

Conceptual SWPPP

Conceptual Stormwater Pollution Prevention Plan

----- For -----

Maifly Development) Multi-Family Residential Town of Dryden, NY

Freese Road & Dryden Road (NYS Route 366)
Town of Dryden, Tompkins County, New York
March 12, 2020

Prepared by:



Prepared For:

Maifly Development
2471 Huntington Drive
Pittsburgh, PA 15241



1.0 Introduction

This project proposes to demolish the existing structure(s), driveways, walkways, utilities, etc. to facilitate the construction of three (3) new buildings consisting of 1, 2 & 3 bedroom units with a total of 65 bedrooms. In addition, associated site grading, drainage, utility, access, lighting and landscaping improvements are also proposed.

Currently, access to the parcel is via two (2) gravel driveway entrances from Freese Road. As proposed, this project will eliminate the northern driveway entrance and reconstruct the southern driveway entrance to serve as a new full-access driveway to Freese Road. This driveway removal and reconstruction work will require driveway permit review and approval by the Town of Dryden Highway Department.

The neighboring project, now or formerly referred to as The Cottages at Fall Creek Crossing (The Cottages), was previously reviewed and approved by the Town of Dryden. That project included the construction of 15 single family homes as well as associated grading, drainage, access, stormwater management and utility improvements based on the available site development plans. As part of The Cottages project, an additional 15 single-family homes were apparently considered as a future phased build-out of the subject properties included in this proposal. However, neither The Cottages project nor the future build-out has occurred.

The project area spans two parcels having Tax ID numbers of (53.-1-3.2 & 53.-1-3.7). As part of the project, the two parcels will be combined to form one parcel.

2.0 Stormwater

A. Stormwater Management

The total site development (disturbance) area will exceed the allowable site disturbance (1 acre) outlined in the New York State Department of Environmental Conservation's (NYSDEC) General Permit for Stormwater Pollutant Discharges. Therefore, a full Stormwater Pollution Prevention Plan (SWPPP) is required which includes Stormwater Quality and Quantity provisions. While a full SWPPP will be prepared separately, a brief narrative summary is provided in this Conceptual Stormwater Management Plan (CSMP) for initial discussion & coordination with the Town of Dryden.

Since the previously approved Cottages Project was never constructed and given that both projects essentially share stormwater facilities, this CSMP considers development potential of both projects.



The entire site is located within the jurisdiction of the Town of Dryden, NY. The Town of Dryden is classified as a Municipal Separate Storm Sewer System (MS4) by NYSDEC. Such classification grants the Town of Dryden jurisdiction over stormwater discharges.

The site and surrounding area ultimately drains into Fall Creek. Fall Creek is a class A stream as identified by NYSDEC and is not on the NYSDEC list of impaired waterbodies (303(d) list).

B. Drainage Analysis Methodology:

The Stormwater Management and drainage analysis enclosed was prepared per the requirements outlined in the New York State Department of Environmental Conservation's Stormwater Management Design Manual (SMDM). As outlined in the SMDM, the United States Department of Agriculture, Natural Resources Conservation Service's (NRCS) Urban Hydrology for Small Watersheds, Technical Release 55 (TR55) was used to analyze the runoff characteristics associated with the site's drainage basin.

Rainfall amounts for the 1, 10 & 100 year storm events were taken from Figures 4.2, 4.3 & 4.4 respectively provided in the January 2015 SMDM. Rainfall amounts for the other storm events analyzed were taken from online data provided by <http://precip.eas.cornell.edu/> "Extreme Precipitation in New York & New England.

Three (3) analysis points (Analysis Point #1, Analysis Point #2 & Analysis Point #3) were established to analyze the pre versus post stormwater runoff rates for the project site. Analysis Point #1 is located at the northern corner of the site where surface runoff drains off the site via an existing drainage swale. Analysis Point #2 is located at the western corner of the site where runoff from the project and portions of Freese Road flow to the northwest via an existing roadside ditch. Analysis Point #3 is an arbitrary point where the combined outflows of Analysis Points #1 & 2 are observed. It should be noted that only runoff contributions associated with the project site and some upland areas flowing onto the subject parcel were evaluated in this analysis. The total runoff and drainage contributions of Dryden Road, Freese Road and other upstream drainage infrastructures were not evaluated.

C. Pre-Development Stormwater Conditions:

Under Pre-Development Conditions, the site was delineated into two (2) drainage areas given the existing topography across the site. A description of these subareas is as follows:

Area #1: This drainage area is comprised of portions of the existing site areas of the project site as well as the neighboring development. Ground cover consists of some impervious cover associated with the existing gravel driveway, Dryden Road, Freese Road, etc. as well as the existing lawn areas. Runoff from Area #1 generally flows to the north/northwest via overland flow where it is collected via the existing drainage ditch located along the northern property line, ultimately flowing to Analysis Point #1.



Area #2: This drainage area is comprised of portions of the existing site areas of the project site as well as the neighboring development. Ground cover consists of some impervious cover associated with the existing roof, gravel driveways, Freese Road, etc. as well as the existing lawn areas. Runoff from Area #2 generally flows to the north/northwest via overland flow where it is collected via the existing drainage ditch located along the north side of Freese Road, ultimately flowing to Analysis Point #2.

Table 1 below provides a summary of Pre-Development runoff rates (CFS) at the chosen Analysis Points (APs).

Table 1

	Analysis Point #1 (Existing)	Analysis Point #2 (Existing)	Analysis Point #3 (Existing)
1 year	2.00	0.92	2.92
2 year	2.75	1.42	4.17
10 year	5.51	3.39	8.90
100 year	12.42	8.72	21.14

Refer to Appendix C for the associated HydroCAD drainage analysis.

D. Post-Development Stormwater Conditions:

Under Post-Development Conditions, the site was separated into eight (8) subareas given the proposed topography across the site. A description of these subareas is as follows:

Area #1: This drainage area is comprised of impervious cover associated with the new buildings, parking, asphalt driveway, etc. as well as some lawn areas. Under proposed conditions, runoff from the roof areas will be collected via gutters and downspouts and piped to the face of curb where it will combine with surface runoff from the parking lot and driveway before ultimately discharging into Bioretention Area #1. Flows from Bioretention Area #1 then enter the new storm sewer system where it combines with the flows from Bioretention Areas #2 & #3 which ultimately discharge to the proposed Detention Pond. Discharge from the pond combines with flows from Area #8 at Analysis Point #1.

Area #2: This drainage area is comprised of lawn area as well as some impervious cover associated with the existing gravel and proposed asphalt driveway areas. Under proposed conditions, runoff from this area drain directly into the proposed Detention Pond where it will combine with flows from Bioretention Areas #1, 2 & 3. Flows from the detention pond will ultimately discharge to Analysis Point #1 where they will combine with runoff from Areas #3 & #8.



Area #3 This drainage area is comprised of lawn area running along the northern property boundary as well as some impervious cover associated with the existing gravel driveway. Under proposed conditions, runoff from this area will discharge directly to Analysis Point #1 where it combines with runoff from Area #8 and flows from the proposed Detention Pond.

Area #4: This drainage area is comprised of impervious cover associated with Freese Road, the proposed asphalt driveway and concrete sidewalk along the property frontage to Freese Road. Under proposed conditions, runoff will drain into the existing roadside drainage ditch where it will discharge directly to Analysis Point #2.

Area #5: This drainage area is comprised of impervious cover associated with the neighboring development's proposed roofs, parking lot and sidewalks as well as some lawn area. Under proposed conditions, runoff from this area will drain to Bioretention Area #3 before flowing through the onsite storm sewer and discharging to the proposed Detention Pond.

Area #6: This drainage area is comprised of impervious cover associated with the neighboring development's proposed roofs, parking lot and sidewalks as well as some lawn area. Under proposed conditions, runoff from this area will drain to Bioretention Area #3 before flowing through the onsite storm sewer and discharging to the proposed Detention Pond.

Area #7: This drainage area is comprised of lawn cover. Under proposed conditions runoff will drain directly into Bioretention Area #2 before flowing through the onsite storm sewer and discharging to the proposed Detention Pond.

Area #8: This drainage area is comprised of the impervious cover associated with the new asphalt driveways, sidewalks, Freese Road and Dryden Road as well as lawn area running along Freese Road, Dryden Road and the shared property boundary with Cornell University. Under proposed conditions, surface runoff is collected by a proposed roadside drainage ditch where it either flows off site or drains into the onsite storm sewer before discharging off the site to the northeast. The runoff will then flow north/northwest where it ultimately discharges to Analysis Point #1.



Table 2 below provides a summary of Post-Development runoff rates (CFS) at the chosen Analysis Points (APs).

Table 2

	Analysis Point #1 (Proposed)	Analysis Point #2 (Proposed)	Analysis Point #3 (Proposed)
1 year	1.75	0.80	2.55
2 year	2.30	1.03	3.34
10 year	4.09	1.87	6.06
100 year	12.15	3.84	15.70

Refer to Appendix C for the associated HydroCAD drainage analysis.

E. Storm Water Quality:

This project proposes both new impervious surfaces and the disturbance to existing impervious surfaces. Portions of this project (disturbance of existing impervious areas) qualifies as a “Redevelopment Project” as defined in Chapter 9 of the SMDM. However, the stormwater management practices for the new development portion of the project must be designed in accordance with Chapter 4 of the SMDM.

Redevelopment portion is proposed to apply to the two existing tax parcels considered in the Maifly Development (53.-1-3.2 & 63.-1-3.7) which currently are or previously were developed as residential home lots with gravel driveways.

As outlined in the SMDM, for Redevelopment Projects that reconstruct existing impervious areas and construct new impervious areas, the WQv shall be calculated for 25% of the disturbed existing impervious area and 100% of the additional impervious area. A summary of the accounting for existing and proposed impervious cover used in calculating the WQv is provided in Appendix C. WQv calculations were evaluated separately for the Maifly Development portion and The Cottages portion.

Maifly Development Portion:

Existing impervious cover to be disturbed within the Maifly portion includes roof areas associated with the existing buildings, asphalt drives and parking areas as well as concrete walkways proposed to be demolished as part of this project. Approximately



0.32 acres of impervious cover exists within the project area to be disturbed and approximately **1.26** acres upon completion of the project.

Based on the above and the impervious cover accounting provided in Appendix C, a total of **±1.02 acres** of impervious cover is to be used in calculating the required WQv for the project site. Using the NYSDEC's Green Infrastructure Worksheets (11/09/15 version), the calculated total WQv to be provided as part of the Maifly Development portion is **±0.077 ac-ft.**

The Cottages Portion:

This portion of the development is considered all new development. Therefore, no redevelopment credit will be taken in evaluating stormwater mitigation criteria for this portion of the project. Proposed impervious cover to be disturbed includes roof areas associated with the existing buildings, asphalt drives and parking areas as well as concrete walkways to be constructed as part of this project. Approximately **1.17** acres of impervious cover is proposed upon completion of the project.

Using the NYSDEC's Green Infrastructure Worksheets (11/09/15 version), the calculated total WQv to be provided as part of The Cottages development portion is **±0.086 ac-ft.**

Per the NYSDEC SMDM, Storm Water Quality is addressed by capturing and treating 90% of the average annual stormwater runoff volume. This captured volume is considered the Water Quality Volume (WQv). WQv is directly related to the amount of impervious cover created/maintained on site.

To address Water Quality concerns, three (3) bioretention areas (Bioretention Area #1, Bioretention Area #2 & Bioretention Area #3) are proposed to be used. Through the use of the bioretention areas and RRv credits associated with this practice, the volume reduced and treated is equal to or greater than the WQv required for both projects.

Bioretention Areas:

The SMDM outlines required elements to be incorporated into the design for bioretention which includes: pretreatment, separation from water table, minimum planting soil media depth and surface mulch treatments.

Pretreatment: As noted above, the SMDM requires that a grass filter strip and/or a gravel diaphragm be used as pretreatment. All bioretention areas will utilize a combination of stone mulch, filter fabric and outlet protection for pretreatment.

Separation from Water Table: The SMDM requires that a 2' vertical separation be maintained between the bottom of bioretention practices and the groundwater. A



geotechnical subsurface investigation has not been completed for this project site. According to the available NRCS Soil Survey information, the depth to the water table is greater than 80". With the proposed section depth of the bioretention areas and the anticipated depth to groundwater, it is likely that the 2' vertical separation criteria can be achieved. Therefore, all bioretention areas will not be lined.

Minimum Planting Soil Media Depth: As outlined in the SMDM, the minimum bioretention soil media depth is 2.5' which equals the depth of soil media provided. The bioretention areas proposed all provide the required 2.5' minimum soil media depth.

Surface Mulch Treatments: The SMDM recommends that aged hardwood mulch be used as a surface treatment in the bioretention areas. However, in an effort to prolong the operational life of the bioretention area and possibly the introduction of additional phosphorus into the stormwater discharges, rolled river stone mulch on non-woven geotextile is proposed in lieu of hardwood bark mulch.

Maximum Ponding Depth: The SMDM recommends limiting the WQv ponding depth to no more than six (6) inches within the bioretention area. Flows in excess of the WQv would need to be discharged from the bioretention area(s) via a non-erosive outlet.

The Bioretention Areas proposed all provide the 6 inches of available ponding between the stone mulch surface and the overflow outlet. The overflow for all Bioretention Areas consists drainage inlets (catch basins) which is routed to the site storm sewer.

Stormwater Hotspot Concern: According to the NYSDEC Stormwater Management Design Manual (SMDM), a Stormwater Hotspot is defined as a land use or activity that generates higher concentrations of hydrocarbons, trace metals or toxicants than are found in typical stormwater runoff, based on monitoring studies. Residential uses are not considered stormwater hotspots.

F. **Runoff Reduction Volume:**

The goal of Runoff Reduction Volume (RRv) as defined Chapter 4 of the NYSDEC SMDM is the 100% reduction of the Water Quality Volume (WQv) by the application of green infrastructure techniques and Stormwater Management Practices (SMPs) to replicate pre-development hydrology. However, projects may experience limitations which may prevent this design goal from being achieved.

According to the NYSDEC Green Infrastructure Worksheets, while using bioretention areas with underdrain(s) a project may receive a 40% credit toward the required Runoff Reduction Volume (RRv). The worksheets completed for this project are provided in Appendix E of this SWPPP. The Bioretention Areas were sized to provide a total RRv of **±0.072 ac-ft.**



The SMDM outlines minimum RRv criteria for sites which cannot reduce 100% of the WQv through the use of green infrastructure practices. Using the information presented in the SMDM, the minimum RRv which must be provided is **±0.070 ac-ft**. Therefore, while the goal to reduce 100% of the WQv through green infrastructure techniques could not be achieved, the provided RRv meets the minimum required therefore the RRv design criteria is satisfied.

G. Stormwater Water Quantity:

To address the water quantity requirements outlined in the SMDM, this project proposes the reconstruction/expansion of the previously approved stormwater detention pond serving the neighboring development (The Cottages at Fall Creek Crossing).

- **Stream Channel Protection Volume, CPv:**
CPv is defined as the 24 hour extended detention of the post-development 1-year, 24-hour storm event. As discussed in the SMDM the CPv requirement does not apply where a reduction in the total CPv volume is achieved through Runoff Reduction practices. While this project proposes Runoff Reduction practices as noted above, a total reduction of the CPv is not feasible. The enclosed calculations provided in Appendix C illustrates the initial total required CPv is **±0.236 ac-ft**. As noted in the SMDM, volume reduction achieved through green infrastructure can be deducted from the required CPv. Therefore, using the provided RRv noted above, the adjusted total required CPv is **±0.166 ac-ft**. This volume is temporarily detained within the proposed Detention Pond. With the provided average head on the low flow outlet, a 1.9" diameter orifice would be required to discharge the required CPv over 24 hours. Given the clogging potential of such an orifice size, a 3" diameter orifice was chosen for the Detention Pond. Per the SMDM, for sites where the CPv orifice is considered too small, such a configuration from the calculated required orifice size is appropriate. Refer to Appendix C for CPv calculations for the Detention Pond.
- **Overbank Flood Control, Qp (10 year storm event):**
Chapter 4 of the NYSDEC SMDM requires that Qp control be provided such that the peak discharge rate from the 10-year storm event under Post-Development Conditions be reduced so to not exceed the Pre-Development Conditions. As illustrated in Table 3 below, the 10-year storm event discharge rate under Post-Development Conditions is less than that of the Pre-Development conditions. Therefore, the Overbank Flood Control (Qp) requirement is satisfied.
- **Extreme Flood Control Criteria, Qf (100 year storm event):**
Chapter 4 of the NYSDEC SMDM requires that Qf control be provided such that the peak discharge rate from the 100-year storm event under Post-Development Conditions be reduced so to not exceed the Pre-Development Conditions. As illustrated in Table 3



below, the 100-year storm event discharge rate under Post-Development Conditions is less than that of the Pre-Development conditions. Therefore, the Extreme Flood Control (Qf) requirement is met.

Table 3 below provides a comparison of Pre and Post Development runoff rates (CFS) at the chosen Analysis Points (APs) and respective peak flow reduction percentage.

Table 3

	AP #1 (Ex)	AP #1 (Pr)	AP #2 (Ex)	AP #2 (Pr)	AP #3 (Ex)	AP #3 (Pr)
1 year	2.00	1.75	0.92	0.80	2.92	2.55
2 year	2.75	2.30	1.42	1.03	4.17	3.34
10 year	5.51	4.09	3.39	1.87	8.90	6.06
100 year	12.42	12.15	8.72	3.84	21.14	15.70

In conclusion, this Project's proposed Bioretention Area and Stormwater Detention Ponds satisfies the Stormwater Quantity, Quality and Runoff Reduction requirements outlined in the NYSDEC SMDM and that required by the Town of Dryden.

H. Conveyance

The onsite stormwater runoff will be conveyed via surface drainage and the proposed onsite storm sewers toward the proposed stormwater management practices. The onsite storm sewers will be sized to convey runoff generated from the 10-year storm event.

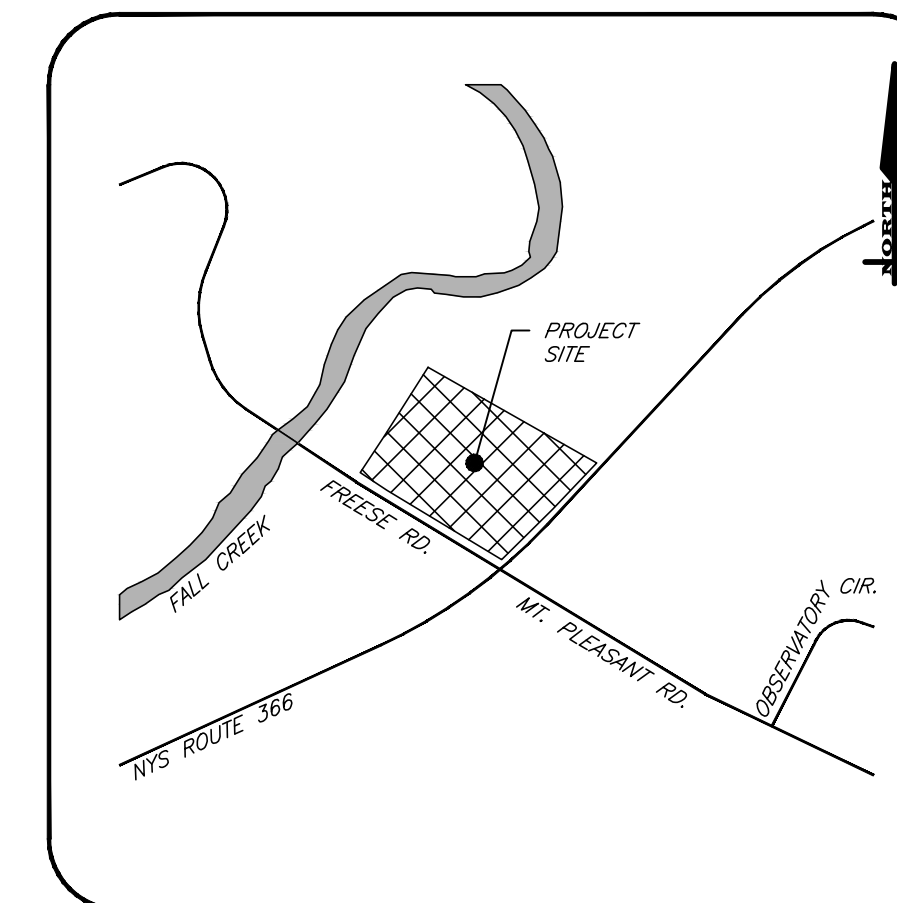
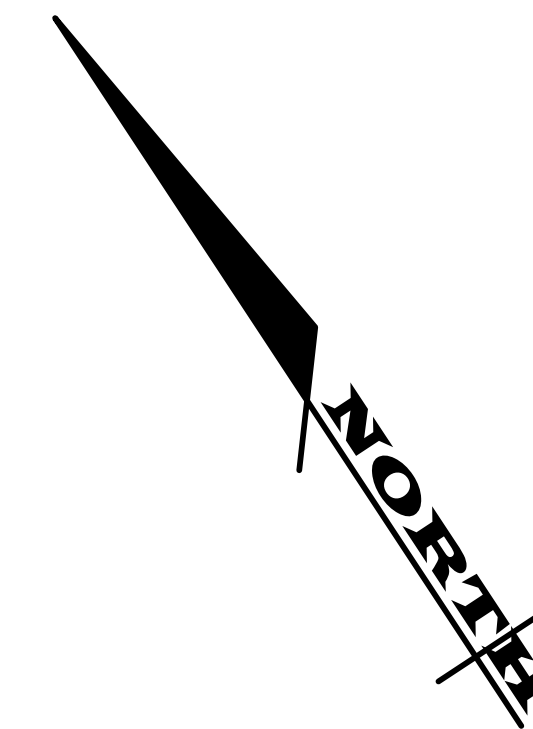
I. Conclusions

Based on our evaluation, the stormwater management practices proposed for both projects are anticipated to comply with the stormwater design requirements as outlined in the NYSDEC SMDM.

Appendix A

Drainage Info/Maps & Hydrologic Analysis

File: I:\Engineering\Job_Files\1096-20\Drawings\1096-20\Drawings.dwg, Last saved: 3/12/2020, Plot Date: 3/12/2020, Plot Style: MARATHON_STANDARD.CTB



LOCATION MAP
N.T.S.

MARATHON ENGINEERING
 ROCHESTER LOCATION
 39 CASCADE DRIVE
 ROCHESTER, NY 14614
 585-458-7770
 ITHACA LOCATION
 840 HANSHAW RD, STE 12
 ITHACA, NY 14850
 607-241-2917
 www.marathoneng.com

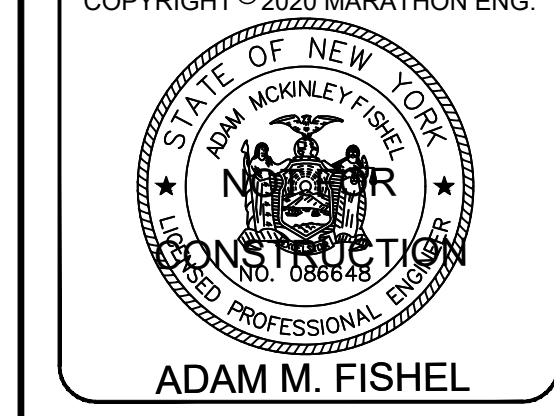
SITE DEVELOPMENT PLANS
 for
MAIFLY DEVELOPMENT
 INTERSECTION OF FRESE ROAD AND DRYDEN ROAD (NYS ROUTE 366)
 TOWN OF DRYDEN
 TOMPKINS COUNTY
 STATE OF NEW YORK

JOB NO: 1096-20
 SCALE: 1" = 30'
 DRAWN: RLJ
 DESIGNED: AMF
 DATE: 03/12/2020

REVISIONS		
DATE	BY	REVISION

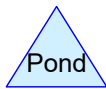
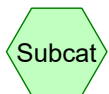
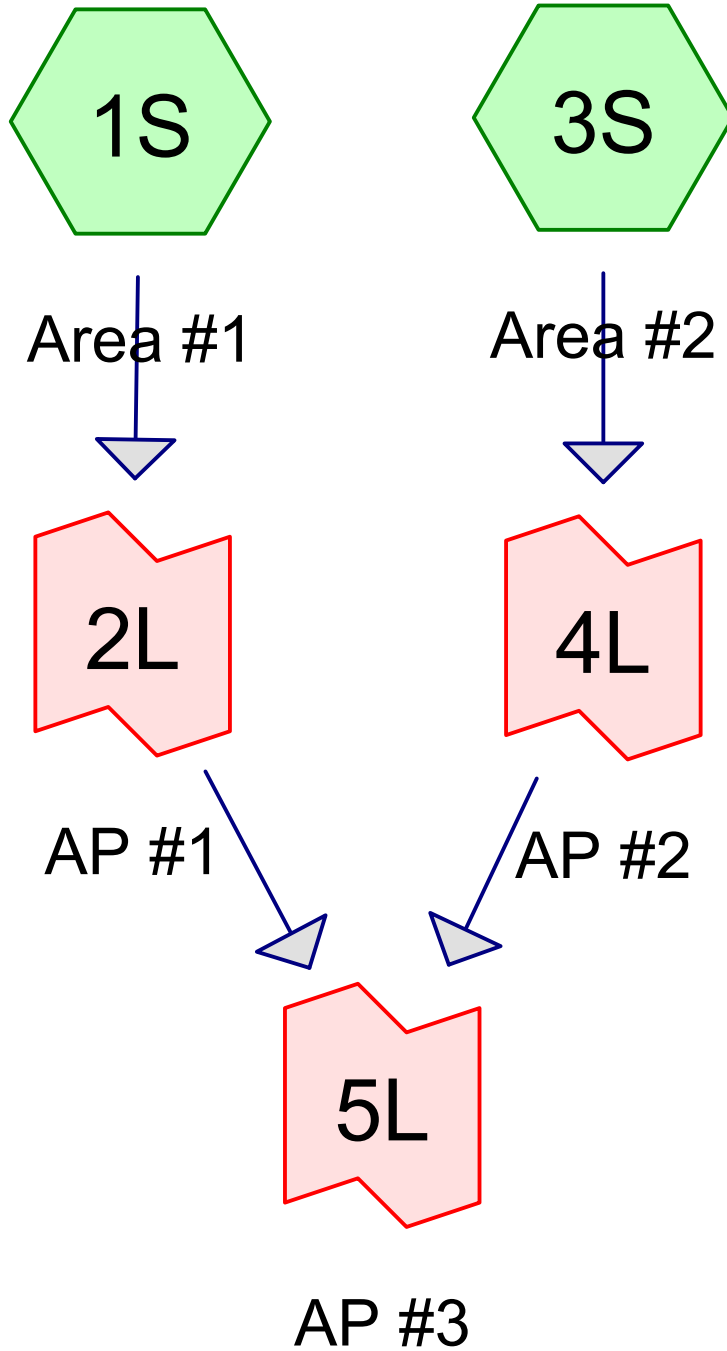
I, A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF NEW YORK, HEREBY CERTIFY THAT I AM THE DESIGNER OF THE ABOVE DESCRIBED PROJECT AND I AM NOT PROVIDING ANY SERVICES TO ANY OTHER PARTY IN CONNECTION WITH THIS PROJECT. I AM NOT PROVIDING ANY SERVICES TO ANY OTHER PARTY IN CONNECTION WITH THIS PROJECT. I AM NOT PROVIDING ANY SERVICES TO ANY OTHER PARTY IN CONNECTION WITH THIS PROJECT.

COPYRIGHT © 2020 MARATHON ENG.



DRAWING TITLE:
**Pre-Development
 Drainage Plan**

1 of 2
 SHEET No: **DR-1**
 1096-20
 JOB No: DRAWING No:



Existing 2020 03-10

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Printed 3/12/2020

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.159	98	(1S)
0.473	80	(1S)
0.315	39	>75% Grass cover, Good, HSG A (3S)
3.519	80	>75% Grass cover, Good, HSG D (1S, 3S)
0.334	98	Paved parking, HSG D (1S, 3S)
4.800	79	TOTAL AREA

Existing 2020 03-10

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Printed 3/12/2020

Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.315	HSG A	3S
0.000	HSG B	
0.000	HSG C	
3.853	HSG D	1S, 3S
0.632	Other	1S
4.800		TOTAL AREA

Existing 2020 03-10

Prepared by {enter your company name here}

Printed 3/12/2020

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Page 4

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.632	0.632		1S
0.315	0.000	0.000	3.519	0.000	3.834	>75% Grass cover, Good	1S, 3S
0.000	0.000	0.000	0.334	0.000	0.334	Paved parking	1S, 3S
0.315	0.000	0.000	3.853	0.632	4.800	TOTAL AREA	

Existing 2020 03-10

Type II 24-hr 1-Year Rainfall=2.01"

Prepared by {enter your company name here}

Printed 3/12/2020

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Page 5

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area #1

Runoff Area=115,129 sf 8.37% Impervious Runoff Depth>0.59"
Flow Length=364' Tc=17.1 min CN=82 Runoff=2.00 cfs 0.130 af

Subcatchment 3S: Area #2

Runoff Area=93,959 sf 12.59% Impervious Runoff Depth>0.37"
Flow Length=857' Tc=16.9 min CN=76 Runoff=0.92 cfs 0.066 af

Link 2L: AP #1

Inflow=2.00 cfs 0.130 af
Primary=2.00 cfs 0.130 af

Link 4L: AP #2

Inflow=0.92 cfs 0.066 af
Primary=0.92 cfs 0.066 af

Link 5L: AP #3

Inflow=2.92 cfs 0.196 af
Primary=2.92 cfs 0.196 af

Total Runoff Area = 4.800 ac Runoff Volume = 0.196 af Average Runoff Depth = 0.49"
89.73% Pervious = 4.307 ac 10.27% Impervious = 0.493 ac

Summary for Subcatchment 1S: Area #1

Runoff = 2.00 cfs @ 12.11 hrs, Volume= 0.130 af, Depth> 0.59"

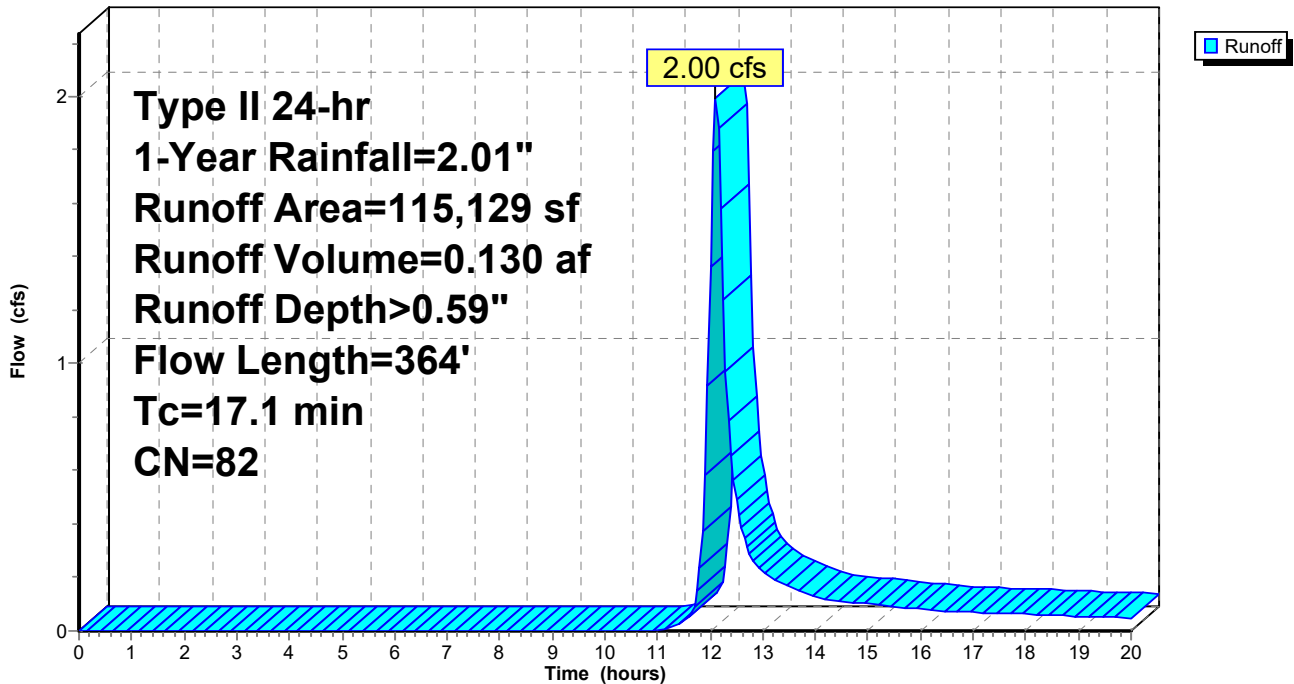
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.01"

Area (sf)	CN	Description
2,713	98	Paved parking, HSG D
84,873	80	>75% Grass cover, Good, HSG D
* 6,920	98	
* 20,623	80	
115,129	82	Weighted Average
105,496		91.63% Pervious Area
9,633		8.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0113	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
0.7	214	0.1042	5.20		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.1	364	Total			

Subcatchment 1S: Area #1

Hydrograph



Summary for Subcatchment 3S: Area #2

Runoff = 0.92 cfs @ 12.12 hrs, Volume= 0.066 af, Depth> 0.37"

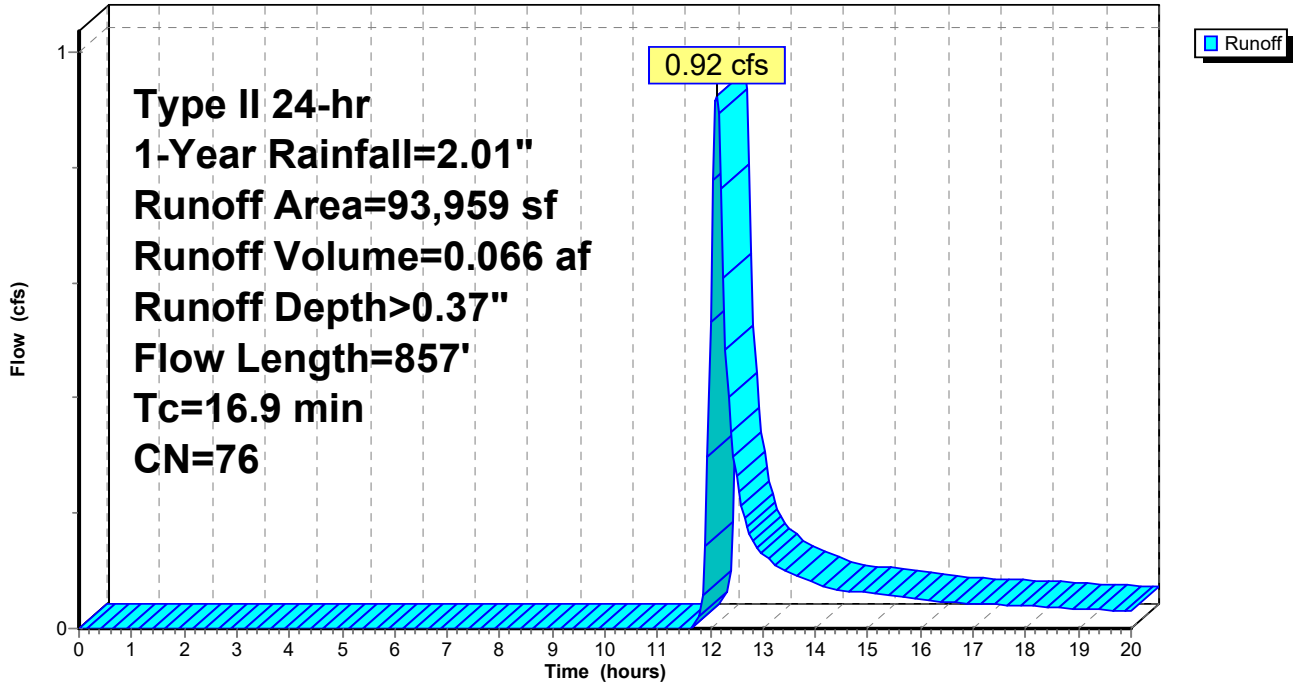
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 1-Year Rainfall=2.01"

Area (sf)	CN	Description
11,831	98	Paved parking, HSG D
13,704	39	>75% Grass cover, Good, HSG A
68,424	80	>75% Grass cover, Good, HSG D
93,959	76	Weighted Average
82,128		87.41% Pervious Area
11,831		12.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	18	0.0556	1.52		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.44"
13.2	132	0.0152	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
1.9	205	0.0122	1.78		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	145	0.0862	12.49	49.97	Channel Flow, Area= 4.0 sf Perim= 8.0' r= 0.50' n= 0.022 Earth, clean & straight
0.1	20	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	170	0.0588	11.07	55.34	Channel Flow, Area= 5.0 sf Perim= 9.0' r= 0.56' n= 0.022 Earth, clean & straight
1.0	167	0.0281	2.70		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
16.9	857	Total			

Subcatchment 3S: Area #2

Hydrograph



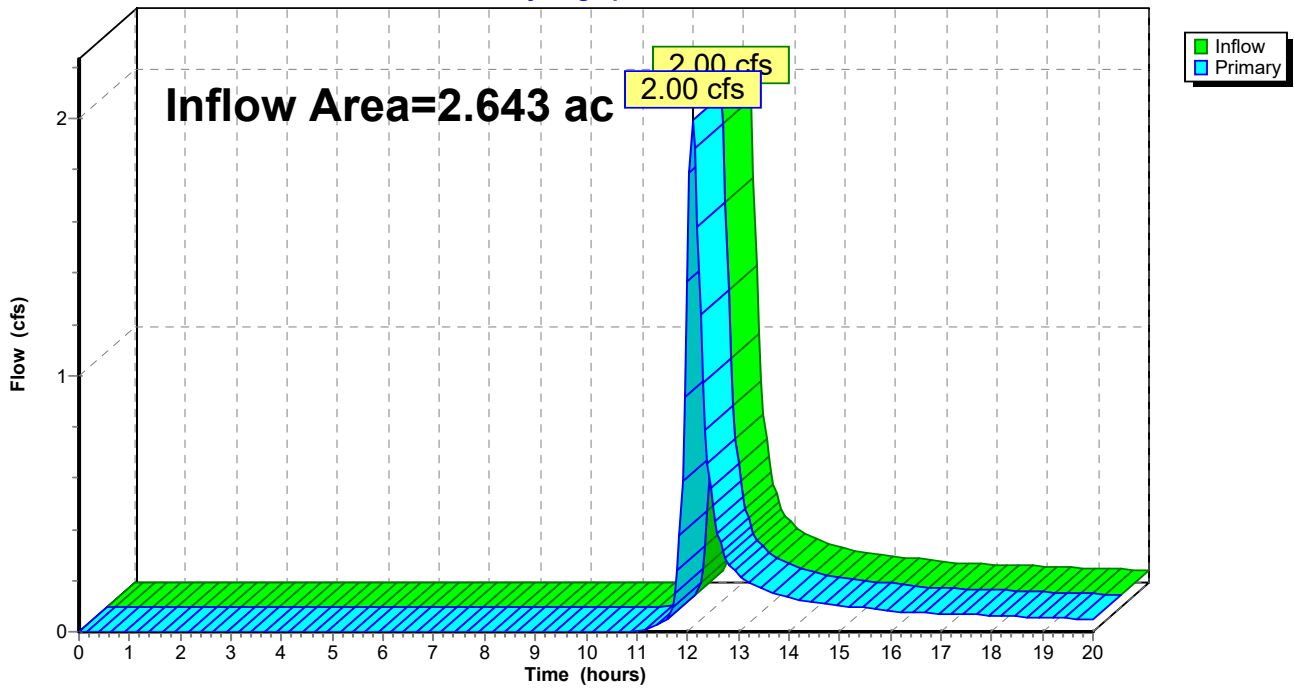
Summary for Link 2L: AP #1

Inflow Area = 2.643 ac, 8.37% Impervious, Inflow Depth > 0.59" for 1-Year event
Inflow = 2.00 cfs @ 12.11 hrs, Volume= 0.130 af
Primary = 2.00 cfs @ 12.11 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link 2L: AP #1

Hydrograph



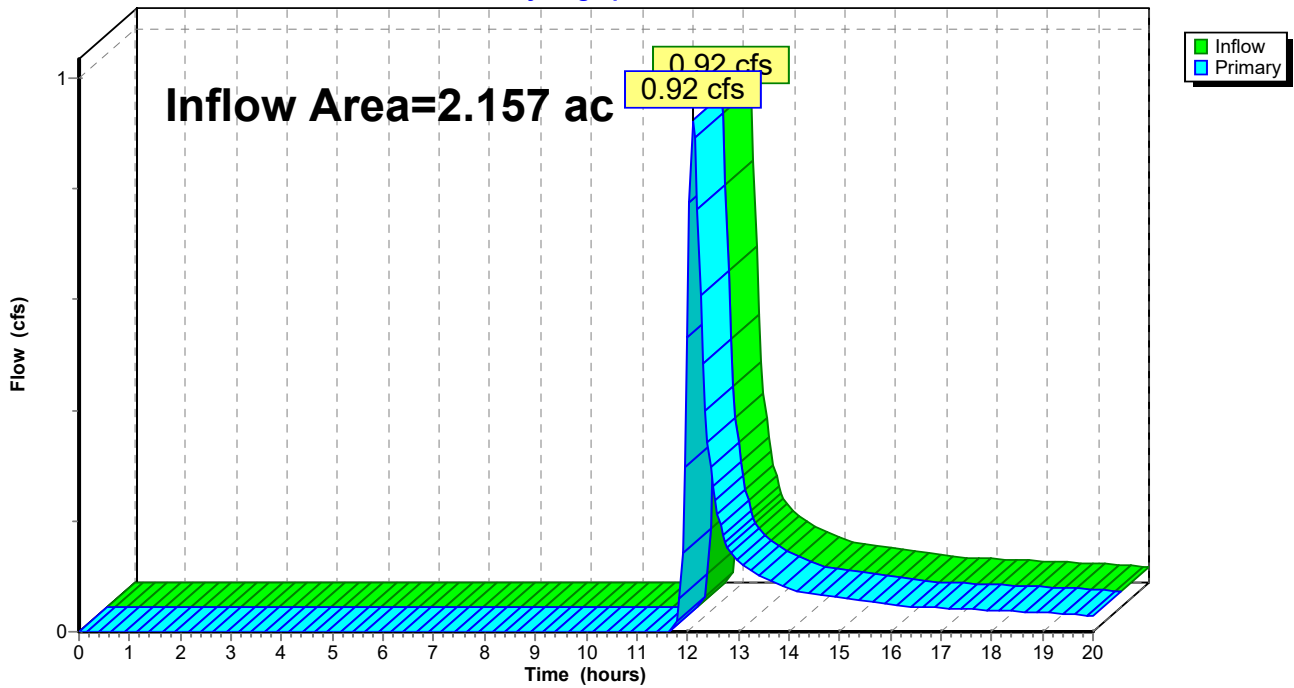
Summary for Link 4L: AP #2

Inflow Area = 2.157 ac, 12.59% Impervious, Inflow Depth > 0.37" for 1-Year event
Inflow = 0.92 cfs @ 12.12 hrs, Volume= 0.066 af
Primary = 0.92 cfs @ 12.12 hrs, Volume= 0.066 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link 4L: AP #2

Hydrograph



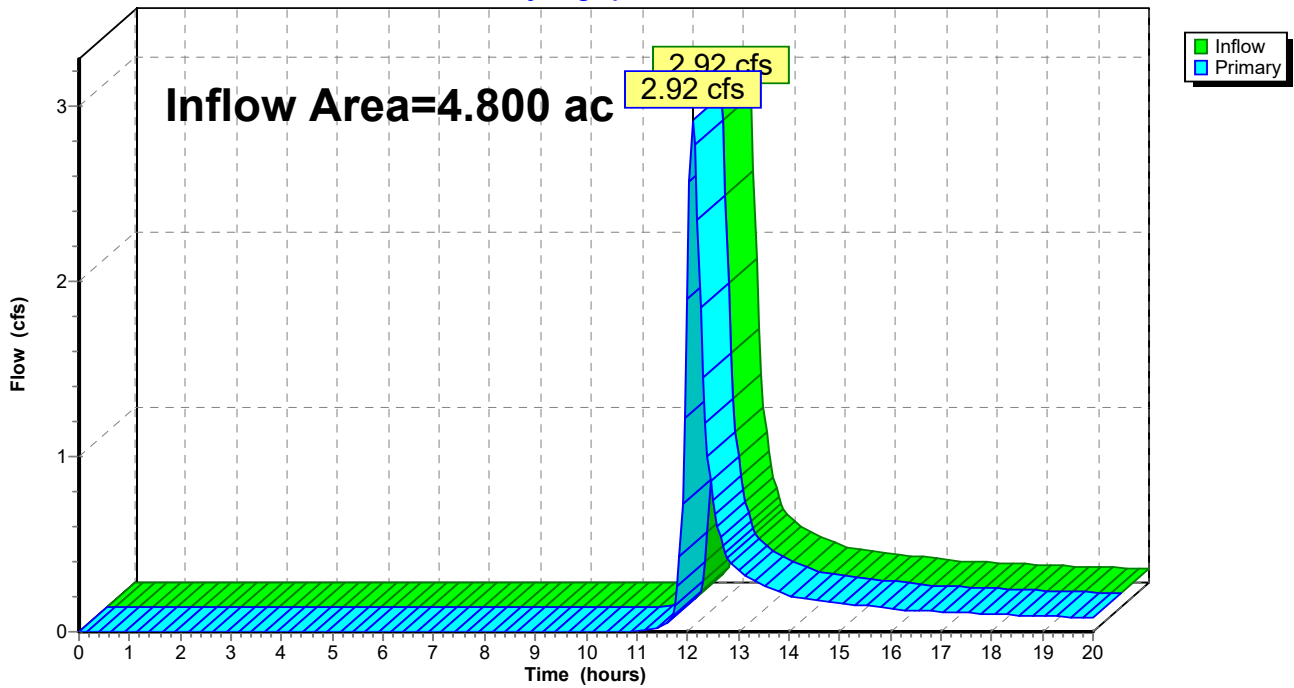
Summary for Link 5L: AP #3

Inflow Area = 4.800 ac, 10.27% Impervious, Inflow Depth > 0.49" for 1-Year event
Inflow = 2.92 cfs @ 12.11 hrs, Volume= 0.196 af
Primary = 2.92 cfs @ 12.11 hrs, Volume= 0.196 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link 5L: AP #3

Hydrograph



Existing 2020 03-10

Type II 24-hr 2-Year Rainfall=2.34"

Prepared by {enter your company name here}

Printed 3/12/2020

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Page 12

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area #1

Runoff Area=115,129 sf 8.37% Impervious Runoff Depth>0.80"
Flow Length=364' Tc=17.1 min CN=82 Runoff=2.75 cfs 0.176 af

Subcatchment 3S: Area #2

Runoff Area=93,959 sf 12.59% Impervious Runoff Depth>0.53"
Flow Length=857' Tc=16.9 min CN=76 Runoff=1.42 cfs 0.096 af

Link 2L: AP #1

Inflow=2.75 cfs 0.176 af
Primary=2.75 cfs 0.176 af

Link 4L: AP #2

Inflow=1.42 cfs 0.096 af
Primary=1.42 cfs 0.096 af

Link 5L: AP #3

Inflow=4.17 cfs 0.271 af
Primary=4.17 cfs 0.271 af

Total Runoff Area = 4.800 ac Runoff Volume = 0.271 af Average Runoff Depth = 0.68"
89.73% Pervious = 4.307 ac 10.27% Impervious = 0.493 ac

Summary for Subcatchment 1S: Area #1

Runoff = 2.75 cfs @ 12.10 hrs, Volume= 0.176 af, Depth> 0.80"

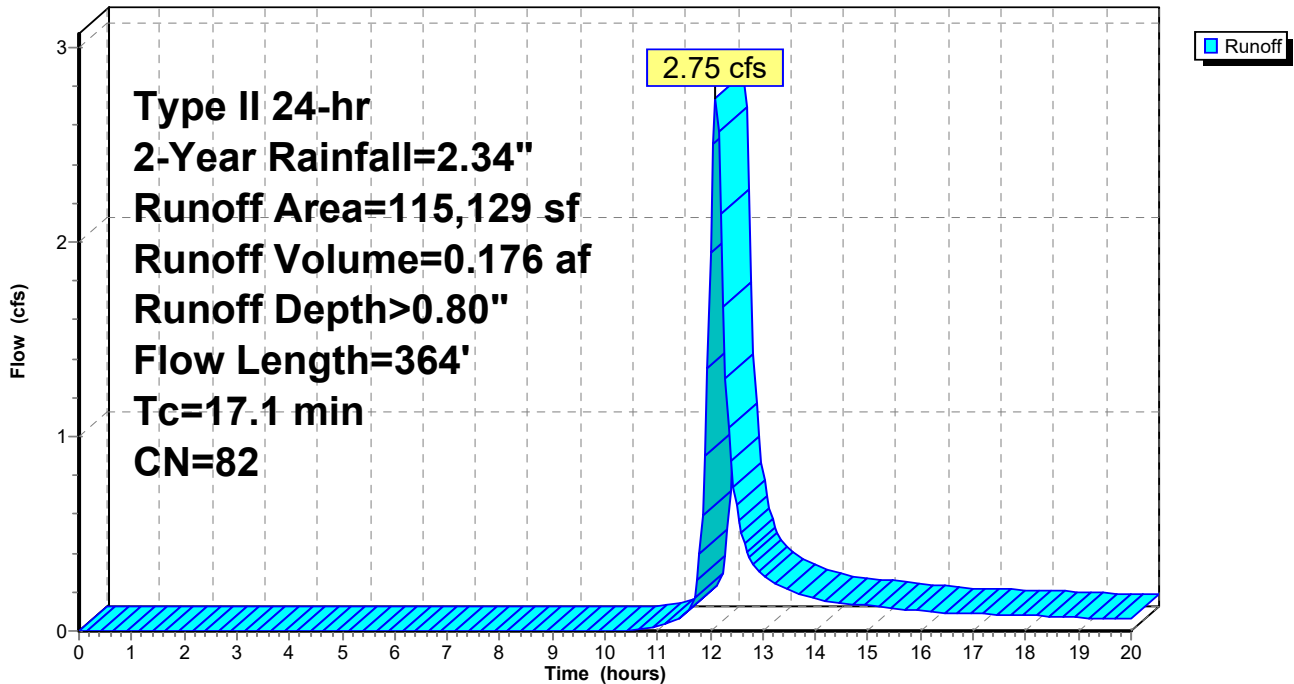
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.34"

Area (sf)	CN	Description
2,713	98	Paved parking, HSG D
84,873	80	>75% Grass cover, Good, HSG D
* 6,920	98	
* 20,623	80	
115,129	82	Weighted Average
105,496		91.63% Pervious Area
9,633		8.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0113	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
0.7	214	0.1042	5.20		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.1	364	Total			

Subcatchment 1S: Area #1

Hydrograph



Summary for Subcatchment 3S: Area #2

Runoff = 1.42 cfs @ 12.11 hrs, Volume= 0.096 af, Depth> 0.53"

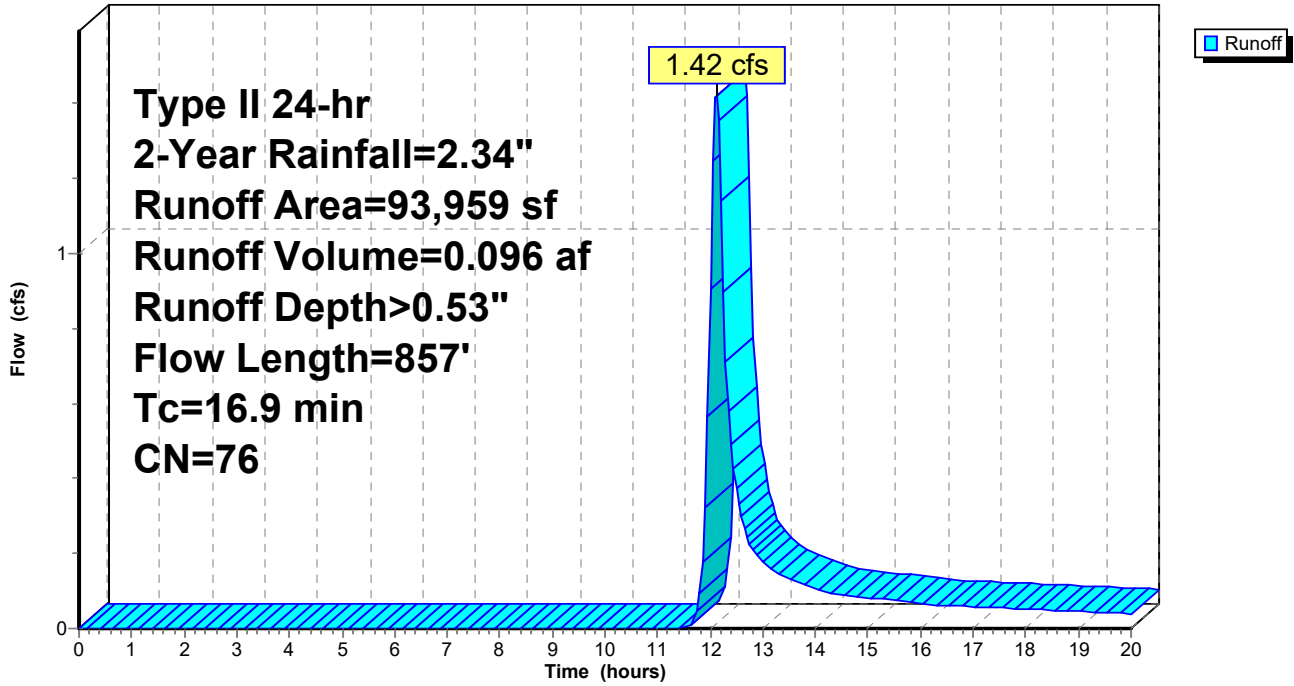
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 2-Year Rainfall=2.34"

Area (sf)	CN	Description
11,831	98	Paved parking, HSG D
13,704	39	>75% Grass cover, Good, HSG A
68,424	80	>75% Grass cover, Good, HSG D
93,959	76	Weighted Average
82,128		87.41% Pervious Area
11,831		12.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	18	0.0556	1.52		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.44"
13.2	132	0.0152	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
1.9	205	0.0122	1.78		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	145	0.0862	12.49	49.97	Channel Flow, Area= 4.0 sf Perim= 8.0' r= 0.50' n= 0.022 Earth, clean & straight
0.1	20	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	170	0.0588	11.07	55.34	Channel Flow, Area= 5.0 sf Perim= 9.0' r= 0.56' n= 0.022 Earth, clean & straight
1.0	167	0.0281	2.70		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
16.9	857	Total			

