Stormwater Report

For

William Wallace Village

274 VILLAGE STREET

MEDWAY MA, 02053

Proposed Residential Development

June 25, 2019

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VOLUME 1 OF 1

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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 "William Wallace Village Medway, MA Site Plan" prepared by Legacy Engineering, LLC with an original date of June 25, 2019. The development consists of 7 two-family dwellings, for a total of 14 dwelling units.

EXISTING SITE

The proposed development lies on the northerly side of Village Street in Medway, totaling approximately 3.63 acres. The site is developed with a single-family dwelling to the rear of the property, and a building used as a gym toward the front of the property. Wetlands lie in the northeast corner of the site. Multiple concrete pads can be found across the site, which are surrounded by woodlands.

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:

Easterly Portions:

- Sudbury (260B): A class B soil.

Westerly Portions:

- Scio (223B): A class B/D soil.

Southeasterly Portions:

- Merrimac (254B): A class A soil.

GROUNDWATER CONDITIONS

On-site testing concluded that the groundwater table slopes from northwest to southeast and ranges from 184.0 in the northwest to 179.2 in the southeast, with the central portions in the vicinity of elevation 183.

SOIL PERMEABILITY

For the purposes of this report and based on the soils present at the proposed stormwater infiltration facilities, a Rawls rate for loamy sand (2.41 inches per hour) is used for infiltration related calculations.

FLOOD PLAIN

No portion of this site lies within a flood plain.

WETLAND PROTECTION ACT

The northeasterly portions of the site include bordering vegetated wetlands along an unnamed tributary of the Charles River. A Notice of Intent will be filed for proposed work within wetland jurisdictional areas.

PROPOSED DEVELOPMENT

The proposed construction consists of 7 two-family dwellings for a total of 14 new dwelling units. The existing house and gym will be demolished to accommodate the new dwellings. Construction also includes all appurtenant driveways, utilities, landscaping, and stormwater management systems.

MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS

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 four primary stormwater discharge points. Note the following:

- Design Point #1: Flow to 280 Village Street: Stormwater basin #1 overflows via rip-rap apron to the adjacent property with a 100-year flow rate of only 1 cfs. This flow will not erode the surrounding soils.
- Design Point #2: Flow to 278 Village Street: There are no new point source discharges to this design point.
- Design Point #3a: Flow to Village Street: The proposed stormwater infiltration field overflows via the trench drain into the street pavement will therefore not erode the area.
- Design Point #3B: Flow to Eastern Abutter: The proposed stormwater infiltration field overflows to the adjacent property via level spreader and by

the driveway trench drain and will therefore not erode the surrounding soils.

- Design Point #4: Flow to Wetlands: Stormwater basin #4 overflows to the adjacent wetlands via level spreader, and Stormwater basin #5 overflows via rip-rap apron. Given the 100-year peak flow rates of only 1.8 and 0.3 cfs, erosion will not occur at these outfall points.

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. Medway Conservation regulations require that the 25-year storm be analyzed for storm drains and basins, and the 50-year storm for culverts. The following five 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
50-Year	6.1 inches
100-Year	6.7 inches

DESIGN POINT #1: Flow to 280 Village Street

Description of Existing Conditions: In the existing condition, Watershed E1 represents uncontrolled overland flow to the adjacent property and consists of woods, lawn, and roof runoff.

Description of Proposed Conditions: In the proposed condition, Watersheds P1a and P1c represent flow to Stormwater Basin #1 and consist of roof and lawn runoff. Watershed P1b represents the uncontrolled runoff to the adjacent property consisting of lawn areas.

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

Summary of Peak Flow Rates to Design Point:

Design Storm (Year)	Peak Runoff Rate (cfs)		Volume of Runoff (ac-ft)	
	Existing	Proposed	Existing	Proposed
2	0.12	0.09	0.024	0.009
10	0.62	0.40	0.072	0.032
25	0.98	0.80	0.105	0.052
50	1.29	1.17	0.132	0.068
100	1.61	1.59	0.161	0.085

DESIGN POINT #2: Flow to 278 Village Street

Description of Existing Conditions: In the existing condition, Watersheds E2a and E2b represent uncontrolled overland flow to the abutter. Watershed E2a is mostly woods, and Watershed E2b is mostly pavement and roof runoff.

Description of Proposed Conditions: In the proposed condition, Watershed P2 represents the narrow strip of land that sheds lawn runoff to the adjacent property. Rates are significantly reduced as a result of the large reduction in watershed area.

Summary of Peak Flow Rates to Design Point:

Design Storm (Year)	Peak Runoff Rate (cfs)		Volume of Runoff (ac-ft)	
	Existing	Proposed	Existing	Proposed
2	0.51	0.04	0.041	0.004
10	0.90	0.14	0.073	0.011
25	1.13	0.21	0.092	0.015
50	1.31	0.26	0.106	0.019
100	1.49	0.32	0.121	0.023

DESIGN POINT #3: Flow to Village Street

Description of Existing Conditions: In the existing condition, Watershed E3a represents the runoff to Village Street. The watershed consists of roof, pavement, gravel, and lawn areas.

Description of Proposed Conditions: In the proposed condition, Watershed P3a sheds to the trench drain, which is routed to the underground infiltration field. Watershed P3b sheds uncontrolled to Village Street and is vegetated.

Summary of Peak Flow Rates to Design Point:

Design Storm (Year)	Peak Runoff Rate (cfs)		Volume of Runoff (ac-ft)	
	Existing	Proposed	Existing	Proposed
2	0.45	0.21	0.035	0.015
10	0.86	0.75	0.067	0.051
25	1.10	1.04	0.085	0.073
50	1.28	1.25	0.099	0.091
100	1.46	1.44	0.113	0.110

DESIGN POINT #3b: Flow to Eastern Abutters

Description of Existing Conditions: In the existing condition, Watershed E3a represents the runoff to the eastern abutter. The watershed consists of roof, pavement, gravel, woods, and lawn areas.

Description of Proposed Conditions: In the proposed condition, Watershed P3c sheds via overland flow to the eastern abutters' stormwater management system (which was designed to handle this off-site flow).

Summary of Peak Flow Rates to Design Point:

Design Storm (Year)	Peak Runoff Rate (cfs)		Volume of Runoff (ac-ft)	
	Existing	Proposed	Existing	Proposed
2	0.07	0.05	0.009	0.006
10	0.26	0.20	0.023	0.016
25	0.37	0.31	0.032	0.023
50	0.47	0.39	0.040	0.029
100	0.57	0.48	0.048	0.035

DESIGN POINT #4: Flow to Wetlands

Description of Existing Conditions: In the existing condition, Watershed E4 represents the runoff to the on-site wetlands and consists of roof, pavement, gravel driveway, concrete slabs, woods, and lawn areas.

Description of Proposed Conditions: In the proposed condition, Watershed P4a represents the runoff from the areas in front of each unit that sheds towards Stormwater Basin #3. Watershed P4b represents the roof runoff from units 7, 8, and 14 that is routed to the basins. Stormwater basins #2, 3 and 4 are connected and are treated as a single basin. The stormwater that sheds to Stormwater Basin #5 is represented by Watershed P4c and P4d and consists of roof and lawn runoff. The uncontrolled runoff to the wetlands is represented by Watershed P4e.

Summary of Peak Flow Rates to Design Point:

Design Storm (Year)	Peak Runoff Rate (cfs)		Volume of Runoff (ac-ft)	
	Existing	Proposed	Existing	Proposed
2	0.63	0.34	0.078	0.065
10	1.96	1.26	0.195	0.177
25	2.80	1.95	0.268	0.249
50	3.48	2.51	0.328	0.308
100	4.18	3.14	0.389	0.373

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 BASIN #1

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

	Class A Soils	Class B Soils	Class C Soils	Class D Soils
On-Site Impervious Area	0 s.f.	9,461 s.f.	0 s.f.	0 s.f.
Required Recharge Volume (Rv)	0 c.f.	276 c.f.	0 c.f.	0 c.f.
Total Rv	276 c.f.			

Capture Area Adjustment: The impervious patios behind each unit are not treated. A capture area adjustment is provided for this design point as follows:

- Treated Impervious Coverage: 9,461 s.f.
- Untreated Impervious Coverage: 588 s.f.
- Percent to Infiltration BMP: 94.2%
- Ratio: 1.06
- *Capture Area Adjusted Rv: 293 c.f.*

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

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

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

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

$V' = A \times D$

Where

A′ is the minimum required bottom area

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

Rv is the Required Recharge Volume

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

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

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

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

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

For this infiltration facility, the Static Method has been utilized. The Static Method simply requires that the infiltration facility's raw storage volume be at least equal to Rv. The proposed Infiltration Basin has a raw storage volume of approximately 1,059 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 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 loamy sand soils at this location. Using the following formula, the drawdown time is calculated:

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

Where:

WQV = 419 c.f.
K = 2.41 inches per hour = 0.20 feet per hour
Bottom Area = 1,604 s.f.

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

Mounding Analysis:

A mounding analysis has been conducted and can be found in attachment L. The bottom of Stormwater Basin #1 is at elevation 186.0, with a seasonal high groundwater elevation below the basin at 184.0. The mound s 0.6 feet and will not impact the basin bottom.

STORMWATER INFILTRATION FIELD

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

	Class A Soils	Class B Soils	Class C Soils	Class D Soils
On-Site Impervious Area	0 s.f.	14,351 s.f.	0 s.f.	0 s.f.
Required Recharge Volume (Rv)	0 c.f.	419 c.f.	0 c.f.	0 c.f.
Total Rv	419 c.f.			

<u>Capture Area Adjustment:</u> The impervious patios behind each unit are not treated. A capture area adjustment is provided for this design point as follows:

- Treated Impervious Coverage: 14,351 s.f.
- Untreated Impervious Coverage: 636 s.f.
- Percent to Infiltration BMP: 95.8%
- Ratio: 1.04
- *<u>Capture Area Adjusted Rv: 437 c.f.</u>*

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 Field has a raw storage volume of approximately 440 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 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 loamy sand soils at this location. Using the following formula, the drawdown time is calculated:

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

Where:

WQV = 624 c.f.

K = 2.41 inches per hour = 0.20 feet per hour

*Bottom Area = 1,258 s.f. *40% Voids = 503 s.f.*

It is concluded that the drawdown time for the infiltrated volume is 6.2 hours, which satisfies this requirement.

<u>Mounding Analysis:</u>

A mounding analysis has been conducted and can be found in attachment L. The bottom of the field is at elevation 181.2, with a seasonal high groundwater elevation below the basin at 179.2. The mound is 1.1 feet and will not impact the field bottom.

STORMWATER INFILTRATION BASINS #2-4

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

	Class A Soils	Class B Soils	Class C Soils	Class D Soils
On-Site Impervious Area	0 s.f.	26,472 s.f.	0 s.f.	0 s.f.
Required Recharge Volume (Rv)	0 c.f.	772 c.f.	0 c.f.	0 c.f.
Total Rv	772 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 Basins have a cumulative raw storage volume of approximately 1,200 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 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 loamy sand soils at this location. Using the following formula, the drawdown time is calculated:

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

Where:

WQV = 1,103 c.f.
K = 2.41 inches per hour = 0.20 feet per hour
Bottom Area = 5,163 s.f.

It is concluded that the drawdown time for the infiltrated volume is 1.1 hours, which satisfies this requirement.

Mounding Analysis:

A mounding analysis has been conducted and can be found in attachment L. The bottom of Stormwater Basins #2-4 are each 2 feet or more above groundwater at their locations. The mound is 0.7 feet and will not impact the bottom of the basins.

STORMWATER INFILTRATION BASINS #5

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

	Class A Soils	Class B Soils	Class C Soils	Class D Soils
On-Site Impervious Area	0 s.f.	7,804 s.f.	0 s.f.	0 s.f.
Required Recharge Volume (Rv)	0 c.f.	228 c.f.	0 c.f.	0 c.f.
Total Rv	228 c.f.			

Capture Area Adjustment: The impervious patios behind each unit are not treated. A capture area adjustment is provided for this design point as follows:

- Treated Impervious Coverage: 7,804 s.f.
- Untreated Impervious Coverage: 1,155 s.f.
- Percent to Infiltration BMP: 87.1%
- Ratio: 1.15
- *Capture Area Adjusted Rv: 261 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 450 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 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 loamy sand soils at this location. Using the following formula, the drawdown time is calculated:

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

Where:

WQV = 373 c.f.
K = 2.41 inches per hour = 0.20 feet per hour
Bottom Area = 333 s.f.

It is concluded that the drawdown time for the infiltrated volume is 5.6 hours, which satisfies this requirement.

Mounding Analysis:

A mounding analysis has been conducted and can be found in attachment L. The bottom of Stormwater Basin #5 is at elevation 185.0, with a seasonal high groundwater elevation below the basin at 181.5. The mound is 0.5 feet and will not impact the bottom of the basin.

STANDARD 4 - TSS Removal

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

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

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

WATER QUALITY VOLUME (WQV)

The Water Quality Volume represents the volume of water which must receive TSS removal treatment in order to comply with Standard 4. The water quality volume is calculated based on either 0.5 inches of runoff or 1.0 inches of runoff from all impervious surfaces on the site. 0.5 inches is used except in sensitive locations as described in the Stormwater Handbook. Since this site does not discharge to a critical area, the WQV is based on 0.5 inches 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)*(0.5 in.)
WQV=(60,467 sq. ft.)*(0.5 in.)/(12 in/ft)=2,519 c.f.

Each basin was designed to treat the WQV attributed to it as shown is Standard 3 of this report.

PROPOSED BMP DESIGN

Deep Sump Manhole

All proposed deep sump manholes 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.

Sediment Forebay

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

For Stormwater Infiltration Basins #1 & #5, the tributary (non-roof) impervious areas are from patio runoff only, which each have 196 s.f. of impervious are. It is not practicable to create a sediment forebay to treat these small areas.

For Stormwater Infiltration Basin #2, the tributary (non-roof) impervious area is 20,913 s.f. and the minimum forebay volume is 174 cubic feet. Runoff is directed to three locations in the basin, and the treatment volume has been split evenly between the three sediment forebays. With water trapped behind the 6" high checkdams, the designed forebays will each contain 60 cubic feet for a total of 180 cubic feet, meeting the requirement.

Stormwater Infiltration Basin:

Stormwater pre-treatment is achieved by sediment forebays where needed (see Attachment E for TSS calculations). These pre-treatment facilities remove the required 25% TSS before water is discharged to the infiltration basin.

Infiltration Basins #1 & 5 have been designed with a rip rap outlet. Infiltration Basin #2-4 are connected and have been designed with a simple concrete outlet headwall with a notch designed to control design storm conditions. The weir wall itself acts as the higher emergency overflow, which discharges towards the wetland via a level spreader.

Underground Infiltration Field:

Stormwater pretreatment is handled by a deep sump drain manhole, which removes the required 25% TSS before treatment.

The infiltration field consists of 44 Cultec C-100HD units, overflow from which is piped to a level spreader.

TSS REMOVAL CALCULATIONS

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

Infiltration Basin:

With the sediment forebay, the total pretreatment TSS removal prior to the infiltration basin is 25%. The infiltration basin provides 80% TSS removal when including one pretreatment device, for a total of 80% TSS removal.

Roof Runoff Infiltration Systems:

With the deep sump structure, the total pretreatment TSS removal prior to the infiltration basin is 25%. The infiltration field provides 80% TSS removal when including one pretreatment device, for a total of 80% TSS removal.

STANDARD 5 - Land Uses with Higher Potential Pollutant Loads

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

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

STANDARD 6 – Critical Areas

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

This site does not lie within a Critical Area. .

STANDARD 7 - Redevelopment

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

The site is a partial redevelopment and therefore is required to meet these standards to the maximum extent practicable. All standards are met except for Standard 4. The patios at the rear of each unit produce impervious runoff that is not able to be practicably treated. These areas are small and will not have a detrimental impact to the surrounding areas.

The proposed surface area of untreated impervious runoff for the site is far less in the proposed condition (2,379 s.f.) than in the existing conditions (22,725 s.f.).

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

William Wallace Village

274 VILLAGE STREET

MEDWAY MA, 02053

Proposed Residential Development

June 25, 2019

PREPARED BY:
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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's infrastructure. 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

William Wallace Village

Project Location

274 Village Street
Medway MA, 02053

Operator Name and Address

DTRT LLC
P.O. Box 95
Truro, MA 02666

References

This O&M Plan references other documents as follows:

Site Plan - Plans entitled "William Wallace Village, Medway, MA Site Plan" with an original date of June 25, 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 William Wallace Village, 274 Village Street, Medway, MA 02053" prepared by Legacy Engineering LLC with an original date of June 25, 2019 (as may be amended).

Site Description

The site consists of seven proposed two-family residential buildings located on 3.63 acres of land on Village Street in Medway and includes all appurtenant driveways, utility systems, landscape areas, and stormwater management systems. Those land areas are collectively referred to herein as the "Development."

Site Usage and Activities

Two-family residential buildings 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 Structures:

1. Deep sump structures 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 structure 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 in and around the development throughout the time of construction.
3. All sediments and hydrocarbons shall be disposed of off-site in accordance with all applicable local, state, and federal regulations.

Sediment Forebays:

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

Stormwater Infiltration Basin:

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

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.

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 and/or organic/synthetic slow release fertilizers shall be used. The optimal use of fertilizers is to create an organic foundation for soil health and development which provides sufficient nutrients for controlled plant growth and avoiding subsurface and surface nutrient loss to groundwater or stormwater runoff. Fertilizer shall be slow release, organic, and low in phosphorous in the 100' wetland buffer.
- 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 shall be limited to sand, sodium chloride or calcium chloride.
6. Snow is not to be stored where runoff will flow directly to the wetlands.

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

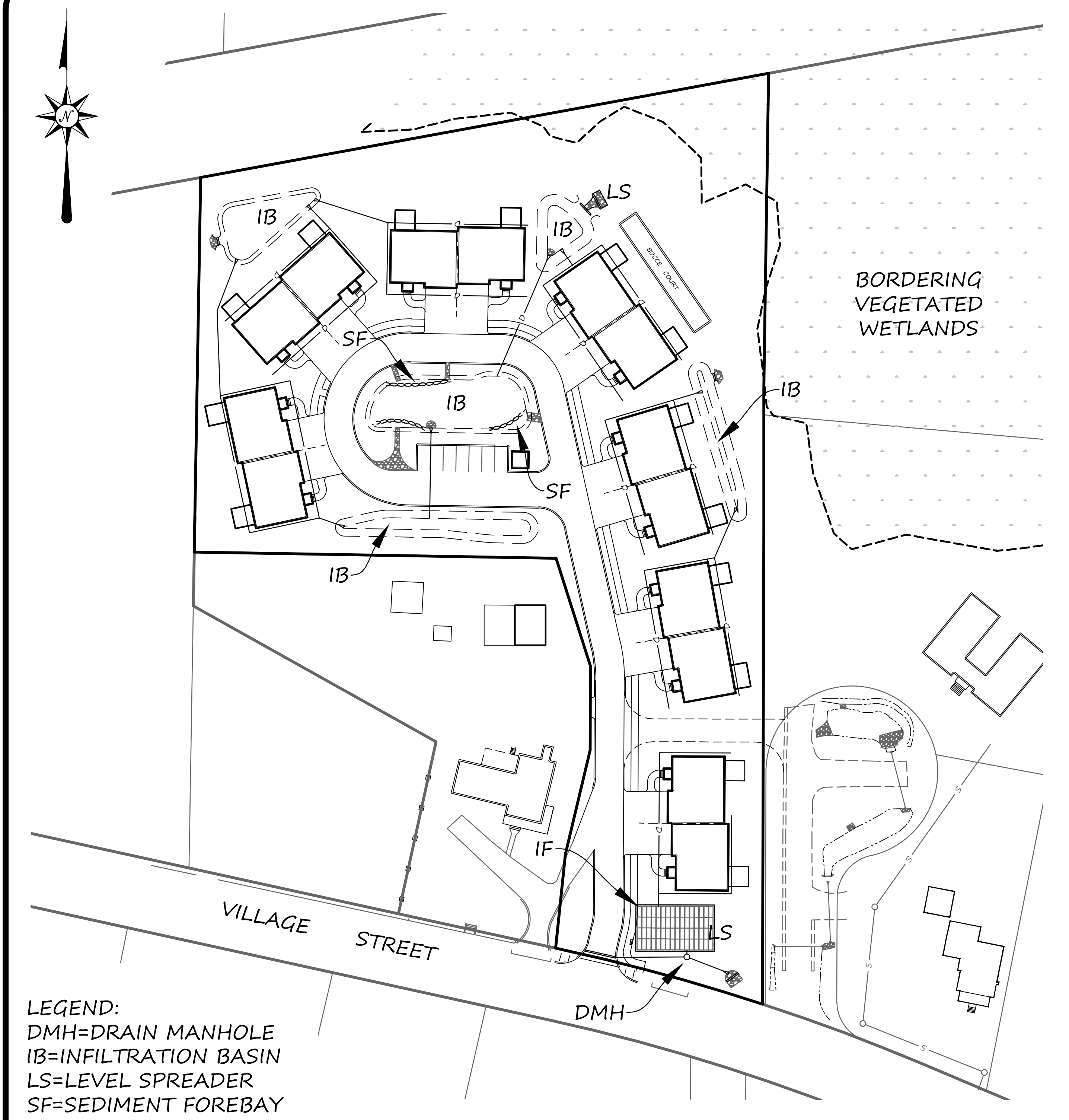
It is estimated that the regular annual maintenance tasks described herein will cost $1,000 per year (2019 value).

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



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

SHEET 1 OF 1

LEGACY ENGINEERING

WILLIAM WALLACE VILLAGE O&M PLAN OF LAND IN MEDWAY, MA

PLAN SCALE: 1"=100'

0' 100' 200'

REVISION	DATE

PLAN DATE: 06/25/19

EXHIBIT 2 STORMWATER SYSTEM OPERATIONS AND MAINTENANCE LOG FORM

Stormwater System Operations and Maintenance Log

Year _______________

General Information	
Project Name	274 Village Street
Site Location	274 Village 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 Structures			
	1st Quarter Cleanout		
	2nd Quarter Cleanout		
	3rd Quarter Cleanout		
	4th Quarter Cleanout		
Sediment Forebay			
	1st Annual Inspection		
	2nd Annual Inspection		
	3rd Annual Inspection		
	4th Annual Inspection		
	1st Annual Mowing		
	2nd Annual Mowing		
	Sediment Rem. Req'd?		
Stormwater Infiltration Basin			
	1st Annual Inspection		
	2nd Annual Inspection		
	1st Annual Mowing		

	O&M Activity	Date Completed	Notes/Comments
	2nd Annual Mowing		
	Sediment Rem. Req'd?		
Infiltration Field			
	1st Annual Inspection		
	2nd Annual inspection		
	System Repl. Req'd?		
Stormwater Pipes, Inlets and Outlets			
	1st Annual Inspection		
	2nd Annual inspection		

ATTACHMENT B: USGS Map


Camp Breezy Meadow
DIANE DR
KIMBERLY DR
Chicken Brook
LOVERING ST
OHLSON CIR
SKYLINE DR
FAIRWAY LN
HOLLISTON ST
JUNIPER RD
CAUSEWAY ST
PUDDINGSTONE LN
BROKEN TREE RD
HICKORY DR
SUN VALLEY DR
SADDLE HILL RD
SPRUCE RD
ELLIS ST
GREEN VALLEY RD
HOWE ST
LOVERING ST
MAPLE ST
COFFEE ST
GORWIN DR
MERYL ST
MAIN ST
OAKLAND ST
109
Milk Pond
TEMPLE ST
POND ST
PO
Park Pond
HIGHLAND ST
OAK ST
EVERGREEN ST
Evergreen Cem
COTTAGE ST
Saint Josephs Cem
Oakland Cem
BROAD ST
Medway
HIGH ST
LINCOLN ST
NORFOLK AVE
Chicken Brook
West Medway
MAIN ST
VILLAGE ST
Charles River Reservoir
POND ST
LOCUS
CHARLES RIVER RD
Charles River
Charles River
Mine Brook
AMYS WAY
LINCOLN ST
BENT ST
PLAIN ST
Shepards Brook
FRANKLIN
WOODHAVEN DR
BEECH ST
PINE ST
PARTRIDGE ST
ELM ST
SKYLINE DR
CHARLES DR
250
200
150
300

ATTACHMENT C: Illicit Discharge Compliance Statement

ILLICIT DISCHARGE COMPLIANCE STATEMENT

William Wallace Village
274 Village 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: June 25, 2019

ATTACHMENT D: Construction Activity NPDES Stormwater Pollution Prevention Plan

Stormwater Pollution Prevention Plan (SWPPP)

For a

Construction Activity

For

William Wallace Village

274 VILLAGE STREET

MEDWAY MA, 02053

Proposed Residential Development

June 25, 2019

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

PREPARED FOR:
DTRT LLC
P.O. Box 95
Truro, MA 02666

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

William Wallace Village

1.2 Project Location

274 Village Street
Medway, MA 02053

1.3 Owner Name and Address

DTRT LLC
P.O. Box 95
Truro, MA 02666

1.4 General Contractor/Operator Name and Address

Owner Operator:

DTRT LLC
P.O. Box 95
Truro, MA 02666

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

Designation of Site Manager and Emergency Contact (person responsible for the day-to-day management of site operations): Larry Rucki (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): <u>(to be determined)</u> 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 "274 Village Street Medway, MA Site Plan" with an original date of May 13, 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 274 Village Street, Medway MA 02053" prepared by Legacy Engineering, LLC with an original date of May 13, 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 proposed construction consists of 7 two-family dwellings for a total of 14 new dwelling units. The existing house and gym will be demolished to make way for these new dwellings. Construction also includes all appurtenant driveways, utilities, and stormwater management systems.
2. The total lot area of the development is approximately 3.63 acres, with approximately 1.8 acres previously disturbed.
3. The site is developed with a single-family dwelling to the rear of the property, and a building used as a gym toward the front of the property. Multiple concrete pads can be found across the site and are surrounded by woodlands. The land in the northeasterly corner of the lot consists of wetlands along an unnamed tributary to the Charles River.
4. The proposed construction activities will disturb approximately 3.0 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 in one phase, which is expected to commence in the fall of 2019 and to be completed by the fall of 2020.

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 buildings 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 Charles River.

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 has implemented such regulations and this project is designed to be consistent with the local stormwater regulations, the DEP Stormwater Management Handbook, and the NPDES Construction General Permit. The Final TMDL also highly recommends a few specific BMP's for phosphorus reduction. One such approach is the use of infiltration facilities, which are highly effective at removing phosphorus as the phosphorus is almost eliminated through vegetation and soils contact as the water infiltrates downward. Data within the TMDL indicates that infiltration facilities designed to hold 1.0 inches of runoff from impervious surfaces, will remove more than 80% of the total annual phosphorus load from the site. Runoff from the site's impervious areas are routed to infiltration facilities designed to accommodate a minimum of 1-inches of runoff. Another focus of the Final TMDL is the elimination of illicit discharges, of which there are none within this project. It is therefore concluded that the proposed site design is consistent with the Nutrient TMDL for the Upper Charles River.

Nutrient (Phosphorus) TMDL for the Lower Charles River:

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

Pathogen TMDL for the Charles River Watershed:

This TMDL provides for reduction in pathogen concentrations in the Charles River watershed's impaired waterbody segments. A review of the EPA TMDL approval dated May 22, 2007 finds a reference to the requirement that projects of this nature implement stormwater BMP's consistent with the NPDES and other applicable regulations. The DEP has issued an implementation guide for this TMDL entitled "Mitigation Measures to Address Pathogen Pollution in Surface Water: A TMDL Implementation Guidance Manual for Massachusetts," which is the basis for the TMDL compliance assessment for this project. Pathogen sources within the Charles River watershed are numerous but many have no specific relation to this project such as combined-sewer overflows (CSO's), agricultural sources, and septic systems. For this project, the only significant potential source of pathogens is stormwater runoff. Stormwater runoff itself is not a source of pathogens. Rather, increases in the peak rate and volume of runoff from a site contribute to a potential increase in the amount of animal waste and other pathogen sources that can be washed into a waterbody. The DEP implementation guides reference the need for local communities to adopt local bylaws and regulations regulating stormwater runoff from both construction activities and post-construction site conditions. The Town has these regulations and the project has been designed accordingly. The DEP implementation guide also notes that infiltration facilities are perhaps the most effective pathogen removal BMP as the pathogens are removed through vegetation contact and by movement through the soil matrix. It is therefore concluded that the project is consistent with the TMDL for pathogens.

1.16 Site Notice & SWPPP Accessibility

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

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

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

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

2.0 Stormwater Controls

2.1 Project Limits and General Control Considerations

The site boundaries are shown on the Site Plan. Construction activities will be limited only to those areas necessary for site construction and no soil disturbance will occur downstream of the limits of erosion controls on the site. The proposed area of disturbance is 3.0 acres, which does not involve the disturbance of more than 10 acres of land that drain to a single point. Furthermore, the limit of work along downstream wetlands buffer areas span some 400 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 northeast 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 Inlets

All storm drain system inlets inside of perimeter controls shall be protected with sediment control measures (silt sacks for catch basins) 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 haybales, silt fence, or filter socks when the depth exceeds four-inches. All control measures will be maintained in effective operating condition. If site inspections identify control measures that are not operating effectively or finds other problems, the Operator must:

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

2.16 Pollution Prevention (Good Housekeeping Practices)

2.16.1 Construction Staging Areas

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

2.16.2 Vehicle Storage, Fueling and Maintenance Area

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

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

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

  - 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).
- ✓ Once the various emergency response teams have arrived at the site, the owner shall follow the instructions of the various governmental entities, which may include the following:
  - A clean up firm may need to be immediately contacted.
  - If the materials have remained trapped in the catch basins or proprietary stormwater treatment units, then these structures may be pumped out. All materials shall be removed by qualified personnel and disposed of in accordance with all applicable local, state, and federal regulations.

2.17 Dewatering Practices

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

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

2.18 Infiltration Systems

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

3.0 Inspections

3.1 Inspection Frequency

The Operator will designate an inspector or inspectors, who shall be a "qualified person" as defined in the CGP and will familiarize himself/herself with the design plans, with the CGP, and with the specifications of this SWPPP. The inspector will inspect the site for compliance with this Plan at least once every seven calendar days 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 straw bales are not buried;
- ✓ Ensure that filter socks are not buried;
- ✓ Ensure that sediment accumulation along erosion controls does not exceed amounts specified above;
- ✓ Ensure that sediment accumulation within existing catch basins are not excessive and that sediment is removed when the depth of accumulation exceeds two feet or 50% of the sump depth, whichever is less;
- ✓ Ensure that un-stabilized areas during active construction activities are not eroding unduly;
- ✓ Ensure that slopes on the construction site are not eroding unduly;
- ✓ Ensure that drainage swales and drainage basins (once constructed) are functioning properly during construction;
- ✓ Ensure that areas where construction activities cease for more than 7 days are temporarily stabilized as specified herein;
- ✓ Ensure that temporary and permanent stabilization measures are thorough and complete and that there are no unprotected or deficient areas;
- ✓ Ensure that the point of vehicular entry into the site is not resulting in soils being tracked into the adjacent street;
- ✓ Care will be taken to determine if pollutants are leaving the site via either overland runoff or entrance into the municipal stormwater system;
- ✓ Determine if pollutants are passing erosion prevention measures and determine whether such issue will result in adverse downstream impacts, in which case additional measures shall be installed as required herein;
- ✓ Identify any areas where new or modified stormwater, sediment and erosion controls are needed;

- ✓ Check for the presence of conditions that could lead to leaks, spills or other accumulations of pollutants on the site;
- ✓ Identify and document all instances of non-compliance; and
- ✓ If a discharge from the property is identified: specify the location, document the visual quality of the discharge including color, odor, floating, settled, or suspended solids, foam, oil sheen or other obvious indicators of stormwater pollutants; and documents the effectiveness and any needed improvements to stormwater controls on the site.

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

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

4.0 Corrective Actions

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

5.0 Personnel Training and Recording Keeping

5.1 Personnel Training

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

5.2 Records

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

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

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

5.3 Retention of Records

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

5.4 Updating This SWPPP

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

6.0 Certifications

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

Signed: ____
(Signature)

Date: ____________________________________

Signed: ____
(Signature)

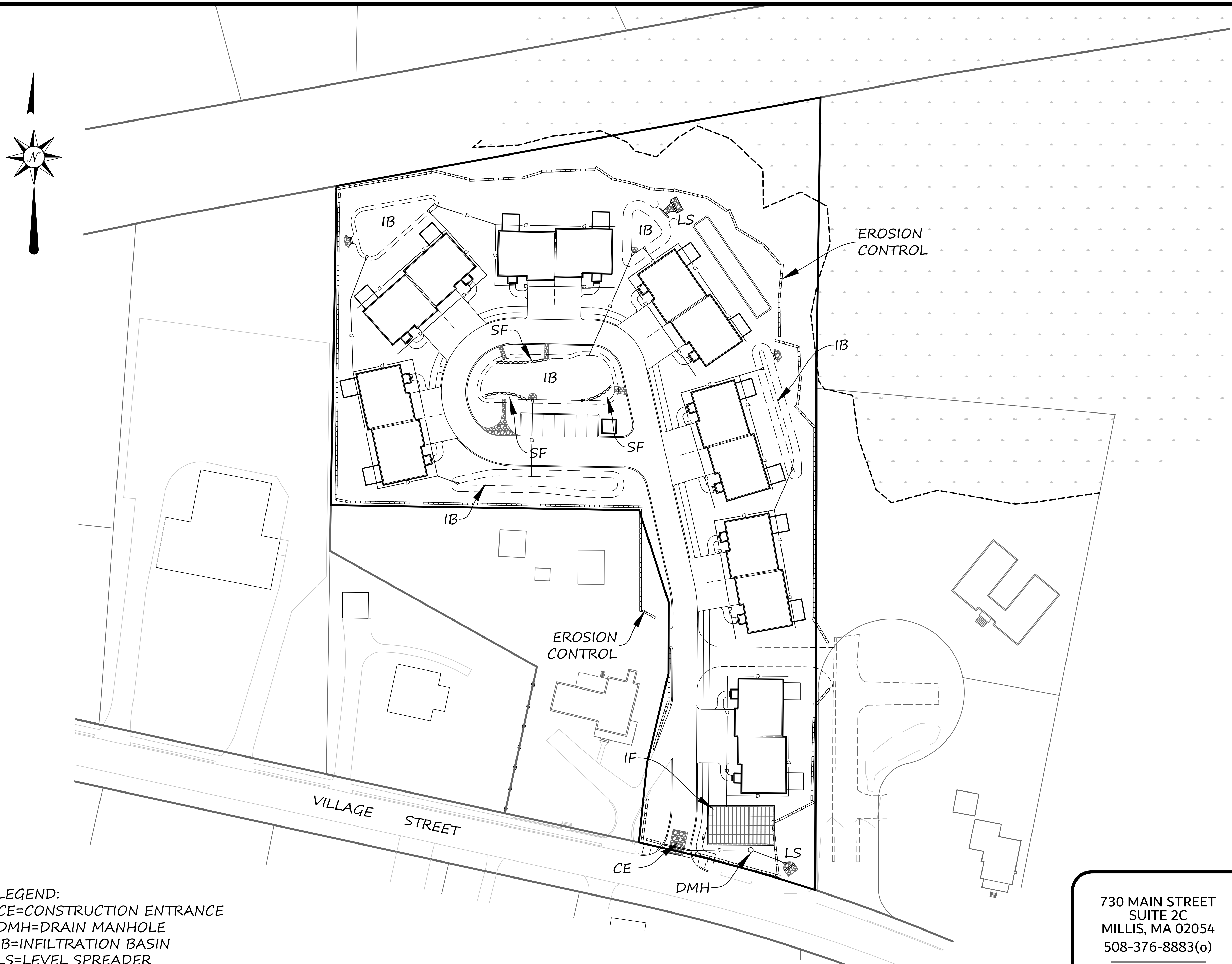
Date: ____________________________________

7.0 Appendices

Appendix 7.1
USGS MAP

Camp Breezy Meadow
West Medway
Medway
FRANKLIN
LOCUS
Milk Pond
Park Pond
Charles River Reservoir
Charles River
Chicken Brook
Mine Brook
Shepards Brook
Evergreen Cem
Saint Josephs Cem
Oakland Cem
VILLAGE ST
MAIN ST
COFFEE ST
LOVERING ST
HOLLISTON ST
POND ST
HIGH ST
OAK ST
EVERGREEN ST
PLAIN ST
WOODHAVEN DR
PARTRIDGE ST
ELM ST
LINCOLN ST
BENT ST
CHARLES DR
SKYLINE DR
CHARLES RIVER RD
AMYS WAY
BROAD ST
OAKLAND ST
HIGHLAND ST
BEECH ST
PINE ST
NORFOLK AVE
COTTAGE ST
TEMPLE ST
MAPLE ST
GORWIN DR
MERYL ST
ELLIS ST
SPRUCE RD
GREEN VALLEY RD
SADDLE HILL RD
SUN VALLEY DR
HOWE ST
OHLSON CIR
DIANE DR
KIMBERLY DR
FAIRWAY LN
JUNIPER RD
CAUSEWAY ST
PUDDINGSTONE LN
BROKEN TREE RD
HICKORY DR
109
PO

Appendix 7.2
SWPPP SITE PLAN



LEGEND:
CE=CONSTRUCTION ENTRANCE
DMH=DRAIN MANHOLE
IB=INFILTRATION BASIN
LS=LEVEL SPREADER
SF=SEDIMENT FOREBAY

PLAN SCALE: 1"=80'

0' 80' 160'

PLAN DATE: JUNE 25, 2019

REVISION	DATE	BY

WILLIAM WALLACE
SWPPP
PLAN OF LAND
IN
MEDWAY, MA

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

SHEET 1 OF 1

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: DTRT LLC

Stormwater Team

	Team Member	Responsibility
1	SWPPP Preparer: Legacy Engineering LLC	Preparing and modifying SWPPP
2	SWPPP Compliance & Oversight: Larry Rucki	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	274 Village Street		
NPDES Tracking No.	MAR___________	Location	274 Village 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 0.5 inches or more) ❑ Regular 7-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	❑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?	❑Yes ❑No	n/a		
5	Is there evidence of sediment being tracked into the street?	❑Yes ❑No	n/a		
6	Do silt sacs require cleaning or replacement?	❑Yes ❑No			
7	Do installed proprietary separators have sediment accumulation?	❑Yes ❑No			
8	Do the installed infiltration BMPs have evidence of sediment accumulation?	❑Yes ❑No			
9	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	n/a		

	BMP/activity	Implemented?	Maintained?	Corrective Action	Date for corrective action/responsible person
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

	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	

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."

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

Location: Infiltration 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 Basin w/ Sediment Forebay	80%	1.00	80%	20%

Total TSS Removal = 80%

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

Project:	274 Village Street
Prepared By:	Legacy Engineering LLC
Date:	June 25, 2019

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

INSTRUCTIONS: *Non-automated: Mar. 4, 2008*

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

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

Location: Infiltration Field

TSS Removal Calculation Worksheet

A BMP1	B TSS Removal Rate1	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Field w/ Deep Sump DMH	80%	1.00	80%	20%

Total TSS Removal = 80%

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

Project: 274 Village Street
Prepared By: Legacy Engineering LLC
Date: June 25, 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.

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

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

Daniel Merrikin

Digitally signed by Daniel J. Merrikin, P.E.
Date: 2019.07.01 08:22:23 -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 (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.

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.

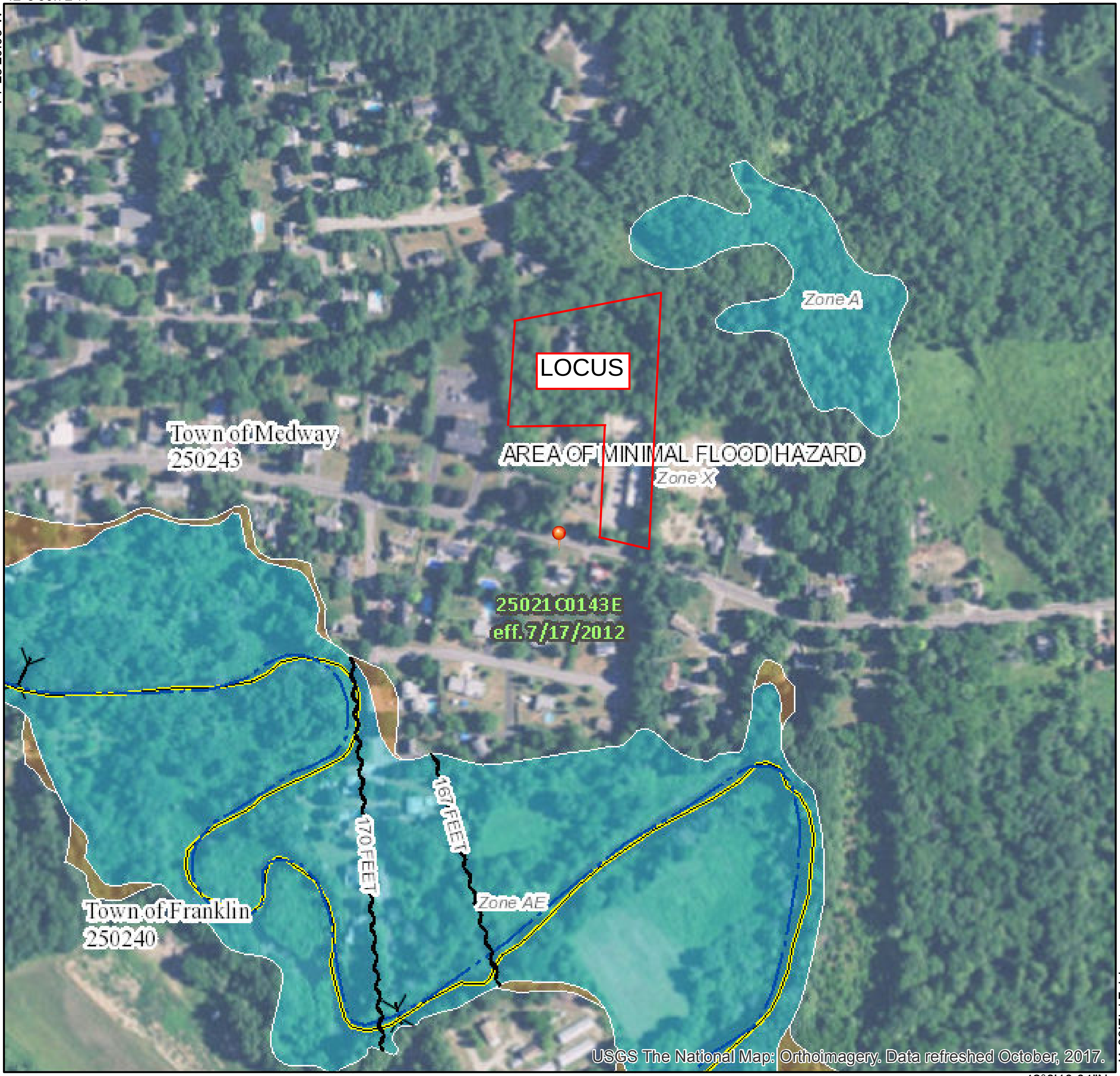
ATTACHMENT G: FEMA Firmette

National Flood Hazard Layer FIRMette

FEMA

42°8'36.72"N

71°25'20.05"W



71°24'42.60"W

42°8'10.04"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
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 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 1/28/2019 at 11:17:24 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

ATTACHMENT H: Soils Data

Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts

Map Scale: 1:1,740 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

N

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 14, Sep 12, 2018

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

Date(s) aerial images were photographed: May 14, 2010—Apr 1, 2017

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	D	0.4	2.7%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	D	0.0	0.1%
223B	Scio very fine sandy loam, 2 to 5 percent slopes	B/D	2.1	14.4%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	3.7	25.4%
260B	Sudbury fine sandy loam, 2 to 8 percent slopes	B	8.3	57.4%
Totals for Area of Interest			**14.5**	**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
274 Village Street Medway, MA 02053

Deep Observation Hole: OTH 1 **Date of Test Hole: May 1, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
28”	Fill										
48”	Bw	10YR6/8				Loamy Sand	1%	<1%	V. Friable	Massive	
108”	C	2.5Y6/2	84”	7.5Y6/8	5%	Loamy Sand	<1%	<1%	V. Friable	Massive	

Additional Notes: Ground Elev.=186.2

Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 84” (Elev.=179.2)

☒ Depth weeping from side of observation hole: 89” (Elev.=178.8)

DEEP OBSERVATION TEST HOLE SOIL LOG
274 Village Street Medway, MA 02053

Deep Observation Hole: OTH 2 **Date of Test Hole: May 1, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
32”	Fill & Ab										
50”	Bw	10YR6/8				Loamy Sand	<1%	<1%	V. Friable	Massive	
61”	C1	2.5Y6/4	55”	7.5Y6/8	5%	Med. Sand	<1%	<1%	Single Grain	Loose	
108”	C2	2.5Y6/2				Sandy Loam	<1%	<1%	V. Friable	Massive	

Additional Notes: Ground Elev.=186.1

Groundwater Indicators Observed at Time of Testing:

☒ Depth observed standing water in observation hole: 75” (Elev.=179.9)

☒ Depth to soil redoximorphic features (mottles): 55” (Elev.=181.5)

☒ Depth weeping from side of observation hole: 61” (Elev.=181.0)

DEEP OBSERVATION TEST HOLE SOIL LOG
274 Village Street Medway, MA 02053

Deep Observation Hole: OTH 3 **Date of Test Hole: May 1, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
24”	Fill										
41”	Bw	10YR6/8				Loamy Sand	<1%	<1%	V. Friable	Massive	
81”	C1	2.5Y6/4	53”	7.5Y6/8	5%	Med S/LS	<1%	<1%	V. Friable	Massive	
108”	C2	2.5Y6/2				Sandy Loam	<1%	<1%	V. Friable	Massive	

Additional Notes: Ground Elev.=187.5

Groundwater Indicators Observed at Time of Testing:

☒ Depth observed standing water in observation hole: 72” (Elev.=181.5)

☒ Depth to soil redoximorphic features (mottles): 53” (Elev.=183.1)

☐ Depth weeping from side of observation hole: None

DEEP OBSERVATION TEST HOLE SOIL LOG
274 Village Street Medway, MA 02053

Deep Observation Hole: OTH 4 **Date of Test Hole: May 1, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
15”	Fill/Af										
27”	Bw	10YR6/8				Loamy Sand	<1%	<1%	V. Friable	Massive	
72”	C1	2.5Y6/4	53”	7.5Y6/8	5%	Med S/LS	<1%	<1%	Single Grain	Loose	
108”	C2	2.5Y6/2				Sandy Loam	<1%	<1%	V. Friable	Massive	

Additional Notes: Ground Elev.=187.3

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

☒ Depth observed standing water in observation hole: 68” (Elev.=181.6)

☒ Depth to soil redoximorphic features (mottles): 53” (Elev.=182.9)

☐ Depth weeping from side of observation hole: None

DEEP OBSERVATION TEST HOLE SOIL LOG
274 Village Street Medway, MA 02053

Deep Observation Hole: OTH 5 **Date of Test Hole: May 1, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
14”	Ap	10YR4/3				Sandy Loam	1%	<1%	V. Friable	Massive	
30”	Bw	10YR6/8				Loamy Sand	1%	<1%	V. Friable	Massive	
63”	C1	2.5Y6/4	36”	7.5Y6/8	5%	Med S/LS	<1%	<1%	V. Friable	Massive	
108”	C2	2.5Y6/2				Sandy Loam	<1%	<1%	V. Friable	Massive	

Additional Notes: Ground Elev.=187.0

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

☒ Depth observed standing water in observation hole: 60” (Elev.=182.0)

☒ Depth to soil redoximorphic features (mottles): 36” (Elev.=184.0)

☐ Depth weeping from side of observation hole: None

DEEP OBSERVATION TEST HOLE SOIL LOG
274 Village Street Medway, MA 02053

Deep Observation Hole: OTH 6 **Date of Test Hole: May 1, 2019** **Soil Evaluation By: Daniel J. Merrikin, P.E.**
(Mass. Approved Soil Evaluator)

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
8”	Ap	10YR4/3				Loamy Sand	1%	<1%	V. Friable	Massive	
16”	Bw	10YR6/7				Loamy Sand	1%	<1%	V. Friable	Massive	
60”	C1	2.5Y6/4	60”	7.5Y6/8	5%	Med. Sand	<1%	<1%	Single Grain	Loose	
108”	C2	2.5Y6/2				Sandy Loam	<1%	<1%	V. Friable	Massive	

Additional Notes: Ground Elev.=187.3

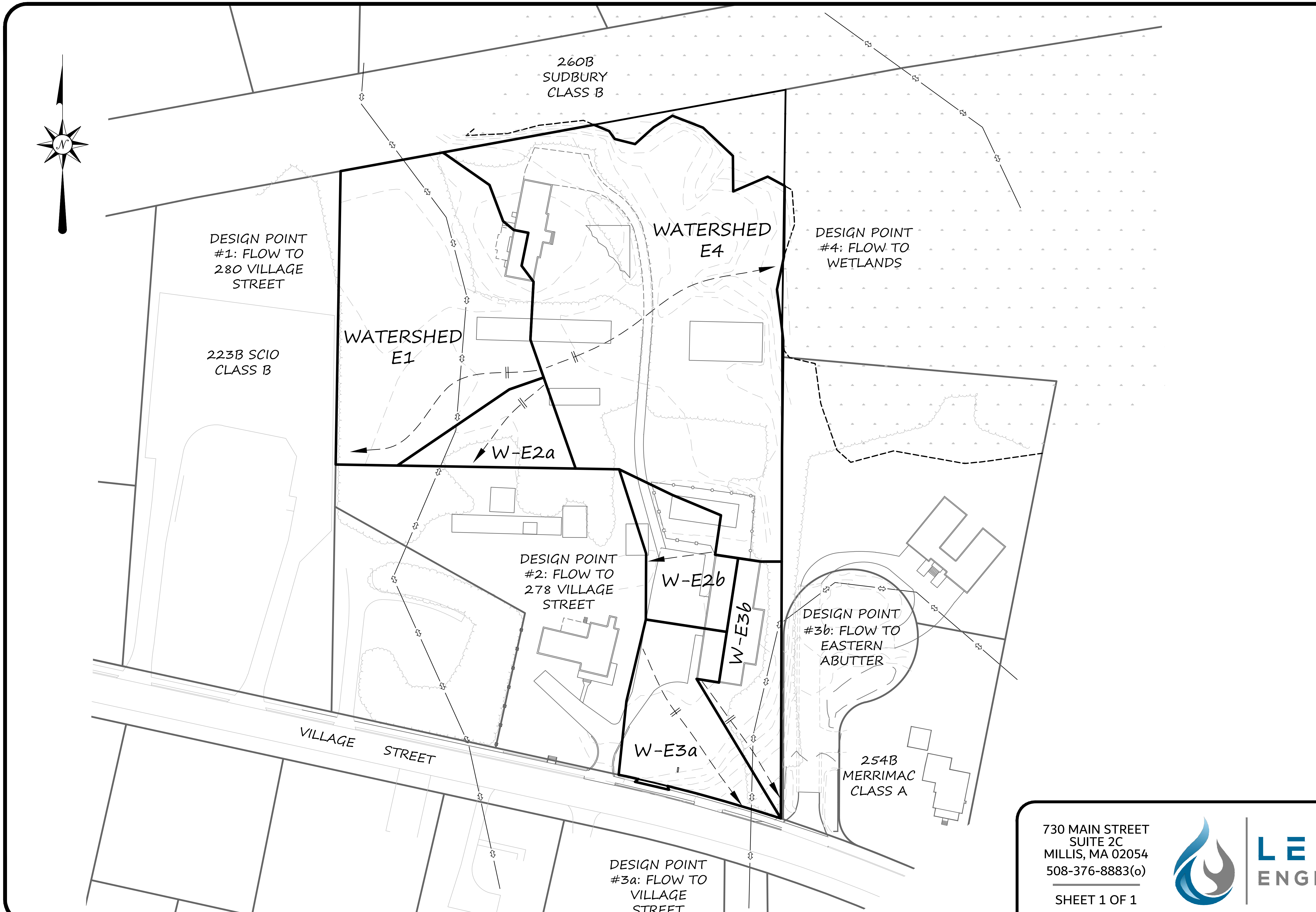
Groundwater Indicators Observed at Time of Testing:

