,384		73.30% Impervious Area

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

Subcatchment 2P: TRIB. TO INFILTRATION BASIN

16064.2 POST-DEVELOPMENT_Basin 4-29-20

Type III 24-hr 25-Year Rainfall=6.15"

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

Printed 5/1/2020

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Page 17

Summary for Subcatchment 6P: TRIB. TO HOPPING BROOK

Runoff = 3.14 cfs @ 12.16 hrs, Volume= 12,411 cf, Depth= 1.69"

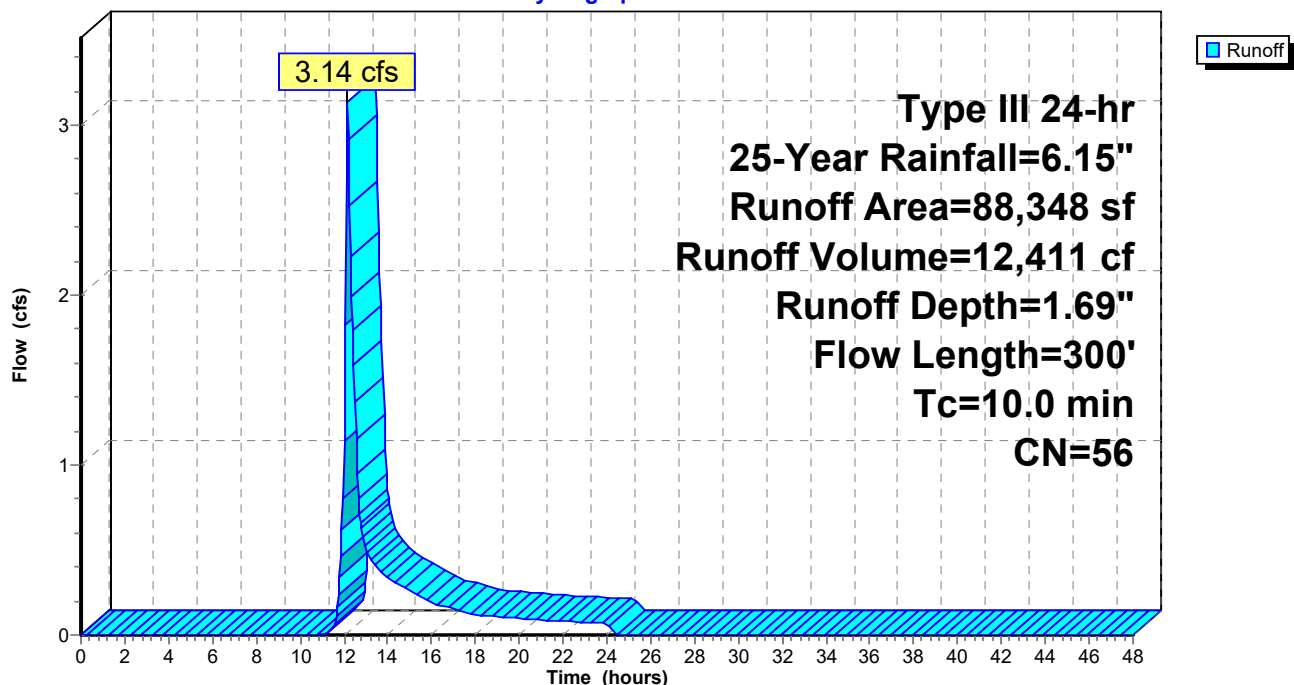
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
26,754	30	Woods, Good, HSG A
24,760	55	Woods, Good, HSG B
* 30,261	77	Wetlands
3,179	39	>75% Grass cover, Good, HSG A
3,394	98	Paved parking, HSG A
88,348	56	Weighted Average
84,954		96.16% Pervious Area
3,394		3.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0800	0.18		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
1.2	250	0.0440	3.38		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.2					Direct Entry,
10.0	300	Total			