Subcatchment 3S: Area #2

Hydrograph



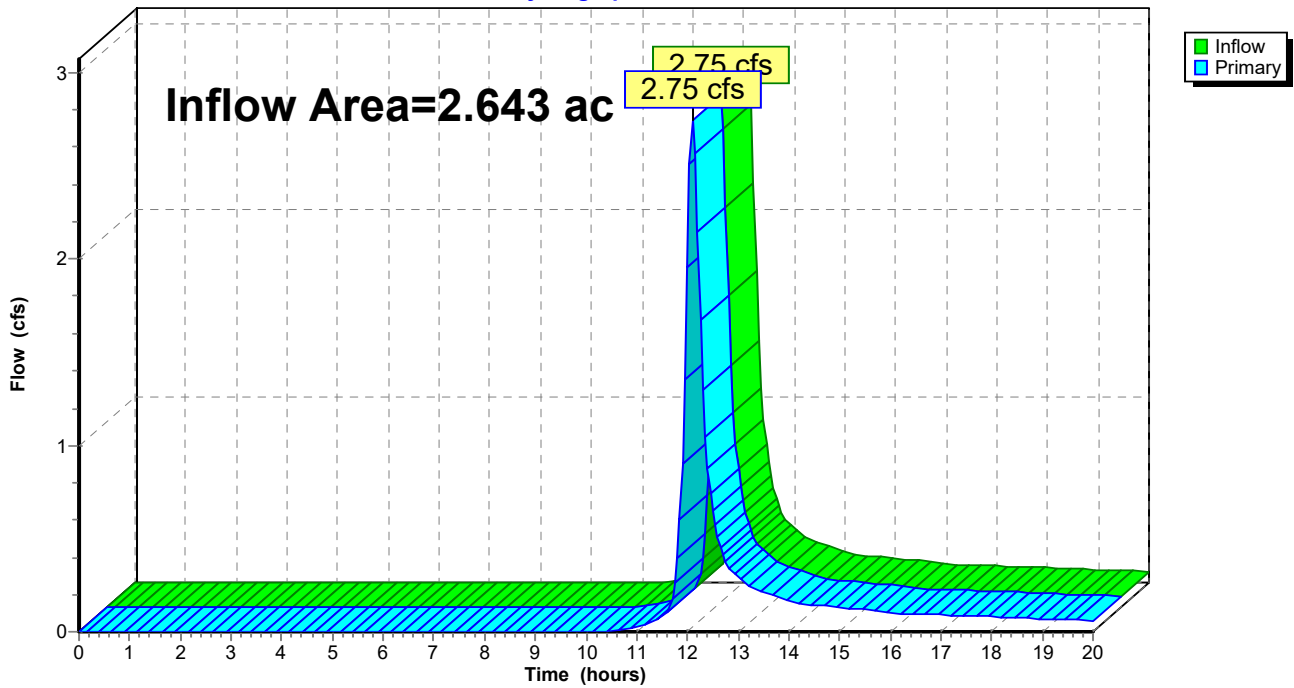
Summary for Link 2L: AP #1

Inflow Area = 2.643 ac, 8.37% Impervious, Inflow Depth > 0.80" for 2-Year event
Inflow = 2.75 cfs @ 12.10 hrs, Volume= 0.176 af
Primary = 2.75 cfs @ 12.10 hrs, Volume= 0.176 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link 2L: AP #1

Hydrograph



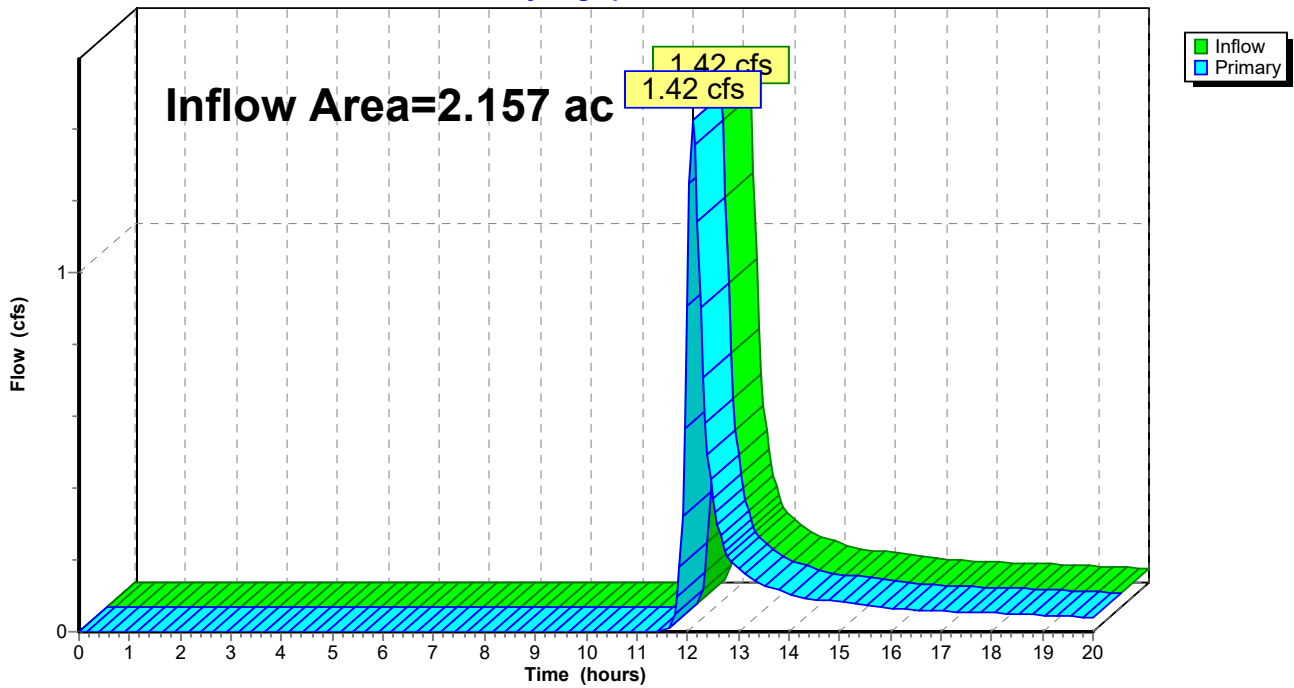
Summary for Link 4L: AP #2

Inflow Area = 2.157 ac, 12.59% Impervious, Inflow Depth > 0.53" for 2-Year event
Inflow = 1.42 cfs @ 12.11 hrs, Volume= 0.096 af
Primary = 1.42 cfs @ 12.11 hrs, Volume= 0.096 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link 4L: AP #2

Hydrograph



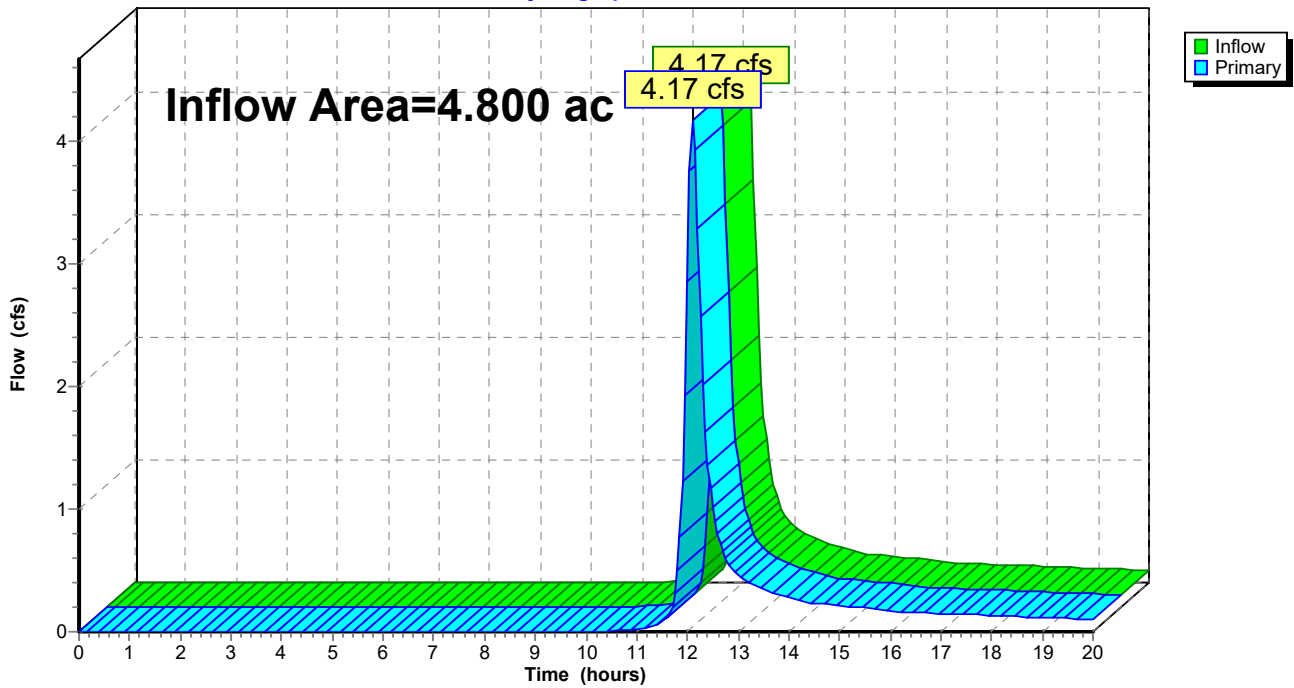
Summary for Link 5L: AP #3

Inflow Area = 4.800 ac, 10.27% Impervious, Inflow Depth > 0.68" for 2-Year event
Inflow = 4.17 cfs @ 12.11 hrs, Volume= 0.271 af
Primary = 4.17 cfs @ 12.11 hrs, Volume= 0.271 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link 5L: AP #3

Hydrograph



Existing 2020 03-10

Type II 24-hr 10-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 3/12/2020

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Page 19

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area #1

Runoff Area=115,129 sf 8.37% Impervious Runoff Depth>1.59"
Flow Length=364' Tc=17.1 min CN=82 Runoff=5.51 cfs 0.350 af

Subcatchment 3S: Area #2

Runoff Area=93,959 sf 12.59% Impervious Runoff Depth>1.20"
Flow Length=857' Tc=16.9 min CN=76 Runoff=3.39 cfs 0.215 af

Link 2L: AP #1

Inflow=5.51 cfs 0.350 af
Primary=5.51 cfs 0.350 af

Link 4L: AP #2

Inflow=3.39 cfs 0.215 af
Primary=3.39 cfs 0.215 af

Link 5L: AP #3

Inflow=8.90 cfs 0.565 af
Primary=8.90 cfs 0.565 af

Total Runoff Area = 4.800 ac Runoff Volume = 0.565 af Average Runoff Depth = 1.41"
89.73% Pervious = 4.307 ac 10.27% Impervious = 0.493 ac

Summary for Subcatchment 1S: Area #1

Runoff = 5.51 cfs @ 12.10 hrs, Volume= 0.350 af, Depth> 1.59"

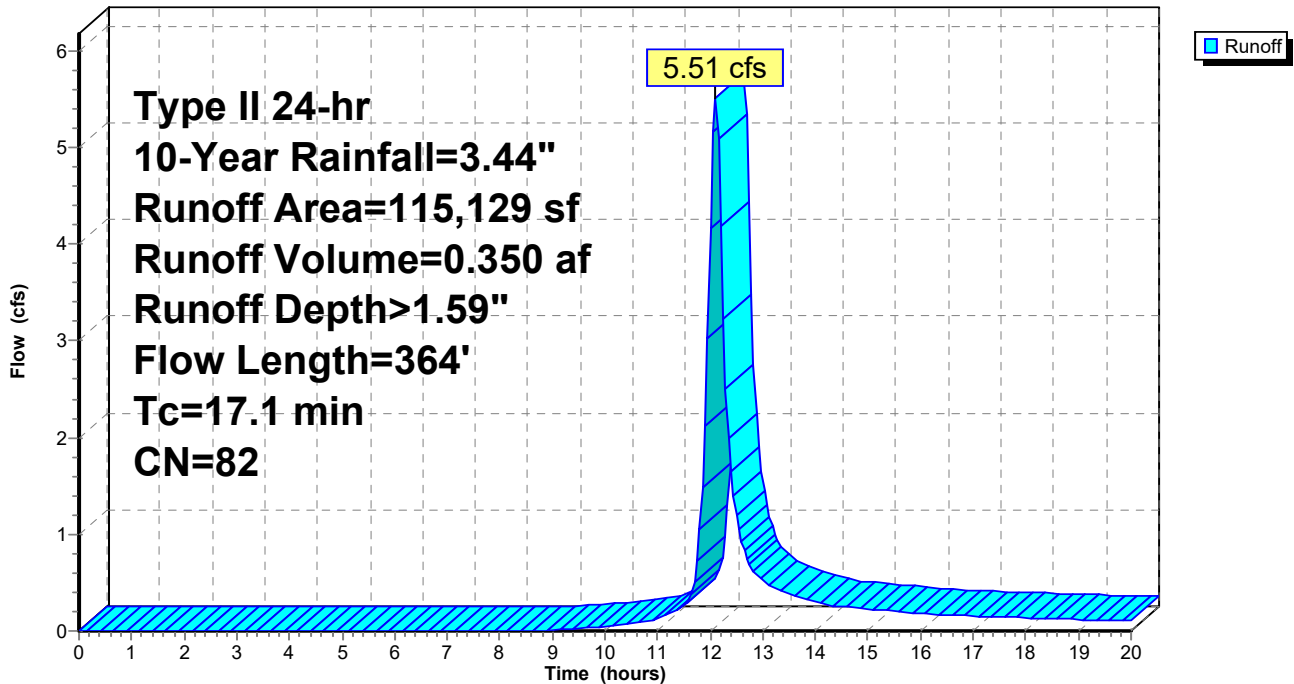
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.44"

Area (sf)	CN	Description
2,713	98	Paved parking, HSG D
84,873	80	>75% Grass cover, Good, HSG D
* 6,920	98	
* 20,623	80	
115,129	82	Weighted Average
105,496		91.63% Pervious Area
9,633		8.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0113	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
0.7	214	0.1042	5.20		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.1	364	Total			

Subcatchment 1S: Area #1

Hydrograph



Summary for Subcatchment 3S: Area #2

Runoff = 3.39 cfs @ 12.10 hrs, Volume= 0.215 af, Depth> 1.20"

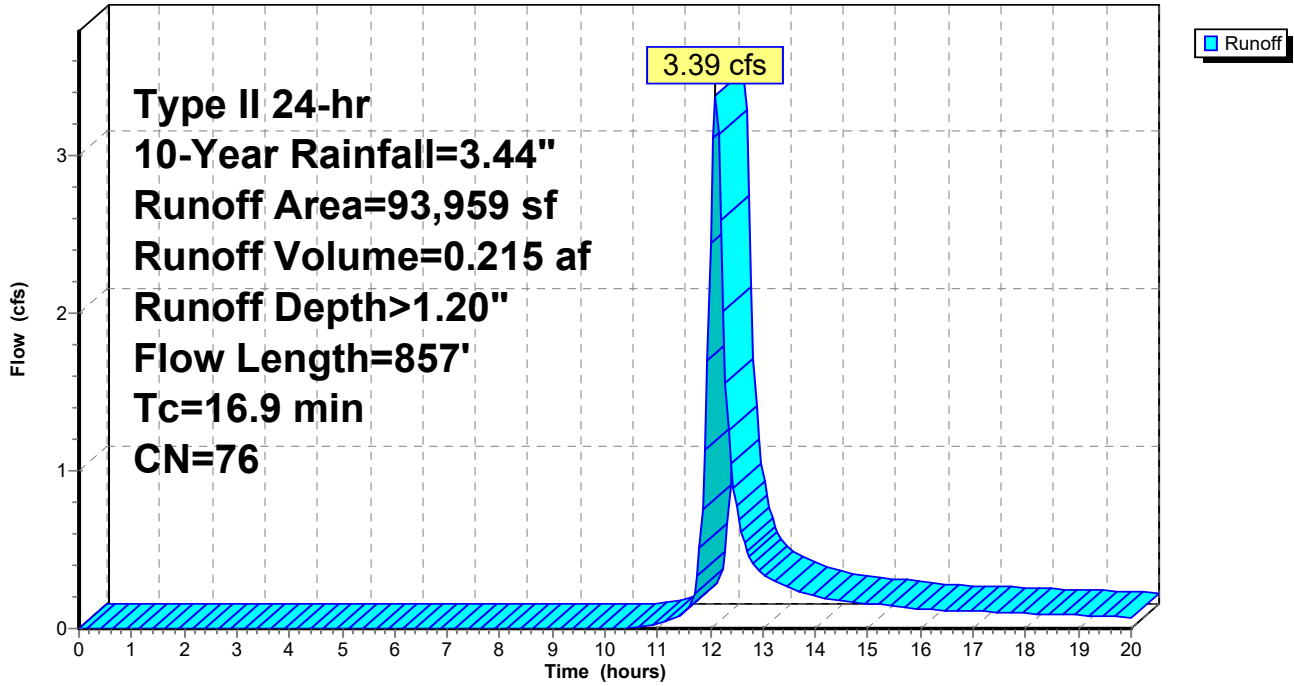
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.44"

Area (sf)	CN	Description
11,831	98	Paved parking, HSG D
13,704	39	>75% Grass cover, Good, HSG A
68,424	80	>75% Grass cover, Good, HSG D
93,959	76	Weighted Average
82,128		87.41% Pervious Area
11,831		12.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	18	0.0556	1.52		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.44"
13.2	132	0.0152	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
1.9	205	0.0122	1.78		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	145	0.0862	12.49	49.97	Channel Flow, Area= 4.0 sf Perim= 8.0' r= 0.50' n= 0.022 Earth, clean & straight
0.1	20	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	170	0.0588	11.07	55.34	Channel Flow, Area= 5.0 sf Perim= 9.0' r= 0.56' n= 0.022 Earth, clean & straight
1.0	167	0.0281	2.70		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
16.9	857	Total			

Subcatchment 3S: Area #2

Hydrograph



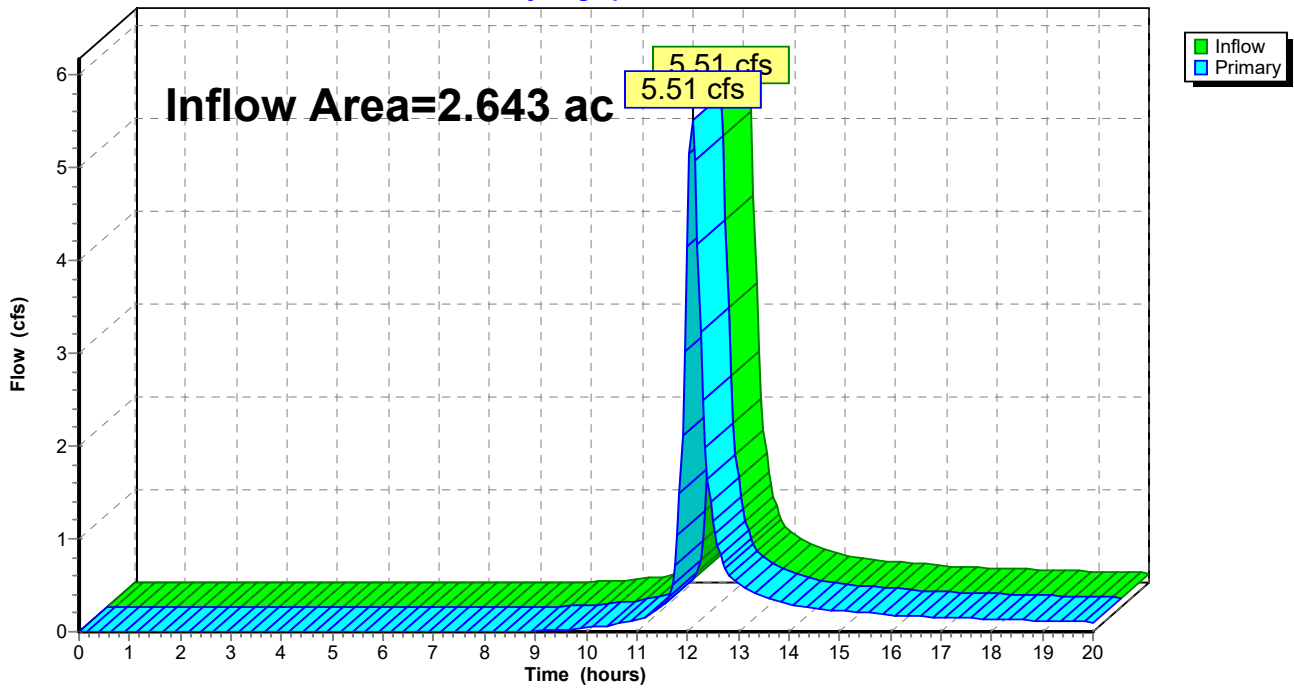
Summary for Link 2L: AP #1

Inflow Area = 2.643 ac, 8.37% Impervious, Inflow Depth > 1.59" for 10-Year event
Inflow = 5.51 cfs @ 12.10 hrs, Volume= 0.350 af
Primary = 5.51 cfs @ 12.10 hrs, Volume= 0.350 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link 2L: AP #1

Hydrograph



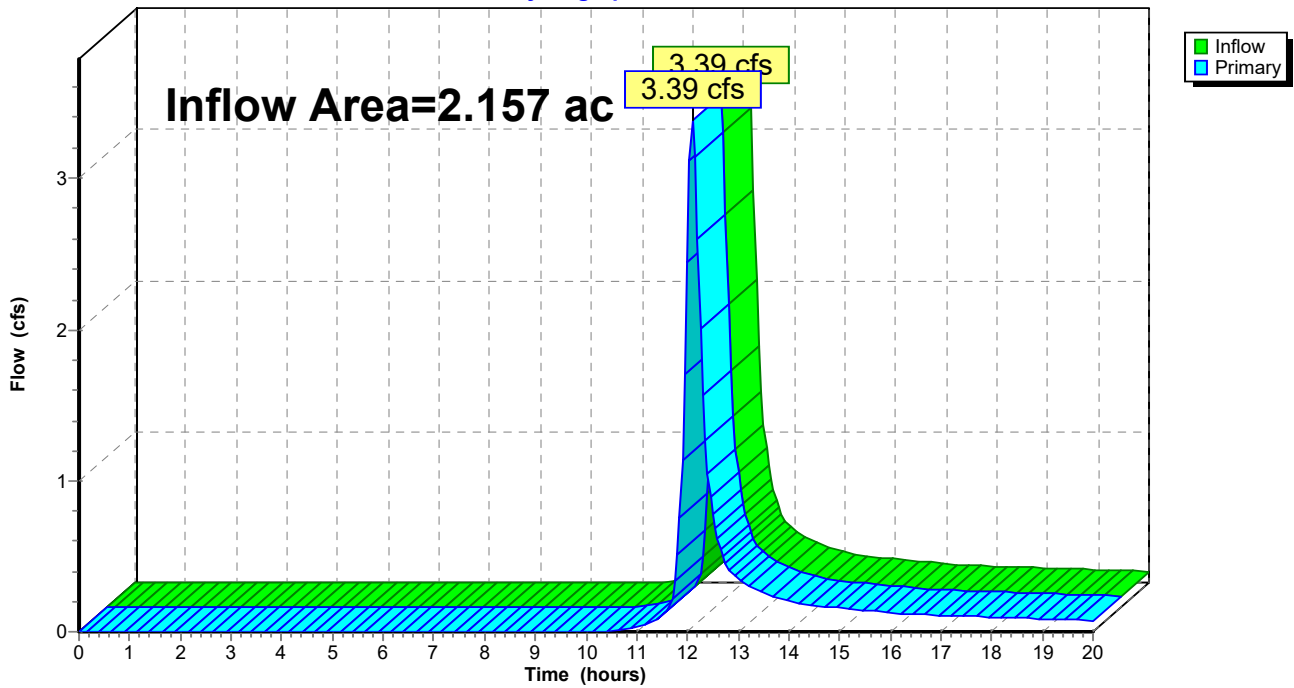
Summary for Link 4L: AP #2

Inflow Area = 2.157 ac, 12.59% Impervious, Inflow Depth > 1.20" for 10-Year event
Inflow = 3.39 cfs @ 12.10 hrs, Volume= 0.215 af
Primary = 3.39 cfs @ 12.10 hrs, Volume= 0.215 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link 4L: AP #2

Hydrograph



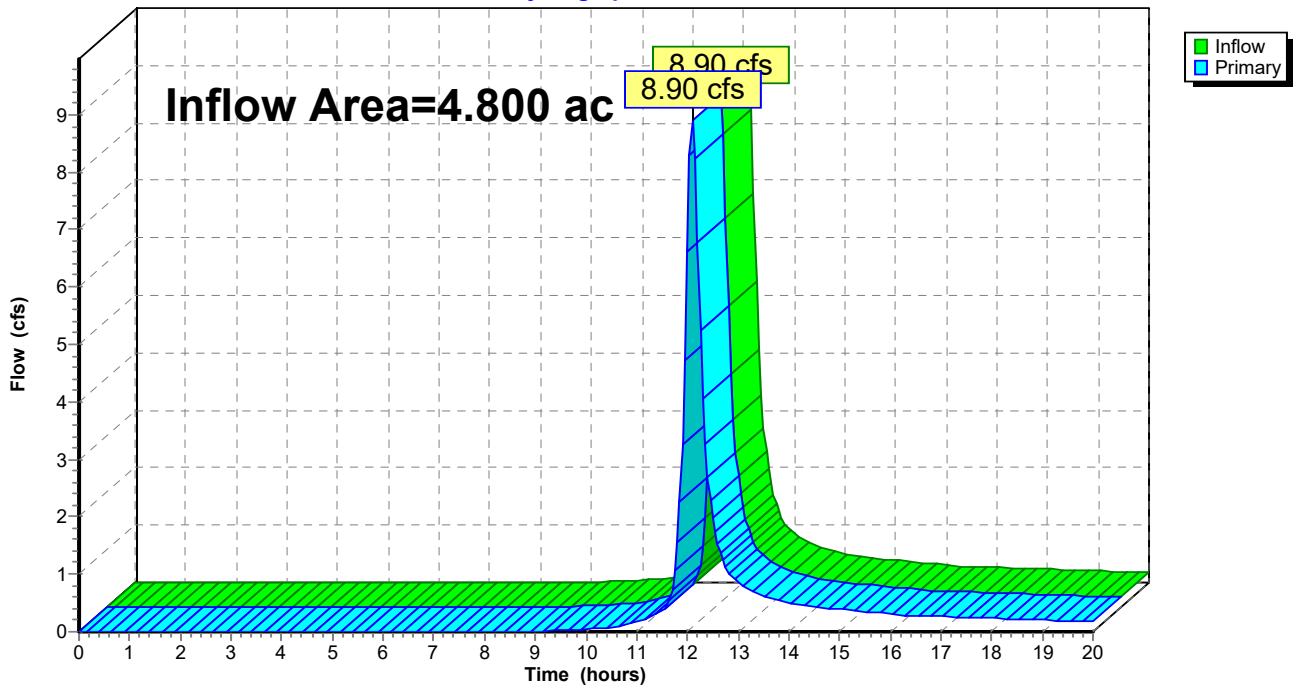
Summary for Link 5L: AP #3

Inflow Area = 4.800 ac, 10.27% Impervious, Inflow Depth > 1.41" for 10-Year event
Inflow = 8.90 cfs @ 12.10 hrs, Volume= 0.565 af
Primary = 8.90 cfs @ 12.10 hrs, Volume= 0.565 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link 5L: AP #3

Hydrograph



Existing 2020 03-10

Type II 24-hr 100-Year Rainfall=5.95"

Prepared by {enter your company name here}

Printed 3/12/2020

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Page 26

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area #1

Runoff Area=115,129 sf 8.37% Impervious Runoff Depth>3.66"
Flow Length=364' Tc=17.1 min CN=82 Runoff=12.42 cfs 0.807 af

Subcatchment 3S: Area #2

Runoff Area=93,959 sf 12.59% Impervious Runoff Depth>3.08"
Flow Length=857' Tc=16.9 min CN=76 Runoff=8.72 cfs 0.553 af

Link 2L: AP #1

Inflow=12.42 cfs 0.807 af
Primary=12.42 cfs 0.807 af

Link 4L: AP #2

Inflow=8.72 cfs 0.553 af
Primary=8.72 cfs 0.553 af

Link 5L: AP #3

Inflow=21.14 cfs 1.360 af
Primary=21.14 cfs 1.360 af

Total Runoff Area = 4.800 ac Runoff Volume = 1.360 af Average Runoff Depth = 3.40"
89.73% Pervious = 4.307 ac 10.27% Impervious = 0.493 ac

Summary for Subcatchment 1S: Area #1

Runoff = 12.42 cfs @ 12.09 hrs, Volume= 0.807 af, Depth> 3.66"

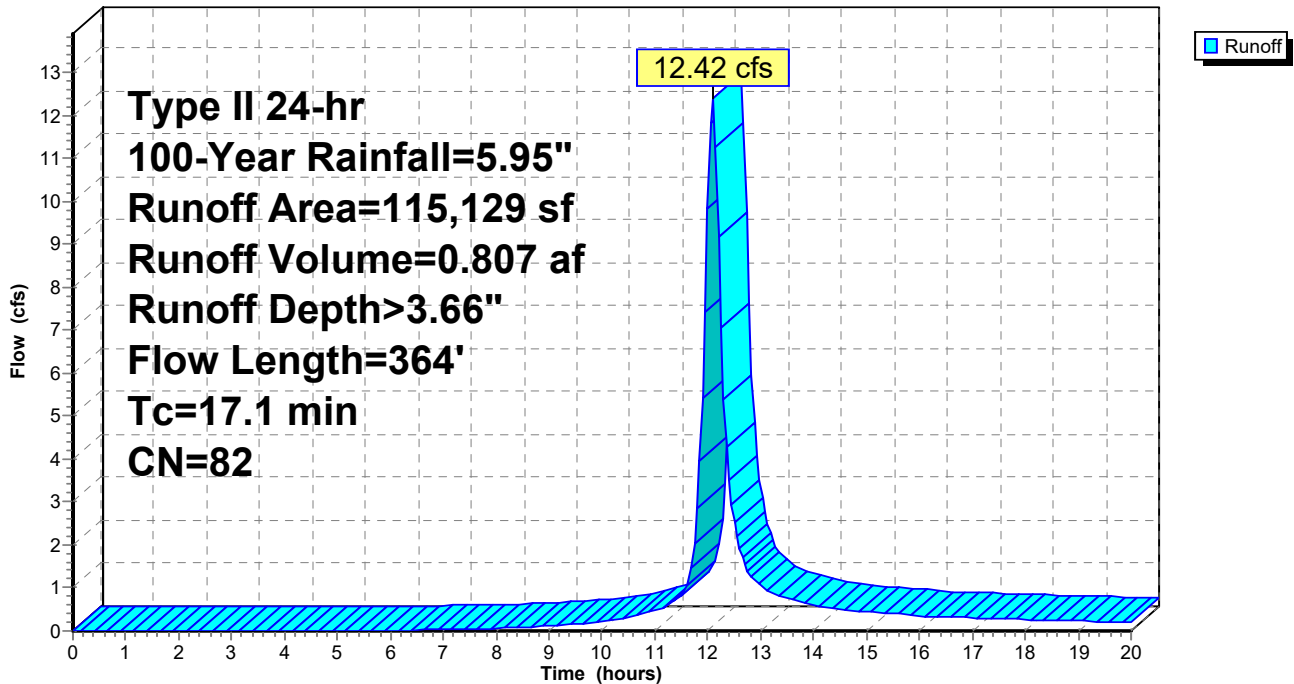
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 100-Year Rainfall=5.95"

Area (sf)	CN	Description
2,713	98	Paved parking, HSG D
84,873	80	>75% Grass cover, Good, HSG D
* 6,920	98	
* 20,623	80	
115,129	82	Weighted Average
105,496		91.63% Pervious Area
9,633		8.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0113	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
0.7	214	0.1042	5.20		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.1	364	Total			

Subcatchment 1S: Area #1

Hydrograph



Summary for Subcatchment 3S: Area #2

Runoff = 8.72 cfs @ 12.09 hrs, Volume= 0.553 af, Depth> 3.08"

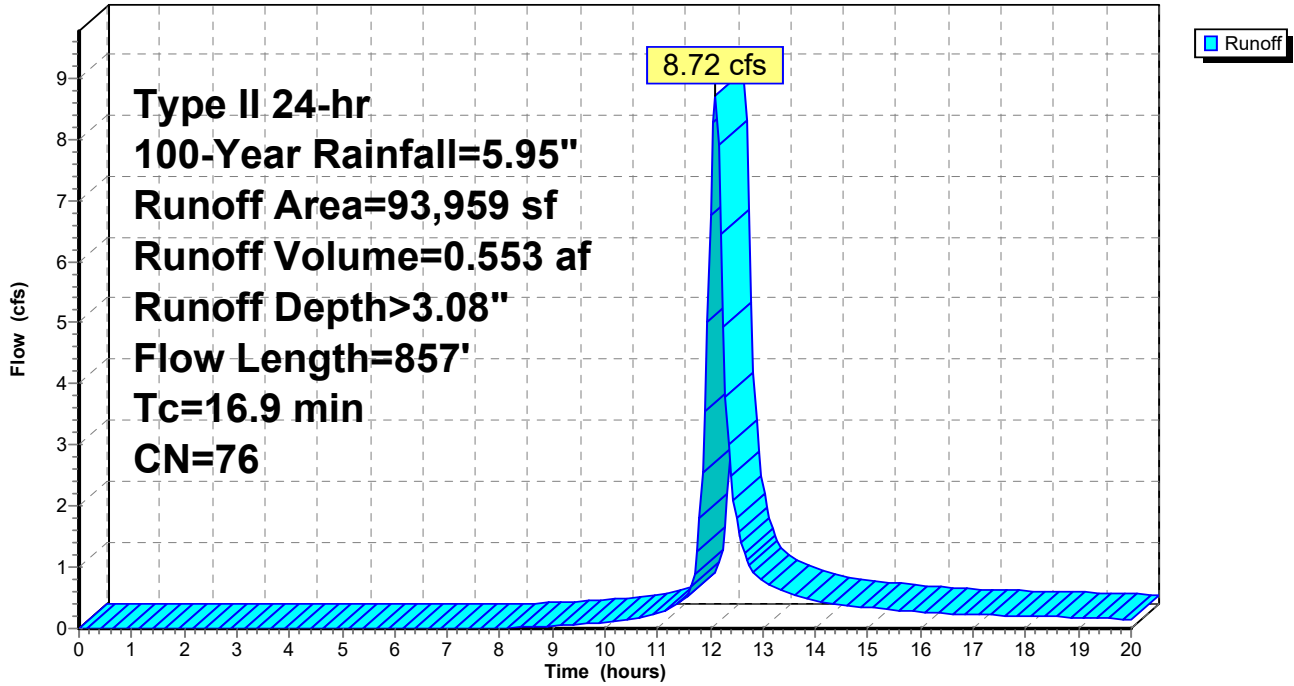
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.95"

Area (sf)	CN	Description
11,831	98	Paved parking, HSG D
13,704	39	>75% Grass cover, Good, HSG A
68,424	80	>75% Grass cover, Good, HSG D
93,959	76	Weighted Average
82,128		87.41% Pervious Area
11,831		12.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	18	0.0556	1.52		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.44"
13.2	132	0.0152	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
1.9	205	0.0122	1.78		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	145	0.0862	12.49	49.97	Channel Flow, Area= 4.0 sf Perim= 8.0' r= 0.50' n= 0.022 Earth, clean & straight
0.1	20	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	170	0.0588	11.07	55.34	Channel Flow, Area= 5.0 sf Perim= 9.0' r= 0.56' n= 0.022 Earth, clean & straight
1.0	167	0.0281	2.70		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
16.9	857	Total			

Subcatchment 3S: Area #2

Hydrograph



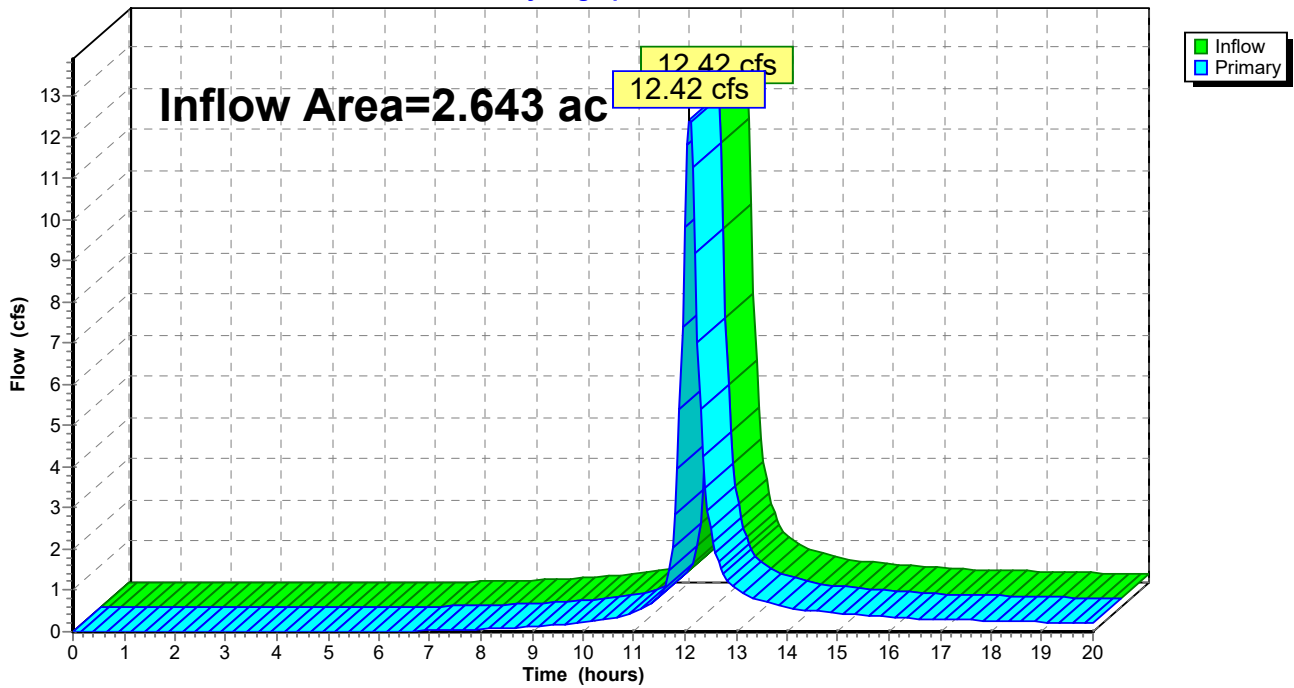
Summary for Link 2L: AP #1

Inflow Area = 2.643 ac, 8.37% Impervious, Inflow Depth > 3.66" for 100-Year event
Inflow = 12.42 cfs @ 12.09 hrs, Volume= 0.807 af
Primary = 12.42 cfs @ 12.09 hrs, Volume= 0.807 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link 2L: AP #1

Hydrograph



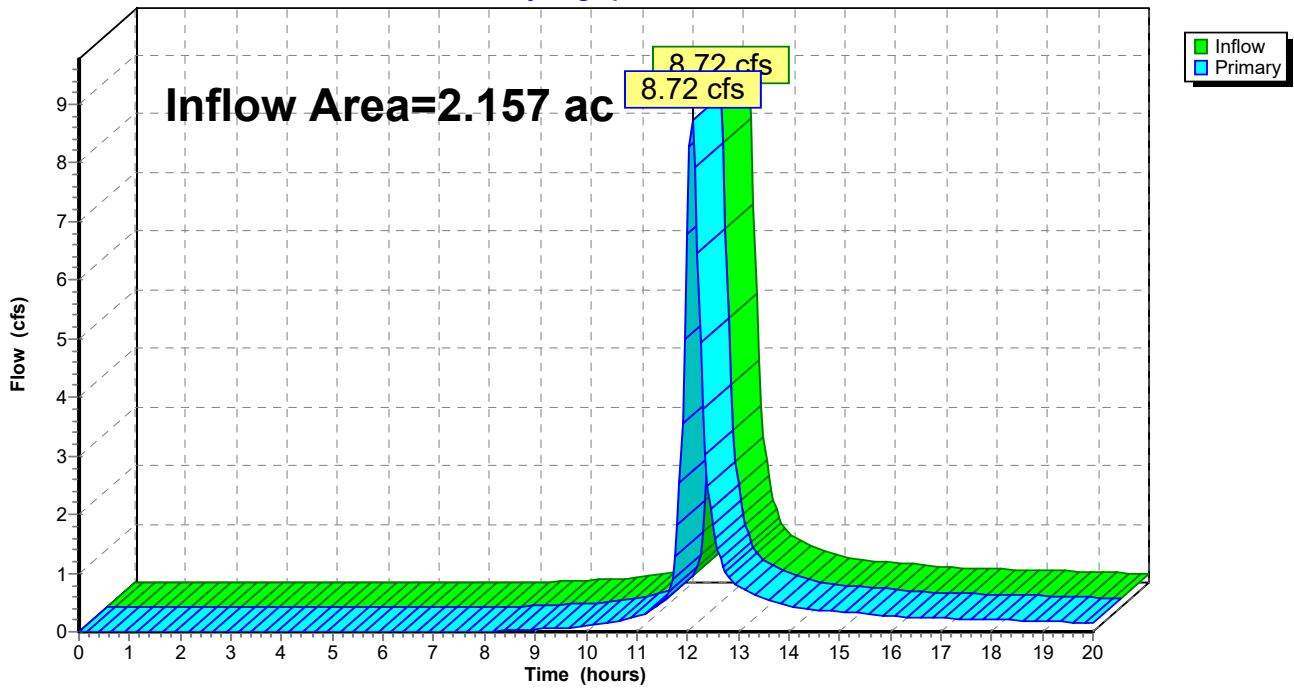
Summary for Link 4L: AP #2

Inflow Area = 2.157 ac, 12.59% Impervious, Inflow Depth > 3.08" for 100-Year event
Inflow = 8.72 cfs @ 12.09 hrs, Volume= 0.553 af
Primary = 8.72 cfs @ 12.09 hrs, Volume= 0.553 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link 4L: AP #2

Hydrograph



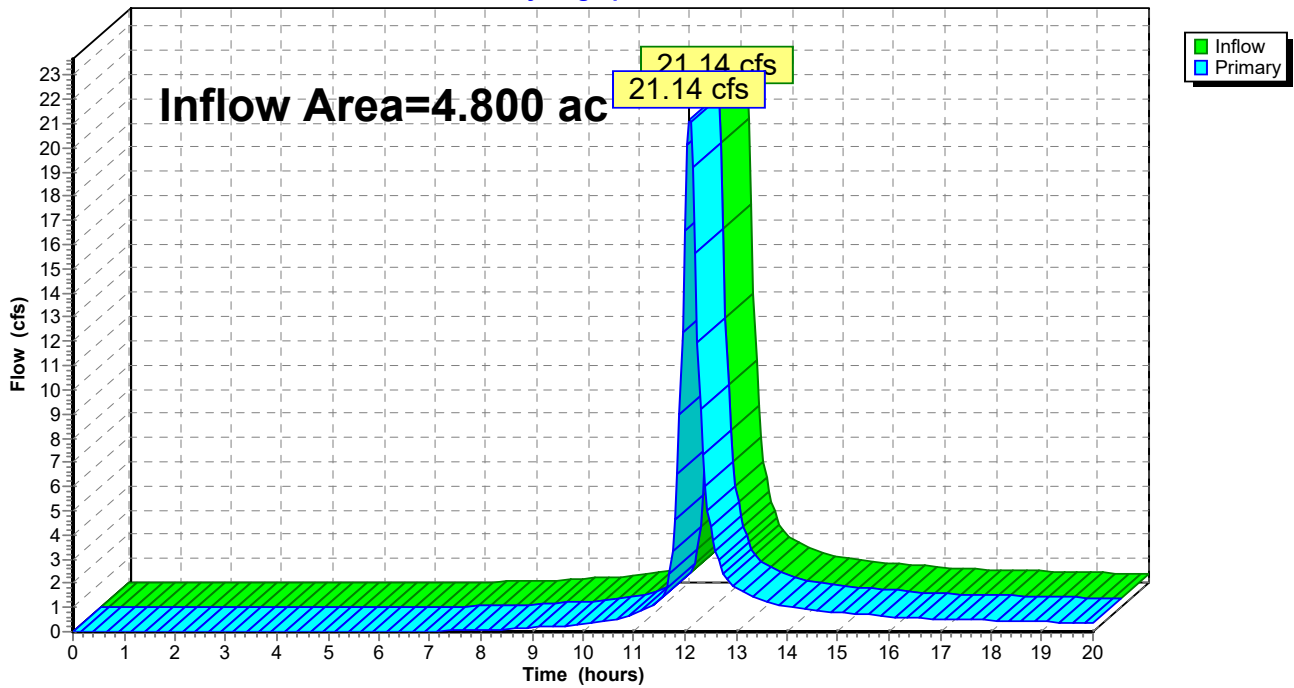
Summary for Link 5L: AP #3

Inflow Area = 4.800 ac, 10.27% Impervious, Inflow Depth > 3.40" for 100-Year event
Inflow = 21.14 cfs @ 12.09 hrs, Volume= 1.360 af
Primary = 21.14 cfs @ 12.09 hrs, Volume= 1.360 af, Atten= 0%, Lag= 0.0 min

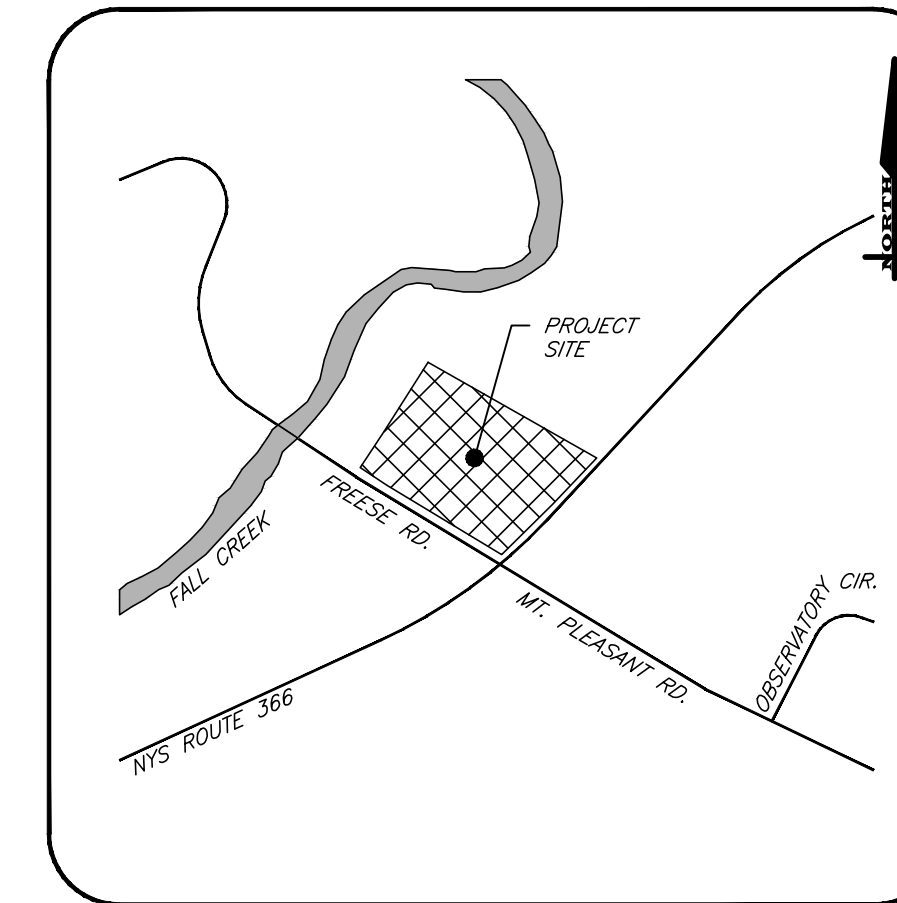
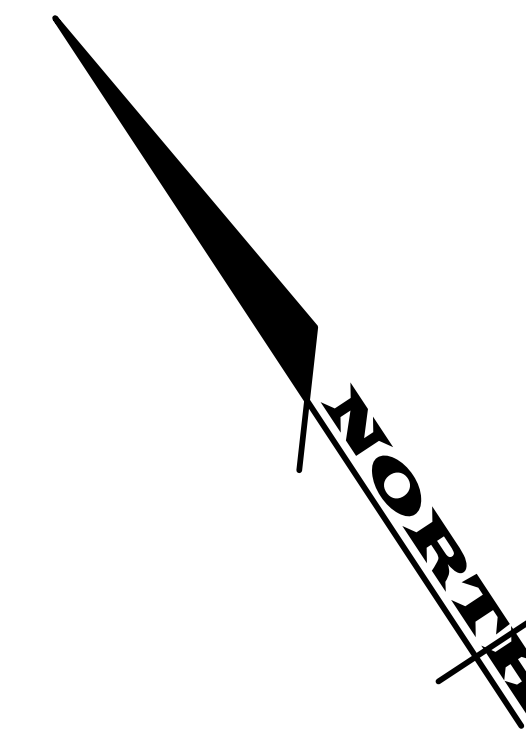
Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link 5L: AP #3

Hydrograph



File: I:\Engineering\Job_Files\1096-20\Drawings\1096-20\Drawings.dwg, Last saved: 3/12/2020, Plot Date: 3/12/2020, By: RYAN JORDAENS, Plot Style: MARATHON_STANDARD.CTB



MARATHON ENGINEERING
 ROCHESTER LOCATION
 39 CASCADE DRIVE
 ROCHESTER, NY 14614
 585-458-7770
 ITHACA LOCATION
 840 HANSHAW RD, STE 12
 ITHACA, NY 14850
 607-241-2917
 www.marathoneng.com

SITE DEVELOPMENT PLANS
 for
MAIFLY DEVELOPMENT

INTERSECTION OF FREESE ROAD AND DRYDEN ROAD (NYS ROUTE 366)
 TOWN OF DRYDEN
 TOMPKINS COUNTY
 STATE OF NEW YORK

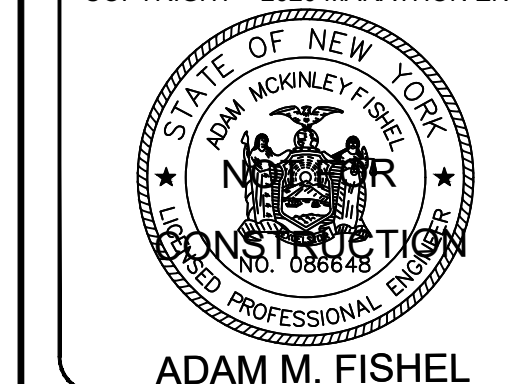
JOB NO: 1096-20
 SCALE: 1" = 30'
 DRAWN: RLJ
 DESIGNED: AMF
 DATE: 03/12/2020

REVISIONS

DATE	BY	REVISION

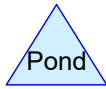
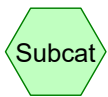
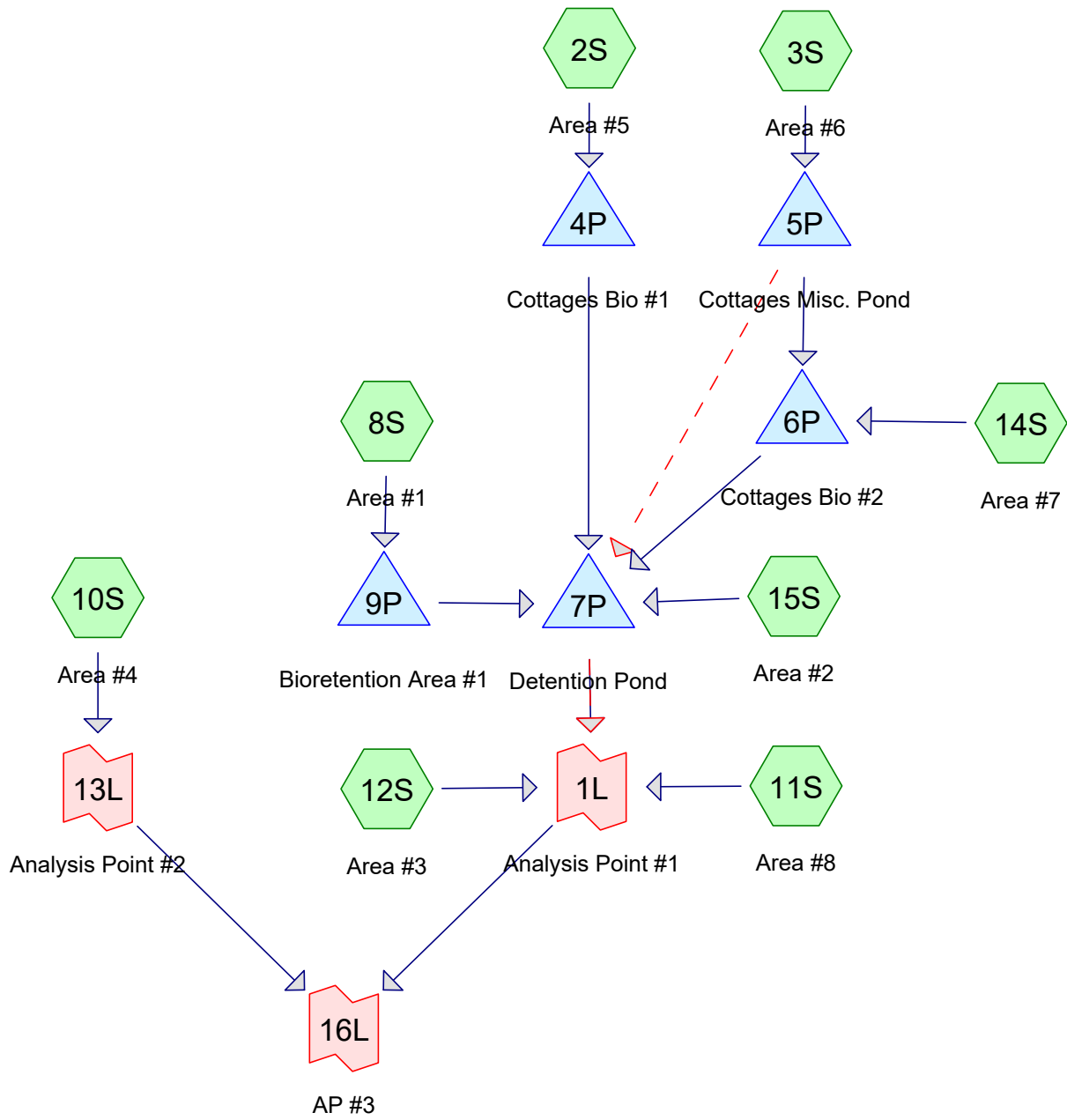
THIS IS A NOTATION OF NEW YORK STATE REGULATION AND NOT A SECTION FOR THE PROJECT. THESE NOTES APPLY TO THE DESIGN OF THE PROJECT. PROFESSIONAL ENGINEER OR LAND SURVEYOR, AS SET FORTH IN ANY WAY, AS BEING THE SEAL OF A PROFESSIONAL ENGINEER OR LAND SURVEYOR. FOR THE DESIGN OF A PROFESSIONAL ENGINEER OR LAND SURVEYOR, THE SEAL OF A PROFESSIONAL ENGINEER OR LAND SURVEYOR SHALL APPEAR ON THE DRAWING. THESE NOTES SHALL BE FILED BY THE ENGINEER AND THE DATE OF SUCH FILING AND A SPECIFIC LOCATION OF THE DESIGNATION.