☐ Depth observed standing water in observation hole: None

☒ Depth to soil redoximorphic features (mottles): 60” (Elev.=182.3)

☒ Depth weeping from side of observation hole: 60” (Elev.=182.3)

ATTACHMENT I: Existing Watershed Plan



PLAN SCALE: 1"=80'

0' 80' 160'

PLAN DATE: JUNE 25, 2019

REVISION	DATE	BY

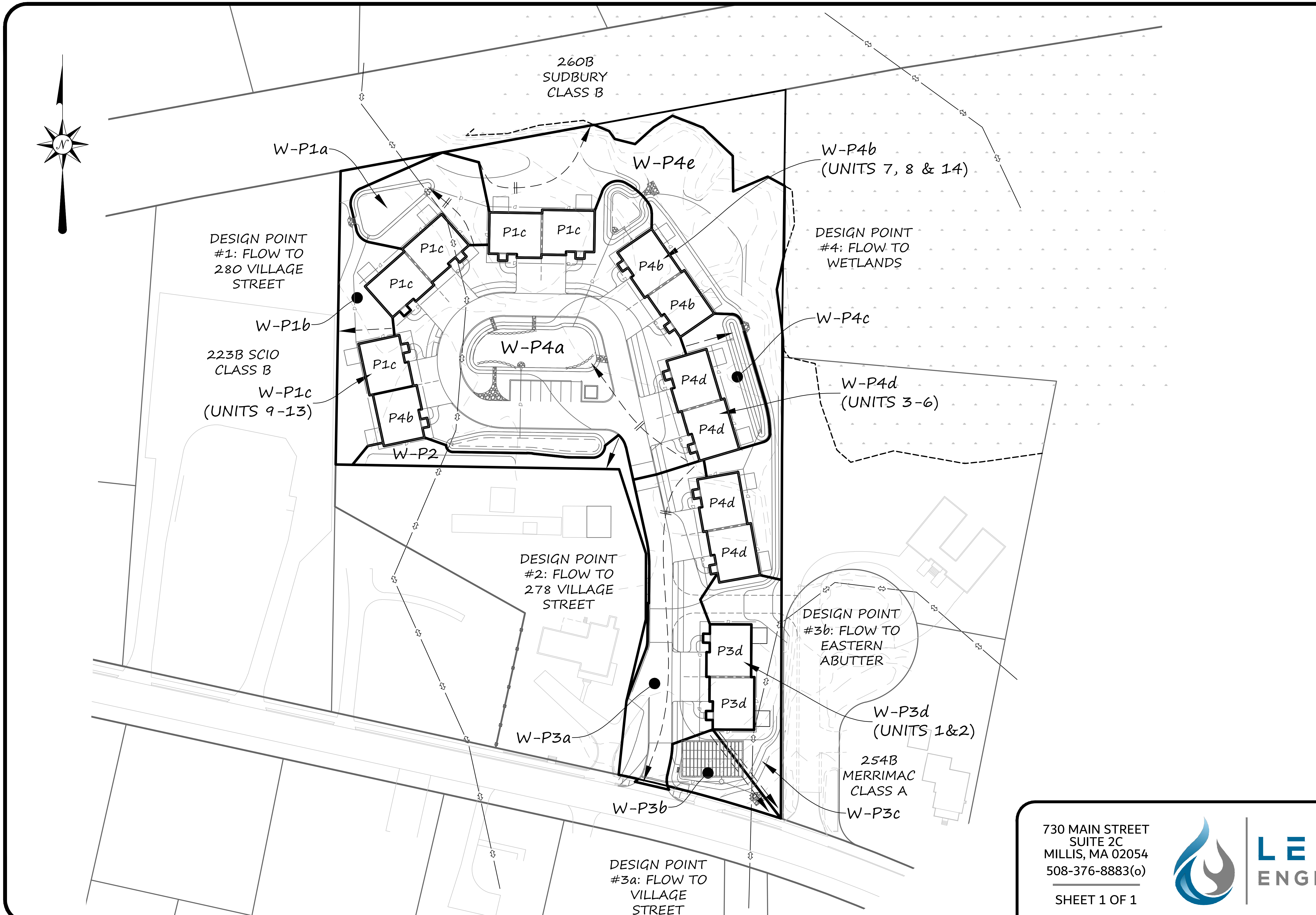
WILLIAM WALLACE
EXISTING WATERSHED
PLAN OF LAND
IN
MEDWAY, MA

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"=80'

0' 80' 160'

PLAN DATE: JUNE 25, 2019

REVISION	DATE	BY

WILLIAM WALLACE PROPOSED WATERSHED PLAN OF LAND IN MEDWAY, MA

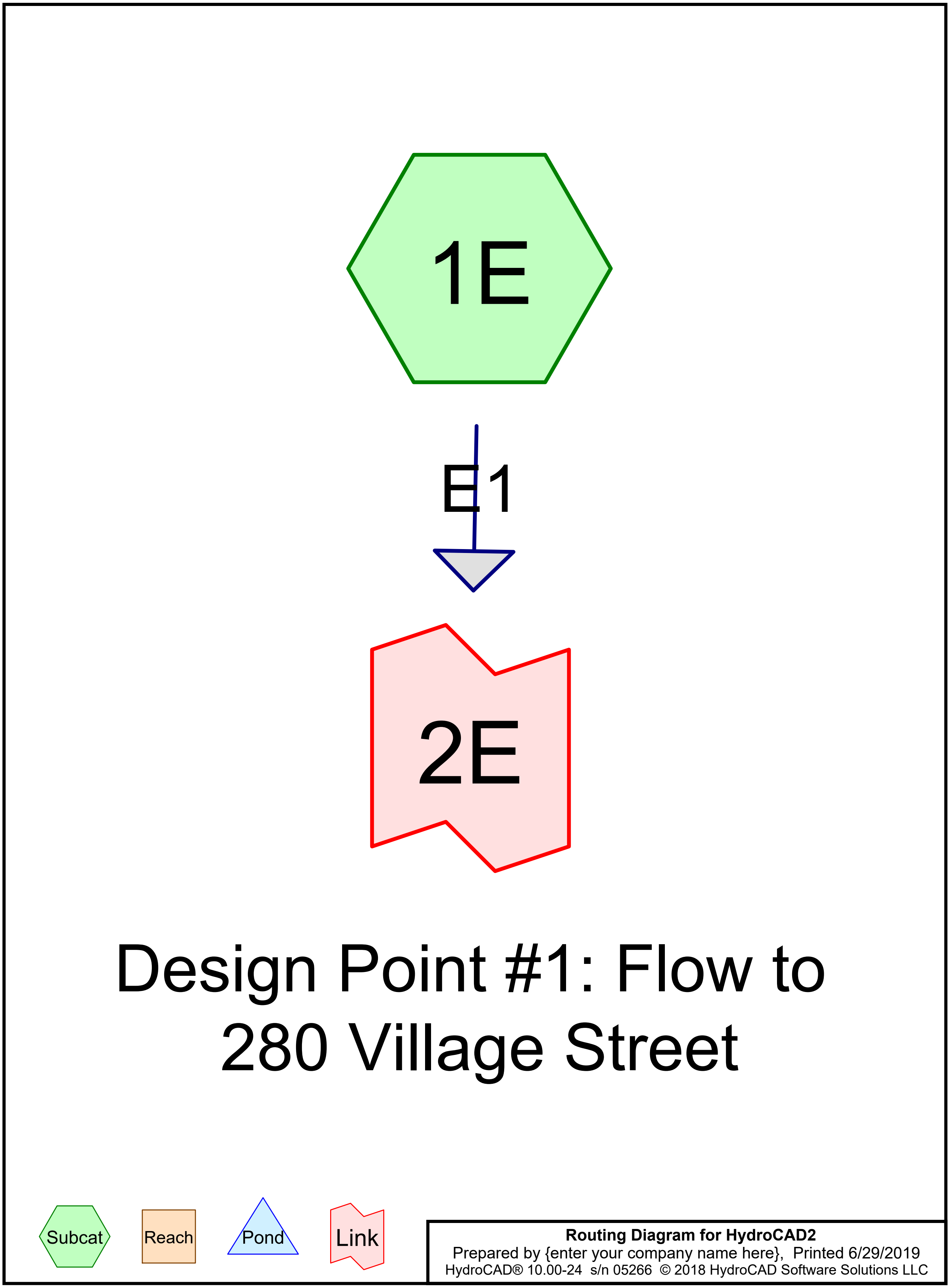
730 MAIN STREET
SUITE 2C
MILLIS, MA 02054
508-376-8883(o)

SHEET 1 OF 1

LEGACY ENGINEERING

ATTACHMENT K: Hydrocad Hydrology Calculations

DESIGN POINT #1: FLOW TO 280 VILLAGE STREET EXISTING CONDITIONS


1E
E1
2E
Design Point #1: Flow to 280 Village Street
Subcat
Reach
Pond
Link
Routing Diagram for HydroCAD2
Prepared by {enter your company name here}, Printed 6/29/2019
HydroCAD® 10.00-24 s/n 05266 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.112	61	>75% Grass cover, Good, HSG B (1E)
0.023	98	Conc Pads, HSG B (1E)
0.015	98	Roofs, HSG B (1E)
0.763	55	Woods, Good, HSG B (1E)
0.913	**57**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.913	HSG B	1E
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.913		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: E1 Runoff Area=39,750 sf 4.08% Impervious Runoff Depth=0.31"
Flow Length=194' Tc=14.8 min CN=57 Runoff=0.12 cfs 0.024 af

Link 2E: Design Point #1: Flow to 280 Village Street Inflow=0.12 cfs 0.024 af
Primary=0.12 cfs 0.024 af

Total Runoff Area = 0.913 ac Runoff Volume = 0.024 af Average Runoff Depth = 0.31"
95.92% Pervious = 0.875 ac 4.08% Impervious = 0.037 ac

Summary for Subcatchment 1E: E1

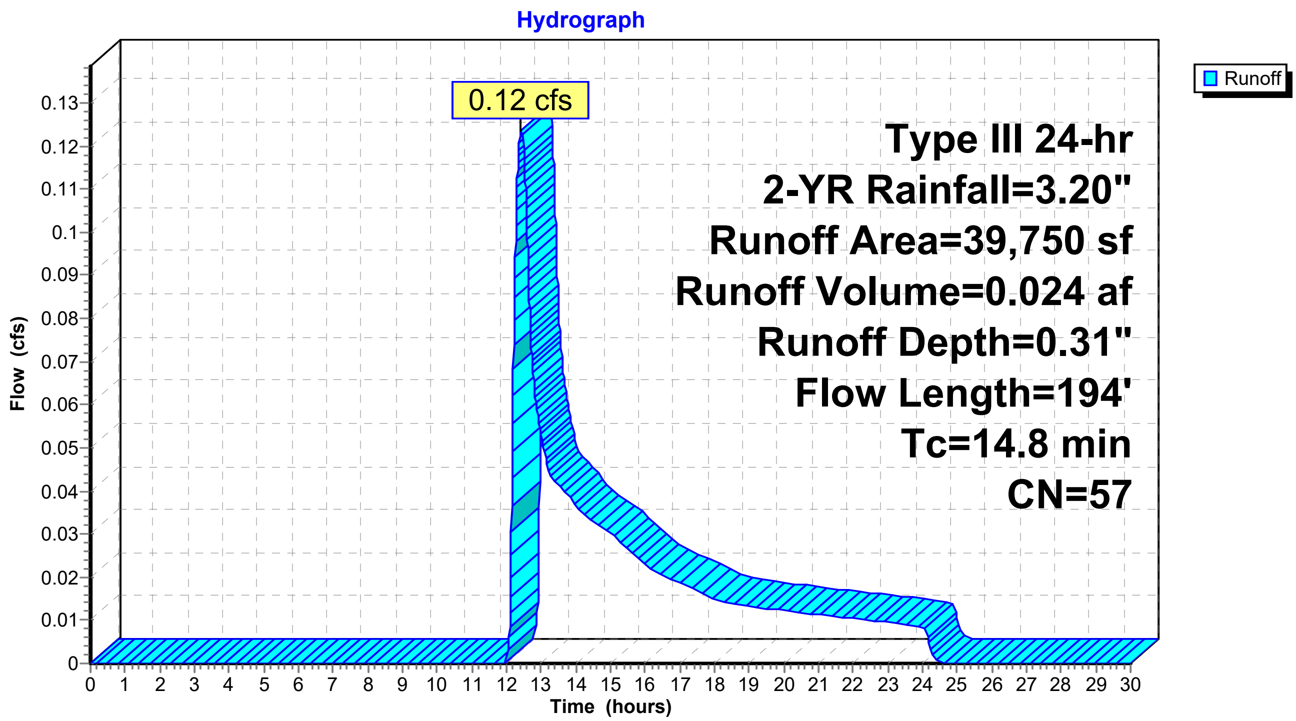
Runoff = 0.12 cfs @ 12.42 hrs, Volume= 0.024 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
*	987	98	Conc Pads, HSG B
	636	98	Roofs, HSG B
	4,896	61	>75% Grass cover, Good, HSG B
	33,231	55	Woods, Good, HSG B
	39,750	57	Weighted Average
	38,127		95.92% Pervious Area
	1,623		4.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	27	0.0120	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
5.6	167	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.8	194	Total			

Subcatchment 1E: E1

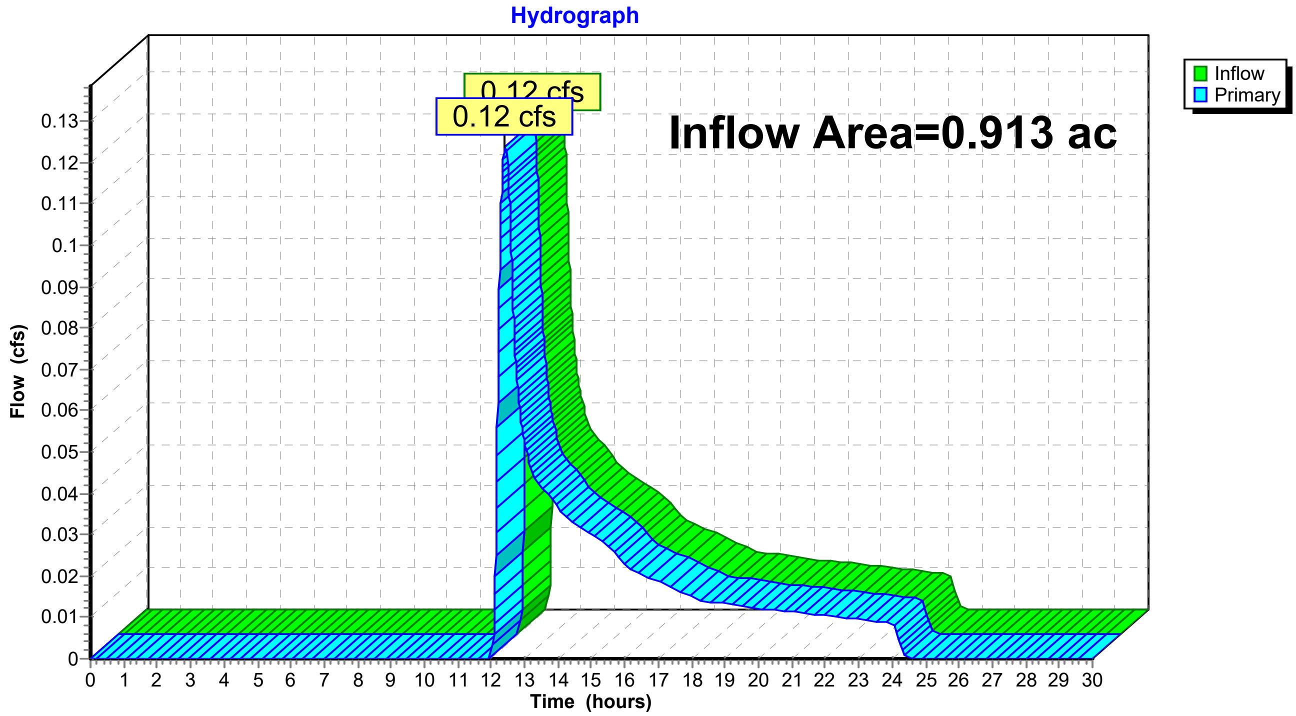


Summary for Link 2E: Design Point #1: Flow to 280 Village Street

Inflow Area = 0.913 ac, 4.08% Impervious, Inflow Depth = 0.31" for 2-YR event
Inflow = 0.12 cfs @ 12.42 hrs, Volume= 0.024 af
Primary = 0.12 cfs @ 12.42 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 2E: Design Point #1: Flow to 280 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: E1 Runoff Area=39,750 sf 4.08% Impervious Runoff Depth=0.95"
Flow Length=194' Tc=14.8 min CN=57 Runoff=0.62 cfs 0.072 af

Link 2E: Design Point #1: Flow to 280 Village Street Inflow=0.62 cfs 0.072 af
Primary=0.62 cfs 0.072 af

Total Runoff Area = 0.913 ac Runoff Volume = 0.072 af Average Runoff Depth = 0.95"
95.92% Pervious = 0.875 ac 4.08% Impervious = 0.037 ac

Summary for Subcatchment 1E: E1

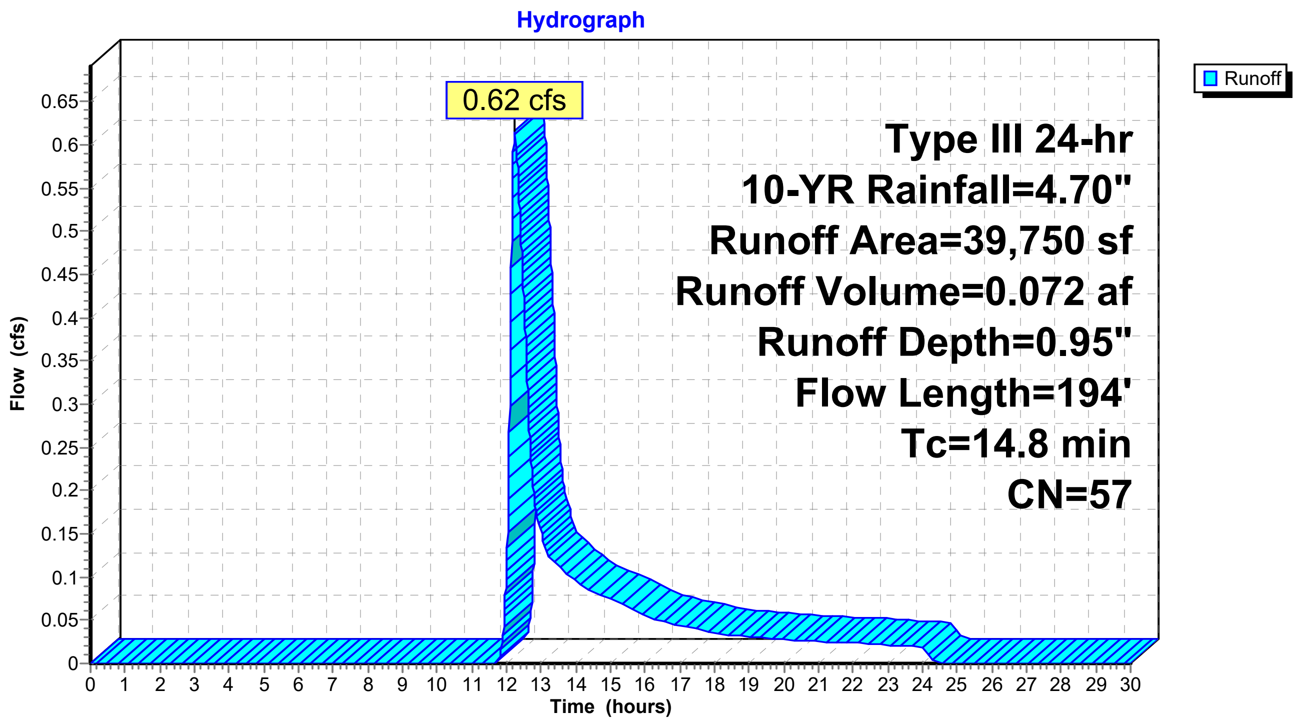
Runoff = 0.62 cfs @ 12.25 hrs, Volume= 0.072 af, Depth= 0.95"

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

	Area (sf)	CN	Description
*	987	98	Conc Pads, HSG B
	636	98	Roofs, HSG B
	4,896	61	>75% Grass cover, Good, HSG B
	33,231	55	Woods, Good, HSG B
	39,750	57	Weighted Average
	38,127		95.92% Pervious Area
	1,623		4.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	27	0.0120	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
5.6	167	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.8	194	Total			

Subcatchment 1E: E1

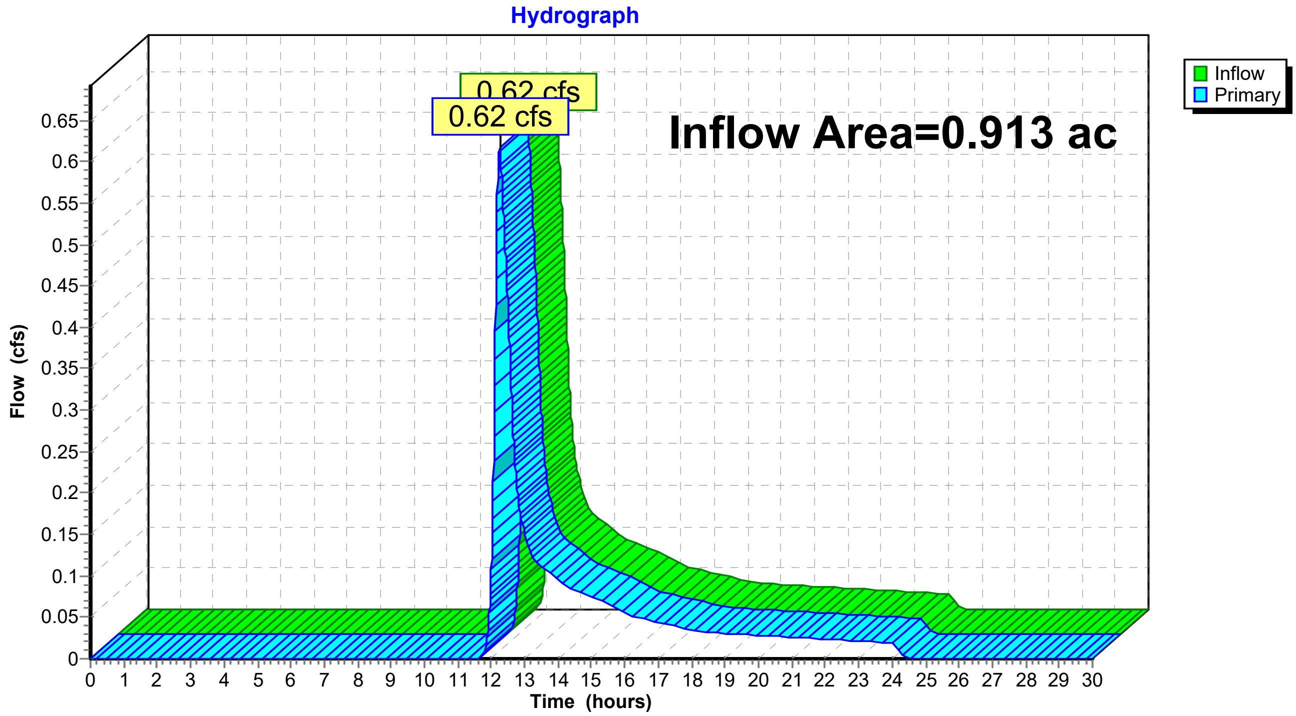


Summary for Link 2E: Design Point #1: Flow to 280 Village Street

Inflow Area = 0.913 ac, 4.08% Impervious, Inflow Depth = 0.95" for 10-YR event
Inflow = 0.62 cfs @ 12.25 hrs, Volume= 0.072 af
Primary = 0.62 cfs @ 12.25 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 2E: Design Point #1: Flow to 280 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: E1 Runoff Area=39,750 sf 4.08% Impervious Runoff Depth=1.38"
Flow Length=194' Tc=14.8 min CN=57 Runoff=0.98 cfs 0.105 af

Link 2E: Design Point #1: Flow to 280 Village Street Inflow=0.98 cfs 0.105 af
Primary=0.98 cfs 0.105 af

Total Runoff Area = 0.913 ac Runoff Volume = 0.105 af Average Runoff Depth = 1.38"
95.92% Pervious = 0.875 ac 4.08% Impervious = 0.037 ac

Summary for Subcatchment 1E: E1

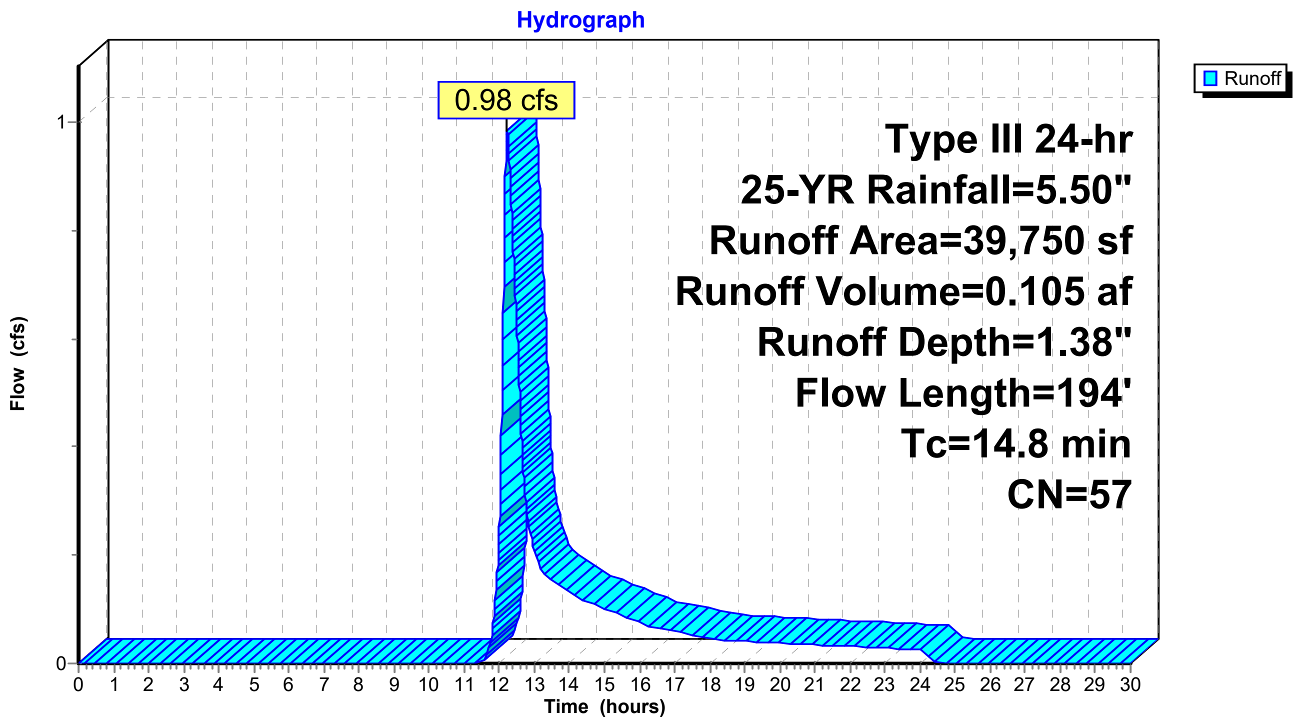
Runoff = 0.98 cfs @ 12.22 hrs, Volume= 0.105 af, Depth= 1.38"

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

	Area (sf)	CN	Description
*	987	98	Conc Pads, HSG B
	636	98	Roofs, HSG B
	4,896	61	>75% Grass cover, Good, HSG B
	33,231	55	Woods, Good, HSG B
	39,750	57	Weighted Average
	38,127		95.92% Pervious Area
	1,623		4.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	27	0.0120	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
5.6	167	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.8	194	Total			

Subcatchment 1E: E1

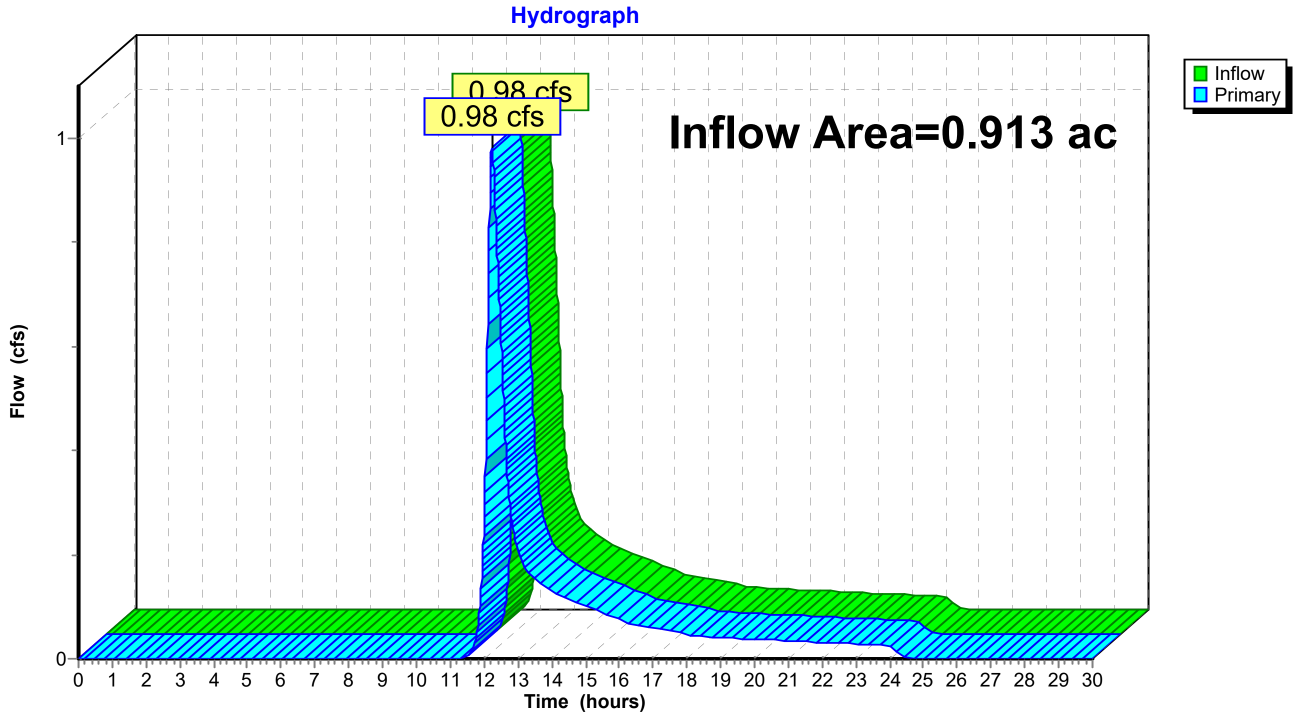


Summary for Link 2E: Design Point #1: Flow to 280 Village Street

Inflow Area = 0.913 ac, 4.08% Impervious, Inflow Depth = 1.38" for 25-YR event
Inflow = 0.98 cfs @ 12.22 hrs, Volume= 0.105 af
Primary = 0.98 cfs @ 12.22 hrs, Volume= 0.105 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 2E: Design Point #1: Flow to 280 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: E1 Runoff Area=39,750 sf 4.08% Impervious Runoff Depth=1.74"
Flow Length=194' Tc=14.8 min CN=57 Runoff=1.29 cfs 0.132 af

Link 2E: Design Point #1: Flow to 280 Village Street Inflow=1.29 cfs 0.132 af
Primary=1.29 cfs 0.132 af

Total Runoff Area = 0.913 ac Runoff Volume = 0.132 af Average Runoff Depth = 1.74"
95.92% Pervious = 0.875 ac 4.08% Impervious = 0.037 ac

Summary for Subcatchment 1E: E1

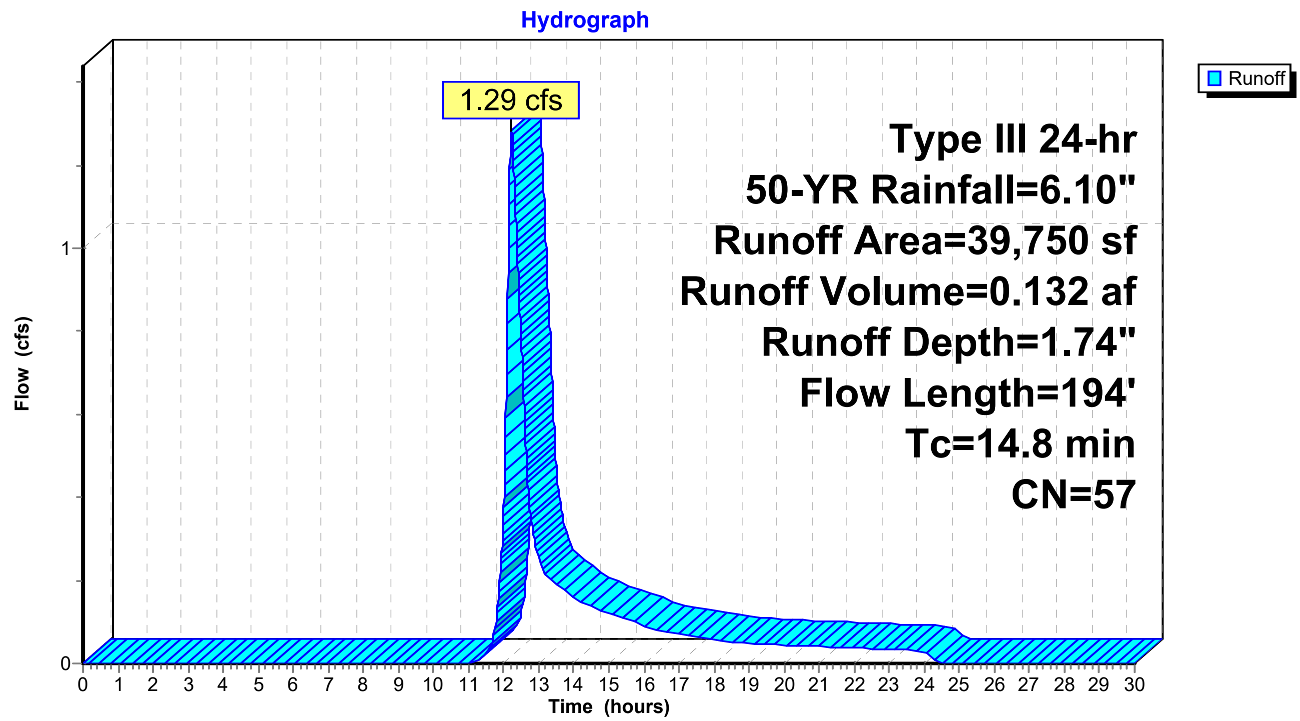
Runoff = 1.29 cfs @ 12.22 hrs, Volume= 0.132 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

	Area (sf)	CN	Description
*	987	98	Conc Pads, HSG B
	636	98	Roofs, HSG B
	4,896	61	>75% Grass cover, Good, HSG B
	33,231	55	Woods, Good, HSG B
	39,750	57	Weighted Average
	38,127		95.92% Pervious Area
	1,623		4.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	27	0.0120	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
5.6	167	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.8	194	Total			

Subcatchment 1E: E1

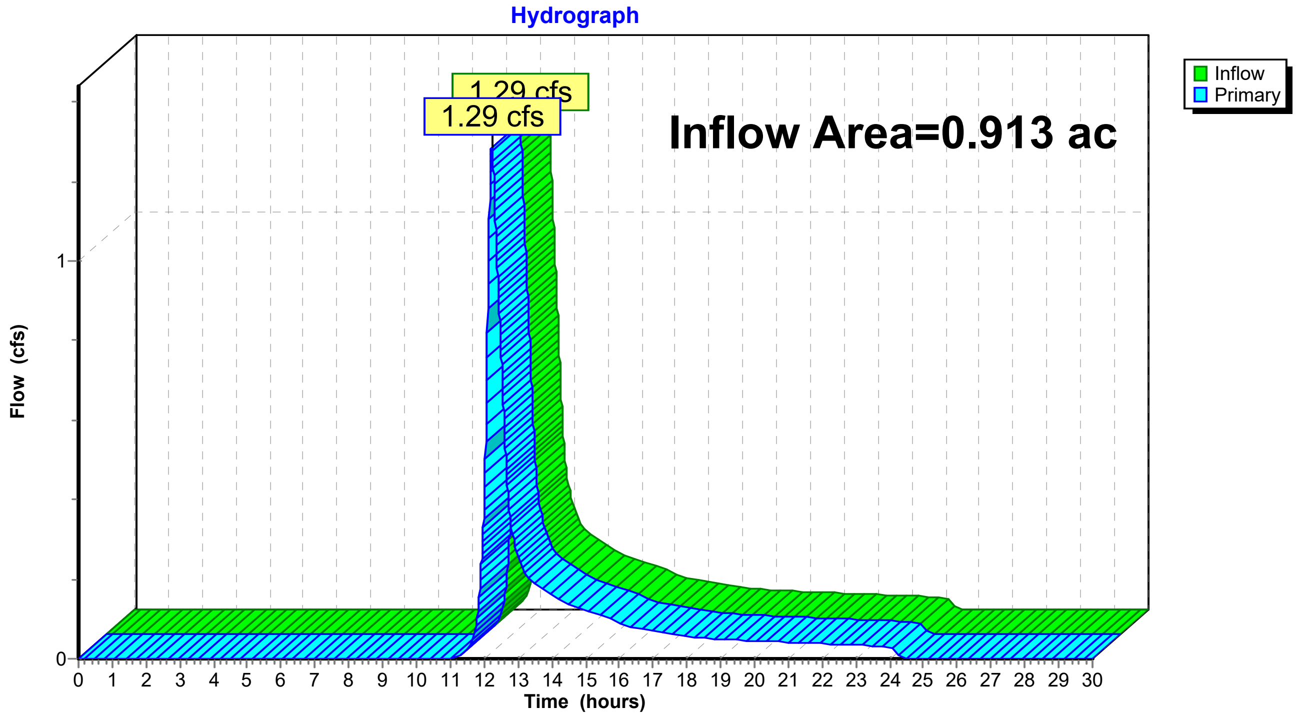


Summary for Link 2E: Design Point #1: Flow to 280 Village Street

Inflow Area = 0.913 ac, 4.08% Impervious, Inflow Depth = 1.74" for 50-YR event
Inflow = 1.29 cfs @ 12.22 hrs, Volume= 0.132 af
Primary = 1.29 cfs @ 12.22 hrs, Volume= 0.132 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 2E: Design Point #1: Flow to 280 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: E1 Runoff Area=39,750 sf 4.08% Impervious Runoff Depth=2.12"
Flow Length=194' Tc=14.8 min CN=57 Runoff=1.61 cfs 0.161 af

Link 2E: Design Point #1: Flow to 280 Village Street Inflow=1.61 cfs 0.161 af
Primary=1.61 cfs 0.161 af

Total Runoff Area = 0.913 ac Runoff Volume = 0.161 af Average Runoff Depth = 2.12"
95.92% Pervious = 0.875 ac 4.08% Impervious = 0.037 ac

Summary for Subcatchment 1E: E1

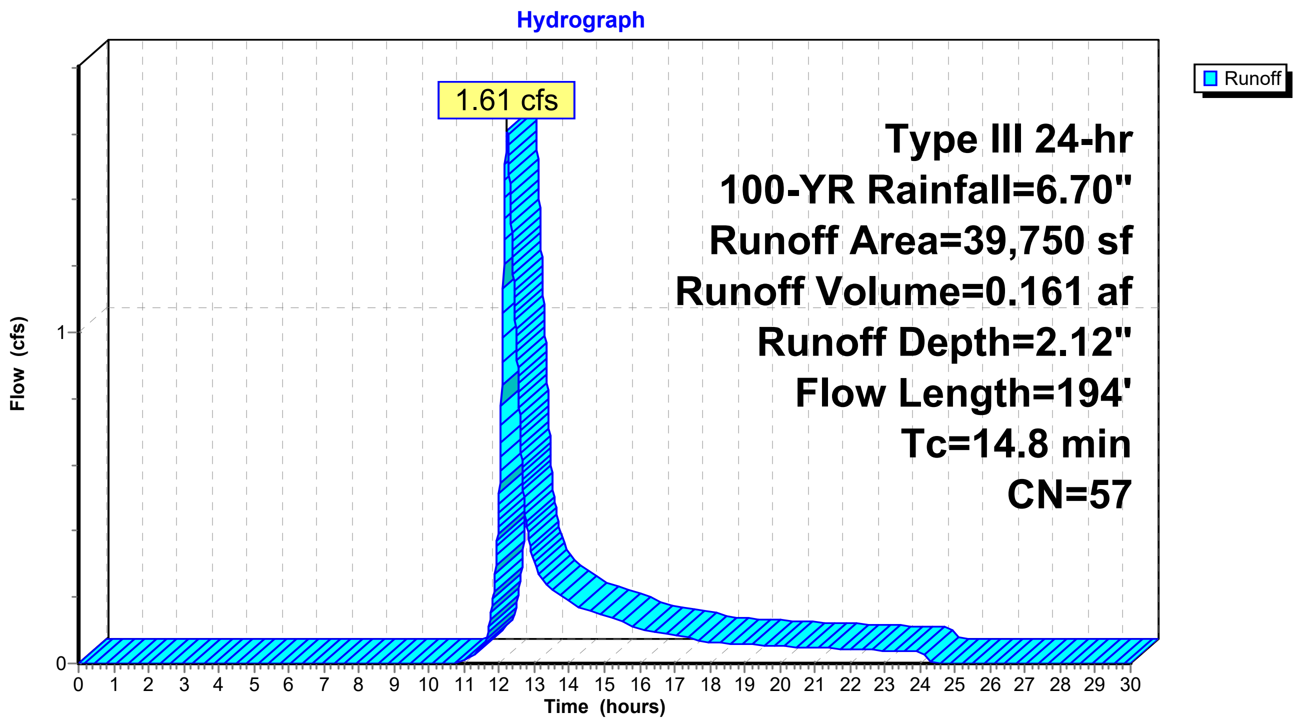
Runoff = 1.61 cfs @ 12.22 hrs, Volume= 0.161 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

	Area (sf)	CN	Description
*	987	98	Conc Pads, HSG B
	636	98	Roofs, HSG B
	4,896	61	>75% Grass cover, Good, HSG B
	33,231	55	Woods, Good, HSG B
	39,750	57	Weighted Average
	38,127		95.92% Pervious Area
	1,623		4.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	27	0.0120	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
5.6	167	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.8	194	Total			

Subcatchment 1E: E1

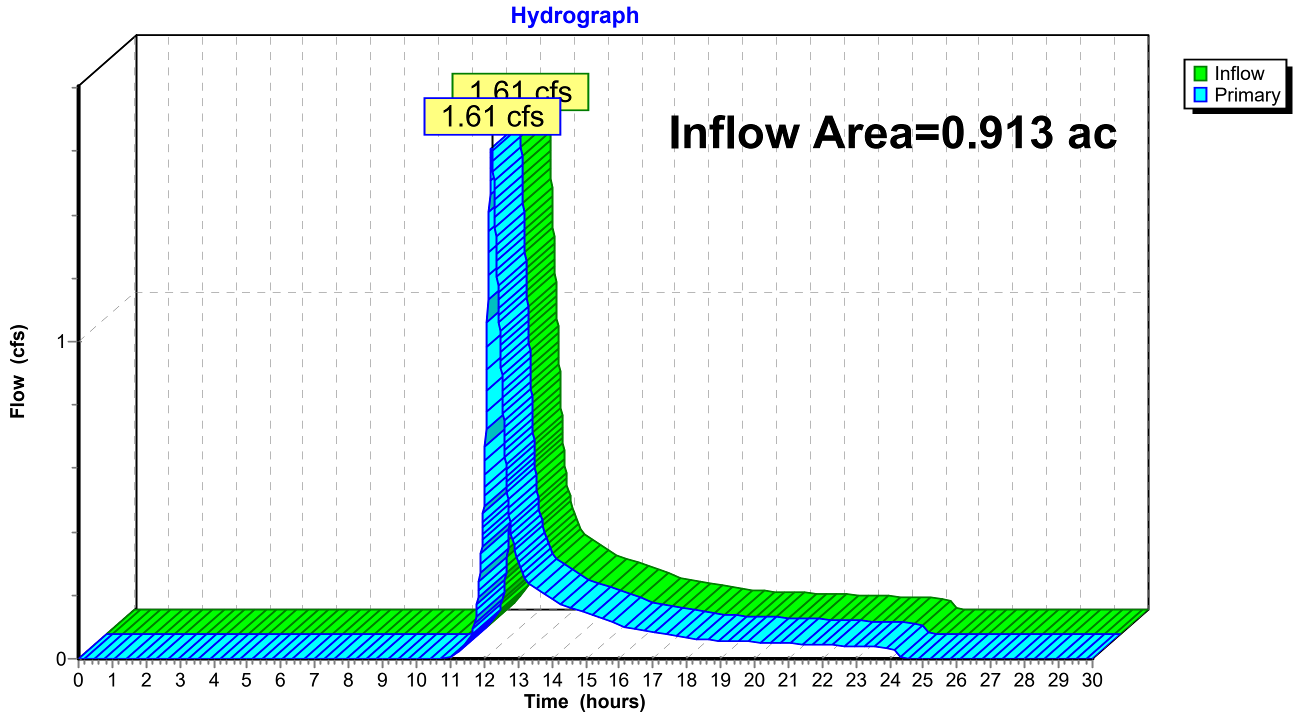


Summary for Link 2E: Design Point #1: Flow to 280 Village Street

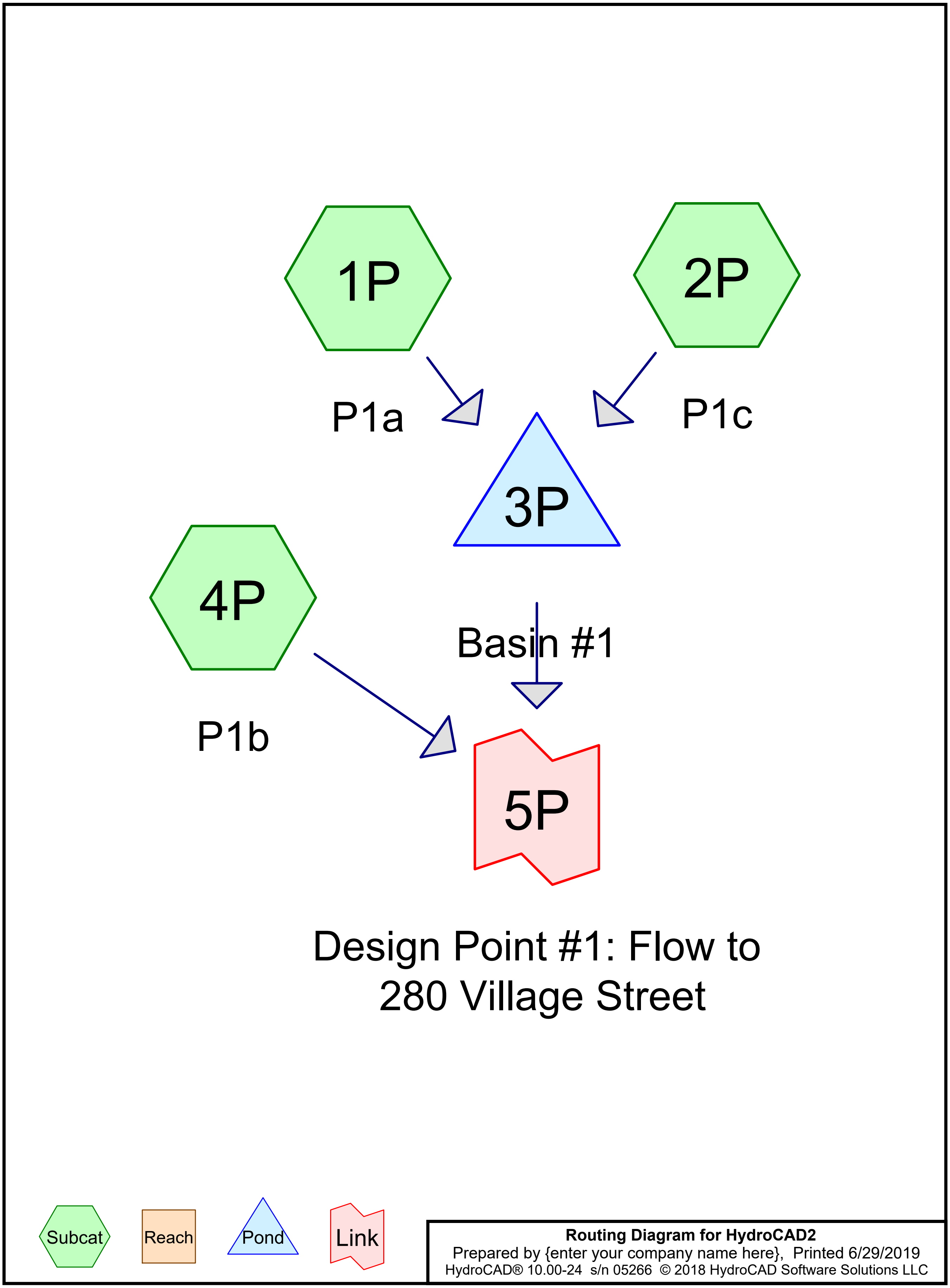
Inflow Area = 0.913 ac, 4.08% Impervious, Inflow Depth = 2.12" for 100-YR event
Inflow = 1.61 cfs @ 12.22 hrs, Volume= 0.161 af
Primary = 1.61 cfs @ 12.22 hrs, Volume= 0.161 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 2E: Design Point #1: Flow to 280 Village Street



