

STORMWATER REPORT

FOR

EMERSON PLACE

RIDGE ST.
MILLIS MA, 02054

PROPOSED RESIDENTIAL SUBDIVISION

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PREPARED BY:
LEGACY ENGINEERING LLC
CONSULTING ENGINEERS
730 MAIN STREET, SUITE 2C
MILLIS, MA 02054

PREPARED FOR:
TD DEVELOPMENT LLC
38 BENJAMIN'S GATE
PLYMOUTH, MA 02360



VOLUME 1 OF 1

TABLE OF CONTENTS

INTRODUCTION	3
EXISTING SITE	3
SOILS	3
GROUNDWATER CONDITIONS	3
SOIL PERMEABILITY	3
FLOOD PLAIN	4
WETLAND PROTECTION ACT	4
PROPOSED DEVELOPMENT	4
MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS	4
STANDARD 1 - New Stormwater Conveyances	4
STANDARD 2 – Peak Discharge Rates	5
DESIGN POINT #1: Flow to Western Wetlands	5
DESIGN POINT #2: Flow to Southern Abutter	6
STANDARD 3 - Loss of Annual Recharge	7
LID/ENVIRONMENTALLY SENSITIVE SITE DESIGN	7
RECHARGE CALCULATIONS AND METHODS	7
STANDARD 4 - TSS Removal	13
WATER QUALITY VOLUME (WOV)	13
PROPOSED BMP DESIGN	14
De Minimis Discharges – Design Point #1	15
De Minimis Discharges – Design Point #2	16
TSS REMOVAL CALCULATIONS	16
STANDARD 5 - Land Uses with Higher Potential Pollutant Loads	17
STANDARD 6 – Critical Areas	18
STANDARD 7 - Redevelopment	18
STANDARD 8 – Erosion Control	18
STANDARD 9 – Long-Term Operations and Maintenance Plan	19
STANDARD 10 – Illicit Discharge Compliance	19
PIPE SIZING CALCULATIONS	19
ATTACHMENT A: Operations and Maintenance Plan	A
ATTACHMENT B: USGS Map	B
ATTACHMENT C: Illicit Discharge Compliance Statement	C
ATTACHMENT D: Construction Activity NPDES Stormwater Pollution Prevention Plan ...	D
ATTACHMENT E: TSS Removal Calculation Sheets	E
ATTACHMENT F: Stormwater Management Handbook Checklist	F
ATTACHMENT G: FEMA Firmette	G
ATTACHMENT H: Soils Data	H
ATTACHMENT I: Existing Watershed Plan	I
ATTACHMENT J: Proposed Watershed Plan	J
ATTACHMENT K: Hydrocad Hydrology Calculations	K
DESIGN POINT #1: FLOW TO WETLANDS EXISTING CONDITIONS	K
DESIGN POINT #1: FLOW TO WETLANDS PROPOSED CONDITIONS	K
DESIGN POINT #2: FLOW TO 43 MAIN ST. EXISTING CONDITIONS	K
DESIGN POINT #2: FLOW TO 43 MAIN ST. PROPOSED CONDITIONS	K
ATTACHMENT L: Mounding Calculations	L
ATTACHMENT M: Rational Method Calculations	M
ATTACHMENT N: First Defense Proprietary Treatment Units	N

INTRODUCTION

This report presents a description along with supporting calculations for the stormwater runoff treatment and mitigation systems proposed for the residential development as presented on a plan set entitled “Emerson Place Definitive Subdivision Plan” prepared by Legacy Engineering LLC with an original date of February 12, 2020. The proposed open space development consists of 43 single-family residential lots.

EXISTING SITE

The proposed development lies on the westerly side of Ridge Street in Millis, totaling approximately 61.25 acres. The site consists of wooded and field areas. A portion of the site is a former gravel pit and is poorly vegetated. Perimeter areas include wetlands and flood plain.

SOILS

A series of test pits have been conducted across the site, which have generally confirmed the soils conditions described in the soils conservation service on-line soils website maps (see Attachment H). The soils conservation service maps indicate that the site is comprised of many different soil types, including Windsor, Sudbury, Scarboro & Birdsall, Swansea, Raynham, and Unclassified Soils, spanning the full range of classes from Class A to Class D soils. A majority of the portions of the site to be developed consist of Class A and B soils.

GROUNDWATER CONDITIONS

On-site testing concluded that the site contains a groundwater table of varied depth based on soils and proximity to wetlands. The test pit locations and groundwater elevations are shown on the grading sheets of the plan set.

SOIL PERMEABILITY

For the purposes of this report and based on the soils present at the proposed stormwater infiltration facility, a Rawls rate for sandy loam (1.02 inches per hour), loamy sand (2.41 inches per hour), and sandy soils (8.27 inches per hour) are used for infiltration related calculations, all based on soils testing performed at each BMP location.

FLOOD PLAIN

The westerly portions of the site lie within a FEMA Zone A 100-year flood plain. A conservative flood plain elevation of 142.9 has been assumed based on the FEMA flood elevation on the north side of Causeway Street. The vast size of the Great Black Swamp however makes it likely that the actual 100-year flood elevation would be lower than elevation 142.9. No work is proposed within such areas.

WETLAND PROTECTION ACT

The site contains bordering vegetated wetlands around the perimeter of the site. A Notice of Intent will be filed for proposed work within wetland jurisdictional areas.

PROPOSED DEVELOPMENT

The proposed open space development consists of the construction of 43 proposed residential lots along 3 new roads, along with associated driveways, landscape areas, utility systems, and stormwater management systems.

MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS

The stormwater management system design consists of a series of catch basins, manholes, and piping which collect runoff from the proposed development and the adjacent watersheds. These devices provide pretreatment prior to conveying stormwater into the various BMPs described herein. The stormwater management system is designed in accordance with the provisions of the DEP Stormwater Management Standards and Handbook, which are summarized below.

STANDARD 1 - New Stormwater Conveyances

No New Stormwater Conveyances (e.g. outfalls) May Discharge Untreated Stormwater Directly to or Cause Erosion in Wetlands or Waters of the Commonwealth. The proposed development complies with this standard.

The development includes two primary stormwater discharge points. Note the following:

- Design Point #1: Flow to Western Wetlands – In the proposed condition, all new discharges from infiltration basins include level spreaders to mitigate discharge velocity and to prevent erosion.
- Design Point #2: Flow to Southern Abutter – In the proposed condition, all new discharges from infiltration basins include level spreaders to mitigate discharge velocity and to prevent erosion.

STANDARD 2 – Peak Discharge Rates

Stormwater Management Systems shall be designed so that the Post-Development Peak Discharge Rates do not Exceed Pre-Development Peak Discharge Rates. The proposed development complies with this standard.

In order to model pre and post peak discharges, a program called Hydrocad was used, which employs the TR-20 modeling system. The DEP Stormwater Management regulations require that the 2 and 10-year storms should be considered for peak rates and the 100-year storm for flooding considerations. The Millis Subdivision Regulations also require that the 1 and 50-year storms be analyzed. The following five theoretical storm events were used to model the site before and after the proposed activities occur¹:

<u>Design Storm</u>	<u>Rainfall</u>
1-Year	2.5 inches
2-Year	3.2 inches
10-Year	4.7 inches
50-Year	5.5 inches
100-Year	6.7 inches

Roof recharge systems designed to hold a minimum 1 inch of runoff are provided for every proposed house. Note however, that no credit for these systems are taken in the HydroCAD calculations, which are therefore conservative.

DESIGN POINT #1: Flow to Western Wetlands

Description of Existing Conditions: In the existing condition, Watersheds E1a represents the runoff that flows to the wetlands in the northeastern portion of the site, which has been modeled as a storage area because of the existing culvert at the base of these watersheds. The wetlands then drain through a culvert under the cart path towards the western wetlands. The runoff that flows directly to the western wetlands downstream of the culvert and cart path is represented by Watershed E1b.

Description of Proposed Conditions: In the proposed condition, Watersheds P1a through P1i represent the runoff that is routed to Infiltration Basin #1. The runoff that is routed to Infiltration Basin #2 is represented by watersheds P1j through P1n. Watershed P1q represents the runoff that flows to the existing northeastern wetland storage area, and Watershed P1r represents the runoff that flows directly to the western wetlands.

¹ Rainfall depths are as specified by MassDEP in Appendix F-1 of the Hydrology Handbook for Conservation Commissioners dated March 2002.

Summary of Peak Flow Rates to Design Point:

Design Storm (Year)	Peak Runoff Rate (cfs)		Volume of Runoff (ac-ft)	
	Existing	Proposed	Existing	Proposed
1	0.92	0.30	0.393	0.391
2	1.36	0.62	0.909	0.863
10	3.68	2.91	2.844	2.600
50	10.81	9.96	5.407	5.024
100	15.29	14.77	6.675	6.238

DESIGN POINT #2: Flow to Southern Abutter

Description of Existing Conditions: In the existing condition, Watershed E2a flows to the wetlands in the southeastern portion of the site, which has been modeled as a storage area because the runoff then flows through two stone culverts under the existing driveway. Flow to these culverts is restricted due to rocks and degradation of the culverts, resulting in about 0.5' of standing water in the trenches leading up to the culverts. Watershed E2b represents the runoff that flows directly to the southern abutter.

Description of Proposed Conditions: In the proposed condition, Watersheds P2a through P2c represent the runoff routed to Infiltration Basin #3. Runoff that sheds to Infiltration Basin #4 is represented by Watershed P2d. Watershed P2g represents the runoff captured at the low point in road over the eastern wetlands. The runoff flowing directly to the eastern wetland storage is represented by Watershed P2f. Watershed P2e represents the uncontrolled runoff directly to the southern abutter.

Summary of Peak Flow Rates to Design Point:

Design Storm (Year)	Peak Runoff Rate (cfs)		Volume of Runoff (ac-ft)	
	Existing	Proposed	Existing	Proposed
1	1.45	1.41	0.609	0.604
2	4.47	4.18	1.366	1.339
10	9.17	8.73	3.614	3.565
50	12.53	12.14	6.239	6.167
100	13.84	13.45	7.474	7.389

STANDARD 3 - Loss of Annual Recharge

Loss of Annual Recharge to Groundwater shall be Eliminated or Minimized through the use of Environmentally Sensitive Site Design, Low Impact Development Techniques, Stormwater Best Management Practices, and Good Operation and Maintenance.

LID/ENVIRONMENTALLY SENSITIVE SITE DESIGN

The proposed stormwater management system includes individual roof runoff infiltration systems for the subdivision.

RECHARGE CALCULATIONS AND METHODS

The DEP Stormwater Management Standards requires that a minimum volume of runoff (Required Recharge Volume, Rv) be recharged on the site based on soils conditions in accordance with the following table:

	Class A Soils	Class B Soils	Class C Soils	Class D Soils
Runoff Depth (d) to be Recharged	d = 0.60 inches	d = 0.35 inches	d = 0.25 inches	d = 0.10 inches

The Required Recharge Volume is calculated by multiplying the runoff depth to be recharged (d) for each soils class by the amount of impervious coverage (on the site) under the proposed condition.

CAPTURE AREA ADJUSTMENT

All new impervious surfaces are routed through infiltration BMPs except some patio areas and the portions of roadway with low points over wetlands. Roof infiltration systems will capture roof runoff. The capture area adjustment is as calculated below:

➤ Total On-Site Impervious Coverage:	282,606 s.f.
➤ Treated Impervious Coverage:	252,378 s.f.
➤ Percent to Infiltration BMP:	89.3%
➤ Ratio:	1.12
➤ <u>Capture Area Adjusted Rv:</u>	<u>11,913 c.f.</u>

The total Rv infiltrated by all infiltration basins is 21,419 c.f., which far exceeds this requirement.

STORMWATER INFILTRATION BASIN #1

Recharge required (Rv)=(Impervious coverage)*(depth to be recharged)

	Class A Soils	Class B Soils	Class C Soils	Class D Soils
On-Site Impervious Area	87,502 s.f.	43,680 s.f.	0 s.f.	1,477 s.f.
Required Recharge Volume (Rv)	4,375 c.f.	1,274 c.f.	0 c.f.	12 c.f.
Total Rv	5,661 c.f.			

Standard 3 requires that infiltration facilities be provided and sized in accordance with three acceptable methods; 1) the Static Method, 2) The Simple Dynamic Method, and 3) the Dynamic Field Method. Each method is summarized below.

Static Method: The Static Method simply requires that the proposed recharge facility contain a total raw volume (adjusted for void space if stone is used within the storage volume) equal to or greater than the Required Recharge Volume.

Simple Dynamic Method: The Simple Dynamic method allows for a very conservative inclusion of some of the recharge which occurs within the infiltration facility during the design storm in accordance with the following formula:

$$A' = Rv \div (D + kT)$$

$$V' = A \times D$$

Where

A' is the minimum required bottom area

V' is the minimum required storage volume of the infiltration facility

Rv is the Required Recharge Volume

D is the depth of the infiltration facility (adjusted by the void space factor if the leaching facility is filled with stone)

K is the saturated hydraulic conductivity determined by the Rawls Rate (Table 2.3.3 of Volume 3, Chapter 1 of the Stormwater Handbook)

T is the allowable drawdown during the peak of the storm = 2 hours for this method

This method allows the designer to include two hours of ongoing recharge during the design storm using a permeability rate (saturated hydraulic conductivity) selected based on the classification of the soil under the infiltration facility.

Dynamic Field Method: The Dynamic Field Method uses a more aggressive inclusion of on-going recharge from an infiltration facility during the design

storm. This method is calculated using rainfall routing software (Hydrocad) and a truncated hydrograph which assumes that the Required Recharge Volume is loaded to the infiltration facility during a 12 hour period. For this method the design permeability rate must be based on in-situ permeability testing with a safety factor of 50% applied to the actual rate found.

For this infiltration facility, the Static Method has been utilized. The Static Method simply requires that the infiltration facility's raw storage volume be at least equal to Rv. The proposed Infiltration Basin has a raw storage volume of approximately 6,607 cubic feet below the lowest outlet, which exceeds the required recharge volume and thus satisfies this requirement.

A secondary check is required to ensure that the Rv will recharge within at least 72 hours. A K value of 2.41 is used for drawdown design purposes since soils testing found loamy sand soils at this location. Using the following formula, the drawdown time is calculated:

$$\text{Time}_{\text{drawdown}} = [Rv / (K \times \text{Bottom Area})]$$

Where:

$$Rv = 5,661 \text{ c.f.}$$

$$K = 2.41 \text{ inches per hour} = 0.20 \text{ feet per hour}$$

$$\text{Bottom Area} = 21,476 \text{ s.f.}$$

It is concluded that the drawdown time for the infiltrated volume is 1.3 hours, which satisfies this requirement.

Mounding Analysis:

A mounding analysis has been conducted and can be found in attachment L. The bottom of Stormwater Basin #1 is at elevation 145.7, with a seasonal high groundwater elevation below the basin at 143.7 (as observed by the peer reviewer). The mound for the infiltration of the WQV of this basin is 1.0 feet.

STORMWATER INFILTRATION BASIN #2

Recharge required (Rv)=(Impervious coverage)*(depth to be recharged)

	Class A Soils	Class B Soils	Class C Soils	Class D Soils
On-Site Impervious Area	59,699 s.f.	23,291 s.f.	0 s.f.	0 s.f.
Required Recharge Volume (Rv)	2,985 c.f.	671 c.f.	0 c.f.	0 c.f.
Total Rv	3,664 c.f.			

For this infiltration facility, the Static Method has been utilized. The Static Method simply requires that the infiltration facility's raw storage volume be at least equal to Rv. The proposed Infiltration Basin has a raw storage volume of approximately 12,663 cubic feet below the lowest outlet, which exceeds the required recharge volume and thus satisfies this requirement.

A secondary check is required to ensure that the Rv will recharge within at least 72 hours. The WQV is greater than the required Rv and is therefore used in this equation instead. A K value of 8.27 is used for drawdown design purposes since soils testing found loamy sand soils at this location. Using the following formula, the drawdown time is calculated:

$$\text{Time}_{\text{drawdown}} = [Rv / (K \times \text{Bottom Area})]$$

Where:

$$WQV = 6,916 \text{ c.f.}$$

$$K = 8.27 \text{ inches per hour} = 0.69 \text{ feet per hour}$$

$$\text{Bottom Area} = 11,051 \text{ s.f.}$$

It is concluded that the drawdown time for the infiltrated volume is 0.9 hours, which satisfies this requirement.

Mounding Analysis:

A mounding analysis has been conducted and can be found in attachment L. The bottom of Stormwater Basin #2 is at elevation 143.5.0, with a seasonal high groundwater elevation below the basin at 141.5. The mound for the infiltration of the WQV of this basin is 1.0 feet.

STORMWATER INFILTRATION BASIN #3

Recharge required (Rv)=(Impervious coverage)*(depth to be recharged)

	Class A Soils	Class B Soils	Class C Soils	Class D Soils
On-Site Impervious Area	0 s.f.	11,113 s.f.	1,781 s.f.	0 s.f.
Required Recharge Volume (Rv)	0 c.f.	324 c.f.	37 c.f.	0 c.f.
Total Rv	361 c.f.			

For this infiltration facility, the Static Method has been utilized. The Static Method simply requires that the infiltration facility's raw storage volume be at least equal to Rv. The proposed Infiltration Basin has a raw storage volume of approximately 1,067 cubic feet below the lowest outlet, which exceeds the required recharge volume and thus satisfies this requirement.

A secondary check is required to ensure that the Rv will recharge within at least 72 hours. The WQV is greater than the required Rv and is therefore used in this equation instead. A K value of 2.41 is used for drawdown design purposes since soils testing found loamy sand soils at this location. Using the following formula, the drawdown time is calculated:

$$\text{Time}_{\text{drawdown}} = [Rv / (K \times \text{Bottom Area})]$$

Where:

$$WQV = 537 \text{ c.f.}$$

$$K = 2.41 \text{ inches per hour} = 0.20 \text{ feet per hour}$$

$$\text{Bottom Area} = 1,961 \text{ s.f.}$$

It is concluded that the drawdown time for the infiltrated volume is 1.4 hours, which satisfies this requirement.

Mounding Analysis:

A mounding analysis has been conducted and can be found in attachment L. The bottom of Stormwater Basin #3 is at elevation 144.5, with a seasonal high groundwater elevation below the basin at 142.2. The mound for the infiltration of the WQV of this basin is 0.7 feet.

STORMWATER INFILTRATION BASIN #4

Recharge required (Rv)=(Impervious coverage)*(depth to be recharged)

	Class A Soils	Class B Soils	Class C Soils	Class D Soils
On-Site Impervious Area	0 s.f.	3,138 s.f.	2,595 s.f.	0 s.f.
Required Recharge Volume (Rv)	0 c.f.	92 c.f.	54 c.f.	0 c.f.
Total Rv	146 c.f.			

For this infiltration facility, the Static Method has been utilized. The Static Method simply requires that the infiltration facility's raw storage volume be at least equal to Rv. The proposed Infiltration Basin has a raw storage volume of approximately 1,007 cubic feet below the lowest outlet, which exceeds the required recharge volume and thus satisfies this requirement.

A secondary check is required to ensure that the Rv will recharge within at least 72 hours. The WQV is greater than the required Rv and is therefore used in this equation instead. A K value of 1.02 is used for drawdown design purposes since soils testing found sandy loam soils at this location. Using the following formula, the drawdown time is calculated:

$$\text{Time}_{\text{drawdown}} = [Rv / (K \times \text{Bottom Area})]$$

Where:

$$WQV = 239 \text{ c.f.}$$

$$K = 1.02 \text{ inches per hour} = 0.085 \text{ feet per hour}$$

$$\text{Bottom Area} = 9,936 \text{ s.f.}$$

It is concluded that the drawdown time for the infiltrated volume is 0.3 hours, which satisfies this requirement.

Mounding Analysis:

A mounding analysis has been conducted and can be found in attachment L. The bottom of Stormwater Basin #4 is at elevation 146.8, with a seasonal high groundwater elevation below the basin at 143.9. The mound for the infiltration of the WQV of this basin is 0.1 feet.

ROOF RUNOFF INFILTRATION FIELDS

Each proposed dwelling includes an underground infiltration field designed to handle 1" of runoff from the entire roof area. Roofs were assumed to be 1,800 s.f

each, which requires a field volume of 149 c.f. The Static Method simply requires that the infiltration facility's raw storage volume be at least equal to Rv. The proposed Infiltration Fields have a raw storage volume of approximately 153 cubic feet below the lowest outlet, which exceeds the required recharge volume and WQV and thus satisfies this requirement.

STANDARD 4 - TSS Removal

Stormwater Management Systems shall be Designed to Remove 80% of Average Annual Post-Construction Load of Total Suspended Solids (TSS). This standard is met when:

- a) A long-term pollution prevention plan is provided and implemented as required (refer to Attachment A),
- b) Structural stormwater BMP's are provided as required, and
- c) Pretreatment is provided as required.

The proposed stormwater management system has been designed to provide a series of Best Management Practices in accordance with the Stormwater Management Policy to remove the pollutants found in runoff as described below for each drainage sub-system.

WATER QUALITY VOLUME (WQV)

The Water Quality Volume represents the volume of water which must receive TSS removal treatment in order to comply with Standard 4. The water quality volume is calculated based on either 0.5 inches of runoff or 1.0 inches of runoff from all impervious surfaces on the site. 0.5 inches is used except in sensitive locations as described in the Stormwater Handbook. The site has areas that require both 0.5 inches and 1.0 inches. The total WQV for the site is split amongst the various BMP treatment trains as described below (or may not apply if the specific BMP's utilized do not use it as a sizing criteria). Using the following formula, the WQV is calculated:

$$\begin{aligned} \text{WQV} &= (\text{Impervious Area}) * (0.5 \text{ in.}) + (\text{Impervious Area}) * (1.0 \text{ in.}) \\ \text{WQV} &= (199,616 \text{ sq. ft.}) * (0.5 \text{ in.}) / (12 \text{ in./ft.}) + (82,990 \text{ sq. ft.}) * (1.0 \text{ in.}) / (12 \text{ in./ft.}) = 15,232 \text{ c.f.} \end{aligned}$$

The water volume to be treated below each infiltration basin outlet is greater than the WQV or Rv (whichever is greater) attributed to each basin as shown in the Standard 3 section of this report. A De Minimis discharge calculation is provided for the untreated discharge.

PROPOSED BMP DESIGN

Deep Sump Catch Basins/First Defense Units:

All proposed deep sump catch basins have 4' sumps with hoods designed in accordance with the DEP Stormwater Handbook. Each structure represents one of the pretreatment BMP's in each treatment train and provides a 25% TSS removal credit. First defense units provide 80% TSS removal, information for which can be found in attachment N.

Sediment Forebay

In accordance with the DEP Handbook, a forebay is sized to hold 0.1" of runoff from its tributary impervious area.

For Stormwater Infiltration Basin #1, the tributary impervious areas from north to south are 39,566 s.f., 35,705 s.f., and 47,131 for each discharge into the basin. The minimum forebay volumes are 330 c.f., 298 c.f., and 393 c.f. With the water trapped behind the 6" high checkdam at the piped outlets, the designed forebays will meet this requirement.

For Stormwater Infiltration Basin #2, the tributary impervious area from May Road is 31,091 s.f. and the minimum forebay volume is 259 cubic feet. With the water trapped behind the 6" high checkdam at the piped outlet, the designed forebay will contain 259 cubic feet, meeting the requirement. The tributary impervious area from June Road is 47,033 s.f. and the minimum forebay volume is 392 cubic feet. With the water trapped behind the 6" high checkdam at the piped outlet, the designed forebay will contain 392 cubic feet, meeting the requirement.

For Stormwater Infiltration Basin #3, the tributary impervious area is 12,894 s.f. and the minimum forebay volume is 107 cubic feet. With the water trapped behind the 6" high checkdam at the piped outlet, the designed forebays will contain 107 cubic feet each, meeting the requirement.

Stormwater Infiltration Basins:

Stormwater pre-treatment is achieved by varying configurations of deep sump catch basin devices, sediment forebays, and First Defense Units (see Attachment E for TSS calculations). Each basin is described in detail below.

Basin #1: The basin is 2.3 feet deep with a bottom at elevation 145.7, which lies 2.0 feet above the seasonal high groundwater elevation at 142.4. In the 100-year storm, the depth of water is 1.2 feet, leaving 1.1 feet of freeboard. The outlet structure

consists of concrete weir wall with a notch design and emergency overflow.

Basin #2: The basin is 3.0 feet deep with a bottom at elevation 143.5, which lies 2.0 feet above the seasonal high groundwater elevation at 141.5. In the 100-year storm, the depth of water is 1.3 feet, leaving 1.7 feet of freeboard. The outlet structure consists of a 15" pipe for emergency overflow.

Basin #3: The basin is 3.0 feet deep with a bottom at elevation 144.5, which lies 2.3 feet above the seasonal high groundwater elevation at 142.2. In the 100-year storm, the depth of water is 1.9 feet, leaving 1.1 feet of freeboard. The outlet structure consists of concrete weir wall with a notch design and emergency overflow.

Basin #4: The basin is 0.8 feet deep with a bottom at elevation 146.8, which lies 2.0 feet above the seasonal high groundwater elevation at 144.8. In the 100-year storm, the depth of water is 0.45 feet, leaving 0.35 feet of freeboard. The outlet structure consists of concrete weir wall with a notch design and emergency overflow.

Roof Runoff Infiltration Systems:

Each roof runoff infiltration system is designed to hold a raw volume of 1 in. of rooftop runoff from 1,700 s.f. of rooftop area and therefore receives a TSS removal credit of 80%. No pretreatment is required for these systems.

De Minimis Discharges – Design Point #1

The total impervious runoff to Design Point #1 is 231,132 s.f. Of this, 5,025 s.f. of runoff from some of the assumed rear yard impervious area is not treated. It is not practicable or cost effective to treat the impervious areas from the rear yard of every lot. We have assumed 500 s.f. of additional impervious area in the rear yard of every house beyond what is shown on the subdivision plan, which is a reasonable average assumption for each lot. The untreated runoff meets the following requirements to be counted as De Minimis:

- Physical site constraints preclude installation of TSS treatment devices;
- Discharge from the impervious areas are less than 1 cfs in the 2-year storm (0.43 cfs);
- An average of at least 80% TSS removal is achieved for the site as a whole
 - The calculations are as follows:
Treated Impervious Area: 215,649 s.f. @ 85% TSS removal

9,458 s.f. @ 80% TSS Removal
 Untreated Impervious Area: 5,025 s.f. @ 0% TSS removal

$$\frac{\text{Total Area}}{A * TSS} = \frac{231,132 \text{ s.f.}}{215,649 \text{ s.f.} * 0.85 + 9,458 \text{ s.f.} * 0.8 + 5,025 * 0} = 82.9\%$$

- The stormwater in the previous calculation all discharges to the same design point;
- Erosion controls are placed at all outlets;
- Standards 2 and 3 are met;
- Pollution prevention measures are included in the SWPPP; and
- The untreated area of runoff has been reduced as much as is practicable.

De Minimis Discharges – Design Point #2

The total impervious runoff to Design Point #2 is 52,4746 s.f. Of this, 5,373 s.f. of runoff from some of the assumed rear yard impervious areas are not treated. The untreated runoff meets the following requirements to be counted as De Minimis:

- Physical site constraints preclude installation of TSS treatment devices;
- Discharge from the pavement is less than 1 cfs in the 2-year storm (0.44 cfs);
- An average of at least 80% TSS removal is achieved for the site as a whole
 - The calculations are as follows:

Treated Impervious Area: 19,830 s.f. @ 97% TSS removal
 12,894 s.f. @ 88% TSS removal
 14,377 s.f. @ 80% TSS removal
 Untreated Impervious Area: 5,373 s.f. @ 0% TSS removal

$$\frac{\text{Total Area}}{A * TSS} = \frac{53,73 \text{ s.f.}}{19,830 \text{ s.f.} * 0.97 + 12,894 \text{ s.f.} * 0.89 + 14,377 \text{ s.f.} * 0.8} = 80.2\%$$

- The stormwater in the previous calculation all discharges to the same design point;
- Erosion controls are placed at all outlets;
- Standards 2 and 3 are met;
- Pollution prevention measures are included in the SWPPP; and
- The untreated area of runoff has been reduced as much as is practicable.

TSS REMOVAL CALCULATIONS

In accordance with the DEP Stormwater Management Handbook, each of the drainage treatment trains has been analyzed for TSS removal. The required TSS removal calculation sheets are included in Attachment E and the following sections provide a narrative discussion of each.

Infiltration Basins:

- Basins #1-2:** Each of these basins includes deep sump catch basins and sediment forebays for pretreatment. The total TSS removal for these basins is 85%. Basin #2 is located in soils with a rapid infiltration rate, and is therefore subject to 44% TSS pretreatment, which is provided by the deep sump catch basin and sediment forebay.
- Basins #3:** This basin includes deep sump catch basins and two sediment forebays for pretreatment. The total TSS removal is 88%.
- Basin #4:** This basin catches only runoff from assumed rear yard impervious areas, which can be considered “clean” runoff and therefore does not require pretreatment. The Total TSS removal for this basin is 80%.

Roof Runoff Infiltration Systems:

The roof runoff infiltration systems provide 80% TSS removal and do not require pretreatment.

Captured Runoff Directly to Wetlands:

Runoff to the southeastern wetlands is treated by catch basins and then two first defense units in series, which provide 97% TSS removal. This high level of TSS removal is provided for de minimis calculation purposes.

STANDARD 5 - Land Uses with Higher Potential Pollutant Loads

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If, through source control and/or pollution prevention, all land uses with higher potential pollutant load cannot be completely protected from exposure to rain, snow, snow melt and stormwater runoff, the proponent shall use the specific structural stormwater BMP's determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

This development is not a Land Use with Higher Potential Pollutant Loads.

STANDARD 6 – Critical Areas

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharge near or to any other critical area requires the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such area, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A “stormwater discharge” as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone 1 or Zone A are prohibited unless essential to the operation of the public water supply.

This site does not lie within a critical area.

STANDARD 7 - Redevelopment

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structures stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

Aside from the existing gravel road/driveway at both street entrances, the site is undeveloped and is therefore not considered to be a redevelopment.

STANDARD 8 – Erosion Control

A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

A construction activity NPDES Stormwater Pollution Prevention Plan has been prepared and included as Attachment D.

STANDARD 9 – Long-Term Operations and Maintenance Plan

A Long-Term Operations and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

A Drainage System Operations and Maintenance Plan has been prepared and included as Attachment A.

STANDARD 10 – Illicit Discharge Compliance

All illicit discharges to the stormwater management system are prohibited.

See Attachment C for the Illicit Discharge Compliance Statement.

PIPE SIZING CALCULATIONS

All on-site pipe sizing was calculated using two different methods, the Rational Method, and HydroCAD. Results are included in Attachments K and M.

ATTACHMENT A: OPERATIONS AND MAINTENANCE PLAN

OPERATIONS & MAINTENANCE PLAN

FOR

EMERSON PLACE

RIDGE ST.
MILLIS MA, 02054

PROPOSED RESIDENTIAL SUBDIVISION

FEBRUARY 12, 2020
REVISED MAY 20, 2020

PREPARED BY:
LEGACY ENGINEERING LLC
CONSULTING ENGINEERS
730 MAIN STREET, SUITE 2C
MILLIS, MA 02054

PREPARED FOR:
TD DEVELOPMENT LLC
38 BENJAMIN'S GATE
PLYMOUTH, MA 02360

TABLE OF CONTENTS

INTRODUCTION	3
Project Name	3
Project Location	3
Operator Name and Address	3
References	3
Site Description	3
Site Usage and Activities	3
PART 1: STORMWATER SYSTEM OPERATIONS AND MAINTENANCE	4
Operations and Maintenance Responsibilities	4
Easement Areas	5
Commencement of Operations and Maintenance Responsibilities	5
Operations and Maintenance Tasks	5
Reporting Requirements	7
Public Safety Features	8
PART 2: SEWER SYSTEM OPERATIONS AND MAINTENANCE	9
Operations and Maintenance Responsibilities	9
Commencement of Operations and Maintenance Responsibilities	10
Operations and Maintenance Tasks	10
Reporting Requirements	10
PART 3: INTEGRATED PEST MANAGEMENT PLAN	12
Applicability	12
Lawn Preparation and Installation	12
Mechanical Lawn Care Standards	12
Core Lawn Care Treatment Program	13
Optional Maintenance Practices to be Applied as Needed	13
PART 4: MISCELLANEOUS PROVISIONS	15
Good Housekeeping Controls	15
Management of Deicing Chemicals and Snow	15
Operator Training	15
Illicit Discharges	15
Estimated Operations and Maintenance Budget	15
PART 5: ACCIDENTAL SPILL AND EMERGENCY RESPONSE PLAN	16
EXHIBIT 1 STORMWATER FACILITIES SITE PLAN	17
EXHIBIT 2 STORMWATER SYSTEM OPERATIONS AND MAINTENANCE LOG FORM	18

INTRODUCTION

This Operations and Maintenance Plan (hereinafter referred to "O&M Plan") is provided to ensure the long-term monitoring and maintenance of various components of the development's infrastructure. This O&M Plan includes the following provisions:

1. Stormwater System Operations and Maintenance
2. Sewer System and Operations Maintenance
3. Integrated Pest Management Plan
4. Miscellaneous Provisions
5. Accidental Spill and Emergency Response Plan

The "Development" and the various components which are referenced in this O&M Plan are described on the site plan referenced below.

Project Name

Emerson Place

Project Location

Ridge Street
Millis, MA 02054

Operator Name and Address

TD Development LLC
38 Benjamin's Gate
Plymouth, MA 02360

The homeowners association will be responsible for O&M tasks once construction has been completed.

References

This O&M Plan references other documents as follows:

Site Plan - Plans entitled "Emerson Place Definitive Subdivision Plan" with an original date of February 12, 2020 (as may be amended), and prepared by Legacy Engineering LLC, hereinafter referred to as the "Site Plan".

Stormwater Report - Report entitled "Stormwater Report for Emerson Place" prepared by Legacy Engineering LLC with an original date of February 12, 2020 (as may be amended).

Site Description

The site consists of 43 proposed residential lots located on 61.25 acres of land on Ridge Street in Millis and includes all appurtenant utility systems, landscape areas, and stormwater management systems. Those land areas are collectively referred to herein as the "Development."

Site Usage and Activities

Single-family residential dwellings and associated appurtenances.

PART 1: STORMWATER SYSTEM OPERATIONS AND MAINTENANCE

In order to maximize the continued effectiveness of the Stormwater Management BMP's for the development, the following Operation and Maintenance requirements apply to all stormwater facilities within the extents of the Development. The stormwater facilities are depicted on the Site Plan and are hereinafter referred to as the "Stormwater Facilities."

Operations and Maintenance Responsibilities

Transfer of Operational Control to the Operator:

Prior to Subdivision Bond Release:

Commencement of O&M obligations by the Operator shall be on a facility by facility basis and shall commence once each individual stormwater facility construction is substantially complete and it is placed into operational use. Each such transfer of Operational control to the Operator shall be documented by a letter copied to the Millis Board of Selectmen indicating the stormwater facilities which are substantially complete and transferred to the Association for operation and maintenance. Regardless of the status of operational control, the Operator shall not be responsible for the completion of construction of any stormwater facilities in accordance with the approved permits and plans.

After Subdivision Bond Release:

After 100% completion of all or portions of the stormwater facilities, as evidenced by release of Planning Board bond for the associated items, the Operator shall be responsible for all operations and maintenance requirements along with any future reconstruction or repair of the stormwater facility.

Roof and Yard Runoff Infiltration/Bioretenention Systems:

Roof Infiltration Systems are always the responsibility of the owner of the individual lot on which they reside as discussed below.

Stormwater Facilities within Street Layout (May Road, April Way, and June Way):

The Operator shall be responsible for funding and executing all Stormwater System Operations and Maintenance requirements for Stormwater Facilities within the right-of-way for each of the three new roadways identified above until such time as the Town of Millis accepts portions of, or all of those new roadways as public ways. Upon acceptance of the new roadways (partial or complete) as a public way by Town Meeting, the Town of Millis will become responsible for maintaining the accepted roadways.

Stormwater Facilities Outside of Street Layouts:

The Operator shall be responsible for the operations and maintenance of all Stormwater Facilities outside of the three new roadways, except for roof runoff infiltration systems, which are to be maintained by each individual lot owner within the Development.

Easement Areas

The following Easement Areas shall be conveyed to the Operator and to the Town of Millis concurrent with recording of the legal documents creating the entity which will become the Operator ("Operator Documents"). Easement areas are shown on the Subdivision Plan.

1. Drainage & Utility Easements on Parcel A2;
2. Drainage & Utility Easements on Parcel B2;
3. Drainage & Utility Easement on Parcel A1;
4. Drainage & Utility Easement on Lots 1, 2, 3, 4, 5, 7, & 8;
5. Drainage & Utility Easement on Lots 23, 24, 25, 26, 27, 28, & 29; and
6. Drainage & Utility Easement on Lots 30, 31, 32, & 33;

Commencement of Operations and Maintenance Responsibilities

Operations and Maintenance tasks shall be commenced once each respective Stormwater Facility is fully constructed and is receiving runoff from the new roadway system or house, as appropriate.

Operations and Maintenance Tasks

Deep Sump Catch Basins:

1. Deep sump catch basins shall be inspected daily during construction activities and all sediments and debris shall be removed four times per year unless the owner can determine through recorded observations that sediment accumulation does not warrant such frequent cleanings. If deep sump catch basin cleaning occurs less than four times per year, cleaning shall occur when two feet of sediments have accumulated in the sump and at least once per year.
2. Silt sacks shall be installed on all catch basins throughout the time of construction.
3. All sediments and hydrocarbons shall be disposed of off-site in accordance with all applicable local, state, and federal regulations.

Sediment Forebays:

1. Sediment forebays shall be inspected at least four times per year to insure proper operation (during a storm event).
2. Sediment forebays should be mowed and all clippings and debris removed at least twice per year. Debris shall be removed at more frequent intervals if warranted by extreme weather events.
3. Sediment should be removed when 3-inches of sediment accumulates anywhere in the forebay.
4. Remove woody vegetation, leaves, and other materials that would affect the life of the system or its operations.

Stormwater Infiltration Basin:

1. Stormwater basins shall be inspected at least twice per year to insure proper operation (during a storm event).

2. Inspections shall include ensuring that inlet, outlet, and splash pad rip-rap aprons are in good condition and that that interior wall systems are in good condition. Deficiencies shall be remedied immediately.
3. Inspections shall include an observation of the accumulation of sediment in the basin. Pretreatment BMPs are intended to capture and contain coarse sediments. Should indication of significant accumulation of sediments in the infiltration basin be observed, increased frequency of cleaning of the preceding sediment forebay and catch basins shall be implemented.
4. Inspections shall include ensuring that outlet structures are unobstructed and free-flowing per the Site Plan design specifications.
5. Inspections shall include ensuring that all berms are fully stabilized, structurally sound and not eroded. Deficiencies shall be remedied immediately.
6. Stormwater basins should be mowed and all clippings and debris removed at least twice per year. Debris shall be removed at more frequent intervals if warranted by extreme weather events. If wetland vegetation grows at the bottom of the stormwater basin, it shall only be mowed once per year at the beginning of the winter season.
7. Sediment should be removed at least once every 5 years or when 2-inches of sediment accumulates anywhere in the basin and disposed of off-site in accordance with all applicable local, state, and federal regulations. Two sedimentation markers shall be installed in the basin by a Registered Land Surveyors with a clear marking of the 2-inch accumulation line. It is recommended that stone bounds be installed with chiseled marks indicating the limit of accumulation, although other similarly permanent marking methods may be utilized.

Roof Runoff Infiltration Systems:

Roof Runoff Infiltration Systems shall be maintained in good working order at all times by each Lot Owner. Any seller within the subdivision shall provide the new owner with a brief written description of the system and the maintenance requirements of this section. Gutters and downspouts shall be maintained in good working order at all times. The lot owner shall inspect the roof runoff leaching system once per calendar year shortly after a small rainstorm event to ensure that water accumulation within the roof runoff leaching system is not excessive. It should be noted that these systems are generally designed to overflow during storm events larger than approximately 1-inch of rainfall. During small storm events, there should be no overflow. Overflow during small storm events is likely an indication of a failed system due to clogging of the soils around the system or may be indicative of a blocked pipe. If this happens, the Lot Owner shall replace the system in accordance with the original design or effect an appropriate repair, if it is determined that this repair will alleviate the problem.

Stormwater Treatment Units (shown on the Site Plan as "First Defense Units"):
(maintenance tasks and frequency from manufacturer published data)

1. Stormwater Treatment units shall be inspected twice per year. Sediments and floating debris and petroleum products shall be removed with a vacuum truck when either the sediment depth reaches 6-inches or the floating depth of petroleum products reaches 3-inches. Sediment and floating debris removal shall occur at least once per year unless the Operator can demonstrate that sediment/floating debris accumulation does not achieve the thresholds noted above within a typical year. The Operator shall submit an analysis by a Registered Professional Engineer to the Planning Board explaining the basis for more infrequent cleaning.
2. All sediments and hydrocarbons shall be disposed of off-site in accordance with all applicable local, state, and federal regulations.

Stormwater Pipes, Inlets and Outfalls:

1. All stormwater inlets and outfalls shall be inspected twice per year.
2. Trash, leaves, debris and sediment shall be removed from inlets and outfalls as needed to keep them free flowing.
3. If inspections indicate that stormwater pipelines have become partially obstructed with trash, leaves, debris or sediment, the pipelines shall be cleaned by water jet truck and the obstructions removed and disposed of.

The various operations and maintenance schedule requirements listed above may be reduced in frequency by approval from the Town. Should such permission be desired, the Operator shall provide documentation of actual on-site maintenance observations by a qualified source (engineer or other qualified person meeting the approval of the Town) demonstrating that the particular Stormwater BMP in question does not warrant the specified frequency of inspection or maintenance activities.

Reporting Requirements

The following documentation shall be submitted no later than December 31st of each calendar year to the Town:

1. A statement, signed by an authorized representative of the Operator indicating that the requirements of this O&M Plan were performed during the previous calendar year. Where requirements were not met, a schedule for their completion shall be provided and a follow-up statement submitted when complete.
2. A list of the maintenance activities performed along with the approximate date of the work.
3. A list of the inspections performed along with a statement by each inspector summarizing the results of the inspections performed in accordance with this O&M plan.
4. Copies of appurtenant documentation supporting the completion of the O&M responsibilities such as copies of contracts and/or receipts with parties engaged to perform maintenance and inspection services.
5. A notation regarding whether there has been any change in the name and or contact information for the Operator.

Public Safety Features

The stormwater system has been designed to safely collect surface runoff from developed areas (as described on the Site Plan and Stormwater Report) by providing collections systems at regular intervals to prevent surface flooding and to treat that runoff in accordance with the provisions of the Massachusetts Stormwater Management Standards and Handbook.

PART 2: SEWER SYSTEM OPERATIONS AND MAINTENANCE

In order to maximize the continued effectiveness of the Sewer System for the Emerson Place Definitive Subdivision, the following Operation and Maintenance requirements apply to all sewer facilities within the extents of the Development. The sewer facilities are depicted on the Subdivision Plan and are hereinafter referred to as the "Sewer Facilities."

Operations and Maintenance Responsibilities

Transfer of Operational Control to the Operator:

Prior to Subdivision Bond Release:

Commencement of O&M obligations by the Operator shall be on a facility by facility basis and shall commence once each individual sewer facility construction is substantially complete and it is placed into operational use. Each such transfer of Operational control to the Operator shall be documented by a letter copied to the Millis Board of Selectmen indicating the sewer facilities which are substantially complete and transferred to the Association for operation and maintenance. Regardless of the status of operational control, the Operator shall not be responsible for the completion of construction of any sewer facilities in accordance with the approved permits and plans.

After Subdivision Bond Release:

After 100% completion of all or portions of the sewer facilities, as evidenced by release of Planning Board bond for the associated items, the Operator shall be responsible for all operations and maintenance requirements along with any future reconstruction or repair of the sewer facility.

Sewer System:

Description:

Those portions of the sewer facilities which consist of sewer mains designed to flow by gravity or low-pressure pumping along with their associated sewer manholes and sewer services to the boundaries of the roadway layout and/or associated easement area.

Designation of Responsibilities:

The Operator shall be responsible for funding and executing all Operations and Maintenance requirements for the Gravity Sewer System until such time as the Town of Millis accepts portions of, or all of the new roadways in the subdivision as public ways or, if earlier, accepts portions of, or all of the Gravity Sewer System. At the time of such acceptance, the Town may elect to accept only portions of the Gravity Sewer System which are 100% complete as evidenced by Planning Board full release of bond for the sections of sewer main in question. Upon acceptance of the sewer mains (partial or complete), the Town of Millis will become responsible for maintaining the accepted sewers except that the

Operator will continue to be responsible to maintain the surface of the easement areas as described herein.

Commencement of Operations and Maintenance Responsibilities

Operations and Maintenance tasks shall be commenced once each respective Sewer Facility is fully constructed and is receiving sewage flow from any house within the Development.

Operations and Maintenance Tasks

Low-Pressure Sewer Pipelines:

1. Pipelines shall be cleaned and replaced as needed to ensure their continued operation.

House Grinder Pumps:

1. Any individual house grinder pumps, including all components, valves, fitting, and services lines from the house to the connection with the gravity or low-pressure sewer pipeline, shall be the sole responsibility of the owner of the lot on which said components reside.

Capital Improvements:

Except for individual house grinder pump system, which, shall be the sole responsibility of the owner of the lot on which said system resides, the Operator shall be responsible for all future costs and work associated with the replacement of any of the facilities noted herein as being the responsibility of the Operator to maintain. Such facilities include without limitation:

1. All roadway sewer facilities unless and until the Town accepts said roadways as public ways or, if earlier, the Town accepts the Sewer System within said roadways, whereupon the Town shall be responsible solely for the Sewer System within said roadways.

Reporting Requirements

The following documentation shall be submitted no later than December 31st of each calendar year to the Town of Millis Department of Public Works, Planning Board and Board of Health:

1. A statement, signed by an authorized representative of the Operator indicating that the requirements of this O&M Plan were performed during the previous calendar year. Where requirements were not met, a schedule for their completion shall be provided and a follow-up statement submitted when complete.
2. A list of the maintenance activities performed along with the approximate date of the work.

3. A list of the inspections performed along with a statement by each inspector summarizing the results of the inspections performed in accordance with this O&M plan.

Copies of appurtenant documentation supporting the completion of the O&M responsibilities such as copies of contracts and/or receipts with parties engaged to perform maintenance and inspection services.

PART 3: INTEGRATED PEST MANAGEMENT PLAN

This Integrated Pest Management Plan (IPM) has been provided at the request of the Town of Millis to ensure the proper application of turf-care products.

Applicability

Each of the 43 lots within the Development shall adhere to this IPM in perpetuity, unless the Board of Selectmen releases the Operator from this obligation in writing.

Lawn Preparation and Installation

The following methods shall be employed for all lawn installation and replacements.

- Topsoil installed in lawn areas shall be installed to a minimum thickness of 6-inches. Installation shall be in a manner that minimizes compaction of the topsoil. Topsoil should include a minimum organic content of 18% in the top 6-inches. In areas where existing topsoil is limited or non-existent due to bedrock or hardpan, 6-24 inches of sandy loam topsoil should be spread with a minimum 18% organic content in the top 6-inches.
- Topsoil shall be tested for pH, organic content and mineral content including calcium, magnesium, potassium and sodium at the time of installation and supplements shall be added as recommended. Lime shall be added at the rates recommended by the soil test lab to bring topsoil pH within recommended levels.
- Seeding shall include at least three of the following turf types: Fine Fescue, Kentucky Bluegrass, Perennial Rye Grass, and Tall Fescue.
- Fertilizer application at the time of seeding shall not exceed 0.5 pounds per 1,000 square feet and shall be either organic or mineral.
- During the period of turf establishment (1-2 seasons after seeding), up to two broadleaf weed control applications per year may be applied to the entire lawn area to encourage the establishment of the turf and prevent weed infestations.

Mechanical Lawn Care Standards

The following maintenance guidelines shall be generally applied to lawn care, although specific adherence to every standard is not necessary. Adherence to these mechanical lawn care standards will encourage the development of a thick, dense, and healthy turf system which will ultimately result in fewer Lawn Care Treatment requirements.

- Lawn cutting height should be adjusted according to the season using the following as guidance:
 - May – June: 2.5" Cut Height
 - July – August: 3-3.5" Cut Height
 - September: 2.5-3" Cut Height
 - October – November: 2" Cut Height
- Lawn mowing should be at sufficient frequency such that not more than 1/3 of the leaf blade height is cut off.
- Aerate the lawn generally once per year in the mid-summer to mid-fall period. A second aeration in the spring may be appropriate for compact soils conditions.

- Dethatching is generally not necessary unless the thatch layer exceed $\frac{3}{4}$ ".

Core Lawn Care Treatment Program

Each lawn shall adhere to the following lawn care practices and restrictions:

- A soil test shall be conducted at least once every two years to evaluate topsoil pH level and the necessary application of lime will be made to bring soil pH within recommended levels. Recommended topsoil pH levels are between 6.5 and 6.8. Soils testing shall also include organic content, mineral content, including calcium, magnesium, potassium and sodium, total cation exchange capacity, and hydrogen. Ideal base saturation percentages for these parameters are as follows:
 - Calcium: 68-70%
 - Magnesium: 15-20%
 - Potassium: 4.5-6%
 - Sodium: <3%
 - Other Bases: 4-8%
 - Hydrogen: 5-10%
- Fertilizer application shall be as-needed based on the results of the latest soils test, plant health, rooting characteristics, growth rate desired, and season. Fertilizer application shall not exceed five times per calendar year and the total quantity of fertilizer applied in any given year shall not result in the application of more than three pounds of nitrogen per 1,000 square feet with not more than one pound of nitrogen applied per 1,000 square feet in any single application. Nitrogen, in the form of fertilizer, should generally be applied in small increments to avoid nitrate leachate and runoff, undesired sprits in growth, and increase in pest population. Granular organic and/or organic/synthetic slow release fertilizers shall be used. The optimal use of fertilizers is to create an organic foundation for soil health and development which provides sufficient nutrients for controlled plant growth and avoiding subsurface and surface nutrient loss to groundwater or stormwater runoff.
- Except as noted below, only one application of crab-grass prevention product is permitted per year during March or April, and only in portions of the lawn in full sun which are prone to such infestations. The use of corn gluton (organic crab-grass control method) is permitted twice per year.
- At the time of fertilizer application, any accidental spillage onto impervious surfaces such as driveways, walkways, patios, and streets shall be swept up and either applied to the lawn or removed from the subdivision.

Optional Maintenance Practices to be Applied as Needed

- Where topsoil testing demonstrates a deficiency, mineral or organic micro-nutrients may be added to achieve recommended levels.
- Generally, chemical pesticides should be used as a final option and the minimum amount necessary to achieve the desired result should be used. Non chemical means of pest control should be tried first. In the event of suspected pest problem, a visual inspection shall first be made by qualified personnel to confirm the presence of stressed vegetation, wildlife activity, pathogens, and other similar indicators. Should a pest problem be identified, the condition shall be monitored periodically such that if the problem subsides, treatment methods can stop as soon as possible thereafter.

- Root bio-stimulants from organic sources (examples include Roots, Organica, or PHC type products, which are brand names and which may change depending on market conditions) may be used as needed.
- Compost topdressing (1/8" – 1/4" depth) may be applied as needed.
- Spot treatment of weeds and Crabgrass may be implemented at any time as needed, but only on a spot-treatment basis and only to those areas affected.
- Spot treatment for turf disease may be implemented at any time as needed, but only on a spot-treatment basis and only to those areas affected.
- Grub control products and similar products may be applied to localized areas only where grub activity is evident. Grub control may be applied when grub populations reach an average of 8 -10 grubs per square foot or if the plant/lawns are showing signs of stress from grub activity.
- One application of Imidacloprid (Merit) or similar products per year is permitted during June and July in areas where grub activity has historically occurred.
- Pesticides which are classified for Restricted Use pursuant to 333 CMR may only be applied by properly licensed or certified personnel or by individuals under the direct on-site supervision of properly licensed or certified personnel in accordance with 333 CMR.

PART 4: MISCELLANEOUS PROVISIONS

Good Housekeeping Controls

The following good housekeeping measures will be implemented in the day-to-day operation of the Development:

1. The site will be maintained in a neat and orderly manner.
2. Fertilizers and pesticide application on the lots shall be in accordance with this plan.
3. All waste materials from the development will be collected in dumpsters and removed from the site by properly licensed disposal companies.

Management of Deicing Chemicals and Snow

Management of on-site snow will be as follows:

1. The site shall be plowed as needed to maintain safe driving conditions. Snow will be stored in windrows along pavement edges and shall be piled in landscape strips as needed.
2. Snow will not be plowed into piles which block or obstruct stormwater management facilities.
3. Snow will not be plowed into piles at roadway intersections such that it would obstruct visibility for entering or exiting vehicles.
4. Deicing chemicals application will be as little as possible while provide a safe environment for vehicular operation and function.

Operator Training

The Operator is responsible for providing training for the staff that will be responsible for the implementation of this O&M Plan. Such training shall occur at least once annually.

Illicit Discharges

The Operator shall not allow non-stormwater discharges into the development's stormwater system. Any discovered non-stormwater discharges into the development's stormwater system shall be immediately disconnected.

Estimated Operations and Maintenance Budget

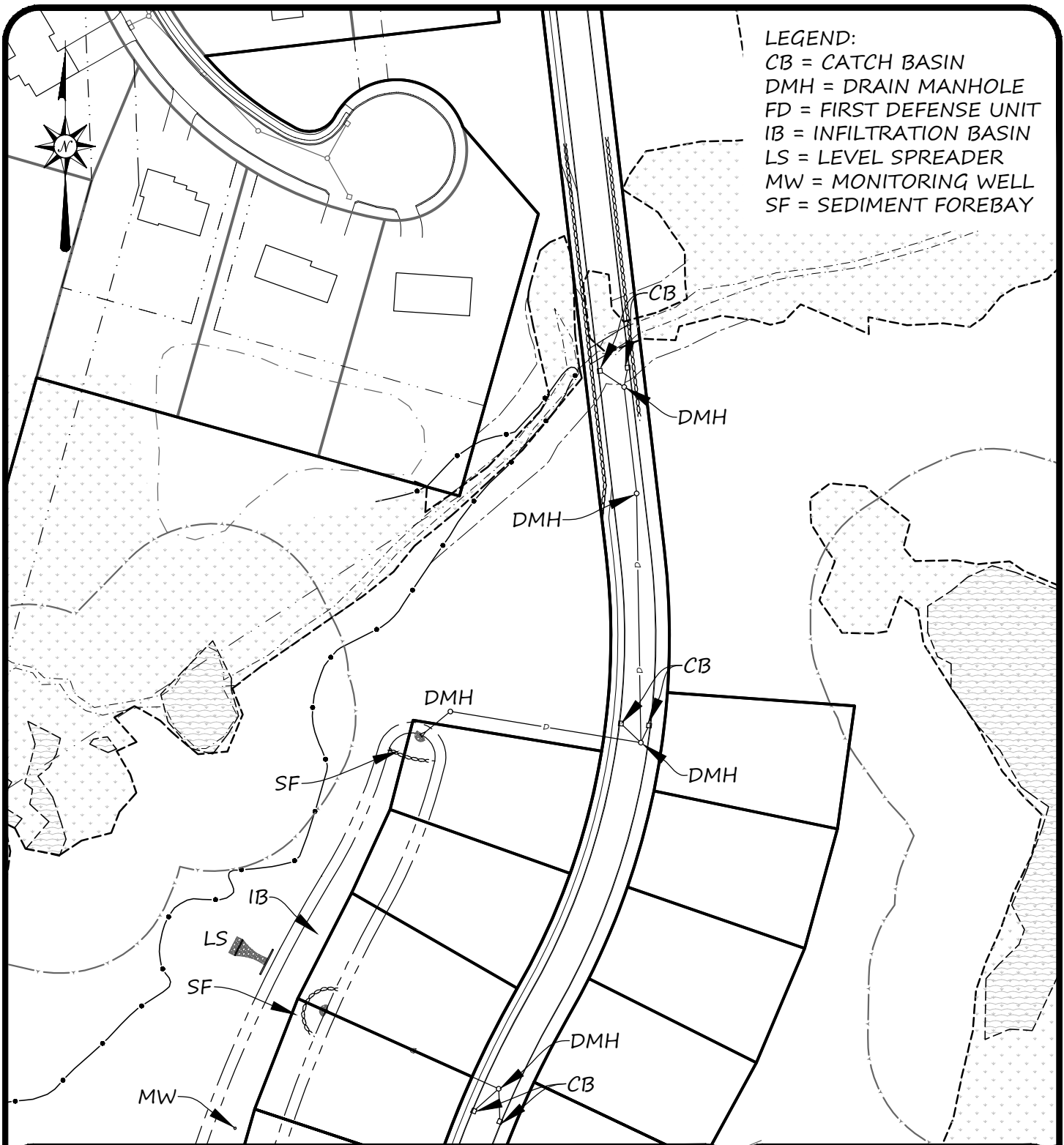
It is estimated that the regular annual maintenance tasks described herein will cost \$6,000 per year (2020 value).

PART 5: ACCIDENTAL SPILL AND EMERGENCY RESPONSE PLAN

In the event of an accident within the boundaries of the Site, where significant gasoline or other petroleum products or other hazardous materials are released, the following procedure shall be followed in the order noted.

1. As quickly as possible, attempt to block the nearest stormwater catch basins if on a roadway, or if in proximity to wetlands, create a berm of soil downslope of the spill.
2. Immediately, and while the containment measures are implemented as described above, notify the following governmental entities and inform them of the type of spill that occurred:
 - Millis Fire Department at 508-376-2361,
 - Millis Board of Health at 508-376-7042,
 - Millis Conservation Commission at 508-376-7045,
 - Mass. Department of Environmental Protection (DEP) Central Region at (508) 792-7650 (address is 8 New Bond Street Worcester, MA 01606), and
 - National Response Center (NRC) at (800) 424-8802 (for spills that require such notification pursuant to 40 CFR Part 110, 40 CFR Part 117, and 40 CR Part 302).
3. Once the various emergency response teams have arrived at the site and if the spill occurs on a lot, the owner shall follow the instructions of the various governmental entities, which may include the following:
 - A clean up firm may need to be immediately contacted.
 - If the hazardous materials have entered the stormwater system, portions of it may need to be cleaned and restored per the DEP. All such activities shall be as specified by the DEP.

EXHIBIT 1 STORMWATER FACILITIES SITE PLAN



730 MAIN STREET
 SUITE 2C
 MILLIS, MA 02054
 508-376-8883(o)
 SHEET 1 OF 3

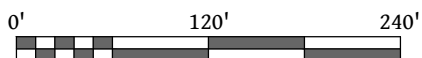


LEGACY
 ENGINEERING

EMERSON PLACE
 O&M
 PLAN OF LAND
 IN
 MILLIS, MA

PLAN DATE: 2/12/2020

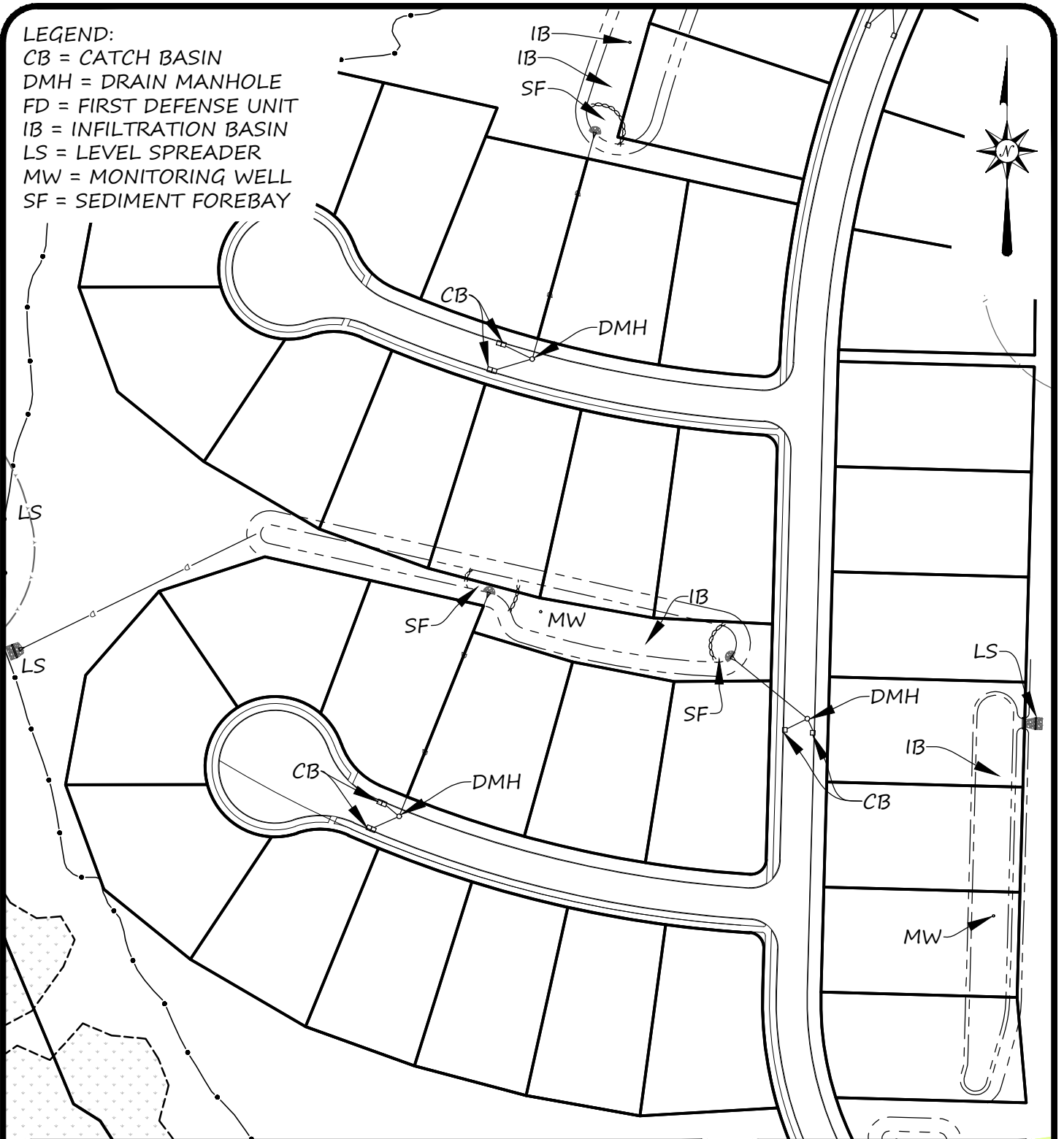
PLAN SCALE: 1"=120'



REVISION	DATE
PER TOWN COMMENTS	5/20/20

LEGEND:

CB = CATCH BASIN
 DMH = DRAIN MANHOLE
 FD = FIRST DEFENSE UNIT
 IB = INFILTRATION BASIN
 LS = LEVEL SPREADER
 MW = MONITORING WELL
 SF = SEDIMENT FOREBAY



730 MAIN STREET
 SUITE 2C
 MILLIS, MA 02054
 508-376-8883(o)
 SHEET 2 OF 3

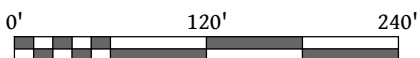


LEGACY
 ENGINEERING

EMERSON PLACE
 O&M
 PLAN OF LAND
 IN
 MILLIS, MA

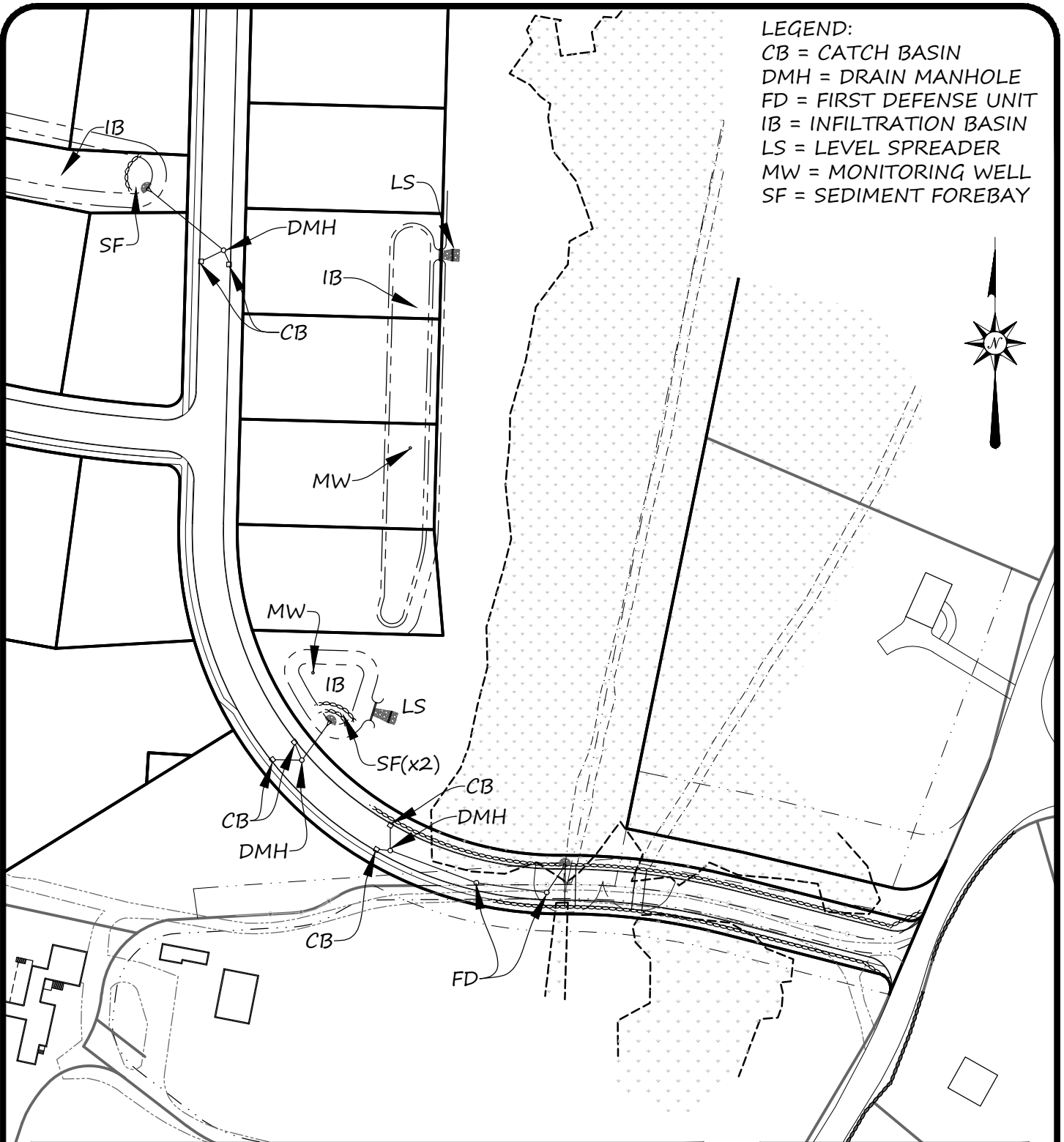
PLAN DATE: 2/12/2020

PLAN SCALE: 1"=120'



REVISION	DATE
PER TOWN COMMENTS	5/20/20

LEGEND:
 CB = CATCH BASIN
 DMH = DRAIN MANHOLE
 FD = FIRST DEFENSE UNIT
 IB = INFILTRATION BASIN
 LS = LEVEL SPREADER
 MW = MONITORING WELL
 SF = SEDIMENT FOREBAY



730 MAIN STREET
 SUITE 2C
 MILLIS, MA 02054
 508-376-8883(o)
 SHEET 3 OF 3

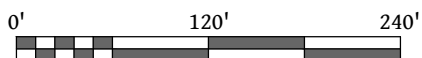


LEGACY
 ENGINEERING

EMERSON PLACE
 O&M
 PLAN OF LAND
 IN
 MILLIS, MA

PLAN DATE: 2/12/2020

PLAN SCALE: 1"=120'



REVISION	DATE
PER TOWN COMMENTS	5/20/20

EXHIBIT 2 STORMWATER SYSTEM OPERATIONS AND MAINTENANCE LOG FORM

Stormwater System Operations and Maintenance Log

Year _____

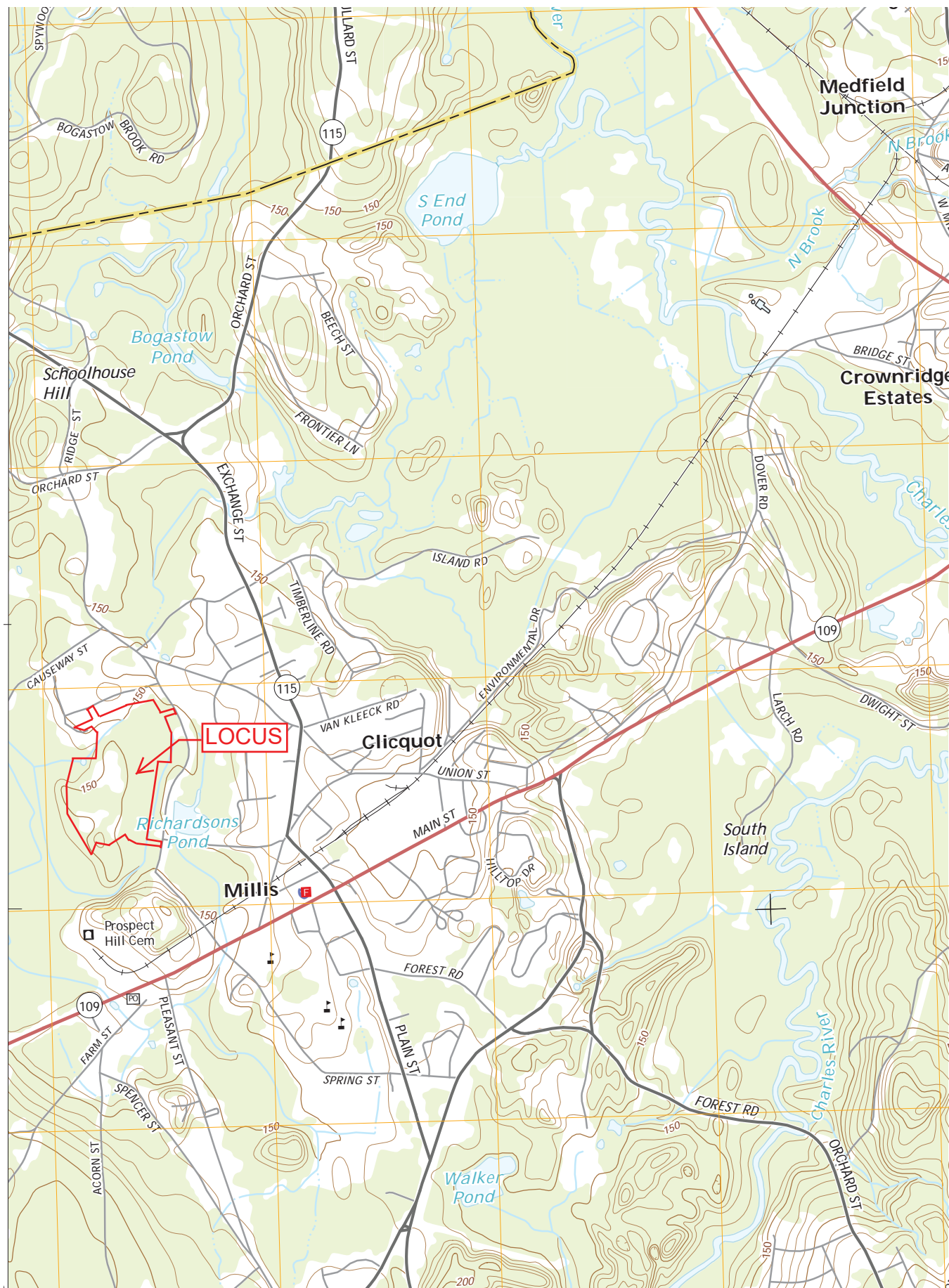
General Information	
Project Name	Emerson Place
Site Location	Ridge Street Millis, Ma 02054
Inspector's Name	
Inspector's Title	
Inspector's Phone	
Signature of Operator at end of Year, Certifying that Work was Completed as Noted. Date:	

O&M Task Checklist

	O&M Activity	Date Completed	Notes/Comments
Deep Sump Catch Basins			
	1 st Quarter Cleanout		
	2 nd Quarter Cleanout		
	3 rd Quarter Cleanout		
	4 th Quarter Cleanout		
Sediment Forebay			
	1 st Annual Inspection		
	2 nd Annual Inspection		
	3 rd Annual Inspection		
	4 th Annual Inspection		
	1 st Annual Mowing		
	2 nd Annual Mowing		
	Sediment Rem. Req'd?		
Stormwater Infiltration Basin			
	1 st Annual Inspection		
	2 nd Annual Inspection		
	1 st Annual Mowing		

	O&M Activity	Date Completed	Notes/Comments
	2 nd Annual Mowing		
	Sediment Removal Req'd?		
Roof Runoff Infiltration System			
	1 st Annual Inspection		
	2 nd Annual inspection		
	System Repl. Req'd?		
First Defense Units			
	1 st Inspection		
	2 nd Inspection		
	Unit Cleaning		
Stormwater Pipes, Inlets and Outlets			
	1 st Annual Inspection		
	2 nd Annual inspection		

ATTACHMENT B: USGS MAP



ATTACHMENT C: ILLICIT DISCHARGE COMPLIANCE STATEMENT

ILLICIT DISCHARGE COMPLIANCE STATEMENT

Emerson Place
Millis, MA

This statement is provided in accordance with the provisions of the Massachusetts Stormwater Management Standard 10 and of the Massachusetts Stormwater Management Handbook.

Note the following:

- ➡ All stormwater management systems contain no connection to the site's wastewater sewer system or to any other non-stormwater collection system.
- ➡ Groundwater collection systems on the site are not connected to the site's wastewater sewer system or to any other non-stormwater collection system.
- ➡ The facility's Operations & Maintenance Plan is designed to prevent any discharge of non-stormwater to the drainage system.
- ➡ Any illicit discharges identified during or after construction will be immediately disconnected.

Date: February 12, 2020

**ATTACHMENT D: CONSTRUCTION
ACTIVITY NPDES STORMWATER POLLUTION
PREVENTION PLAN**

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

FOR A

CONSTRUCTION ACTIVITY

FOR

EMERSON PLACE

RIDGE ST.
MILLIS MA, 02054

PROPOSED RESIDENTIAL SUBDIVISION

FEBRUARY 12, 2020
REVISED MAY 20, 2020

PREPARED BY:
LEGACY ENGINEERING LLC
CONSULTING ENGINEERS
730 MAIN STREET, SUITE 2C
MILLIS, MA 02054

PREPARED FOR:
TD DEVELOPMENT LLC
38 BENJAMIN'S GATE
PLYMOUTH, MA 02360

VOLUME 1 OF 1

CONTENTS

Contents	2
1.0 Project Description and Eligibility	4
1.1 Project Name	4
1.2 Project Location	4
1.3 Owner Name and Address	4
1.4 General Contractor/Operator Name and Address	4
1.5 Stormwater Team	5
1.6 Associated Project Documents	5
1.7 SWPPP Site Plan and Relation to Other Permits	5
1.8 Nature of Construction Activities	5
1.9 Overall Phasing	6
1.10 Major Activity Construction Sequence	6
1.11 Anticipated Discharges	7
1.12 Anticipated Construction and Waste Materials	7
1.13 Project Eligibility	7
1.11.1 Endangered Species	8
1.11.2 Historic Properties	8
1.14 Coverage Dates	8
1.15 Receiving Waters	9
1.15.1 Impaired Waters	9
1.15.2 Tier 2, 2,5 and 3 Waters	9
1.15.3 TMDL Compliance	9
1.16 Site Notice & SWPPP Accessibility	11
2.0 Stormwater Controls	11
2.1 Project Limits and General Control Considerations	11
2.2 Natural Buffers or Equivalent Sediment Controls	12
2.3 Perimeter Erosion and Sediment Controls	12
2.4 Site Access Controls	12
2.5 Stockpiled Soils	12
2.6 Dust Control	13
2.7 Disturbance of Steep Slopes	13
2.8 Topsoil Preservation	13
2.9 Soil Compaction	13
2.10 Protection of Storm Drain Inlets	13
2.11 Protection of Channels and Discharge Points	13
2.12 Construction Stage Sediment Traps/Basins	13
2.13 Treatment Chemicals	14
2.14 Temporary Stabilization	14
2.15 Maintenance of Erosion & Sediment Control Measures	14
2.16 Pollution Prevention (Good Housekeeping Practices)	14
2.16.1 Construction Staging Areas	14
2.16.2 Vehicle Storage, Fueling and Maintenance Area	15
2.16.3 Equipment Washing	15
2.16.4 Building Products, Materials and Wastes	15
2.16.5 Fertilizer, Pesticide, Herbicide, or Insecticide Storage	15
2.16.7 Petroleum and Other Chemical Products Storage	16
2.16.8 Hazardous Products and Hazardous Waste	16

RIDGE PLACE SWPPP

2.16.9 Construction and Domestic Waste	16
2.16.10 Materials/Tools Washing	16
2.16.11 Fertilizer Application	17
2.16.12 Spill Prevention and Response	17
2.17 Dewatering Practices	18
2.18 Infiltration Systems	18
3.0 Inspections	18
3.1 Inspection Frequency	18
3.2 Inspection Areas	19
3.2 Scope of Inspection	19
4.0 Corrective Actions	20
5.0 Personnel Training and Recording Keeping	20
5.1 Personnel Training	20
5.2 Records	21
5.3 Retention of Records	21
5.4 Updating This SWPPP	21
6.0 Certifications	21
7.0 Appendices	22
7.1 USGS Map	
7.2 SWPPP Site Plan	
7.3 Construction General Permit	
7.4 Notice of Intent	
7.5 Stormwater Team	
7.6 Inspection Reports	
7.7 Log of Corrective Actions	
7.8 Log of Reduced Inspection Periods	
7.9 Log of SWPPP Modifications	
7.10 Log of Potential Pollutants	
7.11 Subcontractor Log	
7.12 Estimated Schedule	

1.0 PROJECT DESCRIPTION AND ELIGIBILITY

This SWPPP is prepared in accordance with the requirements of the National Pollutant Discharge Elimination System (NPDES) 2017 Construction General Permit (CGP) for Discharges from Construction Activities, pursuant to the provisions of the Clean Water Act as amended by the Water Quality Act of 1987. The 2017 CGP became effective on February 16, 2017 and expires at midnight on February 16, 2022.

This SWPPP provides project-specific guidance and requirements for the proposed construction activity. Operators are, however, responsible to read, understand, and comply with all applicable requirements of the CGP, which is appended to this SWPPP.

1.1 Project Name

Emerson Place

1.2 Project Location

Ridge Street
Millis, MA 02054

1.3 Owner Name and Address

TD Development LLC
38 Benjamin's Gate
Plymouth, MA 02360

1.4 General Contractor/Operator Name and Address

Owner Operator:

TD Development LLC
38 Benjamin's Gate
Plymouth, MA 02360

The TD Development LLC has full control of plans and specifications. The site contractor, who will have day-to-day operational control and responsibility, will file a separate NPDES Notice of Intent.

Designation of Site Manager and Emergency Contact (person responsible for the day-to-day management of site operations): Robert Fox, (or other individual as may be appointed by the Operator).

General Contractor/Operator:

(to be determined)

_____ will have day-to-day operational control and responsibility of construction activities.

Designation of Site Manager (person responsible for the day-to-day management of site operations): (to be determined) or other individual as may be appointed by the Operator.

1.5 Stormwater Team

The stormwater team is identified in Appendix 10.5.

1.6 Associated Project Documents

This SWPPP references other documents as follows:

Site Plan - Plans entitled "Emerson Place Definitive Subdivision Plan" with an original date of February 12, 2020 (as may be amended), and prepared by Legacy Engineering LLC, hereinafter referred to as the "Site Plan".

Stormwater Report – Report entitled "Stormwater Report for Emerson Place" prepared by Legacy Engineering LLC with an original date of February, 2020 (as may be amended).

1.7 SWPPP Site Plan and Relation to Other Permits

Attached to this document is a SWPPP Site Plan which summarizes the various structural construction erosion control measures to be implemented during construction. Refer to the Site Plan for additional details and requirements. In the event that provisions of this SWPPP conflict with the requirements of the other permits obtained for the project, the requirements of the other permits will prevail unless such conformance will violate the provisions of the CGP. When such conflict is discovered, this SWPPP will be revised to reflect conformance with said permit.

1.8 Nature of Construction Activities

1. The project proposes the construction three new roadways in support of 43 new single family lots including appurtenant, utility systems, stormwater management systems, and landscaping.
2. The total lot area of the development is approximately 61.25 acres.
3. The site contains both wooded and grassed portions of land, surrounded by wetlands connected to the Great Black Swamp.
4. The proposed construction activities will disturb approximately 22.2 acres in six principal phases. Phase 1a will consist of the construction of May Road and stormwater facilities, along with all appurtenant work and will involve the disturbance of 9.8 acres. Phase 1b will consist of the development of the lots along May Road and will disturb an additional 4.7 acres. Phase 2a will consist of the construction of April Way and all appurtenant work and will involve the disturbance of 1.0 acres. Phase 2b will consist of the development of the lots along April Way and will disturb an additional 3.4 acres. Phase 3a will consist of the construction of June Way and all appurtenant work and will involve the disturbance of 1.3 acres. Phase 3b will consist of the development of the lots along June Way and will disturb an additional 2.0 acres.
5. The only on-site construction support activities consist of minor areas of materials storage, which will vary in nature and location depending on the stage of construction.
6. Refer to Section 1.10 and Appendix 7.12 for a discussion of construction sequencing and schedule.
7. Refer to Attachment 10.10 for a list of pollutant generating activities, including materials inventories.
8. Construction activities are expected to occur Mondays through Saturday, 7:00 am through 6:00 pm.

9. This SWPPP is not for a public emergency.

1.9 Overall Phasing

The proposed construction activities will take place over six principal phases. Phase 1a will consist of the construction of May Road and stormwater facilities, along with all appurtenant. Phase 1b will consist of the development of the lots along May Road. Phase 2a will consist of the construction of April Way and all appurtenant work. Phase 2b will consist of the development of the lots along April Way. Phase 3a will consist of the construction of June Way and all appurtenant work. Phase 3b will consist of the development of the lots along June Way. Phase 1a is expected to commence in the summer of 2020 and to be completed by summer of 2022. Phase 1b is expected to commence in the summer of 2022 and be completed by the spring of 2024. Phase 2a is expected to commence in the spring of 2024 and to be completed by the fall of 2024. Phase 2b is expected to commence in the fall of 2024 and be completed by the summer of 2025. Phase 3a is expected to commence in the summer of 2024 and to be completed by the spring of 2025. Phase 3b is expected to commence in the spring of 2025 and to be completed by the summer of 2026.

1.10 Major Activity Construction Sequence

1.10.1 Roadway Construction Sequence

- ✓ Stakeout and install erosion and perimeter controls (which will delineate the limit of work for the project);
- ✓ Demarcate the location of existing utilities on and around the construction area;
- ✓ Clear the proposed entry driveway areas and install the construction entrance apron(s);
- ✓ Clear area around and construct temporary sediment basins;
- ✓ Clear and grub the remaining portions of the development area;
- ✓ Strip and stockpile topsoil;
- ✓ On the balance of the site, commence rough grading to sub grade elevations;
- ✓ Install new site utilities, including the stormwater management system;
- ✓ Pave the road and sidewalk to binder course;
- ✓ Loam, seed, and stabilize disturbed areas;
- ✓ Top course pave the road and sidewalk;
- ✓ Cleanout all catch basins in the portion of the site affected by construction activities after the site is fully stabilized.

1.10.2 House Construction Sequence

- ✓ Install construction entrance and perimeter erosion controls;
- ✓ Clear and grub the development area
- ✓ Grade lots;
- ✓ Install building foundation(s) and begin building construction;
- ✓ Install utilities and roof runoff infiltration systems;
- ✓ Complete construction of new building(s) and complete site landscaping;
- ✓ Temporary erosion controls will be installed as needed and as required by this Plan;

- ✓ Cleanout all catch basins in the portion of the site affected by construction activities after the site is fully stabilized.

1.11 Anticipated Discharges

The following discharges as authorized in the CGP are expected from the proposed construction and associated activities:

- ✓ Stormwater discharges associated with the proposed construction activity.
- ✓ Stormwater discharges from supporting activities such as equipment staging yards, material storage areas, excavated materials disposal areas, etc... directly related to the above noted construction activity.
- ✓ The following non-stormwater discharges, which are directly associated with the proposed large construction activity:
 - Fire hydrant flushing,
 - Waters used to wash vehicles when detergents are not used,
 - Water used to control dust in accordance with Part 3.1.B of the CGP,
 - Potable water including uncontaminated water line flushings,
 - Routine external building wash down that does not use detergents,
 - Pavement wash waters where detergents, spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed). Such wash waters may only be discharged to a surface water if it will first pass through a stormwater treatment BMP,
 - Uncontaminated air conditioning or compressor condensate,
 - Uncontaminated, non-turbid ground water or spring water,
 - Uncontaminated foundation or footing drains,
 - Treated dewatering water;
 - Landscape irrigation, and
 - Any other non-stormwater discharges otherwise allowed in the CGP

1.12 Anticipated Construction and Waste Materials

It is anticipated that the following materials will be present on the site during construction:

- ✓ Earthen materials such as dirt, gravel, crushed stone, loam, sand, fill, and other such substances.
- ✓ Asphalt and paving related materials.
- ✓ Utility piping, manholes, structures, and relative materials.
- ✓ Building materials typically involved in the construction of a residential building.
- ✓ Other typical construction materials.
- ✓ All such materials which are deemed potential pollutants shall be itemized in the log in Appendix 7.10. Potential pollutants include pesticides, fertilizers, plaster, cleaning solvents, glue/adhesives, curing compounds, wood preservatives, hydraulic oil/fluids, gasoline/diesel fuel, kerosene, antifreeze/coolant, sanitary facilities and other similar items.

Waste materials are expected to be limited to excess or discarded portions of the construction materials noted above.

1.13 Project Eligibility

The proposed construction activity is eligible to be permitted under the Construction General Permit for Massachusetts (CGP Permit No. MAR1200000) as the proposed activity will be completed in accordance with all requirements of the CGP.

The proposed construction activity is eligible to be permitted under the Construction General Permit for Massachusetts (CGP Permit No. MAR1200000) for the following reasons:

- ✓ The site will discharge construction-stage stormwater to be covered under the CGP.
- ✓ The parties listed are “operators” as defined in the CGP.
- ✓ The proposed work will disturb more than one acre of land.
- ✓ The EPA is the permitting authority for Massachusetts.
- ✓ As described in 1.9.1, the project meets one of the criteria related to the protection of species that are federally listed as endangered or threatened.
- ✓ The screening process related to the protection of historic properties has or will be completed.
- ✓ The site does not discharge to a Tier 2 water.
- ✓ No cationic treatment chemicals are proposed for use in sediment control.

1.13.1 Endangered Species

The proposed work is not likely to adversely affect ESA-listed species and/or designated critical habitats. Per the most recent NHESP data found on MassGIS, the site does not lie within, nor will it affect an area containing endangered species. Information from the U.S. Fish & Wildlife Service IPaC website indicates that the site may potentially affect one endangered species, the northern long-eared bat. We have therefore conducted a review and concluded the following:

- Per IPaC data, the site does not lie within a critical habitat for said species.
- NHESP mapping data indicates that this site is not a habitat area for said species.
- Stormwater discharges will be managed in accordance with applicable requirements and will therefore not represent a hydrological or toxicity threat to the species of concern.

It is therefore concluded that the activity not likely to adversely affect an ESA-listed species and/or designated critical habitat.

1.13.2 Historic Properties

The proposed activity involves excavation for the installation of various stormwater management BMPs. To the best of our knowledge the site is not considered to be historically significant. There are no site features that suggest historical significance and the site is not listed on the National Register of Historic Places. Consequently, the proposed construction activity meets Appendix E of the CGP.

1.14 Coverage Dates

Coverage under the 2017 CGP terminates at the earliest of the following:

- ✓ The date a Notice of Termination is submitted to the EPA;
- ✓ Expiration of the 2017 CGP on February 16, 2022 (unless the CGP is temporarily extended or the subsequent replacement CGP automatically authorizes continuing coverage)

- ✓ In the event the construction activity extends beyond the termination date of the 2017 CGP, the Operator will be responsible for complying with the subsequent replacement CGP, including any applicability eligibility requirements.

1.15 Receiving Waters

Stormwater Runoff from the entire site will discharge to an unnamed tributary to the Great Black Swamp, which lies within the Charles River Watershed.

1.15.1 Impaired Waters

In accordance with Section 3.2 of the CGP, the following analysis is provided with respect to Impaired Waters:

- The unnamed tributary Great Black Swamp is not listed in the Massachusetts Year 2016 Integrated List of Waters.
- Section 3.2 of the CGP therefore does apply to this site. As such, inspection frequencies need not comply with section 4.3 of the CGP and stabilization completion deadlines comply with relevant portions of section 2.2.14 of the CGP.

1.15.2 Tier 2, 2.5 and 3 Waters

In accordance with Section 3.2 of the CGP, the following analysis is provided with respect to Tier 2, Tier 2.5, and Tier 3 waters.

- Tier 2 waters in Massachusetts are those waters designated as “High Quality Waters” on 314 CMR 4’s associated watershed tables.
- Tier 2.5 waters in Massachusetts are those waters designated as Outstanding Resource Waters on the aforementioned watershed tables.
- To the best of our knowledge, there are no separate Tier 3 waters in Massachusetts.
- The unnamed tributary is not identified as a High Quality Water on the tables appended to 314 CMR 4.

1.15.3 TMDL Compliance

As of the date of this report, a review of the EPA’s TMDL website (<http://cfpub.epa.gov/npdes/stormwater/tmdl.cfm>) concludes that there are TMDL’s that apply to the town where this project is located. A summary of each and its relationship to the proposed construction activity are discussed below.

Northeast Regional Mercury Total Maximum Daily Load:

This TMDL is not exclusive to Massachusetts but rather applies to all of New England. It provides for a reduction in mercury concentrations within surface water bodies. The primary sources of mercury are wastewater (sewer) and atmospheric deposition. Page 27 of the October 24, 2007 “Northeast Regional Mercury Total Maximum Daily Load” report states “Because the majority of mercury in stormwater originates from atmospheric deposition, reductions of mercury loading in stormwater will be addressed through controls on atmospheric deposition.” It is therefore concluded that this

project is not required to implement any specific measure to comply with this TMDL.

Nutrient (Phosphorus) TMDL for the Upper/Middle Charles River:

This TMDL provides for a reduction in phosphorus discharges into the Charles River to reduce warm-weather eutrophication that regularly occurs. A review of the MassDEP implementation plan is available for this TMDL concludes that there are no specific numeric limitations or requirements for individual construction or development projects. Rather, the focus of the proposed implementation plan is in requiring additional regulation by local communities to control and reduce phosphorus generation. The primary impact of a project of this nature relative to phosphorus generation is stormwater generation. The Final TMDL recommends that local communities adopt stormwater management regulations/bylaws to ensure adequate treatment of stormwater runoff, thus reducing phosphorus loadings. The Town has implemented such regulations and this project is designed to be consistent with the local stormwater regulations, the DEP Stormwater Management Handbook, and the NPDES Construction General Permit. The Final TMDL also highly recommends a few specific BMP's for phosphorus reduction. One such approach is the use of infiltration facilities, which are highly effective at removing phosphorus as the phosphorus is almost eliminated through vegetation and soils contact as the water infiltrates downward. Data within the TMDL indicates that infiltration facilities designed to hold 1.0 inches of runoff from impervious surfaces, will remove more than 80% of the total annual phosphorus load from the site. Runoff from the site's impervious areas are routed to infiltration facilities designed to accommodate a minimum of 1-inches of runoff. Another focus of the Final TMDL is the elimination of illicit discharges, of which there are none within this project. It is therefore concluded that the proposed site design is consistent with the Nutrient TMDL for the Upper Charles River.

Nutrient (Phosphorus) TMDL for the Lower Charles River:

This TMDL is essentially the same as noted above for the Upper Charles River. For the same reasons as discussed above, it is therefore concluded that the proposed site design is consistent with the Nutrient TMDL for the Lower Charles River.

Pathogen TMDL for the Charles River Watershed:

This TMDL provides for reduction in pathogen concentrations in the Charles River watershed's impaired waterbody segments. A review of the EPA TMDL approval dated May 22, 2007 finds a reference to the requirement that projects of this nature implement stormwater BMP's consistent with the NPDES and other applicable regulations. The DEP has issued an implementation guide for this TMDL entitled "Mitigation Measures to Address Pathogen Pollution in Surface Water: A TMDL Implementation Guidance Manual for Massachusetts," which is the basis for the TMDL compliance assessment for this project. Pathogen sources within the Charles River

watershed are numerous but many have no specific relation to this project such as combined-sewer overflows (CSO's), agricultural sources, and septic systems. For this project, the only significant potential source of pathogens is stormwater runoff. Stormwater runoff itself is not a source of pathogens. Rather, increases in the peak rate and volume of runoff from a site contribute to a potential increase in the amount of animal waste and other pathogen sources that can be washed into a waterbody. The DEP implementation guides reference the need for local communities to adopt local bylaws and regulations regulating stormwater runoff from both construction activities and post-construction site conditions. The Town has these regulations and the project has been designed accordingly. The DEP implementation guide also notes that infiltration facilities are perhaps the most effective pathogen removal BMP as the pathogens are removed through vegetation contact and by movement through the soil matrix. It is therefore concluded that the project is consistent with the TMDL for pathogens.

1.16 Site Notice & SWPPP Accessibility

A notice will be posted conspicuously near the main entrance of the site adjacent to a public road or right-of-way. It will denote the following:

1. That this site is permitted under the NPDES Construction General Permit No. MAR1200000 and shall include the NPDES Permit tracking number.
2. A contact name and phone number for obtaining additional site information.
3. A URL where the SWPPP is posted or the following statement "If you would like to obtain a copy of the Stormwater Pollution Prevention Plan (SWPPP) for this site, contact the EPA Regional Office at <https://www.epa.gov/aboutepa/epa-region-1-new-england>.
4. The following statement "If you observe indicators of stormwater pollutants in the discharge or in the receiving waterbody, contact the EPA through the following website: <https://www.epa.gov/enforcement/report-environmental-violations>.

The site notice must use fonts large enough to be readily viewed from the adjacent public right-of-way.

This Plan will be kept on-site at all times except where not practical. The Plan will be easily available to Approving Authority inspectors during normal working hours for the construction site.

2.0 STORMWATER CONTROLS

2.1 Project Limits and General Control Considerations

The site boundaries are shown on the Site Plan. Construction activities will be limited only to those areas necessary for site construction and no soil disturbance will occur downstream of the limits of erosion controls on the site. The proposed area of disturbance is 9.8 acres in phase 1a, 4.7 acres in phase 1b, 1.0 acres in phase 2a, 3.4 acres in phase 2b, 1.3 acres in phase 3a, and 2.0 acres in phase 3b. No phase involves the disturbance of more than 10 acres of land that drain to a single point. Furthermore, the limit of work along downstream wetlands buffer areas span some

4,500 linear feet with no concentration points. As such, there is no requirement for a construction sedimentation basin and none will be used unless construction conditions dictate otherwise. Stormwater runoff shall not be directed to the proposed stormwater infiltration basin until the sideslopes and bottom of the basin are vegetated. Perimeter erosion controls are provided to prevent eroded materials from leaving the site. The construction sequence has been proposed in such a way as to minimize the amount of time that disturbed soils will be exposed to weather. A majority of the soils on the disturbed area of the site are Class A and B, which will generate minimal amounts of runoff during construction. Temporary sedimentation basins will be constructed as shown on the plans. Additional temporary sediment basins will be implemented if needed during construction.

2.2 Natural Buffers or Equivalent Sediment Controls

The upland portions of the site are bounded by bordering vegetated wetlands on nearly every side. No work is proposed within 50 feet of a waterbody or waterway except where May Road crosses the wetlands. Thus, a minimum 50' wide natural buffer will be maintained around the nearest of such features for most of the site. Perimeter erosion controls will be provided as specified herein. For areas where construction crosses wetlands, a double layer of perimeter controls is to be installed.

Site runoff through construction will be directed through vegetated buffer areas and perimeter erosion controls to maximize stormwater infiltration and filtering to reduce pollutant discharge.

2.3 Perimeter Erosion and Sediment Controls

Perimeter erosion and sediment control barriers will be provided, installed, and maintained downstream of all proposed construction activities in accordance with this Plan, the Site Plan, and all permits issued for the site development. Such controls must be installed before any earth-disturbing activities occur on the site in question. Erosion and sediment controls may be installed in phases so long as it precedes any earth-disturbing activities within the controls' upstream watershed.

The proposed single layer of perimeter erosion controls will provide adequate protection.

Sediment shall be removed along such controls on a regular basis. In no case, shall sediment be allowed to reach a depth equal to one half of the above ground height of the erosion control device.

2.4 Site Access Controls

Construction vehicles will use designated entry points for each site. Crushed stone or rip-rap entry apron(s) will be installed and properly maintained during construction until the site is paved. All construction access will be via Ridge Street and Rolling Meadows Drive. In the vicinity of the site, Ridge Street and Rolling Meadows Drive will be kept clean and swept as needed to minimize the tracking of soils and dust from the site.

2.5 Stockpiled Soils

Soil stockpiles to be left in place more than 24 hours shall be surrounded with a line of silt fence to prevent the piles from eroding into the site and to discourage on-site

runoff from eroding the stockpiles. Soil stockpiles to be left in place more than 14 days shall be stabilized temporarily in accordance with this plan. Dust control measures shall be implemented to prevent wind erosion of the stockpiles.

2.6 Dust Control

Dust control measures will be implemented regularly to prevent the off-site deposition of wind-eroded soils. The principal form of dust control will be water application.

2.7 Disturbance of Steep Slopes

Contractors must pay careful attention to steep slopes and must implement additional temporary erosion and sediment control measures during work on steep slopes to prevent erosion.

2.8 Topsoil Preservation

Topsoil generated from the site construction activities must either be stockpiled for reuse on site in accordance with the practices noted above, or shall be removed from the site for reuse on other sites. Topsoil may not be mixed with general fill.

2.9 Soil Compaction

Areas designated for final vegetative surfaces or construction-stage or final stormwater infiltration practices shall be protected from excessive compaction by restricting vehicle access and the types of equipment that may be used in such areas. Prior to seeding/planting of such areas, exposed soil that has been compacted shall be loosened by tilling or other similar methods. Conditioning shall consist of deep tilling with a rotary tiller, disc harrowing, or manual loosening and re-grading with an excavator bucket. Conditioning shall extend to a depth of at least 12-inches.

2.10 Protection of Storm Drain Inlets

All storm drain system inlets inside of perimeter controls shall be protected with sediment control measures designed to remove sediment from stormwater prior to entering the inlet. Catch basins along the street frontage shall also be protected.

Such measures shall be periodically maintained and replaced as needed to ensure their proper functionality. Sediment shall be removed daily where found.

2.11 Protection of Channels and Discharge Points

Areas of concentrated stormwater discharge points such as swales, channels, and pipe outfalls shall incorporate velocity mitigation controls. Channels and swales shall implement temporary check dams constructed of straw bales of crushed stone berms. Discharge points shall be protected with temporary rip-rap aprons to dissipate the energy and velocity of stormwater flows.

2.12 Construction Stage Sediment Traps/Basins

The SWPPP plan includes temporary basins during construction. Should construction conditions require further measures, this SWPPP will be updated to incorporate properly designed sediment trap(s).

2.13 Treatment Chemicals

There is no planned use of polymers, flocculants, or other erosion and sediment-control related treatment chemicals at this site.

2.14 Temporary Stabilization

Where construction activities have permanently ceased or where they have temporarily ceased for a period of more than 14 days, temporary soil stabilization measures will be employed in the affected areas in accordance with the following schedule:

- For disturbed areas less than 5 acres: as soon as practicable but no later than 14 calendar days after stabilization has been initiated.
- For disturbed areas larger than 5 acres and for site discharging to sediment- or nutrient-impaired waters: as soon as practicable but no later than 7 calendar days after stabilization has been initiated.

Such stabilization measures will consist of either erosion control mats or seeding. Where seeded for temporary erosion control purposes, a minimum of 6 pounds per 1,000 square feet of seed will be applied along with an appropriate fertilizer (based on the time of year applied) or as necessary to obtain a 70% vegetative cover. Additional seeding will be completed if needed and periodic watering will also be employed if necessary. Where stabilization by the 14th day is precluded by snow cover, frozen ground conditions, or other similar circumstances, stabilization measures will be initiated as soon as practicable.

Areas which are to ultimately be stabilized with pavement or other structural measures will be temporarily stabilized (when construction activities cease for more than 14 days), with crushed stone or a compacted gravel sub-base. Such temporary stabilization measures will be maintained in good condition.

2.15 Maintenance of Erosion & Sediment Control Measures

Erosion and sediment control measures will be maintained in good condition for the duration of the construction activity and until such time as the upstream areas achieve final stabilization as described herein. Sediment will be removed along haybales, silt fence, or filter socks when the depth exceeds four-inches. All control measures will be maintained in effective operating condition. If site inspections identify control measures that are not operating effectively or finds other problems, the Operator must:

- ✓ Initiate work to correct the problem immediately upon discovery and complete the work by the close of the next work day if the problem can be corrected through routine maintenance;
- ✓ For more significant repairs or where inspections determine that additional erosion and sediment controls are needed, such work must be completed and operation no later than 7 calendar days after discovery of the problem.

2.16 Pollution Prevention (Good Housekeeping Practices)

2.16.1 Construction Staging Areas

Construction staging areas will be limited in quantity and will be maintained in a neat and orderly fashion. Refer to the Site Plan for staging area location(s).

2.16.2 Vehicle Storage, Fueling and Maintenance Area

The Operator will designate a specific area of the site for fueling and overnight storage of vehicles on the site. Such area shall be located as far from wetlands areas and stormwater inlets as practicable and outside of the 100' buffer zone. Refer to the Site Plan for vehicle storage area location(s).

All equipment stored on-site will be monitored for leaks and will receive regular preventative maintenance to reduce the chance of leakage. Where vehicle leaks are identified, drip pans and absorbent pads shall be employed until the leak can be repaired, which shall be completed as soon as practicable. The Operator will maintain a bag of chemical sorbent, absorbent pads and an emergency spill kit on the site at all times within one of the designated Staging Areas. A sign shall be posted at the entrance to each Staging Area noting the location of the emergency spill kit. Spill kits shall include the following at a minimum.

- Universal chemical sorbent capable of absorbing up to 15 gallons of liquid.
- Gloves and safety glasses,
- Four chemical socks,
- Four chemical pads,
- Four chemical pillows, and
- Four plastic disposal bags.

2.16.3 Equipment Washing

Vehicle or equipment washing is not allowed on-site.

2.16.4 Building Products, Materials and Wastes

- ✓ The site will be maintained in a neat and orderly manner, with debris regularly disposed of.
- ✓ All products and materials stored on-site will be stored in a neat and orderly manner in appropriate containers. Building materials must be stored under cover (i.e. under a roof or under plastic sheeting) to prevent contact with rainwater.
- ✓ Manufacturer recommendations relative to the proper storage, use, and disposal of products and materials will be followed.
- ✓ An effort will be made to minimize the on-site storage of excess construction materials. In all cases, materials will be removed from the site if unused for more than three months.
- ✓ When use of products and materials have been completed, any excess products and materials will be promptly removed from the site and/or properly disposed of in accordance with all applicable state and federal regulations.
- ✓ All equipment to be stored on-site will be stored in a neat and orderly manner and such equipment will only be stored in the designated equipment Staging Areas on the site.

2.16.5 Fertilizer, Pesticide, Herbicide, or Insecticide Storage

Such materials may not be stored on-site and shall only be brought on-site in the quantities needed for application. Application shall be in accordance with manufacturer recommendation. Disposal of excess products shall follow local, state and federal law.

2.16.7 Petroleum and Other Chemical Products Storage

- ✓ Petroleum products may only be stored on-site in the limited quantities necessary for the ongoing work.
- ✓ All petroleum products will be stored in tightly sealed containers in one of the designated Staging Areas on the site and must be covered to prevent contact with rainwater.
- ✓ All paint and other hazardous materials containers will be stored in a tightly sealed container whenever not in use and stored under cover. Any waste and/or excess for these products will be disposed of off-site in accordance with all applicable state and federal regulations.

2.16.8 Hazardous Products and Hazardous Waste

- ✓ The use of hazardous products during construction will be in accordance with manufacturer recommendations and established construction practices.
- ✓ Hazardous materials must be stored in a separately designated area, under cover, and within secondary storage containers designed to hold at least 110% of the volume of the substance in question.
- ✓ Hazardous products will be kept in their original containers until they are used, and the container labels will be kept on-site within a designated Staging Area until use of the product is no longer needed.
- ✓ Unused quantities of hazardous products will be removed from the site in accordance with all applicable state and federal regulations.
- ✓ Hazardous waste materials generated by the construction (if any) will be disposed of off-site in accordance with all applicable state and federal regulations pertaining to such disposal. The Site Manager will be informed of these requirements and will ensure that this provision is adhered to.
- ✓ Any spills of hazardous materials found on the site will be cleaned up immediately using dry-cleanup procedures and reported in accordance with procedures established by local, state, and federal regulations. Washdowns of spill areas is prohibited.
- ✓ The Site Manager will be properly trained in hazardous materials spill prevention and clean-up.

2.16.9 Construction and Domestic Waste

- ✓ All waste materials from the site will be collected in dumpsters and disposed of off-site in accordance with all applicable state and federal regulations. The dumpster will be emptied as needed and the Operator will ensure that trash collection does not accumulate outside the dumpster. Trash and debris will be collected at least once per working day.
- ✓ The Operator will keep a portable toilet on the site for the use of work personnel and shall dispose of the waste materials in accordance with local, state, and federal regulations.

2.16.10 Materials/Tools Washing

- ✓ Any such wash water shall be directed into a leak-proof container and disposed of off-site in accordance with local, state and federal regulations.
- ✓ Concrete trucks will only wash out or dump surplus concrete within areas designated by the Operator on the site in designated depressions to prevent uncontrolled migration of such materials. All such surplus concrete will be

cleaned-up by crushing the concrete and either re-using it in the construction activities or by removing it from the site.

- ✓ Wash waters from concrete or stucco applications, or from paint brushes or other similar activities must be directed into a leak-proof container or pit designed to prevent overflows due to precipitation. Accumulated wastewater must be disposed of in accordance with all local, state, and federal regulations to the extent it is deemed hazardous. Washwater generating activities must be conducted as far away from wetlands areas and storm drain inlets as possible.

2.16.11 Fertilizer Application

- ✓ Fertilizer shall be applied in accordance with the rates specified herein and in no case more than stipulated in the manufacturer's specifications.
- ✓ To the extent practicable, apply fertilizers in optimal seasons to maximize vegetation uptake and growth.
- ✓ Avoid applying fertilizers before heavy rains are expected and never apply to frozen ground or during winter conditions.
- ✓ Fertilizer may not be used in stormwater BMPs unless the BMP discharges to upland areas and unless the BMP is an infiltration practice.
- ✓ Fertilizers are not to be applied within buffer zones or within the Zone II for drinking water.

2.16.12 Spill Prevention and Response

(This portion of the document is written as if giving instructions to parties working on the property and/or the owner of the property)

In the event of an accident where significant gasoline or other petroleum products are released, the following procedure shall be followed in the order noted.

- ✓ Seek to contain the spill by constructing a berm of earthen or other materials around the spill site until the appropriate emergency response personnel has arrived. Seek to seal off any downstream stormwater facilities by earthen berms or the emergency spill kit materials.
- ✓ Immediately notify the following governmental entities and inform them of the type of spill that occurred:
 - Millis Fire Department at 508-376-2361,
 - Millis Board of Health at 508-376-7042,
 - Millis Conservation Commission at 508-376-7045,
 - Mass. Department of Environmental Protection (DEP) Central Region at (508) 792-7650 (address is 8 New Bond Street Worcester, MA 01606), and
 - National Response Center (NRC) at (800) 424-8802 (for spills that require such notification pursuant to 40 CFR Part 110, 40 CFR Part 117, and 40 CR Part 302).
- ✓ Once the various emergency response teams have arrived at the site, the owner shall follow the instructions of the various governmental entities, which may include the following:
 - A clean up firm may need to be immediately contacted.
 - If the materials have remained trapped in the catch basins or proprietary stormwater treatment units, then these structures may be pumped out. All materials shall be removed by qualified personnel

and disposed of in accordance with all applicable local, state, and federal regulations.

2.17 Dewatering Practices

This site is not expected to encounter significant quantities of groundwater during construction activities but if it does, the following practices will be implemented:

- ✓ Do not discharge any floating solids or foam;
- ✓ If dewatering water is found to contain oil, grease, etc... it must be filtered or passed through an oil/water separator prior to discharge;
- ✓ Wherever possible, discharge dewatering water to vegetated upland areas for infiltration. Where this is not possible, discharge dewatering water into a filtering pit consisting of a perimeter of double rows of haybales lined with three layers of filter fabric. Do not direct dewatering water into wetlands without prior treatment;
- ✓ Velocity dissipation measures must be included at all discharge points (rip-rap or crushed stone apron).

2.18 Infiltration Systems

The proposed construction-stage stormwater controls do not include any underground stormwater infiltration BMPs.

3.0 INSPECTIONS

3.1 Inspection Frequency

The Operator will designate an inspector or inspectors, who shall be a “qualified person” as defined in the CGP and will familiarize himself/herself with the design plans, with the CGP, and with the specifications of this SWPPP. The inspector will inspect the site for compliance with this Plan at least once every seven calendar days or once every fourteen calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches or greater for the entire duration of construction, except as otherwise noted herein. The site does not discharge to a sediment or nutrient impaired water. Refer to CGP for additional inspection requirements.

Inspections may be reduced to twice per month in the first month, and thereafter once per month, in areas that have been temporarily stabilized or to areas that have achieved final stabilization. Wherever work within temporarily stabilized areas resumes, inspections shall be at the normal frequency specified above.

Should construction span a winter season, inspection may cease so long as the ground is frozen, all disturbed areas have been stabilized and construction is not continuing during the frozen conditions. In such case, inspections will resume one month before expected thaw of soil on the site. In areas where work will proceed through frozen ground conditions, inspections may be monthly until the area thaws or until rainfall is expected, whichever occurs earlier.

Once specific areas have received final stabilization, no further inspections are necessary for that area.

3.2 Inspection Areas

The Inspector will inspect all areas that have been cleared, graded, or excavated and which have not yet been stabilized; all stormwater controls including erosion and sediment controls; all equipment, materials, or waste storage areas; all areas where stormwater typically flows on the site; all areas where stormwater discharges from the site; and all areas where stabilization measures have been implemented.

3.2 Scope of Inspection

The inspection will review the following, at a minimum:

- ✓ Ensure that all snow fence lines (to be orange color) are vertical and strung securely between stakes;
- ✓ Ensure that all silt fence lines are vertical and strung securely between stakes and have no tears;
- ✓ Ensure that straw bales are not buried;
- ✓ Ensure that filter socks are not buried;
- ✓ Ensure that sediment accumulation along erosion controls does not exceed amounts specified above;
- ✓ Ensure that sediment accumulation within existing catch basins are not excessive and that sediment is removed when the depth of accumulation exceeds two feet or 50% of the sump depth, whichever is less;
- ✓ Ensure that un-stabilized areas during active construction activities are not eroding unduly;
- ✓ Ensure that slopes on the construction site are not eroding unduly;
- ✓ Ensure that drainage swales and drainage basins (once constructed) are functioning properly during construction;
- ✓ Ensure that areas where construction activities cease for more than 7 days are temporarily stabilized as specified herein;
- ✓ Ensure that temporary and permanent stabilization measures are thorough and complete and that there are no unprotected or deficient areas;
- ✓ Ensure that the point of vehicular entry into the site is not resulting in soils being tracked into the adjacent street;
- ✓ Care will be taken to determine if pollutants are leaving the site via either overland runoff or entrance into the municipal stormwater system;
- ✓ Determine if pollutants are passing erosion prevention measures and determine whether such issue will result in adverse downstream impacts, in which case additional measures shall be installed as required herein;
- ✓ Identify any areas where new or modified stormwater, sediment and erosion controls are needed;
- ✓ Check for the presence of conditions that could lead to leaks, spills or other accumulations of pollutants on the site;
- ✓ Identify and document all instances of non-compliance; and
- ✓ If a discharge from the property is identified: specify the location, document the visual quality of the discharge including color, odor, floating, settled, or suspended solids, foam, oil sheen or other obvious indicators of stormwater pollutants; and documents the effectiveness and any needed improvements to stormwater controls on the site.

All deficiencies will be remedied immediately and no later than seven days after discovery of the deficiency, and if possible, prior to the next anticipated rainfall event, if that event is anticipated to occur sooner than seven days. In addition, this Plan will be updated if needed, upon the documentation of a deficiency. The inspector will complete an inspection report after each site inspection and will provide a copy of this report to the Operator, who will keep the reports on-file. The inspection reports will at a minimum, contain the following information:

- ✓ The inspection date,
- ✓ Name, title, and qualifications of personnel conducting the inspection,
- ✓ Weather information for the period since the last inspection, including an estimate of the beginning time, duration, and rainfall quantity for any rainfall events since the last inspection,
- ✓ Weather information for the time of the inspection,
- ✓ Location of discharges of sediment or pollution from the site, if any are discovered during the inspection,
- ✓ Location of Controls (identified below) that need to be maintained,
- ✓ Location of Controls (identified below) that have failed to perform adequately, and which need redesign or improvement, and
- ✓ Location where additional Controls (not originally designed) need to be provided (if any).
- ✓ The report must identify any discovered incidents of non-compliance, and if none are found, a certification that the site is in compliance with this Plan. The report must be signed by the Inspector and the Operator as identified above.

4.0 CORRECTIVE ACTIONS

Any corrective actions (spills, repairs of stormwater controls, replacement of stormwater controls, installation of new stormwater controls, etc...) must be completed within seven calendar days of the first deficiency observation. A log report must be prepared for each corrective action in accordance with the requirements of the CGP and appended to this SWPPP.

5.0 PERSONNEL TRAINING AND RECORDING KEEPING

5.1 Personnel Training

Inspectors and personnel who are responsible for taking corrective action or for designing, installing, maintaining or repairing stormwater controls, must be trained. Each such person must receive sufficient training such that they understand the requirements of the SWPPP and CGP and the scope of their responsibilities pursuant to these documents. Training will include a thorough description of the location of stormwater controls, the design function of stormwater controls, requirements for inspections and corrective action, and proper procedures to follow when implementing the requirements of the CGP and SWPPP.

5.2 Records

In addition to the inspection reports required herein, the Operator shall keep a record of:

- ✓ Dates when grading occurred,
- ✓ Dates when construction activities temporarily or permanently cease on any portion of the site, and
- ✓ Dates when stabilization measures are installed.

Inspection reports shall be copied to the Town's Conservation Agent.

5.3 Retention of Records

This SWPPP along with the NOI, acknowledgement letter from the EPA, all correspondence, inspection reports, records, and supporting data for this Notice of Intent will be kept for at least three years from the date of termination of coverage under the CGP.

5.4 Updating This SWPPP

This SWPPP will be updated as needed during the construction process to reflect changes in design, construction methodology, operation, maintenance, or other factors that may affect the discharge of stormwater and/or pollutants off the site during construction.

6.0 CERTIFICATIONS

I certify under the penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information contained therein. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____
(Signature)

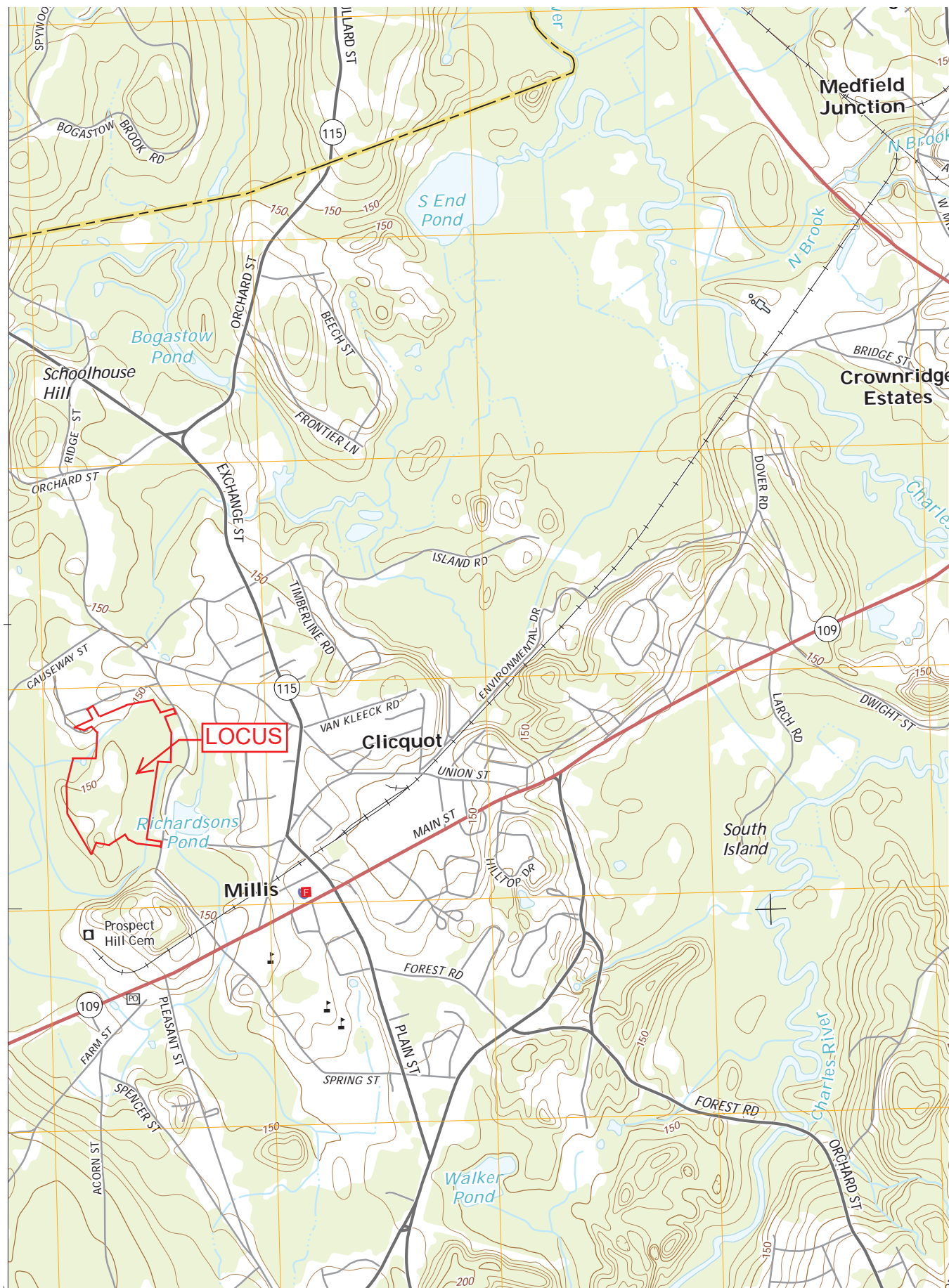
Date: _____

Signed: _____
(Signature)

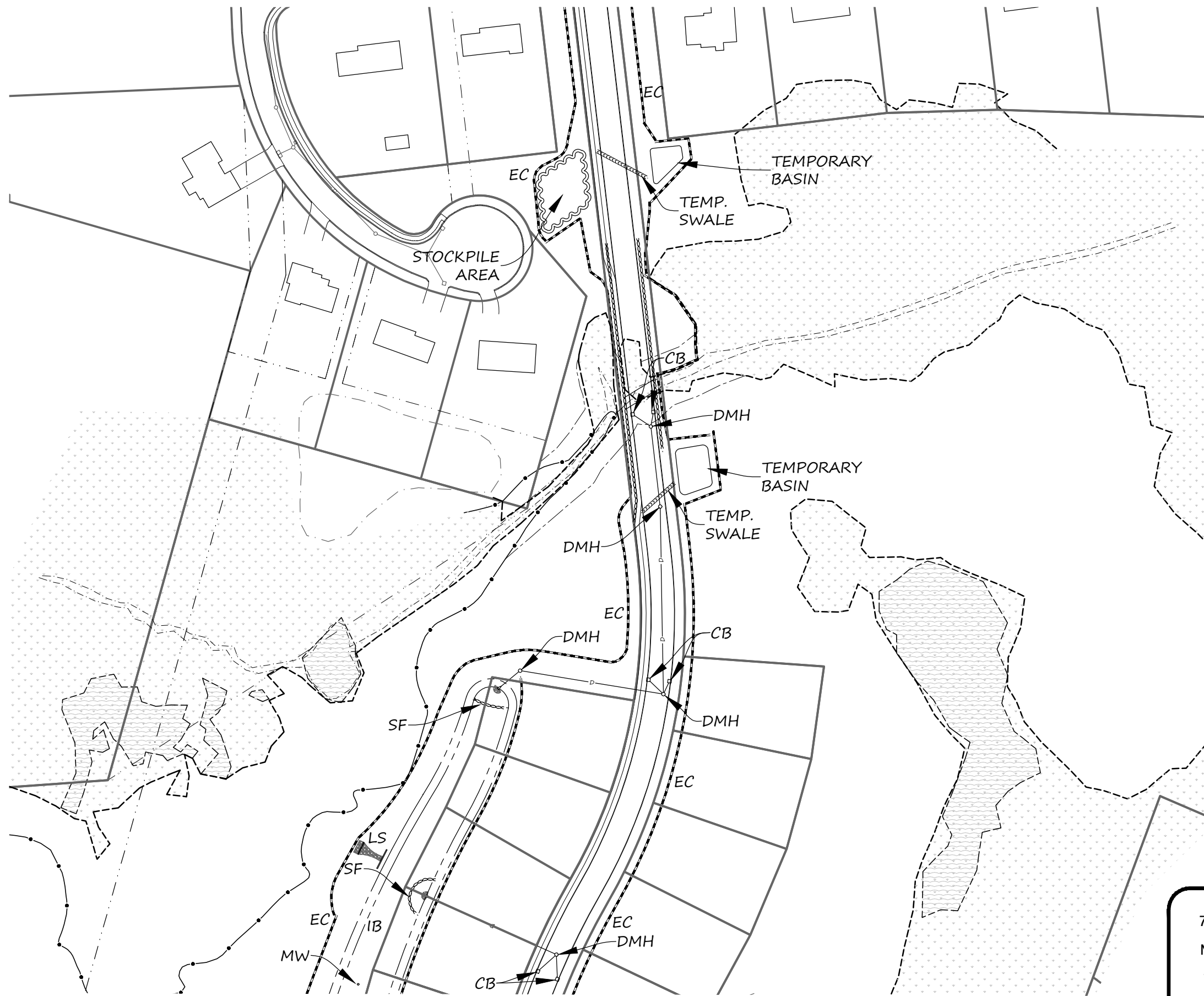
Date: _____

7.0 APPENDICES

APPENDIX 7.1 USGS MAP



APPENDIX 7.2 SWPPP SITE PLAN



PLAN SCALE: 1"=120'



PLAN DATE: FEBRUARY 12, 2020

REVISION	DATE	BY
REVISIONS PER TOWN COMMENTS	5/20/20	DJM

EMERSON PLACE
SWPPP
PLAN OF LAND
IN
MILLIS, MA

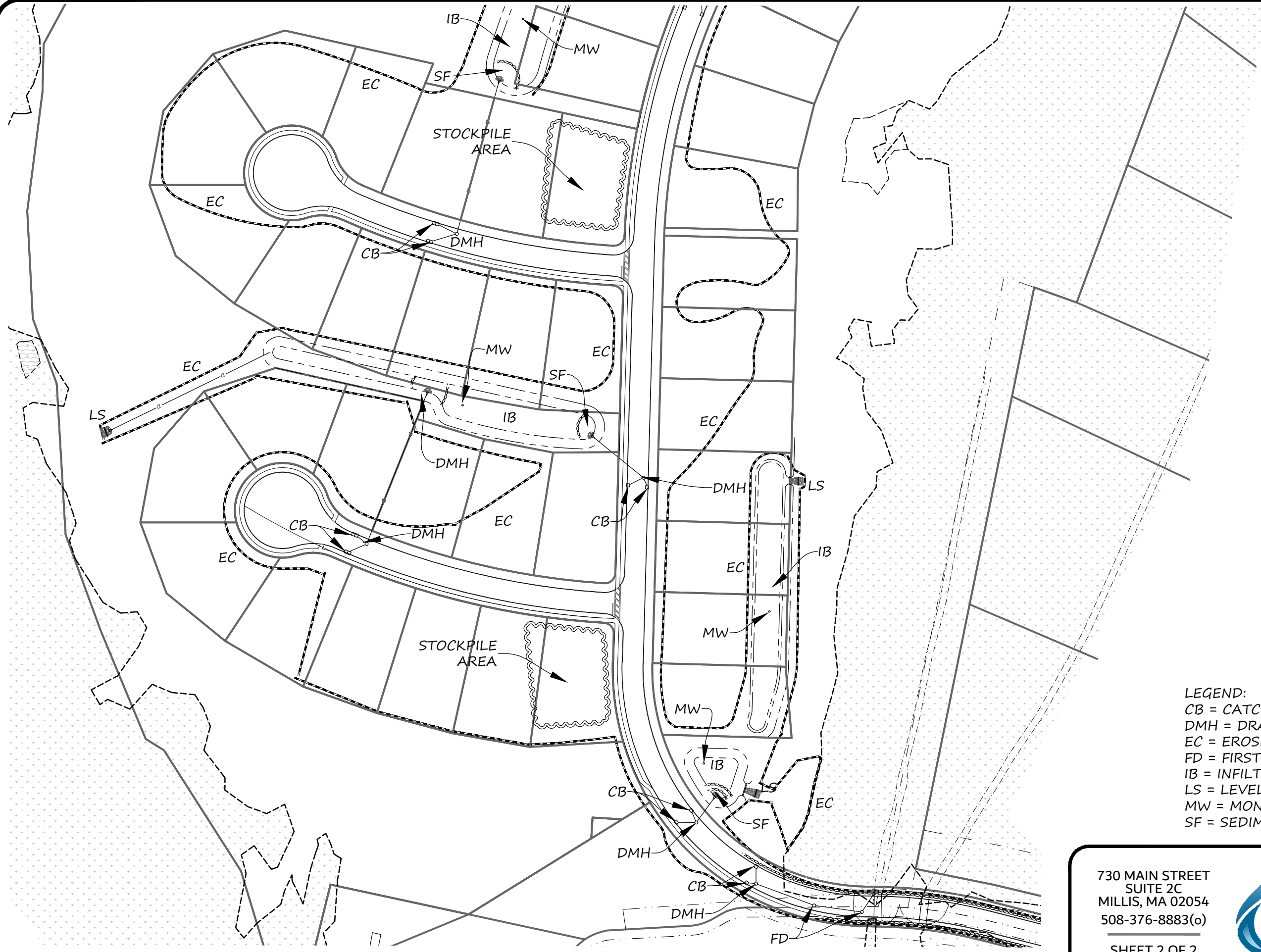
LEGEND:
CB = CATCH BASIN
DMH = DRAIN MANHOLE
EC = EROSION CONTROL
FD = FIRST DEFENSE UNIT
IB = INFILTRATION BASIN
LS = LEVEL SPREADER
LW = LIMIT OF WORK
MW = MONITORING WELL
SF = SEDIMENT FOREBAY

730 MAIN STREET
SUITE 2C
MILLIS, MA 02054
508-376-8883(o)

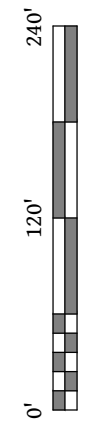
SHEET 1 OF 2



LEGACY
ENGINEERING



PLAN SCALE: 1"=120'



PLAN DATE: FEBRUARY 12, 2020

REVISION	DATE	BY
REVISIONS PER TOWN COMMENTS	5/20/20	DJM

EMERSON PLACE
SWPPP
PLAN OF LAND
IN
MILLIS, MA

- LEGEND:
- CB = CATCH BASIN
 - DMH = DRAIN MANHOLE
 - EC = EROSION CONTROL
 - FD = FIRST DEFENSE UNIT
 - IB = INFILTRATION BASIN
 - LS = LEVEL SPREADER
 - MW = MONITORING WELL
 - SF = SEDIMENT FOREBAY

730 MAIN STREET
SUITE 2C
MILLIS, MA 02054
508-376-8883(o)



LEGACY
ENGINEERING

APPENDIX 7.3
CONSTRUCTION GENERAL
PERMIT (CGP)
(TO BE ADDED AT TIME OF CONSTRUCTION)

APPENDIX 7.4
NOTICE OF INTENT
(TO BE ADDED AT TIME OF CONSTRUCTION)

APPENDIX 7.5
STORMWATER TEAM
(TO BE FINALIZED AT TIME OF CONSTRUCTION)

STORMWATER TEAM

Operator #1 Stormwater Team

Owner/Operator Name: TD Development LLC

Stormwater Team

	Team Member	Responsibility
1	SWPPP Preparer: Legacy Engineering LLC	Preparing and modifying SWPPP
2	SWPPP Compliance & Oversight: Robert Fox	General oversight of compliance with SWPPP & CGP
3	Qualified Inspector: Operator 2 to perform Inspections: T.B.D.	Performing Site Inspections
4	Construction Manager: Operator 2 to provide construction management: T.B.D.	Overseeing the installation & maintenance of all stormwater and erosion controls throughout construction. Day-to-day responsibility for compliance with the SWPPP and CGP

Operator #2 Stormwater Team

Construction Operator Name:

Stormwater Team

	Team Member	Responsibility
1	SWPPP Preparer: Legacy Engineering, LLC	Preparing and modifying SWPPP
2	SWPPP Compliance & Oversight: T.B.D.	General oversight of compliance with SWPPP & CGP
3	Qualified Inspector: T.B.D.	Performing Site Inspections
4	Construction Manager: T.B.D.	Overseeing the installation & maintenance of all stormwater and erosion controls throughout construction. Day-to-day responsibility for compliance with the SWPPP and CGP

APPENDIX 7.6 INSPECTION REPORTS

(TO BE ADDED AS THEY ARE GENERATED)

STORMWATER CONSTRUCTION SITE INSPECTION REPORT

General Information			
Project Name	Emerson Place		
NPDES Tracking No.	MAR_____	Location	Ridge Street Millis, MA 02054
Date of Site Inspection		Start/End Time	
Inspector's Name(s) and Qualifications			
Inspector's Title(s)			
Inspector's Contact Information			
Describe present phase of construction			
Type of Inspection ("Storm" = any rainfall event of 0.25 inches or more) <input type="checkbox"/> Regular 14-day Inspection <input type="checkbox"/> Pre-storm event <input type="checkbox"/> During storm event <input type="checkbox"/> Post-storm event			
Weather Information			
Has it rained since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, provide: Storm Start Date & Time: Storm Duration (hrs): Approximate Rainfall (in):			
Weather at time of this inspection?			
Do you suspect that discharges may have occurred since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Is it safe to perform the required inspection? If no, indicate why and where these limitations apply <input type="checkbox"/> Yes <input type="checkbox"/> No			

Site-specific BMPs Inspection Checklist

	BMP Description	BMP Installed and Operating Properly?	Corrective Action Needed	Date for corrective action/responsible person
1	Entrance Aprons	<input type="checkbox"/> Yes <input type="checkbox"/> No		
2	Erosion Barriers along perimeter of work area	<input type="checkbox"/> Yes <input type="checkbox"/> No		
3	Catch Basin Inlet protection	<input type="checkbox"/> Yes <input type="checkbox"/> No		
4	Other-	<input type="checkbox"/> Yes <input type="checkbox"/> No		
5	Other-	<input type="checkbox"/> Yes <input type="checkbox"/> No		

RIDGE PLACE SWPPP

Overall Site Issues

	BMP/activity	Implemented?	Maintained?	Corrective Action	Date for corrective action/responsible person
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	<input type="checkbox"/> Yes <input type="checkbox"/> No	n/a		
2	Are perimeter controls and sediment barriers adequately installed and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
3	Are stormwater discharges free of sediment deposits?	<input type="checkbox"/> Yes <input type="checkbox"/> No	n/a		
4	Are storm drain inlets properly protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No	n/a		
5	Is there evidence of sediment being tracked into the street?	<input type="checkbox"/> Yes <input type="checkbox"/> No	n/a		
6	Is trash/litter from work areas collected and placed in covered dumpsters?	<input type="checkbox"/> Yes <input type="checkbox"/> No	n/a		
7	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	<input type="checkbox"/> Yes <input type="checkbox"/> No	n/a		

RIDGE PLACE SWPPP

	BMP/activity	Implemented?	Maintained?	Corrective Action	Date for corrective action/responsible person
8	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No	n/a		
9	Are new or additional stormwater controls necessary to ensure compliance with the CGP?	<input type="checkbox"/> Yes <input type="checkbox"/> No	n/a		
10	Do material storage areas present risk of spillage or leakage of potentially hazardous materials ?	<input type="checkbox"/> Yes <input type="checkbox"/> No	n/a		
11	Other-	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		

Non-Compliance: Record any incidents of non-compliance with the Construction General Permit or the SWPPP since the last inspection in the table below.

Have any incidents of non-compliance occurred since the last inspection?

☐Yes ☐No

	Incident Description	Corrective Action Needed & Date of Initiation
1		
2		
3		
4		

RIDGE PLACE SWPPP

Have any incidents of non-compliance occurred since the last inspection?

☐Yes ☐No

	Incident Description	Corrective Action Needed & Date of Initiation
5		

Discharges: Record any incidents of the discharge of sediment or eroded materials from the site

Have any discharges from the site occurred since the last inspection?

☐Yes ☐No

	Location of Discharge & Description of Water Quality (color, odor, floating, settled, or suspected solids, foam, sheen, etc...)	Corrective Action Needed & Date of Initiation (i.e. correction of existing stormwater controls or installation of new stormwater controls)
1		
2		
3		
4		
5		

Certification statement:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name:

Signature:

Date: _____

APPENDIX 7.7
LOG OF CORRECTIVE
ACTIONS
(TO BE ADDED AS INCIDENTS OCCUR)

LOG OF CORRECTIVE ACTION

Corrective Action: "Any action taken to (1) repair, modify, or replace any stormwater control used at the site; (2) clean up and dispose of spills, releases, or other deposits found on the site; and (3) remedy a permit violation."

	Condition Type & Description	Date & Time Condition was Identified	Is SWPPP Modification Required?	Description of Corrective Action Taken (attach additional sheets as needed to describe). Specify type of materials disposed and the disposal location.
1			<input type="checkbox"/> Yes <input type="checkbox"/> No	
2			<input type="checkbox"/> Yes <input type="checkbox"/> No	
3			<input type="checkbox"/> Yes <input type="checkbox"/> No	
4			<input type="checkbox"/> Yes <input type="checkbox"/> No	
5			<input type="checkbox"/> Yes <input type="checkbox"/> No	
6			<input type="checkbox"/> Yes <input type="checkbox"/> No	
7			<input type="checkbox"/> Yes <input type="checkbox"/> No	
8			<input type="checkbox"/> Yes <input type="checkbox"/> No	
9			<input type="checkbox"/> Yes <input type="checkbox"/> No	
10			<input type="checkbox"/> Yes <input type="checkbox"/> No	

APPENDIX 7.8
LOG OF REDUCED
INSPECTIONS
(TO BE ADDED AS INCIDENTS OCCUR)

LOG OF REDUCED INSPECTIONS

Log of reduced inspections permissible pursuant to section 4.4 of the Construction General Permit.

	Reason for Reduced Inspection	Portion of Site Applicable To	Beginning of Reduced Inspection Period	Conclusion of Reduced Inspection Period
1	<input type="checkbox"/> Stabilized Area (reduced to monthly) <input type="checkbox"/> Frozen Conditions			
2	<input type="checkbox"/> Stabilized Area (reduced to monthly) <input type="checkbox"/> Frozen Conditions			
3	<input type="checkbox"/> Stabilized Area (reduced to monthly) <input type="checkbox"/> Frozen Conditions			
4	<input type="checkbox"/> Stabilized Area (reduced to monthly) <input type="checkbox"/> Frozen Conditions			
5	<input type="checkbox"/> Stabilized Area (reduced to monthly) <input type="checkbox"/> Frozen Conditions			
6	<input type="checkbox"/> Stabilized Area (reduced to monthly) <input type="checkbox"/> Frozen Conditions			
7	<input type="checkbox"/> Stabilized Area (reduced to monthly) <input type="checkbox"/> Frozen Conditions			
8	<input type="checkbox"/> Stabilized Area (reduced to monthly) <input type="checkbox"/> Frozen Conditions			
9	<input type="checkbox"/> Stabilized Area (reduced to monthly) <input type="checkbox"/> Frozen Conditions			
10	<input type="checkbox"/> Stabilized Area (reduced to monthly) <input type="checkbox"/> Frozen Conditions			

APPENDIX 7.9
LOG OF SWPPP
MODIFICATIONS
(TO BE ADDED AS MODIFICATIONS OCCUR)

LOG OF SWPPP MODIFICATIONS

	Date of Modification	Person Authorizing Modification	General Description of Modification
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			

APPENDIX 7.10 LOG OF POTENTIAL POLLUTANTS

LIST OF CONSTRUCTION MATERIALS WHICH MAY BE
CONSIDERED A POTENTIAL POLLUTANT
(TO BE ADDED AS SUCH INFORMATION IS DETERMINED)

CONSTRUCTION MATERIALS POLLUTANT LIST

No. _____

DESCRIPTION OF CONSTRUCTION ACTIVITY:

	Construction Material	Solid/Liquid?	General Description of Storage and Use
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

APPENDIX 7.11 SUB-CONTRACTOR LOG

LIST ALL SUB-CONTRACTORS AND APPEND A
CERTIFICATION STATEMENT FOR EACH INDICATING THEIR
KNOWLEDGE OF AND COMPLIANCE WITH THIS SWPPP

(TO BE ADDED AS SUCH INFORMATION IS DETERMINED)

SUB-CONTRACTOR LOG

	Sub-Contractor Name	Address	Contact Name and Phone Number

APPENDIX 7.12 ESTIMATED SCHEDULE

(TO BE ADDED AS SUCH INFORMATION IS DETERMINED)

ESTIMATED SCHEDULE

Task	Estimated Start Date	Estimated Duration
Earth Disturbing Activities		
Clearing and Grubbing		
Mass Grading (major cuts and fills)		
Final Grading		
Soil Stockpile Creation		
Removal of Temporary Stormwater Conveyances (if applicable)		
Removal of Other Temporary Stormwater Control Measures		
Removal of Construction Equipment and Vehicles		
Cessation of Any Pollutant-Generating Activities		

ATTACHMENT E: TSS REMOVAL CALCULATION SHEETS

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin #2 Pretreatment

TSS Removal Calculation Worksheet

A	B	C	D	E
BMP1	TSS Removal Rate1	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Deep Sump Catch Basin	25%	1.00	25%	75%
Sediment Forebay	25%	0.75	19%	56%

Total TSS Removal =

44%

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

Project: Emerson Place
 Prepared By: Legacy Engineering LLC
 Date: May 20, 2020

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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basins #1 & 2

TSS Removal Calculation
Worksheet

A	B	C	D	E
BMP1	TSS Removal Rate1	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Deep Sump Catch Basin	25%	1.00	25%	75%
Infiltration Basin with Sediment Forebay	80%	0.75	60%	15%

Total TSS Removal =

85%

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

Project: Emerson Place
Prepared By: Legacy Engineering LLC
Date: May 20, 2020

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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin #3

TSS Removal Calculation
Worksheet

A	B	C	D	E
BMP1	TSS Removal Rate1	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Deep Sump Catch Basin	25%	1.00	25%	75%
Sediment Forebay	25%	0.75	19%	59%
Infiltration Basin with Sediment Forebay	80%	0.59	47%	12%

Total TSS Removal =

88%

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

Project: Emerson Place
Prepared By: Legacy Engineering LLC
Date: May 20, 2020

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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin #4

TSS Removal Calculation Worksheet

A	B	C	D	E
BMP1	TSS Removal Rate1	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Infiltration Basin Treating Clean Runoff	80%	1.0	80%	20%

Total TSS Removal =

80%

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

Project: Emerson Place
 Prepared By: Legacy Engineering LLP
 Date: May 20, 2020

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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
2. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
3. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
4. Total TSS Removal = Sum All Values in Column D

Location: First Defense Southeastern Wetlands

TSS Removal Calculation Worksheet

A BMP1	B TSS Removal Rate1	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Catch Basin	25%	1.0	25%	75%
First Defense Unit	80%	0.75	60%	15%
First Defense unit	80%	0.15	12%	3%

Total TSS Removal =

97%

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

Project: Emerson Place
Prepared By: Legacy Engineering LLP
Date: May 20, 2020

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

ATTACHMENT F: STORMWATER MANAGEMENT HANDBOOK CHECKLIST



Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

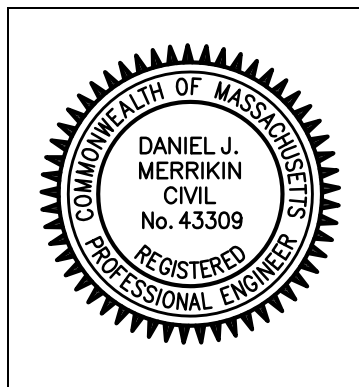
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Signature and Date

Checklist

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

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



Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

Standard 3: Recharge

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

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



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

Standard 4: Water Quality

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

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



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

Standard 6: Critical Areas

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



Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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



Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 9: Operation and Maintenance Plan

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

Standard 10: Prohibition of Illicit Discharges

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

ATTACHMENT G: FEMA FIRMETTE

National Flood Hazard Layer FIRMette



FEMA

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth
		Regulatory Floodway Zone AE, AO, AH, VE, AR
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The base map shown complies with FEMA's base map accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/22/2018 at 8:35:56 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: base map imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

42°10'35.35"N



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 250 500 1,000 1,500 2,000 Feet 1:6,000

42°10'8.68"N

71°21'47.79"W

National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped

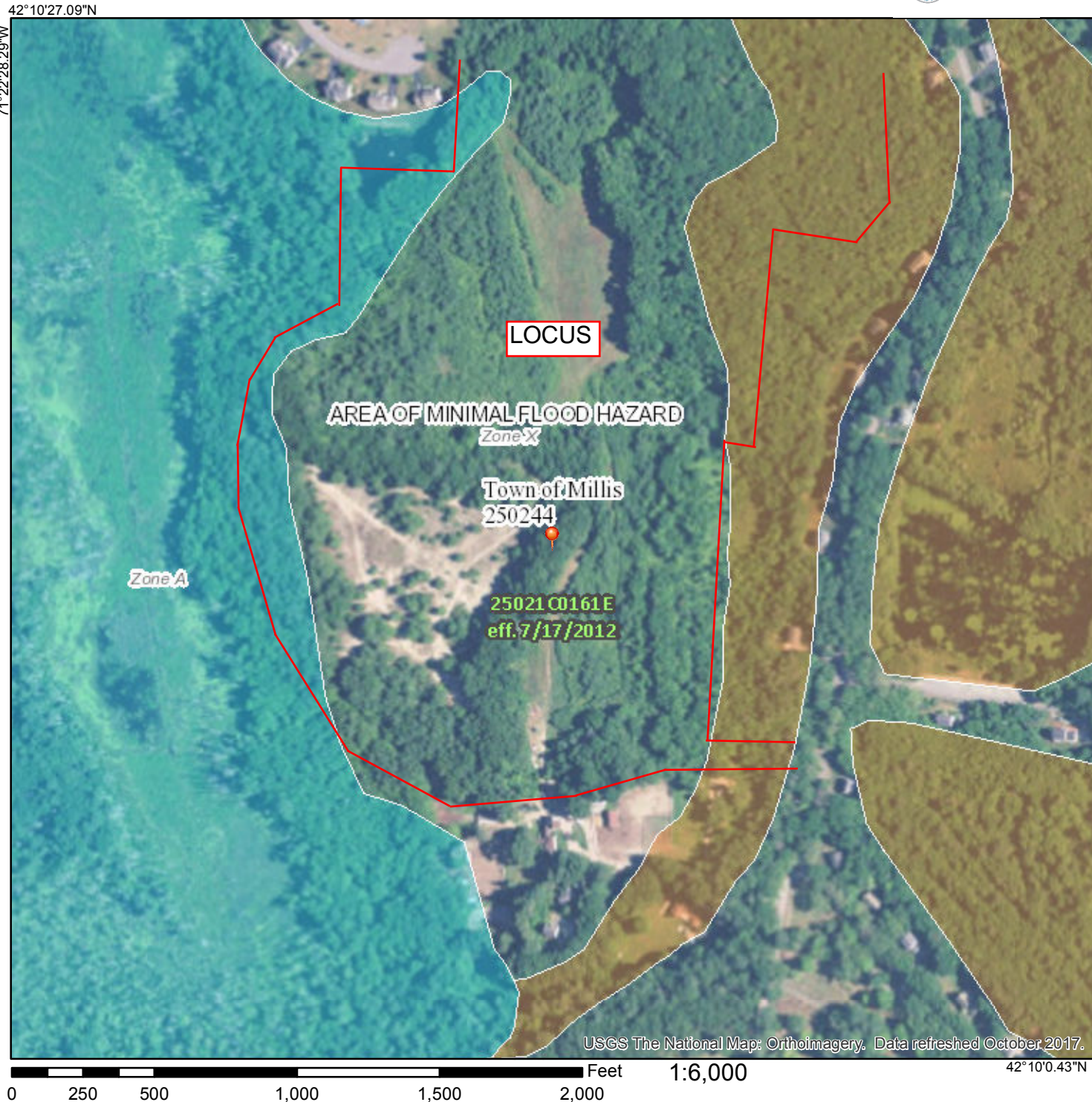


The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

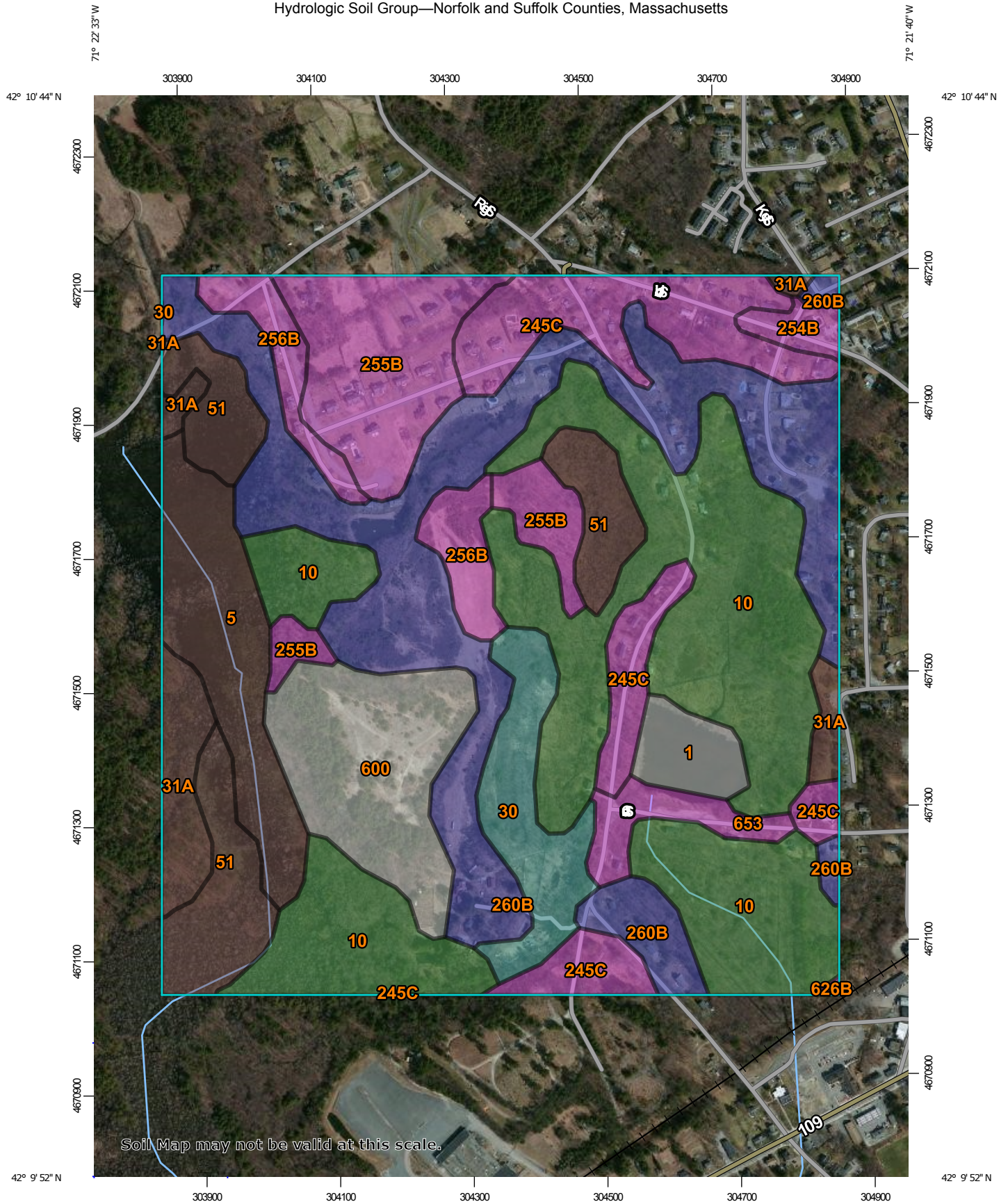
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **11/30/2018 at 10:06:13 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

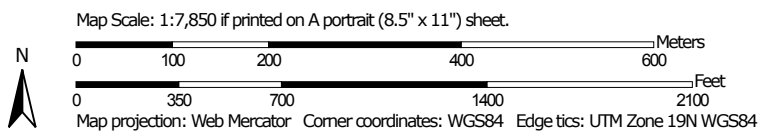


ATTACHMENT H: SOILS DATA

Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts



Soil Map may not be valid at this scale.




**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

3/22/2018
Page 1 of 4


MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines


 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points






 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available


Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

Please rely on the bar scale on each map sheet for map measurements.

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

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
 Survey Area Data: Version 13, Oct 6, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 8, 2011—Apr 9, 2011

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		4.6	1.7%
5	Saco silt loam, 0 to 3 percent slopes	B/D	16.7	6.2%
10	Scarboro and Birdsall soils, 0 to 3 percent slopes	A/D	73.9	27.4%
30	Raynham silt loam, 0 to 3 percent slopes	C	11.6	4.3%
31A	Walpole sandy loam, 0 to 3 percent slopes	B/D	8.9	3.3%
51	Swansea muck, 0 to 1 percent slopes	B/D	19.3	7.2%
245C	Hinckley loamy sand, 8 to 15 percent slopes	A	24.3	9.0%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	2.2	0.8%
255B	Windsor loamy sand, 3 to 8 percent slopes	A	22.2	8.2%
256B	Deerfield loamy sand, 3 to 8 percent slopes	A	9.1	3.4%
260B	Sudbury fine sandy loam, 2 to 8 percent slopes	B	52.6	19.5%
600	Pits, sand and gravel		19.5	7.2%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	A	0.1	0.1%
653	Udorthents, sandy	A	4.7	1.7%
Totals for Area of Interest			269.8	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 1

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
22"	Fill										
28"	Ab	10YR4/4				Sandy Loam	<1%	<1%	V. Friable	Massive	
41"	C1	2.5Y6/3	41"	7.5Y6/8	5%	Loamy Sand	<1%	<1%	V. Friable	Massive	
70"	C2	2.5Y5/2				Silt Loam	<1%	<1%	V. Friable	Massive	To be Removed
130"	C3	2.5Y5/1				Loamy Sand	<1%	<1%	V. Friable	Massive	

Additional Notes: Ground Elev.=145.8

Groundwater Indicators Observed at Time of Testing:

- ☒ Depth observed standing water in observation hole: 104" (Elev.=137.1) ☒ Depth to soil redoximorphic features (mottles): 41" (Elev.=142.4)
- ☒ Depth weeping from side of observation hole: 89" (Elev.=138.4)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 2

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
12"	Ap	10YR4/3				Sandy Loam					
35"	C1	2.5Y6/3	15"	7.5Y6/8	5%	Loamy Sand	<1%	<1%	V. Friable	Massive	
70"	C2	2.5Y5/2				Silt Loam	<1%	<1%	V. Friable	Massive	To be Removed
120"	C3	2.5Y5/1				LS/SL	<1%	1%	V. Friable	Massive	

Additional Notes: Ground Elev.=145.1

Groundwater Indicators Observed at Time of Testing:

- ☒ Depth observed standing water in observation hole: 110" (Elev.=135.9) ☒ Depth to soil redoximorphic features (mottles): 15" (Elev.=143.9)
- ☒ Depth weeping from side of observation hole: 35" (Elev.=142.2)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 3

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
7"	Ap	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
43"	Bw	10YR6/8				Loamy Sand	1%	<1%	V. Friable	Massive	
144"	C	2.5Y6/4	124"	7.5Y6/8	5%	Med. Sand	2%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=152.3

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 124" (Elev.=142.0)

☐ Depth weeping from side of observation hole: None

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 4

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
9"	Ap	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
18"	Bw	2.5Y6/7				Loamy Sand	3%	<1%	V. Friable	Massive	
124"	C	2.5Y6/4	115"	7.5Y6/8	5%	Med. Sand	3%	<1%	Loose	Single Grain	Lacustrine Lenses LS

Additional Notes: Ground Elev.=148.1

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 110" (Elev.=138.9)

☒ Depth weeping from side of observation hole: 115" (Elev.=138.5)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 5

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
12"	Ap	10YR4/3				Sandy Loam	<1%	<1%	V. Friable	Massive	
24"	B	10YR5/4				Sandy Loam	<1%	<1%	V. Friable	Massive	
51"	C1	2.5Y6/4	51"	7.5Y6/8	5%	Loamy Sand	3%	<1%	V. Friable	Massive	
84"	C2	2.5Y6/4				Sandy Loam	2%	<1%	V. Friable	Massive	Coarse Sand Pockets
120"	C3	2.5Y6/4				Med. Sand	5%	1%	Loose	Single Grain	

Additional Notes: Ground Elev.=146.0

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth weeping from side of observation hole: 82" (Elev.=139.2)

☒ Depth to soil redoximorphic features (mottles): 51" (Elev.=141.8)
(Town Peer reviewer subsequently observed redox. at 14" below
grade by hand auger investigation)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 6

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
5"	Af	10YR4/3				Loamy Sand	2%	1%	V. Friable	Massive	
136"	C1	2.5Y6/4	96"	7.5Y6/8	50%	Med. Sand	1%	5%	Loose	Single Grain	
168"	C2	2.5Y6/4				Loamy Sand	<1%	<1%	V. Friable	Massive	

Additional Notes: Ground Elev.=153.9

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 96" (Elev.=145.9)

☐ Depth weeping from side of observation hole: None

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 7

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
5"	Af	10YR4/3				Loamy Sand	2%	1%	V. Friable	Massive	
40"	C1	2.5Y6/4				Med. Sand	7%	2%	Loose	Single Grain	
180"	C2	2.5Y6/4	108"	7.5Y6/8	50%	Med. Sand	<1%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=150.5

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 108" (Elev.=141.5)

☒ Depth weeping from side of observation hole: 160" (Elev.=137.2)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 8

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
3"	Af	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
180"	C	2.5Y6/4	132"	7.5Y6/8	50%	Med. Sand	1%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=150.2

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 132" (Elev.=139.2)

☒ Depth weeping from side of observation hole: 162" (Elev.=136.7)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 9

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
130"	C	2.5Y6/4	46"	7.5Y6/8	50%	Med. Sand	<1%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=142.9

Groundwater Indicators Observed at Time of Testing:

- ☒ Depth observed standing water in observation hole: 125" (Elev.=132.5) ☒ Depth to soil redoximorphic features (mottles): 46" (Elev.=139.1)
- ☒ Depth weeping from side of observation hole: 125" (Elev.=132.5)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 10

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
120"	C	2.5Y6/4	90"	7.5Y6/8	50%	Med. Sand	1%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=143.5

Groundwater Indicators Observed at Time of Testing:

- ☒ Depth observed standing water in observation hole: 96" (Elev.=135.5)
- ☒ Depth to soil redoximorphic features (mottles): 90" (Elev.=136.0)
- ☒ Depth weeping from side of observation hole: 96" (Elev.=135.5)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 11

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
15"	Bw	10YR6/8				Loamy Sand	<1%	<1%	V. Friable	Massive	
36"	C1	2.5Y6/4				Med. Sand	3%	<1%	Loose	Single Grain	
104"	C2	2.5Y6/3				LS/SL	<1%	<1%	V. Friable	Massive	
160"	C3	2.5Y6/4				Med. Sand	<1%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=153.0

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☐ Depth to soil redoximorphic features (mottles): None

☐ Depth weeping from side of observation hole: None

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 12

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
33"	C1	2.5Y6/3				S/LS	<1%	<1%	Loose	Single Grain	Lacustrine Bands
136"	C2	2.5Y6/4				Med. Sand	<1%	<1%	Loose	Single Grain	
150"	C3	2.5Y6/4				Loamy Sand	<1%	<1%	V. Friable	Massive	

Additional Notes: Ground Elev.=148.4

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☐ Depth to soil redoximorphic features (mottles): None

☐ Depth weeping from side of observation hole: None

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 13

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
132"	C	2.5Y6/4				Med. Sand	<1%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=150.7

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☐ Depth to soil redoximorphic features (mottles): None

☐ Depth weeping from side of observation hole: None

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 14

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
130"	C	2.5Y6/4				Med. Fine Sand	1%	<1%	Loose	Single Grain	Lacustrine Layers

Additional Notes: Ground Elev.=152.0

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☐ Depth to soil redoximorphic features (mottles): None

☐ Depth weeping from side of observation hole: None

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 15

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
144"	C	2.5Y6/4	132"	7.5Y6/8	50%	Sand	<1%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=150.3

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☐ Depth weeping from side of observation hole: None

☒ Depth to soil redoximorphic features (mottles): 132" (Elev.=139.3)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 16

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
13"	Ap	10YR4/3				Loamy Sand	1%	<1%	V. Friable	Massive	
24"	Bw	10YR6/8				Loamy Sand	3%	1%	V. Friable	Massive	
108"	C1	2.5Y6/4	52"	7.5Y6/8	50%	Loamy Sand	8%	2%	V. Friable	Massive	
120"	C2	2.5Y5/2				Sandy Loam	<1%	<1%	V. Friable	Massive	

Additional Notes: Ground Elev.=149.3

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 52" (Elev.=145.0)

☒ Depth weeping from side of observation hole: 100" (Elev.=141.0)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 17

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
13"	Ap	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
26"	Bw	10YR6/8				Loamy Sand	1%	<1%	V. Friable	Massive	
115"	C	2.5Y6/4	60"	7.5Y6/8	50%	Sand	<1%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=146.3

Groundwater Indicators Observed at Time of Testing:

☒ Depth observed standing water in observation hole: 110" (Elev.=137.1)

☒ Depth weeping from side of observation hole: 110" (Elev.=137.1)

☒ Depth to soil redoximorphic features (mottles): 60" (Elev.=141.3)
(Town Peer reviewer subsequently observed redox. at 42" below
grade by hand auger investigation)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 18

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
13"	Ap	10YR4/3				Sandy Loam	<1%	<1%	V. Friable	Massive	
31"	B	10YR5/6				Loamy Sand	<1%	<1%	V. Friable	Massive	
51"	C1	2.5Y6/4				Loamy Sand	<1%	<1%	V. Friable	Massive	
88"	C2	2.5Y6/4	60"	7.5Y6/8	5%	Med. Sand	10%	2%	Loose	Single Grain	
120"	C3	2.5Y6/3				Loamy Sand	3%	2%	V. Friable	Massive	

Additional Notes: Ground Elev.=149.3

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 60" (Elev.=144.3)

☒ Depth weeping from side of observation hole: 88" (Elev.=142.0)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 19

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
11"	Ap	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
30"	B	10YR5/6				Loamy Sand	<1%	<1%	V. Friable	Massive	
56"	C1	2.5Y6/4				Loamy Sand	<1%	<1%	V. Friable	Massive	
85"	C2	2.5Y6/4	80"	7.5Y6/8	5%	Med. Sand	4%	<1%	Loose	Single Grain	
120"	C3	2.5Y6/3				Loamy Sand	1%	2%	V. Friable	Massive	

Additional Notes: Ground Elev.=150.4

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 80" (Elev.=143.7)

☒ Depth weeping from side of observation hole: 85" (Elev.=143.3)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 20

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
10"	Ap	10YR4/3				Sandy Loam	1%	<1%	V. Friable	Massive	
24"	B	10YR5/4				Loamy Sand	<1%	1%	V. Friable	Massive	
112"	C	2.5Y6/4	30"	7.5Y6/8	5%	Loamy Sand	2%	2%	V. Friable	Massive	Few Boulders

Additional Notes: Ground Elev.=144.7

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 30" (Elev.=142.2)

☒ Depth weeping from side of observation hole: 94" (Elev.=136.9)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 21

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
8"	Ap	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
32"	Bw	10YR6/8				Loamy Sand	<1%	<1%	V. Friable	Massive	
100"	C	2.5Y6/4	34"	7.5Y6/8	5%	Loamy Sand	3%	1%	V. Friable	Massive	

Additional Notes: Ground Elev.=145.2

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth weeping from side of observation hole: 72" (Elev.=139.2)

☒ Depth to soil redoximorphic features (mottles): 34" (Elev.=142.4)
(Town Peer reviewer subsequently observed redox. at 18" below
grade by hand auger investigation)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 22

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
4"	Af	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
132"	C	2.5Y6/4				Sand	1%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=156.8

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☐ Depth to soil redoximorphic features (mottles): None

☐ Depth weeping from side of observation hole: None

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 23

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
10"	Af	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
144"	C	2.5Y6/4				Sand	2%	<1%	Loose	Single Grain	Lacustrine

Additional Notes: Ground Elev.=156.0

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☐ Depth to soil redoximorphic features (mottles): None

☐ Depth weeping from side of observation hole: None

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 24

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
2"	Af	10YR4/3				Sandy Loam	<1%	<1%	V. Friable	Massive	
100"	C1	2.5Y6/3				LS/SL	<1%	4%	V. Friable	Massive	Lacustrine
144"	C2	2.5Y6/4	110"	7.5Y6/8	5%	Sand	<1%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=145.4

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth weeping from side of observation hole: 120" (Elev.=135.4)

☒ Depth to soil redoximorphic features (mottles): 110" (Elev.=136.2)
(Town Peer reviewer subsequently observed redox. at 12" below
grade by hand auger investigation)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 25

Date of Test Hole: November 15, 2019

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
4"	A	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
42"	Bw	10YR6/8				Loamy Sand	1%	<1%	V. Friable	Massive	
120"	C	2.5Y6/4	95"	7.5Y6/8	5%	Med. Sand	5%	3%	Loose	Single Grain	

Additional Notes: Ground Elev.=154.1

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 95" (Elev.=146.2)

☒ Depth weeping from side of observation hole: 102" (Elev.=145.6)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 25A Date of Test Hole: May 14, 2020 Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
19"	Ab	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
38"	Bw	10YR6/8				Loamy Sand	<1%	<1%	V. Friable	Massive	
120"	C	2.5Y6/3	63"	7.5Y6/8	5%	Sand/ Loamy Sand	<1%	<1%	V. Friable	Massive	

Additional Notes: Ground Elev.=145.3

Groundwater Indicators Observed at Time of Testing:

- ☒ Depth observed standing water in observation hole: 78" (Elev.=138.8) ☒ Depth to soil redoximorphic features (mottles): 63" (Elev.=140.1)
- ☒ Depth weeping from side of observation hole: 78" (Elev.=138.8)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 26

Date of Test Hole: May 14, 2020

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
110"	C	2.5Y6/3	70"	7.5Y6/8	5%	Med. Sand	<1%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=145.4

Groundwater Indicators Observed at Time of Testing:

- ☒ Depth observed standing water in observation hole: 82" (Elev.=138.6)
- ☒ Depth to soil redoximorphic features (mottles): 70" (Elev.=139.6)
- ☒ Depth weeping from side of observation hole: 82" (Elev.=138.6)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 27

Date of Test Hole: May 14, 2020

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
10"	Ap	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
22"	Bw	10YR6/8				Loamy Sand	<1%	<1%	V. Friable	Massive	
120"	C	2.5Y6/4	65"	7.5Y6/8	5%	Loamy Sand	<1%	<1%	V. Friable	Massive	

Additional Notes: Ground Elev.=145.5

Groundwater Indicators Observed at Time of Testing:

☒ Depth observed standing water in observation hole: 92" (Elev.=137.8)

☒ Depth to soil redoximorphic features (mottles): 65" (Elev.=140.1)

☐ Depth weeping from side of observation hole: None

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 28

Date of Test Hole: May 14, 2020

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
3"	A	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
64"	C1	2.5Y6/4				Med. Sand	<1%	<1%	Loose	Single Grain	
190"	C2	2.5Y6/4	175"	7.5Y6/8	5%	Loamy Sand/Sand	<1%	<1%	V. Friable	Massive	Lacustrine layers

Additional Notes: Ground Elev.=154.5

Groundwater Indicators Observed at Time of Testing:

- ☒ Depth observed standing water in observation hole: 182" (Elev.=139.3) ☒ Depth to soil redoximorphic features (mottles): 175" (Elev.=139.9)
- ☒ Depth weeping from side of observation hole: 182" (Elev.=139.3)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 29

Date of Test Hole: May 14, 2020

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
3"	A	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
110"	C	2.5Y6/3	93"	7.5Y6/8	5%	Loamy Sand/ Sandy Loam	<1%	<1%	V. Friable	Massive	Lacustrine layers

Additional Notes: Ground Elev.=147.3

Groundwater Indicators Observed at Time of Testing:

- ☒ Depth observed standing water in observation hole: 102" (Elev.=138.8) ☒ Depth to soil redoximorphic features (mottles): 93" (Elev.=139.6)
- ☒ Depth weeping from side of observation hole: 102" (Elev.=138.8)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 30

Date of Test Hole: May 14, 2020

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
43"	Sand Fill										
45"	Ab	10YR4/3				Loamy Sand	<1%	<1%	V. Friable	Massive	
60"	C1	2.5Y6/2	48"	7.5Y6/8	5%	Sandy Loam	2%	<1%	V. Friable	Massive	
100"	C2	2.5Y5/1				Loamy Sand	3%	<1%	Loose	Single Grain	Lacustrine layers

Additional Notes: Ground Elev.=146.2

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 48" (Elev.=142.2)

☒ Depth weeping from side of observation hole: 66" (Elev.=140.7)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 31

Date of Test Hole: May 14, 2020

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
48"	Sand Fill										
50"	Ab	10YR4/3				Loamy Sand	<1%	<1%	Friable	Massive	
60"	C1	2.5Y6/4	50"	7.5Y6/8	5%	Loamy Sand	<1%	<1%	V. Friable	Massive	
73"	C2	2.5Y5/2				Loam	<1%	<1%	Friable	Massive	
110"	C3	2.5Y5/1				Loamy Sand	<1%	<1%	V. Friable	Massive	Lacustrine layers

Additional Notes: Ground Elev.=146.2

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 50" (Elev.=142.0)

☒ Depth weeping from side of observation hole: 60" (Elev.=141.2)

DEEP OBSERVATION TEST HOLE SOIL LOG

Ridge Street Millis, MA 02054

Deep Observation Hole: OTH 32

Date of Test Hole: May 14, 2020

Soil Evaluation By: Daniel J. Merrikin, P.E.
(Mass. Approved Soil Evaluator)

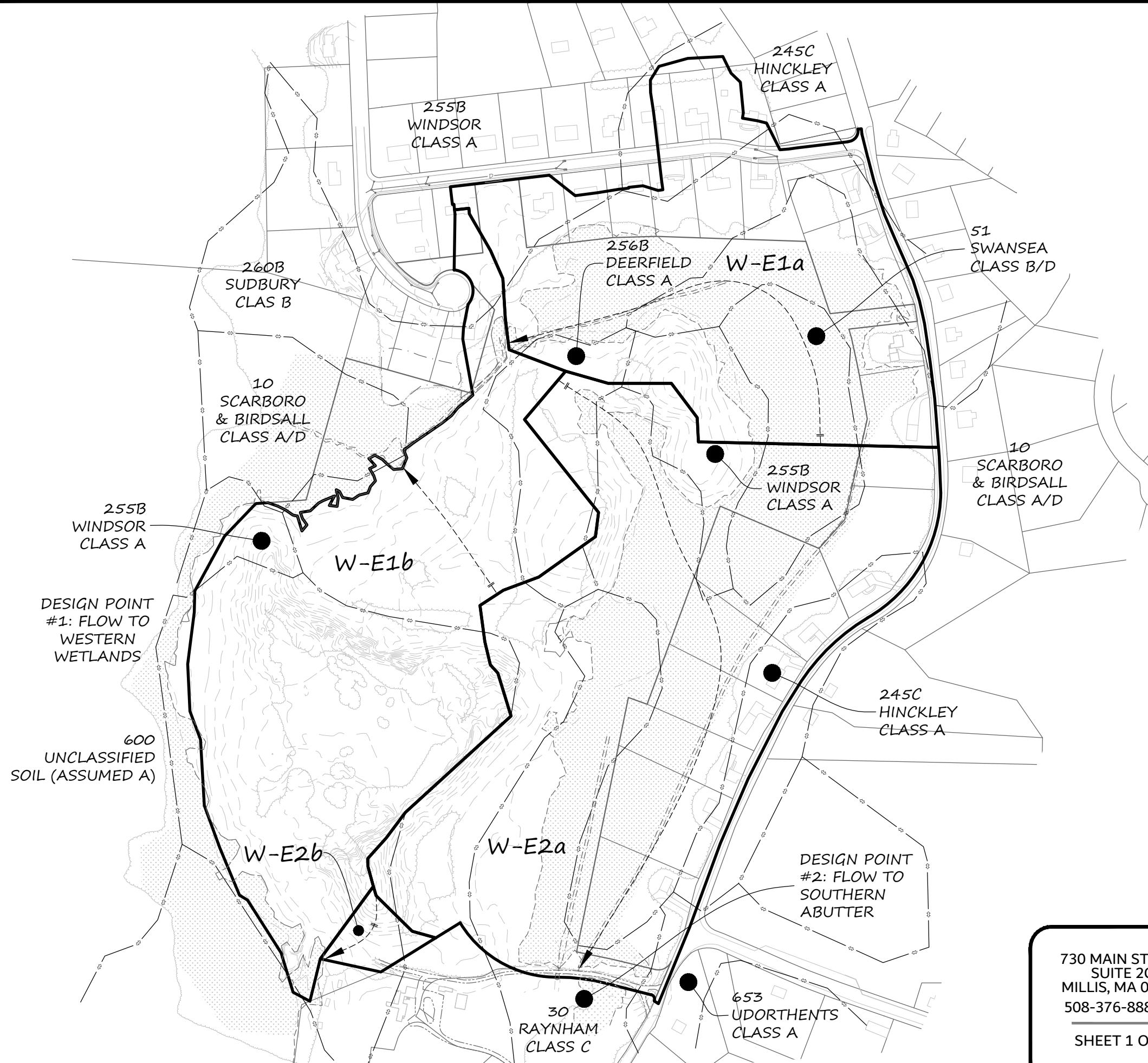
Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
8"	Ap	10YR4/3				Sandy Loam	<1%	<1%	V. Friable	Massive	
22"	B	10YR5/3				Sandy Loam	<1%	<1%	V. Friable	Massive	
96"	C1	2.5Y6/4	32"	7.5Y6/8	5%	Sandy Loam	<1%	<1%	V. Friable	Massive	
115"	C2	2.5Y6/4				Med. Sand	<1%	<1%	Loose	Single Grain	

Additional Notes: Ground Elev.=146.1

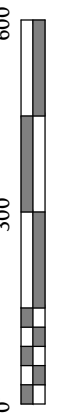
Groundwater Indicators Observed at Time of Testing:

- ☐ Depth observed standing water in observation hole: 98" (Elev.=137.9)
 ☒ Depth to soil redoximorphic features (mottles): 32" (Elev.=143.4)
- ☒ Depth weeping from side of observation hole: 32" (Elev.=143.4)

ATTACHMENT I: EXISTING WATERSHED PLAN



PLAN SCALE: 1"=300'



PLAN DATE: FEBRUARY 12, 2020

REVISION	DATE	BY
REVISIONS PER TOWN COMMENTS	5/20/20	DJM

EMERSON PLACE
EXISTING
WATERSHED
PLAN OF LAND IN
MILLIS, MA

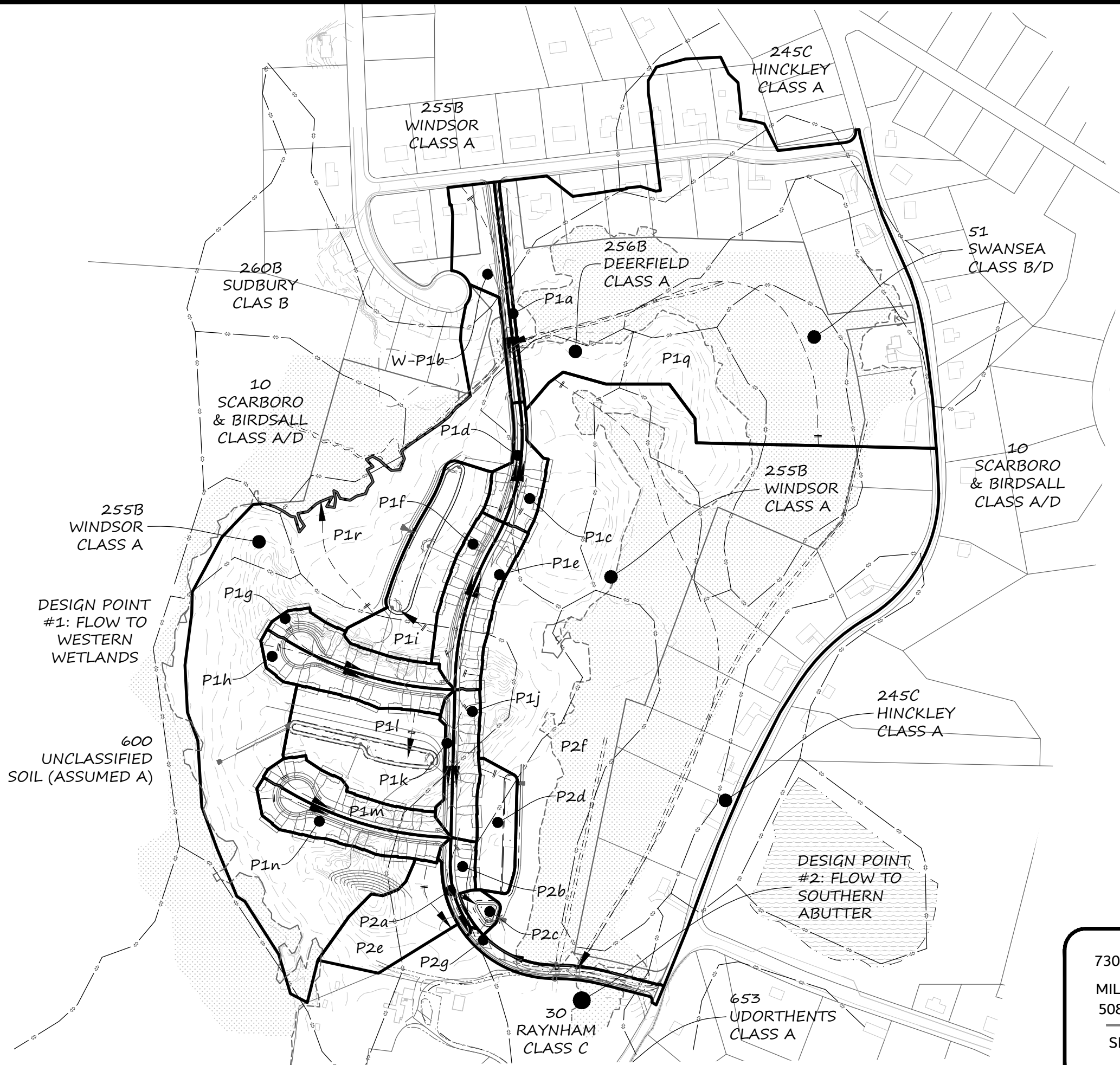
730 MAIN STREET
SUITE 2C
MILLIS, MA 02054
508-376-8883(o)

SHEET 1 OF 1

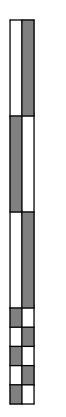


LEGACY
ENGINEERING

ATTACHMENT J: PROPOSED WATERSHED PLAN



PLAN SCALE: 1"=300'



PLAN DATE: FEBRUARY 12, 2020

REVISION	DATE	BY
REVISIONS PER TOWN COMMENTS	5/20/20	DJM

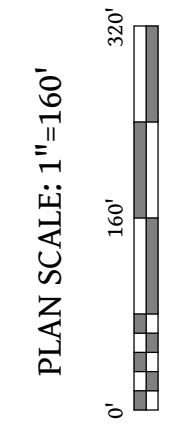
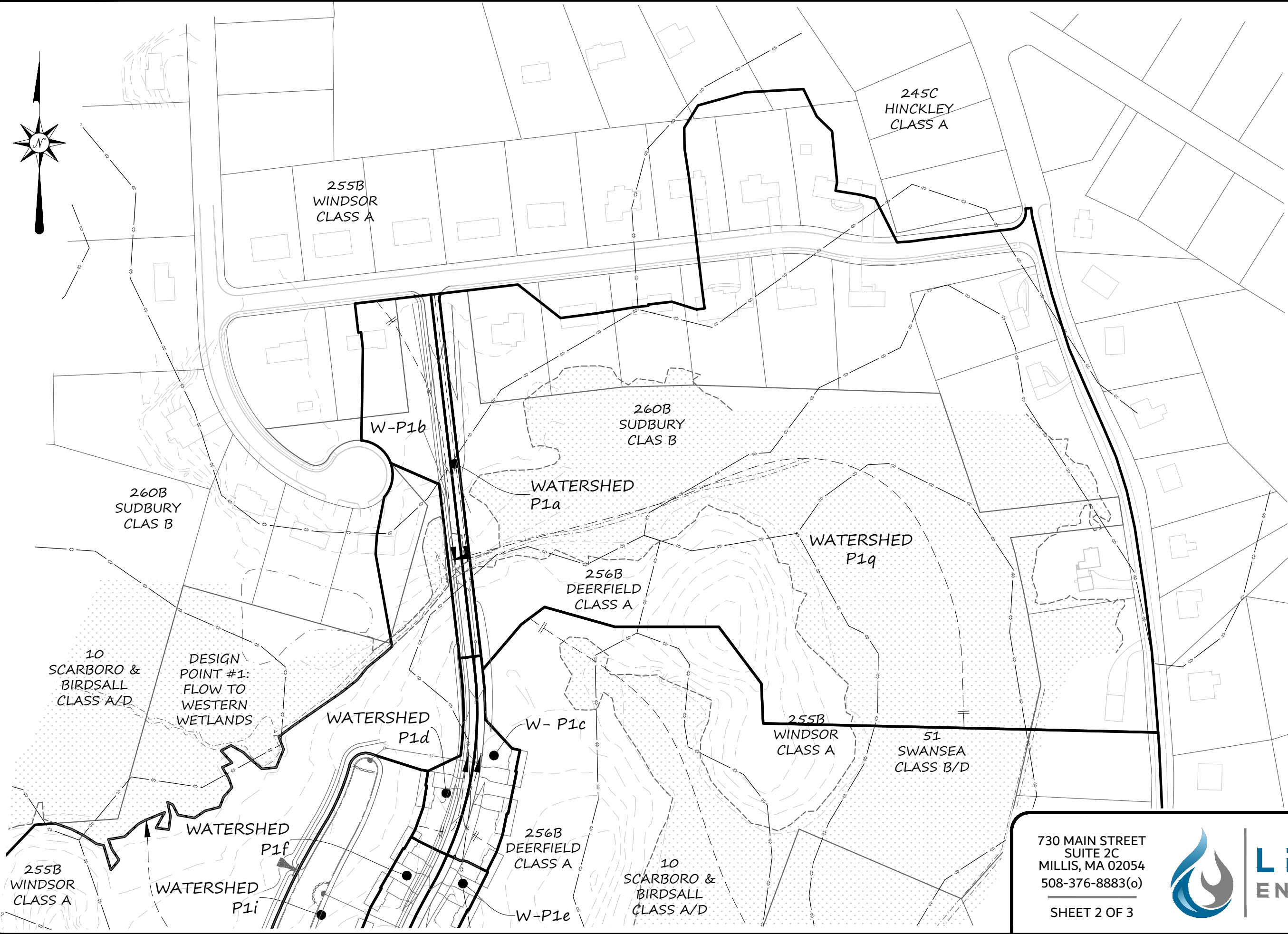
EMERSON PLACE
PROPOSED
WATERSHED
PLAN OF LAND IN
MILLIS, MA

730 MAIN STREET
SUITE 2C
MILLIS, MA 02054
508-376-8883(o)

SHEET 1 OF 3



LEGACY
ENGINEERING



PLAN DATE: FEBRUARY 12, 2020			
REVISION	DATE	BY	
REVISIONS PER TOWN COMMENTS	5/20/20	DJM	

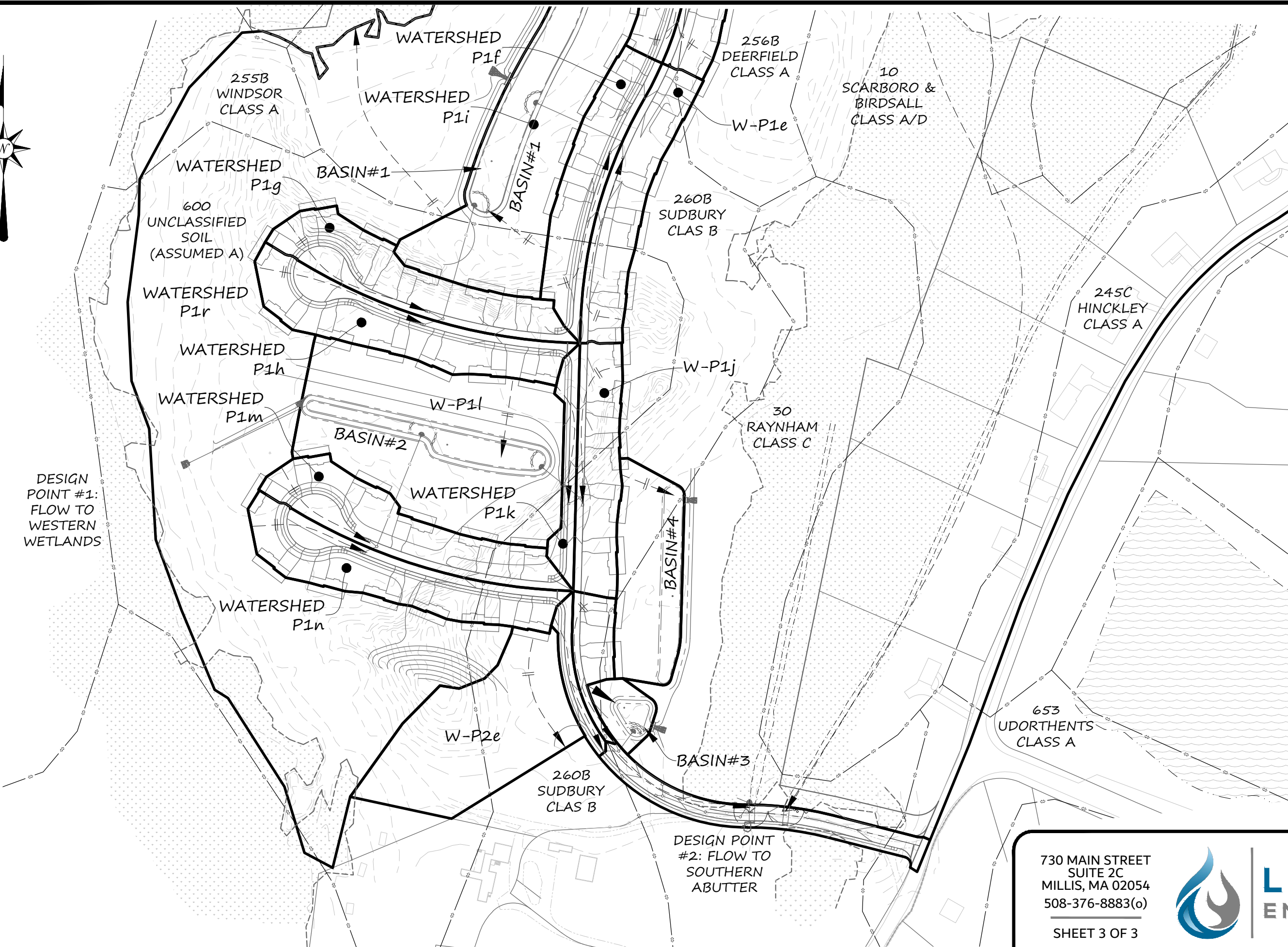
EMERSON PLACE
PROPOSED
WATERSHED
PLAN OF LAND IN
MILLIS, MA

730 MAIN STREET
SUITE 2C
MILLIS, MA 02054
508-376-8883(o)
SHEET 2 OF 3





DESIGN
POINT #1:
FLOW TO
WESTERN
WETLANDS



PLAN SCALE: 1"=160'



PLAN DATE: FEBRUARY 12, 2020

REVISION	DATE	BY
REVISIONS PER TOWN COMMENTS	5/20/20	DJM

EMERSON PLACE
PROPOSED
WATERSHED
PLAN OF LAND IN
MILLIS, MA

730 MAIN STREET
SUITE 2C
MILLIS, MA 02054
508-376-8883(o)

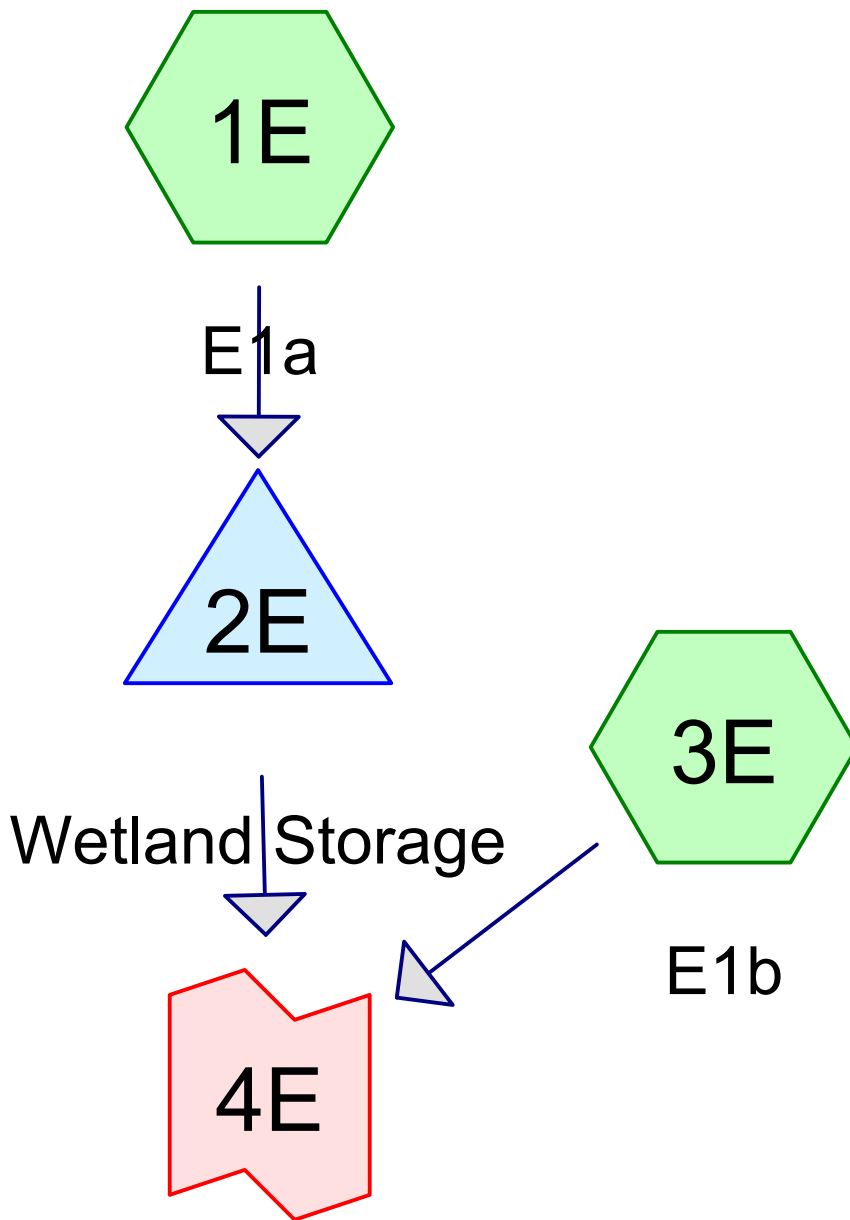
SHEET 3 OF 3



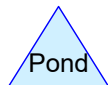
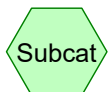
LEGACY
ENGINEERING