COPYRIGHT © 2020 MARATHON ENG.



DRAWING TITLE:
 Post-Development
 Drainage Plan

2 of 2
 SHEET No: DR-2
 JOB No: 1096-20
 DRAWING No:



Routing Diagram for Proposed 2020 03-10
 Prepared by {enter your company name here}, Printed 3/12/2020
 HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Proposed 2020 03-10

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Printed 3/12/2020

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.104	80	(10S, 11S, 12S)
2.376	80	>75% Grass cover, Good, HSG D (2S, 3S, 8S, 10S, 11S, 12S, 14S, 15S)
2.321	98	Paved parking, HSG D (2S, 3S, 8S, 10S, 11S, 12S, 14S, 15S)
4.800	89	TOTAL AREA

Proposed 2020 03-10

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Printed 3/12/2020

Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
4.696	HSG D	2S, 3S, 8S, 10S, 11S, 12S, 14S, 15S
0.104	Other	10S, 11S, 12S
4.800		TOTAL AREA

Proposed 2020 03-10

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Printed 3/12/2020

Page 4

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.104	0.104		10S, 11S, 12S
0.000	0.000	0.000	2.376	0.000	2.376	>75% Grass cover, Good	2S, 3S, 8S, 10S, 11S, 12S, 14S, 15S
0.000	0.000	0.000	2.321	0.000	2.321	Paved parking	2S, 3S, 8S, 10S, 11S, 12S, 14S, 15S
0.000	0.000	0.000	4.696	0.104	4.800	TOTAL AREA	

Proposed 2020 03-10

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Printed 3/12/2020

Page 5

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	4P	931.00	930.00	79.0	0.0127	0.013	12.0	0.0	0.0
2	5P	928.50	927.00	44.0	0.0341	0.013	12.0	0.0	0.0
3	5P	931.00	930.00	80.0	0.0125	0.013	12.0	0.0	0.0
4	6P	917.50	919.00	65.0	-0.0231	0.013	24.0	0.0	0.0
5	7P	907.00	906.00	10.0	0.1000	0.013	12.0	0.0	0.0
6	9P	916.50	912.00	125.0	0.0360	0.013	24.0	0.0	0.0

Proposed 2020 03-10

Type II 24-hr 1-Year Rainfall=2.01"

Prepared by {enter your company name here}

Printed 3/12/2020

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Page 6

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: Area #5	Runoff Area=28,781 sf 58.14% Impervious Runoff Depth>1.02" Tc=6.0 min CN=90 Runoff=1.25 cfs 0.056 af
Subcatchment 3S: Area #6	Runoff Area=17,509 sf 71.35% Impervious Runoff Depth>1.23" Tc=6.0 min CN=93 Runoff=0.89 cfs 0.041 af
Subcatchment 8S: Area #1	Runoff Area=60,121 sf 75.62% Impervious Runoff Depth>1.31" Tc=6.0 min CN=94 Runoff=3.22 cfs 0.151 af
Subcatchment 10S: Area #4	Runoff Area=23,397 sf 34.49% Impervious Runoff Depth>0.78" Tc=6.0 min CN=86 Runoff=0.80 cfs 0.035 af
Subcatchment 11S: Area #8	Runoff Area=40,870 sf 32.00% Impervious Runoff Depth>0.78" Tc=6.0 min CN=86 Runoff=1.40 cfs 0.061 af
Subcatchment 12S: Area #3	Runoff Area=9,258 sf 13.15% Impervious Runoff Depth>0.59" Tc=6.0 min CN=82 Runoff=0.24 cfs 0.010 af
Subcatchment 14S: Area #7	Runoff Area=11,499 sf 21.75% Impervious Runoff Depth>0.68" Tc=6.0 min CN=84 Runoff=0.34 cfs 0.015 af
Subcatchment 15S: Area #2	Runoff Area=17,653 sf 8.68% Impervious Runoff Depth>0.59" Tc=6.0 min CN=82 Runoff=0.46 cfs 0.020 af
Pond 4P: Cottages Bio #1	Peak Elev=935.36' Storage=570 cf Inflow=1.25 cfs 0.056 af Outflow=1.18 cfs 0.047 af
Pond 5P: Cottages Misc. Pond	Peak Elev=935.19' Storage=67 cf Inflow=0.89 cfs 0.041 af Primary=0.88 cfs 0.041 af Secondary=0.00 cfs 0.000 af Outflow=0.88 cfs 0.041 af
Pond 6P: Cottages Bio #2	Peak Elev=921.55' Storage=1,275 cf Inflow=1.23 cfs 0.056 af Outflow=0.33 cfs 0.030 af
Pond 7P: Detention Pond	Peak Elev=908.03' Storage=5,039 cf Inflow=4.72 cfs 0.212 af Primary=0.22 cfs 0.138 af Secondary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.138 af
Pond 9P: Bioretention Area #1	Peak Elev=920.63' Storage=1,997 cf Inflow=3.22 cfs 0.151 af Outflow=3.09 cfs 0.115 af
Link 1L: Analysis Point #1	Inflow=1.75 cfs 0.210 af Primary=1.75 cfs 0.210 af
Link 13L: Analysis Point #2	Inflow=0.80 cfs 0.035 af Primary=0.80 cfs 0.035 af
Link 16L: AP #3	Inflow=2.55 cfs 0.245 af Primary=2.55 cfs 0.245 af

Proposed 2020 03-10

Type II 24-hr 1-Year Rainfall=2.01"

Prepared by {enter your company name here}

Printed 3/12/2020

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Page 7

Total Runoff Area = 4.800 ac Runoff Volume = 0.390 af Average Runoff Depth = 0.98"
51.65% Pervious = 2.479 ac 48.35% Impervious = 2.321 ac

Summary for Subcatchment 2S: Area #5

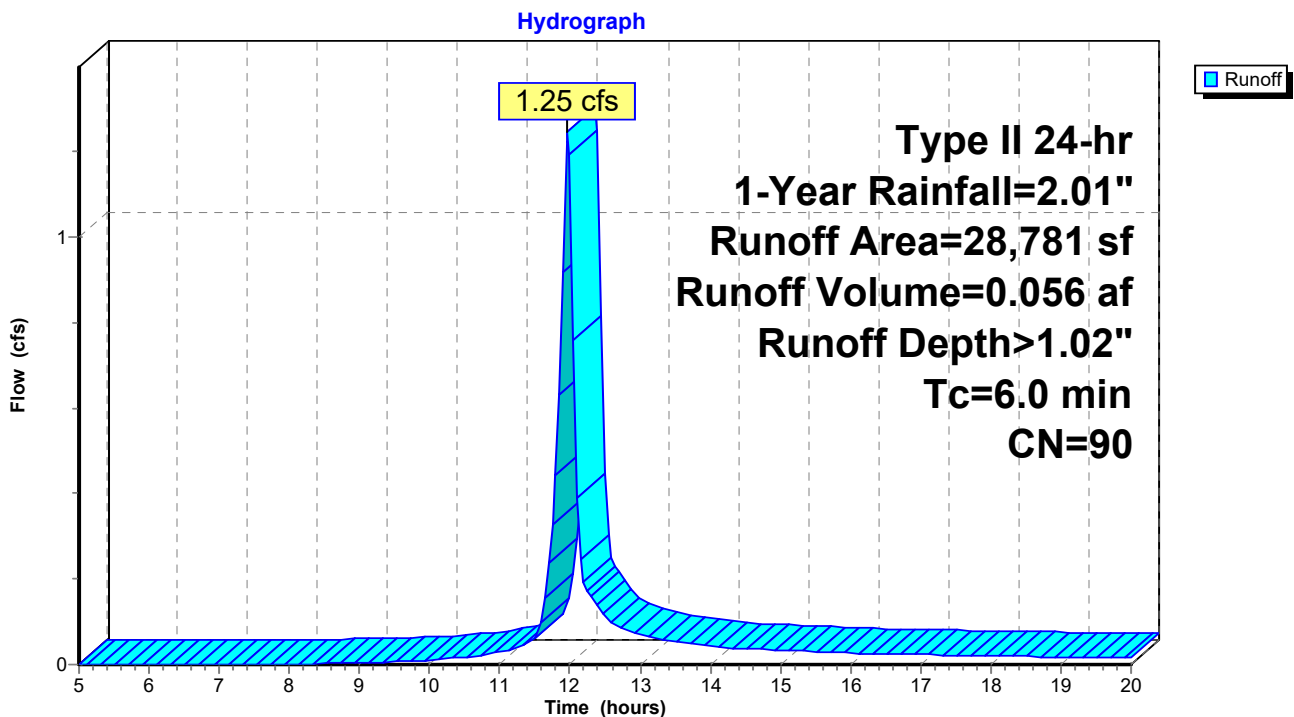
Runoff = 1.25 cfs @ 11.97 hrs, Volume= 0.056 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 1-Year Rainfall=2.01"

Area (sf)	CN	Description
16,732	98	Paved parking, HSG D
12,049	80	>75% Grass cover, Good, HSG D
28,781	90	Weighted Average
12,049		41.86% Pervious Area
16,732		58.14% Impervious Area

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

Subcatchment 2S: Area #5



Summary for Subcatchment 3S: Area #6

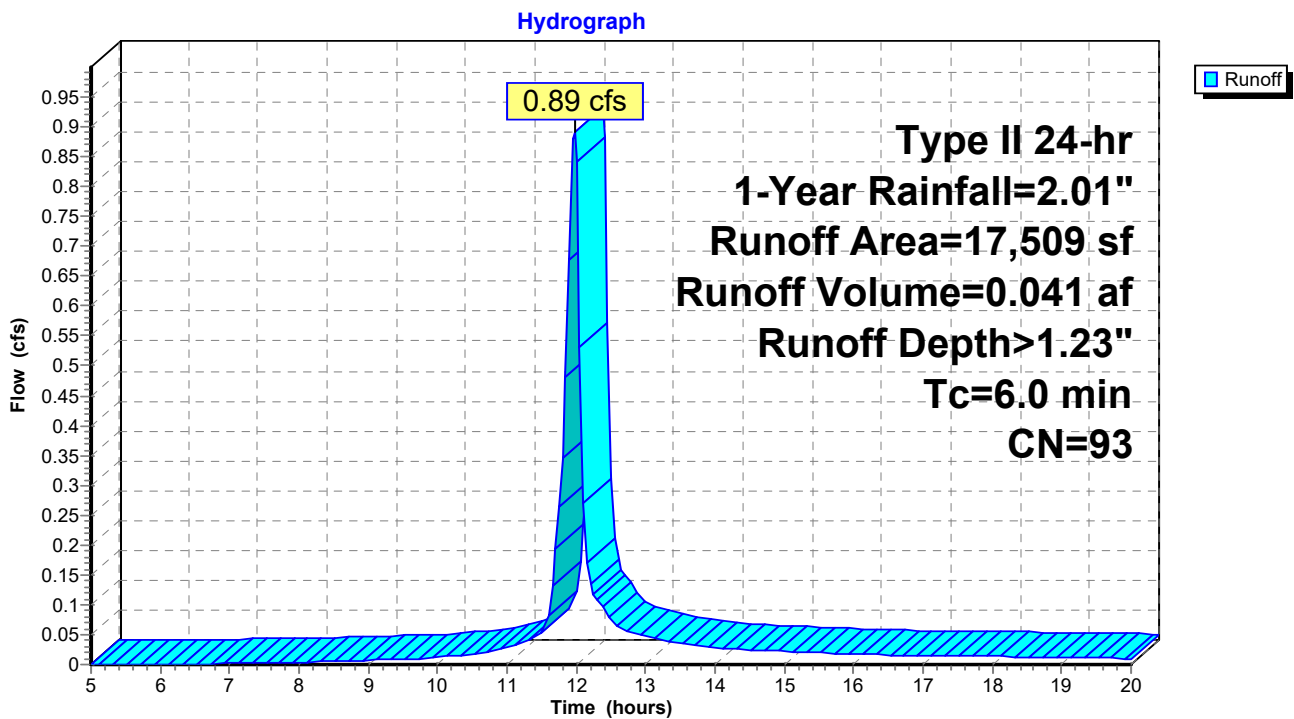
Runoff = 0.89 cfs @ 11.97 hrs, Volume= 0.041 af, Depth> 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 1-Year Rainfall=2.01"

Area (sf)	CN	Description
12,493	98	Paved parking, HSG D
5,016	80	>75% Grass cover, Good, HSG D
17,509	93	Weighted Average
5,016		28.65% Pervious Area
12,493		71.35% Impervious Area

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

Subcatchment 3S: Area #6



Summary for Subcatchment 8S: Area #1

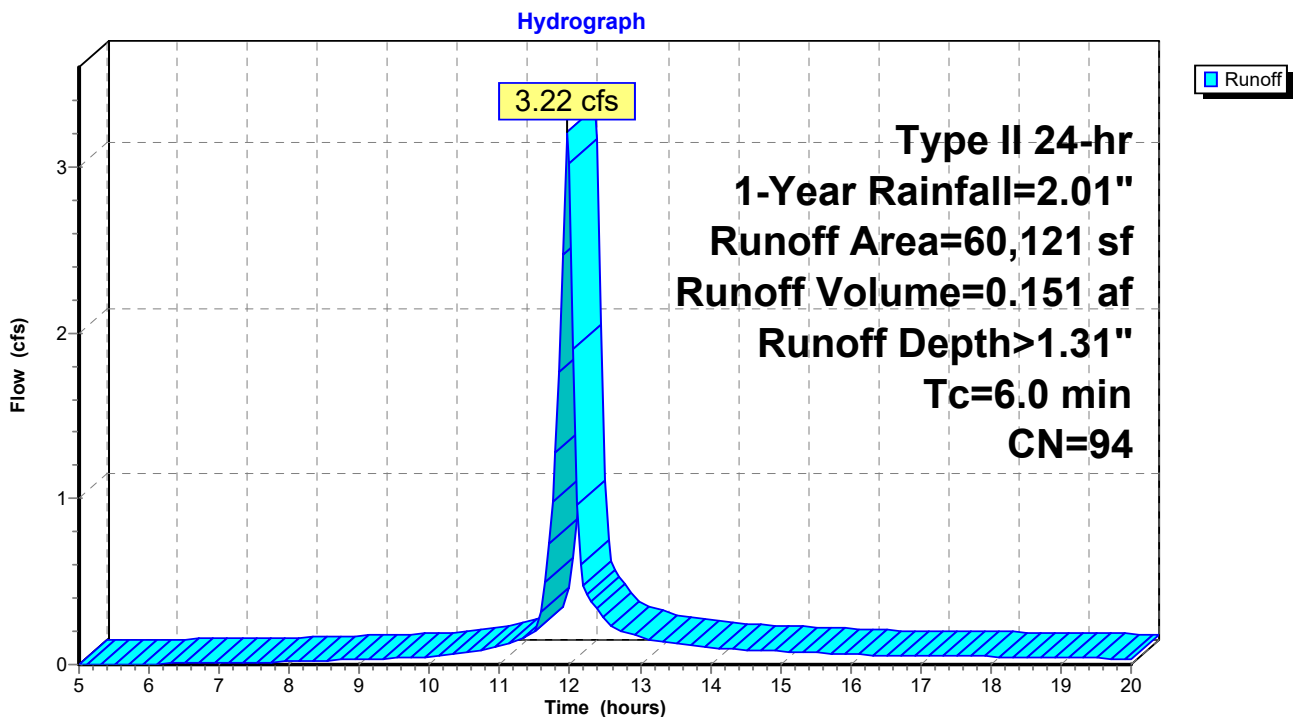
Runoff = 3.22 cfs @ 11.97 hrs, Volume= 0.151 af, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 1-Year Rainfall=2.01"

Area (sf)	CN	Description
45,462	98	Paved parking, HSG D
14,659	80	>75% Grass cover, Good, HSG D
60,121	94	Weighted Average
14,659		24.38% Pervious Area
45,462		75.62% Impervious Area

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

Subcatchment 8S: Area #1



Summary for Subcatchment 10S: Area #4

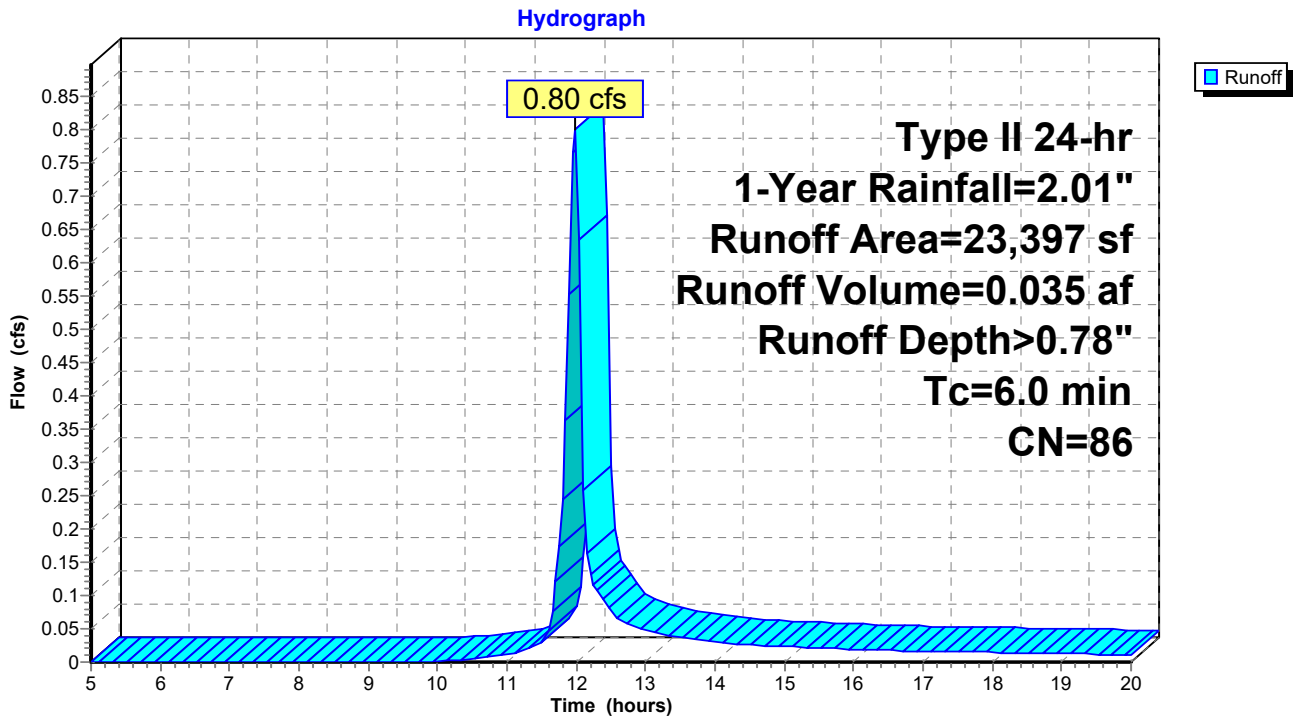
Runoff = 0.80 cfs @ 11.98 hrs, Volume= 0.035 af, Depth> 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 1-Year Rainfall=2.01"

Area (sf)	CN	Description
8,069	98	Paved parking, HSG D
13,824	80	>75% Grass cover, Good, HSG D
* 1,504	80	
23,397	86	Weighted Average
15,328		65.51% Pervious Area
8,069		34.49% Impervious Area

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

Subcatchment 10S: Area #4



Summary for Subcatchment 11S: Area #8

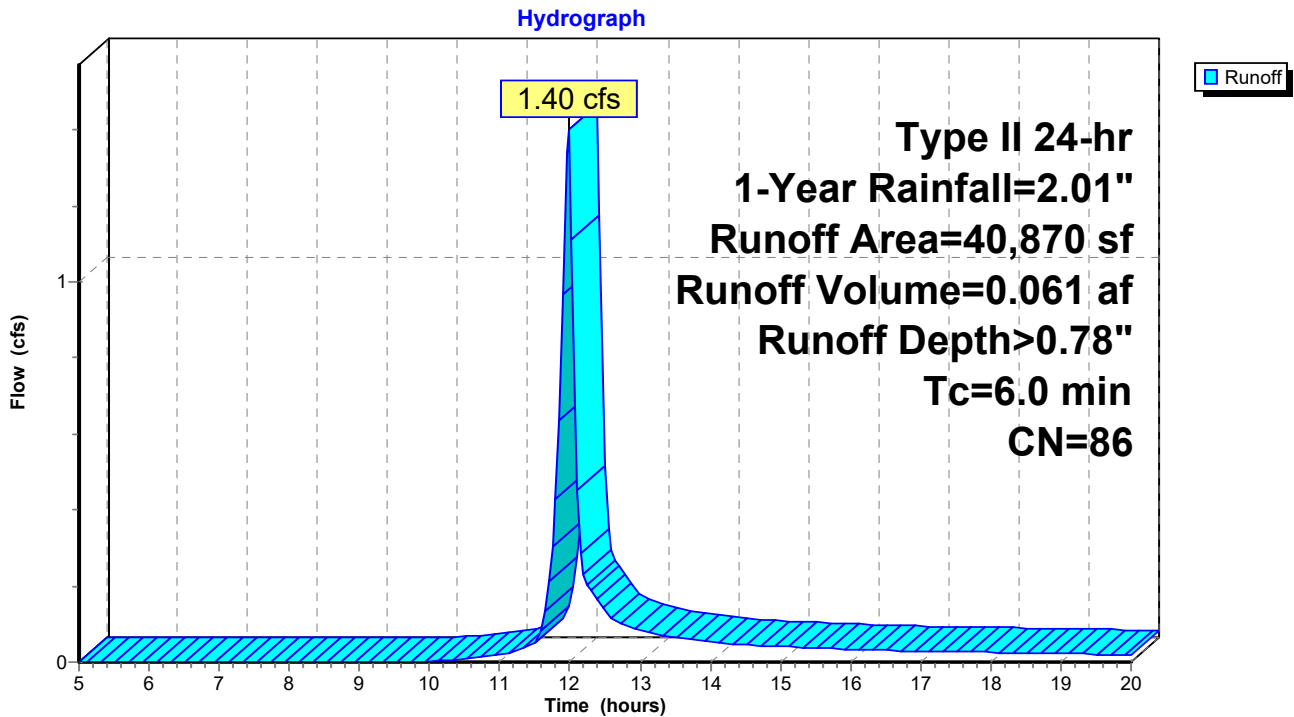
Runoff = 1.40 cfs @ 11.98 hrs, Volume= 0.061 af, Depth> 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 1-Year Rainfall=2.01"

Area (sf)	CN	Description
13,078	98	Paved parking, HSG D
26,289	80	>75% Grass cover, Good, HSG D
* 1,503	80	
40,870	86	Weighted Average
27,792		68.00% Pervious Area
13,078		32.00% Impervious Area

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

Subcatchment 11S: Area #8



Summary for Subcatchment 12S: Area #3

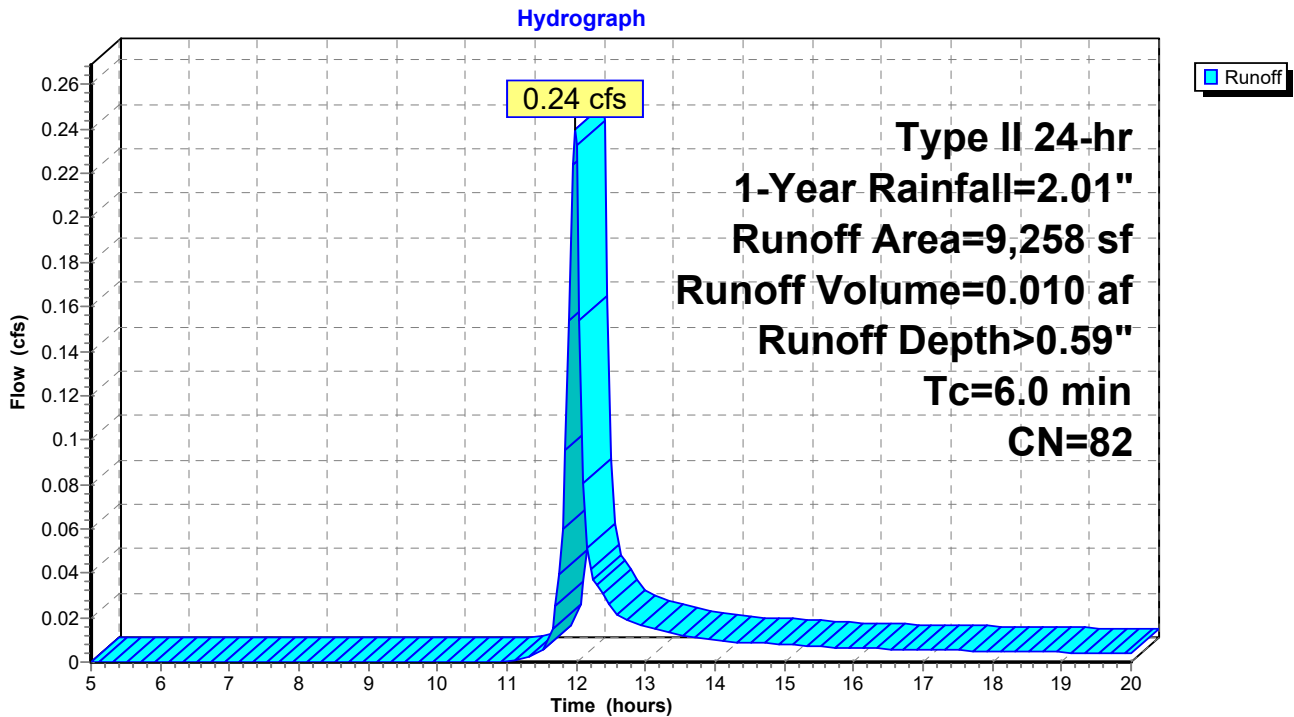
Runoff = 0.24 cfs @ 11.98 hrs, Volume= 0.010 af, Depth> 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 1-Year Rainfall=2.01"

Area (sf)	CN	Description
1,217	98	Paved parking, HSG D
6,538	80	>75% Grass cover, Good, HSG D
* 1,503	80	
9,258	82	Weighted Average
8,041		86.85% Pervious Area
1,217		13.15% Impervious Area

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

Subcatchment 12S: Area #3



Summary for Subcatchment 14S: Area #7

Runoff = 0.34 cfs @ 11.98 hrs, Volume= 0.015 af, Depth> 0.68"

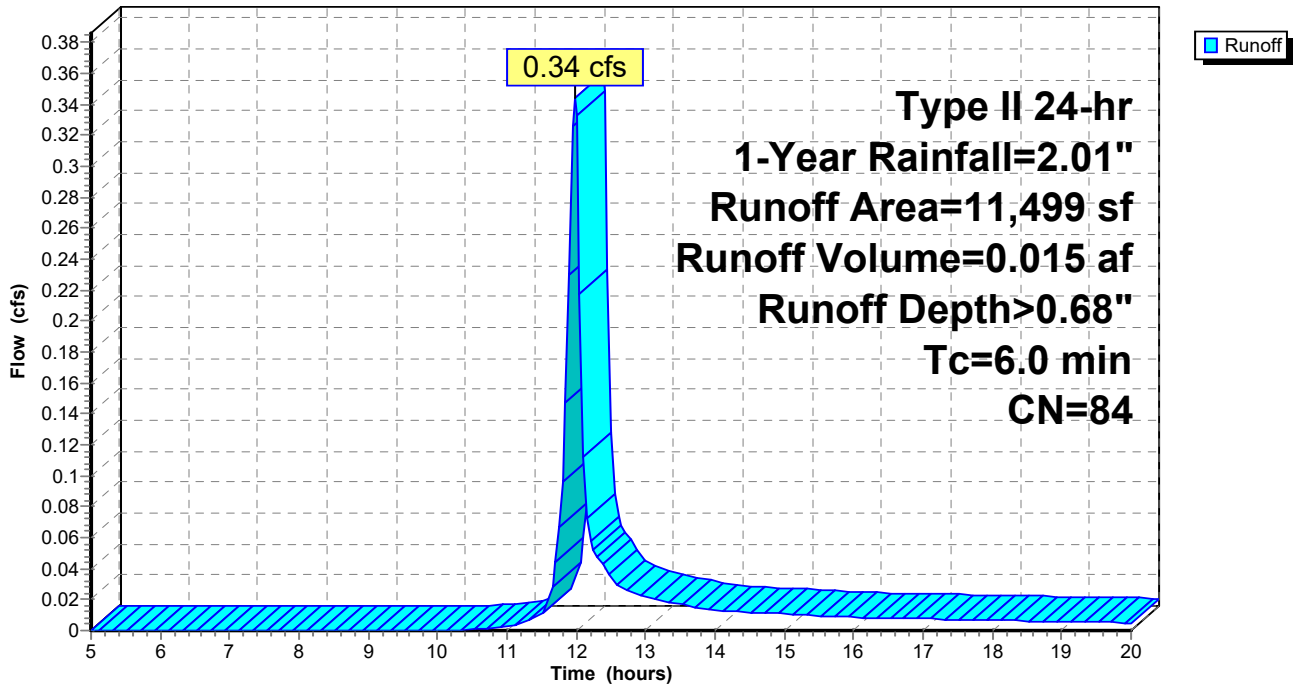
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 1-Year Rainfall=2.01"

Area (sf)	CN	Description
2,501	98	Paved parking, HSG D
8,998	80	>75% Grass cover, Good, HSG D
11,499	84	Weighted Average
8,998		78.25% Pervious Area
2,501		21.75% Impervious Area

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

Subcatchment 14S: Area #7

Hydrograph



Summary for Subcatchment 15S: Area #2

Runoff = 0.46 cfs @ 11.98 hrs, Volume= 0.020 af, Depth> 0.59"

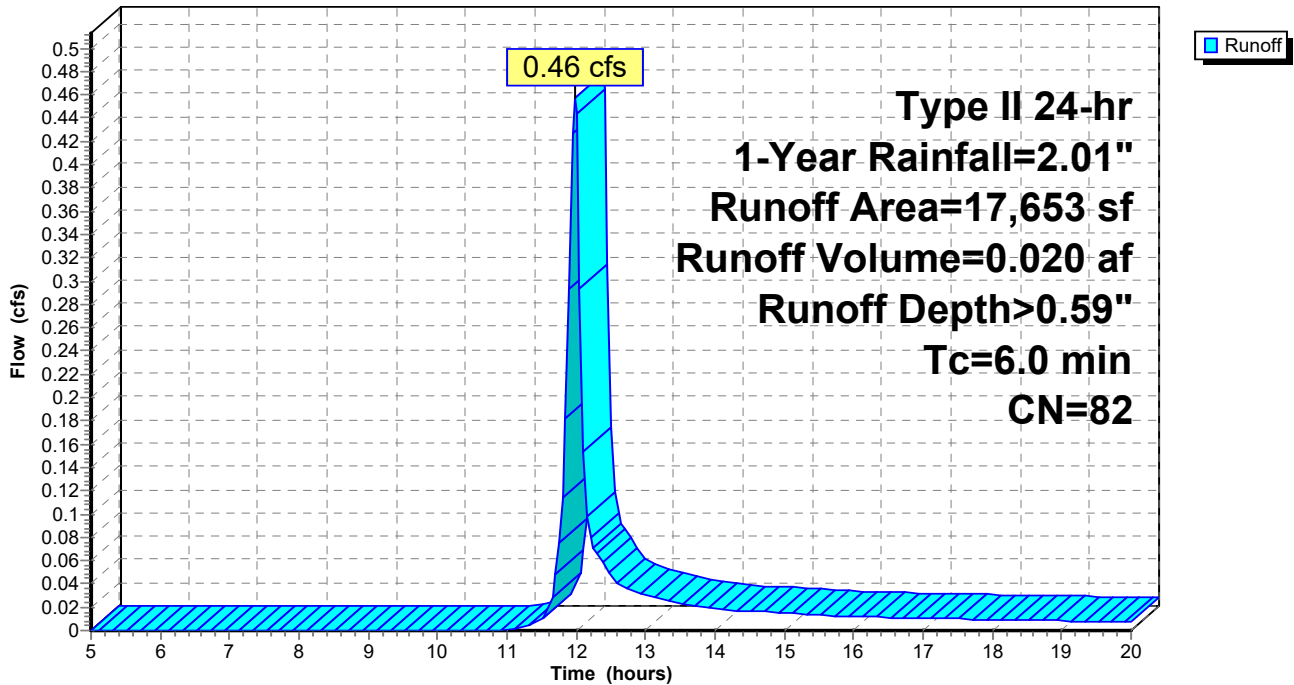
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 1-Year Rainfall=2.01"

Area (sf)	CN	Description
1,532	98	Paved parking, HSG D
16,121	80	>75% Grass cover, Good, HSG D
17,653	82	Weighted Average
16,121		91.32% Pervious Area
1,532		8.68% Impervious Area

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

Subcatchment 15S: Area #2

Hydrograph



Summary for Pond 4P: Cottages Bio #1

Inflow Area = 0.661 ac, 58.14% Impervious, Inflow Depth > 1.02" for 1-Year event
 Inflow = 1.25 cfs @ 11.97 hrs, Volume= 0.056 af
 Outflow = 1.18 cfs @ 12.00 hrs, Volume= 0.047 af, Atten= 5%, Lag= 1.7 min
 Primary = 1.18 cfs @ 12.00 hrs, Volume= 0.047 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 935.36' @ 12.00 hrs Surf.Area= 1,798 sf Storage= 570 cf

Plug-Flow detention time= 71.7 min calculated for 0.047 af (84% of inflow)
 Center-of-Mass det. time= 24.0 min (806.4 - 782.4)

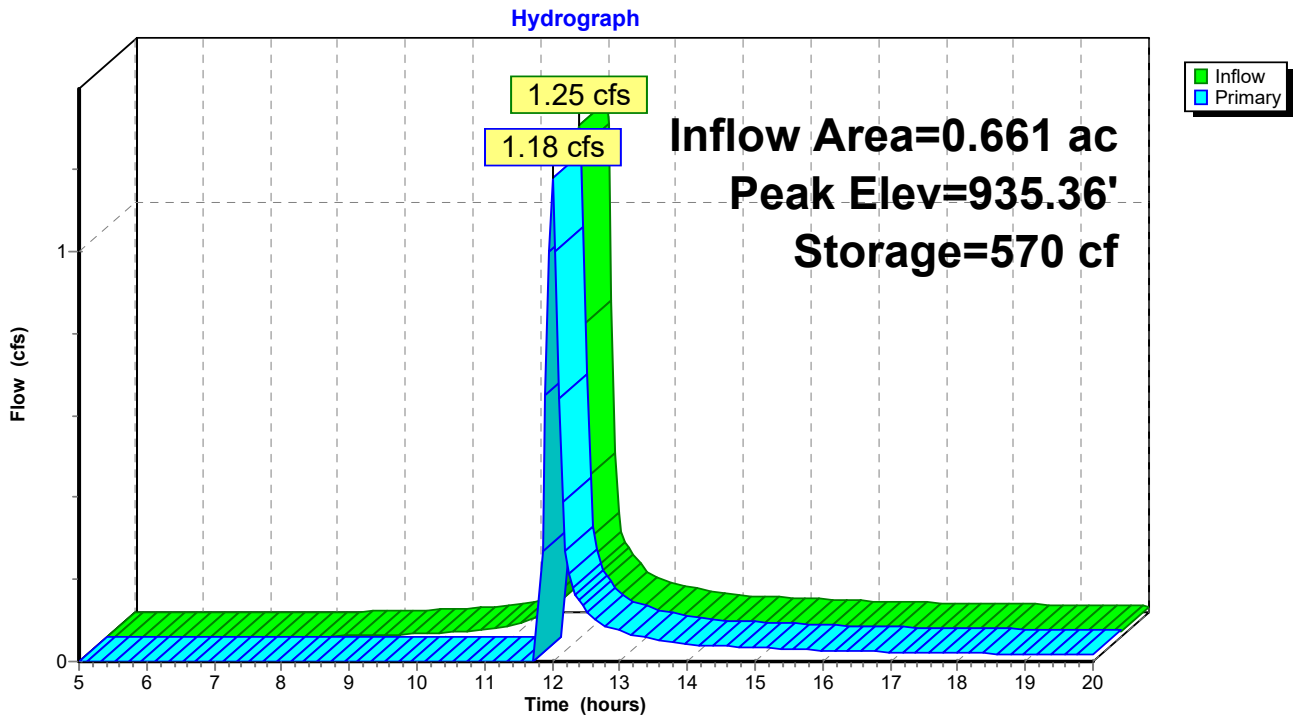
Volume	Invert	Avail.Storage	Storage Description
#1	935.00'	1,964 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
935.00	1,377	0	0
936.00	2,550	1,964	1,964

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	12.0" Round Culvert L= 79.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 931.00' / 930.00' S= 0.0127 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	935.25'	30.0" x 30.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	935.00'	0.250 in/hr Exfiltration over Surface area above 935.00' Conductivity to Groundwater Elevation = -8.00' Excluded Surface area = 1,377 sf

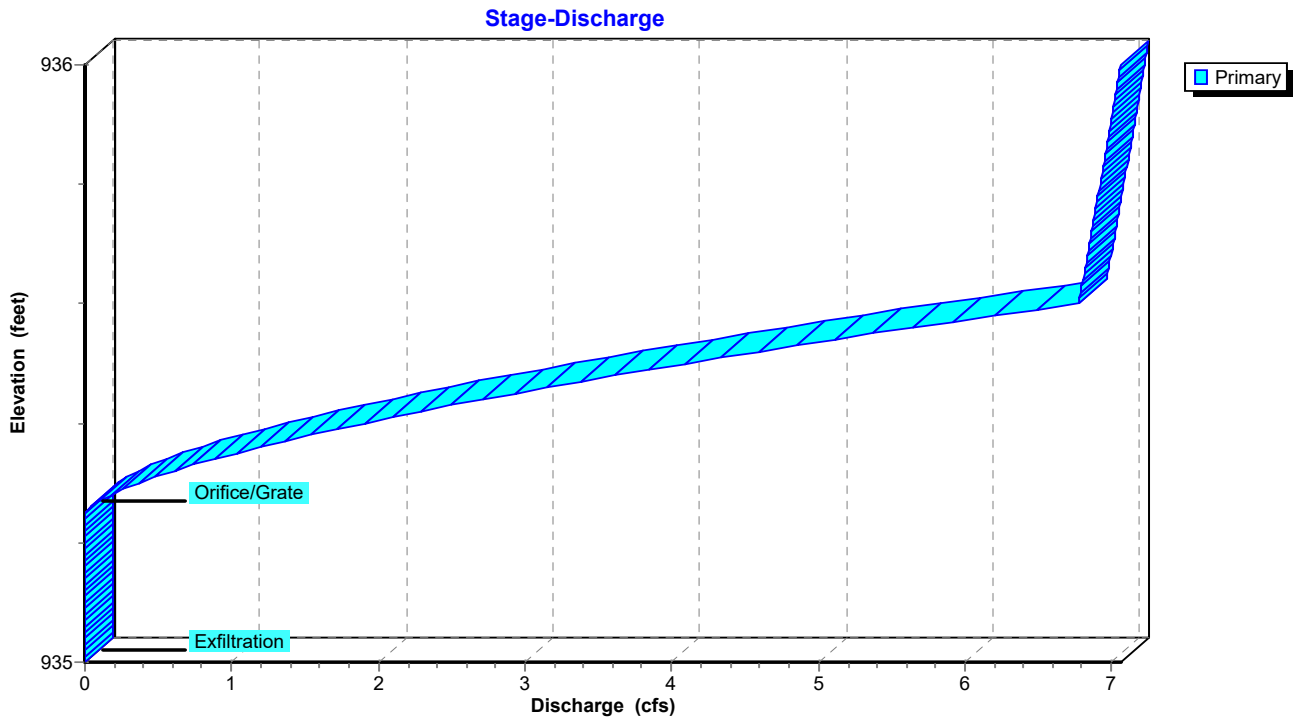
Primary OutFlow Max=1.18 cfs @ 12.00 hrs HW=935.36' (Free Discharge)

- 1=Culvert (Passes 1.18 cfs of 6.60 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 1.18 cfs @ 1.08 fps)
- 3=Exfiltration (Controls 0.00 cfs)

Pond 4P: Cottages Bio #1



Pond 4P: Cottages Bio #1



Summary for Pond 5P: Cottages Misc. Pond

Inflow Area = 0.402 ac, 71.35% Impervious, Inflow Depth > 1.23" for 1-Year event
 Inflow = 0.89 cfs @ 11.97 hrs, Volume= 0.041 af
 Outflow = 0.88 cfs @ 11.99 hrs, Volume= 0.041 af, Atten= 1%, Lag= 1.1 min
 Primary = 0.88 cfs @ 11.99 hrs, Volume= 0.041 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 935.19' @ 11.99 hrs Surf.Area= 394 sf Storage= 67 cf

Plug-Flow detention time= 2.5 min calculated for 0.041 af (100% of inflow)
 Center-of-Mass det. time= 1.8 min (771.2 - 769.4)

Volume	Invert	Avail.Storage	Storage Description
#1	935.00'	548 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
935.00	296	0	0
936.00	800	548	548

Device	Routing	Invert	Outlet Devices
#1	Primary	928.50'	12.0" Round Culvert L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 928.50' / 927.00' S= 0.0341 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	935.00'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Secondary	931.00'	12.0" Round Culvert L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 931.00' / 930.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#4	Device 3	935.50'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

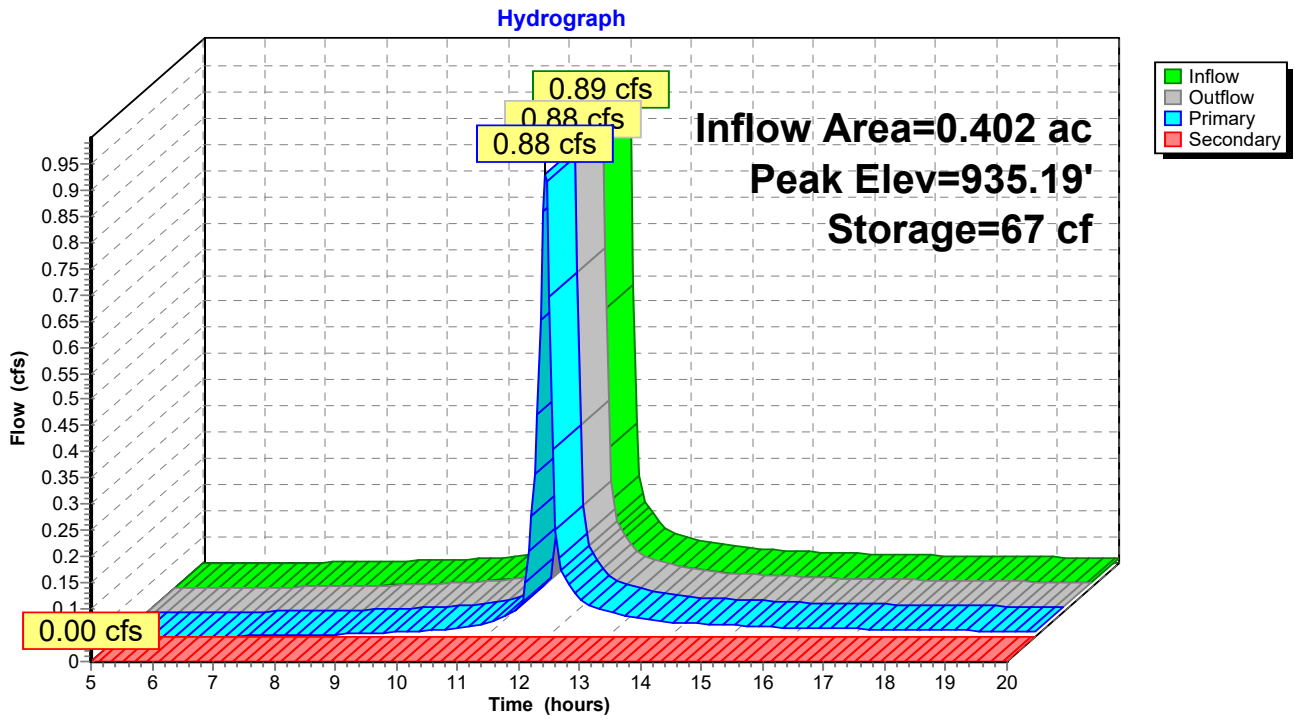
Primary OutFlow Max=0.85 cfs @ 11.99 hrs HW=935.19' (Free Discharge)

- ↑1=Culvert (Passes 0.85 cfs of 9.41 cfs potential flow)
- ↑2=Orifice/Grate (Weir Controls 0.85 cfs @ 1.43 fps)

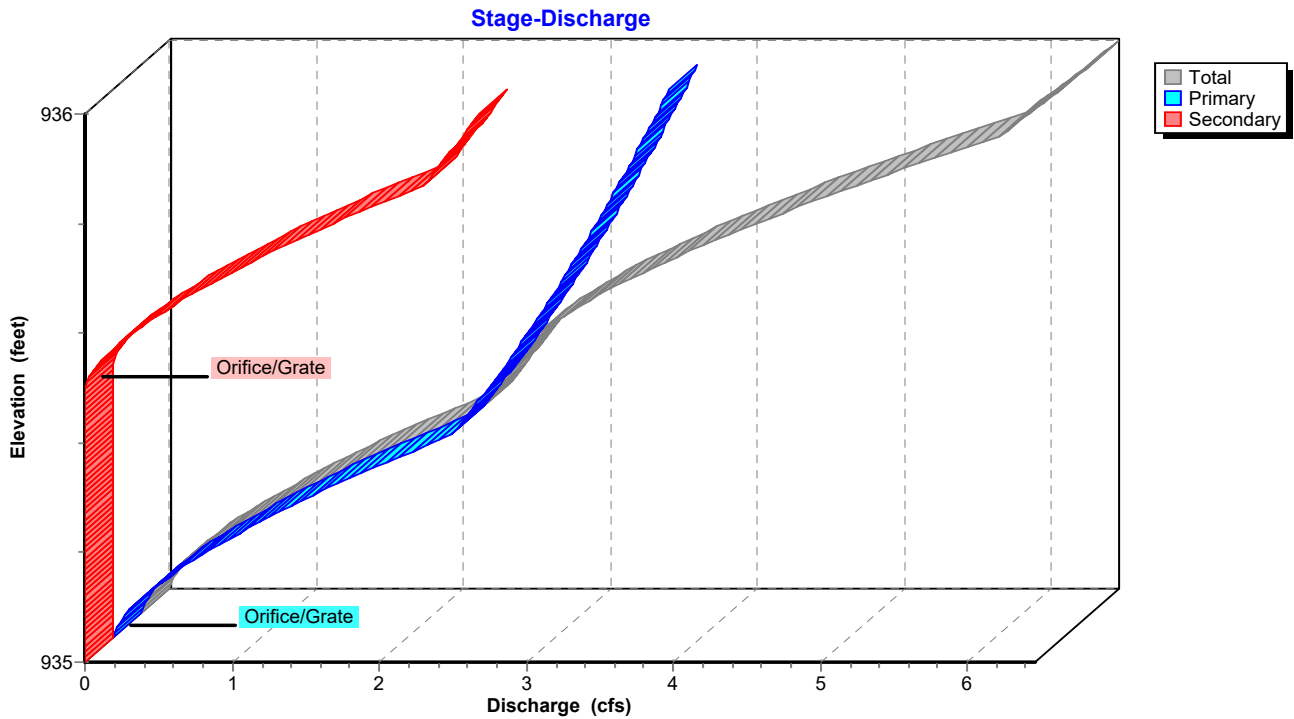
Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=935.00' (Free Discharge)

- ↑3=Culvert (Passes 0.00 cfs of 6.29 cfs potential flow)
- ↑4=Orifice/Grate (Controls 0.00 cfs)

Pond 5P: Cottages Misc. Pond



Pond 5P: Cottages Misc. Pond



Summary for Pond 6P: Cottages Bio #2

Inflow Area = 0.666 ac, 51.69% Impervious, Inflow Depth > 1.01" for 1-Year event
 Inflow = 1.23 cfs @ 11.98 hrs, Volume= 0.056 af
 Outflow = 0.33 cfs @ 12.15 hrs, Volume= 0.030 af, Atten= 73%, Lag= 10.1 min
 Primary = 0.33 cfs @ 12.15 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 921.55' @ 12.15 hrs Surf.Area= 2,429 sf Storage= 1,275 cf

Plug-Flow detention time= 157.9 min calculated for 0.030 af (53% of inflow)
 Center-of-Mass det. time= 79.7 min (859.2 - 779.5)

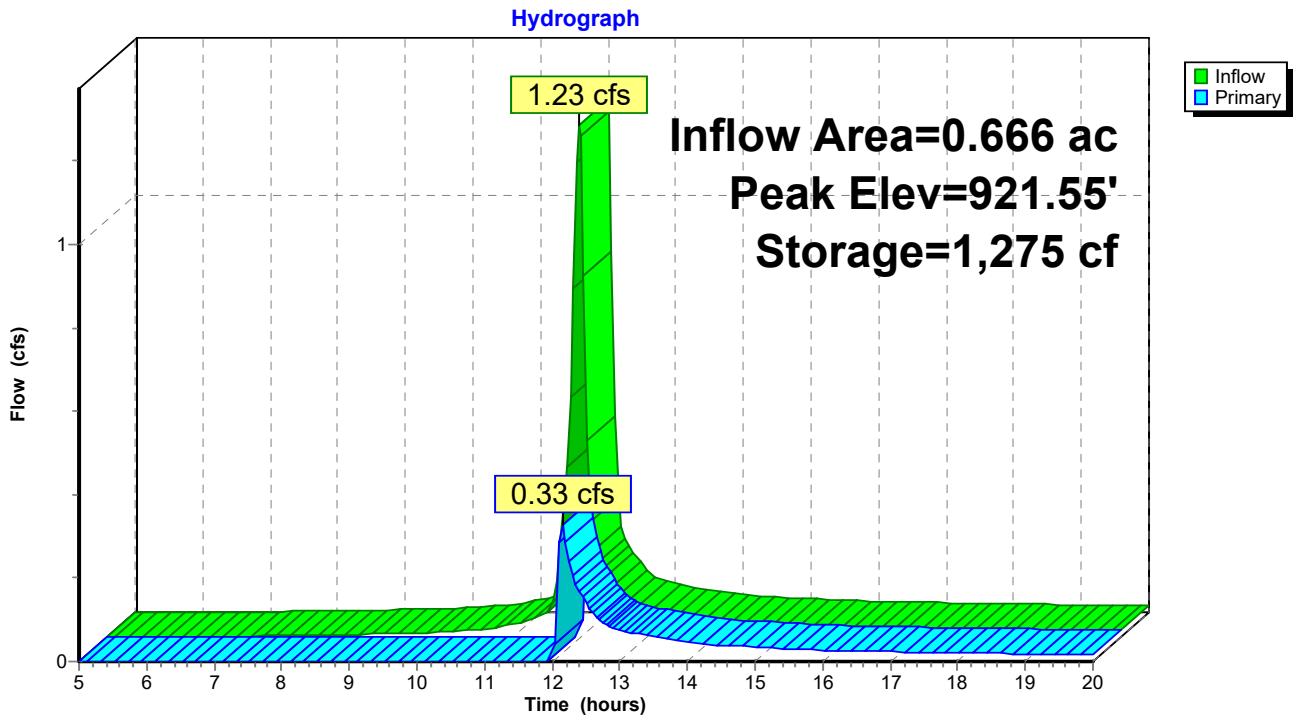
Volume	Invert	Avail.Storage	Storage Description
#1	921.00'	5,278 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
921.00	2,178	0	0
922.00	2,632	2,405	2,405
923.00	3,113	2,873	5,278

Device	Routing	Invert	Outlet Devices
#1	Primary	919.00'	24.0" Round Culvert L= 65.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 917.50' / 919.00' S= -0.0231 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	921.50'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	921.00'	0.250 in/hr Exfiltration over Surface area above 921.00' Conductivity to Groundwater Elevation = -7.00' Excluded Surface area = 2,178 sf