DESIGN POINT #1: FLOW TO 280 VILLAGE STREET PROPOSED CONDITIONS



Routing Diagram for HydroCAD2
Prepared by {enter your company name here}, Printed 6/29/2019
HydroCAD® 10.00-24 s/n 05266 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.346	61	>75% Grass cover, Good, HSG B (1P, 4P)
0.013	98	Patios, HSG B (4P)
0.004	98	Paved parking, HSG B (1P)
0.213	98	Roofs, HSG B (2P)
0.577	**76**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.577	HSG B	1P, 2P, 4P
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.577		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: P1a Runoff Area=7,363 sf 2.66% Impervious Runoff Depth=0.48"
Flow Length=68' Tc=9.6 min CN=62 Runoff=0.06 cfs 0.007 af

Subcatchment 2P: P1c Runoff Area=9,265 sf 100.00% Impervious Runoff Depth=2.97"
Tc=2.0 min CN=98 Runoff=0.76 cfs 0.053 af

Pond 3P: Basin #1 Peak Elev=186.43' Storage=732 cf Inflow=0.78 cfs 0.059 af
Discarded=0.10 cfs 0.059 af Primary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.059 af

Subcatchment 4P: P1b Runoff Area=8,504 sf 6.91% Impervious Runoff Depth=0.56"
Flow Length=47' Slope=0.0200 '/' Tc=7.8 min CN=64 Runoff=0.09 cfs 0.009 af

Link 5P: Design Point #1: Flow to 280 Village Street Inflow=0.09 cfs 0.009 af
Primary=0.09 cfs 0.009 af

Total Runoff Area = 0.577 ac Runoff Volume = 0.068 af Average Runoff Depth = 1.42"
60.02% Pervious = 0.346 ac 39.98% Impervious = 0.231 ac

Summary for Subcatchment 1P: P1a

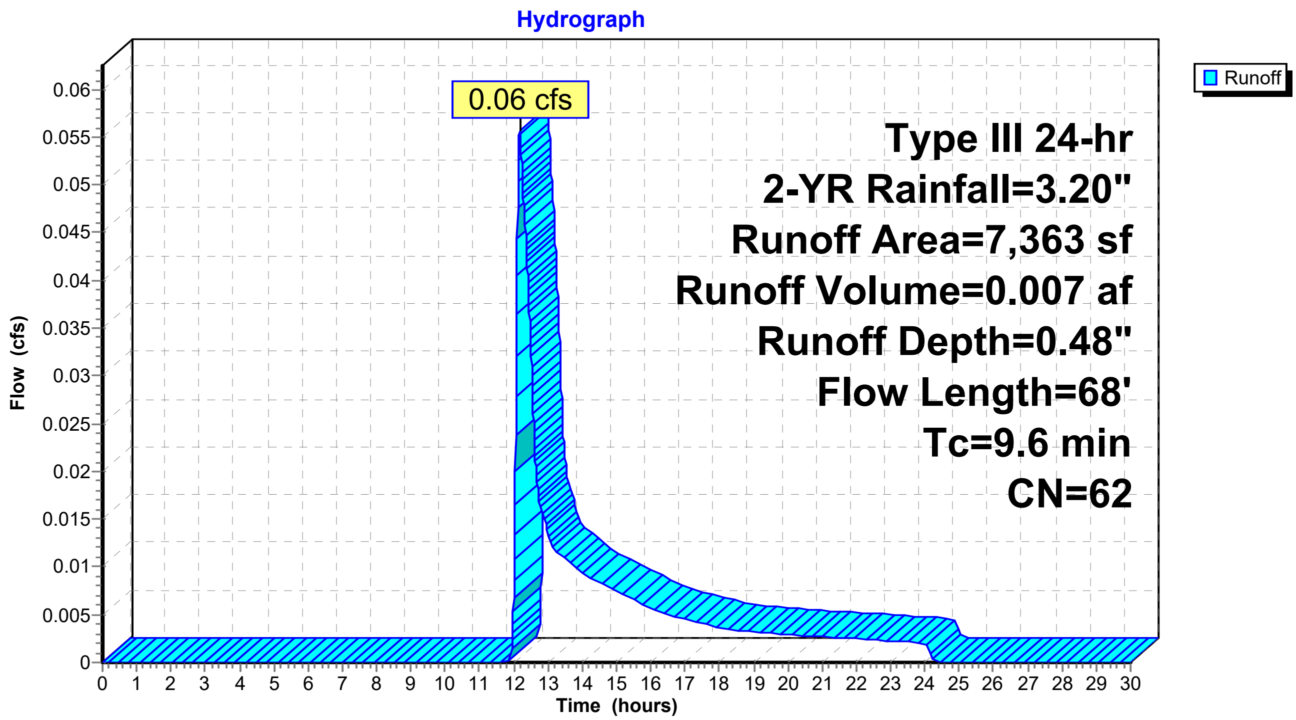
Runoff = 0.06 cfs @ 12.17 hrs, Volume= 0.007 af, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
196	98	Paved parking, HSG B
7,167	61	>75% Grass cover, Good, HSG B
7,363	62	Weighted Average
7,167		97.34% Pervious Area
196		2.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	46	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.2	22	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.6	68	Total			

Subcatchment 1P: P1a



Summary for Subcatchment 2P: P1c

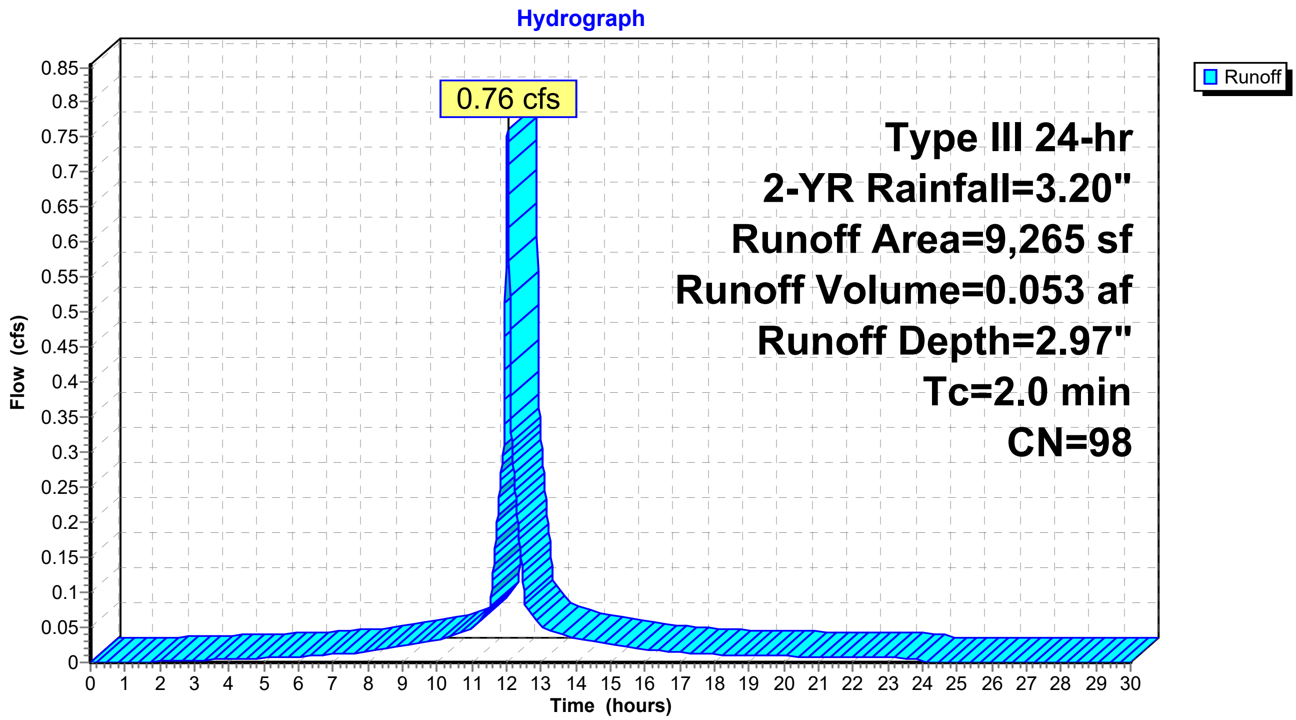
Runoff = 0.76 cfs @ 12.03 hrs, Volume= 0.053 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
9,265	98	Roofs, HSG B
9,265		100.00% Impervious Area

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

Subcatchment 2P: P1c



Summary for Pond 3P: Basin #1

Inflow Area =	0.382 ac, 56.90% Impervious,	Inflow Depth = 1.87"	for 2-YR event	
Inflow =	0.78 cfs @	12.03 hrs, Volume=	0.059 af	
Outflow =	0.10 cfs @	12.59 hrs, Volume=	0.059 af,	Atten= 87%, Lag= 33.3 min
Discarded =	0.10 cfs @	12.59 hrs, Volume=	0.059 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 186.43' @ 12.59 hrs Surf.Area= 1,833 sf Storage= 732 cf

Plug-Flow detention time= 46.7 min calculated for 0.059 af (100% of inflow)
Center-of-Mass det. time= 46.7 min (817.6 - 771.0)

Volume	Invert	Avail.Storage	Storage Description
#1	186.00'	1,878 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

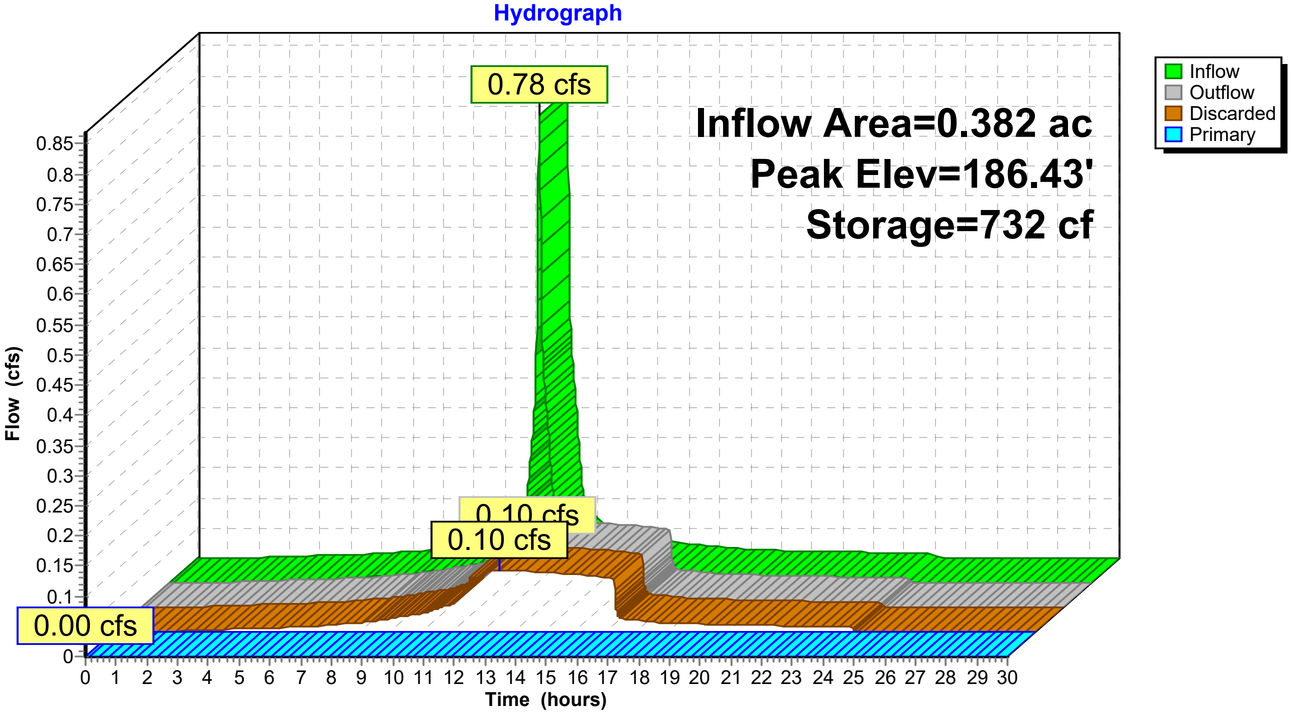
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
186.00	1,604	177.0	0	0	1,604
187.00	2,165	196.0	1,878	1,878	2,198

Device	Routing	Invert	Outlet Devices
#1	Discarded	186.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	186.60'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 186.60 187.00 Width (feet) 4.00 4.00

Discarded OutFlow Max=0.10 cfs @ 12.59 hrs HW=186.43' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=186.00' (Free Discharge)
└─**2=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond 3P: Basin #1



Summary for Subcatchment 4P: P1b

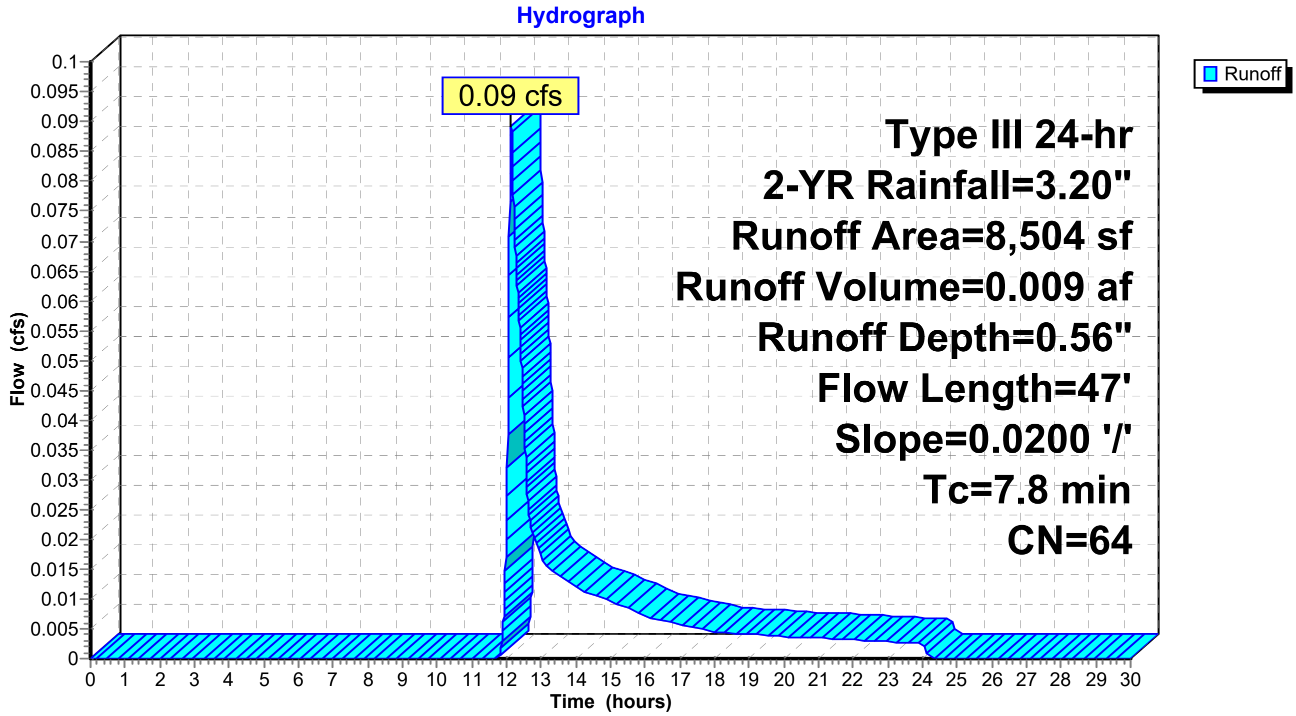
Runoff = 0.09 cfs @ 12.14 hrs, Volume= 0.009 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
*	588	98	Patios, HSG B
	7,916	61	>75% Grass cover, Good, HSG B
	8,504	64	Weighted Average
	7,916		93.09% Pervious Area
	588		6.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	47	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 4P: P1b

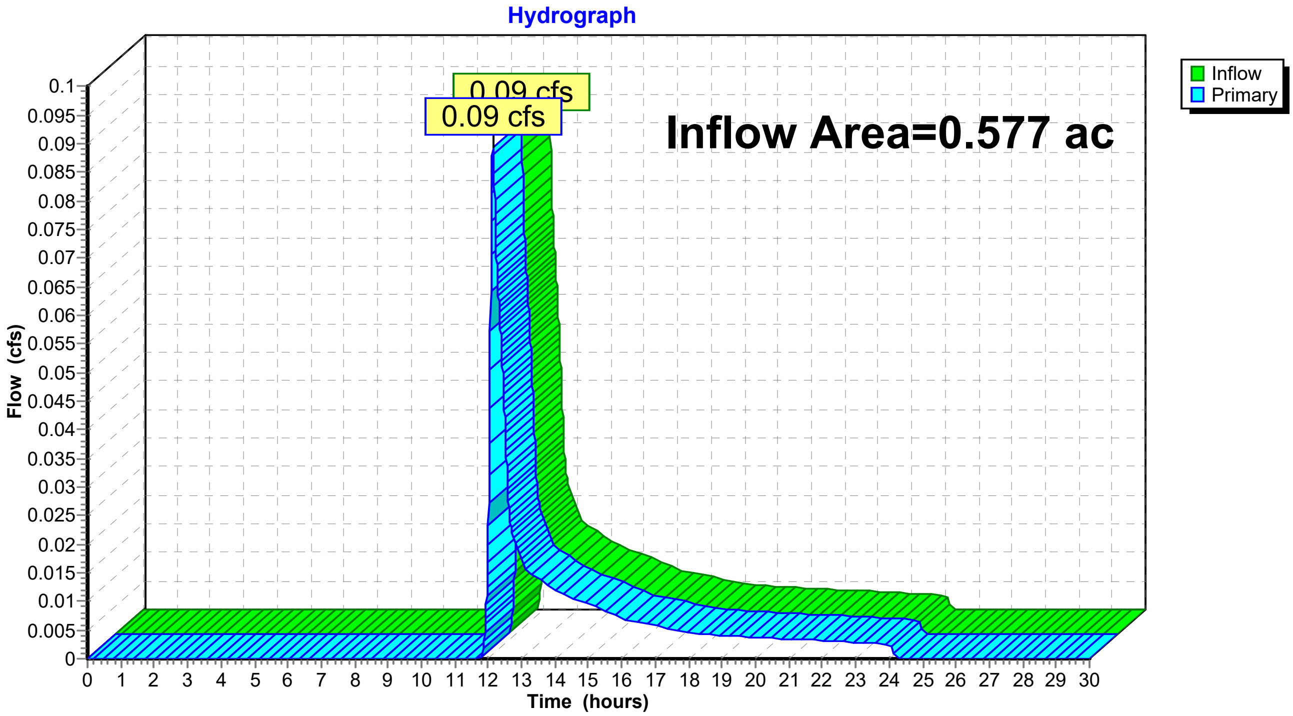


Summary for Link 5P: Design Point #1: Flow to 280 Village Street

Inflow Area = 0.577 ac, 39.98% Impervious, Inflow Depth = 0.19" for 2-YR event
Inflow = 0.09 cfs @ 12.14 hrs, Volume= 0.009 af
Primary = 0.09 cfs @ 12.14 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 5P: Design Point #1: Flow to 280 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: P1a Runoff Area=7,363 sf 2.66% Impervious Runoff Depth=1.26"
Flow Length=68' Tc=9.6 min CN=62 Runoff=0.20 cfs 0.018 af

Subcatchment 2P: P1c Runoff Area=9,265 sf 100.00% Impervious Runoff Depth=4.46"
Tc=2.0 min CN=98 Runoff=1.13 cfs 0.079 af

Pond 3P: Basin #1 Peak Elev=186.67' Storage=1,203 cf Inflow=1.22 cfs 0.097 af
Discarded=0.11 cfs 0.088 af Primary=0.26 cfs 0.009 af Outflow=0.37 cfs 0.097 af

Subcatchment 4P: P1b Runoff Area=8,504 sf 6.91% Impervious Runoff Depth=1.39"
Flow Length=47' Slope=0.0200 '/' Tc=7.8 min CN=64 Runoff=0.28 cfs 0.023 af

Link 5P: Design Point #1: Flow to 280 Village Street Inflow=0.40 cfs 0.032 af
Primary=0.40 cfs 0.032 af

Total Runoff Area = 0.577 ac Runoff Volume = 0.119 af Average Runoff Depth = 2.48"
60.02% Pervious = 0.346 ac 39.98% Impervious = 0.231 ac

Summary for Subcatchment 1P: P1a

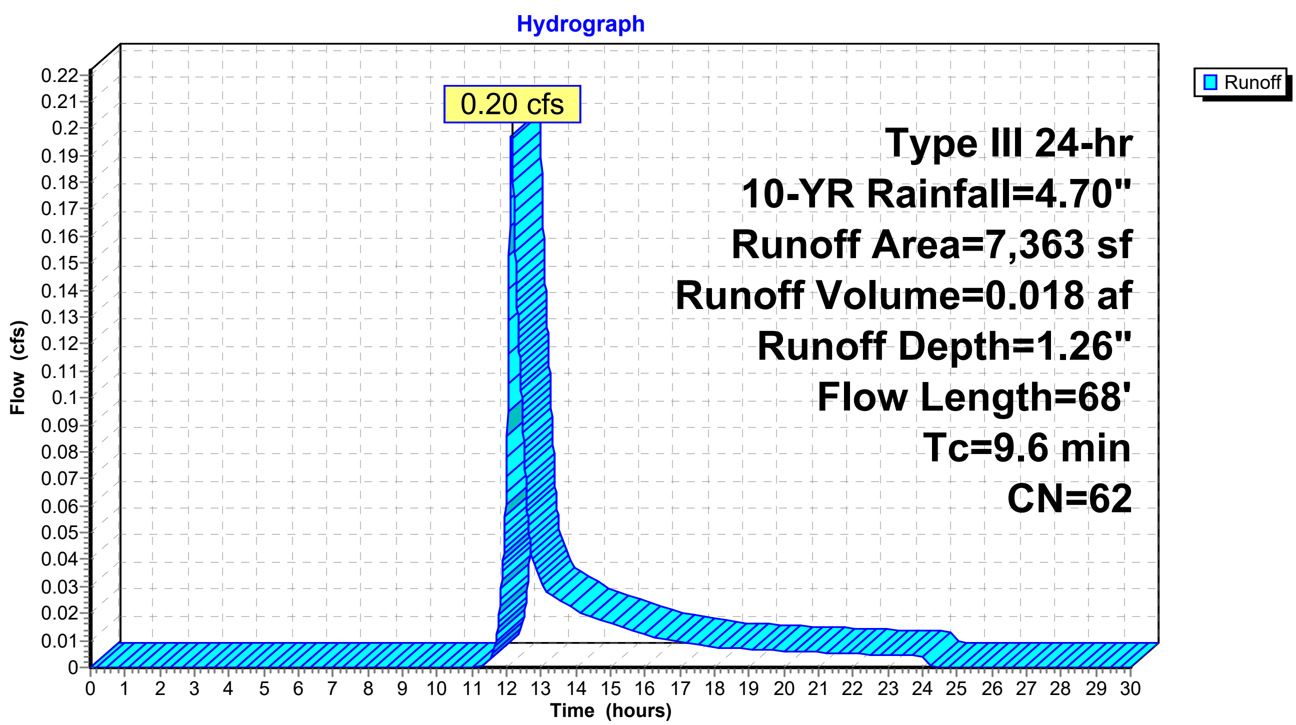
Runoff = 0.20 cfs @ 12.15 hrs, Volume= 0.018 af, Depth= 1.26"

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

Area (sf)	CN	Description
196	98	Paved parking, HSG B
7,167	61	>75% Grass cover, Good, HSG B
7,363	62	Weighted Average
7,167		97.34% Pervious Area
196		2.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	46	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.2	22	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.6	68	Total			

Subcatchment 1P: P1a



Summary for Subcatchment 2P: P1c

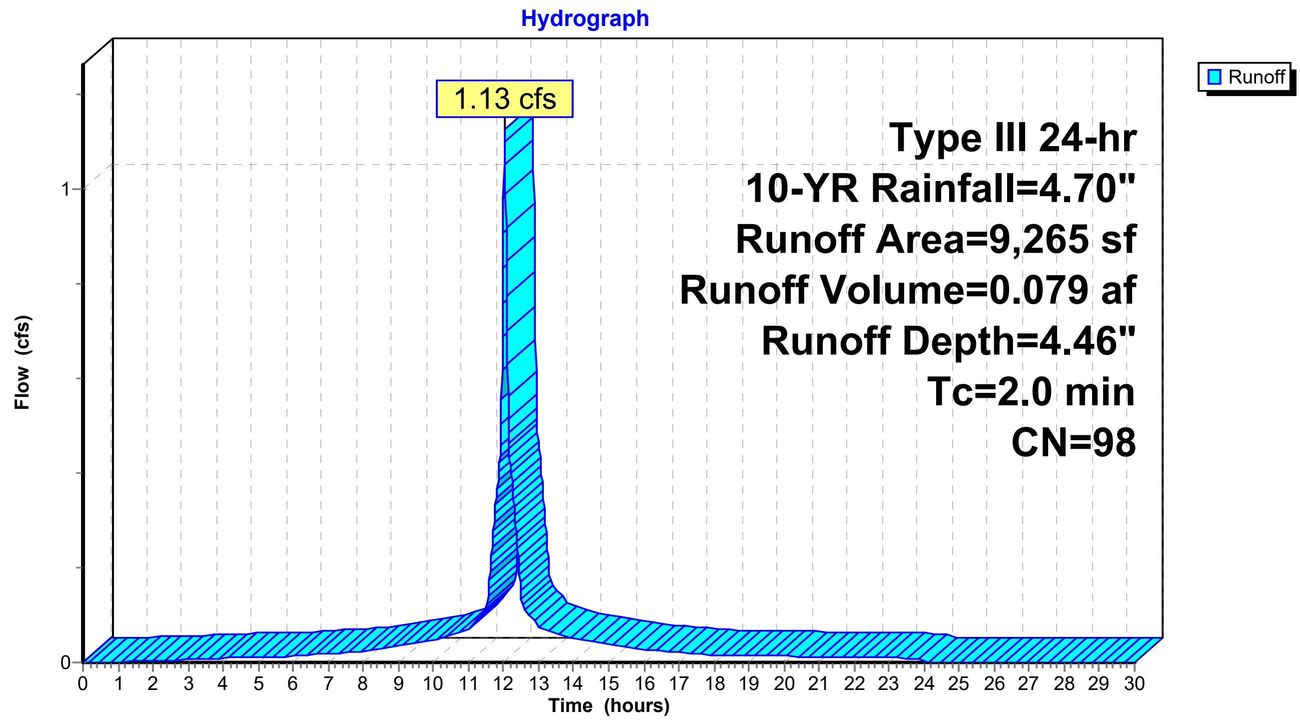
Runoff = 1.13 cfs @ 12.03 hrs, Volume= 0.079 af, Depth= 4.46"

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

Area (sf)	CN	Description
9,265	98	Roofs, HSG B
9,265		100.00% Impervious Area

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

Subcatchment 2P: P1c



Summary for Pond 3P: Basin #1

Inflow Area = 0.382 ac, 56.90% Impervious, Inflow Depth = 3.04" for 10-YR event
Inflow = 1.22 cfs @ 12.03 hrs, Volume= 0.097 af
Outflow = 0.37 cfs @ 12.38 hrs, Volume= 0.097 af, Atten= 69%, Lag= 20.7 min
Discarded = 0.11 cfs @ 12.38 hrs, Volume= 0.088 af
Primary = 0.26 cfs @ 12.38 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 186.67' @ 12.38 hrs Surf.Area= 1,973 sf Storage= 1,203 cf

Plug-Flow detention time= 69.0 min calculated for 0.097 af (100% of inflow)
Center-of-Mass det. time= 68.9 min (838.4 - 769.4)

Volume	Invert	Avail.Storage	Storage Description
#1	186.00'	1,878 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

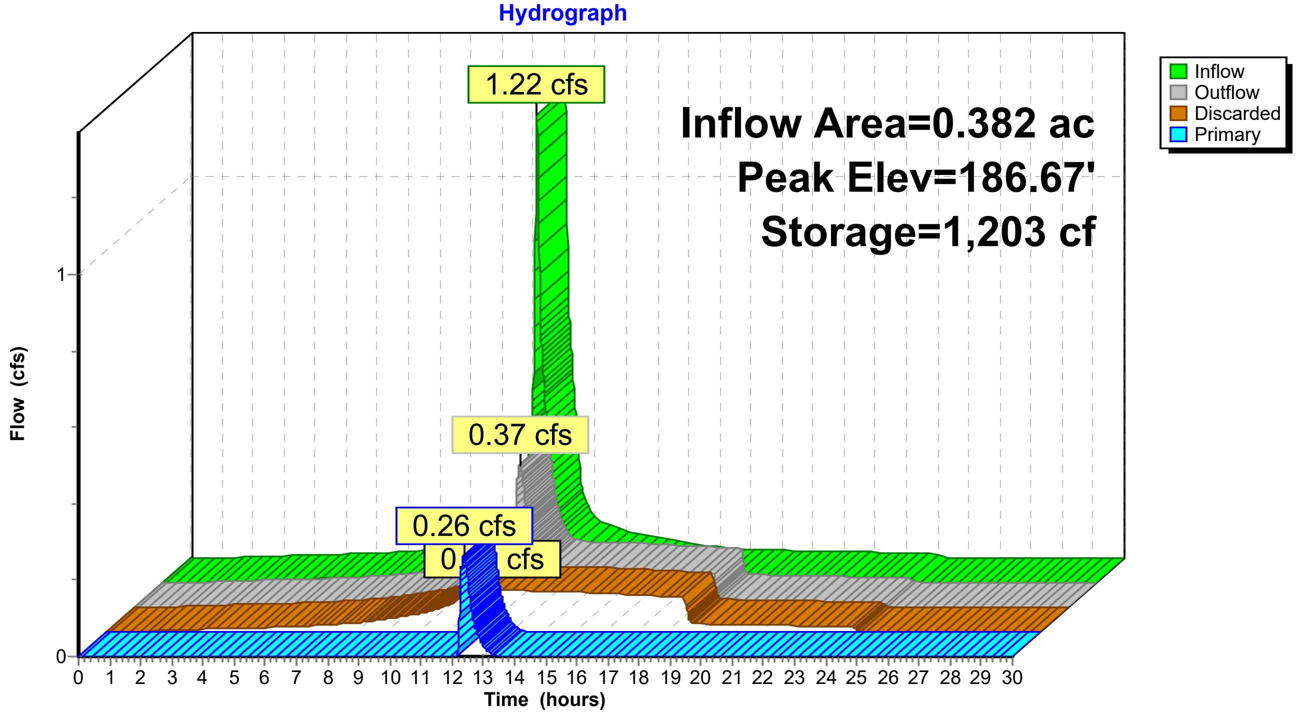
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
186.00	1,604	177.0	0	0	1,604
187.00	2,165	196.0	1,878	1,878	2,198

Device	Routing	Invert	Outlet Devices
#1	Discarded	186.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	186.60'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 186.60 187.00 Width (feet) 4.00 4.00

Discarded OutFlow Max=0.11 cfs @ 12.38 hrs HW=186.67' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.26 cfs @ 12.38 hrs HW=186.67' (Free Discharge)
└─**2=Custom Weir/Orifice** (Weir Controls 0.26 cfs @ 0.89 fps)

Pond 3P: Basin #1



Summary for Subcatchment 4P: P1b

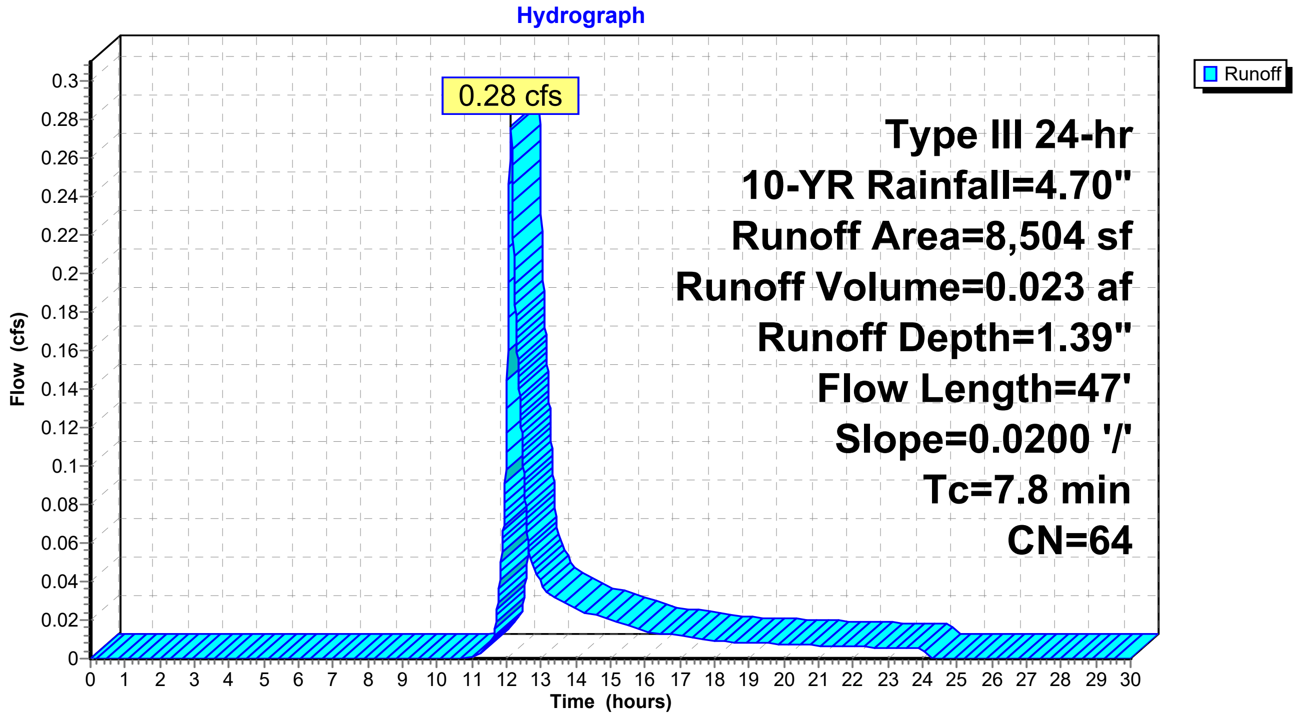
Runoff = 0.28 cfs @ 12.12 hrs, Volume= 0.023 af, Depth= 1.39"

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

	Area (sf)	CN	Description
*	588	98	Patios, HSG B
	7,916	61	>75% Grass cover, Good, HSG B
	8,504	64	Weighted Average
	7,916		93.09% Pervious Area
	588		6.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	47	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 4P: P1b

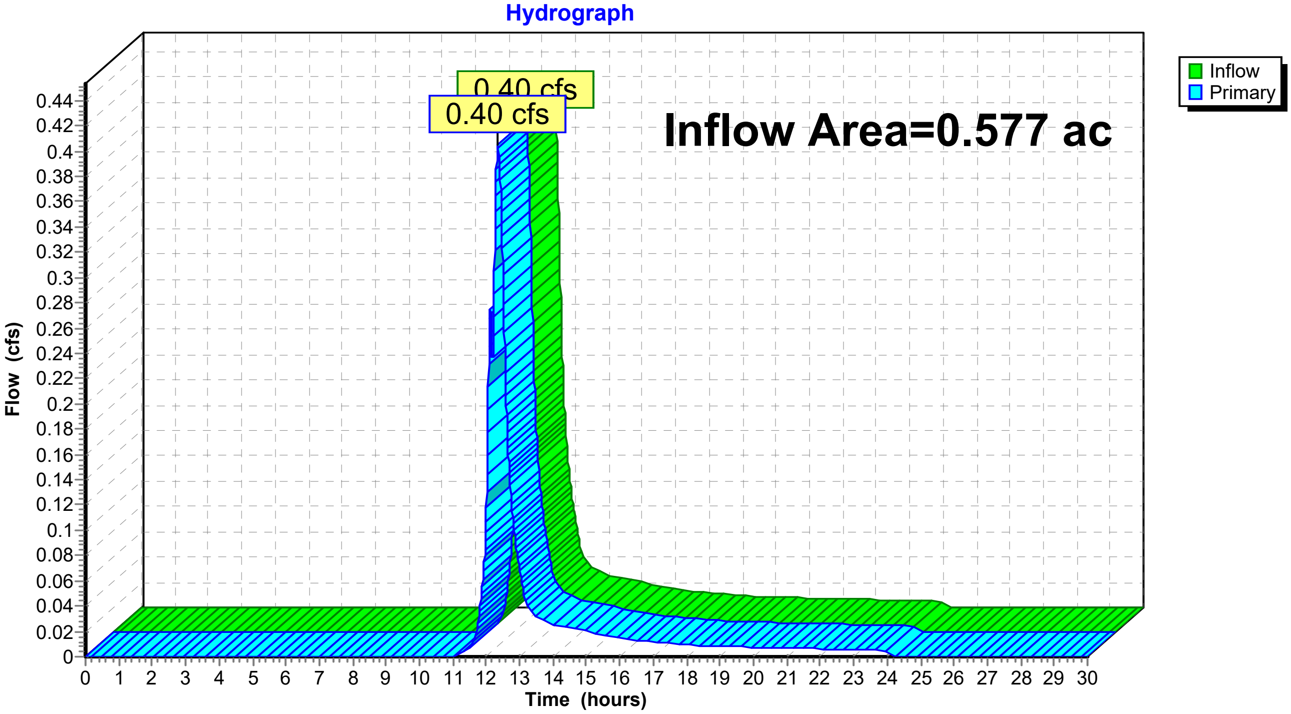


Summary for Link 5P: Design Point #1: Flow to 280 Village Street

Inflow Area =	0.577 ac,	39.98% Impervious,	Inflow Depth = 0.66"	for 10-YR event
Inflow =	0.40 cfs @	12.35 hrs, Volume=	0.032 af	
Primary =	0.40 cfs @	12.35 hrs, Volume=	0.032 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 5P: Design Point #1: Flow to 280 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: P1a Runoff Area=7,363 sf 2.66% Impervious Runoff Depth=1.76"
Flow Length=68' Tc=9.6 min CN=62 Runoff=0.29 cfs 0.025 af

Subcatchment 2P: P1c Runoff Area=9,265 sf 100.00% Impervious Runoff Depth=5.26"
Tc=2.0 min CN=98 Runoff=1.32 cfs 0.093 af

Pond 3P: Basin #1 Peak Elev=186.72' Storage=1,290 cf Inflow=1.47 cfs 0.118 af
Discarded=0.11 cfs 0.097 af Primary=0.53 cfs 0.021 af Outflow=0.64 cfs 0.118 af

Subcatchment 4P: P1b Runoff Area=8,504 sf 6.91% Impervious Runoff Depth=1.91"
Flow Length=47' Slope=0.0200 '/' Tc=7.8 min CN=64 Runoff=0.39 cfs 0.031 af

Link 5P: Design Point #1: Flow to 280 Village Street Inflow=0.80 cfs 0.052 af
Primary=0.80 cfs 0.052 af

Total Runoff Area = 0.577 ac Runoff Volume = 0.149 af Average Runoff Depth = 3.10"
60.02% Pervious = 0.346 ac 39.98% Impervious = 0.231 ac

Summary for Subcatchment 1P: P1a

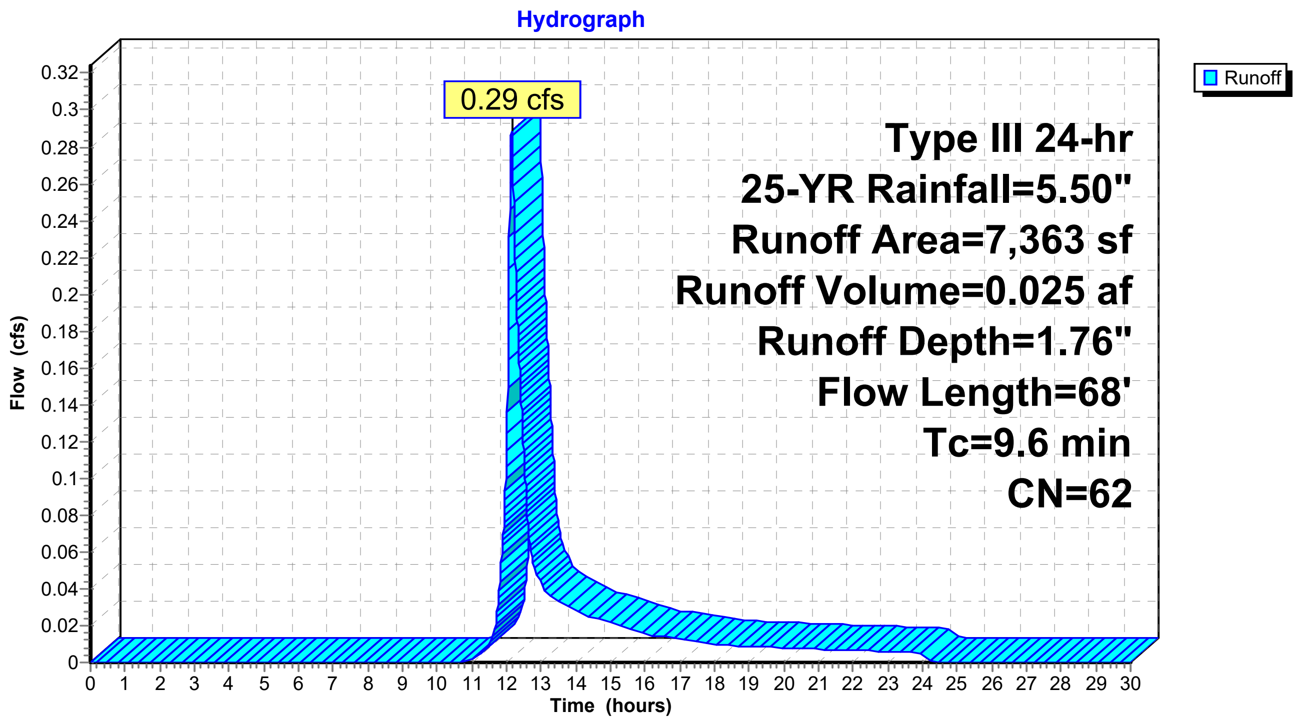
Runoff = 0.29 cfs @ 12.15 hrs, Volume= 0.025 af, Depth= 1.76"

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

Area (sf)	CN	Description
196	98	Paved parking, HSG B
7,167	61	>75% Grass cover, Good, HSG B
7,363	62	Weighted Average
7,167		97.34% Pervious Area
196		2.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	46	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.2	22	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.6	68	Total			

Subcatchment 1P: P1a



Summary for Subcatchment 2P: P1c

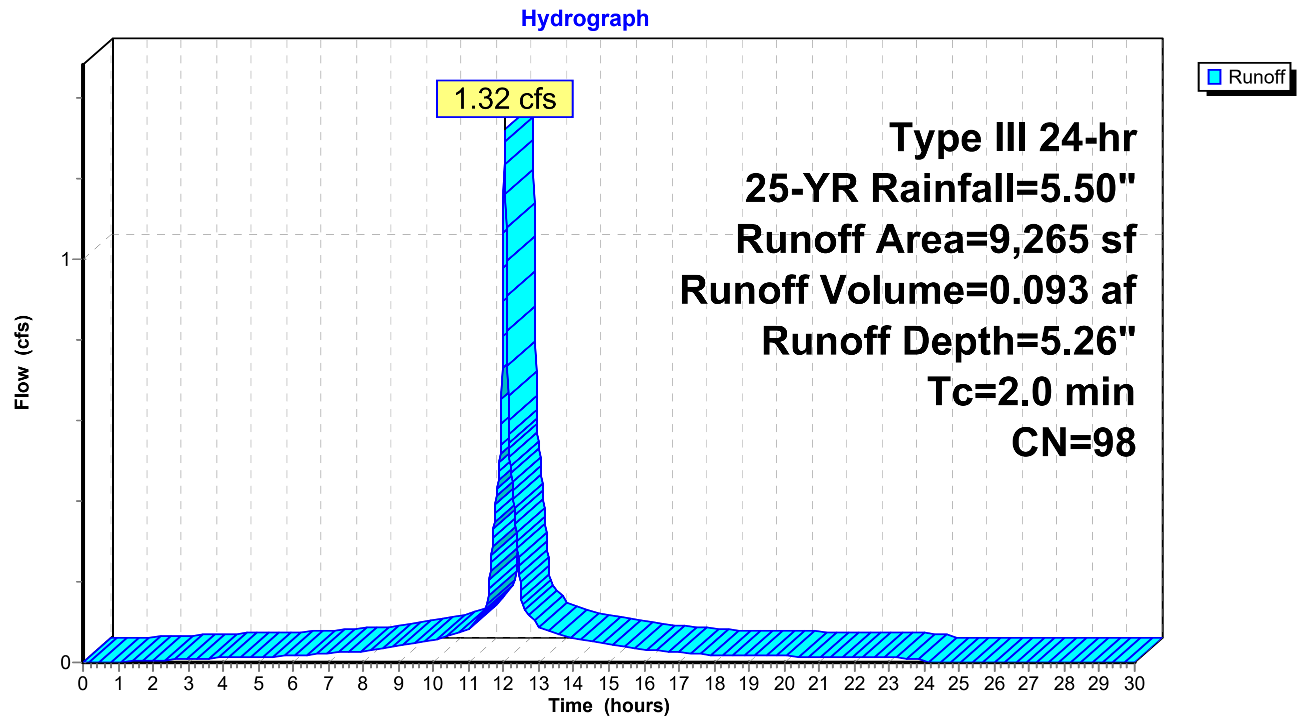
Runoff = 1.32 cfs @ 12.03 hrs, Volume= 0.093 af, Depth= 5.26"

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

Area (sf)	CN	Description
9,265	98	Roofs, HSG B
9,265		100.00% Impervious Area

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

Subcatchment 2P: P1c



Summary for Pond 3P: Basin #1

Inflow Area = 0.382 ac, 56.90% Impervious, Inflow Depth = 3.71" for 25-YR event
Inflow = 1.47 cfs @ 12.03 hrs, Volume= 0.118 af
Outflow = 0.64 cfs @ 12.25 hrs, Volume= 0.118 af, Atten= 56%, Lag= 13.4 min
Discarded = 0.11 cfs @ 12.25 hrs, Volume= 0.097 af
Primary = 0.53 cfs @ 12.25 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 186.72' @ 12.25 hrs Surf.Area= 1,998 sf Storage= 1,290 cf

Plug-Flow detention time= 65.5 min calculated for 0.118 af (100% of inflow)
Center-of-Mass det. time= 65.5 min (834.2 - 768.7)

Volume	Invert	Avail.Storage	Storage Description
#1	186.00'	1,878 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

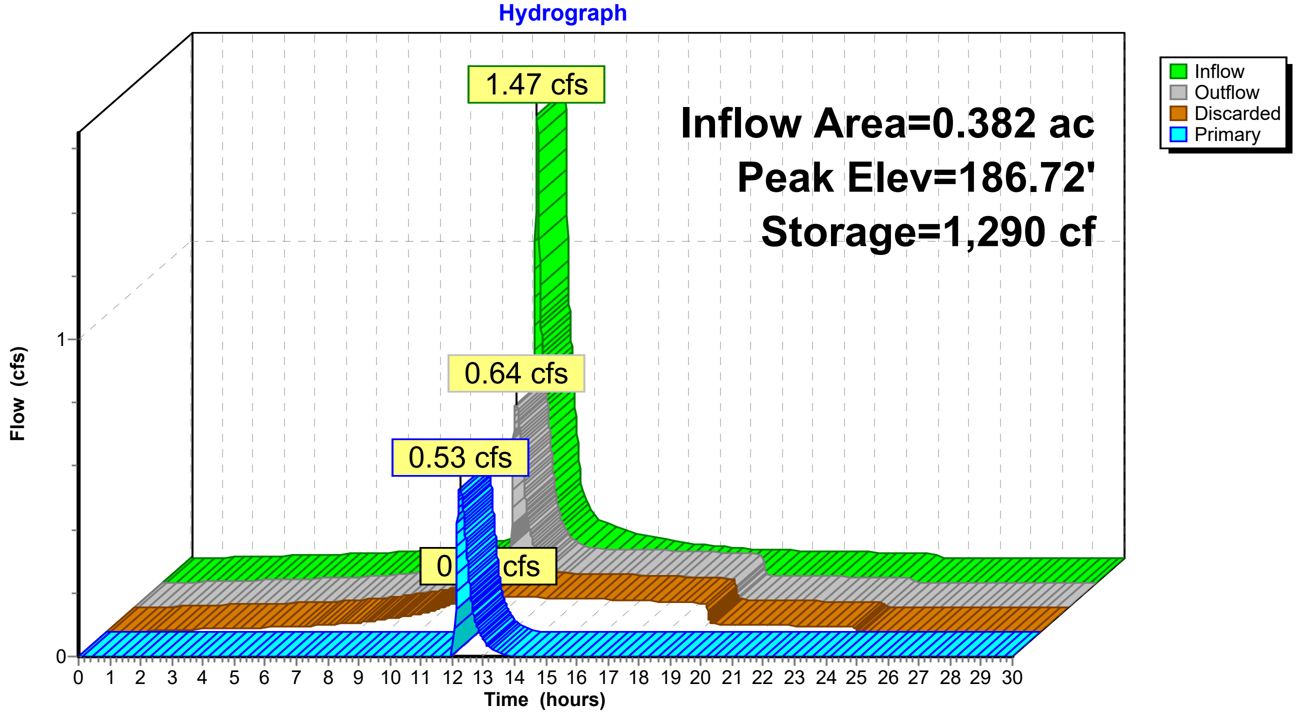
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
186.00	1,604	177.0	0	0	1,604
187.00	2,165	196.0	1,878	1,878	2,198

Device	Routing	Invert	Outlet Devices
#1	Discarded	186.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	186.60'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 186.60 187.00 Width (feet) 4.00 4.00