ATTACHMENT K: HYDROCAD HYDROLOGY CALCULATIONS

**DESIGN POINT #1: FLOW TO WESTERN
WETLANDS EXISTING CONDITIONS**



Design Point #1: Flow to
Western Wetlands



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Page 2

Project Notes

Rainfall events imported from "Acorn Place R3.hcp"

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Page 3

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-In	Type III 24-hr		Default	24.00	1	1.00	2
2	1-YR	Type III 24-hr		Default	24.00	1	2.50	2
3	2-YR	Type III 24-hr		Default	24.00	1	3.20	2
4	10-YR	Type III 24-hr		Default	24.00	1	4.70	2
5	50-YR	Type III 24-hr		Default	24.00	1	6.10	2
6	100-YR	Type III 24-hr		Default	24.00	1	6.70	2

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Page 4

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.945	39	>75% Grass cover, Good HSG A (1E, 3E)
3.006	61	>75% Grass cover, Good HSG B (1E, 3E)
3.747	68	Pasture/grassland/range, Poor, HSG A (3E)
0.560	98	Paved parking HSG A (1E)
0.511	98	Paved parking HSG B (1E)
0.397	98	Roofs HSG A (1E, 3E)
0.164	98	Roofs HSG B (1E, 3E)
15.750	30	Woods, Good HSG A (1E, 3E)
7.730	55	Woods, Good HSG B (1E, 3E)
9.642	77	Woods, Good HSG D (1E)
47.451	52	TOTAL AREA

Ridge Street HydroCAD Revised Final

Type III 24-hr 1-YR Rainfall=2.50"

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Page 5

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: E1a

Runoff Area=936,224 sf 7.42% Impervious Runoff Depth=0.22"
Flow Length=1,260' Slope=0.0100 '/' Tc=24.1 min CN=62 Runoff=1.69 cfs 0.393 af

Pond 2E: Wetland Storage

Peak Elev=145.82' Storage=1,394 cf Inflow=1.69 cfs 0.393 af
24.0" Round Culvert n=0.013 L=25.0' S=-0.0016 '/' Outflow=0.92 cfs 0.393 af

Subcatchment3E: E1b

Runoff Area=1,130,762 sf 0.15% Impervious Runoff Depth=0.00"
Flow Length=447' Tc=19.2 min CN=43 Runoff=0.00 cfs 0.000 af

Link 4E: Design Point #1: Flow to Western Wetlands

Inflow=0.92 cfs 0.393 af
Primary=0.92 cfs 0.393 af

Total Runoff Area = 47.451 ac Runoff Volume = 0.393 af Average Runoff Depth = 0.10"
96.56% Pervious = 45.820 ac 3.44% Impervious = 1.632 ac

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Type III 24-hr 1-YR Rainfall=2.50"

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Page 6

Summary for Subcatchment 1E: E1a

Runoff = 1.69 cfs @ 12.57 hrs, Volume= 0.393 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
22,240	98	Paved parking HSG B
24,401	98	Paved parking HSG A
6,082	98	Roofs HSG B
16,716	98	Roofs HSG A
97,343	61	>75% Grass cover, Good HSG B
149,714	39	>75% Grass cover, Good HSG A
137,899	30	Woods, Good HSG A
61,803	55	Woods, Good HSG B
420,026	77	Woods, Good HSG D
936,224	62	Weighted Average
866,785	60	92.58% Pervious Area
69,439	98	7.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,035	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
24.1	1,260	Total			

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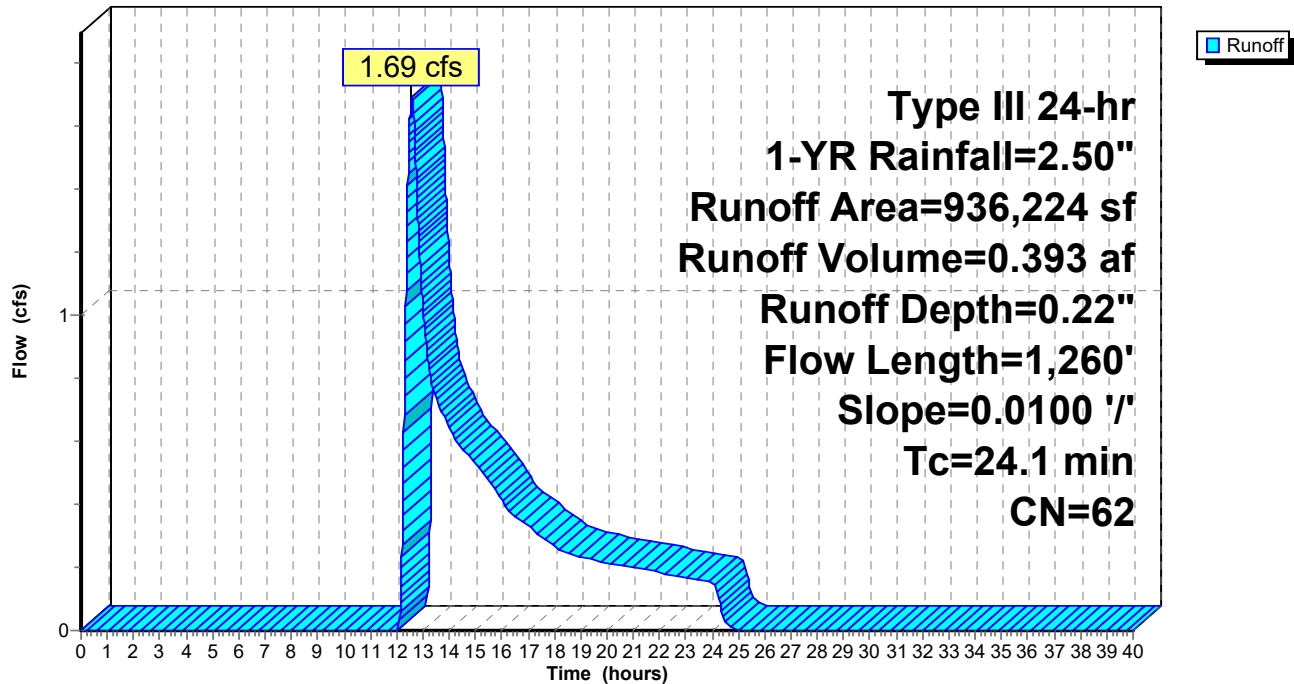
Type III 24-hr 1-YR Rainfall=2.50"

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Page 7

Subcatchment 1E: E1a

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 8

Summary for Pond 2E: Wetland Storage

Inflow Area = 21.493 ac, 7.42% Impervious, Inflow Depth = 0.22" for 1-YR event
 Inflow = 1.69 cfs @ 12.57 hrs, Volume= 0.393 af
 Outflow = 0.92 cfs @ 13.12 hrs, Volume= 0.393 af, Atten= 46%, Lag= 32.7 min
 Primary = 0.92 cfs @ 13.12 hrs, Volume= 0.393 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 145.82' @ 13.12 hrs Surf.Area= 32,944 sf Storage= 1,394 cf

Plug-Flow detention time= 8.7 min calculated for 0.393 af (100% of inflow)
 Center-of-Mass det. time= 8.6 min (972.3 - 963.7)

Volume	Invert	Avail.Storage	Storage Description		
#1	145.20'	133,862 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.20	20	18.0	0	0	20
145.70	60	30.0	19	19	67
146.00	195,920	2,713.0	19,941	19,960	585,715
146.50	261,254	2,891.0	113,902	133,862	665,107

Device	Routing	Invert	Outlet Devices
#1	Primary	145.31'	24.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.27' / 145.31' S= -0.0016 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=0.92 cfs @ 13.12 hrs HW=145.82' (Free Discharge)

↑1=Culvert (Barrel Controls 0.92 cfs @ 1.96 fps)

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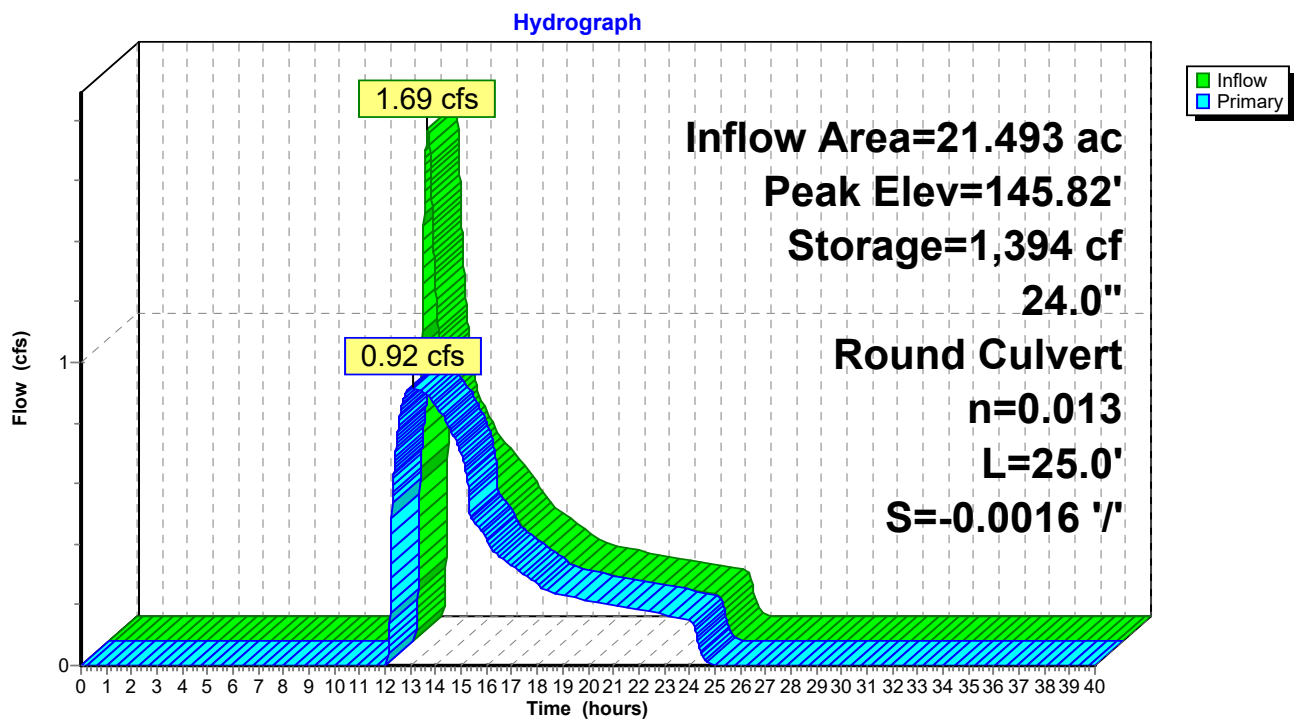
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Type III 24-hr 1-YR Rainfall=2.50"

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Page 9

Pond 2E: Wetland Storage



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 10

Summary for Subcatchment 3E: E1b

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

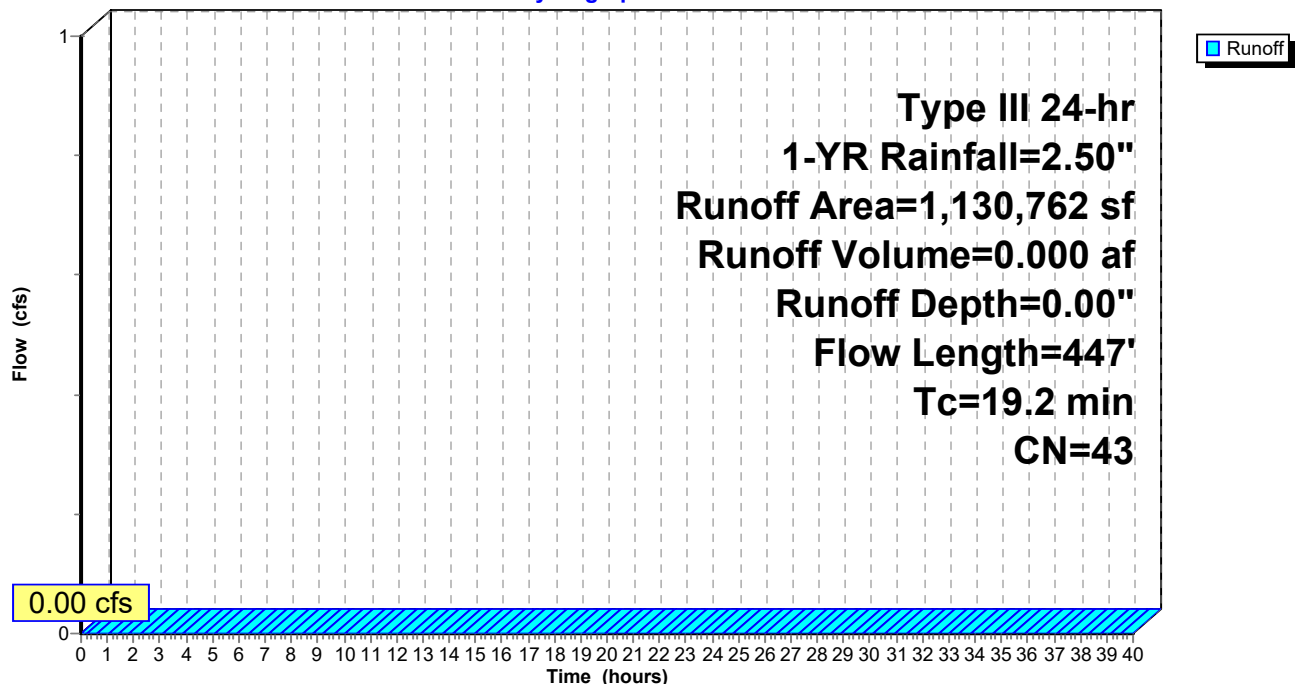
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
1,056	98	Roofs HSG B
588	98	Roofs HSG A
163,214	68	Pasture/grassland/range, Poor, HSG A
33,609	61	>75% Grass cover, Good HSG B
109,245	39	>75% Grass cover, Good HSG A
548,151	30	Woods, Good HSG A
274,899	55	Woods, Good HSG B
1,130,762	43	Weighted Average
1,129,118	43	99.85% Pervious Area
1,644	98	0.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
9.9	422	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.2	447	Total			

Subcatchment 3E: E1b

Hydrograph

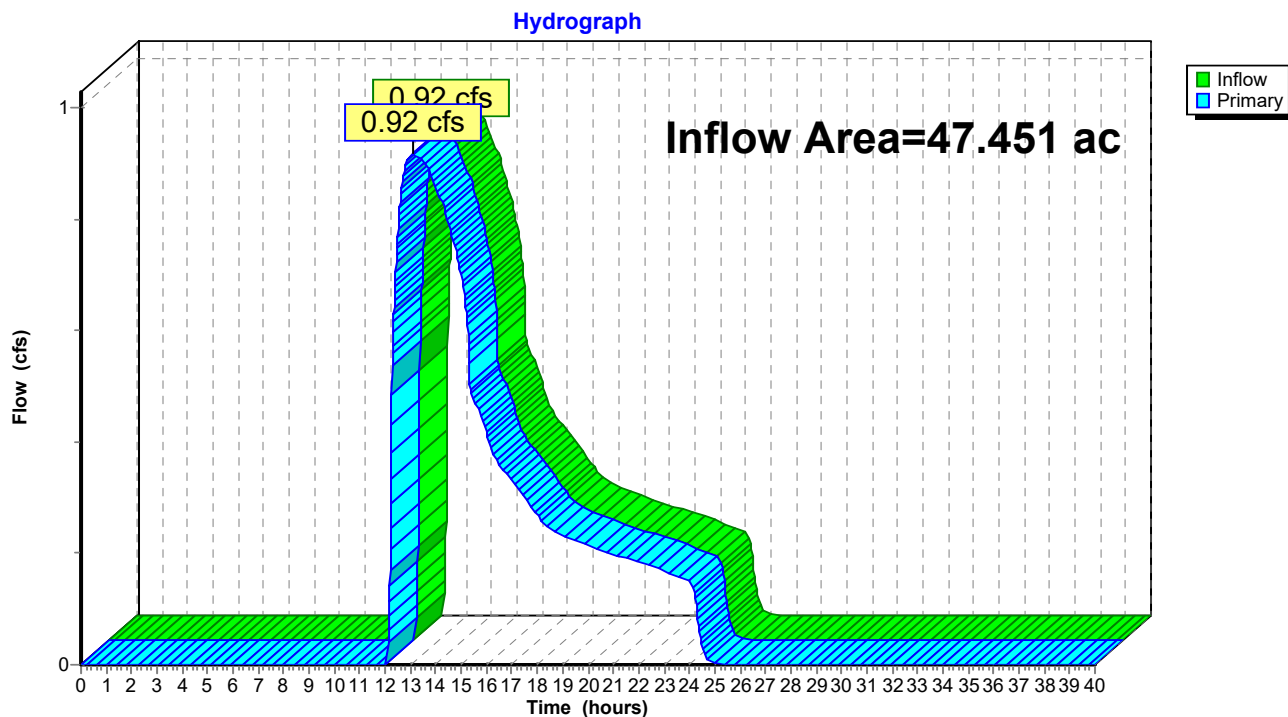


Summary for Link 4E: Design Point #1: Flow to Western Wetlands

Inflow Area = 47.451 ac, 3.44% Impervious, Inflow Depth = 0.10" for 1-YR event
 Inflow = 0.92 cfs @ 13.12 hrs, Volume= 0.393 af
 Primary = 0.92 cfs @ 13.12 hrs, Volume= 0.393 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 4E: Design Point #1: Flow to Western Wetlands



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 12

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: E1a

Runoff Area=936,224 sf 7.42% Impervious Runoff Depth=0.48"
Flow Length=1,260' Slope=0.0100 '/' Tc=24.1 min CN=62 Runoff=5.31 cfs 0.861 af

Pond 2E: Wetland Storage

Peak Elev=145.93' Storage=9,389 cf Inflow=5.31 cfs 0.861 af
24.0" Round Culvert n=0.013 L=25.0' S=-0.0016 '/' Outflow=1.36 cfs 0.861 af

Subcatchment3E: E1b

Runoff Area=1,130,762 sf 0.15% Impervious Runoff Depth=0.02"
Flow Length=447' Tc=19.2 min CN=43 Runoff=0.07 cfs 0.047 af

Link 4E: Design Point #1: Flow to Western Wetlands

Inflow=1.36 cfs 0.909 af
Primary=1.36 cfs 0.909 af

Total Runoff Area = 47.451 ac Runoff Volume = 0.909 af Average Runoff Depth = 0.23"
96.56% Pervious = 45.820 ac 3.44% Impervious = 1.632 ac

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Type III 24-hr 2-YR Rainfall=3.20"

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Page 13

Summary for Subcatchment 1E: E1a

Runoff = 5.31 cfs @ 12.45 hrs, Volume= 0.861 af, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
22,240	98	Paved parking HSG B
24,401	98	Paved parking HSG A
6,082	98	Roofs HSG B
16,716	98	Roofs HSG A
97,343	61	>75% Grass cover, Good HSG B
149,714	39	>75% Grass cover, Good HSG A
137,899	30	Woods, Good HSG A
61,803	55	Woods, Good HSG B
420,026	77	Woods, Good HSG D
936,224	62	Weighted Average
866,785	60	92.58% Pervious Area
69,439	98	7.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,035	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
24.1	1,260	Total			

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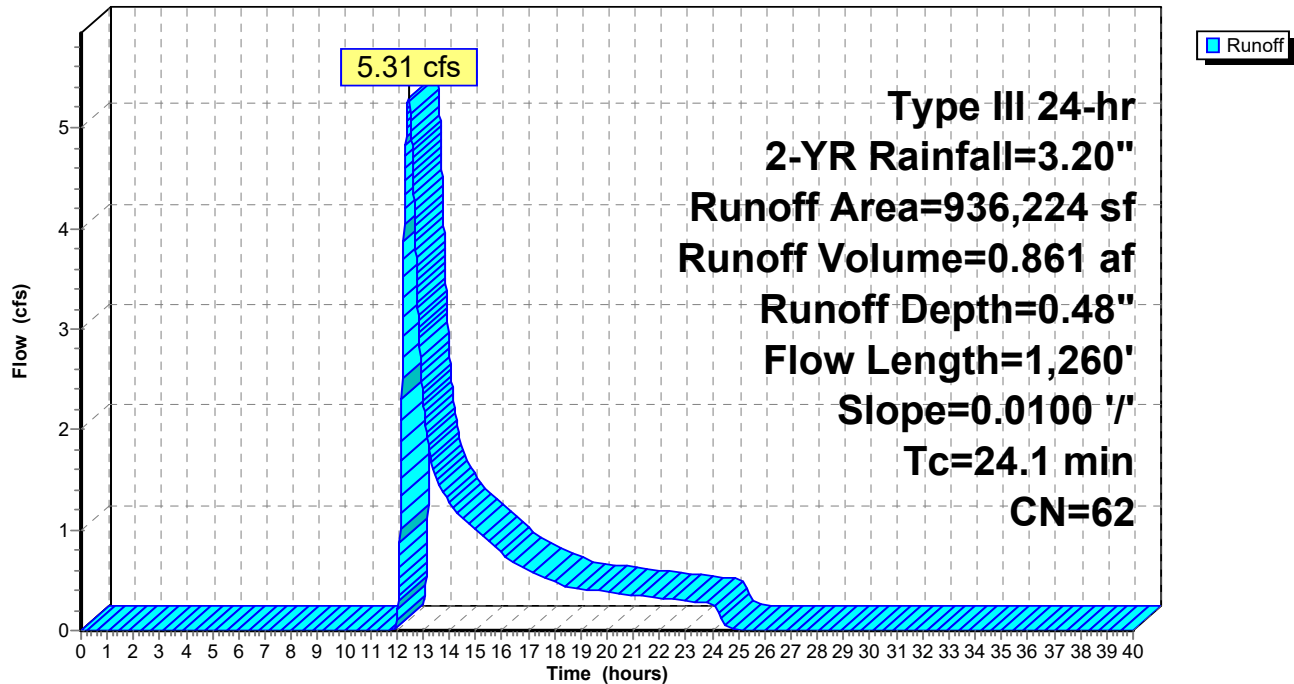
Type III 24-hr 2-YR Rainfall=3.20"

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Page 14

Subcatchment 1E: E1a

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 15

Summary for Pond 2E: Wetland Storage

Inflow Area = 21.493 ac, 7.42% Impervious, Inflow Depth = 0.48" for 2-YR event
 Inflow = 5.31 cfs @ 12.45 hrs, Volume= 0.861 af
 Outflow = 1.36 cfs @ 13.82 hrs, Volume= 0.861 af, Atten= 74%, Lag= 82.0 min
 Primary = 1.36 cfs @ 13.82 hrs, Volume= 0.861 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 145.93' @ 13.82 hrs Surf.Area= 118,417 sf Storage= 9,389 cf

Plug-Flow detention time= 69.0 min calculated for 0.861 af (100% of inflow)
 Center-of-Mass det. time= 68.9 min (995.2 - 926.3)

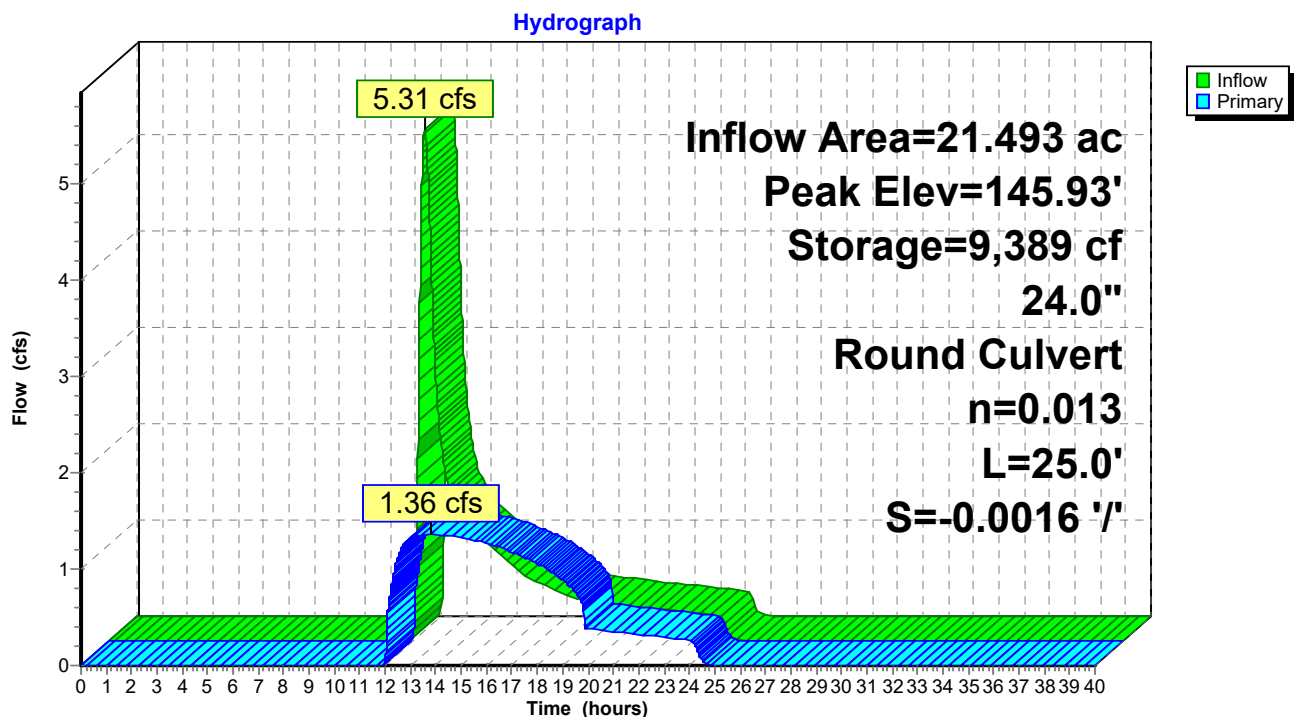
Volume	Invert	Avail.Storage	Storage Description		
#1	145.20'	133,862 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.20	20	18.0	0	0	20
145.70	60	30.0	19	19	67
146.00	195,920	2,713.0	19,941	19,960	585,715
146.50	261,254	2,891.0	113,902	133,862	665,107

Device	Routing	Invert	Outlet Devices
#1	Primary	145.31'	24.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.27' / 145.31' S= -0.0016 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=1.36 cfs @ 13.82 hrs HW=145.93' (Free Discharge)

↑**1=Culvert** (Barrel Controls 1.36 cfs @ 2.23 fps)

Pond 2E: Wetland Storage



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 17

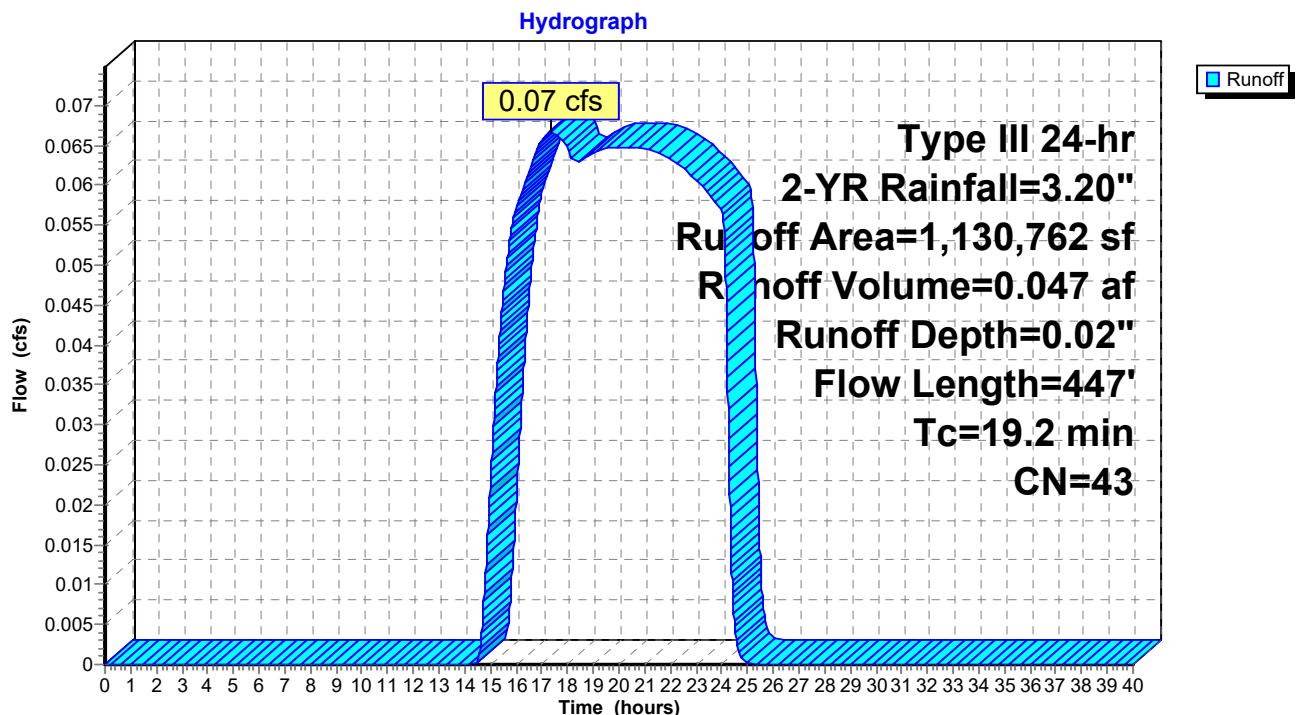
Summary for Subcatchment 3E: E1b

Runoff = 0.07 cfs @ 17.39 hrs, Volume= 0.047 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
1,056	98	Roofs HSG B
588	98	Roofs HSG A
163,214	68	Pasture/grassland/range, Poor, HSG A
33,609	61	>75% Grass cover, Good HSG B
109,245	39	>75% Grass cover, Good HSG A
548,151	30	Woods, Good HSG A
274,899	55	Woods, Good HSG B
1,130,762	43	Weighted Average
1,129,118	43	99.85% Pervious Area
1,644	98	0.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
9.9	422	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.2	447	Total			

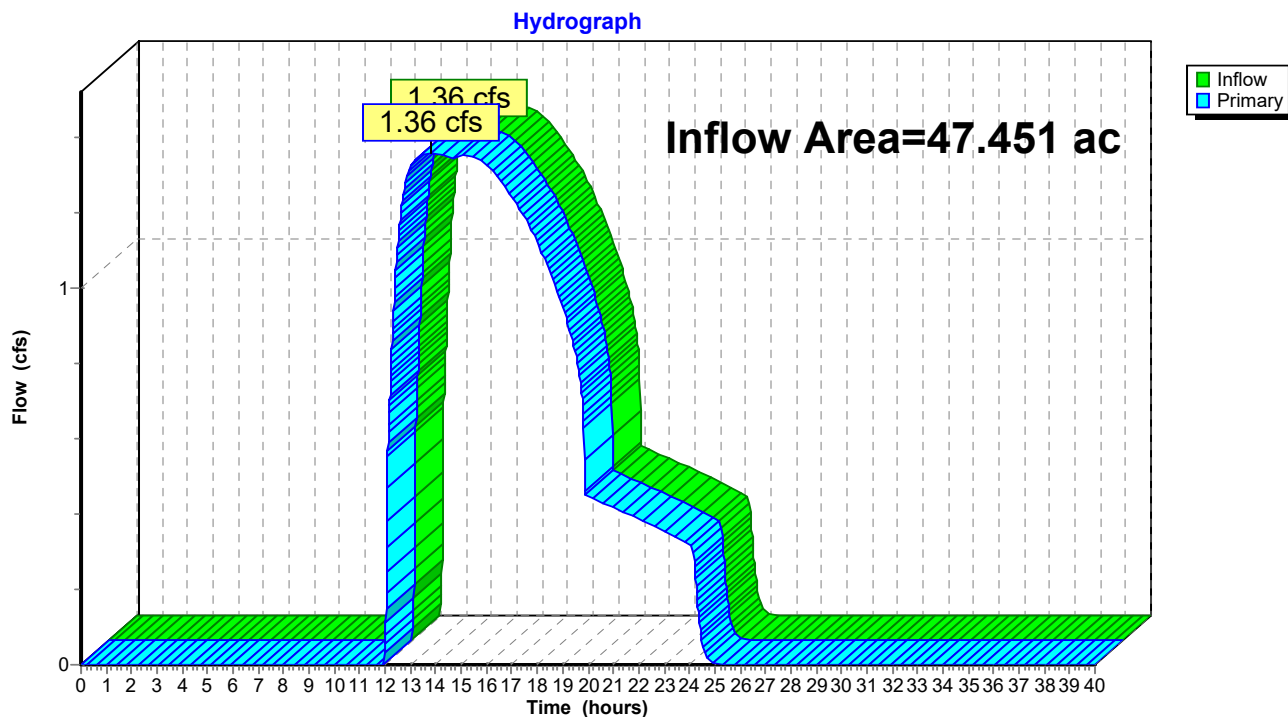
Subcatchment 3E: E1b

Summary for Link 4E: Design Point #1: Flow to Western Wetlands

Inflow Area = 47.451 ac, 3.44% Impervious, Inflow Depth = 0.23" for 2-YR event
 Inflow = 1.36 cfs @ 13.82 hrs, Volume= 0.909 af
 Primary = 1.36 cfs @ 13.82 hrs, Volume= 0.909 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 4E: Design Point #1: Flow to Western Wetlands



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 19

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: E1a

Runoff Area=936,224 sf 7.42% Impervious Runoff Depth=1.26"
Flow Length=1,260' Slope=0.0100 '/ Outflow=2.23 cfs 2.251 af

Pond 2E: Wetland Storage

Peak Elev=146.11' Storage=42,892 cf Inflow=17.74 cfs 2.251 af
24.0" Round Culvert n=0.013 L=25.0' S=-0.0016 '/ Outflow=2.23 cfs 2.251 af

Subcatchment3E: E1b

Runoff Area=1,130,762 sf 0.15% Impervious Runoff Depth=0.27"
Flow Length=447' Tc=19.2 min CN=43 Runoff=1.87 cfs 0.593 af

Link 4E: Design Point #1: Flow to Western Wetlands

Inflow=3.68 cfs 2.844 af
Primary=3.68 cfs 2.844 af

Total Runoff Area = 47.451 ac Runoff Volume = 2.844 af Average Runoff Depth = 0.72"
96.56% Pervious = 45.820 ac 3.44% Impervious = 1.632 ac

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Type III 24-hr 10-YR Rainfall=4.70"

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Page 20

Summary for Subcatchment 1E: E1a

Runoff = 17.74 cfs @ 12.38 hrs, Volume= 2.251 af, Depth= 1.26"

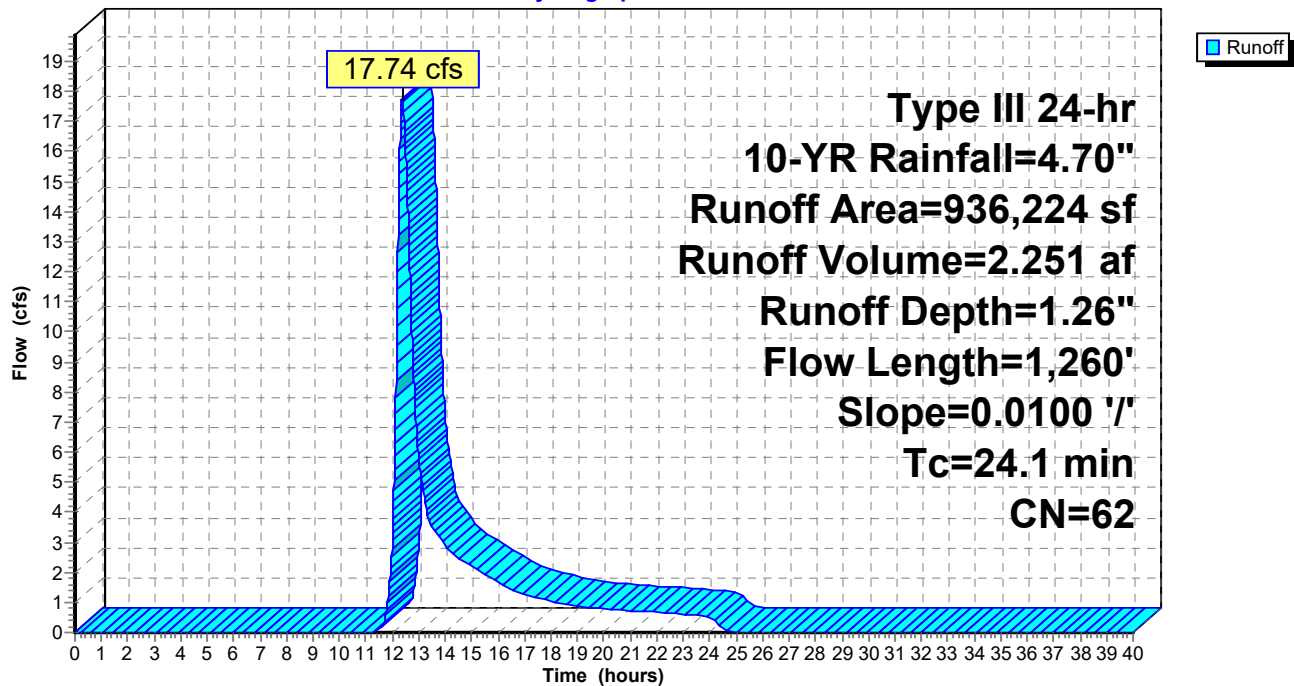
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
22,240	98	Paved parking HSG B
24,401	98	Paved parking HSG A
6,082	98	Roofs HSG B
16,716	98	Roofs HSG A
97,343	61	>75% Grass cover, Good HSG B
149,714	39	>75% Grass cover, Good HSG A
137,899	30	Woods, Good HSG A
61,803	55	Woods, Good HSG B
420,026	77	Woods, Good HSG D
936,224	62	Weighted Average
866,785	60	92.58% Pervious Area
69,439	98	7.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,035	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
24.1	1,260	Total			

Subcatchment 1E: E1a

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 22

Summary for Pond 2E: Wetland Storage

Inflow Area = 21.493 ac, 7.42% Impervious, Inflow Depth = 1.26" for 10-YR event
 Inflow = 17.74 cfs @ 12.38 hrs, Volume= 2.251 af
 Outflow = 2.23 cfs @ 14.98 hrs, Volume= 2.251 af, Atten= 87%, Lag= 155.9 min
 Primary = 2.23 cfs @ 14.98 hrs, Volume= 2.251 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.11' @ 14.98 hrs Surf.Area= 209,870 sf Storage= 42,892 cf

Plug-Flow detention time= 238.8 min calculated for 2.251 af (100% of inflow)
 Center-of-Mass det. time= 238.8 min (1,129.3 - 890.5)

Volume	Invert	Avail.Storage	Storage Description		
#1	145.20'	133,862 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.20	20	18.0	0	0	20
145.70	60	30.0	19	19	67
146.00	195,920	2,713.0	19,941	19,960	585,715
146.50	261,254	2,891.0	113,902	133,862	665,107

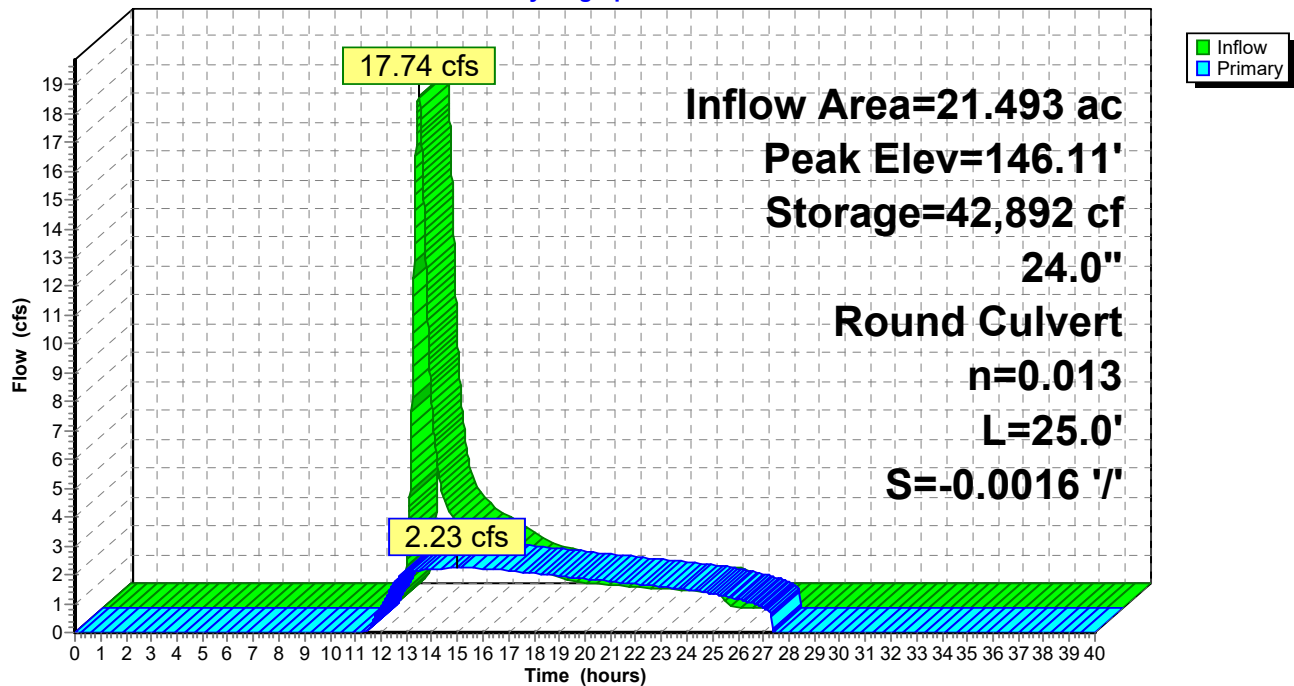
Device	Routing	Invert	Outlet Devices
#1	Primary	145.31'	24.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.27' / 145.31' S= -0.0016 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=2.23 cfs @ 14.98 hrs HW=146.11' (Free Discharge)

↑**1=Culvert** (Barrel Controls 2.23 cfs @ 2.61 fps)

Pond 2E: Wetland Storage

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 24

Summary for Subcatchment 3E: E1b

Runoff = 1.87 cfs @ 12.59 hrs, Volume= 0.593 af, Depth= 0.27"

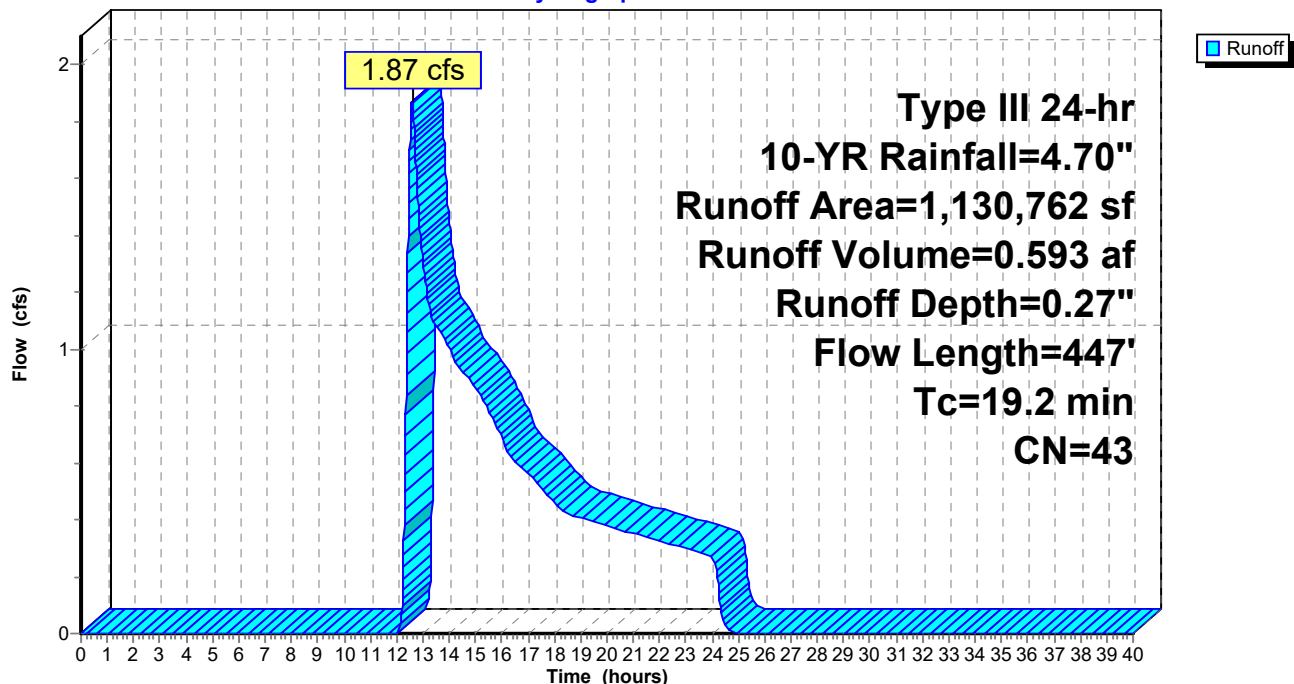
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
1,056	98	Roofs HSG B
588	98	Roofs HSG A
163,214	68	Pasture/grassland/range, Poor, HSG A
33,609	61	>75% Grass cover, Good HSG B
109,245	39	>75% Grass cover, Good HSG A
548,151	30	Woods, Good HSG A
274,899	55	Woods, Good HSG B
1,130,762	43	Weighted Average
1,129,118	43	99.85% Pervious Area
1,644	98	0.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
9.9	422	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.2	447	Total			

Subcatchment 3E: E1b

Hydrograph

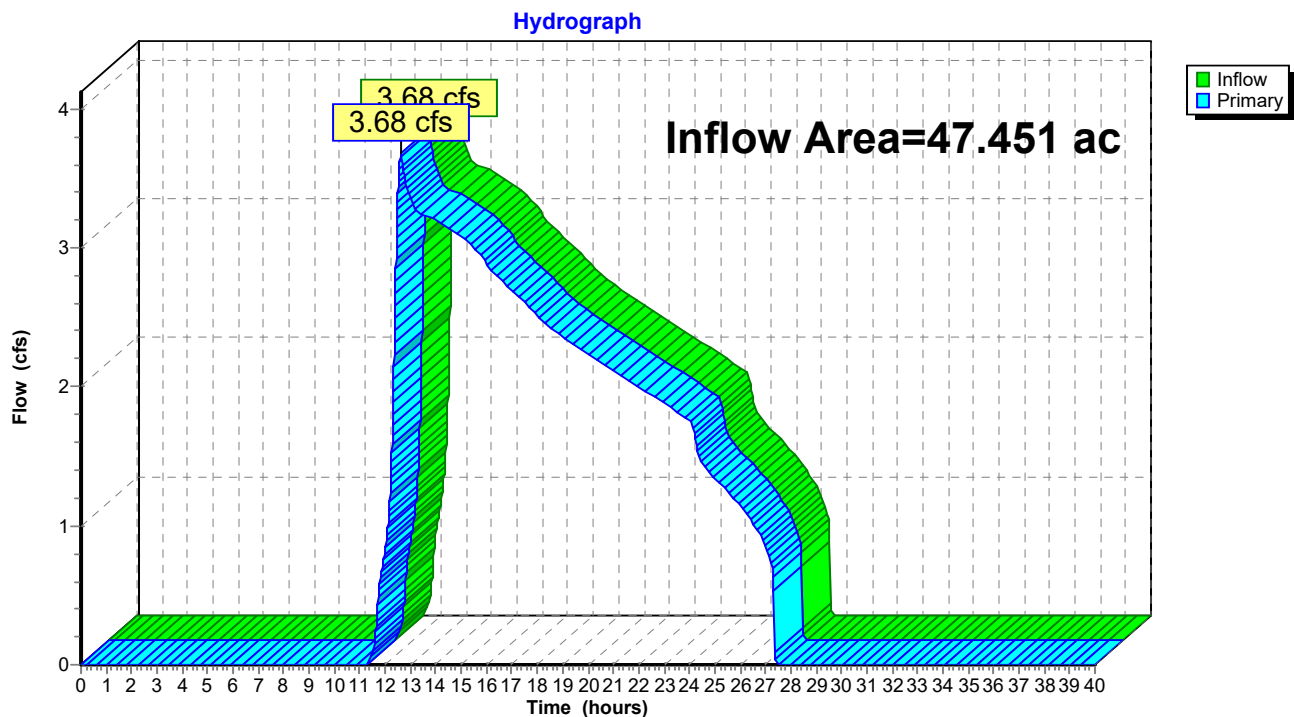


Summary for Link 4E: Design Point #1: Flow to Western Wetlands

Inflow Area = 47.451 ac, 3.44% Impervious, Inflow Depth = 0.72" for 10-YR event
 Inflow = 3.68 cfs @ 12.61 hrs, Volume= 2.844 af
 Primary = 3.68 cfs @ 12.61 hrs, Volume= 2.844 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 4E: Design Point #1: Flow to Western Wetlands



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 26

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: E1a

Runoff Area=936,224 sf 7.42% Impervious Runoff Depth=2.16"
Flow Length=1,260' Slope=0.0100 '/' Tc=24.1 min CN=62 Runoff=32.49 cfs 3.867 af

Pond 2E: Wetland Storage

Peak Elev=146.30' Storage=84,134 cf Inflow=32.49 cfs 3.867 af
24.0" Round Culvert n=0.013 L=25.0' S=-0.0016 '/' Outflow=3.31 cfs 3.867 af

Subcatchment3E: E1b

Runoff Area=1,130,762 sf 0.15% Impervious Runoff Depth=0.71"
Flow Length=447' Tc=19.2 min CN=43 Runoff=8.66 cfs 1.540 af

Link 4E: Design Point #1: Flow to Western Wetlands

Inflow=10.81 cfs 5.407 af
Primary=10.81 cfs 5.407 af

Total Runoff Area = 47.451 ac Runoff Volume = 5.408 af Average Runoff Depth = 1.37"
96.56% Pervious = 45.820 ac 3.44% Impervious = 1.632 ac

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Type III 24-hr 50-YR Rainfall=6.10"

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Page 27

Summary for Subcatchment 1E: E1a

Runoff = 32.49 cfs @ 12.35 hrs, Volume= 3.867 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
22,240	98	Paved parking HSG B
24,401	98	Paved parking HSG A
6,082	98	Roofs HSG B
16,716	98	Roofs HSG A
97,343	61	>75% Grass cover, Good HSG B
149,714	39	>75% Grass cover, Good HSG A
137,899	30	Woods, Good HSG A
61,803	55	Woods, Good HSG B
420,026	77	Woods, Good HSG D
936,224	62	Weighted Average
866,785	60	92.58% Pervious Area
69,439	98	7.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,035	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
24.1	1,260	Total			

Ridge Street HydroCAD Revised Final

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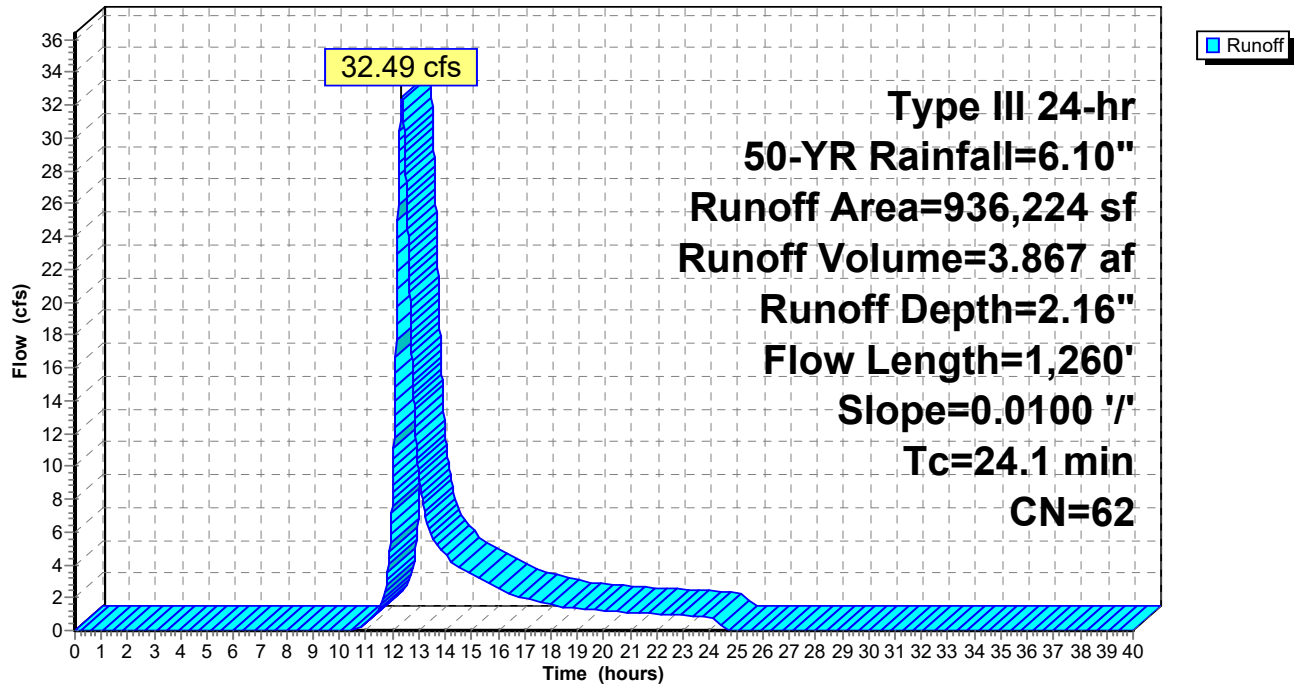
Type III 24-hr 50-YR Rainfall=6.10"

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Page 28

Subcatchment 1E: E1a

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 29

Summary for Pond 2E: Wetland Storage

Inflow Area = 21.493 ac, 7.42% Impervious, Inflow Depth = 2.16" for 50-YR event
 Inflow = 32.49 cfs @ 12.35 hrs, Volume= 3.867 af
 Outflow = 3.31 cfs @ 15.18 hrs, Volume= 3.867 af, Atten= 90%, Lag= 169.6 min
 Primary = 3.31 cfs @ 15.18 hrs, Volume= 3.867 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.30' @ 15.18 hrs Surf.Area= 233,865 sf Storage= 84,134 cf

Plug-Flow detention time= 333.1 min calculated for 3.866 af (100% of inflow)
 Center-of-Mass det. time= 333.1 min (1,206.6 - 873.4)

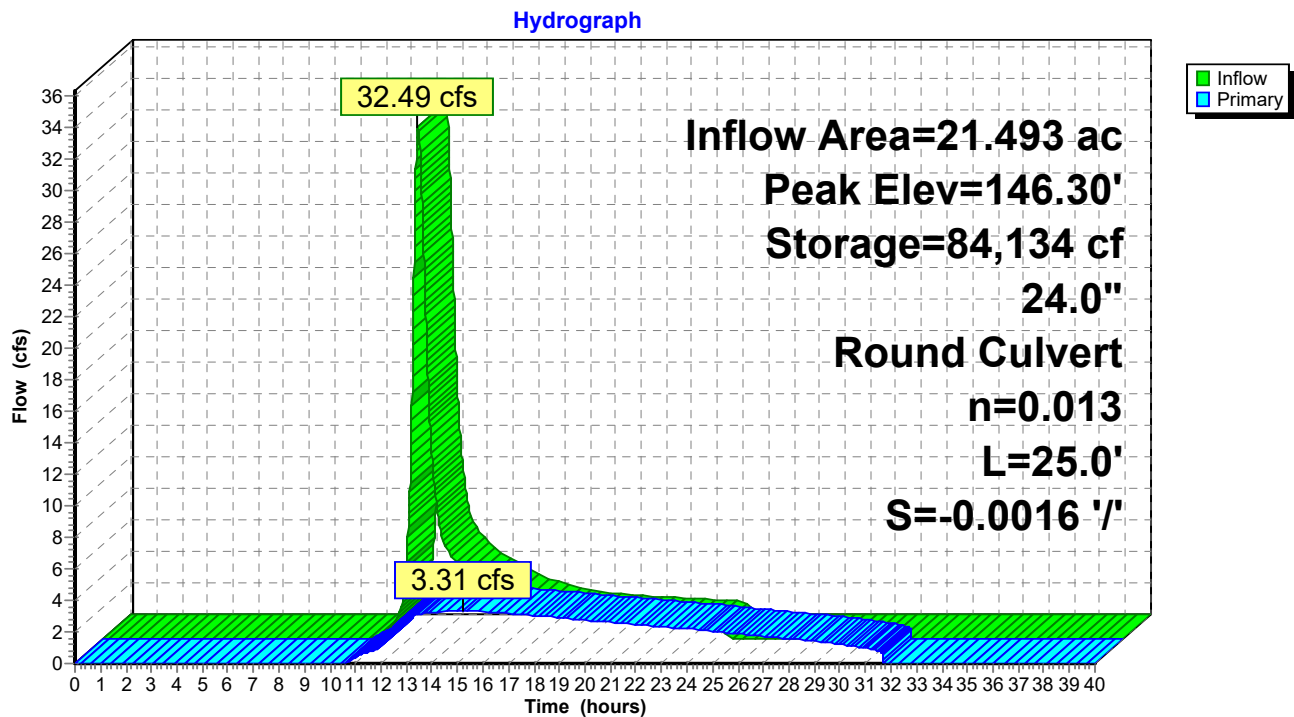
Volume	Invert	Avail.Storage	Storage Description		
#1	145.20'	133,862 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.20	20	18.0	0	0	20
145.70	60	30.0	19	19	67
146.00	195,920	2,713.0	19,941	19,960	585,715
146.50	261,254	2,891.0	113,902	133,862	665,107

Device	Routing	Invert	Outlet Devices
#1	Primary	145.31'	24.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.27' / 145.31' S= -0.0016 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=3.31 cfs @ 15.18 hrs HW=146.30' (Free Discharge)

↑**1=Culvert** (Barrel Controls 3.31 cfs @ 2.96 fps)

Pond 2E: Wetland Storage



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 31

Summary for Subcatchment 3E: E1b

Runoff = 8.66 cfs @ 12.44 hrs, Volume= 1.540 af, Depth= 0.71"

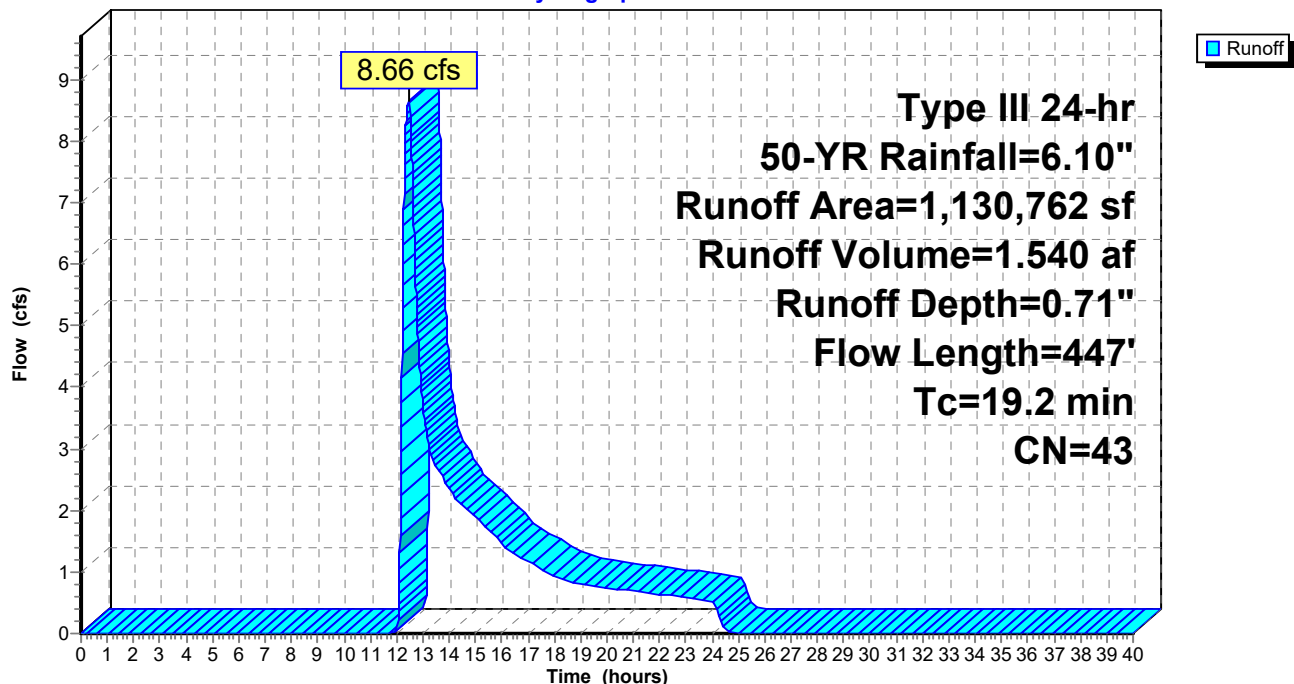
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
1,056	98	Roofs HSG B
588	98	Roofs HSG A
163,214	68	Pasture/grassland/range, Poor, HSG A
33,609	61	>75% Grass cover, Good HSG B
109,245	39	>75% Grass cover, Good HSG A
548,151	30	Woods, Good HSG A
274,899	55	Woods, Good HSG B
1,130,762	43	Weighted Average
1,129,118	43	99.85% Pervious Area
1,644	98	0.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
9.9	422	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.2	447	Total			

Subcatchment 3E: E1b

Hydrograph

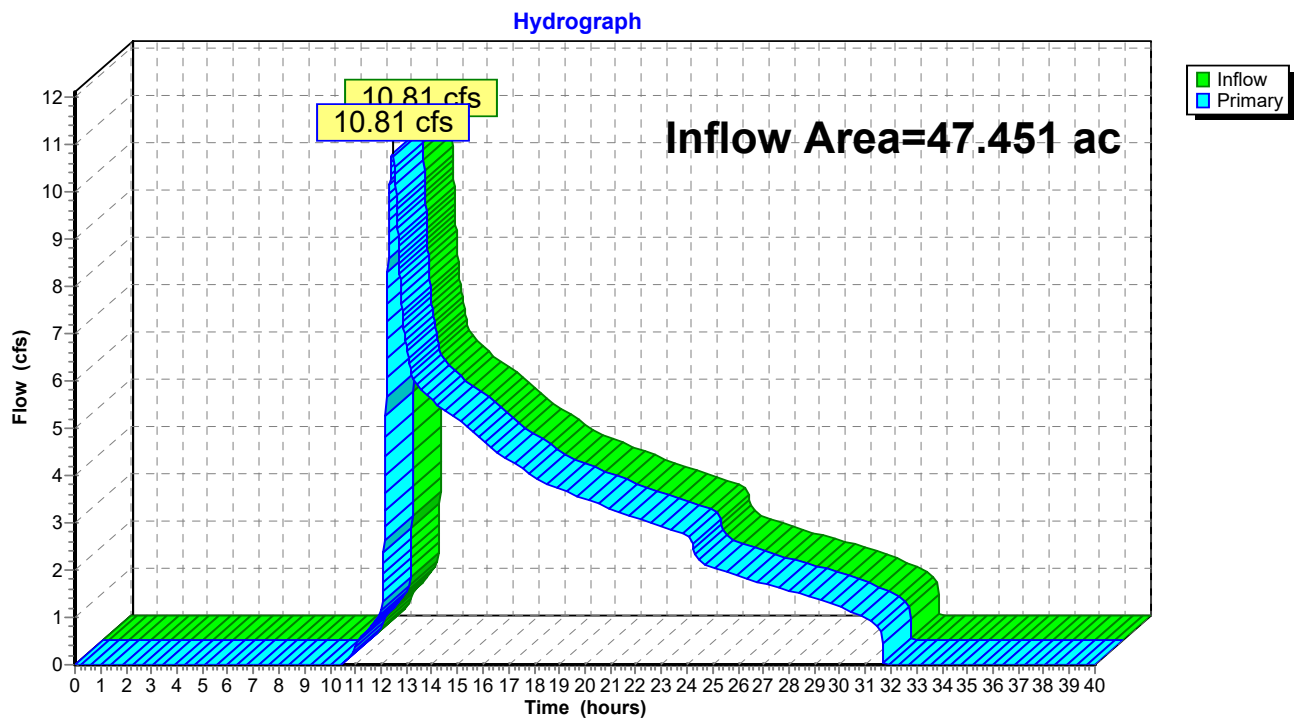


Summary for Link 4E: Design Point #1: Flow to Western Wetlands

Inflow Area = 47.451 ac, 3.44% Impervious, Inflow Depth = 1.37" for 50-YR event
 Inflow = 10.81 cfs @ 12.47 hrs, Volume= 5.407 af
 Primary = 10.81 cfs @ 12.47 hrs, Volume= 5.407 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 4E: Design Point #1: Flow to Western Wetlands



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 33

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: E1a

Runoff Area=936,224 sf 7.42% Impervious Runoff Depth=2.58"
Flow Length=1,260' Slope=0.0100 '/' Tc=24.1 min CN=62 Runoff=39.40 cfs 4.626 af

Pond 2E: Wetland Storage

Peak Elev=146.38' Storage=103,617 cf Inflow=39.40 cfs 4.626 af
24.0" Round Culvert n=0.013 L=25.0' S=-0.0016 '/' Outflow=3.83 cfs 4.626 af

Subcatchment3E: E1b

Runoff Area=1,130,762 sf 0.15% Impervious Runoff Depth=0.95"
Flow Length=447' Tc=19.2 min CN=43 Runoff=13.05 cfs 2.049 af

Link 4E: Design Point #1: Flow to Western Wetlands

Inflow=15.29 cfs 6.675 af
Primary=15.29 cfs 6.675 af

Total Runoff Area = 47.451 ac Runoff Volume = 6.675 af Average Runoff Depth = 1.69"
96.56% Pervious = 45.820 ac 3.44% Impervious = 1.632 ac

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Type III 24-hr 100-YR Rainfall=6.70"

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Page 34

Summary for Subcatchment 1E: E1a

Runoff = 39.40 cfs @ 12.35 hrs, Volume= 4.626 af, Depth= 2.58"

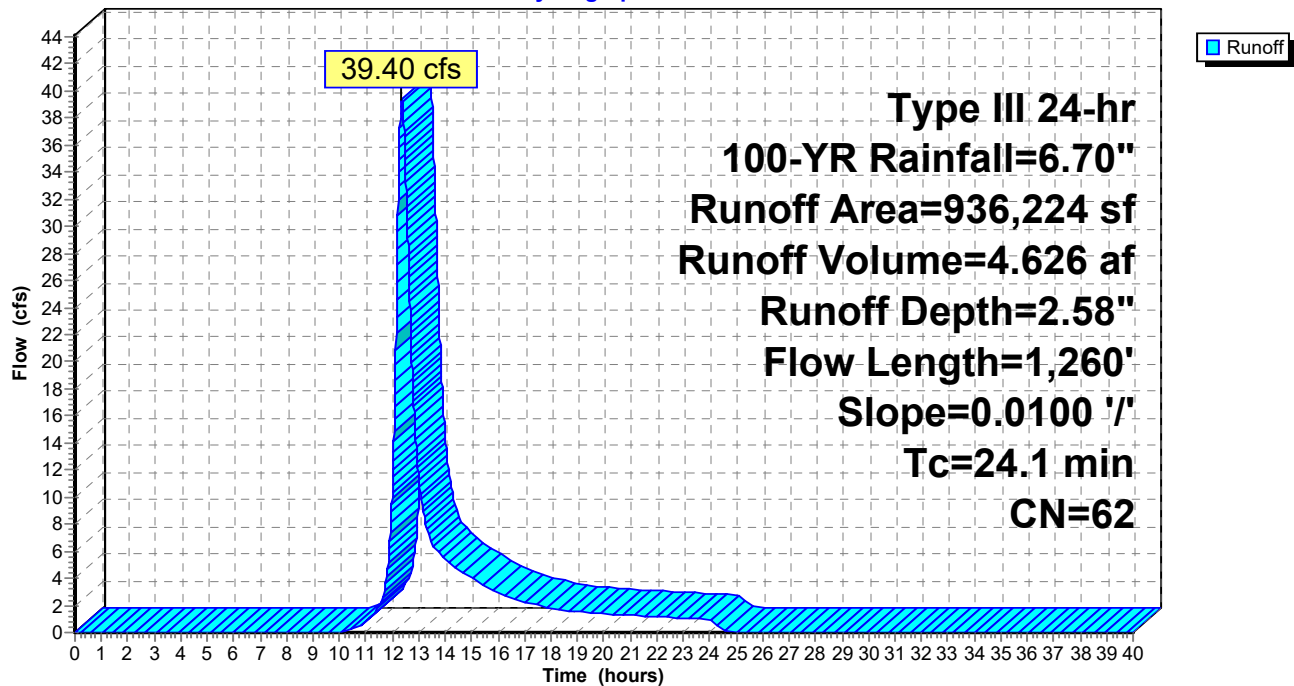
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
22,240	98	Paved parking HSG B
24,401	98	Paved parking HSG A
6,082	98	Roofs HSG B
16,716	98	Roofs HSG A
97,343	61	>75% Grass cover, Good HSG B
149,714	39	>75% Grass cover, Good HSG A
137,899	30	Woods, Good HSG A
61,803	55	Woods, Good HSG B
420,026	77	Woods, Good HSG D
936,224	62	Weighted Average
866,785	60	92.58% Pervious Area
69,439	98	7.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,035	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
24.1	1,260	Total			

Subcatchment 1E: E1a

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 36

Summary for Pond 2E: Wetland Storage

Inflow Area = 21.493 ac, 7.42% Impervious, Inflow Depth = 2.58" for 100-YR event
 Inflow = 39.40 cfs @ 12.35 hrs, Volume= 4.626 af
 Outflow = 3.83 cfs @ 15.18 hrs, Volume= 4.626 af, Atten= 90%, Lag= 169.9 min
 Primary = 3.83 cfs @ 15.18 hrs, Volume= 4.626 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.38' @ 15.18 hrs Surf.Area= 244,777 sf Storage= 103,617 cf

Plug-Flow detention time= 359.8 min calculated for 4.624 af (100% of inflow)
 Center-of-Mass det. time= 359.8 min (1,227.8 - 868.0)

Volume	Invert	Avail.Storage	Storage Description		
#1	145.20'	133,862 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.20	20	18.0	0	0	20
145.70	60	30.0	19	19	67
146.00	195,920	2,713.0	19,941	19,960	585,715
146.50	261,254	2,891.0	113,902	133,862	665,107

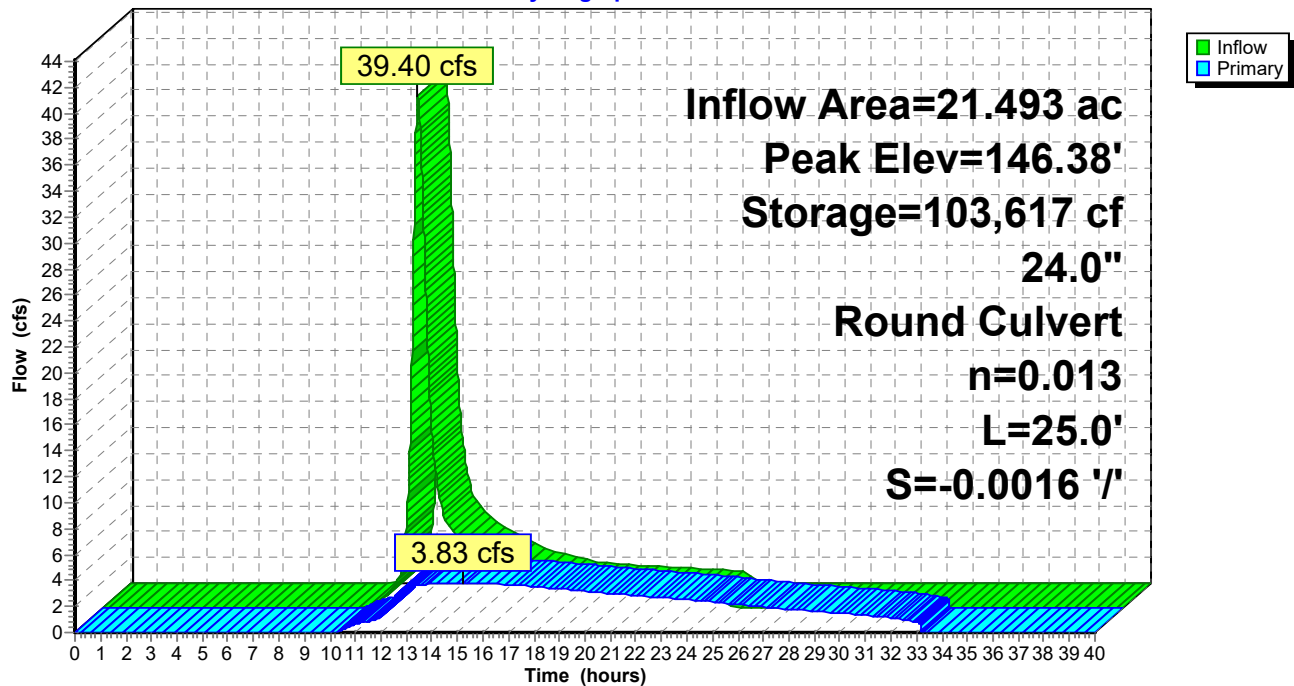
Device	Routing	Invert	Outlet Devices
#1	Primary	145.31'	24.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.27' / 145.31' S= -0.0016 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=3.83 cfs @ 15.18 hrs HW=146.38' (Free Discharge)

↑**1=Culvert** (Barrel Controls 3.83 cfs @ 3.09 fps)

Pond 2E: Wetland Storage

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 38

Summary for Subcatchment 3E: E1b

Runoff = 13.05 cfs @ 12.38 hrs, Volume= 2.049 af, Depth= 0.95"

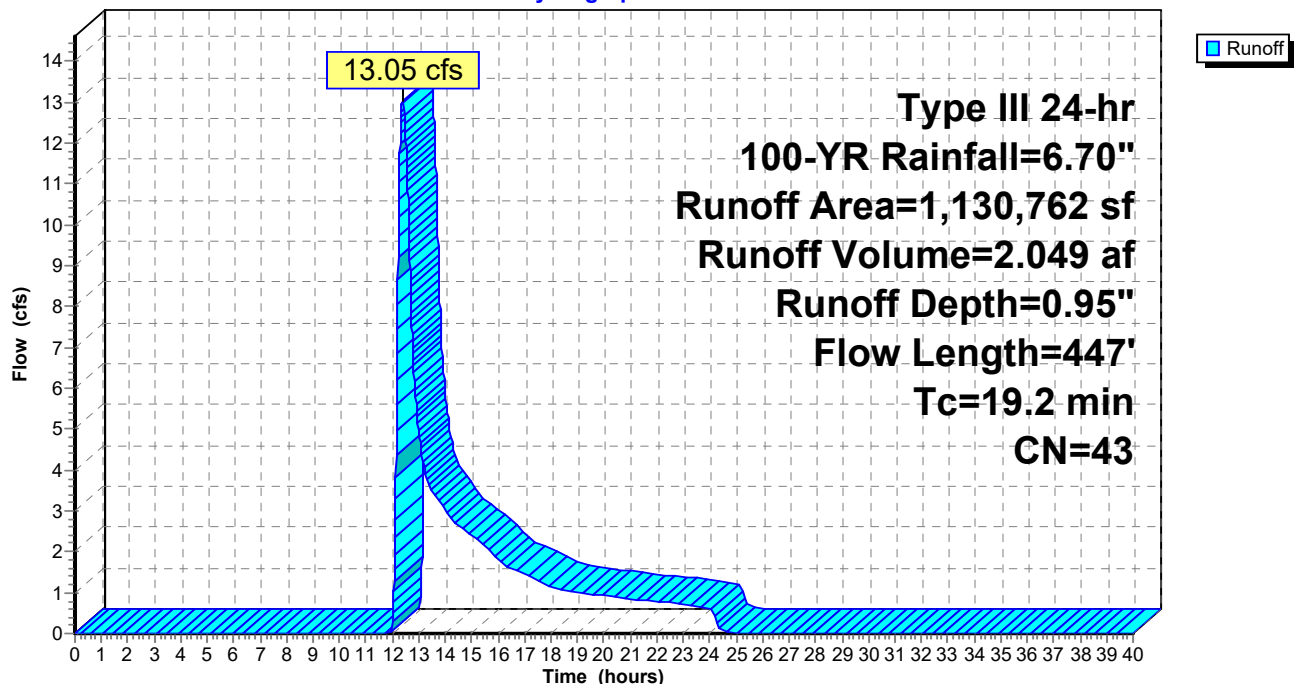
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
1,056	98	Roofs HSG B
588	98	Roofs HSG A
163,214	68	Pasture/grassland/range, Poor, HSG A
33,609	61	>75% Grass cover, Good HSG B
109,245	39	>75% Grass cover, Good HSG A
548,151	30	Woods, Good HSG A
274,899	55	Woods, Good HSG B
1,130,762	43	Weighted Average
1,129,118	43	99.85% Pervious Area
1,644	98	0.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
9.9	422	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.2	447	Total			

Subcatchment 3E: E1b

Hydrograph

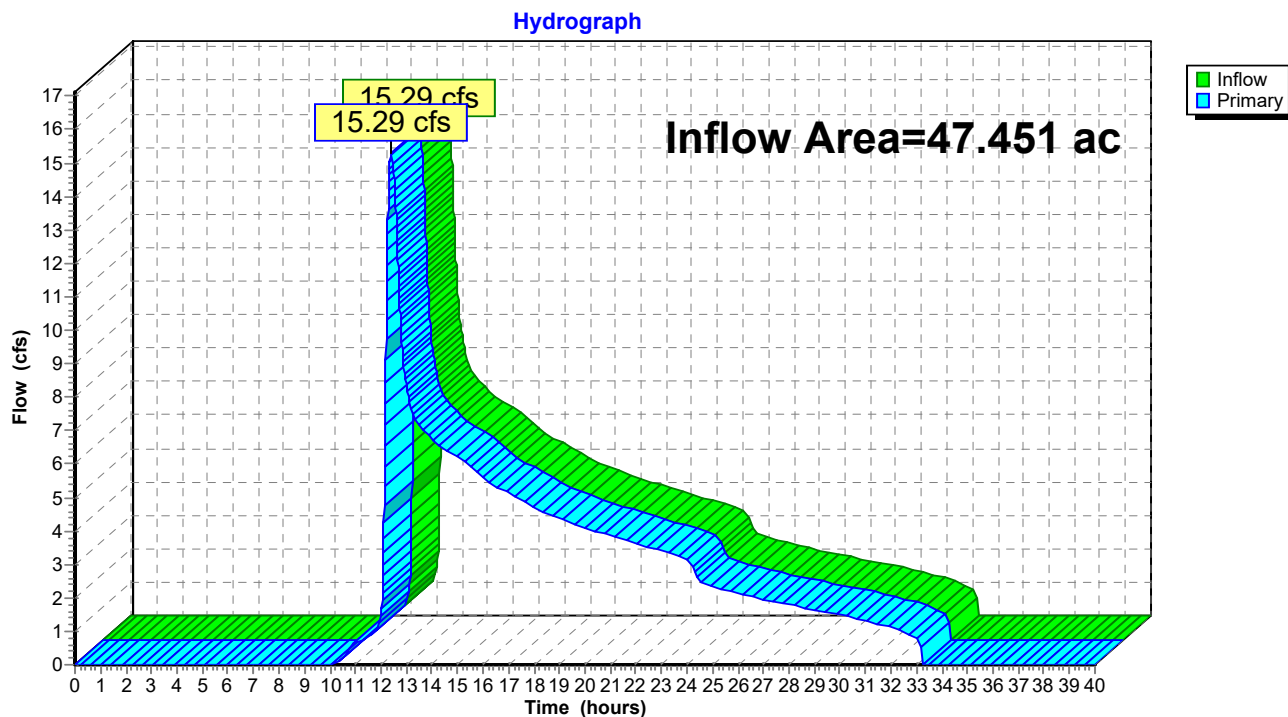


Summary for Link 4E: Design Point #1: Flow to Western Wetlands

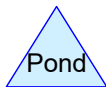
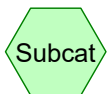
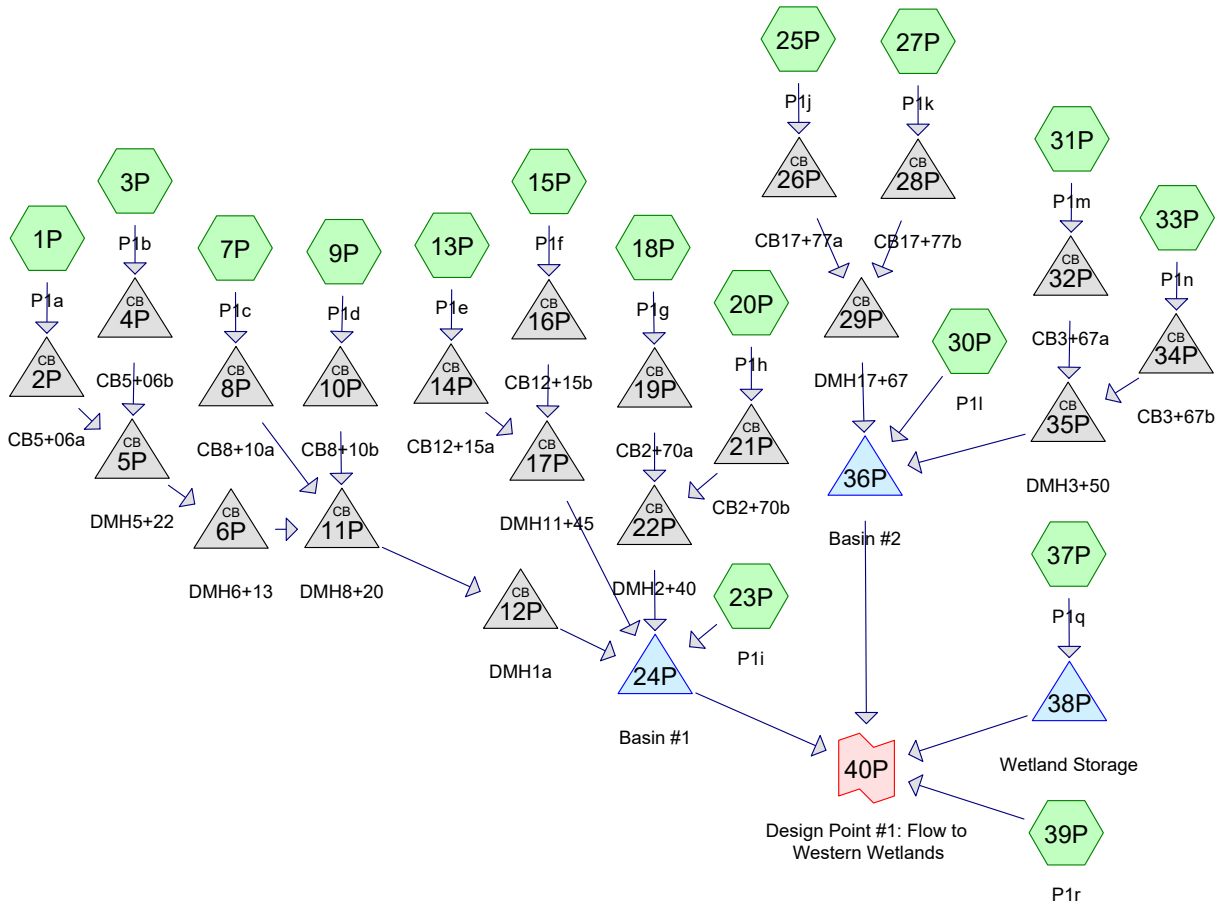
Inflow Area = 47.451 ac, 3.44% Impervious, Inflow Depth = 1.69" for 100-YR event
 Inflow = 15.29 cfs @ 12.40 hrs, Volume= 6.675 af
 Primary = 15.29 cfs @ 12.40 hrs, Volume= 6.675 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 4E: Design Point #1: Flow to Western Wetlands



**DESIGN POINT #1: FLOW TO WESTERN
WETLANDS PROPOSED CONDITIONS**



Routing Diagram for Ridge Street HydroCAD Revised Final
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Page 2

Project Notes

Rainfall events imported from "Acorn Place R3.hcp"

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Page 3

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-In	Type III 24-hr		Default	24.00	1	1.00	2
2	1-YR	Type III 24-hr		Default	24.00	1	2.50	2
3	2-YR	Type III 24-hr		Default	24.00	1	3.20	2
4	10-YR	Type III 24-hr		Default	24.00	1	4.70	2
5	50-YR	Type III 24-hr		Default	24.00	1	6.10	2
6	100-YR	Type III 24-hr		Default	24.00	1	6.70	2

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Page 4

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
10.797	39	>75% Grass cover, Good HSG A (1P, 3P, 7P, 9P, 13P, 15P, 18P, 20P, 23P, 25P, 27P, 30P, 31P, 33P, 37P, 39P)
4.928	61	>75% Grass cover, Good HSG B (1P, 3P, 7P, 9P, 13P, 15P, 23P, 25P, 27P, 30P, 31P, 33P, 37P, 39P)
0.009	80	>75% Grass cover, Good HSG D (1P, 3P, 37P)
3.260	98	Paved parking HSG A (1P, 3P, 7P, 9P, 13P, 15P, 18P, 20P, 23P, 25P, 27P, 30P, 31P, 33P, 37P, 39P)
1.675	98	Paved parking HSG B (1P, 3P, 7P, 9P, 13P, 15P, 23P, 25P, 27P, 30P, 31P, 33P, 37P, 39P)
0.034	98	Paved parking HSG D (1P, 3P)
1.362	98	Roofs HSG A (3P, 7P, 13P, 15P, 18P, 20P, 23P, 25P, 30P, 31P, 33P, 37P, 39P)
0.560	98	Roofs HSG B (9P, 13P, 15P, 23P, 25P, 30P, 31P, 33P, 37P, 39P)
0.253	98	Water Surface HSG A (30P)
9.640	30	Woods, Good HSG A (3P, 15P, 23P, 37P, 39P)
5.445	55	Woods, Good HSG B (9P, 15P, 23P, 37P, 39P)
9.600	77	Woods, Good HSG D (37P)
47.565	58	TOTAL AREA

Ridge Street HydroCAD Revised Final

Type III 24-hr 1-YR Rainfall=2.50"

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Page 5

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1P: P1a

Runoff Area=8,961 sf 99.73% Impervious Runoff Depth=2.27"
Flow Length=474' Tc=14.6 min CN=98 Runoff=0.38 cfs 0.039 af

Pond 2P: CB5+06a

Peak Elev=149.41' Inflow=0.38 cfs 0.039 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0177 ' Outflow=0.38 cfs 0.039 af

Subcatchment3P: P1b

Runoff Area=48,701 sf 27.64% Impervious Runoff Depth=0.10"
Flow Length=473' Slope=0.0100 ' Tc=6.0 min CN=56 Runoff=0.02 cfs 0.009 af

Pond 4P: CB5+06b

Peak Elev=149.17' Inflow=0.02 cfs 0.009 af
12.0" Round Culvert n=0.011 L=21.0' S=0.0110 ' Outflow=0.02 cfs 0.009 af

Pond 5P: DMH5+22

Peak Elev=149.12' Inflow=0.38 cfs 0.048 af
15.0" Round Culvert n=0.011 L=88.0' S=0.0060 ' Outflow=0.38 cfs 0.048 af

Pond 6P: DMH6+13

Peak Elev=148.53' Inflow=0.38 cfs 0.048 af
15.0" Round Culvert n=0.011 L=209.0' S=0.0060 ' Outflow=0.38 cfs 0.048 af

Subcatchment7P: P1c

Runoff Area=19,485 sf 49.68% Impervious Runoff Depth=0.42"
Flow Length=193' Slope=0.0100 ' Tc=11.0 min CN=69 Runoff=0.13 cfs 0.016 af

Pond 8P: CB8+10a

Peak Elev=147.38' Inflow=0.13 cfs 0.016 af
12.0" Round Culvert n=0.011 L=12.0' S=0.0175 ' Outflow=0.13 cfs 0.016 af

Subcatchment9P: P1d

Runoff Area=15,346 sf 57.18% Impervious Runoff Depth=0.94"
Flow Length=194' Slope=0.0100 ' Tc=10.6 min CN=81 Runoff=0.32 cfs 0.028 af

Pond 10P: CB8+10b

Peak Elev=147.48' Inflow=0.32 cfs 0.028 af
12.0" Round Culvert n=0.011 L=19.0' S=0.0111 ' Outflow=0.32 cfs 0.028 af

Pond 11P: DMH8+20

Peak Elev=147.35' Inflow=0.83 cfs 0.091 af
18.0" Round Culvert n=0.011 L=161.0' S=0.0061 ' Outflow=0.83 cfs 0.091 af

Pond 12P: DMH1a

Peak Elev=146.35' Inflow=0.83 cfs 0.091 af
18.0" Round Culvert n=0.011 L=35.0' S=0.0060 ' Outflow=0.83 cfs 0.091 af

Subcatchment13P: P1e

Runoff Area=37,107 sf 49.02% Impervious Runoff Depth=0.65"
Flow Length=331' Slope=0.0100 ' Tc=12.0 min CN=75 Runoff=0.47 cfs 0.046 af

Pond 14P: CB12+15a

Peak Elev=148.25' Inflow=0.47 cfs 0.046 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0100 ' Outflow=0.47 cfs 0.046 af

Subcatchment15P: P1f

Runoff Area=35,775 sf 48.96% Impervious Runoff Depth=0.65"
Flow Length=280' Slope=0.0100 ' Tc=11.5 min CN=75 Runoff=0.46 cfs 0.045 af

Pond 16P: CB12+15b

Peak Elev=148.24' Inflow=0.46 cfs 0.045 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0100 ' Outflow=0.46 cfs 0.045 af

Ridge Street HydroCAD Revised Final*Type III 24-hr 1-YR Rainfall=2.50"*

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Page 6

Pond 17P: DMH11+45Peak Elev=148.06' Inflow=0.94 cfs 0.091 af
15.0" Round Culvert n=0.011 L=155.0' S=0.0123 '/' Outflow=0.94 cfs 0.091 af**Subcatchment18P: P1g**Runoff Area=42,623 sf 52.76% Impervious Runoff Depth=0.46"
Flow Length=313' Slope=0.0100 '/' Tc=12.1 min CN=70 Runoff=0.32 cfs 0.037 af**Pond 19P: CB2+70a**Peak Elev=147.45' Inflow=0.32 cfs 0.037 af
15.0" Round Culvert n=0.011 L=24.0' S=0.0125 '/' Outflow=0.32 cfs 0.037 af**Subcatchment20P: P1h**Runoff Area=45,838 sf 53.76% Impervious Runoff Depth=0.49"
Flow Length=301' Slope=0.0100 '/' Tc=11.7 min CN=71 Runoff=0.40 cfs 0.043 af**Pond 21P: CB2+70b**Peak Elev=147.49' Inflow=0.40 cfs 0.043 af
15.0" Round Culvert n=0.011 L=30.0' S=0.0083 '/' Outflow=0.40 cfs 0.043 af**Pond 22P: DMH2+40**Peak Elev=147.16' Inflow=0.72 cfs 0.080 af
18.0" Round Culvert x 2.00 n=0.011 L=199.0' S=0.0060 '/' Outflow=0.72 cfs 0.080 af**Subcatchment23P: P1i**Runoff Area=95,819 sf 10.70% Impervious Runoff Depth=0.13"
Flow Length=110' Tc=10.1 min CN=58 Runoff=0.08 cfs 0.024 af**Pond 24P: Basin #1**Peak Elev=145.77' Storage=1,572 cf Inflow=2.48 cfs 0.287 af
Discarded=1.21 cfs 0.287 af Primary=0.00 cfs 0.000 af Outflow=1.21 cfs 0.287 af**Subcatchment25P: P1j**Runoff Area=32,095 sf 46.13% Impervious Runoff Depth=0.57"
Flow Length=265' Slope=0.0100 '/' Tc=11.8 min CN=73 Runoff=0.34 cfs 0.035 af**Pond 26P: CB17+77a**Peak Elev=146.32' Inflow=0.34 cfs 0.035 af
12.0" Round Culvert n=0.011 L=10.0' S=0.0100 '/' Outflow=0.34 cfs 0.035 af**Subcatchment27P: P1k**Runoff Area=11,617 sf 66.38% Impervious Runoff Depth=1.00"
Flow Length=210' Slope=0.0100 '/' Tc=8.7 min CN=82 Runoff=0.28 cfs 0.022 af**Pond 28P: CB17+77b**Peak Elev=146.30' Inflow=0.28 cfs 0.022 af
12.0" Round Culvert n=0.011 L=18.0' S=0.0056 '/' Outflow=0.28 cfs 0.022 af**Pond 29P: DMH17+67**Peak Elev=146.21' Inflow=0.60 cfs 0.057 af
15.0" Round Culvert n=0.011 L=75.0' S=0.0313 '/' Outflow=0.60 cfs 0.057 af**Subcatchment30P: P1l**Runoff Area=114,834 sf 21.32% Impervious Runoff Depth=0.04"
Flow Length=113' Tc=10.4 min CN=52 Runoff=0.01 cfs 0.010 af**Subcatchment31P: P1m**Runoff Area=43,062 sf 52.36% Impervious Runoff Depth=0.53"
Flow Length=198' Slope=0.0100 '/' Tc=10.9 min CN=72 Runoff=0.43 cfs 0.044 af**Pond 32P: CB3+67a**Peak Elev=145.43' Inflow=0.43 cfs 0.044 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0254 '/' Outflow=0.43 cfs 0.044 af**Subcatchment33P: P1n**Runoff Area=44,792 sf 54.66% Impervious Runoff Depth=0.57"
Flow Length=199' Slope=0.0100 '/' Tc=10.9 min CN=73 Runoff=0.49 cfs 0.049 af**Pond 34P: CB3+67b**Peak Elev=145.46' Inflow=0.49 cfs 0.049 af
12.0" Round Culvert n=0.011 L=22.0' S=0.0150 '/' Outflow=0.49 cfs 0.049 af

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Page 7

Pond 35P: DMH3+50

Peak Elev=145.03' Inflow=0.92 cfs 0.092 af
18.0" Round Culvert x 2.00 n=0.011 L=205.0' S=0.0060 '/' Outflow=0.92 cfs 0.092 af

Pond 36P: Basin #2

Peak Elev=143.52' Storage=222 cf Inflow=1.51 cfs 0.159 af
Discarded=1.42 cfs 0.159 af Primary=0.00 cfs 0.000 af Outflow=1.42 cfs 0.159 af

Subcatchment37P: P1q

Runoff Area=914,537 sf 7.52% Impervious Runoff Depth=0.24"
Flow Length=1,260' Slope=0.0100 '/' Tc=24.1 min CN=63 Runoff=1.99 cfs 0.427 af

Pond 38P: Wetland Storage

Peak Elev=145.93' Storage=9,010 cf Inflow=1.99 cfs 0.427 af
Outflow=0.30 cfs 0.391 af

Subcatchment39P: P1r

Runoff Area=561,327 sf 2.58% Impervious Runoff Depth=0.00"
Flow Length=368' Tc=17.4 min CN=42 Runoff=0.00 cfs 0.000 af

Link 40P: Design Point #1: Flow to Western Wetlands

Inflow=0.30 cfs 0.391 af
Primary=0.30 cfs 0.391 af

Total Runoff Area = 47.565 ac Runoff Volume = 0.872 af Average Runoff Depth = 0.22"
84.98% Pervious = 40.420 ac 15.02% Impervious = 7.145 ac

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Page 8

Summary for Subcatchment 1P: P1a

Runoff = 0.38 cfs @ 12.19 hrs, Volume= 0.039 af, Depth= 2.27"

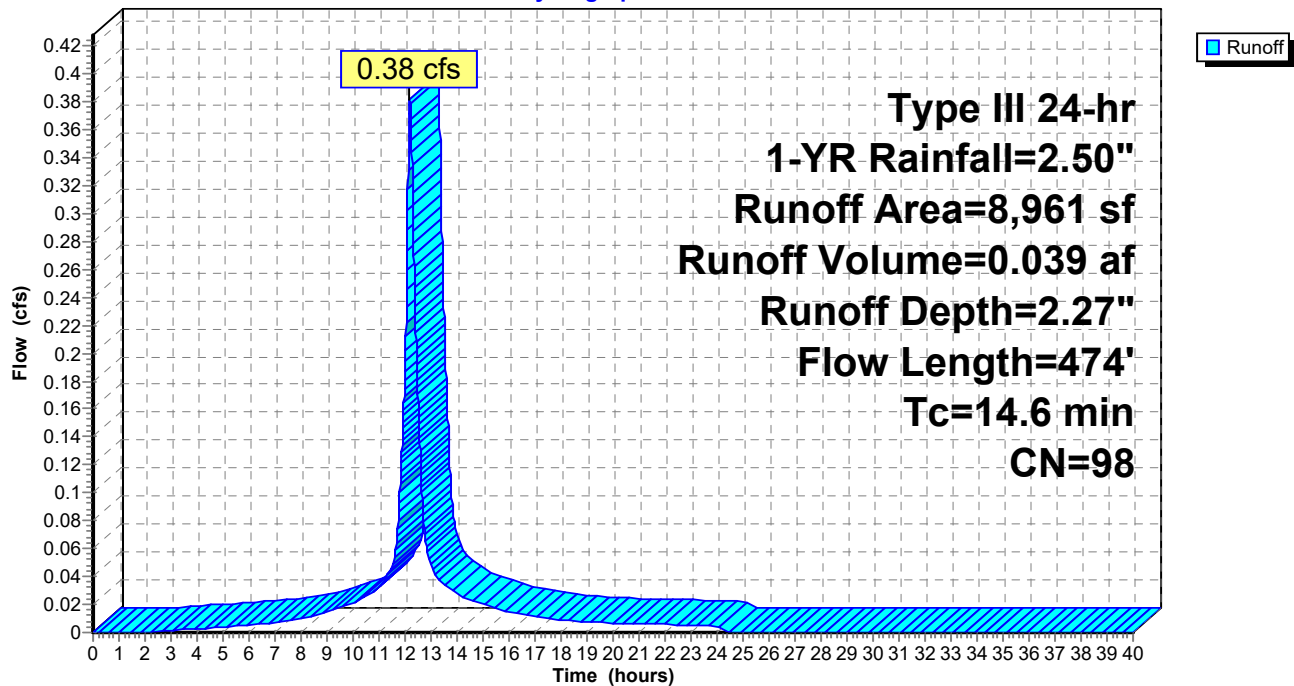
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
9	61	>75% Grass cover, Good HSG B
1	80	>75% Grass cover, Good HSG D
2,432	98	Paved parking HSG B
553	98	Paved parking HSG D
5,952	98	Paved parking HSG A
14	39	>75% Grass cover, Good HSG A
8,961	98	Weighted Average
24	49	0.27% Pervious Area
8,937	98	99.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
2.8	142	0.0150	0.86		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.4	290	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
14.6	474	Total			

Subcatchment 1P: P1a

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 10

Summary for Pond 2P: CB5+06a

Inflow Area = 0.206 ac, 99.73% Impervious, Inflow Depth = 2.27" for 1-YR event
Inflow = 0.38 cfs @ 12.19 hrs, Volume= 0.039 af
Outflow = 0.38 cfs @ 12.19 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min
Primary = 0.38 cfs @ 12.19 hrs, Volume= 0.039 af

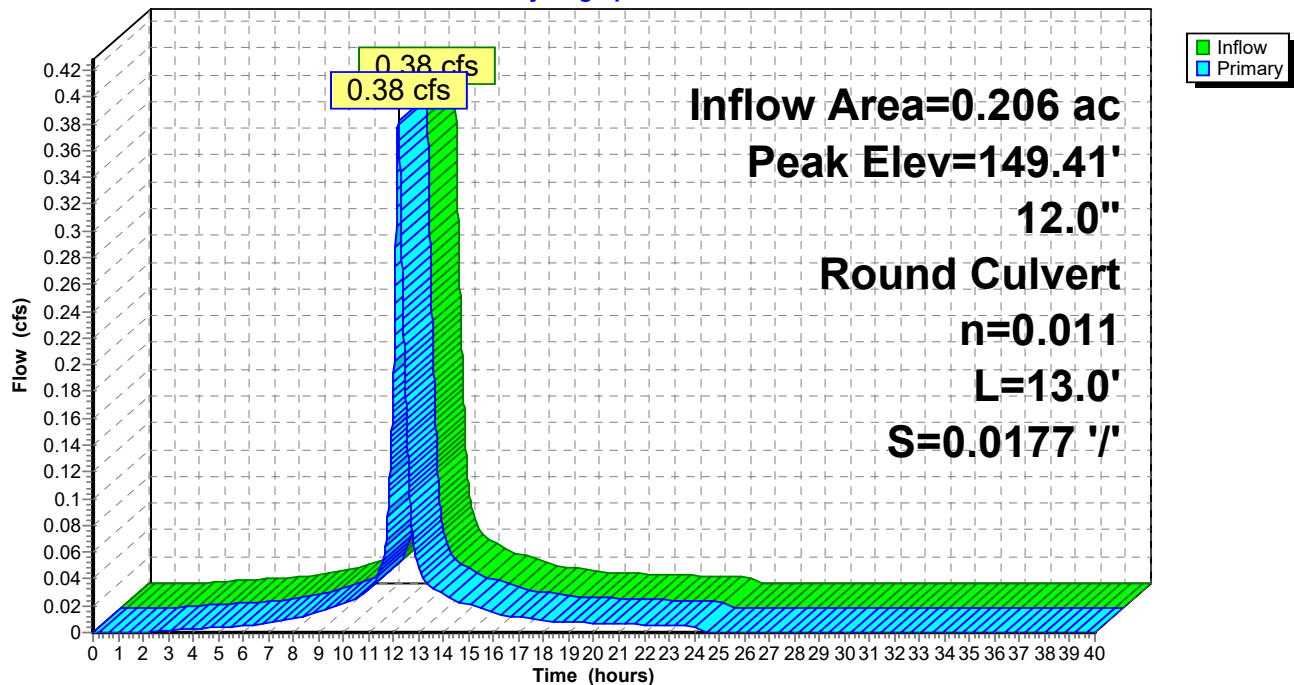
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.41' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	149.10'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 149.10' / 148.87' S= 0.0177 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.38 cfs @ 12.19 hrs HW=149.41' (Free Discharge)
↑1=Culvert (Inlet Controls 0.38 cfs @ 1.88 fps)

Pond 2P: CB5+06a

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 11

Summary for Subcatchment 3P: P1b

Runoff = 0.02 cfs @ 12.48 hrs, Volume= 0.009 af, Depth= 0.10"

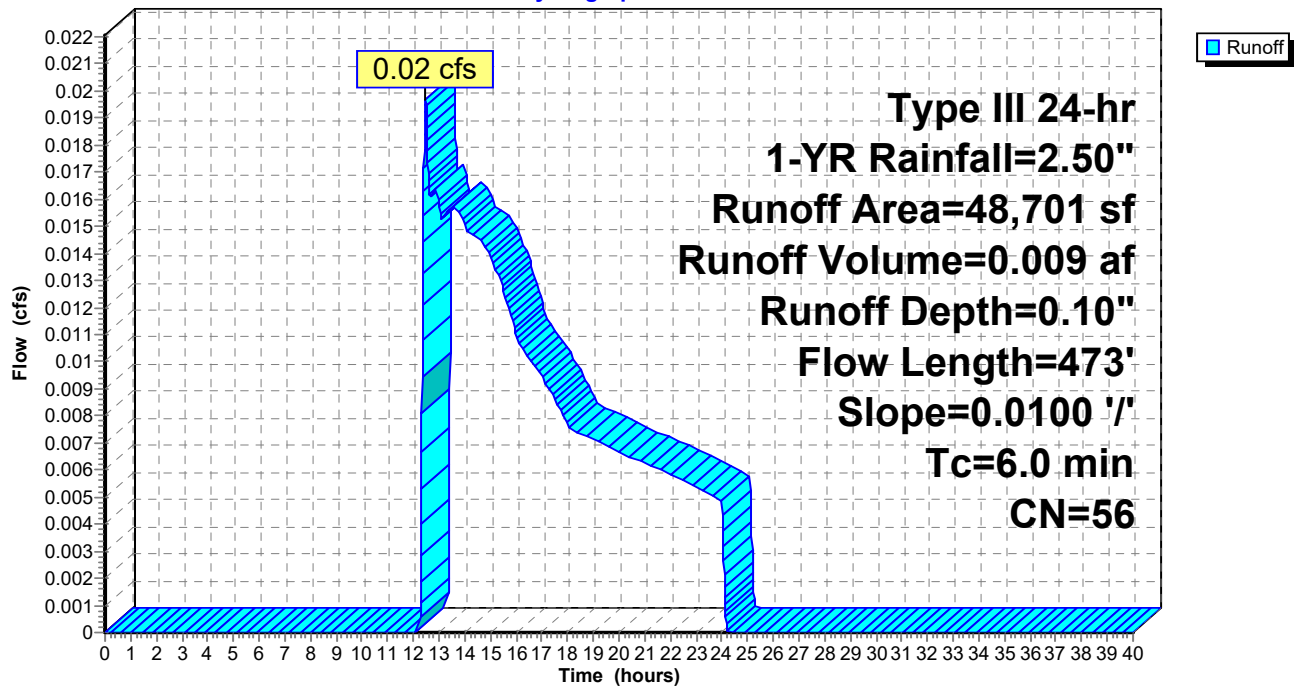
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
828	61	>75% Grass cover, Good HSG B
174	80	>75% Grass cover, Good HSG D
3,006	98	Paved parking HSG B
915	98	Paved parking HSG D
34,195	39	>75% Grass cover, Good HSG A
1,263	98	Roofs HSG A
8,276	98	Paved parking HSG A
44	30	Woods, Good HSG A
0	55	Woods, Good HSG B
48,701	56	Weighted Average
35,241	40	72.36% Pervious Area
13,460	98	27.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0100	1.30		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.4	173	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.3	473	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3P: P1b

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 13

Summary for Pond 4P: CB5+06b

Inflow Area = 1.118 ac, 27.64% Impervious, Inflow Depth = 0.10" for 1-YR event
Inflow = 0.02 cfs @ 12.48 hrs, Volume= 0.009 af
Outflow = 0.02 cfs @ 12.48 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min
Primary = 0.02 cfs @ 12.48 hrs, Volume= 0.009 af

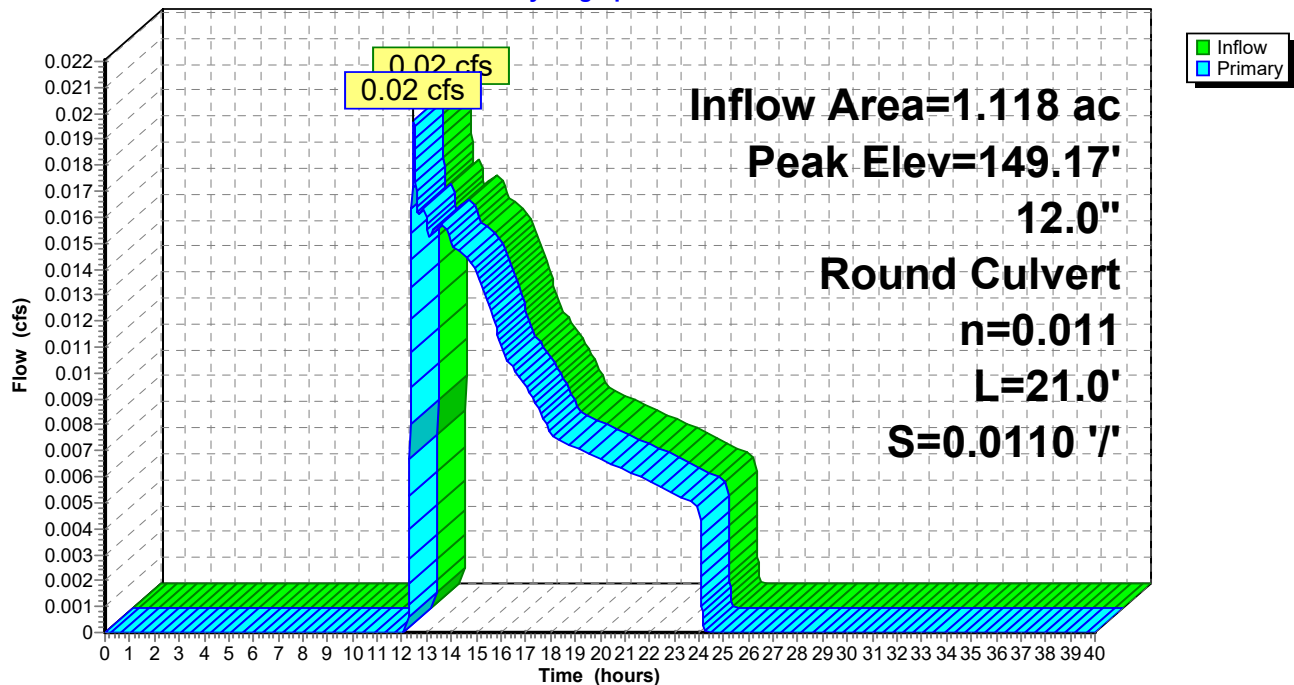
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.17' @ 12.48 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	149.10'	12.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 149.10' / 148.87' S= 0.0110 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.02 cfs @ 12.48 hrs HW=149.17' (Free Discharge)
↑**1=Culvert** (Inlet Controls 0.02 cfs @ 0.88 fps)

Pond 4P: CB5+06b

Hydrograph



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Page 14

Summary for Pond 5P: DMH5+22

Inflow Area = 1.324 ac, 38.84% Impervious, Inflow Depth = 0.44" for 1-YR event
Inflow = 0.38 cfs @ 12.19 hrs, Volume= 0.048 af
Outflow = 0.38 cfs @ 12.19 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min
Primary = 0.38 cfs @ 12.19 hrs, Volume= 0.048 af

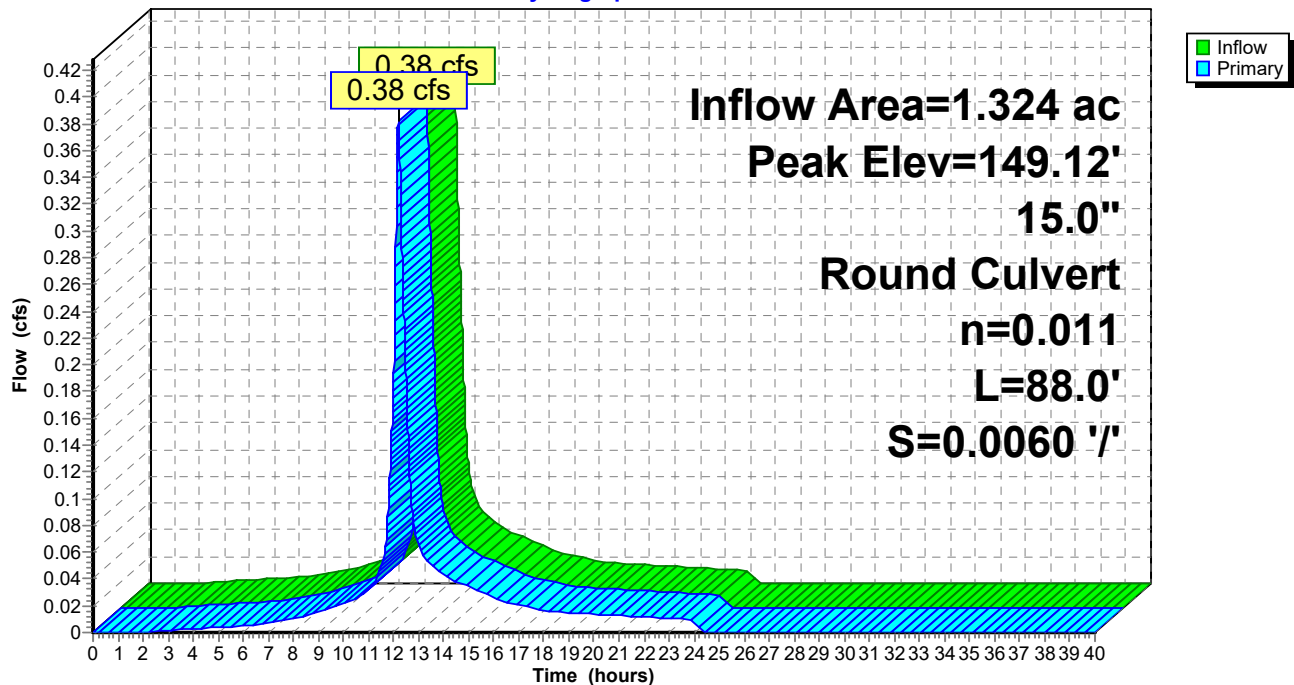
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.12' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	148.82'	15.0" Round Culvert L= 88.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 148.82' / 148.29' S= 0.0060 '/' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=0.38 cfs @ 12.19 hrs HW=149.12' (Free Discharge)
↑1=Culvert (Barrel Controls 0.38 cfs @ 2.56 fps)

Pond 5P: DMH5+22

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 15

Summary for Pond 6P: DMH6+13

Inflow Area = 1.324 ac, 38.84% Impervious, Inflow Depth = 0.44" for 1-YR event
Inflow = 0.38 cfs @ 12.19 hrs, Volume= 0.048 af
Outflow = 0.38 cfs @ 12.19 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min
Primary = 0.38 cfs @ 12.19 hrs, Volume= 0.048 af

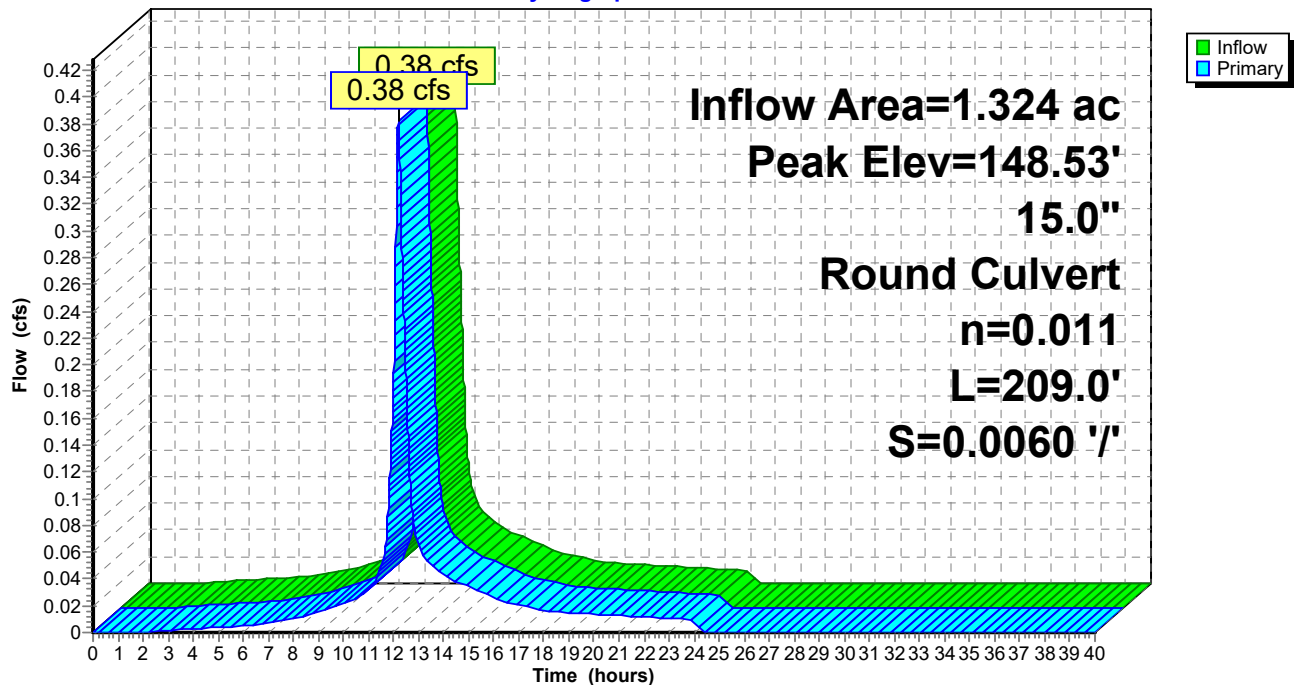
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.53' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	148.24'	15.0" Round Culvert L= 209.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 148.24' / 146.99' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=0.38 cfs @ 12.19 hrs HW=148.53' (Free Discharge)
↑1=Culvert (Barrel Controls 0.38 cfs @ 2.63 fps)

Pond 6P: DMH6+13

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Type III 24-hr 1-YR Rainfall=2.50"

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Page 16

Summary for Subcatchment 7P: P1c

Runoff = 0.13 cfs @ 12.19 hrs, Volume= 0.016 af, Depth= 0.42"

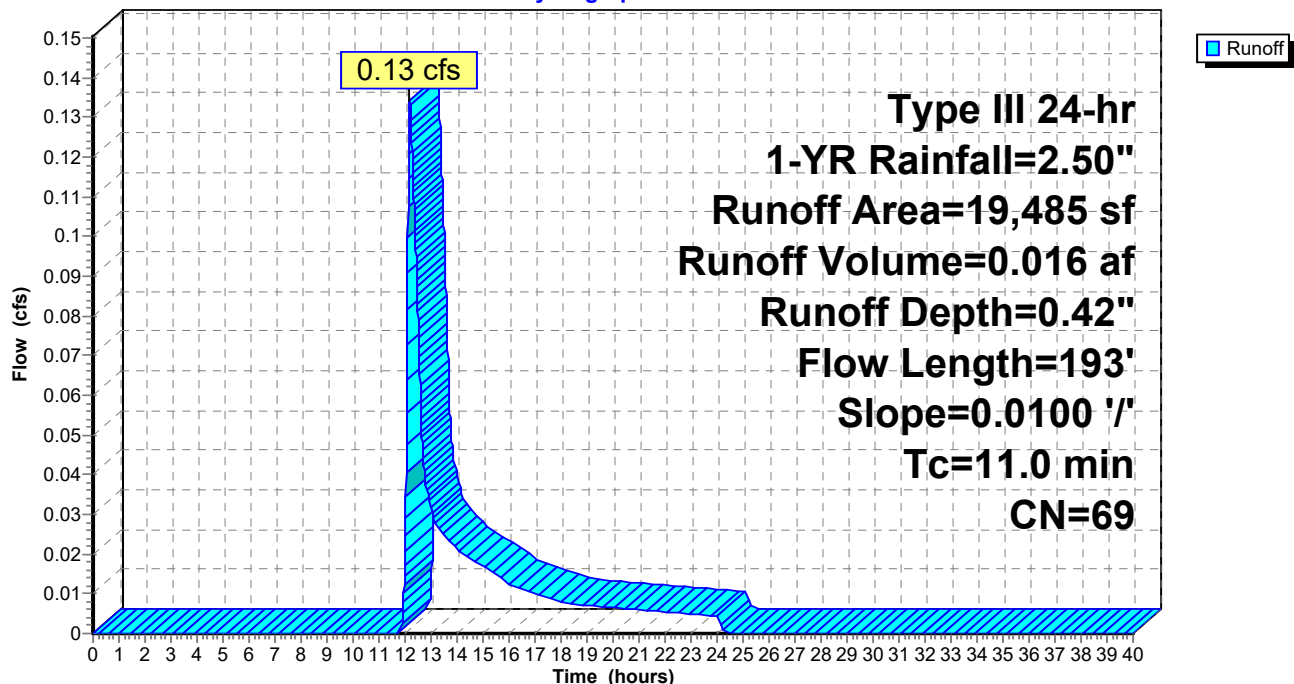
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
442	61	>75% Grass cover, Good HSG B
5,958	98	Paved parking HSG A
1,438	98	Paved parking HSG B
9,363	39	>75% Grass cover, Good HSG A
2,284	98	Roofs HSG A
19,485	69	Weighted Average
9,805	40	50.32% Pervious Area
9,680	98	49.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.5	21	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.1	130	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.0	193	Total			

Subcatchment 7P: P1c

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 17

Summary for Pond 8P: CB8+10a

Inflow Area = 0.447 ac, 49.68% Impervious, Inflow Depth = 0.42" for 1-YR event
Inflow = 0.13 cfs @ 12.19 hrs, Volume= 0.016 af
Outflow = 0.13 cfs @ 12.19 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.19 hrs, Volume= 0.016 af

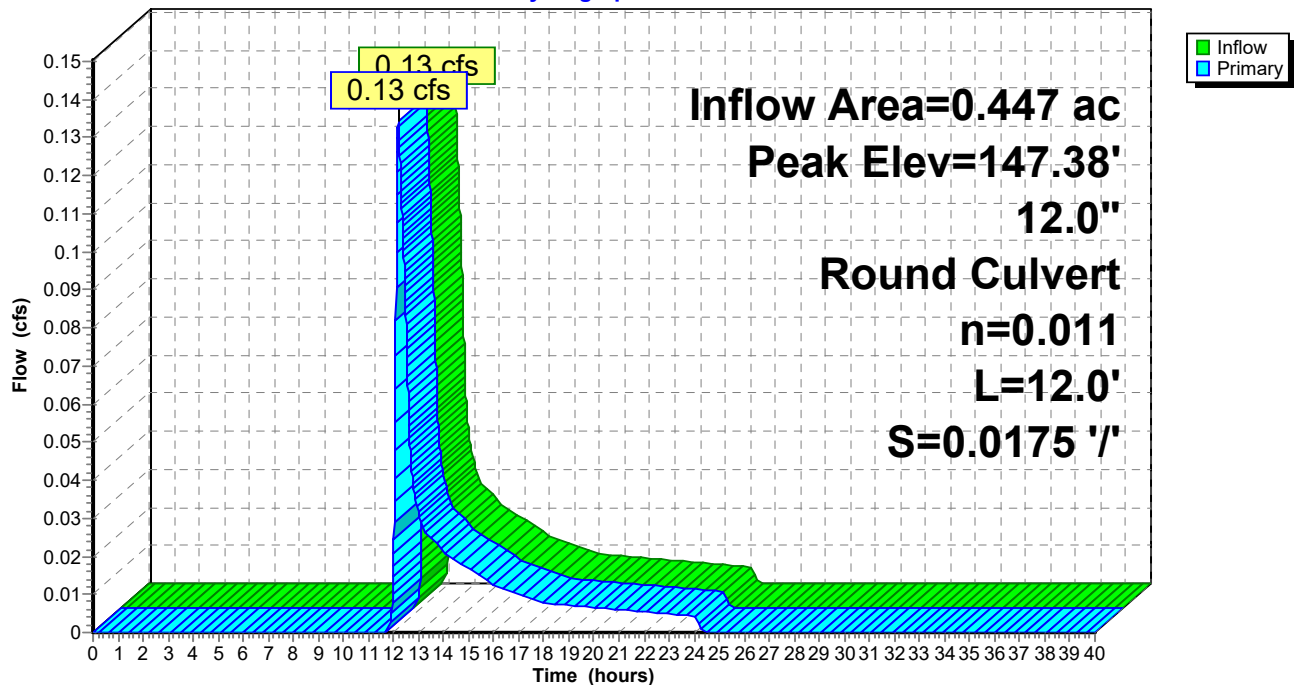
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.38' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.20'	12.0" Round Culvert L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.20' / 146.99' S= 0.0175 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.13 cfs @ 12.19 hrs HW=147.38' (Free Discharge)
↑**1=Culvert** (Inlet Controls 0.13 cfs @ 1.43 fps)

Pond 8P: CB8+10a

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 18

Summary for Subcatchment 9P: P1d

Runoff = 0.32 cfs @ 12.15 hrs, Volume= 0.028 af, Depth= 0.94"

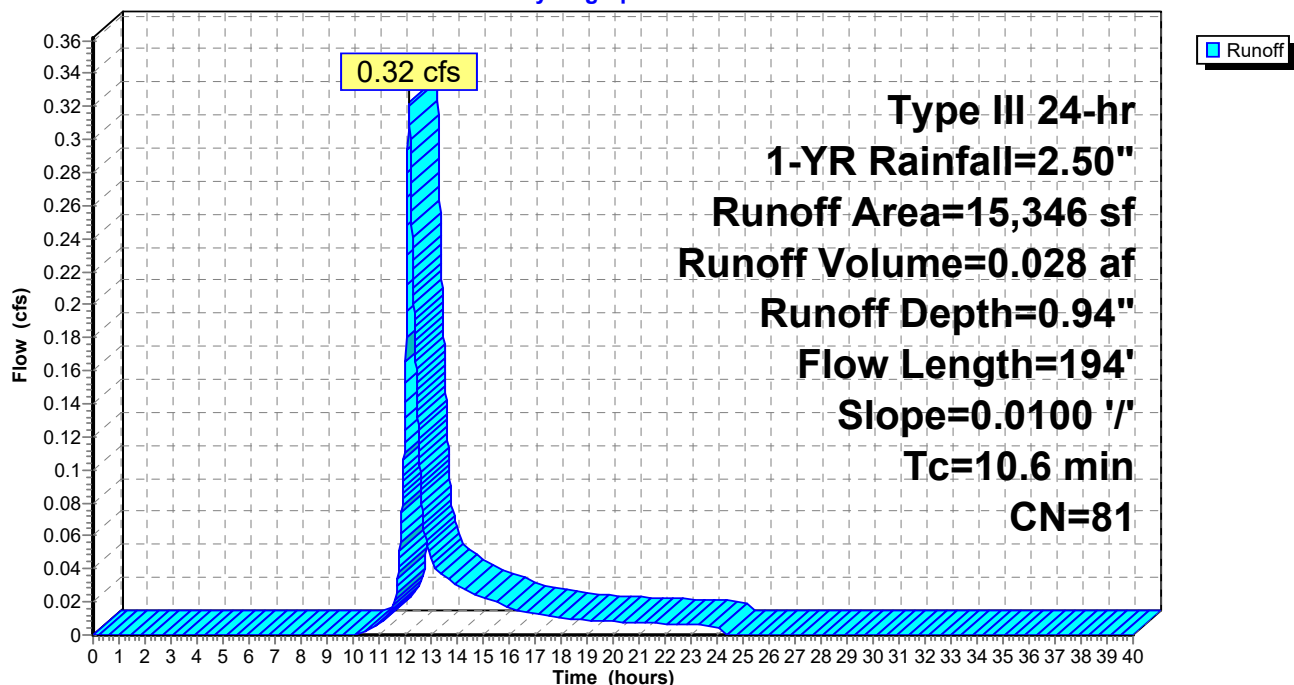
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
5,770	61	>75% Grass cover, Good HSG B
704	39	>75% Grass cover, Good HSG A
1,057	98	Roofs HSG B
3,321	98	Paved parking HSG A
4,397	98	Paved parking HSG B
97	55	Woods, Good HSG B
15,346	81	Weighted Average
6,571	59	42.82% Pervious Area
8,775	98	57.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.2	152	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.6	194	Total			

Subcatchment 9P: P1d

Hydrograph



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Page 19

Summary for Pond 10P: CB8+10b

Inflow Area = 0.352 ac, 57.18% Impervious, Inflow Depth = 0.94" for 1-YR event
Inflow = 0.32 cfs @ 12.15 hrs, Volume= 0.028 af
Outflow = 0.32 cfs @ 12.15 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 12.15 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.48' @ 12.15 hrs

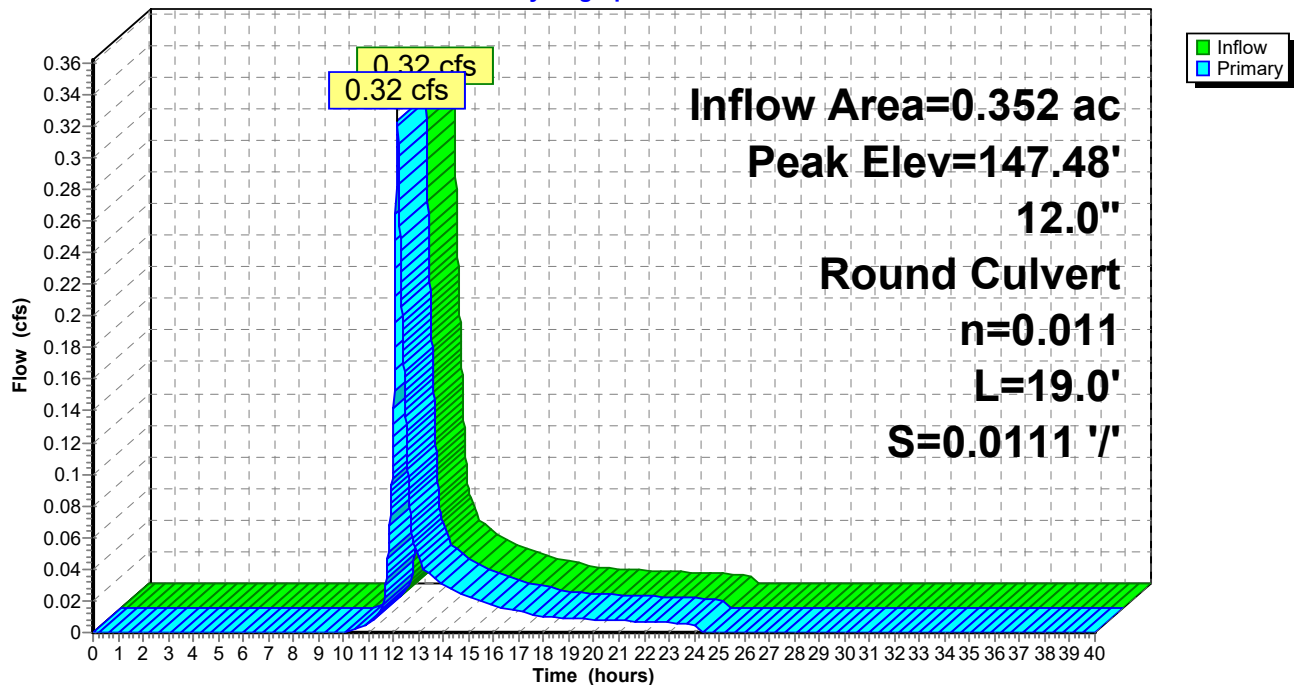
Device	Routing	Invert	Outlet Devices
#1	Primary	147.20'	12.0" Round Culvert L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.20' / 146.99' S= 0.0111 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.32 cfs @ 12.15 hrs HW=147.48' (Free Discharge)

↑1=Culvert (Barrel Controls 0.32 cfs @ 2.66 fps)

Pond 10P: CB8+10b

Hydrograph



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Page 20

Summary for Pond 11P: DMH8+20

Inflow Area = 2.123 ac, 44.17% Impervious, Inflow Depth = 0.52" for 1-YR event
Inflow = 0.83 cfs @ 12.18 hrs, Volume= 0.091 af
Outflow = 0.83 cfs @ 12.18 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.18 hrs, Volume= 0.091 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.35' @ 12.18 hrs

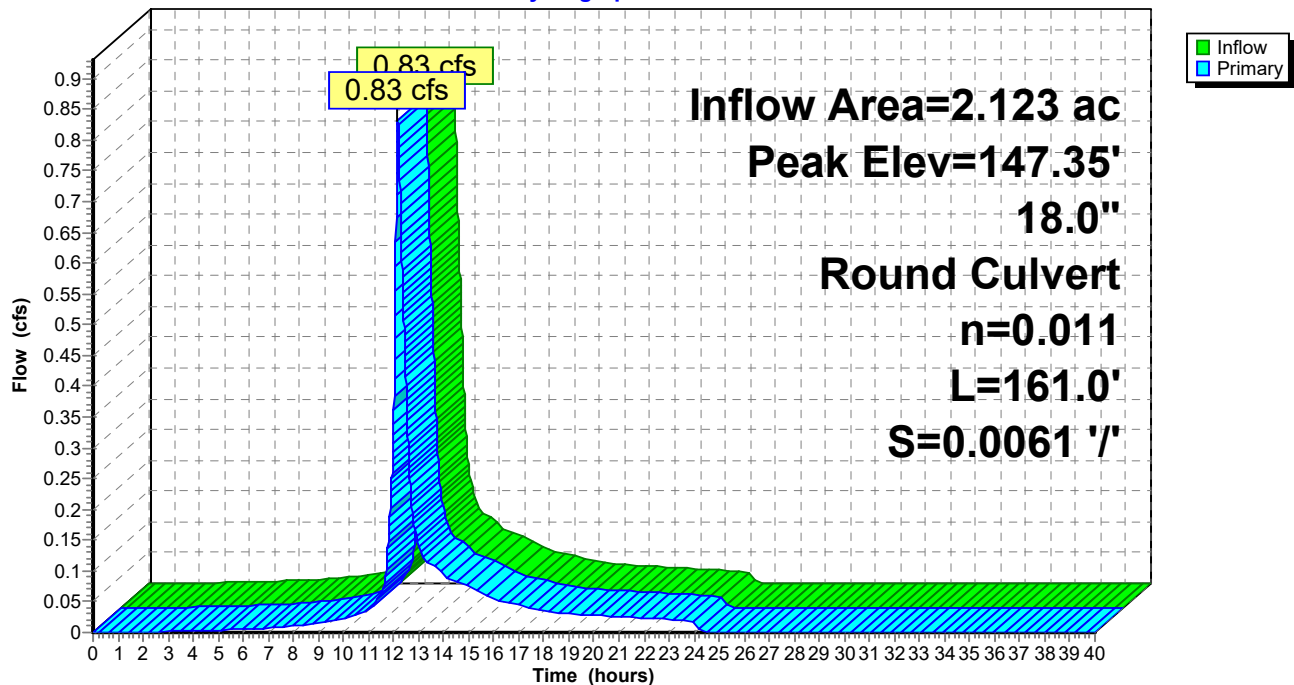
Device	Routing	Invert	Outlet Devices
#1	Primary	146.94'	18.0" Round Culvert L= 161.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.94' / 145.96' S= 0.0061 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.83 cfs @ 12.18 hrs HW=147.35' (Free Discharge)

↑1=Culvert (Barrel Controls 0.83 cfs @ 3.18 fps)

Pond 11P: DMH8+20

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 21

Summary for Pond 12P: DMH1a

Inflow Area = 2.123 ac, 44.17% Impervious, Inflow Depth = 0.52" for 1-YR event
Inflow = 0.83 cfs @ 12.18 hrs, Volume= 0.091 af
Outflow = 0.83 cfs @ 12.18 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.18 hrs, Volume= 0.091 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 146.35' @ 12.18 hrs

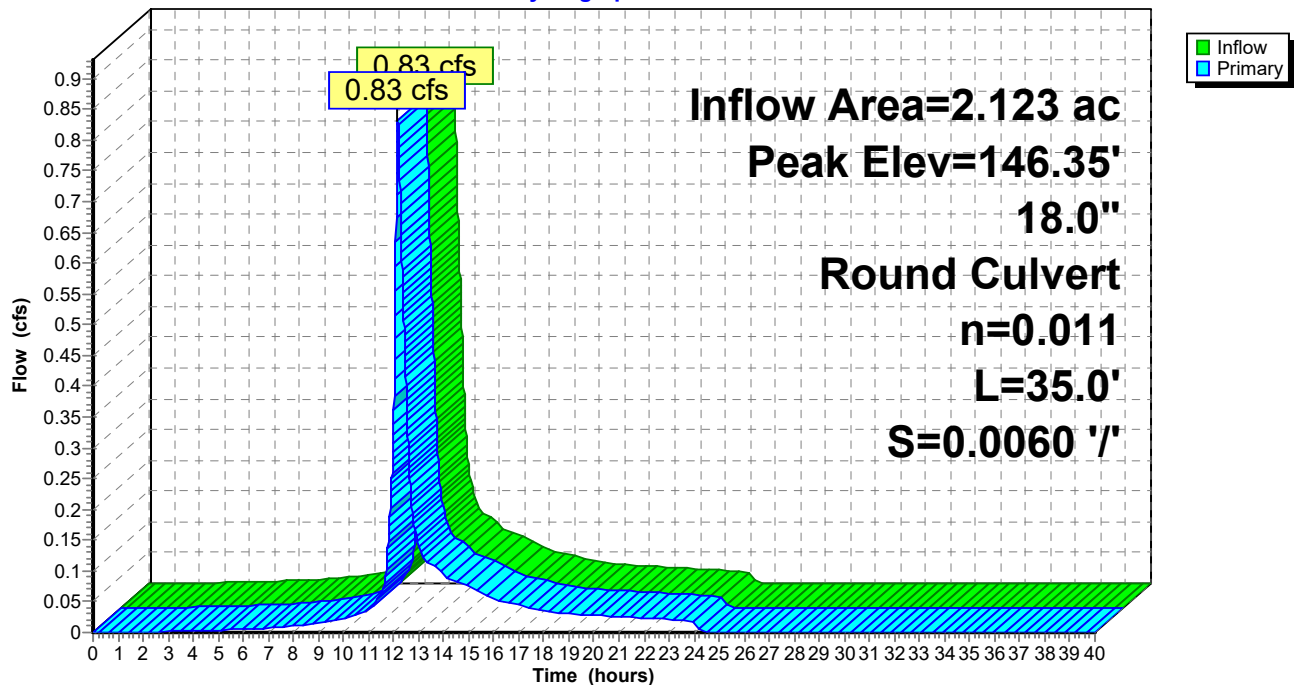
Device	Routing	Invert	Outlet Devices
#1	Primary	145.91'	18.0" Round Culvert L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.91' / 145.70' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.83 cfs @ 12.18 hrs HW=146.35' (Free Discharge)

↑1=Culvert (Barrel Controls 0.83 cfs @ 2.84 fps)

Pond 12P: DMH1a

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 22

Summary for Subcatchment 13P: P1e

Runoff = 0.47 cfs @ 12.18 hrs, Volume= 0.046 af, Depth= 0.65"

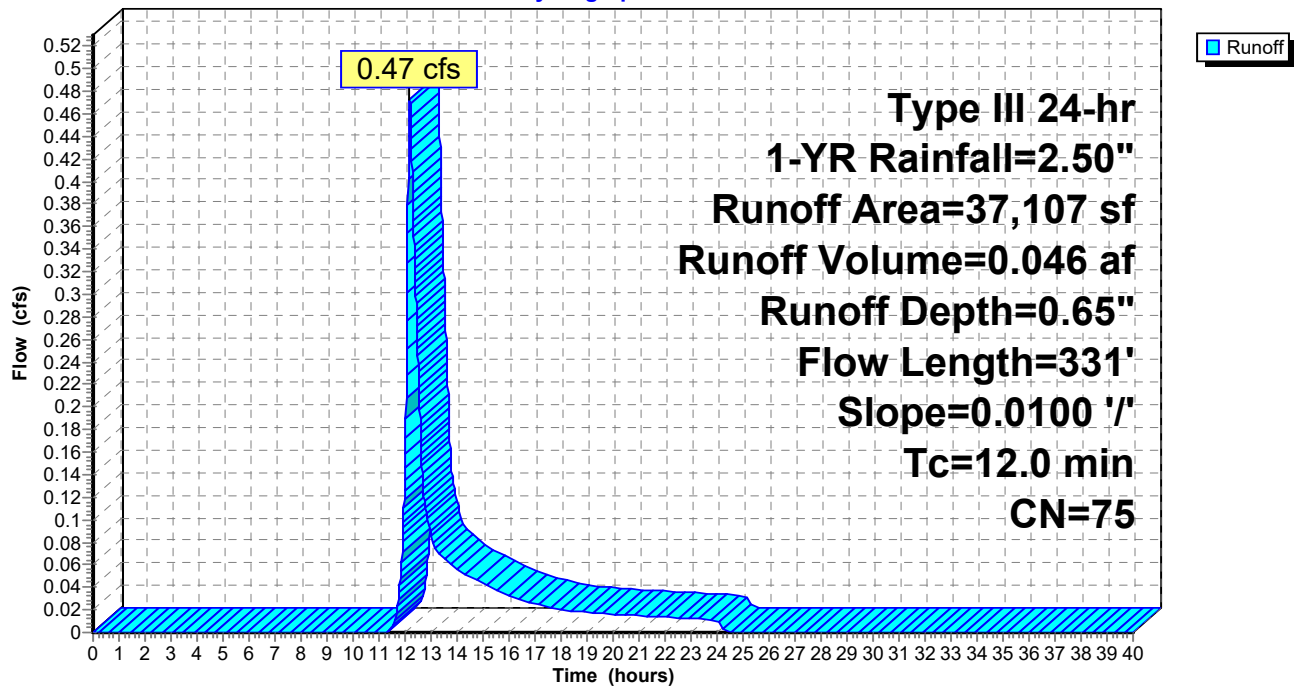
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
8,461	98	Paved parking HSG B
5,642	98	Paved parking HSG A
11,605	61	>75% Grass cover, Good HSG B
7,314	39	>75% Grass cover, Good HSG A
2,331	98	Roofs HSG B
1,754	98	Roofs HSG A
37,107	75	Weighted Average
18,919	52	50.98% Pervious Area
18,188	98	49.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.4	16	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	273	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
12.0	331	Total			

Subcatchment 13P: P1e

Hydrograph



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Page 24

Summary for Pond 14P: CB12+15a

Inflow Area = 0.852 ac, 49.02% Impervious, Inflow Depth = 0.65" for 1-YR event
Inflow = 0.47 cfs @ 12.18 hrs, Volume= 0.046 af
Outflow = 0.47 cfs @ 12.18 hrs, Volume= 0.046 af, Atten= 0%, Lag= 0.0 min
Primary = 0.47 cfs @ 12.18 hrs, Volume= 0.046 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 148.25' @ 12.18 hrs

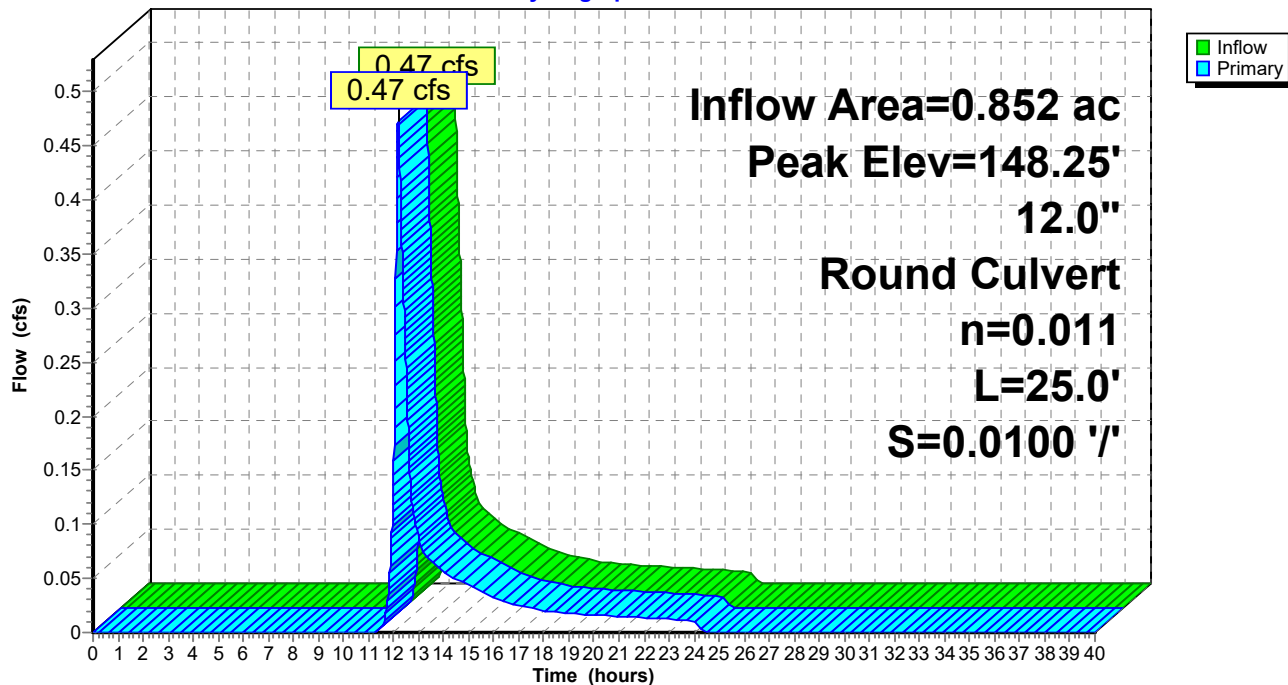
Device	Routing	Invert	Outlet Devices
#1	Primary	147.90'	12.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.90' / 147.65' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.47 cfs @ 12.18 hrs HW=148.25' (Free Discharge)

↑1=Culvert (Barrel Controls 0.47 cfs @ 2.90 fps)

Pond 14P: CB12+15a

Hydrograph



Ridge Street HydroCAD Revised Final

Type III 24-hr 1-YR Rainfall=2.50"

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Page 25

Summary for Subcatchment 15P: P1f

Runoff = 0.46 cfs @ 12.18 hrs, Volume= 0.045 af, Depth= 0.65"

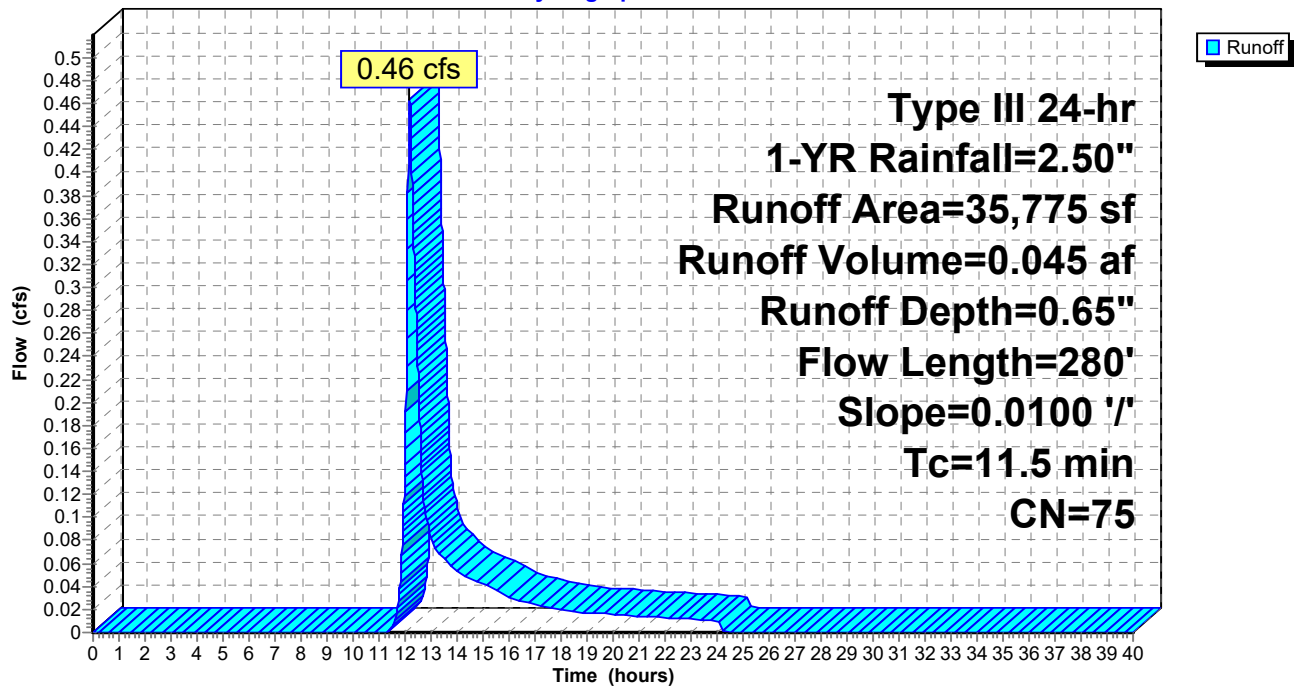
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
5,367	39	>75% Grass cover, Good HSG A
11,969	61	>75% Grass cover, Good HSG B
331	98	Roofs HSG A
3,270	98	Roofs HSG B
10,583	98	Paved parking HSG B
3,333	98	Paved parking HSG A
742	30	Woods, Good HSG A
180	55	Woods, Good HSG B
35,775	75	Weighted Average
18,258	53	51.04% Pervious Area
17,517	98	48.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.8	225	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.5	280	Total			

Subcatchment 15P: P1f

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 27

Summary for Pond 16P: CB12+15b

Inflow Area = 0.821 ac, 48.96% Impervious, Inflow Depth = 0.65" for 1-YR event
Inflow = 0.46 cfs @ 12.18 hrs, Volume= 0.045 af
Outflow = 0.46 cfs @ 12.18 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min
Primary = 0.46 cfs @ 12.18 hrs, Volume= 0.045 af

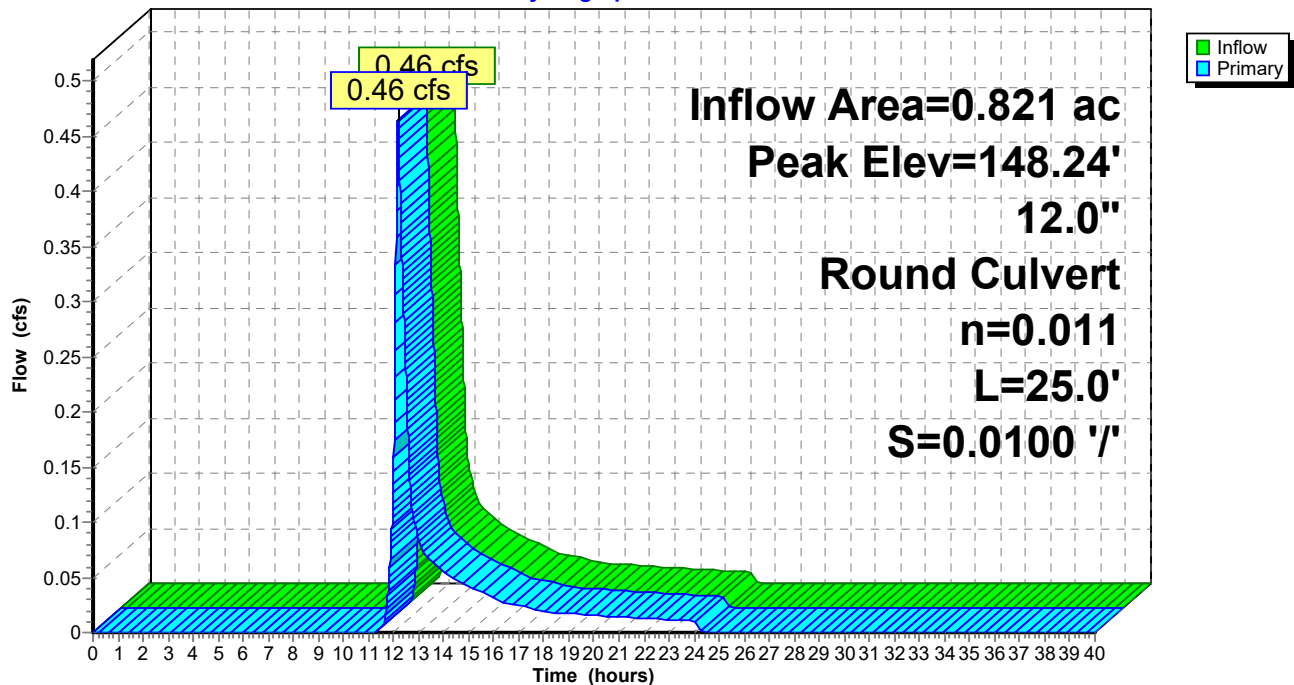
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.24' @ 12.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.90'	12.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.90' / 147.65' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.46 cfs @ 12.18 hrs HW=148.24' (Free Discharge)
↑1=Culvert (Barrel Controls 0.46 cfs @ 2.88 fps)

Pond 16P: CB12+15b

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 28

Summary for Pond 17P: DMH11+45

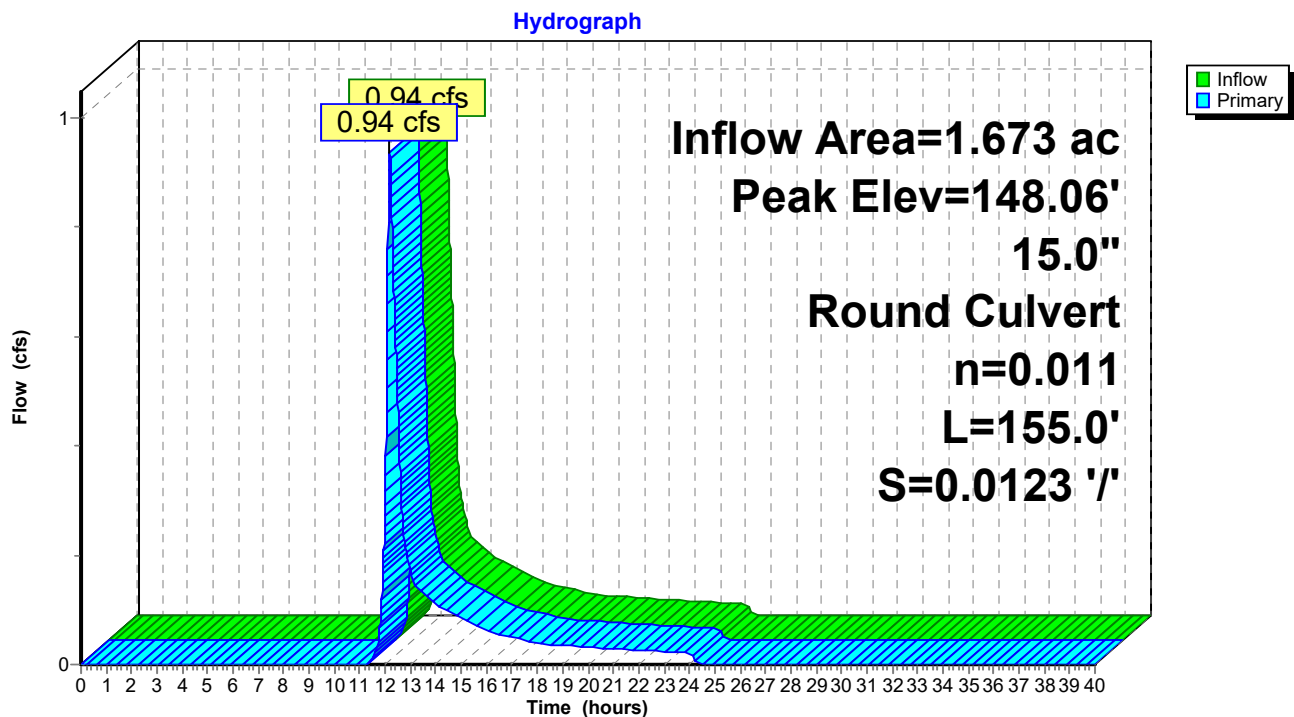
Inflow Area = 1.673 ac, 48.99% Impervious, Inflow Depth = 0.65" for 1-YR event
Inflow = 0.94 cfs @ 12.18 hrs, Volume= 0.091 af
Outflow = 0.94 cfs @ 12.18 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 12.18 hrs, Volume= 0.091 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.06' @ 12.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.60'	15.0" Round Culvert L= 155.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.60' / 145.70' S= 0.0123 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=0.94 cfs @ 12.18 hrs HW=148.06' (Free Discharge)
↑1=Culvert (Inlet Controls 0.94 cfs @ 2.30 fps)

Pond 17P: DMH11+45



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 29

Summary for Subcatchment 18P: P1g

Runoff = 0.32 cfs @ 12.20 hrs, Volume= 0.037 af, Depth= 0.46"

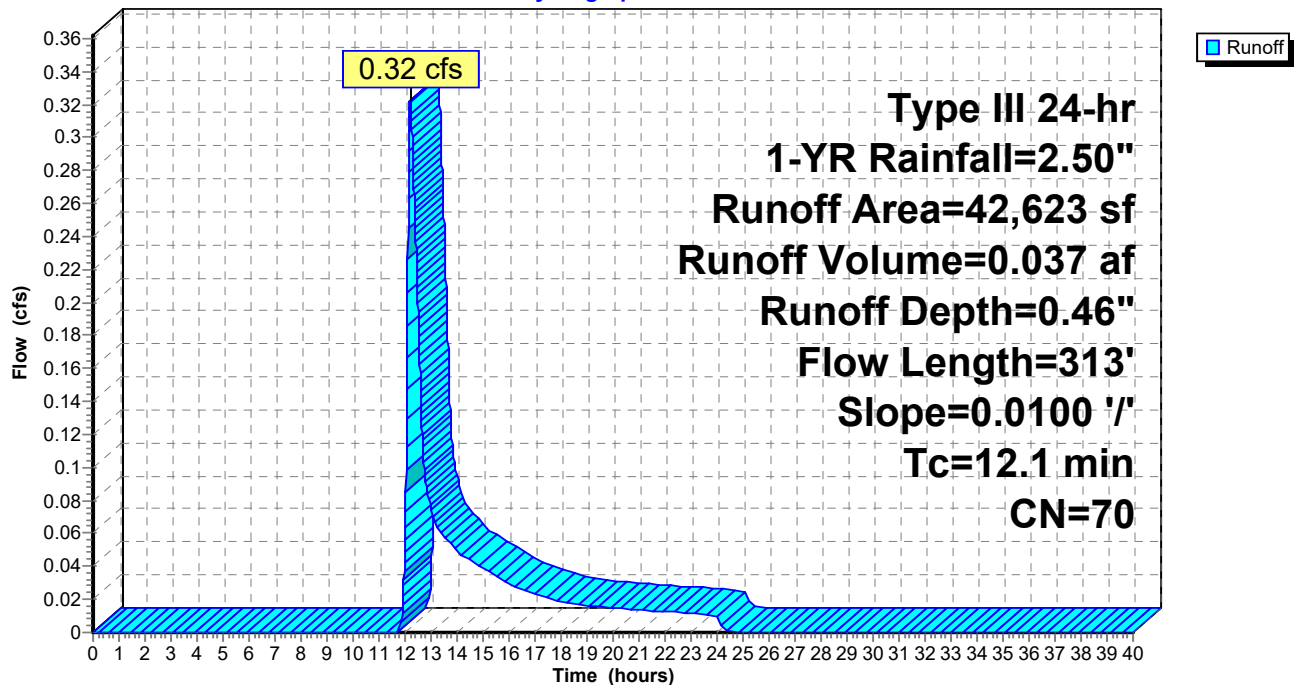
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
20,136	39	>75% Grass cover, Good HSG A
4,639	98	Roofs HSG A
17,848	98	Paved parking HSG A
42,623	70	Weighted Average
20,136	39	47.24% Pervious Area
22,487	98	52.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.7	29	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.0	242	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
12.1	313	Total			

Subcatchment 18P: P1g

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 30

Summary for Pond 19P: CB2+70a

Inflow Area = 0.978 ac, 52.76% Impervious, Inflow Depth = 0.46" for 1-YR event
Inflow = 0.32 cfs @ 12.20 hrs, Volume= 0.037 af
Outflow = 0.32 cfs @ 12.20 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 12.20 hrs, Volume= 0.037 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.45' @ 12.20 hrs

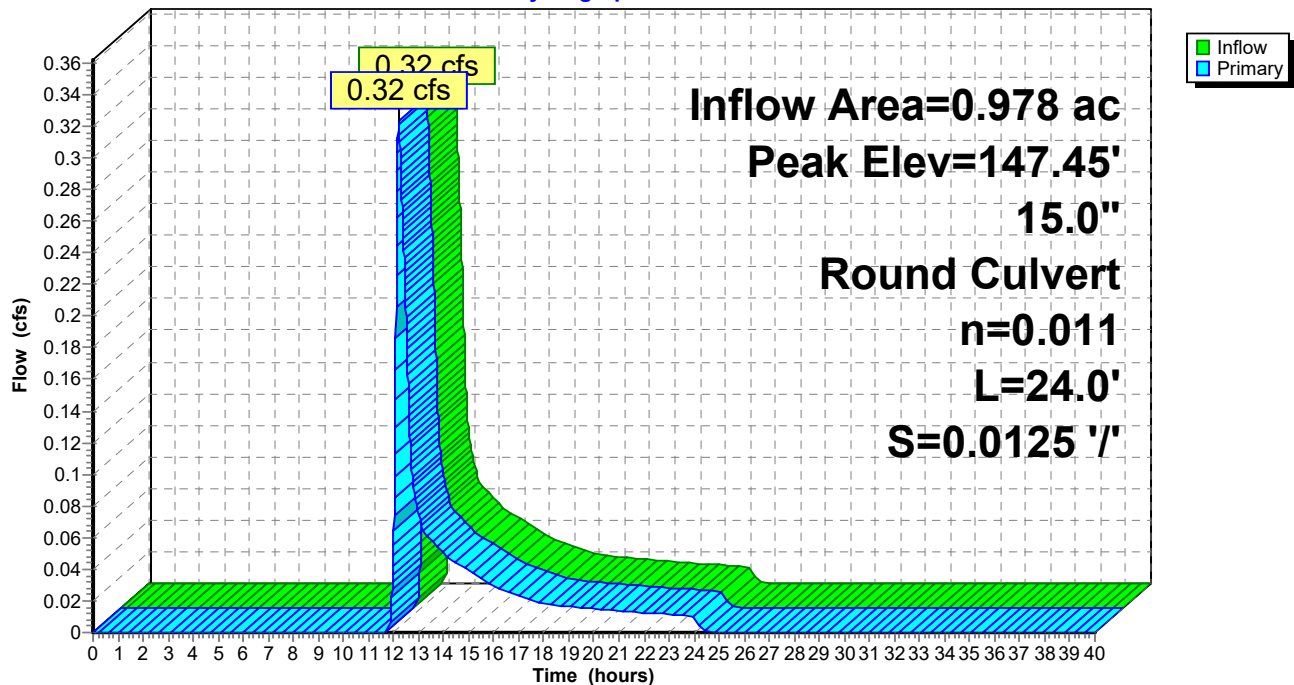
Device	Routing	Invert	Outlet Devices
#1	Primary	147.19'	15.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.19' / 146.89' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=0.32 cfs @ 12.20 hrs HW=147.45' (Free Discharge)

↑**1=Culvert** (Inlet Controls 0.32 cfs @ 1.74 fps)

Pond 19P: CB2+70a

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 31

Summary for Subcatchment 20P: P1h

Runoff = 0.40 cfs @ 12.19 hrs, Volume= 0.043 af, Depth= 0.49"

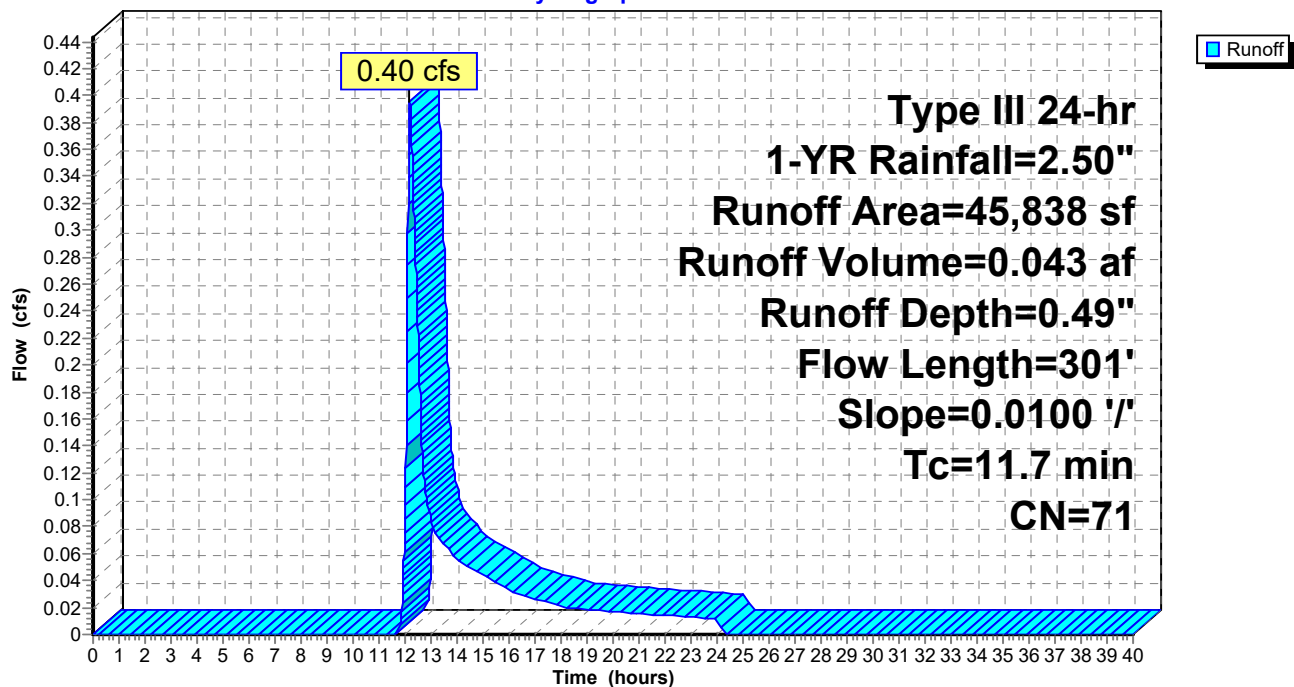
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
21,194	39	>75% Grass cover, Good HSG A
5,783	98	Roofs HSG A
18,861	98	Paved parking HSG A
45,838	71	Weighted Average
21,194	39	46.24% Pervious Area
24,644	98	53.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	11	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.0	248	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.7	301	Total			

Subcatchment 20P: P1h

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 32

Summary for Pond 21P: CB2+70b

Inflow Area = 1.052 ac, 53.76% Impervious, Inflow Depth = 0.49" for 1-YR event
Inflow = 0.40 cfs @ 12.19 hrs, Volume= 0.043 af
Outflow = 0.40 cfs @ 12.19 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min
Primary = 0.40 cfs @ 12.19 hrs, Volume= 0.043 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.49' @ 12.19 hrs

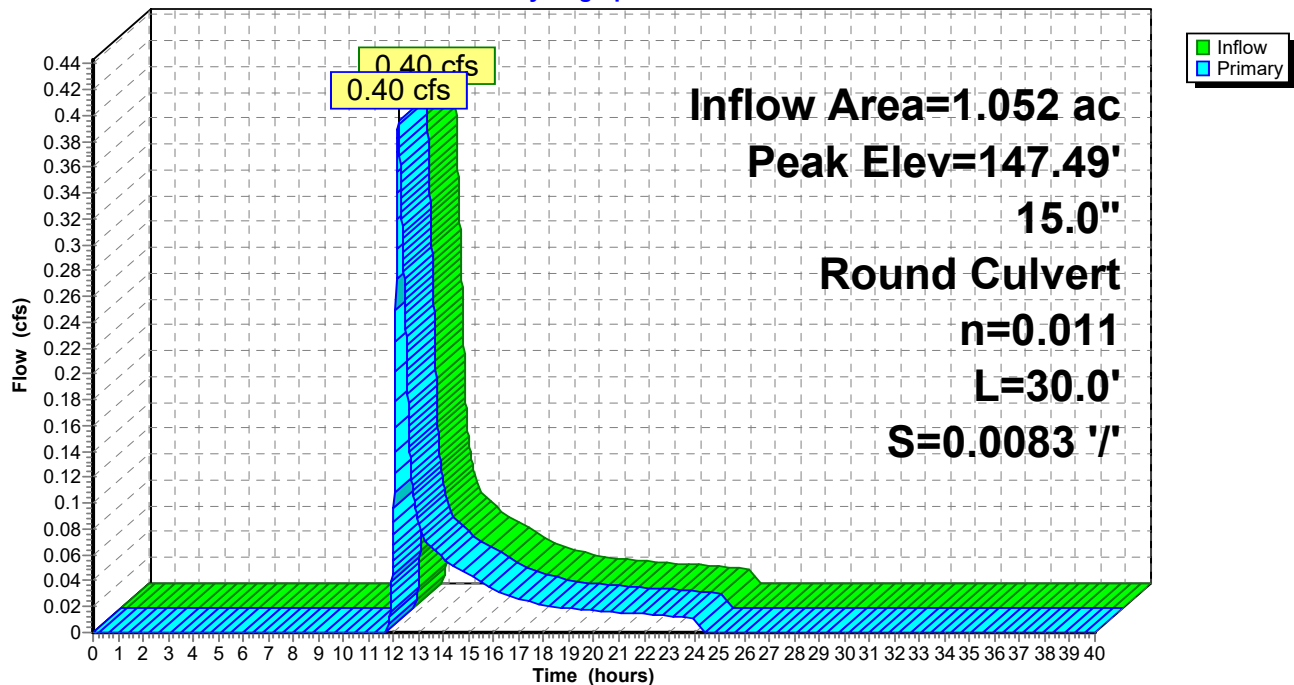
Device	Routing	Invert	Outlet Devices
#1	Primary	147.19'	15.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.19' / 146.94' S= 0.0083 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=0.40 cfs @ 12.19 hrs HW=147.49' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.40 cfs @ 2.64 fps)

Pond 21P: CB2+70b

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 33

Summary for Pond 22P: DMH2+40

Inflow Area = 2.031 ac, 53.28% Impervious, Inflow Depth = 0.47" for 1-YR event
Inflow = 0.72 cfs @ 12.20 hrs, Volume= 0.080 af
Outflow = 0.72 cfs @ 12.20 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min
Primary = 0.72 cfs @ 12.20 hrs, Volume= 0.080 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.16' @ 12.20 hrs

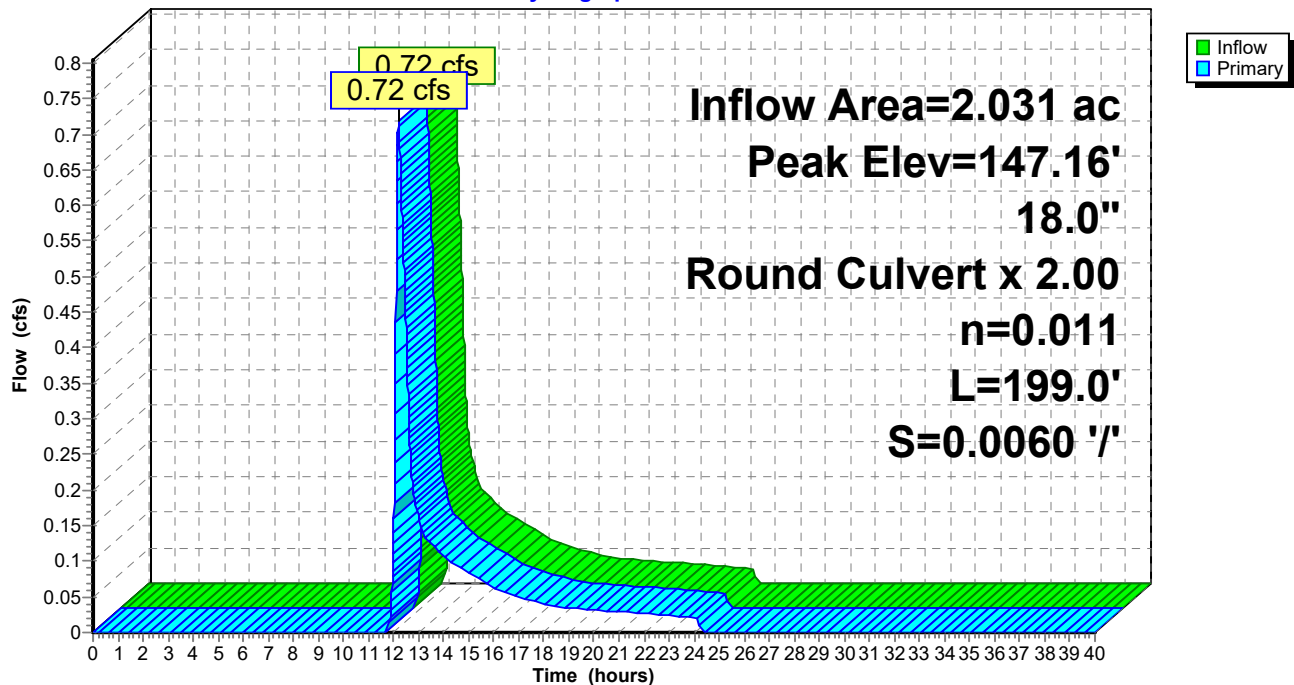
Device	Routing	Invert	Outlet Devices
#1	Primary	146.89'	18.0" Round Culvert X 2.00 L= 199.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.89' / 145.70' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.72 cfs @ 12.20 hrs HW=147.16' (Free Discharge)

1=Culvert (Barrel Controls 0.72 cfs @ 2.53 fps)

Pond 22P: DMH2+40

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 34

Summary for Subcatchment 23P: P1i

Runoff = 0.08 cfs @ 12.47 hrs, Volume= 0.024 af, Depth= 0.13"

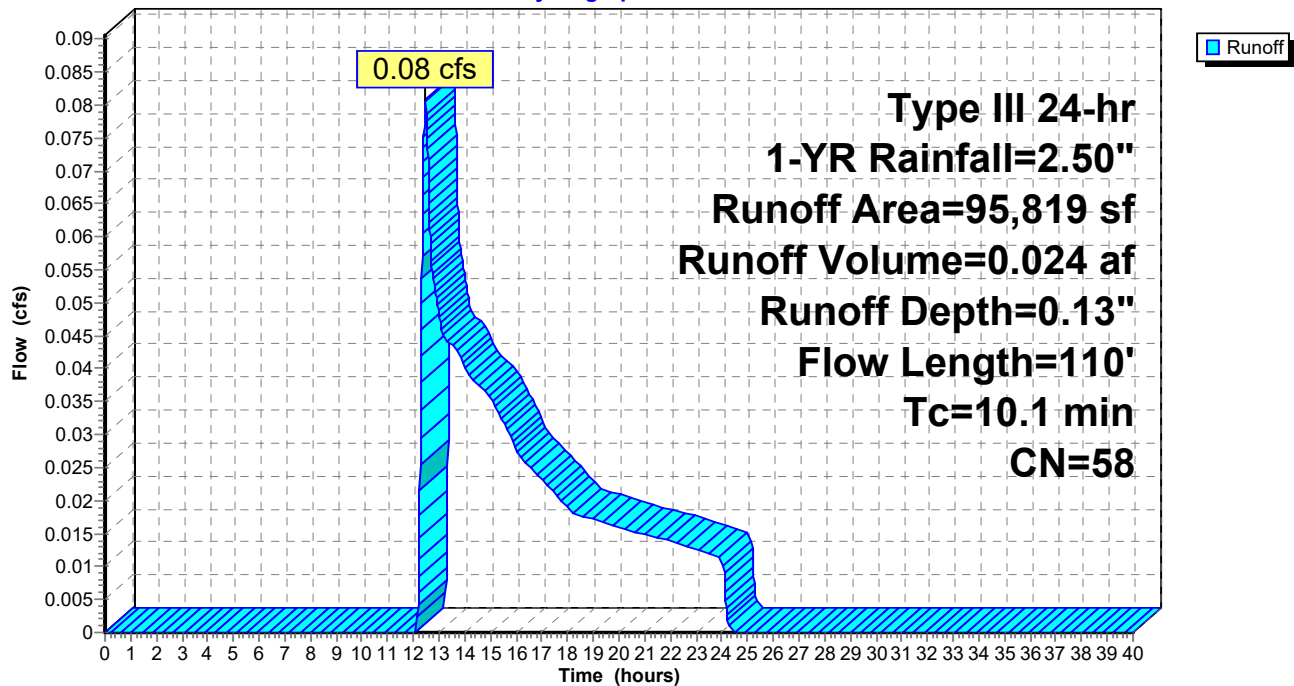
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
41,468	61	>75% Grass cover, Good HSG B
14,814	39	>75% Grass cover, Good HSG A
1,336	98	Paved parking HSG A
2,500	98	Paved parking HSG B
2,201	98	Roofs HSG A
4,220	98	Roofs HSG B
6,601	30	Woods, Good HSG A
22,679	55	Woods, Good HSG B
95,819	58	Weighted Average
85,562	53	89.30% Pervious Area
10,257	98	10.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	35	0.0200	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	75	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.1	110	Total			

Subcatchment 23P: P1i

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 36

Summary for Pond 24P: Basin #1

Inflow Area = 8.027 ac, 38.31% Impervious, Inflow Depth = 0.43" for 1-YR event
 Inflow = 2.48 cfs @ 12.18 hrs, Volume= 0.287 af
 Outflow = 1.21 cfs @ 12.55 hrs, Volume= 0.287 af, Atten= 51%, Lag= 21.7 min
 Discarded = 1.21 cfs @ 12.55 hrs, Volume= 0.287 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 145.77' @ 12.55 hrs Surf.Area= 21,739 sf Storage= 1,572 cf

Plug-Flow detention time= 10.0 min calculated for 0.287 af (100% of inflow)
 Center-of-Mass det. time= 10.0 min (893.7 - 883.7)

Volume	Invert	Avail.Storage	Storage Description
#1	145.70'	59,551 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.70	21,476	960.0	0	0	21,476
148.00	30,575	1,018.0	59,551	59,551	30,885

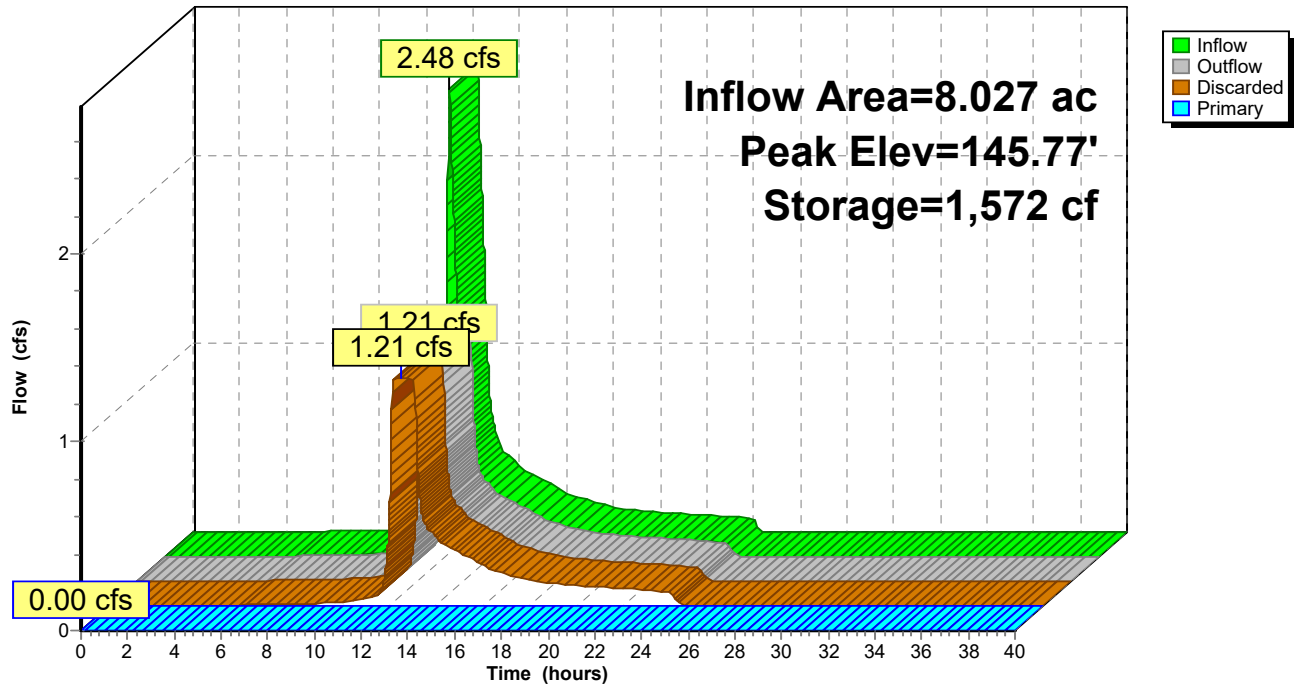
Device	Routing	Invert	Outlet Devices
#1	Discarded	145.70'	2.410 in/hr Exfiltration over Surface area
#2	Primary	146.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28)
			Elev. (feet) 146.00 146.50 146.50 148.00
			Width (feet) 1.00 1.00 5.00 5.00

Discarded OutFlow Max=1.21 cfs @ 12.55 hrs HW=145.77' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 1.21 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=145.70' (Free Discharge)
 ↑2=Custom Weir/Orifice (Controls 0.00 cfs)

Pond 24P: Basin #1

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 38

Summary for Subcatchment 25P: P1j

Runoff = 0.34 cfs @ 12.18 hrs, Volume= 0.035 af, Depth= 0.57"

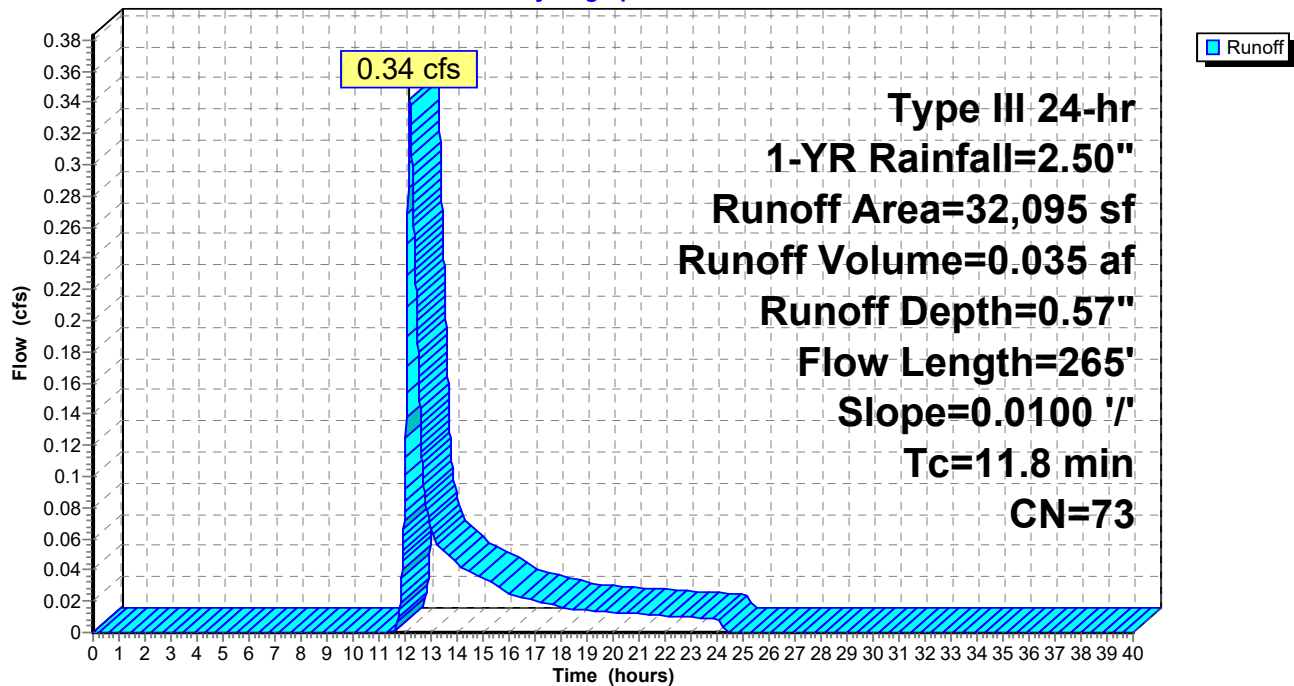
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
5,345	98	Paved parking HSG B
9,999	61	>75% Grass cover, Good HSG B
7,290	39	>75% Grass cover, Good HSG A
2,671	98	Roofs HSG B
1,535	98	Roofs HSG A
5,255	98	Paved parking HSG A
32,095	73	Weighted Average
17,289	52	53.87% Pervious Area
14,806	98	46.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.8	33	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	190	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.8	265	Total			

Subcatchment 25P: P1j

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 40

Summary for Pond 26P: CB17+77a

Inflow Area = 0.737 ac, 46.13% Impervious, Inflow Depth = 0.57" for 1-YR event
Inflow = 0.34 cfs @ 12.18 hrs, Volume= 0.035 af
Outflow = 0.34 cfs @ 12.18 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.18 hrs, Volume= 0.035 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 146.32' @ 12.18 hrs

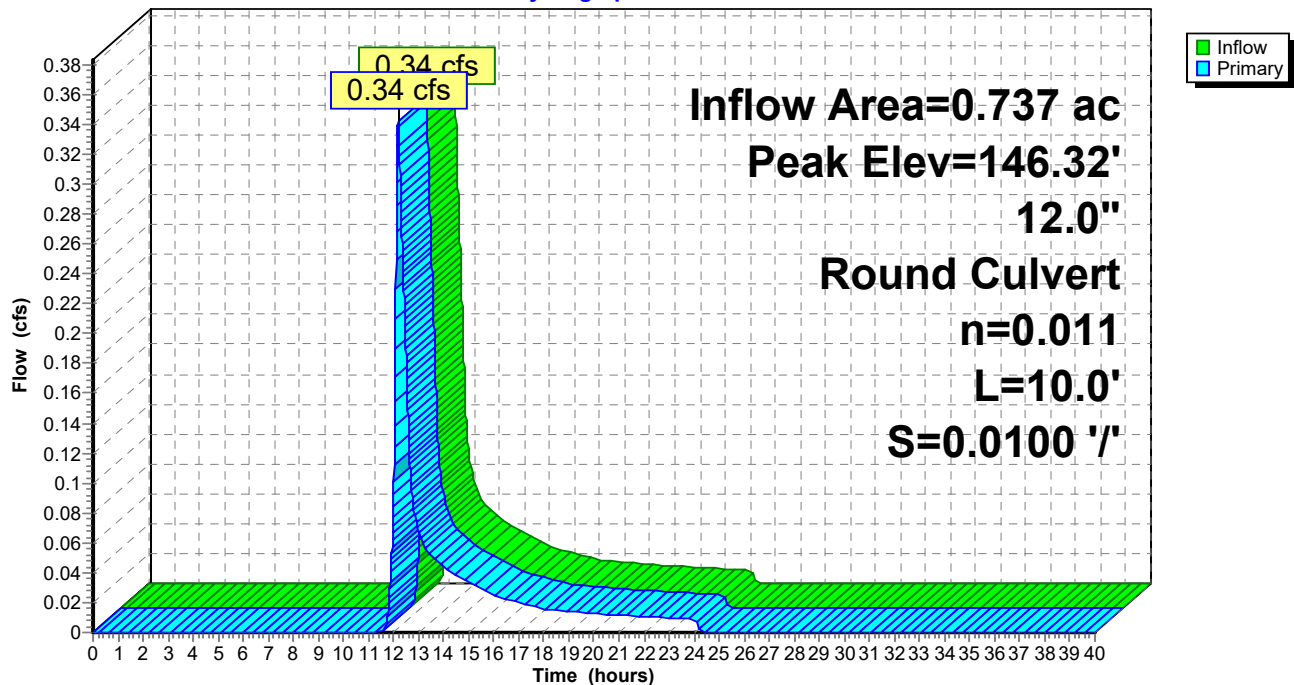
Device	Routing	Invert	Outlet Devices
#1	Primary	146.00'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.00' / 145.90' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.34 cfs @ 12.18 hrs HW=146.32' (Free Discharge)

↑1=Culvert (Barrel Controls 0.34 cfs @ 2.41 fps)

Pond 26P: CB17+77a

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 41

Summary for Subcatchment 27P: P1k

Runoff = 0.28 cfs @ 12.13 hrs, Volume= 0.022 af, Depth= 1.00"