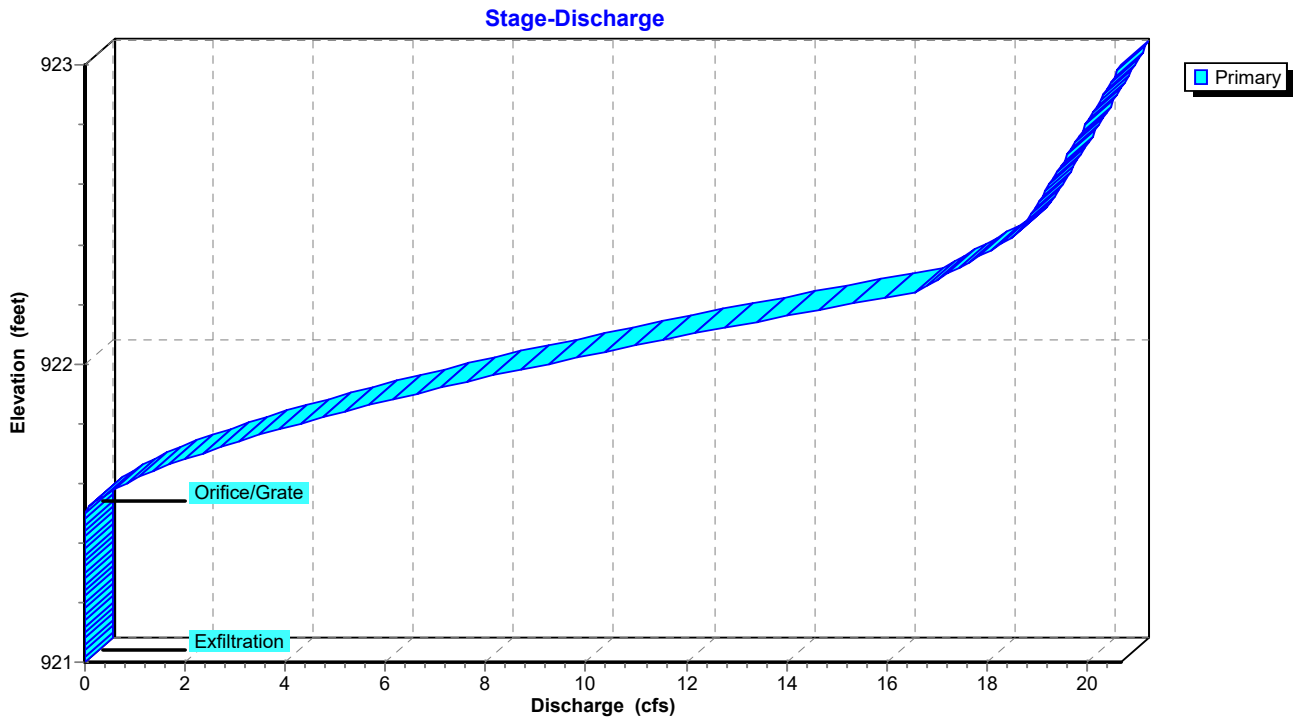
Primary OutFlow Max=0.32 cfs @ 12.15 hrs HW=921.55' (Free Discharge)

- 1=Culvert (Passes 0.32 cfs of 14.88 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 0.32 cfs @ 0.76 fps)
- 3=Exfiltration (Controls 0.00 cfs)

Pond 6P: Cottages Bio #2



Pond 6P: Cottages Bio #2



Summary for Pond 7P: Detention Pond

Inflow Area = 3.112 ac, 58.07% Impervious, Inflow Depth > 0.82" for 1-Year event
 Inflow = 4.72 cfs @ 11.99 hrs, Volume= 0.212 af
 Outflow = 0.22 cfs @ 13.86 hrs, Volume= 0.138 af, Atten= 95%, Lag= 112.0 min
 Primary = 0.22 cfs @ 13.86 hrs, Volume= 0.138 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 908.03' @ 13.86 hrs Surf.Area= 5,358 sf Storage= 5,039 cf

Plug-Flow detention time= 218.5 min calculated for 0.138 af (65% of inflow)
 Center-of-Mass det. time= 140.6 min (952.6 - 812.0)

Volume	Invert	Avail.Storage	Storage Description
#1	907.00'	39,370 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
907.00	4,416	0	0
908.00	5,328	4,872	4,872
909.00	6,297	5,813	10,685
910.00	7,323	6,810	17,495
911.00	8,406	7,865	25,359
912.00	9,544	8,975	34,334
912.50	10,600	5,036	39,370

Device	Routing	Invert	Outlet Devices
#1	Primary	907.00'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 907.00' / 906.00' S= 0.1000 1/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	907.00'	3.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	908.50'	30.0" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Secondary	910.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 2.50 Width (feet) 2.00 12.00

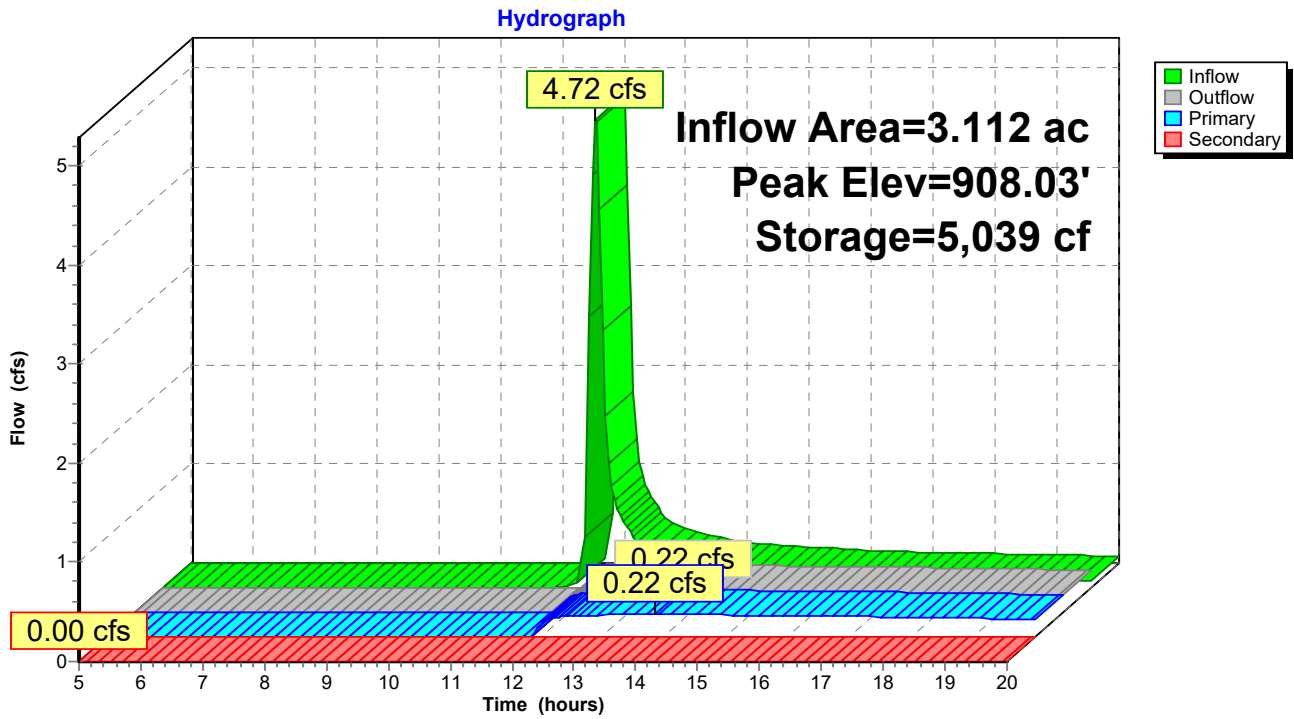
Primary OutFlow Max=0.22 cfs @ 13.86 hrs HW=908.03' (Free Discharge)

- ↑ 1=Culvert (Passes 0.22 cfs of 2.76 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.22 cfs @ 4.58 fps)
- ↑ 3=Orifice/Grate (Controls 0.00 cfs)

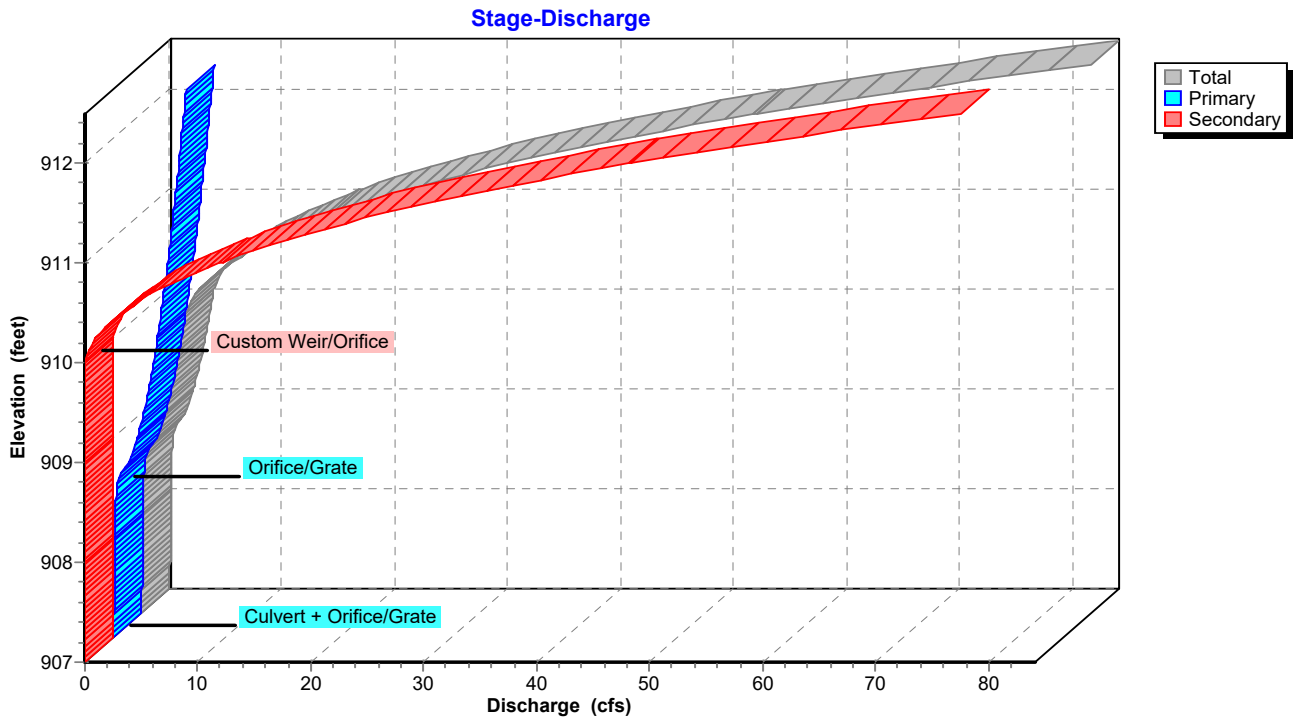
Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=907.00' (Free Discharge)

- ↑ 4=Custom Weir/Orifice (Controls 0.00 cfs)

Pond 7P: Detention Pond



Pond 7P: Detention Pond



Summary for Pond 9P: Bioretention Area #1

Inflow Area = 1.380 ac, 75.62% Impervious, Inflow Depth > 1.31" for 1-Year event
 Inflow = 3.22 cfs @ 11.97 hrs, Volume= 0.151 af
 Outflow = 3.09 cfs @ 11.99 hrs, Volume= 0.115 af, Atten= 4%, Lag= 1.6 min
 Primary = 3.09 cfs @ 11.99 hrs, Volume= 0.115 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 920.63' @ 11.99 hrs Surf.Area= 3,332 sf Storage= 1,997 cf

Plug-Flow detention time= 98.2 min calculated for 0.115 af (76% of inflow)
 Center-of-Mass det. time= 38.6 min (802.8 - 764.1)

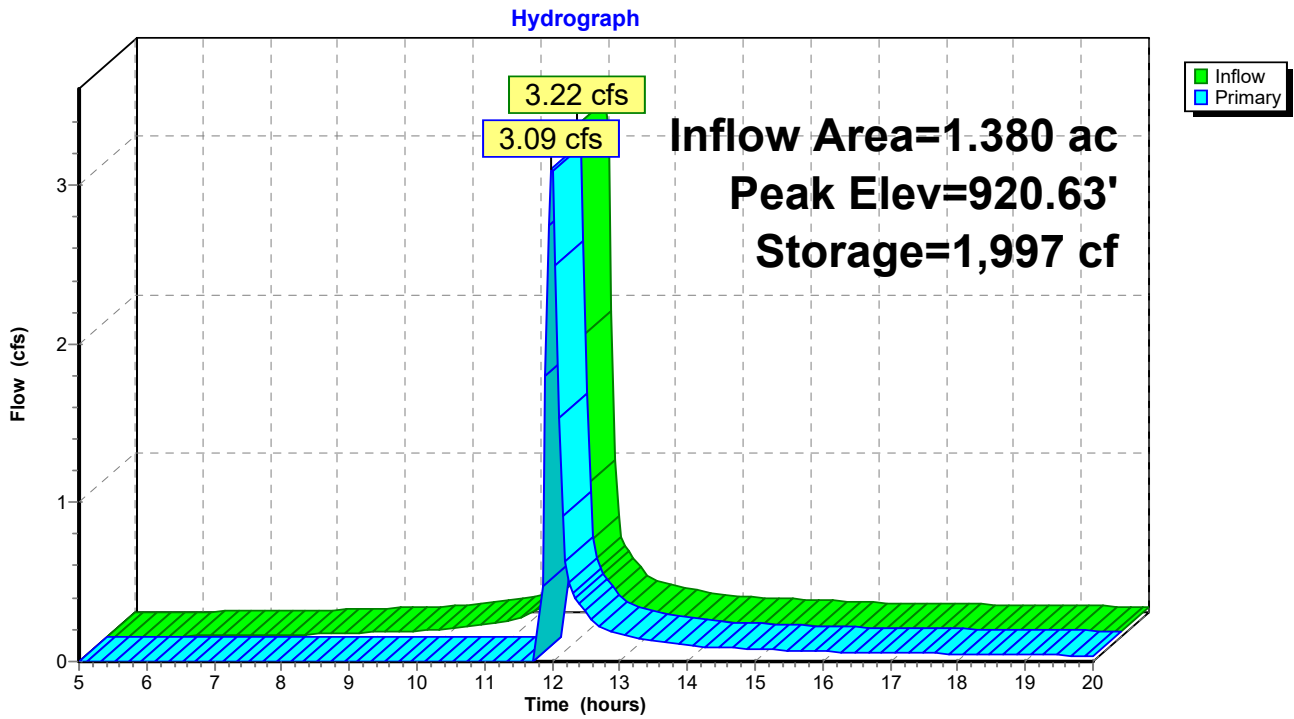
Volume	Invert	Avail.Storage	Storage Description
#1	920.00'	5,095 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
920.00	3,000	0	0
921.00	3,527	3,264	3,264
921.50	3,799	1,832	5,095

Device	Routing	Invert	Outlet Devices
#1	Primary	916.50'	24.0" Round Culvert L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 916.50' / 912.00' S= 0.0360 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	920.50'	30.0" x 30.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	920.00'	0.250 in/hr Exfiltration over Surface area above 920.00' Conductivity to Groundwater Elevation = -7.00' Excluded Surface area = 3,000 sf

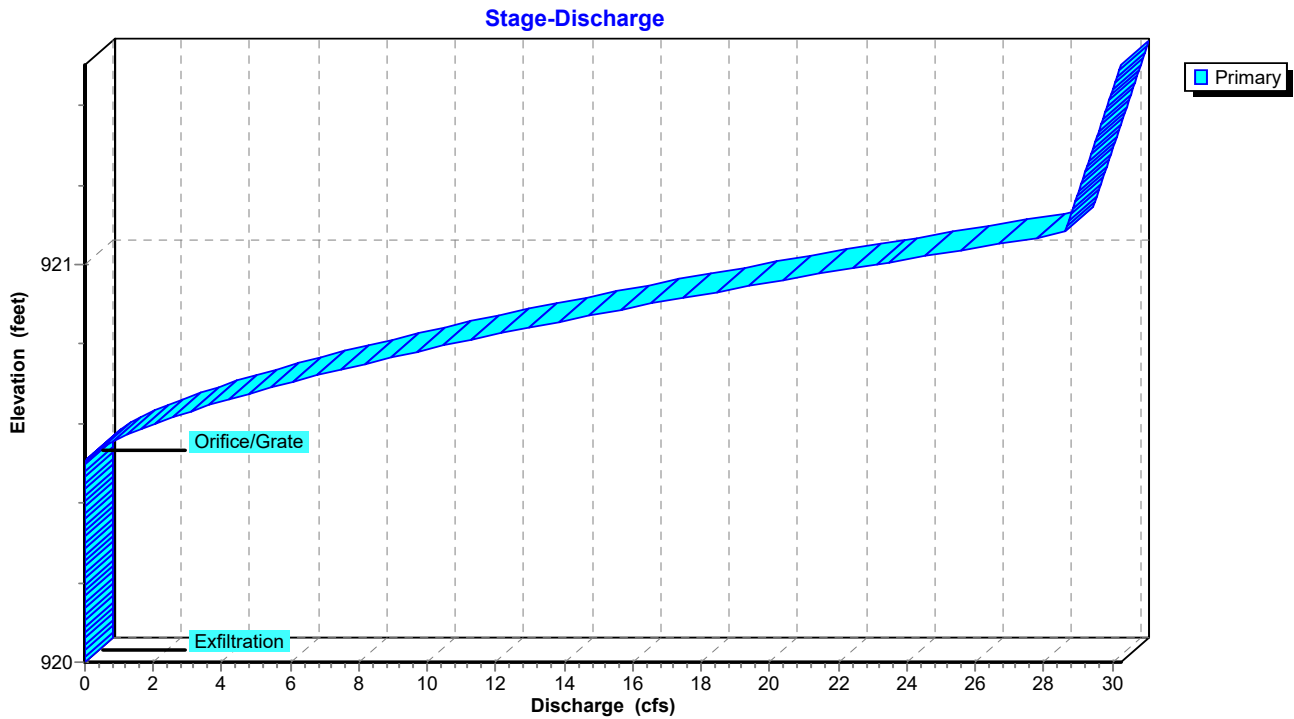
Primary OutFlow Max=3.04 cfs @ 11.99 hrs HW=920.63' (Free Discharge)

- 1=Culvert (Passes 3.04 cfs of 26.76 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 3.04 cfs @ 1.18 fps)
- 3=Exfiltration (Controls 0.00 cfs)

Pond 9P: Bioretention Area #1



Pond 9P: Bioretention Area #1

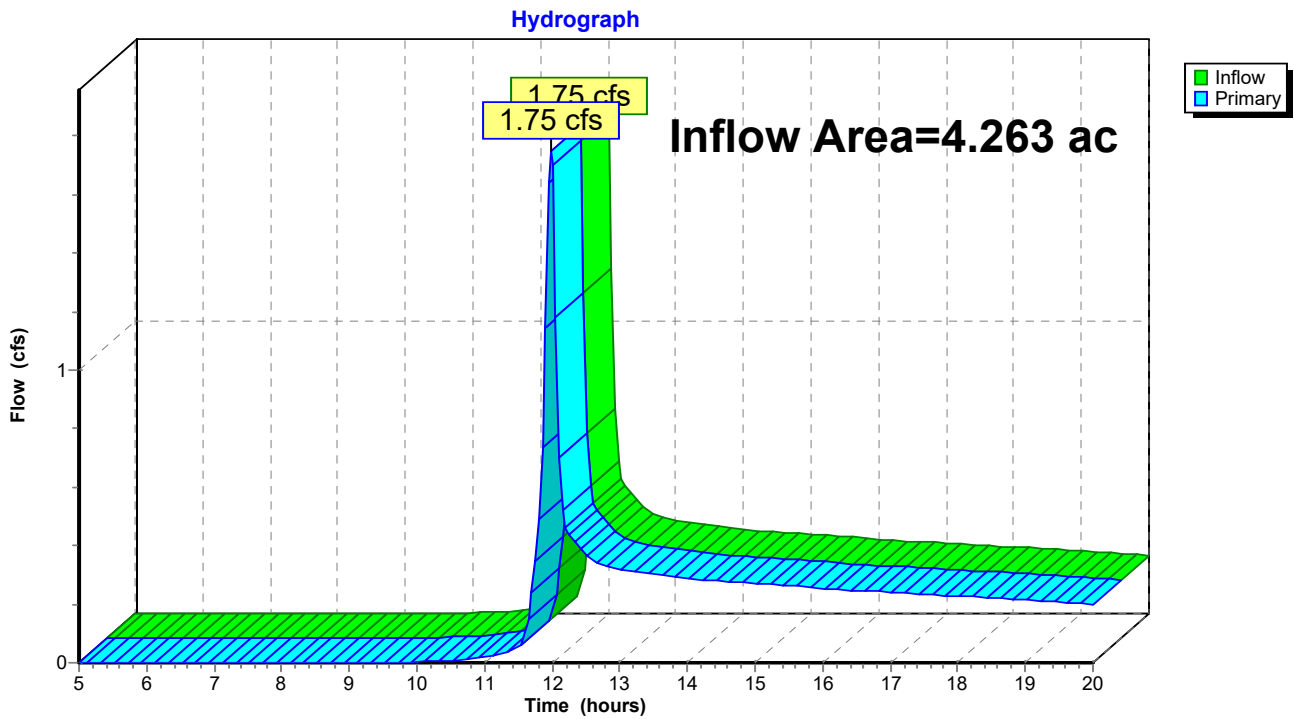


Summary for Link 1L: Analysis Point #1

Inflow Area = 4.263 ac, 50.09% Impervious, Inflow Depth > 0.59" for 1-Year event
Inflow = 1.75 cfs @ 11.98 hrs, Volume= 0.210 af
Primary = 1.75 cfs @ 11.98 hrs, Volume= 0.210 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: Analysis Point #1

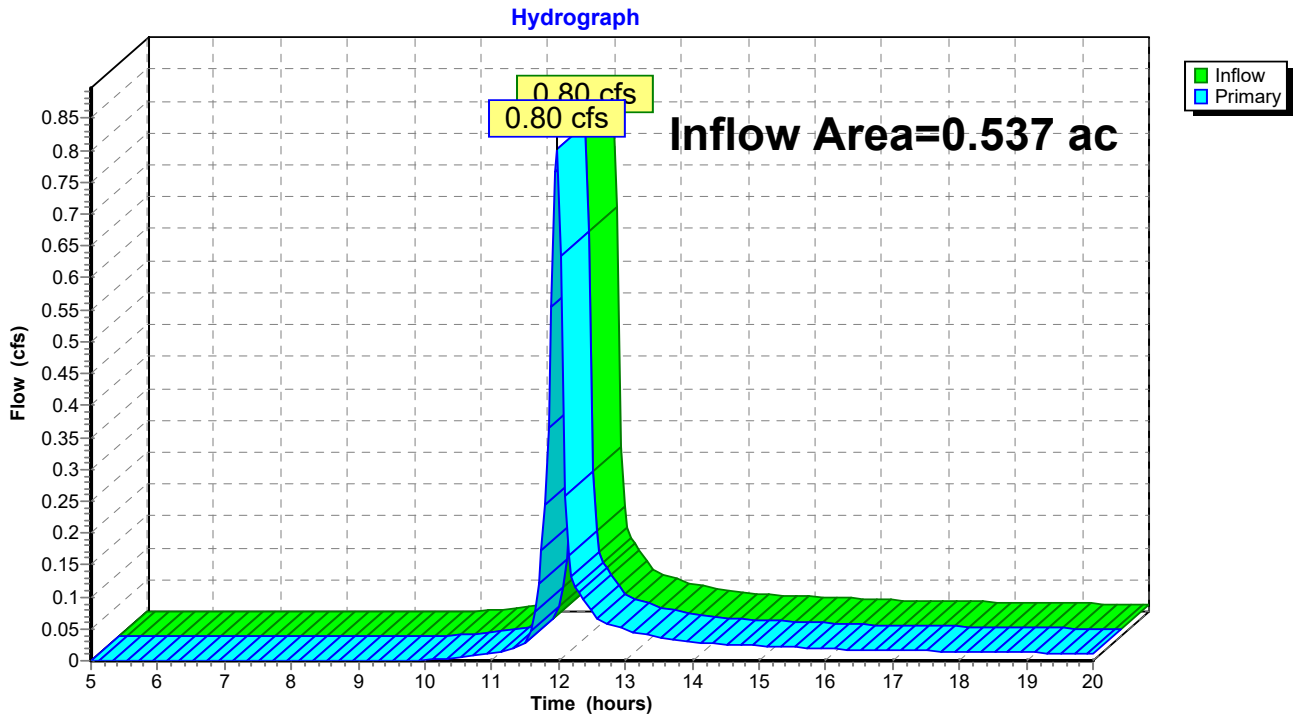


Summary for Link 13L: Analysis Point #2

Inflow Area = 0.537 ac, 34.49% Impervious, Inflow Depth > 0.78" for 1-Year event
Inflow = 0.80 cfs @ 11.98 hrs, Volume= 0.035 af
Primary = 0.80 cfs @ 11.98 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 13L: Analysis Point #2



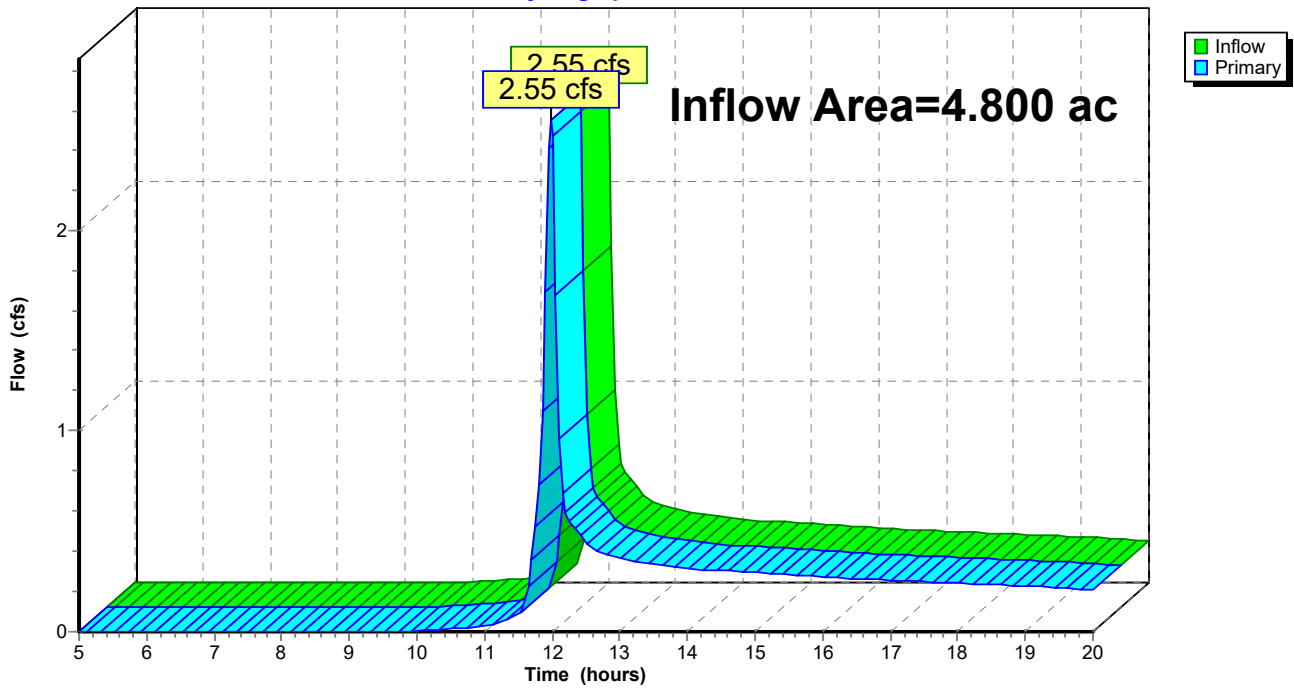
Summary for Link 16L: AP #3

Inflow Area = 4.800 ac, 48.35% Impervious, Inflow Depth > 0.61" for 1-Year event
Inflow = 2.55 cfs @ 11.98 hrs, Volume= 0.245 af
Primary = 2.55 cfs @ 11.98 hrs, Volume= 0.245 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 16L: AP #3

Hydrograph



Proposed 2020 03-10

Type II 24-hr 2-Year Rainfall=2.34"

Prepared by {enter your company name here}

Printed 3/12/2020

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Page 29

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: Area #5	Runoff Area=28,781 sf 58.14% Impervious Runoff Depth>1.29" Tc=6.0 min CN=90 Runoff=1.56 cfs 0.071 af
Subcatchment 3S: Area #6	Runoff Area=17,509 sf 71.35% Impervious Runoff Depth>1.52" Tc=6.0 min CN=93 Runoff=1.09 cfs 0.051 af
Subcatchment 8S: Area #1	Runoff Area=60,121 sf 75.62% Impervious Runoff Depth>1.61" Tc=6.0 min CN=94 Runoff=3.89 cfs 0.185 af
Subcatchment 10S: Area #4	Runoff Area=23,397 sf 34.49% Impervious Runoff Depth>1.02" Tc=6.0 min CN=86 Runoff=1.03 cfs 0.046 af
Subcatchment 11S: Area #8	Runoff Area=40,870 sf 32.00% Impervious Runoff Depth>1.02" Tc=6.0 min CN=86 Runoff=1.80 cfs 0.080 af
Subcatchment 12S: Area #3	Runoff Area=9,258 sf 13.15% Impervious Runoff Depth>0.80" Tc=6.0 min CN=82 Runoff=0.33 cfs 0.014 af
Subcatchment 14S: Area #7	Runoff Area=11,499 sf 21.75% Impervious Runoff Depth>0.91" Tc=6.0 min CN=84 Runoff=0.46 cfs 0.020 af
Subcatchment 15S: Area #2	Runoff Area=17,653 sf 8.68% Impervious Runoff Depth>0.80" Tc=6.0 min CN=82 Runoff=0.62 cfs 0.027 af
Pond 4P: Cottages Bio #1	Peak Elev=935.38' Storage=603 cf Inflow=1.56 cfs 0.071 af Outflow=1.49 cfs 0.062 af
Pond 5P: Cottages Misc. Pond	Peak Elev=935.22' Storage=78 cf Inflow=1.09 cfs 0.051 af Primary=1.08 cfs 0.051 af Secondary=0.00 cfs 0.000 af Outflow=1.08 cfs 0.051 af
Pond 6P: Cottages Bio #2	Peak Elev=921.61' Storage=1,410 cf Inflow=1.53 cfs 0.071 af Outflow=0.93 cfs 0.044 af
Pond 7P: Detention Pond	Peak Elev=908.42' Storage=7,210 cf Inflow=6.16 cfs 0.282 af Primary=0.27 cfs 0.169 af Secondary=0.00 cfs 0.000 af Outflow=0.27 cfs 0.169 af
Pond 9P: Bioretention Area #1	Peak Elev=920.65' Storage=2,058 cf Inflow=3.89 cfs 0.185 af Outflow=3.76 cfs 0.149 af
Link 1L: Analysis Point #1	Inflow=2.30 cfs 0.263 af Primary=2.30 cfs 0.263 af
Link 13L: Analysis Point #2	Inflow=1.03 cfs 0.046 af Primary=1.03 cfs 0.046 af
Link 16L: AP #3	Inflow=3.34 cfs 0.309 af Primary=3.34 cfs 0.309 af

Proposed 2020 03-10

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Type II 24-hr 2-Year Rainfall=2.34"

Printed 3/12/2020

Page 30

Total Runoff Area = 4.800 ac Runoff Volume = 0.494 af Average Runoff Depth = 1.23"
51.65% Pervious = 2.479 ac 48.35% Impervious = 2.321 ac

Summary for Subcatchment 2S: Area #5

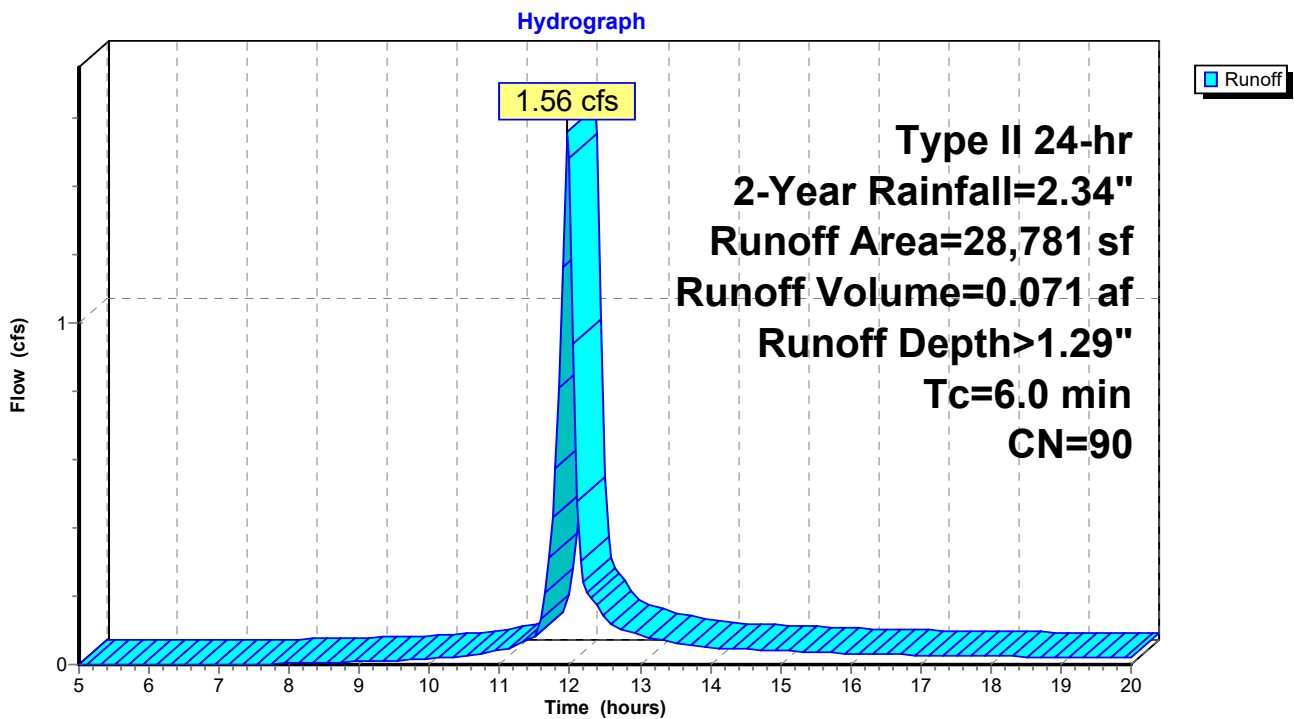
Runoff = 1.56 cfs @ 11.97 hrs, Volume= 0.071 af, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 2-Year Rainfall=2.34"

Area (sf)	CN	Description
16,732	98	Paved parking, HSG D
12,049	80	>75% Grass cover, Good, HSG D
28,781	90	Weighted Average
12,049		41.86% Pervious Area
16,732		58.14% Impervious Area

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

Subcatchment 2S: Area #5



Summary for Subcatchment 3S: Area #6

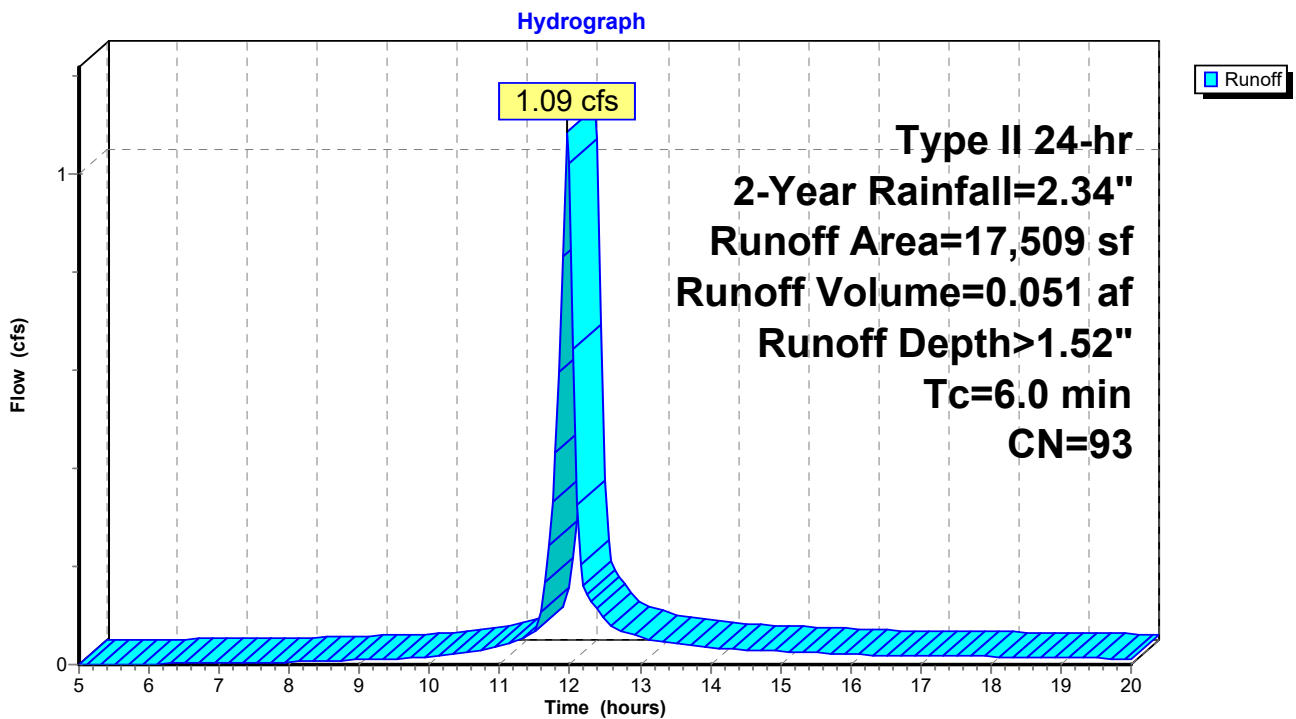
Runoff = 1.09 cfs @ 11.97 hrs, Volume= 0.051 af, Depth> 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 2-Year Rainfall=2.34"

Area (sf)	CN	Description
12,493	98	Paved parking, HSG D
5,016	80	>75% Grass cover, Good, HSG D
17,509	93	Weighted Average
5,016		28.65% Pervious Area
12,493		71.35% Impervious Area

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

Subcatchment 3S: Area #6



Summary for Subcatchment 8S: Area #1

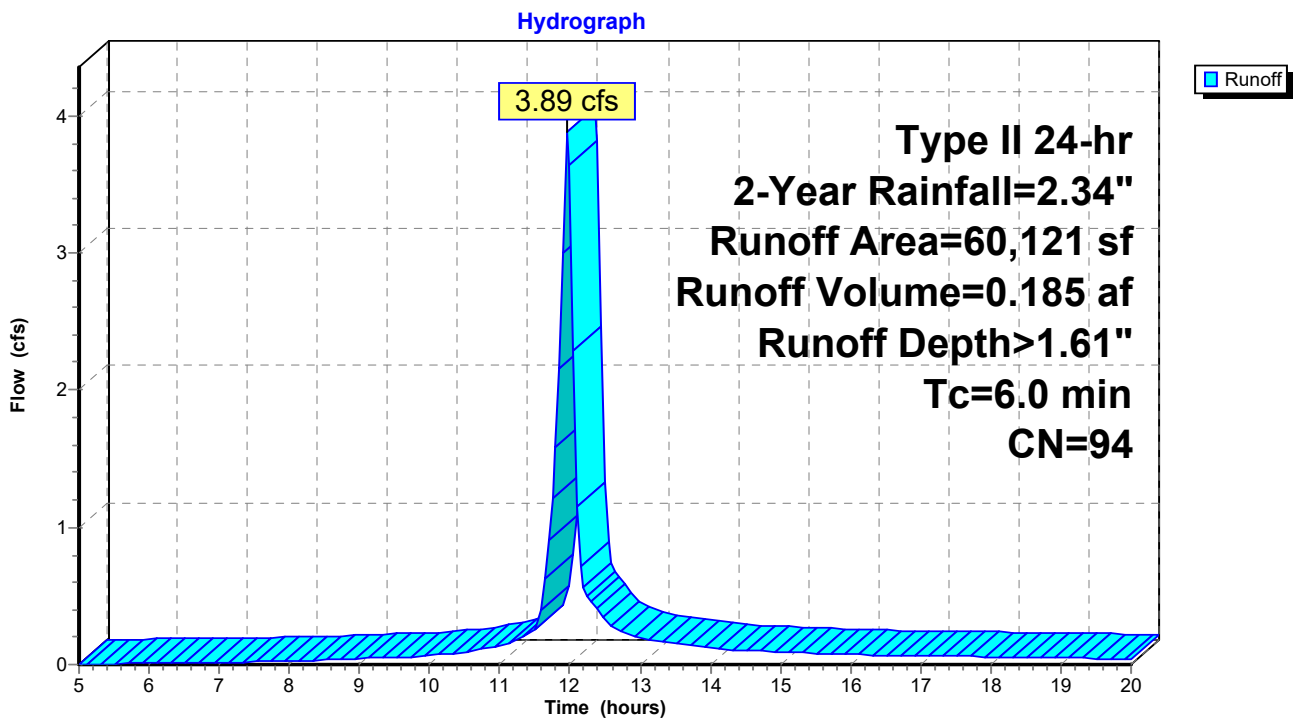
Runoff = 3.89 cfs @ 11.97 hrs, Volume= 0.185 af, Depth> 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 2-Year Rainfall=2.34"

Area (sf)	CN	Description
45,462	98	Paved parking, HSG D
14,659	80	>75% Grass cover, Good, HSG D
60,121	94	Weighted Average
14,659		24.38% Pervious Area
45,462		75.62% Impervious Area

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

Subcatchment 8S: Area #1



Summary for Subcatchment 10S: Area #4

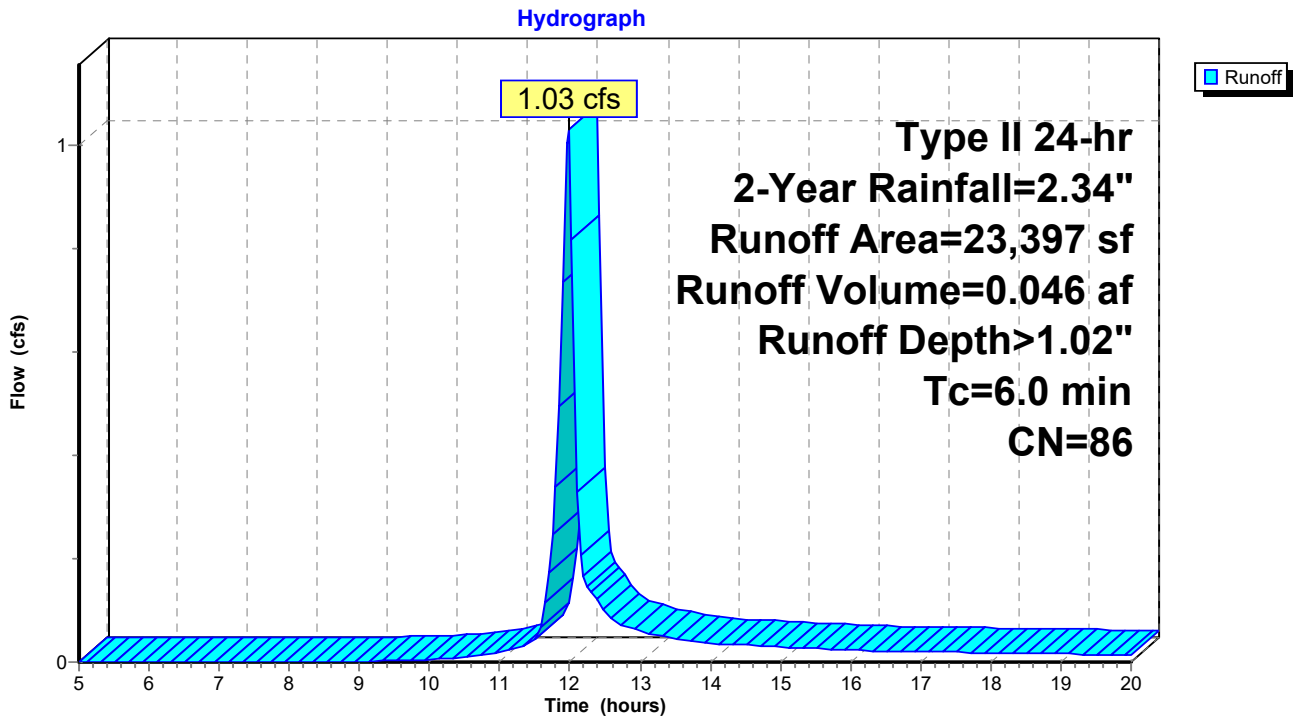
Runoff = 1.03 cfs @ 11.97 hrs, Volume= 0.046 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 2-Year Rainfall=2.34"

Area (sf)	CN	Description
8,069	98	Paved parking, HSG D
13,824	80	>75% Grass cover, Good, HSG D
* 1,504	80	
23,397	86	Weighted Average
15,328		65.51% Pervious Area
8,069		34.49% Impervious Area

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

Subcatchment 10S: Area #4



Summary for Subcatchment 11S: Area #8

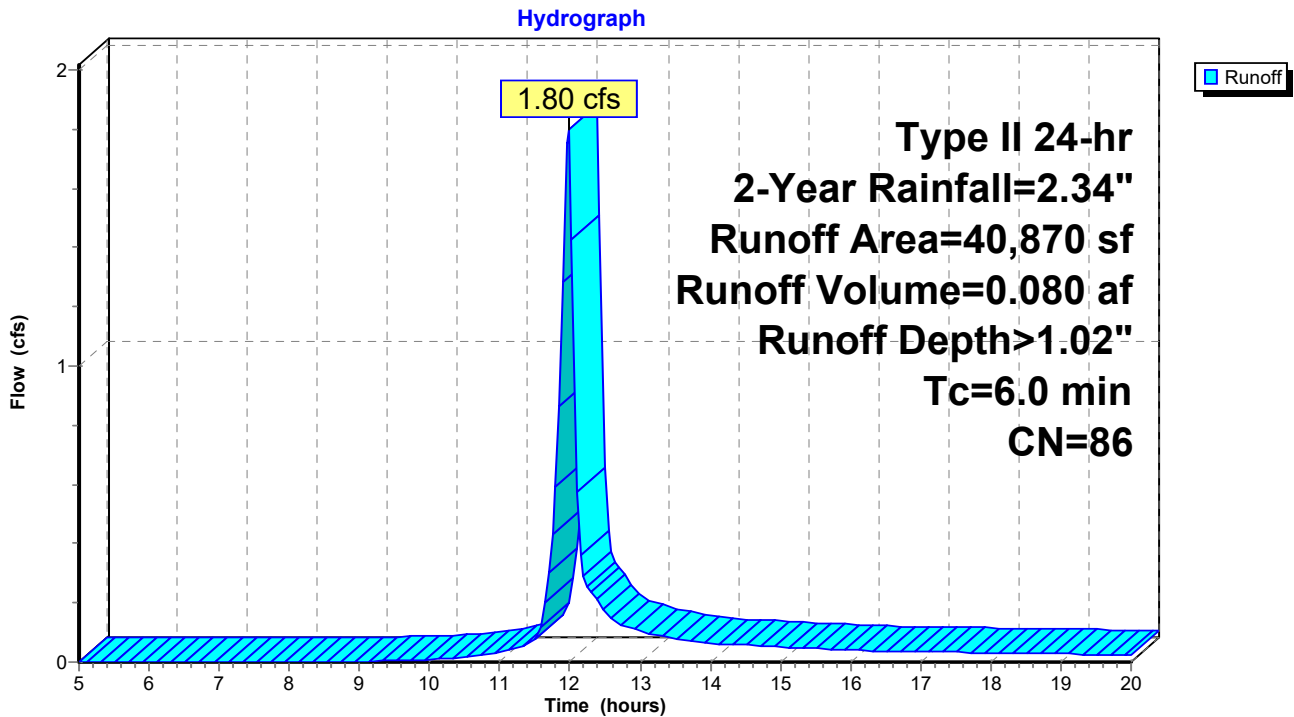
Runoff = 1.80 cfs @ 11.97 hrs, Volume= 0.080 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 2-Year Rainfall=2.34"

Area (sf)	CN	Description
13,078	98	Paved parking, HSG D
26,289	80	>75% Grass cover, Good, HSG D
* 1,503	80	
40,870	86	Weighted Average
27,792		68.00% Pervious Area
13,078		32.00% Impervious Area

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

Subcatchment 11S: Area #8



Summary for Subcatchment 12S: Area #3

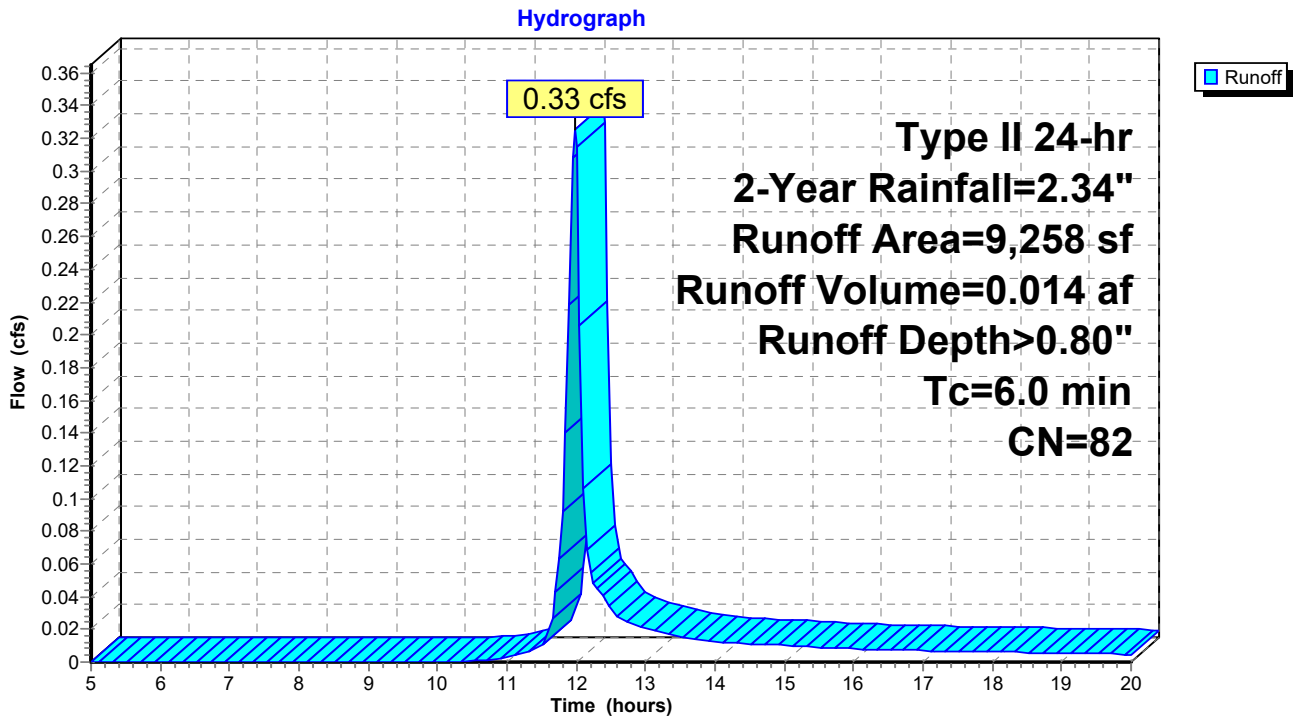
Runoff = 0.33 cfs @ 11.98 hrs, Volume= 0.014 af, Depth> 0.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 2-Year Rainfall=2.34"

Area (sf)	CN	Description
1,217	98	Paved parking, HSG D
6,538	80	>75% Grass cover, Good, HSG D
* 1,503	80	
9,258	82	Weighted Average
8,041		86.85% Pervious Area
1,217		13.15% Impervious Area

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

Subcatchment 12S: Area #3



Summary for Subcatchment 14S: Area #7

Runoff = 0.46 cfs @ 11.98 hrs, Volume= 0.020 af, Depth> 0.91"

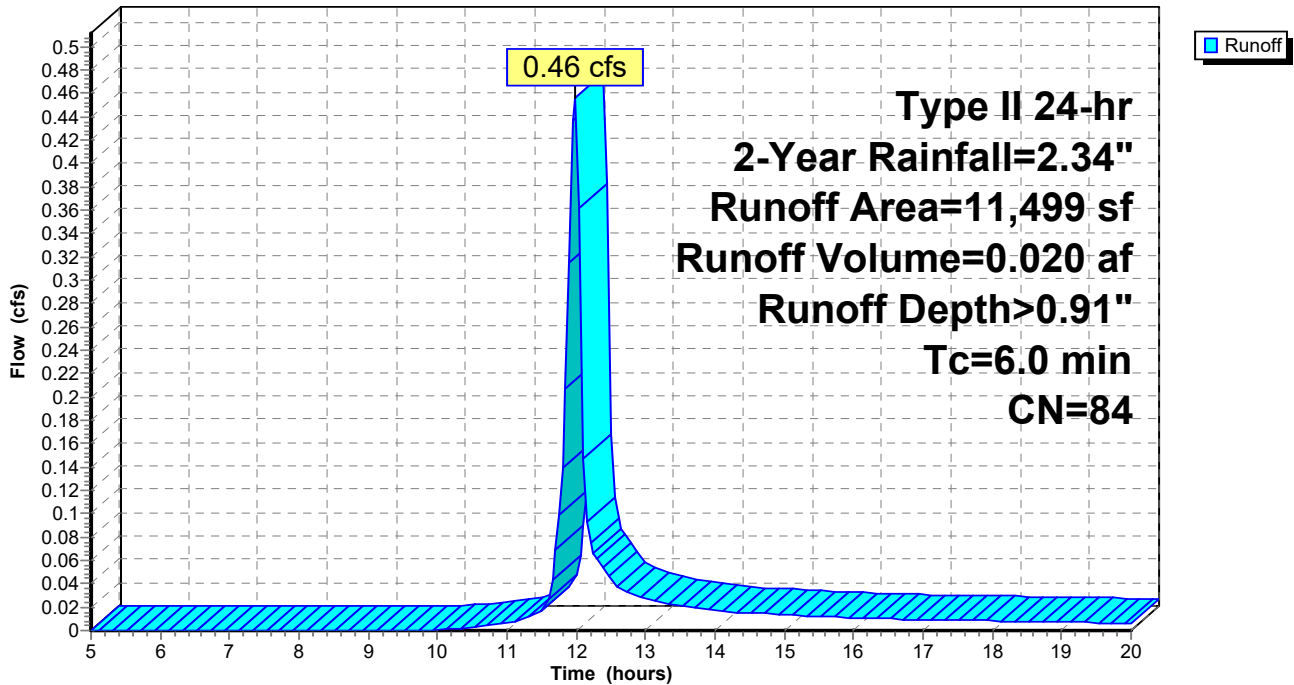
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 2-Year Rainfall=2.34"

Area (sf)	CN	Description
2,501	98	Paved parking, HSG D
8,998	80	>75% Grass cover, Good, HSG D
11,499	84	Weighted Average
8,998		78.25% Pervious Area
2,501		21.75% Impervious Area