Discarded OutFlow Max=0.11 cfs @ 12.25 hrs HW=186.72' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.53 cfs @ 12.25 hrs HW=186.72' (Free Discharge)
2=Custom Weir/Orifice (Weir Controls 0.53 cfs @ 1.12 fps)

Pond 3P: Basin #1



Summary for Subcatchment 4P: P1b

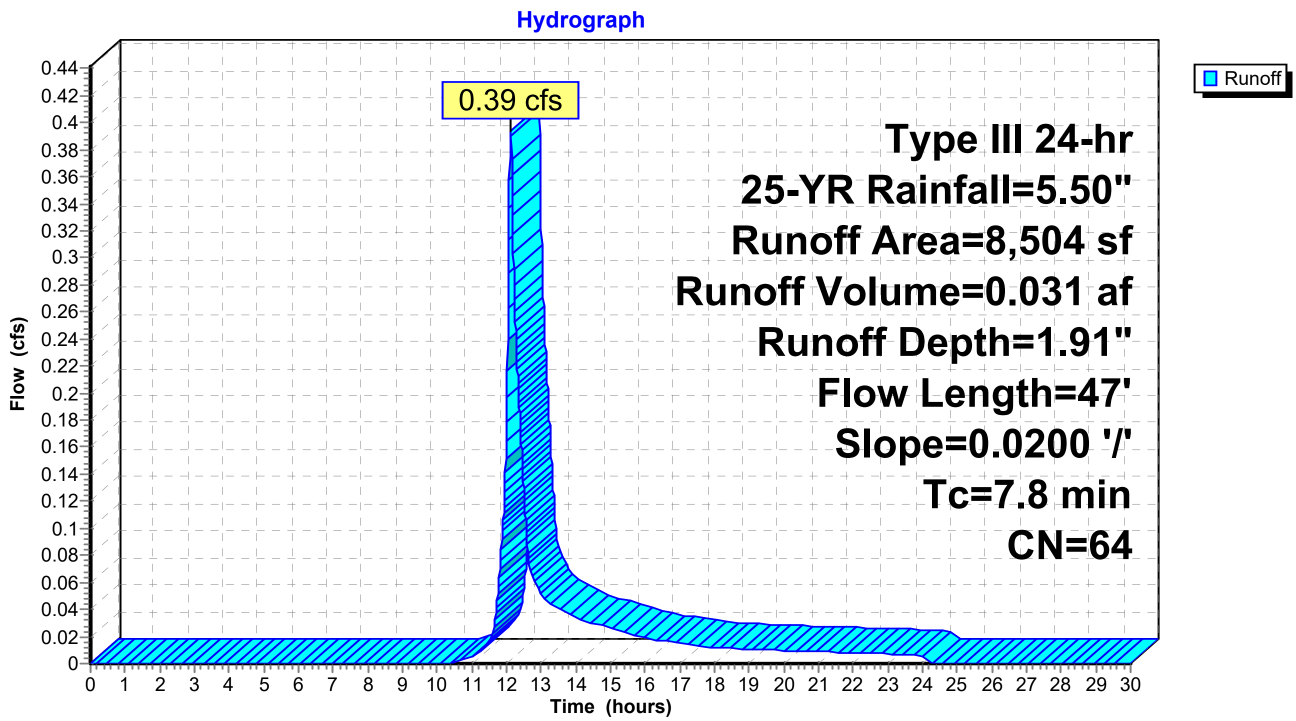
Runoff = 0.39 cfs @ 12.12 hrs, Volume= 0.031 af, Depth= 1.91"

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

	Area (sf)	CN	Description
*	588	98	Patios, HSG B
	7,916	61	>75% Grass cover, Good, HSG B
	8,504	64	Weighted Average
	7,916		93.09% Pervious Area
	588		6.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	47	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 4P: P1b

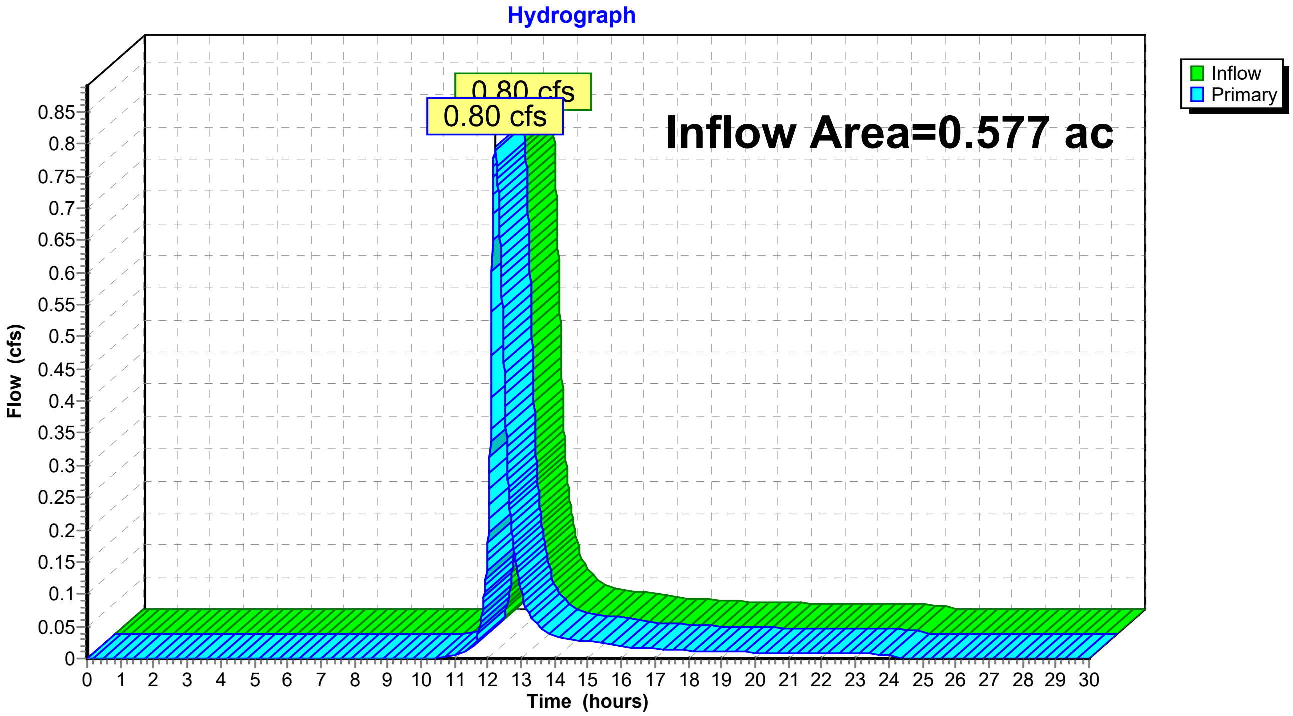


Summary for Link 5P: Design Point #1: Flow to 280 Village Street

Inflow Area =	0.577 ac, 39.98% Impervious, Inflow Depth = 1.08" for 25-YR event		
Inflow =	0.80 cfs @ 12.21 hrs, Volume=	0.052 af	
Primary =	0.80 cfs @ 12.21 hrs, Volume=	0.052 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 5P: Design Point #1: Flow to 280 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: P1a Runoff Area=7,363 sf 2.66% Impervious Runoff Depth=2.16"
Flow Length=68' Tc=9.6 min CN=62 Runoff=0.36 cfs 0.030 af

Subcatchment 2P: P1c Runoff Area=9,265 sf 100.00% Impervious Runoff Depth=5.86"
Tc=2.0 min CN=98 Runoff=1.47 cfs 0.104 af

Pond 3P: Basin #1 Peak Elev=186.75' Storage=1,352 cf Inflow=1.66 cfs 0.134 af
Discarded=0.11 cfs 0.104 af Primary=0.75 cfs 0.030 af Outflow=0.86 cfs 0.134 af

Subcatchment 4P: P1b Runoff Area=8,504 sf 6.91% Impervious Runoff Depth=2.33"
Flow Length=47' Slope=0.0200 '/' Tc=7.8 min CN=64 Runoff=0.49 cfs 0.038 af

Link 5P: Design Point #1: Flow to 280 Village Street Inflow=1.17 cfs 0.068 af
Primary=1.17 cfs 0.068 af

Total Runoff Area = 0.577 ac Runoff Volume = 0.172 af Average Runoff Depth = 3.58"
60.02% Pervious = 0.346 ac 39.98% Impervious = 0.231 ac

Summary for Subcatchment 1P: P1a

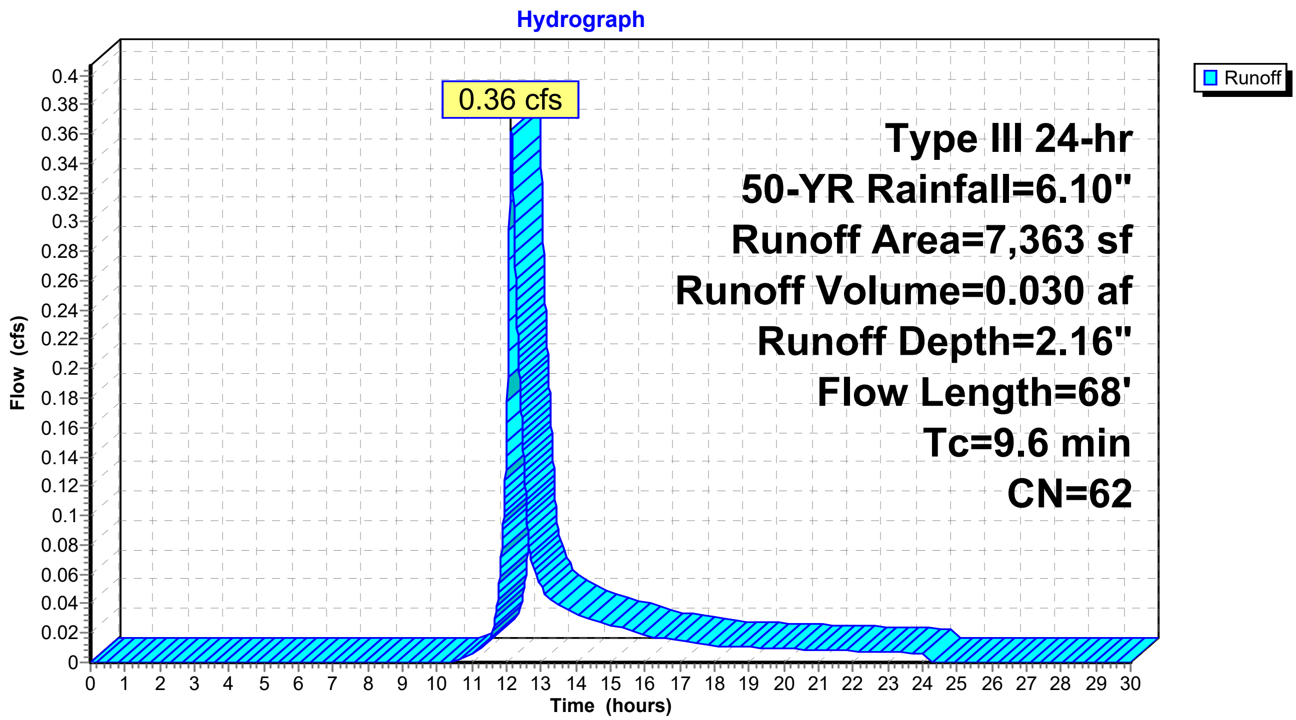
Runoff = 0.36 cfs @ 12.14 hrs, Volume= 0.030 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
196	98	Paved parking, HSG B
7,167	61	>75% Grass cover, Good, HSG B
7,363	62	Weighted Average
7,167		97.34% Pervious Area
196		2.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	46	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.2	22	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.6	68	Total			

Subcatchment 1P: P1a



Summary for Subcatchment 2P: P1c

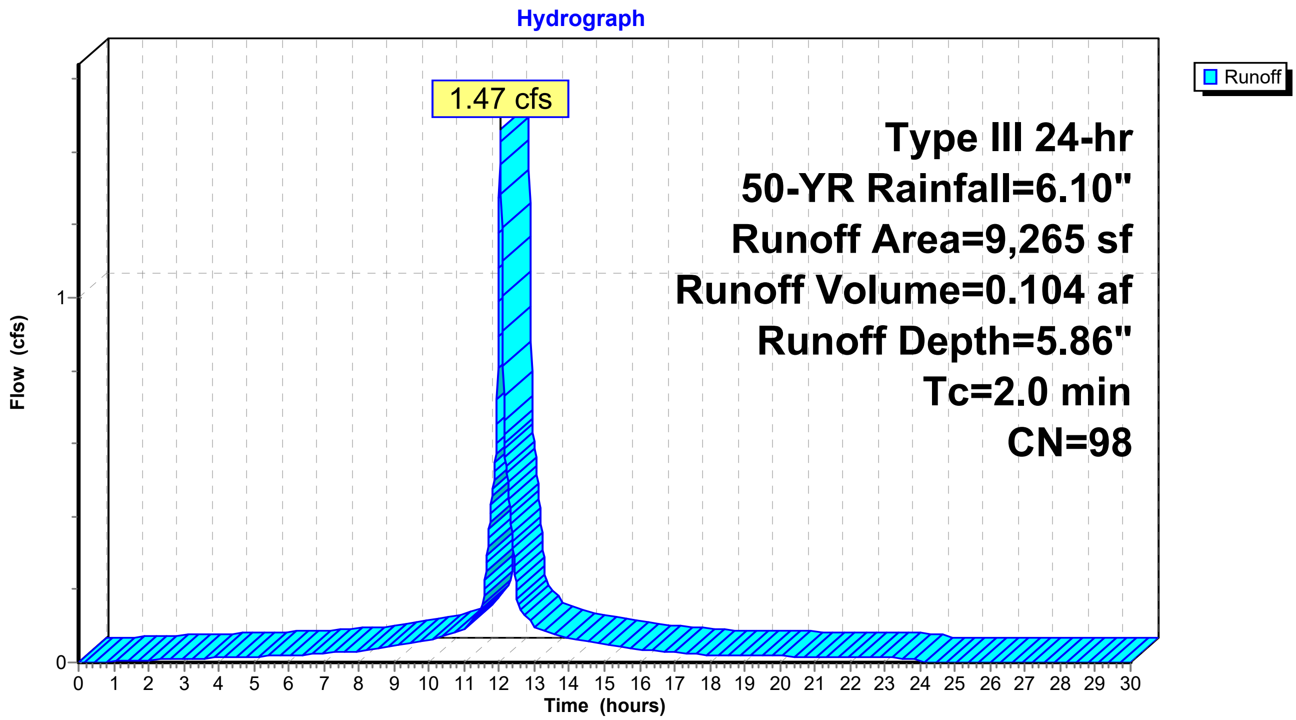
Runoff = 1.47 cfs @ 12.03 hrs, Volume= 0.104 af, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
9,265	98	Roofs, HSG B
9,265		100.00% Impervious Area

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

Subcatchment 2P: P1c



Summary for Pond 3P: Basin #1

Inflow Area = 0.382 ac, 56.90% Impervious, Inflow Depth = 4.22" for 50-YR event
Inflow = 1.66 cfs @ 12.03 hrs, Volume= 0.134 af
Outflow = 0.86 cfs @ 12.20 hrs, Volume= 0.134 af, Atten= 48%, Lag= 9.9 min
Discarded = 0.11 cfs @ 12.20 hrs, Volume= 0.104 af
Primary = 0.75 cfs @ 12.20 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 186.75' @ 12.20 hrs Surf.Area= 2,016 sf Storage= 1,352 cf

Plug-Flow detention time= 63.2 min calculated for 0.134 af (100% of inflow)
Center-of-Mass det. time= 63.2 min (831.3 - 768.1)

Volume	Invert	Avail.Storage	Storage Description
#1	186.00'	1,878 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

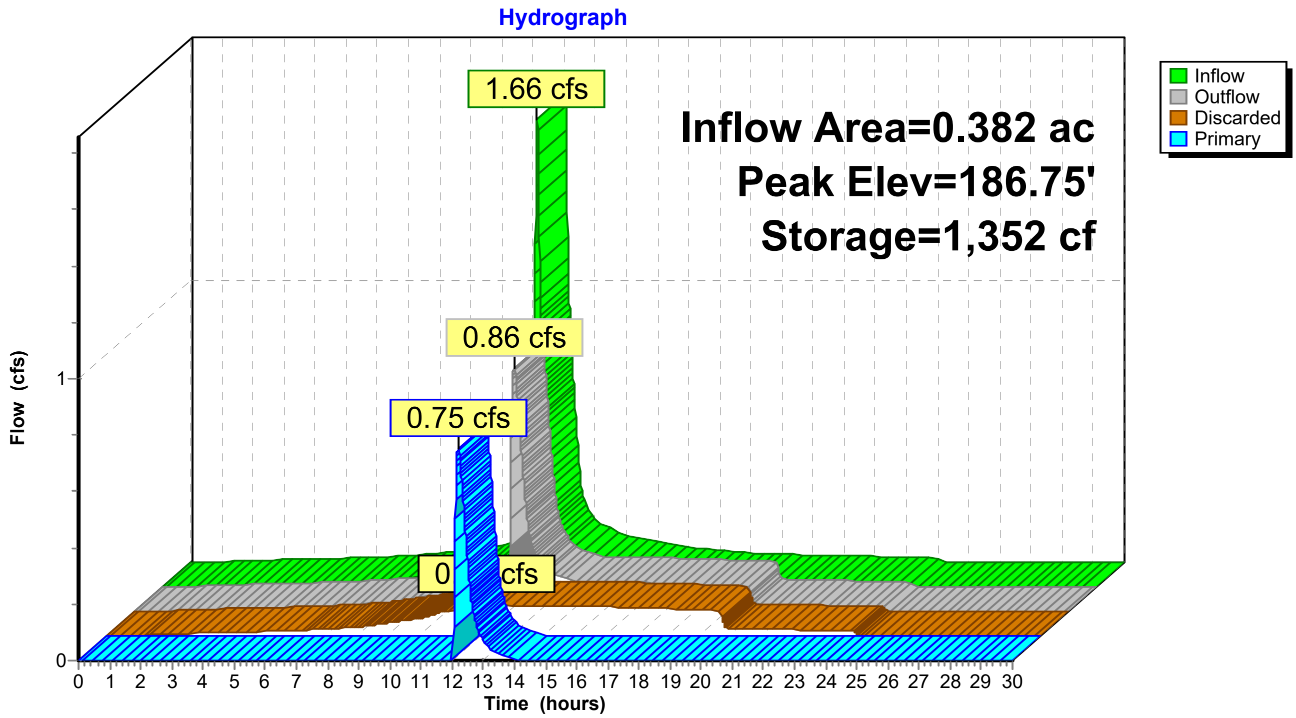
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
186.00	1,604	177.0	0	0	1,604
187.00	2,165	196.0	1,878	1,878	2,198

Device	Routing	Invert	Outlet Devices
#1	Discarded	186.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	186.60'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 186.60 187.00 Width (feet) 4.00 4.00

Discarded OutFlow Max=0.11 cfs @ 12.20 hrs HW=186.75' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.75 cfs @ 12.20 hrs HW=186.75' (Free Discharge)
└─**2=Custom Weir/Orifice** (Weir Controls 0.75 cfs @ 1.26 fps)

Pond 3P: Basin #1



Summary for Subcatchment 4P: P1b

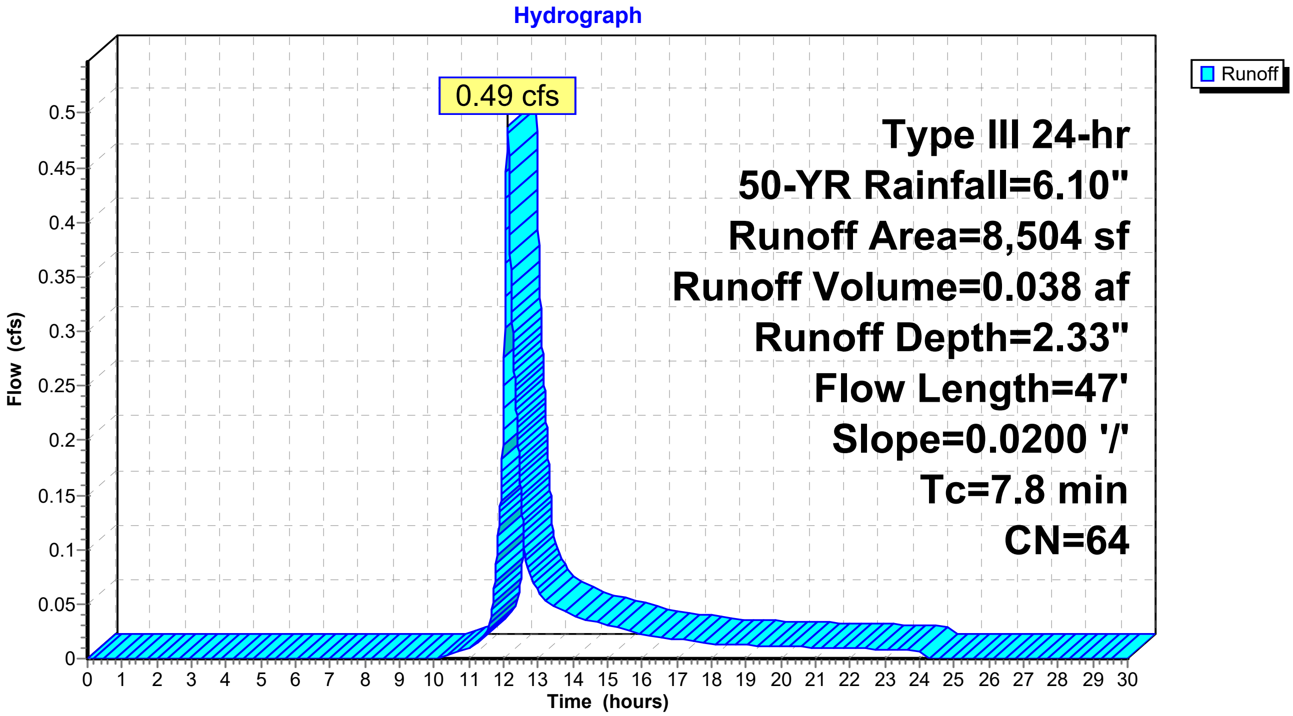
Runoff = 0.49 cfs @ 12.12 hrs, Volume= 0.038 af, Depth= 2.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

	Area (sf)	CN	Description
*	588	98	Patios, HSG B
	7,916	61	>75% Grass cover, Good, HSG B
	8,504	64	Weighted Average
	7,916		93.09% Pervious Area
	588		6.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	47	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 4P: P1b

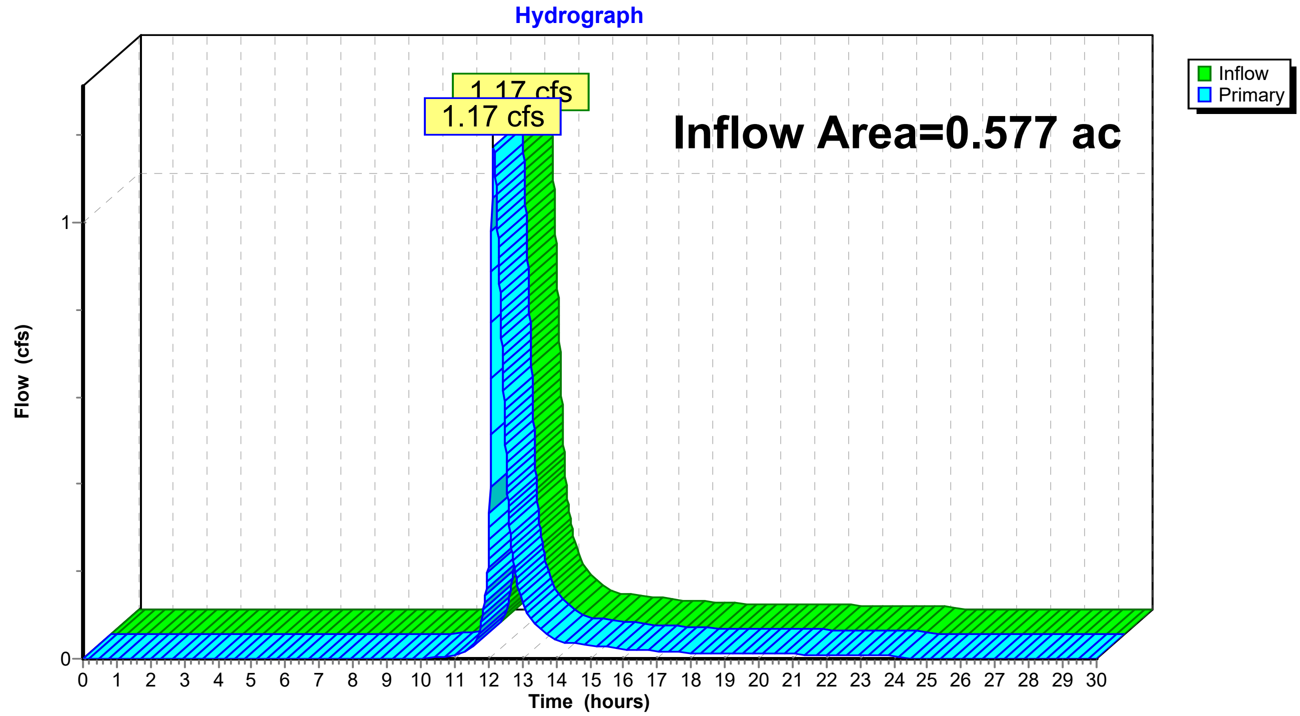


Summary for Link 5P: Design Point #1: Flow to 280 Village Street

Inflow Area = 0.577 ac, 39.98% Impervious, Inflow Depth = 1.41" for 50-YR event
Inflow = 1.17 cfs @ 12.16 hrs, Volume= 0.068 af
Primary = 1.17 cfs @ 12.16 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 5P: Design Point #1: Flow to 280 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: P1a Runoff Area=7,363 sf 2.66% Impervious Runoff Depth=2.58"
Flow Length=68' Tc=9.6 min CN=62 Runoff=0.44 cfs 0.036 af

Subcatchment 2P: P1c Runoff Area=9,265 sf 100.00% Impervious Runoff Depth=6.46"
Tc=2.0 min CN=98 Runoff=1.61 cfs 0.115 af

Pond 3P: Basin #1 Peak Elev=186.78' Storage=1,419 cf Inflow=1.85 cfs 0.151 af
Discarded=0.11 cfs 0.111 af Primary=1.01 cfs 0.040 af Outflow=1.13 cfs 0.151 af

Subcatchment 4P: P1b Runoff Area=8,504 sf 6.91% Impervious Runoff Depth=2.78"
Flow Length=47' Slope=0.0200 '/' Tc=7.8 min CN=64 Runoff=0.59 cfs 0.045 af

Link 5P: Design Point #1: Flow to 280 Village Street Inflow=1.59 cfs 0.085 af
Primary=1.59 cfs 0.085 af

Total Runoff Area = 0.577 ac Runoff Volume = 0.196 af Average Runoff Depth = 4.08"
60.02% Pervious = 0.346 ac 39.98% Impervious = 0.231 ac

Summary for Subcatchment 1P: P1a

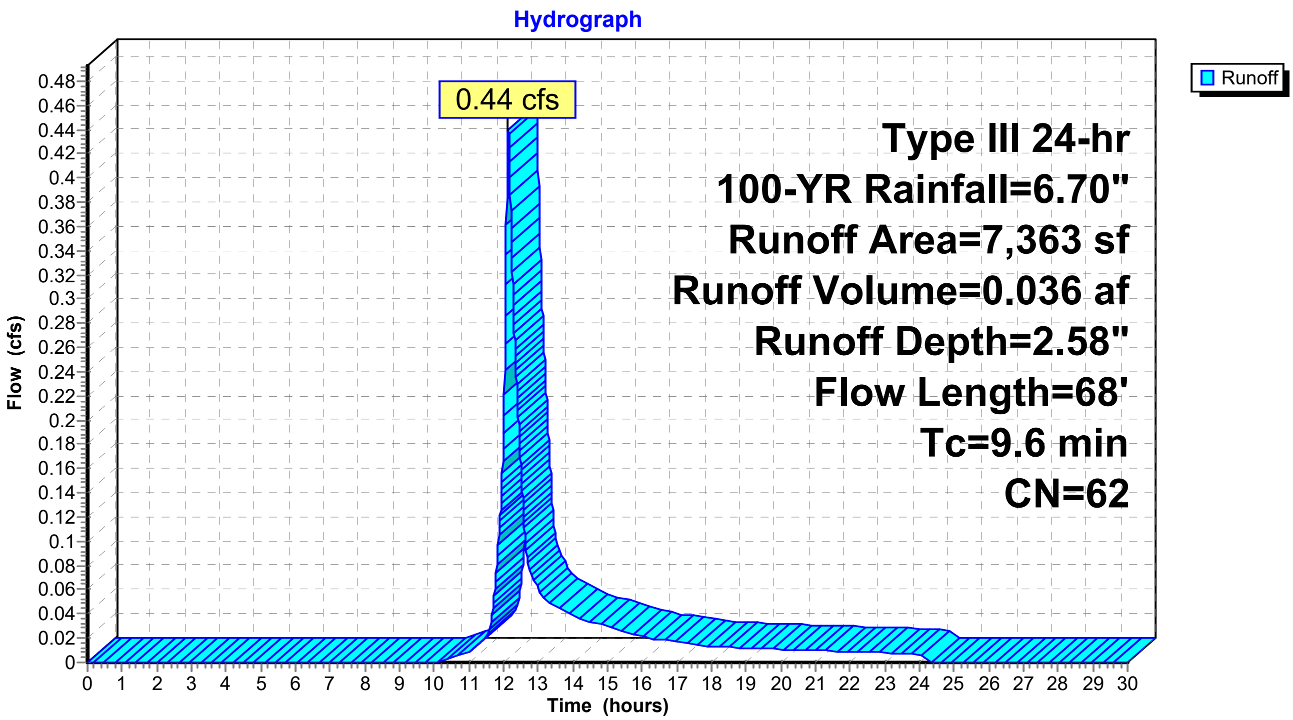
Runoff = 0.44 cfs @ 12.14 hrs, Volume= 0.036 af, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
196	98	Paved parking, HSG B
7,167	61	>75% Grass cover, Good, HSG B
7,363	62	Weighted Average
7,167		97.34% Pervious Area
196		2.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	46	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.2	22	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.6	68	Total			

Subcatchment 1P: P1a



Summary for Subcatchment 2P: P1c

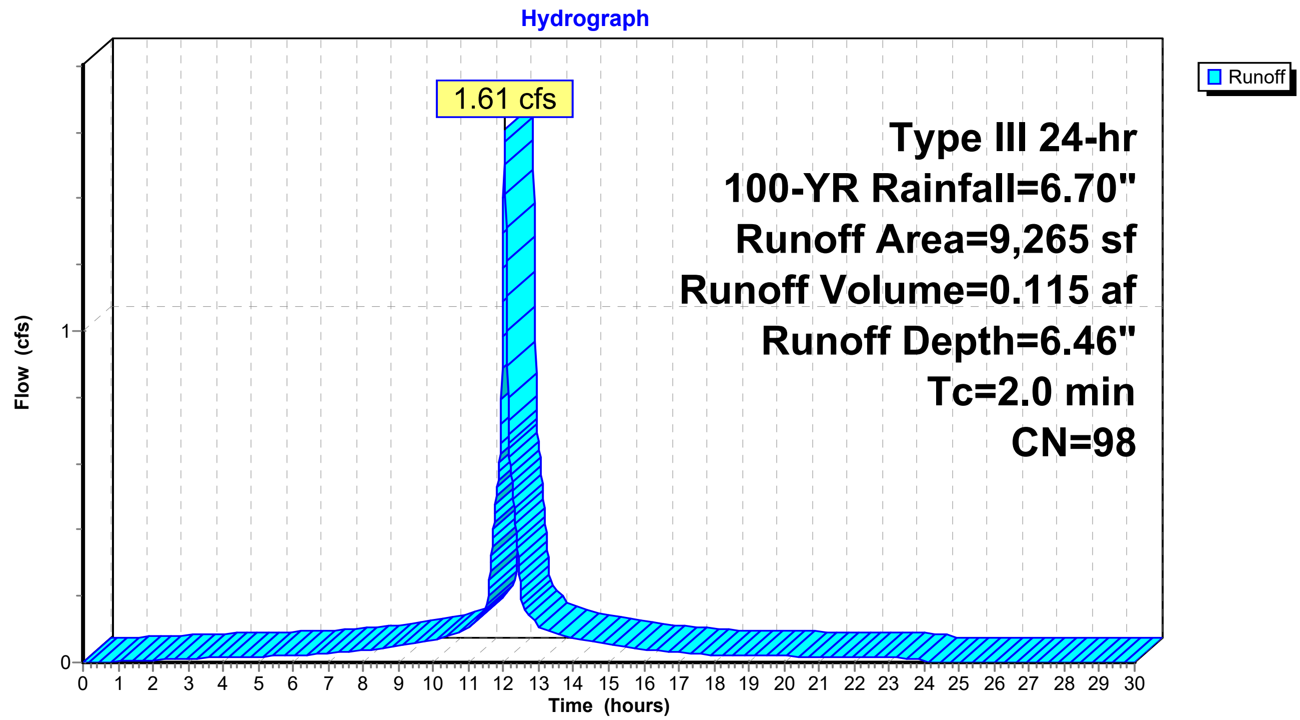
Runoff = 1.61 cfs @ 12.03 hrs, Volume= 0.115 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
9,265	98	Roofs, HSG B
9,265		100.00% Impervious Area

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

Subcatchment 2P: P1c



Summary for Pond 3P: Basin #1

Inflow Area =	0.382 ac,	56.90% Impervious,	Inflow Depth = 4.74"	for 100-YR event
Inflow =	1.85 cfs @	12.03 hrs, Volume=	0.151 af	
Outflow =	1.13 cfs @	12.14 hrs, Volume=	0.151 af,	Atten= 39%, Lag= 6.6 min
Discarded =	0.11 cfs @	12.14 hrs, Volume=	0.111 af	
Primary =	1.01 cfs @	12.14 hrs, Volume=	0.040 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 186.78' @ 12.14 hrs Surf.Area= 2,035 sf Storage= 1,419 cf

Plug-Flow detention time= 61.2 min calculated for 0.151 af (100% of inflow)
Center-of-Mass det. time= 61.2 min (828.7 - 767.5)

Volume	Invert	Avail.Storage	Storage Description
#1	186.00'	1,878 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

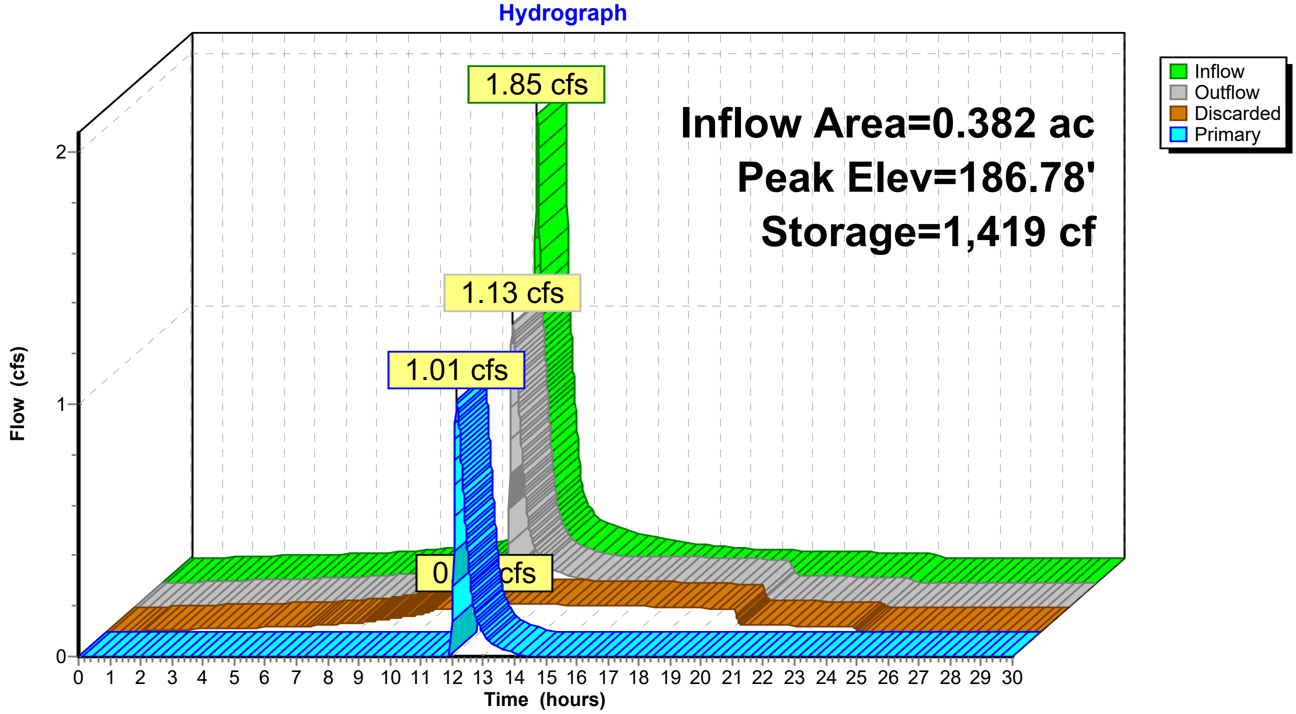
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
186.00	1,604	177.0	0	0	1,604
187.00	2,165	196.0	1,878	1,878	2,198

Device	Routing	Invert	Outlet Devices
#1	Discarded	186.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	186.60'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 186.60 187.00 Width (feet) 4.00 4.00

Discarded OutFlow Max=0.11 cfs @ 12.14 hrs HW=186.78' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=1.01 cfs @ 12.14 hrs HW=186.78' (Free Discharge)
└─**2=Custom Weir/Orifice** (Weir Controls 1.01 cfs @ 1.39 fps)

Pond 3P: Basin #1



Summary for Subcatchment 4P: P1b

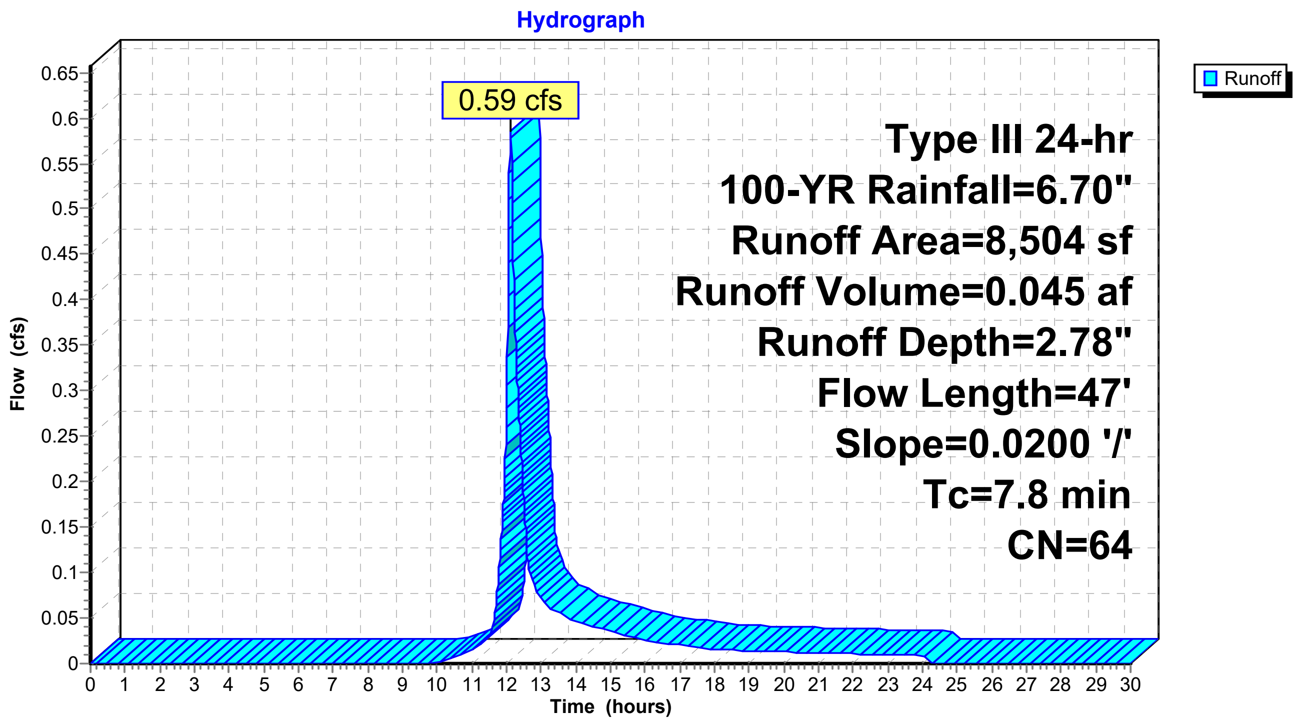
Runoff = 0.59 cfs @ 12.12 hrs, Volume= 0.045 af, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

	Area (sf)	CN	Description
*	588	98	Patios, HSG B
	7,916	61	>75% Grass cover, Good, HSG B
	8,504	64	Weighted Average
	7,916		93.09% Pervious Area
	588		6.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	47	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 4P: P1b

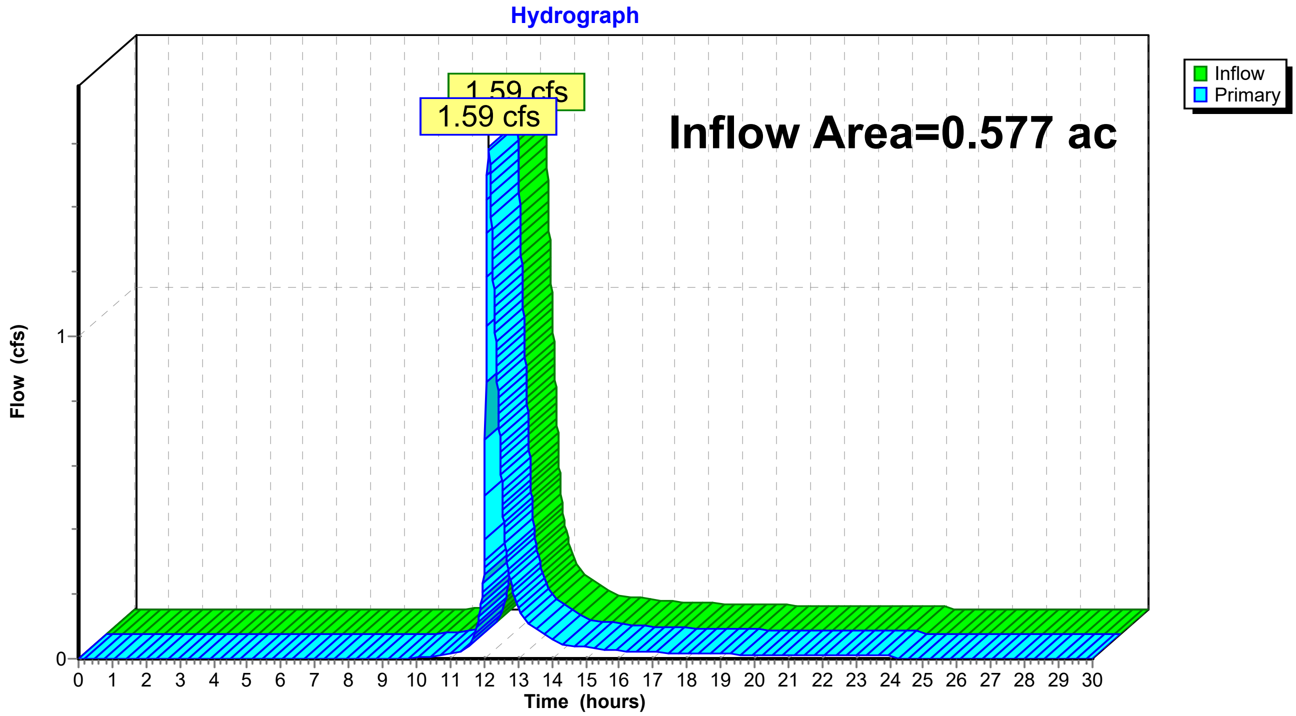


Summary for Link 5P: Design Point #1: Flow to 280 Village Street

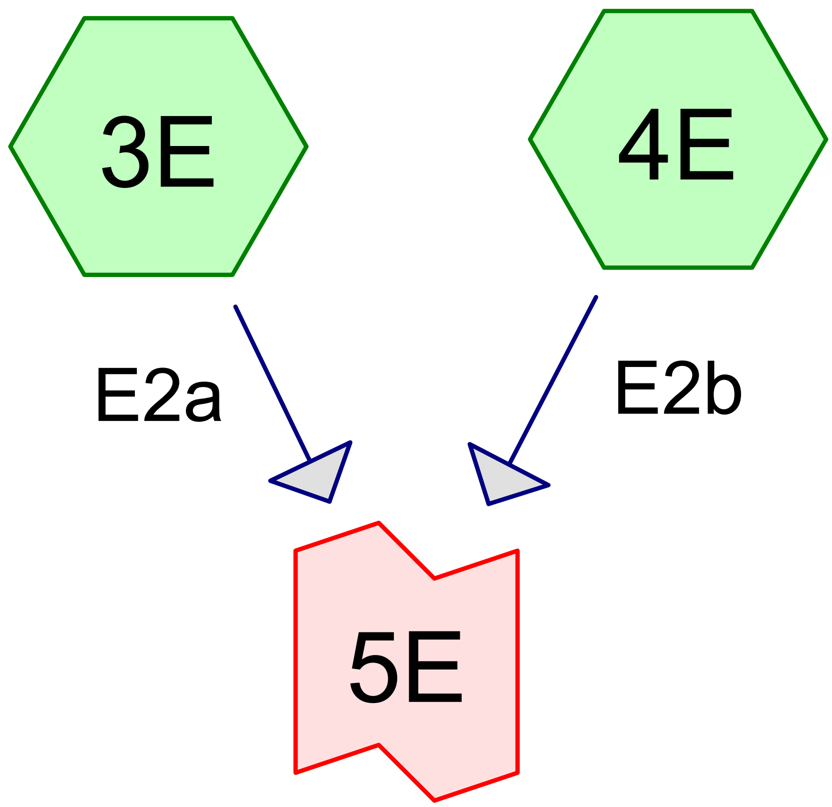
Inflow Area =	0.577 ac, 39.98% Impervious, Inflow Depth = 1.78"		for 100-YR event
Inflow =	1.59 cfs @ 12.13 hrs, Volume=	0.085 af	
Primary =	1.59 cfs @ 12.13 hrs, Volume=	0.085 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

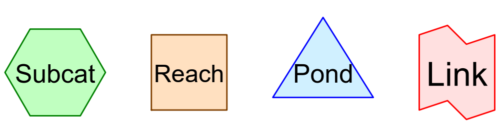
Link 5P: Design Point #1: Flow to 280 Village Street



DESIGN POINT #2: FLOW TO 278 VILLAGE STREET EXISTING CONDITIONS



Design Point #2: Flow to
278 Village Street



Routing Diagram for HydroCAD2
Prepared by {enter your company name here}, Printed 6/29/2019

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.076	61	>75% Grass cover, Good, HSG B (3E, 4E)
0.000	98	Concrete Pad, HSG B (3E)
0.012	90	Gravel (4E)
0.113	98	Paved parking, HSG B (4E)
0.035	98	Roofs, HSG B (4E)
0.127	55	Woods, Good, HSG B (3E)
0.364	**75**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.352	HSG B	3E, 4E
0.000	HSG C	
0.000	HSG D	
0.012	Other	4E
0.364		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3E: E2a Runoff Area=6,946 sf 0.26% Impervious Runoff Depth=0.28"
Flow Length=69' Slope=0.0100 '/' Tc=10.3 min CN=56 Runoff=0.02 cfs 0.004 af

Subcatchment 4E: E2b Runoff Area=8,889 sf 72.75% Impervious Runoff Depth=2.17"
Flow Length=60' Tc=6.3 min CN=90 Runoff=0.51 cfs 0.037 af

Link 5E: Design Point #2: Flow to 278 Village Street Inflow=0.51 cfs 0.041 af
Primary=0.51 cfs 0.041 af

Total Runoff Area = 0.364 ac Runoff Volume = 0.041 af Average Runoff Depth = 1.34"
59.05% Pervious = 0.215 ac 40.95% Impervious = 0.149 ac

Summary for Subcatchment 3E: E2a

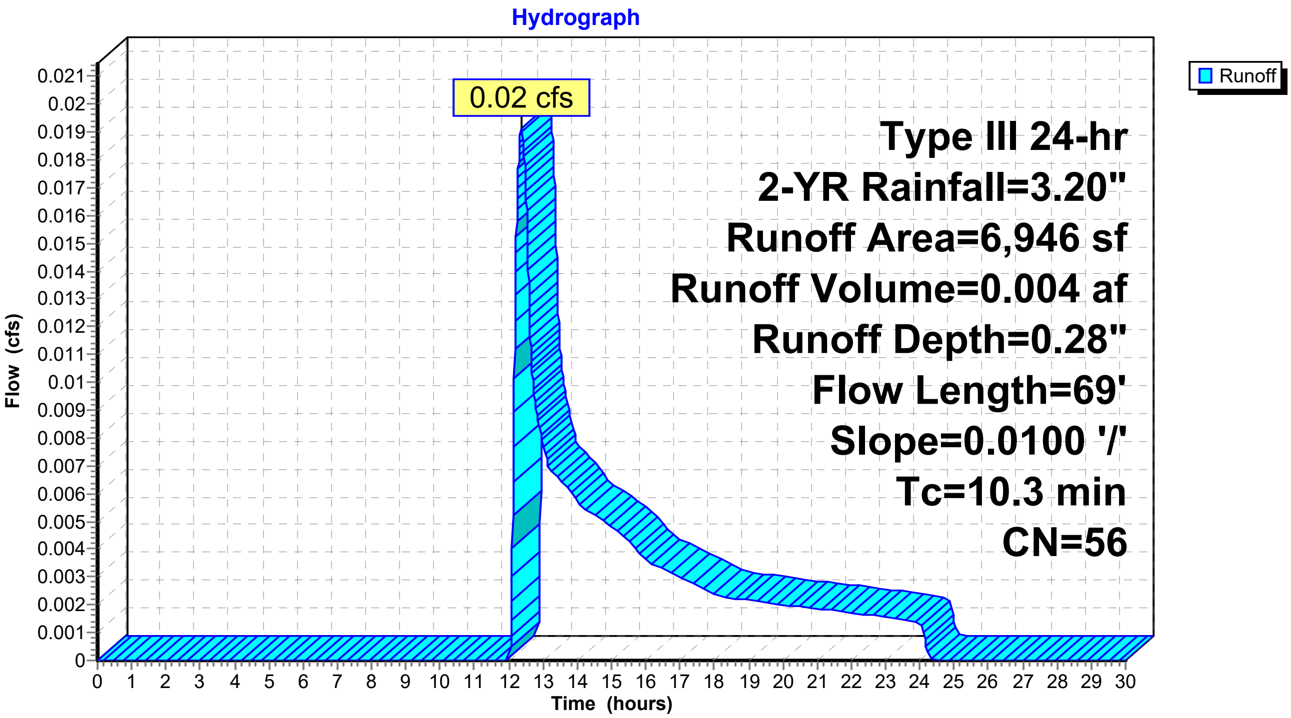
Runoff = 0.02 cfs @ 12.37 hrs, Volume= 0.004 af, Depth= 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
*	18	98	Concrete Pad, HSG B
	1,404	61	>75% Grass cover, Good, HSG B
	5,524	55	Woods, Good, HSG B
	6,946	56	Weighted Average
	6,928		99.74% Pervious Area
	18		0.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	44	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	69	Total			

