Stormwater Report

For

39 Main Street

MEDWAY MA, 02053

Proposed Residential Development

March 26, 2019
REVISED June 10, 2019

PREPARED BY:
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PREPARED FOR:
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VOLUME 1 OF 1

COMMONWEALTH OF MASSACHUSETTS
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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 "39 Main Street Site Plan of Land" prepared by Legacy Engineering LLC with an original date of March 26, 2019. The development consists of a 4.5 story, 190 unit apartment building and appurtenances.

EXISTING SITE

The proposed development lies on the southerly side of Main Street in Medway, totaling approximately 12.3 acres. The site predominately consists of woods and fields, with wetlands on the easterly side.

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 various soils types as follows:

Westerly Portions:

- Canton (420B): A class B glacial till soil

Easterly Portions:

- Hinckley (245B): A class A glacial till soil
- Swansea Muck (51): A class D soil in wetland areas

GROUNDWATER CONDITIONS

On-site testing concluded that the site contains a groundwater table sloped eastward towards the wetlands. Groundwater elevations vary in depth 6 feet to 11 feet below grade, depending on the location on this sloping site.

SOIL PERMEABILITY

For the purposes of this report and based on the soils present at the proposed stormwater infiltration facilities, a Rawls rate for sand (8.27 inches per hour) is used for a the Infiltration Basin and Infiltration Field #1a, while a Rawl's rate for loamy sand (2.41 inches per hour) is used for Infiltration Fields #1b and #2.

FLOOD PLAIN

The easterly wetland portions of the site lie within a FEMA Zone AE100-year flood plain, although no work is proposed within such areas.

WETLAND PROTECTION ACT

The easterly portions of the site include bordering vegetated wetlands along an unnamed tributary of the Great Black Swamp. A Notice of Intent will be filed for proposed work within wetland jurisdictional areas.

PROPOSED DEVELOPMENT

The proposed construction consists of a 4½ story, 190 unit apartment building, 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: Design point #1 represents the discharge to the easterly wetland system. All outlets from proposed stormwater facilities are equipped with level spreaders to prevent erosion to the wetlands.
- Design Point #2: Design Point #2 represents flow to the abutting property to the south of the development. There is no channelized discharge to this design point under either the existing or proposed condition.

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 following four theoretical storm events were used to model the site before and after the proposed activities occur[1]:

Design Storm	Rainfall
2-Year	3.2 inches
10-Year	4.7 inches
25-Year	5.5 inches
100-Year	6.7 inches

DESIGN POINT #1: Flow to Wetlands

Description of Existing Conditions: In the existing condition, Watershed E1 represents uncontrolled overland flow from the majority of the site. There are five existing houses with driveways within the watershed along main street. The remainder of the watershed consists of woods and minor field areas.

Description of Proposed Conditions: In the proposed condition, Watersheds P1a through P1i represent runoff captured and treated by infiltration field #1. This includes the northern and western portions of the site as well as the flow from off site in these directions. Watersheds P2a through P2f represent runoff captured and treated by infiltration field #2. This includes the southern and eastern portions of the site. Watershed P3 represents the uncontrolled runoff to the wetlands.

Summary of Peak Flow Rates to Design Point:

Design Storm (Year)	Peak Runoff Rate (cfs)	
	Existing	Proposed
2	0.22	0.19
10	2.88	2.72
25	5.44	5.21
100	10.33	10.32

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

DESIGN POINT #2: Overland flow to 43 Main St.

Description of Existing Conditions: In the existing condition, Watershed E-2 represents uncontrolled overland flow into 43 Main St. The watershed is mostly woods.

Description of Proposed Conditions: In the proposed condition, Watershed P4 represents uncontrolled flow to the abutter. The area contributing to this design point is greatly reduced in the proposed condition.

Summary of Peak Flow Rates to Design Point:

Design Storm (Year)	Peak Runoff Rate (cfs)	
	Existing	Proposed
2	0.02	0.00
10	0.33	0.00
25	0.69	0.33
100	1.41	0.55

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.

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.

STORMWATER INFILTRATION FIELDS #1a & #1b

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	86,724 s.f.	20,274 s.f.	0 s.f.	0 s.f.
Required Recharge Volume (Rv)	4,336 c.f.	591 c.f.	0 c.f.	0 c.f.
Total Rv	4,928 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:

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

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
n is the stone void factor

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 Fields have a combined raw storage volume of approximately 9,800 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 required Water Quality Volume (WQV) exceeds the Rv and is used for this calculation. A K value of 2.41 is used for drawdown design purposes for the entire field as a conservative measure. Using the following formula, the drawdown time is calculated:

$Time_{drawdown}$ = [Rv/(K x Bottom Area)]

Where:

WQV = 8,917 c.f.
K = 2.41 inches per hour = 0.20 feet per hour
Bottom Area = 13,285 s.f. x 40% voids = 5,314 s.f.

It is concluded that the drawdown time for the infiltrated volume is 8.4 hours, which satisfies this requirement.

STORMWATER INFILTRATION BASIN

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	280 s.f.	11,067 s.f.	0 s.f.	0 s.f.
Required Recharge Volume (Rv)	14 c.f.	323 c.f.	0 c.f.	0 c.f.
Total Rv	337 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 4,130 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 required Water Quality Volume (WQV) exceeds the Rv and is used for this calculation. A K value of 8.27 is used for drawdown design purposes since soils testing found sandy soils at this location. Using the following formula, the drawdown time is calculated:

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

Where:

WQV = 946 c.f.
K = 8.27 inches per hour = 0.69 feet per hour
Bottom Area = 3,291 s.f.

It is concluded that the drawdown time for the infiltrated volume is 0.4 hours, which satisfies this requirement.

STORMWATER INFILTRATION FIELD #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	55,303 s.f.	17,101 s.f.	0 s.f.	0 s.f.
Required Recharge Volume (Rv)	2,765 c.f.	499 c.f.	0 c.f.	0 c.f.
Total Rv	3,264 c.f.			

For this infiltration facility, the Simple Dynamic Method has been utilized. This method allows for two hours or recharge during the storm event. The required WQV is larger than the Rv and is therefore used in this calculation. The WQV is based upon the volume calculated from 1" of runoff from all impervious surfaces attributed to this infiltration facility, and equals 6,034 c.f. The standard equation shown previously cannot be used for this infiltration field due to the variable void ratio produced by the chambers at different elevations. The following method is used instead:

WQV = Minimum Static Component + Recharge Component

Recharge component = Area(A)*Void ratio(n)*Infiltration Rate(k)*Time(T)
= 6,004 s.f. * 0.4 * 0.2 ft./hr. * 2 hr. = 960 c.f.

Minimum Static Component = WQV – Recharge component
= 6,034 c.f. – 960 c.f. = 5,074 c.f.

Per the HydroCAD storage calculations, the storage volume at the elevation of the lowest outlet (159.3) is 5,075 c.f. This is greater than the required minimum static component of the WQV and therefore meets this requirement.

A secondary check is required to ensure that the Rv will recharge within at least 72 hours. The required Water Quality Volume (WQV) exceeds the Rv and is used for this calculation. A K value of 2.41 is used for drawdown design purposes since soils testing found sandy soils at this location. Using the following formula, the drawdown time is calculated:

$Time_{drawdown}$ = [Rv/(K x Bottom Area)]

Where:
WQV = 6,034 c.f.
K = 2.41 inches per hour = 0.20 feet per hour
Bottom Area = 6,004 s.f. x 40% voids = 2,401 s.f.

It is concluded that the drawdown time for the infiltrated volume is 12.5 hours, which satisfies this requirement.

Mounding Analysis:

A mounding analysis has been conducted and can be found in attachment L. The bottom of Infiltration Fields #1a & #1b is at elevation 158.0, with an average seasonal high groundwater elevation below the field at 153. The mound height is 3.1 feet and will not intercept the bottom of the field. An infiltration rate of 2.41 in/hr was used as a conservative measure for this calculation, even though a majority of the fields lie within sand soils.

The bottom of Infiltration Field #2 is at elevation 158.0, with a seasonal high groundwater elevation below the basin at 152.4. Although no groundwater was found in the test pits at this location, the bottom of the test pit was used as the groundwater elevation as a conservative design measure. The mound height is 3.5 feet and will not intercept the bottom of the field.

The bottom of the Infiltration Basin is at elevation 165.5, with a seasonal high groundwater elevation below the basin at 162.3. The mound height is 0.5 feet and will not intercept the bottom of the field.

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 non-roof impervious surfaces on the site. 0.5 inches is used except in sensitive locations as described in the Stormwater Handbook. Since this site discharges towards a Zone II for a public drinking water supply, the WQV is based on 1.0 inch of runoff. 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:

WQV=(Impervious Area)*(1 in.)
WQV=(190,749 sq. ft.)*(1 in.)/(12 in/ft)=15,896 c.f.

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 50% TSS removal, information for which can be found in attachment M.

Underground Infiltration Systems:

Infiltration Fields #1a & #1b are sized to hold and infiltrate a volume of 9,800 c.f. of stormwater. Overflow from the system discharges to the wetlands via a level spreader. The impervious area treated by this facility is 106,998 s.f. The WQV required to be treated by this facility is 8,917 c.f. The field therefore has sufficient storage volume to treat the WQV. In the 100-year storm, the field fills to an elevation of 161.6, leaving 0.3 feet of freeboard to the top of the field at 161.9.

Infiltration field #2 is sized to infiltrate a volume of 5,075 c.f. of stormwater. Overflow from the system discharges to the wetlands via a level spreader. The impervious area treated by this facility is 72,404 s.f. The WQV required to be treated by this facility is reduced as shown in the calculations in Standard 3 of this report, which result in a required treatment volume of 5,074 c.f. The field therefore has sufficient storage volume to treat the WQV. In the 100-year storm, the field fills to an elevation of 161.7, leaving 0.3 feet of freeboard to the top of the field at 162.0.

Infiltration Basin:

The infiltration basin is sized to hold and infiltrate a volume of 4,130 c.f. of stormwater. Overflow from the system discharges to the wetlands via a level spreader. The impervious area treated by this facility is 11,347 s.f. The WQV required to be treated by this facility is 946 c.f. The field therefore has sufficient storage volume to treat the WQV. In the 100-year storm, the basin fills to an elevation of 166.6, leaving 1.4 feet of freeboard to the top of the berm at 168.0.

TSS REMOVAL CALCULATIONS

In accordance with the DEP Stormwater Management Handbook, each of the drainage treatment trains have 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.

Underground Infiltration Fields:

Each infiltration field provides 80% TSS removal and is preceded by a First Defense Unit providing 50% TTS removal, which satisfies the 44% pretreatment requirement. The total TSS removal for these facilities is 85% where catch basins and First Defense units are used, and 80% where just First defense units are used.

Infiltration Basin:

The infiltration basin provides 80% TSS removal and is preceded by a First Defense Unit providing 50% TTS removal, which satisfies the 44% pretreatment requirement. The total TSS removal for these facilities is 85% where catch basins and First Defense units are used, and 80% where just First defense units are used.

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 generates greater than 1,000 vehicle trips per day and therefore qualifies as a LUHPPL. The development already complies with many of the Standard 5 requirements due to the requirements for discharging to wetlands in a Zone II, including the treatment of 1" of runoff from all impervious surfaces as well as the removal of 44% TSS prior to infiltration structures.

Standard 5 additionally requires oil separation treatment for high intensity use parking lots. This requirement is met by the proposed First Defense units capturing all parking lot runoff.

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 partially lies within a Zone II, which is considered a Critical Area. Stormwater infiltration BMPs are therefore preceded by pretreatment BMPs which achieve a minimum of 44% TSS removal.

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.

The site is largely undeveloped woodlands. A small portion of land is currently developed as a single-family dwelling along Main Street. The Stormwater Management Standards will be met to the maximum extent practicable for the developed location.

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.

ATTACHMENT A: Operations and Maintenance Plan

Operations & Maintenance Plan

For

39 Main Street

MEDWAY MA, 02053

Proposed Residential Development

March 26, 2019
REVISED June 10, 2019

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PREPARED FOR:
Strategic land ventures
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Needham, MA 02494

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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. This O&M Plan includes the following provisions:

1. Stormwater System Operations and Maintenance
2. Integrated Pest Management Plan
3. Miscellaneous Provisions
4. 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

39 Main Street

Project Location

39 Main Street
Medway MA, 02053

Operator Name and Address

Strategic Land Ventures
257 Hillside Avenue
Needham, MA 02494

References

This O&M Plan references other documents as follows:

Site Plan - Plans entitled "39 Main Street Site Plan of Land" with an original date of March 26, 2019 (as may be amended), and prepared by Legacy Engineering, LLC, hereinafter referred to as the "Site Plan".

Stormwater Report – Report entitled "Stormwater Report for 39 Main Street Medway, MA 02053" prepared by Legacy Engineering, LLC with an original date of March 26, 2019 (as may be amended).

Site Description

The proposed use consists of a 4.5 story, 190 unit apartment building located on 12.3 acres of land on Main Street in Medway 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

Residential apartment 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

The Operator or its designee shall be responsible for implementing all Operations and Maintenance (O&M) responsibilities.

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 Development.

Operations and Maintenance Tasks

Deep Sump Catch Basins/Area Drains:

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.
4. Area drains on the west side of the building are to be cleared of leaves weekly during the fall.

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.

Underground Infiltration Field:

1. Perform all pretreatment BMP maintenance, structural and non-structural, as required herein.
2. Inspect the infiltration field at least twice per year, approximately 2-4 days after a rainfall event to ensure that water is not still in the field (as it should have infiltrated into underlying soils by then). Should the infiltration field fail to infiltrate water sufficiently, the field system shall be excavated and replaced in accordance with the original design.
3. Clean out the Separator Row when sediment reaches 3".

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.

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: INTEGRATED PEST MANAGEMENT PLAN

Applicability

The Development shall adhere to this IPM in perpetuity, unless the conservation Commission 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 4-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 4-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. Fertilizer shall be slow release, organic, and low in phosphorous in the 100′ wetland buffer.
- 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 ¾″.

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/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 site.

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" – ¼" 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 one 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 3: 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.
5. Deicing chemicals in the wetland buffer zone shall be limited to sand, salt or calcium chloride.

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

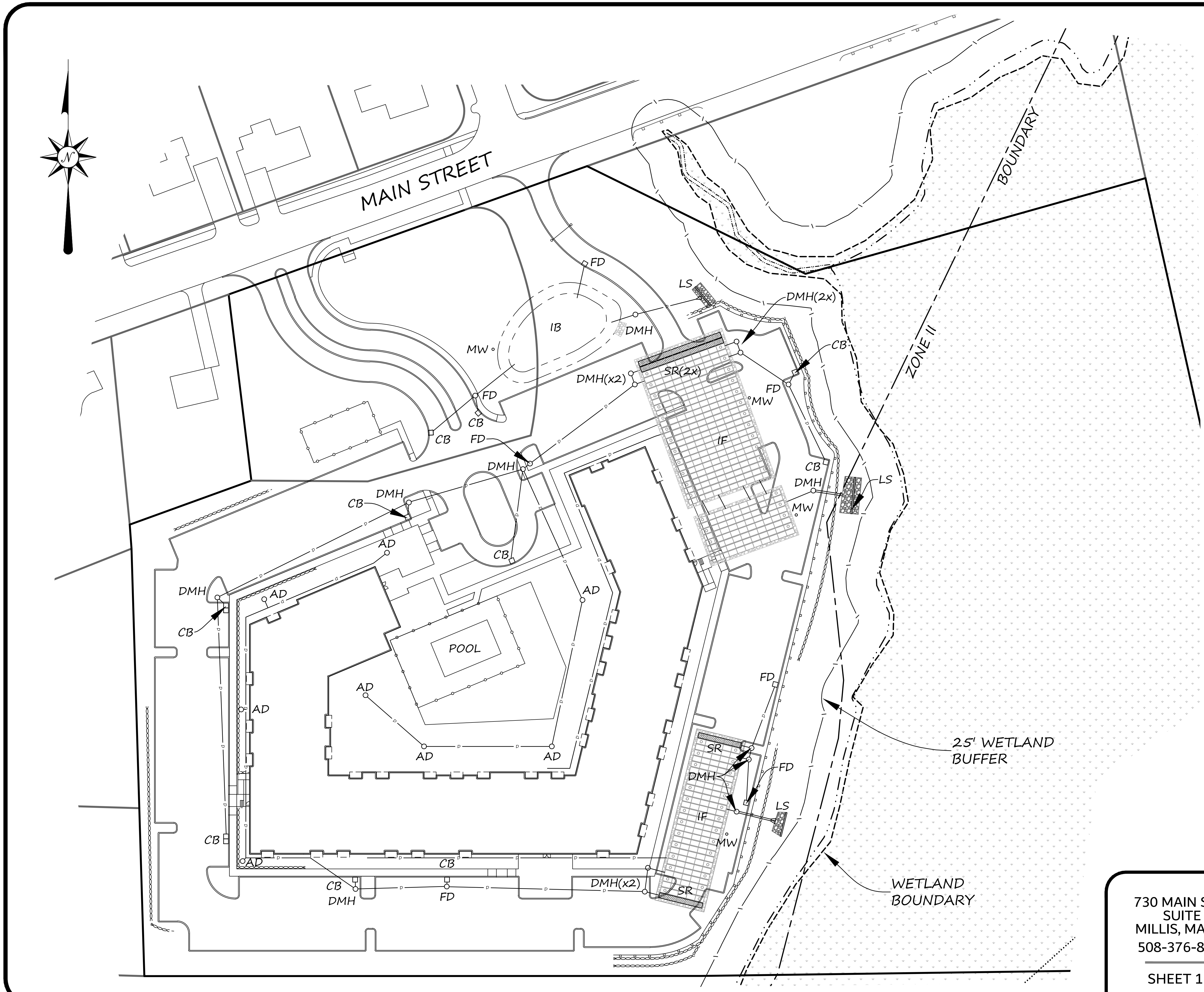
It is estimated that the regular annual maintenance tasks described herein will cost $5,000 per year (2019 value).

PART 4: 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:
   - Medway Fire Department at 911,
   - Medway Board of Health at 508-533-3206,
   - Medway Conservation Commission at 508-533-3292,
   - 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



LEGEND:

LS= LEVEL SPREADER
CB= CATCH BASIN
DMH= DRAIN MANHOLE
FD= FIRST DEFENSE UNIT
IB= INFILTRATION BASIN
IF= INFILTRATION FIELD
MW= MONITORING WELL
SR= SEPARATOR ROW

PLAN SCALE: 1"=80'

0' 80' 160'

PLAN DATE: MARCH 26, 2019

REVISION	DATE	BY
REV. PER TOWN COMMENTS	6/10/19	DJM

39 MAIN STREET O&M PLAN OF LAND IN MEDWAY, MA

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

SHEET 1 OF 1

LEGACY ENGINEERING

EXHIBIT 2 STORMWATER SYSTEM OPERATIONS AND MAINTENANCE LOG FORM

Stormwater System Operations and Maintenance Log

Year _______________

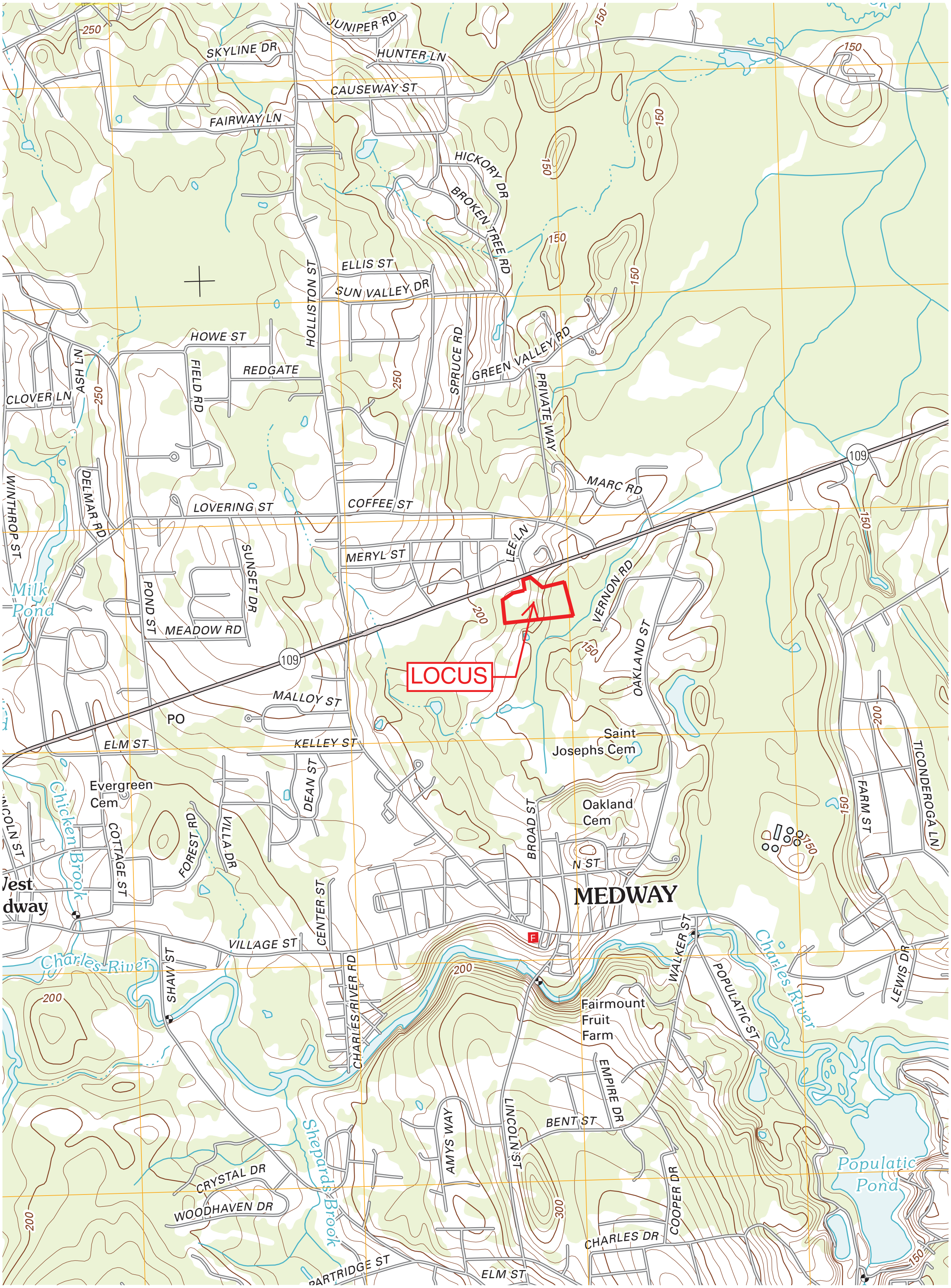
General Information	
Project Name	39 Main Street
Site Location	39 Main Street, Medway Ma, 02053
Inspector's Name	
Inspector's Title	
Inspector's Phone	
Signature of Operator at end of Year, Certifying that Work was Completed as Noted. Date:	

O&M Task Checklist

	O&M Activity	Date Completed	Notes/Comments
Deep Sump Catch Basins			
	1st Quarter Cleanout		
	2nd Quarter Cleanout		
	3rd Quarter Cleanout		
	4th Quarter Cleanout		
Underground infiltration Fields			
	1st Annual Inspection		
	2nd Annual inspection		
	Sep. Row Cleaned?		
	System Repl. Req'd?		
Stormwater Infiltration Basin			
	1st Annual Inspection		
	2nd Annual Inspection		
	1st Annual Mowing		
	2nd Annual Mowing		
	Sediment Removal Req'd?		

First Defense Units			
	1st Inspection		
	2nd Inspection		
	Unit Cleaning		
Stormwater Pipes, Inlets and Outlets			
	1st Annual Inspection		
	2nd Annual inspection		

ATTACHMENT B: USGS Map


LOCUS
MEDWAY
West Medway
JUNIPER RD
SKYLINE DR
HUNTER LN
CAUSEWAY ST
FAIRWAY LN
HICKORY DR
BROKEN TREE RD
ELLIS ST
SUN VALLEY DR
HOLLISTON ST
HOWE ST
REDGATE
FIELD RD
ASH LN
CLOVER LN
SPRUCE RD
GREEN VALLEY RD
PRIVATE WAY
MARC RD
LOVERING ST
COFFEE ST
WINTHROP ST
DELMAR RD
MERYL ST
LEE LN
SUNSET DR
POND ST
MEADOW RD
VERNON RD
Milk Pond
OAKLAND ST
MALLOY ST
PO
ELM ST
KELLEY ST
Saint Josephs Cem
Evergreen Cem
Chicken Brook
DEAN ST
COTTAGE ST
FOREST RD
VILLA DR
BROAD ST
Oakland Cem
N ST
FARM ST
TICONDEROGA LN
CENTER ST
VILLAGE ST
Charles River
SHAW ST
CHARLES RIVER RD
WALKER ST
POPULATIC ST
LEWIS DR
Fairmount Fruit Farm
EMPIRE DR
BENT ST
AMYS WAY
LINCOLN ST
Shepards Brook
CRYSTAL DR
WOODHAVEN DR
COOPER DR
CHARLES DR
Populatic Pond
PARTRIDGE ST
ELM ST
109
250
200
150
300

ATTACHMENT C: Illicit Discharge Compliance Statement

ILLICIT DISCHARGE COMPLIANCE STATEMENT

39 Main Street
Medway, 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: March 26, 2019

ATTACHMENT D: Construction Activity NPDES Stormwater Pollution Prevention Plan

Stormwater Pollution Prevention Plan (SWPPP)

For a

Construction Activity

For

39 Main Street

MEDWAY MA, 02053

Proposed Residential Development

MARCH 26, 2019
REVISED June 10, 2019

PREPARED BY:
LEGACY ENGINEERING, LLC
Consulting Engineers
730 Main Street, Suite 2C
Millis, MA 02054

PREPARED FOR:
Strategic land ventures
257 Hillside Avenue
Needham, MA 02494

VOLUME 1 OF 1

Contents

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

39 Main Street

1.2 Project Location

39 Main Street
Medway, MA 02053

1.3 Owner Name and Address

Strategic Land Ventures
257 Hillside Avenue
Needham, MA 02494

1.4 General Contractor/Operator Name and Address

Owner Operator:

Strategic Land Ventures
257 Hillside Avenue
Needham, MA 02494

Designation of Site Manager and Emergency Contact (person responsible for the day-to-day management of site operations): Geoff Engler, (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 "39 Main Street Site Plan of Land" with an original date of March 26, 2019 (as may be amended), and prepared by Legacy Engineering, LLC, hereinafter referred to as the "Site Plan".

Stormwater Report – Report entitled "Stormwater Report for 39 Main Street Medway, MA 02053" prepared by Legacy Engineering, LLC with an original date of March 26, 2019 (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 of a 4.5 story, 190 unit apartment building, including appurtenant parking lot, utility systems, stormwater management systems, and landscaping.
2. The total lot area of the development is approximately 12.3 acres.
3. The site is mostly wooded with a small grass field in the center of the site. The land in the easterly portion of the lot is wetlands along an unnamed tributary to Great Black Swamp.
4. The proposed construction activities will disturb approximately 6.7 acres in a single phase.
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 project will be constructed a single phase. Work is expected to commence in 2020 and to be completed by the end of 2021.

1.10 Major Activity Construction Sequence

1.10.1 Construction Sequence

- ✓ Install construction entrance and perimeter erosion controls;
- ✓ Locate existing utilities on and around the construction area;
- ✓ Demolish the existing dwelling and appurtenances;
- ✓ Clear and grub the development area;
- ✓ Grade the site;
- ✓ Install building foundation(s) and begin building construction;
- ✓ Install utilities including stormwater facilities;
- ✓ Complete stormwater facilities prior to paving the site
- ✓ Complete construction of new building(s), pave, 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 nor 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 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 of Medway 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. Medway 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 in Phase is 6.7 acres, and therefore does not the disturb more than 10 acres of land that drain to a single point. Furthermore, the limit of work along downstream wetlands buffer areas span some 800 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. The soils on the disturbed area of the site are Class A and B, which will generate minimal amounts of runoff during construction. Temporary sediment basins will be implemented if needed during construction.

2.2 Natural Buffers or Equivalent Sediment Controls

The site is bounded to the east by bordering vegetated wetlands which flank an unnamed tributary. No work is proposed within 50 feet of a waterbody or waterway. Thus, a minimum 50' wide natural buffer will be maintained around the nearest of such features. Perimeter erosion controls will be provided as specified herein.

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 Main Street. In the vicinity of the site, Main Street 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 Facilities

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.

Proposed infiltration fields, once installed, are to also be inspected periodically and cleaned when needed.

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

Due to the size of this project and the decentralized nature of runoff patterns, sediment traps are not expected to be needed. Should construction conditions dictate otherwise, this SWPPP shall 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 ceases 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 compost 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.
- ✓ Within the 100' wetland buffer zone, fertilizer shall be slow release, organic, and low in phosphorous.

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:
  - o Medway Fire Department at 911,
  - o Medway Board of Health at 508-533-3206,
  - o Medway Conservation Commission at 508-533-3292,
  - o Mass. Department of Environmental Protection (DEP) Central Region at (508) 792-7650 (address is 20 Riverside Drive, Lakeville, MA 02347), and
  - o 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:
    - o A clean up firm may need to be immediately contacted.
    - o 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 and within 24 hours of the occurrence of a storm event of 0.5 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 compost socks 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)

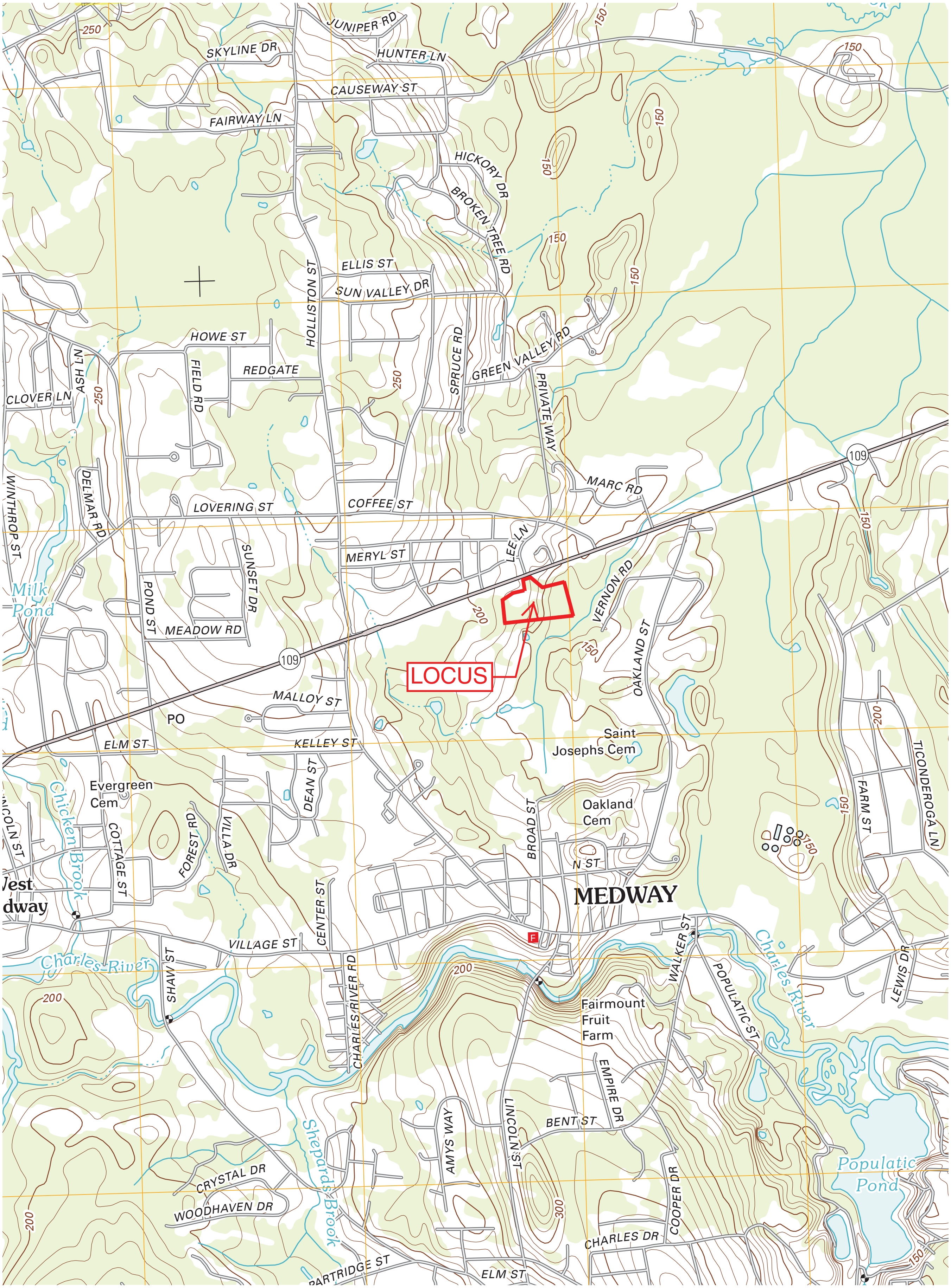
Date: ___________________________________

Signed: ____
(Signature)

Date: ___________________________________

7.0 Appendices

Appendix 7.1
USGS MAP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MEDWAY
West
dway
109
PO
Milk
Pond
Chicken Brook
Charles River
Shepards Brook
Populatic
Pond
Evergreen
Cem
Saint
Josephs Cem
Oakland
Cem
Fairmount
Fruit
Farm
JUNIPER RD
HUNTER LN
SKYLINE DR
CAUSEWAY ST
FAIRWAY LN
HICKORY DR
BROKEN TREE RD
ELLIS ST
SUN VALLEY DR
HOLLISTON ST
HOWE ST
REDGATE
FIELD RD
ASH LN
CLOVER LN
SPRUCE RD
GREEN VALLEY RD
PRIVATE WAY
MARC RD
WINTHROP ST
DELMAR RD
LOVERING ST
COFFEE ST
LEE LN
MERYL ST
SUNSET DR
POND ST
MEADOW RD
VERNON RD
OAKLAND ST
MALLOY ST
ELM ST
KELLEY ST
DEAN ST
VILLA DR
FOREST RD
COTTAGE ST
LINCOLN ST
BROAD ST
N ST
CENTER ST
VILLAGE ST
SHAW ST
CHARLES RIVER RD
WALKER ST
POPULATIC ST
EMPIRE DR
BENT ST
AMYS WAY
CRYSTAL DR
WOODHAVEN DR
COOPER DR
CHARLES DR
PARTRIDGE ST
ELM ST
FARM ST
TICONDEROGA LN
LEWIS DR
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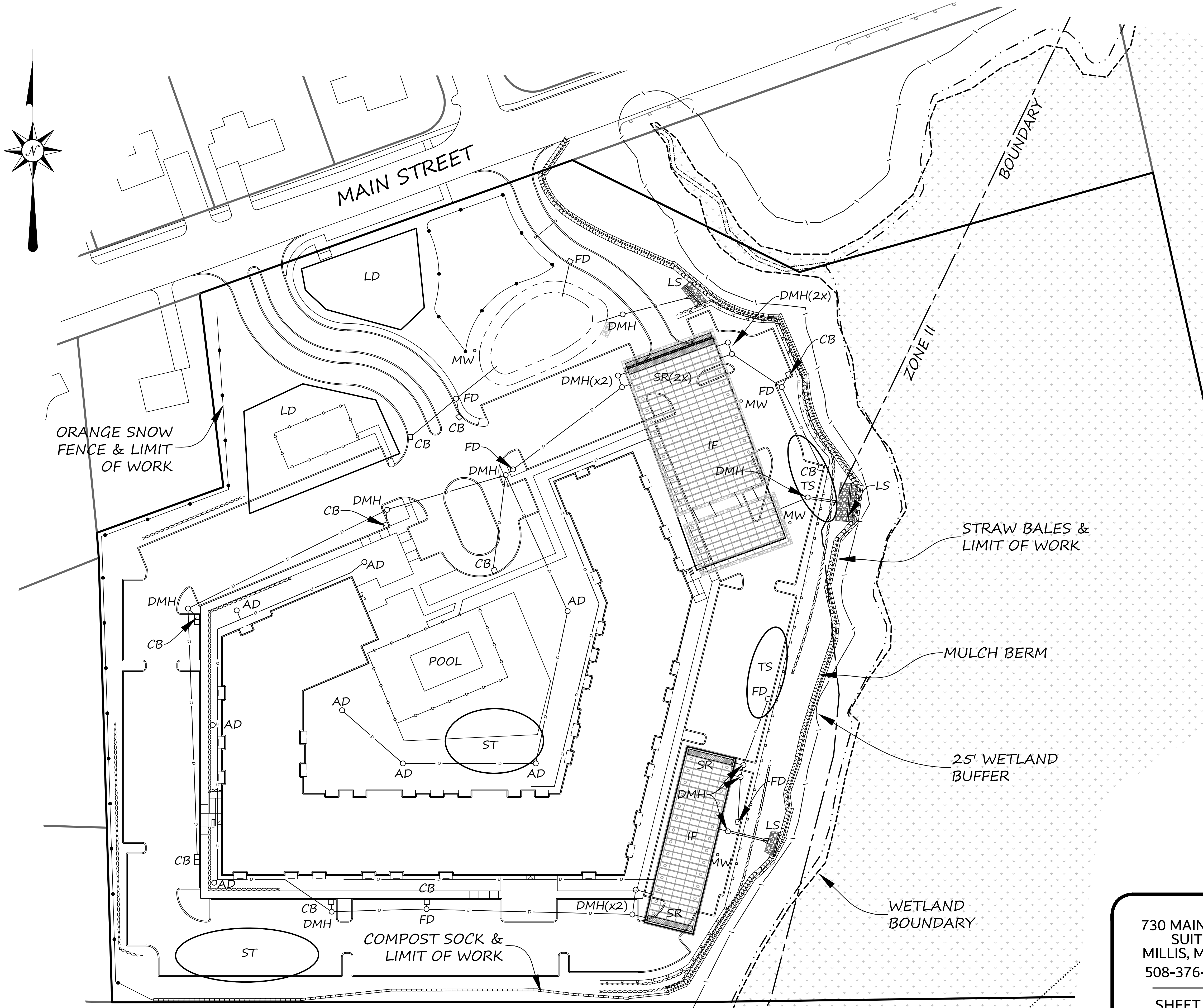
200
250
300

Appendix 7.2
SWPPP SITE PLAN



LEGEND:

LS= LEVEL SPREADER
CB= CATCH BASIN
DMH= DRAIN MANHOLE
FD= FIRST DEFENSE UNIT
IF= INFILTRATION FIELD
LD= LAYDOWN/EQUIPMENT AREA
MW= MONITORING WELL
SR= SEPARATOR ROW
ST= STOCKPILE

NOTE: SEE PLANS FOR ADDIITONAL CONSTRUCTION POLLUTION PREVENTION MEASURES.

PLAN SCALE: 1"=80"

0' 80' 160'

PLAN DATE: MARCH 26, 2019

REVISION	DATE	BY
REV. PER TOWN COMMENTS	6/10/19	DJM

39 MAIN STREET SWPPP PLAN OF LAND IN MEDWAY, MA

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: Strategic Land Ventures

Stormwater Team

	Team Member	Responsibility
1	SWPPP Preparer: Legacy Engineering, LLC	Preparing and modifying SWPPP
2	SWPPP Compliance & Oversight: Geoff Engler	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	39 Main Street		
NPDES Tracking No.	MAR___________	Location	39 Main Street, Medway MA, 02053
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) ❑ Regular 14-day Inspection ❑ Pre-storm event ❑ During storm event ❑ Post-storm event			
Weather Information			
Has it rained since the last inspection? ❑Yes ❑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? ❑Yes ❑No			
Is it safe to perform the required inspection? If no, indicate why and where these limitations apply ❑Yes ❑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	❑Yes ❑No		
2	Erosion Barriers along perimeter of work area	❑Yes ❑No		
3	Catch Basin Inlet protection (silt sacs)	❑Yes ❑No		
4	Other-	❑Yes ❑No		
5	Other-	❑Yes ❑No		

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?	❑Yes ❑No	n/a		
2	Are perimeter controls and sediment barriers adequately installed and maintained?	❑Yes ❑No	❑Yes ❑No		
3	Are stormwater discharges free of sediment deposits?	❑Yes ❑No	n/a		
4	Are storm drain inlets properly protected with silt sacs?	❑Yes ❑No	n/a		
5	Do silt sacs require cleaning or replacement?	❑Yes ❑No			
6	Do installed proprietary separators have sediment accumulation?	❑Yes ❑No			
7	Do the installed infiltration BMPs have evidence of sediment accumulation?	❑Yes ❑No			
8	Is there evidence of sediment being tracked into the street?	❑Yes ❑No	n/a		
9	Is trash/litter from work areas collected and placed in covered	❑Yes ❑No	n/a		

	BMP/activity	Implemented?	Maintained?	Corrective Action	Date for corrective action/responsible person
	dumpsters?				
10	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	n/a		
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	n/a		
12	Are new or additional stormwater controls necessary to ensure compliance with the CGP?	❑Yes ❑No	n/a		
13	Do material storage areas present risk of spillage or leakage of potentially hazardous materials ?	❑Yes ❑No	n/a		
14	Other-	❑Yes ❑No	❑Yes ❑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		
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			❑Yes ❑No	
2			❑Yes ❑No	
3			❑Yes ❑No	
4			❑Yes ❑No	
5			❑Yes ❑No	
6			❑Yes ❑No	
7			❑Yes ❑No	
8			❑Yes ❑No	
9			❑Yes ❑No	
10			❑Yes ❑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	❑ Stabilized Area (reduced to monthly) ❑ Frozen Conditions			
2	❑ Stabilized Area (reduced to monthly) ❑ Frozen Conditions			
3	❑ Stabilized Area (reduced to monthly) ❑ Frozen Conditions			
4	❑ Stabilized Area (reduced to monthly) ❑ Frozen Conditions			
5	❑ Stabilized Area (reduced to monthly) ❑ Frozen Conditions			
6	❑ Stabilized Area (reduced to monthly) ❑ Frozen Conditions			
7	❑ Stabilized Area (reduced to monthly) ❑ Frozen Conditions			
8	❑ Stabilized Area (reduced to monthly) ❑ Frozen Conditions			
9	❑ Stabilized Area (reduced to monthly) ❑ Frozen Conditions			
10	❑ Stabilized Area (reduced to monthly) ❑ 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
6. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table

Location: Infiltration Fields & Basin Pretreatment

TSS Removal Calculation Worksheet

A BMP1	B TSS Removal Rate1	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
First Defense Unit	50%	1.00	50%	50%

Total TSS Removal = 50%

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

Project:	39 Main Street
Prepared By:	Legacy Engineering, LLC
Date:	June 10, 2019

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From Mass DEP Stormwater Handboook Vol. 1

Mass. Dept. of Environmental Protection

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
6. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table

Location: Infiltration Fields & Basin

TSS Removal Calculation Worksheet

A BMP 1	B TSS Removal Rate 1	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Field w/ First Defense Unit	80%	1.00	80%	20%

Total TSS Removal = 80%

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

Project:	39 Main Street
Prepared By:	Legacy Engineering, LLC
Date:	June 10, 2019

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From Mass DEP Stormwater Handboook Vol. 1

Mass. Dept. of Environmental Protection

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
6. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table

Location: Infiltration Fields & Basin Pretreatment With Catch Basins

TSS Removal Calculation Worksheet

A BMP1	B TSS Removal Rate1	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Catch Basin	25%	1.00	25%	75%
First Defense Unit	50%	0.75	37.5%	37.5%

Total TSS Removal = 62.5%

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

Project:	39 Main Street
Prepared By:	Legacy Engineering, LLC
Date:	June 10, 2019

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From Mass DEP Stormwater Handboook Vol. 1

Mass. Dept. of Environmental Protection

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
6. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table

Location: Infiltration Fields & Basin With Catch Basins

TSS Removal Calculation Worksheet

A BMP1	B TSS Removal Rate1	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Catch Basin	25%	1.00	25%	75%
Infiltration Field w/ First Defense Unit	80%	0.75	60%	15%

Total TSS Removal = 85%

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

Project: 39 Main Street

Prepared By: Legacy Engineering, LLC

Date: June 10, 2019

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From Mass DEP Stormwater Handboook Vol. 1

Mass. Dept. of Environmental Protection

ATTACHMENT F: Stormwater Management Handbook Checklist

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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 8[2]
- 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

COMMONWEALTH OF MASSACHUSETTS
DANIEL J.
MERRIKIN
CIVIL
No. 43309
REGISTERED
PROFESSIONAL ENGINEER

Digitally signed by Daniel J. Merrikin, P.E.
Date: 2019.06.14 14:01:20 -04'00'

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 (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 Field[1]

☒ 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 (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 (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 (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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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

42°9'30.16"N

71°24'14.60"W

71°23'37.14"W

42°9'3.48"N

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

1:6,000

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 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

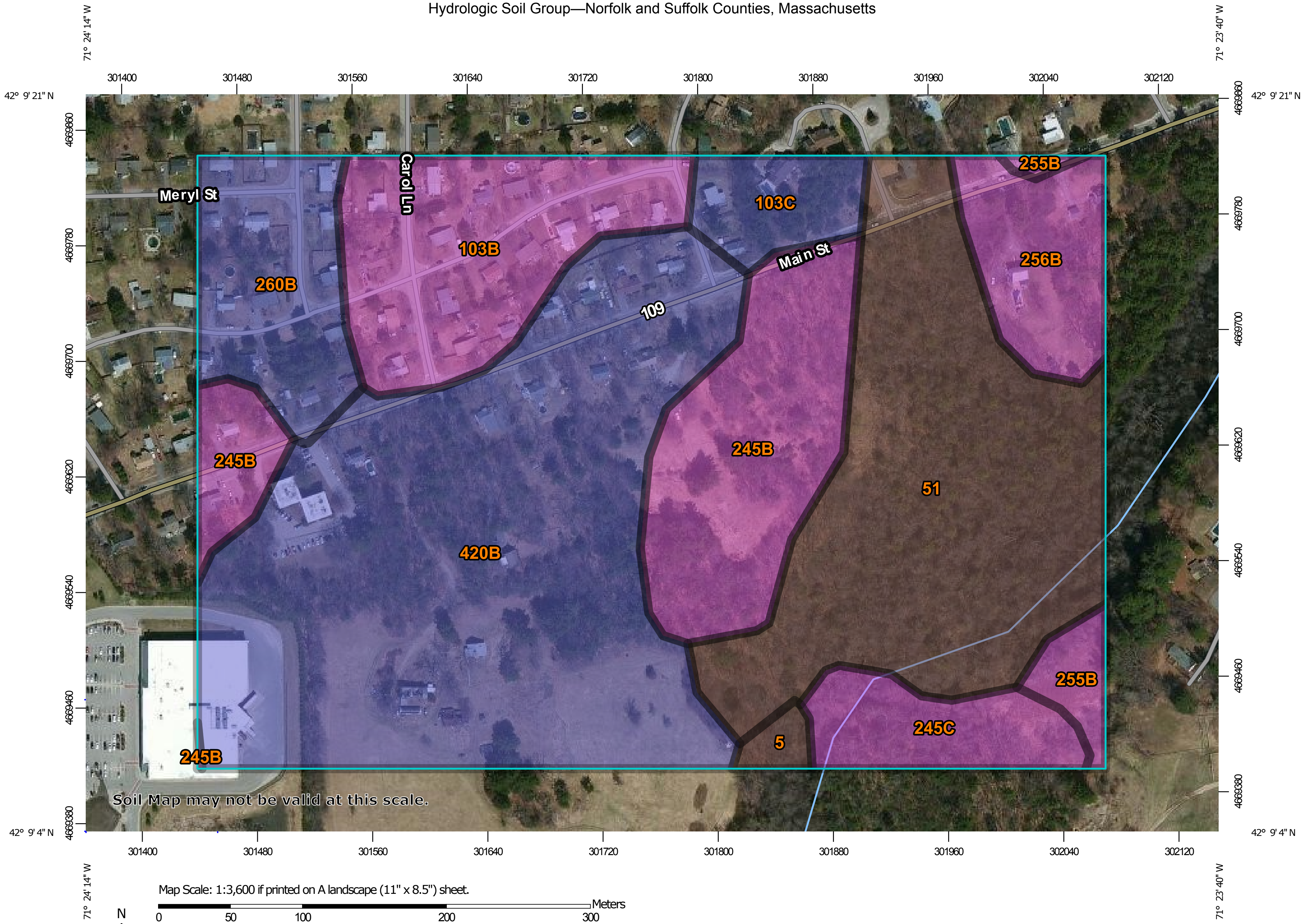
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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 1/8/2019 at 11:19:34 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



Map Scale: 1:3,600 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

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 12, Sep 15, 2016

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

Hydrologic Soil Group— Summary by Map Unit — Norfolk and Suffolk Counties, Massachusetts (MA616)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
5	Saco silt loam, 0 to 3 percent slopes	B/D	0.4	0.6%
51	Swansea muck, 0 to 1 percent slopes	B/D	14.6	22.0%
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	A	6.7	10.1%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	B	1.9	2.9%
245B	Hinckley loamy sand, 3 to 8 percent slopes	A	8.1	12.2%
245C	Hinckley loamy sand, 8 to 15 percent slopes	A	2.6	3.9%
255B	Windsor loamy sand, 3 to 8 percent slopes	A	1.0	1.6%
256B	Deerfield loamy sand, 3 to 8 percent slopes	A	3.2	4.8%
260B	Sudbury fine sandy loam, 2 to 8 percent slopes	B	4.4	6.7%
420B	Canton fine sandy loam, 3 to 8 percent slopes	B	23.3	35.2%
Totals for Area of Interest			**66.4**	**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
39 Main Street, Medway, MA

Deep Observation Hole: OTH 1 **Date of Test Hole: April 27, 2016** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
7”	Ap	10YR4/3	None	LS	1%	<1%	Massive	Very Friable	
31”	Bw	10YR6/8	None	LS	1%	<1%	Massive	Very Friable	
56”	C1	2.5Y6/3	None	LS/ Lenses S (Med)	<1%	<1%	Massive	Very Friable	
144”	C2	2.5Y6/4	72”	S (Med)	5%	2%	Single Grain	Loose	
164”	C3	2.5Y6/3	Yes	LS/SL	3%	2%	Massive	Very Friable	

Reference Ground Elevation: 168.33
Additional Notes: None

<u>Groundwater Indicators Observed at Time of Testing:</u>

☒ Depth observed standing water in observation hole: 102”

☒ Depth to soil redoximorphic features (mottles): 72”

☒ Depth weeping from side of observation hole: 102”

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 2 **Date of Test Hole: April 27, 2016** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
8”	Ap	10YR4/3	None	LS	1%	1%	Massive	Very Friable	
28”	B	10YR5/6	None	LS	3%	4%	Massive	Very Friable	
90”	C1	2.5Y6/4	72”	LS	4%	4%	Massive	Very Friable	Inconsistent Thickness
126”	C2	2.5Y6/3	Yes	SL/LS	2%	2%	Massive	Very Friable	Few boulders

Reference Ground Elevation: 167.53
Additional Notes: None

<u>Groundwater Indicators Observed at Time of Testing:</u>

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 72”

☒ Depth weeping from side of observation hole: 87”

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 3 **Date of Test Hole: April 27, 2016** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
12”	A_P	10YR4/4	None	LS	1%	<1%	Massive	Very Friable	
28”	B_W	10YR5/6	None	LS	1%	<1%	Massive	Very Friable	
70”	C1	2.5Y6/3	None	LS	<1%	<1%	Massive	Very Friable	
136”	C2	2.5Y6/4	72”	LS	6%	3%	Massive	Very Friable	

Reference Ground Elevation: 167.93
Additional Notes: None

<u>Groundwater Indicators Observed at Time of Testing:</u>

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 72”

☒ Depth weeping from side of observation hole: 98”

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 4 **Date of Test Hole: April 27, 2016** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
12”	Ap	10YR4/3	None	LS	1%	<1%	Massive	Very Friable	
26”	B	10YR5/6	None	LS	1%	<1%	Massive	Very Friable	
80”	C1	2.5Y6/4	None	LS/S	<1%	<1%	Massive/ Single Grain	Loose/ Very Friable	
128”	C2	2.5Y6/4	80”	LS/S	4%	3%	Massive/ Single Grain	Loose/ Very Friable	

Reference Ground Elevation: 169.43
Additional Notes: None

Groundwater Indicators Observed at Time of Testing:

☒ Depth observed standing water in observation hole: 88”

☒ Depth to soil redoximorphic features (mottles): 80”

☒ Depth weeping from side of observation hole: 80”

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 5 **Date of Test Hole: April 27, 2016** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
6”	Ap	10YR4/3	None	LS	1%	<1%	Massive	Very Friable	
20”	Bw	10YR5/6	None	LS	1%	1%	Massive	Very Friable	
83”	C1	2.5Y6/4	None	LS	3%	1%	Massive	Very Friable	
120	C2	10YR5/4	91”	LS	3%	2%	Massive	Very Friable	Some Boulder/Fractured Ledge

Reference Ground Elevation: 165.53
Additional Notes: None

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 91”

☒ Depth weeping from side of observation hole: 98”

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 6 **Date of Test Hole: April 27, 2016** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
77”	Fill								
120”	C	2.5Y6/4	80”	LS	5%	3%	Massive	Very Friable	

Reference Ground Elevation: 162.53
Additional Notes: None

<u>Groundwater Indicators Observed at Time of Testing:</u>

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 80”

☒ Depth weeping from side of observation hole: 80”

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 7 **Date of Test Hole: April 27, 2016** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
36"	Fill								
42"	A_B	10YR4/3	None	LS	1%	<1%	Massive	Very Friable	
66"	B_W	10YR5/6	None	LS	1%	<1%	Massive	Very Friable	
160"	C	2.5Y6/4	128"	LS	3%	1%	Massive	Very Friable	

Reference Ground Elevation: 162.13
Additional Notes: None

Groundwater Indicators Observed at Time of Testing:

☒ Depth observed standing water in observation hole: 142"

☒ Depth weeping from side of observation hole: 142"

☒ Depth to soil redoximorphic features (mottles): 128"

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 8 **Date of Test Hole: April 27, 2016** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
4”	Ap	10YR4/3	None	LS	1%	<1%	Massive	Very Friable	
18”	Bw	10YR5/6	None	LS	3%	1%	Massive	Very Friable	
72”	C	2.5Y6/4	None	S (Med)	5%	4%	Single Grain	Loose	Refusal @72”

Reference Ground Elevation: 168.03
Additional Notes: None

<u>Groundwater Indicators Observed at Time of Testing:</u>

☐ Depth observed standing water in observation hole: None ☐ Depth to soil redoximorphic features (mottles): None

☐ Depth weeping from side of observation hole: None ☒ Depth to refusal: 72”

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 9 **Date of Test Hole: April 27, 2016** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
30”	Fill								
48”	Bw	10YR5/6	None	LS	3%	1%	Massive	Very Friable	
64”	C1	2.5Y6/3	None	LS	2%	1%	Massive	Very Friable	
144”	C2	2.5Y6/4	132”	S (Med)	5%	3%	Single Grain	Loose	Faint redox

Reference Ground Elevation: 165.13
Additional Notes: None

Groundwater Indicators Observed at Time of Testing:

☒ Depth observed standing water in observation hole:144”

☒ Depth to soil redoximorphic features (mottles): 132”

☐ Depth weeping from side of observation hole: None

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 10 **Date of Test Hole: April 27, 2016** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
5”	A	10YR4/3	None	LS	1%	<1%	Massive	Very Friable	
28”	Bw	10YR6/8	None	LS	2%	1%	Massive	Very Friable	
68”	C1	2.5Y6/4	None	S(Med)	4%	2%	Single Grain	Loose	
150”	C2	2.5Y6/3	132”	LS	2%	1%	Massive	Very Friable	

Reference Ground Elevation: 167.03
Additional Notes: None

<u>Groundwater Indicators Observed at Time of Testing:</u>

☒ Depth observed standing water in observation hole: 144”

☒ Depth to soil redoximorphic features (mottles): 132”

☐ Depth weeping from side of observation hole: None

☐ Depth to refusal: None”

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 11 **Date of Test Hole: April 27, 2016** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
5”	A_P	10YR4/3	None	LS	1%	<1%	Massive	Very Friable	
19”	B_W	10YR6/8	None	LS	2%	1%	Massive	Very Friable	
72”	C1	2.5Y6/4	None	S (Med)	5%	2%	Single Grain	Loose	
102”	C2	2.5Y6/3	None	LS	2%	1%	Massive	Very Friable	Few boulders

Reference Ground Elevation: 166.43
Additional Notes: None

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
- ☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 12 **Date of Test Hole: January 10, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
4”	A	10YR4/3		LS	1%	2%	Massive	Very Friable	
20”	Bw	10YR6/8		LS	1%	<1%	Massive	Very Friable	
30”	B/C	2.5Y6/6		LS	1%	1%	Massive	Very Friable	
90”	C1	2.5Y6/4		S (Med)	6%	4%	Single Grain	Loose	
120”	C2	2.5Y6/2		LS	2%	4%	Massive	Very Friable	Boulders

Reference Ground Elevation: 168.8
Additional Notes: None

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

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 13 **Date of Test Hole: January 10, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
2”	A	10YR4/3		LS	1%	<1%	Massive	Very Friable	
21”	B_w	10YR6/8		LS	2%	<1%	Massive	Very Friable	
50”	C1	2.5Y6/4		S (med)	3%	<1%	Single Grain	Loose	
110”	C2	2.5Y6/2		LS	2%	4%	Massive	Very Friable	Boulders

Reference Ground Elevation: 168.6
Additional Notes: None

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): None

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 14 **Date of Test Hole: January 10, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
3”	A	10YR4/3		LS	1%	<1%	Massive	Very Friable	
15”	B	10YR6/7		LS	8%	2%	Massive	Very Friable	
90”	C	2.5Y6/4	80”	S (med)	8%	3%	Single Grain	Loose	

Reference Ground Elevation: 173.9
Additional Notes: None

<u>Groundwater Indicators Observed at Time of Testing:</u>

☒ Depth observed standing water in observation hole: 84” (166.9)

☒ Depth to soil redoximorphic features (mottles): 80” (167.2)

☐ Depth weeping from side of observation hole: None

☒ Depth to refusal: 90” (166.4)

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 15 **Date of Test Hole: January 10, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
6”	A	10YR4/3		LS	1%	<1%	Massive	Very Friable	
22”	Bw	10YR6/8		LS	2%	1%	Massive	Very Friable	
102”	C1	2.5Y6/4	77”	S (med)	6%	3%	Single Grain	Loose	

Reference Ground Elevation: 173.2
Additional Notes: None

Groundwater Indicators Observed at Time of Testing:

☒ Depth observed standing water in observation hole: 78” (166.7)

☐ Depth weeping from side of observation hole: None

☒ Depth to soil redoximorphic features (mottles): 77” (166.8)

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 16 **Date of Test Hole: January 10, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
4”	A	10YR4/3		LS	1%	<1%	Massive	Very Friable	
23”	B_W	10YR6/8		LS	2%	1%	Massive	Very Friable	
108”	C	2.5Y6/4	90”	S (med)	6%	3%	Single Grain	Loose	

Reference Ground Elevation: 171.3
Additional Notes: None

<u>Groundwater Indicators Observed at Time of Testing:</u>

☒ Depth observed standing water in observation hole: 94” (163.5)

☐ Depth weeping from side of observation hole: None

☒ Depth to soil redoximorphic features (mottles): 90” (163.8)

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 17 **Date of Test Hole: January 10, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
3”	A	10YR4/3		LS	1%	<1%	Massive	Very Friable	
24”	B_W	10YR6/8		LS	3%	1%	Massive	Very Friable	
40”	C1	2.5Y6/4		S (med)	8%	3%	Single Grain	Loose	
80”	C1	2.5Y6/2	78”	LS	2%	1%	Massive	Very Friable	

Reference Ground Elevation: 169.6
Additional Notes: None

<u>Groundwater Indicators Observed at Time of Testing:</u>

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 78” (163.1)

☐ Depth weeping from side of observation hole: None

☒ Depth to refusal: 80” (162.9)

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 18 **Date of Test Hole: January 10, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
6”	A	10YR4/3		LS	1%	<1%	Massive	Very Friable	
16”	B_W	10YR6/8		LS	3%	1%	Massive	Very Friable	
60”	C1	2.5Y6/4	44”	S (med)	4%	2%	Single Grain	Loose	
80”	C1	2.5Y6/2		LS/SL	3%	1%	Massive	Very Friable	

Reference Ground Elevation: 166.3
Additional Notes: None

Groundwater Indicators Observed at Time of Testing:

☒ Depth observed standing water in observation hole: 60” (161.3)

☒ Depth weeping from side of observation hole: 44” (162.6)

☒ Depth to soil redoximorphic features (mottles): 44” (162.6)

☒ Depth to refusal: 80” (159.6)

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 19 **Date of Test Hole: January 10, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
9”	A	10YR4/3		LS	1%	<1%	Massive	Very Friable	
34”	B_W	10YR6/8		LS	1%	<1%	Massive	Very Friable	
60”	C1	2.5Y6/2		LS/S	1%	3%	Massive	Very Friable	Boulders
108”	C2	2.5Y6/4		S (Med)	8%	3%	Single Grain	Loose	

Reference Ground Elevation: 159.2
Additional Notes: None

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

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 20 **Date of Test Hole: January 10, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
4”	A	10YR4/3		LS	1%	<1%	Massive	Very Friable	
23”	Bw	10YR6/8		LS	2%	1%	Massive	Very Friable	
72”	C1	2.5Y6/4		S (Med)	4%	2%	Single Grain	Loose	
115”	C2	2.5Y6/2		LS/S	2%	2%	Massive	Very Friable	Few Boulders

Reference Ground Elevation: 162.0
Additional Notes: None

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

☐ Depth to refusal: None

DEEP OBSERVATION TEST HOLE SOIL LOG
39 Main Street, Medway, MA

Deep Observation Hole: OTH 22 **Date of Test Hole: January 10, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Depth of Redoximorphic Features	Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
					Gravel	Cobbles & Stones			
57”	Fill								
96”	C	2.5Y6/4		S (Med)	8%	4%	Single Grain	Loose	Boulders

Reference Ground Elevation: 162.5
Additional Notes: None

<u>Groundwater Indicators Observed at Time of Testing:</u>

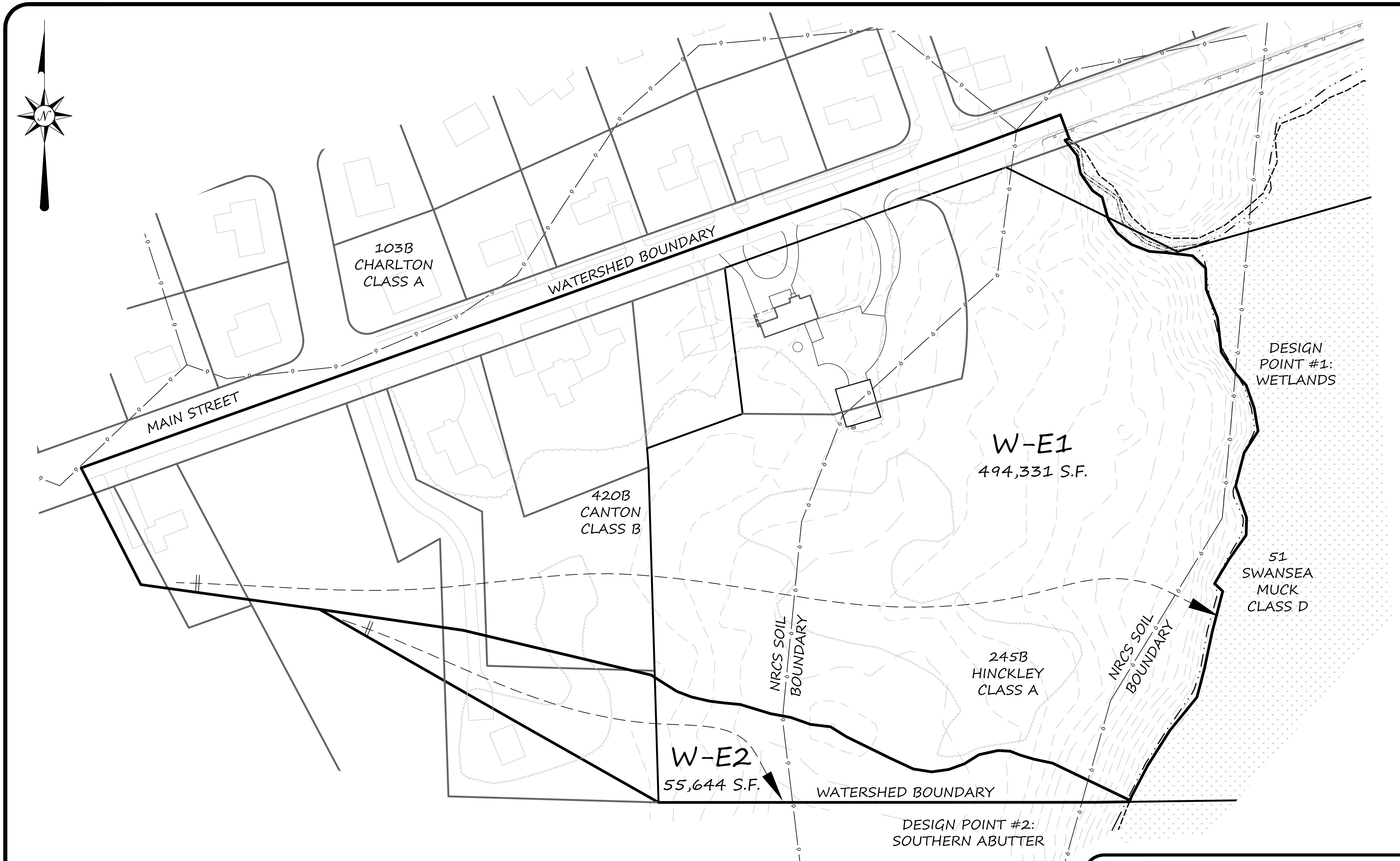
☐ Depth observed standing water in observation hole: None

☐ Depth to soil redoximorphic features (mottles): None

☐ Depth weeping from side of observation hole: None

☐ Depth to refusal: None

ATTACHMENT I: Existing Watershed Plan



PLAN SCALE: 1"=100"

0' 100' 200'

PLAN DATE: MARCH 26, 2019

REVISION	DATE	BY

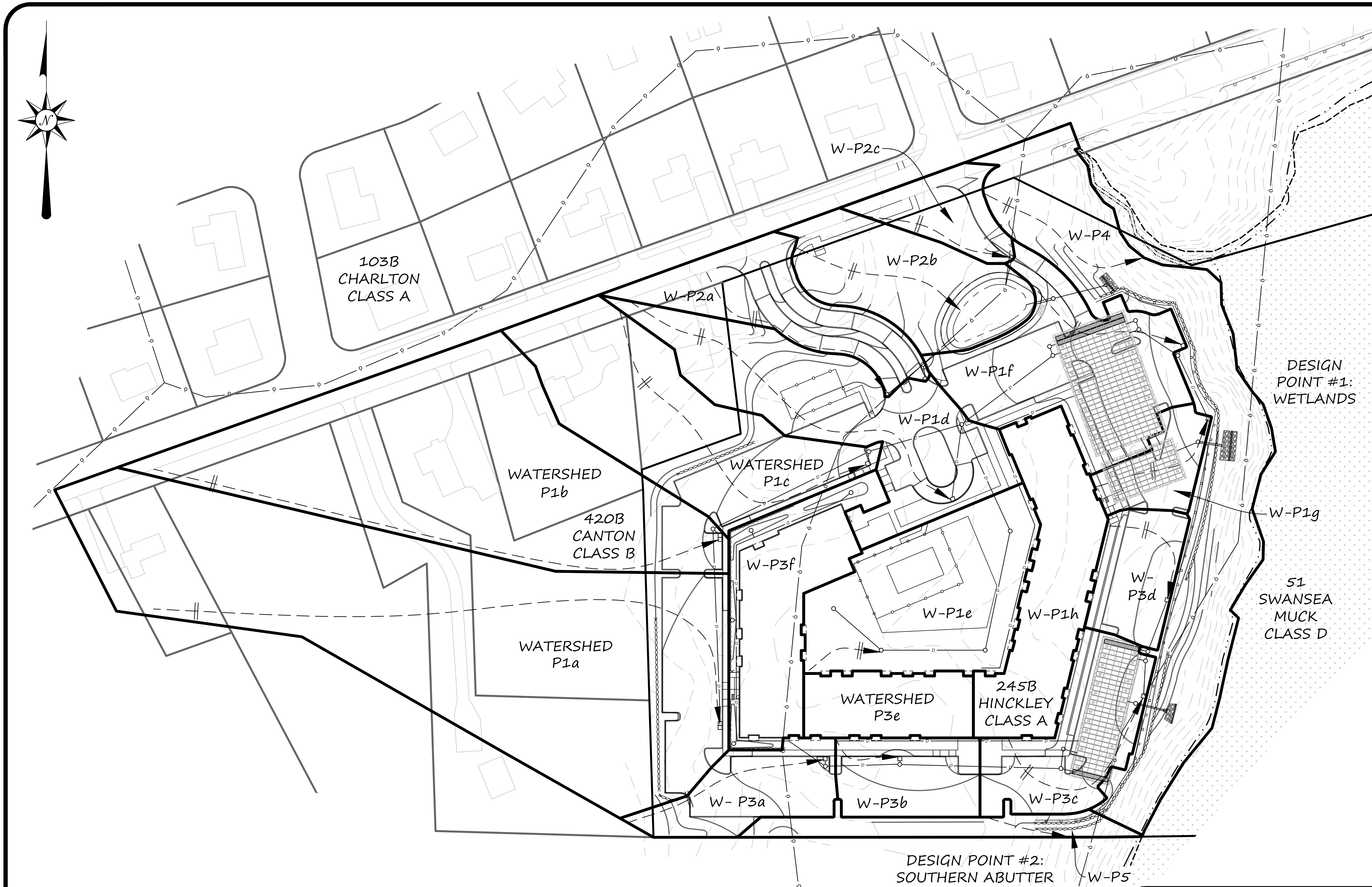
39 MAIN STREET
EXISTING
WATERSHED PLAN
OF LAND IN
MEDWAY, MA

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"=100"

0' 100' 200'

PLAN DATE: MARCH 26, 2019

REVISION	DATE	BY
REV. PER TOWN COMMENTS	6/10/19	DJM

39 MAIN STREET PROPOSED WATERSHED PLAN OF LAND IN MEDWAY, MA

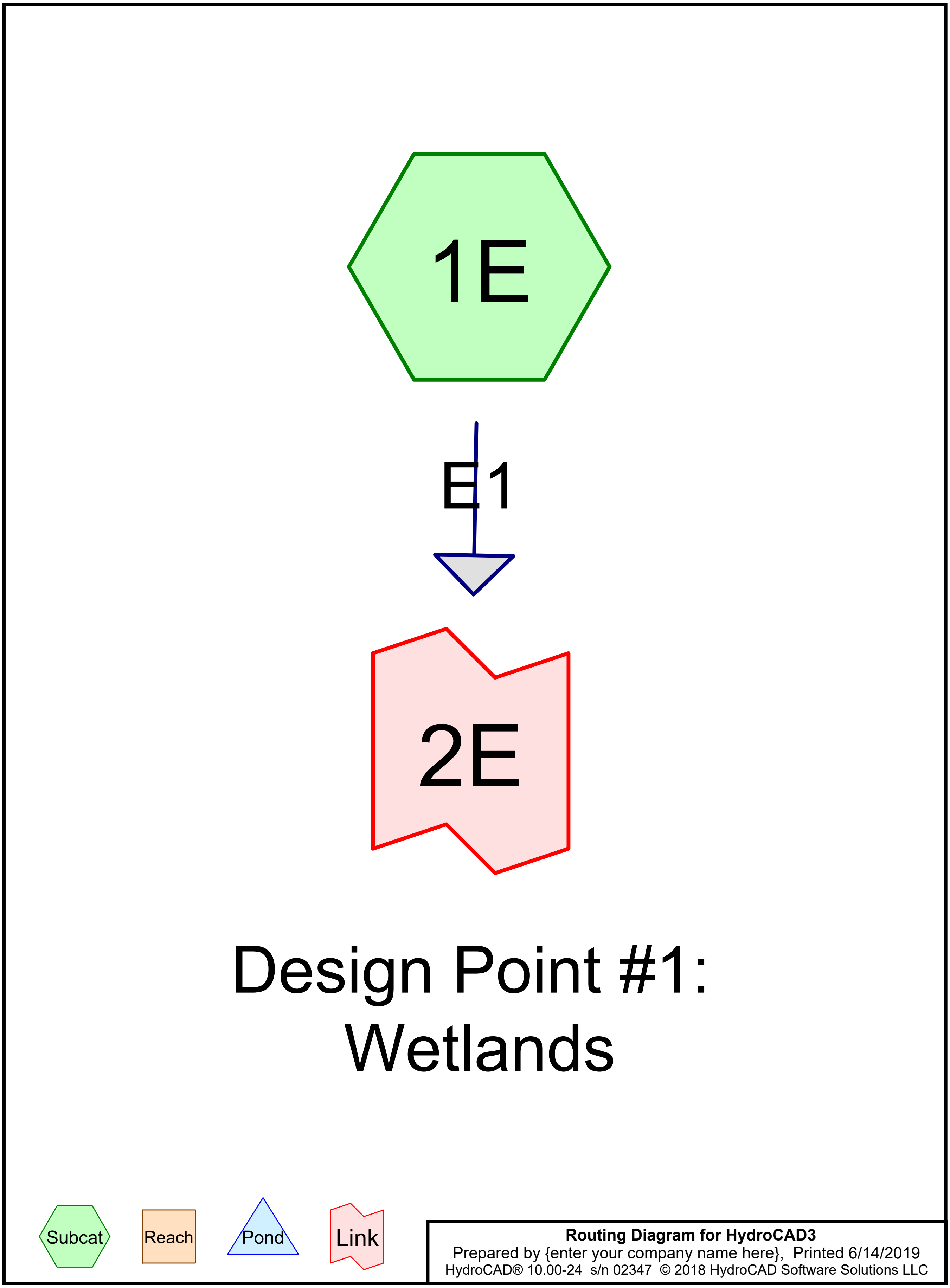
730 MAIN STREET
SUITE 2C
MILLIS, MA 02054
508-376-8883(o)

SHEET 1 OF 1

LEGACY ENGINEERING

ATTACHMENT K: Hydrocad Hydrology Calculations

DESIGN POINT #1: FLOW TO WETLANDS EXISTING CONDITIONS



Routing Diagram for HydroCAD3
Prepared by {enter your company name here}, Printed 6/14/2019

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.340	79	<50% Grass cover, Poor, HSG B (1E)
1.094	39	>75% Grass cover, Good, HSG A (1E)
1.271	61	>75% Grass cover, Good, HSG B (1E)
0.036	98	Paved parking, HSG A (1E)
0.997	98	Paved parking, HSG B (1E)
3.953	30	Woods, Good, HSG A (1E)
3.657	55	Woods, Good, HSG B (1E)
11.348	**50**	**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1E: E1 Runoff Area=494,331 sf 9.11% Impervious Runoff Depth=0.13"
Flow Length=1,112' Tc=25.7 min CN=50 Runoff=0.22 cfs 0.122 af

Link 2E: Design Point #1: Wetlands Inflow=0.22 cfs 0.122 af
Primary=0.22 cfs 0.122 af

Total Runoff Area = 11.348 ac Runoff Volume = 0.122 af Average Runoff Depth = 0.13"
90.89% Pervious = 10.315 ac 9.11% Impervious = 1.034 ac

Summary for Subcatchment 1E: E1

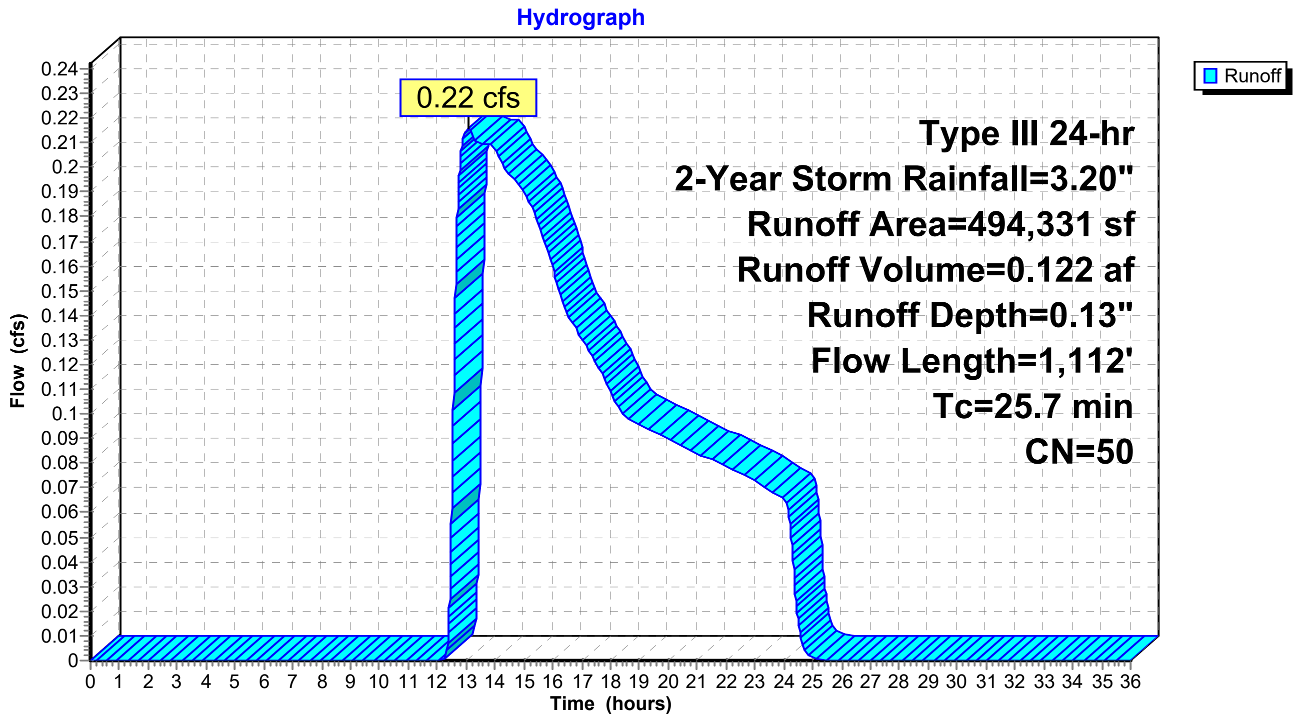
Runoff = 0.22 cfs @ 13.10 hrs, Volume= 0.122 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
1,576	98	Paved parking, HSG A
43,445	98	Paved parking, HSG B
172,178	30	Woods, Good, HSG A
159,284	55	Woods, Good, HSG B
55,377	61	>75% Grass cover, Good, HSG B
47,663	39	>75% Grass cover, Good, HSG A
14,808	79	<50% Grass cover, Poor, HSG B
494,331	50	Weighted Average
449,310		90.89% Pervious Area
45,021		9.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	43	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
12.2	816	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	12	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.1	241	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.7	1,112	Total			

Subcatchment 1E: E1

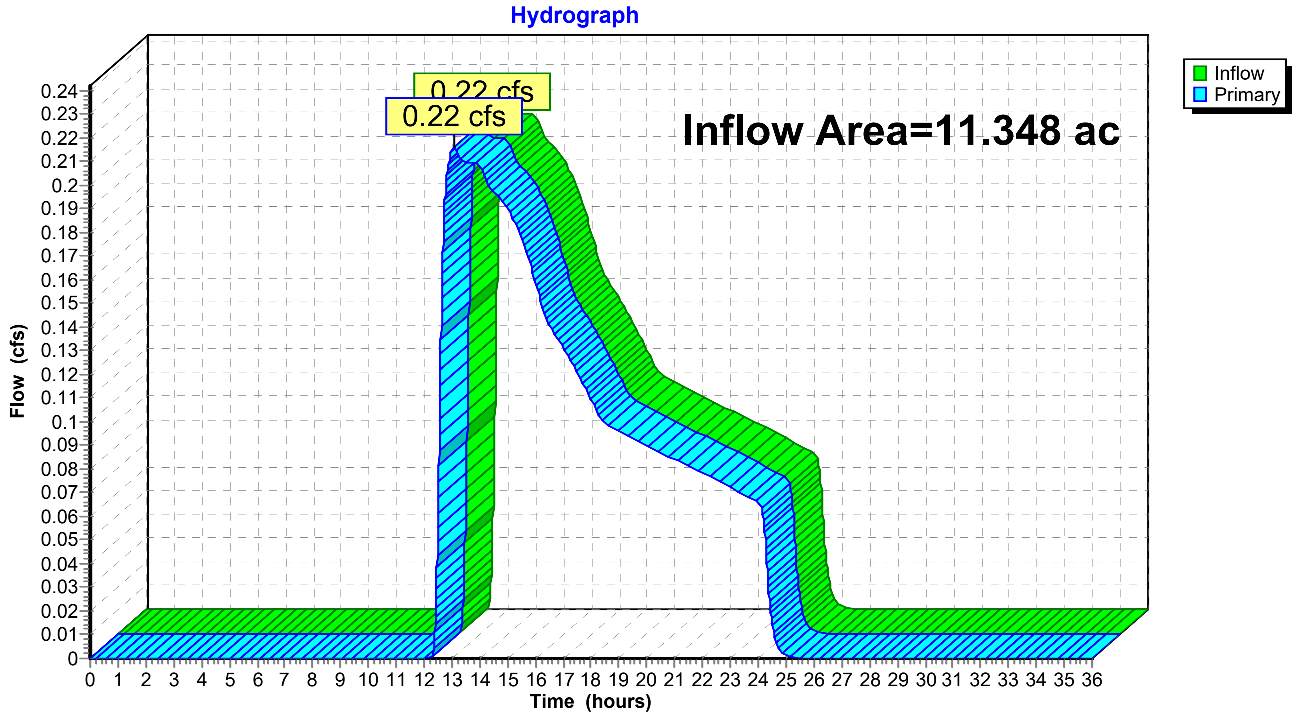


Summary for Link 2E: Design Point #1: Wetlands

Inflow Area = 11.348 ac, 9.11% Impervious, Inflow Depth = 0.13" for 2-Year Storm event
Inflow = 0.22 cfs @ 13.10 hrs, Volume= 0.122 af
Primary = 0.22 cfs @ 13.10 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 2E: Design Point #1: Wetlands



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1E: E1 Runoff Area=494,331 sf 9.11% Impervious Runoff Depth=0.57"
Flow Length=1,112' Tc=25.7 min CN=50 Runoff=2.88 cfs 0.543 af

Link 2E: Design Point #1: Wetlands Inflow=2.88 cfs 0.543 af
Primary=2.88 cfs 0.543 af

Total Runoff Area = 11.348 ac Runoff Volume = 0.543 af Average Runoff Depth = 0.57"
90.89% Pervious = 10.315 ac 9.11% Impervious = 1.034 ac

Summary for Subcatchment 1E: E1

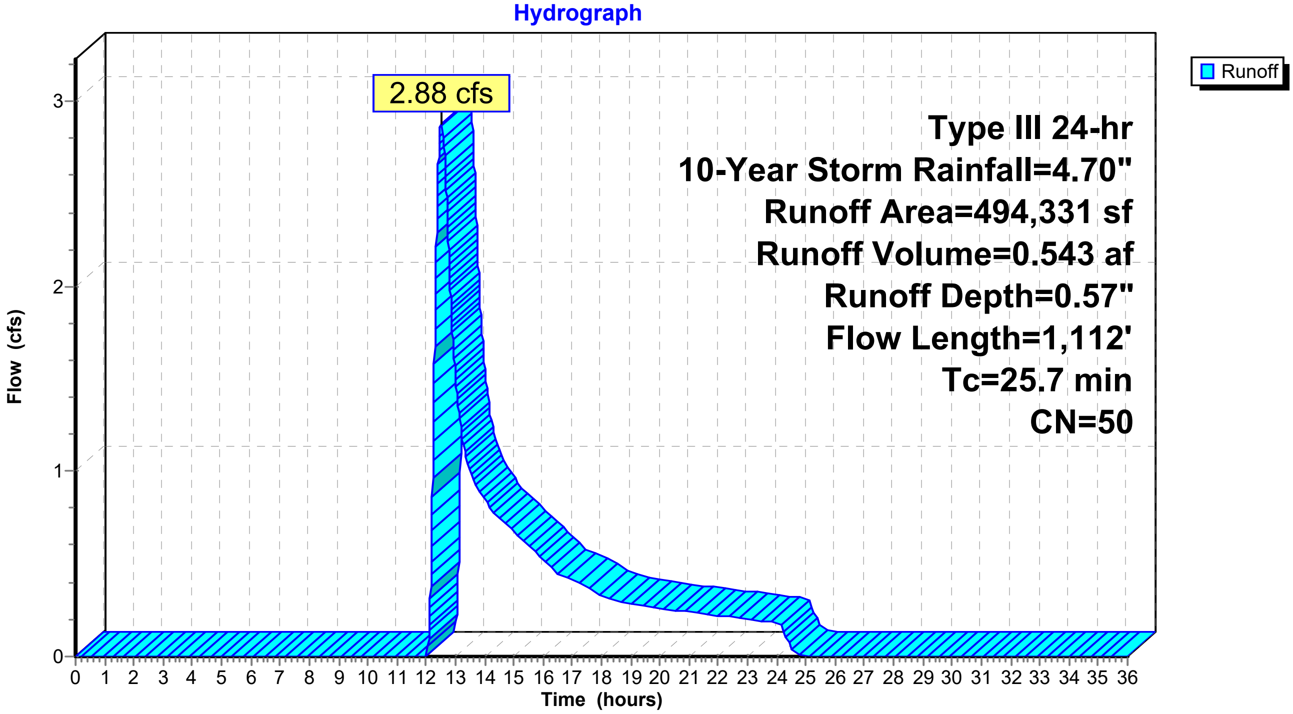
Runoff = 2.88 cfs @ 12.53 hrs, Volume= 0.543 af, Depth= 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
1,576	98	Paved parking, HSG A
43,445	98	Paved parking, HSG B
172,178	30	Woods, Good, HSG A
159,284	55	Woods, Good, HSG B
55,377	61	>75% Grass cover, Good, HSG B
47,663	39	>75% Grass cover, Good, HSG A
14,808	79	<50% Grass cover, Poor, HSG B
494,331	50	Weighted Average
449,310		90.89% Pervious Area
45,021		9.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	43	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
12.2	816	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	12	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.1	241	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.7	1,112	Total			

Subcatchment 1E: E1

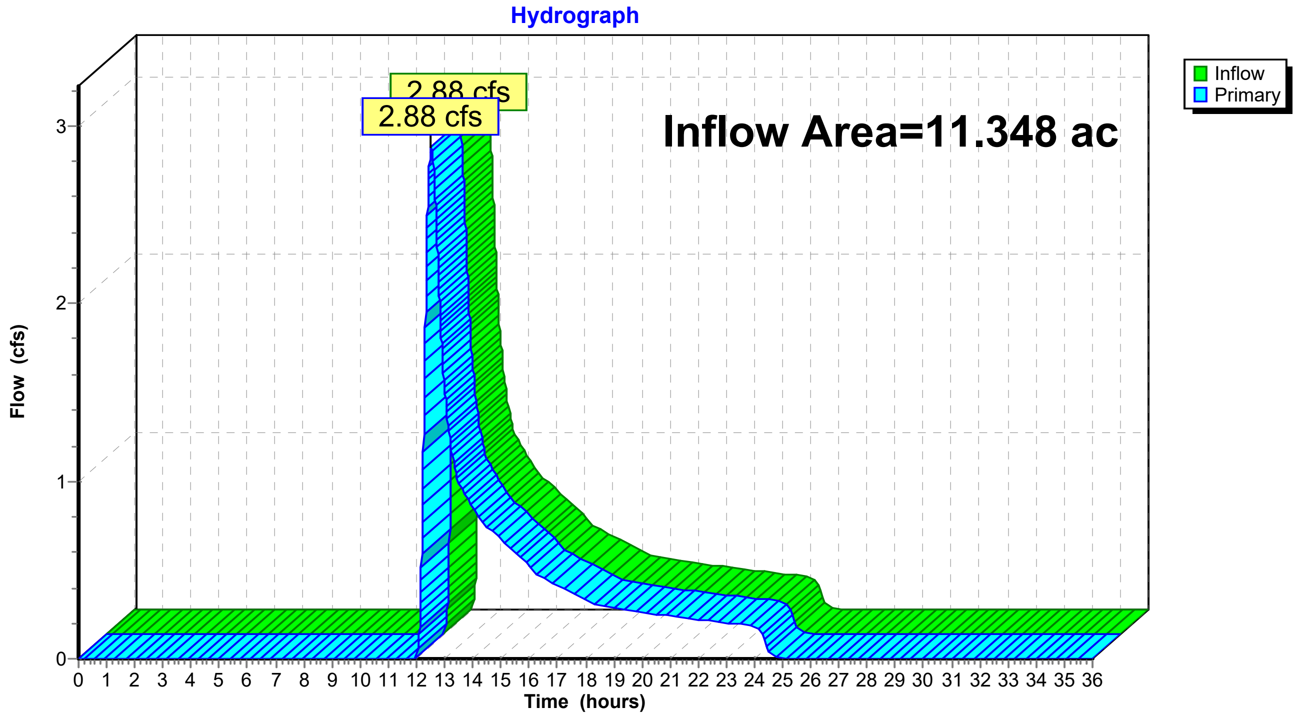


Summary for Link 2E: Design Point #1: Wetlands

Inflow Area =	11.348 ac,	9.11% Impervious,	Inflow Depth = 0.57"	for 10-Year Storm event	
Inflow =	2.88 cfs @	12.53 hrs,	Volume=	0.543 af	
Primary =	2.88 cfs @	12.53 hrs,	Volume=	0.543 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 2E: Design Point #1: Wetlands



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1E: E1 Runoff Area=494,331 sf 9.11% Impervious Runoff Depth=0.91"
Flow Length=1,112' Tc=25.7 min CN=50 Runoff=5.44 cfs 0.858 af

Link 2E: Design Point #1: Wetlands Inflow=5.44 cfs 0.858 af
Primary=5.44 cfs 0.858 af

Total Runoff Area = 11.348 ac Runoff Volume = 0.858 af Average Runoff Depth = 0.91"
90.89% Pervious = 10.315 ac 9.11% Impervious = 1.034 ac

Summary for Subcatchment 1E: E1

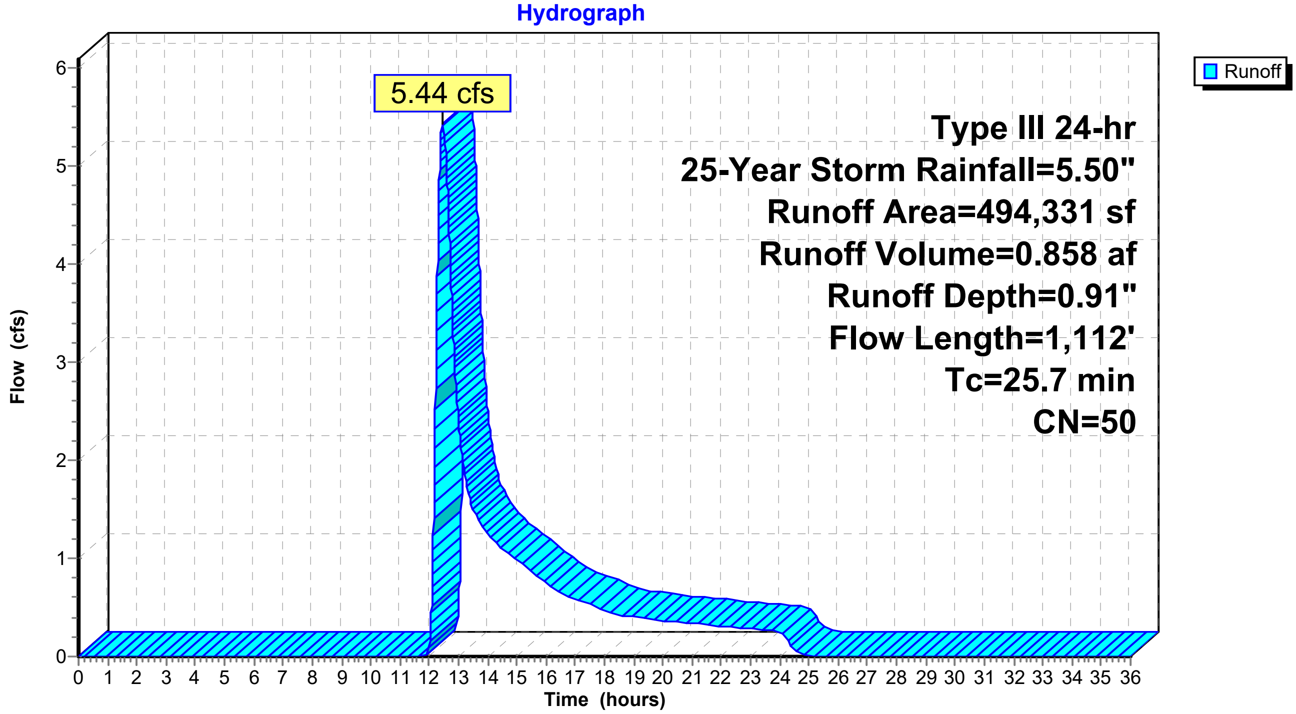
Runoff = 5.44 cfs @ 12.47 hrs, Volume= 0.858 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
1,576	98	Paved parking, HSG A
43,445	98	Paved parking, HSG B
172,178	30	Woods, Good, HSG A
159,284	55	Woods, Good, HSG B
55,377	61	>75% Grass cover, Good, HSG B
47,663	39	>75% Grass cover, Good, HSG A
14,808	79	<50% Grass cover, Poor, HSG B
494,331	50	Weighted Average
449,310		90.89% Pervious Area
45,021		9.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	43	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
12.2	816	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	12	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.1	241	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.7	1,112	Total			

Subcatchment 1E: E1

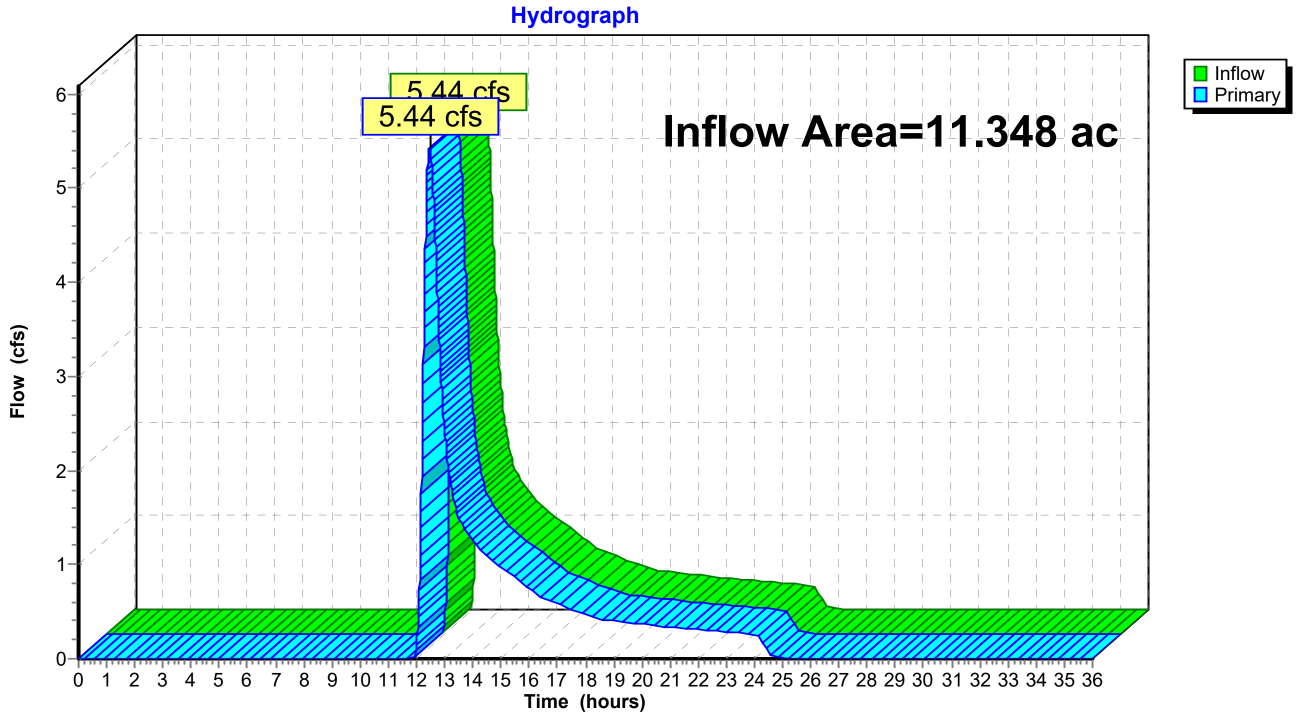


Summary for Link 2E: Design Point #1: Wetlands

Inflow Area = 11.348 ac, 9.11% Impervious, Inflow Depth = 0.91" for 25-Year Storm event
Inflow = 5.44 cfs @ 12.47 hrs, Volume= 0.858 af
Primary = 5.44 cfs @ 12.47 hrs, Volume= 0.858 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 2E: Design Point #1: Wetlands



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1E: E1 Runoff Area=494,331 sf 9.11% Impervious Runoff Depth=1.50"
Flow Length=1,112' Tc=25.7 min CN=50 Runoff=10.33 cfs 1.421 af

Link 2E: Design Point #1: Wetlands Inflow=10.33 cfs 1.421 af
Primary=10.33 cfs 1.421 af

Total Runoff Area = 11.348 ac Runoff Volume = 1.421 af Average Runoff Depth = 1.50"
90.89% Pervious = 10.315 ac 9.11% Impervious = 1.034 ac

Summary for Subcatchment 1E: E1

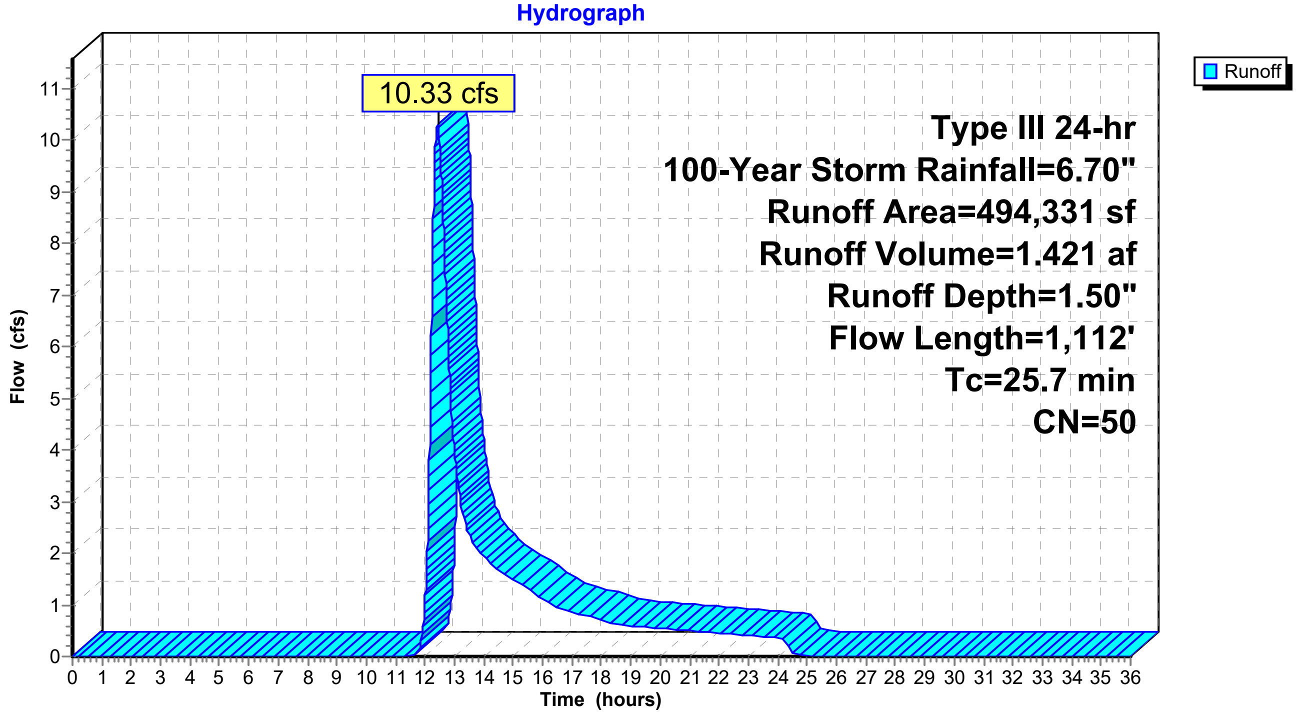
Runoff = 10.33 cfs @ 12.42 hrs, Volume= 1.421 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
1,576	98	Paved parking, HSG A
43,445	98	Paved parking, HSG B
172,178	30	Woods, Good, HSG A
159,284	55	Woods, Good, HSG B
55,377	61	>75% Grass cover, Good, HSG B
47,663	39	>75% Grass cover, Good, HSG A
14,808	79	<50% Grass cover, Poor, HSG B
494,331	50	Weighted Average
449,310		90.89% Pervious Area
45,021		9.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	43	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
12.2	816	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	12	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.1	241	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.7	1,112	Total			

Subcatchment 1E: E1

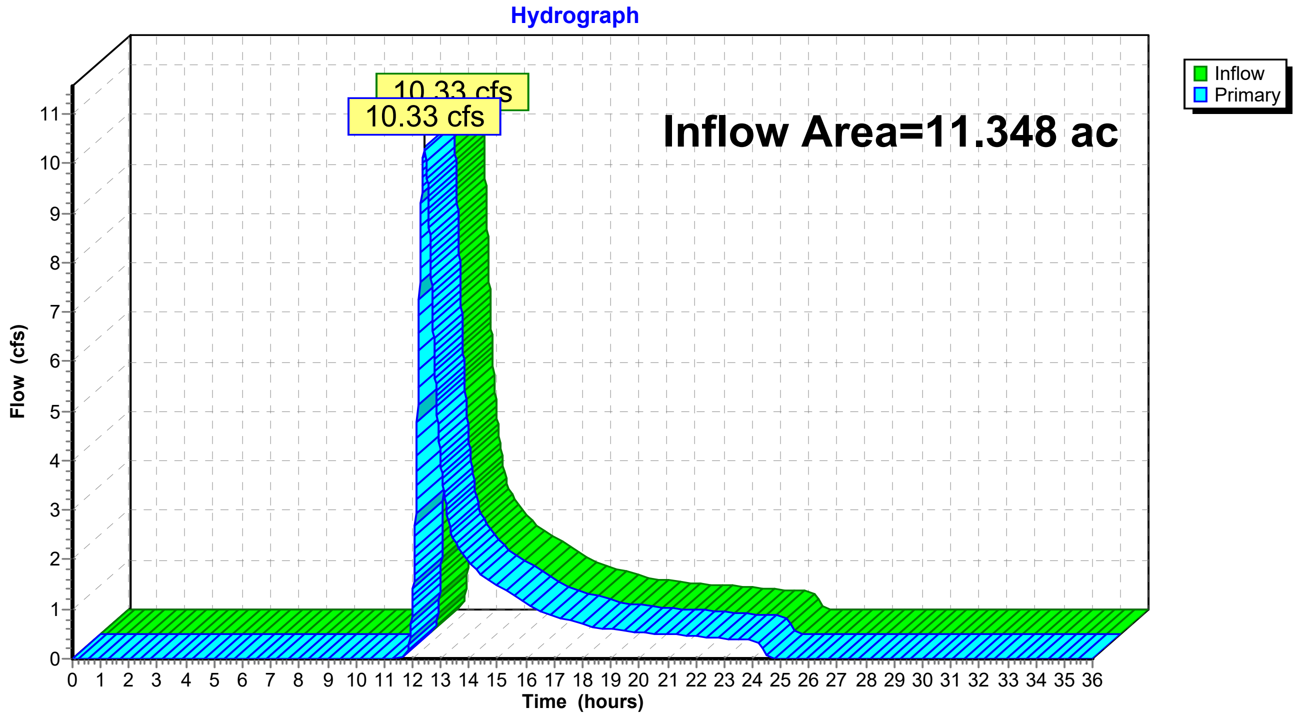


Summary for Link 2E: Design Point #1: Wetlands

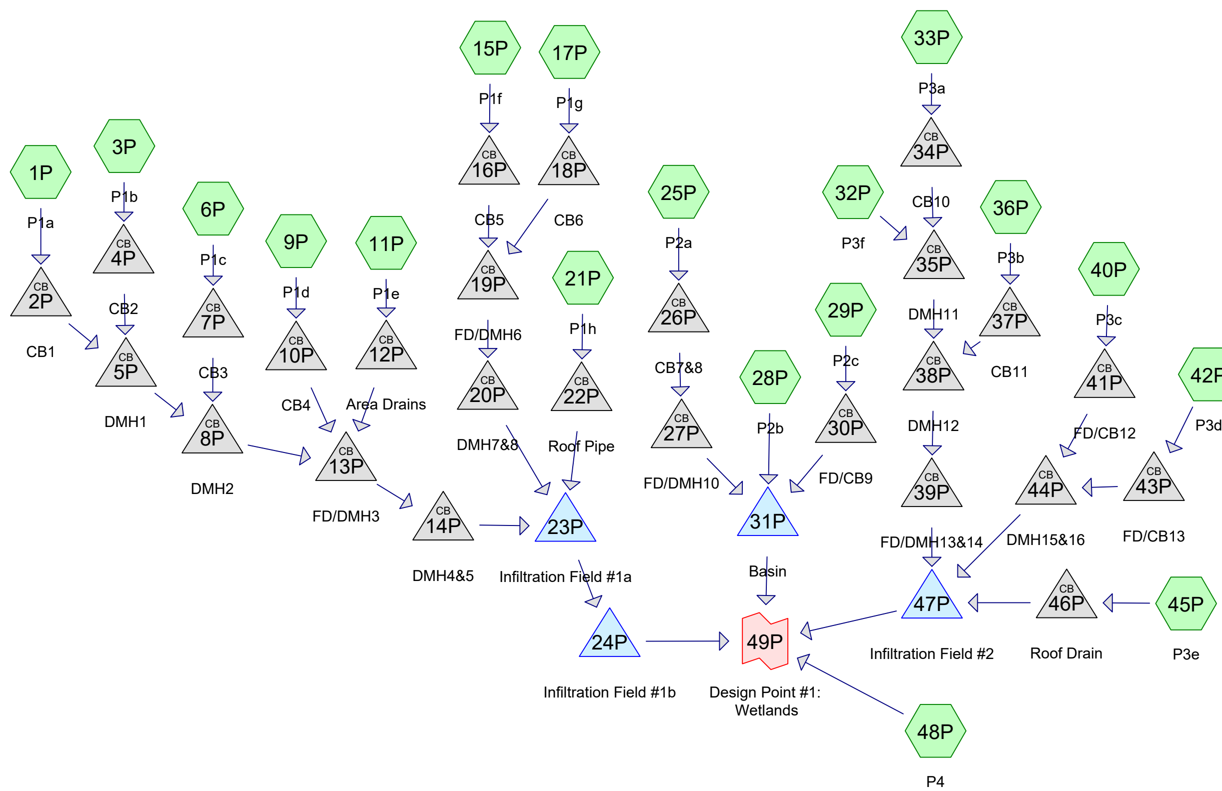
Inflow Area = 11.348 ac, 9.11% Impervious, Inflow Depth = 1.50" for 100-Year Storm event
Inflow = 10.33 cfs @ 12.42 hrs, Volume= 1.421 af
Primary = 10.33 cfs @ 12.42 hrs, Volume= 1.421 af, Atten= 0%, Lag= 0.0 min

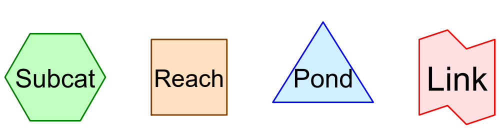
Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 2E: Design Point #1: Wetlands



DESIGN POINT #1: FLOW TO WETLANDS PROPOSED CONDITIONS





Routing Diagram for HydroCAD3
Prepared by {enter your company name here}, Printed 6/14/2019
HydroCAD® 10.00-24 s/n 02347 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.132	79	<50% Grass cover, Poor, HSG B (9P, 25P)
1.435	39	>75% Grass cover, Good, HSG A (6P, 9P, 11P, 15P, 17P, 28P, 29P, 32P, 33P, 36P, 40P, 42P, 48P)
2.063	61	>75% Grass cover, Good, HSG B (1P, 3P, 6P, 9P, 15P, 25P, 28P, 29P, 32P, 33P, 48P)
2.184	98	Paved parking, HSG A (6P, 9P, 11P, 15P, 17P, 25P, 29P, 33P, 36P, 40P, 42P, 48P)
1.795	98	Paved parking, HSG B (1P, 3P, 6P, 9P, 25P, 28P, 29P, 32P, 33P, 48P)
0.383	98	Roofs, HSG A (32P, 45P)
0.254	98	Roofs, HSG B (32P)
0.535	98	Unconnected roofs, HSG A (21P)
0.757	30	Woods, Good, HSG A (48P)
2.897	55	Woods, Good, HSG B (1P, 3P, 6P, 9P, 28P, 29P, 48P)
12.435	**71**	**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1P: P1a Runoff Area=112,620 sf 17.81% Impervious Runoff Depth=0.56"
Flow Length=655' Tc=16.4 min CN=64 Runoff=0.92 cfs 0.120 af

Pond 2P: CB1 Peak Elev=167.36' Inflow=0.92 cfs 0.120 af
18.0" Round Culvert n=0.011 L=194.0' S=0.0052 '/' Outflow=0.92 cfs 0.120 af

Subcatchment 3P: P1b Runoff Area=72,566 sf 24.44% Impervious Runoff Depth=0.69"
Flow Length=562' Tc=16.0 min CN=67 Runoff=0.82 cfs 0.095 af

Pond 4P: CB2 Peak Elev=166.55' Inflow=0.82 cfs 0.095 af
12.0" Round Culvert n=0.011 L=3.0' S=0.0333 '/' Outflow=0.82 cfs 0.095 af

Pond 5P: DMH1 Peak Elev=166.38' Inflow=1.73 cfs 0.216 af
24.0" Round Culvert n=0.011 L=171.0' S=0.0053 '/' Outflow=1.73 cfs 0.216 af

Subcatchment 6P: P1c Runoff Area=36,786 sf 40.24% Impervious Runoff Depth=1.09"
Flow Length=372' Tc=16.1 min CN=75 Runoff=0.76 cfs 0.077 af

Pond 7P: CB3 Peak Elev=165.58' Inflow=0.76 cfs 0.077 af
12.0" Round Culvert n=0.011 L=3.0' S=0.0333 '/' Outflow=0.76 cfs 0.077 af

Pond 8P: DMH2 Peak Elev=165.46' Inflow=2.48 cfs 0.293 af
24.0" Round Culvert n=0.011 L=94.0' S=0.0287 '/' Outflow=2.48 cfs 0.293 af

Subcatchment 9P: P1d Runoff Area=35,572 sf 40.58% Impervious Runoff Depth=1.09"
Flow Length=403' Tc=11.6 min CN=75 Runoff=0.83 cfs 0.074 af

Pond 10P: CB4 Peak Elev=164.96' Inflow=0.83 cfs 0.074 af
12.0" Round Culvert n=0.011 L=72.0' S=0.0333 '/' Outflow=0.83 cfs 0.074 af

Subcatchment 11P: P1e Runoff Area=31,721 sf 39.55% Impervious Runoff Depth=0.48"
Flow Length=81' Slope=0.0200 '/' Tc=9.8 min CN=62 Runoff=0.24 cfs 0.029 af

Pond 12P: Area Drains Peak Elev=163.15' Inflow=0.24 cfs 0.029 af
8.0" Round Culvert n=0.011 L=114.0' S=0.0061 '/' Outflow=0.24 cfs 0.029 af

Pond 13P: FD/DMH3 Peak Elev=162.78' Inflow=3.41 cfs 0.396 af
24.0" Round Culvert n=0.011 L=104.0' S=0.0308 '/' Outflow=3.41 cfs 0.396 af

Pond 14P: DMH4&5 Peak Elev=159.62' Inflow=3.41 cfs 0.396 af
Outflow=3.41 cfs 0.396 af

Subcatchment 15P: P1f Runoff Area=29,980 sf 78.85% Impervious Runoff Depth=1.84"
Flow Length=169' Slope=0.0600 '/' Tc=6.2 min CN=86 Runoff=1.47 cfs 0.105 af

Pond 16P: CB5 Peak Elev=160.69' Inflow=1.47 cfs 0.105 af
12.0" Round Culvert n=0.011 L=7.0' S=0.0143 '/' Outflow=1.47 cfs 0.105 af

Subcatchment 17P: P1g Runoff Area=7,680 sf 84.80% Impervious Runoff Depth=2.08"
Flow Length=144' Slope=0.0300 '/' Tc=5.0 min CN=89 Runoff=0.44 cfs 0.031 af

Pond 18P: CB6 Peak Elev=160.72' Inflow=0.44 cfs 0.031 af
12.0" Round Culvert n=0.011 L=66.0' S=0.0076 '/' Outflow=0.44 cfs 0.031 af

Pond 19P: FD/DMH6 Peak Elev=160.46' Inflow=1.91 cfs 0.136 af
12.0" Round Culvert n=0.011 L=44.0' S=0.0205 '/' Outflow=1.91 cfs 0.136 af

Pond 20P: DMH7&8 Peak Elev=159.47' Inflow=1.91 cfs 0.136 af
12.0" Round Culvert n=0.011 L=9.5' S=0.0105 '/' Outflow=1.91 cfs 0.136 af

Subcatchment 21P: P1h Runoff Area=23,312 sf 100.00% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=98 Runoff=1.66 cfs 0.132 af

Pond 22P: Roof Pipe Peak Elev=164.22' Inflow=1.66 cfs 0.132 af
12.0" Round Culvert n=0.011 L=302.0' S=0.0100 '/' Outflow=1.66 cfs 0.132 af

Pond 23P: Infiltration Field #1a Peak Elev=158.80' Storage=4,474 cf Inflow=5.71 cfs 0.665 af
Discarded=1.91 cfs 0.630 af Primary=0.88 cfs 0.035 af Outflow=2.79 cfs 0.665 af

Pond 24P: Infiltration Field #1b Peak Elev=158.63' Storage=1,030 cf Inflow=0.88 cfs 0.035 af
Discarded=0.18 cfs 0.035 af Primary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.035 af

Subcatchment 25P: P2a Runoff Area=17,804 sf 68.89% Impervious Runoff Depth=2.00"
Flow Length=229' Tc=9.8 min CN=88 Runoff=0.84 cfs 0.068 af

Pond 26P: CB7&8 Peak Elev=168.32' Inflow=0.84 cfs 0.068 af
Outflow=0.84 cfs 0.068 af

Pond 27P: FD/DMH10 Peak Elev=167.57' Inflow=0.84 cfs 0.068 af
12.0" Round Culvert n=0.011 L=43.0' S=0.0256 '/' Outflow=0.84 cfs 0.068 af

Subcatchment 28P: P2b Runoff Area=21,688 sf 6.26% Impervious Runoff Depth=0.34"
Flow Length=176' Tc=10.4 min CN=58 Runoff=0.08 cfs 0.014 af

Subcatchment 29P: P2c Runoff Area=8,798 sf 43.73% Impervious Runoff Depth=1.09"
Flow Length=158' Slope=0.0500 '/' Tc=10.1 min CN=75 Runoff=0.21 cfs 0.018 af

Pond 30P: FD/CB9 Peak Elev=168.23' Inflow=0.21 cfs 0.018 af
12.0" Round Culvert n=0.011 L=30.0' S=0.0667 '/' Outflow=0.21 cfs 0.018 af

Pond 31P: Basin Peak Elev=165.59' Storage=311 cf Inflow=1.11 cfs 0.101 af
Discarded=0.64 cfs 0.101 af Primary=0.00 cfs 0.000 af Outflow=0.64 cfs 0.101 af

Subcatchment 32P: P3f Runoff Area=23,307 sf 73.75% Impervious Runoff Depth=1.91"
Tc=6.0 min CN=87 Runoff=1.20 cfs 0.085 af

Subcatchment 33P: P3a Runoff Area=12,898 sf 69.13% Impervious Runoff Depth=1.76"
Flow Length=211' Tc=6.9 min CN=85 Runoff=0.59 cfs 0.043 af

Pond 34P: CB10 Peak Elev=165.69' Inflow=0.59 cfs 0.043 af
12.0" Round Culvert n=0.011 L=122.0' S=0.0164 '/' Outflow=0.59 cfs 0.043 af

Pond 35P: DMH11 Peak Elev=165.65' Inflow=1.79 cfs 0.129 af
15.0" Round Culvert n=0.011 L=71.0' S=0.0141 '/' Outflow=1.79 cfs 0.129 af

Subcatchment 36P: P3b Runoff Area=11,557 sf 86.94% Impervious Runoff Depth=2.17"
Flow Length=74' Slope=0.0200 '/' Tc=5.0 min CN=90 Runoff=0.69 cfs 0.048 af

Pond 37P: CB11 Peak Elev=164.66' Inflow=0.69 cfs 0.048 af
12.0" Round Culvert n=0.011 L=3.0' S=0.0333 '/' Outflow=0.69 cfs 0.048 af

Pond 38P: DMH12 Peak Elev=164.63' Inflow=2.47 cfs 0.177 af
18.0" Round Culvert n=0.011 L=158.0' S=0.0323 '/' Outflow=2.47 cfs 0.177 af

Pond 39P: FD/DMH13&14 Peak Elev=159.54' Inflow=2.47 cfs 0.177 af
Outflow=2.47 cfs 0.177 af

Subcatchment 40P: P3c Runoff Area=18,486 sf 87.50% Impervious Runoff Depth=2.26"
Flow Length=225' Tc=5.0 min CN=91 Runoff=1.15 cfs 0.080 af

Pond 41P: FD/CB12 Peak Elev=160.36' Inflow=1.15 cfs 0.080 af
12.0" Round Culvert n=0.011 L=32.0' S=0.0313 '/' Outflow=1.15 cfs 0.080 af

Subcatchment 42P: P3d Runoff Area=10,489 sf 85.99% Impervious Runoff Depth=2.17"
Flow Length=124' Slope=0.0300 '/' Tc=5.0 min CN=90 Runoff=0.63 cfs 0.044 af

Pond 43P: FD/CB13 Peak Elev=160.40' Inflow=0.63 cfs 0.044 af
12.0" Round Culvert n=0.011 L=52.0' S=0.0231 '/' Outflow=0.63 cfs 0.044 af

Pond 44P: DMH15&16 Peak Elev=159.54' Inflow=1.77 cfs 0.123 af
12.0" Round Culvert n=0.011 L=6.5' S=0.0154 '/' Outflow=1.77 cfs 0.123 af

Subcatchment 45P: P3e Runoff Area=11,055 sf 100.00% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=98 Runoff=0.79 cfs 0.063 af

Pond 46P: Roof Drain Peak Elev=165.56' Inflow=0.79 cfs 0.063 af
8.0" Round Culvert n=0.011 L=232.0' S=0.0280 '/' Outflow=0.79 cfs 0.063 af

Pond 47P: Infiltration Field #2 Peak Elev=159.54' Storage=6,204 cf Inflow=5.01 cfs 0.363 af
Discarded=0.33 cfs 0.340 af Primary=0.19 cfs 0.023 af Outflow=0.52 cfs 0.363 af

Subcatchment 48P: P4 Runoff Area=55,339 sf 2.62% Impervious Runoff Depth=0.00"
Flow Length=204' Tc=8.6 min CN=36 Runoff=0.00 cfs 0.000 af

Link 49P: Design Point #1: Wetlands Inflow=0.19 cfs 0.023 af
Primary=0.19 cfs 0.023 af

Total Runoff Area = 12.435 ac Runoff Volume = 1.128 af Average Runoff Depth = 1.09"
58.58% Pervious = 7.284 ac 41.42% Impervious = 5.151 ac

Summary for Subcatchment 1P: P1a

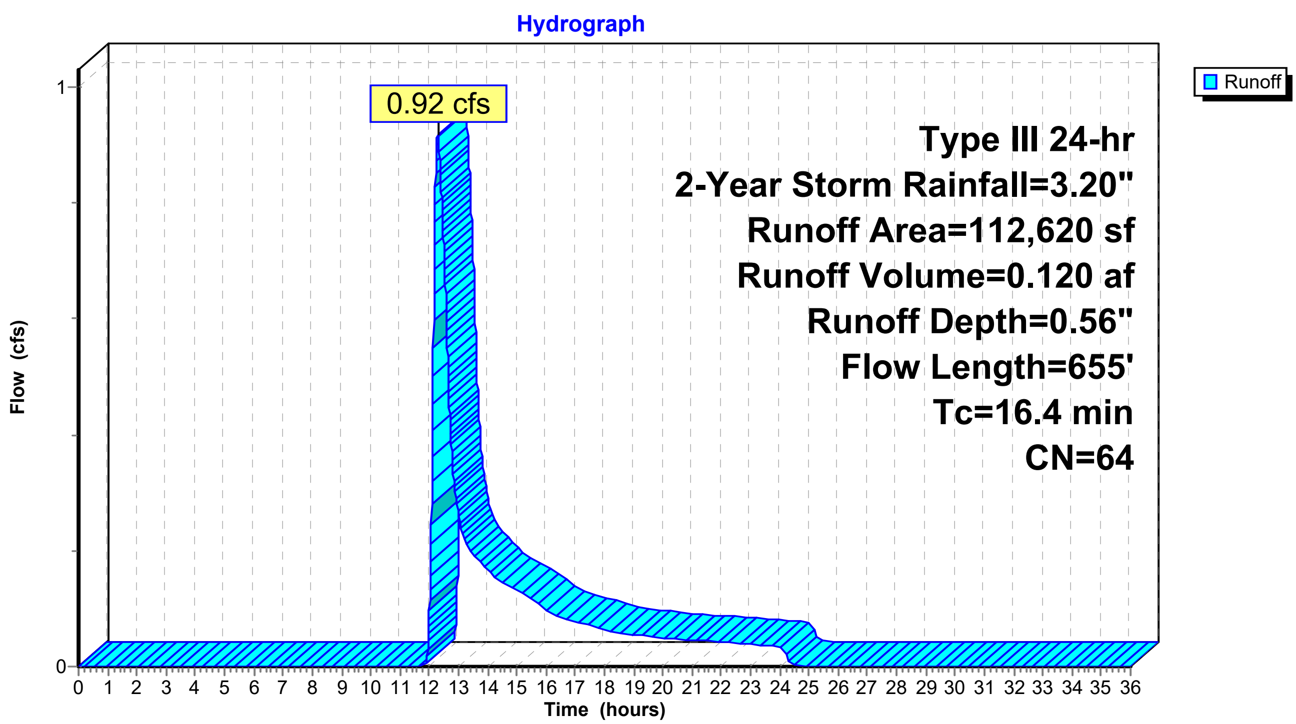
Runoff = 0.92 cfs @ 12.29 hrs, Volume= 0.120 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
20,058	98	Paved parking, HSG B
20,706	61	>75% Grass cover, Good, HSG B
71,856	55	Woods, Good, HSG B
112,620	64	Weighted Average
92,562		82.19% Pervious Area
20,058		17.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	43	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
6.8	410	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	47	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	155	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.4	655	Total			

Subcatchment 1P: P1a



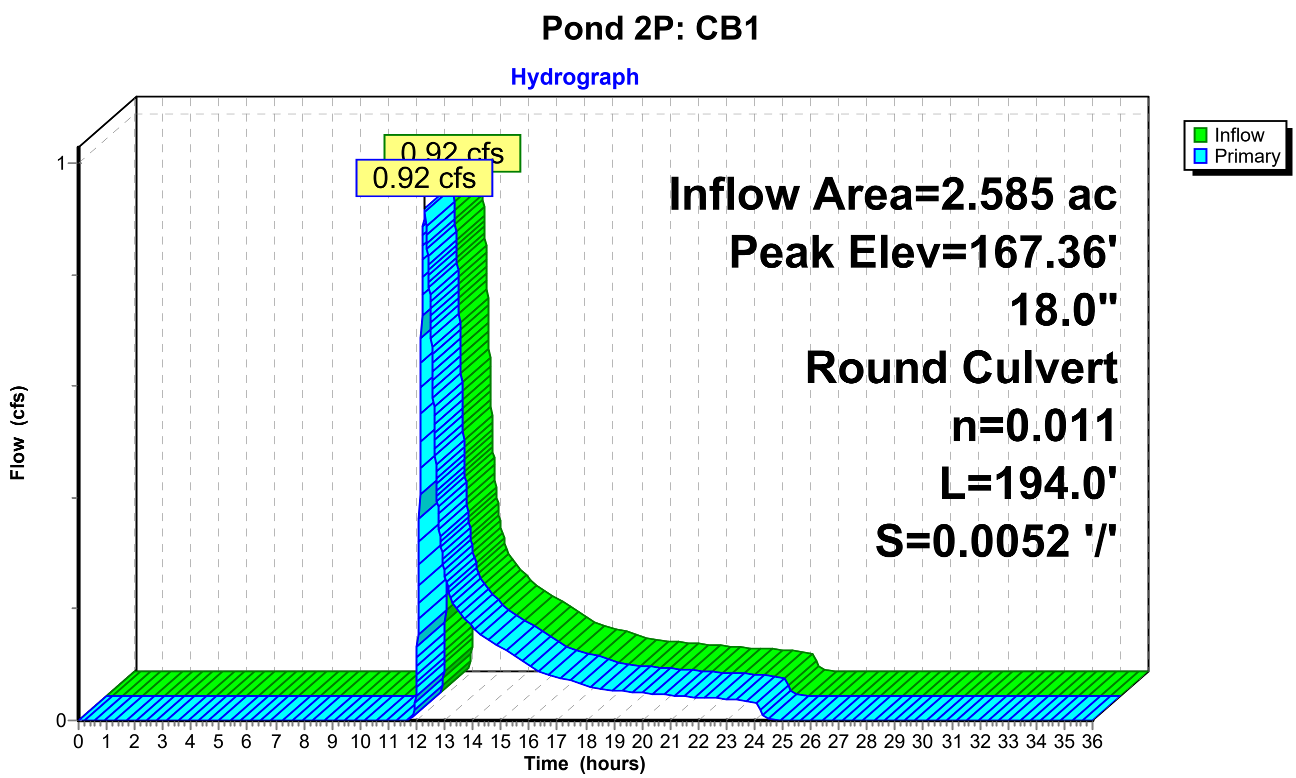
Summary for Pond 2P: CB1

Inflow Area =	2.585 ac,	17.81% Impervious,	Inflow Depth = 0.56"	for 2-Year Storm event
Inflow =	0.92 cfs @	12.29 hrs, Volume=	0.120 af	
Outflow =	0.92 cfs @	12.29 hrs, Volume=	0.120 af, Atten= 0%, Lag= 0.0 min	
Primary =	0.92 cfs @	12.29 hrs, Volume=	0.120 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 167.36' @ 12.29 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	166.90'	**18.0" Round Culvert** L= 194.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 166.90' / 165.90' S= 0.0052 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.92 cfs @ 12.29 hrs HW=167.36' TW=166.38' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.92 cfs @ 2.97 fps)



Summary for Subcatchment 3P: P1b

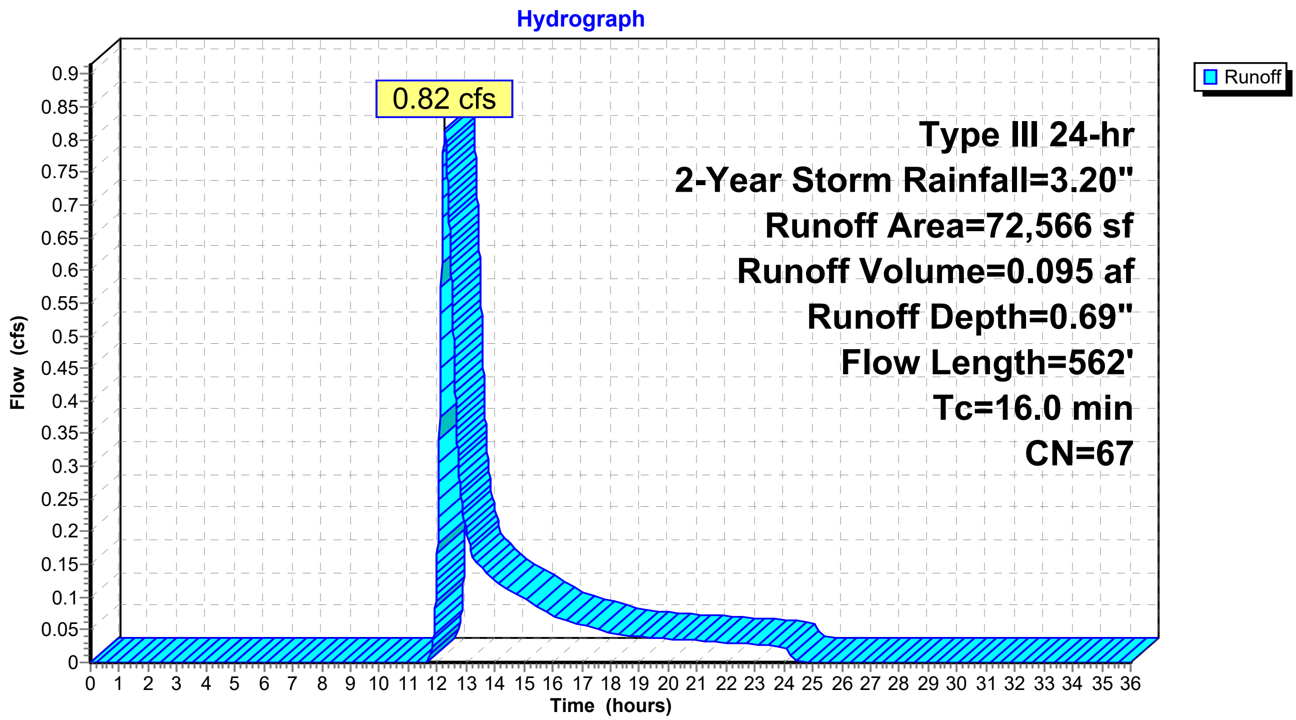
Runoff = 0.82 cfs @ 12.25 hrs, Volume= 0.095 af, Depth= 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
17,734	98	Paved parking, HSG B
20,240	61	>75% Grass cover, Good, HSG B
34,592	55	Woods, Good, HSG B
72,566	67	Weighted Average
54,832		75.56% Pervious Area
17,734		24.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	43	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
6.0	405	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	17	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	97	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.0	562	Total			