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

Subcatchment 14S: Area #7

Hydrograph



Summary for Subcatchment 15S: Area #2

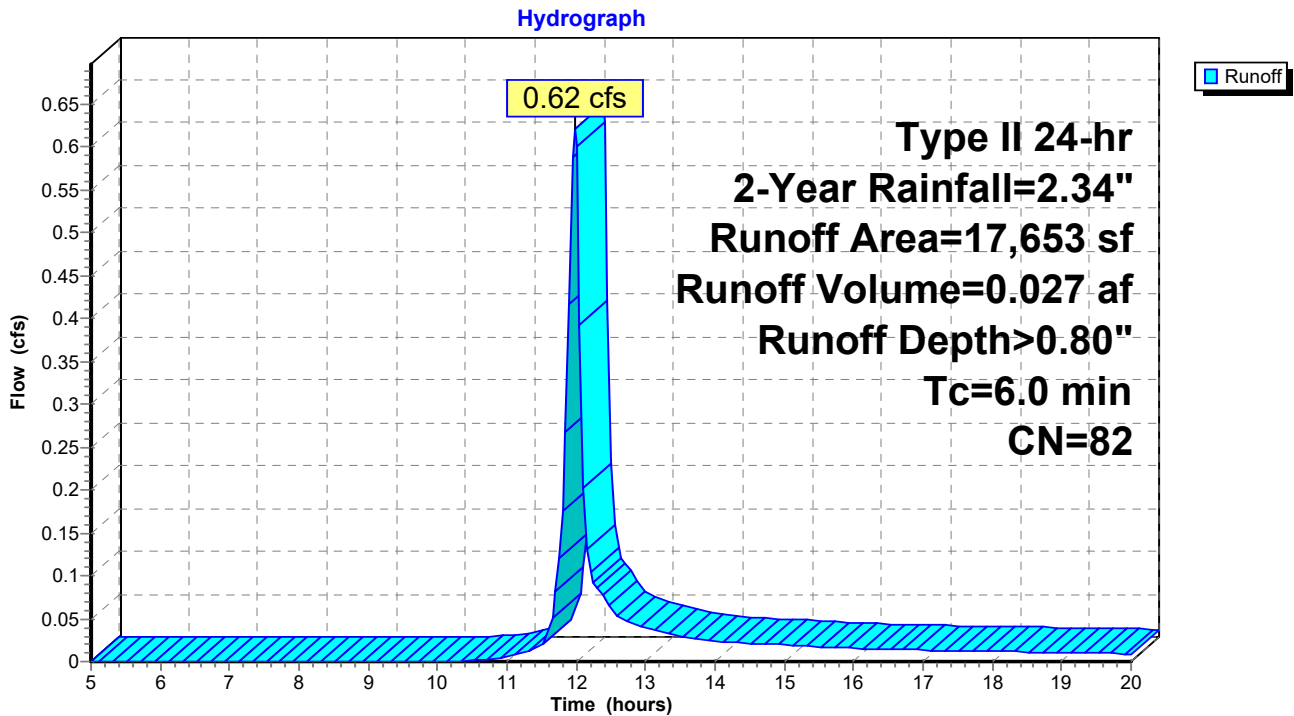
Runoff = 0.62 cfs @ 11.98 hrs, Volume= 0.027 af, Depth> 0.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 2-Year Rainfall=2.34"

Area (sf)	CN	Description
1,532	98	Paved parking, HSG D
16,121	80	>75% Grass cover, Good, HSG D
17,653	82	Weighted Average
16,121		91.32% Pervious Area
1,532		8.68% Impervious Area

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

Subcatchment 15S: Area #2



Summary for Pond 4P: Cottages Bio #1

Inflow Area = 0.661 ac, 58.14% Impervious, Inflow Depth > 1.29" for 2-Year event
 Inflow = 1.56 cfs @ 11.97 hrs, Volume= 0.071 af
 Outflow = 1.49 cfs @ 12.00 hrs, Volume= 0.062 af, Atten= 5%, Lag= 1.6 min
 Primary = 1.49 cfs @ 12.00 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 935.38' @ 12.00 hrs Surf.Area= 1,820 sf Storage= 603 cf

Plug-Flow detention time= 61.9 min calculated for 0.062 af (87% of inflow)
 Center-of-Mass det. time= 21.4 min (798.7 - 777.3)

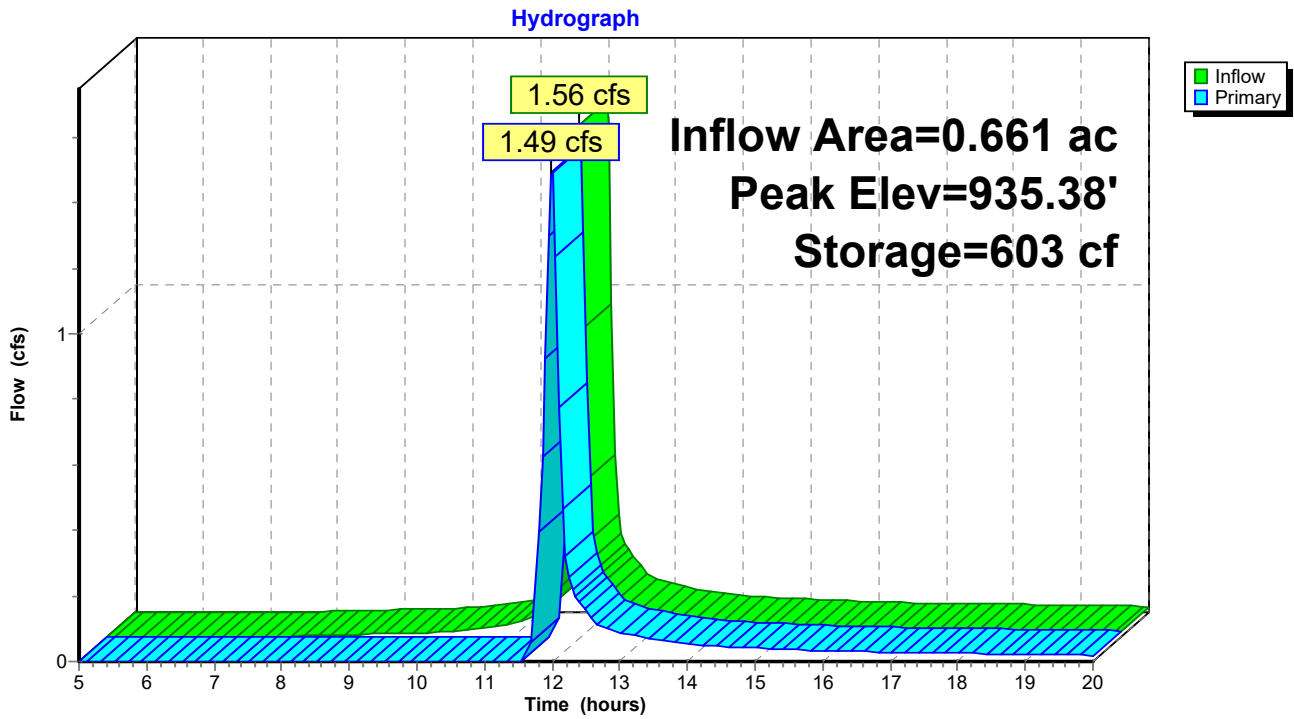
Volume	Invert	Avail.Storage	Storage Description
#1	935.00'	1,964 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
935.00	1,377	0	0
936.00	2,550	1,964	1,964

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	12.0" Round Culvert L= 79.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 931.00' / 930.00' S= 0.0127 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	935.25'	30.0" x 30.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	935.00'	0.250 in/hr Exfiltration over Surface area above 935.00' Conductivity to Groundwater Elevation = -8.00' Excluded Surface area = 1,377 sf

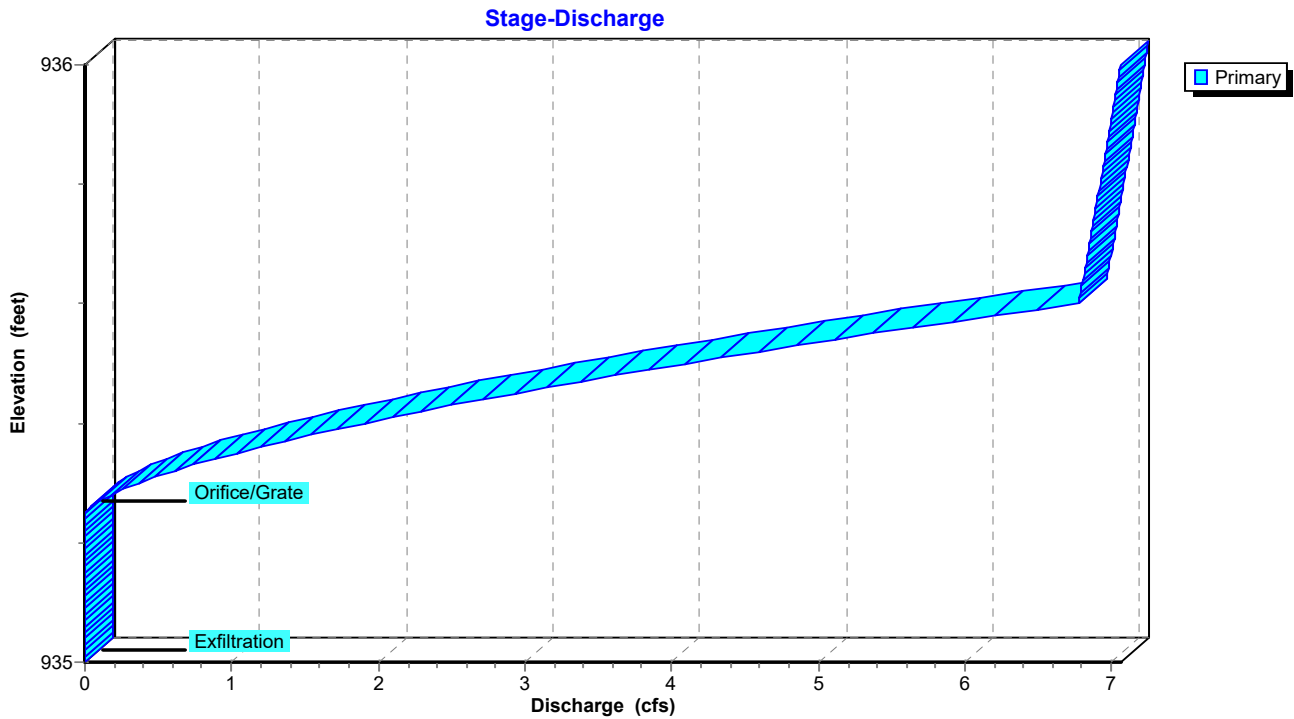
Primary OutFlow Max=1.48 cfs @ 12.00 hrs HW=935.38' (Free Discharge)

- 1=Culvert (Passes 1.48 cfs of 6.61 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 1.47 cfs @ 1.16 fps)
- 3=Exfiltration (Controls 0.00 cfs)

Pond 4P: Cottages Bio #1



Pond 4P: Cottages Bio #1



Summary for Pond 5P: Cottages Misc. Pond

Inflow Area = 0.402 ac, 71.35% Impervious, Inflow Depth > 1.52" for 2-Year event
 Inflow = 1.09 cfs @ 11.97 hrs, Volume= 0.051 af
 Outflow = 1.08 cfs @ 11.98 hrs, Volume= 0.051 af, Atten= 1%, Lag= 1.1 min
 Primary = 1.08 cfs @ 11.98 hrs, Volume= 0.051 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 935.22' @ 11.98 hrs Surf.Area= 408 sf Storage= 78 cf

Plug-Flow detention time= 2.4 min calculated for 0.051 af (100% of inflow)
 Center-of-Mass det. time= 1.8 min (766.3 - 764.5)

Volume	Invert	Avail.Storage	Storage Description
#1	935.00'	548 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
935.00	296	0	0
936.00	800	548	548

Device	Routing	Invert	Outlet Devices
#1	Primary	928.50'	12.0" Round Culvert L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 928.50' / 927.00' S= 0.0341 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	935.00'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Secondary	931.00'	12.0" Round Culvert L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 931.00' / 930.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#4	Device 3	935.50'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

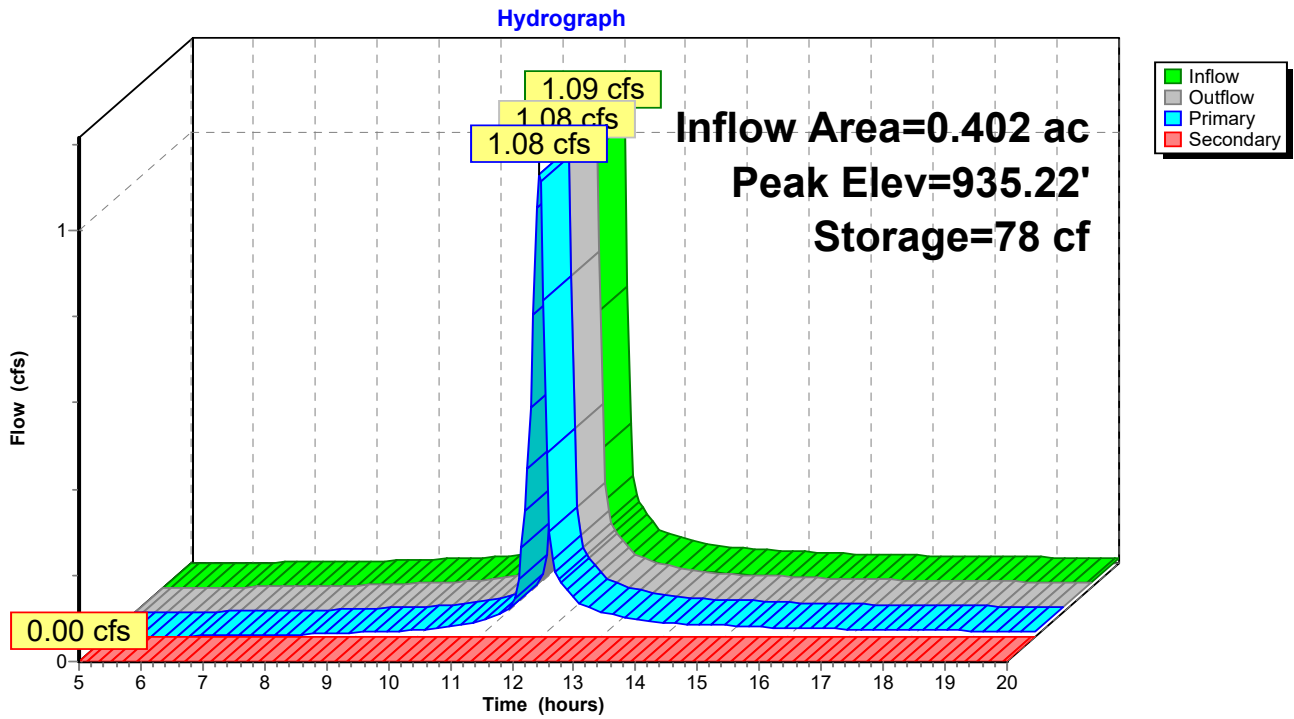
Primary OutFlow Max=1.04 cfs @ 11.98 hrs HW=935.22' (Free Discharge)

- ↑1=Culvert (Passes 1.04 cfs of 9.43 cfs potential flow)
- ↑2=Orifice/Grate (Weir Controls 1.04 cfs @ 1.52 fps)

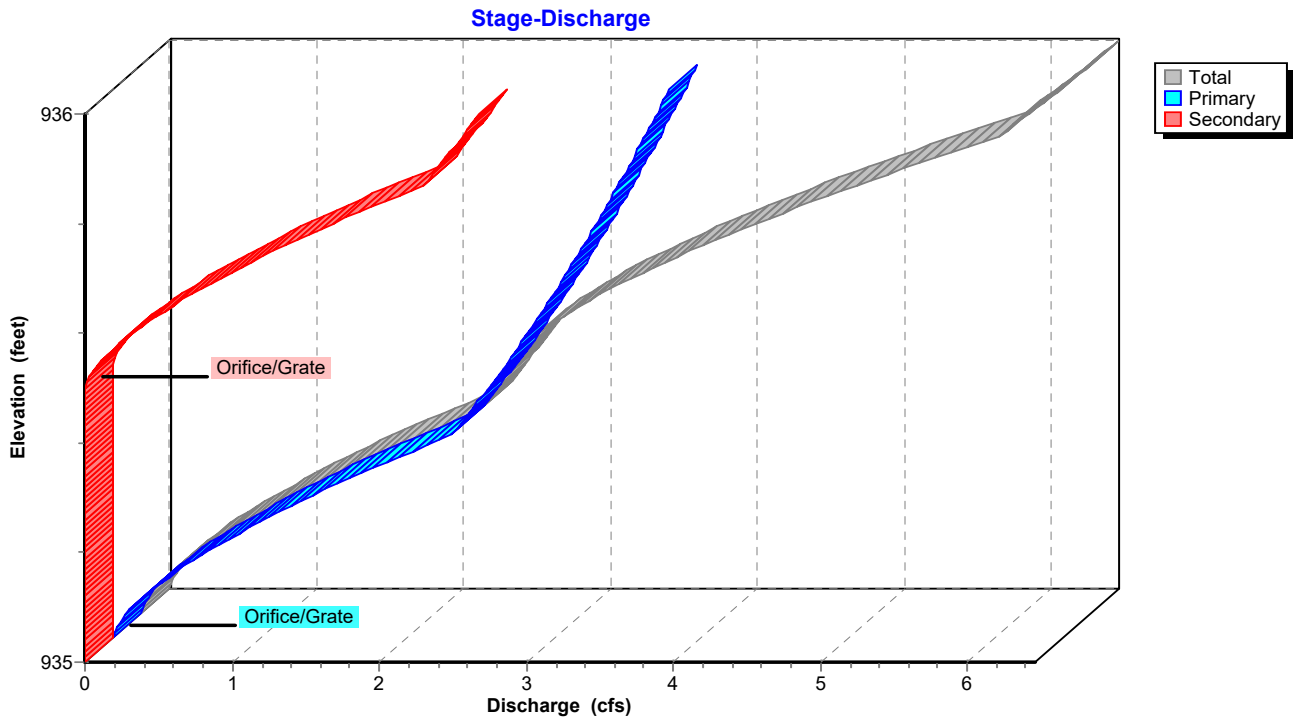
Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=935.00' (Free Discharge)

- ↑3=Culvert (Passes 0.00 cfs of 6.29 cfs potential flow)
- ↑4=Orifice/Grate (Controls 0.00 cfs)

Pond 5P: Cottages Misc. Pond



Pond 5P: Cottages Misc. Pond



Summary for Pond 6P: Cottages Bio #2

Inflow Area = 0.666 ac, 51.69% Impervious, Inflow Depth > 1.28" for 2-Year event
 Inflow = 1.53 cfs @ 11.98 hrs, Volume= 0.071 af
 Outflow = 0.93 cfs @ 12.07 hrs, Volume= 0.044 af, Atten= 39%, Lag= 5.4 min
 Primary = 0.93 cfs @ 12.07 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 921.61' @ 12.07 hrs Surf.Area= 2,454 sf Storage= 1,410 cf

Plug-Flow detention time= 131.2 min calculated for 0.044 af (62% of inflow)
 Center-of-Mass det. time= 59.1 min (833.9 - 774.7)

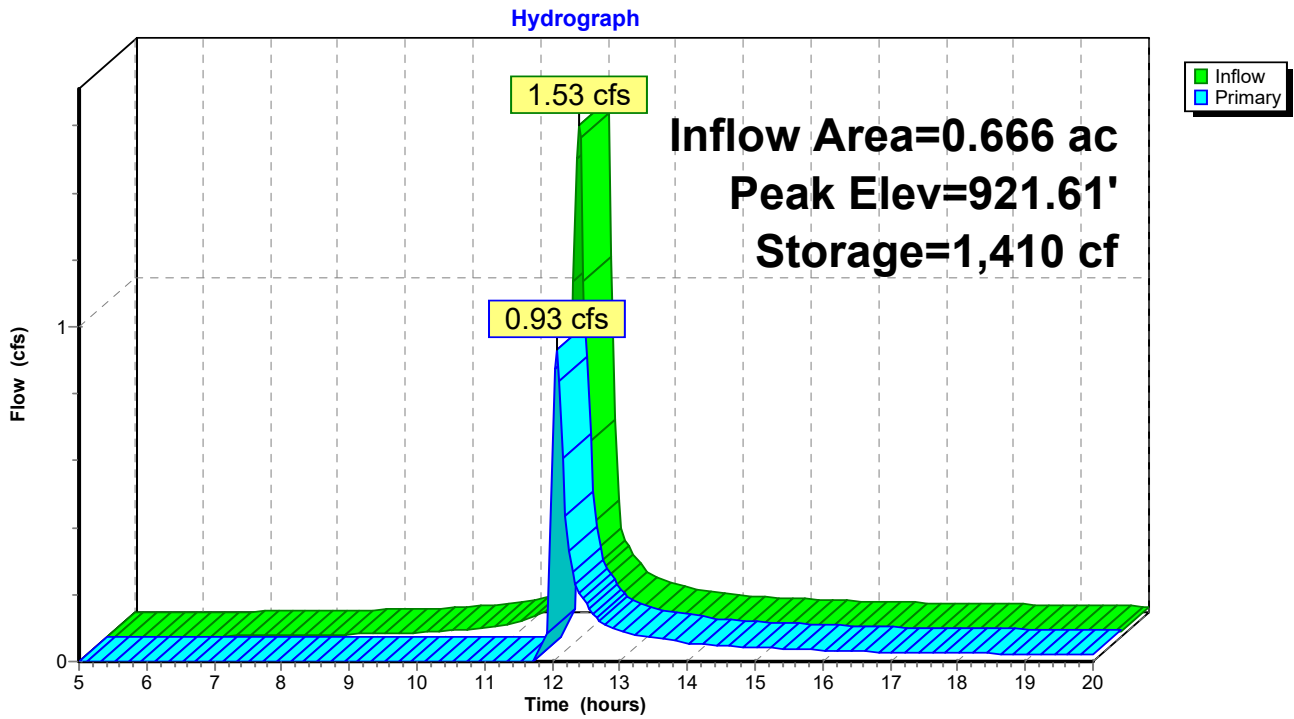
Volume	Invert	Avail.Storage	Storage Description
#1	921.00'	5,278 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
921.00	2,178	0	0
922.00	2,632	2,405	2,405
923.00	3,113	2,873	5,278

Device	Routing	Invert	Outlet Devices
#1	Primary	919.00'	24.0" Round Culvert L= 65.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 917.50' / 919.00' S= -0.0231 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	921.50'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	921.00'	0.250 in/hr Exfiltration over Surface area above 921.00' Conductivity to Groundwater Elevation = -7.00' Excluded Surface area = 2,178 sf

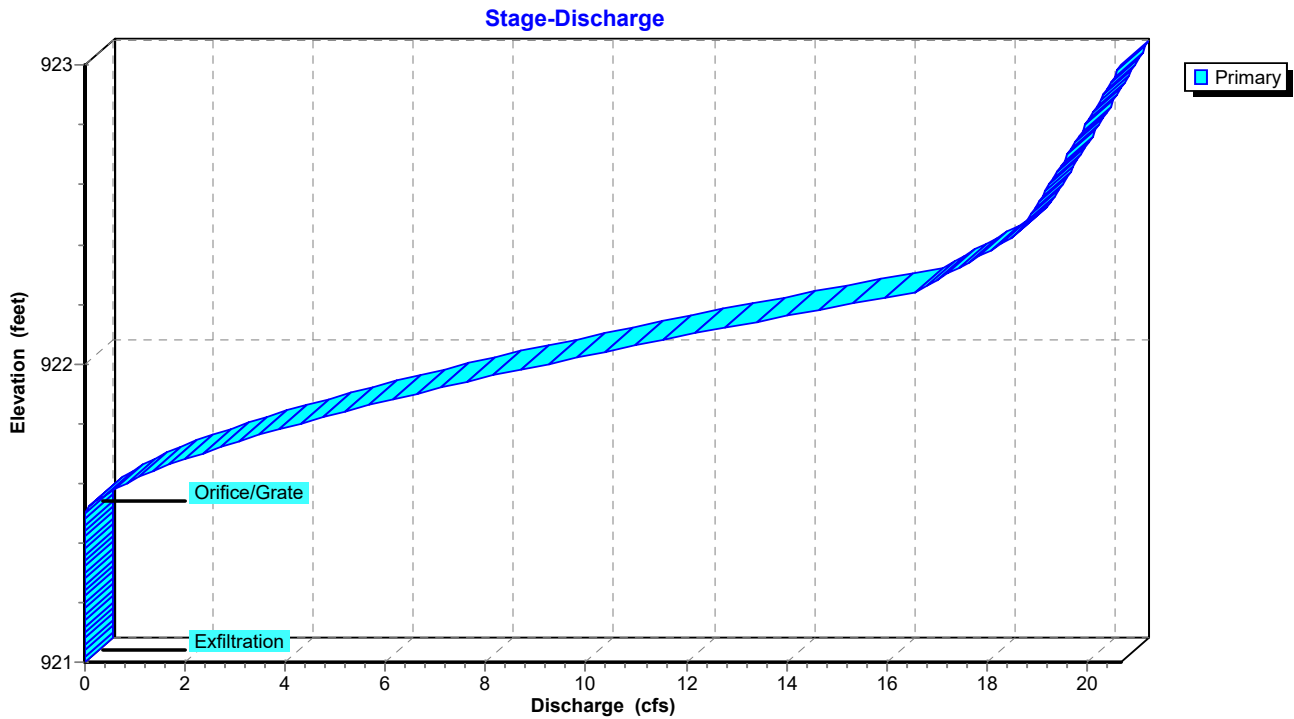
Primary OutFlow Max=0.86 cfs @ 12.07 hrs HW=921.60' (Free Discharge)

- 1=Culvert (Passes 0.86 cfs of 15.12 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 0.86 cfs @ 1.05 fps)
- 3=Exfiltration (Controls 0.00 cfs)

Pond 6P: Cottages Bio #2



Pond 6P: Cottages Bio #2



Summary for Pond 7P: Detention Pond

Inflow Area = 3.112 ac, 58.07% Impervious, Inflow Depth > 1.09" for 2-Year event
 Inflow = 6.16 cfs @ 12.00 hrs, Volume= 0.282 af
 Outflow = 0.27 cfs @ 13.88 hrs, Volume= 0.169 af, Atten= 96%, Lag= 112.7 min
 Primary = 0.27 cfs @ 13.88 hrs, Volume= 0.169 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 908.42' @ 13.88 hrs Surf.Area= 5,737 sf Storage= 7,210 cf

Plug-Flow detention time= 229.3 min calculated for 0.169 af (60% of inflow)
 Center-of-Mass det. time= 150.7 min (953.2 - 802.5)

Volume	Invert	Avail.Storage	Storage Description
#1	907.00'	39,370 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
907.00	4,416	0	0
908.00	5,328	4,872	4,872
909.00	6,297	5,813	10,685
910.00	7,323	6,810	17,495
911.00	8,406	7,865	25,359
912.00	9,544	8,975	34,334
912.50	10,600	5,036	39,370

Device	Routing	Invert	Outlet Devices
#1	Primary	907.00'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 907.00' / 906.00' S= 0.1000 1' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	907.00'	3.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	908.50'	30.0" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Secondary	910.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 2.50 Width (feet) 2.00 12.00

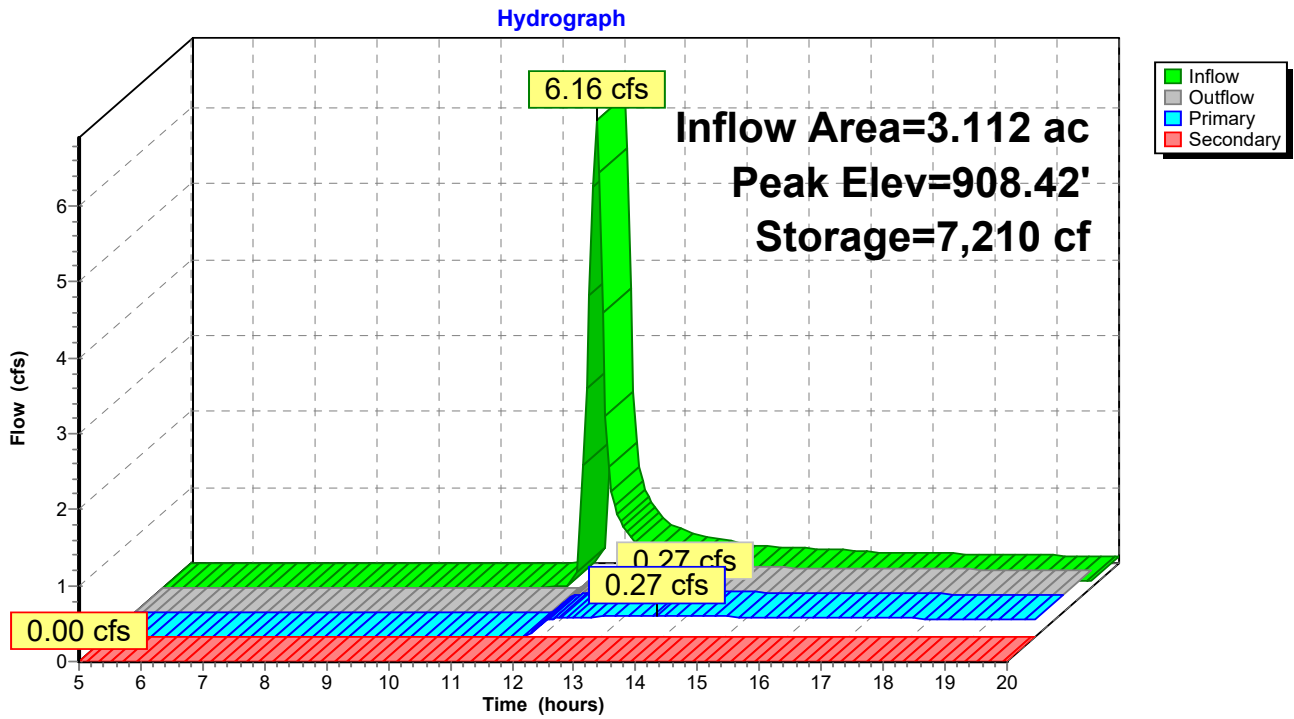
Primary OutFlow Max=0.27 cfs @ 13.88 hrs HW=908.42' (Free Discharge)

- ↑ 1=Culvert (Passes 0.27 cfs of 3.63 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.27 cfs @ 5.48 fps)
- ↑ 3=Orifice/Grate (Controls 0.00 cfs)

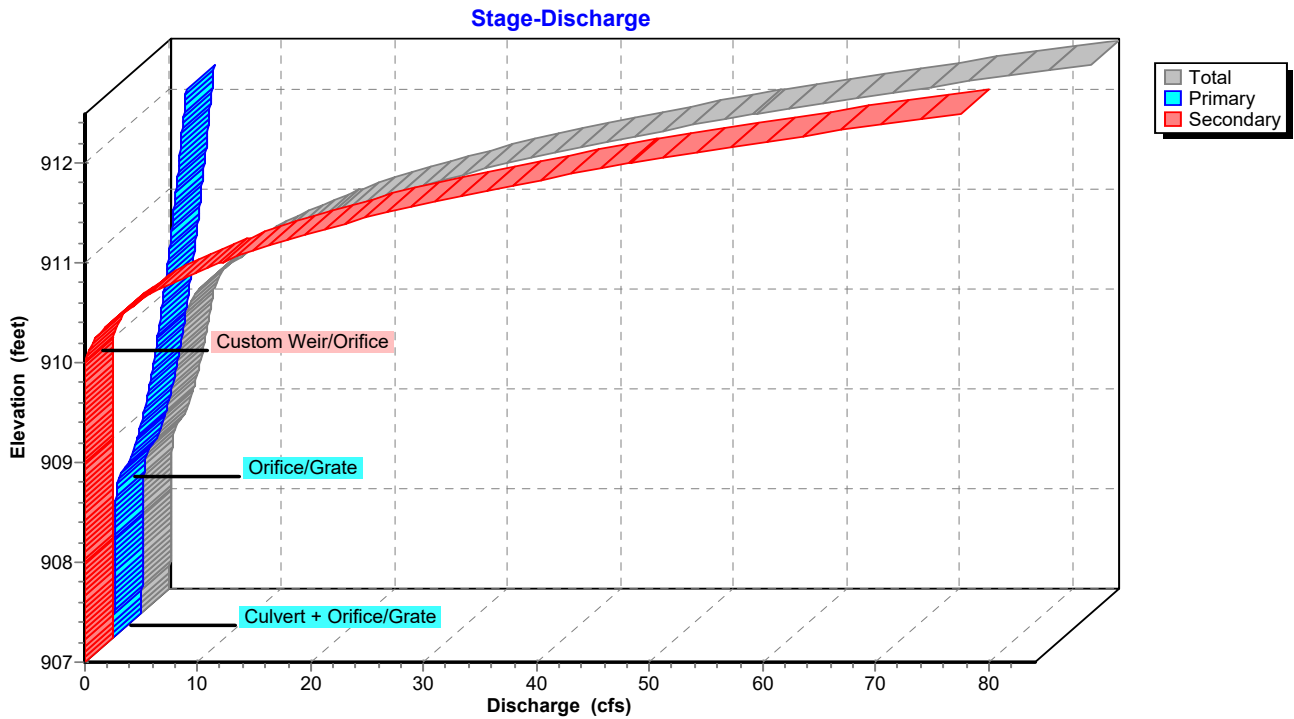
Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=907.00' (Free Discharge)

- ↑ 4=Custom Weir/Orifice (Controls 0.00 cfs)

Pond 7P: Detention Pond



Pond 7P: Detention Pond



Summary for Pond 9P: Bioretention Area #1

Inflow Area = 1.380 ac, 75.62% Impervious, Inflow Depth > 1.61" for 2-Year event
 Inflow = 3.89 cfs @ 11.97 hrs, Volume= 0.185 af
 Outflow = 3.76 cfs @ 11.99 hrs, Volume= 0.149 af, Atten= 3%, Lag= 1.5 min
 Primary = 3.76 cfs @ 11.99 hrs, Volume= 0.149 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 920.65' @ 11.99 hrs Surf.Area= 3,342 sf Storage= 2,058 cf

Plug-Flow detention time= 89.2 min calculated for 0.149 af (80% of inflow)
 Center-of-Mass det. time= 35.4 min (794.8 - 759.4)

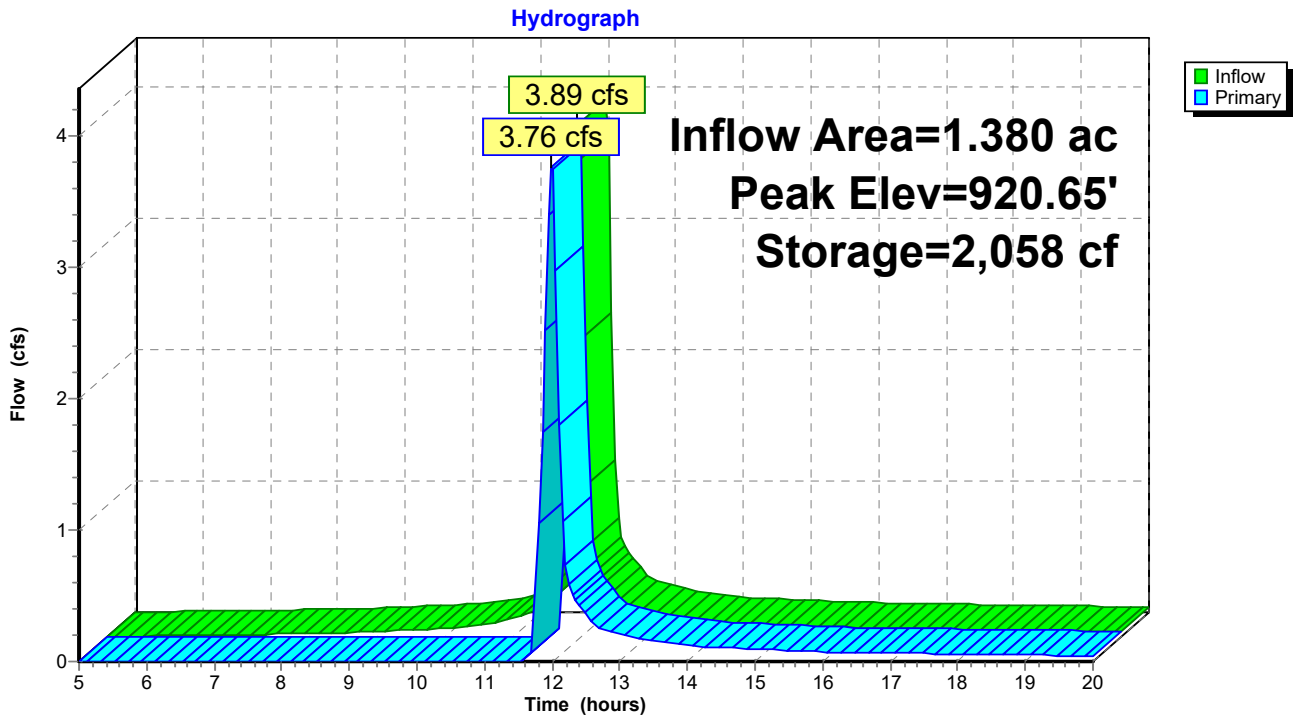
Volume	Invert	Avail.Storage	Storage Description
#1	920.00'	5,095 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
920.00	3,000	0	0
921.00	3,527	3,264	3,264
921.50	3,799	1,832	5,095

Device	Routing	Invert	Outlet Devices
#1	Primary	916.50'	24.0" Round Culvert L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 916.50' / 912.00' S= 0.0360 ' S Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	920.50'	30.0" x 30.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	920.00'	0.250 in/hr Exfiltration over Surface area above 920.00' Conductivity to Groundwater Elevation = -7.00' Excluded Surface area = 3,000 sf

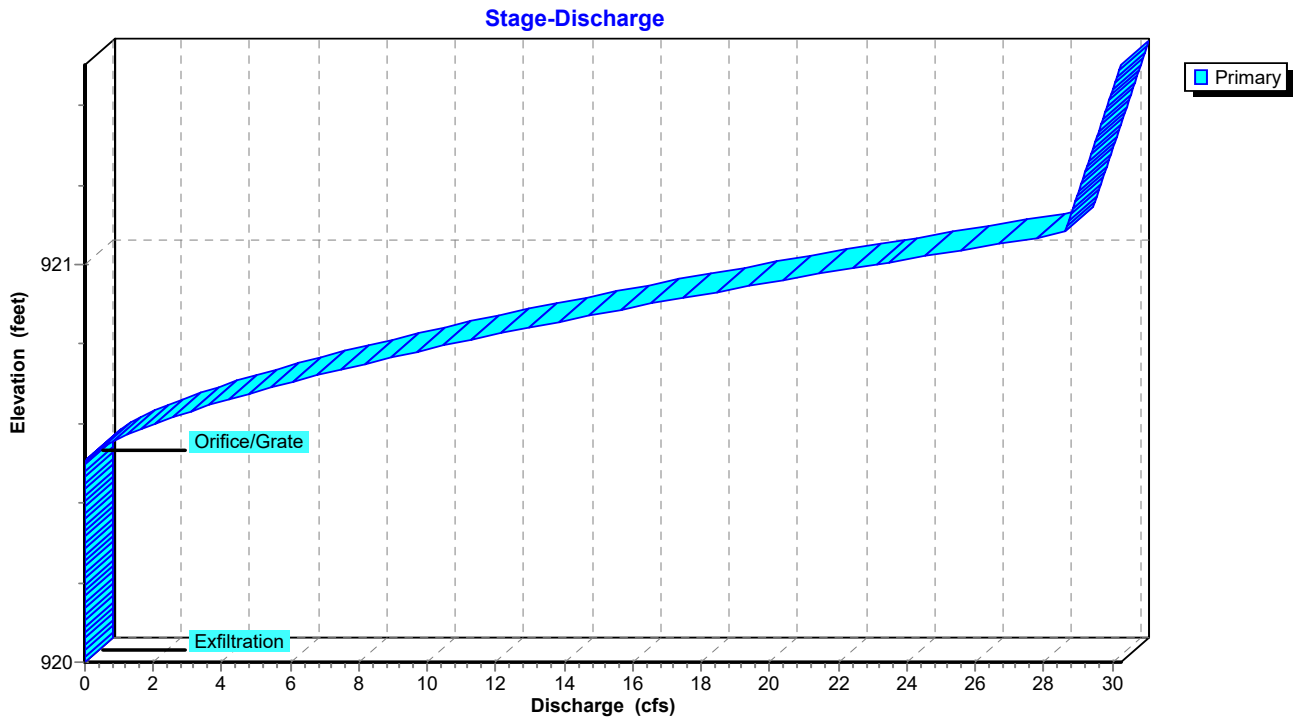
Primary OutFlow Max=3.67 cfs @ 11.99 hrs HW=920.65' (Free Discharge)

- 1=Culvert (Passes 3.67 cfs of 26.83 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 3.67 cfs @ 1.25 fps)
- 3=Exfiltration (Controls 0.00 cfs)

Pond 9P: Bioretention Area #1



Pond 9P: Bioretention Area #1

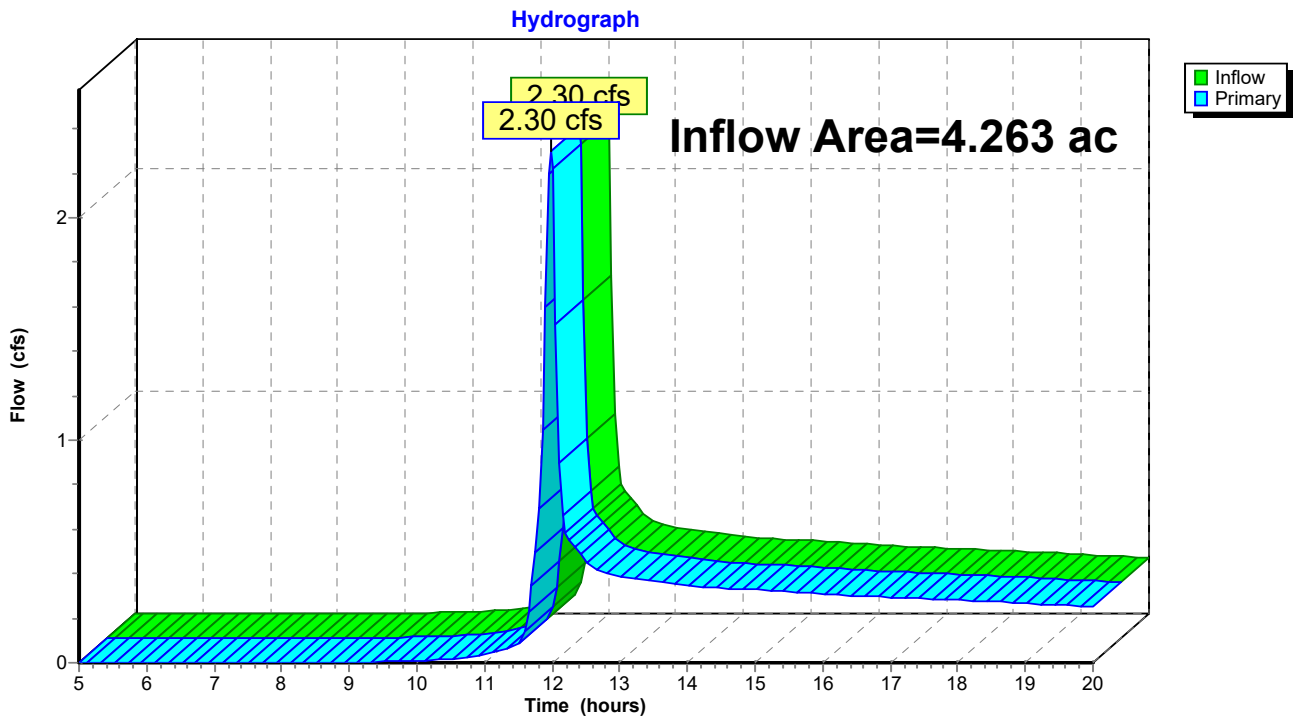


Summary for Link 1L: Analysis Point #1

Inflow Area = 4.263 ac, 50.09% Impervious, Inflow Depth > 0.74" for 2-Year event
Inflow = 2.30 cfs @ 11.98 hrs, Volume= 0.263 af
Primary = 2.30 cfs @ 11.98 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: Analysis Point #1

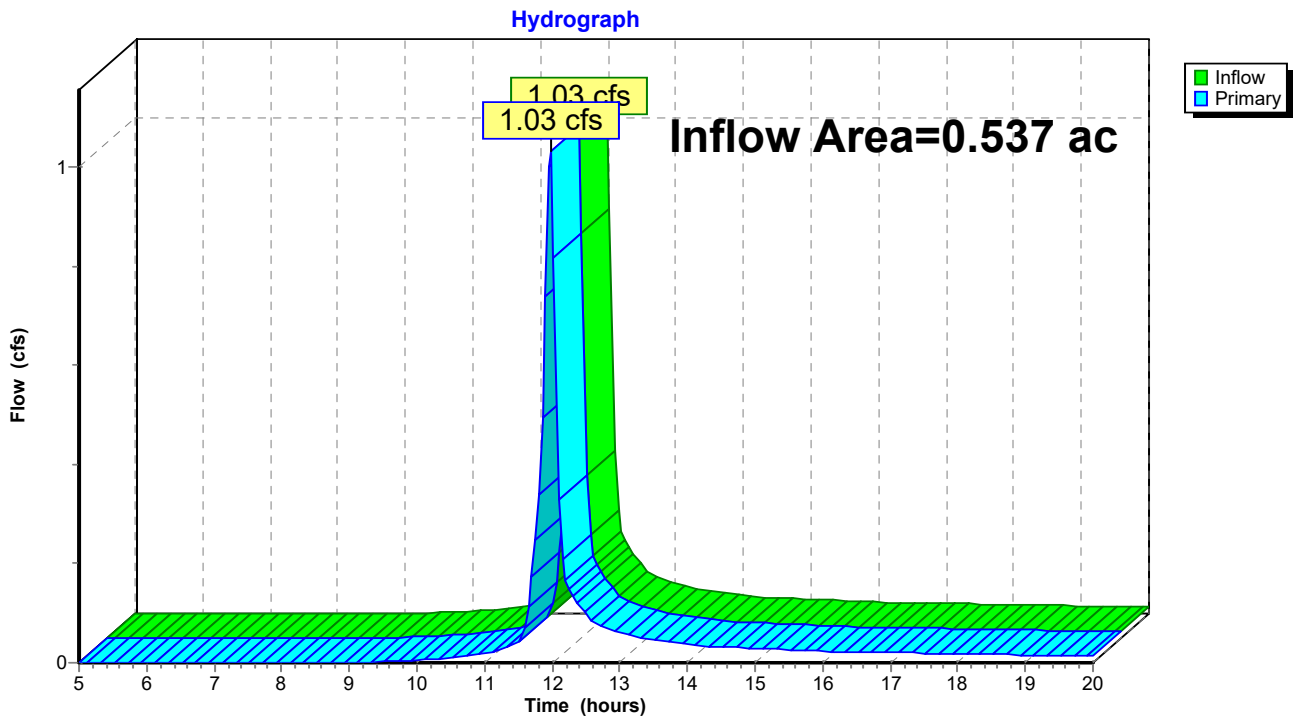


Summary for Link 13L: Analysis Point #2

Inflow Area = 0.537 ac, 34.49% Impervious, Inflow Depth > 1.02" for 2-Year event
Inflow = 1.03 cfs @ 11.97 hrs, Volume= 0.046 af
Primary = 1.03 cfs @ 11.97 hrs, Volume= 0.046 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 13L: Analysis Point #2



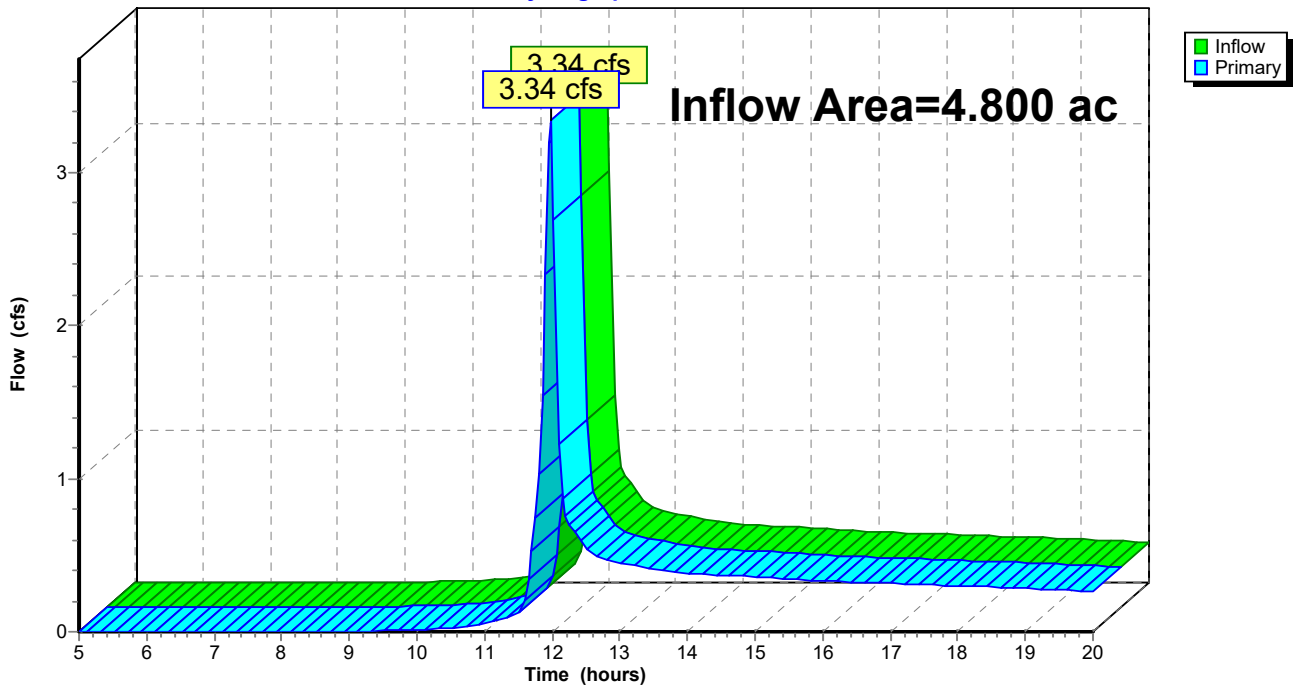
Summary for Link 16L: AP #3

Inflow Area = 4.800 ac, 48.35% Impervious, Inflow Depth > 0.77" for 2-Year event
Inflow = 3.34 cfs @ 11.98 hrs, Volume= 0.309 af
Primary = 3.34 cfs @ 11.98 hrs, Volume= 0.309 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 16L: AP #3

Hydrograph



Proposed 2020 03-10

Type II 24-hr 10-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 3/12/2020

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Page 52

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: Area #5	Runoff Area=28,781 sf 58.14% Impervious Runoff Depth>2.24" Tc=6.0 min CN=90 Runoff=2.62 cfs 0.123 af
Subcatchment 3S: Area #6	Runoff Area=17,509 sf 71.35% Impervious Runoff Depth>2.51" Tc=6.0 min CN=93 Runoff=1.74 cfs 0.084 af
Subcatchment 8S: Area #1	Runoff Area=60,121 sf 75.62% Impervious Runoff Depth>2.60" Tc=6.0 min CN=94 Runoff=6.10 cfs 0.300 af
Subcatchment 10S: Area #4	Runoff Area=23,397 sf 34.49% Impervious Runoff Depth>1.90" Tc=6.0 min CN=86 Runoff=1.87 cfs 0.085 af
Subcatchment 11S: Area #8	Runoff Area=40,870 sf 32.00% Impervious Runoff Depth>1.90" Tc=6.0 min CN=86 Runoff=3.26 cfs 0.148 af
Subcatchment 12S: Area #3	Runoff Area=9,258 sf 13.15% Impervious Runoff Depth>1.60" Tc=6.0 min CN=82 Runoff=0.63 cfs 0.028 af
Subcatchment 14S: Area #7	Runoff Area=11,499 sf 21.75% Impervious Runoff Depth>1.74" Tc=6.0 min CN=84 Runoff=0.85 cfs 0.038 af
Subcatchment 15S: Area #2	Runoff Area=17,653 sf 8.68% Impervious Runoff Depth>1.60" Tc=6.0 min CN=82 Runoff=1.21 cfs 0.054 af
Pond 4P: Cottages Bio #1	Peak Elev=935.43' Storage=704 cf Inflow=2.62 cfs 0.123 af Outflow=2.54 cfs 0.114 af
Pond 5P: Cottages Misc. Pond	Peak Elev=935.30' Storage=113 cf Inflow=1.74 cfs 0.084 af Primary=1.72 cfs 0.084 af Secondary=0.00 cfs 0.000 af Outflow=1.72 cfs 0.084 af
Pond 6P: Cottages Bio #2	Peak Elev=921.70' Storage=1,636 cf Inflow=2.57 cfs 0.122 af Outflow=2.34 cfs 0.096 af
Pond 7P: Detention Pond	Peak Elev=909.09' Storage=11,262 cf Inflow=11.96 cfs 0.526 af Primary=2.38 cfs 0.377 af Secondary=0.00 cfs 0.000 af Outflow=2.38 cfs 0.377 af
Pond 9P: Bioretention Area #1	Peak Elev=920.70' Storage=2,237 cf Inflow=6.10 cfs 0.300 af Outflow=5.95 cfs 0.263 af
Link 1L: Analysis Point #1	Inflow=4.09 cfs 0.554 af Primary=4.09 cfs 0.554 af
Link 13L: Analysis Point #2	Inflow=1.87 cfs 0.085 af Primary=1.87 cfs 0.085 af
Link 16L: AP #3	Inflow=6.06 cfs 0.639 af Primary=6.06 cfs 0.639 af

Proposed 2020 03-10

Type II 24-hr 10-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 3/12/2020

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Page 53

Total Runoff Area = 4.800 ac Runoff Volume = 0.860 af Average Runoff Depth = 2.15"
51.65% Pervious = 2.479 ac 48.35% Impervious = 2.321 ac