Subcatchment 3E: E2a



Summary for Subcatchment 4E: E2b

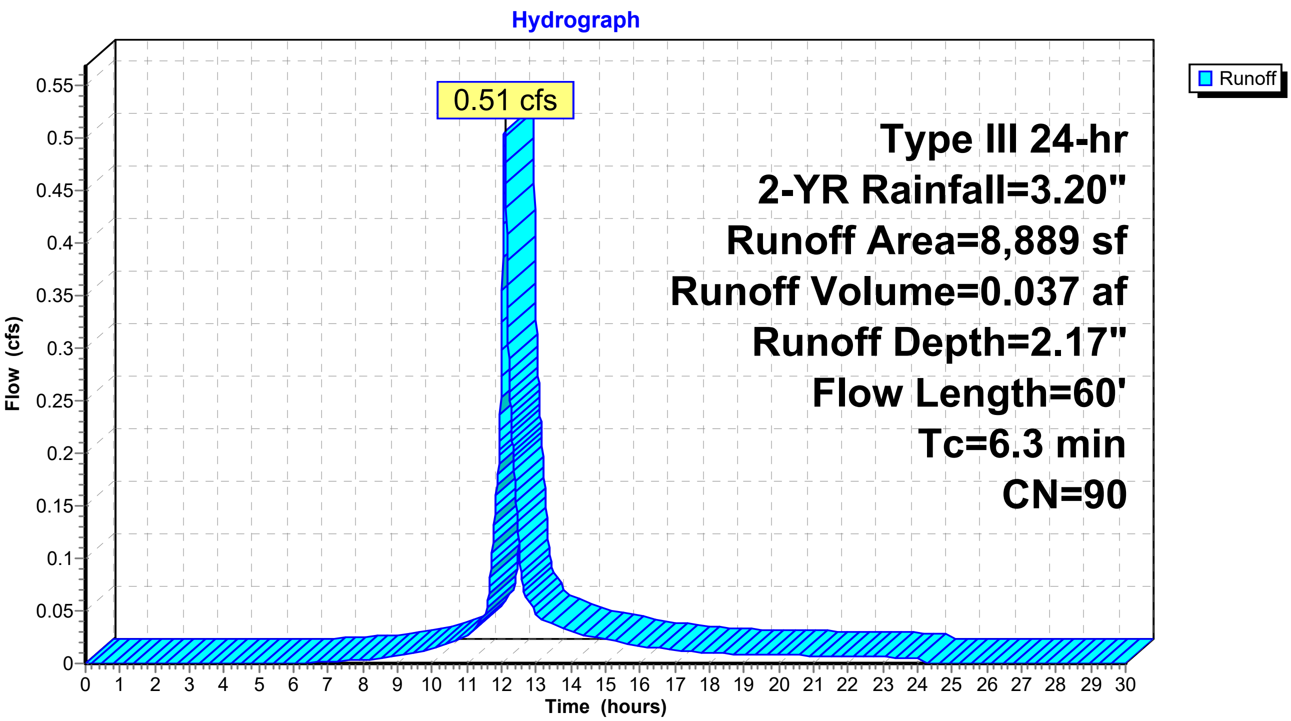
Runoff = 0.51 cfs @ 12.09 hrs, Volume= 0.037 af, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
	4,930	98	Paved parking, HSG B
	1,537	98	Roofs, HSG B
*	513	90	Gravel
	1,909	61	>75% Grass cover, Good, HSG B
	8,889	90	Weighted Average
	2,422		27.25% Pervious Area
	6,467		72.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	24	0.0120	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	36	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.3	60	Total			

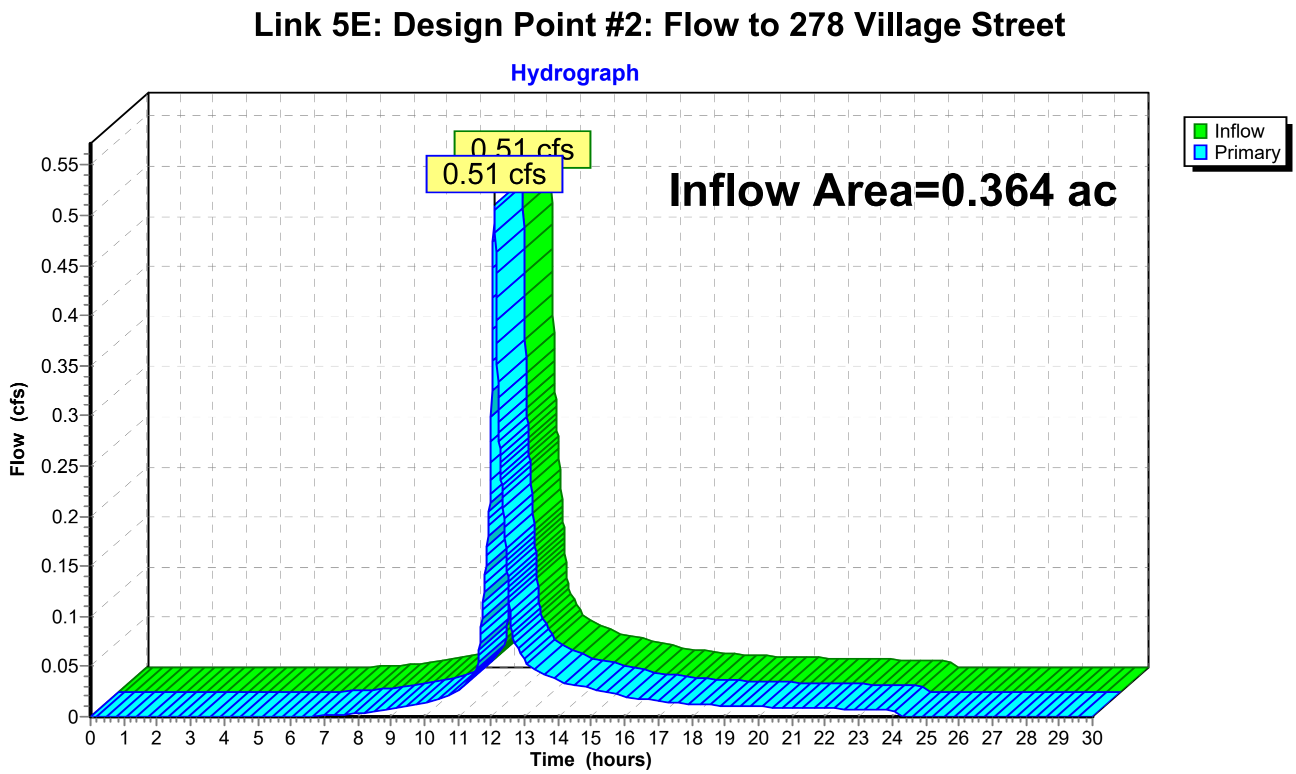
Subcatchment 4E: E2b



Summary for Link 5E: Design Point #2: Flow to 278 Village Street

Inflow Area = 0.364 ac, 40.95% Impervious, Inflow Depth = 1.34" for 2-YR event
Inflow = 0.51 cfs @ 12.09 hrs, Volume= 0.041 af
Primary = 0.51 cfs @ 12.09 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3E: E2a Runoff Area=6,946 sf 0.26% Impervious Runoff Depth=0.89"
Flow Length=69' Slope=0.0100 '/' Tc=10.3 min CN=56 Runoff=0.11 cfs 0.012 af

Subcatchment 4E: E2b Runoff Area=8,889 sf 72.75% Impervious Runoff Depth=3.59"
Flow Length=60' Tc=6.3 min CN=90 Runoff=0.82 cfs 0.061 af

Link 5E: Design Point #2: Flow to 278 Village Street Inflow=0.90 cfs 0.073 af
Primary=0.90 cfs 0.073 af

Total Runoff Area = 0.364 ac Runoff Volume = 0.073 af Average Runoff Depth = 2.40"
59.05% Pervious = 0.215 ac 40.95% Impervious = 0.149 ac

Summary for Subcatchment 3E: E2a

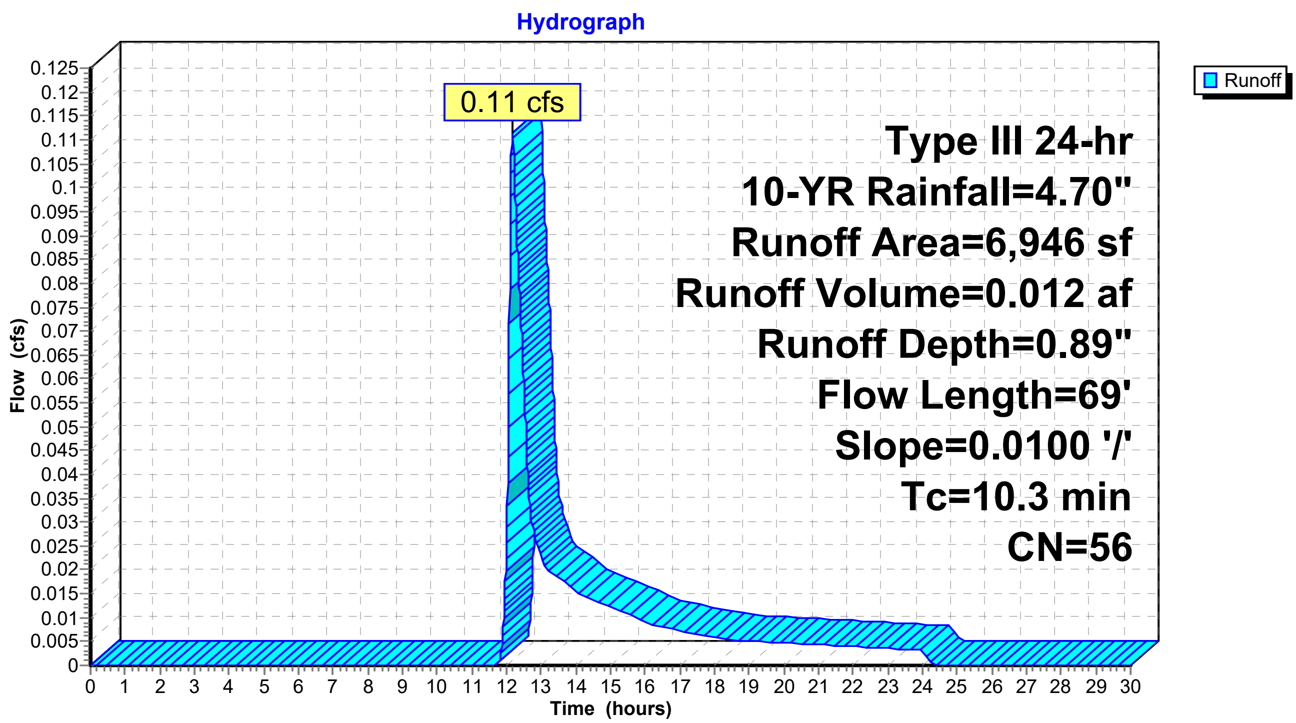
Runoff = 0.11 cfs @ 12.17 hrs, Volume= 0.012 af, Depth= 0.89"

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

	Area (sf)	CN	Description
*	18	98	Concrete Pad, HSG B
	1,404	61	>75% Grass cover, Good, HSG B
	5,524	55	Woods, Good, HSG B
	6,946	56	Weighted Average
	6,928		99.74% Pervious Area
	18		0.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	44	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	69	Total			

Subcatchment 3E: E2a



Summary for Subcatchment 4E: E2b

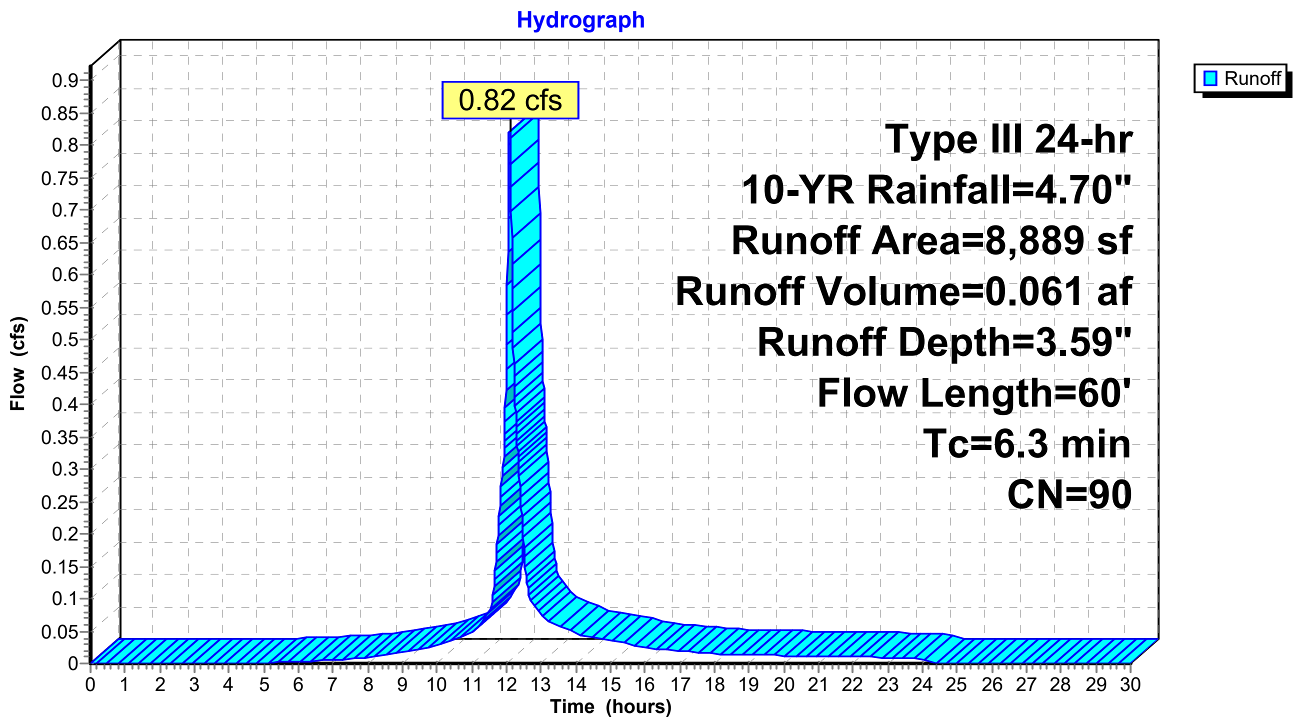
Runoff = 0.82 cfs @ 12.09 hrs, Volume= 0.061 af, Depth= 3.59"

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

	Area (sf)	CN	Description
	4,930	98	Paved parking, HSG B
	1,537	98	Roofs, HSG B
*	513	90	Gravel
	1,909	61	>75% Grass cover, Good, HSG B
	8,889	90	Weighted Average
	2,422		27.25% Pervious Area
	6,467		72.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	24	0.0120	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	36	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.3	60	Total			

Subcatchment 4E: E2b

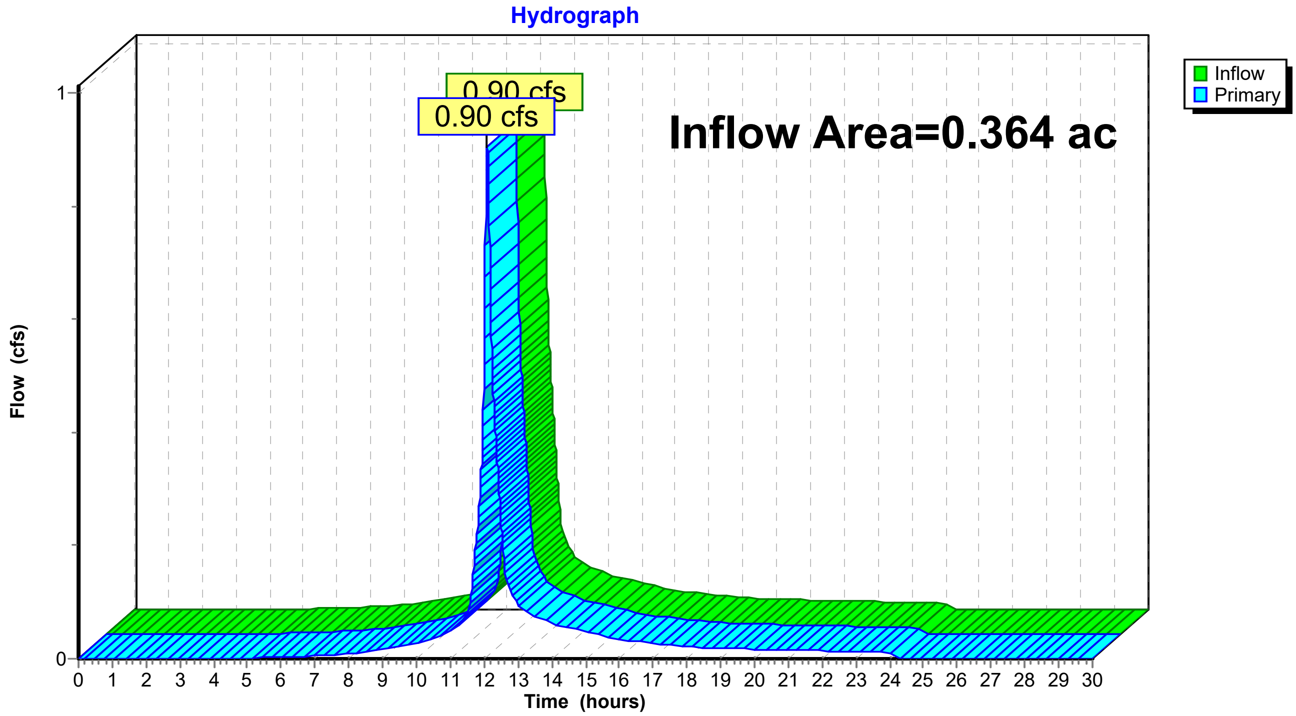


Summary for Link 5E: Design Point #2: Flow to 278 Village Street

Inflow Area = 0.364 ac, 40.95% Impervious, Inflow Depth = 2.40" for 10-YR event
Inflow = 0.90 cfs @ 12.09 hrs, Volume= 0.073 af
Primary = 0.90 cfs @ 12.09 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 5E: Design Point #2: Flow to 278 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3E: E2a Runoff Area=6,946 sf 0.26% Impervious Runoff Depth=1.31"
Flow Length=69' Slope=0.0100 '/' Tc=10.3 min CN=56 Runoff=0.18 cfs 0.017 af

Subcatchment 4E: E2b Runoff Area=8,889 sf 72.75% Impervious Runoff Depth=4.36"
Flow Length=60' Tc=6.3 min CN=90 Runoff=0.99 cfs 0.074 af

Link 5E: Design Point #2: Flow to 278 Village Street Inflow=1.13 cfs 0.092 af
Primary=1.13 cfs 0.092 af

Total Runoff Area = 0.364 ac Runoff Volume = 0.092 af Average Runoff Depth = 3.02"
59.05% Pervious = 0.215 ac 40.95% Impervious = 0.149 ac

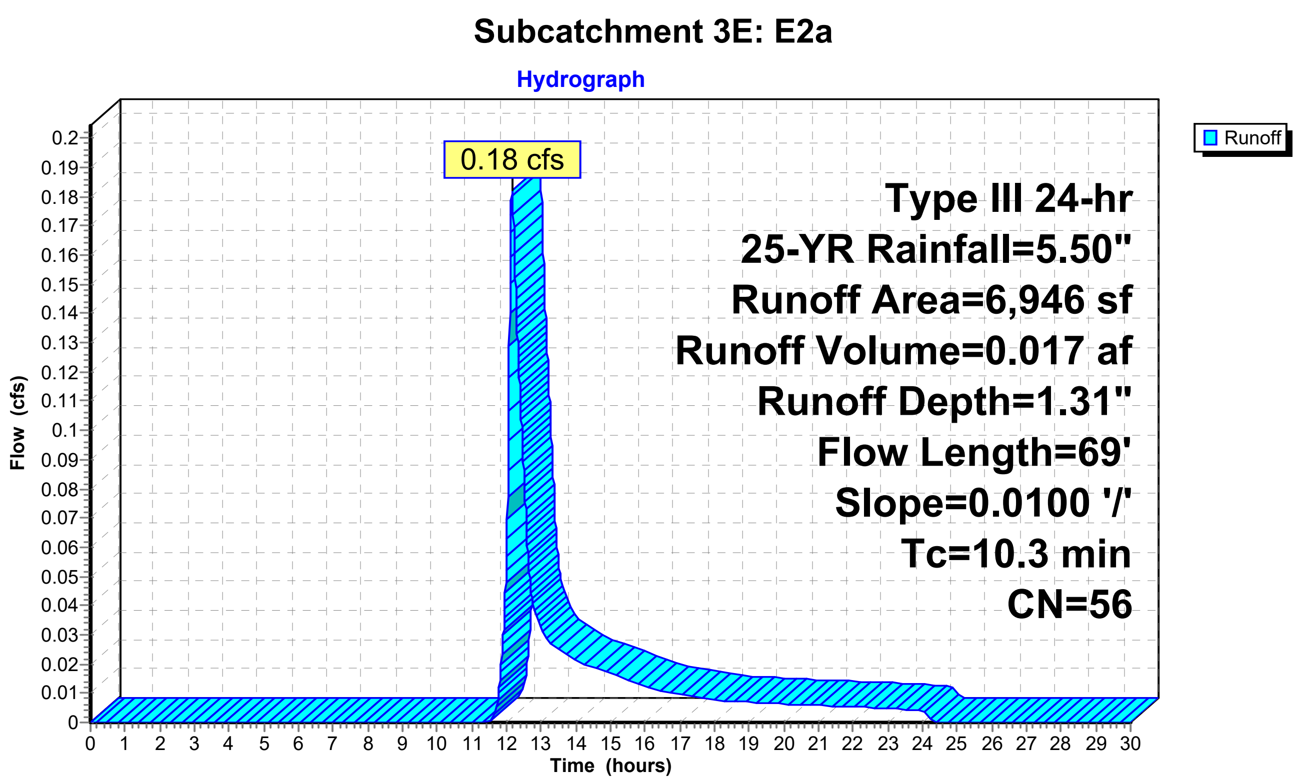
Summary for Subcatchment 3E: E2a

Runoff = 0.18 cfs @ 12.16 hrs, Volume= 0.017 af, Depth= 1.31"

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

	Area (sf)	CN	Description
*	18	98	Concrete Pad, HSG B
	1,404	61	>75% Grass cover, Good, HSG B
	5,524	55	Woods, Good, HSG B
	6,946	56	Weighted Average
	6,928		99.74% Pervious Area
	18		0.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	44	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	69	Total			



Summary for Subcatchment 4E: E2b

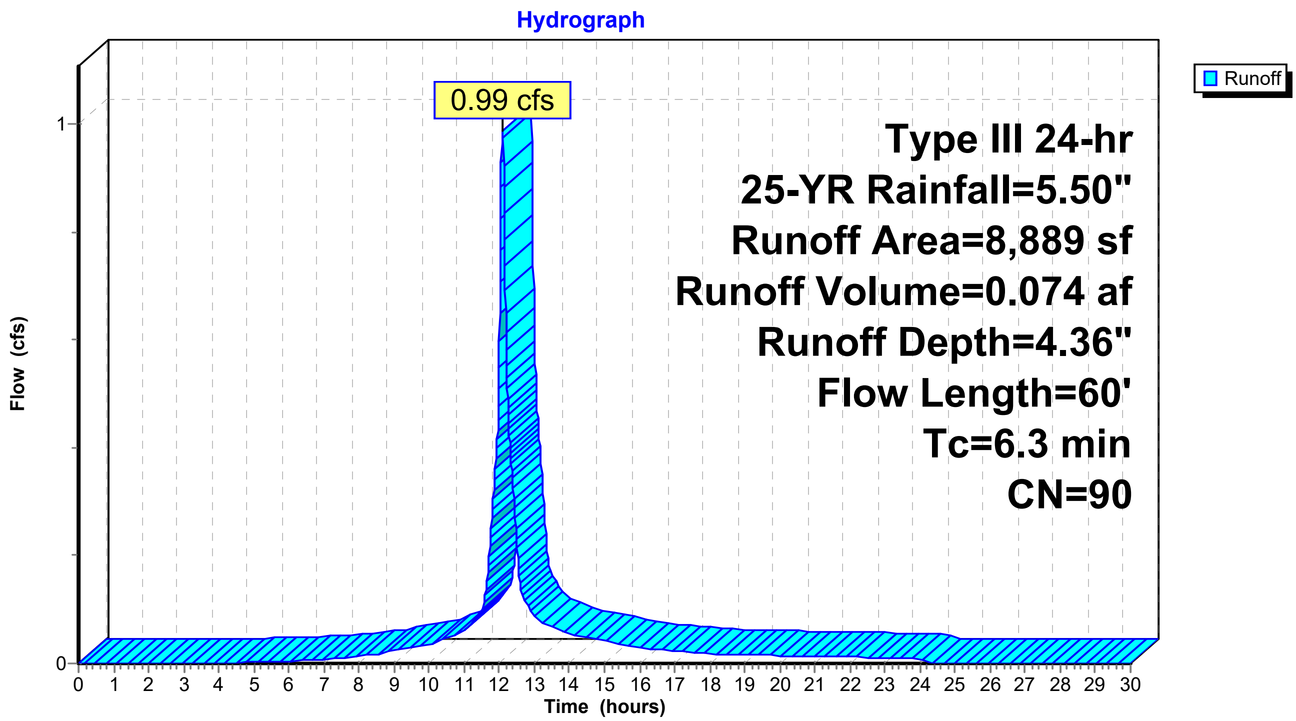
Runoff = 0.99 cfs @ 12.09 hrs, Volume= 0.074 af, Depth= 4.36"

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

	Area (sf)	CN	Description
	4,930	98	Paved parking, HSG B
	1,537	98	Roofs, HSG B
*	513	90	Gravel
	1,909	61	>75% Grass cover, Good, HSG B
	8,889	90	Weighted Average
	2,422		27.25% Pervious Area
	6,467		72.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	24	0.0120	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	36	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.3	60	Total			

Subcatchment 4E: E2b

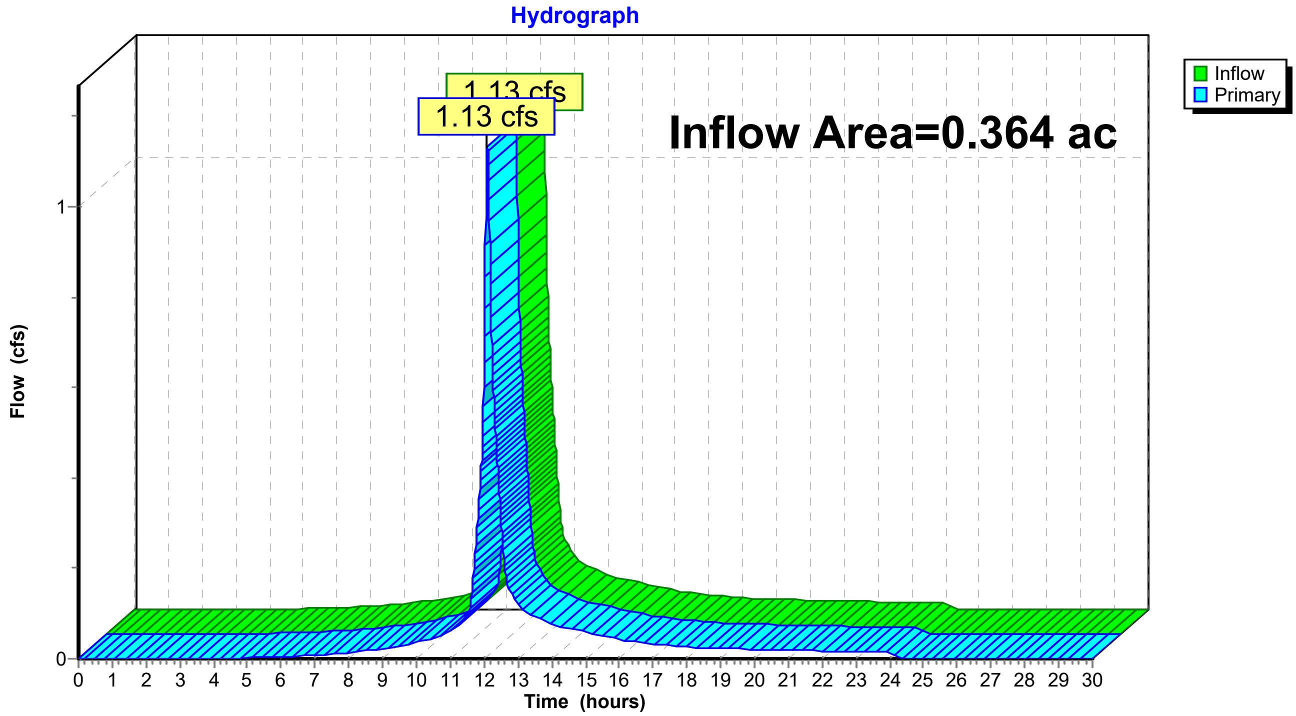


Summary for Link 5E: Design Point #2: Flow to 278 Village Street

Inflow Area = 0.364 ac, 40.95% Impervious, Inflow Depth = 3.02" for 25-YR event
Inflow = 1.13 cfs @ 12.10 hrs, Volume= 0.092 af
Primary = 1.13 cfs @ 12.10 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 5E: Design Point #2: Flow to 278 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3E: E2a Runoff Area=6,946 sf 0.26% Impervious Runoff Depth=1.66"
Flow Length=69' Slope=0.0100 '/' Tc=10.3 min CN=56 Runoff=0.24 cfs 0.022 af

Subcatchment 4E: E2b Runoff Area=8,889 sf 72.75% Impervious Runoff Depth=4.94"
Flow Length=60' Tc=6.3 min CN=90 Runoff=1.11 cfs 0.084 af

Link 5E: Design Point #2: Flow to 278 Village Street Inflow=1.31 cfs 0.106 af
Primary=1.31 cfs 0.106 af

Total Runoff Area = 0.364 ac Runoff Volume = 0.106 af Average Runoff Depth = 3.50"
59.05% Pervious = 0.215 ac 40.95% Impervious = 0.149 ac

Summary for Subcatchment 3E: E2a

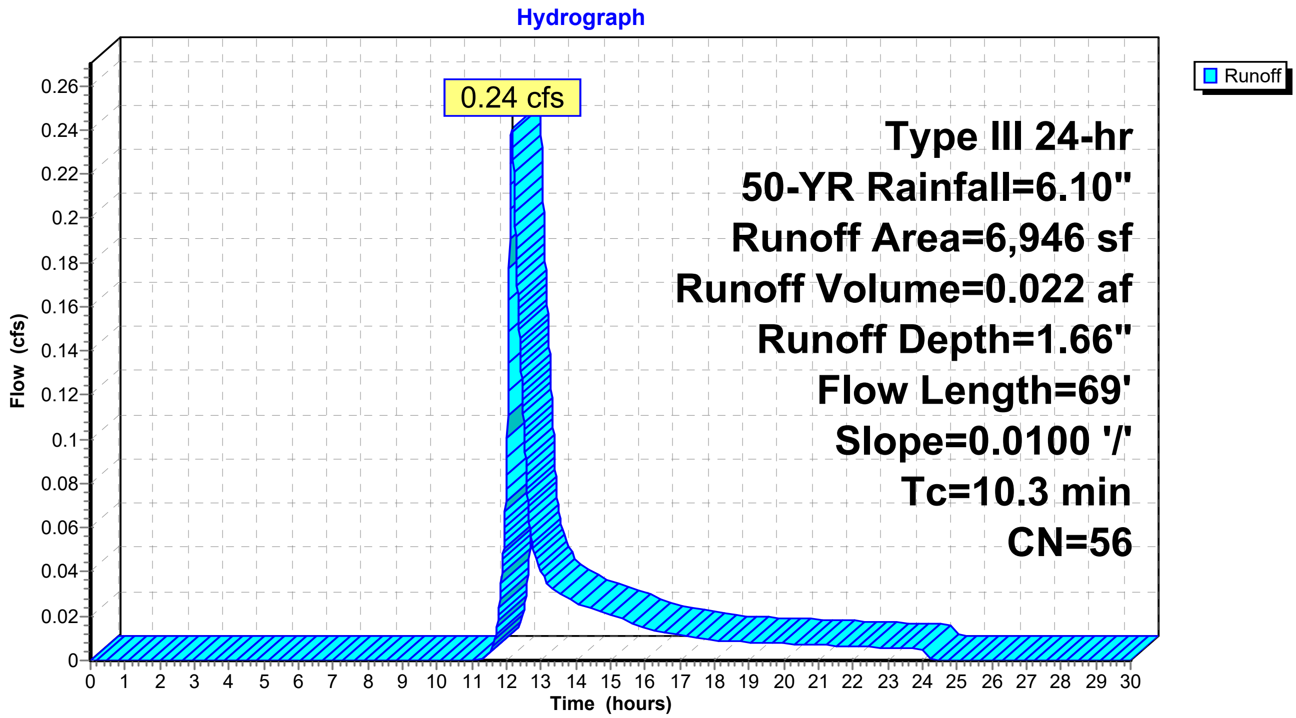
Runoff = 0.24 cfs @ 12.16 hrs, Volume= 0.022 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

	Area (sf)	CN	Description
*	18	98	Concrete Pad, HSG B
	1,404	61	>75% Grass cover, Good, HSG B
	5,524	55	Woods, Good, HSG B
	6,946	56	Weighted Average
	6,928		99.74% Pervious Area
	18		0.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	44	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	69	Total			

Subcatchment 3E: E2a



Summary for Subcatchment 4E: E2b

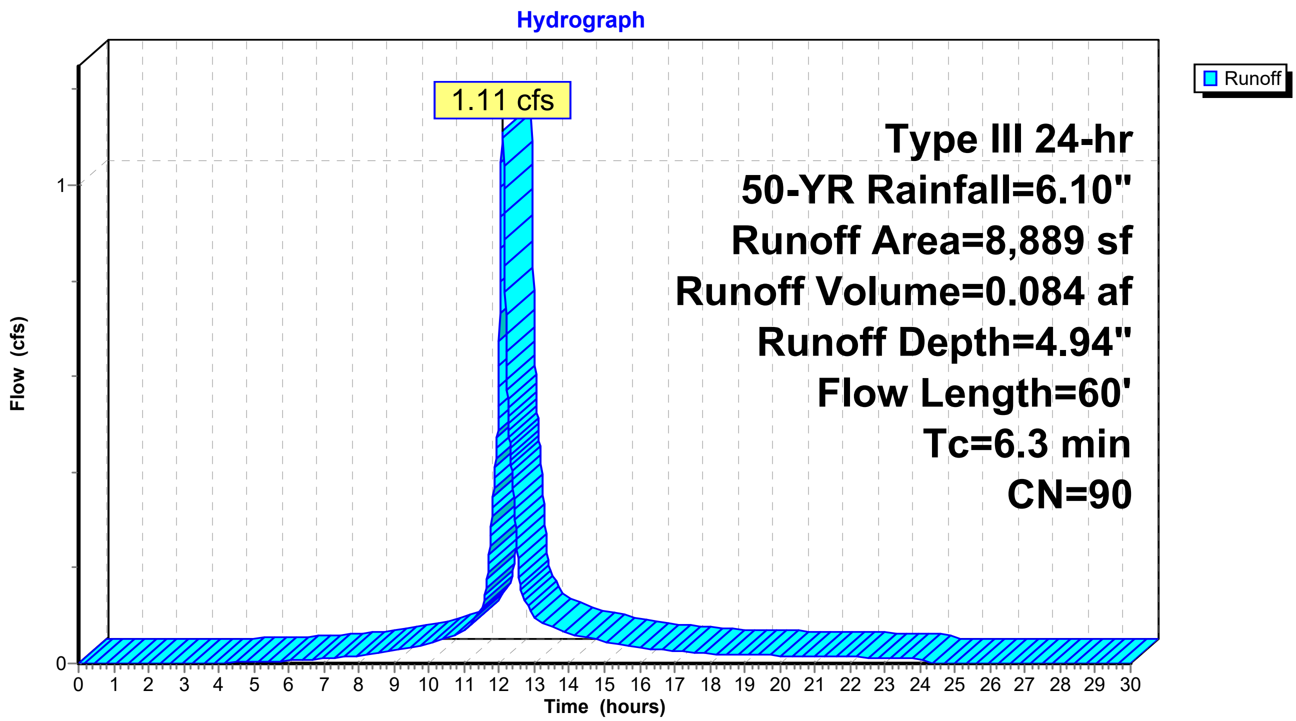
Runoff = 1.11 cfs @ 12.09 hrs, Volume= 0.084 af, Depth= 4.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

	Area (sf)	CN	Description
	4,930	98	Paved parking, HSG B
	1,537	98	Roofs, HSG B
*	513	90	Gravel
	1,909	61	>75% Grass cover, Good, HSG B
	8,889	90	Weighted Average
	2,422		27.25% Pervious Area
	6,467		72.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	24	0.0120	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	36	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.3	60	Total			

Subcatchment 4E: E2b

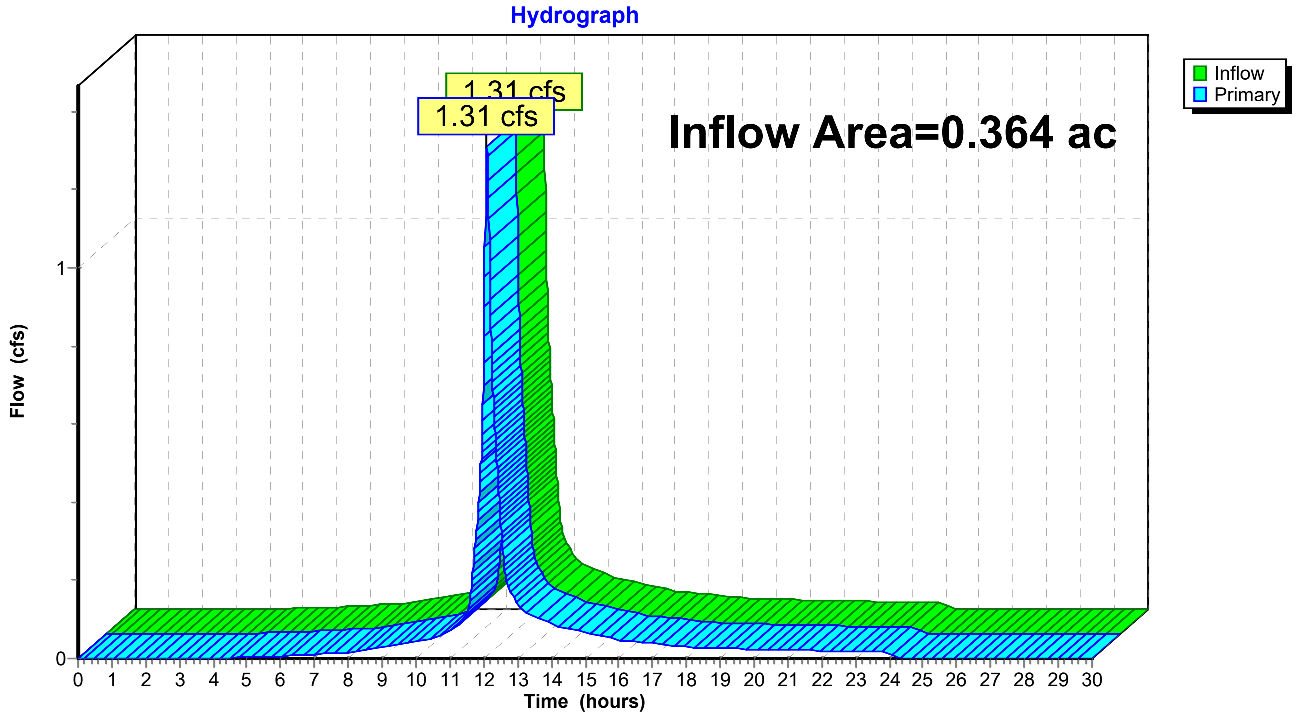


Summary for Link 5E: Design Point #2: Flow to 278 Village Street

Inflow Area = 0.364 ac, 40.95% Impervious, Inflow Depth = 3.50" for 50-YR event
Inflow = 1.31 cfs @ 12.10 hrs, Volume= 0.106 af
Primary = 1.31 cfs @ 12.10 hrs, Volume= 0.106 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 5E: Design Point #2: Flow to 278 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3E: E2a Runoff Area=6,946 sf 0.26% Impervious Runoff Depth=2.03"
Flow Length=69' Slope=0.0100 '/' Tc=10.3 min CN=56 Runoff=0.30 cfs 0.027 af

Subcatchment 4E: E2b Runoff Area=8,889 sf 72.75% Impervious Runoff Depth=5.53"
Flow Length=60' Tc=6.3 min CN=90 Runoff=1.24 cfs 0.094 af

Link 5E: Design Point #2: Flow to 278 Village Street Inflow=1.49 cfs 0.121 af
Primary=1.49 cfs 0.121 af

Total Runoff Area = 0.364 ac Runoff Volume = 0.121 af Average Runoff Depth = 3.99"
59.05% Pervious = 0.215 ac 40.95% Impervious = 0.149 ac

Summary for Subcatchment 3E: E2a

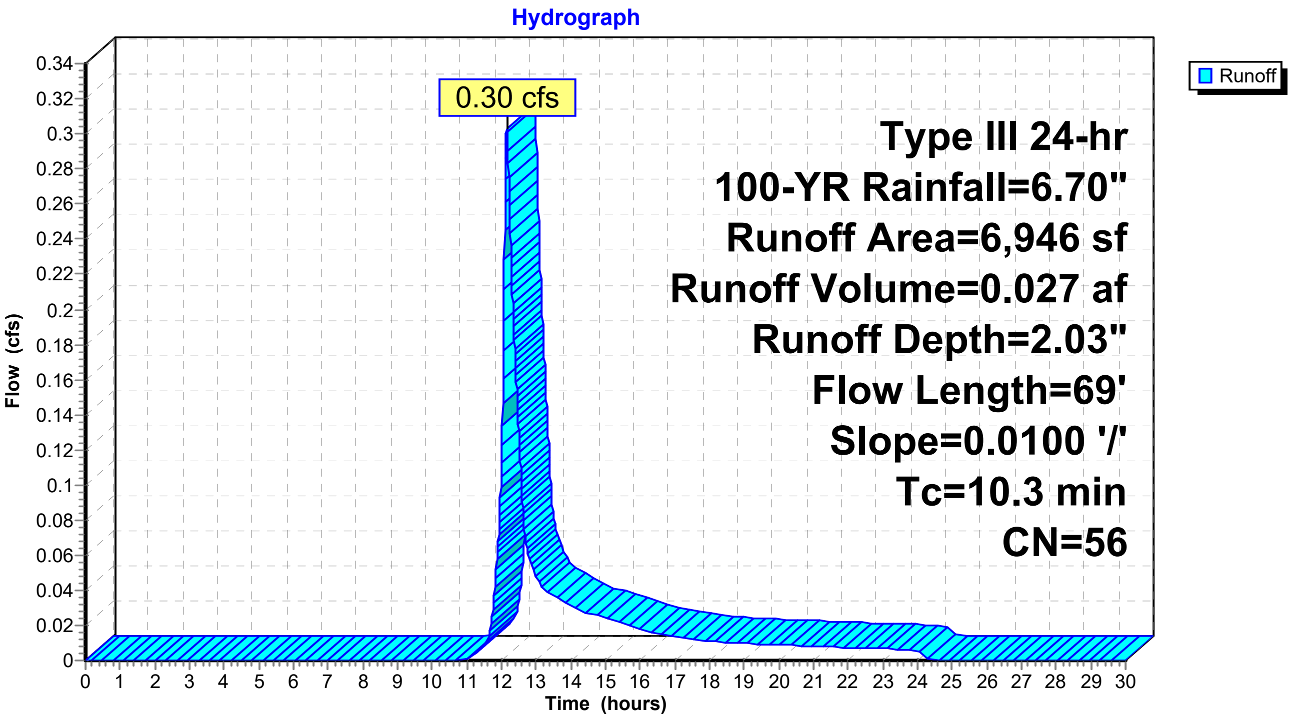
Runoff = 0.30 cfs @ 12.16 hrs, Volume= 0.027 af, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

	Area (sf)	CN	Description
*	18	98	Concrete Pad, HSG B
	1,404	61	>75% Grass cover, Good, HSG B
	5,524	55	Woods, Good, HSG B
	6,946	56	Weighted Average
	6,928		99.74% Pervious Area
	18		0.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	25	0.0100	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	44	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	69	Total			

Subcatchment 3E: E2a



Summary for Subcatchment 4E: E2b

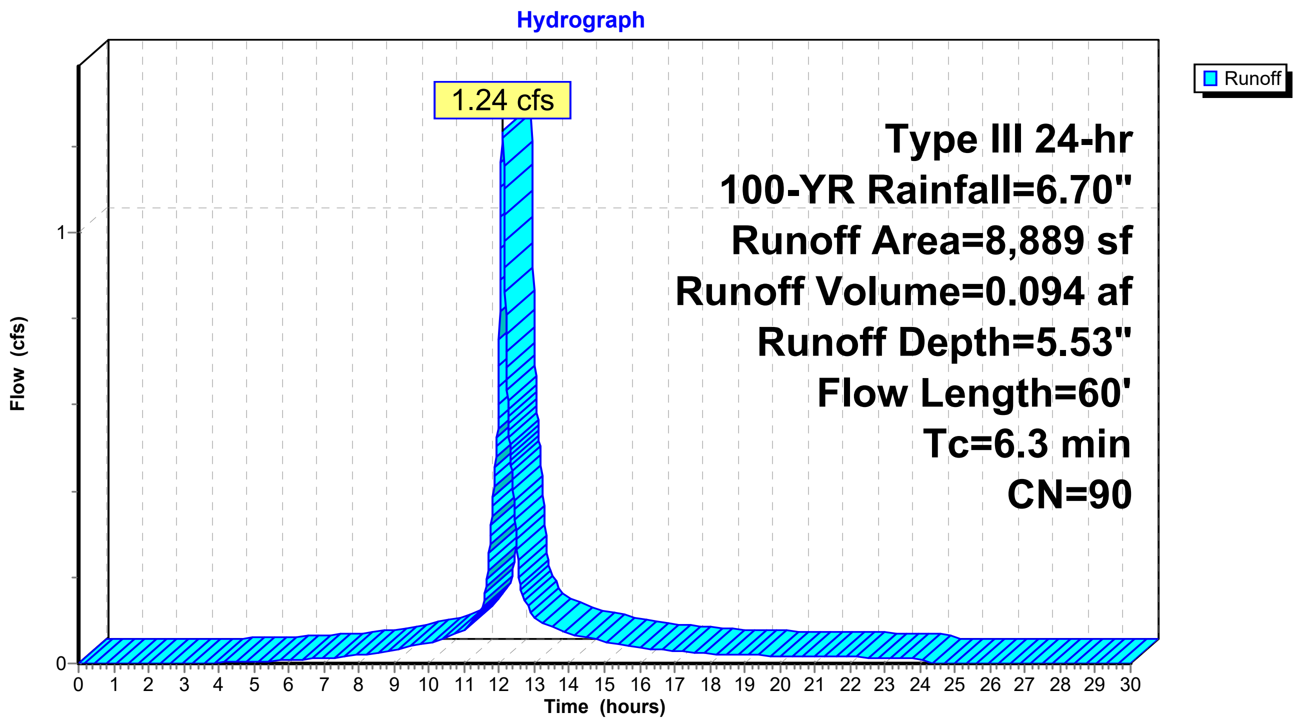
Runoff = 1.24 cfs @ 12.09 hrs, Volume= 0.094 af, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

	Area (sf)	CN	Description
	4,930	98	Paved parking, HSG B
	1,537	98	Roofs, HSG B
*	513	90	Gravel
	1,909	61	>75% Grass cover, Good, HSG B
	8,889	90	Weighted Average
	2,422		27.25% Pervious Area
	6,467		72.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	24	0.0120	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.7	36	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.3	60	Total			