Subcatchment 3P: P1b



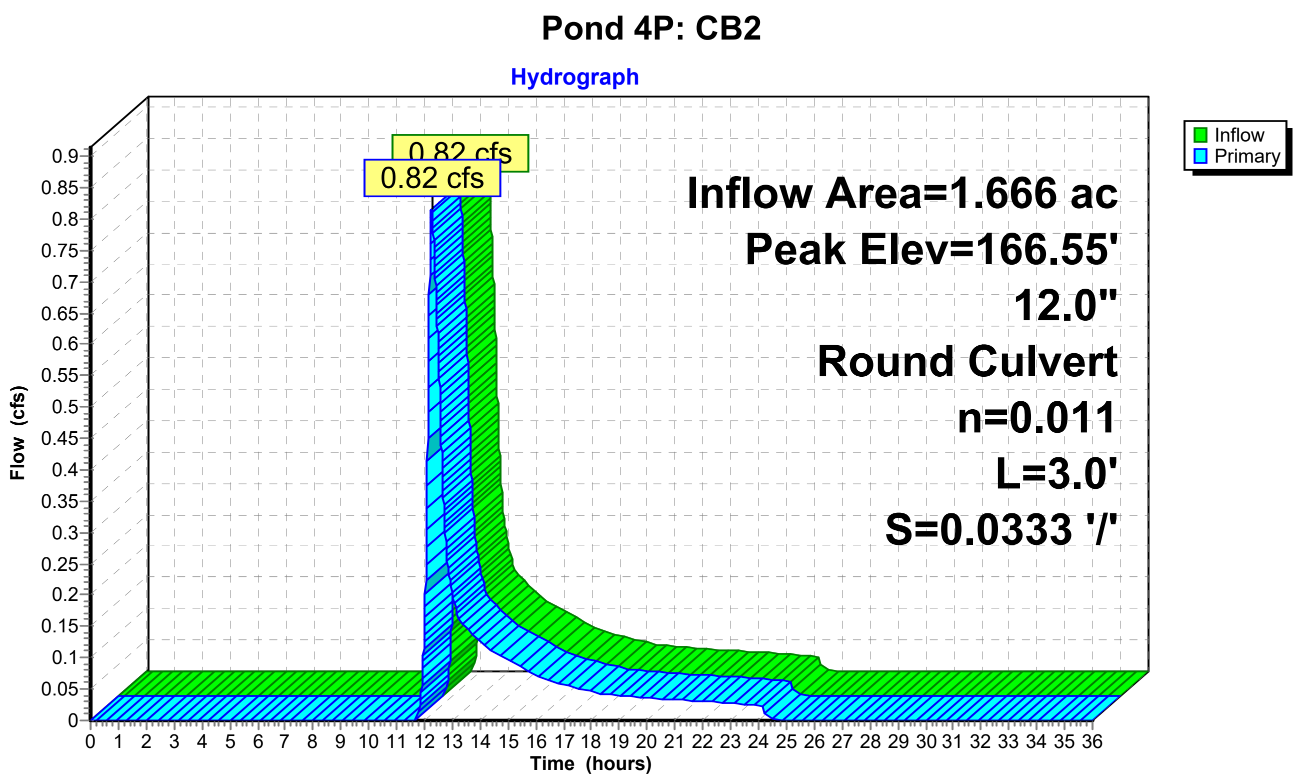
Summary for Pond 4P: CB2

Inflow Area =	1.666 ac,	24.44% Impervious,	Inflow Depth = 0.69"	for 2-Year Storm event
Inflow =	0.82 cfs @	12.25 hrs, Volume=	0.095 af	
Outflow =	0.82 cfs @	12.25 hrs, Volume=	0.095 af, Atten= 0%, Lag= 0.0 min	
Primary =	0.82 cfs @	12.25 hrs, Volume=	0.095 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.55' @ 12.27 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	166.00'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 166.00' / 165.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.81 cfs @ 12.25 hrs HW=166.55' TW=166.38' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.81 cfs @ 2.64 fps)



Summary for Pond 5P: DMH1

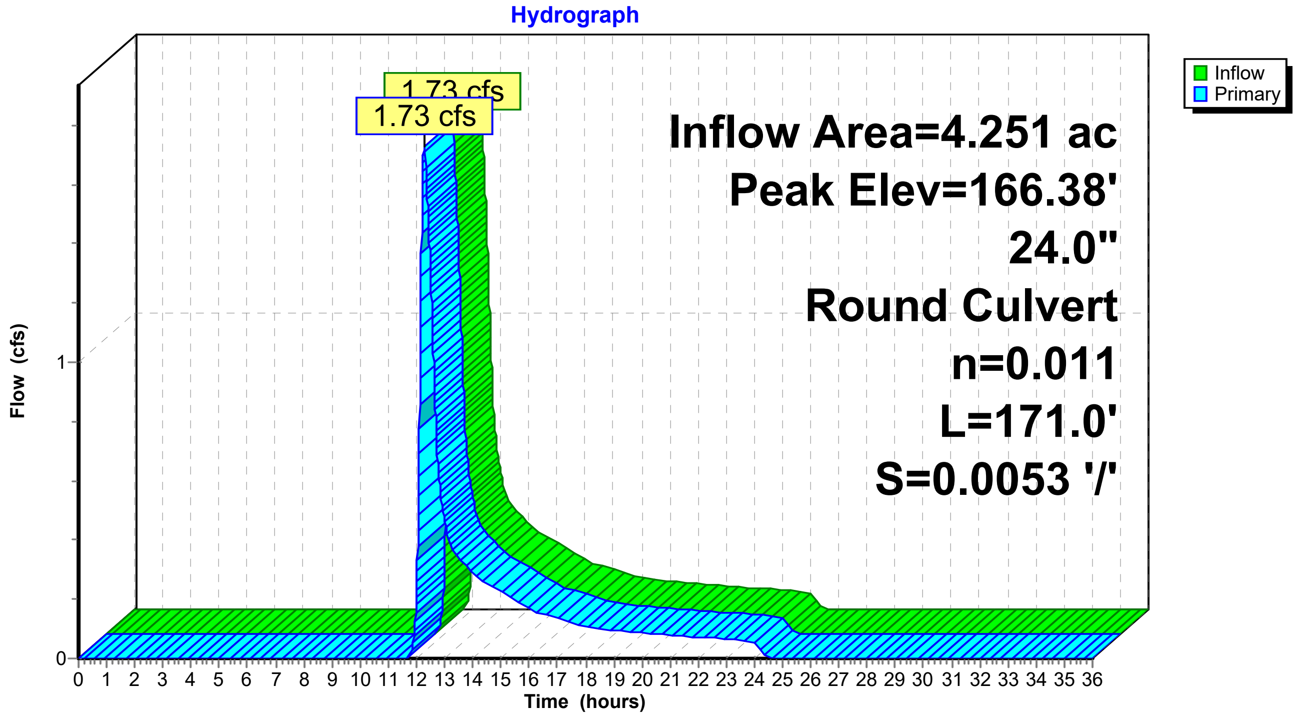
Inflow Area =	4.251 ac, 20.41% Impervious,	Inflow Depth = 0.61"	for 2-Year Storm event
Inflow =	1.73 cfs @ 12.27 hrs,	Volume=	0.216 af
Outflow =	1.73 cfs @ 12.27 hrs,	Volume=	0.216 af, Atten= 0%, Lag= 0.0 min
Primary =	1.73 cfs @ 12.27 hrs,	Volume=	0.216 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.38' @ 12.27 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.80'	**24.0" Round Culvert** L= 171.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.80' / 164.90' S= 0.0053 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=1.73 cfs @ 12.27 hrs HW=166.38' TW=165.46' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.73 cfs @ 3.41 fps)

Pond 5P: DMH1



Summary for Subcatchment 6P: P1c

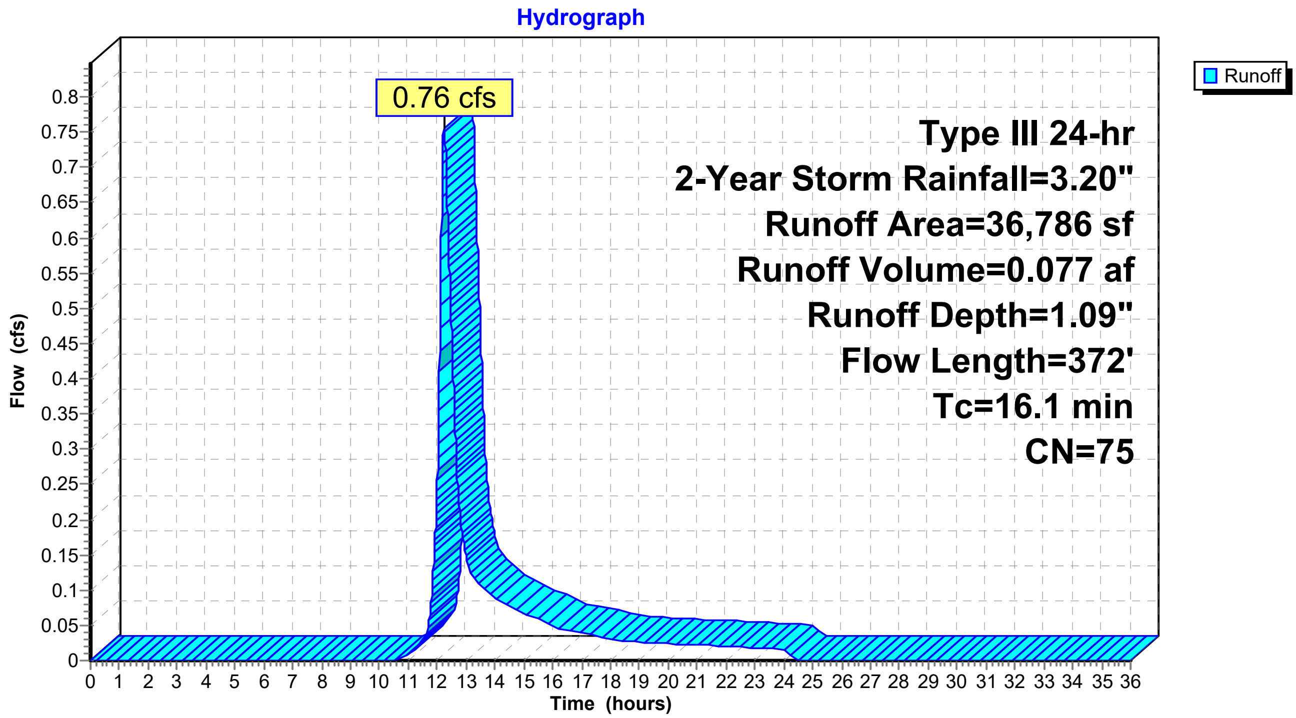
Runoff = 0.76 cfs @ 12.24 hrs, Volume= 0.077 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
1,366	98	Paved parking, HSG A
13,437	98	Paved parking, HSG B
228	39	>75% Grass cover, Good, HSG A
15,234	61	>75% Grass cover, Good, HSG B
6,521	55	Woods, Good, HSG B
36,786	75	Weighted Average
21,983		59.76% Pervious Area
14,803		40.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	47	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
4.8	36	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	74	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	40	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	175	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.1	372	Total			

Subcatchment 6P: P1c



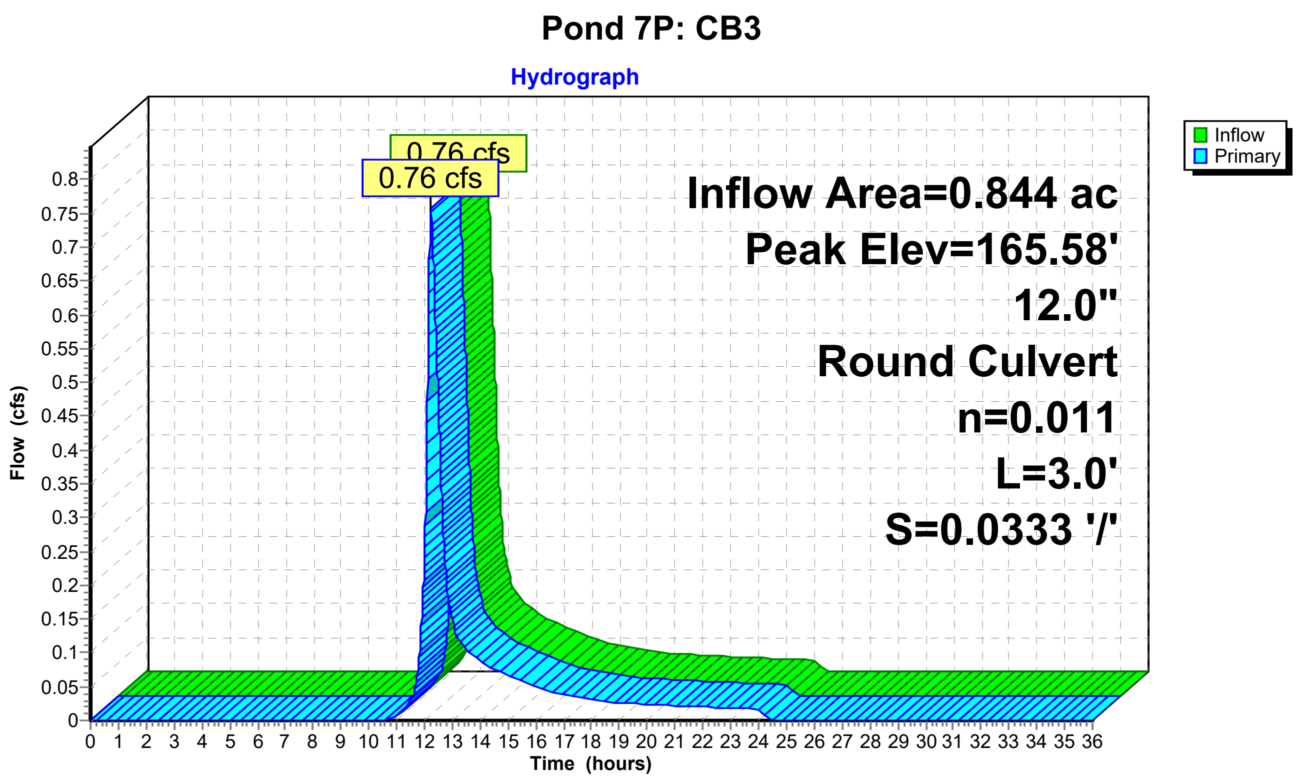
Summary for Pond 7P: CB3

Inflow Area =	0.844 ac,	40.24% Impervious,	Inflow Depth = 1.09"	for 2-Year Storm event	
Inflow =	0.76 cfs @	12.24 hrs,	Volume=	0.077 af	
Outflow =	0.76 cfs @	12.24 hrs,	Volume=	0.077 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.76 cfs @	12.24 hrs,	Volume=	0.077 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.58' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 164.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.75 cfs @ 12.24 hrs HW=165.58' TW=165.45' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 0.75 cfs @ 2.28 fps)



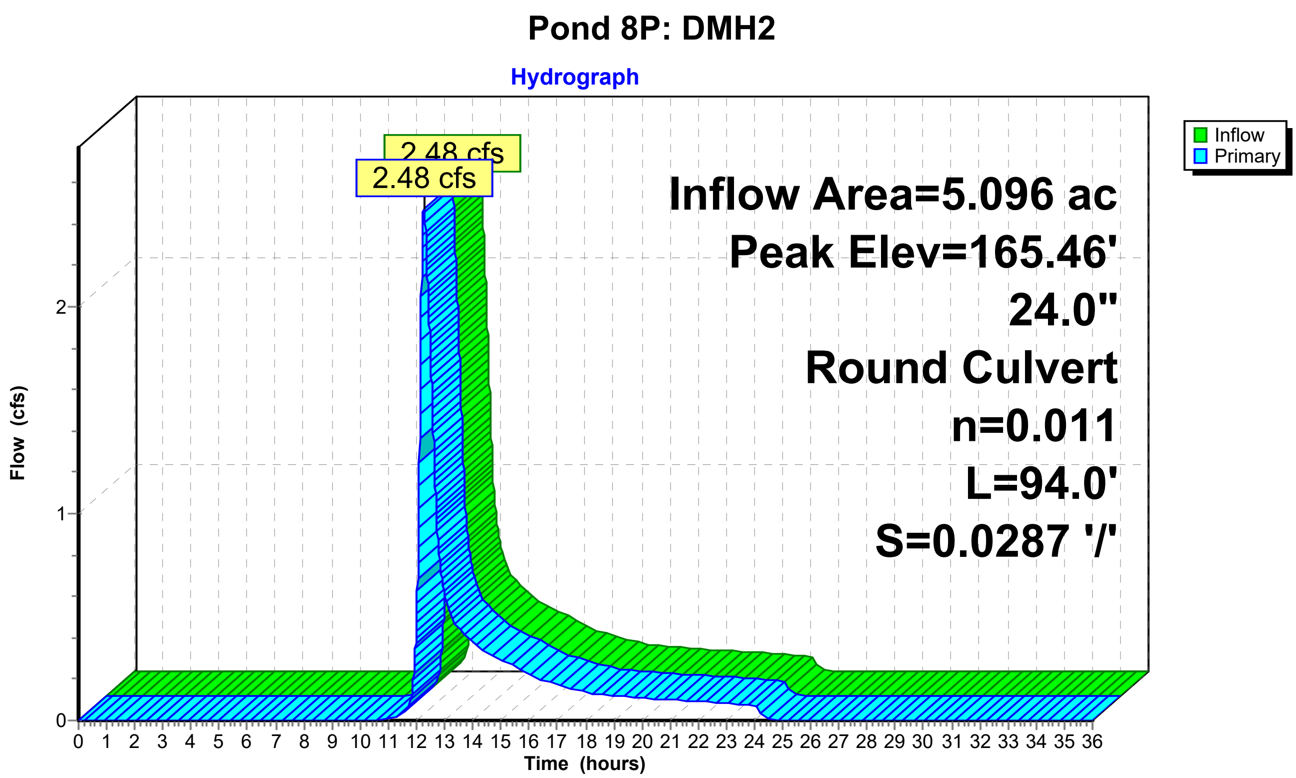
Summary for Pond 8P: DMH2

Inflow Area =	5.096 ac,	23.69% Impervious,	Inflow Depth = 0.69"	for 2-Year Storm event
Inflow =	2.48 cfs @	12.26 hrs, Volume=	0.293 af	
Outflow =	2.48 cfs @	12.26 hrs, Volume=	0.293 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.48 cfs @	12.26 hrs, Volume=	0.293 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.46' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.80'	**24.0" Round Culvert** L= 94.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 164.80' / 162.10' S= 0.0287 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=2.48 cfs @ 12.26 hrs HW=165.46' TW=162.78' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.48 cfs @ 2.76 fps)



Summary for Subcatchment 9P: P1d

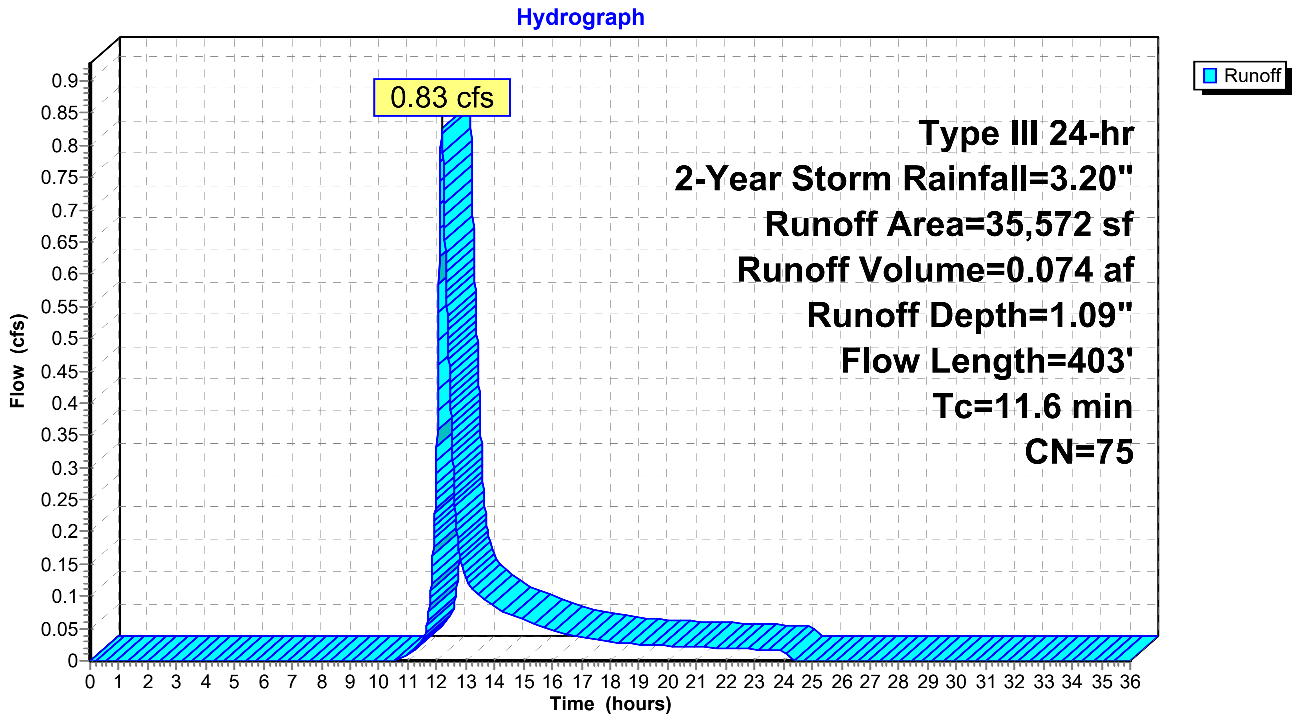
Runoff = 0.83 cfs @ 12.17 hrs, Volume= 0.074 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
11,385	98	Paved parking, HSG A
3,050	98	Paved parking, HSG B
5,618	39	>75% Grass cover, Good, HSG A
10,400	61	>75% Grass cover, Good, HSG B
4,510	79	<50% Grass cover, Poor, HSG B
609	55	Woods, Good, HSG B
35,572	75	Weighted Average
21,137		59.42% Pervious Area
14,435		40.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	83	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.1	13	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	130	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.0	177	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
11.6	403	Total			

Subcatchment 9P: P1d



Summary for Pond 10P: CB4

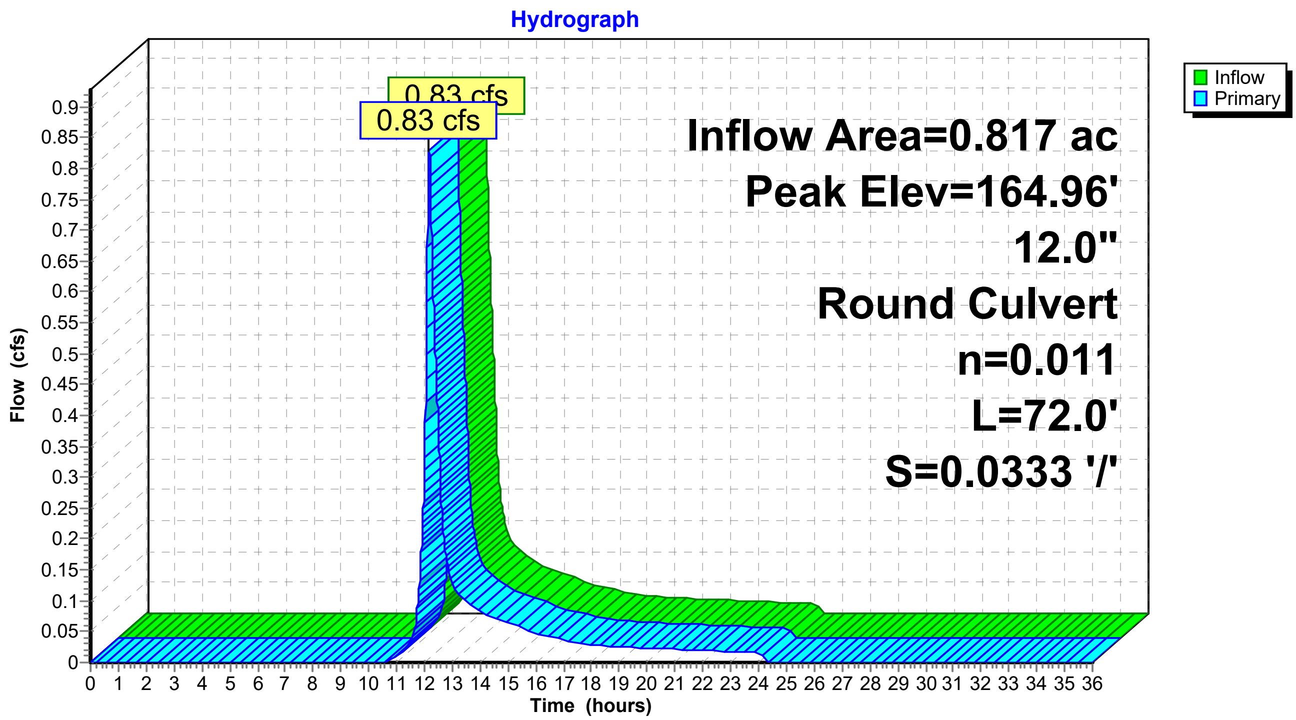
Inflow Area = 0.817 ac, 40.58% Impervious, Inflow Depth = 1.09" for 2-Year Storm event
Inflow = 0.83 cfs @ 12.17 hrs, Volume= 0.074 af
Outflow = 0.83 cfs @ 12.17 hrs, Volume= 0.074 af, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.17 hrs, Volume= 0.074 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 164.96' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.50'	**12.0" Round Culvert** L= 72.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 164.50' / 162.10' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.17 hrs HW=164.96' TW=162.74' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.83 cfs @ 2.32 fps)

Pond 10P: CB4



Summary for Subcatchment 11P: P1e

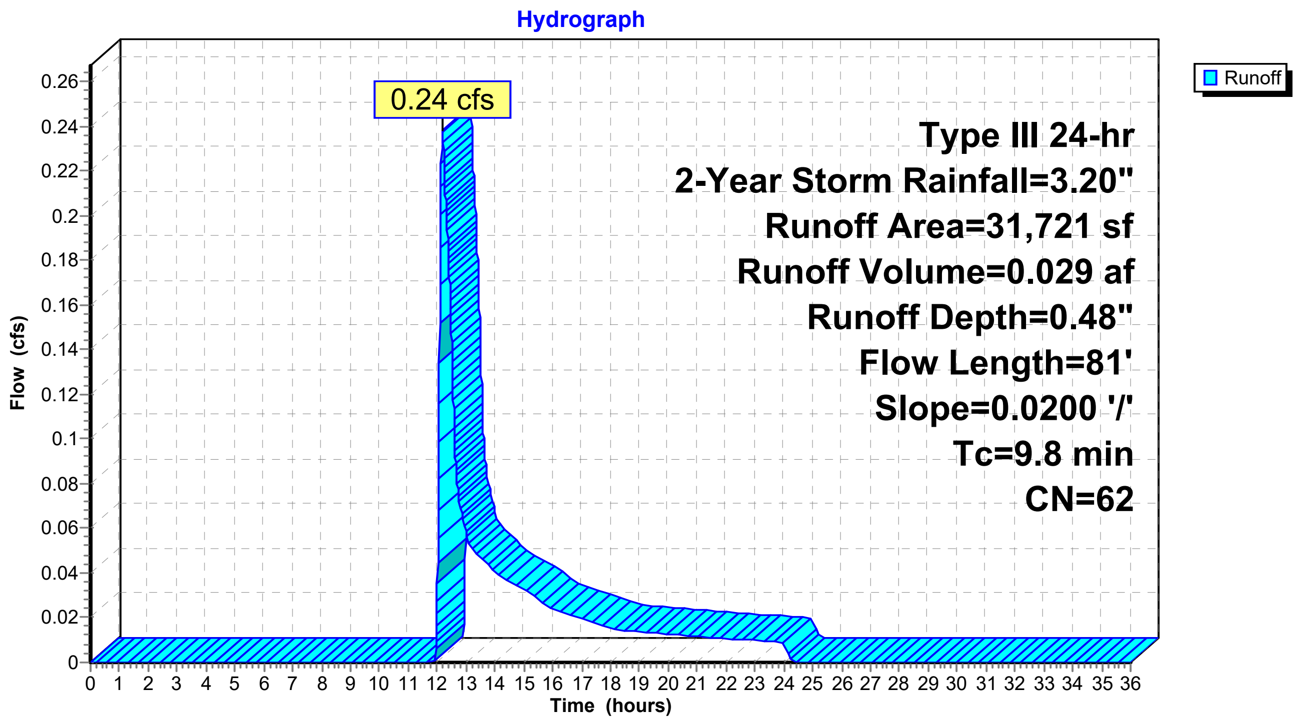
Runoff = 0.24 cfs @ 12.18 hrs, Volume= 0.029 af, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
12,547	98	Paved parking, HSG A
19,174	39	>75% Grass cover, Good, HSG A
31,721	62	Weighted Average
19,174		60.45% Pervious Area
12,547		39.55% 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"
0.4	22	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.8	81	Total			

Subcatchment 11P: P1e



Summary for Pond 12P: Area Drains

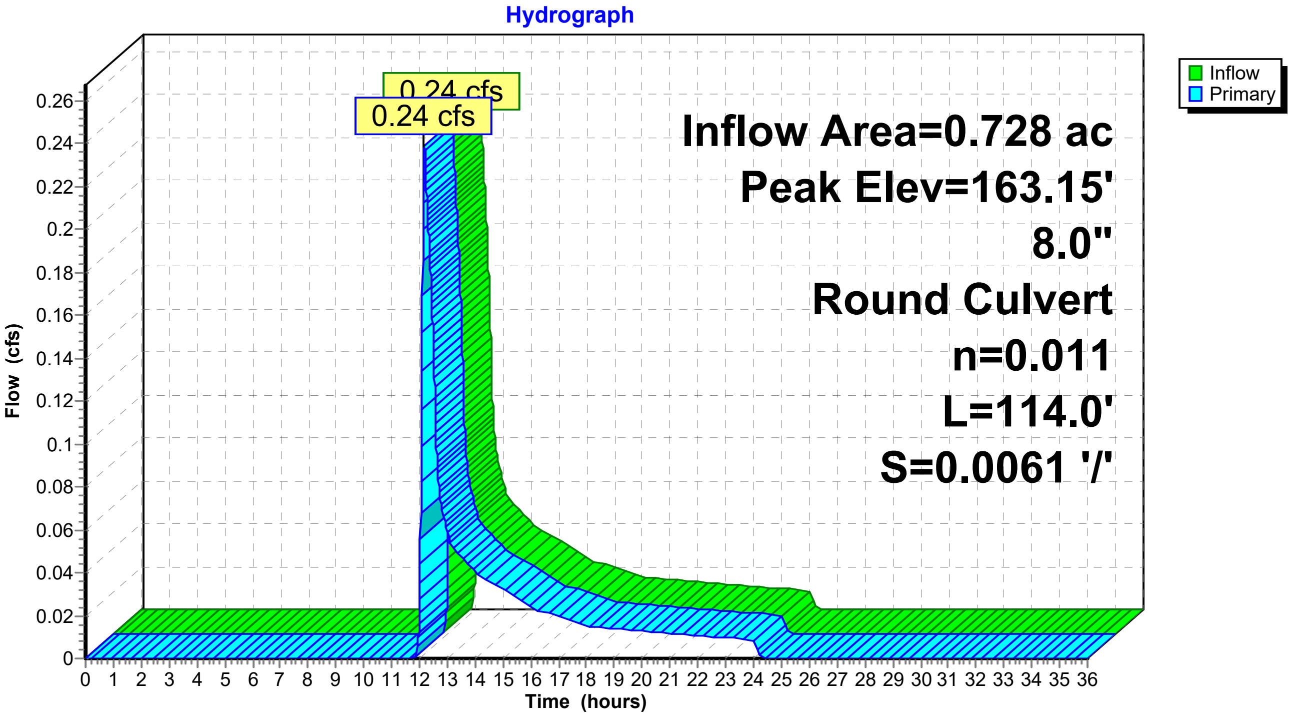
Inflow Area =	0.728 ac,	39.55% Impervious,	Inflow Depth = 0.48"	for 2-Year Storm event	
Inflow =	0.24 cfs @	12.18 hrs,	Volume=	0.029 af	
Outflow =	0.24 cfs @	12.18 hrs,	Volume=	0.029 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.24 cfs @	12.18 hrs,	Volume=	0.029 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 163.15' @ 12.20 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.80'	**8.0" Round Culvert** L= 114.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.80' / 162.10' S= 0.0061 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.23 cfs @ 12.18 hrs HW=163.14' TW=162.75' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.23 cfs @ 1.88 fps)

Pond 12P: Area Drains



Summary for Pond 13P: FD/DMH3

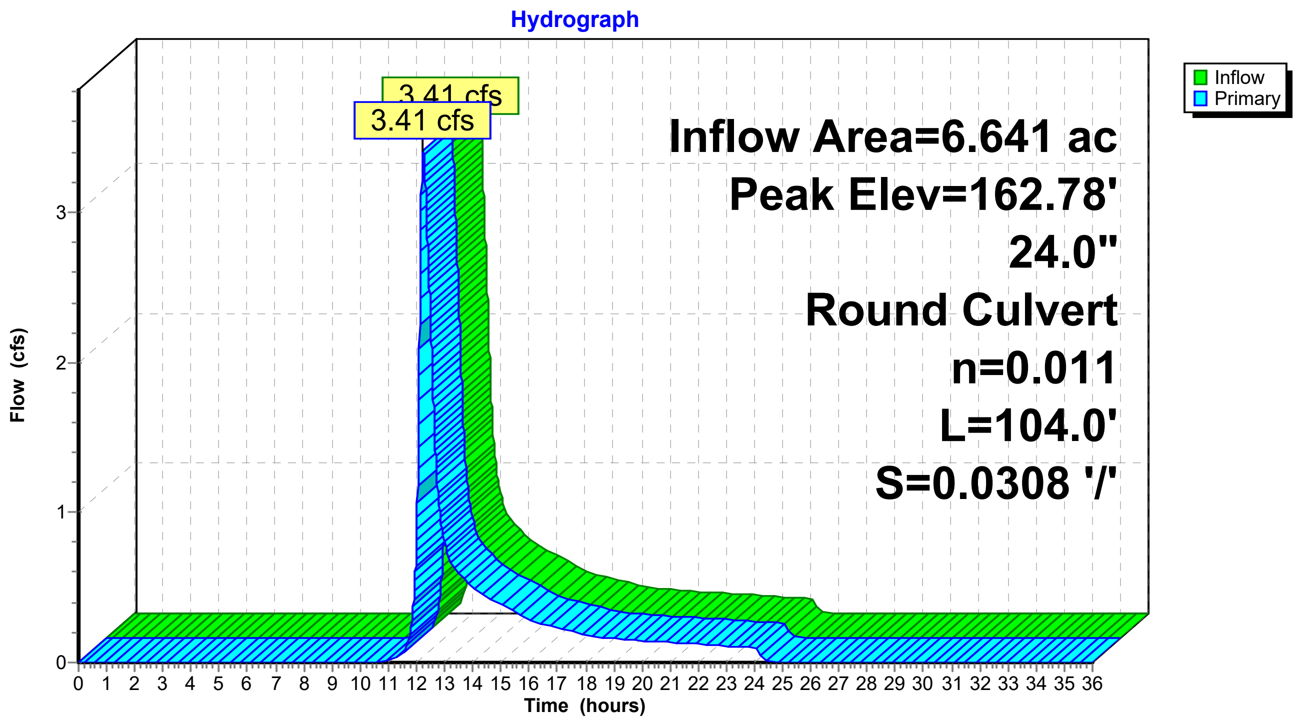
Inflow Area =	6.641 ac,	27.51% Impervious,	Inflow Depth = 0.72"	for 2-Year Storm event	
Inflow =	3.41 cfs @	12.23 hrs,	Volume=	0.396 af	
Outflow =	3.41 cfs @	12.23 hrs,	Volume=	0.396 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.41 cfs @	12.23 hrs,	Volume=	0.396 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 162.78' @ 12.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.00'	**24.0" Round Culvert** L= 104.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.00' / 158.80' S= 0.0308 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=3.41 cfs @ 12.23 hrs HW=162.78' TW=159.62' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.41 cfs @ 3.01 fps)

Pond 13P: FD/DMH3



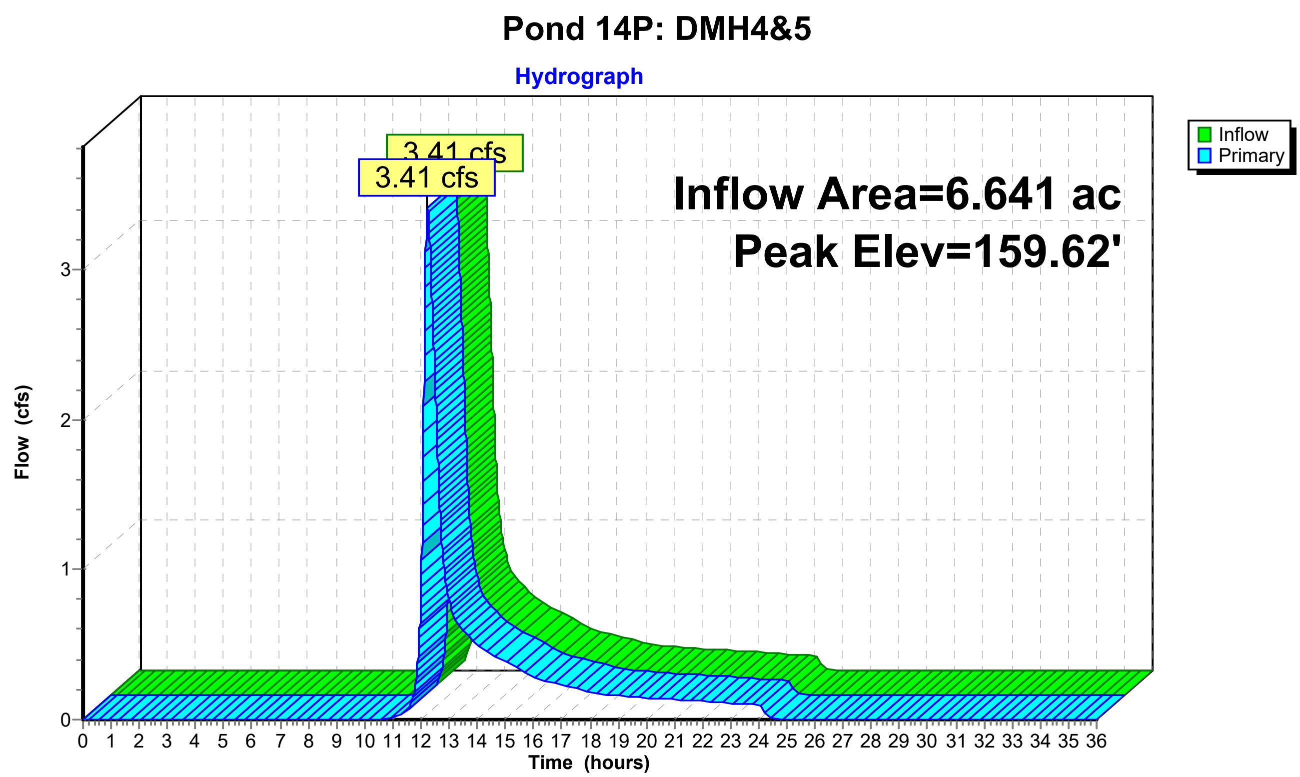
Summary for Pond 14P: DMH4&5

Inflow Area =	6.641 ac,	27.51% Impervious,	Inflow Depth = 0.72"	for 2-Year Storm event	
Inflow =	3.41 cfs @	12.23 hrs,	Volume=	0.396 af	
Outflow =	3.41 cfs @	12.23 hrs,	Volume=	0.396 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.41 cfs @	12.23 hrs,	Volume=	0.396 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 159.62' @ 12.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**18.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Primary	161.00'	**18.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 158.50' S= 0.4167 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=3.41 cfs @ 12.23 hrs HW=159.62' TW=158.59' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 3.41 cfs @ 3.77 fps)
└**2=Culvert** (Controls 0.00 cfs)



Summary for Subcatchment 15P: P1f

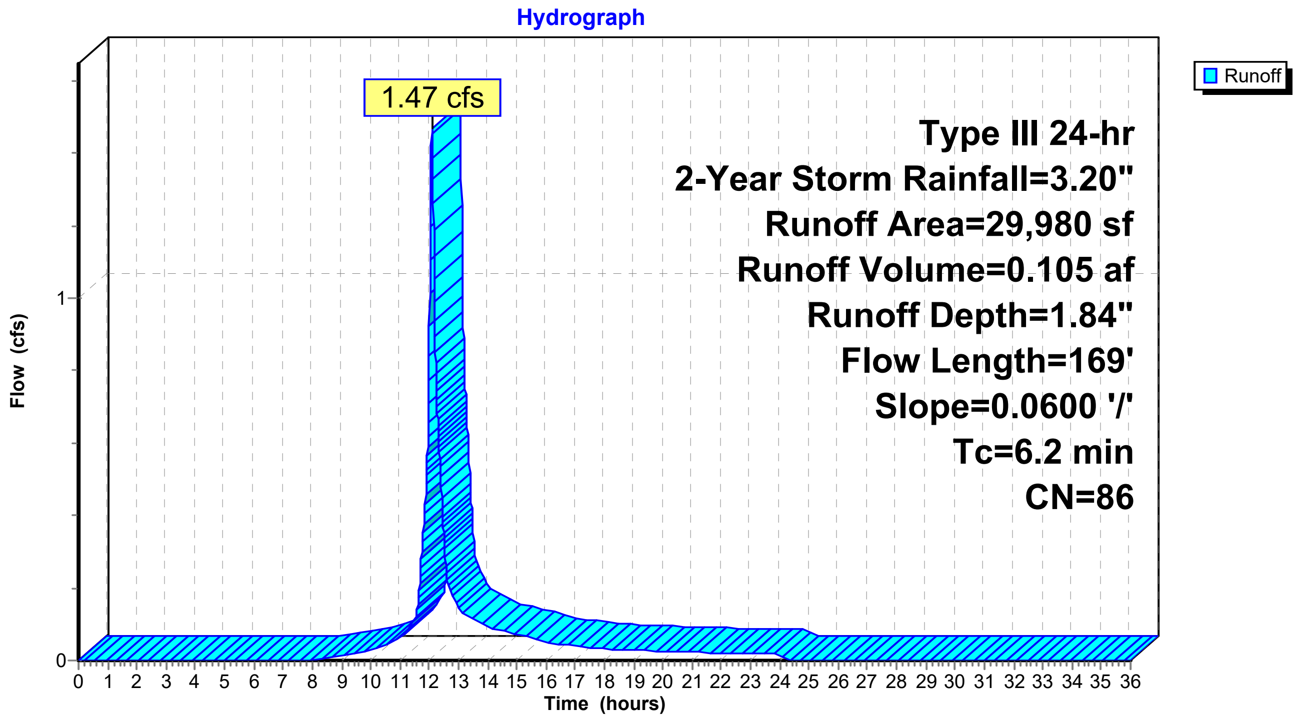
Runoff = 1.47 cfs @ 12.09 hrs, Volume= 0.105 af, Depth= 1.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
23,639	98	Paved parking, HSG A
6,281	39	>75% Grass cover, Good, HSG A
60	61	>75% Grass cover, Good, HSG B
29,980	86	Weighted Average
6,341		21.15% Pervious Area
23,639		78.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	56	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.4	113	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.2	169	Total			

Subcatchment 15P: P1f



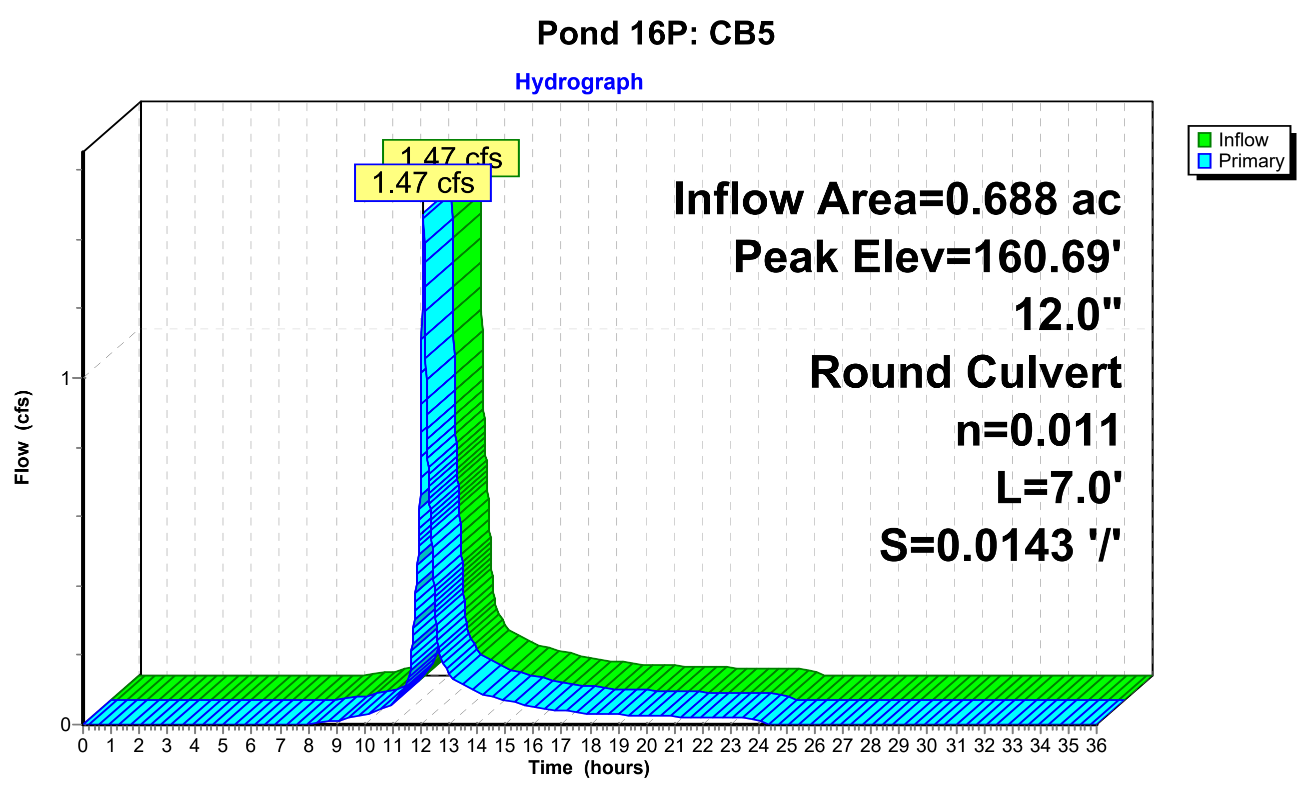
Summary for Pond 16P: CB5

Inflow Area = 0.688 ac, 78.85% Impervious, Inflow Depth = 1.84" for 2-Year Storm event
Inflow = 1.47 cfs @ 12.09 hrs, Volume= 0.105 af
Outflow = 1.47 cfs @ 12.09 hrs, Volume= 0.105 af, Atten= 0%, Lag= 0.0 min
Primary = 1.47 cfs @ 12.09 hrs, Volume= 0.105 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.69' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.90'	**12.0" Round Culvert** L= 7.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.90' / 159.80' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.47 cfs @ 12.09 hrs HW=160.69' TW=160.46' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.47 cfs @ 3.02 fps)



Summary for Subcatchment 17P: P1g

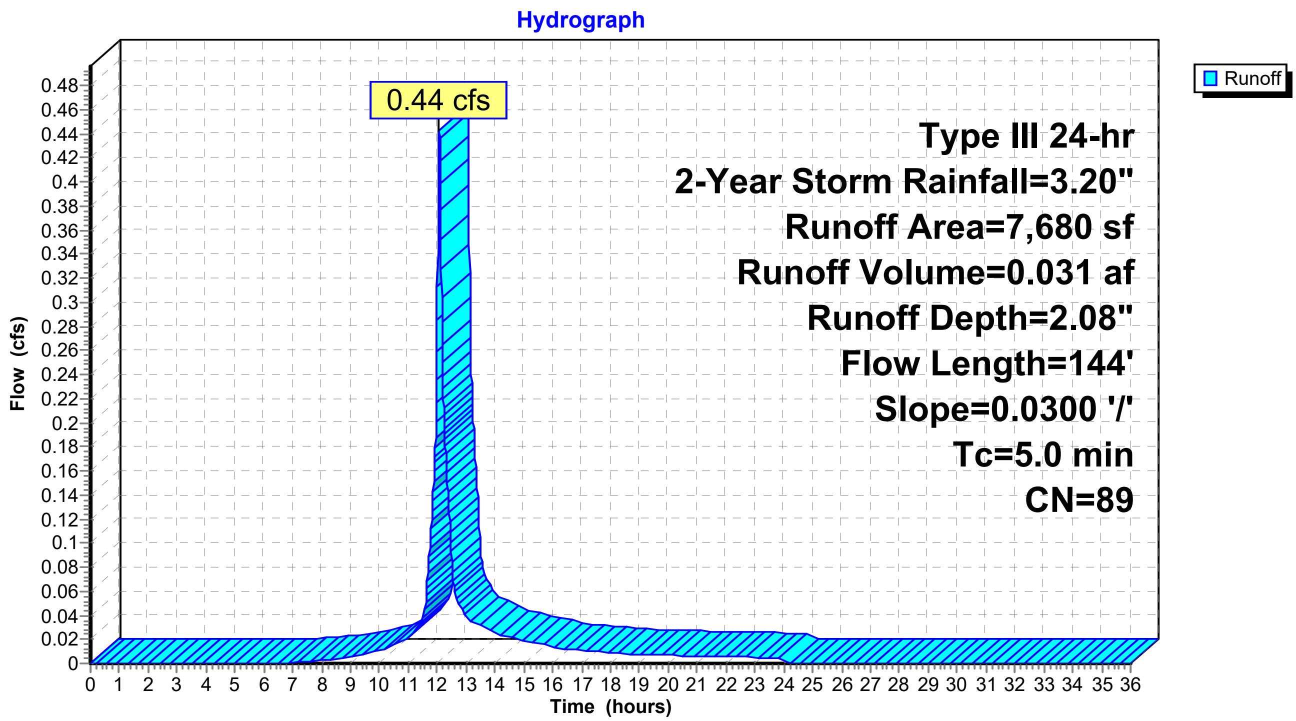
Runoff = 0.44 cfs @ 12.07 hrs, Volume= 0.031 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
6,513	98	Paved parking, HSG A
1,167	39	>75% Grass cover, Good, HSG A
7,680	89	Weighted Average
1,167		15.20% Pervious Area
6,513		84.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	20	0.0300	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.5	40	0.0300	1.35		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
0.9	84	0.0300	1.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
4.7	144	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 17P: P1g



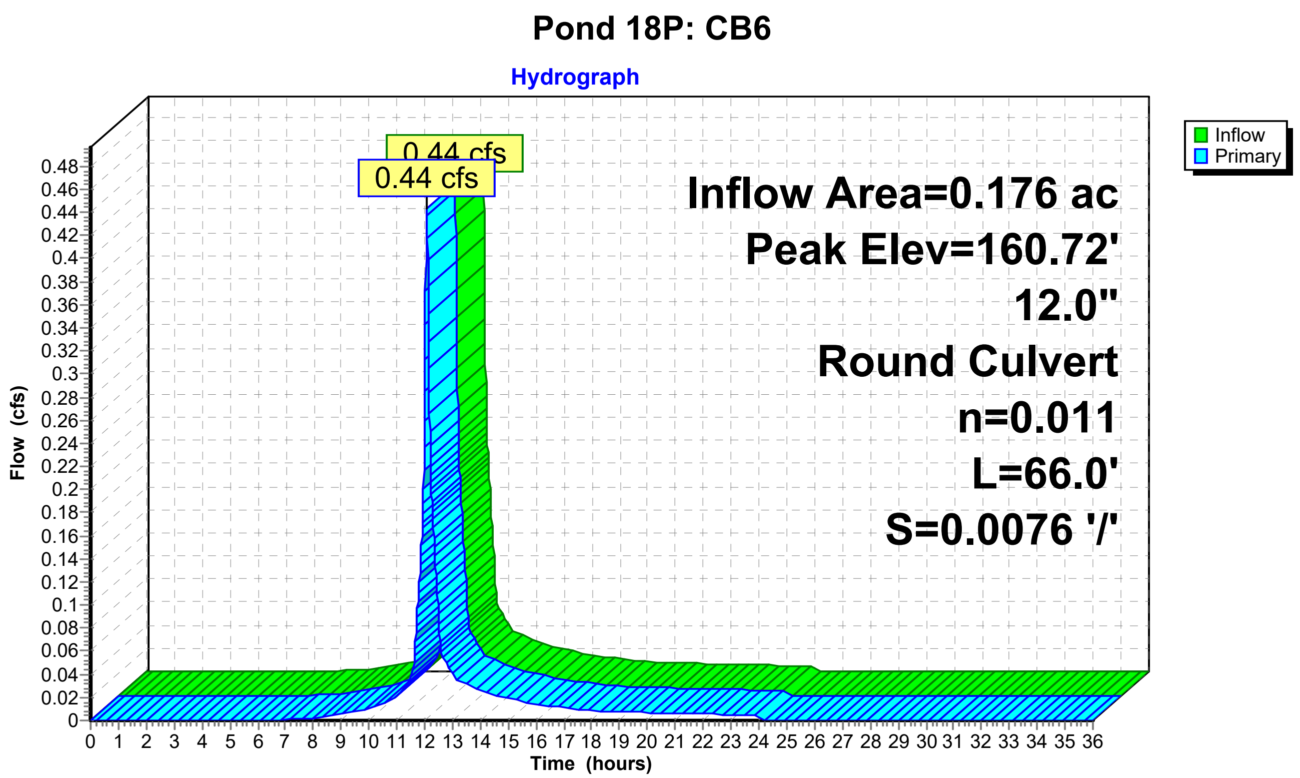
Summary for Pond 18P: CB6

Inflow Area =	0.176 ac,	84.80% Impervious,	Inflow Depth =	2.08"	for 2-Year Storm event
Inflow =	0.44 cfs @	12.07 hrs,	Volume=	0.031 af	
Outflow =	0.44 cfs @	12.07 hrs,	Volume=	0.031 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.44 cfs @	12.07 hrs,	Volume=	0.031 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.72' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**12.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.80' S= 0.0076 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.43 cfs @ 12.07 hrs HW=160.71' TW=160.45' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.43 cfs @ 2.08 fps)



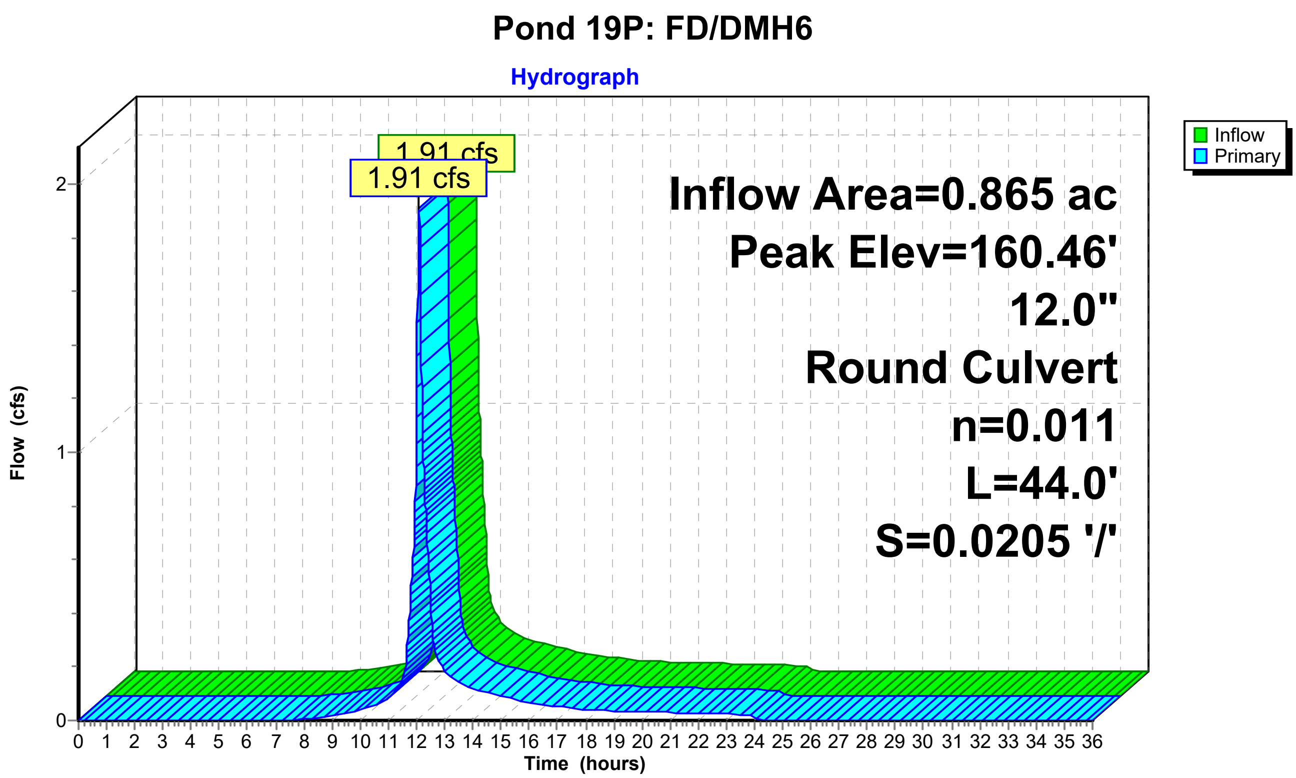
Summary for Pond 19P: FD/DMH6

Inflow Area =	0.865 ac,	80.06% Impervious,	Inflow Depth = 1.89"	for 2-Year Storm event
Inflow =	1.91 cfs @	12.09 hrs, Volume=	0.136 af	
Outflow =	1.91 cfs @	12.09 hrs, Volume=	0.136 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.91 cfs @	12.09 hrs, Volume=	0.136 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.46' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.70'	**12.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.70' / 158.80' S= 0.0205 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.90 cfs @ 12.09 hrs HW=160.46' TW=159.47' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.90 cfs @ 2.97 fps)



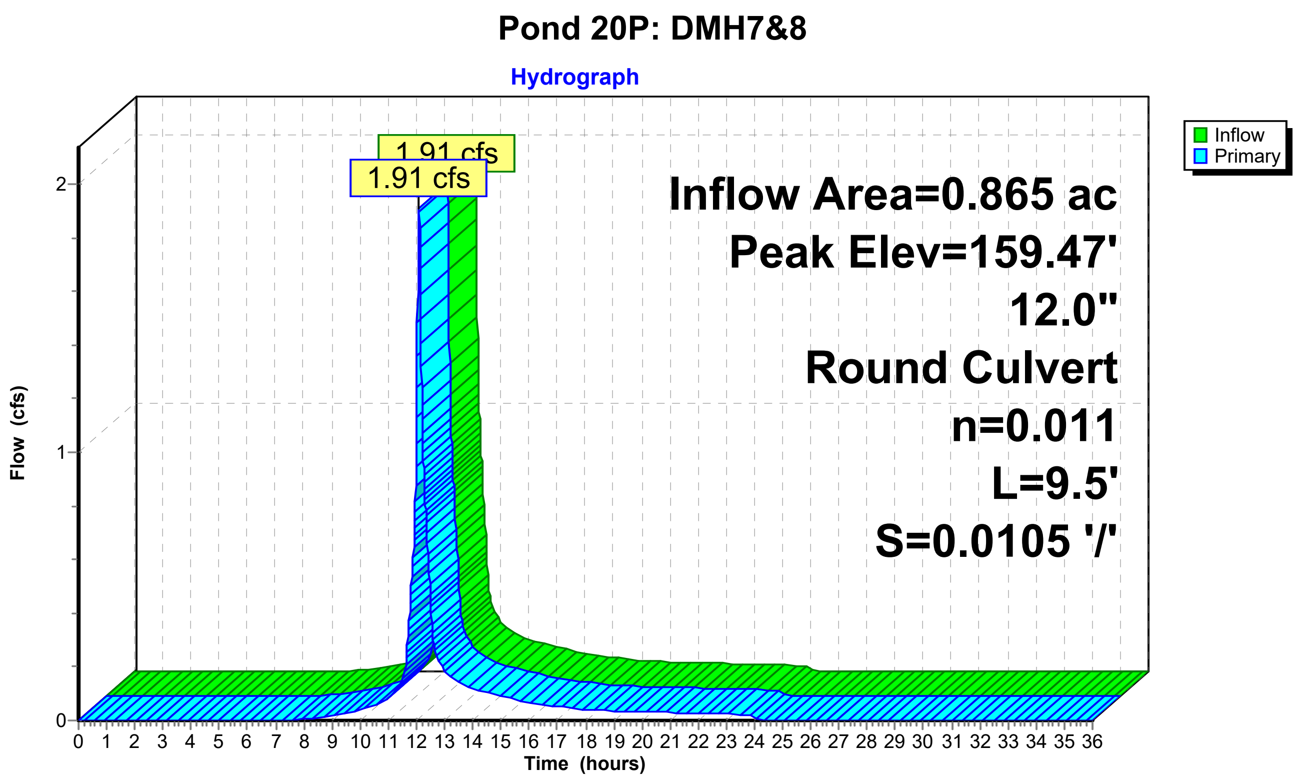
Summary for Pond 20P: DMH7&8

Inflow Area =	0.865 ac,	80.06% Impervious,	Inflow Depth = 1.89"	for 2-Year Storm event
Inflow =	1.91 cfs @	12.09 hrs, Volume=	0.136 af	
Outflow =	1.91 cfs @	12.09 hrs, Volume=	0.136 af, Atten= 0%, Lag= 0.0 min	
Primary =	1.91 cfs @	12.09 hrs, Volume=	0.136 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 159.47' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 9.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0105 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.90 cfs @ 12.09 hrs HW=159.47' TW=158.22' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 1.90 cfs @ 3.50 fps)



Summary for Subcatchment 21P: P1h

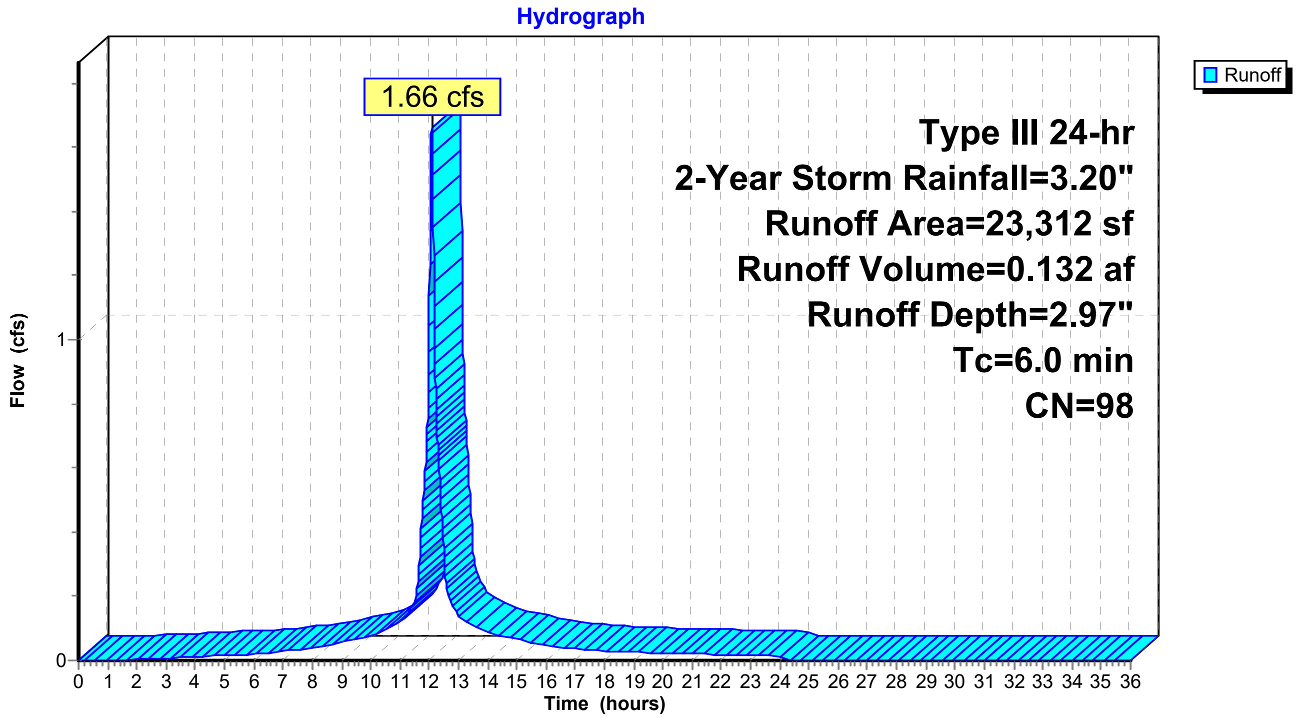
Runoff = 1.66 cfs @ 12.08 hrs, Volume= 0.132 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
23,312	98	Unconnected roofs, HSG A
23,312		100.00% Impervious Area
23,312		100.00% Unconnected

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

Subcatchment 21P: P1h



Summary for Pond 22P: Roof Pipe

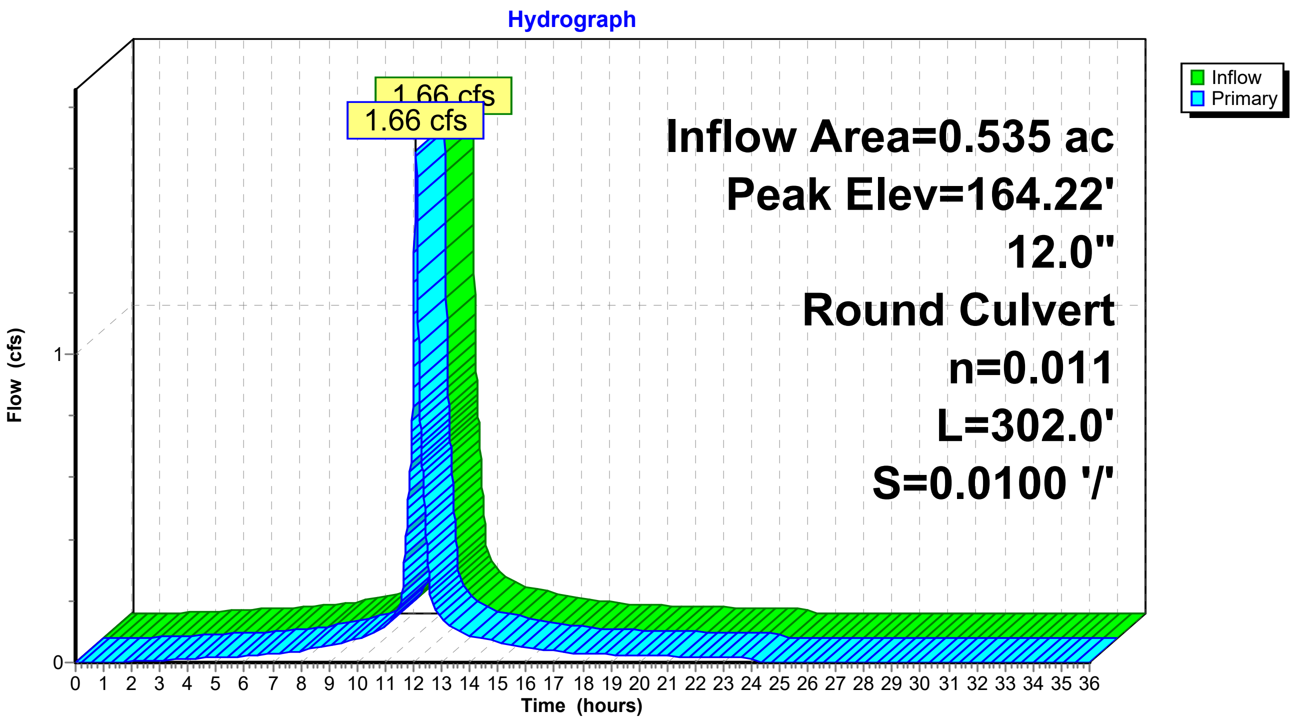
Inflow Area = 0.535 ac,100.00% Impervious, Inflow Depth = 2.97" for 2-Year Storm event
Inflow = 1.66 cfs @ 12.08 hrs, Volume= 0.132 af
Outflow = 1.66 cfs @ 12.08 hrs, Volume= 0.132 af, Atten= 0%, Lag= 0.0 min
Primary = 1.66 cfs @ 12.08 hrs, Volume= 0.132 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 164.22' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.52'	**12.0" Round Culvert** L= 302.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.52' / 160.50' S= 0.0100 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.66 cfs @ 12.08 hrs HW=164.22' TW=158.21' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.66 cfs @ 2.84 fps)

Pond 22P: Roof Pipe



Summary for Pond 23P: Infiltration Field #1a

Inflow Area =	8.040 ac, 37.99% Impervious, Inflow Depth = 0.99"	for 2-Year Storm event		
Inflow =	5.71 cfs @	12.13 hrs, Volume=	0.665 af	
Outflow =	2.79 cfs @	12.53 hrs, Volume=	0.665 af,	Atten= 51%, Lag= 24.5 min
Discarded =	1.91 cfs @	12.02 hrs, Volume=	0.630 af	
Primary =	0.88 cfs @	12.53 hrs, Volume=	0.035 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 158.80' @ 12.53 hrs Surf.Area= 9,970 sf Storage= 4,474 cf

Plug-Flow detention time= 10.0 min calculated for 0.664 af (100% of inflow)
Center-of-Mass det. time= 10.0 min (859.1 - 849.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	158.00'	9,894 cf	**130.17'W x 76.50'L x 3.88'H Field A**
			38,586 cf Overall - 13,851 cf Embedded = 24,735 cf x 40.0% Voids
#2A	158.50'	13,851 cf	**Cultec R-330XLHD** x 260 Inside #1
			Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
			Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
			Row Length Adjustment= +1.50' x 7.45 sf x 26 rows
#3	158.00'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		23,821 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf
#3	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf
#4	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf
#5	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf

Discarded OutFlow Max=1.91 cfs @ 12.02 hrs HW=158.06' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 1.91 cfs)

Primary OutFlow Max=0.88 cfs @ 12.53 hrs HW=158.80' TW=158.32' (Dynamic Tailwater)
├─**2=Culvert** (Barrel Controls 0.22 cfs @ 1.69 fps)
├─**3=Culvert** (Barrel Controls 0.22 cfs @ 1.69 fps)
├─**4=Culvert** (Barrel Controls 0.22 cfs @ 1.69 fps)
└─**5=Culvert** (Barrel Controls 0.22 cfs @ 1.69 fps)

Pond 23P: Infiltration Field #1a - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 26 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

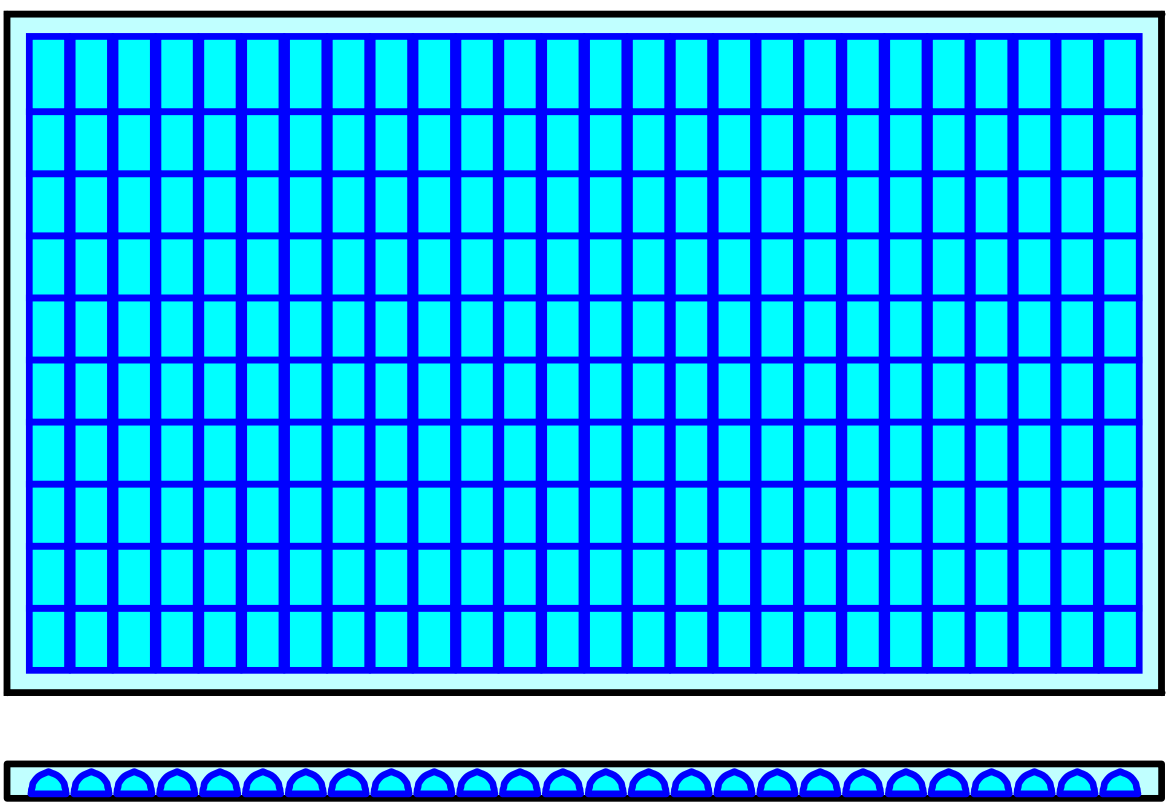
10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +30.0" End Stone x 2 = 76.50' Base Length
26 Rows x 52.0" Wide + 6.0" Spacing x 25 + 30.0" Side Stone x 2 = 130.17' Base Width
6.0" Base + 30.5" Chamber Height + 10.0" Cover = 3.88' Field Height

260 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 26 Rows = 13,851.4 cf Chamber Storage

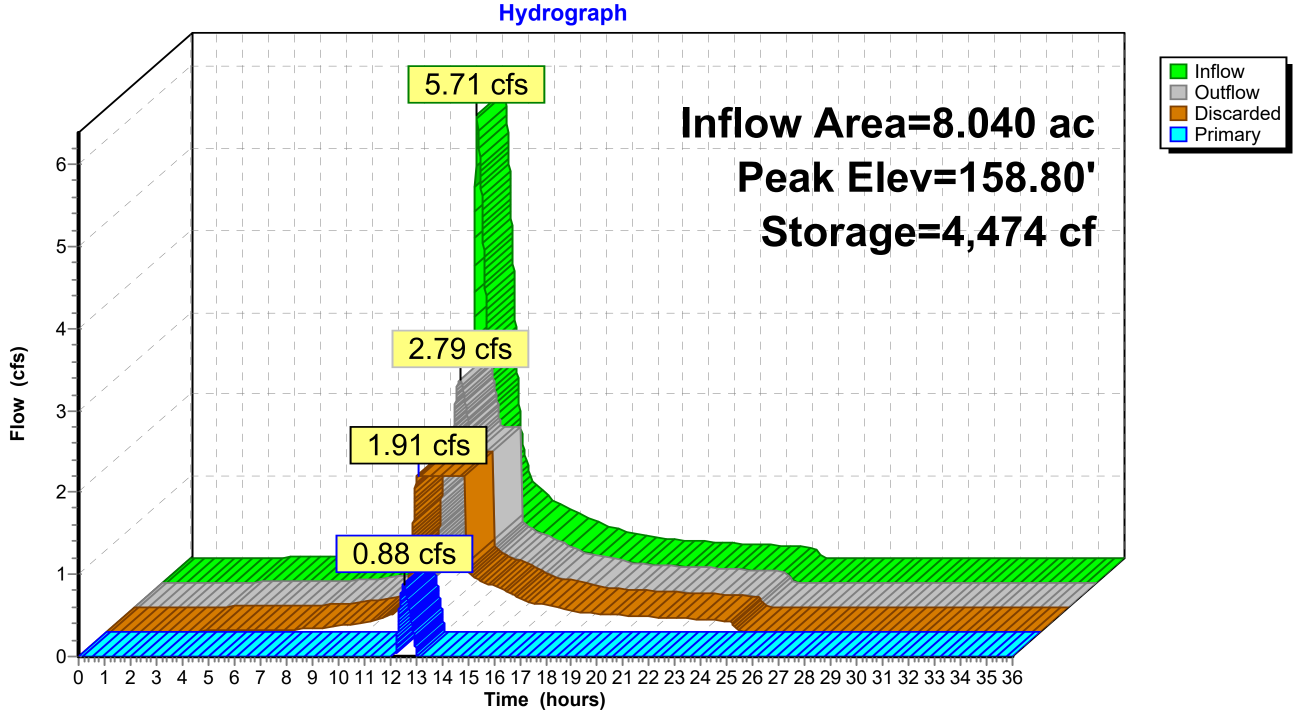
38,586.3 cf Field - 13,851.4 cf Chambers = 24,734.9 cf Stone x 40.0% Voids = 9,893.9 cf Stone Storage

Chamber Storage + Stone Storage = 23,745.4 cf = 0.545 af
Overall Storage Efficiency = 61.5%
Overall System Size = 76.50' x 130.17' x 3.88'

260 Chambers
1,429.1 cy Field
916.1 cy Stone



Pond 23P: Infiltration Field #1a



Summary for Pond 24P: Infiltration Field #1b

Inflow Area = 8.040 ac, 37.99% Impervious, Inflow Depth = 0.05" for 2-Year Storm event
Inflow = 0.88 cfs @ 12.53 hrs, Volume= 0.035 af
Outflow = 0.18 cfs @ 12.37 hrs, Volume= 0.035 af, Atten= 79%, Lag= 0.0 min
Discarded = 0.18 cfs @ 12.37 hrs, Volume= 0.035 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 158.63' @ 12.95 hrs Surf.Area= 3,315 sf Storage= 1,030 cf

Plug-Flow detention time= 48.3 min calculated for 0.035 af (100% of inflow)
Center-of-Mass det. time= 48.3 min (803.7 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	158.00'	3,414 cf	**43.17'W x 76.50'L x 3.88'H Field A** 12,796 cf Overall - 4,262 cf Embedded = 8,534 cf x 40.0% Voids
#2A	158.50'	4,262 cf	**Cultec R-330XLHD** x 80 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 8 rows
#3	158.00'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		7,751 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	159.15'	**12.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.15' / 156.00' S= 0.1432 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#3	Primary	160.00'	**8.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.00' / 156.00' S= 0.1818 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Discarded OutFlow Max=0.18 cfs @ 12.37 hrs HW=158.06' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=158.00' TW=0.00' (Dynamic Tailwater)
├─**2=Culvert** (Controls 0.00 cfs)
└─**3=Culvert** (Controls 0.00 cfs)

Pond 24P: Infiltration Field #1b - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 8 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

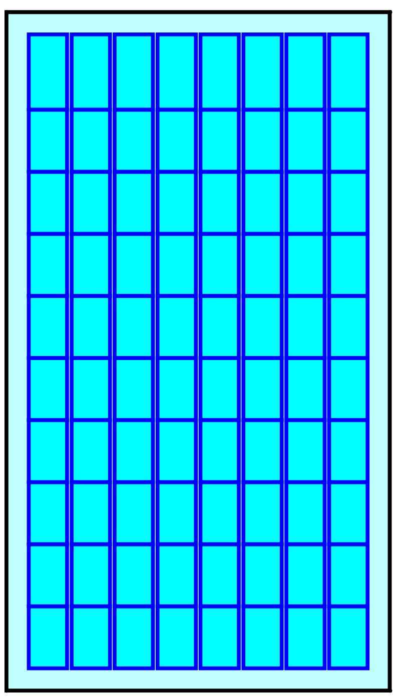
10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +30.0" End Stone x 2 = 76.50' Base Length
8 Rows x 52.0" Wide + 6.0" Spacing x 7 + 30.0" Side Stone x 2 = 43.17' Base Width
6.0" Base + 30.5" Chamber Height + 10.0" Cover = 3.88' Field Height

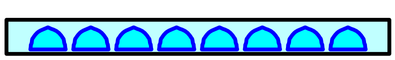
80 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 8 Rows = 4,262.0 cf Chamber Storage

12,796.2 cf Field - 4,262.0 cf Chambers = 8,534.2 cf Stone x 40.0% Voids = 3,413.7 cf Stone Storage

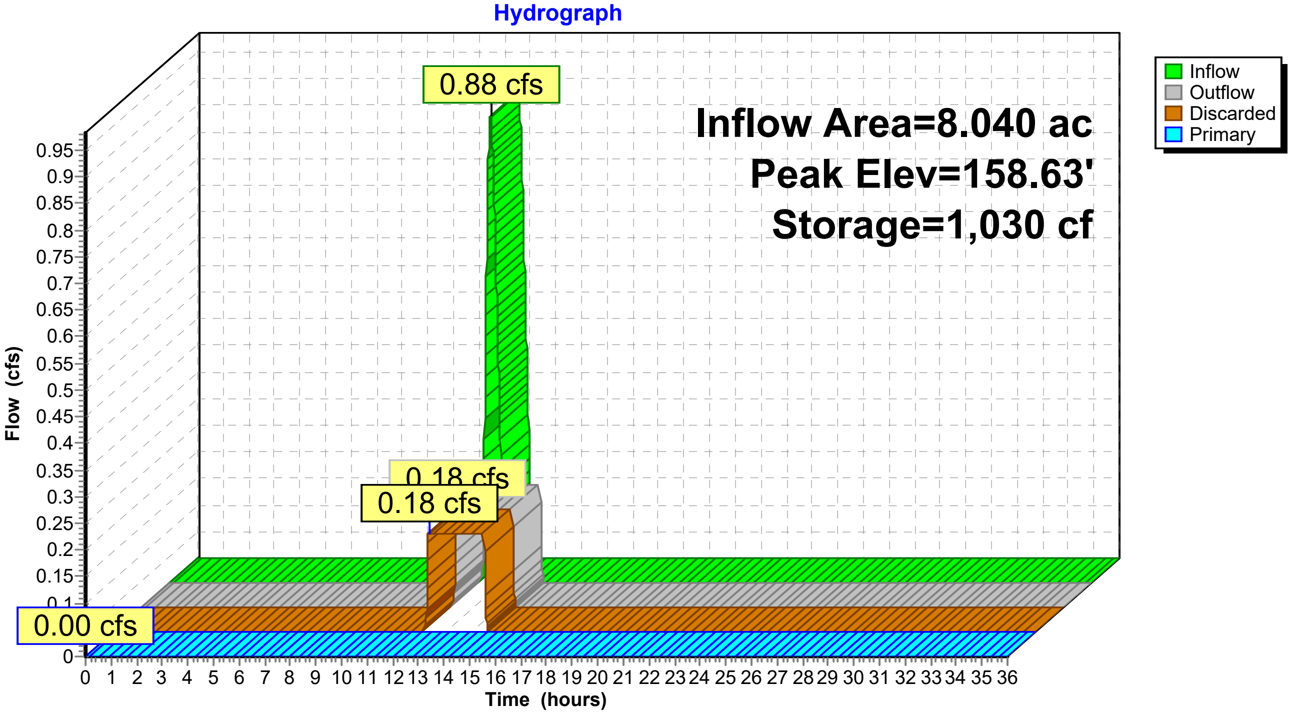
Chamber Storage + Stone Storage = 7,675.7 cf = 0.176 af
Overall Storage Efficiency = 60.0%
Overall System Size = 76.50' x 43.17' x 3.88'

80 Chambers
473.9 cy Field
316.1 cy Stone





Pond 24P: Infiltration Field #1b



Summary for Subcatchment 25P: P2a

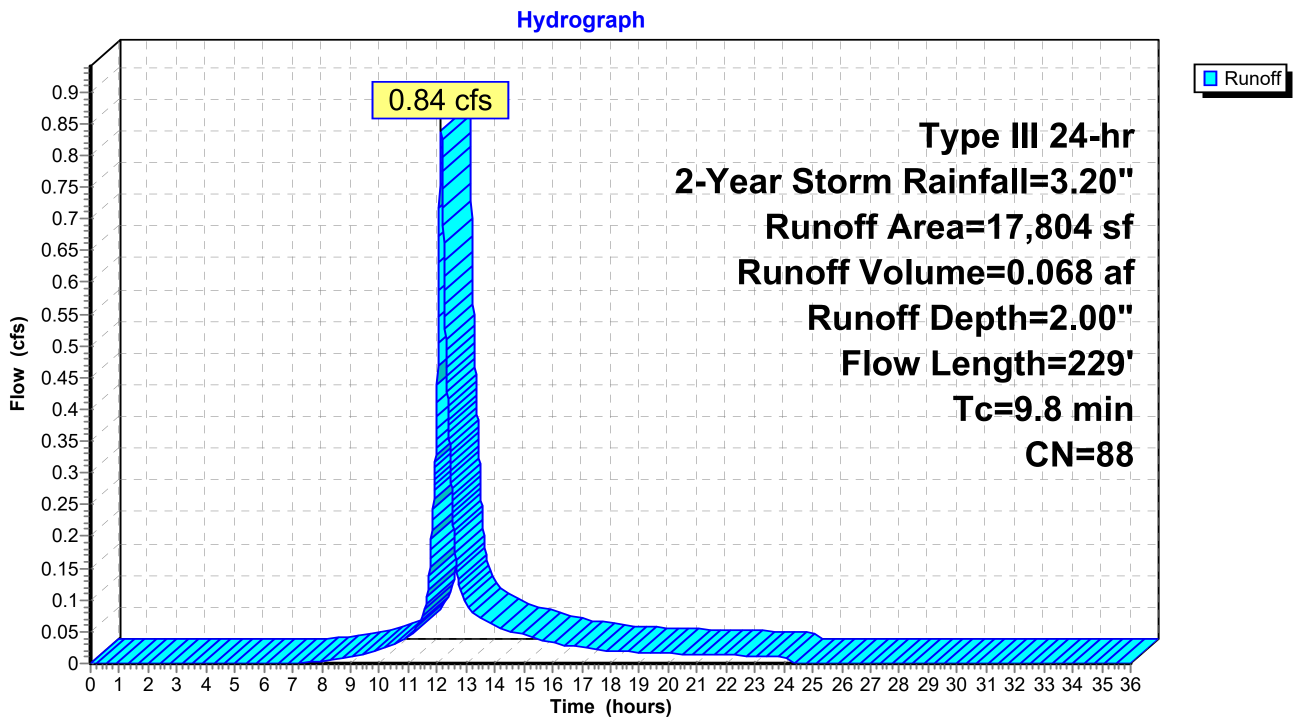
Runoff = 0.84 cfs @ 12.14 hrs, Volume= 0.068 af, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
218	98	Paved parking, HSG A
12,048	98	Paved parking, HSG B
1,239	79	<50% Grass cover, Poor, HSG B
4,299	61	>75% Grass cover, Good, HSG B
17,804	88	Weighted Average
5,538		31.11% Pervious Area
12,266		68.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	83	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.5	146	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.8	229	Total			

Subcatchment 25P: P2a



Summary for Pond 26P: CB7&8

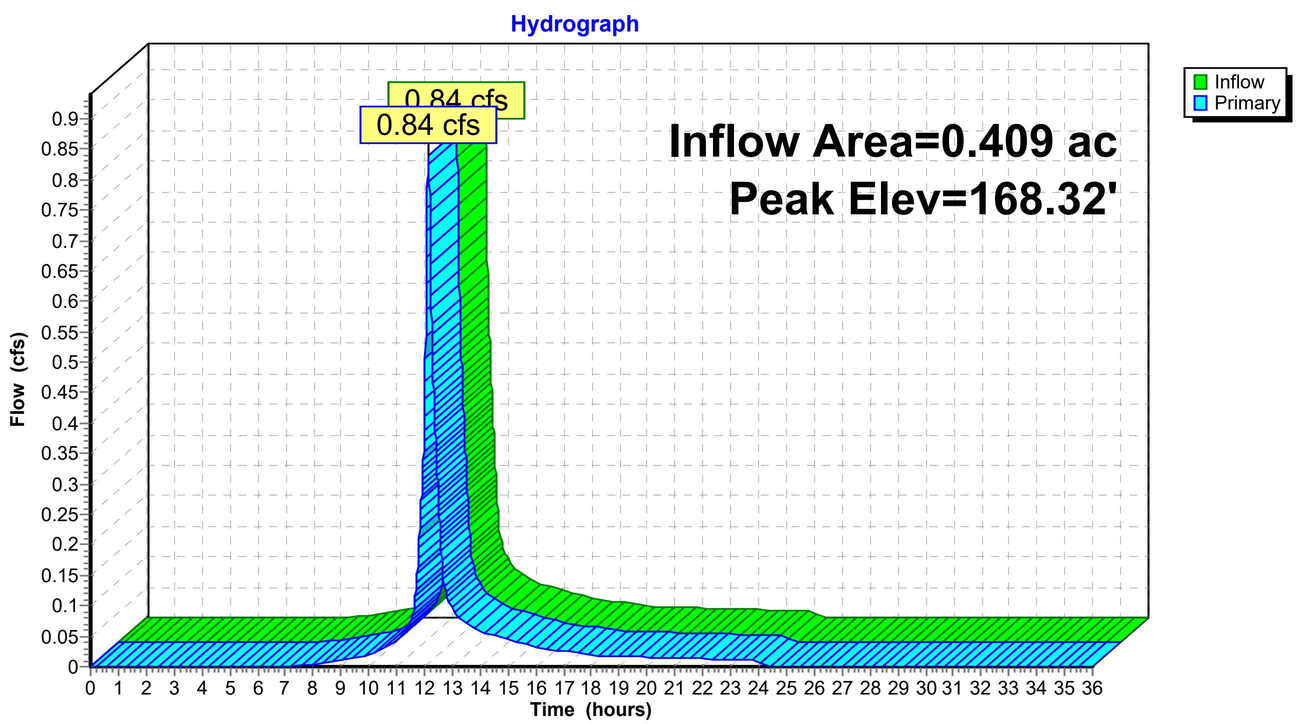
Inflow Area =	0.409 ac,	68.89% Impervious,	Inflow Depth = 2.00"	for 2-Year Storm event
Inflow =	0.84 cfs @	12.14 hrs, Volume=	0.068 af	
Outflow =	0.84 cfs @	12.14 hrs, Volume=	0.068 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.84 cfs @	12.14 hrs, Volume=	0.068 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 168.32' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	168.00'	**12.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 167.20' S= 0.0190 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Primary	168.00'	**12.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 167.20' S= 0.0727 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.84 cfs @ 12.14 hrs HW=168.32' TW=167.57' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.42 cfs @ 1.93 fps)
2=Culvert (Inlet Controls 0.42 cfs @ 1.93 fps)

Pond 26P: CB7&8



Summary for Pond 27P: FD/DMH10

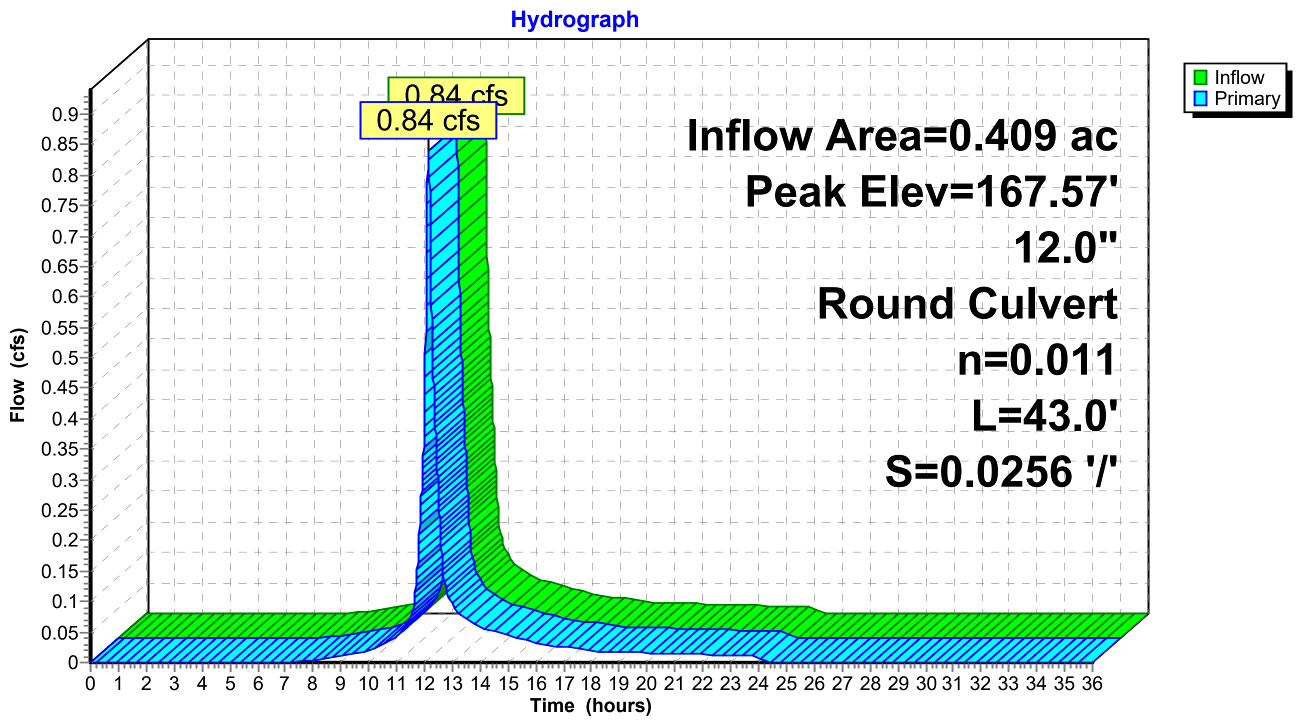
Inflow Area =	0.409 ac,	68.89% Impervious,	Inflow Depth = 2.00"	for 2-Year Storm event	
Inflow =	0.84 cfs @	12.14 hrs,	Volume=	0.068 af	
Outflow =	0.84 cfs @	12.14 hrs,	Volume=	0.068 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.84 cfs @	12.14 hrs,	Volume=	0.068 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 167.57' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	167.10'	**12.0" Round Culvert** L= 43.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.10' / 166.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.84 cfs @ 12.14 hrs HW=167.57' TW=165.54' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.84 cfs @ 2.33 fps)

Pond 27P: FD/DMH10



Summary for Subcatchment 28P: P2b

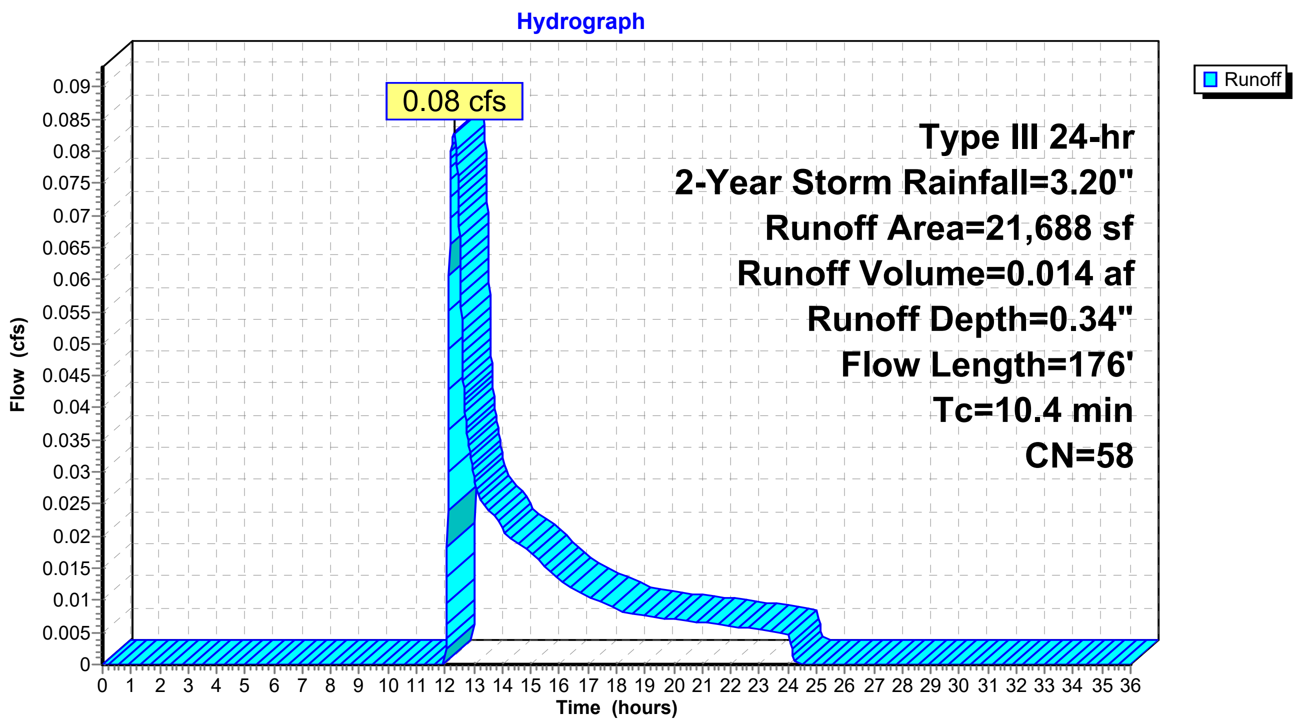
Runoff = 0.08 cfs @ 12.31 hrs, Volume= 0.014 af, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
1,358	98	Paved parking, HSG B
8,334	61	>75% Grass cover, Good, HSG B
3,244	39	>75% Grass cover, Good, HSG A
8,752	55	Woods, Good, HSG B
21,688	58	Weighted Average
20,330		93.74% Pervious Area
1,358		6.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	61	0.0600	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	92	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	23	0.2200	3.28		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.4	176	Total			

Subcatchment 28P: P2b



Summary for Subcatchment 29P: P2c

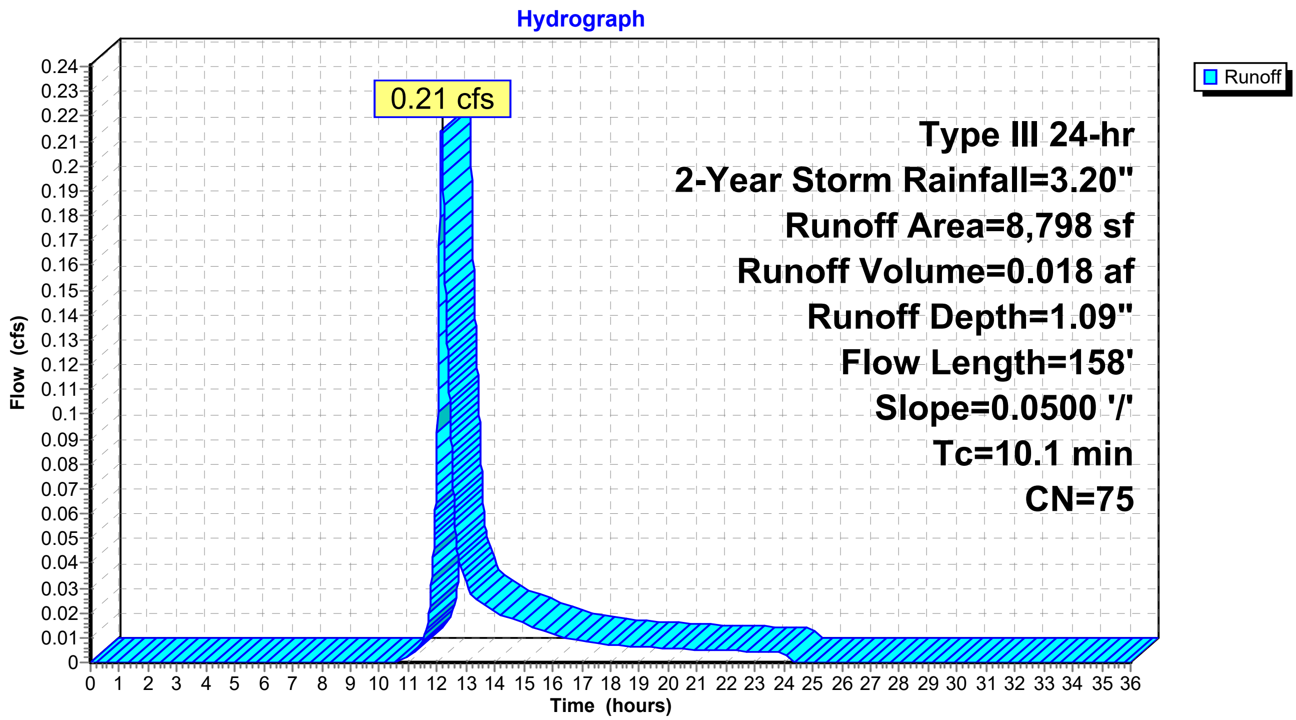
Runoff = 0.21 cfs @ 12.15 hrs, Volume= 0.018 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
62	98	Paved parking, HSG A
3,785	98	Paved parking, HSG B
8	39	>75% Grass cover, Good, HSG A
2,132	61	>75% Grass cover, Good, HSG B
2,811	55	Woods, Good, HSG B
8,798	75	Weighted Average
4,951		56.27% Pervious Area
3,847		43.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	35	0.0500	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
4.3	21	0.0500	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.5	102	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.1	158	Total			

Subcatchment 29P: P2c



Summary for Pond 30P: FD/CB9

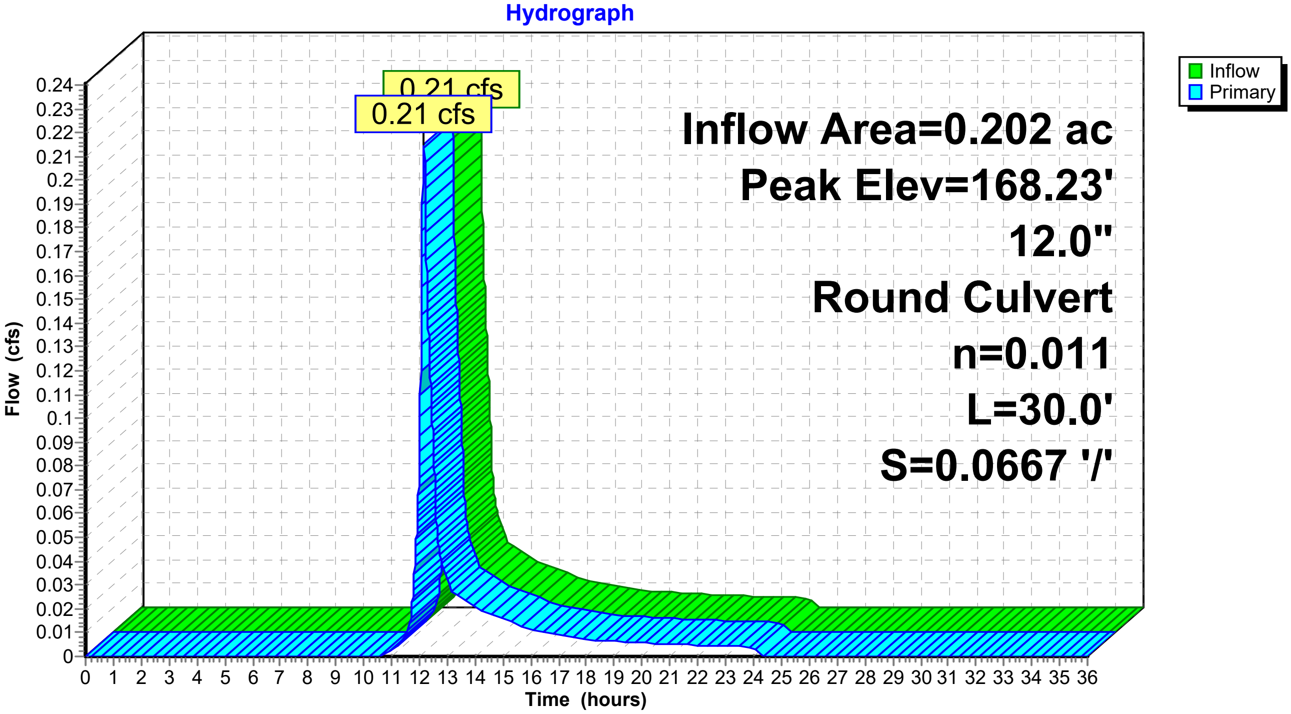
Inflow Area = 0.202 ac, 43.73% Impervious, Inflow Depth = 1.09" for 2-Year Storm event
Inflow = 0.21 cfs @ 12.15 hrs, Volume= 0.018 af
Outflow = 0.21 cfs @ 12.15 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min
Primary = 0.21 cfs @ 12.15 hrs, Volume= 0.018 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 168.23' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	168.00'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 166.00' S= 0.0667 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.21 cfs @ 12.15 hrs HW=168.23' TW=165.55' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.21 cfs @ 1.62 fps)

Pond 30P: FD/CB9



Summary for Pond 31P: Basin

Inflow Area = 1.109 ac, 36.18% Impervious, Inflow Depth = 1.09" for 2-Year Storm event
Inflow = 1.11 cfs @ 12.14 hrs, Volume= 0.101 af
Outflow = 0.64 cfs @ 12.35 hrs, Volume= 0.101 af, Atten= 42%, Lag= 12.2 min
Discarded = 0.64 cfs @ 12.35 hrs, Volume= 0.101 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.59' @ 12.35 hrs Surf.Area= 3,367 sf Storage= 311 cf

Plug-Flow detention time= 2.4 min calculated for 0.101 af (100% of inflow)
Center-of-Mass det. time= 2.4 min (845.7 - 843.3)

Volume	Invert	Avail.Storage	Storage Description
#1	165.50'	11,005 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

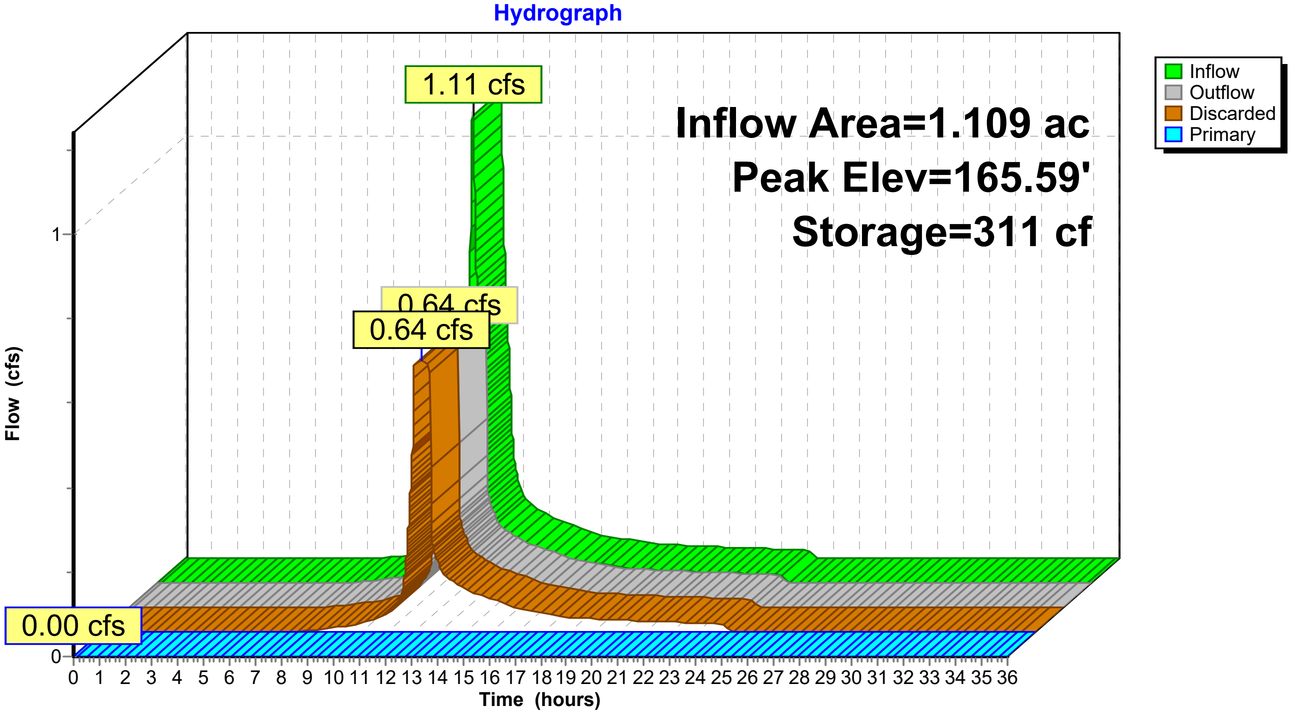
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
165.50	3,291	222.0	0	0	3,291
168.00	5,616	282.0	11,005	11,005	5,779

Device	Routing	Invert	Outlet Devices
#1	Discarded	165.50'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	166.60'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 166.60' / 161.00' S= 0.1120 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Discarded OutFlow Max=0.64 cfs @ 12.35 hrs HW=165.59' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.64 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=165.50' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 31P: Basin



Summary for Subcatchment 32P: P3f

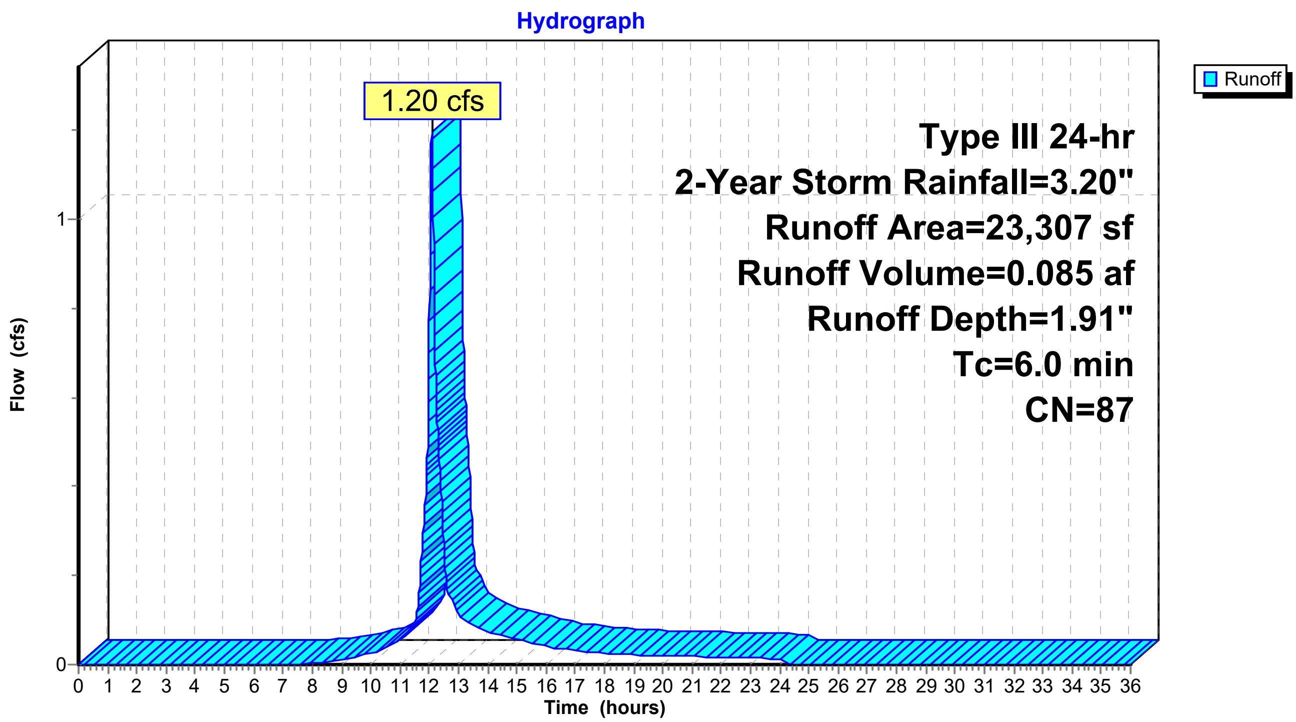
Runoff = 1.20 cfs @ 12.09 hrs, Volume= 0.085 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
5,626	98	Roofs, HSG A
11,048	98	Roofs, HSG B
516	98	Paved parking, HSG B
1,861	39	>75% Grass cover, Good, HSG A
4,256	61	>75% Grass cover, Good, HSG B
23,307	87	Weighted Average
6,117		26.25% Pervious Area
17,190		73.75% Impervious Area

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

Subcatchment 32P: P3f



Summary for Subcatchment 33P: P3a

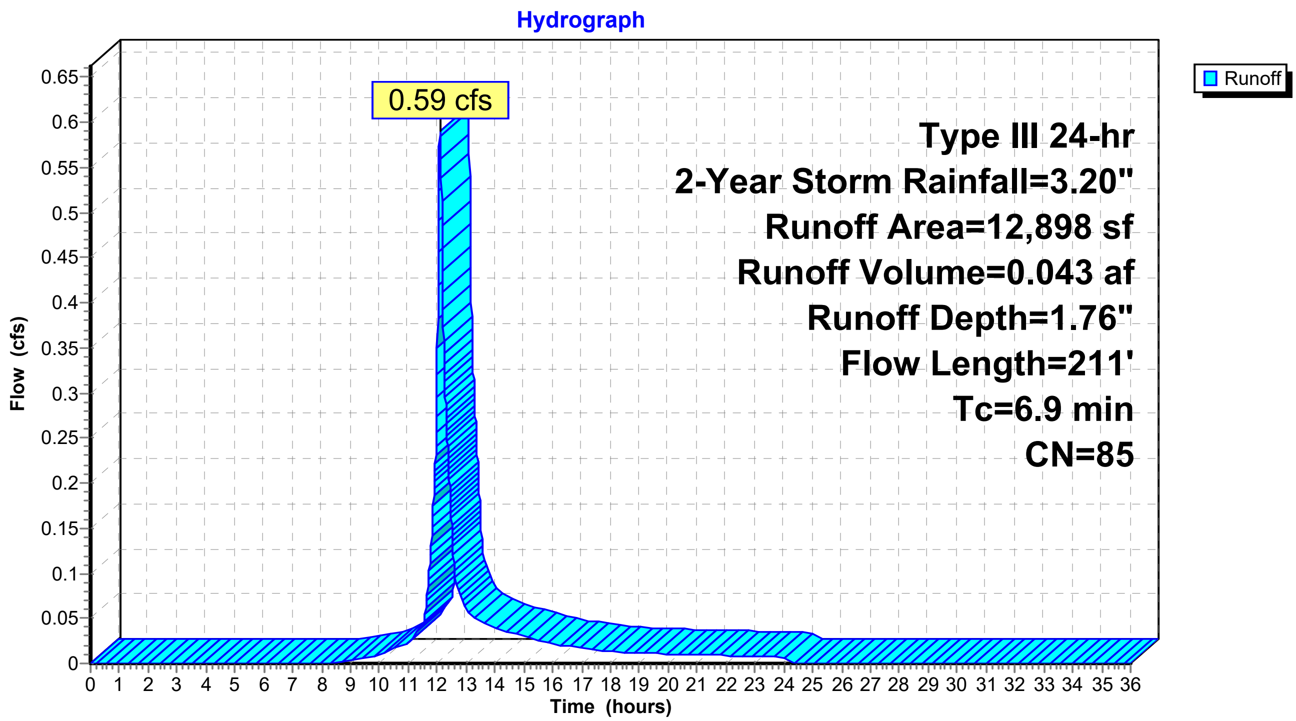
Runoff = 0.59 cfs @ 12.10 hrs, Volume= 0.043 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
3,379	98	Paved parking, HSG A
5,537	98	Paved parking, HSG B
692	39	>75% Grass cover, Good, HSG A
3,290	61	>75% Grass cover, Good, HSG B
12,898	85	Weighted Average
3,982		30.87% Pervious Area
8,916		69.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	66	0.0700	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	145	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.9	211	Total			

Subcatchment 33P: P3a



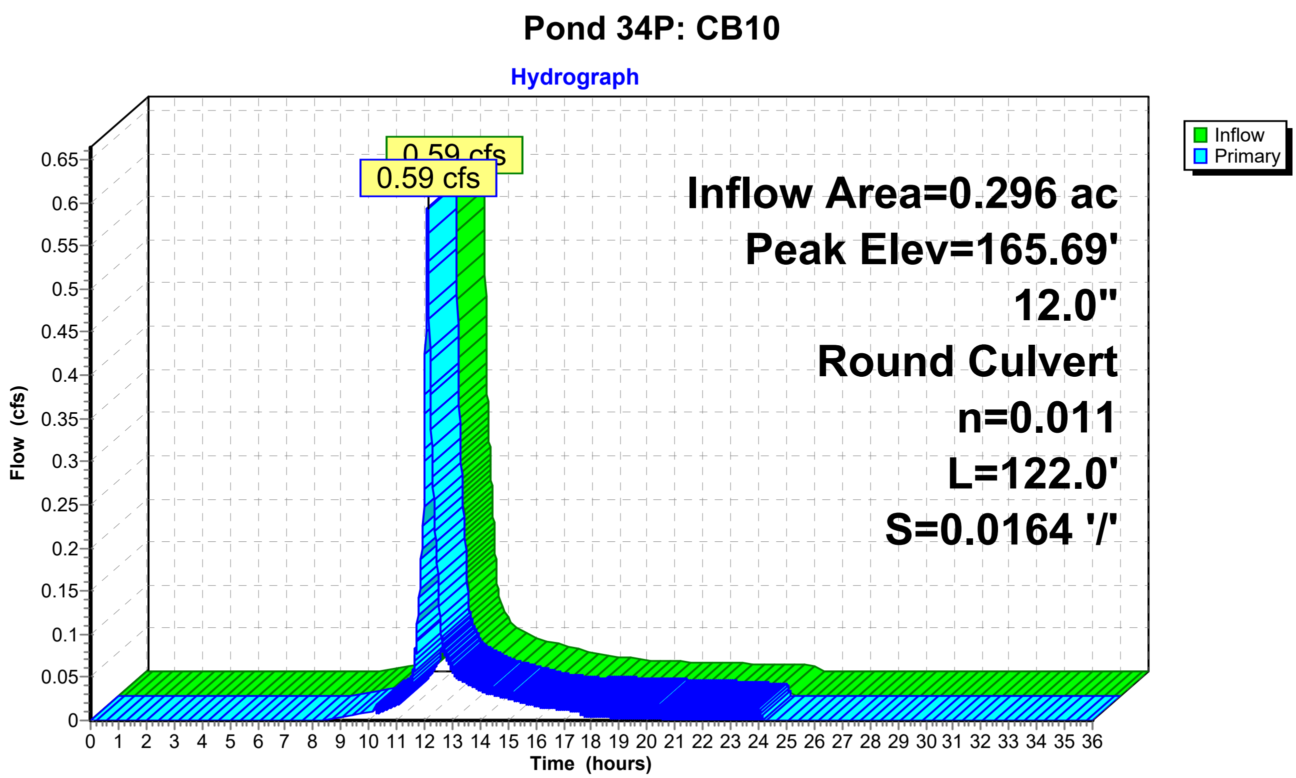
Summary for Pond 34P: CB10

Inflow Area = 0.296 ac, 69.13% Impervious, Inflow Depth = 1.76" for 2-Year Storm event
Inflow = 0.59 cfs @ 12.10 hrs, Volume= 0.043 af
Outflow = 0.59 cfs @ 12.11 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.6 min
Primary = 0.59 cfs @ 12.11 hrs, Volume= 0.043 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.69' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.00'	**12.0" Round Culvert** L= 122.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.00' / 161.00' S= 0.0164 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.63 cfs @ 12.11 hrs HW=165.69' TW=165.65' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.63 cfs @ 0.80 fps)



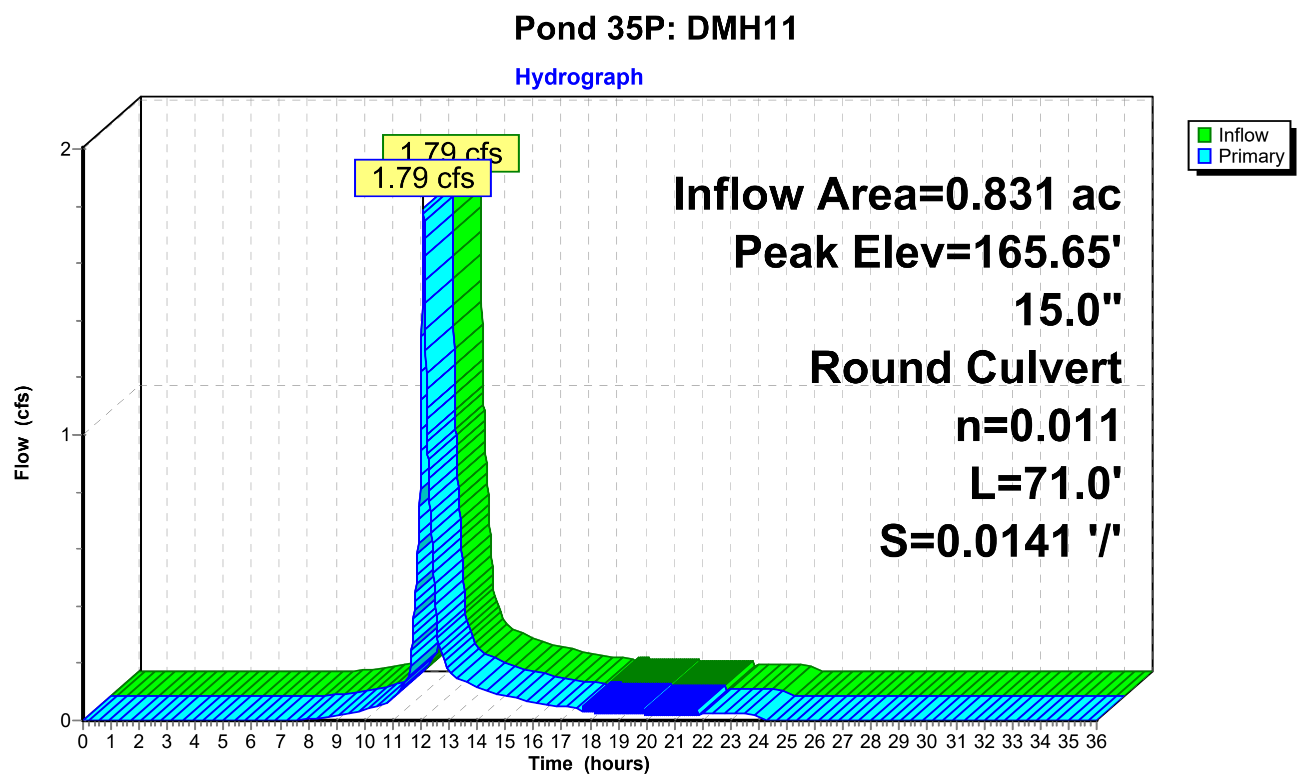
Summary for Pond 35P: DMH11

Inflow Area =	0.831 ac,	72.11% Impervious,	Inflow Depth = 1.86"	for 2-Year Storm event
Inflow =	1.79 cfs @	12.09 hrs, Volume=	0.129 af	
Outflow =	1.79 cfs @	12.09 hrs, Volume=	0.129 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.79 cfs @	12.09 hrs, Volume=	0.129 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.65' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**15.0" Round Culvert** L= 71.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 164.00' S= 0.0141 '/' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=1.79 cfs @ 12.09 hrs HW=165.65' TW=164.63' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.79 cfs @ 2.75 fps)



Summary for Subcatchment 36P: P3b

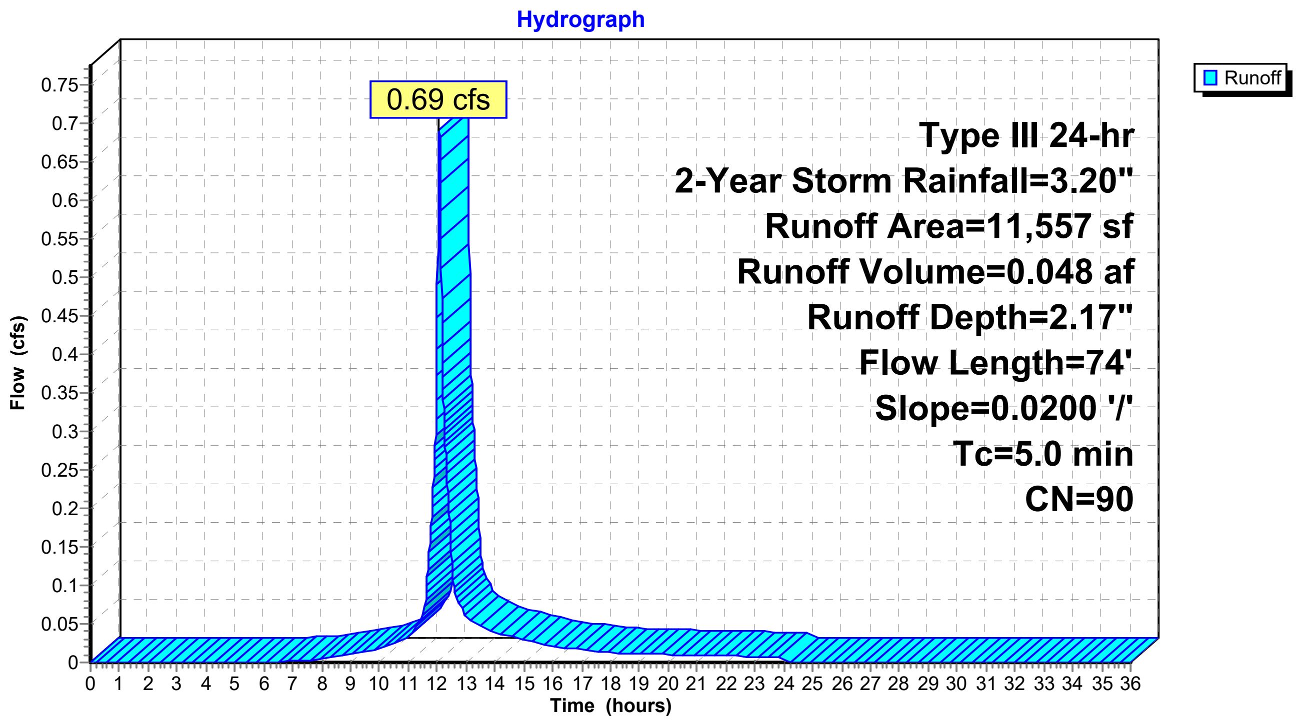
Runoff = 0.69 cfs @ 12.07 hrs, Volume= 0.048 af, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
10,048	98	Paved parking, HSG A
1,509	39	>75% Grass cover, Good, HSG A
11,557	90	Weighted Average
1,509		13.06% Pervious Area
10,048		86.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	14	0.0200	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.8	60	0.0200	1.24		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.8	74	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 36P: P3b