Subcatchment 6P: TRIB. TO HOPPING BROOK

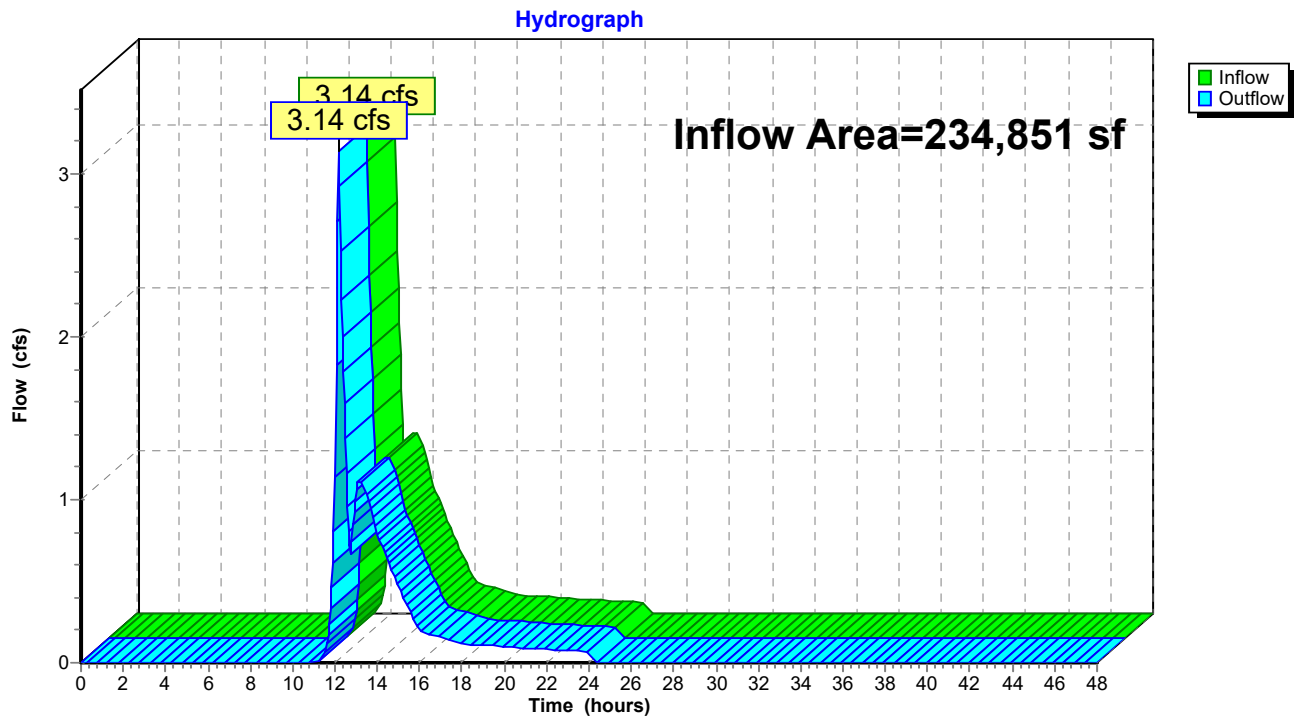
Hydrograph



Summary for Reach 2R: SUM TO HOPPING BROOK

Inflow Area = 234,851 sf, 47.17% Impervious, Inflow Depth = 0.84" for 25-Year event
Inflow = 3.14 cfs @ 12.16 hrs, Volume= 16,413 cf
Outflow = 3.14 cfs @ 12.16 hrs, Volume= 16,413 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 2R: SUM TO HOPPING BROOK

Summary for Pond 8P: INFILTRATION BASIN

Inflow Area = 146,503 sf, 73.30% Impervious, Inflow Depth = 4.13" for 25-Year event
 Inflow = 13.92 cfs @ 12.14 hrs, Volume= 50,364 cf
 Outflow = 1.31 cfs @ 13.25 hrs, Volume= 50,364 cf, Atten= 91%, Lag= 66.3 min
 Discarded = 0.63 cfs @ 13.25 hrs, Volume= 46,363 cf
 Primary = 0.69 cfs @ 13.25 hrs, Volume= 4,002 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 204.09' @ 13.25 hrs Surf.Area= 11,205 sf Storage= 27,603 cf

Plug-Flow detention time= 485.0 min calculated for 50,312 cf (100% of inflow)
 Center-of-Mass det. time= 485.5 min (1,297.2 - 811.7)