Summary for Subcatchment 2S: Area #5

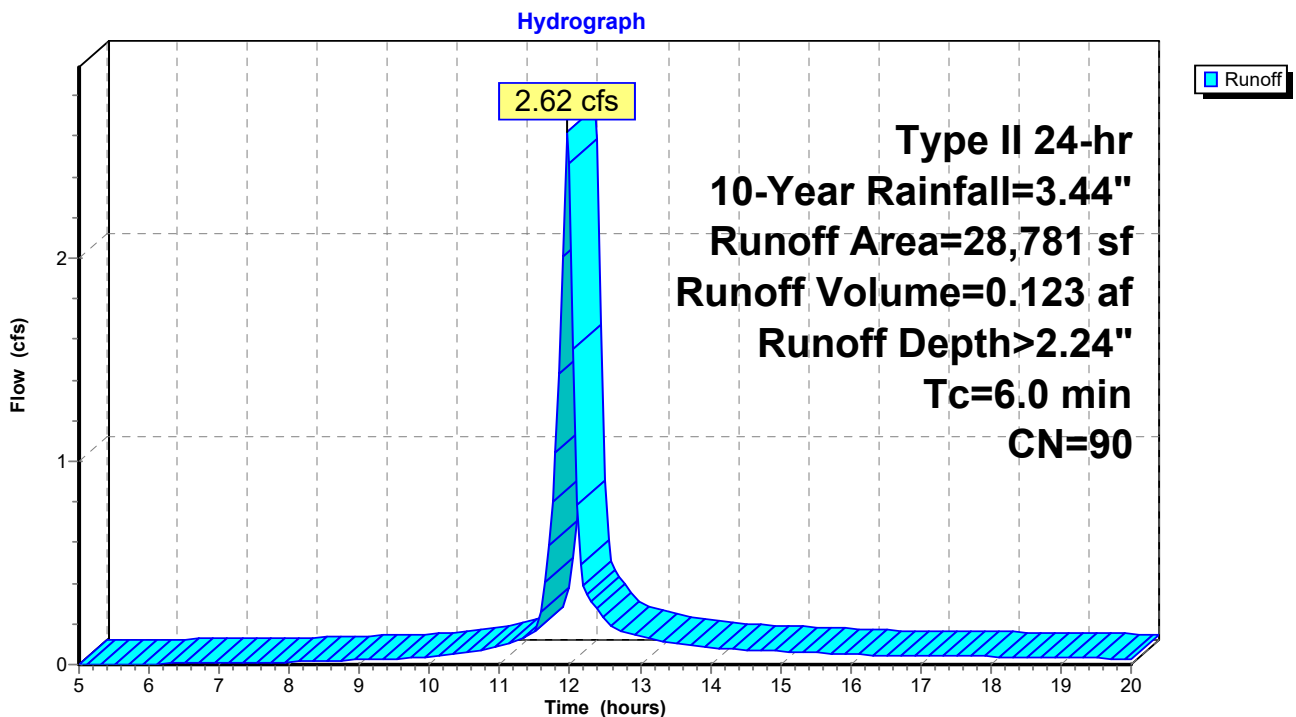
Runoff = 2.62 cfs @ 11.97 hrs, Volume= 0.123 af, Depth> 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-Year Rainfall=3.44"

Area (sf)	CN	Description
16,732	98	Paved parking, HSG D
12,049	80	>75% Grass cover, Good, HSG D
28,781	90	Weighted Average
12,049		41.86% Pervious Area
16,732		58.14% Impervious Area

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

Subcatchment 2S: Area #5



Summary for Subcatchment 3S: Area #6

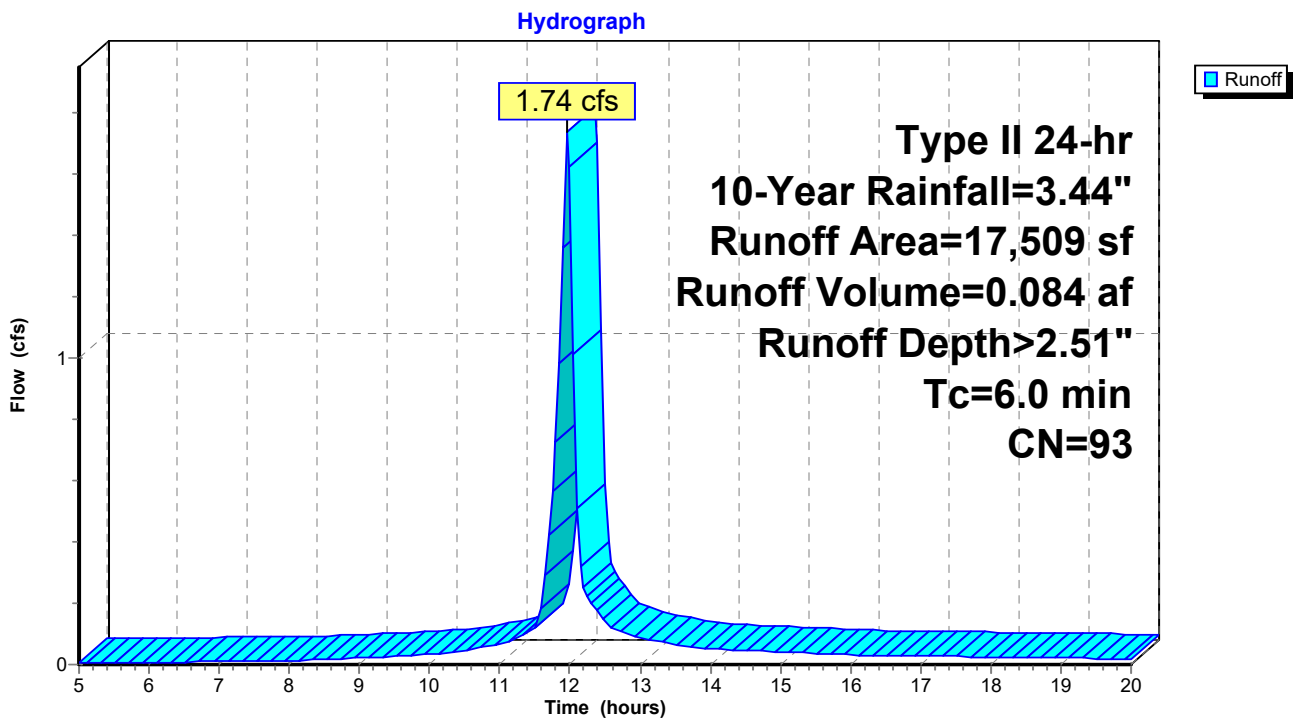
Runoff = 1.74 cfs @ 11.96 hrs, Volume= 0.084 af, Depth> 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-Year Rainfall=3.44"

Area (sf)	CN	Description
12,493	98	Paved parking, HSG D
5,016	80	>75% Grass cover, Good, HSG D
17,509	93	Weighted Average
5,016		28.65% Pervious Area
12,493		71.35% Impervious Area

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

Subcatchment 3S: Area #6



Summary for Subcatchment 8S: Area #1

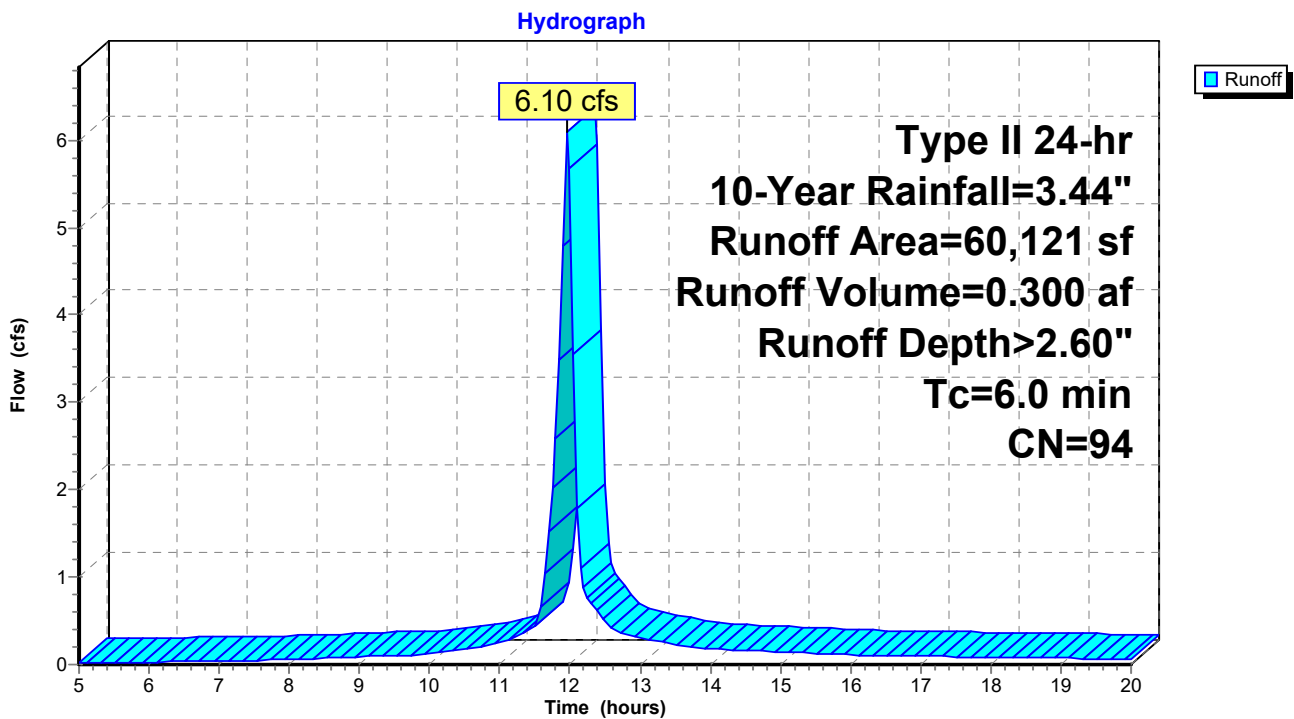
Runoff = 6.10 cfs @ 11.96 hrs, Volume= 0.300 af, Depth> 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-Year Rainfall=3.44"

Area (sf)	CN	Description
45,462	98	Paved parking, HSG D
14,659	80	>75% Grass cover, Good, HSG D
60,121	94	Weighted Average
14,659		24.38% Pervious Area
45,462		75.62% Impervious Area

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

Subcatchment 8S: Area #1



Summary for Subcatchment 10S: Area #4

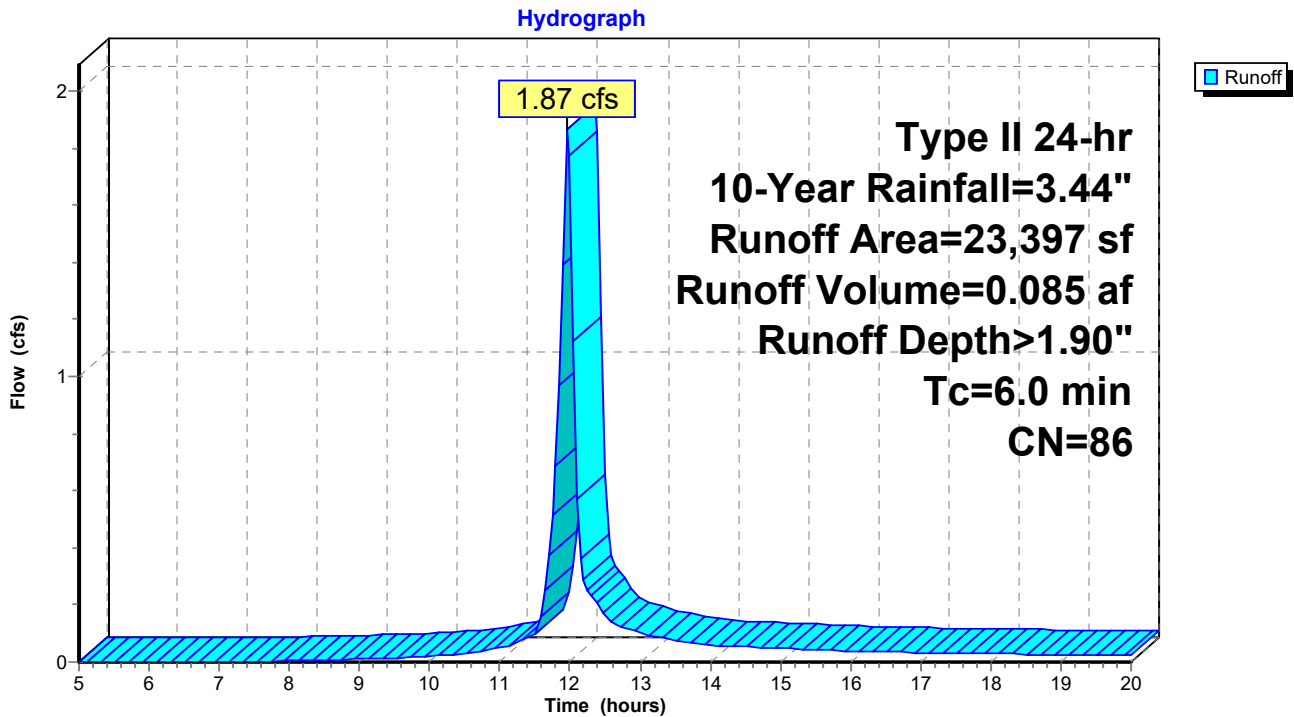
Runoff = 1.87 cfs @ 11.97 hrs, Volume= 0.085 af, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-Year Rainfall=3.44"

Area (sf)	CN	Description
8,069	98	Paved parking, HSG D
13,824	80	>75% Grass cover, Good, HSG D
* 1,504	80	
23,397	86	Weighted Average
15,328		65.51% Pervious Area
8,069		34.49% Impervious Area

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

Subcatchment 10S: Area #4



Summary for Subcatchment 11S: Area #8

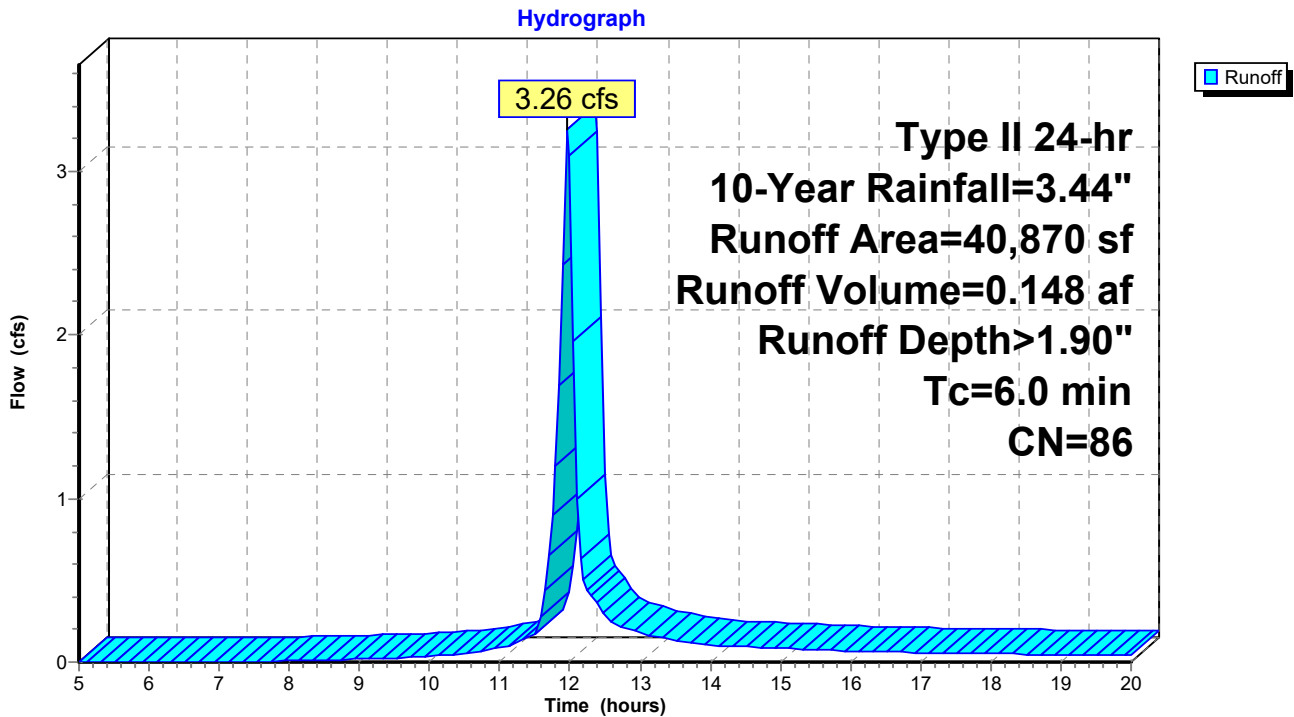
Runoff = 3.26 cfs @ 11.97 hrs, Volume= 0.148 af, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-Year Rainfall=3.44"

Area (sf)	CN	Description
13,078	98	Paved parking, HSG D
26,289	80	>75% Grass cover, Good, HSG D
* 1,503	80	
40,870	86	Weighted Average
27,792		68.00% Pervious Area
13,078		32.00% Impervious Area

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

Subcatchment 11S: Area #8



Summary for Subcatchment 12S: Area #3

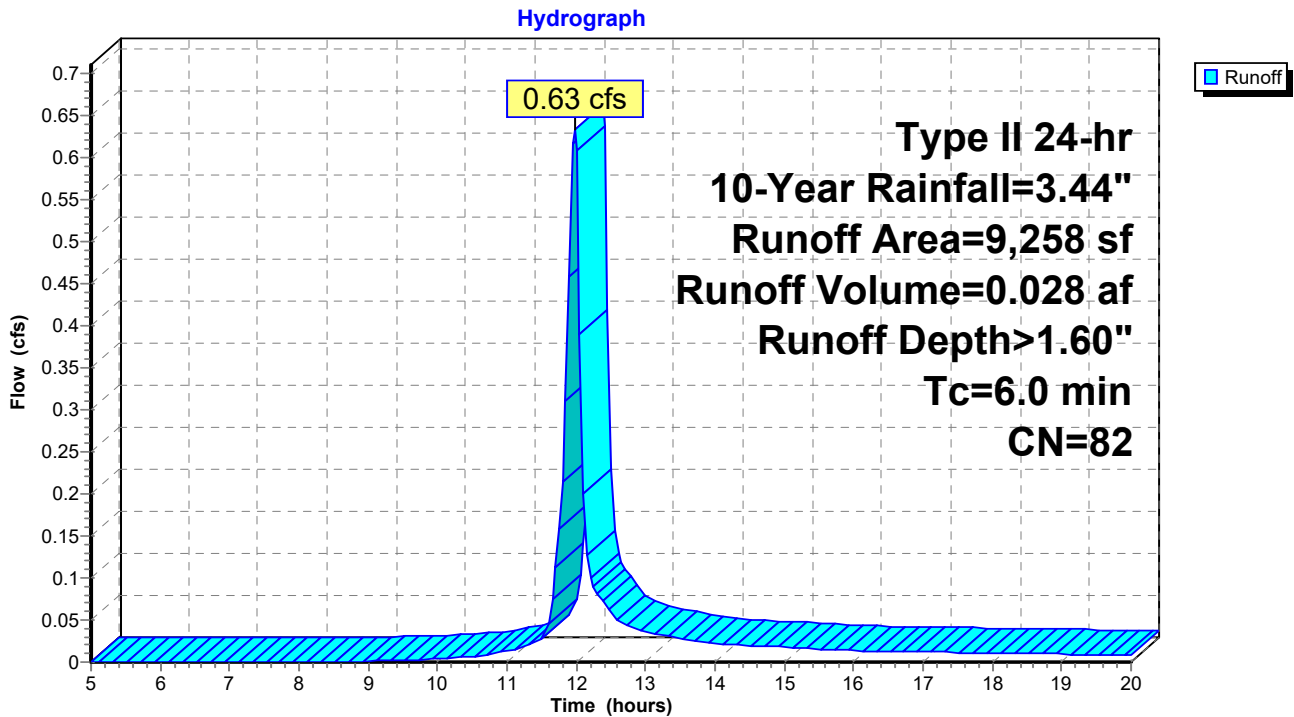
Runoff = 0.63 cfs @ 11.97 hrs, Volume= 0.028 af, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-Year Rainfall=3.44"

Area (sf)	CN	Description
1,217	98	Paved parking, HSG D
6,538	80	>75% Grass cover, Good, HSG D
* 1,503	80	
9,258	82	Weighted Average
8,041		86.85% Pervious Area
1,217		13.15% Impervious Area

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

Subcatchment 12S: Area #3



Summary for Subcatchment 14S: Area #7

Runoff = 0.85 cfs @ 11.97 hrs, Volume= 0.038 af, Depth> 1.74"

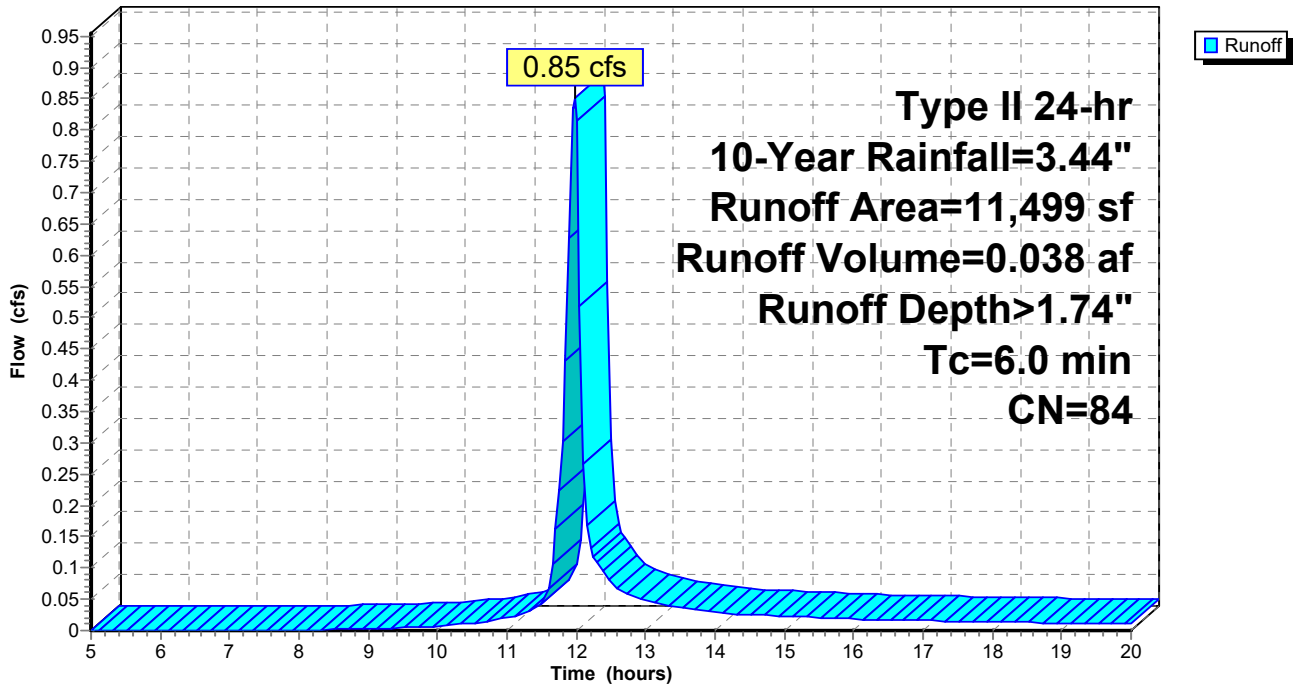
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-Year Rainfall=3.44"

Area (sf)	CN	Description
2,501	98	Paved parking, HSG D
8,998	80	>75% Grass cover, Good, HSG D
11,499	84	Weighted Average
8,998		78.25% Pervious Area
2,501		21.75% Impervious Area

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

Subcatchment 14S: Area #7

Hydrograph



Summary for Subcatchment 15S: Area #2

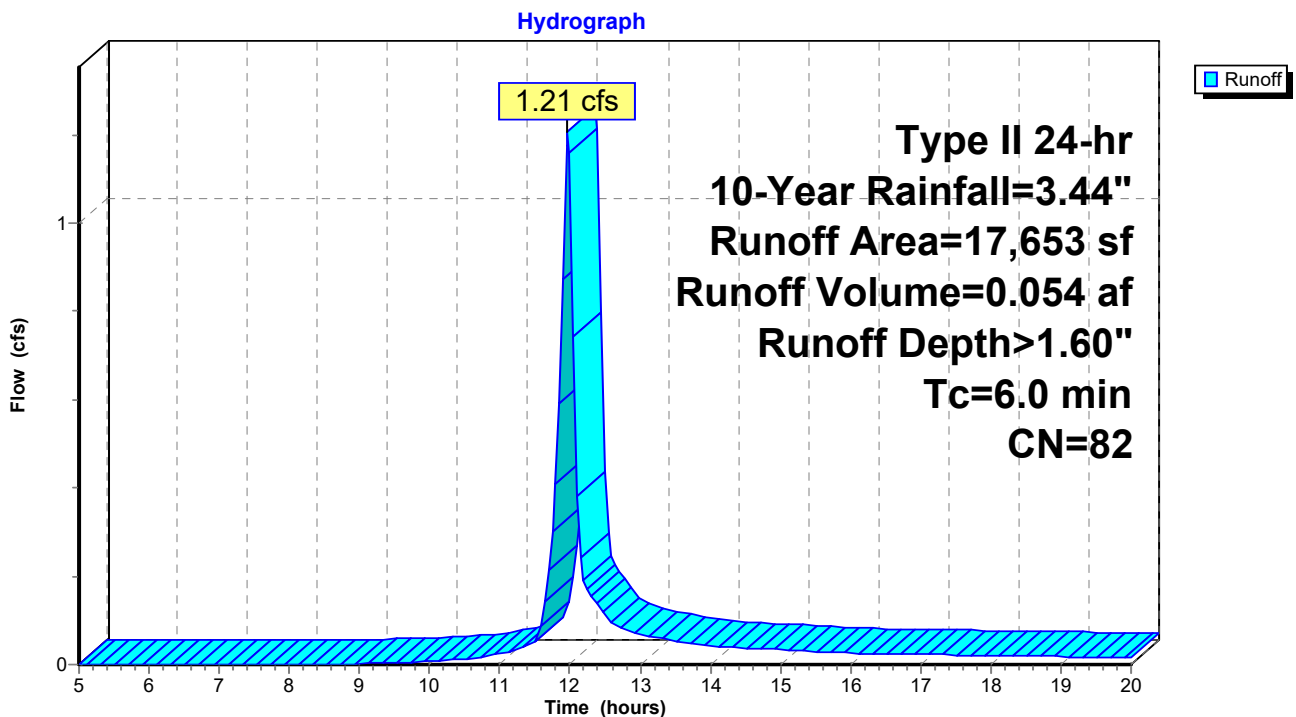
Runoff = 1.21 cfs @ 11.97 hrs, Volume= 0.054 af, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-Year Rainfall=3.44"

Area (sf)	CN	Description
1,532	98	Paved parking, HSG D
16,121	80	>75% Grass cover, Good, HSG D
17,653	82	Weighted Average
16,121		91.32% Pervious Area
1,532		8.68% Impervious Area

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

Subcatchment 15S: Area #2



Summary for Pond 4P: Cottages Bio #1

Inflow Area = 0.661 ac, 58.14% Impervious, Inflow Depth > 2.24" for 10-Year event
 Inflow = 2.62 cfs @ 11.97 hrs, Volume= 0.123 af
 Outflow = 2.54 cfs @ 11.99 hrs, Volume= 0.114 af, Atten= 3%, Lag= 1.5 min
 Primary = 2.54 cfs @ 11.99 hrs, Volume= 0.114 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 935.43' @ 11.99 hrs Surf.Area= 1,883 sf Storage= 704 cf

Plug-Flow detention time= 44.9 min calculated for 0.114 af (92% of inflow)
 Center-of-Mass det. time= 18.7 min (783.4 - 764.6)

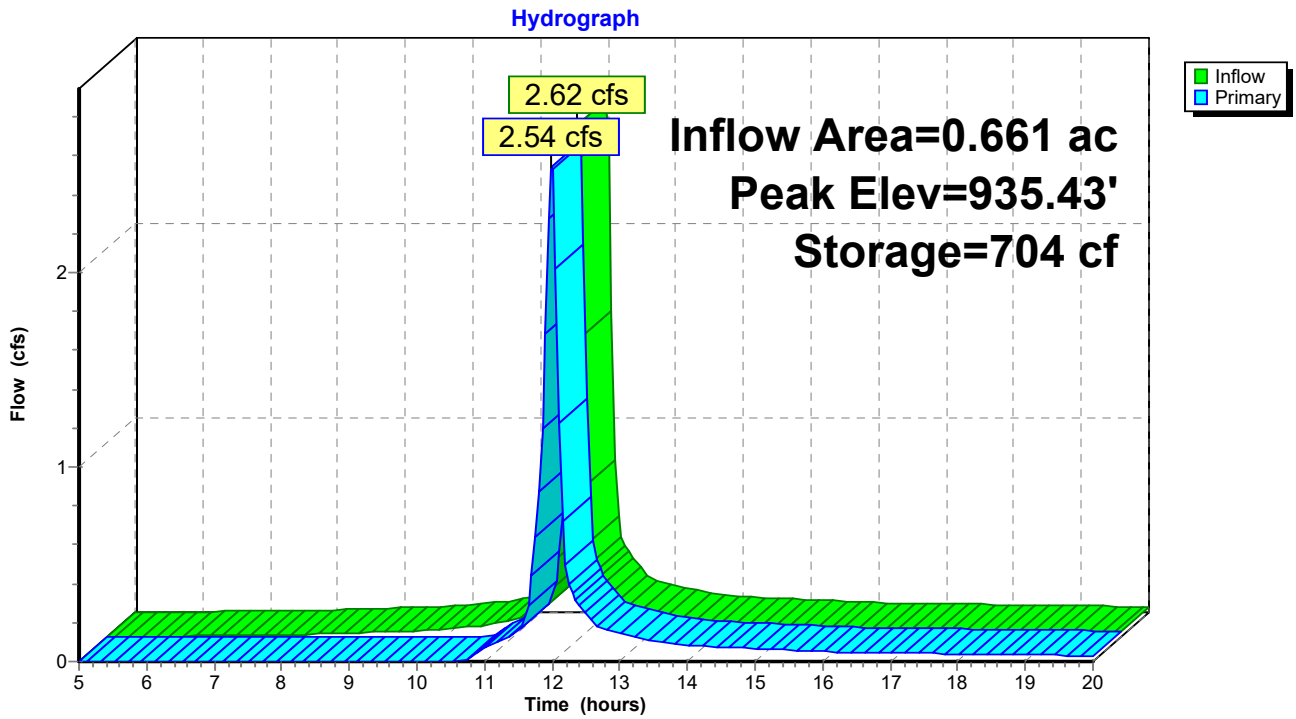
Volume	Invert	Avail.Storage	Storage Description
#1	935.00'	1,964 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
935.00	1,377	0	0
936.00	2,550	1,964	1,964

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	12.0" Round Culvert L= 79.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 931.00' / 930.00' S= 0.0127 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	935.25'	30.0" x 30.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	935.00'	0.250 in/hr Exfiltration over Surface area above 935.00' Conductivity to Groundwater Elevation = -8.00' Excluded Surface area = 1,377 sf

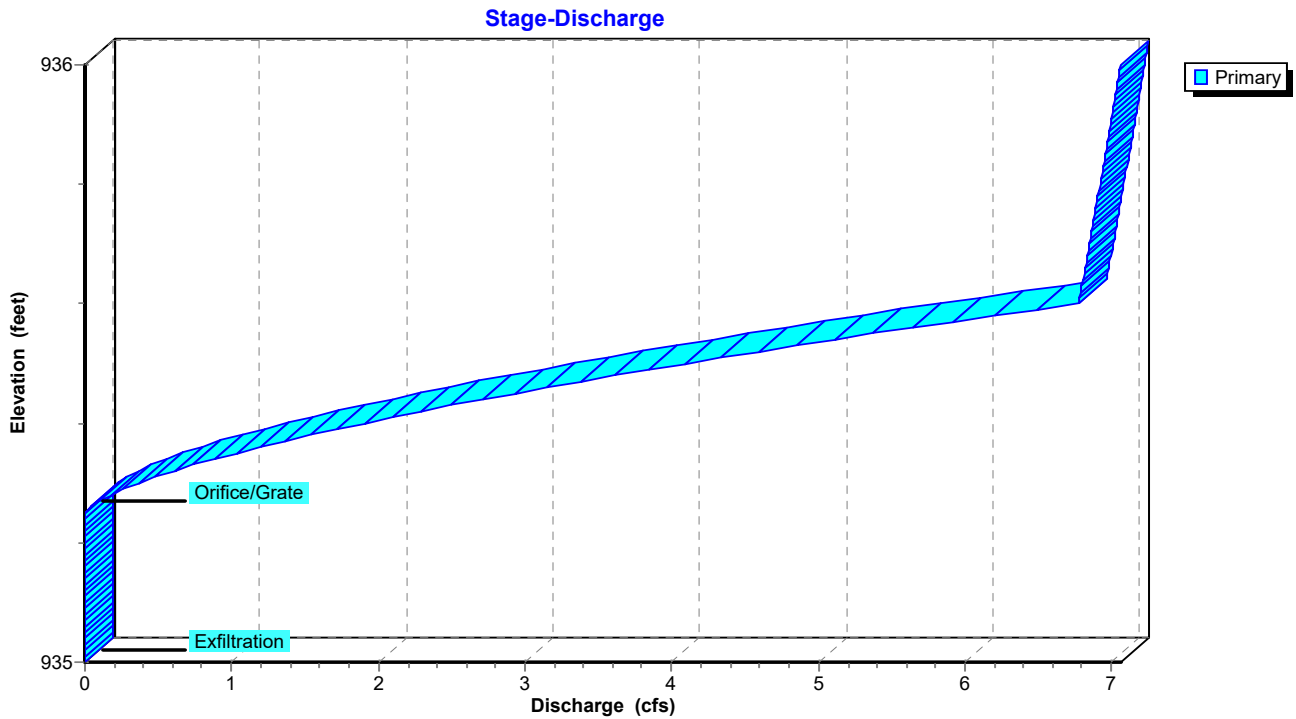
Primary OutFlow Max=2.48 cfs @ 11.99 hrs HW=935.43' (Free Discharge)

- 1=Culvert (Passes 2.48 cfs of 6.65 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 2.48 cfs @ 1.38 fps)
- 3=Exfiltration (Controls 0.00 cfs)

Pond 4P: Cottages Bio #1



Pond 4P: Cottages Bio #1



Summary for Pond 5P: Cottages Misc. Pond

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.402 ac, 71.35% Impervious, Inflow Depth > 2.51" for 10-Year event
 Inflow = 1.74 cfs @ 11.96 hrs, Volume= 0.084 af
 Outflow = 1.72 cfs @ 11.98 hrs, Volume= 0.084 af, Atten= 1%, Lag= 1.0 min
 Primary = 1.72 cfs @ 11.98 hrs, Volume= 0.084 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 935.30' @ 11.98 hrs Surf.Area= 449 sf Storage= 113 cf

Plug-Flow detention time= 2.2 min calculated for 0.084 af (100% of inflow)
 Center-of-Mass det. time= 1.6 min (755.1 - 753.4)

Volume	Invert	Avail.Storage	Storage Description
#1	935.00'	548 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
935.00	296	0	0
936.00	800	548	548

Device	Routing	Invert	Outlet Devices
#1	Primary	928.50'	12.0" Round Culvert L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 928.50' / 927.00' S= 0.0341 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	935.00'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Secondary	931.00'	12.0" Round Culvert L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 931.00' / 930.00' S= 0.0125 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#4	Device 3	935.50'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

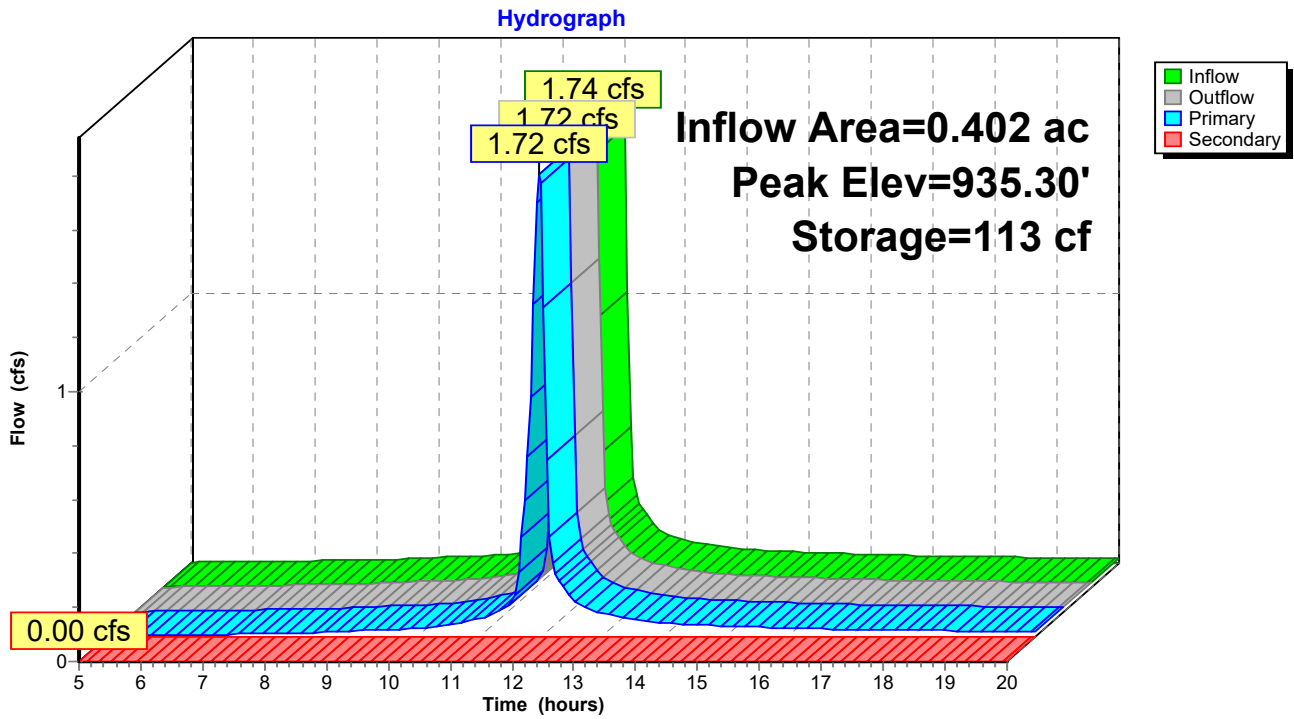
Primary OutFlow Max=1.66 cfs @ 11.98 hrs HW=935.30' (Free Discharge)

- ↑ 1=Culvert (Passes 1.66 cfs of 9.49 cfs potential flow)
- ↑ 2=Orifice/Grate (Weir Controls 1.66 cfs @ 1.78 fps)

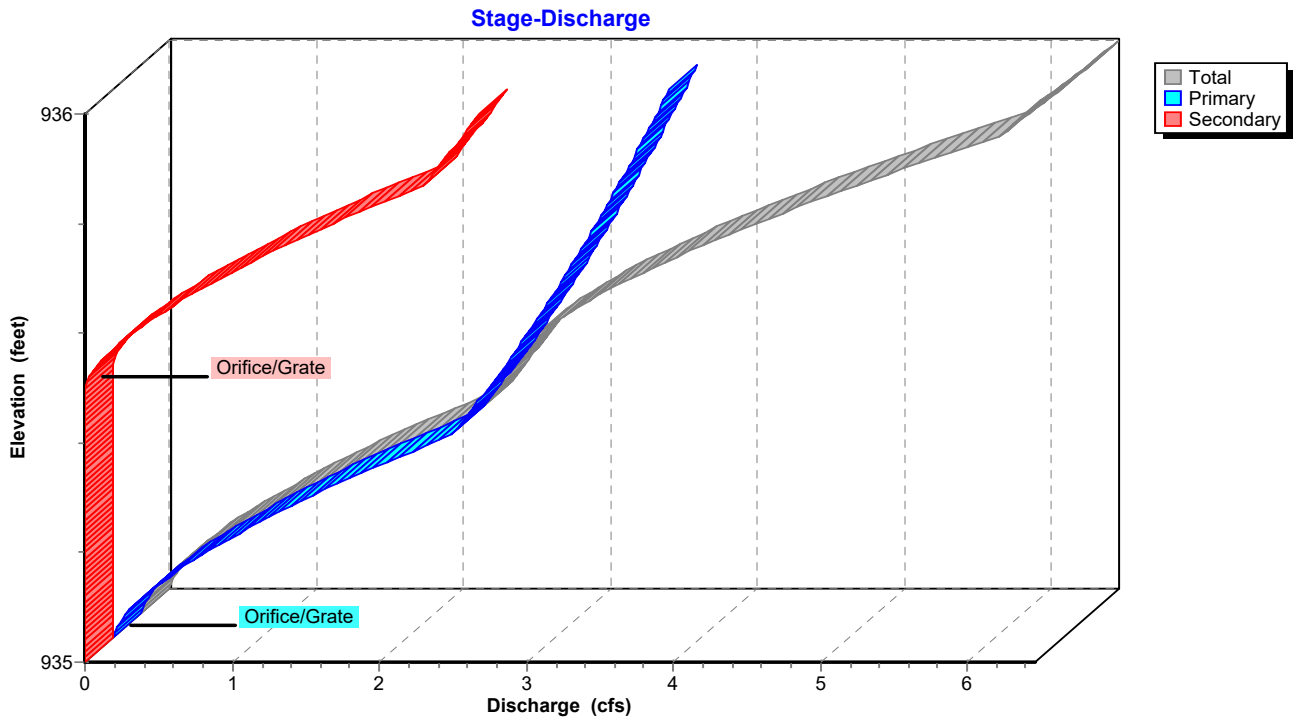
Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=935.00' (Free Discharge)

- ↑ 3=Culvert (Passes 0.00 cfs of 6.29 cfs potential flow)
- ↑ 4=Orifice/Grate (Controls 0.00 cfs)

Pond 5P: Cottages Misc. Pond



Pond 5P: Cottages Misc. Pond



Summary for Pond 6P: Cottages Bio #2

Inflow Area = 0.666 ac, 51.69% Impervious, Inflow Depth > 2.20" for 10-Year event
 Inflow = 2.57 cfs @ 11.98 hrs, Volume= 0.122 af
 Outflow = 2.34 cfs @ 12.01 hrs, Volume= 0.096 af, Atten= 9%, Lag= 2.1 min
 Primary = 2.34 cfs @ 12.01 hrs, Volume= 0.096 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 921.70' @ 12.01 hrs Surf.Area= 2,496 sf Storage= 1,636 cf

Plug-Flow detention time= 95.2 min calculated for 0.095 af (78% of inflow)
 Center-of-Mass det. time= 38.9 min (802.5 - 763.7)

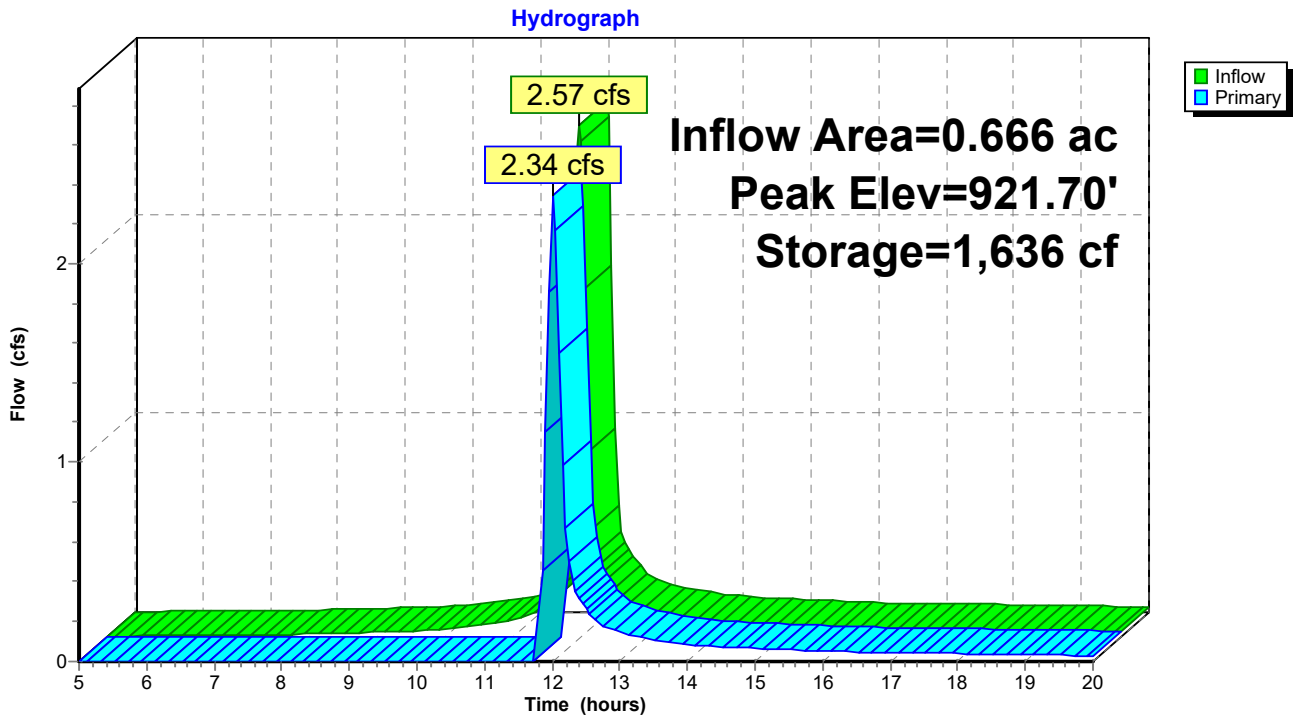
Volume	Invert	Avail.Storage	Storage Description
#1	921.00'	5,278 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
921.00	2,178	0	0
922.00	2,632	2,405	2,405
923.00	3,113	2,873	5,278

Device	Routing	Invert	Outlet Devices
#1	Primary	919.00'	24.0" Round Culvert L= 65.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 917.50' / 919.00' S= -0.0231 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	921.50'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	921.00'	0.250 in/hr Exfiltration over Surface area above 921.00' Conductivity to Groundwater Elevation = -7.00' Excluded Surface area = 2,178 sf

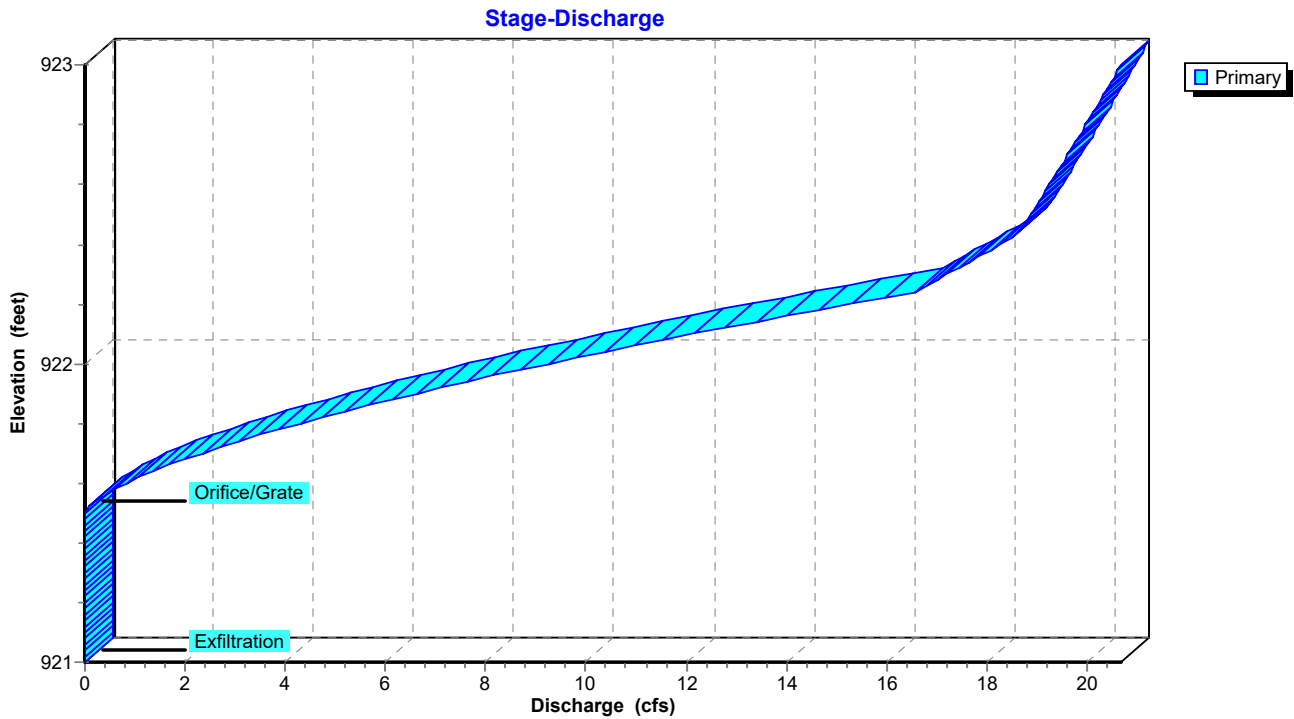
Primary OutFlow Max=2.28 cfs @ 12.01 hrs HW=921.70' (Free Discharge)

- 1=Culvert (Passes 2.28 cfs of 15.55 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 2.28 cfs @ 1.45 fps)
- 3=Exfiltration (Controls 0.00 cfs)

Pond 6P: Cottages Bio #2



Pond 6P: Cottages Bio #2



Summary for Pond 7P: Detention Pond

Inflow Area = 3.112 ac, 58.07% Impervious, Inflow Depth > 2.03" for 10-Year event
 Inflow = 11.96 cfs @ 11.99 hrs, Volume= 0.526 af
 Outflow = 2.38 cfs @ 12.21 hrs, Volume= 0.377 af, Atten= 80%, Lag= 13.4 min
 Primary = 2.38 cfs @ 12.21 hrs, Volume= 0.377 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 909.09' @ 12.21 hrs Surf.Area= 6,390 sf Storage= 11,262 cf

Plug-Flow detention time= 137.2 min calculated for 0.377 af (72% of inflow)
 Center-of-Mass det. time= 73.8 min (859.4 - 785.6)

Volume	Invert	Avail.Storage	Storage Description
#1	907.00'	39,370 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
907.00	4,416	0	0
908.00	5,328	4,872	4,872
909.00	6,297	5,813	10,685
910.00	7,323	6,810	17,495
911.00	8,406	7,865	25,359
912.00	9,544	8,975	34,334
912.50	10,600	5,036	39,370

Device	Routing	Invert	Outlet Devices
#1	Primary	907.00'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 907.00' / 906.00' S= 0.1000 1' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	907.00'	3.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	908.50'	30.0" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Secondary	910.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 2.50 Width (feet) 2.00 12.00

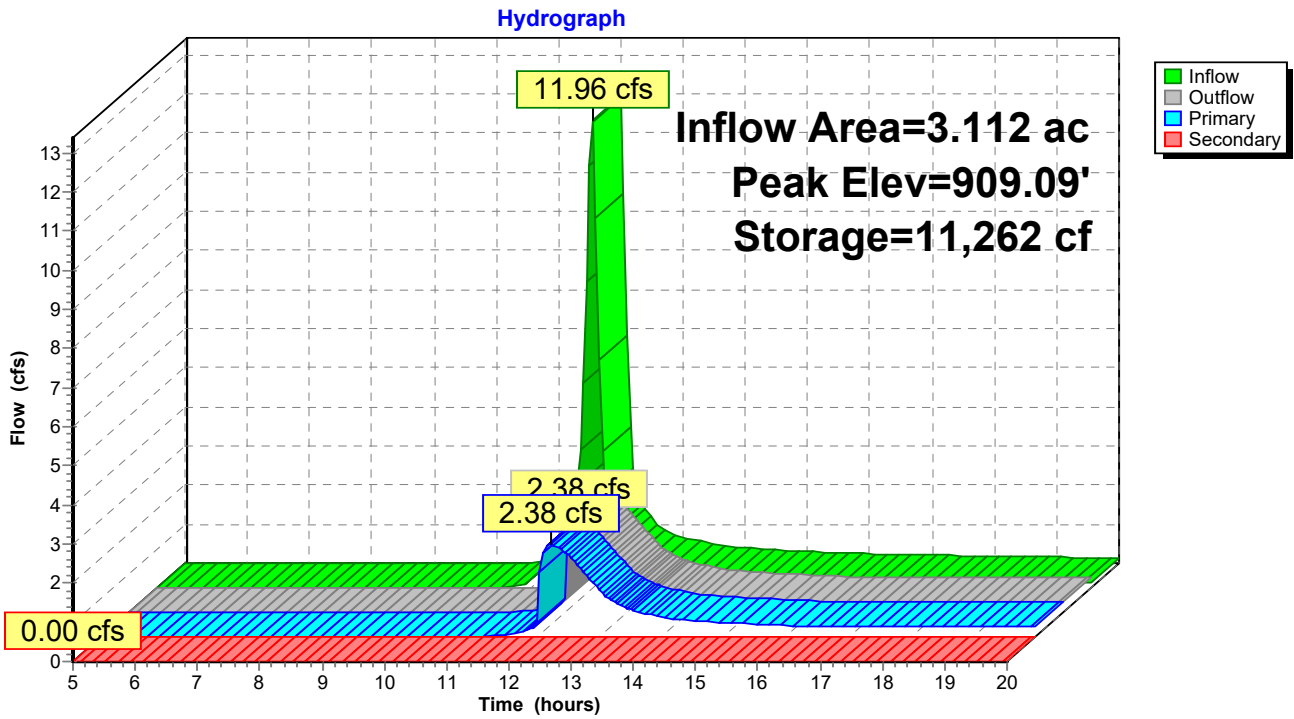
Primary OutFlow Max=2.37 cfs @ 12.21 hrs HW=909.09' (Free Discharge)

- ↑ 1=Culvert (Passes 2.37 cfs of 4.77 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.33 cfs @ 6.75 fps)
- ↑ 3=Orifice/Grate (Orifice Controls 2.04 cfs @ 3.27 fps)