Summary for Pond 37P: CB11

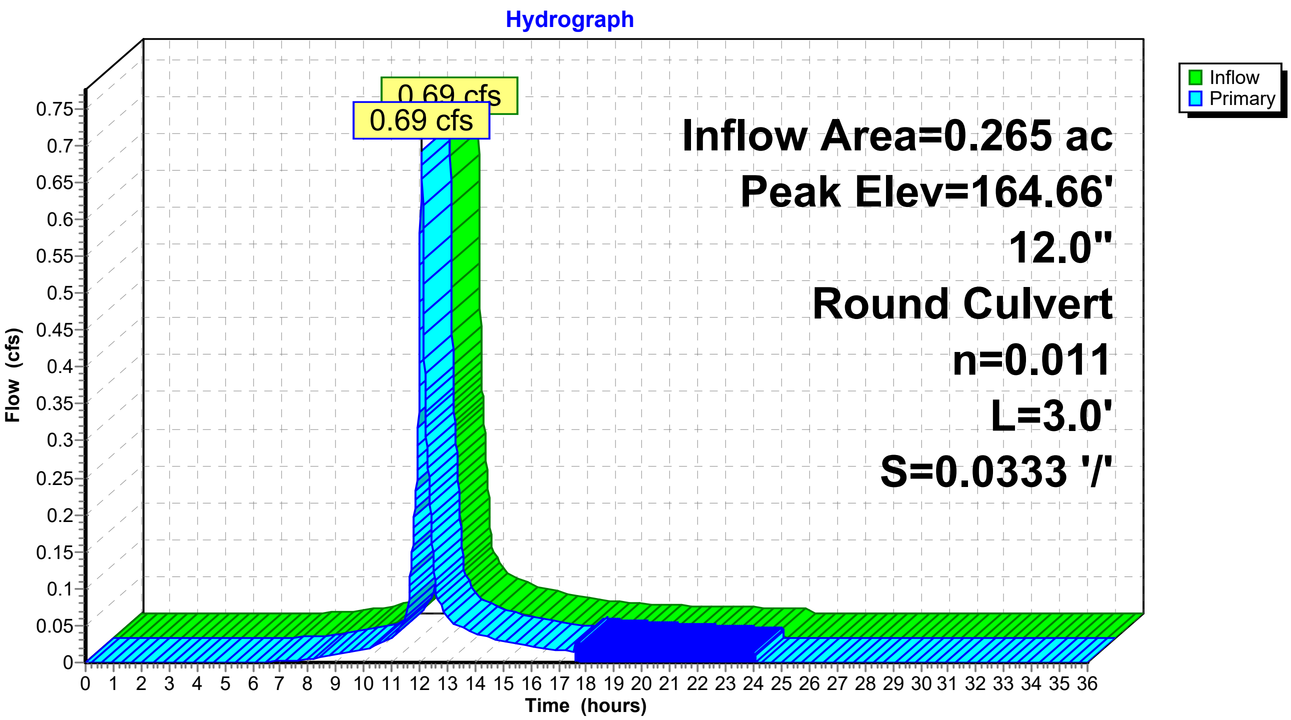
Inflow Area =	0.265 ac,	86.94% Impervious,	Inflow Depth = 2.17"	for 2-Year Storm event
Inflow =	0.69 cfs @	12.07 hrs, Volume=	0.048 af	
Outflow =	0.69 cfs @	12.08 hrs, Volume=	0.048 af, Atten= 0%, Lag= 0.2 min	
Primary =	0.69 cfs @	12.08 hrs, Volume=	0.048 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 164.66' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	161.10'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.10' / 161.00' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.58 cfs @ 12.08 hrs HW=164.65' TW=164.62' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.58 cfs @ 0.74 fps)

Pond 37P: CB11



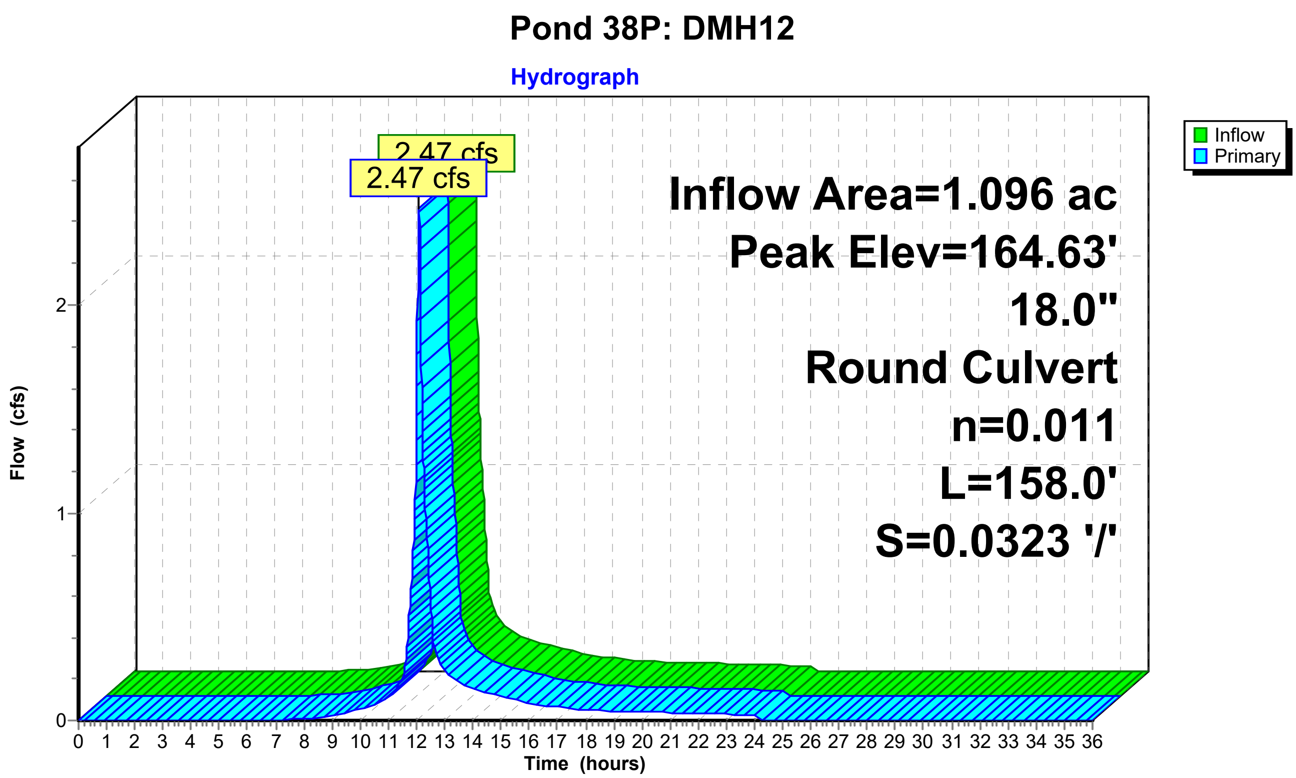
Summary for Pond 38P: DMH12

Inflow Area =	1.096 ac,	75.70% Impervious,	Inflow Depth = 1.93"	for 2-Year Storm event
Inflow =	2.47 cfs @	12.09 hrs, Volume=	0.177 af	
Outflow =	2.47 cfs @	12.09 hrs, Volume=	0.177 af, Atten= 0%, Lag= 0.0 min	
Primary =	2.47 cfs @	12.09 hrs, Volume=	0.177 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 164.63' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.90'	**18.0" Round Culvert** L= 158.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.90' / 158.80' S= 0.0323 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=2.46 cfs @ 12.09 hrs HW=164.63' TW=159.26' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 2.46 cfs @ 2.90 fps)



Summary for Pond 39P: FD/DMH13&14

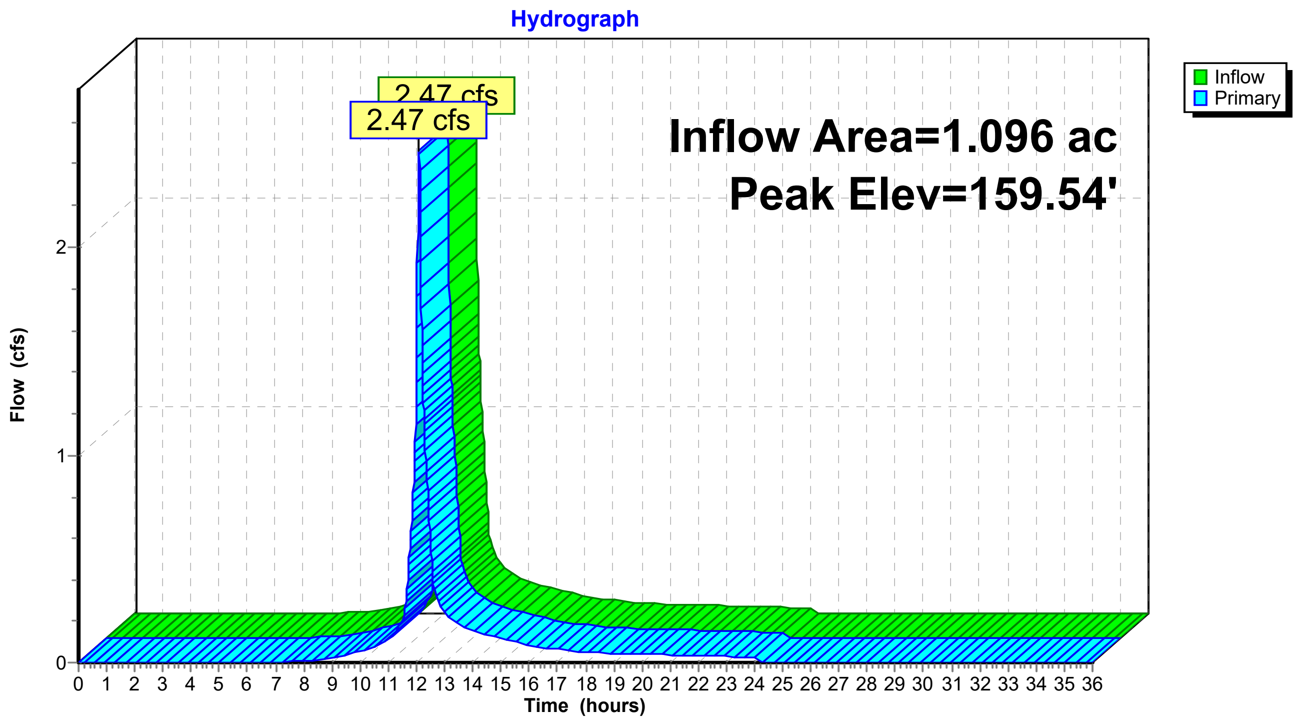
Inflow Area = 1.096 ac, 75.70% Impervious, Inflow Depth = 1.93" for 2-Year Storm event
Inflow = 2.47 cfs @ 12.09 hrs, Volume= 0.177 af
Outflow = 2.47 cfs @ 12.09 hrs, Volume= 0.177 af, Atten= 0%, Lag= 0.0 min
Primary = 2.47 cfs @ 12.09 hrs, Volume= 0.177 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 159.54' @ 12.87 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Primary	158.60'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.46 cfs @ 12.09 hrs HW=159.26' TW=158.86' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.23 cfs @ 3.18 fps)
2=Culvert (Barrel Controls 1.23 cfs @ 3.18 fps)

Pond 39P: FD/DMH13&14



Summary for Subcatchment 40P: P3c

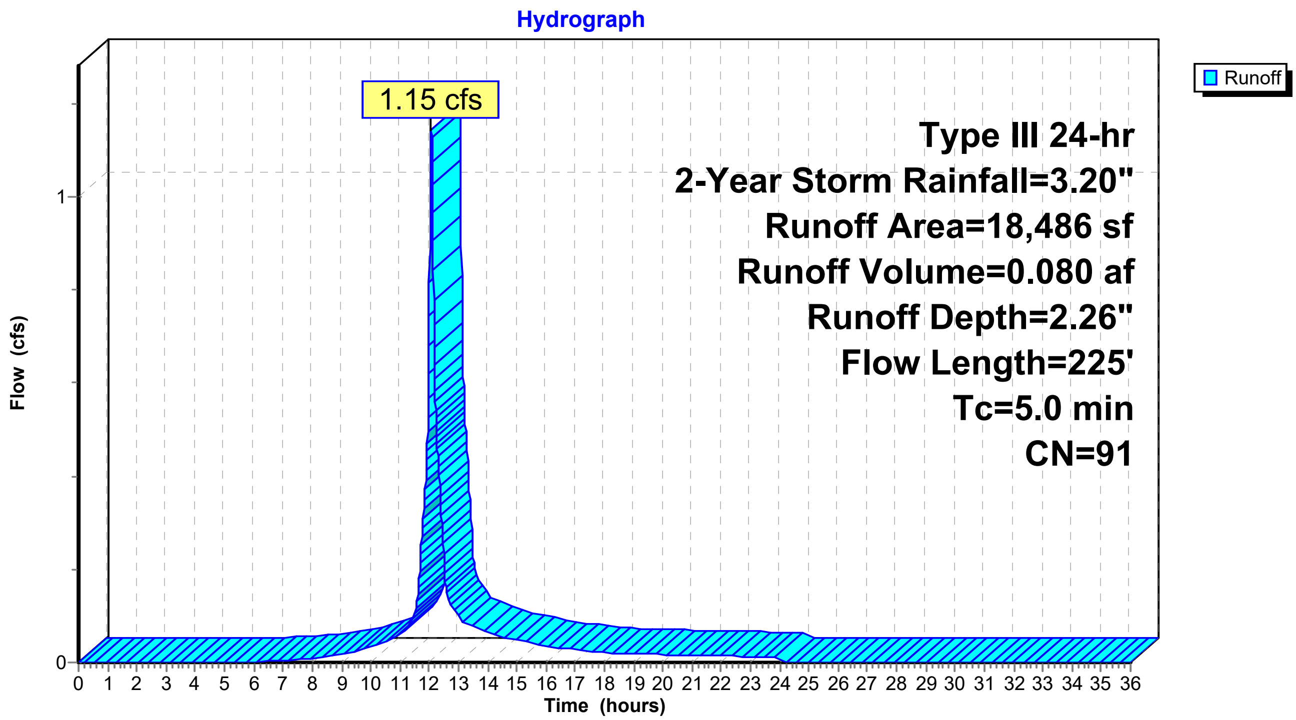
Runoff = 1.15 cfs @ 12.07 hrs, Volume= 0.080 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
16,176	98	Paved parking, HSG A
2,310	39	>75% Grass cover, Good, HSG A
18,486	91	Weighted Average
2,310		12.50% Pervious Area
16,176		87.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0300	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.7	210	0.0400	2.11		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
4.4	225	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 40P: P3c



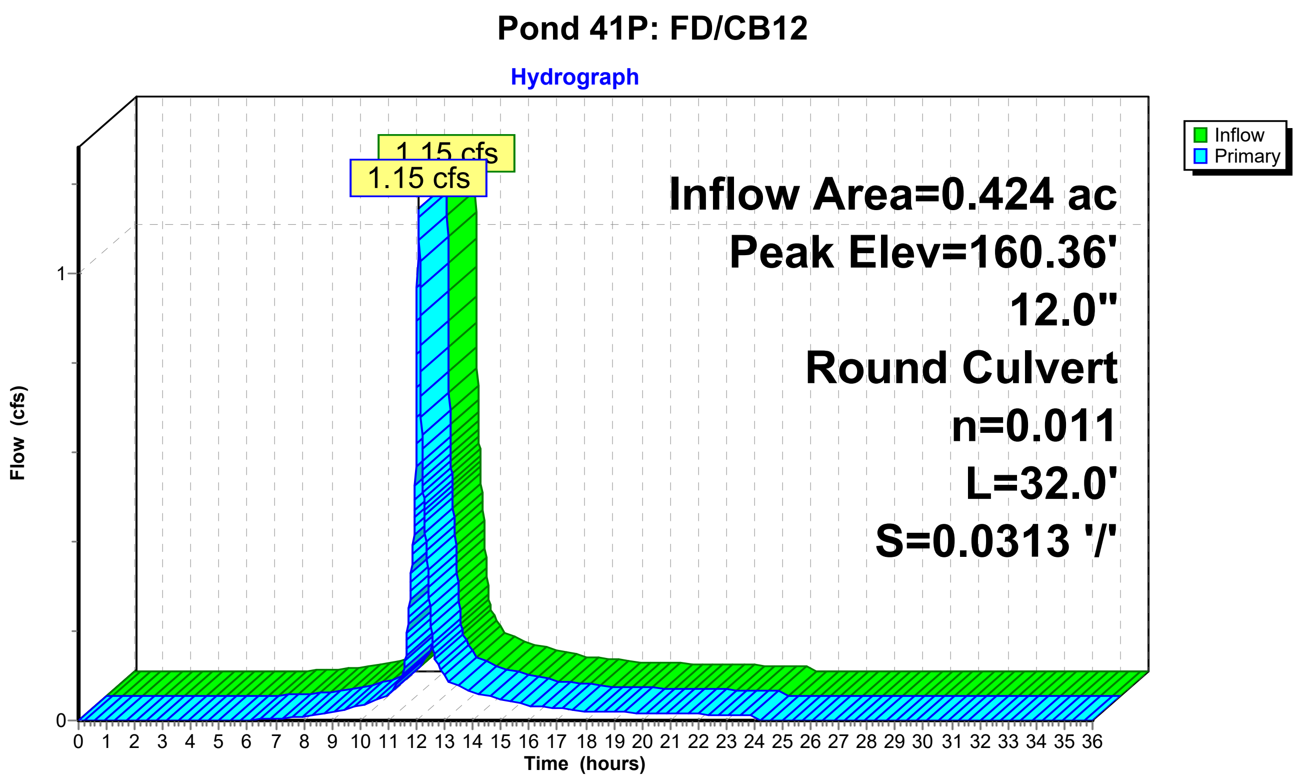
Summary for Pond 41P: FD/CB12

Inflow Area = 0.424 ac, 87.50% Impervious, Inflow Depth = 2.26" for 2-Year Storm event
Inflow = 1.15 cfs @ 12.07 hrs, Volume= 0.080 af
Outflow = 1.15 cfs @ 12.07 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min
Primary = 1.15 cfs @ 12.07 hrs, Volume= 0.080 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.36' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.80'	**12.0" Round Culvert** L= 32.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.80' / 158.80' S= 0.0313 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.14 cfs @ 12.07 hrs HW=160.36' TW=159.42' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.14 cfs @ 2.54 fps)



Summary for Subcatchment 42P: P3d

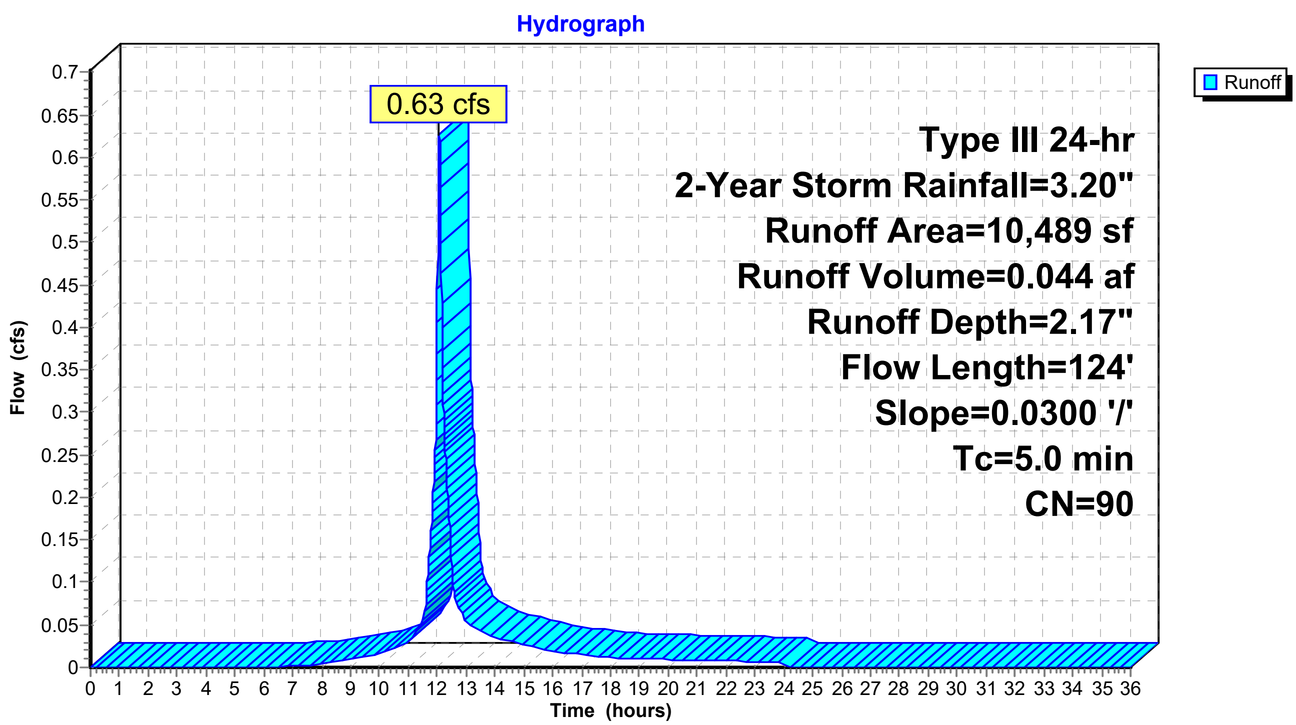
Runoff = 0.63 cfs @ 12.07 hrs, Volume= 0.044 af, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
9,019	98	Paved parking, HSG A
1,470	39	>75% Grass cover, Good, HSG A
10,489	90	Weighted Average
1,470		14.01% Pervious Area
9,019		85.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	14	0.0300	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	110	0.0300	1.65		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.6	124	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 42P: P3d



Summary for Pond 43P: FD/CB13

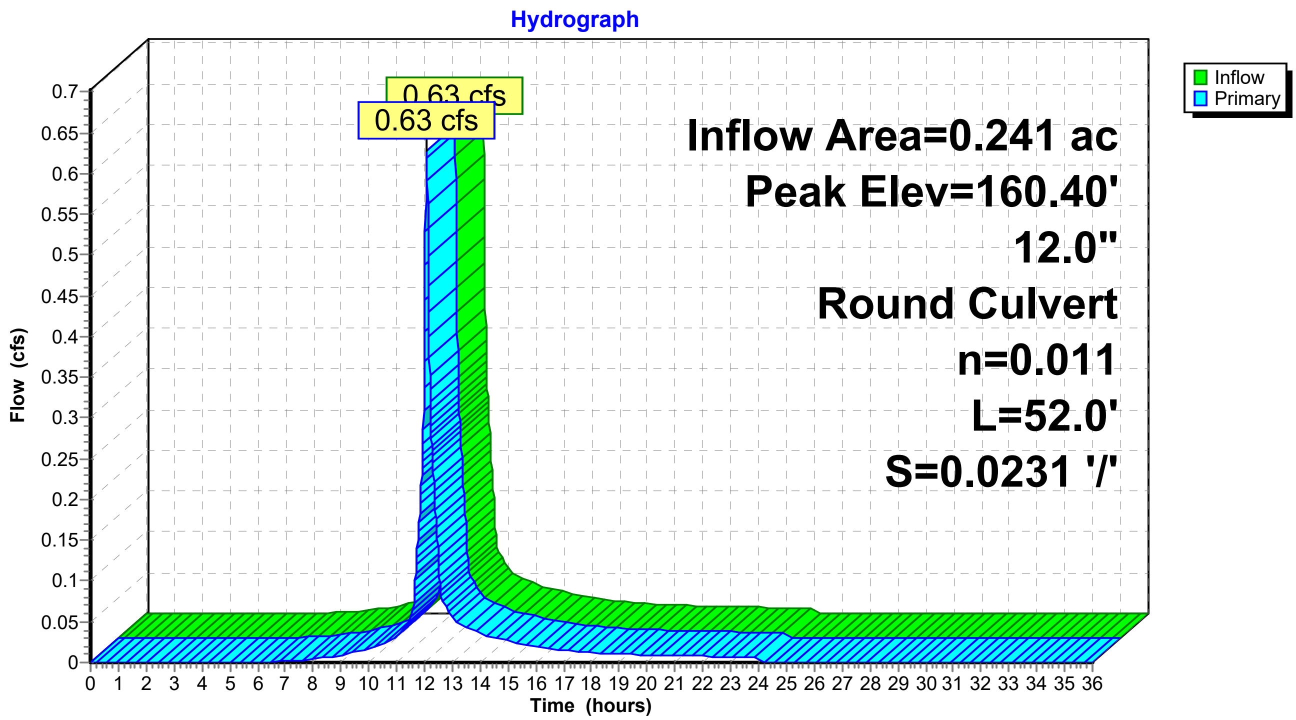
Inflow Area = 0.241 ac, 85.99% Impervious, Inflow Depth = 2.17" for 2-Year Storm event
Inflow = 0.63 cfs @ 12.07 hrs, Volume= 0.044 af
Outflow = 0.63 cfs @ 12.07 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min
Primary = 0.63 cfs @ 12.07 hrs, Volume= 0.044 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.40' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	160.00'	**12.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.00' / 158.80' S= 0.0231 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.63 cfs @ 12.07 hrs HW=160.40' TW=159.42' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.63 cfs @ 2.15 fps)

Pond 43P: FD/CB13



Summary for Pond 44P: DMH15&16

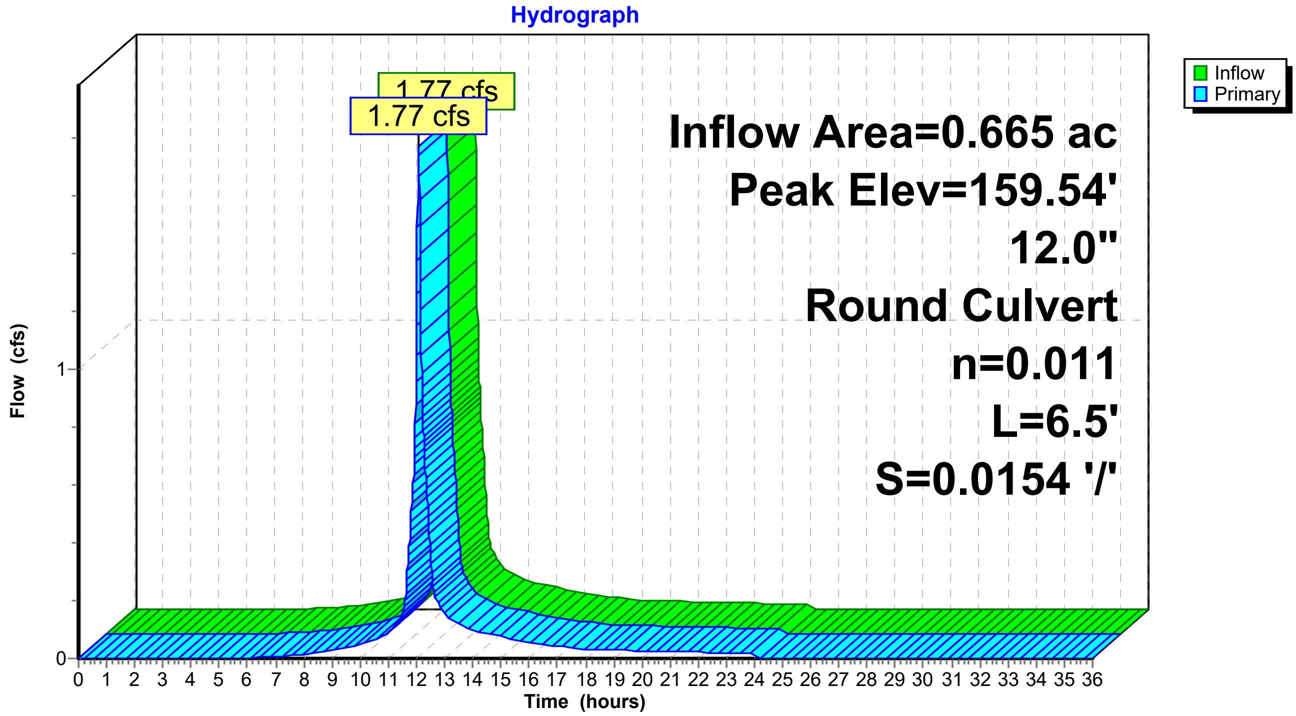
Inflow Area = 0.665 ac, 86.95% Impervious, Inflow Depth = 2.23" for 2-Year Storm event
Inflow = 1.77 cfs @ 12.07 hrs, Volume= 0.123 af
Outflow = 1.77 cfs @ 12.07 hrs, Volume= 0.123 af, Atten= 0%, Lag= 0.0 min
Primary = 1.77 cfs @ 12.07 hrs, Volume= 0.123 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 159.54' @ 12.87 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 6.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0154 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.77 cfs @ 12.07 hrs HW=159.42' TW=158.81' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.77 cfs @ 3.48 fps)

Pond 44P: DMH15&16



Summary for Subcatchment 45P: P3e

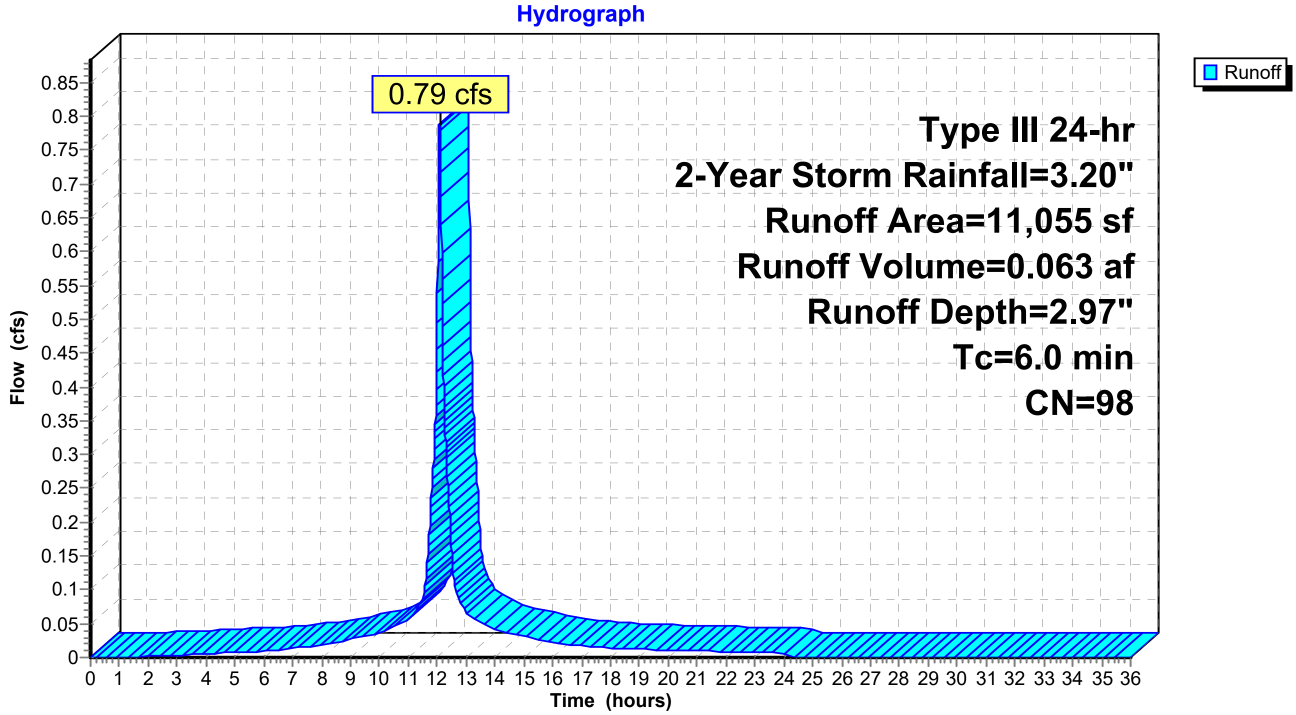
Runoff = 0.79 cfs @ 12.08 hrs, Volume= 0.063 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
11,055	98	Roofs, HSG A
11,055		100.00% Impervious Area

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

Subcatchment 45P: P3e



Summary for Pond 46P: Roof Drain

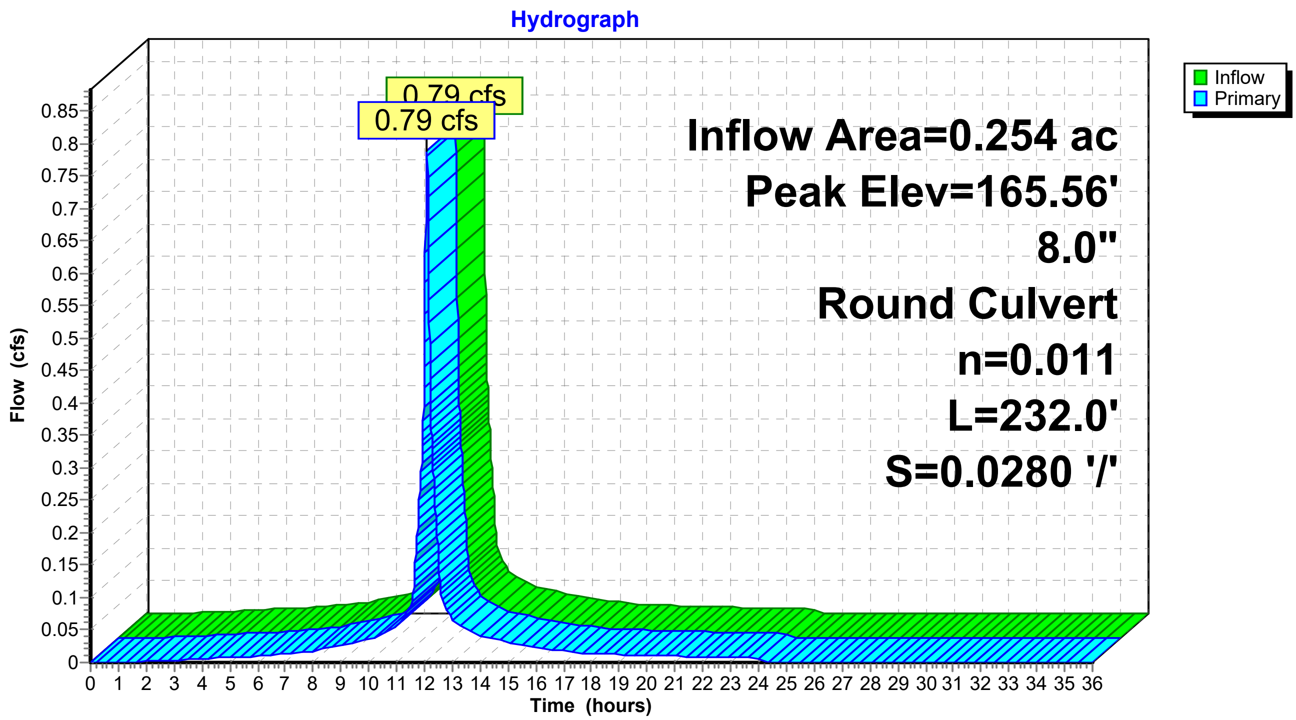
Inflow Area =	0.254 ac,100.00% Impervious,	Inflow Depth = 2.97"	for 2-Year Storm event	
Inflow =	0.79 cfs @	12.08 hrs, Volume=	0.063 af	
Outflow =	0.79 cfs @	12.08 hrs, Volume=	0.063 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.79 cfs @	12.08 hrs, Volume=	0.063 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.56' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**8.0" Round Culvert** L= 232.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 158.50' S= 0.0280 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.79 cfs @ 12.08 hrs HW=165.55' TW=158.84' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.79 cfs @ 2.54 fps)

Pond 46P: Roof Drain



Summary for Pond 47P: Infiltration Field #2

Inflow Area = 2.015 ac, 82.47% Impervious, Inflow Depth = 2.16" for 2-Year Storm event
Inflow = 5.01 cfs @ 12.08 hrs, Volume= 0.363 af
Outflow = 0.52 cfs @ 12.87 hrs, Volume= 0.363 af, Atten= 90%, Lag= 47.5 min
Discarded = 0.33 cfs @ 11.56 hrs, Volume= 0.340 af
Primary = 0.19 cfs @ 12.87 hrs, Volume= 0.023 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 159.54' @ 12.87 hrs Surf.Area= 6,004 sf Storage= 6,204 cf

Plug-Flow detention time= 139.6 min calculated for 0.363 af (100% of inflow)
Center-of-Mass det. time= 139.5 min (941.5 - 802.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	158.00'	6,551 cf	**144.67'W x 41.50'L x 4.04'H Field A** 24,265 cf Overall - 7,887 cf Embedded = 16,378 cf x 40.0% Voids
#2A	158.50'	7,887 cf	**Cultec R-330XLHD** x 145 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 29 rows
		14,438 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	159.30'	**8.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.30' / 157.00' S= 0.0548 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#3	Primary	161.00'	**12.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 157.00' S= 0.0952 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Discarded OutFlow Max=0.33 cfs @ 11.56 hrs HW=158.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.33 cfs)

Primary OutFlow Max=0.19 cfs @ 12.87 hrs HW=159.54' TW=0.00' (Dynamic Tailwater)
2=Culvert (Inlet Controls 0.19 cfs @ 1.67 fps)
3=Culvert (Controls 0.00 cfs)

Pond 47P: Infiltration Field #2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 29 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

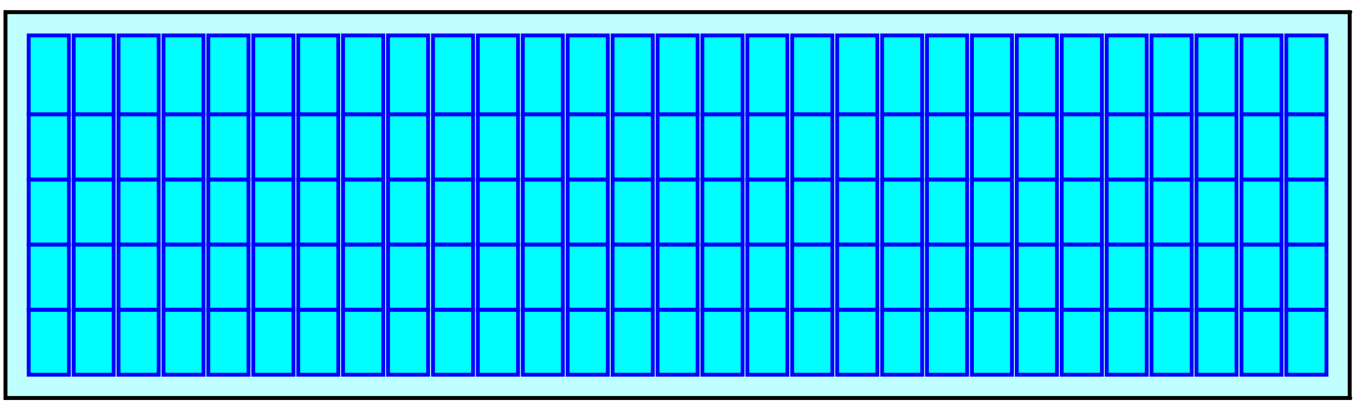
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +30.0" End Stone x 2 = 41.50' Base Length
29 Rows x 52.0" Wide + 6.0" Spacing x 28 + 30.0" Side Stone x 2 = 144.67' Base Width
6.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.04' Field Height

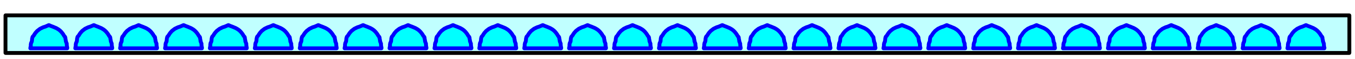
145 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 29 Rows = 7,886.9 cf Chamber Storage

24,264.8 cf Field - 7,886.9 cf Chambers = 16,377.9 cf Stone x 40.0% Voids = 6,551.2 cf Stone Storage

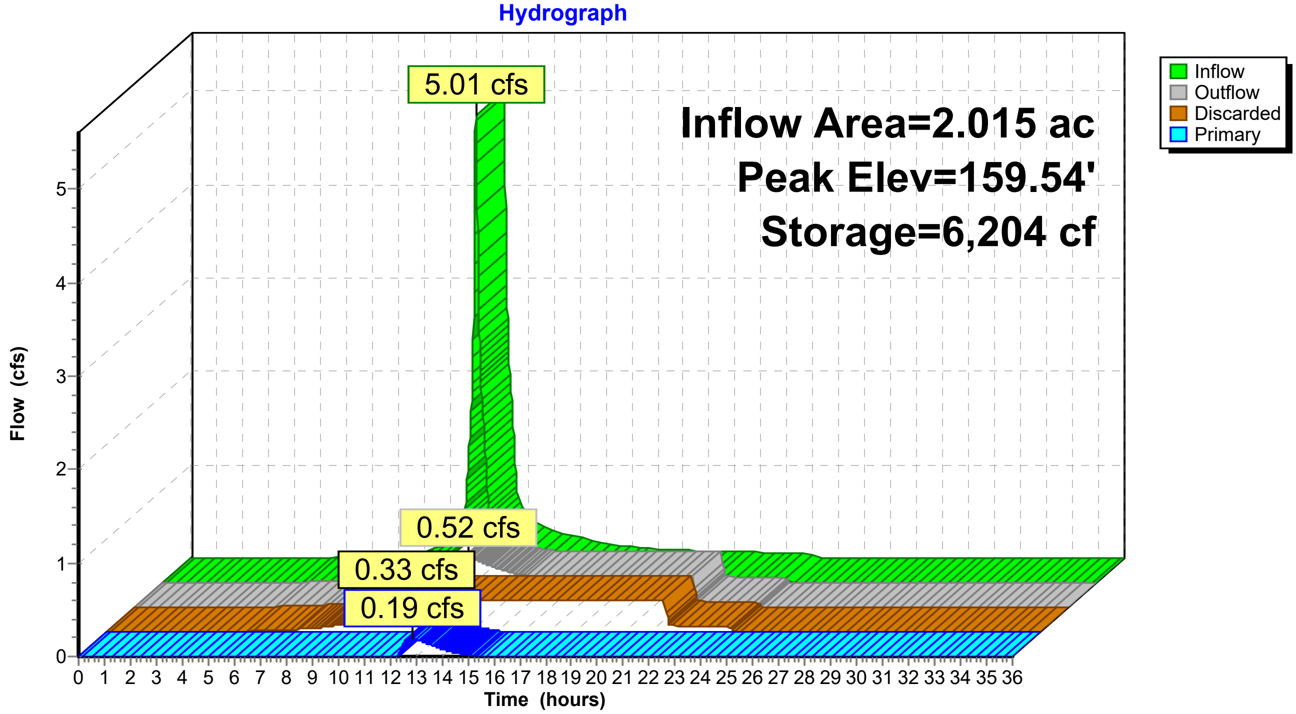
Chamber Storage + Stone Storage = 14,438.1 cf = 0.331 af
Overall Storage Efficiency = 59.5%
Overall System Size = 41.50' x 144.67' x 4.04'

145 Chambers
898.7 cy Field
606.6 cy Stone





Pond 47P: Infiltration Field #2



Summary for Subcatchment 48P: P4

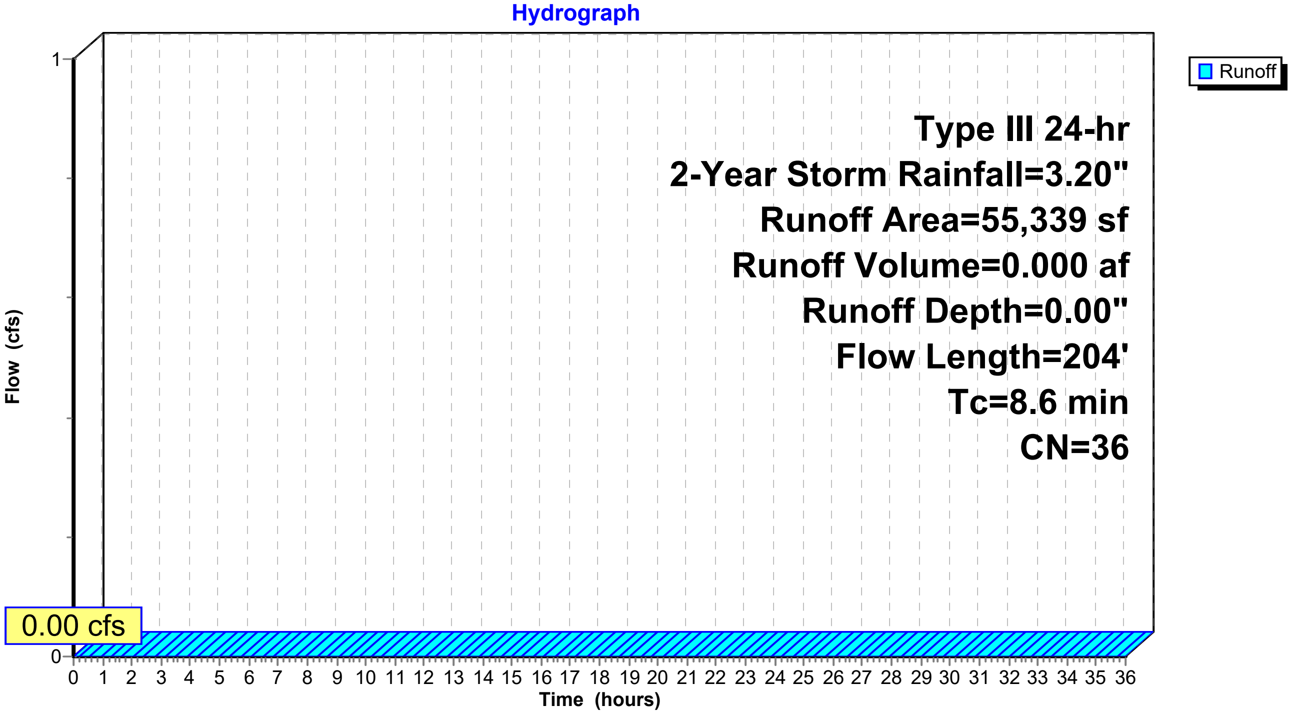
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

	Area (sf)	CN	Description
*	793	98	Paved parking, HSG A
	658	98	Paved parking, HSG B
	18,959	39	>75% Grass cover, Good, HSG A
	898	61	>75% Grass cover, Good, HSG B
	32,976	30	Woods, Good, HSG A
	1,055	55	Woods, Good, HSG B
	55,339	36	Weighted Average
	53,888		97.38% Pervious Area
	1,451		2.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	36	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
2.2	8	0.0400	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	160	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.6	204	Total			

Subcatchment 48P: P4

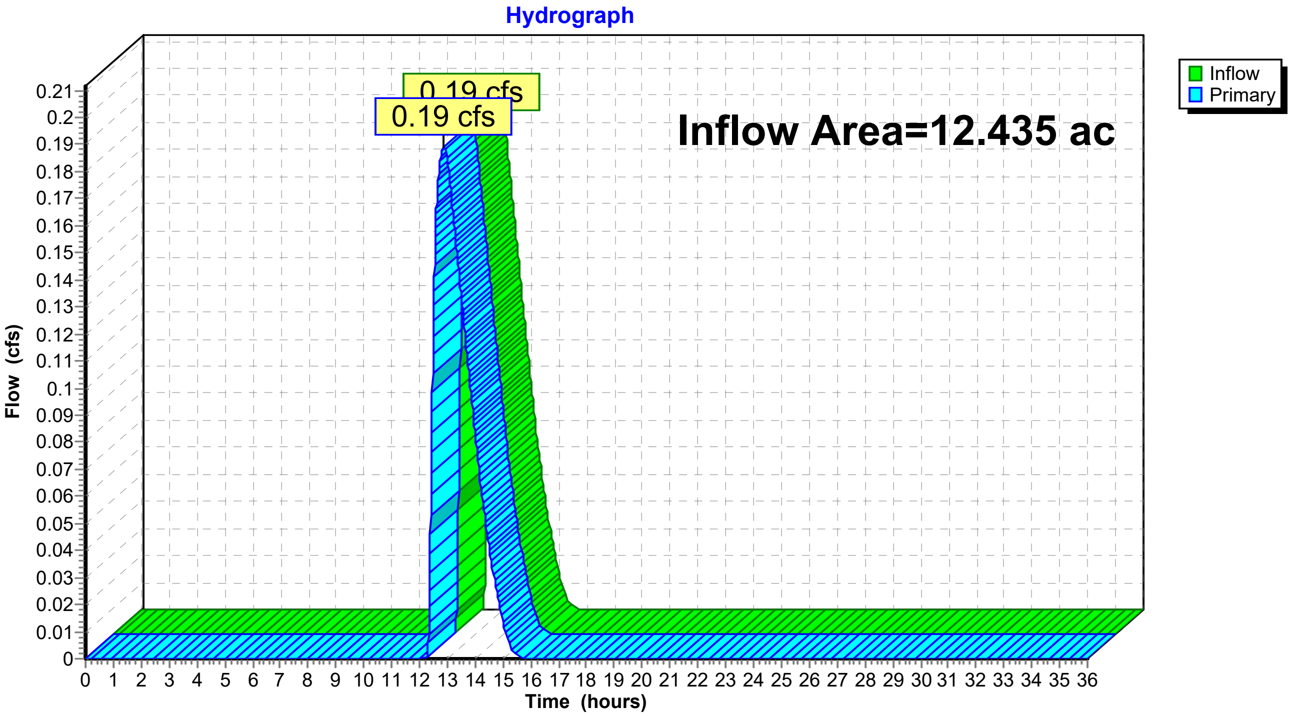


Summary for Link 49P: Design Point #1: Wetlands

Inflow Area =	12.435 ac,	41.42% Impervious,	Inflow Depth = 0.02"	for 2-Year Storm event
Inflow =	0.19 cfs @	12.87 hrs, Volume=	0.023 af	
Primary =	0.19 cfs @	12.87 hrs, Volume=	0.023 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 49P: Design Point #1: Wetlands



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1P: P1a Runoff Area=112,620 sf 17.81% Impervious Runoff Depth=1.39"
Flow Length=655' Tc=16.4 min CN=64 Runoff=2.83 cfs 0.299 af

Pond 2P: CB1 Peak Elev=167.79' Inflow=2.83 cfs 0.299 af
18.0" Round Culvert n=0.011 L=194.0' S=0.0052 '/' Outflow=2.83 cfs 0.299 af

Subcatchment 3P: P1b Runoff Area=72,566 sf 24.44% Impervious Runoff Depth=1.60"
Flow Length=562' Tc=16.0 min CN=67 Runoff=2.18 cfs 0.222 af

Pond 4P: CB2 Peak Elev=167.20' Inflow=2.18 cfs 0.222 af
12.0" Round Culvert n=0.011 L=3.0' S=0.0333 '/' Outflow=2.18 cfs 0.222 af

Pond 5P: DMH1 Peak Elev=166.87' Inflow=5.01 cfs 0.521 af
24.0" Round Culvert n=0.011 L=171.0' S=0.0053 '/' Outflow=5.01 cfs 0.521 af

Subcatchment 6P: P1c Runoff Area=36,786 sf 40.24% Impervious Runoff Depth=2.21"
Flow Length=372' Tc=16.1 min CN=75 Runoff=1.60 cfs 0.155 af

Pond 7P: CB3 Peak Elev=166.10' Inflow=1.60 cfs 0.155 af
12.0" Round Culvert n=0.011 L=3.0' S=0.0333 '/' Outflow=1.60 cfs 0.155 af

Pond 8P: DMH2 Peak Elev=165.93' Inflow=6.60 cfs 0.676 af
24.0" Round Culvert n=0.011 L=94.0' S=0.0287 '/' Outflow=6.60 cfs 0.676 af

Subcatchment 9P: P1d Runoff Area=35,572 sf 40.58% Impervious Runoff Depth=2.21"
Flow Length=403' Tc=11.6 min CN=75 Runoff=1.75 cfs 0.150 af

Pond 10P: CB4 Peak Elev=165.22' Inflow=1.75 cfs 0.150 af
12.0" Round Culvert n=0.011 L=72.0' S=0.0333 '/' Outflow=1.75 cfs 0.150 af

Subcatchment 11P: P1e Runoff Area=31,721 sf 39.55% Impervious Runoff Depth=1.26"
Flow Length=81' Slope=0.0200 '/' Tc=9.8 min CN=62 Runoff=0.85 cfs 0.076 af

Pond 12P: Area Drains Peak Elev=163.82' Inflow=0.85 cfs 0.076 af
8.0" Round Culvert n=0.011 L=114.0' S=0.0061 '/' Outflow=0.85 cfs 0.076 af

Pond 13P: FD/DMH3 Peak Elev=163.35' Inflow=8.89 cfs 0.903 af
24.0" Round Culvert n=0.011 L=104.0' S=0.0308 '/' Outflow=8.89 cfs 0.903 af

Pond 14P: DMH4&5 Peak Elev=160.63' Inflow=8.89 cfs 0.903 af
Outflow=8.89 cfs 0.903 af

Subcatchment 15P: P1f Runoff Area=29,980 sf 78.85% Impervious Runoff Depth=3.19"
Flow Length=169' Slope=0.0600 '/' Tc=6.2 min CN=86 Runoff=2.53 cfs 0.183 af

Pond 16P: CB5 Peak Elev=161.38' Inflow=2.53 cfs 0.183 af
12.0" Round Culvert n=0.011 L=7.0' S=0.0143 '/' Outflow=2.53 cfs 0.183 af

Subcatchment 17P: P1g Runoff Area=7,680 sf 84.80% Impervious Runoff Depth=3.49"
Flow Length=144' Slope=0.0300 '/' Tc=5.0 min CN=89 Runoff=0.73 cfs 0.051 af

Pond 18P: CB6 Peak Elev=161.04' Inflow=0.73 cfs 0.051 af
12.0" Round Culvert n=0.011 L=66.0' S=0.0076 '/' Outflow=0.73 cfs 0.051 af

Pond 19P: FD/DMH6 Peak Elev=160.93' Inflow=3.24 cfs 0.234 af
12.0" Round Culvert n=0.011 L=44.0' S=0.0205 '/' Outflow=3.24 cfs 0.234 af

Pond 20P: DMH7&8 Peak Elev=159.95' Inflow=3.24 cfs 0.234 af
12.0" Round Culvert n=0.011 L=9.5' S=0.0105 '/' Outflow=3.24 cfs 0.234 af

Subcatchment 21P: P1h Runoff Area=23,312 sf 100.00% Impervious Runoff Depth=4.46"
Tc=6.0 min CN=98 Runoff=2.46 cfs 0.199 af

Pond 22P: Roof Pipe Peak Elev=164.44' Inflow=2.46 cfs 0.199 af
12.0" Round Culvert n=0.011 L=302.0' S=0.0100 '/' Outflow=2.46 cfs 0.199 af

Pond 23P: Infiltration Field #1a Peak Elev=159.79' Storage=12,567 cf Inflow=12.44 cfs 1.336 af
Discarded=1.91 cfs 1.123 af Primary=5.99 cfs 0.213 af Outflow=7.90 cfs 1.336 af

Pond 24P: Infiltration Field #1b Peak Elev=159.78' Storage=4,026 cf Inflow=5.99 cfs 0.213 af
Discarded=0.18 cfs 0.096 af Primary=1.42 cfs 0.117 af Outflow=1.61 cfs 0.213 af

Subcatchment 25P: P2a Runoff Area=17,804 sf 68.89% Impervious Runoff Depth=3.38"
Flow Length=229' Tc=9.8 min CN=88 Runoff=1.40 cfs 0.115 af

Pond 26P: CB7&8 Peak Elev=168.42' Inflow=1.40 cfs 0.115 af
Outflow=1.40 cfs 0.115 af

Pond 27P: FD/DMH10 Peak Elev=167.73' Inflow=1.40 cfs 0.115 af
12.0" Round Culvert n=0.011 L=43.0' S=0.0256 '/' Outflow=1.40 cfs 0.115 af

Subcatchment 28P: P2b Runoff Area=21,688 sf 6.26% Impervious Runoff Depth=1.01"
Flow Length=176' Tc=10.4 min CN=58 Runoff=0.42 cfs 0.042 af

Subcatchment 29P: P2c Runoff Area=8,798 sf 43.73% Impervious Runoff Depth=2.21"
Flow Length=158' Slope=0.0500 '/' Tc=10.1 min CN=75 Runoff=0.45 cfs 0.037 af

Pond 30P: FD/CB9 Peak Elev=168.33' Inflow=0.45 cfs 0.037 af
12.0" Round Culvert n=0.011 L=30.0' S=0.0667 '/' Outflow=0.45 cfs 0.037 af

Pond 31P: Basin Peak Elev=165.96' Storage=1,616 cf Inflow=2.26 cfs 0.194 af
Discarded=0.70 cfs 0.194 af Primary=0.00 cfs 0.000 af Outflow=0.70 cfs 0.194 af

Subcatchment 32P: P3f Runoff Area=23,307 sf 73.75% Impervious Runoff Depth=3.29"
Tc=6.0 min CN=87 Runoff=2.03 cfs 0.146 af

Subcatchment 33P: P3a Runoff Area=12,898 sf 69.13% Impervious Runoff Depth=3.09"
Flow Length=211' Tc=6.9 min CN=85 Runoff=1.03 cfs 0.076 af

Pond 34P: CB10 Peak Elev=166.01' Inflow=1.03 cfs 0.076 af
12.0" Round Culvert n=0.011 L=122.0' S=0.0164 '/' Outflow=1.03 cfs 0.076 af

Pond 35P: DMH11 Peak Elev=165.90' Inflow=3.06 cfs 0.223 af
15.0" Round Culvert n=0.011 L=71.0' S=0.0141 '/' Outflow=3.06 cfs 0.223 af

Subcatchment 36P: P3b Runoff Area=11,557 sf 86.94% Impervious Runoff Depth=3.59"
Flow Length=74' Slope=0.0200 '/' Tc=5.0 min CN=90 Runoff=1.12 cfs 0.079 af

Pond 37P: CB11 Peak Elev=164.97' Inflow=1.12 cfs 0.079 af
12.0" Round Culvert n=0.011 L=3.0' S=0.0333 '/' Outflow=1.13 cfs 0.079 af

Pond 38P: DMH12 Peak Elev=164.89' Inflow=4.16 cfs 0.302 af
18.0" Round Culvert n=0.011 L=158.0' S=0.0323 '/' Outflow=4.16 cfs 0.302 af

Pond 39P: FD/DMH13&14 Peak Elev=160.32' Inflow=4.16 cfs 0.302 af
Outflow=4.16 cfs 0.302 af

Subcatchment 40P: P3c Runoff Area=18,486 sf 87.50% Impervious Runoff Depth=3.69"
Flow Length=225' Tc=5.0 min CN=91 Runoff=1.83 cfs 0.131 af

Pond 41P: FD/CB12 Peak Elev=160.54' Inflow=1.83 cfs 0.131 af
12.0" Round Culvert n=0.011 L=32.0' S=0.0313 '/' Outflow=1.83 cfs 0.131 af

Subcatchment 42P: P3d Runoff Area=10,489 sf 85.99% Impervious Runoff Depth=3.59"
Flow Length=124' Slope=0.0300 '/' Tc=5.0 min CN=90 Runoff=1.02 cfs 0.072 af

Pond 43P: FD/CB13 Peak Elev=160.52' Inflow=1.02 cfs 0.072 af
12.0" Round Culvert n=0.011 L=52.0' S=0.0231 '/' Outflow=1.02 cfs 0.072 af

Pond 44P: DMH15&16 Peak Elev=160.32' Inflow=2.85 cfs 0.203 af
12.0" Round Culvert n=0.011 L=6.5' S=0.0154 '/' Outflow=2.85 cfs 0.203 af

Subcatchment 45P: P3e Runoff Area=11,055 sf 100.00% Impervious Runoff Depth=4.46"
Tc=6.0 min CN=98 Runoff=1.17 cfs 0.094 af

Pond 46P: Roof Drain Peak Elev=165.81' Inflow=1.17 cfs 0.094 af
8.0" Round Culvert n=0.011 L=232.0' S=0.0280 '/' Outflow=1.17 cfs 0.094 af

Pond 47P: Infiltration Field #2 Peak Elev=160.30' Storage=9,571 cf Inflow=8.13 cfs 0.599 af
Discarded=0.33 cfs 0.422 af Primary=1.37 cfs 0.177 af Outflow=1.71 cfs 0.599 af

Subcatchment 48P: P4 Runoff Area=55,339 sf 2.62% Impervious Runoff Depth=0.07"
Flow Length=204' Tc=8.6 min CN=36 Runoff=0.01 cfs 0.007 af

Link 49P: Design Point #1: Wetlands Inflow=2.72 cfs 0.301 af
Primary=2.72 cfs 0.301 af

Total Runoff Area = 12.435 ac Runoff Volume = 2.137 af Average Runoff Depth = 2.06"
58.58% Pervious = 7.284 ac 41.42% Impervious = 5.151 ac

Summary for Subcatchment 1P: P1a

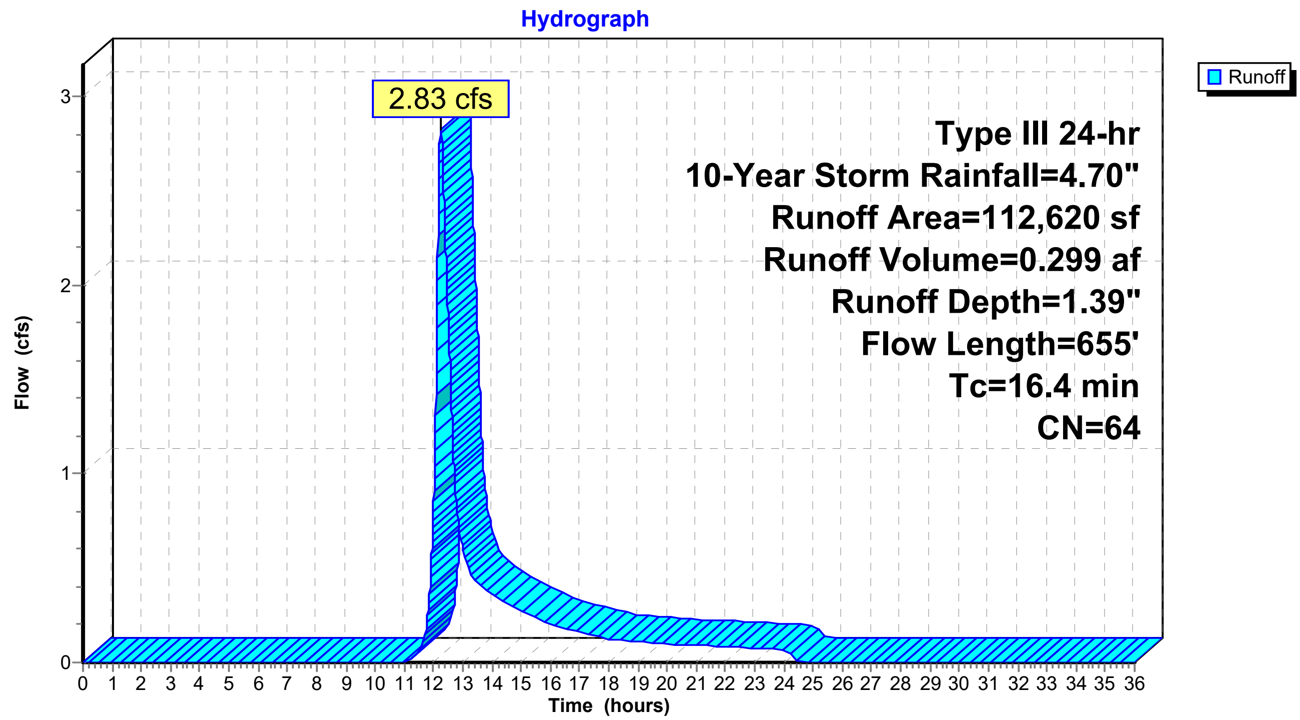
Runoff = 2.83 cfs @ 12.25 hrs, Volume= 0.299 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
20,058	98	Paved parking, HSG B
20,706	61	>75% Grass cover, Good, HSG B
71,856	55	Woods, Good, HSG B
112,620	64	Weighted Average
92,562		82.19% Pervious Area
20,058		17.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	43	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
6.8	410	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	47	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	155	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.4	655	Total			

Subcatchment 1P: P1a



Summary for Pond 2P: CB1

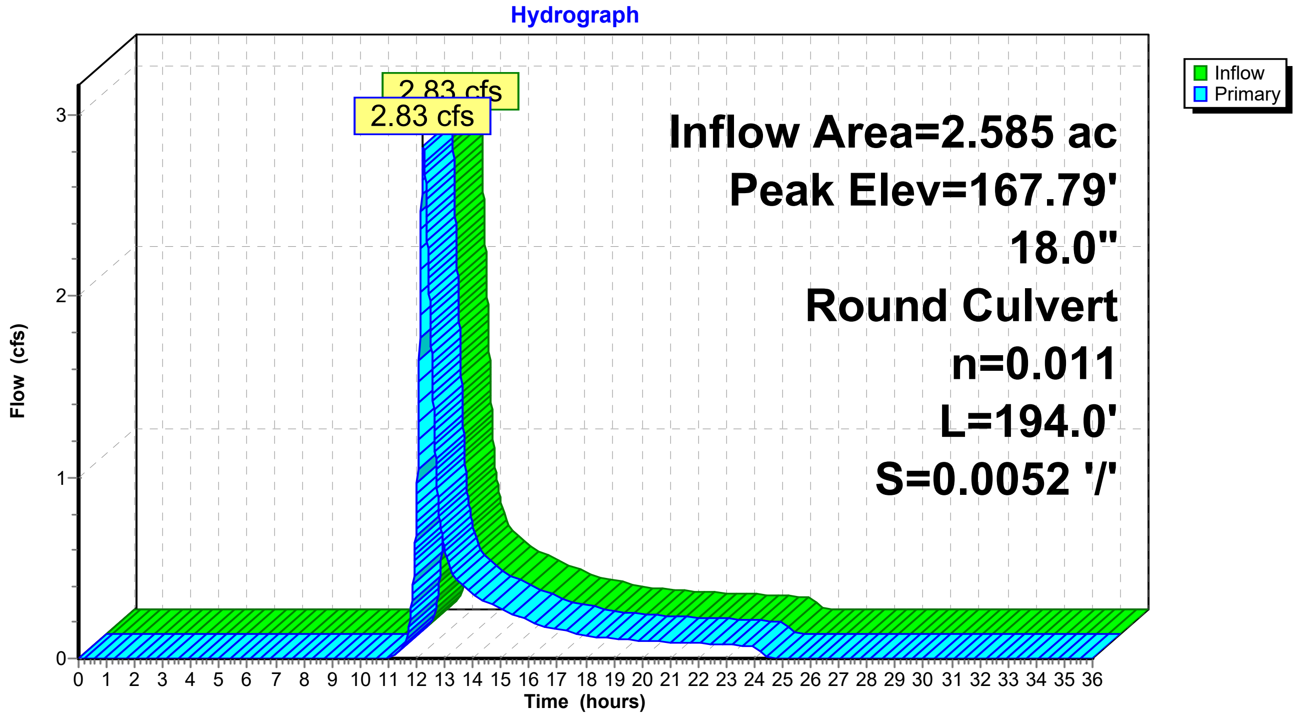
Inflow Area =	2.585 ac,	17.81% Impervious,	Inflow Depth = 1.39"	for 10-Year Storm event	
Inflow =	2.83 cfs @	12.25 hrs,	Volume=	0.299 af	
Outflow =	2.83 cfs @	12.25 hrs,	Volume=	0.299 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.83 cfs @	12.25 hrs,	Volume=	0.299 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 167.79' @ 12.25 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	166.90'	**18.0" Round Culvert** L= 194.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 166.90' / 165.90' S= 0.0052 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=2.83 cfs @ 12.25 hrs HW=167.79' TW=166.87' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 2.83 cfs @ 3.71 fps)

Pond 2P: CB1



Summary for Subcatchment 3P: P1b

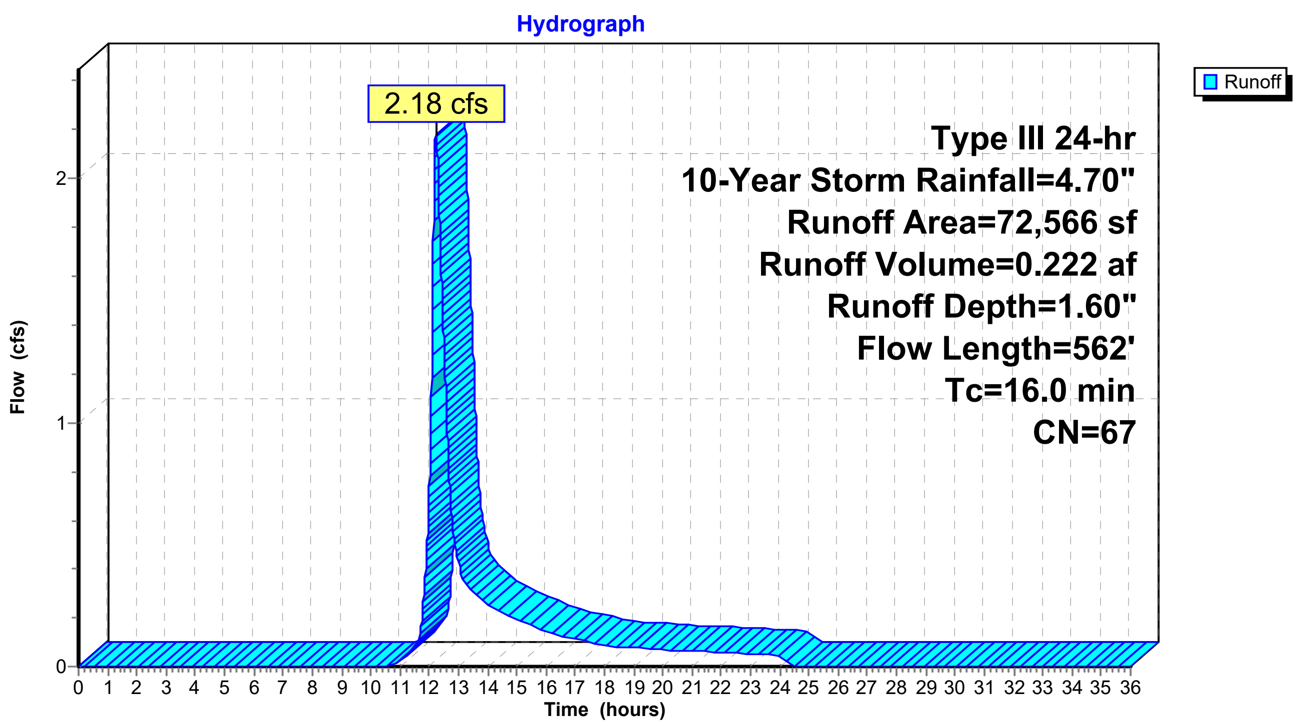
Runoff = 2.18 cfs @ 12.23 hrs, Volume= 0.222 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
17,734	98	Paved parking, HSG B
20,240	61	>75% Grass cover, Good, HSG B
34,592	55	Woods, Good, HSG B
72,566	67	Weighted Average
54,832		75.56% Pervious Area
17,734		24.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	43	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
6.0	405	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	17	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	97	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.0	562	Total			

Subcatchment 3P: P1b



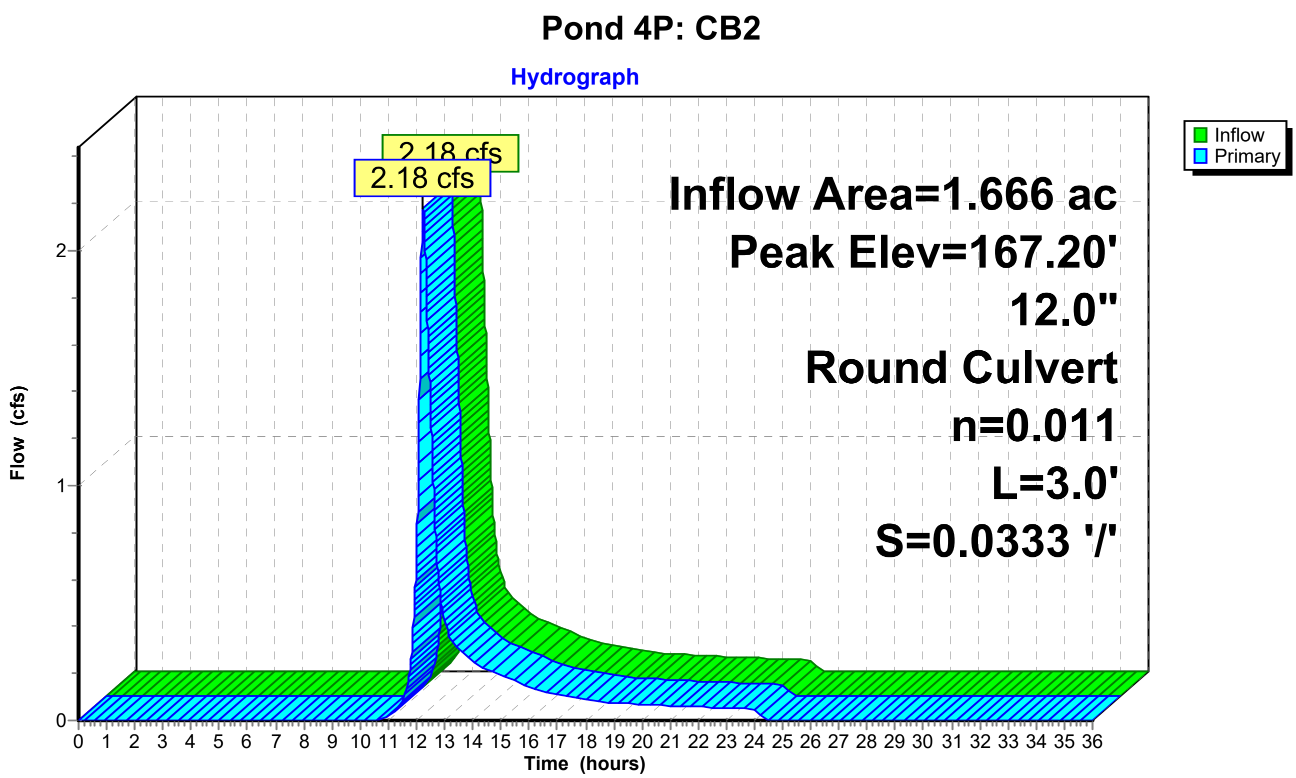
Summary for Pond 4P: CB2

Inflow Area =	1.666 ac,	24.44% Impervious,	Inflow Depth = 1.60"	for 10-Year Storm event
Inflow =	2.18 cfs @	12.23 hrs,	Volume=	0.222 af
Outflow =	2.18 cfs @	12.23 hrs,	Volume=	0.222 af, Atten= 0%, Lag= 0.0 min
Primary =	2.18 cfs @	12.23 hrs,	Volume=	0.222 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 167.20' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	166.00'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 166.00' / 165.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.17 cfs @ 12.23 hrs HW=167.20' TW=166.87' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 2.17 cfs @ 2.76 fps)



Summary for Pond 5P: DMH1

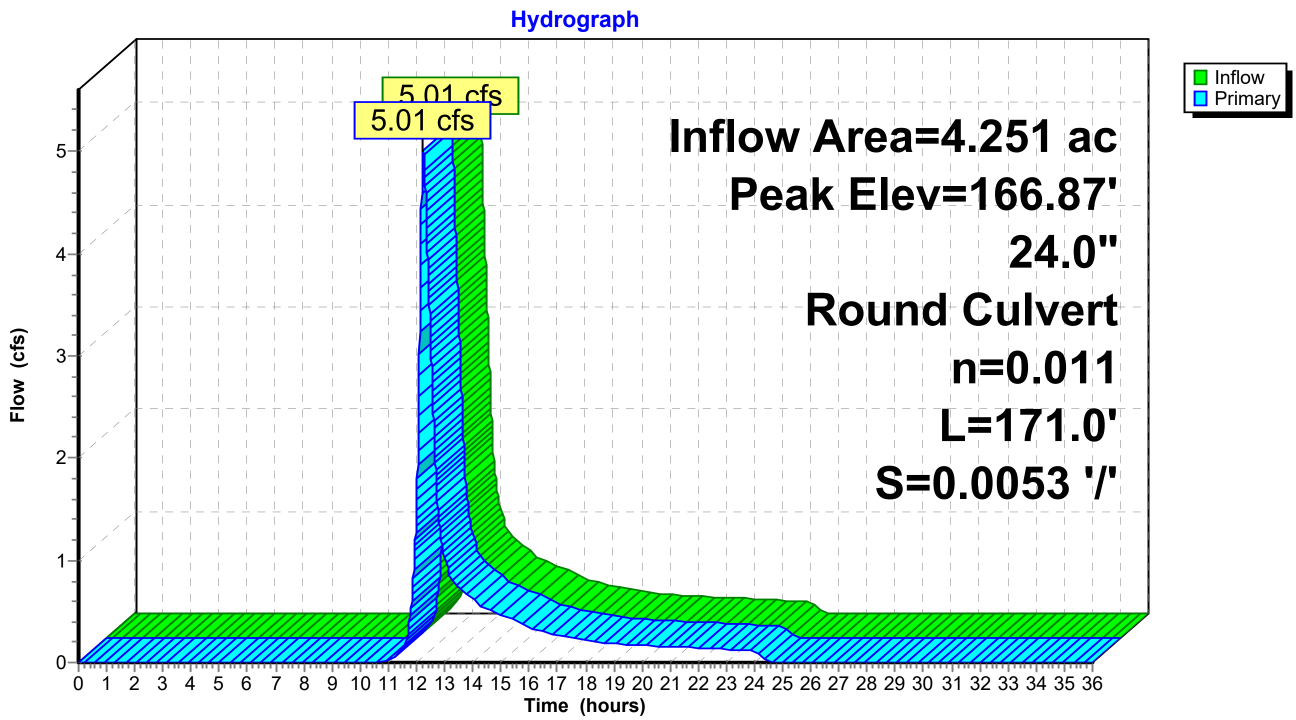
Inflow Area =	4.251 ac,	20.41% Impervious,	Inflow Depth = 1.47"	for 10-Year Storm event	
Inflow =	5.01 cfs @	12.24 hrs,	Volume=	0.521 af	
Outflow =	5.01 cfs @	12.24 hrs,	Volume=	0.521 af,	Atten= 0%, Lag= 0.0 min
Primary =	5.01 cfs @	12.24 hrs,	Volume=	0.521 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.87' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.80'	**24.0" Round Culvert** L= 171.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.80' / 164.90' S= 0.0053 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=5.01 cfs @ 12.24 hrs HW=166.87' TW=165.93' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 5.01 cfs @ 4.25 fps)

Pond 5P: DMH1



Summary for Subcatchment 6P: P1c

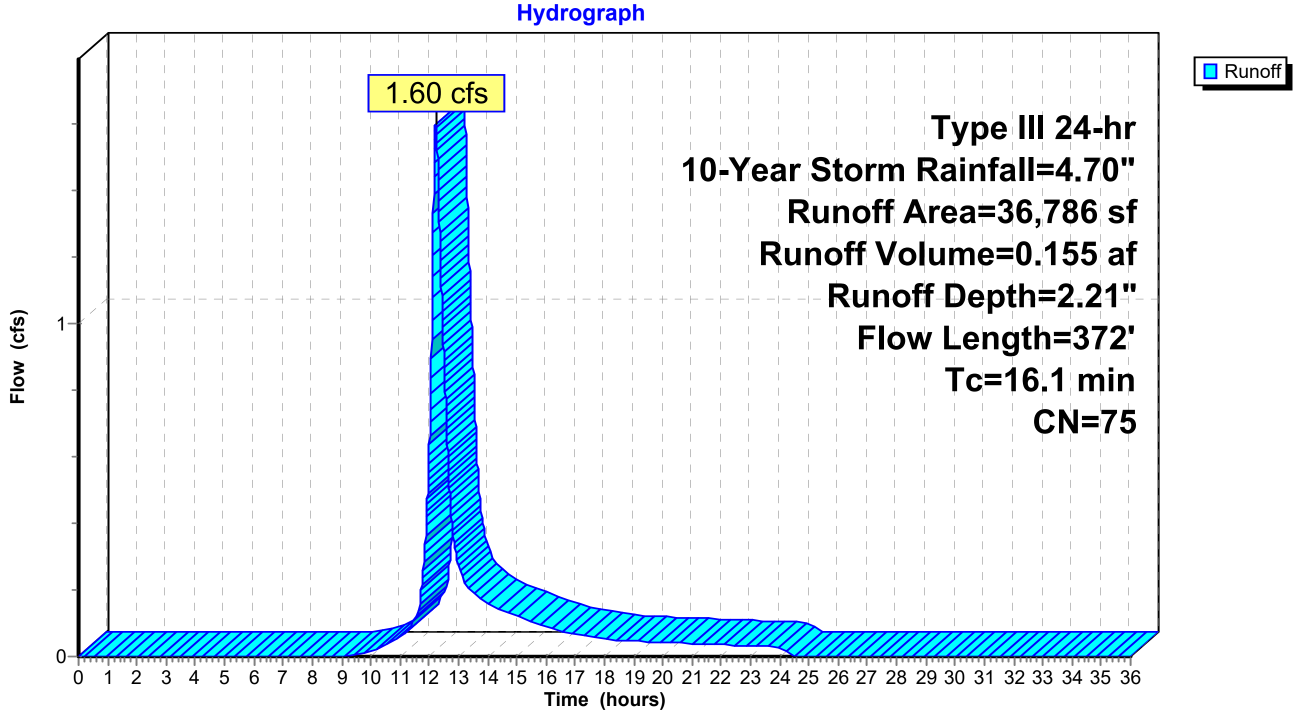
Runoff = 1.60 cfs @ 12.22 hrs, Volume= 0.155 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
1,366	98	Paved parking, HSG A
13,437	98	Paved parking, HSG B
228	39	>75% Grass cover, Good, HSG A
15,234	61	>75% Grass cover, Good, HSG B
6,521	55	Woods, Good, HSG B
36,786	75	Weighted Average
21,983		59.76% Pervious Area
14,803		40.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	47	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
4.8	36	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	74	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	40	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	175	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.1	372	Total			

Subcatchment 6P: P1c



Summary for Pond 7P: CB3

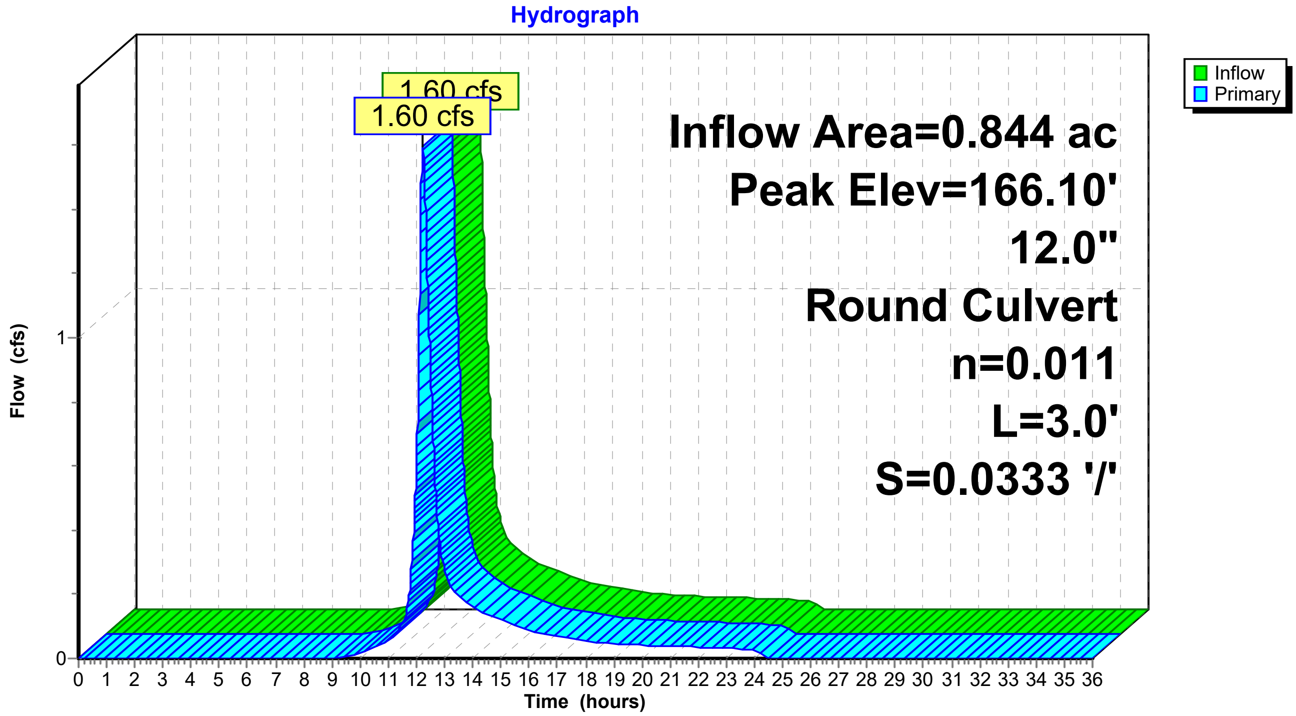
Inflow Area =	0.844 ac, 40.24% Impervious,	Inflow Depth = 2.21"	for 10-Year Storm event	
Inflow =	1.60 cfs @	12.22 hrs, Volume=	0.155 af	
Outflow =	1.60 cfs @	12.22 hrs, Volume=	0.155 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.60 cfs @	12.22 hrs, Volume=	0.155 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.10' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 164.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.57 cfs @ 12.22 hrs HW=166.10' TW=165.92' (Dynamic Tailwater)
└1=Culvert (Inlet Controls 1.57 cfs @ 2.00 fps)

Pond 7P: CB3



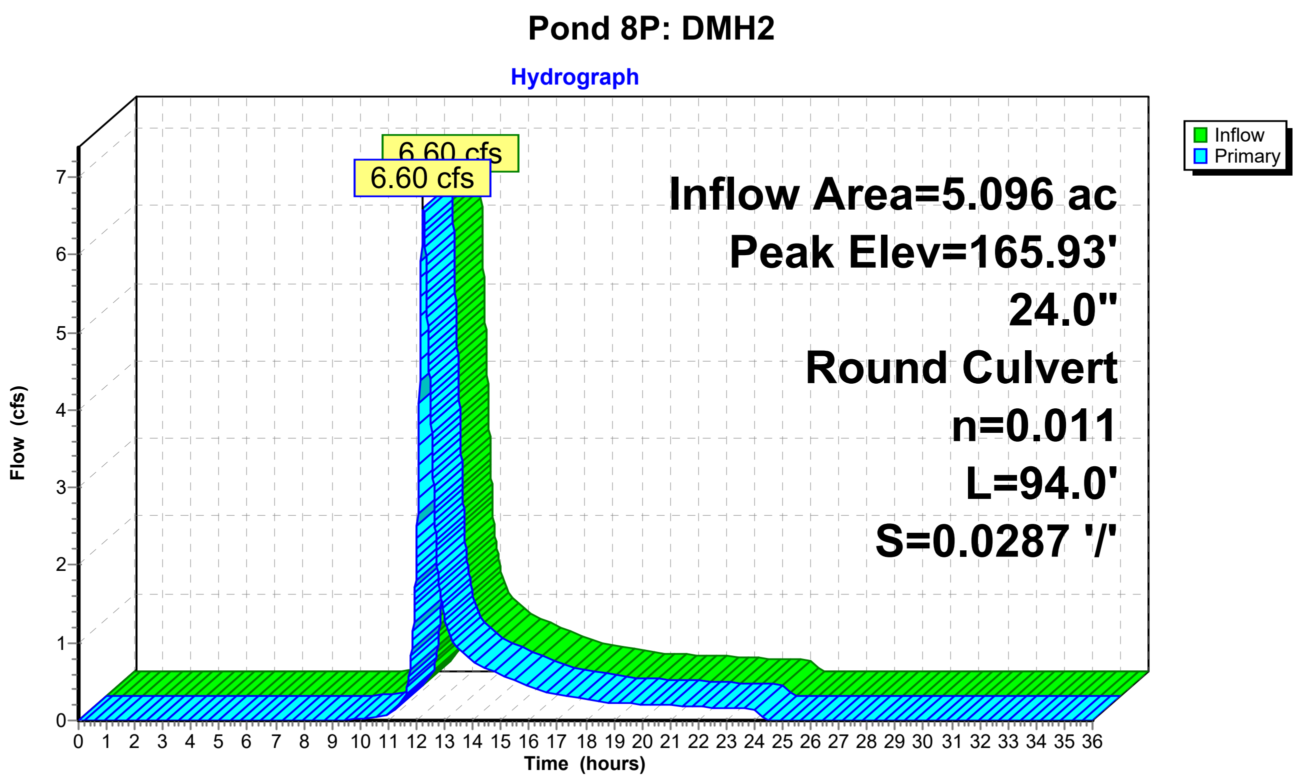
Summary for Pond 8P: DMH2

Inflow Area =	5.096 ac,	23.69% Impervious,	Inflow Depth =	1.59"	for 10-Year Storm event
Inflow =	6.60 cfs @	12.24 hrs,	Volume=	0.676 af	
Outflow =	6.60 cfs @	12.24 hrs,	Volume=	0.676 af,	Atten= 0%, Lag= 0.0 min
Primary =	6.60 cfs @	12.24 hrs,	Volume=	0.676 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.93' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.80'	**24.0" Round Culvert** L= 94.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 164.80' / 162.10' S= 0.0287 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=6.60 cfs @ 12.24 hrs HW=165.93' TW=163.34' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 6.60 cfs @ 3.61 fps)



Summary for Subcatchment 9P: P1d

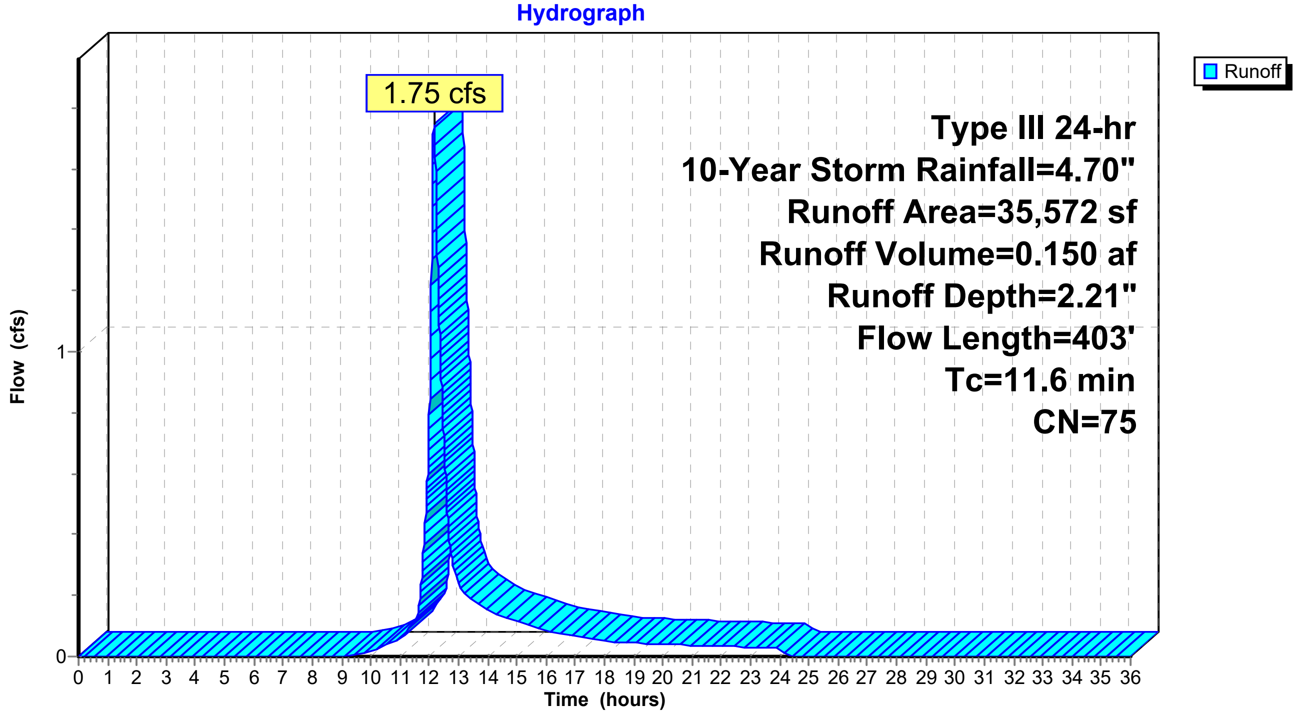
Runoff = 1.75 cfs @ 12.16 hrs, Volume= 0.150 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
11,385	98	Paved parking, HSG A
3,050	98	Paved parking, HSG B
5,618	39	>75% Grass cover, Good, HSG A
10,400	61	>75% Grass cover, Good, HSG B
4,510	79	<50% Grass cover, Poor, HSG B
609	55	Woods, Good, HSG B
35,572	75	Weighted Average
21,137		59.42% Pervious Area
14,435		40.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	83	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.1	13	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	130	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.0	177	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
11.6	403	Total			

Subcatchment 9P: P1d



Summary for Pond 10P: CB4

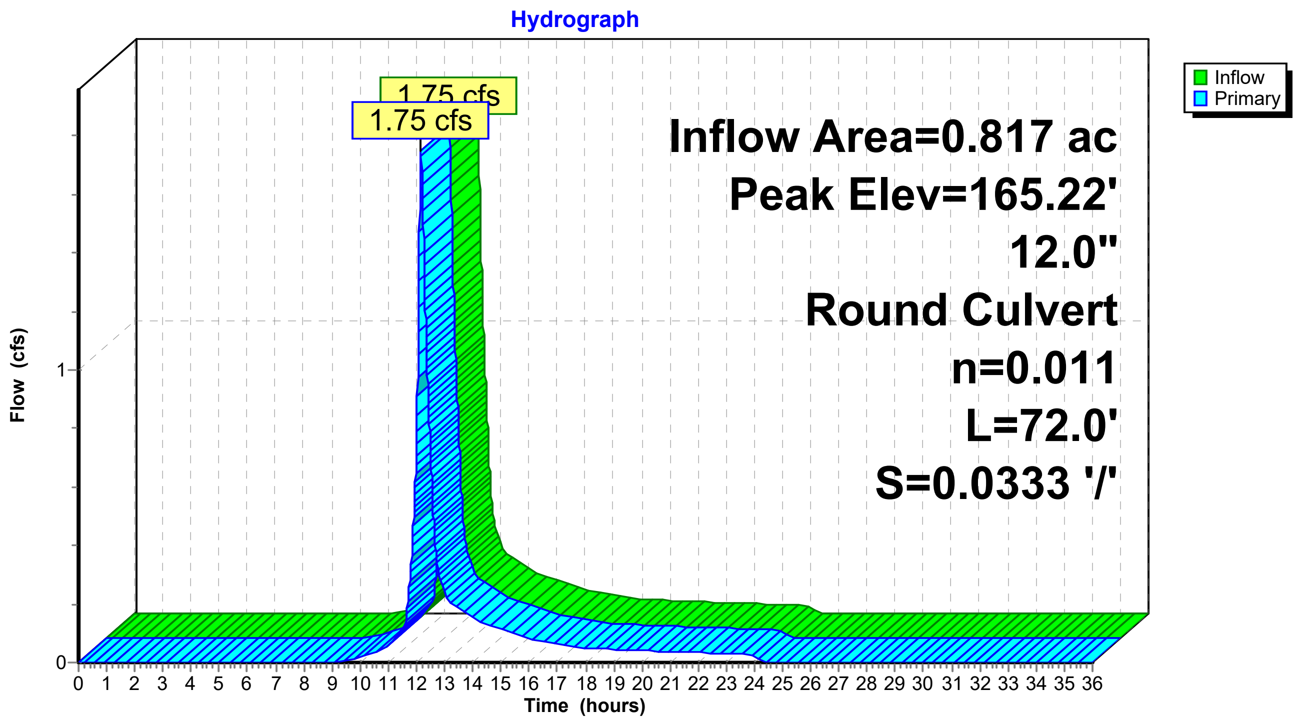
Inflow Area =	0.817 ac, 40.58% Impervious,	Inflow Depth = 2.21"	for 10-Year Storm event	
Inflow =	1.75 cfs @	12.16 hrs, Volume=	0.150 af	
Outflow =	1.75 cfs @	12.16 hrs, Volume=	0.150 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.75 cfs @	12.16 hrs, Volume=	0.150 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.22' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.50'	**12.0" Round Culvert** L= 72.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 164.50' / 162.10' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.74 cfs @ 12.16 hrs HW=165.22' TW=163.30' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.74 cfs @ 2.89 fps)

Pond 10P: CB4



Summary for Subcatchment 11P: P1e

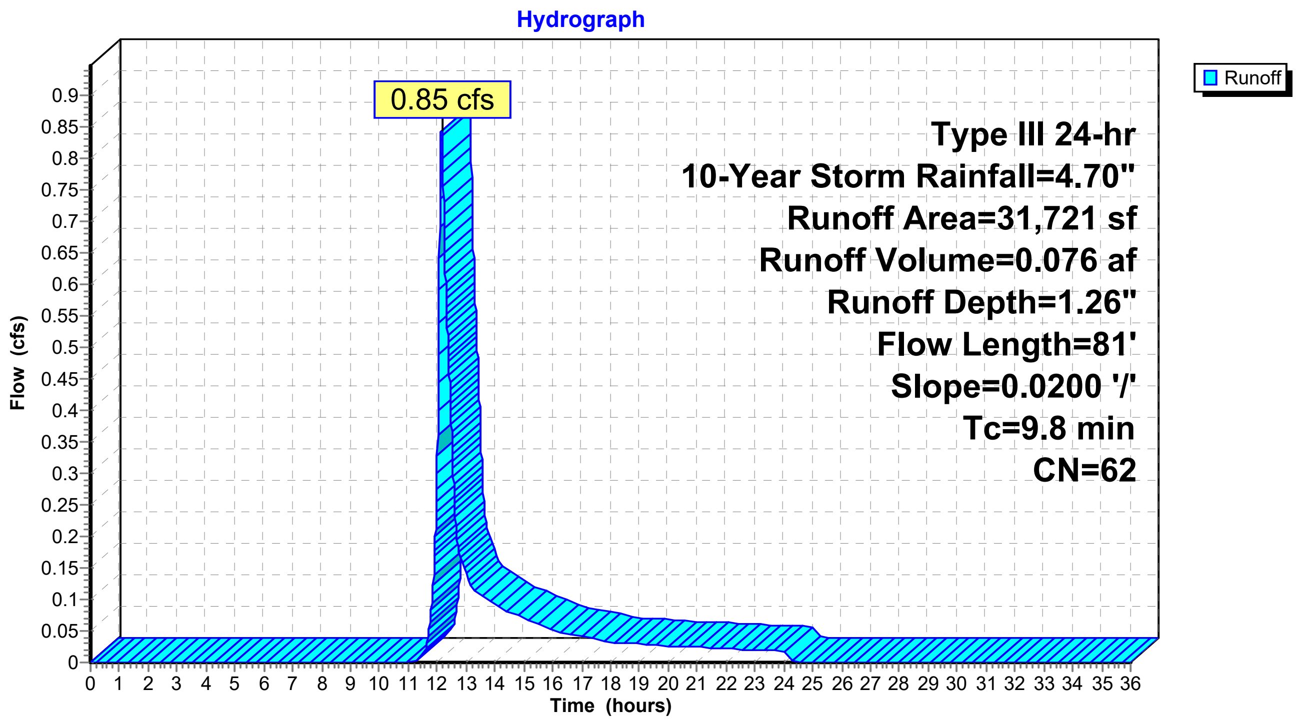
Runoff = 0.85 cfs @ 12.15 hrs, Volume= 0.076 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
12,547	98	Paved parking, HSG A
19,174	39	>75% Grass cover, Good, HSG A
31,721	62	Weighted Average
19,174		60.45% Pervious Area
12,547		39.55% 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"
0.4	22	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.8	81	Total			

Subcatchment 11P: P1e



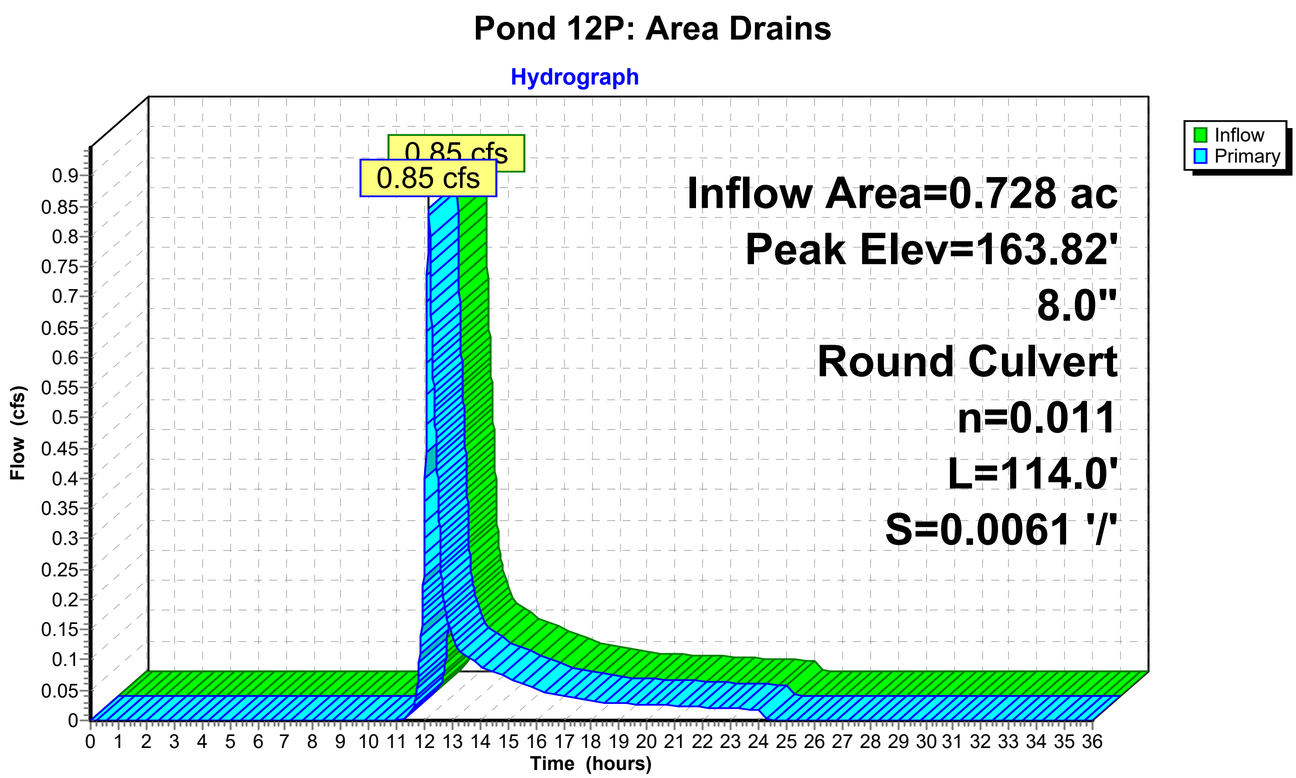
Summary for Pond 12P: Area Drains

Inflow Area =	0.728 ac,	39.55% Impervious,	Inflow Depth = 1.26"	for 10-Year Storm event
Inflow =	0.85 cfs @	12.15 hrs, Volume=	0.076 af	
Outflow =	0.85 cfs @	12.15 hrs, Volume=	0.076 af, Atten= 0%, Lag= 0.0 min	
Primary =	0.85 cfs @	12.15 hrs, Volume=	0.076 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 163.82' @ 12.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.80'	**8.0" Round Culvert** L= 114.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.80' / 162.10' S= 0.0061 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.82 cfs @ 12.15 hrs HW=163.78' TW=163.27' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.82 cfs @ 2.36 fps)



Summary for Pond 13P: FD/DMH3

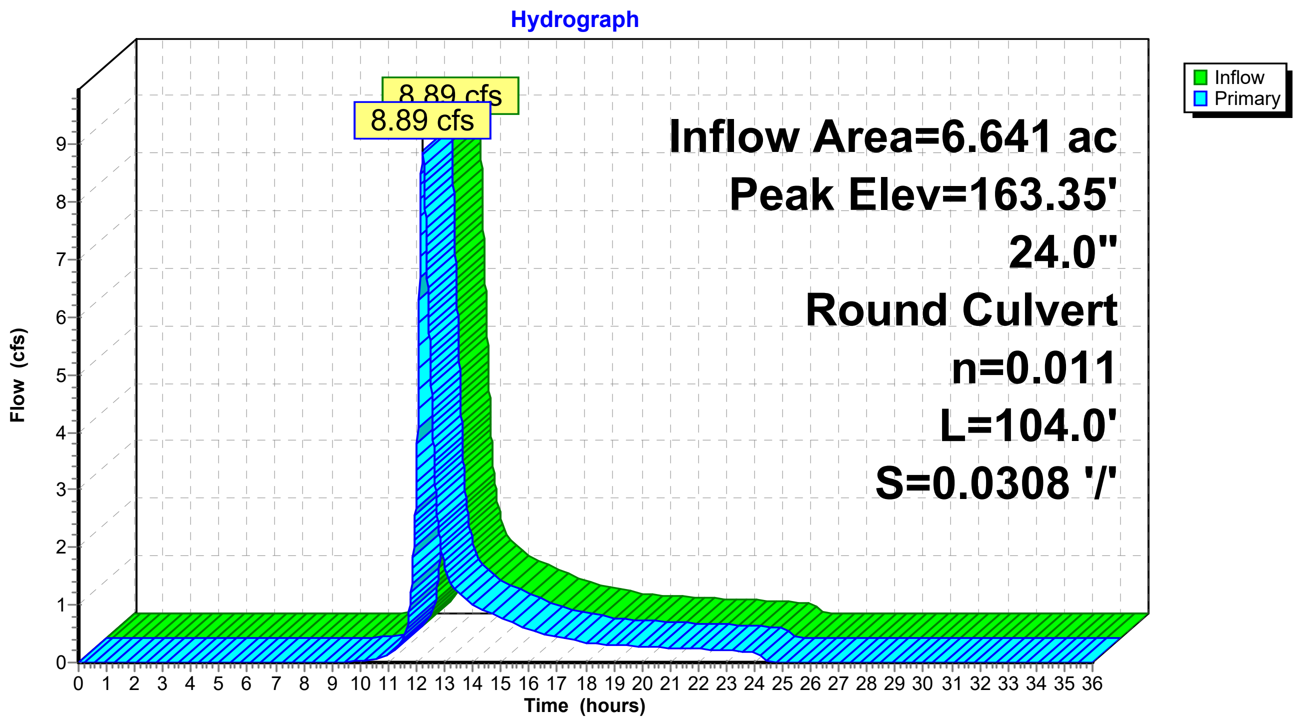
Inflow Area =	6.641 ac,	27.51% Impervious,	Inflow Depth = 1.63"	for 10-Year Storm event
Inflow =	8.89 cfs @	12.21 hrs, Volume=	0.903 af	
Outflow =	8.89 cfs @	12.21 hrs, Volume=	0.903 af, Atten= 0%, Lag= 0.0 min	
Primary =	8.89 cfs @	12.21 hrs, Volume=	0.903 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 163.35' @ 12.21 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.00'	**24.0" Round Culvert** L= 104.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.00' / 158.80' S= 0.0308 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=8.88 cfs @ 12.21 hrs HW=163.35' TW=160.63' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 8.88 cfs @ 3.95 fps)

Pond 13P: FD/DMH3



Summary for Pond 14P: DMH4&5

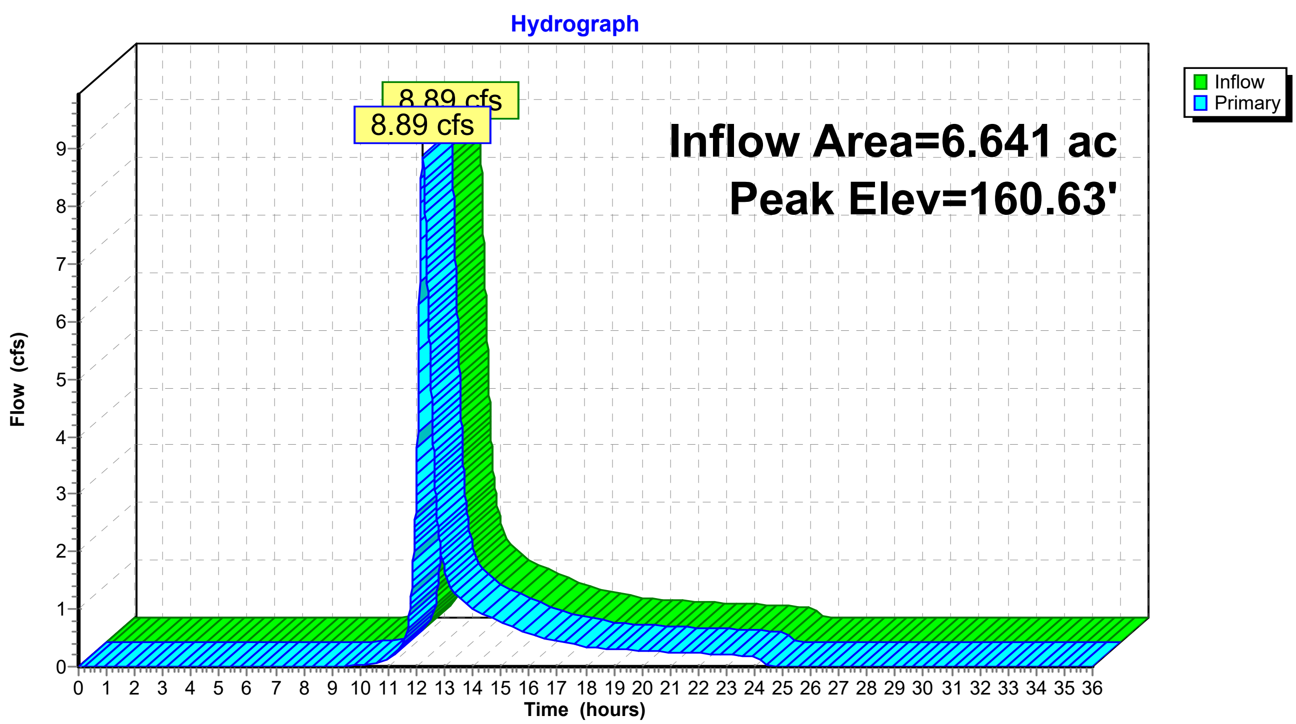
Inflow Area =	6.641 ac,	27.51% Impervious,	Inflow Depth = 1.63"	for 10-Year Storm event	
Inflow =	8.89 cfs @	12.21 hrs,	Volume=	0.903 af	
Outflow =	8.89 cfs @	12.21 hrs,	Volume=	0.903 af,	Atten= 0%, Lag= 0.0 min
Primary =	8.89 cfs @	12.21 hrs,	Volume=	0.903 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.63' @ 12.21 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**18.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Primary	161.00'	**18.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 158.50' S= 0.4167 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=8.88 cfs @ 12.21 hrs HW=160.63' TW=159.19' (Dynamic Tailwater)
1=Culvert (Barrel Controls 8.88 cfs @ 5.03 fps)
2=Culvert (Controls 0.00 cfs)

Pond 14P: DMH4&5



Summary for Subcatchment 15P: P1f

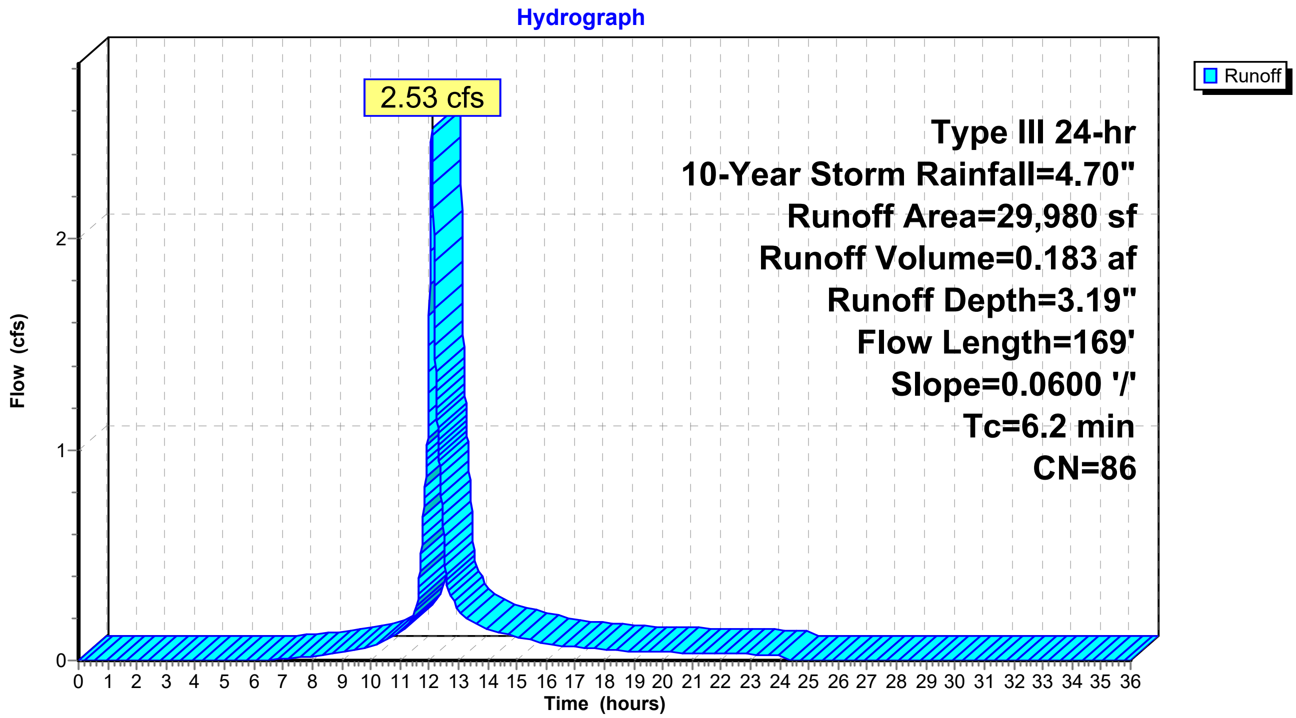
Runoff = 2.53 cfs @ 12.09 hrs, Volume= 0.183 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
23,639	98	Paved parking, HSG A
6,281	39	>75% Grass cover, Good, HSG A
60	61	>75% Grass cover, Good, HSG B
29,980	86	Weighted Average
6,341		21.15% Pervious Area
23,639		78.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	56	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.4	113	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.2	169	Total			

Subcatchment 15P: P1f



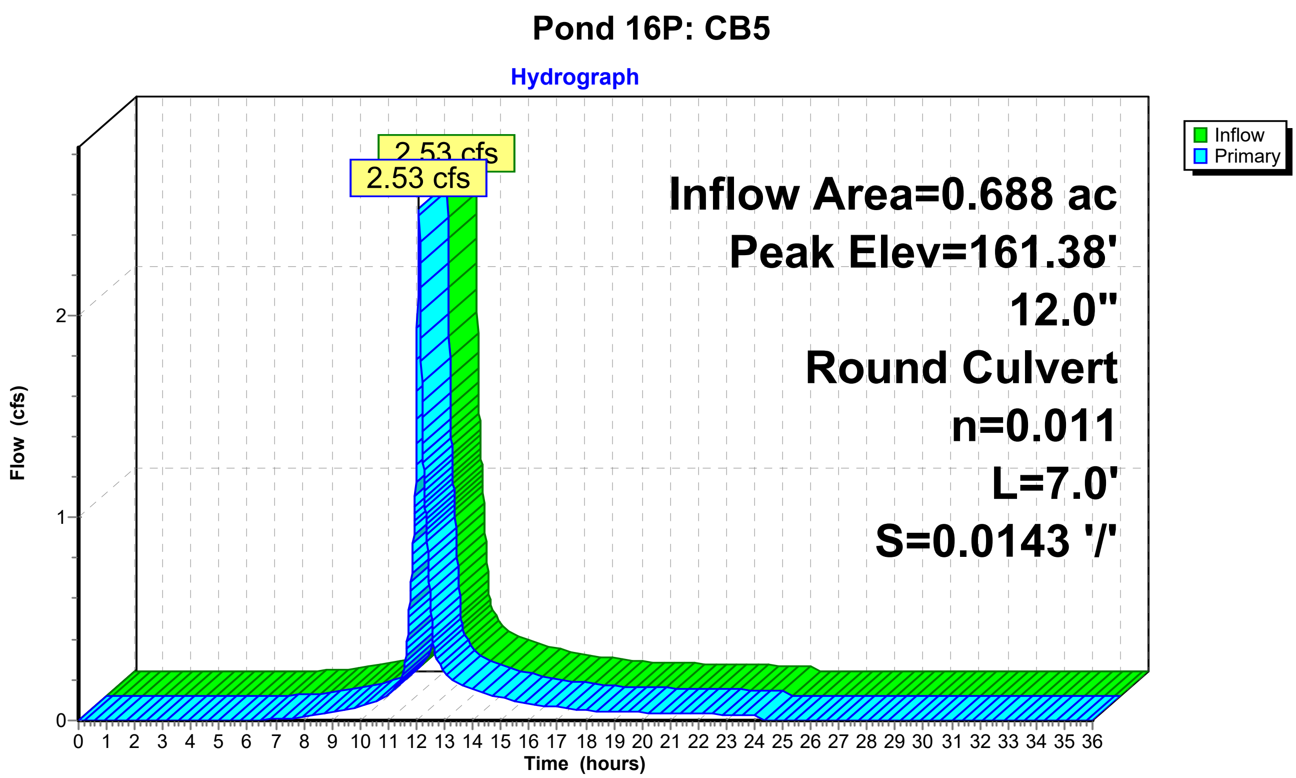
Summary for Pond 16P: CB5

Inflow Area =	0.688 ac,	78.85% Impervious,	Inflow Depth = 3.19"	for 10-Year Storm event
Inflow =	2.53 cfs @	12.09 hrs,	Volume=	0.183 af
Outflow =	2.53 cfs @	12.09 hrs,	Volume=	0.183 af, Atten= 0%, Lag= 0.0 min
Primary =	2.53 cfs @	12.09 hrs,	Volume=	0.183 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.38' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.90'	**12.0" Round Culvert** L= 7.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.90' / 159.80' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.52 cfs @ 12.09 hrs HW=161.38' TW=160.93' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.52 cfs @ 3.21 fps)



Summary for Subcatchment 17P: P1g

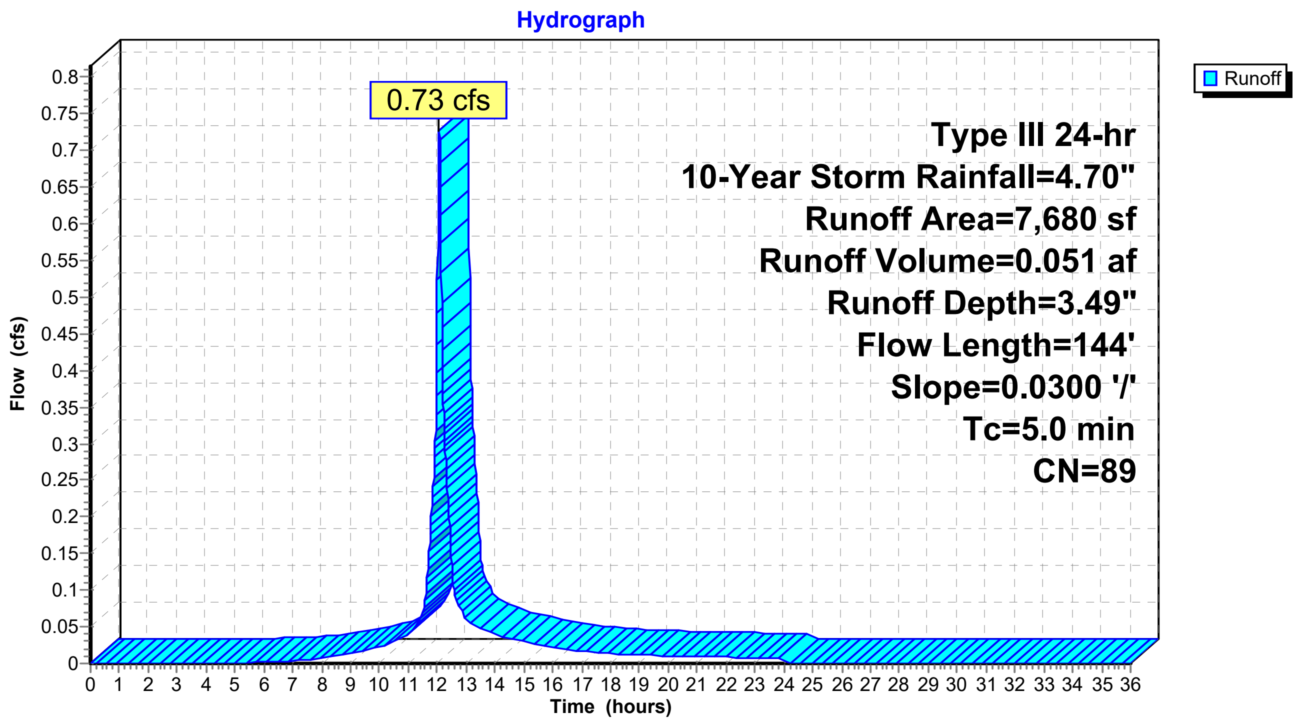
Runoff = 0.73 cfs @ 12.07 hrs, Volume= 0.051 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
6,513	98	Paved parking, HSG A
1,167	39	>75% Grass cover, Good, HSG A
7,680	89	Weighted Average
1,167		15.20% Pervious Area
6,513		84.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	20	0.0300	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.5	40	0.0300	1.35		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
0.9	84	0.0300	1.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
4.7	144	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 17P: P1g



Summary for Pond 18P: CB6

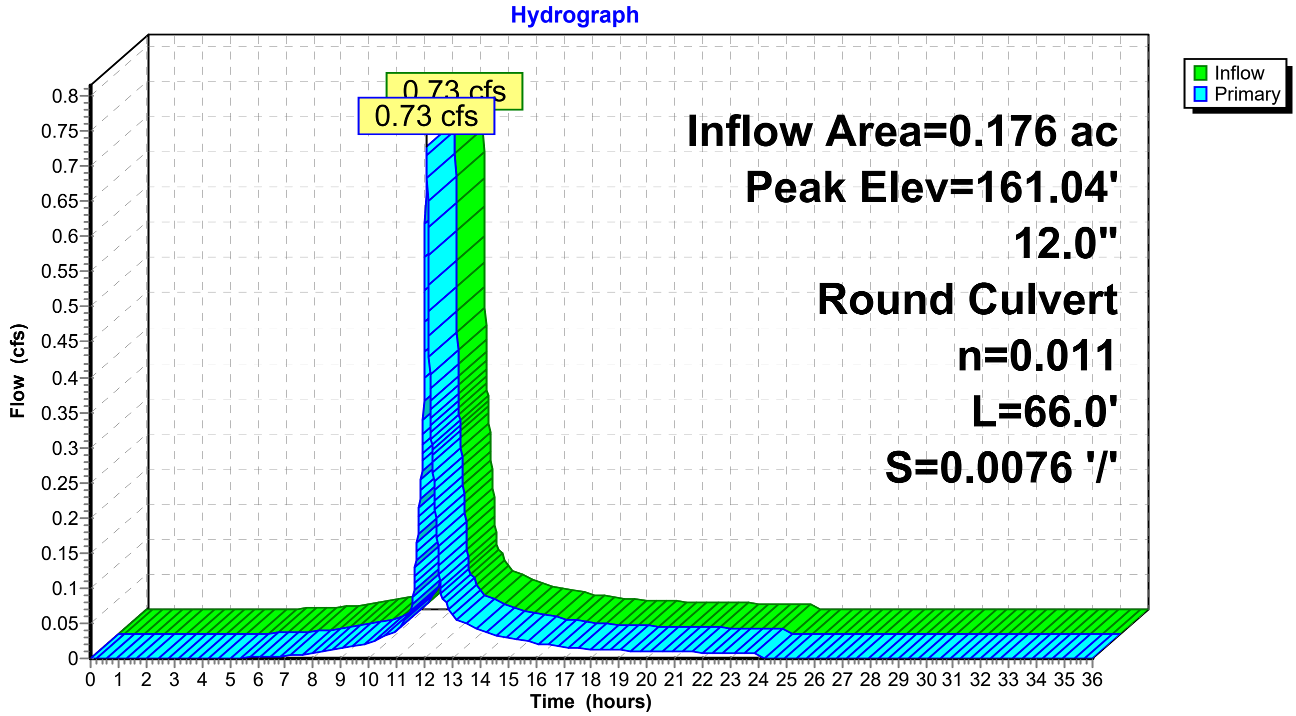
Inflow Area =	0.176 ac,	84.80% Impervious,	Inflow Depth = 3.49"	for 10-Year Storm event
Inflow =	0.73 cfs @	12.07 hrs, Volume=	0.051 af	
Outflow =	0.73 cfs @	12.07 hrs, Volume=	0.051 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.73 cfs @	12.07 hrs, Volume=	0.051 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.04' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**12.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.80' S= 0.0076 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.61 cfs @ 12.07 hrs HW=161.01' TW=160.91' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.61 cfs @ 1.44 fps)

Pond 18P: CB6



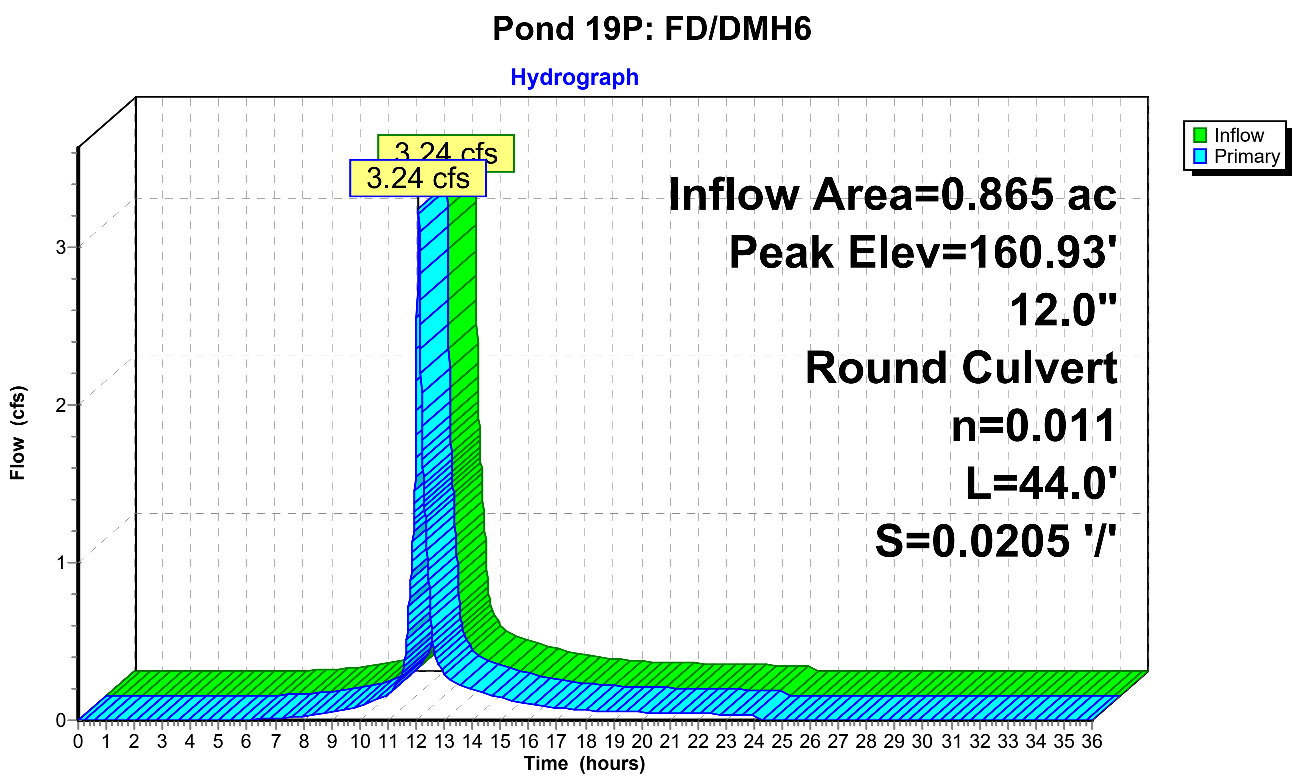
Summary for Pond 19P: FD/DMH6

Inflow Area =	0.865 ac,	80.06% Impervious,	Inflow Depth = 3.25"	for 10-Year Storm event	
Inflow =	3.24 cfs @	12.08 hrs,	Volume=	0.234 af	
Outflow =	3.24 cfs @	12.08 hrs,	Volume=	0.234 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.24 cfs @	12.08 hrs,	Volume=	0.234 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.93' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.70'	**12.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.70' / 158.80' S= 0.0205 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.24 cfs @ 12.08 hrs HW=160.93' TW=159.95' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.24 cfs @ 4.12 fps)



Summary for Pond 20P: DMH7&8

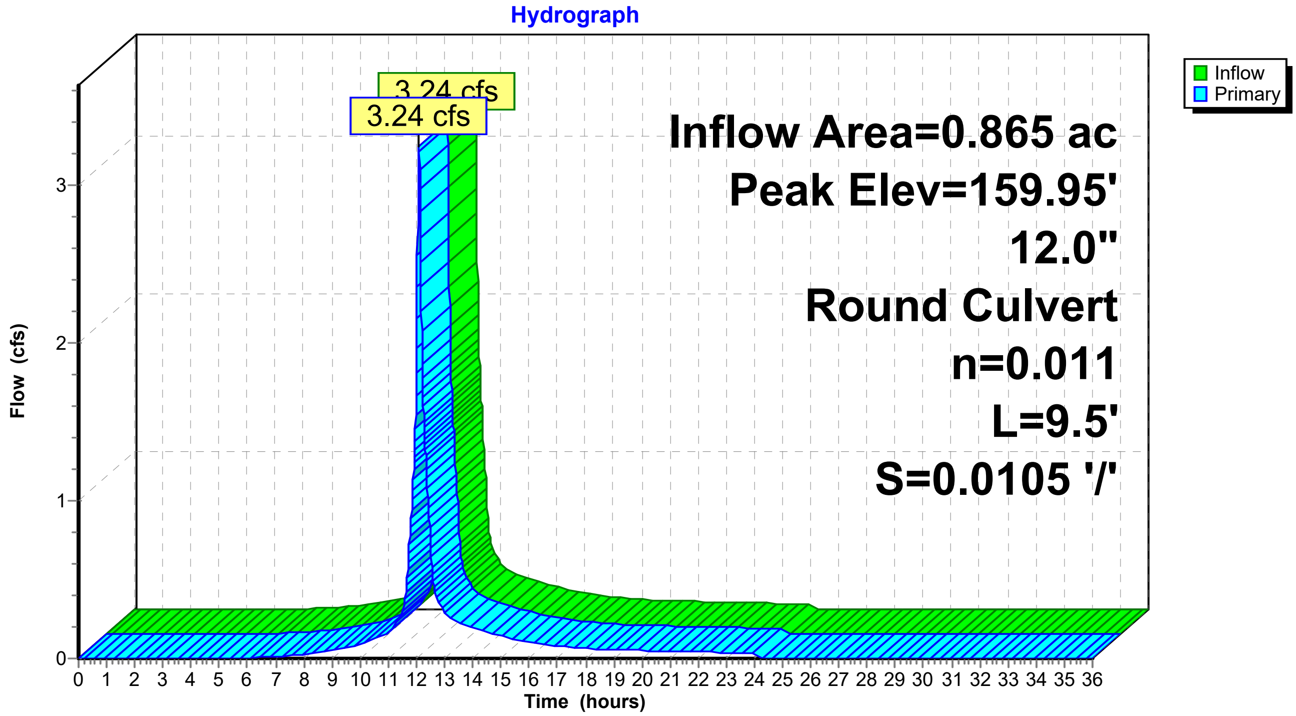
Inflow Area =	0.865 ac,	80.06% Impervious,	Inflow Depth = 3.25"	for 10-Year Storm event
Inflow =	3.24 cfs @	12.08 hrs, Volume=	0.234 af	
Outflow =	3.24 cfs @	12.08 hrs, Volume=	0.234 af, Atten= 0%, Lag= 0.0 min	
Primary =	3.24 cfs @	12.08 hrs, Volume=	0.234 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 159.95' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 9.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0105 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.24 cfs @ 12.08 hrs HW=159.95' TW=158.74' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 3.24 cfs @ 4.12 fps)