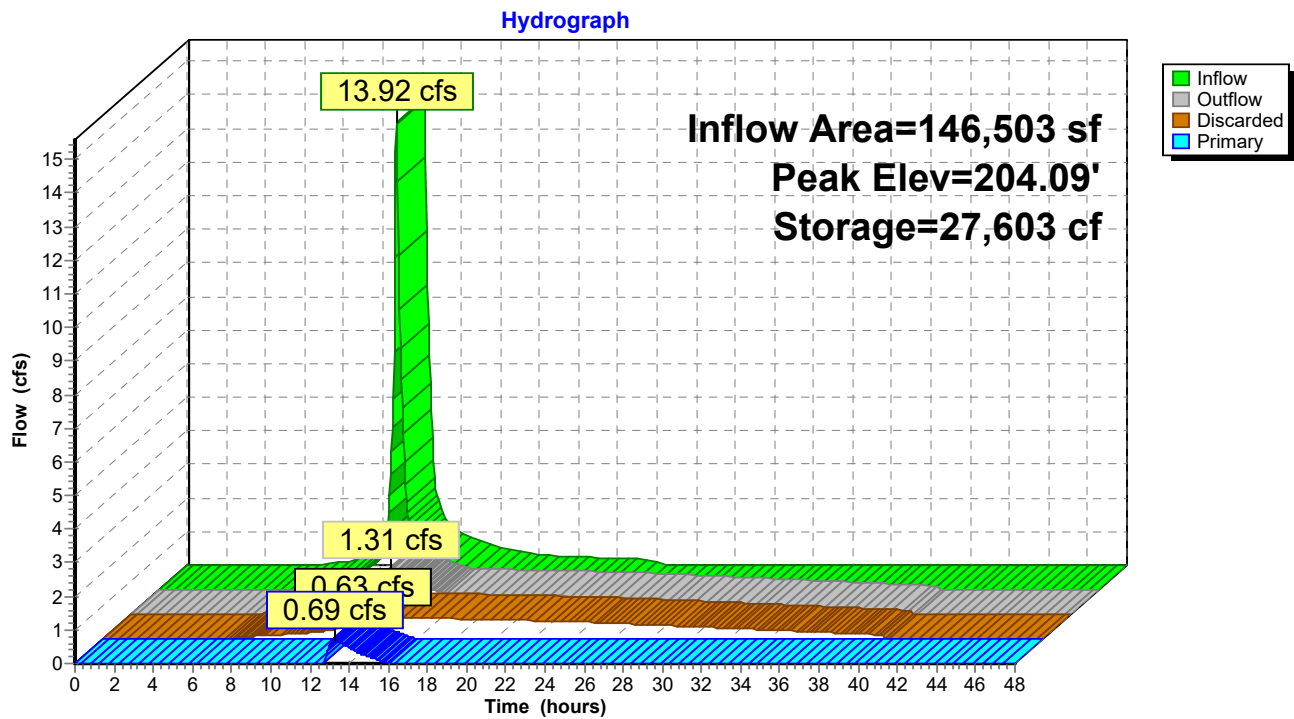
Volume	Invert	Avail.Storage	Storage Description
#1	199.99'	45,077 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
199.99	0	0	0
200.00	2,125	11	11
202.00	6,720	8,845	8,856
204.00	11,063	17,783	26,639
205.50	13,522	18,439	45,077

Device	Routing	Invert	Outlet Devices
#1	Discarded	199.99'	2.410 in/hr Exfiltration over Surface area
#2	Primary	204.00'	8.0' long x 1.25' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 4.0' Crest Height

Discarded OutFlow Max=0.63 cfs @ 13.25 hrs HW=204.09' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.63 cfs)

Primary OutFlow Max=0.67 cfs @ 13.25 hrs HW=204.09' (Free Discharge)
 ↑**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.67 cfs @ 0.96 fps)

Pond 8P: INFILTRATION BASIN

16064.2 POST-DEVELOPMENT_Basin 4-29-20*Type III 24-hr 100-Year Rainfall=8.80"*

Prepared by MERRILL ENGINEERS & LAND SURVEYORS

Printed 5/1/2020

HydroCAD® 10.00-25 s/n 02159 © 2019 HydroCAD Software Solutions LLC

Page 21

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2P: TRIB. TO

Runoff Area=146,503 sf 73.30% Impervious Runoff Depth=6.62"