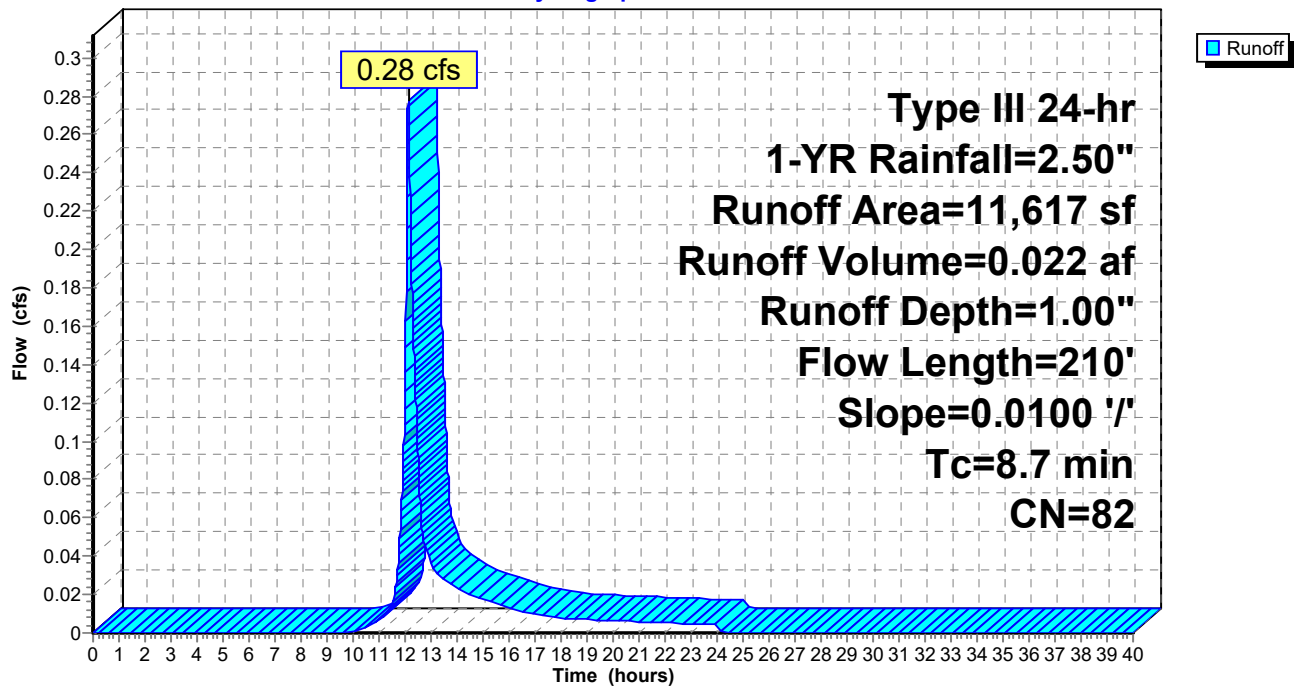
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
3,375	98	Paved parking HSG B
1,993	61	>75% Grass cover, Good HSG B
1,913	39	>75% Grass cover, Good HSG A
4,336	98	Paved parking HSG A
11,617	82	Weighted Average
3,906	50	33.62% Pervious Area
7,711	98	66.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	30	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.5	180	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
8.7	210	Total			

Subcatchment 27P: P1k

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 42

Summary for Pond 28P: CB17+77b

Inflow Area = 0.267 ac, 66.38% Impervious, Inflow Depth = 1.00" for 1-YR event
Inflow = 0.28 cfs @ 12.13 hrs, Volume= 0.022 af
Outflow = 0.28 cfs @ 12.13 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min
Primary = 0.28 cfs @ 12.13 hrs, Volume= 0.022 af

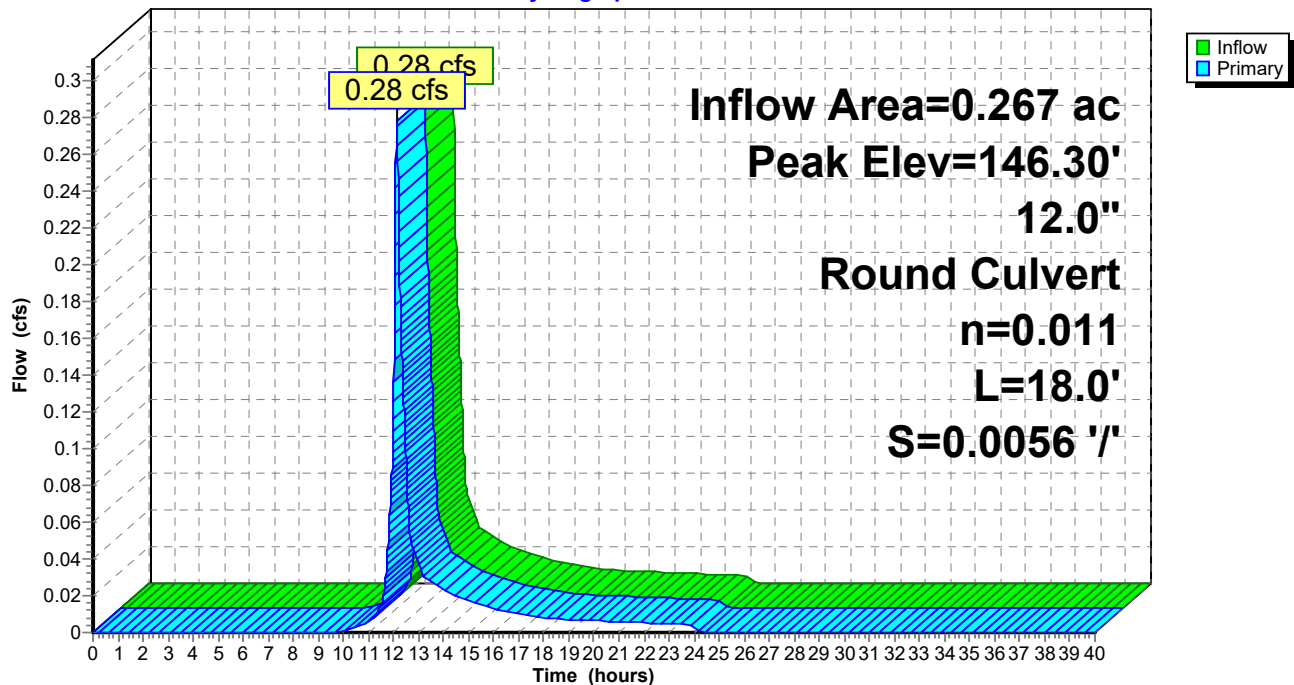
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 146.30' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	146.00'	12.0" Round Culvert L= 18.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.00' / 145.90' S= 0.0056 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.28 cfs @ 12.13 hrs HW=146.30' (Free Discharge)
↑1=Culvert (Barrel Controls 0.28 cfs @ 2.14 fps)

Pond 28P: CB17+77b

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 43

Summary for Pond 29P: DMH17+67

Inflow Area = 1.003 ac, 51.51% Impervious, Inflow Depth = 0.68" for 1-YR event
Inflow = 0.60 cfs @ 12.16 hrs, Volume= 0.057 af
Outflow = 0.60 cfs @ 12.16 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min
Primary = 0.60 cfs @ 12.16 hrs, Volume= 0.057 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 146.21' @ 12.16 hrs

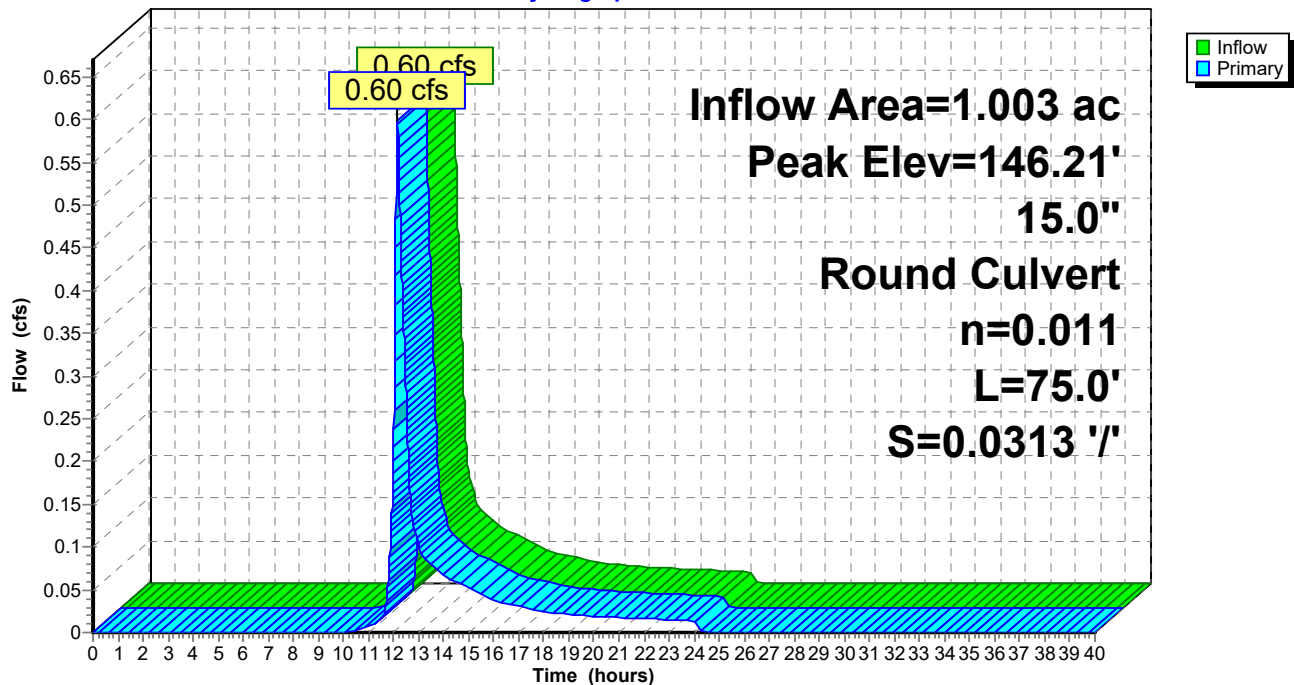
Device	Routing	Invert	Outlet Devices
#1	Primary	145.85'	15.0" Round Culvert L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.85' / 143.50' S= 0.0313 '/' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=0.60 cfs @ 12.16 hrs HW=146.21' (Free Discharge)

↑**1=Culvert** (Inlet Controls 0.60 cfs @ 2.04 fps)

Pond 29P: DMH17+67

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 44

Summary for Subcatchment 30P: P1I

Runoff = 0.01 cfs @ 15.15 hrs, Volume= 0.010 af, Depth= 0.04"

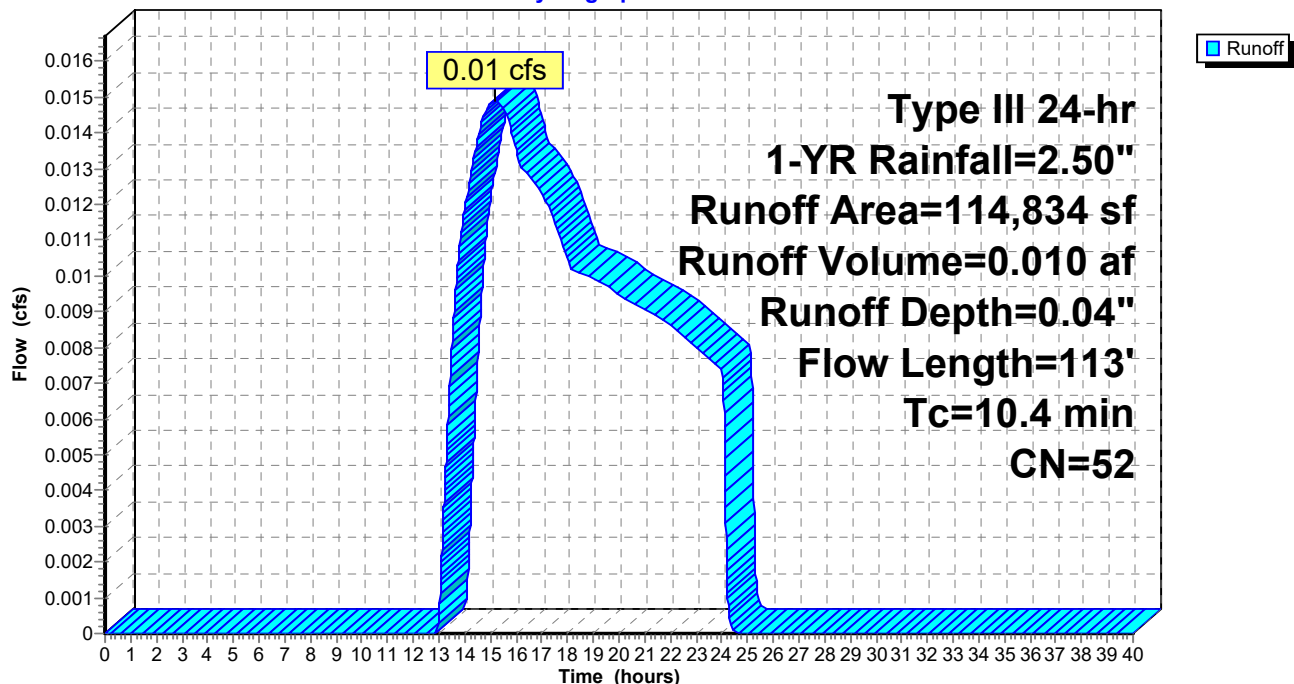
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
3,499	61	>75% Grass cover, Good HSG B
11,038	98	Water Surface HSG A
86,857	39	>75% Grass cover, Good HSG A
500	98	Paved parking HSG B
4,500	98	Paved parking HSG A
844	98	Roofs HSG B
7,596	98	Roofs HSG A
114,834	52	Weighted Average
90,356	40	78.68% Pervious Area
24,478	98	21.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.0	71	0.0550	1.17		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
10.4	113	Total			

Subcatchment 30P: P1I

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 45

Summary for Subcatchment 31P: P1m

Runoff = 0.43 cfs @ 12.17 hrs, Volume= 0.044 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
16,597	39	>75% Grass cover, Good HSG A
3,917	61	>75% Grass cover, Good HSG B
865	98	Roofs HSG B
3,773	98	Roofs HSG A
3,473	98	Paved parking HSG B
14,437	98	Paved parking HSG A
43,062	72	Weighted Average
20,514	43	47.64% Pervious Area
22,548	98	52.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	12	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	144	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.9	198	Total			

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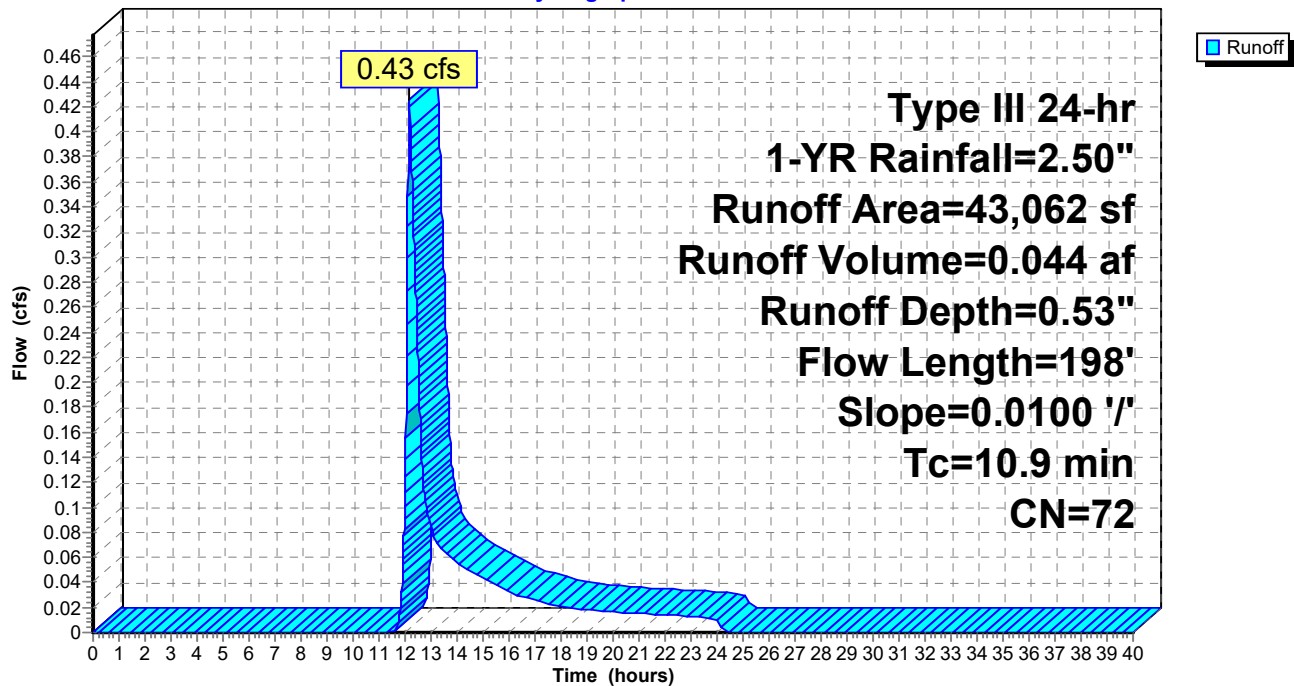
Type III 24-hr 1-YR Rainfall=2.50"

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Page 46

Subcatchment 31P: P1m

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 47

Summary for Pond 32P: CB3+67a

Inflow Area = 0.989 ac, 52.36% Impervious, Inflow Depth = 0.53" for 1-YR event
Inflow = 0.43 cfs @ 12.17 hrs, Volume= 0.044 af
Outflow = 0.43 cfs @ 12.17 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min
Primary = 0.43 cfs @ 12.17 hrs, Volume= 0.044 af

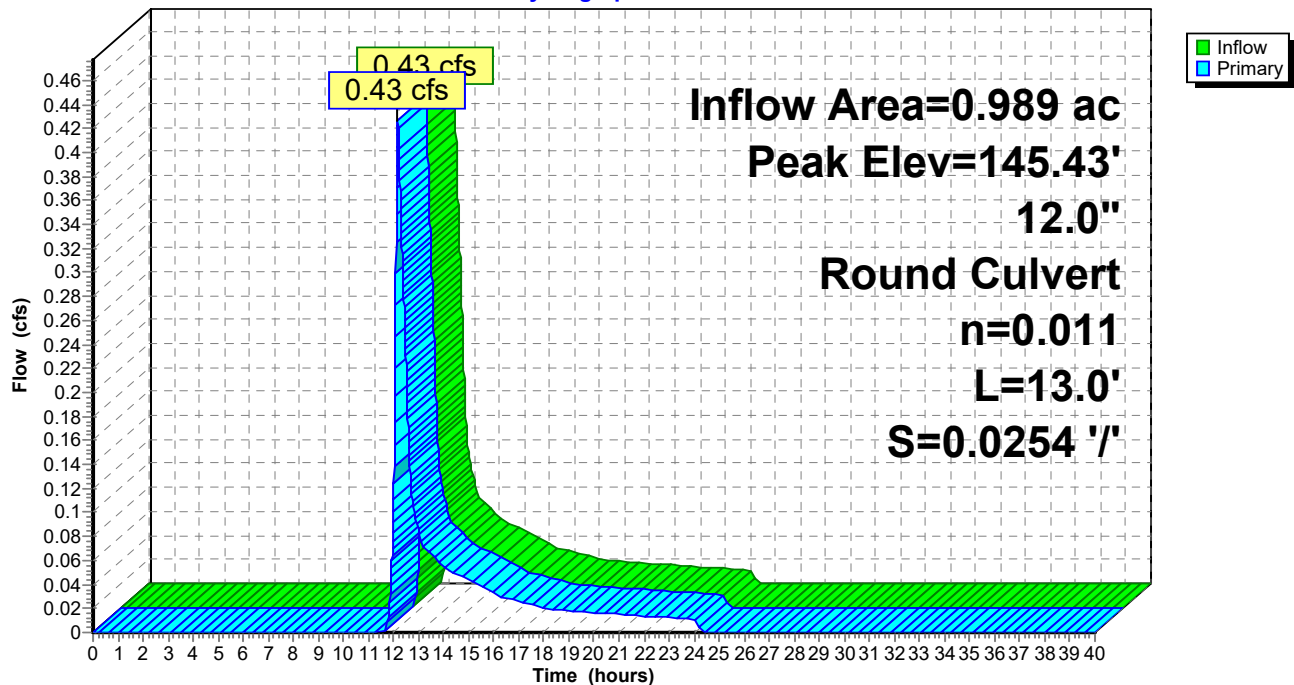
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.43' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	145.11'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.11' / 144.78' S= 0.0254 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.43 cfs @ 12.17 hrs HW=145.43' (Free Discharge)
↑**1=Culvert** (Inlet Controls 0.43 cfs @ 1.94 fps)

Pond 32P: CB3+67a

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 48

Summary for Subcatchment 33P: P1n

Runoff = 0.49 cfs @ 12.17 hrs, Volume= 0.049 af, Depth= 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
3,458	61	>75% Grass cover, Good HSG B
16,849	39	>75% Grass cover, Good HSG A
4,323	98	Roofs HSG A
1,422	98	Roofs HSG B
13,944	98	Paved parking HSG A
4,796	98	Paved parking HSG B
44,792	73	Weighted Average
20,307	43	45.34% Pervious Area
24,485	98	54.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	144	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.9	199	Total			

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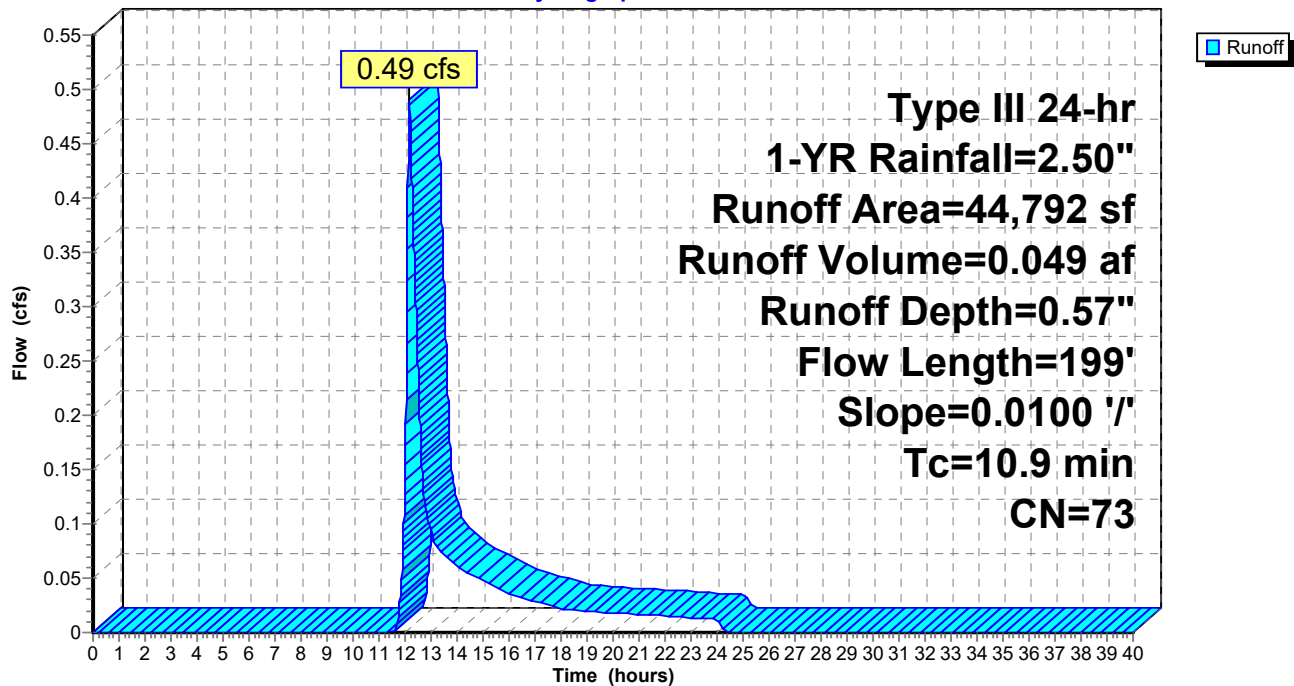
Type III 24-hr 1-YR Rainfall=2.50"

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Page 49

Subcatchment 33P: P1n

Hydrograph



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Page 50

Summary for Pond 34P: CB3+67b

Inflow Area = 1.028 ac, 54.66% Impervious, Inflow Depth = 0.57" for 1-YR event
Inflow = 0.49 cfs @ 12.17 hrs, Volume= 0.049 af
Outflow = 0.49 cfs @ 12.17 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min
Primary = 0.49 cfs @ 12.17 hrs, Volume= 0.049 af

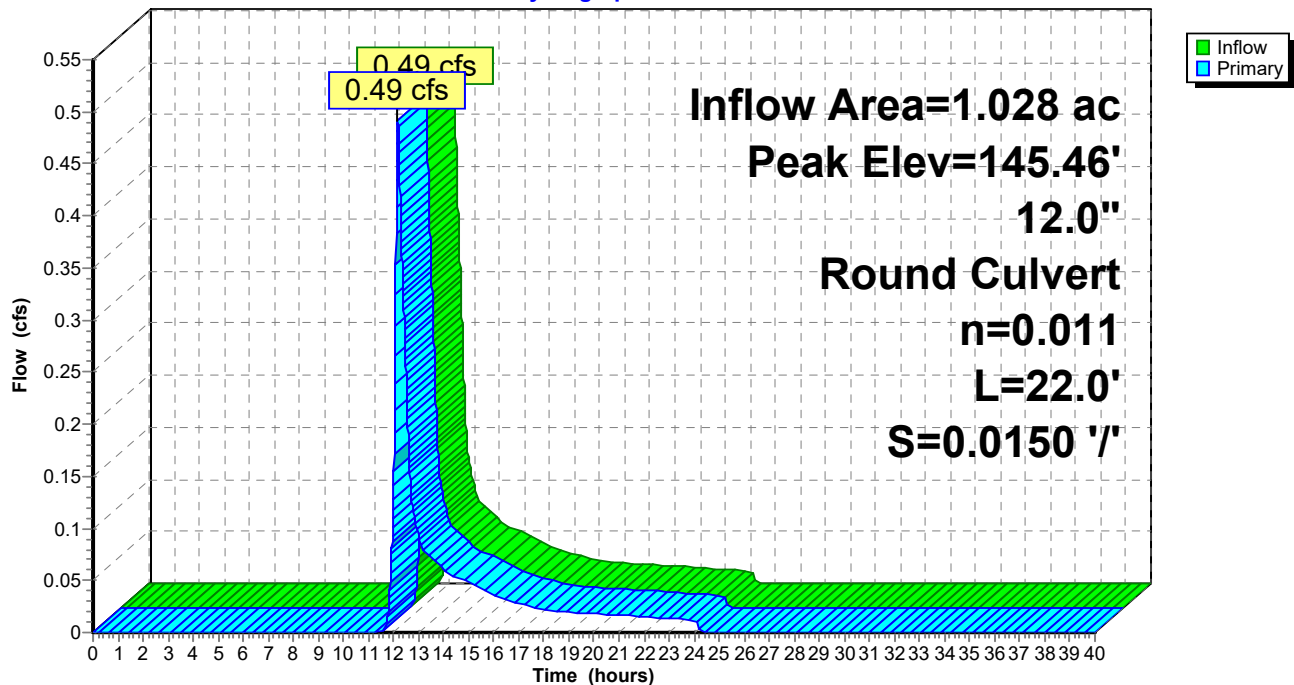
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.46' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	145.11'	12.0" Round Culvert L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.11' / 144.78' S= 0.0150 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.49 cfs @ 12.17 hrs HW=145.46' (Free Discharge)
↑**1=Culvert** (Inlet Controls 0.49 cfs @ 2.01 fps)

Pond 34P: CB3+67b

Hydrograph



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Page 51

Summary for Pond 35P: DMH3+50

Inflow Area = 2.017 ac, 53.54% Impervious, Inflow Depth = 0.55" for 1-YR event
Inflow = 0.92 cfs @ 12.17 hrs, Volume= 0.092 af
Outflow = 0.92 cfs @ 12.17 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min
Primary = 0.92 cfs @ 12.17 hrs, Volume= 0.092 af

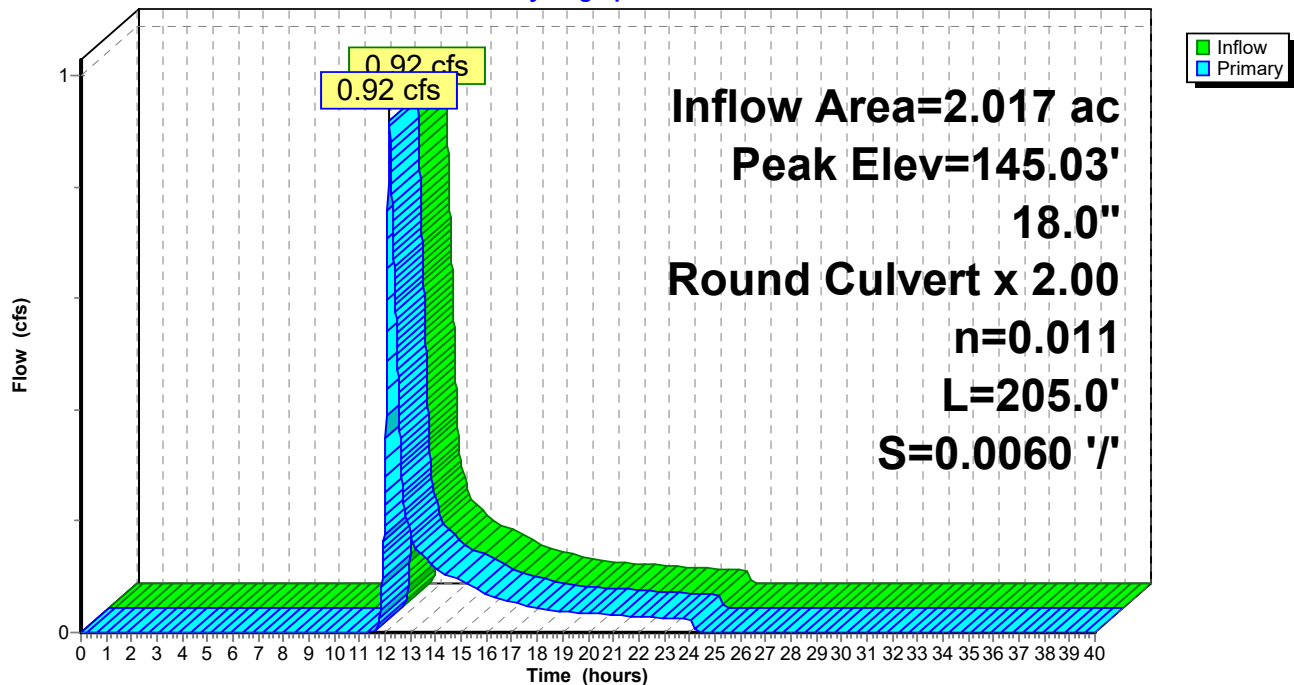
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.03' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.73'	18.0" Round Culvert X 2.00 L= 205.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.73' / 143.50' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.92 cfs @ 12.17 hrs HW=145.03' (Free Discharge)
↑1=Culvert (Barrel Controls 0.92 cfs @ 2.71 fps)

Pond 35P: DMH3+50

Hydrograph



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Page 52

Summary for Pond 36P: Basin #2

Inflow Area = 5.657 ac, 38.16% Impervious, Inflow Depth = 0.34" for 1-YR event
 Inflow = 1.51 cfs @ 12.17 hrs, Volume= 0.159 af
 Outflow = 1.42 cfs @ 12.21 hrs, Volume= 0.159 af, Atten= 6%, Lag= 2.7 min
 Discarded = 1.42 cfs @ 12.21 hrs, Volume= 0.159 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 143.52' @ 12.21 hrs Surf.Area= 11,112 sf Storage= 222 cf

Plug-Flow detention time= 2.6 min calculated for 0.159 af (100% of inflow)
 Center-of-Mass det. time= 2.6 min (899.1 - 896.5)

Volume	Invert	Avail.Storage	Storage Description
#1	143.50'	48,638 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
143.50	11,051	875.0	0	0	11,051
146.50	21,996	950.0	48,638	48,638	22,282

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.50'	8.270 in/hr Exfiltration over Surface area
#2	Primary	144.50'	15.0" Round Culvert L= 220.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.50' / 143.00' S= 0.0068 ' S= 0.0068 ' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Discarded OutFlow Max=2.13 cfs @ 12.21 hrs HW=143.52' (Free Discharge)

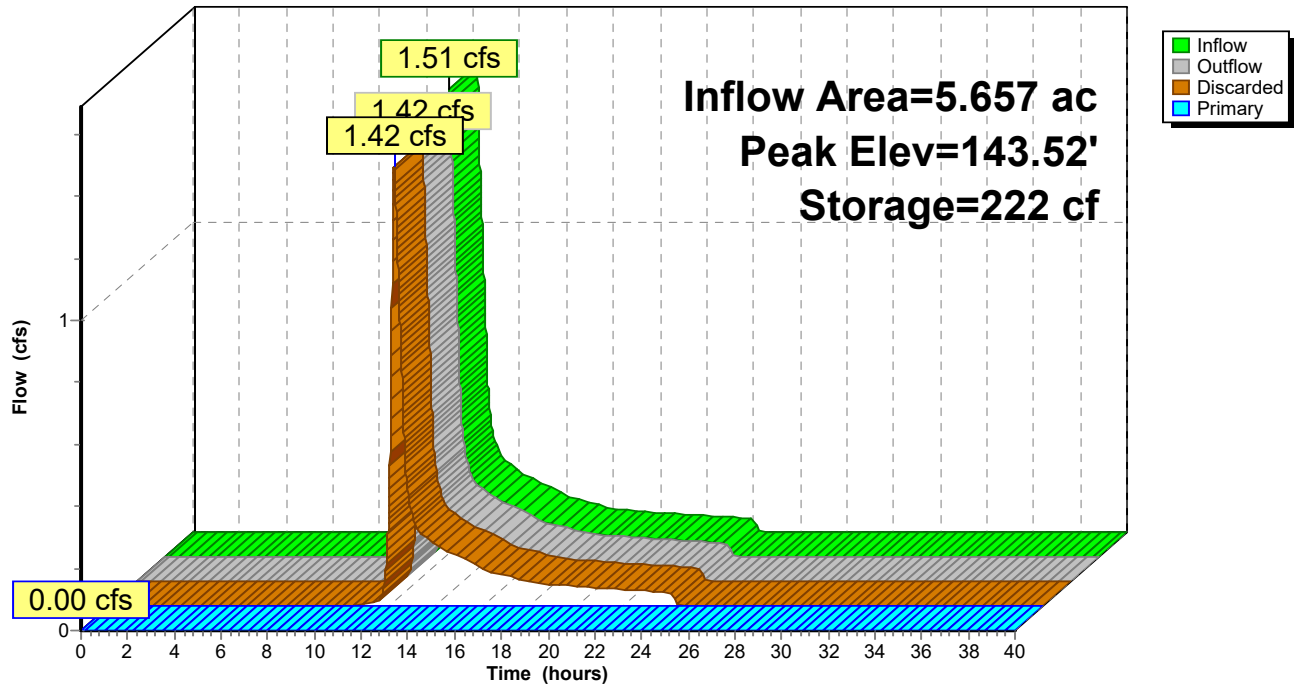
↑**1=Exfiltration** (Exfiltration Controls 2.13 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=143.50' (Free Discharge)

↑**2=Culvert** (Controls 0.00 cfs)

Pond 36P: Basin #2

Hydrograph



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Page 54

Summary for Subcatchment 37P: P1q

Runoff = 1.99 cfs @ 12.56 hrs, Volume= 0.427 af, Depth= 0.24"

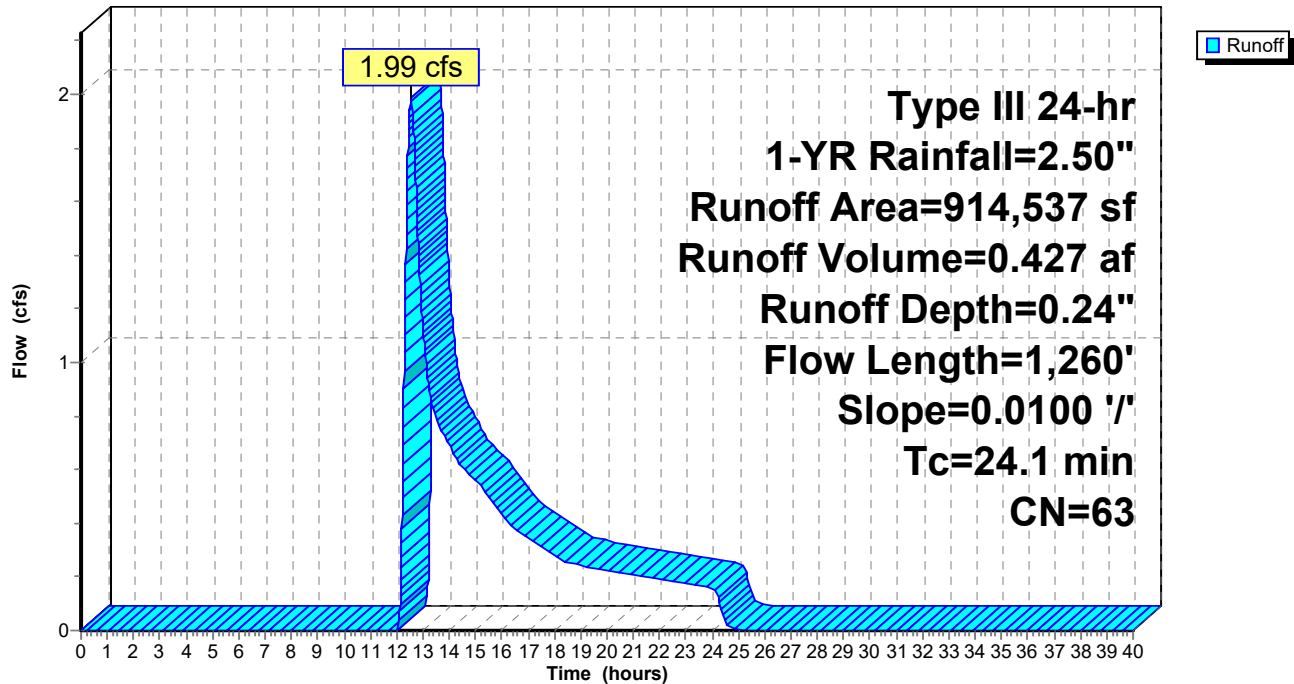
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
22,240	98	Paved parking HSG B
215	80	>75% Grass cover, Good HSG D
98,766	61	>75% Grass cover, Good HSG B
127,688	39	>75% Grass cover, Good HSG A
24,404	98	Paved parking HSG A
6,082	98	Roofs HSG B
16,041	98	Roofs HSG A
145,280	30	Woods, Good HSG A
55,658	55	Woods, Good HSG B
418,163	77	Woods, Good HSG D
914,537	63	Weighted Average
845,770	60	92.48% Pervious Area
68,767	98	7.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,035	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
24.1	1,260	Total			

Subcatchment 37P: P1q

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 56

Summary for Pond 38P: Wetland Storage

Inflow Area = 20.995 ac, 7.52% Impervious, Inflow Depth = 0.24" for 1-YR event
 Inflow = 1.99 cfs @ 12.56 hrs, Volume= 0.427 af
 Outflow = 0.30 cfs @ 17.67 hrs, Volume= 0.391 af, Atten= 85%, Lag= 306.9 min
 Primary = 0.30 cfs @ 17.67 hrs, Volume= 0.391 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 145.93' @ 17.67 hrs Surf.Area= 115,174 sf Storage= 9,010 cf

Plug-Flow detention time= 423.9 min calculated for 0.391 af (92% of inflow)
 Center-of-Mass det. time= 385.0 min (1,340.9 - 955.9)

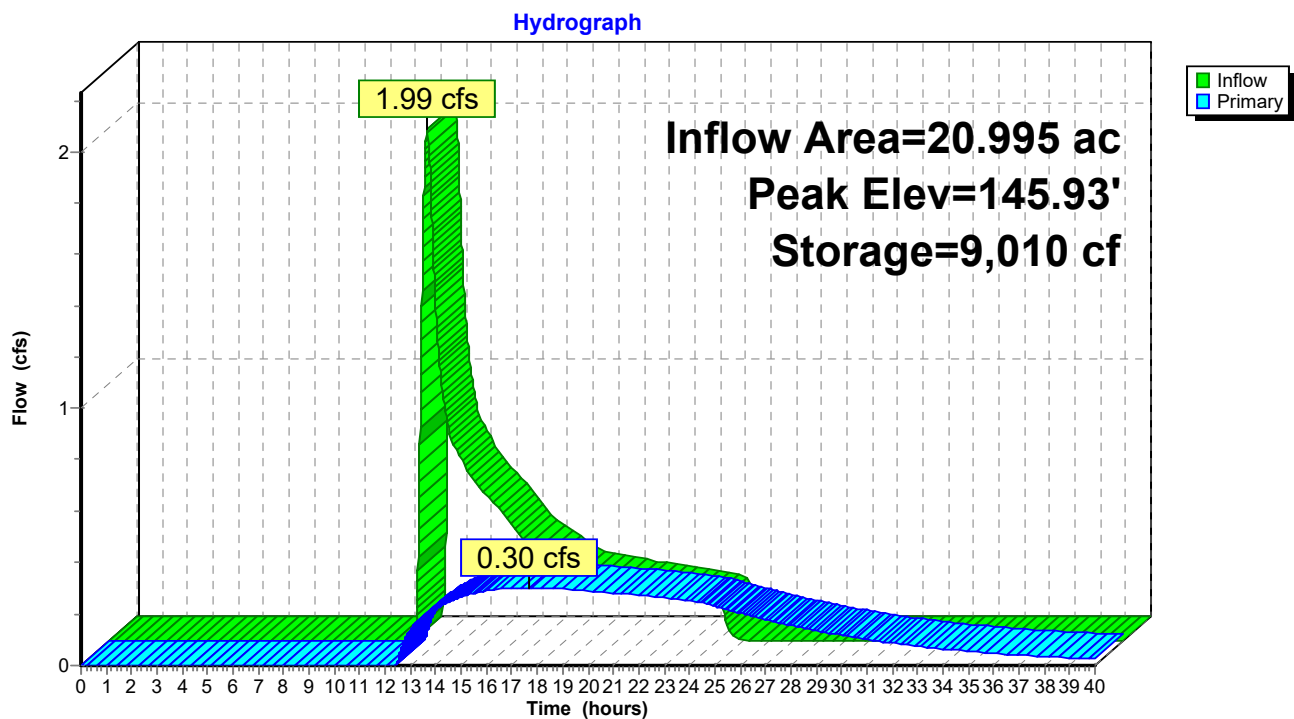
Volume	Invert	Avail.Storage	Storage Description		
#1	145.20'	133,865 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.20	30	18.0	0	0	30
145.70	60	30.0	22	22	77
146.00	195,920	2,713.0	19,941	19,963	585,725
146.50	261,254	2,891.0	113,902	133,865	665,117

Device	Routing	Invert	Outlet Devices
#1	Primary	145.80'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 145.80 146.00 146.00 146.50 Width (feet) 2.00 2.00 5.00 5.00

Primary OutFlow Max=0.30 cfs @ 17.67 hrs HW=145.93' (Free Discharge)

↑1=Custom Weir/Orifice (Weir Controls 0.30 cfs @ 1.18 fps)

Pond 38P: Wetland Storage



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Page 58

Summary for Subcatchment 39P: P1r

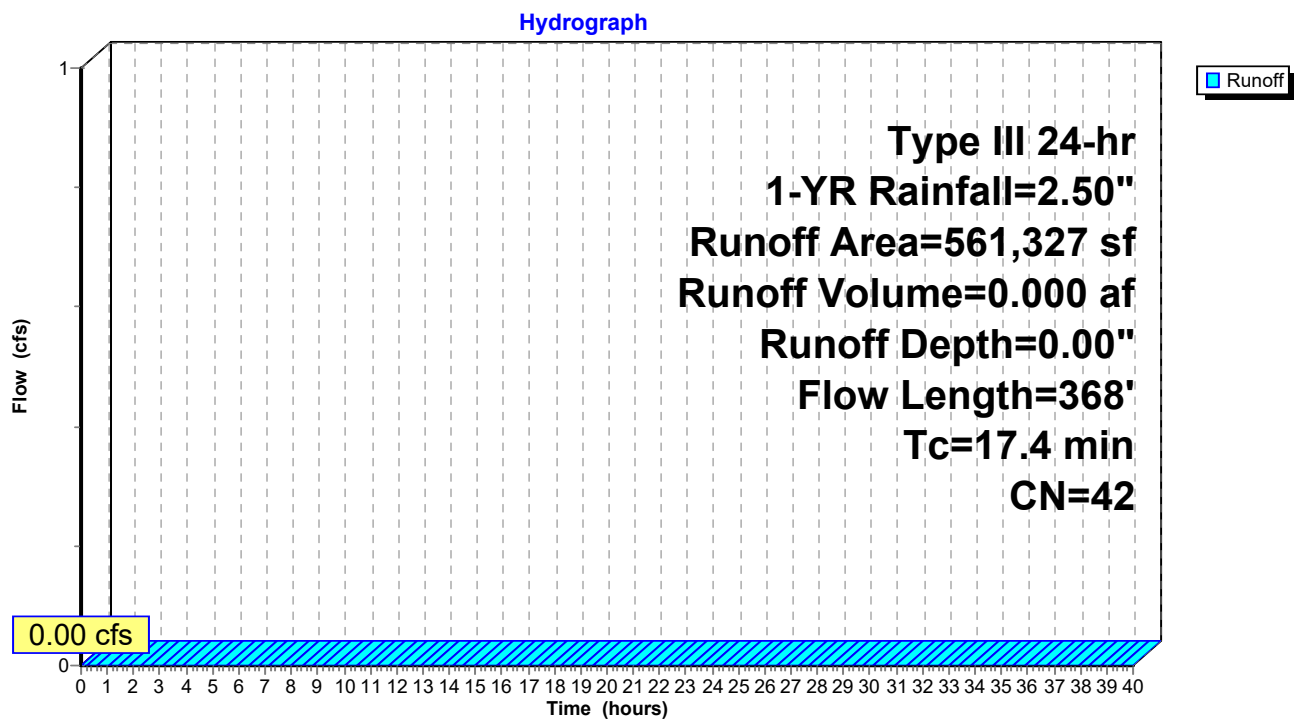
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
20,944	61	>75% Grass cover, Good HSG B
100,043	39	>75% Grass cover, Good HSG A
1,653	98	Roofs HSG B
7,805	98	Roofs HSG A
4,592	98	Paved parking HSG A
433	98	Paved parking HSG B
267,267	30	Woods, Good HSG A
158,590	55	Woods, Good HSG B
561,327	42	Weighted Average
546,844	40	97.42% Pervious Area
14,483	98	2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	343	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
17.4	368	Total			

Subcatchment 39P: P1r

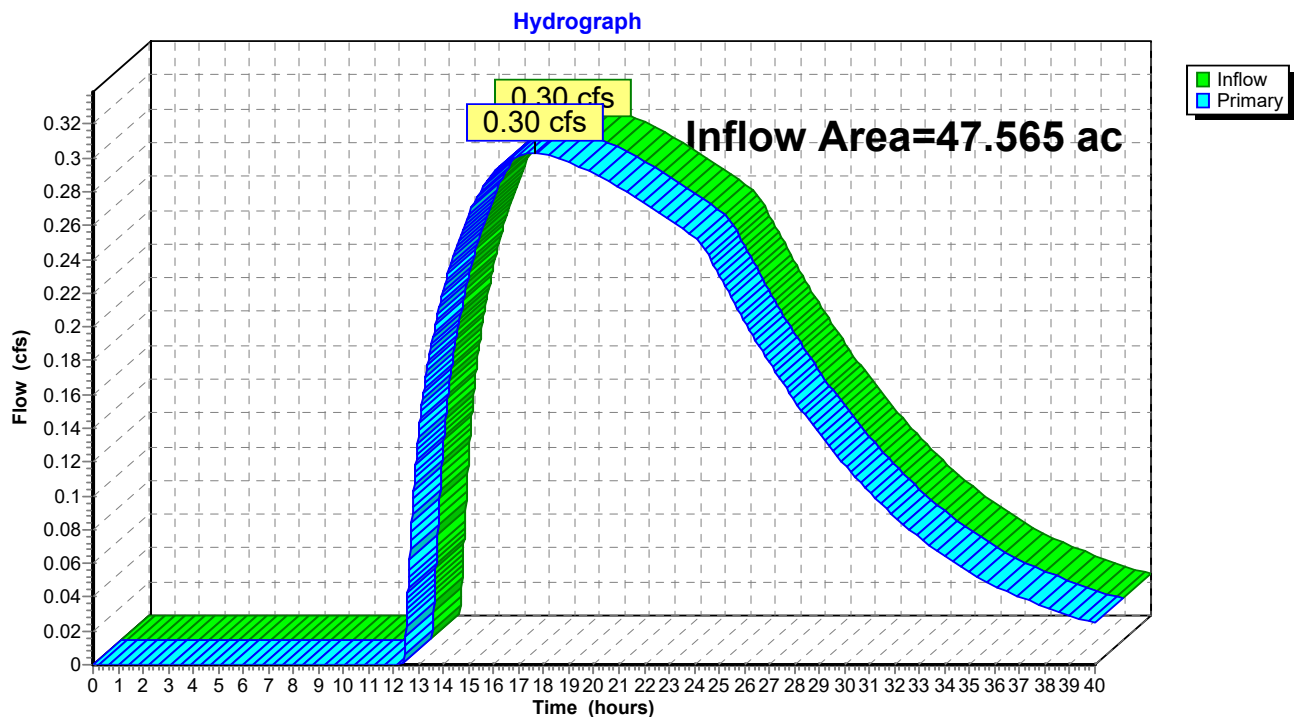


Summary for Link 40P: Design Point #1: Flow to Western Wetlands

Inflow Area = 47.565 ac, 15.02% Impervious, Inflow Depth > 0.10" for 1-YR event
 Inflow = 0.30 cfs @ 17.67 hrs, Volume= 0.391 af
 Primary = 0.30 cfs @ 17.67 hrs, Volume= 0.391 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 40P: Design Point #1: Flow to Western Wetlands



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Page 61

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1P: P1a

Runoff Area=8,961 sf 99.73% Impervious Runoff Depth=2.97"
Flow Length=474' Tc=14.6 min CN=98 Runoff=0.49 cfs 0.051 af

Pond 2P: CB5+06a

Peak Elev=149.45' Inflow=0.49 cfs 0.051 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0177 ' Outflow=0.49 cfs 0.051 af

Subcatchment3P: P1b

Runoff Area=48,701 sf 27.64% Impervious Runoff Depth=0.28"
Flow Length=473' Slope=0.0100 ' Tc=6.0 min CN=56 Runoff=0.14 cfs 0.026 af

Pond 4P: CB5+06b

Peak Elev=149.28' Inflow=0.14 cfs 0.026 af
12.0" Round Culvert n=0.011 L=21.0' S=0.0110 ' Outflow=0.14 cfs 0.026 af

Pond 5P: DMH5+22

Peak Elev=149.20' Inflow=0.62 cfs 0.077 af
15.0" Round Culvert n=0.011 L=88.0' S=0.0060 ' Outflow=0.62 cfs 0.077 af

Pond 6P: DMH6+13

Peak Elev=148.61' Inflow=0.62 cfs 0.077 af
15.0" Round Culvert n=0.011 L=209.0' S=0.0060 ' Outflow=0.62 cfs 0.077 af

Subcatchment7P: P1c

Runoff Area=19,485 sf 49.68% Impervious Runoff Depth=0.78"
Flow Length=193' Slope=0.0100 ' Tc=11.0 min CN=69 Runoff=0.30 cfs 0.029 af

Pond 8P: CB8+10a

Peak Elev=147.47' Inflow=0.30 cfs 0.029 af
12.0" Round Culvert n=0.011 L=12.0' S=0.0175 ' Outflow=0.30 cfs 0.029 af

Subcatchment9P: P1d

Runoff Area=15,346 sf 57.18% Impervious Runoff Depth=1.47"
Flow Length=194' Slope=0.0100 ' Tc=10.6 min CN=81 Runoff=0.52 cfs 0.043 af

Pond 10P: CB8+10b

Peak Elev=147.57' Inflow=0.52 cfs 0.043 af
12.0" Round Culvert n=0.011 L=19.0' S=0.0111 ' Outflow=0.52 cfs 0.043 af

Pond 11P: DMH8+20

Peak Elev=147.48' Inflow=1.42 cfs 0.149 af
18.0" Round Culvert n=0.011 L=161.0' S=0.0061 ' Outflow=1.42 cfs 0.149 af

Pond 12P: DMH1a

Peak Elev=146.51' Inflow=1.42 cfs 0.149 af
18.0" Round Culvert n=0.011 L=35.0' S=0.0060 ' Outflow=1.42 cfs 0.149 af

Subcatchment13P: P1e

Runoff Area=37,107 sf 49.02% Impervious Runoff Depth=1.09"
Flow Length=331' Slope=0.0100 ' Tc=12.0 min CN=75 Runoff=0.85 cfs 0.078 af

Pond 14P: CB12+15a

Peak Elev=148.39' Inflow=0.85 cfs 0.078 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0100 ' Outflow=0.85 cfs 0.078 af

Subcatchment15P: P1f

Runoff Area=35,775 sf 48.96% Impervious Runoff Depth=1.09"
Flow Length=280' Slope=0.0100 ' Tc=11.5 min CN=75 Runoff=0.84 cfs 0.075 af

Pond 16P: CB12+15b

Peak Elev=148.38' Inflow=0.84 cfs 0.075 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0100 ' Outflow=0.84 cfs 0.075 af

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Page 62

Pond 17P: DMH11+45Peak Elev=148.23' Inflow=1.69 cfs 0.153 af
15.0" Round Culvert n=0.011 L=155.0' S=0.0123 '/' Outflow=1.69 cfs 0.153 af**Subcatchment18P: P1g**Runoff Area=42,623 sf 52.76% Impervious Runoff Depth=0.83"
Flow Length=313' Slope=0.0100 '/' Tc=12.1 min CN=70 Runoff=0.69 cfs 0.068 af**Pond 19P: CB2+70a**Peak Elev=147.58' Inflow=0.69 cfs 0.068 af
15.0" Round Culvert n=0.011 L=24.0' S=0.0125 '/' Outflow=0.69 cfs 0.068 af**Subcatchment20P: P1h**Runoff Area=45,838 sf 53.76% Impervious Runoff Depth=0.88"
Flow Length=301' Slope=0.0100 '/' Tc=11.7 min CN=71 Runoff=0.81 cfs 0.077 af**Pond 21P: CB2+70b**Peak Elev=147.63' Inflow=0.81 cfs 0.077 af
15.0" Round Culvert n=0.011 L=30.0' S=0.0083 '/' Outflow=0.81 cfs 0.077 af**Pond 22P: DMH2+40**Peak Elev=147.28' Inflow=1.50 cfs 0.145 af
18.0" Round Culvert x 2.00 n=0.011 L=199.0' S=0.0060 '/' Outflow=1.50 cfs 0.145 af**Subcatchment23P: P1i**Runoff Area=95,819 sf 10.70% Impervious Runoff Depth=0.34"
Flow Length=110' Tc=10.1 min CN=58 Runoff=0.37 cfs 0.063 af**Pond 24P: Basin #1**Peak Elev=145.94' Storage=5,158 cf Inflow=4.93 cfs 0.509 af
Discarded=1.25 cfs 0.509 af Primary=0.00 cfs 0.000 af Outflow=1.25 cfs 0.509 af**Subcatchment25P: P1j**Runoff Area=32,095 sf 46.13% Impervious Runoff Depth=0.98"
Flow Length=265' Slope=0.0100 '/' Tc=11.8 min CN=73 Runoff=0.65 cfs 0.060 af**Pond 26P: CB17+77a**Peak Elev=146.46' Inflow=0.65 cfs 0.060 af
12.0" Round Culvert n=0.011 L=10.0' S=0.0100 '/' Outflow=0.65 cfs 0.060 af**Subcatchment27P: P1k**Runoff Area=11,617 sf 66.38% Impervious Runoff Depth=1.54"
Flow Length=210' Slope=0.0100 '/' Tc=8.7 min CN=82 Runoff=0.44 cfs 0.034 af**Pond 28P: CB17+77b**Peak Elev=146.38' Inflow=0.44 cfs 0.034 af
12.0" Round Culvert n=0.011 L=18.0' S=0.0056 '/' Outflow=0.44 cfs 0.034 af**Pond 29P: DMH17+67**Peak Elev=146.34' Inflow=1.06 cfs 0.095 af
15.0" Round Culvert n=0.011 L=75.0' S=0.0313 '/' Outflow=1.06 cfs 0.095 af**Subcatchment30P: P1l**Runoff Area=114,834 sf 21.32% Impervious Runoff Depth=0.17"
Flow Length=113' Tc=10.4 min CN=52 Runoff=0.13 cfs 0.038 af**Subcatchment31P: P1m**Runoff Area=43,062 sf 52.36% Impervious Runoff Depth=0.93"
Flow Length=198' Slope=0.0100 '/' Tc=10.9 min CN=72 Runoff=0.84 cfs 0.077 af**Pond 32P: CB3+67a**Peak Elev=145.58' Inflow=0.84 cfs 0.077 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0254 '/' Outflow=0.84 cfs 0.077 af**Subcatchment33P: P1n**Runoff Area=44,792 sf 54.66% Impervious Runoff Depth=0.98"
Flow Length=199' Slope=0.0100 '/' Tc=10.9 min CN=73 Runoff=0.94 cfs 0.084 af**Pond 34P: CB3+67b**Peak Elev=145.61' Inflow=0.94 cfs 0.084 af
12.0" Round Culvert n=0.011 L=22.0' S=0.0150 '/' Outflow=0.94 cfs 0.084 af

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Page 63

Pond 35P: DMH3+50

Peak Elev=145.15' Inflow=1.78 cfs 0.161 af
18.0" Round Culvert x 2.00 n=0.011 L=205.0' S=0.0060 '/' Outflow=1.78 cfs 0.161 af

Pond 36P: Basin #2

Peak Elev=143.55' Storage=598 cf Inflow=2.83 cfs 0.293 af
Discarded=2.15 cfs 0.293 af Primary=0.00 cfs 0.000 af Outflow=2.15 cfs 0.293 af

Subcatchment37P: P1q

Runoff Area=914,537 sf 7.52% Impervious Runoff Depth=0.52"
Flow Length=1,260' Slope=0.0100 '/' Tc=24.1 min CN=63 Runoff=5.84 cfs 0.909 af

Pond 38P: Wetland Storage

Peak Elev=146.00' Storage=20,740 cf Inflow=5.84 cfs 0.909 af
Outflow=0.61 cfs 0.849 af

Subcatchment39P: P1r

Runoff Area=561,327 sf 2.58% Impervious Runoff Depth=0.01"
Flow Length=368' Tc=17.4 min CN=42 Runoff=0.02 cfs 0.014 af

Link 40P: Design Point #1: Flow to Western Wetlands

Inflow=0.62 cfs 0.863 af
Primary=0.62 cfs 0.863 af

Total Runoff Area = 47.565 ac Runoff Volume = 1.725 af Average Runoff Depth = 0.44"
84.98% Pervious = 40.420 ac 15.02% Impervious = 7.145 ac

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Page 64

Summary for Subcatchment 1P: P1a

Runoff = 0.49 cfs @ 12.19 hrs, Volume= 0.051 af, Depth= 2.97"

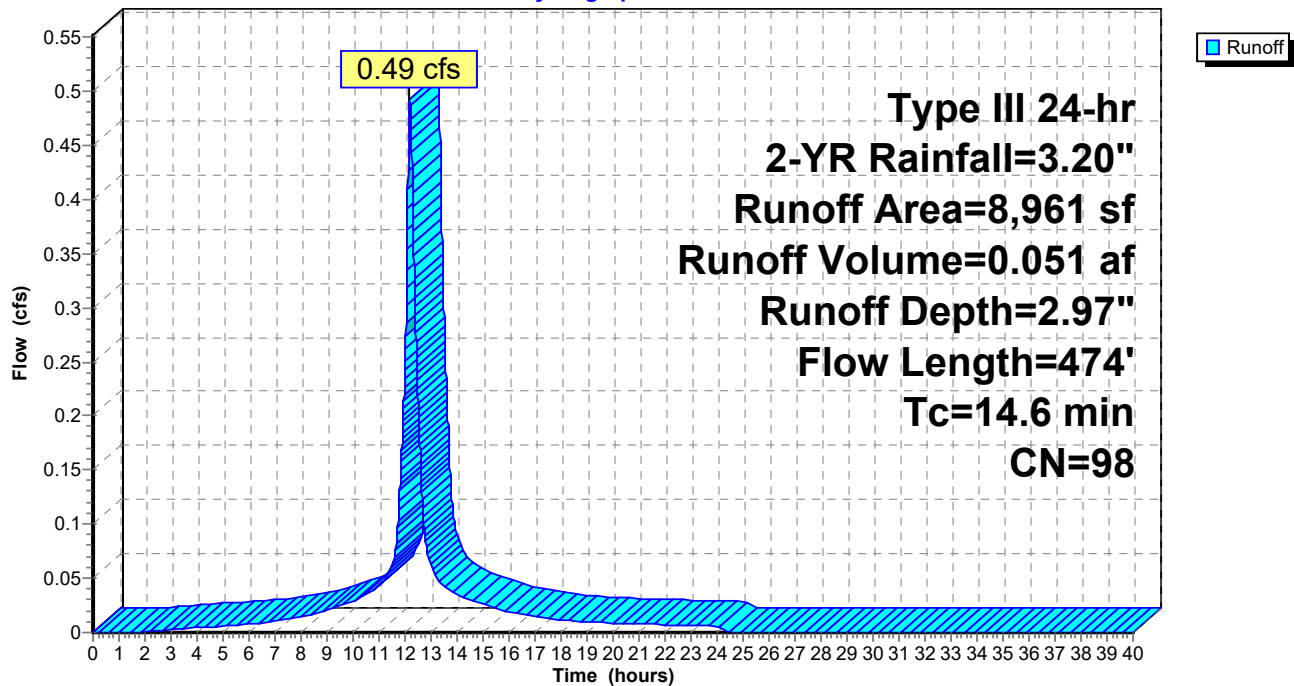
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
9	61	>75% Grass cover, Good HSG B
1	80	>75% Grass cover, Good HSG D
2,432	98	Paved parking HSG B
553	98	Paved parking HSG D
5,952	98	Paved parking HSG A
14	39	>75% Grass cover, Good HSG A
8,961	98	Weighted Average
24	49	0.27% Pervious Area
8,937	98	99.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
2.8	142	0.0150	0.86		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.4	290	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
14.6	474	Total			

Subcatchment 1P: P1a

Hydrograph



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Page 66

Summary for Pond 2P: CB5+06a

Inflow Area = 0.206 ac, 99.73% Impervious, Inflow Depth = 2.97" for 2-YR event
Inflow = 0.49 cfs @ 12.19 hrs, Volume= 0.051 af
Outflow = 0.49 cfs @ 12.19 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min
Primary = 0.49 cfs @ 12.19 hrs, Volume= 0.051 af

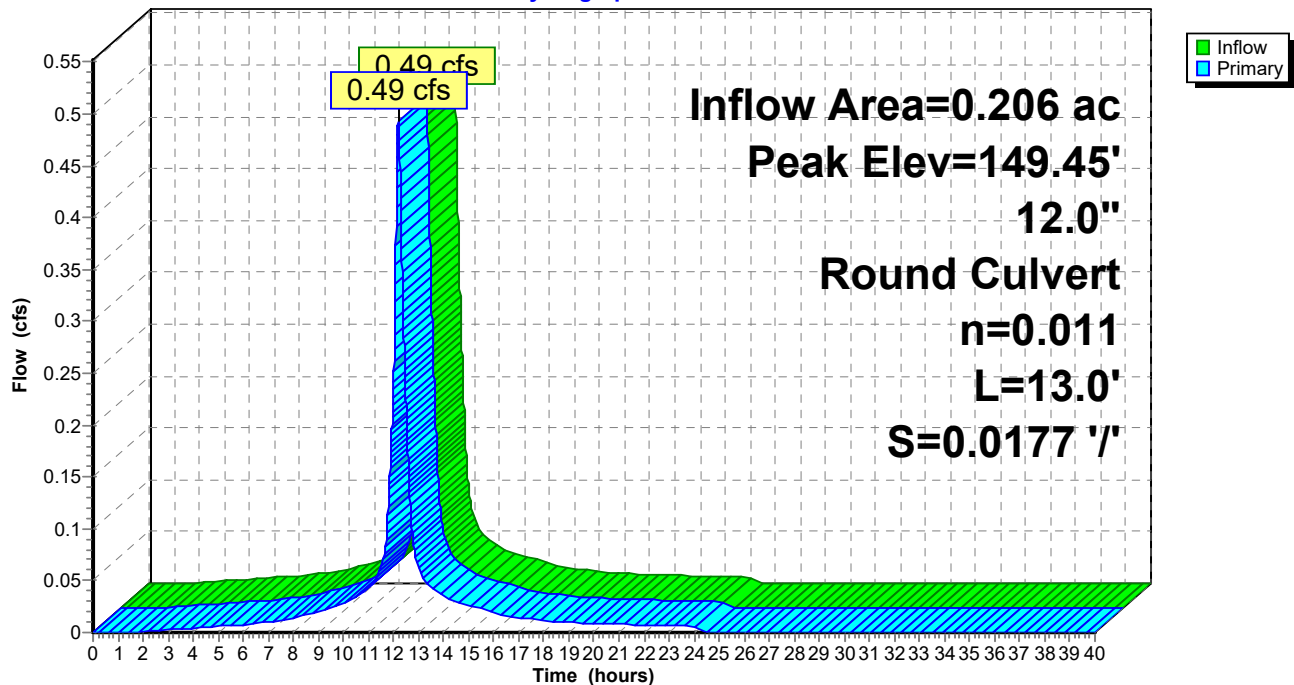
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.45' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	149.10'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 149.10' / 148.87' S= 0.0177 ' /' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.49 cfs @ 12.19 hrs HW=149.45' (Free Discharge)
↑1=Culvert (Inlet Controls 0.49 cfs @ 2.01 fps)

Pond 2P: CB5+06a

Hydrograph



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Page 67

Summary for Subcatchment 3P: P1b

Runoff = 0.14 cfs @ 12.31 hrs, Volume= 0.026 af, Depth= 0.28"

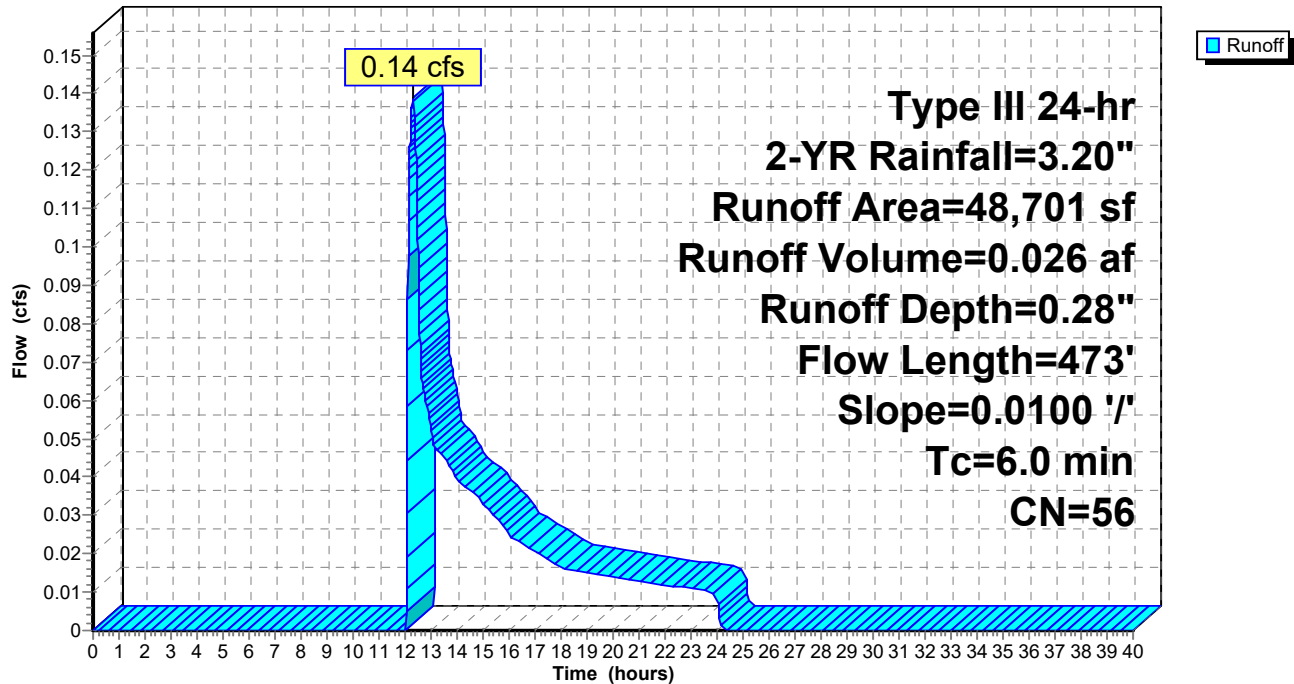
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
828	61	>75% Grass cover, Good HSG B
174	80	>75% Grass cover, Good HSG D
3,006	98	Paved parking HSG B
915	98	Paved parking HSG D
34,195	39	>75% Grass cover, Good HSG A
1,263	98	Roofs HSG A
8,276	98	Paved parking HSG A
44	30	Woods, Good HSG A
0	55	Woods, Good HSG B
48,701	56	Weighted Average
35,241	40	72.36% Pervious Area
13,460	98	27.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0100	1.30		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.4	173	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.3	473	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3P: P1b

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Page 69

Summary for Pond 4P: CB5+06b

Inflow Area = 1.118 ac, 27.64% Impervious, Inflow Depth = 0.28" for 2-YR event
Inflow = 0.14 cfs @ 12.31 hrs, Volume= 0.026 af
Outflow = 0.14 cfs @ 12.31 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min
Primary = 0.14 cfs @ 12.31 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 149.28' @ 12.31 hrs

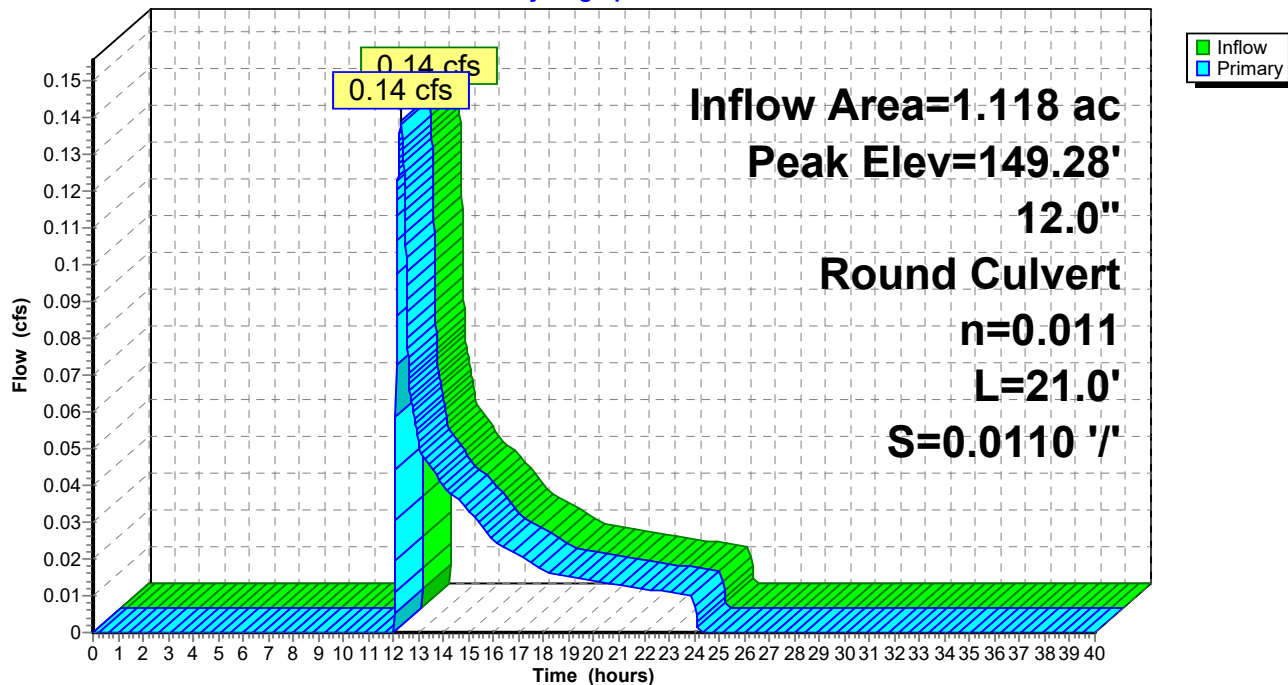
Device	Routing	Invert	Outlet Devices
#1	Primary	149.10'	12.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 149.10' / 148.87' S= 0.0110 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.14 cfs @ 12.31 hrs HW=149.28' (Free Discharge)

↑1=Culvert (Inlet Controls 0.14 cfs @ 1.44 fps)

Pond 4P: CB5+06b

Hydrograph



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Page 70

Summary for Pond 5P: DMH5+22

Inflow Area = 1.324 ac, 38.84% Impervious, Inflow Depth = 0.70" for 2-YR event
Inflow = 0.62 cfs @ 12.20 hrs, Volume= 0.077 af
Outflow = 0.62 cfs @ 12.20 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min
Primary = 0.62 cfs @ 12.20 hrs, Volume= 0.077 af

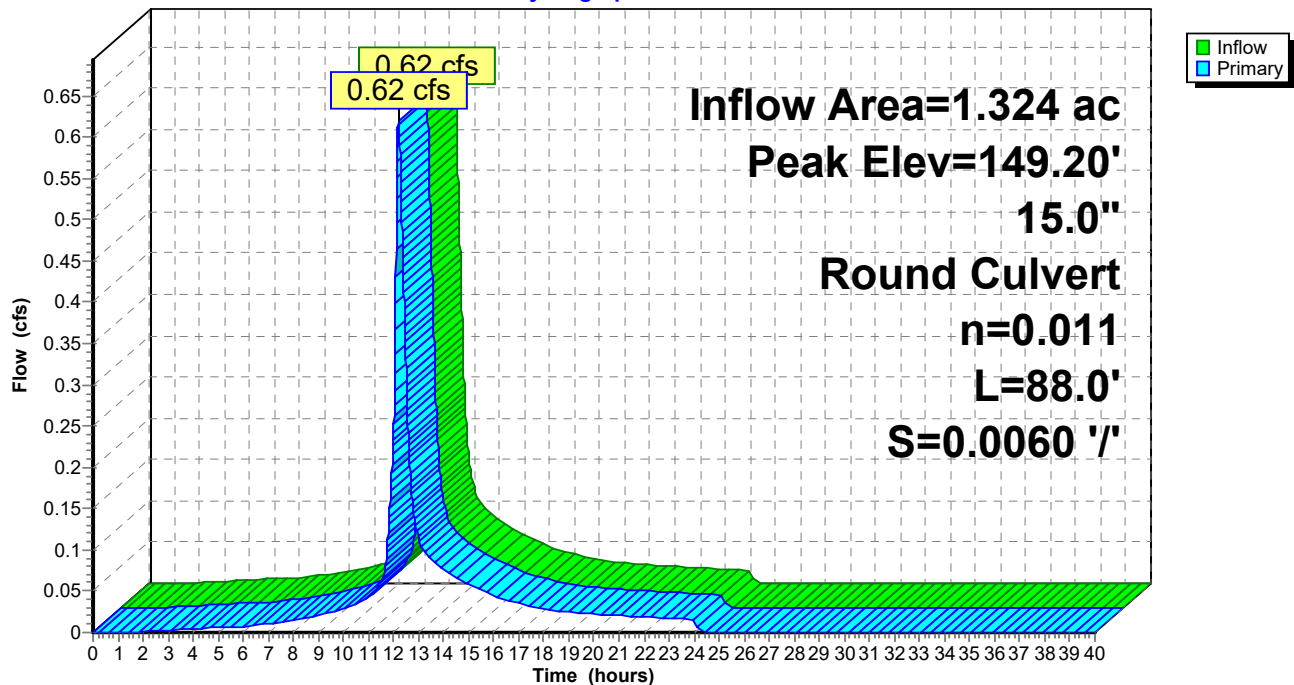
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.20' @ 12.20 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	148.82'	15.0" Round Culvert L= 88.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 148.82' / 148.29' S= 0.0060 '/' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=0.62 cfs @ 12.20 hrs HW=149.20' (Free Discharge)
↑**1=Culvert** (Barrel Controls 0.62 cfs @ 2.90 fps)

Pond 5P: DMH5+22

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 71

Summary for Pond 6P: DMH6+13

Inflow Area = 1.324 ac, 38.84% Impervious, Inflow Depth = 0.70" for 2-YR event
Inflow = 0.62 cfs @ 12.20 hrs, Volume= 0.077 af
Outflow = 0.62 cfs @ 12.20 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min
Primary = 0.62 cfs @ 12.20 hrs, Volume= 0.077 af

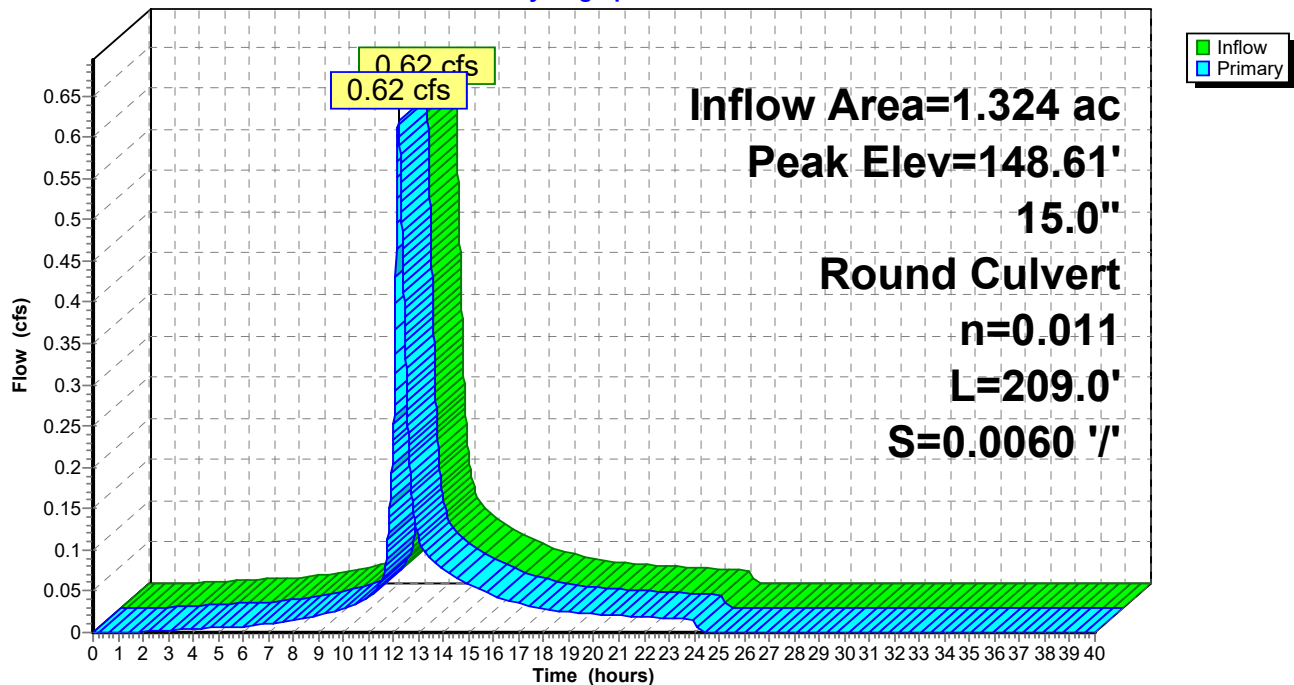
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.61' @ 12.20 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	148.24'	15.0" Round Culvert L= 209.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 148.24' / 146.99' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=0.62 cfs @ 12.20 hrs HW=148.61' (Free Discharge)
↑**1=Culvert** (Barrel Controls 0.62 cfs @ 3.01 fps)

Pond 6P: DMH6+13

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 72

Summary for Subcatchment 7P: P1c

Runoff = 0.30 cfs @ 12.17 hrs, Volume= 0.029 af, Depth= 0.78"

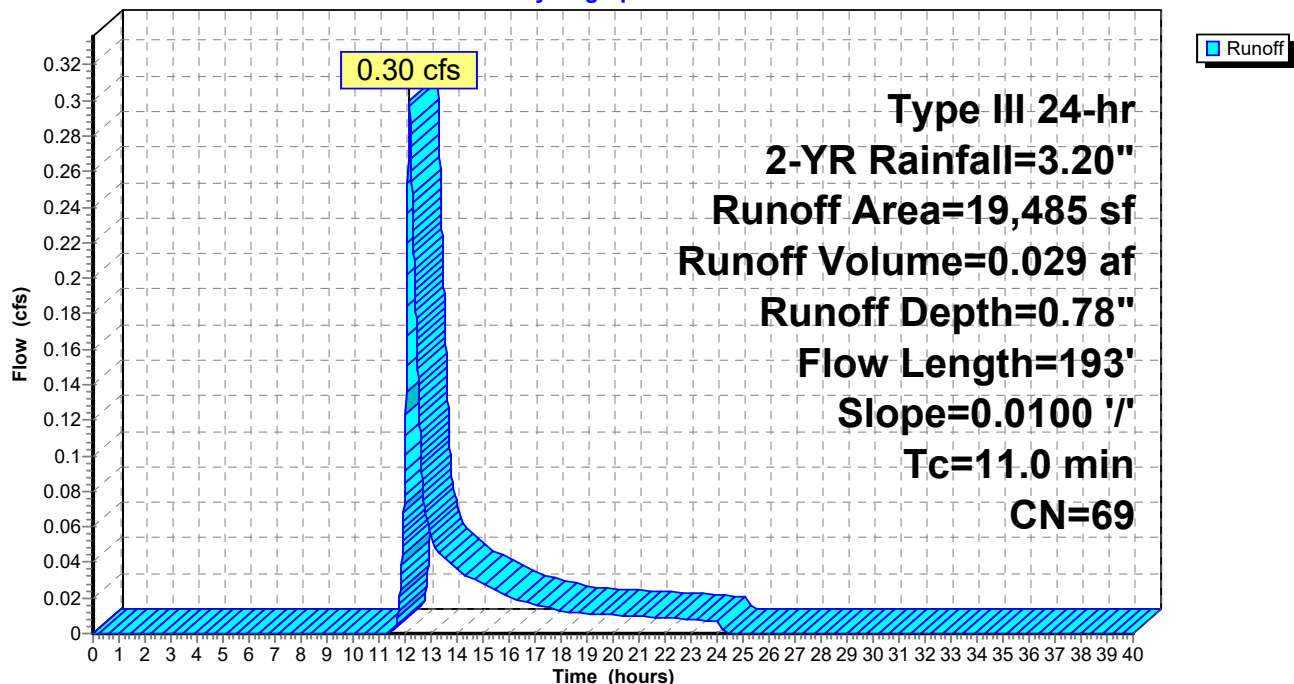
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
442	61	>75% Grass cover, Good HSG B
5,958	98	Paved parking HSG A
1,438	98	Paved parking HSG B
9,363	39	>75% Grass cover, Good HSG A
2,284	98	Roofs HSG A
19,485	69	Weighted Average
9,805	40	50.32% Pervious Area
9,680	98	49.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.5	21	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.1	130	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.0	193	Total			

Subcatchment 7P: P1c

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 73

Summary for Pond 8P: CB8+10a

Inflow Area = 0.447 ac, 49.68% Impervious, Inflow Depth = 0.78" for 2-YR event
Inflow = 0.30 cfs @ 12.17 hrs, Volume= 0.029 af
Outflow = 0.30 cfs @ 12.17 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min
Primary = 0.30 cfs @ 12.17 hrs, Volume= 0.029 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.47' @ 12.17 hrs

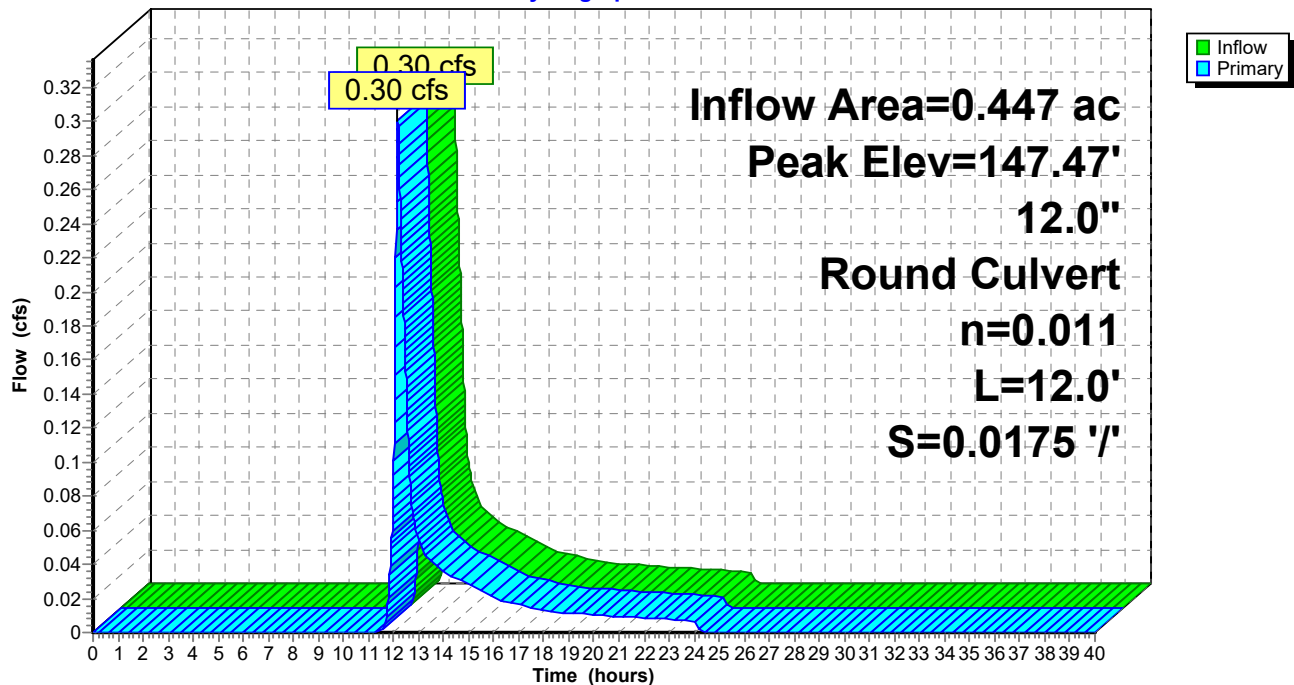
Device	Routing	Invert	Outlet Devices
#1	Primary	147.20'	12.0" Round Culvert L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.20' / 146.99' S= 0.0175 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.30 cfs @ 12.17 hrs HW=147.47' (Free Discharge)

↑1=Culvert (Inlet Controls 0.30 cfs @ 1.77 fps)

Pond 8P: CB8+10a

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 74

Summary for Subcatchment 9P: P1d

Runoff = 0.52 cfs @ 12.15 hrs, Volume= 0.043 af, Depth= 1.47"

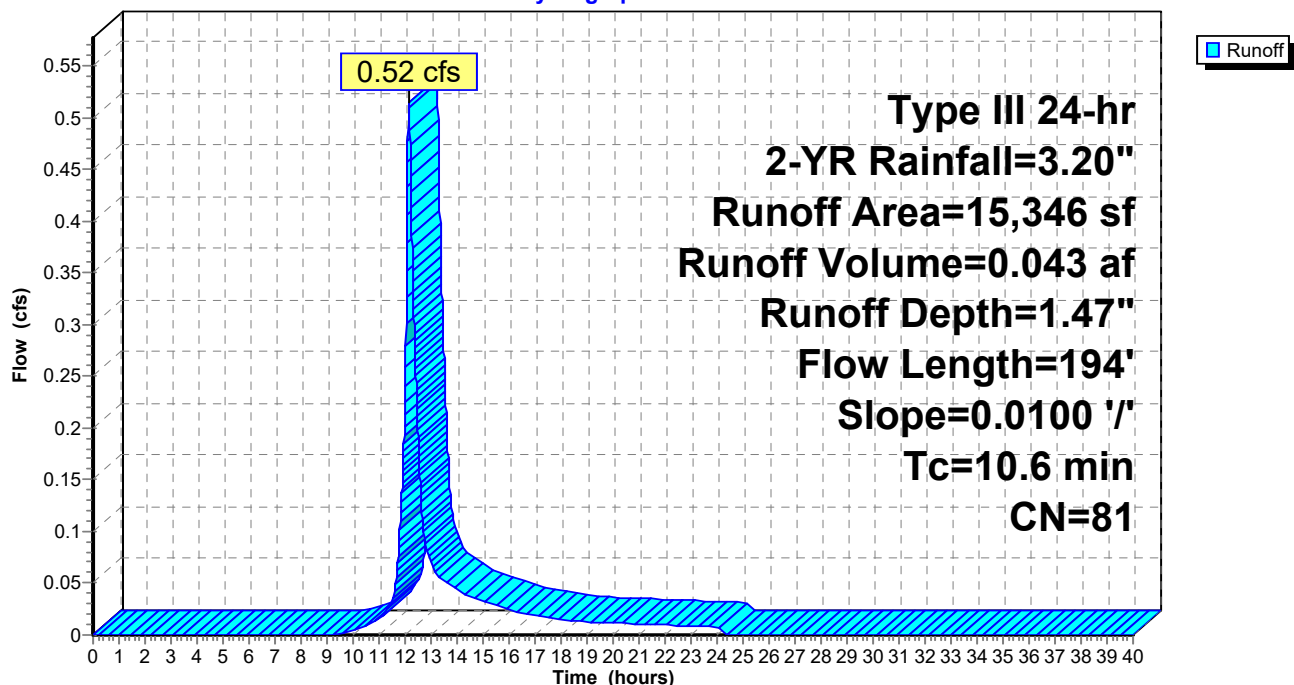
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
5,770	61	>75% Grass cover, Good HSG B
704	39	>75% Grass cover, Good HSG A
1,057	98	Roofs HSG B
3,321	98	Paved parking HSG A
4,397	98	Paved parking HSG B
97	55	Woods, Good HSG B
15,346	81	Weighted Average
6,571	59	42.82% Pervious Area
8,775	98	57.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.2	152	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.6	194	Total			

Subcatchment 9P: P1d

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Page 75

Summary for Pond 10P: CB8+10b

Inflow Area = 0.352 ac, 57.18% Impervious, Inflow Depth = 1.47" for 2-YR event
Inflow = 0.52 cfs @ 12.15 hrs, Volume= 0.043 af
Outflow = 0.52 cfs @ 12.15 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min
Primary = 0.52 cfs @ 12.15 hrs, Volume= 0.043 af

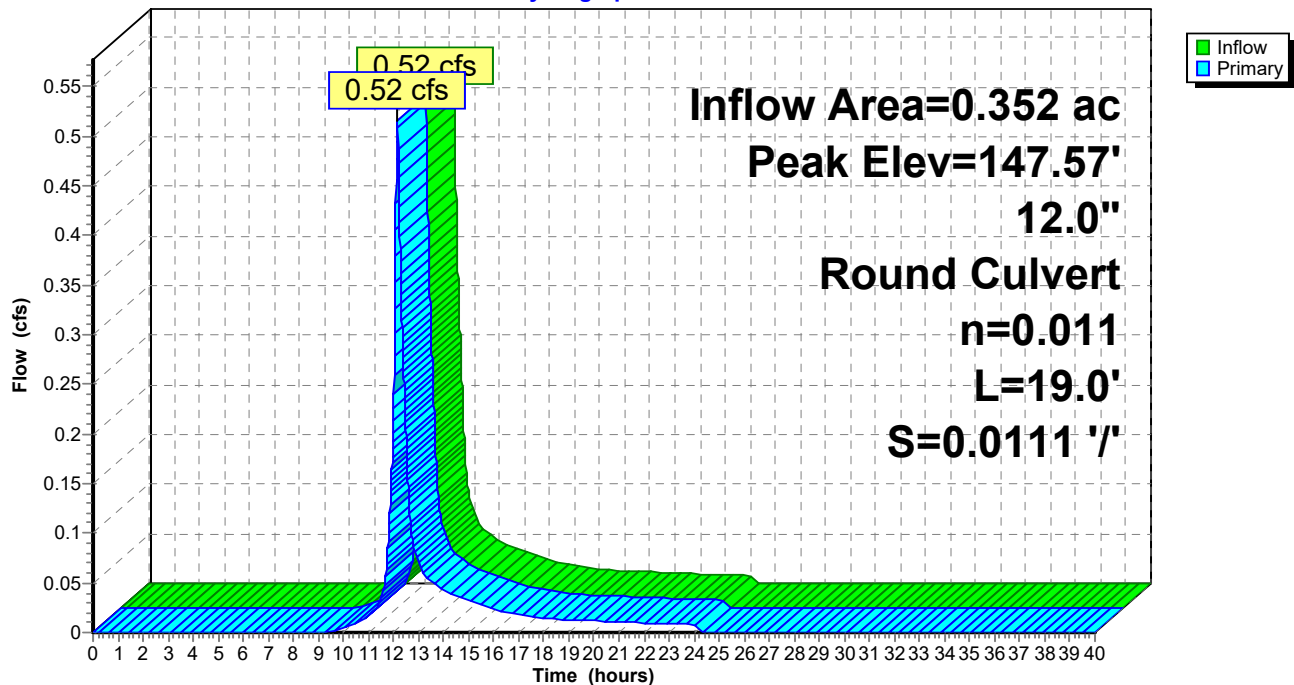
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.57' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.20'	12.0" Round Culvert L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.20' / 146.99' S= 0.0111 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.52 cfs @ 12.15 hrs HW=147.57' (Free Discharge)
1=Culvert (Barrel Controls 0.52 cfs @ 2.92 fps)

Pond 10P: CB8+10b

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Page 76

Summary for Pond 11P: DMH8+20

Inflow Area = 2.123 ac, 44.17% Impervious, Inflow Depth = 0.84" for 2-YR event
Inflow = 1.42 cfs @ 12.17 hrs, Volume= 0.149 af
Outflow = 1.42 cfs @ 12.17 hrs, Volume= 0.149 af, Atten= 0%, Lag= 0.0 min
Primary = 1.42 cfs @ 12.17 hrs, Volume= 0.149 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.48' @ 12.17 hrs

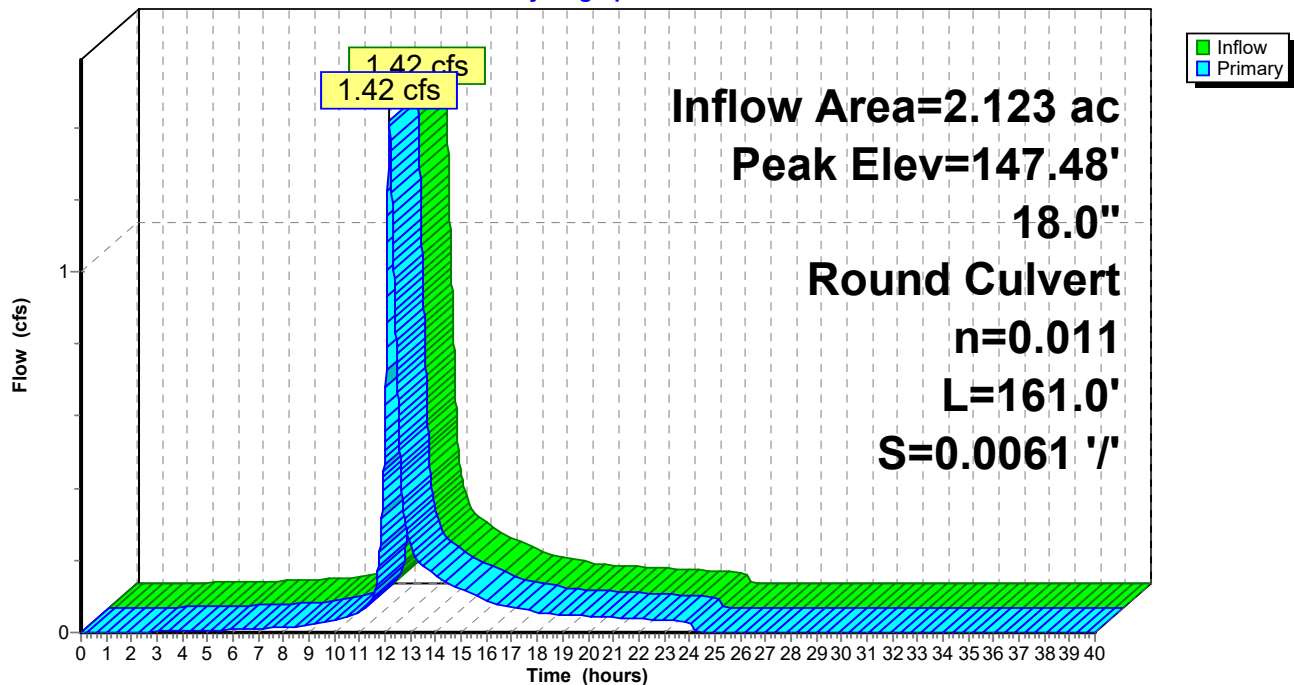
Device	Routing	Invert	Outlet Devices
#1	Primary	146.94'	18.0" Round Culvert L= 161.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.94' / 145.96' S= 0.0061 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.42 cfs @ 12.17 hrs HW=147.48' (Free Discharge)

↑1=Culvert (Barrel Controls 1.42 cfs @ 3.65 fps)

Pond 11P: DMH8+20

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 77

Summary for Pond 12P: DMH1a

Inflow Area = 2.123 ac, 44.17% Impervious, Inflow Depth = 0.84" for 2-YR event
Inflow = 1.42 cfs @ 12.17 hrs, Volume= 0.149 af
Outflow = 1.42 cfs @ 12.17 hrs, Volume= 0.149 af, Atten= 0%, Lag= 0.0 min
Primary = 1.42 cfs @ 12.17 hrs, Volume= 0.149 af

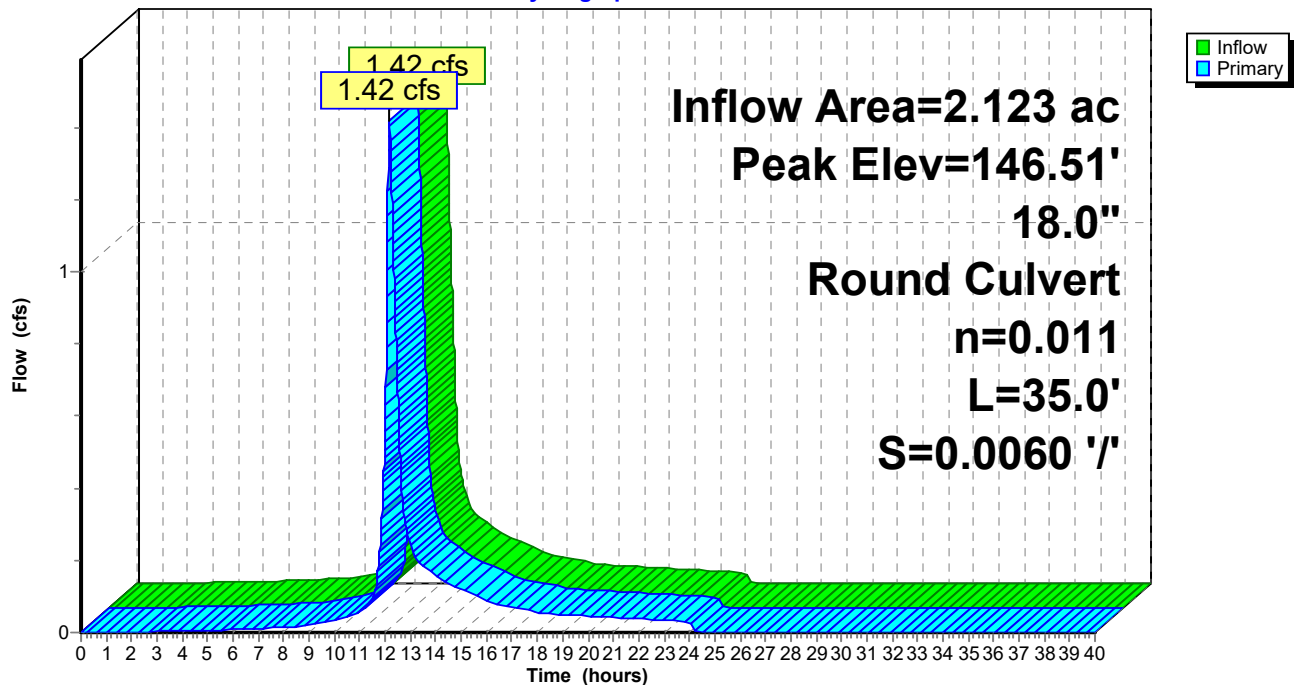
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 146.51' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	145.91'	18.0" Round Culvert L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.91' / 145.70' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.42 cfs @ 12.17 hrs HW=146.51' (Free Discharge)
↑1=Culvert (Barrel Controls 1.42 cfs @ 3.20 fps)

Pond 12P: DMH1a

Hydrograph



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Page 78

Summary for Subcatchment 13P: P1e

Runoff = 0.85 cfs @ 12.17 hrs, Volume= 0.078 af, Depth= 1.09"

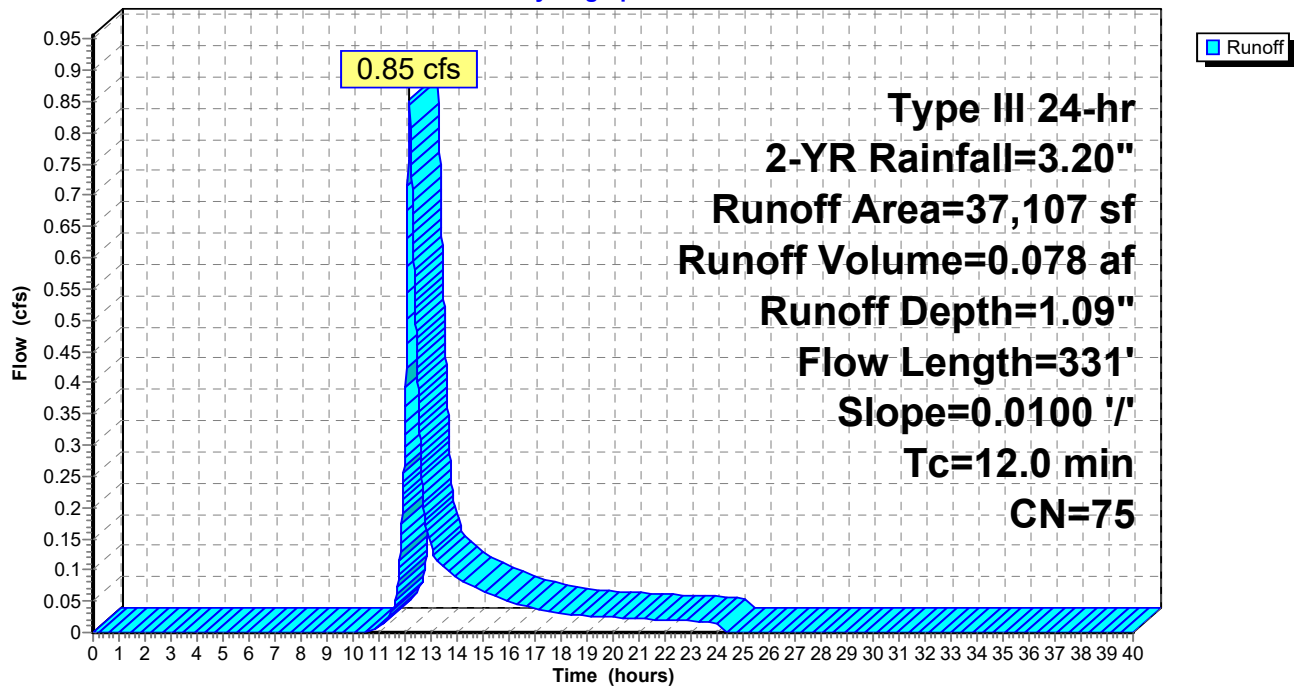
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
8,461	98	Paved parking HSG B
5,642	98	Paved parking HSG A
11,605	61	>75% Grass cover, Good HSG B
7,314	39	>75% Grass cover, Good HSG A
2,331	98	Roofs HSG B
1,754	98	Roofs HSG A
37,107	75	Weighted Average
18,919	52	50.98% Pervious Area
18,188	98	49.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.4	16	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	273	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
12.0	331	Total			

Subcatchment 13P: P1e

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 80

Summary for Pond 14P: CB12+15a

Inflow Area = 0.852 ac, 49.02% Impervious, Inflow Depth = 1.09" for 2-YR event
Inflow = 0.85 cfs @ 12.17 hrs, Volume= 0.078 af
Outflow = 0.85 cfs @ 12.17 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min
Primary = 0.85 cfs @ 12.17 hrs, Volume= 0.078 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 148.39' @ 12.17 hrs

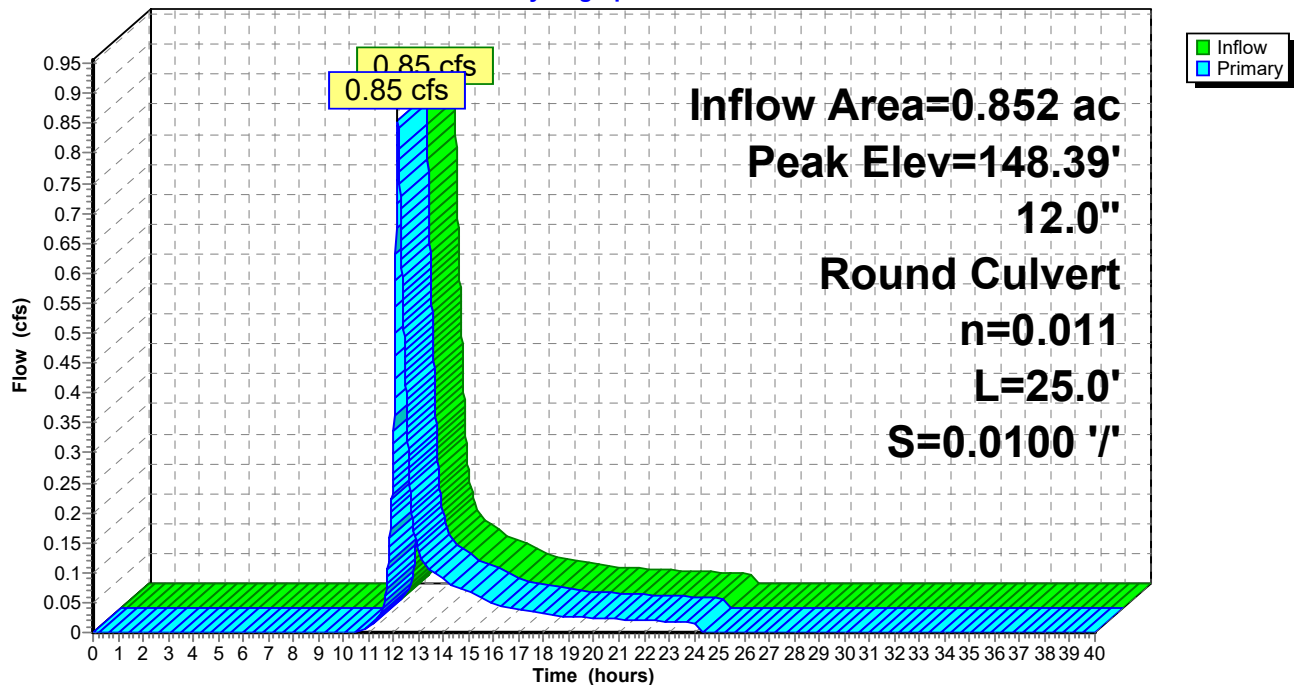
Device	Routing	Invert	Outlet Devices
#1	Primary	147.90'	12.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.90' / 147.65' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.85 cfs @ 12.17 hrs HW=148.39' (Free Discharge)

↑1=Culvert (Barrel Controls 0.85 cfs @ 3.26 fps)

Pond 14P: CB12+15a

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 81

Summary for Subcatchment 15P: P1f

Runoff = 0.84 cfs @ 12.17 hrs, Volume= 0.075 af, Depth= 1.09"

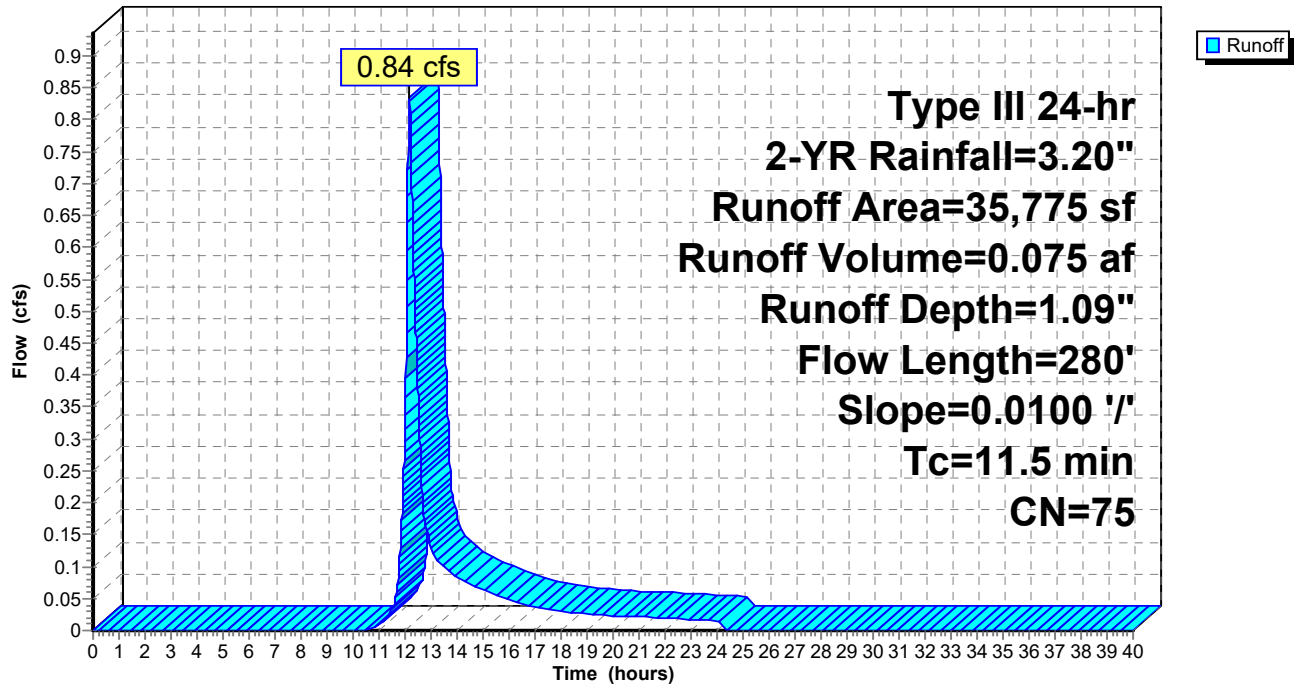
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
5,367	39	>75% Grass cover, Good HSG A
11,969	61	>75% Grass cover, Good HSG B
331	98	Roofs HSG A
3,270	98	Roofs HSG B
10,583	98	Paved parking HSG B
3,333	98	Paved parking HSG A
742	30	Woods, Good HSG A
180	55	Woods, Good HSG B
35,775	75	Weighted Average
18,258	53	51.04% Pervious Area
17,517	98	48.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.8	225	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.5	280	Total			

Subcatchment 15P: P1f

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 83

Summary for Pond 16P: CB12+15b

Inflow Area = 0.821 ac, 48.96% Impervious, Inflow Depth = 1.09" for 2-YR event
Inflow = 0.84 cfs @ 12.17 hrs, Volume= 0.075 af
Outflow = 0.84 cfs @ 12.17 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min
Primary = 0.84 cfs @ 12.17 hrs, Volume= 0.075 af

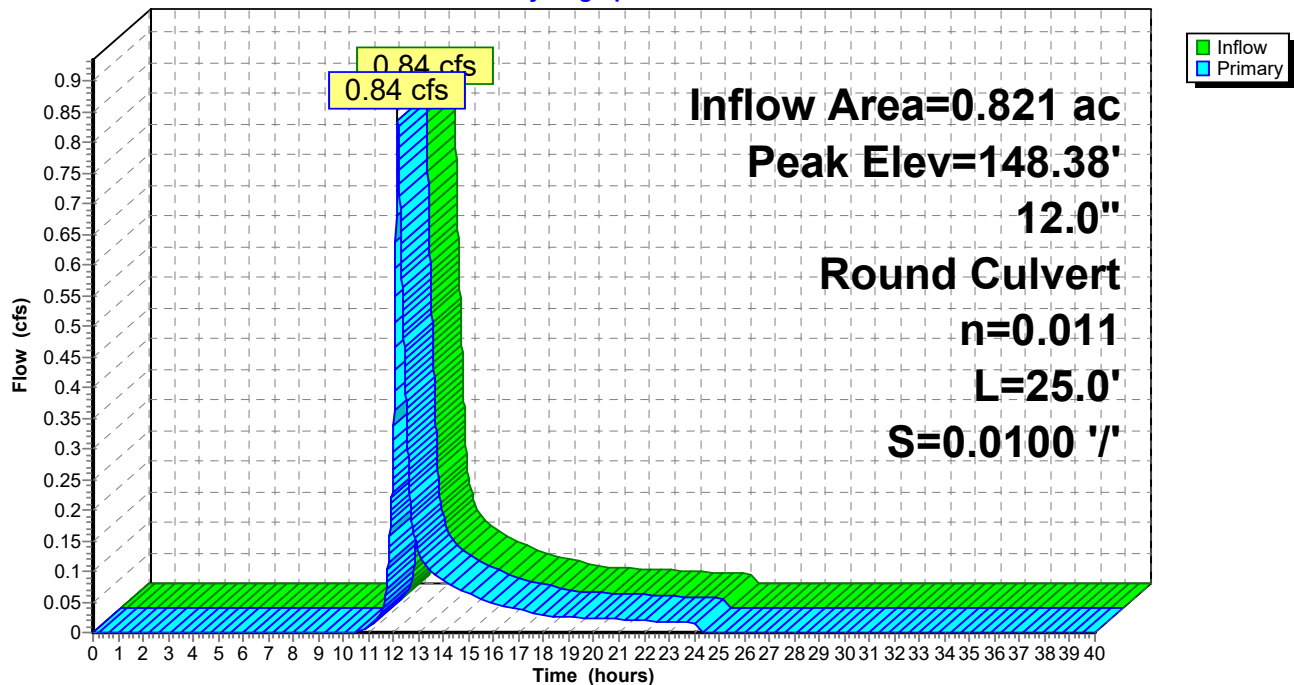
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.38' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.90'	12.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.90' / 147.65' S= 0.0100 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.84 cfs @ 12.17 hrs HW=148.38' (Free Discharge)
1=Culvert (Barrel Controls 0.84 cfs @ 3.25 fps)

Pond 16P: CB12+15b

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 84

Summary for Pond 17P: DMH11+45

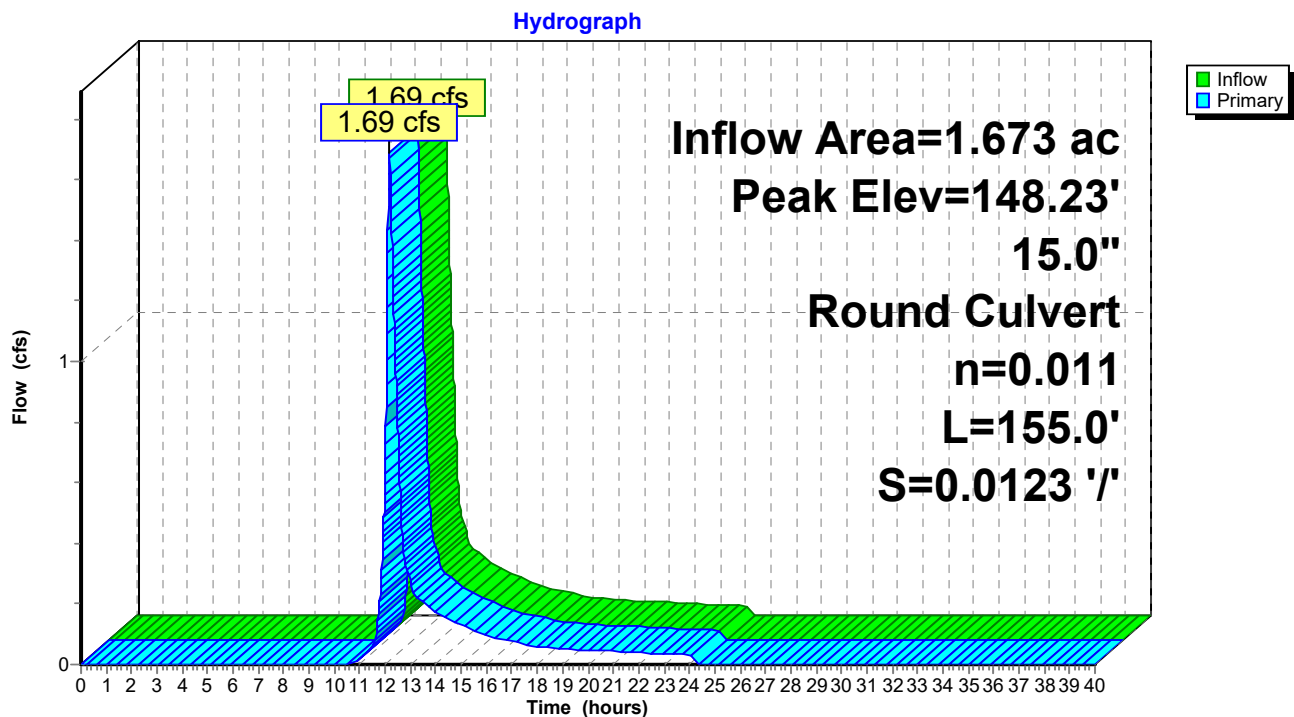
Inflow Area = 1.673 ac, 48.99% Impervious, Inflow Depth = 1.09" for 2-YR event
Inflow = 1.69 cfs @ 12.17 hrs, Volume= 0.153 af
Outflow = 1.69 cfs @ 12.17 hrs, Volume= 0.153 af, Atten= 0%, Lag= 0.0 min
Primary = 1.69 cfs @ 12.17 hrs, Volume= 0.153 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.23' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.60'	15.0" Round Culvert L= 155.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.60' / 145.70' S= 0.0123 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.69 cfs @ 12.17 hrs HW=148.23' (Free Discharge)
↑1=Culvert (Inlet Controls 1.69 cfs @ 2.71 fps)

Pond 17P: DMH11+45



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 85

Summary for Subcatchment 18P: P1g

Runoff = 0.69 cfs @ 12.19 hrs, Volume= 0.068 af, Depth= 0.83"

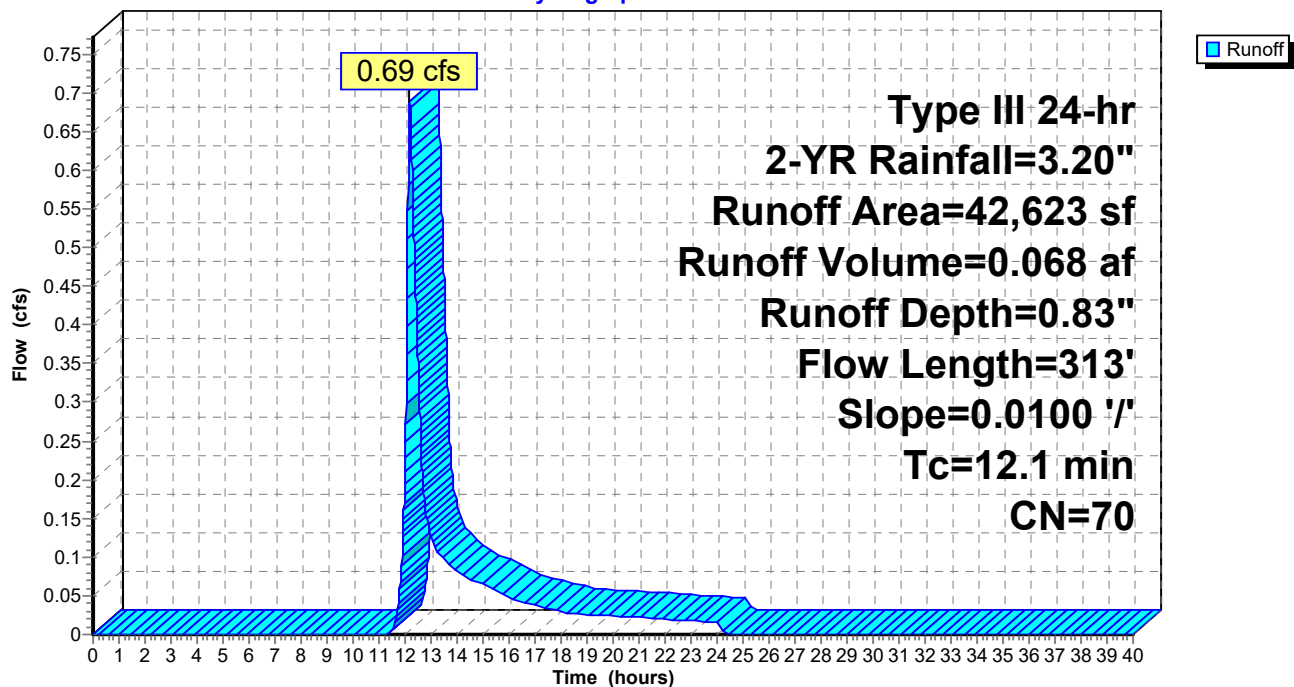
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
20,136	39	>75% Grass cover, Good HSG A
4,639	98	Roofs HSG A
17,848	98	Paved parking HSG A
42,623	70	Weighted Average
20,136	39	47.24% Pervious Area
22,487	98	52.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.7	29	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.0	242	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
12.1	313	Total			

Subcatchment 18P: P1g

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 86

Summary for Pond 19P: CB2+70a

Inflow Area = 0.978 ac, 52.76% Impervious, Inflow Depth = 0.83" for 2-YR event
Inflow = 0.69 cfs @ 12.19 hrs, Volume= 0.068 af
Outflow = 0.69 cfs @ 12.19 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min
Primary = 0.69 cfs @ 12.19 hrs, Volume= 0.068 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.58' @ 12.19 hrs

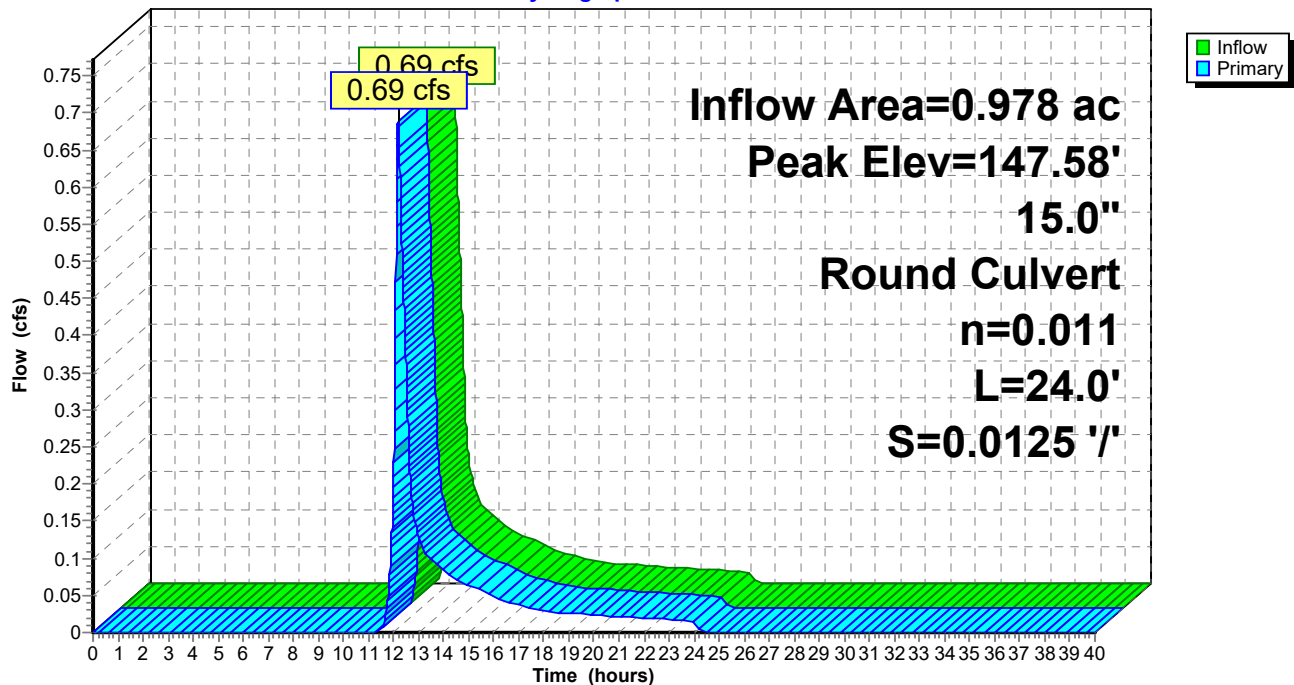
Device	Routing	Invert	Outlet Devices
#1	Primary	147.19'	15.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.19' / 146.89' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=0.69 cfs @ 12.19 hrs HW=147.58' (Free Discharge)

↑1=Culvert (Inlet Controls 0.69 cfs @ 2.12 fps)

Pond 19P: CB2+70a

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 87

Summary for Subcatchment 20P: P1h

Runoff = 0.81 cfs @ 12.18 hrs, Volume= 0.077 af, Depth= 0.88"

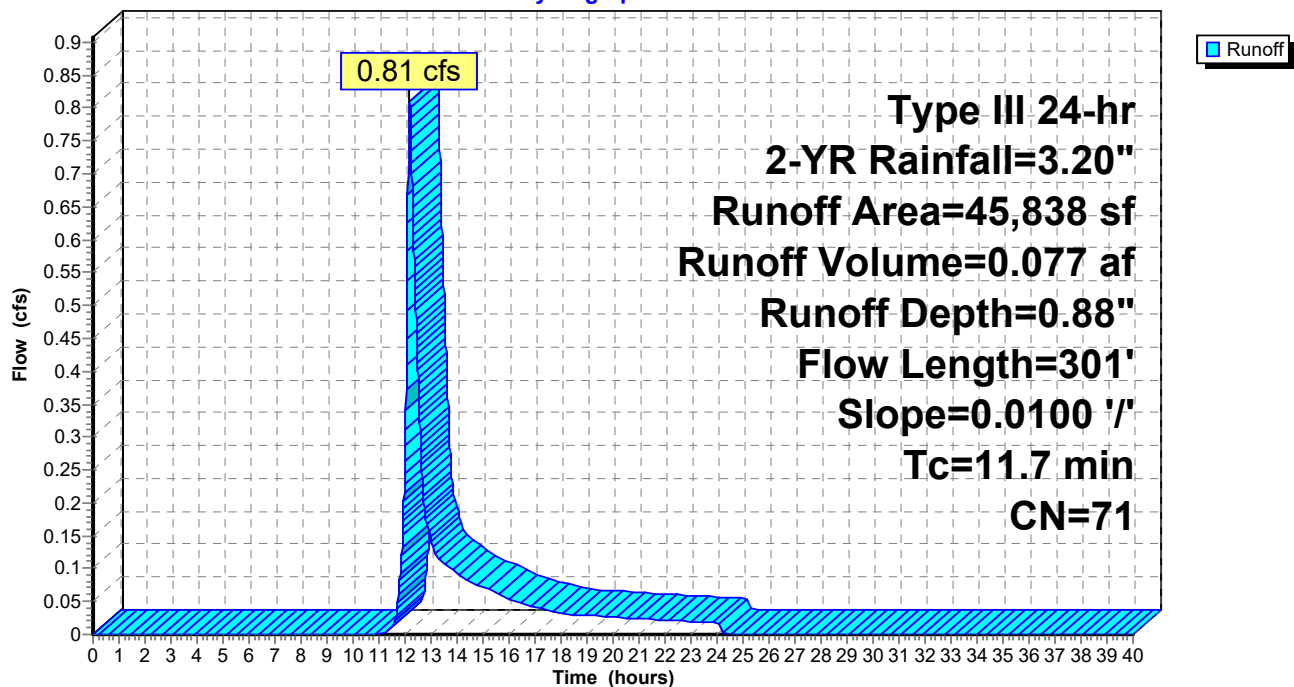
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
21,194	39	>75% Grass cover, Good HSG A
5,783	98	Roofs HSG A
18,861	98	Paved parking HSG A
45,838	71	Weighted Average
21,194	39	46.24% Pervious Area
24,644	98	53.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	11	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.0	248	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.7	301	Total			

Subcatchment 20P: P1h

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 88

Summary for Pond 21P: CB2+70b

Inflow Area = 1.052 ac, 53.76% Impervious, Inflow Depth = 0.88" for 2-YR event
Inflow = 0.81 cfs @ 12.18 hrs, Volume= 0.077 af
Outflow = 0.81 cfs @ 12.18 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min
Primary = 0.81 cfs @ 12.18 hrs, Volume= 0.077 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.63' @ 12.18 hrs

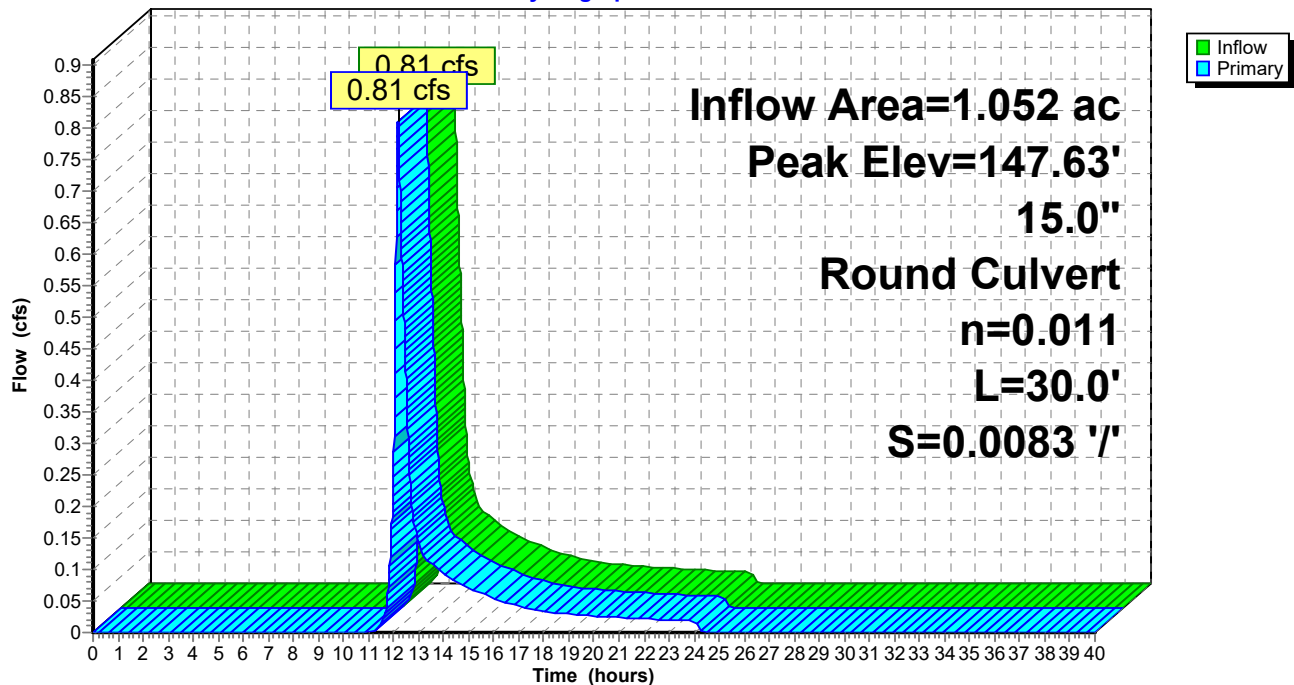
Device	Routing	Invert	Outlet Devices
#1	Primary	147.19'	15.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.19' / 146.94' S= 0.0083 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=0.81 cfs @ 12.18 hrs HW=147.63' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.81 cfs @ 3.08 fps)

Pond 21P: CB2+70b

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 89

Summary for Pond 22P: DMH2+40

Inflow Area = 2.031 ac, 53.28% Impervious, Inflow Depth = 0.85" for 2-YR event
Inflow = 1.50 cfs @ 12.18 hrs, Volume= 0.145 af
Outflow = 1.50 cfs @ 12.18 hrs, Volume= 0.145 af, Atten= 0%, Lag= 0.0 min
Primary = 1.50 cfs @ 12.18 hrs, Volume= 0.145 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.28' @ 12.18 hrs

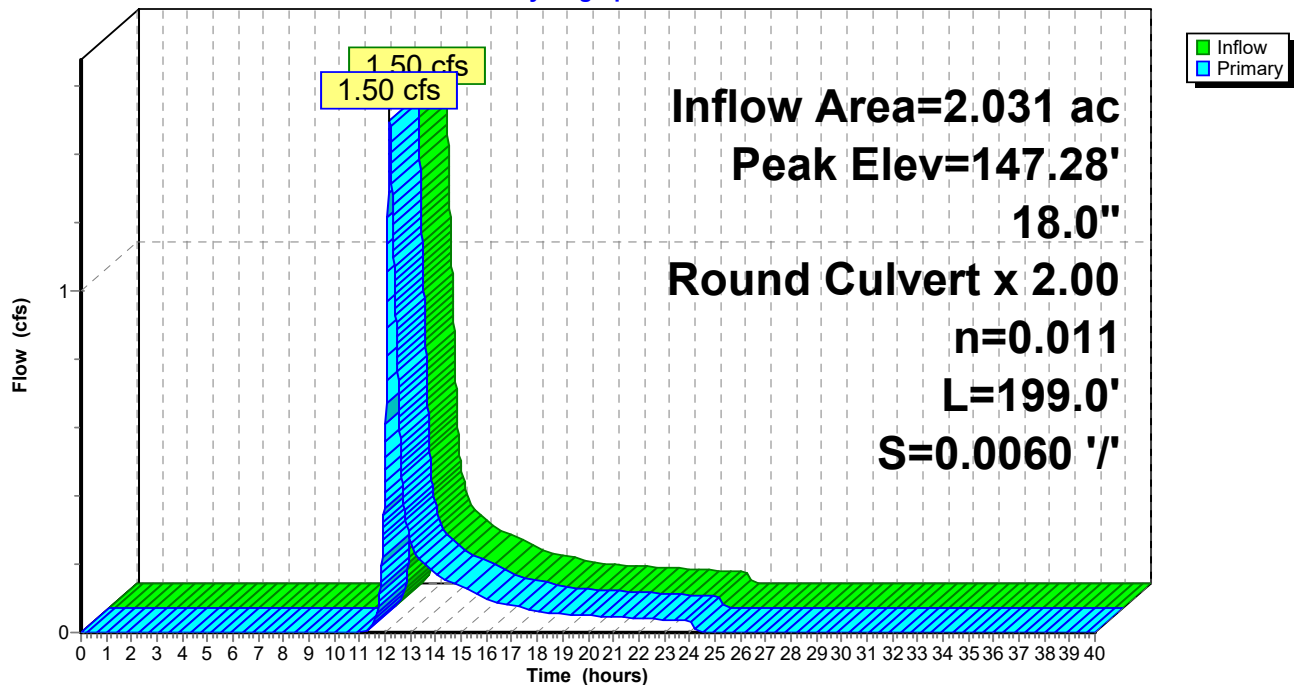
Device	Routing	Invert	Outlet Devices
#1	Primary	146.89'	18.0" Round Culvert X 2.00 L= 199.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.89' / 145.70' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.50 cfs @ 12.18 hrs HW=147.28' (Free Discharge)

↑1=Culvert (Barrel Controls 1.50 cfs @ 3.10 fps)

Pond 22P: DMH2+40

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 90

Summary for Subcatchment 23P: P1i

Runoff = 0.37 cfs @ 12.31 hrs, Volume= 0.063 af, Depth= 0.34"

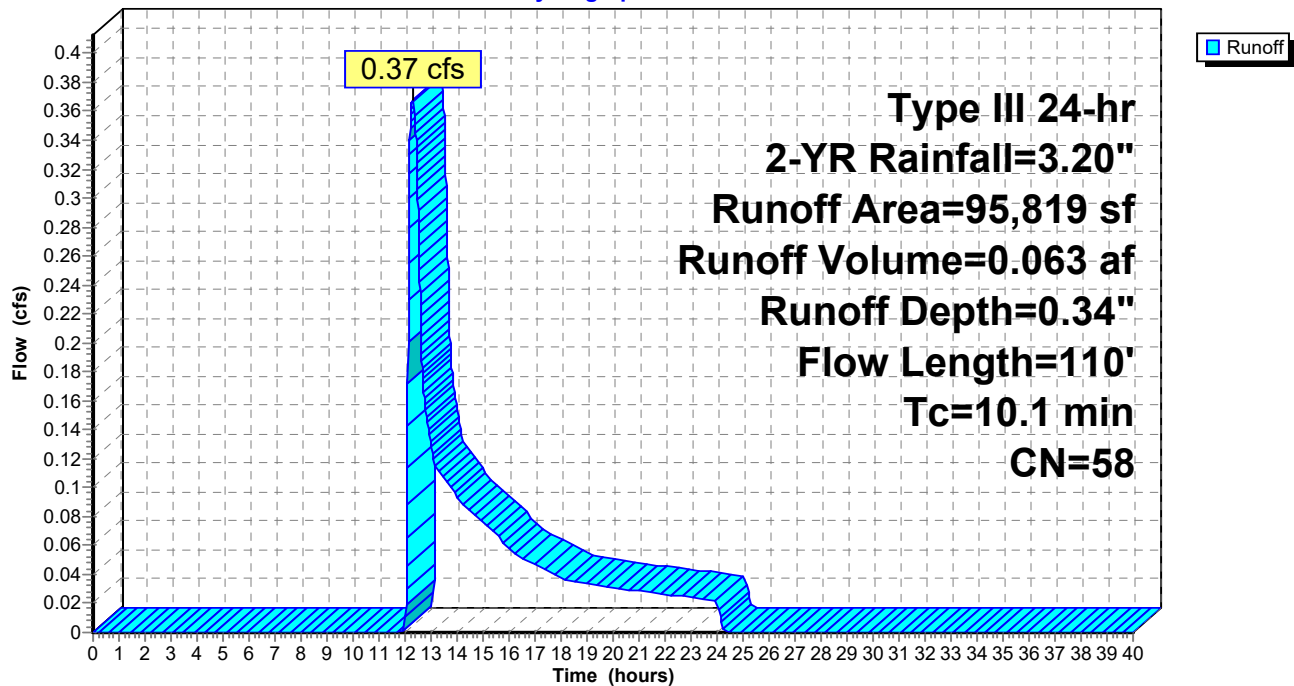
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
41,468	61	>75% Grass cover, Good HSG B
14,814	39	>75% Grass cover, Good HSG A
1,336	98	Paved parking HSG A
2,500	98	Paved parking HSG B
2,201	98	Roofs HSG A
4,220	98	Roofs HSG B
6,601	30	Woods, Good HSG A
22,679	55	Woods, Good HSG B
95,819	58	Weighted Average
85,562	53	89.30% Pervious Area
10,257	98	10.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	35	0.0200	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	75	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.1	110	Total			

Subcatchment 23P: P1i

Hydrograph



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Page 92

Summary for Pond 24P: Basin #1

Inflow Area = 8.027 ac, 38.31% Impervious, Inflow Depth = 0.76" for 2-YR event
 Inflow = 4.93 cfs @ 12.18 hrs, Volume= 0.509 af
 Outflow = 1.25 cfs @ 12.73 hrs, Volume= 0.509 af, Atten= 75%, Lag= 32.9 min
 Discarded = 1.25 cfs @ 12.73 hrs, Volume= 0.509 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 145.94' @ 12.73 hrs Surf.Area= 22,334 sf Storage= 5,158 cf

Plug-Flow detention time= 29.3 min calculated for 0.509 af (100% of inflow)
 Center-of-Mass det. time= 29.3 min (900.4 - 871.1)

Volume	Invert	Avail.Storage	Storage Description
#1	145.70'	59,551 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.70	21,476	960.0	0	0	21,476
148.00	30,575	1,018.0	59,551	59,551	30,885

Device	Routing	Invert	Outlet Devices
#1	Discarded	145.70'	2.410 in/hr Exfiltration over Surface area
#2	Primary	146.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28)
			Elev. (feet) 146.00 146.50 146.50 148.00
			Width (feet) 1.00 1.00 5.00 5.00

Discarded OutFlow Max=1.25 cfs @ 12.73 hrs HW=145.94' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 1.25 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=145.70' (Free Discharge)
 ↑2=Custom Weir/Orifice (Controls 0.00 cfs)

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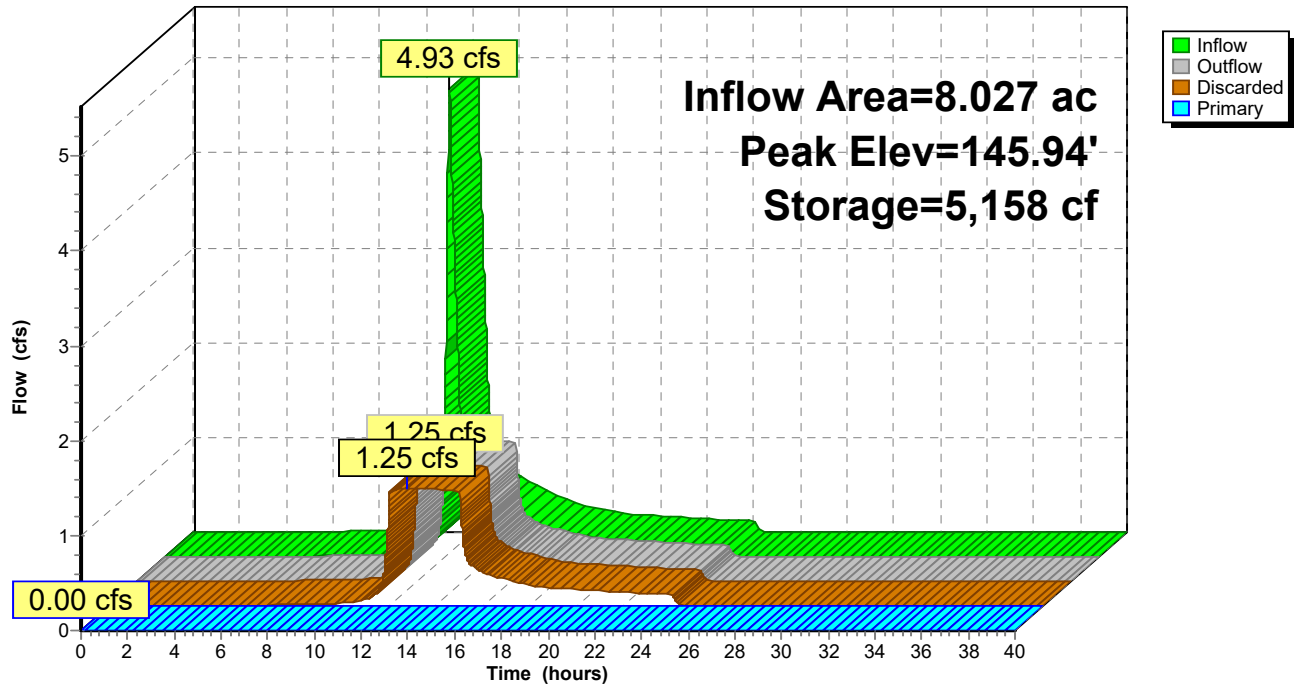
Type III 24-hr 2-YR Rainfall=3.20"

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Page 93

Pond 24P: Basin #1

Hydrograph



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Page 94

Summary for Subcatchment 25P: P1j

Runoff = 0.65 cfs @ 12.18 hrs, Volume= 0.060 af, Depth= 0.98"

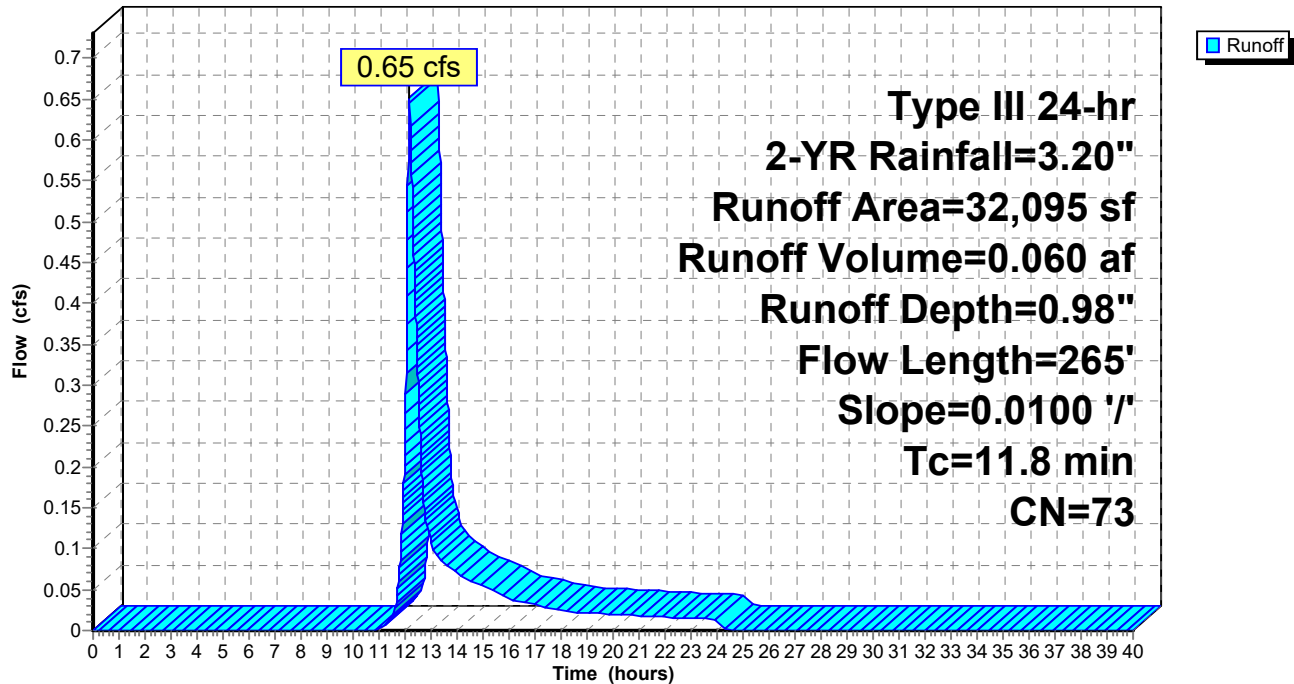
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
5,345	98	Paved parking HSG B
9,999	61	>75% Grass cover, Good HSG B
7,290	39	>75% Grass cover, Good HSG A
2,671	98	Roofs HSG B
1,535	98	Roofs HSG A
5,255	98	Paved parking HSG A
32,095	73	Weighted Average
17,289	52	53.87% Pervious Area
14,806	98	46.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.8	33	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	190	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.8	265	Total			

Subcatchment 25P: P1j

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 96

Summary for Pond 26P: CB17+77a

Inflow Area = 0.737 ac, 46.13% Impervious, Inflow Depth = 0.98" for 2-YR event
Inflow = 0.65 cfs @ 12.18 hrs, Volume= 0.060 af
Outflow = 0.65 cfs @ 12.18 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min
Primary = 0.65 cfs @ 12.18 hrs, Volume= 0.060 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 146.46' @ 12.18 hrs

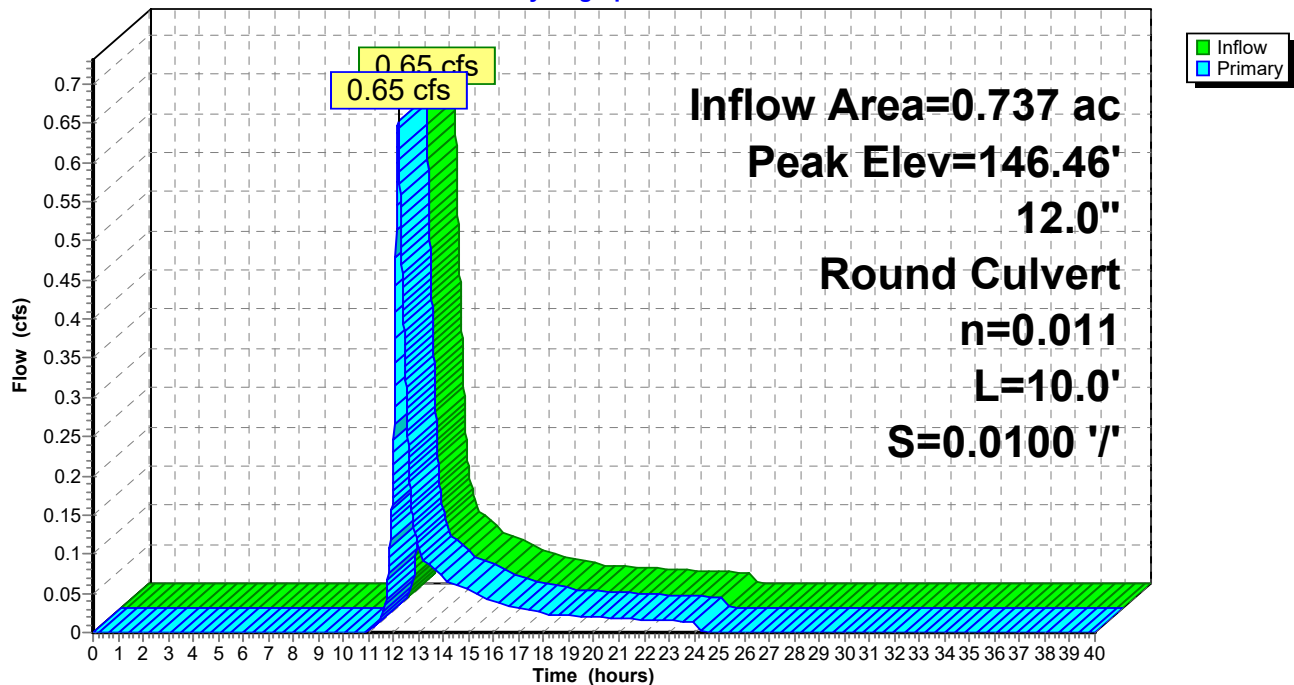
Device	Routing	Invert	Outlet Devices
#1	Primary	146.00'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.00' / 145.90' S= 0.0100 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.65 cfs @ 12.18 hrs HW=146.46' (Free Discharge)

↑1=Culvert (Barrel Controls 0.65 cfs @ 2.75 fps)

Pond 26P: CB17+77a

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 97

Summary for Subcatchment 27P: P1k

Runoff = 0.44 cfs @ 12.13 hrs, Volume= 0.034 af, Depth= 1.54"

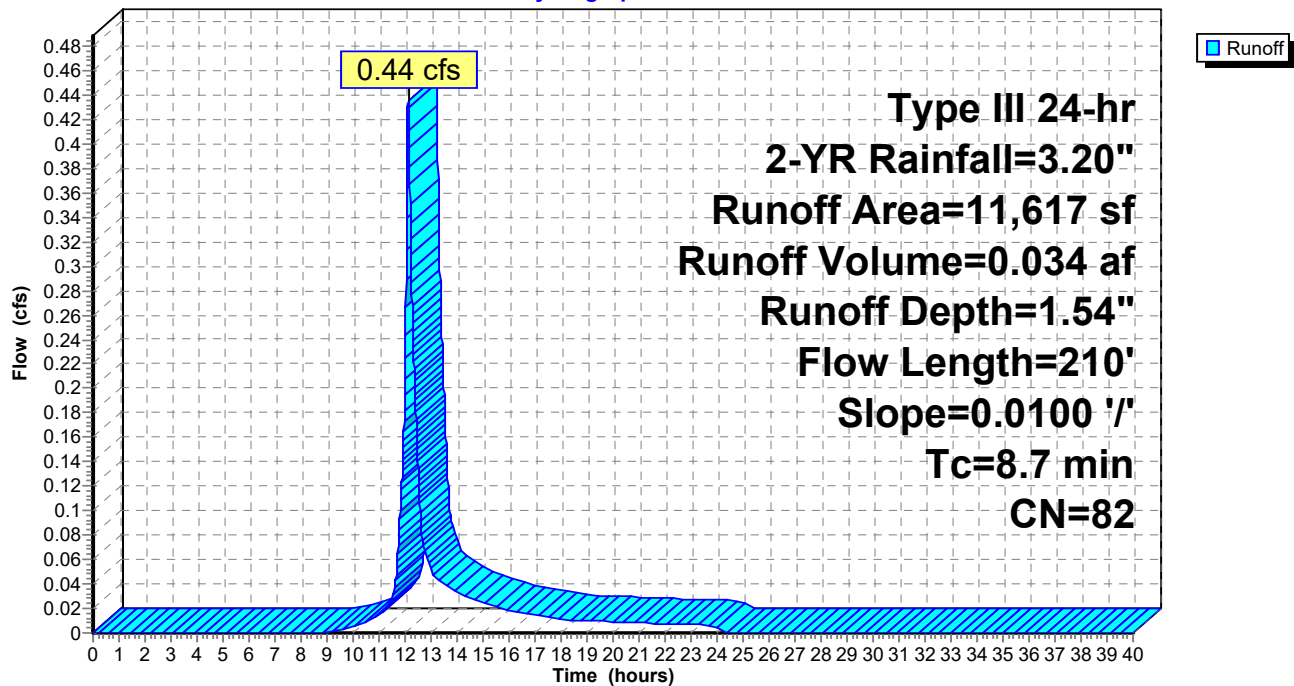
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
3,375	98	Paved parking HSG B
1,993	61	>75% Grass cover, Good HSG B
1,913	39	>75% Grass cover, Good HSG A
4,336	98	Paved parking HSG A
11,617	82	Weighted Average
3,906	50	33.62% Pervious Area
7,711	98	66.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	30	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.5	180	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
8.7	210	Total			

Subcatchment 27P: P1k

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 98

Summary for Pond 28P: CB17+77b

Inflow Area = 0.267 ac, 66.38% Impervious, Inflow Depth = 1.54" for 2-YR event
Inflow = 0.44 cfs @ 12.13 hrs, Volume= 0.034 af
Outflow = 0.44 cfs @ 12.13 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min
Primary = 0.44 cfs @ 12.13 hrs, Volume= 0.034 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 146.38' @ 12.13 hrs

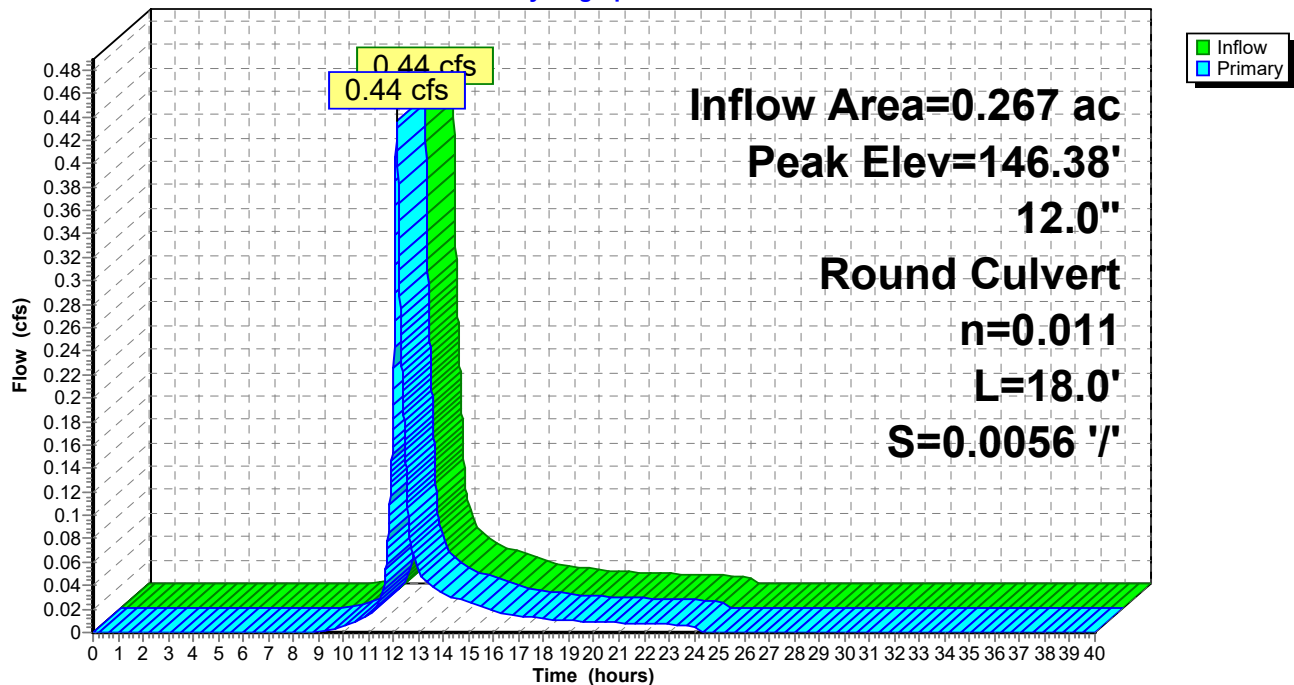
Device	Routing	Invert	Outlet Devices
#1	Primary	146.00'	12.0" Round Culvert L= 18.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.00' / 145.90' S= 0.0056 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.44 cfs @ 12.13 hrs HW=146.38' (Free Discharge)

↑1=Culvert (Barrel Controls 0.44 cfs @ 2.38 fps)

Pond 28P: CB17+77b

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 99

Summary for Pond 29P: DMH17+67

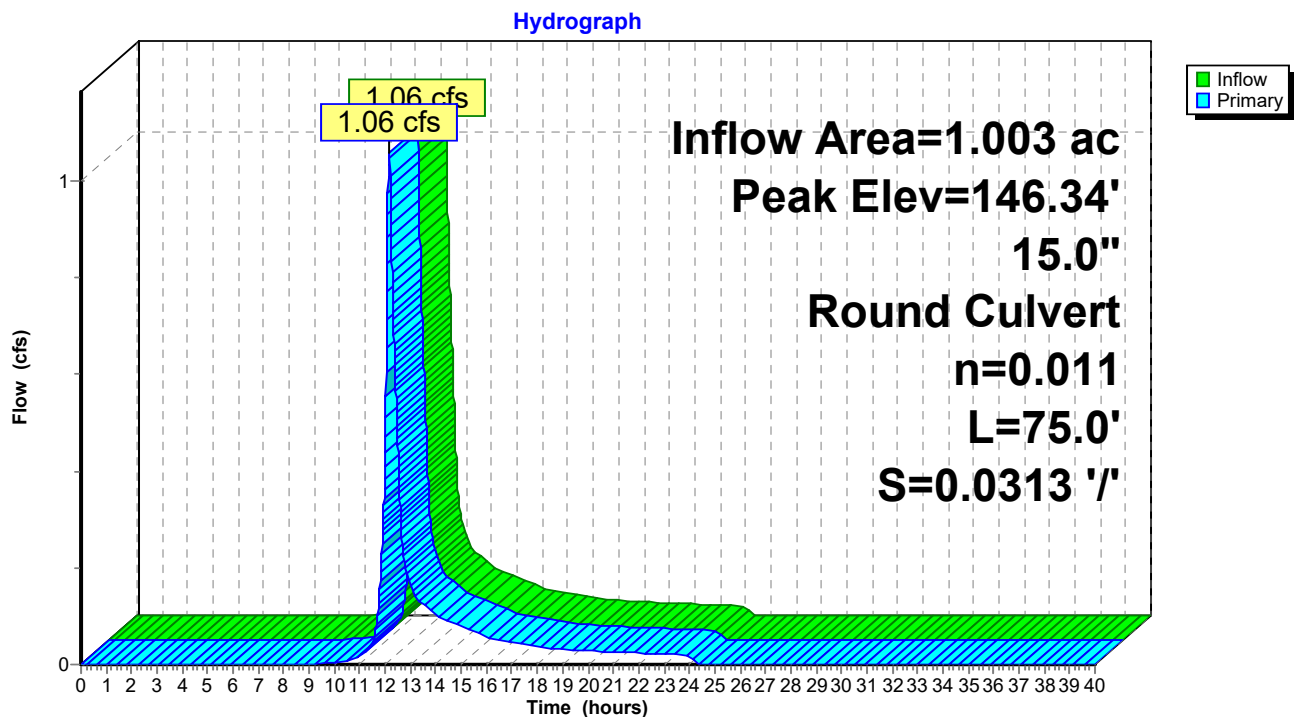
Inflow Area = 1.003 ac, 51.51% Impervious, Inflow Depth = 1.13" for 2-YR event
Inflow = 1.06 cfs @ 12.15 hrs, Volume= 0.095 af
Outflow = 1.06 cfs @ 12.15 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min
Primary = 1.06 cfs @ 12.15 hrs, Volume= 0.095 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 146.34' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	145.85'	15.0" Round Culvert L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.85' / 143.50' S= 0.0313 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.06 cfs @ 12.15 hrs HW=146.34' (Free Discharge)
↑1=Culvert (Inlet Controls 1.06 cfs @ 2.38 fps)

Pond 29P: DMH17+67



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Page 100

Summary for Subcatchment 30P: P1I

Runoff = 0.13 cfs @ 12.48 hrs, Volume= 0.038 af, Depth= 0.17"

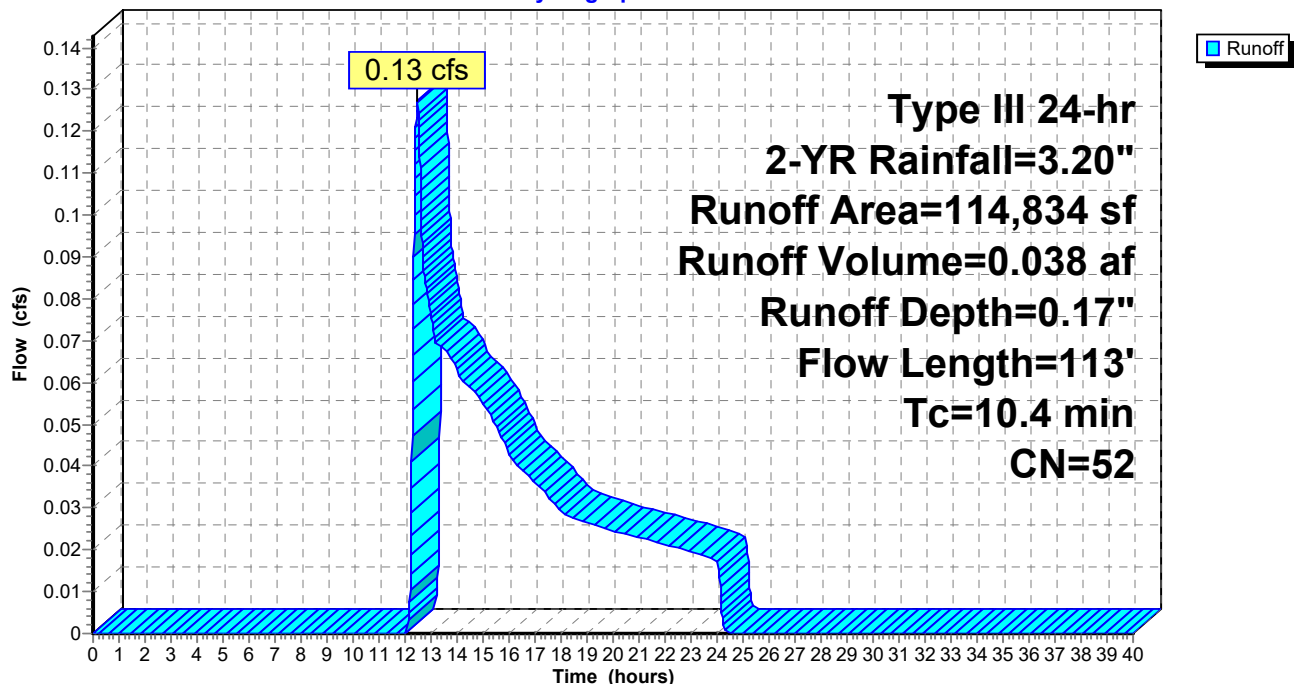
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
3,499	61	>75% Grass cover, Good HSG B
11,038	98	Water Surface HSG A
86,857	39	>75% Grass cover, Good HSG A
500	98	Paved parking HSG B
4,500	98	Paved parking HSG A
844	98	Roofs HSG B
7,596	98	Roofs HSG A
114,834	52	Weighted Average
90,356	40	78.68% Pervious Area
24,478	98	21.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.0	71	0.0550	1.17		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
10.4	113	Total			

Subcatchment 30P: P1I

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 101

Summary for Subcatchment 31P: P1m

Runoff = 0.84 cfs @ 12.17 hrs, Volume= 0.077 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
16,597	39	>75% Grass cover, Good HSG A
3,917	61	>75% Grass cover, Good HSG B
865	98	Roofs HSG B
3,773	98	Roofs HSG A
3,473	98	Paved parking HSG B
14,437	98	Paved parking HSG A
43,062	72	Weighted Average
20,514	43	47.64% Pervious Area
22,548	98	52.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	12	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	144	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.9	198	Total			

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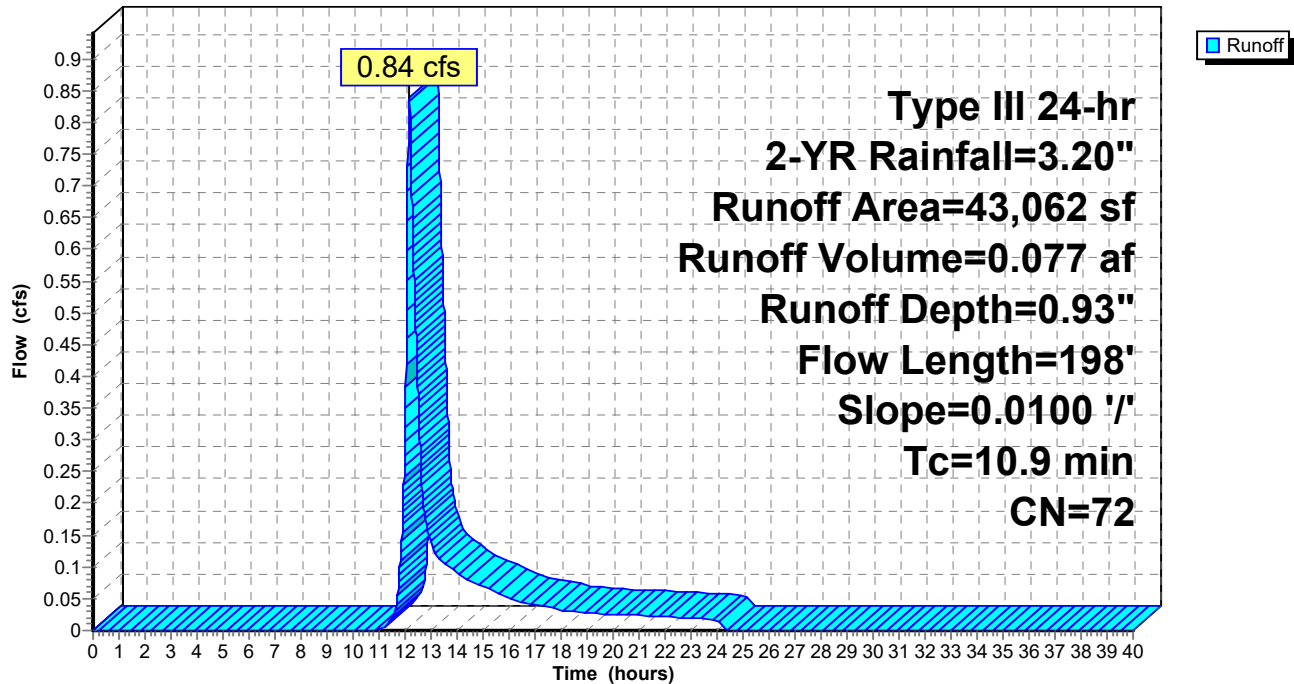
Type III 24-hr 2-YR Rainfall=3.20"

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Page 102

Subcatchment 31P: P1m

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 103

Summary for Pond 32P: CB3+67a

Inflow Area = 0.989 ac, 52.36% Impervious, Inflow Depth = 0.93" for 2-YR event
Inflow = 0.84 cfs @ 12.17 hrs, Volume= 0.077 af
Outflow = 0.84 cfs @ 12.17 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min
Primary = 0.84 cfs @ 12.17 hrs, Volume= 0.077 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.58' @ 12.17 hrs

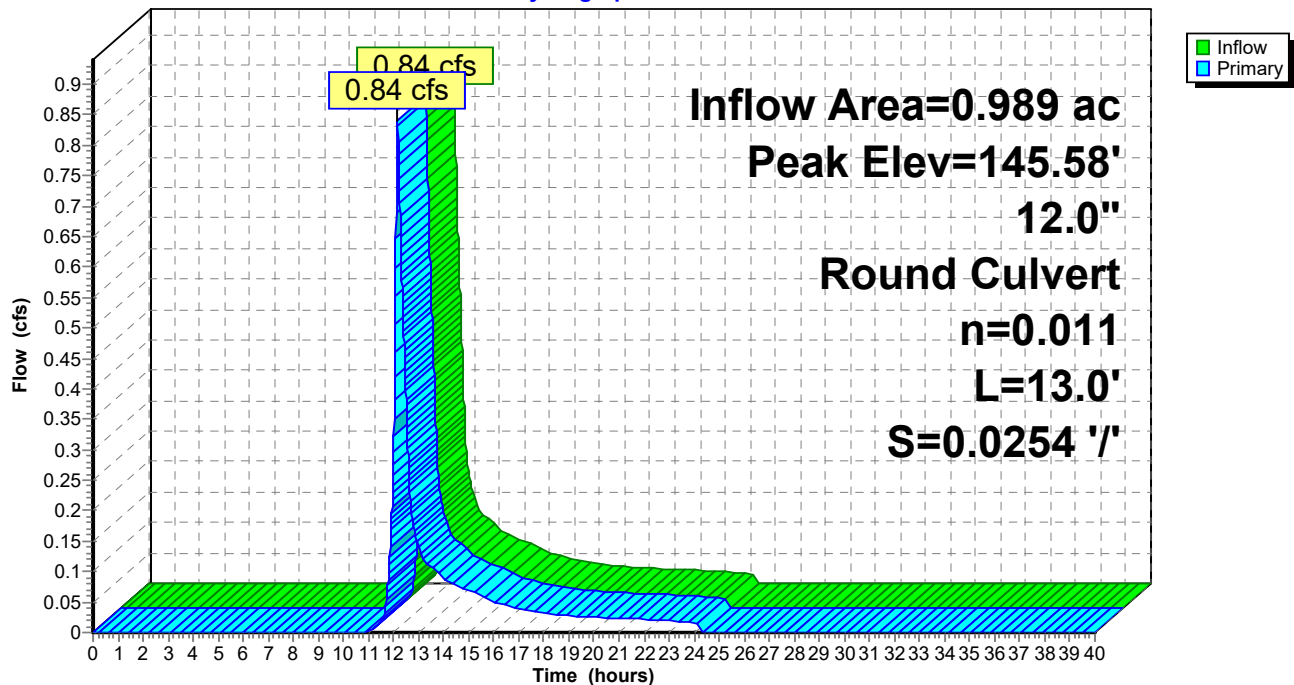
Device	Routing	Invert	Outlet Devices
#1	Primary	145.11'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.11' / 144.78' S= 0.0254 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.84 cfs @ 12.17 hrs HW=145.58' (Free Discharge)

↑1=Culvert (Inlet Controls 0.84 cfs @ 2.33 fps)

Pond 32P: CB3+67a

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 104

Summary for Subcatchment 33P: P1n

Runoff = 0.94 cfs @ 12.16 hrs, Volume= 0.084 af, Depth= 0.98"

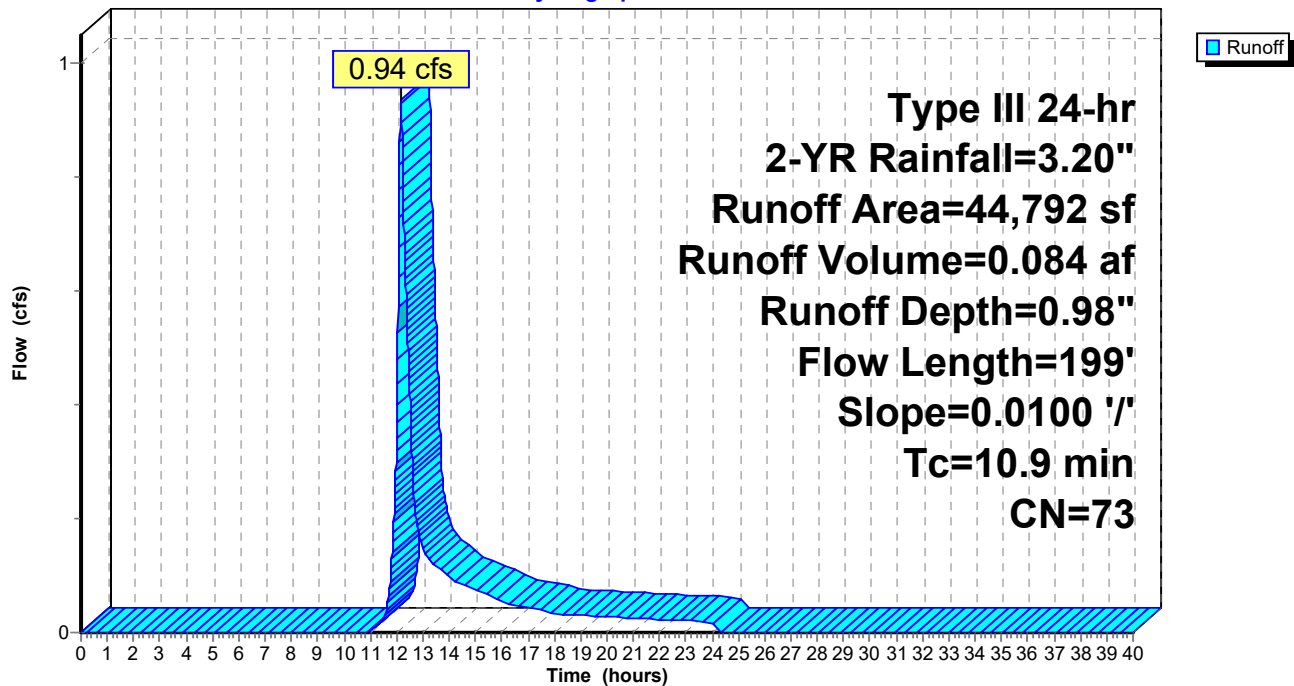
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
3,458	61	>75% Grass cover, Good HSG B
16,849	39	>75% Grass cover, Good HSG A
4,323	98	Roofs HSG A
1,422	98	Roofs HSG B
13,944	98	Paved parking HSG A
4,796	98	Paved parking HSG B
44,792	73	Weighted Average
20,307	43	45.34% Pervious Area
24,485	98	54.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	144	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.9	199	Total			

Subcatchment 33P: P1n

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 106

Summary for Pond 34P: CB3+67b

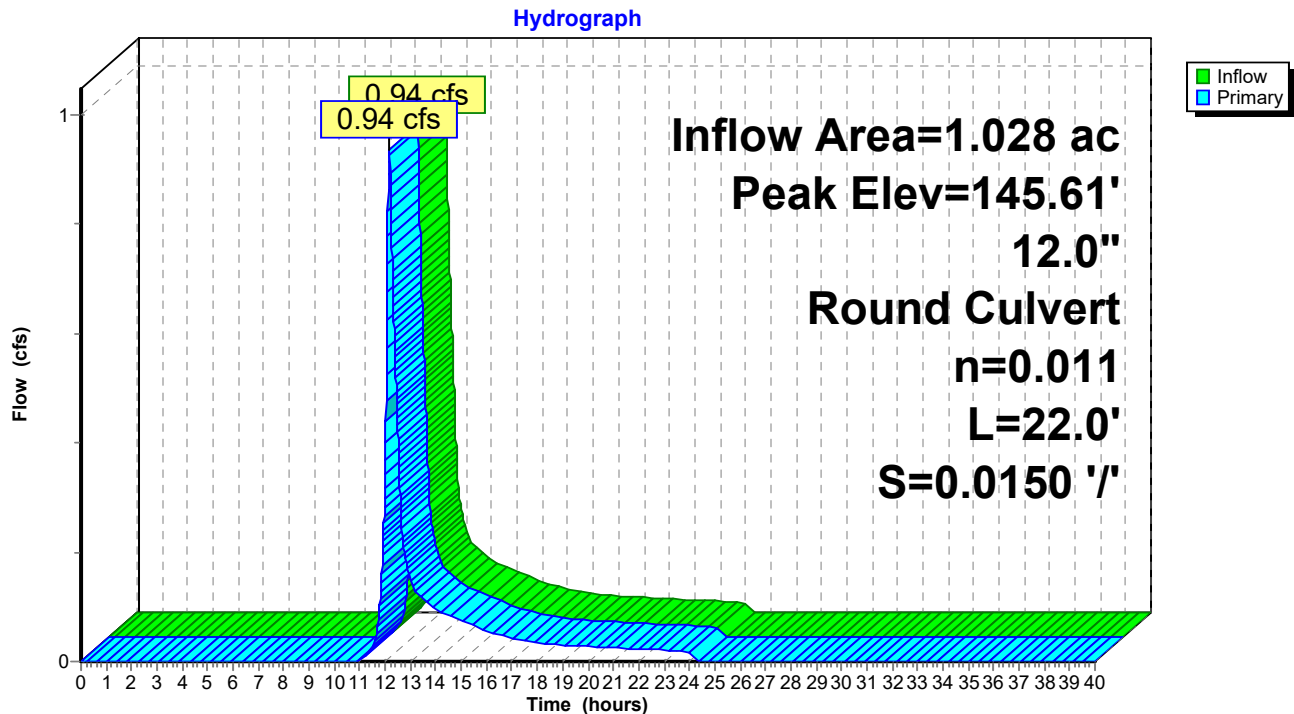
Inflow Area = 1.028 ac, 54.66% Impervious, Inflow Depth = 0.98" for 2-YR event
Inflow = 0.94 cfs @ 12.16 hrs, Volume= 0.084 af
Outflow = 0.94 cfs @ 12.16 hrs, Volume= 0.084 af, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 12.16 hrs, Volume= 0.084 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.61' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	145.11'	12.0" Round Culvert L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.11' / 144.78' S= 0.0150 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.93 cfs @ 12.16 hrs HW=145.61' (Free Discharge)
↑1=Culvert (Inlet Controls 0.93 cfs @ 2.40 fps)

Pond 34P: CB3+67b



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Page 107

Summary for Pond 35P: DMH3+50

Inflow Area = 2.017 ac, 53.54% Impervious, Inflow Depth = 0.96" for 2-YR event
Inflow = 1.78 cfs @ 12.17 hrs, Volume= 0.161 af
Outflow = 1.78 cfs @ 12.17 hrs, Volume= 0.161 af, Atten= 0%, Lag= 0.0 min
Primary = 1.78 cfs @ 12.17 hrs, Volume= 0.161 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.15' @ 12.17 hrs

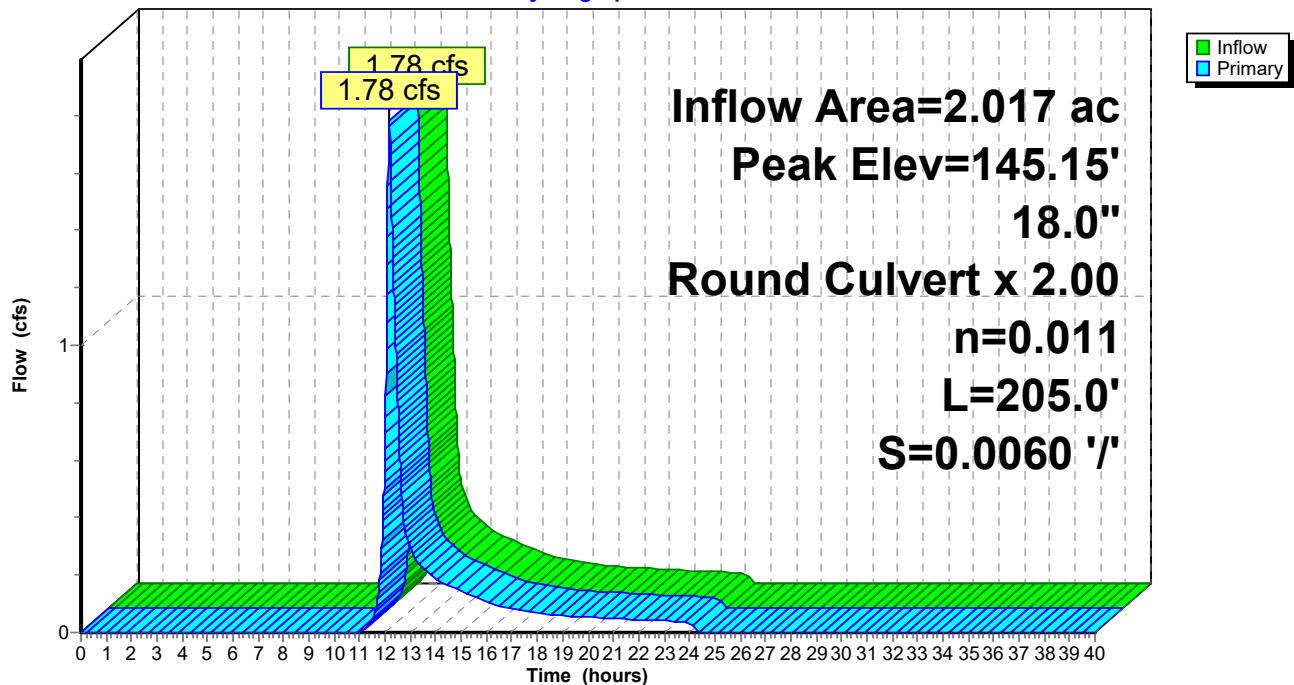
Device	Routing	Invert	Outlet Devices
#1	Primary	144.73'	18.0" Round Culvert X 2.00 L= 205.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.73' / 143.50' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.77 cfs @ 12.17 hrs HW=145.15' (Free Discharge)

↑1=Culvert (Barrel Controls 1.77 cfs @ 3.25 fps)

Pond 35P: DMH3+50

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 108

Summary for Pond 36P: Basin #2

Inflow Area = 5.657 ac, 38.16% Impervious, Inflow Depth = 0.62" for 2-YR event
 Inflow = 2.83 cfs @ 12.16 hrs, Volume= 0.293 af
 Outflow = 2.15 cfs @ 12.29 hrs, Volume= 0.293 af, Atten= 24%, Lag= 7.9 min
 Discarded = 2.15 cfs @ 12.29 hrs, Volume= 0.293 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 143.55' @ 12.29 hrs Surf.Area= 11,214 sf Storage= 598 cf

Plug-Flow detention time= 2.9 min calculated for 0.293 af (100% of inflow)
 Center-of-Mass det. time= 2.9 min (885.7 - 882.8)

Volume	Invert	Avail.Storage	Storage Description
#1	143.50'	48,638 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
143.50	11,051	875.0	0	0	11,051
146.50	21,996	950.0	48,638	48,638	22,282

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.50'	8.270 in/hr Exfiltration over Surface area
#2	Primary	144.50'	15.0" Round Culvert L= 220.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.50' / 143.00' S= 0.0068 ' S= 0.0068 ' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Discarded OutFlow Max=2.15 cfs @ 12.29 hrs HW=143.55' (Free Discharge)

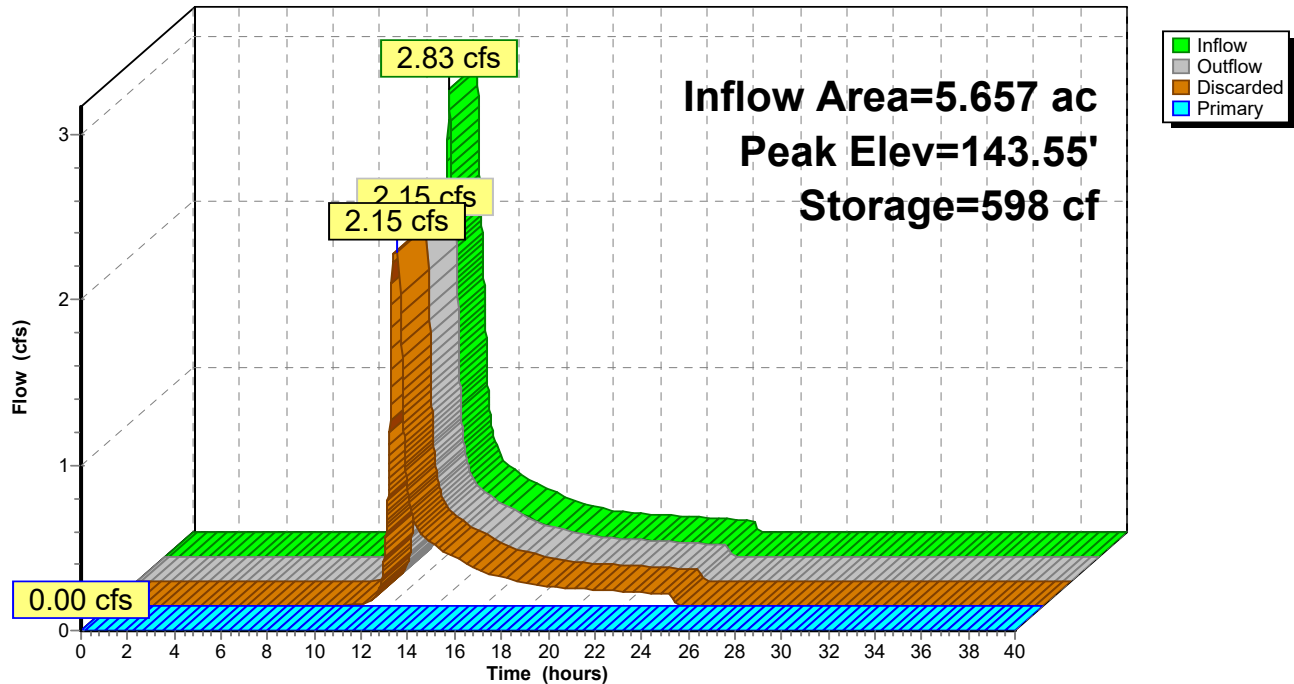
↑**1=Exfiltration** (Exfiltration Controls 2.15 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=143.50' (Free Discharge)

↑**2=Culvert** (Controls 0.00 cfs)

Pond 36P: Basin #2

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 110

Summary for Subcatchment 37P: P1q

Runoff = 5.84 cfs @ 12.45 hrs, Volume= 0.909 af, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
22,240	98	Paved parking HSG B
215	80	>75% Grass cover, Good HSG D
98,766	61	>75% Grass cover, Good HSG B
127,688	39	>75% Grass cover, Good HSG A
24,404	98	Paved parking HSG A
6,082	98	Roofs HSG B
16,041	98	Roofs HSG A
145,280	30	Woods, Good HSG A
55,658	55	Woods, Good HSG B
418,163	77	Woods, Good HSG D
914,537	63	Weighted Average
845,770	60	92.48% Pervious Area
68,767	98	7.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,035	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
24.1	1,260	Total			

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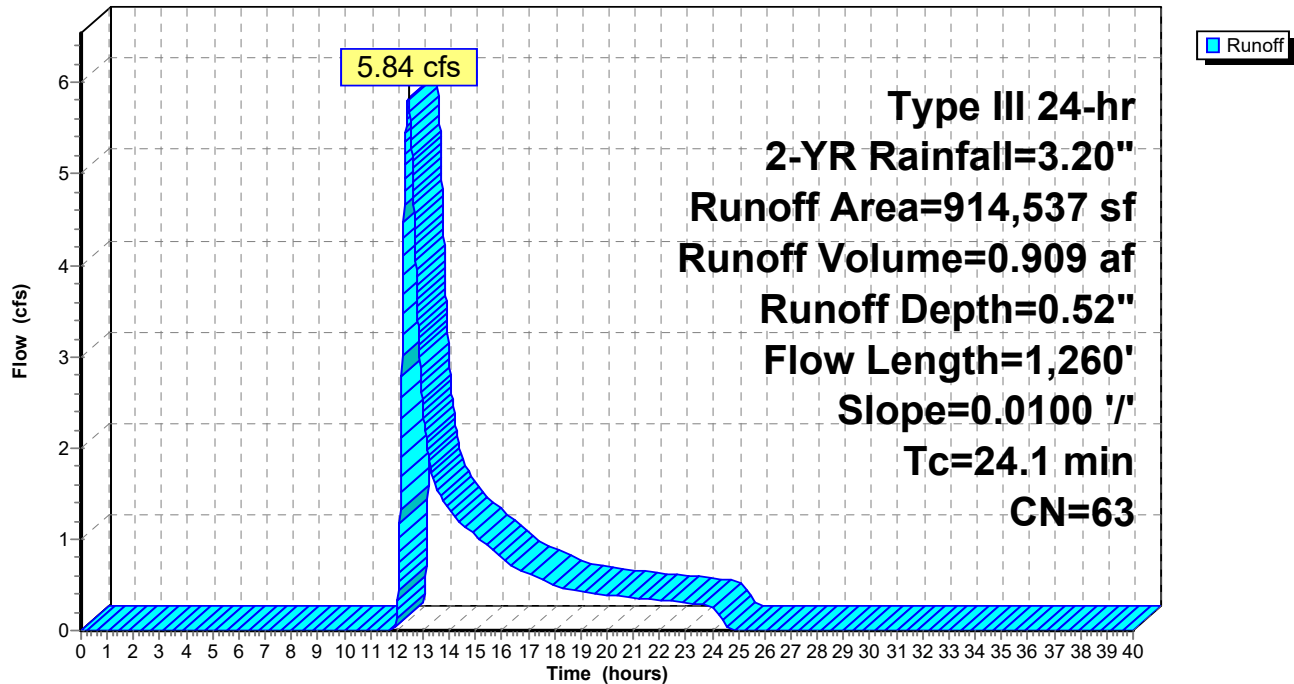
Type III 24-hr 2-YR Rainfall=3.20"