Pond 20P: DMH7&8



Summary for Subcatchment 21P: P1h

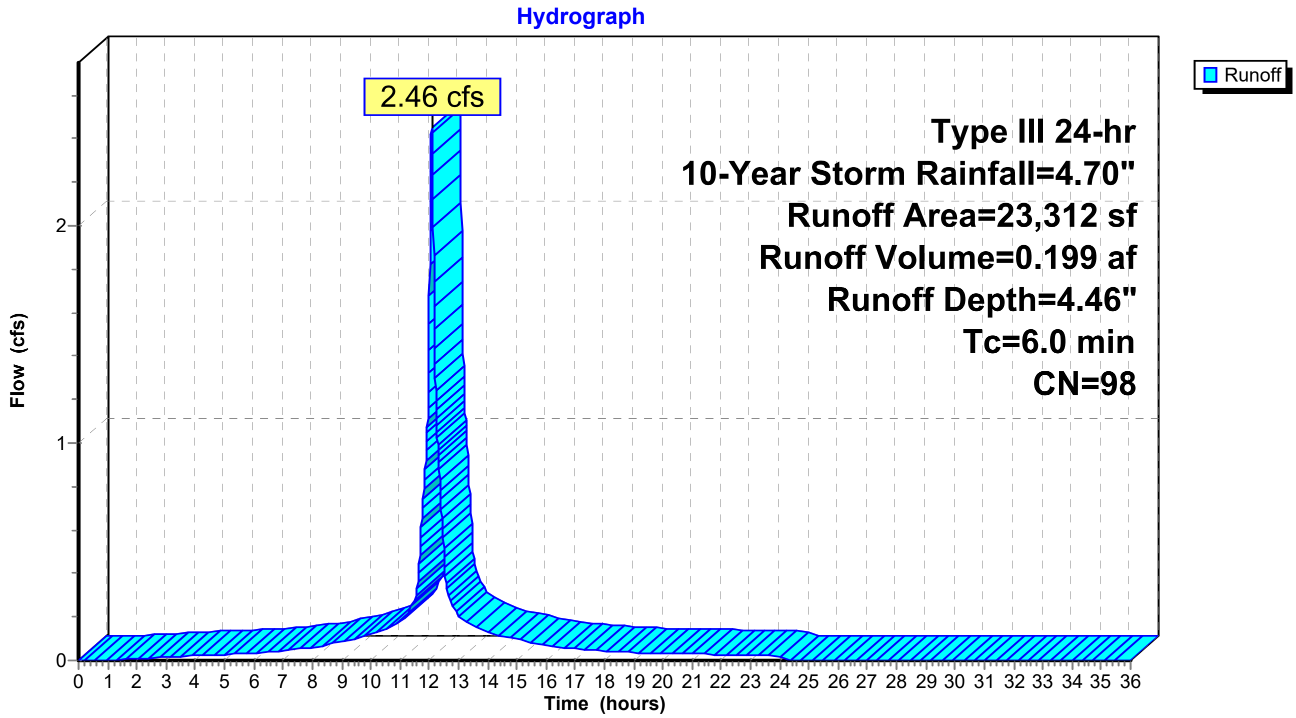
Runoff = 2.46 cfs @ 12.08 hrs, Volume= 0.199 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
23,312	98	Unconnected roofs, HSG A
23,312		100.00% Impervious Area
23,312		100.00% Unconnected

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

Subcatchment 21P: P1h



Summary for Pond 22P: Roof Pipe

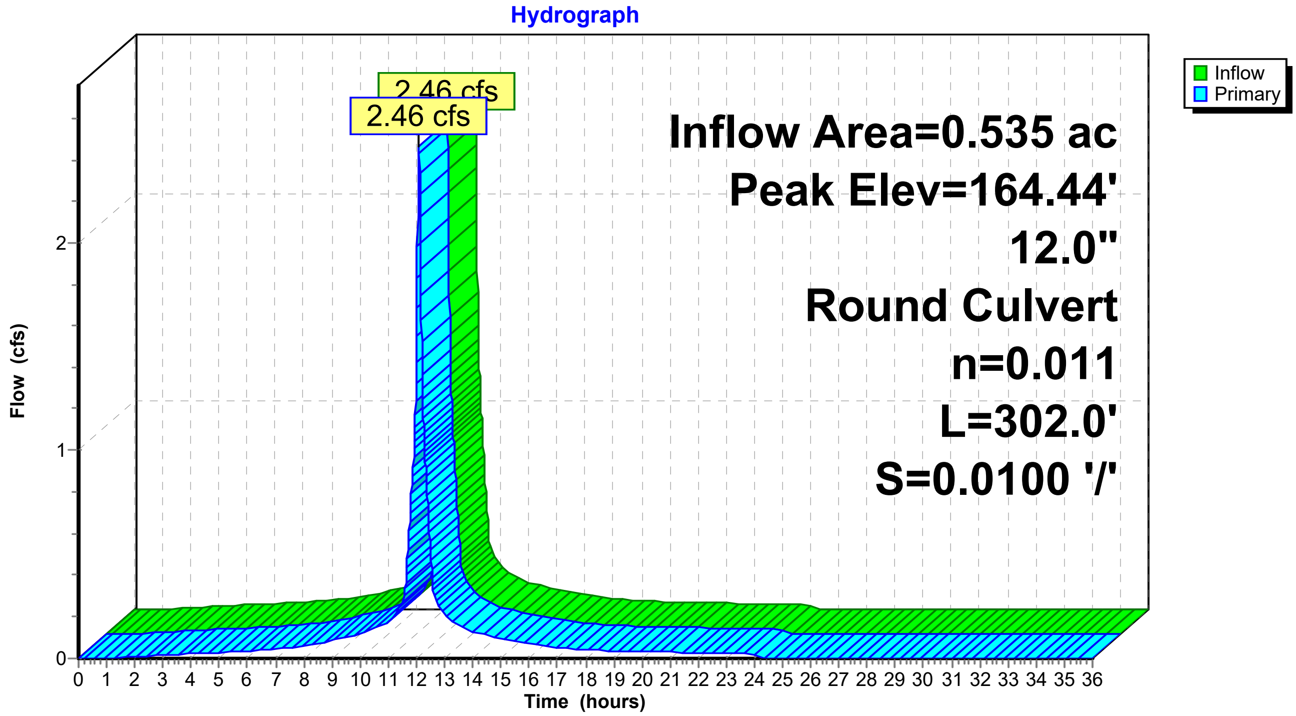
Inflow Area =	0.535 ac,100.00% Impervious,	Inflow Depth = 4.46"	for 10-Year Storm event	
Inflow =	2.46 cfs @	12.08 hrs, Volume=	0.199 af	
Outflow =	2.46 cfs @	12.08 hrs, Volume=	0.199 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.46 cfs @	12.08 hrs, Volume=	0.199 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 164.44' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.52'	**12.0" Round Culvert** L= 302.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.52' / 160.50' S= 0.0100 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.45 cfs @ 12.08 hrs HW=164.44' TW=158.74' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.45 cfs @ 3.26 fps)

Pond 22P: Roof Pipe



Summary for Pond 23P: Infiltration Field #1a

Inflow Area = 8.040 ac, 37.99% Impervious, Inflow Depth = 1.99" for 10-Year Storm event
Inflow = 12.44 cfs @ 12.14 hrs, Volume= 1.336 af
Outflow = 7.90 cfs @ 12.29 hrs, Volume= 1.336 af, Atten= 37%, Lag= 8.6 min
Discarded = 1.91 cfs @ 11.82 hrs, Volume= 1.123 af
Primary = 5.99 cfs @ 12.29 hrs, Volume= 0.213 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 159.79' @ 12.70 hrs Surf.Area= 9,970 sf Storage= 12,567 cf

Plug-Flow detention time= 35.0 min calculated for 1.336 af (100% of inflow)
Center-of-Mass det. time= 35.0 min (871.6 - 836.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	158.00'	9,894 cf	**130.17'W x 76.50'L x 3.88'H Field A**
			38,586 cf Overall - 13,851 cf Embedded = 24,735 cf x 40.0% Voids
#2A	158.50'	13,851 cf	**Cultec R-330XLHD** x 260 Inside #1
			Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
			Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
			Row Length Adjustment= +1.50' x 7.45 sf x 26 rows
#3	158.00'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		23,821 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf
#3	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf
#4	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf
#5	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf

Discarded OutFlow Max=1.91 cfs @ 11.82 hrs HW=158.06' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 1.91 cfs)

Primary OutFlow Max=5.53 cfs @ 12.29 hrs HW=159.32' TW=159.15' (Dynamic Tailwater)
├─**2=Culvert** (Outlet Controls 1.38 cfs @ 2.71 fps)
├─**3=Culvert** (Outlet Controls 1.38 cfs @ 2.71 fps)
├─**4=Culvert** (Outlet Controls 1.38 cfs @ 2.71 fps)
└─**5=Culvert** (Outlet Controls 1.38 cfs @ 2.71 fps)

Pond 23P: Infiltration Field #1a - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 26 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

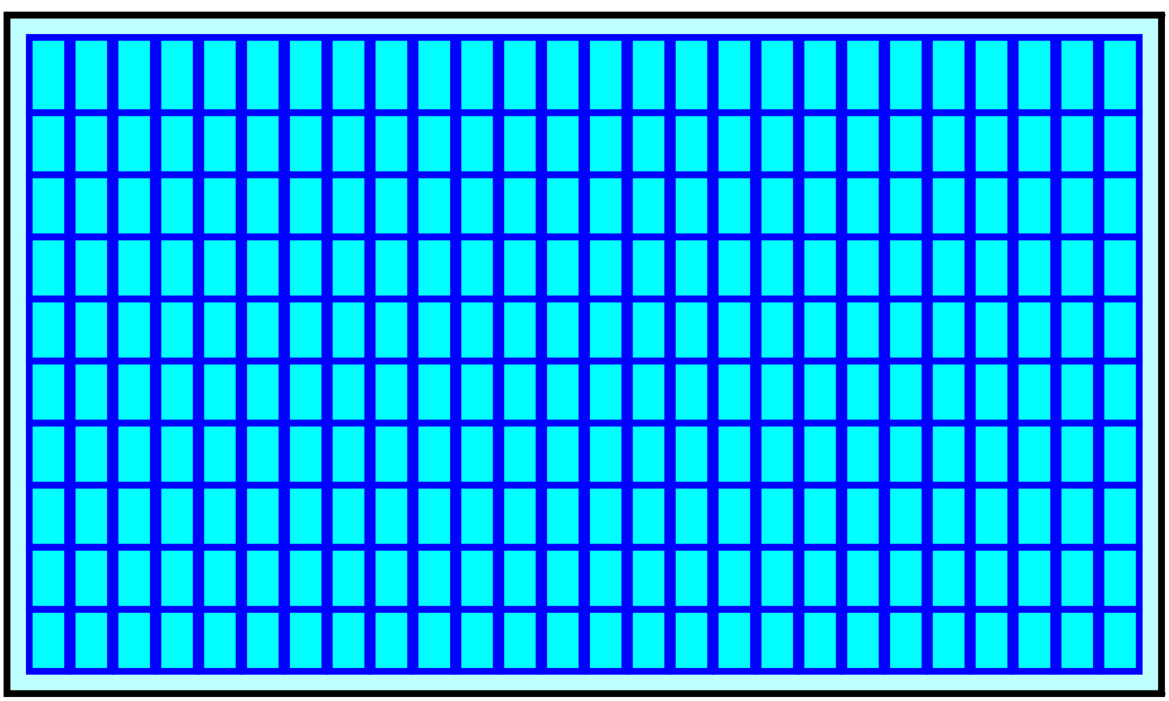
10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +30.0" End Stone x 2 = 76.50' Base Length
26 Rows x 52.0" Wide + 6.0" Spacing x 25 + 30.0" Side Stone x 2 = 130.17' Base Width
6.0" Base + 30.5" Chamber Height + 10.0" Cover = 3.88' Field Height

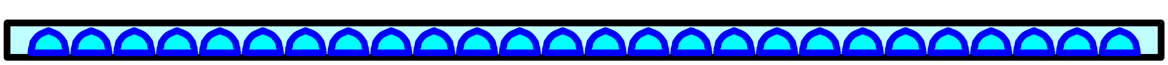
260 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 26 Rows = 13,851.4 cf Chamber Storage

38,586.3 cf Field - 13,851.4 cf Chambers = 24,734.9 cf Stone x 40.0% Voids = 9,893.9 cf Stone Storage

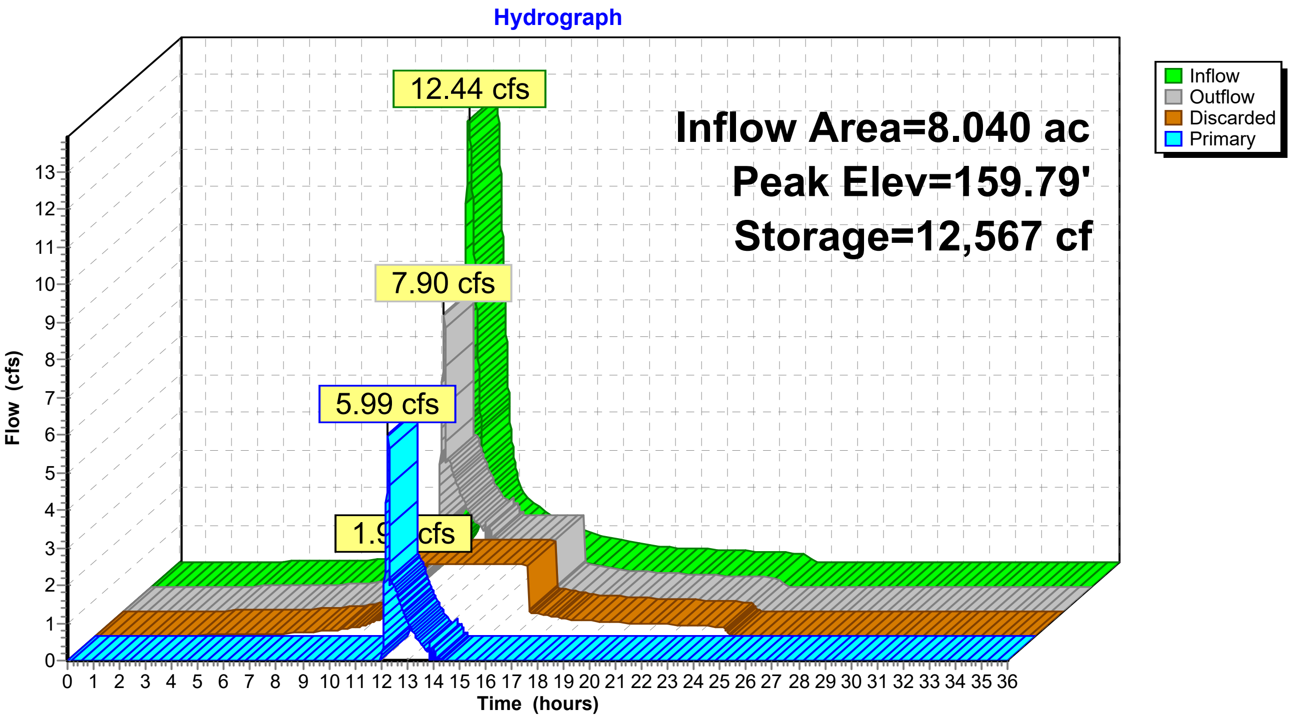
Chamber Storage + Stone Storage = 23,745.4 cf = 0.545 af
Overall Storage Efficiency = 61.5%
Overall System Size = 76.50' x 130.17' x 3.88'

260 Chambers
1,429.1 cy Field
916.1 cy Stone





Pond 23P: Infiltration Field #1a



Summary for Pond 24P: Infiltration Field #1b

Inflow Area = 8.040 ac, 37.99% Impervious, Inflow Depth = 0.32" for 10-Year Storm event
Inflow = 5.99 cfs @ 12.29 hrs, Volume= 0.213 af
Outflow = 1.61 cfs @ 12.70 hrs, Volume= 0.213 af, Atten= 73%, Lag= 24.6 min
Discarded = 0.18 cfs @ 12.11 hrs, Volume= 0.096 af
Primary = 1.42 cfs @ 12.70 hrs, Volume= 0.117 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 159.78' @ 12.70 hrs Surf.Area= 3,315 sf Storage= 4,026 cf

Plug-Flow detention time= 80.4 min calculated for 0.213 af (100% of inflow)
Center-of-Mass det. time= 80.4 min (839.5 - 759.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	158.00'	3,414 cf	**43.17'W x 76.50'L x 3.88'H Field A** 12,796 cf Overall - 4,262 cf Embedded = 8,534 cf x 40.0% Voids
#2A	158.50'	4,262 cf	**Cultec R-330XLHD** x 80 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 8 rows
#3	158.00'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		7,751 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	159.15'	**12.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.15' / 156.00' S= 0.1432 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#3	Primary	160.00'	**8.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.00' / 156.00' S= 0.1818 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Discarded OutFlow Max=0.18 cfs @ 12.11 hrs HW=158.07' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=1.42 cfs @ 12.70 hrs HW=159.78' TW=0.00' (Dynamic Tailwater)
├─**2=Culvert** (Inlet Controls 1.42 cfs @ 2.71 fps)
└─**3=Culvert** (Controls 0.00 cfs)

Pond 24P: Infiltration Field #1b - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 8 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

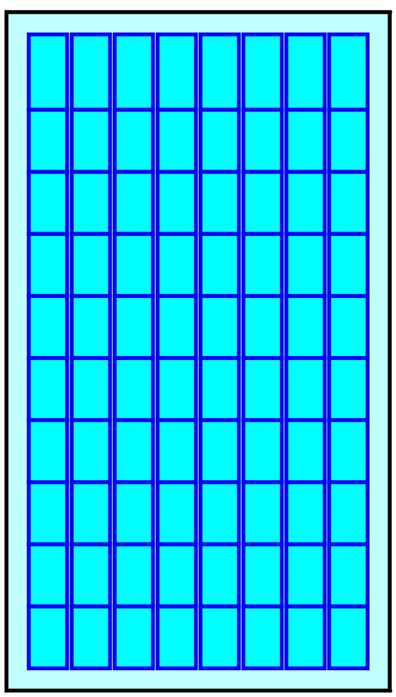
10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +30.0" End Stone x 2 = 76.50' Base Length
8 Rows x 52.0" Wide + 6.0" Spacing x 7 + 30.0" Side Stone x 2 = 43.17' Base Width
6.0" Base + 30.5" Chamber Height + 10.0" Cover = 3.88' Field Height

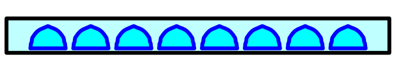
80 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 8 Rows = 4,262.0 cf Chamber Storage

12,796.2 cf Field - 4,262.0 cf Chambers = 8,534.2 cf Stone x 40.0% Voids = 3,413.7 cf Stone Storage

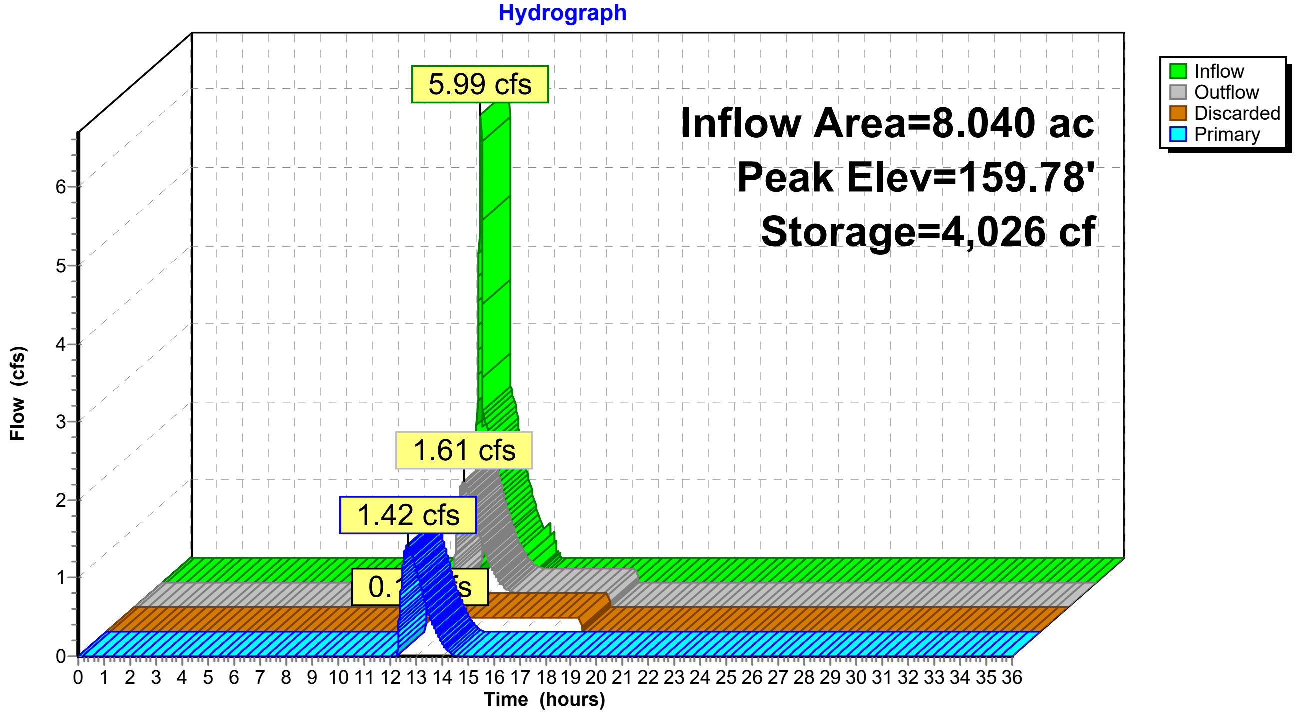
Chamber Storage + Stone Storage = 7,675.7 cf = 0.176 af
Overall Storage Efficiency = 60.0%
Overall System Size = 76.50' x 43.17' x 3.88'

80 Chambers
473.9 cy Field
316.1 cy Stone





Pond 24P: Infiltration Field #1b



Summary for Subcatchment 25P: P2a

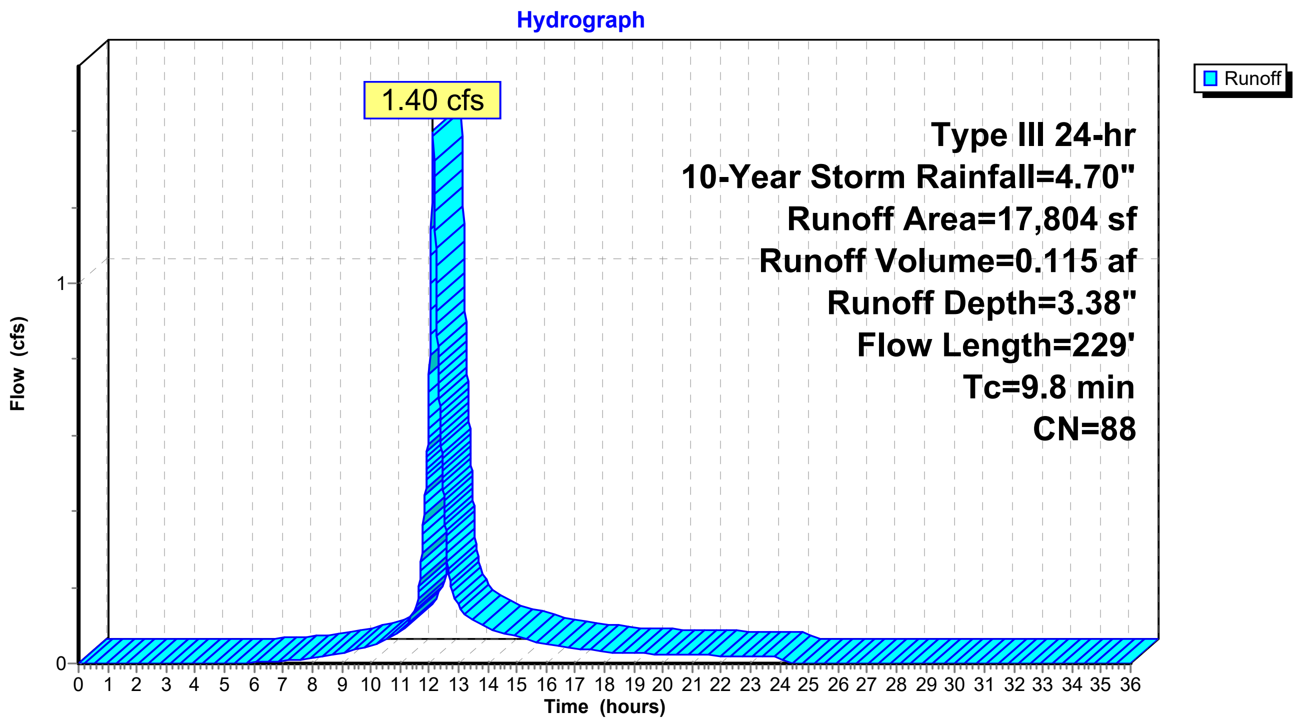
Runoff = 1.40 cfs @ 12.14 hrs, Volume= 0.115 af, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
218	98	Paved parking, HSG A
12,048	98	Paved parking, HSG B
1,239	79	<50% Grass cover, Poor, HSG B
4,299	61	>75% Grass cover, Good, HSG B
17,804	88	Weighted Average
5,538		31.11% Pervious Area
12,266		68.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	83	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.5	146	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.8	229	Total			

Subcatchment 25P: P2a



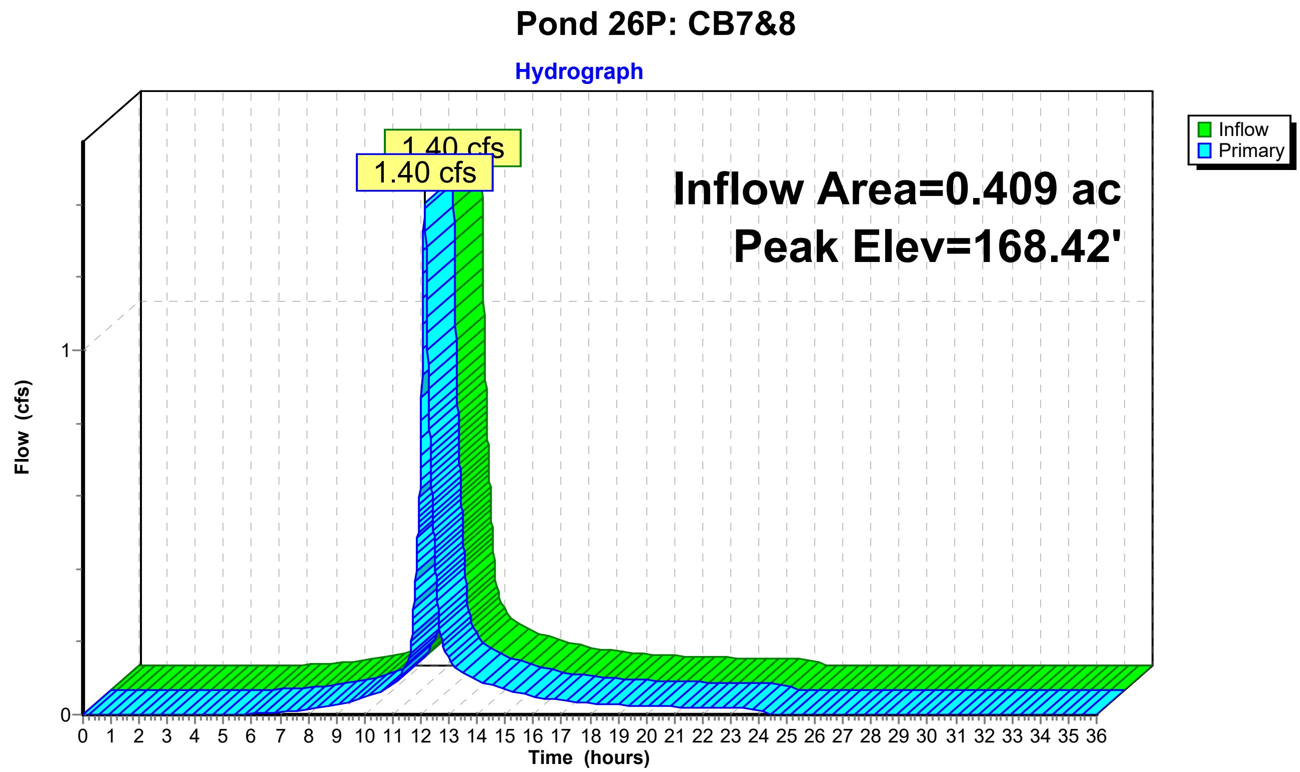
Summary for Pond 26P: CB7&8

Inflow Area = 0.409 ac, 68.89% Impervious, Inflow Depth = 3.38" for 10-Year Storm event
Inflow = 1.40 cfs @ 12.14 hrs, Volume= 0.115 af
Outflow = 1.40 cfs @ 12.14 hrs, Volume= 0.115 af, Atten= 0%, Lag= 0.0 min
Primary = 1.40 cfs @ 12.14 hrs, Volume= 0.115 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 168.42' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	168.00'	**12.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 167.20' S= 0.0190 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Primary	168.00'	**12.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 167.20' S= 0.0727 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.40 cfs @ 12.14 hrs HW=168.42' TW=167.73' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.70 cfs @ 2.21 fps)
2=Culvert (Inlet Controls 0.70 cfs @ 2.21 fps)



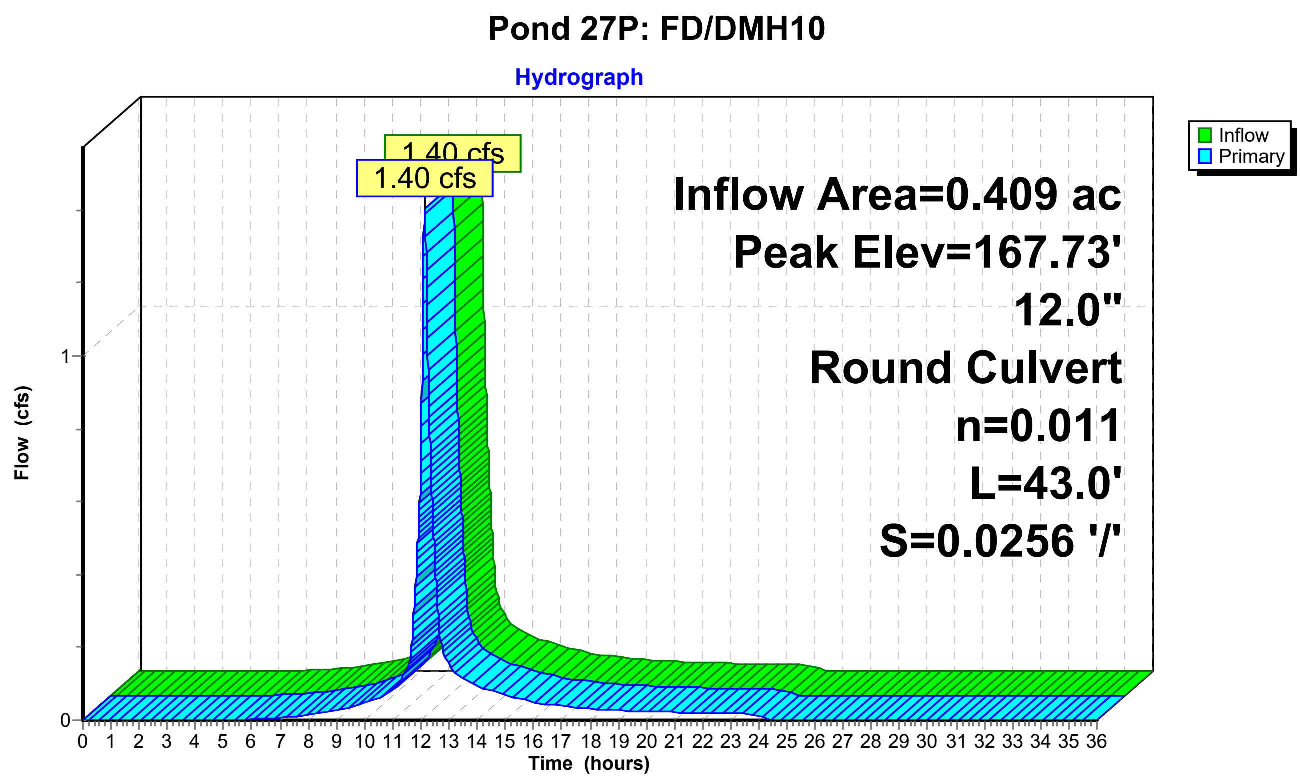
Summary for Pond 27P: FD/DMH10

Inflow Area =	0.409 ac,	68.89% Impervious,	Inflow Depth = 3.38"	for 10-Year Storm event
Inflow =	1.40 cfs @	12.14 hrs, Volume=	0.115 af	
Outflow =	1.40 cfs @	12.14 hrs, Volume=	0.115 af, Atten= 0%, Lag= 0.0 min	
Primary =	1.40 cfs @	12.14 hrs, Volume=	0.115 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 167.73' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	167.10'	**12.0" Round Culvert** L= 43.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.10' / 166.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.40 cfs @ 12.14 hrs HW=167.73' TW=165.68' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.40 cfs @ 2.70 fps)



Summary for Subcatchment 28P: P2b

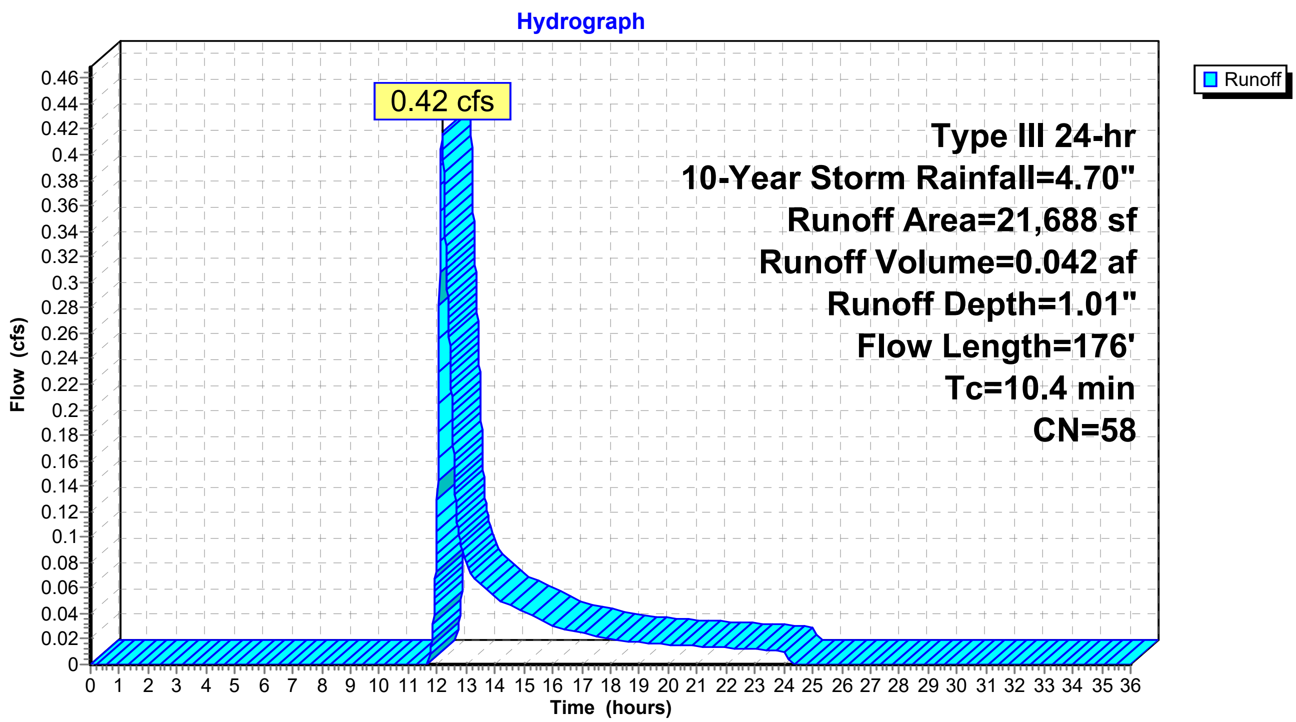
Runoff = 0.42 cfs @ 12.17 hrs, Volume= 0.042 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
1,358	98	Paved parking, HSG B
8,334	61	>75% Grass cover, Good, HSG B
3,244	39	>75% Grass cover, Good, HSG A
8,752	55	Woods, Good, HSG B
21,688	58	Weighted Average
20,330		93.74% Pervious Area
1,358		6.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	61	0.0600	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	92	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	23	0.2200	3.28		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.4	176	Total			

Subcatchment 28P: P2b



Summary for Subcatchment 29P: P2c

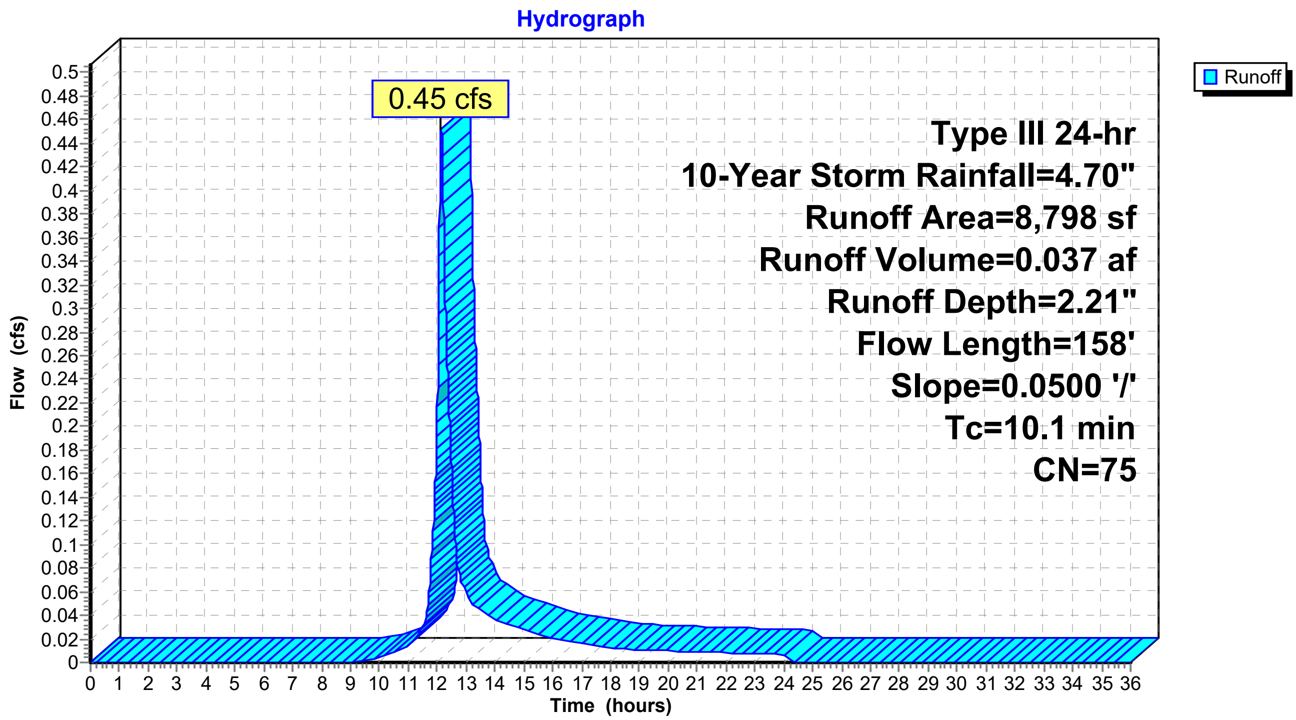
Runoff = 0.45 cfs @ 12.15 hrs, Volume= 0.037 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
62	98	Paved parking, HSG A
3,785	98	Paved parking, HSG B
8	39	>75% Grass cover, Good, HSG A
2,132	61	>75% Grass cover, Good, HSG B
2,811	55	Woods, Good, HSG B
8,798	75	Weighted Average
4,951		56.27% Pervious Area
3,847		43.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	35	0.0500	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
4.3	21	0.0500	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.5	102	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.1	158	Total			

Subcatchment 29P: P2c



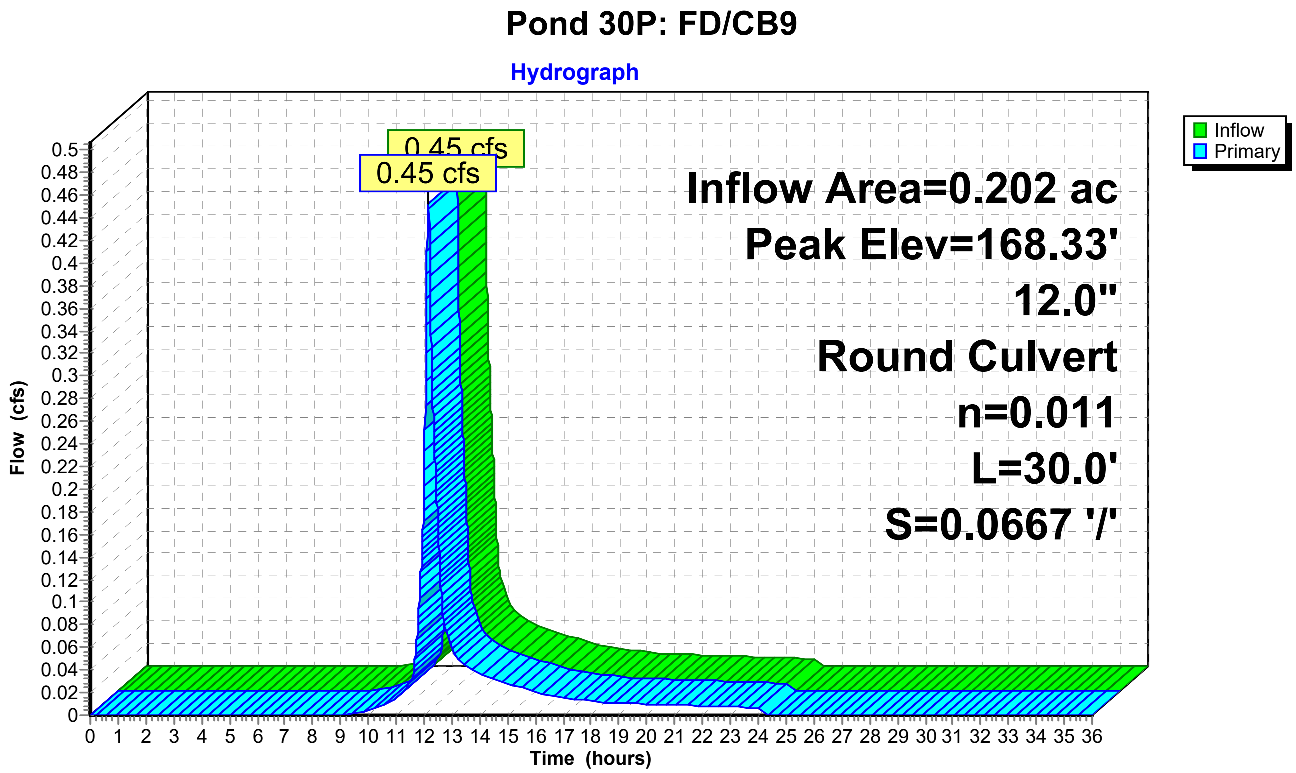
Summary for Pond 30P: FD/CB9

Inflow Area =	0.202 ac,	43.73% Impervious,	Inflow Depth = 2.21"	for 10-Year Storm event
Inflow =	0.45 cfs @	12.15 hrs, Volume=	0.037 af	
Outflow =	0.45 cfs @	12.15 hrs, Volume=	0.037 af, Atten= 0%, Lag= 0.0 min	
Primary =	0.45 cfs @	12.15 hrs, Volume=	0.037 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 168.33' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	168.00'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 166.00' S= 0.0667 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.45 cfs @ 12.15 hrs HW=168.33' TW=165.70' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.45 cfs @ 1.97 fps)



Summary for Pond 31P: Basin

Inflow Area = 1.109 ac, 36.18% Impervious, Inflow Depth = 2.10" for 10-Year Storm event
Inflow = 2.26 cfs @ 12.14 hrs, Volume= 0.194 af
Outflow = 0.70 cfs @ 12.54 hrs, Volume= 0.194 af, Atten= 69%, Lag= 24.0 min
Discarded = 0.70 cfs @ 12.54 hrs, Volume= 0.194 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.96' @ 12.54 hrs Surf.Area= 3,676 sf Storage= 1,616 cf

Plug-Flow detention time= 12.2 min calculated for 0.194 af (100% of inflow)
Center-of-Mass det. time= 12.2 min (842.0 - 829.8)

Volume	Invert	Avail.Storage	Storage Description
#1	165.50'	11,005 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

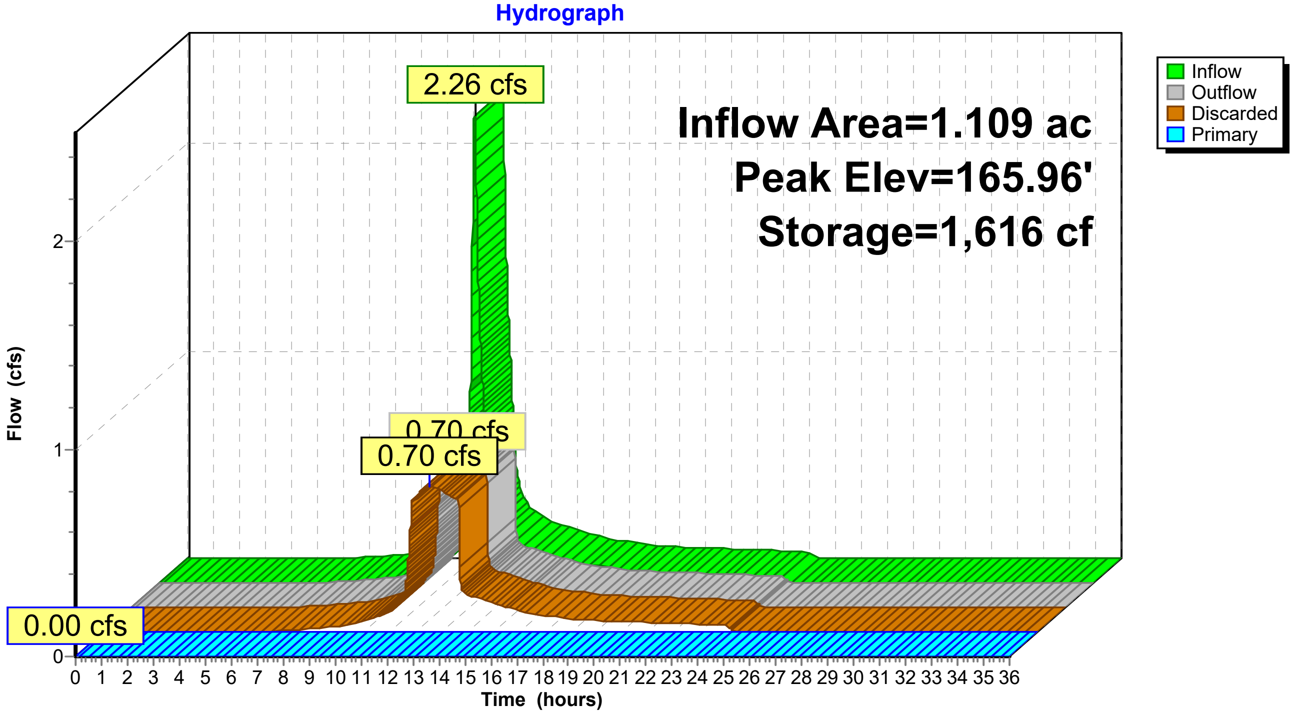
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
165.50	3,291	222.0	0	0	3,291
168.00	5,616	282.0	11,005	11,005	5,779

Device	Routing	Invert	Outlet Devices
#1	Discarded	165.50'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	166.60'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 166.60' / 161.00' S= 0.1120 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Discarded OutFlow Max=0.70 cfs @ 12.54 hrs HW=165.96' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.70 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=165.50' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 31P: Basin



Summary for Subcatchment 32P: P3f

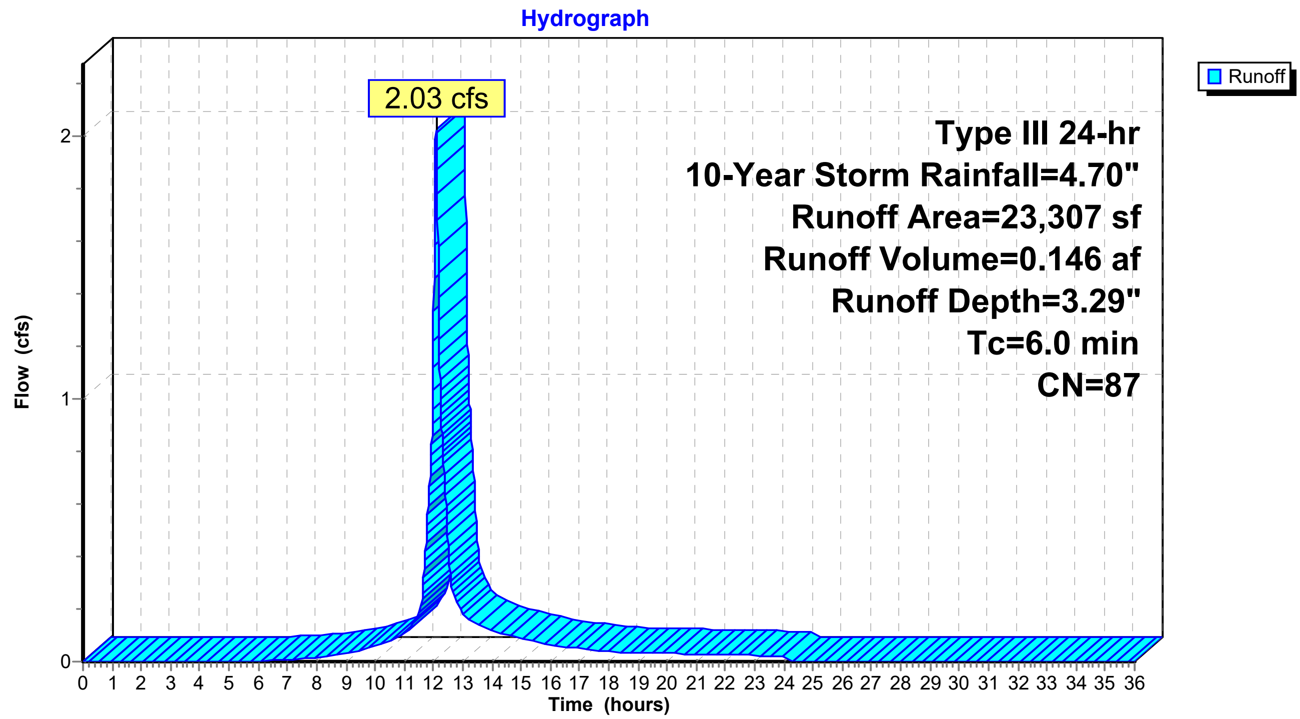
Runoff = 2.03 cfs @ 12.09 hrs, Volume= 0.146 af, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
5,626	98	Roofs, HSG A
11,048	98	Roofs, HSG B
516	98	Paved parking, HSG B
1,861	39	>75% Grass cover, Good, HSG A
4,256	61	>75% Grass cover, Good, HSG B
23,307	87	Weighted Average
6,117		26.25% Pervious Area
17,190		73.75% Impervious Area

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

Subcatchment 32P: P3f



Summary for Subcatchment 33P: P3a

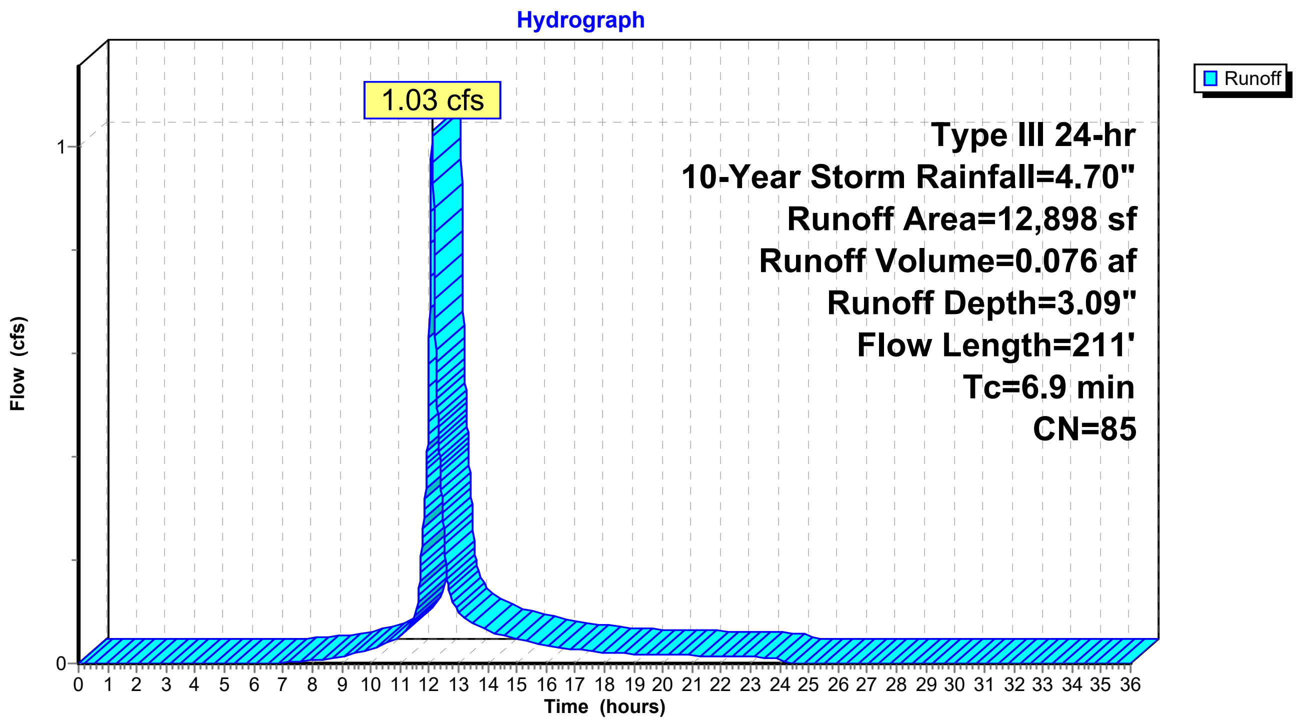
Runoff = 1.03 cfs @ 12.10 hrs, Volume= 0.076 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
3,379	98	Paved parking, HSG A
5,537	98	Paved parking, HSG B
692	39	>75% Grass cover, Good, HSG A
3,290	61	>75% Grass cover, Good, HSG B
12,898	85	Weighted Average
3,982		30.87% Pervious Area
8,916		69.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	66	0.0700	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	145	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.9	211	Total			

Subcatchment 33P: P3a



Summary for Pond 34P: CB10

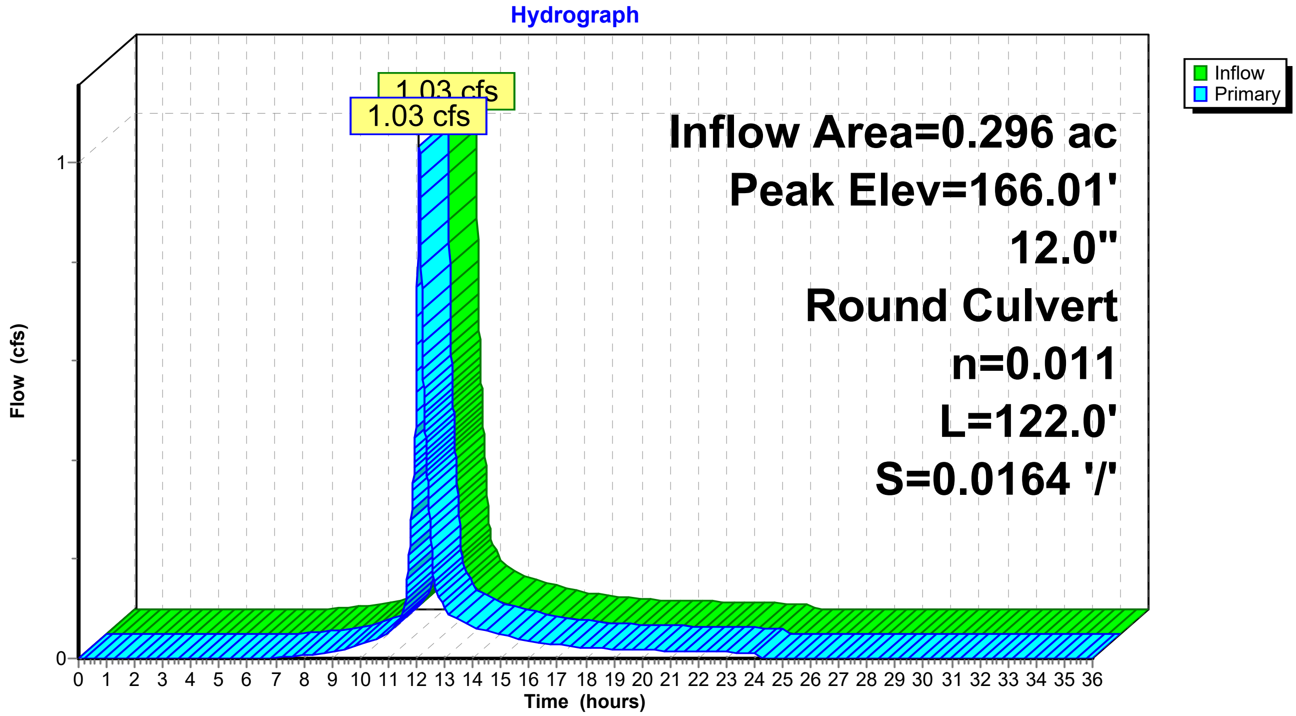
Inflow Area =	0.296 ac,	69.13% Impervious,	Inflow Depth = 3.09"	for 10-Year Storm event
Inflow =	1.03 cfs @	12.10 hrs, Volume=	0.076 af	
Outflow =	1.03 cfs @	12.10 hrs, Volume=	0.076 af, Atten= 0%, Lag= 0.0 min	
Primary =	1.03 cfs @	12.10 hrs, Volume=	0.076 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.01' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.00'	**12.0" Round Culvert** L= 122.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.00' / 161.00' S= 0.0164 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.04 cfs @ 12.10 hrs HW=166.01' TW=165.90' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.04 cfs @ 1.33 fps)

Pond 34P: CB10



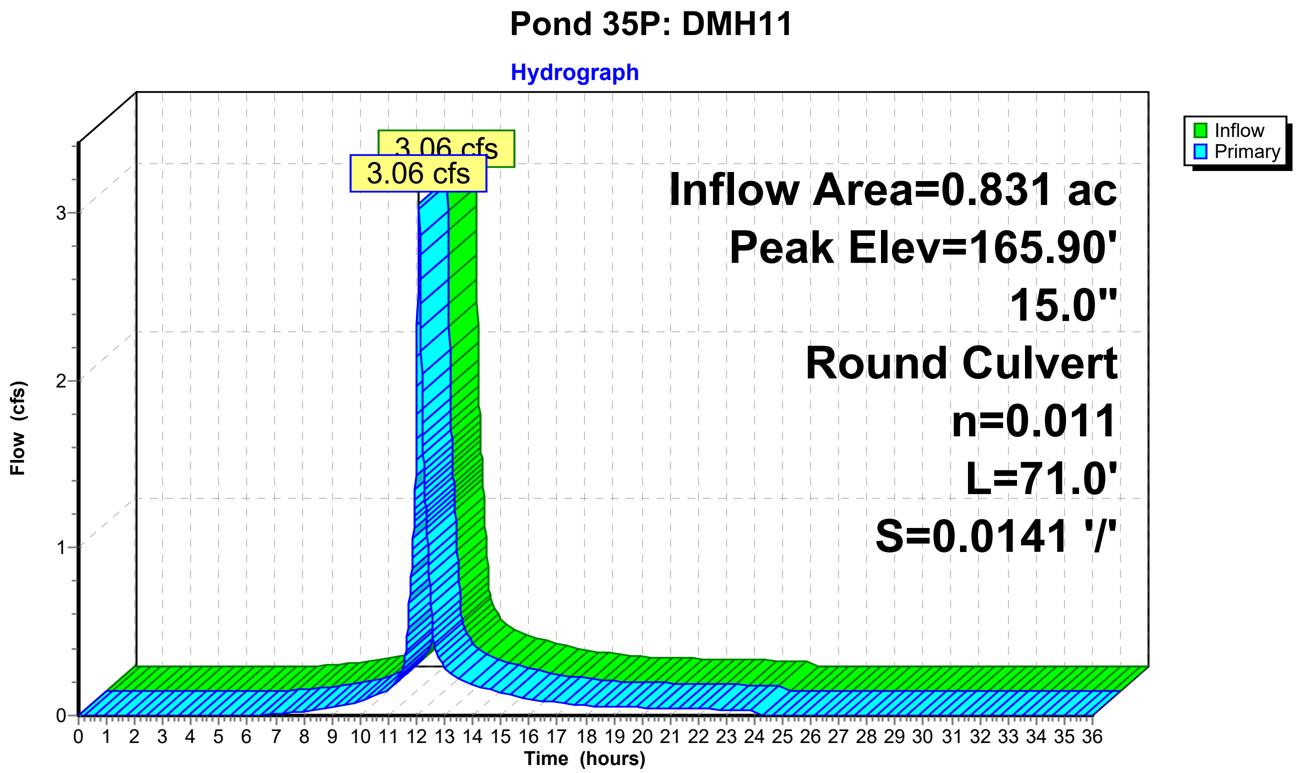
Summary for Pond 35P: DMH11

Inflow Area =	0.831 ac,	72.11% Impervious,	Inflow Depth = 3.22"	for 10-Year Storm event
Inflow =	3.06 cfs @	12.09 hrs, Volume=	0.223 af	
Outflow =	3.06 cfs @	12.09 hrs, Volume=	0.223 af, Atten= 0%, Lag= 0.0 min	
Primary =	3.06 cfs @	12.09 hrs, Volume=	0.223 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.90' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**15.0" Round Culvert** L= 71.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 164.00' S= 0.0141 '/' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.06 cfs @ 12.09 hrs HW=165.90' TW=164.88' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.06 cfs @ 3.23 fps)



Summary for Subcatchment 36P: P3b

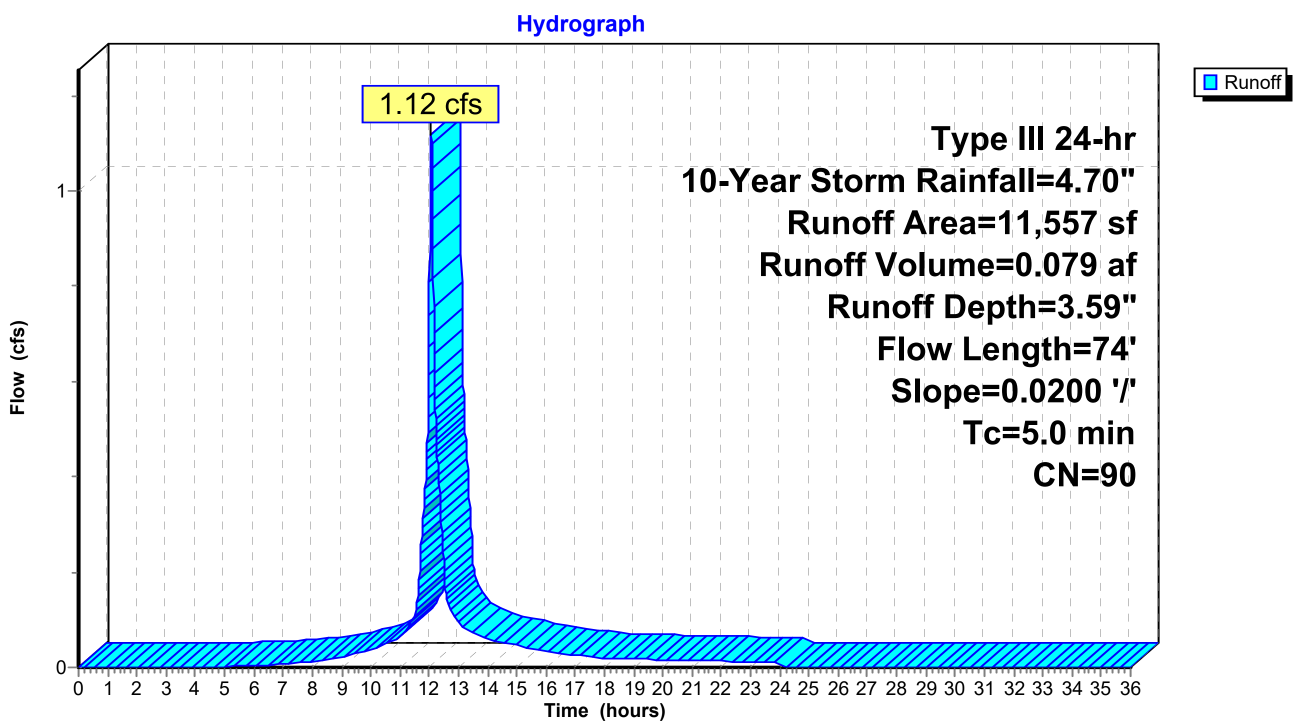
Runoff = 1.12 cfs @ 12.07 hrs, Volume= 0.079 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
10,048	98	Paved parking, HSG A
1,509	39	>75% Grass cover, Good, HSG A
11,557	90	Weighted Average
1,509		13.06% Pervious Area
10,048		86.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	14	0.0200	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.8	60	0.0200	1.24		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.8	74	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 36P: P3b



Summary for Pond 37P: CB11

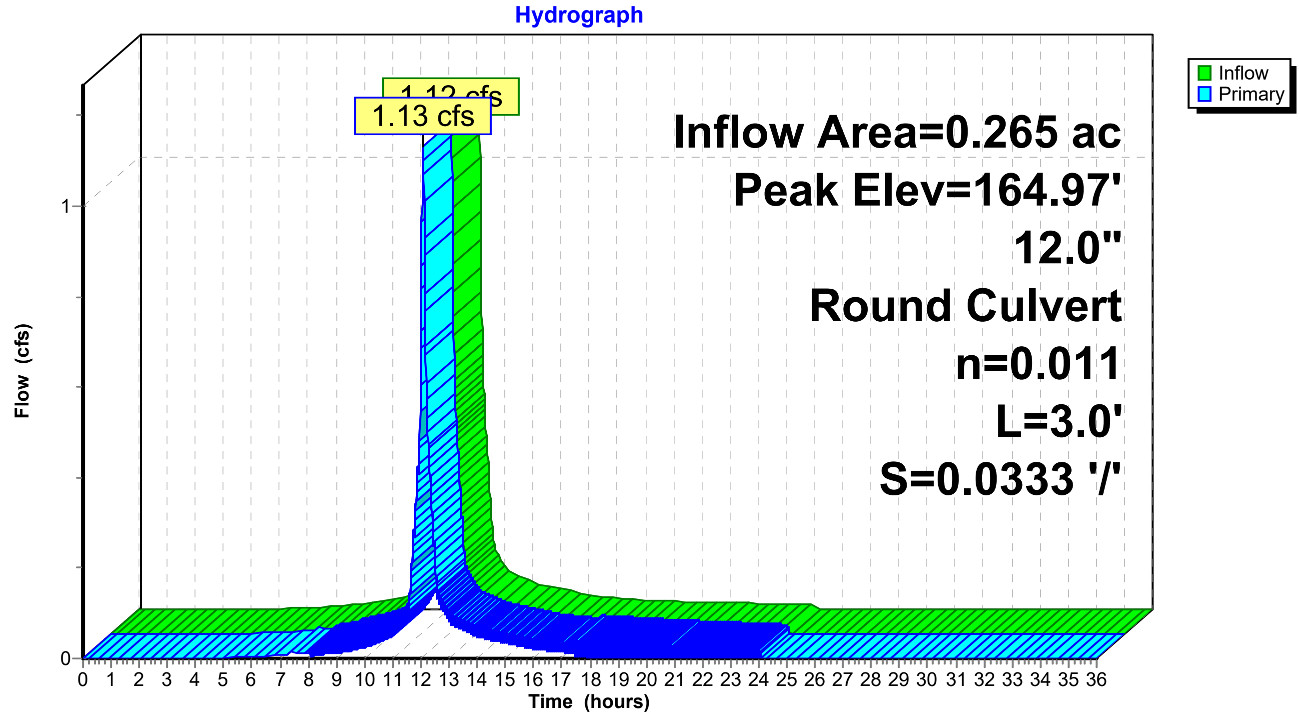
Inflow Area =	0.265 ac,	86.94% Impervious,	Inflow Depth = 3.59"	for 10-Year Storm event
Inflow =	1.12 cfs @	12.07 hrs, Volume=	0.079 af	
Outflow =	1.13 cfs @	12.07 hrs, Volume=	0.079 af, Atten= 0%, Lag= 0.0 min	
Primary =	1.13 cfs @	12.07 hrs, Volume=	0.079 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 164.97' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	161.10'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.10' / 161.00' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.99 cfs @ 12.07 hrs HW=164.94' TW=164.88' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.99 cfs @ 1.26 fps)

Pond 37P: CB11



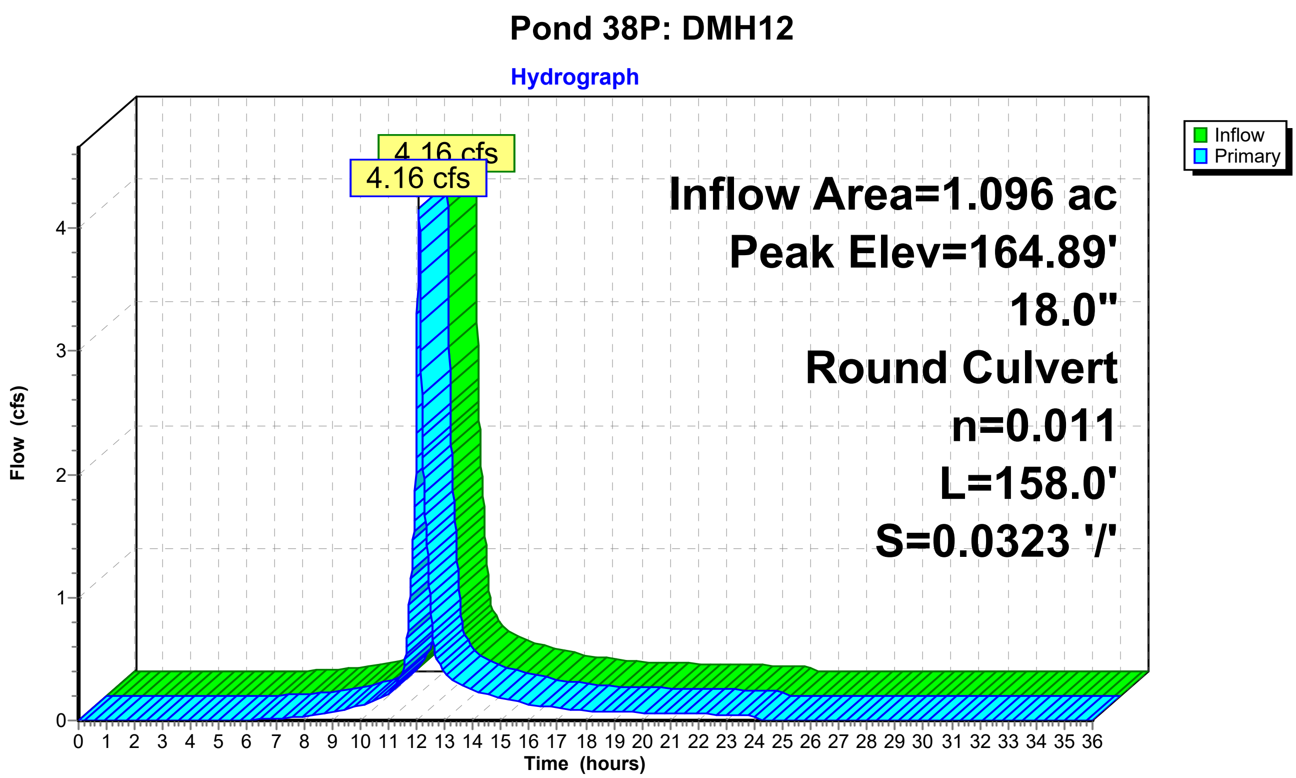
Summary for Pond 38P: DMH12

Inflow Area =	1.096 ac,	75.70% Impervious,	Inflow Depth = 3.31"	for 10-Year Storm event
Inflow =	4.16 cfs @	12.09 hrs, Volume=	0.302 af	
Outflow =	4.16 cfs @	12.09 hrs, Volume=	0.302 af, Atten= 0%, Lag= 0.0 min	
Primary =	4.16 cfs @	12.09 hrs, Volume=	0.302 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 164.89' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.90'	**18.0" Round Culvert** L= 158.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.90' / 158.80' S= 0.0323 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=4.15 cfs @ 12.09 hrs HW=164.88' TW=159.73' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.15 cfs @ 3.38 fps)



Summary for Pond 39P: FD/DMH13&14

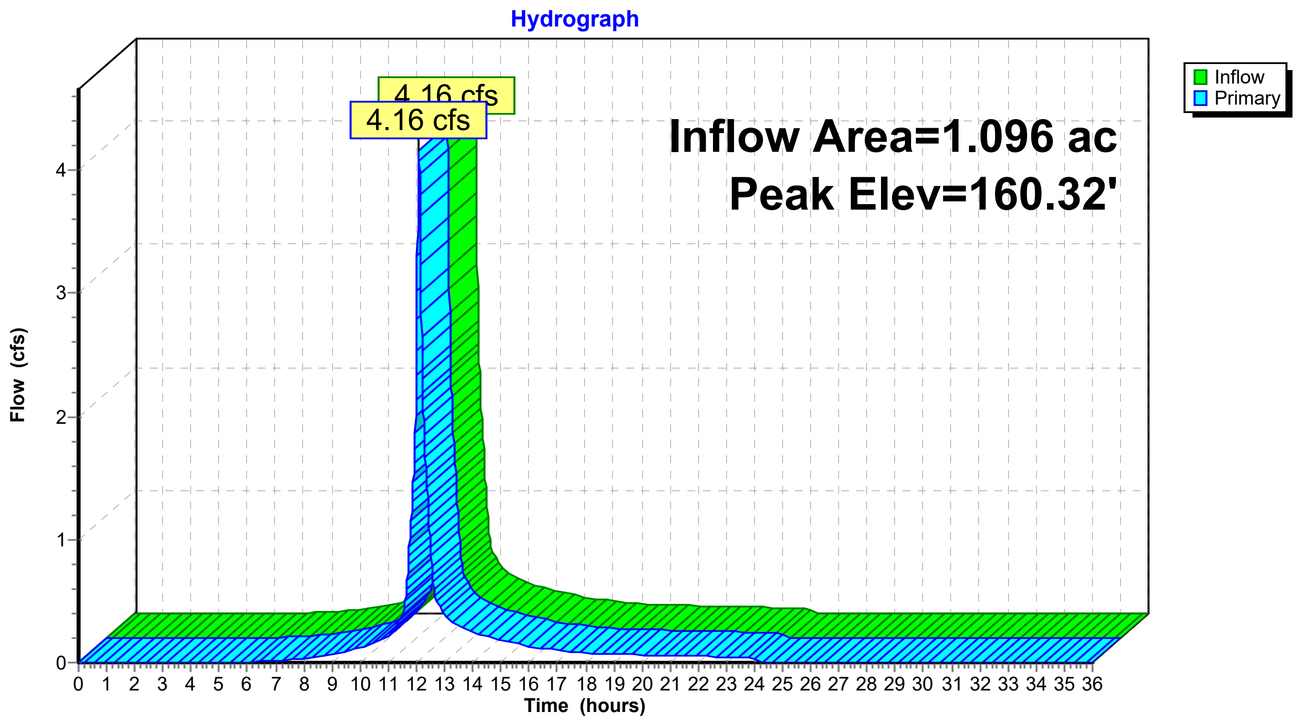
Inflow Area = 1.096 ac, 75.70% Impervious, Inflow Depth = 3.31" for 10-Year Storm event
Inflow = 4.16 cfs @ 12.09 hrs, Volume= 0.302 af
Outflow = 4.16 cfs @ 12.09 hrs, Volume= 0.302 af, Atten= 0%, Lag= 0.0 min
Primary = 4.16 cfs @ 12.09 hrs, Volume= 0.302 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.32' @ 12.49 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Primary	158.60'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.72 cfs @ 12.09 hrs HW=159.73' TW=159.49' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.86 cfs @ 2.37 fps)
2=Culvert (Inlet Controls 1.86 cfs @ 2.37 fps)

Pond 39P: FD/DMH13&14



Summary for Subcatchment 40P: P3c

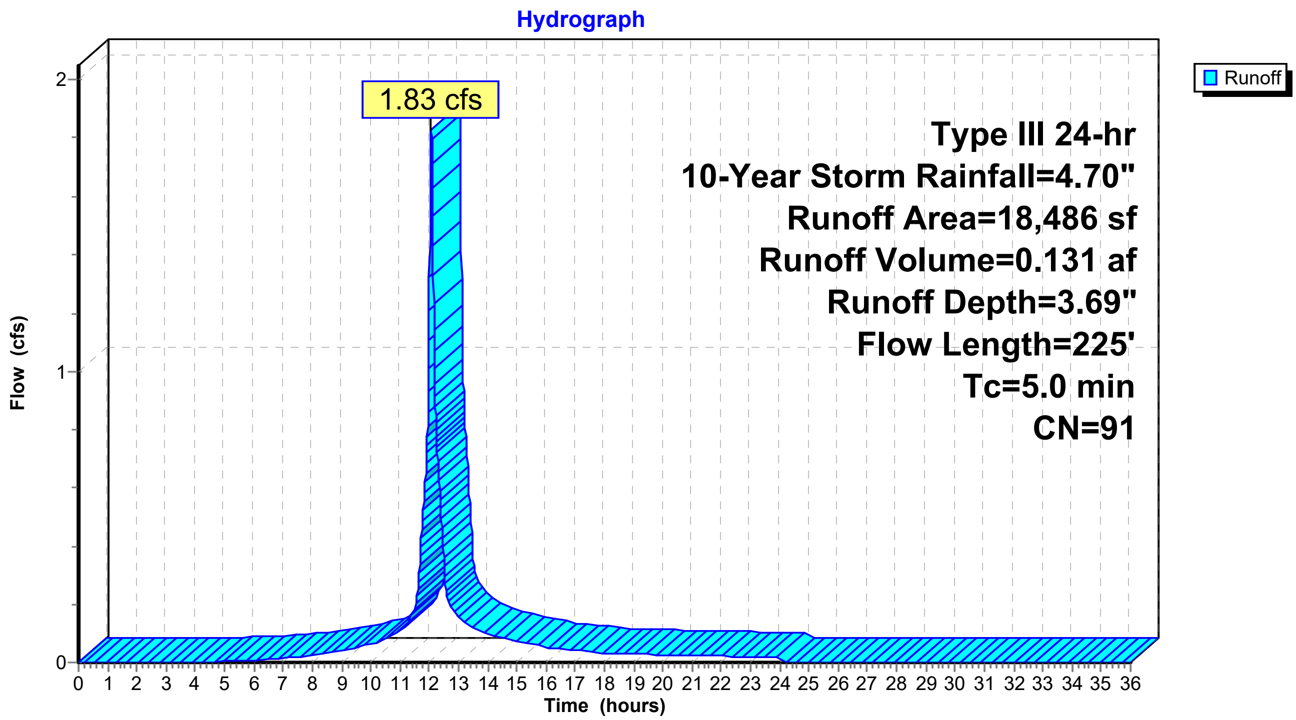
Runoff = 1.83 cfs @ 12.07 hrs, Volume= 0.131 af, Depth= 3.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
16,176	98	Paved parking, HSG A
2,310	39	>75% Grass cover, Good, HSG A
18,486	91	Weighted Average
2,310		12.50% Pervious Area
16,176		87.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0300	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.7	210	0.0400	2.11		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
4.4	225	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 40P: P3c



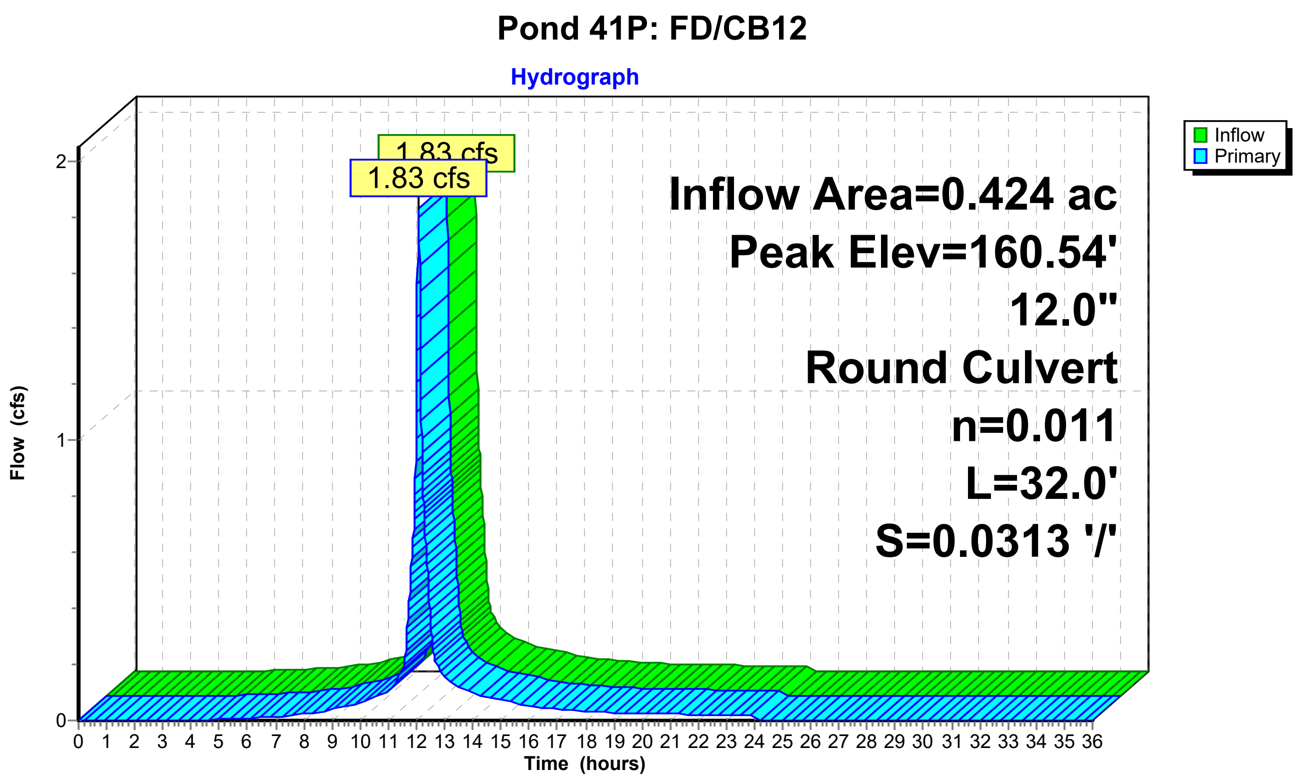
Summary for Pond 41P: FD/CB12

Inflow Area = 0.424 ac, 87.50% Impervious, Inflow Depth = 3.69" for 10-Year Storm event
Inflow = 1.83 cfs @ 12.07 hrs, Volume= 0.131 af
Outflow = 1.83 cfs @ 12.07 hrs, Volume= 0.131 af, Atten= 0%, Lag= 0.0 min
Primary = 1.83 cfs @ 12.07 hrs, Volume= 0.131 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.54' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.80'	**12.0" Round Culvert** L= 32.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.80' / 158.80' S= 0.0313 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.83 cfs @ 12.07 hrs HW=160.54' TW=159.90' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.83 cfs @ 2.93 fps)



Summary for Subcatchment 42P: P3d

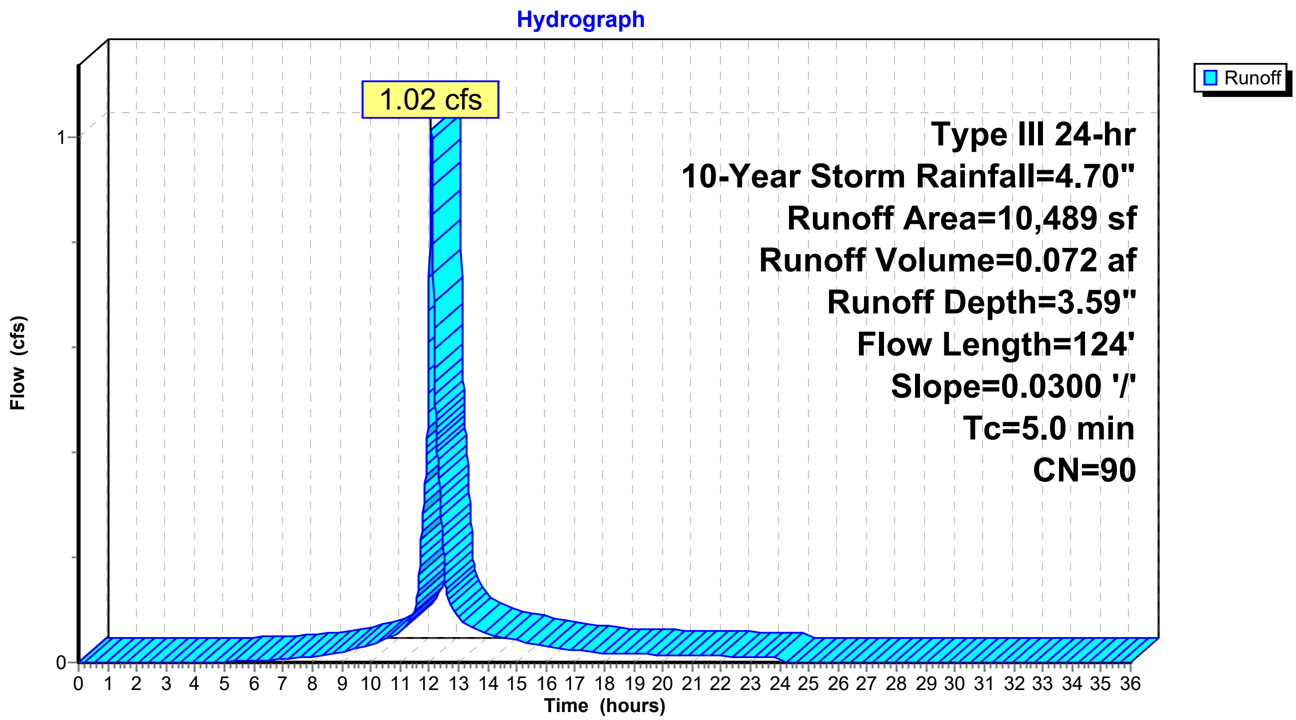
Runoff = 1.02 cfs @ 12.07 hrs, Volume= 0.072 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
9,019	98	Paved parking, HSG A
1,470	39	>75% Grass cover, Good, HSG A
10,489	90	Weighted Average
1,470		14.01% Pervious Area
9,019		85.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	14	0.0300	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	110	0.0300	1.65		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.6	124	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 42P: P3d



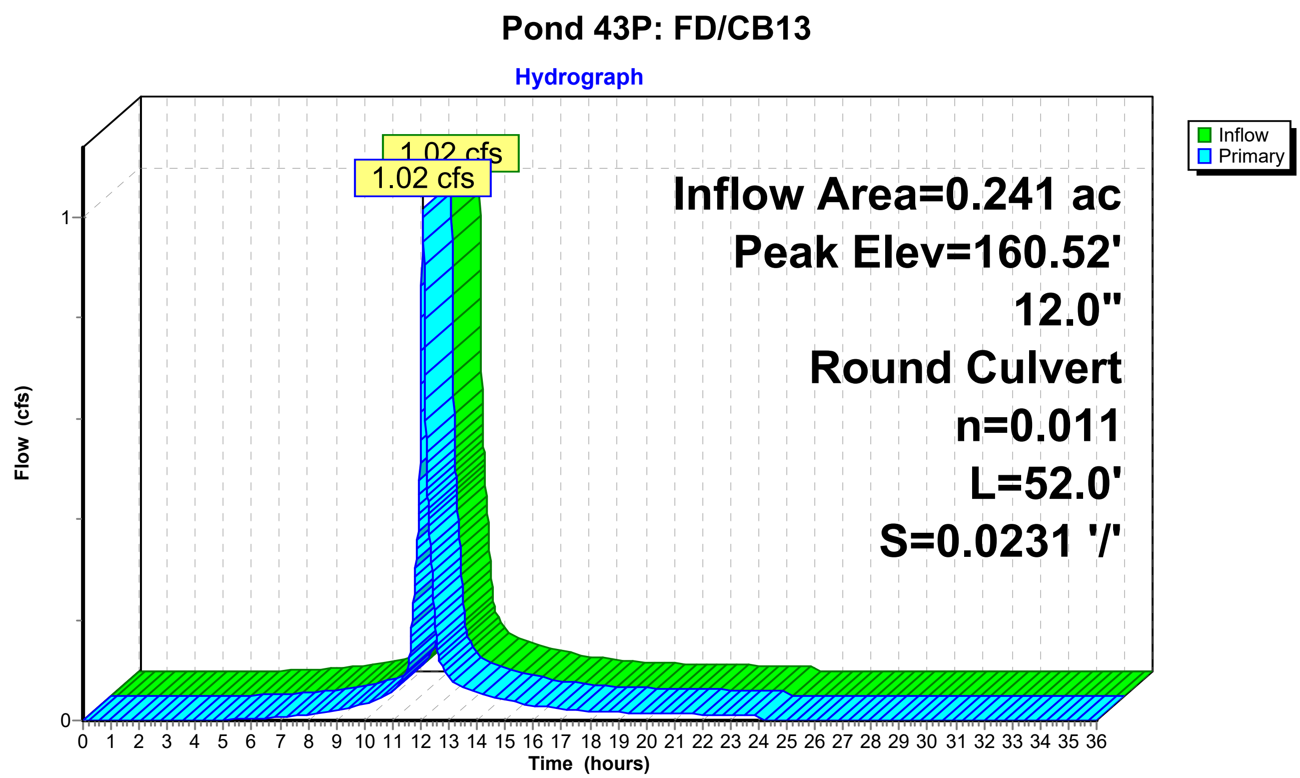
Summary for Pond 43P: FD/CB13

Inflow Area =	0.241 ac,	85.99% Impervious,	Inflow Depth = 3.59"	for 10-Year Storm event
Inflow =	1.02 cfs @	12.07 hrs, Volume=	0.072 af	
Outflow =	1.02 cfs @	12.07 hrs, Volume=	0.072 af, Atten= 0%, Lag= 0.0 min	
Primary =	1.02 cfs @	12.07 hrs, Volume=	0.072 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.52' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	160.00'	**12.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.00' / 158.80' S= 0.0231 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.02 cfs @ 12.07 hrs HW=160.52' TW=159.90' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.02 cfs @ 2.46 fps)



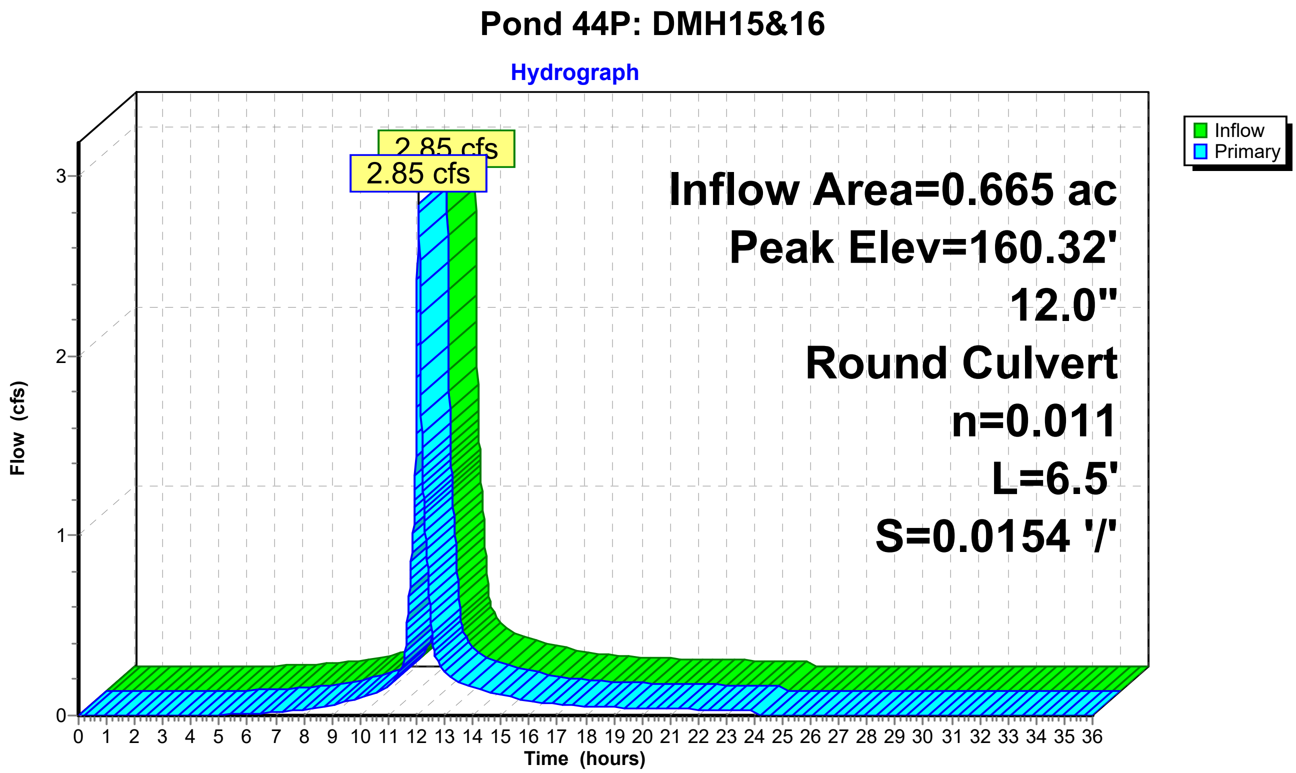
Summary for Pond 44P: DMH15&16

Inflow Area = 0.665 ac, 86.95% Impervious, Inflow Depth = 3.65" for 10-Year Storm event
Inflow = 2.85 cfs @ 12.07 hrs, Volume= 0.203 af
Outflow = 2.85 cfs @ 12.07 hrs, Volume= 0.203 af, Atten= 0%, Lag= 0.0 min
Primary = 2.85 cfs @ 12.07 hrs, Volume= 0.203 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.32' @ 12.48 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 6.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0154 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.69 cfs @ 12.07 hrs HW=159.90' TW=159.40' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.69 cfs @ 3.43 fps)



Summary for Subcatchment 45P: P3e

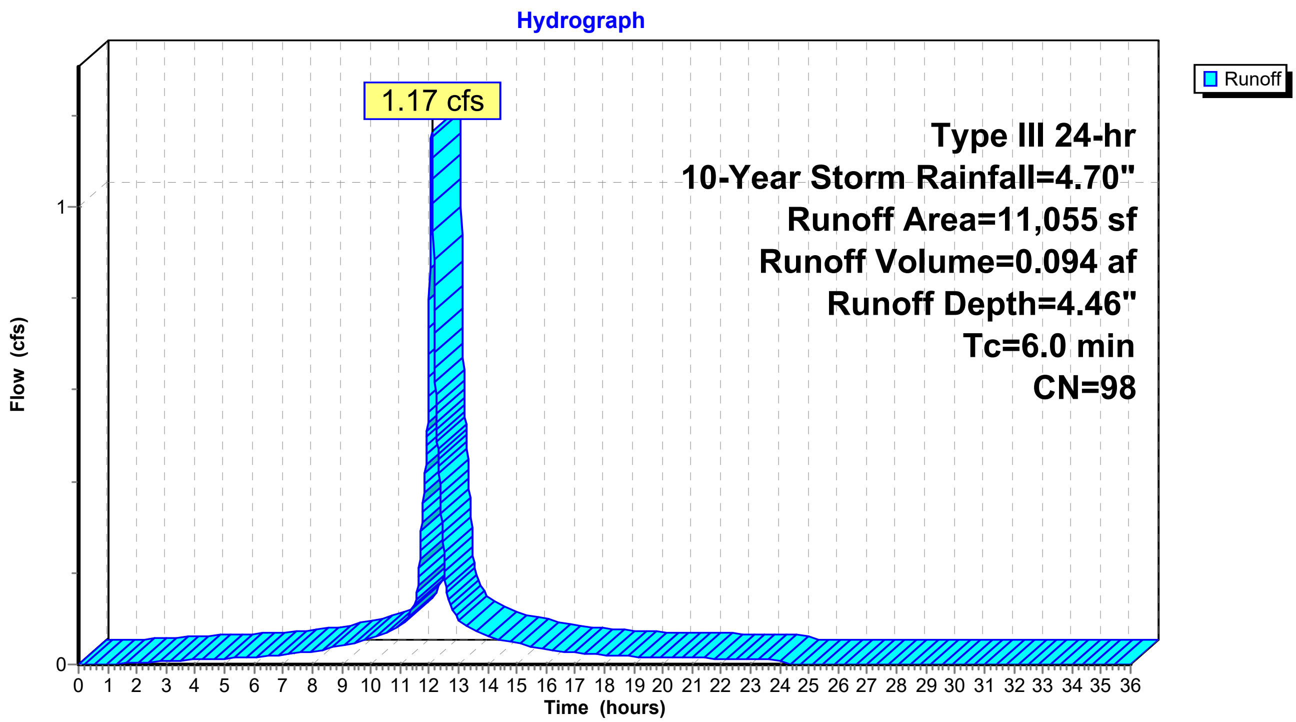
Runoff = 1.17 cfs @ 12.08 hrs, Volume= 0.094 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
11,055	98	Roofs, HSG A
11,055		100.00% Impervious Area

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

Subcatchment 45P: P3e



Summary for Pond 46P: Roof Drain

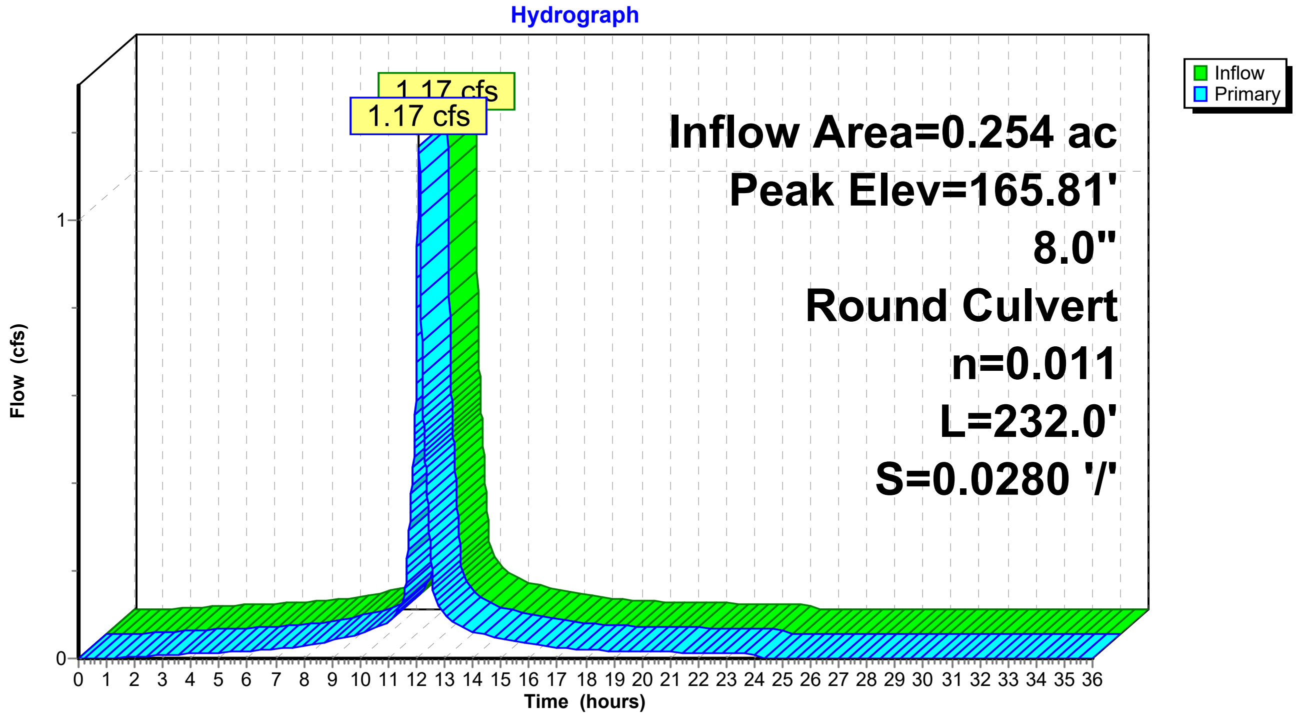
Inflow Area = 0.254 ac,100.00% Impervious, Inflow Depth = 4.46" for 10-Year Storm event
Inflow = 1.17 cfs @ 12.08 hrs, Volume= 0.094 af
Outflow = 1.17 cfs @ 12.08 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min
Primary = 1.17 cfs @ 12.08 hrs, Volume= 0.094 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.81' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**8.0" Round Culvert** L= 232.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 158.50' S= 0.0280 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=1.16 cfs @ 12.08 hrs HW=165.81' TW=159.46' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.16 cfs @ 3.34 fps)

Pond 46P: Roof Drain



Summary for Pond 47P: Infiltration Field #2

Inflow Area = 2.015 ac, 82.47% Impervious, Inflow Depth = 3.57" for 10-Year Storm event
Inflow = 8.13 cfs @ 12.08 hrs, Volume= 0.599 af
Outflow = 1.71 cfs @ 12.50 hrs, Volume= 0.599 af, Atten= 79%, Lag= 25.3 min
Discarded = 0.33 cfs @ 10.82 hrs, Volume= 0.422 af
Primary = 1.37 cfs @ 12.50 hrs, Volume= 0.177 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.30' @ 12.50 hrs Surf.Area= 6,004 sf Storage= 9,571 cf

Plug-Flow detention time= 121.7 min calculated for 0.599 af (100% of inflow)
Center-of-Mass det. time= 121.7 min (911.3 - 789.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	158.00'	6,551 cf	**144.67'W x 41.50'L x 4.04'H Field A** 24,265 cf Overall - 7,887 cf Embedded = 16,378 cf x 40.0% Voids
#2A	158.50'	7,887 cf	**Cultec R-330XLHD** x 145 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 29 rows
		14,438 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	159.30'	**8.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.30' / 157.00' S= 0.0548 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#3	Primary	161.00'	**12.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 157.00' S= 0.0952 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Discarded OutFlow Max=0.33 cfs @ 10.82 hrs HW=158.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.33 cfs)

Primary OutFlow Max=1.37 cfs @ 12.50 hrs HW=160.30' TW=0.00' (Dynamic Tailwater)
2=Culvert (Inlet Controls 1.37 cfs @ 3.93 fps)
3=Culvert (Controls 0.00 cfs)

Pond 47P: Infiltration Field #2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 29 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

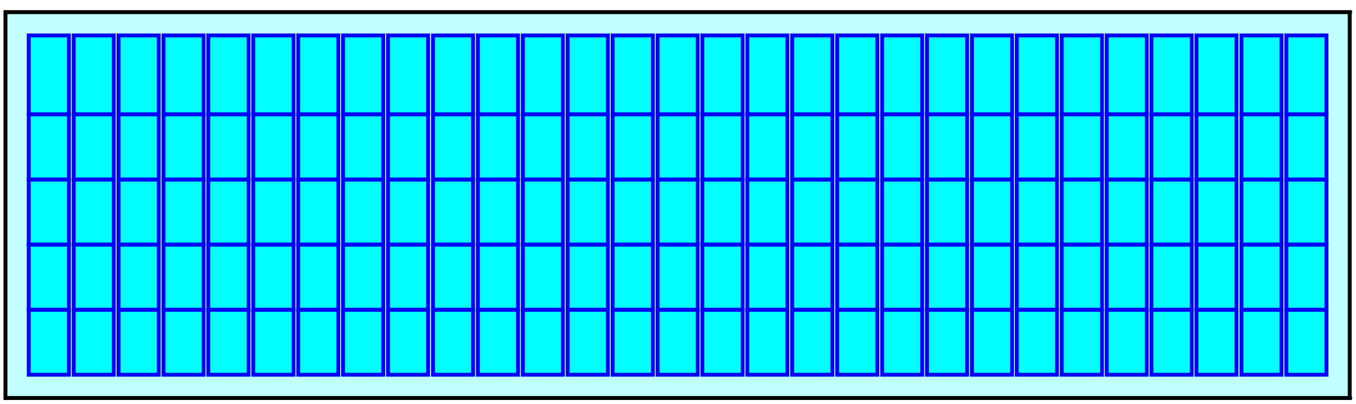
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +30.0" End Stone x 2 = 41.50' Base Length
29 Rows x 52.0" Wide + 6.0" Spacing x 28 + 30.0" Side Stone x 2 = 144.67' Base Width
6.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.04' Field Height

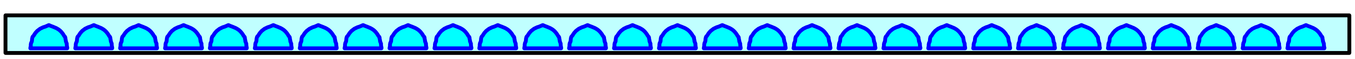
145 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 29 Rows = 7,886.9 cf Chamber Storage

24,264.8 cf Field - 7,886.9 cf Chambers = 16,377.9 cf Stone x 40.0% Voids = 6,551.2 cf Stone Storage

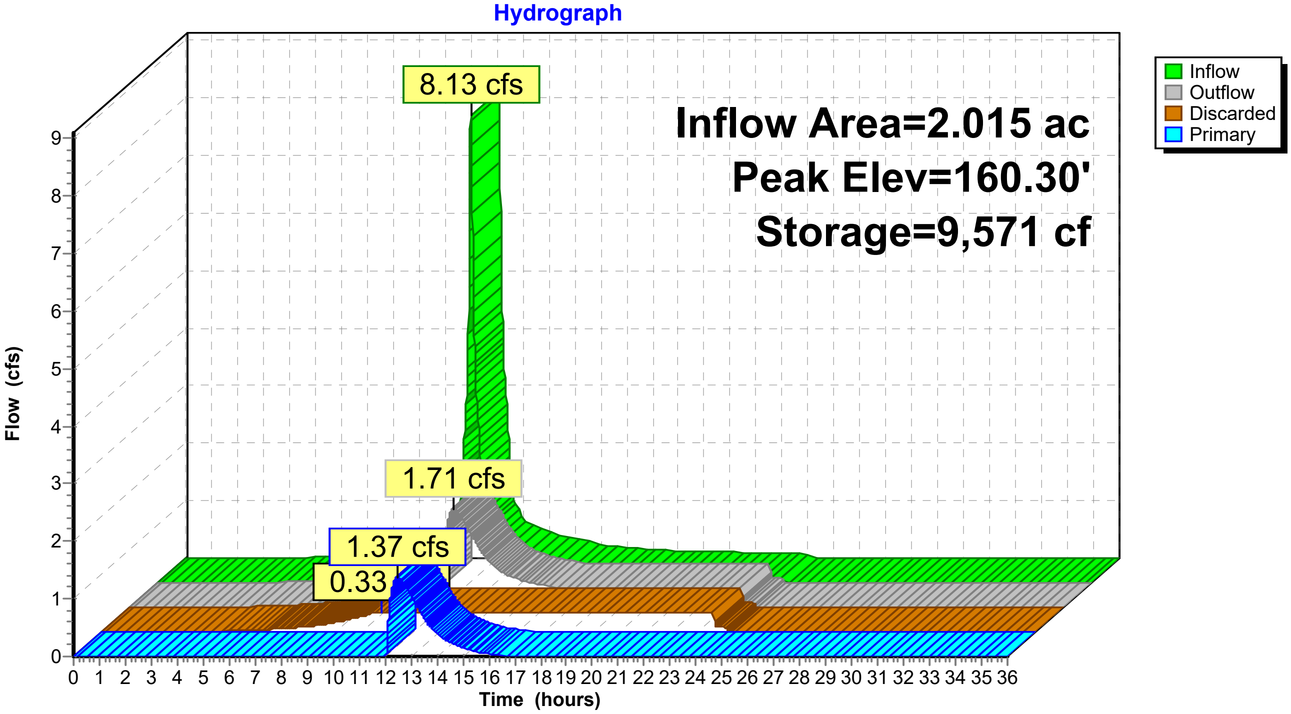
Chamber Storage + Stone Storage = 14,438.1 cf = 0.331 af
Overall Storage Efficiency = 59.5%
Overall System Size = 41.50' x 144.67' x 4.04'

145 Chambers
898.7 cy Field
606.6 cy Stone





Pond 47P: Infiltration Field #2



Summary for Subcatchment 48P: P4

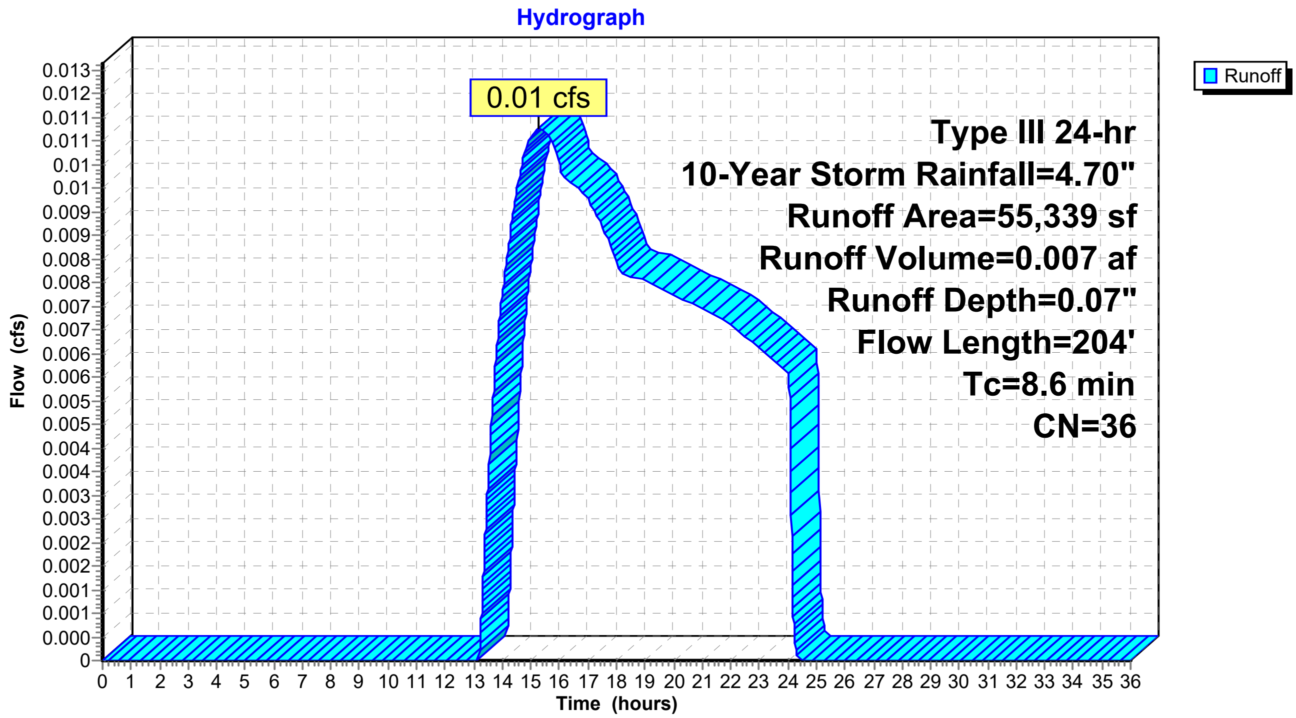
Runoff = 0.01 cfs @ 15.30 hrs, Volume= 0.007 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

	Area (sf)	CN	Description
*	793	98	Paved parking, HSG A
	658	98	Paved parking, HSG B
	18,959	39	>75% Grass cover, Good, HSG A
	898	61	>75% Grass cover, Good, HSG B
	32,976	30	Woods, Good, HSG A
	1,055	55	Woods, Good, HSG B
	55,339	36	Weighted Average
	53,888		97.38% Pervious Area
	1,451		2.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	36	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
2.2	8	0.0400	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	160	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.6	204	Total			

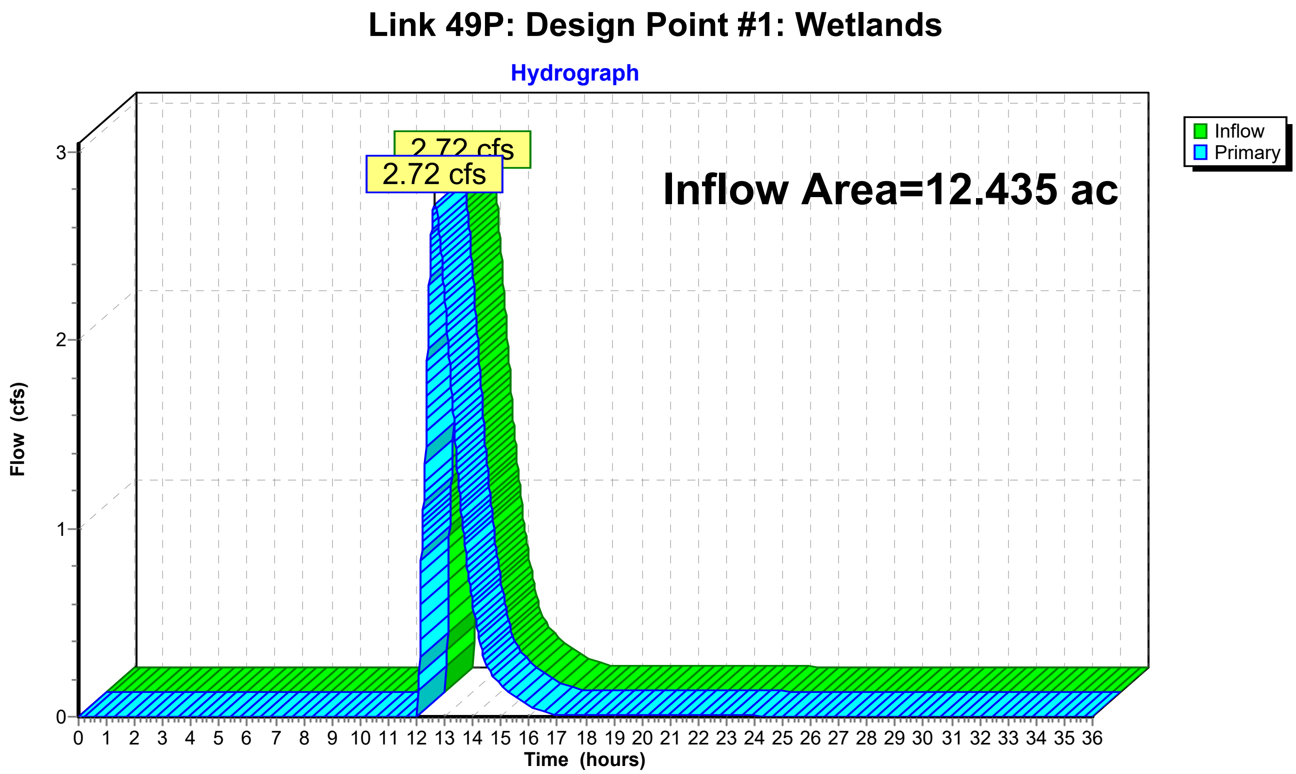
Subcatchment 48P: P4



Summary for Link 49P: Design Point #1: Wetlands

Inflow Area =	12.435 ac,	41.42% Impervious,	Inflow Depth = 0.29"	for 10-Year Storm event	
Inflow =	2.72 cfs @	12.65 hrs,	Volume=	0.301 af	
Primary =	2.72 cfs @	12.65 hrs,	Volume=	0.301 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1P: P1a Runoff Area=112,620 sf 17.81% Impervious Runoff Depth=1.91"
Flow Length=655' Tc=16.4 min CN=64 Runoff=4.04 cfs 0.412 af

Pond 2P: CB1 Peak Elev=168.03' Inflow=4.04 cfs 0.412 af
18.0" Round Culvert n=0.011 L=194.0' S=0.0052 '/' Outflow=4.04 cfs 0.412 af

Subcatchment 3P: P1b Runoff Area=72,566 sf 24.44% Impervious Runoff Depth=2.16"
Flow Length=562' Tc=16.0 min CN=67 Runoff=3.02 cfs 0.300 af

Pond 4P: CB2 Peak Elev=167.77' Inflow=3.02 cfs 0.300 af
12.0" Round Culvert n=0.011 L=3.0' S=0.0333 '/' Outflow=3.02 cfs 0.300 af

Pond 5P: DMH1 Peak Elev=167.13' Inflow=7.07 cfs 0.712 af
24.0" Round Culvert n=0.011 L=171.0' S=0.0053 '/' Outflow=7.07 cfs 0.712 af

Subcatchment 6P: P1c Runoff Area=36,786 sf 40.24% Impervious Runoff Depth=2.86"
Flow Length=372' Tc=16.1 min CN=75 Runoff=2.08 cfs 0.201 af

Pond 7P: CB3 Peak Elev=166.47' Inflow=2.08 cfs 0.201 af
12.0" Round Culvert n=0.011 L=3.0' S=0.0333 '/' Outflow=2.08 cfs 0.201 af

Pond 8P: DMH2 Peak Elev=166.17' Inflow=9.14 cfs 0.913 af
24.0" Round Culvert n=0.011 L=94.0' S=0.0287 '/' Outflow=9.14 cfs 0.913 af

Subcatchment 9P: P1d Runoff Area=35,572 sf 40.58% Impervious Runoff Depth=2.86"
Flow Length=403' Tc=11.6 min CN=75 Runoff=2.27 cfs 0.195 af

Pond 10P: CB4 Peak Elev=165.36' Inflow=2.27 cfs 0.195 af
12.0" Round Culvert n=0.011 L=72.0' S=0.0333 '/' Outflow=2.27 cfs 0.195 af

Subcatchment 11P: P1e Runoff Area=31,721 sf 39.55% Impervious Runoff Depth=1.76"
Flow Length=81' Slope=0.0200 '/' Tc=9.8 min CN=62 Runoff=1.24 cfs 0.107 af

Pond 12P: Area Drains Peak Elev=164.70' Inflow=1.24 cfs 0.107 af
8.0" Round Culvert n=0.011 L=114.0' S=0.0061 '/' Outflow=1.24 cfs 0.107 af

Pond 13P: FD/DMH3 Peak Elev=163.66' Inflow=12.24 cfs 1.215 af
24.0" Round Culvert n=0.011 L=104.0' S=0.0308 '/' Outflow=12.24 cfs 1.215 af

Pond 14P: DMH4&5 Peak Elev=161.35' Inflow=12.24 cfs 1.215 af
Outflow=12.24 cfs 1.215 af

Subcatchment 15P: P1f Runoff Area=29,980 sf 78.85% Impervious Runoff Depth=3.94"
Flow Length=169' Slope=0.0600 '/' Tc=6.2 min CN=86 Runoff=3.10 cfs 0.226 af

Pond 16P: CB5 Peak Elev=161.96' Inflow=3.10 cfs 0.226 af
12.0" Round Culvert n=0.011 L=7.0' S=0.0143 '/' Outflow=3.10 cfs 0.226 af

Subcatchment 17P: P1g Runoff Area=7,680 sf 84.80% Impervious Runoff Depth=4.25"
Flow Length=144' Slope=0.0300 '/' Tc=5.0 min CN=89 Runoff=0.88 cfs 0.062 af

Pond 18P: CB6 Peak Elev=161.36' Inflow=0.88 cfs 0.062 af
12.0" Round Culvert n=0.011 L=66.0' S=0.0076 '/' Outflow=0.88 cfs 0.062 af

Pond 19P: FD/DMH6 Peak Elev=161.30' Inflow=3.96 cfs 0.288 af
12.0" Round Culvert n=0.011 L=44.0' S=0.0205 '/' Outflow=3.96 cfs 0.288 af

Pond 20P: DMH7&8 Peak Elev=160.38' Inflow=3.96 cfs 0.288 af
12.0" Round Culvert n=0.011 L=9.5' S=0.0105 '/' Outflow=3.96 cfs 0.288 af

Subcatchment 21P: P1h Runoff Area=23,312 sf 100.00% Impervious Runoff Depth=5.26"
Tc=6.0 min CN=98 Runoff=2.88 cfs 0.235 af

Pond 22P: Roof Pipe Peak Elev=164.60' Inflow=2.88 cfs 0.235 af
12.0" Round Culvert n=0.011 L=302.0' S=0.0100 '/' Outflow=2.88 cfs 0.235 af

Pond 23P: Infiltration Field #1a Peak Elev=160.36' Storage=16,726 cf Inflow=16.48 cfs 1.738 af
Discarded=1.91 cfs 1.301 af Primary=8.28 cfs 0.437 af Outflow=10.19 cfs 1.738 af

Pond 24P: Infiltration Field #1b Peak Elev=160.31' Storage=5,271 cf Inflow=8.28 cfs 0.437 af
Discarded=0.18 cfs 0.107 af Primary=3.36 cfs 0.330 af Outflow=3.55 cfs 0.437 af

Subcatchment 25P: P2a Runoff Area=17,804 sf 68.89% Impervious Runoff Depth=4.15"
Flow Length=229' Tc=9.8 min CN=88 Runoff=1.70 cfs 0.141 af

Pond 26P: CB7&8 Peak Elev=168.47' Inflow=1.70 cfs 0.141 af
Outflow=1.70 cfs 0.141 af

Pond 27P: FD/DMH10 Peak Elev=167.81' Inflow=1.70 cfs 0.141 af
12.0" Round Culvert n=0.011 L=43.0' S=0.0256 '/' Outflow=1.70 cfs 0.141 af

Subcatchment 28P: P2b Runoff Area=21,688 sf 6.26% Impervious Runoff Depth=1.45"
Flow Length=176' Tc=10.4 min CN=58 Runoff=0.65 cfs 0.060 af

Subcatchment 29P: P2c Runoff Area=8,798 sf 43.73% Impervious Runoff Depth=2.86"
Flow Length=158' Slope=0.0500 '/' Tc=10.1 min CN=75 Runoff=0.59 cfs 0.048 af

Pond 30P: FD/CB9 Peak Elev=168.39' Inflow=0.59 cfs 0.048 af
12.0" Round Culvert n=0.011 L=30.0' S=0.0667 '/' Outflow=0.59 cfs 0.048 af

Pond 31P: Basin Peak Elev=166.21' Storage=2,547 cf Inflow=2.93 cfs 0.250 af
Discarded=0.74 cfs 0.250 af Primary=0.00 cfs 0.000 af Outflow=0.74 cfs 0.250 af

Subcatchment 32P: P3f Runoff Area=23,307 sf 73.75% Impervious Runoff Depth=4.04"
Tc=6.0 min CN=87 Runoff=2.48 cfs 0.180 af

Subcatchment 33P: P3a Runoff Area=12,898 sf 69.13% Impervious Runoff Depth=3.83"
Flow Length=211' Tc=6.9 min CN=85 Runoff=1.27 cfs 0.095 af

Pond 34P: CB10 Peak Elev=166.20' Inflow=1.27 cfs 0.095 af
12.0" Round Culvert n=0.011 L=122.0' S=0.0164 '/' Outflow=1.27 cfs 0.095 af

Pond 35P: DMH11 Peak Elev=166.03' Inflow=3.74 cfs 0.275 af
15.0" Round Culvert n=0.011 L=71.0' S=0.0141 '/' Outflow=3.74 cfs 0.275 af

Subcatchment 36P: P3b Runoff Area=11,557 sf 86.94% Impervious Runoff Depth=4.36"
Flow Length=74' Slope=0.0200 '/' Tc=5.0 min CN=90 Runoff=1.35 cfs 0.096 af

Pond 37P: CB11 Peak Elev=165.13' Inflow=1.35 cfs 0.096 af
12.0" Round Culvert n=0.011 L=3.0' S=0.0333 '/' Outflow=1.36 cfs 0.096 af

Pond 38P: DMH12 Peak Elev=165.02' Inflow=5.07 cfs 0.371 af
18.0" Round Culvert n=0.011 L=158.0' S=0.0323 '/' Outflow=5.07 cfs 0.371 af

Pond 39P: FD/DMH13&14 Peak Elev=160.92' Inflow=5.07 cfs 0.371 af
Outflow=5.07 cfs 0.371 af

Subcatchment 40P: P3c Runoff Area=18,486 sf 87.50% Impervious Runoff Depth=4.47"
Flow Length=225' Tc=5.0 min CN=91 Runoff=2.19 cfs 0.158 af

Pond 41P: FD/CB12 Peak Elev=160.95' Inflow=2.19 cfs 0.158 af
12.0" Round Culvert n=0.011 L=32.0' S=0.0313 '/' Outflow=2.19 cfs 0.158 af

Subcatchment 42P: P3d Runoff Area=10,489 sf 85.99% Impervious Runoff Depth=4.36"
Flow Length=124' Slope=0.0300 '/' Tc=5.0 min CN=90 Runoff=1.22 cfs 0.087 af

Pond 43P: FD/CB13 Peak Elev=160.94' Inflow=1.22 cfs 0.087 af
12.0" Round Culvert n=0.011 L=52.0' S=0.0231 '/' Outflow=1.22 cfs 0.087 af

Pond 44P: DMH15&16 Peak Elev=160.93' Inflow=3.41 cfs 0.246 af
12.0" Round Culvert n=0.011 L=6.5' S=0.0154 '/' Outflow=3.41 cfs 0.246 af

Subcatchment 45P: P3e Runoff Area=11,055 sf 100.00% Impervious Runoff Depth=5.26"
Tc=6.0 min CN=98 Runoff=1.37 cfs 0.111 af

Pond 46P: Roof Drain Peak Elev=165.99' Inflow=1.37 cfs 0.111 af
8.0" Round Culvert n=0.011 L=232.0' S=0.0280 '/' Outflow=1.37 cfs 0.111 af

Pond 47P: Infiltration Field #2 Peak Elev=160.89' Storage=11,663 cf Inflow=9.82 cfs 0.728 af
Discarded=0.33 cfs 0.458 af Primary=1.89 cfs 0.270 af Outflow=2.22 cfs 0.728 af

Subcatchment 48P: P4 Runoff Area=55,339 sf 2.62% Impervious Runoff Depth=0.19"
Flow Length=204' Tc=8.6 min CN=36 Runoff=0.03 cfs 0.020 af

Link 49P: Design Point #1: Wetlands Inflow=5.21 cfs 0.620 af
Primary=5.21 cfs 0.620 af

Total Runoff Area = 12.435 ac Runoff Volume = 2.736 af Average Runoff Depth = 2.64"
58.58% Pervious = 7.284 ac 41.42% Impervious = 5.151 ac