Subcatchment 4E: E2b

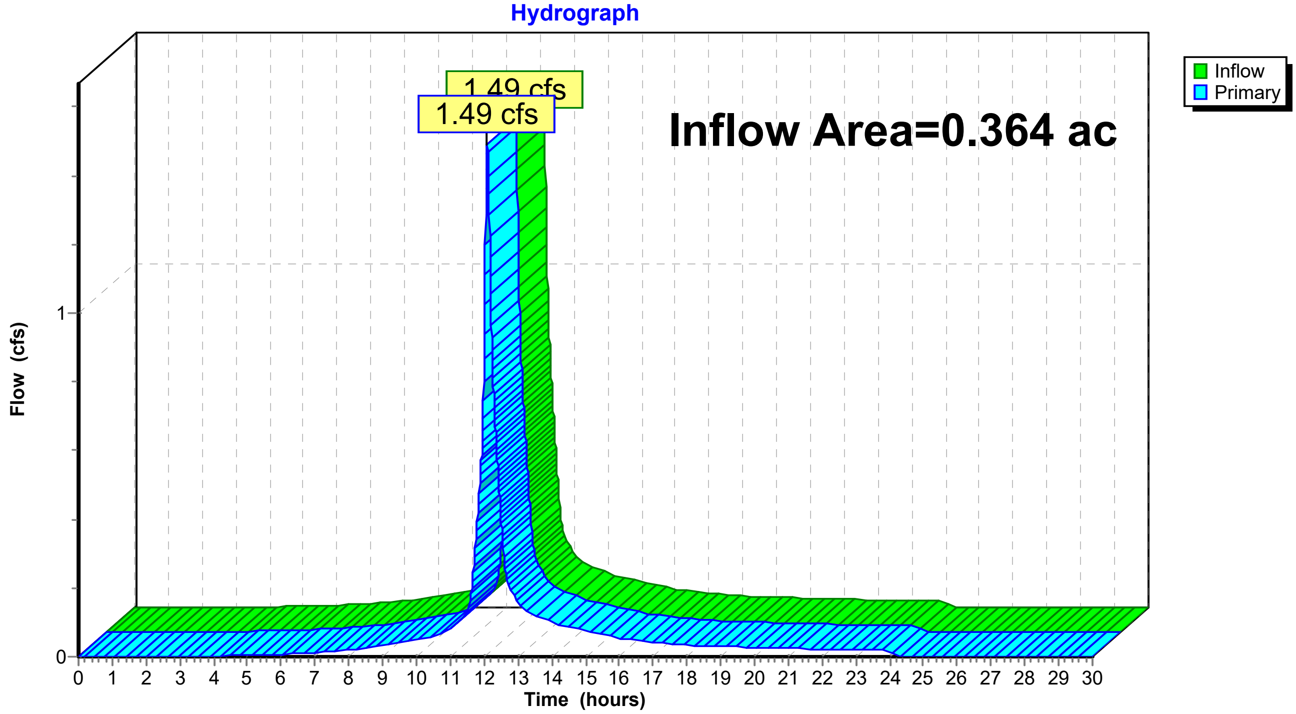


Summary for Link 5E: Design Point #2: Flow to 278 Village Street

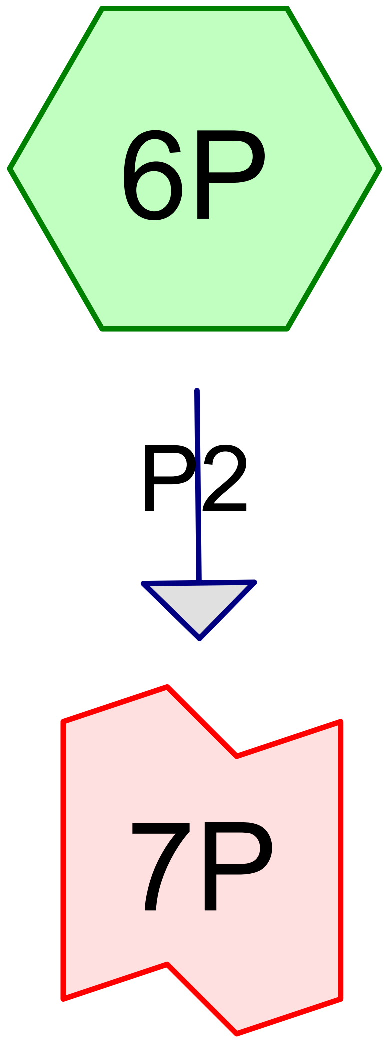
Inflow Area =	0.364 ac,	40.95% Impervious,	Inflow Depth = 3.99"	for 100-YR event
Inflow =	1.49 cfs @	12.10 hrs, Volume=	0.121 af	
Primary =	1.49 cfs @	12.10 hrs, Volume=	0.121 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

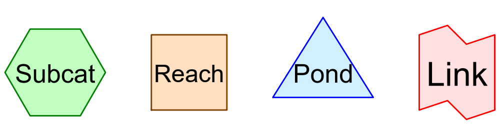
Link 5E: Design Point #2: Flow to 278 Village Street



DESIGN POINT #2: FLOW TO 278 VILLAGE STREET PROPOSED CONDITIONS



Design Point #2: Flow to 278 Village Street



Routing Diagram for HydroCAD2
Prepared by {enter your company name here}, Printed 6/29/2019

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.109	61	>75% Grass cover, Good, HSG B (6P)
0.001	90	Gravel (6P)
0.110	**61**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.109	HSG B	6P
0.000	HSG C	
0.000	HSG D	
0.001	Other	6P
0.110		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6P: P2 Runoff Area=4,778 sf 0.00% Impervious Runoff Depth=0.44"
Flow Length=30' Slope=0.0200 '/' Tc=5.4 min CN=61 Runoff=0.04 cfs 0.004 af

Link 7P: Design Point #2: Flow to 278 Village Street Inflow=0.04 cfs 0.004 af
Primary=0.04 cfs 0.004 af

Total Runoff Area = 0.110 ac Runoff Volume = 0.004 af Average Runoff Depth = 0.44"
100.00% Pervious = 0.110 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 6P: P2

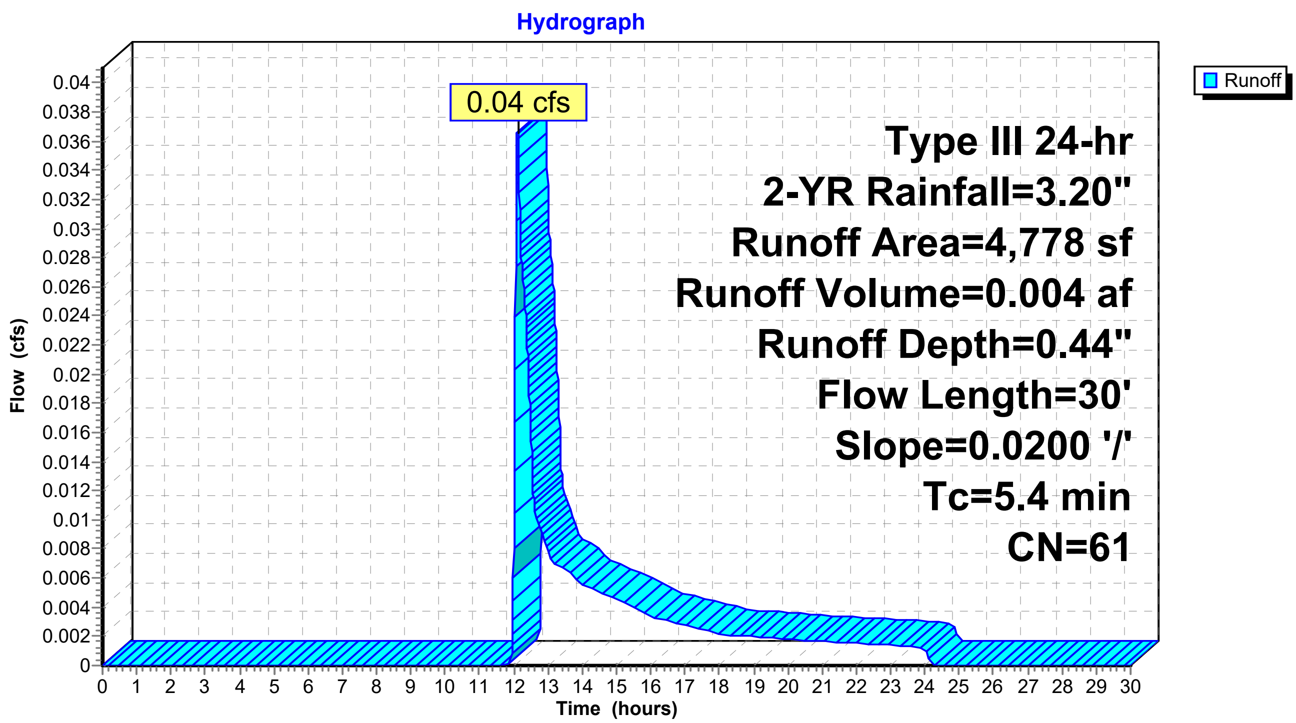
Runoff = 0.04 cfs @ 12.11 hrs, Volume= 0.004 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
*	41	90	Gravel
	4,737	61	>75% Grass cover, Good, HSG B
	4,778	61	Weighted Average
	4,778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	30	0.0200	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 6P: P2

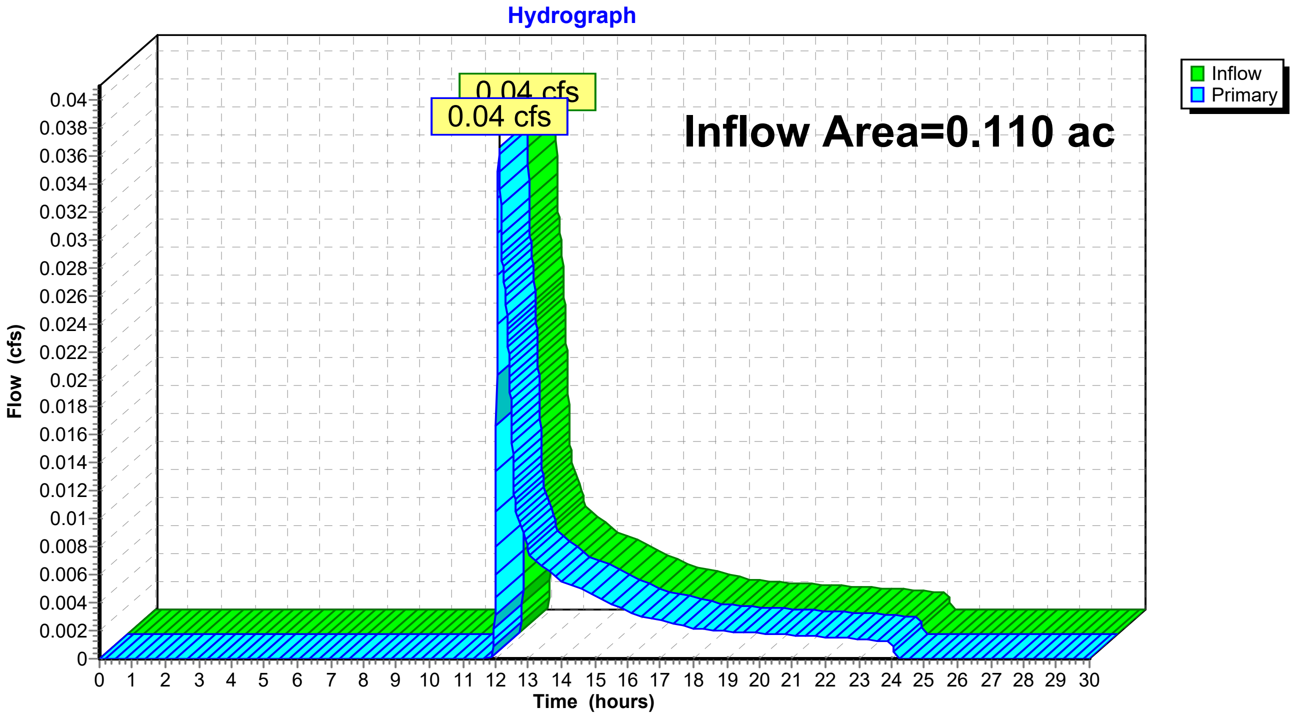


Summary for Link 7P: Design Point #2: Flow to 278 Village Street

Inflow Area =	0.110 ac,	0.00% Impervious,	Inflow Depth = 0.44"	for 2-YR event	
Inflow =	0.04 cfs @	12.11 hrs,	Volume=	0.004 af	
Primary =	0.04 cfs @	12.11 hrs,	Volume=	0.004 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 7P: Design Point #2: Flow to 278 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6P: P2 Runoff Area=4,778 sf 0.00% Impervious Runoff Depth=1.19"
Flow Length=30' Slope=0.0200 '/' Tc=5.4 min CN=61 Runoff=0.14 cfs 0.011 af

Link 7P: Design Point #2: Flow to 278 Village Street Inflow=0.14 cfs 0.011 af
Primary=0.14 cfs 0.011 af

Total Runoff Area = 0.110 ac Runoff Volume = 0.011 af Average Runoff Depth = 1.19"
100.00% Pervious = 0.110 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 6P: P2

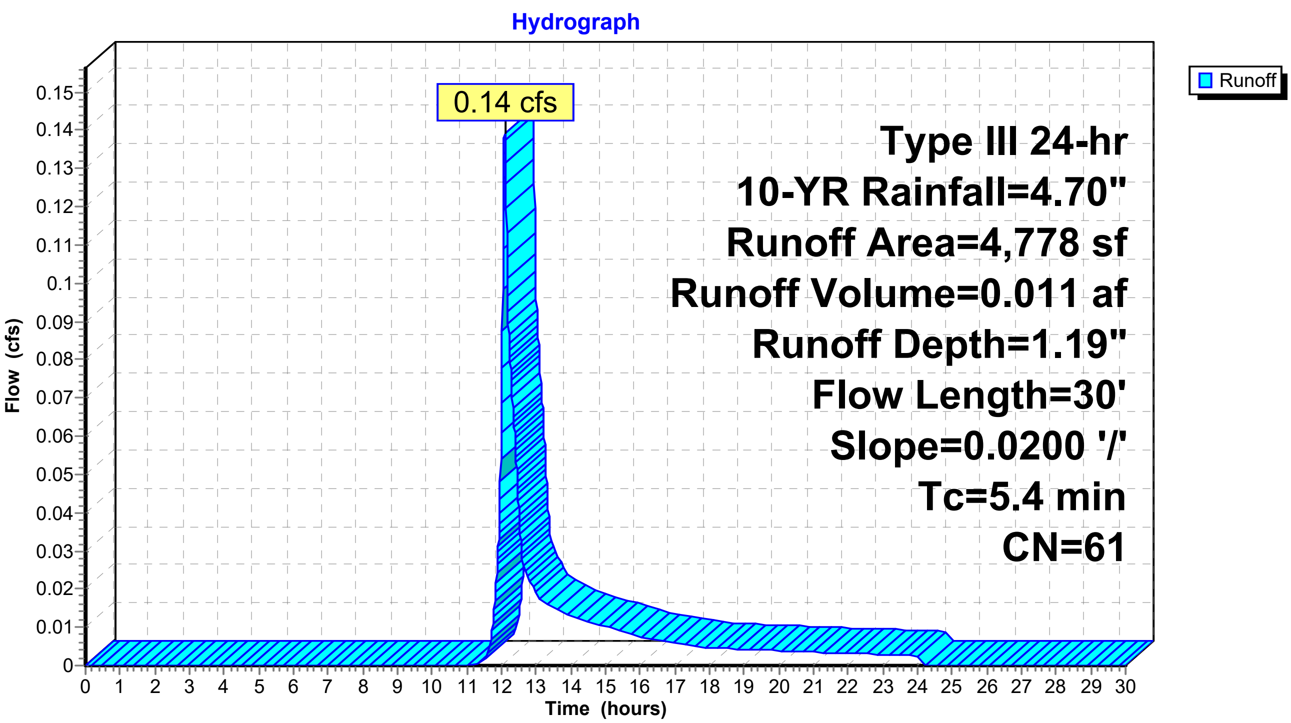
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 0.011 af, Depth= 1.19"

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

	Area (sf)	CN	Description
*	41	90	Gravel
	4,737	61	>75% Grass cover, Good, HSG B
	4,778	61	Weighted Average
	4,778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	30	0.0200	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 6P: P2

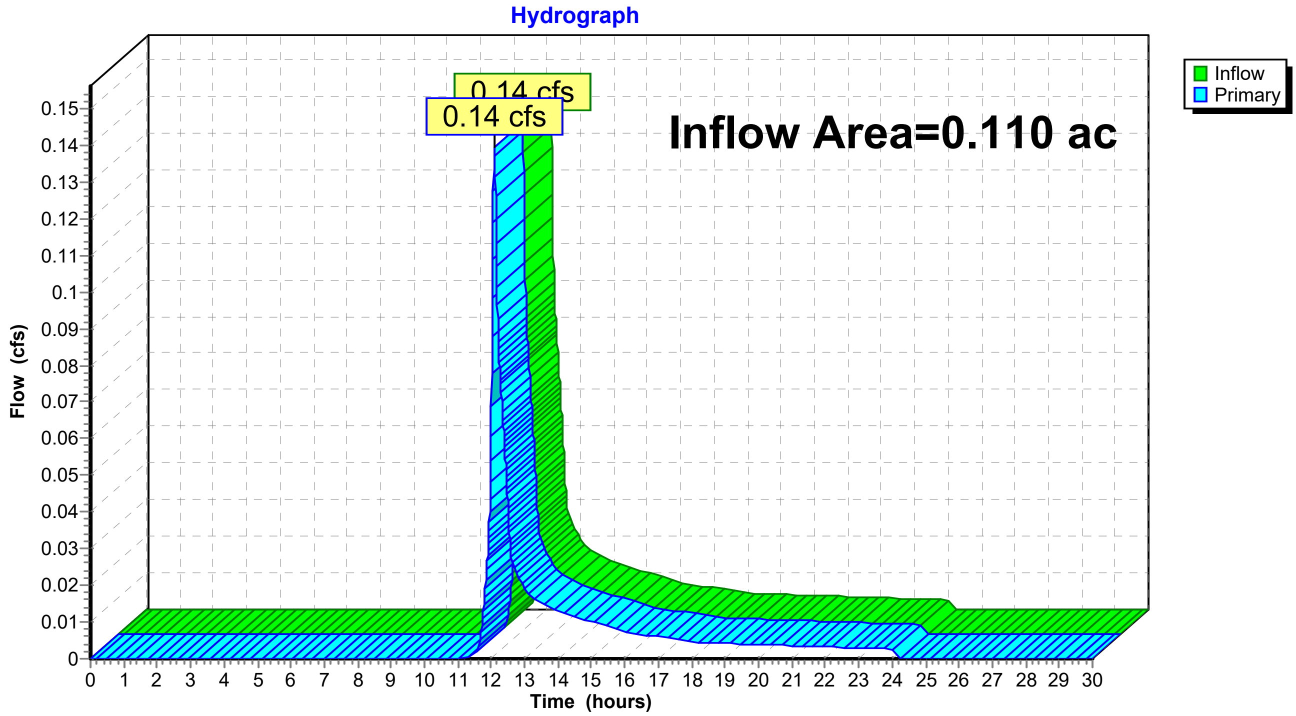


Summary for Link 7P: Design Point #2: Flow to 278 Village Street

Inflow Area = 0.110 ac, 0.00% Impervious, Inflow Depth = 1.19" for 10-YR event
Inflow = 0.14 cfs @ 12.09 hrs, Volume= 0.011 af
Primary = 0.14 cfs @ 12.09 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 7P: Design Point #2: Flow to 278 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6P: P2 Runoff Area=4,778 sf 0.00% Impervious Runoff Depth=1.68"
Flow Length=30' Slope=0.0200 '/' Tc=5.4 min CN=61 Runoff=0.21 cfs 0.015 af

Link 7P: Design Point #2: Flow to 278 Village Street Inflow=0.21 cfs 0.015 af
Primary=0.21 cfs 0.015 af

Total Runoff Area = 0.110 ac Runoff Volume = 0.015 af Average Runoff Depth = 1.68"
100.00% Pervious = 0.110 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 6P: P2

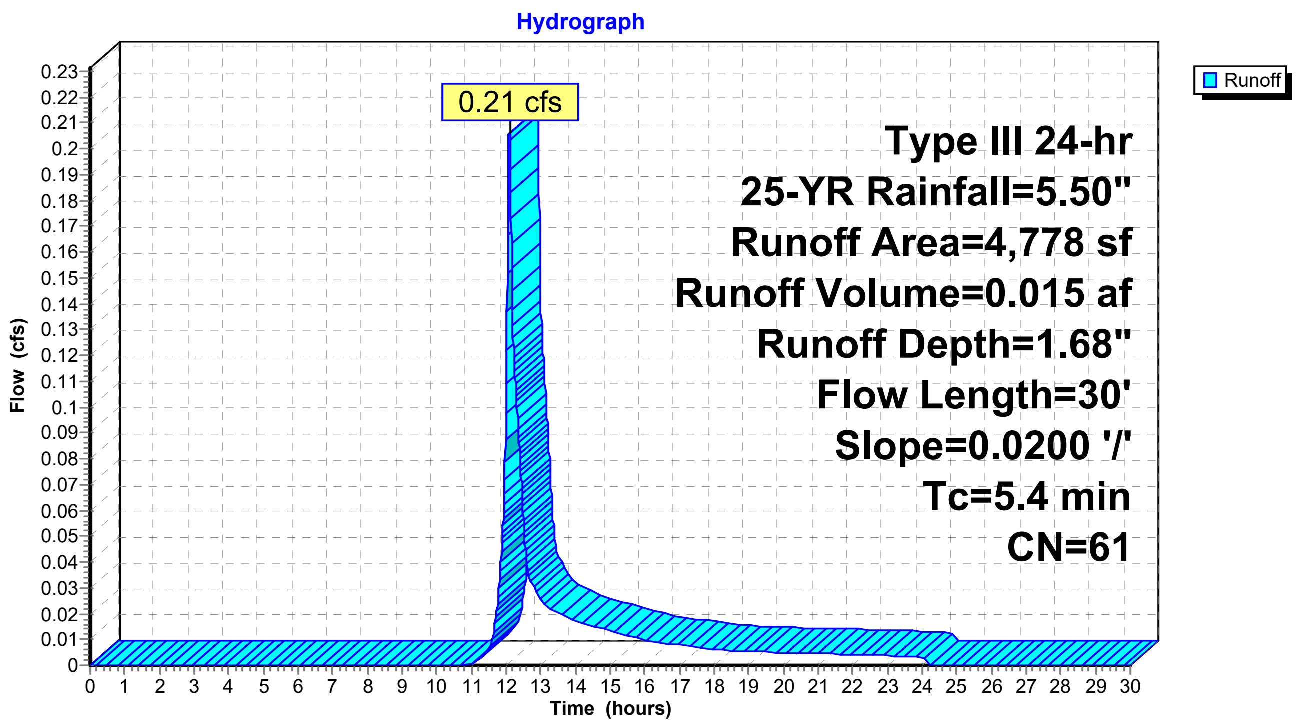
Runoff = 0.21 cfs @ 12.09 hrs, Volume= 0.015 af, Depth= 1.68"

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

	Area (sf)	CN	Description
*	41	90	Gravel
	4,737	61	>75% Grass cover, Good, HSG B
	4,778	61	Weighted Average
	4,778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	30	0.0200	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 6P: P2

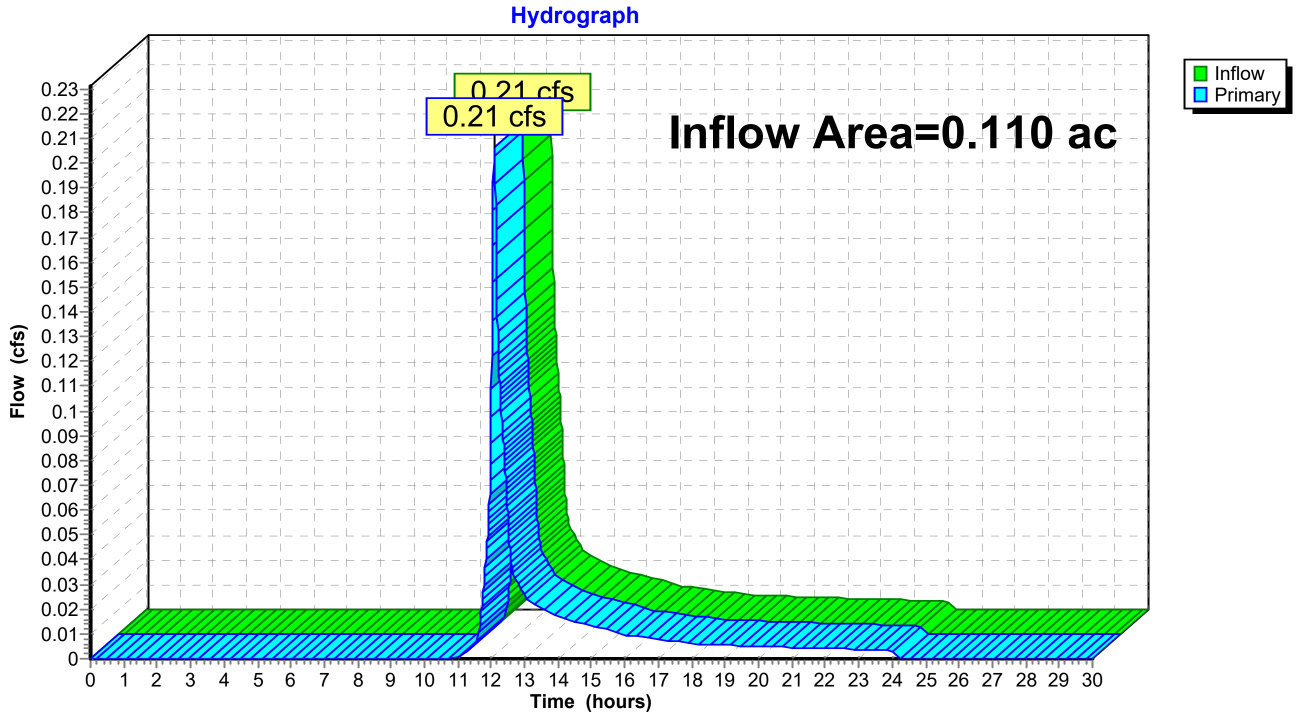


Summary for Link 7P: Design Point #2: Flow to 278 Village Street

Inflow Area = 0.110 ac, 0.00% Impervious, Inflow Depth = 1.68" for 25-YR event
Inflow = 0.21 cfs @ 12.09 hrs, Volume= 0.015 af
Primary = 0.21 cfs @ 12.09 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 7P: Design Point #2: Flow to 278 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6P: P2 Runoff Area=4,778 sf 0.00% Impervious Runoff Depth=2.07"
Flow Length=30' Slope=0.0200 '/' Tc=5.4 min CN=61 Runoff=0.26 cfs 0.019 af

Link 7P: Design Point #2: Flow to 278 Village Street Inflow=0.26 cfs 0.019 af
Primary=0.26 cfs 0.019 af

Total Runoff Area = 0.110 ac Runoff Volume = 0.019 af Average Runoff Depth = 2.07"
100.00% Pervious = 0.110 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 6P: P2

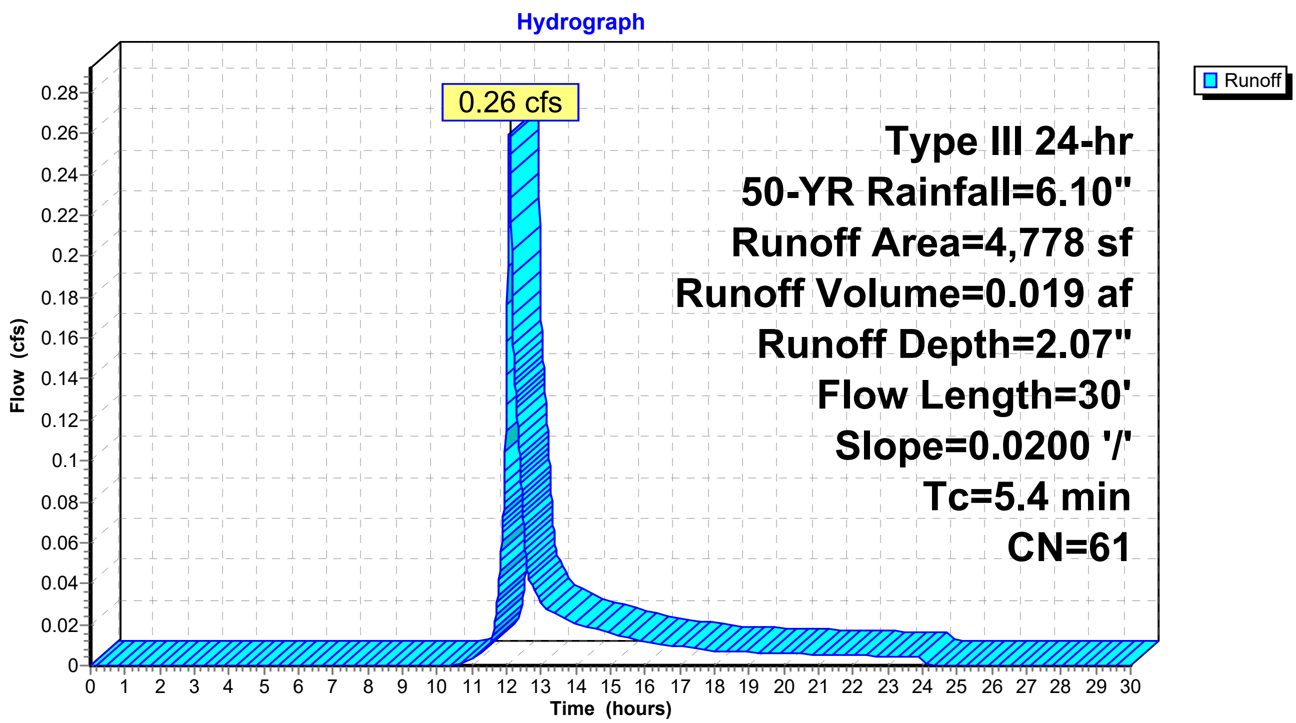
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 0.019 af, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

	Area (sf)	CN	Description
*	41	90	Gravel
	4,737	61	>75% Grass cover, Good, HSG B
	4,778	61	Weighted Average
	4,778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	30	0.0200	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 6P: P2

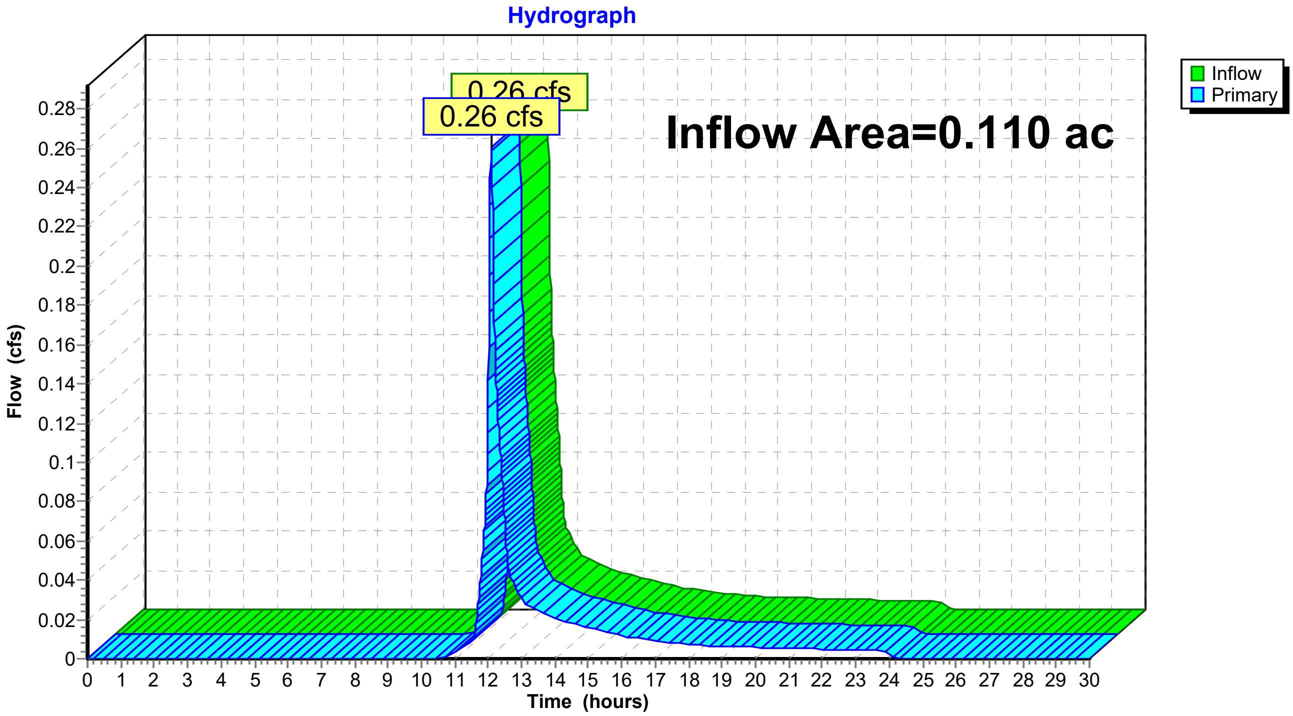


Summary for Link 7P: Design Point #2: Flow to 278 Village Street

Inflow Area =	0.110 ac,	0.00% Impervious,	Inflow Depth = 2.07"	for 50-YR event
Inflow =	0.26 cfs @	12.09 hrs, Volume=	0.019 af	
Primary =	0.26 cfs @	12.09 hrs, Volume=	0.019 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 7P: Design Point #2: Flow to 278 Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6P: P2 Runoff Area=4,778 sf 0.00% Impervious Runoff Depth=2.49"
Flow Length=30' Slope=0.0200 '/' Tc=5.4 min CN=61 Runoff=0.32 cfs 0.023 af

Link 7P: Design Point #2: Flow to 278 Village Street Inflow=0.32 cfs 0.023 af
Primary=0.32 cfs 0.023 af

Total Runoff Area = 0.110 ac Runoff Volume = 0.023 af Average Runoff Depth = 2.49"
100.00% Pervious = 0.110 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 6P: P2

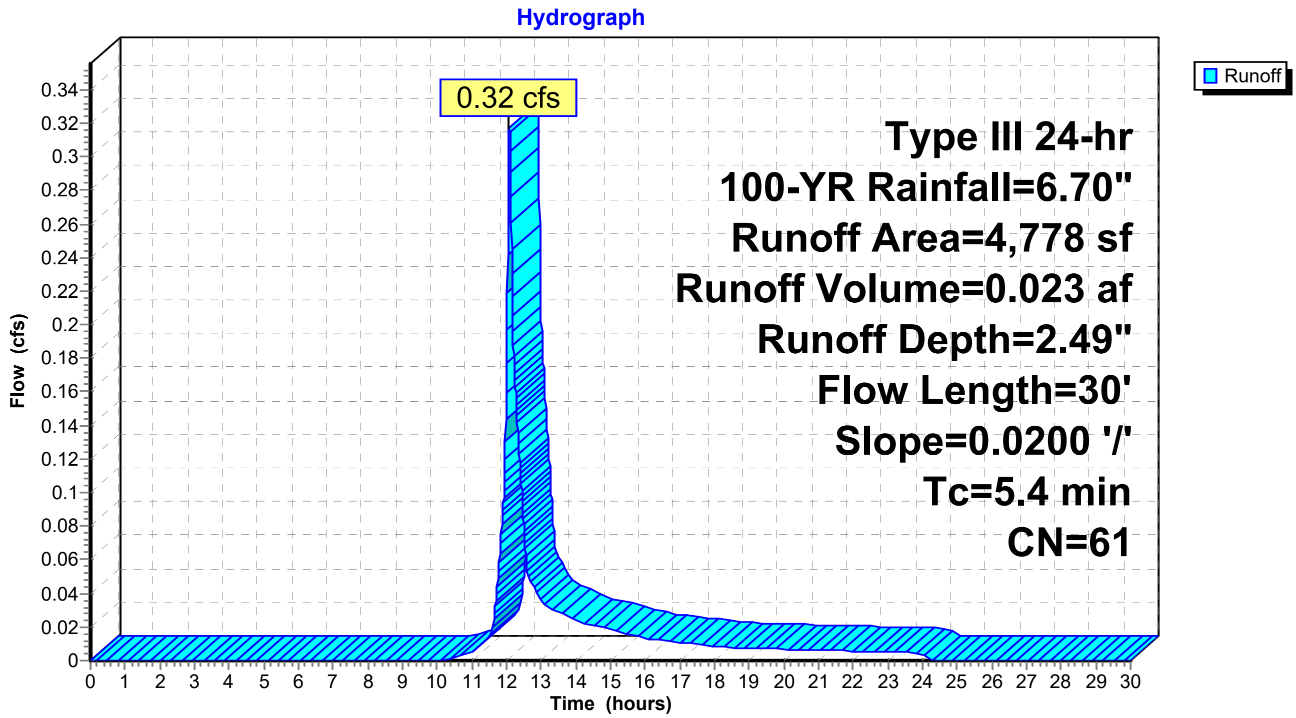
Runoff = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

	Area (sf)	CN	Description
*	41	90	Gravel
	4,737	61	>75% Grass cover, Good, HSG B
	4,778	61	Weighted Average
	4,778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	30	0.0200	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 6P: P2

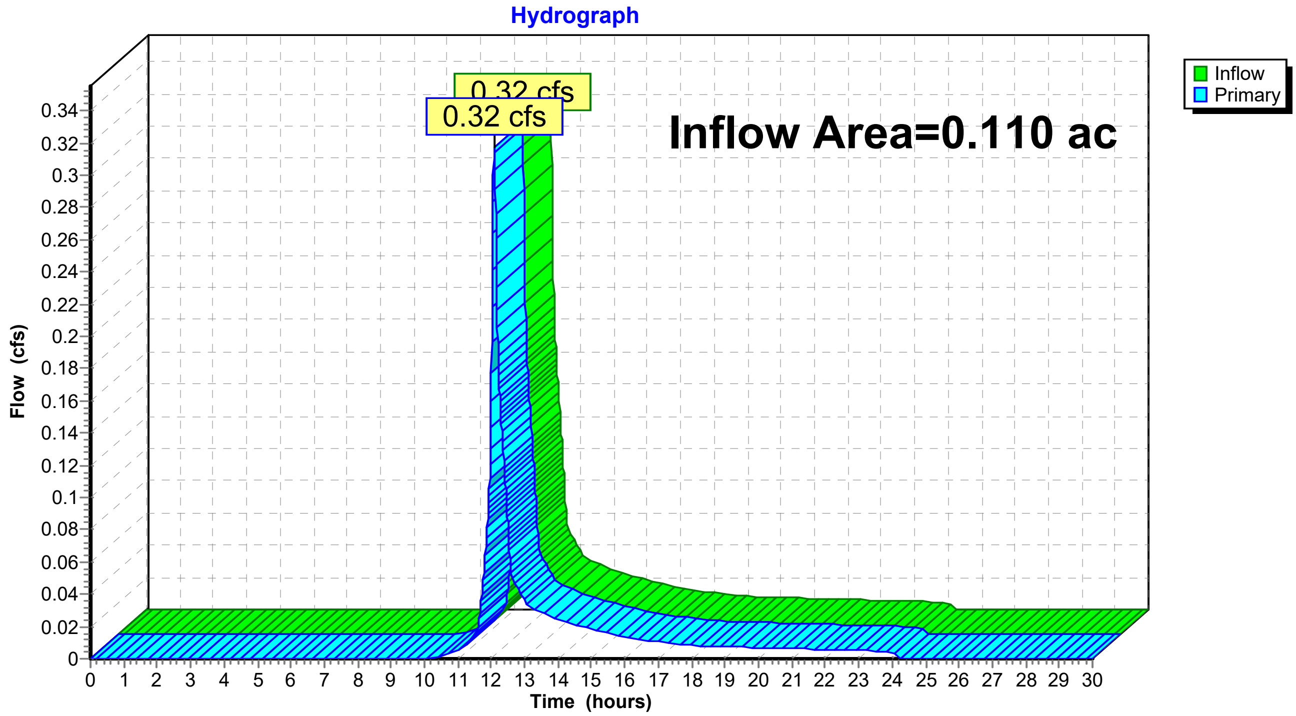


Summary for Link 7P: Design Point #2: Flow to 278 Village Street

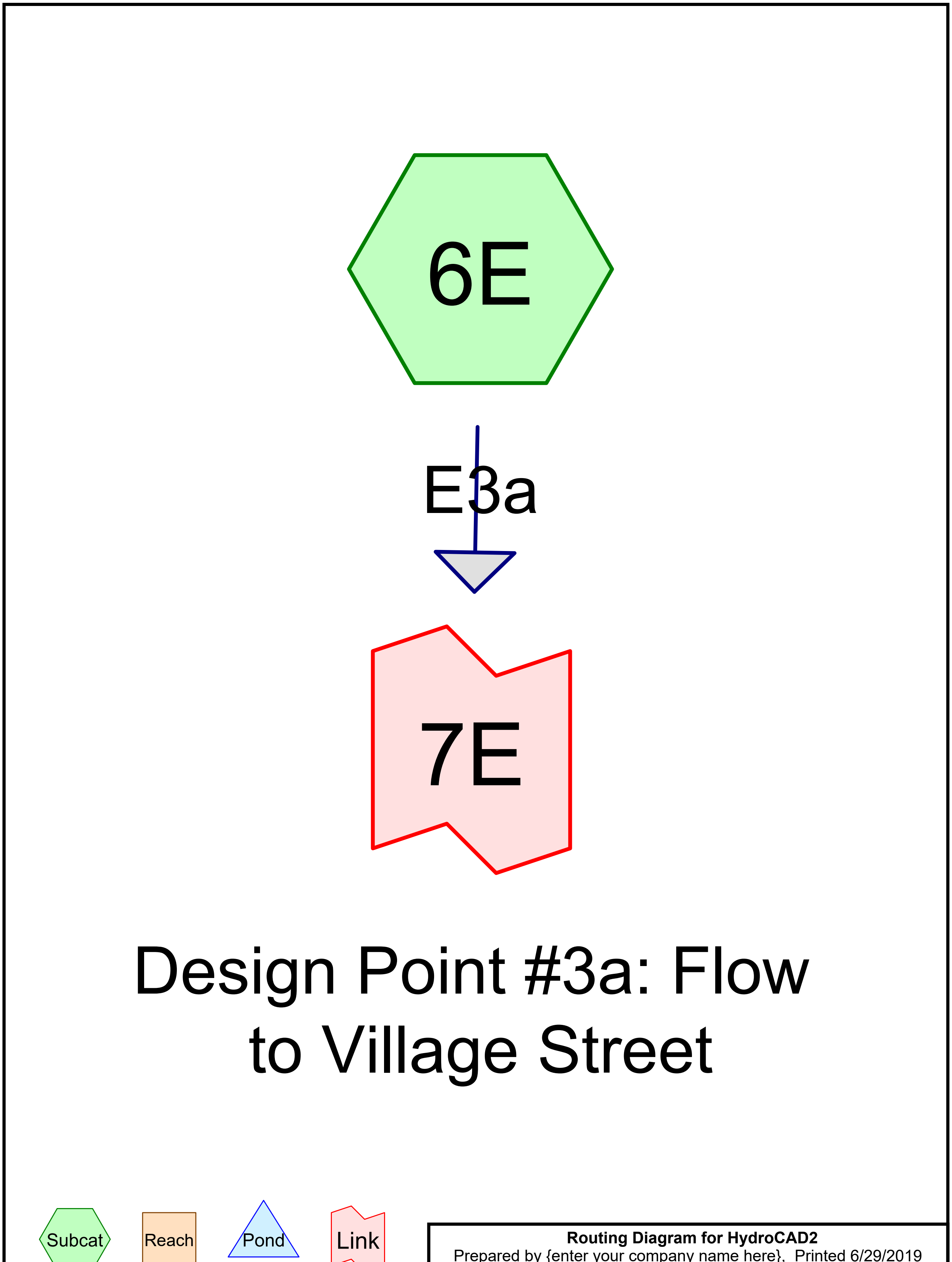
Inflow Area = 0.110 ac, 0.00% Impervious, Inflow Depth = 2.49" for 100-YR event
Inflow = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af
Primary = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 7P: Design Point #2: Flow to 278 Village Street



DESIGN POINT #3a: FLOW TO VILLAGE STREET EXISTING CONDITIONS



Routing Diagram for HydroCAD2
Prepared by {enter your company name here}, Printed 6/29/2019
HydroCAD® 10.00-24 s/n 05266 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.117	61	>75% Grass cover, Good, HSG B (6E)
0.090	90	Gravel (6E)
0.072	98	Paved parking, HSG B (6E)
0.021	98	Roofs, HSG B (6E)
0.010	30	Woods, Good, HSG A (6E)
0.003	55	Woods, Good, HSG B (6E)
0.314	**79**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.010	HSG A	6E
0.214	HSG B	6E
0.000	HSG C	
0.000	HSG D	
0.090	Other	6E
0.314		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6E: E3a Runoff Area=13,673 sf 29.88% Impervious Runoff Depth=1.34"
Flow Length=164' Tc=8.3 min CN=79 Runoff=0.45 cfs 0.035 af

Link 7E: Design Point #3a: Flow to Village Street Inflow=0.45 cfs 0.035 af
Primary=0.45 cfs 0.035 af

Total Runoff Area = 0.314 ac Runoff Volume = 0.035 af Average Runoff Depth = 1.34"
70.12% Pervious = 0.220 ac 29.88% Impervious = 0.094 ac

Summary for Subcatchment 6E: E3a

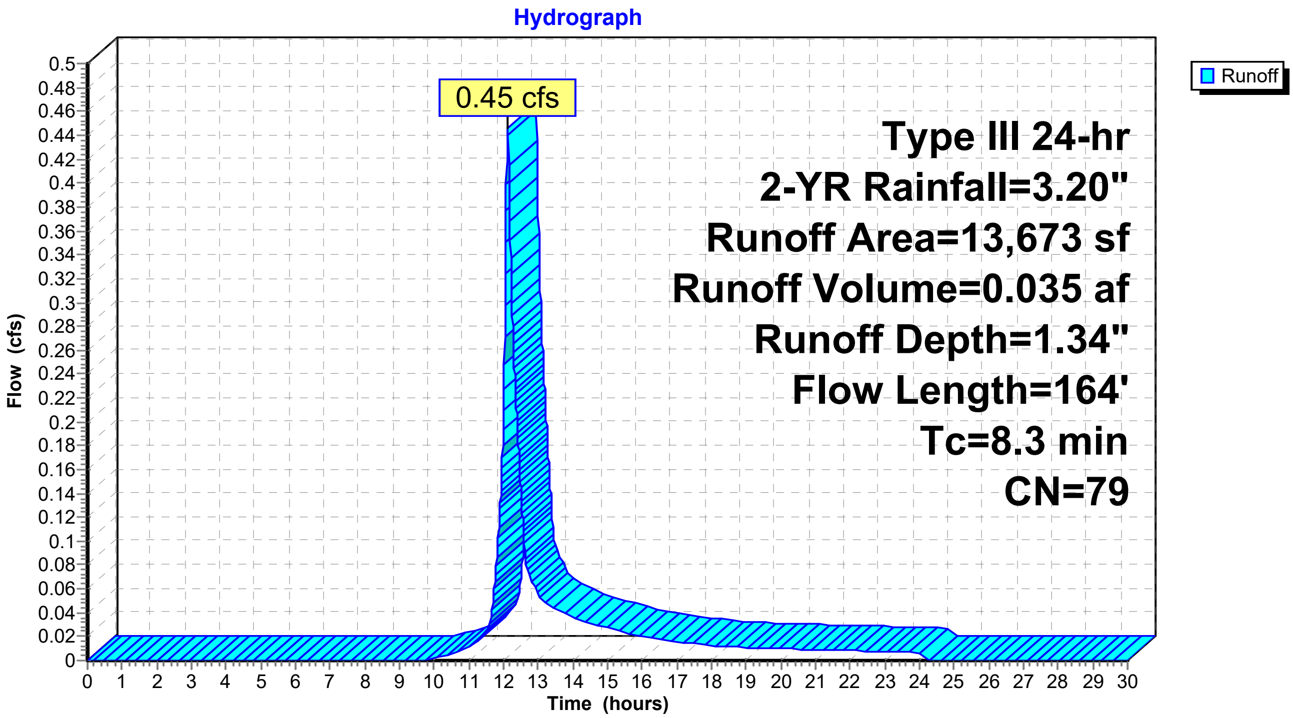
Runoff = 0.45 cfs @ 12.12 hrs, Volume= 0.035 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
	3,157	98	Paved parking, HSG B
	928	98	Roofs, HSG B
*	3,909	90	Gravel
	5,111	61	>75% Grass cover, Good, HSG B
	451	30	Woods, Good, HSG A
	117	55	Woods, Good, HSG B
	13,673	79	Weighted Average
	9,588		70.12% Pervious Area
	4,085		29.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	36	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.6	27	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.0	101	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	164	Total			

Subcatchment 6E: E3a

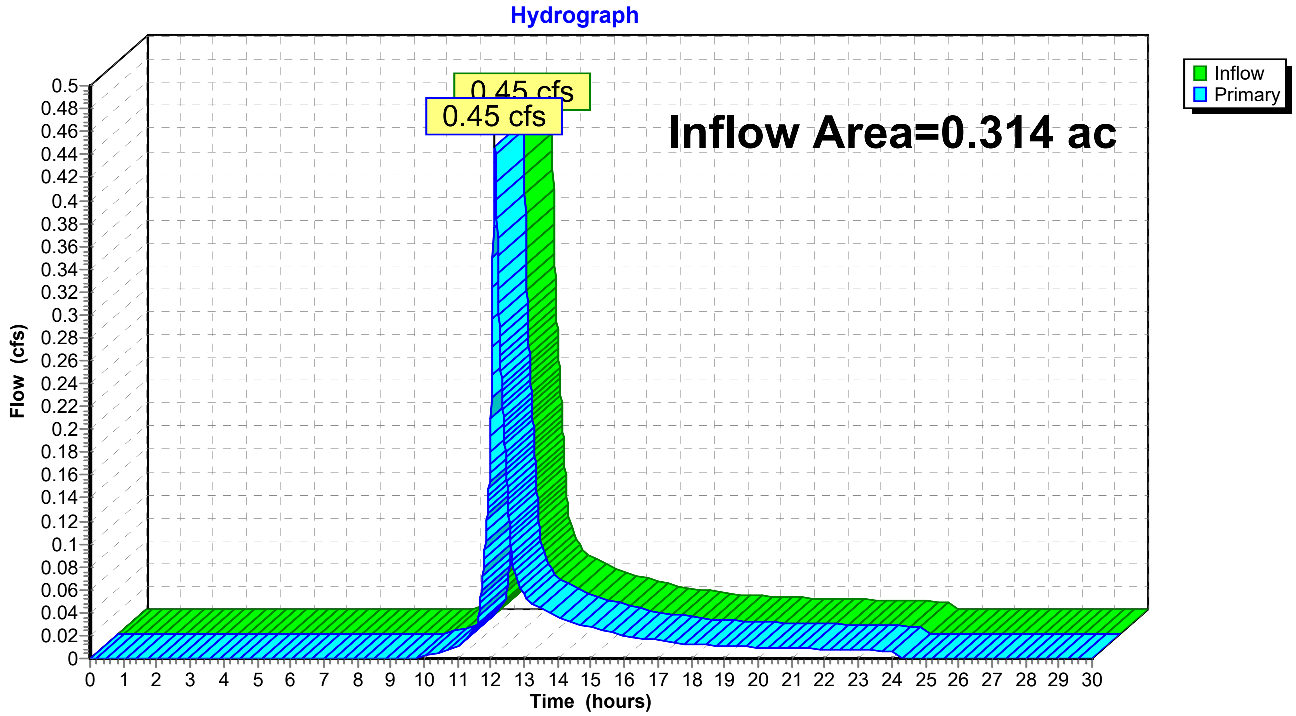


Summary for Link 7E: Design Point #3a: Flow to Village Street

Inflow Area = 0.314 ac, 29.88% Impervious, Inflow Depth = 1.34" for 2-YR event
Inflow = 0.45 cfs @ 12.12 hrs, Volume= 0.035 af
Primary = 0.45 cfs @ 12.12 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 7E: Design Point #3a: Flow to Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6E: E3a Runoff Area=13,673 sf 29.88% Impervious Runoff Depth=2.55"
Flow Length=164' Tc=8.3 min CN=79 Runoff=0.86 cfs 0.067 af