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Page 111

Subcatchment 37P: P1q

Hydrograph



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Page 112

Summary for Pond 38P: Wetland Storage

Inflow Area = 20.995 ac, 7.52% Impervious, Inflow Depth = 0.52" for 2-YR event
 Inflow = 5.84 cfs @ 12.45 hrs, Volume= 0.909 af
 Outflow = 0.61 cfs @ 17.11 hrs, Volume= 0.849 af, Atten= 90%, Lag= 280.0 min
 Primary = 0.61 cfs @ 17.11 hrs, Volume= 0.849 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.00' @ 17.11 hrs Surf.Area= 196,401 sf Storage= 20,740 cf

Plug-Flow detention time= 469.9 min calculated for 0.849 af (93% of inflow)
 Center-of-Mass det. time= 437.3 min (1,358.6 - 921.3)

Volume	Invert	Avail.Storage	Storage Description
#1	145.20'	133,865 cf	Custom Stage Data (Irregular) Listed below (Recalc)

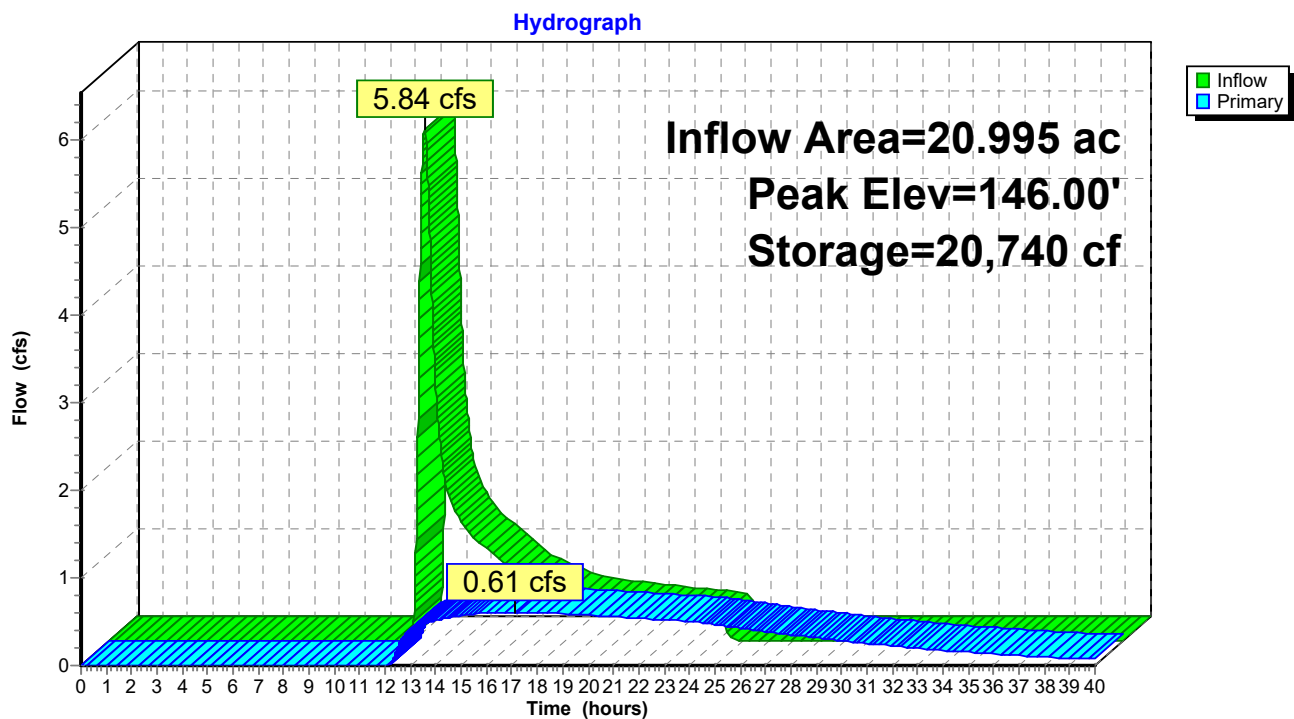
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.20	30	18.0	0	0	30
145.70	60	30.0	22	22	77
146.00	195,920	2,713.0	19,941	19,963	585,725
146.50	261,254	2,891.0	113,902	133,865	665,117

Device	Routing	Invert	Outlet Devices
#1	Primary	145.80'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 145.80 146.00 146.00 146.50 Width (feet) 2.00 2.00 5.00 5.00

Primary OutFlow Max=0.61 cfs @ 17.11 hrs HW=146.00' (Free Discharge)

↑1=Custom Weir/Orifice (Weir Controls 0.61 cfs @ 1.44 fps)

Pond 38P: Wetland Storage



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 114

Summary for Subcatchment 39P: P1r

Runoff = 0.02 cfs @ 21.71 hrs, Volume= 0.014 af, Depth= 0.01"

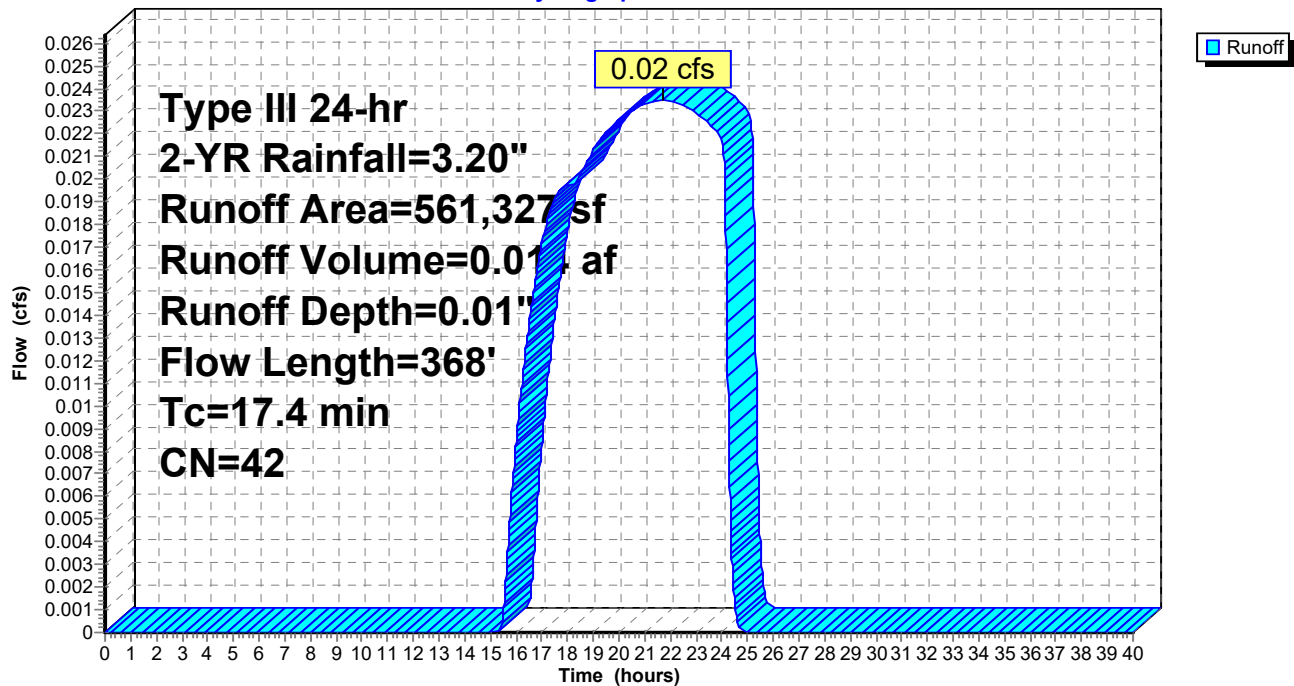
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
20,944	61	>75% Grass cover, Good HSG B
100,043	39	>75% Grass cover, Good HSG A
1,653	98	Roofs HSG B
7,805	98	Roofs HSG A
4,592	98	Paved parking HSG A
433	98	Paved parking HSG B
267,267	30	Woods, Good HSG A
158,590	55	Woods, Good HSG B
561,327	42	Weighted Average
546,844	40	97.42% Pervious Area
14,483	98	2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	343	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
17.4	368	Total			

Subcatchment 39P: P1r

Hydrograph

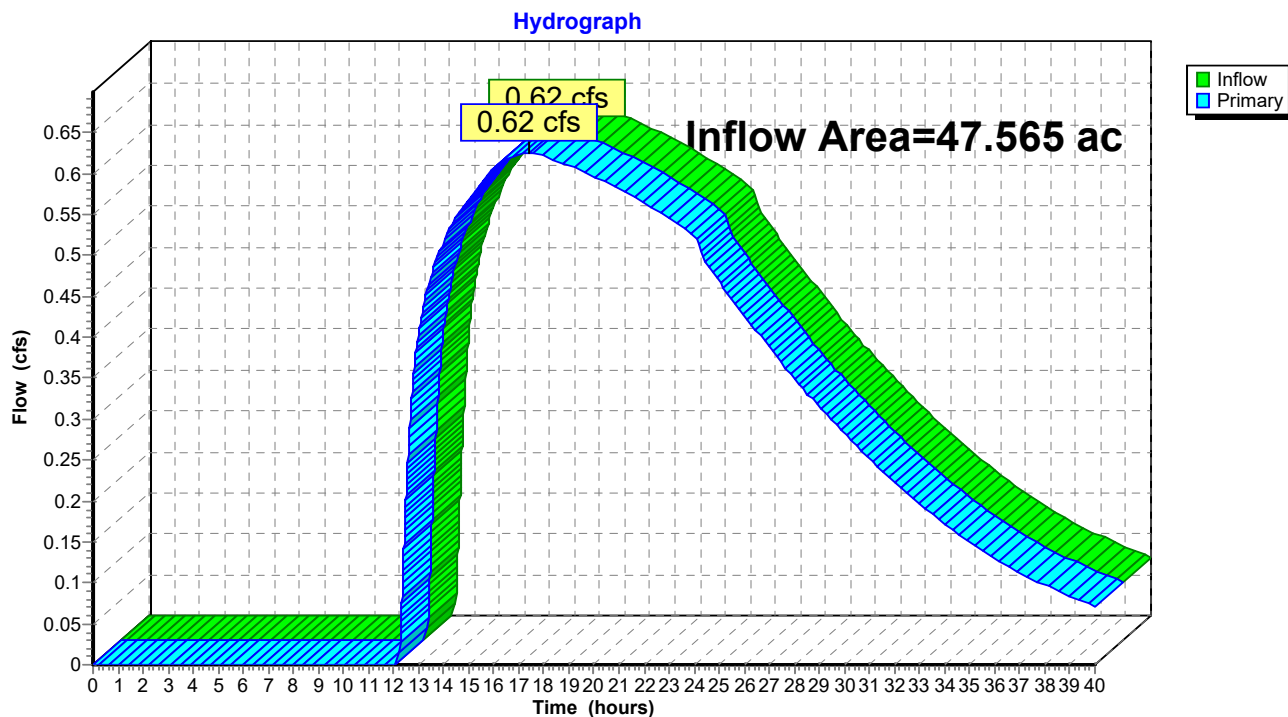


Summary for Link 40P: Design Point #1: Flow to Western Wetlands

Inflow Area = 47.565 ac, 15.02% Impervious, Inflow Depth > 0.22" for 2-YR event
 Inflow = 0.62 cfs @ 17.38 hrs, Volume= 0.863 af
 Primary = 0.62 cfs @ 17.38 hrs, Volume= 0.863 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 40P: Design Point #1: Flow to Western Wetlands



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 117

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1P: P1a

Runoff Area=8,961 sf 99.73% Impervious Runoff Depth=4.46"
Flow Length=474' Tc=14.6 min CN=98 Runoff=0.73 cfs 0.077 af

Pond 2P: CB5+06a

Peak Elev=149.53' Inflow=0.73 cfs 0.077 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0177 ' Outflow=0.73 cfs 0.077 af

Subcatchment3P: P1b

Runoff Area=48,701 sf 27.64% Impervious Runoff Depth=0.89"
Flow Length=473' Slope=0.0100 ' Tc=6.0 min CN=56 Runoff=0.92 cfs 0.083 af

Pond 4P: CB5+06b

Peak Elev=149.61' Inflow=0.92 cfs 0.083 af
12.0" Round Culvert n=0.011 L=21.0' S=0.0110 ' Outflow=0.92 cfs 0.083 af

Pond 5P: DMH5+22

Peak Elev=149.45' Inflow=1.54 cfs 0.160 af
15.0" Round Culvert n=0.011 L=88.0' S=0.0060 ' Outflow=1.54 cfs 0.160 af

Pond 6P: DMH6+13

Peak Elev=148.85' Inflow=1.54 cfs 0.160 af
15.0" Round Culvert n=0.011 L=209.0' S=0.0060 ' Outflow=1.54 cfs 0.160 af

Subcatchment7P: P1c

Runoff Area=19,485 sf 49.68% Impervious Runoff Depth=1.74"
Flow Length=193' Slope=0.0100 ' Tc=11.0 min CN=69 Runoff=0.75 cfs 0.065 af

Pond 8P: CB8+10a

Peak Elev=147.64' Inflow=0.75 cfs 0.065 af
12.0" Round Culvert n=0.011 L=12.0' S=0.0175 ' Outflow=0.75 cfs 0.065 af

Subcatchment9P: P1d

Runoff Area=15,346 sf 57.18% Impervious Runoff Depth=2.72"
Flow Length=194' Slope=0.0100 ' Tc=10.6 min CN=81 Runoff=0.96 cfs 0.080 af

Pond 10P: CB8+10b

Peak Elev=147.73' Inflow=0.96 cfs 0.080 af
12.0" Round Culvert n=0.011 L=19.0' S=0.0111 ' Outflow=0.96 cfs 0.080 af

Pond 11P: DMH8+20

Peak Elev=147.80' Inflow=3.23 cfs 0.304 af
18.0" Round Culvert n=0.011 L=161.0' S=0.0061 ' Outflow=3.23 cfs 0.304 af

Pond 12P: DMH1a

Peak Elev=146.87' Inflow=3.23 cfs 0.304 af
18.0" Round Culvert n=0.011 L=35.0' S=0.0060 ' Outflow=3.23 cfs 0.304 af

Subcatchment13P: P1e

Runoff Area=37,107 sf 49.02% Impervious Runoff Depth=2.21"
Flow Length=331' Slope=0.0100 ' Tc=12.0 min CN=75 Runoff=1.80 cfs 0.157 af

Pond 14P: CB12+15a

Peak Elev=148.68' Inflow=1.80 cfs 0.157 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0100 ' Outflow=1.80 cfs 0.157 af

Subcatchment15P: P1f

Runoff Area=35,775 sf 48.96% Impervious Runoff Depth=2.21"
Flow Length=280' Slope=0.0100 ' Tc=11.5 min CN=75 Runoff=1.76 cfs 0.151 af

Pond 16P: CB12+15b

Peak Elev=148.67' Inflow=1.76 cfs 0.151 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0100 ' Outflow=1.76 cfs 0.151 af

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Type III 24-hr 10-YR Rainfall=4.70"

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Page 118

Pond 17P: DMH11+45Peak Elev=148.60' Inflow=3.56 cfs 0.308 af
15.0" Round Culvert n=0.011 L=155.0' S=0.0123 ' Outflow=3.56 cfs 0.308 af**Subcatchment18P: P1g**Runoff Area=42,623 sf 52.76% Impervious Runoff Depth=1.82"
Flow Length=313' Slope=0.0100 ' Tc=12.1 min CN=70 Runoff=1.66 cfs 0.148 af**Pond 19P: CB2+70a**Peak Elev=147.83' Inflow=1.66 cfs 0.148 af
15.0" Round Culvert n=0.011 L=24.0' S=0.0125 ' Outflow=1.66 cfs 0.148 af**Subcatchment20P: P1h**Runoff Area=45,838 sf 53.76% Impervious Runoff Depth=1.89"
Flow Length=301' Slope=0.0100 ' Tc=11.7 min CN=71 Runoff=1.89 cfs 0.166 af**Pond 21P: CB2+70b**Peak Elev=147.92' Inflow=1.89 cfs 0.166 af
15.0" Round Culvert n=0.011 L=30.0' S=0.0083 ' Outflow=1.89 cfs 0.166 af**Pond 22P: DMH2+40**Peak Elev=147.50' Inflow=3.55 cfs 0.314 af
18.0" Round Culvert x 2.00 n=0.011 L=199.0' S=0.0060 ' Outflow=3.55 cfs 0.314 af**Subcatchment23P: P1i**Runoff Area=95,819 sf 10.70% Impervious Runoff Depth=1.01"
Flow Length=110' Tc=10.1 min CN=58 Runoff=1.87 cfs 0.185 af**Pond 24P: Basin #1**Peak Elev=146.41' Storage=16,105 cf Inflow=12.15 cfs 1.111 af
Discarded=1.34 cfs 0.955 af Primary=0.85 cfs 0.156 af Outflow=2.20 cfs 1.111 af**Subcatchment25P: P1j**Runoff Area=32,095 sf 46.13% Impervious Runoff Depth=2.05"
Flow Length=265' Slope=0.0100 ' Tc=11.8 min CN=73 Runoff=1.44 cfs 0.126 af**Pond 26P: CB17+77a**Peak Elev=146.73' Inflow=1.44 cfs 0.126 af
12.0" Round Culvert n=0.011 L=10.0' S=0.0100 ' Outflow=1.44 cfs 0.126 af**Subcatchment27P: P1k**Runoff Area=11,617 sf 66.38% Impervious Runoff Depth=2.81"
Flow Length=210' Slope=0.0100 ' Tc=8.7 min CN=82 Runoff=0.80 cfs 0.062 af**Pond 28P: CB17+77b**Peak Elev=146.53' Inflow=0.80 cfs 0.062 af
12.0" Round Culvert n=0.011 L=18.0' S=0.0056 ' Outflow=0.80 cfs 0.062 af**Pond 29P: DMH17+67**Peak Elev=146.59' Inflow=2.20 cfs 0.188 af
15.0" Round Culvert n=0.011 L=75.0' S=0.0313 ' Outflow=2.20 cfs 0.188 af**Subcatchment30P: P1l**Runoff Area=114,834 sf 21.32% Impervious Runoff Depth=0.67"
Flow Length=113' Tc=10.4 min CN=52 Runoff=1.14 cfs 0.148 af**Subcatchment31P: P1m**Runoff Area=43,062 sf 52.36% Impervious Runoff Depth=1.97"
Flow Length=198' Slope=0.0100 ' Tc=10.9 min CN=72 Runoff=1.90 cfs 0.162 af**Pond 32P: CB3+67a**Peak Elev=145.87' Inflow=1.90 cfs 0.162 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0254 ' Outflow=1.90 cfs 0.162 af**Subcatchment33P: P1n**Runoff Area=44,792 sf 54.66% Impervious Runoff Depth=2.05"
Flow Length=199' Slope=0.0100 ' Tc=10.9 min CN=73 Runoff=2.07 cfs 0.175 af**Pond 34P: CB3+67b**Peak Elev=145.91' Inflow=2.07 cfs 0.175 af
12.0" Round Culvert n=0.011 L=22.0' S=0.0150 ' Outflow=2.07 cfs 0.175 af

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Page 119

Pond 35P: DMH3+50

Peak Elev=145.38' Inflow=3.97 cfs 0.338 af
18.0" Round Culvert x 2.00 n=0.011 L=205.0' S=0.0060 '/' Outflow=3.97 cfs 0.338 af

Pond 36P: Basin #2

Peak Elev=143.97' Storage=5,593 cf Inflow=7.25 cfs 0.674 af
Discarded=2.40 cfs 0.674 af Primary=0.00 cfs 0.000 af Outflow=2.40 cfs 0.674 af

Subcatchment37P: P1q

Runoff Area=914,537 sf 7.52% Impervious Runoff Depth=1.32"
Flow Length=1,260' Slope=0.0100 '/' Tc=24.1 min CN=63 Runoff=18.49 cfs 2.314 af

Pond 38P: Wetland Storage

Peak Elev=146.16' Storage=51,979 cf Inflow=18.49 cfs 2.314 af
Outflow=1.99 cfs 2.188 af

Subcatchment39P: P1r

Runoff Area=561,327 sf 2.58% Impervious Runoff Depth=0.24"
Flow Length=368' Tc=17.4 min CN=42 Runoff=0.70 cfs 0.256 af

Link 40P: Design Point #1: Flow to Western Wetlands

Inflow=2.91 cfs 2.600 af
Primary=2.91 cfs 2.600 af

Total Runoff Area = 47.565 ac Runoff Volume = 4.355 af Average Runoff Depth = 1.10"
84.98% Pervious = 40.420 ac 15.02% Impervious = 7.145 ac

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Page 120

Summary for Subcatchment 1P: P1a

Runoff = 0.73 cfs @ 12.19 hrs, Volume= 0.077 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
9	61	>75% Grass cover, Good HSG B
1	80	>75% Grass cover, Good HSG D
2,432	98	Paved parking HSG B
553	98	Paved parking HSG D
5,952	98	Paved parking HSG A
14	39	>75% Grass cover, Good HSG A
8,961	98	Weighted Average
24	49	0.27% Pervious Area
8,937	98	99.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
2.8	142	0.0150	0.86		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.4	290	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
14.6	474	Total			

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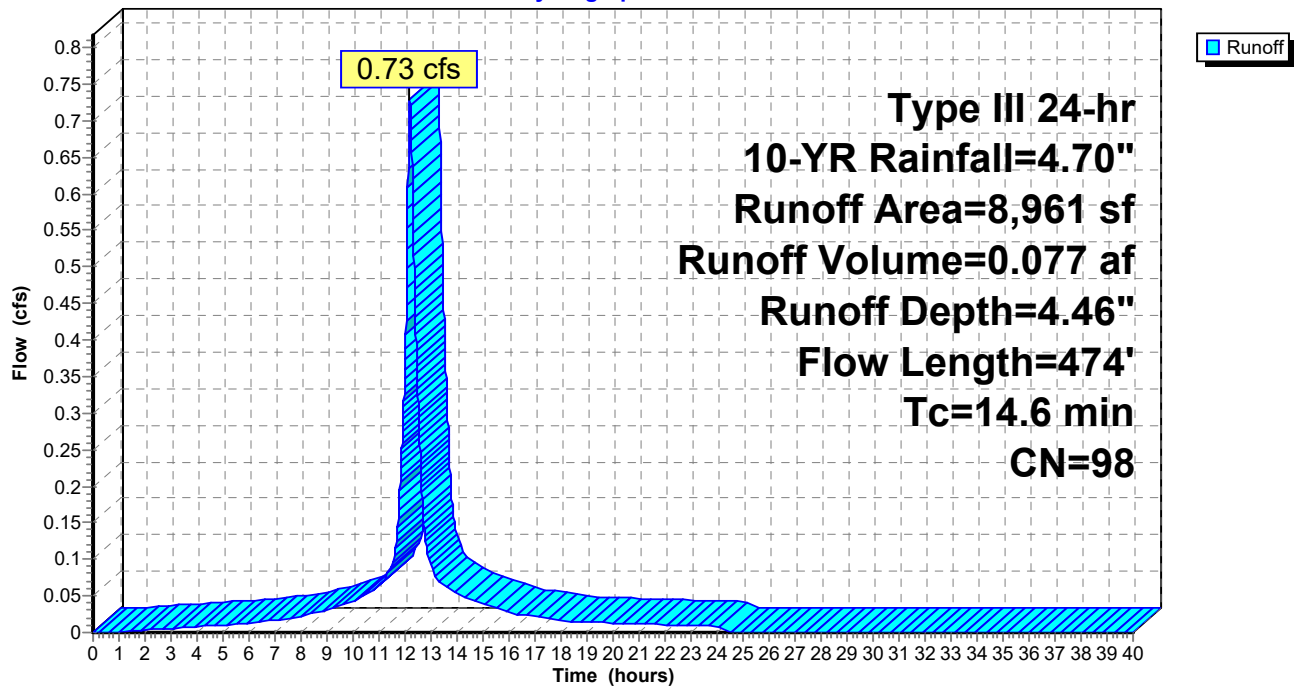
Type III 24-hr 10-YR Rainfall=4.70"

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Page 121

Subcatchment 1P: P1a

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 122

Summary for Pond 2P: CB5+06a

Inflow Area = 0.206 ac, 99.73% Impervious, Inflow Depth = 4.46" for 10-YR event
Inflow = 0.73 cfs @ 12.19 hrs, Volume= 0.077 af
Outflow = 0.73 cfs @ 12.19 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min
Primary = 0.73 cfs @ 12.19 hrs, Volume= 0.077 af

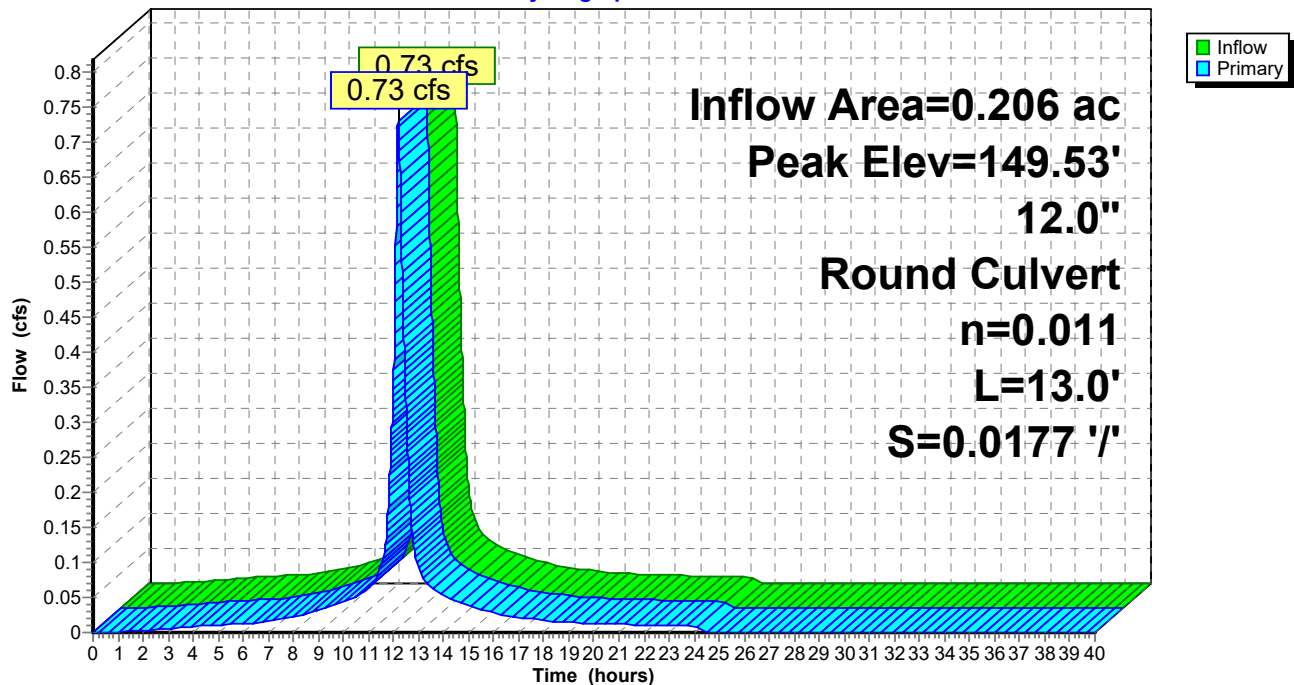
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.53' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	149.10'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 149.10' / 148.87' S= 0.0177 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.73 cfs @ 12.19 hrs HW=149.53' (Free Discharge)
↑1=Culvert (Inlet Controls 0.73 cfs @ 2.24 fps)

Pond 2P: CB5+06a

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 123

Summary for Subcatchment 3P: P1b

Runoff = 0.92 cfs @ 12.11 hrs, Volume= 0.083 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
828	61	>75% Grass cover, Good HSG B
174	80	>75% Grass cover, Good HSG D
3,006	98	Paved parking HSG B
915	98	Paved parking HSG D
34,195	39	>75% Grass cover, Good HSG A
1,263	98	Roofs HSG A
8,276	98	Paved parking HSG A
44	30	Woods, Good HSG A
0	55	Woods, Good HSG B
48,701	56	Weighted Average
35,241	40	72.36% Pervious Area
13,460	98	27.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0100	1.30		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.4	173	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.3	473	Total, Increased to minimum Tc = 6.0 min			

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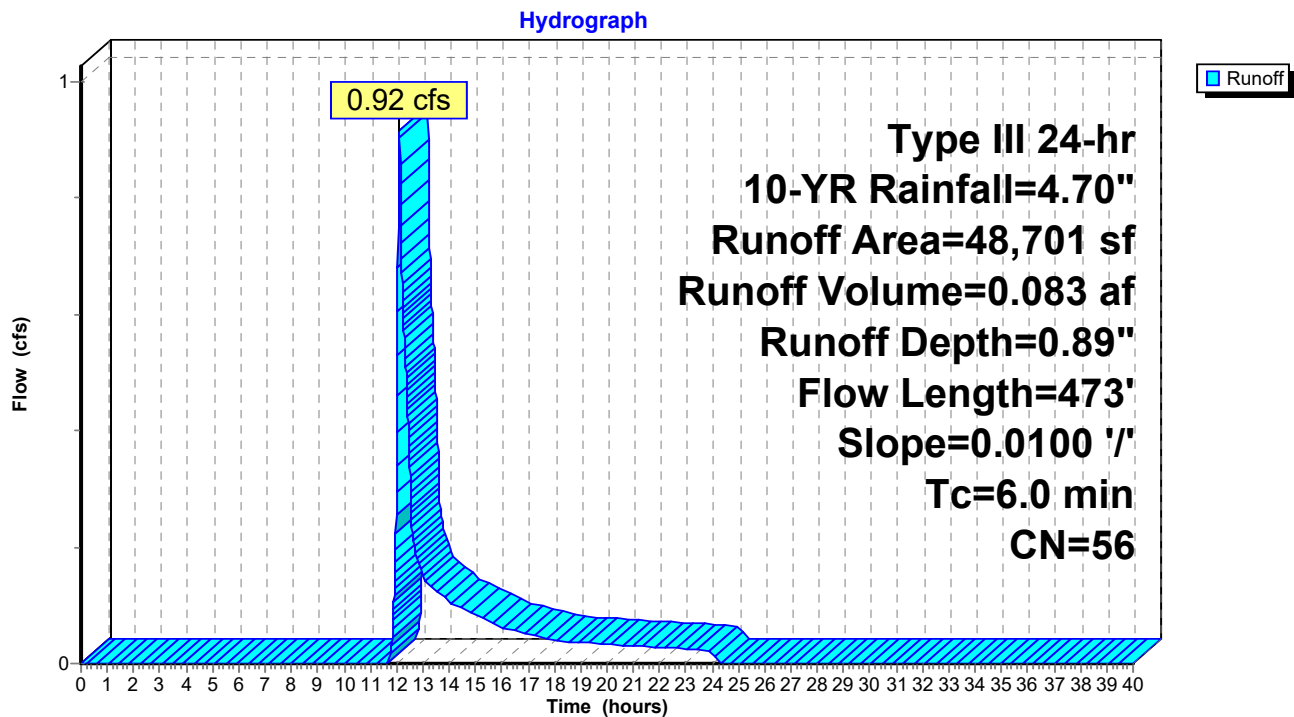
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Type III 24-hr 10-YR Rainfall=4.70"

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Page 124

Subcatchment 3P: P1b



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 125

Summary for Pond 4P: CB5+06b

Inflow Area = 1.118 ac, 27.64% Impervious, Inflow Depth = 0.89" for 10-YR event
Inflow = 0.92 cfs @ 12.11 hrs, Volume= 0.083 af
Outflow = 0.92 cfs @ 12.11 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.0 min
Primary = 0.92 cfs @ 12.11 hrs, Volume= 0.083 af

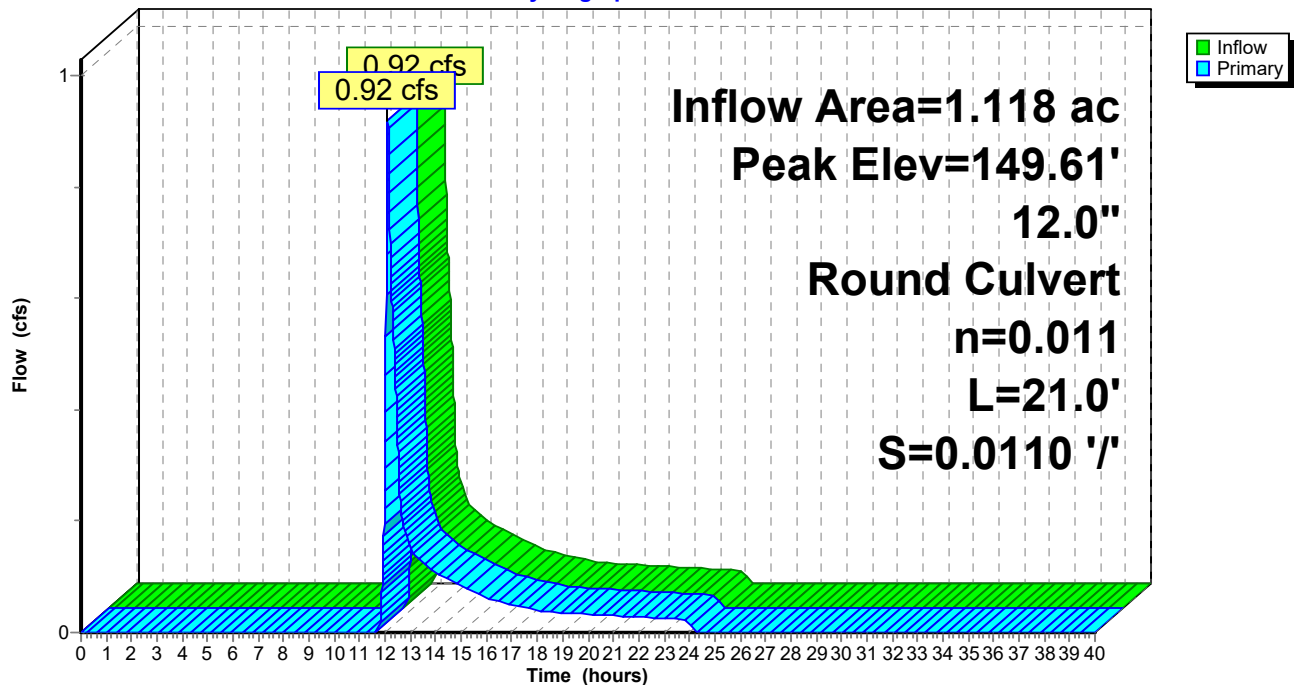
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.61' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	149.10'	12.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 149.10' / 148.87' S= 0.0110 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.92 cfs @ 12.11 hrs HW=149.61' (Free Discharge)
↑1=Culvert (Barrel Controls 0.92 cfs @ 3.31 fps)

Pond 4P: CB5+06b

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 126

Summary for Pond 5P: DMH5+22

Inflow Area = 1.324 ac, 38.84% Impervious, Inflow Depth = 1.45" for 10-YR event
Inflow = 1.54 cfs @ 12.13 hrs, Volume= 0.160 af
Outflow = 1.54 cfs @ 12.13 hrs, Volume= 0.160 af, Atten= 0%, Lag= 0.0 min
Primary = 1.54 cfs @ 12.13 hrs, Volume= 0.160 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 149.45' @ 12.13 hrs

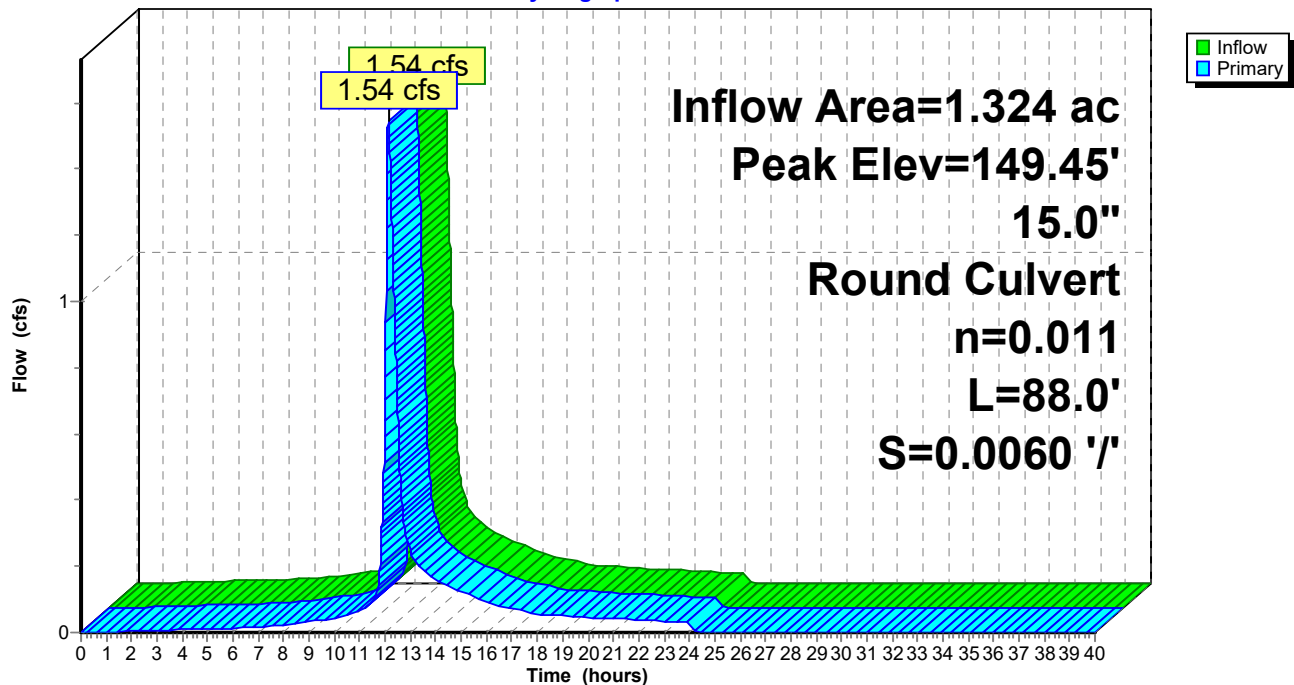
Device	Routing	Invert	Outlet Devices
#1	Primary	148.82'	15.0" Round Culvert L= 88.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 148.82' / 148.29' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.54 cfs @ 12.13 hrs HW=149.45' (Free Discharge)

↑1=Culvert (Barrel Controls 1.54 cfs @ 3.61 fps)

Pond 5P: DMH5+22

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 127

Summary for Pond 6P: DMH6+13

Inflow Area = 1.324 ac, 38.84% Impervious, Inflow Depth = 1.45" for 10-YR event
Inflow = 1.54 cfs @ 12.13 hrs, Volume= 0.160 af
Outflow = 1.54 cfs @ 12.13 hrs, Volume= 0.160 af, Atten= 0%, Lag= 0.0 min
Primary = 1.54 cfs @ 12.13 hrs, Volume= 0.160 af

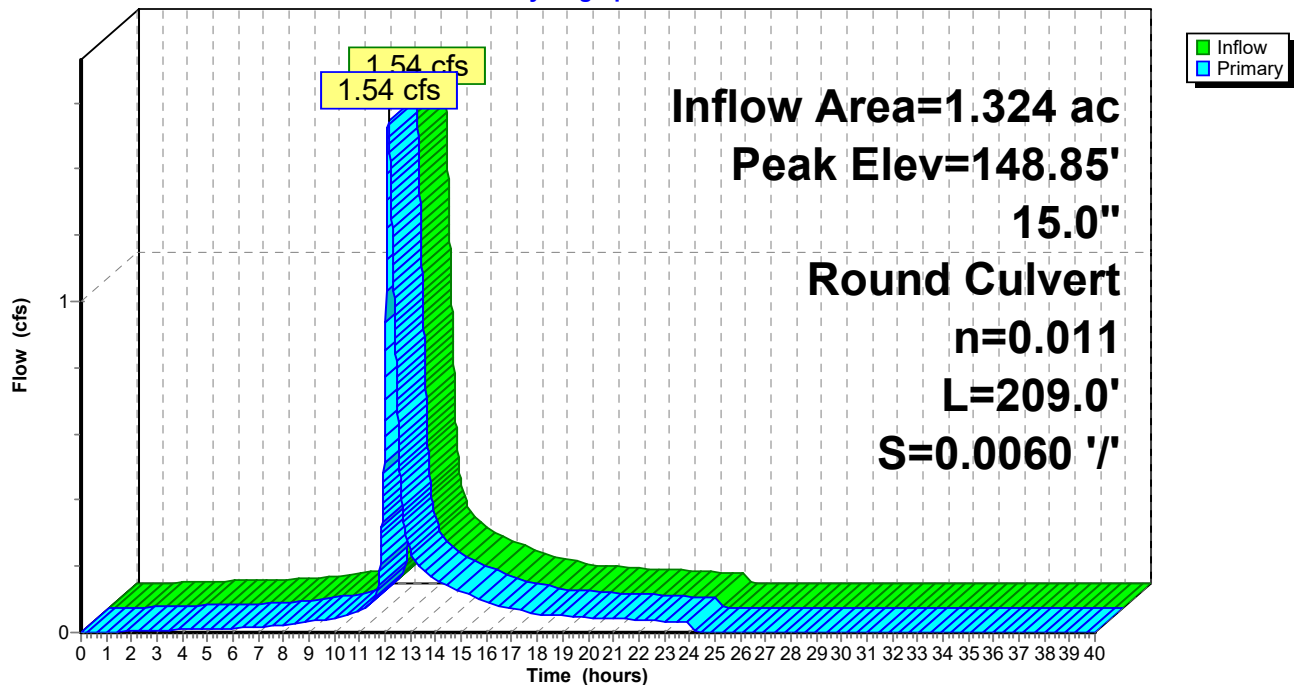
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.85' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	148.24'	15.0" Round Culvert L= 209.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 148.24' / 146.99' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.54 cfs @ 12.13 hrs HW=148.85' (Free Discharge)
↑1=Culvert (Barrel Controls 1.54 cfs @ 3.81 fps)

Pond 6P: DMH6+13

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 128

Summary for Subcatchment 7P: P1c

Runoff = 0.75 cfs @ 12.16 hrs, Volume= 0.065 af, Depth= 1.74"

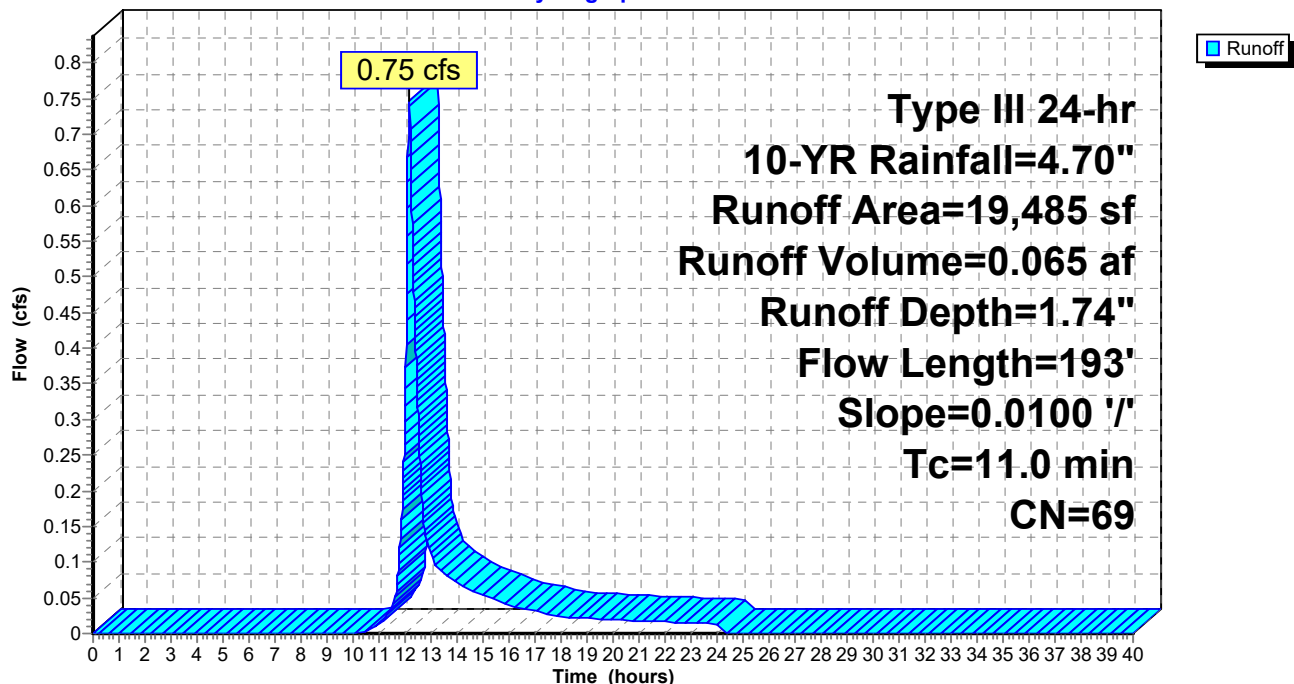
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
442	61	>75% Grass cover, Good HSG B
5,958	98	Paved parking HSG A
1,438	98	Paved parking HSG B
9,363	39	>75% Grass cover, Good HSG A
2,284	98	Roofs HSG A
19,485	69	Weighted Average
9,805	40	50.32% Pervious Area
9,680	98	49.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.5	21	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.1	130	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.0	193	Total			

Subcatchment 7P: P1c

Hydrograph



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Page 129

Summary for Pond 8P: CB8+10a

Inflow Area = 0.447 ac, 49.68% Impervious, Inflow Depth = 1.74" for 10-YR event
Inflow = 0.75 cfs @ 12.16 hrs, Volume= 0.065 af
Outflow = 0.75 cfs @ 12.16 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min
Primary = 0.75 cfs @ 12.16 hrs, Volume= 0.065 af

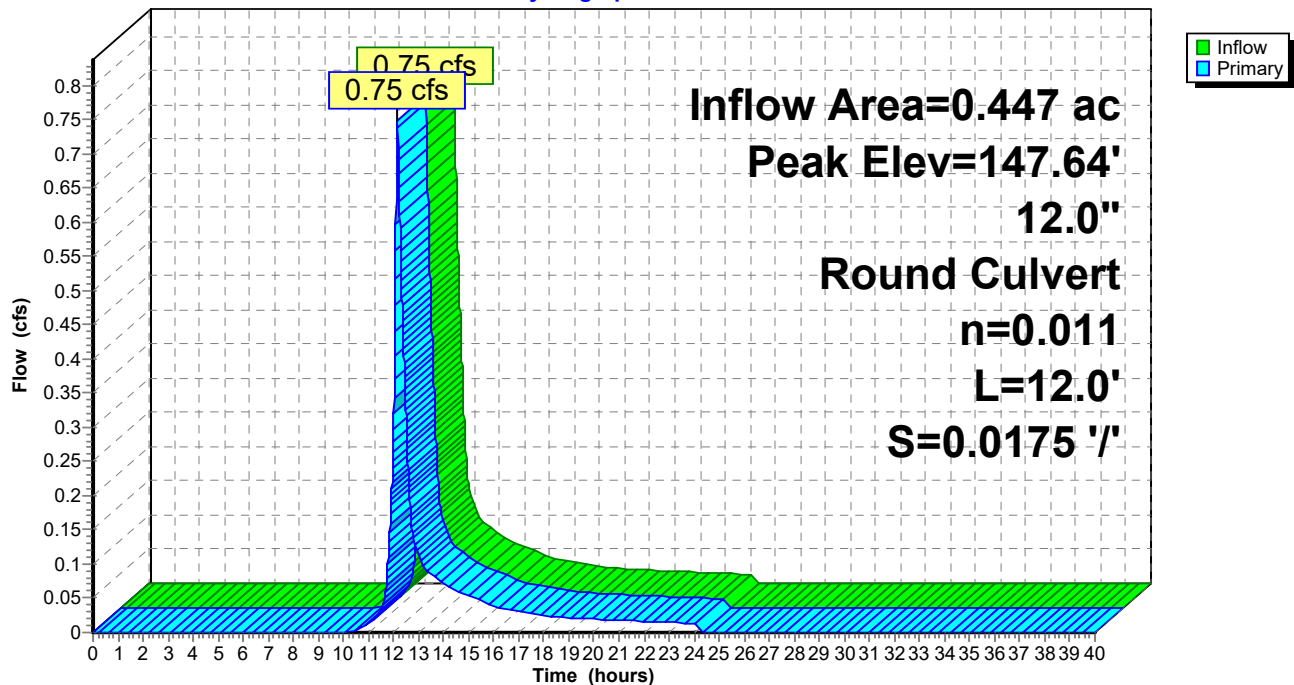
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.64' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.20'	12.0" Round Culvert L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.20' / 146.99' S= 0.0175 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.75 cfs @ 12.16 hrs HW=147.64' (Free Discharge)
↑1=Culvert (Barrel Controls 0.75 cfs @ 3.29 fps)

Pond 8P: CB8+10a

Hydrograph



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Page 130

Summary for Subcatchment 9P: P1d

Runoff = 0.96 cfs @ 12.15 hrs, Volume= 0.080 af, Depth= 2.72"

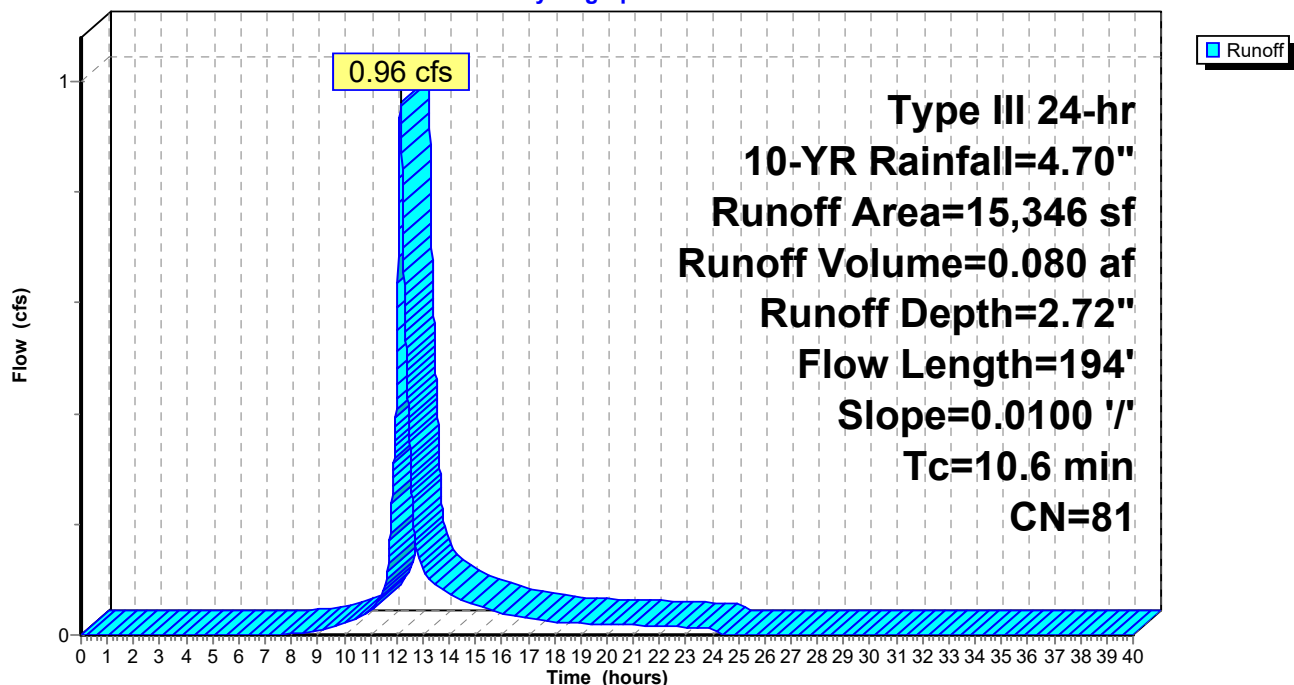
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
5,770	61	>75% Grass cover, Good HSG B
704	39	>75% Grass cover, Good HSG A
1,057	98	Roofs HSG B
3,321	98	Paved parking HSG A
4,397	98	Paved parking HSG B
97	55	Woods, Good HSG B
15,346	81	Weighted Average
6,571	59	42.82% Pervious Area
8,775	98	57.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.2	152	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.6	194	Total			

Subcatchment 9P: P1d

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Page 131

Summary for Pond 10P: CB8+10b

Inflow Area = 0.352 ac, 57.18% Impervious, Inflow Depth = 2.72" for 10-YR event
Inflow = 0.96 cfs @ 12.15 hrs, Volume= 0.080 af
Outflow = 0.96 cfs @ 12.15 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min
Primary = 0.96 cfs @ 12.15 hrs, Volume= 0.080 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.73' @ 12.15 hrs

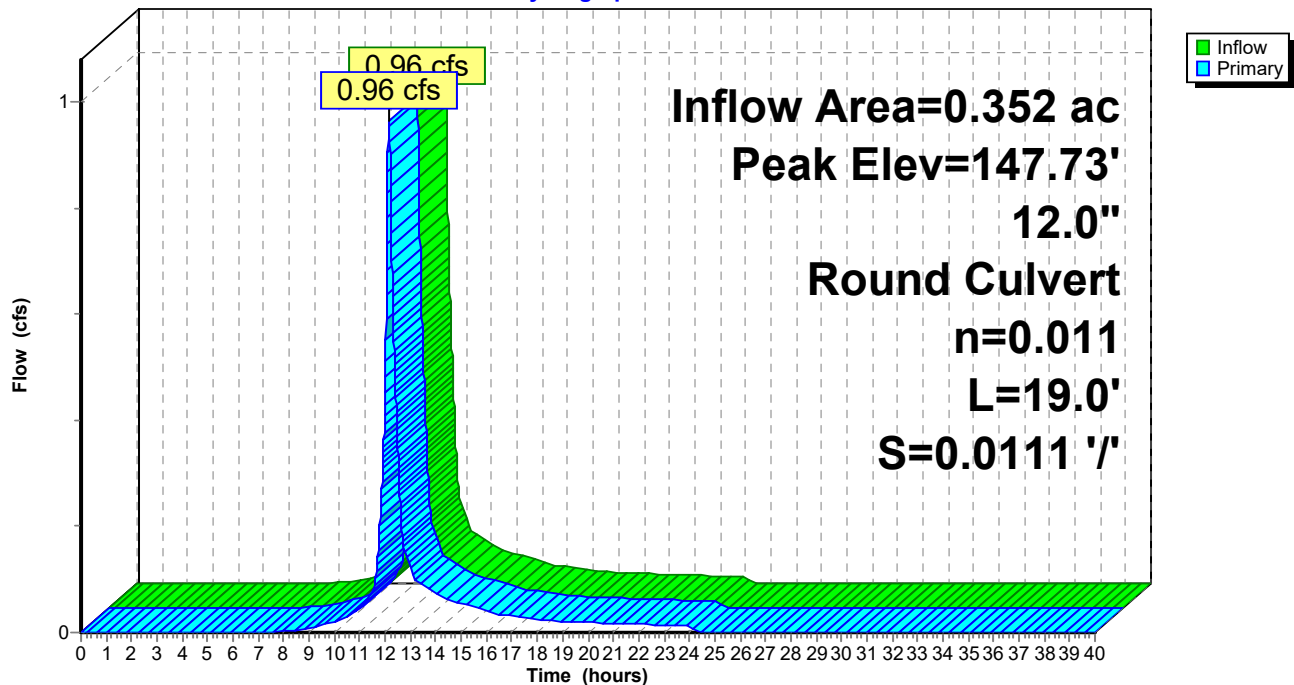
Device	Routing	Invert	Outlet Devices
#1	Primary	147.20'	12.0" Round Culvert L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.20' / 146.99' S= 0.0111 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.96 cfs @ 12.15 hrs HW=147.73' (Free Discharge)

↑1=Culvert (Barrel Controls 0.96 cfs @ 3.30 fps)

Pond 10P: CB8+10b

Hydrograph



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Page 132

Summary for Pond 11P: DMH8+20

Inflow Area = 2.123 ac, 44.17% Impervious, Inflow Depth = 1.72" for 10-YR event
Inflow = 3.23 cfs @ 12.14 hrs, Volume= 0.304 af
Outflow = 3.23 cfs @ 12.14 hrs, Volume= 0.304 af, Atten= 0%, Lag= 0.0 min
Primary = 3.23 cfs @ 12.14 hrs, Volume= 0.304 af

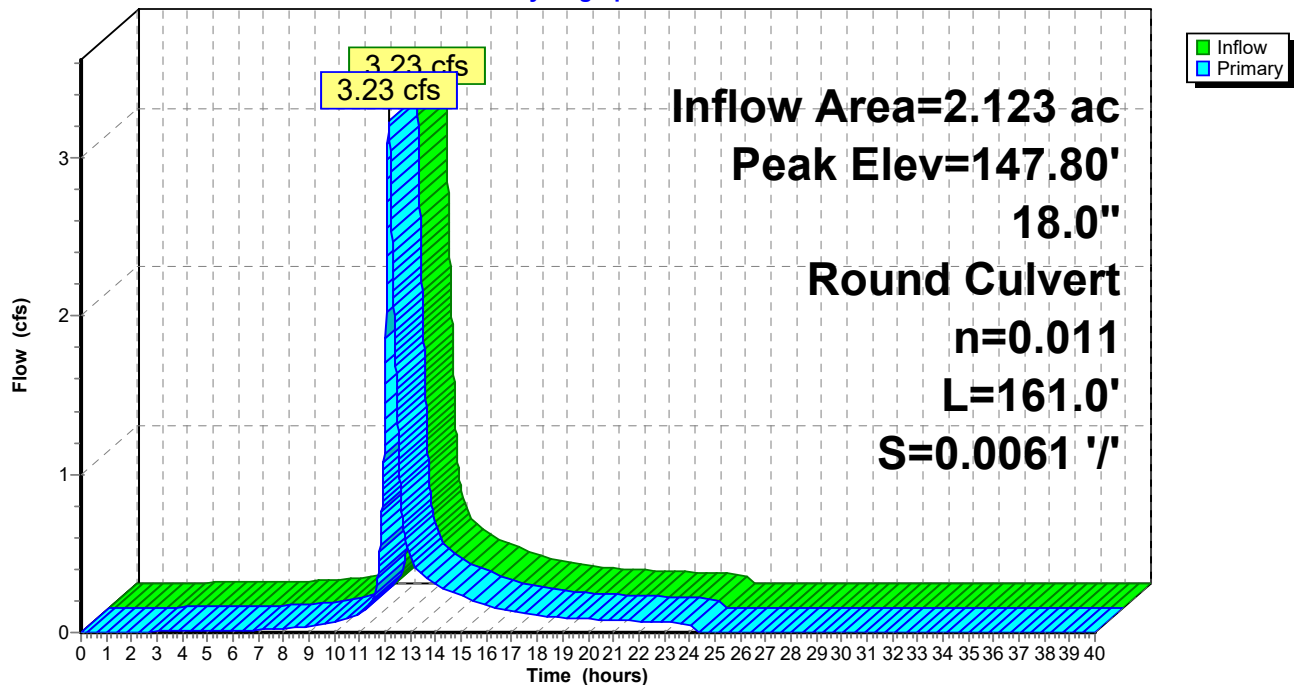
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.80' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	146.94'	18.0" Round Culvert L= 161.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.94' / 145.96' S= 0.0061 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=3.23 cfs @ 12.14 hrs HW=147.80' (Free Discharge)
↑1=Culvert (Barrel Controls 3.23 cfs @ 4.44 fps)

Pond 11P: DMH8+20

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 133

Summary for Pond 12P: DMH1a

Inflow Area = 2.123 ac, 44.17% Impervious, Inflow Depth = 1.72" for 10-YR event
Inflow = 3.23 cfs @ 12.14 hrs, Volume= 0.304 af
Outflow = 3.23 cfs @ 12.14 hrs, Volume= 0.304 af, Atten= 0%, Lag= 0.0 min
Primary = 3.23 cfs @ 12.14 hrs, Volume= 0.304 af

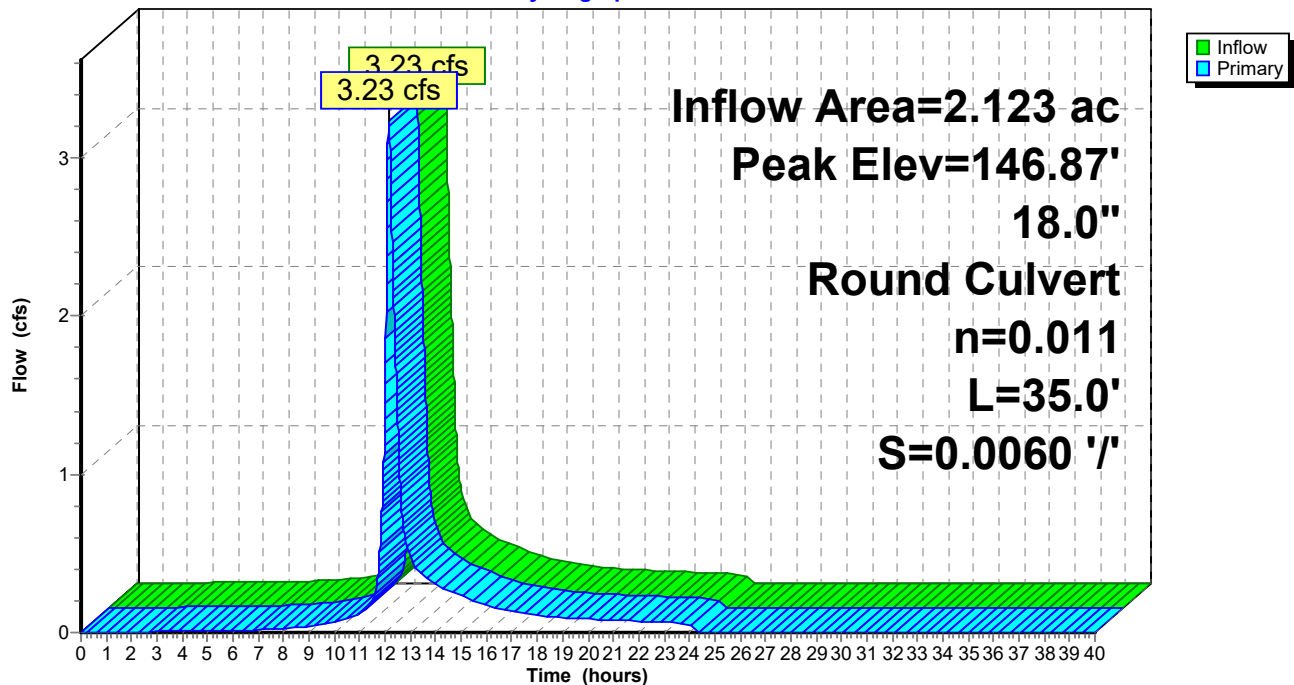
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 146.87' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	145.91'	18.0" Round Culvert L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.91' / 145.70' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=3.23 cfs @ 12.14 hrs HW=146.87' (Free Discharge)
↑1=Culvert (Barrel Controls 3.23 cfs @ 3.84 fps)

Pond 12P: DMH1a

Hydrograph



Ridge Street HydroCAD Revised Final

Type III 24-hr 10-YR Rainfall=4.70"

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Page 134

Summary for Subcatchment 13P: P1e

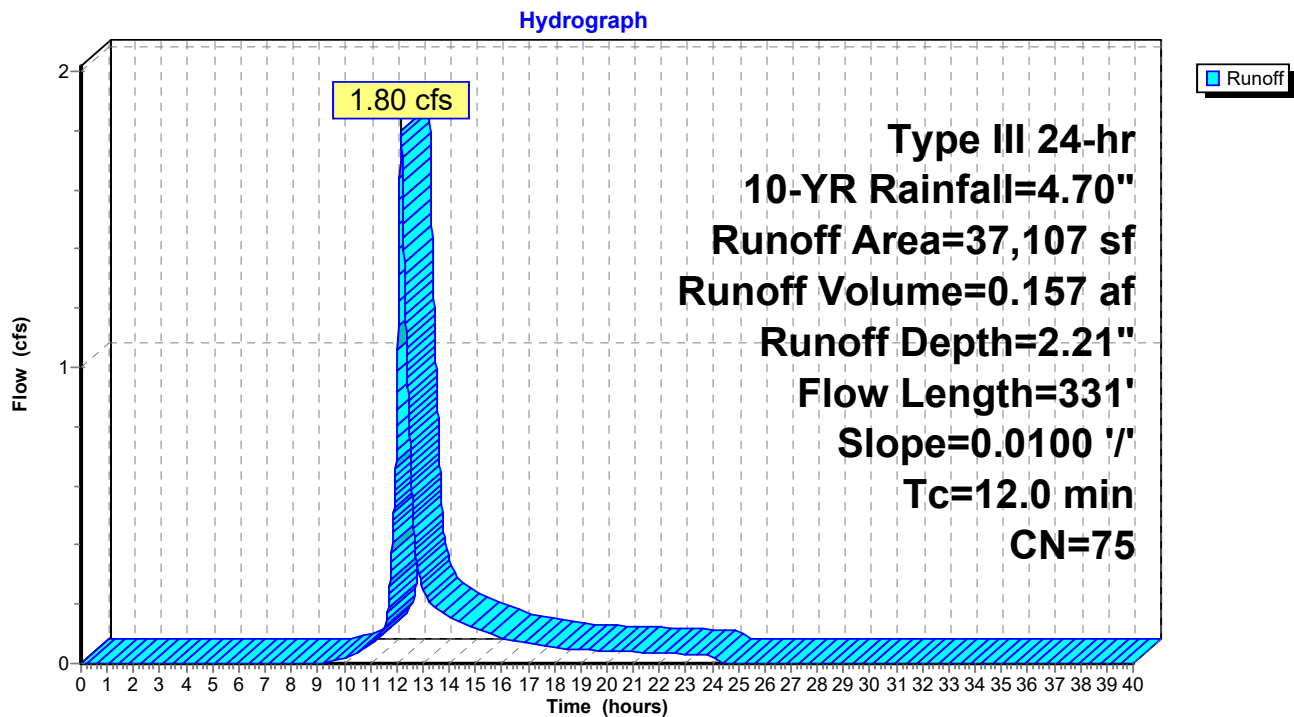
Runoff = 1.80 cfs @ 12.17 hrs, Volume= 0.157 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
8,461	98	Paved parking HSG B
5,642	98	Paved parking HSG A
11,605	61	>75% Grass cover, Good HSG B
7,314	39	>75% Grass cover, Good HSG A
2,331	98	Roofs HSG B
1,754	98	Roofs HSG A
37,107	75	Weighted Average
18,919	52	50.98% Pervious Area
18,188	98	49.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.4	16	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	273	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
12.0	331	Total			

Subcatchment 13P: P1e



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 136

Summary for Pond 14P: CB12+15a

Inflow Area = 0.852 ac, 49.02% Impervious, Inflow Depth = 2.21" for 10-YR event
Inflow = 1.80 cfs @ 12.17 hrs, Volume= 0.157 af
Outflow = 1.80 cfs @ 12.17 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min
Primary = 1.80 cfs @ 12.17 hrs, Volume= 0.157 af

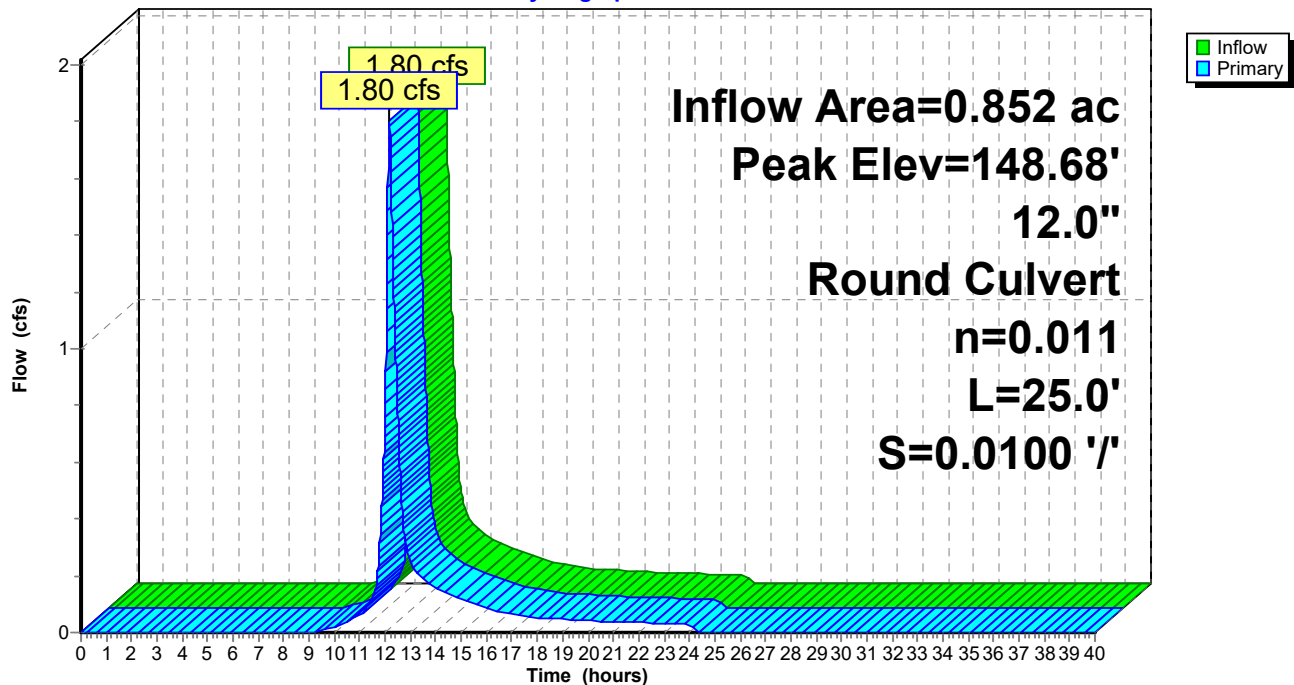
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.68' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.90'	12.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.90' / 147.65' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.80 cfs @ 12.17 hrs HW=148.68' (Free Discharge)
↑1=Culvert (Barrel Controls 1.80 cfs @ 3.78 fps)

Pond 14P: CB12+15a

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 137

Summary for Subcatchment 15P: P1f

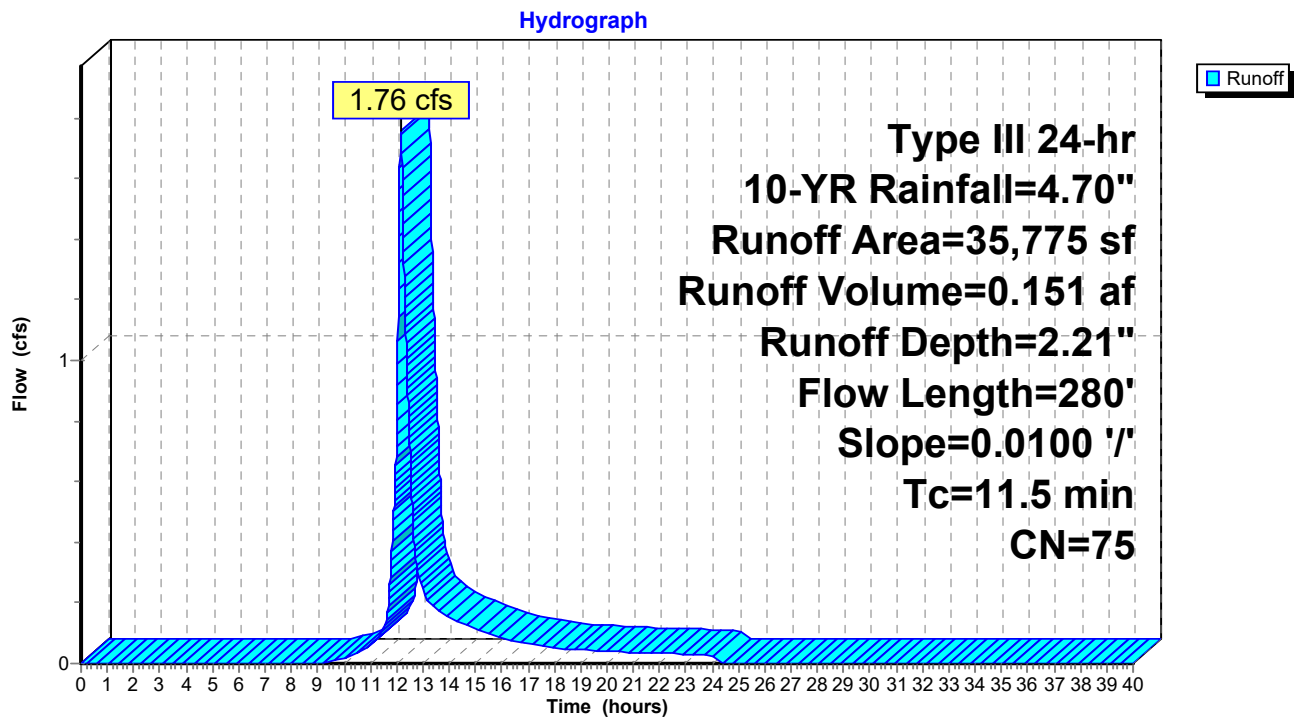
Runoff = 1.76 cfs @ 12.16 hrs, Volume= 0.151 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
5,367	39	>75% Grass cover, Good HSG A
11,969	61	>75% Grass cover, Good HSG B
331	98	Roofs HSG A
3,270	98	Roofs HSG B
10,583	98	Paved parking HSG B
3,333	98	Paved parking HSG A
742	30	Woods, Good HSG A
180	55	Woods, Good HSG B
35,775	75	Weighted Average
18,258	53	51.04% Pervious Area
17,517	98	48.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.8	225	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.5	280	Total			

Subcatchment 15P: P1f



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 139

Summary for Pond 16P: CB12+15b

Inflow Area = 0.821 ac, 48.96% Impervious, Inflow Depth = 2.21" for 10-YR event
Inflow = 1.76 cfs @ 12.16 hrs, Volume= 0.151 af
Outflow = 1.76 cfs @ 12.16 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min
Primary = 1.76 cfs @ 12.16 hrs, Volume= 0.151 af

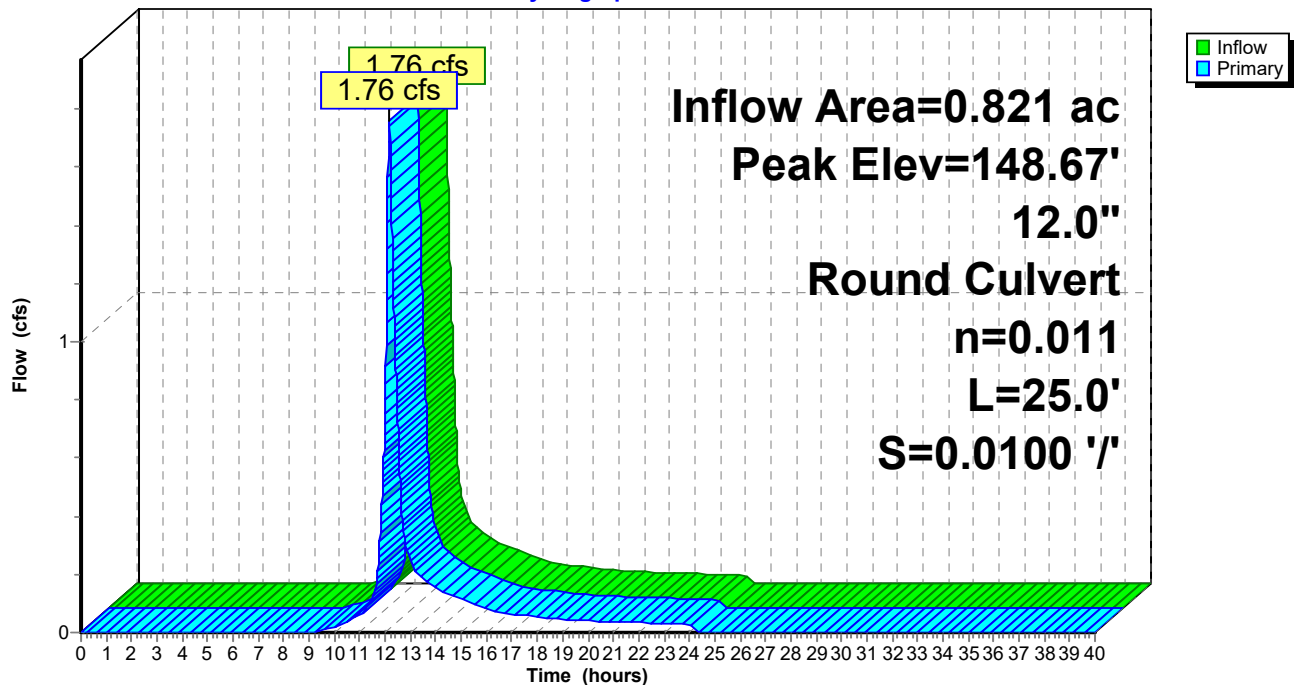
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.67' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.90'	12.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.90' / 147.65' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.76 cfs @ 12.16 hrs HW=148.67' (Free Discharge)
↑1=Culvert (Barrel Controls 1.76 cfs @ 3.77 fps)

Pond 16P: CB12+15b

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 140

Summary for Pond 17P: DMH11+45

Inflow Area = 1.673 ac, 48.99% Impervious, Inflow Depth = 2.21" for 10-YR event
Inflow = 3.56 cfs @ 12.17 hrs, Volume= 0.308 af
Outflow = 3.56 cfs @ 12.17 hrs, Volume= 0.308 af, Atten= 0%, Lag= 0.0 min
Primary = 3.56 cfs @ 12.17 hrs, Volume= 0.308 af

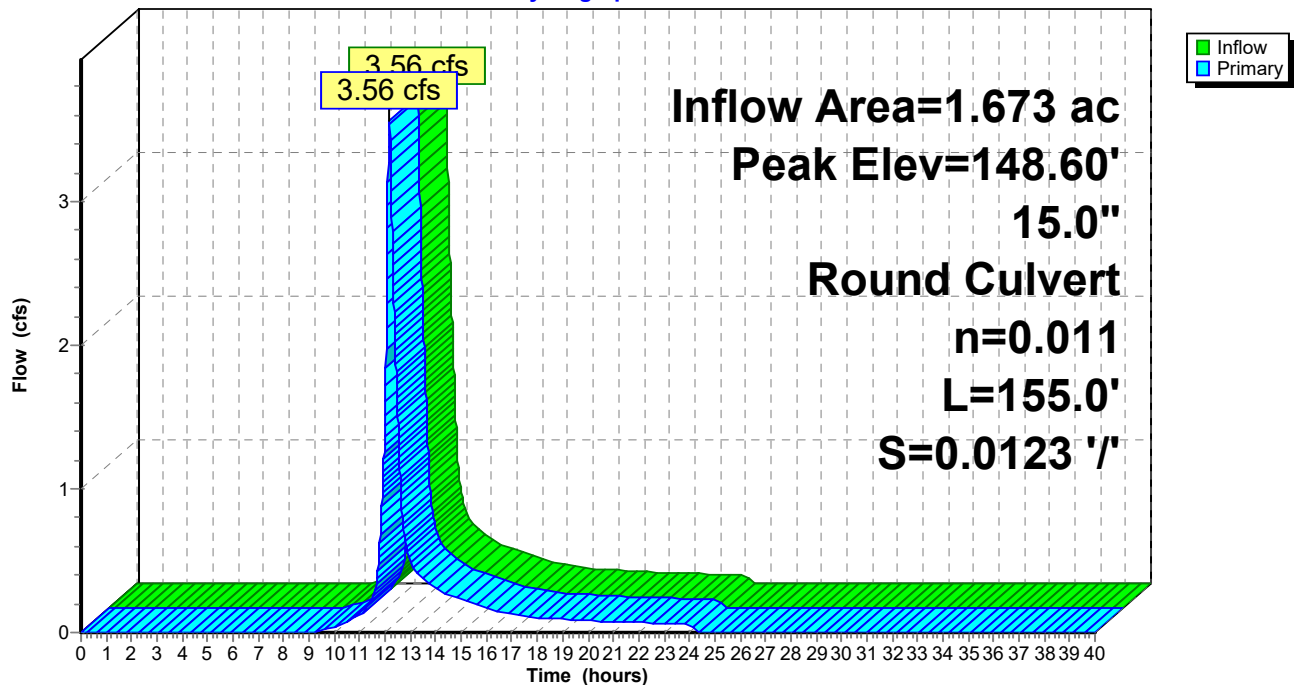
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.60' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.60'	15.0" Round Culvert L= 155.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.60' / 145.70' S= 0.0123 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.55 cfs @ 12.17 hrs HW=148.59' (Free Discharge)
↑**1=Culvert** (Inlet Controls 3.55 cfs @ 3.40 fps)

Pond 17P: DMH11+45

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 141

Summary for Subcatchment 18P: P1g

Runoff = 1.66 cfs @ 12.17 hrs, Volume= 0.148 af, Depth= 1.82"

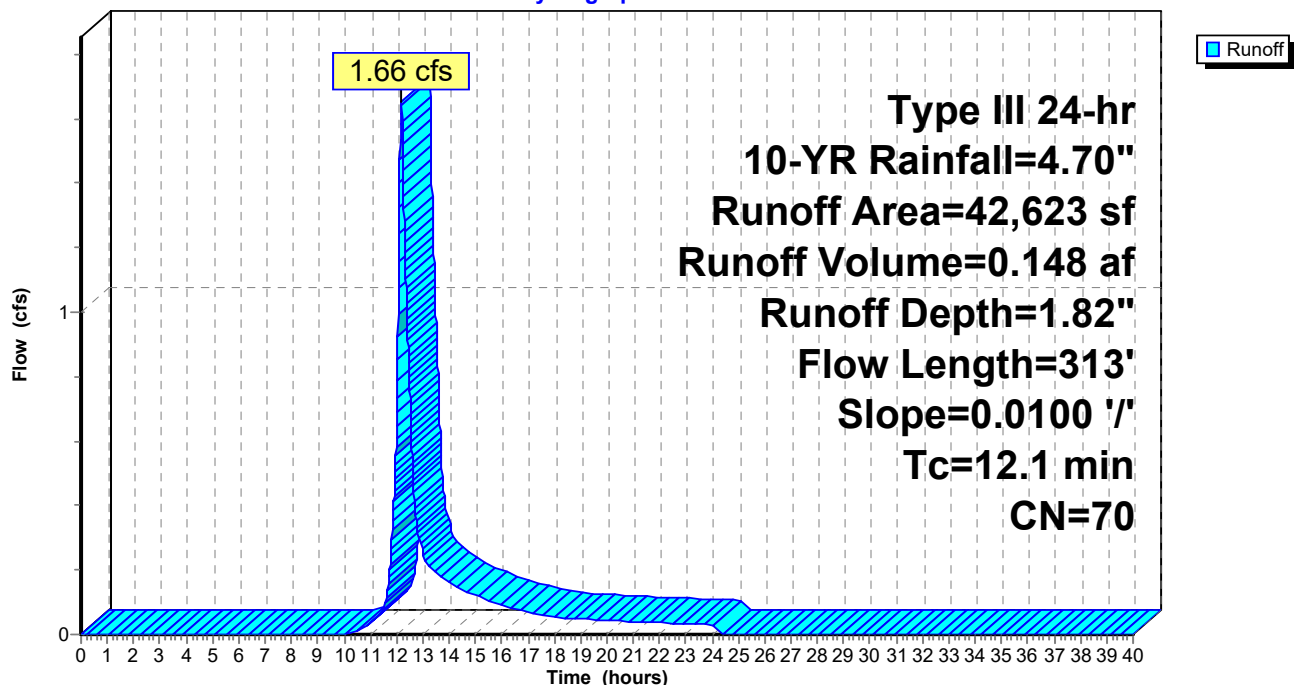
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
20,136	39	>75% Grass cover, Good HSG A
4,639	98	Roofs HSG A
17,848	98	Paved parking HSG A
42,623	70	Weighted Average
20,136	39	47.24% Pervious Area
22,487	98	52.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.7	29	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.0	242	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
12.1	313	Total			

Subcatchment 18P: P1g

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 142

Summary for Pond 19P: CB2+70a

Inflow Area = 0.978 ac, 52.76% Impervious, Inflow Depth = 1.82" for 10-YR event
Inflow = 1.66 cfs @ 12.17 hrs, Volume= 0.148 af
Outflow = 1.66 cfs @ 12.17 hrs, Volume= 0.148 af, Atten= 0%, Lag= 0.0 min
Primary = 1.66 cfs @ 12.17 hrs, Volume= 0.148 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.83' @ 12.17 hrs

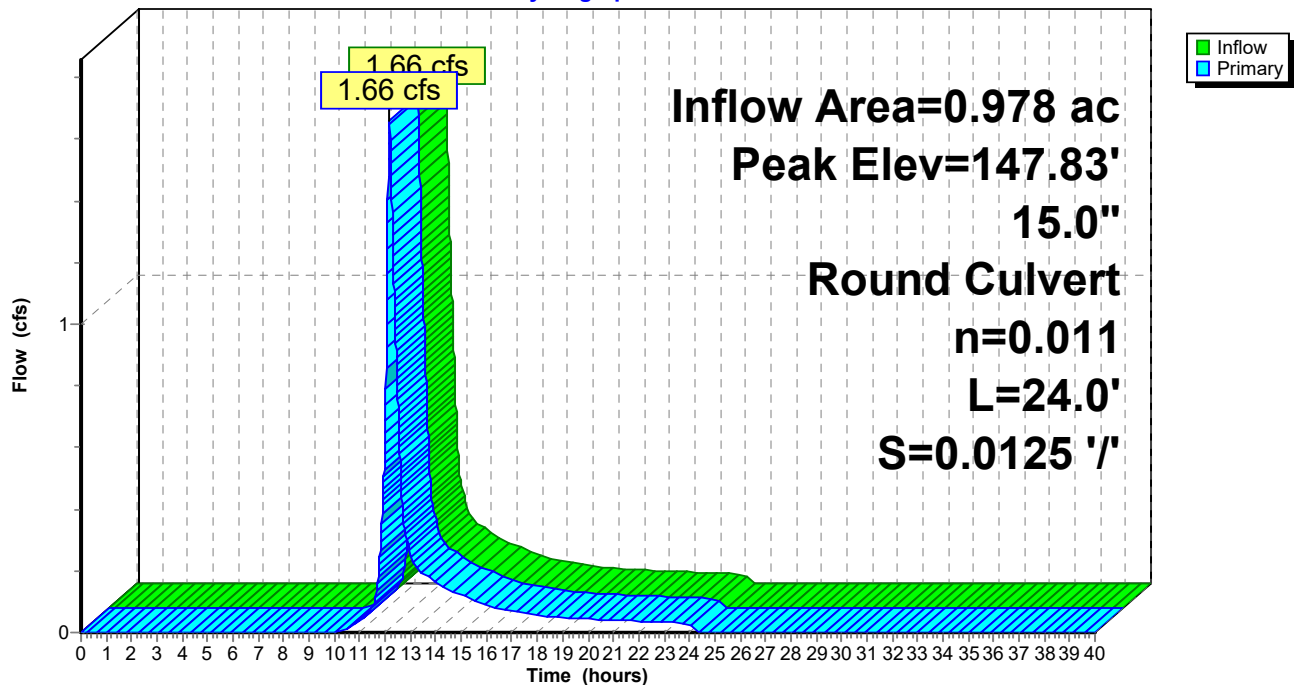
Device	Routing	Invert	Outlet Devices
#1	Primary	147.19'	15.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.19' / 146.89' S= 0.0125 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.66 cfs @ 12.17 hrs HW=147.83' (Free Discharge)

↑1=Culvert (Barrel Controls 1.66 cfs @ 3.83 fps)

Pond 19P: CB2+70a

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 143

Summary for Subcatchment 20P: P1h

Runoff = 1.89 cfs @ 12.17 hrs, Volume= 0.166 af, Depth= 1.89"

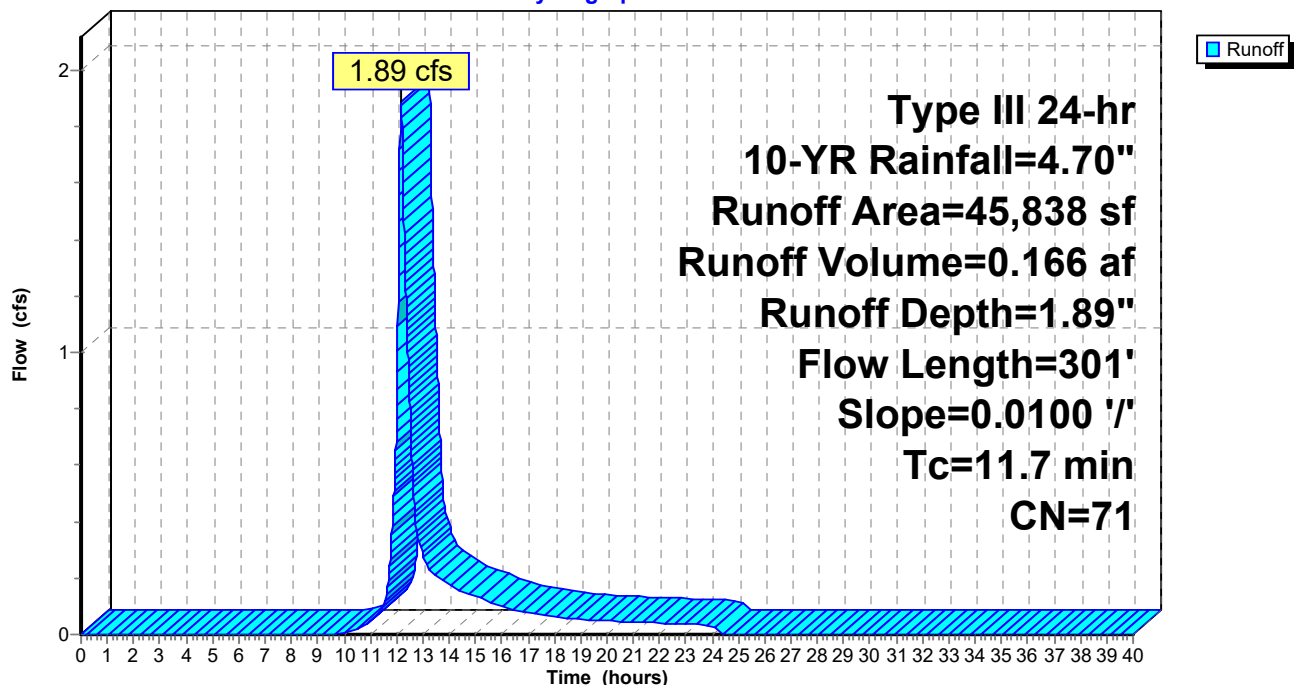
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
21,194	39	>75% Grass cover, Good HSG A
5,783	98	Roofs HSG A
18,861	98	Paved parking HSG A
45,838	71	Weighted Average
21,194	39	46.24% Pervious Area
24,644	98	53.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	11	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.0	248	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.7	301	Total			

Subcatchment 20P: P1h

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 144

Summary for Pond 21P: CB2+70b

Inflow Area = 1.052 ac, 53.76% Impervious, Inflow Depth = 1.89" for 10-YR event
Inflow = 1.89 cfs @ 12.17 hrs, Volume= 0.166 af
Outflow = 1.89 cfs @ 12.17 hrs, Volume= 0.166 af, Atten= 0%, Lag= 0.0 min
Primary = 1.89 cfs @ 12.17 hrs, Volume= 0.166 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.92' @ 12.17 hrs

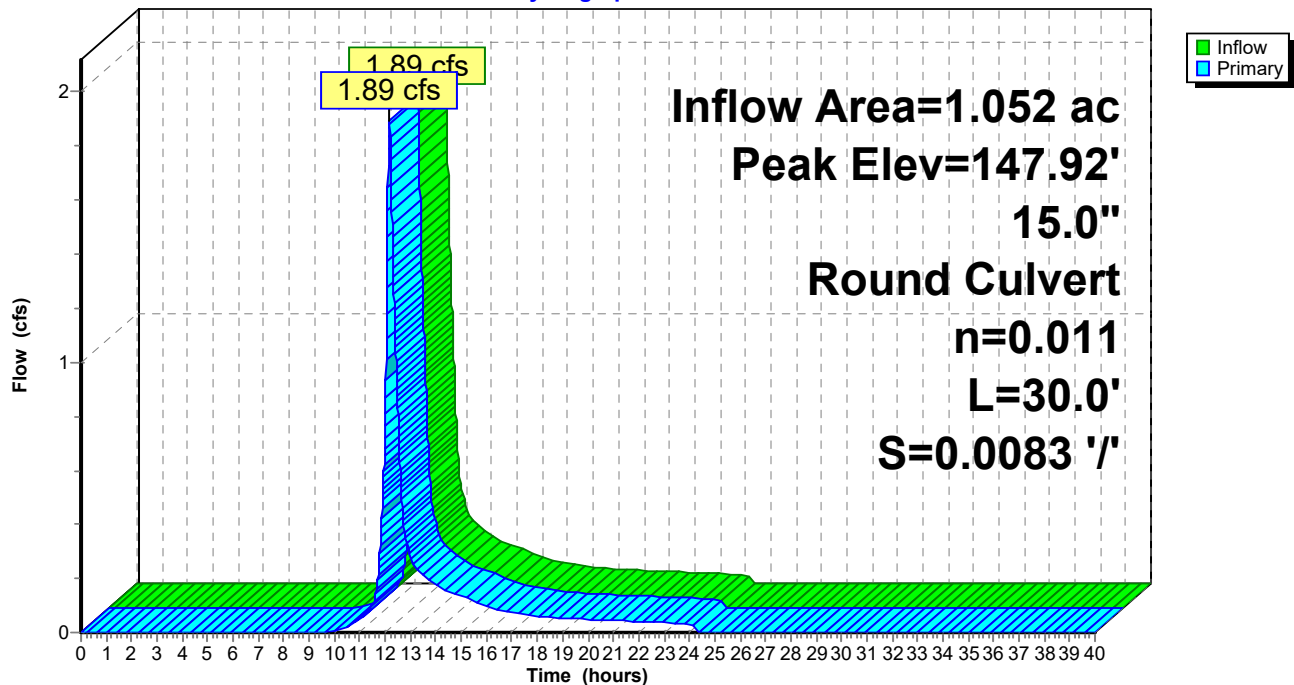
Device	Routing	Invert	Outlet Devices
#1	Primary	147.19'	15.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.19' / 146.94' S= 0.0083 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.89 cfs @ 12.17 hrs HW=147.92' (Free Discharge)

↑1=Culvert (Barrel Controls 1.89 cfs @ 3.67 fps)

Pond 21P: CB2+70b

Hydrograph



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Page 145

Summary for Pond 22P: DMH2+40

Inflow Area = 2.031 ac, 53.28% Impervious, Inflow Depth = 1.86" for 10-YR event
Inflow = 3.55 cfs @ 12.17 hrs, Volume= 0.314 af
Outflow = 3.55 cfs @ 12.17 hrs, Volume= 0.314 af, Atten= 0%, Lag= 0.0 min
Primary = 3.55 cfs @ 12.17 hrs, Volume= 0.314 af

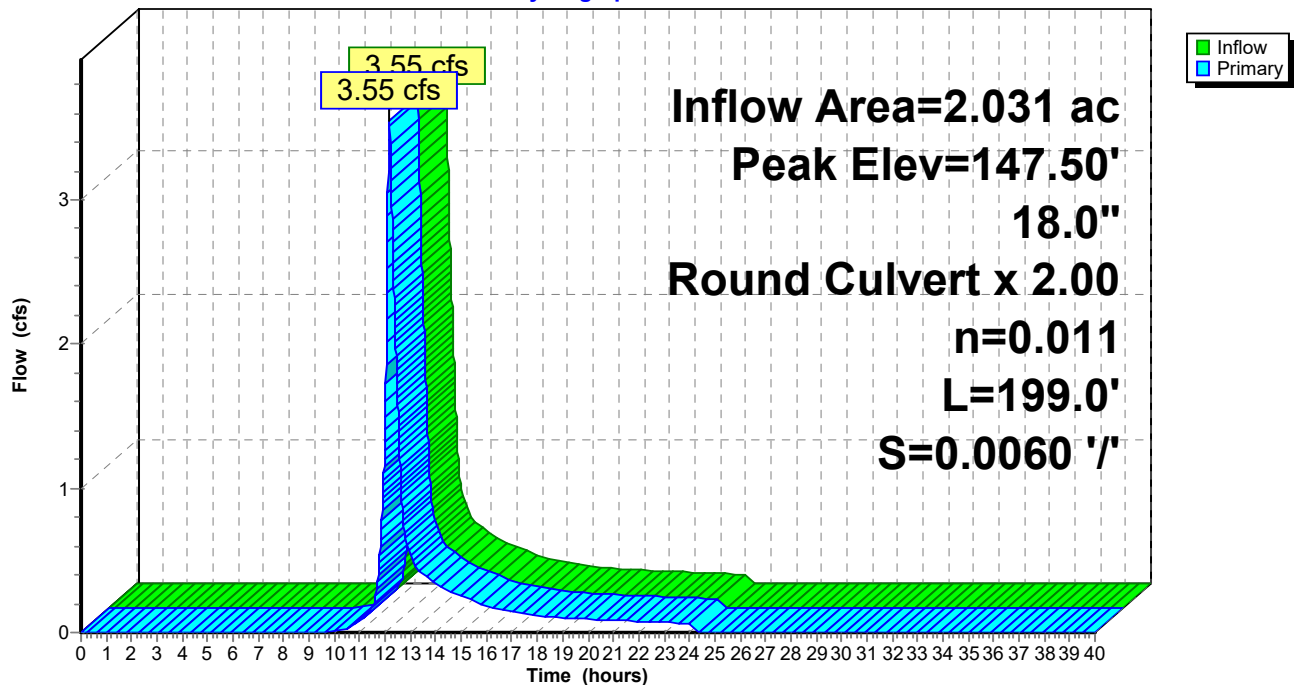
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.50' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	146.89'	18.0" Round Culvert X 2.00 L= 199.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.89' / 145.70' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=3.55 cfs @ 12.17 hrs HW=147.50' (Free Discharge)
↑1=Culvert (Barrel Controls 3.55 cfs @ 3.88 fps)

Pond 22P: DMH2+40

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 146

Summary for Subcatchment 23P: P1i

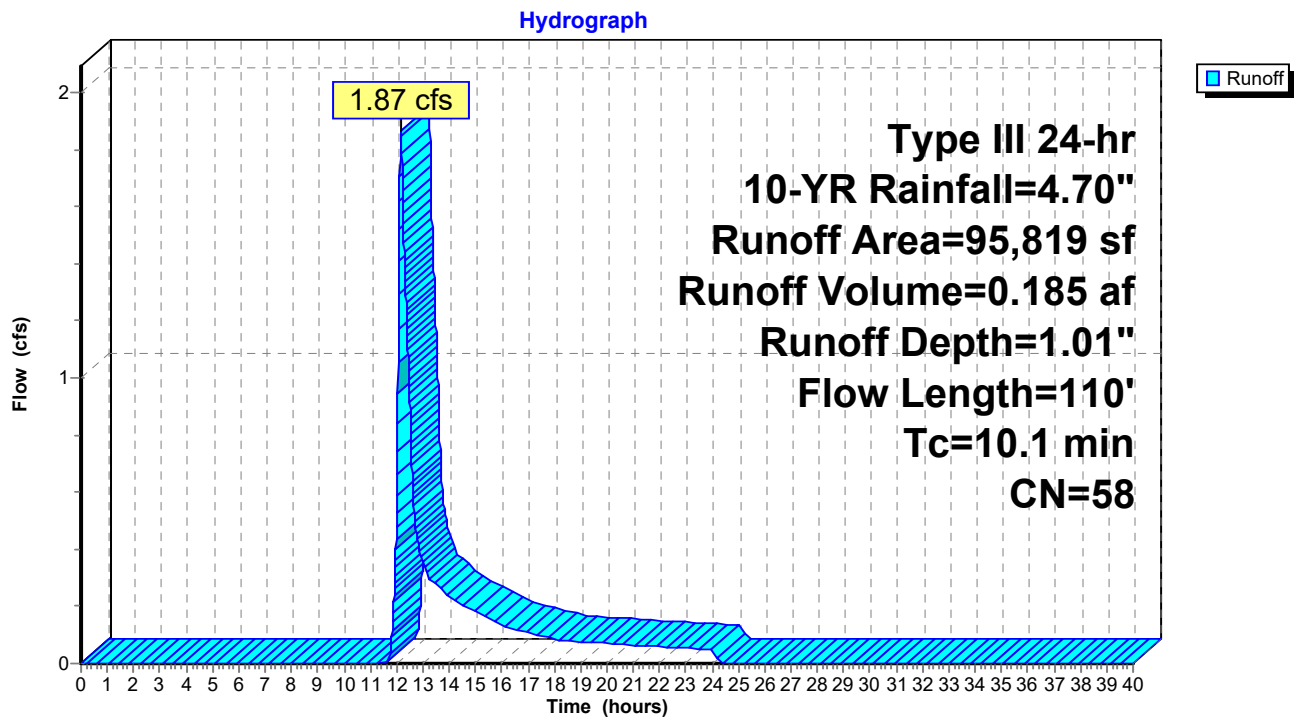
Runoff = 1.87 cfs @ 12.16 hrs, Volume= 0.185 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
41,468	61	>75% Grass cover, Good HSG B
14,814	39	>75% Grass cover, Good HSG A
1,336	98	Paved parking HSG A
2,500	98	Paved parking HSG B
2,201	98	Roofs HSG A
4,220	98	Roofs HSG B
6,601	30	Woods, Good HSG A
22,679	55	Woods, Good HSG B
95,819	58	Weighted Average
85,562	53	89.30% Pervious Area
10,257	98	10.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	35	0.0200	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	75	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.1	110	Total			

Subcatchment 23P: P1i



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Page 148

Summary for Pond 24P: Basin #1

Inflow Area = 8.027 ac, 38.31% Impervious, Inflow Depth = 1.66" for 10-YR event
 Inflow = 12.15 cfs @ 12.16 hrs, Volume= 1.111 af
 Outflow = 2.20 cfs @ 12.84 hrs, Volume= 1.111 af, Atten= 82%, Lag= 40.8 min
 Discarded = 1.34 cfs @ 12.84 hrs, Volume= 0.955 af
 Primary = 0.85 cfs @ 12.84 hrs, Volume= 0.156 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.41' @ 12.84 hrs Surf.Area= 24,103 sf Storage= 16,105 cf

Plug-Flow detention time= 80.9 min calculated for 1.111 af (100% of inflow)
 Center-of-Mass det. time= 80.9 min (933.0 - 852.1)

Volume	Invert	Avail.Storage	Storage Description
#1	145.70'	59,551 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.70	21,476	960.0	0	0	21,476
148.00	30,575	1,018.0	59,551	59,551	30,885

Device	Routing	Invert	Outlet Devices
#1	Discarded	145.70'	2.410 in/hr Exfiltration over Surface area
#2	Primary	146.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28)
			Elev. (feet) 146.00 146.50 146.50 148.00
			Width (feet) 1.00 1.00 5.00 5.00

Discarded OutFlow Max=1.34 cfs @ 12.84 hrs HW=146.41' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 1.34 cfs)

Primary OutFlow Max=0.85 cfs @ 12.84 hrs HW=146.41' (Free Discharge)
 ↑2=Custom Weir/Orifice (Weir Controls 0.85 cfs @ 2.09 fps)

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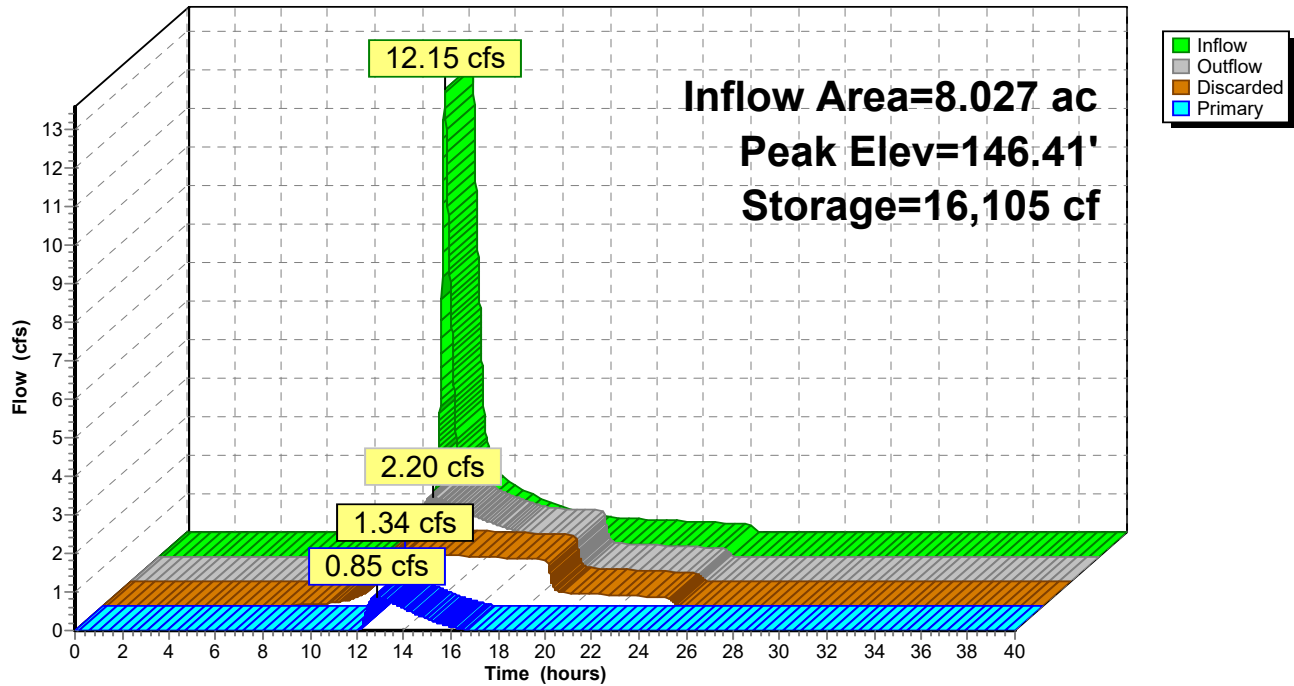
Type III 24-hr 10-YR Rainfall=4.70"

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Page 149

Pond 24P: Basin #1

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 150

Summary for Subcatchment 25P: P1j

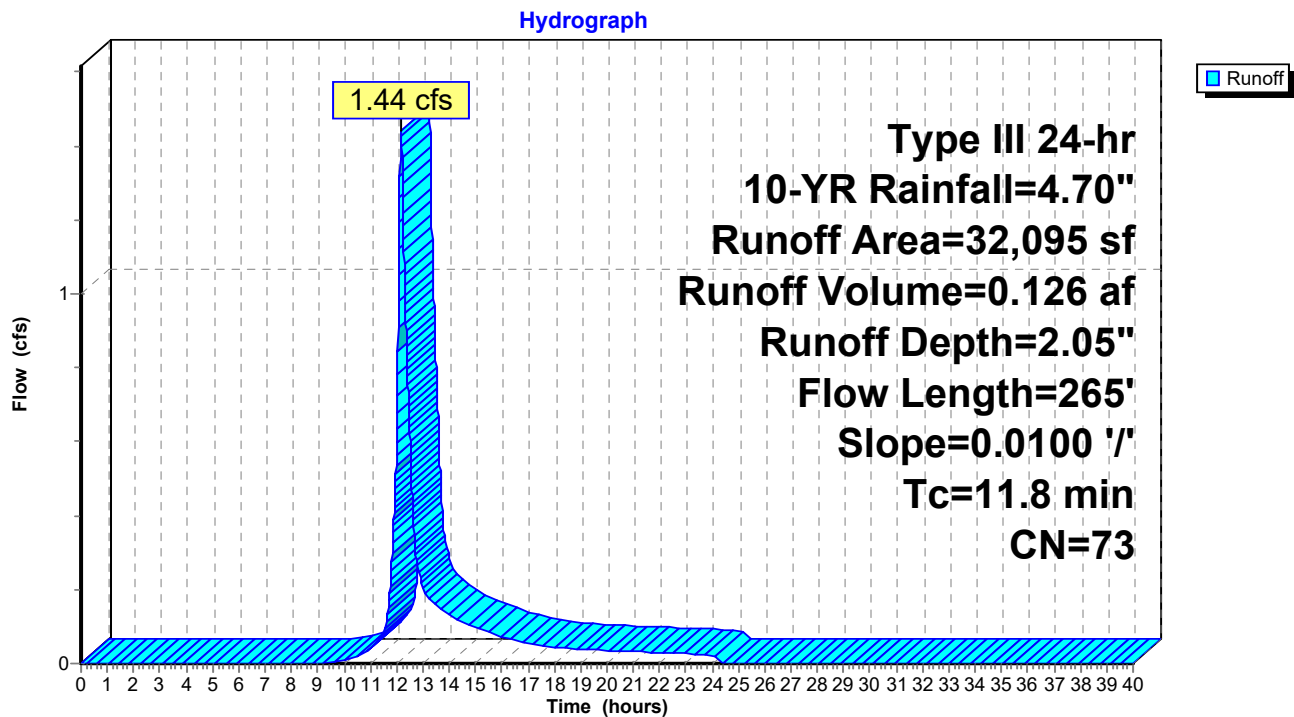
Runoff = 1.44 cfs @ 12.17 hrs, Volume= 0.126 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
5,345	98	Paved parking HSG B
9,999	61	>75% Grass cover, Good HSG B
7,290	39	>75% Grass cover, Good HSG A
2,671	98	Roofs HSG B
1,535	98	Roofs HSG A
5,255	98	Paved parking HSG A
32,095	73	Weighted Average
17,289	52	53.87% Pervious Area
14,806	98	46.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.8	33	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	190	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.8	265	Total			

Subcatchment 25P: P1j



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Page 152

Summary for Pond 26P: CB17+77a

Inflow Area = 0.737 ac, 46.13% Impervious, Inflow Depth = 2.05" for 10-YR event
Inflow = 1.44 cfs @ 12.17 hrs, Volume= 0.126 af
Outflow = 1.44 cfs @ 12.17 hrs, Volume= 0.126 af, Atten= 0%, Lag= 0.0 min
Primary = 1.44 cfs @ 12.17 hrs, Volume= 0.126 af

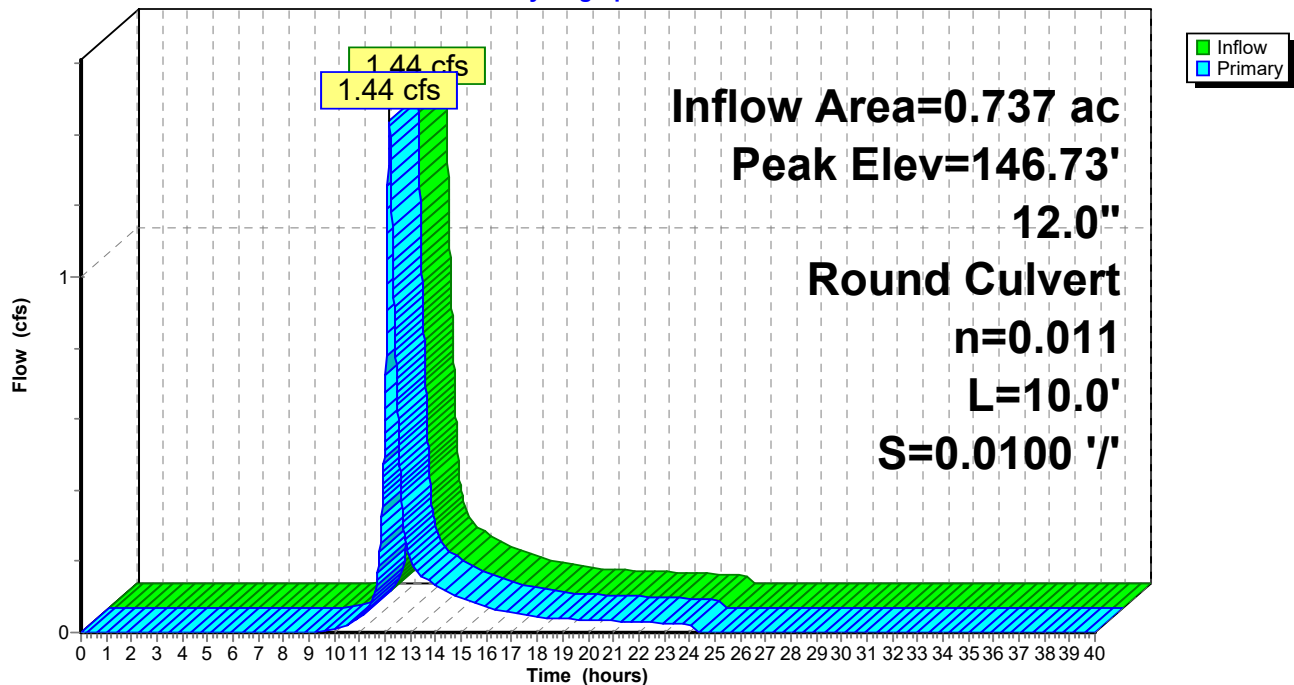
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 146.73' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	146.00'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.00' / 145.90' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.44 cfs @ 12.17 hrs HW=146.73' (Free Discharge)
↑1=Culvert (Barrel Controls 1.44 cfs @ 3.27 fps)

Pond 26P: CB17+77a

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 153

Summary for Subcatchment 27P: P1k

Runoff = 0.80 cfs @ 12.12 hrs, Volume= 0.062 af, Depth= 2.81"

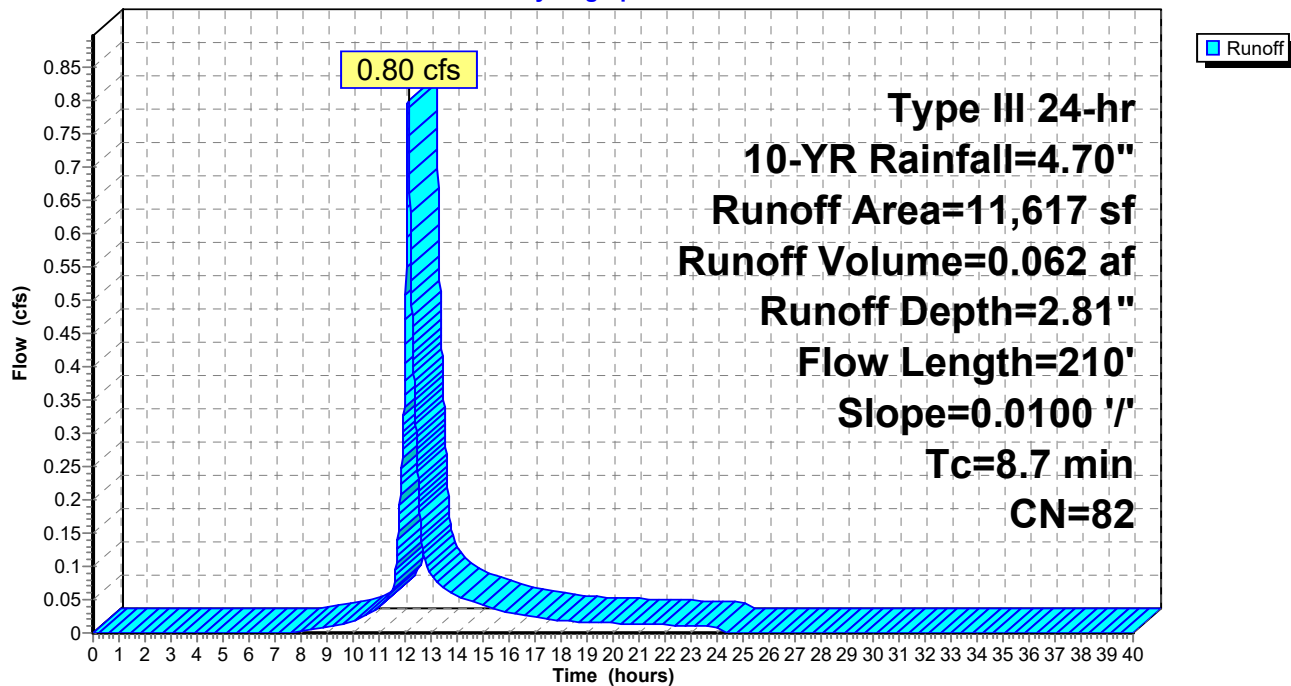
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
3,375	98	Paved parking HSG B
1,993	61	>75% Grass cover, Good HSG B
1,913	39	>75% Grass cover, Good HSG A
4,336	98	Paved parking HSG A
11,617	82	Weighted Average
3,906	50	33.62% Pervious Area
7,711	98	66.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	30	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.5	180	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
8.7	210	Total			

Subcatchment 27P: P1k

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 154

Summary for Pond 28P: CB17+77b

Inflow Area = 0.267 ac, 66.38% Impervious, Inflow Depth = 2.81" for 10-YR event
Inflow = 0.80 cfs @ 12.12 hrs, Volume= 0.062 af
Outflow = 0.80 cfs @ 12.12 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min
Primary = 0.80 cfs @ 12.12 hrs, Volume= 0.062 af

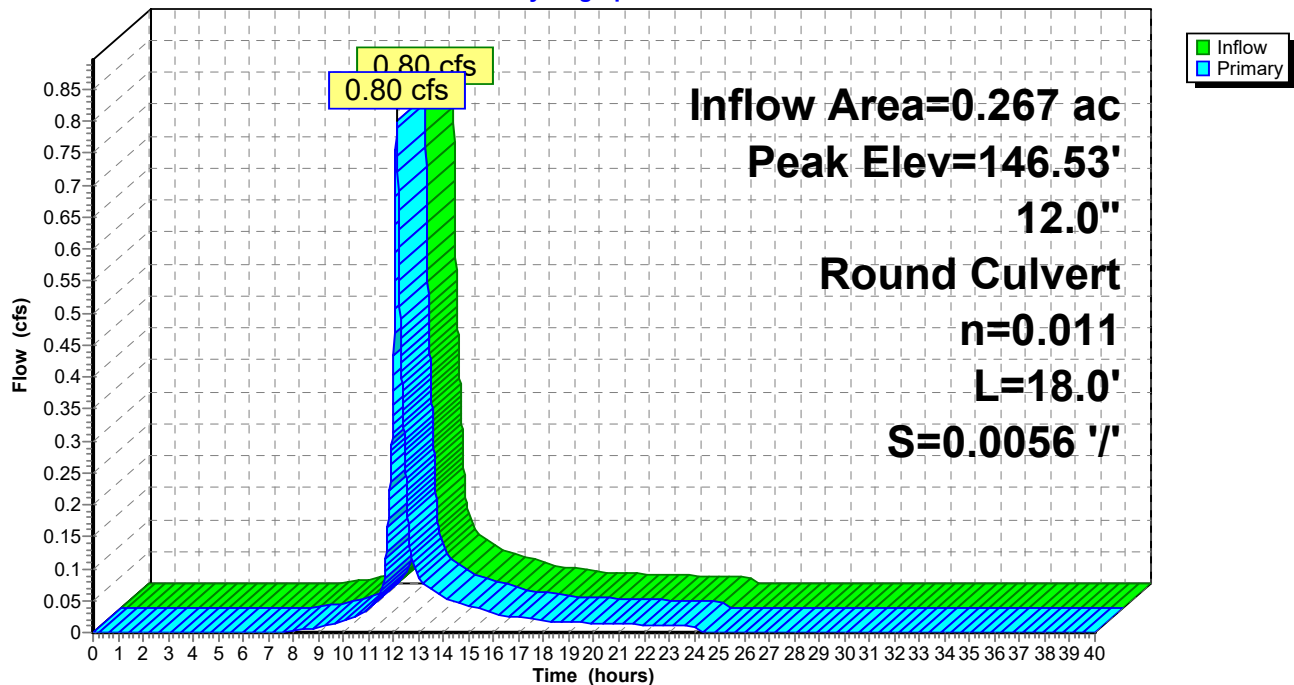
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 146.53' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	146.00'	12.0" Round Culvert L= 18.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.00' / 145.90' S= 0.0056 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.80 cfs @ 12.12 hrs HW=146.53' (Free Discharge)
↑1=Culvert (Barrel Controls 0.80 cfs @ 2.74 fps)

Pond 28P: CB17+77b

Hydrograph



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Page 155

Summary for Pond 29P: DMH17+67

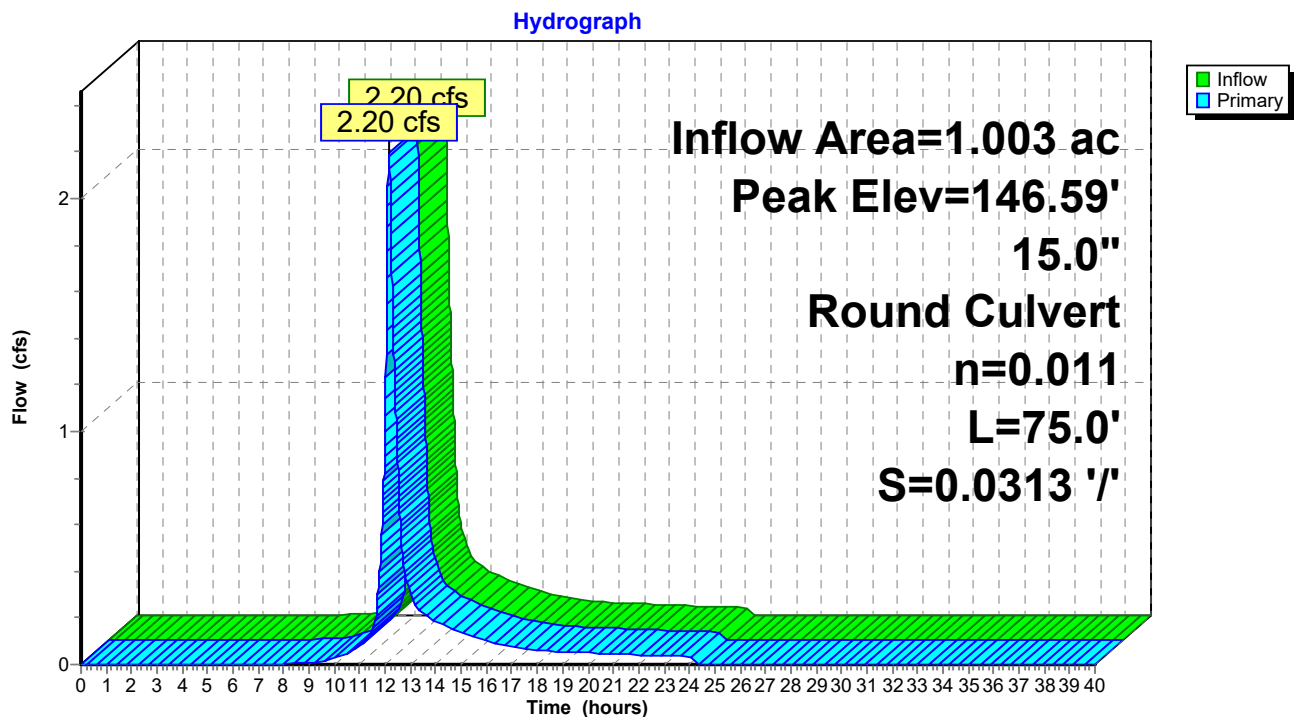
Inflow Area = 1.003 ac, 51.51% Impervious, Inflow Depth = 2.25" for 10-YR event
Inflow = 2.20 cfs @ 12.15 hrs, Volume= 0.188 af
Outflow = 2.20 cfs @ 12.15 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min
Primary = 2.20 cfs @ 12.15 hrs, Volume= 0.188 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 146.59' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	145.85'	15.0" Round Culvert L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.85' / 143.50' S= 0.0313 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=2.19 cfs @ 12.15 hrs HW=146.59' (Free Discharge)
↑1=Culvert (Inlet Controls 2.19 cfs @ 2.92 fps)

Pond 29P: DMH17+67



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 156

Summary for Subcatchment 30P: P1I

Runoff = 1.14 cfs @ 12.19 hrs, Volume= 0.148 af, Depth= 0.67"

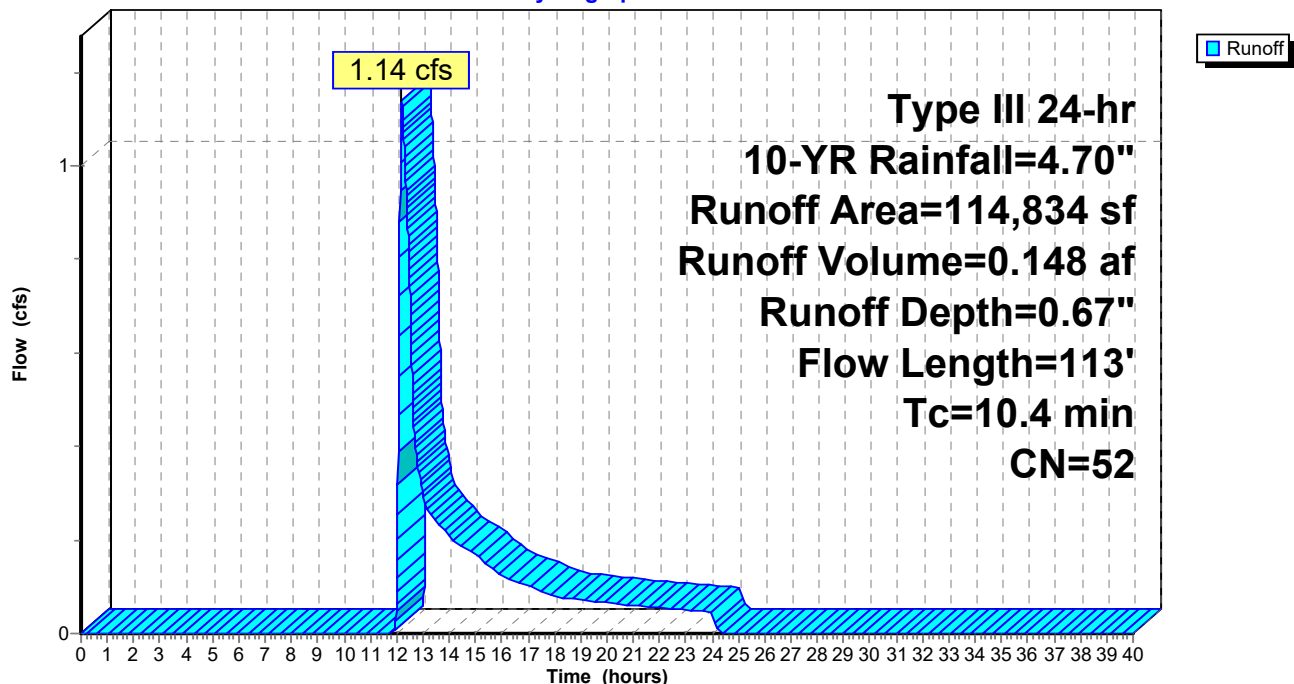
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
3,499	61	>75% Grass cover, Good HSG B
11,038	98	Water Surface HSG A
86,857	39	>75% Grass cover, Good HSG A
500	98	Paved parking HSG B
4,500	98	Paved parking HSG A
844	98	Roofs HSG B
7,596	98	Roofs HSG A
114,834	52	Weighted Average
90,356	40	78.68% Pervious Area
24,478	98	21.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.0	71	0.0550	1.17		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
10.4	113	Total			

Subcatchment 30P: P1I

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 157

Summary for Subcatchment 31P: P1m

Runoff = 1.90 cfs @ 12.16 hrs, Volume= 0.162 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
16,597	39	>75% Grass cover, Good HSG A
3,917	61	>75% Grass cover, Good HSG B
865	98	Roofs HSG B
3,773	98	Roofs HSG A
3,473	98	Paved parking HSG B
14,437	98	Paved parking HSG A
43,062	72	Weighted Average
20,514	43	47.64% Pervious Area
22,548	98	52.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	12	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	144	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.9	198	Total			

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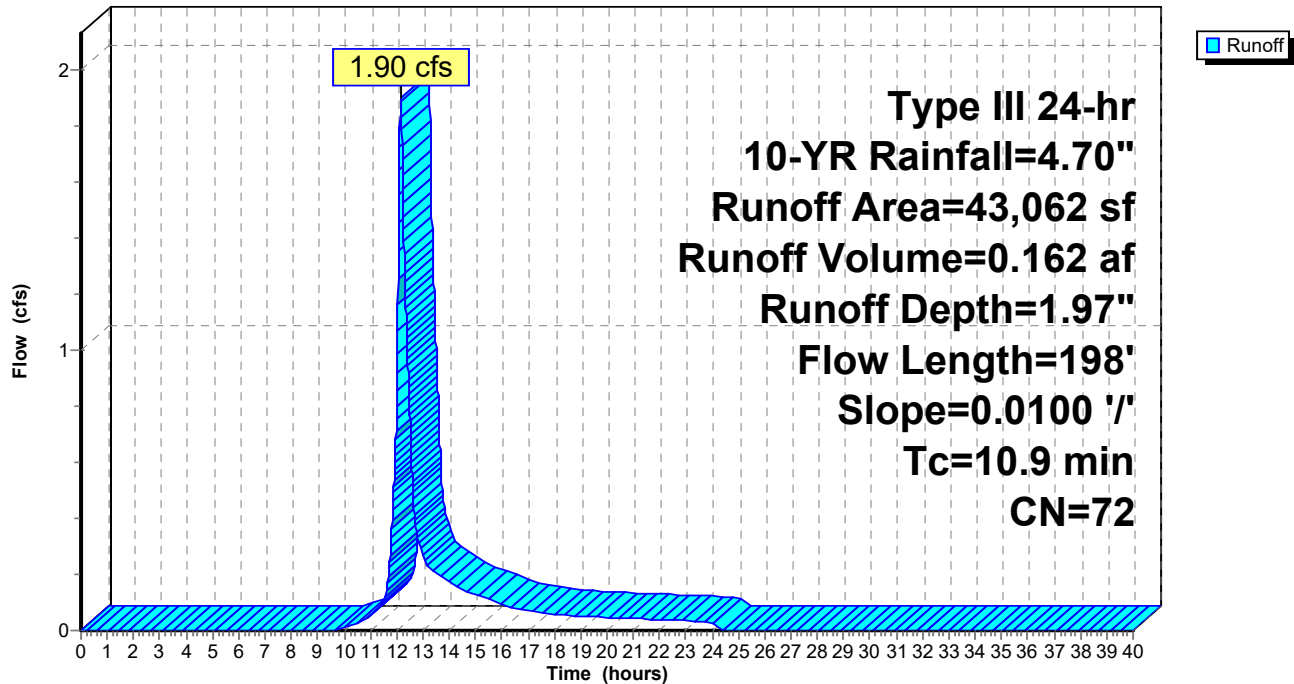
Type III 24-hr 10-YR Rainfall=4.70"

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Page 158

Subcatchment 31P: P1m

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 159

Summary for Pond 32P: CB3+67a

Inflow Area = 0.989 ac, 52.36% Impervious, Inflow Depth = 1.97" for 10-YR event
Inflow = 1.90 cfs @ 12.16 hrs, Volume= 0.162 af
Outflow = 1.90 cfs @ 12.16 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min
Primary = 1.90 cfs @ 12.16 hrs, Volume= 0.162 af

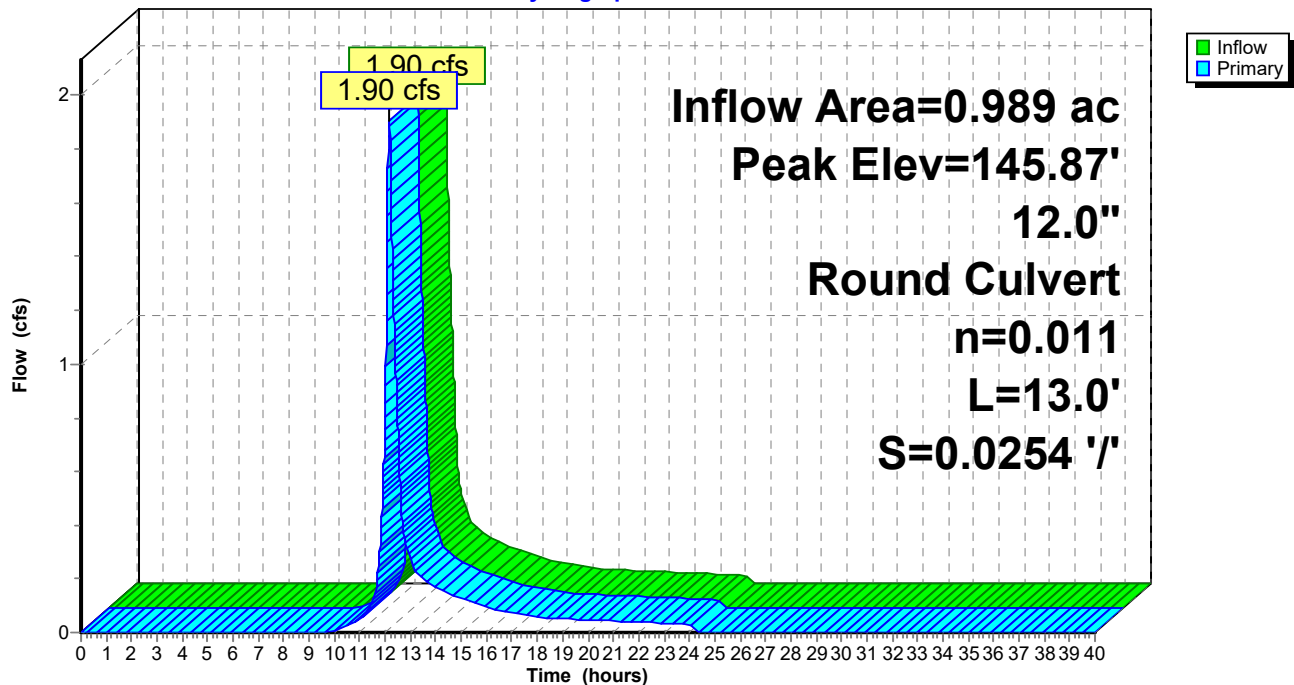
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.87' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	145.11'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.11' / 144.78' S= 0.0254 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.90 cfs @ 12.16 hrs HW=145.87' (Free Discharge)
↑**1=Culvert** (Inlet Controls 1.90 cfs @ 2.97 fps)

Pond 32P: CB3+67a

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 160

Summary for Subcatchment 33P: P1n

Runoff = 2.07 cfs @ 12.15 hrs, Volume= 0.175 af, Depth= 2.05"

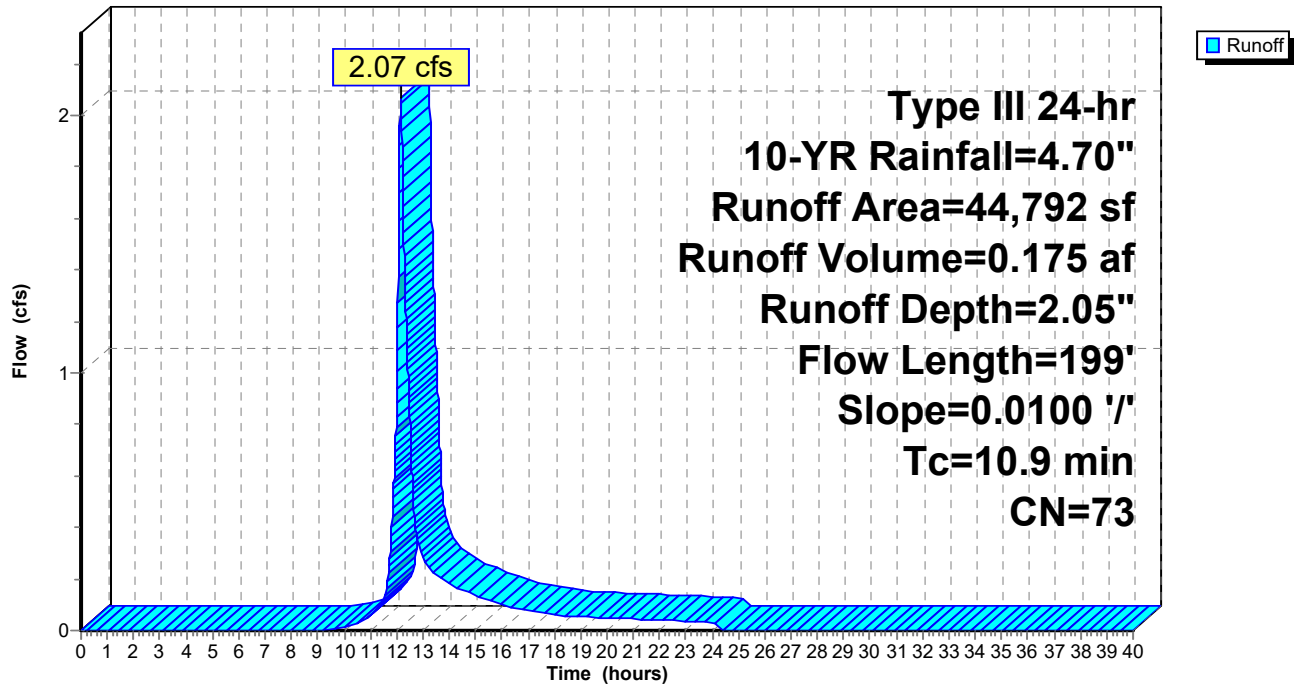
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
3,458	61	>75% Grass cover, Good HSG B
16,849	39	>75% Grass cover, Good HSG A
4,323	98	Roofs HSG A
1,422	98	Roofs HSG B
13,944	98	Paved parking HSG A
4,796	98	Paved parking HSG B
44,792	73	Weighted Average
20,307	43	45.34% Pervious Area
24,485	98	54.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	144	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.9	199	Total			

Subcatchment 33P: P1n

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 162

Summary for Pond 34P: CB3+67b

Inflow Area = 1.028 ac, 54.66% Impervious, Inflow Depth = 2.05" for 10-YR event
Inflow = 2.07 cfs @ 12.15 hrs, Volume= 0.175 af
Outflow = 2.07 cfs @ 12.15 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.0 min
Primary = 2.07 cfs @ 12.15 hrs, Volume= 0.175 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.91' @ 12.15 hrs

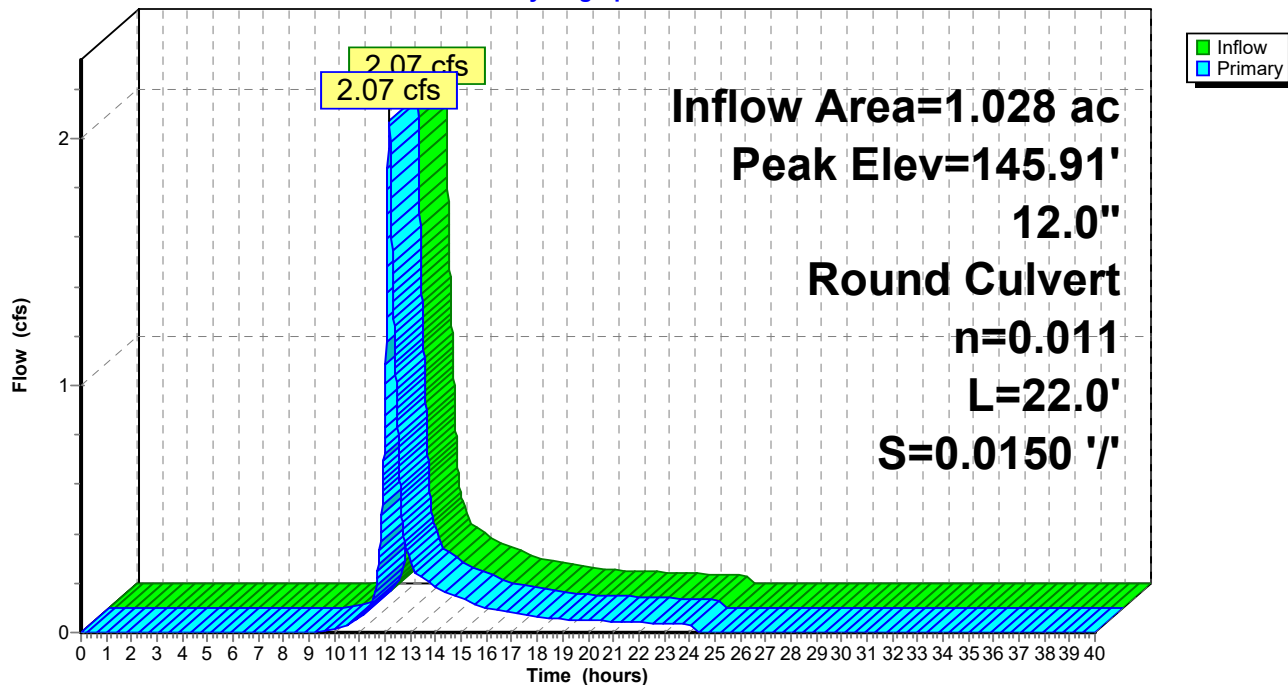
Device	Routing	Invert	Outlet Devices
#1	Primary	145.11'	12.0" Round Culvert L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.11' / 144.78' S= 0.0150 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.07 cfs @ 12.15 hrs HW=145.91' (Free Discharge)

↑1=Culvert (Inlet Controls 2.07 cfs @ 3.05 fps)

Pond 34P: CB3+67b

Hydrograph



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Page 163

Summary for Pond 35P: DMH3+50

Inflow Area = 2.017 ac, 53.54% Impervious, Inflow Depth = 2.01" for 10-YR event
Inflow = 3.97 cfs @ 12.15 hrs, Volume= 0.338 af
Outflow = 3.97 cfs @ 12.15 hrs, Volume= 0.338 af, Atten= 0%, Lag= 0.0 min
Primary = 3.97 cfs @ 12.15 hrs, Volume= 0.338 af

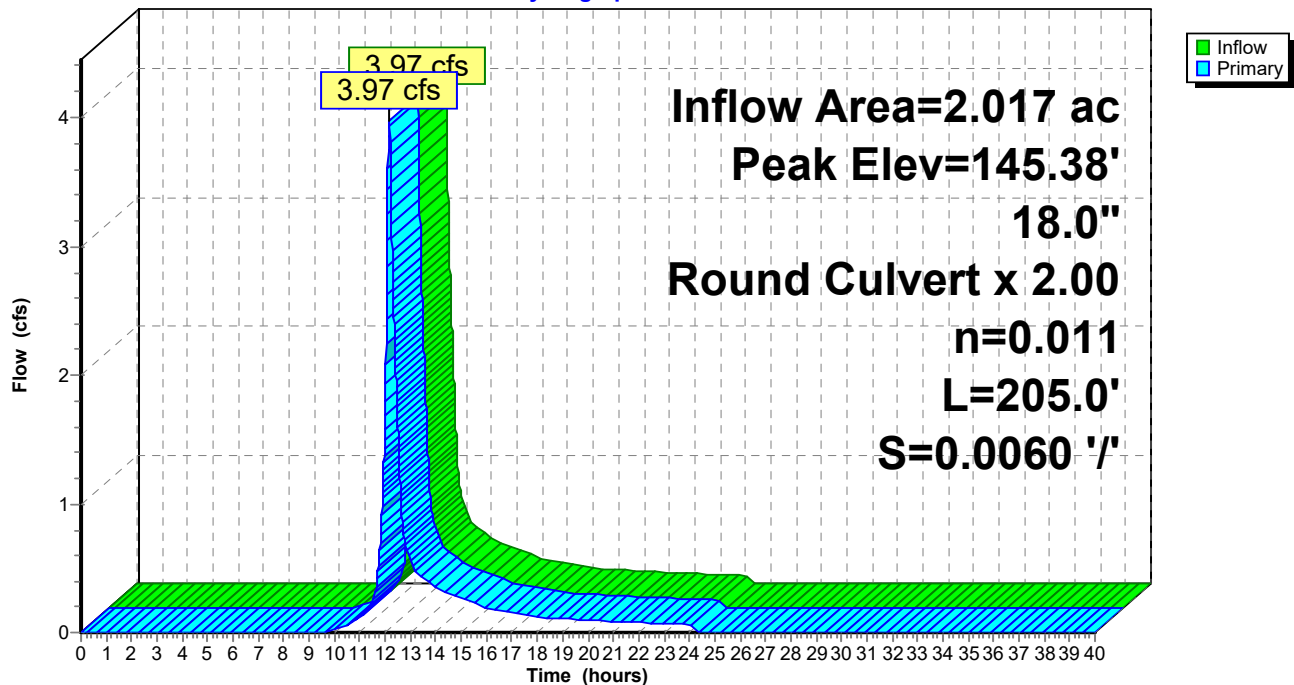
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.38' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.73'	18.0" Round Culvert X 2.00 L= 205.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.73' / 143.50' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=3.97 cfs @ 12.15 hrs HW=145.38' (Free Discharge)
↑1=Culvert (Barrel Controls 3.97 cfs @ 4.00 fps)

Pond 35P: DMH3+50

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 164

Summary for Pond 36P: Basin #2

Inflow Area = 5.657 ac, 38.16% Impervious, Inflow Depth = 1.43" for 10-YR event
 Inflow = 7.25 cfs @ 12.16 hrs, Volume= 0.674 af
 Outflow = 2.40 cfs @ 12.58 hrs, Volume= 0.674 af, Atten= 67%, Lag= 25.3 min
 Discarded = 2.40 cfs @ 12.58 hrs, Volume= 0.674 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 143.97' @ 12.58 hrs Surf.Area= 12,534 sf Storage= 5,593 cf

Plug-Flow detention time= 13.9 min calculated for 0.674 af (100% of inflow)
 Center-of-Mass det. time= 13.9 min (875.0 - 861.2)

Volume	Invert	Avail.Storage	Storage Description
#1	143.50'	48,638 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
143.50	11,051	875.0	0	0	11,051
146.50	21,996	950.0	48,638	48,638	22,282

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.50'	8.270 in/hr Exfiltration over Surface area
#2	Primary	144.50'	15.0" Round Culvert L= 220.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.50' / 143.00' S= 0.0068 '/' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Discarded OutFlow Max=2.40 cfs @ 12.58 hrs HW=143.97' (Free Discharge)

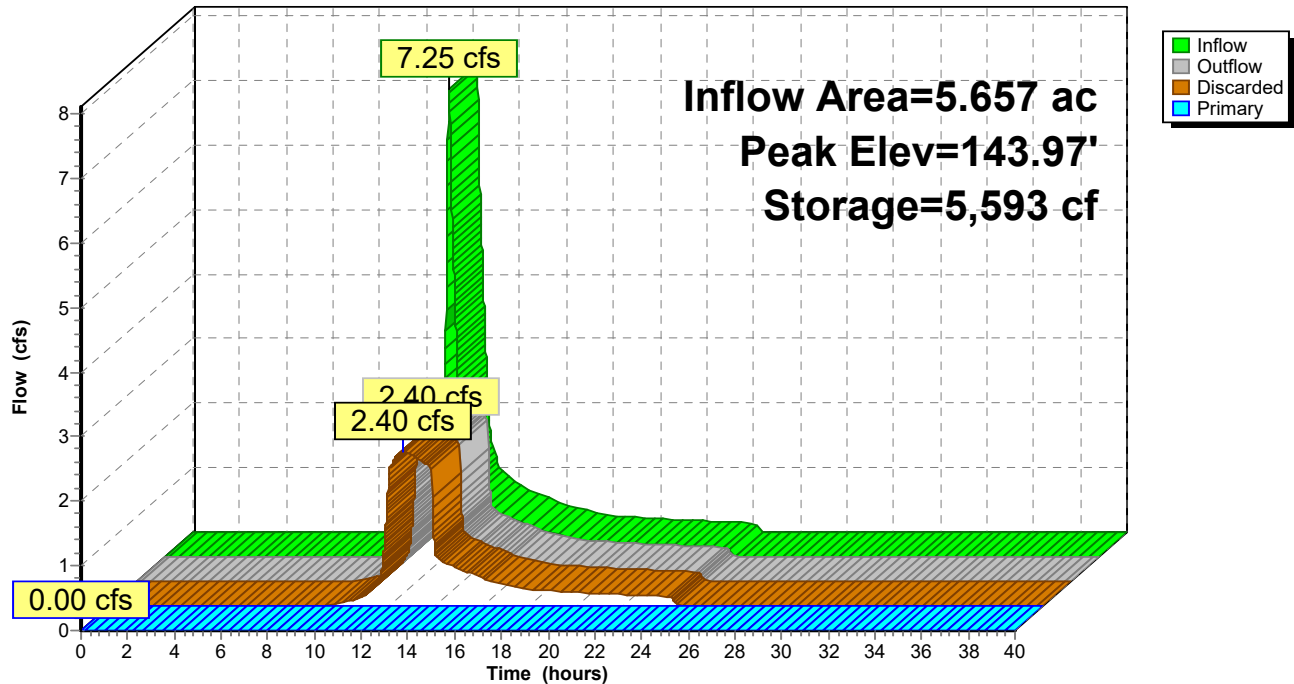
↑**1=Exfiltration** (Exfiltration Controls 2.40 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=143.50' (Free Discharge)

↑**2=Culvert** (Controls 0.00 cfs)

Pond 36P: Basin #2

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 166

Summary for Subcatchment 37P: P1q

Runoff = 18.49 cfs @ 12.37 hrs, Volume= 2.314 af, Depth= 1.32"

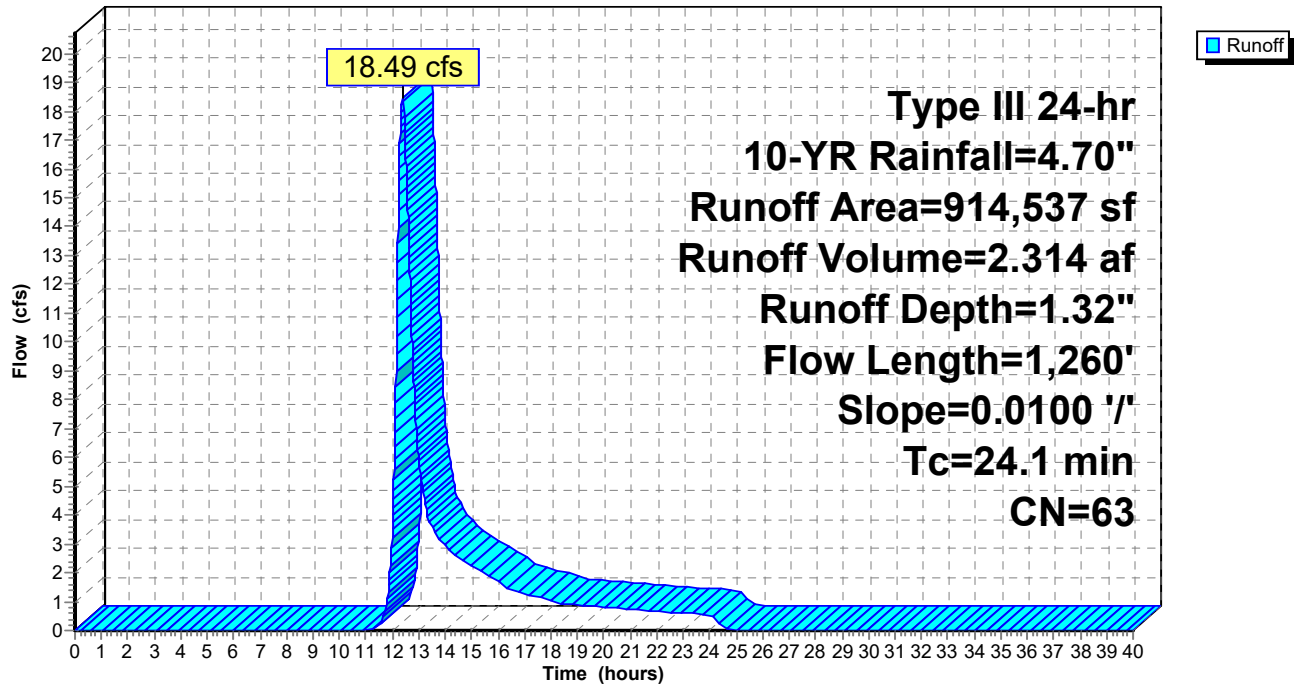
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
22,240	98	Paved parking HSG B
215	80	>75% Grass cover, Good HSG D
98,766	61	>75% Grass cover, Good HSG B
127,688	39	>75% Grass cover, Good HSG A
24,404	98	Paved parking HSG A
6,082	98	Roofs HSG B
16,041	98	Roofs HSG A
145,280	30	Woods, Good HSG A
55,658	55	Woods, Good HSG B
418,163	77	Woods, Good HSG D
914,537	63	Weighted Average
845,770	60	92.48% Pervious Area
68,767	98	7.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,035	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
24.1	1,260	Total			

Subcatchment 37P: P1q

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 168

Summary for Pond 38P: Wetland Storage

Inflow Area = 20.995 ac, 7.52% Impervious, Inflow Depth = 1.32" for 10-YR event
 Inflow = 18.49 cfs @ 12.37 hrs, Volume= 2.314 af
 Outflow = 1.99 cfs @ 15.45 hrs, Volume= 2.188 af, Atten= 89%, Lag= 184.4 min
 Primary = 1.99 cfs @ 15.45 hrs, Volume= 2.188 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.16' @ 15.45 hrs Surf.Area= 215,269 sf Storage= 51,979 cf

Plug-Flow detention time= 425.8 min calculated for 2.187 af (95% of inflow)
 Center-of-Mass det. time= 397.4 min (1,284.9 - 887.5)

Volume	Invert	Avail.Storage	Storage Description
#1	145.20'	133,865 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.20	30	18.0	0	0	30
145.70	60	30.0	22	22	77
146.00	195,920	2,713.0	19,941	19,963	585,725
146.50	261,254	2,891.0	113,902	133,865	665,117

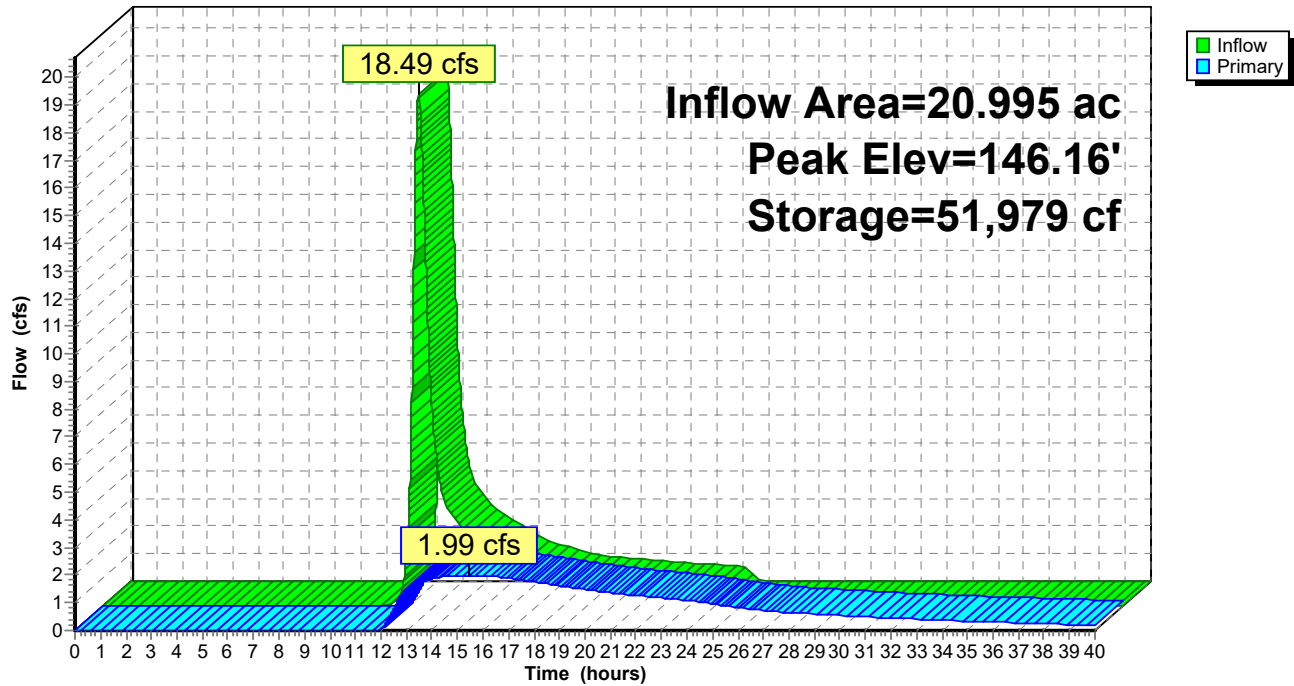
Device	Routing	Invert	Outlet Devices
#1	Primary	145.80'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 145.80 146.00 146.00 146.50 Width (feet) 2.00 2.00 5.00 5.00

Primary OutFlow Max=1.99 cfs @ 15.45 hrs HW=146.16' (Free Discharge)

↑1=Custom Weir/Orifice (Weir Controls 1.99 cfs @ 1.69 fps)

Pond 38P: Wetland Storage

Hydrograph



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Page 170

Summary for Subcatchment 39P: P1r

Runoff = 0.70 cfs @ 12.59 hrs, Volume= 0.256 af, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
20,944	61	>75% Grass cover, Good HSG B
100,043	39	>75% Grass cover, Good HSG A
1,653	98	Roofs HSG B
7,805	98	Roofs HSG A
4,592	98	Paved parking HSG A
433	98	Paved parking HSG B
267,267	30	Woods, Good HSG A
158,590	55	Woods, Good HSG B
561,327	42	Weighted Average
546,844	40	97.42% Pervious Area
14,483	98	2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	343	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
17.4	368	Total			

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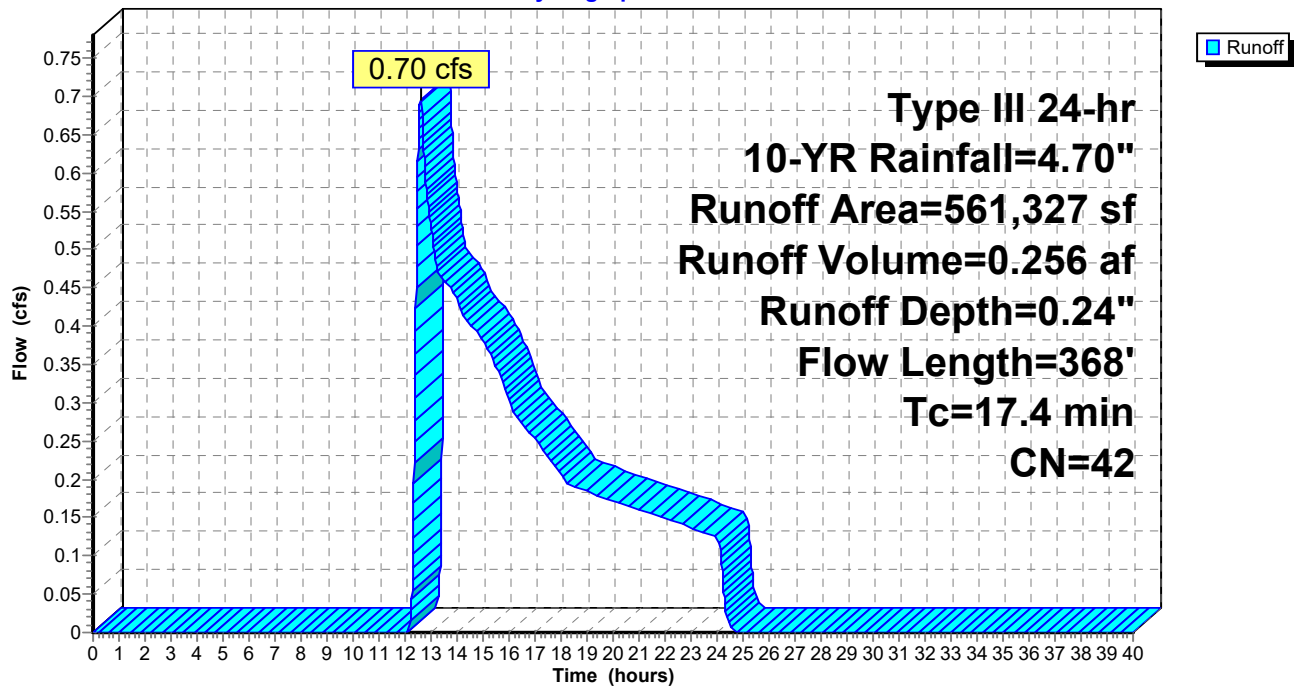
Type III 24-hr 10-YR Rainfall=4.70"

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Page 171

Subcatchment 39P: P1r

Hydrograph

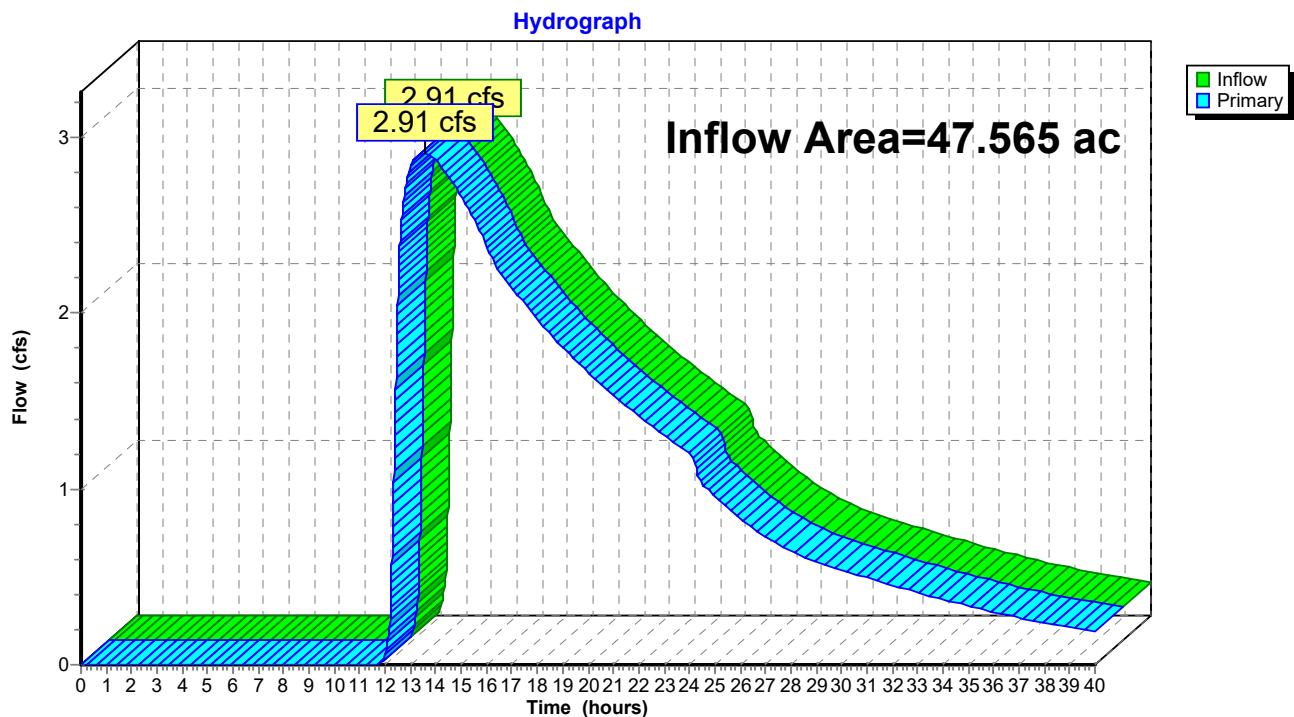


Summary for Link 40P: Design Point #1: Flow to Western Wetlands

Inflow Area = 47.565 ac, 15.02% Impervious, Inflow Depth > 0.66" for 10-YR event
 Inflow = 2.91 cfs @ 13.59 hrs, Volume= 2.600 af
 Primary = 2.91 cfs @ 13.59 hrs, Volume= 2.600 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 40P: Design Point #1: Flow to Western Wetlands



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 173

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1P: P1a

Runoff Area=8,961 sf 99.73% Impervious Runoff Depth=5.86"
Flow Length=474' Tc=14.6 min CN=98 Runoff=0.95 cfs 0.100 af

Pond 2P: CB5+06a

Peak Elev=149.60' Inflow=0.95 cfs 0.100 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0177 ' Outflow=0.95 cfs 0.100 af

Subcatchment3P: P1b

Runoff Area=48,701 sf 27.64% Impervious Runoff Depth=1.66"
Flow Length=473' Slope=0.0100 ' Tc=6.0 min CN=56 Runoff=1.97 cfs 0.154 af

Pond 4P: CB5+06b

Peak Elev=149.93' Inflow=1.97 cfs 0.154 af
12.0" Round Culvert n=0.011 L=21.0' S=0.0110 ' Outflow=1.97 cfs 0.154 af

Pond 5P: DMH5+22

Peak Elev=149.71' Inflow=2.74 cfs 0.255 af
15.0" Round Culvert n=0.011 L=88.0' S=0.0060 ' Outflow=2.74 cfs 0.255 af

Pond 6P: DMH6+13

Peak Elev=149.09' Inflow=2.74 cfs 0.255 af
15.0" Round Culvert n=0.011 L=209.0' S=0.0060 ' Outflow=2.74 cfs 0.255 af

Subcatchment7P: P1c

Runoff Area=19,485 sf 49.68% Impervious Runoff Depth=2.79"
Flow Length=193' Slope=0.0100 ' Tc=11.0 min CN=69 Runoff=1.23 cfs 0.104 af

Pond 8P: CB8+10a

Peak Elev=147.80' Inflow=1.23 cfs 0.104 af
12.0" Round Culvert n=0.011 L=12.0' S=0.0175 ' Outflow=1.23 cfs 0.104 af

Subcatchment9P: P1d

Runoff Area=15,346 sf 57.18% Impervious Runoff Depth=3.97"
Flow Length=194' Slope=0.0100 ' Tc=10.6 min CN=81 Runoff=1.40 cfs 0.117 af

Pond 10P: CB8+10b

Peak Elev=147.87' Inflow=1.40 cfs 0.117 af
12.0" Round Culvert n=0.011 L=19.0' S=0.0111 ' Outflow=1.40 cfs 0.117 af

Pond 11P: DMH8+20

Peak Elev=148.11' Inflow=5.28 cfs 0.475 af
18.0" Round Culvert n=0.011 L=161.0' S=0.0061 ' Outflow=5.28 cfs 0.475 af

Pond 12P: DMH1a

Peak Elev=147.22' Inflow=5.28 cfs 0.475 af
18.0" Round Culvert n=0.011 L=35.0' S=0.0060 ' Outflow=5.28 cfs 0.475 af

Subcatchment13P: P1e

Runoff Area=37,107 sf 49.02% Impervious Runoff Depth=3.37"
Flow Length=331' Slope=0.0100 ' Tc=12.0 min CN=75 Runoff=2.76 cfs 0.239 af

Pond 14P: CB12+15a

Peak Elev=148.96' Inflow=2.76 cfs 0.239 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0100 ' Outflow=2.76 cfs 0.239 af

Subcatchment15P: P1f

Runoff Area=35,775 sf 48.96% Impervious Runoff Depth=3.37"
Flow Length=280' Slope=0.0100 ' Tc=11.5 min CN=75 Runoff=2.70 cfs 0.230 af

Pond 16P: CB12+15b

Peak Elev=148.94' Inflow=2.70 cfs 0.230 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0100 ' Outflow=2.70 cfs 0.230 af

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Page 174

Pond 17P: DMH11+45Peak Elev=149.08' Inflow=5.46 cfs 0.470 af
15.0" Round Culvert n=0.011 L=155.0' S=0.0123 '/' Outflow=5.46 cfs 0.470 af**Subcatchment18P: P1g**Runoff Area=42,623 sf 52.76% Impervious Runoff Depth=2.88"
Flow Length=313' Slope=0.0100 '/' Tc=12.1 min CN=70 Runoff=2.69 cfs 0.235 af**Pond 19P: CB2+70a**Peak Elev=148.05' Inflow=2.69 cfs 0.235 af
15.0" Round Culvert n=0.011 L=24.0' S=0.0125 '/' Outflow=2.69 cfs 0.235 af**Subcatchment20P: P1h**Runoff Area=45,838 sf 53.76% Impervious Runoff Depth=2.98"
Flow Length=301' Slope=0.0100 '/' Tc=11.7 min CN=71 Runoff=3.03 cfs 0.261 af**Pond 21P: CB2+70b**Peak Elev=148.17' Inflow=3.03 cfs 0.261 af
15.0" Round Culvert n=0.011 L=30.0' S=0.0083 '/' Outflow=3.03 cfs 0.261 af**Pond 22P: DMH2+40**Peak Elev=147.69' Inflow=5.72 cfs 0.497 af
18.0" Round Culvert x 2.00 n=0.011 L=199.0' S=0.0060 '/' Outflow=5.72 cfs 0.497 af**Subcatchment23P: P1i**Runoff Area=95,819 sf 10.70% Impervious Runoff Depth=1.82"
Flow Length=110' Tc=10.1 min CN=58 Runoff=3.78 cfs 0.334 af**Pond 24P: Basin #1**Peak Elev=146.79' Storage=25,538 cf Inflow=20.10 cfs 1.775 af
Discarded=1.43 cfs 1.207 af Primary=4.30 cfs 0.568 af Outflow=5.73 cfs 1.775 af**Subcatchment25P: P1j**Runoff Area=32,095 sf 46.13% Impervious Runoff Depth=3.17"
Flow Length=265' Slope=0.0100 '/' Tc=11.8 min CN=73 Runoff=2.26 cfs 0.195 af**Pond 26P: CB17+77a**Peak Elev=146.98' Inflow=2.26 cfs 0.195 af
12.0" Round Culvert n=0.011 L=10.0' S=0.0100 '/' Outflow=2.26 cfs 0.195 af**Subcatchment27P: P1k**Runoff Area=11,617 sf 66.38% Impervious Runoff Depth=4.08"
Flow Length=210' Slope=0.0100 '/' Tc=8.7 min CN=82 Runoff=1.15 cfs 0.091 af**Pond 28P: CB17+77b**Peak Elev=146.66' Inflow=1.15 cfs 0.091 af
12.0" Round Culvert n=0.011 L=18.0' S=0.0056 '/' Outflow=1.15 cfs 0.091 af**Pond 29P: DMH17+67**Peak Elev=146.81' Inflow=3.35 cfs 0.285 af
15.0" Round Culvert n=0.011 L=75.0' S=0.0313 '/' Outflow=3.35 cfs 0.285 af**Subcatchment30P: P1l**Runoff Area=114,834 sf 21.32% Impervious Runoff Depth=1.34"
Flow Length=113' Tc=10.4 min CN=52 Runoff=2.99 cfs 0.295 af**Subcatchment31P: P1m**Runoff Area=43,062 sf 52.36% Impervious Runoff Depth=3.08"
Flow Length=198' Slope=0.0100 '/' Tc=10.9 min CN=72 Runoff=3.02 cfs 0.253 af**Pond 32P: CB3+67a**Peak Elev=146.25' Inflow=3.02 cfs 0.253 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0254 '/' Outflow=3.02 cfs 0.253 af**Subcatchment33P: P1n**Runoff Area=44,792 sf 54.66% Impervious Runoff Depth=3.17"
Flow Length=199' Slope=0.0100 '/' Tc=10.9 min CN=73 Runoff=3.25 cfs 0.272 af**Pond 34P: CB3+67b**Peak Elev=146.35' Inflow=3.25 cfs 0.272 af
12.0" Round Culvert n=0.011 L=22.0' S=0.0150 '/' Outflow=3.25 cfs 0.272 af

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Page 175

Pond 35P: DMH3+50

Peak Elev=145.57' Inflow=6.27 cfs 0.525 af
18.0" Round Culvert x 2.00 n=0.011 L=205.0' S=0.0060 '/' Outflow=6.27 cfs 0.525 af

Pond 36P: Basin #2

Peak Elev=144.53' Storage=13,134 cf Inflow=12.57 cfs 1.105 af
Discarded=2.76 cfs 1.105 af Primary=0.01 cfs 0.000 af Outflow=2.76 cfs 1.105 af

Subcatchment37P: P1q

Runoff Area=914,537 sf 7.52% Impervious Runoff Depth=2.25"
Flow Length=1,260' Slope=0.0100 '/' Tc=24.1 min CN=63 Runoff=33.25 cfs 3.931 af

Pond 38P: Wetland Storage

Peak Elev=146.31' Storage=86,071 cf Inflow=33.25 cfs 3.931 af
Outflow=4.04 cfs 3.758 af

Subcatchment39P: P1r

Runoff Area=561,327 sf 2.58% Impervious Runoff Depth=0.65"
Flow Length=368' Tc=17.4 min CN=42 Runoff=3.78 cfs 0.698 af

Link 40P: Design Point #1: Flow to Western Wetlands

Inflow=9.96 cfs 5.024 af
Primary=9.96 cfs 5.024 af

Total Runoff Area = 47.565 ac Runoff Volume = 7.509 af Average Runoff Depth = 1.89"
84.98% Pervious = 40.420 ac 15.02% Impervious = 7.145 ac

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Page 176

Summary for Subcatchment 1P: P1a

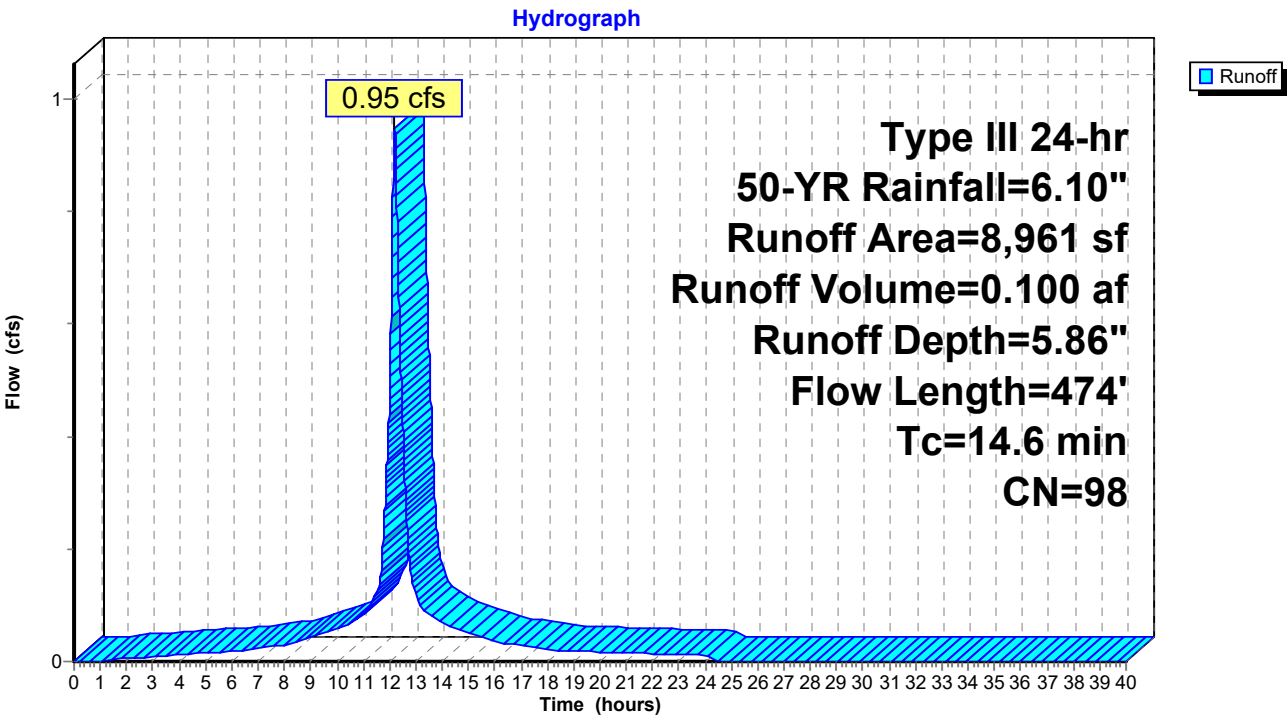
Runoff = 0.95 cfs @ 12.19 hrs, Volume= 0.100 af, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
9	61	>75% Grass cover, Good HSG B
1	80	>75% Grass cover, Good HSG D
2,432	98	Paved parking HSG B
553	98	Paved parking HSG D
5,952	98	Paved parking HSG A
14	39	>75% Grass cover, Good HSG A
8,961	98	Weighted Average
24	49	0.27% Pervious Area
8,937	98	99.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
2.8	142	0.0150	0.86		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.4	290	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
14.6	474	Total			

Subcatchment 1P: P1a



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 178

Summary for Pond 2P: CB5+06a

Inflow Area = 0.206 ac, 99.73% Impervious, Inflow Depth = 5.86" for 50-YR event
Inflow = 0.95 cfs @ 12.19 hrs, Volume= 0.100 af
Outflow = 0.95 cfs @ 12.19 hrs, Volume= 0.100 af, Atten= 0%, Lag= 0.0 min
Primary = 0.95 cfs @ 12.19 hrs, Volume= 0.100 af

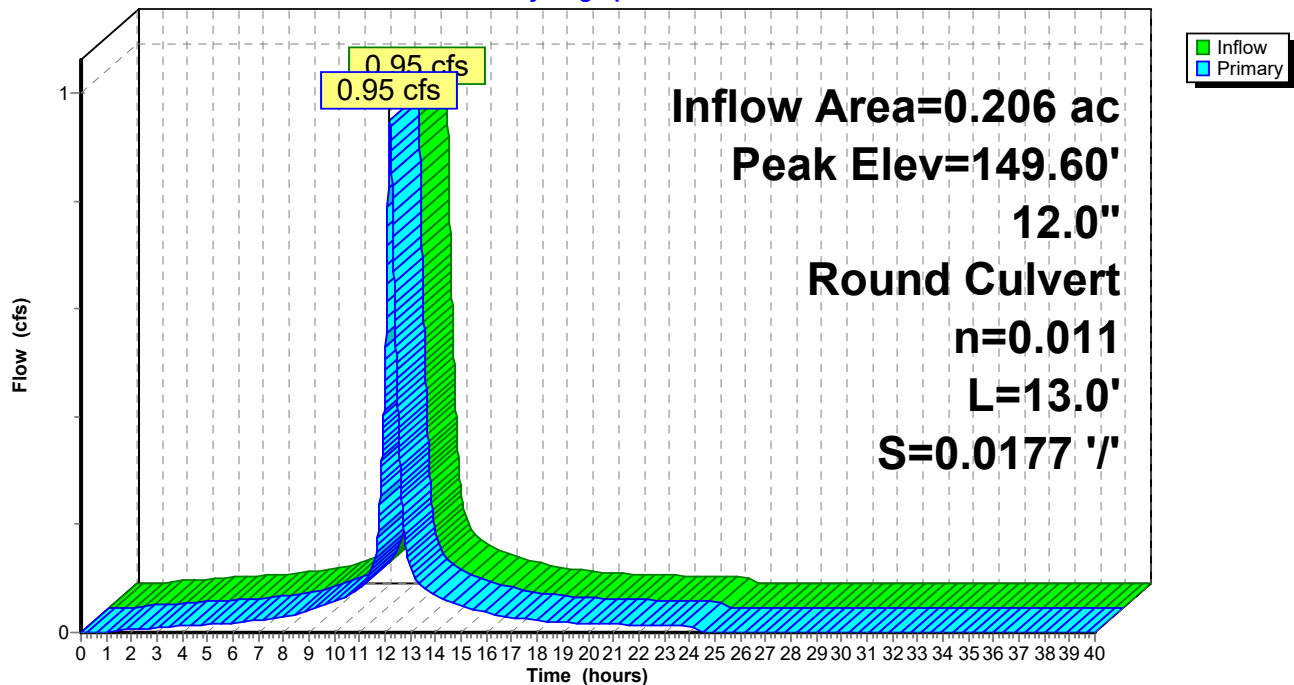
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.60' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	149.10'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 149.10' / 148.87' S= 0.0177 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.95 cfs @ 12.19 hrs HW=149.60' (Free Discharge)
↑1=Culvert (Barrel Controls 0.95 cfs @ 3.49 fps)

Pond 2P: CB5+06a

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 179

Summary for Subcatchment 3P: P1b

Runoff = 1.97 cfs @ 12.10 hrs, Volume= 0.154 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
828	61	>75% Grass cover, Good HSG B
174	80	>75% Grass cover, Good HSG D
3,006	98	Paved parking HSG B
915	98	Paved parking HSG D
34,195	39	>75% Grass cover, Good HSG A
1,263	98	Roofs HSG A
8,276	98	Paved parking HSG A
44	30	Woods, Good HSG A
0	55	Woods, Good HSG B
48,701	56	Weighted Average
35,241	40	72.36% Pervious Area
13,460	98	27.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0100	1.30		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.4	173	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.3	473	Total, Increased to minimum Tc = 6.0 min			

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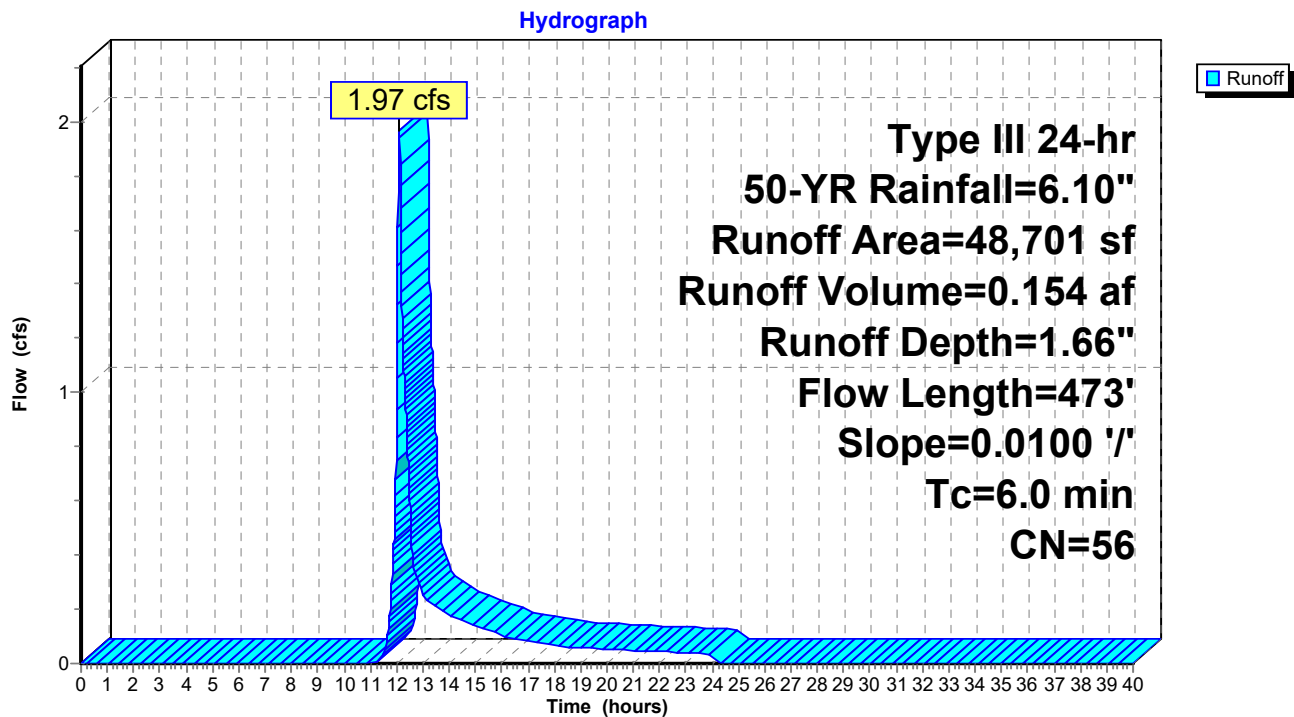
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Type III 24-hr 50-YR Rainfall=6.10"

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Page 180

Subcatchment 3P: P1b



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 181

Summary for Pond 4P: CB5+06b

Inflow Area = 1.118 ac, 27.64% Impervious, Inflow Depth = 1.66" for 50-YR event
Inflow = 1.97 cfs @ 12.10 hrs, Volume= 0.154 af
Outflow = 1.97 cfs @ 12.10 hrs, Volume= 0.154 af, Atten= 0%, Lag= 0.0 min
Primary = 1.97 cfs @ 12.10 hrs, Volume= 0.154 af

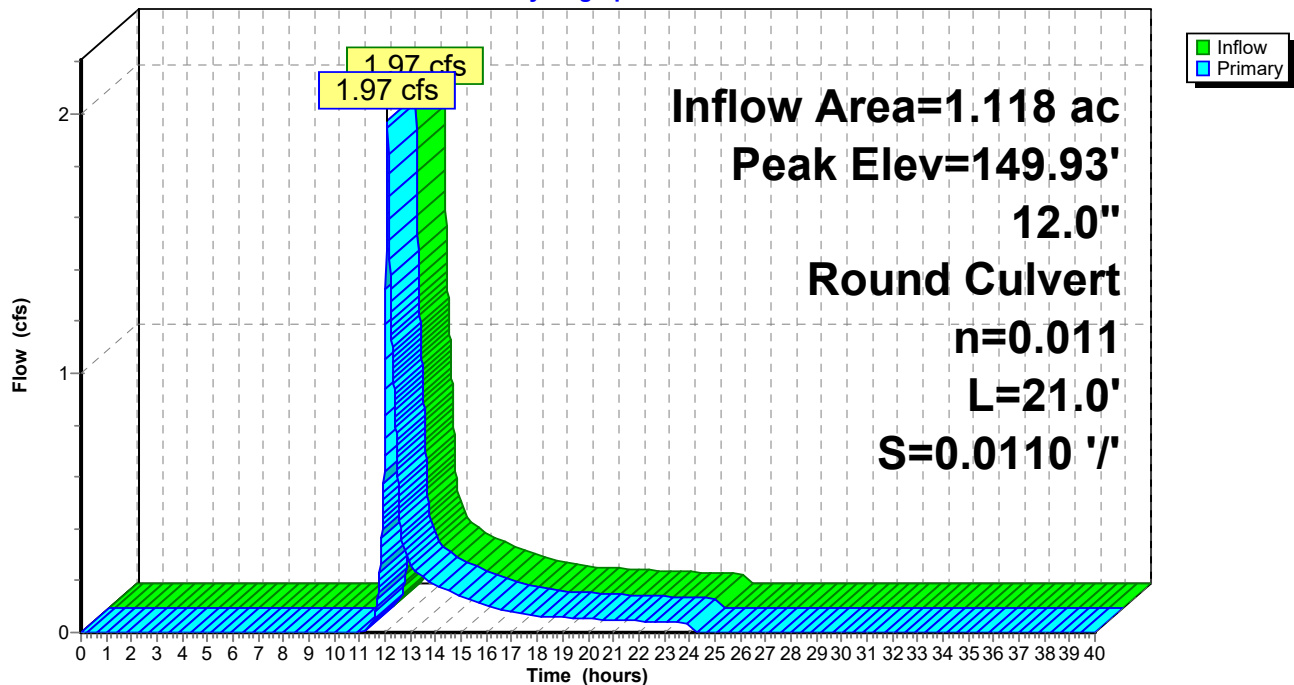
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.93' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	149.10'	12.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 149.10' / 148.87' S= 0.0110 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.97 cfs @ 12.10 hrs HW=149.93' (Free Discharge)
↑1=Culvert (Barrel Controls 1.97 cfs @ 3.85 fps)

Pond 4P: CB5+06b

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 182

Summary for Pond 5P: DMH5+22

Inflow Area = 1.324 ac, 38.84% Impervious, Inflow Depth = 2.31" for 50-YR event
Inflow = 2.74 cfs @ 12.11 hrs, Volume= 0.255 af
Outflow = 2.74 cfs @ 12.11 hrs, Volume= 0.255 af, Atten= 0%, Lag= 0.0 min
Primary = 2.74 cfs @ 12.11 hrs, Volume= 0.255 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 149.71' @ 12.11 hrs