Summary for Subcatchment 1P: P1a

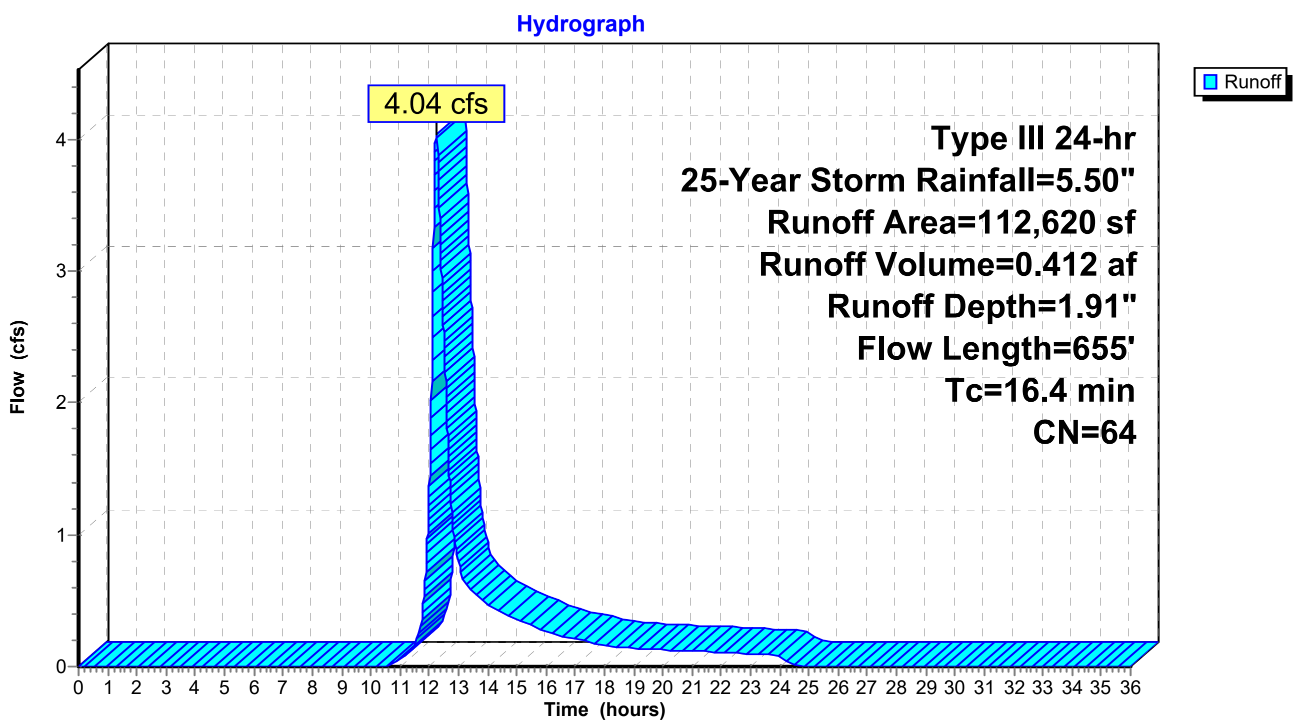
Runoff = 4.04 cfs @ 12.24 hrs, Volume= 0.412 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
20,058	98	Paved parking, HSG B
20,706	61	>75% Grass cover, Good, HSG B
71,856	55	Woods, Good, HSG B
112,620	64	Weighted Average
92,562		82.19% Pervious Area
20,058		17.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	43	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
6.8	410	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	47	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	155	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.4	655	Total			

Subcatchment 1P: P1a



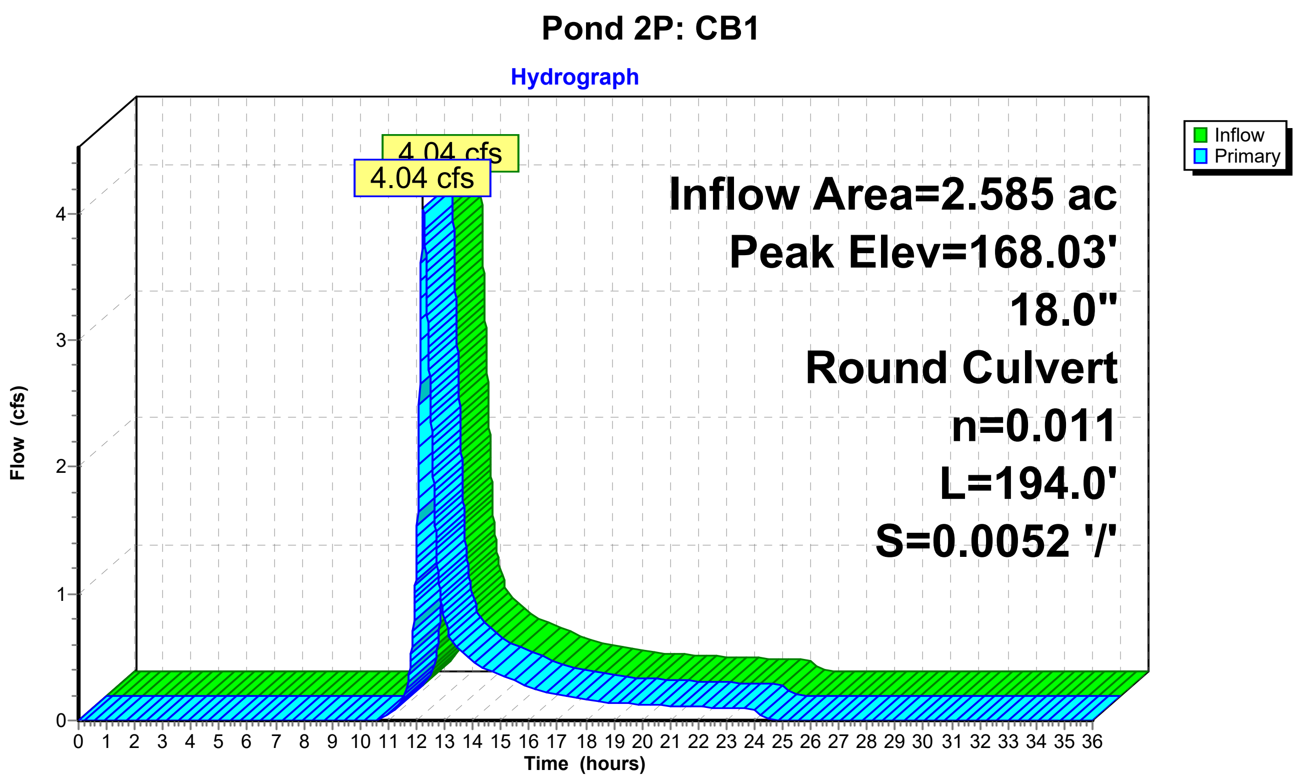
Summary for Pond 2P: CB1

Inflow Area =	2.585 ac,	17.81% Impervious,	Inflow Depth =	1.91"	for 25-Year Storm event
Inflow =	4.04 cfs @	12.24 hrs,	Volume=	0.412 af	
Outflow =	4.04 cfs @	12.24 hrs,	Volume=	0.412 af,	Atten= 0%, Lag= 0.0 min
Primary =	4.04 cfs @	12.24 hrs,	Volume=	0.412 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 168.03' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	166.90'	**18.0" Round Culvert** L= 194.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 166.90' / 165.90' S= 0.0052 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=4.03 cfs @ 12.24 hrs HW=168.03' TW=167.13' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 4.03 cfs @ 3.91 fps)



Summary for Subcatchment 3P: P1b

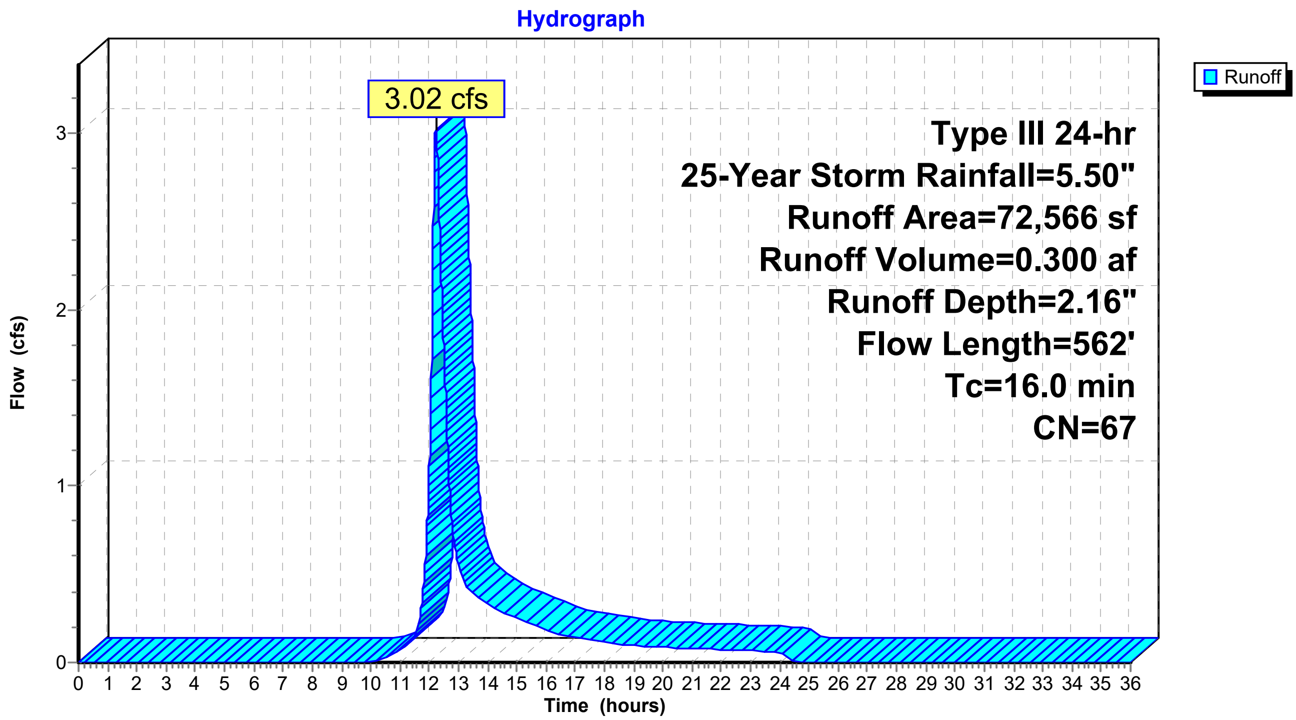
Runoff = 3.02 cfs @ 12.23 hrs, Volume= 0.300 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
17,734	98	Paved parking, HSG B
20,240	61	>75% Grass cover, Good, HSG B
34,592	55	Woods, Good, HSG B
72,566	67	Weighted Average
54,832		75.56% Pervious Area
17,734		24.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	43	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
6.0	405	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	17	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	97	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.0	562	Total			

Subcatchment 3P: P1b



Summary for Pond 4P: CB2

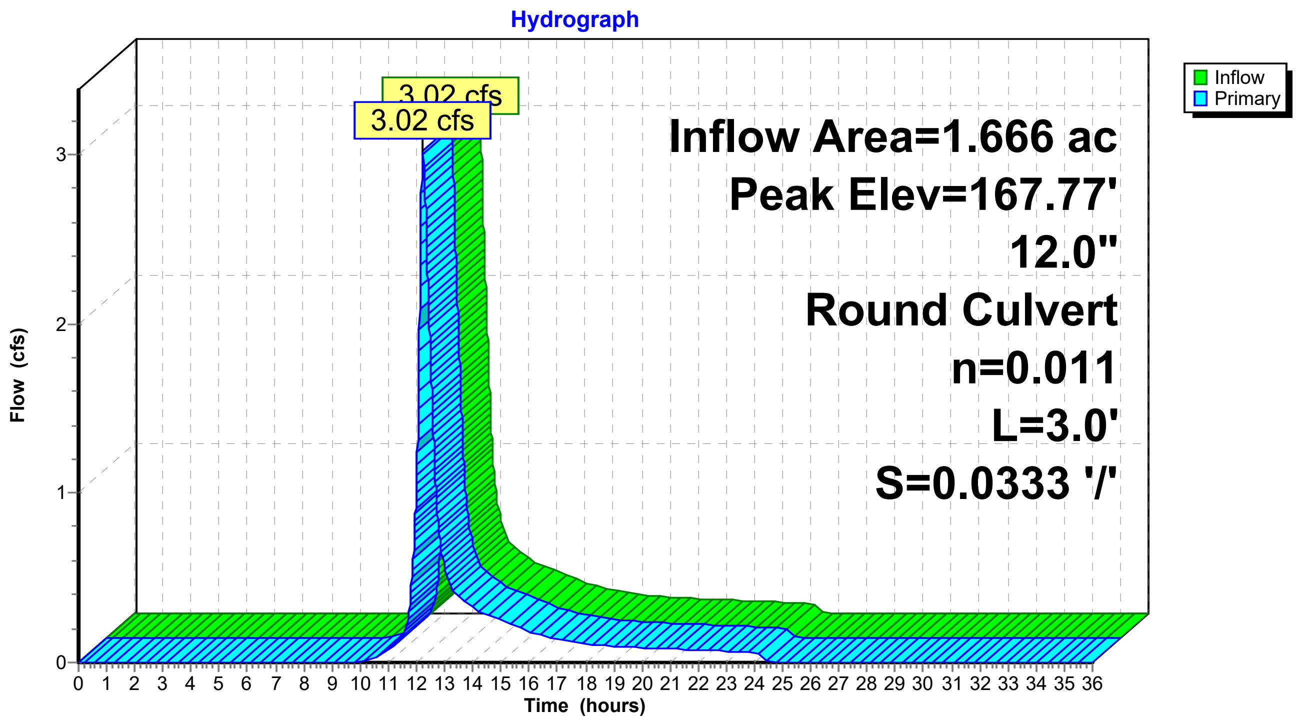
Inflow Area =	1.666 ac,	24.44% Impervious,	Inflow Depth = 2.16"	for 25-Year Storm event	
Inflow =	3.02 cfs @	12.23 hrs,	Volume=	0.300 af	
Outflow =	3.02 cfs @	12.23 hrs,	Volume=	0.300 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.02 cfs @	12.23 hrs,	Volume=	0.300 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 167.77' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	166.00'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 166.00' / 165.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.01 cfs @ 12.23 hrs HW=167.76' TW=167.13' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.01 cfs @ 3.83 fps)

Pond 4P: CB2



Summary for Pond 5P: DMH1

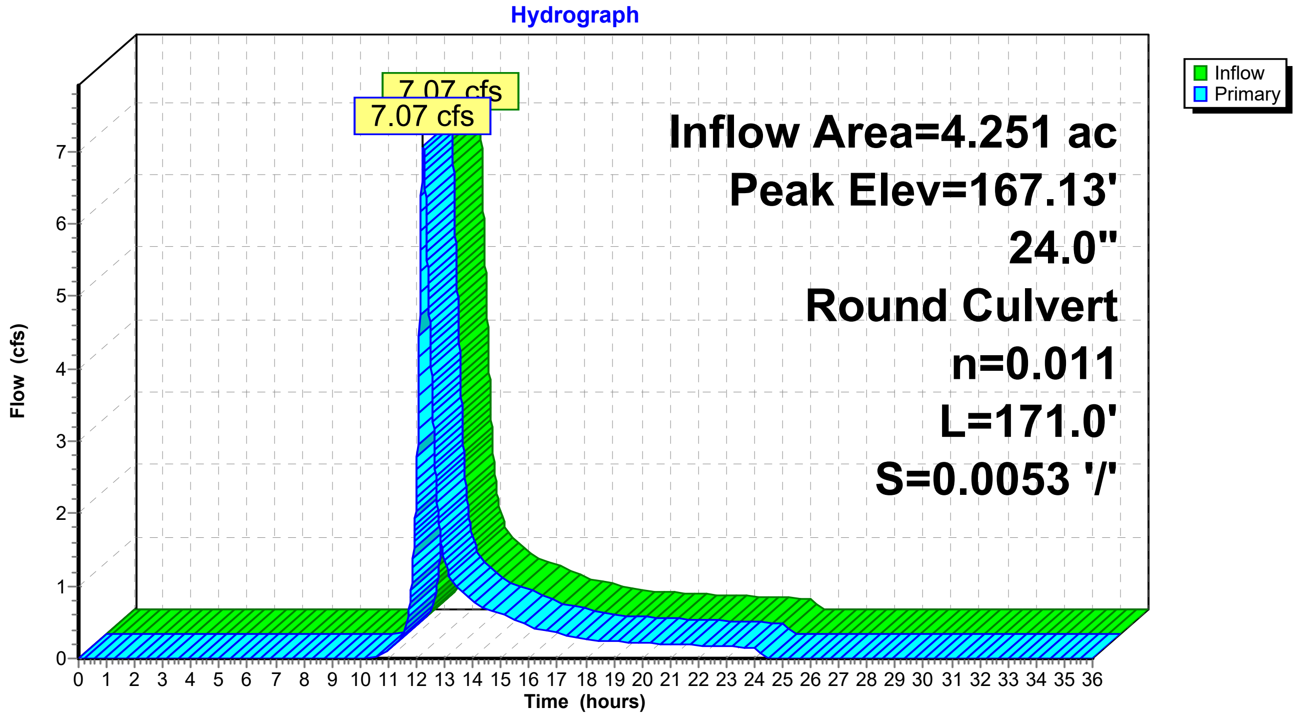
Inflow Area =	4.251 ac,	20.41% Impervious,	Inflow Depth = 2.01"	for 25-Year Storm event
Inflow =	7.07 cfs @	12.23 hrs, Volume=	0.712 af	
Outflow =	7.07 cfs @	12.23 hrs, Volume=	0.712 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.07 cfs @	12.23 hrs, Volume=	0.712 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 167.13' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.80'	**24.0" Round Culvert** L= 171.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.80' / 164.90' S= 0.0053 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=7.06 cfs @ 12.23 hrs HW=167.13' TW=166.17' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 7.06 cfs @ 4.51 fps)

Pond 5P: DMH1



Summary for Subcatchment 6P: P1c

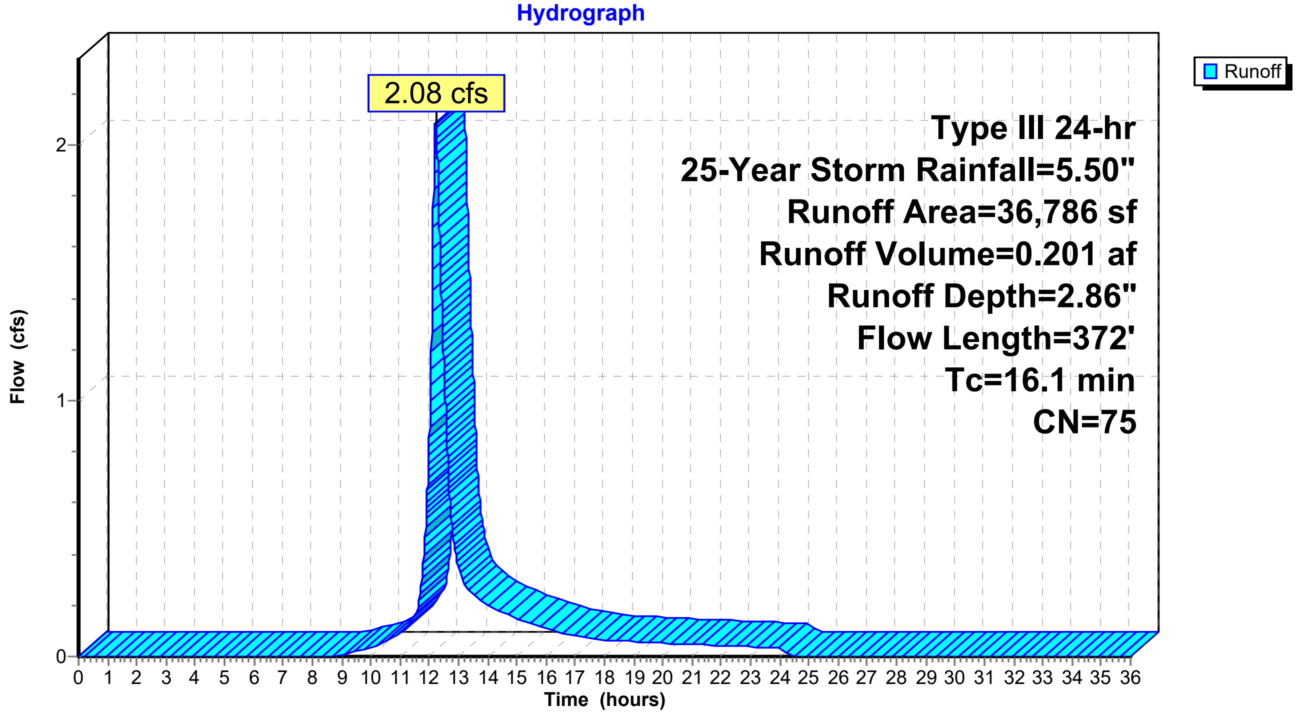
Runoff = 2.08 cfs @ 12.22 hrs, Volume= 0.201 af, Depth= 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
1,366	98	Paved parking, HSG A
13,437	98	Paved parking, HSG B
228	39	>75% Grass cover, Good, HSG A
15,234	61	>75% Grass cover, Good, HSG B
6,521	55	Woods, Good, HSG B
36,786	75	Weighted Average
21,983		59.76% Pervious Area
14,803		40.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	47	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
4.8	36	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	74	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	40	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	175	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.1	372	Total			

Subcatchment 6P: P1c



Summary for Pond 7P: CB3

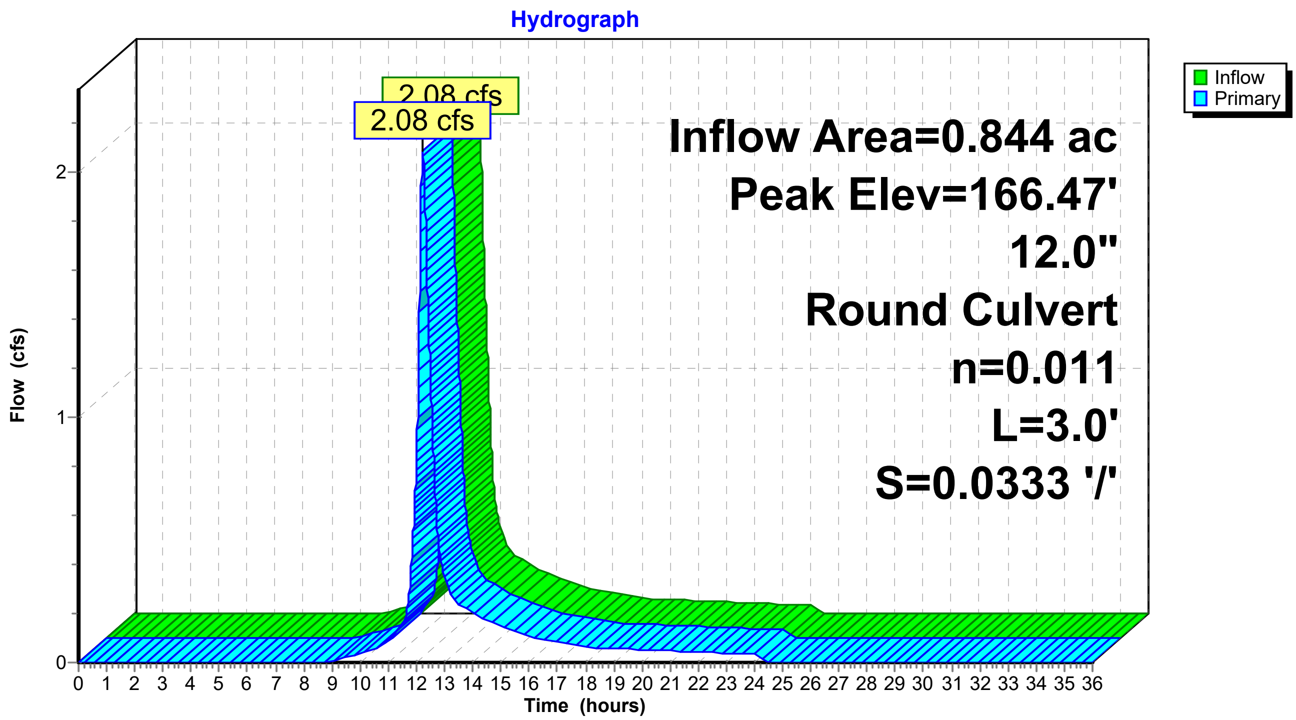
Inflow Area =	0.844 ac,	40.24% Impervious,	Inflow Depth = 2.86"	for 25-Year Storm event	
Inflow =	2.08 cfs @	12.22 hrs,	Volume=	0.201 af	
Outflow =	2.08 cfs @	12.22 hrs,	Volume=	0.201 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.08 cfs @	12.22 hrs,	Volume=	0.201 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.47' @ 12.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 164.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.06 cfs @ 12.22 hrs HW=166.47' TW=166.17' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.06 cfs @ 2.63 fps)

Pond 7P: CB3



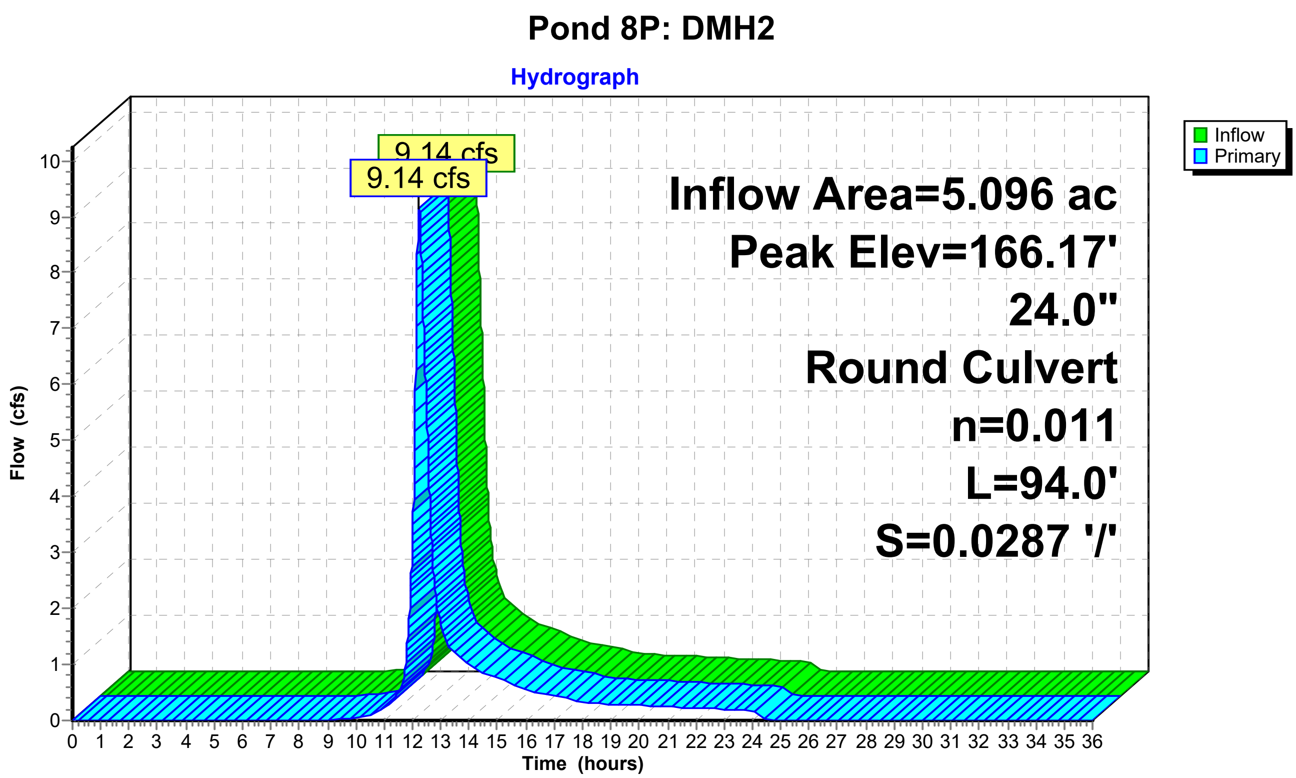
Summary for Pond 8P: DMH2

Inflow Area =	5.096 ac,	23.69% Impervious,	Inflow Depth = 2.15"	for 25-Year Storm event	
Inflow =	9.14 cfs @	12.23 hrs,	Volume=	0.913 af	
Outflow =	9.14 cfs @	12.23 hrs,	Volume=	0.913 af,	Atten= 0%, Lag= 0.0 min
Primary =	9.14 cfs @	12.23 hrs,	Volume=	0.913 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.17' @ 12.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.80'	**24.0" Round Culvert** L= 94.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 164.80' / 162.10' S= 0.0287 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=9.14 cfs @ 12.23 hrs HW=166.17' TW=163.65' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 9.14 cfs @ 3.98 fps)



Summary for Subcatchment 9P: P1d

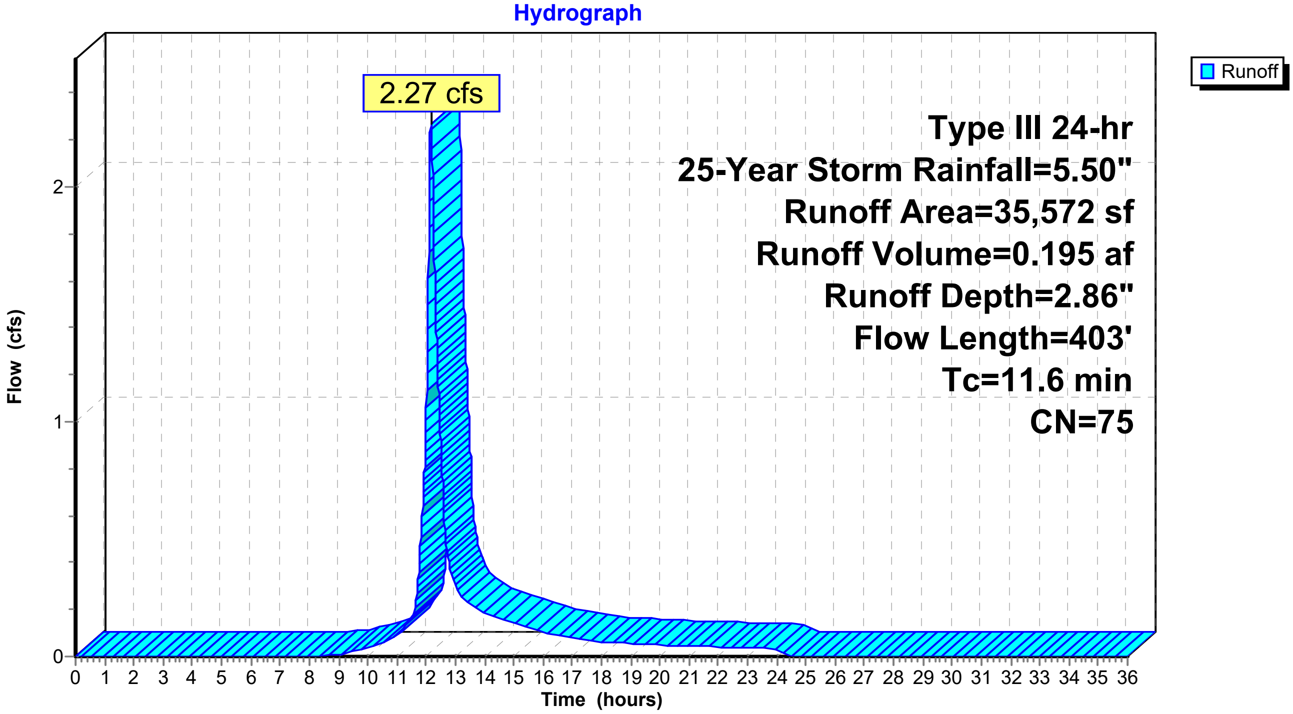
Runoff = 2.27 cfs @ 12.16 hrs, Volume= 0.195 af, Depth= 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
11,385	98	Paved parking, HSG A
3,050	98	Paved parking, HSG B
5,618	39	>75% Grass cover, Good, HSG A
10,400	61	>75% Grass cover, Good, HSG B
4,510	79	<50% Grass cover, Poor, HSG B
609	55	Woods, Good, HSG B
35,572	75	Weighted Average
21,137		59.42% Pervious Area
14,435		40.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	83	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.1	13	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	130	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.0	177	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
11.6	403	Total			

Subcatchment 9P: P1d



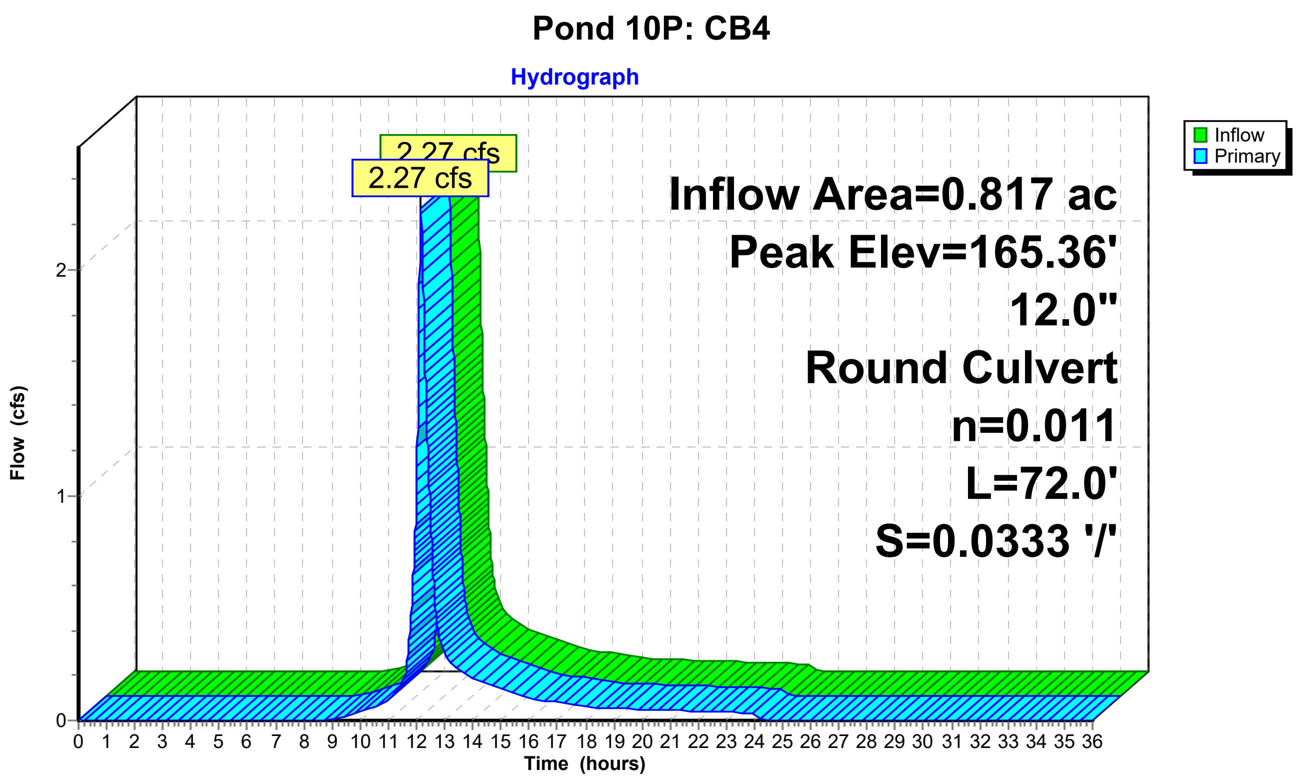
Summary for Pond 10P: CB4

Inflow Area =	0.817 ac,	40.58% Impervious,	Inflow Depth = 2.86"	for 25-Year Storm event	
Inflow =	2.27 cfs @	12.16 hrs,	Volume=	0.195 af	
Outflow =	2.27 cfs @	12.16 hrs,	Volume=	0.195 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.27 cfs @	12.16 hrs,	Volume=	0.195 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.36' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.50'	**12.0" Round Culvert** L= 72.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 164.50' / 162.10' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.27 cfs @ 12.16 hrs HW=165.36' TW=163.60' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.27 cfs @ 3.16 fps)



Summary for Subcatchment 11P: P1e

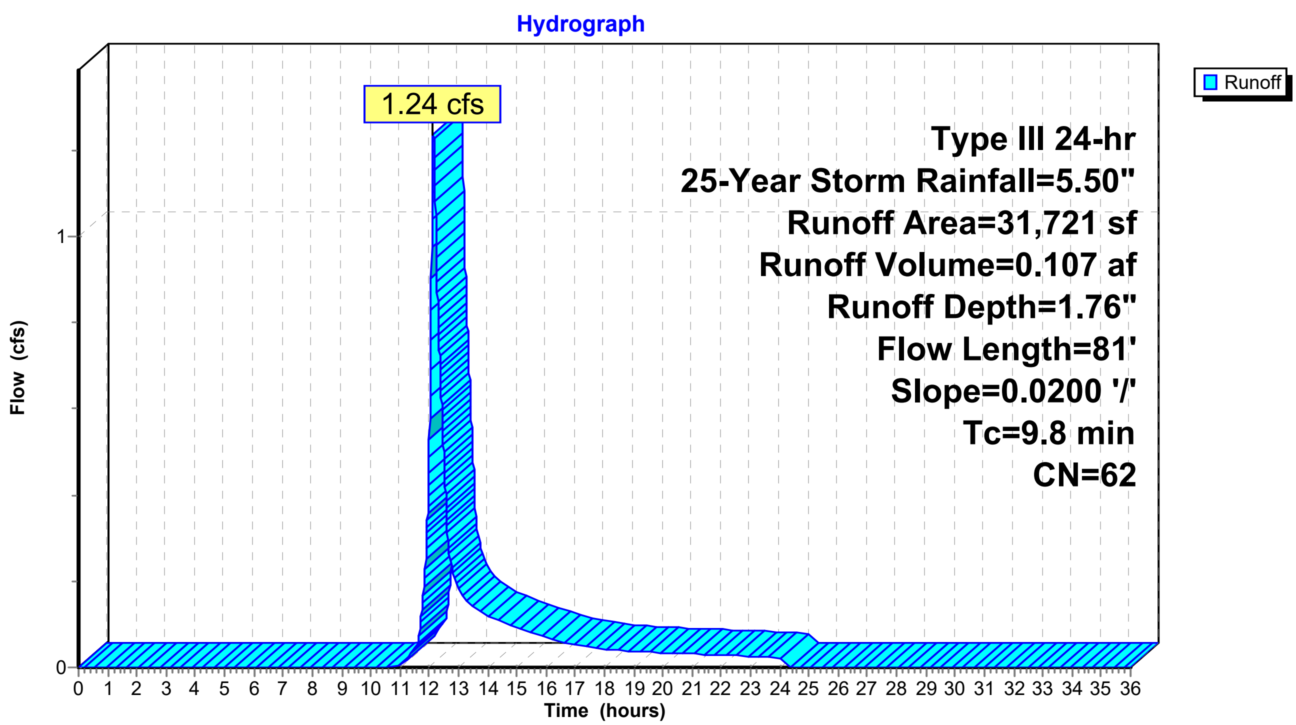
Runoff = 1.24 cfs @ 12.15 hrs, Volume= 0.107 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
12,547	98	Paved parking, HSG A
19,174	39	>75% Grass cover, Good, HSG A
31,721	62	Weighted Average
19,174		60.45% Pervious Area
12,547		39.55% 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"
0.4	22	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.8	81	Total			

Subcatchment 11P: P1e



Summary for Pond 12P: Area Drains

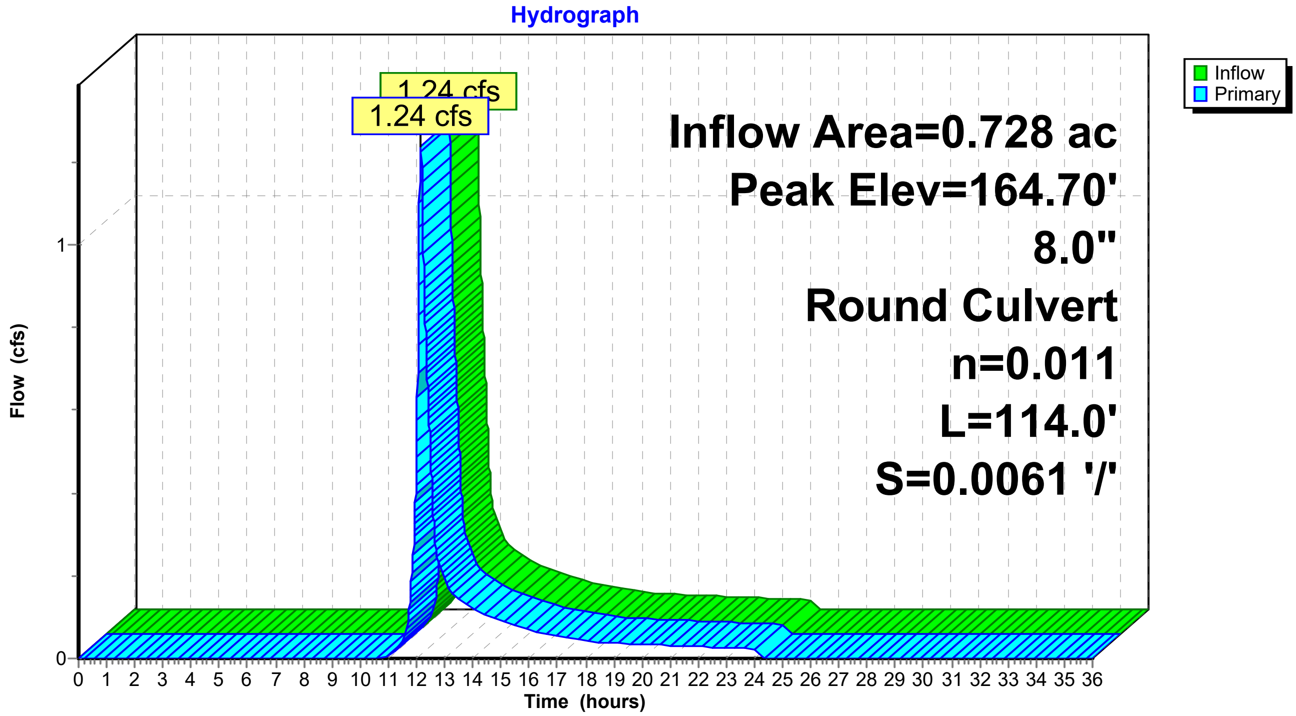
Inflow Area =	0.728 ac,	39.55% Impervious,	Inflow Depth = 1.76"	for 25-Year Storm event	
Inflow =	1.24 cfs @	12.15 hrs,	Volume=	0.107 af	
Outflow =	1.24 cfs @	12.15 hrs,	Volume=	0.107 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.24 cfs @	12.15 hrs,	Volume=	0.107 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 164.70' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.80'	**8.0" Round Culvert** L= 114.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.80' / 162.10' S= 0.0061 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=1.22 cfs @ 12.15 hrs HW=164.67' TW=163.55' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 1.22 cfs @ 3.49 fps)

Pond 12P: Area Drains



Summary for Pond 13P: FD/DMH3

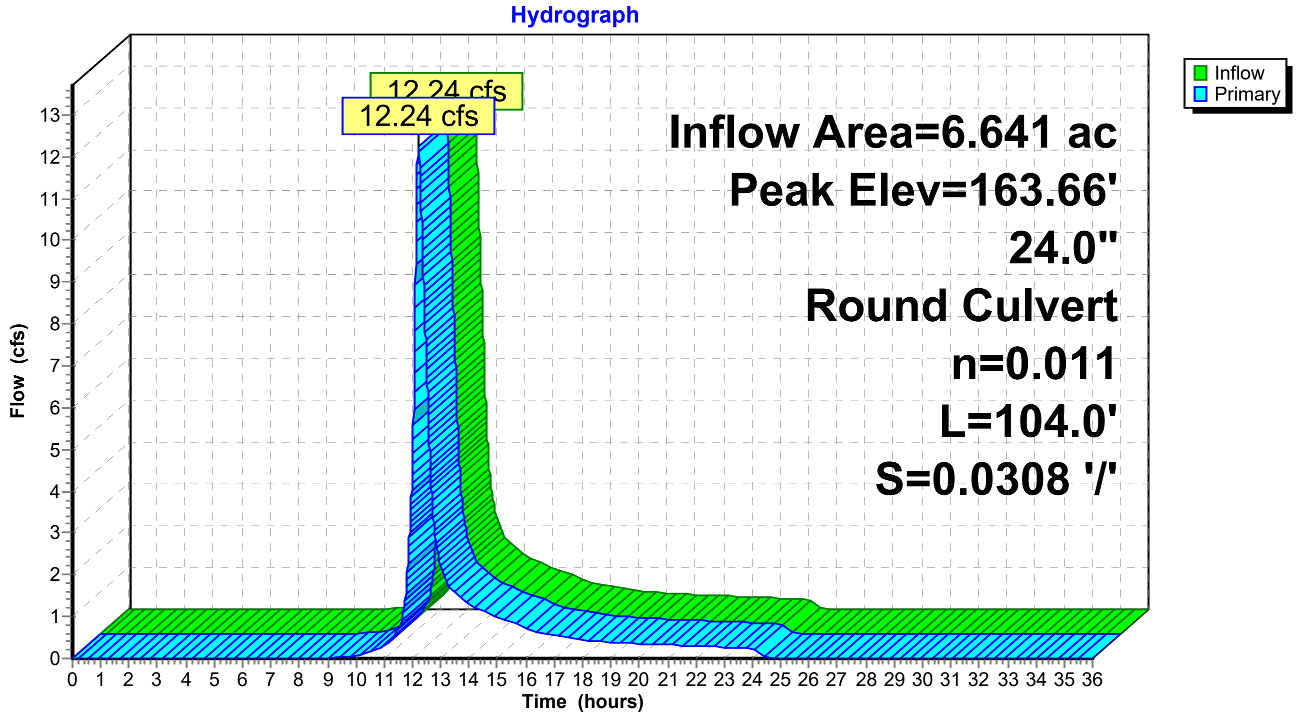
Inflow Area =	6.641 ac,	27.51% Impervious,	Inflow Depth = 2.20"	for 25-Year Storm event	
Inflow =	12.24 cfs @	12.21 hrs,	Volume=	1.215 af	
Outflow =	12.24 cfs @	12.21 hrs,	Volume=	1.215 af,	Atten= 0%, Lag= 0.0 min
Primary =	12.24 cfs @	12.21 hrs,	Volume=	1.215 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 163.66' @ 12.21 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.00'	**24.0" Round Culvert** L= 104.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.00' / 158.80' S= 0.0308 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=12.24 cfs @ 12.21 hrs HW=163.66' TW=161.34' (Dynamic Tailwater)
1=Culvert (Inlet Controls 12.24 cfs @ 4.39 fps)

Pond 13P: FD/DMH3



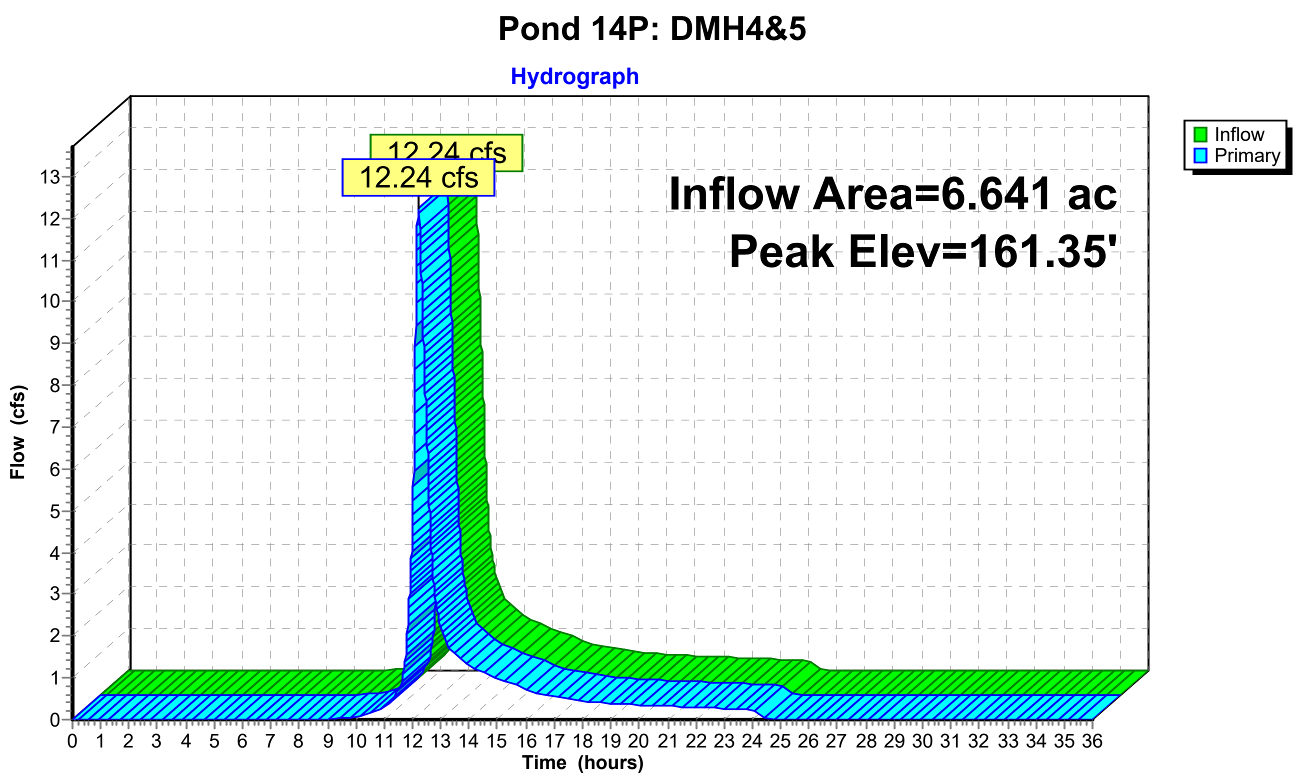
Summary for Pond 14P: DMH4&5

Inflow Area =	6.641 ac,	27.51% Impervious,	Inflow Depth = 2.20"	for 25-Year Storm event	
Inflow =	12.24 cfs @	12.21 hrs,	Volume=	1.215 af	
Outflow =	12.24 cfs @	12.21 hrs,	Volume=	1.215 af,	Atten= 0%, Lag= 0.0 min
Primary =	12.24 cfs @	12.21 hrs,	Volume=	1.215 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.35' @ 12.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**18.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Primary	161.00'	**18.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 158.50' S= 0.4167 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=12.15 cfs @ 12.21 hrs HW=161.34' TW=159.49' (Dynamic Tailwater)
1=Culvert (Inlet Controls 11.57 cfs @ 6.55 fps)
2=Culvert (Inlet Controls 0.59 cfs @ 1.98 fps)



Summary for Subcatchment 15P: P1f

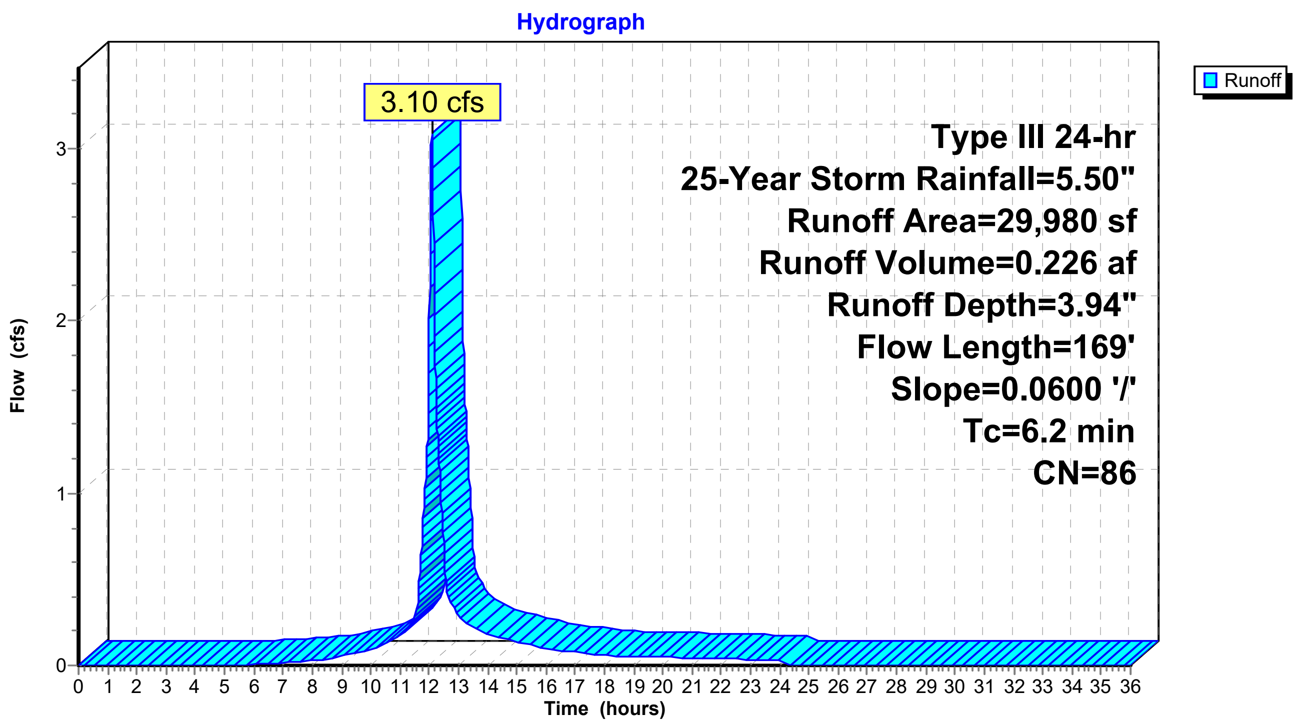
Runoff = 3.10 cfs @ 12.09 hrs, Volume= 0.226 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
23,639	98	Paved parking, HSG A
6,281	39	>75% Grass cover, Good, HSG A
60	61	>75% Grass cover, Good, HSG B
29,980	86	Weighted Average
6,341		21.15% Pervious Area
23,639		78.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	56	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.4	113	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.2	169	Total			

Subcatchment 15P: P1f



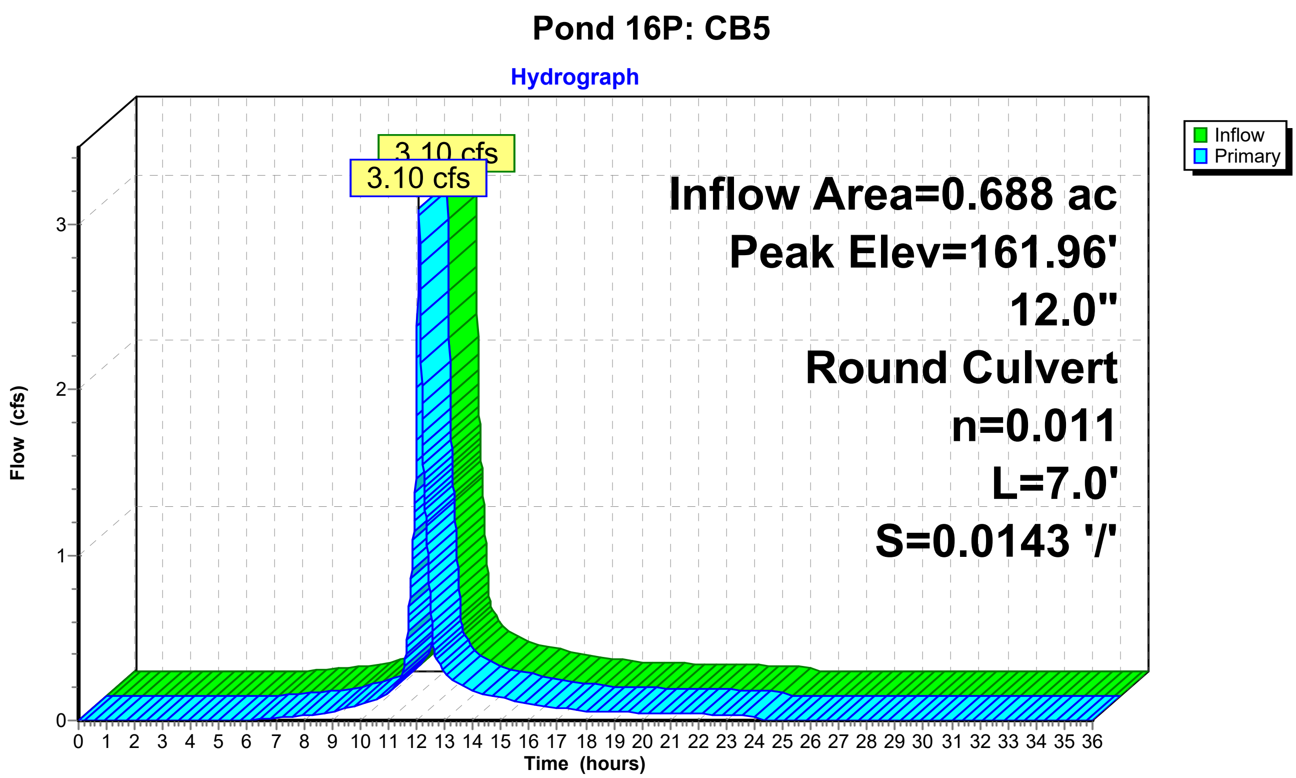
Summary for Pond 16P: CB5

Inflow Area = 0.688 ac, 78.85% Impervious, Inflow Depth = 3.94" for 25-Year Storm event
Inflow = 3.10 cfs @ 12.09 hrs, Volume= 0.226 af
Outflow = 3.10 cfs @ 12.09 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.0 min
Primary = 3.10 cfs @ 12.09 hrs, Volume= 0.226 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.96' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.90'	**12.0" Round Culvert** L= 7.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.90' / 159.80' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.09 cfs @ 12.09 hrs HW=161.96' TW=161.29' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.09 cfs @ 3.93 fps)



Summary for Subcatchment 17P: P1g

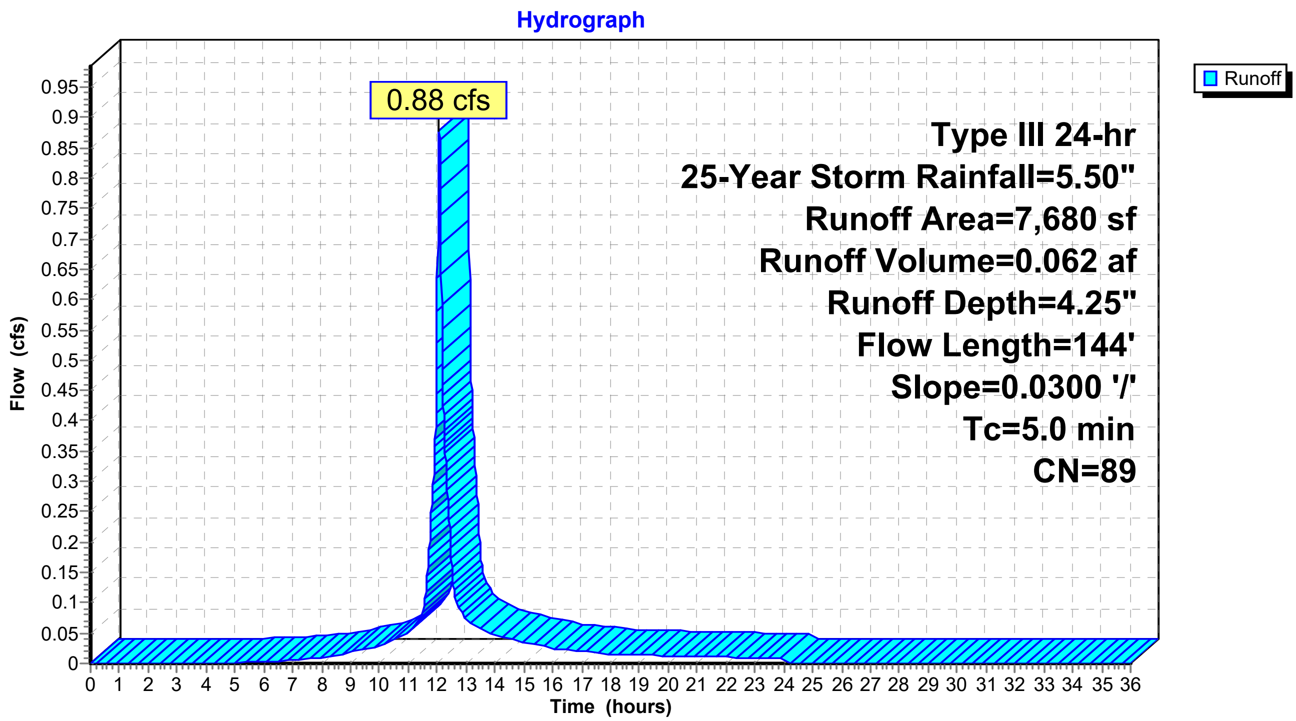
Runoff = 0.88 cfs @ 12.07 hrs, Volume= 0.062 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
6,513	98	Paved parking, HSG A
1,167	39	>75% Grass cover, Good, HSG A
7,680	89	Weighted Average
1,167		15.20% Pervious Area
6,513		84.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	20	0.0300	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.5	40	0.0300	1.35		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
0.9	84	0.0300	1.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
4.7	144	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 17P: P1g



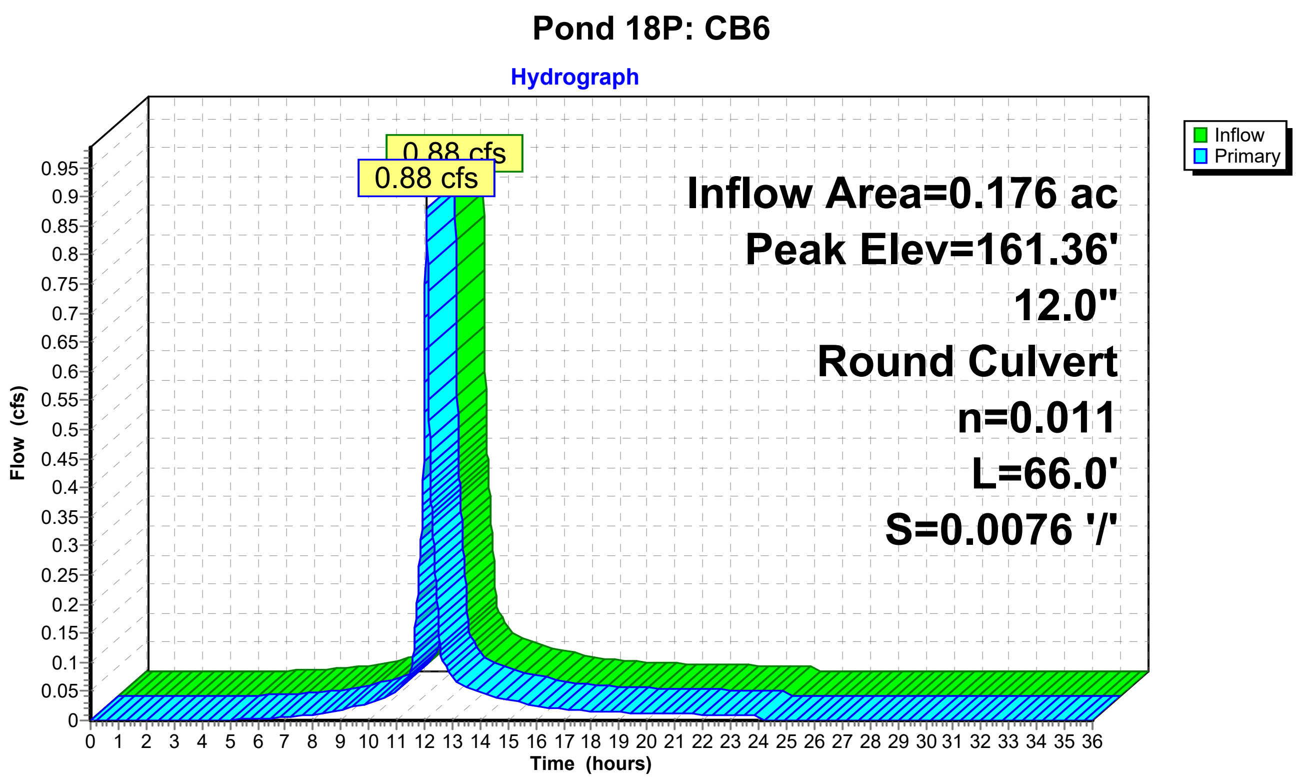
Summary for Pond 18P: CB6

Inflow Area =	0.176 ac,	84.80% Impervious,	Inflow Depth = 4.25"	for 25-Year Storm event	
Inflow =	0.88 cfs @	12.07 hrs,	Volume=	0.062 af	
Outflow =	0.88 cfs @	12.07 hrs,	Volume=	0.062 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.88 cfs @	12.07 hrs,	Volume=	0.062 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.36' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**12.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.80' S= 0.0076 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.47 cfs @ 12.07 hrs HW=161.29' TW=161.27' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.47 cfs @ 0.75 fps)



Summary for Pond 19P: FD/DMH6

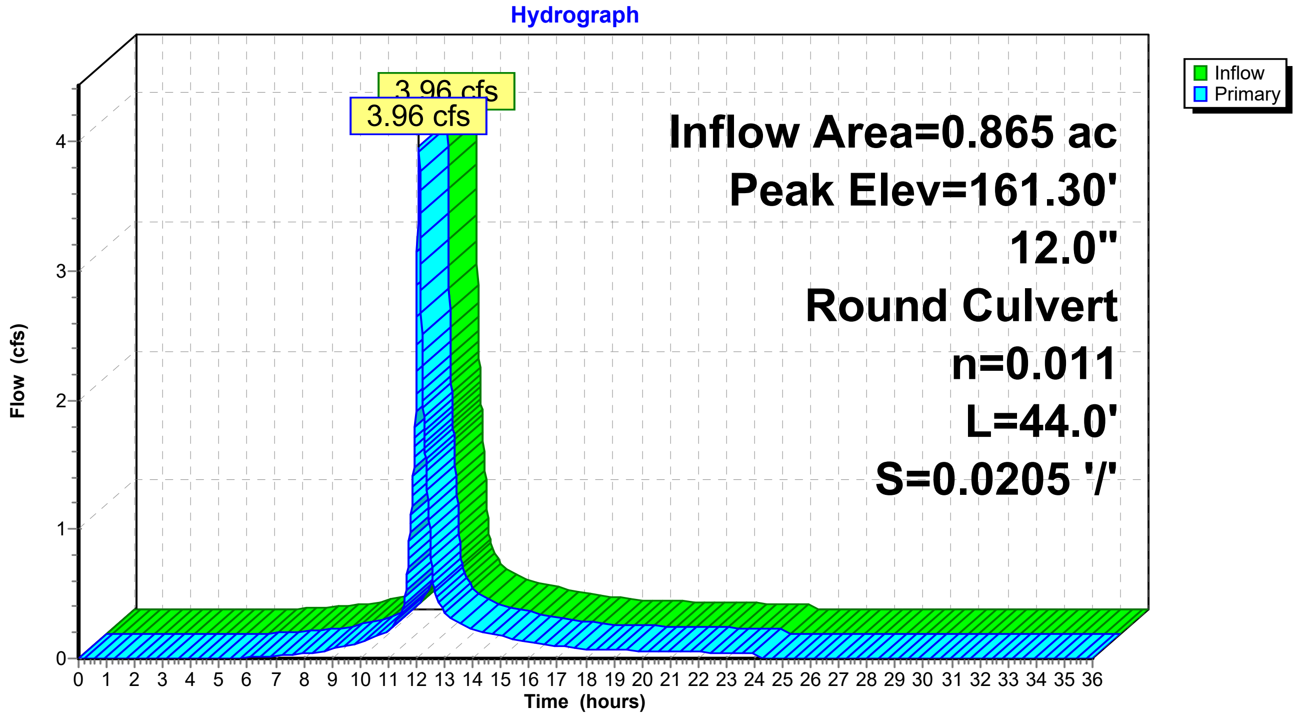
Inflow Area =	0.865 ac,	80.06% Impervious,	Inflow Depth = 4.00"	for 25-Year Storm event	
Inflow =	3.96 cfs @	12.08 hrs,	Volume=	0.288 af	
Outflow =	3.96 cfs @	12.08 hrs,	Volume=	0.288 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.96 cfs @	12.08 hrs,	Volume=	0.288 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.30' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.70'	**12.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.70' / 158.80' S= 0.0205 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.95 cfs @ 12.08 hrs HW=161.29' TW=160.19' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.95 cfs @ 5.03 fps)

Pond 19P: FD/DMH6



Summary for Pond 20P: DMH7&8

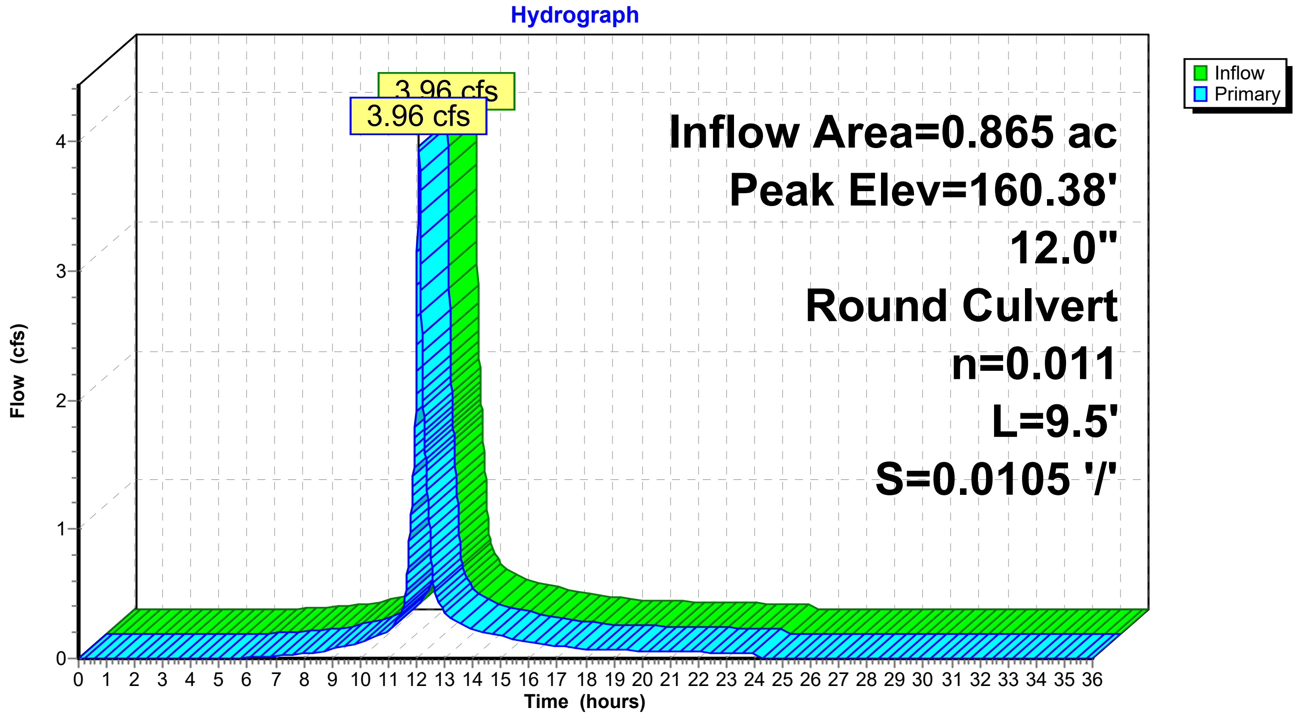
Inflow Area = 0.865 ac, 80.06% Impervious, Inflow Depth = 4.00" for 25-Year Storm event
Inflow = 3.96 cfs @ 12.08 hrs, Volume= 0.288 af
Outflow = 3.96 cfs @ 12.08 hrs, Volume= 0.288 af, Atten= 0%, Lag= 0.0 min
Primary = 3.96 cfs @ 12.08 hrs, Volume= 0.288 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.38' @ 12.63 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 9.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0105 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.95 cfs @ 12.08 hrs HW=160.19' TW=158.99' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.95 cfs @ 5.03 fps)

Pond 20P: DMH7&8



Summary for Subcatchment 21P: P1h

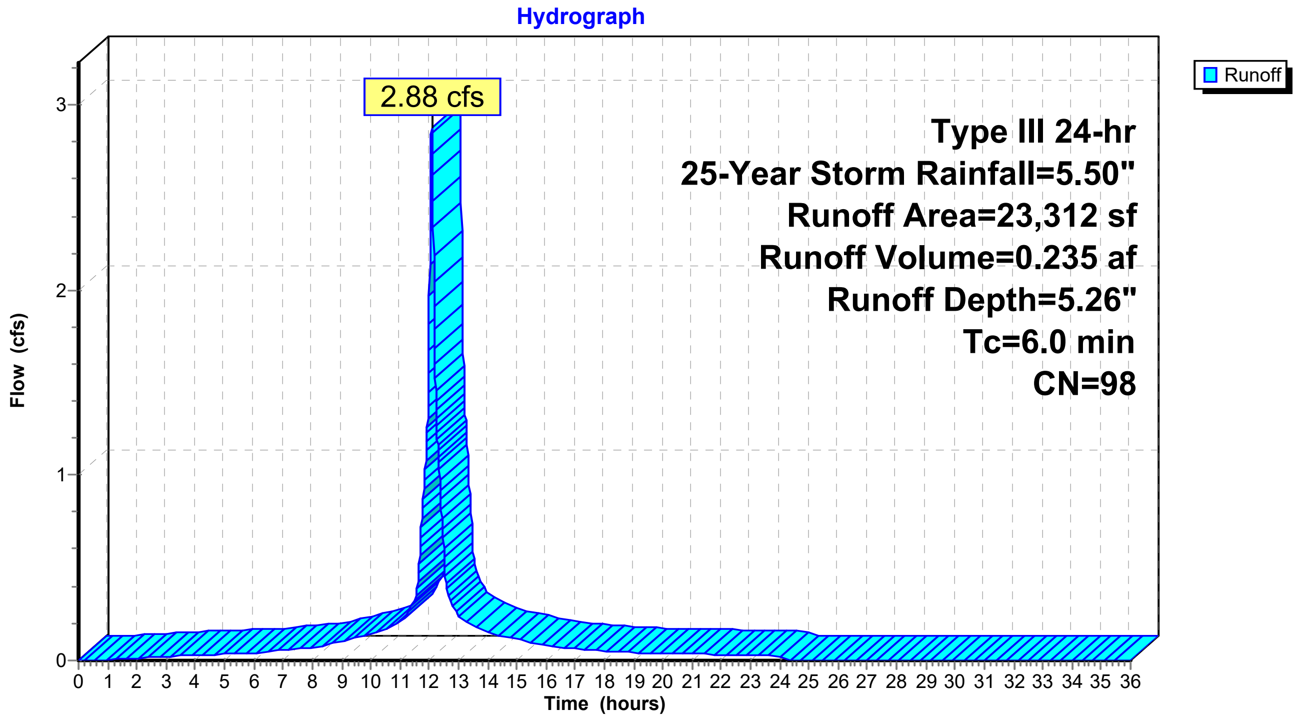
Runoff = 2.88 cfs @ 12.08 hrs, Volume= 0.235 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
23,312	98	Unconnected roofs, HSG A
23,312		100.00% Impervious Area
23,312		100.00% Unconnected

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

Subcatchment 21P: P1h



Summary for Pond 22P: Roof Pipe

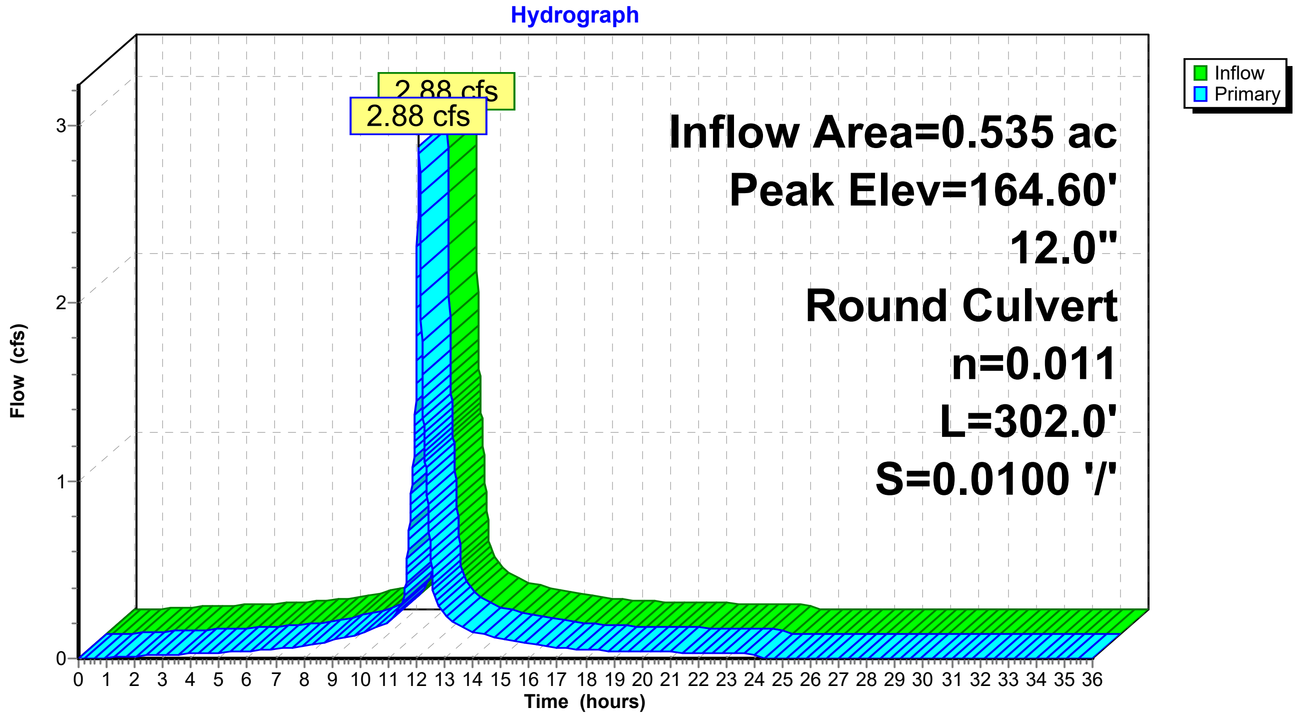
Inflow Area =	0.535 ac,100.00% Impervious,	Inflow Depth = 5.26"	for 25-Year Storm event	
Inflow =	2.88 cfs @	12.08 hrs, Volume=	0.235 af	
Outflow =	2.88 cfs @	12.08 hrs, Volume=	0.235 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.88 cfs @	12.08 hrs, Volume=	0.235 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 164.60' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.52'	**12.0" Round Culvert** L= 302.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.52' / 160.50' S= 0.0100 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.88 cfs @ 12.08 hrs HW=164.60' TW=158.99' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.88 cfs @ 3.66 fps)

Pond 22P: Roof Pipe



Summary for Pond 23P: Infiltration Field #1a

Inflow Area = 8.040 ac, 37.99% Impervious, Inflow Depth = 2.59" for 25-Year Storm event
Inflow = 16.48 cfs @ 12.15 hrs, Volume= 1.738 af
Outflow = 10.19 cfs @ 12.22 hrs, Volume= 1.738 af, Atten= 38%, Lag= 4.0 min
Discarded = 1.91 cfs @ 11.74 hrs, Volume= 1.301 af
Primary = 8.28 cfs @ 12.22 hrs, Volume= 0.437 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.36' @ 12.63 hrs Surf.Area= 9,970 sf Storage= 16,726 cf

Plug-Flow detention time= 37.4 min calculated for 1.737 af (100% of inflow)
Center-of-Mass det. time= 37.4 min (868.9 - 831.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	158.00'	9,894 cf	**130.17'W x 76.50'L x 3.88'H Field A**
			38,586 cf Overall - 13,851 cf Embedded = 24,735 cf x 40.0% Voids
#2A	158.50'	13,851 cf	**Cultec R-330XLHD** x 260 Inside #1
			Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
			Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
			Row Length Adjustment= +1.50' x 7.45 sf x 26 rows
#3	158.00'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		23,821 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf
#3	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf
#4	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf
#5	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf

Discarded OutFlow Max=1.91 cfs @ 11.74 hrs HW=158.06' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 1.91 cfs)

Primary OutFlow Max=7.00 cfs @ 12.22 hrs HW=159.51' TW=159.29' (Dynamic Tailwater)
├─**2=Culvert** (Inlet Controls 1.75 cfs @ 2.23 fps)
├─**3=Culvert** (Inlet Controls 1.75 cfs @ 2.23 fps)
├─**4=Culvert** (Inlet Controls 1.75 cfs @ 2.23 fps)
└─**5=Culvert** (Inlet Controls 1.75 cfs @ 2.23 fps)

Pond 23P: Infiltration Field #1a - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 26 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

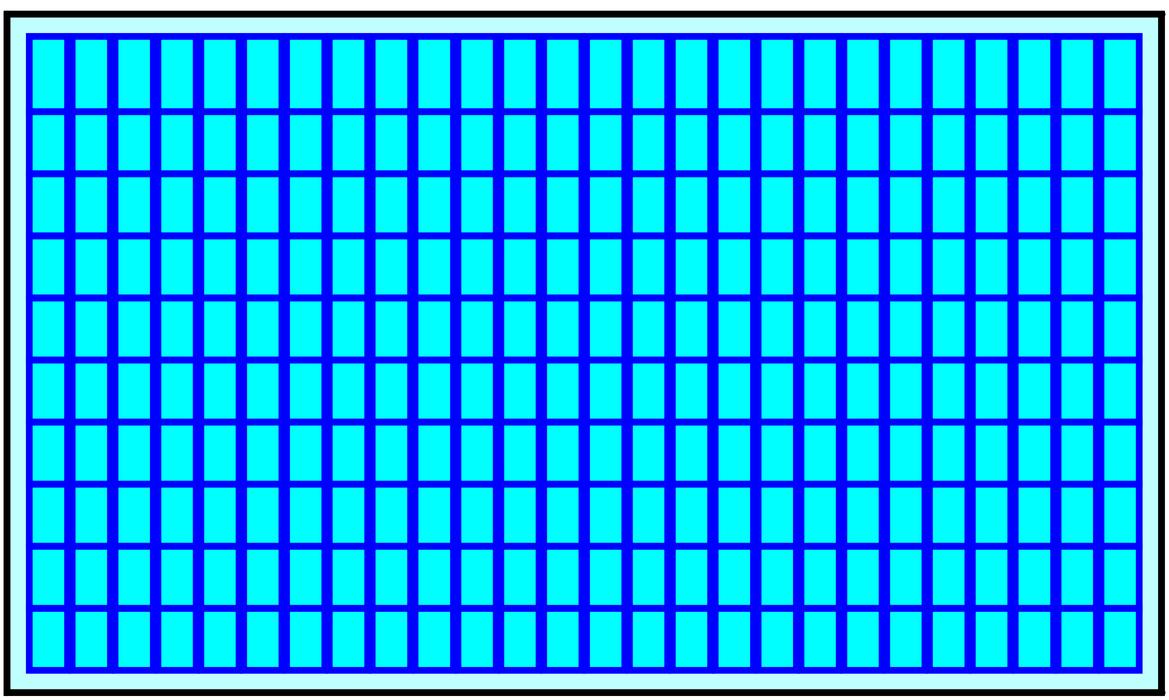
10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +30.0" End Stone x 2 = 76.50' Base Length
26 Rows x 52.0" Wide + 6.0" Spacing x 25 + 30.0" Side Stone x 2 = 130.17' Base Width
6.0" Base + 30.5" Chamber Height + 10.0" Cover = 3.88' Field Height

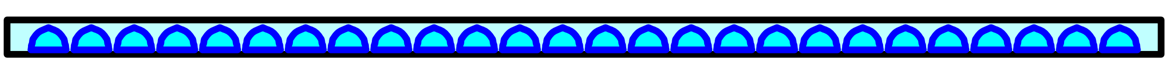
260 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 26 Rows = 13,851.4 cf Chamber Storage

38,586.3 cf Field - 13,851.4 cf Chambers = 24,734.9 cf Stone x 40.0% Voids = 9,893.9 cf Stone Storage

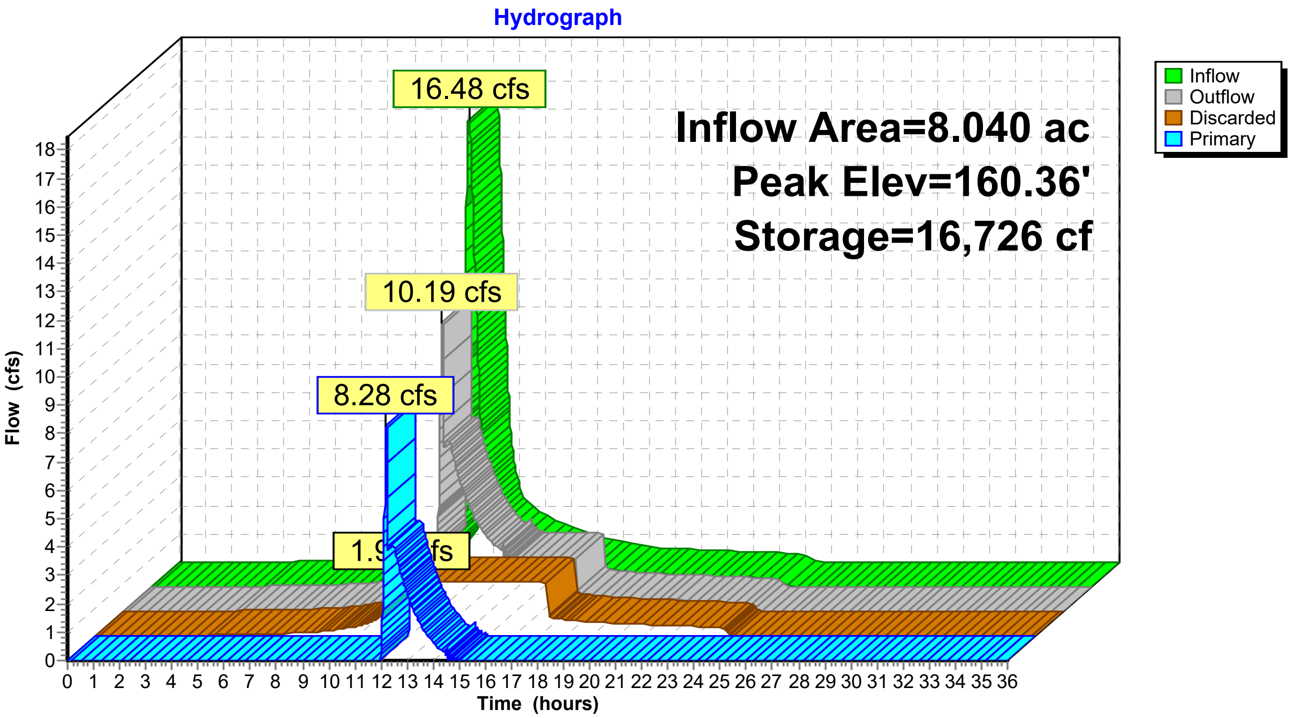
Chamber Storage + Stone Storage = 23,745.4 cf = 0.545 af
Overall Storage Efficiency = 61.5%
Overall System Size = 76.50' x 130.17' x 3.88'

260 Chambers
1,429.1 cy Field
916.1 cy Stone





Pond 23P: Infiltration Field #1a



Summary for Pond 24P: Infiltration Field #1b

Inflow Area =	8.040 ac, 37.99% Impervious, Inflow Depth = 0.65"	for 25-Year Storm event	
Inflow =	8.28 cfs @ 12.22 hrs, Volume=	0.437 af	
Outflow =	3.55 cfs @ 12.64 hrs, Volume=	0.437 af, Atten= 57%, Lag= 25.4 min	
Discarded =	0.18 cfs @ 12.05 hrs, Volume=	0.107 af	
Primary =	3.36 cfs @ 12.64 hrs, Volume=	0.330 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.31' @ 12.64 hrs Surf.Area= 3,315 sf Storage= 5,271 cf

Plug-Flow detention time= 52.1 min calculated for 0.437 af (100% of inflow)
Center-of-Mass det. time= 52.1 min (820.5 - 768.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	158.00'	3,414 cf	**43.17'W x 76.50'L x 3.88'H Field A** 12,796 cf Overall - 4,262 cf Embedded = 8,534 cf x 40.0% Voids
#2A	158.50'	4,262 cf	**Cultec R-330XLHD** x 80 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 8 rows
#3	158.00'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		7,751 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	159.15'	**12.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.15' / 156.00' S= 0.1432 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#3	Primary	160.00'	**8.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.00' / 156.00' S= 0.1818 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Discarded OutFlow Max=0.18 cfs @ 12.05 hrs HW=158.07' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=3.36 cfs @ 12.64 hrs HW=160.31' TW=0.00' (Dynamic Tailwater)
├─**2=Culvert** (Inlet Controls 3.07 cfs @ 3.91 fps)
└─**3=Culvert** (Inlet Controls 0.30 cfs @ 1.89 fps)

Pond 24P: Infiltration Field #1b - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 8 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

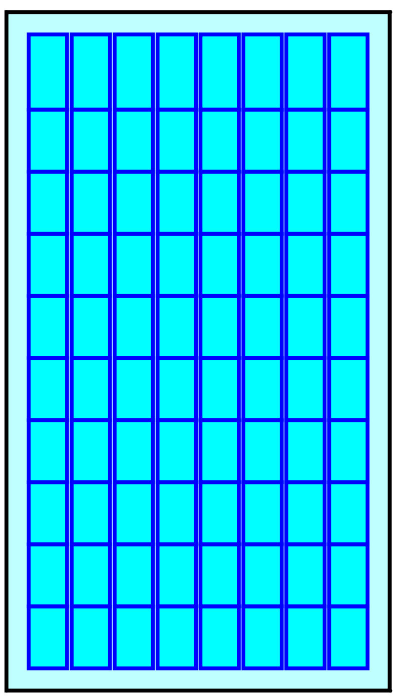
10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +30.0" End Stone x 2 = 76.50' Base Length
8 Rows x 52.0" Wide + 6.0" Spacing x 7 + 30.0" Side Stone x 2 = 43.17' Base Width
6.0" Base + 30.5" Chamber Height + 10.0" Cover = 3.88' Field Height

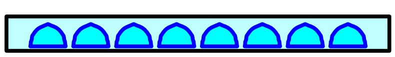
80 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 8 Rows = 4,262.0 cf Chamber Storage

12,796.2 cf Field - 4,262.0 cf Chambers = 8,534.2 cf Stone x 40.0% Voids = 3,413.7 cf Stone Storage

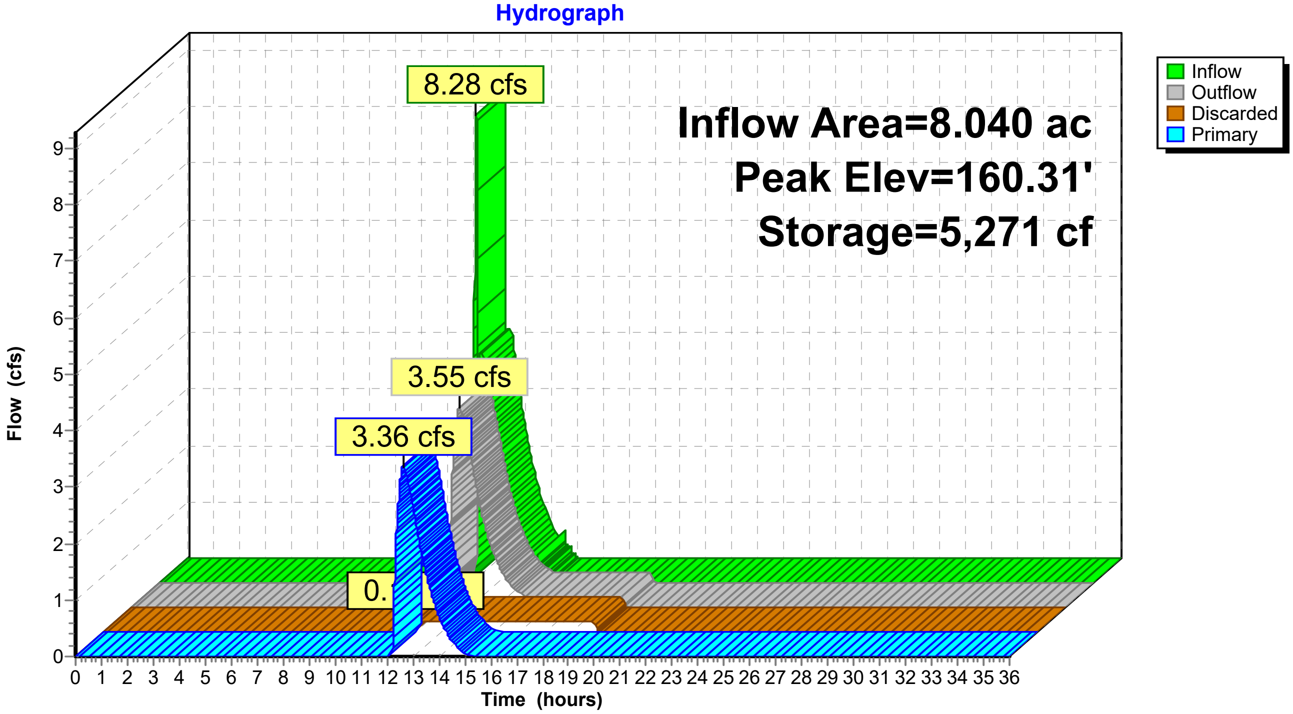
Chamber Storage + Stone Storage = 7,675.7 cf = 0.176 af
Overall Storage Efficiency = 60.0%
Overall System Size = 76.50' x 43.17' x 3.88'

80 Chambers
473.9 cy Field
316.1 cy Stone





Pond 24P: Infiltration Field #1b



Summary for Subcatchment 25P: P2a

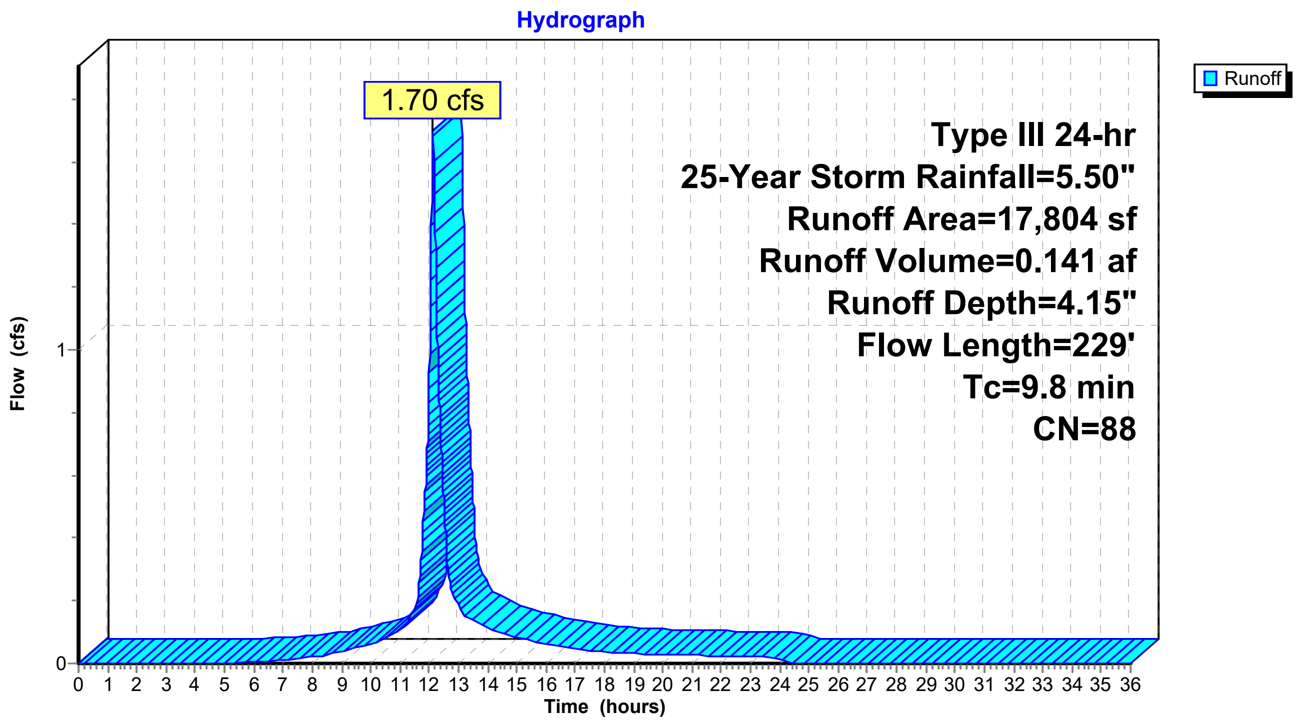
Runoff = 1.70 cfs @ 12.13 hrs, Volume= 0.141 af, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
218	98	Paved parking, HSG A
12,048	98	Paved parking, HSG B
1,239	79	<50% Grass cover, Poor, HSG B
4,299	61	>75% Grass cover, Good, HSG B
17,804	88	Weighted Average
5,538		31.11% Pervious Area
12,266		68.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	83	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.5	146	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.8	229	Total			

Subcatchment 25P: P2a



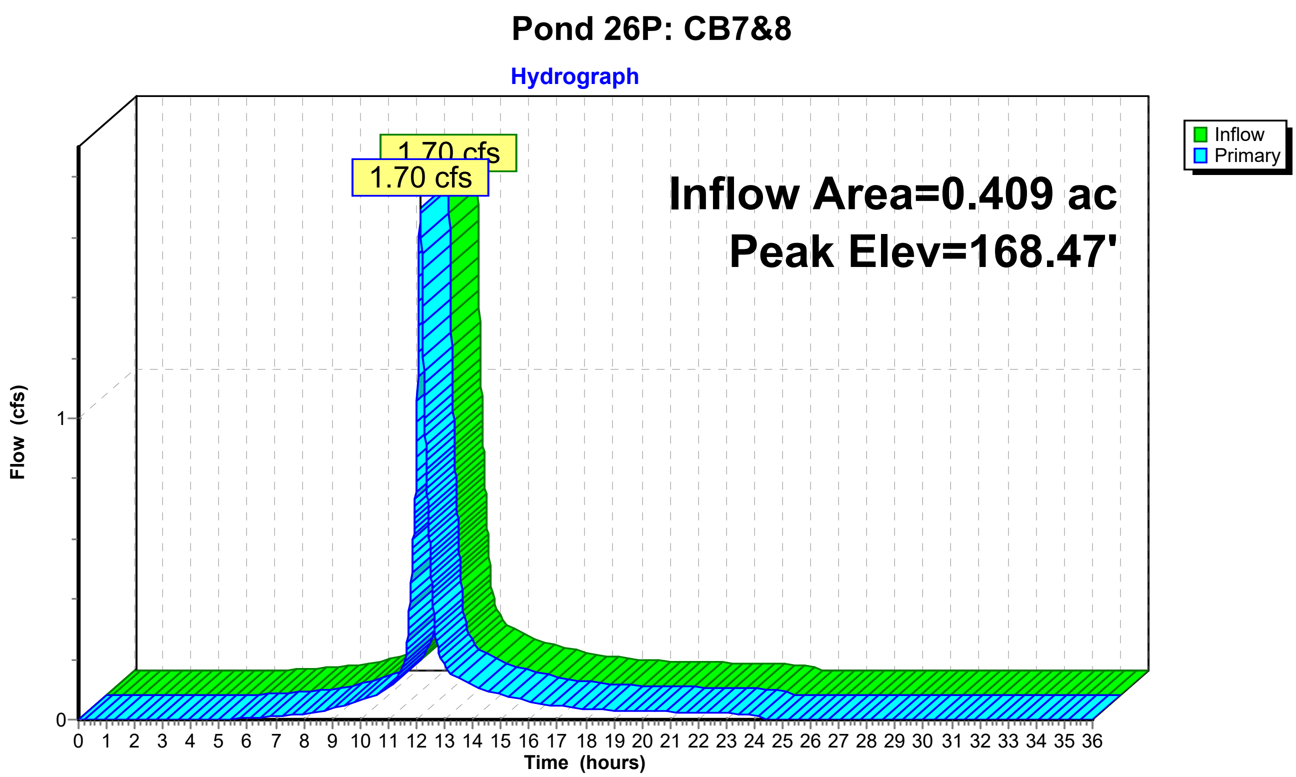
Summary for Pond 26P: CB7&8

Inflow Area =	0.409 ac,	68.89% Impervious, Inflow Depth = 4.15"	for 25-Year Storm event	
Inflow =	1.70 cfs @	12.13 hrs, Volume=	0.141 af	
Outflow =	1.70 cfs @	12.13 hrs, Volume=	0.141 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.70 cfs @	12.13 hrs, Volume=	0.141 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 168.47' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	168.00'	**12.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 167.20' S= 0.0190 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Primary	168.00'	**12.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 167.20' S= 0.0727 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.70 cfs @ 12.13 hrs HW=168.47' TW=167.81' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.85 cfs @ 2.34 fps)
2=Culvert (Inlet Controls 0.85 cfs @ 2.34 fps)



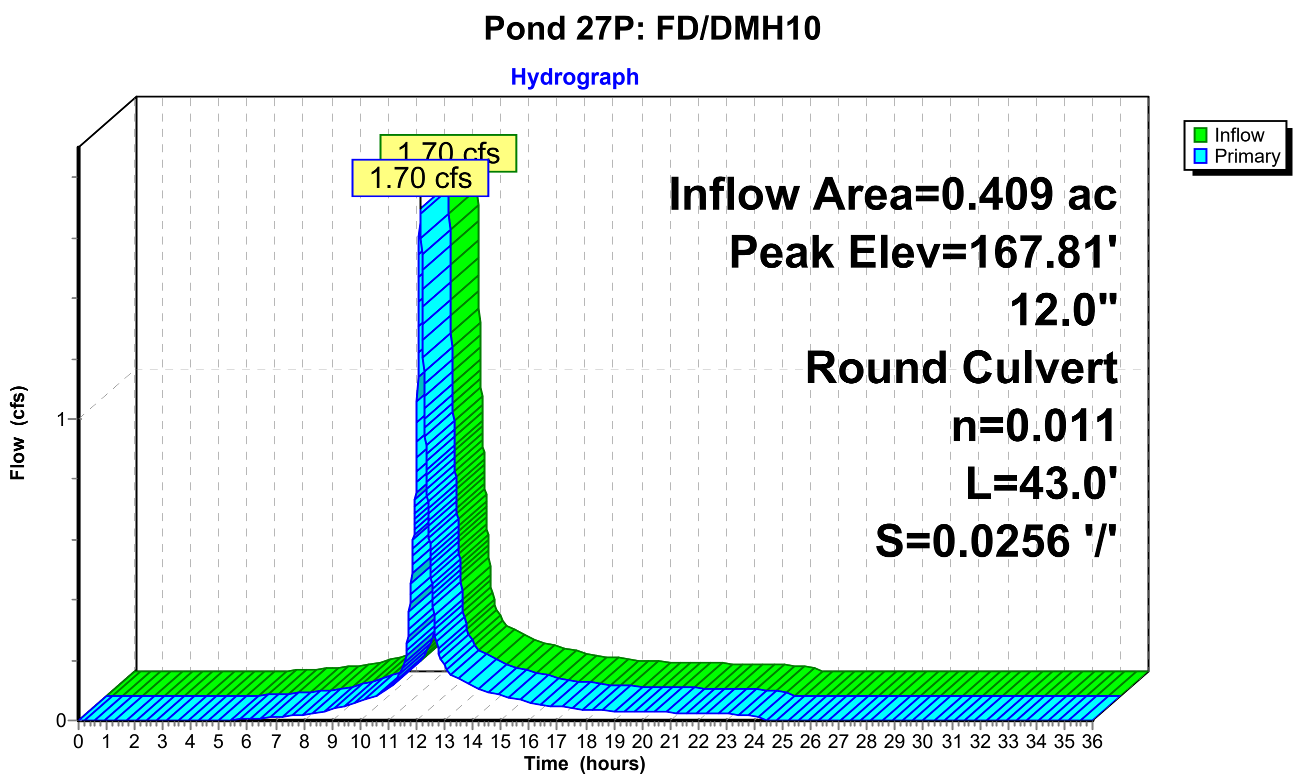
Summary for Pond 27P: FD/DMH10

Inflow Area =	0.409 ac,	68.89% Impervious,	Inflow Depth =	4.15"	for 25-Year Storm event
Inflow =	1.70 cfs @	12.13 hrs,	Volume=	0.141 af	
Outflow =	1.70 cfs @	12.13 hrs,	Volume=	0.141 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.70 cfs @	12.13 hrs,	Volume=	0.141 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 167.81' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	167.10'	**12.0" Round Culvert** L= 43.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.10' / 166.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.70 cfs @ 12.13 hrs HW=167.81' TW=165.79' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.70 cfs @ 2.86 fps)



Summary for Subcatchment 28P: P2b

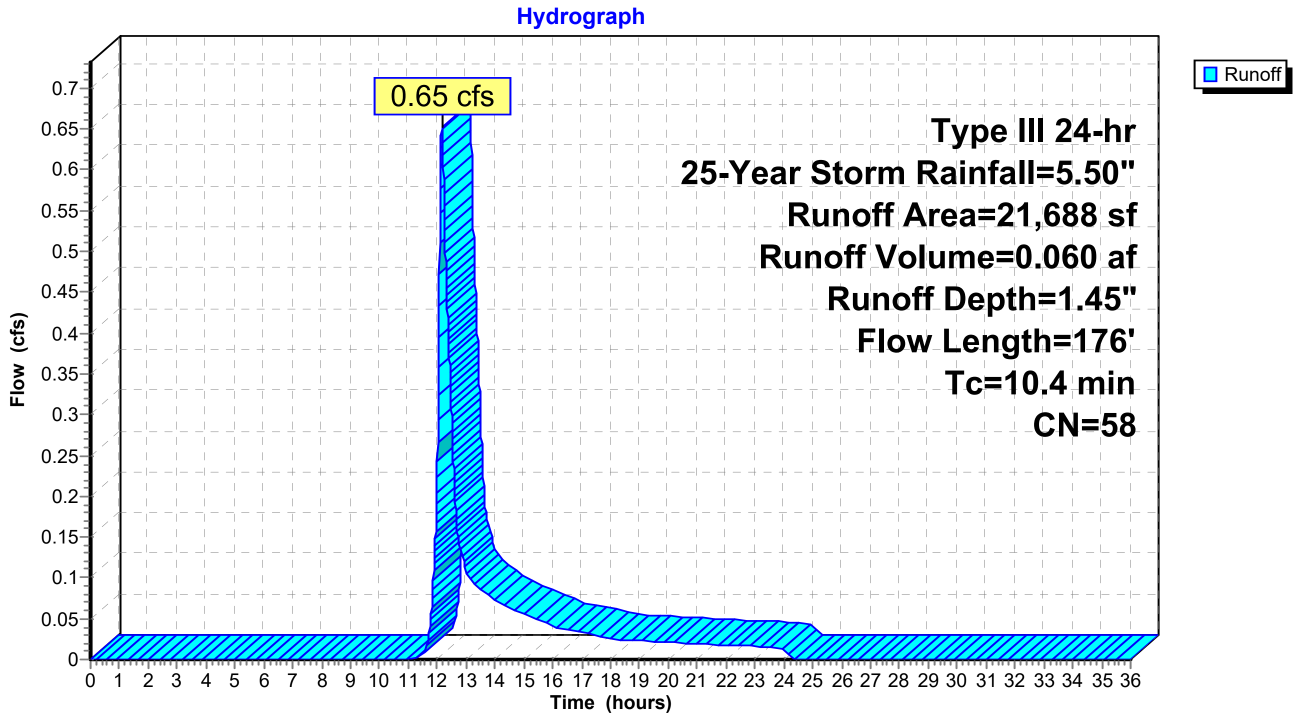
Runoff = 0.65 cfs @ 12.16 hrs, Volume= 0.060 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
1,358	98	Paved parking, HSG B
8,334	61	>75% Grass cover, Good, HSG B
3,244	39	>75% Grass cover, Good, HSG A
8,752	55	Woods, Good, HSG B
21,688	58	Weighted Average
20,330		93.74% Pervious Area
1,358		6.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	61	0.0600	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	92	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	23	0.2200	3.28		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.4	176	Total			

Subcatchment 28P: P2b



Summary for Subcatchment 29P: P2c

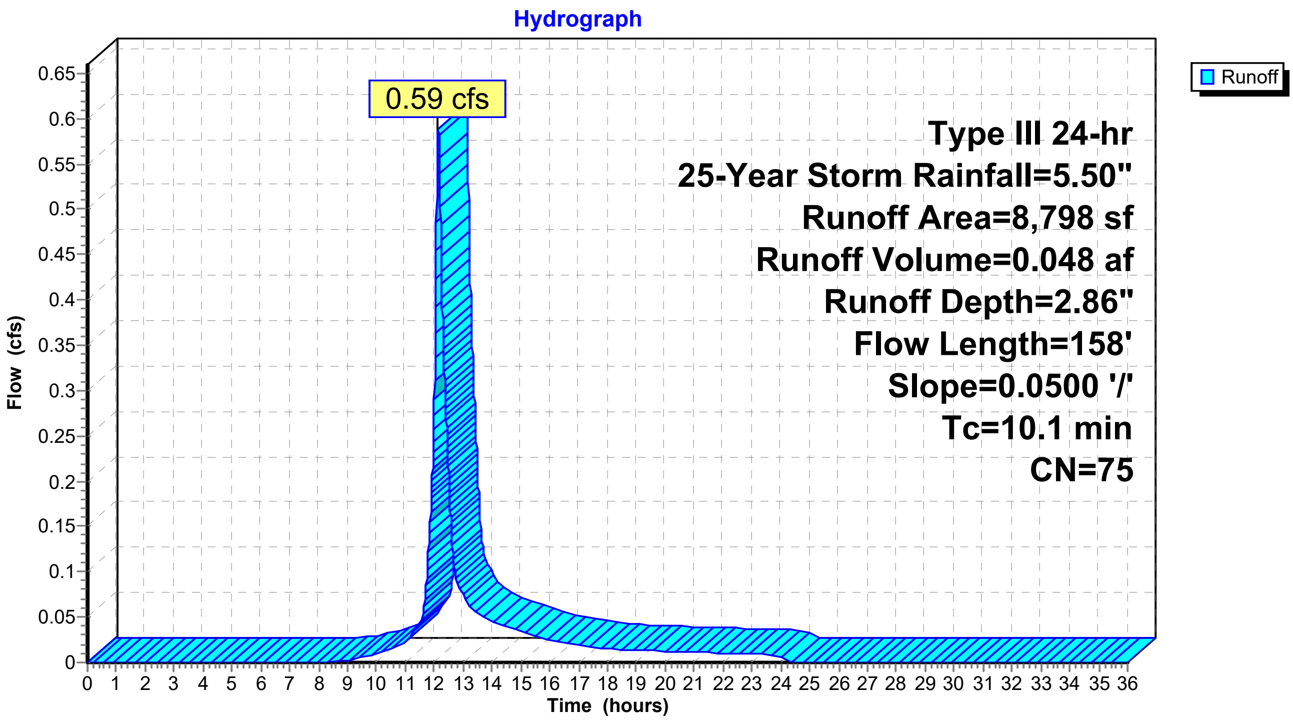
Runoff = 0.59 cfs @ 12.14 hrs, Volume= 0.048 af, Depth= 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
62	98	Paved parking, HSG A
3,785	98	Paved parking, HSG B
8	39	>75% Grass cover, Good, HSG A
2,132	61	>75% Grass cover, Good, HSG B
2,811	55	Woods, Good, HSG B
8,798	75	Weighted Average
4,951		56.27% Pervious Area
3,847		43.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	35	0.0500	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
4.3	21	0.0500	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.5	102	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.1	158	Total			

Subcatchment 29P: P2c



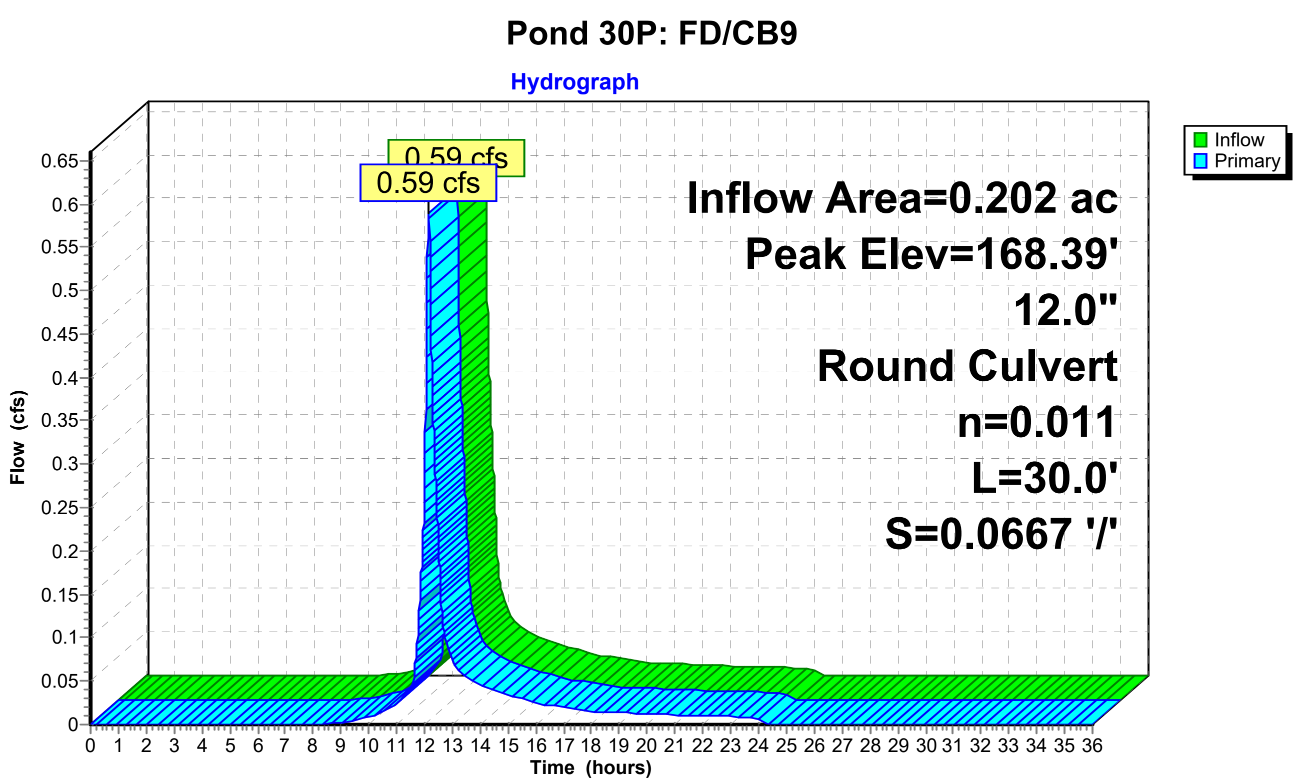
Summary for Pond 30P: FD/CB9

Inflow Area =	0.202 ac,	43.73% Impervious,	Inflow Depth = 2.86"	for 25-Year Storm event	
Inflow =	0.59 cfs @	12.14 hrs,	Volume=	0.048 af	
Outflow =	0.59 cfs @	12.14 hrs,	Volume=	0.048 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.59 cfs @	12.14 hrs,	Volume=	0.048 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 168.39' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	168.00'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 166.00' S= 0.0667 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.59 cfs @ 12.14 hrs HW=168.38' TW=165.81' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.59 cfs @ 2.11 fps)



Summary for Pond 31P: Basin

Inflow Area =	1.109 ac, 36.18% Impervious,	Inflow Depth = 2.70"	for 25-Year Storm event	
Inflow =	2.93 cfs @	12.14 hrs, Volume=	0.250 af	
Outflow =	0.74 cfs @	12.59 hrs, Volume=	0.250 af,	Atten= 75%, Lag= 26.7 min
Discarded =	0.74 cfs @	12.59 hrs, Volume=	0.250 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.21' @ 12.59 hrs Surf.Area= 3,889 sf Storage= 2,547 cf

Plug-Flow detention time= 20.3 min calculated for 0.250 af (100% of inflow)
Center-of-Mass det. time= 20.3 min (844.7 - 824.4)

Volume	Invert	Avail.Storage	Storage Description
#1	165.50'	11,005 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

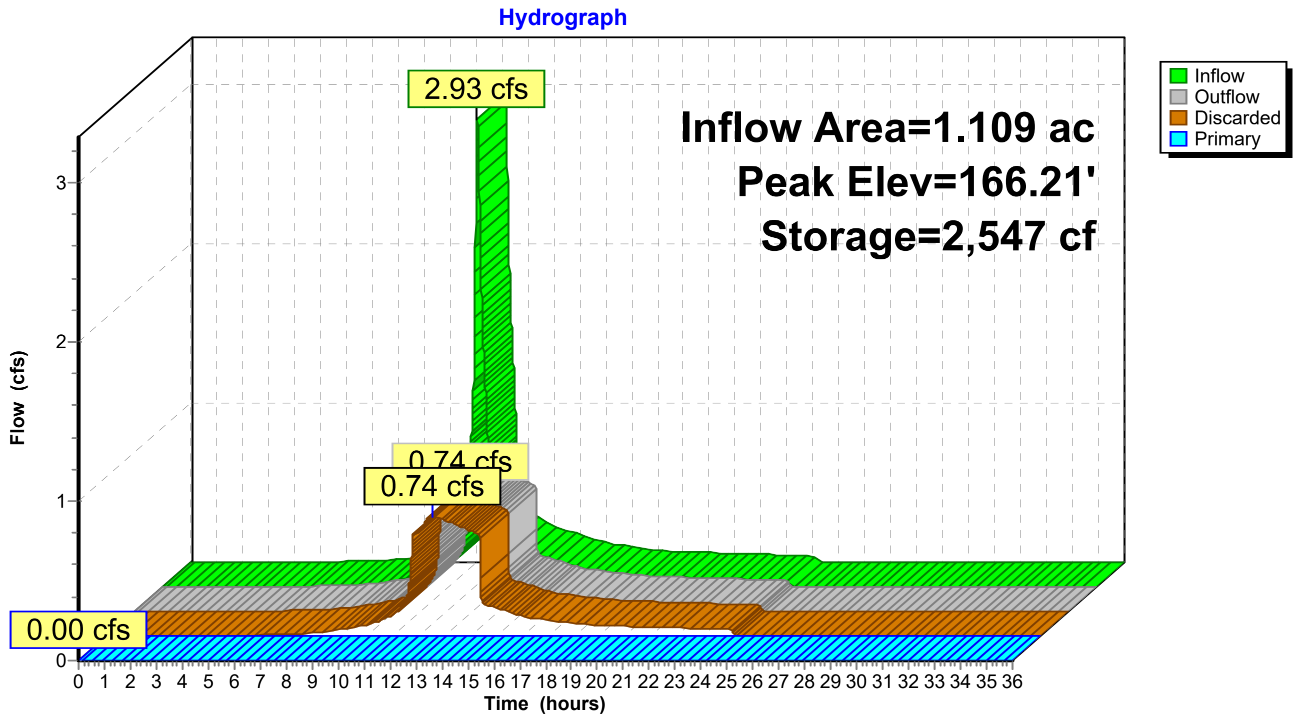
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
165.50	3,291	222.0	0	0	3,291
168.00	5,616	282.0	11,005	11,005	5,779

Device	Routing	Invert	Outlet Devices
#1	Discarded	165.50'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	166.60'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 166.60' / 161.00' S= 0.1120 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Discarded OutFlow Max=0.74 cfs @ 12.59 hrs HW=166.21' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.74 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=165.50' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 31P: Basin



Summary for Subcatchment 32P: P3f

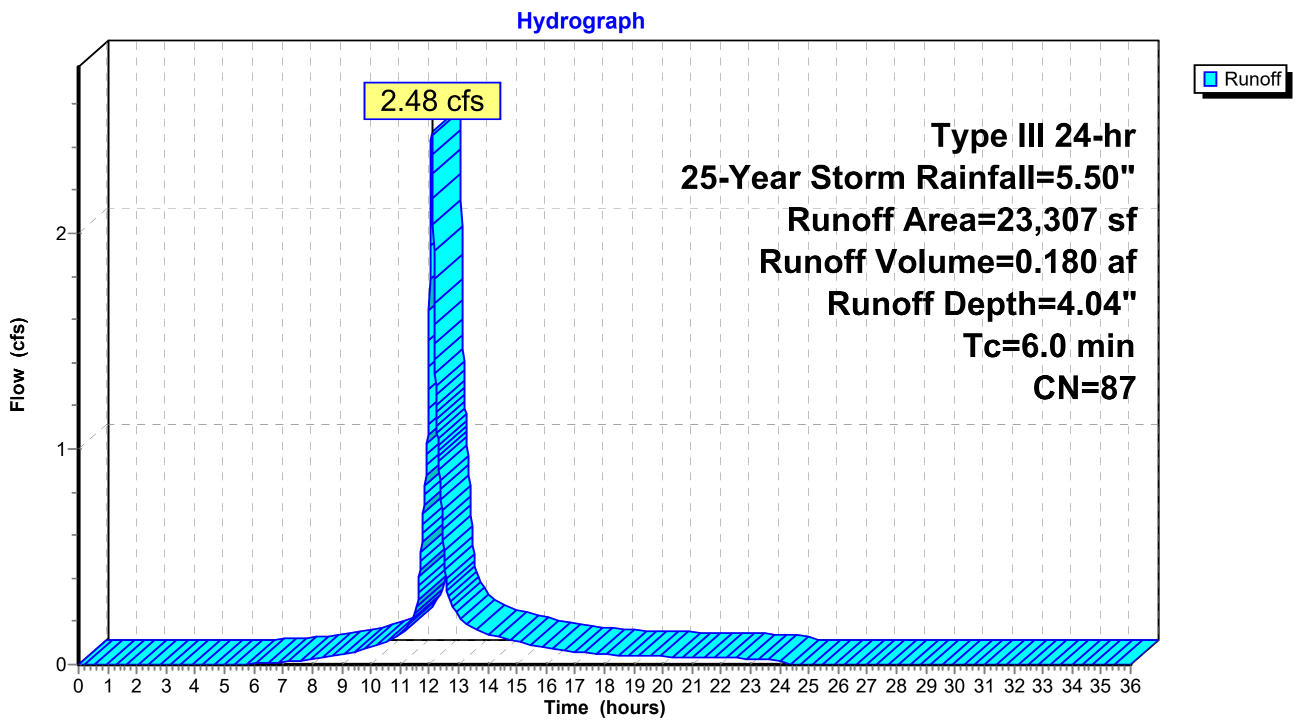
Runoff = 2.48 cfs @ 12.09 hrs, Volume= 0.180 af, Depth= 4.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
5,626	98	Roofs, HSG A
11,048	98	Roofs, HSG B
516	98	Paved parking, HSG B
1,861	39	>75% Grass cover, Good, HSG A
4,256	61	>75% Grass cover, Good, HSG B
23,307	87	Weighted Average
6,117		26.25% Pervious Area
17,190		73.75% Impervious Area

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

Subcatchment 32P: P3f



Summary for Subcatchment 33P: P3a

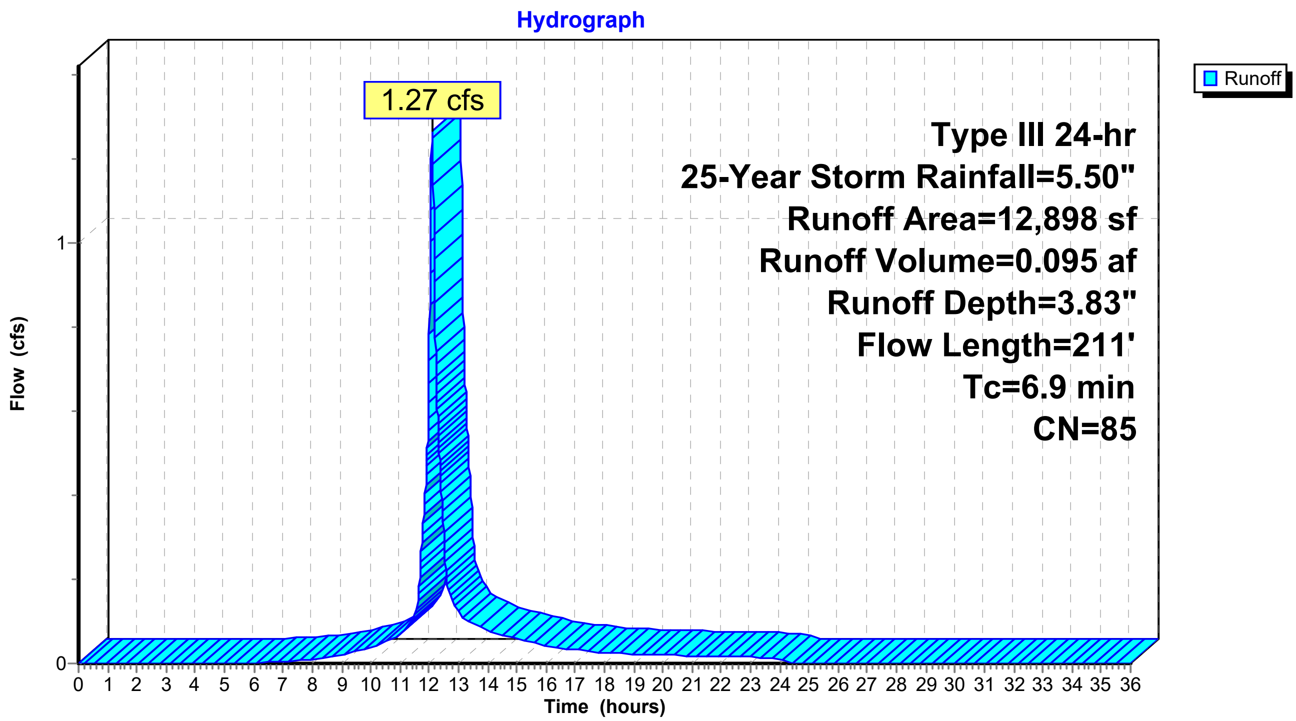
Runoff = 1.27 cfs @ 12.10 hrs, Volume= 0.095 af, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
3,379	98	Paved parking, HSG A
5,537	98	Paved parking, HSG B
692	39	>75% Grass cover, Good, HSG A
3,290	61	>75% Grass cover, Good, HSG B
12,898	85	Weighted Average
3,982		30.87% Pervious Area
8,916		69.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	66	0.0700	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	145	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.9	211	Total			

Subcatchment 33P: P3a



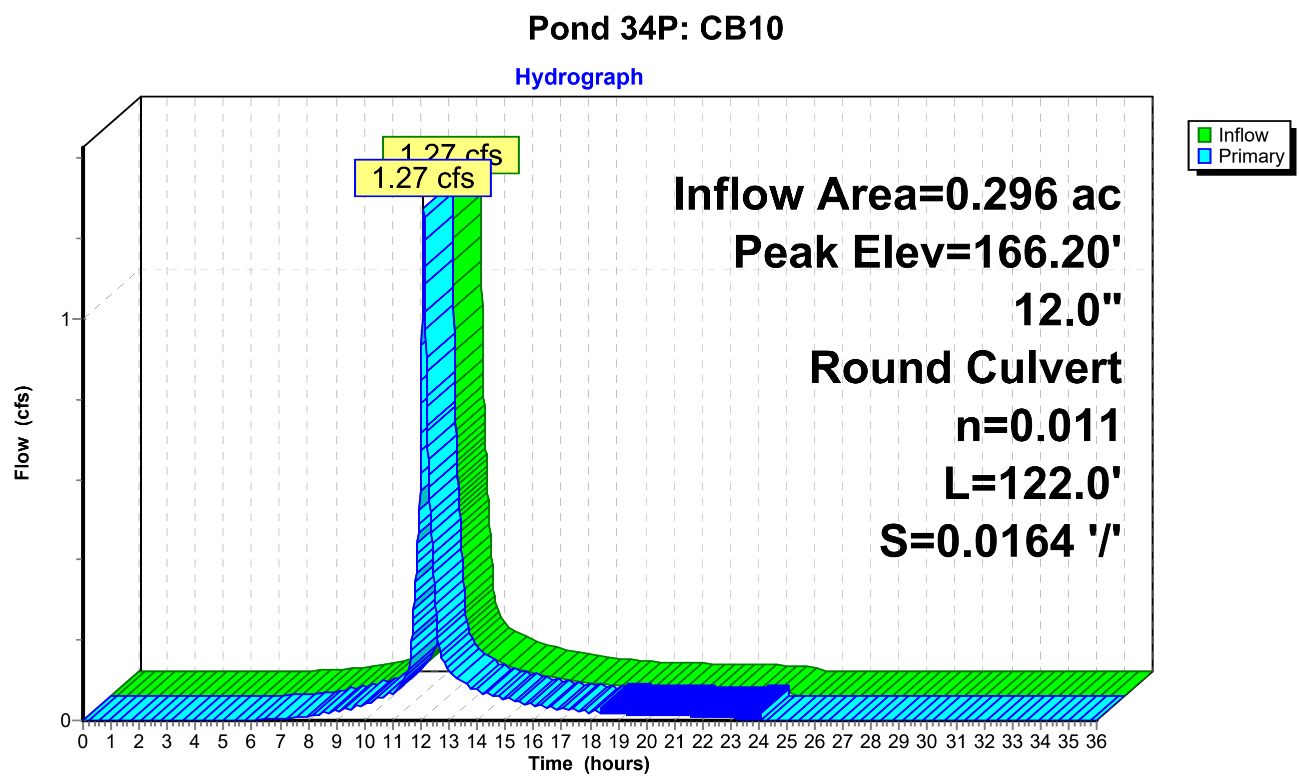
Summary for Pond 34P: CB10

Inflow Area =	0.296 ac,	69.13% Impervious,	Inflow Depth = 3.83"	for 25-Year Storm event	
Inflow =	1.27 cfs @	12.10 hrs,	Volume=	0.095 af	
Outflow =	1.27 cfs @	12.09 hrs,	Volume=	0.095 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.27 cfs @	12.09 hrs,	Volume=	0.095 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.20' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.00'	**12.0" Round Culvert** L= 122.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.00' / 161.00' S= 0.0164 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.26 cfs @ 12.09 hrs HW=166.20' TW=166.03' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.26 cfs @ 1.60 fps)