Link 7E: Design Point #3a: Flow to Village Street Inflow=0.86 cfs 0.067 af
Primary=0.86 cfs 0.067 af

Total Runoff Area = 0.314 ac Runoff Volume = 0.067 af Average Runoff Depth = 2.55"
70.12% Pervious = 0.220 ac 29.88% Impervious = 0.094 ac

Summary for Subcatchment 6E: E3a

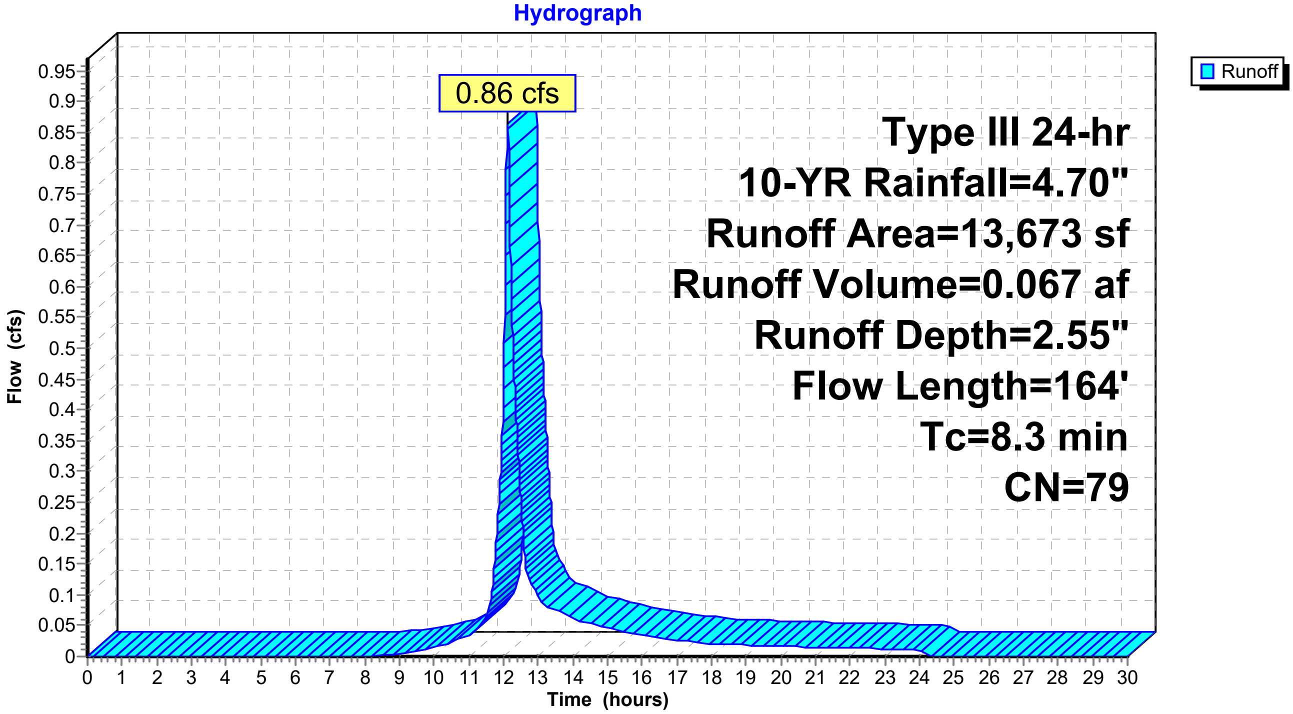
Runoff = 0.86 cfs @ 12.12 hrs, Volume= 0.067 af, Depth= 2.55"

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

	Area (sf)	CN	Description
	3,157	98	Paved parking, HSG B
	928	98	Roofs, HSG B
*	3,909	90	Gravel
	5,111	61	>75% Grass cover, Good, HSG B
	451	30	Woods, Good, HSG A
	117	55	Woods, Good, HSG B
	13,673	79	Weighted Average
	9,588		70.12% Pervious Area
	4,085		29.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	36	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.6	27	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.0	101	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	164	Total			

Subcatchment 6E: E3a

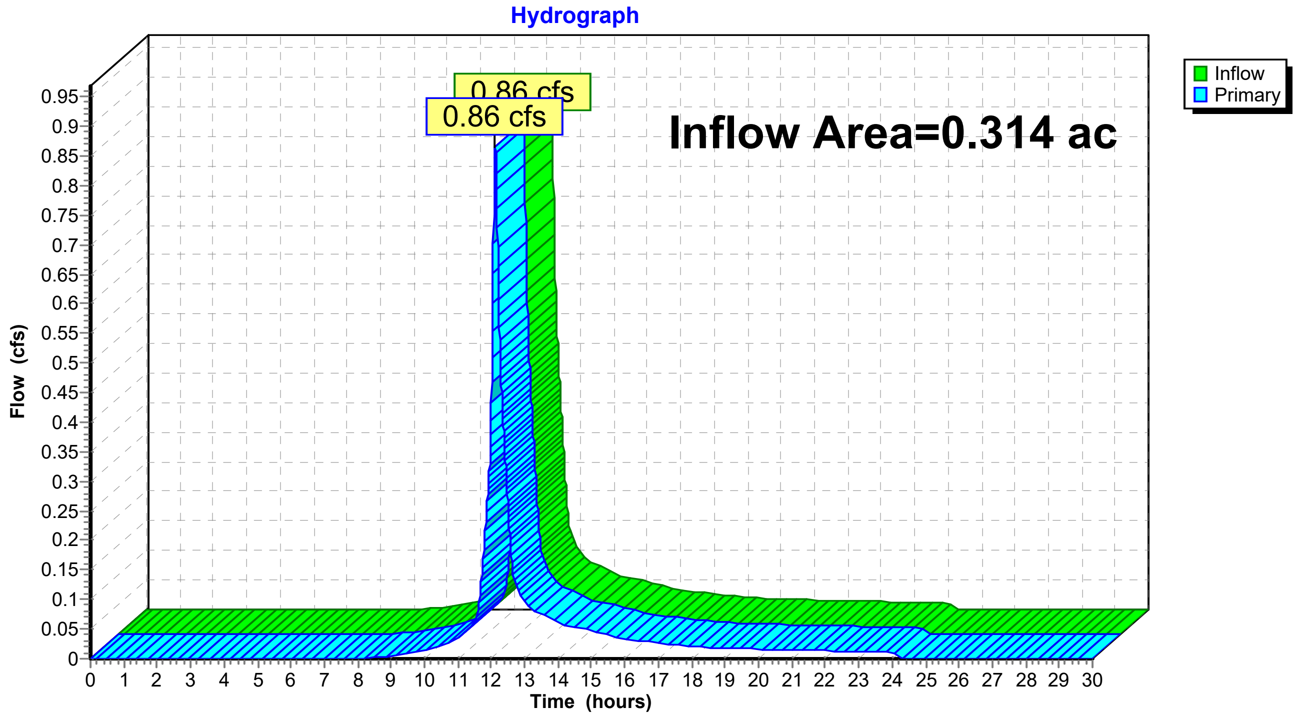


Summary for Link 7E: Design Point #3a: Flow to Village Street

Inflow Area =	0.314 ac, 29.88% Impervious, Inflow Depth = 2.55"	for 10-YR event	
Inflow =	0.86 cfs @ 12.12 hrs, Volume=	0.067 af	
Primary =	0.86 cfs @ 12.12 hrs, Volume=	0.067 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 7E: Design Point #3a: Flow to Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6E: E3a Runoff Area=13,673 sf 29.88% Impervious Runoff Depth=3.24"
Flow Length=164' Tc=8.3 min CN=79 Runoff=1.10 cfs 0.085 af

Link 7E: Design Point #3a: Flow to Village Street Inflow=1.10 cfs 0.085 af
Primary=1.10 cfs 0.085 af

Total Runoff Area = 0.314 ac Runoff Volume = 0.085 af Average Runoff Depth = 3.24"
70.12% Pervious = 0.220 ac 29.88% Impervious = 0.094 ac

Summary for Subcatchment 6E: E3a

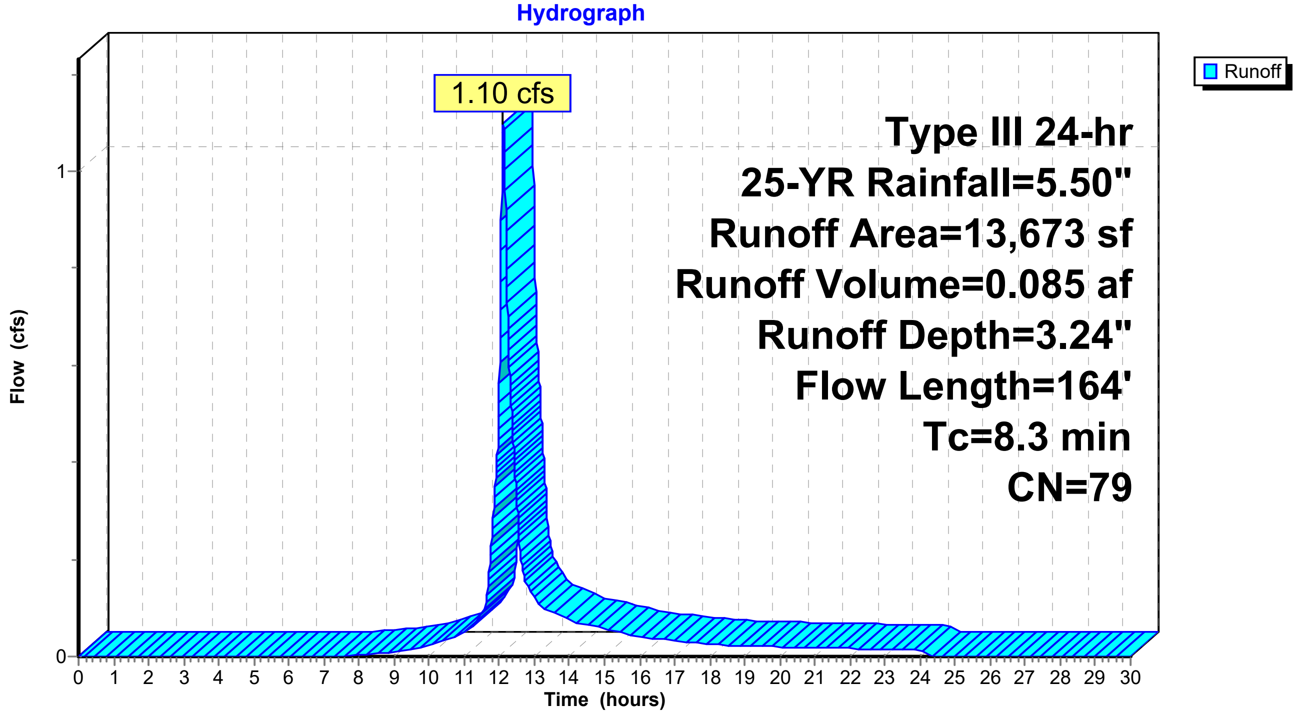
Runoff = 1.10 cfs @ 12.12 hrs, Volume= 0.085 af, Depth= 3.24"

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

	Area (sf)	CN	Description
	3,157	98	Paved parking, HSG B
	928	98	Roofs, HSG B
*	3,909	90	Gravel
	5,111	61	>75% Grass cover, Good, HSG B
	451	30	Woods, Good, HSG A
	117	55	Woods, Good, HSG B
	13,673	79	Weighted Average
	9,588		70.12% Pervious Area
	4,085		29.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	36	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.6	27	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.0	101	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	164	Total			

Subcatchment 6E: E3a

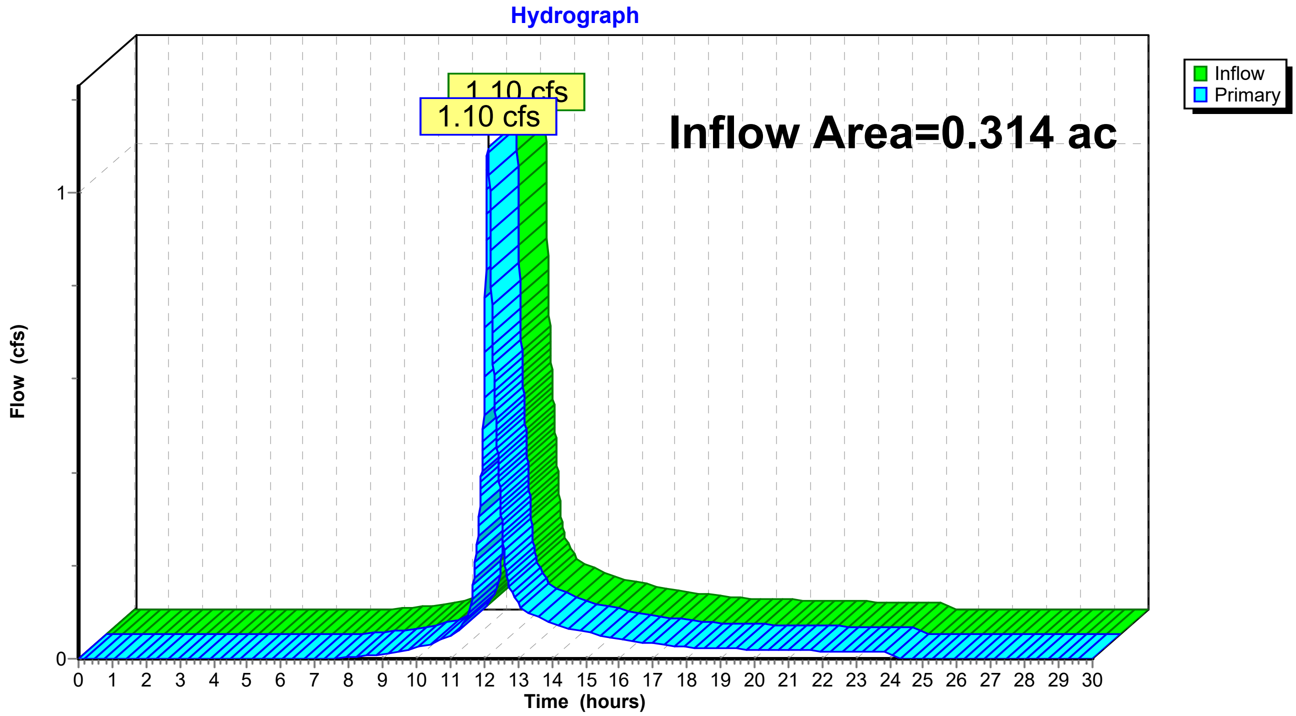


Summary for Link 7E: Design Point #3a: Flow to Village Street

Inflow Area = 0.314 ac, 29.88% Impervious, Inflow Depth = 3.24" for 25-YR event
Inflow = 1.10 cfs @ 12.12 hrs, Volume= 0.085 af
Primary = 1.10 cfs @ 12.12 hrs, Volume= 0.085 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 7E: Design Point #3a: Flow to Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6E: E3a Runoff Area=13,673 sf 29.88% Impervious Runoff Depth=3.77"
Flow Length=164' Tc=8.3 min CN=79 Runoff=1.28 cfs 0.099 af

Link 7E: Design Point #3a: Flow to Village Street Inflow=1.28 cfs 0.099 af
Primary=1.28 cfs 0.099 af

Total Runoff Area = 0.314 ac Runoff Volume = 0.099 af Average Runoff Depth = 3.77"
70.12% Pervious = 0.220 ac 29.88% Impervious = 0.094 ac

Summary for Subcatchment 6E: E3a

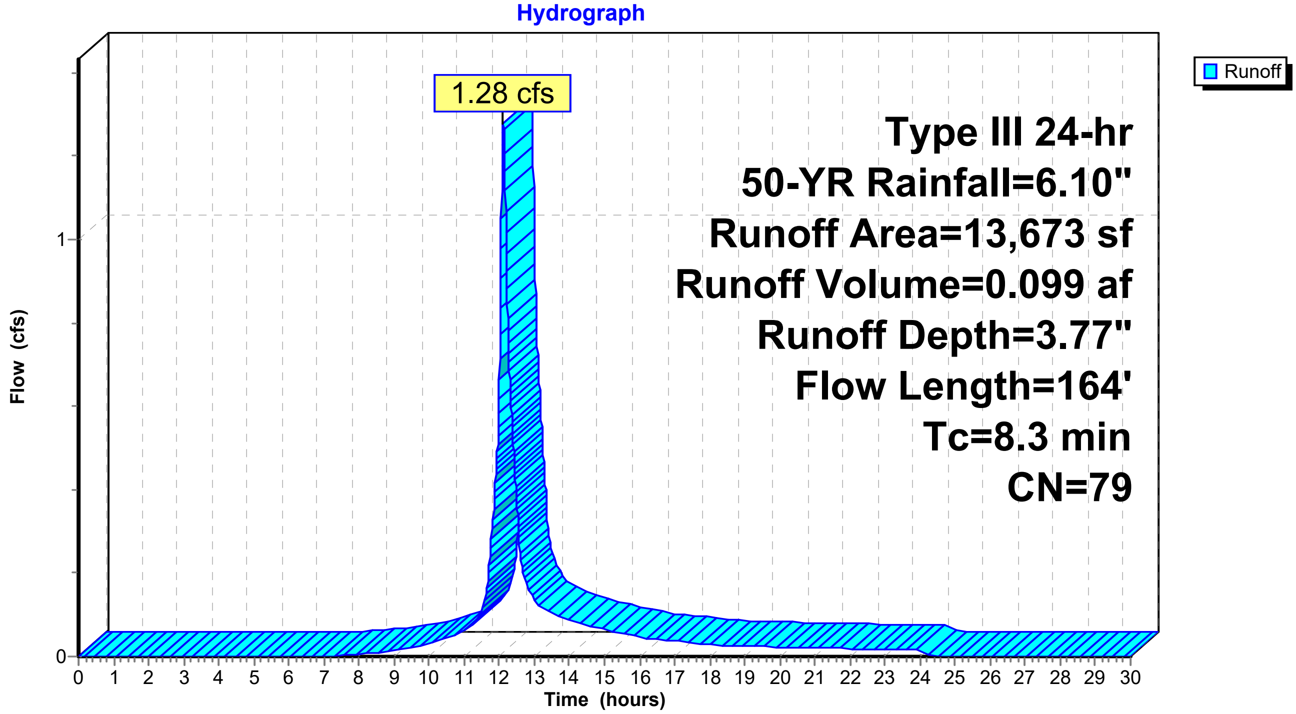
Runoff = 1.28 cfs @ 12.12 hrs, Volume= 0.099 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

	Area (sf)	CN	Description
	3,157	98	Paved parking, HSG B
	928	98	Roofs, HSG B
*	3,909	90	Gravel
	5,111	61	>75% Grass cover, Good, HSG B
	451	30	Woods, Good, HSG A
	117	55	Woods, Good, HSG B
	13,673	79	Weighted Average
	9,588		70.12% Pervious Area
	4,085		29.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	36	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.6	27	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.0	101	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	164	Total			

Subcatchment 6E: E3a

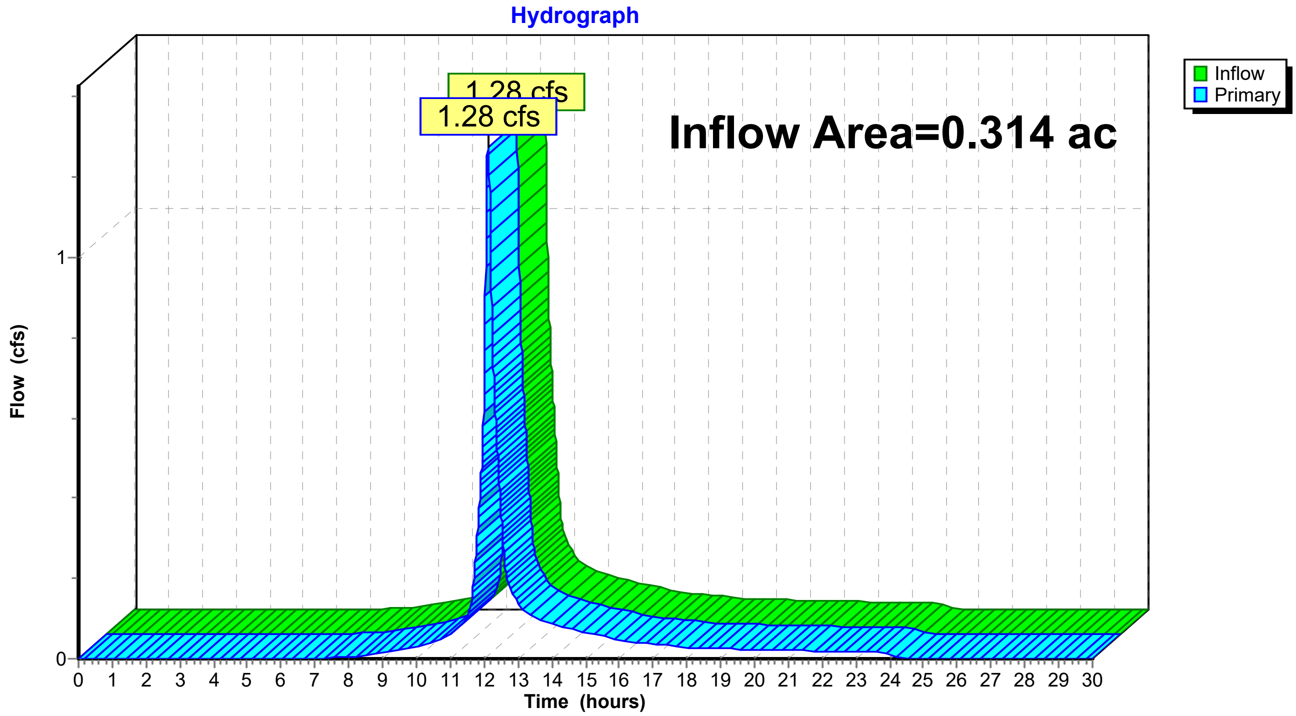


Summary for Link 7E: Design Point #3a: Flow to Village Street

Inflow Area = 0.314 ac, 29.88% Impervious, Inflow Depth = 3.77" for 50-YR event
Inflow = 1.28 cfs @ 12.12 hrs, Volume= 0.099 af
Primary = 1.28 cfs @ 12.12 hrs, Volume= 0.099 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 7E: Design Point #3a: Flow to Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6E: E3a Runoff Area=13,673 sf 29.88% Impervious Runoff Depth=4.31"
Flow Length=164' Tc=8.3 min CN=79 Runoff=1.46 cfs 0.113 af

Link 7E: Design Point #3a: Flow to Village Street Inflow=1.46 cfs 0.113 af
Primary=1.46 cfs 0.113 af

Total Runoff Area = 0.314 ac Runoff Volume = 0.113 af Average Runoff Depth = 4.31"
70.12% Pervious = 0.220 ac 29.88% Impervious = 0.094 ac

Summary for Subcatchment 6E: E3a

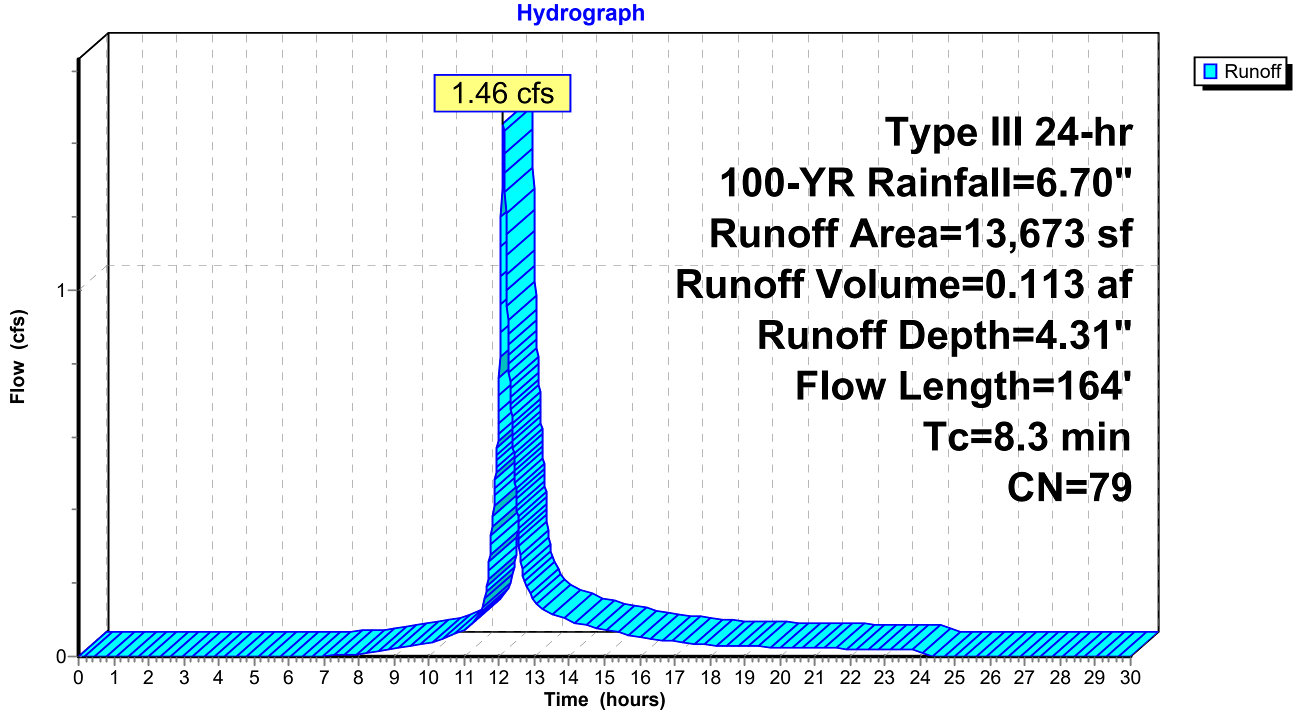
Runoff = 1.46 cfs @ 12.12 hrs, Volume= 0.113 af, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

	Area (sf)	CN	Description
	3,157	98	Paved parking, HSG B
	928	98	Roofs, HSG B
*	3,909	90	Gravel
	5,111	61	>75% Grass cover, Good, HSG B
	451	30	Woods, Good, HSG A
	117	55	Woods, Good, HSG B
	13,673	79	Weighted Average
	9,588		70.12% Pervious Area
	4,085		29.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	36	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.6	27	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.0	101	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	164	Total			

Subcatchment 6E: E3a

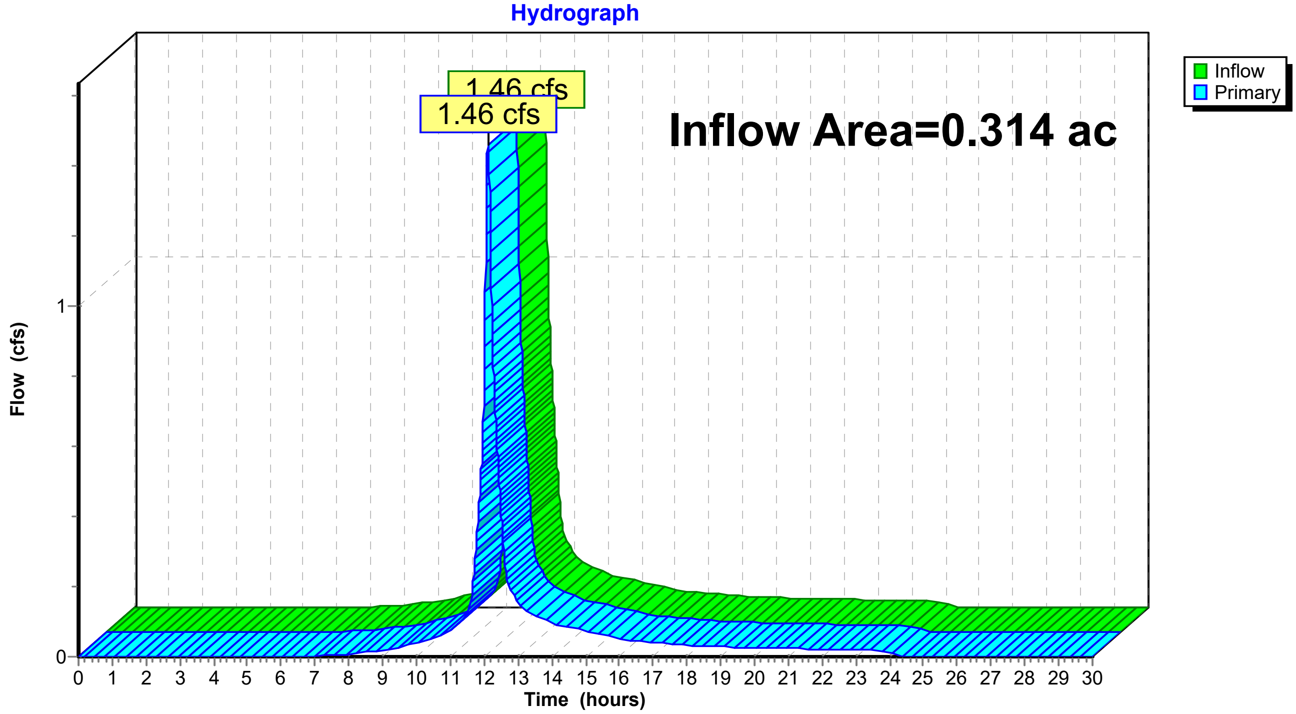


Summary for Link 7E: Design Point #3a: Flow to Village Street

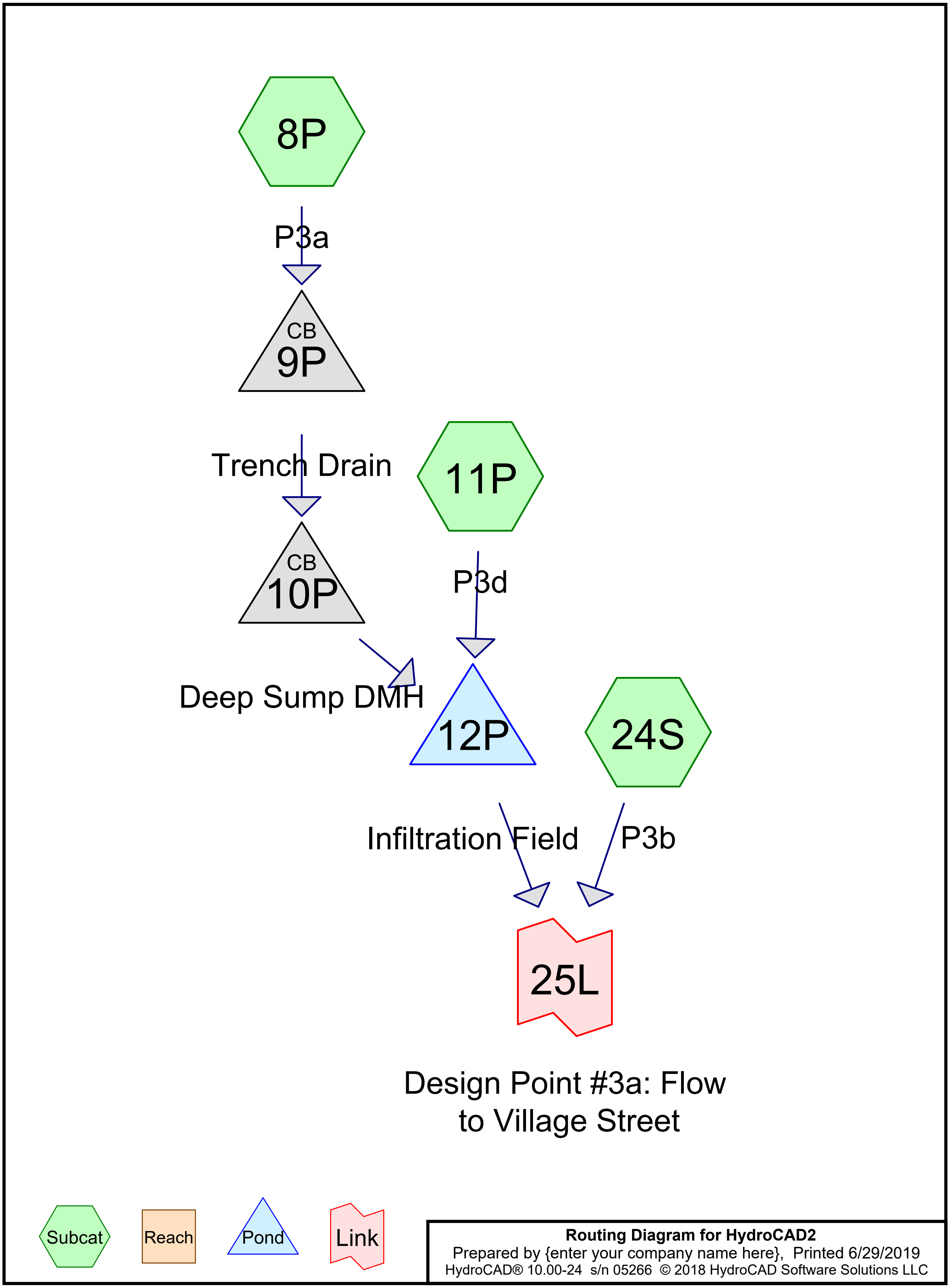
Inflow Area =	0.314 ac,	29.88% Impervious,	Inflow Depth = 4.31"	for 100-YR event
Inflow =	1.46 cfs @	12.12 hrs, Volume=	0.113 af	
Primary =	1.46 cfs @	12.12 hrs, Volume=	0.113 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 7E: Design Point #3a: Flow to Village Street



DESIGN POINT #3a: FLOW TO VILLAGE STREET PROPOSED CONDITIONS



Routing Diagram for HydroCAD2
Prepared by {enter your company name here}, Printed 6/29/2019
HydroCAD® 10.00-24 s/n 05266 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.183	61	>75% Grass cover, Good, HSG B (8P, 24S)
0.011	90	Gravel (8P)
0.250	98	Paved parking, HSG B (8P, 24S)
0.085	98	Roofs, HSG B (11P)
0.008	30	Woods, Good, HSG A (24S)
0.536	**84**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.008	HSG A	24S
0.518	HSG B	8P, 11P, 24S
0.000	HSG C	
0.000	HSG D	
0.011	Other	8P
0.536		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8P: P3a Runoff Area=15,941 sf 66.78% Impervious Runoff Depth=1.91"
Flow Length=292' Tc=10.0 min CN=87 Runoff=0.72 cfs 0.058 af

Pond 9P: Trench Drain Peak Elev=182.50' Inflow=0.72 cfs 0.058 af
10.0" Round Culvert n=0.011 L=48.0' S=0.0062 '/' Outflow=0.72 cfs 0.058 af

Pond 10P: Deep Sump DMH Peak Elev=182.29' Inflow=0.72 cfs 0.058 af
10.0" Round Culvert n=0.011 L=3.0' S=0.0000 '/' Outflow=0.72 cfs 0.058 af

Subcatchment 11P: P3d Runoff Area=3,706 sf 100.00% Impervious Runoff Depth=2.97"
Tc=2.0 min CN=98 Runoff=0.30 cfs 0.021 af

Pond 12P: Infiltration Field Peak Elev=182.16' Storage=1,025 cf Inflow=0.86 cfs 0.079 af
Discarded=0.10 cfs 0.067 af Primary=0.20 cfs 0.012 af Outflow=0.30 cfs 0.079 af

Subcatchment 24S: P3b Runoff Area=3,722 sf 6.56% Impervious Runoff Depth=0.44"
Flow Length=90' Slope=0.0670 '/' Tc=5.6 min CN=61 Runoff=0.03 cfs 0.003 af

Link 25L: Design Point #3a: Flow to Village Street Inflow=0.21 cfs 0.015 af
Primary=0.21 cfs 0.015 af

Total Runoff Area = 0.536 ac Runoff Volume = 0.083 af Average Runoff Depth = 1.85"
37.55% Pervious = 0.201 ac 62.45% Impervious = 0.335 ac

Summary for Subcatchment 8P: P3a

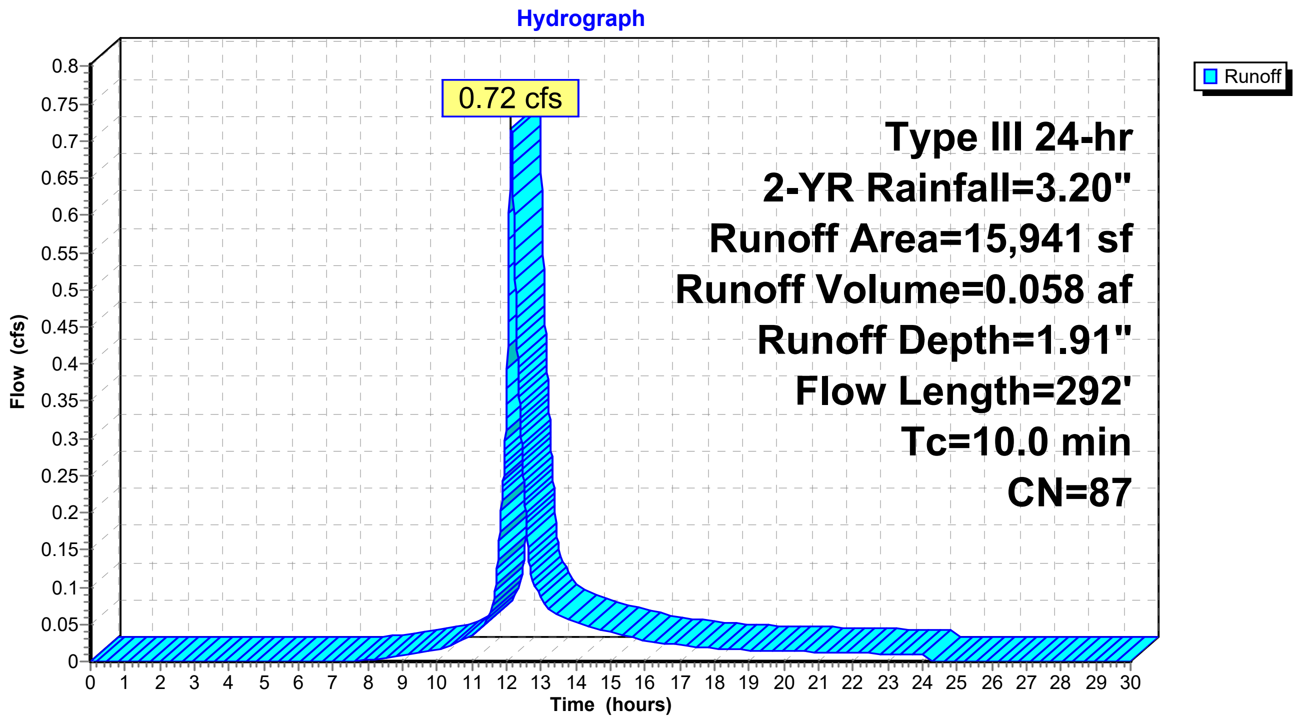
Runoff = 0.72 cfs @ 12.14 hrs, Volume= 0.058 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
	10,645	98	Paved parking, HSG B
*	476	90	Gravel
	4,820	61	>75% Grass cover, Good, HSG B
	15,941	87	Weighted Average
	5,296		33.22% Pervious Area
	10,645		66.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	40	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.2	9	0.0120	0.69		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.4	243	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.0	292	Total			

Subcatchment 8P: P3a



Summary for Pond 9P: Trench Drain

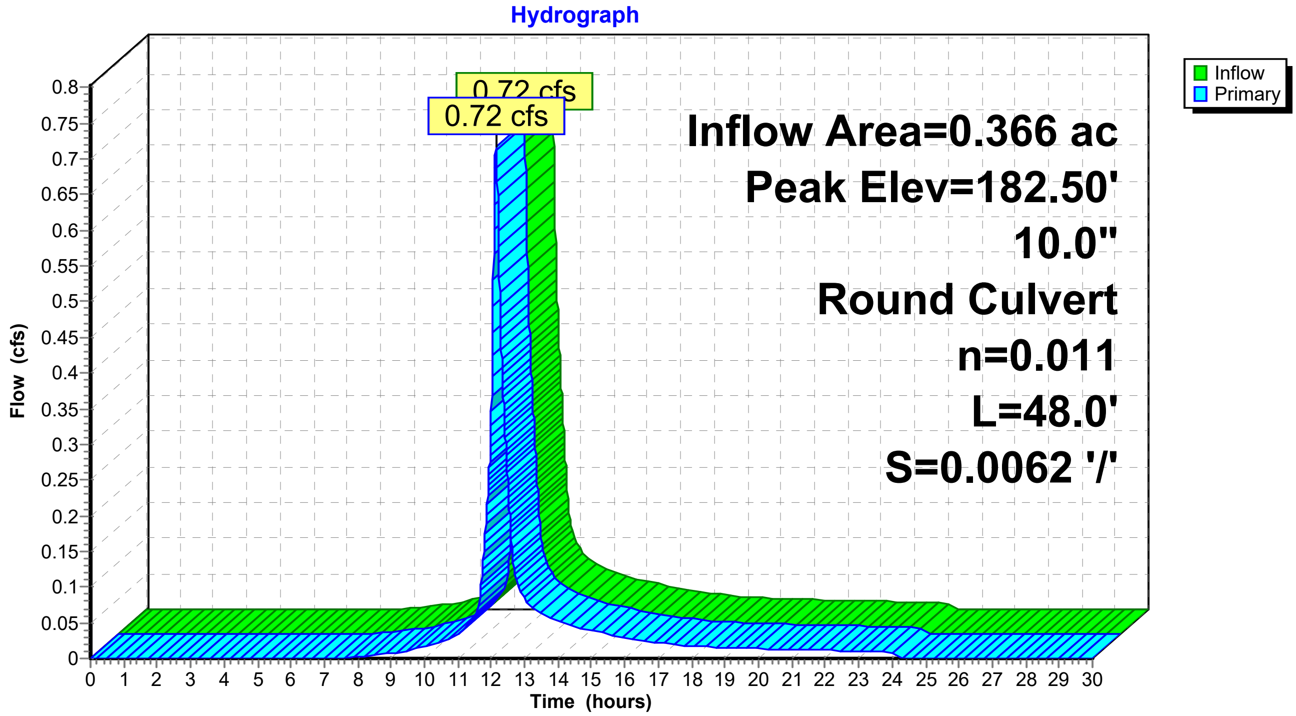
Inflow Area =	0.366 ac, 66.78% Impervious,	Inflow Depth = 1.91"	for 2-YR event
Inflow =	0.72 cfs @ 12.14 hrs,	Volume=	0.058 af
Outflow =	0.72 cfs @ 12.14 hrs,	Volume=	0.058 af, Atten= 0%, Lag= 0.0 min
Primary =	0.72 cfs @ 12.14 hrs,	Volume=	0.058 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.50' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**10.0" Round Culvert** L= 48.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 182.00' / 181.70' S= 0.0062 '/' Cc= 0.900 n= 0.011, Flow Area= 0.55 sf

Primary OutFlow Max=0.72 cfs @ 12.14 hrs HW=182.50' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.72 cfs @ 3.01 fps)

Pond 9P: Trench Drain



Summary for Pond 10P: Deep Sump DMH

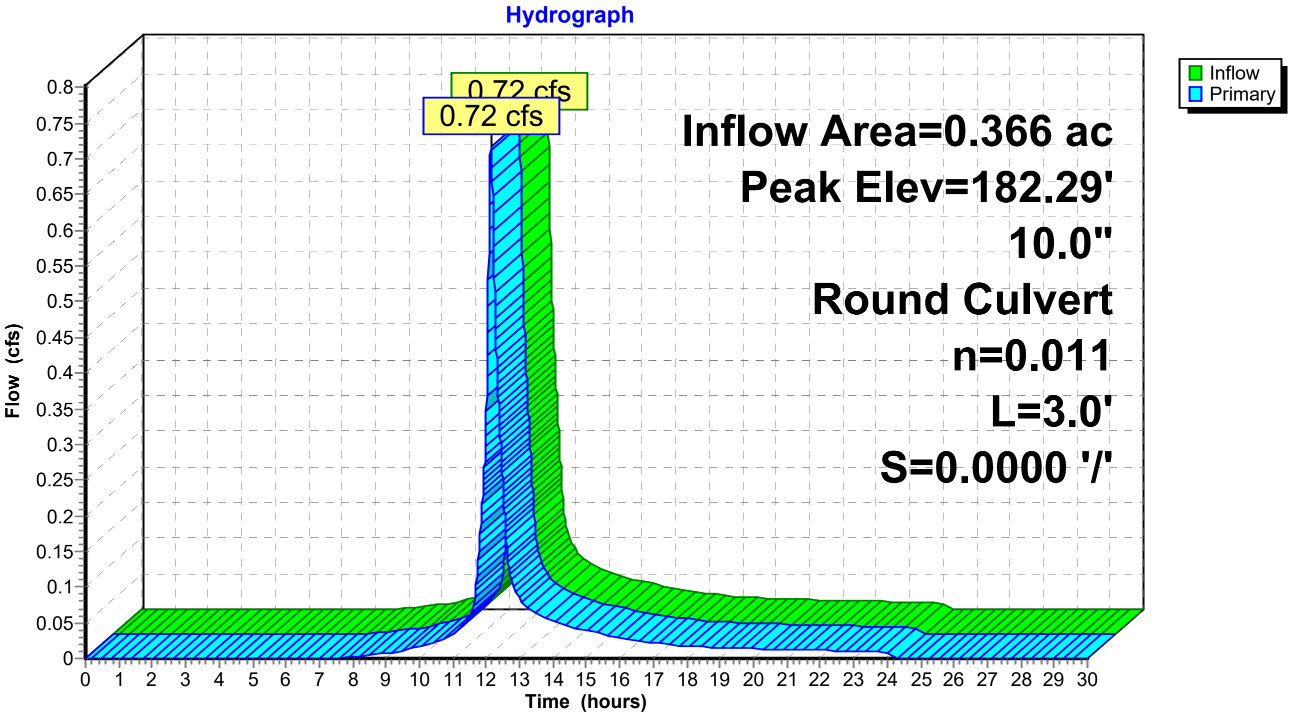
Inflow Area = 0.366 ac, 66.78% Impervious, Inflow Depth = 1.91" for 2-YR event
Inflow = 0.72 cfs @ 12.14 hrs, Volume= 0.058 af
Outflow = 0.72 cfs @ 12.14 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min
Primary = 0.72 cfs @ 12.14 hrs, Volume= 0.058 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.29' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	181.70'	**10.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 181.70' / 181.70' S= 0.0000 '/' Cc= 0.900 n= 0.011, Flow Area= 0.55 sf

Primary OutFlow Max=0.72 cfs @ 12.14 hrs HW=182.29' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.72 cfs @ 2.45 fps)

Pond 10P: Deep Sump DMH



Summary for Subcatchment 11P: P3d

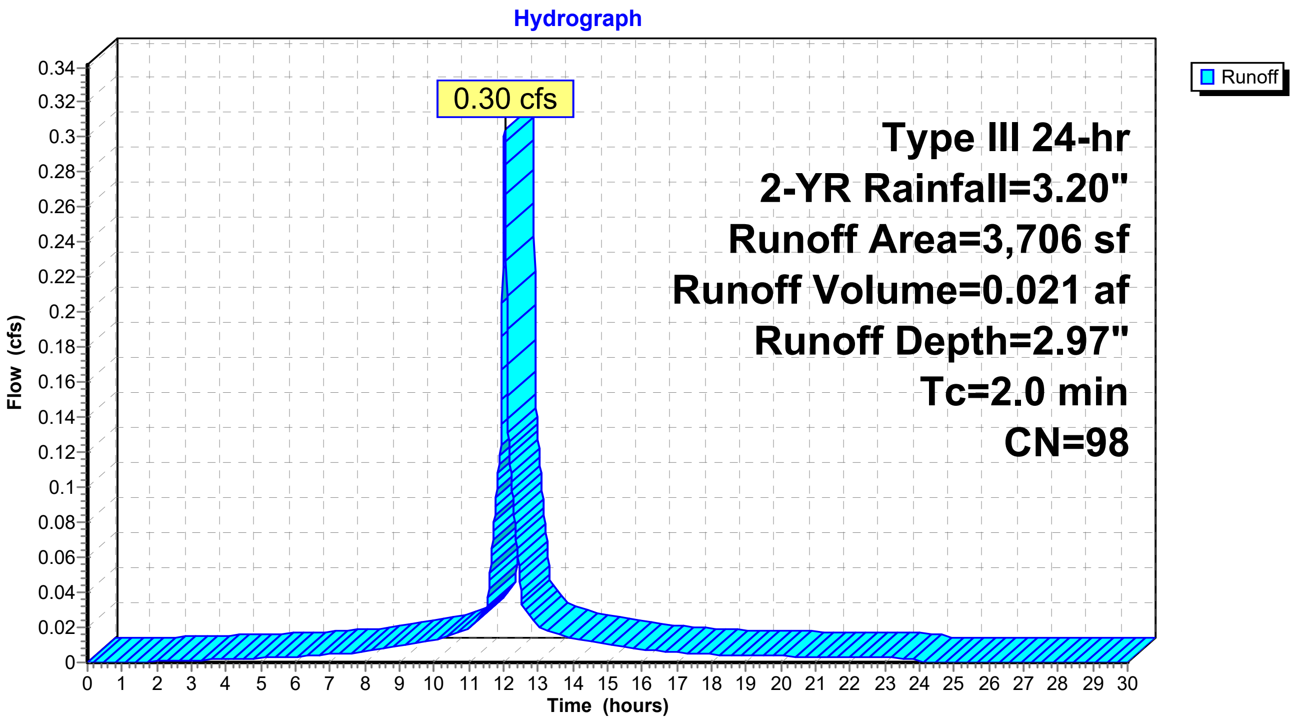
Runoff = 0.30 cfs @ 12.03 hrs, Volume= 0.021 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
3,706	98	Roofs, HSG B
3,706		100.00% Impervious Area

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

Subcatchment 11P: P3d



Summary for Pond 12P: Infiltration Field

Inflow Area = 0.451 ac, 73.04% Impervious, Inflow Depth = 2.11" for 2-YR event
Inflow = 0.86 cfs @ 12.11 hrs, Volume= 0.079 af
Outflow = 0.30 cfs @ 12.49 hrs, Volume= 0.079 af, Atten= 65%, Lag= 22.4 min
Discarded = 0.10 cfs @ 11.60 hrs, Volume= 0.067 af
Primary = 0.20 cfs @ 12.49 hrs, Volume= 0.012 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.16' @ 12.49 hrs Surf.Area= 1,800 sf Storage= 1,025 cf