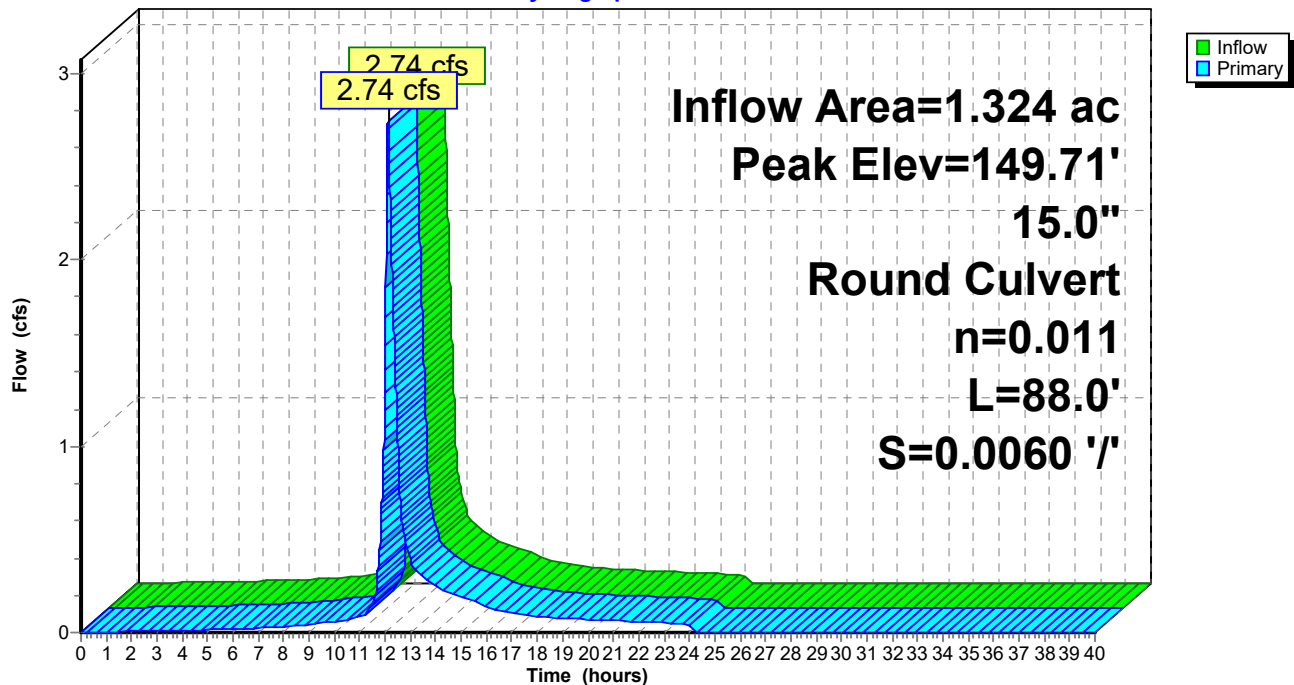
Device	Routing	Invert	Outlet Devices
#1	Primary	148.82'	15.0" Round Culvert L= 88.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 148.82' / 148.29' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=2.74 cfs @ 12.11 hrs HW=149.71' (Free Discharge)

↑1=Culvert (Barrel Controls 2.74 cfs @ 4.10 fps)

Pond 5P: DMH5+22

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 183

Summary for Pond 6P: DMH6+13

Inflow Area = 1.324 ac, 38.84% Impervious, Inflow Depth = 2.31" for 50-YR event
Inflow = 2.74 cfs @ 12.11 hrs, Volume= 0.255 af
Outflow = 2.74 cfs @ 12.11 hrs, Volume= 0.255 af, Atten= 0%, Lag= 0.0 min
Primary = 2.74 cfs @ 12.11 hrs, Volume= 0.255 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 149.09' @ 12.11 hrs

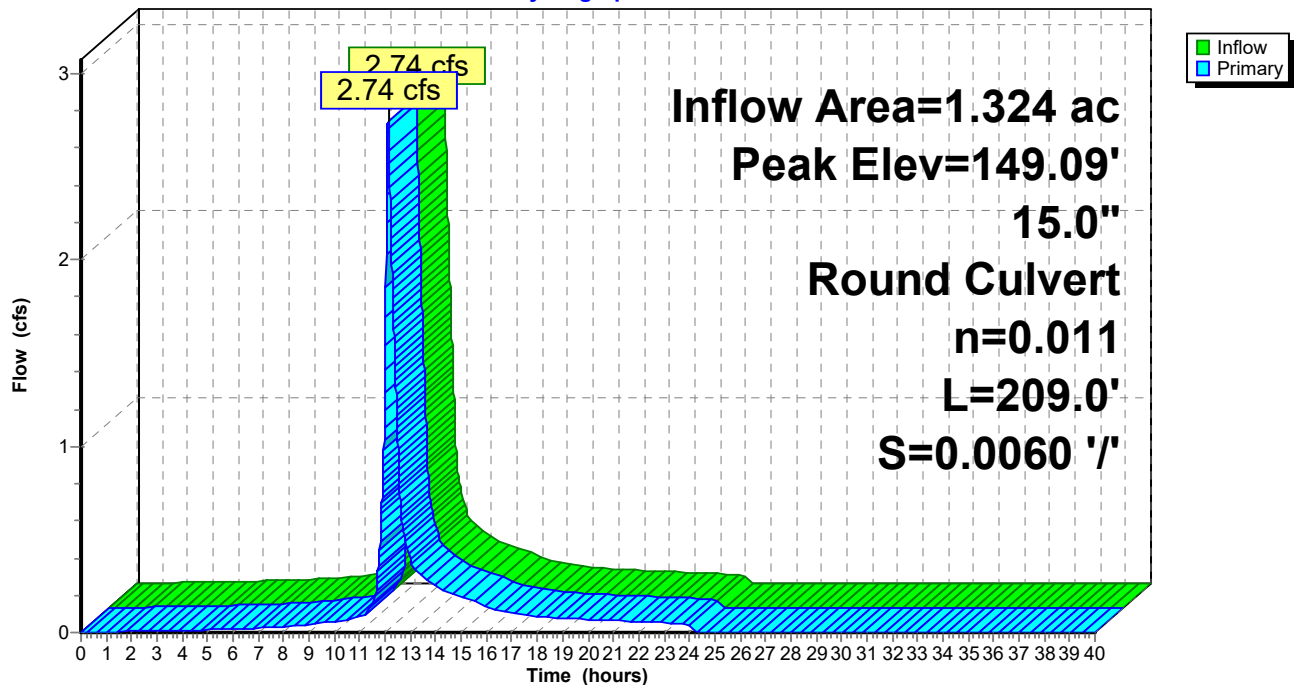
Device	Routing	Invert	Outlet Devices
#1	Primary	148.24'	15.0" Round Culvert L= 209.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 148.24' / 146.99' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=2.74 cfs @ 12.11 hrs HW=149.09' (Free Discharge)

↑1=Culvert (Barrel Controls 2.74 cfs @ 4.37 fps)

Pond 6P: DMH6+13

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 184

Summary for Subcatchment 7P: P1c

Runoff = 1.23 cfs @ 12.16 hrs, Volume= 0.104 af, Depth= 2.79"

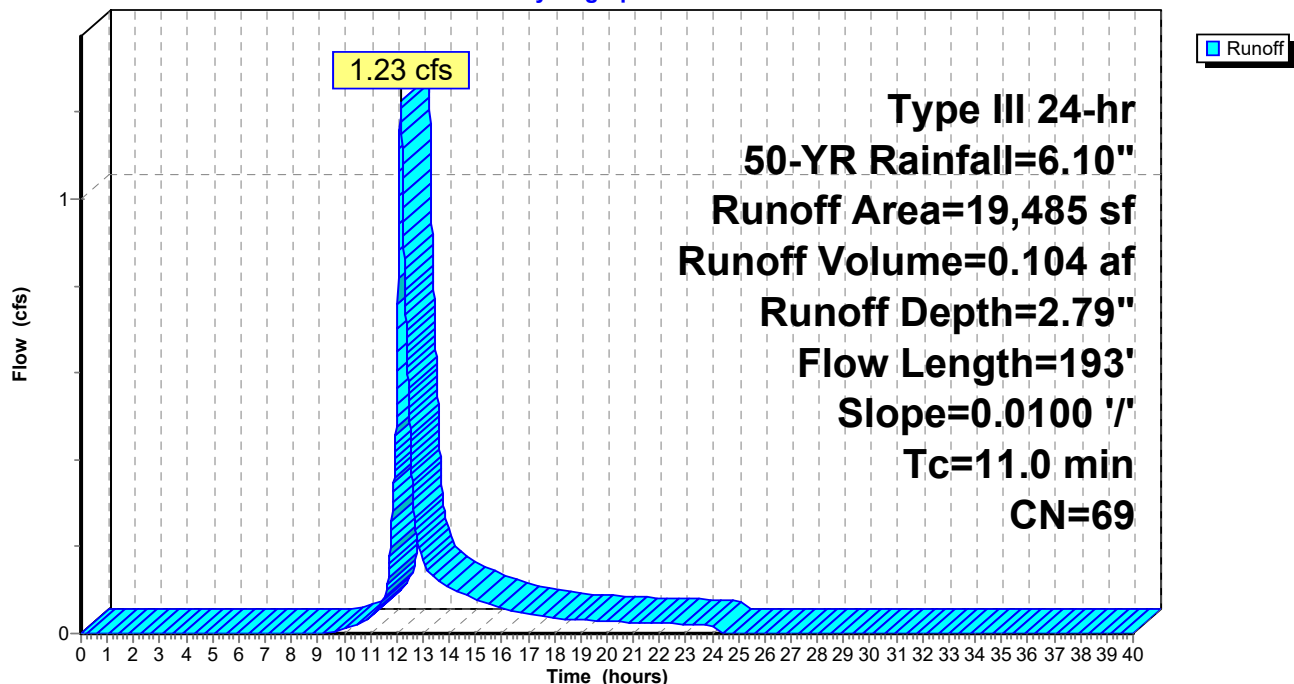
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
442	61	>75% Grass cover, Good HSG B
5,958	98	Paved parking HSG A
1,438	98	Paved parking HSG B
9,363	39	>75% Grass cover, Good HSG A
2,284	98	Roofs HSG A
19,485	69	Weighted Average
9,805	40	50.32% Pervious Area
9,680	98	49.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.5	21	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.1	130	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.0	193	Total			

Subcatchment 7P: P1c

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Page 185

Summary for Pond 8P: CB8+10a

Inflow Area = 0.447 ac, 49.68% Impervious, Inflow Depth = 2.79" for 50-YR event
Inflow = 1.23 cfs @ 12.16 hrs, Volume= 0.104 af
Outflow = 1.23 cfs @ 12.16 hrs, Volume= 0.104 af, Atten= 0%, Lag= 0.0 min
Primary = 1.23 cfs @ 12.16 hrs, Volume= 0.104 af

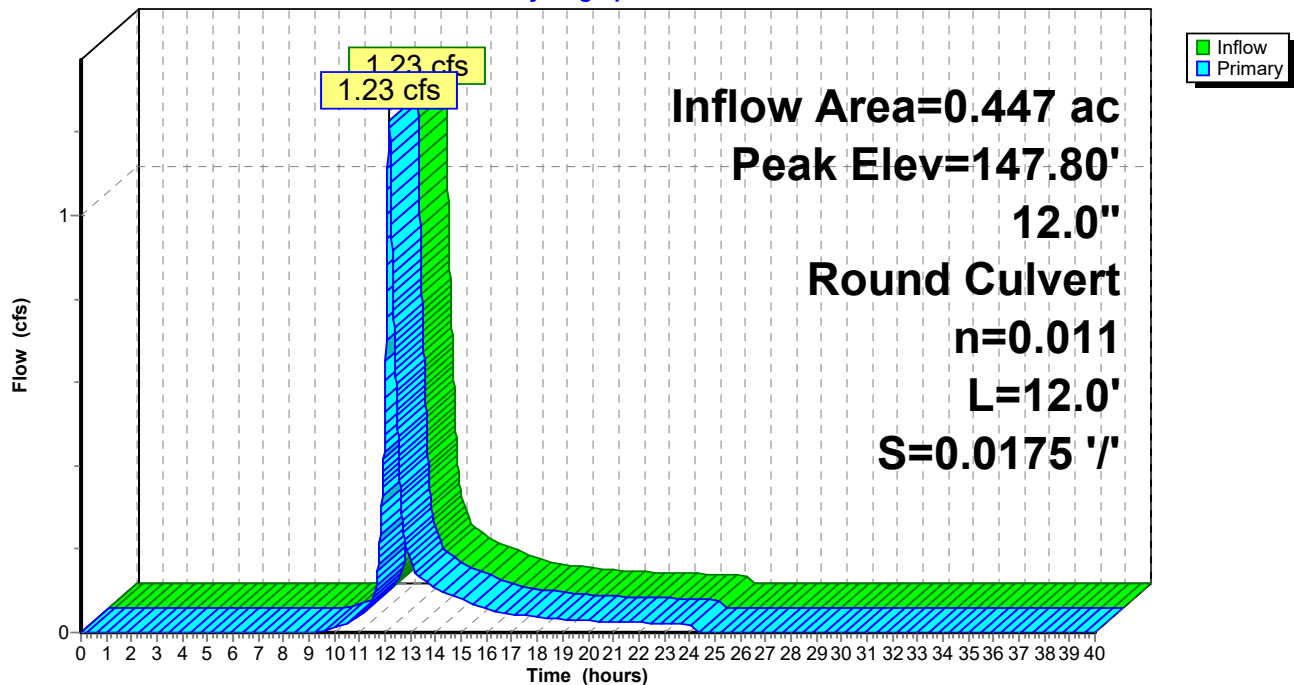
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.80' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.20'	12.0" Round Culvert L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.20' / 146.99' S= 0.0175 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.23 cfs @ 12.16 hrs HW=147.80' (Free Discharge)
↑1=Culvert (Barrel Controls 1.23 cfs @ 3.59 fps)

Pond 8P: CB8+10a

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Page 186

Summary for Subcatchment 9P: P1d

Runoff = 1.40 cfs @ 12.14 hrs, Volume= 0.117 af, Depth= 3.97"

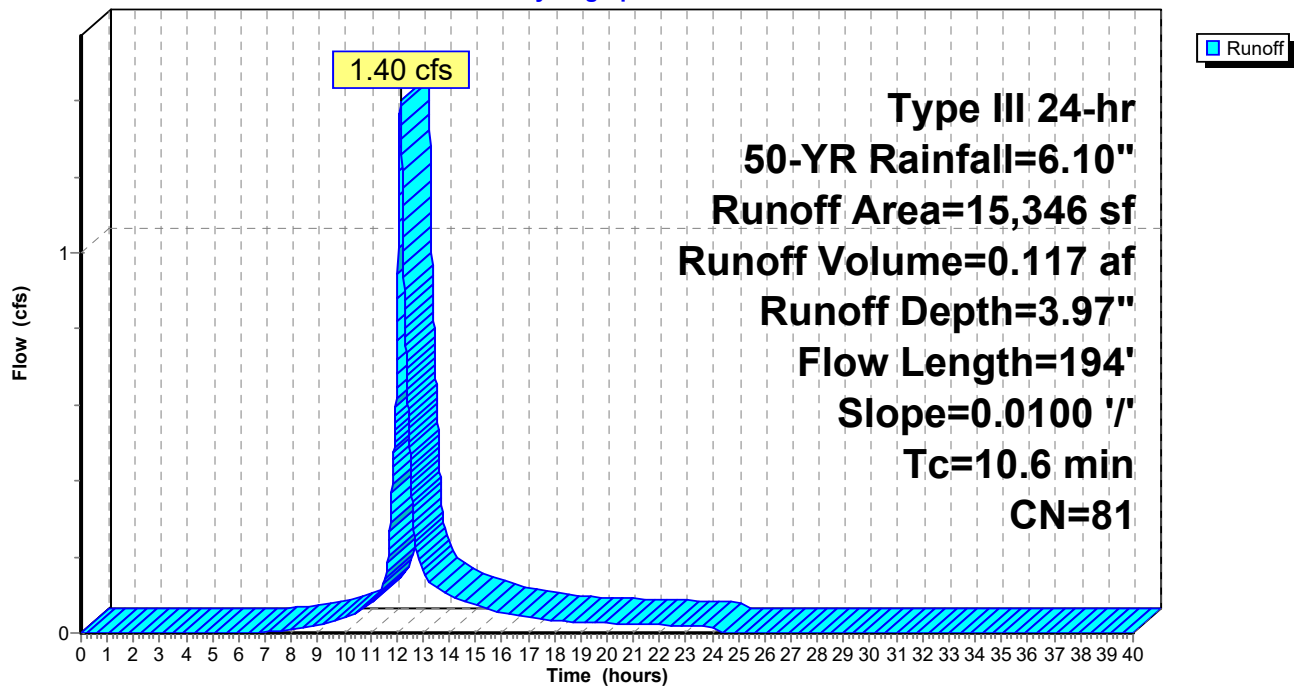
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
5,770	61	>75% Grass cover, Good HSG B
704	39	>75% Grass cover, Good HSG A
1,057	98	Roofs HSG B
3,321	98	Paved parking HSG A
4,397	98	Paved parking HSG B
97	55	Woods, Good HSG B
15,346	81	Weighted Average
6,571	59	42.82% Pervious Area
8,775	98	57.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.2	152	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.6	194	Total			

Subcatchment 9P: P1d

Hydrograph



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Page 187

Summary for Pond 10P: CB8+10b

Inflow Area = 0.352 ac, 57.18% Impervious, Inflow Depth = 3.97" for 50-YR event
Inflow = 1.40 cfs @ 12.14 hrs, Volume= 0.117 af
Outflow = 1.40 cfs @ 12.14 hrs, Volume= 0.117 af, Atten= 0%, Lag= 0.0 min
Primary = 1.40 cfs @ 12.14 hrs, Volume= 0.117 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.87' @ 12.14 hrs

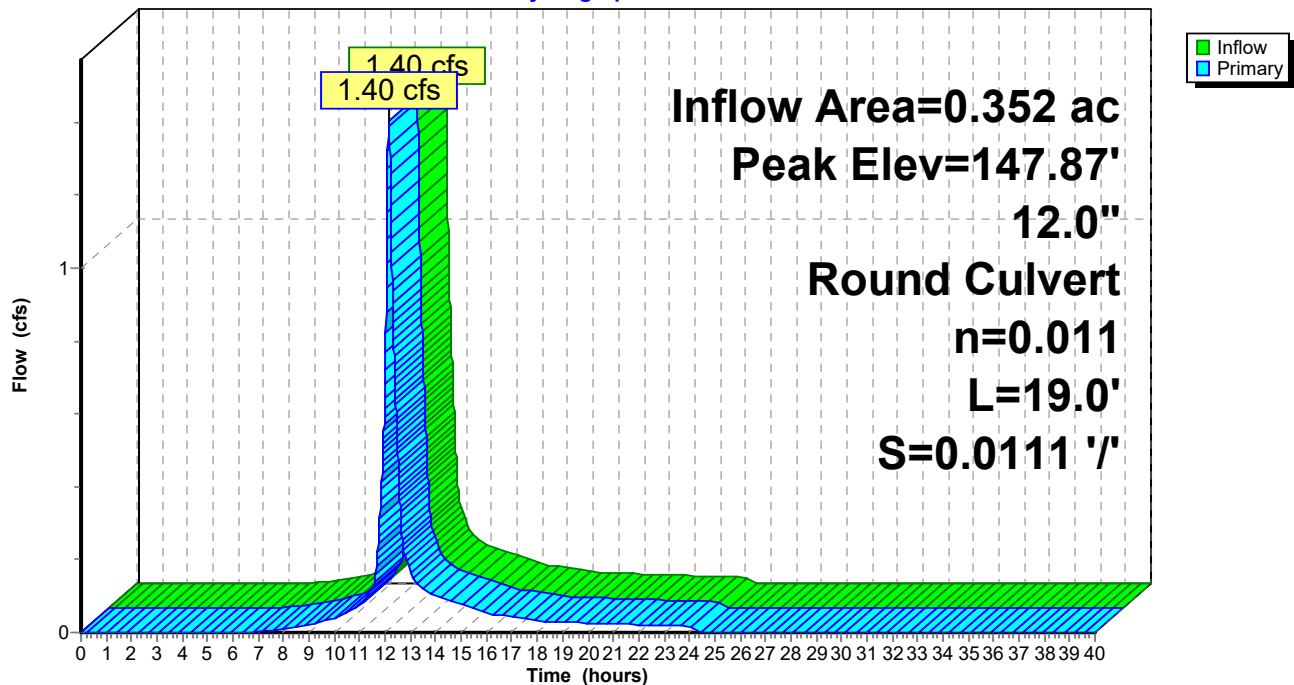
Device	Routing	Invert	Outlet Devices
#1	Primary	147.20'	12.0" Round Culvert L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.20' / 146.99' S= 0.0111 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.40 cfs @ 12.14 hrs HW=147.87' (Free Discharge)

↑1=Culvert (Barrel Controls 1.40 cfs @ 3.55 fps)

Pond 10P: CB8+10b

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Page 188

Summary for Pond 11P: DMH8+20

Inflow Area = 2.123 ac, 44.17% Impervious, Inflow Depth = 2.69" for 50-YR event
Inflow = 5.28 cfs @ 12.13 hrs, Volume= 0.475 af
Outflow = 5.28 cfs @ 12.13 hrs, Volume= 0.475 af, Atten= 0%, Lag= 0.0 min
Primary = 5.28 cfs @ 12.13 hrs, Volume= 0.475 af

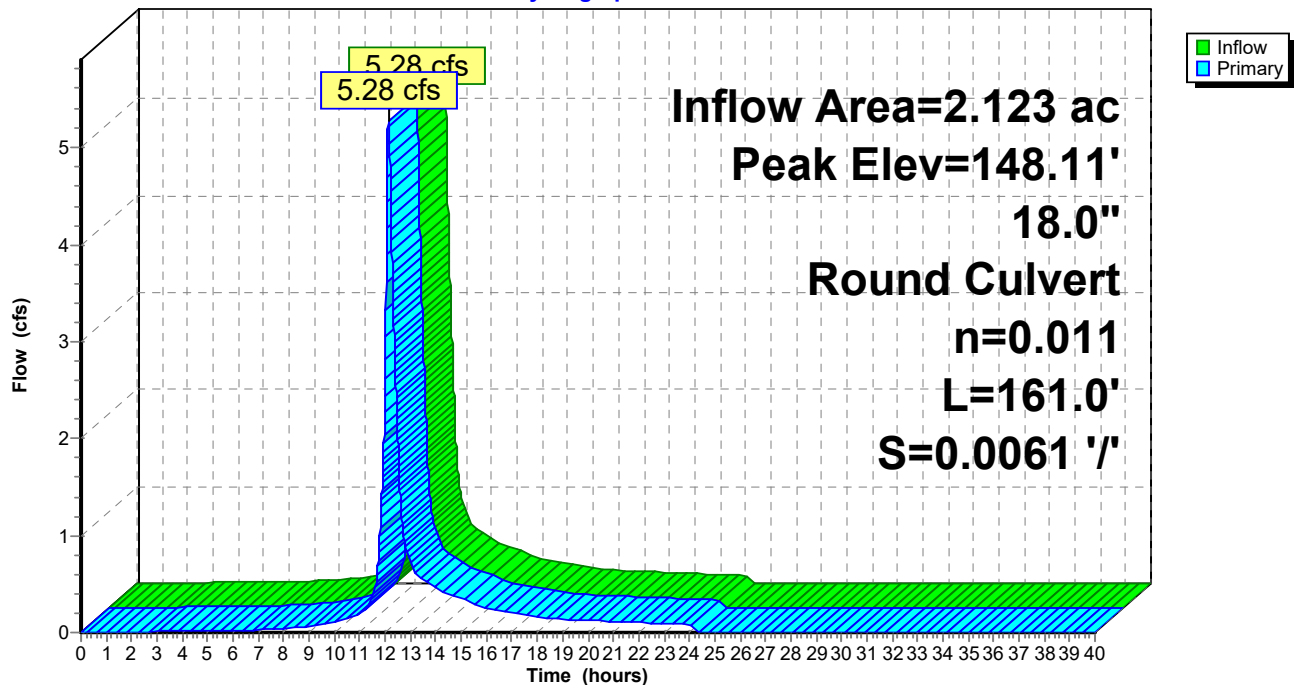
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.11' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	146.94'	18.0" Round Culvert L= 161.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.94' / 145.96' S= 0.0061 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=5.27 cfs @ 12.13 hrs HW=148.11' (Free Discharge)
↑1=Culvert (Barrel Controls 5.27 cfs @ 4.93 fps)

Pond 11P: DMH8+20

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 189

Summary for Pond 12P: DMH1a

Inflow Area = 2.123 ac, 44.17% Impervious, Inflow Depth = 2.69" for 50-YR event
Inflow = 5.28 cfs @ 12.13 hrs, Volume= 0.475 af
Outflow = 5.28 cfs @ 12.13 hrs, Volume= 0.475 af, Atten= 0%, Lag= 0.0 min
Primary = 5.28 cfs @ 12.13 hrs, Volume= 0.475 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.22' @ 12.13 hrs

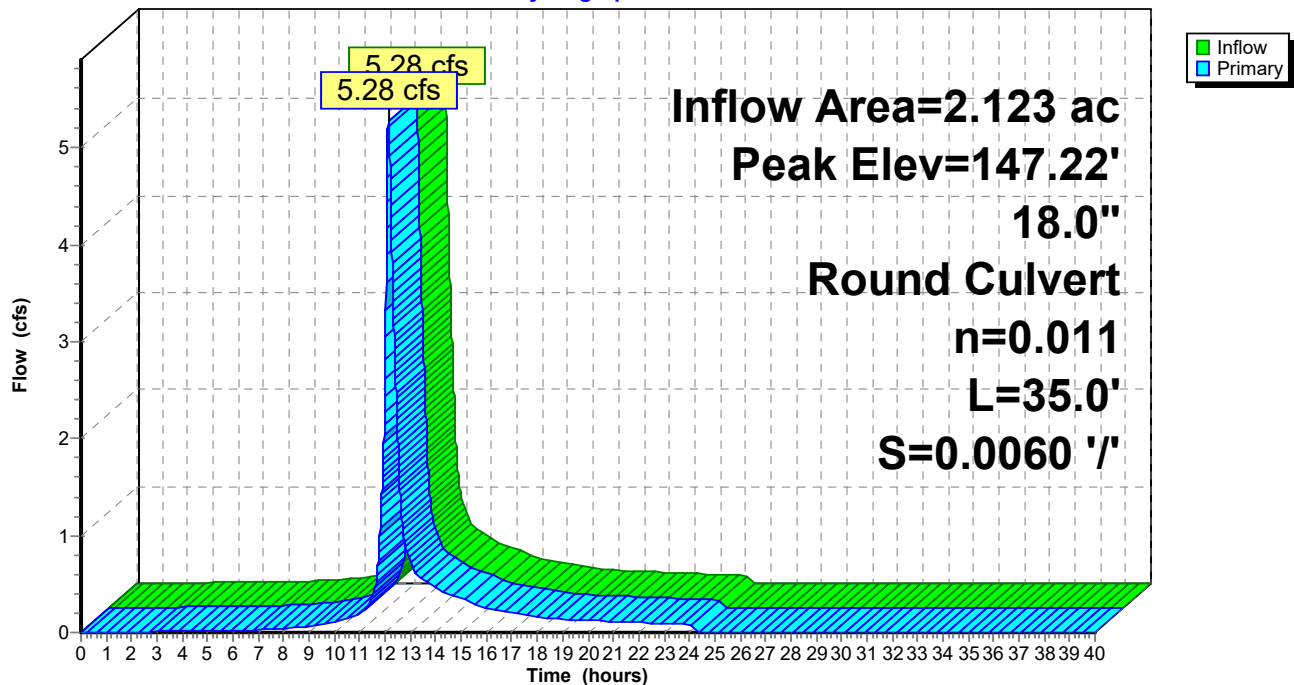
Device	Routing	Invert	Outlet Devices
#1	Primary	145.91'	18.0" Round Culvert L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.91' / 145.70' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=5.27 cfs @ 12.13 hrs HW=147.22' (Free Discharge)

1=Culvert (Barrel Controls 5.27 cfs @ 4.30 fps)

Pond 12P: DMH1a

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 190

Summary for Subcatchment 13P: P1e

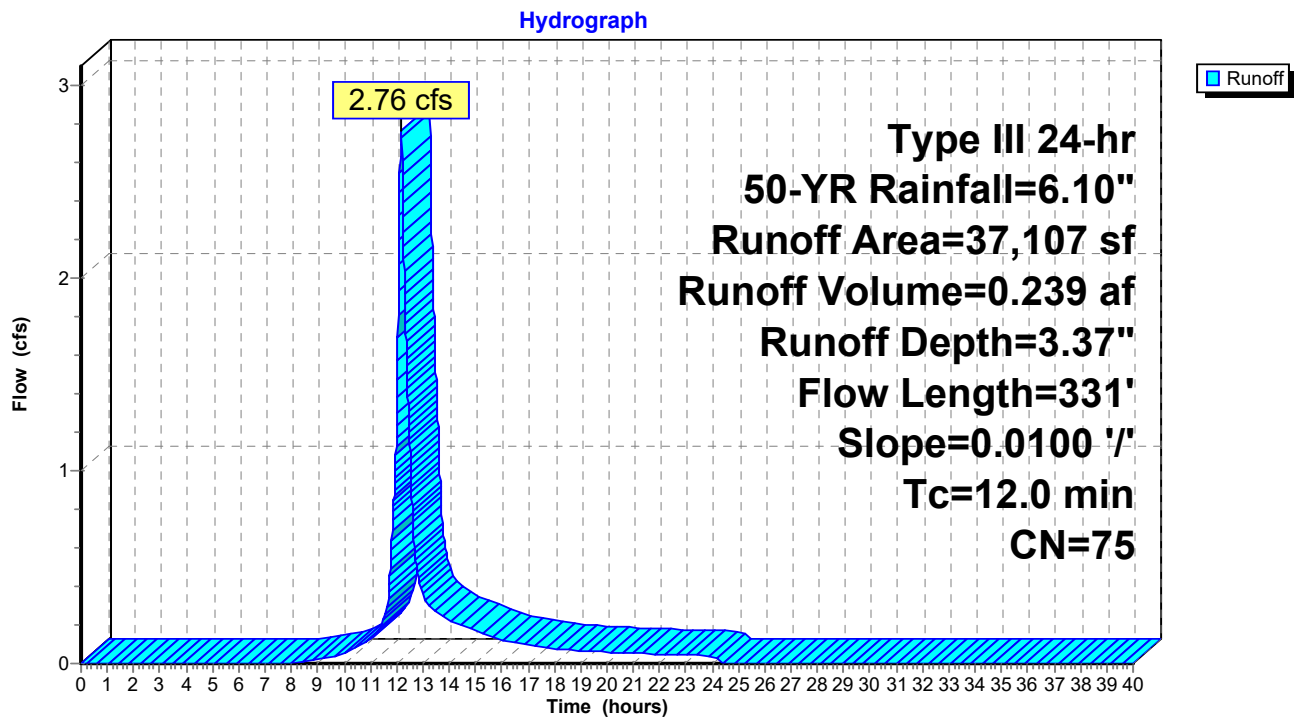
Runoff = 2.76 cfs @ 12.17 hrs, Volume= 0.239 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
8,461	98	Paved parking HSG B
5,642	98	Paved parking HSG A
11,605	61	>75% Grass cover, Good HSG B
7,314	39	>75% Grass cover, Good HSG A
2,331	98	Roofs HSG B
1,754	98	Roofs HSG A
37,107	75	Weighted Average
18,919	52	50.98% Pervious Area
18,188	98	49.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.4	16	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	273	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
12.0	331	Total			

Subcatchment 13P: P1e



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Page 192

Summary for Pond 14P: CB12+15a

Inflow Area = 0.852 ac, 49.02% Impervious, Inflow Depth = 3.37" for 50-YR event
Inflow = 2.76 cfs @ 12.17 hrs, Volume= 0.239 af
Outflow = 2.76 cfs @ 12.17 hrs, Volume= 0.239 af, Atten= 0%, Lag= 0.0 min
Primary = 2.76 cfs @ 12.17 hrs, Volume= 0.239 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 148.96' @ 12.17 hrs

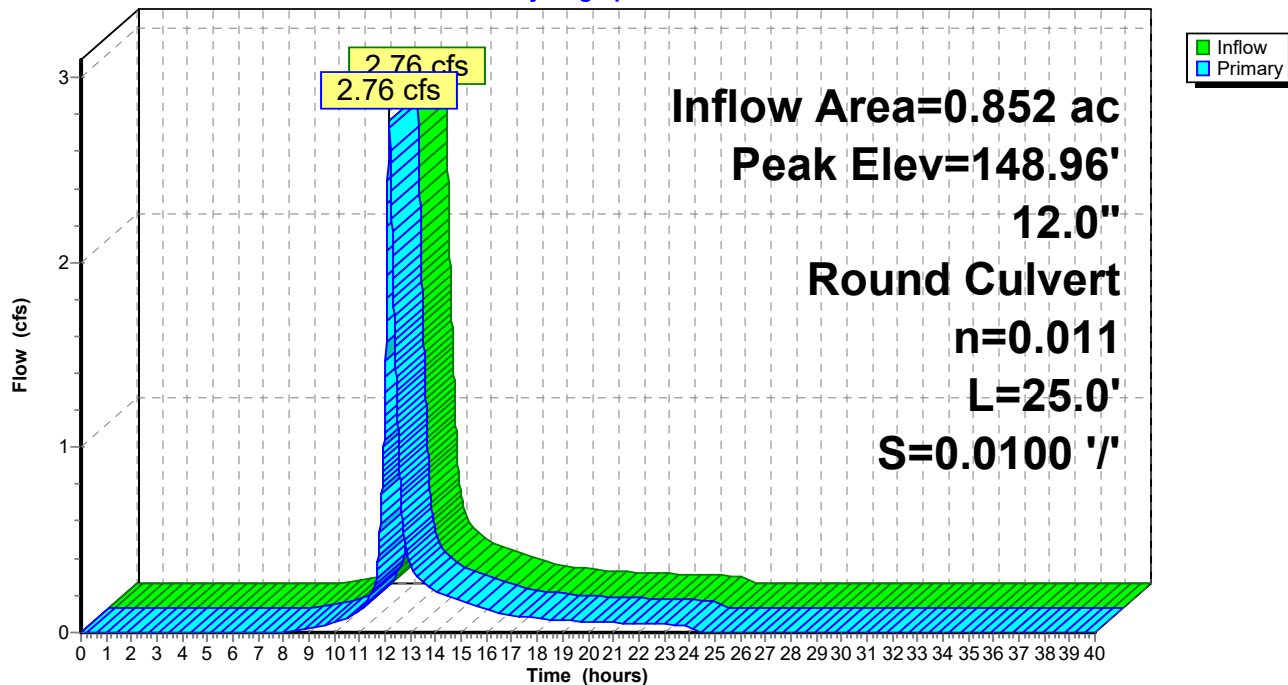
Device	Routing	Invert	Outlet Devices
#1	Primary	147.90'	12.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.90' / 147.65' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.76 cfs @ 12.17 hrs HW=148.96' (Free Discharge)

↑1=Culvert (Barrel Controls 2.76 cfs @ 4.14 fps)

Pond 14P: CB12+15a

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 193

Summary for Subcatchment 15P: P1f

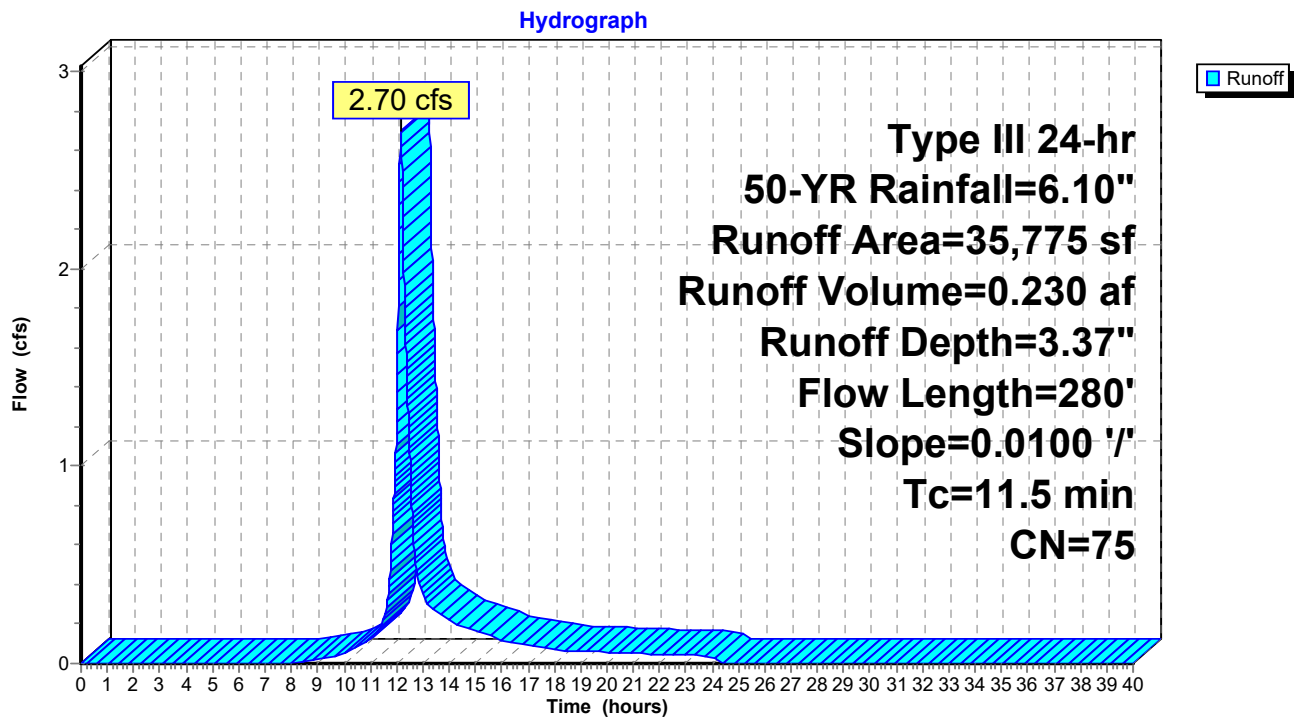
Runoff = 2.70 cfs @ 12.16 hrs, Volume= 0.230 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
5,367	39	>75% Grass cover, Good HSG A
11,969	61	>75% Grass cover, Good HSG B
331	98	Roofs HSG A
3,270	98	Roofs HSG B
10,583	98	Paved parking HSG B
3,333	98	Paved parking HSG A
742	30	Woods, Good HSG A
180	55	Woods, Good HSG B
35,775	75	Weighted Average
18,258	53	51.04% Pervious Area
17,517	98	48.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.8	225	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.5	280	Total			

Subcatchment 15P: P1f



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Page 195

Summary for Pond 16P: CB12+15b

Inflow Area = 0.821 ac, 48.96% Impervious, Inflow Depth = 3.37" for 50-YR event
Inflow = 2.70 cfs @ 12.16 hrs, Volume= 0.230 af
Outflow = 2.70 cfs @ 12.16 hrs, Volume= 0.230 af, Atten= 0%, Lag= 0.0 min
Primary = 2.70 cfs @ 12.16 hrs, Volume= 0.230 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 148.94' @ 12.16 hrs

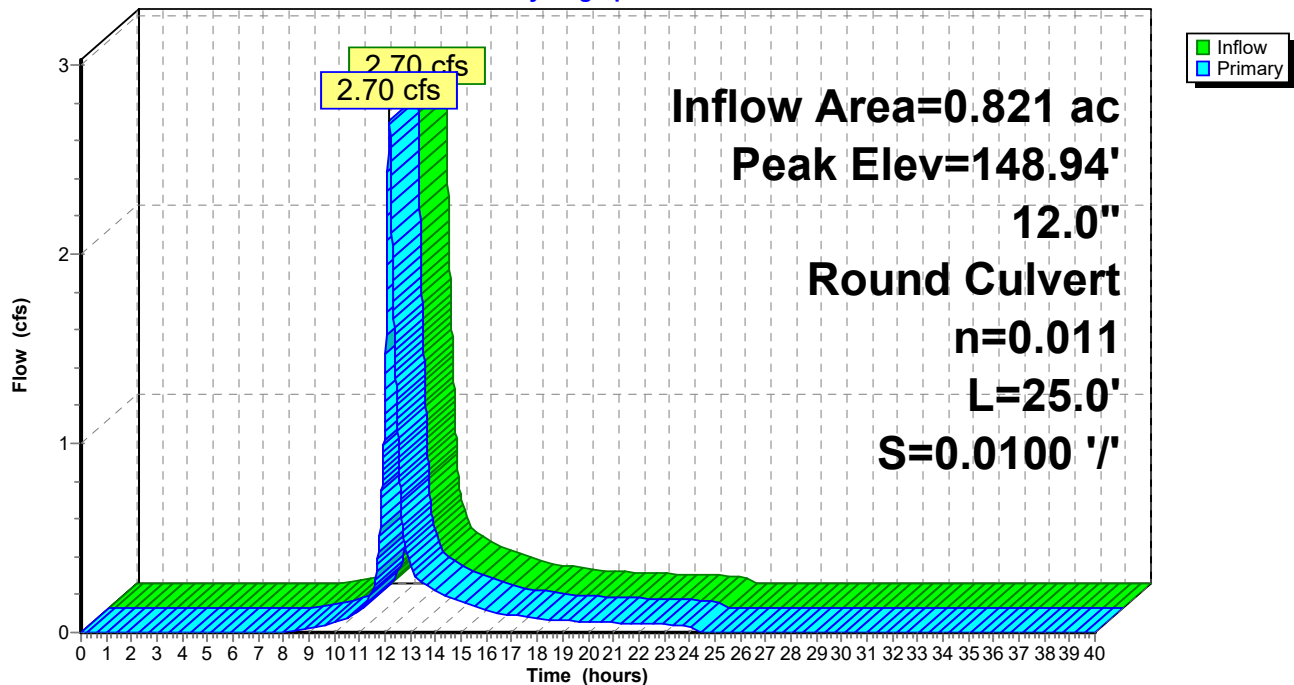
Device	Routing	Invert	Outlet Devices
#1	Primary	147.90'	12.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.90' / 147.65' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.70 cfs @ 12.16 hrs HW=148.94' (Free Discharge)

↑1=Culvert (Barrel Controls 2.70 cfs @ 4.12 fps)

Pond 16P: CB12+15b

Hydrograph



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Page 196

Summary for Pond 17P: DMH11+45

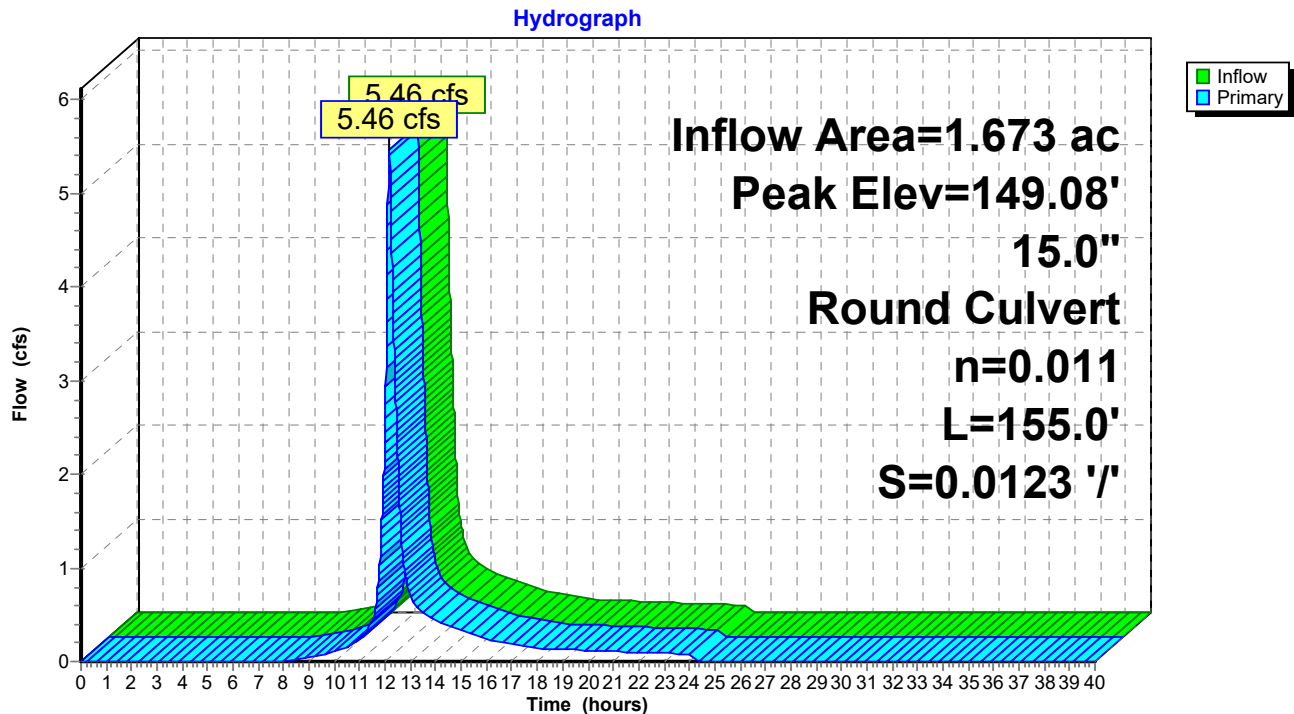
Inflow Area = 1.673 ac, 48.99% Impervious, Inflow Depth = 3.37" for 50-YR event
Inflow = 5.46 cfs @ 12.16 hrs, Volume= 0.470 af
Outflow = 5.46 cfs @ 12.16 hrs, Volume= 0.470 af, Atten= 0%, Lag= 0.0 min
Primary = 5.46 cfs @ 12.16 hrs, Volume= 0.470 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.08' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.60'	15.0" Round Culvert L= 155.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.60' / 145.70' S= 0.0123 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=5.46 cfs @ 12.16 hrs HW=149.08' (Free Discharge)
↑1=Culvert (Inlet Controls 5.46 cfs @ 4.45 fps)

Pond 17P: DMH11+45



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 197

Summary for Subcatchment 18P: P1g

Runoff = 2.69 cfs @ 12.17 hrs, Volume= 0.235 af, Depth= 2.88"

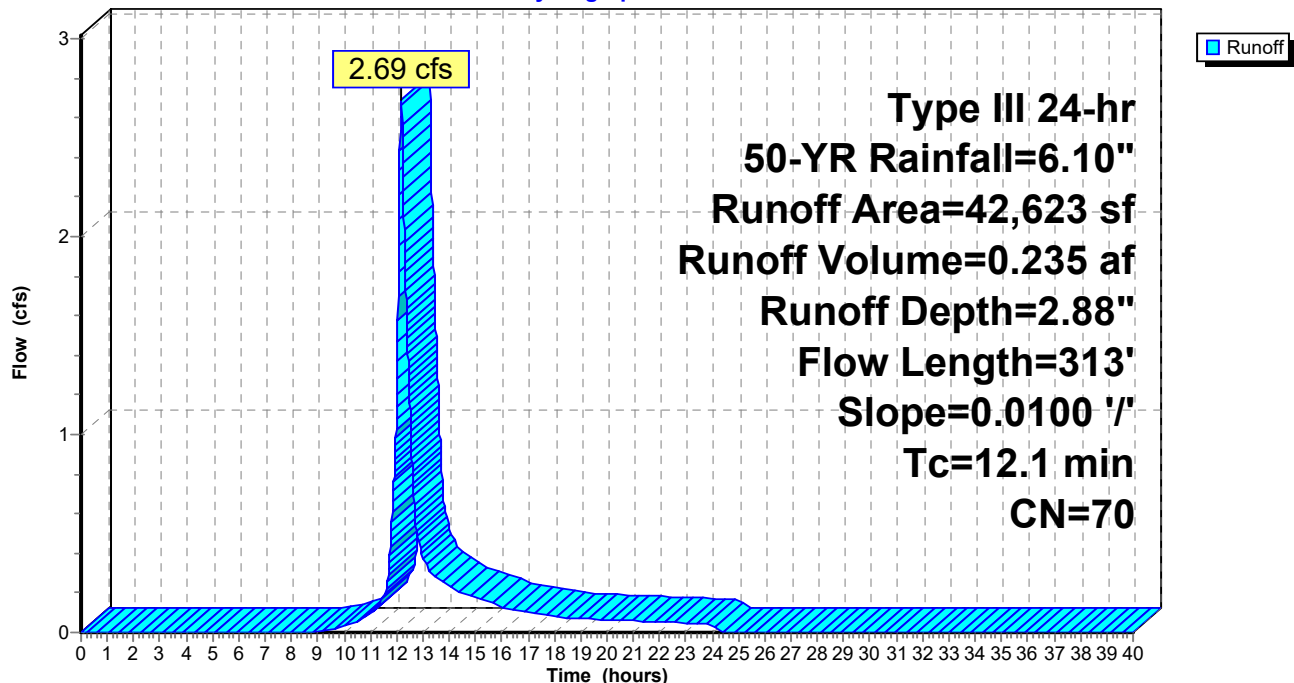
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
20,136	39	>75% Grass cover, Good HSG A
4,639	98	Roofs HSG A
17,848	98	Paved parking HSG A
42,623	70	Weighted Average
20,136	39	47.24% Pervious Area
22,487	98	52.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.7	29	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.0	242	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
12.1	313	Total			

Subcatchment 18P: P1g

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 198

Summary for Pond 19P: CB2+70a

Inflow Area = 0.978 ac, 52.76% Impervious, Inflow Depth = 2.88" for 50-YR event
Inflow = 2.69 cfs @ 12.17 hrs, Volume= 0.235 af
Outflow = 2.69 cfs @ 12.17 hrs, Volume= 0.235 af, Atten= 0%, Lag= 0.0 min
Primary = 2.69 cfs @ 12.17 hrs, Volume= 0.235 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 148.05' @ 12.17 hrs

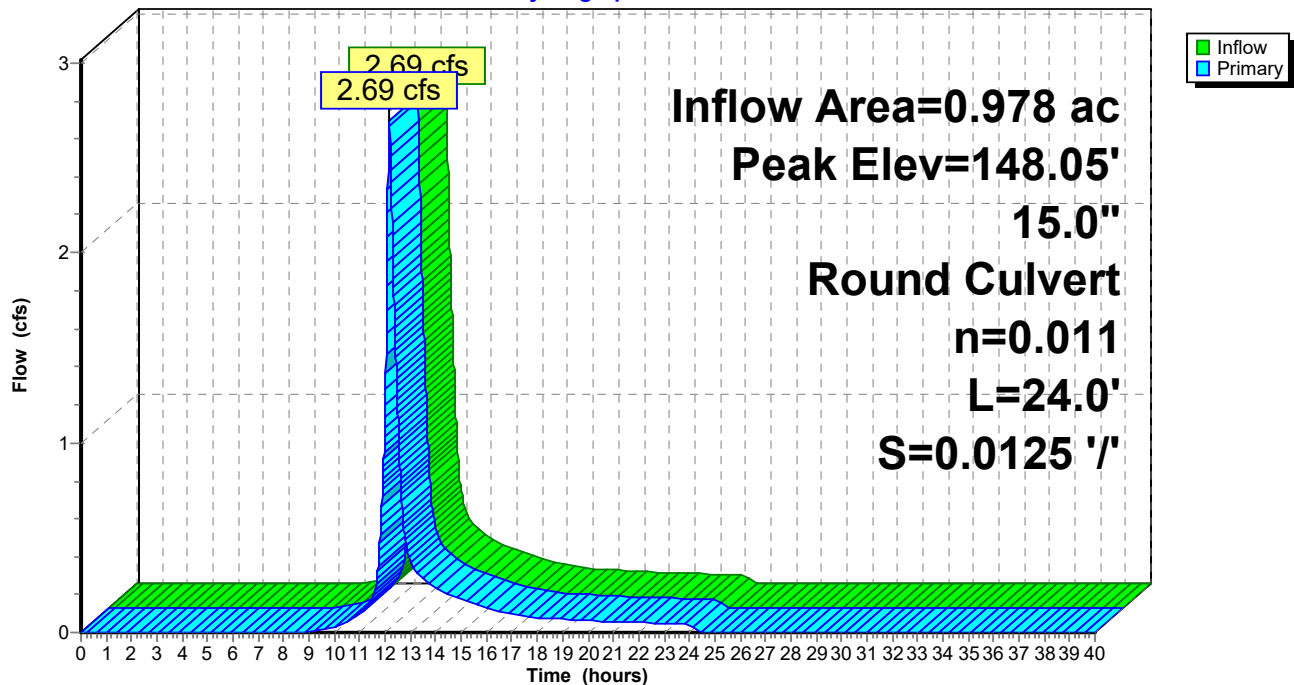
Device	Routing	Invert	Outlet Devices
#1	Primary	147.19'	15.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.19' / 146.89' S= 0.0125 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=2.69 cfs @ 12.17 hrs HW=148.05' (Free Discharge)

↑1=Culvert (Barrel Controls 2.69 cfs @ 4.19 fps)

Pond 19P: CB2+70a

Hydrograph



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Page 199

Summary for Subcatchment 20P: P1h

Runoff = 3.03 cfs @ 12.16 hrs, Volume= 0.261 af, Depth= 2.98"

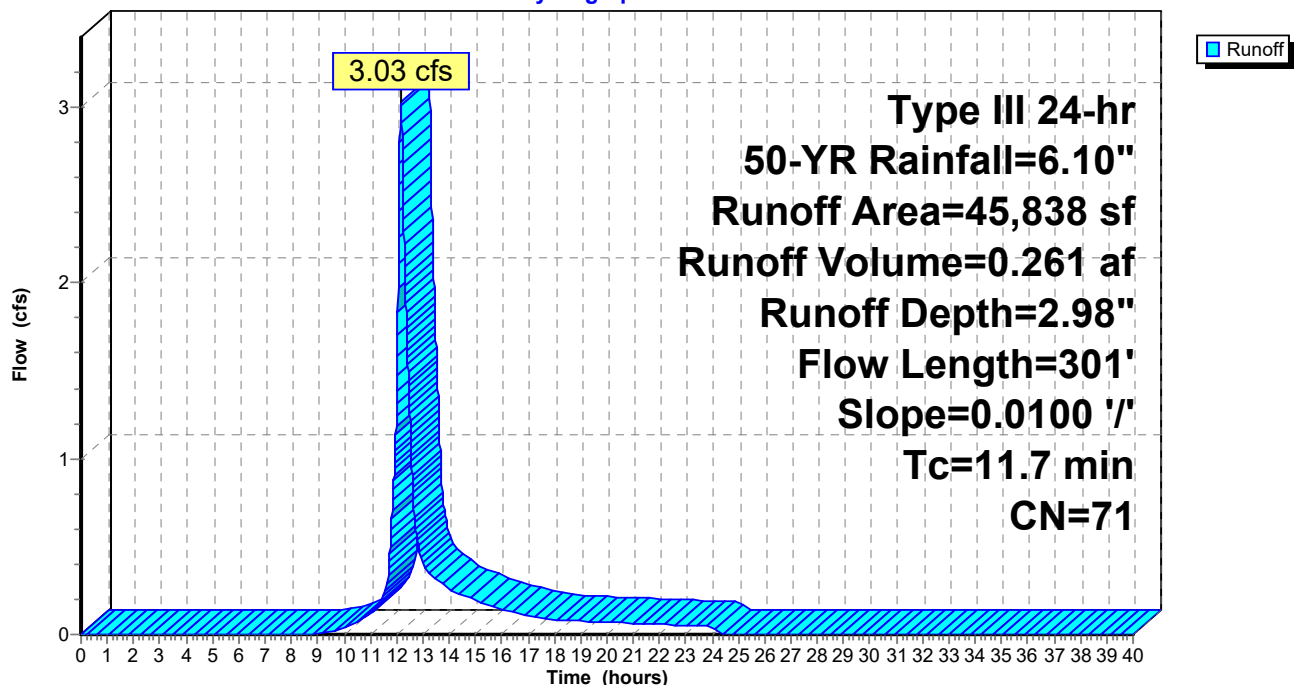
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
21,194	39	>75% Grass cover, Good HSG A
5,783	98	Roofs HSG A
18,861	98	Paved parking HSG A
45,838	71	Weighted Average
21,194	39	46.24% Pervious Area
24,644	98	53.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	11	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.0	248	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.7	301	Total			

Subcatchment 20P: P1h

Hydrograph



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Page 200

Summary for Pond 21P: CB2+70b

Inflow Area = 1.052 ac, 53.76% Impervious, Inflow Depth = 2.98" for 50-YR event
Inflow = 3.03 cfs @ 12.16 hrs, Volume= 0.261 af
Outflow = 3.03 cfs @ 12.16 hrs, Volume= 0.261 af, Atten= 0%, Lag= 0.0 min
Primary = 3.03 cfs @ 12.16 hrs, Volume= 0.261 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 148.17' @ 12.16 hrs

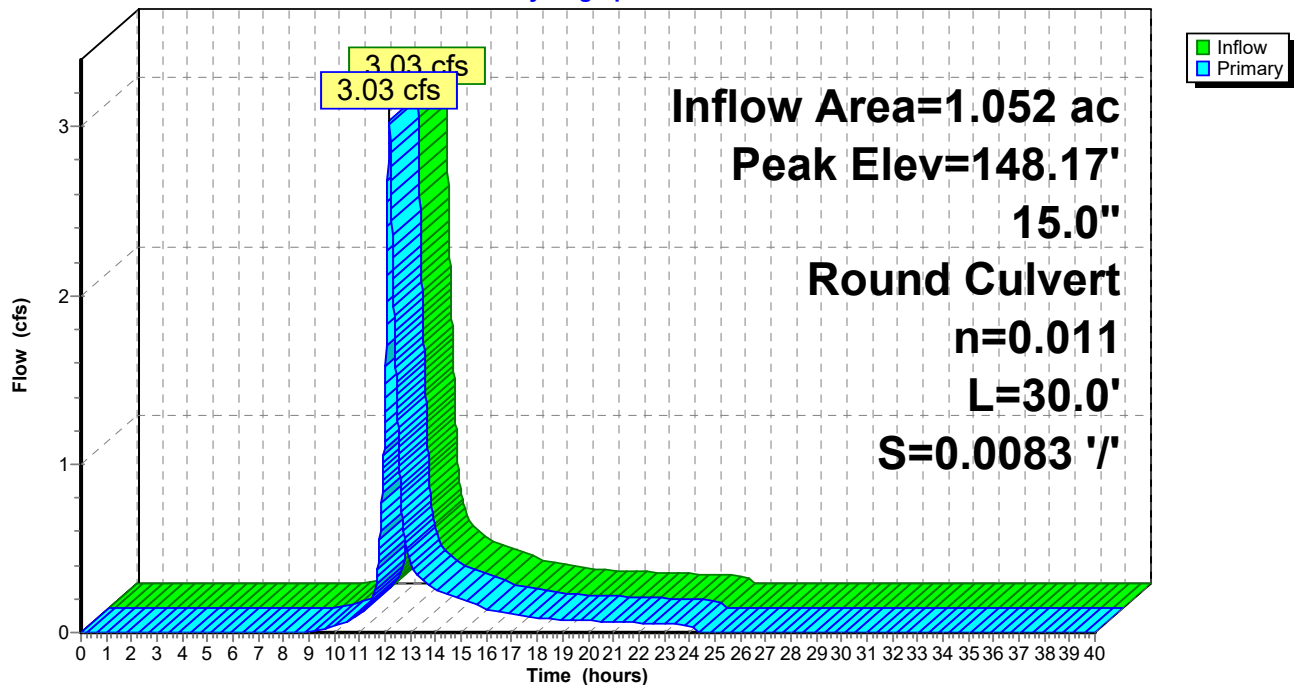
Device	Routing	Invert	Outlet Devices
#1	Primary	147.19'	15.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.19' / 146.94' S= 0.0083 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.03 cfs @ 12.16 hrs HW=148.17' (Free Discharge)

↑1=Culvert (Barrel Controls 3.03 cfs @ 4.05 fps)

Pond 21P: CB2+70b

Hydrograph



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Page 201

Summary for Pond 22P: DMH2+40

Inflow Area = 2.031 ac, 53.28% Impervious, Inflow Depth = 2.93" for 50-YR event
Inflow = 5.72 cfs @ 12.17 hrs, Volume= 0.497 af
Outflow = 5.72 cfs @ 12.17 hrs, Volume= 0.497 af, Atten= 0%, Lag= 0.0 min
Primary = 5.72 cfs @ 12.17 hrs, Volume= 0.497 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.69' @ 12.17 hrs

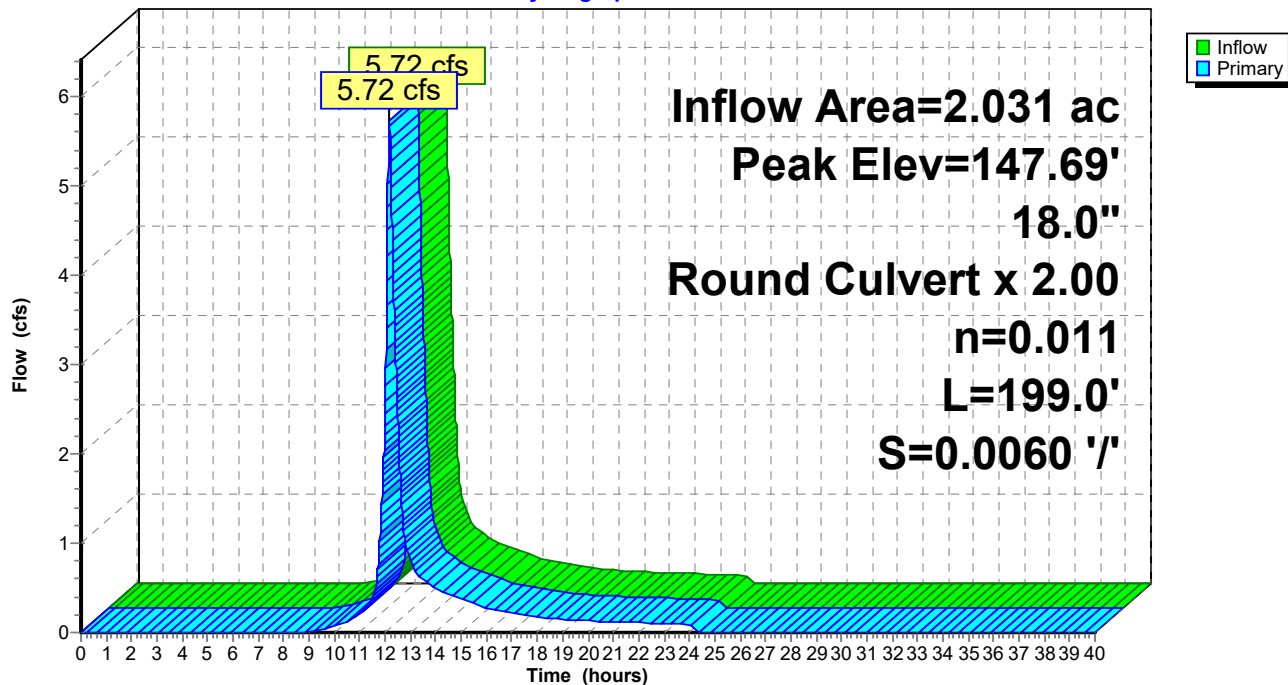
Device	Routing	Invert	Outlet Devices
#1	Primary	146.89'	18.0" Round Culvert X 2.00 L= 199.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.89' / 145.70' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=5.72 cfs @ 12.17 hrs HW=147.69' (Free Discharge)

1=Culvert (Barrel Controls 5.72 cfs @ 4.36 fps)

Pond 22P: DMH2+40

Hydrograph



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Page 202

Summary for Subcatchment 23P: P1i

Runoff = 3.78 cfs @ 12.15 hrs, Volume= 0.334 af, Depth= 1.82"

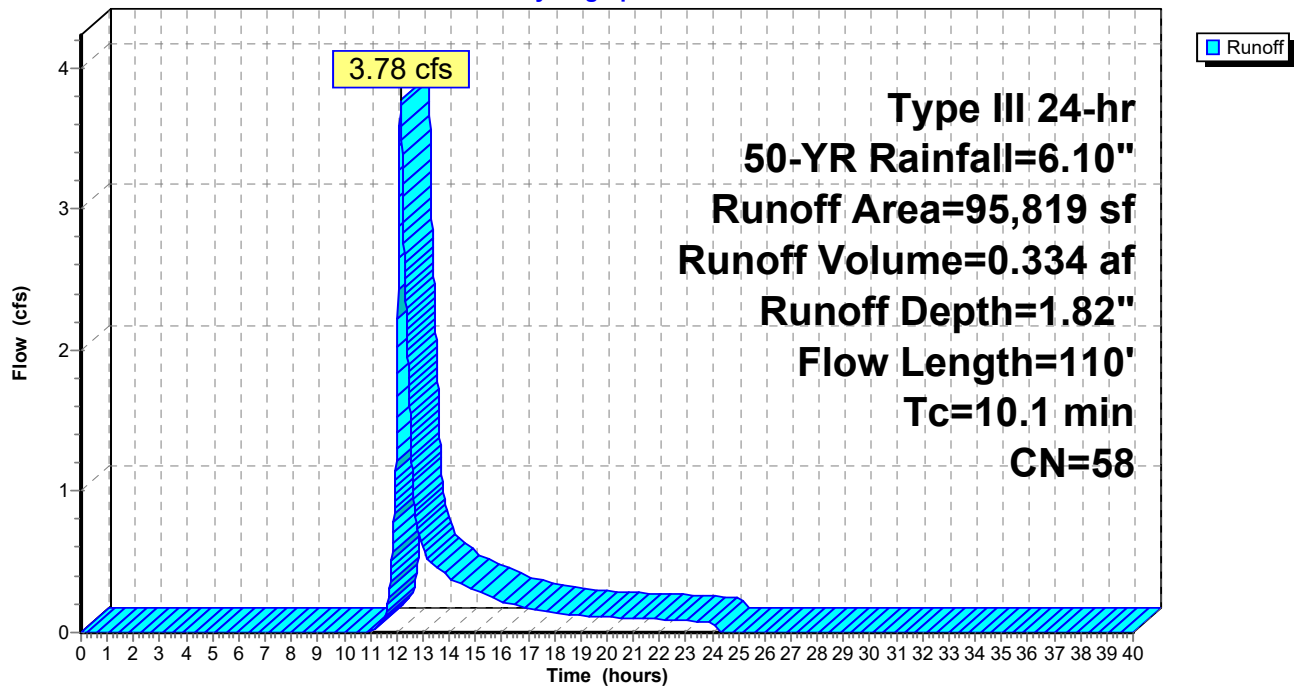
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
41,468	61	>75% Grass cover, Good HSG B
14,814	39	>75% Grass cover, Good HSG A
1,336	98	Paved parking HSG A
2,500	98	Paved parking HSG B
2,201	98	Roofs HSG A
4,220	98	Roofs HSG B
6,601	30	Woods, Good HSG A
22,679	55	Woods, Good HSG B
95,819	58	Weighted Average
85,562	53	89.30% Pervious Area
10,257	98	10.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	35	0.0200	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	75	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.1	110	Total			

Subcatchment 23P: P1i

Hydrograph



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Page 204

Summary for Pond 24P: Basin #1

Inflow Area = 8.027 ac, 38.31% Impervious, Inflow Depth = 2.65" for 50-YR event
 Inflow = 20.10 cfs @ 12.15 hrs, Volume= 1.775 af
 Outflow = 5.73 cfs @ 12.60 hrs, Volume= 1.775 af, Atten= 72%, Lag= 26.6 min
 Discarded = 1.43 cfs @ 12.60 hrs, Volume= 1.207 af
 Primary = 4.30 cfs @ 12.60 hrs, Volume= 0.568 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.79' @ 12.60 hrs Surf.Area= 25,576 sf Storage= 25,538 cf

Plug-Flow detention time= 83.3 min calculated for 1.775 af (100% of inflow)
 Center-of-Mass det. time= 83.3 min (923.7 - 840.5)

Volume	Invert	Avail.Storage	Storage Description
#1	145.70'	59,551 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.70	21,476	960.0	0	0	21,476
148.00	30,575	1,018.0	59,551	59,551	30,885

Device	Routing	Invert	Outlet Devices
#1	Discarded	145.70'	2.410 in/hr Exfiltration over Surface area
#2	Primary	146.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28)
			Elev. (feet) 146.00 146.50 146.50 148.00
			Width (feet) 1.00 1.00 5.00 5.00

Discarded OutFlow Max=1.43 cfs @ 12.60 hrs HW=146.79' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 1.43 cfs)

Primary OutFlow Max=4.30 cfs @ 12.60 hrs HW=146.79' (Free Discharge)
 ↑2=Custom Weir/Orifice (Weir Controls 4.30 cfs @ 2.22 fps)

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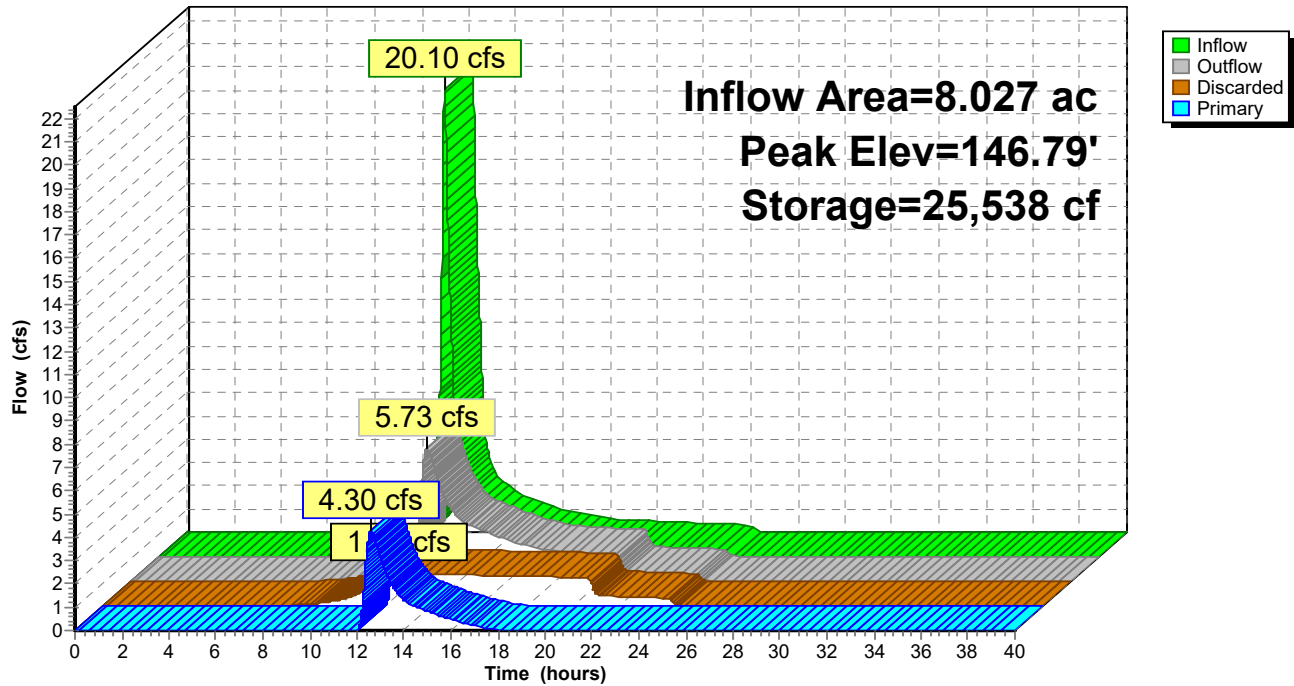
Type III 24-hr 50-YR Rainfall=6.10"

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Page 205

Pond 24P: Basin #1

Hydrograph



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Page 206

Summary for Subcatchment 25P: P1j

Runoff = 2.26 cfs @ 12.16 hrs, Volume= 0.195 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
5,345	98	Paved parking HSG B
9,999	61	>75% Grass cover, Good HSG B
7,290	39	>75% Grass cover, Good HSG A
2,671	98	Roofs HSG B
1,535	98	Roofs HSG A
5,255	98	Paved parking HSG A
32,095	73	Weighted Average
17,289	52	53.87% Pervious Area
14,806	98	46.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.8	33	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	190	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.8	265	Total			

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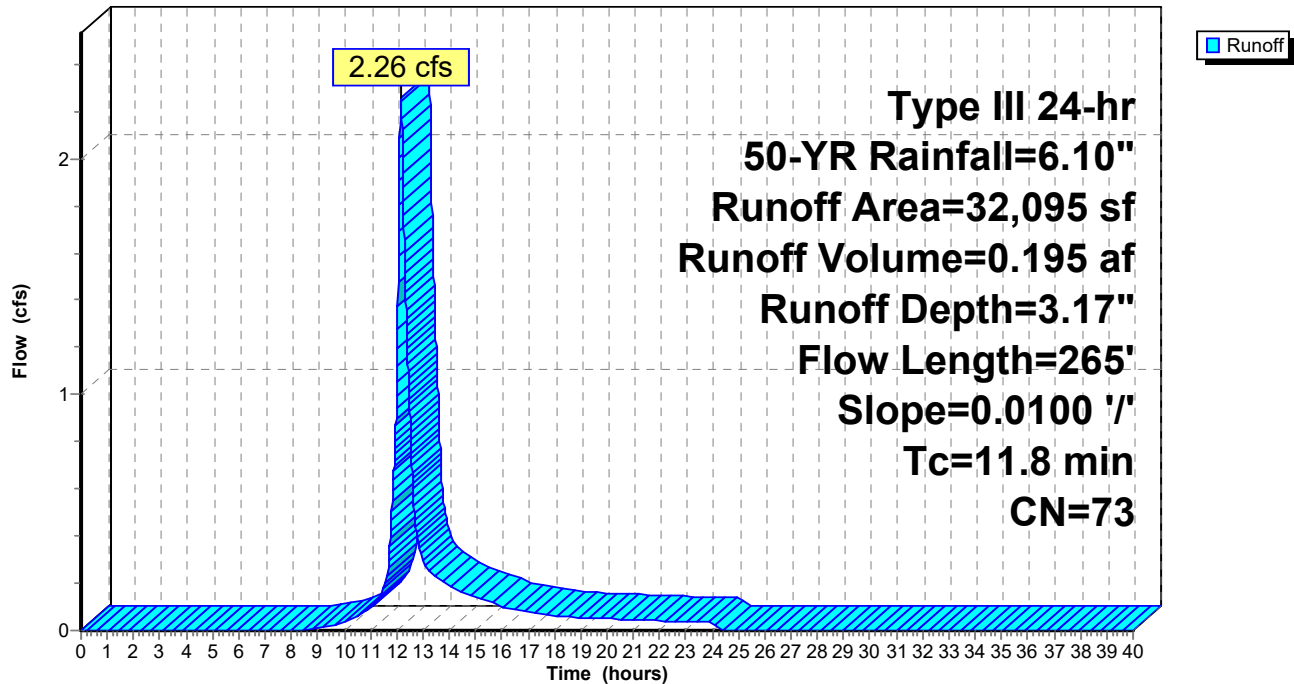
Type III 24-hr 50-YR Rainfall=6.10"

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Page 207

Subcatchment 25P: P1j

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 208

Summary for Pond 26P: CB17+77a

Inflow Area = 0.737 ac, 46.13% Impervious, Inflow Depth = 3.17" for 50-YR event
Inflow = 2.26 cfs @ 12.16 hrs, Volume= 0.195 af
Outflow = 2.26 cfs @ 12.16 hrs, Volume= 0.195 af, Atten= 0%, Lag= 0.0 min
Primary = 2.26 cfs @ 12.16 hrs, Volume= 0.195 af

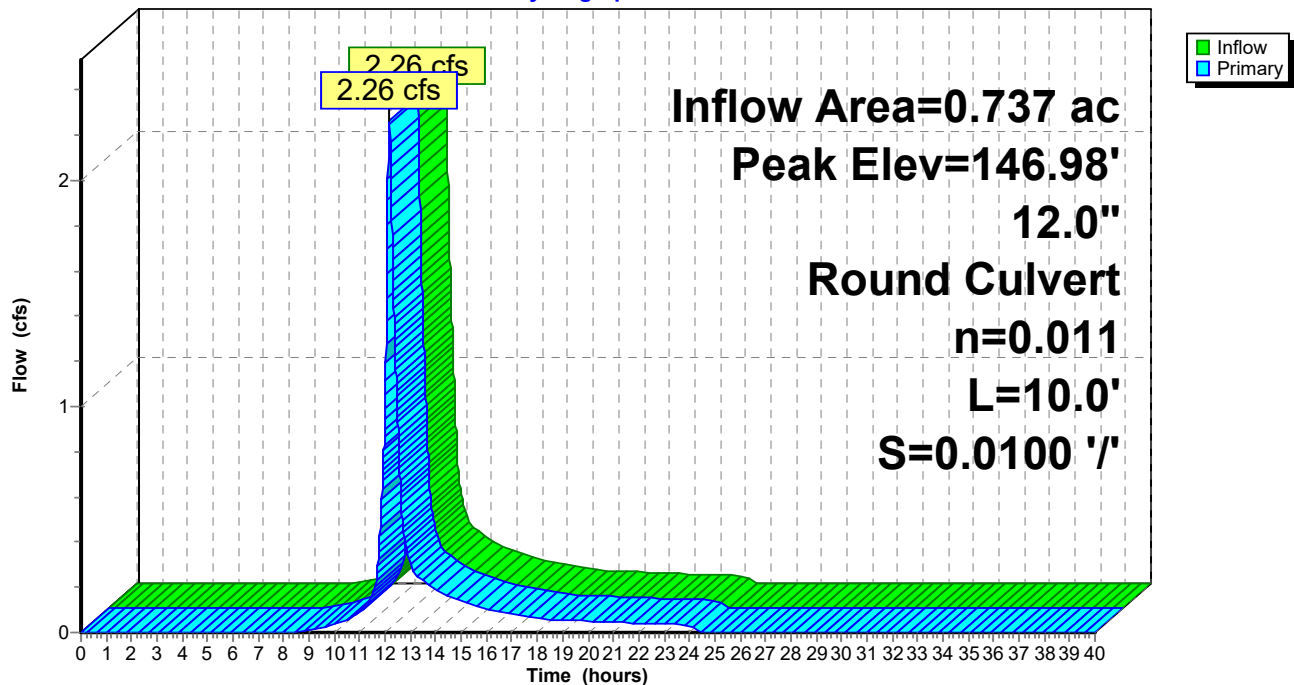
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 146.98' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	146.00'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.00' / 145.90' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.26 cfs @ 12.16 hrs HW=146.98' (Free Discharge)
↑1=Culvert (Barrel Controls 2.26 cfs @ 3.64 fps)

Pond 26P: CB17+77a

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 209

Summary for Subcatchment 27P: P1k

Runoff = 1.15 cfs @ 12.12 hrs, Volume= 0.091 af, Depth= 4.08"

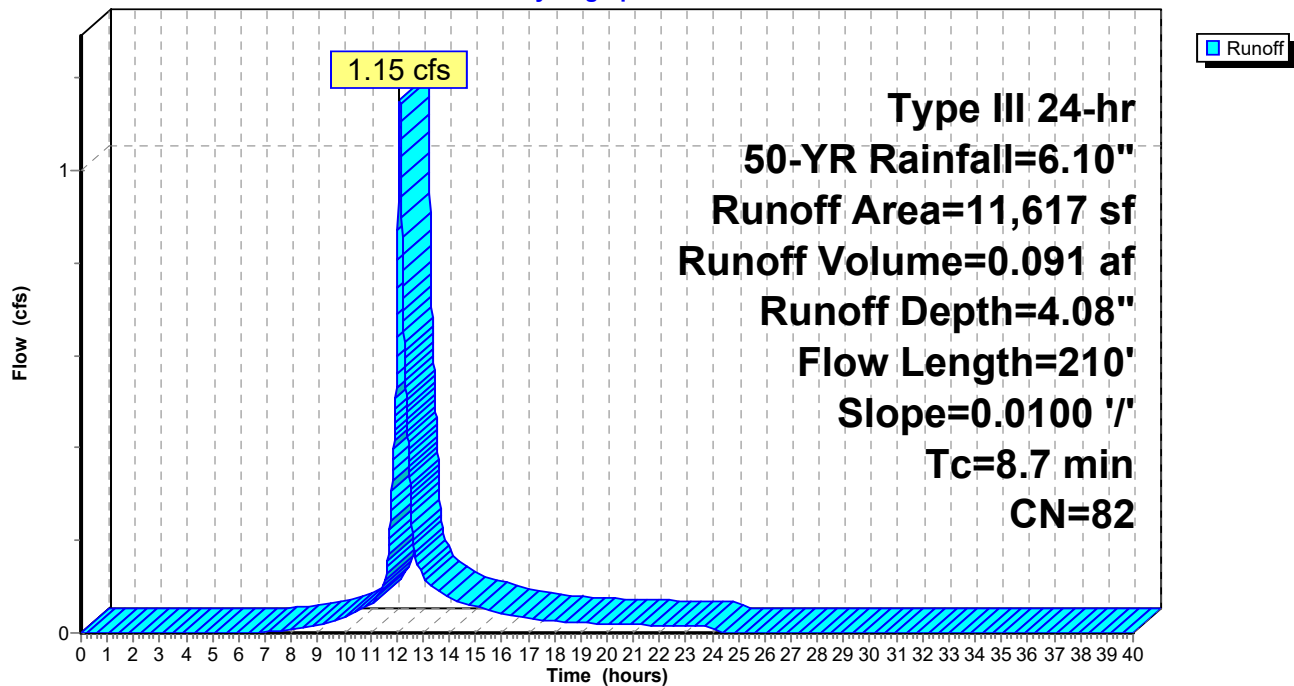
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
3,375	98	Paved parking HSG B
1,993	61	>75% Grass cover, Good HSG B
1,913	39	>75% Grass cover, Good HSG A
4,336	98	Paved parking HSG A
11,617	82	Weighted Average
3,906	50	33.62% Pervious Area
7,711	98	66.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	30	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.5	180	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
8.7	210	Total			

Subcatchment 27P: P1k

Hydrograph



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Page 210

Summary for Pond 28P: CB17+77b

Inflow Area = 0.267 ac, 66.38% Impervious, Inflow Depth = 4.08" for 50-YR event
Inflow = 1.15 cfs @ 12.12 hrs, Volume= 0.091 af
Outflow = 1.15 cfs @ 12.12 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min
Primary = 1.15 cfs @ 12.12 hrs, Volume= 0.091 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 146.66' @ 12.12 hrs

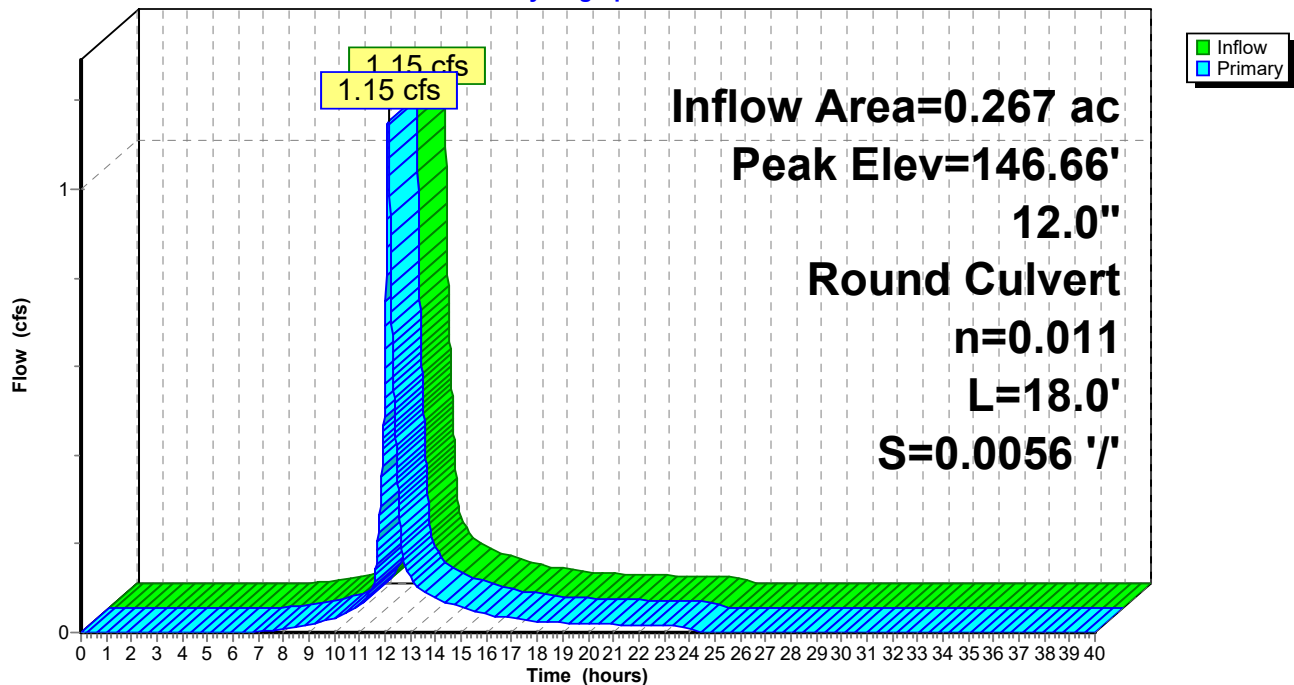
Device	Routing	Invert	Outlet Devices
#1	Primary	146.00'	12.0" Round Culvert L= 18.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.00' / 145.90' S= 0.0056 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.15 cfs @ 12.12 hrs HW=146.66' (Free Discharge)

↑1=Culvert (Barrel Controls 1.15 cfs @ 2.99 fps)

Pond 28P: CB17+77b

Hydrograph



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Page 211

Summary for Pond 29P: DMH17+67

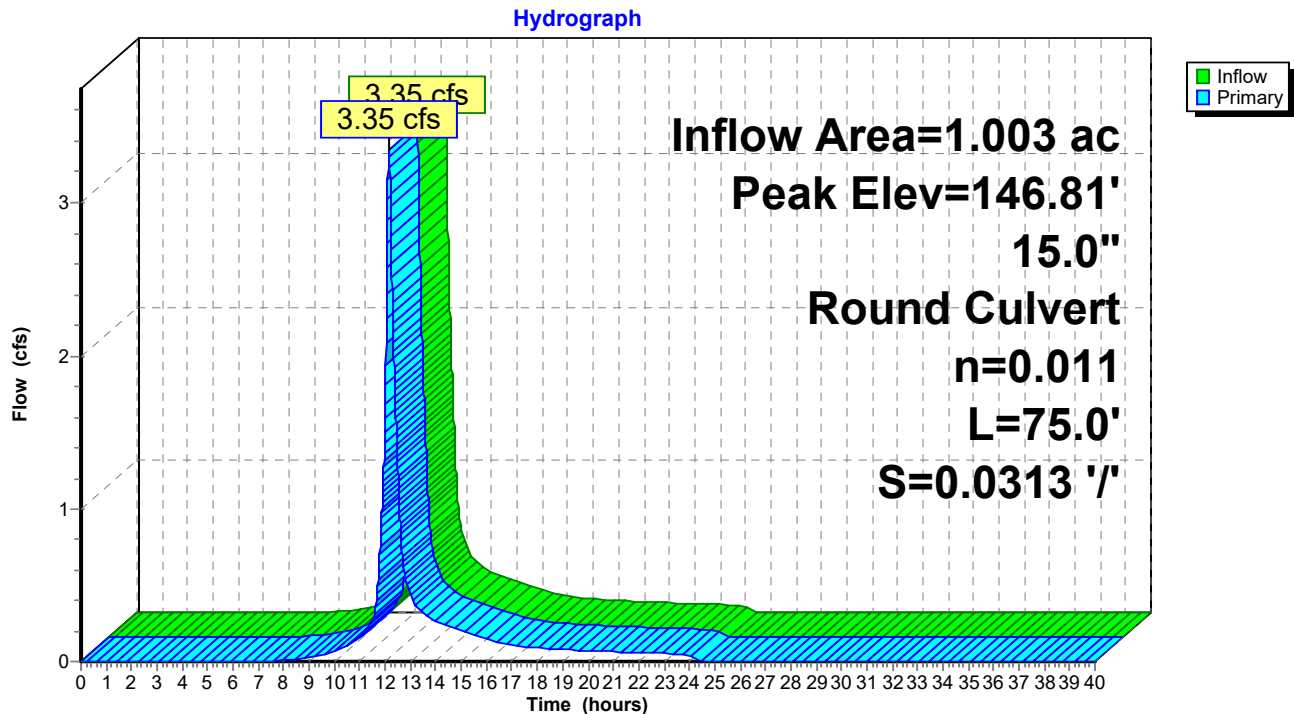
Inflow Area = 1.003 ac, 51.51% Impervious, Inflow Depth = 3.41" for 50-YR event
Inflow = 3.35 cfs @ 12.15 hrs, Volume= 0.285 af
Outflow = 3.35 cfs @ 12.15 hrs, Volume= 0.285 af, Atten= 0%, Lag= 0.0 min
Primary = 3.35 cfs @ 12.15 hrs, Volume= 0.285 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 146.81' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	145.85'	15.0" Round Culvert L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.85' / 143.50' S= 0.0313 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.35 cfs @ 12.15 hrs HW=146.80' (Free Discharge)
↑1=Culvert (Inlet Controls 3.35 cfs @ 3.33 fps)

Pond 29P: DMH17+67



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 212

Summary for Subcatchment 30P: P1I

Runoff = 2.99 cfs @ 12.17 hrs, Volume= 0.295 af, Depth= 1.34"

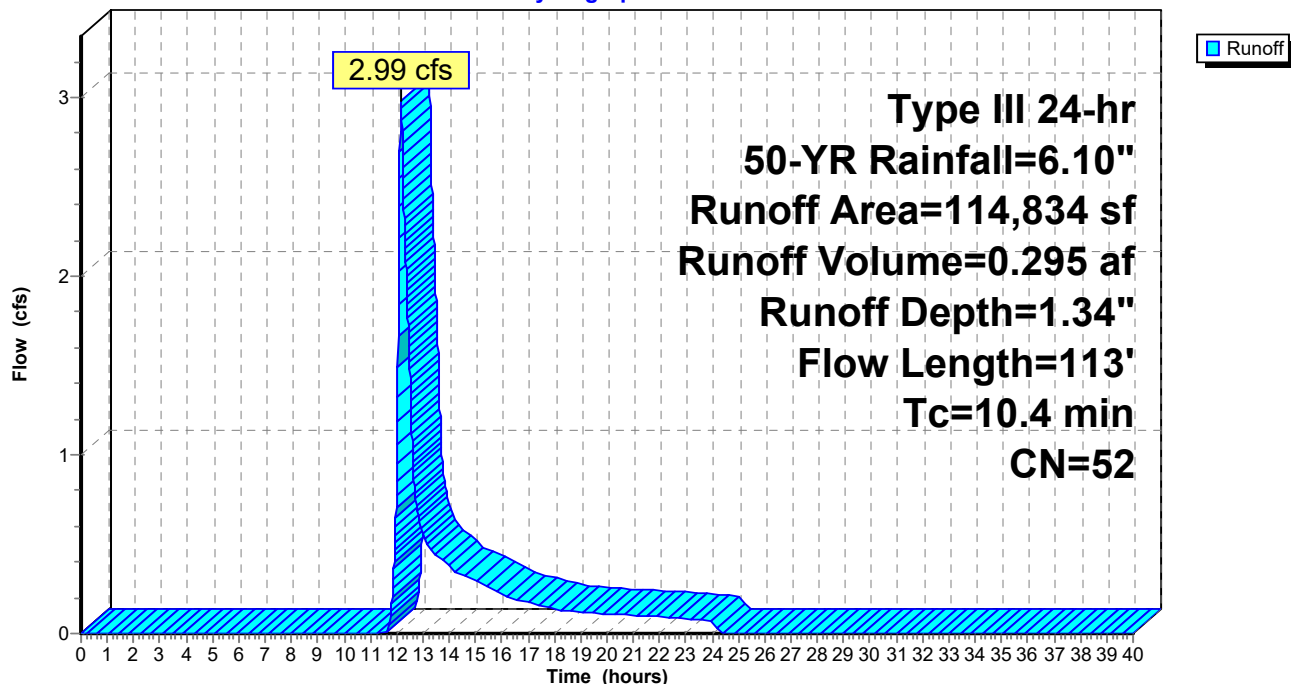
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
3,499	61	>75% Grass cover, Good HSG B
11,038	98	Water Surface HSG A
86,857	39	>75% Grass cover, Good HSG A
500	98	Paved parking HSG B
4,500	98	Paved parking HSG A
844	98	Roofs HSG B
7,596	98	Roofs HSG A
114,834	52	Weighted Average
90,356	40	78.68% Pervious Area
24,478	98	21.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.0	71	0.0550	1.17		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
10.4	113	Total			

Subcatchment 30P: P1I

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 213

Summary for Subcatchment 31P: P1m

Runoff = 3.02 cfs @ 12.15 hrs, Volume= 0.253 af, Depth= 3.08"

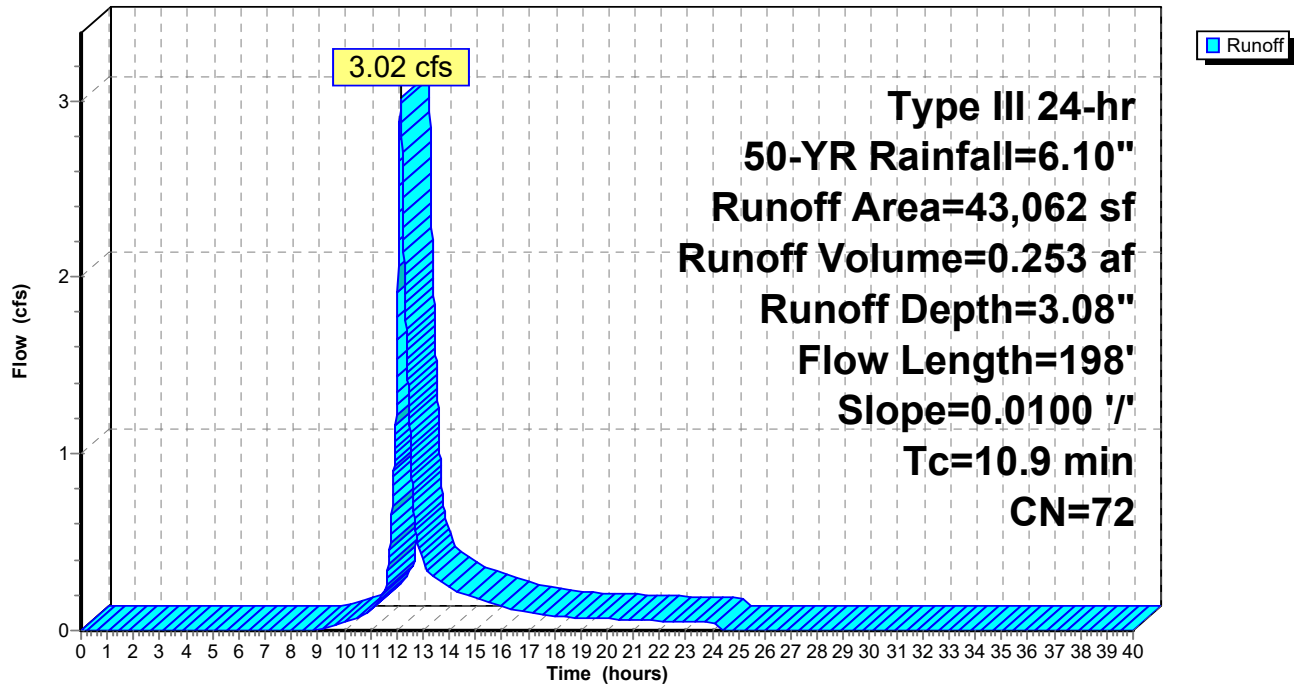
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
16,597	39	>75% Grass cover, Good HSG A
3,917	61	>75% Grass cover, Good HSG B
865	98	Roofs HSG B
3,773	98	Roofs HSG A
3,473	98	Paved parking HSG B
14,437	98	Paved parking HSG A
43,062	72	Weighted Average
20,514	43	47.64% Pervious Area
22,548	98	52.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	12	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	144	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.9	198	Total			

Subcatchment 31P: P1m

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 215

Summary for Pond 32P: CB3+67a

Inflow Area = 0.989 ac, 52.36% Impervious, Inflow Depth = 3.08" for 50-YR event
Inflow = 3.02 cfs @ 12.15 hrs, Volume= 0.253 af
Outflow = 3.02 cfs @ 12.15 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min
Primary = 3.02 cfs @ 12.15 hrs, Volume= 0.253 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 146.25' @ 12.15 hrs

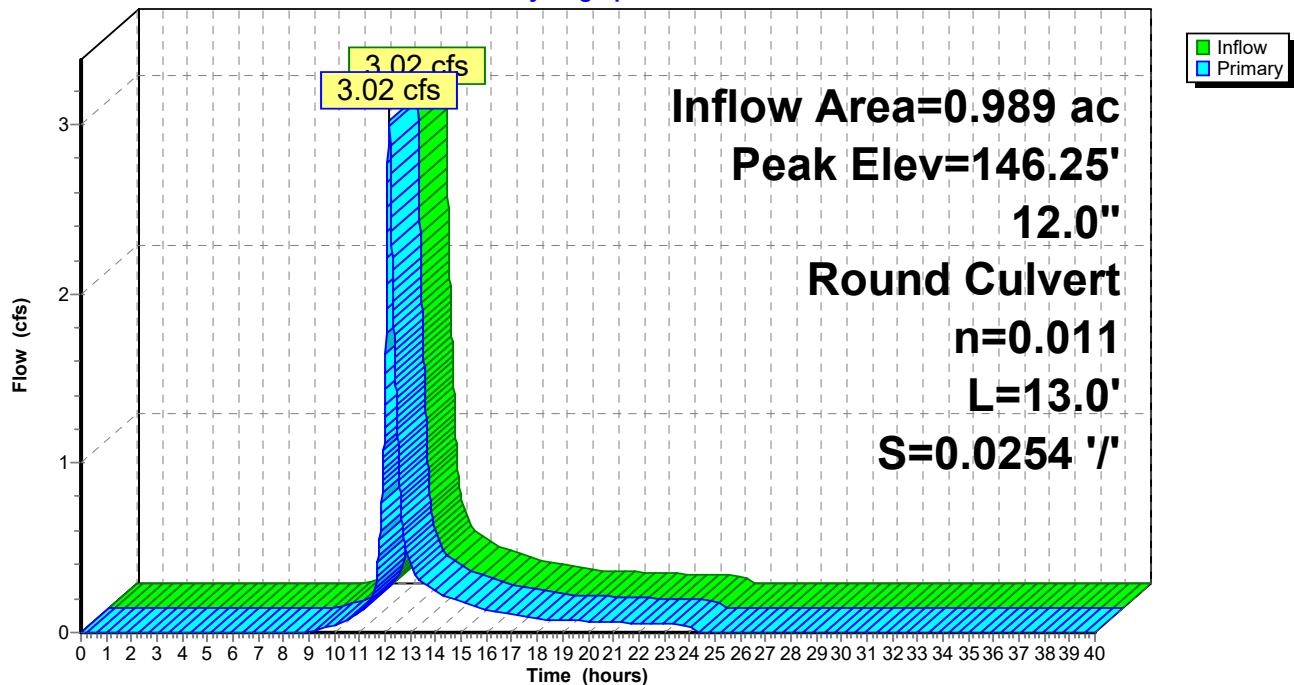
Device	Routing	Invert	Outlet Devices
#1	Primary	145.11'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.11' / 144.78' S= 0.0254 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.02 cfs @ 12.15 hrs HW=146.25' (Free Discharge)

↑1=Culvert (Inlet Controls 3.02 cfs @ 3.84 fps)

Pond 32P: CB3+67a

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 216

Summary for Subcatchment 33P: P1n

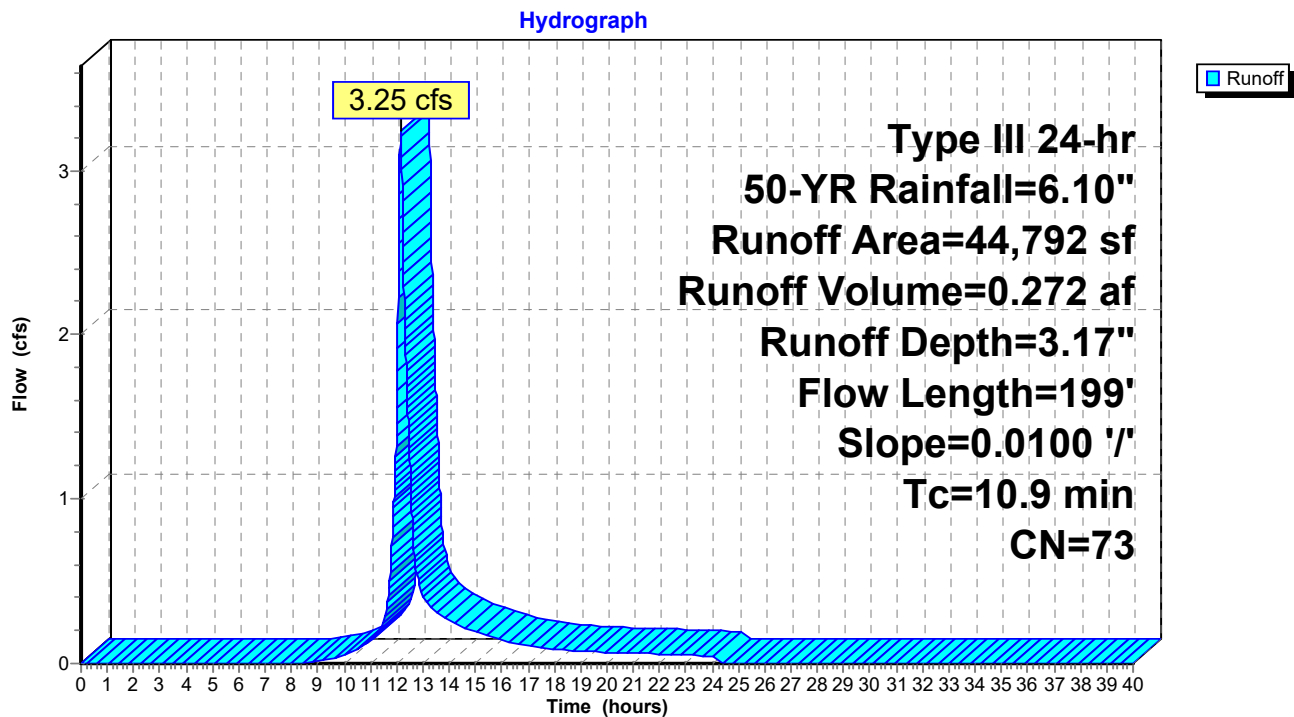
Runoff = 3.25 cfs @ 12.15 hrs, Volume= 0.272 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
3,458	61	>75% Grass cover, Good HSG B
16,849	39	>75% Grass cover, Good HSG A
4,323	98	Roofs HSG A
1,422	98	Roofs HSG B
13,944	98	Paved parking HSG A
4,796	98	Paved parking HSG B
44,792	73	Weighted Average
20,307	43	45.34% Pervious Area
24,485	98	54.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	144	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.9	199	Total			

Subcatchment 33P: P1n



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Page 218

Summary for Pond 34P: CB3+67b

Inflow Area = 1.028 ac, 54.66% Impervious, Inflow Depth = 3.17" for 50-YR event
Inflow = 3.25 cfs @ 12.15 hrs, Volume= 0.272 af
Outflow = 3.25 cfs @ 12.15 hrs, Volume= 0.272 af, Atten= 0%, Lag= 0.0 min
Primary = 3.25 cfs @ 12.15 hrs, Volume= 0.272 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 146.35' @ 12.15 hrs

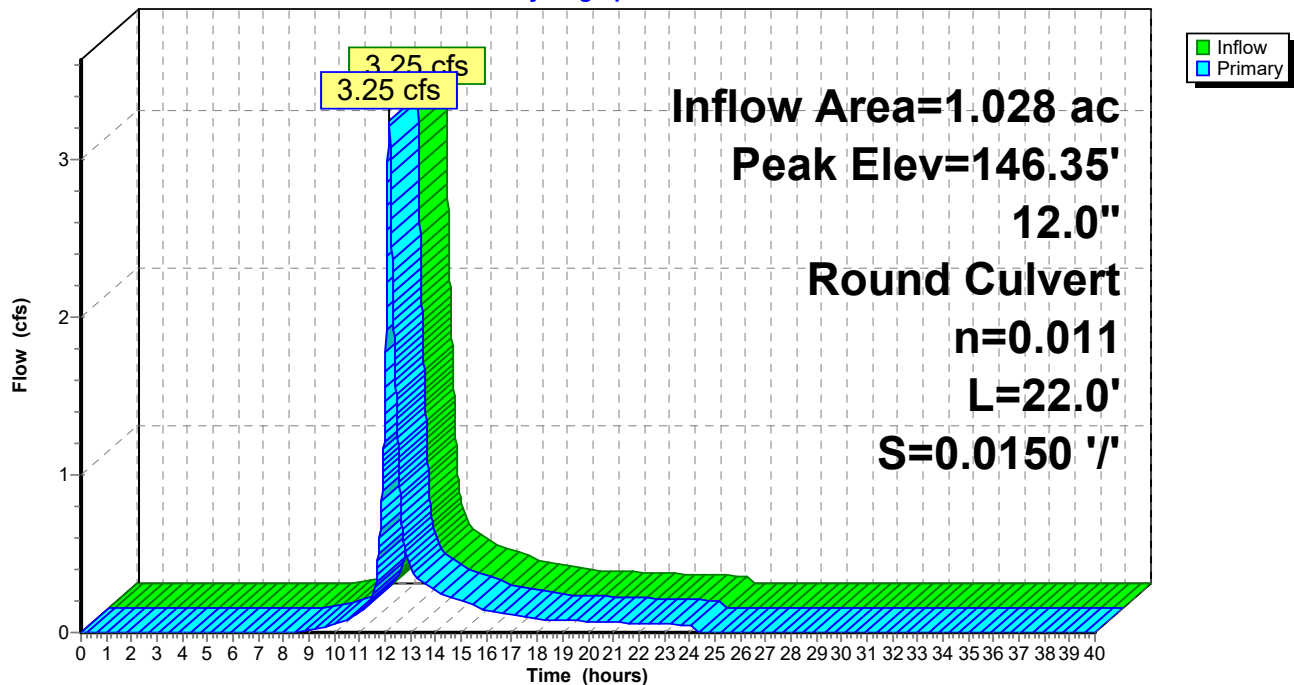
Device	Routing	Invert	Outlet Devices
#1	Primary	145.11'	12.0" Round Culvert L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.11' / 144.78' S= 0.0150 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.24 cfs @ 12.15 hrs HW=146.35' (Free Discharge)

↑1=Culvert (Inlet Controls 3.24 cfs @ 4.13 fps)

Pond 34P: CB3+67b

Hydrograph



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Page 219

Summary for Pond 35P: DMH3+50

Inflow Area = 2.017 ac, 53.54% Impervious, Inflow Depth = 3.12" for 50-YR event
Inflow = 6.27 cfs @ 12.15 hrs, Volume= 0.525 af
Outflow = 6.27 cfs @ 12.15 hrs, Volume= 0.525 af, Atten= 0%, Lag= 0.0 min
Primary = 6.27 cfs @ 12.15 hrs, Volume= 0.525 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.57' @ 12.15 hrs

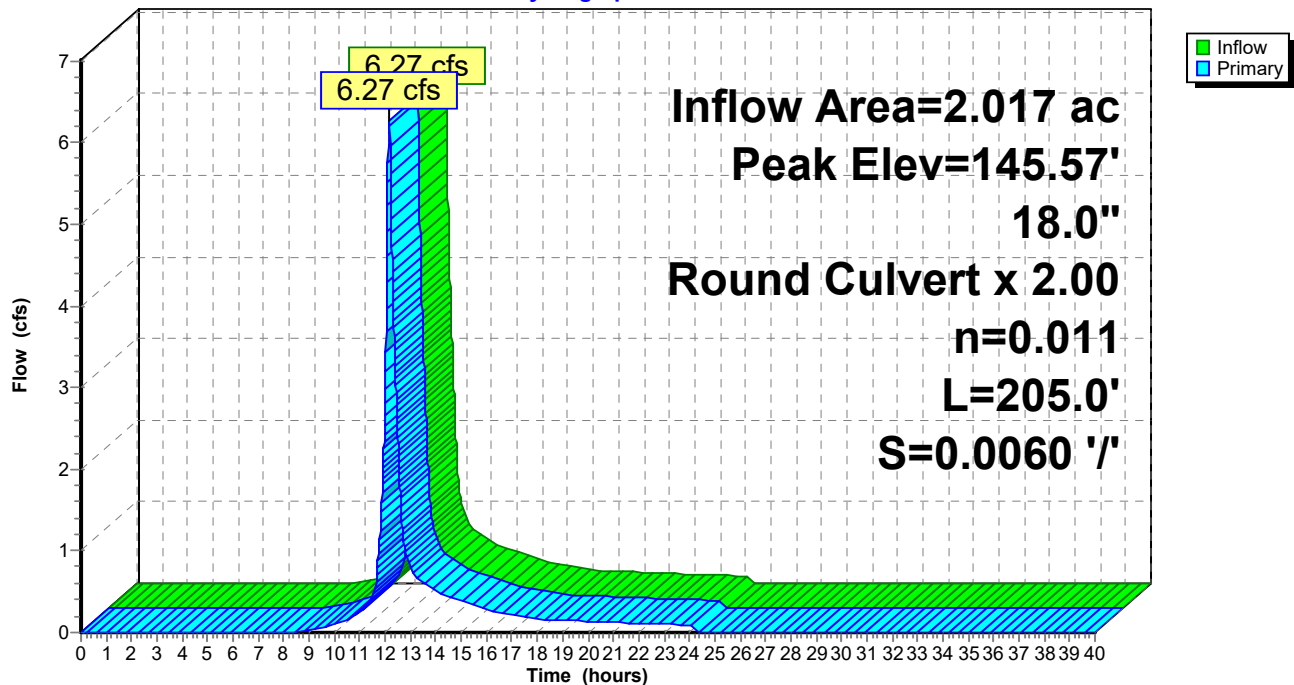
Device	Routing	Invert	Outlet Devices
#1	Primary	144.73'	18.0" Round Culvert X 2.00 L= 205.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.73' / 143.50' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=6.26 cfs @ 12.15 hrs HW=145.57' (Free Discharge)

↑1=Culvert (Barrel Controls 6.26 cfs @ 4.46 fps)

Pond 35P: DMH3+50

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 220

Summary for Pond 36P: Basin #2

Inflow Area = 5.657 ac, 38.16% Impervious, Inflow Depth = 2.34" for 50-YR event
 Inflow = 12.57 cfs @ 12.15 hrs, Volume= 1.105 af
 Outflow = 2.76 cfs @ 12.67 hrs, Volume= 1.105 af, Atten= 78%, Lag= 31.2 min
 Discarded = 2.76 cfs @ 12.67 hrs, Volume= 1.105 af
 Primary = 0.01 cfs @ 12.67 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 144.53' @ 12.67 hrs Surf.Area= 14,405 sf Storage= 13,134 cf

Plug-Flow detention time= 34.5 min calculated for 1.105 af (100% of inflow)
 Center-of-Mass det. time= 34.5 min (882.8 - 848.2)

Volume	Invert	Avail.Storage	Storage Description
#1	143.50'	48,638 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
143.50	11,051	875.0	0	0	11,051
146.50	21,996	950.0	48,638	48,638	22,282

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.50'	8.270 in/hr Exfiltration over Surface area
#2	Primary	144.50'	15.0" Round Culvert L= 220.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.50' / 143.00' S= 0.0068 ' S= 0.0068 ' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Discarded OutFlow Max=2.76 cfs @ 12.67 hrs HW=144.53' (Free Discharge)

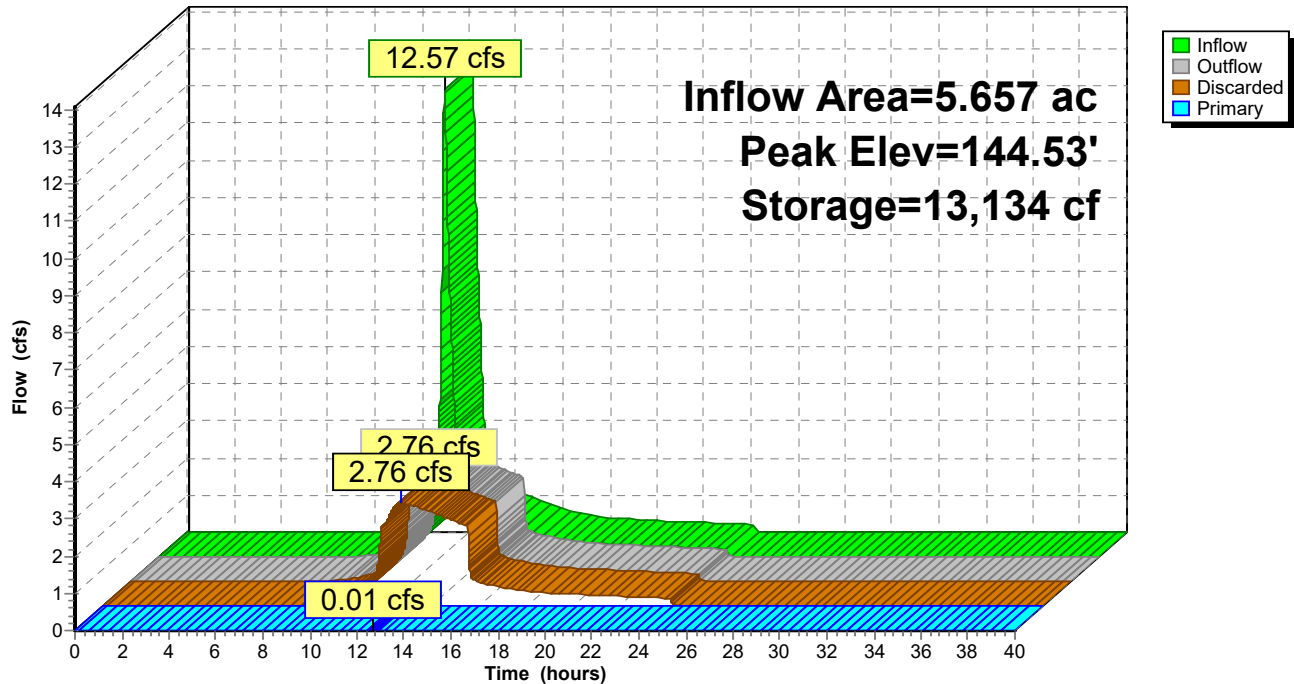
↑**1=Exfiltration** (Exfiltration Controls 2.76 cfs)

Primary OutFlow Max=0.00 cfs @ 12.67 hrs HW=144.53' (Free Discharge)

↑**2=Culvert** (Barrel Controls 0.00 cfs @ 0.74 fps)

Pond 36P: Basin #2

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 222

Summary for Subcatchment 37P: P1q

Runoff = 33.25 cfs @ 12.35 hrs, Volume= 3.931 af, Depth= 2.25"

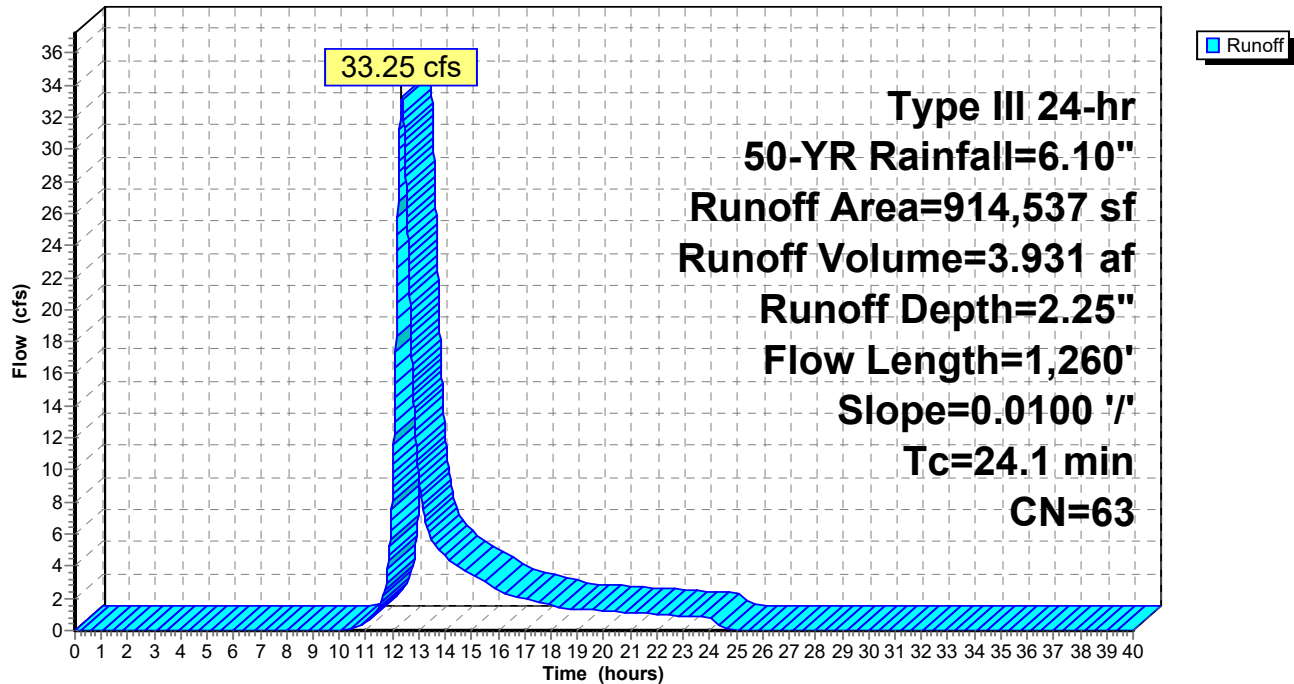
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
22,240	98	Paved parking HSG B
215	80	>75% Grass cover, Good HSG D
98,766	61	>75% Grass cover, Good HSG B
127,688	39	>75% Grass cover, Good HSG A
24,404	98	Paved parking HSG A
6,082	98	Roofs HSG B
16,041	98	Roofs HSG A
145,280	30	Woods, Good HSG A
55,658	55	Woods, Good HSG B
418,163	77	Woods, Good HSG D
914,537	63	Weighted Average
845,770	60	92.48% Pervious Area
68,767	98	7.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,035	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
24.1	1,260	Total			

Subcatchment 37P: P1q

Hydrograph



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Page 224

Summary for Pond 38P: Wetland Storage

Inflow Area = 20.995 ac, 7.52% Impervious, Inflow Depth = 2.25" for 50-YR event
 Inflow = 33.25 cfs @ 12.35 hrs, Volume= 3.931 af
 Outflow = 4.04 cfs @ 14.38 hrs, Volume= 3.758 af, Atten= 88%, Lag= 121.7 min
 Primary = 4.04 cfs @ 14.38 hrs, Volume= 3.758 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.31' @ 14.38 hrs Surf.Area= 234,959 sf Storage= 86,071 cf

Plug-Flow detention time= 372.8 min calculated for 3.758 af (96% of inflow)
 Center-of-Mass det. time= 349.0 min (1,219.9 - 870.9)

Volume	Invert	Avail.Storage	Storage Description
#1	145.20'	133,865 cf	Custom Stage Data (Irregular) Listed below (Recalc)

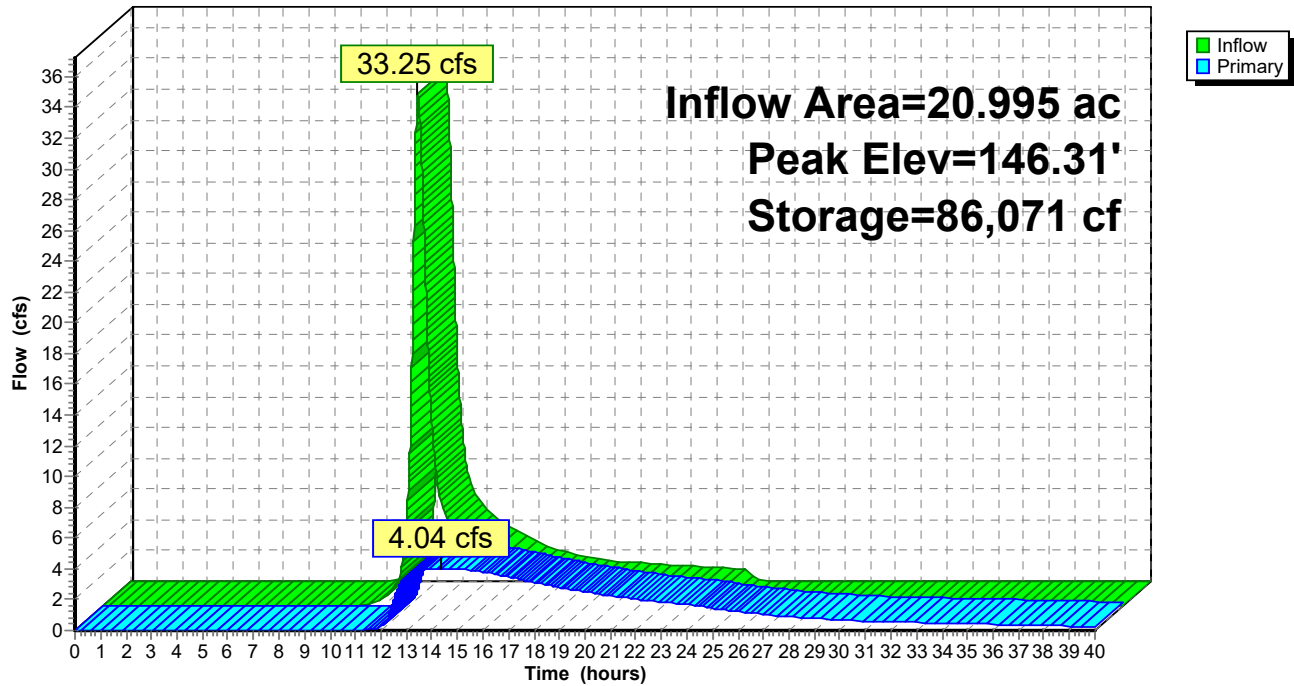
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.20	30	18.0	0	0	30
145.70	60	30.0	22	22	77
146.00	195,920	2,713.0	19,941	19,963	585,725
146.50	261,254	2,891.0	113,902	133,865	665,117

Device	Routing	Invert	Outlet Devices
#1	Primary	145.80'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 145.80 146.00 146.00 146.50 Width (feet) 2.00 2.00 5.00 5.00

Primary OutFlow Max=4.04 cfs @ 14.38 hrs HW=146.31' (Free Discharge)
 ↑1=Custom Weir/Orifice (Weir Controls 4.04 cfs @ 2.09 fps)

Pond 38P: Wetland Storage

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 226

Summary for Subcatchment 39P: P1r

Runoff = 3.78 cfs @ 12.43 hrs, Volume= 0.698 af, Depth= 0.65"

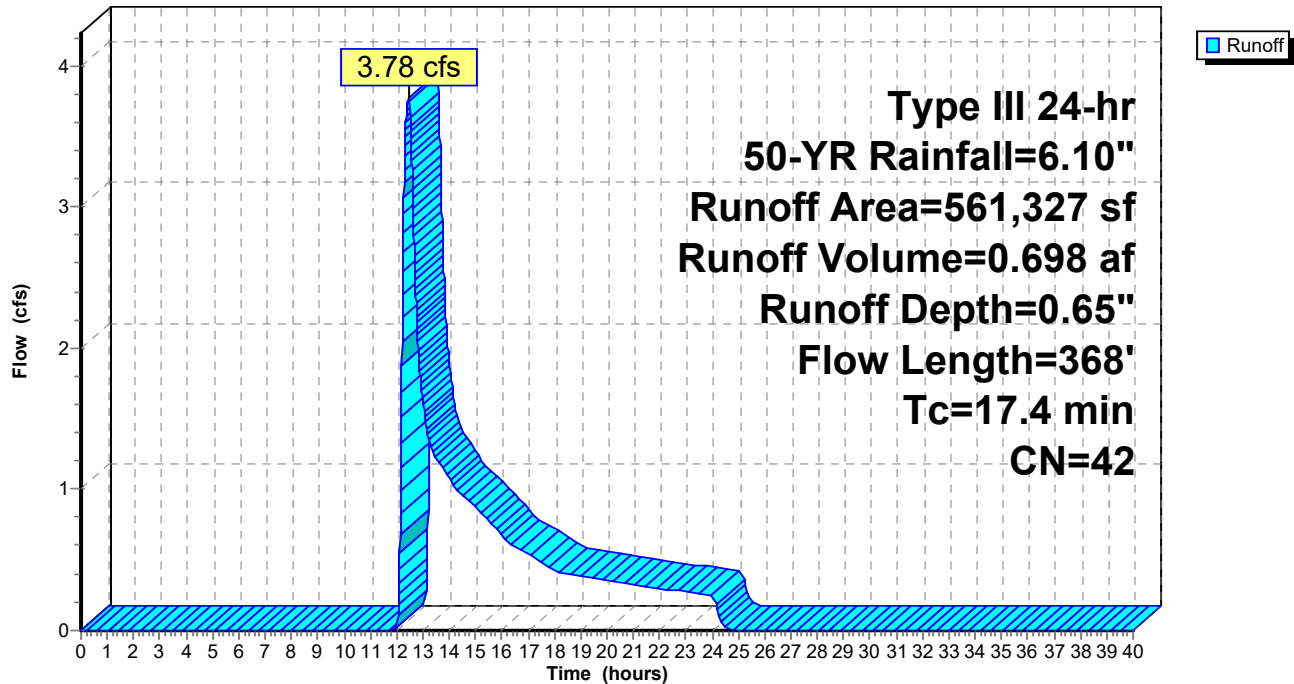
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
20,944	61	>75% Grass cover, Good HSG B
100,043	39	>75% Grass cover, Good HSG A
1,653	98	Roofs HSG B
7,805	98	Roofs HSG A
4,592	98	Paved parking HSG A
433	98	Paved parking HSG B
267,267	30	Woods, Good HSG A
158,590	55	Woods, Good HSG B
561,327	42	Weighted Average
546,844	40	97.42% Pervious Area
14,483	98	2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	343	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
17.4	368	Total			

Subcatchment 39P: P1r

Hydrograph

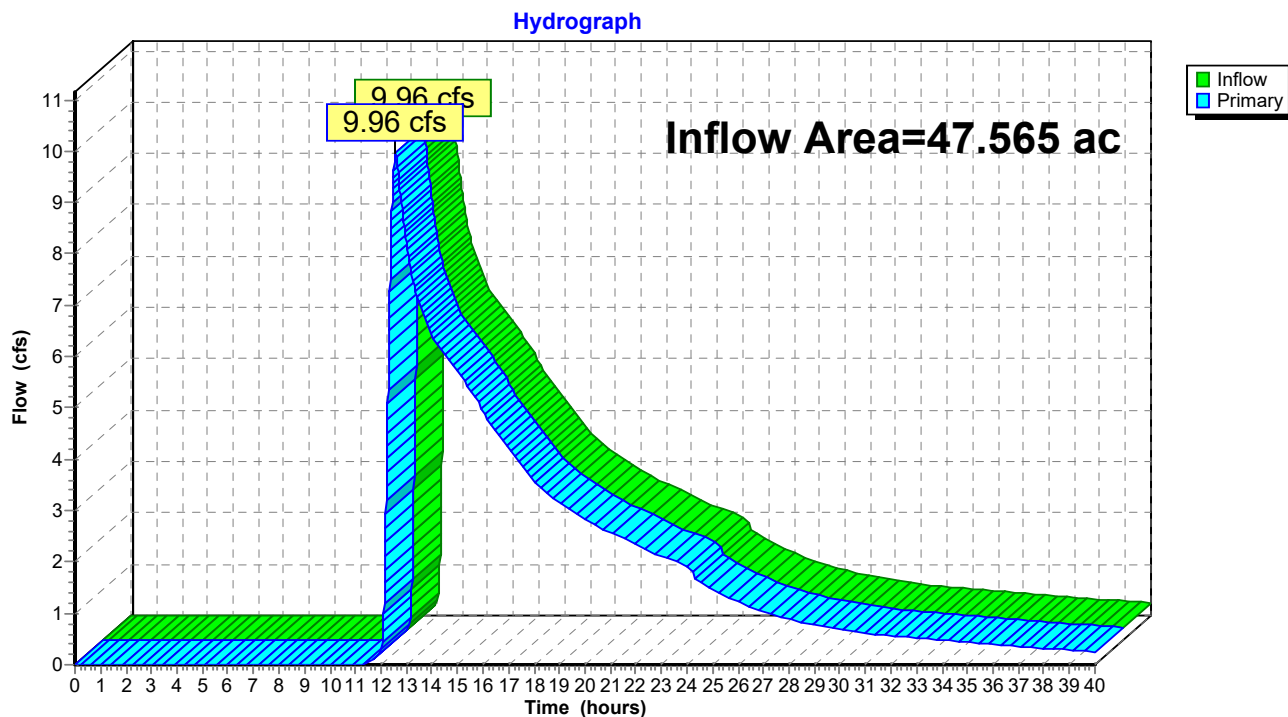


Summary for Link 40P: Design Point #1: Flow to Western Wetlands

Inflow Area = 47.565 ac, 15.02% Impervious, Inflow Depth > 1.27" for 50-YR event
 Inflow = 9.96 cfs @ 12.58 hrs, Volume= 5.024 af
 Primary = 9.96 cfs @ 12.58 hrs, Volume= 5.024 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 40P: Design Point #1: Flow to Western Wetlands



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 229

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1P: P1a

Runoff Area=8,961 sf 99.73% Impervious Runoff Depth=6.46"
Flow Length=474' Tc=14.6 min CN=98 Runoff=1.04 cfs 0.111 af

Pond 2P: CB5+06a

Peak Elev=149.63' Inflow=1.04 cfs 0.111 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0177 ' Outflow=1.04 cfs 0.111 af

Subcatchment3P: P1b

Runoff Area=48,701 sf 27.64% Impervious Runoff Depth=2.03"
Flow Length=473' Slope=0.0100 ' Tc=6.0 min CN=56 Runoff=2.48 cfs 0.189 af

Pond 4P: CB5+06b

Peak Elev=150.07' Inflow=2.48 cfs 0.189 af
12.0" Round Culvert n=0.011 L=21.0' S=0.0110 ' Outflow=2.48 cfs 0.189 af

Pond 5P: DMH5+22

Peak Elev=149.83' Inflow=3.32 cfs 0.299 af
15.0" Round Culvert n=0.011 L=88.0' S=0.0060 ' Outflow=3.32 cfs 0.299 af

Pond 6P: DMH6+13

Peak Elev=149.20' Inflow=3.32 cfs 0.299 af
15.0" Round Culvert n=0.011 L=209.0' S=0.0060 ' Outflow=3.32 cfs 0.299 af

Subcatchment7P: P1c

Runoff Area=19,485 sf 49.68% Impervious Runoff Depth=3.27"
Flow Length=193' Slope=0.0100 ' Tc=11.0 min CN=69 Runoff=1.45 cfs 0.122 af

Pond 8P: CB8+10a

Peak Elev=147.86' Inflow=1.45 cfs 0.122 af
12.0" Round Culvert n=0.011 L=12.0' S=0.0175 ' Outflow=1.45 cfs 0.122 af

Subcatchment9P: P1d

Runoff Area=15,346 sf 57.18% Impervious Runoff Depth=4.53"
Flow Length=194' Slope=0.0100 ' Tc=10.6 min CN=81 Runoff=1.59 cfs 0.133 af

Pond 10P: CB8+10b

Peak Elev=147.92' Inflow=1.59 cfs 0.133 af
12.0" Round Culvert n=0.011 L=19.0' S=0.0111 ' Outflow=1.59 cfs 0.133 af

Pond 11P: DMH8+20

Peak Elev=148.24' Inflow=6.22 cfs 0.554 af
18.0" Round Culvert n=0.011 L=161.0' S=0.0061 ' Outflow=6.22 cfs 0.554 af

Pond 12P: DMH1a

Peak Elev=147.38' Inflow=6.22 cfs 0.554 af
18.0" Round Culvert n=0.011 L=35.0' S=0.0060 ' Outflow=6.22 cfs 0.554 af

Subcatchment13P: P1e

Runoff Area=37,107 sf 49.02% Impervious Runoff Depth=3.89"
Flow Length=331' Slope=0.0100 ' Tc=12.0 min CN=75 Runoff=3.19 cfs 0.276 af

Pond 14P: CB12+15a

Peak Elev=149.11' Inflow=3.19 cfs 0.276 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0100 ' Outflow=3.19 cfs 0.276 af

Subcatchment15P: P1f

Runoff Area=35,775 sf 48.96% Impervious Runoff Depth=3.89"
Flow Length=280' Slope=0.0100 ' Tc=11.5 min CN=75 Runoff=3.12 cfs 0.266 af

Pond 16P: CB12+15b

Peak Elev=149.08' Inflow=3.12 cfs 0.266 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0100 ' Outflow=3.12 cfs 0.266 af

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Page 230

Pond 17P: DMH11+45Peak Elev=149.36' Inflow=6.30 cfs 0.542 af
15.0" Round Culvert n=0.011 L=155.0' S=0.0123 '/' Outflow=6.30 cfs 0.542 af**Subcatchment18P: P1g**Runoff Area=42,623 sf 52.76% Impervious Runoff Depth=3.37"
Flow Length=313' Slope=0.0100 '/' Tc=12.1 min CN=70 Runoff=3.16 cfs 0.275 af**Pond 19P: CB2+70a**Peak Elev=148.15' Inflow=3.16 cfs 0.275 af
15.0" Round Culvert n=0.011 L=24.0' S=0.0125 '/' Outflow=3.16 cfs 0.275 af**Subcatchment20P: P1h**Runoff Area=45,838 sf 53.76% Impervious Runoff Depth=3.47"
Flow Length=301' Slope=0.0100 '/' Tc=11.7 min CN=71 Runoff=3.55 cfs 0.304 af**Pond 21P: CB2+70b**Peak Elev=148.28' Inflow=3.55 cfs 0.304 af
15.0" Round Culvert n=0.011 L=30.0' S=0.0083 '/' Outflow=3.55 cfs 0.304 af**Pond 22P: DMH2+40**Peak Elev=147.76' Inflow=6.70 cfs 0.579 af
18.0" Round Culvert x 2.00 n=0.011 L=199.0' S=0.0060 '/' Outflow=6.70 cfs 0.579 af**Subcatchment23P: P1i**Runoff Area=95,819 sf 10.70% Impervious Runoff Depth=2.21"
Flow Length=110' Tc=10.1 min CN=58 Runoff=4.69 cfs 0.405 af**Pond 24P: Basin #1**Peak Elev=146.92' Storage=29,014 cf Inflow=23.73 cfs 2.080 af
Discarded=1.46 cfs 1.296 af Primary=6.48 cfs 0.784 af Outflow=7.94 cfs 2.080 af**Subcatchment25P: P1j**Runoff Area=32,095 sf 46.13% Impervious Runoff Depth=3.68"
Flow Length=265' Slope=0.0100 '/' Tc=11.8 min CN=73 Runoff=2.63 cfs 0.226 af**Pond 26P: CB17+77a**Peak Elev=147.10' Inflow=2.63 cfs 0.226 af
12.0" Round Culvert n=0.011 L=10.0' S=0.0100 '/' Outflow=2.63 cfs 0.226 af**Subcatchment27P: P1k**Runoff Area=11,617 sf 66.38% Impervious Runoff Depth=4.64"
Flow Length=210' Slope=0.0100 '/' Tc=8.7 min CN=82 Runoff=1.30 cfs 0.103 af**Pond 28P: CB17+77b**Peak Elev=146.71' Inflow=1.30 cfs 0.103 af
12.0" Round Culvert n=0.011 L=18.0' S=0.0056 '/' Outflow=1.30 cfs 0.103 af**Pond 29P: DMH17+67**Peak Elev=146.90' Inflow=3.86 cfs 0.329 af
15.0" Round Culvert n=0.011 L=75.0' S=0.0313 '/' Outflow=3.86 cfs 0.329 af**Subcatchment30P: P1l**Runoff Area=114,834 sf 21.32% Impervious Runoff Depth=1.67"
Flow Length=113' Tc=10.4 min CN=52 Runoff=3.91 cfs 0.367 af**Subcatchment31P: P1m**Runoff Area=43,062 sf 52.36% Impervious Runoff Depth=3.57"
Flow Length=198' Slope=0.0100 '/' Tc=10.9 min CN=72 Runoff=3.52 cfs 0.294 af**Pond 32P: CB3+67a**Peak Elev=146.48' Inflow=3.52 cfs 0.294 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0254 '/' Outflow=3.52 cfs 0.294 af**Subcatchment33P: P1n**Runoff Area=44,792 sf 54.66% Impervious Runoff Depth=3.68"
Flow Length=199' Slope=0.0100 '/' Tc=10.9 min CN=73 Runoff=3.77 cfs 0.315 af**Pond 34P: CB3+67b**Peak Elev=146.60' Inflow=3.77 cfs 0.315 af
12.0" Round Culvert n=0.011 L=22.0' S=0.0150 '/' Outflow=3.77 cfs 0.315 af

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Page 231

Pond 35P: DMH3+50

Peak Elev=145.65' Inflow=7.29 cfs 0.610 af
18.0" Round Culvert x 2.00 n=0.011 L=205.0' S=0.0060 '/' Outflow=7.29 cfs 0.610 af

Pond 36P: Basin #2

Peak Elev=144.77' Storage=16,630 cf Inflow=15.03 cfs 1.306 af
Discarded=2.92 cfs 1.287 af Primary=0.35 cfs 0.019 af Outflow=3.26 cfs 1.306 af

Subcatchment37P: P1q

Runoff Area=914,537 sf 7.52% Impervious Runoff Depth=2.68"
Flow Length=1,260' Slope=0.0100 '/' Tc=24.1 min CN=63 Runoff=40.12 cfs 4.686 af

Pond 38P: Wetland Storage

Peak Elev=146.37' Storage=102,241 cf Inflow=40.12 cfs 4.686 af
Outflow=5.11 cfs 4.497 af

Subcatchment39P: P1r

Runoff Area=561,327 sf 2.58% Impervious Runoff Depth=0.87"
Flow Length=368' Tc=17.4 min CN=42 Runoff=5.82 cfs 0.938 af

Link 40P: Design Point #1: Flow to Western Wetlands

Inflow=14.77 cfs 6.238 af
Primary=14.77 cfs 6.238 af

Total Runoff Area = 47.565 ac Runoff Volume = 9.011 af Average Runoff Depth = 2.27"
84.98% Pervious = 40.420 ac 15.02% Impervious = 7.145 ac

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Page 232

Summary for Subcatchment 1P: P1a

Runoff = 1.04 cfs @ 12.19 hrs, Volume= 0.111 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
9	61	>75% Grass cover, Good HSG B
1	80	>75% Grass cover, Good HSG D
2,432	98	Paved parking HSG B
553	98	Paved parking HSG D
5,952	98	Paved parking HSG A
14	39	>75% Grass cover, Good HSG A
8,961	98	Weighted Average
24	49	0.27% Pervious Area
8,937	98	99.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
2.8	142	0.0150	0.86		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.4	290	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
14.6	474	Total			

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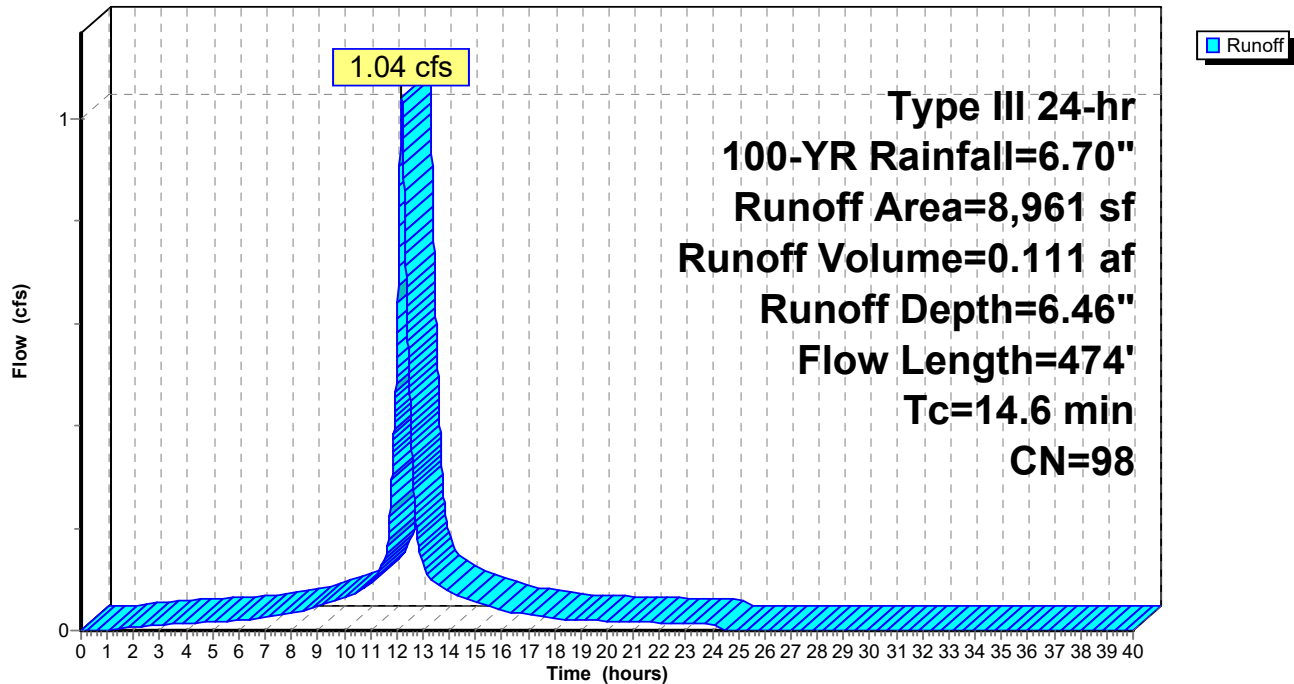
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Page 233

Subcatchment 1P: P1a

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Type III 24-hr 100-YR Rainfall=6.70"

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Page 234

Summary for Pond 2P: CB5+06a

Inflow Area = 0.206 ac, 99.73% Impervious, Inflow Depth = 6.46" for 100-YR event
Inflow = 1.04 cfs @ 12.19 hrs, Volume= 0.111 af
Outflow = 1.04 cfs @ 12.19 hrs, Volume= 0.111 af, Atten= 0%, Lag= 0.0 min
Primary = 1.04 cfs @ 12.19 hrs, Volume= 0.111 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 149.63' @ 12.19 hrs

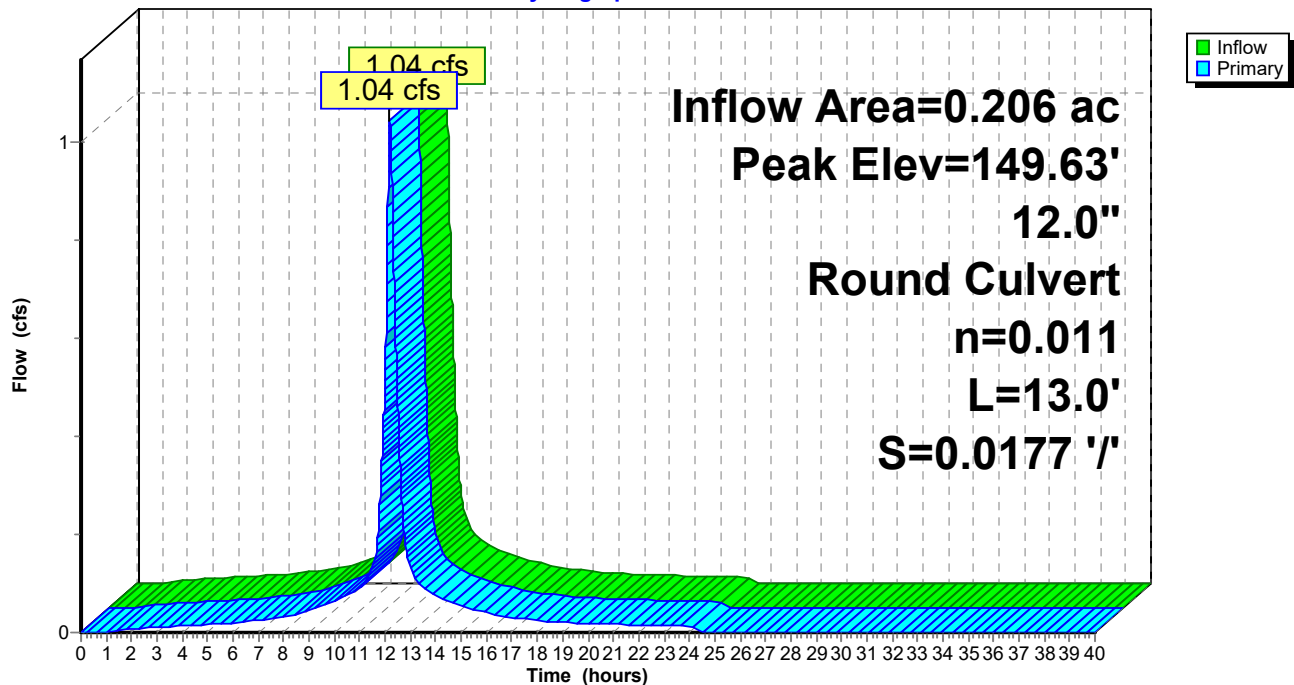
Device	Routing	Invert	Outlet Devices
#1	Primary	149.10'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 149.10' / 148.87' S= 0.0177 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.04 cfs @ 12.19 hrs HW=149.63' (Free Discharge)

↑1=Culvert (Barrel Controls 1.04 cfs @ 3.55 fps)

Pond 2P: CB5+06a

Hydrograph



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Page 235

Summary for Subcatchment 3P: P1b

Runoff = 2.48 cfs @ 12.10 hrs, Volume= 0.189 af, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
828	61	>75% Grass cover, Good HSG B
174	80	>75% Grass cover, Good HSG D
3,006	98	Paved parking HSG B
915	98	Paved parking HSG D
34,195	39	>75% Grass cover, Good HSG A
1,263	98	Roofs HSG A
8,276	98	Paved parking HSG A
44	30	Woods, Good HSG A
0	55	Woods, Good HSG B
48,701	56	Weighted Average
35,241	40	72.36% Pervious Area
13,460	98	27.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0100	1.30		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.4	173	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.3	473	Total, Increased to minimum Tc = 6.0 min			

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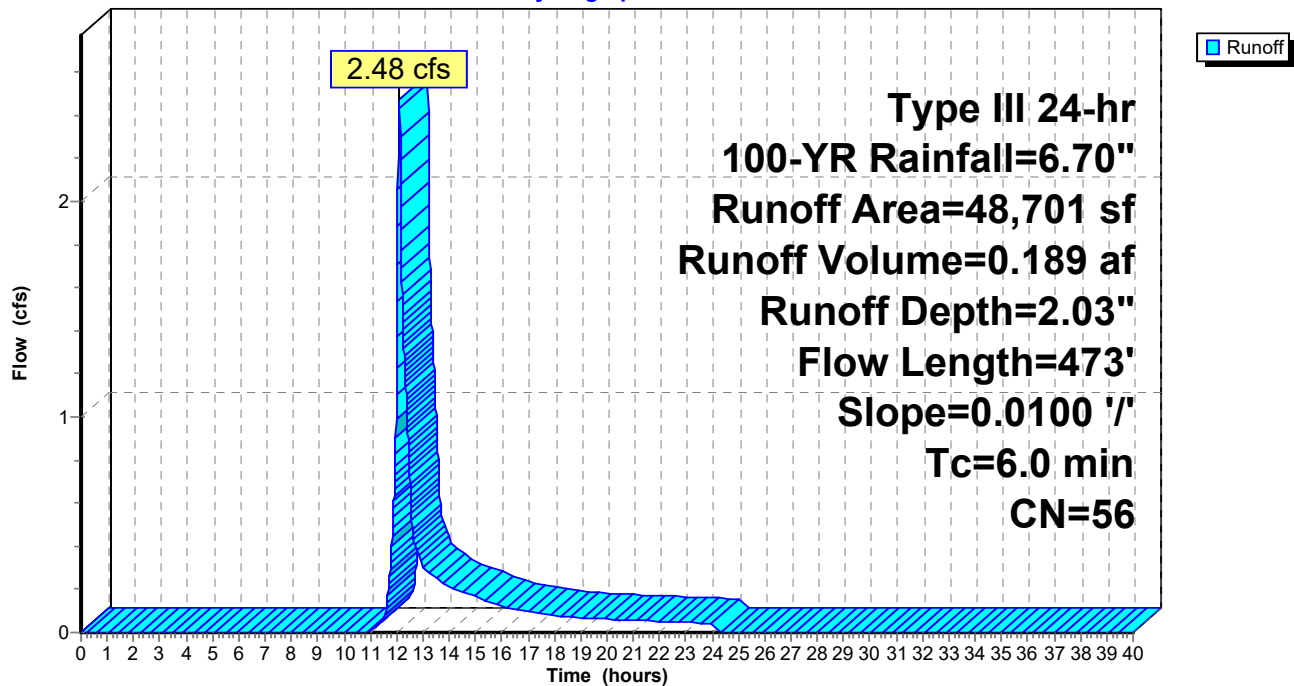
Type III 24-hr 100-YR Rainfall=6.70"

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Page 236

Subcatchment 3P: P1b

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Type III 24-hr 100-YR Rainfall=6.70"

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Page 237

Summary for Pond 4P: CB5+06b

Inflow Area = 1.118 ac, 27.64% Impervious, Inflow Depth = 2.03" for 100-YR event
Inflow = 2.48 cfs @ 12.10 hrs, Volume= 0.189 af
Outflow = 2.48 cfs @ 12.10 hrs, Volume= 0.189 af, Atten= 0%, Lag= 0.0 min
Primary = 2.48 cfs @ 12.10 hrs, Volume= 0.189 af

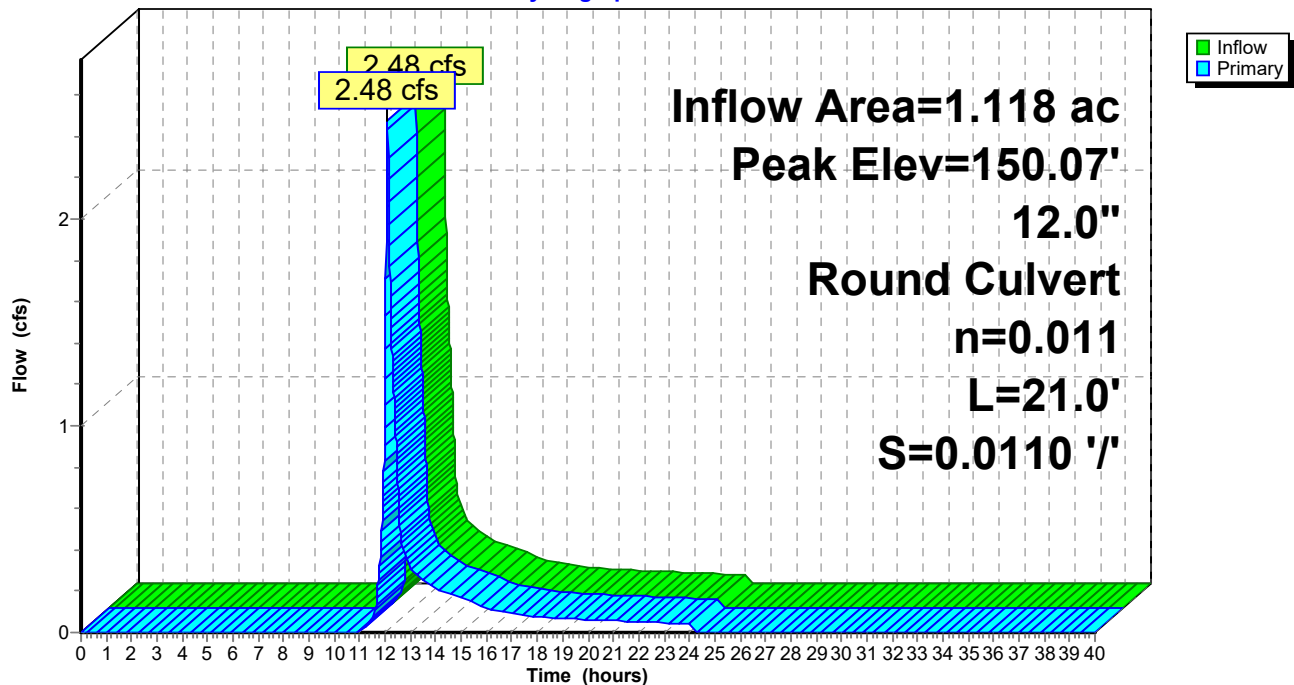
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 150.07' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	149.10'	12.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 149.10' / 148.87' S= 0.0110 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.47 cfs @ 12.10 hrs HW=150.07' (Free Discharge)
↑1=Culvert (Barrel Controls 2.47 cfs @ 4.03 fps)

Pond 4P: CB5+06b

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Type III 24-hr 100-YR Rainfall=6.70"

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Page 238

Summary for Pond 5P: DMH5+22

Inflow Area = 1.324 ac, 38.84% Impervious, Inflow Depth = 2.71" for 100-YR event
Inflow = 3.32 cfs @ 12.11 hrs, Volume= 0.299 af
Outflow = 3.32 cfs @ 12.11 hrs, Volume= 0.299 af, Atten= 0%, Lag= 0.0 min
Primary = 3.32 cfs @ 12.11 hrs, Volume= 0.299 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 149.83' @ 12.11 hrs

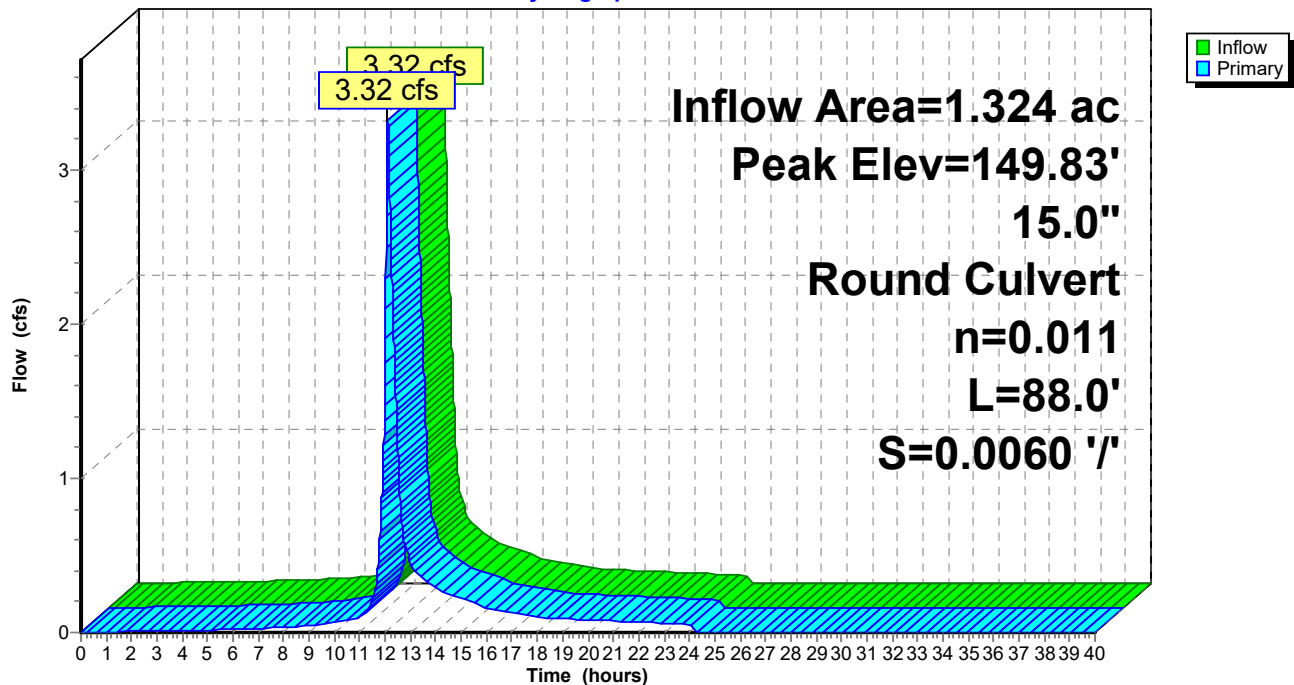
Device	Routing	Invert	Outlet Devices
#1	Primary	148.82'	15.0" Round Culvert L= 88.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 148.82' / 148.29' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.32 cfs @ 12.11 hrs HW=149.83' (Free Discharge)

1=Culvert (Barrel Controls 3.32 cfs @ 4.26 fps)

Pond 5P: DMH5+22

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 239

Summary for Pond 6P: DMH6+13

Inflow Area = 1.324 ac, 38.84% Impervious, Inflow Depth = 2.71" for 100-YR event
Inflow = 3.32 cfs @ 12.11 hrs, Volume= 0.299 af
Outflow = 3.32 cfs @ 12.11 hrs, Volume= 0.299 af, Atten= 0%, Lag= 0.0 min
Primary = 3.32 cfs @ 12.11 hrs, Volume= 0.299 af

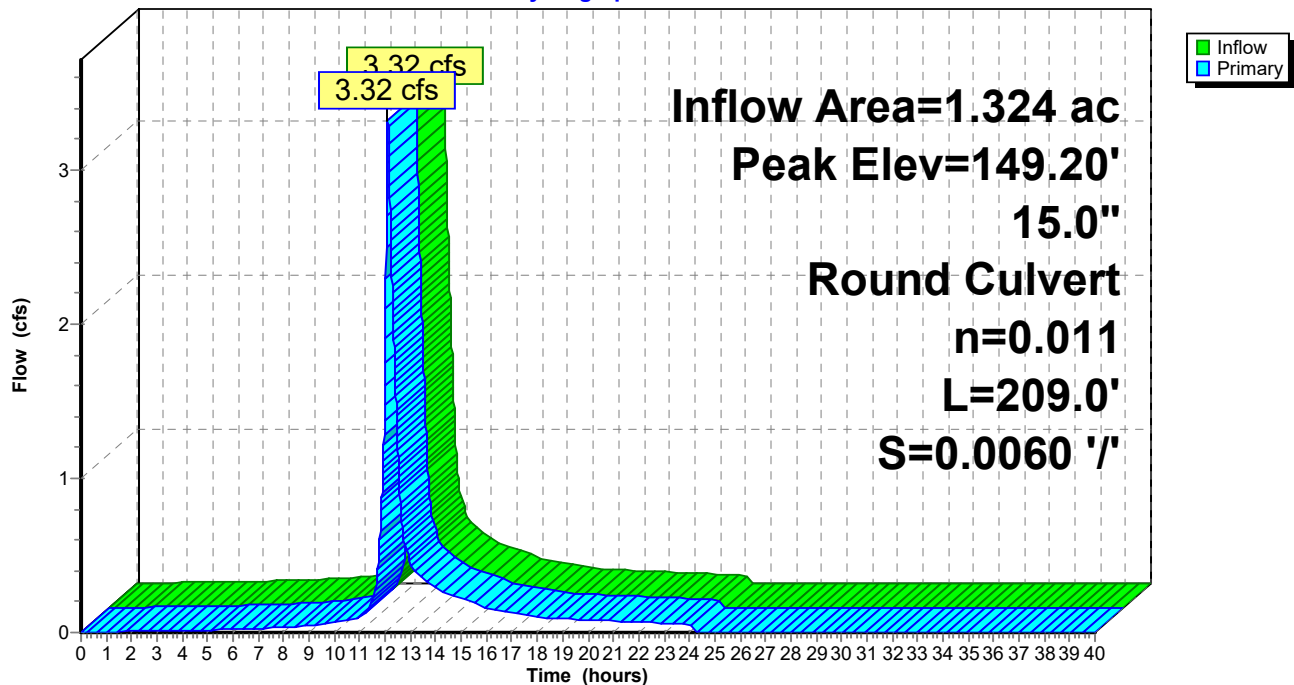
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.20' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	148.24'	15.0" Round Culvert L= 209.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 148.24' / 146.99' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.32 cfs @ 12.11 hrs HW=149.20' (Free Discharge)
1=Culvert (Barrel Controls 3.32 cfs @ 4.55 fps)

Pond 6P: DMH6+13

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Page 240

Summary for Subcatchment 7P: P1c

Runoff = 1.45 cfs @ 12.16 hrs, Volume= 0.122 af, Depth= 3.27"

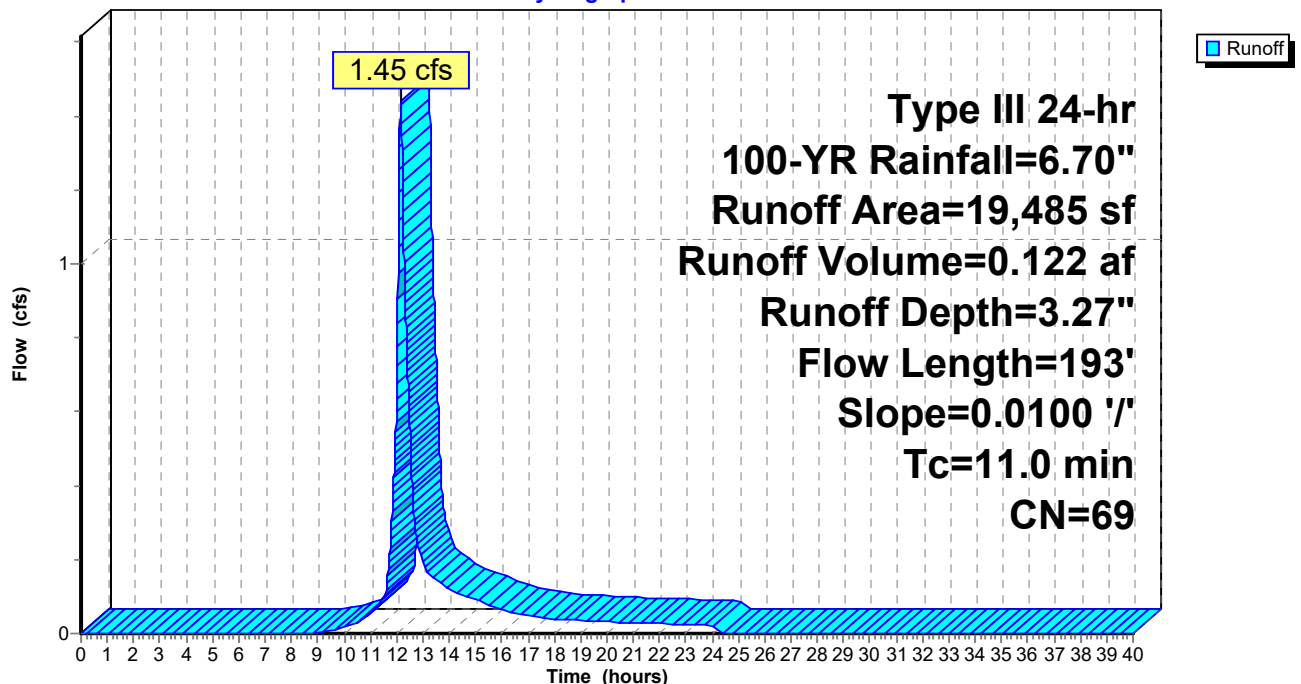
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
442	61	>75% Grass cover, Good HSG B
5,958	98	Paved parking HSG A
1,438	98	Paved parking HSG B
9,363	39	>75% Grass cover, Good HSG A
2,284	98	Roofs HSG A
19,485	69	Weighted Average
9,805	40	50.32% Pervious Area
9,680	98	49.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.5	21	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.1	130	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.0	193	Total			

Subcatchment 7P: P1c

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Page 241

Summary for Pond 8P: CB8+10a

Inflow Area = 0.447 ac, 49.68% Impervious, Inflow Depth = 3.27" for 100-YR event
Inflow = 1.45 cfs @ 12.16 hrs, Volume= 0.122 af
Outflow = 1.45 cfs @ 12.16 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min
Primary = 1.45 cfs @ 12.16 hrs, Volume= 0.122 af

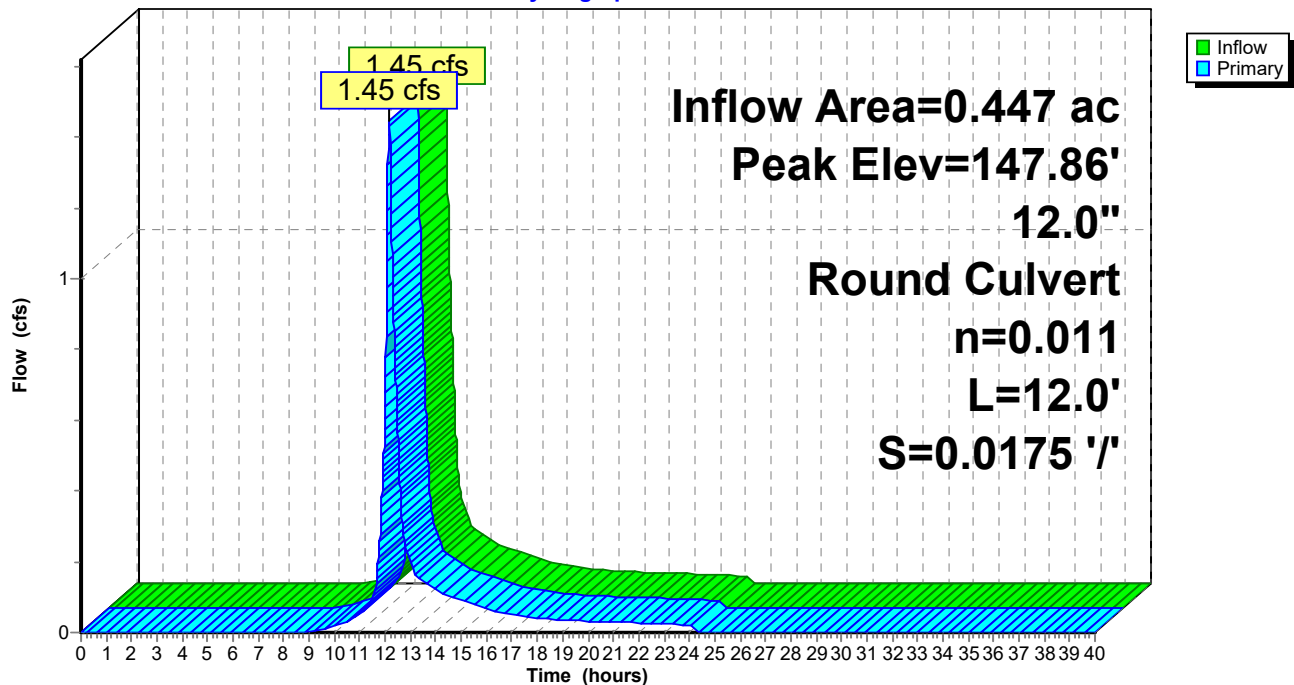
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.86' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.20'	12.0" Round Culvert L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.20' / 146.99' S= 0.0175 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.44 cfs @ 12.16 hrs HW=147.86' (Free Discharge)
↑1=Culvert (Barrel Controls 1.44 cfs @ 3.70 fps)

Pond 8P: CB8+10a

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Page 242

Summary for Subcatchment 9P: P1d

Runoff = 1.59 cfs @ 12.14 hrs, Volume= 0.133 af, Depth= 4.53"

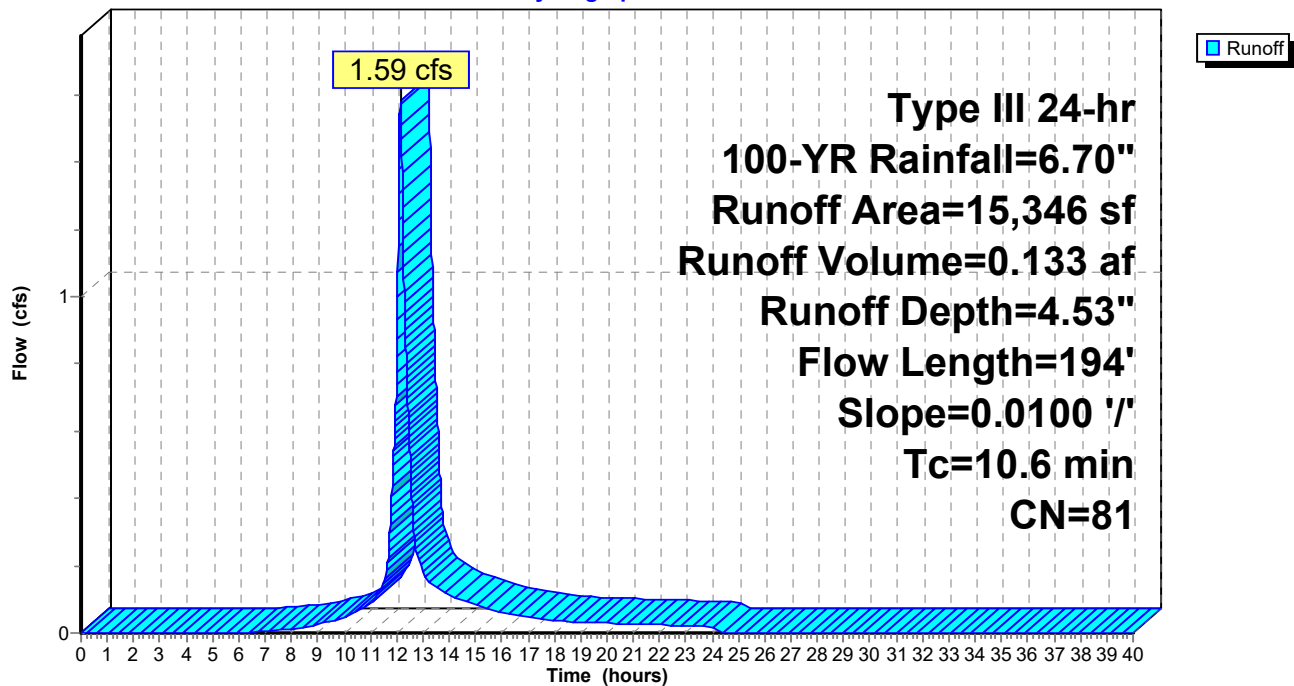
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
5,770	61	>75% Grass cover, Good HSG B
704	39	>75% Grass cover, Good HSG A
1,057	98	Roofs HSG B
3,321	98	Paved parking HSG A
4,397	98	Paved parking HSG B
97	55	Woods, Good HSG B
15,346	81	Weighted Average
6,571	59	42.82% Pervious Area
8,775	98	57.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.2	152	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.6	194	Total			

Subcatchment 9P: P1d

Hydrograph



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Page 243

Summary for Pond 10P: CB8+10b

Inflow Area = 0.352 ac, 57.18% Impervious, Inflow Depth = 4.53" for 100-YR event
Inflow = 1.59 cfs @ 12.14 hrs, Volume= 0.133 af
Outflow = 1.59 cfs @ 12.14 hrs, Volume= 0.133 af, Atten= 0%, Lag= 0.0 min
Primary = 1.59 cfs @ 12.14 hrs, Volume= 0.133 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.92' @ 12.14 hrs

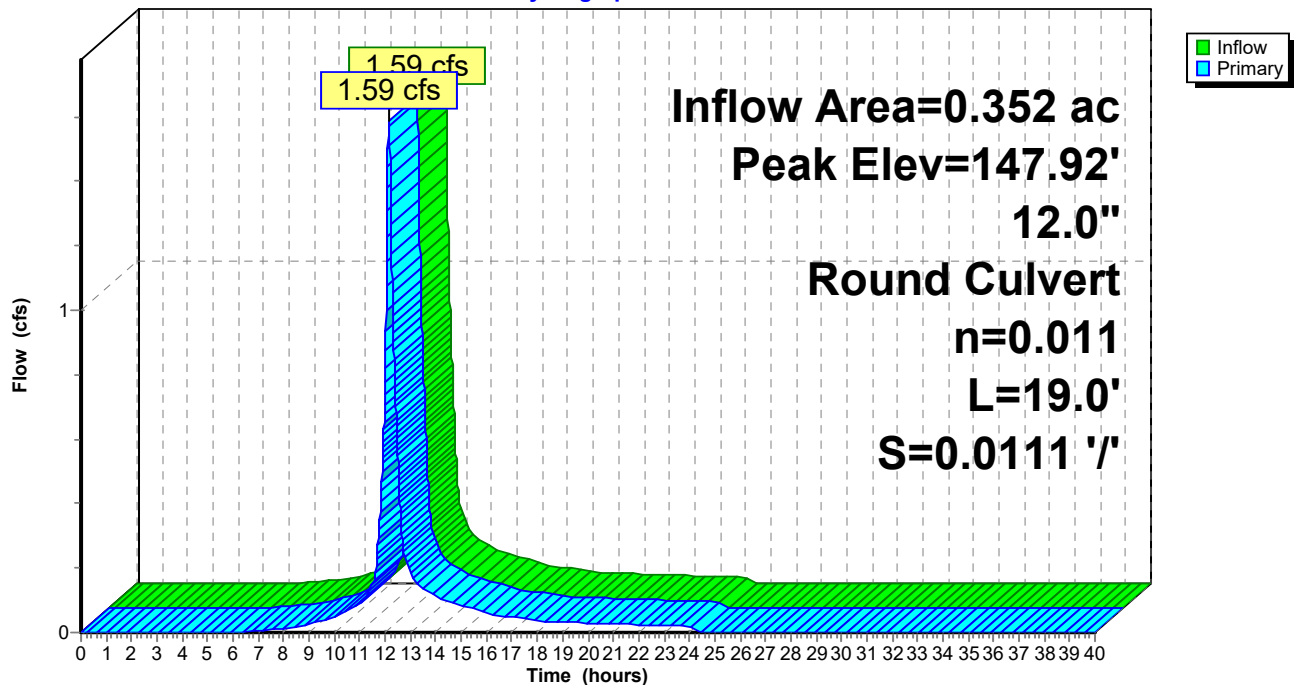
Device	Routing	Invert	Outlet Devices
#1	Primary	147.20'	12.0" Round Culvert L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.20' / 146.99' S= 0.0111 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.59 cfs @ 12.14 hrs HW=147.92' (Free Discharge)

↑1=Culvert (Barrel Controls 1.59 cfs @ 3.64 fps)

Pond 10P: CB8+10b

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Page 244

Summary for Pond 11P: DMH8+20

Inflow Area = 2.123 ac, 44.17% Impervious, Inflow Depth = 3.13" for 100-YR event
Inflow = 6.22 cfs @ 12.13 hrs, Volume= 0.554 af
Outflow = 6.22 cfs @ 12.13 hrs, Volume= 0.554 af, Atten= 0%, Lag= 0.0 min
Primary = 6.22 cfs @ 12.13 hrs, Volume= 0.554 af

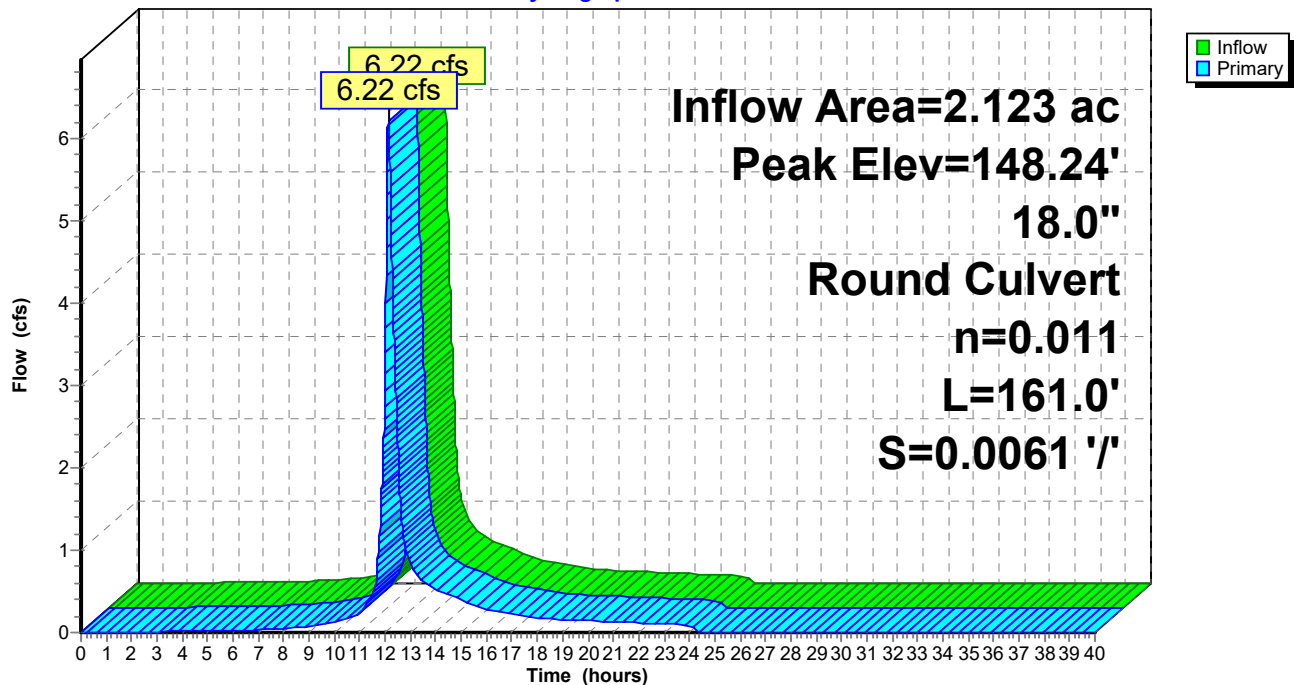
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.24' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	146.94'	18.0" Round Culvert L= 161.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.94' / 145.96' S= 0.0061 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=6.22 cfs @ 12.13 hrs HW=148.24' (Free Discharge)
↑**1=Culvert** (Barrel Controls 6.22 cfs @ 5.09 fps)

Pond 11P: DMH8+20

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 245

Summary for Pond 12P: DMH1a

Inflow Area = 2.123 ac, 44.17% Impervious, Inflow Depth = 3.13" for 100-YR event
Inflow = 6.22 cfs @ 12.13 hrs, Volume= 0.554 af
Outflow = 6.22 cfs @ 12.13 hrs, Volume= 0.554 af, Atten= 0%, Lag= 0.0 min
Primary = 6.22 cfs @ 12.13 hrs, Volume= 0.554 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.38' @ 12.13 hrs

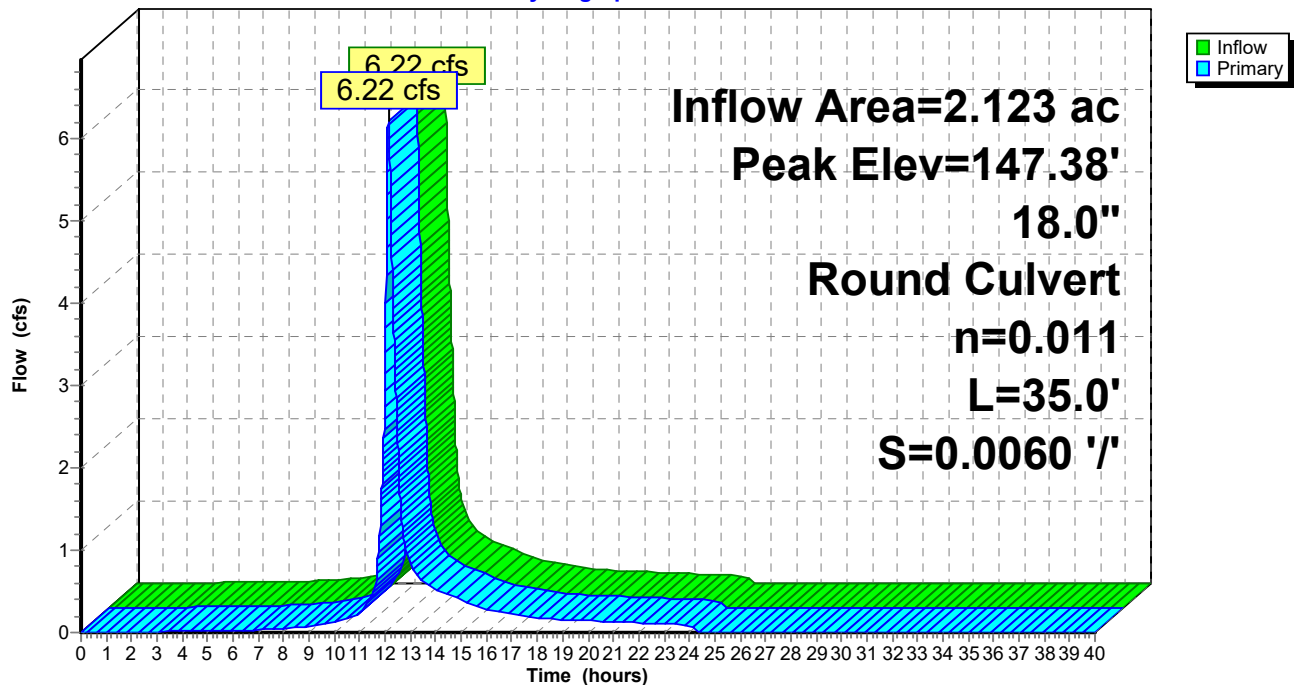
Device	Routing	Invert	Outlet Devices
#1	Primary	145.91'	18.0" Round Culvert L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.91' / 145.70' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=6.22 cfs @ 12.13 hrs HW=147.38' (Free Discharge)

1=Culvert (Barrel Controls 6.22 cfs @ 4.47 fps)

Pond 12P: DMH1a

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 246

Summary for Subcatchment 13P: P1e

Runoff = 3.19 cfs @ 12.17 hrs, Volume= 0.276 af, Depth= 3.89"

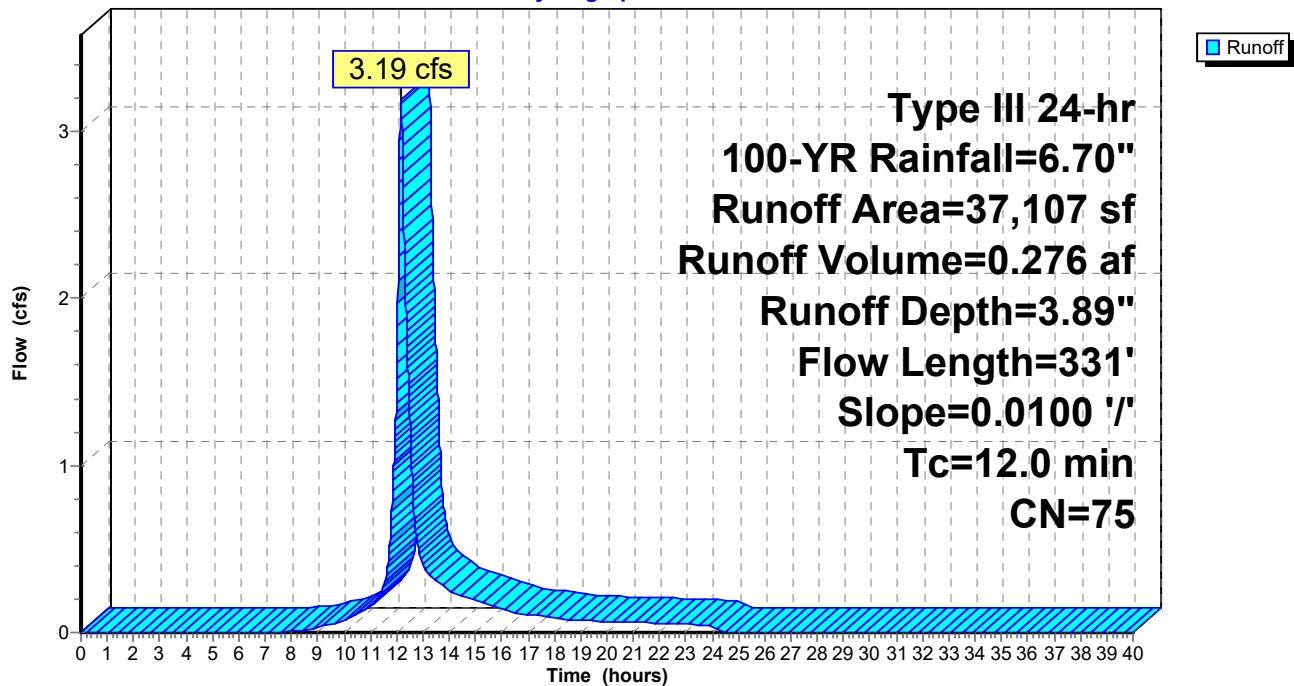
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
8,461	98	Paved parking HSG B
5,642	98	Paved parking HSG A
11,605	61	>75% Grass cover, Good HSG B
7,314	39	>75% Grass cover, Good HSG A
2,331	98	Roofs HSG B
1,754	98	Roofs HSG A
37,107	75	Weighted Average
18,919	52	50.98% Pervious Area
18,188	98	49.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.4	16	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	273	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
12.0	331	Total			

Subcatchment 13P: P1e

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 248

Summary for Pond 14P: CB12+15a

Inflow Area = 0.852 ac, 49.02% Impervious, Inflow Depth = 3.89" for 100-YR event
Inflow = 3.19 cfs @ 12.17 hrs, Volume= 0.276 af
Outflow = 3.19 cfs @ 12.17 hrs, Volume= 0.276 af, Atten= 0%, Lag= 0.0 min
Primary = 3.19 cfs @ 12.17 hrs, Volume= 0.276 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 149.11' @ 12.17 hrs

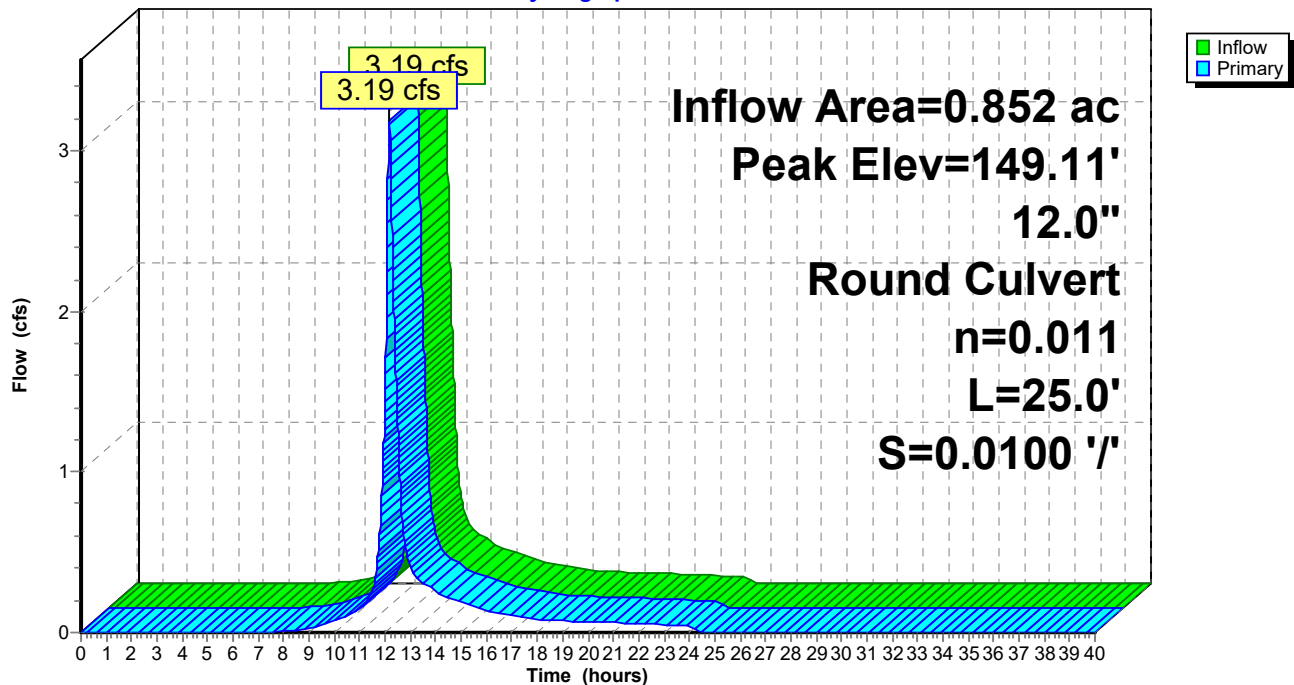
Device	Routing	Invert	Outlet Devices
#1	Primary	147.90'	12.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.90' / 147.65' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.19 cfs @ 12.17 hrs HW=149.11' (Free Discharge)

↑1=Culvert (Inlet Controls 3.19 cfs @ 4.06 fps)