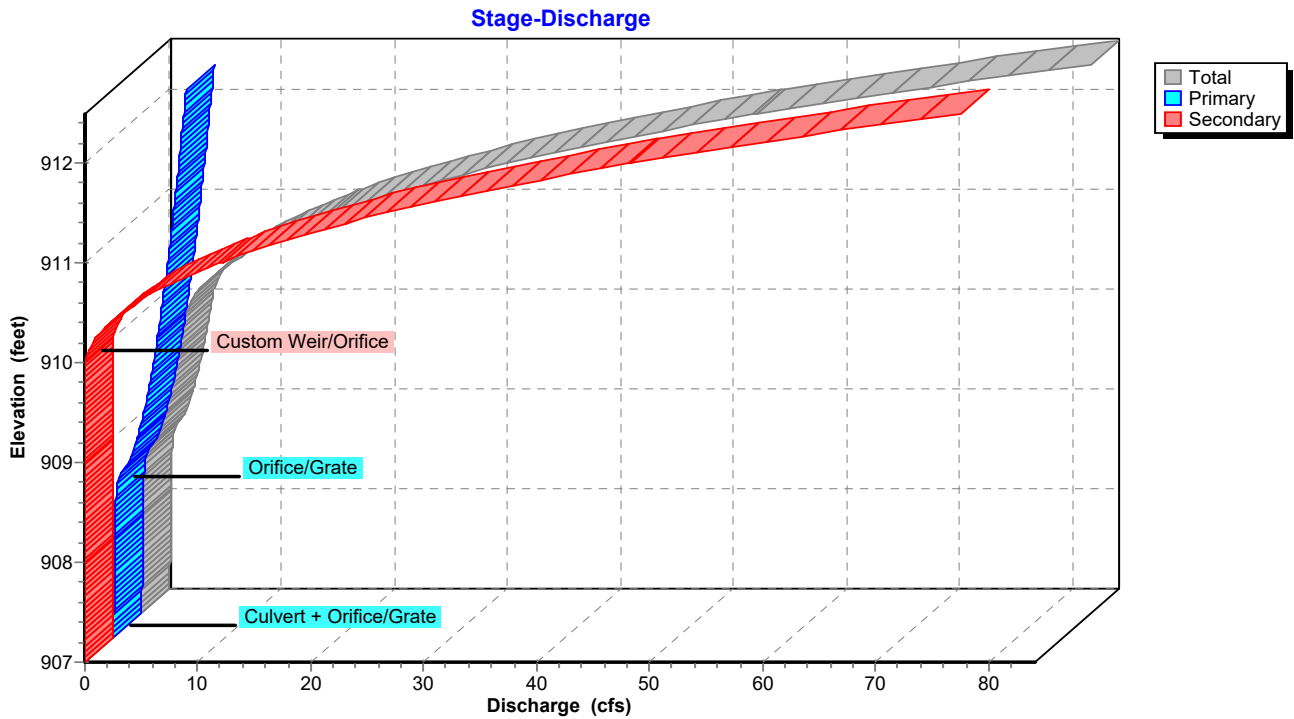
Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=907.00' (Free Discharge)

- ↑ 4=Custom Weir/Orifice (Controls 0.00 cfs)

Pond 7P: Detention Pond



Pond 7P: Detention Pond



Summary for Pond 9P: Bioretention Area #1

[82] Warning: Early inflow requires earlier time span

Inflow Area = 1.380 ac, 75.62% Impervious, Inflow Depth > 2.60" for 10-Year event
 Inflow = 6.10 cfs @ 11.96 hrs, Volume= 0.300 af
 Outflow = 5.95 cfs @ 11.99 hrs, Volume= 0.263 af, Atten= 2%, Lag= 1.4 min
 Primary = 5.95 cfs @ 11.99 hrs, Volume= 0.263 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 920.70' @ 11.99 hrs Surf.Area= 3,370 sf Storage= 2,237 cf

Plug-Flow detention time= 70.7 min calculated for 0.263 af (88% of inflow)
 Center-of-Mass det. time= 30.6 min (780.1 - 749.5)

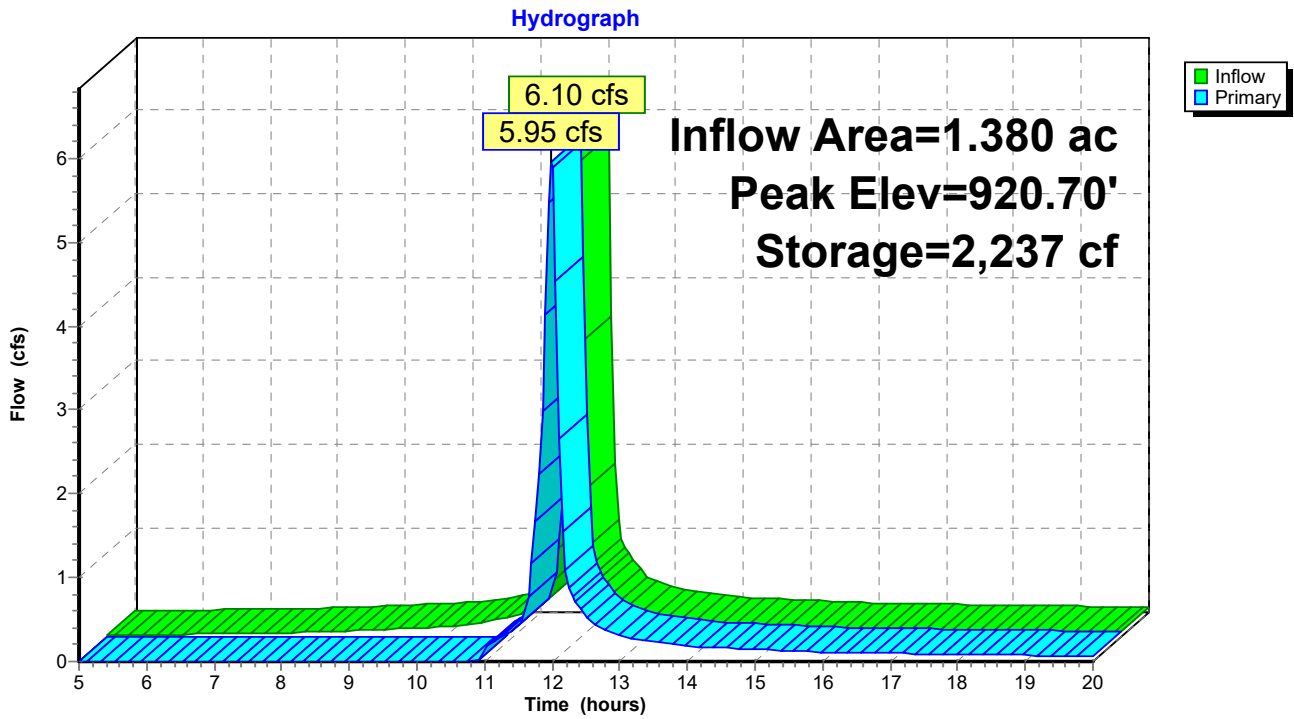
Volume	Invert	Avail.Storage	Storage Description
#1	920.00'	5,095 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
920.00	3,000	0	0
921.00	3,527	3,264	3,264
921.50	3,799	1,832	5,095

Device	Routing	Invert	Outlet Devices
#1	Primary	916.50'	24.0" Round Culvert L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 916.50' / 912.00' S= 0.0360 ' S= 0.0360 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	920.50'	30.0" x 30.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	920.00'	0.250 in/hr Exfiltration over Surface area above 920.00' Conductivity to Groundwater Elevation = -7.00' Excluded Surface area = 3,000 sf

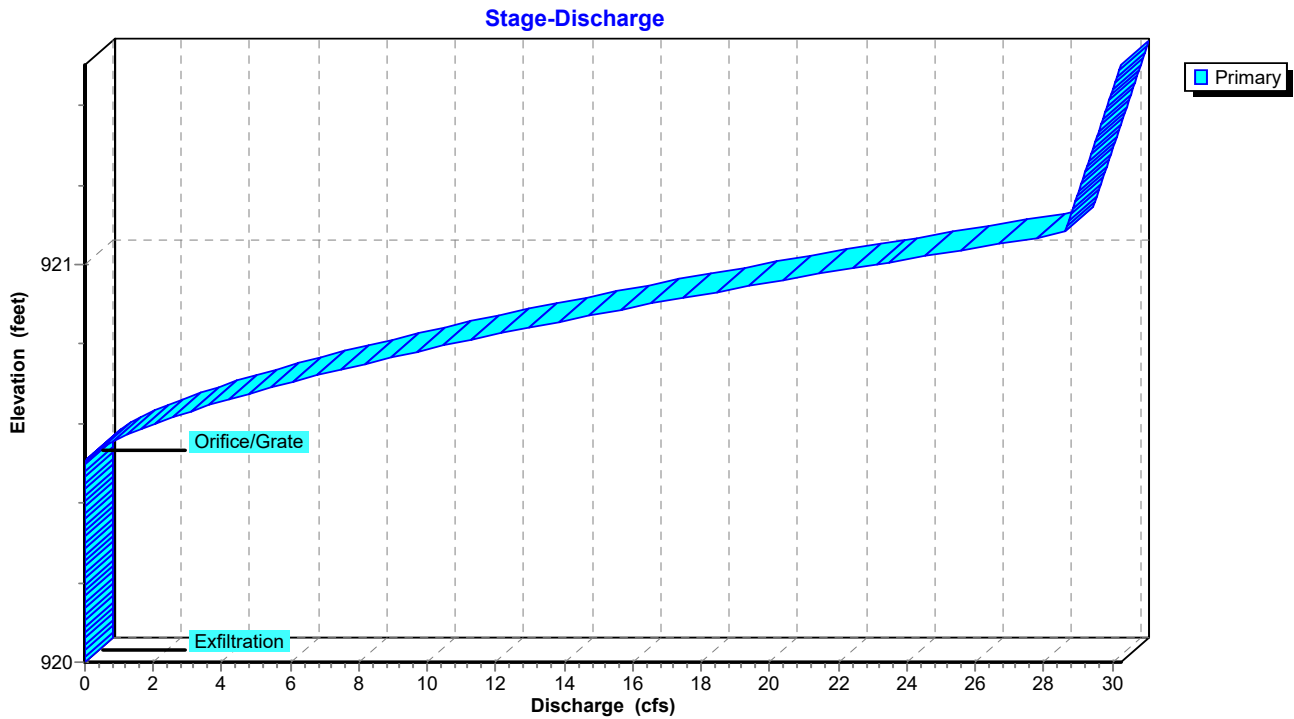
Primary OutFlow Max=5.78 cfs @ 11.99 hrs HW=920.70' (Free Discharge)

- 1=Culvert (Passes 5.78 cfs of 27.05 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 5.77 cfs @ 1.46 fps)
- 3=Exfiltration (Controls 0.00 cfs)

Pond 9P: Bioretention Area #1



Pond 9P: Bioretention Area #1

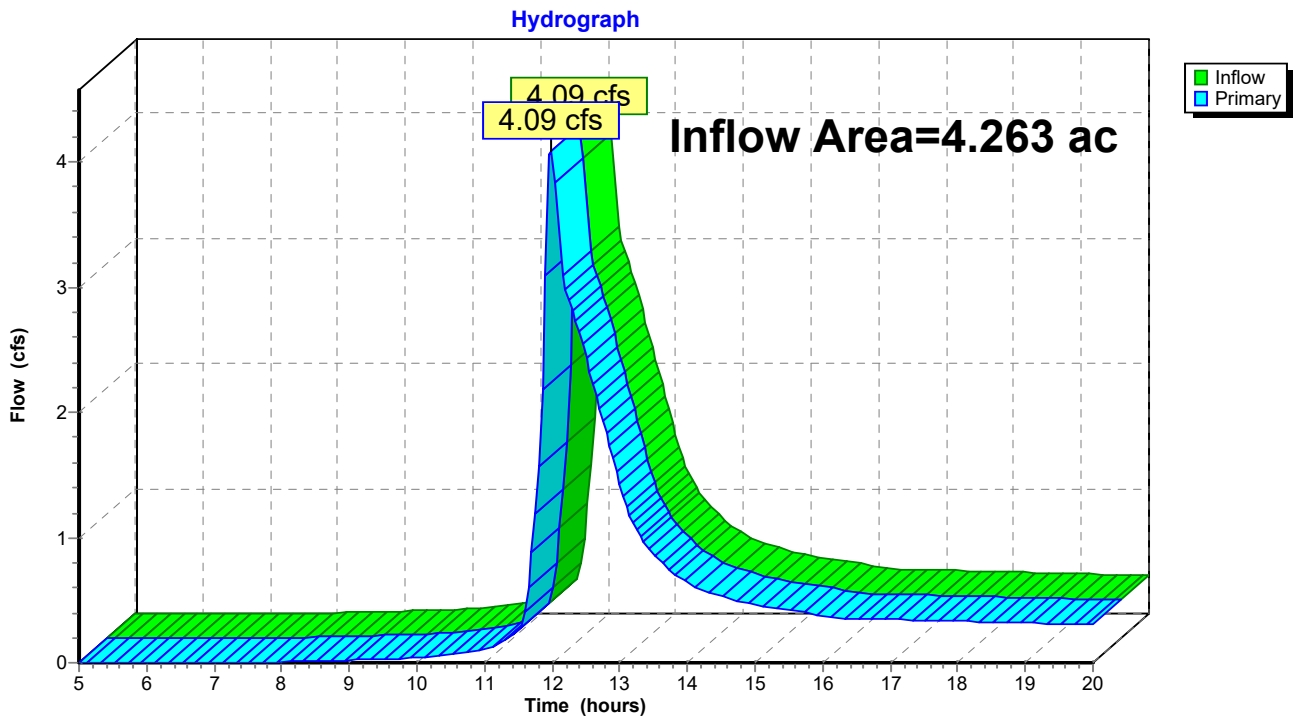


Summary for Link 1L: Analysis Point #1

Inflow Area = 4.263 ac, 50.09% Impervious, Inflow Depth > 1.56" for 10-Year event
Inflow = 4.09 cfs @ 11.99 hrs, Volume= 0.554 af
Primary = 4.09 cfs @ 11.99 hrs, Volume= 0.554 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: Analysis Point #1

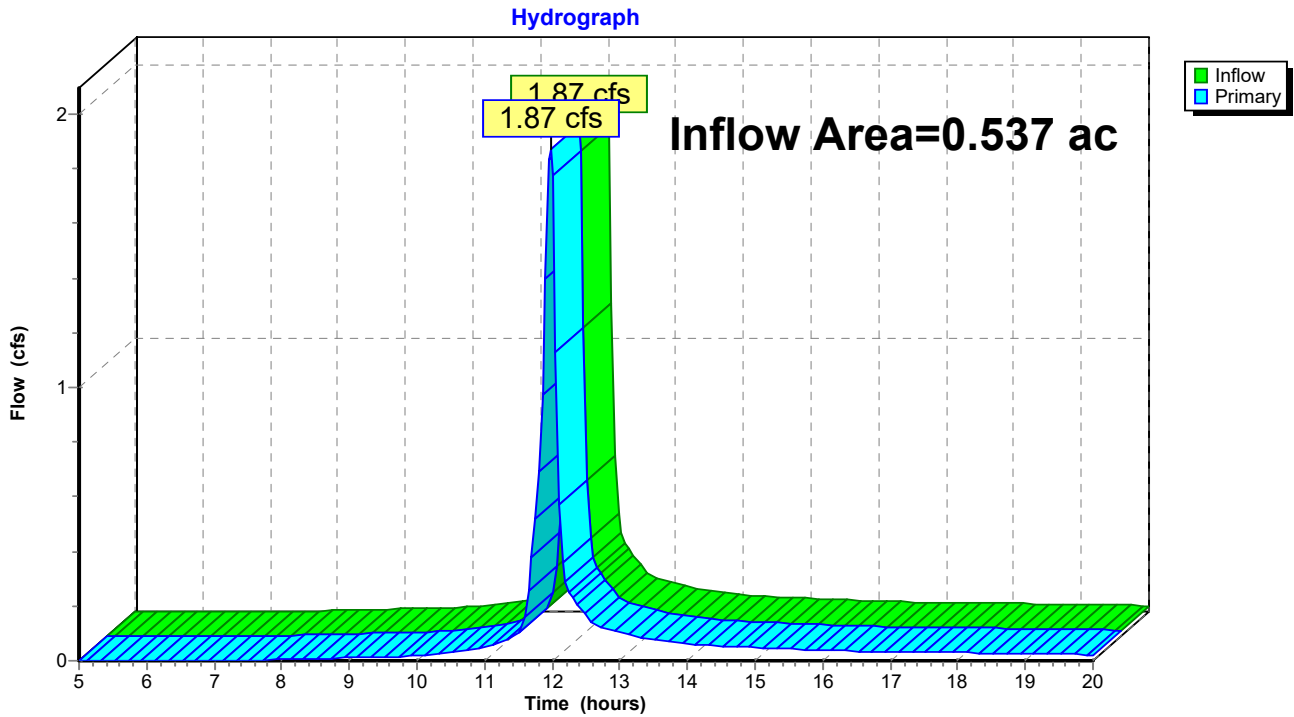


Summary for Link 13L: Analysis Point #2

Inflow Area = 0.537 ac, 34.49% Impervious, Inflow Depth > 1.90" for 10-Year event
Inflow = 1.87 cfs @ 11.97 hrs, Volume= 0.085 af
Primary = 1.87 cfs @ 11.97 hrs, Volume= 0.085 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 13L: Analysis Point #2



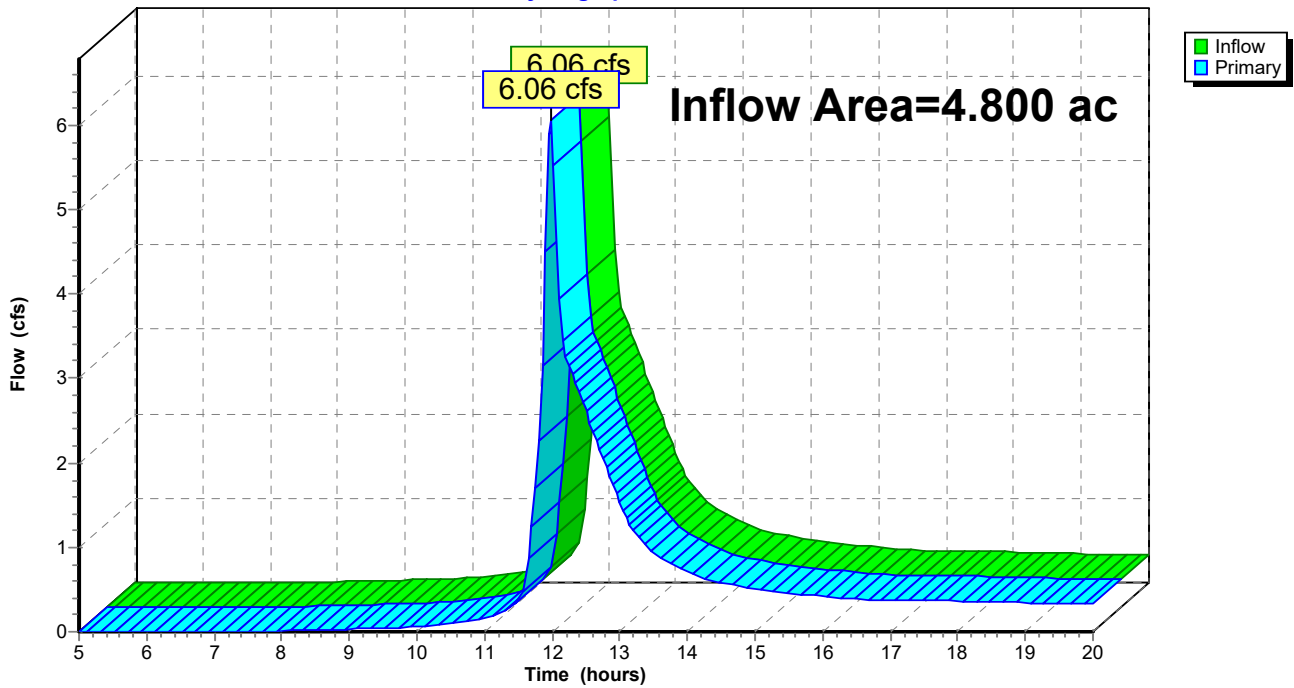
Summary for Link 16L: AP #3

Inflow Area = 4.800 ac, 48.35% Impervious, Inflow Depth > 1.60" for 10-Year event
Inflow = 6.06 cfs @ 11.97 hrs, Volume= 0.639 af
Primary = 6.06 cfs @ 11.97 hrs, Volume= 0.639 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 16L: AP #3

Hydrograph



Proposed 2020 03-10

Type II 24-hr 100-Year Rainfall=5.95"

Prepared by {enter your company name here}

Printed 3/12/2020

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Page 75

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: Area #5	Runoff Area=28,781 sf 58.14% Impervious Runoff Depth>4.50" Tc=6.0 min CN=90 Runoff=5.05 cfs 0.248 af
Subcatchment 3S: Area #6	Runoff Area=17,509 sf 71.35% Impervious Runoff Depth>4.80" Tc=6.0 min CN=93 Runoff=3.19 cfs 0.161 af
Subcatchment 8S: Area #1	Runoff Area=60,121 sf 75.62% Impervious Runoff Depth>4.90" Tc=6.0 min CN=94 Runoff=11.07 cfs 0.563 af
Subcatchment 10S: Area #4	Runoff Area=23,397 sf 34.49% Impervious Runoff Depth>4.09" Tc=6.0 min CN=86 Runoff=3.84 cfs 0.183 af
Subcatchment 11S: Area #8	Runoff Area=40,870 sf 32.00% Impervious Runoff Depth>4.09" Tc=6.0 min CN=86 Runoff=6.71 cfs 0.319 af
Subcatchment 12S: Area #3	Runoff Area=9,258 sf 13.15% Impervious Runoff Depth>3.67" Tc=6.0 min CN=82 Runoff=1.40 cfs 0.065 af
Subcatchment 14S: Area #7	Runoff Area=11,499 sf 21.75% Impervious Runoff Depth>3.88" Tc=6.0 min CN=84 Runoff=1.82 cfs 0.085 af
Subcatchment 15S: Area #2	Runoff Area=17,653 sf 8.68% Impervious Runoff Depth>3.67" Tc=6.0 min CN=82 Runoff=2.68 cfs 0.124 af
Pond 4P: Cottages Bio #1	Peak Elev=935.53' Storage=901 cf Inflow=5.05 cfs 0.248 af Outflow=4.92 cfs 0.238 af
Pond 5P: Cottages Misc. Pond	Peak Elev=935.57' Storage=250 cf Inflow=3.19 cfs 0.161 af Primary=2.85 cfs 0.160 af Secondary=0.18 cfs 0.001 af Outflow=3.03 cfs 0.161 af
Pond 6P: Cottages Bio #2	Peak Elev=921.81' Storage=1,903 cf Inflow=4.64 cfs 0.245 af Outflow=4.43 cfs 0.218 af
Pond 7P: Detention Pond	Peak Elev=910.60' Storage=22,106 cf Inflow=22.96 cfs 1.108 af Primary=4.67 cfs 0.841 af Secondary=4.53 cfs 0.091 af Outflow=9.20 cfs 0.931 af
Pond 9P: Bioretention Area #1	Peak Elev=920.80' Storage=2,578 cf Inflow=11.07 cfs 0.563 af Outflow=10.88 cfs 0.526 af
Link 1L: Analysis Point #1	Inflow=12.15 cfs 1.316 af Primary=12.15 cfs 1.316 af
Link 13L: Analysis Point #2	Inflow=3.84 cfs 0.183 af Primary=3.84 cfs 0.183 af
Link 16L: AP #3	Inflow=15.70 cfs 1.499 af Primary=15.70 cfs 1.499 af

Proposed 2020 03-10

Type II 24-hr 100-Year Rainfall=5.95"

Prepared by {enter your company name here}

Printed 3/12/2020

HydroCAD® 10.00-25 s/n 10755 © 2019 HydroCAD Software Solutions LLC

Page 76

Total Runoff Area = 4.800 ac Runoff Volume = 1.748 af Average Runoff Depth = 4.37"
51.65% Pervious = 2.479 ac 48.35% Impervious = 2.321 ac

Summary for Subcatchment 2S: Area #5

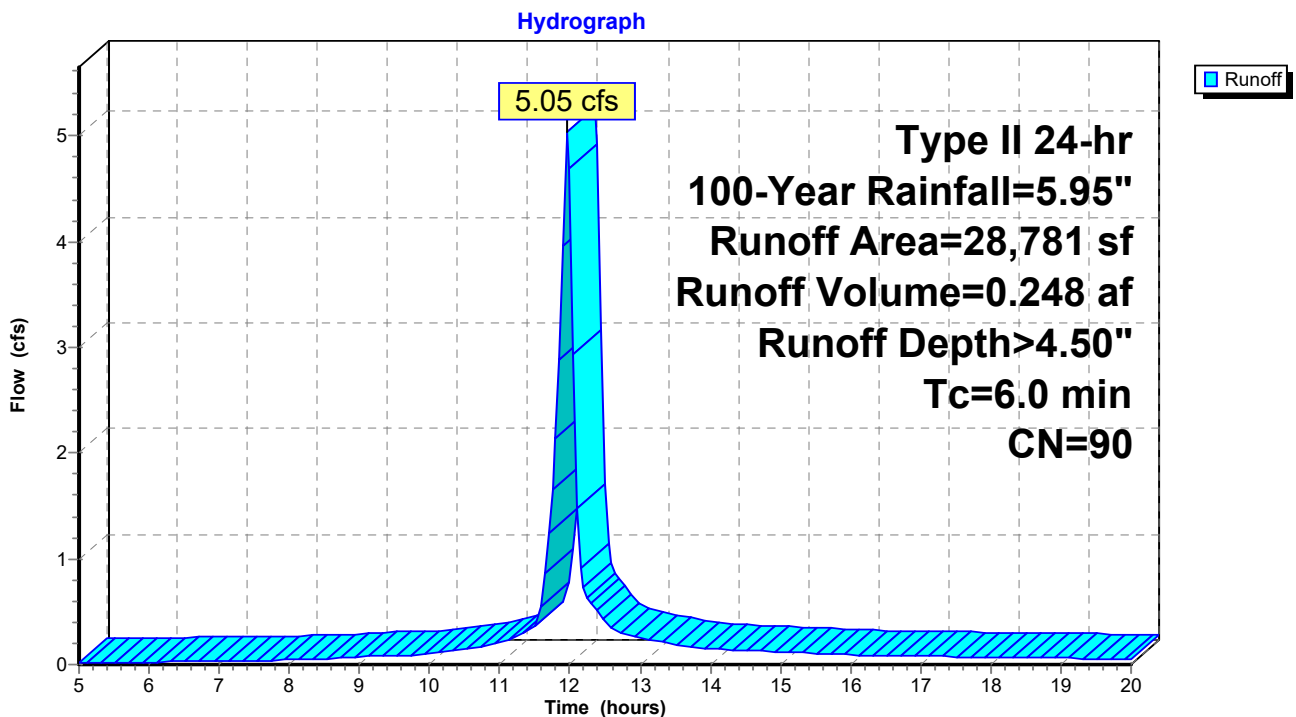
Runoff = 5.05 cfs @ 11.96 hrs, Volume= 0.248 af, Depth> 4.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 100-Year Rainfall=5.95"

Area (sf)	CN	Description
16,732	98	Paved parking, HSG D
12,049	80	>75% Grass cover, Good, HSG D
28,781	90	Weighted Average
12,049		41.86% Pervious Area
16,732		58.14% Impervious Area

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

Subcatchment 2S: Area #5



Summary for Subcatchment 3S: Area #6

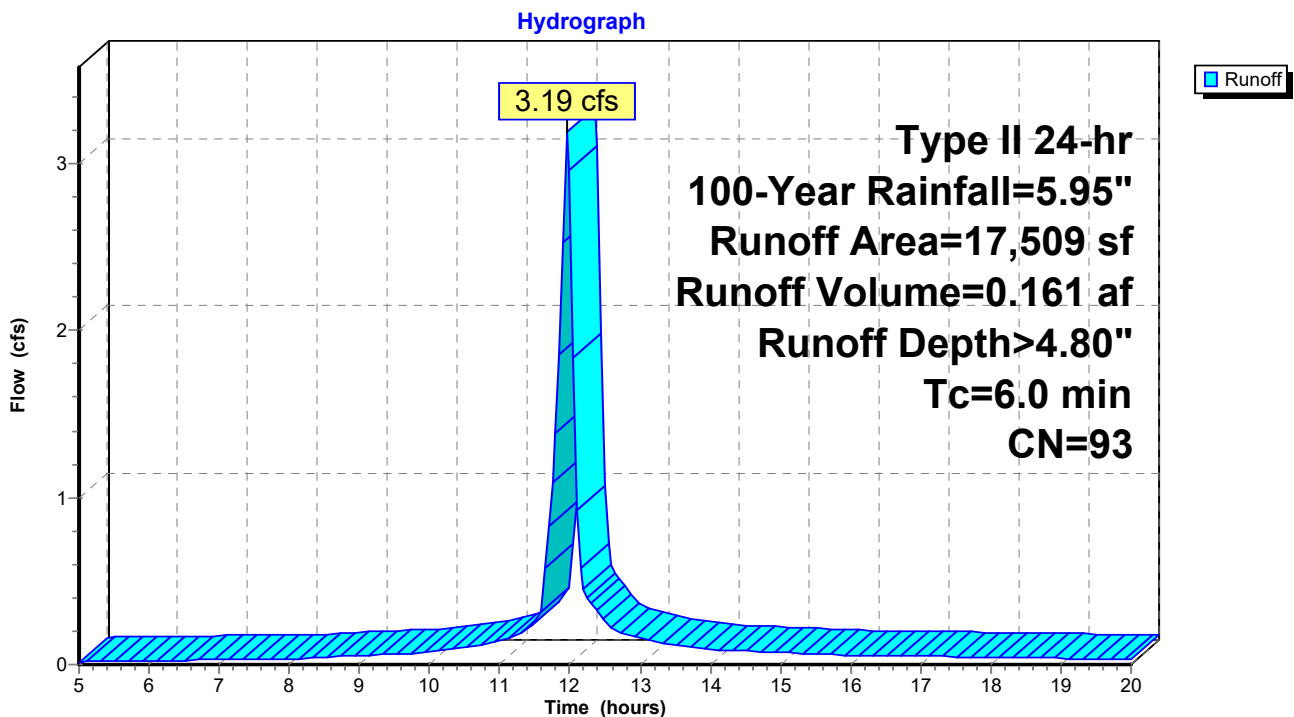
Runoff = 3.19 cfs @ 11.96 hrs, Volume= 0.161 af, Depth> 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 100-Year Rainfall=5.95"

Area (sf)	CN	Description
12,493	98	Paved parking, HSG D
5,016	80	>75% Grass cover, Good, HSG D
17,509	93	Weighted Average
5,016		28.65% Pervious Area
12,493		71.35% Impervious Area

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

Subcatchment 3S: Area #6



Summary for Subcatchment 8S: Area #1

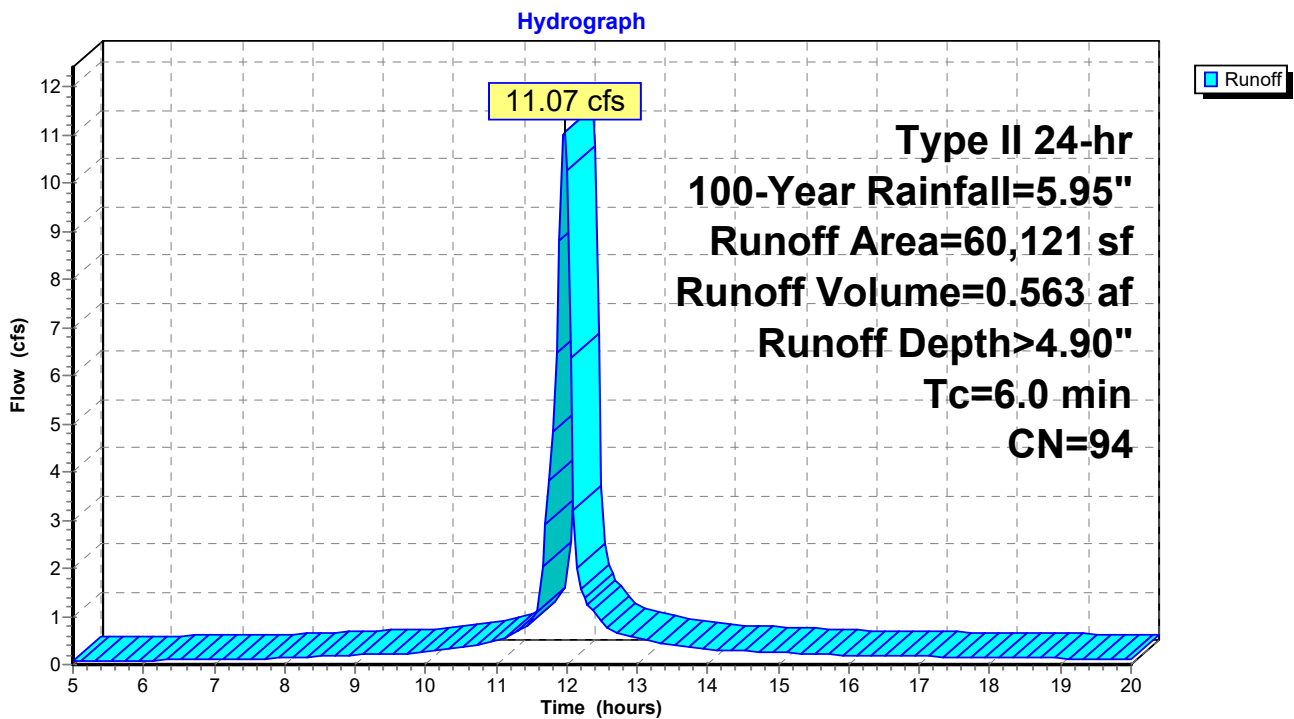
Runoff = 11.07 cfs @ 11.96 hrs, Volume= 0.563 af, Depth> 4.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 100-Year Rainfall=5.95"

Area (sf)	CN	Description
45,462	98	Paved parking, HSG D
14,659	80	>75% Grass cover, Good, HSG D
60,121	94	Weighted Average
14,659		24.38% Pervious Area
45,462		75.62% Impervious Area

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

Subcatchment 8S: Area #1



Summary for Subcatchment 10S: Area #4

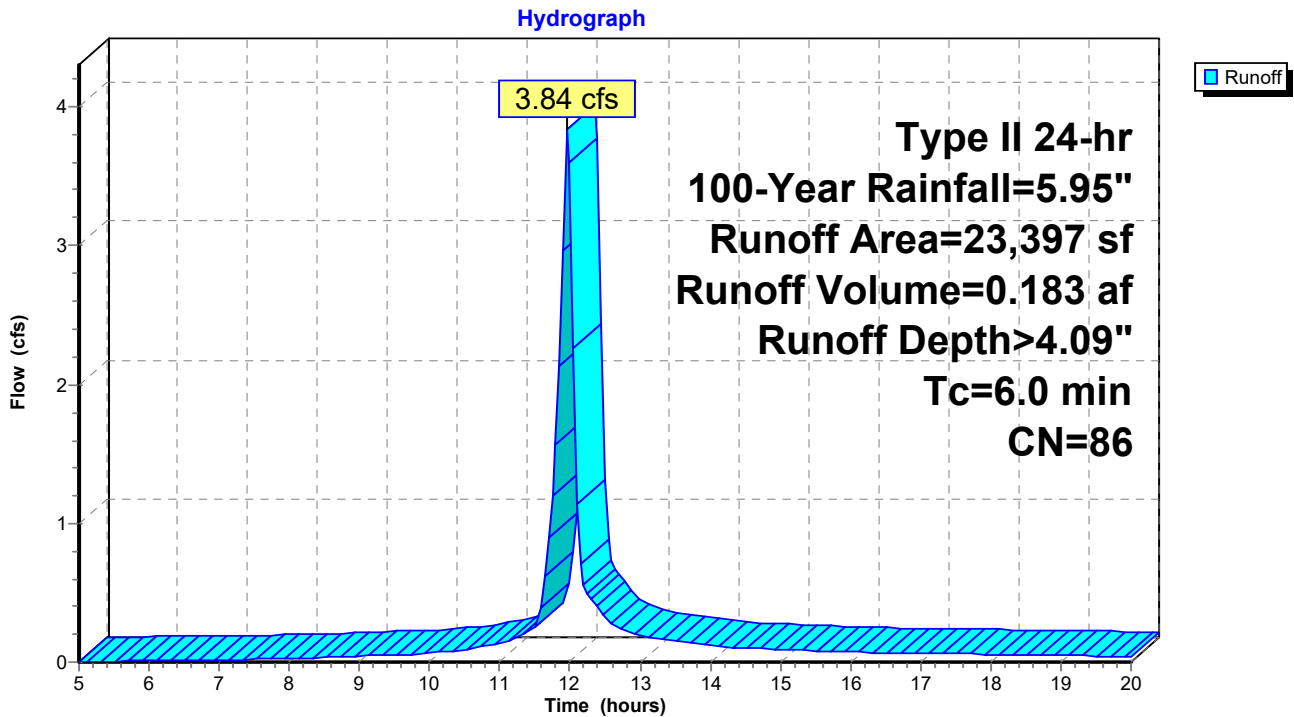
Runoff = 3.84 cfs @ 11.97 hrs, Volume= 0.183 af, Depth> 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 100-Year Rainfall=5.95"

Area (sf)	CN	Description
8,069	98	Paved parking, HSG D
13,824	80	>75% Grass cover, Good, HSG D
* 1,504	80	
23,397	86	Weighted Average
15,328		65.51% Pervious Area
8,069		34.49% Impervious Area

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

Subcatchment 10S: Area #4



Summary for Subcatchment 11S: Area #8

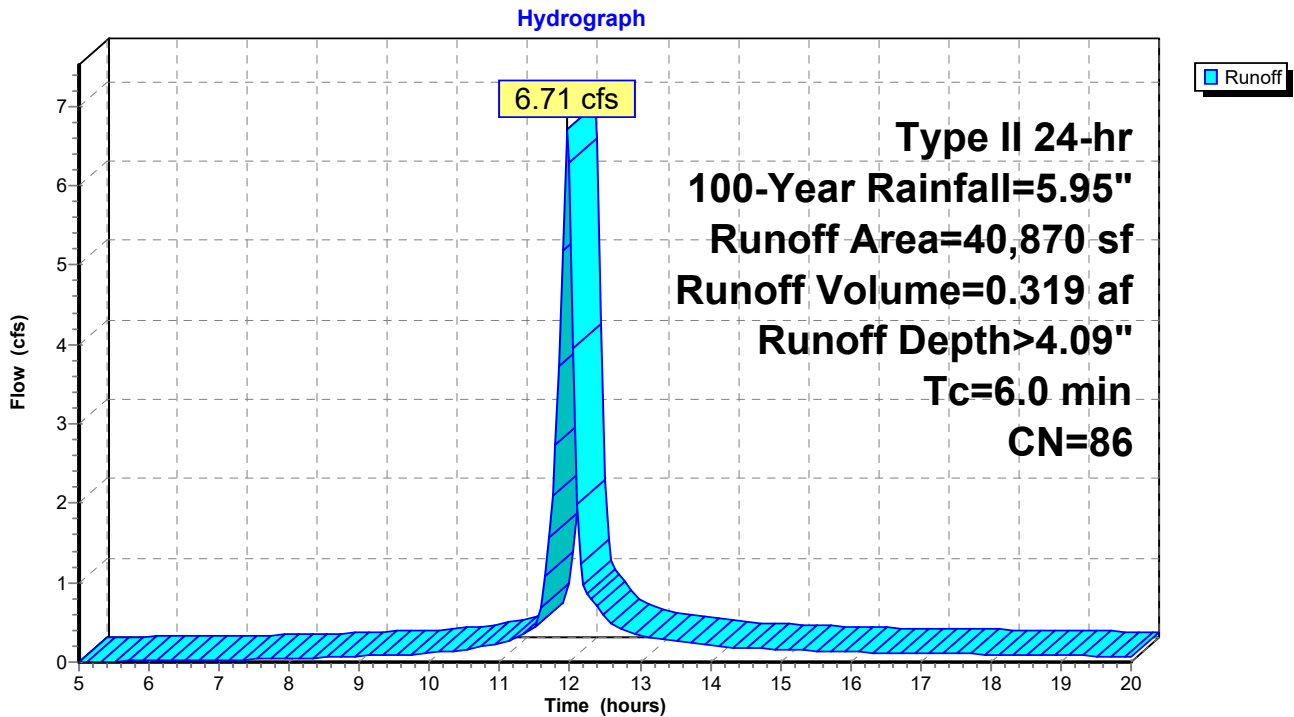
Runoff = 6.71 cfs @ 11.97 hrs, Volume= 0.319 af, Depth> 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 100-Year Rainfall=5.95"

Area (sf)	CN	Description
13,078	98	Paved parking, HSG D
26,289	80	>75% Grass cover, Good, HSG D
* 1,503	80	
40,870	86	Weighted Average
27,792		68.00% Pervious Area
13,078		32.00% Impervious Area

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

Subcatchment 11S: Area #8



Summary for Subcatchment 12S: Area #3

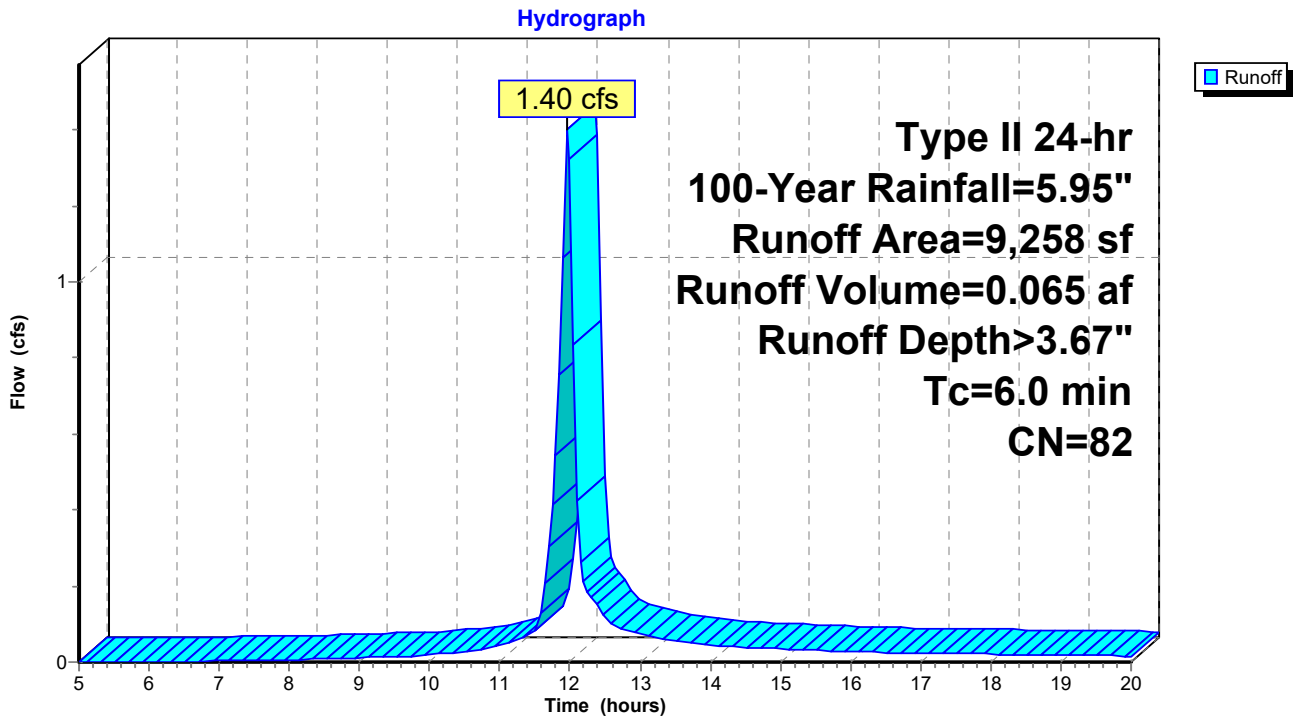
Runoff = 1.40 cfs @ 11.97 hrs, Volume= 0.065 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 100-Year Rainfall=5.95"

Area (sf)	CN	Description
1,217	98	Paved parking, HSG D
6,538	80	>75% Grass cover, Good, HSG D
* 1,503	80	
9,258	82	Weighted Average
8,041		86.85% Pervious Area
1,217		13.15% Impervious Area

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

Subcatchment 12S: Area #3



Summary for Subcatchment 14S: Area #7

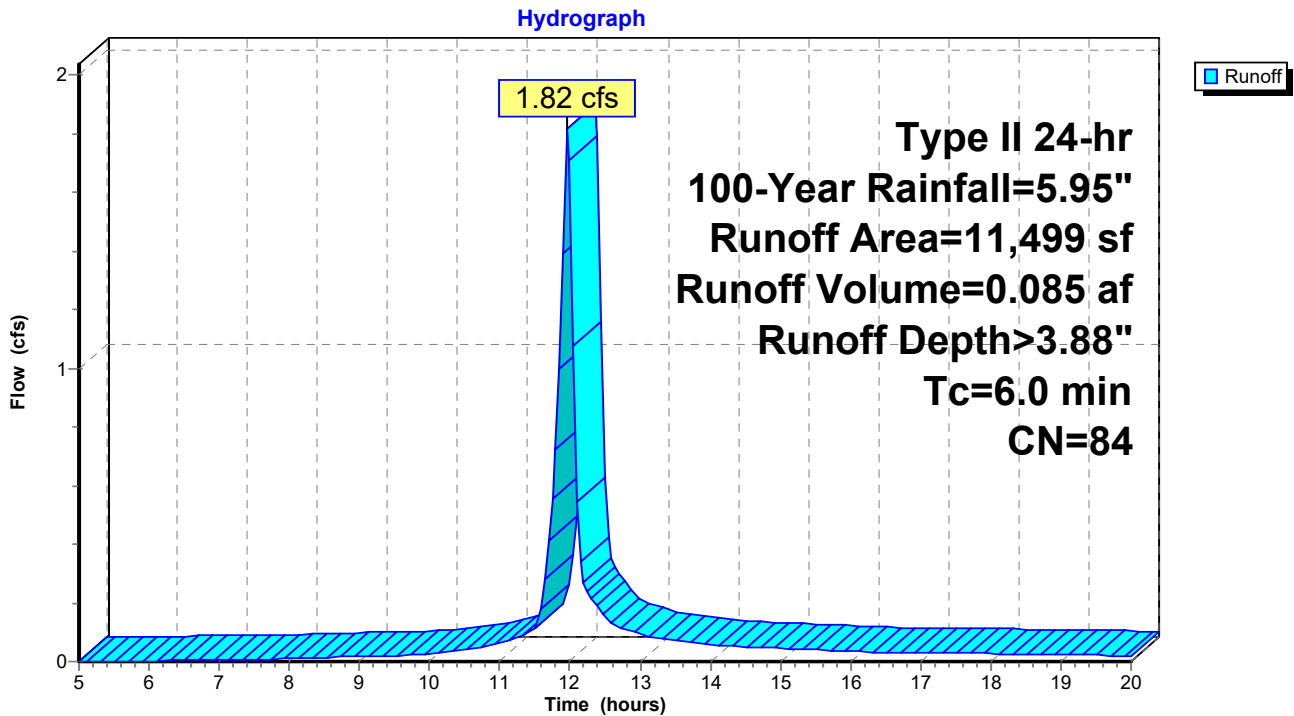
Runoff = 1.82 cfs @ 11.97 hrs, Volume= 0.085 af, Depth> 3.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 100-Year Rainfall=5.95"

Area (sf)	CN	Description
2,501	98	Paved parking, HSG D
8,998	80	>75% Grass cover, Good, HSG D
11,499	84	Weighted Average
8,998		78.25% Pervious Area
2,501		21.75% Impervious Area

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

Subcatchment 14S: Area #7



Summary for Subcatchment 15S: Area #2

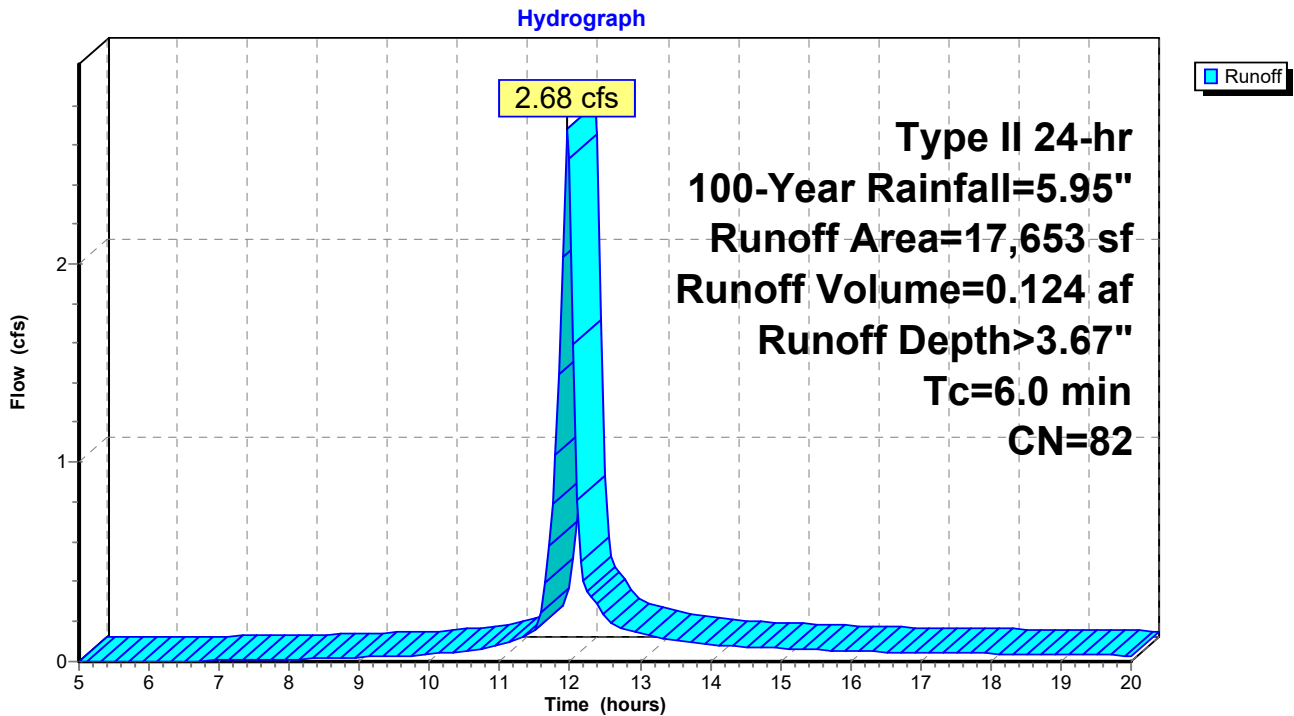
Runoff = 2.68 cfs @ 11.97 hrs, Volume= 0.124 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.95"

Area (sf)	CN	Description
1,532	98	Paved parking, HSG D
16,121	80	>75% Grass cover, Good, HSG D
17,653	82	Weighted Average
16,121		91.32% Pervious Area
1,532		8.68% Impervious Area

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

Subcatchment 15S: Area #2



Summary for Pond 4P: Cottages Bio #1

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.661 ac, 58.14% Impervious, Inflow Depth > 4.50" for 100-Year event
 Inflow = 5.05 cfs @ 11.96 hrs, Volume= 0.248 af
 Outflow = 4.92 cfs @ 11.99 hrs, Volume= 0.238 af, Atten= 2%, Lag= 1.4 min
 Primary = 4.92 cfs @ 11.99 hrs, Volume= 0.238 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 935.53' @ 11.99 hrs Surf.Area= 2,002 sf Storage= 901 cf

Plug-Flow detention time= 29.5 min calculated for 0.238 af (96% of inflow)
 Center-of-Mass det. time= 14.6 min (764.2 - 749.6)

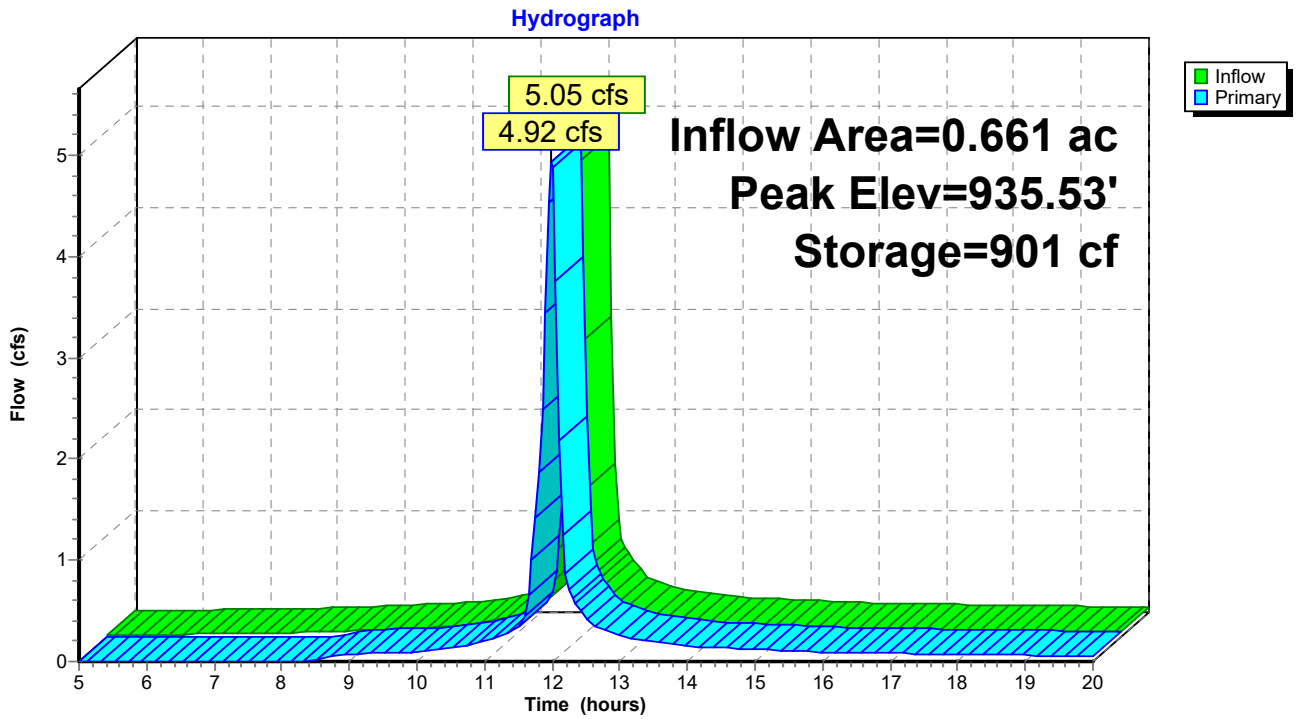
Volume	Invert	Avail.Storage	Storage Description
#1	935.00'	1,964 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
935.00	1,377	0	0
936.00	2,550	1,964	1,964

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	12.0" Round Culvert L= 79.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 931.00' / 930.00' S= 0.0127 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	935.25'	30.0" x 30.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	935.00'	0.250 in/hr Exfiltration over Surface area above 935.00' Conductivity to Groundwater Elevation = -8.00' Excluded Surface area = 1,377 sf