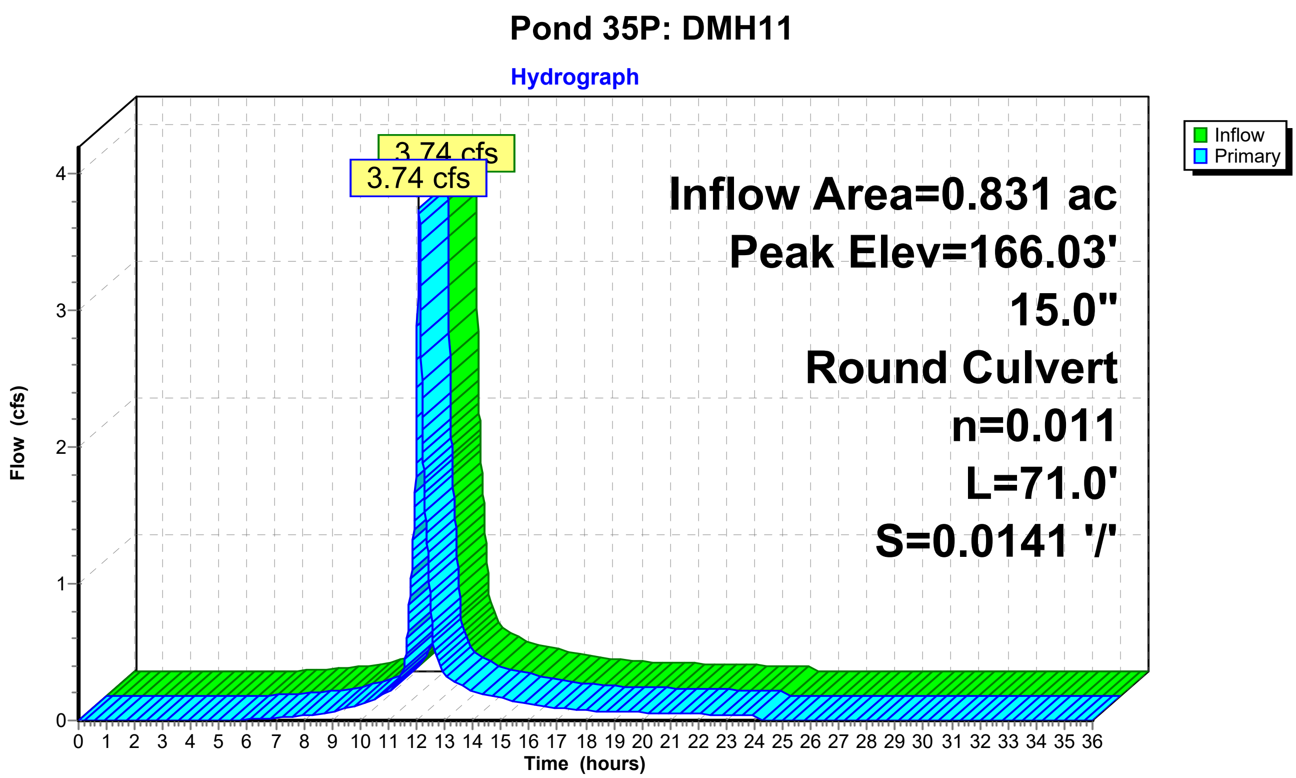
Summary for Pond 35P: DMH11

Inflow Area =	0.831 ac,	72.11% Impervious,	Inflow Depth = 3.97"	for 25-Year Storm event	
Inflow =	3.74 cfs @	12.09 hrs,	Volume=	0.275 af	
Outflow =	3.74 cfs @	12.09 hrs,	Volume=	0.275 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.74 cfs @	12.09 hrs,	Volume=	0.275 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.03' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**15.0" Round Culvert** L= 71.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 164.00' S= 0.0141 '/' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=3.74 cfs @ 12.09 hrs HW=166.03' TW=165.01' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.74 cfs @ 3.46 fps)



Summary for Subcatchment 36P: P3b

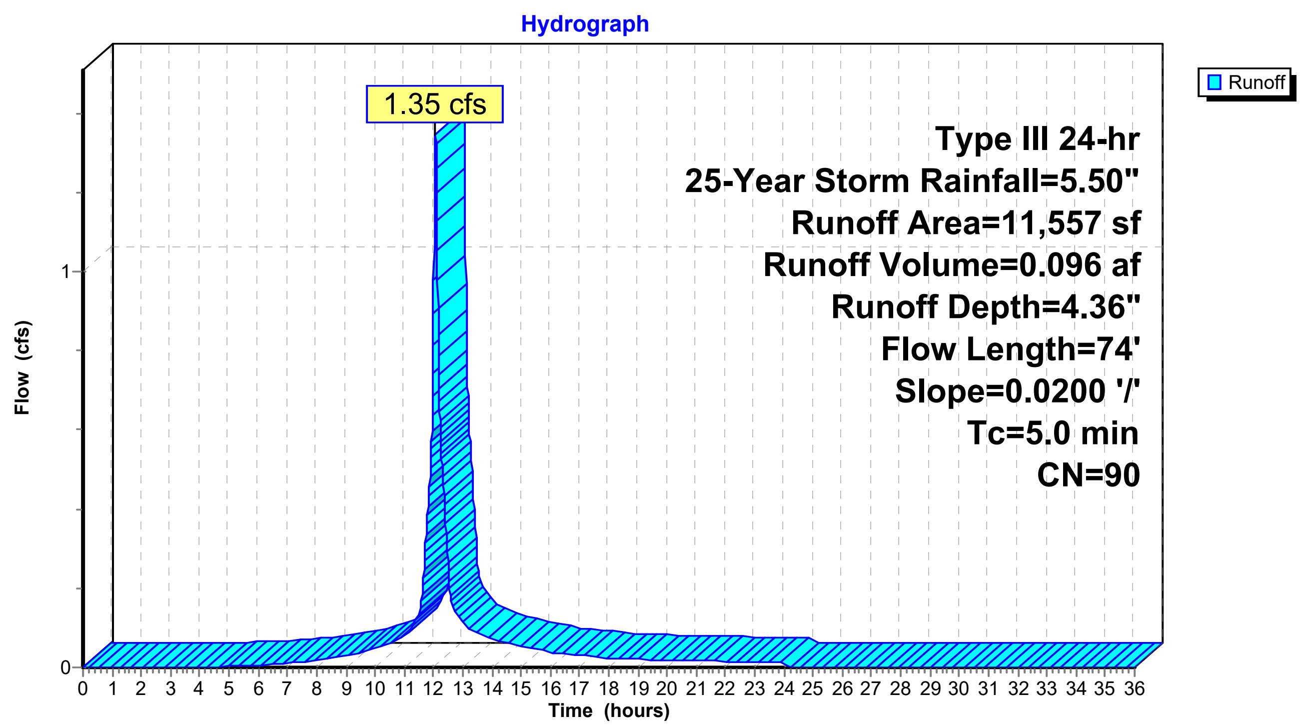
Runoff = 1.35 cfs @ 12.07 hrs, Volume= 0.096 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
10,048	98	Paved parking, HSG A
1,509	39	>75% Grass cover, Good, HSG A
11,557	90	Weighted Average
1,509		13.06% Pervious Area
10,048		86.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	14	0.0200	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.8	60	0.0200	1.24		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.8	74	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 36P: P3b



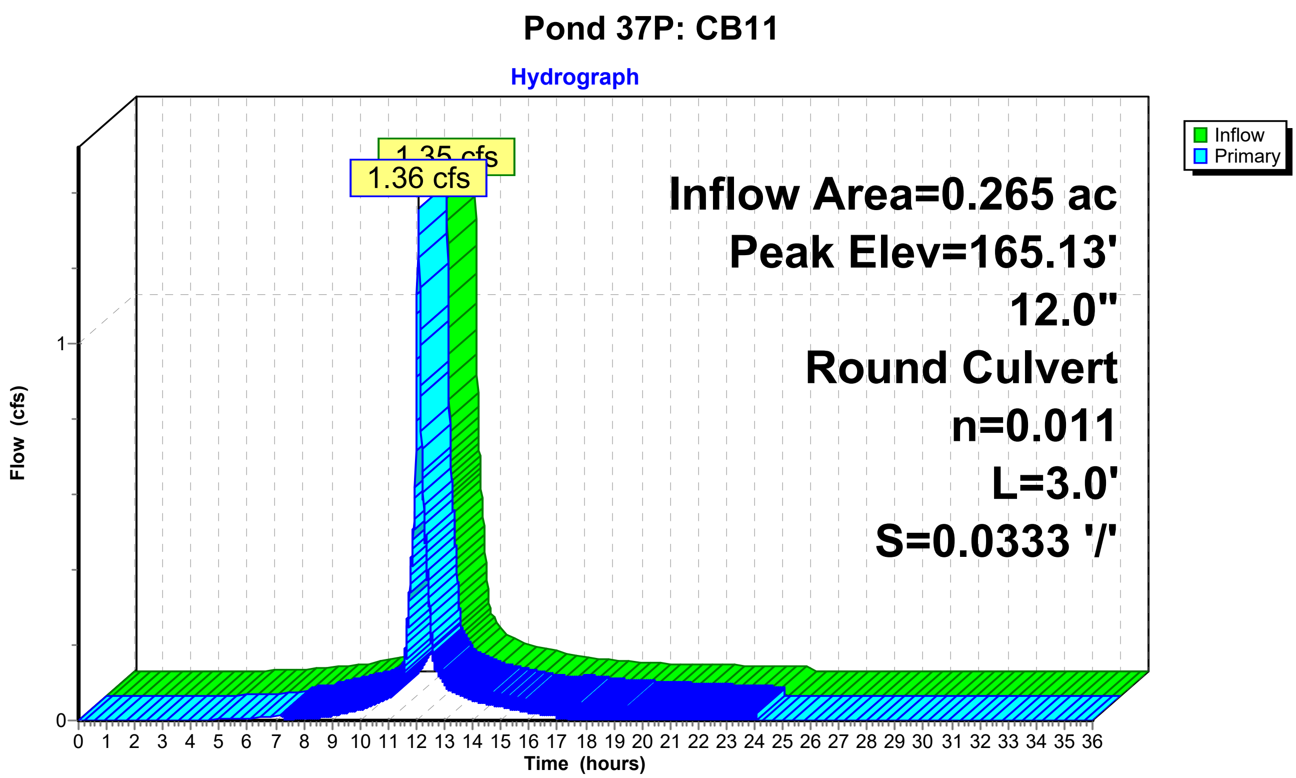
Summary for Pond 37P: CB11

Inflow Area =	0.265 ac, 86.94% Impervious,	Inflow Depth = 4.36"	for 25-Year Storm event	
Inflow =	1.35 cfs @	12.07 hrs, Volume=	0.096 af	
Outflow =	1.36 cfs @	12.08 hrs, Volume=	0.096 af,	Atten= 0%, Lag= 0.4 min
Primary =	1.36 cfs @	12.08 hrs, Volume=	0.096 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.13' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	161.10'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.10' / 161.00' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.27 cfs @ 12.08 hrs HW=165.13' TW=165.01' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.27 cfs @ 1.62 fps)



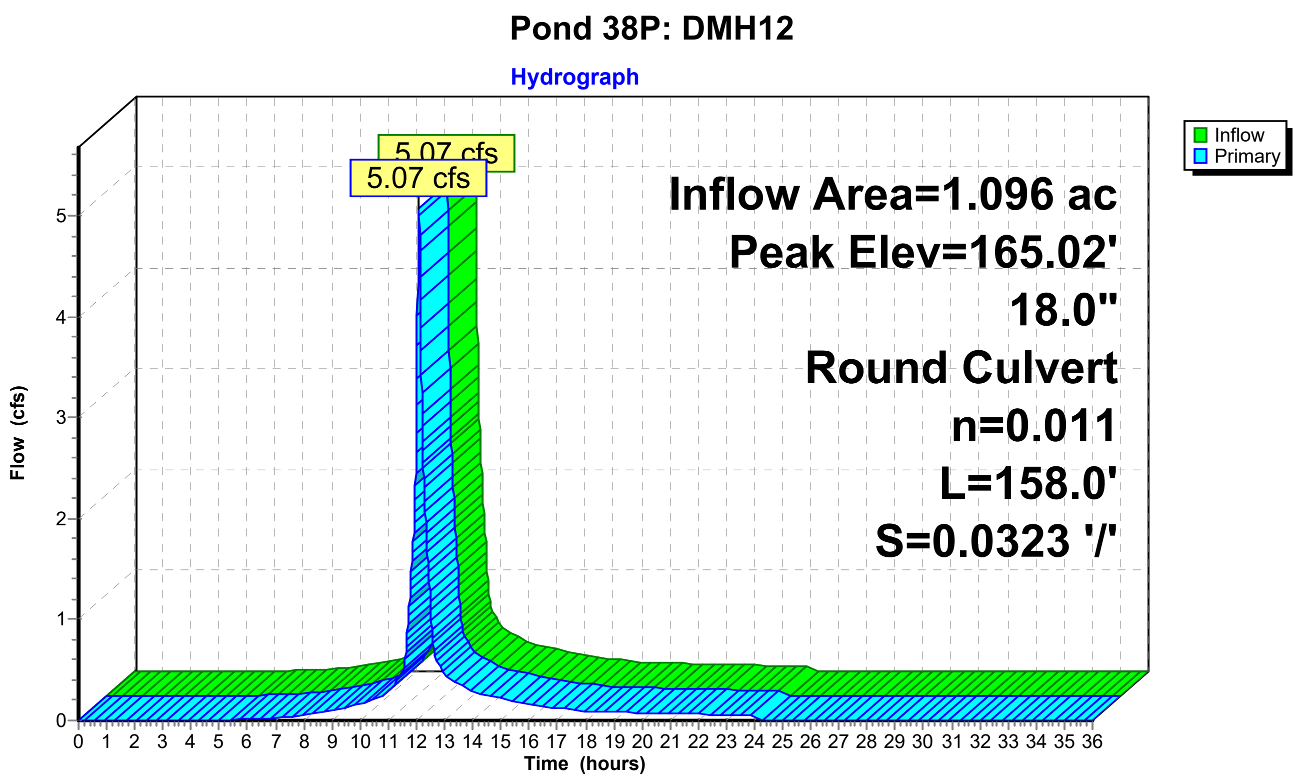
Summary for Pond 38P: DMH12

Inflow Area = 1.096 ac, 75.70% Impervious, Inflow Depth = 4.06" for 25-Year Storm event
Inflow = 5.07 cfs @ 12.08 hrs, Volume= 0.371 af
Outflow = 5.07 cfs @ 12.08 hrs, Volume= 0.371 af, Atten= 0%, Lag= 0.0 min
Primary = 5.07 cfs @ 12.08 hrs, Volume= 0.371 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.02' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.90'	**18.0" Round Culvert** L= 158.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.90' / 158.80' S= 0.0323 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=5.05 cfs @ 12.08 hrs HW=165.01' TW=160.22' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.05 cfs @ 3.59 fps)



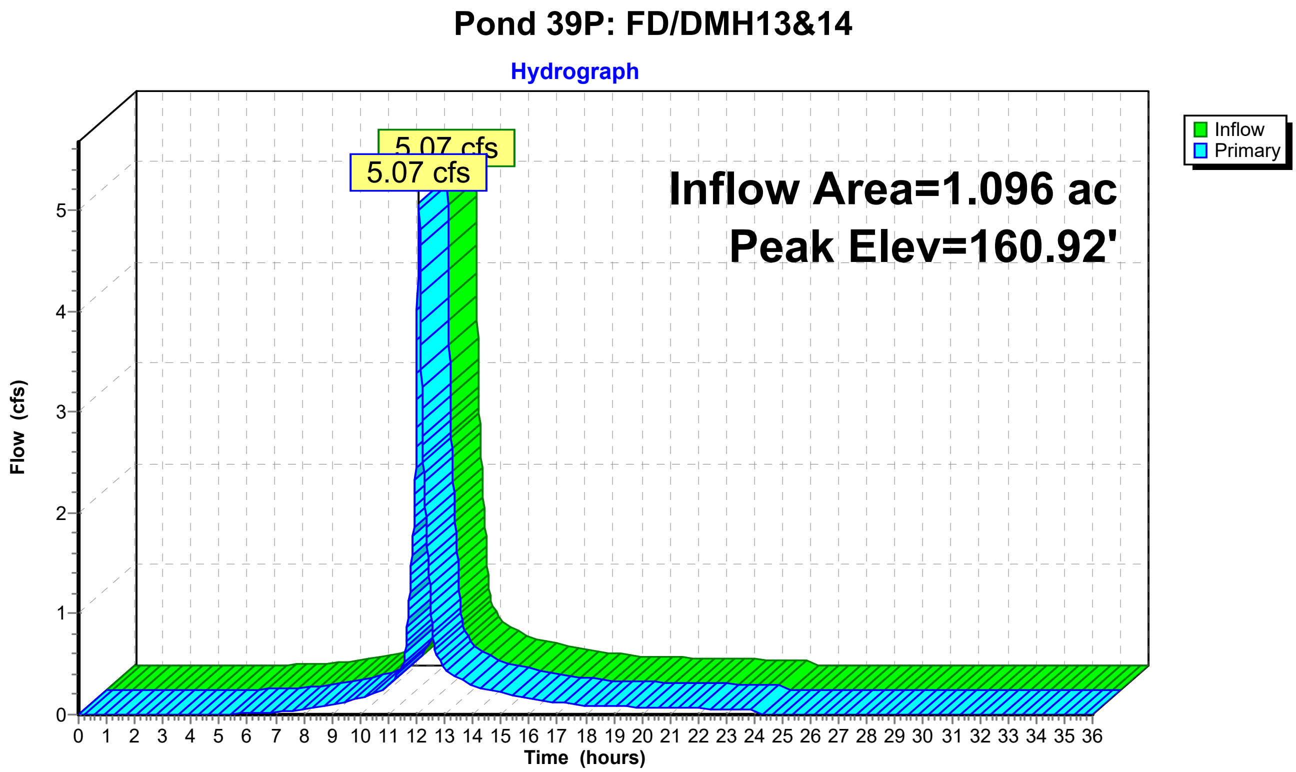
Summary for Pond 39P: FD/DMH13&14

Inflow Area =	1.096 ac, 75.70% Impervious,	Inflow Depth = 4.06"	for 25-Year Storm event	
Inflow =	5.07 cfs @ 12.08 hrs,	Volume=	0.371 af	
Outflow =	5.07 cfs @ 12.08 hrs,	Volume=	0.371 af,	Atten= 0%, Lag= 0.0 min
Primary =	5.07 cfs @ 12.08 hrs,	Volume=	0.371 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.92' @ 12.48 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Primary	158.60'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=4.65 cfs @ 12.08 hrs HW=160.22' TW=159.84' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.32 cfs @ 2.96 fps)
2=Culvert (Inlet Controls 2.32 cfs @ 2.96 fps)



Summary for Subcatchment 40P: P3c

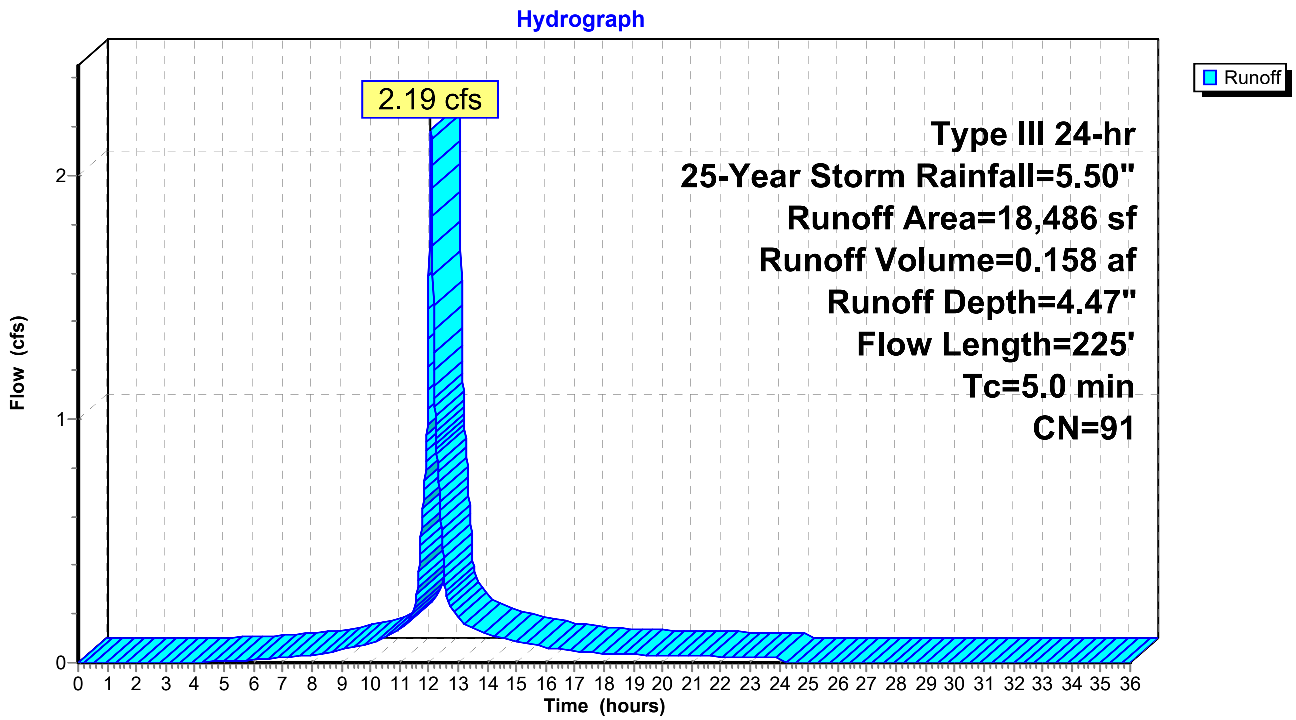
Runoff = 2.19 cfs @ 12.07 hrs, Volume= 0.158 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
16,176	98	Paved parking, HSG A
2,310	39	>75% Grass cover, Good, HSG A
18,486	91	Weighted Average
2,310		12.50% Pervious Area
16,176		87.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0300	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.7	210	0.0400	2.11		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
4.4	225	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 40P: P3c



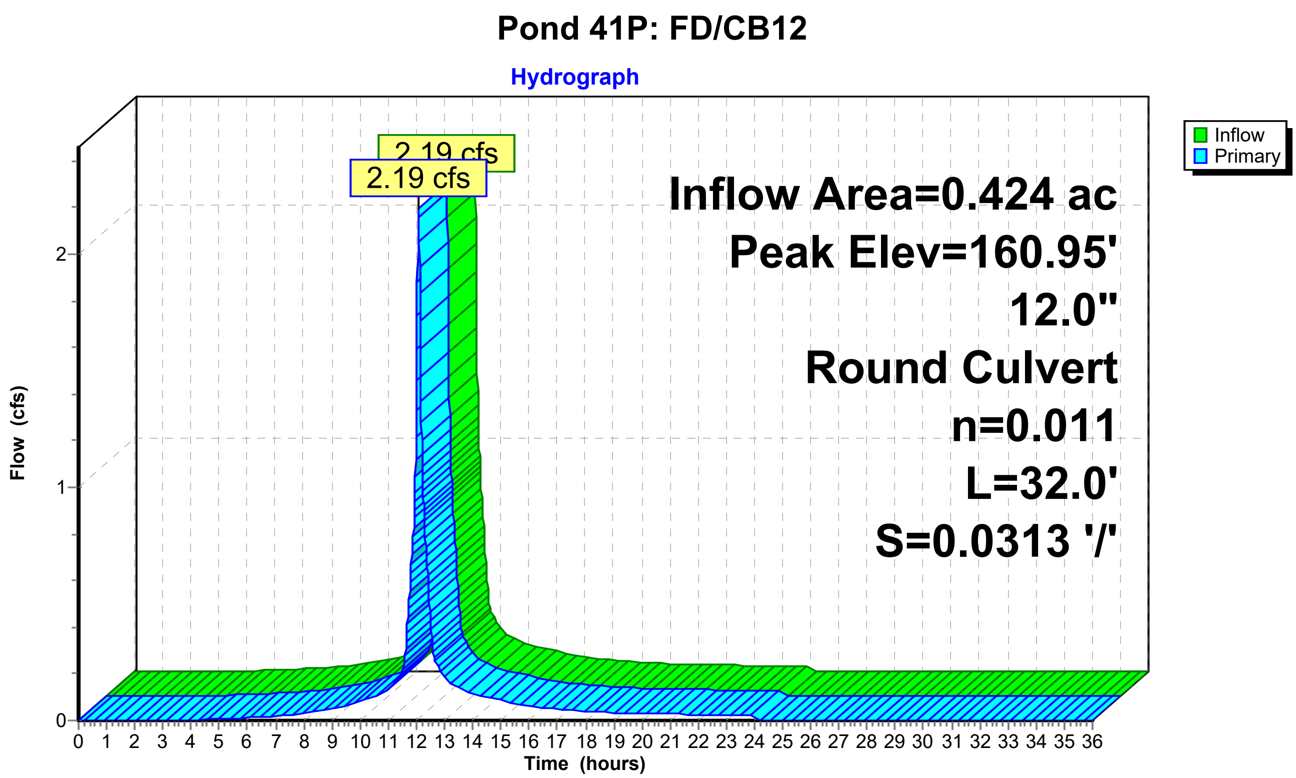
Summary for Pond 41P: FD/CB12

Inflow Area =	0.424 ac,	87.50% Impervious,	Inflow Depth = 4.47"	for 25-Year Storm event
Inflow =	2.19 cfs @	12.07 hrs, Volume=	0.158 af	
Outflow =	2.19 cfs @	12.07 hrs, Volume=	0.158 af, Atten= 0%, Lag= 0.0 min	
Primary =	2.19 cfs @	12.07 hrs, Volume=	0.158 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.95' @ 12.46 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.80'	**12.0" Round Culvert** L= 32.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.80' / 158.80' S= 0.0313 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.94 cfs @ 12.07 hrs HW=160.81' TW=160.51' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.94 cfs @ 3.05 fps)



Summary for Subcatchment 42P: P3d

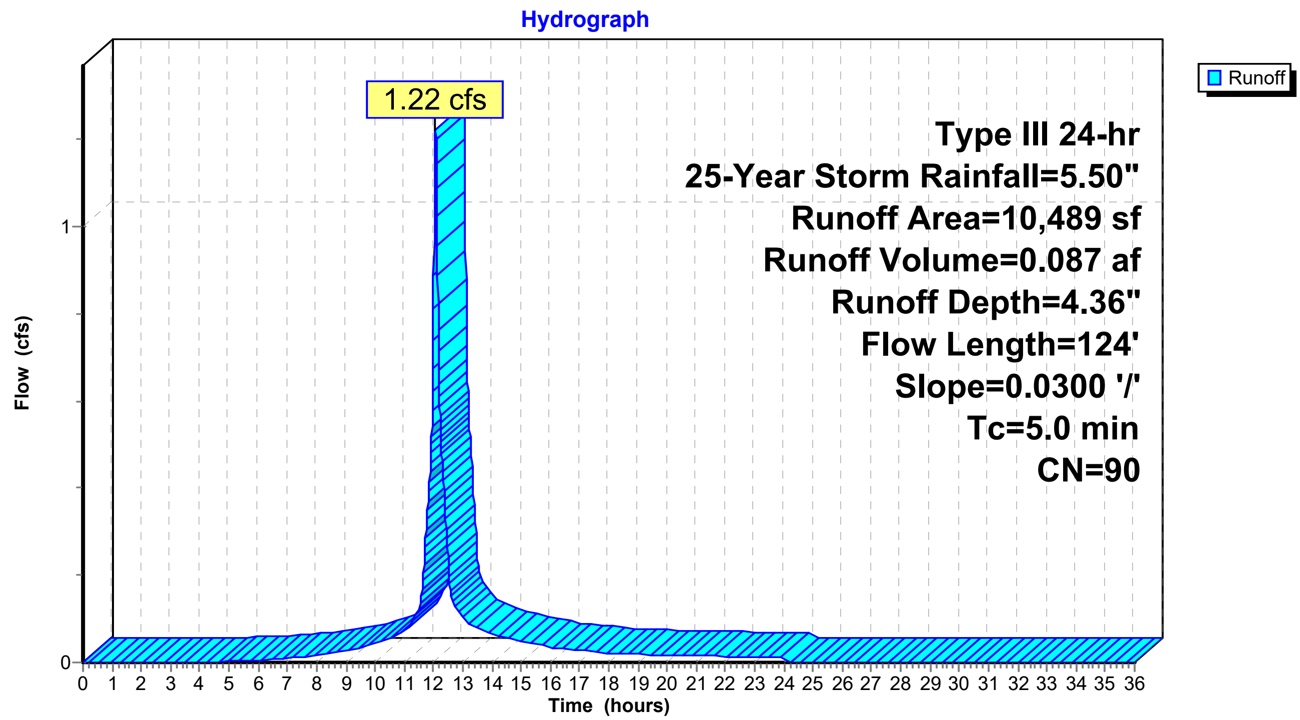
Runoff = 1.22 cfs @ 12.07 hrs, Volume= 0.087 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
9,019	98	Paved parking, HSG A
1,470	39	>75% Grass cover, Good, HSG A
10,489	90	Weighted Average
1,470		14.01% Pervious Area
9,019		85.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	14	0.0300	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	110	0.0300	1.65		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.6	124	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 42P: P3d



Summary for Pond 43P: FD/CB13

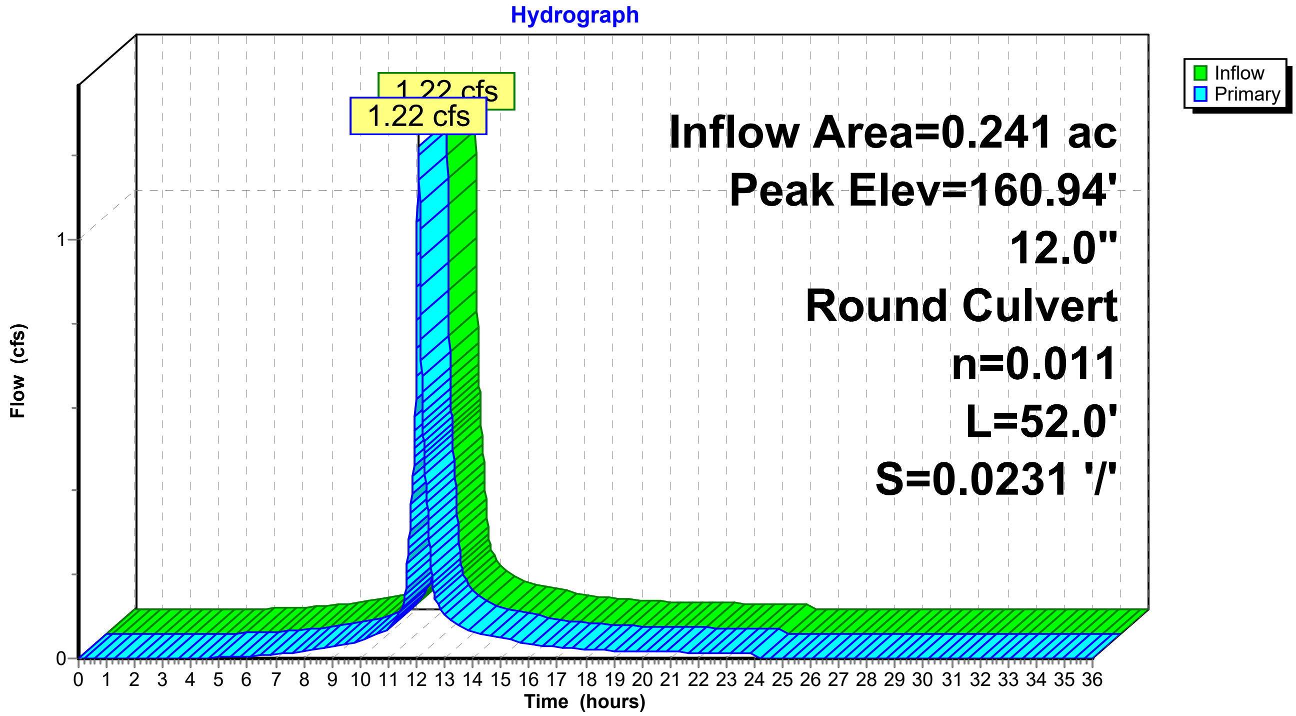
Inflow Area = 0.241 ac, 85.99% Impervious, Inflow Depth = 4.36" for 25-Year Storm event
Inflow = 1.22 cfs @ 12.07 hrs, Volume= 0.087 af
Outflow = 1.22 cfs @ 12.07 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min
Primary = 1.22 cfs @ 12.07 hrs, Volume= 0.087 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.94' @ 12.47 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	160.00'	**12.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.00' / 158.80' S= 0.0231 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.05 cfs @ 12.07 hrs HW=160.73' TW=160.51' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.05 cfs @ 2.37 fps)

Pond 43P: FD/CB13



Summary for Pond 44P: DMH15&16

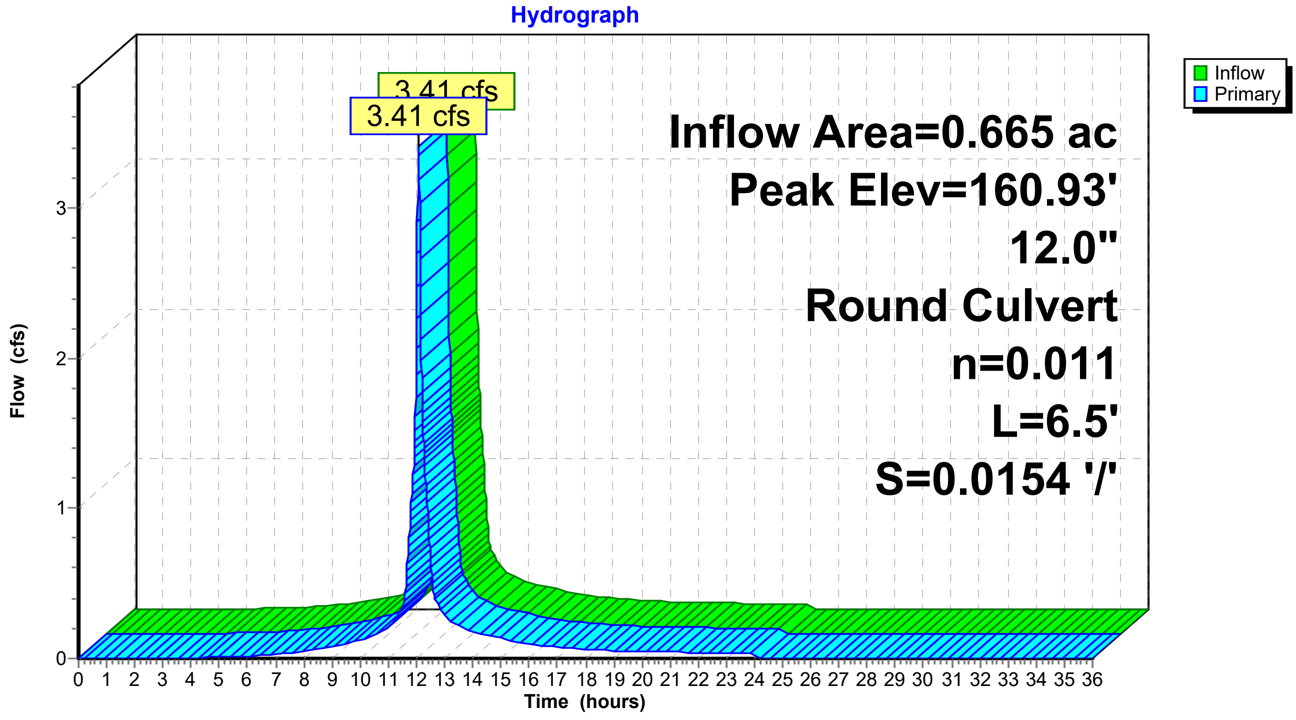
Inflow Area = 0.665 ac, 86.95% Impervious, Inflow Depth = 4.43" for 25-Year Storm event
Inflow = 3.41 cfs @ 12.07 hrs, Volume= 0.246 af
Outflow = 3.41 cfs @ 12.07 hrs, Volume= 0.246 af, Atten= 0%, Lag= 0.0 min
Primary = 3.41 cfs @ 12.07 hrs, Volume= 0.246 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.93' @ 12.46 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 6.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0154 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.26 cfs @ 12.07 hrs HW=160.51' TW=159.76' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.26 cfs @ 4.16 fps)

Pond 44P: DMH15&16



Summary for Subcatchment 45P: P3e

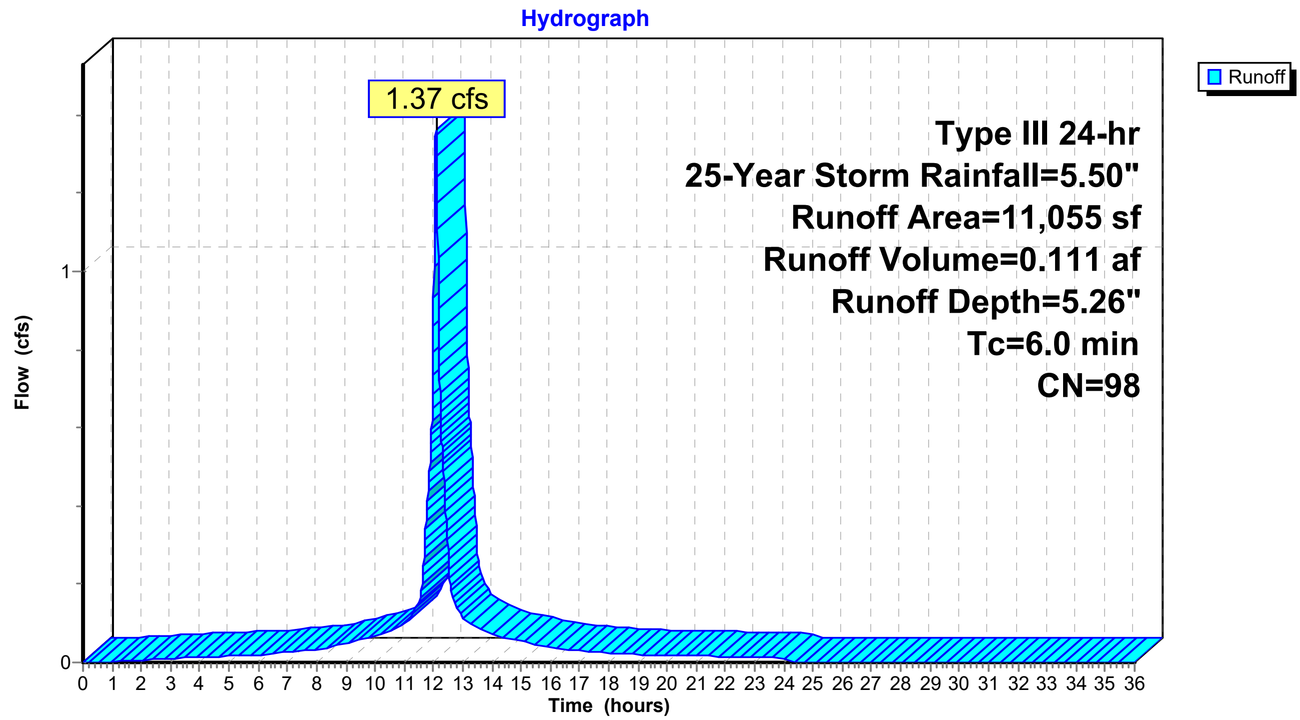
Runoff = 1.37 cfs @ 12.08 hrs, Volume= 0.111 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
11,055	98	Roofs, HSG A
11,055		100.00% Impervious Area

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

Subcatchment 45P: P3e



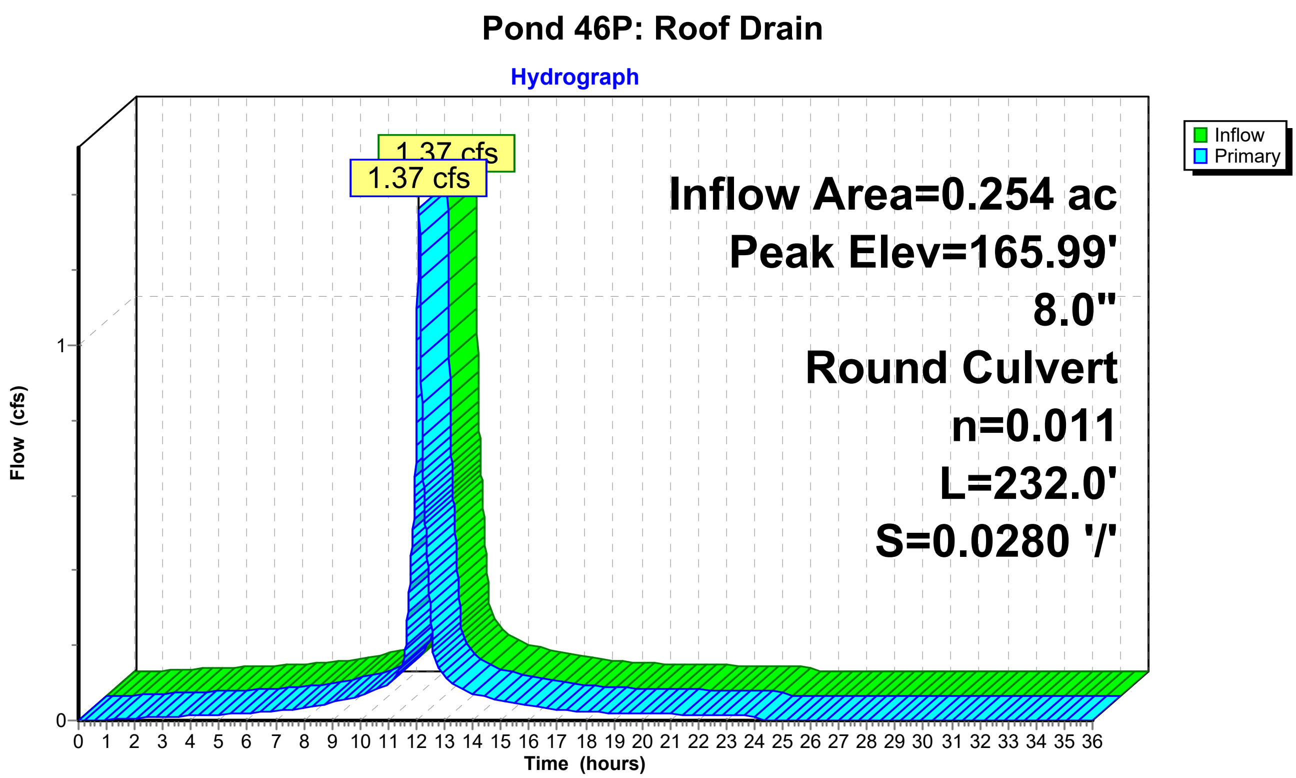
Summary for Pond 46P: Roof Drain

Inflow Area =	0.254 ac,100.00% Impervious,	Inflow Depth = 5.26"	for 25-Year Storm event	
Inflow =	1.37 cfs @	12.08 hrs, Volume=	0.111 af	
Outflow =	1.37 cfs @	12.08 hrs, Volume=	0.111 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.37 cfs @	12.08 hrs, Volume=	0.111 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.99' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**8.0" Round Culvert** L= 232.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 158.50' S= 0.0280 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=1.36 cfs @ 12.08 hrs HW=165.99' TW=159.85' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.36 cfs @ 3.91 fps)



Summary for Pond 47P: Infiltration Field #2

Inflow Area = 2.015 ac, 82.47% Impervious, Inflow Depth = 4.33" for 25-Year Storm event
Inflow = 9.82 cfs @ 12.08 hrs, Volume= 0.728 af
Outflow = 2.22 cfs @ 12.48 hrs, Volume= 0.728 af, Atten= 77%, Lag= 24.1 min
Discarded = 0.33 cfs @ 10.39 hrs, Volume= 0.458 af
Primary = 1.89 cfs @ 12.48 hrs, Volume= 0.270 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.89' @ 12.48 hrs Surf.Area= 6,004 sf Storage= 11,663 cf

Plug-Flow detention time= 116.9 min calculated for 0.728 af (100% of inflow)
Center-of-Mass det. time= 116.8 min (901.6 - 784.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	158.00'	6,551 cf	**144.67'W x 41.50'L x 4.04'H Field A** 24,265 cf Overall - 7,887 cf Embedded = 16,378 cf x 40.0% Voids
#2A	158.50'	7,887 cf	**Cultec R-330XLHD** x 145 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 29 rows
		14,438 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	159.30'	**8.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.30' / 157.00' S= 0.0548 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#3	Primary	161.00'	**12.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 157.00' S= 0.0952 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Discarded OutFlow Max=0.33 cfs @ 10.39 hrs HW=158.04' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Primary OutFlow Max=1.89 cfs @ 12.48 hrs HW=160.89' TW=0.00' (Dynamic Tailwater)
├─**2=Culvert** (Inlet Controls 1.89 cfs @ 5.41 fps)
└─**3=Culvert** (Controls 0.00 cfs)

Pond 47P: Infiltration Field #2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 29 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

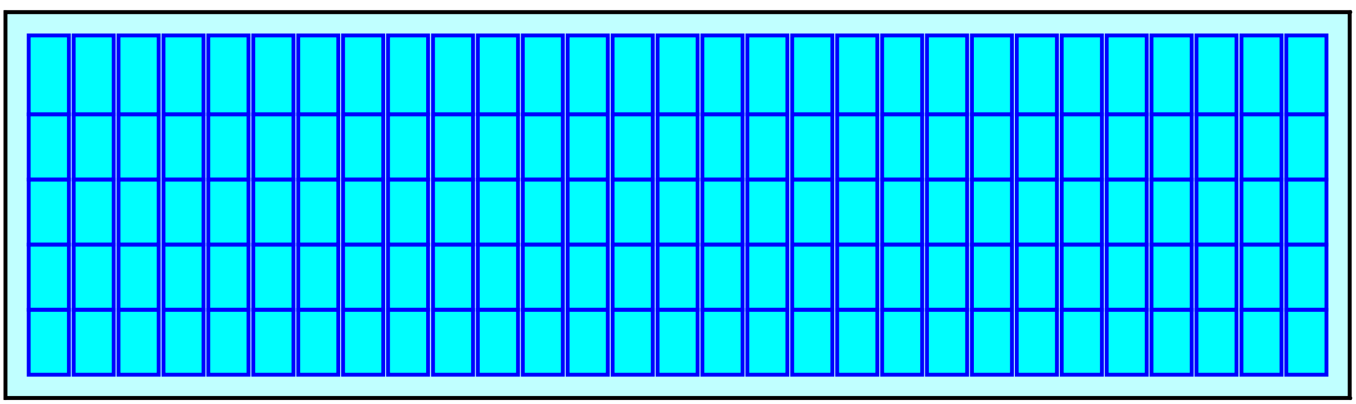
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +30.0" End Stone x 2 = 41.50' Base Length
29 Rows x 52.0" Wide + 6.0" Spacing x 28 + 30.0" Side Stone x 2 = 144.67' Base Width
6.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.04' Field Height

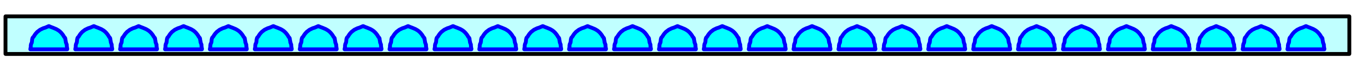
145 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 29 Rows = 7,886.9 cf Chamber Storage

24,264.8 cf Field - 7,886.9 cf Chambers = 16,377.9 cf Stone x 40.0% Voids = 6,551.2 cf Stone Storage

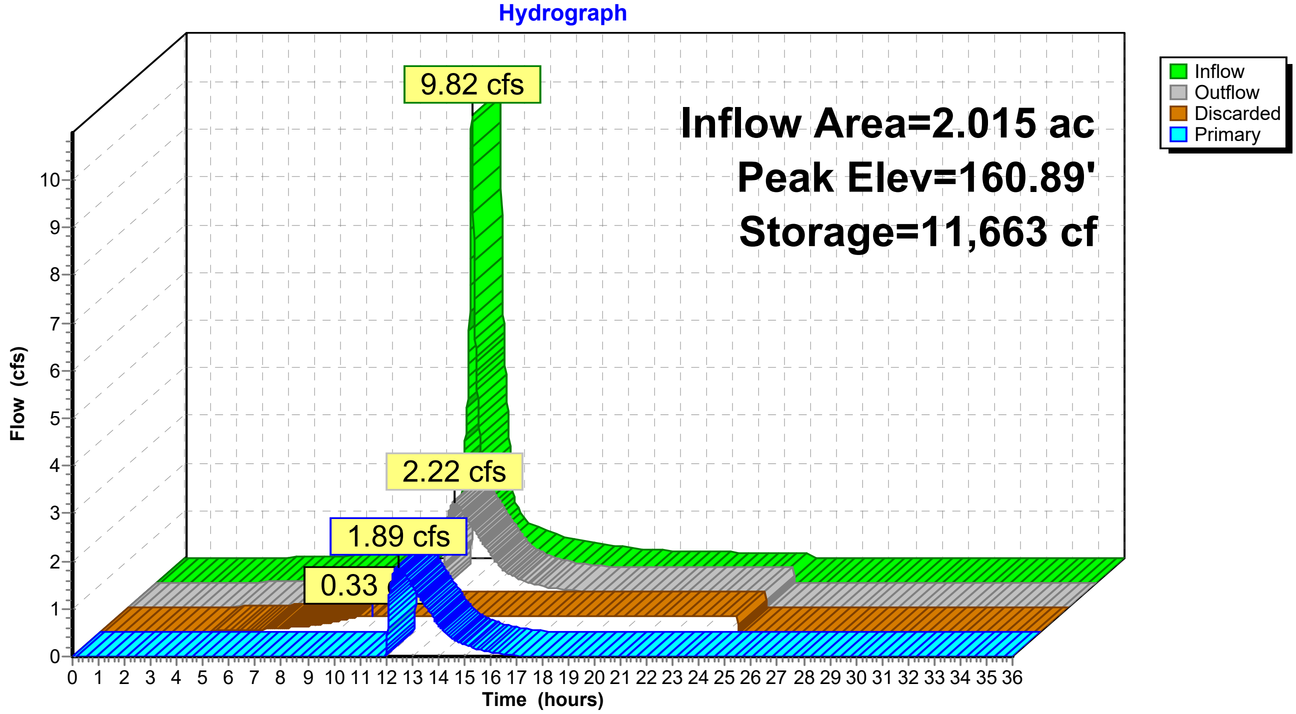
Chamber Storage + Stone Storage = 14,438.1 cf = 0.331 af
Overall Storage Efficiency = 59.5%
Overall System Size = 41.50' x 144.67' x 4.04'

145 Chambers
898.7 cy Field
606.6 cy Stone





Pond 47P: Infiltration Field #2



Summary for Subcatchment 48P: P4

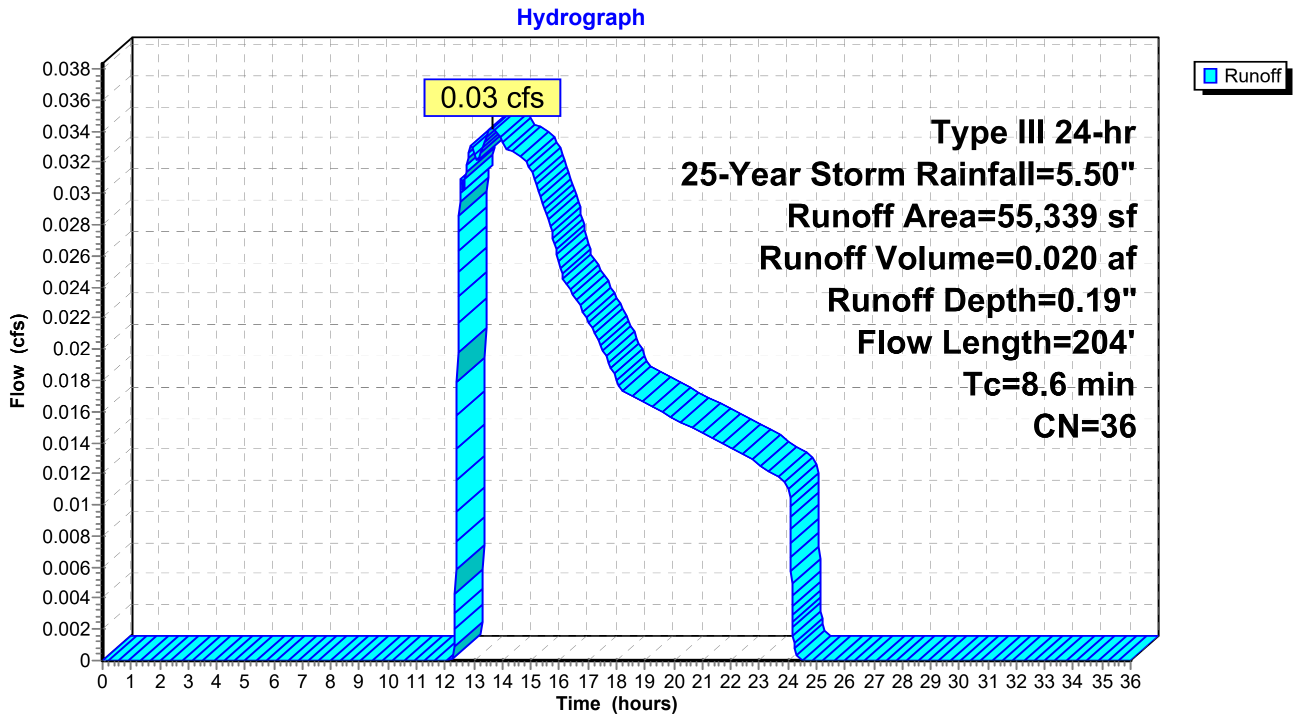
Runoff = 0.03 cfs @ 13.69 hrs, Volume= 0.020 af, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

	Area (sf)	CN	Description
*	793	98	Paved parking, HSG A
	658	98	Paved parking, HSG B
	18,959	39	>75% Grass cover, Good, HSG A
	898	61	>75% Grass cover, Good, HSG B
	32,976	30	Woods, Good, HSG A
	1,055	55	Woods, Good, HSG B
	55,339	36	Weighted Average
	53,888		97.38% Pervious Area
	1,451		2.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	36	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
2.2	8	0.0400	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	160	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.6	204	Total			

Subcatchment 48P: P4

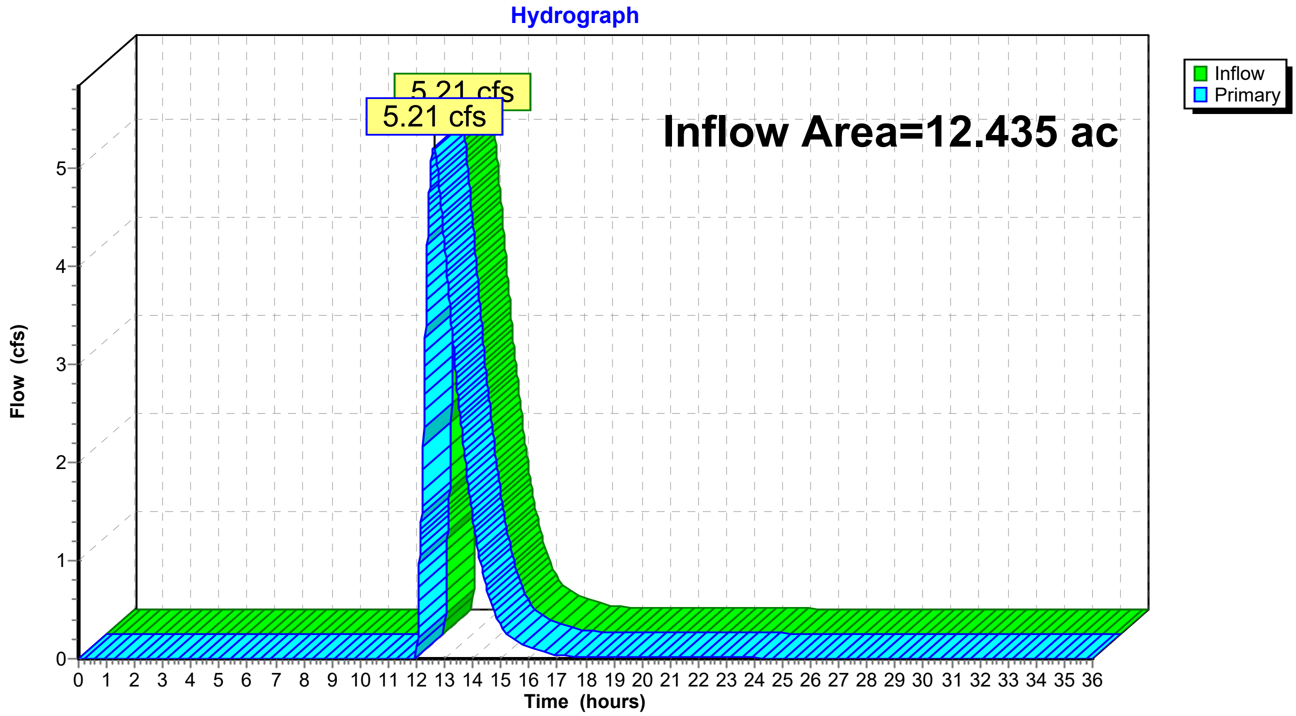


Summary for Link 49P: Design Point #1: Wetlands

Inflow Area = 12.435 ac, 41.42% Impervious, Inflow Depth = 0.60" for 25-Year Storm event
Inflow = 5.21 cfs @ 12.61 hrs, Volume= 0.620 af
Primary = 5.21 cfs @ 12.61 hrs, Volume= 0.620 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 49P: Design Point #1: Wetlands



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1P: P1a Runoff Area=112,620 sf 17.81% Impervious Runoff Depth=2.78"
Flow Length=655' Tc=16.4 min CN=64 Runoff=6.03 cfs 0.598 af

Pond 2P: CB1 Peak Elev=168.45' Inflow=6.03 cfs 0.598 af
18.0" Round Culvert n=0.011 L=194.0' S=0.0052 '/' Outflow=6.03 cfs 0.598 af

Subcatchment 3P: P1b Runoff Area=72,566 sf 24.44% Impervious Runoff Depth=3.07"
Flow Length=562' Tc=16.0 min CN=67 Runoff=4.38 cfs 0.426 af

Pond 4P: CB2 Peak Elev=168.87' Inflow=4.38 cfs 0.426 af
12.0" Round Culvert n=0.011 L=3.0' S=0.0333 '/' Outflow=4.38 cfs 0.426 af

Pond 5P: DMH1 Peak Elev=167.54' Inflow=10.40 cfs 1.024 af
24.0" Round Culvert n=0.011 L=171.0' S=0.0053 '/' Outflow=10.40 cfs 1.024 af

Subcatchment 6P: P1c Runoff Area=36,786 sf 40.24% Impervious Runoff Depth=3.89"
Flow Length=372' Tc=16.1 min CN=75 Runoff=2.84 cfs 0.273 af

Pond 7P: CB3 Peak Elev=167.12' Inflow=2.84 cfs 0.273 af
12.0" Round Culvert n=0.011 L=3.0' S=0.0333 '/' Outflow=2.84 cfs 0.273 af

Pond 8P: DMH2 Peak Elev=166.56' Inflow=13.23 cfs 1.297 af
24.0" Round Culvert n=0.011 L=94.0' S=0.0287 '/' Outflow=13.23 cfs 1.297 af

Subcatchment 9P: P1d Runoff Area=35,572 sf 40.58% Impervious Runoff Depth=3.89"
Flow Length=403' Tc=11.6 min CN=75 Runoff=3.09 cfs 0.264 af

Pond 10P: CB4 Peak Elev=165.67' Inflow=3.09 cfs 0.264 af
12.0" Round Culvert n=0.011 L=72.0' S=0.0333 '/' Outflow=3.09 cfs 0.264 af

Subcatchment 11P: P1e Runoff Area=31,721 sf 39.55% Impervious Runoff Depth=2.58"
Flow Length=81' Slope=0.0200 '/' Tc=9.8 min CN=62 Runoff=1.89 cfs 0.157 af

Pond 12P: Area Drains Peak Elev=166.78' Inflow=1.89 cfs 0.157 af
8.0" Round Culvert n=0.011 L=114.0' S=0.0061 '/' Outflow=1.89 cfs 0.157 af

Pond 13P: FD/DMH3 Peak Elev=164.36' Inflow=17.62 cfs 1.719 af
24.0" Round Culvert n=0.011 L=104.0' S=0.0308 '/' Outflow=17.62 cfs 1.719 af

Pond 14P: DMH4&5 Peak Elev=162.17' Inflow=17.62 cfs 1.719 af
Outflow=17.62 cfs 1.719 af

Subcatchment 15P: P1f Runoff Area=29,980 sf 78.85% Impervious Runoff Depth=5.08"
Flow Length=169' Slope=0.0600 '/' Tc=6.2 min CN=86 Runoff=3.95 cfs 0.291 af

Pond 16P: CB5 Peak Elev=163.88' Inflow=3.95 cfs 0.291 af
12.0" Round Culvert n=0.011 L=7.0' S=0.0143 '/' Outflow=3.95 cfs 0.291 af

Subcatchment 17P: P1g Runoff Area=7,680 sf 84.80% Impervious Runoff Depth=5.42"
Flow Length=144' Slope=0.0300 '/' Tc=5.0 min CN=89 Runoff=1.11 cfs 0.080 af

Pond 18P: CB6 Peak Elev=162.90' Inflow=1.11 cfs 0.080 af
12.0" Round Culvert n=0.011 L=66.0' S=0.0076 '/' Outflow=1.11 cfs 0.080 af

Pond 19P: FD/DMH6 Peak Elev=162.82' Inflow=5.03 cfs 0.371 af
12.0" Round Culvert n=0.011 L=44.0' S=0.0205 '/' Outflow=5.03 cfs 0.371 af

Pond 20P: DMH7&8 Peak Elev=161.68' Inflow=5.03 cfs 0.371 af
12.0" Round Culvert n=0.011 L=9.5' S=0.0105 '/' Outflow=5.03 cfs 0.371 af

Subcatchment 21P: P1h Runoff Area=23,312 sf 100.00% Impervious Runoff Depth=6.46"
Tc=6.0 min CN=98 Runoff=3.52 cfs 0.288 af

Pond 22P: Roof Pipe Peak Elev=164.88' Inflow=3.52 cfs 0.288 af
12.0" Round Culvert n=0.011 L=302.0' S=0.0100 '/' Outflow=3.52 cfs 0.288 af

Pond 23P: Infiltration Field #1a Peak Elev=161.63' Storage=22,835 cf Inflow=22.90 cfs 2.378 af
Discarded=1.91 cfs 1.535 af Primary=9.48 cfs 0.843 af Outflow=11.39 cfs 2.378 af

Pond 24P: Infiltration Field #1b Peak Elev=161.42' Storage=7,120 cf Inflow=9.48 cfs 0.843 af
Discarded=0.18 cfs 0.121 af Primary=6.79 cfs 0.722 af Outflow=6.97 cfs 0.843 af

Subcatchment 25P: P2a Runoff Area=17,804 sf 68.89% Impervious Runoff Depth=5.30"
Flow Length=229' Tc=9.8 min CN=88 Runoff=2.15 cfs 0.181 af

Pond 26P: CB7&8 Peak Elev=168.54' Inflow=2.15 cfs 0.181 af
Outflow=2.15 cfs 0.181 af

Pond 27P: FD/DMH10 Peak Elev=167.93' Inflow=2.15 cfs 0.181 af
12.0" Round Culvert n=0.011 L=43.0' S=0.0256 '/' Outflow=2.15 cfs 0.181 af

Subcatchment 28P: P2b Runoff Area=21,688 sf 6.26% Impervious Runoff Depth=2.21"
Flow Length=176' Tc=10.4 min CN=58 Runoff=1.05 cfs 0.092 af

Subcatchment 29P: P2c Runoff Area=8,798 sf 43.73% Impervious Runoff Depth=3.89"
Flow Length=158' Slope=0.0500 '/' Tc=10.1 min CN=75 Runoff=0.80 cfs 0.065 af

Pond 30P: FD/CB9 Peak Elev=168.46' Inflow=0.80 cfs 0.065 af
12.0" Round Culvert n=0.011 L=30.0' S=0.0667 '/' Outflow=0.80 cfs 0.065 af

Pond 31P: Basin Peak Elev=166.60' Storage=4,113 cf Inflow=3.99 cfs 0.338 af
Discarded=0.81 cfs 0.338 af Primary=0.00 cfs 0.000 af Outflow=0.81 cfs 0.338 af

Subcatchment 32P: P3f Runoff Area=23,307 sf 73.75% Impervious Runoff Depth=5.19"
Tc=6.0 min CN=87 Runoff=3.14 cfs 0.231 af

Subcatchment 33P: P3a Runoff Area=12,898 sf 69.13% Impervious Runoff Depth=4.97"
Flow Length=211' Tc=6.9 min CN=85 Runoff=1.63 cfs 0.123 af

Pond 34P: CB10 Peak Elev=166.56' Inflow=1.63 cfs 0.123 af
12.0" Round Culvert n=0.011 L=122.0' S=0.0164 '/' Outflow=1.65 cfs 0.123 af

Pond 35P: DMH11 Peak Elev=166.28' Inflow=4.79 cfs 0.354 af
15.0" Round Culvert n=0.011 L=71.0' S=0.0141 '/' Outflow=4.79 cfs 0.354 af

Subcatchment 36P: P3b Runoff Area=11,557 sf 86.94% Impervious Runoff Depth=5.53"
Flow Length=74' Slope=0.0200 '/' Tc=5.0 min CN=90 Runoff=1.69 cfs 0.122 af

Pond 37P: CB11 Peak Elev=165.40' Inflow=1.69 cfs 0.122 af
12.0" Round Culvert n=0.011 L=3.0' S=0.0333 '/' Outflow=1.71 cfs 0.122 af

Pond 38P: DMH12 Peak Elev=165.22' Inflow=6.45 cfs 0.476 af
18.0" Round Culvert n=0.011 L=158.0' S=0.0323 '/' Outflow=6.45 cfs 0.476 af

Pond 39P: FD/DMH13&14 Peak Elev=161.86' Inflow=6.45 cfs 0.476 af
Outflow=6.45 cfs 0.476 af

Subcatchment 40P: P3c Runoff Area=18,486 sf 87.50% Impervious Runoff Depth=5.64"
Flow Length=225' Tc=5.0 min CN=91 Runoff=2.73 cfs 0.200 af

Pond 41P: FD/CB12 Peak Elev=162.10' Inflow=2.73 cfs 0.200 af
12.0" Round Culvert n=0.011 L=32.0' S=0.0313 '/' Outflow=2.73 cfs 0.200 af

Subcatchment 42P: P3d Runoff Area=10,489 sf 85.99% Impervious Runoff Depth=5.53"
Flow Length=124' Slope=0.0300 '/' Tc=5.0 min CN=90 Runoff=1.53 cfs 0.111 af

Pond 43P: FD/CB13 Peak Elev=161.93' Inflow=1.53 cfs 0.111 af
12.0" Round Culvert n=0.011 L=52.0' S=0.0231 '/' Outflow=1.53 cfs 0.111 af

Pond 44P: DMH15&16 Peak Elev=161.91' Inflow=4.26 cfs 0.311 af
12.0" Round Culvert n=0.011 L=6.5' S=0.0154 '/' Outflow=4.26 cfs 0.311 af

Subcatchment 45P: P3e Runoff Area=11,055 sf 100.00% Impervious Runoff Depth=6.46"
Tc=6.0 min CN=98 Runoff=1.67 cfs 0.137 af

Pond 46P: Roof Drain Peak Elev=166.32' Inflow=1.67 cfs 0.137 af
8.0" Round Culvert n=0.011 L=232.0' S=0.0280 '/' Outflow=1.67 cfs 0.137 af

Pond 47P: Infiltration Field #2 Peak Elev=161.74' Storage=13,715 cf Inflow=12.31 cfs 0.923 af
Discarded=0.33 cfs 0.502 af Primary=4.27 cfs 0.421 af Outflow=4.60 cfs 0.923 af

Subcatchment 48P: P4 Runoff Area=55,339 sf 2.62% Impervious Runoff Depth=0.47"
Flow Length=204' Tc=8.6 min CN=36 Runoff=0.22 cfs 0.050 af

Link 49P: Design Point #1: Wetlands Inflow=10.32 cfs 1.193 af
Primary=10.32 cfs 1.193 af

Total Runoff Area = 12.435 ac Runoff Volume = 3.689 af Average Runoff Depth = 3.56"
58.58% Pervious = 7.284 ac 41.42% Impervious = 5.151 ac

Summary for Subcatchment 1P: P1a

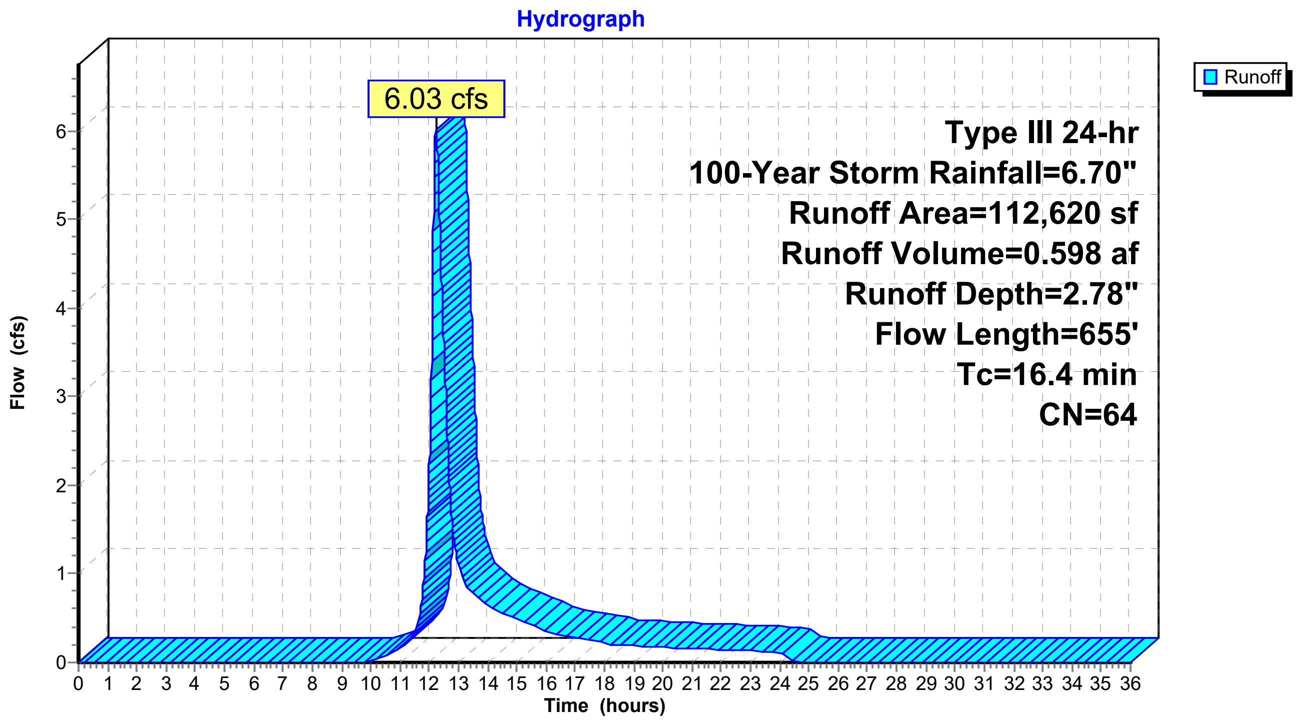
Runoff = 6.03 cfs @ 12.23 hrs, Volume= 0.598 af, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
20,058	98	Paved parking, HSG B
20,706	61	>75% Grass cover, Good, HSG B
71,856	55	Woods, Good, HSG B
112,620	64	Weighted Average
92,562		82.19% Pervious Area
20,058		17.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	43	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
6.8	410	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	47	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	155	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.4	655	Total			

Subcatchment 1P: P1a



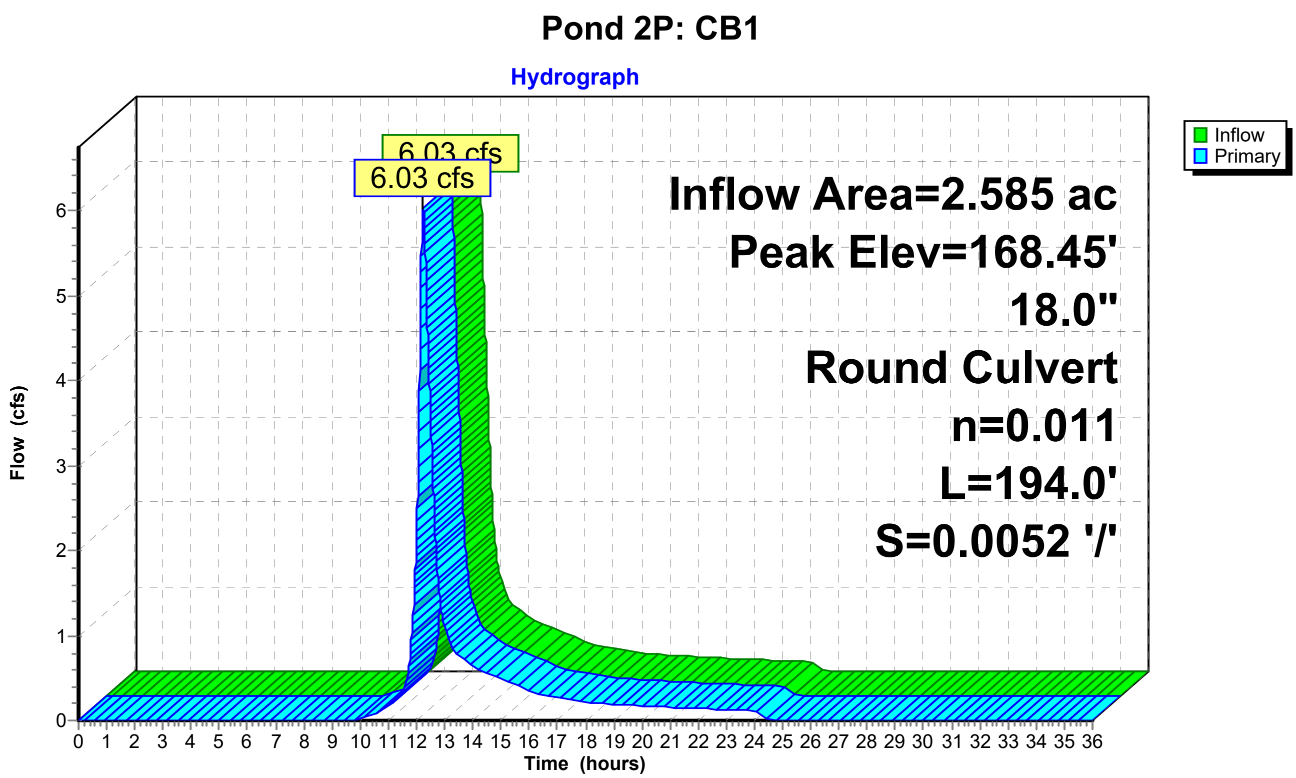
Summary for Pond 2P: CB1

Inflow Area =	2.585 ac,	17.81% Impervious,	Inflow Depth = 2.78"	for 100-Year Storm event
Inflow =	6.03 cfs @	12.23 hrs, Volume=	0.598 af	
Outflow =	6.03 cfs @	12.23 hrs, Volume=	0.598 af,	Atten= 0%, Lag= 0.0 min
Primary =	6.03 cfs @	12.23 hrs, Volume=	0.598 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 168.45' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	166.90'	**18.0" Round Culvert** L= 194.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 166.90' / 165.90' S= 0.0052 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=6.01 cfs @ 12.23 hrs HW=168.45' TW=167.54' (Dynamic Tailwater)
1=Culvert (Outlet Controls 6.01 cfs @ 4.10 fps)



Summary for Subcatchment 3P: P1b

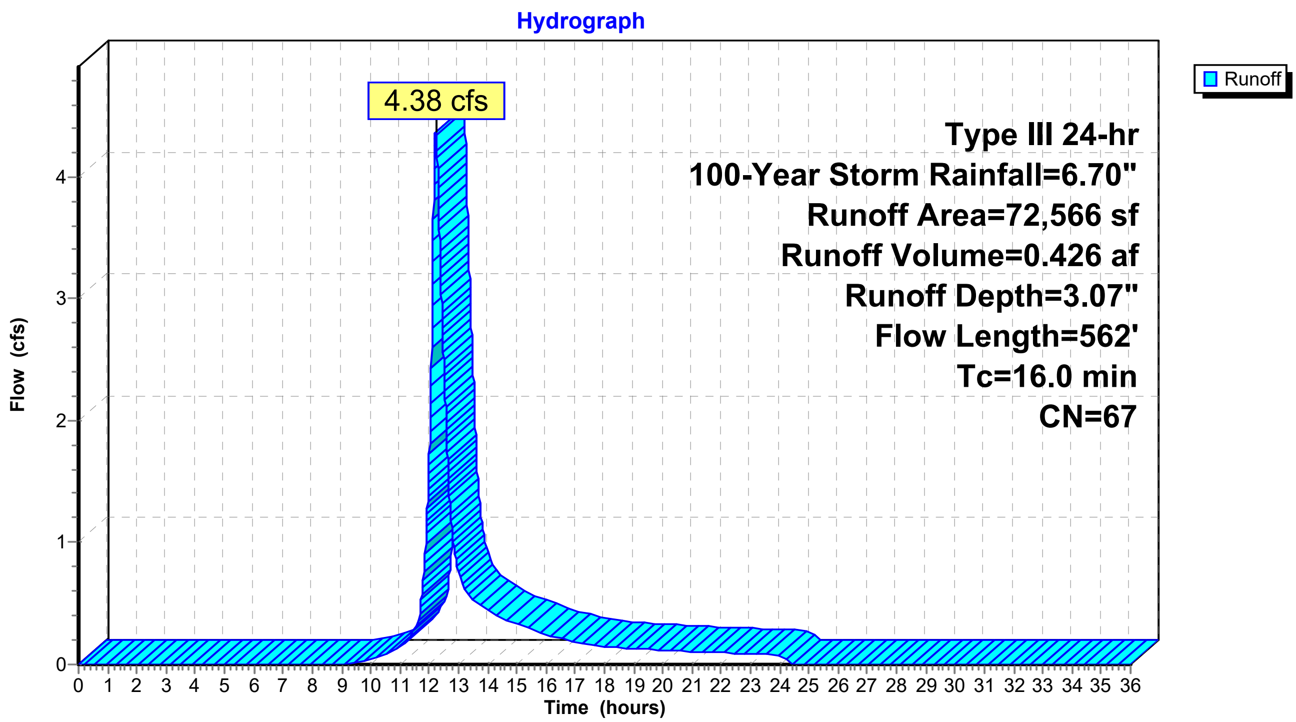
Runoff = 4.38 cfs @ 12.22 hrs, Volume= 0.426 af, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
17,734	98	Paved parking, HSG B
20,240	61	>75% Grass cover, Good, HSG B
34,592	55	Woods, Good, HSG B
72,566	67	Weighted Average
54,832		75.56% Pervious Area
17,734		24.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	43	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
6.0	405	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	17	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	97	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.0	562	Total			

Subcatchment 3P: P1b



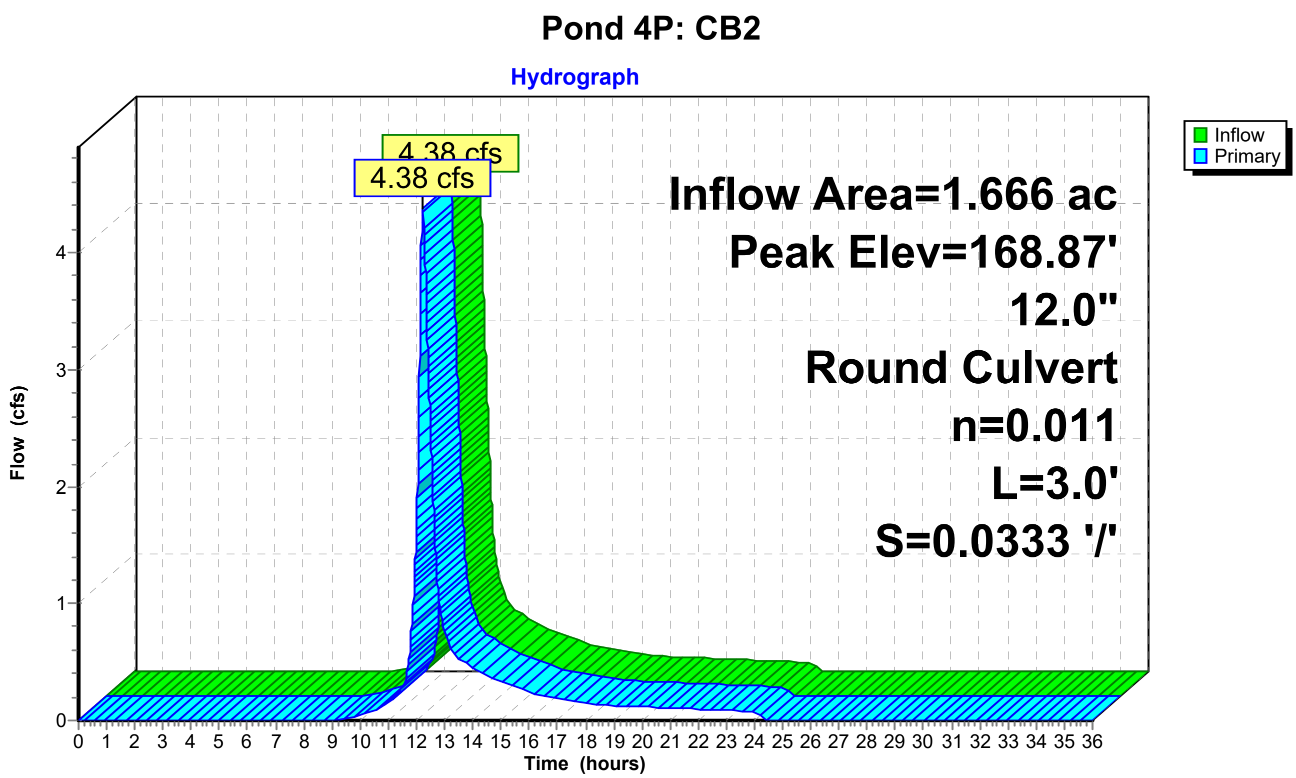
Summary for Pond 4P: CB2

Inflow Area =	1.666 ac,	24.44% Impervious,	Inflow Depth =	3.07"	for 100-Year Storm event	
Inflow =	4.38 cfs @	12.22 hrs,	Volume=	0.426 af		
Outflow =	4.38 cfs @	12.22 hrs,	Volume=	0.426 af,	Atten= 0%,	Lag= 0.0 min
Primary =	4.38 cfs @	12.22 hrs,	Volume=	0.426 af		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 168.87' @ 12.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	166.00'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 166.00' / 165.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=4.36 cfs @ 12.22 hrs HW=168.87' TW=167.54' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.36 cfs @ 5.55 fps)



Summary for Pond 5P: DMH1

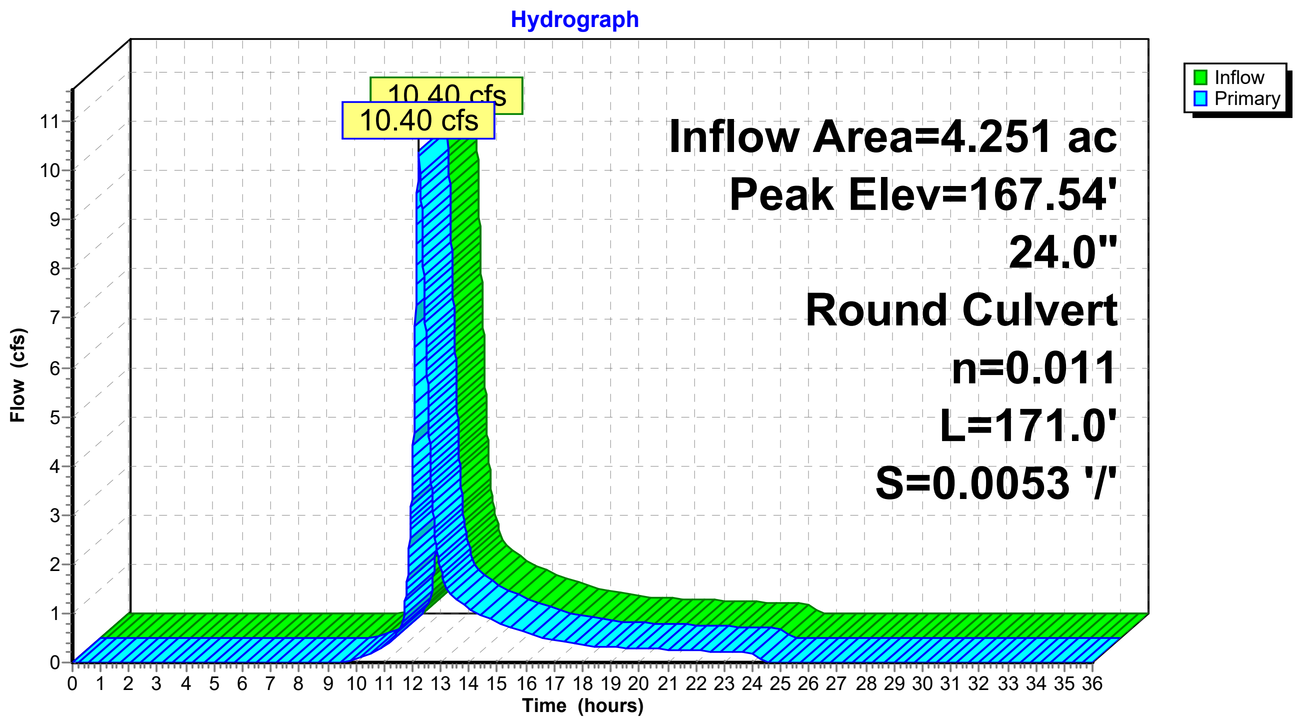
Inflow Area =	4.251 ac,	20.41% Impervious,	Inflow Depth = 2.89"	for 100-Year Storm event	
Inflow =	10.40 cfs @	12.23 hrs,	Volume=	1.024 af	
Outflow =	10.40 cfs @	12.23 hrs,	Volume=	1.024 af,	Atten= 0%, Lag= 0.0 min
Primary =	10.40 cfs @	12.23 hrs,	Volume=	1.024 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 167.54' @ 12.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.80'	**24.0" Round Culvert** L= 171.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.80' / 164.90' S= 0.0053 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=10.39 cfs @ 12.23 hrs HW=167.54' TW=166.56' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 10.39 cfs @ 4.78 fps)

Pond 5P: DMH1



Summary for Subcatchment 6P: P1c

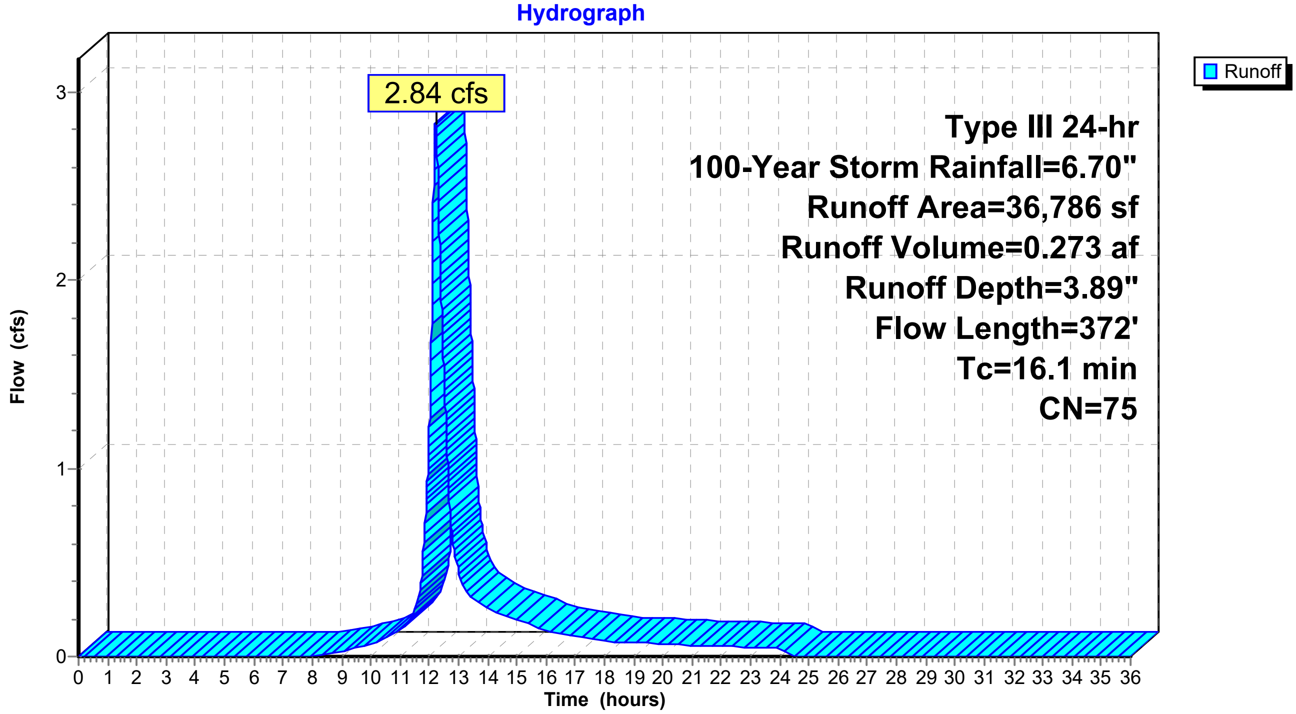
Runoff = 2.84 cfs @ 12.22 hrs, Volume= 0.273 af, Depth= 3.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
1,366	98	Paved parking, HSG A
13,437	98	Paved parking, HSG B
228	39	>75% Grass cover, Good, HSG A
15,234	61	>75% Grass cover, Good, HSG B
6,521	55	Woods, Good, HSG B
36,786	75	Weighted Average
21,983		59.76% Pervious Area
14,803		40.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	47	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
4.8	36	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	74	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	40	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	175	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.1	372	Total			

Subcatchment 6P: P1c



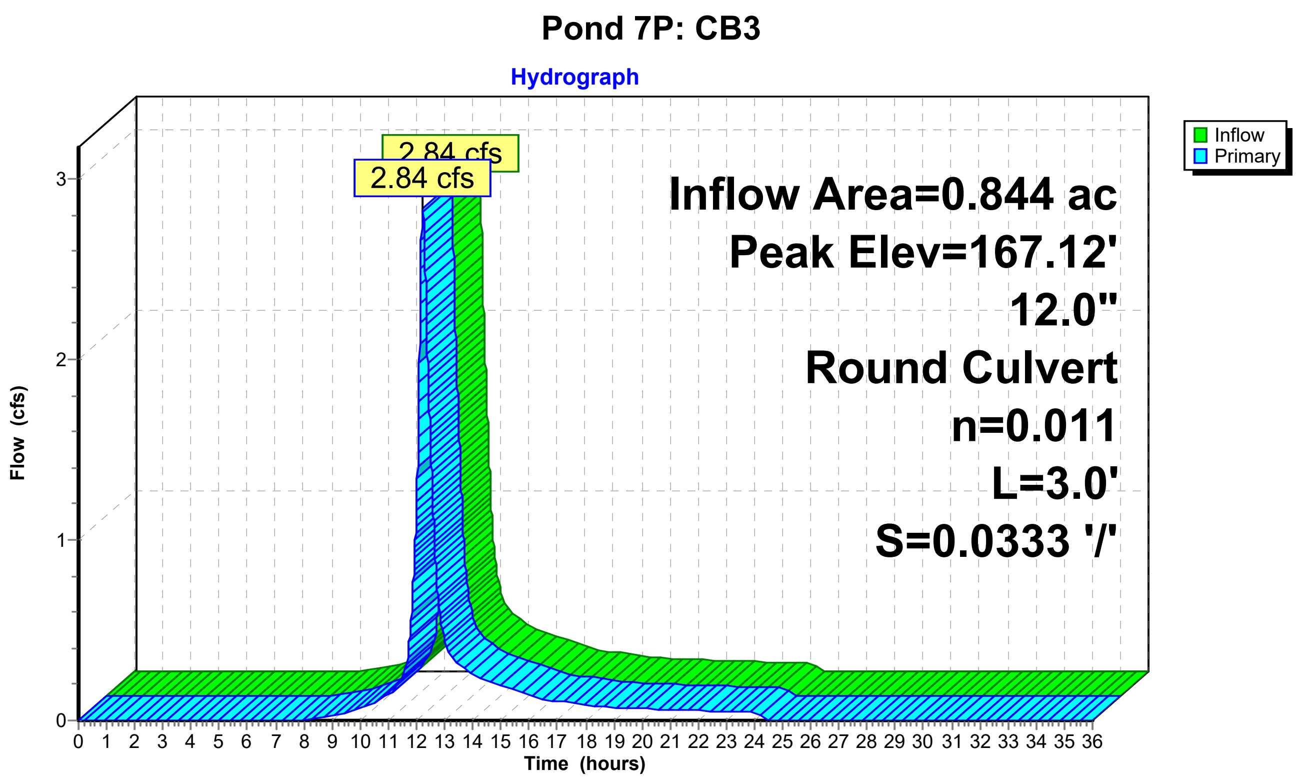
Summary for Pond 7P: CB3

Inflow Area =	0.844 ac,	40.24% Impervious,	Inflow Depth = 3.89"	for 100-Year Storm event	
Inflow =	2.84 cfs @	12.22 hrs,	Volume=	0.273 af	
Outflow =	2.84 cfs @	12.22 hrs,	Volume=	0.273 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.84 cfs @	12.22 hrs,	Volume=	0.273 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 167.12' @ 12.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 164.90' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.82 cfs @ 12.22 hrs HW=167.11' TW=166.56' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.82 cfs @ 3.59 fps)



Summary for Pond 8P: DMH2

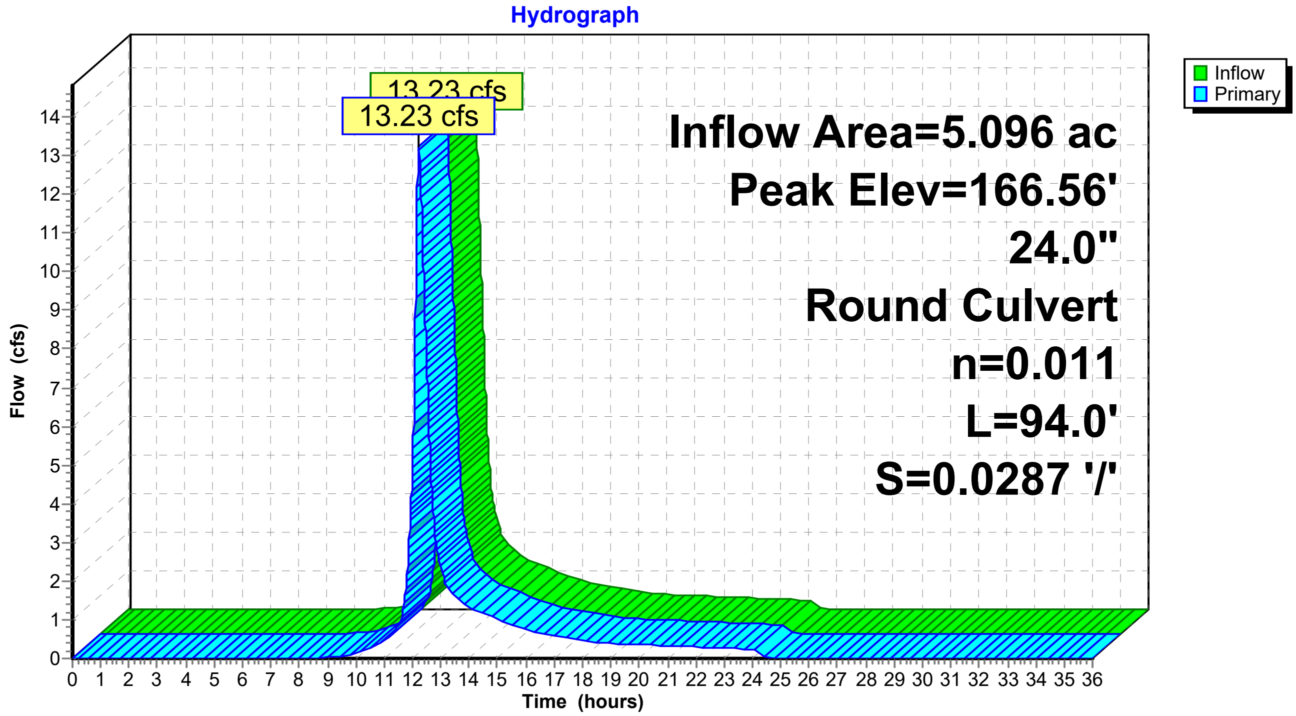
Inflow Area =	5.096 ac, 23.69% Impervious,	Inflow Depth = 3.06"	for 100-Year Storm event	
Inflow =	13.23 cfs @	12.23 hrs, Volume=	1.297 af	
Outflow =	13.23 cfs @	12.23 hrs, Volume=	1.297 af,	Atten= 0%, Lag= 0.0 min
Primary =	13.23 cfs @	12.23 hrs, Volume=	1.297 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.56' @ 12.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.80'	**24.0" Round Culvert** L= 94.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 164.80' / 162.10' S= 0.0287 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=13.22 cfs @ 12.23 hrs HW=166.56' TW=164.33' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 13.22 cfs @ 4.52 fps)

Pond 8P: DMH2



Summary for Subcatchment 9P: P1d

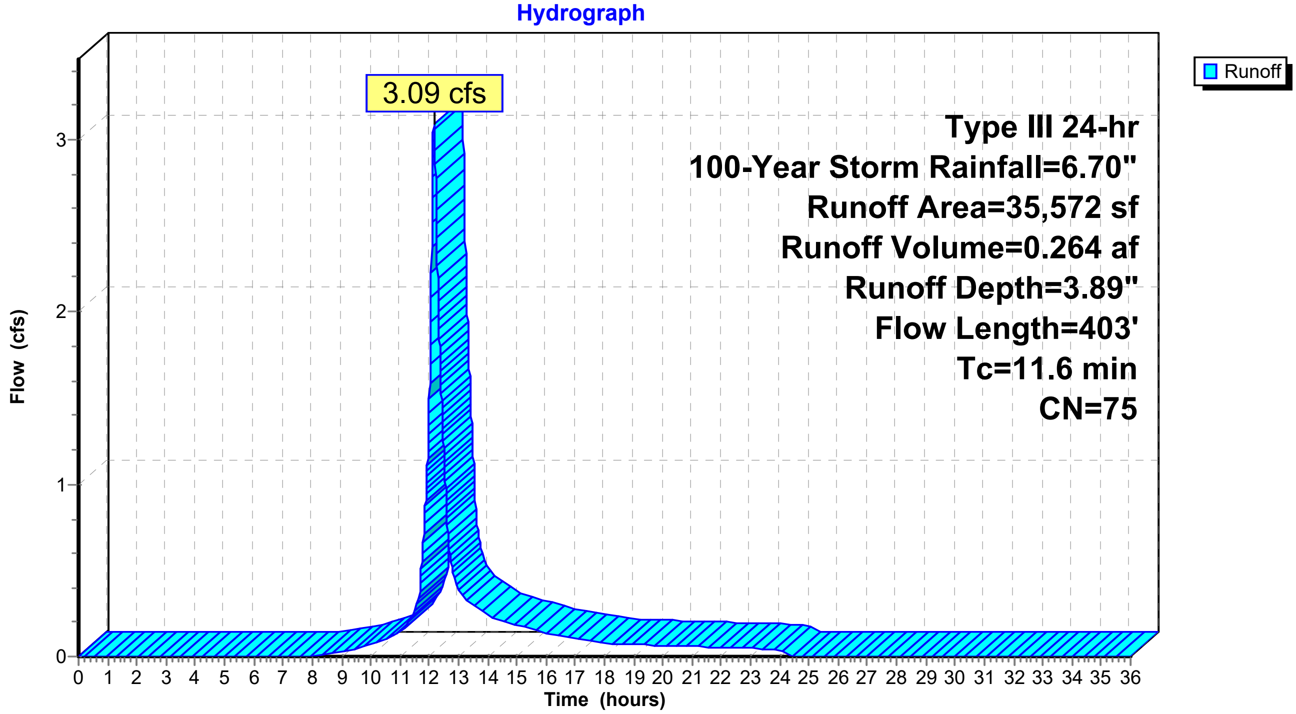
Runoff = 3.09 cfs @ 12.16 hrs, Volume= 0.264 af, Depth= 3.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
11,385	98	Paved parking, HSG A
3,050	98	Paved parking, HSG B
5,618	39	>75% Grass cover, Good, HSG A
10,400	61	>75% Grass cover, Good, HSG B
4,510	79	<50% Grass cover, Poor, HSG B
609	55	Woods, Good, HSG B
35,572	75	Weighted Average
21,137		59.42% Pervious Area
14,435		40.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	83	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.1	13	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	130	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.0	177	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
11.6	403	Total			

Subcatchment 9P: P1d



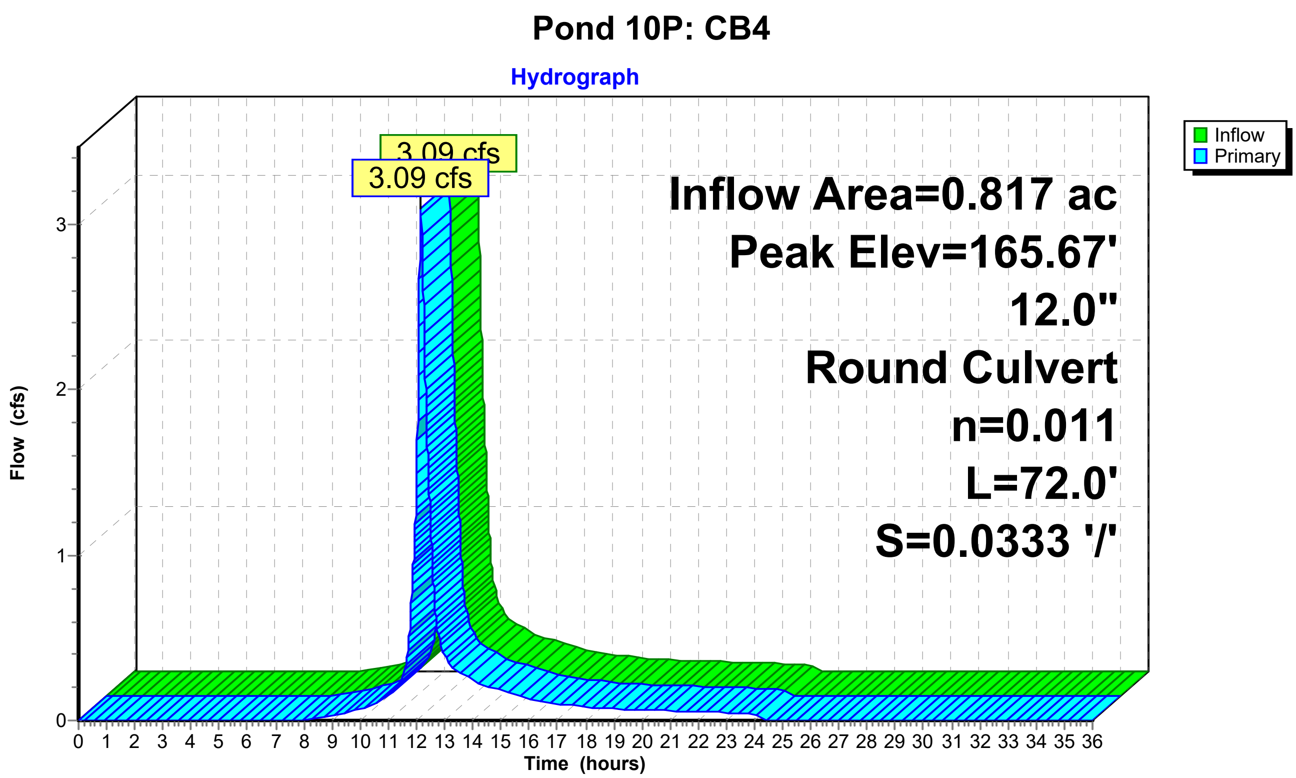
Summary for Pond 10P: CB4

Inflow Area =	0.817 ac,	40.58% Impervious,	Inflow Depth =	3.89"	for 100-Year Storm event
Inflow =	3.09 cfs @	12.16 hrs,	Volume=	0.264 af	
Outflow =	3.09 cfs @	12.16 hrs,	Volume=	0.264 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.09 cfs @	12.16 hrs,	Volume=	0.264 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.67' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.50'	**12.0" Round Culvert** L= 72.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 164.50' / 162.10' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.09 cfs @ 12.16 hrs HW=165.67' TW=164.23' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.09 cfs @ 3.94 fps)



Summary for Subcatchment 11P: P1e

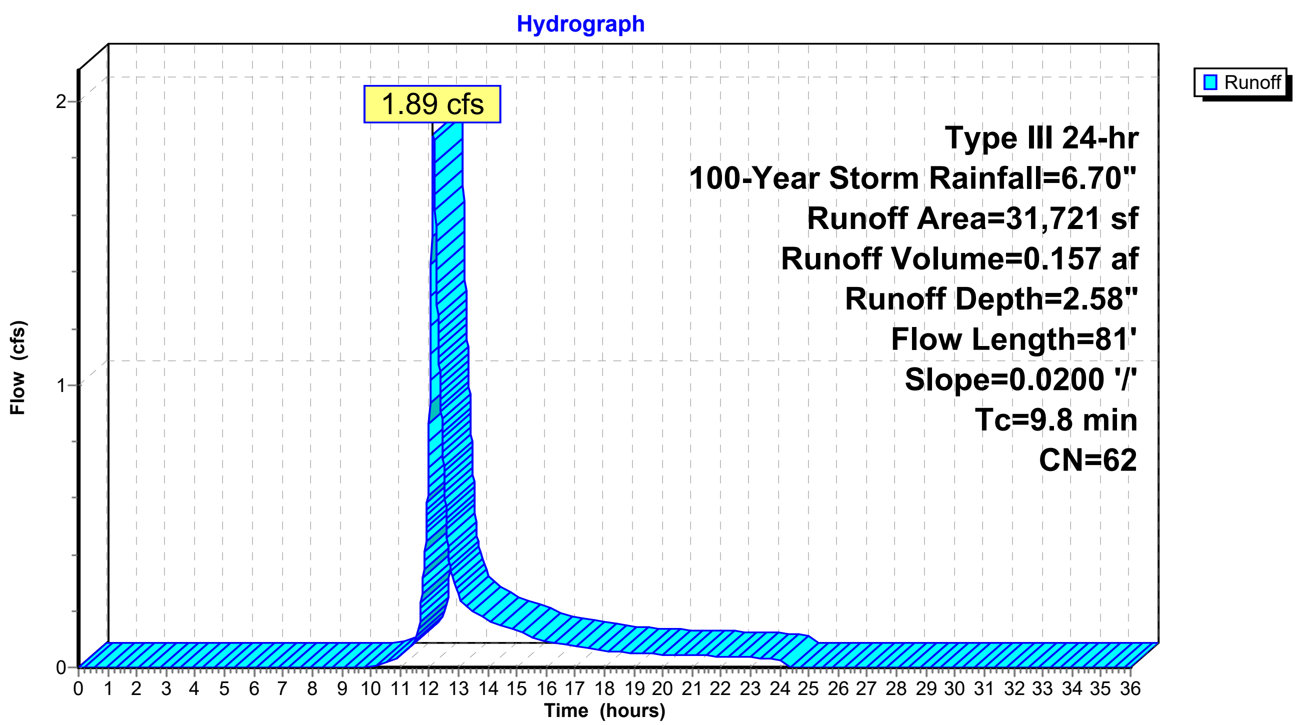
Runoff = 1.89 cfs @ 12.14 hrs, Volume= 0.157 af, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
12,547	98	Paved parking, HSG A
19,174	39	>75% Grass cover, Good, HSG A
31,721	62	Weighted Average
19,174		60.45% Pervious Area
12,547		39.55% 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"
0.4	22	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.8	81	Total			

Subcatchment 11P: P1e



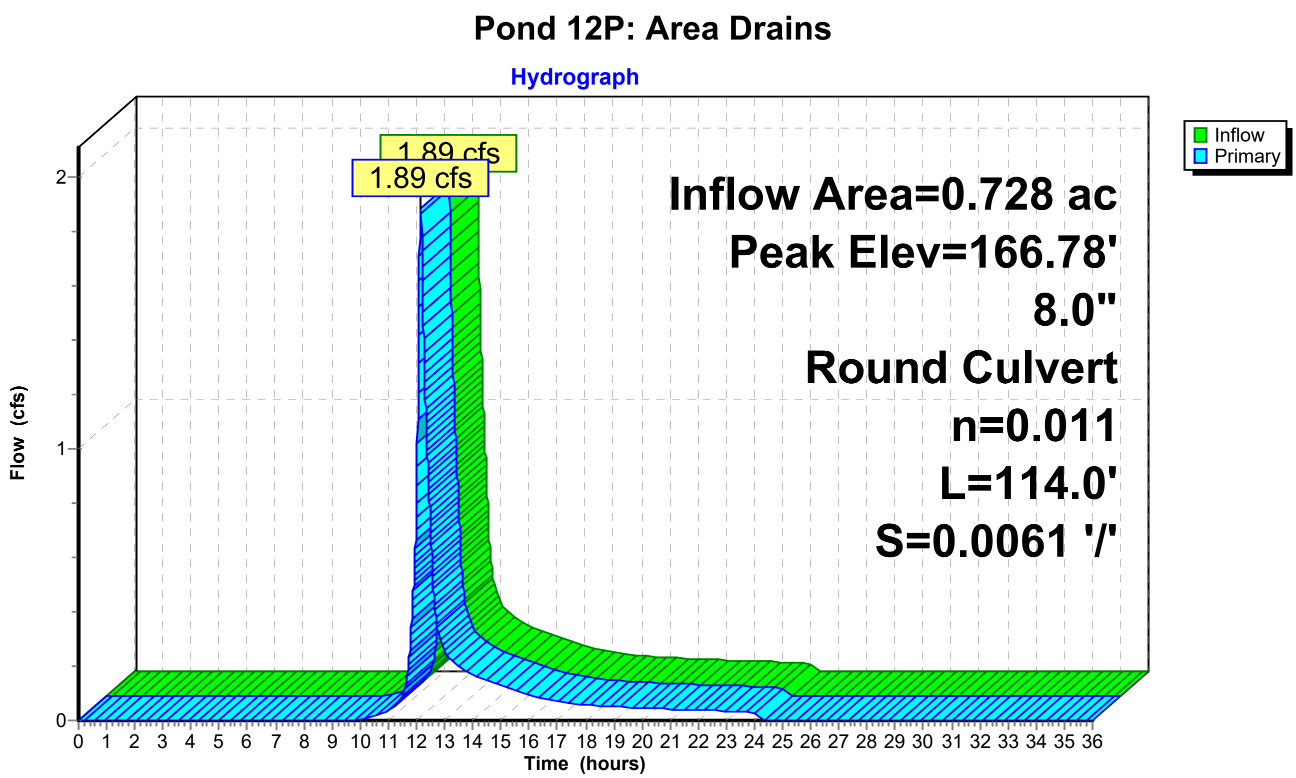
Summary for Pond 12P: Area Drains

Inflow Area =	0.728 ac,	39.55% Impervious,	Inflow Depth = 2.58"	for 100-Year Storm event	
Inflow =	1.89 cfs @	12.14 hrs,	Volume=	0.157 af	
Outflow =	1.89 cfs @	12.14 hrs,	Volume=	0.157 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.89 cfs @	12.14 hrs,	Volume=	0.157 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.78' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.80'	**8.0" Round Culvert** L= 114.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.80' / 162.10' S= 0.0061 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=1.86 cfs @ 12.14 hrs HW=166.71' TW=164.12' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.86 cfs @ 5.32 fps)



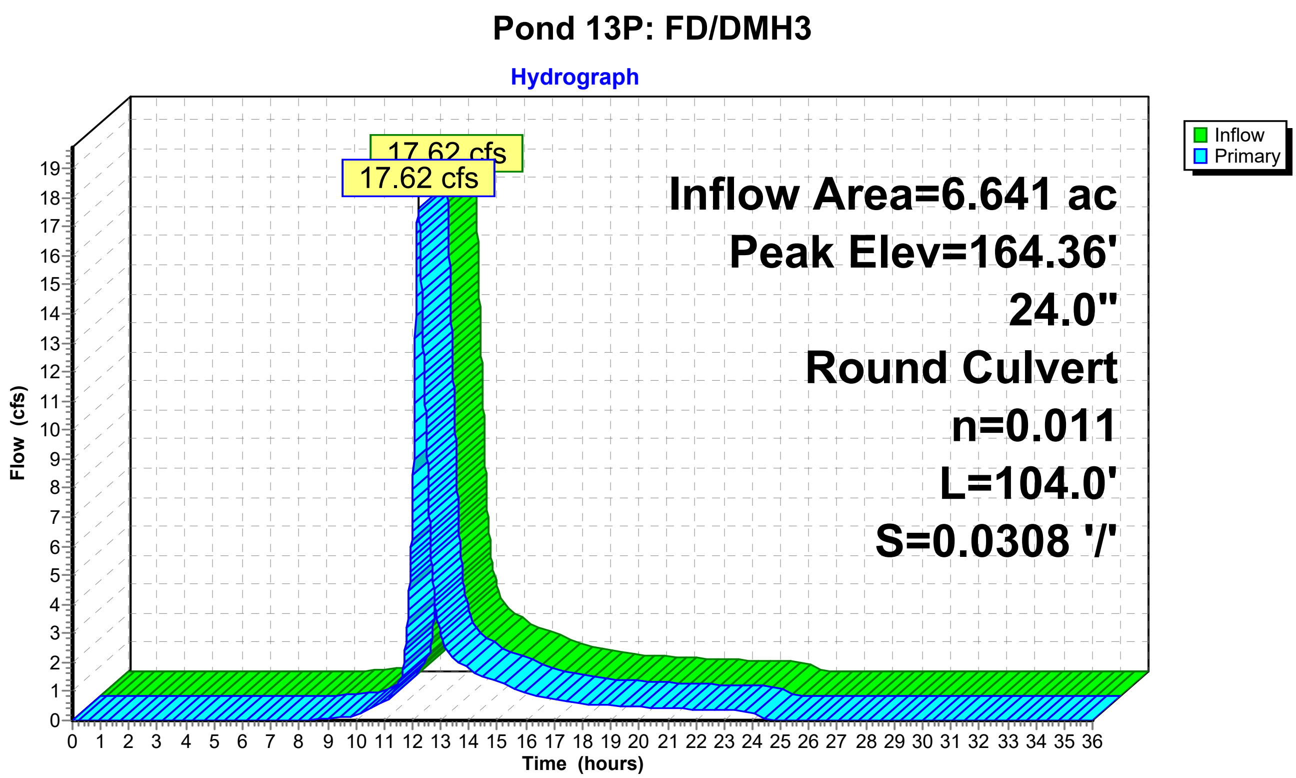
Summary for Pond 13P: FD/DMH3

Inflow Area = 6.641 ac, 27.51% Impervious, Inflow Depth = 3.11" for 100-Year Storm event
Inflow = 17.62 cfs @ 12.21 hrs, Volume= 1.719 af
Outflow = 17.62 cfs @ 12.21 hrs, Volume= 1.719 af, Atten= 0%, Lag= 0.0 min
Primary = 17.62 cfs @ 12.21 hrs, Volume= 1.719 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 164.36' @ 12.21 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.00'	**24.0" Round Culvert** L= 104.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.00' / 158.80' S= 0.0308 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=17.61 cfs @ 12.21 hrs HW=164.35' TW=162.14' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 17.61 cfs @ 5.60 fps)



Summary for Pond 14P: DMH4&5

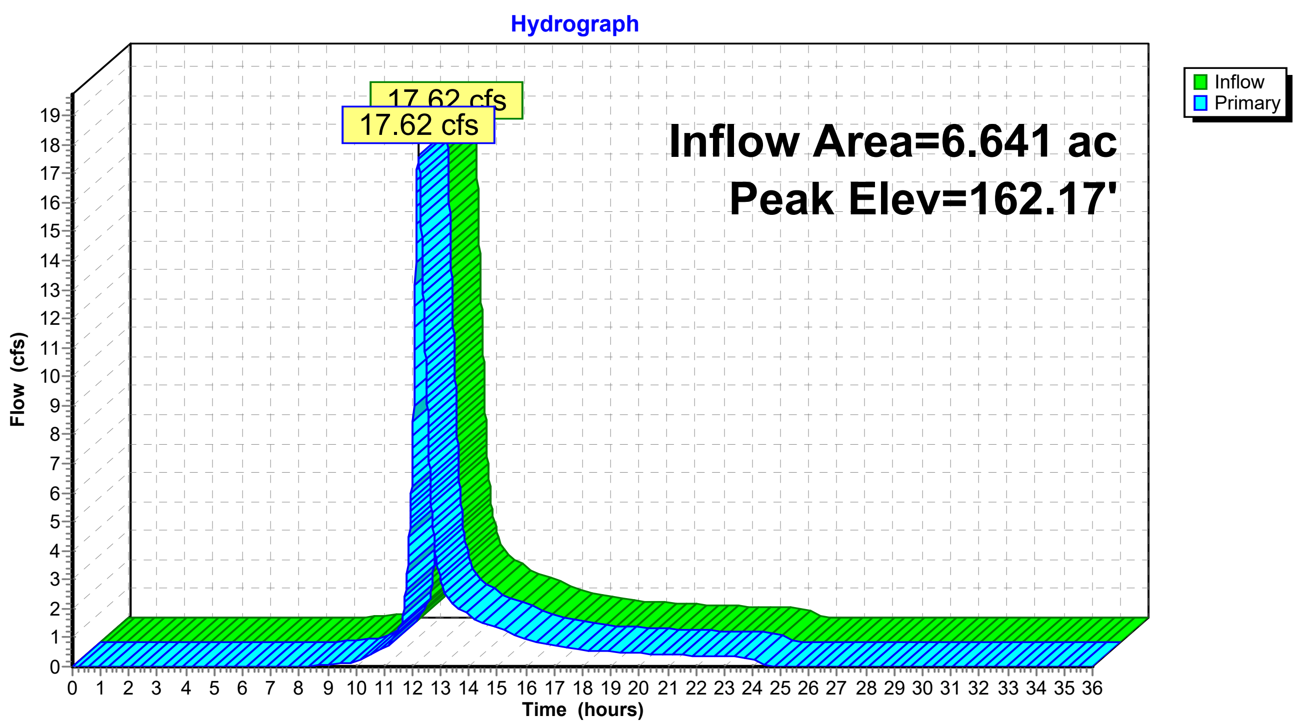
Inflow Area = 6.641 ac, 27.51% Impervious, Inflow Depth = 3.11" for 100-Year Storm event
Inflow = 17.62 cfs @ 12.21 hrs, Volume= 1.719 af
Outflow = 17.62 cfs @ 12.21 hrs, Volume= 1.719 af, Atten= 0%, Lag= 0.0 min
Primary = 17.62 cfs @ 12.21 hrs, Volume= 1.719 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 162.17' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**18.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Primary	161.00'	**18.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 158.50' S= 0.4167 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=17.41 cfs @ 12.21 hrs HW=162.14' TW=160.08' (Dynamic Tailwater)
1=Culvert (Inlet Controls 12.20 cfs @ 6.90 fps)
2=Culvert (Inlet Controls 5.21 cfs @ 3.63 fps)

Pond 14P: DMH4&5



Summary for Subcatchment 15P: P1f

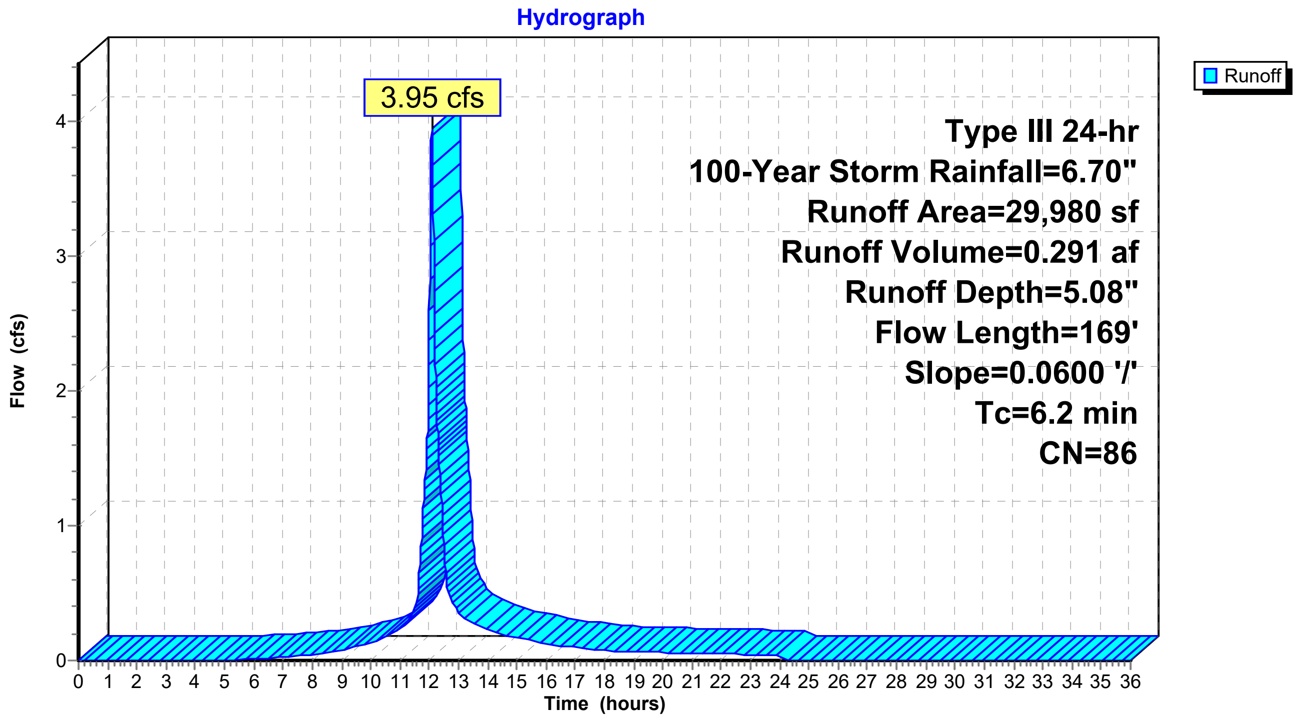
Runoff = 3.95 cfs @ 12.09 hrs, Volume= 0.291 af, Depth= 5.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
23,639	98	Paved parking, HSG A
6,281	39	>75% Grass cover, Good, HSG A
60	61	>75% Grass cover, Good, HSG B
29,980	86	Weighted Average
6,341		21.15% Pervious Area
23,639		78.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	56	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.4	113	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.2	169	Total			

Subcatchment 15P: P1f



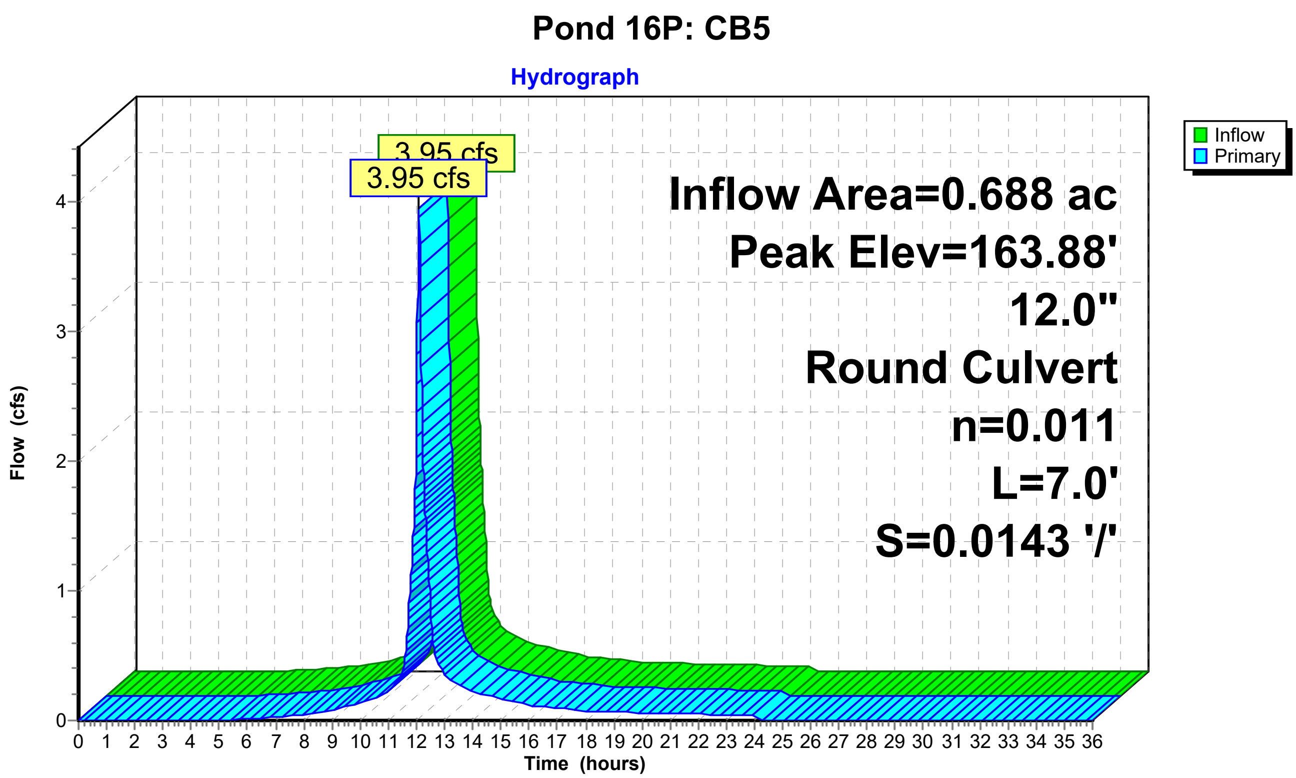
Summary for Pond 16P: CB5

Inflow Area =	0.688 ac,	78.85% Impervious,	Inflow Depth = 5.08"	for 100-Year Storm event	
Inflow =	3.95 cfs @	12.09 hrs,	Volume=	0.291 af	
Outflow =	3.95 cfs @	12.09 hrs,	Volume=	0.291 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.95 cfs @	12.09 hrs,	Volume=	0.291 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 163.88' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.90'	**12.0" Round Culvert** L= 7.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.90' / 159.80' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.72 cfs @ 12.09 hrs HW=163.76' TW=162.79' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.72 cfs @ 4.74 fps)



Summary for Subcatchment 17P: P1g

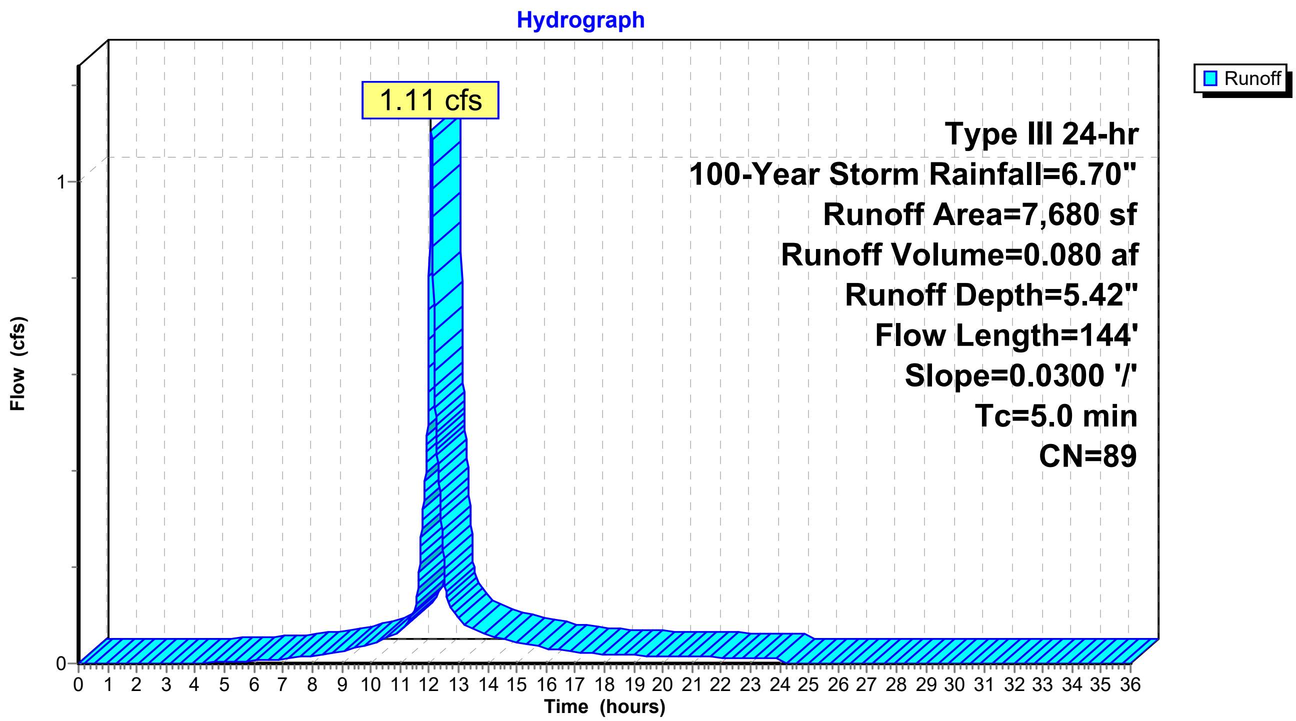
Runoff = 1.11 cfs @ 12.07 hrs, Volume= 0.080 af, Depth= 5.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
6,513	98	Paved parking, HSG A
1,167	39	>75% Grass cover, Good, HSG A
7,680	89	Weighted Average
1,167		15.20% Pervious Area
6,513		84.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	20	0.0300	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.5	40	0.0300	1.35		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
0.9	84	0.0300	1.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
4.7	144	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 17P: P1g