Tc=10.0 min CN=82 Runoff=21.93 cfs 80,849 cf

Subcatchment6P: TRIB. TO HOPPING

Runoff Area=88,348 sf 3.84% Impervious Runoff Depth=3.46"

Flow Length=300' Tc=10.0 min CN=56 Runoff=6.95 cfs 25,501 cf

Reach 2R: SUM TO HOPPING BROOK

Inflow=14.29 cfs 54,198 cf

Outflow=14.29 cfs 54,198 cf

Pond 8P: INFILTRATION BASIN

Peak Elev=204.53' Storage=32,779 cf Inflow=21.93 cfs 80,849 cf

Discarded=0.67 cfs 52,152 cf Primary=10.24 cfs 28,697 cf Outflow=10.91 cfs 80,849 cf

Total Runoff Area = 234,851 sf Runoff Volume = 106,350 cf Average Runoff Depth = 5.43"
52.83% Pervious = 124,073 sf 47.17% Impervious = 110,778 sf

Summary for Subcatchment 2P: TRIB. TO INFILTRATION BASIN

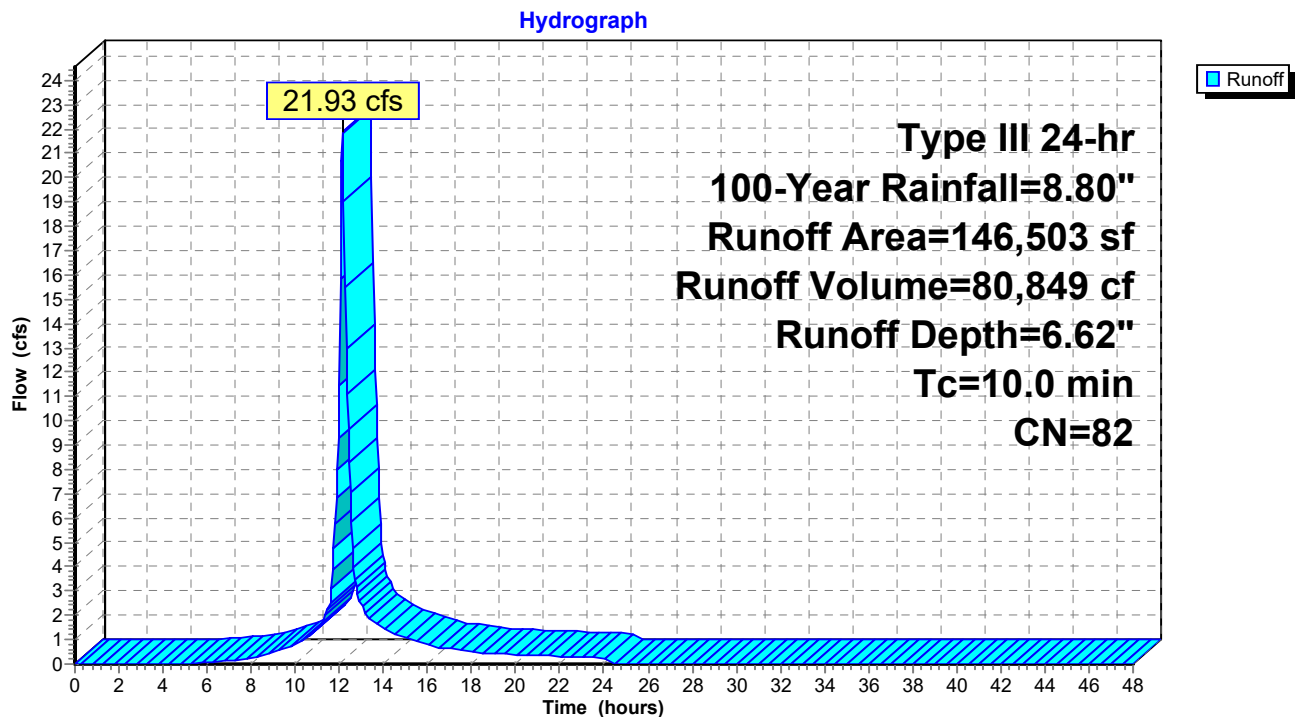
Runoff = 21.93 cfs @ 12.14 hrs, Volume= 80,849 cf, Depth= 6.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
79,370	98	Paved parking, HSG A
* 28,014	98	Roof Area
39,119	39	>75% Grass cover, Good, HSG A
146,503	82	Weighted Average
39,119		26.70% Pervious Area
107,384		73.30% Impervious Area