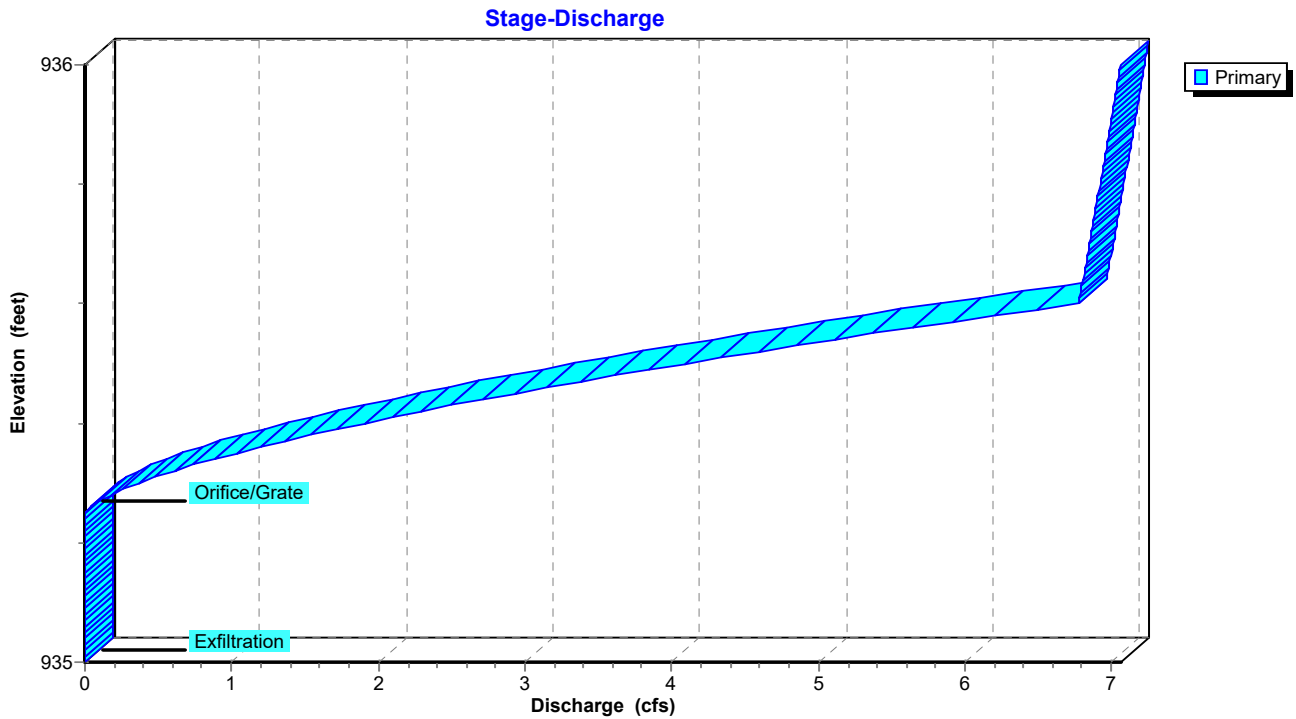
Primary OutFlow Max=4.78 cfs @ 11.99 hrs HW=935.53' (Free Discharge)

- ↑ 1=Culvert (Passes 4.78 cfs of 6.72 cfs potential flow)
- ↑ 2=Orifice/Grate (Weir Controls 4.78 cfs @ 1.72 fps)
- ↑ 3=Exfiltration (Controls 0.00 cfs)

Pond 4P: Cottages Bio #1



Pond 4P: Cottages Bio #1



Summary for Pond 5P: Cottages Misc. Pond

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.402 ac, 71.35% Impervious, Inflow Depth > 4.80" for 100-Year event
 Inflow = 3.19 cfs @ 11.96 hrs, Volume= 0.161 af
 Outflow = 3.03 cfs @ 12.00 hrs, Volume= 0.161 af, Atten= 5%, Lag= 2.0 min
 Primary = 2.85 cfs @ 11.99 hrs, Volume= 0.160 af
 Secondary = 0.18 cfs @ 12.00 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 935.57' @ 11.99 hrs Surf.Area= 582 sf Storage= 250 cf

Plug-Flow detention time= 2.0 min calculated for 0.160 af (100% of inflow)
 Center-of-Mass det. time= 1.5 min (743.4 - 741.9)

Volume	Invert	Avail.Storage	Storage Description
#1	935.00'	548 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
935.00	296	0	0
936.00	800	548	548

Device	Routing	Invert	Outlet Devices
#1	Primary	928.50'	12.0" Round Culvert L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 928.50' / 927.00' S= 0.0341 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	935.00'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Secondary	931.00'	12.0" Round Culvert L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 931.00' / 930.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#4	Device 3	935.50'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

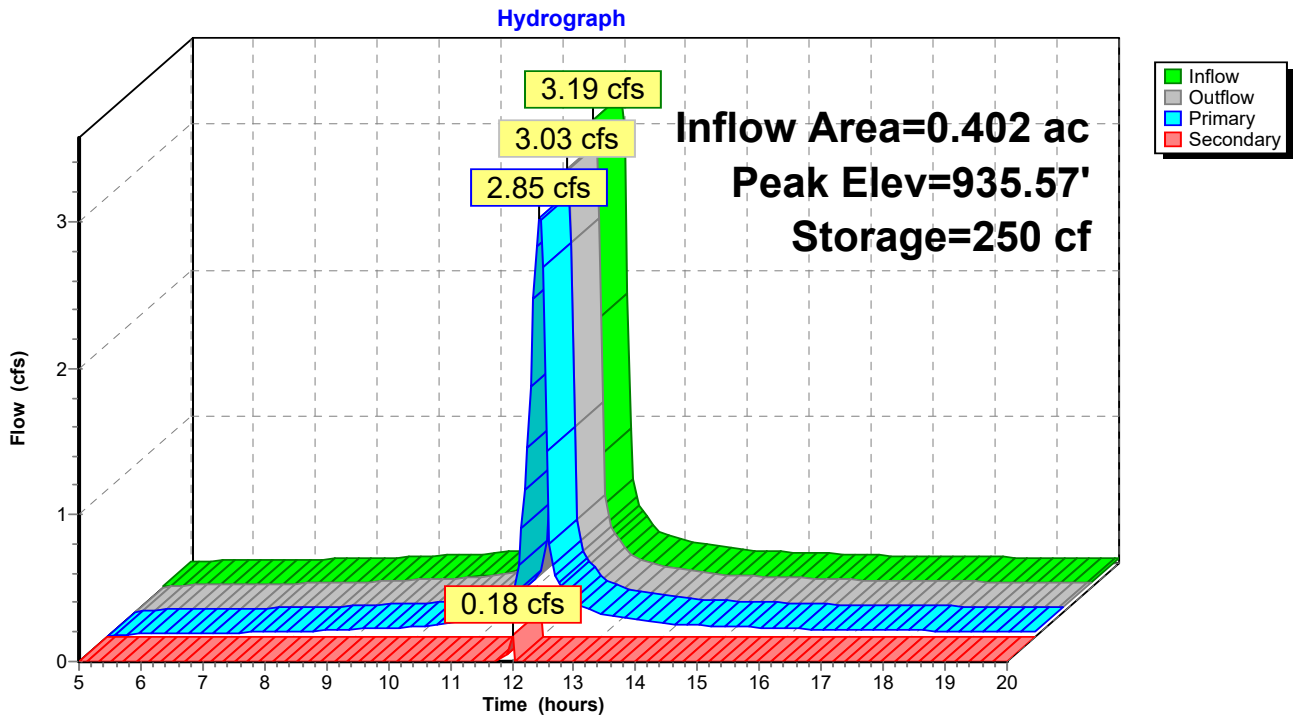
Primary OutFlow Max=2.82 cfs @ 11.99 hrs HW=935.56' (Free Discharge)

- ↑ 1=Culvert (Passes 2.82 cfs of 9.68 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 2.82 cfs @ 3.59 fps)

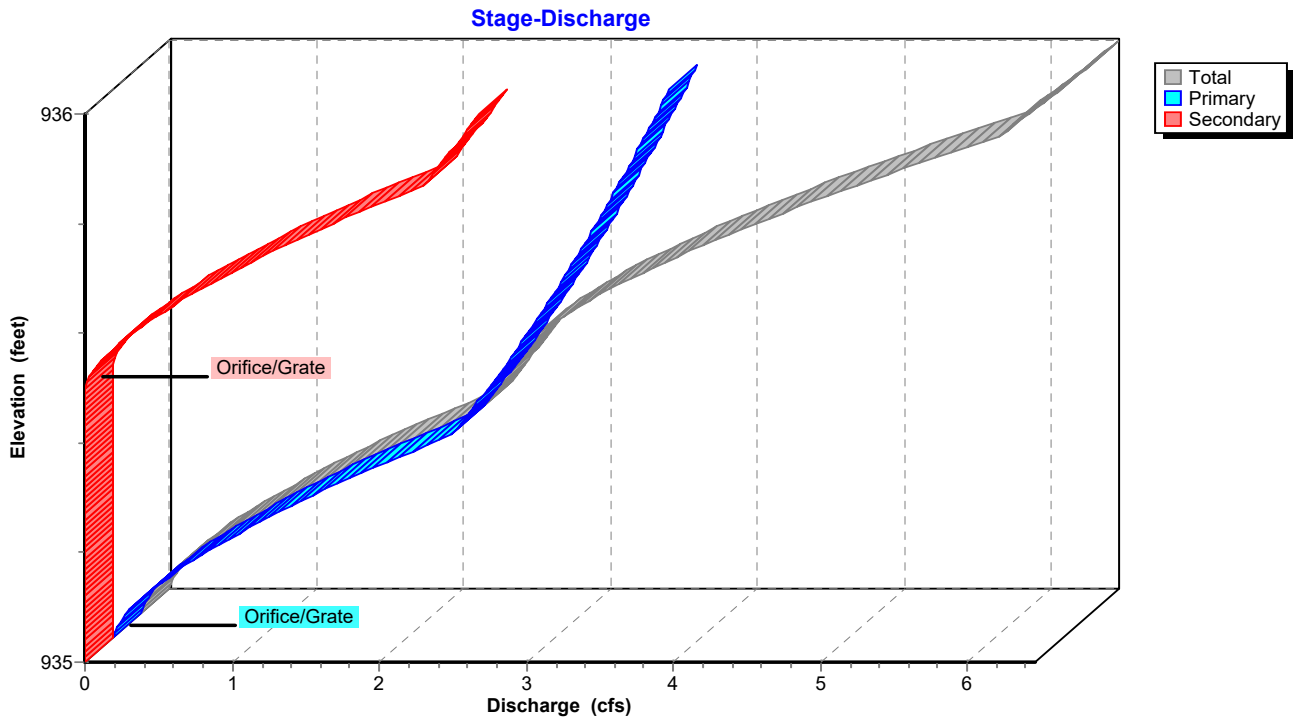
Secondary OutFlow Max=0.18 cfs @ 12.00 hrs HW=935.57' (Free Discharge)

- ↑ 3=Culvert (Passes 0.18 cfs of 6.72 cfs potential flow)
- ↑ 4=Orifice/Grate (Weir Controls 0.18 cfs @ 0.84 fps)

Pond 5P: Cottages Misc. Pond



Pond 5P: Cottages Misc. Pond



Summary for Pond 6P: Cottages Bio #2

Inflow Area = 0.666 ac, 51.69% Impervious, Inflow Depth > 4.42" for 100-Year event
 Inflow = 4.64 cfs @ 11.98 hrs, Volume= 0.245 af
 Outflow = 4.43 cfs @ 12.01 hrs, Volume= 0.218 af, Atten= 5%, Lag= 1.6 min
 Primary = 4.43 cfs @ 12.01 hrs, Volume= 0.218 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 921.81' @ 12.01 hrs Surf.Area= 2,544 sf Storage= 1,903 cf

Plug-Flow detention time= 66.8 min calculated for 0.217 af (89% of inflow)
 Center-of-Mass det. time= 30.3 min (781.1 - 750.8)

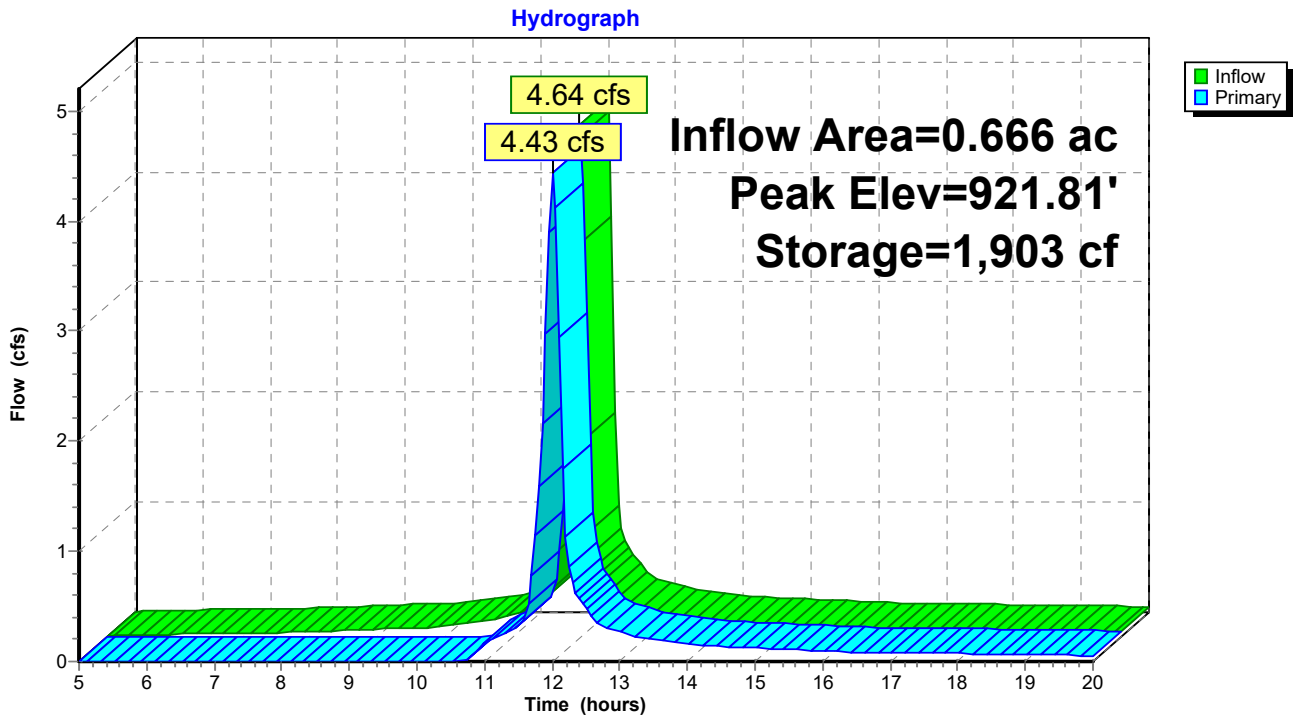
Volume	Invert	Avail.Storage	Storage Description
#1	921.00'	5,278 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
921.00	2,178	0	0
922.00	2,632	2,405	2,405
923.00	3,113	2,873	5,278

Device	Routing	Invert	Outlet Devices
#1	Primary	919.00'	24.0" Round Culvert L= 65.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 917.50' / 919.00' S= -0.0231 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	921.50'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	921.00'	0.250 in/hr Exfiltration over Surface area above 921.00' Conductivity to Groundwater Elevation = -7.00' Excluded Surface area = 2,178 sf

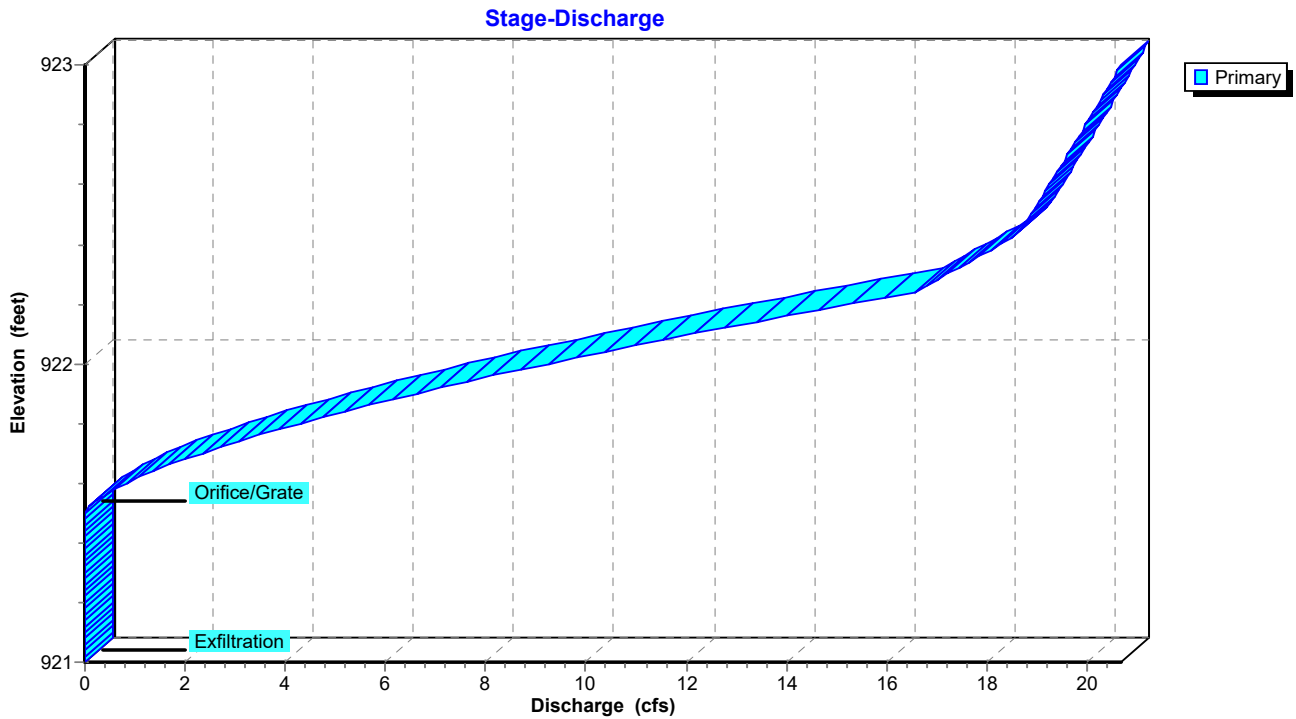
Primary OutFlow Max=4.38 cfs @ 12.01 hrs HW=921.80' (Free Discharge)

- 1=Culvert (Passes 4.38 cfs of 16.04 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 4.38 cfs @ 1.80 fps)
- 3=Exfiltration (Controls 0.00 cfs)

Pond 6P: Cottages Bio #2



Pond 6P: Cottages Bio #2



Summary for Pond 7P: Detention Pond

Inflow Area = 3.112 ac, 58.07% Impervious, Inflow Depth > 4.27" for 100-Year event
 Inflow = 22.96 cfs @ 11.99 hrs, Volume= 1.108 af
 Outflow = 9.20 cfs @ 12.12 hrs, Volume= 0.931 af, Atten= 60%, Lag= 8.0 min
 Primary = 4.67 cfs @ 12.12 hrs, Volume= 0.841 af
 Secondary = 4.53 cfs @ 12.12 hrs, Volume= 0.091 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 910.60' @ 12.12 hrs Surf.Area= 7,976 sf Storage= 22,106 cf

Plug-Flow detention time= 92.4 min calculated for 0.928 af (84% of inflow)
 Center-of-Mass det. time= 47.1 min (814.3 - 767.2)

Volume	Invert	Avail.Storage	Storage Description
#1	907.00'	39,370 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
907.00	4,416	0	0
908.00	5,328	4,872	4,872
909.00	6,297	5,813	10,685
910.00	7,323	6,810	17,495
911.00	8,406	7,865	25,359
912.00	9,544	8,975	34,334
912.50	10,600	5,036	39,370

Device	Routing	Invert	Outlet Devices
#1	Primary	907.00'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 907.00' / 906.00' S= 0.1000 1/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	907.00'	3.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	908.50'	30.0" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Secondary	910.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 2.50 Width (feet) 2.00 12.00

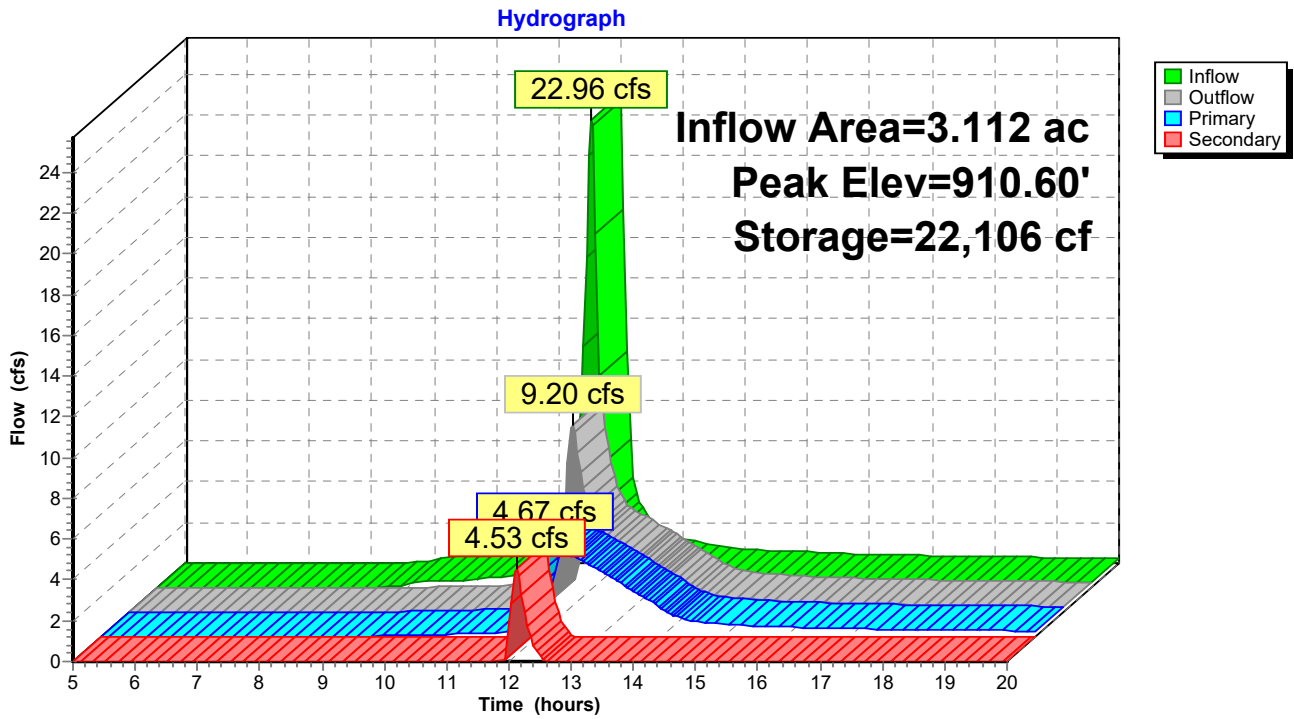
Primary OutFlow Max=4.65 cfs @ 12.12 hrs HW=910.59' (Free Discharge)

- ↑ 1=Culvert (Passes 4.65 cfs of 6.64 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.44 cfs @ 8.96 fps)
- ↑ 3=Orifice/Grate (Orifice Controls 4.21 cfs @ 6.74 fps)

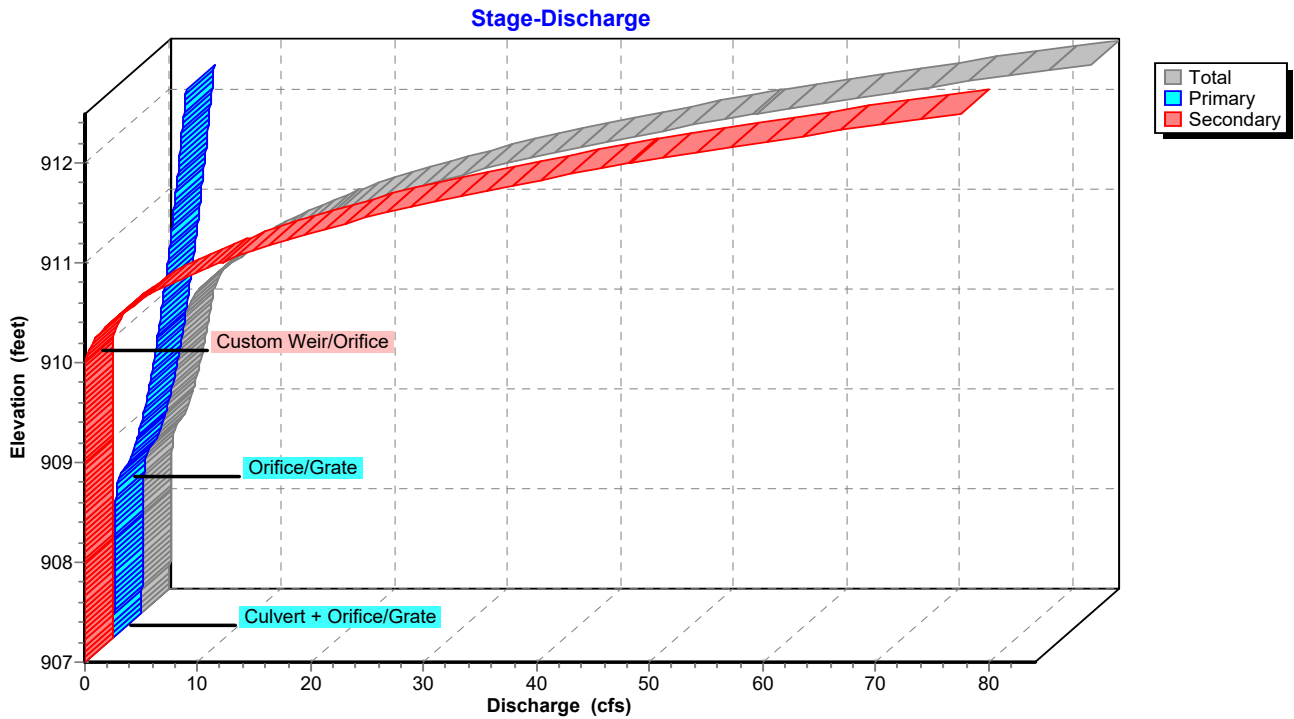
Secondary OutFlow Max=4.31 cfs @ 12.12 hrs HW=910.59' (Free Discharge)

- ↑ 4=Custom Weir/Orifice (Weir Controls 4.31 cfs @ 2.32 fps)

Pond 7P: Detention Pond



Pond 7P: Detention Pond



Summary for Pond 9P: Bioretention Area #1

[82] Warning: Early inflow requires earlier time span

Inflow Area = 1.380 ac, 75.62% Impervious, Inflow Depth > 4.90" for 100-Year event
 Inflow = 11.07 cfs @ 11.96 hrs, Volume= 0.563 af
 Outflow = 10.88 cfs @ 11.98 hrs, Volume= 0.526 af, Atten= 2%, Lag= 1.2 min
 Primary = 10.88 cfs @ 11.98 hrs, Volume= 0.526 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 920.80' @ 11.98 hrs Surf.Area= 3,423 sf Storage= 2,578 cf

Plug-Flow detention time= 48.4 min calculated for 0.526 af (93% of inflow)
 Center-of-Mass det. time= 23.1 min (762.4 - 739.3)

Volume	Invert	Avail.Storage	Storage Description
#1	920.00'	5,095 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

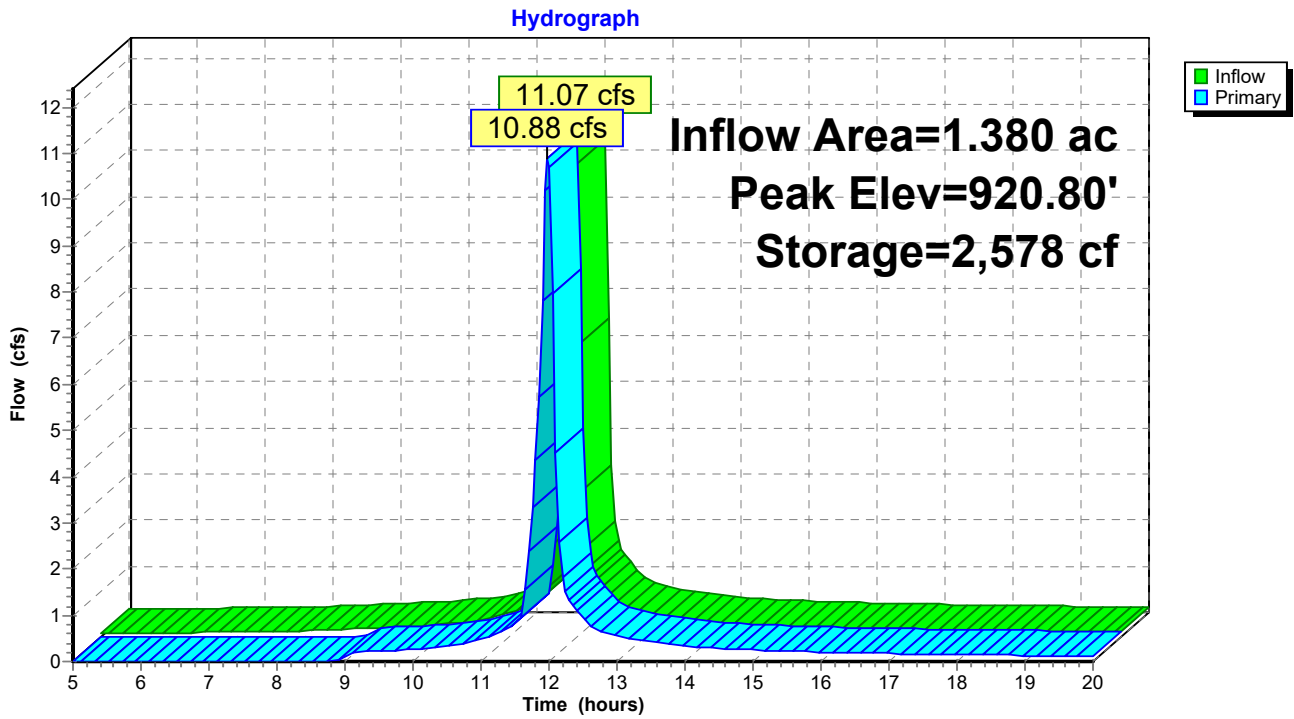
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
920.00	3,000	0	0
921.00	3,527	3,264	3,264
921.50	3,799	1,832	5,095

Device	Routing	Invert	Outlet Devices
#1	Primary	916.50'	24.0" Round Culvert L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 916.50' / 912.00' S= 0.0360 ' S= 0.0360 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	920.50'	30.0" x 30.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	920.00'	0.250 in/hr Exfiltration over Surface area above 920.00' Conductivity to Groundwater Elevation = -7.00' Excluded Surface area = 3,000 sf

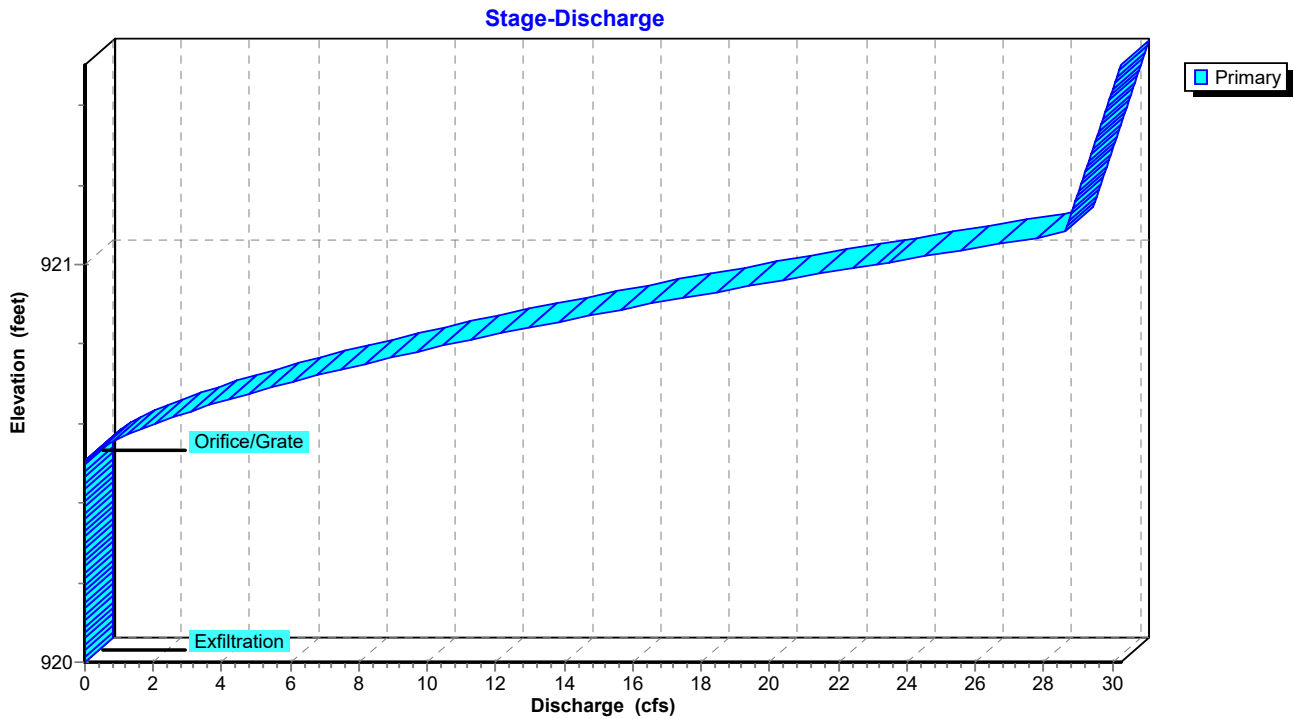
Primary OutFlow Max=10.51 cfs @ 11.98 hrs HW=920.80' (Free Discharge)

- 1=Culvert (Passes 10.51 cfs of 27.46 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 10.51 cfs @ 1.78 fps)
- 3=Exfiltration (Controls 0.00 cfs)

Pond 9P: Bioretention Area #1



Pond 9P: Bioretention Area #1

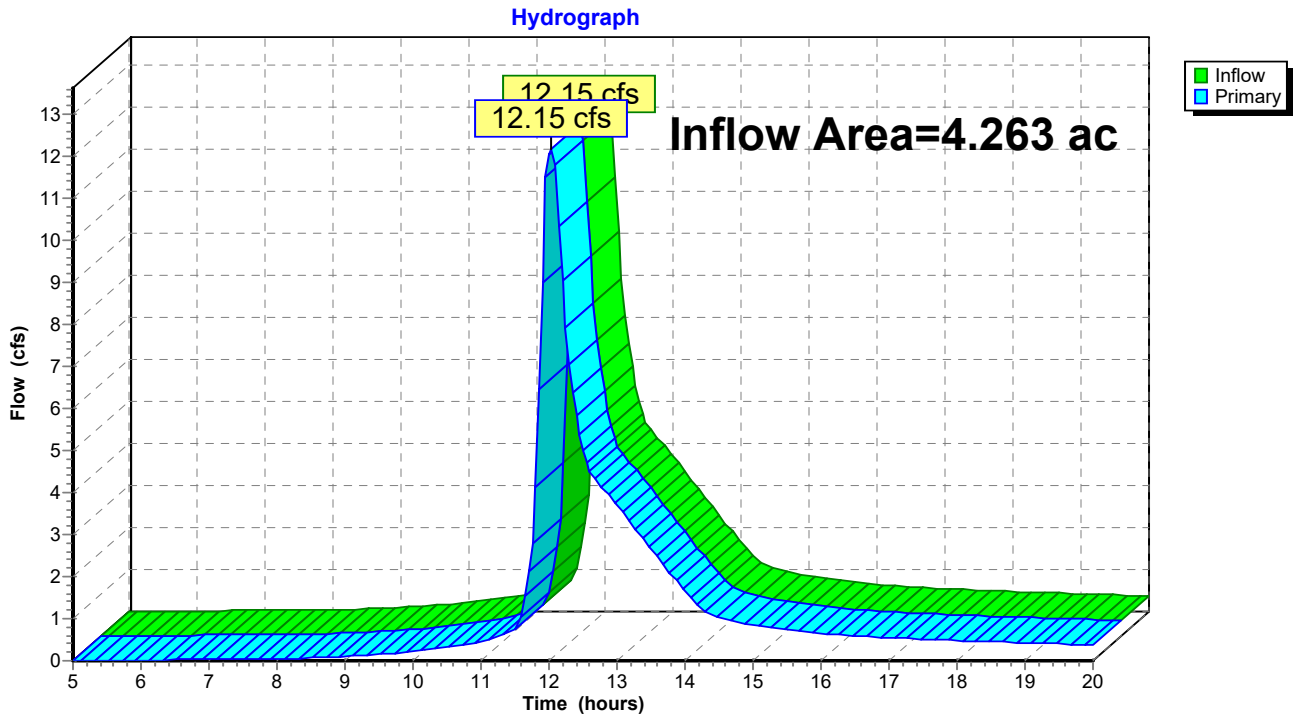


Summary for Link 1L: Analysis Point #1

Inflow Area = 4.263 ac, 50.09% Impervious, Inflow Depth > 3.70" for 100-Year event
Inflow = 12.15 cfs @ 12.03 hrs, Volume= 1.316 af
Primary = 12.15 cfs @ 12.03 hrs, Volume= 1.316 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: Analysis Point #1

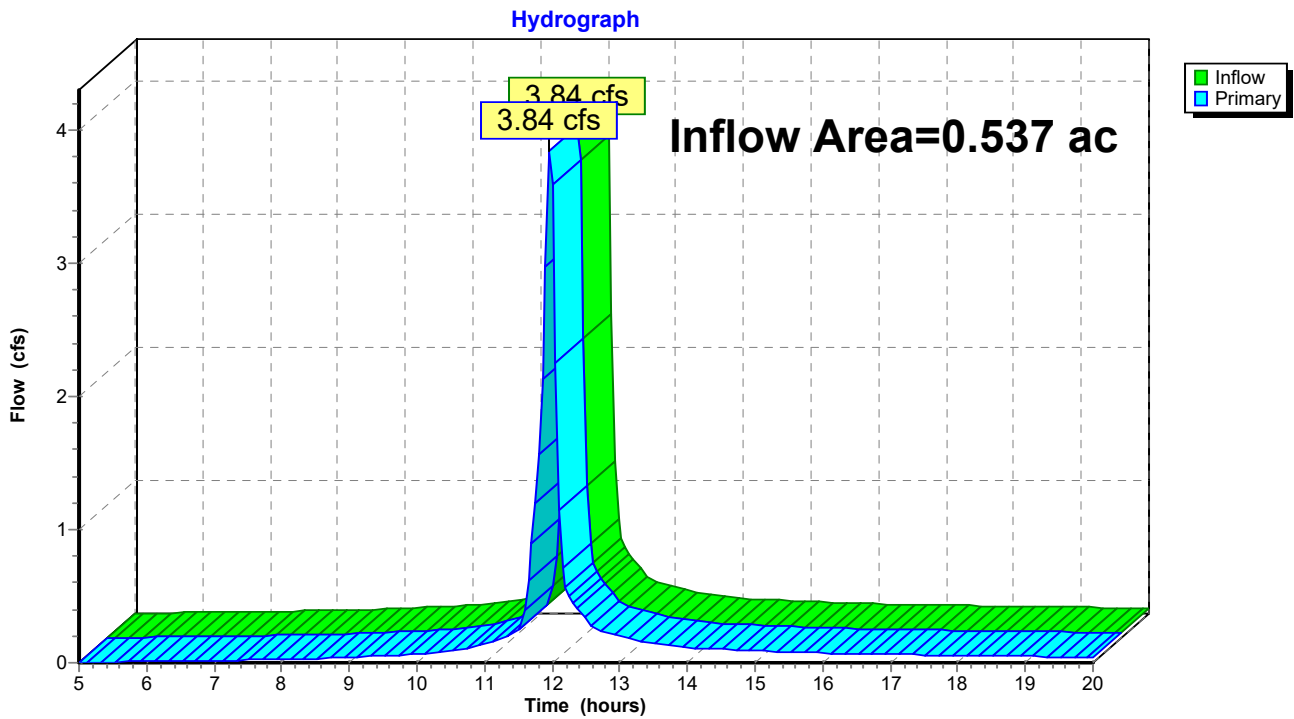


Summary for Link 13L: Analysis Point #2

Inflow Area = 0.537 ac, 34.49% Impervious, Inflow Depth > 4.09" for 100-Year event
Inflow = 3.84 cfs @ 11.97 hrs, Volume= 0.183 af
Primary = 3.84 cfs @ 11.97 hrs, Volume= 0.183 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 13L: Analysis Point #2



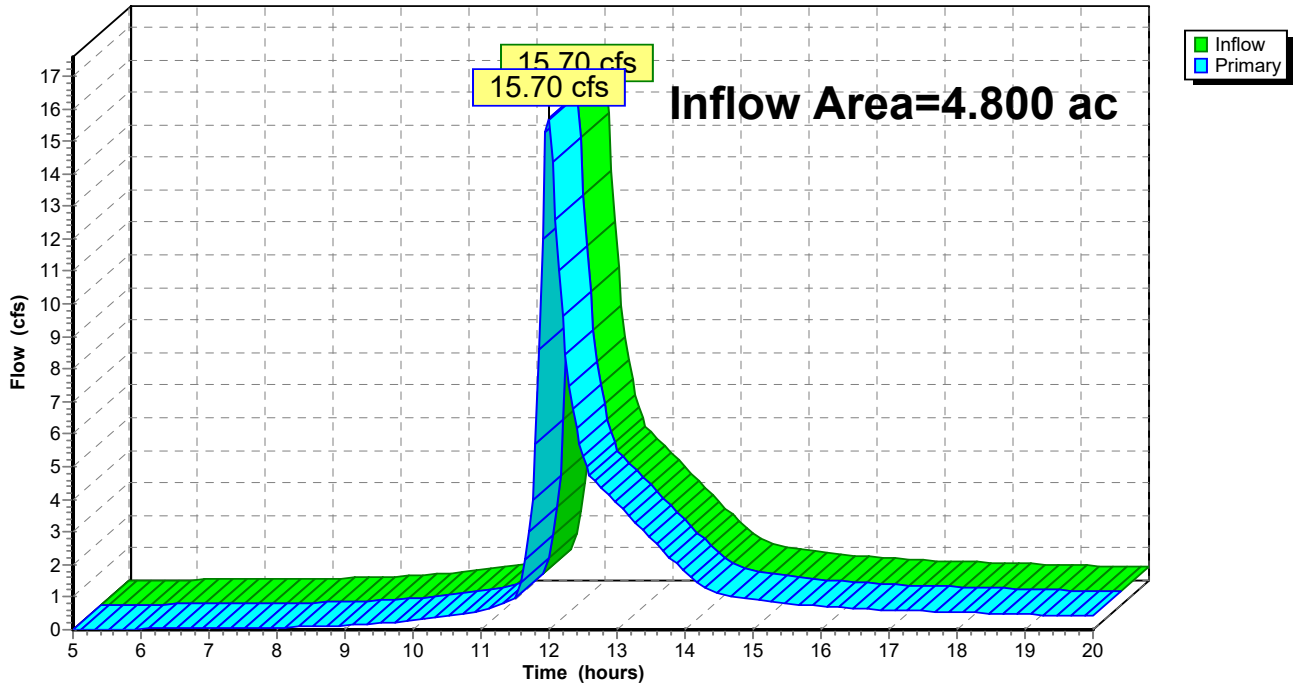
Summary for Link 16L: AP #3

Inflow Area = 4.800 ac, 48.35% Impervious, Inflow Depth > 3.75" for 100-Year event
Inflow = 15.70 cfs @ 11.99 hrs, Volume= 1.499 af
Primary = 15.70 cfs @ 11.99 hrs, Volume= 1.499 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 16L: AP #3

Hydrograph





Project: **Maifly - Freese Road**
 Project No.: **1096-20**
 By: **AMF**
 Date: **3/4/2020**

Existing / Proposed Impervious Cover Summary

Breakdown of Watersheds:

Existing Conditions

Analysis Point ID	Impervious Area (acres)	Area Description
1	0.05	Parcel to be demolished.
	0.27	Parcel demolished previous to gravel fill placement
Total Analysis Pt #1	0.32	

Proposed Conditions

Analysis Point ID	Impervious Area (acres)	Area Description
1	1.26	Maifly Development
Total Analysis Pt #1	1.26	

1.02 Total Impervious Area used in WQv Calculations for Bioretention Area #1, acres ^{1, 2}

¹ Existing Impervious Areas accounted for above were only calculated in areas proposed to be physically disturbed.
² Per Chapter 9 of the SMDM under the "Redevelopment Criteria" 25% of the existing impervious area disturbed and 100% of the new impervious cover is to be included in the calculating the impervious coverage used in determining total WQv to be treated in the respective Water Quality Practice.

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?.....

Design Point: P= 0.90 inch

Breakdown of Subcatchments						
Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (ft ³)	Description
1	2.30	1.02	44%	0.45	3,375	Maifly
2	1.95	1.17	60%	0.59	3,759	The Cottages
3						
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	4.25	2.19	52%	0.51	7,133	Subtotal 1
Total	4.25	2.19	52%	0.51	7,133	Initial WQv

0.16 af

Identify Runoff Reduction Techniques By Area			
Technique	Total Contributing Area (Acre)	Contributing Impervious Area (Acre)	Notes
Conservation of Natural Areas	0.00	0.00	minimum 10,000 sf
Riparian Buffers	0.00	0.00	maximum contributing length 75 feet to 150 feet
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	Up to 100 sf directly connected impervious area may be subtracted per
Total	0.00	0.00	

Recalculate WQv after application of Area Reduction Techniques					
	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Runoff Coefficient Rv	WQv (ft ³)
"<<Initial WQv"	4.25	2.19	52%	0.51	7,133
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	4.25	2.19	52%	0.51	7,133
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	4.25	2.19	52%	0.51	7,133
WQv reduced by Area Reduction techniques					0

0.16 af
0.00 af

Total Water Quality Volume Calculation

$$WQv(\text{acre-feet}) = [(P)(Rv)(A)] / 12$$

All Subcatchments						
Catchment	Total Area (Acres)	Impervious Cover (Acres)	Percent Impervious %	Runoff Coefficient Rv	WQv (ft ³)	Description
1	2.30	1.02	0.44	0.45	3374.81	
2	1.95	1.17	0.60	0.59	3,759	
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techniques/Standard SMPs		Total Contributing Area	Total Contributing Impervious Area	WQv Reduced (RRv)	WQv Treated
			(acres)	(acres)	cf	cf
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4				
	Bioretention & Infiltration Bioretention	F-5	4.25	2.19	3124	4009
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4)	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2)	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
Wet Swale (O-2)	O-2					
Totals by Area Reduction		→	0.00	0.00	0	
Totals by Volume Reduction		→	0.00	0.00	0	
Totals by Standard SMP w/RRV		→	4.25	2.19	3124	4009
Totals by Standard SMP		→	0.00	0.00		0
Totals (Area + Volume + all SMPs)		→	4.25	2.19	3,124	4,009
	Impervious Cover v	okay				

	Total Area v	okay				
--	----------------	------	--	--	--	--

Minimum RRv

Enter the Soils Data for the site

Soil Group	Acres	S
A	2.78	55%
B		40%
C	0.73	30%
D	0.73	20%
Total Area	4.24	

Calculate the Minimum RRv

S =	0.45	
Impervious =	2.19	<i>acre</i>
Precipitation	0.9	<i>in</i>
Rv	0.95	
Minimum RRv	3,036	<i>ft3</i>
	0.07	<i>af</i>

NOI QUESTIONS

#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	7133	0.164
30	Total RRV Provided	3124	0.072
31	Is RRV Provided \geq WQv Required?	No	
32	Minimum RRV	3036	0.070
32a	Is RRV Provided \geq Minimum RRV Required?	Yes	
33a	Total WQv Treated	4009	0.092
34	Sum of Volume Reduced & Treated	7133	0.164
34	Sum of Volume Reduced and Treated	7133	0.164
35	Is Sum RRV Provided and WQv Provided \geq WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	C_{pv}	
37	Overbank	Q_p	
37	Extreme Flood Control	Q_f	
	Are Quantity Control requirements met?		

NOI QUESTIONS

43.79%

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

$$A_f = WQv * (df) / [k * (hf + df)(tf)]$$

<i>A_f</i>	Required Surface Area (ft ²)	The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: Sand - 3.5 ft/day (City of Austin 1988); Peat - 2.0 ft/day (Galli 1990); Leaf Compost - 8.7 ft/day (Claytor and Schueler, 1996); Bioretention Soil (0.5 ft/day (Claytor &
<i>WQv</i>	Water Quality Volume (ft ³)	
<i>df</i>	Depth of the Soil Medium (feet)	<i>k</i>
<i>hf</i>	Average height of water above the planter bed	
<i>tf</i>	Volume Through the Filter Media (days)	

Design Point: <input style="width: 100px;" type="text"/>							
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	R _v	WQv (ft ³)	Precipitation (in)	Description
1	2.30	1.02	0.44	0.45	3374.81	0.90	
Enter Impervious Area Reduced by Disconnection of Rooftops			44%	0.45	3,375	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						ft ³	
Soil Information							
Soil Group		D					
Soil Infiltration Rate		0.00	in/hour	Okay			
Using Underdrains?		Yes Okay					
Calculate the Minimum Filter Area							
				Value	Units	Notes	
WQv				3,375	ft ³		
Enter Depth of Soil Media			<i>df</i>	2.5	ft	2.5-4 ft	
Enter Hydraulic Conductivity			<i>k</i>	0.5	ft/day		
Enter Average Height of Ponding			<i>hf</i>	0.25	ft	6 inches max.	
Enter Filter Time			<i>tf</i>	2	days		
Required Filter Area			<i>A_f</i>	3068	ft²		
Determine Actual Bio-Retention Area							
Filter Width		34	ft				
Filter Length		100	ft				
Filter Area		3400	ft ²				
Actual Volume Provided		3740	ft ³				
Determine Runoff Reduction							
Is the Bioretention contributing flow to another practice?			No	Select Practice			
RR _v		1,496					
RR_v applied		1,496	ft³	This is 40% of the storage provided or WQv whichever is less.			
Volume Treated		1,879	ft ³	This is the portion of the WQv that is not reduced in the practice.			
Volume Directed		0	ft ³	This volume is directed another practice			
Sizing V		OK		Check to be sure Area provided ≥ A _f			

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

$$Af = WQv * (df) / [k * (hf + df)(tf)]$$

- | | | |
|------------|---|--|
| <i>Af</i> | Required Surface Area (ft ²) | The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: Sand - 3.5 ft/day (City of Austin 1988); Peat - 2.0 ft/day (Galli 1990); Leaf Compost - 8.7 ft/day (Claytor and Schueler, 1996); Bioretention Soil (0.5 ft/day (Claytor & Schueler, 1996) |
| <i>WQv</i> | Water Quality Volume (ft ³) | |
| <i>df</i> | Depth of the Soil Medium (feet) | <i>k</i> |
| <i>hf</i> | Average height of water above the planter bed | |
| <i>tf</i> | Volume Through the Filter Media (days) | |

Design Point: <input style="width: 100px;" type="text"/>								
Enter Site Data For Drainage Area to be Treated by Practice								
Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (ft ³)	Precipitation (in)	Description	
2	1.95	1.17	0.60	0.59	3758.68	0.90		
Enter Impervious Area Reduced by Disconnection of Rooftops			60%	0.59	3,759	<<WQv after adjusting for Disconnected Rooftops		
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						ft ³		
Soil Information								
Soil Group		D						
Soil Infiltration Rate		0.00	<i>in/hour</i>	<i>Okay</i>				
Using Underdrains?		Yes <i>Okay</i>						
Calculate the Minimum Filter Area								
				Value	Units	Notes		
WQv				3,759	ft ³			
Enter Depth of Soil Media			<i>df</i>	2.5	ft	2.5-4 ft		
Enter Hydraulic Conductivity			<i>k</i>	0.5	ft/day			
Enter Average Height of Ponding			<i>hf</i>	0.25	ft	6 inches max.		
Enter Filter Time			<i>tf</i>	2	days			
Required Filter Area			<i>Af</i>	3417	ft²			
Determine Actual Bio-Retention Area								
Filter Width		37	ft					
Filter Length		100	ft					
Filter Area		3700	ft ²					
Actual Volume Provided		4070	ft ³					
Determine Runoff Reduction								
Is the Bioretention contributing flow to another practice?				Select Practice				
RRv		1,628						
RRv applied		1,628	ft³	<i>This is 40% of the storage provided or WQv whichever is less.</i>				
Volume Treated		2,131	ft ³	<i>This is the portion of the WQv that is not reduced in the practice.</i>				
Volume Directed		0	ft ³	This volume is directed another practice				
Sizing V		OK		<i>Check to be sure Area provided ≥ Af</i>				



Project: **Maifly - Freese Road**
 Project No.: **1096-20**
 By: **AMF**
 Date: **3/4/2020**

Channel Protection Volume (CP_v) Pond #1

Provide 24-hour detention for the runoff from the 1-year design storm:

* The "Short-cut" sizing technique presented in Appendix B of NYSDEC's SMDM is used.

Total Area = 4.26 ac
 Composite CN = 89.00
 T_c = 0.100 hrs
 I_a = 0.247 in (per Table 4-1 in TR-55)
 P = 2 in (per Figure 4.2 in SMDM)
 I_a/P = 0.12
 Therefore, q_u = 1000 csm/in (per Exhibit 4-II in TR-55)

T (extended detention time) = 24 hrs
 q_o/q_i (ratio of outflow to inflow) = 0.025 (per Figure B.1 in SMDM)

V_s/V_r (ratio of req. stor. Vol. to runoff vol.) = 0.647 (per Eq. (2.1.16) in SMDM)
 Q_d (post dev. Runoff for 1yr storm) = 1.025 in (per Table 2-1 in TR-55)

Therefore, V_s = 0.236 ac-ft (per Eq. (2.1.17) in SMDM)

WQ_v Detention = 0.000 ac-ft
 Net Required Volume = 0.236 ac-ft
 Provided RR_v = 0.070 ac-ft
Adjusted CP_v = 0.166 ac-ft

Discharge Orifice Size

Rate =
 Net Required CP_v/24 hrs.
 = 0.08 cfs

Average Head = (CP_v P.W.S. - N.W.S.)/2
 = 0.8 ft

Orifice Discharge

$$Q = C_d * A * (2gh)^{1/2}$$

$$Q = \text{Discharge (cfs)}$$

C_d = Coefficient of Discharge (sharp edged orifice = 0.60)

g = gravity (32.2)

h = Head (ft)

A = Open area of orifice (ft²)

$$= Q / (C_d (2gh)^{1/2})$$

$$= 0.020 \text{ ft}^2$$

Diameter = 1.9 in

Therefore use a 3 inch orifice