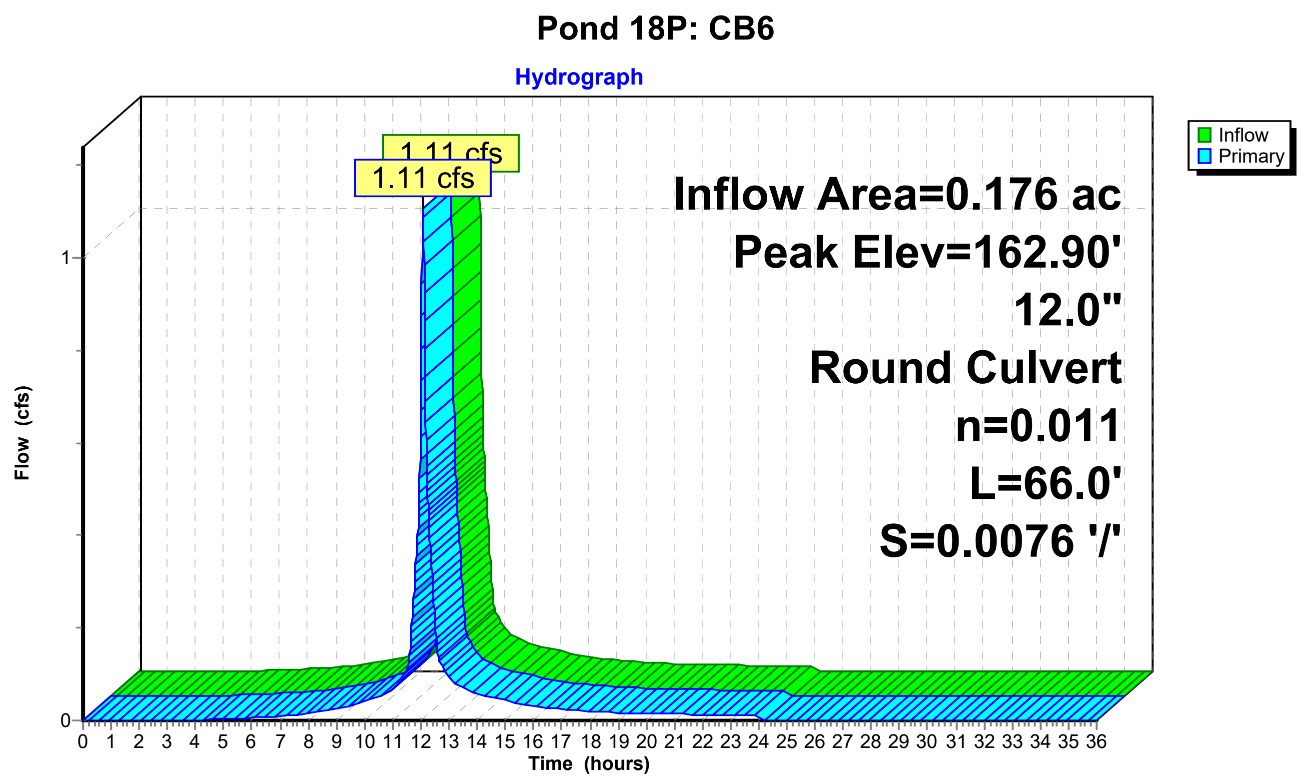
Summary for Pond 18P: CB6

Inflow Area =	0.176 ac, 84.80% Impervious,	Inflow Depth = 5.42"	for 100-Year Storm event	
Inflow =	1.11 cfs @	12.07 hrs, Volume=	0.080 af	
Outflow =	1.11 cfs @	12.07 hrs, Volume=	0.080 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.11 cfs @	12.07 hrs, Volume=	0.080 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 162.90' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**12.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.80' S= 0.0076 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=162.35' TW=162.54' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)



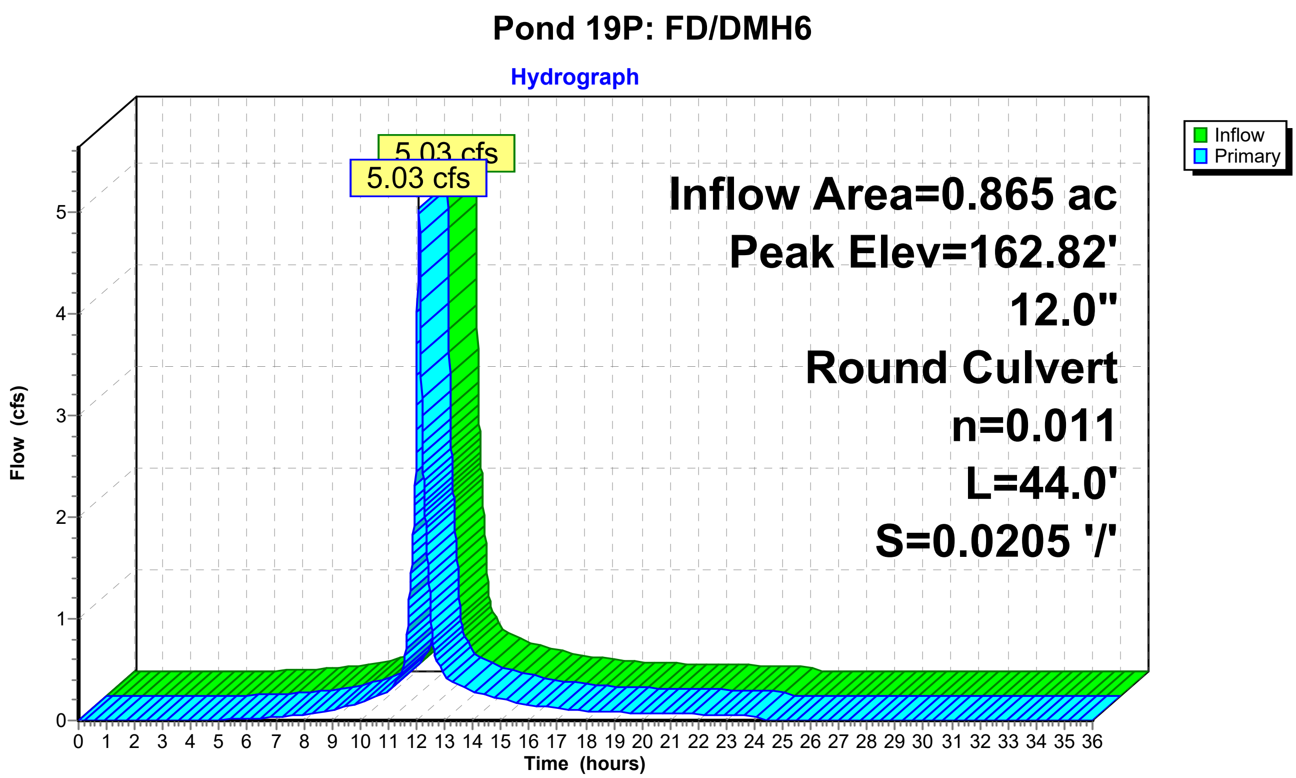
Summary for Pond 19P: FD/DMH6

Inflow Area =	0.865 ac, 80.06% Impervious, Inflow Depth = 5.15" for 100-Year Storm event		
Inflow =	5.03 cfs @ 12.08 hrs, Volume=	0.371 af	
Outflow =	5.03 cfs @ 12.08 hrs, Volume=	0.371 af,	Atten= 0%, Lag= 0.0 min
Primary =	5.03 cfs @ 12.08 hrs, Volume=	0.371 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 162.82' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.70'	**12.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.70' / 158.80' S= 0.0205 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=4.91 cfs @ 12.08 hrs HW=162.75' TW=161.07' (Dynamic Tailwater)
1=Culvert (Inlet Controls 4.91 cfs @ 6.25 fps)



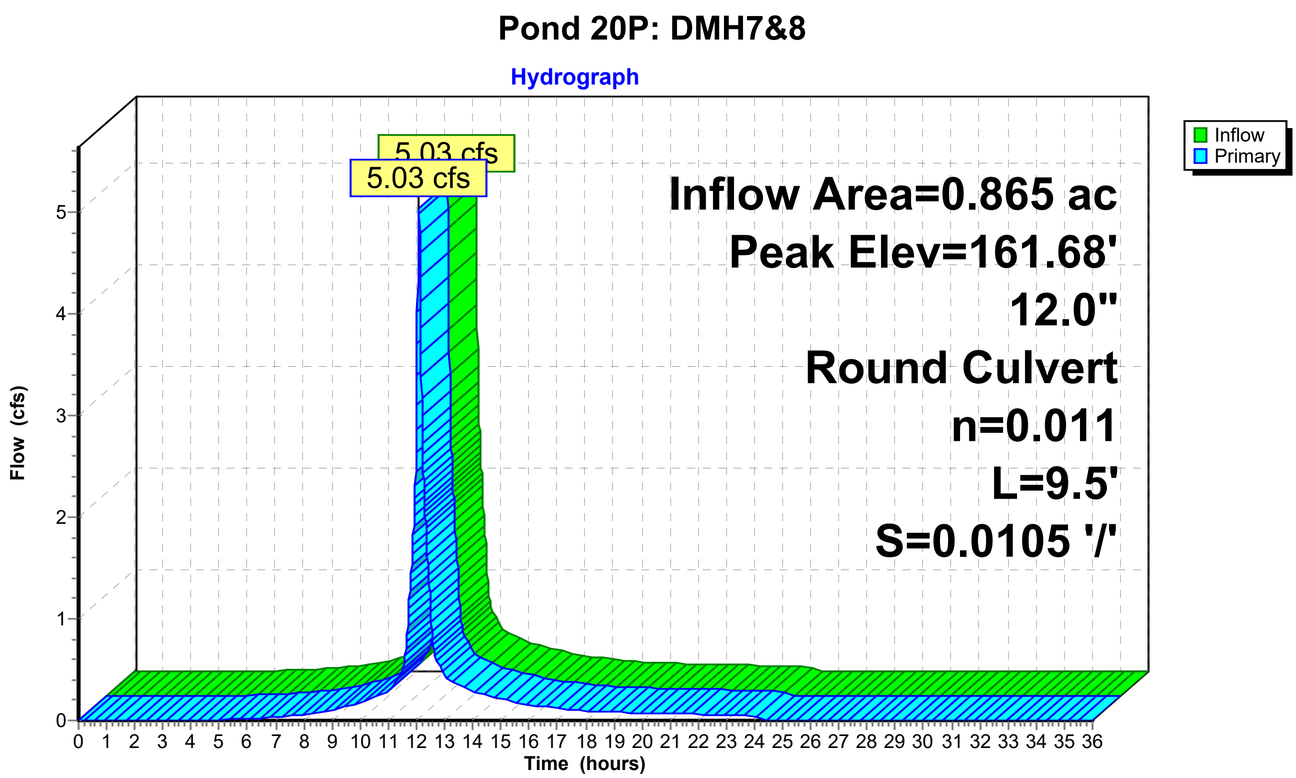
Summary for Pond 20P: DMH7&8

Inflow Area =	0.865 ac,	80.06% Impervious,	Inflow Depth = 5.15"	for 100-Year Storm event	
Inflow =	5.03 cfs @	12.08 hrs,	Volume=	0.371 af	
Outflow =	5.03 cfs @	12.08 hrs,	Volume=	0.371 af,	Atten= 0%, Lag= 0.0 min
Primary =	5.03 cfs @	12.08 hrs,	Volume=	0.371 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.68' @ 12.57 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 9.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0105 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=4.95 cfs @ 12.08 hrs HW=161.07' TW=159.36' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.95 cfs @ 6.30 fps)



Summary for Subcatchment 21P: P1h

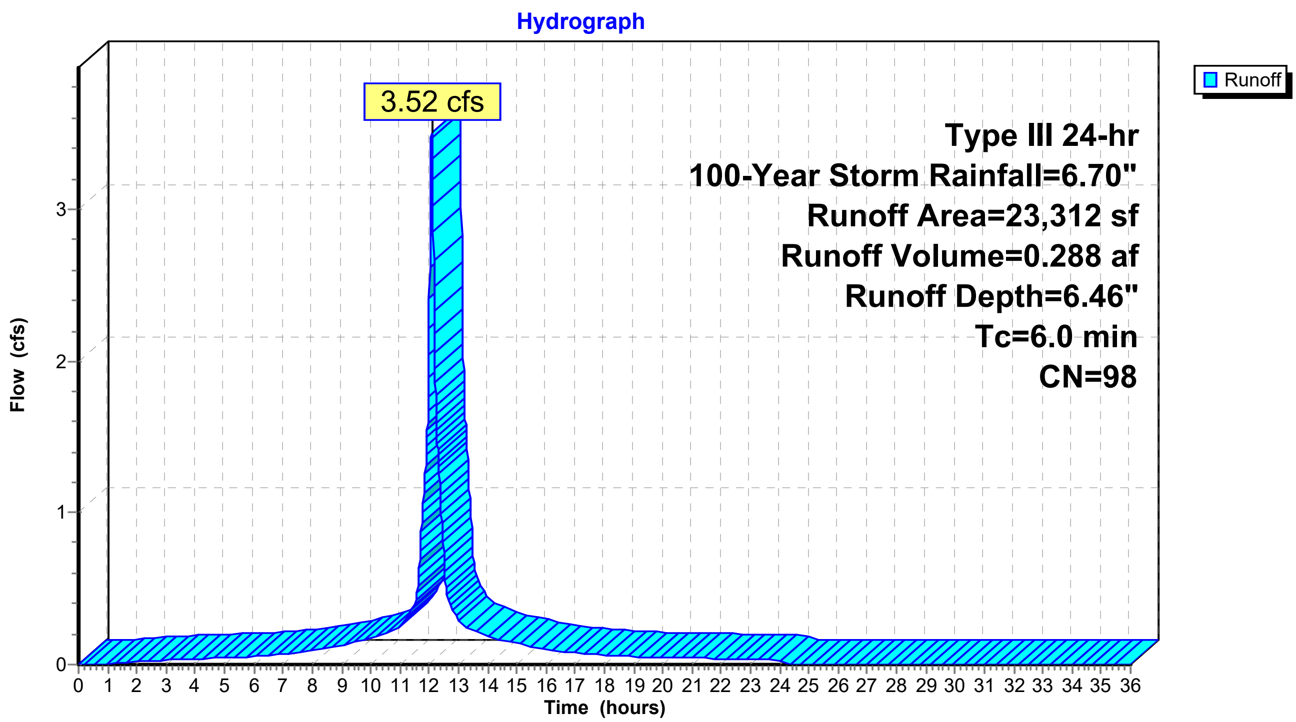
Runoff = 3.52 cfs @ 12.08 hrs, Volume= 0.288 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
23,312	98	Unconnected roofs, HSG A
23,312		100.00% Impervious Area
23,312		100.00% Unconnected

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

Subcatchment 21P: P1h



Summary for Pond 22P: Roof Pipe

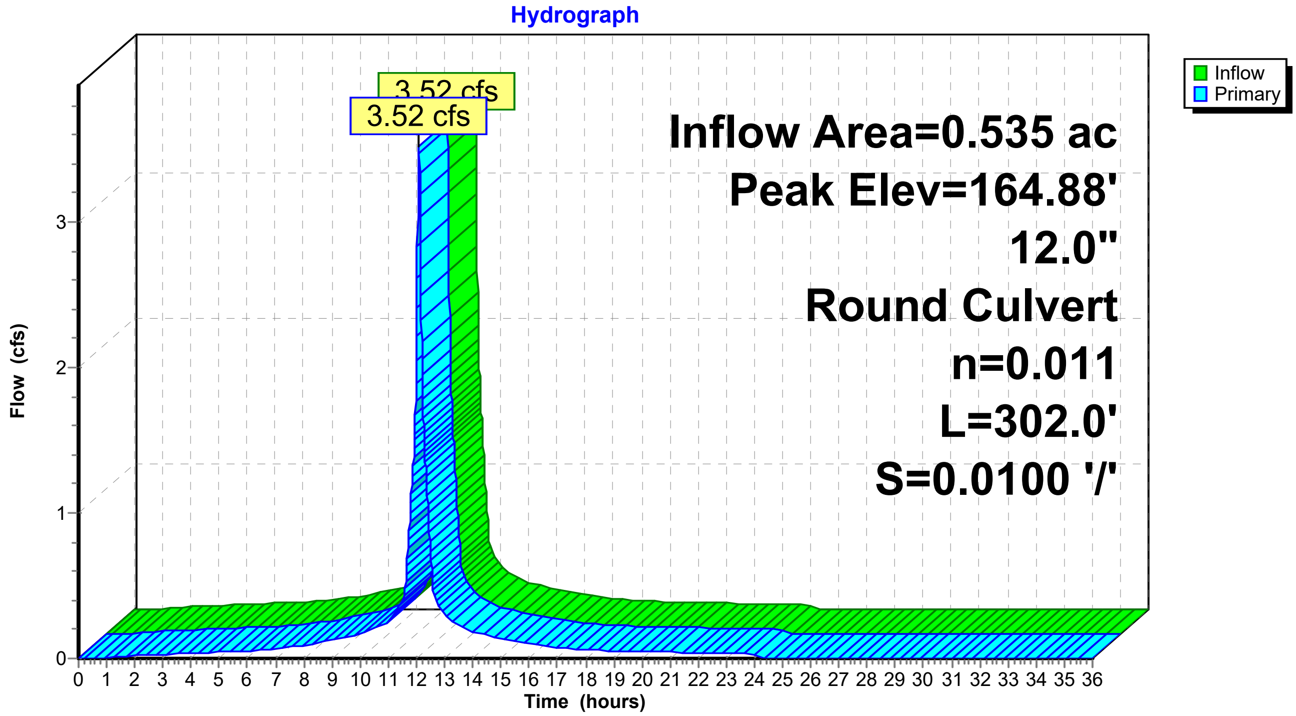
Inflow Area =	0.535 ac,100.00% Impervious,	Inflow Depth = 6.46"	for 100-Year Storm event	
Inflow =	3.52 cfs @	12.08 hrs, Volume=	0.288 af	
Outflow =	3.52 cfs @	12.08 hrs, Volume=	0.288 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.52 cfs @	12.08 hrs, Volume=	0.288 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 164.88' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.52'	**12.0" Round Culvert** L= 302.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.52' / 160.50' S= 0.0100 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=3.51 cfs @ 12.08 hrs HW=164.88' TW=159.35' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.51 cfs @ 4.47 fps)

Pond 22P: Roof Pipe



Summary for Pond 23P: Infiltration Field #1a

Inflow Area =	8.040 ac, 37.99% Impervious,	Inflow Depth = 3.55"	for 100-Year Storm event	
Inflow =	22.90 cfs @	12.15 hrs, Volume=	2.378 af	
Outflow =	11.39 cfs @	12.13 hrs, Volume=	2.378 af,	Atten= 50%, Lag= 0.0 min
Discarded =	1.91 cfs @	11.61 hrs, Volume=	1.535 af	
Primary =	9.48 cfs @	12.13 hrs, Volume=	0.843 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.63' @ 12.57 hrs Surf.Area= 9,970 sf Storage= 22,835 cf

Plug-Flow detention time= 37.8 min calculated for 2.378 af (100% of inflow)
Center-of-Mass det. time= 37.8 min (862.7 - 824.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	158.00'	9,894 cf	**130.17'W x 76.50'L x 3.88'H Field A**
			38,586 cf Overall - 13,851 cf Embedded = 24,735 cf x 40.0% Voids
#2A	158.50'	13,851 cf	**Cultec R-330XLHD** x 260 Inside #1
			Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
			Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
			Row Length Adjustment= +1.50' x 7.45 sf x 26 rows
#3	158.00'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		23,821 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf
#3	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf
#4	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf
#5	Primary	158.50'	**12.0" Round Culvert**
			L= 3.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 158.50' / 158.50' S= 0.0000 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.79 sf

Discarded OutFlow Max=1.91 cfs @ 11.61 hrs HW=158.06' (Free Discharge)
└—**1=Exfiltration** (Exfiltration Controls 1.91 cfs)

Primary OutFlow Max=8.31 cfs @ 12.13 hrs HW=159.62' TW=159.32' (Dynamic Tailwater)
├—**2=Culvert** (Inlet Controls 2.08 cfs @ 2.64 fps)
├—**3=Culvert** (Inlet Controls 2.08 cfs @ 2.64 fps)
├—**4=Culvert** (Inlet Controls 2.08 cfs @ 2.64 fps)
└—**5=Culvert** (Inlet Controls 2.08 cfs @ 2.64 fps)

Pond 23P: Infiltration Field #1a - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 26 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

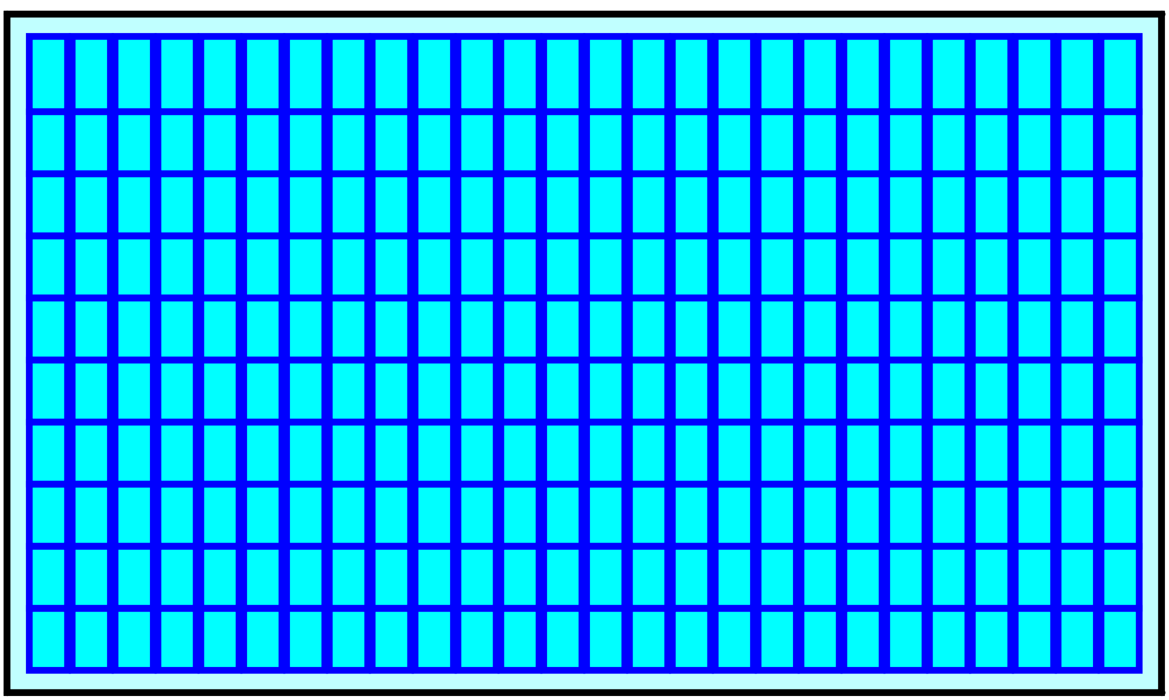
10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +30.0" End Stone x 2 = 76.50' Base Length
26 Rows x 52.0" Wide + 6.0" Spacing x 25 + 30.0" Side Stone x 2 = 130.17' Base Width
6.0" Base + 30.5" Chamber Height + 10.0" Cover = 3.88' Field Height

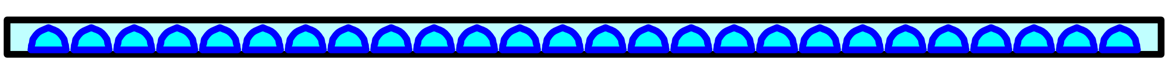
260 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 26 Rows = 13,851.4 cf Chamber Storage

38,586.3 cf Field - 13,851.4 cf Chambers = 24,734.9 cf Stone x 40.0% Voids = 9,893.9 cf Stone Storage

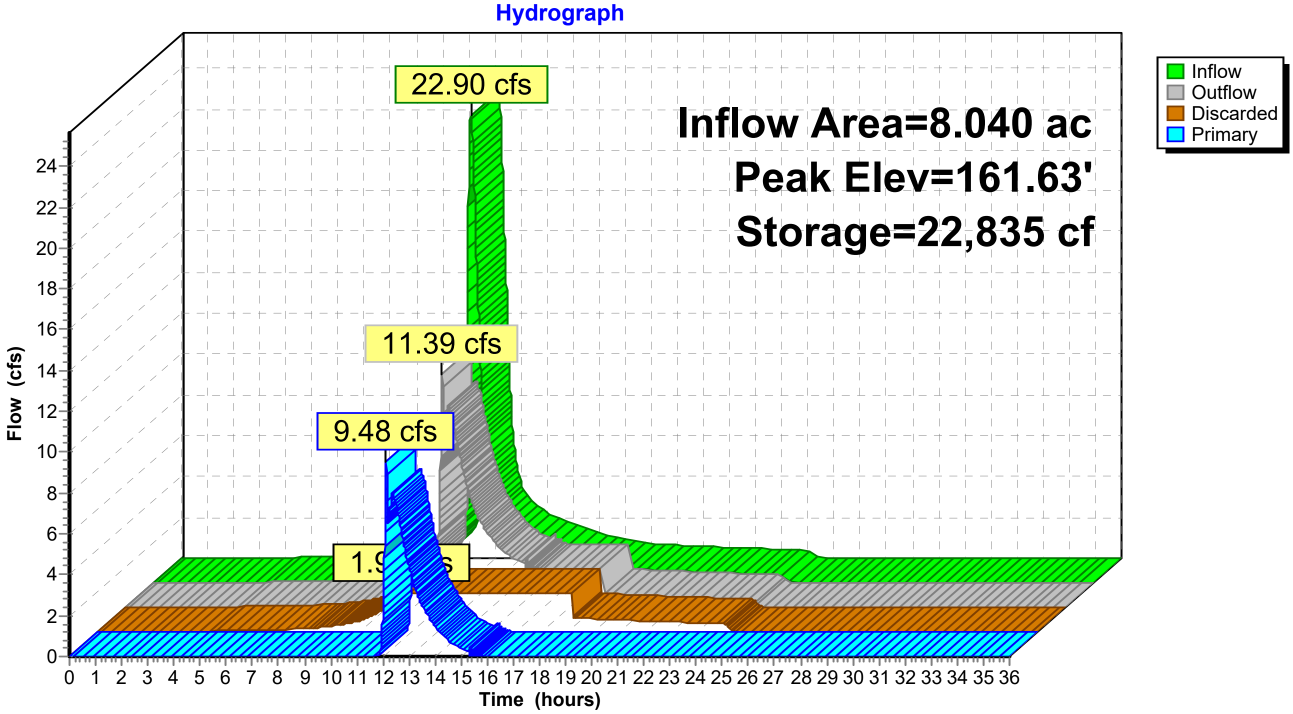
Chamber Storage + Stone Storage = 23,745.4 cf = 0.545 af
Overall Storage Efficiency = 61.5%
Overall System Size = 76.50' x 130.17' x 3.88'

260 Chambers
1,429.1 cy Field
916.1 cy Stone





Pond 23P: Infiltration Field #1a



Summary for Pond 24P: Infiltration Field #1b

Inflow Area = 8.040 ac, 37.99% Impervious, Inflow Depth = 1.26" for 100-Year Storm event
Inflow = 9.48 cfs @ 12.13 hrs, Volume= 0.843 af
Outflow = 6.97 cfs @ 12.59 hrs, Volume= 0.843 af, Atten= 26%, Lag= 27.1 min
Discarded = 0.18 cfs @ 11.96 hrs, Volume= 0.121 af
Primary = 6.79 cfs @ 12.59 hrs, Volume= 0.722 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.42' @ 12.59 hrs Surf.Area= 3,315 sf Storage= 7,120 cf

Plug-Flow detention time= 35.9 min calculated for 0.843 af (100% of inflow)
Center-of-Mass det. time= 35.9 min (811.3 - 775.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	158.00'	3,414 cf	**43.17'W x 76.50'L x 3.88'H Field A** 12,796 cf Overall - 4,262 cf Embedded = 8,534 cf x 40.0% Voids
#2A	158.50'	4,262 cf	**Cultec R-330XLHD** x 80 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 8 rows
#3	158.00'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		7,751 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	159.15'	**12.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.15' / 156.00' S= 0.1432 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#3	Primary	160.00'	**8.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.00' / 156.00' S= 0.1818 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Discarded OutFlow Max=0.18 cfs @ 11.96 hrs HW=158.08' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=6.79 cfs @ 12.59 hrs HW=161.42' TW=0.00' (Dynamic Tailwater)
├─**2=Culvert** (Inlet Controls 5.03 cfs @ 6.41 fps)
└─**3=Culvert** (Inlet Controls 1.75 cfs @ 5.02 fps)

Pond 24P: Infiltration Field #1b - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 8 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

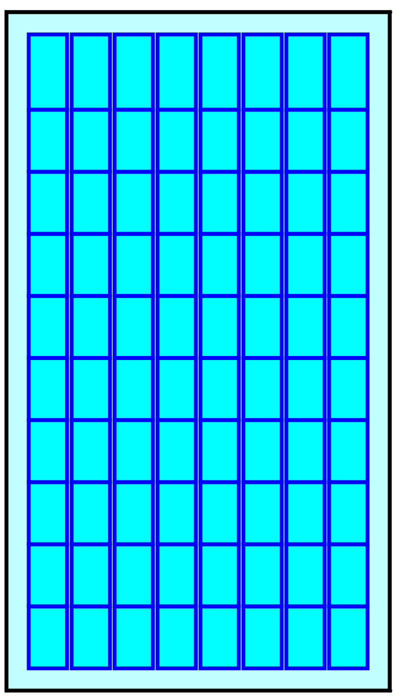
10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +30.0" End Stone x 2 = 76.50' Base Length
8 Rows x 52.0" Wide + 6.0" Spacing x 7 + 30.0" Side Stone x 2 = 43.17' Base Width
6.0" Base + 30.5" Chamber Height + 10.0" Cover = 3.88' Field Height

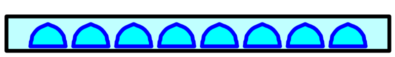
80 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 8 Rows = 4,262.0 cf Chamber Storage

12,796.2 cf Field - 4,262.0 cf Chambers = 8,534.2 cf Stone x 40.0% Voids = 3,413.7 cf Stone Storage

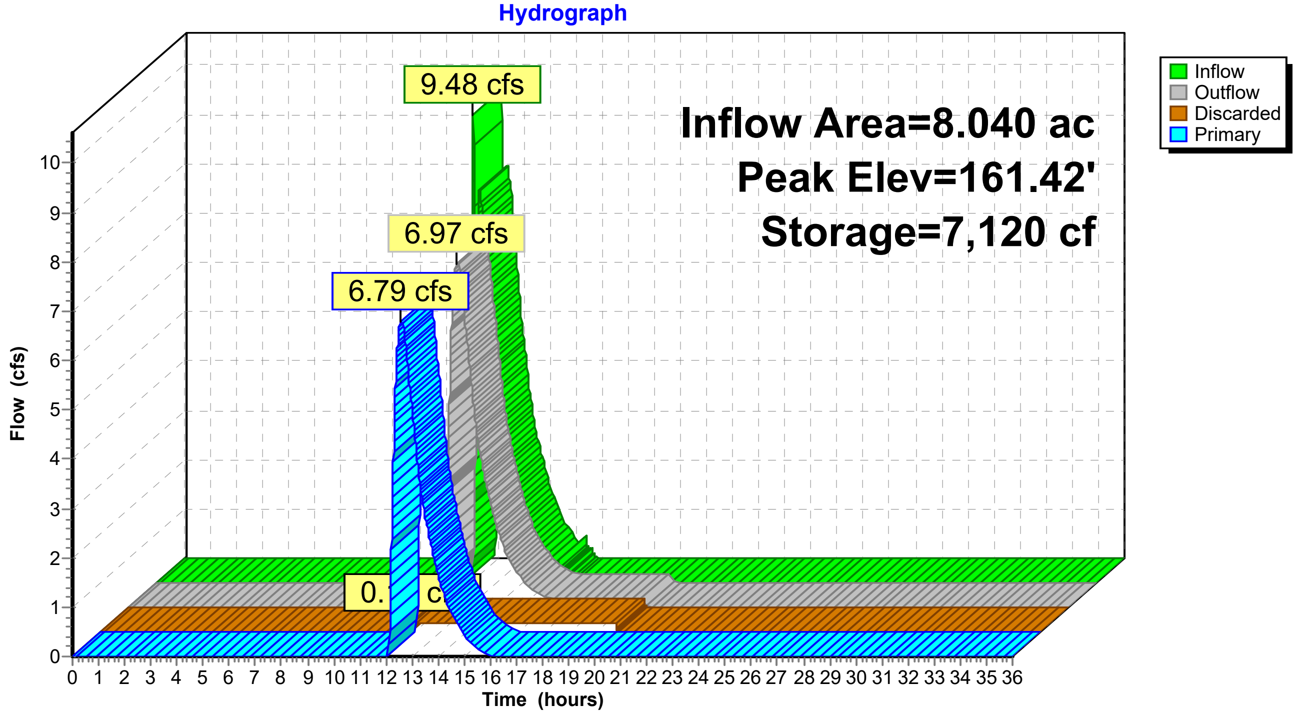
Chamber Storage + Stone Storage = 7,675.7 cf = 0.176 af
Overall Storage Efficiency = 60.0%
Overall System Size = 76.50' x 43.17' x 3.88'

80 Chambers
473.9 cy Field
316.1 cy Stone





Pond 24P: Infiltration Field #1b



Summary for Subcatchment 25P: P2a

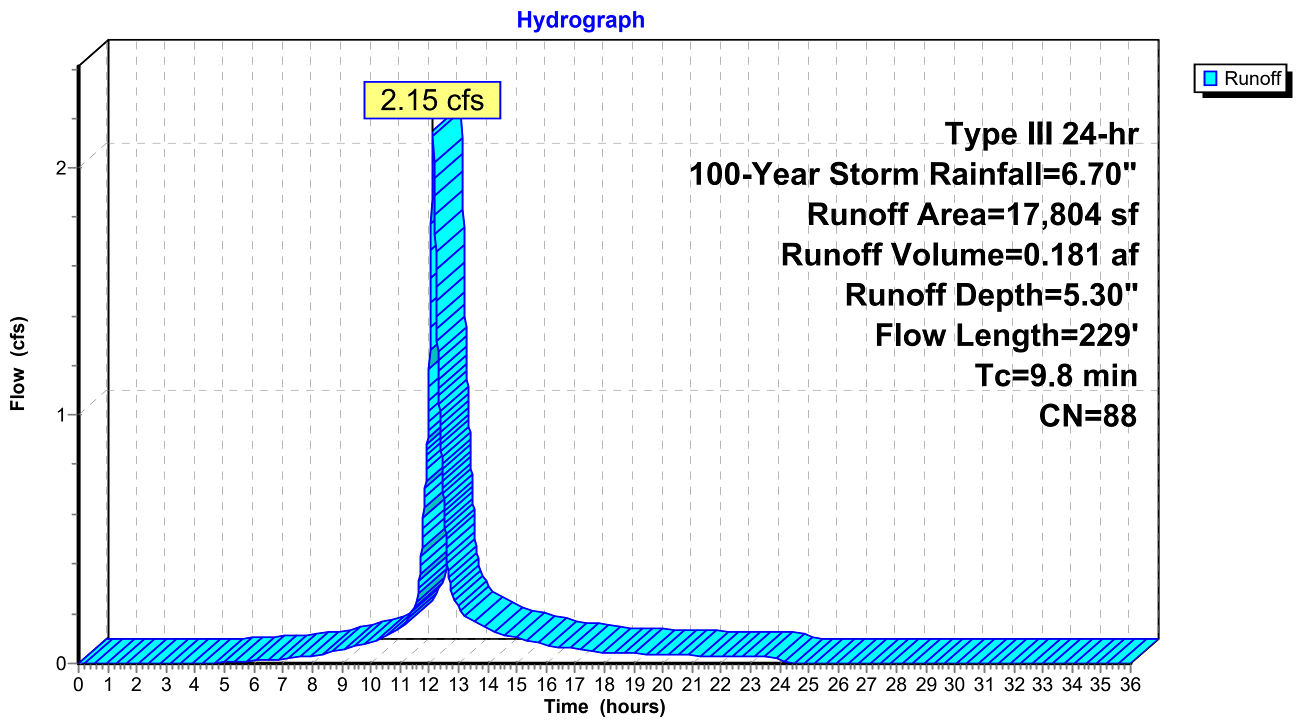
Runoff = 2.15 cfs @ 12.13 hrs, Volume= 0.181 af, Depth= 5.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
218	98	Paved parking, HSG A
12,048	98	Paved parking, HSG B
1,239	79	<50% Grass cover, Poor, HSG B
4,299	61	>75% Grass cover, Good, HSG B
17,804	88	Weighted Average
5,538		31.11% Pervious Area
12,266		68.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	83	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.5	146	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.8	229	Total			

Subcatchment 25P: P2a



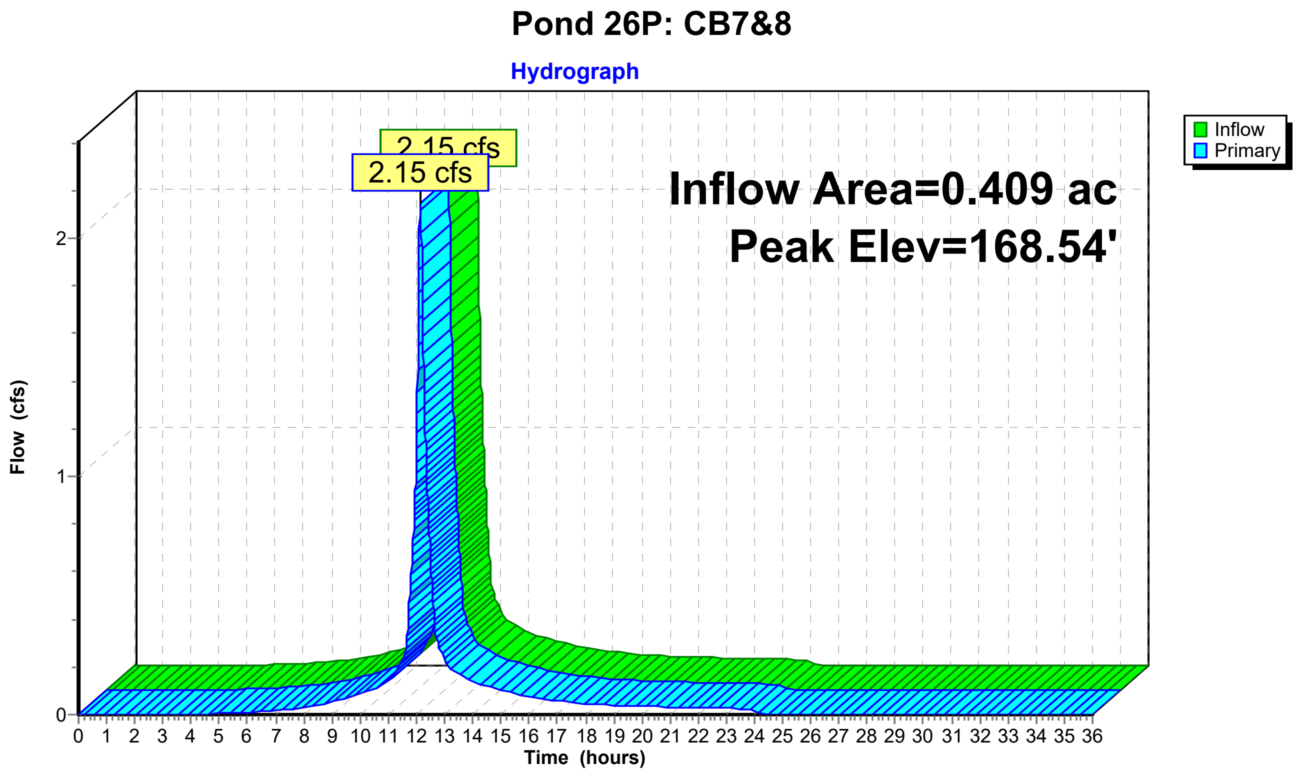
Summary for Pond 26P: CB7&8

Inflow Area = 0.409 ac, 68.89% Impervious, Inflow Depth = 5.30" for 100-Year Storm event
Inflow = 2.15 cfs @ 12.13 hrs, Volume= 0.181 af
Outflow = 2.15 cfs @ 12.13 hrs, Volume= 0.181 af, Atten= 0%, Lag= 0.0 min
Primary = 2.15 cfs @ 12.13 hrs, Volume= 0.181 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 168.54' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	168.00'	**12.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 167.20' S= 0.0190 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Primary	168.00'	**12.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 167.20' S= 0.0727 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.15 cfs @ 12.13 hrs HW=168.54' TW=167.93' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.07 cfs @ 2.50 fps)
2=Culvert (Inlet Controls 1.07 cfs @ 2.50 fps)



Summary for Pond 27P: FD/DMH10

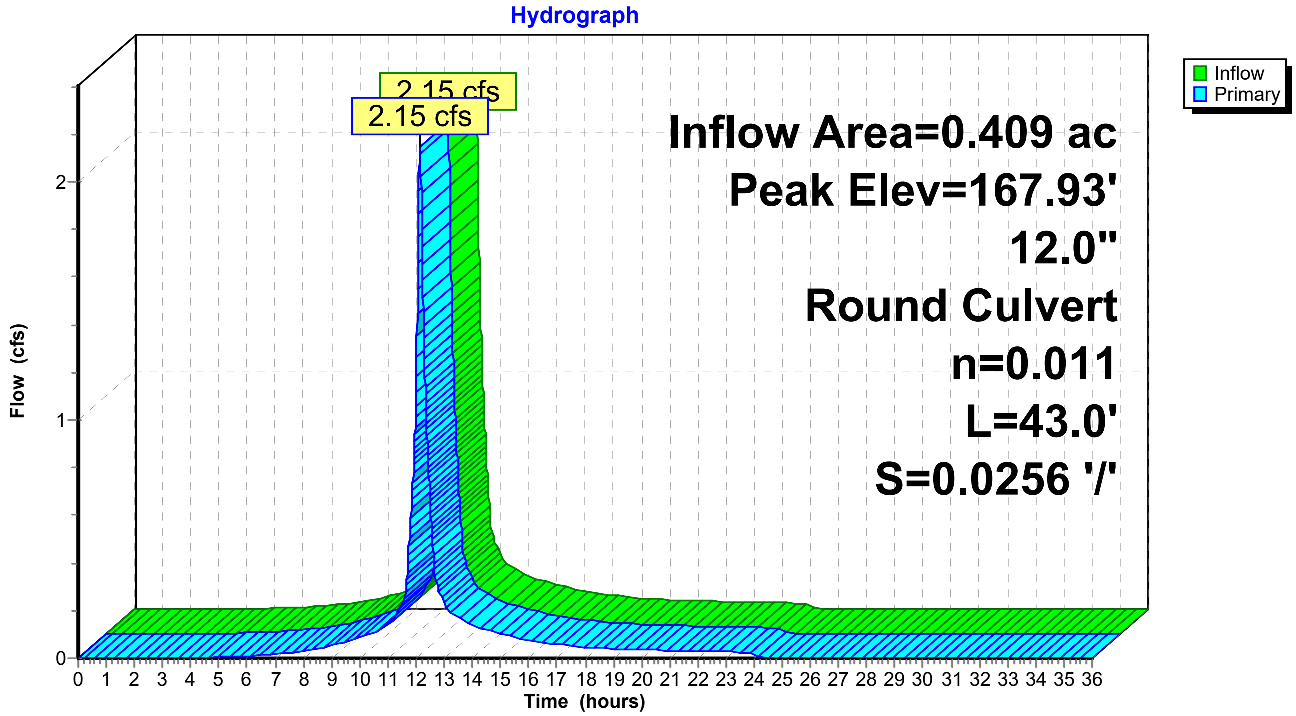
Inflow Area =	0.409 ac,	68.89% Impervious,	Inflow Depth = 5.30"	for 100-Year Storm event	
Inflow =	2.15 cfs @	12.13 hrs,	Volume=	0.181 af	
Outflow =	2.15 cfs @	12.13 hrs,	Volume=	0.181 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.15 cfs @	12.13 hrs,	Volume=	0.181 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 167.93' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	167.10'	**12.0" Round Culvert** L= 43.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.10' / 166.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.15 cfs @ 12.13 hrs HW=167.93' TW=165.98' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.15 cfs @ 3.09 fps)

Pond 27P: FD/DMH10



Summary for Subcatchment 28P: P2b

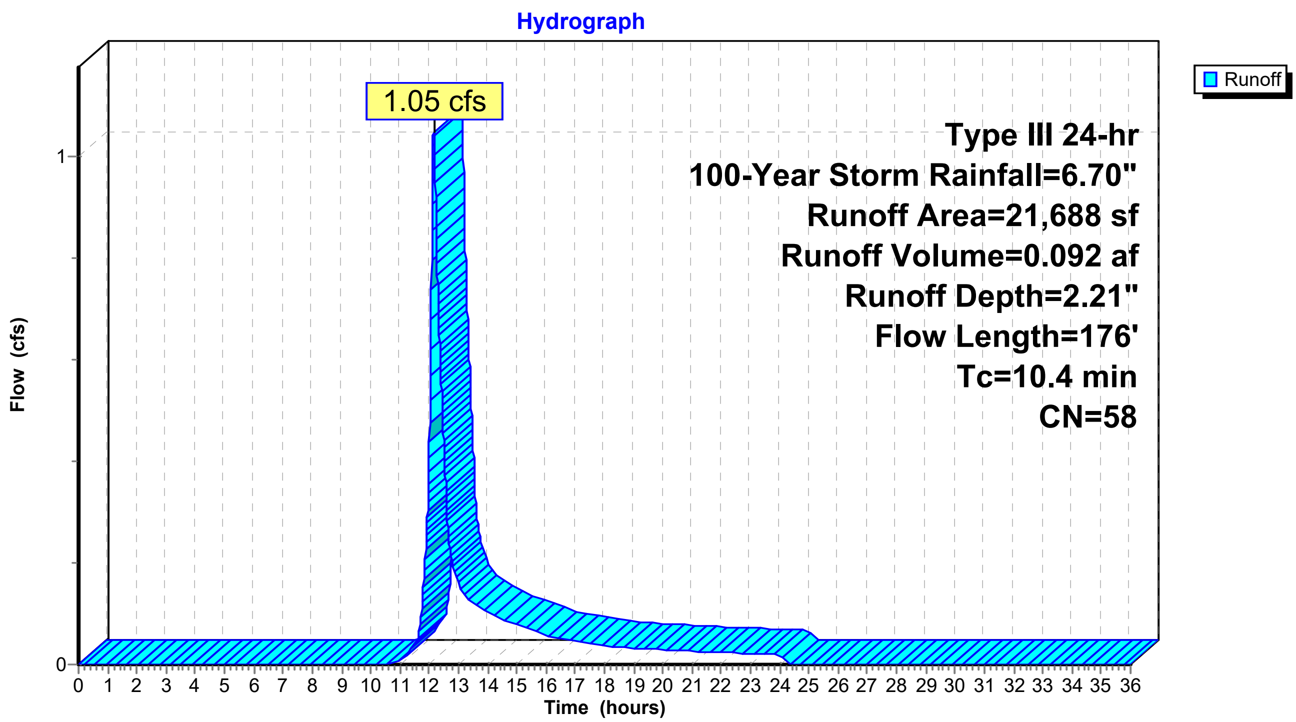
Runoff = 1.05 cfs @ 12.15 hrs, Volume= 0.092 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
1,358	98	Paved parking, HSG B
8,334	61	>75% Grass cover, Good, HSG B
3,244	39	>75% Grass cover, Good, HSG A
8,752	55	Woods, Good, HSG B
21,688	58	Weighted Average
20,330		93.74% Pervious Area
1,358		6.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	61	0.0600	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	92	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	23	0.2200	3.28		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.4	176	Total			

Subcatchment 28P: P2b



Summary for Subcatchment 29P: P2c

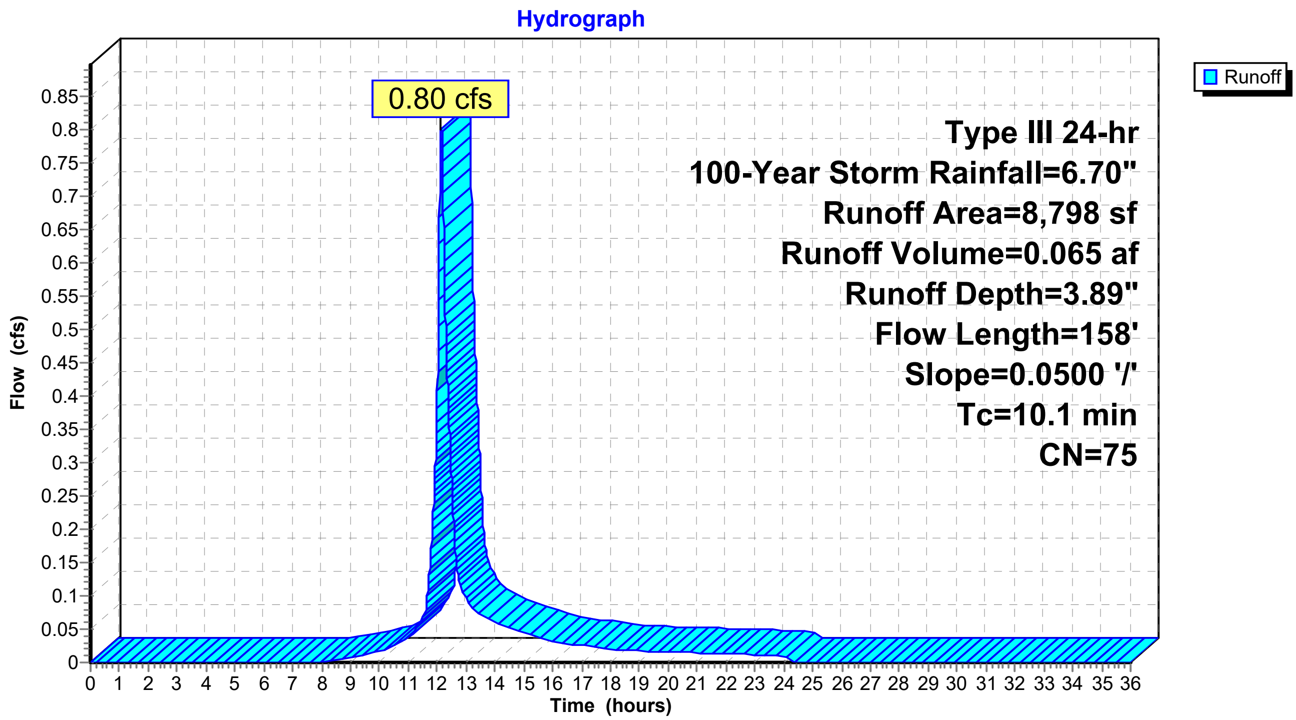
Runoff = 0.80 cfs @ 12.14 hrs, Volume= 0.065 af, Depth= 3.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
62	98	Paved parking, HSG A
3,785	98	Paved parking, HSG B
8	39	>75% Grass cover, Good, HSG A
2,132	61	>75% Grass cover, Good, HSG B
2,811	55	Woods, Good, HSG B
8,798	75	Weighted Average
4,951		56.27% Pervious Area
3,847		43.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	35	0.0500	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
4.3	21	0.0500	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.5	102	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.1	158	Total			

Subcatchment 29P: P2c



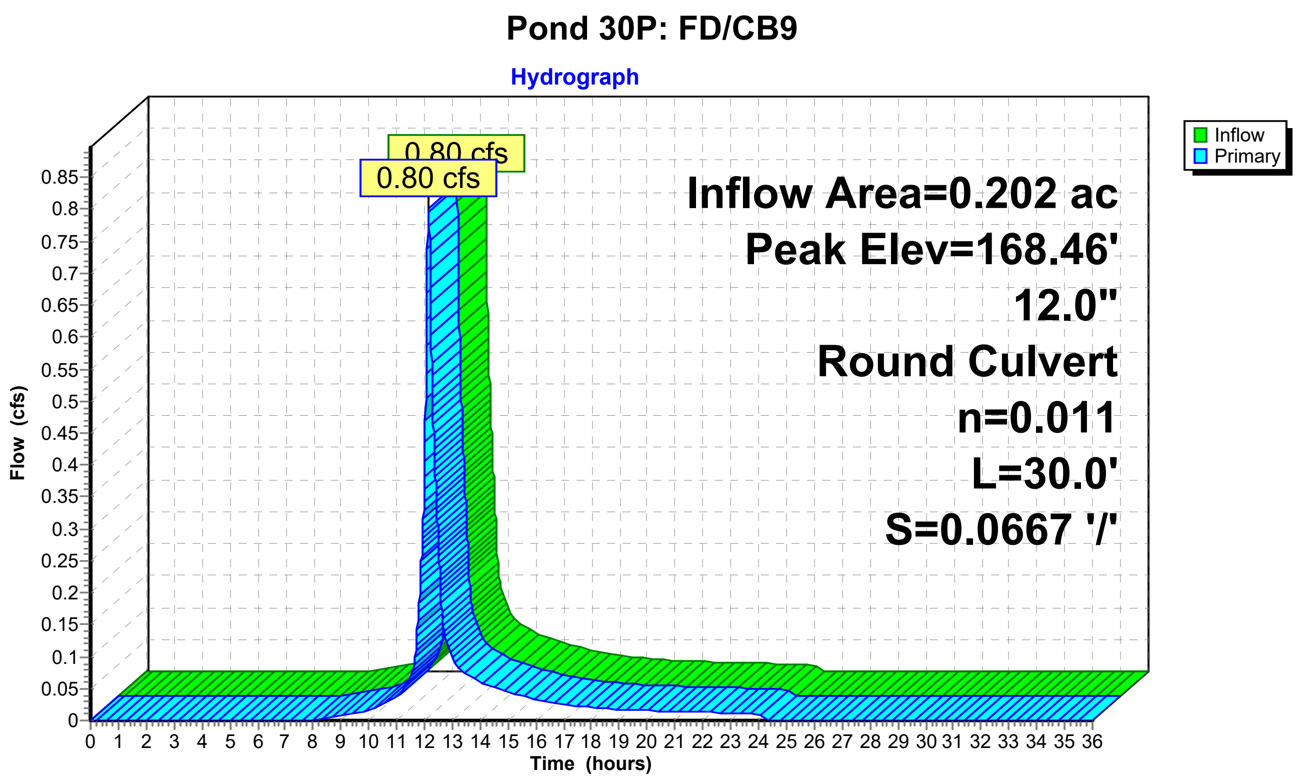
Summary for Pond 30P: FD/CB9

Inflow Area =	0.202 ac,	43.73% Impervious,	Inflow Depth = 3.89"	for 100-Year Storm event	
Inflow =	0.80 cfs @	12.14 hrs,	Volume=	0.065 af	
Outflow =	0.80 cfs @	12.14 hrs,	Volume=	0.065 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.80 cfs @	12.14 hrs,	Volume=	0.065 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 168.46' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	168.00'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 166.00' S= 0.0667 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.80 cfs @ 12.14 hrs HW=168.46' TW=166.01' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.80 cfs @ 2.30 fps)



Summary for Pond 31P: Basin

Inflow Area =	1.109 ac,	36.18% Impervious,	Inflow Depth = 3.65"	for 100-Year Storm event	
Inflow =	3.99 cfs @	12.14 hrs,	Volume=	0.338 af	
Outflow =	0.81 cfs @	12.64 hrs,	Volume=	0.338 af,	Atten= 80%, Lag= 29.9 min
Discarded =	0.81 cfs @	12.64 hrs,	Volume=	0.338 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.60' @ 12.64 hrs Surf.Area= 4,234 sf Storage= 4,113 cf

Plug-Flow detention time= 34.3 min calculated for 0.338 af (100% of inflow)
Center-of-Mass det. time= 34.3 min (852.2 - 817.9)

Volume	Invert	Avail.Storage	Storage Description
#1	165.50'	11,005 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

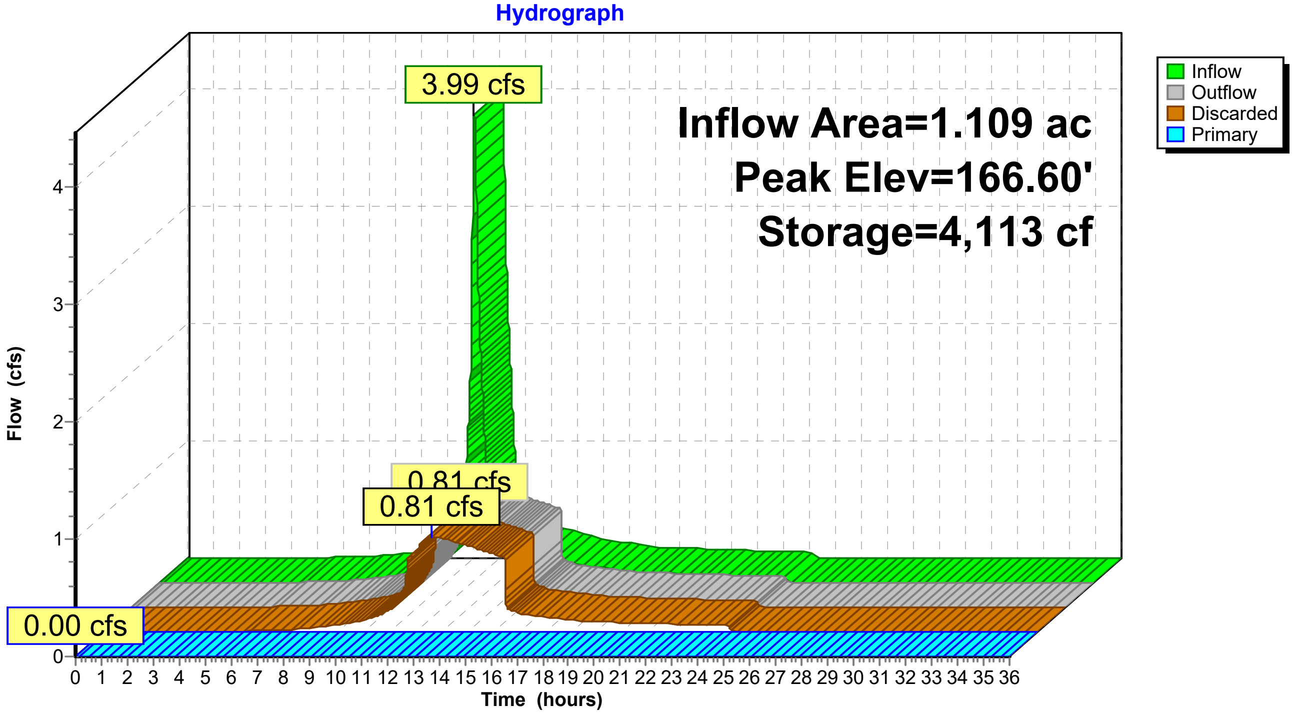
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
165.50	3,291	222.0	0	0	3,291
168.00	5,616	282.0	11,005	11,005	5,779

Device	Routing	Invert	Outlet Devices
#1	Discarded	165.50'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	166.60'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 166.60' / 161.00' S= 0.1120 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Discarded OutFlow Max=0.81 cfs @ 12.64 hrs HW=166.60' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.81 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=165.50' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 31P: Basin



Summary for Subcatchment 32P: P3f

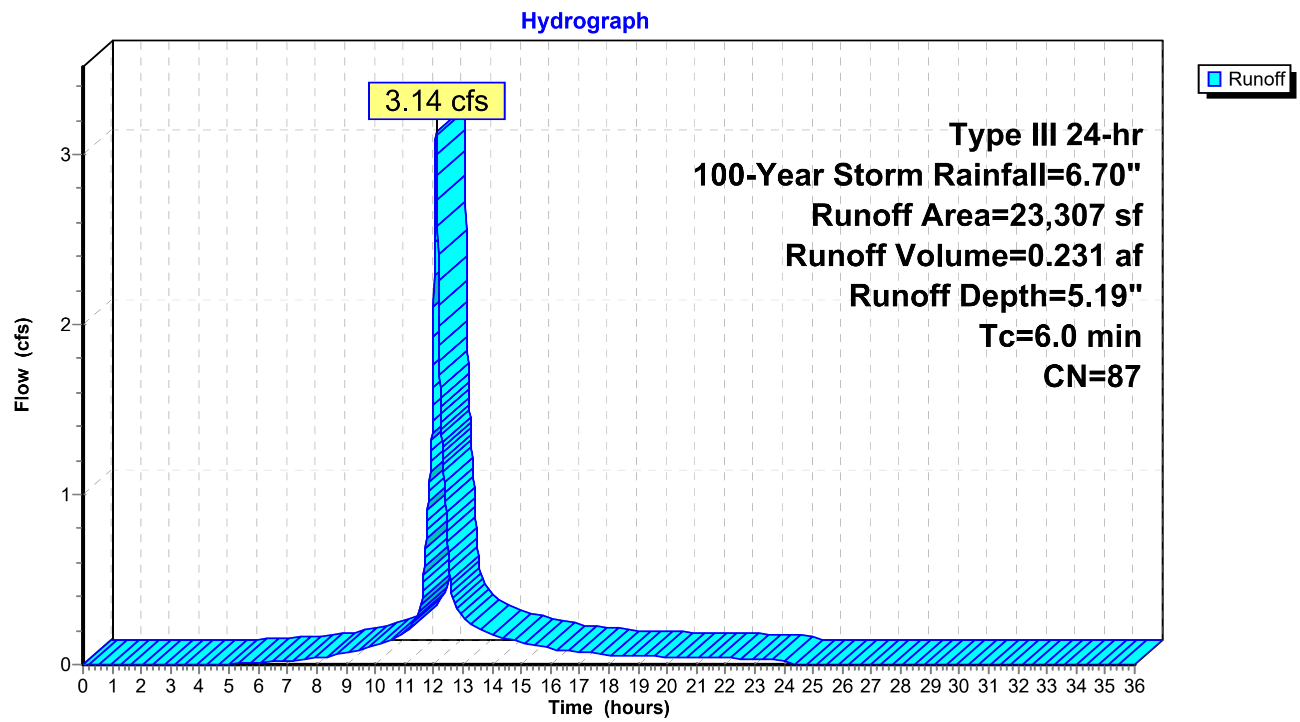
Runoff = 3.14 cfs @ 12.09 hrs, Volume= 0.231 af, Depth= 5.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
5,626	98	Roofs, HSG A
11,048	98	Roofs, HSG B
516	98	Paved parking, HSG B
1,861	39	>75% Grass cover, Good, HSG A
4,256	61	>75% Grass cover, Good, HSG B
23,307	87	Weighted Average
6,117		26.25% Pervious Area
17,190		73.75% Impervious Area

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

Subcatchment 32P: P3f



Summary for Subcatchment 33P: P3a

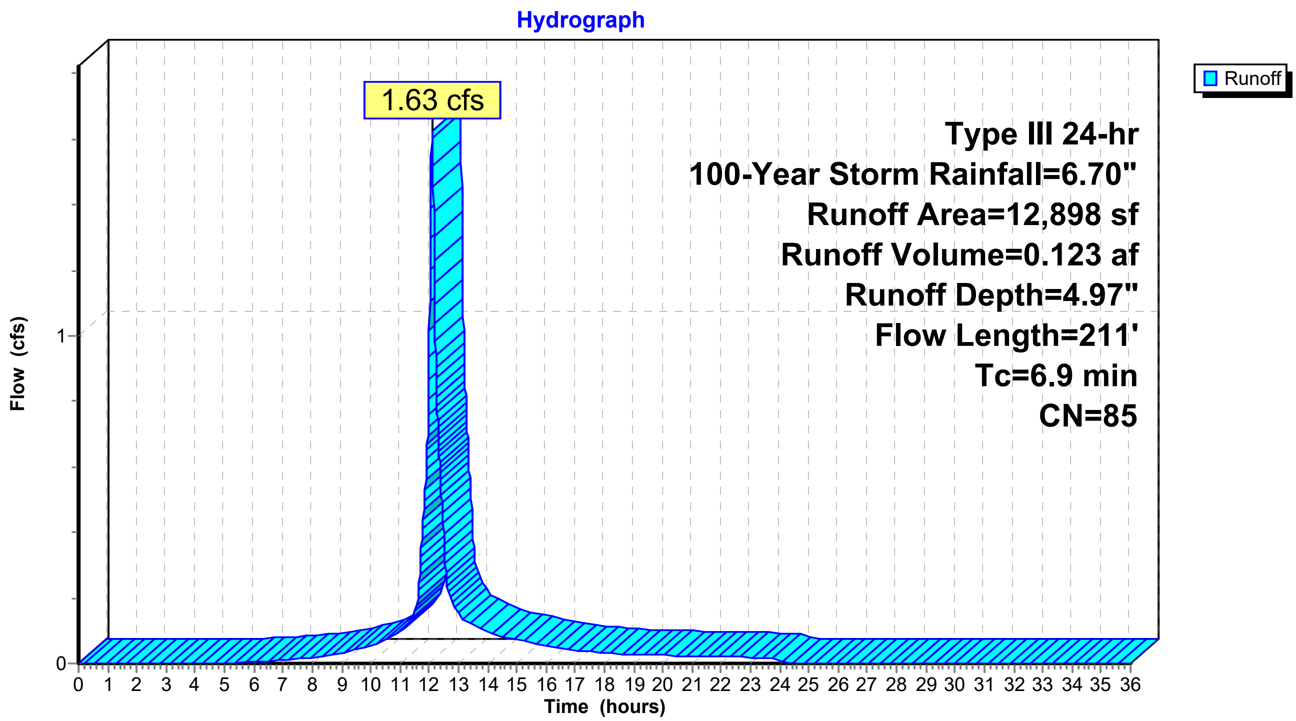
Runoff = 1.63 cfs @ 12.10 hrs, Volume= 0.123 af, Depth= 4.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
3,379	98	Paved parking, HSG A
5,537	98	Paved parking, HSG B
692	39	>75% Grass cover, Good, HSG A
3,290	61	>75% Grass cover, Good, HSG B
12,898	85	Weighted Average
3,982		30.87% Pervious Area
8,916		69.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	66	0.0700	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	145	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.9	211	Total			

Subcatchment 33P: P3a



Summary for Pond 34P: CB10

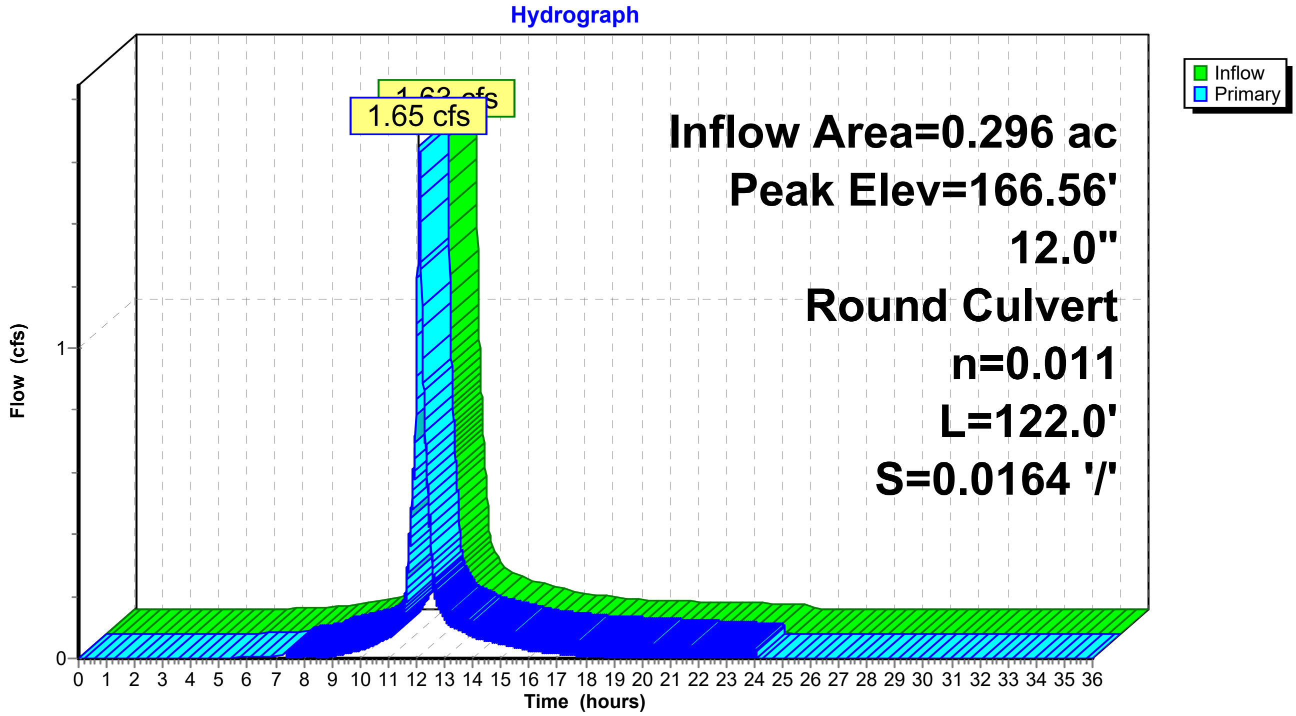
Inflow Area =	0.296 ac,	69.13% Impervious,	Inflow Depth = 4.97"	for 100-Year Storm event	
Inflow =	1.63 cfs @	12.10 hrs,	Volume=	0.123 af	
Outflow =	1.65 cfs @	12.09 hrs,	Volume=	0.123 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.65 cfs @	12.09 hrs,	Volume=	0.123 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.56' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.00'	**12.0" Round Culvert** L= 122.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.00' / 161.00' S= 0.0164 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.60 cfs @ 12.09 hrs HW=166.55' TW=166.28' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.60 cfs @ 2.04 fps)

Pond 34P: CB10



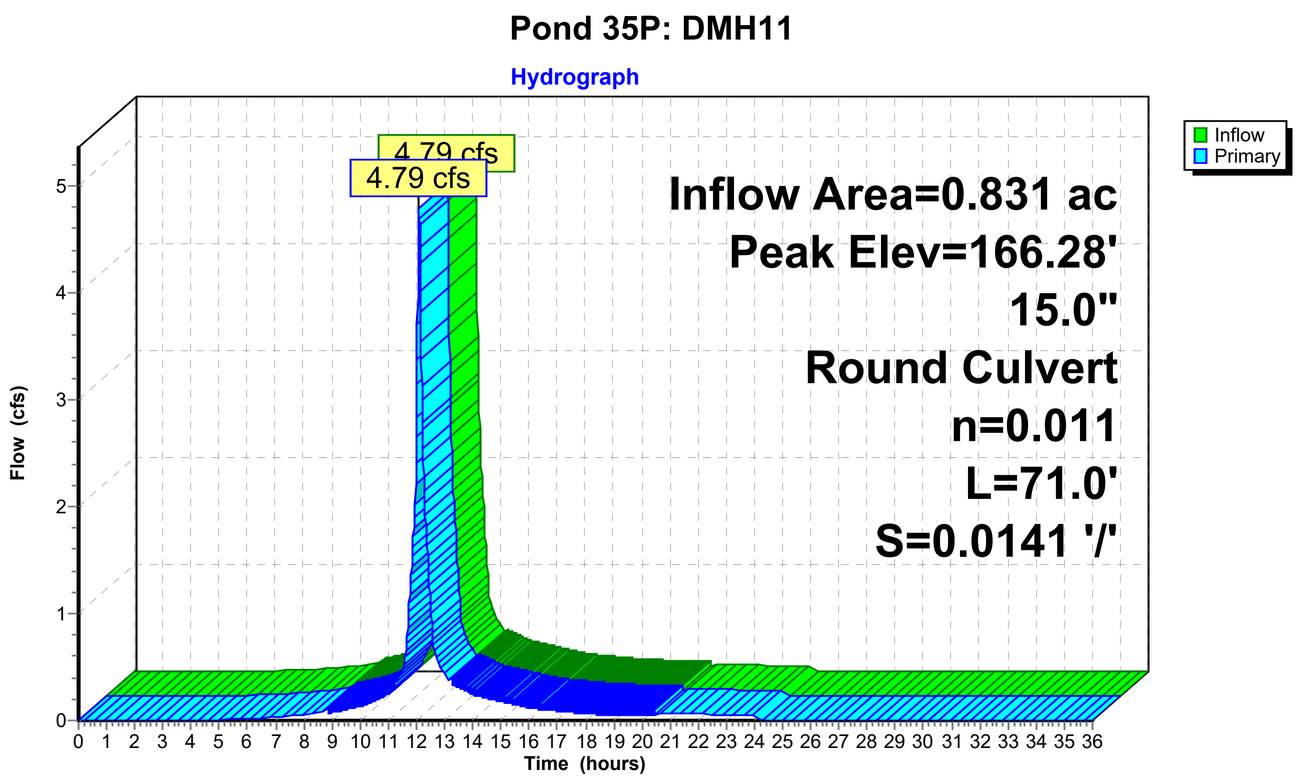
Summary for Pond 35P: DMH11

Inflow Area =	0.831 ac,	72.11% Impervious,	Inflow Depth = 5.11"	for 100-Year Storm event	
Inflow =	4.79 cfs @	12.09 hrs,	Volume=	0.354 af	
Outflow =	4.79 cfs @	12.09 hrs,	Volume=	0.354 af,	Atten= 0%, Lag= 0.0 min
Primary =	4.79 cfs @	12.09 hrs,	Volume=	0.354 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.28' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**15.0" Round Culvert** L= 71.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 164.00' S= 0.0141 '/' Cc= 0.900 n= 0.011, Flow Area= 1.23 sf

Primary OutFlow Max=4.78 cfs @ 12.09 hrs HW=166.28' TW=165.22' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.78 cfs @ 3.90 fps)



Summary for Subcatchment 36P: P3b

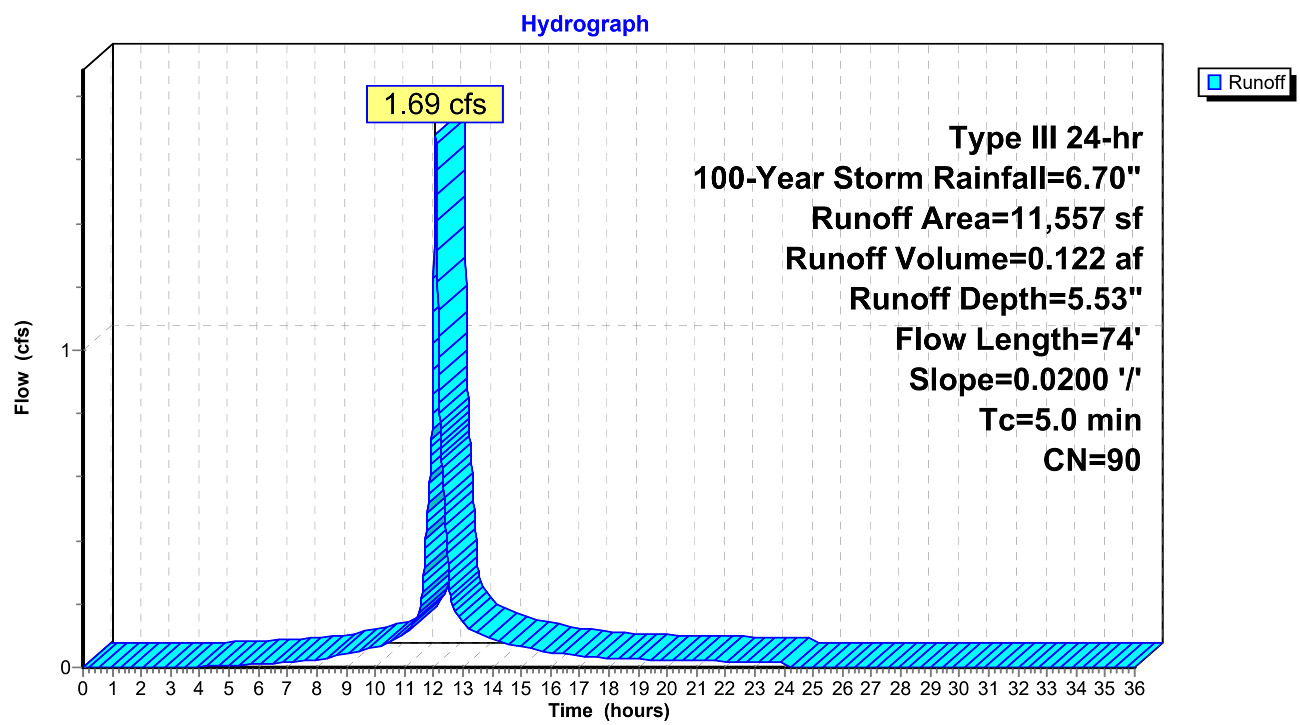
Runoff = 1.69 cfs @ 12.07 hrs, Volume= 0.122 af, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
10,048	98	Paved parking, HSG A
1,509	39	>75% Grass cover, Good, HSG A
11,557	90	Weighted Average
1,509		13.06% Pervious Area
10,048		86.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	14	0.0200	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.8	60	0.0200	1.24		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.8	74	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 36P: P3b



Summary for Pond 37P: CB11

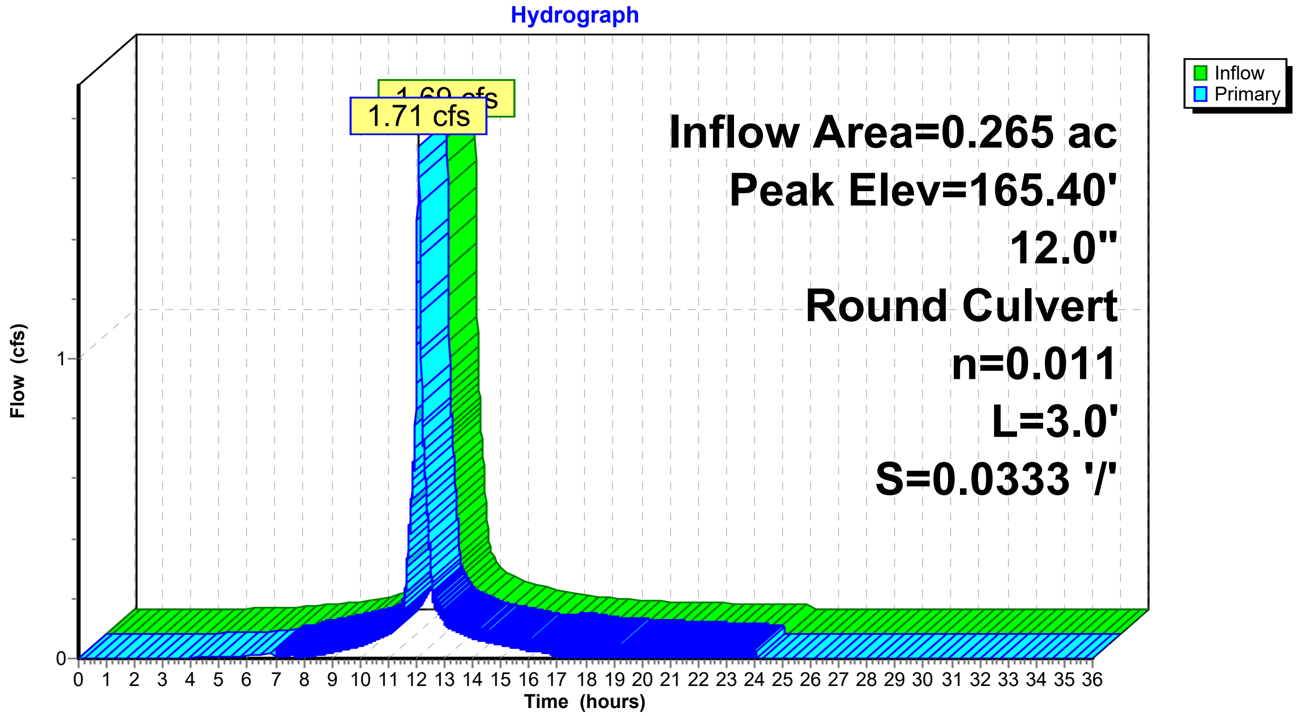
Inflow Area =	0.265 ac, 86.94% Impervious,	Inflow Depth = 5.53"	for 100-Year Storm event	
Inflow =	1.69 cfs @	12.07 hrs, Volume=	0.122 af	
Outflow =	1.71 cfs @	12.07 hrs, Volume=	0.122 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.71 cfs @	12.07 hrs, Volume=	0.122 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.40' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	161.10'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.10' / 161.00' S= 0.0333 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.52 cfs @ 12.07 hrs HW=165.37' TW=165.21' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.52 cfs @ 1.93 fps)

Pond 37P: CB11



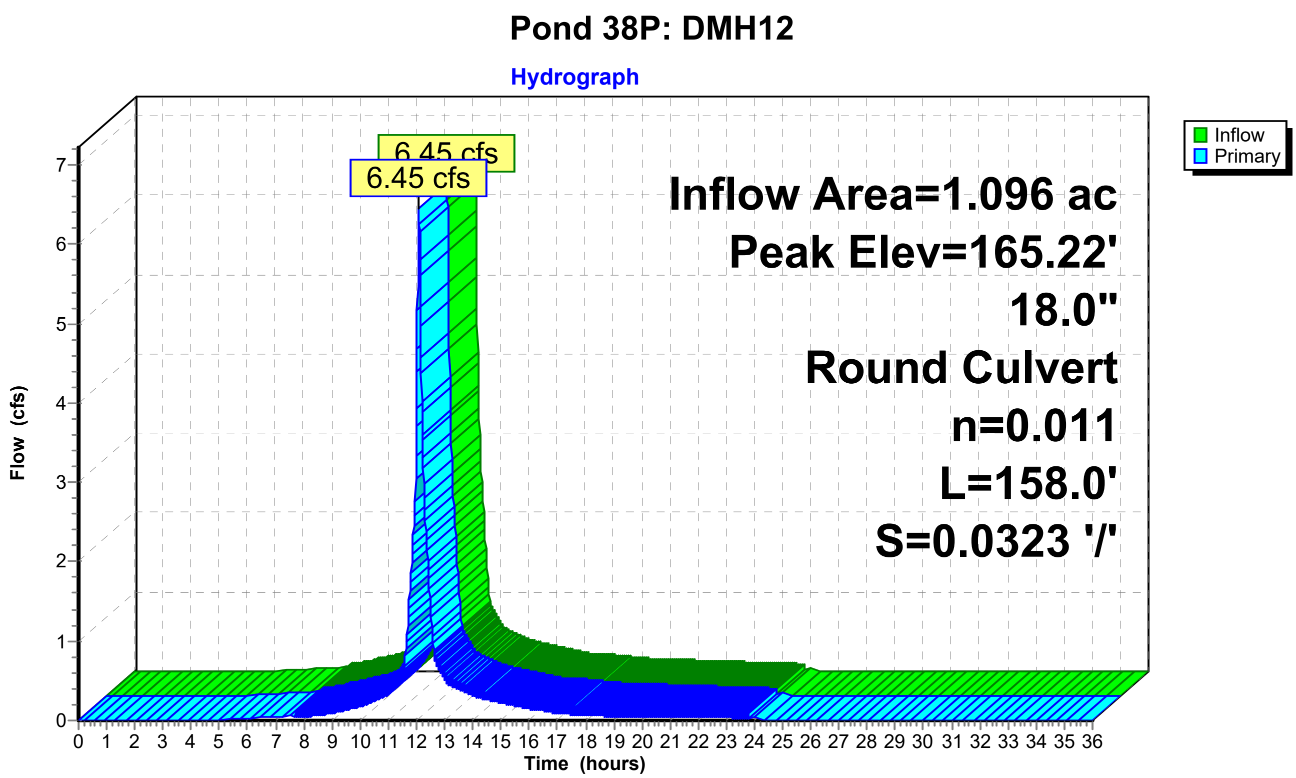
Summary for Pond 38P: DMH12

Inflow Area =	1.096 ac,	75.70% Impervious,	Inflow Depth = 5.21"	for 100-Year Storm event	
Inflow =	6.45 cfs @	12.09 hrs,	Volume=	0.476 af	
Outflow =	6.45 cfs @	12.09 hrs,	Volume=	0.476 af,	Atten= 0%, Lag= 0.0 min
Primary =	6.45 cfs @	12.09 hrs,	Volume=	0.476 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 165.22' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.90'	**18.0" Round Culvert** L= 158.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.90' / 158.80' S= 0.0323 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=6.43 cfs @ 12.09 hrs HW=165.22' TW=161.15' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 6.43 cfs @ 3.91 fps)



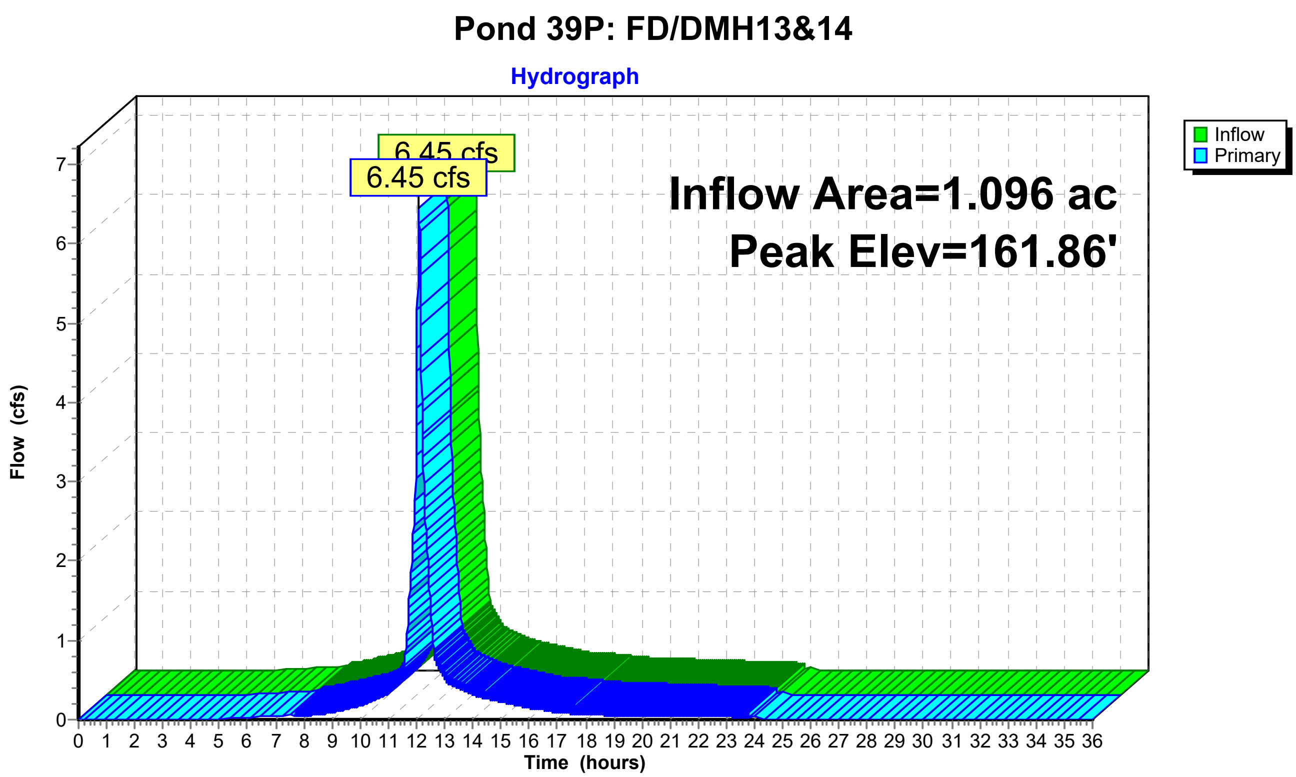
Summary for Pond 39P: FD/DMH13&14

Inflow Area =	1.096 ac,	75.70% Impervious,	Inflow Depth =	5.21"	for 100-Year Storm event
Inflow =	6.45 cfs @	12.09 hrs,	Volume=	0.476 af	
Outflow =	6.45 cfs @	12.09 hrs,	Volume=	0.476 af,	Atten= 0%, Lag= 0.0 min
Primary =	6.45 cfs @	12.09 hrs,	Volume=	0.476 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.86' @ 12.29 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Primary	158.60'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=5.97 cfs @ 12.09 hrs HW=161.15' TW=160.53' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.99 cfs @ 3.80 fps)
2=Culvert (Inlet Controls 2.99 cfs @ 3.80 fps)



Summary for Subcatchment 40P: P3c

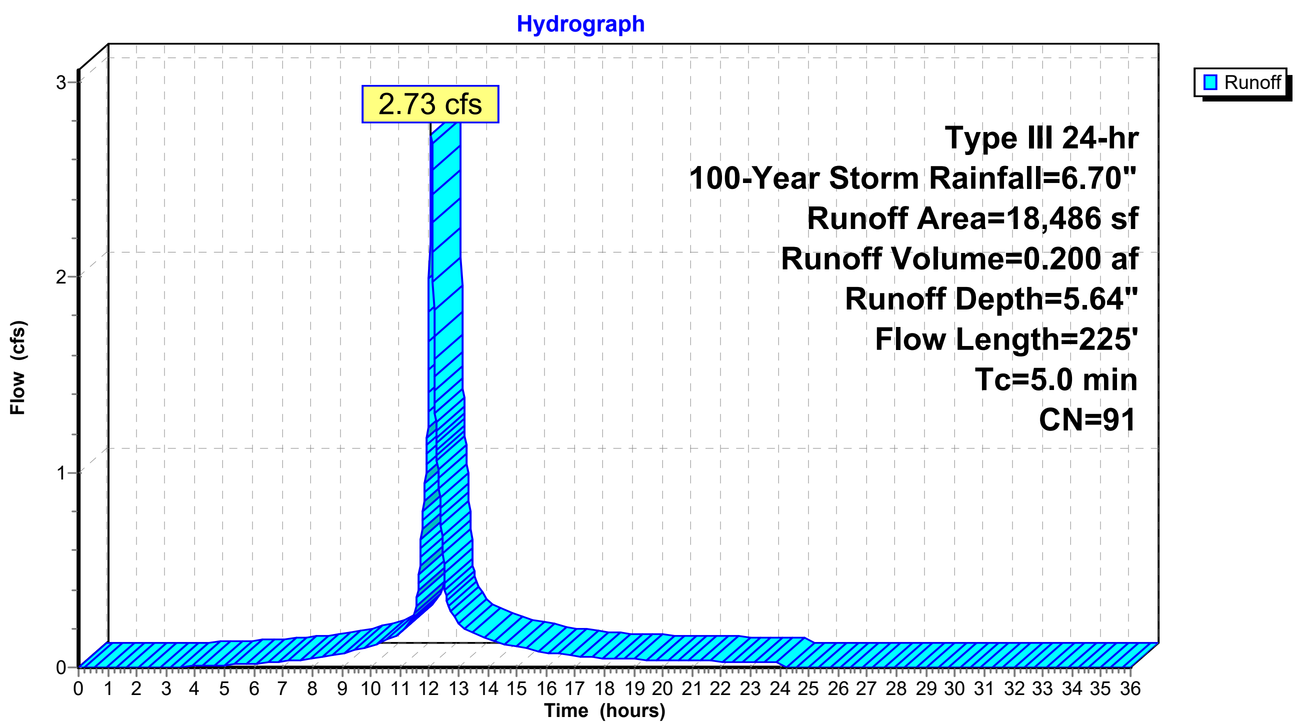
Runoff = 2.73 cfs @ 12.07 hrs, Volume= 0.200 af, Depth= 5.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
16,176	98	Paved parking, HSG A
2,310	39	>75% Grass cover, Good, HSG A
18,486	91	Weighted Average
2,310		12.50% Pervious Area
16,176		87.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0300	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.7	210	0.0400	2.11		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
4.4	225	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 40P: P3c



Summary for Pond 41P: FD/CB12

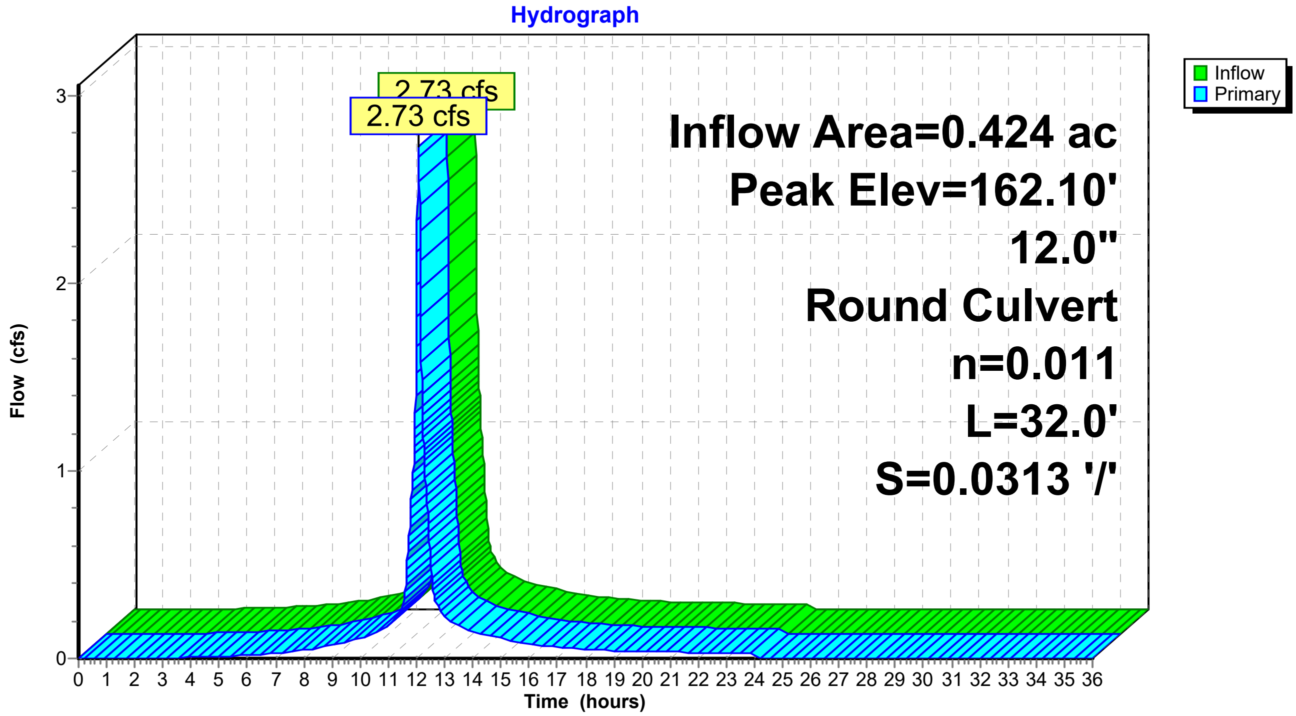
Inflow Area =	0.424 ac, 87.50% Impervious,	Inflow Depth = 5.64"	for 100-Year Storm event	
Inflow =	2.73 cfs @	12.07 hrs, Volume=	0.200 af	
Outflow =	2.73 cfs @	12.07 hrs, Volume=	0.200 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.73 cfs @	12.07 hrs, Volume=	0.200 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 162.10' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.80'	**12.0" Round Culvert** L= 32.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.80' / 158.80' S= 0.0313 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=2.42 cfs @ 12.07 hrs HW=161.95' TW=161.54' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.42 cfs @ 3.08 fps)

Pond 41P: FD/CB12



Summary for Subcatchment 42P: P3d

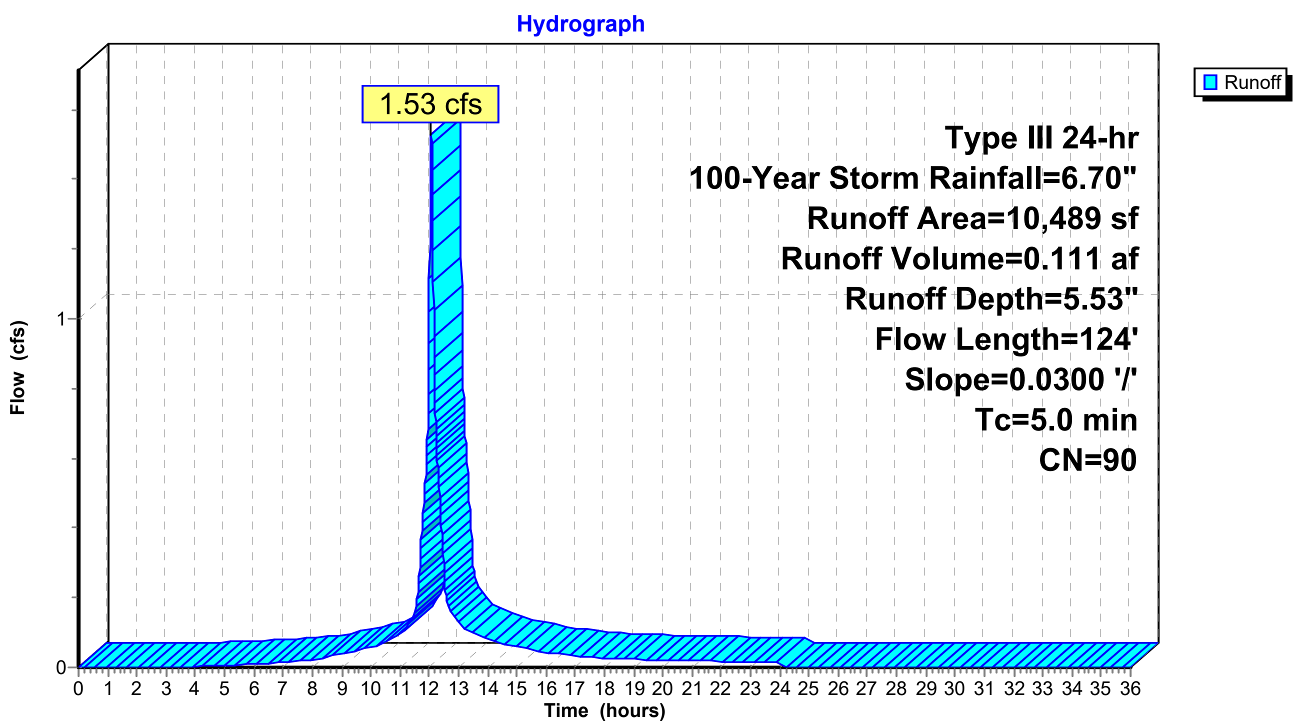
Runoff = 1.53 cfs @ 12.07 hrs, Volume= 0.111 af, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
9,019	98	Paved parking, HSG A
1,470	39	>75% Grass cover, Good, HSG A
10,489	90	Weighted Average
1,470		14.01% Pervious Area
9,019		85.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	14	0.0300	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	110	0.0300	1.65		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.6	124	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 42P: P3d



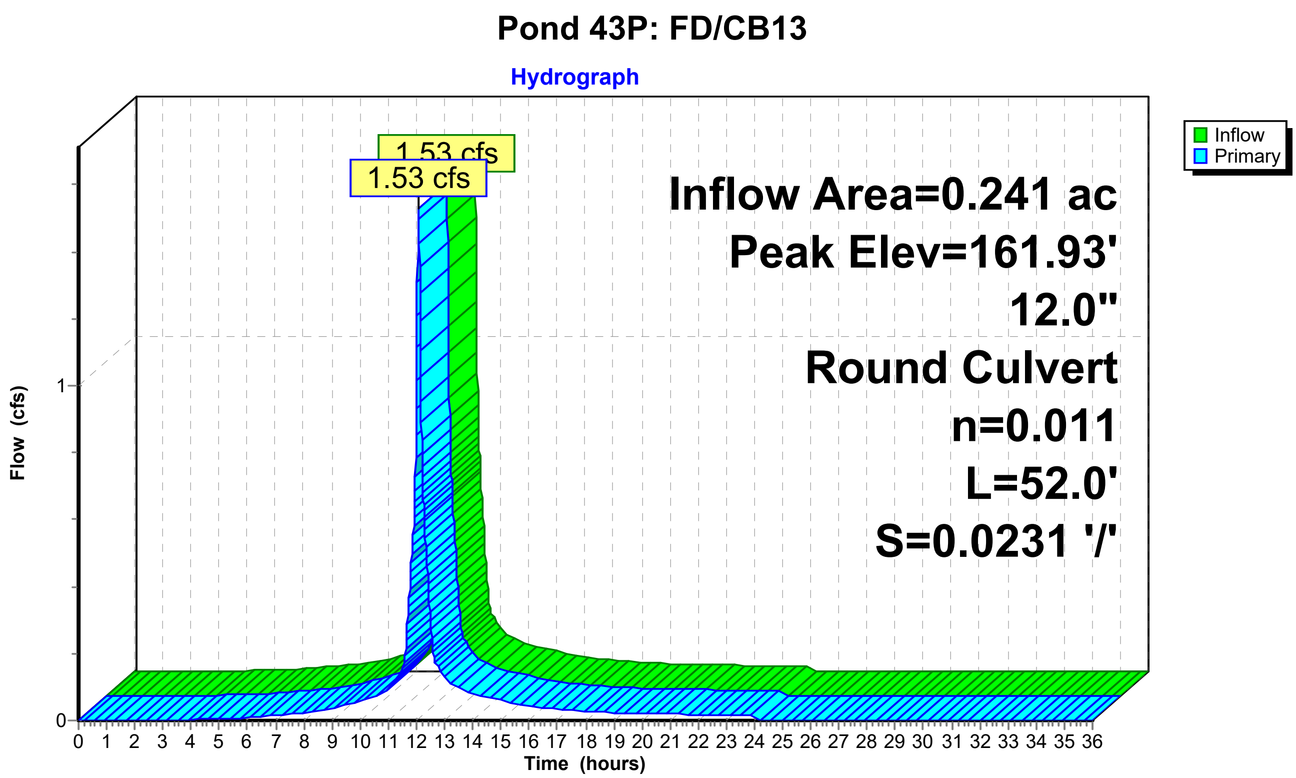
Summary for Pond 43P: FD/CB13

Inflow Area =	0.241 ac,	85.99% Impervious,	Inflow Depth =	5.53"	for 100-Year Storm event
Inflow =	1.53 cfs @	12.07 hrs,	Volume=	0.111 af	
Outflow =	1.53 cfs @	12.07 hrs,	Volume=	0.111 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.53 cfs @	12.07 hrs,	Volume=	0.111 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.93' @ 12.29 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	160.00'	**12.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.00' / 158.80' S= 0.0231 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.87 cfs @ 12.07 hrs HW=161.59' TW=161.54' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.87 cfs @ 1.11 fps)



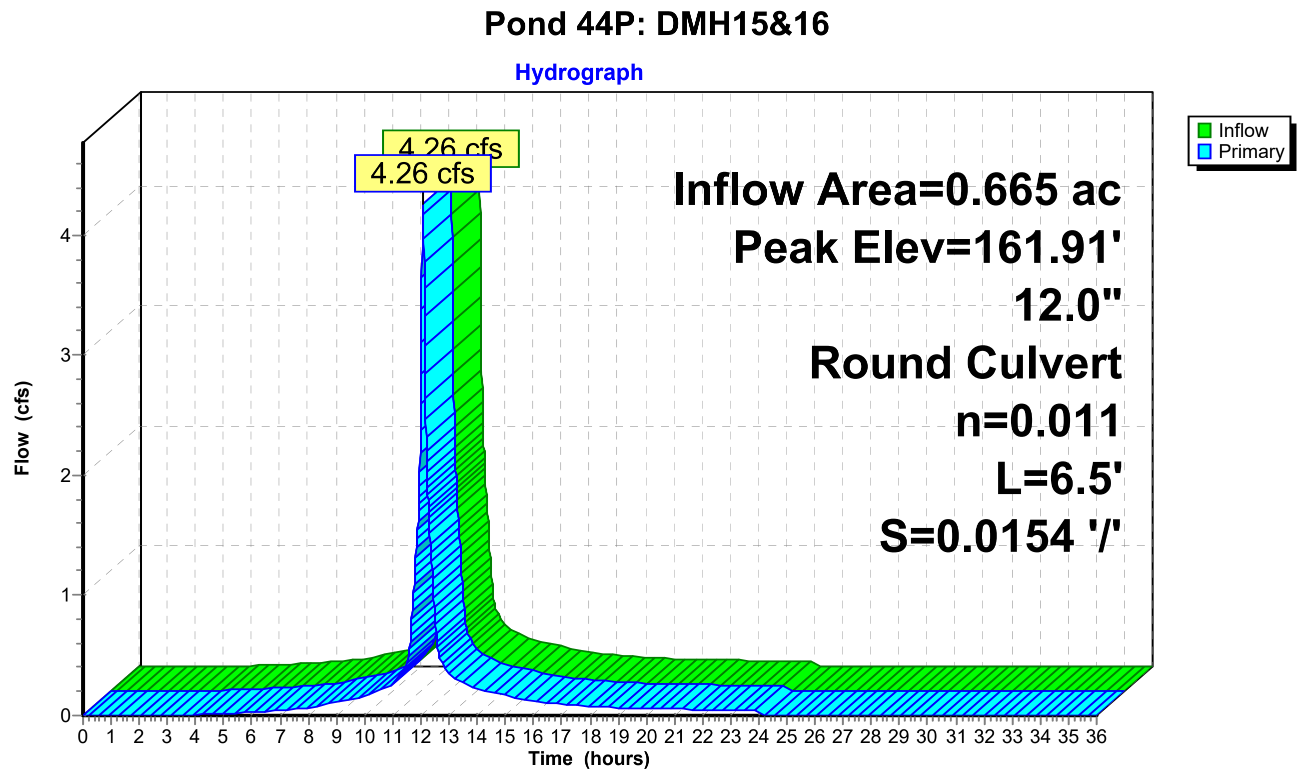
Summary for Pond 44P: DMH15&16

Inflow Area =	0.665 ac,	86.95% Impervious,	Inflow Depth =	5.60"	for 100-Year Storm event
Inflow =	4.26 cfs @	12.07 hrs,	Volume=	0.311 af	
Outflow =	4.26 cfs @	12.07 hrs,	Volume=	0.311 af,	Atten= 0%, Lag= 0.0 min
Primary =	4.26 cfs @	12.07 hrs,	Volume=	0.311 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.91' @ 12.29 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 6.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0154 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=4.10 cfs @ 12.07 hrs HW=161.54' TW=160.36' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 4.10 cfs @ 5.22 fps)



Summary for Subcatchment 45P: P3e

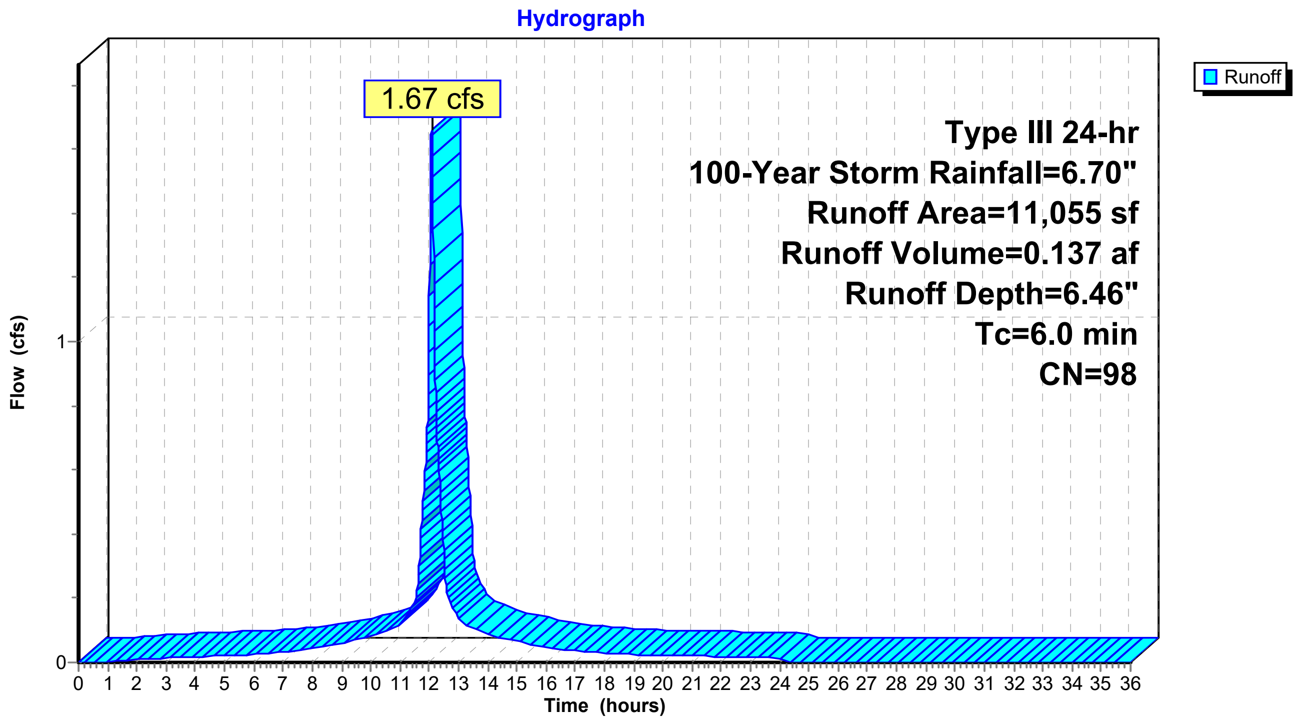
Runoff = 1.67 cfs @ 12.08 hrs, Volume= 0.137 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
11,055	98	Roofs, HSG A
11,055		100.00% Impervious Area

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

Subcatchment 45P: P3e



Summary for Pond 46P: Roof Drain

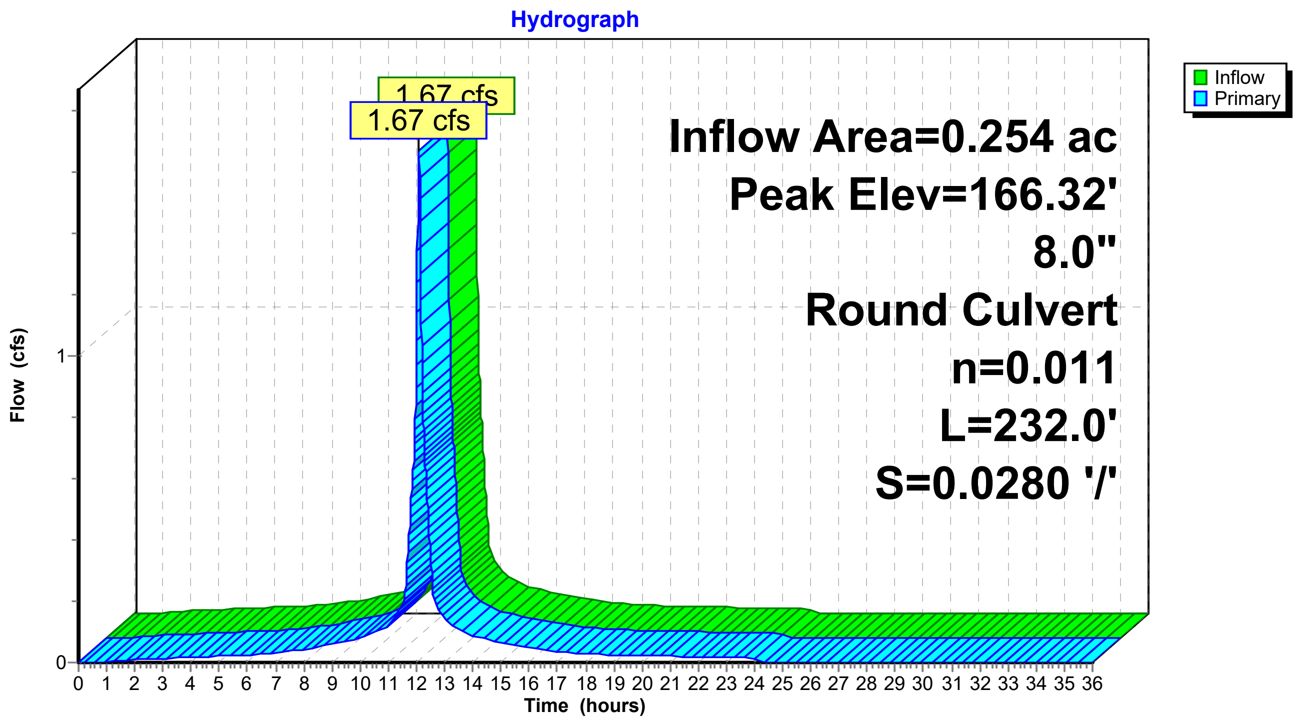
Inflow Area =	0.254 ac,100.00% Impervious,	Inflow Depth = 6.46"	for 100-Year Storm event		
Inflow =	1.67 cfs @	12.08 hrs,	Volume=	0.137 af	
Outflow =	1.67 cfs @	12.08 hrs,	Volume=	0.137 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.67 cfs @	12.08 hrs,	Volume=	0.137 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 166.32' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**8.0" Round Culvert** L= 232.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.00' / 158.50' S= 0.0280 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=1.67 cfs @ 12.08 hrs HW=166.31' TW=160.48' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.67 cfs @ 4.77 fps)

Pond 46P: Roof Drain



Summary for Pond 47P: Infiltration Field #2

Inflow Area = 2.015 ac, 82.47% Impervious, Inflow Depth = 5.50" for 100-Year Storm event
Inflow = 12.31 cfs @ 12.07 hrs, Volume= 0.923 af
Outflow = 4.60 cfs @ 12.32 hrs, Volume= 0.923 af, Atten= 63%, Lag= 14.7 min
Discarded = 0.33 cfs @ 9.68 hrs, Volume= 0.502 af
Primary = 4.27 cfs @ 12.32 hrs, Volume= 0.421 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 161.74' @ 12.32 hrs Surf.Area= 6,004 sf Storage= 13,715 cf

Plug-Flow detention time= 108.9 min calculated for 0.923 af (100% of inflow)
Center-of-Mass det. time= 108.9 min (887.9 - 779.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	158.00'	6,551 cf	**144.67'W x 41.50'L x 4.04'H Field A** 24,265 cf Overall - 7,887 cf Embedded = 16,378 cf x 40.0% Voids
#2A	158.50'	7,887 cf	**Cultec R-330XLHD** x 145 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 29 rows
		14,438 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	159.30'	**8.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.30' / 157.00' S= 0.0548 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#3	Primary	161.00'	**12.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 157.00' S= 0.0952 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Discarded OutFlow Max=0.33 cfs @ 9.68 hrs HW=158.04' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Primary OutFlow Max=4.27 cfs @ 12.32 hrs HW=161.74' TW=0.00' (Dynamic Tailwater)
├─**2=Culvert** (Inlet Controls 2.44 cfs @ 6.99 fps)
└─**3=Culvert** (Inlet Controls 1.83 cfs @ 2.93 fps)

Pond 47P: Infiltration Field #2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 29 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

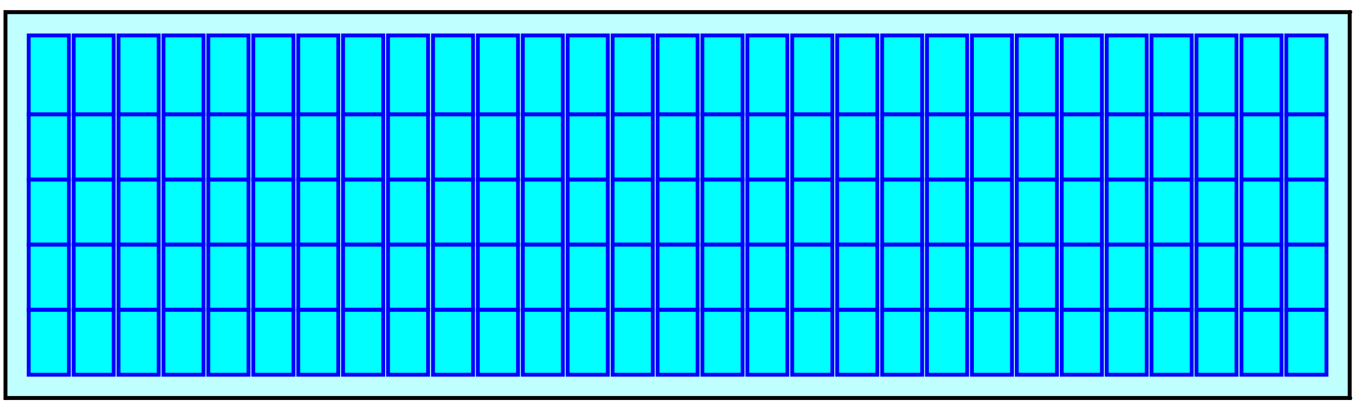
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +30.0" End Stone x 2 = 41.50' Base Length
29 Rows x 52.0" Wide + 6.0" Spacing x 28 + 30.0" Side Stone x 2 = 144.67' Base Width
6.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.04' Field Height

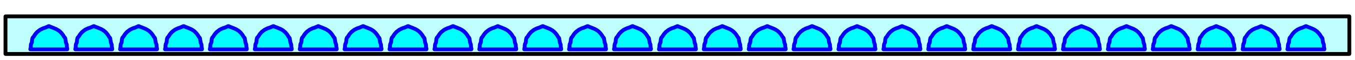
145 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 29 Rows = 7,886.9 cf Chamber Storage

24,264.8 cf Field - 7,886.9 cf Chambers = 16,377.9 cf Stone x 40.0% Voids = 6,551.2 cf Stone Storage

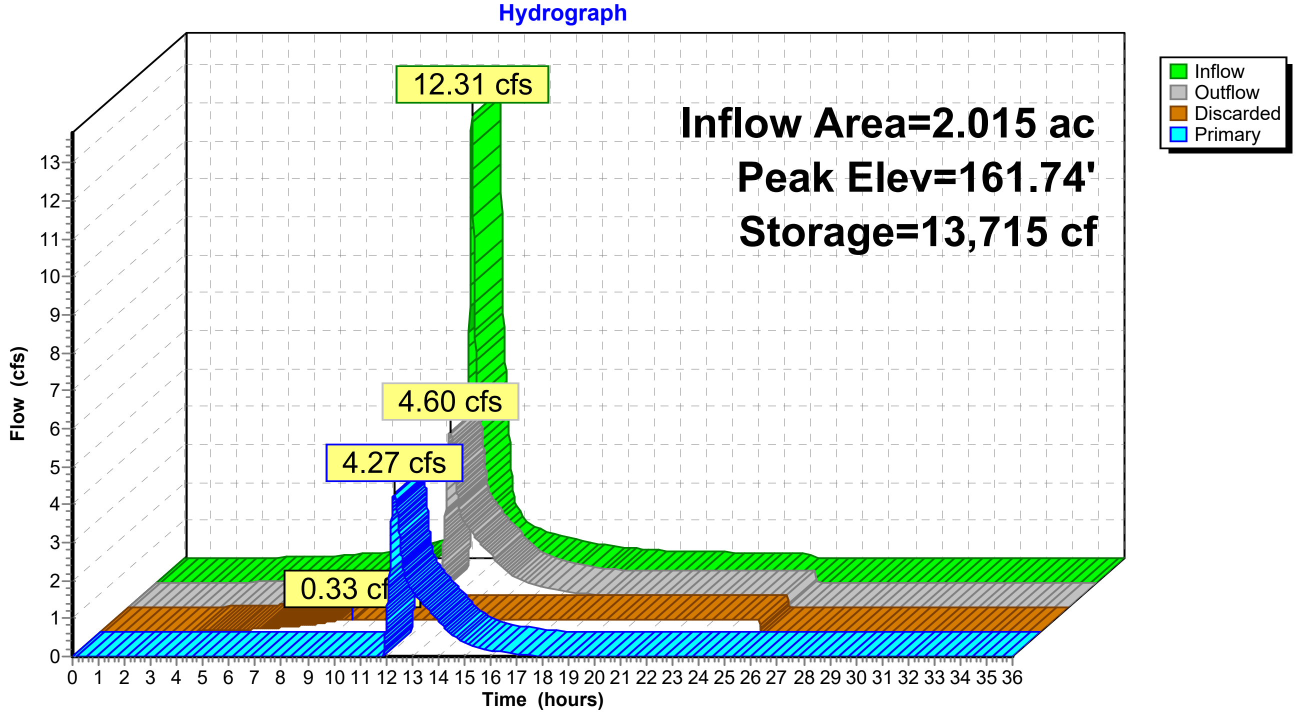
Chamber Storage + Stone Storage = 14,438.1 cf = 0.331 af
Overall Storage Efficiency = 59.5%
Overall System Size = 41.50' x 144.67' x 4.04'

145 Chambers
898.7 cy Field
606.6 cy Stone





Pond 47P: Infiltration Field #2



Summary for Subcatchment 48P: P4

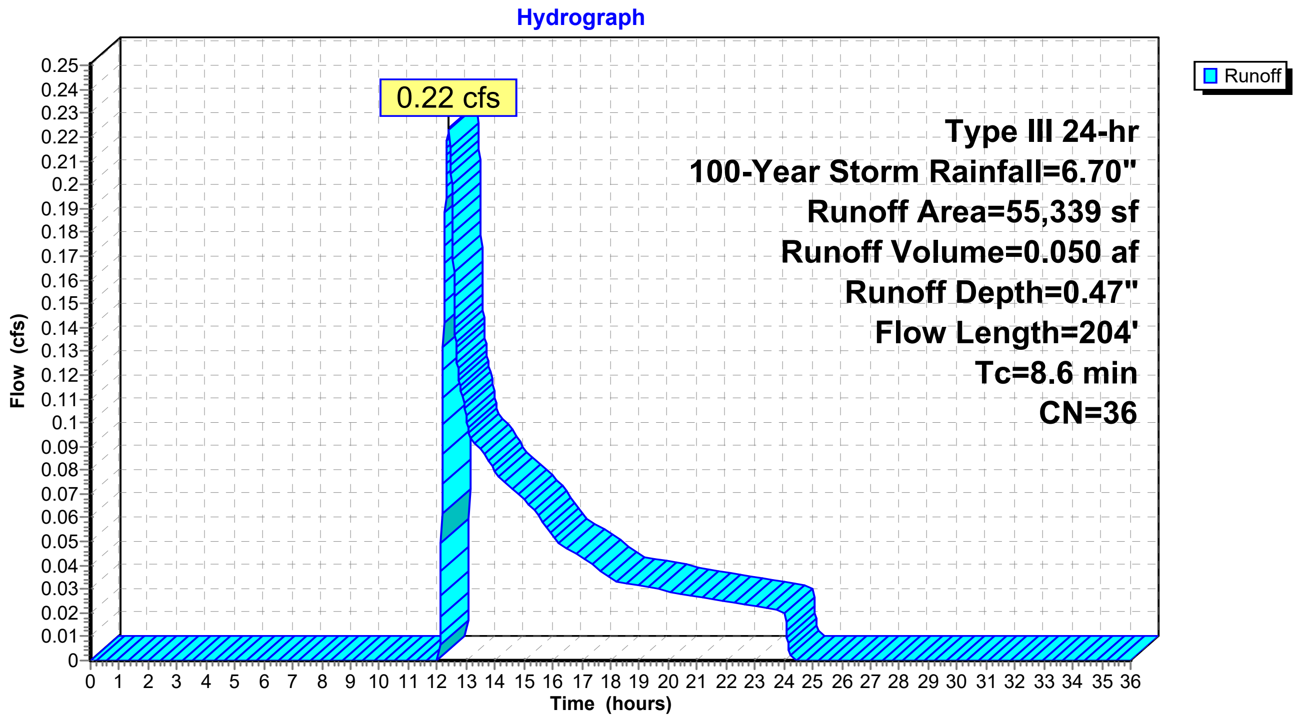
Runoff = 0.22 cfs @ 12.39 hrs, Volume= 0.050 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

	Area (sf)	CN	Description
*	793	98	Paved parking, HSG A
	658	98	Paved parking, HSG B
	18,959	39	>75% Grass cover, Good, HSG A
	898	61	>75% Grass cover, Good, HSG B
	32,976	30	Woods, Good, HSG A
	1,055	55	Woods, Good, HSG B
	55,339	36	Weighted Average
	53,888		97.38% Pervious Area
	1,451		2.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	36	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
2.2	8	0.0400	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	160	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.6	204	Total			

Subcatchment 48P: P4

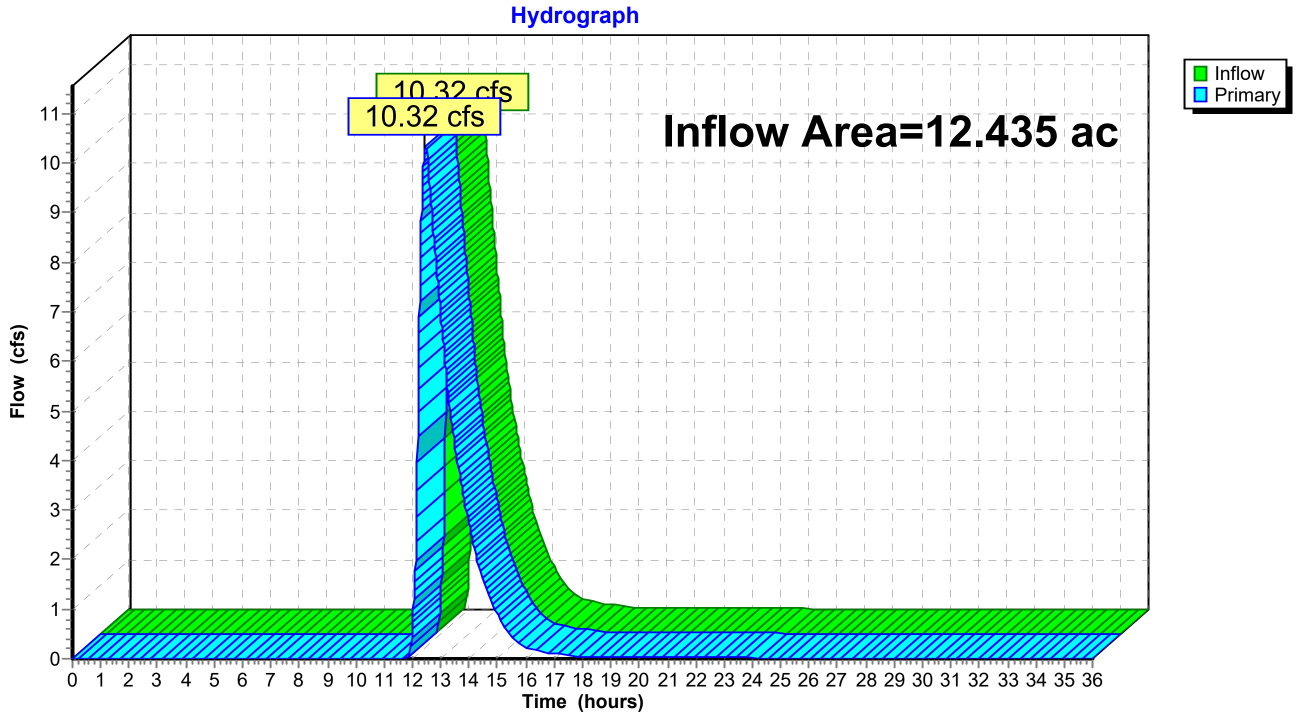


Summary for Link 49P: Design Point #1: Wetlands

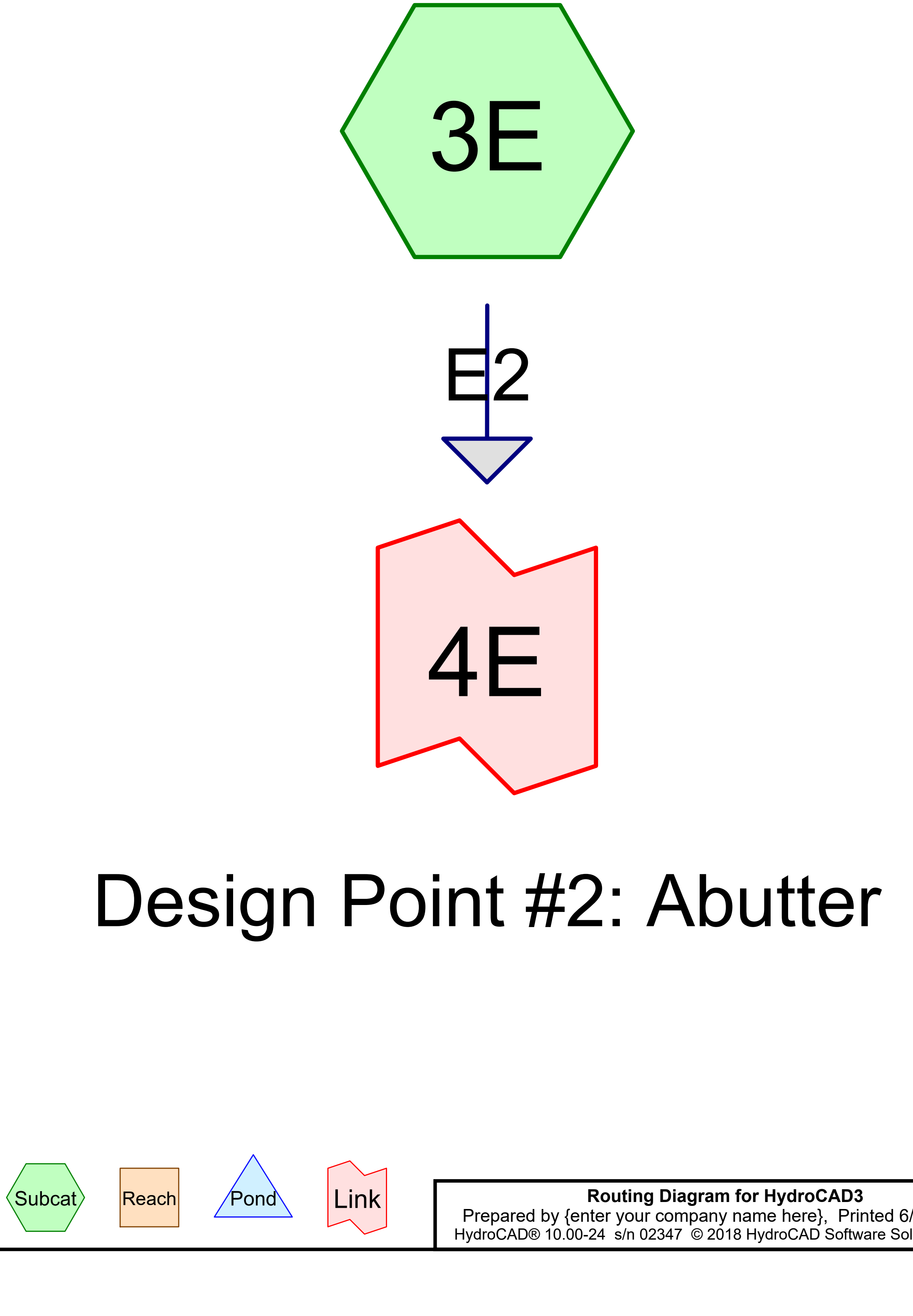
Inflow Area = 12.435 ac, 41.42% Impervious, Inflow Depth = 1.15" for 100-Year Storm event
Inflow = 10.32 cfs @ 12.46 hrs, Volume= 1.193 af
Primary = 10.32 cfs @ 12.46 hrs, Volume= 1.193 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 49P: Design Point #1: Wetlands