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

Subcatchment 2P: TRIB. TO INFILTRATION BASIN



Summary for Subcatchment 6P: TRIB. TO HOPPING BROOK

Runoff = 6.95 cfs @ 12.15 hrs, Volume= 25,501 cf, Depth= 3.46"

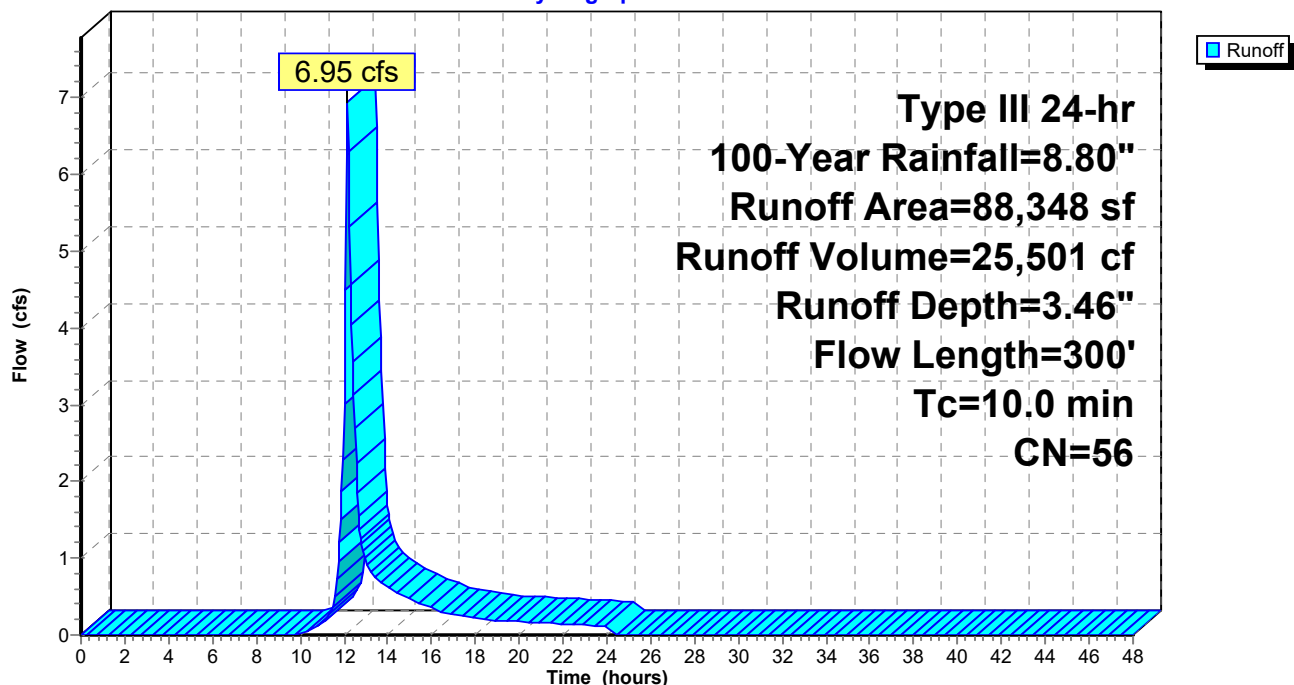
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
26,754	30	Woods, Good, HSG A
24,760	55	Woods, Good, HSG B
* 30,261	77	Wetlands
3,179	39	>75% Grass cover, Good, HSG A
3,394	98	Paved parking, HSG A
88,348	56	Weighted Average
84,954		96.16% Pervious Area
3,394		3.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0800	0.18		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
1.2	250	0.0440	3.38		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.2					Direct Entry,
10.0	300	Total			