Pond 14P: CB12+15a

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 249

Summary for Subcatchment 15P: P1f

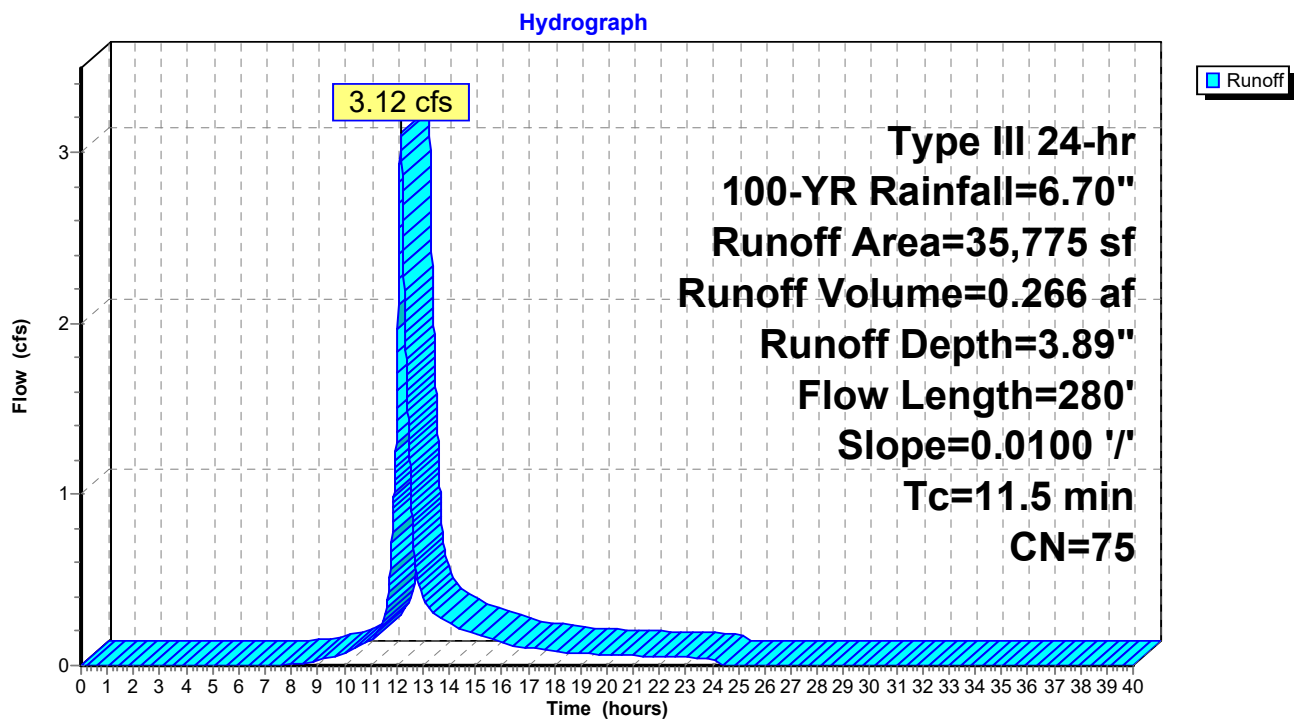
Runoff = 3.12 cfs @ 12.16 hrs, Volume= 0.266 af, Depth= 3.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
5,367	39	>75% Grass cover, Good HSG A
11,969	61	>75% Grass cover, Good HSG B
331	98	Roofs HSG A
3,270	98	Roofs HSG B
10,583	98	Paved parking HSG B
3,333	98	Paved parking HSG A
742	30	Woods, Good HSG A
180	55	Woods, Good HSG B
35,775	75	Weighted Average
18,258	53	51.04% Pervious Area
17,517	98	48.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.8	225	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.5	280	Total			

Subcatchment 15P: P1f



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 251

Summary for Pond 16P: CB12+15b

Inflow Area = 0.821 ac, 48.96% Impervious, Inflow Depth = 3.89" for 100-YR event
Inflow = 3.12 cfs @ 12.16 hrs, Volume= 0.266 af
Outflow = 3.12 cfs @ 12.16 hrs, Volume= 0.266 af, Atten= 0%, Lag= 0.0 min
Primary = 3.12 cfs @ 12.16 hrs, Volume= 0.266 af

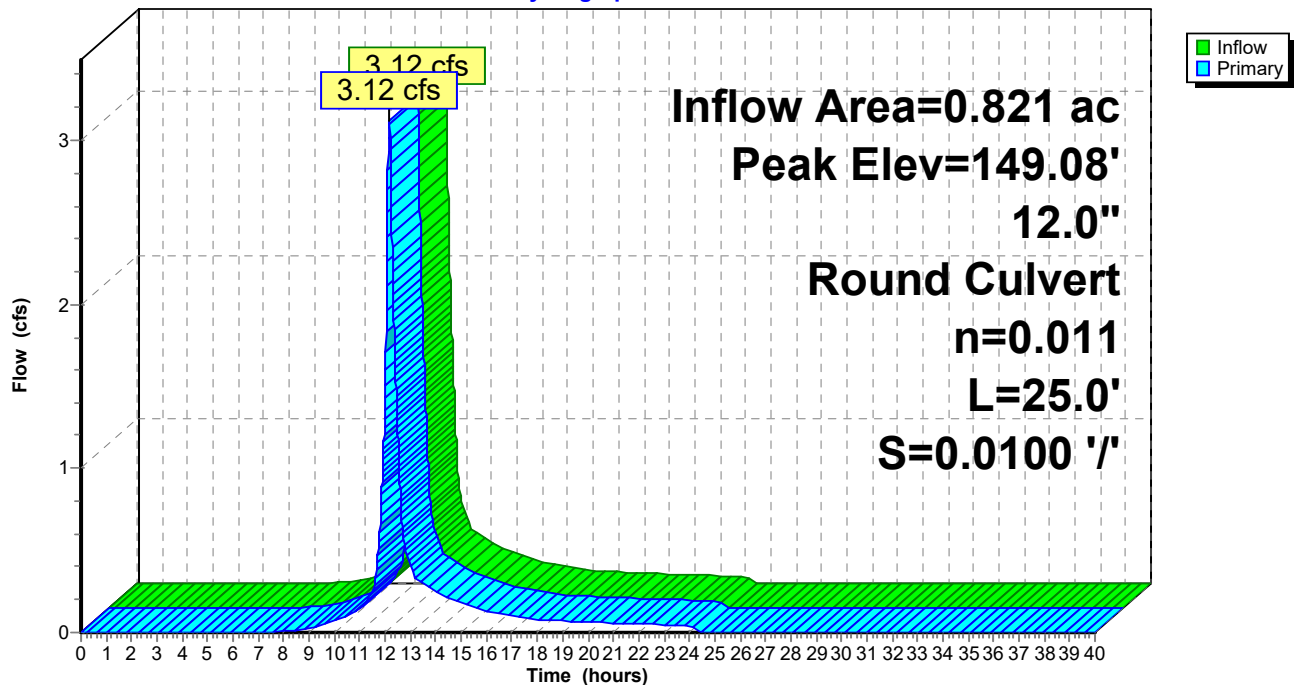
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.08' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.90'	12.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.90' / 147.65' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.12 cfs @ 12.16 hrs HW=149.08' (Free Discharge)
↑1=Culvert (Inlet Controls 3.12 cfs @ 3.97 fps)

Pond 16P: CB12+15b

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 252

Summary for Pond 17P: DMH11+45

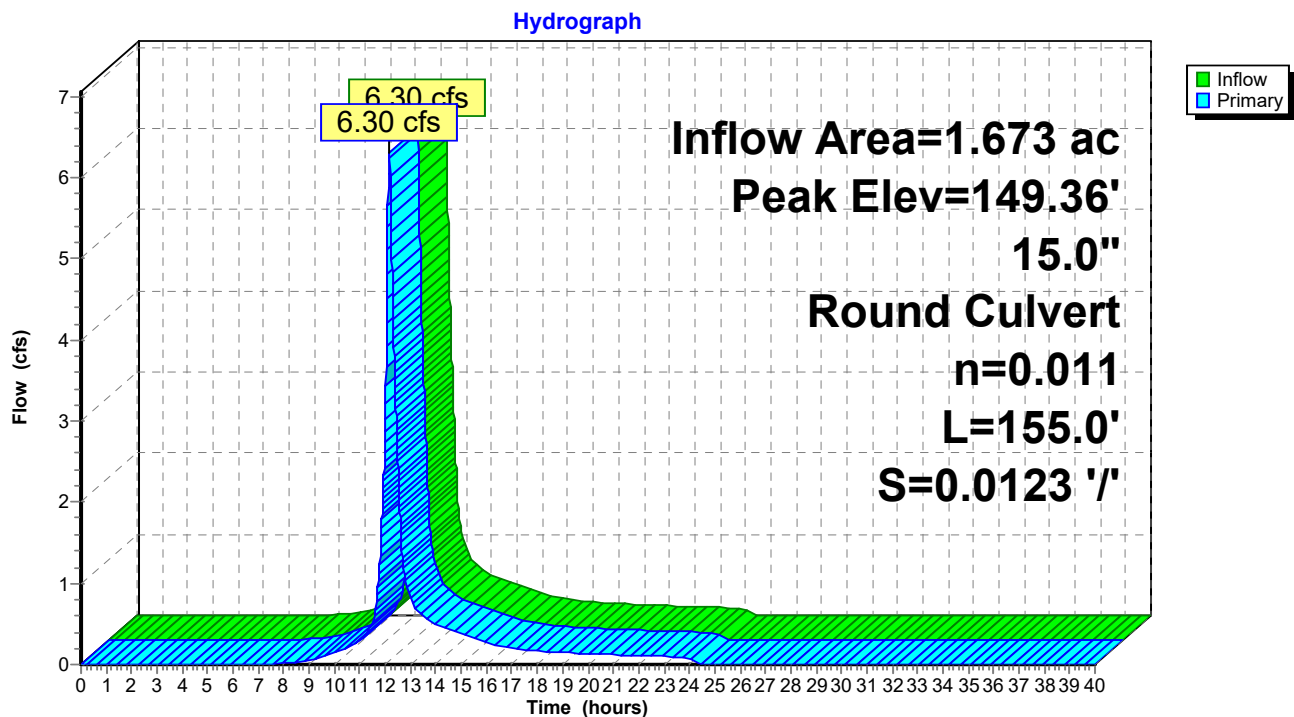
Inflow Area = 1.673 ac, 48.99% Impervious, Inflow Depth = 3.89" for 100-YR event
Inflow = 6.30 cfs @ 12.16 hrs, Volume= 0.542 af
Outflow = 6.30 cfs @ 12.16 hrs, Volume= 0.542 af, Atten= 0%, Lag= 0.0 min
Primary = 6.30 cfs @ 12.16 hrs, Volume= 0.542 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.36' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	147.60'	15.0" Round Culvert L= 155.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.60' / 145.70' S= 0.0123 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=6.30 cfs @ 12.16 hrs HW=149.36' (Free Discharge)
↑1=Culvert (Inlet Controls 6.30 cfs @ 5.14 fps)

Pond 17P: DMH11+45



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 253

Summary for Subcatchment 18P: P1g

Runoff = 3.16 cfs @ 12.17 hrs, Volume= 0.275 af, Depth= 3.37"

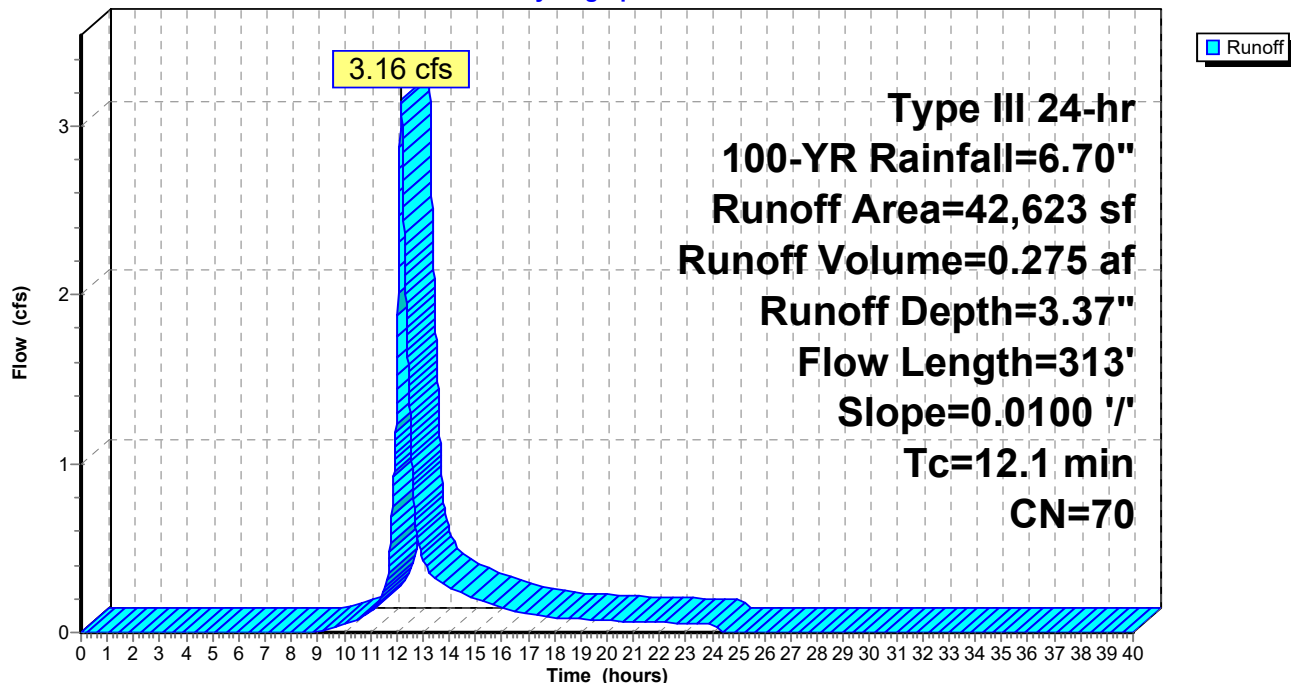
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
20,136	39	>75% Grass cover, Good HSG A
4,639	98	Roofs HSG A
17,848	98	Paved parking HSG A
42,623	70	Weighted Average
20,136	39	47.24% Pervious Area
22,487	98	52.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.7	29	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.0	242	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
12.1	313	Total			

Subcatchment 18P: P1g

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 254

Summary for Pond 19P: CB2+70a

Inflow Area = 0.978 ac, 52.76% Impervious, Inflow Depth = 3.37" for 100-YR event
Inflow = 3.16 cfs @ 12.17 hrs, Volume= 0.275 af
Outflow = 3.16 cfs @ 12.17 hrs, Volume= 0.275 af, Atten= 0%, Lag= 0.0 min
Primary = 3.16 cfs @ 12.17 hrs, Volume= 0.275 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 148.15' @ 12.17 hrs

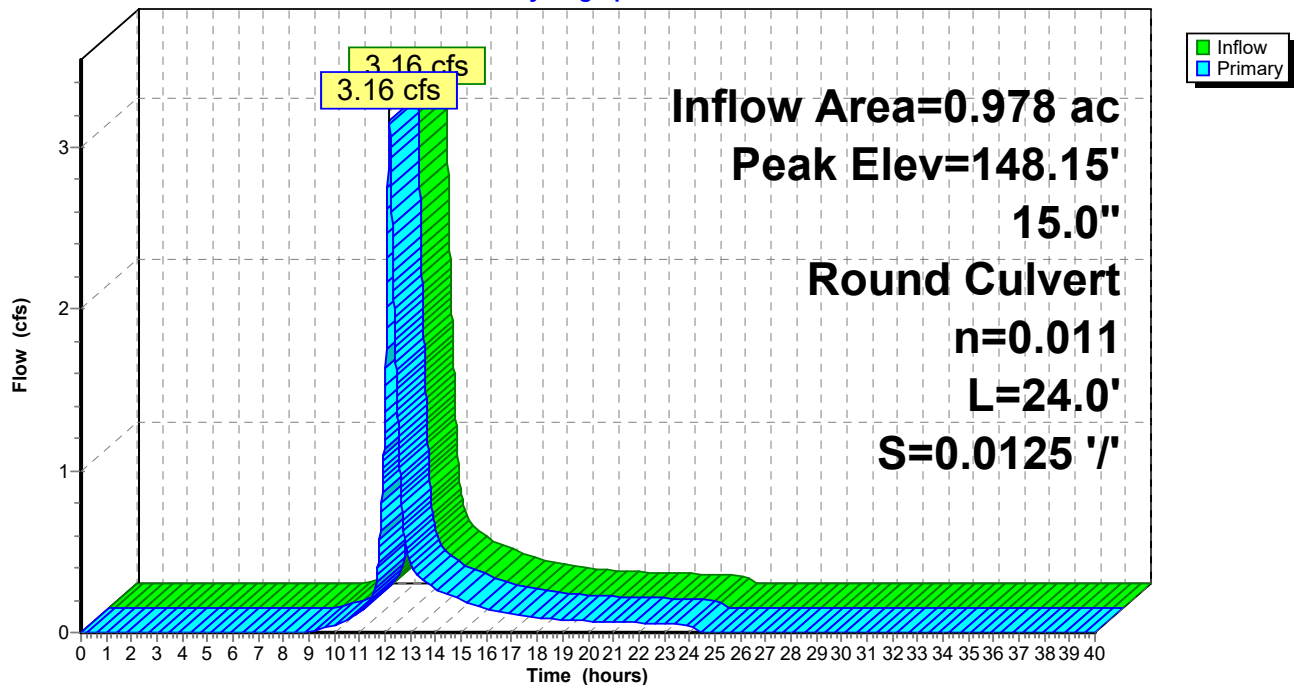
Device	Routing	Invert	Outlet Devices
#1	Primary	147.19'	15.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.19' / 146.89' S= 0.0125 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.16 cfs @ 12.17 hrs HW=148.15' (Free Discharge)

1=Culvert (Barrel Controls 3.16 cfs @ 4.32 fps)

Pond 19P: CB2+70a

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 255

Summary for Subcatchment 20P: P1h

Runoff = 3.55 cfs @ 12.16 hrs, Volume= 0.304 af, Depth= 3.47"

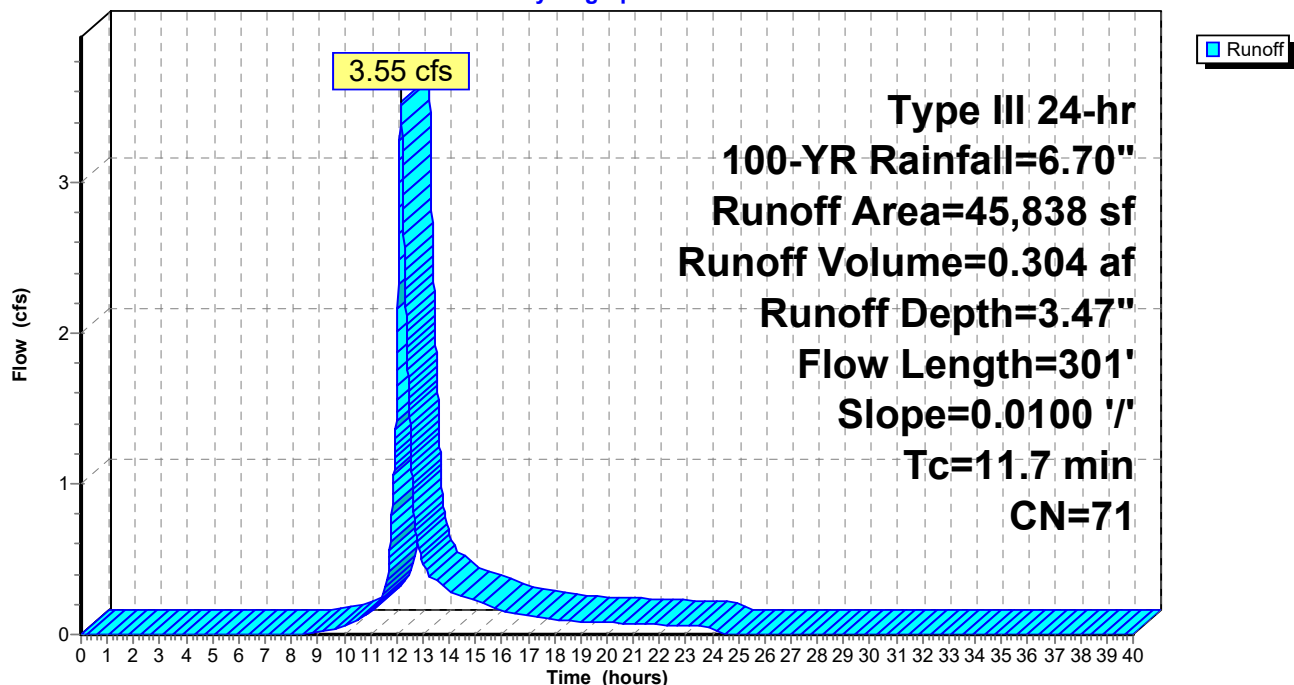
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
21,194	39	>75% Grass cover, Good HSG A
5,783	98	Roofs HSG A
18,861	98	Paved parking HSG A
45,838	71	Weighted Average
21,194	39	46.24% Pervious Area
24,644	98	53.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	11	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.0	248	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.7	301	Total			

Subcatchment 20P: P1h

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 256

Summary for Pond 21P: CB2+70b

Inflow Area = 1.052 ac, 53.76% Impervious, Inflow Depth = 3.47" for 100-YR event
Inflow = 3.55 cfs @ 12.16 hrs, Volume= 0.304 af
Outflow = 3.55 cfs @ 12.16 hrs, Volume= 0.304 af, Atten= 0%, Lag= 0.0 min
Primary = 3.55 cfs @ 12.16 hrs, Volume= 0.304 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 148.28' @ 12.16 hrs

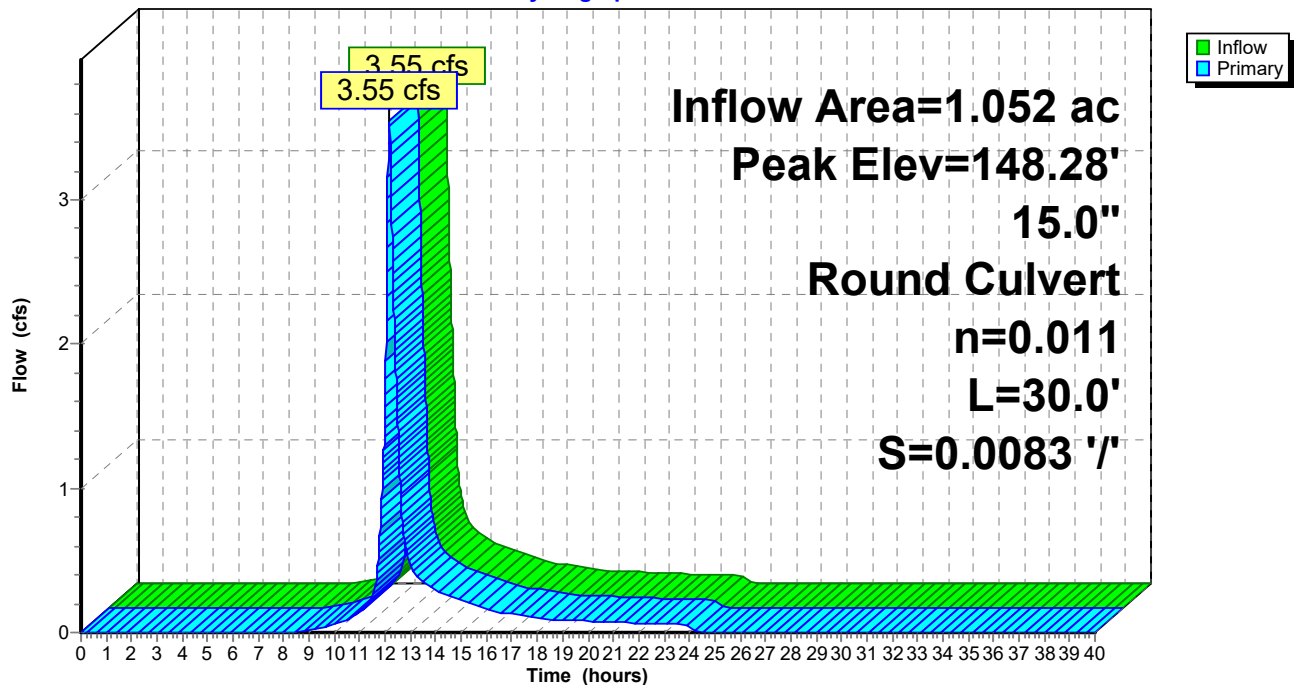
Device	Routing	Invert	Outlet Devices
#1	Primary	147.19'	15.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 147.19' / 146.94' S= 0.0083 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.54 cfs @ 12.16 hrs HW=148.28' (Free Discharge)

↑1=Culvert (Barrel Controls 3.54 cfs @ 4.19 fps)

Pond 21P: CB2+70b

Hydrograph



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Page 257

Summary for Pond 22P: DMH2+40

Inflow Area = 2.031 ac, 53.28% Impervious, Inflow Depth = 3.42" for 100-YR event
Inflow = 6.70 cfs @ 12.17 hrs, Volume= 0.579 af
Outflow = 6.70 cfs @ 12.17 hrs, Volume= 0.579 af, Atten= 0%, Lag= 0.0 min
Primary = 6.70 cfs @ 12.17 hrs, Volume= 0.579 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.76' @ 12.17 hrs

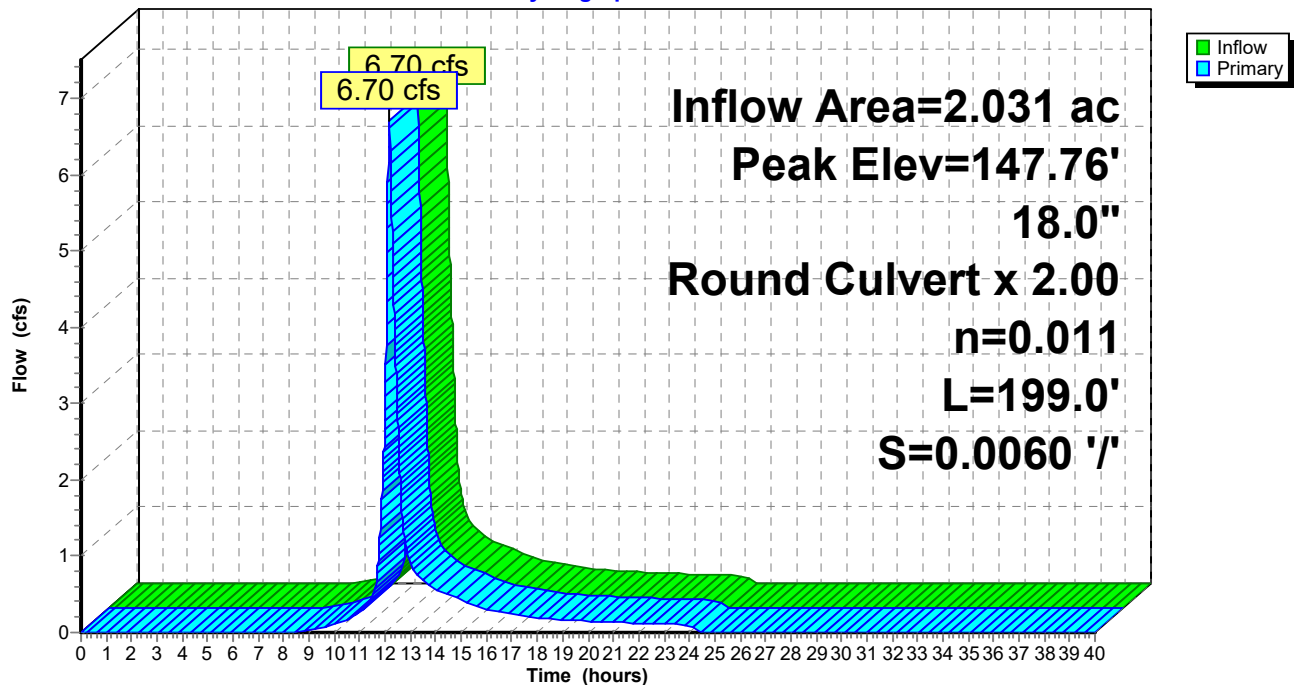
Device	Routing	Invert	Outlet Devices
#1	Primary	146.89'	18.0" Round Culvert X 2.00 L= 199.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.89' / 145.70' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=6.70 cfs @ 12.17 hrs HW=147.76' (Free Discharge)

1=Culvert (Barrel Controls 6.70 cfs @ 4.52 fps)

Pond 22P: DMH2+40

Hydrograph



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Page 258

Summary for Subcatchment 23P: P1i

Runoff = 4.69 cfs @ 12.15 hrs, Volume= 0.405 af, Depth= 2.21"

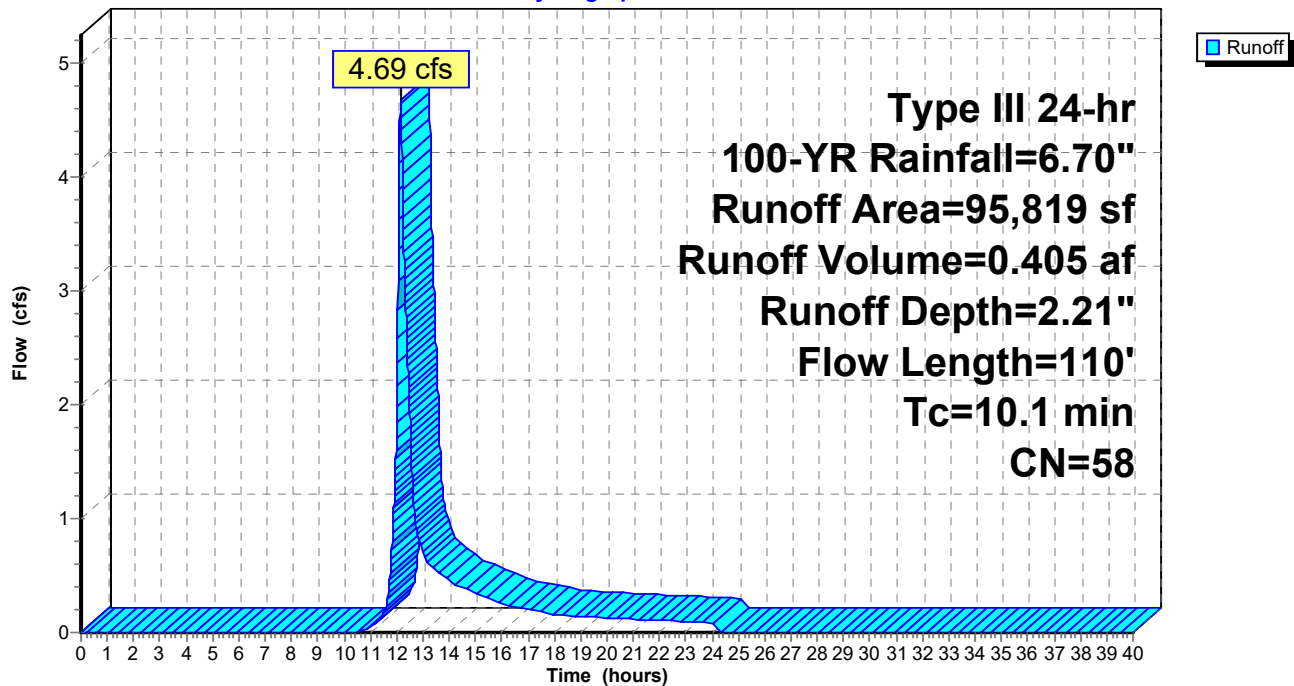
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
41,468	61	>75% Grass cover, Good HSG B
14,814	39	>75% Grass cover, Good HSG A
1,336	98	Paved parking HSG A
2,500	98	Paved parking HSG B
2,201	98	Roofs HSG A
4,220	98	Roofs HSG B
6,601	30	Woods, Good HSG A
22,679	55	Woods, Good HSG B
95,819	58	Weighted Average
85,562	53	89.30% Pervious Area
10,257	98	10.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	35	0.0200	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	75	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.1	110	Total			

Subcatchment 23P: P1i

Hydrograph



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Page 260

Summary for Pond 24P: Basin #1

Inflow Area = 8.027 ac, 38.31% Impervious, Inflow Depth = 3.11" for 100-YR event
 Inflow = 23.73 cfs @ 12.15 hrs, Volume= 2.080 af
 Outflow = 7.94 cfs @ 12.55 hrs, Volume= 2.080 af, Atten= 67%, Lag= 23.9 min
 Discarded = 1.46 cfs @ 12.55 hrs, Volume= 1.296 af
 Primary = 6.48 cfs @ 12.55 hrs, Volume= 0.784 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.92' @ 12.55 hrs Surf.Area= 26,108 sf Storage= 29,014 cf

Plug-Flow detention time= 80.3 min calculated for 2.080 af (100% of inflow)
 Center-of-Mass det. time= 80.3 min (916.7 - 836.5)

Volume	Invert	Avail.Storage	Storage Description
#1	145.70'	59,551 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.70	21,476	960.0	0	0	21,476
148.00	30,575	1,018.0	59,551	59,551	30,885

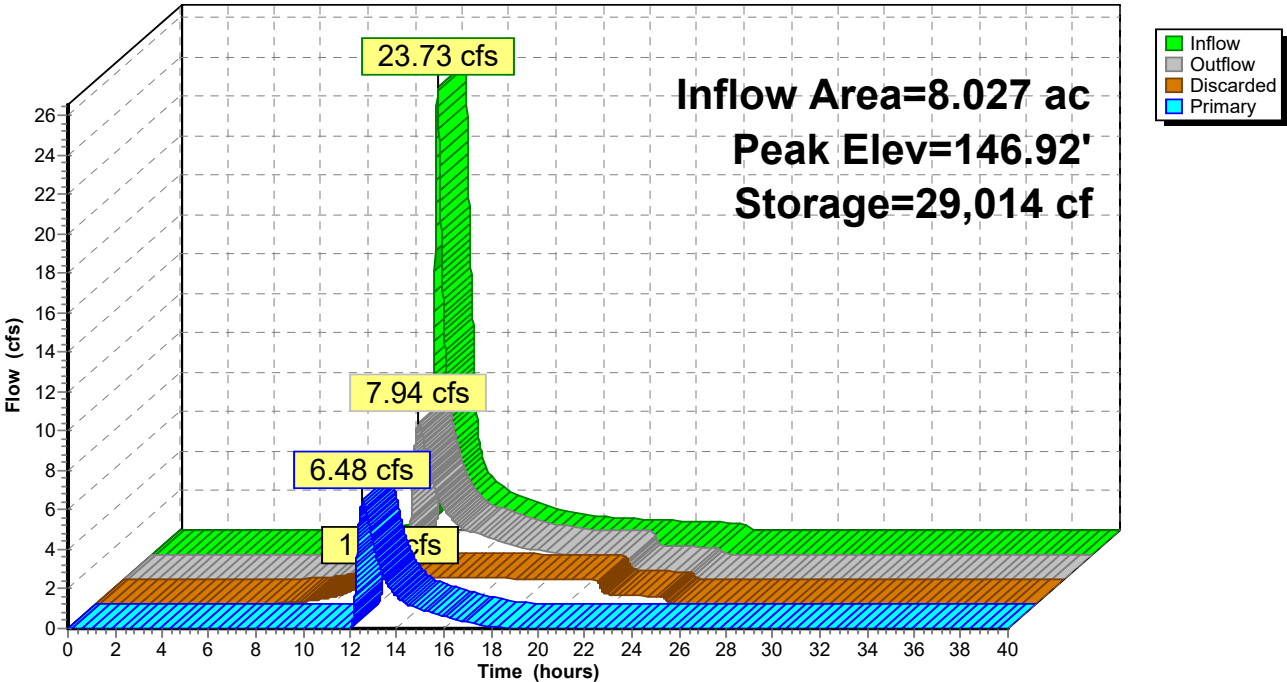
Device	Routing	Invert	Outlet Devices
#1	Discarded	145.70'	2.410 in/hr Exfiltration over Surface area
#2	Primary	146.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28)
			Elev. (feet) 146.00 146.50 146.50 148.00
			Width (feet) 1.00 1.00 5.00 5.00

Discarded OutFlow Max=1.46 cfs @ 12.55 hrs HW=146.92' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 1.46 cfs)

Primary OutFlow Max=6.48 cfs @ 12.55 hrs HW=146.92' (Free Discharge)
 ↑2=Custom Weir/Orifice (Weir Controls 6.48 cfs @ 2.49 fps)

Pond 24P: Basin #1

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 262

Summary for Subcatchment 25P: P1j

Runoff = 2.63 cfs @ 12.16 hrs, Volume= 0.226 af, Depth= 3.68"

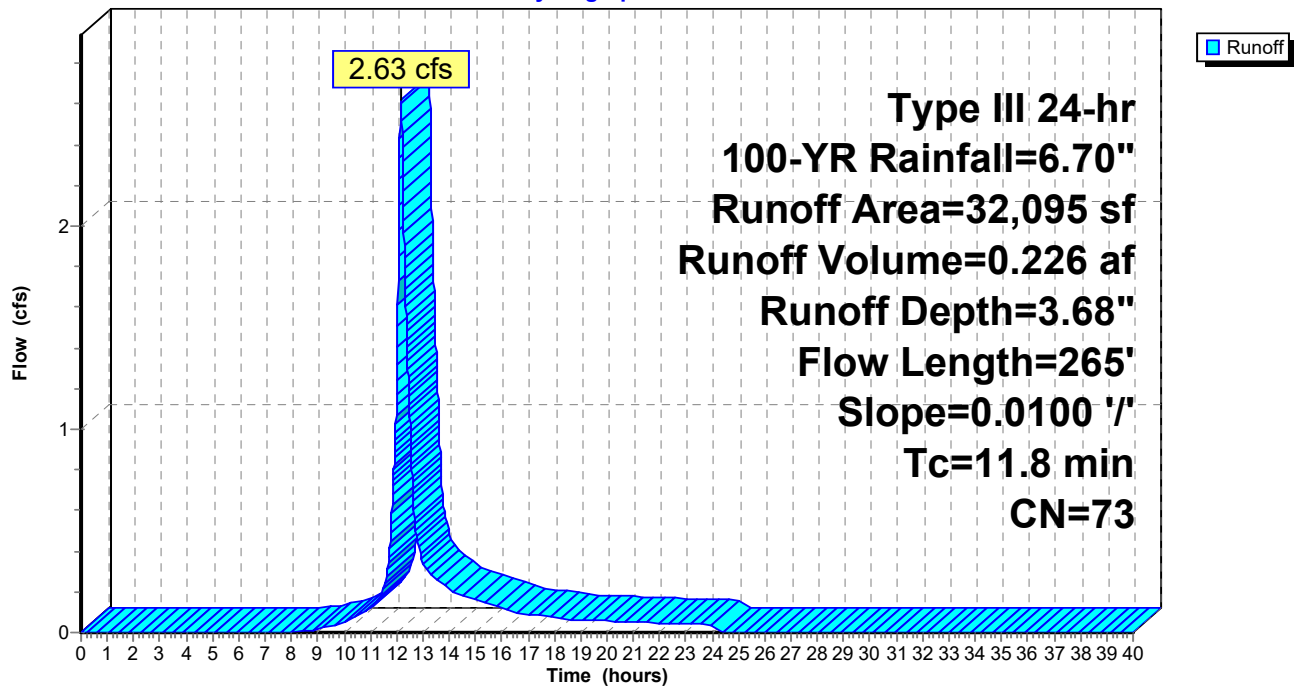
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
5,345	98	Paved parking HSG B
9,999	61	>75% Grass cover, Good HSG B
7,290	39	>75% Grass cover, Good HSG A
2,671	98	Roofs HSG B
1,535	98	Roofs HSG A
5,255	98	Paved parking HSG A
32,095	73	Weighted Average
17,289	52	53.87% Pervious Area
14,806	98	46.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.8	33	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	190	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.8	265	Total			

Subcatchment 25P: P1j

Hydrograph



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Page 264

Summary for Pond 26P: CB17+77a

Inflow Area = 0.737 ac, 46.13% Impervious, Inflow Depth = 3.68" for 100-YR event
Inflow = 2.63 cfs @ 12.16 hrs, Volume= 0.226 af
Outflow = 2.63 cfs @ 12.16 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.0 min
Primary = 2.63 cfs @ 12.16 hrs, Volume= 0.226 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 147.10' @ 12.16 hrs

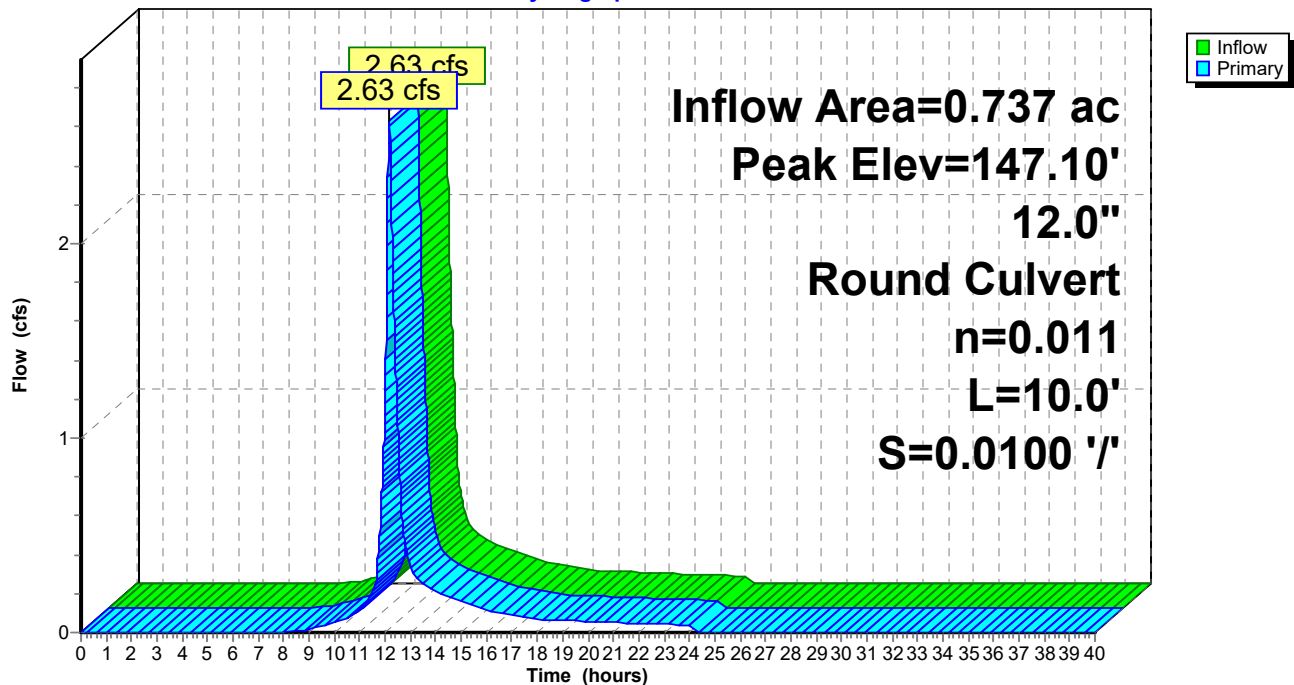
Device	Routing	Invert	Outlet Devices
#1	Primary	146.00'	12.0" Round Culvert L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.00' / 145.90' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.62 cfs @ 12.16 hrs HW=147.10' (Free Discharge)

↑1=Culvert (Barrel Controls 2.62 cfs @ 3.80 fps)

Pond 26P: CB17+77a

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 265

Summary for Subcatchment 27P: P1k

Runoff = 1.30 cfs @ 12.12 hrs, Volume= 0.103 af, Depth= 4.64"

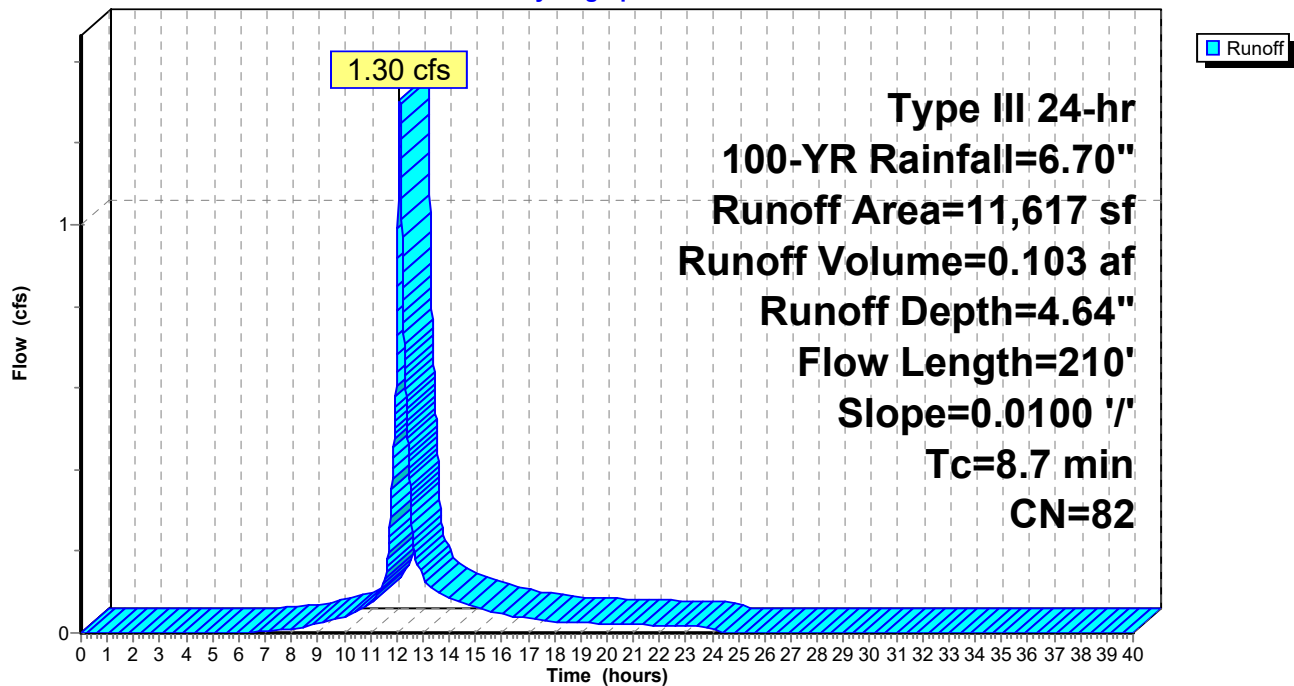
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
3,375	98	Paved parking HSG B
1,993	61	>75% Grass cover, Good HSG B
1,913	39	>75% Grass cover, Good HSG A
4,336	98	Paved parking HSG A
11,617	82	Weighted Average
3,906	50	33.62% Pervious Area
7,711	98	66.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	30	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.5	180	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
8.7	210	Total			

Subcatchment 27P: P1k

Hydrograph



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Page 266

Summary for Pond 28P: CB17+77b

Inflow Area = 0.267 ac, 66.38% Impervious, Inflow Depth = 4.64" for 100-YR event
Inflow = 1.30 cfs @ 12.12 hrs, Volume= 0.103 af
Outflow = 1.30 cfs @ 12.12 hrs, Volume= 0.103 af, Atten= 0%, Lag= 0.0 min
Primary = 1.30 cfs @ 12.12 hrs, Volume= 0.103 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 146.71' @ 12.12 hrs

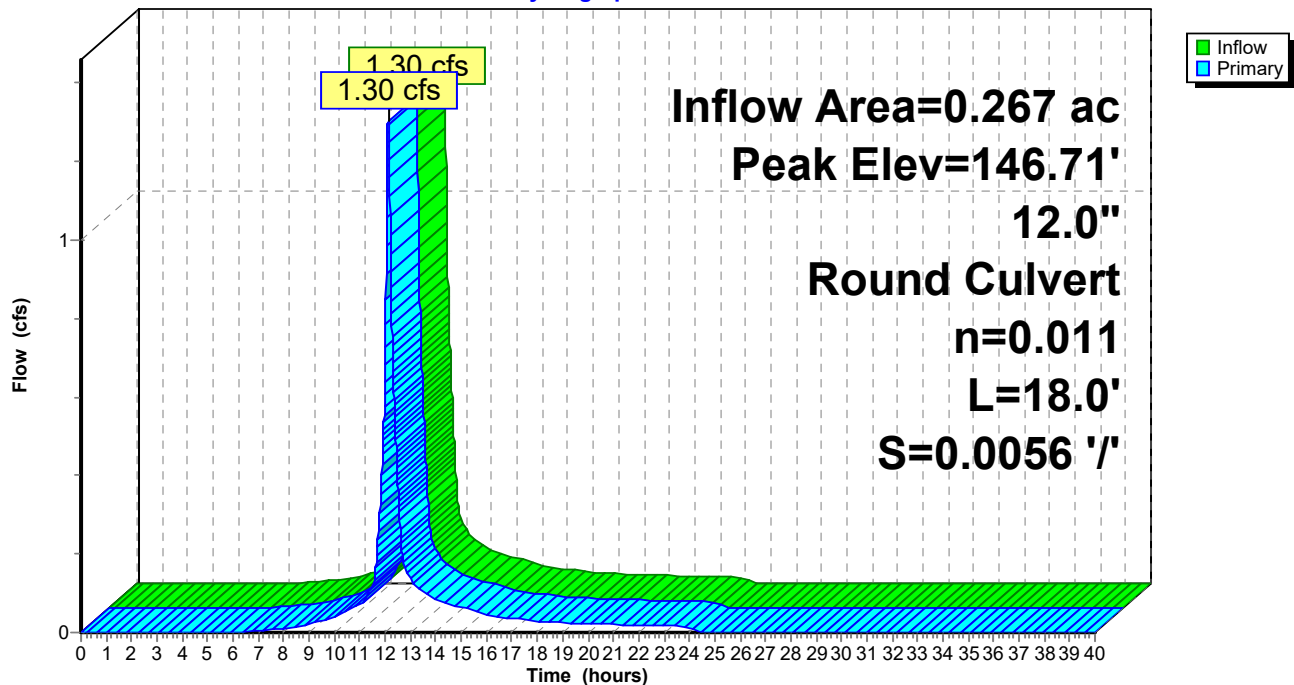
Device	Routing	Invert	Outlet Devices
#1	Primary	146.00'	12.0" Round Culvert L= 18.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 146.00' / 145.90' S= 0.0056 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.30 cfs @ 12.12 hrs HW=146.71' (Free Discharge)

↑1=Culvert (Barrel Controls 1.30 cfs @ 3.08 fps)

Pond 28P: CB17+77b

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 267

Summary for Pond 29P: DMH17+67

Inflow Area = 1.003 ac, 51.51% Impervious, Inflow Depth = 3.93" for 100-YR event
Inflow = 3.86 cfs @ 12.15 hrs, Volume= 0.329 af
Outflow = 3.86 cfs @ 12.15 hrs, Volume= 0.329 af, Atten= 0%, Lag= 0.0 min
Primary = 3.86 cfs @ 12.15 hrs, Volume= 0.329 af

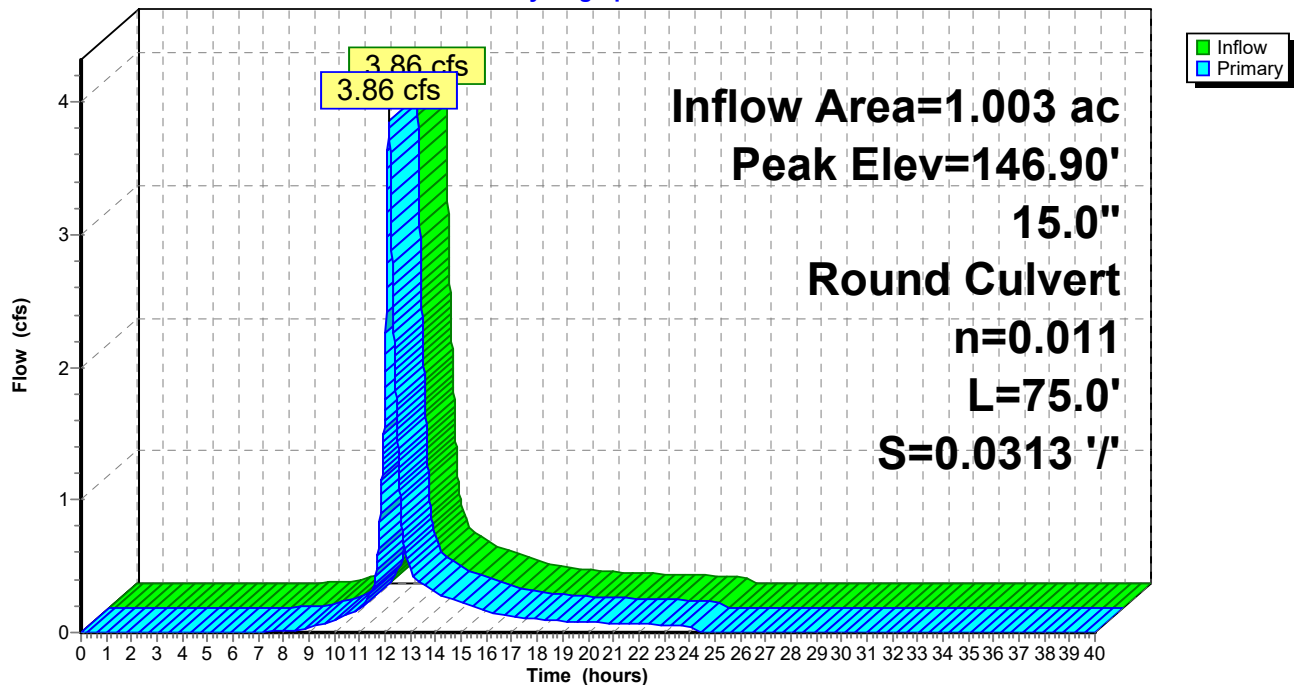
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 146.90' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	145.85'	15.0" Round Culvert L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.85' / 143.50' S= 0.0313 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.85 cfs @ 12.15 hrs HW=146.90' (Free Discharge)
↑1=Culvert (Inlet Controls 3.85 cfs @ 3.49 fps)

Pond 29P: DMH17+67

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 268

Summary for Subcatchment 30P: P1I

Runoff = 3.91 cfs @ 12.16 hrs, Volume= 0.367 af, Depth= 1.67"

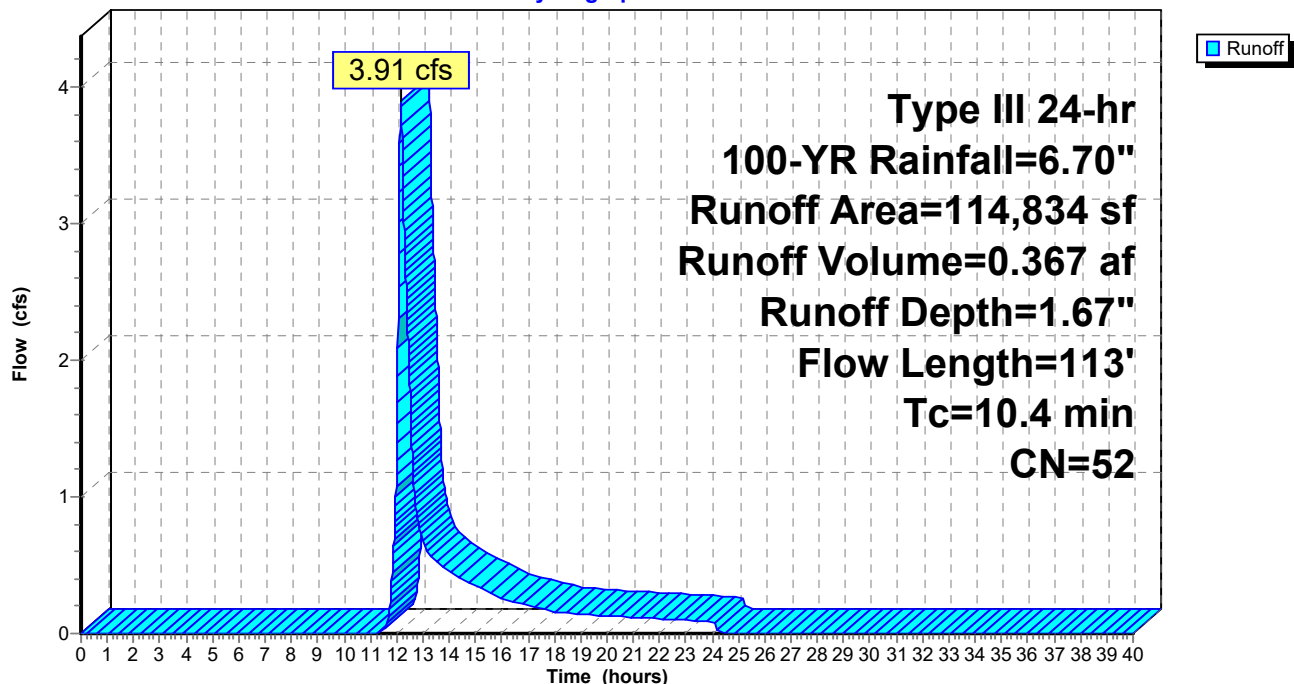
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
3,499	61	>75% Grass cover, Good HSG B
11,038	98	Water Surface HSG A
86,857	39	>75% Grass cover, Good HSG A
500	98	Paved parking HSG B
4,500	98	Paved parking HSG A
844	98	Roofs HSG B
7,596	98	Roofs HSG A
114,834	52	Weighted Average
90,356	40	78.68% Pervious Area
24,478	98	21.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.0	71	0.0550	1.17		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
10.4	113	Total			

Subcatchment 30P: P1I

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 269

Summary for Subcatchment 31P: P1m

Runoff = 3.52 cfs @ 12.15 hrs, Volume= 0.294 af, Depth= 3.57"

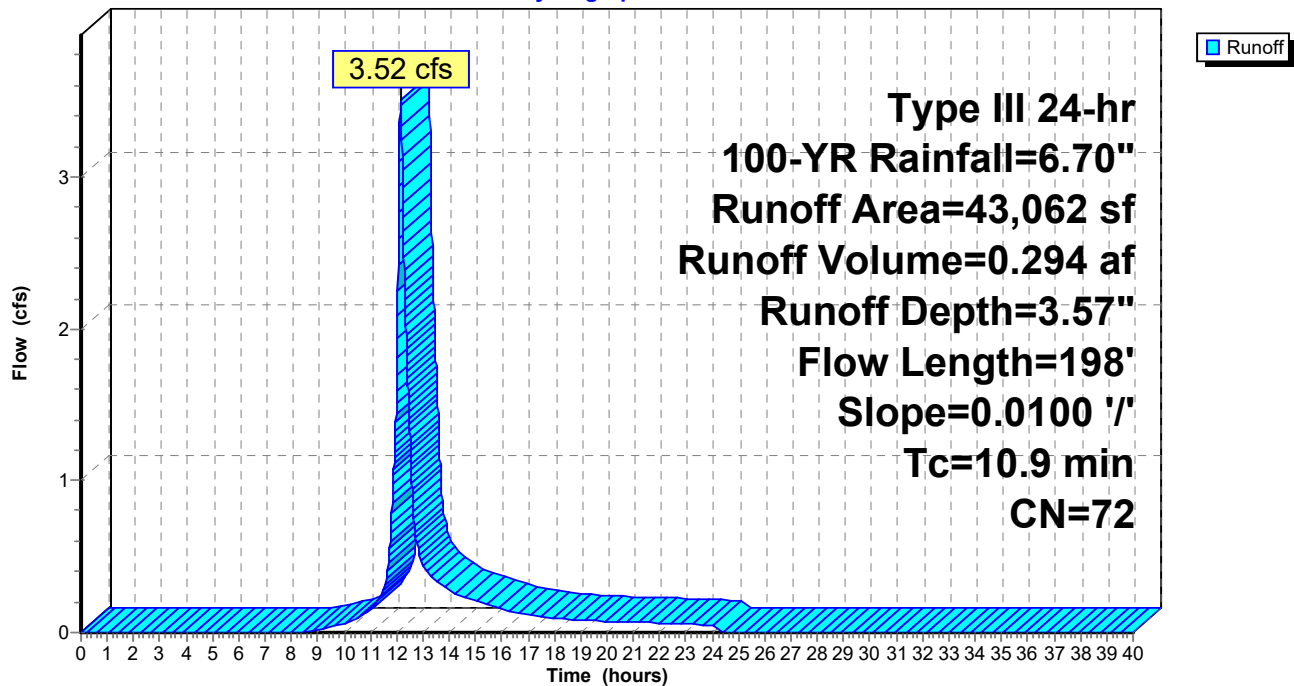
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
16,597	39	>75% Grass cover, Good HSG A
3,917	61	>75% Grass cover, Good HSG B
865	98	Roofs HSG B
3,773	98	Roofs HSG A
3,473	98	Paved parking HSG B
14,437	98	Paved parking HSG A
43,062	72	Weighted Average
20,514	43	47.64% Pervious Area
22,548	98	52.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	12	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	144	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.9	198	Total			

Subcatchment 31P: P1m

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 271

Summary for Pond 32P: CB3+67a

Inflow Area = 0.989 ac, 52.36% Impervious, Inflow Depth = 3.57" for 100-YR event
Inflow = 3.52 cfs @ 12.15 hrs, Volume= 0.294 af
Outflow = 3.52 cfs @ 12.15 hrs, Volume= 0.294 af, Atten= 0%, Lag= 0.0 min
Primary = 3.52 cfs @ 12.15 hrs, Volume= 0.294 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 146.48' @ 12.15 hrs

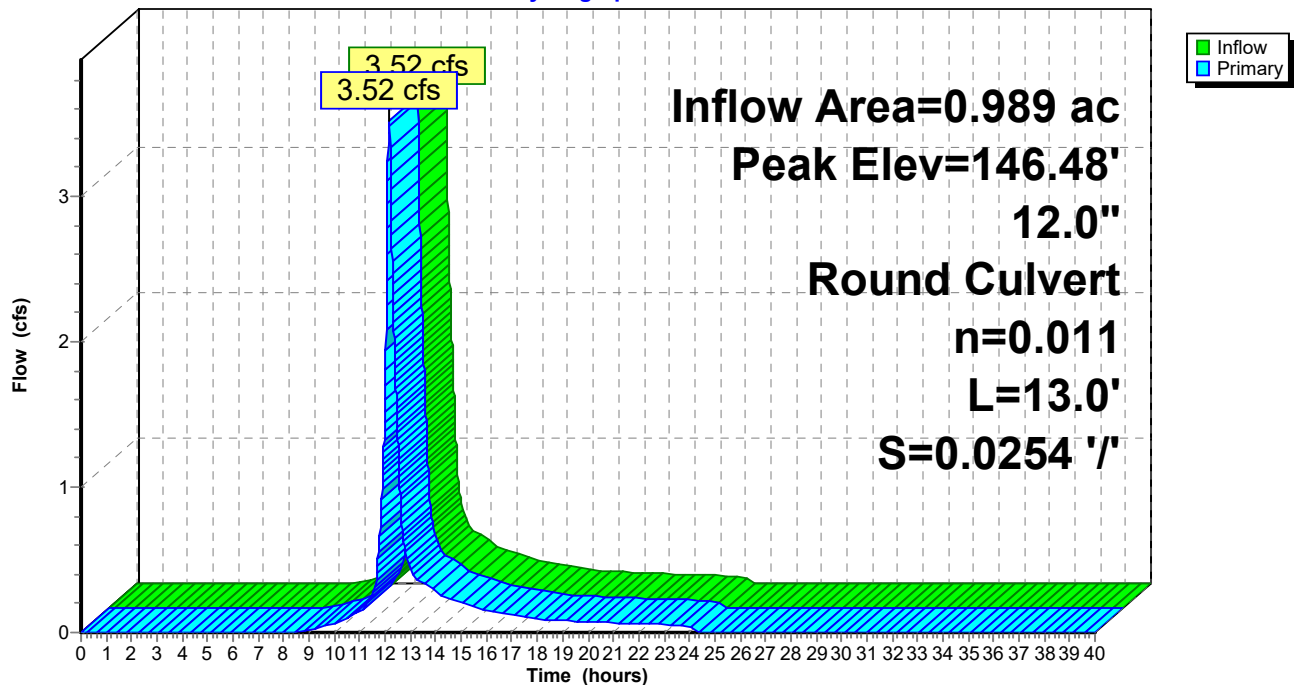
Device	Routing	Invert	Outlet Devices
#1	Primary	145.11'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.11' / 144.78' S= 0.0254 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.52 cfs @ 12.15 hrs HW=146.47' (Free Discharge)

↑1=Culvert (Inlet Controls 3.52 cfs @ 4.48 fps)

Pond 32P: CB3+67a

Hydrograph



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Page 272

Summary for Subcatchment 33P: P1n

Runoff = 3.77 cfs @ 12.15 hrs, Volume= 0.315 af, Depth= 3.68"

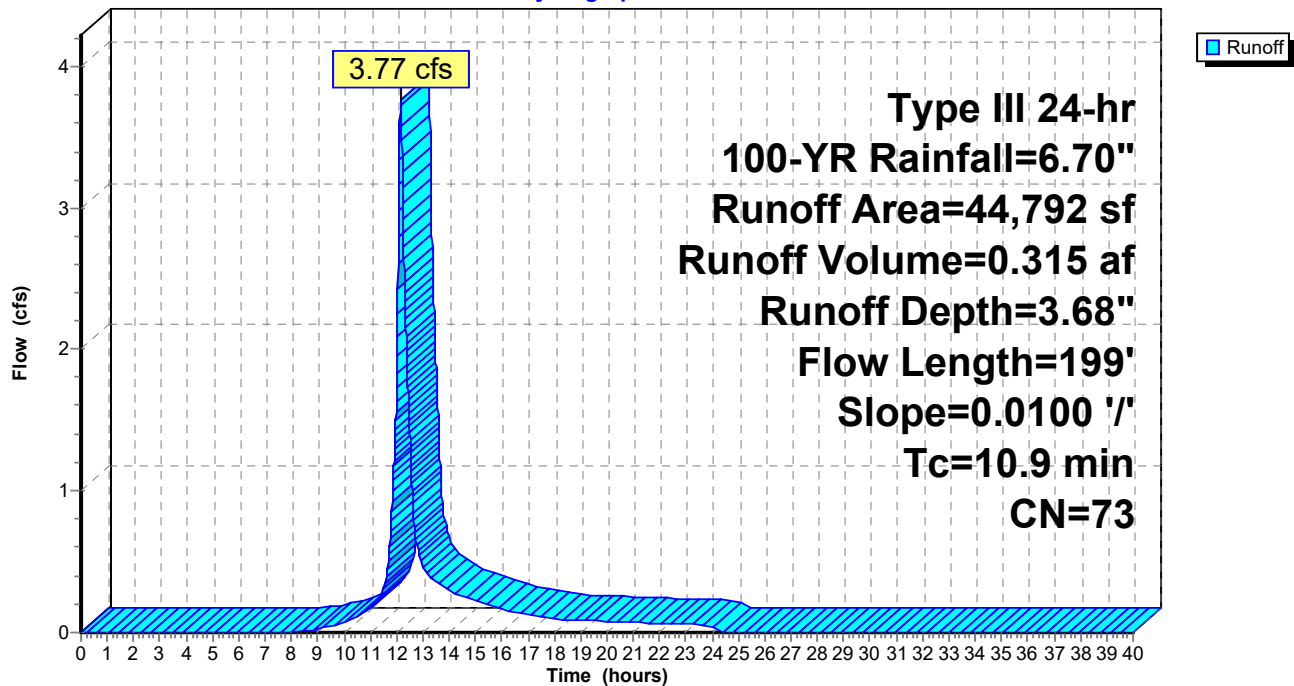
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
3,458	61	>75% Grass cover, Good HSG B
16,849	39	>75% Grass cover, Good HSG A
4,323	98	Roofs HSG A
1,422	98	Roofs HSG B
13,944	98	Paved parking HSG A
4,796	98	Paved parking HSG B
44,792	73	Weighted Average
20,307	43	45.34% Pervious Area
24,485	98	54.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	144	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.9	199	Total			

Subcatchment 33P: P1n

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 274

Summary for Pond 34P: CB3+67b

Inflow Area = 1.028 ac, 54.66% Impervious, Inflow Depth = 3.68" for 100-YR event
Inflow = 3.77 cfs @ 12.15 hrs, Volume= 0.315 af
Outflow = 3.77 cfs @ 12.15 hrs, Volume= 0.315 af, Atten= 0%, Lag= 0.0 min
Primary = 3.77 cfs @ 12.15 hrs, Volume= 0.315 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 146.60' @ 12.15 hrs

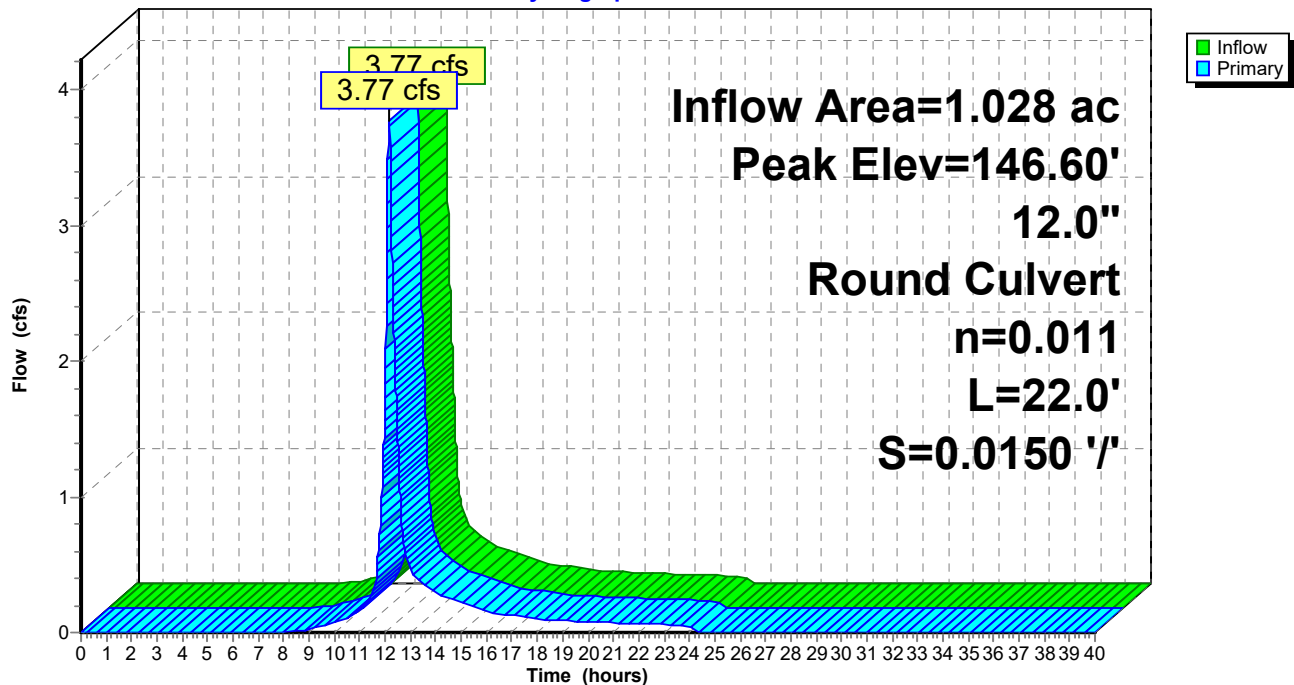
Device	Routing	Invert	Outlet Devices
#1	Primary	145.11'	12.0" Round Culvert L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.11' / 144.78' S= 0.0150 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.77 cfs @ 12.15 hrs HW=146.60' (Free Discharge)

↑1=Culvert (Inlet Controls 3.77 cfs @ 4.79 fps)

Pond 34P: CB3+67b

Hydrograph



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Page 275

Summary for Pond 35P: DMH3+50

Inflow Area = 2.017 ac, 53.54% Impervious, Inflow Depth = 3.63" for 100-YR event
Inflow = 7.29 cfs @ 12.15 hrs, Volume= 0.610 af
Outflow = 7.29 cfs @ 12.15 hrs, Volume= 0.610 af, Atten= 0%, Lag= 0.0 min
Primary = 7.29 cfs @ 12.15 hrs, Volume= 0.610 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.65' @ 12.15 hrs

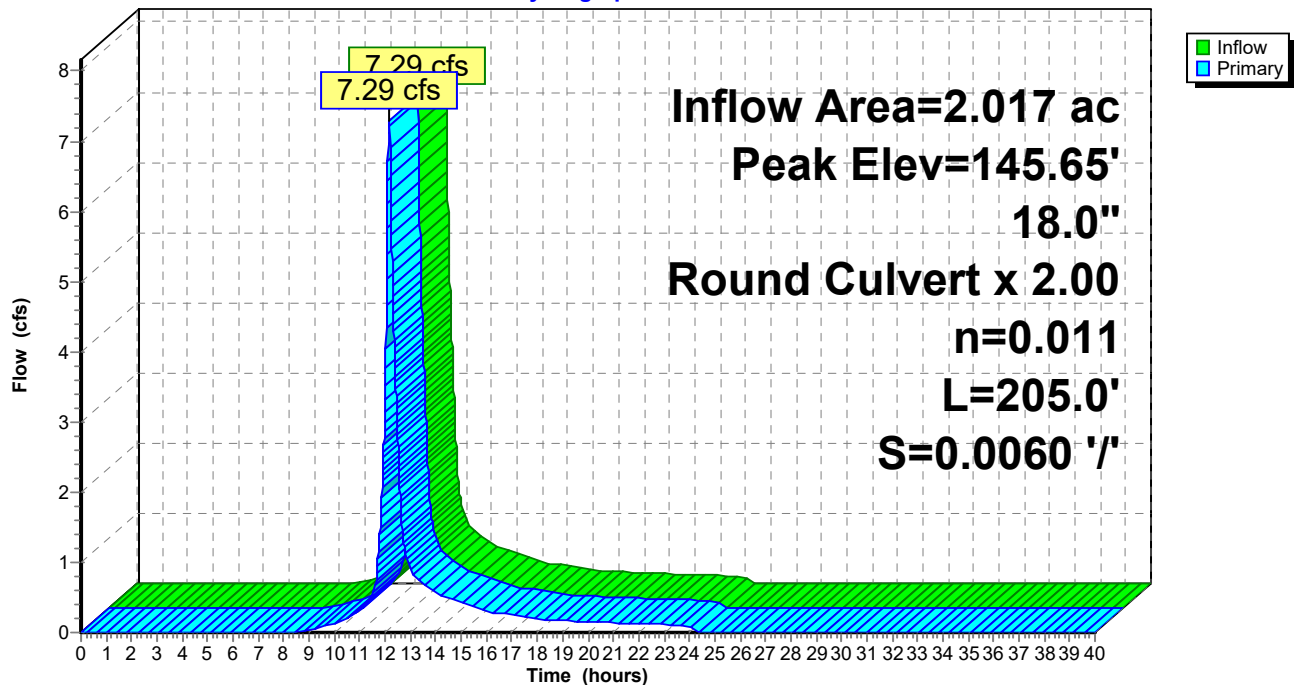
Device	Routing	Invert	Outlet Devices
#1	Primary	144.73'	18.0" Round Culvert X 2.00 L= 205.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.73' / 143.50' S= 0.0060 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=7.28 cfs @ 12.15 hrs HW=145.65' (Free Discharge)

↑1=Culvert (Barrel Controls 7.28 cfs @ 4.62 fps)

Pond 35P: DMH3+50

Hydrograph



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Page 276

Summary for Pond 36P: Basin #2

Inflow Area = 5.657 ac, 38.16% Impervious, Inflow Depth = 2.77" for 100-YR event
 Inflow = 15.03 cfs @ 12.15 hrs, Volume= 1.306 af
 Outflow = 3.26 cfs @ 12.67 hrs, Volume= 1.306 af, Atten= 78%, Lag= 31.0 min
 Discarded = 2.92 cfs @ 12.67 hrs, Volume= 1.287 af
 Primary = 0.35 cfs @ 12.67 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 144.77' @ 12.67 hrs Surf.Area= 15,232 sf Storage= 16,630 cf

Plug-Flow detention time= 42.7 min calculated for 1.306 af (100% of inflow)
 Center-of-Mass det. time= 42.6 min (886.6 - 843.9)

Volume	Invert	Avail.Storage	Storage Description
#1	143.50'	48,638 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
143.50	11,051	875.0	0	0	11,051
146.50	21,996	950.0	48,638	48,638	22,282

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.50'	8.270 in/hr Exfiltration over Surface area
#2	Primary	144.50'	15.0" Round Culvert L= 220.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.50' / 143.00' S= 0.0068 ' S= 0.0068 ' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Discarded OutFlow Max=2.92 cfs @ 12.67 hrs HW=144.77' (Free Discharge)

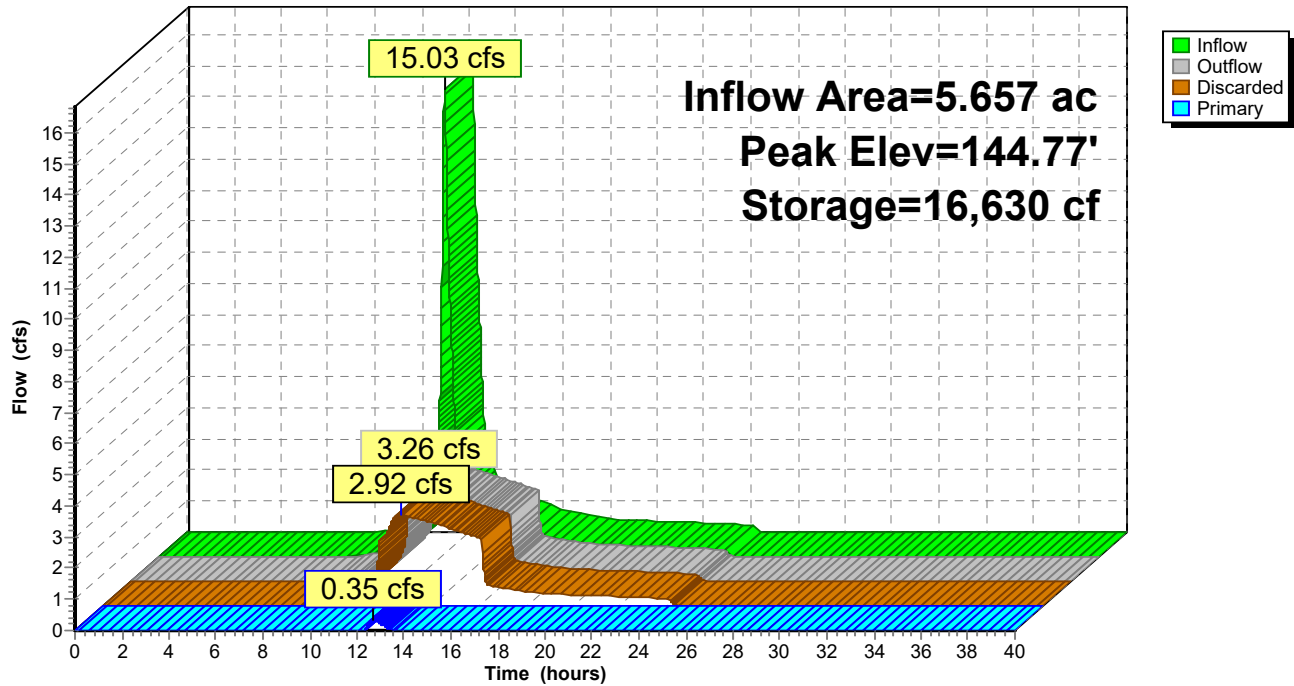
↑**1=Exfiltration** (Exfiltration Controls 2.92 cfs)

Primary OutFlow Max=0.35 cfs @ 12.67 hrs HW=144.77' (Free Discharge)

↑**2=Culvert** (Inlet Controls 0.35 cfs @ 1.77 fps)

Pond 36P: Basin #2

Hydrograph



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Page 278

Summary for Subcatchment 37P: P1q

Runoff = 40.12 cfs @ 12.35 hrs, Volume= 4.686 af, Depth= 2.68"

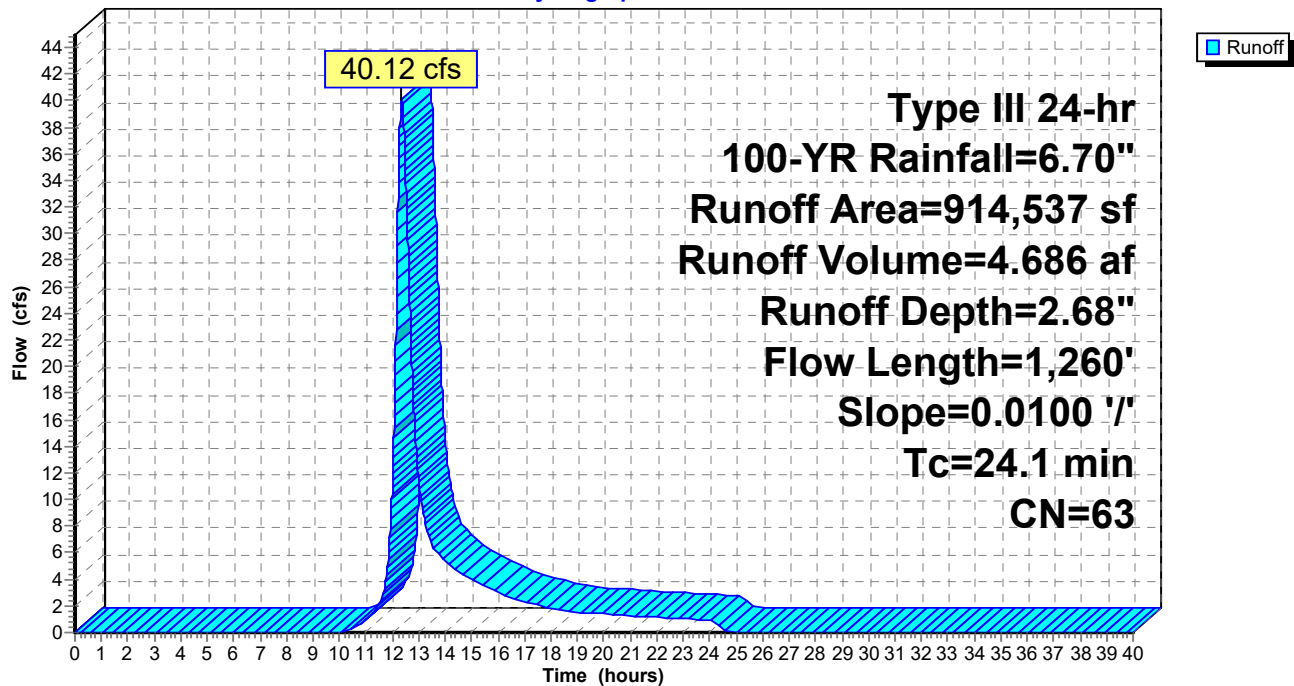
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
22,240	98	Paved parking HSG B
215	80	>75% Grass cover, Good HSG D
98,766	61	>75% Grass cover, Good HSG B
127,688	39	>75% Grass cover, Good HSG A
24,404	98	Paved parking HSG A
6,082	98	Roofs HSG B
16,041	98	Roofs HSG A
145,280	30	Woods, Good HSG A
55,658	55	Woods, Good HSG B
418,163	77	Woods, Good HSG D
914,537	63	Weighted Average
845,770	60	92.48% Pervious Area
68,767	98	7.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,035	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
24.1	1,260	Total			

Subcatchment 37P: P1q

Hydrograph



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Page 280

Summary for Pond 38P: Wetland Storage

Inflow Area = 20.995 ac, 7.52% Impervious, Inflow Depth = 2.68" for 100-YR event
 Inflow = 40.12 cfs @ 12.35 hrs, Volume= 4.686 af
 Outflow = 5.11 cfs @ 14.13 hrs, Volume= 4.497 af, Atten= 87%, Lag= 107.1 min
 Primary = 5.11 cfs @ 14.13 hrs, Volume= 4.497 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.37' @ 14.13 hrs Surf.Area= 244,013 sf Storage= 102,241 cf

Plug-Flow detention time= 356.0 min calculated for 4.496 af (96% of inflow)
 Center-of-Mass det. time= 334.1 min (1,199.8 - 865.7)

Volume	Invert	Avail.Storage	Storage Description
#1	145.20'	133,865 cf	Custom Stage Data (Irregular) Listed below (Recalc)

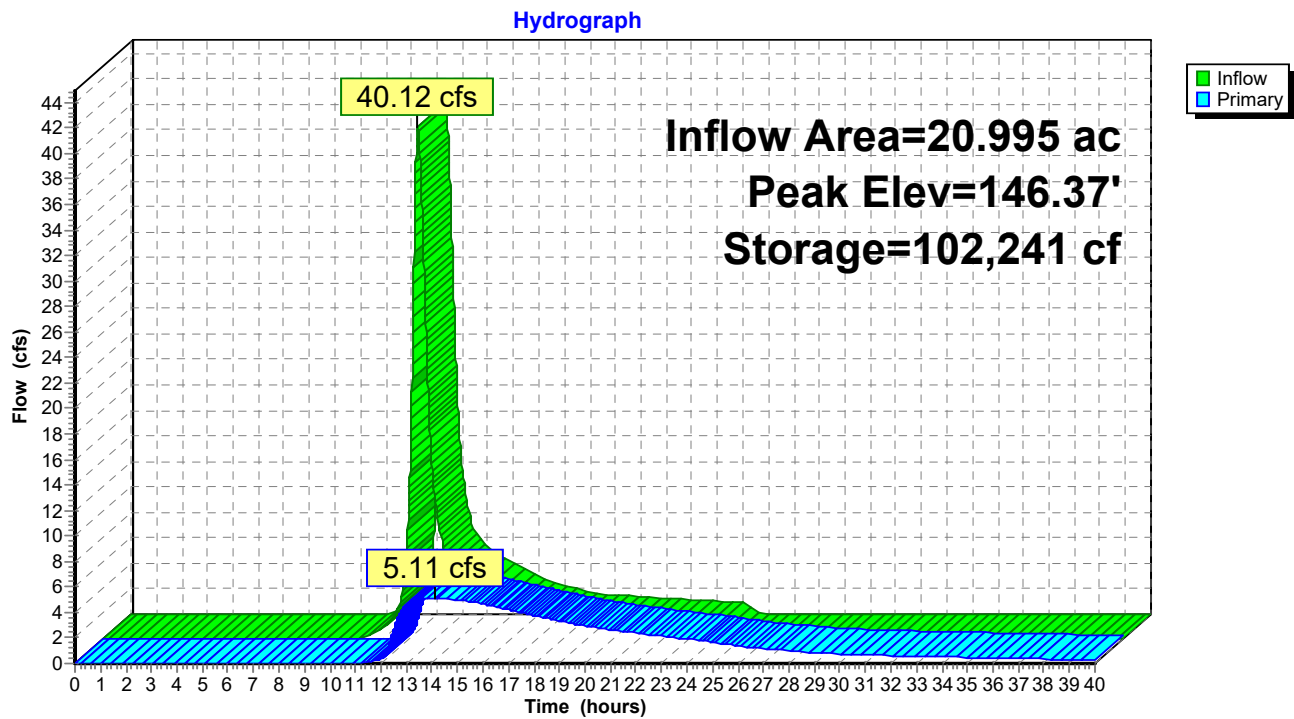
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
145.20	30	18.0	0	0	30
145.70	60	30.0	22	22	77
146.00	195,920	2,713.0	19,941	19,963	585,725
146.50	261,254	2,891.0	113,902	133,865	665,117

Device	Routing	Invert	Outlet Devices
#1	Primary	145.80'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 145.80 146.00 146.00 146.50 Width (feet) 2.00 2.00 5.00 5.00

Primary OutFlow Max=5.11 cfs @ 14.13 hrs HW=146.37' (Free Discharge)

↑1=Custom Weir/Orifice (Weir Controls 5.11 cfs @ 2.25 fps)

Pond 38P: Wetland Storage



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 282

Summary for Subcatchment 39P: P1r

Runoff = 5.82 cfs @ 12.36 hrs, Volume= 0.938 af, Depth= 0.87"

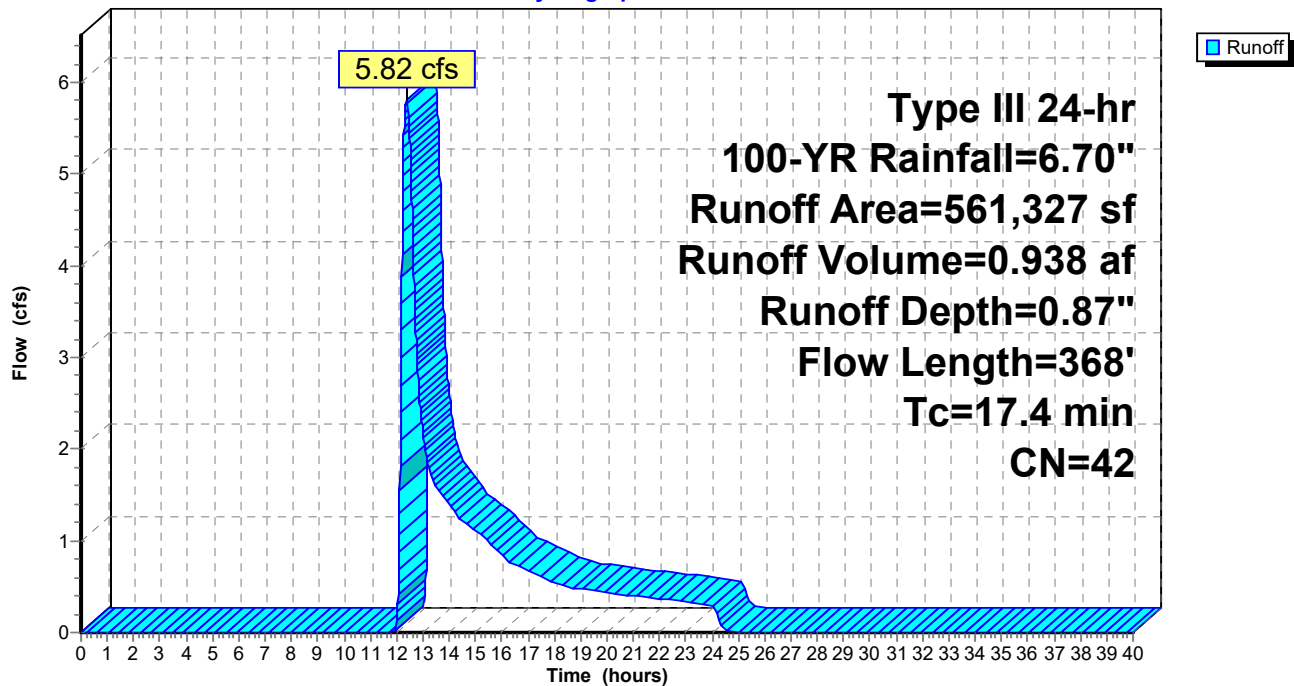
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
20,944	61	>75% Grass cover, Good HSG B
100,043	39	>75% Grass cover, Good HSG A
1,653	98	Roofs HSG B
7,805	98	Roofs HSG A
4,592	98	Paved parking HSG A
433	98	Paved parking HSG B
267,267	30	Woods, Good HSG A
158,590	55	Woods, Good HSG B
561,327	42	Weighted Average
546,844	40	97.42% Pervious Area
14,483	98	2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	343	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
17.4	368	Total			

Subcatchment 39P: P1r

Hydrograph

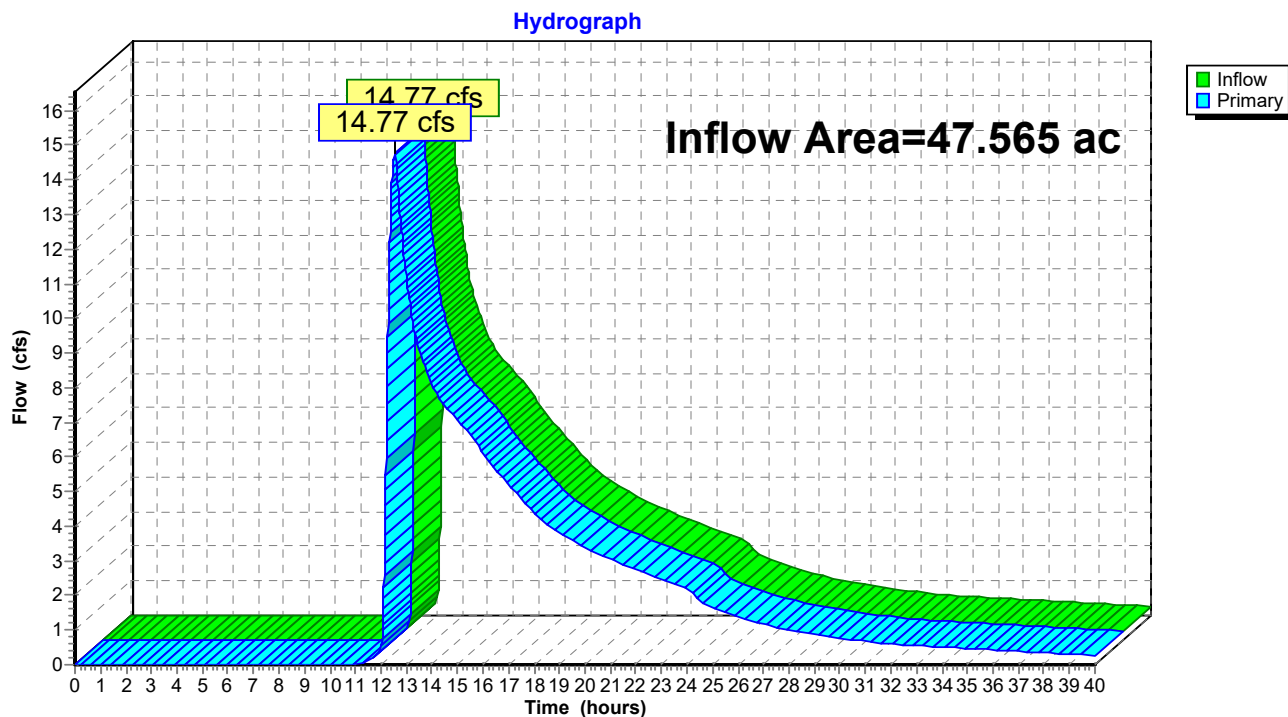


Summary for Link 40P: Design Point #1: Flow to Western Wetlands

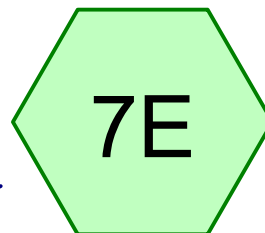
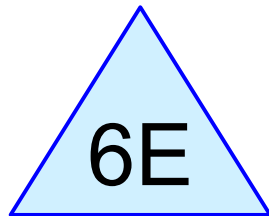
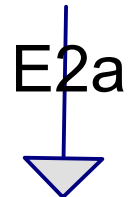
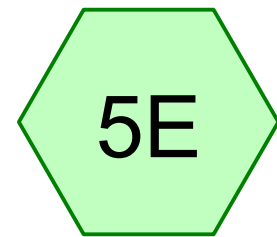
Inflow Area = 47.565 ac, 15.02% Impervious, Inflow Depth > 1.57" for 100-YR event
 Inflow = 14.77 cfs @ 12.54 hrs, Volume= 6.238 af
 Primary = 14.77 cfs @ 12.54 hrs, Volume= 6.238 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

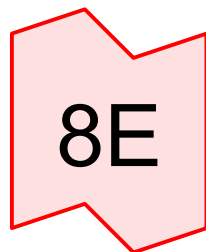
Link 40P: Design Point #1: Flow to Western Wetlands



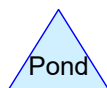
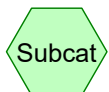
DESIGN POINT #2: FLOW SOUTHERN
ABUTTER EXISTING CONDITIONS



E2b



Design point #2: Flow to
Southern Abutter



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Page 2

Project Notes

Rainfall events imported from "Acorn Place R3.hcp"

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Page 3

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-In	Type III 24-hr		Default	24.00	1	1.00	2
2	1-YR	Type III 24-hr		Default	24.00	1	2.50	2
3	2-YR	Type III 24-hr		Default	24.00	1	3.20	2
4	10-YR	Type III 24-hr		Default	24.00	1	4.70	2
5	50-YR	Type III 24-hr		Default	24.00	1	6.10	2
6	100-YR	Type III 24-hr		Default	24.00	1	6.70	2

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Page 4

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.242	39	>75% Grass cover, Good HSG A (5E)
1.137	61	>75% Grass cover, Good HSG B (5E, 7E)
0.010	74	>75% Grass cover, Good HSG C (5E)
0.675	98	Paved parking HSG A (5E)
0.004	98	Paved parking HSG C (5E)
0.241	98	Roofs HSG A (5E)
7.216	30	Woods, Good HSG A (5E, 7E)
3.603	55	Woods, Good HSG B (5E, 7E)
2.982	70	Woods, Good HSG C (5E)
16.496	77	Woods, Good HSG D (5E)
35.606	61	TOTAL AREA

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Type III 24-hr 1-YR Rainfall=2.50"

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Page 5

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 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 5E: E2a

Runoff Area=1,513,602 sf 2.65% Impervious Runoff Depth=0.22"
Flow Length=1,966' Slope=0.0100 '/' Tc=29.7 min CN=62 Runoff=2.53 cfs 0.635 af

Pond 6E: Wetland Storage

Peak Elev=143.66' Storage=4,025 cf Inflow=2.53 cfs 0.635 af
Outflow=1.45 cfs 0.609 af

Subcatchment 7E: E2b

Runoff Area=37,417 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=259' Tc=11.6 min CN=33 Runoff=0.00 cfs 0.000 af

Link 8E: Design point #2: Flow to Southern Abutter

Inflow=1.45 cfs 0.609 af
Primary=1.45 cfs 0.609 af

Total Runoff Area = 35.606 ac Runoff Volume = 0.635 af Average Runoff Depth = 0.21"
97.42% Pervious = 34.687 ac 2.58% Impervious = 0.920 ac

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Type III 24-hr 1-YR Rainfall=2.50"

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Page 6

Summary for Subcatchment 5E: E2a

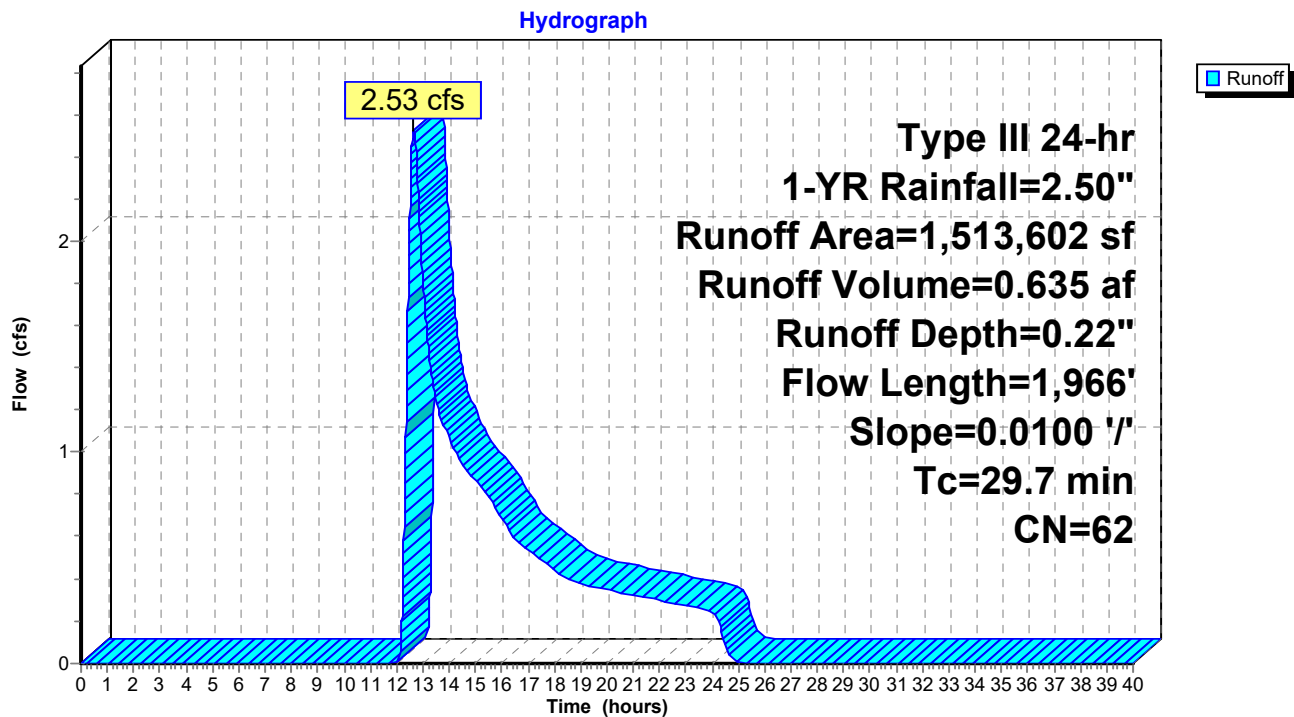
Runoff = 2.53 cfs @ 12.64 hrs, Volume= 0.635 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
29,382	98	Paved parking HSG A
196	98	Paved parking HSG C
10,487	98	Roofs HSG A
417	74	>75% Grass cover, Good HSG C
141,226	39	>75% Grass cover, Good HSG A
48,657	61	>75% Grass cover, Good HSG B
281,934	30	Woods, Good HSG A
152,817	55	Woods, Good HSG B
129,909	70	Woods, Good HSG C
718,577	77	Woods, Good HSG D
1,513,602	62	Weighted Average
1,473,537	61	97.35% Pervious Area
40,065	98	2.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	1,741	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
29.7	1,966	Total			

Subcatchment 5E: E2a



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 8

Summary for Pond 6E: Wetland Storage

Inflow Area = 34.748 ac, 2.65% Impervious, Inflow Depth = 0.22" for 1-YR event
 Inflow = 2.53 cfs @ 12.64 hrs, Volume= 0.635 af
 Outflow = 1.45 cfs @ 13.25 hrs, Volume= 0.609 af, Atten= 43%, Lag= 36.2 min
 Primary = 1.45 cfs @ 13.25 hrs, Volume= 0.609 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 143.66' @ 13.25 hrs Surf.Area= 11,588 sf Storage= 4,025 cf

Plug-Flow detention time= 66.9 min calculated for 0.609 af (96% of inflow)
 Center-of-Mass det. time= 47.1 min (1,016.1 - 968.9)

Volume	Invert	Avail.Storage	Storage Description
#1	142.71'	205,693 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
142.71	100	50.0	0	0	100
144.00	20,500	4,000.0	9,474	9,474	1,273,143
145.00	470,000	4,330.0	196,219	205,693	1,491,933

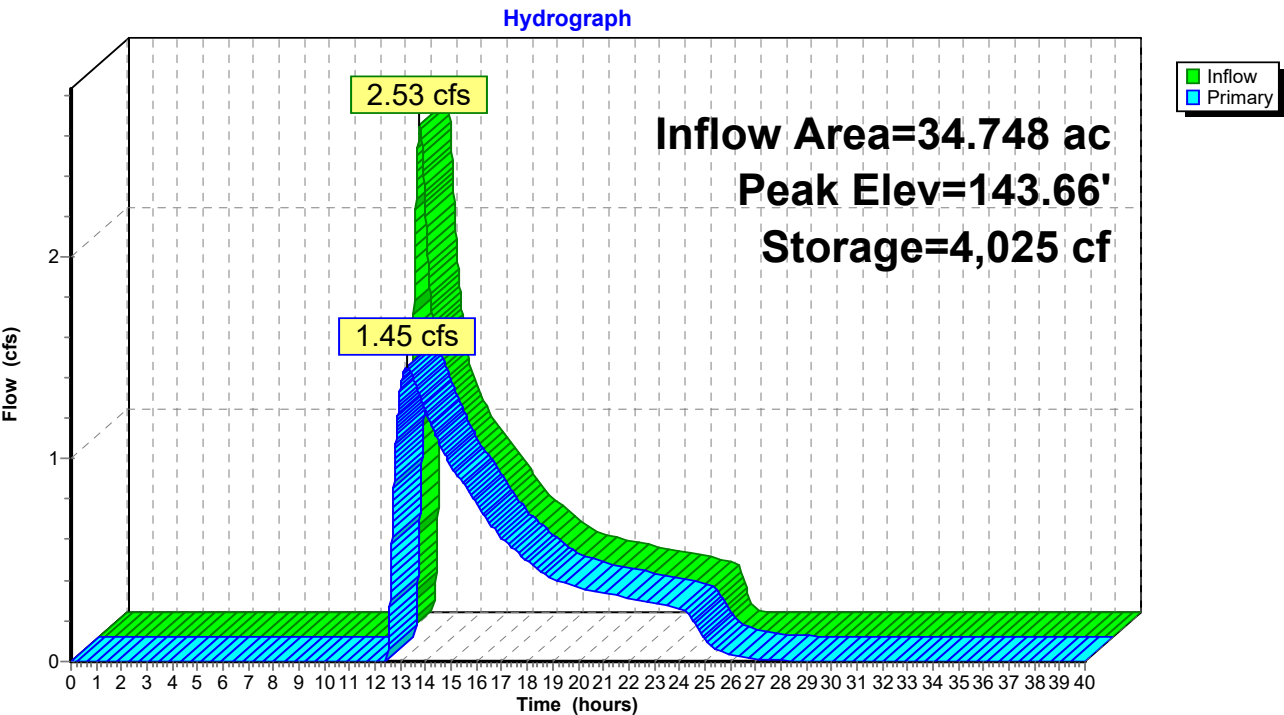
Device	Routing	Invert	Outlet Devices
#1	Primary	142.71'	36.0" W x 8.0" H Box Culvert X 2.00 L= 50.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 142.71' / 142.46' S= 0.0050 ' / Cc= 0.900 n= 0.018, Flow Area= 2.00 sf
#2	Device 1	143.30'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 143.30 145.00 Width (feet) 2.00 3.00

Primary OutFlow Max=1.45 cfs @ 13.25 hrs HW=143.66' (Free Discharge)

↑ **1=Culvert** (Passes 1.45 cfs of 11.42 cfs potential flow)

↑ **2=Custom Weir/Orifice** (Weir Controls 1.45 cfs @ 1.93 fps)

Pond 6E: Wetland Storage



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 10

Summary for Subcatchment 7E: E2b

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

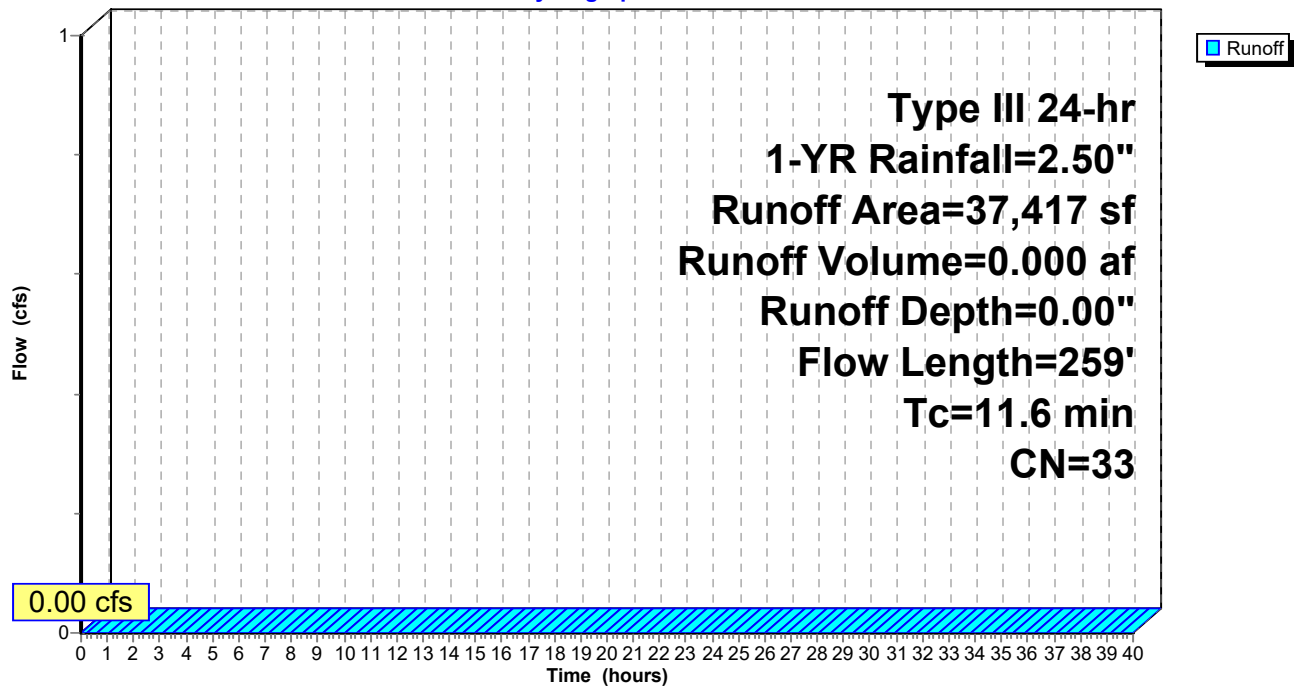
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
868	61	>75% Grass cover, Good HSG B
32,403	30	Woods, Good HSG A
4,146	55	Woods, Good HSG B
37,417	33	Weighted Average
37,417	33	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	79	0.1000	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
2.3	180	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.6	259	Total			

Subcatchment 7E: E2b

Hydrograph

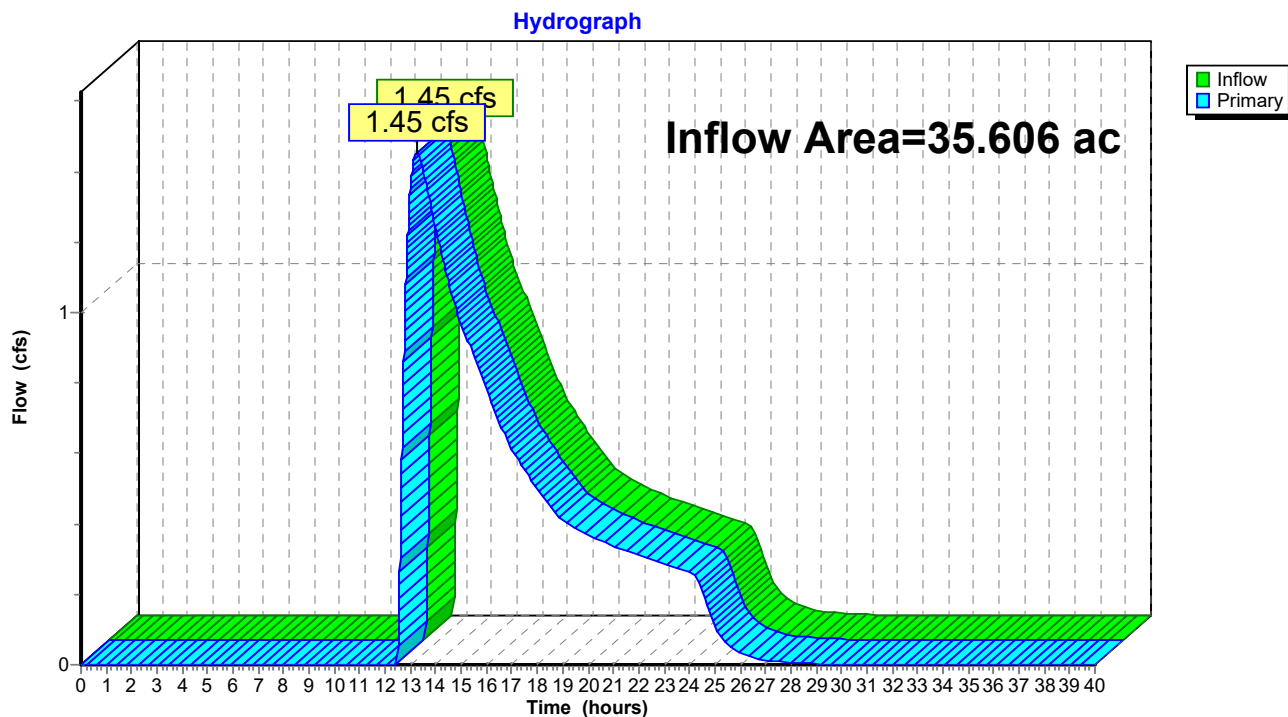


Summary for Link 8E: Design point #2: Flow to Southern Abutter

Inflow Area = 35.606 ac, 2.58% Impervious, Inflow Depth = 0.21" for 1-YR event
 Inflow = 1.45 cfs @ 13.25 hrs, Volume= 0.609 af
 Primary = 1.45 cfs @ 13.25 hrs, Volume= 0.609 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 8E: Design point #2: Flow to Southern Abutter



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 12

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 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 5E: E2a

Runoff Area=1,513,602 sf 2.65% Impervious Runoff Depth=0.48"
Flow Length=1,966' Slope=0.0100 '/' Tc=29.7 min CN=62 Runoff=7.93 cfs 1.393 af

Pond 6E: Wetland Storage

Peak Elev=144.03' Storage=10,260 cf Inflow=7.93 cfs 1.393 af
Outflow=4.47 cfs 1.366 af

Subcatchment 7E: E2b

Runoff Area=37,417 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=259' Tc=11.6 min CN=33 Runoff=0.00 cfs 0.000 af

Link 8E: Design point #2: Flow to Southern Abutter

Inflow=4.47 cfs 1.366 af
Primary=4.47 cfs 1.366 af

Total Runoff Area = 35.606 ac Runoff Volume = 1.393 af Average Runoff Depth = 0.47"
97.42% Pervious = 34.687 ac 2.58% Impervious = 0.920 ac

Ridge Street HydroCAD Revised Final

Type III 24-hr 2-YR Rainfall=3.20"

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Page 13

Summary for Subcatchment 5E: E2a

Runoff = 7.93 cfs @ 12.54 hrs, Volume= 1.393 af, Depth= 0.48"

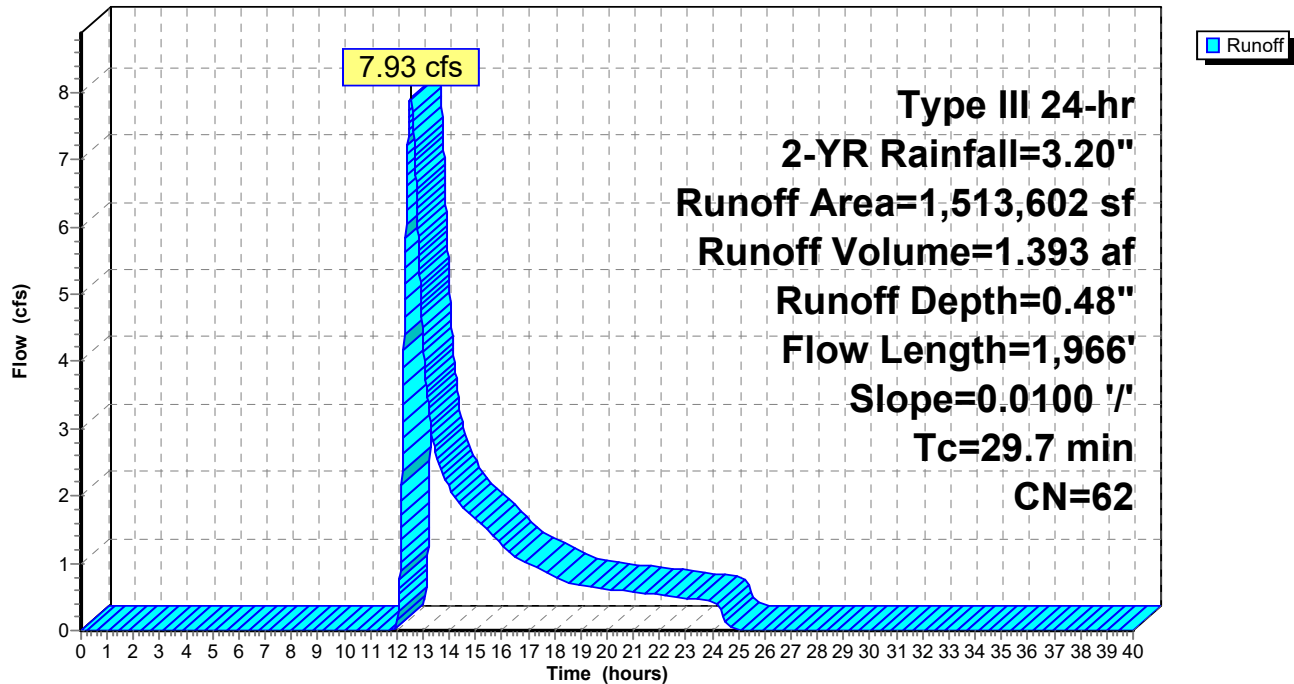
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
29,382	98	Paved parking HSG A
196	98	Paved parking HSG C
10,487	98	Roofs HSG A
417	74	>75% Grass cover, Good HSG C
141,226	39	>75% Grass cover, Good HSG A
48,657	61	>75% Grass cover, Good HSG B
281,934	30	Woods, Good HSG A
152,817	55	Woods, Good HSG B
129,909	70	Woods, Good HSG C
718,577	77	Woods, Good HSG D
1,513,602	62	Weighted Average
1,473,537	61	97.35% Pervious Area
40,065	98	2.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	1,741	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
29.7	1,966	Total			

Subcatchment 5E: E2a

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 15

Summary for Pond 6E: Wetland Storage

Inflow Area = 34.748 ac, 2.65% Impervious, Inflow Depth = 0.48" for 2-YR event
 Inflow = 7.93 cfs @ 12.54 hrs, Volume= 1.393 af
 Outflow = 4.47 cfs @ 12.98 hrs, Volume= 1.366 af, Atten= 44%, Lag= 26.3 min
 Primary = 4.47 cfs @ 12.98 hrs, Volume= 1.366 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 144.03' @ 12.98 hrs Surf.Area= 26,092 sf Storage= 10,260 cf

Plug-Flow detention time= 48.1 min calculated for 1.366 af (98% of inflow)
 Center-of-Mass det. time= 38.3 min (969.8 - 931.5)

Volume	Invert	Avail.Storage	Storage Description
#1	142.71'	205,693 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
142.71	100	50.0	0	0	100
144.00	20,500	4,000.0	9,474	9,474	1,273,143
145.00	470,000	4,330.0	196,219	205,693	1,491,933

Device	Routing	Invert	Outlet Devices
#1	Primary	142.71'	36.0" W x 8.0" H Box Culvert X 2.00 L= 50.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 142.71' / 142.46' S= 0.0050 ' /' Cc= 0.900 n= 0.018, Flow Area= 2.00 sf
#2	Device 1	143.30'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 143.30 145.00 Width (feet) 2.00 3.00

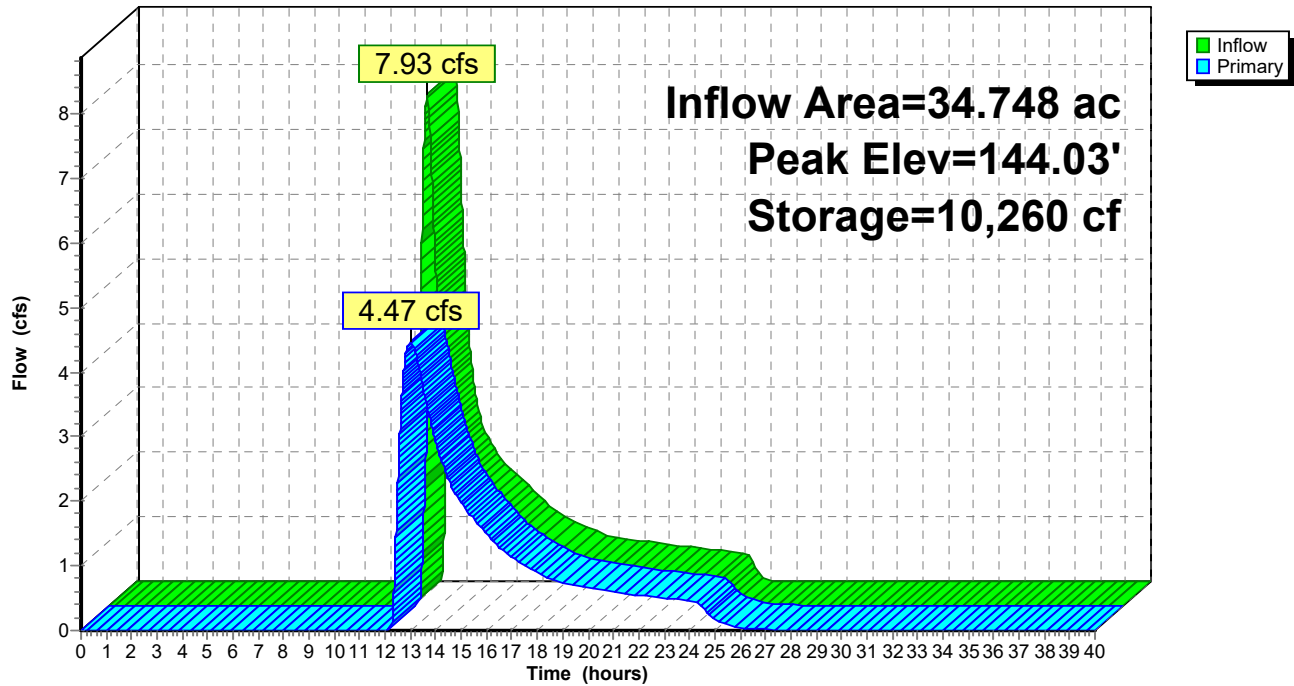
Primary OutFlow Max=4.47 cfs @ 12.98 hrs HW=144.03' (Free Discharge)

↑1=Culvert (Passes 4.47 cfs of 14.95 cfs potential flow)

↑2=Custom Weir/Orifice (Weir Controls 4.47 cfs @ 2.75 fps)

Pond 6E: Wetland Storage

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 17

Summary for Subcatchment 7E: E2b

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

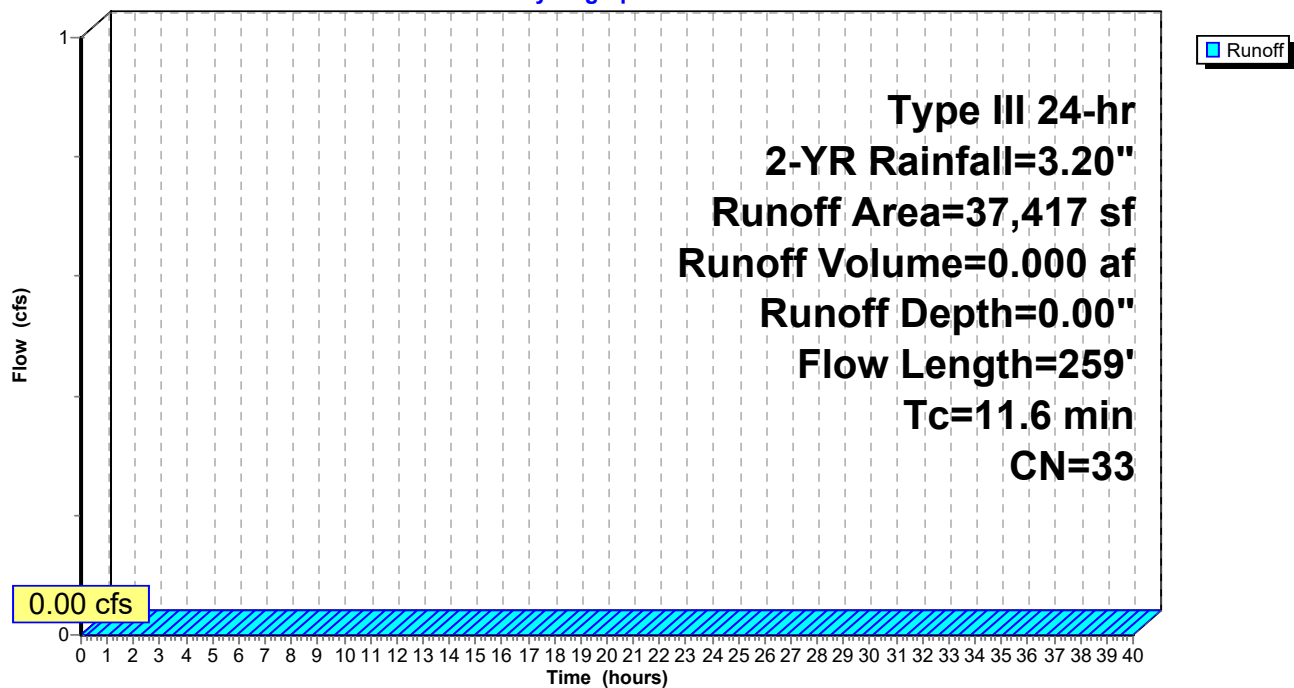
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
868	61	>75% Grass cover, Good HSG B
32,403	30	Woods, Good HSG A
4,146	55	Woods, Good HSG B
37,417	33	Weighted Average
37,417	33	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	79	0.1000	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
2.3	180	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.6	259	Total			

Subcatchment 7E: E2b

Hydrograph

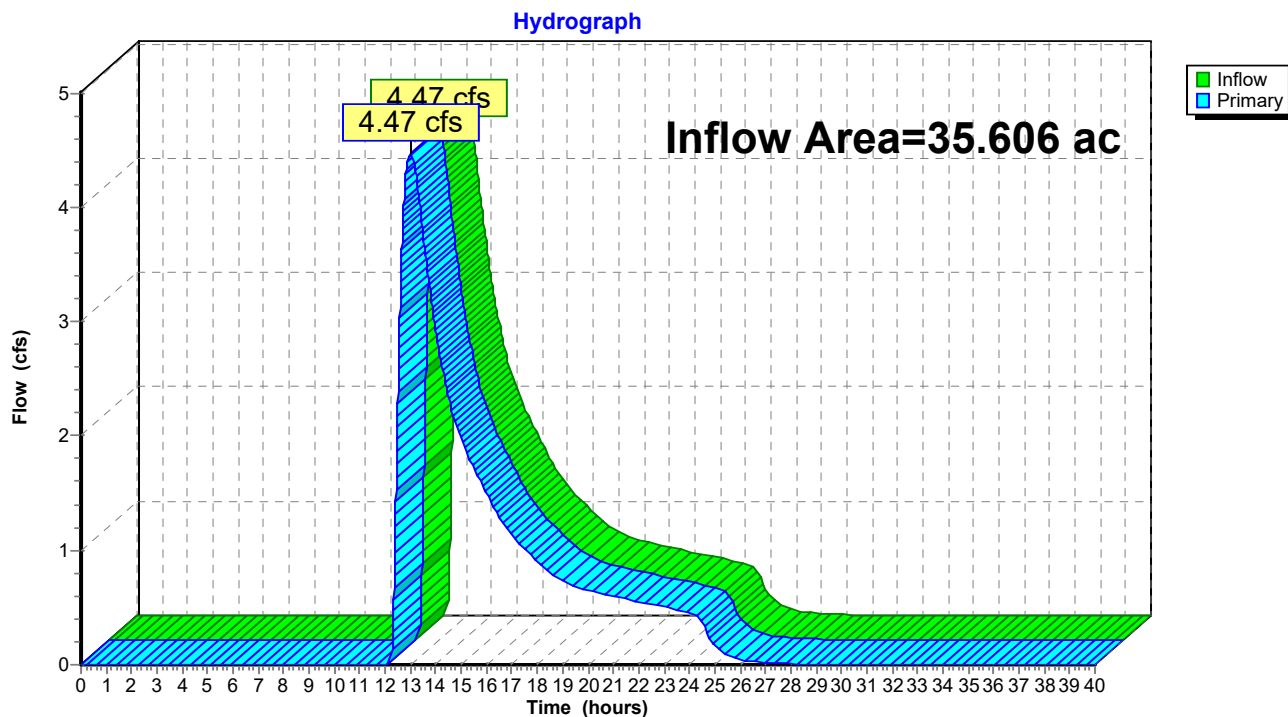


Summary for Link 8E: Design point #2: Flow to Southern Abutter

Inflow Area = 35.606 ac, 2.58% Impervious, Inflow Depth = 0.46" for 2-YR event
 Inflow = 4.47 cfs @ 12.98 hrs, Volume= 1.366 af
 Primary = 4.47 cfs @ 12.98 hrs, Volume= 1.366 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 8E: Design point #2: Flow to Southern Abutter



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 19

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 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 5E: E2a

Runoff Area=1,513,602 sf 2.65% Impervious Runoff Depth=1.26"
Flow Length=1,966' Slope=0.0100 '/' Tc=29.7 min CN=62 Runoff=26.24 cfs 3.639 af

Pond 6E: Wetland Storage

Peak Elev=144.45' Storage=43,327 cf Inflow=26.24 cfs 3.639 af
Outflow=9.17 cfs 3.613 af

Subcatchment 7E: E2b

Runoff Area=37,417 sf 0.00% Impervious Runoff Depth=0.02"
Flow Length=259' Tc=11.6 min CN=33 Runoff=0.00 cfs 0.001 af

Link 8E: Design point #2: Flow to Southern Abutter

Inflow=9.17 cfs 3.614 af
Primary=9.17 cfs 3.614 af

Total Runoff Area = 35.606 ac Runoff Volume = 3.641 af Average Runoff Depth = 1.23"
97.42% Pervious = 34.687 ac 2.58% Impervious = 0.920 ac

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Type III 24-hr 10-YR Rainfall=4.70"

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Page 20

Summary for Subcatchment 5E: E2a

Runoff = 26.24 cfs @ 12.47 hrs, Volume= 3.639 af, Depth= 1.26"

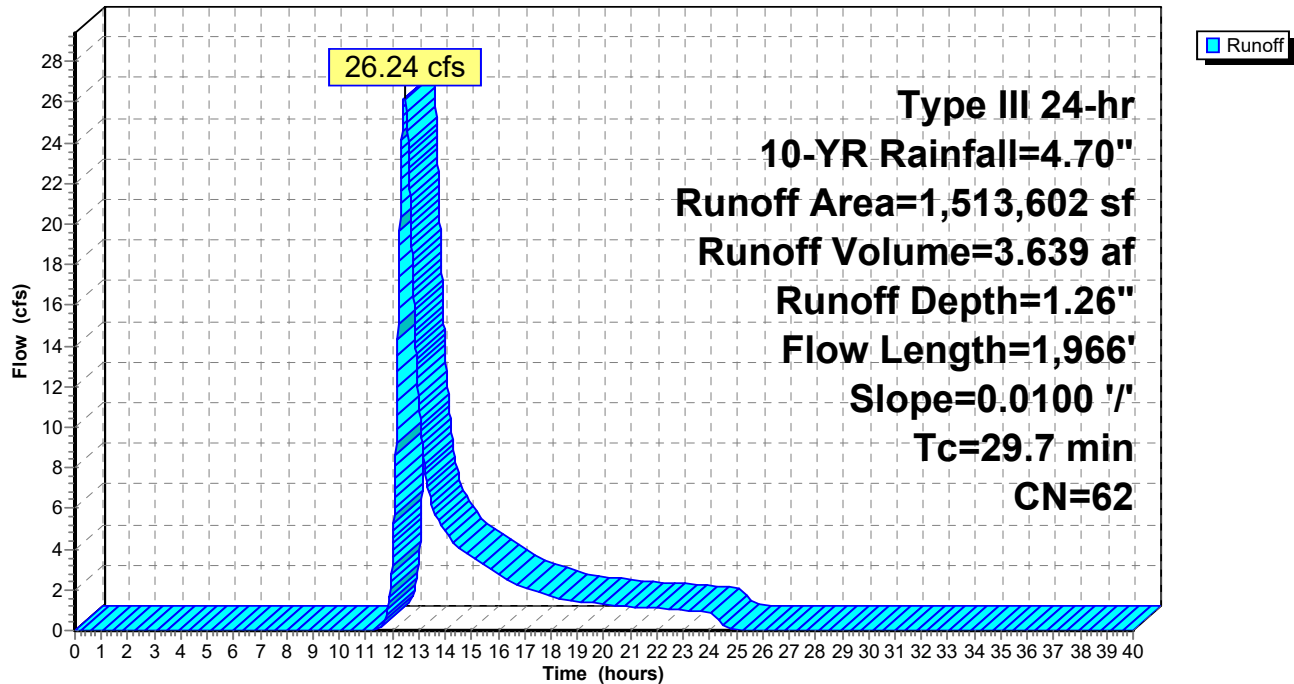
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
29,382	98	Paved parking HSG A
196	98	Paved parking HSG C
10,487	98	Roofs HSG A
417	74	>75% Grass cover, Good HSG C
141,226	39	>75% Grass cover, Good HSG A
48,657	61	>75% Grass cover, Good HSG B
281,934	30	Woods, Good HSG A
152,817	55	Woods, Good HSG B
129,909	70	Woods, Good HSG C
718,577	77	Woods, Good HSG D
1,513,602	62	Weighted Average
1,473,537	61	97.35% Pervious Area
40,065	98	2.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	1,741	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
29.7	1,966	Total			

Subcatchment 5E: E2a

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 22

Summary for Pond 6E: Wetland Storage

Inflow Area = 34.748 ac, 2.65% Impervious, Inflow Depth = 1.26" for 10-YR event
 Inflow = 26.24 cfs @ 12.47 hrs, Volume= 3.639 af
 Outflow = 9.17 cfs @ 13.13 hrs, Volume= 3.613 af, Atten= 65%, Lag= 39.7 min
 Primary = 9.17 cfs @ 13.13 hrs, Volume= 3.613 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 144.45' @ 13.13 hrs Surf.Area= 149,870 sf Storage= 43,327 cf

Plug-Flow detention time= 57.1 min calculated for 3.613 af (99% of inflow)
 Center-of-Mass det. time= 53.0 min (948.7 - 895.7)

Volume	Invert	Avail.Storage	Storage Description
#1	142.71'	205,693 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
142.71	100	50.0	0	0	100
144.00	20,500	4,000.0	9,474	9,474	1,273,143
145.00	470,000	4,330.0	196,219	205,693	1,491,933

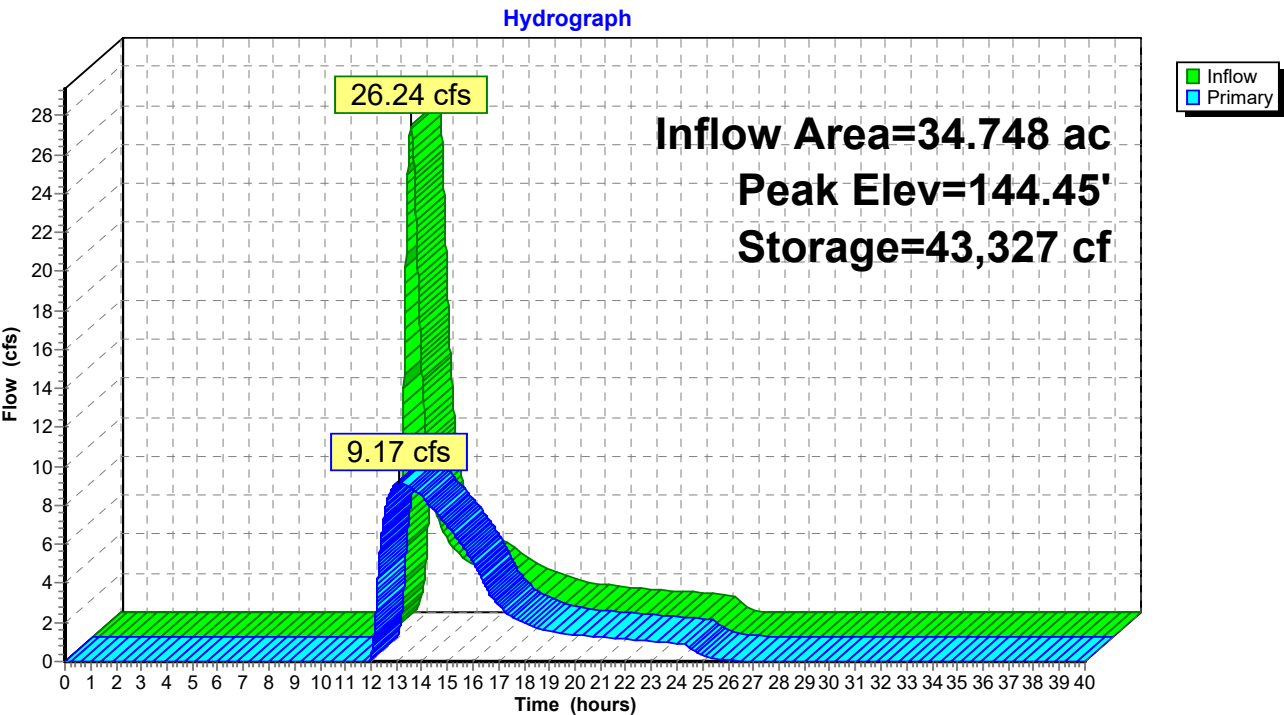
Device	Routing	Invert	Outlet Devices
#1	Primary	142.71'	36.0" W x 8.0" H Box Culvert X 2.00 L= 50.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 142.71' / 142.46' S= 0.0050 ' /' Cc= 0.900 n= 0.018, Flow Area= 2.00 sf
#2	Device 1	143.30'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 143.30 145.00 Width (feet) 2.00 3.00

Primary OutFlow Max=9.17 cfs @ 13.13 hrs HW=144.45' (Free Discharge)

↑1=Culvert (Passes 9.17 cfs of 18.06 cfs potential flow)

↑2=Custom Weir/Orifice (Weir Controls 9.17 cfs @ 3.41 fps)

Pond 6E: Wetland Storage



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 24

Summary for Subcatchment 7E: E2b

Runoff = 0.00 cfs @ 21.64 hrs, Volume= 0.001 af, Depth= 0.02"

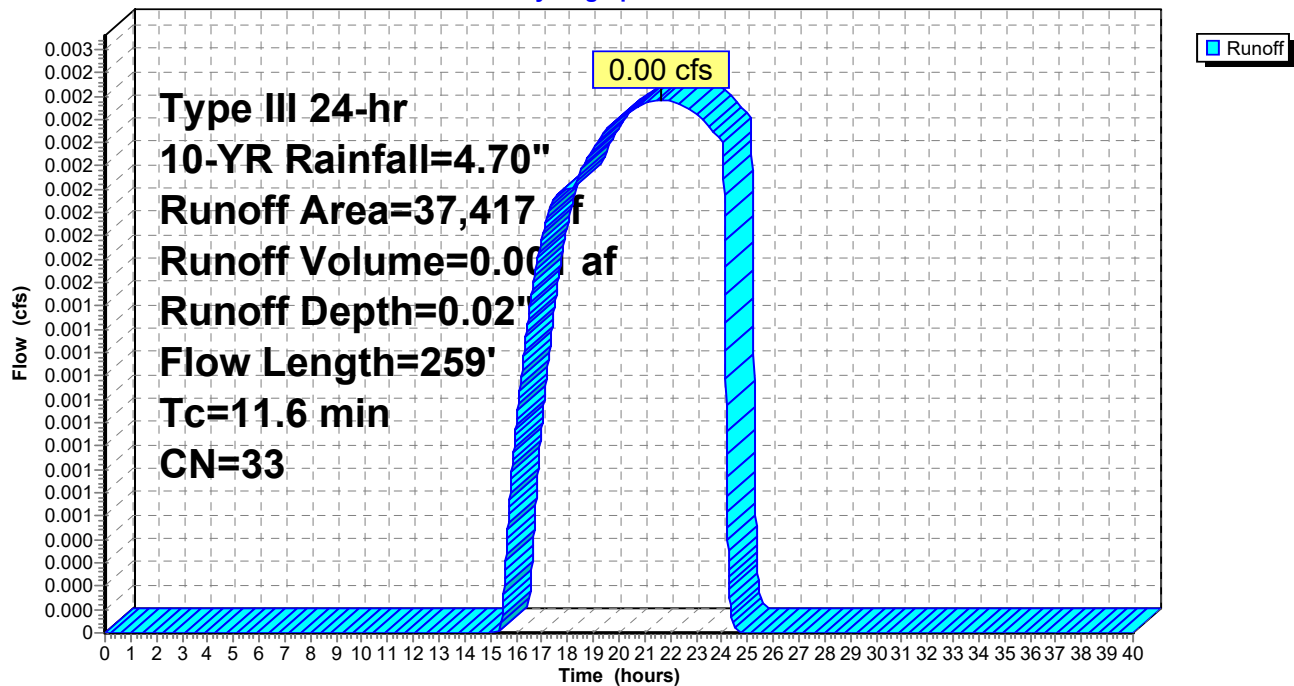
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
868	61	>75% Grass cover, Good HSG B
32,403	30	Woods, Good HSG A
4,146	55	Woods, Good HSG B
37,417	33	Weighted Average
37,417	33	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	79	0.1000	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
2.3	180	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.6	259	Total			

Subcatchment 7E: E2b

Hydrograph

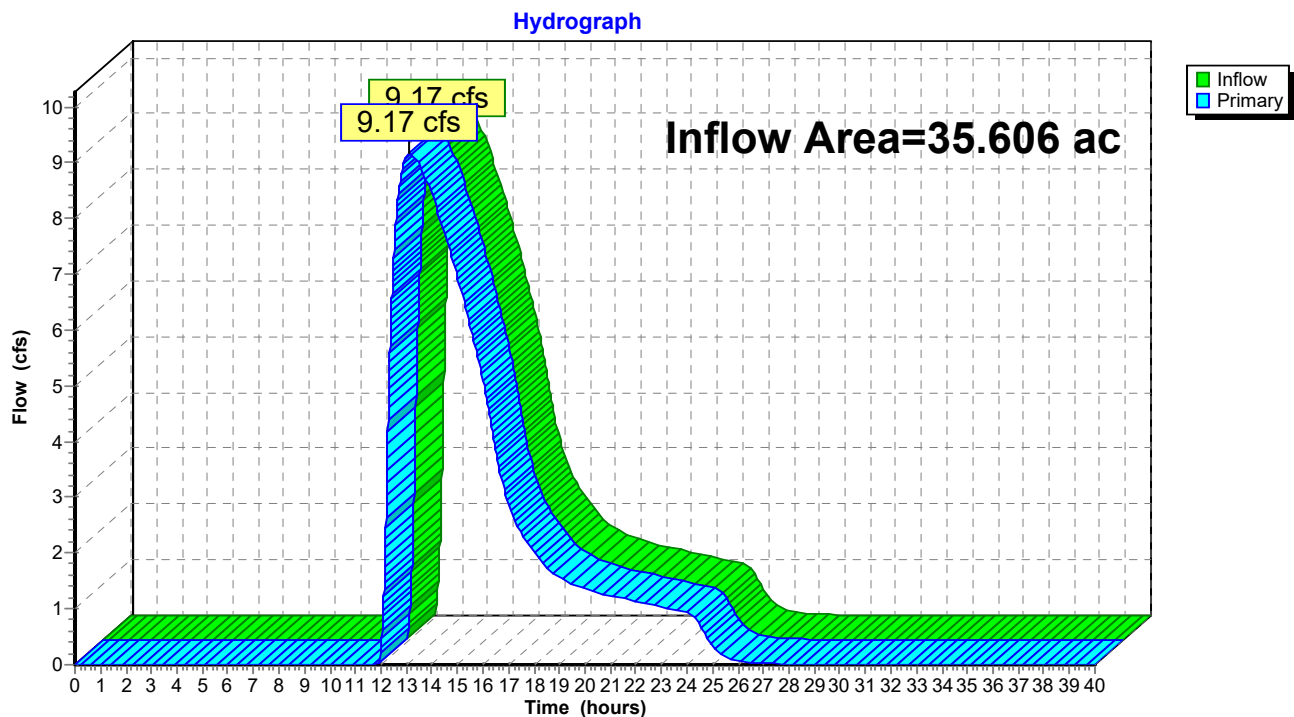


Summary for Link 8E: Design point #2: Flow to Southern Abutter

Inflow Area = 35.606 ac, 2.58% Impervious, Inflow Depth = 1.22" for 10-YR event
 Inflow = 9.17 cfs @ 13.13 hrs, Volume= 3.614 af
 Primary = 9.17 cfs @ 13.13 hrs, Volume= 3.614 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 8E: Design point #2: Flow to Southern Abutter



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 26

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 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 5E: E2a

Runoff Area=1,513,602 sf 2.65% Impervious Runoff Depth=2.16"

Flow Length=1,966' Slope=0.0100 '/' Tc=29.7 min CN=62 Runoff=48.00 cfs 6.252 af

Pond 6E: Wetland Storage

Peak Elev=144.69' Storage=93,169 cf Inflow=48.00 cfs 6.252 af

Outflow=12.51 cfs 6.226 af

Subcatchment 7E: E2b

Runoff Area=37,417 sf 0.00% Impervious Runoff Depth=0.19"

Flow Length=259' Tc=11.6 min CN=33 Runoff=0.02 cfs 0.013 af

Link 8E: Design point #2: Flow to Southern Abutter

Inflow=12.53 cfs 6.239 af

Primary=12.53 cfs 6.239 af

Total Runoff Area = 35.606 ac Runoff Volume = 6.265 af Average Runoff Depth = 2.11"
97.42% Pervious = 34.687 ac 2.58% Impervious = 0.920 ac

Ridge Street HydroCAD Revised Final

Type III 24-hr 50-YR Rainfall=6.10"

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Page 27

Summary for Subcatchment 5E: E2a

Runoff = 48.00 cfs @ 12.44 hrs, Volume= 6.252 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
29,382	98	Paved parking HSG A
196	98	Paved parking HSG C
10,487	98	Roofs HSG A
417	74	>75% Grass cover, Good HSG C
141,226	39	>75% Grass cover, Good HSG A
48,657	61	>75% Grass cover, Good HSG B
281,934	30	Woods, Good HSG A
152,817	55	Woods, Good HSG B
129,909	70	Woods, Good HSG C
718,577	77	Woods, Good HSG D
1,513,602	62	Weighted Average
1,473,537	61	97.35% Pervious Area
40,065	98	2.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	1,741	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
29.7	1,966	Total			

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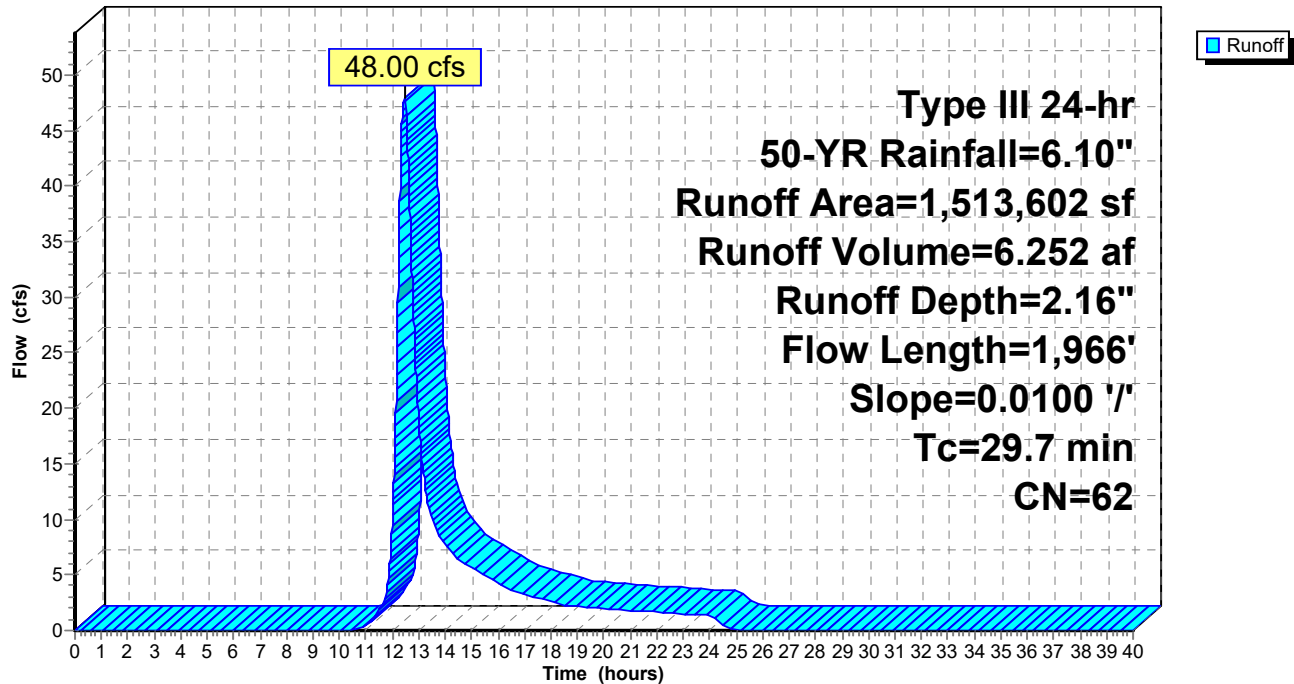
Type III 24-hr 50-YR Rainfall=6.10"

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Page 28

Subcatchment 5E: E2a

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 29

Summary for Pond 6E: Wetland Storage

Inflow Area = 34.748 ac, 2.65% Impervious, Inflow Depth = 2.16" for 50-YR event
 Inflow = 48.00 cfs @ 12.44 hrs, Volume= 6.252 af
 Outflow = 12.51 cfs @ 13.27 hrs, Volume= 6.226 af, Atten= 74%, Lag= 49.5 min
 Primary = 12.51 cfs @ 13.27 hrs, Volume= 6.226 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 144.69' @ 13.27 hrs Surf.Area= 268,490 sf Storage= 93,169 cf

Plug-Flow detention time= 84.1 min calculated for 6.226 af (100% of inflow)
 Center-of-Mass det. time= 81.5 min (960.2 - 878.6)

Volume	Invert	Avail.Storage	Storage Description
#1	142.71'	205,693 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
142.71	100	50.0	0	0	100
144.00	20,500	4,000.0	9,474	9,474	1,273,143
145.00	470,000	4,330.0	196,219	205,693	1,491,933

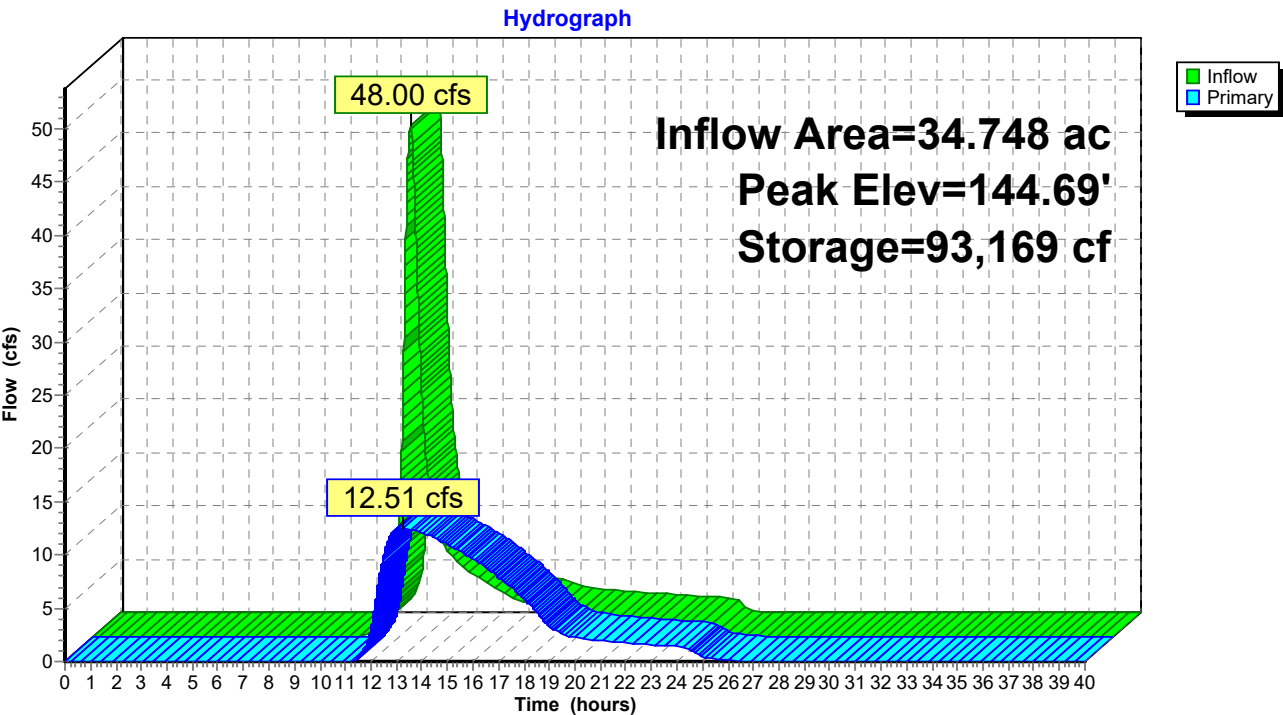
Device	Routing	Invert	Outlet Devices
#1	Primary	142.71'	36.0" W x 8.0" H Box Culvert X 2.00 L= 50.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 142.71' / 142.46' S= 0.0050 ' S= 0.0050 ' Cc= 0.900 n= 0.018, Flow Area= 2.00 sf
#2	Device 1	143.30'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 143.30 145.00 Width (feet) 2.00 3.00

Primary OutFlow Max=12.51 cfs @ 13.27 hrs HW=144.69' (Free Discharge)

1=Culvert (Passes 12.51 cfs of 19.64 cfs potential flow)

2=Custom Weir/Orifice (Weir Controls 12.51 cfs @ 3.73 fps)

Pond 6E: Wetland Storage



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 31

Summary for Subcatchment 7E: E2b

Runoff = 0.02 cfs @ 13.83 hrs, Volume= 0.013 af, Depth= 0.19"

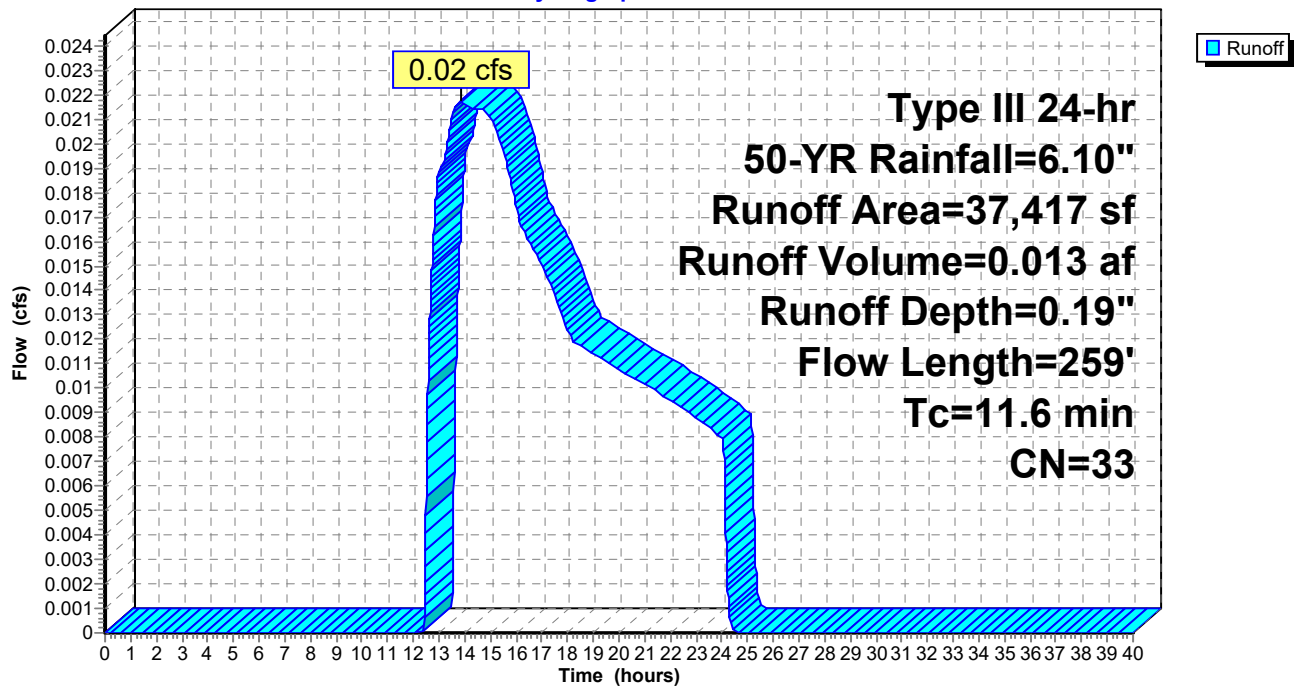
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
868	61	>75% Grass cover, Good HSG B
32,403	30	Woods, Good HSG A
4,146	55	Woods, Good HSG B
37,417	33	Weighted Average
37,417	33	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	79	0.1000	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
2.3	180	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.6	259	Total			

Subcatchment 7E: E2b

Hydrograph

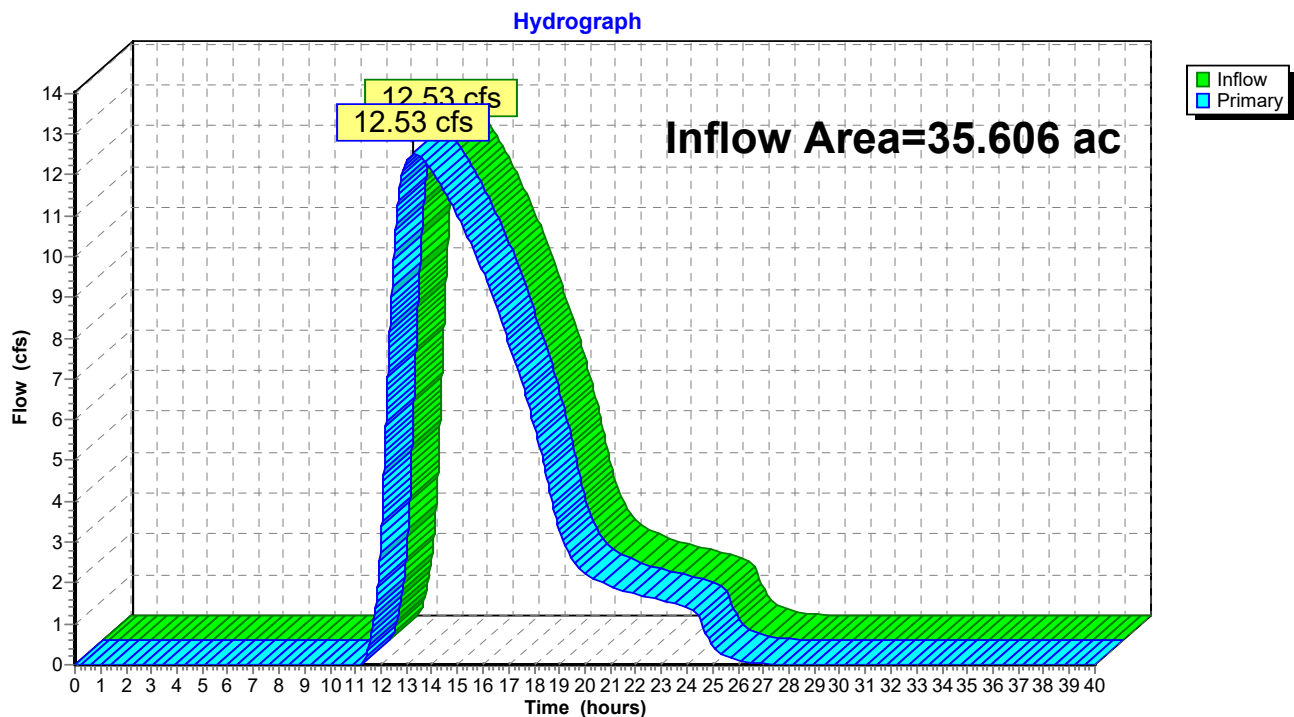


Summary for Link 8E: Design point #2: Flow to Southern Abutter

Inflow Area = 35.606 ac, 2.58% Impervious, Inflow Depth = 2.10" for 50-YR event
 Inflow = 12.53 cfs @ 13.27 hrs, Volume= 6.239 af
 Primary = 12.53 cfs @ 13.27 hrs, Volume= 6.239 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 8E: Design point #2: Flow to Southern Abutter



Ridge Street HydroCAD Revised Final

Type III 24-hr 100-YR Rainfall=6.70"

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Page 33

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 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 5E: E2a

Runoff Area=1,513,602 sf 2.65% Impervious Runoff Depth=2.58"
Flow Length=1,966' Slope=0.0100 '/' Tc=29.7 min CN=62 Runoff=58.15 cfs 7.478 af

Pond 6E: Wetland Storage

Peak Elev=144.78' Storage=118,250 cf Inflow=58.15 cfs 7.478 af
Outflow=13.80 cfs 7.452 af

Subcatchment 7E: E2b

Runoff Area=37,417 sf 0.00% Impervious Runoff Depth=0.30"
Flow Length=259' Tc=11.6 min CN=33 Runoff=0.06 cfs 0.022 af

Link 8E: Design point #2: Flow to Southern Abutter

Inflow=13.84 cfs 7.474 af
Primary=13.84 cfs 7.474 af

Total Runoff Area = 35.606 ac Runoff Volume = 7.500 af Average Runoff Depth = 2.53"
97.42% Pervious = 34.687 ac 2.58% Impervious = 0.920 ac

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Type III 24-hr 100-YR Rainfall=6.70"

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Page 34

Summary for Subcatchment 5E: E2a

Runoff = 58.15 cfs @ 12.44 hrs, Volume= 7.478 af, Depth= 2.58"

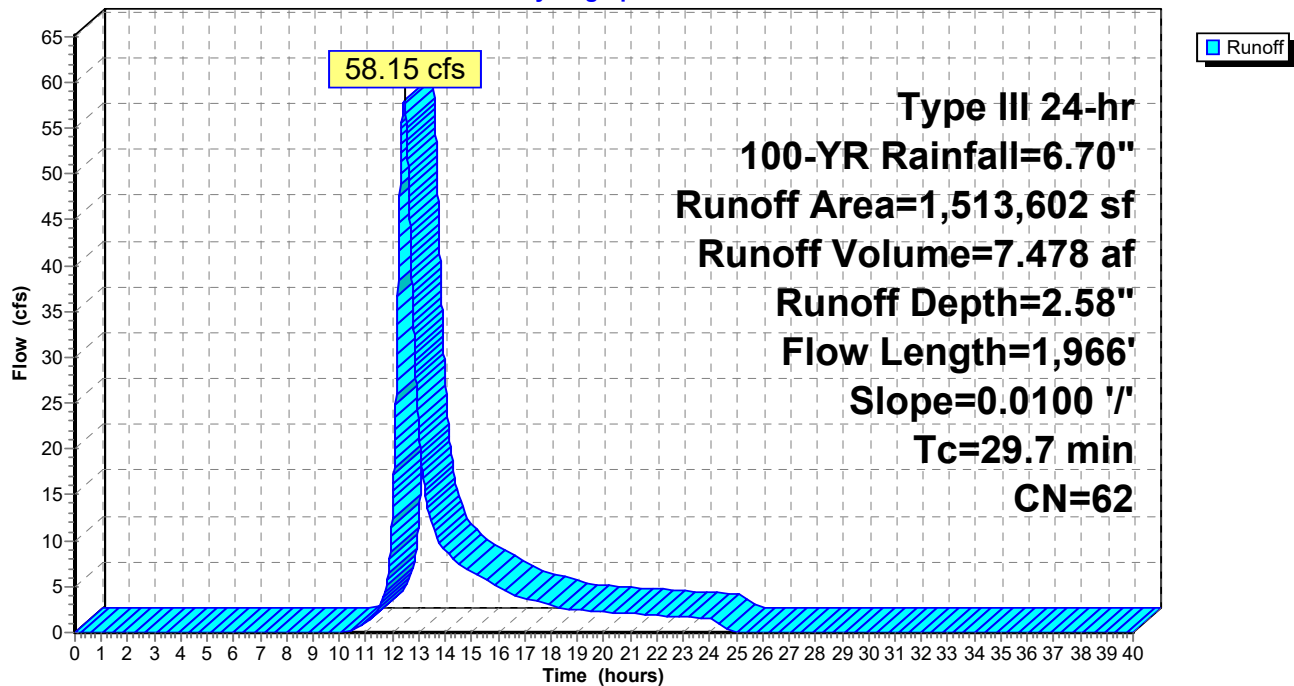
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
29,382	98	Paved parking HSG A
196	98	Paved parking HSG C
10,487	98	Roofs HSG A
417	74	>75% Grass cover, Good HSG C
141,226	39	>75% Grass cover, Good HSG A
48,657	61	>75% Grass cover, Good HSG B
281,934	30	Woods, Good HSG A
152,817	55	Woods, Good HSG B
129,909	70	Woods, Good HSG C
718,577	77	Woods, Good HSG D
1,513,602	62	Weighted Average
1,473,537	61	97.35% Pervious Area
40,065	98	2.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	1,741	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
29.7	1,966	Total			

Subcatchment 5E: E2a

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 36

Summary for Pond 6E: Wetland Storage

Inflow Area = 34.748 ac, 2.65% Impervious, Inflow Depth = 2.58" for 100-YR event
 Inflow = 58.15 cfs @ 12.44 hrs, Volume= 7.478 af
 Outflow = 13.80 cfs @ 13.32 hrs, Volume= 7.452 af, Atten= 76%, Lag= 52.7 min
 Primary = 13.80 cfs @ 13.32 hrs, Volume= 7.452 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 144.78' @ 13.32 hrs Surf.Area= 318,717 sf Storage= 118,250 cf

Plug-Flow detention time= 96.5 min calculated for 7.452 af (100% of inflow)
 Center-of-Mass det. time= 94.4 min (967.6 - 873.2)

Volume	Invert	Avail.Storage	Storage Description
#1	142.71'	205,693 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
142.71	100	50.0	0	0	100
144.00	20,500	4,000.0	9,474	9,474	1,273,143
145.00	470,000	4,330.0	196,219	205,693	1,491,933

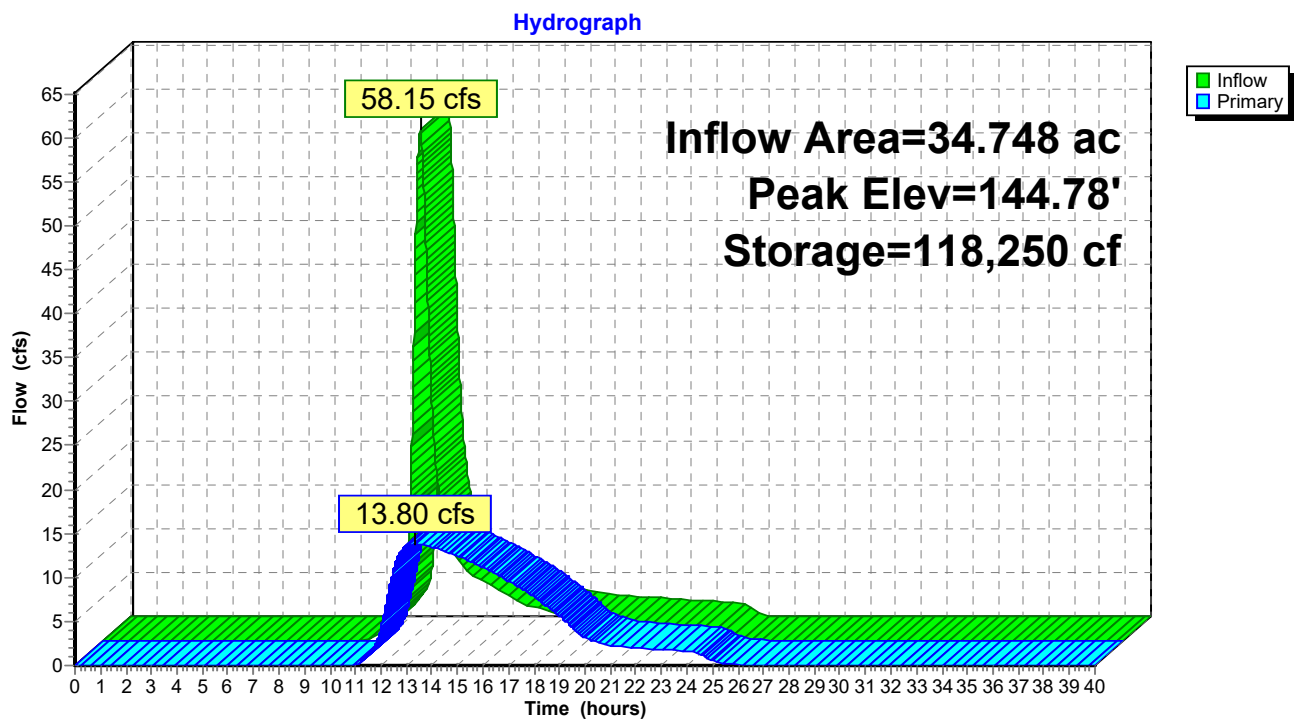
Device	Routing	Invert	Outlet Devices
#1	Primary	142.71'	36.0" W x 8.0" H Box Culvert X 2.00 L= 50.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 142.71' / 142.46' S= 0.0050 ' / Cc= 0.900 n= 0.018, Flow Area= 2.00 sf
#2	Device 1	143.30'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 143.30 145.00 Width (feet) 2.00 3.00

Primary OutFlow Max=13.80 cfs @ 13.32 hrs HW=144.78' (Free Discharge)

1=Culvert (Passes 13.80 cfs of 20.17 cfs potential flow)

2=Custom Weir/Orifice (Weir Controls 13.80 cfs @ 3.84 fps)

Pond 6E: Wetland Storage



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 38

Summary for Subcatchment 7E: E2b

Runoff = 0.06 cfs @ 12.54 hrs, Volume= 0.022 af, Depth= 0.30"

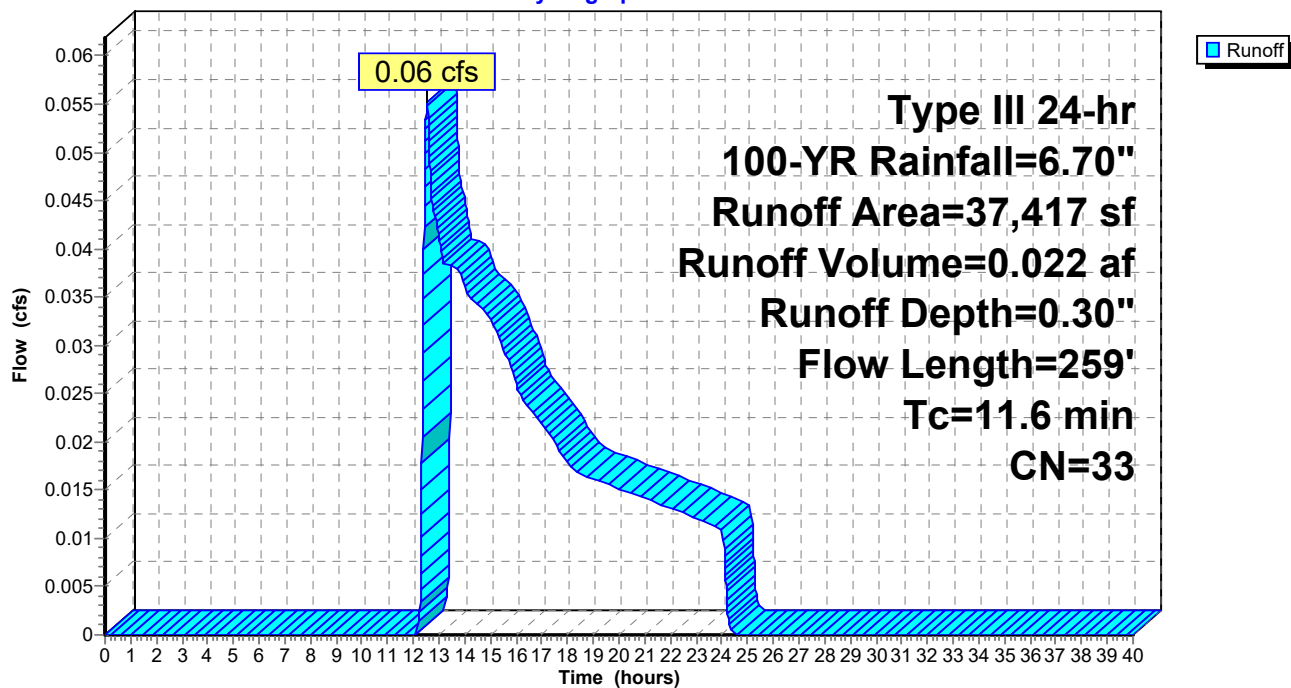
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
868	61	>75% Grass cover, Good HSG B
32,403	30	Woods, Good HSG A
4,146	55	Woods, Good HSG B
37,417	33	Weighted Average
37,417	33	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	79	0.1000	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
2.3	180	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.6	259	Total			

Subcatchment 7E: E2b

Hydrograph

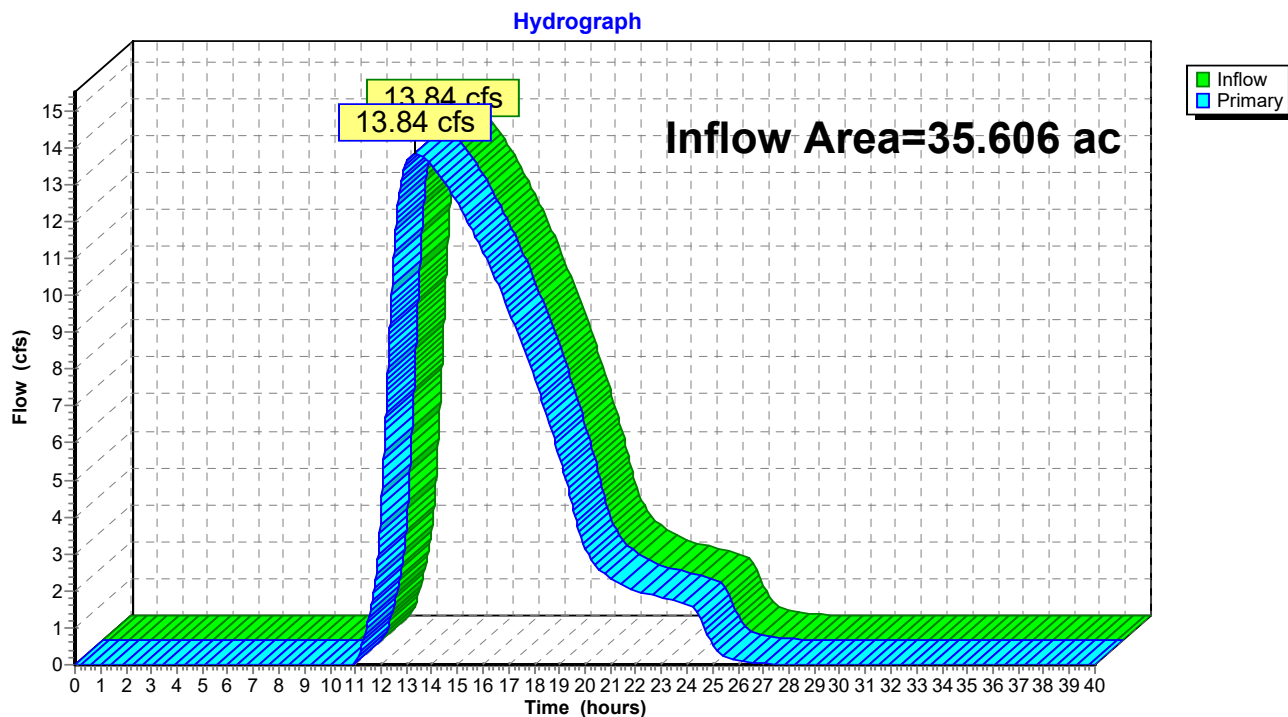


Summary for Link 8E: Design point #2: Flow to Southern Abutter

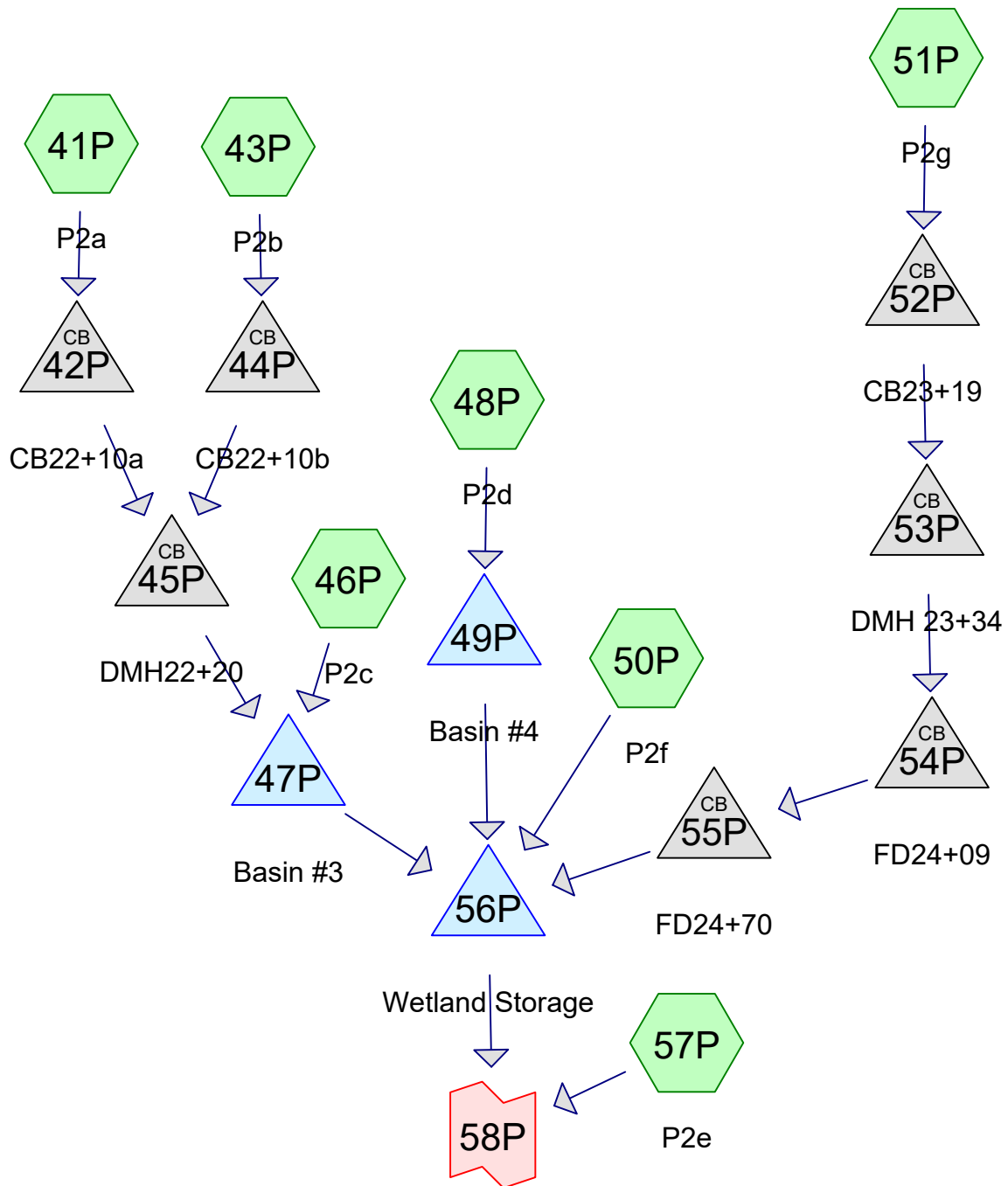
Inflow Area = 35.606 ac, 2.58% Impervious, Inflow Depth = 2.52" for 100-YR event
 Inflow = 13.84 cfs @ 13.32 hrs, Volume= 7.474 af
 Primary = 13.84 cfs @ 13.32 hrs, Volume= 7.474 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

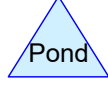
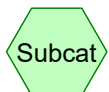
Link 8E: Design point #2: Flow to Southern Abutter



DESIGN POINT #2: FLOW SOUTHERN
ABUTTER PROPOSED CONDITIONS



Design Point #2: Flow to
Southern Abutter



Routing Diagram for Ridge Street HydroCAD Revised Final
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Page 2

Project Notes

Rainfall events imported from "Acorn Place R3.hcp"

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Page 3

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-In	Type III 24-hr		Default	24.00	1	1.00	2
2	1-YR	Type III 24-hr		Default	24.00	1	2.50	2
3	2-YR	Type III 24-hr		Default	24.00	1	3.20	2
4	10-YR	Type III 24-hr		Default	24.00	1	4.70	2
5	50-YR	Type III 24-hr		Default	24.00	1	6.10	2
6	100-YR	Type III 24-hr		Default	24.00	1	6.70	2

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Page 4

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.370	39	>75% Grass cover, Good HSG A (50P, 51P, 57P)
1.086	61	>75% Grass cover, Good HSG B (41P, 43P, 46P, 48P, 50P, 51P, 57P)
0.817	74	>75% Grass cover, Good HSG C (43P, 46P, 48P, 50P, 51P)
0.047	80	>75% Grass cover, Good HSG D (50P)
0.788	98	Paved parking HSG A (50P, 51P)
0.322	98	Paved parking HSG B (41P, 43P, 48P, 50P, 51P, 57P)
0.395	98	Paved parking HSG C (43P, 48P, 50P, 51P)
0.028	98	Paved parking HSG D (51P)
0.368	98	Roofs HSG A (50P)
0.134	98	Roofs HSG B (43P, 48P, 50P, 57P)
0.065	98	Roofs HSG C (43P, 48P)
0.027	98	Water Surface HSG B (48P)
0.246	98	Water Surface HSG C (46P, 48P)
7.926	30	Woods, Good HSG A (50P, 51P, 57P)
1.973	55	Woods, Good HSG B (41P, 50P, 51P, 57P)
1.474	70	Woods, Good HSG C (46P, 50P, 51P)
16.421	77	Woods, Good HSG D (50P)
35.486	62	TOTAL AREA

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Type III 24-hr 1-YR Rainfall=2.50"

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Page 5

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment41P: P2a Runoff Area=7,053 sf 75.12% Impervious Runoff Depth=1.45"
Flow Length=245' Slope=0.0100 '/ Tc=8.0 min CN=89 Runoff=0.26 cfs 0.020 af

Pond 42P: CB22+10a Peak Elev=145.42' Inflow=0.26 cfs 0.020 af
12.0" Round Culvert n=0.011 L=21.0' S=0.0071 '/ Outflow=0.26 cfs 0.020 af

Subcatchment43P: P2b Runoff Area=12,212 sf 62.20% Impervious Runoff Depth=1.18"
Flow Length=288' Slope=0.0100 '/ Tc=11.4 min CN=85 Runoff=0.32 cfs 0.028 af

Pond 44P: CB22+10b Peak Elev=145.44' Inflow=0.32 cfs 0.028 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0115 '/ Outflow=0.32 cfs 0.028 af

Pond 45P: DMH22+20 Peak Elev=145.33' Inflow=0.56 cfs 0.047 af
12.0" Round Culvert n=0.011 L=35.0' S=0.0129 '/ Outflow=0.56 cfs 0.047 af

Subcatchment46P: P2c Runoff Area=9,439 sf 20.70% Impervious Runoff Depth=0.79"
Flow Length=52' Slope=0.0600 '/ Tc=6.0 min CN=78 Runoff=0.19 cfs 0.014 af

Pond 47P: Basin #3 Peak Elev=144.91' Storage=860 cf Inflow=0.74 cfs 0.061 af
Discarded=0.13 cfs 0.061 af Primary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.061 af

Subcatchment48P: P2d Runoff Area=40,118 sf 39.07% Impervious Runoff Depth=0.89"
Flow Length=94' Tc=10.0 min CN=80 Runoff=0.80 cfs 0.068 af

Pond 49P: Basin #4 Peak Elev=146.87' Storage=674 cf Inflow=0.80 cfs 0.068 af
Discarded=0.24 cfs 0.068 af Primary=0.00 cfs 0.000 af Outflow=0.24 cfs 0.068 af

Subcatchment50P: P2f Runoff Area=1,386,131 sf 3.73% Impervious Runoff Depth=0.22"
Flow Length=1,966' Slope=0.0100 '/ Tc=29.7 min CN=62 Runoff=2.31 cfs 0.582 af

Subcatchment51P: P2g Runoff Area=23,385 sf 84.80% Impervious Runoff Depth=1.78"
Flow Length=460' Slope=0.0120 '/ Tc=6.0 min CN=93 Runoff=1.10 cfs 0.080 af

Pond 52P: CB23+19 Peak Elev=144.94' Inflow=1.10 cfs 0.080 af
12.0" Round Culvert x 2.00 n=0.011 L=21.0' S=0.0048 '/ Outflow=1.10 cfs 0.080 af

Pond 53P: DMH 23+34 Peak Elev=144.85' Inflow=1.10 cfs 0.080 af
15.0" Round Culvert n=0.011 L=75.0' S=0.0093 '/ Outflow=1.10 cfs 0.080 af

Pond 54P: FD24+09 Peak Elev=143.85' Inflow=1.10 cfs 0.080 af
15.0" Round Culvert n=0.011 L=59.0' S=0.0051 '/ Outflow=1.10 cfs 0.080 af

Pond 55P: FD24+70 Peak Elev=143.53' Inflow=1.10 cfs 0.080 af
15.0" Round Culvert n=0.011 L=27.0' S=0.0048 '/ Outflow=1.10 cfs 0.080 af

Pond 56P: Wetland Storage Peak Elev=143.79' Storage=5,743 cf Inflow=2.46 cfs 0.661 af
Outflow=1.41 cfs 0.604 af

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Type III 24-hr 1-YR Rainfall=2.50"

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Page 6

Subcatchment 57P: P2e

Runoff Area=67,449 sf 2.00% Impervious Runoff Depth=0.00"
Flow Length=204' Slope=0.0200 '/' Tc=12.8 min CN=45 Runoff=0.00 cfs 0.000 af

Link 58P: Design Point #2: Flow to Southern Abutter

Inflow=1.41 cfs 0.604 af
Primary=1.41 cfs 0.604 af

Total Runoff Area = 35.486 ac Runoff Volume = 0.791 af Average Runoff Depth = 0.27"
93.31% Pervious = 33.114 ac 6.69% Impervious = 2.373 ac

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Page 7

Summary for Subcatchment 41P: P2a

Runoff = 0.26 cfs @ 12.11 hrs, Volume= 0.020 af, Depth= 1.45"

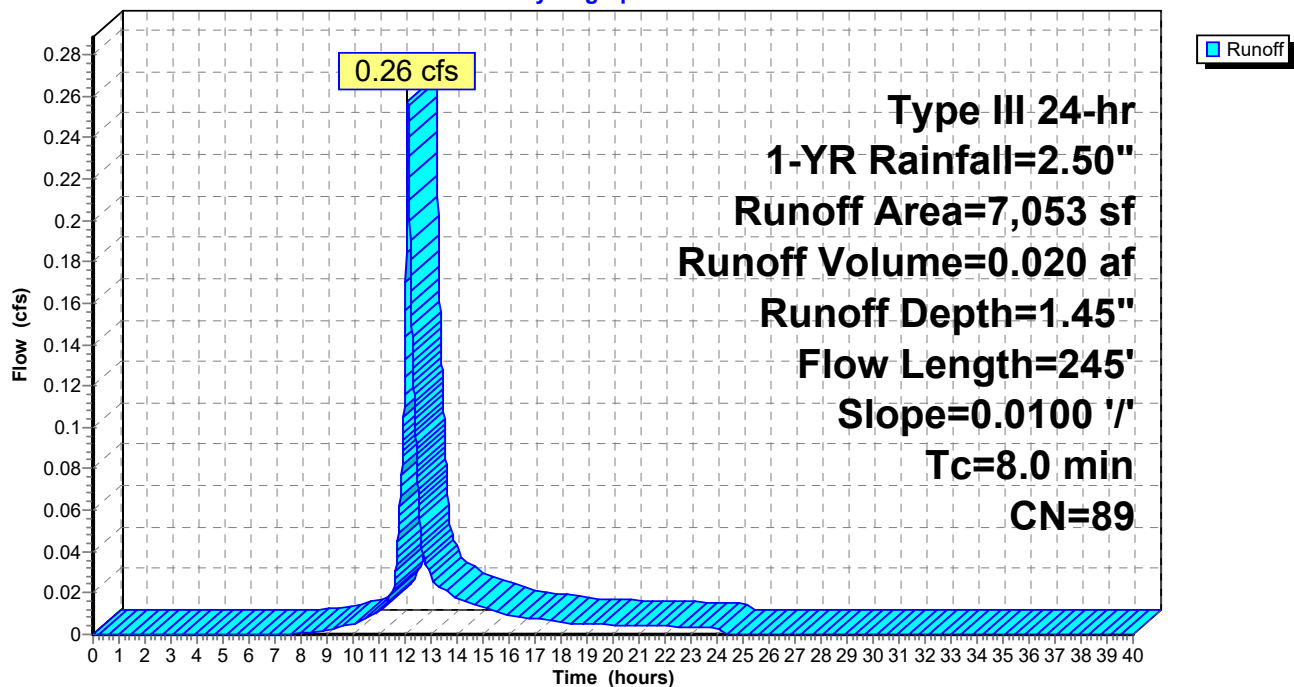
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
1,714	61	>75% Grass cover, Good HSG B
5,298	98	Paved parking HSG B
41	55	Woods, Good HSG B
7,053	89	Weighted Average
1,755	61	24.88% Pervious Area
5,298	98	75.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	25	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.8	220	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
8.0	245	Total			

Subcatchment 41P: P2a

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 8

Summary for Pond 42P: CB22+10a

Inflow Area = 0.162 ac, 75.12% Impervious, Inflow Depth = 1.45" for 1-YR event
Inflow = 0.26 cfs @ 12.11 hrs, Volume= 0.020 af
Outflow = 0.26 cfs @ 12.11 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min
Primary = 0.26 cfs @ 12.11 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.42' @ 12.11 hrs