DESIGN POINT #2: FLOW TO 43 MAIN ST. EXISTING CONDITIONS



Routing Diagram for HydroCAD3
Prepared by {enter your company name here}, Printed 6/14/2019

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.153	61	>75% Grass cover, Good, HSG B (3E)
0.027	98	Paved parking, HSG B (3E)
0.383	30	Woods, Good, HSG A (3E)
0.715	55	Woods, Good, HSG B (3E)
1.277	**49**	**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3E: E2 Runoff Area=55,645 sf 2.15% Impervious Runoff Depth=0.11"
Flow Length=515' Tc=12.5 min CN=49 Runoff=0.02 cfs 0.012 af

Link 4E: Design Point #2: Abutter Inflow=0.02 cfs 0.012 af
Primary=0.02 cfs 0.012 af

Total Runoff Area = 1.277 ac Runoff Volume = 0.012 af Average Runoff Depth = 0.11"
97.85% Pervious = 1.250 ac 2.15% Impervious = 0.027 ac

Summary for Subcatchment 3E: E2

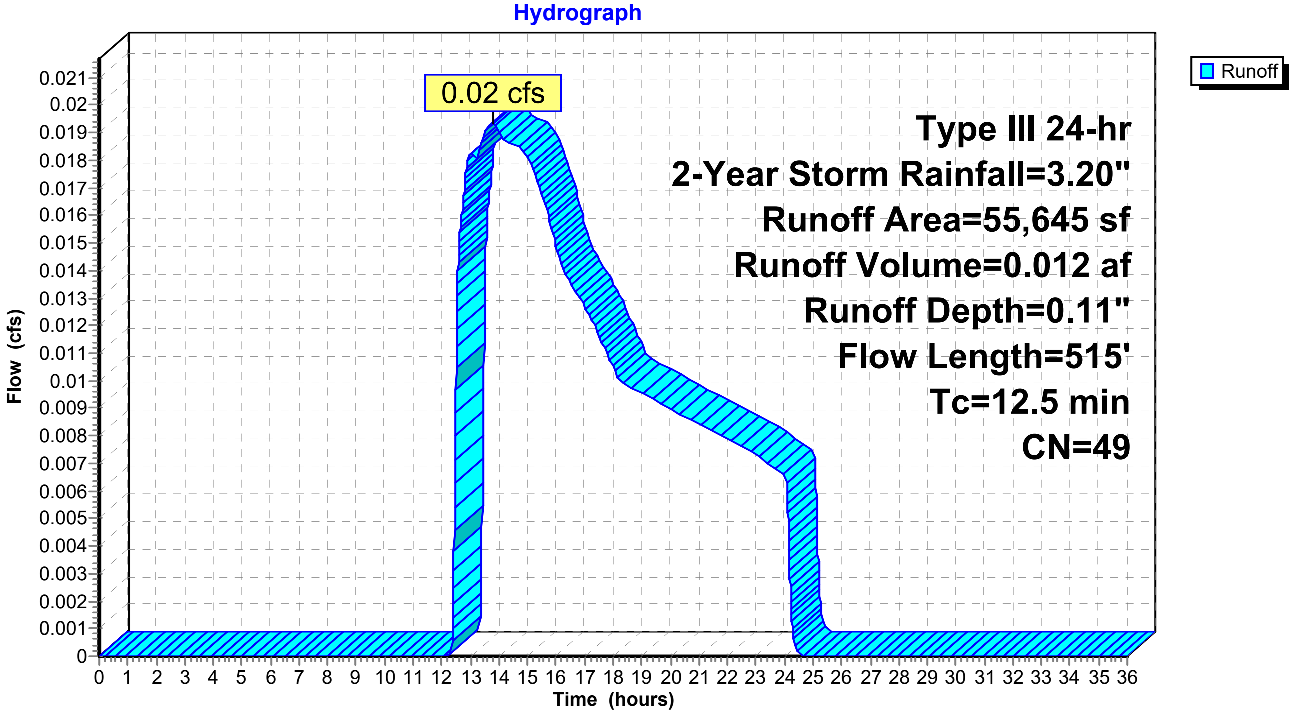
Runoff = 0.02 cfs @ 13.79 hrs, Volume= 0.012 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
1,194	98	Paved parking, HSG B
16,665	30	Woods, Good, HSG A
31,132	55	Woods, Good, HSG B
6,654	61	>75% Grass cover, Good, HSG B
55,645	49	Weighted Average
54,451		97.85% Pervious Area
1,194		2.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	28	0.0500	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	108	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	12	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	95	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	47	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	225	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.5	515	Total			

Subcatchment 3E: E2

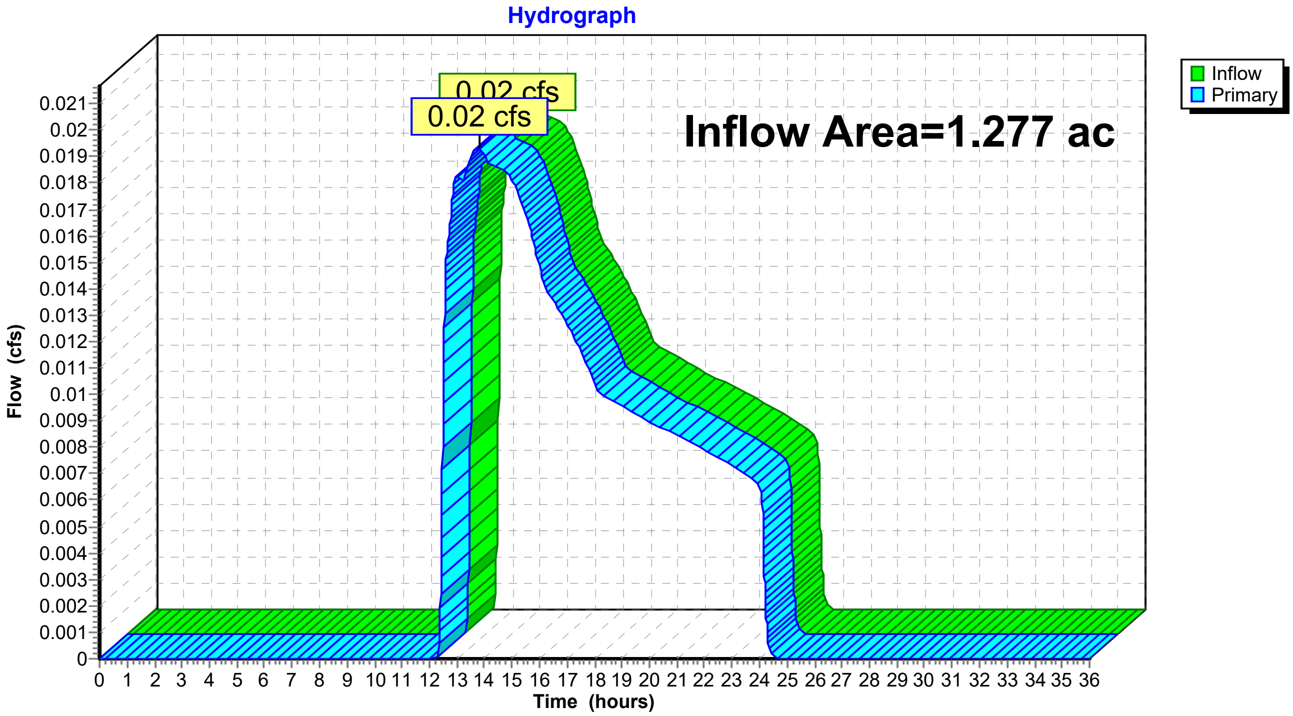


Summary for Link 4E: Design Point #2: Abutter

Inflow Area =	1.277 ac,	2.15% Impervious, Inflow Depth = 0.11"	for 2-Year Storm event	
Inflow =	0.02 cfs @	13.79 hrs, Volume=	0.012 af	
Primary =	0.02 cfs @	13.79 hrs, Volume=	0.012 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 4E: Design Point #2: Abutter



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3E: E2 Runoff Area=55,645 sf 2.15% Impervious Runoff Depth=0.53"
Flow Length=515' Tc=12.5 min CN=49 Runoff=0.33 cfs 0.056 af

Link 4E: Design Point #2: Abutter Inflow=0.33 cfs 0.056 af
Primary=0.33 cfs 0.056 af

Total Runoff Area = 1.277 ac Runoff Volume = 0.056 af Average Runoff Depth = 0.53"
97.85% Pervious = 1.250 ac 2.15% Impervious = 0.027 ac

Summary for Subcatchment 3E: E2

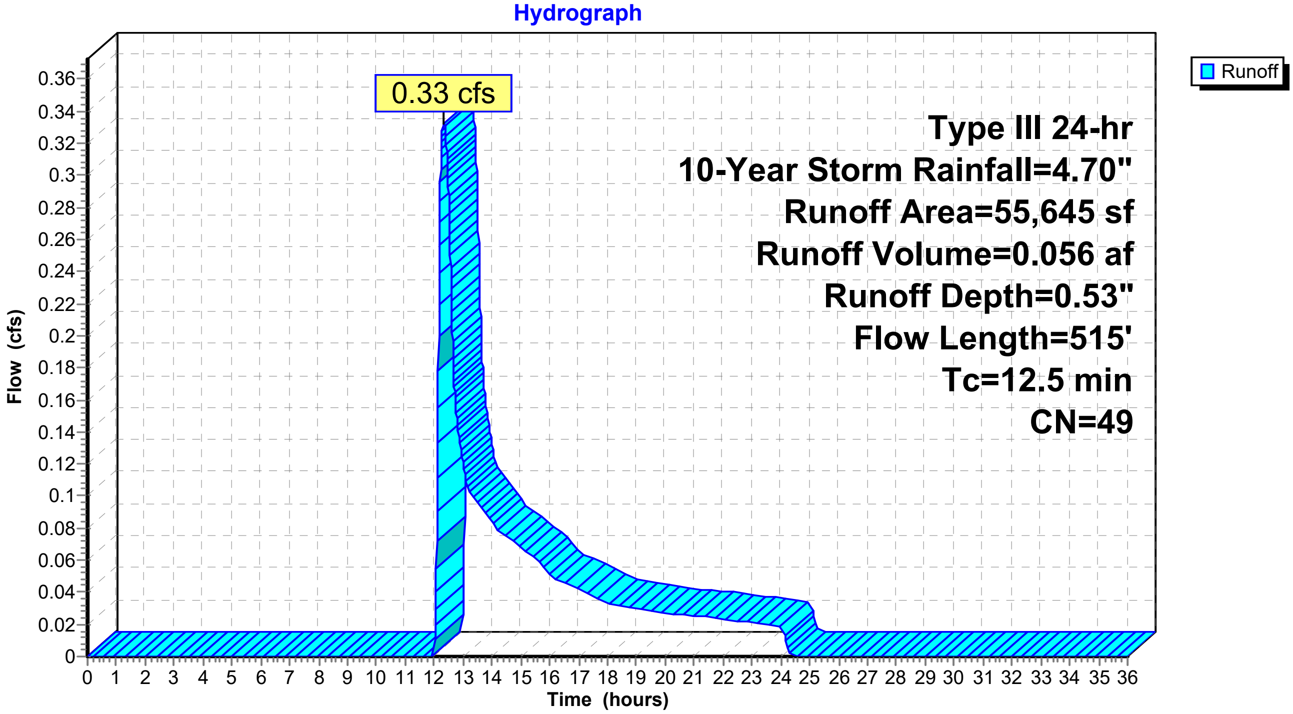
Runoff = 0.33 cfs @ 12.34 hrs, Volume= 0.056 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
1,194	98	Paved parking, HSG B
16,665	30	Woods, Good, HSG A
31,132	55	Woods, Good, HSG B
6,654	61	>75% Grass cover, Good, HSG B
55,645	49	Weighted Average
54,451		97.85% Pervious Area
1,194		2.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	28	0.0500	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	108	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	12	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	95	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	47	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	225	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.5	515	Total			

Subcatchment 3E: E2

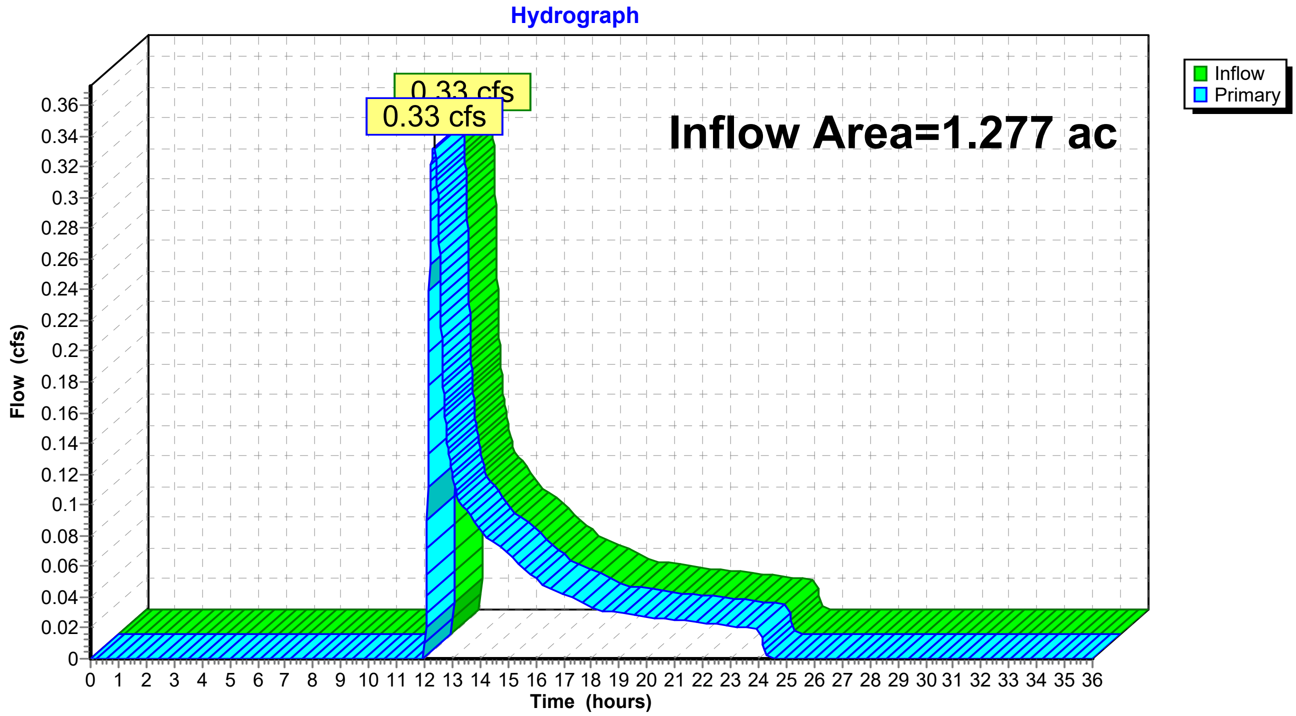


Summary for Link 4E: Design Point #2: Abutter

Inflow Area =	1.277 ac,	2.15% Impervious,	Inflow Depth = 0.53"	for 10-Year Storm event
Inflow =	0.33 cfs @	12.34 hrs,	Volume=	0.056 af
Primary =	0.33 cfs @	12.34 hrs,	Volume=	0.056 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 4E: Design Point #2: Abutter



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3E: E2 Runoff Area=55,645 sf 2.15% Impervious Runoff Depth=0.85"
Flow Length=515' Tc=12.5 min CN=49 Runoff=0.69 cfs 0.090 af

Link 4E: Design Point #2: Abutter Inflow=0.69 cfs 0.090 af
Primary=0.69 cfs 0.090 af

Total Runoff Area = 1.277 ac Runoff Volume = 0.090 af Average Runoff Depth = 0.85"
97.85% Pervious = 1.250 ac 2.15% Impervious = 0.027 ac

Summary for Subcatchment 3E: E2

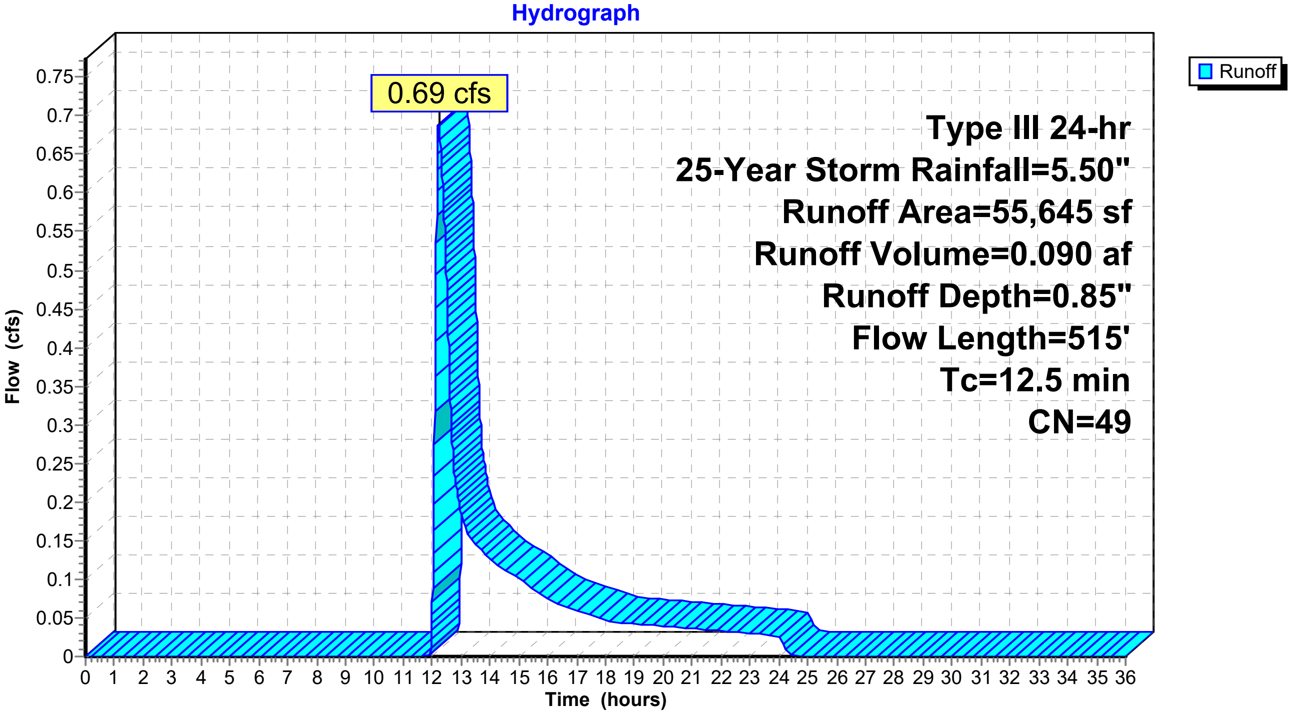
Runoff = 0.69 cfs @ 12.23 hrs, Volume= 0.090 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
1,194	98	Paved parking, HSG B
16,665	30	Woods, Good, HSG A
31,132	55	Woods, Good, HSG B
6,654	61	>75% Grass cover, Good, HSG B
55,645	49	Weighted Average
54,451		97.85% Pervious Area
1,194		2.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	28	0.0500	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	108	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	12	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	95	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	47	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	225	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.5	515	Total			

Subcatchment 3E: E2

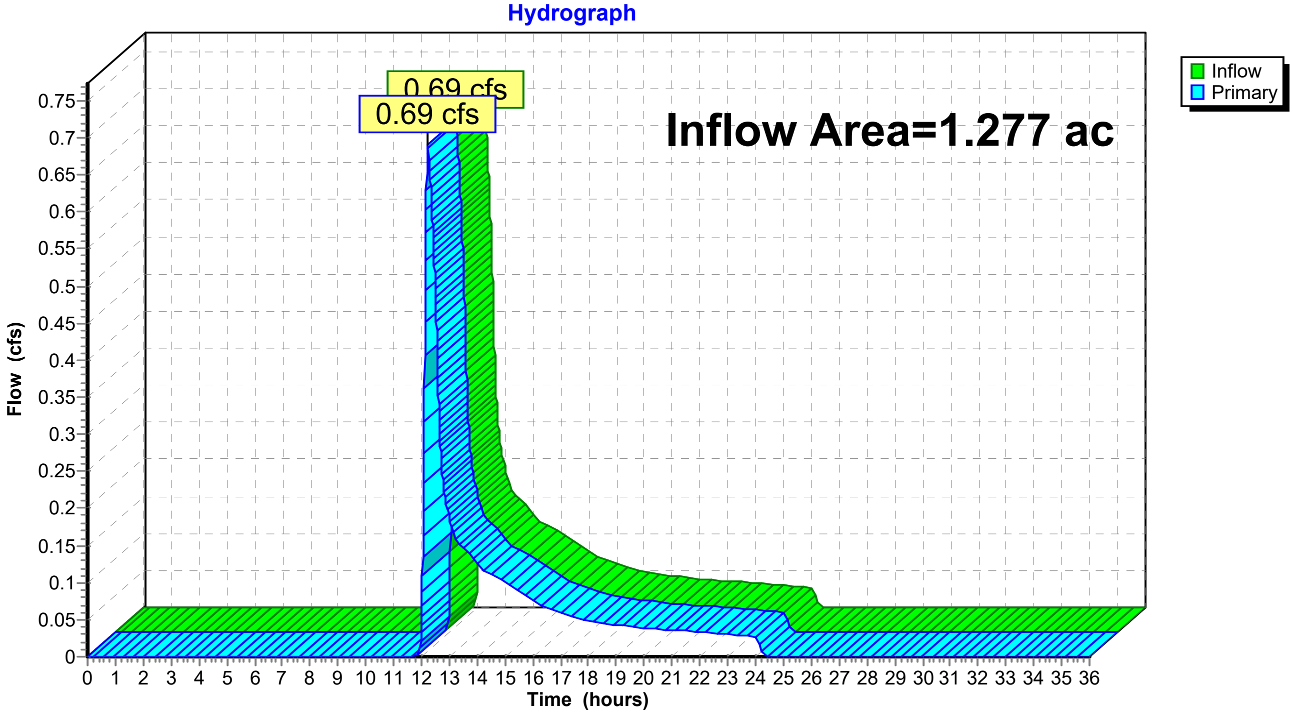


Summary for Link 4E: Design Point #2: Abutter

Inflow Area =	1.277 ac,	2.15% Impervious,	Inflow Depth = 0.85"	for 25-Year Storm event	
Inflow =	0.69 cfs @	12.23 hrs,	Volume=	0.090 af	
Primary =	0.69 cfs @	12.23 hrs,	Volume=	0.090 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 4E: Design Point #2: Abutter



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3E: E2 Runoff Area=55,645 sf 2.15% Impervious Runoff Depth=1.42"
Flow Length=515' Tc=12.5 min CN=49 Runoff=1.41 cfs 0.151 af

Link 4E: Design Point #2: Abutter Inflow=1.41 cfs 0.151 af
Primary=1.41 cfs 0.151 af

Total Runoff Area = 1.277 ac Runoff Volume = 0.151 af Average Runoff Depth = 1.42"
97.85% Pervious = 1.250 ac 2.15% Impervious = 0.027 ac

Summary for Subcatchment 3E: E2

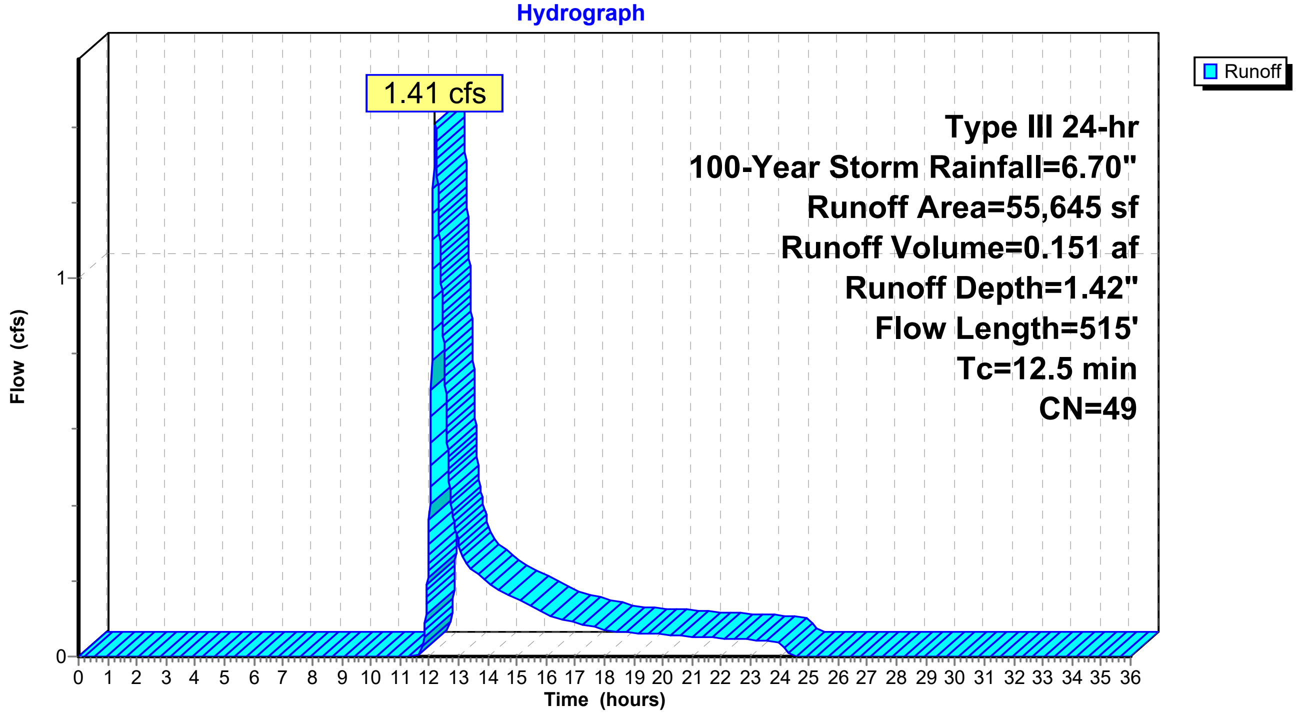
Runoff = 1.41 cfs @ 12.20 hrs, Volume= 0.151 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
1,194	98	Paved parking, HSG B
16,665	30	Woods, Good, HSG A
31,132	55	Woods, Good, HSG B
6,654	61	>75% Grass cover, Good, HSG B
55,645	49	Weighted Average
54,451		97.85% Pervious Area
1,194		2.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	28	0.0500	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	108	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	12	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	95	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	47	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	225	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.5	515	Total			

Subcatchment 3E: E2

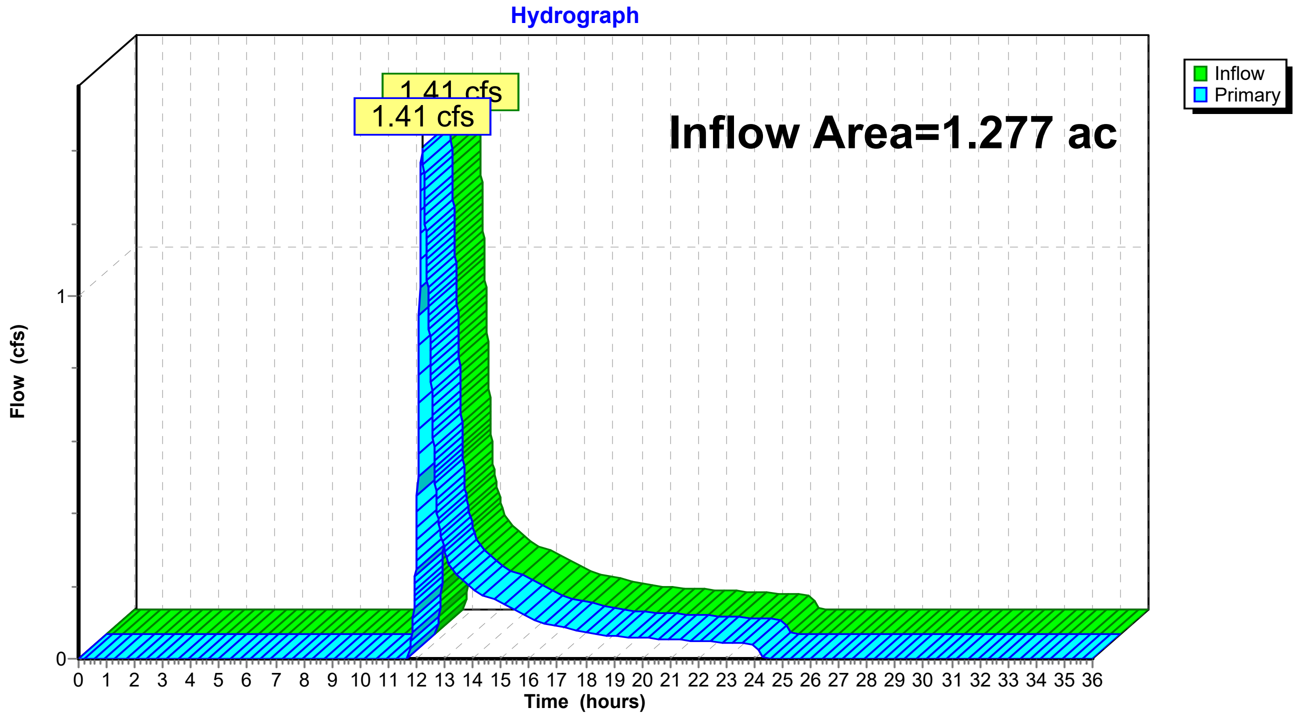


Summary for Link 4E: Design Point #2: Abutter

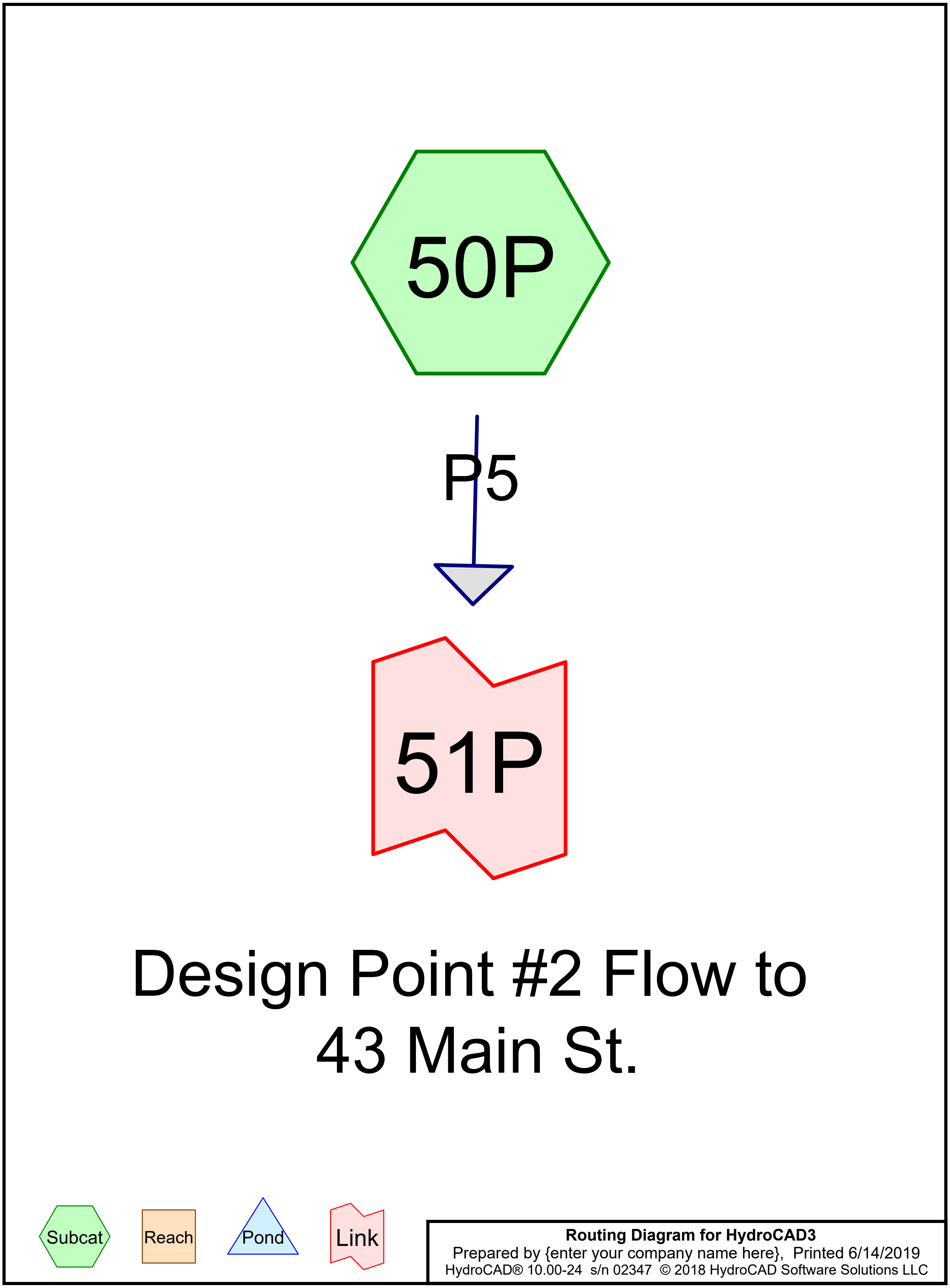
Inflow Area =	1.277 ac,	2.15% Impervious,	Inflow Depth = 1.42"	for 100-Year Storm event	
Inflow =	1.41 cfs @	12.20 hrs,	Volume=	0.151 af	
Primary =	1.41 cfs @	12.20 hrs,	Volume=	0.151 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 4E: Design Point #2: Abutter



DESIGN POINT #2: FLOW TO 43 MAIN ST. PROPOSED CONDITIONS



Routing Diagram for HydroCAD3
Prepared by {enter your company name here}, Printed 6/14/2019

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.020	39	>75% Grass cover, Good, HSG A (50P)
0.161	61	>75% Grass cover, Good, HSG B (50P)
0.010	30	Woods, Good, HSG A (50P)
0.191	**57**	**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 50P: P5 Runoff Area=8,310 sf 0.00% Impervious Runoff Depth=0.31"
Tc=0.0 min CN=57 Runoff=0.03 cfs 0.005 af

Link 51P: Design Point #2 Flow to 43 Main St. Inflow=0.03 cfs 0.005 af
Primary=0.03 cfs 0.005 af

Total Runoff Area = 0.191 ac Runoff Volume = 0.005 af Average Runoff Depth = 0.31"
100.00% Pervious = 0.191 ac 0.00% Impervious = 0.000 ac

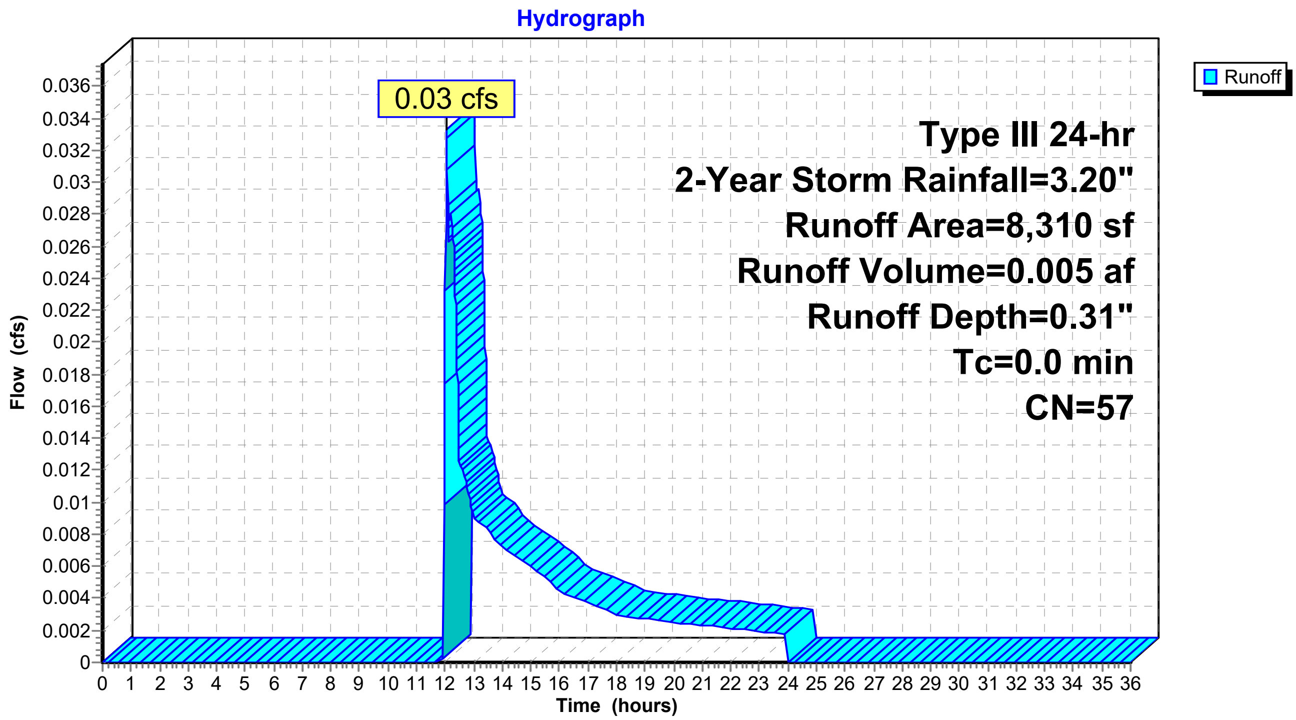
Summary for Subcatchment 50P: P5

Runoff = 0.03 cfs @ 12.05 hrs, Volume= 0.005 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
871	39	>75% Grass cover, Good, HSG A
6,994	61	>75% Grass cover, Good, HSG B
445	30	Woods, Good, HSG A
8,310	57	Weighted Average
8,310		100.00% Pervious Area

Subcatchment 50P: P5

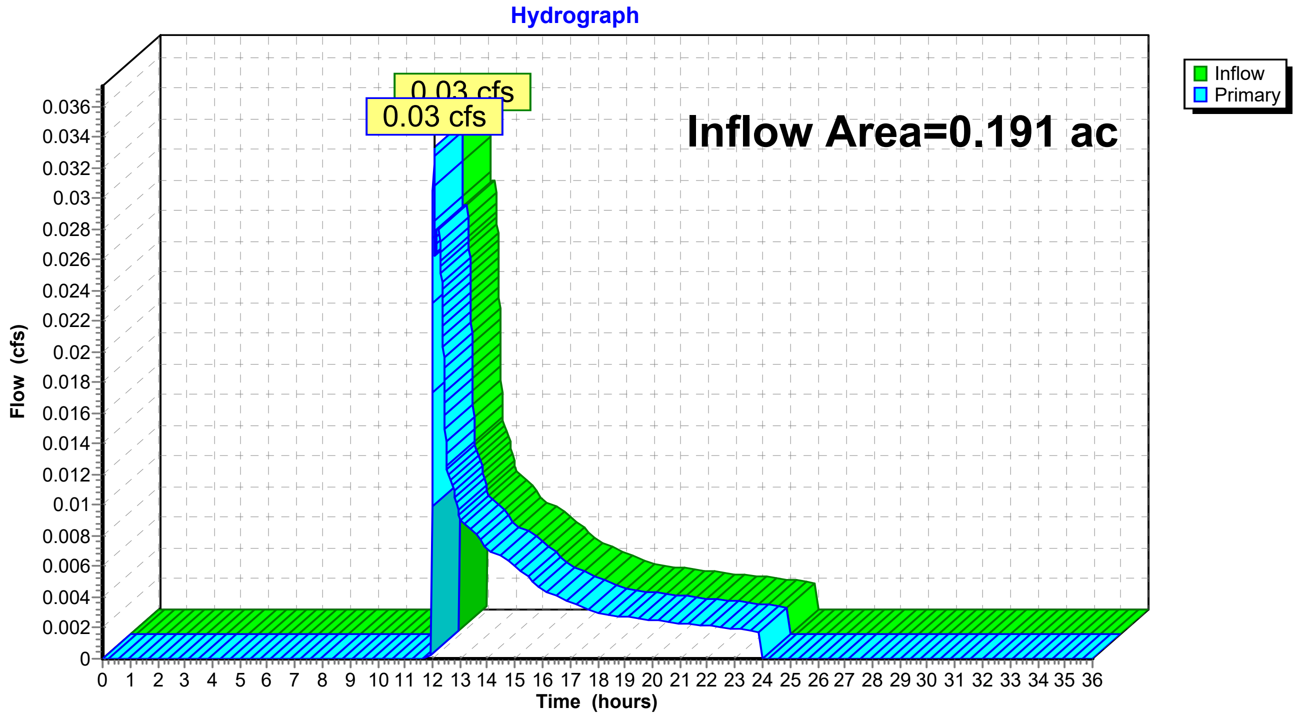


Summary for Link 51P: Design Point #2 Flow to 43 Main St.

Inflow Area =	0.191 ac,	0.00% Impervious,	Inflow Depth =	0.31"	for 2-Year Storm event	
Inflow =	0.03 cfs @	12.05 hrs,	Volume=	0.005 af		
Primary =	0.03 cfs @	12.05 hrs,	Volume=	0.005 af,	Atten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 51P: Design Point #2 Flow to 43 Main St.



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 50P: P5 Runoff Area=8,310 sf 0.00% Impervious Runoff Depth=0.95"
Tc=0.0 min CN=57 Runoff=0.21 cfs 0.015 af

Link 51P: Design Point #2 Flow to 43 Main St. Inflow=0.21 cfs 0.015 af
Primary=0.21 cfs 0.015 af

Total Runoff Area = 0.191 ac Runoff Volume = 0.015 af Average Runoff Depth = 0.95"
100.00% Pervious = 0.191 ac 0.00% Impervious = 0.000 ac

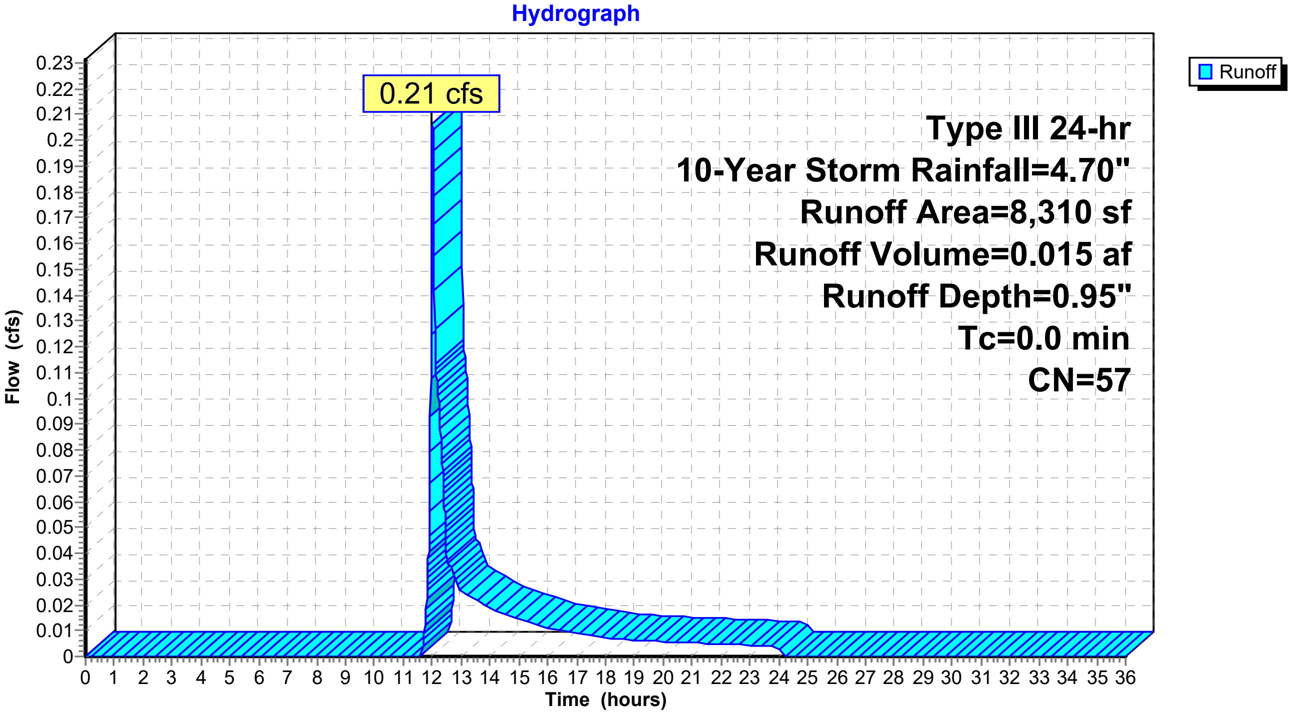
Summary for Subcatchment 50P: P5

Runoff = 0.21 cfs @ 12.01 hrs, Volume= 0.015 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
871	39	>75% Grass cover, Good, HSG A
6,994	61	>75% Grass cover, Good, HSG B
445	30	Woods, Good, HSG A
8,310	57	Weighted Average
8,310		100.00% Pervious Area

Subcatchment 50P: P5

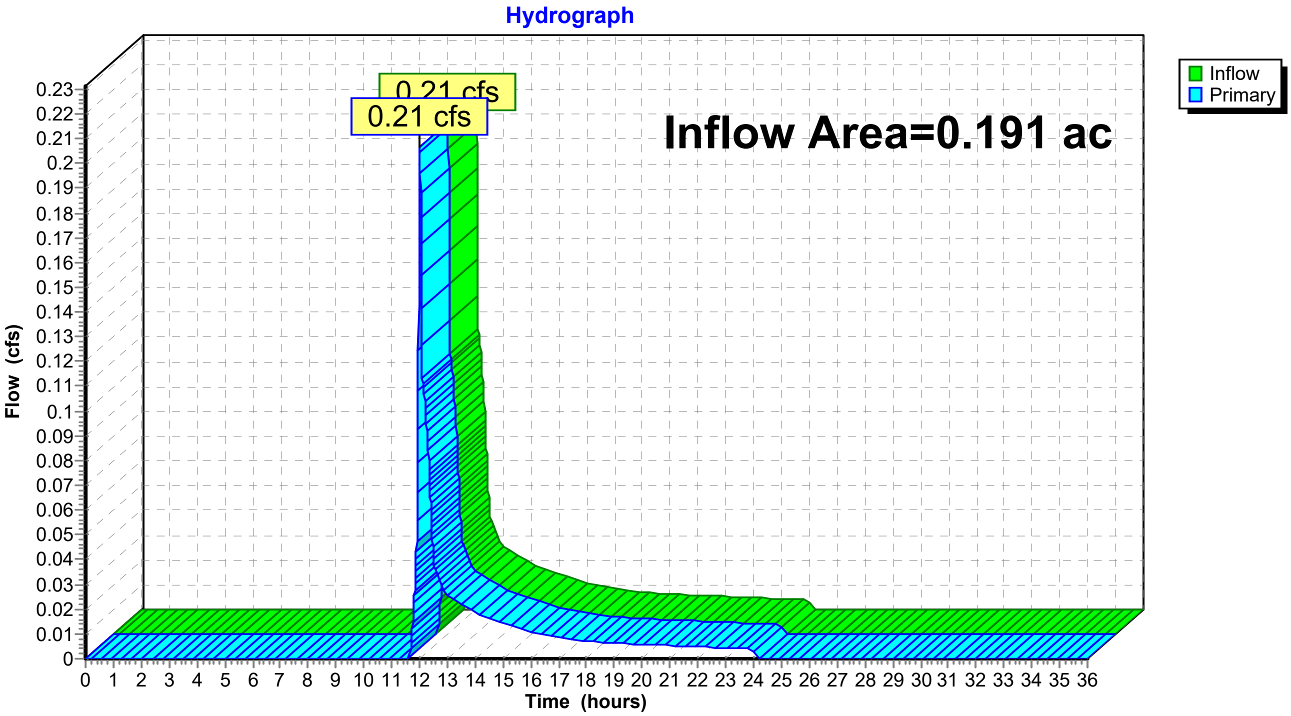


Summary for Link 51P: Design Point #2 Flow to 43 Main St.

Inflow Area =	0.191 ac,	0.00% Impervious, Inflow Depth = 0.95"	for 10-Year Storm event	
Inflow =	0.21 cfs @	12.01 hrs, Volume=	0.015 af	
Primary =	0.21 cfs @	12.01 hrs, Volume=	0.015 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 51P: Design Point #2 Flow to 43 Main St.



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 50P: P5 Runoff Area=8,310 sf 0.00% Impervious Runoff Depth=1.38"
Tc=0.0 min CN=57 Runoff=0.33 cfs 0.022 af

Link 51P: Design Point #2 Flow to 43 Main St. Inflow=0.33 cfs 0.022 af
Primary=0.33 cfs 0.022 af

Total Runoff Area = 0.191 ac Runoff Volume = 0.022 af Average Runoff Depth = 1.38"
100.00% Pervious = 0.191 ac 0.00% Impervious = 0.000 ac

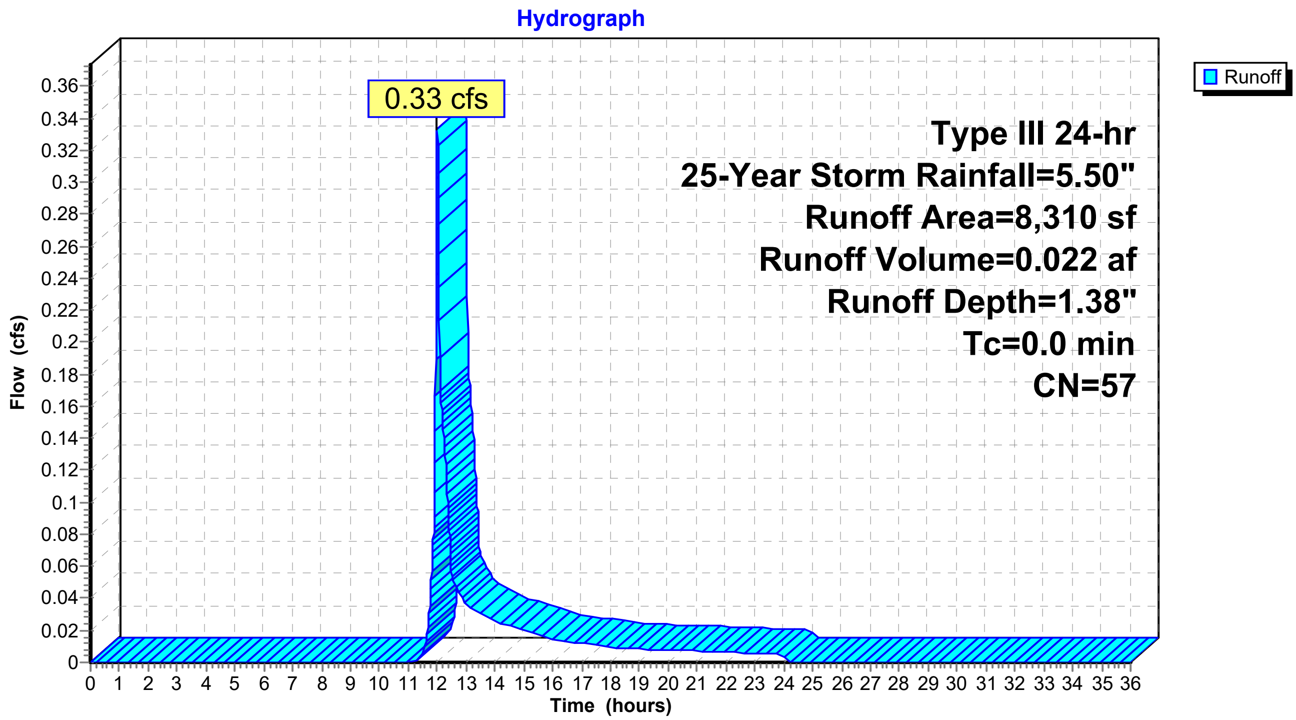
Summary for Subcatchment 50P: P5

Runoff = 0.33 cfs @ 12.00 hrs, Volume= 0.022 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
871	39	>75% Grass cover, Good, HSG A
6,994	61	>75% Grass cover, Good, HSG B
445	30	Woods, Good, HSG A
8,310	57	Weighted Average
8,310		100.00% Pervious Area

Subcatchment 50P: P5

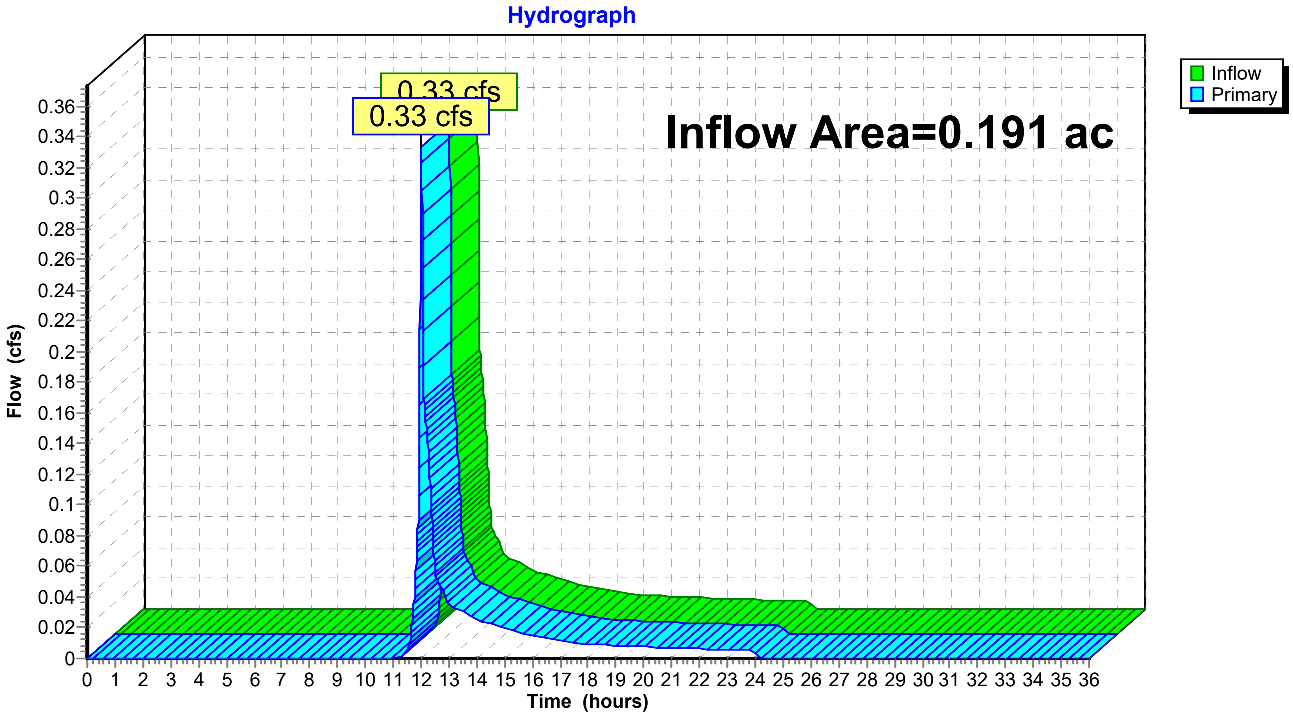


Summary for Link 51P: Design Point #2 Flow to 43 Main St.

Inflow Area =	0.191 ac,	0.00% Impervious,	Inflow Depth = 1.38"	for 25-Year Storm event	
Inflow =	0.33 cfs @	12.00 hrs,	Volume=	0.022 af	
Primary =	0.33 cfs @	12.00 hrs,	Volume=	0.022 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 51P: Design Point #2 Flow to 43 Main St.



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 50P: P5 Runoff Area=8,310 sf 0.00% Impervious Runoff Depth=2.12"
Tc=0.0 min CN=57 Runoff=0.55 cfs 0.034 af

Link 51P: Design Point #2 Flow to 43 Main St. Inflow=0.55 cfs 0.034 af
Primary=0.55 cfs 0.034 af

Total Runoff Area = 0.191 ac Runoff Volume = 0.034 af Average Runoff Depth = 2.12"
100.00% Pervious = 0.191 ac 0.00% Impervious = 0.000 ac

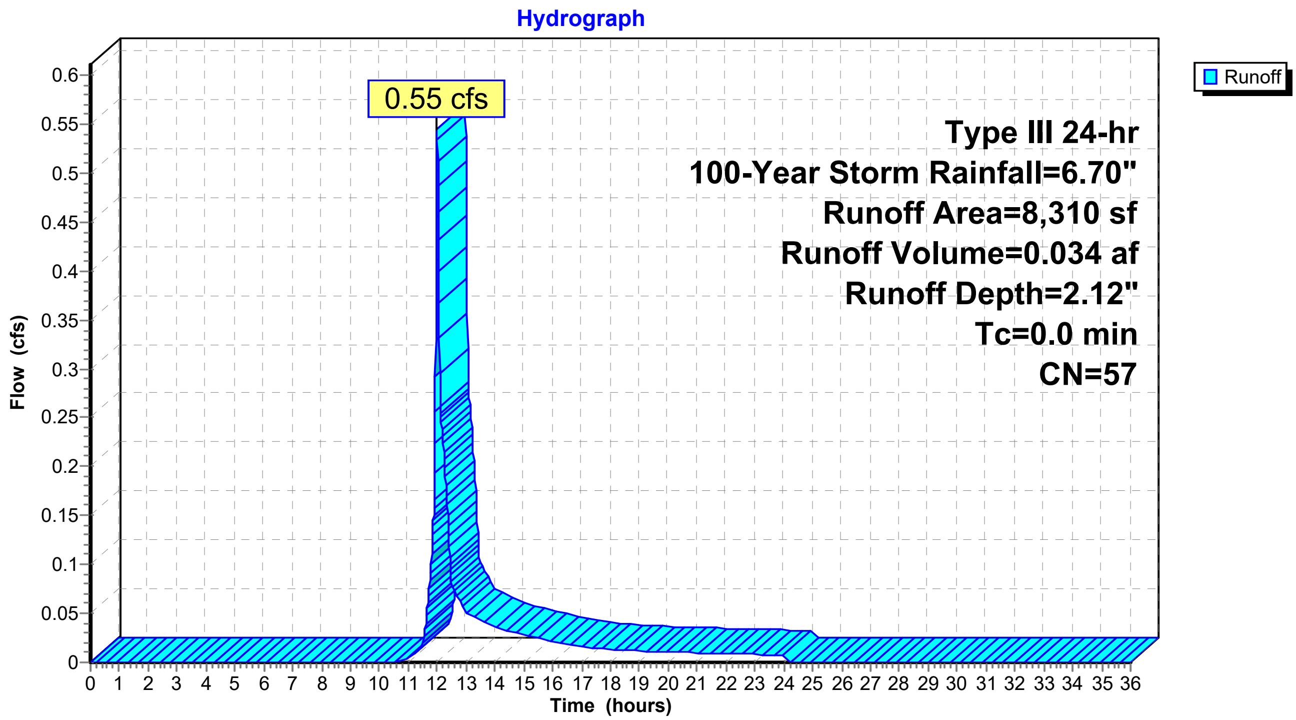
Summary for Subcatchment 50P: P5

Runoff = 0.55 cfs @ 12.00 hrs, Volume= 0.034 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.70"

Area (sf)	CN	Description
871	39	>75% Grass cover, Good, HSG A
6,994	61	>75% Grass cover, Good, HSG B
445	30	Woods, Good, HSG A
8,310	57	Weighted Average
8,310		100.00% Pervious Area

Subcatchment 50P: P5

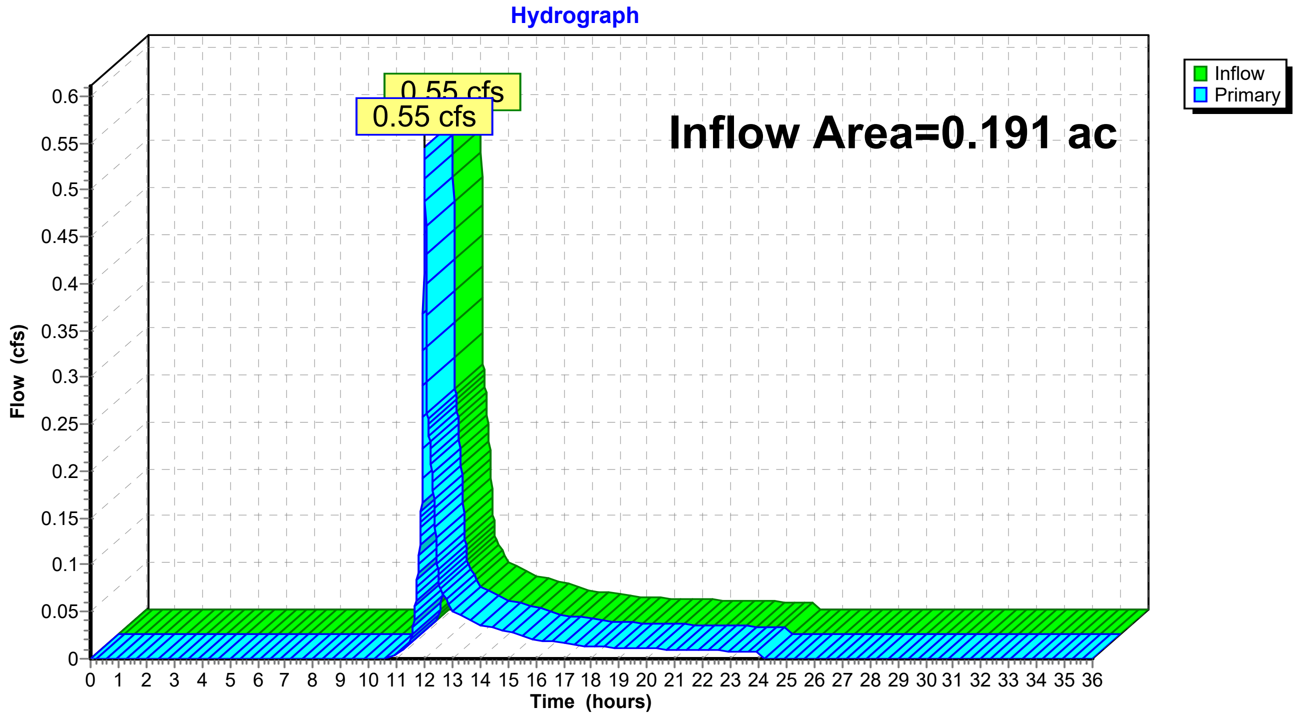


Summary for Link 51P: Design Point #2 Flow to 43 Main St.

Inflow Area = 0.191 ac, 0.00% Impervious, Inflow Depth = 2.12" for 100-Year Storm event
Inflow = 0.55 cfs @ 12.00 hrs, Volume= 0.034 af
Primary = 0.55 cfs @ 12.00 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

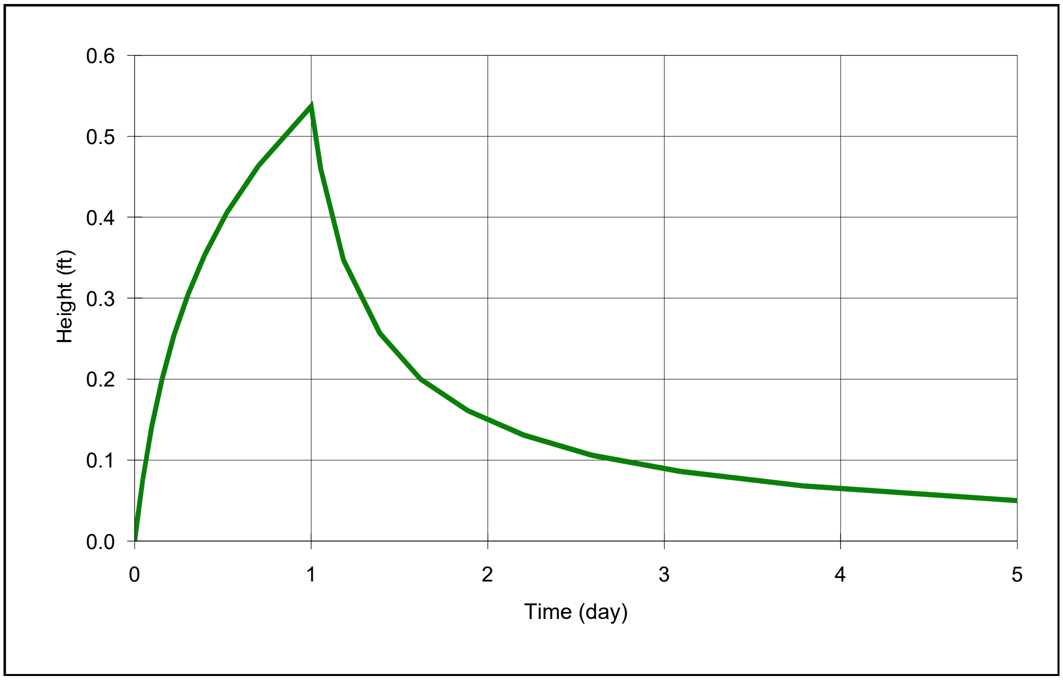
Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 51P: Design Point #2 Flow to 43 Main St.



ATTACHMENT L: Mounding Calculations

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Legacy Engineering LLC

PROJECT: Infiltration Basin

ANALYST: Daniel J. Merrikin, P.E.

DATE: 6/13/2019 TIME: 11:51:32 AM

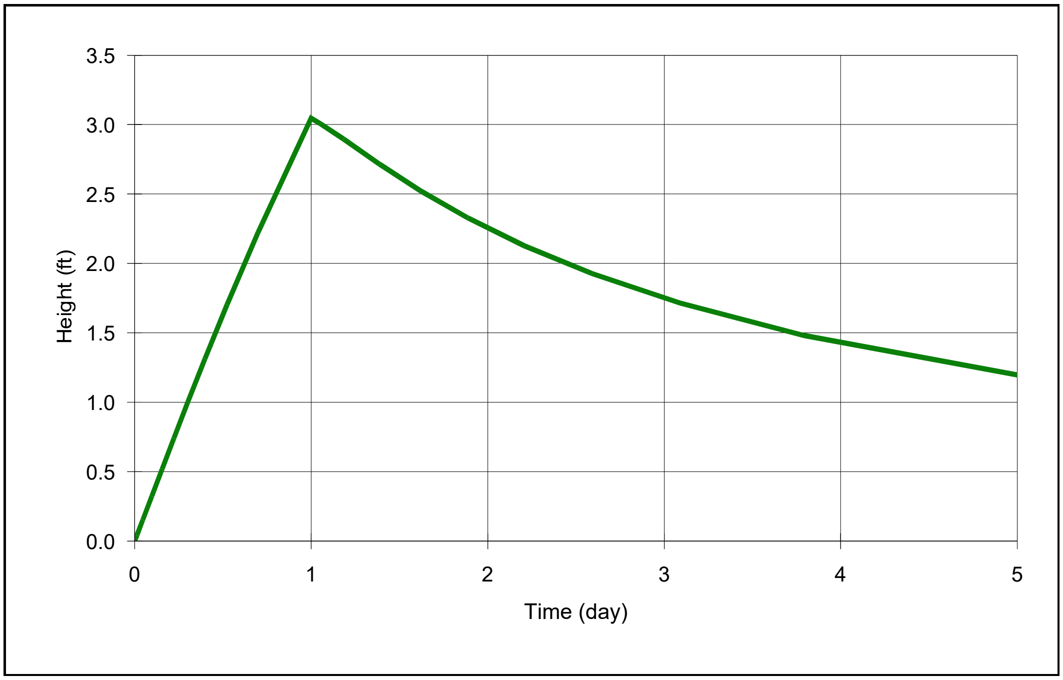
INPUT PARAMETERS

Application rate: 0.36 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: 80 ft
Width of application area: 33.1 ft
No constant head boundary used
Groundwater mounding @
X coordinate: 0 ft
Y coordinate: 0 ft
Total volume applied: 953.28 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.02
0	0.08
0.1	0.14
0.2	0.2
0.2	0.25
0.3	0.3
0.4	0.35
0.5	0.41
0.7	0.46
1	0.54
1.1	0.46
1.2	0.35
1.4	0.26
1.6	0.2
1.9	0.16
2.2	0.13
2.6	0.11
3.1	0.09
3.8	0.07
5	0.05

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Legacy Engineering LLC

PROJECT: Infiltration Field 1

ANALYST: Daniel J. Merrikin, P.E.

DATE: 6/14/2019 TIME: 8:44:46 AM

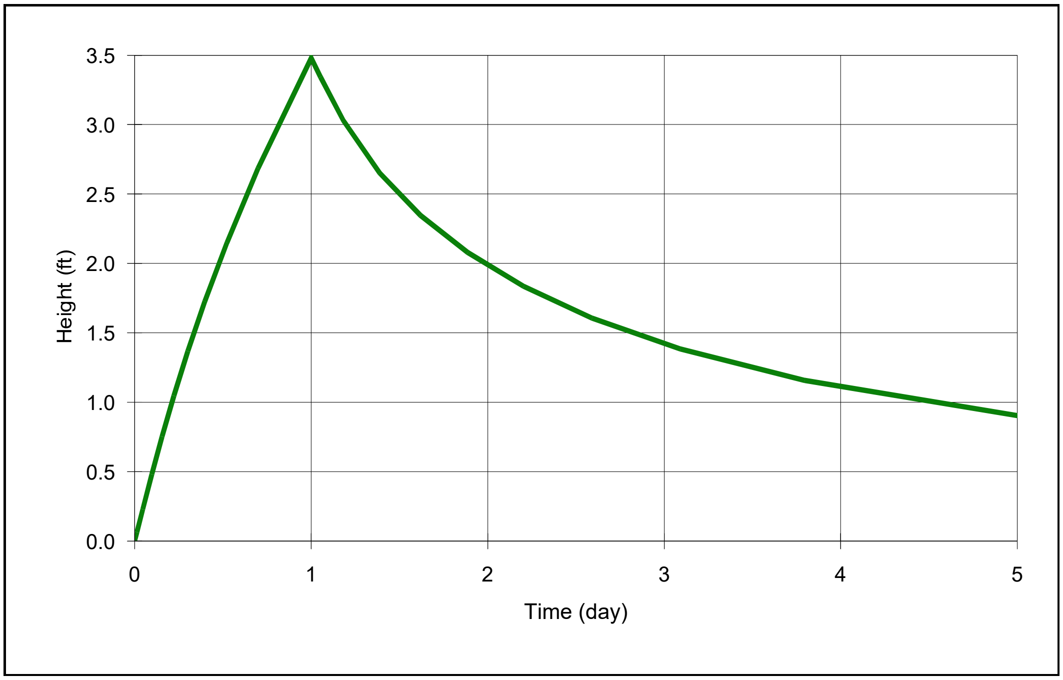
INPUT PARAMETERS

Application rate: 0.67 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: 174.8 ft
Width of application area: 76 ft
No constant head boundary used
Groundwater mounding @
X coordinate: 0 ft
Y coordinate: 0 ft
Total volume applied: 8900.816 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.04
0	0.15
0.1	0.32
0.2	0.52
0.2	0.74
0.3	1
0.4	1.31
0.5	1.7
0.7	2.22
1	3.05
1.1	3.01
1.2	2.9
1.4	2.72
1.6	2.52
1.9	2.33
2.2	2.13
2.6	1.93
3.1	1.71
3.8	1.48
5	1.2

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Legacy Engineering LLC

PROJECT: Infiltration Field 2

ANALYST: Daniel J. Merrikin, P.E.

DATE: 6/14/2019 TIME: 8:46:44 AM

INPUT PARAMETERS

Application rate: 1 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: 144.67 ft
Width of application area: 41.5 ft
No constant head boundary used
Groundwater mounding @
X coordinate: 0 ft
Y coordinate: 0 ft
Total volume applied: 6003.805 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.06
0	0.23
0.1	0.48
0.2	0.75
0.2	1.05
0.3	1.37
0.4	1.73
0.5	2.15
0.7	2.69
1	3.48
1.1	3.34
1.2	3.03
1.4	2.65
1.6	2.35
1.9	2.08
2.2	1.84
2.6	1.61
3.1	1.38
3.8	1.16
5	0.9

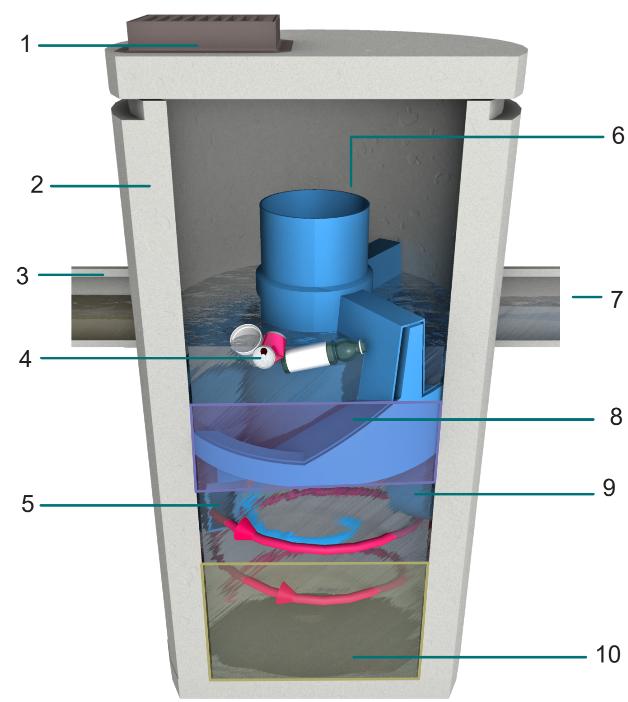
ATTACHMENT M: First Defense Proprietary Treatment Units

First Defense® High Capacity

A Simple Solution for your Trickiest Sites

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.



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

Components

1. Inlet Grate (optional)
2. Precast chamber
3. Inlet Pipe (optional)
4. Floatables Draw Off Slot (not pictured)
5. Inlet Chute
6. Internal Bypass
7. Outlet pipe
8. Oil and Floatables Storage
9. Outlet chute
10. Sediment Storage Sump

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.

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

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.

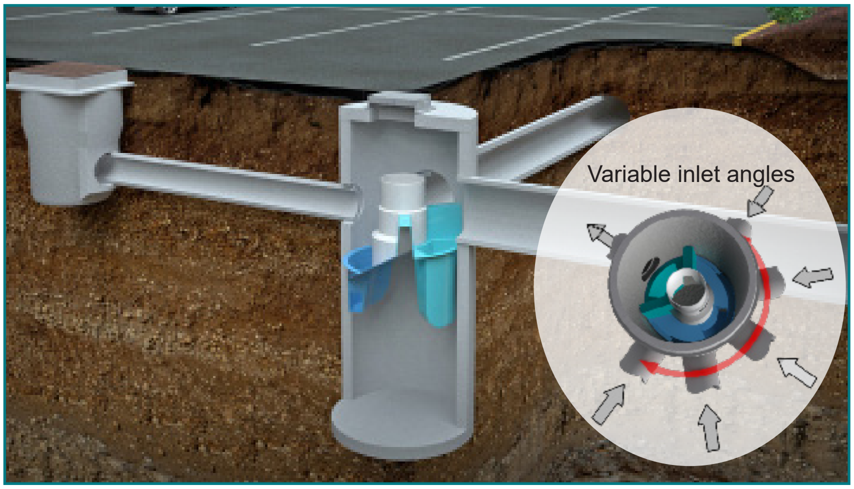


Fig 2. Works with multiple inlet pipes and grates

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 separatror, 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 vactor 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)	(yd^3 / m^3)	(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

[1]Contact Hydro International when larger pipe sizes are required.
[2]Contact Hydro International when custom sediment storage capacity is required.
[3]Minimum 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).

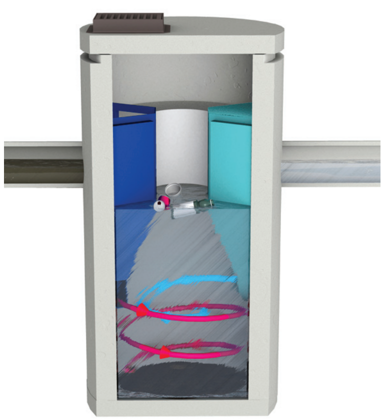


Fig.1 The First Defense® captures fine sediments as well as gross pollutants, making it an effective stand-alone treatment device for space constrained sites.

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).

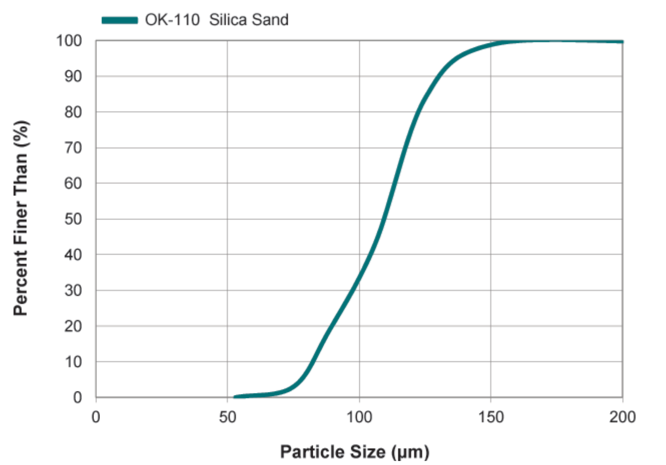


Fig.2 Particle size distribution of the OK-110 silica blend, which contains a large fraction of fine particle sizes that are targeted by stand-alone stormwater treatment devices.

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).

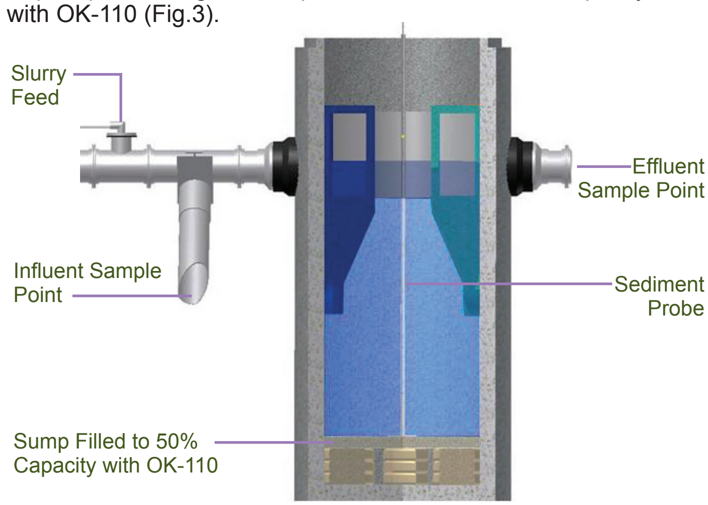


Fig.3 The 4-ft First Defense® was tested with its sump pre-loaded to 50% capacity with OK-110 sediment.

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).

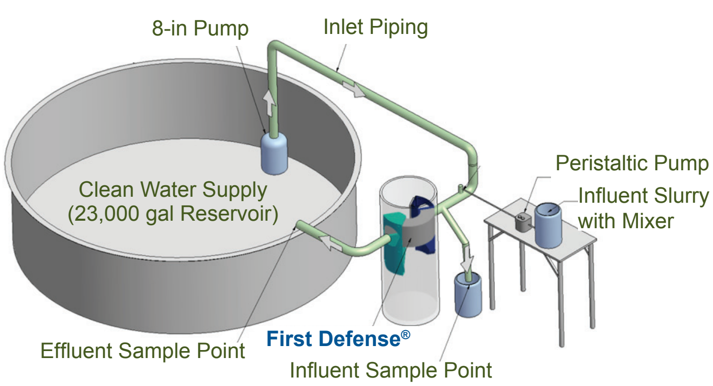


Fig.4 The First Defense® was tested at Hydro International's Portland, Maine test facility.

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.

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: 207.756.6200 Fax: 207.756.6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

Hydro International First Defense OK-110 Sand SSC (TSS) Removal Confirmation Test November 12, 2004

Reported by Jeff Dennis
Division of Watershed Management, DEP

On November 12, 2004 I witnessed a confirmation test of the ability of a 4 ft diameter First Defense® unit with an 8 inch inlet to remove OK-110 grade silica sand. The test was performed in the laboratory of the Hydro International office on Hutchins Drive in Portland, Maine. The target flow rate for the test was 320 gpm.

Lab Set-Up

The laboratory set-up for the test consists of a 23,300 gallon clean water storage reservoir from which water is pumped into an 8 in pipe which feeds water to a 4 ft diameter First Defense® unit. The pipe from the storage reservoir is fitted with a valved bypass to divert excess flows back to the storage reservoir, a butterfly valve along with a variable frequency drive for flow control, and an ISCO UniMag Magnetic Flowmeter. OK-110 sand is fed into the inflow pipe from an elevated 60 gal sand slurry barrel. The sand is kept in a relatively uniform suspension in the slurry tank using a propeller type mixer. Slurry is pumped through plastic tubing from the slurry tank into the inflow pipe by a peristaltic pump. An automatic sampler is located upstream of the slurry feed to collect background samples. Several feet downstream of the slurry feed in the inflow pipe there is a 6 inch T with a sluice gate for collection of inflow samples.

The outflow pipe from the First Defense® unit has a free-fall discharge back into the storage reservoir. Outflow samples are collected by passing the sample bottle through the free fall discharge into the reservoir.

Test Procedure

The target test flow for the test was 320 gpm. The mean water detention time in the system at this flow rate is 78 seconds. Outflow samples lagged inflow samples by this amount. The interval between samples for both the inflow and outflow samples was 60 seconds. Back ground samples were collected at the same time as inflow samples. Flow was observed throughout the test.

The flow rate was stabilized at around 300 gpm and the slurry feed pump started. The system was then allowed to reach equilibrium for a period in excess of four detention times, before the first inflow sample was taken. Outflow sampling commenced about 78 seconds later. Background sampling commenced prior to inflow sampling and continued throughout the test. Six sets of samples were taken.

Inflow, outflow and background samples were taken to the University of Maine Environmental Chemistry Lab for Suspended Sediment Concentration analysis. The analyses was performed by John Cangelosi.

Results

Results of the test are presented in the attached tables. Inflow concentrations ranged from 189.1 mg/l to 299.8 mg/l. Outflow concentrations ranged from 12.6 mg/l to 17.3 mg/l. Background concentrations ranged between 0.9 and 1.9 mg/l.

The removal efficiencies indicated by inflow/outflow pairs ranged from 93.3% up to 95.4%, with a mean of 94.2%. When adjusted for recycled background concentrations, efficiencies were slightly higher, from 94.0% to 95.7% with a mean of 94.7%.

Flow for the test varied from 262 gpm to 328 gpm with a mean of 290 gpm, slightly lower than the target flow rate of 320 gpm.

Conclusions

All the 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. Variation in paired removal efficiencies was low, and variation in inflow concentration was high, but still acceptable. Since removal efficiencies were so much higher than the required 80% and the flow for at least one pair exceeded 320 gpm, it is reasonable to conclude that, even though the mean flow was less than the target flow of 320 gpm, the unit can remove greater than 80% of OK-110 grade silica sand at the target flow rate of 320 gpm.

Therefore, the conclusion of this report is that the test performed on November 11, 2004, in substantial accordance with the Lab Testing Protocol, indicates that a 4 ft diameter First Defense® unit operating at an average flow rate of 320 gpm provides at least 80% removal of the specified OK-110 grade silica sand.

Signed: ____________________ Date: 7/21/05

First Defense OK-110 Sand Confirmation Test - 11/12/04

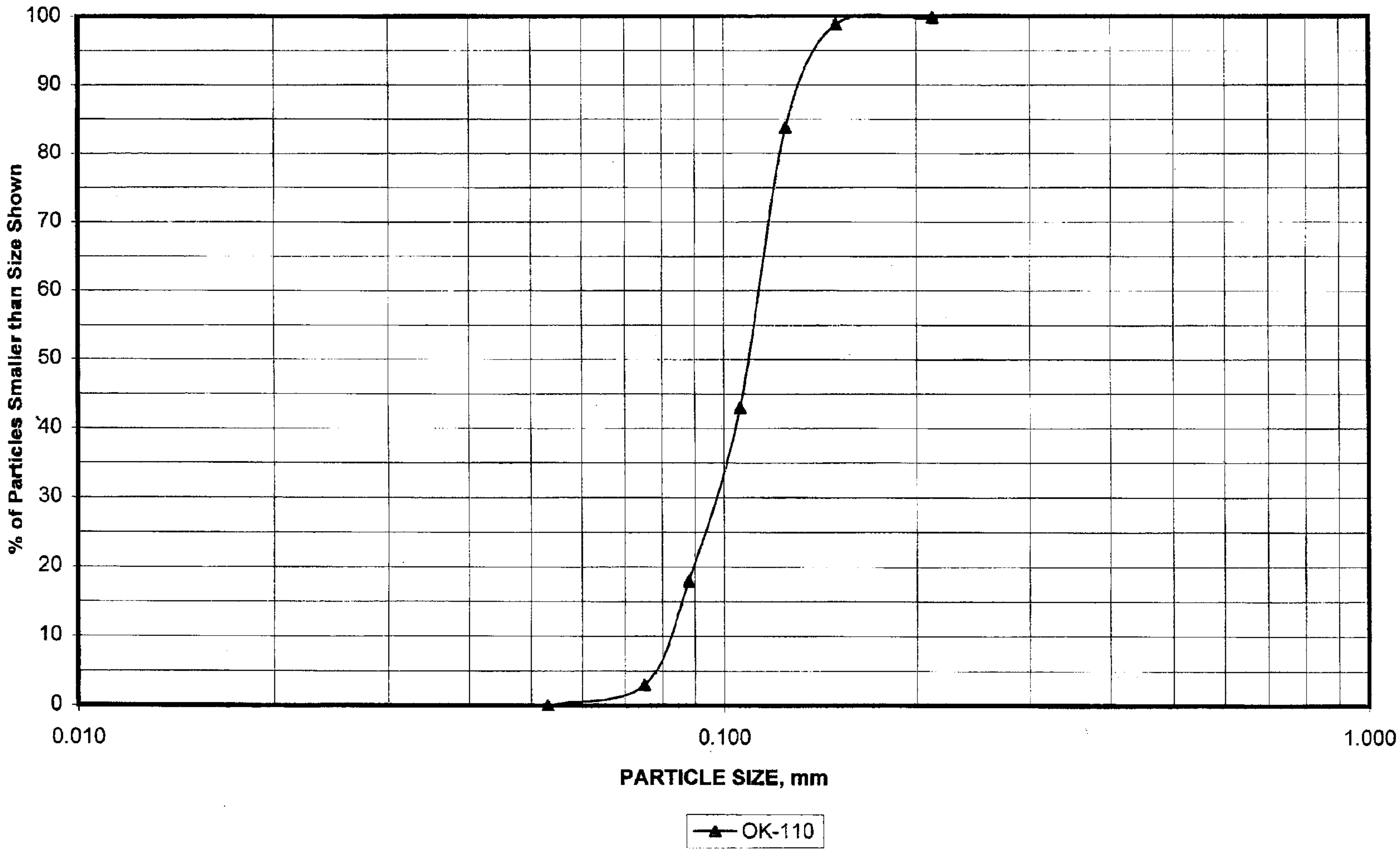
	Inflow (mg/l)	Time	Outflow (mg/l)	Time	Background	Rem. Eff.	Inflow - BG	Outflow - BG	BG adj. Rem. Eff.
1	299.8	11:08	13.7	11:09	0.9	95.4	298.9	12.8	95.7
2	268.6	11:09	16.8	11:10	1.2	93.7	267.4	15.6	94.2
3	189.1	11:10	12.6	11:11	1.4	93.3	187.7	11.2	94.0
4	279.1	11:11	15.8	11:12	1.9	94.3	277.2	13.9	95.0
5	291.1	11:12	17.3	11:13	1.4	94.1	289.7	15.9	94.5
6	267.2	11:13	15.8	11:14	1.2	94.1	266.0	14.6	94.5
Mean	265.8		15.3		1.3	94.2	264.5	14.0	94.7

Flow	l/sec
1	17.4
2	20.7
3	19.1
4	18.6
5	16.5
6	17.7
mean	18.3

18.3 l/sec = 290 gpm = 0.65 cfs

Residence Time and interval between samples 78 seconds, time to start of sampling 5 minutes 13 seconds

Maine DEP U.S. Silica OK-110 Sand Removal Confirmation Test
Grain Size Distribution of Test Material



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

April 4, 2016

Lisa Lemont, CPSWQ
Business Development Manager
Hydro International
94 Hutchins Drive
Portland, ME 04102

Re: MTD Lab Certification
First Defense® HC (FDHC) Stormwater Treatment Device by Hydro International

TSS Removal Rate 50%

Dear Ms. Lemont:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested an MTD Laboratory Certification for the First Defense® HC Stormwater Treatment Device.

The projects falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated February 2016) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the First Defense® HC Stormwater Treatment Device by Hydro International at a TSS removal rate of 50% when designed, operated and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The First Defense® HC Stormwater Treatment Device shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This First Defense® HC Stormwater Treatment Device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using the First Defense® HC Stormwater Treatment Device shall incorporate, at a minimum, the maintenance requirements noted in the attached document. However, it is recommended to review the maintenance website at http://www.hydro-int.com/UserFiles/downloads/FD_O%2BM_F1512.pdf for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for the First Defense® HC Stormwater Treatment Device:

   Example: A 0.25 acre impervious site is to be treated to 50% TSS removal using a First Defense® HC Stormwater Treatment Device. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:

   time of concentration = 10 minutes
   i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
   c=0.99 (curve number for impervious)
   Q=ciA=0.99x3.2x0.25=0.79 cfs

   Given the site runoff is 0.79 cfs and based on Table 1 below, the First Defense® HC Model 4-ft with a MTFR of 1.5 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

   The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and Table A-2 of the NJCAT Verification Report.

Table 1 First Defense® HC Models

First Defense® Model	Manhole Diameter (ft)	Maximum Treatment Flowrate, MTFR (cfs)
4-ft	4-ft	1.50
6-ft	6-ft	3.38
8-ft	8-ft	6.00

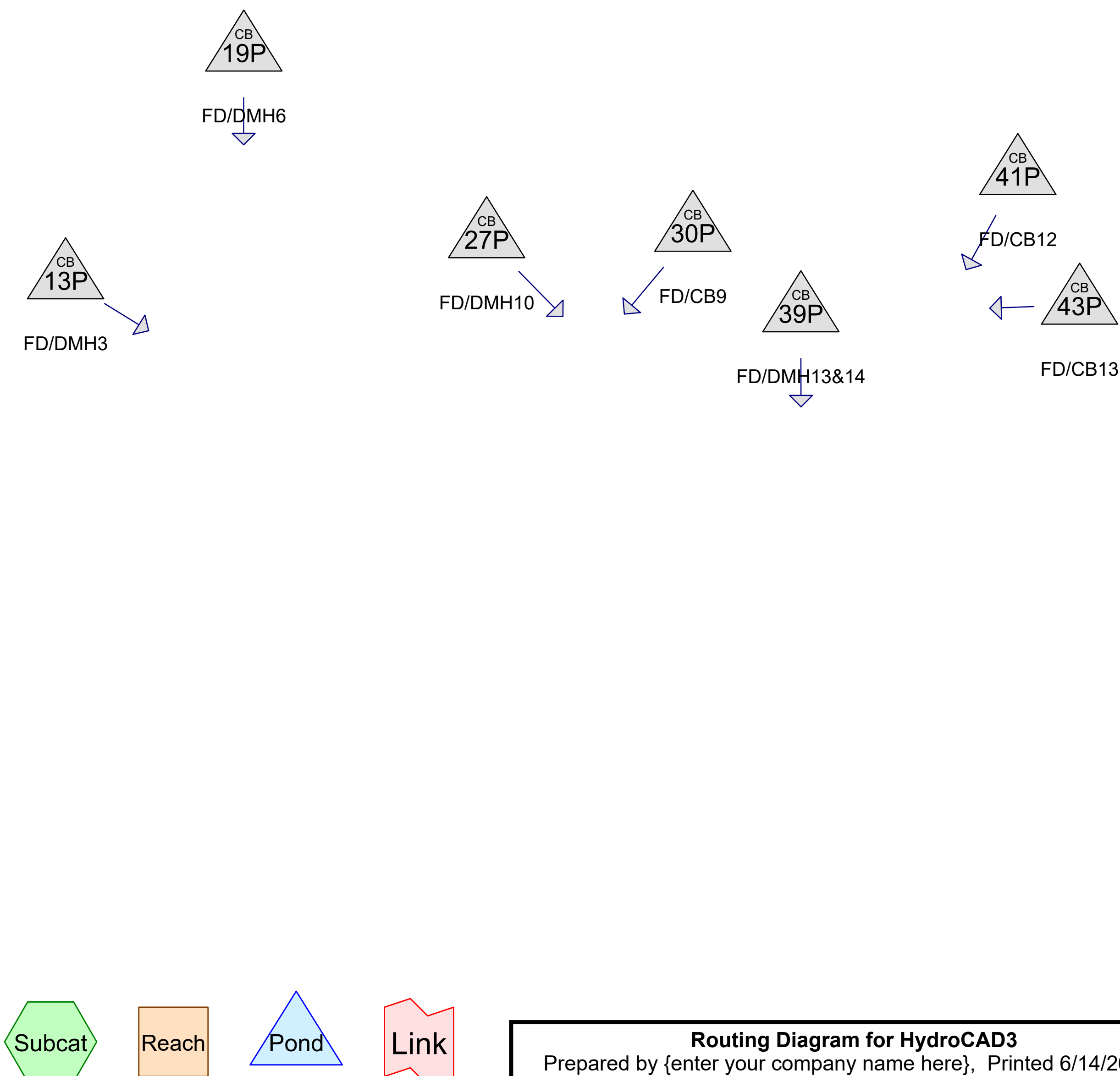
Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance of the New Jersey Stormwater Best Management Practices Manual.

If you have any questions regarding the above information, please contact Mr. Titus Magnanao of my office at (609) 633-7021.

Sincerely,

James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan
C: Chron File
Richard Magee, NJCAT
Vince Mazzei, DLUR
Ravi Patraju, NJDEP
Gabriel Mahon, BNPC
Titus Magnanao, BNPC



Routing Diagram for HydroCAD3
Prepared by {enter your company name here}, Printed 6/14/2019
HydroCAD® 10.00-24 s/n 02347 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.000	**0**	**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Pond 13P: FD/DMH3 Peak Elev=162.03' Inflow=0.01 cfs 0.004 af
24.0" Round Culvert n=0.011 L=104.0' S=0.0308 '/' Outflow=0.01 cfs 0.004 af

Pond 19P: FD/DMH6 Peak Elev=159.91' Inflow=0.18 cfs 0.016 af
12.0" Round Culvert n=0.011 L=44.0' S=0.0205 '/' Outflow=0.18 cfs 0.016 af

Pond 27P: FD/DMH10 Peak Elev=167.25' Inflow=0.09 cfs 0.009 af
12.0" Round Culvert n=0.011 L=43.0' S=0.0256 '/' Outflow=0.09 cfs 0.009 af

Pond 30P: FD/CB9 Peak Elev=168.01' Inflow=0.00 cfs 0.001 af
12.0" Round Culvert n=0.011 L=30.0' S=0.0667 '/' Outflow=0.00 cfs 0.001 af

Pond 39P: FD/DMH13&14 Peak Elev=158.78' Inflow=0.26 cfs 0.021 af
Outflow=0.26 cfs 0.021 af

Pond 41P: FD/CB12 Peak Elev=160.01' Inflow=0.18 cfs 0.013 af
12.0" Round Culvert n=0.011 L=32.0' S=0.0313 '/' Outflow=0.18 cfs 0.013 af

Pond 43P: FD/CB13 Peak Elev=160.14' Inflow=0.09 cfs 0.006 af
12.0" Round Culvert n=0.011 L=52.0' S=0.0231 '/' Outflow=0.09 cfs 0.006 af

Summary for Pond 13P: FD/DMH3

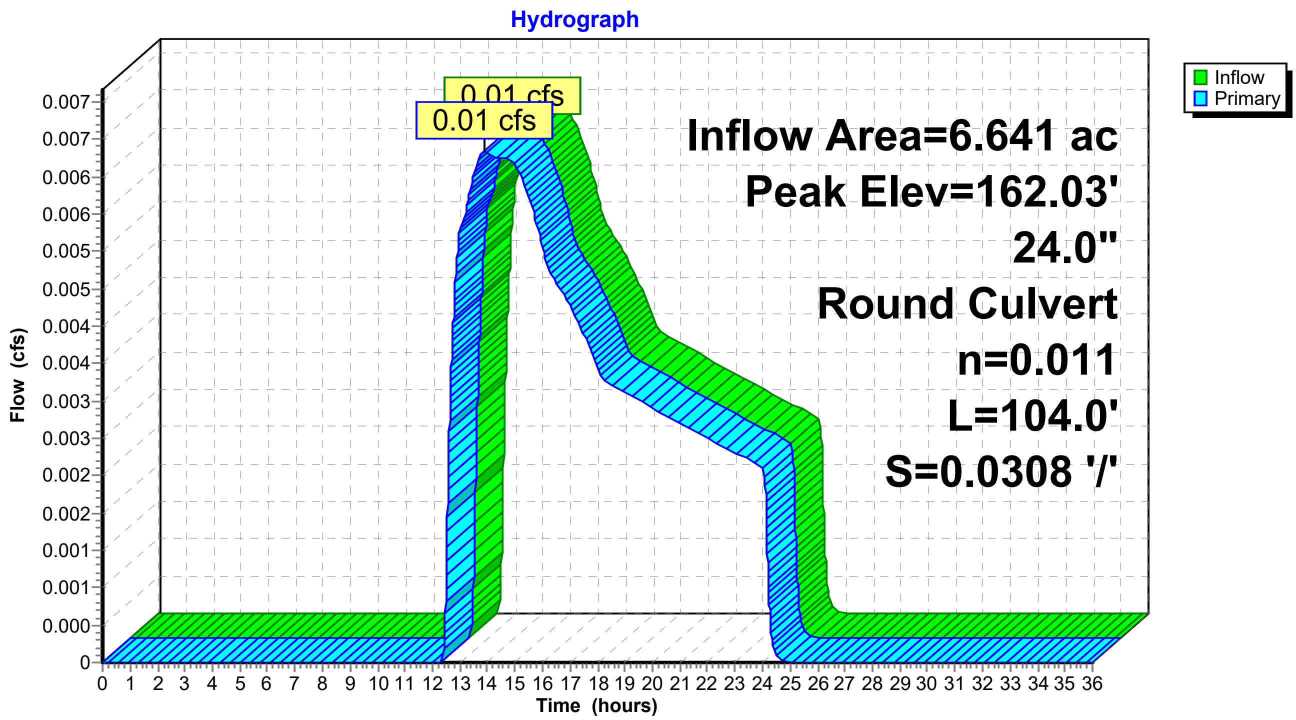
Inflow Area =	6.641 ac,	27.51% Impervious,	Inflow Depth = 0.01"	for 1-IN event	
Inflow =	0.01 cfs @	13.90 hrs,	Volume=	0.004 af	
Outflow =	0.01 cfs @	13.90 hrs,	Volume=	0.004 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.01 cfs @	13.90 hrs,	Volume=	0.004 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 162.03' @ 13.90 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.00'	**24.0" Round Culvert** L= 104.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.00' / 158.80' S= 0.0308 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=0.01 cfs @ 13.90 hrs HW=162.03' TW=158.64' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.01 cfs @ 0.62 fps)

Pond 13P: FD/DMH3



Summary for Pond 19P: FD/DMH6

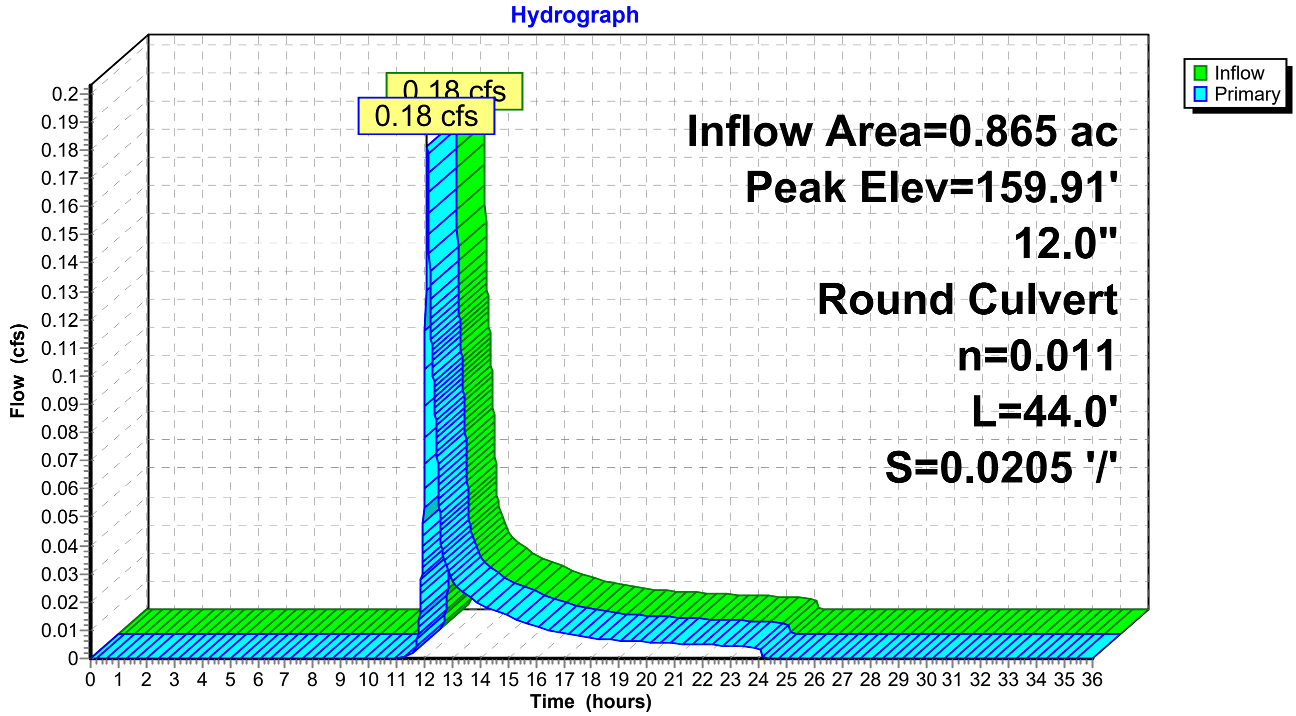
Inflow Area =	0.865 ac, 80.06% Impervious, Inflow Depth = 0.22" for 1-IN event		
Inflow =	0.18 cfs @ 12.10 hrs,	Volume=	0.016 af
Outflow =	0.18 cfs @ 12.10 hrs,	Volume=	0.016 af, Atten= 0%, Lag= 0.0 min
Primary =	0.18 cfs @ 12.10 hrs,	Volume=	0.016 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 159.91' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.70'	**12.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.70' / 158.80' S= 0.0205 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.18 cfs @ 12.10 hrs HW=159.91' TW=158.82' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.18 cfs @ 1.55 fps)

Pond 19P: FD/DMH6



Summary for Pond 27P: FD/DMH10

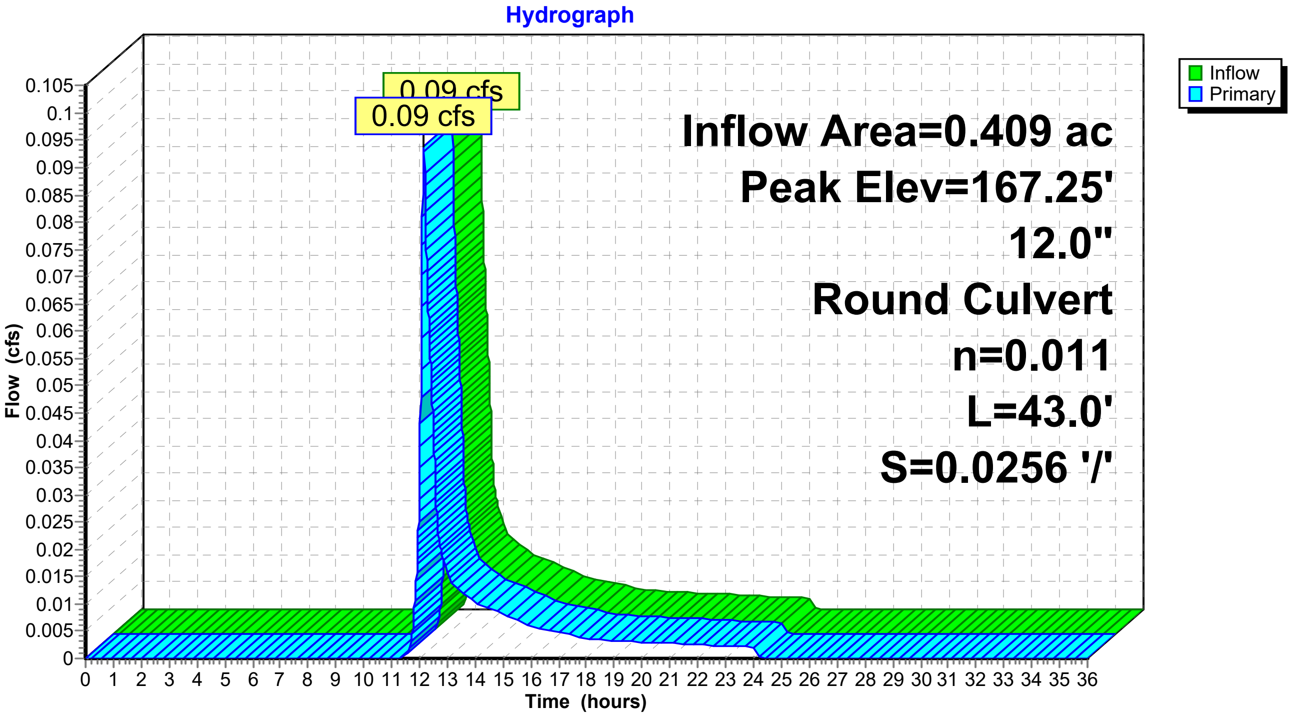
Inflow Area =	0.409 ac, 68.89% Impervious, Inflow Depth = 0.25" for 1-IN event			
Inflow =	0.09 cfs @	12.15 hrs, Volume=	0.009 af	
Outflow =	0.09 cfs @	12.15 hrs, Volume=	0.009 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.09 cfs @	12.15 hrs, Volume=	0.009 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 167.25' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	167.10'	**12.0" Round Culvert** L= 43.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.10' / 166.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.09 cfs @ 12.15 hrs HW=167.25' TW=164.30' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.09 cfs @ 1.31 fps)

Pond 27P: FD/DMH10



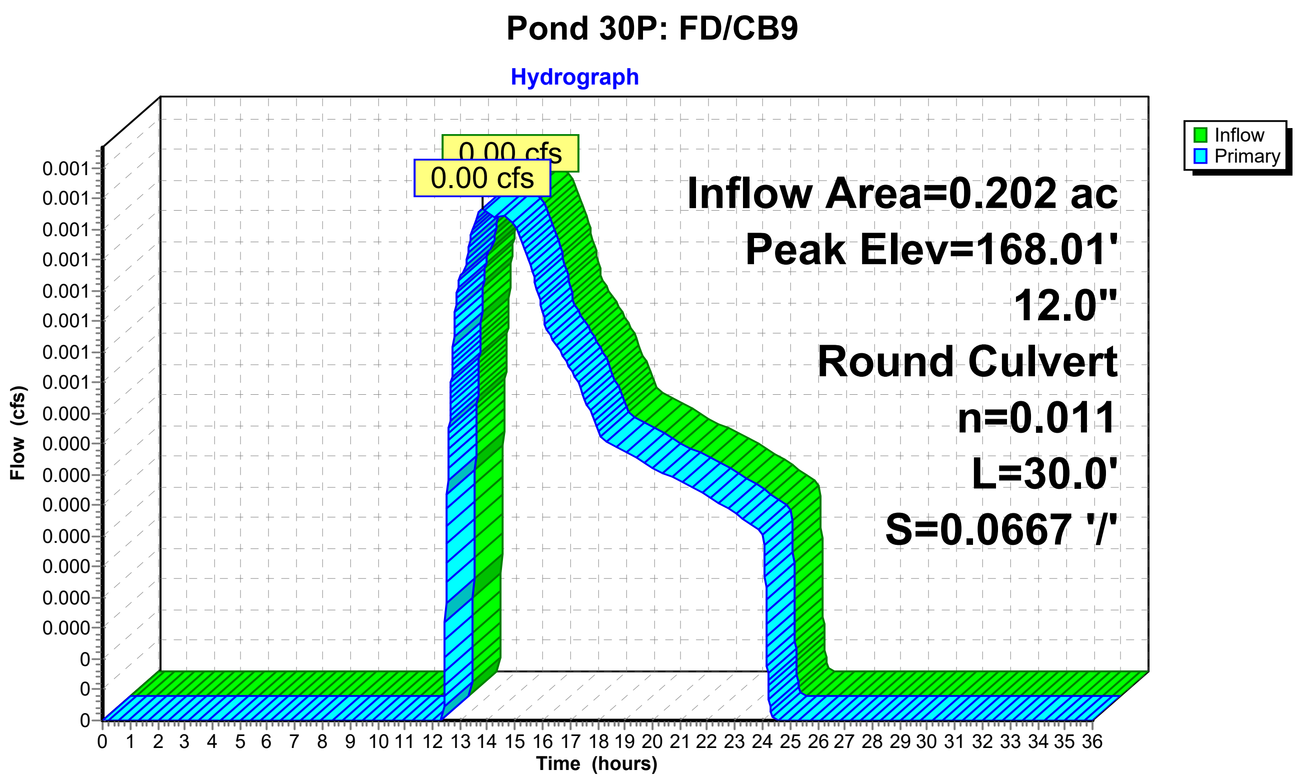
Summary for Pond 30P: FD/CB9

Inflow Area =	0.202 ac,	43.73% Impervious,	Inflow Depth = 0.03"	for 1-IN event
Inflow =	0.00 cfs @	13.84 hrs, Volume=	0.001 af	
Outflow =	0.00 cfs @	13.84 hrs, Volume=	0.001 af, Atten= 0%, Lag= 0.0 min	
Primary =	0.00 cfs @	13.84 hrs, Volume=	0.001 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 168.01' @ 13.84 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	168.00'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.00' / 166.00' S= 0.0667 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 13.84 hrs HW=168.01' TW=164.30' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.00 cfs @ 0.40 fps)



Summary for Pond 39P: FD/DMH13&14

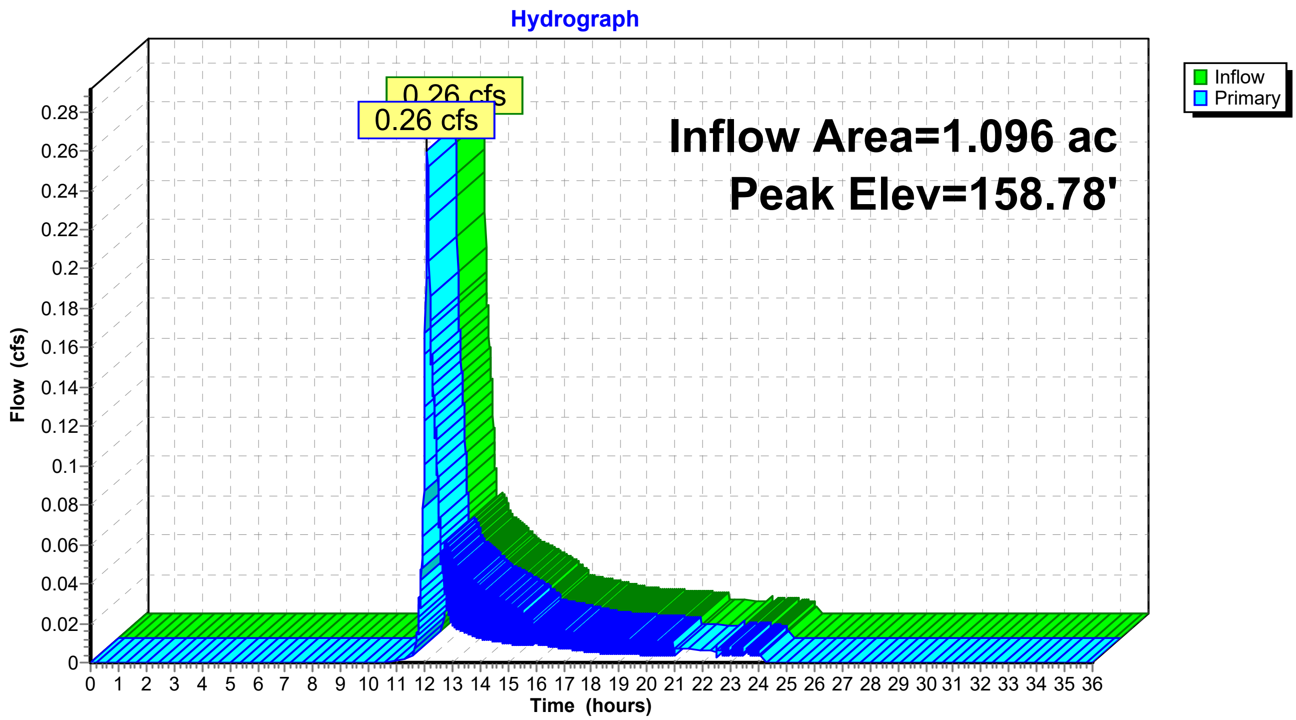
Inflow Area = 1.096 ac, 75.70% Impervious, Inflow Depth = 0.23" for 1-IN event
Inflow = 0.26 cfs @ 12.10 hrs, Volume= 0.021 af
Outflow = 0.26 cfs @ 12.10 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min
Primary = 0.26 cfs @ 12.10 hrs, Volume= 0.021 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 158.78' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.60'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Primary	158.60'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.60' / 158.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.10 hrs HW=158.78' TW=158.05' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.13 cfs @ 2.03 fps)
2=Culvert (Barrel Controls 0.13 cfs @ 2.03 fps)

Pond 39P: FD/DMH13&14



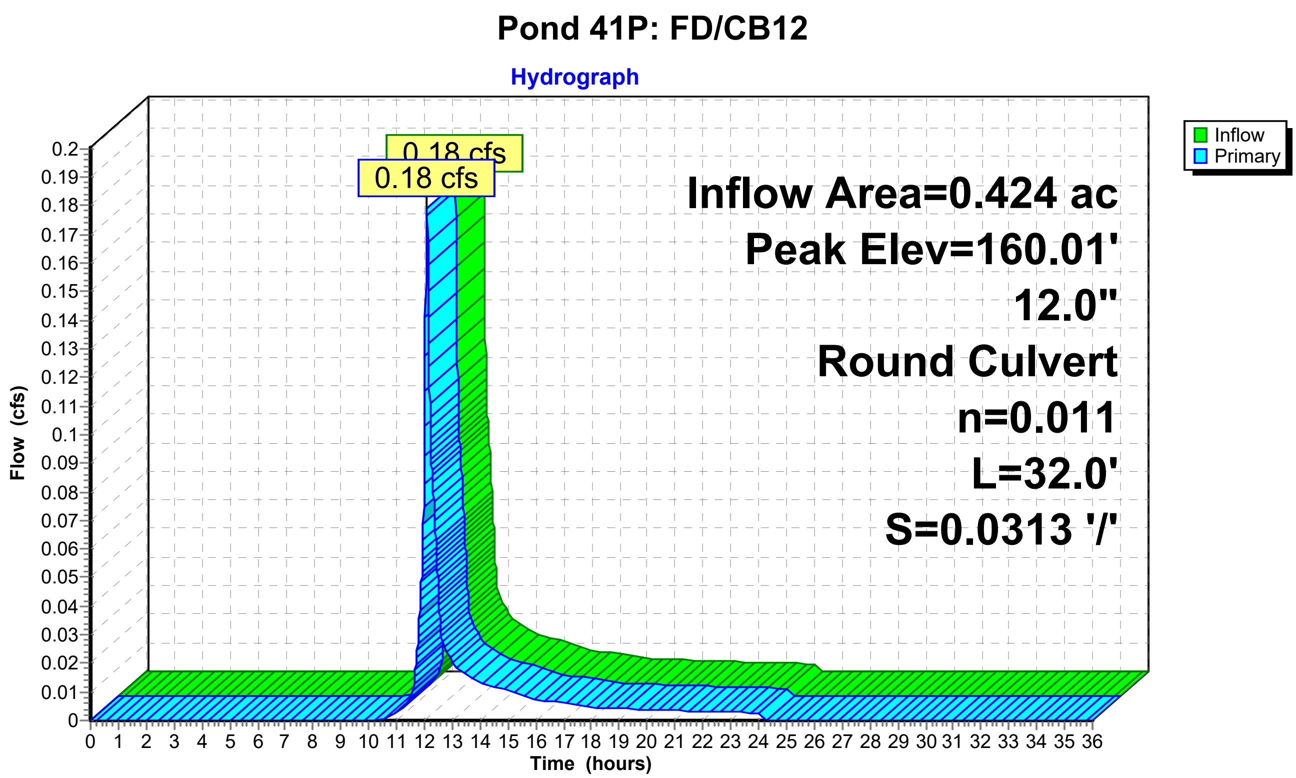
Summary for Pond 41P: FD/CB12

Inflow Area =	0.424 ac,	87.50% Impervious,	Inflow Depth = 0.36"	for 1-IN event
Inflow =	0.18 cfs @	12.08 hrs, Volume=	0.013 af	
Outflow =	0.18 cfs @	12.08 hrs, Volume=	0.013 af, Atten= 0%, Lag= 0.0 min	
Primary =	0.18 cfs @	12.08 hrs, Volume=	0.013 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.01' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	159.80'	**12.0" Round Culvert** L= 32.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.80' / 158.80' S= 0.0313 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.18 cfs @ 12.08 hrs HW=160.01' TW=158.87' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.18 cfs @ 1.54 fps)



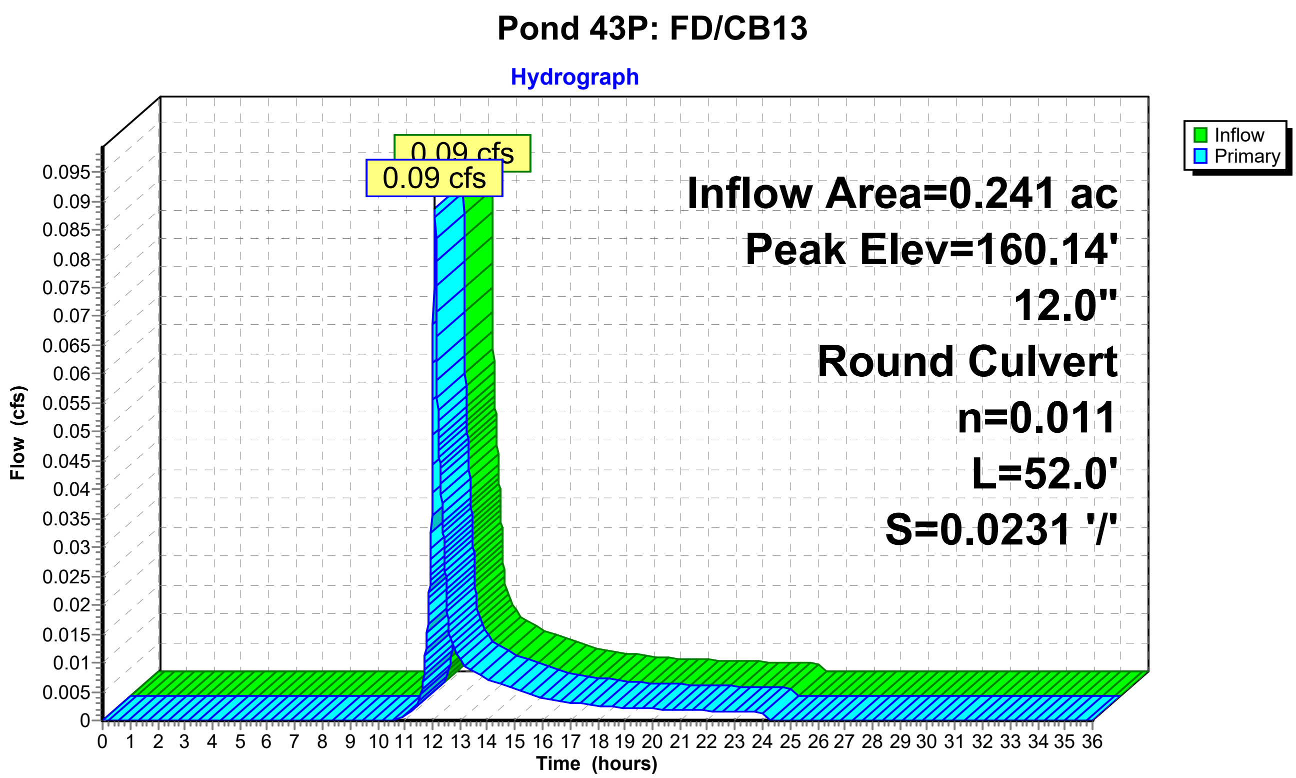
Summary for Pond 43P: FD/CB13

Inflow Area =	0.241 ac,	85.99% Impervious,	Inflow Depth = 0.32"	for 1-IN event	
Inflow =	0.09 cfs @	12.08 hrs,	Volume=	0.006 af	
Outflow =	0.09 cfs @	12.08 hrs,	Volume=	0.006 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.09 cfs @	12.08 hrs,	Volume=	0.006 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 160.14' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	160.00'	**12.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.00' / 158.80' S= 0.0231 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.09 cfs @ 12.08 hrs HW=160.14' TW=158.87' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.09 cfs @ 1.29 fps)



ATTACHMENT N: Grate Calculations

Neenah Inlet Grate Capacity Calculations

For Flow on Slopes

$Q=K'D^{(5/3)}$

Where
Q=Grate flow capacity
K=From chart (for R-3405 Grate)
D=Depth of flow

"K'" Value	For D=0.2 Slope L	Capacity
18.8	1.00%	1.29
21.6	1.50%	1.48
24.4	2.00%	1.67
25.4	2.50%	1.74
26.4	3.00%	1.81
27.3	3.50%	1.87
28.3	4.00%	1.94
29.4	4.50%	2.01
30.5	5.00%	2.09
31.5	5.50%	2.15
32.6	6.00%	2.23

For Ponding Flows

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

Where
Q=Grate flow capacity
C=0.6
A=Open area
G=32.2
h=Depth of Water

A= 1.5

h	Q
0.1	2.28
0.2	3.23
0.3	3.96
0.4	4.57
0.5	5.11

Single/Double Grate

Catch Basin	Slope	HydroCAD 25-Yr cfs	Grate Capacity cfs	Double Grate Needed?
CB1	Ponding	4.03	5.11	No
CB2	Ponding	3.02	5.11	No
CB3	Ponding	2.07	5.11	No
CB4	Ponding	2.2	5.11	No
CB5	Ponding	3.02	5.11	No
CB6	Ponding	0.86	5.11	No
CB7	5.00%	0.85	2.09	No
CB8	5.00%	0.85	2.09	No
CB9	4.00%	0.59	1.94	No
CB10	Ponding	1.26	5.11	No
CB11	Ponding	1.32	5.11	No
CB12	Ponding	2.15	5.11	No
CB13	Ponding	1.18	5.11	No

CB1 and CB2 are proposed to have double grates as a conservative measure

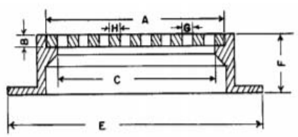
*Capacity for ponding situations is based on ponding depth of 0.5', which is equivalent to curb height.

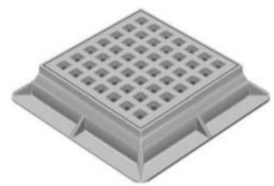
■ Note: When specifying/ordering grates, refer to "Choosing the Proper Inlet Grate" on pages 125-126.
For a complete listing of FREE OPEN AREAS and WEIR PERIMETERS of all NEENAH grates, refer to pages 327-332.

R-3404 to R-3405 Series
Gutter Inlet Frame, Grate

Heavy Duty

CATALOG NUMBER	GRATE TYPE	SQ. FT. OPEN	WEIR PERIMETER LINEAL FEET
R-3404	H	1.4	7.2
R-3405	H	1.5	7.9
R-3405-A	H	1.3	8.0
R-3405-A	L	1.5	8.0
R-3405-B	H	1.3	8.0
R-3405-B	L	1.5	8.0
R-3405-D3	H	3.5	10
R-3405-D4	H	3.5	10





Illustrating R-3405

Dimensions in inches

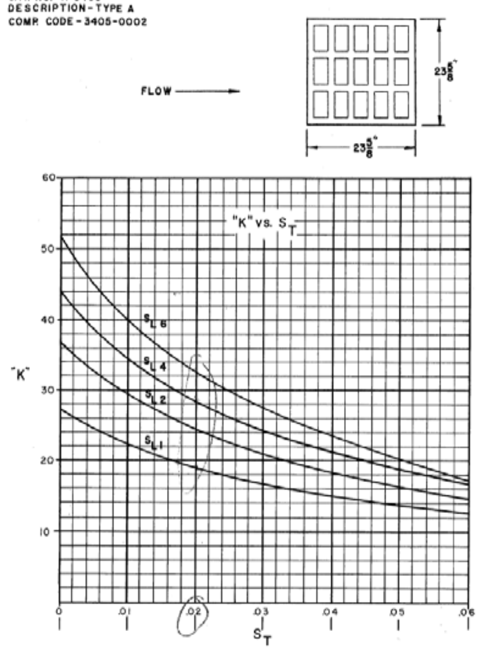
Catalog No.	A	B	C	E	F	G	H
R-3404	21 1/2 x 21 1/2	1 1/2	20 1/8 x 20 1/8	30 5/8 x 30 5/8	5 1/8	2 x 2	15/16
R-3405	23 5/8 x 23 5/8	1 1/2	22 x 22	32 3/4 x 32 3/4	6	2 1/8 x 2 1/8	1
R-3405-A **	23 7/8 x 23 7/8	2	22 x 22	32 1/8 x 32 1/8	6 1/8	2 1/4 x 2 1/4	1 7/16
R-3405-B * **	23 7/8 x 23 7/8	2	22 x 22	32 1/8 x 29	6 1/8	2 1/4 x 2 1/4	1 7/16
R-3405-D3 +	29 3/4 x 29 3/4	1 7/16	28 1/2 x 28 1/2	34 3/4 x 38	6	3 3/4 x 3 3/4	1 1/16
R-3405-D4	29 3/4 x 29 3/4	1 7/16	28 1/2 x 28 1/2	38 x 38	6	3 3/4 x 3 3/4	1 1/16

* Same as R-3405-A except base flange on 3 sides only.
** Also available grate Type L.
+ Same as R-3405-D4 except base flange on 3 sides only.

Type L

*Design catch basin used (R-3405)

CAT. NO.-R-3405
DESCRIPTION-TYPE A
COMP. CODE-3405-0002



S_T = TRANSVERSE GUTTER SLOPE
S_L = LONGITUDINAL GUTTER SLOPE
K = GRATE INLET COEFFICIENT

*Neenah "K'" value chart for R-3405 Grate