Subcatchment 6P: TRIB. TO HOPPING BROOK

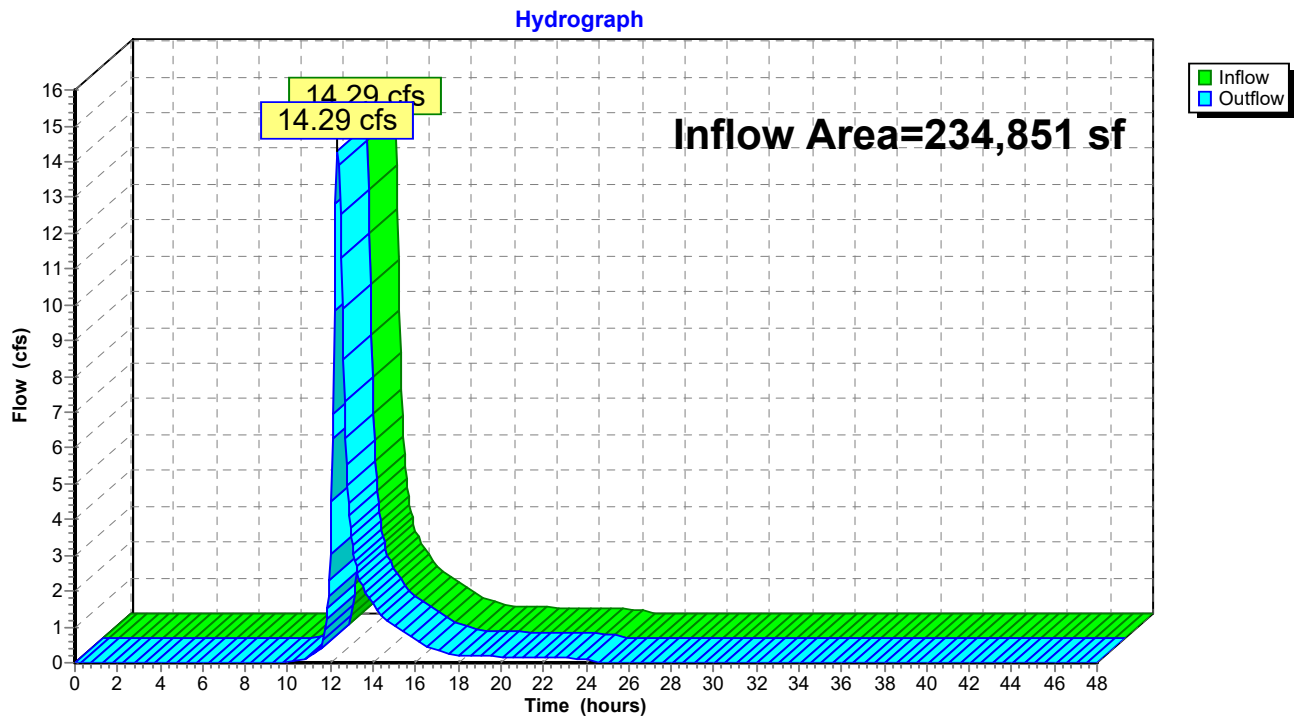
Hydrograph



Summary for Reach 2R: SUM TO HOPPING BROOK

Inflow Area = 234,851 sf, 47.17% Impervious, Inflow Depth = 2.77" for 100-Year event
Inflow = 14.29 cfs @ 12.33 hrs, Volume= 54,198 cf
Outflow = 14.29 cfs @ 12.33 hrs, Volume= 54,198 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 2R: SUM TO HOPPING BROOK

Summary for Pond 8P: INFILTRATION BASIN

Inflow Area = 146,503 sf, 73.30% Impervious, Inflow Depth = 6.62" for 100-Year event
 Inflow = 21.93 cfs @ 12.14 hrs, Volume= 80,849 cf
 Outflow = 10.91 cfs @ 12.36 hrs, Volume= 80,849 cf, Atten= 50%, Lag= 13.5 min
 Discarded = 0.67 cfs @ 12.36 hrs, Volume= 52,152 cf
 Primary = 10.24 cfs @ 12.36 hrs, Volume= 28,697 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 204.53' @ 12.36 hrs Surf.Area= 11,938 sf Storage= 32,779 cf