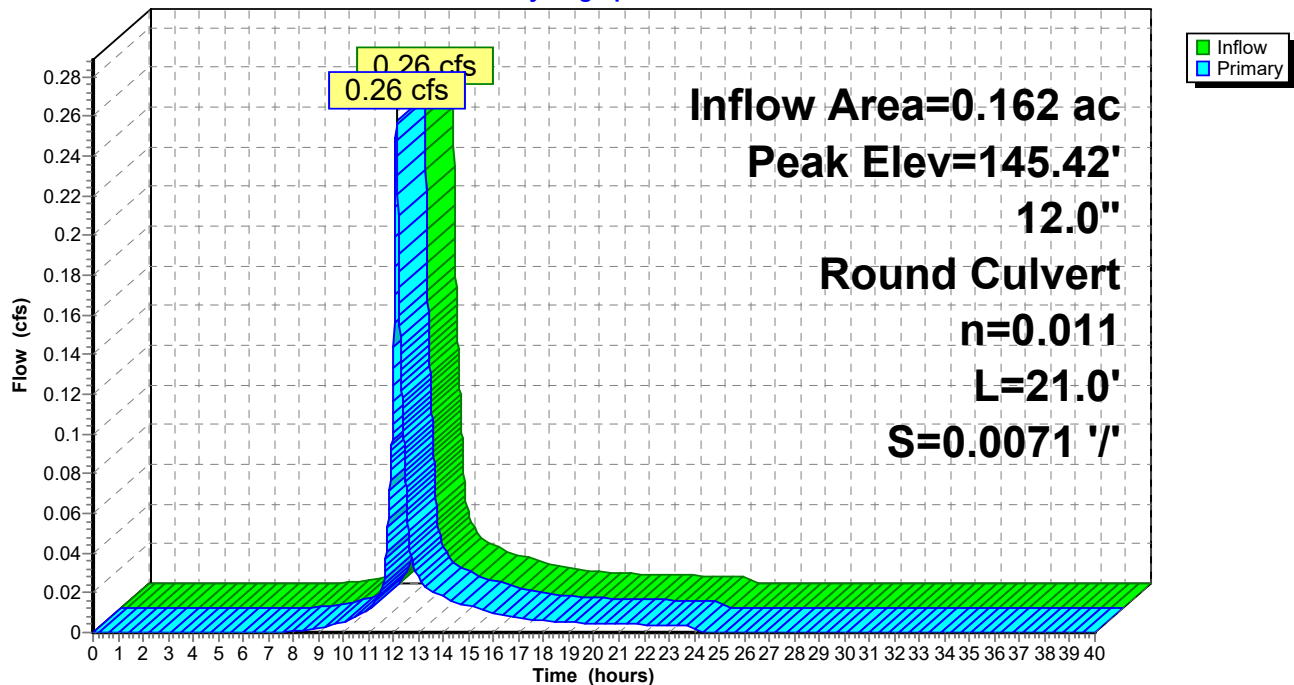
Device	Routing	Invert	Outlet Devices
#1	Primary	145.15'	12.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.15' / 145.00' S= 0.0071 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.11 hrs HW=145.42' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.26 cfs @ 2.26 fps)

Pond 42P: CB22+10a

Hydrograph



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Page 9

Summary for Subcatchment 43P: P2b

Runoff = 0.32 cfs @ 12.16 hrs, Volume= 0.028 af, Depth= 1.18"

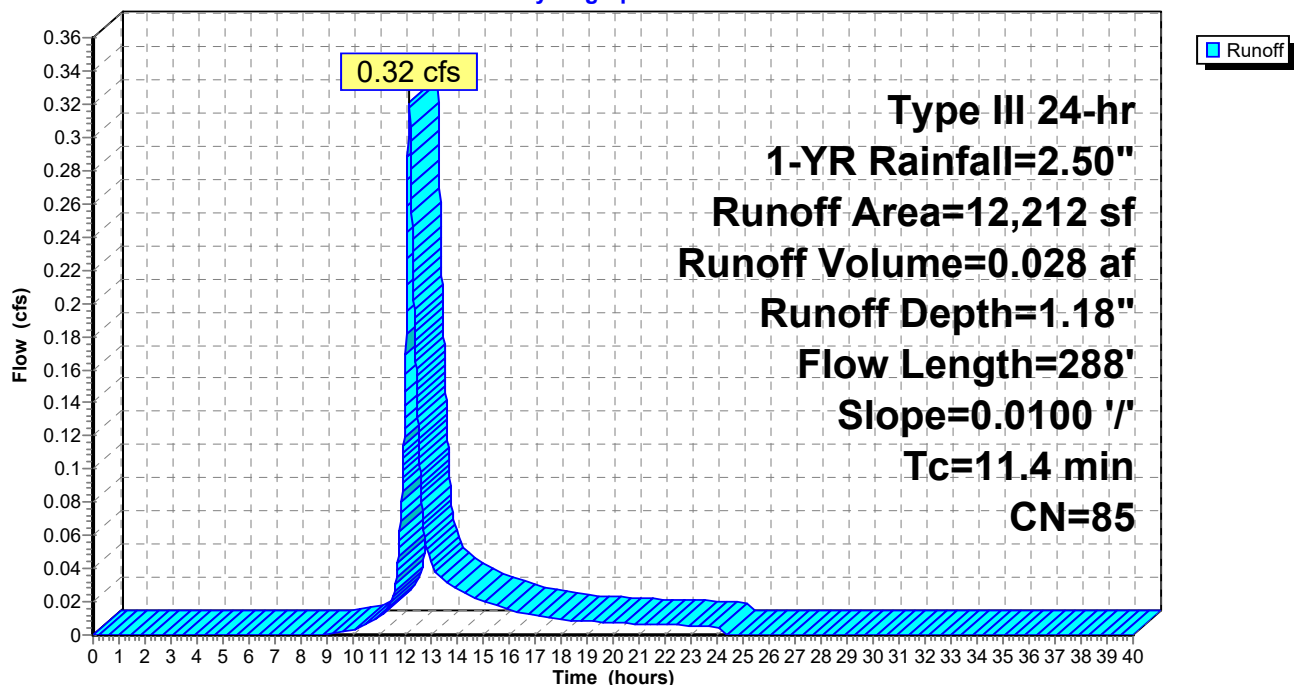
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
5,505	98	Paved parking HSG B
310	98	Roofs HSG B
3,911	61	>75% Grass cover, Good HSG B
705	74	>75% Grass cover, Good HSG C
1,230	98	Roofs HSG C
551	98	Paved parking HSG C
12,212	85	Weighted Average
4,616	63	37.80% Pervious Area
7,596	98	62.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
2.0	246	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.4	288	Total			

Subcatchment 43P: P2b

Hydrograph



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Page 10

Summary for Pond 44P: CB22+10b

Inflow Area = 0.280 ac, 62.20% Impervious, Inflow Depth = 1.18" for 1-YR event
Inflow = 0.32 cfs @ 12.16 hrs, Volume= 0.028 af
Outflow = 0.32 cfs @ 12.16 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 12.16 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.44' @ 12.16 hrs

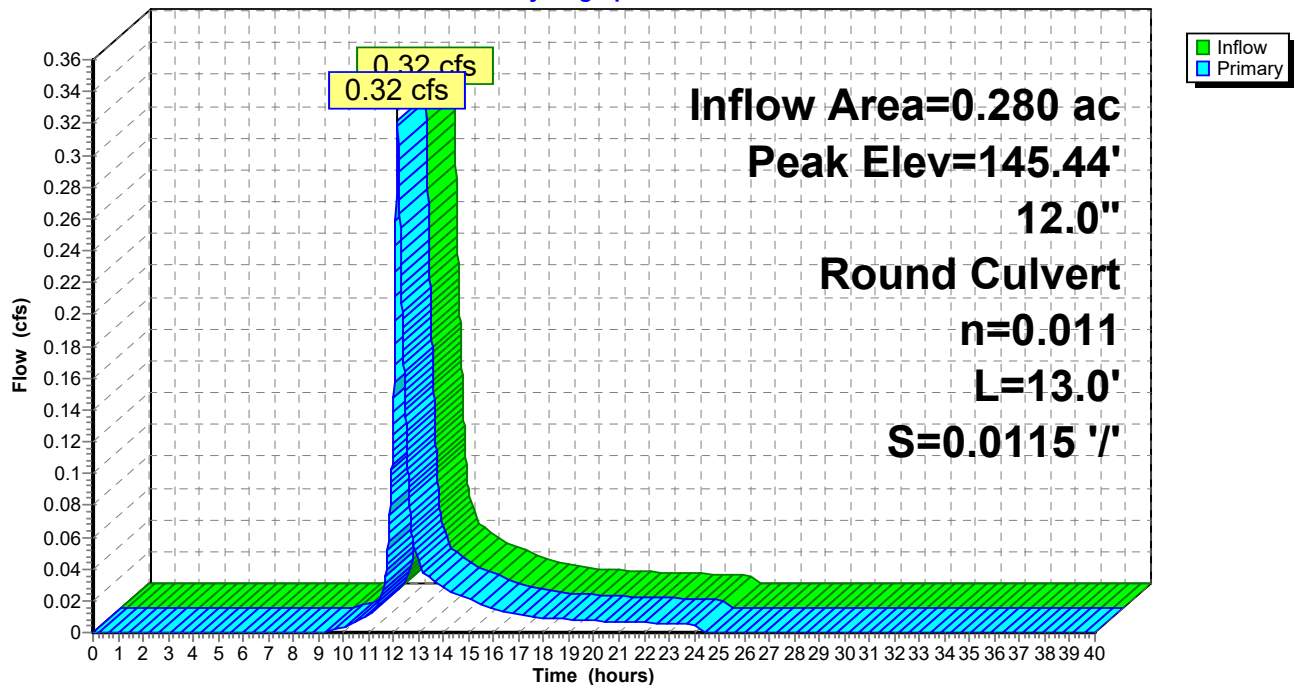
Device	Routing	Invert	Outlet Devices
#1	Primary	145.15'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.15' / 145.00' S= 0.0115 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.32 cfs @ 12.16 hrs HW=145.44' (Free Discharge)

↑1=Culvert (Barrel Controls 0.32 cfs @ 2.55 fps)

Pond 44P: CB22+10b

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 11

Summary for Pond 45P: DMH22+20

Inflow Area = 0.442 ac, 66.93% Impervious, Inflow Depth = 1.28" for 1-YR event
Inflow = 0.56 cfs @ 12.14 hrs, Volume= 0.047 af
Outflow = 0.56 cfs @ 12.14 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min
Primary = 0.56 cfs @ 12.14 hrs, Volume= 0.047 af

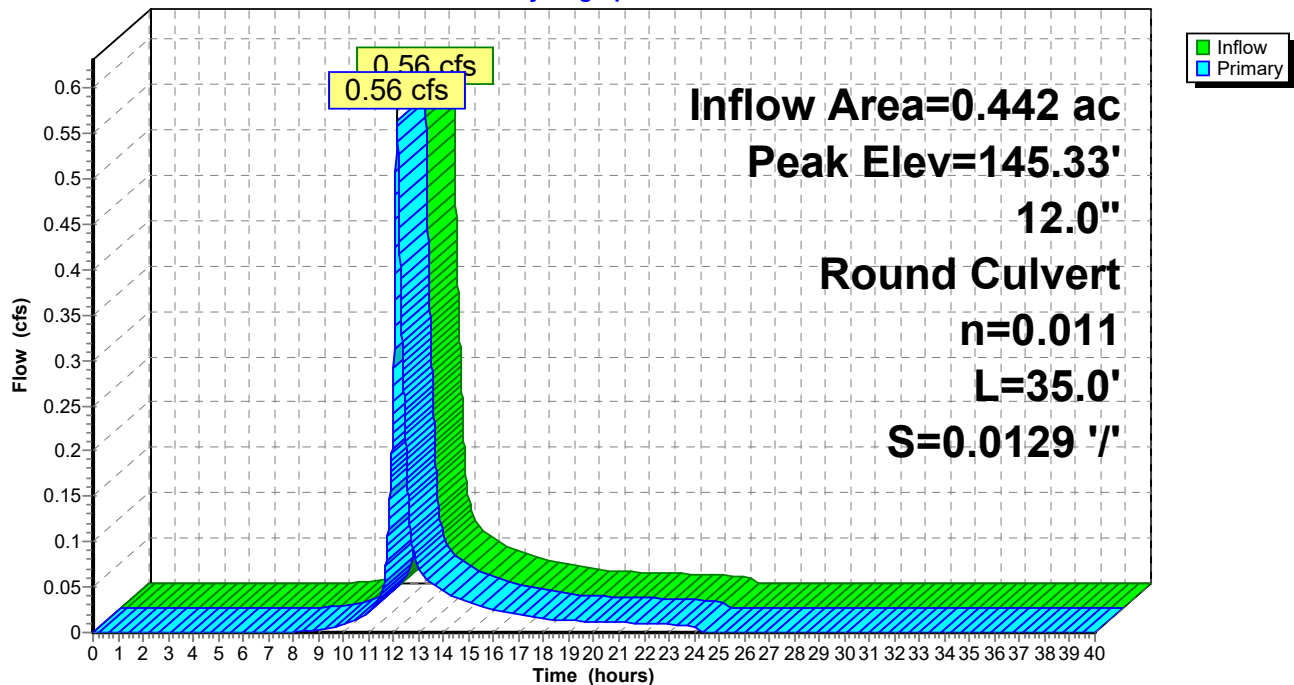
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.33' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.95'	12.0" Round Culvert L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.95' / 144.50' S= 0.0129 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.56 cfs @ 12.14 hrs HW=145.33' (Free Discharge)
↑ **1=Culvert** (Inlet Controls 0.56 cfs @ 2.09 fps)

Pond 45P: DMH22+20

Hydrograph



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Page 12

Summary for Subcatchment 46P: P2c

Runoff = 0.19 cfs @ 12.10 hrs, Volume= 0.014 af, Depth= 0.79"

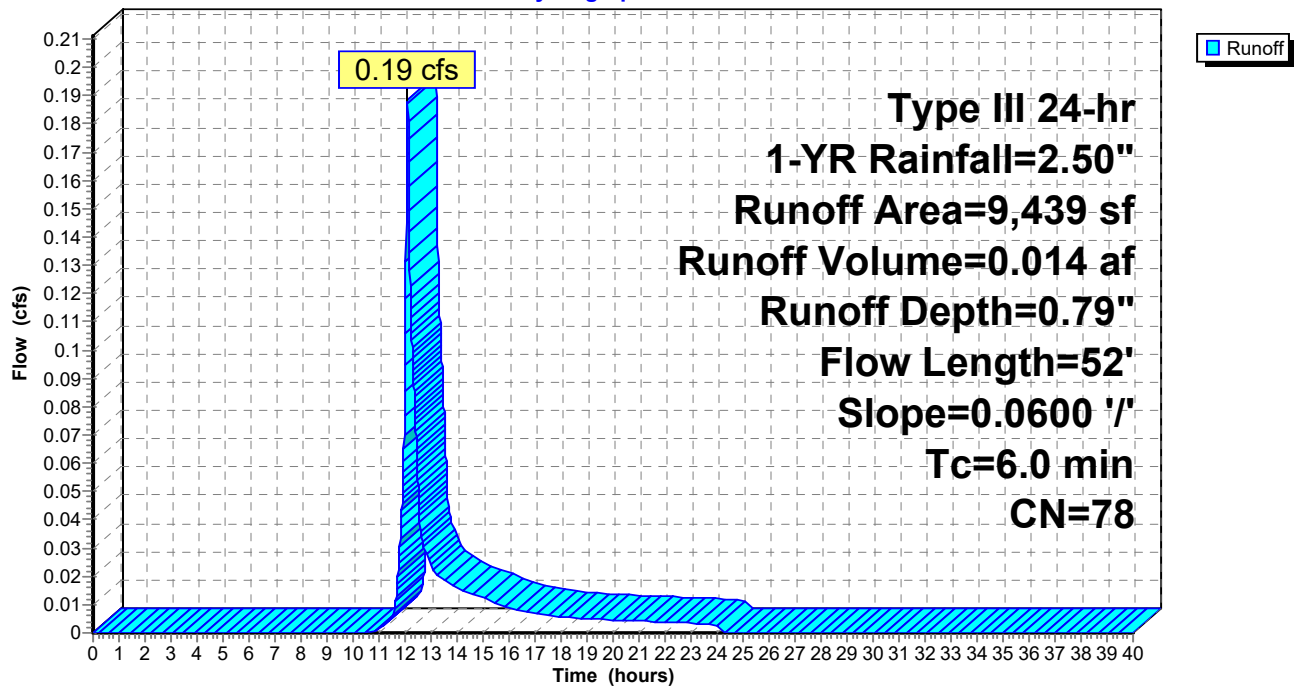
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
822	61	>75% Grass cover, Good HSG B
1,954	98	Water Surface HSG C
6,662	74	>75% Grass cover, Good HSG C
1	70	Woods, Good HSG C
9,439	78	Weighted Average
7,485	73	79.30% Pervious Area
1,954	98	20.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	52	0.0600	0.16		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
5.4	52	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 46P: P2c

Hydrograph



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Page 13

Summary for Pond 47P: Basin #3

Inflow Area = 0.659 ac, 51.73% Impervious, Inflow Depth = 1.12" for 1-YR event
 Inflow = 0.74 cfs @ 12.12 hrs, Volume= 0.061 af
 Outflow = 0.13 cfs @ 12.75 hrs, Volume= 0.061 af, Atten= 83%, Lag= 37.3 min
 Discarded = 0.13 cfs @ 12.75 hrs, Volume= 0.061 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 144.91' @ 12.75 hrs Surf.Area= 2,245 sf Storage= 860 cf

Plug-Flow detention time= 55.4 min calculated for 0.061 af (100% of inflow)
 Center-of-Mass det. time= 55.4 min (896.8 - 841.3)

Volume	Invert	Avail.Storage	Storage Description
#1	144.50'	9,424 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.50	1,961	173.0	0	0	1,961
147.50	4,494	249.0	9,424	9,424	4,591

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	146.50'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 146.50 147.50 Width (feet) 4.00 4.00
#3	Primary	145.00'	2.0" Round Culvert L= 1.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.00' / 145.00' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.011, Flow Area= 0.02 sf

Discarded OutFlow Max=0.13 cfs @ 12.75 hrs HW=144.91' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=144.50' (Free Discharge)
 ↑ **2=Custom Weir/Orifice** (Controls 0.00 cfs)
 ↑ **3=Culvert** (Controls 0.00 cfs)

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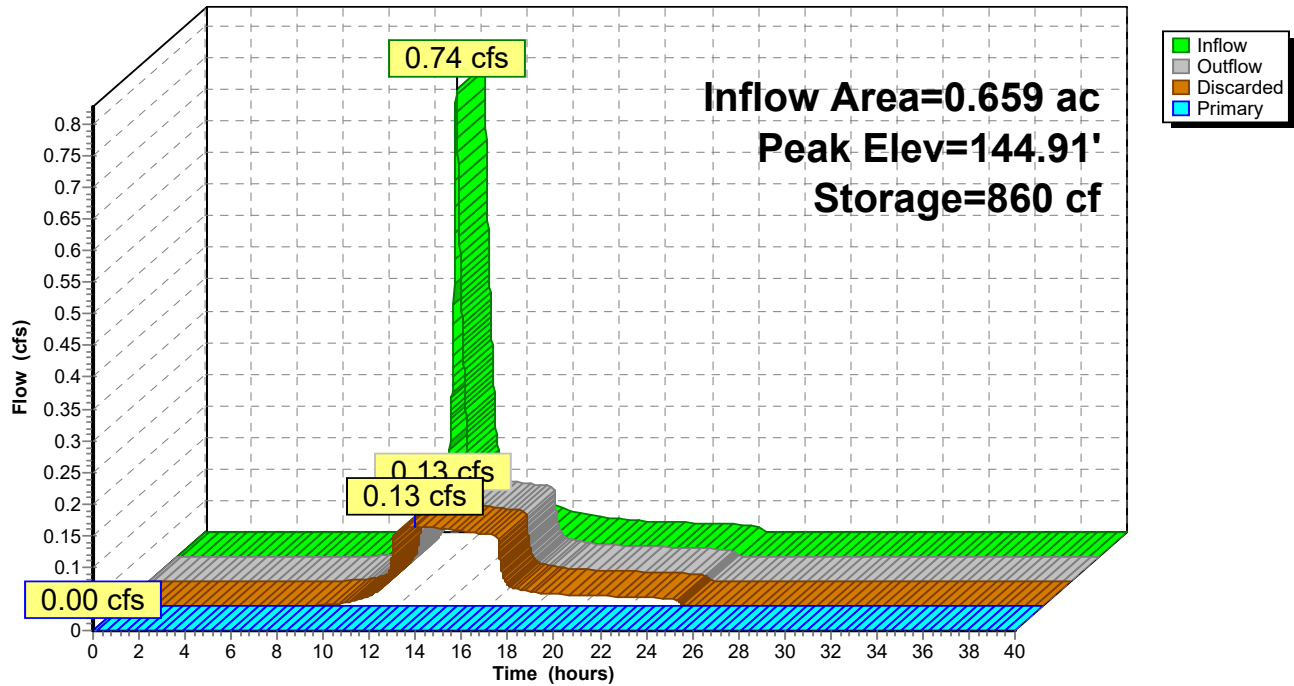
Type III 24-hr 1-YR Rainfall=2.50"

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Page 14

Pond 47P: Basin #3

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Page 15

Summary for Subcatchment 48P: P2d

Runoff = 0.80 cfs @ 12.15 hrs, Volume= 0.068 af, Depth= 0.89"

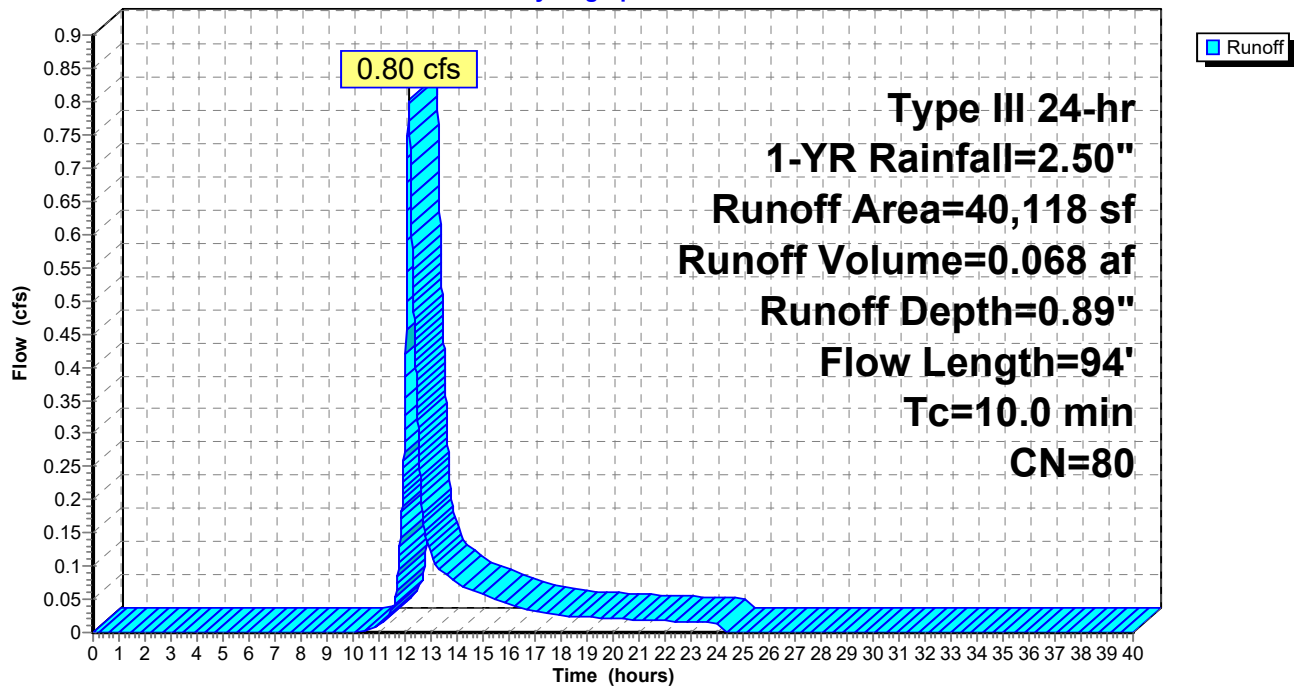
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
10,069	61	>75% Grass cover, Good HSG B
1,195	98	Water Surface HSG B
8,750	98	Water Surface HSG C
1,000	98	Paved parking HSG C
1,089	98	Paved parking HSG B
14,373	74	>75% Grass cover, Good HSG C
1,595	98	Roofs HSG C
2,047	98	Roofs HSG B
40,118	80	Weighted Average
24,442	69	60.93% Pervious Area
15,676	98	39.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.6	52	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.0	94	Total			

Subcatchment 48P: P2d

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 17

Summary for Pond 49P: Basin #4

Inflow Area = 0.921 ac, 39.07% Impervious, Inflow Depth = 0.89" for 1-YR event
 Inflow = 0.80 cfs @ 12.15 hrs, Volume= 0.068 af
 Outflow = 0.24 cfs @ 12.58 hrs, Volume= 0.068 af, Atten= 70%, Lag= 25.8 min
 Discarded = 0.24 cfs @ 12.58 hrs, Volume= 0.068 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.87' @ 12.58 hrs Surf.Area= 10,120 sf Storage= 674 cf

Plug-Flow detention time= 20.3 min calculated for 0.068 af (100% of inflow)
 Center-of-Mass det. time= 20.3 min (880.3 - 860.1)

Volume	Invert	Avail.Storage	Storage Description
#1	146.80'	8,853 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.80	9,936	709.0	0	0	9,936
147.60	12,237	711.0	8,853	8,853	10,547

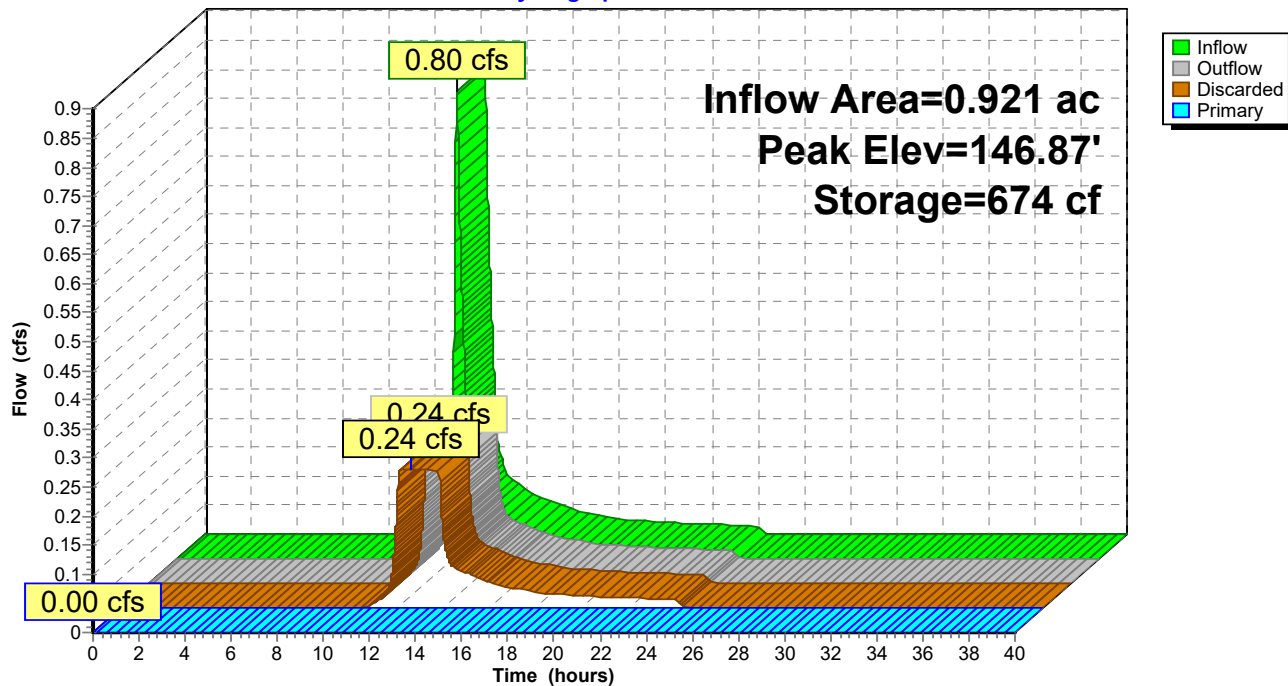
Device	Routing	Invert	Outlet Devices
#1	Discarded	146.80'	1.020 in/hr Exfiltration over Surface area
#2	Primary	146.90'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28)
			Elev. (feet) 146.90 147.20 147.20 148.00
			Width (feet) 1.50 1.50 8.00 8.00

Discarded OutFlow Max=0.24 cfs @ 12.58 hrs HW=146.87' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.24 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=146.80' (Free Discharge)
 ↑2=Custom Weir/Orifice (Controls 0.00 cfs)

Pond 49P: Basin #4

Hydrograph



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Page 19

Summary for Subcatchment 50P: P2f

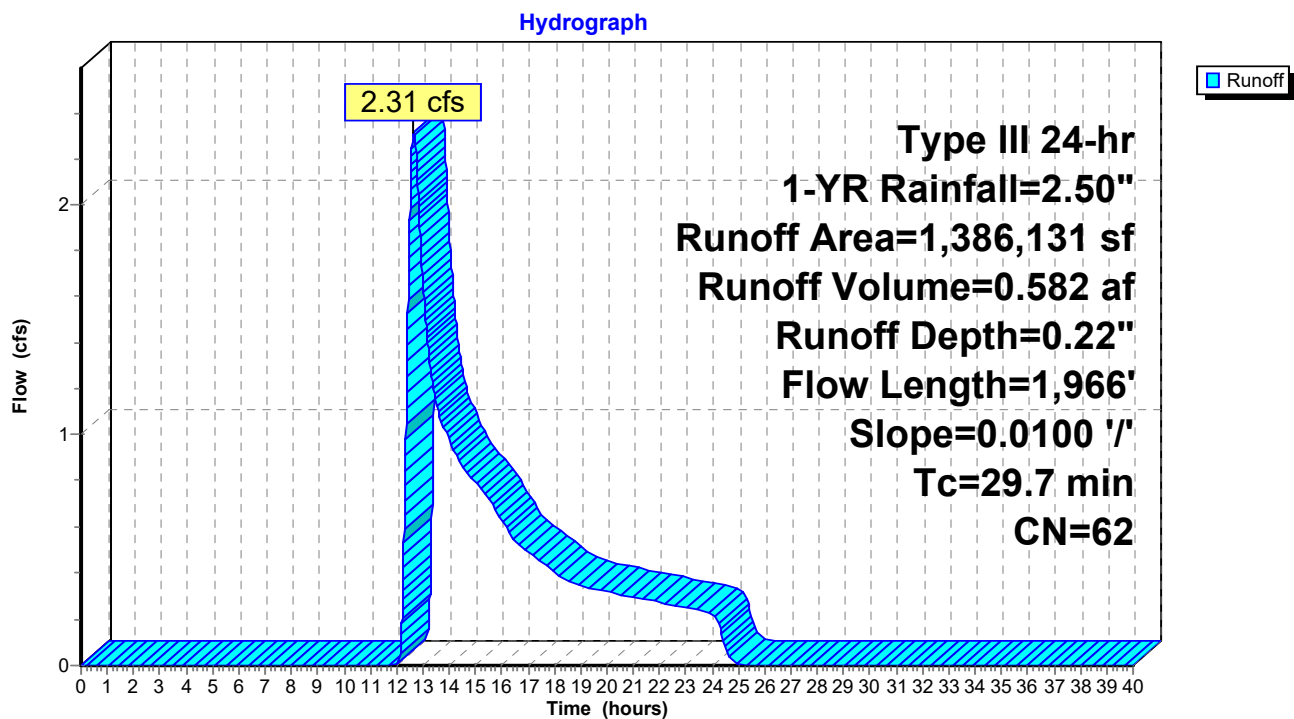
Runoff = 2.31 cfs @ 12.64 hrs, Volume= 0.582 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
2,050	80	>75% Grass cover, Good HSG D
17,544	61	>75% Grass cover, Good HSG B
1,002	98	Paved parking HSG B
31,785	98	Paved parking HSG A
11,439	74	>75% Grass cover, Good HSG C
146,051	39	>75% Grass cover, Good HSG A
197	98	Paved parking HSG C
2,625	98	Roofs HSG B
16,036	98	Roofs HSG A
311,884	30	Woods, Good HSG A
66,486	55	Woods, Good HSG B
63,729	70	Woods, Good HSG C
715,303	77	Woods, Good HSG D
1,386,131	62	Weighted Average
1,334,486	60	96.27% Pervious Area
51,645	98	3.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	1,741	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
29.7	1,966	Total			

Subcatchment 50P: P2f



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 21

Summary for Subcatchment 51P: P2g

Runoff = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af, Depth= 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
1,223	98	Paved parking HSG D
614	98	Paved parking HSG B
222	61	>75% Grass cover, Good HSG B
236	39	>75% Grass cover, Good HSG A
2,406	74	>75% Grass cover, Good HSG C
2,519	98	Paved parking HSG A
15,474	98	Paved parking HSG C
161	30	Woods, Good HSG A
63	55	Woods, Good HSG B
467	70	Woods, Good HSG C
23,385	93	Weighted Average
3,555	68	15.20% Pervious Area
19,830	98	84.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	300	0.0120	1.40		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.2	160	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.8	460	Total, Increased to minimum Tc = 6.0 min			

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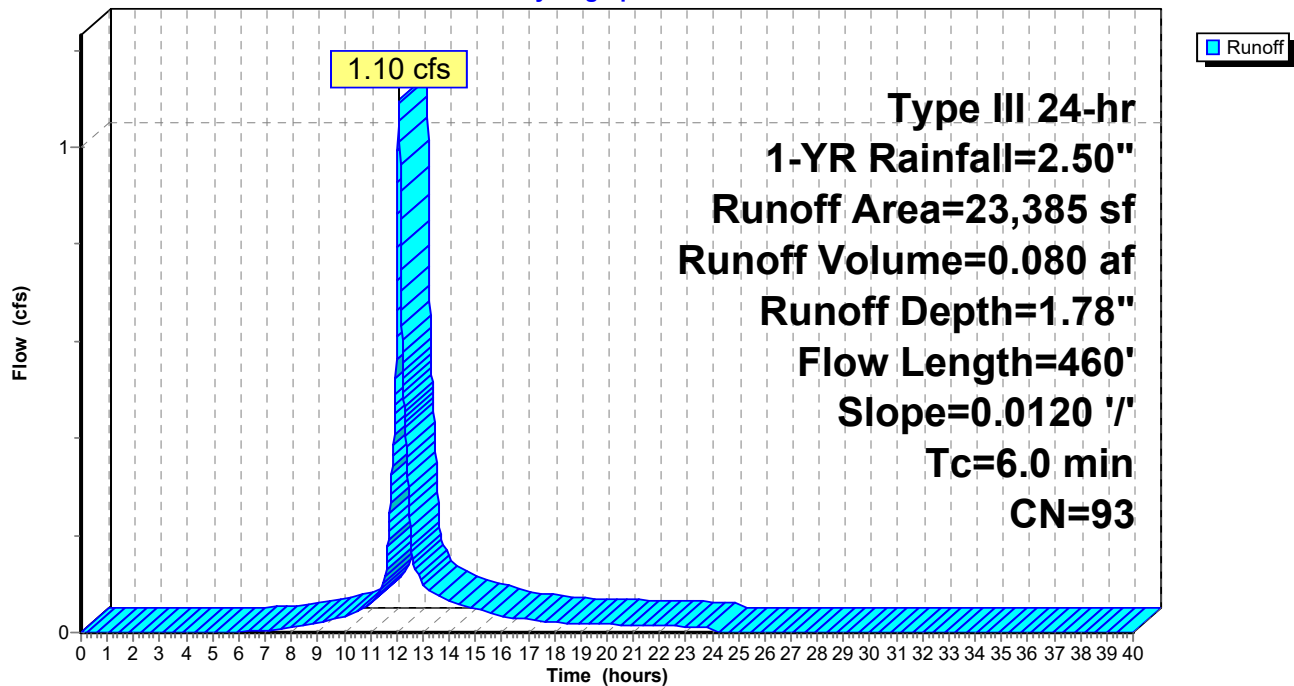
Type III 24-hr 1-YR Rainfall=2.50"

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Page 22

Subcatchment 51P: P2g

Hydrograph



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Page 23

Summary for Pond 52P: CB23+19

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 1.78" for 1-YR event
Inflow = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af
Outflow = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min
Primary = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af

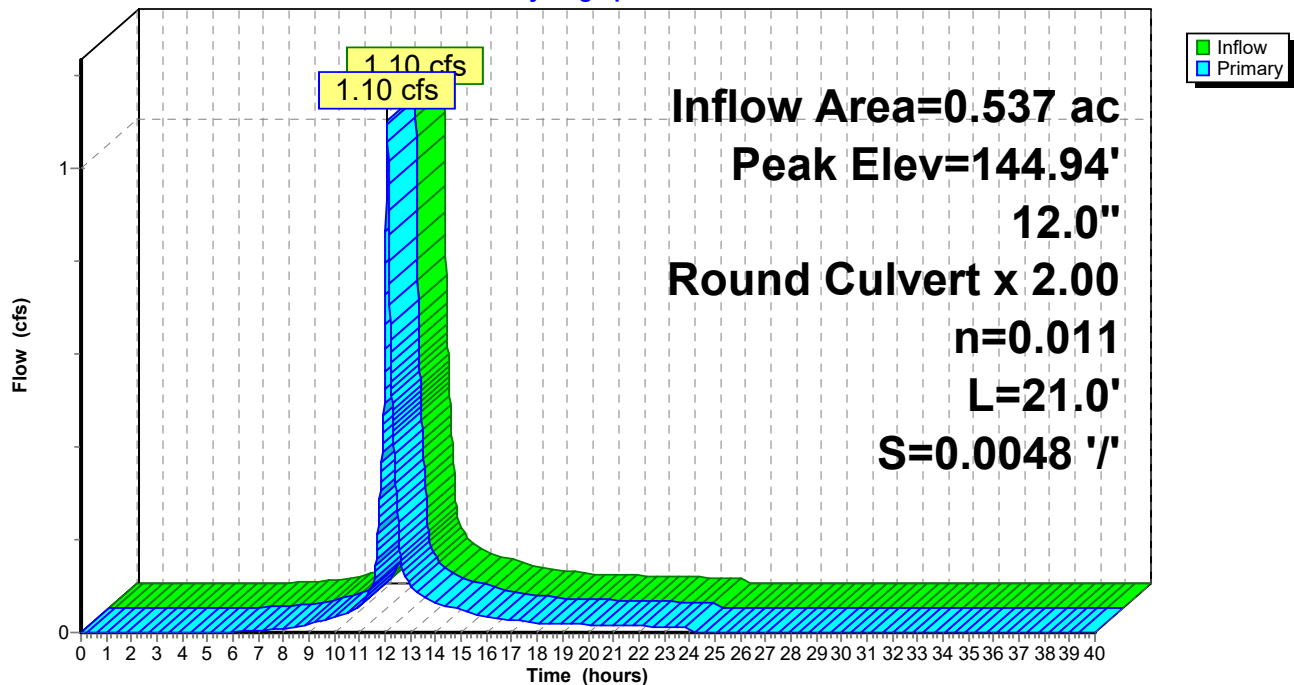
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 144.94' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.50'	12.0" Round Culvert X 2.00 L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.50' / 144.40' S= 0.0048 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.10 cfs @ 12.09 hrs HW=144.94' (Free Discharge)
↑1=Culvert (Barrel Controls 1.10 cfs @ 2.46 fps)

Pond 52P: CB23+19

Hydrograph



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Page 24

Summary for Pond 53P: DMH 23+34

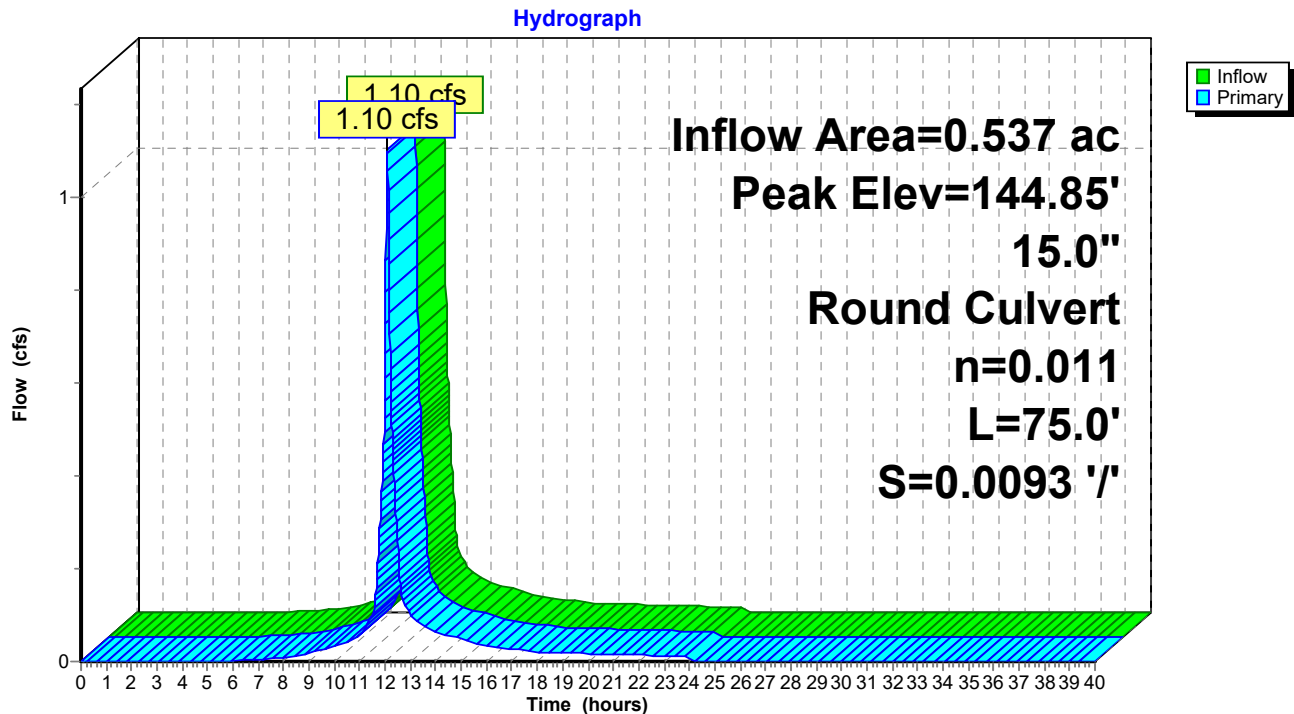
Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 1.78" for 1-YR event
Inflow = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af
Outflow = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min
Primary = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 144.85' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.35'	15.0" Round Culvert L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.35' / 143.65' S= 0.0093 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.10 cfs @ 12.09 hrs HW=144.85' (Free Discharge)
↑1=Culvert (Inlet Controls 1.10 cfs @ 2.40 fps)

Pond 53P: DMH 23+34



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 25

Summary for Pond 54P: FD24+09

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 1.78" for 1-YR event
Inflow = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af
Outflow = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min
Primary = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af

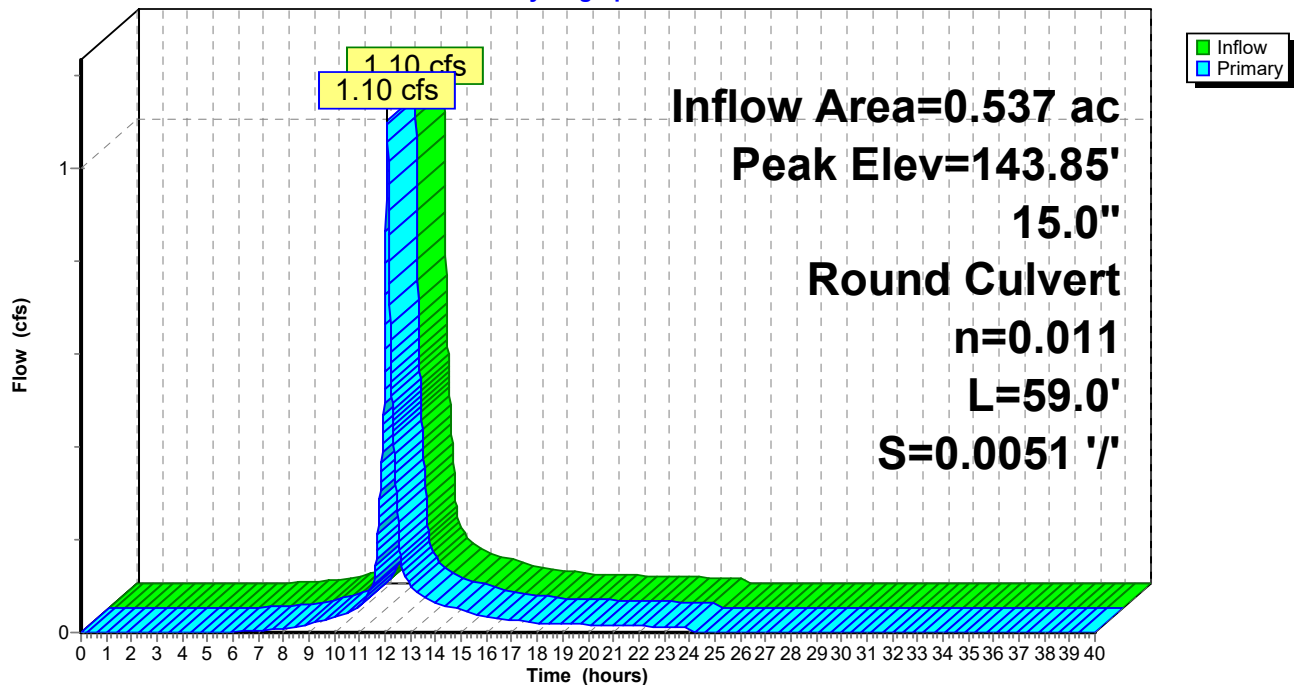
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 143.85' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	15.0" Round Culvert L= 59.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 143.30' / 143.00' S= 0.0051 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.10 cfs @ 12.09 hrs HW=143.85' (Free Discharge)
↑1=Culvert (Barrel Controls 1.10 cfs @ 3.08 fps)

Pond 54P: FD24+09

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 26

Summary for Pond 55P: FD24+70

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 1.78" for 1-YR event
Inflow = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af
Outflow = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min
Primary = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af

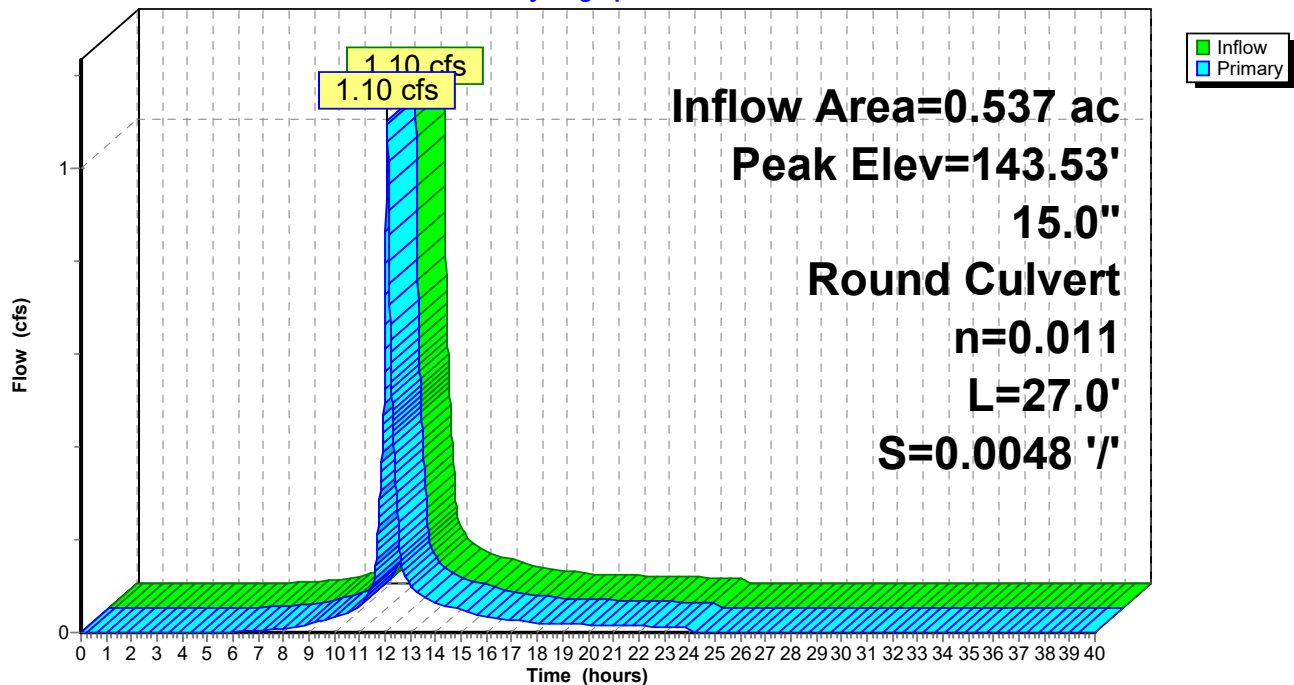
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 143.53' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	142.95'	15.0" Round Culvert L= 27.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 142.95' / 142.82' S= 0.0048 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.10 cfs @ 12.09 hrs HW=143.53' (Free Discharge)
↑1=Culvert (Barrel Controls 1.10 cfs @ 2.88 fps)

Pond 55P: FD24+70

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.50"

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Page 27

Summary for Pond 56P: Wetland Storage

Inflow Area = 33.938 ac, 6.90% Impervious, Inflow Depth = 0.23" for 1-YR event
 Inflow = 2.46 cfs @ 12.64 hrs, Volume= 0.661 af
 Outflow = 1.41 cfs @ 13.25 hrs, Volume= 0.604 af, Atten= 43%, Lag= 36.5 min
 Primary = 1.41 cfs @ 13.25 hrs, Volume= 0.604 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 143.79' @ 13.25 hrs Surf.Area= 14,685 sf Storage= 5,743 cf

Plug-Flow detention time= 109.6 min calculated for 0.604 af (91% of inflow)
 Center-of-Mass det. time= 68.8 min (1,017.6 - 948.8)

Volume	Invert	Avail.Storage	Storage Description
#1	142.71'	205,693 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
142.71	100	50.0	0	0	100
144.00	20,500	4,000.0	9,474	9,474	1,273,143
145.00	470,000	4,330.0	196,219	205,693	1,491,933

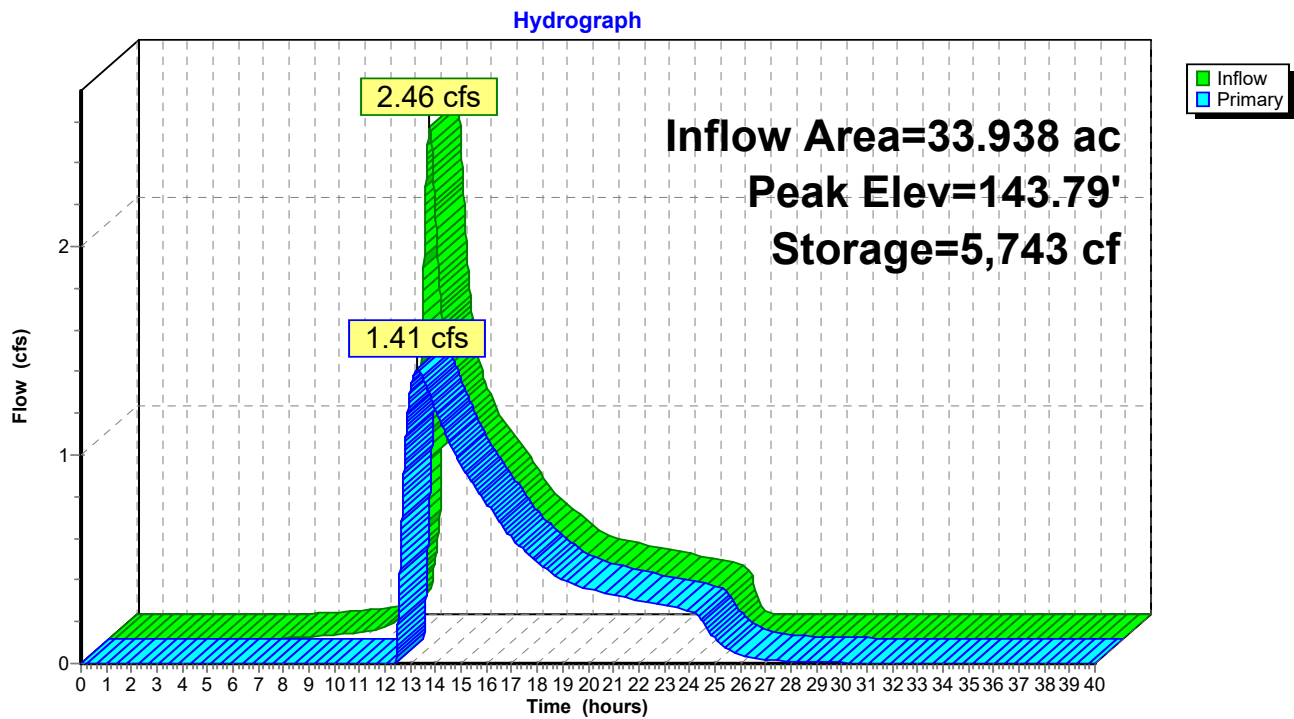
Device	Routing	Invert	Outlet Devices
#1	Primary	142.71'	36.0" W x 8.0" H Box Culvert X 2.00 L= 50.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 142.71' / 142.46' S= 0.0050 ' / ' Cc= 0.900 n= 0.018, Flow Area= 2.00 sf
#2	Device 1	143.50'	Custom Weir/Orifice X 2.00, Cv= 2.62 (C= 3.28) Elev. (feet) 143.50 144.90 144.90 145.00 Width (feet) 1.40 1.40 3.00 3.00

Primary OutFlow Max=1.41 cfs @ 13.25 hrs HW=143.79' (Free Discharge)

↑1=Culvert (Passes 1.41 cfs of 12.76 cfs potential flow)

↑2=Custom Weir/Orifice (Weir Controls 1.41 cfs @ 1.75 fps)

Pond 56P: Wetland Storage



Summary for Subcatchment 57P: P2e

Runoff = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af, Depth= 0.00"

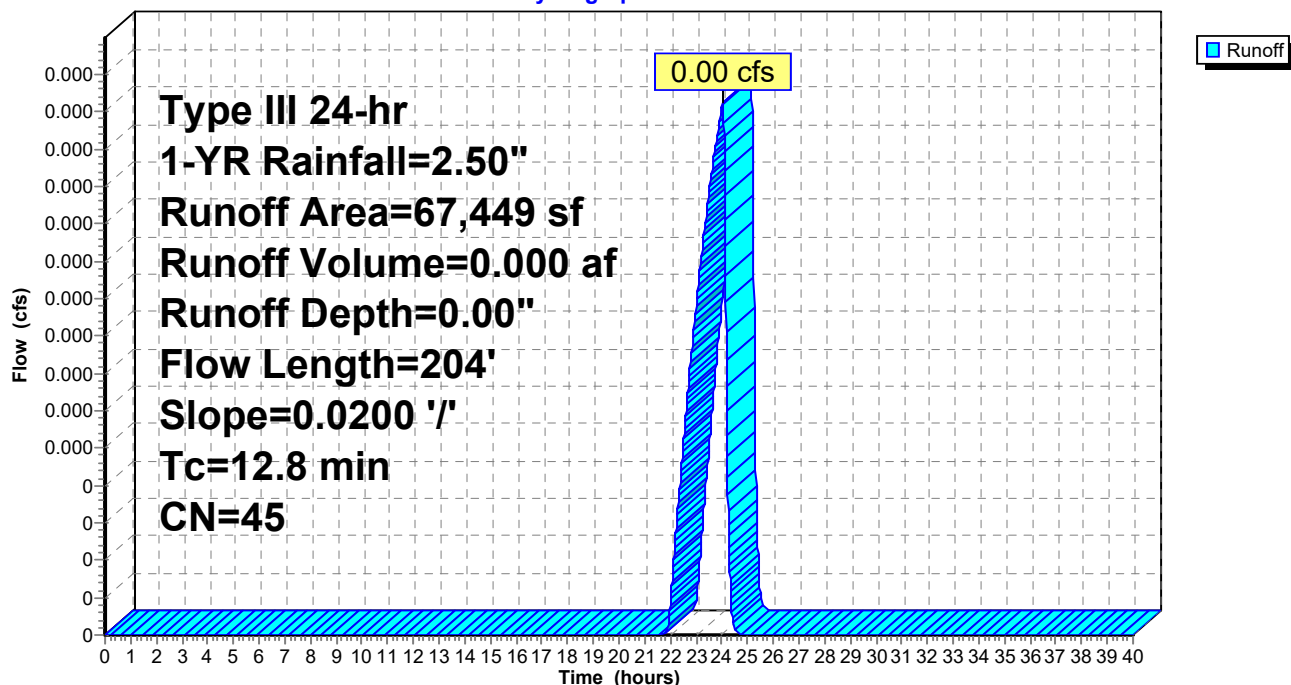
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YR Rainfall=2.50"

Area (sf)	CN	Description
13,005	61	>75% Grass cover, Good HSG B
531	39	>75% Grass cover, Good HSG A
844	98	Roofs HSG B
504	98	Paved parking HSG B
33,230	30	Woods, Good HSG A
19,335	55	Woods, Good HSG B
67,449	45	Weighted Average
66,101	43	98.00% Pervious Area
1,348	98	2.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	59	0.0200	0.11		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
3.4	145	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.8	204	Total			

Subcatchment 57P: P2e

Hydrograph

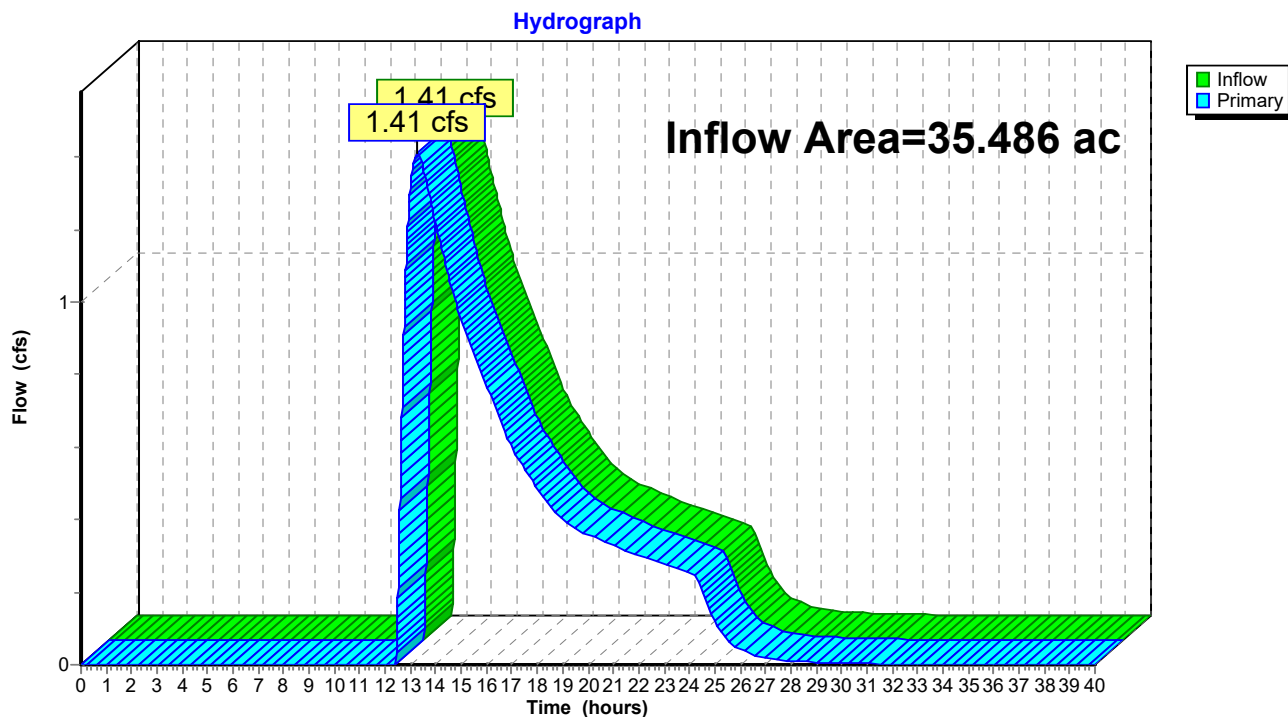


Summary for Link 58P: Design Point #2: Flow to Southern Abutter

Inflow Area = 35.486 ac, 6.69% Impervious, Inflow Depth = 0.20" for 1-YR event
 Inflow = 1.41 cfs @ 13.25 hrs, Volume= 0.604 af
 Primary = 1.41 cfs @ 13.25 hrs, Volume= 0.604 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 58P: Design Point #2: Flow to Southern Abutter



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 31

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment41P: P2a Runoff Area=7,053 sf 75.12% Impervious Runoff Depth=2.08"
Flow Length=245' Slope=0.0100 '/ Tc=8.0 min CN=89 Runoff=0.37 cfs 0.028 af

Pond 42P: CB22+10a Peak Elev=145.48' Inflow=0.37 cfs 0.028 af
12.0" Round Culvert n=0.011 L=21.0' S=0.0071 '/ Outflow=0.37 cfs 0.028 af

Subcatchment43P: P2b Runoff Area=12,212 sf 62.20% Impervious Runoff Depth=1.76"
Flow Length=288' Slope=0.0100 '/ Tc=11.4 min CN=85 Runoff=0.48 cfs 0.041 af

Pond 44P: CB22+10b Peak Elev=145.52' Inflow=0.48 cfs 0.041 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0115 '/ Outflow=0.48 cfs 0.041 af

Pond 45P: DMH22+20 Peak Elev=145.41' Inflow=0.83 cfs 0.069 af
12.0" Round Culvert n=0.011 L=35.0' S=0.0129 '/ Outflow=0.83 cfs 0.069 af

Subcatchment46P: P2c Runoff Area=9,439 sf 20.70% Impervious Runoff Depth=1.27"
Flow Length=52' Slope=0.0600 '/ Tc=6.0 min CN=78 Runoff=0.32 cfs 0.023 af

Pond 47P: Basin #3 Peak Elev=145.17' Storage=1,476 cf Inflow=1.12 cfs 0.092 af
Discarded=0.14 cfs 0.089 af Primary=0.02 cfs 0.003 af Outflow=0.16 cfs 0.092 af

Subcatchment48P: P2d Runoff Area=40,118 sf 39.07% Impervious Runoff Depth=1.40"
Flow Length=94' Tc=10.0 min CN=80 Runoff=1.31 cfs 0.108 af

Pond 49P: Basin #4 Peak Elev=146.94' Storage=1,387 cf Inflow=1.31 cfs 0.108 af
Discarded=0.24 cfs 0.105 af Primary=0.04 cfs 0.002 af Outflow=0.28 cfs 0.108 af

Subcatchment50P: P2f Runoff Area=1,386,131 sf 3.73% Impervious Runoff Depth=0.48"
Flow Length=1,966' Slope=0.0100 '/ Tc=29.7 min CN=62 Runoff=7.26 cfs 1.275 af

Subcatchment51P: P2g Runoff Area=23,385 sf 84.80% Impervious Runoff Depth=2.45"
Flow Length=460' Slope=0.0120 '/ Tc=6.0 min CN=93 Runoff=1.49 cfs 0.109 af

Pond 52P: CB23+19 Peak Elev=145.02' Inflow=1.49 cfs 0.109 af
12.0" Round Culvert x 2.00 n=0.011 L=21.0' S=0.0048 '/ Outflow=1.49 cfs 0.109 af

Pond 53P: DMH 23+34 Peak Elev=144.94' Inflow=1.49 cfs 0.109 af
15.0" Round Culvert n=0.011 L=75.0' S=0.0093 '/ Outflow=1.49 cfs 0.109 af

Pond 54P: FD24+09 Peak Elev=143.96' Inflow=1.49 cfs 0.109 af
15.0" Round Culvert n=0.011 L=59.0' S=0.0051 '/ Outflow=1.49 cfs 0.109 af

Pond 55P: FD24+70 Peak Elev=143.64' Inflow=1.49 cfs 0.109 af
15.0" Round Culvert n=0.011 L=27.0' S=0.0048 '/ Outflow=1.49 cfs 0.109 af

Pond 56P: Wetland Storage Peak Elev=144.09' Storage=12,089 cf Inflow=7.58 cfs 1.390 af
Outflow=4.18 cfs 1.333 af

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Page 32

Subcatchment 57P: P2e

Runoff Area=67,449 sf 2.00% Impervious Runoff Depth=0.04"
Flow Length=204' Slope=0.0200 '/' Tc=12.8 min CN=45 Runoff=0.01 cfs 0.006 af

Link 58P: Design Point #2: Flow to Southern Abutter

Inflow=4.18 cfs 1.339 af
Primary=4.18 cfs 1.339 af

Total Runoff Area = 35.486 ac Runoff Volume = 1.590 af Average Runoff Depth = 0.54"
93.31% Pervious = 33.114 ac 6.69% Impervious = 2.373 ac

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Type III 24-hr 2-YR Rainfall=3.20"

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Page 33

Summary for Subcatchment 41P: P2a

Runoff = 0.37 cfs @ 12.11 hrs, Volume= 0.028 af, Depth= 2.08"

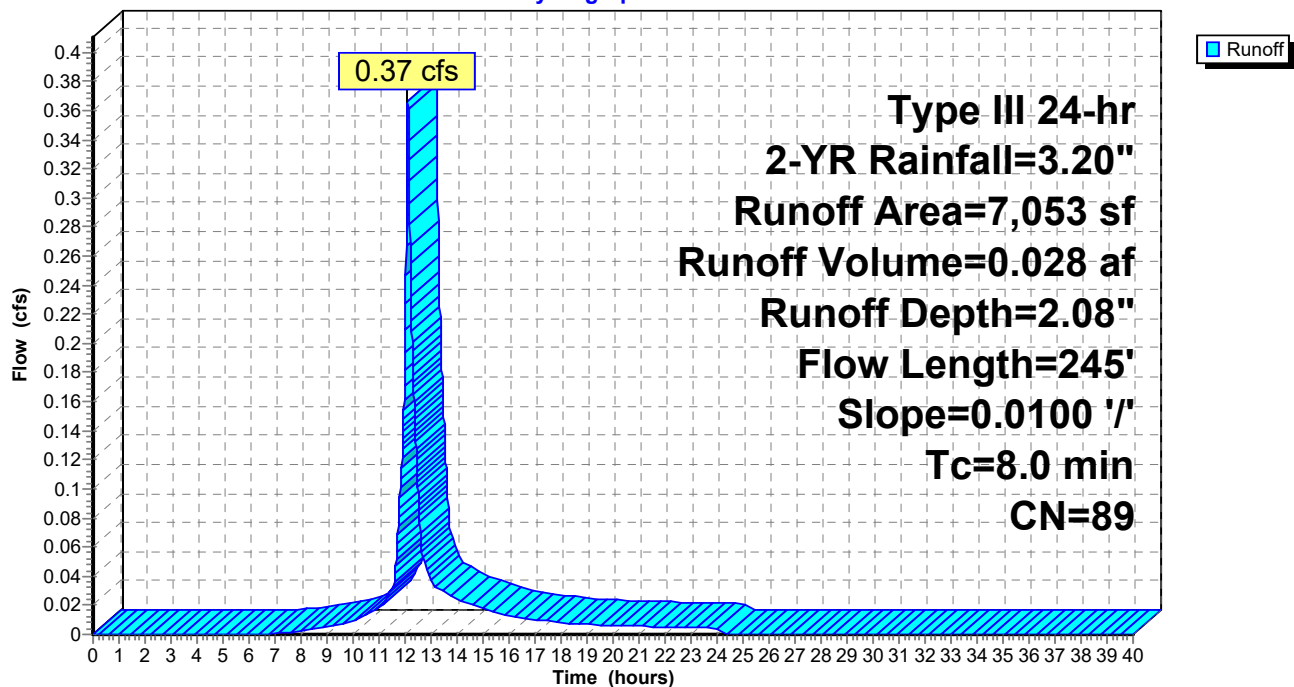
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
1,714	61	>75% Grass cover, Good HSG B
5,298	98	Paved parking HSG B
41	55	Woods, Good HSG B
7,053	89	Weighted Average
1,755	61	24.88% Pervious Area
5,298	98	75.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	25	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.8	220	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
8.0	245	Total			

Subcatchment 41P: P2a

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 34

Summary for Pond 42P: CB22+10a

Inflow Area = 0.162 ac, 75.12% Impervious, Inflow Depth = 2.08" for 2-YR event
Inflow = 0.37 cfs @ 12.11 hrs, Volume= 0.028 af
Outflow = 0.37 cfs @ 12.11 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
Primary = 0.37 cfs @ 12.11 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.48' @ 12.11 hrs

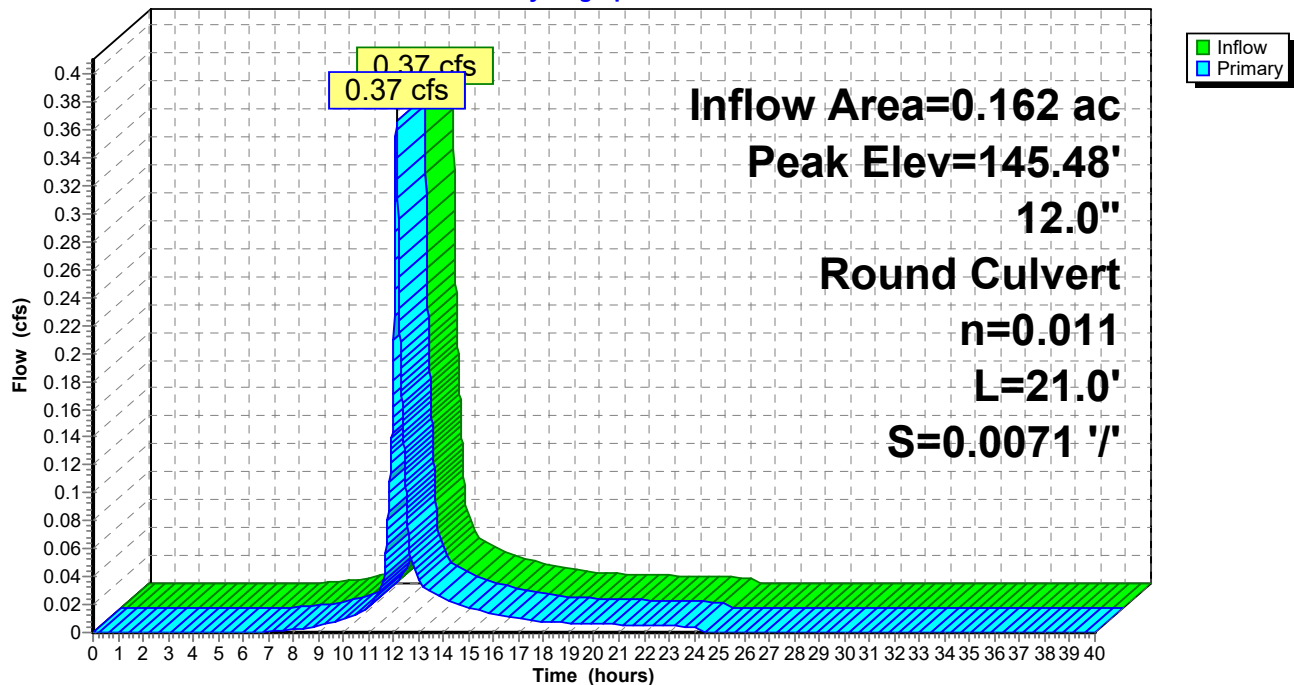
Device	Routing	Invert	Outlet Devices
#1	Primary	145.15'	12.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.15' / 145.00' S= 0.0071 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.37 cfs @ 12.11 hrs HW=145.48' (Free Discharge)

↑1=Culvert (Barrel Controls 0.37 cfs @ 2.45 fps)

Pond 42P: CB22+10a

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 35

Summary for Subcatchment 43P: P2b

Runoff = 0.48 cfs @ 12.16 hrs, Volume= 0.041 af, Depth= 1.76"

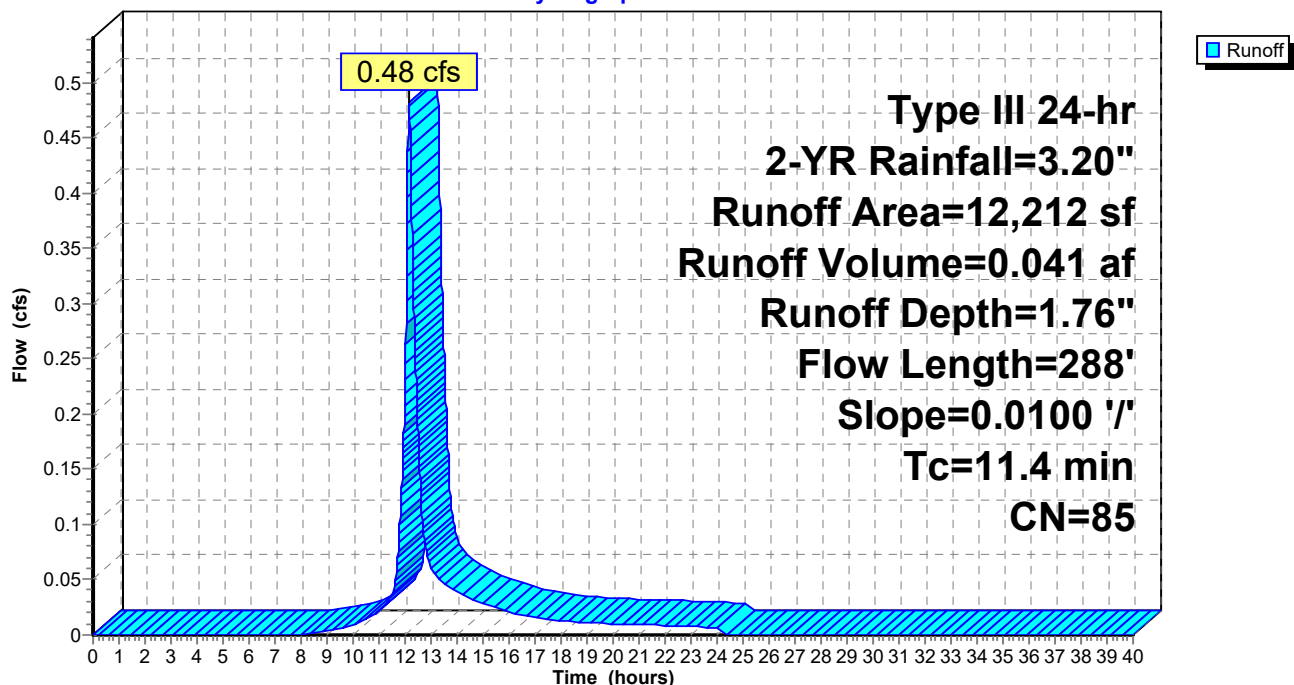
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
5,505	98	Paved parking HSG B
310	98	Roofs HSG B
3,911	61	>75% Grass cover, Good HSG B
705	74	>75% Grass cover, Good HSG C
1,230	98	Roofs HSG C
551	98	Paved parking HSG C
12,212	85	Weighted Average
4,616	63	37.80% Pervious Area
7,596	98	62.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
2.0	246	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.4	288	Total			

Subcatchment 43P: P2b

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 36

Summary for Pond 44P: CB22+10b

Inflow Area = 0.280 ac, 62.20% Impervious, Inflow Depth = 1.76" for 2-YR event
Inflow = 0.48 cfs @ 12.16 hrs, Volume= 0.041 af
Outflow = 0.48 cfs @ 12.16 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min
Primary = 0.48 cfs @ 12.16 hrs, Volume= 0.041 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.52' @ 12.16 hrs

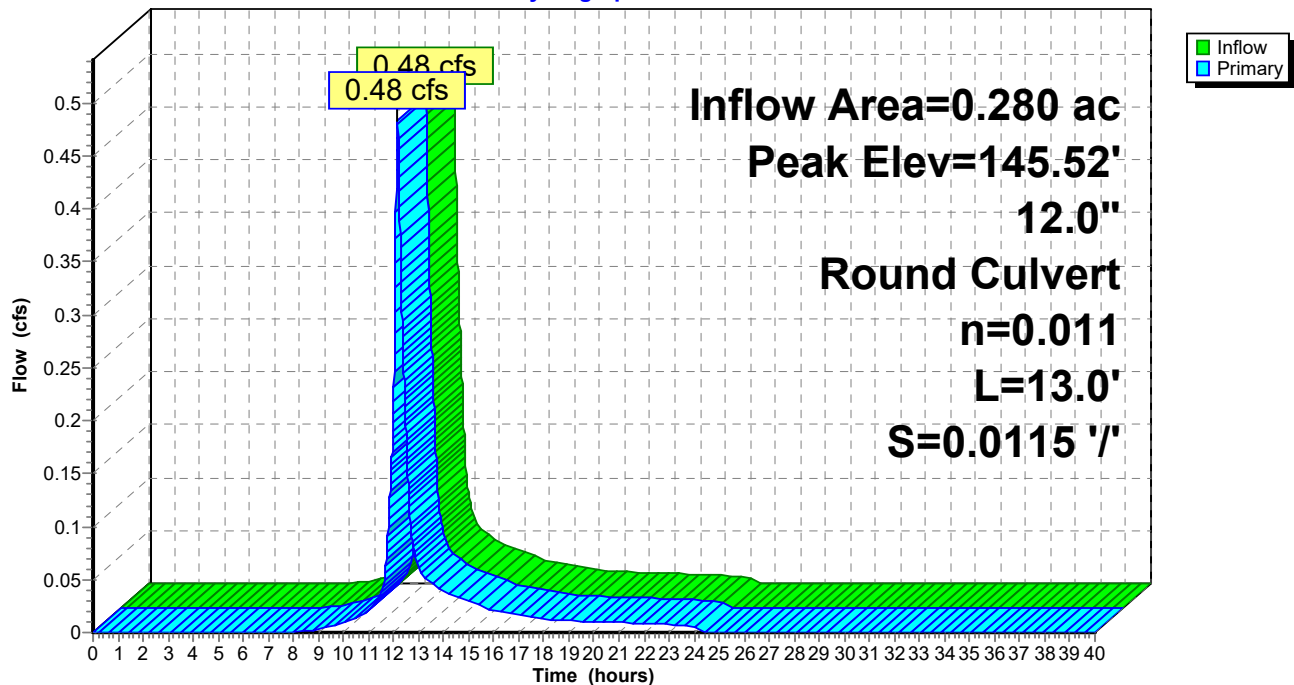
Device	Routing	Invert	Outlet Devices
#1	Primary	145.15'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.15' / 145.00' S= 0.0115 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.48 cfs @ 12.16 hrs HW=145.52' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.48 cfs @ 2.76 fps)

Pond 44P: CB22+10b

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 37

Summary for Pond 45P: DMH22+20

Inflow Area = 0.442 ac, 66.93% Impervious, Inflow Depth = 1.88" for 2-YR event
Inflow = 0.83 cfs @ 12.14 hrs, Volume= 0.069 af
Outflow = 0.83 cfs @ 12.14 hrs, Volume= 0.069 af, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.14 hrs, Volume= 0.069 af

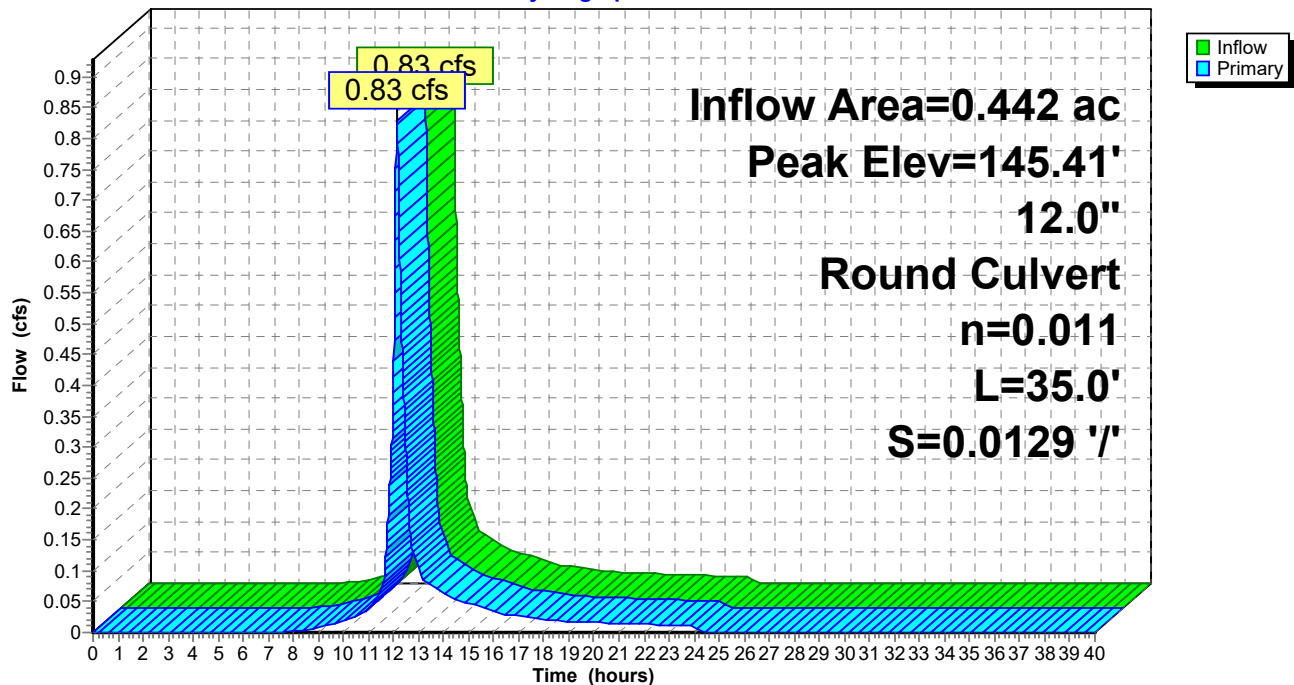
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.41' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.95'	12.0" Round Culvert L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.95' / 144.50' S= 0.0129 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.14 hrs HW=145.41' (Free Discharge)
↑1=Culvert (Inlet Controls 0.83 cfs @ 2.32 fps)

Pond 45P: DMH22+20

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 38

Summary for Subcatchment 46P: P2c

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 1.27"

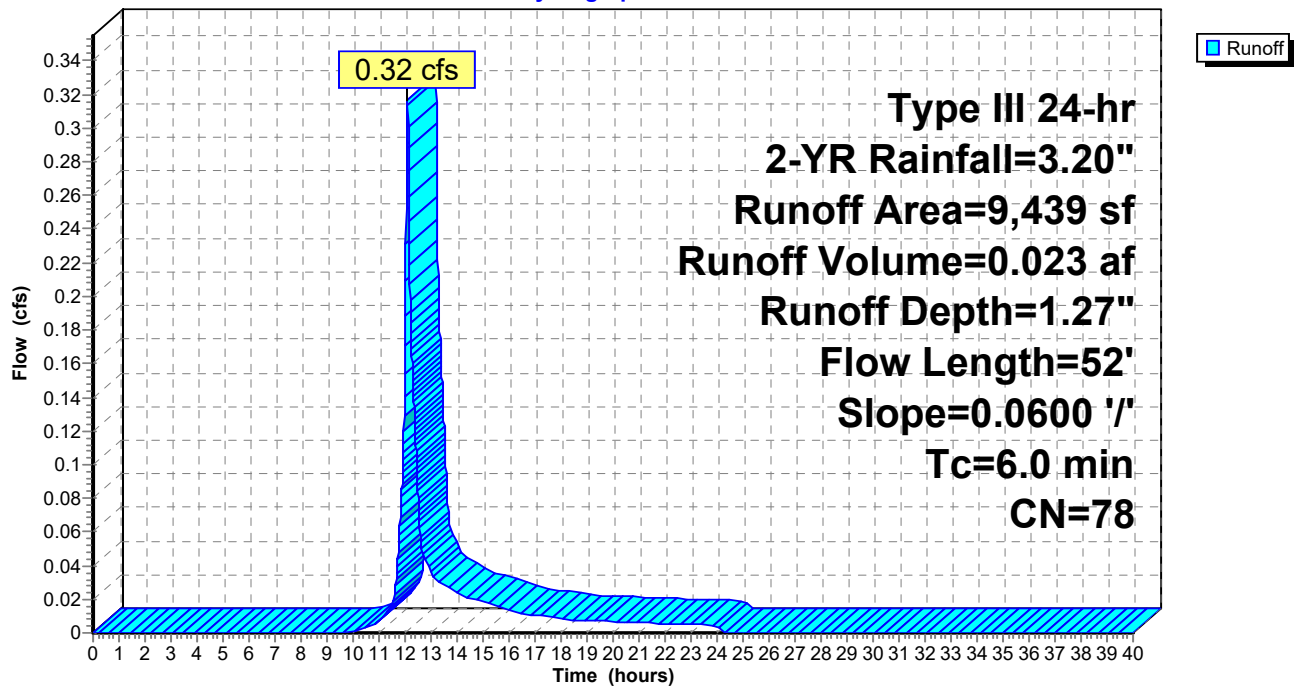
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
822	61	>75% Grass cover, Good HSG B
1,954	98	Water Surface HSG C
6,662	74	>75% Grass cover, Good HSG C
1	70	Woods, Good HSG C
9,439	78	Weighted Average
7,485	73	79.30% Pervious Area
1,954	98	20.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	52	0.0600	0.16		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
5.4	52	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 46P: P2c

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 39

Summary for Pond 47P: Basin #3

Inflow Area = 0.659 ac, 51.73% Impervious, Inflow Depth = 1.68" for 2-YR event
 Inflow = 1.12 cfs @ 12.12 hrs, Volume= 0.092 af
 Outflow = 0.16 cfs @ 12.85 hrs, Volume= 0.092 af, Atten= 86%, Lag= 43.9 min
 Discarded = 0.14 cfs @ 12.85 hrs, Volume= 0.089 af
 Primary = 0.02 cfs @ 12.85 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 145.17' @ 12.85 hrs Surf.Area= 2,438 sf Storage= 1,476 cf

Plug-Flow detention time= 91.1 min calculated for 0.092 af (100% of inflow)
 Center-of-Mass det. time= 91.1 min (921.1 - 830.1)

Volume	Invert	Avail.Storage	Storage Description
#1	144.50'	9,424 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.50	1,961	173.0	0	0	1,961
147.50	4,494	249.0	9,424	9,424	4,591

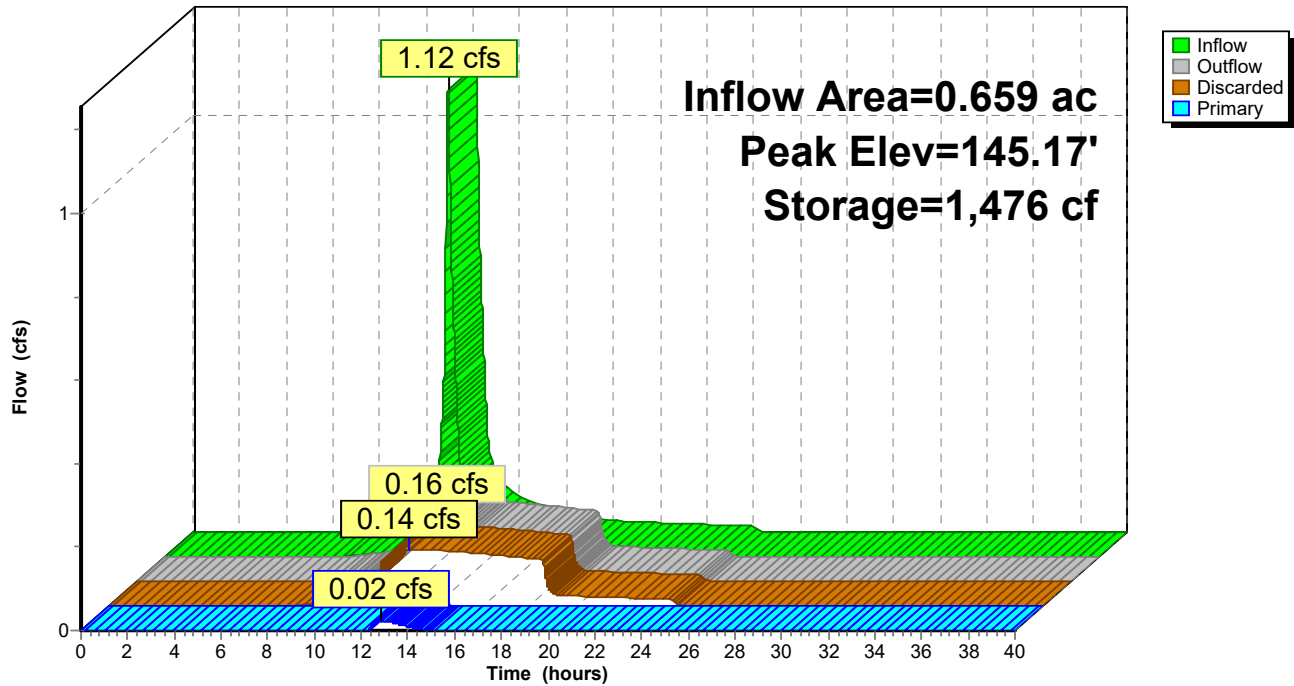
Device	Routing	Invert	Outlet Devices
#1	Discarded	144.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	146.50'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 146.50 147.50 Width (feet) 4.00 4.00
#3	Primary	145.00'	2.0" Round Culvert L= 1.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.00' / 145.00' S= 0.0000 ' /' Cc= 0.900 n= 0.011, Flow Area= 0.02 sf

Discarded OutFlow Max=0.14 cfs @ 12.85 hrs HW=145.17' (Free Discharge)
 1=Exfiltration (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.02 cfs @ 12.85 hrs HW=145.17' (Free Discharge)
 2=Custom Weir/Orifice (Controls 0.00 cfs)
 3=Culvert (Barrel Controls 0.02 cfs @ 1.28 fps)

Pond 47P: Basin #3

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 41

Summary for Subcatchment 48P: P2d

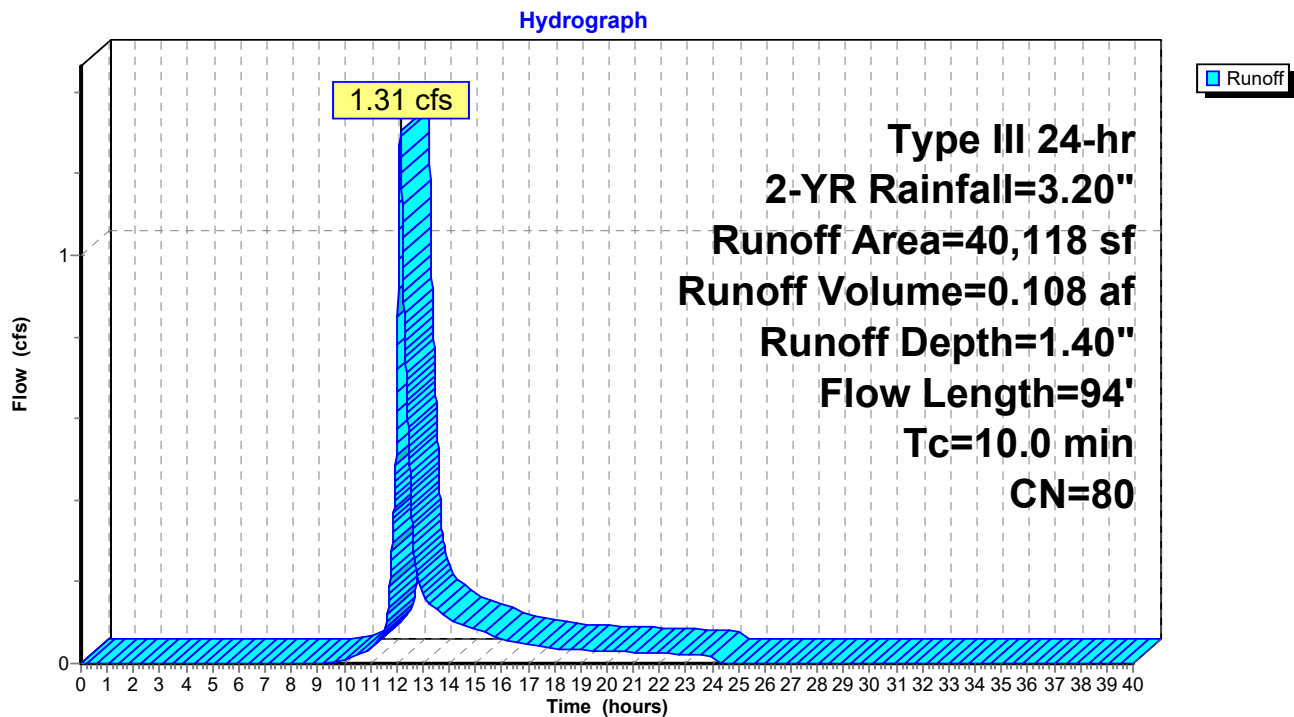
Runoff = 1.31 cfs @ 12.14 hrs, Volume= 0.108 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
10,069	61	>75% Grass cover, Good HSG B
1,195	98	Water Surface HSG B
8,750	98	Water Surface HSG C
1,000	98	Paved parking HSG C
1,089	98	Paved parking HSG B
14,373	74	>75% Grass cover, Good HSG C
1,595	98	Roofs HSG C
2,047	98	Roofs HSG B
40,118	80	Weighted Average
24,442	69	60.93% Pervious Area
15,676	98	39.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.6	52	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.0	94	Total			

Subcatchment 48P: P2d



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 43

Summary for Pond 49P: Basin #4

Inflow Area = 0.921 ac, 39.07% Impervious, Inflow Depth = 1.40" for 2-YR event
 Inflow = 1.31 cfs @ 12.14 hrs, Volume= 0.108 af
 Outflow = 0.28 cfs @ 12.65 hrs, Volume= 0.108 af, Atten= 79%, Lag= 30.2 min
 Discarded = 0.24 cfs @ 12.65 hrs, Volume= 0.105 af
 Primary = 0.04 cfs @ 12.65 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.94' @ 12.65 hrs Surf.Area= 10,313 sf Storage= 1,387 cf

Plug-Flow detention time= 40.9 min calculated for 0.108 af (100% of inflow)
 Center-of-Mass det. time= 40.9 min (887.4 - 846.5)

Volume	Invert	Avail.Storage	Storage Description
#1	146.80'	8,853 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.80	9,936	709.0	0	0	9,936
147.60	12,237	711.0	8,853	8,853	10,547

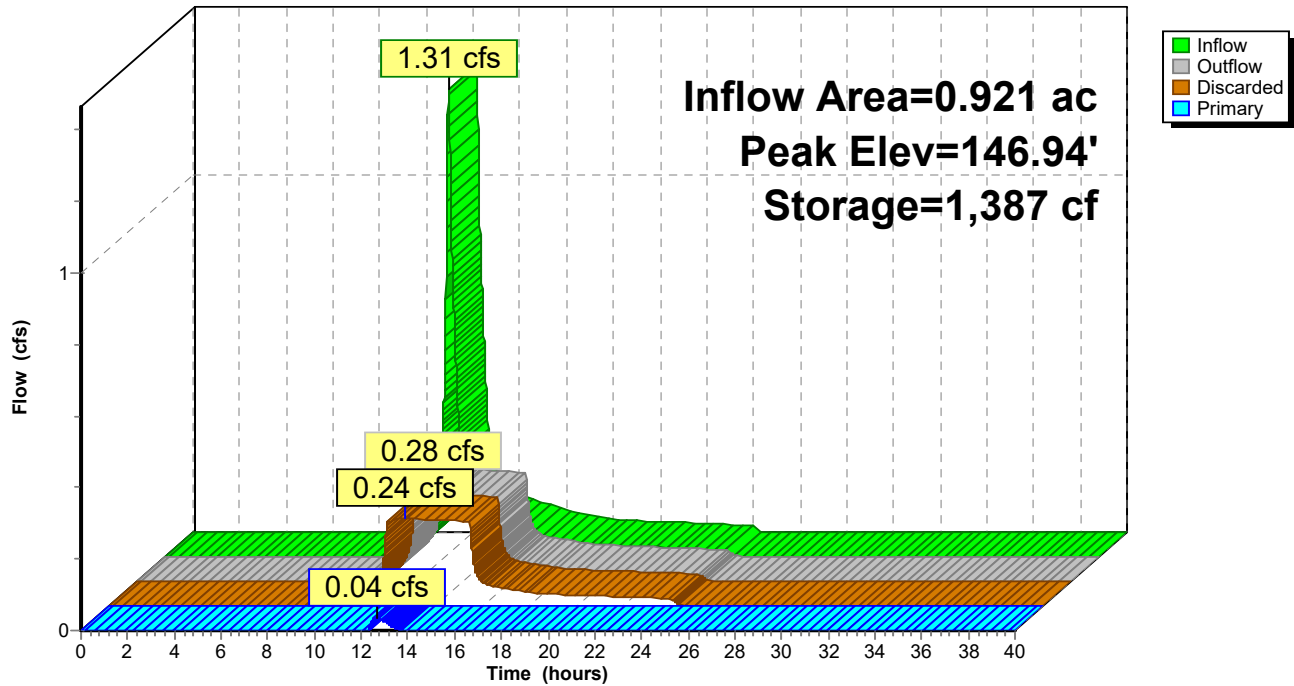
Device	Routing	Invert	Outlet Devices
#1	Discarded	146.80'	1.020 in/hr Exfiltration over Surface area
#2	Primary	146.90'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28)
			Elev. (feet) 146.90 147.20 147.20 148.00
			Width (feet) 1.50 1.50 8.00 8.00

Discarded OutFlow Max=0.24 cfs @ 12.65 hrs HW=146.94' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.24 cfs)

Primary OutFlow Max=0.03 cfs @ 12.65 hrs HW=146.94' (Free Discharge)
 ↑**2=Custom Weir/Orifice** (Weir Controls 0.03 cfs @ 0.63 fps)

Pond 49P: Basin #4

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 45

Summary for Subcatchment 50P: P2f

Runoff = 7.26 cfs @ 12.54 hrs, Volume= 1.275 af, Depth= 0.48"

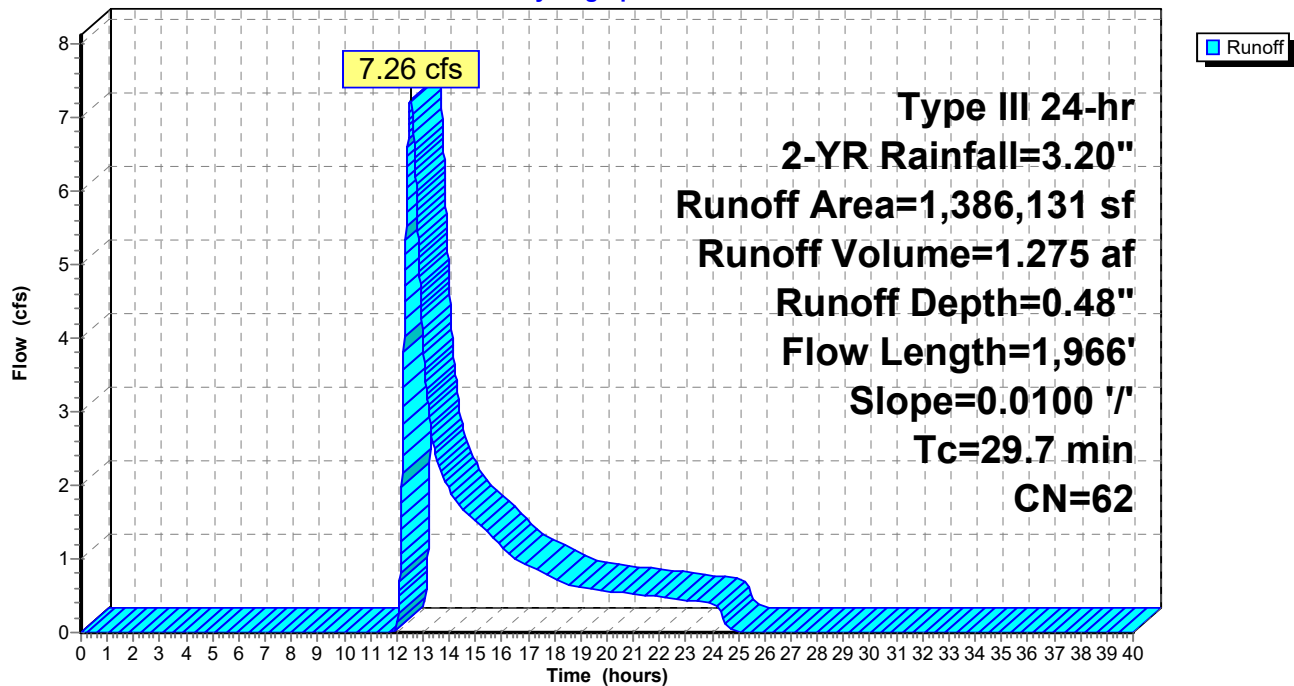
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
2,050	80	>75% Grass cover, Good HSG D
17,544	61	>75% Grass cover, Good HSG B
1,002	98	Paved parking HSG B
31,785	98	Paved parking HSG A
11,439	74	>75% Grass cover, Good HSG C
146,051	39	>75% Grass cover, Good HSG A
197	98	Paved parking HSG C
2,625	98	Roofs HSG B
16,036	98	Roofs HSG A
311,884	30	Woods, Good HSG A
66,486	55	Woods, Good HSG B
63,729	70	Woods, Good HSG C
715,303	77	Woods, Good HSG D
1,386,131	62	Weighted Average
1,334,486	60	96.27% Pervious Area
51,645	98	3.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	1,741	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
29.7	1,966	Total			

Subcatchment 50P: P2f

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 47

Summary for Subcatchment 51P: P2g

Runoff = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af, Depth= 2.45"

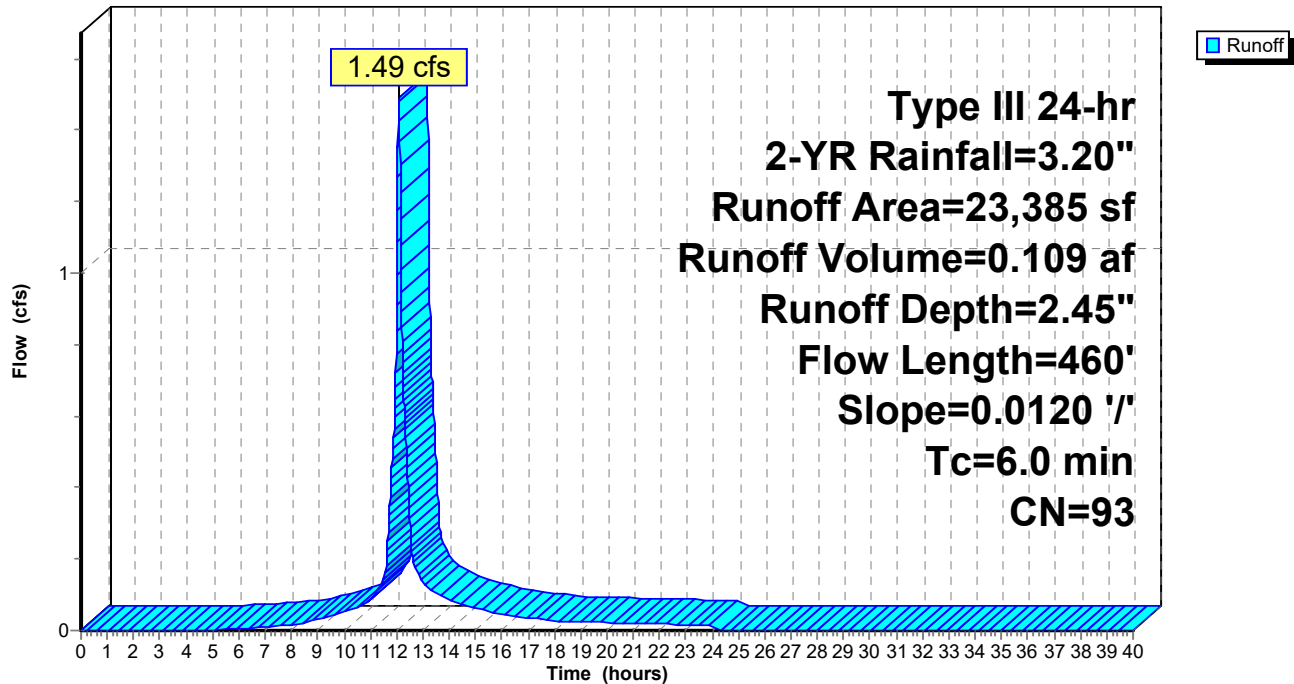
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
1,223	98	Paved parking HSG D
614	98	Paved parking HSG B
222	61	>75% Grass cover, Good HSG B
236	39	>75% Grass cover, Good HSG A
2,406	74	>75% Grass cover, Good HSG C
2,519	98	Paved parking HSG A
15,474	98	Paved parking HSG C
161	30	Woods, Good HSG A
63	55	Woods, Good HSG B
467	70	Woods, Good HSG C
23,385	93	Weighted Average
3,555	68	15.20% Pervious Area
19,830	98	84.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	300	0.0120	1.40		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.2	160	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.8	460	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 51P: P2g

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 49

Summary for Pond 52P: CB23+19

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 2.45" for 2-YR event
Inflow = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af
Outflow = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af, Atten= 0%, Lag= 0.0 min
Primary = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af

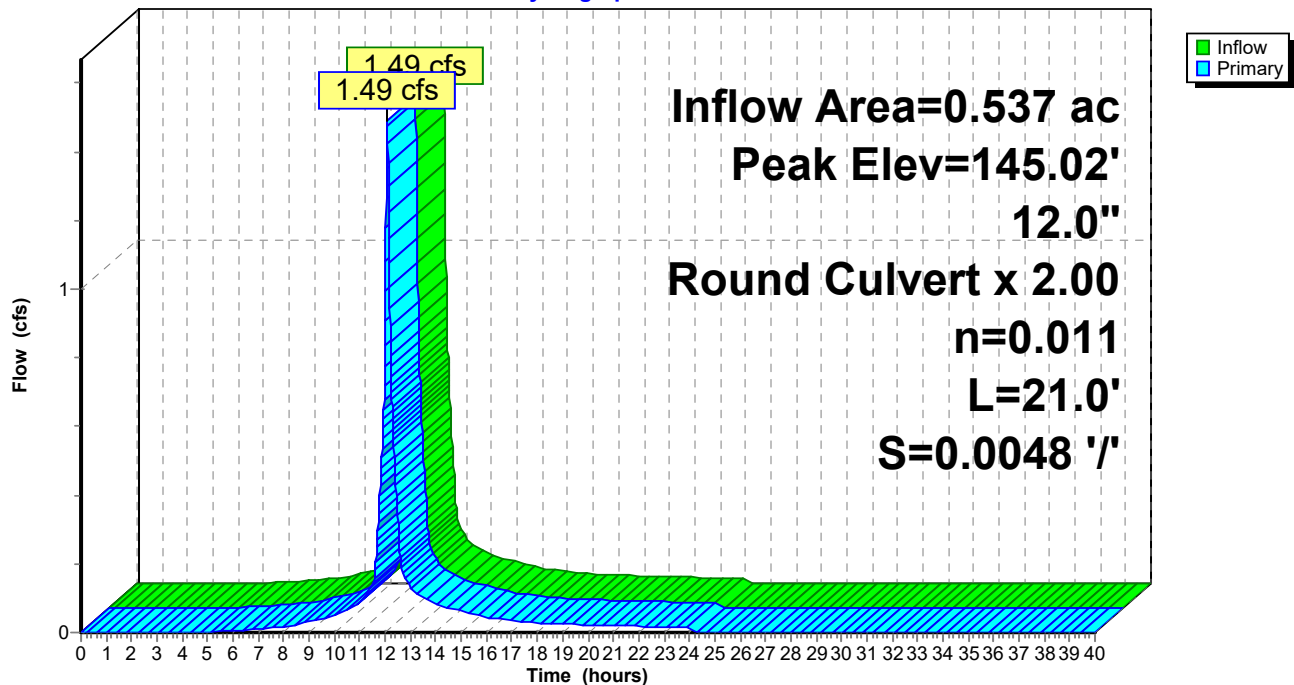
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.02' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.50'	12.0" Round Culvert X 2.00 L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.50' / 144.40' S= 0.0048 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.49 cfs @ 12.09 hrs HW=145.02' (Free Discharge)
↑1=Culvert (Barrel Controls 1.49 cfs @ 2.65 fps)

Pond 52P: CB23+19

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 50

Summary for Pond 53P: DMH 23+34

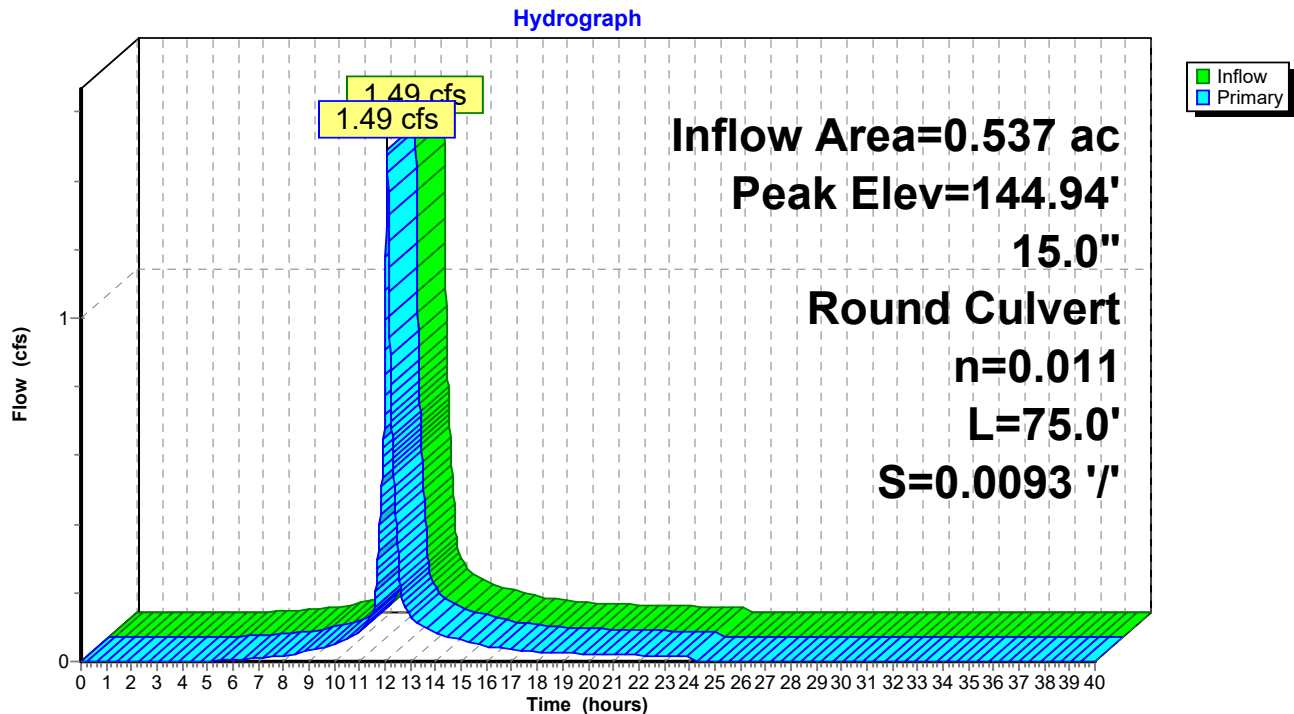
Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 2.45" for 2-YR event
Inflow = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af
Outflow = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af, Atten= 0%, Lag= 0.0 min
Primary = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 144.94' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.35'	15.0" Round Culvert L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.35' / 143.65' S= 0.0093 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.49 cfs @ 12.09 hrs HW=144.94' (Free Discharge)
↑1=Culvert (Inlet Controls 1.49 cfs @ 2.61 fps)

Pond 53P: DMH 23+34



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 51

Summary for Pond 54P: FD24+09

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 2.45" for 2-YR event
Inflow = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af
Outflow = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af, Atten= 0%, Lag= 0.0 min
Primary = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af

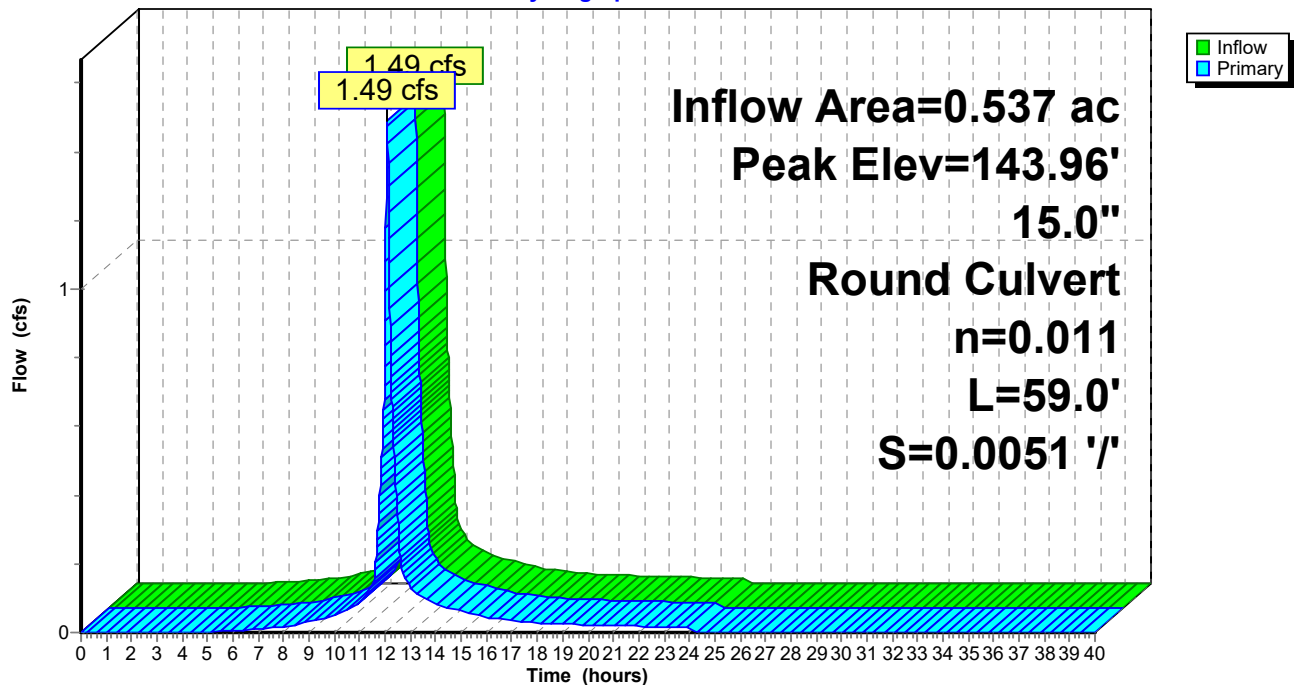
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 143.96' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	15.0" Round Culvert L= 59.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 143.30' / 143.00' S= 0.0051 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.49 cfs @ 12.09 hrs HW=143.96' (Free Discharge)
↑1=Culvert (Barrel Controls 1.49 cfs @ 3.31 fps)

Pond 54P: FD24+09

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 52

Summary for Pond 55P: FD24+70

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 2.45" for 2-YR event
Inflow = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af
Outflow = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af, Atten= 0%, Lag= 0.0 min
Primary = 1.49 cfs @ 12.09 hrs, Volume= 0.109 af

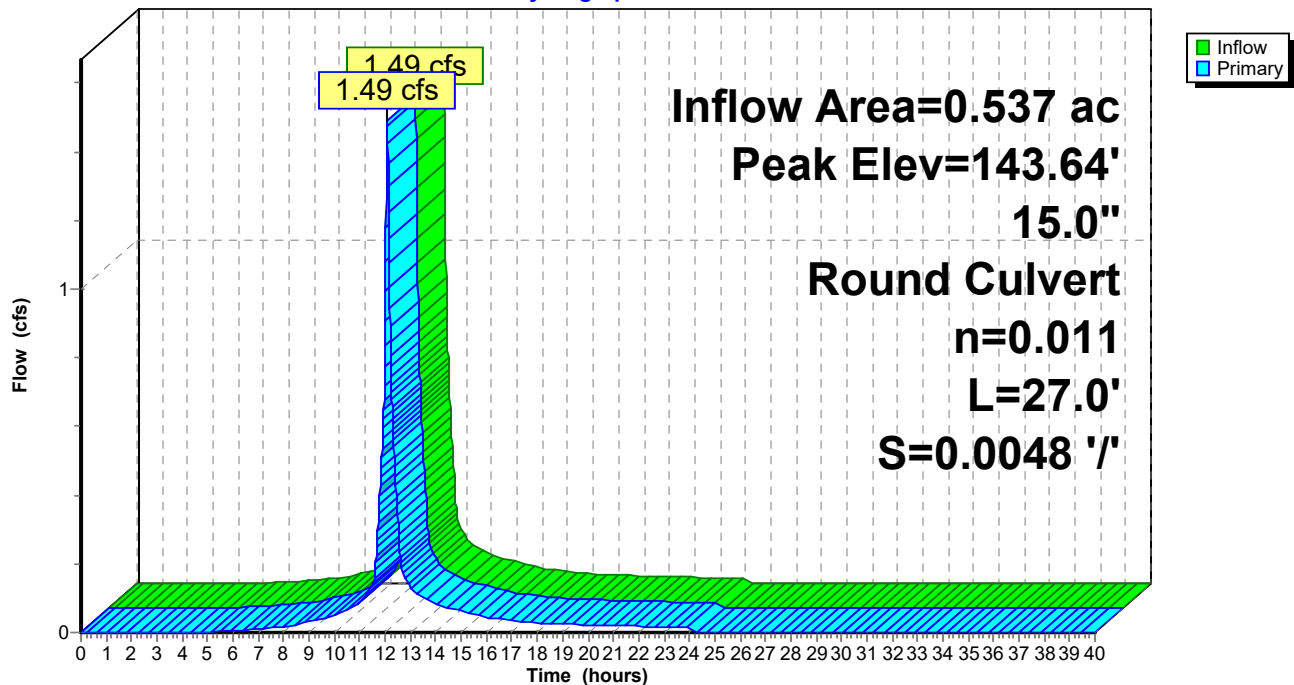
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 143.64' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	142.95'	15.0" Round Culvert L= 27.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 142.95' / 142.82' S= 0.0048 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.49 cfs @ 12.09 hrs HW=143.64' (Free Discharge)
↑1=Culvert (Barrel Controls 1.49 cfs @ 3.10 fps)

Pond 55P: FD24+70

Hydrograph



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Page 53

Summary for Pond 56P: Wetland Storage

Inflow Area = 33.938 ac, 6.90% Impervious, Inflow Depth = 0.49" for 2-YR event
 Inflow = 7.58 cfs @ 12.53 hrs, Volume= 1.390 af
 Outflow = 4.18 cfs @ 13.00 hrs, Volume= 1.333 af, Atten= 45%, Lag= 27.9 min
 Primary = 4.18 cfs @ 13.00 hrs, Volume= 1.333 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 144.09' @ 13.00 hrs Surf.Area= 37,257 sf Storage= 12,089 cf

Plug-Flow detention time= 71.6 min calculated for 1.333 af (96% of inflow)
 Center-of-Mass det. time= 50.4 min (970.5 - 920.0)

Volume	Invert	Avail.Storage	Storage Description
#1	142.71'	205,693 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
142.71	100	50.0	0	0	100
144.00	20,500	4,000.0	9,474	9,474	1,273,143
145.00	470,000	4,330.0	196,219	205,693	1,491,933

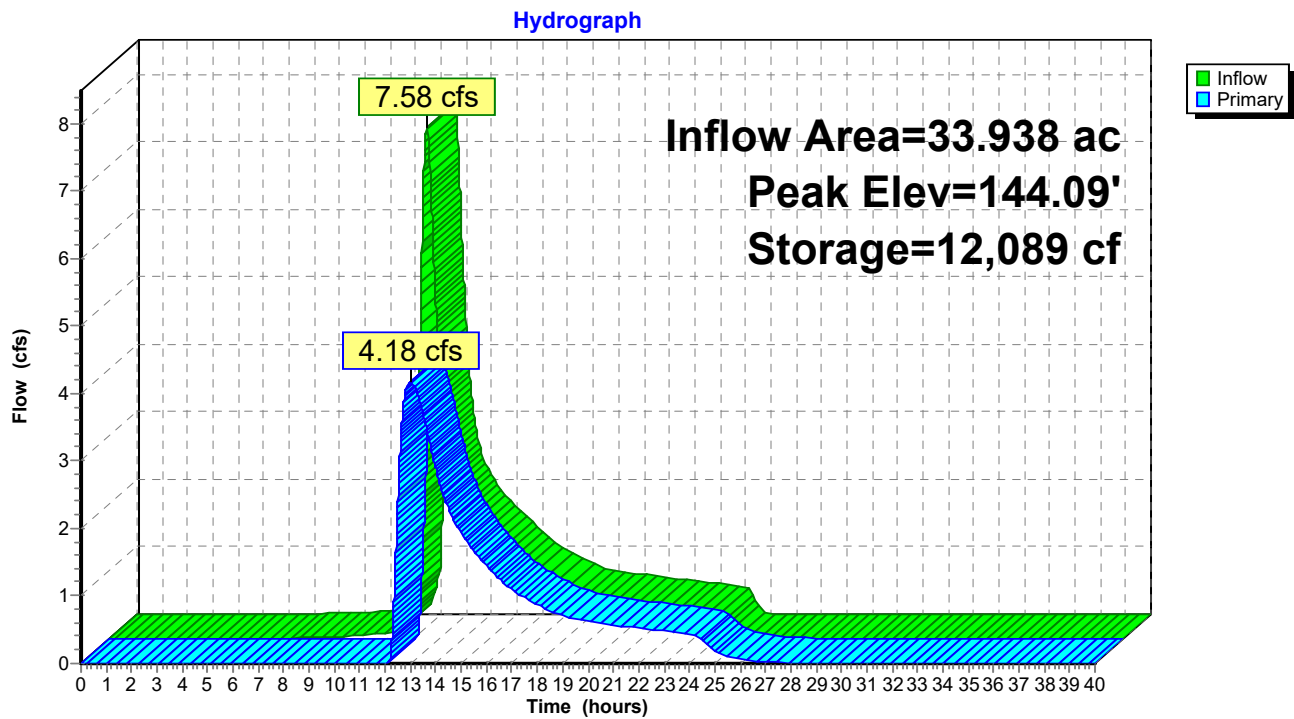
Device	Routing	Invert	Outlet Devices
#1	Primary	142.71'	36.0" W x 8.0" H Box Culvert X 2.00 L= 50.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 142.71' / 142.46' S= 0.0050 ' S= 0.0050 ' Cc= 0.900 n= 0.018, Flow Area= 2.00 sf
#2	Device 1	143.50'	Custom Weir/Orifice X 2.00, Cv= 2.62 (C= 3.28) Elev. (feet) 143.50 144.90 144.90 145.00 Width (feet) 1.40 1.40 3.00 3.00

Primary OutFlow Max=4.18 cfs @ 13.00 hrs HW=144.09' (Free Discharge)

1=Culvert (Passes 4.18 cfs of 15.42 cfs potential flow)

2=Custom Weir/Orifice (Weir Controls 4.18 cfs @ 2.52 fps)

Pond 56P: Wetland Storage



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Type III 24-hr 2-YR Rainfall=3.20"

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Page 55

Summary for Subcatchment 57P: P2e

Runoff = 0.01 cfs @ 15.46 hrs, Volume= 0.006 af, Depth= 0.04"

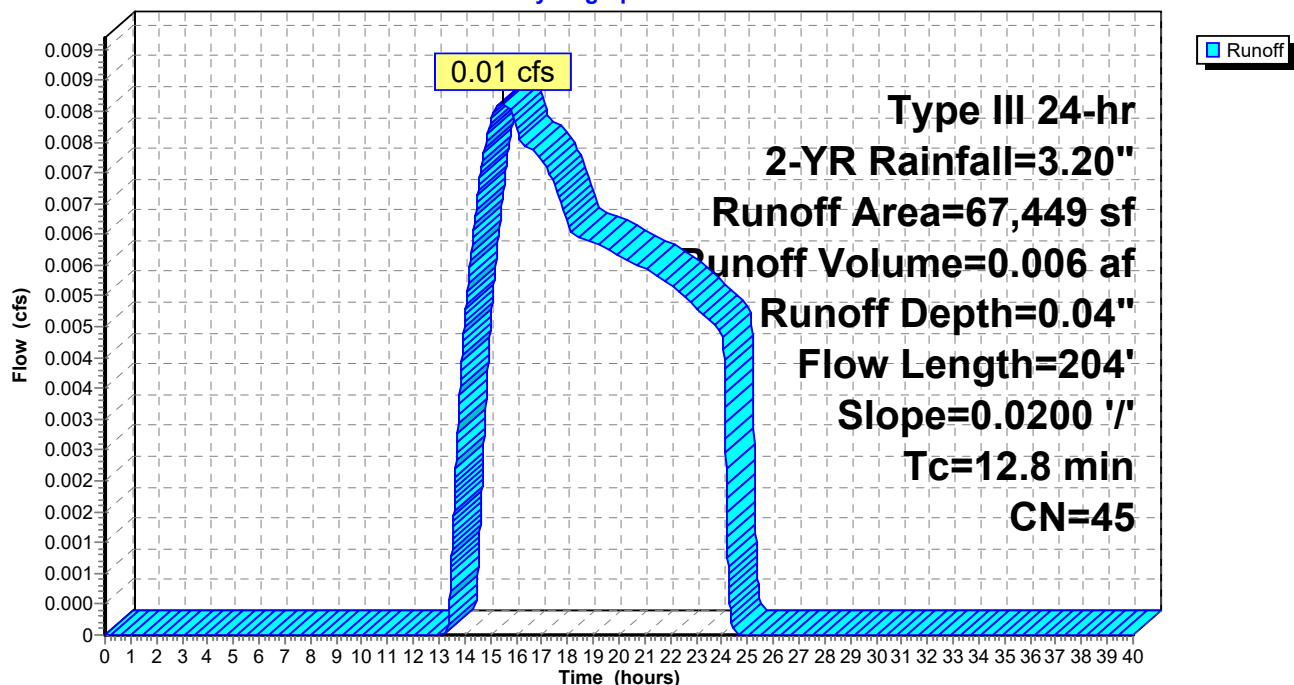
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
13,005	61	>75% Grass cover, Good HSG B
531	39	>75% Grass cover, Good HSG A
844	98	Roofs HSG B
504	98	Paved parking HSG B
33,230	30	Woods, Good HSG A
19,335	55	Woods, Good HSG B
67,449	45	Weighted Average
66,101	43	98.00% Pervious Area
1,348	98	2.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	59	0.0200	0.11		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
3.4	145	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.8	204	Total			

Subcatchment 57P: P2e

Hydrograph

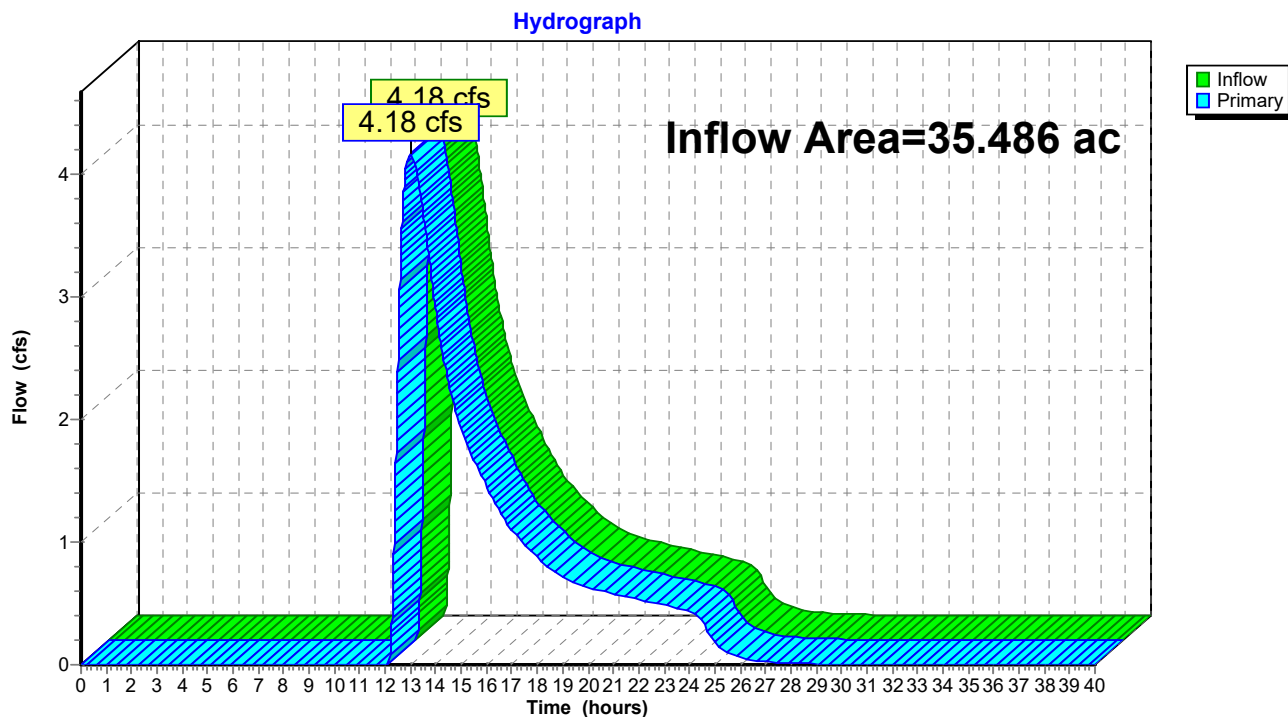


Summary for Link 58P: Design Point #2: Flow to Southern Abutter

Inflow Area = 35.486 ac, 6.69% Impervious, Inflow Depth = 0.45" for 2-YR event
 Inflow = 4.18 cfs @ 13.00 hrs, Volume= 1.339 af
 Primary = 4.18 cfs @ 13.00 hrs, Volume= 1.339 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 58P: Design Point #2: Flow to Southern Abutter



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 57

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment41P: P2a Runoff Area=7,053 sf 75.12% Impervious Runoff Depth=3.49"
Flow Length=245' Slope=0.0100 '/' Tc=8.0 min CN=89 Runoff=0.60 cfs 0.047 af

Pond 42P: CB22+10a Peak Elev=145.58' Inflow=0.60 cfs 0.047 af
12.0" Round Culvert n=0.011 L=21.0' S=0.0071 '/' Outflow=0.60 cfs 0.047 af

Subcatchment43P: P2b Runoff Area=12,212 sf 62.20% Impervious Runoff Depth=3.09"
Flow Length=288' Slope=0.0100 '/' Tc=11.4 min CN=85 Runoff=0.85 cfs 0.072 af

Pond 44P: CB22+10b Peak Elev=145.66' Inflow=0.85 cfs 0.072 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0115 '/' Outflow=0.85 cfs 0.072 af

Pond 45P: DMH22+20 Peak Elev=145.58' Inflow=1.41 cfs 0.119 af
12.0" Round Culvert n=0.011 L=35.0' S=0.0129 '/' Outflow=1.41 cfs 0.119 af

Subcatchment46P: P2c Runoff Area=9,439 sf 20.70% Impervious Runoff Depth=2.46"
Flow Length=52' Slope=0.0600 '/' Tc=6.0 min CN=78 Runoff=0.62 cfs 0.044 af

Pond 47P: Basin #3 Peak Elev=145.71' Storage=2,903 cf Inflow=1.99 cfs 0.164 af
Discarded=0.16 cfs 0.137 af Primary=0.08 cfs 0.027 af Outflow=0.24 cfs 0.164 af

Subcatchment48P: P2d Runoff Area=40,118 sf 39.07% Impervious Runoff Depth=2.63"
Flow Length=94' Tc=10.0 min CN=80 Runoff=2.48 cfs 0.202 af

Pond 49P: Basin #4 Peak Elev=147.08' Storage=2,857 cf Inflow=2.48 cfs 0.202 af
Discarded=0.25 cfs 0.160 af Primary=0.37 cfs 0.042 af Outflow=0.62 cfs 0.202 af

Subcatchment50P: P2f Runoff Area=1,386,131 sf 3.73% Impervious Runoff Depth=1.26"
Flow Length=1,966' Slope=0.0100 '/' Tc=29.7 min CN=62 Runoff=24.03 cfs 3.333 af

Subcatchment51P: P2g Runoff Area=23,385 sf 84.80% Impervious Runoff Depth=3.90"
Flow Length=460' Slope=0.0120 '/' Tc=6.0 min CN=93 Runoff=2.32 cfs 0.175 af

Pond 52P: CB23+19 Peak Elev=145.17' Inflow=2.32 cfs 0.175 af
12.0" Round Culvert x 2.00 n=0.011 L=21.0' S=0.0048 '/' Outflow=2.32 cfs 0.175 af

Pond 53P: DMH 23+34 Peak Elev=145.11' Inflow=2.32 cfs 0.175 af
15.0" Round Culvert n=0.011 L=75.0' S=0.0093 '/' Outflow=2.32 cfs 0.175 af

Pond 54P: FD24+09 Peak Elev=144.15' Inflow=2.32 cfs 0.175 af
15.0" Round Culvert n=0.011 L=59.0' S=0.0051 '/' Outflow=2.32 cfs 0.175 af

Pond 55P: FD24+70 Peak Elev=143.85' Inflow=2.32 cfs 0.175 af
15.0" Round Culvert n=0.011 L=27.0' S=0.0048 '/' Outflow=2.32 cfs 0.175 af

Pond 56P: Wetland Storage Peak Elev=144.46' Storage=45,094 cf Inflow=25.02 cfs 3.577 af
Outflow=8.64 cfs 3.520 af

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Page 58

Subcatchment 57P: P2e

Runoff Area=67,449 sf 2.00% Impervious Runoff Depth=0.35"
Flow Length=204' Slope=0.0200 '/' Tc=12.8 min CN=45 Runoff=0.20 cfs 0.045 af

Link 58P: Design Point #2: Flow to Southern Abutter

Inflow=8.73 cfs 3.565 af
Primary=8.73 cfs 3.565 af

Total Runoff Area = 35.486 ac Runoff Volume = 3.919 af Average Runoff Depth = 1.33"
93.31% Pervious = 33.114 ac 6.69% Impervious = 2.373 ac

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Type III 24-hr 10-YR Rainfall=4.70"

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Page 59

Summary for Subcatchment 41P: P2a

Runoff = 0.60 cfs @ 12.11 hrs, Volume= 0.047 af, Depth= 3.49"

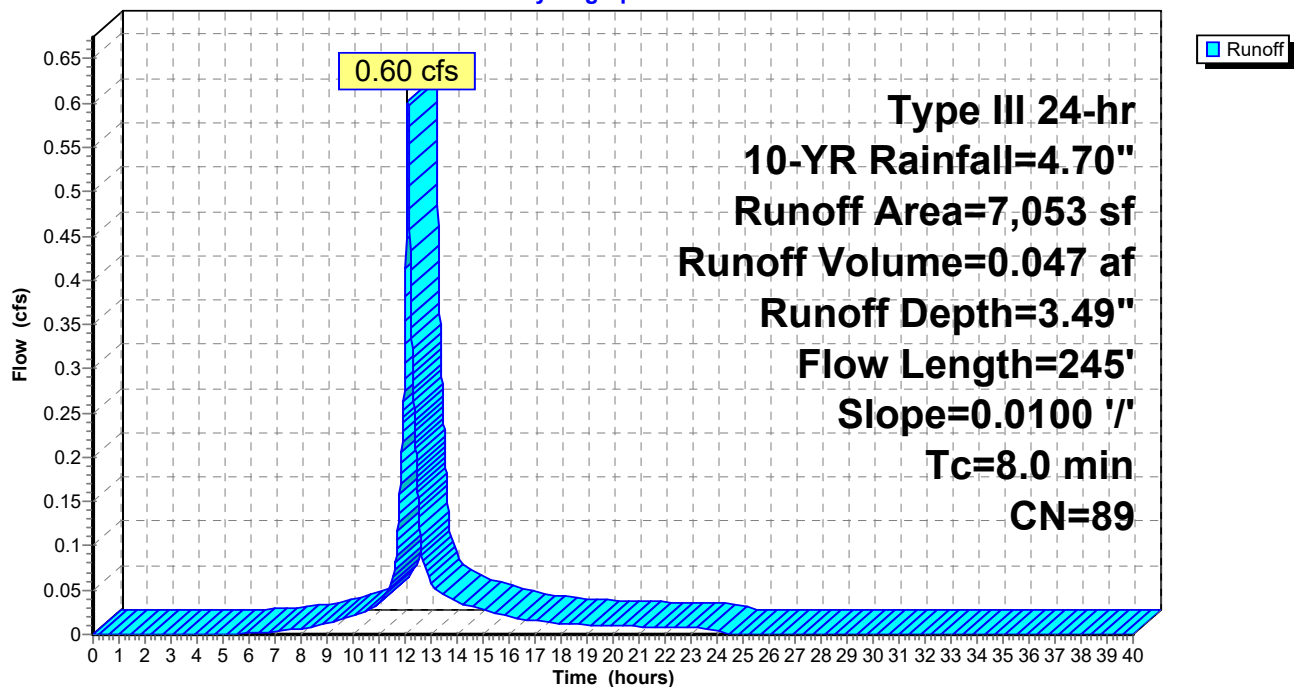
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
1,714	61	>75% Grass cover, Good HSG B
5,298	98	Paved parking HSG B
41	55	Woods, Good HSG B
7,053	89	Weighted Average
1,755	61	24.88% Pervious Area
5,298	98	75.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	25	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.8	220	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
8.0	245	Total			

Subcatchment 41P: P2a

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 60

Summary for Pond 42P: CB22+10a

Inflow Area = 0.162 ac, 75.12% Impervious, Inflow Depth = 3.49" for 10-YR event
Inflow = 0.60 cfs @ 12.11 hrs, Volume= 0.047 af
Outflow = 0.60 cfs @ 12.11 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min
Primary = 0.60 cfs @ 12.11 hrs, Volume= 0.047 af

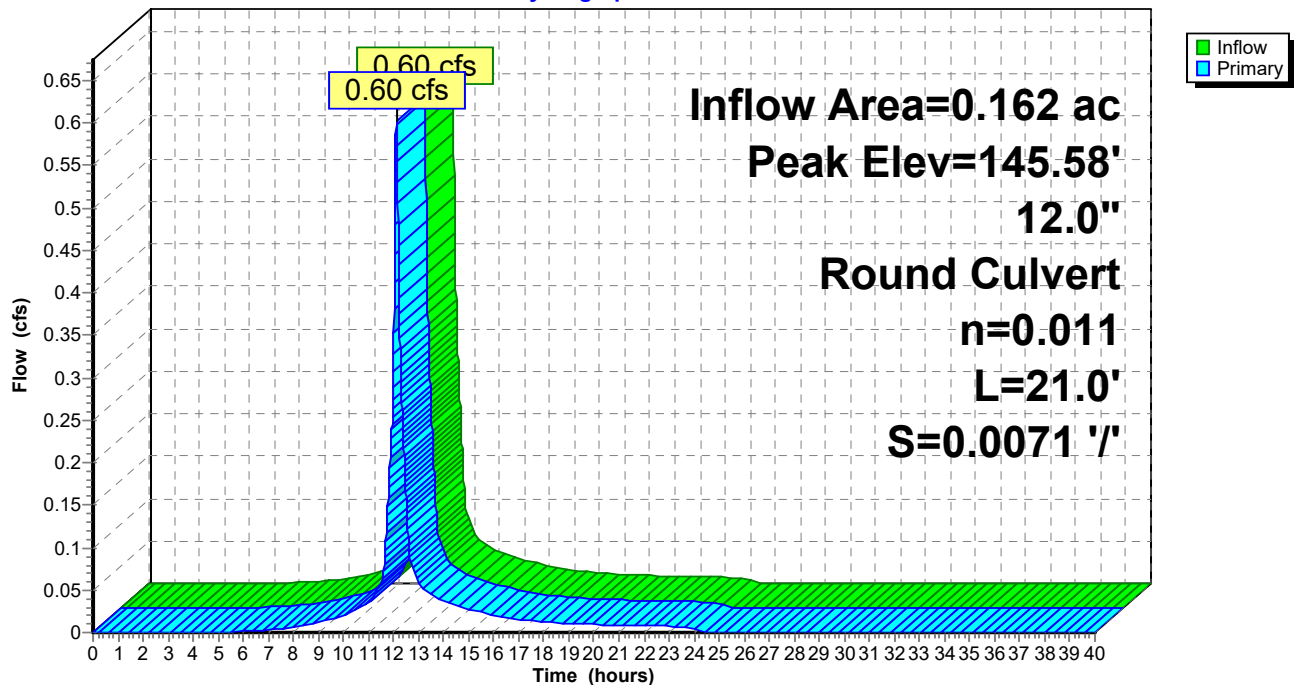
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.58' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	145.15'	12.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.15' / 145.00' S= 0.0071 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.60 cfs @ 12.11 hrs HW=145.58' (Free Discharge)
↑ **1=Culvert** (Barrel Controls 0.60 cfs @ 2.73 fps)

Pond 42P: CB22+10a

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 61

Summary for Subcatchment 43P: P2b

Runoff = 0.85 cfs @ 12.15 hrs, Volume= 0.072 af, Depth= 3.09"

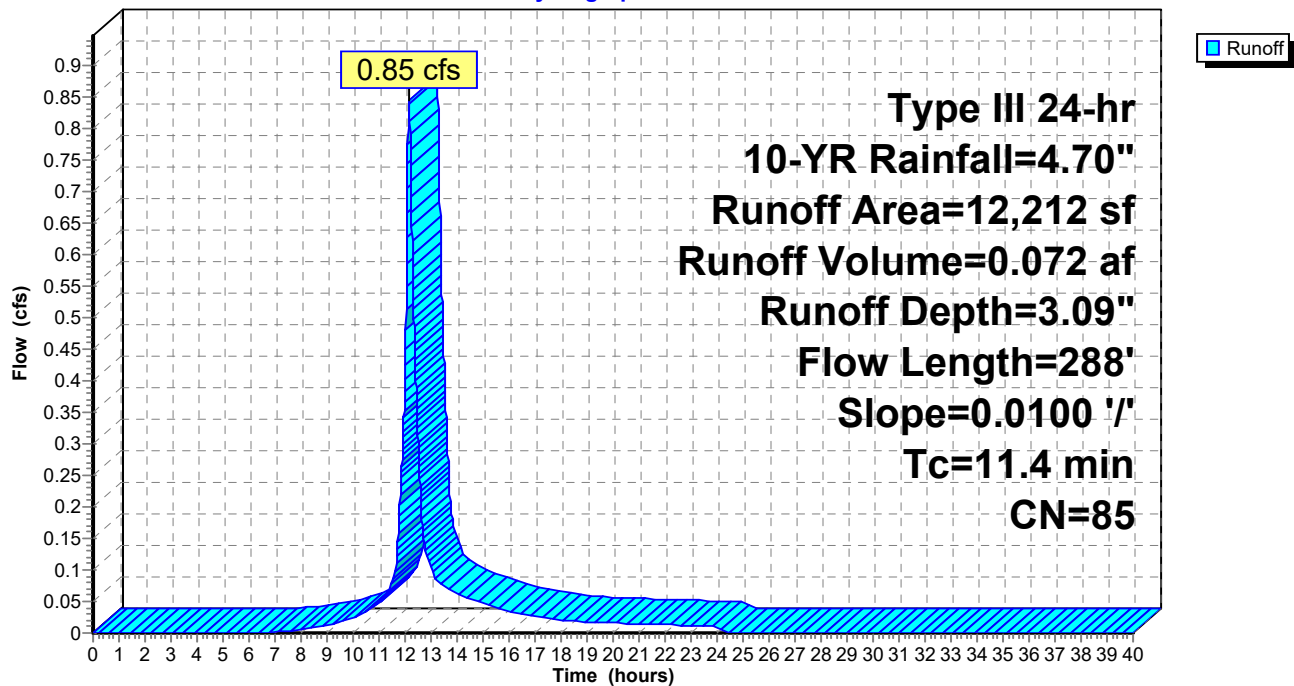
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
5,505	98	Paved parking HSG B
310	98	Roofs HSG B
3,911	61	>75% Grass cover, Good HSG B
705	74	>75% Grass cover, Good HSG C
1,230	98	Roofs HSG C
551	98	Paved parking HSG C
12,212	85	Weighted Average
4,616	63	37.80% Pervious Area
7,596	98	62.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
2.0	246	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.4	288	Total			

Subcatchment 43P: P2b

Hydrograph



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Page 62

Summary for Pond 44P: CB22+10b

Inflow Area = 0.280 ac, 62.20% Impervious, Inflow Depth = 3.09" for 10-YR event
Inflow = 0.85 cfs @ 12.15 hrs, Volume= 0.072 af
Outflow = 0.85 cfs @ 12.15 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.0 min
Primary = 0.85 cfs @ 12.15 hrs, Volume= 0.072 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.66' @ 12.15 hrs

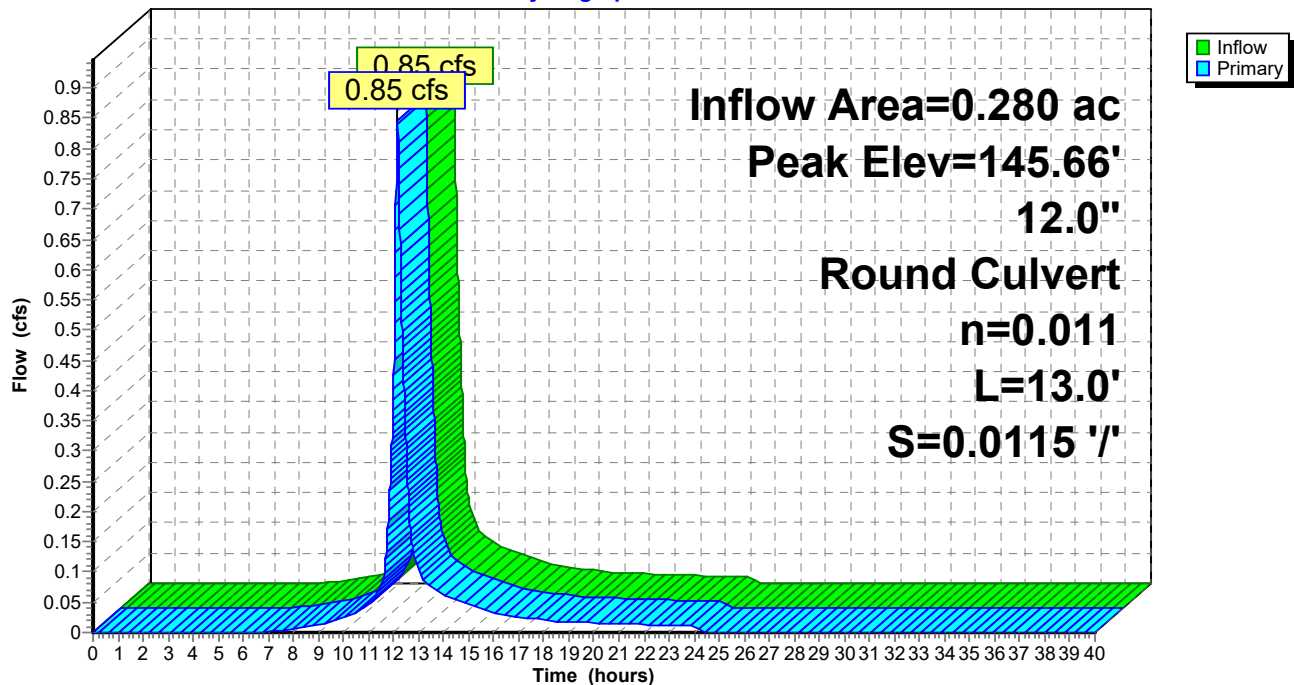
Device	Routing	Invert	Outlet Devices
#1	Primary	145.15'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.15' / 145.00' S= 0.0115 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.84 cfs @ 12.15 hrs HW=145.66' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.84 cfs @ 3.08 fps)

Pond 44P: CB22+10b

Hydrograph



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Page 63

Summary for Pond 45P: DMH22+20

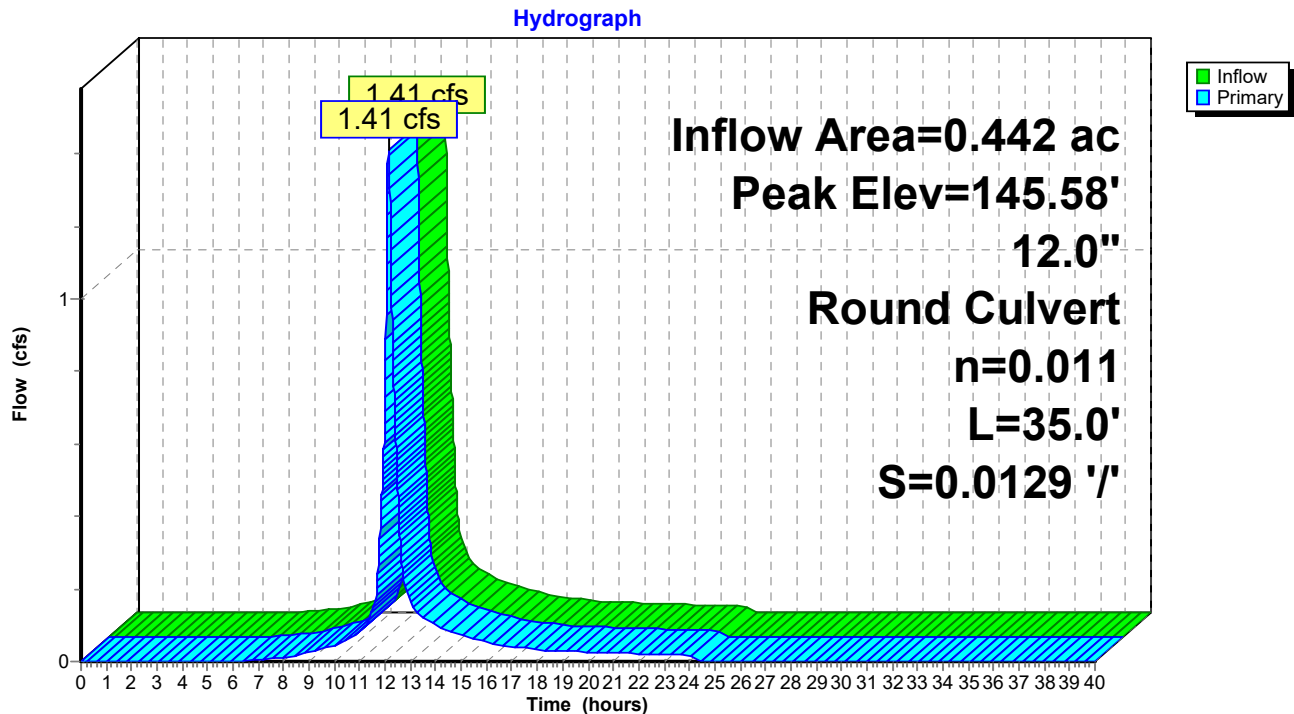
Inflow Area = 0.442 ac, 66.93% Impervious, Inflow Depth = 3.24" for 10-YR event
Inflow = 1.41 cfs @ 12.13 hrs, Volume= 0.119 af
Outflow = 1.41 cfs @ 12.13 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.0 min
Primary = 1.41 cfs @ 12.13 hrs, Volume= 0.119 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.58' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.95'	12.0" Round Culvert L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.95' / 144.50' S= 0.0129 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.41 cfs @ 12.13 hrs HW=145.58' (Free Discharge)
↑1=Culvert (Inlet Controls 1.41 cfs @ 2.70 fps)

Pond 45P: DMH22+20



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 64

Summary for Subcatchment 46P: P2c

Runoff = 0.62 cfs @ 12.09 hrs, Volume= 0.044 af, Depth= 2.46"

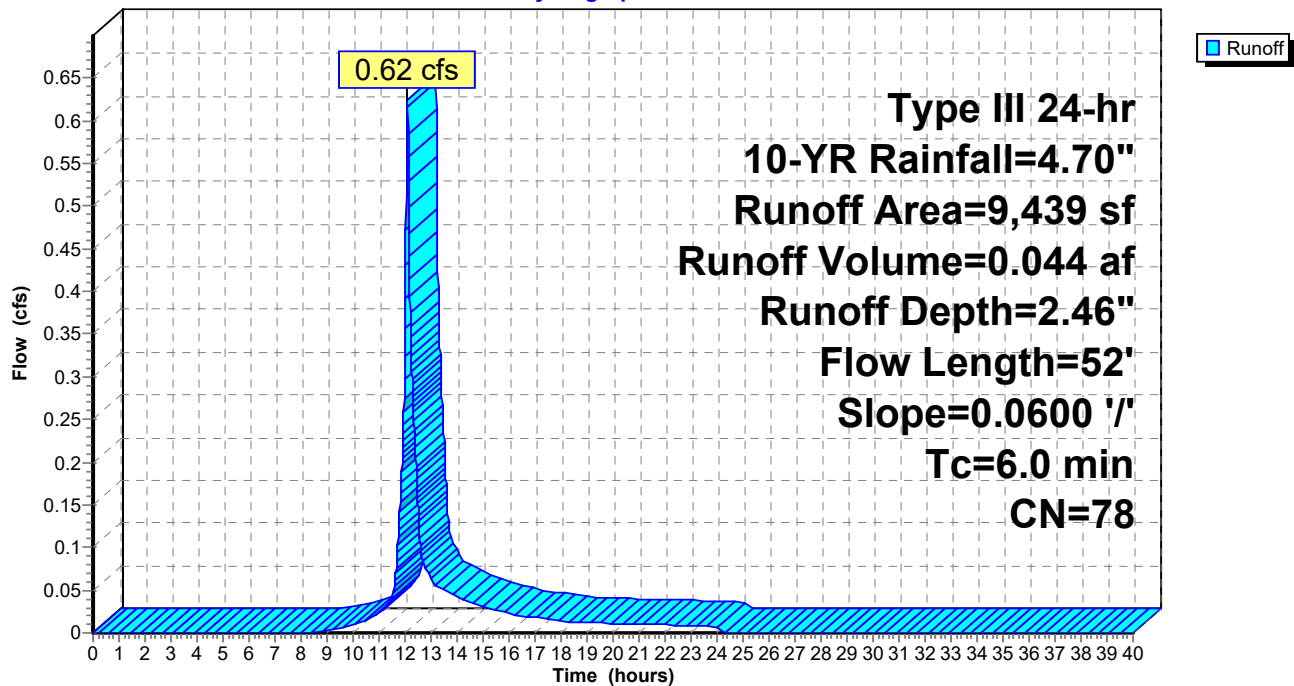
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
822	61	>75% Grass cover, Good HSG B
1,954	98	Water Surface HSG C
6,662	74	>75% Grass cover, Good HSG C
1	70	Woods, Good HSG C
9,439	78	Weighted Average
7,485	73	79.30% Pervious Area
1,954	98	20.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	52	0.0600	0.16		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
5.4	52	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 46P: P2c

Hydrograph



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Page 65

Summary for Pond 47P: Basin #3

Inflow Area = 0.659 ac, 51.73% Impervious, Inflow Depth = 2.98" for 10-YR event
 Inflow = 1.99 cfs @ 12.12 hrs, Volume= 0.164 af
 Outflow = 0.24 cfs @ 12.93 hrs, Volume= 0.164 af, Atten= 88%, Lag= 49.0 min
 Discarded = 0.16 cfs @ 12.93 hrs, Volume= 0.137 af
 Primary = 0.08 cfs @ 12.93 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 145.71' @ 12.93 hrs Surf.Area= 2,859 sf Storage= 2,903 cf

Plug-Flow detention time= 128.5 min calculated for 0.164 af (100% of inflow)
 Center-of-Mass det. time= 128.4 min (942.7 - 814.3)

Volume	Invert	Avail.Storage	Storage Description
#1	144.50'	9,424 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.50	1,961	173.0	0	0	1,961
147.50	4,494	249.0	9,424	9,424	4,591

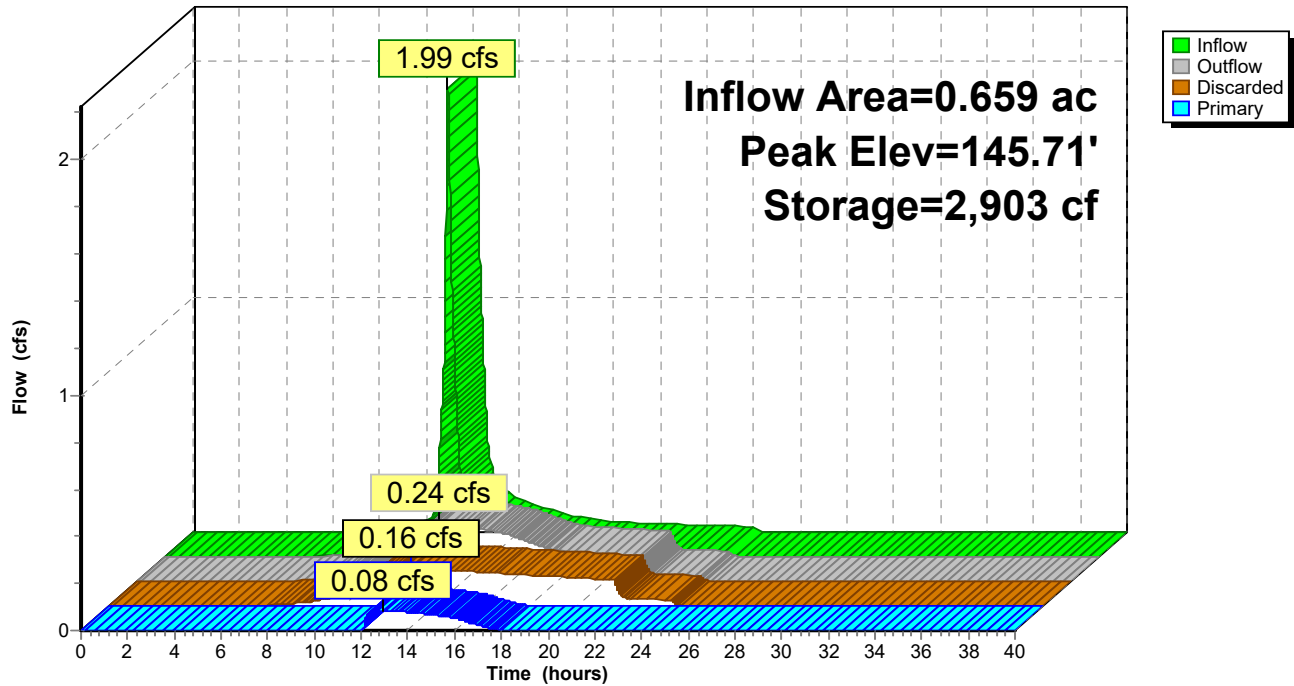
Device	Routing	Invert	Outlet Devices
#1	Discarded	144.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	146.50'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 146.50 147.50 Width (feet) 4.00 4.00
#3	Primary	145.00'	2.0" Round Culvert L= 1.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.00' / 145.00' S= 0.0000 ' /' Cc= 0.900 n= 0.011, Flow Area= 0.02 sf

Discarded OutFlow Max=0.16 cfs @ 12.93 hrs HW=145.71' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.08 cfs @ 12.93 hrs HW=145.71' (Free Discharge)
 ↑ **2=Custom Weir/Orifice** (Controls 0.00 cfs)
 ↑ **3=Culvert** (Inlet Controls 0.08 cfs @ 3.82 fps)

Pond 47P: Basin #3

Hydrograph



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Page 67

Summary for Subcatchment 48P: P2d

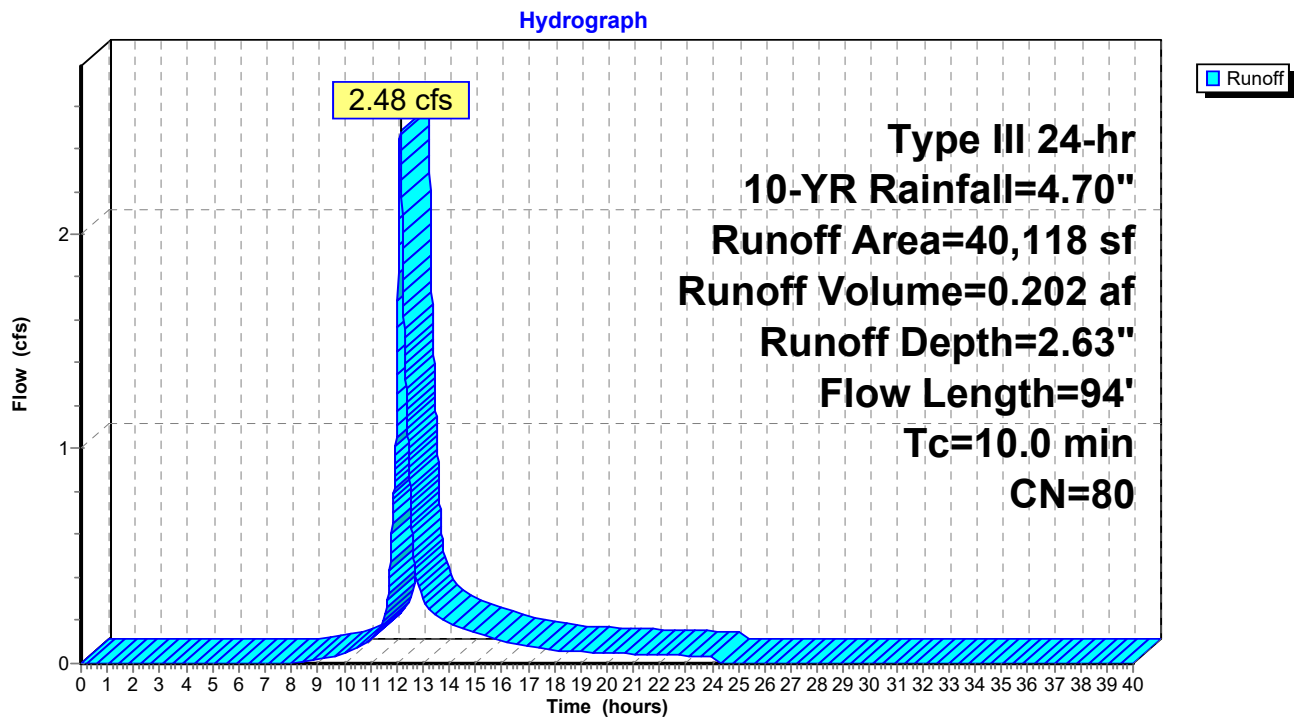
Runoff = 2.48 cfs @ 12.14 hrs, Volume= 0.202 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
10,069	61	>75% Grass cover, Good HSG B
1,195	98	Water Surface HSG B
8,750	98	Water Surface HSG C
1,000	98	Paved parking HSG C
1,089	98	Paved parking HSG B
14,373	74	>75% Grass cover, Good HSG C
1,595	98	Roofs HSG C
2,047	98	Roofs HSG B
40,118	80	Weighted Average
24,442	69	60.93% Pervious Area
15,676	98	39.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.6	52	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.0	94	Total			

Subcatchment 48P: P2d



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Page 69

Summary for Pond 49P: Basin #4

Inflow Area = 0.921 ac, 39.07% Impervious, Inflow Depth = 2.63" for 10-YR event
 Inflow = 2.48 cfs @ 12.14 hrs, Volume= 0.202 af
 Outflow = 0.62 cfs @ 12.58 hrs, Volume= 0.202 af, Atten= 75%, Lag= 26.6 min
 Discarded = 0.25 cfs @ 12.58 hrs, Volume= 0.160 af
 Primary = 0.37 cfs @ 12.58 hrs, Volume= 0.042 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 147.08' @ 12.58 hrs Surf.Area= 10,705 sf Storage= 2,857 cf

Plug-Flow detention time= 56.0 min calculated for 0.202 af (100% of inflow)
 Center-of-Mass det. time= 56.0 min (884.2 - 828.2)

Volume	Invert	Avail.Storage	Storage Description
#1	146.80'	8,853 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.80	9,936	709.0	0	0	9,936
147.60	12,237	711.0	8,853	8,853	10,547

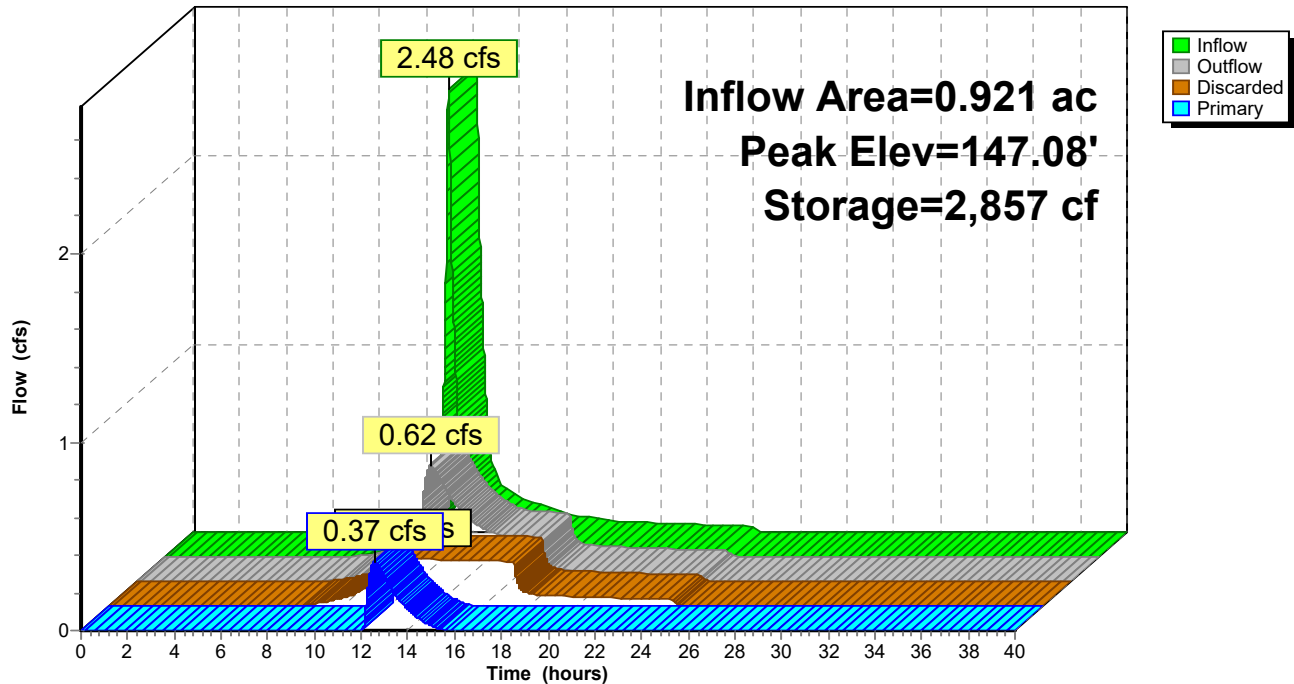
Device	Routing	Invert	Outlet Devices
#1	Discarded	146.80'	1.020 in/hr Exfiltration over Surface area
#2	Primary	146.90'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28)
			Elev. (feet) 146.90 147.20 147.20 148.00
			Width (feet) 1.50 1.50 8.00 8.00

Discarded OutFlow Max=0.25 cfs @ 12.58 hrs HW=147.08' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Primary OutFlow Max=0.37 cfs @ 12.58 hrs HW=147.08' (Free Discharge)
 ↑**2=Custom Weir/Orifice** (Weir Controls 0.37 cfs @ 1.38 fps)

Pond 49P: Basin #4

Hydrograph



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Page 71

Summary for Subcatchment 50P: P2f

Runoff = 24.03 cfs @ 12.47 hrs, Volume= 3.333 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
2,050	80	>75% Grass cover, Good HSG D
17,544	61	>75% Grass cover, Good HSG B
1,002	98	Paved parking HSG B
31,785	98	Paved parking HSG A
11,439	74	>75% Grass cover, Good HSG C
146,051	39	>75% Grass cover, Good HSG A
197	98	Paved parking HSG C
2,625	98	Roofs HSG B
16,036	98	Roofs HSG A
311,884	30	Woods, Good HSG A
66,486	55	Woods, Good HSG B
63,729	70	Woods, Good HSG C
715,303	77	Woods, Good HSG D
1,386,131	62	Weighted Average
1,334,486	60	96.27% Pervious Area
51,645	98	3.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	1,741	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
29.7	1,966	Total			

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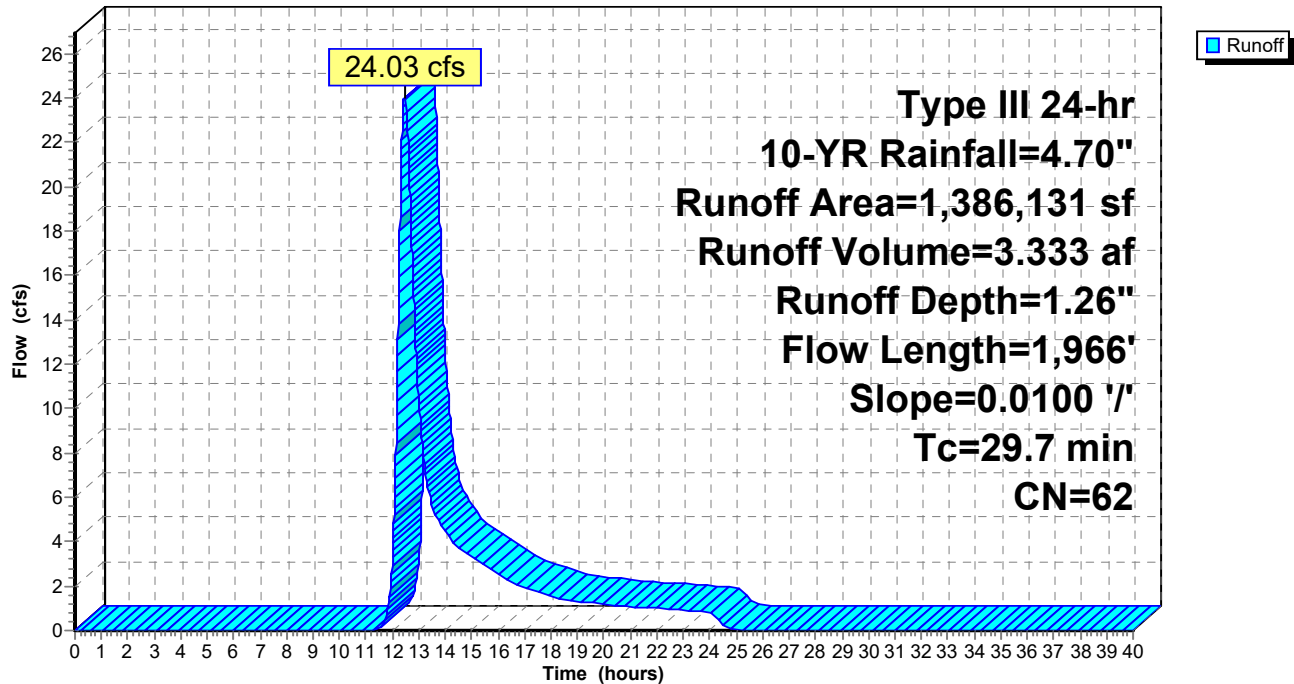
Type III 24-hr 10-YR Rainfall=4.70"

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Page 72

Subcatchment 50P: P2f

Hydrograph



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Page 73

Summary for Subcatchment 51P: P2g

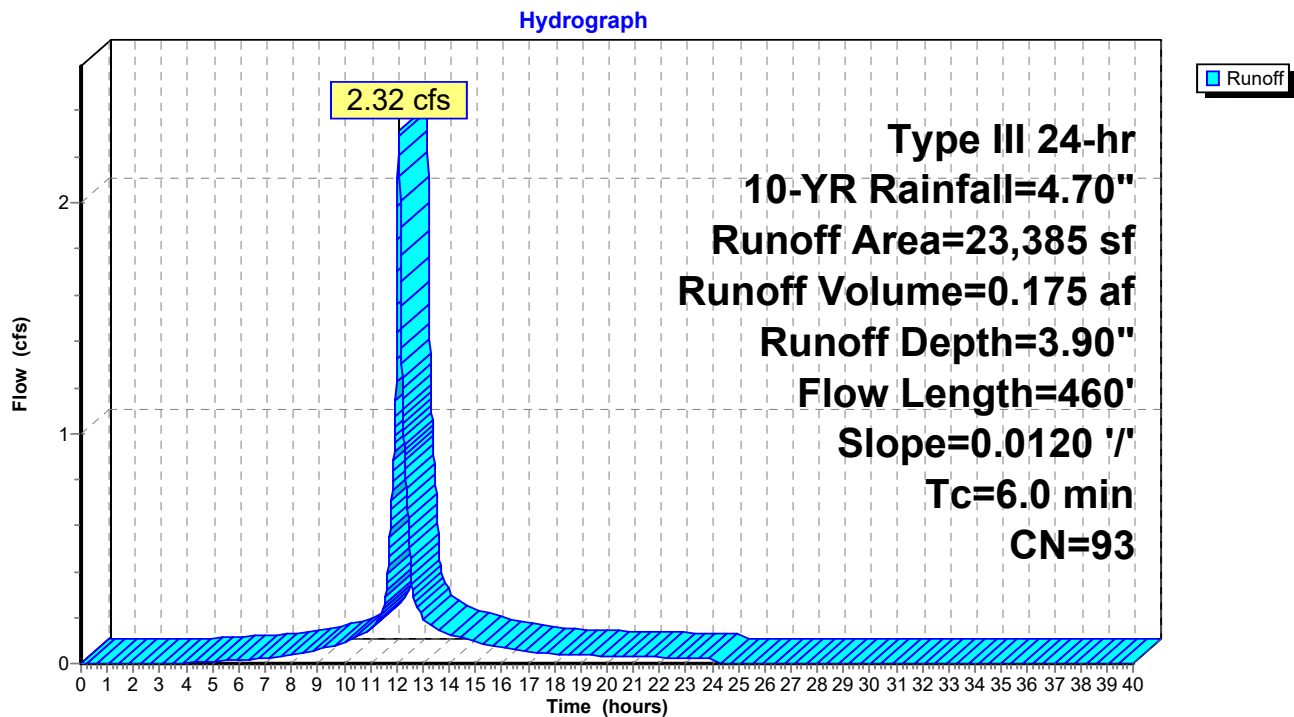
Runoff = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
1,223	98	Paved parking HSG D
614	98	Paved parking HSG B
222	61	>75% Grass cover, Good HSG B
236	39	>75% Grass cover, Good HSG A
2,406	74	>75% Grass cover, Good HSG C
2,519	98	Paved parking HSG A
15,474	98	Paved parking HSG C
161	30	Woods, Good HSG A
63	55	Woods, Good HSG B
467	70	Woods, Good HSG C
23,385	93	Weighted Average
3,555	68	15.20% Pervious Area
19,830	98	84.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	300	0.0120	1.40		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.2	160	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.8	460	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 51P: P2g



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Page 75

Summary for Pond 52P: CB23+19

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 3.90" for 10-YR event
Inflow = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af
Outflow = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.0 min
Primary = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.17' @ 12.08 hrs

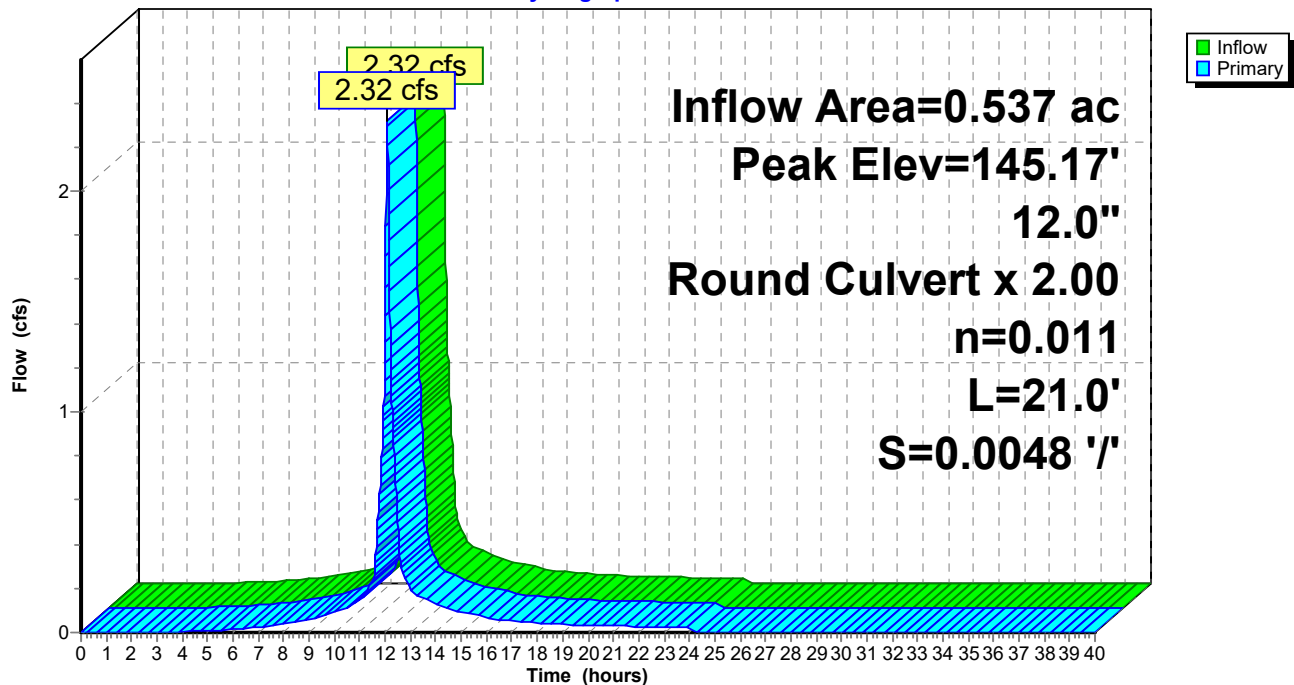
Device	Routing	Invert	Outlet Devices
#1	Primary	144.50'	12.0" Round Culvert X 2.00 L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.50' / 144.40' S= 0.0048 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.31 cfs @ 12.08 hrs HW=145.17' (Free Discharge)

↑1=Culvert (Barrel Controls 2.31 cfs @ 2.95 fps)

Pond 52P: CB23+19

Hydrograph



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Page 76

Summary for Pond 53P: DMH 23+34

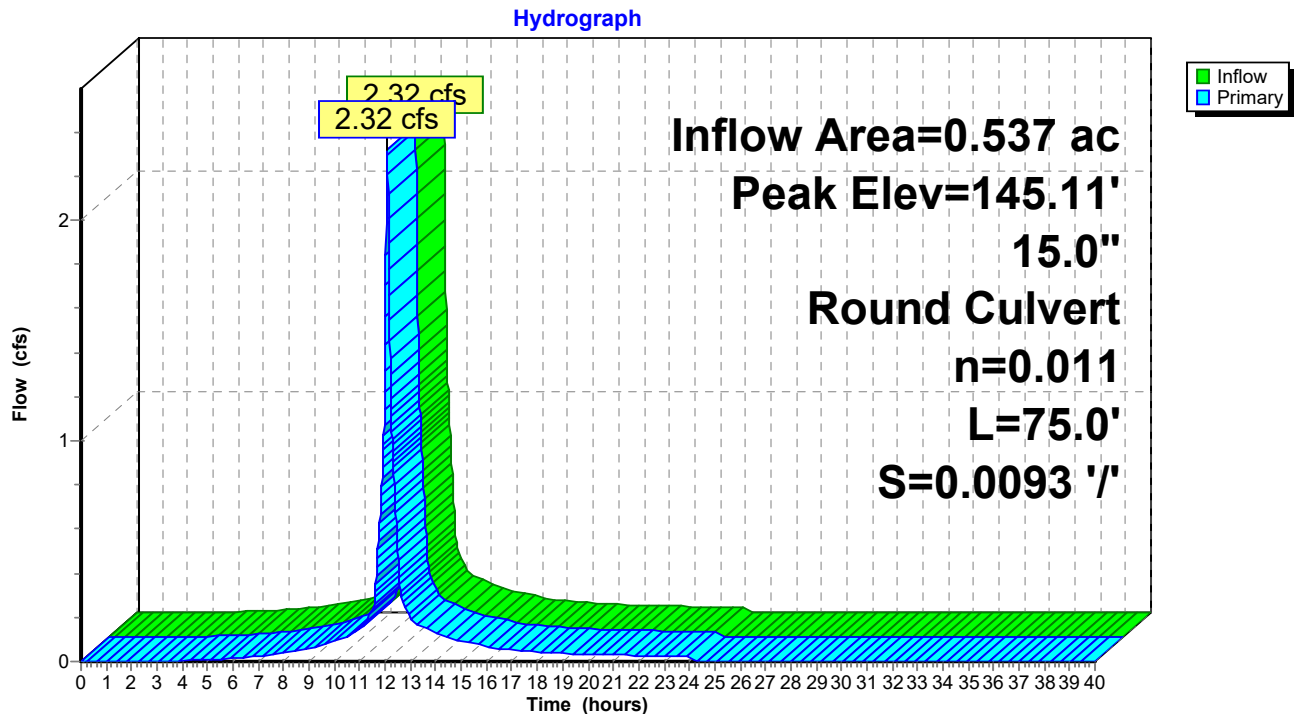
Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 3.90" for 10-YR event
Inflow = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af
Outflow = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.0 min
Primary = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.11' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.35'	15.0" Round Culvert L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.35' / 143.65' S= 0.0093 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=2.31 cfs @ 12.08 hrs HW=145.11' (Free Discharge)
↑ **1=Culvert** (Inlet Controls 2.31 cfs @ 2.97 fps)

Pond 53P: DMH 23+34



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Page 77

Summary for Pond 54P: FD24+09

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 3.90" for 10-YR event
Inflow = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af
Outflow = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.0 min
Primary = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af

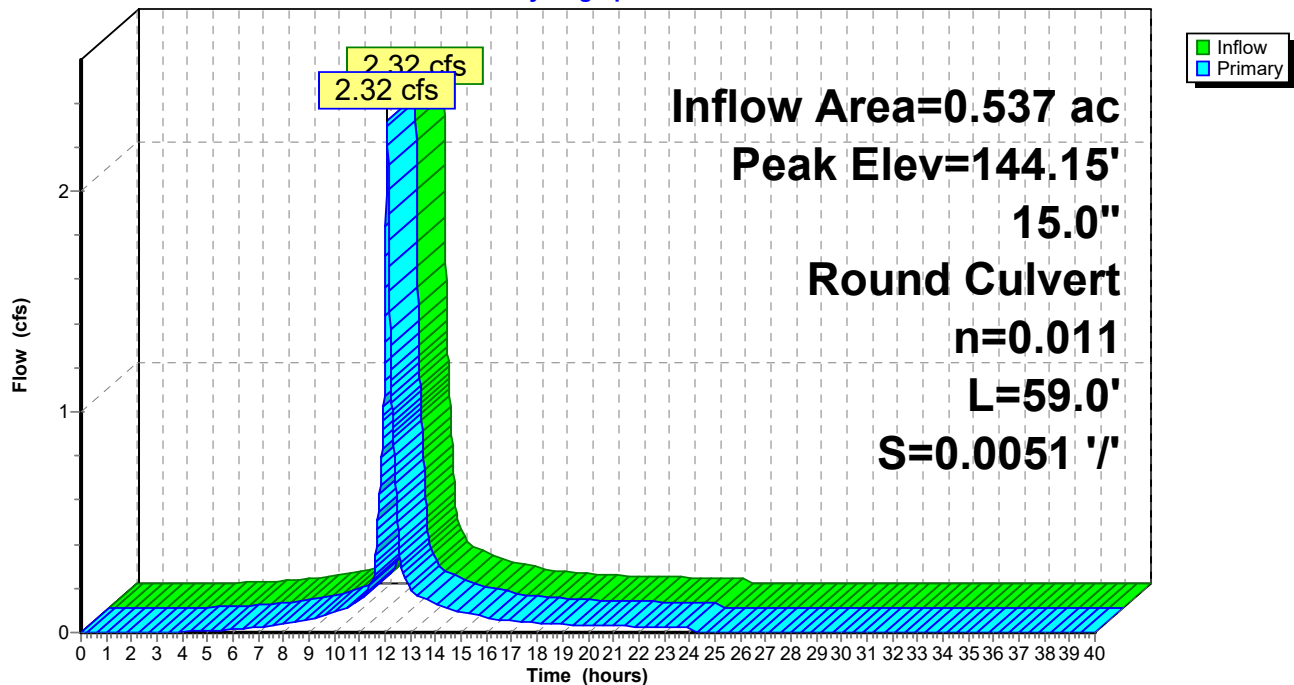
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 144.15' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	15.0" Round Culvert L= 59.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 143.30' / 143.00' S= 0.0051 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=2.31 cfs @ 12.08 hrs HW=144.15' (Free Discharge)
↑1=Culvert (Barrel Controls 2.31 cfs @ 3.66 fps)

Pond 54P: FD24+09

Hydrograph



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 78

Summary for Pond 55P: FD24+70

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 3.90" for 10-YR event
Inflow = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af
Outflow = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.0 min
Primary = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af

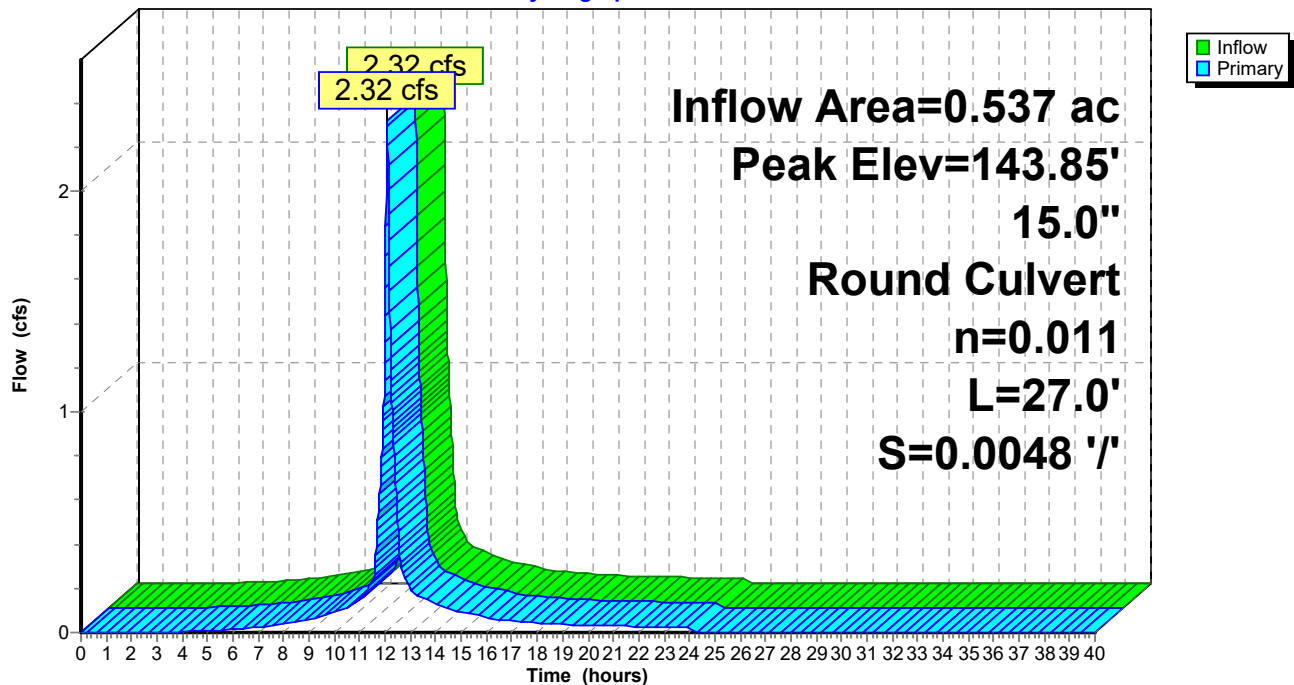
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 143.85' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	142.95'	15.0" Round Culvert L= 27.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 142.95' / 142.82' S= 0.0048 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=2.31 cfs @ 12.08 hrs HW=143.85' (Free Discharge)
↑1=Culvert (Barrel Controls 2.31 cfs @ 3.44 fps)

Pond 55P: FD24+70

Hydrograph



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Page 79

Summary for Pond 56P: Wetland Storage

Inflow Area = 33.938 ac, 6.90% Impervious, Inflow Depth = 1.26" for 10-YR event
 Inflow = 25.02 cfs @ 12.45 hrs, Volume= 3.577 af
 Outflow = 8.64 cfs @ 13.15 hrs, Volume= 3.520 af, Atten= 65%, Lag= 42.0 min
 Primary = 8.64 cfs @ 13.15 hrs, Volume= 3.520 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 144.46' @ 13.15 hrs Surf.Area= 154,782 sf Storage= 45,094 cf

Plug-Flow detention time= 70.6 min calculated for 3.519 af (98% of inflow)
 Center-of-Mass det. time= 61.8 min (950.4 - 888.6)

Volume	Invert	Avail.Storage	Storage Description
#1	142.71'	205,693 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
142.71	100	50.0	0	0	100
144.00	20,500	4,000.0	9,474	9,474	1,273,143
145.00	470,000	4,330.0	196,219	205,693	1,491,933

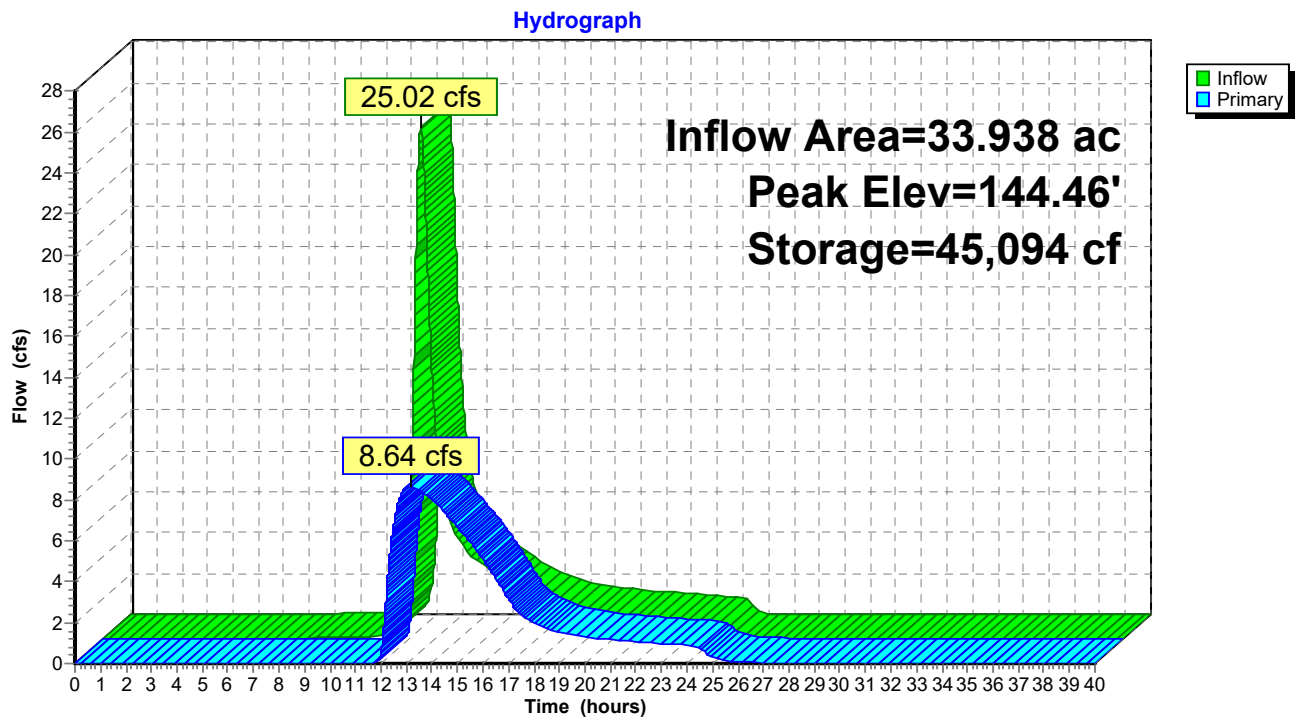
Device	Routing	Invert	Outlet Devices
#1	Primary	142.71'	36.0" W x 8.0" H Box Culvert X 2.00 L= 50.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 142.71' / 142.46' S= 0.0050 ' / Cc= 0.900 n= 0.018, Flow Area= 2.00 sf
#2	Device 1	143.50'	Custom Weir/Orifice X 2.00, Cv= 2.62 (C= 3.28) Elev. (feet) 143.50 144.90 144.90 145.00 Width (feet) 1.40 1.40 3.00 3.00

Primary OutFlow Max=8.64 cfs @ 13.15 hrs HW=144.46' (Free Discharge)

1=Culvert (Passes 8.64 cfs of 18.14 cfs potential flow)

2=Custom Weir/Orifice (Weir Controls 8.64 cfs @ 3.21 fps)

Pond 56P: Wetland Storage



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Type III 24-hr 10-YR Rainfall=4.70"

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Page 81

Summary for Subcatchment 57P: P2e

Runoff = 0.20 cfs @ 12.45 hrs, Volume= 0.045 af, Depth= 0.35"

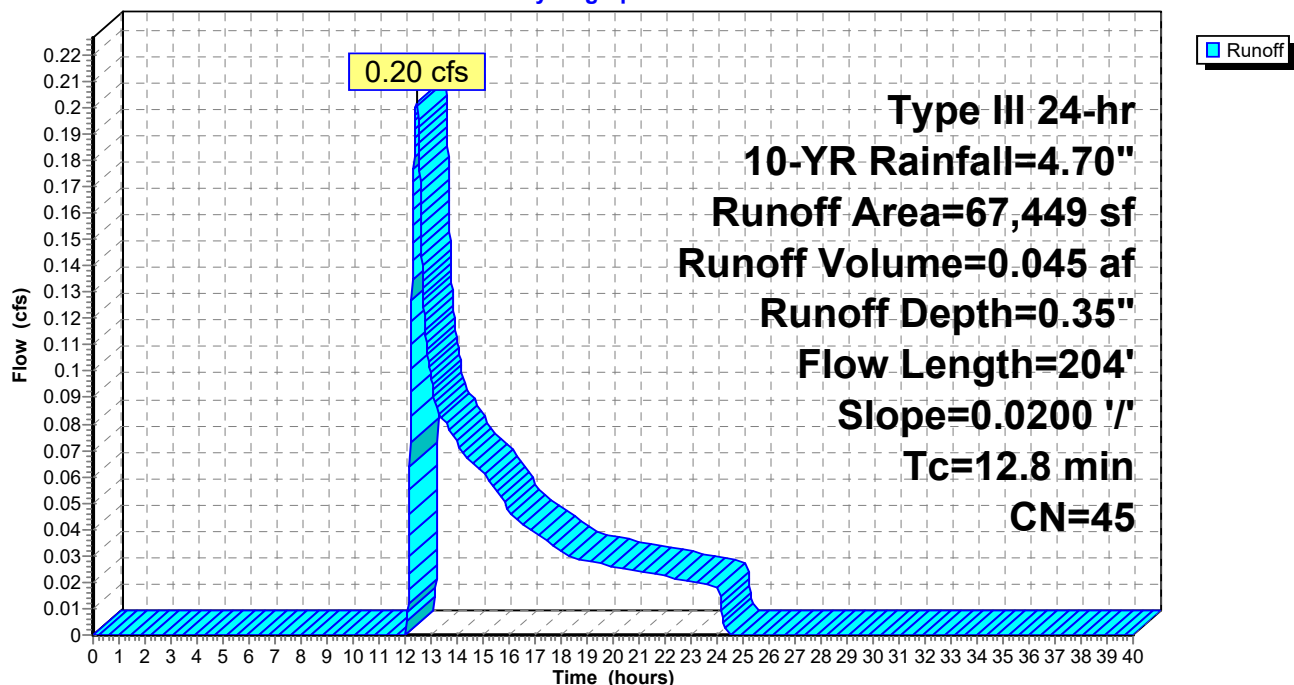
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.70"

Area (sf)	CN	Description
13,005	61	>75% Grass cover, Good HSG B
531	39	>75% Grass cover, Good HSG A
844	98	Roofs HSG B
504	98	Paved parking HSG B
33,230	30	Woods, Good HSG A
19,335	55	Woods, Good HSG B
67,449	45	Weighted Average
66,101	43	98.00% Pervious Area
1,348	98	2.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	59	0.0200	0.11		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
3.4	145	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.8	204	Total			

Subcatchment 57P: P2e

Hydrograph

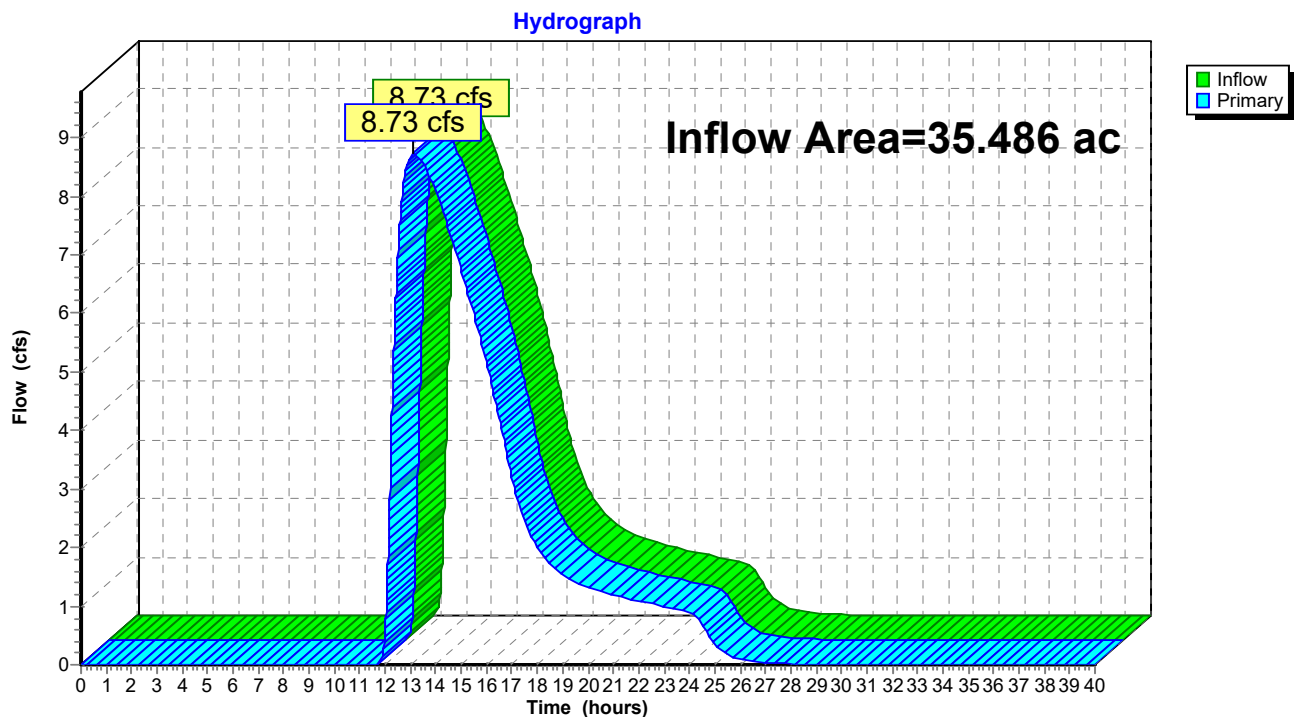


Summary for Link 58P: Design Point #2: Flow to Southern Abutter

Inflow Area = 35.486 ac, 6.69% Impervious, Inflow Depth = 1.21" for 10-YR event
 Inflow = 8.73 cfs @ 13.14 hrs, Volume= 3.565 af
 Primary = 8.73 cfs @ 13.14 hrs, Volume= 3.565 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 58P: Design Point #2: Flow to Southern Abutter



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 83

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment41P: P2a Runoff Area=7,053 sf 75.12% Impervious Runoff Depth=4.83"
Flow Length=245' Slope=0.0100 '/' Tc=8.0 min CN=89 Runoff=0.82 cfs 0.065 af

Pond 42P: CB22+10a Peak Elev=145.67' Inflow=0.82 cfs 0.065 af
12.0" Round Culvert n=0.011 L=21.0' S=0.0071 '/' Outflow=0.82 cfs 0.065 af

Subcatchment43P: P2b Runoff Area=12,212 sf 62.20% Impervious Runoff Depth=4.40"
Flow Length=288' Slope=0.0100 '/' Tc=11.4 min CN=85 Runoff=1.19 cfs 0.103 af

Pond 44P: CB22+10b Peak Elev=145.77' Inflow=1.19 cfs 0.103 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0115 '/' Outflow=1.19 cfs 0.103 af

Pond 45P: DMH22+20 Peak Elev=145.73' Inflow=1.96 cfs 0.168 af
12.0" Round Culvert n=0.011 L=35.0' S=0.0129 '/' Outflow=1.96 cfs 0.168 af

Subcatchment46P: P2c Runoff Area=9,439 sf 20.70% Impervious Runoff Depth=3.67"
Flow Length=52' Slope=0.0600 '/' Tc=6.0 min CN=78 Runoff=0.93 cfs 0.066 af

Pond 47P: Basin #3 Peak Elev=146.23' Storage=4,487 cf Inflow=2.82 cfs 0.234 af
Discarded=0.18 cfs 0.180 af Primary=0.11 cfs 0.054 af Outflow=0.30 cfs 0.234 af

Subcatchment48P: P2d Runoff Area=40,118 sf 39.07% Impervious Runoff Depth=3.87"
Flow Length=94' Tc=10.0 min CN=80 Runoff=3.64 cfs 0.297 af

Pond 49P: Basin #4 Peak Elev=147.20' Storage=4,181 cf Inflow=3.64 cfs 0.297 af
Discarded=0.26 cfs 0.198 af Primary=0.80 cfs 0.099 af Outflow=1.06 cfs 0.297 af

Subcatchment50P: P2f Runoff Area=1,386,131 sf 3.73% Impervious Runoff Depth=2.16"
Flow Length=1,966' Slope=0.0100 '/' Tc=29.7 min CN=62 Runoff=43.96 cfs 5.726 af

Subcatchment51P: P2g Runoff Area=23,385 sf 84.80% Impervious Runoff Depth=5.28"
Flow Length=460' Slope=0.0120 '/' Tc=6.0 min CN=93 Runoff=3.08 cfs 0.236 af

Pond 52P: CB23+19 Peak Elev=145.29' Inflow=3.08 cfs 0.236 af
12.0" Round Culvert x 2.00 n=0.011 L=21.0' S=0.0048 '/' Outflow=3.08 cfs 0.236 af

Pond 53P: DMH 23+34 Peak Elev=145.26' Inflow=3.08 cfs 0.236 af
15.0" Round Culvert n=0.011 L=75.0' S=0.0093 '/' Outflow=3.08 cfs 0.236 af

Pond 54P: FD24+09 Peak Elev=144.32' Inflow=3.08 cfs 0.236 af
15.0" Round Culvert n=0.011 L=59.0' S=0.0051 '/' Outflow=3.08 cfs 0.236 af

Pond 55P: FD24+70 Peak Elev=144.02' Inflow=3.08 cfs 0.236 af
15.0" Round Culvert n=0.011 L=27.0' S=0.0048 '/' Outflow=3.08 cfs 0.236 af

Pond 56P: Wetland Storage Peak Elev=144.69' Storage=93,544 cf Inflow=45.65 cfs 6.115 af
Outflow=11.95 cfs 6.058 af

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Type III 24-hr 50-YR Rainfall=6.10"

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Page 84

Subcatchment 57P: P2e

Runoff Area=67,449 sf 2.00% Impervious Runoff Depth=0.84"
Flow Length=204' Slope=0.0200 '/' Tc=12.8 min CN=45 Runoff=0.76 cfs 0.109 af

Link 58P: Design Point #2: Flow to Southern Abutter

Inflow=12.14 cfs 6.167 af
Primary=12.14 cfs 6.167 af

Total Runoff Area = 35.486 ac Runoff Volume = 6.602 af Average Runoff Depth = 2.23"
93.31% Pervious = 33.114 ac 6.69% Impervious = 2.373 ac

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Type III 24-hr 50-YR Rainfall=6.10"

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Page 85

Summary for Subcatchment 41P: P2a

Runoff = 0.82 cfs @ 12.11 hrs, Volume= 0.065 af, Depth= 4.83"

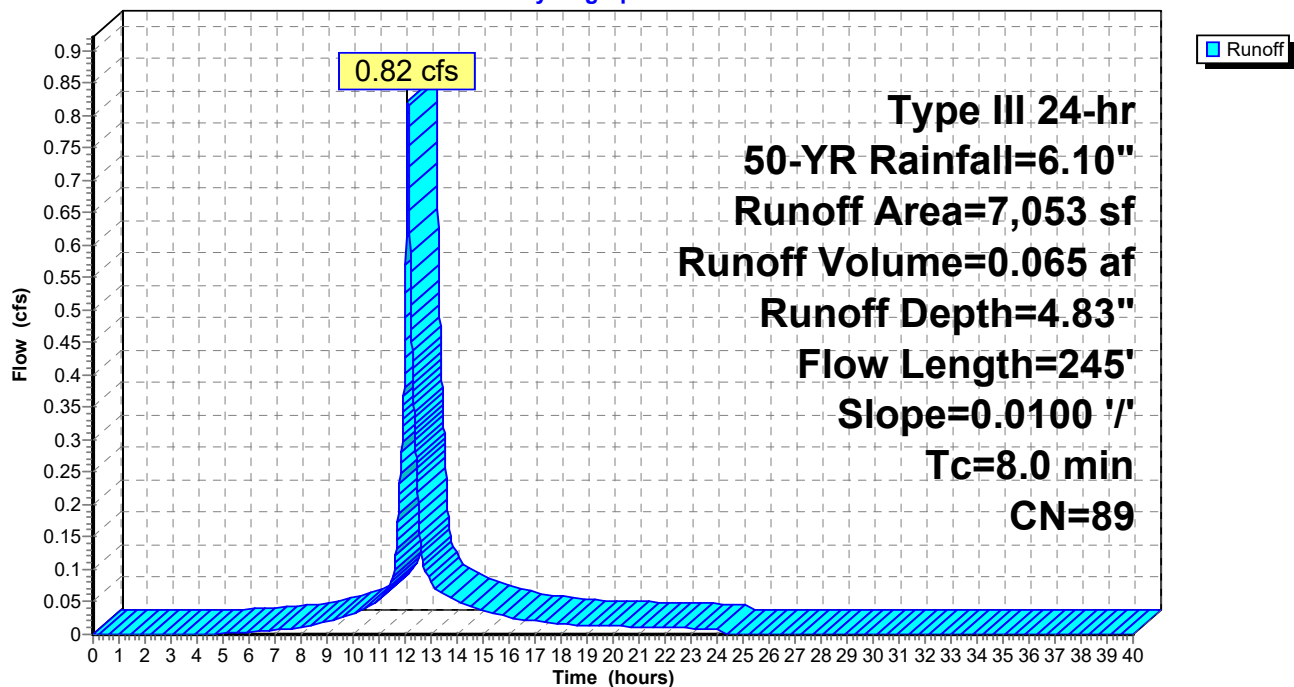
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
1,714	61	>75% Grass cover, Good HSG B
5,298	98	Paved parking HSG B
41	55	Woods, Good HSG B
7,053	89	Weighted Average
1,755	61	24.88% Pervious Area
5,298	98	75.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	25	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.8	220	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
8.0	245	Total			

Subcatchment 41P: P2a

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 86

Summary for Pond 42P: CB22+10a

Inflow Area = 0.162 ac, 75.12% Impervious, Inflow Depth = 4.83" for 50-YR event
Inflow = 0.82 cfs @ 12.11 hrs, Volume= 0.065 af
Outflow = 0.82 cfs @ 12.11 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min
Primary = 0.82 cfs @ 12.11 hrs, Volume= 0.065 af

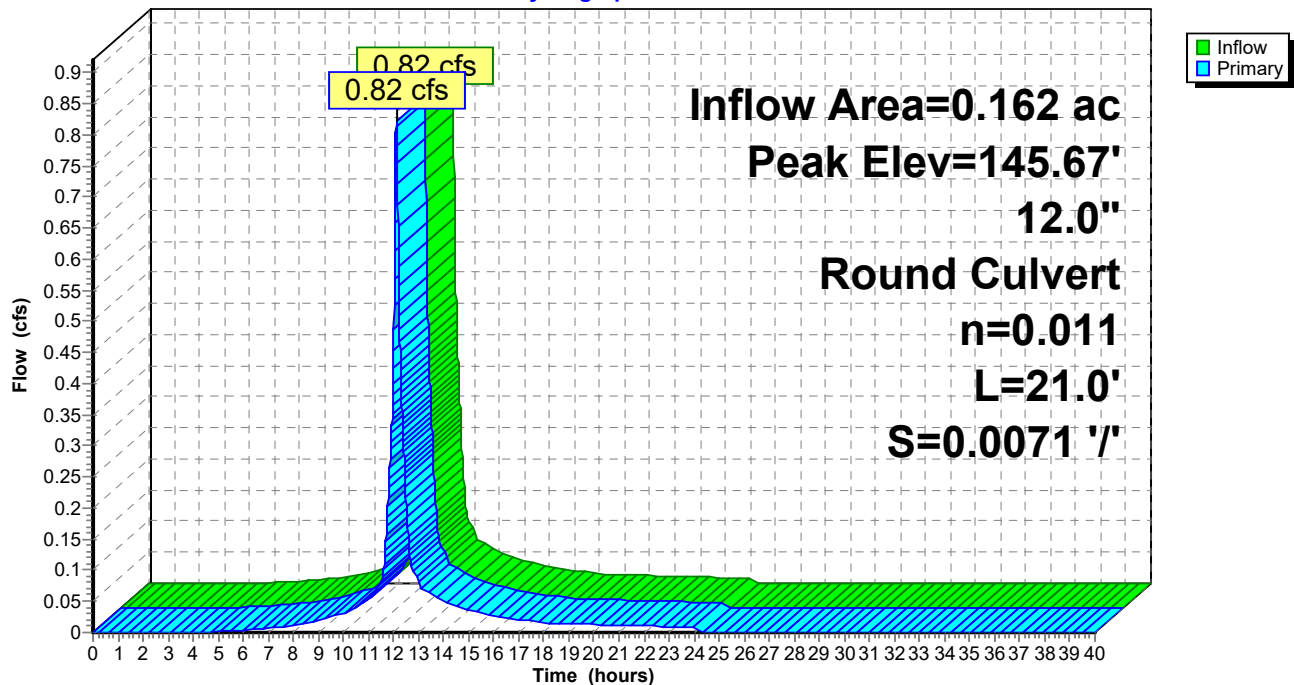
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.67' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	145.15'	12.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.15' / 145.00' S= 0.0071 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.82 cfs @ 12.11 hrs HW=145.67' (Free Discharge)
↑1=Culvert (Barrel Controls 0.82 cfs @ 2.93 fps)

Pond 42P: CB22+10a

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 87

Summary for Subcatchment 43P: P2b

Runoff = 1.19 cfs @ 12.15 hrs, Volume= 0.103 af, Depth= 4.40"

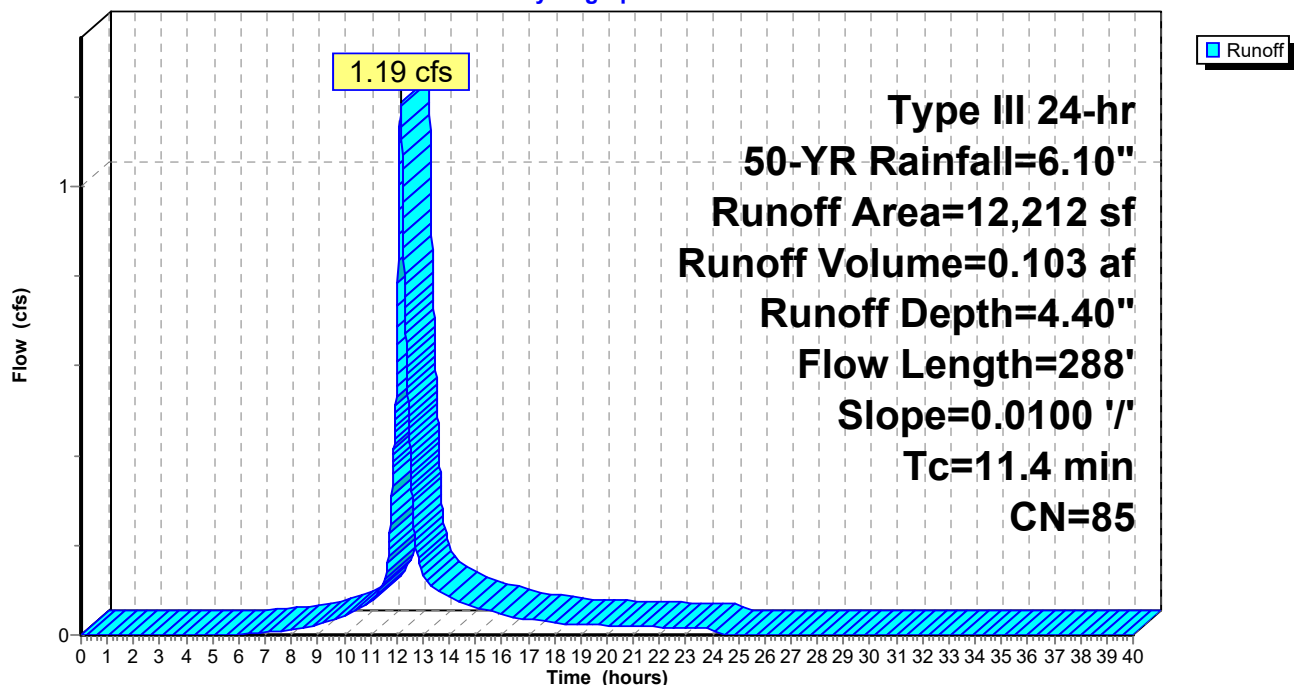
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
5,505	98	Paved parking HSG B
310	98	Roofs HSG B
3,911	61	>75% Grass cover, Good HSG B
705	74	>75% Grass cover, Good HSG C
1,230	98	Roofs HSG C
551	98	Paved parking HSG C
12,212	85	Weighted Average
4,616	63	37.80% Pervious Area
7,596	98	62.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
2.0	246	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.4	288	Total			

Subcatchment 43P: P2b

Hydrograph



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Page 88

Summary for Pond 44P: CB22+10b

Inflow Area = 0.280 ac, 62.20% Impervious, Inflow Depth = 4.40" for 50-YR event
Inflow = 1.19 cfs @ 12.15 hrs, Volume= 0.103 af
Outflow = 1.19 cfs @ 12.15 hrs, Volume= 0.103 af, Atten= 0%, Lag= 0.0 min
Primary = 1.19 cfs @ 12.15 hrs, Volume= 0.103 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.77' @ 12.15 hrs

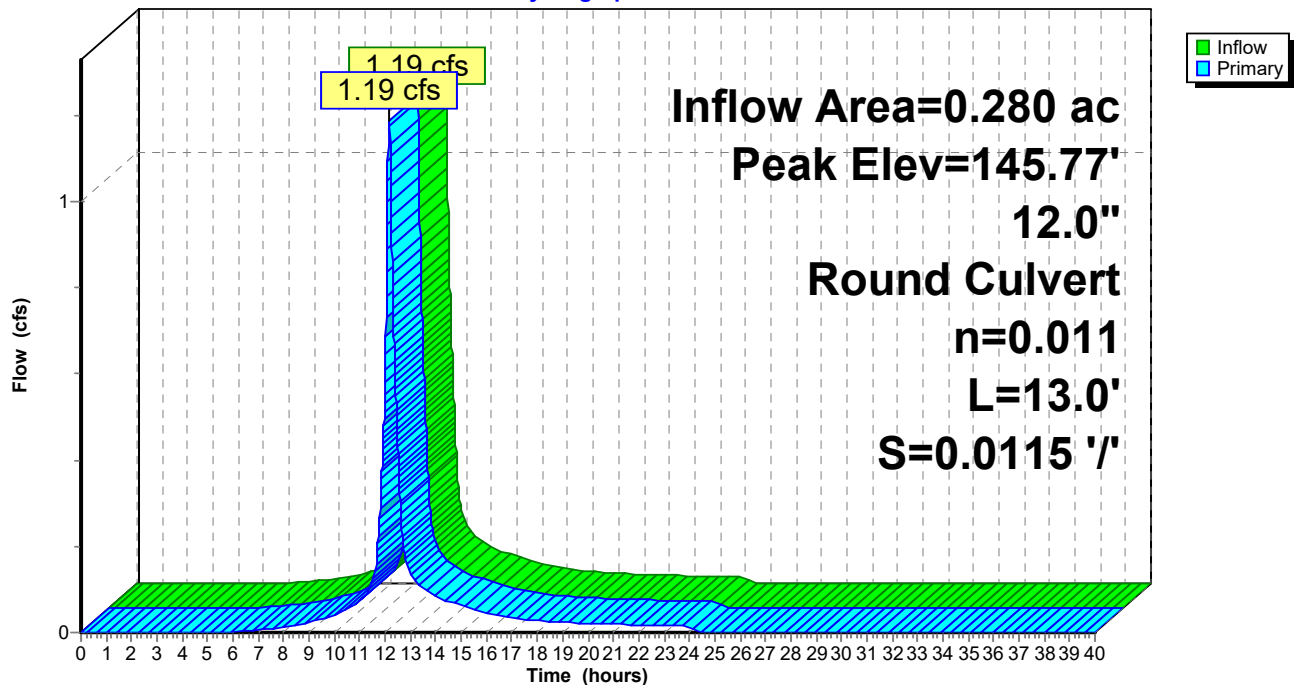
Device	Routing	Invert	Outlet Devices
#1	Primary	145.15'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.15' / 145.00' S= 0.0115 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.19 cfs @ 12.15 hrs HW=145.77' (Free Discharge)

↑1=Culvert (Barrel Controls 1.19 cfs @ 3.30 fps)

Pond 44P: CB22+10b

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 89

Summary for Pond 45P: DMH22+20

Inflow Area = 0.442 ac, 66.93% Impervious, Inflow Depth = 4.56" for 50-YR event
Inflow = 1.96 cfs @ 12.13 hrs, Volume= 0.168 af
Outflow = 1.96 cfs @ 12.13 hrs, Volume= 0.168 af, Atten= 0%, Lag= 0.0 min
Primary = 1.96 cfs @ 12.13 hrs, Volume= 0.168 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.73' @ 12.13 hrs

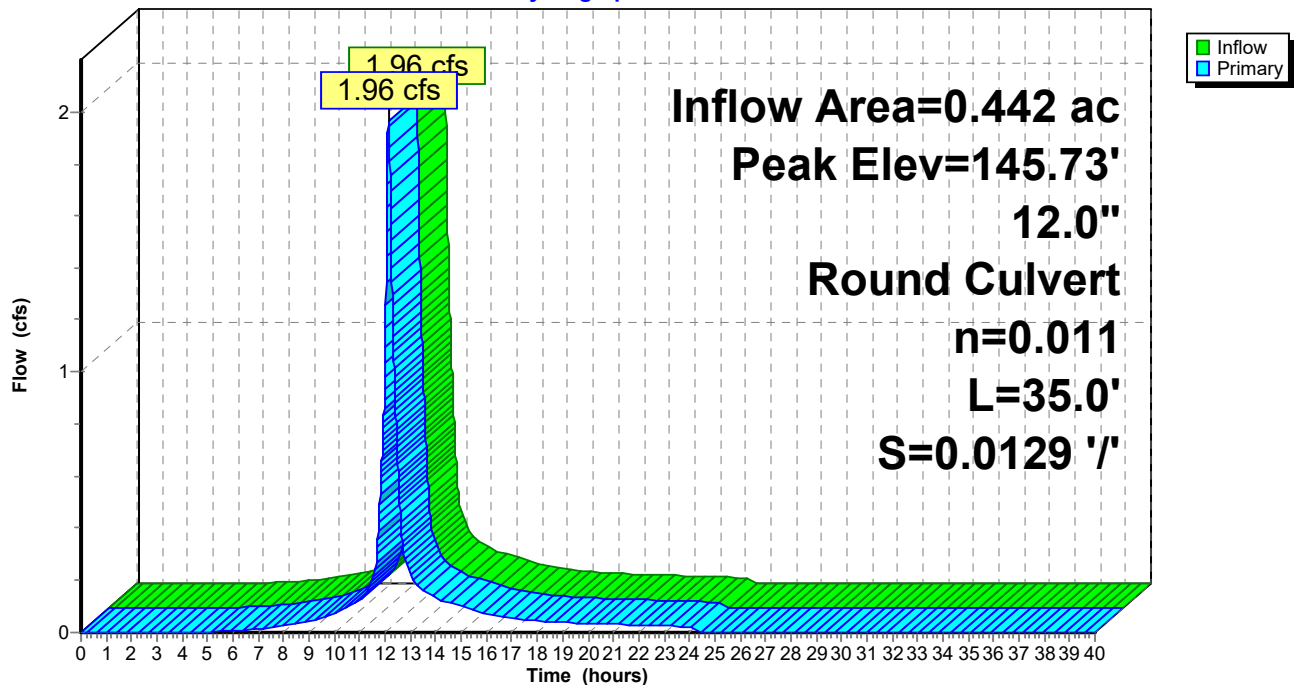
Device	Routing	Invert	Outlet Devices
#1	Primary	144.95'	12.0" Round Culvert L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.95' / 144.50' S= 0.0129 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.96 cfs @ 12.13 hrs HW=145.73' (Free Discharge)

↑1=Culvert (Inlet Controls 1.96 cfs @ 3.00 fps)

Pond 45P: DMH22+20

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 90

Summary for Subcatchment 46P: P2c

Runoff = 0.93 cfs @ 12.09 hrs, Volume= 0.066 af, Depth= 3.67"

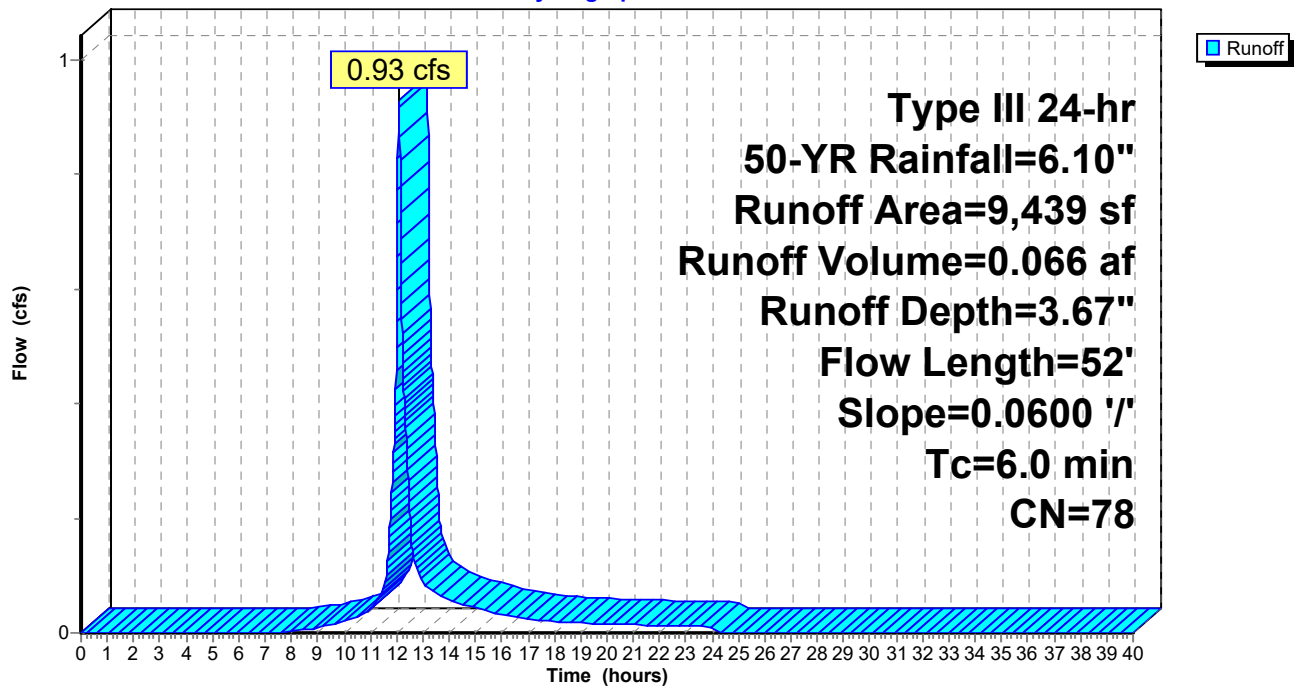
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
822	61	>75% Grass cover, Good HSG B
1,954	98	Water Surface HSG C
6,662	74	>75% Grass cover, Good HSG C
1	70	Woods, Good HSG C
9,439	78	Weighted Average
7,485	73	79.30% Pervious Area
1,954	98	20.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	52	0.0600	0.16		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
5.4	52	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 46P: P2c

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 91

Summary for Pond 47P: Basin #3

Inflow Area = 0.659 ac, 51.73% Impervious, Inflow Depth = 4.26" for 50-YR event
 Inflow = 2.82 cfs @ 12.12 hrs, Volume= 0.234 af
 Outflow = 0.30 cfs @ 13.04 hrs, Volume= 0.234 af, Atten= 89%, Lag= 55.6 min
 Discarded = 0.18 cfs @ 13.04 hrs, Volume= 0.180 af
 Primary = 0.11 cfs @ 13.04 hrs, Volume= 0.054 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.23' @ 13.04 hrs Surf.Area= 3,293 sf Storage= 4,487 cf

Plug-Flow detention time= 166.3 min calculated for 0.234 af (100% of inflow)
 Center-of-Mass det. time= 166.3 min (970.8 - 804.5)

Volume	Invert	Avail.Storage	Storage Description
#1	144.50'	9,424 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.50	1,961	173.0	0	0	1,961
147.50	4,494	249.0	9,424	9,424	4,591

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	146.50'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 146.50 147.50 Width (feet) 4.00 4.00
#3	Primary	145.00'	2.0" Round Culvert L= 1.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.00' / 145.00' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.011, Flow Area= 0.02 sf

Discarded OutFlow Max=0.18 cfs @ 13.04 hrs HW=146.23' (Free Discharge)
 1=Exfiltration (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.11 cfs @ 13.04 hrs HW=146.23' (Free Discharge)
 2=Custom Weir/Orifice (Controls 0.00 cfs)
 3=Culvert (Inlet Controls 0.11 cfs @ 5.15 fps)

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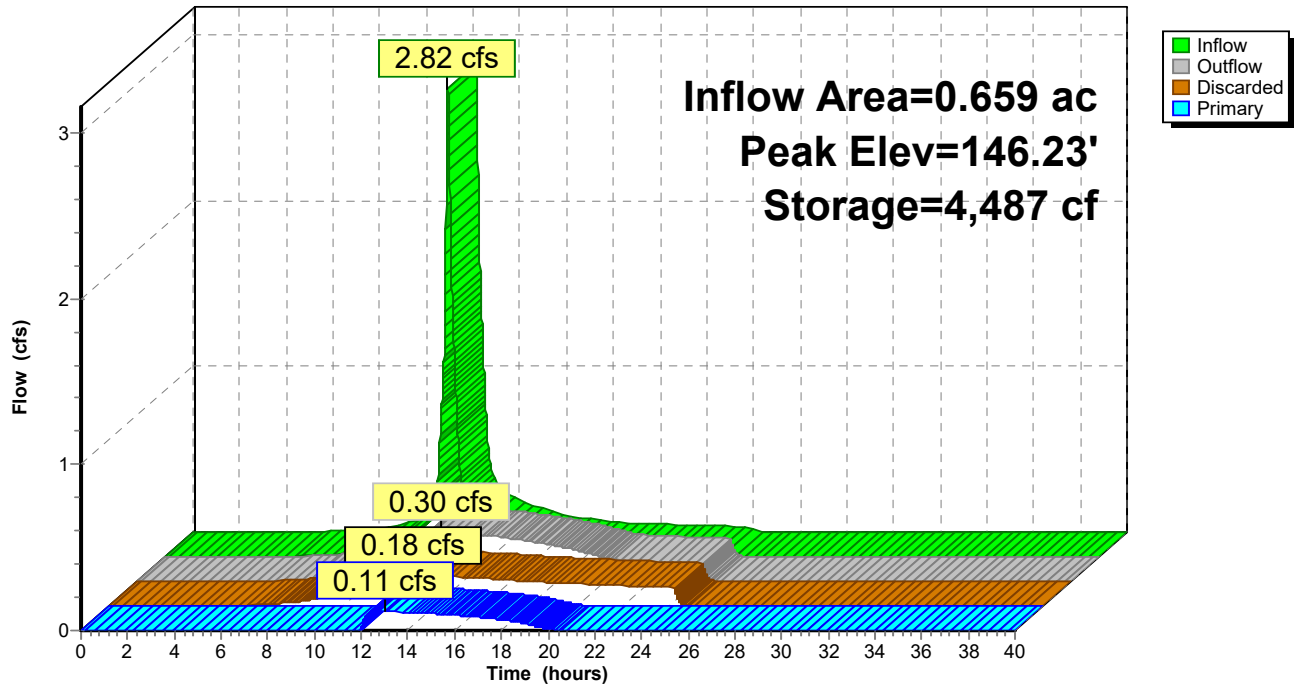
Type III 24-hr 50-YR Rainfall=6.10"

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Page 92

Pond 47P: Basin #3

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 93

Summary for Subcatchment 48P: P2d

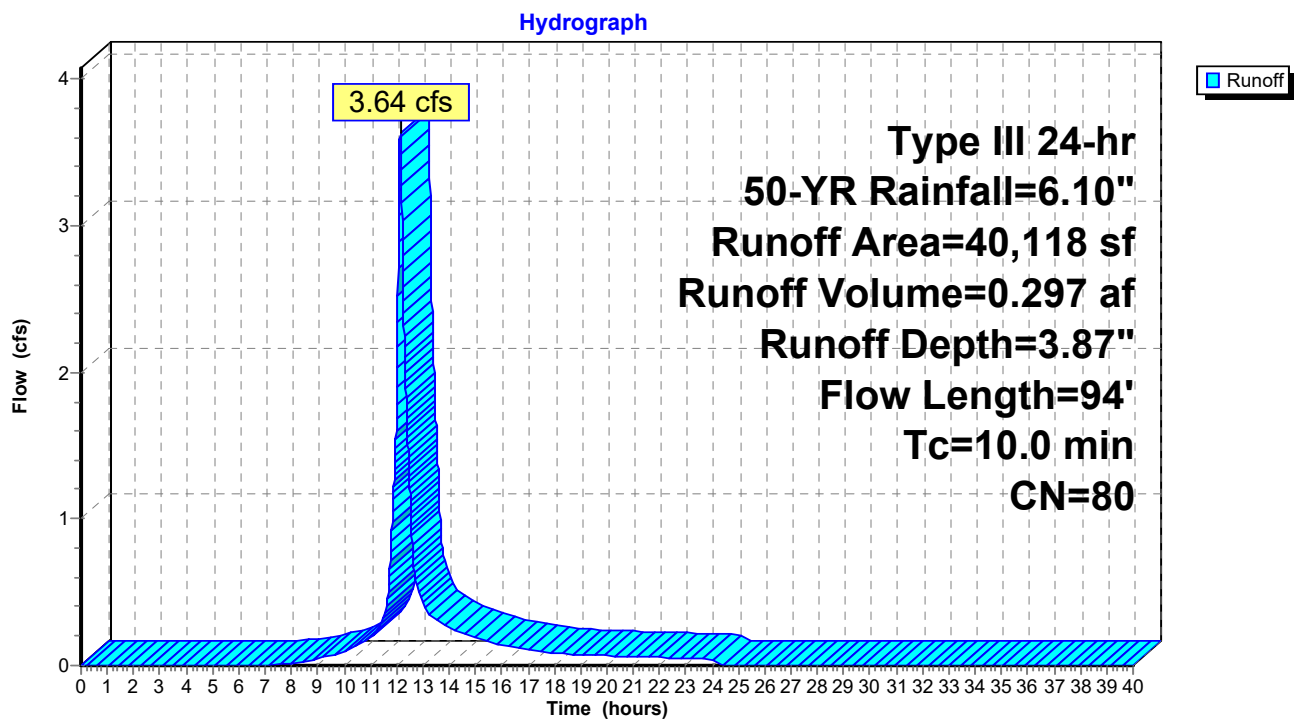
Runoff = 3.64 cfs @ 12.14 hrs, Volume= 0.297 af, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
10,069	61	>75% Grass cover, Good HSG B
1,195	98	Water Surface HSG B
8,750	98	Water Surface HSG C
1,000	98	Paved parking HSG C
1,089	98	Paved parking HSG B
14,373	74	>75% Grass cover, Good HSG C
1,595	98	Roofs HSG C
2,047	98	Roofs HSG B
40,118	80	Weighted Average
24,442	69	60.93% Pervious Area
15,676	98	39.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.6	52	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.0	94	Total			

Subcatchment 48P: P2d



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 95

Summary for Pond 49P: Basin #4

Inflow Area = 0.921 ac, 39.07% Impervious, Inflow Depth = 3.87" for 50-YR event
 Inflow = 3.64 cfs @ 12.14 hrs, Volume= 0.297 af
 Outflow = 1.06 cfs @ 12.54 hrs, Volume= 0.297 af, Atten= 71%, Lag= 23.8 min
 Discarded = 0.26 cfs @ 12.54 hrs, Volume= 0.198 af
 Primary = 0.80 cfs @ 12.54 hrs, Volume= 0.099 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 147.20' @ 12.54 hrs Surf.Area= 11,053 sf Storage= 4,181 cf

Plug-Flow detention time= 57.0 min calculated for 0.297 af (100% of inflow)
 Center-of-Mass det. time= 57.0 min (874.2 - 817.2)

Volume	Invert	Avail.Storage	Storage Description
#1	146.80'	8,853 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.80	9,936	709.0	0	0	9,936
147.60	12,237	711.0	8,853	8,853	10,547

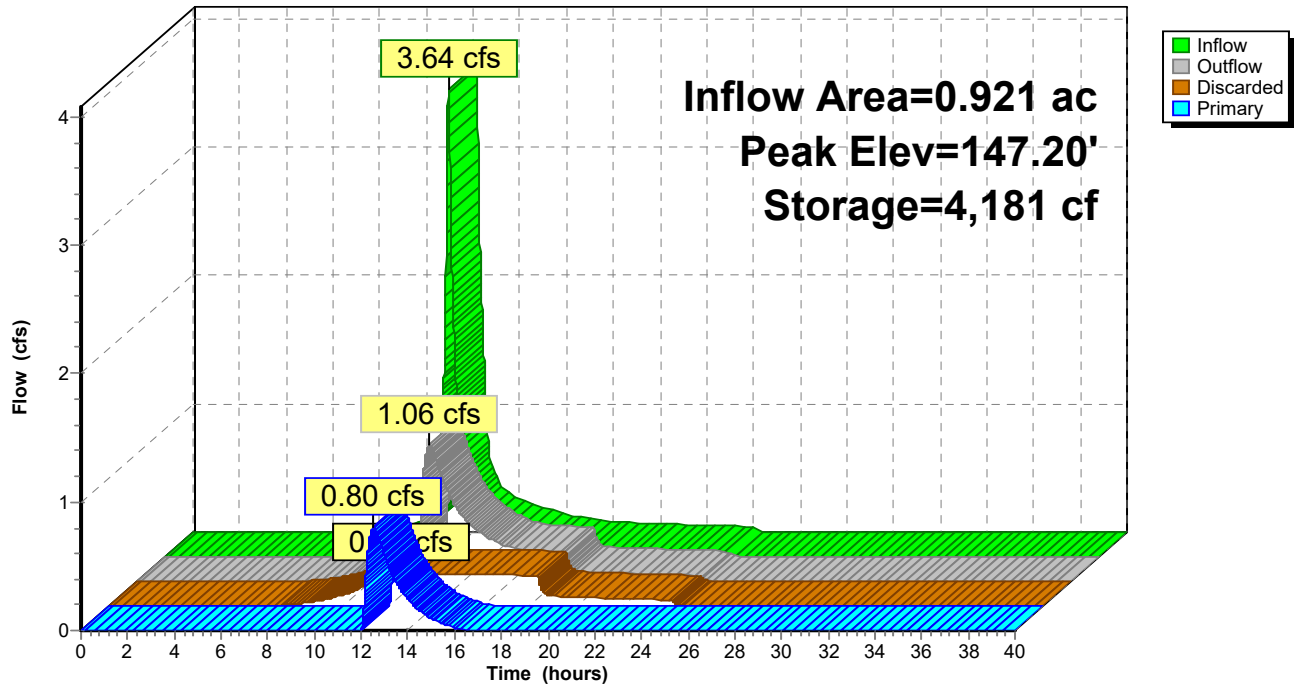
Device	Routing	Invert	Outlet Devices
#1	Discarded	146.80'	1.020 in/hr Exfiltration over Surface area
#2	Primary	146.90'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28)
			Elev. (feet) 146.90 147.20 147.20 148.00
			Width (feet) 1.50 1.50 8.00 8.00

Discarded OutFlow Max=0.26 cfs @ 12.54 hrs HW=147.20' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=0.80 cfs @ 12.54 hrs HW=147.20' (Free Discharge)
 ↑**2=Custom Weir/Orifice** (Weir Controls 0.80 cfs @ 1.79 fps)

Pond 49P: Basin #4

Hydrograph



Ridge Street HydroCAD Revised Final

Type III 24-hr 50-YR Rainfall=6.10"

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Page 97

Summary for Subcatchment 50P: P2f

Runoff = 43.96 cfs @ 12.44 hrs, Volume= 5.726 af, Depth= 2.16"

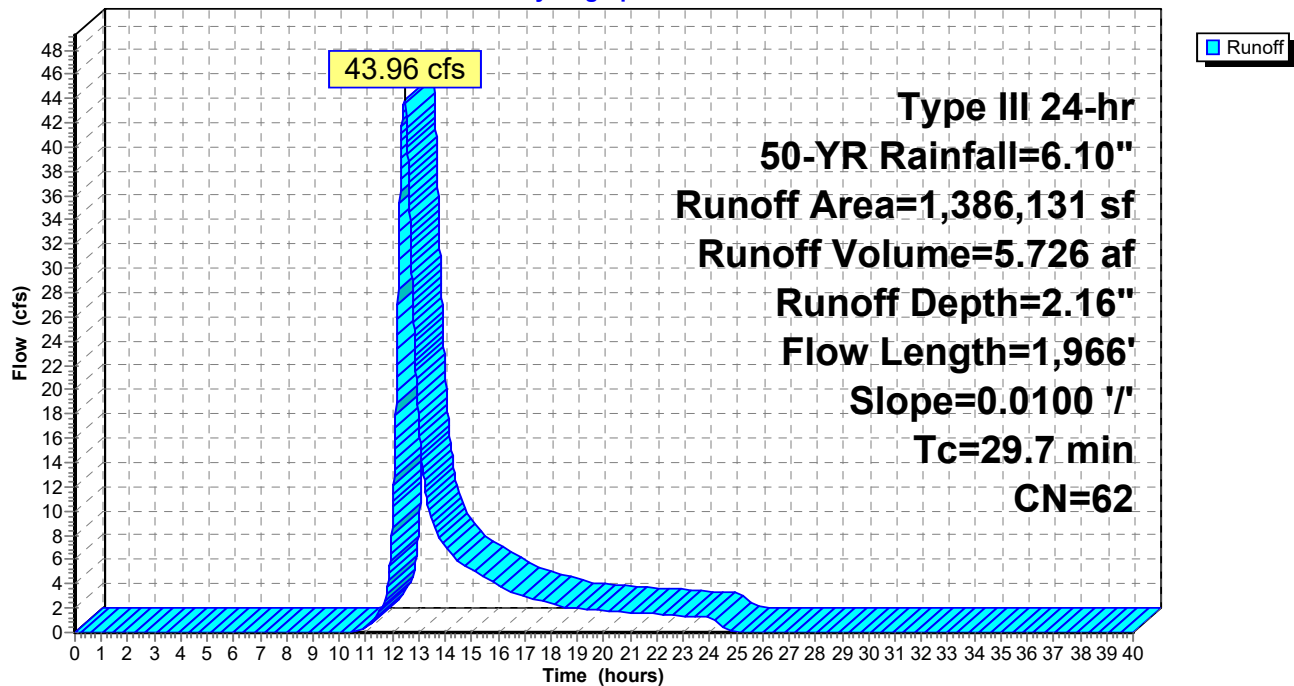
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
2,050	80	>75% Grass cover, Good HSG D
17,544	61	>75% Grass cover, Good HSG B
1,002	98	Paved parking HSG B
31,785	98	Paved parking HSG A
11,439	74	>75% Grass cover, Good HSG C
146,051	39	>75% Grass cover, Good HSG A
197	98	Paved parking HSG C
2,625	98	Roofs HSG B
16,036	98	Roofs HSG A
311,884	30	Woods, Good HSG A
66,486	55	Woods, Good HSG B
63,729	70	Woods, Good HSG C
715,303	77	Woods, Good HSG D
1,386,131	62	Weighted Average
1,334,486	60	96.27% Pervious Area
51,645	98	3.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	1,741	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
29.7	1,966	Total			

Subcatchment 50P: P2f

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 99

Summary for Subcatchment 51P: P2g

Runoff = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af, Depth= 5.28"

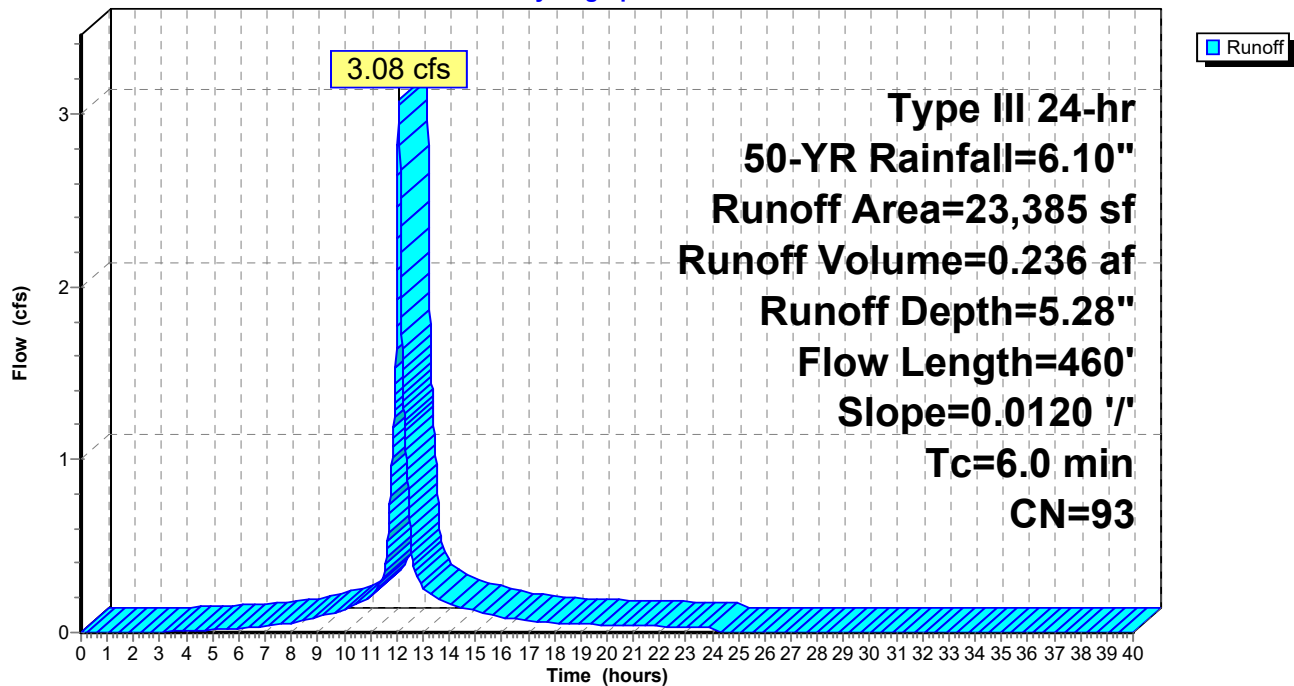
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
1,223	98	Paved parking HSG D
614	98	Paved parking HSG B
222	61	>75% Grass cover, Good HSG B
236	39	>75% Grass cover, Good HSG A
2,406	74	>75% Grass cover, Good HSG C
2,519	98	Paved parking HSG A
15,474	98	Paved parking HSG C
161	30	Woods, Good HSG A
63	55	Woods, Good HSG B
467	70	Woods, Good HSG C
23,385	93	Weighted Average
3,555	68	15.20% Pervious Area
19,830	98	84.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	300	0.0120	1.40		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.2	160	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.8	460	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 51P: P2g

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Type III 24-hr 50-YR Rainfall=6.10"

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Page 101

Summary for Pond 52P: CB23+19

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 5.28" for 50-YR event
Inflow = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af
Outflow = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.0 min
Primary = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af

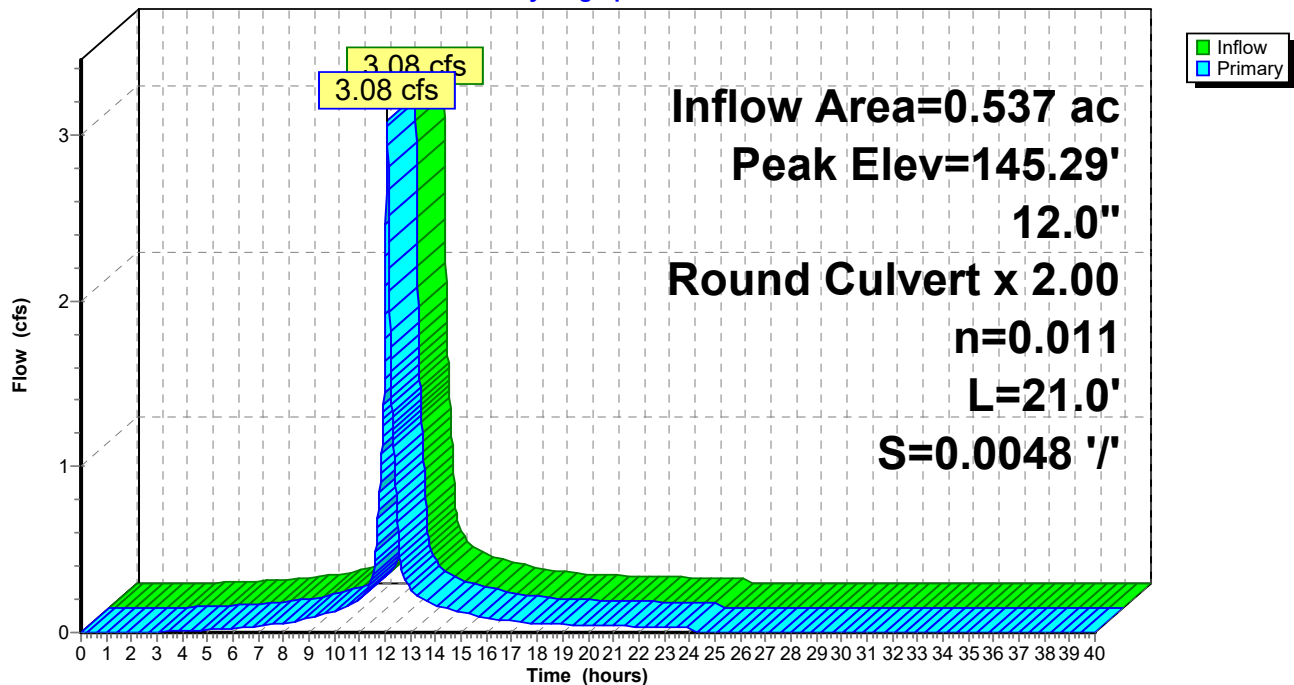
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.29' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.50'	12.0" Round Culvert X 2.00 L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.50' / 144.40' S= 0.0048 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.08 cfs @ 12.08 hrs HW=145.29' (Free Discharge)
↑1=Culvert (Barrel Controls 3.08 cfs @ 3.17 fps)

Pond 52P: CB23+19

Hydrograph



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 102

Summary for Pond 53P: DMH 23+34

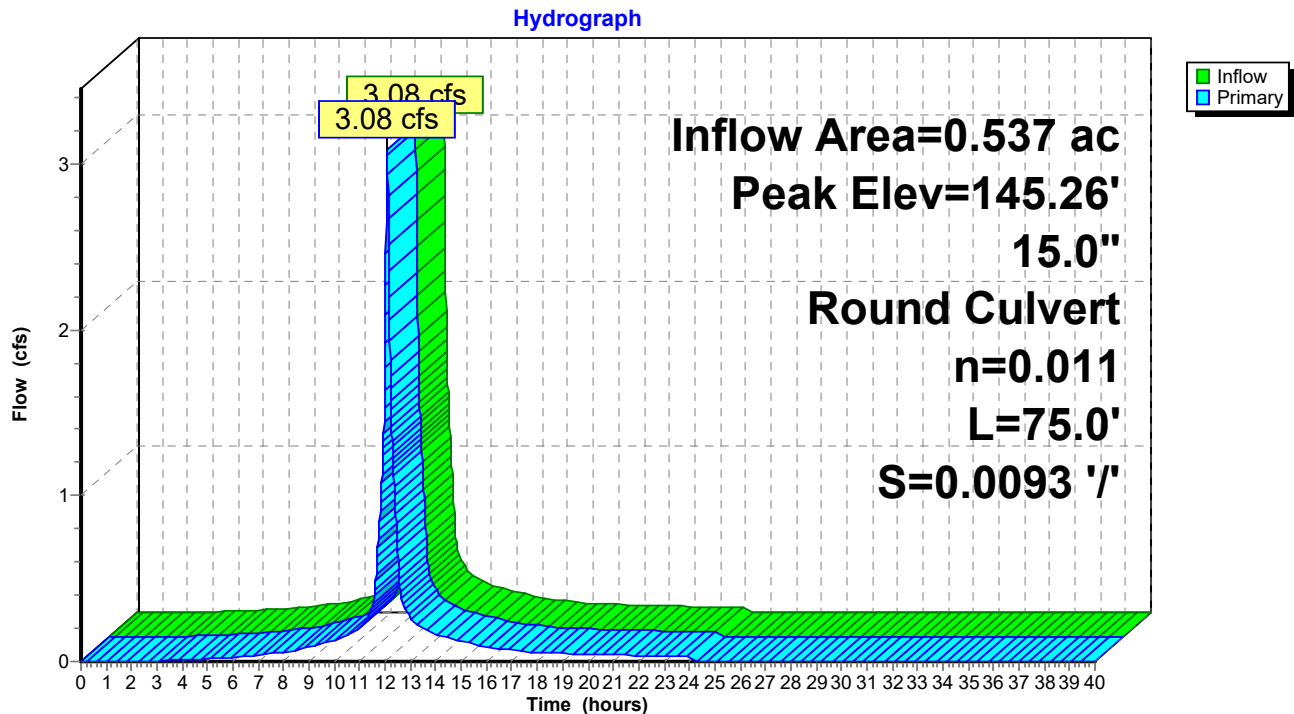
Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 5.28" for 50-YR event
Inflow = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af
Outflow = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.0 min
Primary = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.26' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.35'	15.0" Round Culvert L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.35' / 143.65' S= 0.0093 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.08 cfs @ 12.08 hrs HW=145.25' (Free Discharge)
↑1=Culvert (Inlet Controls 3.08 cfs @ 3.24 fps)

Pond 53P: DMH 23+34



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Page 103

Summary for Pond 54P: FD24+09

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 5.28" for 50-YR event
Inflow = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af
Outflow = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.0 min
Primary = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af

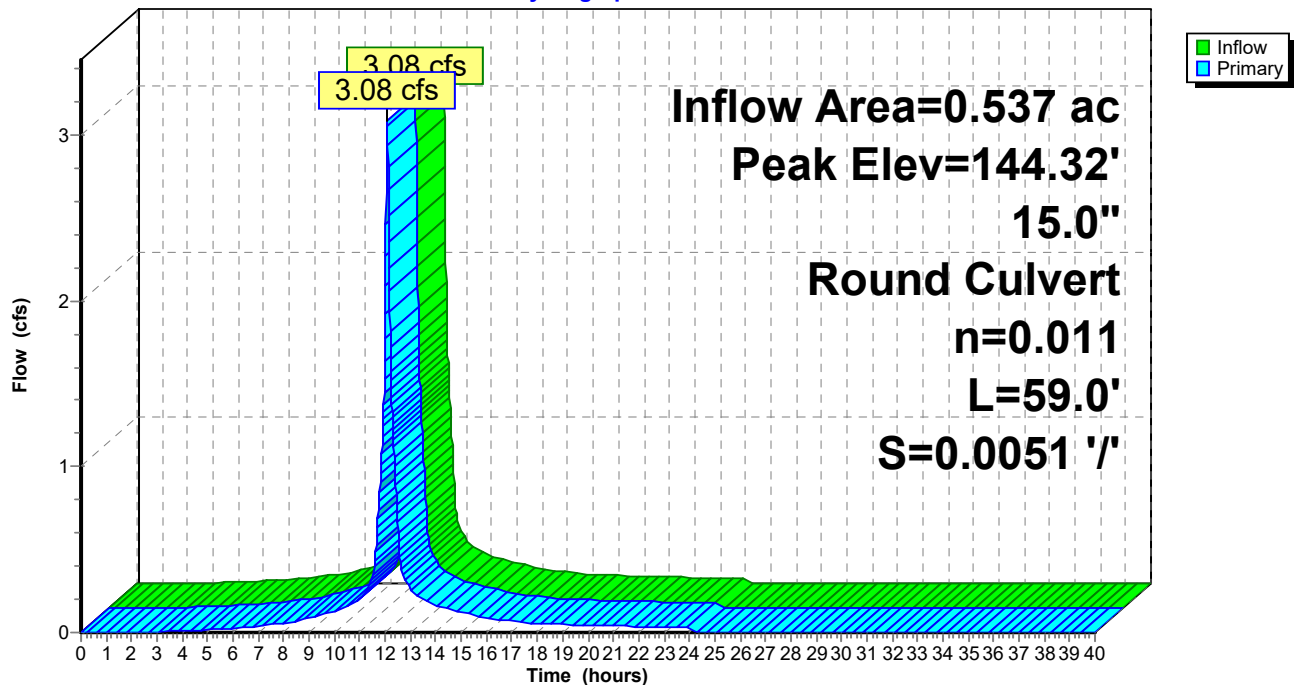
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 144.32' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	15.0" Round Culvert L= 59.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 143.30' / 143.00' S= 0.0051 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.08 cfs @ 12.08 hrs HW=144.32' (Free Discharge)
↑1=Culvert (Barrel Controls 3.08 cfs @ 3.91 fps)

Pond 54P: FD24+09

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Page 104

Summary for Pond 55P: FD24+70

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 5.28" for 50-YR event
Inflow = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af
Outflow = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.0 min
Primary = 3.08 cfs @ 12.08 hrs, Volume= 0.236 af

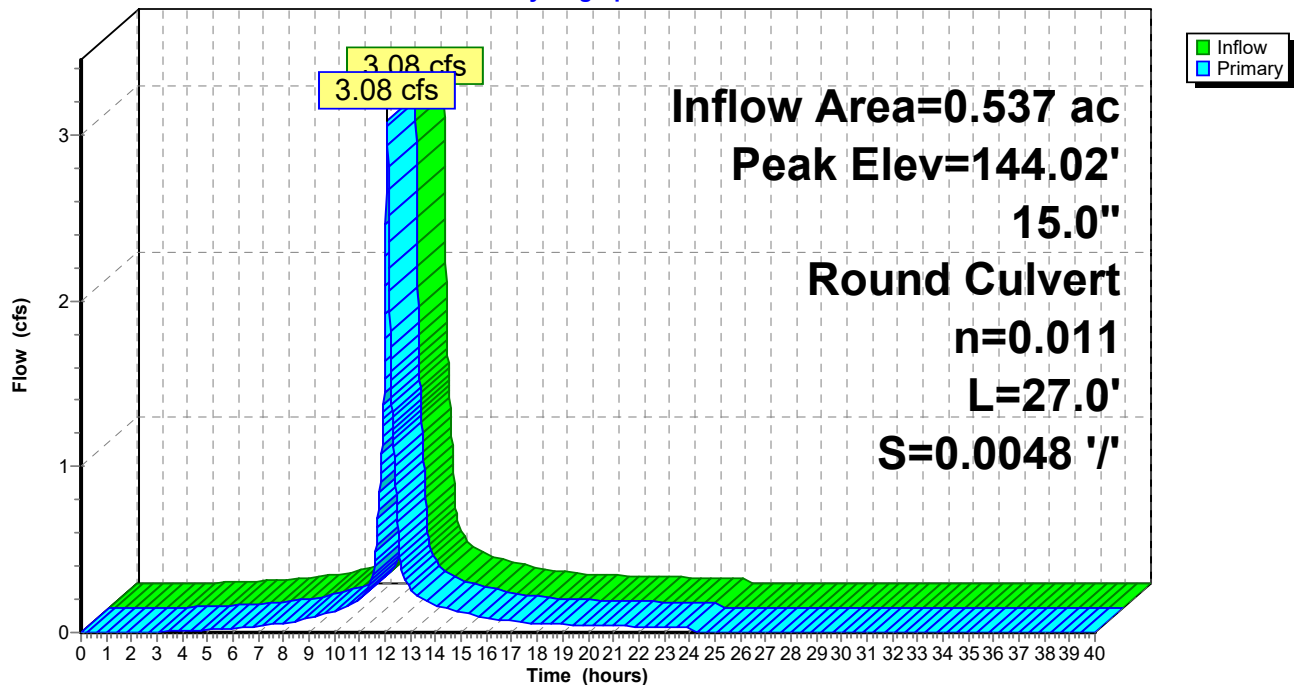
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 144.02' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	142.95'	15.0" Round Culvert L= 27.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 142.95' / 142.82' S= 0.0048 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.08 cfs @ 12.08 hrs HW=144.02' (Free Discharge)
↑1=Culvert (Barrel Controls 3.08 cfs @ 3.70 fps)

Pond 55P: FD24+70

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Page 105

Summary for Pond 56P: Wetland Storage

Inflow Area = 33.938 ac, 6.90% Impervious, Inflow Depth = 2.16" for 50-YR event
 Inflow = 45.65 cfs @ 12.44 hrs, Volume= 6.115 af
 Outflow = 11.95 cfs @ 13.29 hrs, Volume= 6.058 af, Atten= 74%, Lag= 50.9 min
 Primary = 11.95 cfs @ 13.29 hrs, Volume= 6.058 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 144.69' @ 13.29 hrs Surf.Area= 269,274 sf Storage= 93,544 cf

Plug-Flow detention time= 94.4 min calculated for 6.058 af (99% of inflow)
 Center-of-Mass det. time= 88.9 min (962.5 - 873.5)

Volume	Invert	Avail.Storage	Storage Description
#1	142.71'	205,693 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
142.71	100	50.0	0	0	100
144.00	20,500	4,000.0	9,474	9,474	1,273,143
145.00	470,000	4,330.0	196,219	205,693	1,491,933

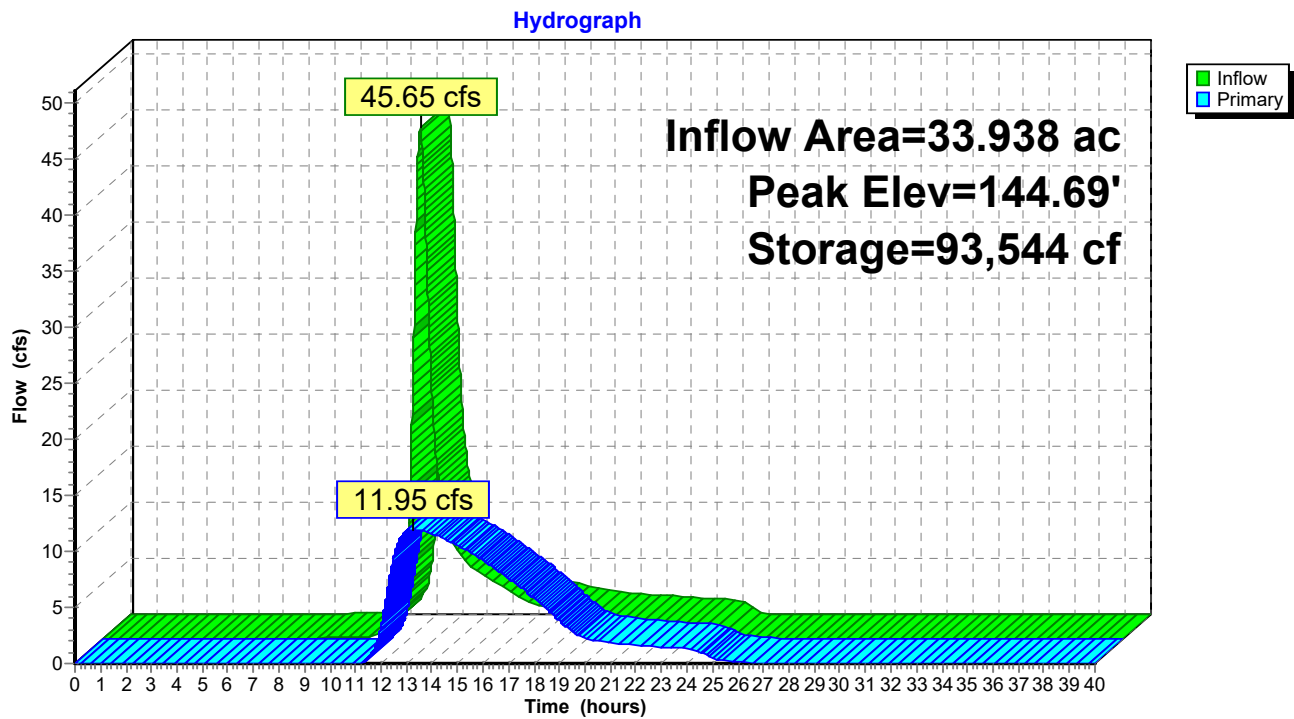
Device	Routing	Invert	Outlet Devices
#1	Primary	142.71'	36.0" W x 8.0" H Box Culvert X 2.00 L= 50.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 142.71' / 142.46' S= 0.0050 ' / Cc= 0.900 n= 0.018, Flow Area= 2.00 sf
#2	Device 1	143.50'	Custom Weir/Orifice X 2.00, Cv= 2.62 (C= 3.28) Elev. (feet) 143.50 144.90 144.90 145.00 Width (feet) 1.40 1.40 3.00 3.00

Primary OutFlow Max=11.95 cfs @ 13.29 hrs HW=144.69' (Free Discharge)

1=Culvert (Passes 11.95 cfs of 19.65 cfs potential flow)

2=Custom Weir/Orifice (Weir Controls 11.95 cfs @ 3.58 fps)

Pond 56P: Wetland Storage



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Type III 24-hr 50-YR Rainfall=6.10"

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Page 107

Summary for Subcatchment 57P: P2e

Runoff = 0.76 cfs @ 12.25 hrs, Volume= 0.109 af, Depth= 0.84"

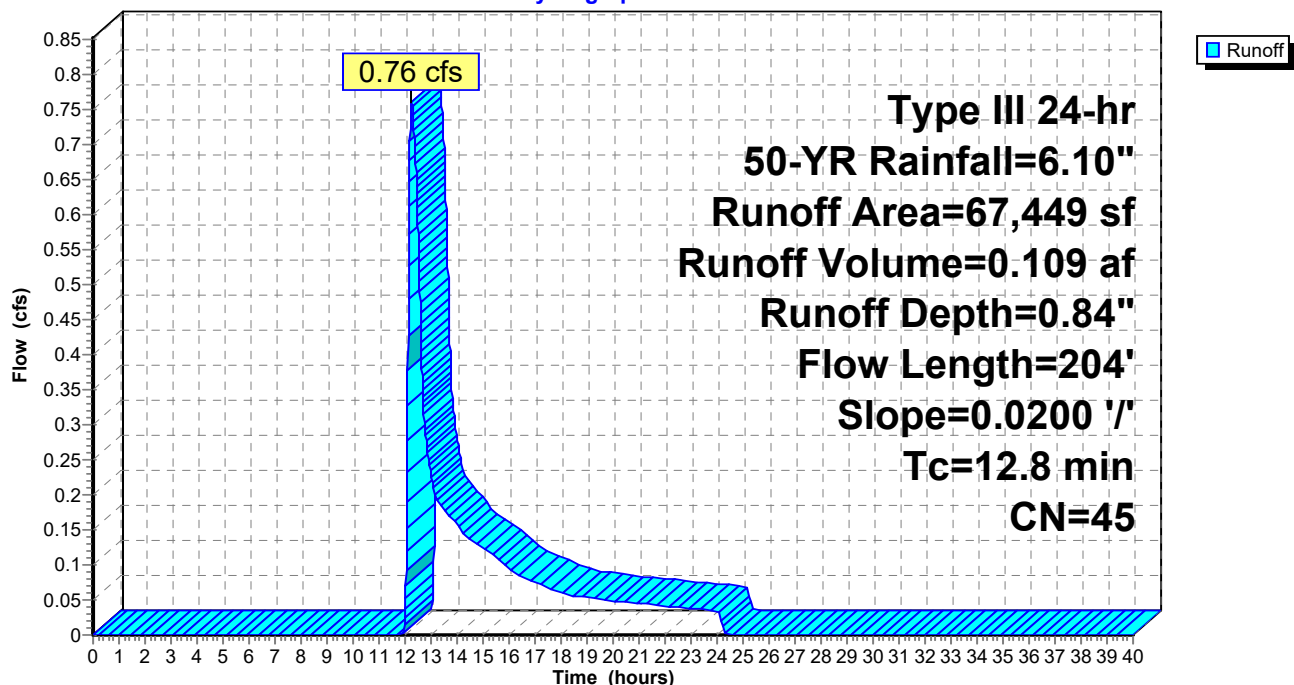
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
13,005	61	>75% Grass cover, Good HSG B
531	39	>75% Grass cover, Good HSG A
844	98	Roofs HSG B
504	98	Paved parking HSG B
33,230	30	Woods, Good HSG A
19,335	55	Woods, Good HSG B
<hr/>		
67,449	45	Weighted Average
66,101	43	98.00% Pervious Area
1,348	98	2.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	59	0.0200	0.11		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
3.4	145	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.8	204	Total			

Subcatchment 57P: P2e

Hydrograph

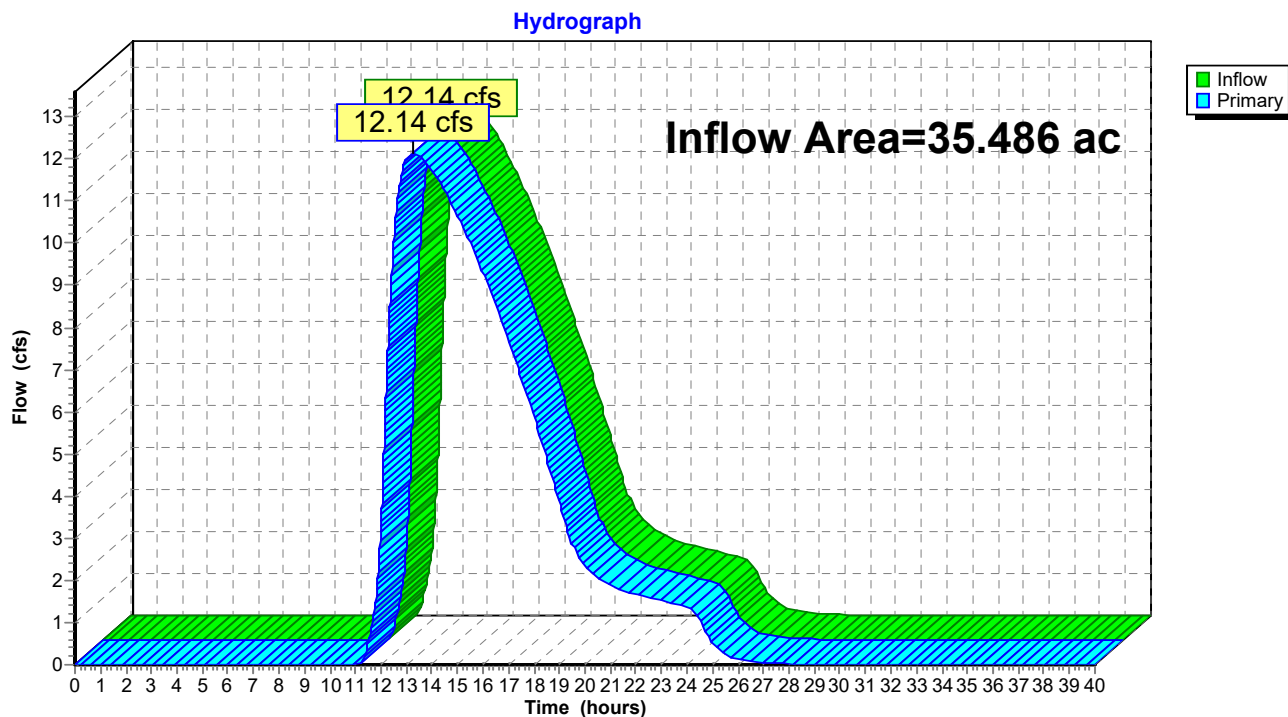


Summary for Link 58P: Design Point #2: Flow to Southern Abutter

Inflow Area = 35.486 ac, 6.69% Impervious, Inflow Depth = 2.09" for 50-YR event
 Inflow = 12.14 cfs @ 13.27 hrs, Volume= 6.167 af
 Primary = 12.14 cfs @ 13.27 hrs, Volume= 6.167 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 58P: Design Point #2: Flow to Southern Abutter



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 109

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment41P: P2a Runoff Area=7,053 sf 75.12% Impervious Runoff Depth=5.42"
Flow Length=245' Slope=0.0100 '/' Tc=8.0 min CN=89 Runoff=0.92 cfs 0.073 af

Pond 42P: CB22+10a Peak Elev=145.70' Inflow=0.92 cfs 0.073 af
12.0" Round Culvert n=0.011 L=21.0' S=0.0071 '/' Outflow=0.92 cfs 0.073 af

Subcatchment43P: P2b Runoff Area=12,212 sf 62.20% Impervious Runoff Depth=4.97"
Flow Length=288' Slope=0.0100 '/' Tc=11.4 min CN=85 Runoff=1.34 cfs 0.116 af

Pond 44P: CB22+10b Peak Elev=145.82' Inflow=1.34 cfs 0.116 af
12.0" Round Culvert n=0.011 L=13.0' S=0.0115 '/' Outflow=1.34 cfs 0.116 af

Pond 45P: DMH22+20 Peak Elev=145.79' Inflow=2.20 cfs 0.189 af
12.0" Round Culvert n=0.011 L=35.0' S=0.0129 '/' Outflow=2.20 cfs 0.189 af

Subcatchment46P: P2c Runoff Area=9,439 sf 20.70% Impervious Runoff Depth=4.20"
Flow Length=52' Slope=0.0600 '/' Tc=6.0 min CN=78 Runoff=1.06 cfs 0.076 af

Pond 47P: Basin #3 Peak Elev=146.44' Storage=5,214 cf Inflow=3.18 cfs 0.265 af
Discarded=0.19 cfs 0.199 af Primary=0.12 cfs 0.066 af Outflow=0.32 cfs 0.265 af

Subcatchment48P: P2d Runoff Area=40,118 sf 39.07% Impervious Runoff Depth=4.42"
Flow Length=94' Tc=10.0 min CN=80 Runoff=4.14 cfs 0.339 af

Pond 49P: Basin #4 Peak Elev=147.24' Storage=4,662 cf Inflow=4.14 cfs 0.339 af
Discarded=0.26 cfs 0.212 af Primary=1.17 cfs 0.127 af Outflow=1.43 cfs 0.339 af

Subcatchment50P: P2f Runoff Area=1,386,131 sf 3.73% Impervious Runoff Depth=2.58"
Flow Length=1,966' Slope=0.0100 '/' Tc=29.7 min CN=62 Runoff=53.25 cfs 6.849 af

Subcatchment51P: P2g Runoff Area=23,385 sf 84.80% Impervious Runoff Depth=5.87"
Flow Length=460' Slope=0.0120 '/' Tc=6.0 min CN=93 Runoff=3.41 cfs 0.263 af

Pond 52P: CB23+19 Peak Elev=145.34' Inflow=3.41 cfs 0.263 af
12.0" Round Culvert x 2.00 n=0.011 L=21.0' S=0.0048 '/' Outflow=3.41 cfs 0.263 af

Pond 53P: DMH 23+34 Peak Elev=145.32' Inflow=3.41 cfs 0.263 af
15.0" Round Culvert n=0.011 L=75.0' S=0.0093 '/' Outflow=3.41 cfs 0.263 af

Pond 54P: FD24+09 Peak Elev=144.39' Inflow=3.41 cfs 0.263 af
15.0" Round Culvert n=0.011 L=59.0' S=0.0051 '/' Outflow=3.41 cfs 0.263 af

Pond 55P: FD24+70 Peak Elev=144.09' Inflow=3.41 cfs 0.263 af
15.0" Round Culvert n=0.011 L=27.0' S=0.0048 '/' Outflow=3.41 cfs 0.263 af

Pond 56P: Wetland Storage Peak Elev=144.78' Storage=117,893 cf Inflow=55.42 cfs 7.304 af
Outflow=13.21 cfs 7.247 af

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Page 110

Subcatchment 57P: P2e

Runoff Area=67,449 sf 2.00% Impervious Runoff Depth=1.10"
Flow Length=204' Slope=0.0200 '/' Tc=12.8 min CN=45 Runoff=1.13 cfs 0.142 af

Link 58P: Design Point #2: Flow to Southern Abutter

Inflow=13.45 cfs 7.389 af
Primary=13.45 cfs 7.389 af

Total Runoff Area = 35.486 ac Runoff Volume = 7.857 af Average Runoff Depth = 2.66"
93.31% Pervious = 33.114 ac 6.69% Impervious = 2.373 ac

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Type III 24-hr 100-YR Rainfall=6.70"

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Page 111

Summary for Subcatchment 41P: P2a

Runoff = 0.92 cfs @ 12.11 hrs, Volume= 0.073 af, Depth= 5.42"

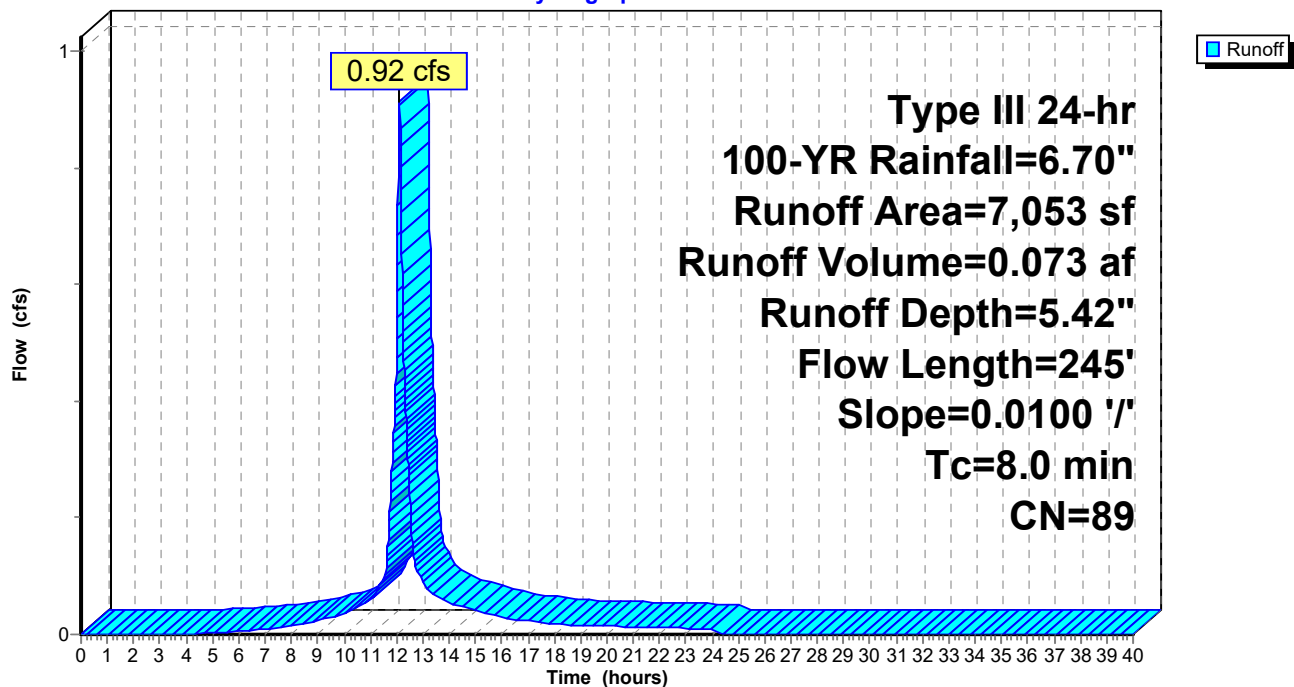
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
1,714	61	>75% Grass cover, Good HSG B
5,298	98	Paved parking HSG B
41	55	Woods, Good HSG B
7,053	89	Weighted Average
1,755	61	24.88% Pervious Area
5,298	98	75.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	25	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.8	220	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
8.0	245	Total			

Subcatchment 41P: P2a

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Page 112

Summary for Pond 42P: CB22+10a

Inflow Area = 0.162 ac, 75.12% Impervious, Inflow Depth = 5.42" for 100-YR event
Inflow = 0.92 cfs @ 12.11 hrs, Volume= 0.073 af
Outflow = 0.92 cfs @ 12.11 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min
Primary = 0.92 cfs @ 12.11 hrs, Volume= 0.073 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.70' @ 12.11 hrs

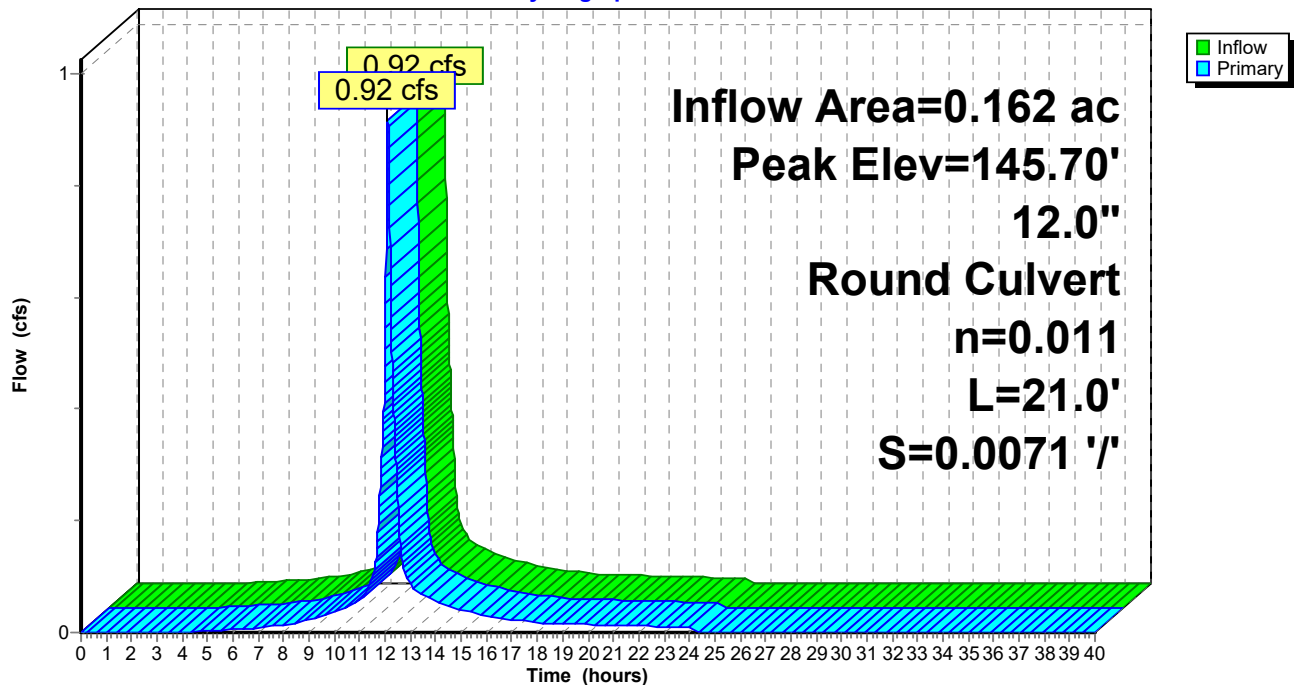
Device	Routing	Invert	Outlet Devices
#1	Primary	145.15'	12.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.15' / 145.00' S= 0.0071 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.92 cfs @ 12.11 hrs HW=145.70' (Free Discharge)

↑1=Culvert (Barrel Controls 0.92 cfs @ 3.00 fps)

Pond 42P: CB22+10a

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 113

Summary for Subcatchment 43P: P2b

Runoff = 1.34 cfs @ 12.15 hrs, Volume= 0.116 af, Depth= 4.97"

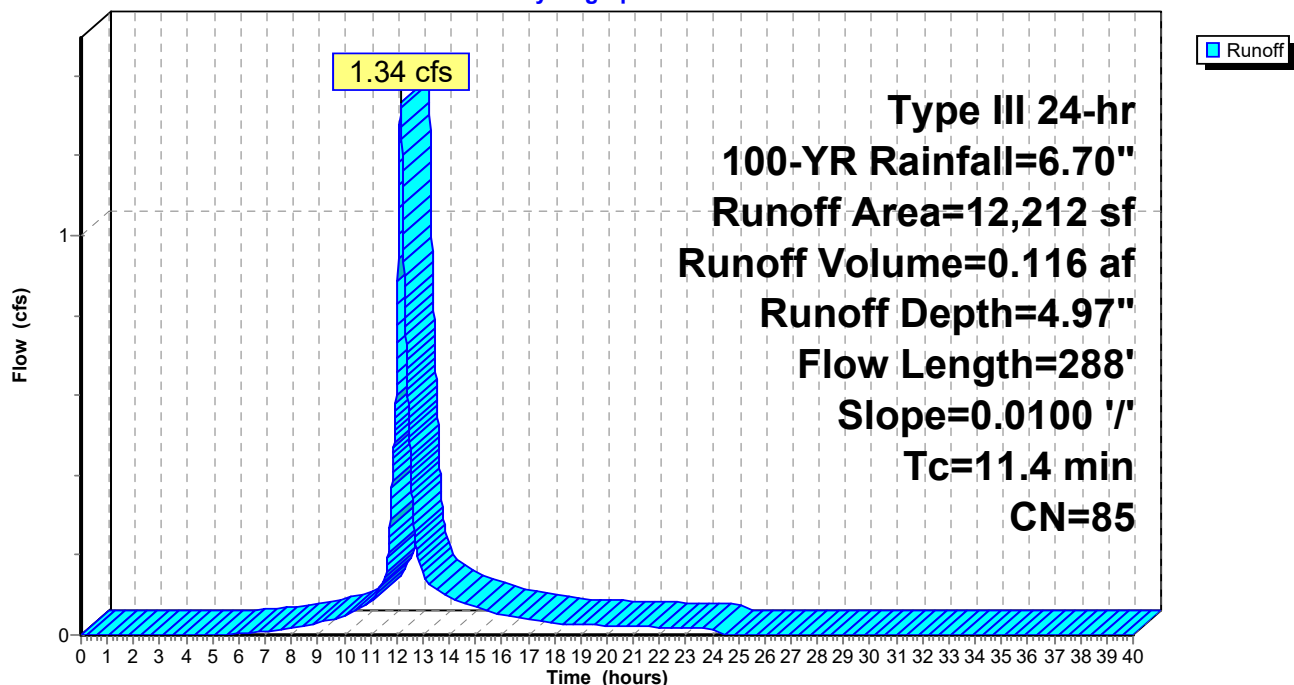
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
5,505	98	Paved parking HSG B
310	98	Roofs HSG B
3,911	61	>75% Grass cover, Good HSG B
705	74	>75% Grass cover, Good HSG C
1,230	98	Roofs HSG C
551	98	Paved parking HSG C
12,212	85	Weighted Average
4,616	63	37.80% Pervious Area
7,596	98	62.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
2.0	246	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
11.4	288	Total			

Subcatchment 43P: P2b

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

Printed 5/19/2020

Page 114

Summary for Pond 44P: CB22+10b

Inflow Area = 0.280 ac, 62.20% Impervious, Inflow Depth = 4.97" for 100-YR event
Inflow = 1.34 cfs @ 12.15 hrs, Volume= 0.116 af
Outflow = 1.34 cfs @ 12.15 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min
Primary = 1.34 cfs @ 12.15 hrs, Volume= 0.116 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 145.82' @ 12.15 hrs

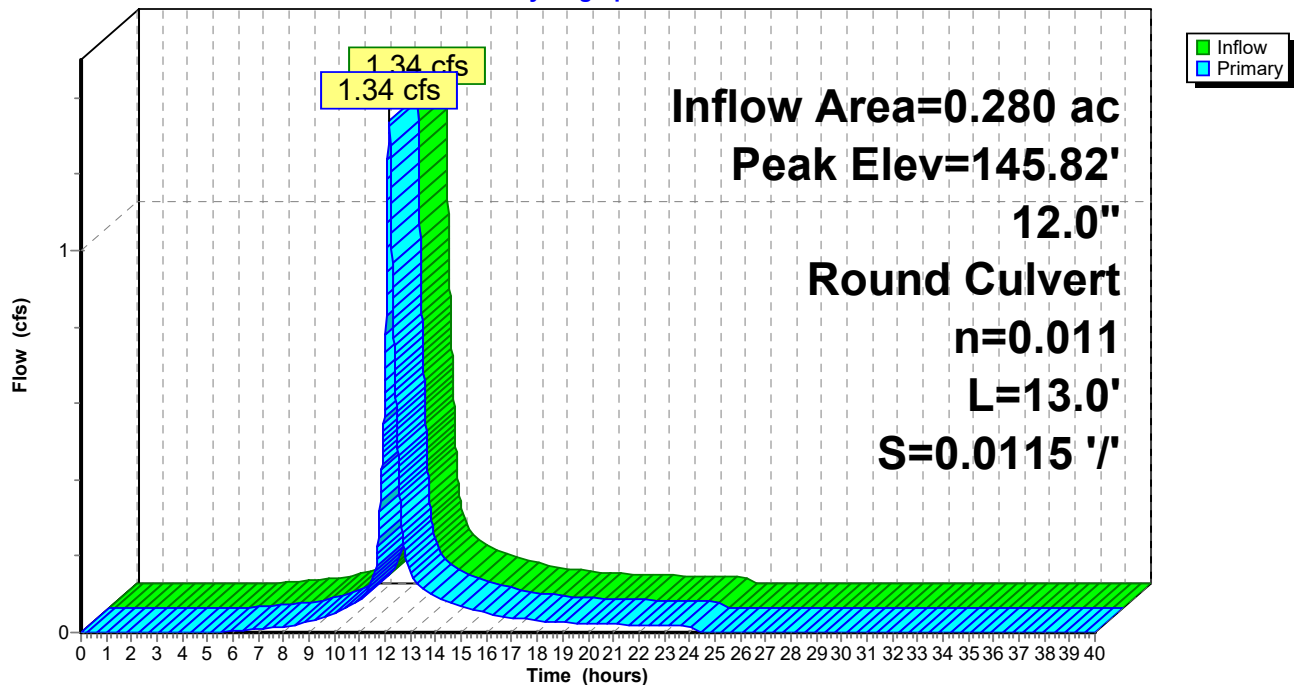
Device	Routing	Invert	Outlet Devices
#1	Primary	145.15'	12.0" Round Culvert L= 13.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.15' / 145.00' S= 0.0115 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.34 cfs @ 12.15 hrs HW=145.82' (Free Discharge)

↑1=Culvert (Barrel Controls 1.34 cfs @ 3.38 fps)

Pond 44P: CB22+10b

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 115

Summary for Pond 45P: DMH22+20

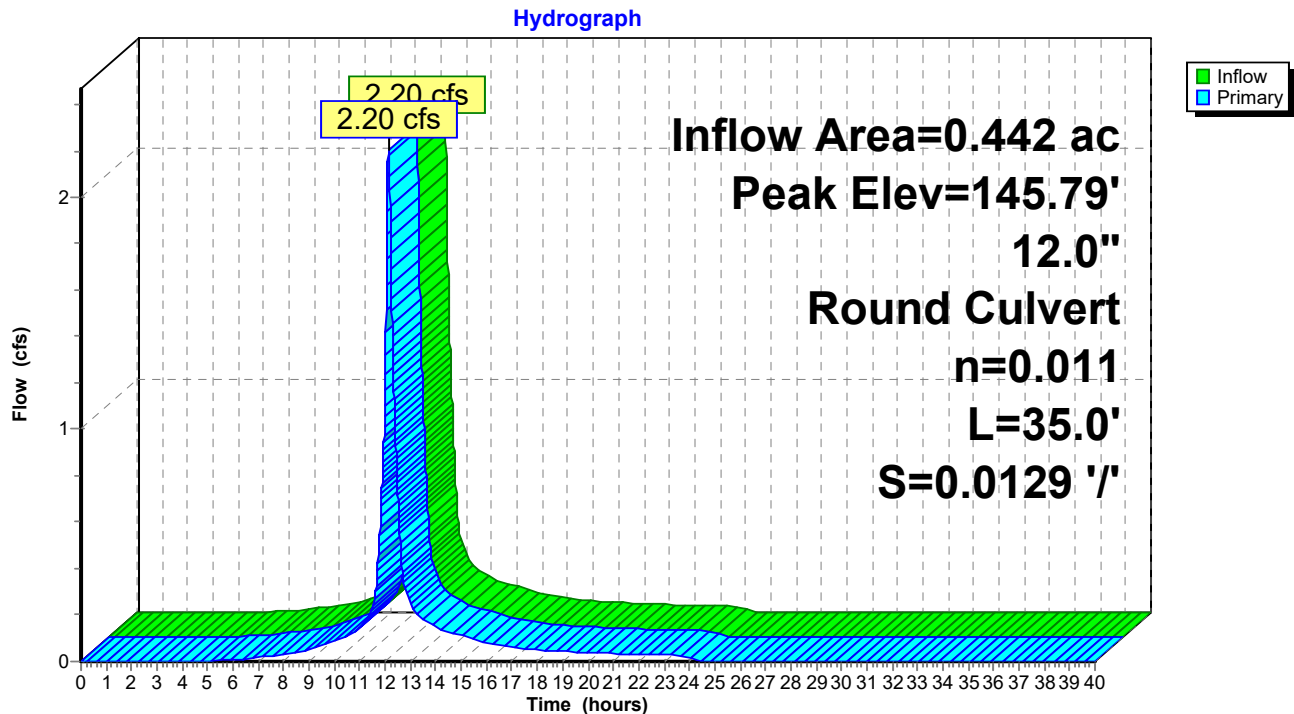
Inflow Area = 0.442 ac, 66.93% Impervious, Inflow Depth = 5.13" for 100-YR event
Inflow = 2.20 cfs @ 12.13 hrs, Volume= 0.189 af
Outflow = 2.20 cfs @ 12.13 hrs, Volume= 0.189 af, Atten= 0%, Lag= 0.0 min
Primary = 2.20 cfs @ 12.13 hrs, Volume= 0.189 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.79' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.95'	12.0" Round Culvert L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.95' / 144.50' S= 0.0129 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.20 cfs @ 12.13 hrs HW=145.79' (Free Discharge)
↑1=Culvert (Inlet Controls 2.20 cfs @ 3.12 fps)

Pond 45P: DMH22+20



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Page 116

Summary for Subcatchment 46P: P2c

Runoff = 1.06 cfs @ 12.09 hrs, Volume= 0.076 af, Depth= 4.20"

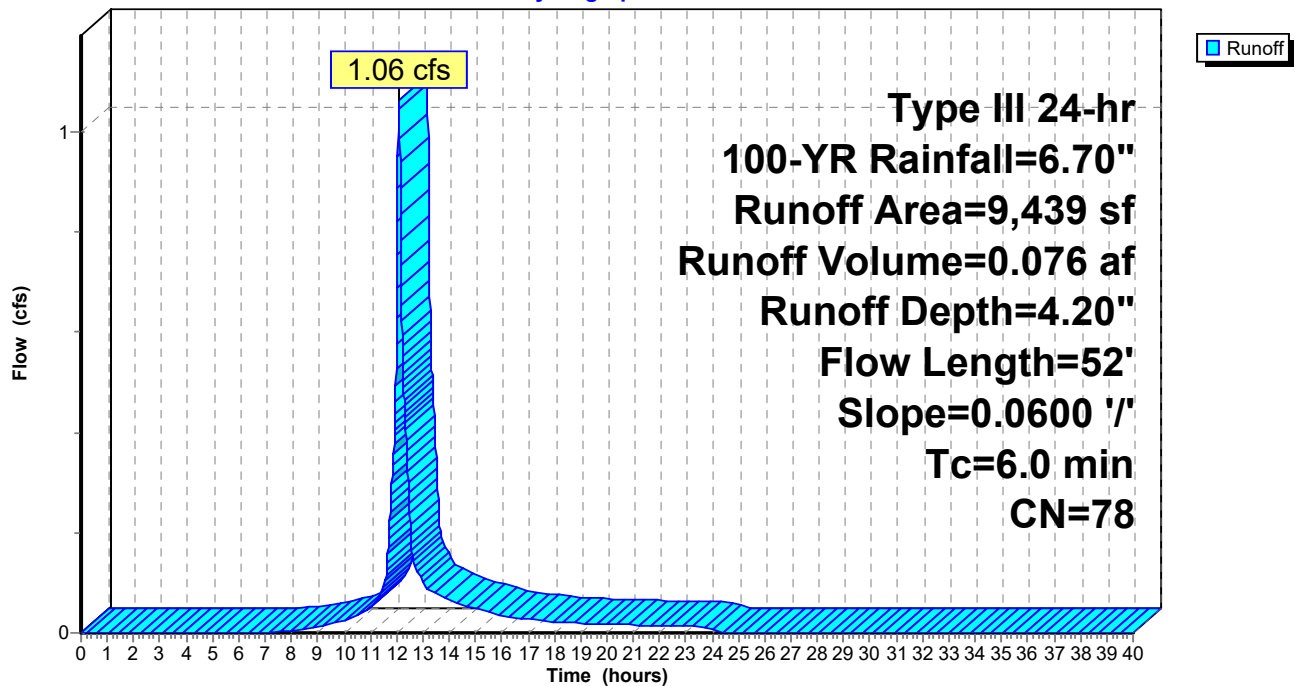
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
822	61	>75% Grass cover, Good HSG B
1,954	98	Water Surface HSG C
6,662	74	>75% Grass cover, Good HSG C
1	70	Woods, Good HSG C
9,439	78	Weighted Average
7,485	73	79.30% Pervious Area
1,954	98	20.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	52	0.0600	0.16		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
5.4	52	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 46P: P2c

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 117

Summary for Pond 47P: Basin #3

Inflow Area = 0.659 ac, 51.73% Impervious, Inflow Depth = 4.83" for 100-YR event
 Inflow = 3.18 cfs @ 12.11 hrs, Volume= 0.265 af
 Outflow = 0.32 cfs @ 13.08 hrs, Volume= 0.265 af, Atten= 90%, Lag= 58.1 min
 Discarded = 0.19 cfs @ 13.08 hrs, Volume= 0.199 af
 Primary = 0.12 cfs @ 13.08 hrs, Volume= 0.066 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.44' @ 13.08 hrs Surf.Area= 3,482 sf Storage= 5,214 cf

Plug-Flow detention time= 182.1 min calculated for 0.265 af (100% of inflow)
 Center-of-Mass det. time= 182.1 min (983.2 - 801.1)

Volume	Invert	Avail.Storage	Storage Description		
#1	144.50'	9,424 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.50	1,961	173.0	0	0	1,961
147.50	4,494	249.0	9,424	9,424	4,591

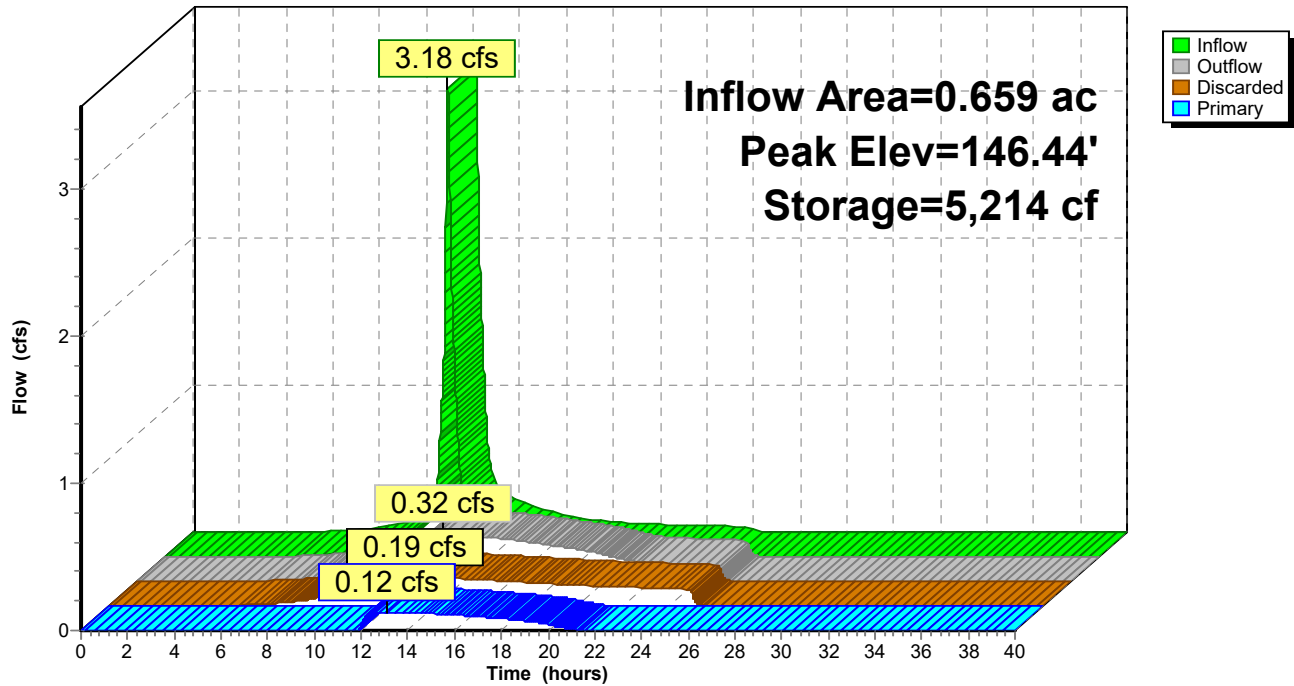
Device	Routing	Invert	Outlet Devices
#1	Discarded	144.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	146.50'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 146.50 147.50 Width (feet) 4.00 4.00
#3	Primary	145.00'	2.0" Round Culvert L= 1.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 145.00' / 145.00' S= 0.0000 ' /' Cc= 0.900 n= 0.011, Flow Area= 0.02 sf

Discarded OutFlow Max=0.19 cfs @ 13.08 hrs HW=146.44' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.12 cfs @ 13.08 hrs HW=146.44' (Free Discharge)
 ↑ **2=Custom Weir/Orifice** (Controls 0.00 cfs)
 ↑ **3=Culvert** (Inlet Controls 0.12 cfs @ 5.61 fps)

Pond 47P: Basin #3

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 119

Summary for Subcatchment 48P: P2d

Runoff = 4.14 cfs @ 12.14 hrs, Volume= 0.339 af, Depth= 4.42"

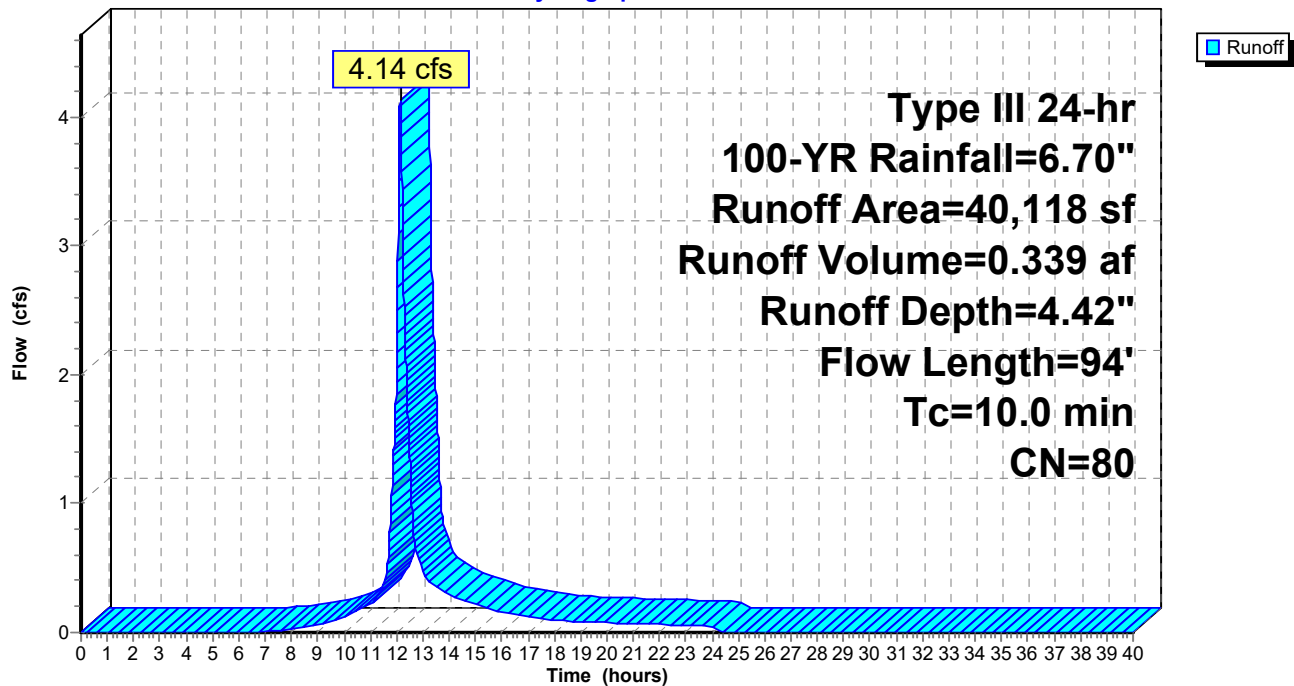
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
10,069	61	>75% Grass cover, Good HSG B
1,195	98	Water Surface HSG B
8,750	98	Water Surface HSG C
1,000	98	Paved parking HSG C
1,089	98	Paved parking HSG B
14,373	74	>75% Grass cover, Good HSG C
1,595	98	Roofs HSG C
2,047	98	Roofs HSG B
40,118	80	Weighted Average
24,442	69	60.93% Pervious Area
15,676	98	39.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.6	52	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.0	94	Total			

Subcatchment 48P: P2d

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 121

Summary for Pond 49P: Basin #4

Inflow Area = 0.921 ac, 39.07% Impervious, Inflow Depth = 4.42" for 100-YR event
 Inflow = 4.14 cfs @ 12.14 hrs, Volume= 0.339 af
 Outflow = 1.43 cfs @ 12.49 hrs, Volume= 0.339 af, Atten= 65%, Lag= 20.9 min
 Discarded = 0.26 cfs @ 12.49 hrs, Volume= 0.212 af
 Primary = 1.17 cfs @ 12.49 hrs, Volume= 0.127 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 147.24' @ 12.49 hrs Surf.Area= 11,177 sf Storage= 4,662 cf

Plug-Flow detention time= 56.1 min calculated for 0.339 af (100% of inflow)
 Center-of-Mass det. time= 56.1 min (869.5 - 813.4)

Volume	Invert	Avail.Storage	Storage Description
#1	146.80'	8,853 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.80	9,936	709.0	0	0	9,936
147.60	12,237	711.0	8,853	8,853	10,547

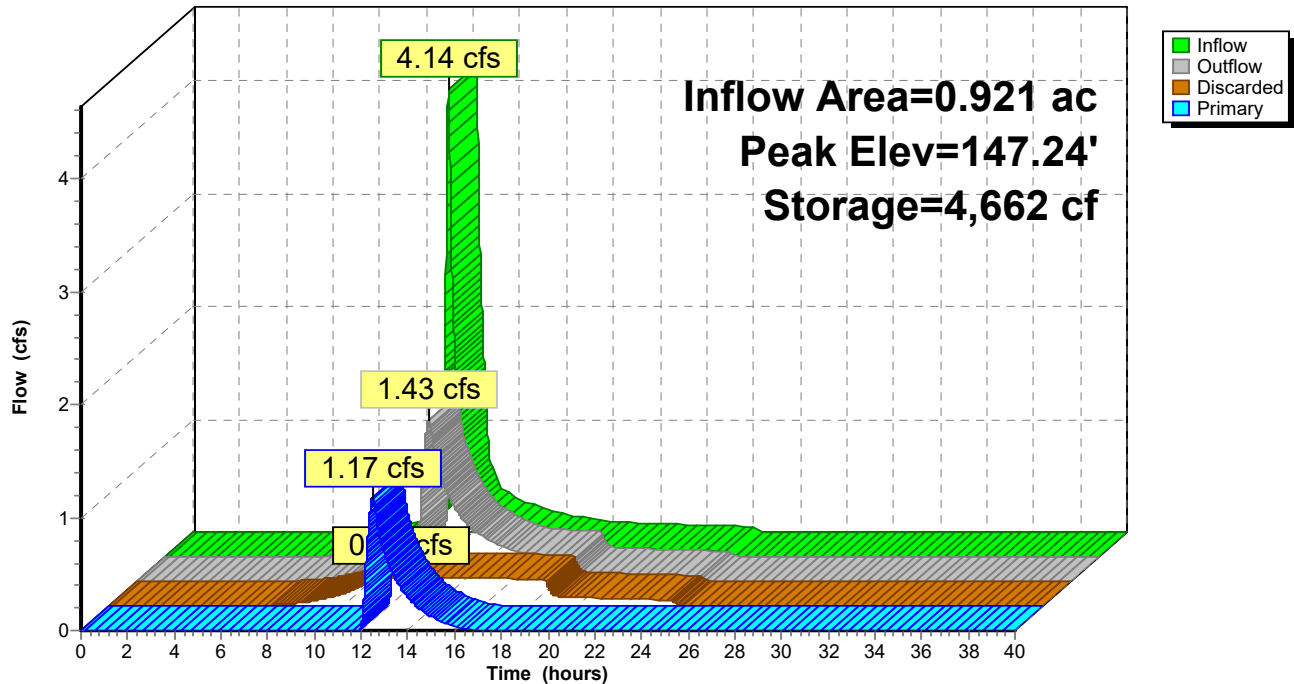
Device	Routing	Invert	Outlet Devices
#1	Discarded	146.80'	1.020 in/hr Exfiltration over Surface area
#2	Primary	146.90'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28)
			Elev. (feet) 146.90 147.20 147.20 148.00
			Width (feet) 1.50 1.50 8.00 8.00

Discarded OutFlow Max=0.26 cfs @ 12.49 hrs HW=147.24' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=1.16 cfs @ 12.49 hrs HW=147.24' (Free Discharge)
 ↑**2=Custom Weir/Orifice** (Weir Controls 1.16 cfs @ 1.48 fps)

Pond 49P: Basin #4

Hydrograph



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Page 123

Summary for Subcatchment 50P: P2f

Runoff = 53.25 cfs @ 12.44 hrs, Volume= 6.849 af, Depth= 2.58"

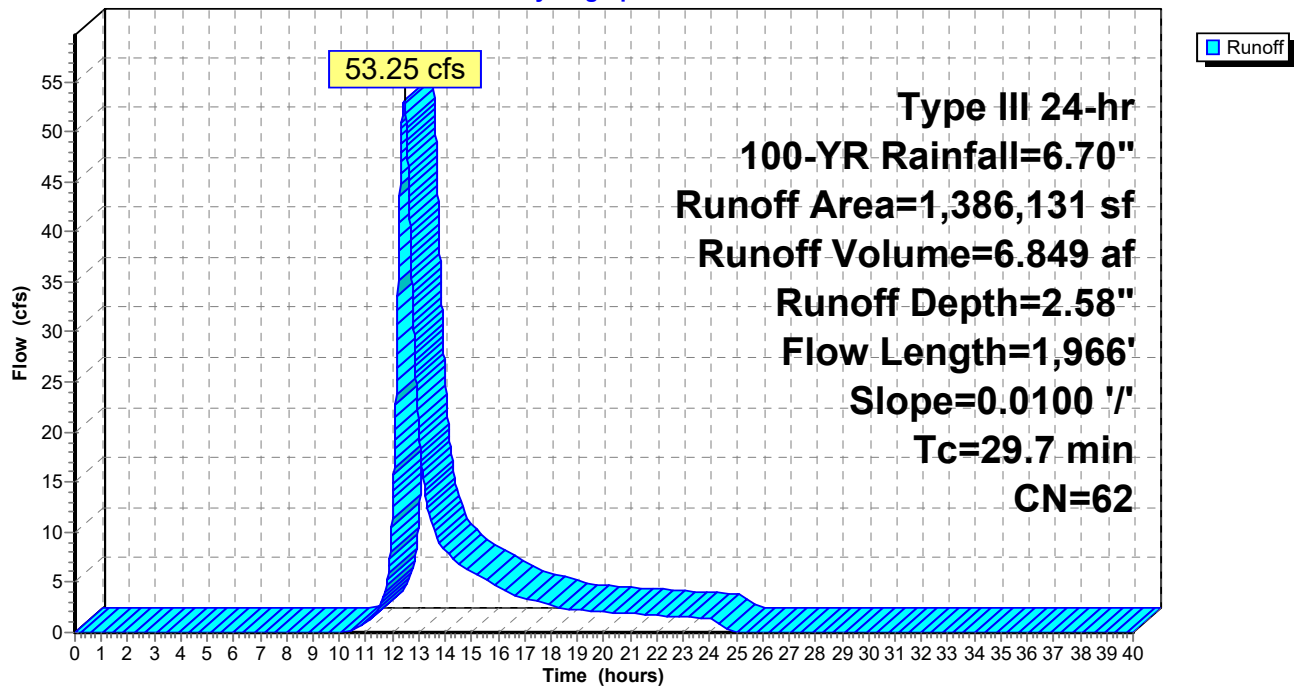
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
2,050	80	>75% Grass cover, Good HSG D
17,544	61	>75% Grass cover, Good HSG B
1,002	98	Paved parking HSG B
31,785	98	Paved parking HSG A
11,439	74	>75% Grass cover, Good HSG C
146,051	39	>75% Grass cover, Good HSG A
197	98	Paved parking HSG C
2,625	98	Roofs HSG B
16,036	98	Roofs HSG A
311,884	30	Woods, Good HSG A
66,486	55	Woods, Good HSG B
63,729	70	Woods, Good HSG C
715,303	77	Woods, Good HSG D
1,386,131	62	Weighted Average
1,334,486	60	96.27% Pervious Area
51,645	98	3.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
6.7	200	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	1,741	0.0100	2.12	6.37	Channel Flow, Area= 3.0 sf Perim= 3.0' r= 1.00' n= 0.070
29.7	1,966	Total			

Subcatchment 50P: P2f

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 125

Summary for Subcatchment 51P: P2g

Runoff = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af, Depth= 5.87"

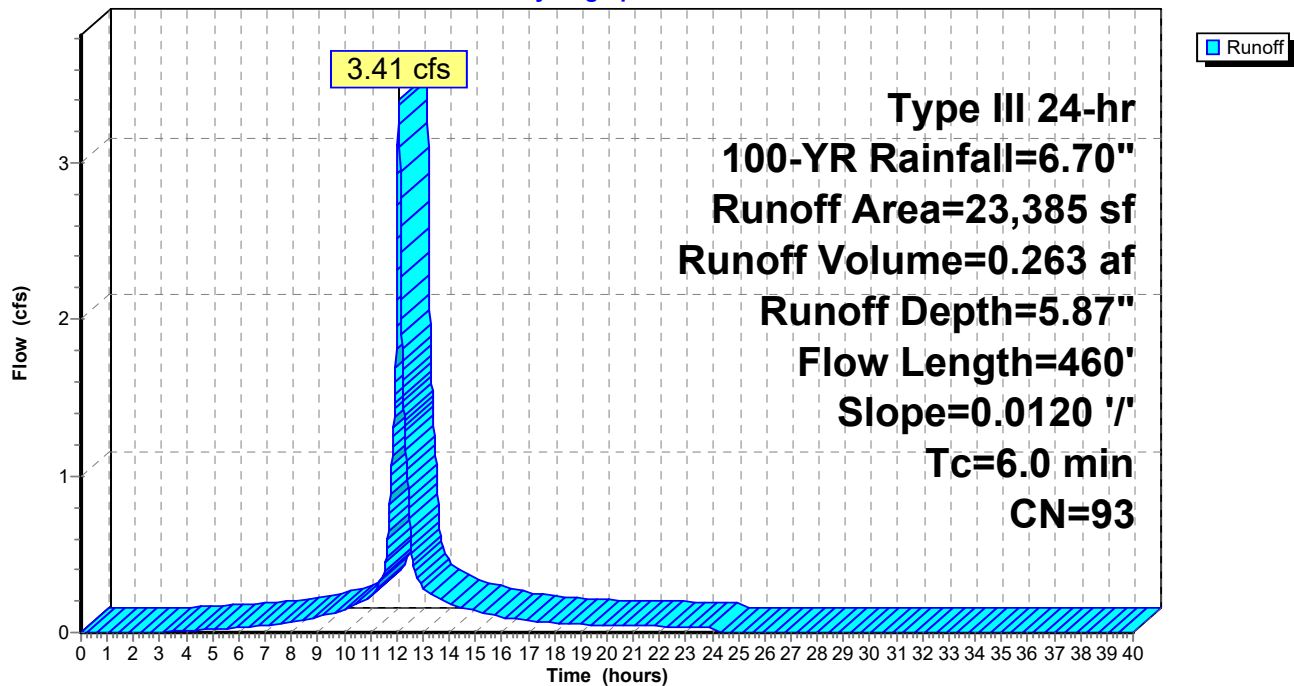
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
1,223	98	Paved parking HSG D
614	98	Paved parking HSG B
222	61	>75% Grass cover, Good HSG B
236	39	>75% Grass cover, Good HSG A
2,406	74	>75% Grass cover, Good HSG C
2,519	98	Paved parking HSG A
15,474	98	Paved parking HSG C
161	30	Woods, Good HSG A
63	55	Woods, Good HSG B
467	70	Woods, Good HSG C
23,385	93	Weighted Average
3,555	68	15.20% Pervious Area
19,830	98	84.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	300	0.0120	1.40		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.2	160	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.8	460	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 51P: P2g

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 127

Summary for Pond 52P: CB23+19

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 5.87" for 100-YR event
Inflow = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af
Outflow = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.0 min
Primary = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af

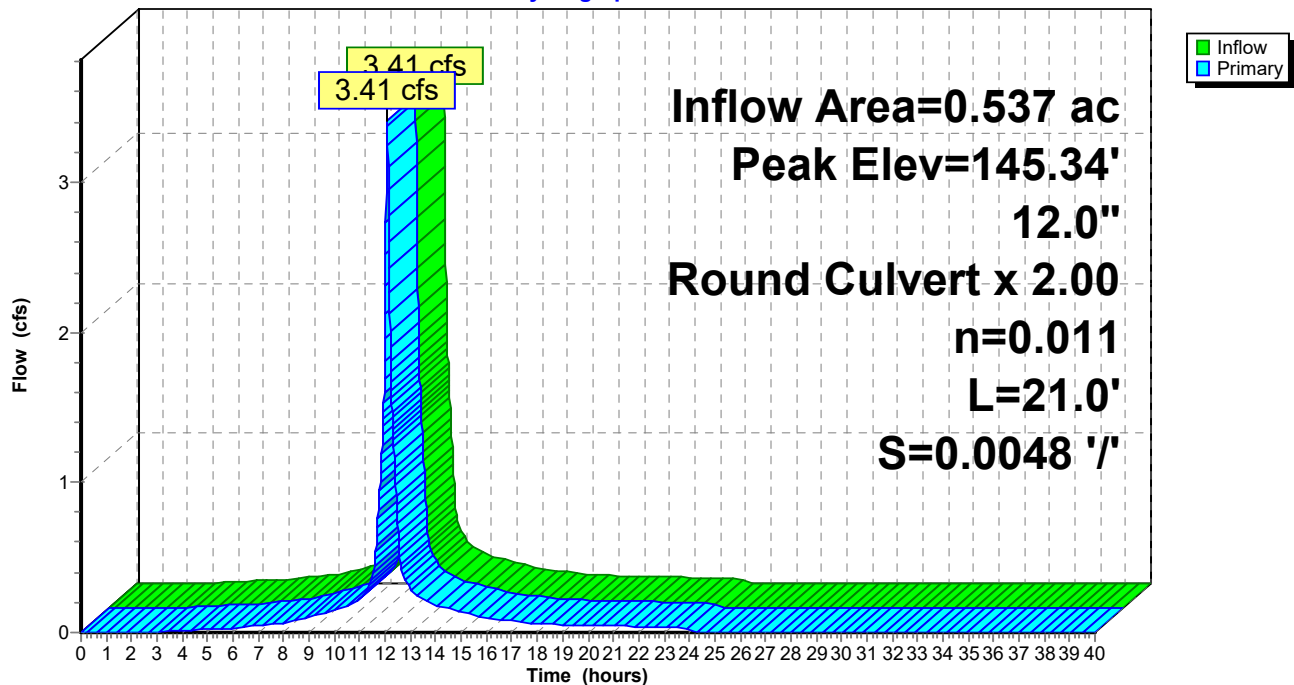
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.34' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.50'	12.0" Round Culvert X 2.00 L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.50' / 144.40' S= 0.0048 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.40 cfs @ 12.08 hrs HW=145.34' (Free Discharge)
↑1=Culvert (Barrel Controls 3.40 cfs @ 3.25 fps)

Pond 52P: CB23+19

Hydrograph



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Page 128

Summary for Pond 53P: DMH 23+34

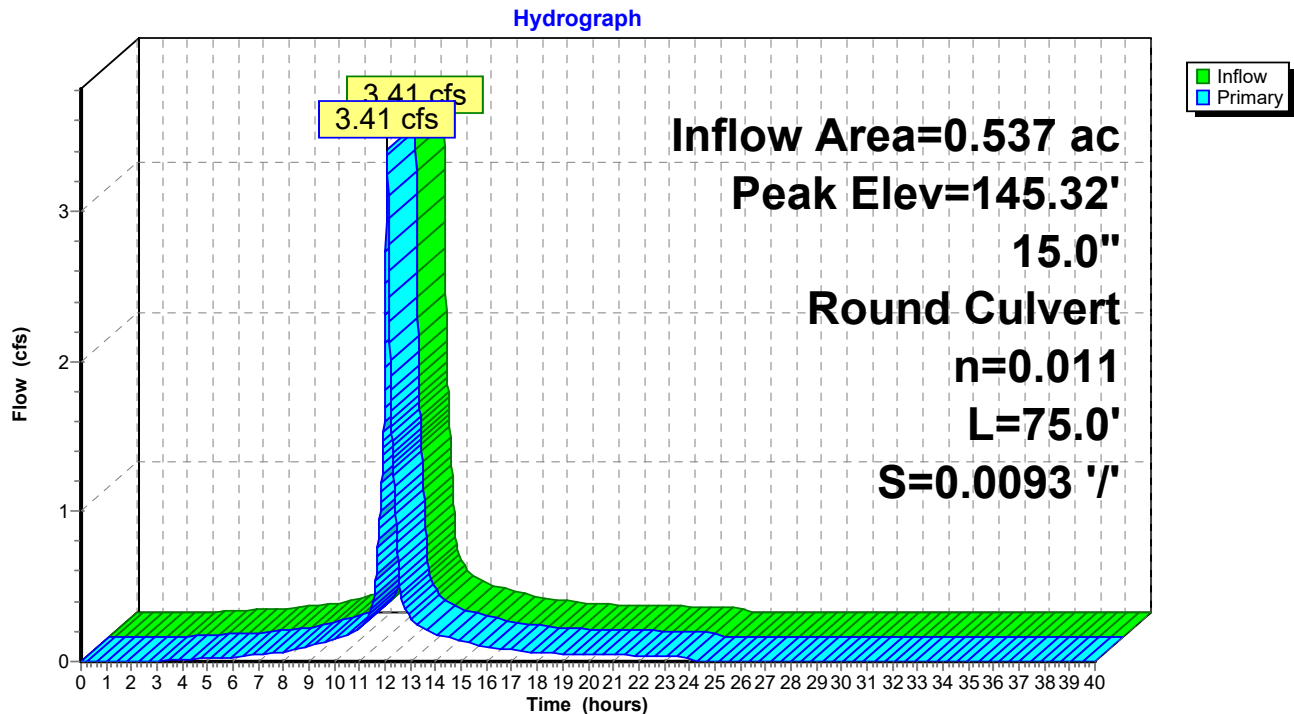
Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 5.87" for 100-YR event
Inflow = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af
Outflow = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.0 min
Primary = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.32' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	144.35'	15.0" Round Culvert L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.35' / 143.65' S= 0.0093 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.40 cfs @ 12.08 hrs HW=145.32' (Free Discharge)
↑1=Culvert (Inlet Controls 3.40 cfs @ 3.35 fps)

Pond 53P: DMH 23+34



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Page 129

Summary for Pond 54P: FD24+09

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 5.87" for 100-YR event
Inflow = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af
Outflow = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.0 min
Primary = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af

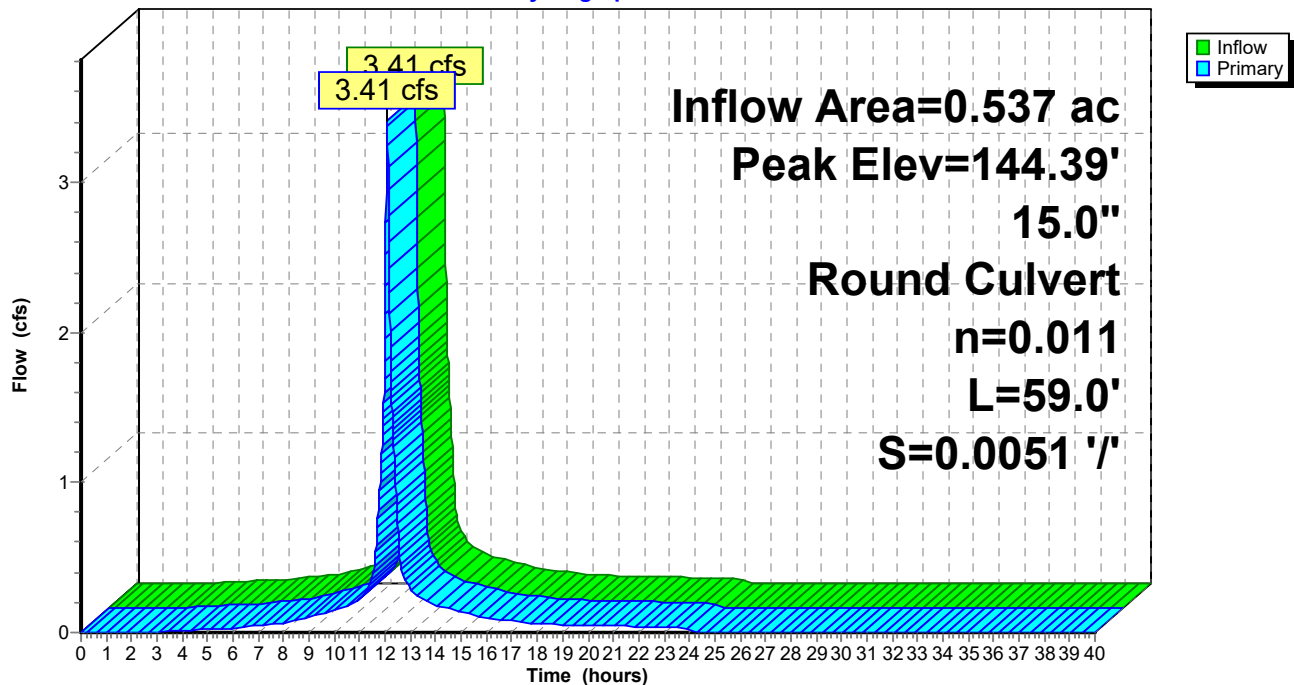
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 144.39' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	15.0" Round Culvert L= 59.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 143.30' / 143.00' S= 0.0051 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.40 cfs @ 12.08 hrs HW=144.39' (Free Discharge)
↑1=Culvert (Barrel Controls 3.40 cfs @ 4.00 fps)

Pond 54P: FD24+09

Hydrograph



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Page 130

Summary for Pond 55P: FD24+70

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 5.87" for 100-YR event
Inflow = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af
Outflow = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.0 min
Primary = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af

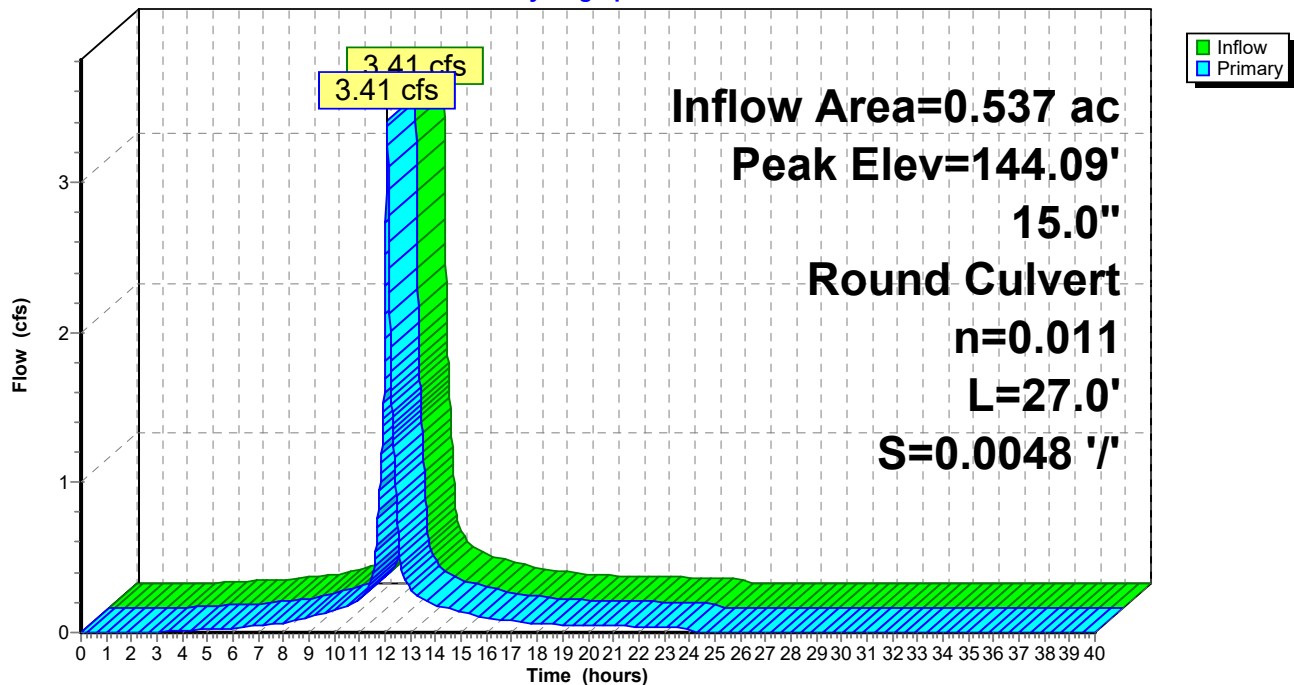
Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 144.09' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	142.95'	15.0" Round Culvert L= 27.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 142.95' / 142.82' S= 0.0048 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.40 cfs @ 12.08 hrs HW=144.09' (Free Discharge)
↑1=Culvert (Barrel Controls 3.40 cfs @ 3.79 fps)

Pond 55P: FD24+70

Hydrograph



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Type III 24-hr 100-YR Rainfall=6.70"

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Page 131

Summary for Pond 56P: Wetland Storage

Inflow Area = 33.938 ac, 6.90% Impervious, Inflow Depth = 2.58" for 100-YR event
 Inflow = 55.42 cfs @ 12.44 hrs, Volume= 7.304 af
 Outflow = 13.21 cfs @ 13.34 hrs, Volume= 7.247 af, Atten= 76%, Lag= 54.0 min
 Primary = 13.21 cfs @ 13.34 hrs, Volume= 7.247 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 144.78' @ 13.34 hrs Surf.Area= 318,031 sf Storage= 117,893 cf

Plug-Flow detention time= 105.7 min calculated for 7.246 af (99% of inflow)
 Center-of-Mass det. time= 101.3 min (970.0 - 868.7)

Volume	Invert	Avail.Storage	Storage Description
#1	142.71'	205,693 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
142.71	100	50.0	0	0	100
144.00	20,500	4,000.0	9,474	9,474	1,273,143
145.00	470,000	4,330.0	196,219	205,693	1,491,933

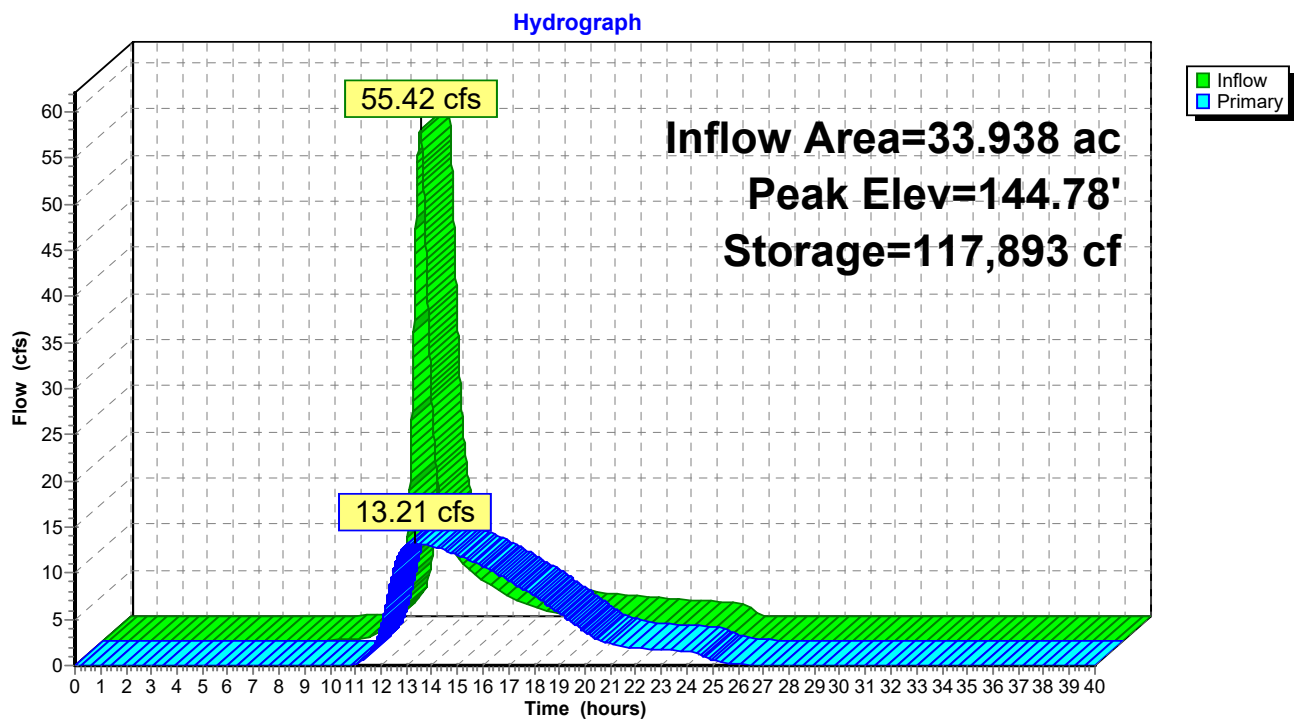
Device	Routing	Invert	Outlet Devices
#1	Primary	142.71'	36.0" W x 8.0" H Box Culvert X 2.00 L= 50.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 142.71' / 142.46' S= 0.0050 ' S= 0.0050 ' Cc= 0.900 n= 0.018, Flow Area= 2.00 sf
#2	Device 1	143.50'	Custom Weir/Orifice X 2.00, Cv= 2.62 (C= 3.28) Elev. (feet) 143.50 144.90 144.90 145.00 Width (feet) 1.40 1.40 3.00 3.00

Primary OutFlow Max=13.21 cfs @ 13.34 hrs HW=144.78' (Free Discharge)

1=Culvert (Passes 13.21 cfs of 20.16 cfs potential flow)

2=Custom Weir/Orifice (Weir Controls 13.21 cfs @ 3.70 fps)

Pond 56P: Wetland Storage



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Page 133

Summary for Subcatchment 57P: P2e

Runoff = 1.13 cfs @ 12.22 hrs, Volume= 0.142 af, Depth= 1.10"

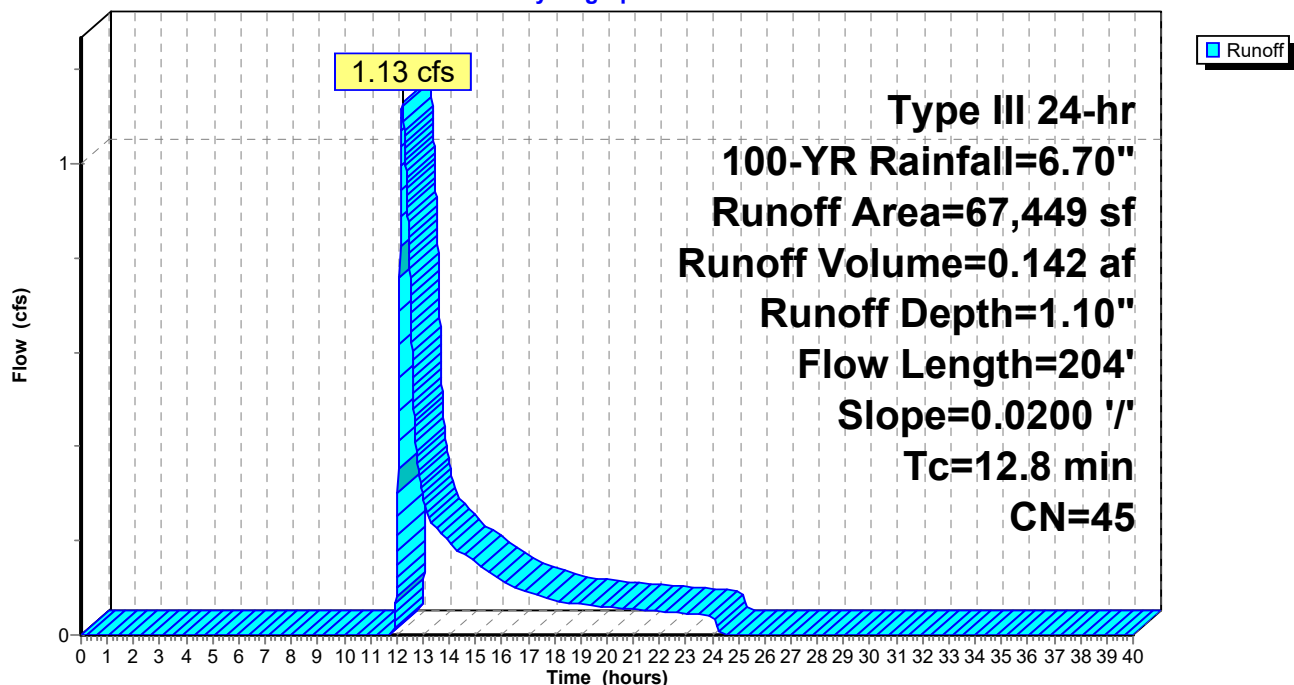
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
13,005	61	>75% Grass cover, Good HSG B
531	39	>75% Grass cover, Good HSG A
844	98	Roofs HSG B
504	98	Paved parking HSG B
33,230	30	Woods, Good HSG A
19,335	55	Woods, Good HSG B
67,449	45	Weighted Average
66,101	43	98.00% Pervious Area
1,348	98	2.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	59	0.0200	0.11		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
3.4	145	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.8	204	Total			

Subcatchment 57P: P2e

Hydrograph

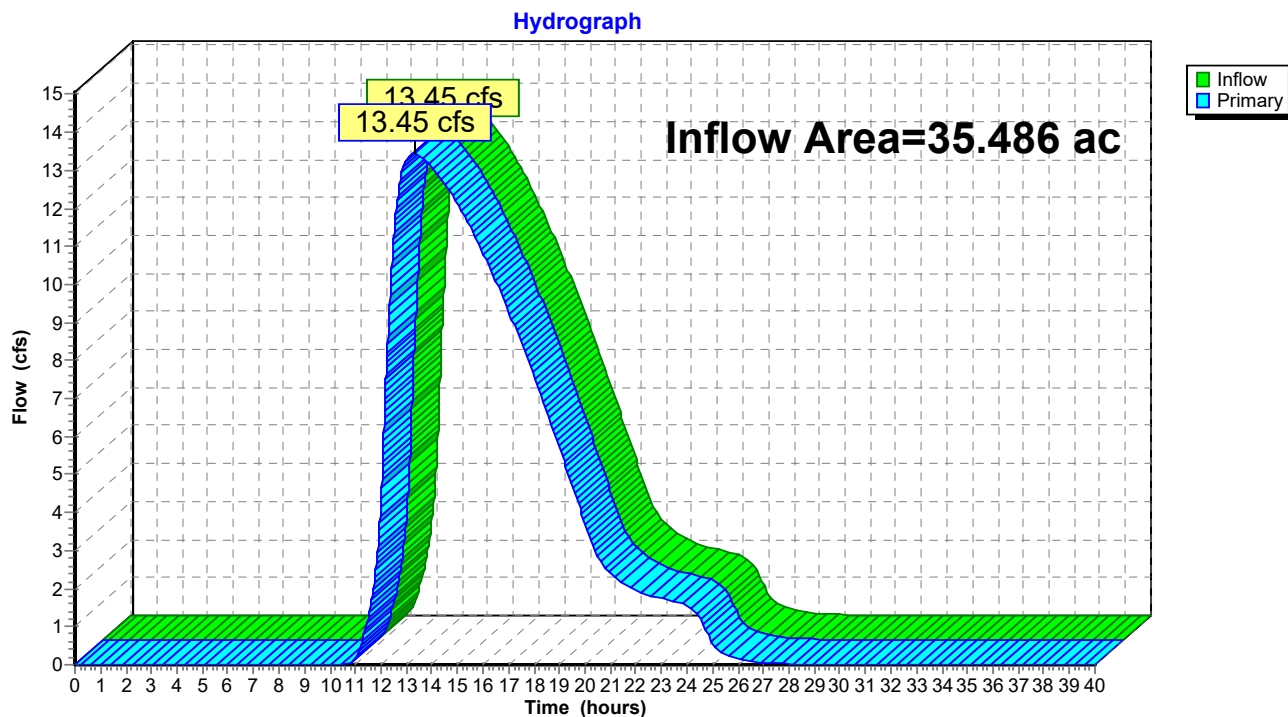


Summary for Link 58P: Design Point #2: Flow to Southern Abutter

Inflow Area = 35.486 ac, 6.69% Impervious, Inflow Depth = 2.50" for 100-YR event
 Inflow = 13.45 cfs @ 13.30 hrs, Volume= 7.389 af
 Primary = 13.45 cfs @ 13.30 hrs, Volume= 7.389 af, Atten= 0%, Lag= 0.0 min

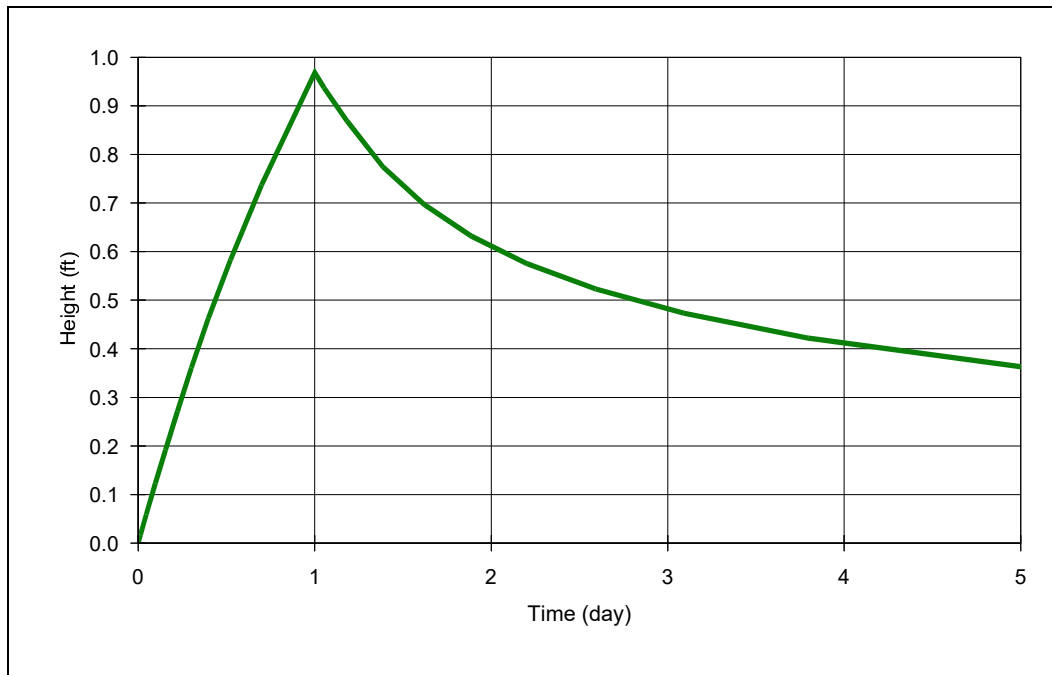
Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link 58P: Design Point #2: Flow to Southern Abutter



ATTACHMENT L: MOUNDING CALCULATIONS

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Legacy Engineering LLC

PROJECT: Infiltration Basin #1

ANALYST: Daniel J. Merrikin, P.E.

DATE: 5/5/2020 TIME: 12:59:15 PM

INPUT PARAMETERS

Application rate: 0.26 c.ft/day/sq. ft

Duration of application: 1 day

Total simulation time: 5 day

Fillable porosity: 0.2

Hydraulic conductivity: 4.8 ft/day

Initial saturated thickness: 20 ft

Length of application area: 460 ft

Width of application area: 47 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 0 ft

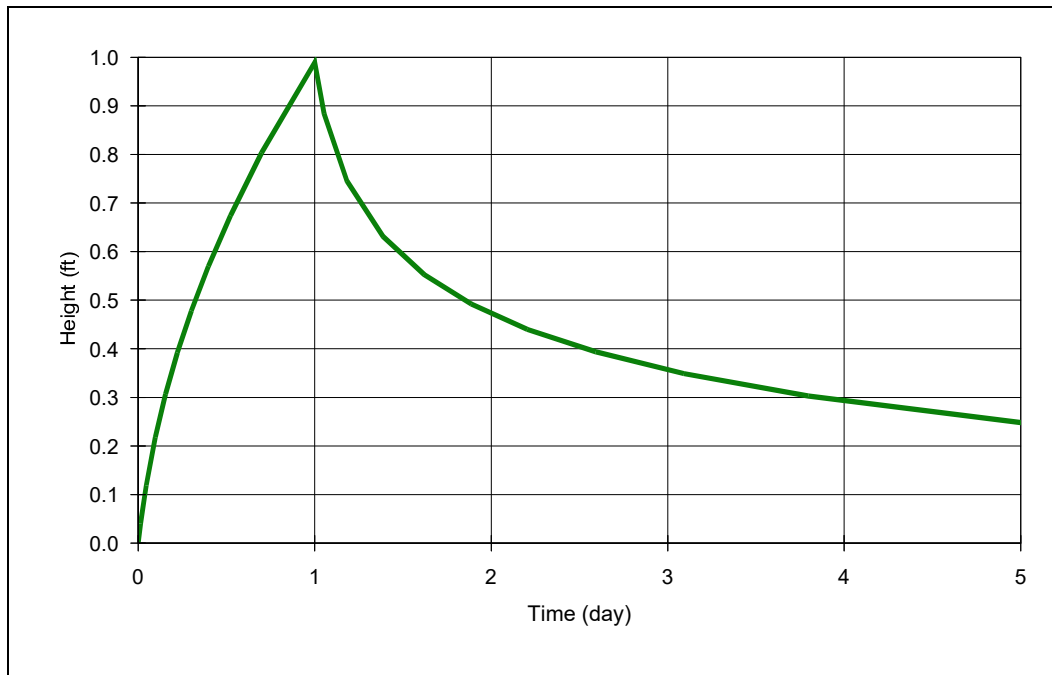
Y coordinate: 0 ft

Total volume applied: 5621.2 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.02
0	0.06
0.1	0.12
0.2	0.19
0.2	0.27
0.3	0.36
0.4	0.46
0.5	0.58
0.7	0.74
1	0.97
1.1	0.94
1.2	0.87
1.4	0.77
1.6	0.70
1.9	0.63
2.2	0.57
2.6	0.52
3.1	0.47
3.8	0.42
5	0.36

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Legacy Engineering LLC

PROJECT: Infiltration Basin #2

ANALYST: Daniel J. Merrikin, P.E.

DATE: 5/19/2020 TIME: 10:33:53 AM

INPUT PARAMETERS

Application rate: 0.63 c.ft/day/sq. ft

Duration of application: 1 day

Total simulation time: 5 day

Fillable porosity: 0.2

Hydraulic conductivity: 16.5 ft/day

Initial saturated thickness: 20 ft

Length of application area: 420 ft

Width of application area: 26.3 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 0 ft

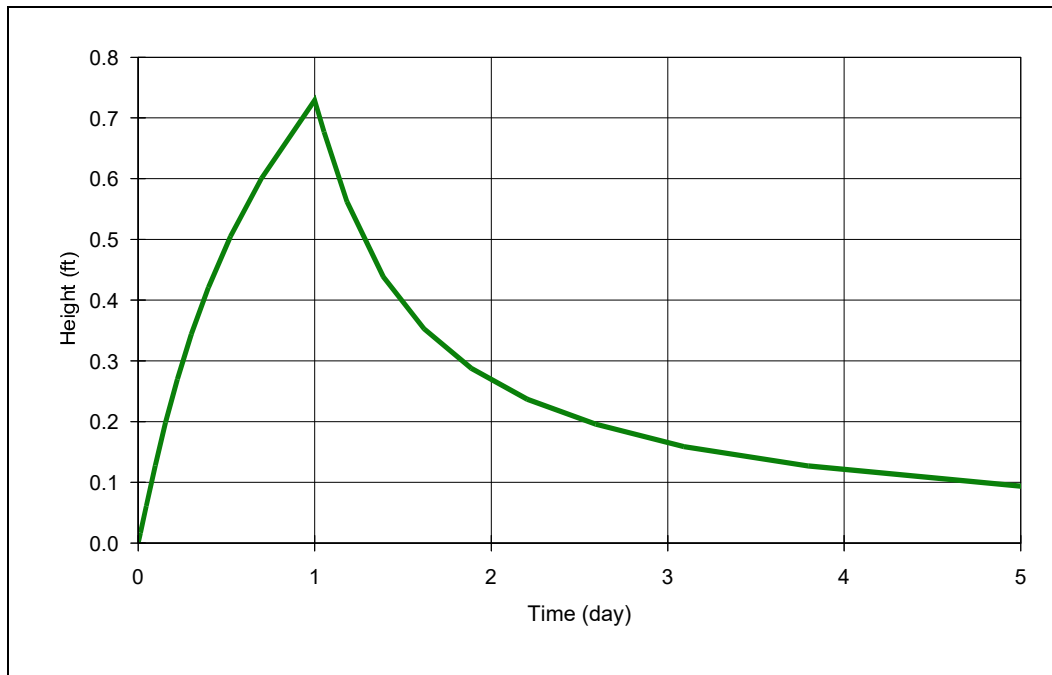
Y coordinate: 0 ft

Total volume applied: 6958.98 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.04
0	0.12
0.1	0.22
0.2	0.31
0.2	0.39
0.3	0.48
0.4	0.57
0.5	0.67
0.7	0.8
1	0.99
1.1	0.88
1.2	0.74
1.4	0.63
1.6	0.55
1.9	0.49
2.2	0.44
2.6	0.39
3.1	0.35
3.8	0.3
5	0.25

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Legacy Engineering LLC

PROJECT: Infiltration Basin #3

ANALYST: Daniel J. Merrikin, P.E.

DATE: 5/19/2020 TIME: 10:40:40 AM

INPUT PARAMETERS

Application rate: 0.27 c.ft/day/sq. ft

Duration of application: 1 day

Total simulation time: 5 day

Fillable porosity: 0.2

Hydraulic conductivity: 4.8 ft/day

Initial saturated thickness: 20 ft

Length of application area: 52 ft

Width of application area: 37.7 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 0 ft

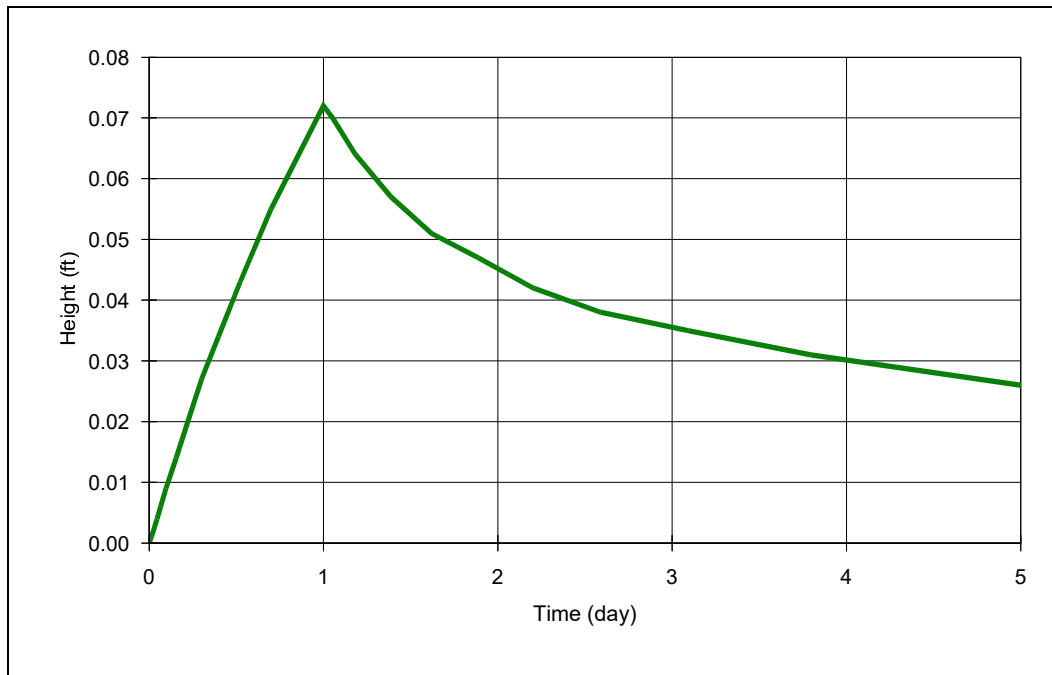
Y coordinate: 0 ft

Total volume applied: 529.308 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.02
0	0.06
0.1	0.13
0.2	0.2
0.2	0.27
0.3	0.34
0.4	0.42
0.5	0.5
0.7	0.6
1	0.73
1.1	0.68
1.2	0.56
1.4	0.44
1.6	0.35
1.9	0.29
2.2	0.24
2.6	0.2
3.1	0.16
3.8	0.13
5	0.09

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Legacy Engineering LLC

PROJECT: Infiltration Basin #4

ANALYST: Daniel J. Merrikin, P.E.

DATE: 5/19/2020 TIME: 10:46:14 AM

INPUT PARAMETERS

Application rate: 0.02 c.ft/day/sq. ft

Duration of application: 1 day

Total simulation time: 5 day

Fillable porosity: 0.2

Hydraulic conductivity: 2 ft/day

Initial saturated thickness: 20 ft

Length of application area: 340 ft

Width of application area: 29.2 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 0 ft

Y coordinate: 0 ft

Total volume applied: 198.56 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0
0	0
0.1	0.01
0.2	0.01
0.2	0.02
0.3	0.03
0.4	0.03
0.5	0.04
0.7	0.06
1	0.07
1.1	0.07
1.2	0.06
1.4	0.06
1.6	0.05
1.9	0.05
2.2	0.04
2.6	0.04
3.1	0.04
3.8	0.03
5	0.03

ATTACHMENT M: RATIONAL METHOD CALCULATIONS

RATIONAL METHOD DRAINAGE STRUCTURE CALCULATIONS

LOCATION: EMERSON PLACE
DATE: 5/18/2020 BY: DJM
DESIGN STORM: 10/100 Yr.

LOCATION			AREA		C	C x A	Sum C x A	FLOW TIME (min.)			i	Q (cfs)	DESIGN					COMMENTS
WATERSHED	FROM	TO	INCRE- MENT	TOTAL				To Inlet	In Chnl	Time Conc			Size (in.)	Slope %	n	Full Cap (cfs)	Full Vel. (fps)	
P1a	CB	DMH	0.21		0.90	0.19		14.6		14.6	6.7	1.2	12	0.018	0.011	5.6	7.2	100-yr
P1b	CB	DMH	1.12		0.43	0.48		5.3		5.3	9.0	4.3	12	0.011	0.011	4.4	5.6	100-yr
	DMH	DMH		1.32			0.67	14.6	0.2	14.8	6.6	4.4	15	0.006	0.011	5.9	4.8	100-yr
	DMH	DMH		1.32			0.67	14.8	0.2	15.0	6.5	4.3	15	0.006	0.011	5.9	4.8	100-yr
P1c	CB	DMH	0.35		0.58	0.20		11.0		11.0	7.7	1.6	12	0.017	0.011	5.5	7.0	100-yr
P1d	CB	DMH	0.35		0.62	0.22		10.6		10.6	7.9	1.7	12	0.011	0.011	4.4	5.6	100-yr
	DMH	DMH		2.03			1.09	15.0	0.2	15.2	6.4	7.0	18	0.006	0.011	9.6	5.4	100-yr
	DMH	Basin1		2.03			1.09	15.2	0.1	15.3	6.4	7.0	18	0.006	0.011	9.6	5.4	100-yr
P1e	CB	DMH	0.85		0.57	0.48		12.0		12.0	7.8	3.8	12	0.010	0.011	4.2	5.4	100-yr
P1f	CB	DMH	0.82		0.57	0.47		11.5		11.5	7.9	3.7	12	0.010	0.011	4.2	5.4	100-yr
	DMH	Basin1		1.67			0.95	12.0	0.2	12.2	7.7	7.3	15	0.012	0.011	8.4	6.8	100-yr
P1g	CB	DMH	0.98		0.59	0.58		12.1		12.1	7.8	4.5	15	0.012	0.011	8.4	6.8	100-yr
P1h	CB	DMH	1.05		0.60	0.63		11.7		11.7	7.8	4.9	15	0.008	0.011	6.8	5.6	100-yr
	DMH	Basin1		2.03			1.21	12.1	0.2	12.3	7.5	9.1	18	0.006	0.011	9.6	5.4	100-yr
P1j	CB	DMH	0.74		0.55	0.40		11.8		11.8	7.8	3.2	12	0.010	0.011	4.2	5.4	100-yr
P1k	CB	DMH	0.27		0.68	0.18		8.7		8.7	8.2	1.5	12	0.006	0.011	3.3	4.2	100-yr
	DMH	Basin2		1.00			0.59	11.8	0.2	12.0	7.8	4.6	15	0.031	0.011	13.4	11.0	100-yr
P1m	CB	DMH	0.99		0.59	0.58		10.9		10.9	7.7	4.5	12	0.025	0.011	6.7	8.5	100-yr
P1n	CB	DMH	1.04		0.60	0.62		10.9		10.9	7.7	4.8	12	0.015	0.011	5.2	6.6	100-yr
	DMH	Basin2		2.02			1.20	10.9	0.2	11.1	7.7	9.3	18	0.006	0.011	9.6	5.4	100-yr
	Basin2	Wetland		Rate from HydroCad				10.9	0.2	11.1	7.7	0.3	15	0.007	0.011	6.4	5.2	100-yr
P2a	CB	DMH	0.16		0.74	0.12		8.0		8.0	8.5	1.0	12	0.007	0.011	3.5	4.5	100-yr
P2b	CB	DMH	0.28		0.65	0.18		11.4		11.4	7.9	1.4	12	0.011	0.011	4.4	5.6	100-yr
	DMH	Basin5		0.44			0.30	11.4		11.4	7.9	2.4	12	0.009	0.011	4.0	5.1	100-yr
P2g1	CB	DMH	0.27		0.80	0.22		3.6		3.6	9.5	2.0	12	0.005	0.011	3.0	3.8	100-yr
P2g2	CB	DMH	0.27		0.80	0.22		3.6		3.6	9.5	2.0	12	0.005	0.011	3.0	3.8	100-yr
	DMH	FD		0.54			0.43	3.6		3.6	9.5	4.1	15	0.009	0.011	7.2	5.9	100-yr
	FD	FD		0.54			0.43	3.6		3.6	9.5	4.1	15	0.005	0.011	5.4	4.4	100-yr
	FD	Wetland		0.54			0.43	3.6		3.6	9.5	4.1	15	0.005	0.011	5.4	4.4	100-yr

ATTACHMENT N: FIRST DEFENSE PROPRIETARY TREATMENT UNITS

First Defense® High Capacity

A Simple Solution for your Trickiest Sites

Product Profile

The First Defense® High Capacity is an enhanced vortex separator that combines an effective stormwater treatment chamber with an integral peak flow bypass. It efficiently removes sediment total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® High Capacity is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints (**Table 1**, next page).

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for “offline” arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 450% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

How it Works

The First Defense® High Capacity has internal components designed to remove and retain gross debris, total suspended solids (TSS) and hydrocarbons (**Fig.1**).

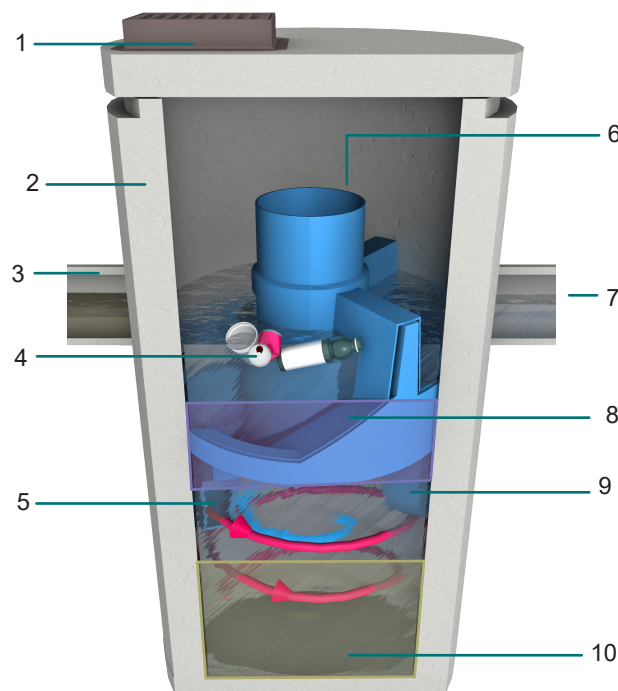
Contaminated stormwater runoff enters the inlet chute from a surface grate and/or inlet pipe. The inlet chute introduces flow into the chamber tangentially to create a low energy vortex flow regime (**magenta arrow**) that directs sediment into the sump while oils, floating trash and debris rise to the surface.

Treated stormwater exits through a submerged outlet chute located opposite to the direction of the rotating flow (**blue arrow**). Enhanced vortex separation is provided by forcing the rotating flow within the vessel to follow the longest path possible rather than directly from inlet to outlet.

Higher flows bypass the treatment chamber to prevent turbulence and washout of captured pollutants. An internal bypass conveys infrequent peak flows directly to the outlet eliminating the need for, and expense of, external bypass control structures. A floatables draw off slot functions to convey floatables into the treatment chamber prior to bypass.

Verified by NJCAT and NJDEP

Fig.1 The First Defense® High Capacity has internal components designed to efficiently capture pollutants and prevent washout at peak flows.



Components

- | | |
|--|-------------------------------|
| 1. Inlet Grate (optional) | 6. Internal Bypass |
| 2. Precast chamber | 7. Outlet pipe |
| 3. Inlet Pipe (optional) | 8. Oil and Floatables Storage |
| 4. Floatables Draw Off Slot (not pictured) | 9. Outlet chute |
| 5. Inlet Chute | 10. Sediment Storage Sump |

First Defense® High Capacity

Sizing & Design

This adaptable online treatment system works easily with large pipes, multiple inlet pipes, inlet grates and now, contains a high capacity bypass for the conveyance of large peak flows. Designed with site flexibility in mind, the First Defense® High Capacity allows engineers to maximize available site space without compromising treatment level.

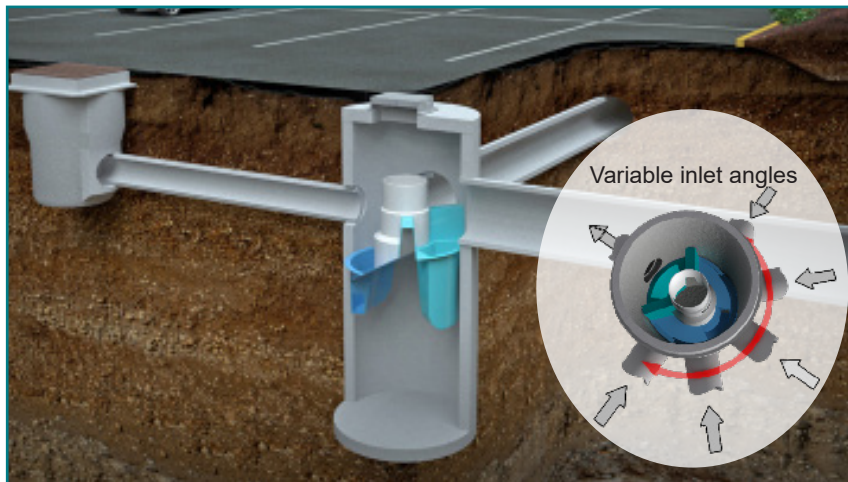


Fig 2. Works with multiple inlet pipes and grates

Inspection and Maintenance

Nobody maintains our systems better than we do. To ensure optimal, ongoing device performance, be sure to recommend Hydro International as a preferred service and maintenance provider to your clients.

Call **1 (800) 848-2706** to schedule an inspection and cleanout or learn more at hydro-int.com/service

SIZING CALCULATOR FOR ENGINEERS



This simple online tool will recommend the best separator, model size and online/offline arrangement based on site-specific data entered by the user.

Go to hydro-int.com/sizing to access the tool.



Fig 3. Maintenance is done with a vector truck

Table 1. First Defense® High Capacity Design Criteria.

First Defense® High Capacity Model Number	Diameter	Typical TSS Treatment Flow Rates		Peak Online Flow Rate	Maximum Pipe Diameter ¹	Oil Storage Capacity	Typical Sediment Storage Capacity ²	Minimum Distance from Outlet Invert to Top of Rim ³	Standard Distance from Outlet Invert to Sump Floor
		NJDEP Certified	110µm						
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd³ / m³)	(ft / m)	(ft / m)
FD-3HC	3 / 0.9	0.84 / 23.7	1.06 / 45.3	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.71 / 1.13
FD-4HC	4 / 1.2	1.50 / 42.4	1.88 / 50.9	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	4.97 / 1.5
FD-5HC	5 / 1.5	2.34 / 66.2	2.94 / 82.1	20 / 566	24 / 600	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.19 / 1.5
FD-6HC	6 / 1.8	3.38 / 95.7	4.23 / 133.9	32 / 906	30 / 750	496 / 1,878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	5.97 / 1.8
FD-8HC	8 / 2.4	6.00 / 169.9	7.52 / 212.9	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 - 1.8	7.40 / 2.2

¹Contact Hydro International when larger pipe sizes are required.

²Contact Hydro International when custom sediment storage capacity is required.

³Minimum distance for models depends on pipe diameter.

Performance Verification of TSS Removal with OK-110 Silica Sand

The First Defense® is a cost competitive device used to capture oil, debris and sediment from stormwater runoff. Commonly used as a pre-treatment device, the First Defense® effectively captures the bulk of the pollutant load when used upstream of more sensitive treatment devices such as infiltration systems.

The First Defense® is equally well suited as a stand alone treatment device for use on space constrained sites. Whereas pretreatment devices are used to capture gross solids, stand alone treatment devices must remove gross solids and finer particles. Stand alone treatment units must also prevent pollutant washout during intense storm events, as there is no additional treatment system downstream to capture pollutants scoured from the upstream system before runoff is discharged to the environment.

The First Defense® uses the principles of rotational flow to provide greater capture efficiency of fine suspended solids as compared to that of conventional gravity separation chambers. Furthermore, its unique internal bypass prevents washout of captured pollutants during intense storm flows. Flows exceeding the design treatment flow rate are diverted away from the pollutant storage sump through an enclosed bypass chute. This arrangement protects captured pollutants from high scour velocities during high-intensity rainfall without requiring the use of an additional bypass junction manhole (Fig.1).

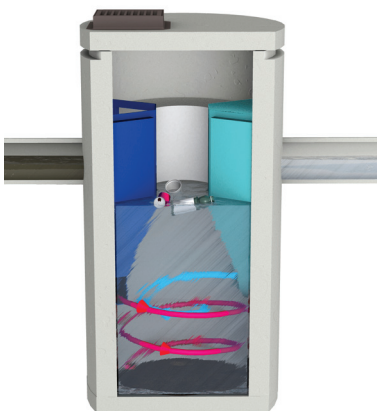


Fig.1 The First Defense® captures fine sediments as well as gross pollutants, making it an effective stand-alone treatment device for space constrained sites.

Performance Test Objectives and Protocols

To evaluate the treatment performance of the First Defense®, a 4-ft diameter unit was tested at Hydro International's hydraulics laboratory in Portland, ME. The primary objectives were to: 1) independently verify the removal efficiency of Total Suspended

Solids (TSS) with a fine particle size gradation, and 2) verify that the First Defense® protects previously captured pollutants from washout during high-flow bypass mode.

TSS removal tests were conducted according to the Maine Department of Environmental Protection (MEDEP) Test Protocols, which specify OK-110 sediment as the test pollutant (Fig.2).

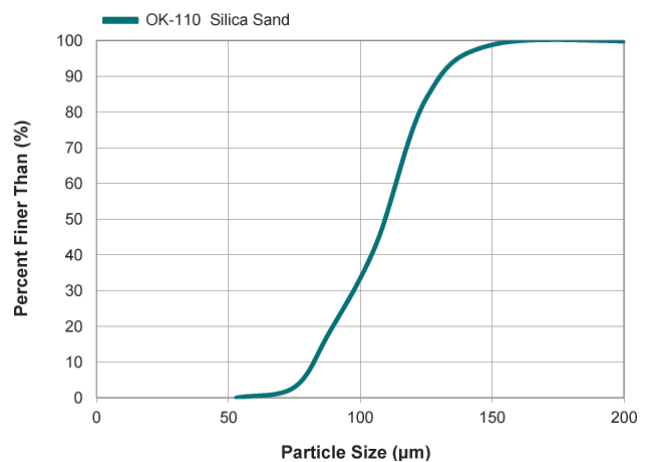


Fig.2 Particle size distribution of the OK-110 silica blend, which contains a large fraction of fine particle sizes that are targeted by stand-alone stormwater treatment devices.

Washout tests were conducted in conformance with the 2009 New Jersey DEP protocols for Hydrodynamic Separators, which require pre-loading the sump of the test unit to 50% capacity with OK-110 (Fig.3).

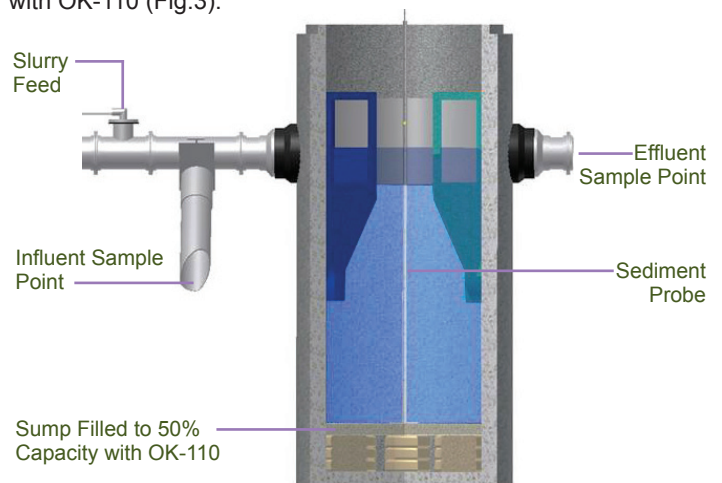


Fig.3 The 4-ft First Defense® was tested with its sump pre-loaded to 50% capacity with OK-110 sediment.

First Defense®

Washout Test Procedures

Washout tests were conducted at multiple flow rates ranging from 0.88 to 3.8 cfs. At each tested flow rate, clean water from a 23,000 gallon reservoir was pumped to the First Defense® for 15 minutes (Fig.4).

At the conclusion of the test run, the sediment depth was measured and compared to the initial depth. Results showed no measureable decrease in the depth of sediment pre-loaded in the sump.

The first round of retention results were confirmed by retesting at the same flow rates while measuring changes in effluent concentrations. While pumping clean water from the reservoir through the pre-loaded sump for 25 minutes at each flow rate, influent and effluent samples were collected at 5-minute intervals. The samples were analyzed for TSS by an independent, state-certified laboratory utilizing APHA SM2540D.

The analytical results for all test runs showed non-detectable levels of TSS.

A representative from the University of New Hampshire Stormwater Center observed all of the washout tests as an independent witness. This witness reviewed data analysis and quality control procedures of the external laboratory used for sample analysis, and provided a written report to independently verify the observations.

TSS Removal Efficiency Test Procedures

TSS removal efficiency tests were run at 0.7 cfs, the targeted Design Treatment Flow Rate of the 4-ft First Defense®. A slurry mixture of F-60 was pumped into the clean water pipeline conveying water from a 23,000 gal reservoir to the First Defense® (Fig.4).

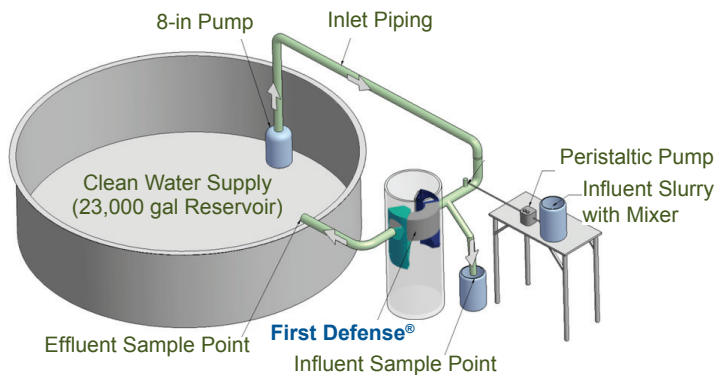


Fig.4 The First Defense® was tested at Hydro International's Portland, Maine test facility.

Influent and effluent samples were taken at pre-determined intervals spaced by residence time. All samples had a minimum volume of 500 mL. Background influent and effluent samples were collected and analyzed to ensure clean water supplied from the reservoir did not exceed non-detectable concentrations of 4 mg/L TSS.

Samples were independently analyzed for TSS using APHA SM2540D by an accredited third party laboratory.

Test Results

Overall, the First Defense® met and exceeded the scour test requirements of the NJDEP protocol, showing no measurable effluent TSS concentration and no measurable decrease in depth of the pre-loaded sediment at flows up to 500% of the model's Design Treatment Flow Rate.

Overall, the test results show that the First Defense® exceeds 94% removal for the mean flow rate of 0.65 cfs (293 gpm), and would be expected to exceed 90% removal at the target flow rate of 0.71 cfs (Table 1). These tests were independently witnessed and reported by Jeff Dennis of the Maine DEP. As stated in his written assessment:

"All paired sample removal efficiencies exceeded 80%, as did their mean whether or not they were adjusted for background concentrations, so it is very clear that at 290 gpm, a 4-ft diameter First Defense® unit can remove at least 80% of OK-110 grade silica sand, and seems to be able to remove more than 90% at this flow."

Table 1. OK-110 Sediment Removal Efficiency.

Test Run	Flow Rate	Influent TSS Concentration	Effluent TSS Concentration	Removal Efficiency
	(cfs)	(mg/L)	(mg/L)	(%)
1	0.61	299.8	13.7	95.4
2	0.73	268.6	16.8	93.7
3	0.67	189.1	12.6	93.3
4	0.66	279.1	15.8	94.3
5	0.58	291.1	17.3	94.1
6	0.63	267.2	15.8	94.1
Mean	0.65	265.5	15.2	94.2

Conclusions

The results confirm that the First Defense® effectively captures fine sediment at its treatment flow rate, and that fine sediments captured in the pollutant storage sump are protected from washout during intense storm events. This confirms that the First Defense® is a suitable stand-alone stormwater treatment device for sites where larger treatment systems are not practical solutions.

Ridge Street HydroCAD Revised Final

Prepared by {enter your company name here}

HydroCAD® 10.10-3a s/n 02347 © 2020 HydroCAD Software Solutions LLC

Type III 24-hr 1-In Rainfall=1.00"

Printed 5/19/2020

Page 4

Summary for Pond 54P: FD24+09

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 0.45" for 1-In event
Inflow = 0.28 cfs @ 12.09 hrs, Volume= 0.020 af
Outflow = 0.28 cfs @ 12.09 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min
Primary = 0.28 cfs @ 12.09 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 143.57' @ 12.09 hrs

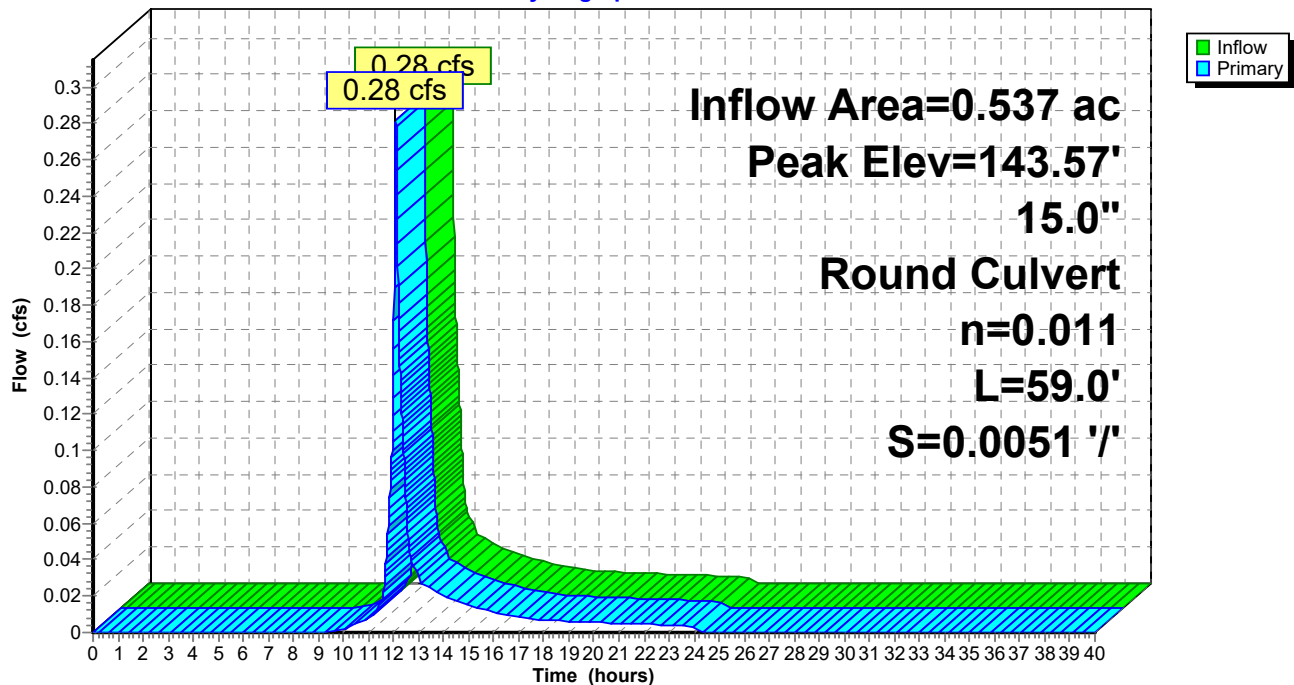
Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	15.0" Round Culvert L= 59.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 143.30' / 143.00' S= 0.0051 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=0.28 cfs @ 12.09 hrs HW=143.57' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.28 cfs @ 2.20 fps)

Pond 54P: FD24+09

Hydrograph



Ridge Street HydroCAD Revised Final

Prepared by {enter your company name here}

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Type III 24-hr 1-In Rainfall=1.00"

Printed 5/19/2020

Page 5

Summary for Pond 55P: FD24+70

Inflow Area = 0.537 ac, 84.80% Impervious, Inflow Depth = 0.45" for 1-In event
Inflow = 0.28 cfs @ 12.09 hrs, Volume= 0.020 af
Outflow = 0.28 cfs @ 12.09 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min
Primary = 0.28 cfs @ 12.09 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 143.23' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	142.95'	15.0" Round Culvert L= 27.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 142.95' / 142.82' S= 0.0048 '/ Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=0.28 cfs @ 12.09 hrs HW=143.23' (Free Discharge)

↑1=Culvert (Barrel Controls 0.28 cfs @ 2.08 fps)

Pond 55P: FD24+70

Hydrograph