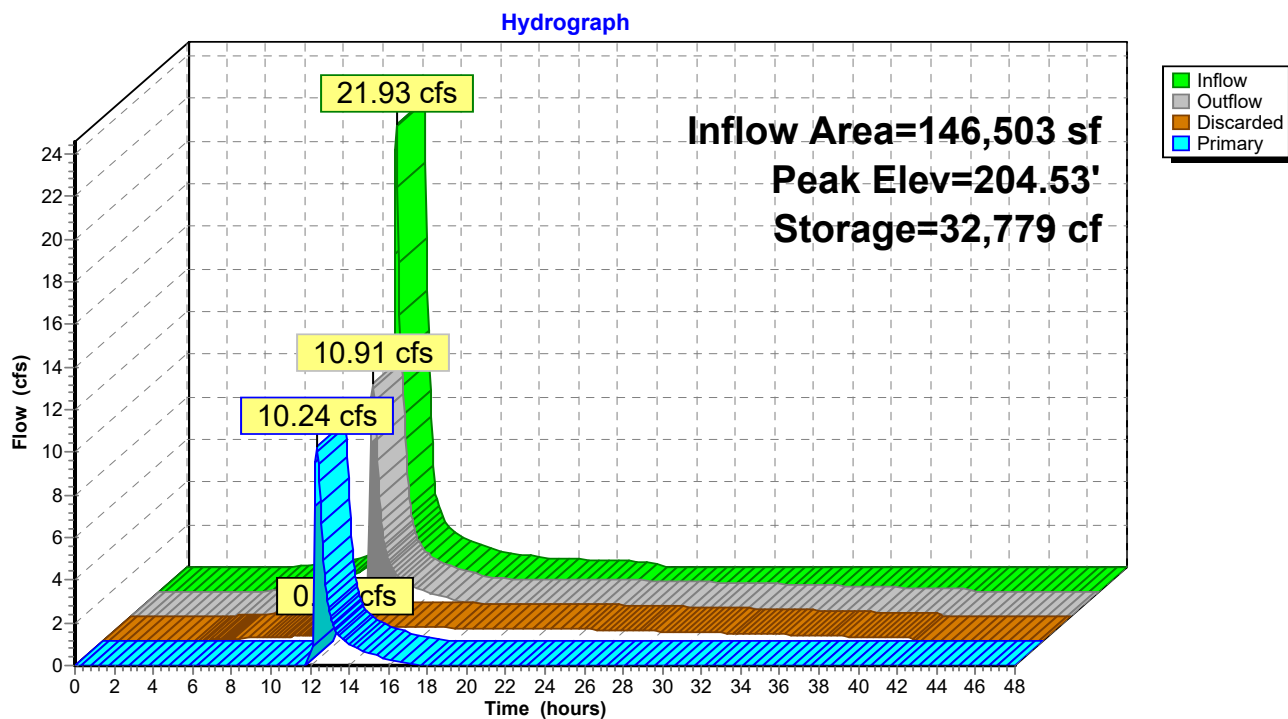
Plug-Flow detention time= 350.7 min calculated for 80,765 cf (100% of inflow)
 Center-of-Mass det. time= 351.4 min (1,149.8 - 798.4)

Volume	Invert	Avail.Storage	Storage Description
#1	199.99'	45,077 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
199.99	0	0	0
200.00	2,125	11	11
202.00	6,720	8,845	8,856
204.00	11,063	17,783	26,639
205.50	13,522	18,439	45,077

Device	Routing	Invert	Outlet Devices
#1	Discarded	199.99'	2.410 in/hr Exfiltration over Surface area
#2	Primary	204.00'	8.0' long x 1.25' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 4.0' Crest Height

Discarded OutFlow Max=0.67 cfs @ 12.36 hrs HW=204.53' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.67 cfs)

Primary OutFlow Max=10.15 cfs @ 12.36 hrs HW=204.53' (Free Discharge)
 ↑**2=Sharp-Crested Rectangular Weir** (Weir Controls 10.15 cfs @ 2.42 fps)

Pond 8P: INFILTRATION BASIN

APPENDIX C

Additional Calculations:

- 1. Recharge Volumes Calculation**
- 2. Water Quality Volume**
- 3. TSS Removal Calculations**

MERRILL ENGINEERS & LAND SURVEYORS
 REGISTERED PROFESSIONAL ENGINEERS
 427 COLUMBIA ROAD, HANOVER, MA. 02339
 TEL. (781) 826-9200

JOB **16-064**
 SHEET NO. 1 of 1
 CALCULATED BY DA
 CHECKED BY PGP DATE: 7/5/18
 Rev'd: 4/30/20

Location: **GLEN BROOK WAY - Phases I & II**

Recharge Volumes (Standard #3)

Total Area (Ac.)= 3.155
 Total Impervious Area A Soil (Ac.)= 2.55
 Total Impervious Area B Soil (Ac.)= 0
 Total Impervious Area C Soil (Ac.)= 0

	Vol. To Recharge (inches per Imp. Acre)	Volume (Imp. Area x inches per Acre)	
Recharge Volume (A soil)	0.4	1.02	
Recharge Volume (B soil)	0.25	0.00	
Recharge Volume (C soil)	0.1	0.00	
		1.02	AC-IN
Total Required Recharge Volume:		0.09	AC-FT
		3703	C.F.

**Recharge volume provided by Infiltration
 System:**

Volume Provided (below outlet, Infiltr. Basin #1): 26,528+ C.F.

MERRILL ENGINEERS & LAND SURVEYORS
REGISTERED PROFESSIONAL ENGINEERS
427 COLUMBIA ROAD, HANOVER, MA. 02339
TEL. (781) 826-9200

JOB 16-064
SHEET NO. 1 of 1
CALCULATED BY DA
CHECKED BY PGP
DATE: 7/5/2018
REV'D: 4/30/2020

WATER QUALITY VOLUME (STANDARD #4)

Location: **GLEN BROOK WAY - Phases I & II**

Total New Impervious Area

Parking Area w/Sidewalks/firelanes, etc 82,770 S.F.

Roof 28,014 S.F.

Total Area: 110,784 S.F.

Vol.: 0.5 or 1.0 inch x Imp. Area (per S.W. Mgmt Policy)

0.5 inch x Imp. Area 4,616 cubic feet

Provided by large Infiltration Basin (see calcs in Appdx B)

26,528+ c.f. (Below outlet)

Parking Area

Bioretention Area Sizing:

5%-7% of contributing area minimum

Bioretention Area #1:

Contributing Impervious Area:

Bioretention area provided:

Percentage of Contributing area:

**Bioretention Area
Media Volume
(Void Ratio=0.25)**

79,370 SF

4,214 SF 3160.5 C.F.

5.31% (meets minimum
requirement of 5% - 7%)

Sediment Forebay Volume:

Required Volume =

Impervious Area:

Required Volume=

Volume of Sediment Forebay:

400 CF/AC x Impervious Area

1.8221 AC 79,370 SF

728.83 CF

780 CF

Fire Dept. Access

Bioretention Area Sizing:

5%-7% of contributing area minimum

Bioretention Area #1:

Contributing Impervious Area:

Bioretention area provided:

Percentage of Contributing area:

**Bioretention Area
Media Volume
(Void Ratio=0.25)**

3,398 SF

250 SF 187.5 C.F.

7.36% (meets minimum
requirement of 5% - 7%)

Sediment Forebay Volume:

Required Volume =

Impervious Area:

Required Volume=

Volume of Sediment Forebay:

400 CF/AC x Impervious Area

0.078 AC 3,398 SF

31.20 CF

40 CF

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Glen Brook Way -F.D. Access Drive

TSS Removal Calculation Worksheet	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
	Bioretention Area	0.90	1.00	0.90	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10

Total TSS Removal =

90%

Separate Form Needs to
be Completed for Each
Outlet or BMP Train

Project: 16-064 - Phase II
Prepared By: DA
Date: 4/30/2020

*Equals remaining load from previous BMP (E)
which enters the BMP