Plug-Flow detention time= 52.1 min calculated for 0.079 af (100% of inflow)
Center-of-Mass det. time= 52.1 min (856.2 - 804.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.20'	1,096 cf	**55.00'W x 32.50'L x 2.04'H Field A** 3,649 cf Overall - 908 cf Embedded = 2,741 cf x 40.0% Voids
#2A	181.70'	908 cf	**Cultec C-100HD** x 64 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 16 rows
#3	181.20'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		2,043 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.20'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	181.88'	**8.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.88' / 181.00' S= 0.0352 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Discarded OutFlow Max=0.10 cfs @ 11.60 hrs HW=181.23' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.20 cfs @ 12.49 hrs HW=182.16' (Free Discharge)
└─**2=Culvert** (Inlet Controls 0.20 cfs @ 1.42 fps)

Pond 12P: Infiltration Field - Chamber Wizard Field A

Chamber Model = Cultec C-100HD (Cultec Contactor® 100HD)
Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
Row Length Adjustment= +0.50' x 1.86 sf x 16 rows

36.0" Wide + 4.0" Spacing = 40.0" C-C Row Spacing

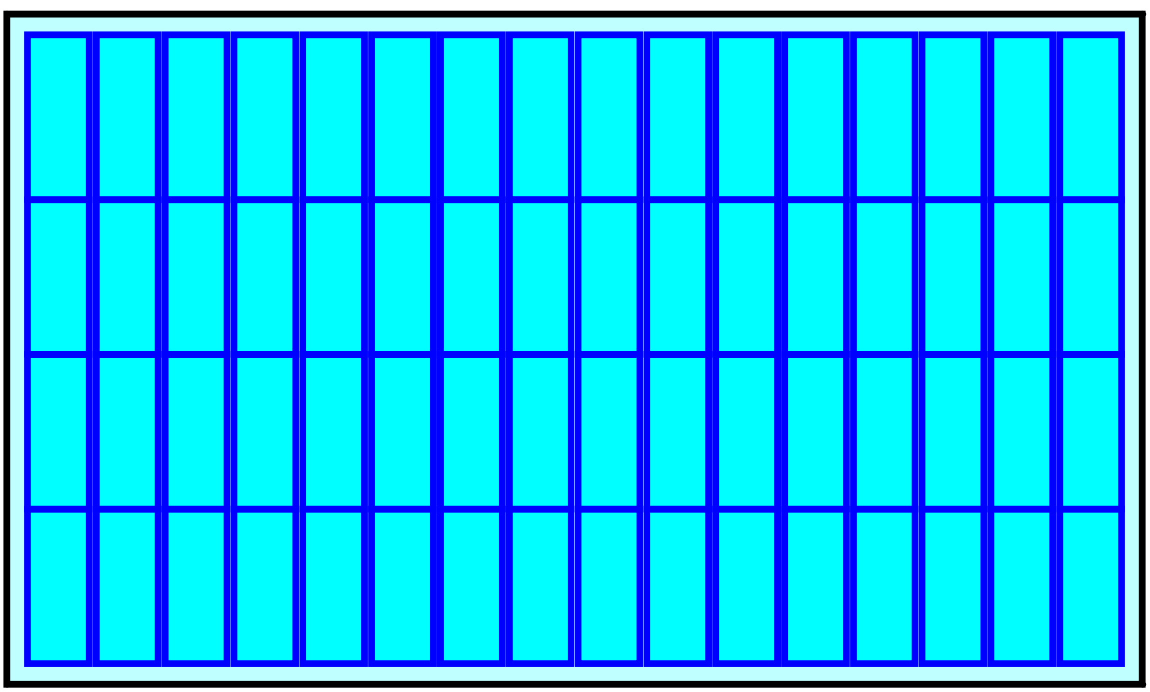
4 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 30.50' Row Length +12.0" End Stone x 2 = 32.50' Base Length
16 Rows x 36.0" Wide + 4.0" Spacing x 15 + 12.0" Side Stone x 2 = 55.00' Base Width
6.0" Base + 12.5" Chamber Height + 6.0" Cover = 2.04' Field Height

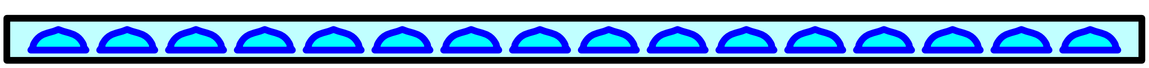
64 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 16 Rows = 908.4 cf Chamber Storage

3,649.5 cf Field - 908.4 cf Chambers = 2,741.1 cf Stone x 40.0% Voids = 1,096.4 cf Stone Storage

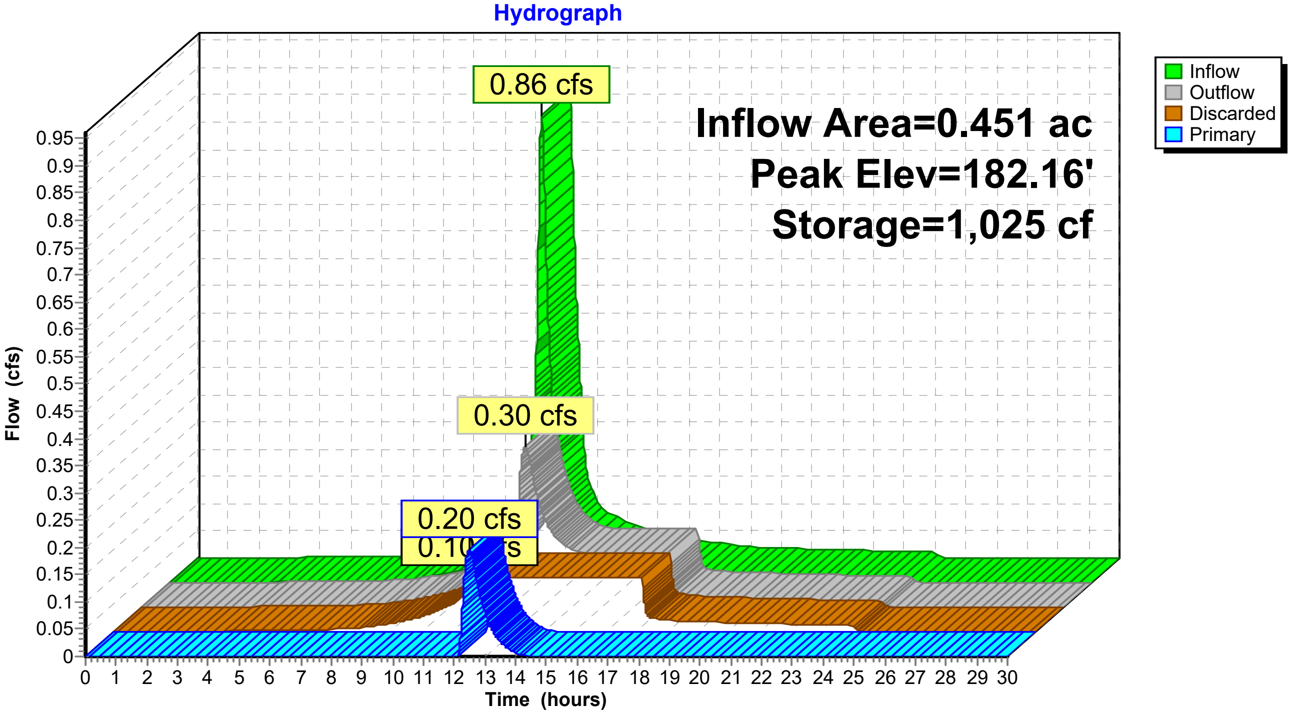
Chamber Storage + Stone Storage = 2,004.8 cf = 0.046 af
Overall Storage Efficiency = 54.9%
Overall System Size = 32.50' x 55.00' x 2.04'

64 Chambers
135.2 cy Field
101.5 cy Stone





Pond 12P: Infiltration Field



Summary for Subcatchment 24S: P3b

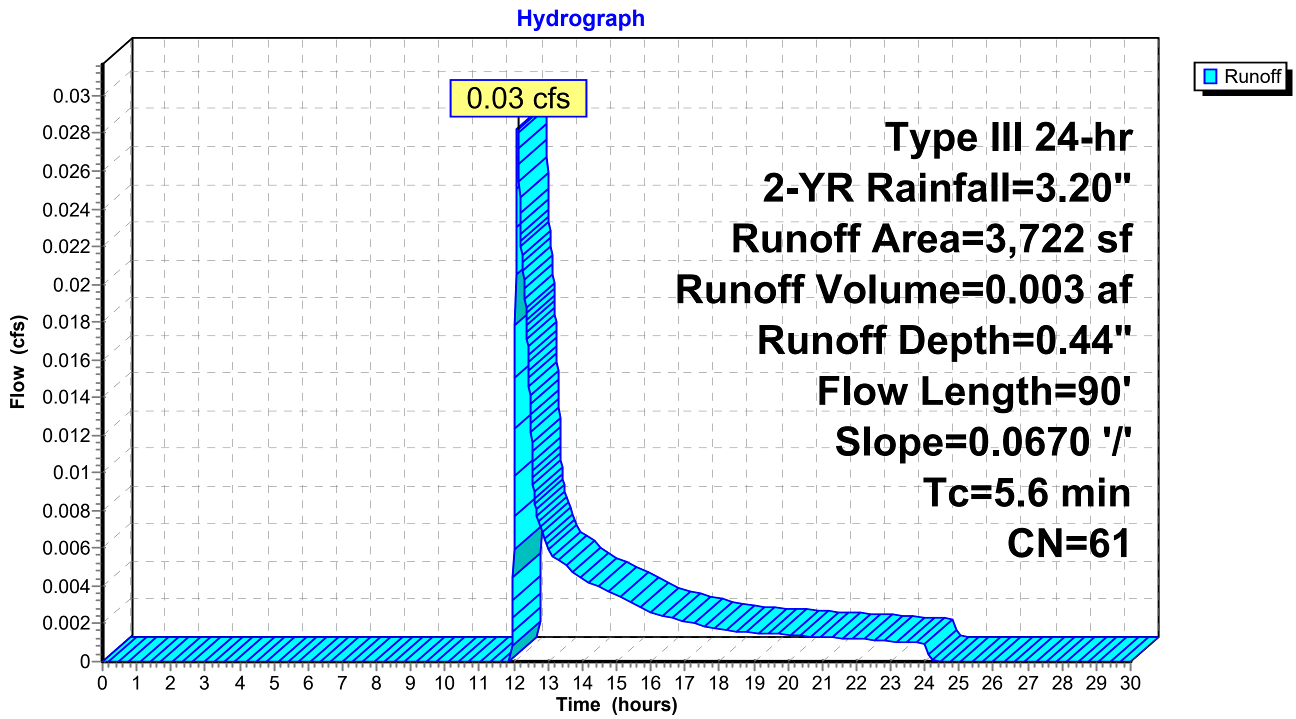
Runoff = 0.03 cfs @ 12.12 hrs, Volume= 0.003 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
244	98	Paved parking, HSG B
3,143	61	>75% Grass cover, Good, HSG B
335	30	Woods, Good, HSG A
3,722	61	Weighted Average
3,478		93.44% Pervious Area
244		6.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	90	0.0670	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"

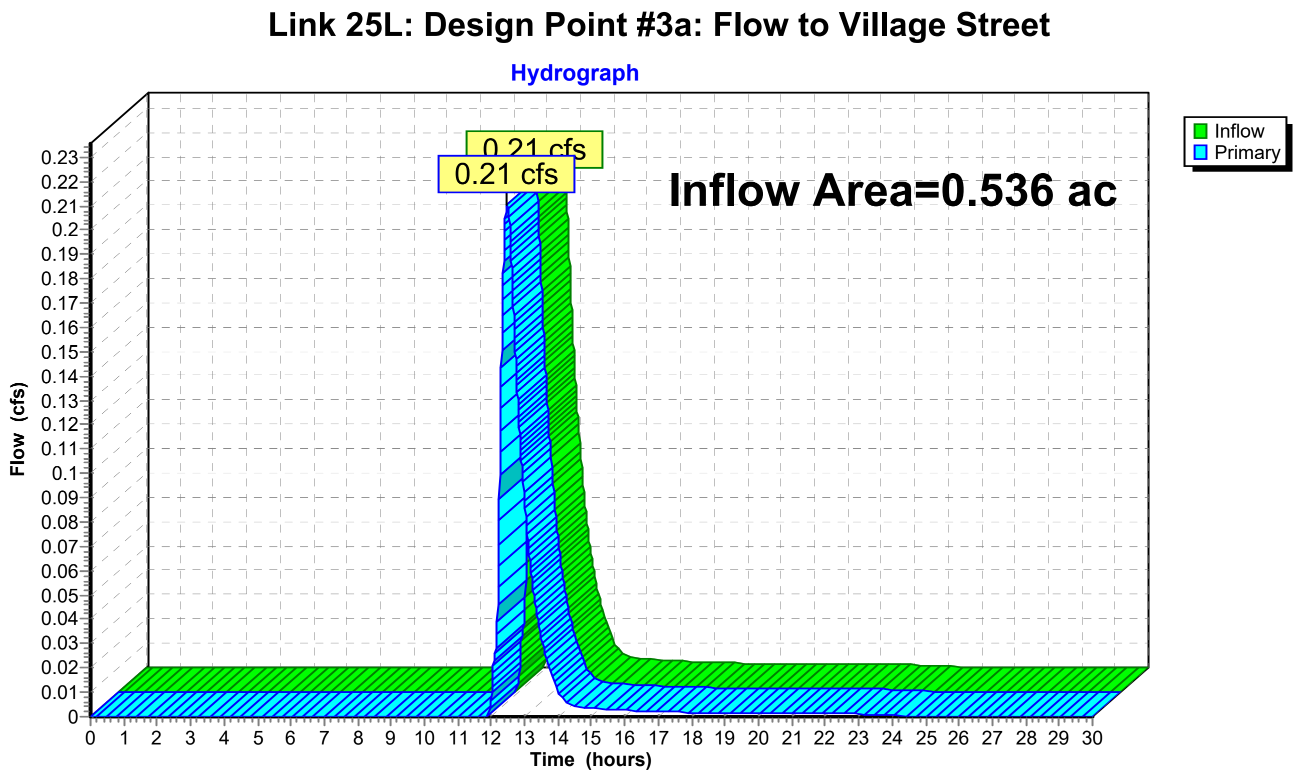
Subcatchment 24S: P3b



Summary for Link 25L: Design Point #3a: Flow to Village Street

Inflow Area = 0.536 ac, 62.45% Impervious, Inflow Depth = 0.34" for 2-YR event
Inflow = 0.21 cfs @ 12.47 hrs, Volume= 0.015 af
Primary = 0.21 cfs @ 12.47 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8P: P3a Runoff Area=15,941 sf 66.78% Impervious Runoff Depth=3.29"
Flow Length=292' Tc=10.0 min CN=87 Runoff=1.22 cfs 0.100 af

Pond 9P: Trench Drain Peak Elev=182.70' Inflow=1.22 cfs 0.100 af
10.0" Round Culvert n=0.011 L=48.0' S=0.0062 '/' Outflow=1.22 cfs 0.100 af

Pond 10P: Deep Sump DMH Peak Elev=182.50' Inflow=1.22 cfs 0.100 af
10.0" Round Culvert n=0.011 L=3.0' S=0.0000 '/' Outflow=1.22 cfs 0.100 af

Subcatchment 11P: P3d Runoff Area=3,706 sf 100.00% Impervious Runoff Depth=4.46"
Tc=2.0 min CN=98 Runoff=0.45 cfs 0.032 af

Pond 12P: Infiltration Field Peak Elev=182.48' Storage=1,438 cf Inflow=1.43 cfs 0.132 af
Discarded=0.10 cfs 0.089 af Primary=0.69 cfs 0.043 af Outflow=0.79 cfs 0.132 af

Subcatchment 24S: P3b Runoff Area=3,722 sf 6.56% Impervious Runoff Depth=1.19"
Flow Length=90' Slope=0.0670 '/' Tc=5.6 min CN=61 Runoff=0.11 cfs 0.008 af

Link 25L: Design Point #3a: Flow to Village Street Inflow=0.75 cfs 0.051 af
Primary=0.75 cfs 0.051 af

Total Runoff Area = 0.536 ac Runoff Volume = 0.140 af Average Runoff Depth = 3.14"
37.55% Pervious = 0.201 ac 62.45% Impervious = 0.335 ac

Summary for Subcatchment 8P: P3a

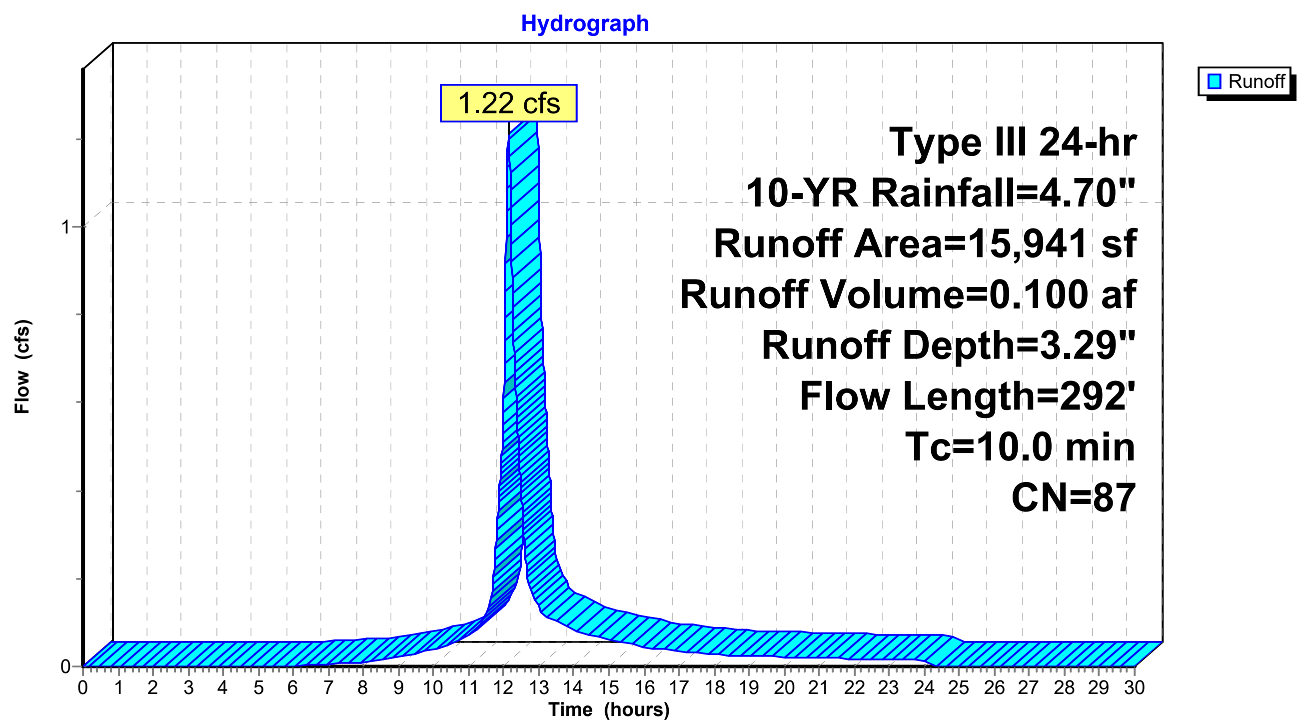
Runoff = 1.22 cfs @ 12.14 hrs, Volume= 0.100 af, Depth= 3.29"

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

	Area (sf)	CN	Description
	10,645	98	Paved parking, HSG B
*	476	90	Gravel
	4,820	61	>75% Grass cover, Good, HSG B
	15,941	87	Weighted Average
	5,296		33.22% Pervious Area
	10,645		66.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	40	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.2	9	0.0120	0.69		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.4	243	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.0	292	Total			

Subcatchment 8P: P3a



Summary for Pond 9P: Trench Drain

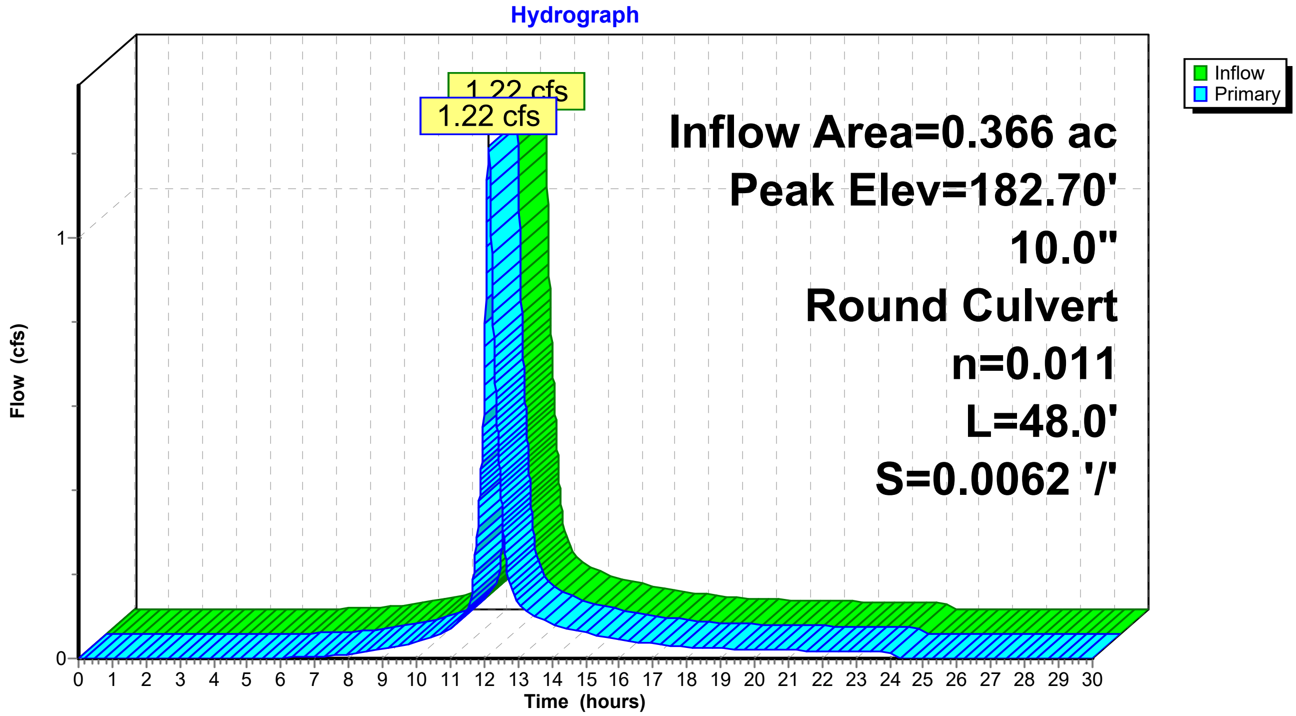
Inflow Area = 0.366 ac, 66.78% Impervious, Inflow Depth = 3.29" for 10-YR event
Inflow = 1.22 cfs @ 12.14 hrs, Volume= 0.100 af
Outflow = 1.22 cfs @ 12.14 hrs, Volume= 0.100 af, Atten= 0%, Lag= 0.0 min
Primary = 1.22 cfs @ 12.14 hrs, Volume= 0.100 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.70' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**10.0" Round Culvert** L= 48.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 182.00' / 181.70' S= 0.0062 '/' Cc= 0.900 n= 0.011, Flow Area= 0.55 sf

Primary OutFlow Max=1.21 cfs @ 12.14 hrs HW=182.69' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.21 cfs @ 3.38 fps)

Pond 9P: Trench Drain



Summary for Pond 10P: Deep Sump DMH

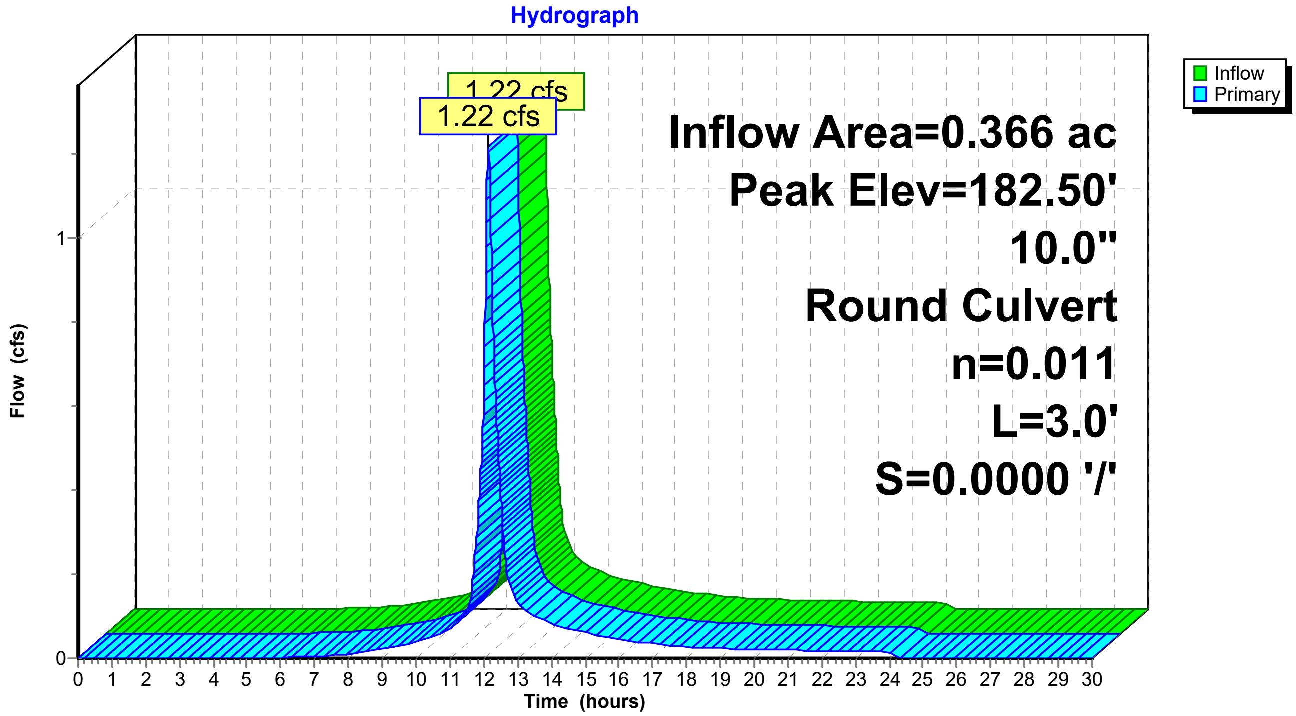
Inflow Area = 0.366 ac, 66.78% Impervious, Inflow Depth = 3.29" for 10-YR event
Inflow = 1.22 cfs @ 12.14 hrs, Volume= 0.100 af
Outflow = 1.22 cfs @ 12.14 hrs, Volume= 0.100 af, Atten= 0%, Lag= 0.0 min
Primary = 1.22 cfs @ 12.14 hrs, Volume= 0.100 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.50' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	181.70'	**10.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 181.70' / 181.70' S= 0.0000 '/' Cc= 0.900 n= 0.011, Flow Area= 0.55 sf

Primary OutFlow Max=1.21 cfs @ 12.14 hrs HW=182.50' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.21 cfs @ 2.87 fps)

Pond 10P: Deep Sump DMH



Summary for Subcatchment 11P: P3d

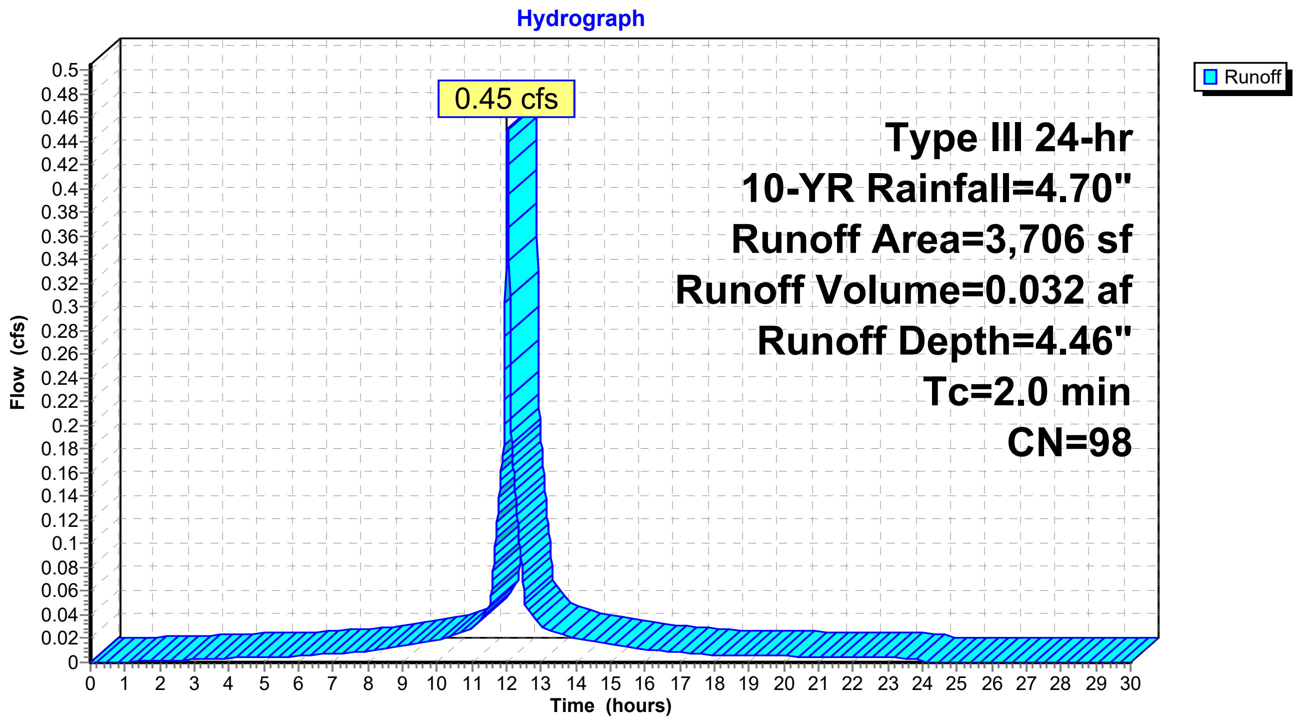
Runoff = 0.45 cfs @ 12.03 hrs, Volume= 0.032 af, Depth= 4.46"

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

Area (sf)	CN	Description
3,706	98	Roofs, HSG B
3,706		100.00% Impervious Area

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

Subcatchment 11P: P3d



Summary for Pond 12P: Infiltration Field

Inflow Area =	0.451 ac,	73.04% Impervious,	Inflow Depth = 3.51"	for 10-YR event
Inflow =	1.43 cfs @	12.12 hrs, Volume=	0.132 af	
Outflow =	0.79 cfs @	12.32 hrs, Volume=	0.132 af, Atten= 44%, Lag= 12.3 min	
Discarded =	0.10 cfs @	11.09 hrs, Volume=	0.089 af	
Primary =	0.69 cfs @	12.32 hrs, Volume=	0.043 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.48' @ 12.32 hrs Surf.Area= 1,800 sf Storage= 1,438 cf

Plug-Flow detention time= 46.5 min calculated for 0.132 af (100% of inflow)
Center-of-Mass det. time= 46.5 min (838.9 - 792.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.20'	1,096 cf	**55.00'W x 32.50'L x 2.04'H Field A** 3,649 cf Overall - 908 cf Embedded = 2,741 cf x 40.0% Voids
#2A	181.70'	908 cf	**Cultec C-100HD** x 64 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 16 rows
#3	181.20'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		2,043 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.20'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	181.88'	**8.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.88' / 181.00' S= 0.0352 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Discarded OutFlow Max=0.10 cfs @ 11.09 hrs HW=181.23' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.69 cfs @ 12.32 hrs HW=182.48' (Free Discharge)
└─**2=Culvert** (Inlet Controls 0.69 cfs @ 2.09 fps)

Pond 12P: Infiltration Field - Chamber Wizard Field A

Chamber Model = Cultec C-100HD (Cultec Contactor® 100HD)
Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
Row Length Adjustment= +0.50' x 1.86 sf x 16 rows

36.0" Wide + 4.0" Spacing = 40.0" C-C Row Spacing

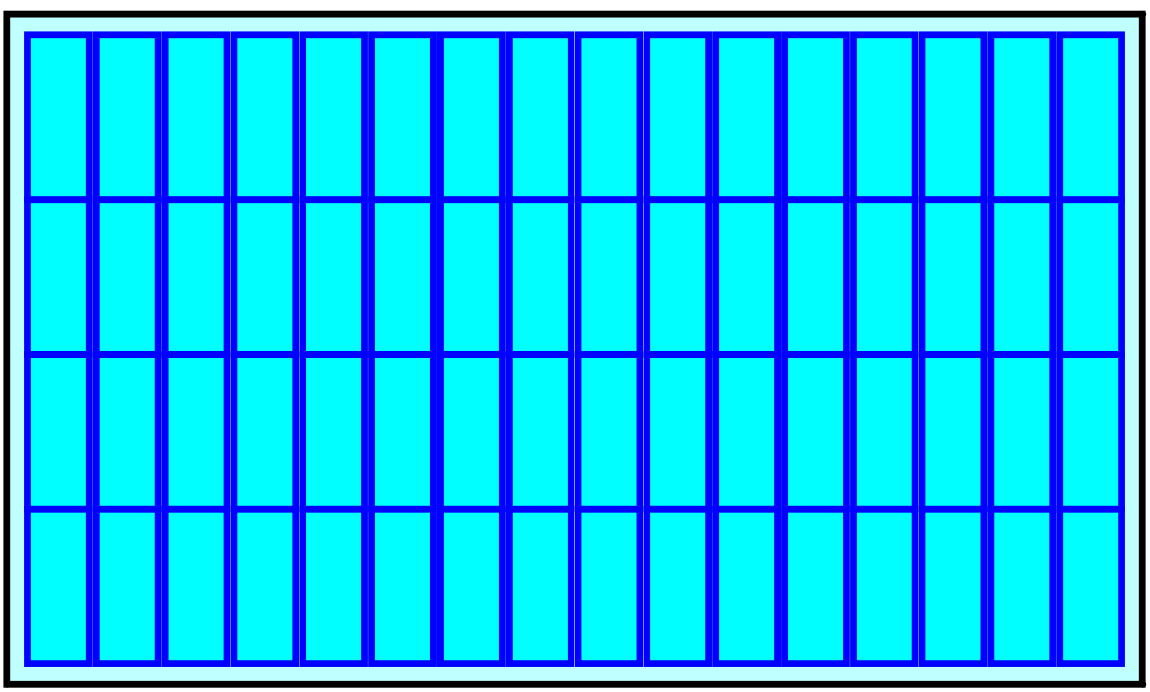
4 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 30.50' Row Length +12.0" End Stone x 2 = 32.50' Base Length
16 Rows x 36.0" Wide + 4.0" Spacing x 15 + 12.0" Side Stone x 2 = 55.00' Base Width
6.0" Base + 12.5" Chamber Height + 6.0" Cover = 2.04' Field Height

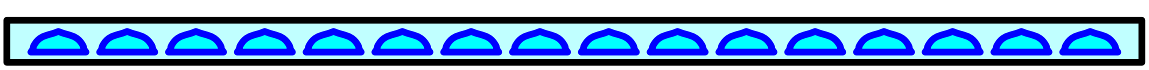
64 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 16 Rows = 908.4 cf Chamber Storage

3,649.5 cf Field - 908.4 cf Chambers = 2,741.1 cf Stone x 40.0% Voids = 1,096.4 cf Stone Storage

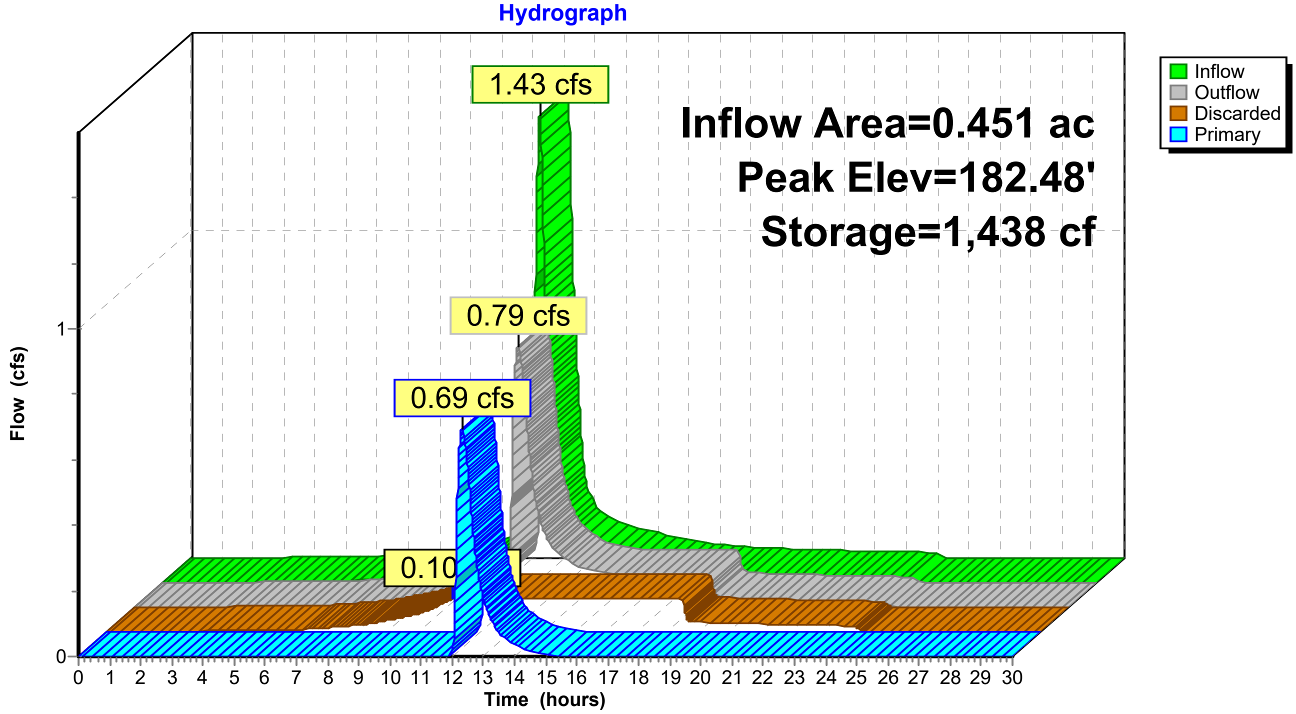
Chamber Storage + Stone Storage = 2,004.8 cf = 0.046 af
Overall Storage Efficiency = 54.9%
Overall System Size = 32.50' x 55.00' x 2.04'

64 Chambers
135.2 cy Field
101.5 cy Stone





Pond 12P: Infiltration Field



Summary for Subcatchment 24S: P3b

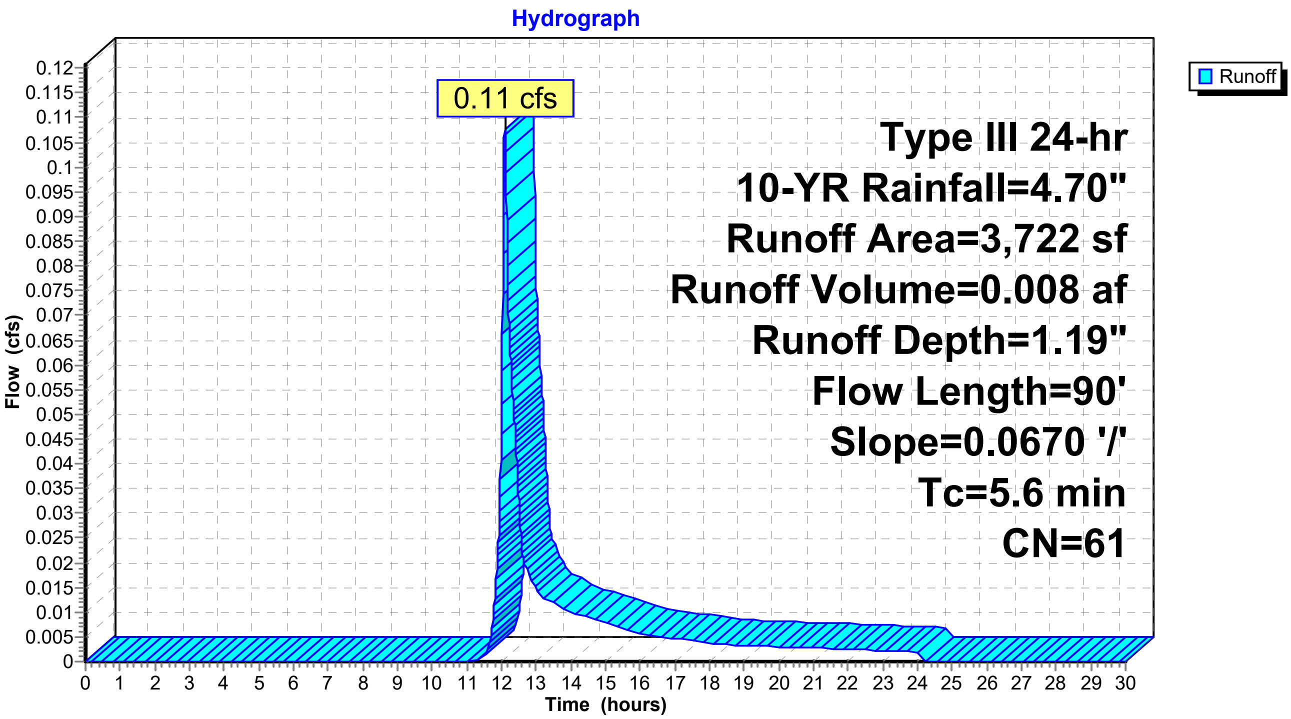
Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Depth= 1.19"

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

Area (sf)	CN	Description
244	98	Paved parking, HSG B
3,143	61	>75% Grass cover, Good, HSG B
335	30	Woods, Good, HSG A
3,722	61	Weighted Average
3,478		93.44% Pervious Area
244		6.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	90	0.0670	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"

Subcatchment 24S: P3b

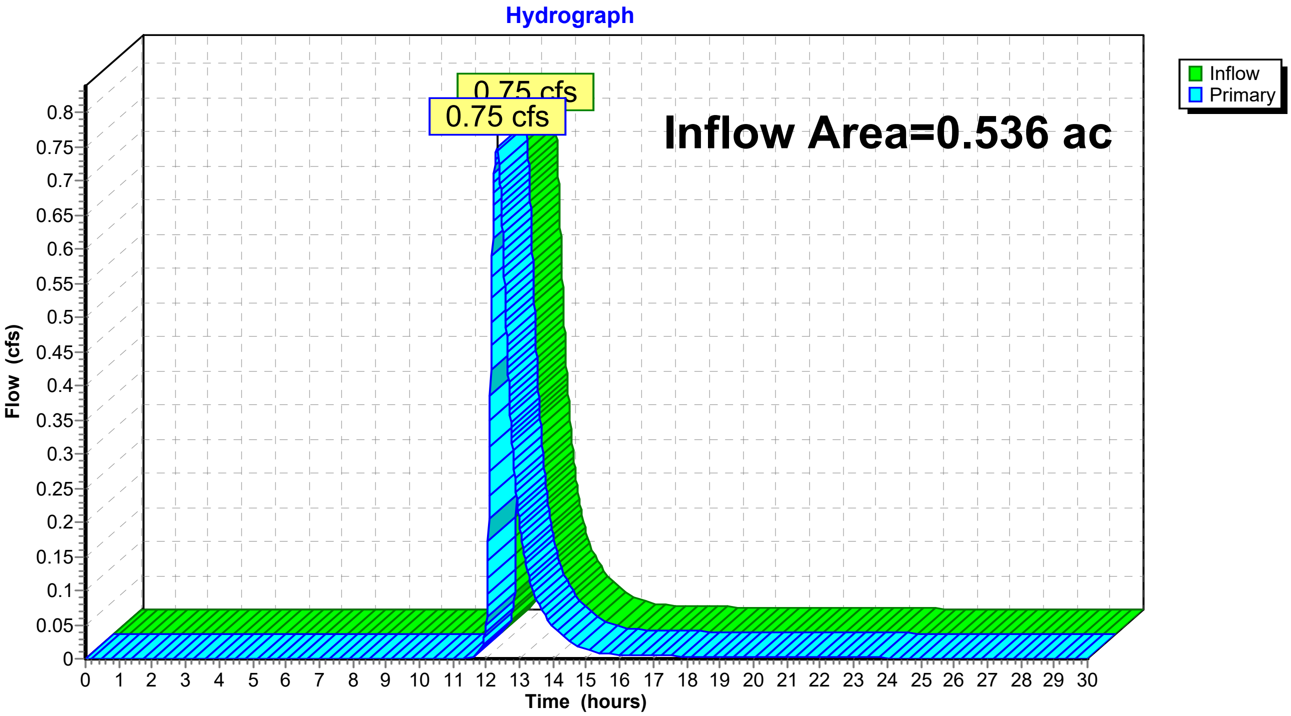


Summary for Link 25L: Design Point #3a: Flow to Village Street

Inflow Area = 0.536 ac, 62.45% Impervious, Inflow Depth = 1.14" for 10-YR event
Inflow = 0.75 cfs @ 12.31 hrs, Volume= 0.051 af
Primary = 0.75 cfs @ 12.31 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 25L: Design Point #3a: Flow to Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8P: P3a Runoff Area=15,941 sf 66.78% Impervious Runoff Depth=4.04"
Flow Length=292' Tc=10.0 min CN=87 Runoff=1.48 cfs 0.123 af

Pond 9P: Trench Drain Peak Elev=182.80' Inflow=1.48 cfs 0.123 af
10.0" Round Culvert n=0.011 L=48.0' S=0.0062 '/' Outflow=1.48 cfs 0.123 af

Pond 10P: Deep Sump DMH Peak Elev=182.62' Inflow=1.48 cfs 0.123 af
10.0" Round Culvert n=0.011 L=3.0' S=0.0000 '/' Outflow=1.48 cfs 0.123 af

Subcatchment 11P: P3d Runoff Area=3,706 sf 100.00% Impervious Runoff Depth=5.26"
Tc=2.0 min CN=98 Runoff=0.53 cfs 0.037 af

Pond 12P: Infiltration Field Peak Elev=182.73' Storage=1,661 cf Inflow=1.73 cfs 0.161 af
Discarded=0.10 cfs 0.099 af Primary=0.96 cfs 0.061 af Outflow=1.06 cfs 0.161 af

Subcatchment 24S: P3b Runoff Area=3,722 sf 6.56% Impervious Runoff Depth=1.68"
Flow Length=90' Slope=0.0670 '/' Tc=5.6 min CN=61 Runoff=0.16 cfs 0.012 af

Link 25L: Design Point #3a: Flow to Village Street Inflow=1.04 cfs 0.073 af
Primary=1.04 cfs 0.073 af

Total Runoff Area = 0.536 ac Runoff Volume = 0.172 af Average Runoff Depth = 3.86"
37.55% Pervious = 0.201 ac 62.45% Impervious = 0.335 ac

Summary for Subcatchment 8P: P3a

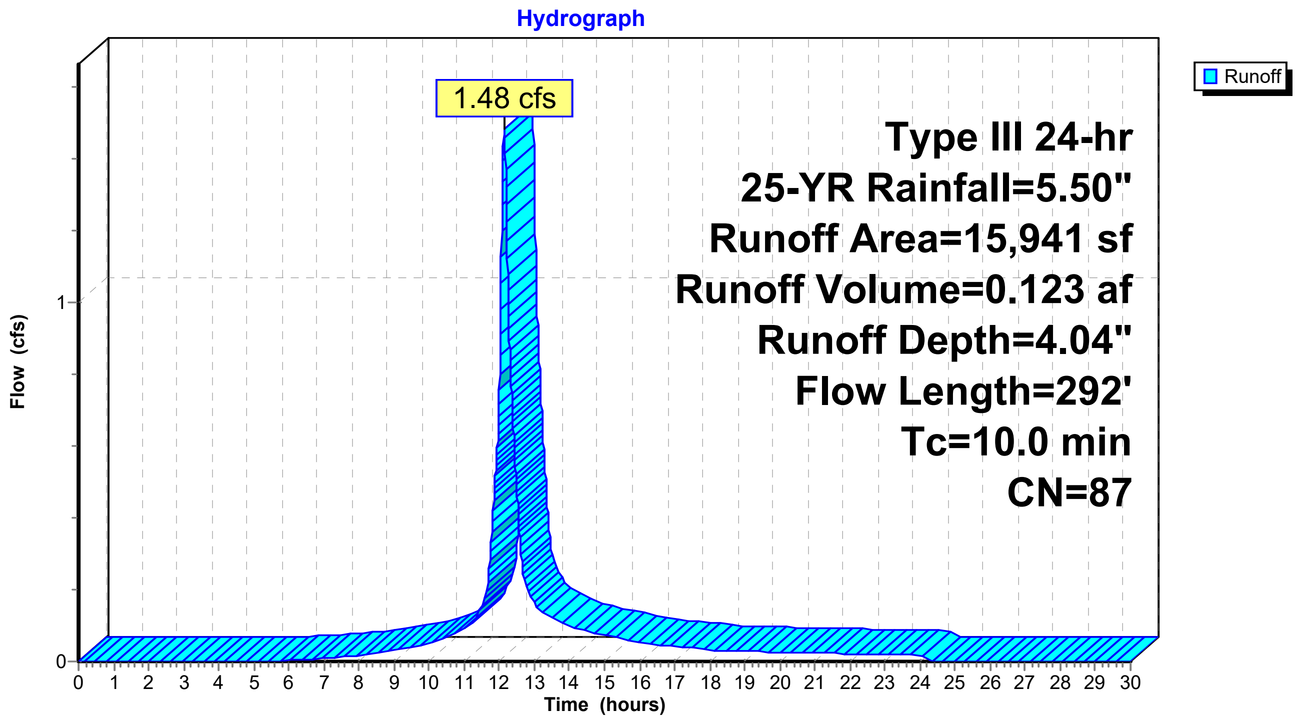
Runoff = 1.48 cfs @ 12.14 hrs, Volume= 0.123 af, Depth= 4.04"

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

	Area (sf)	CN	Description
	10,645	98	Paved parking, HSG B
*	476	90	Gravel
	4,820	61	>75% Grass cover, Good, HSG B
	15,941	87	Weighted Average
	5,296		33.22% Pervious Area
	10,645		66.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	40	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.2	9	0.0120	0.69		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.4	243	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.0	292	Total			

Subcatchment 8P: P3a



Summary for Pond 9P: Trench Drain

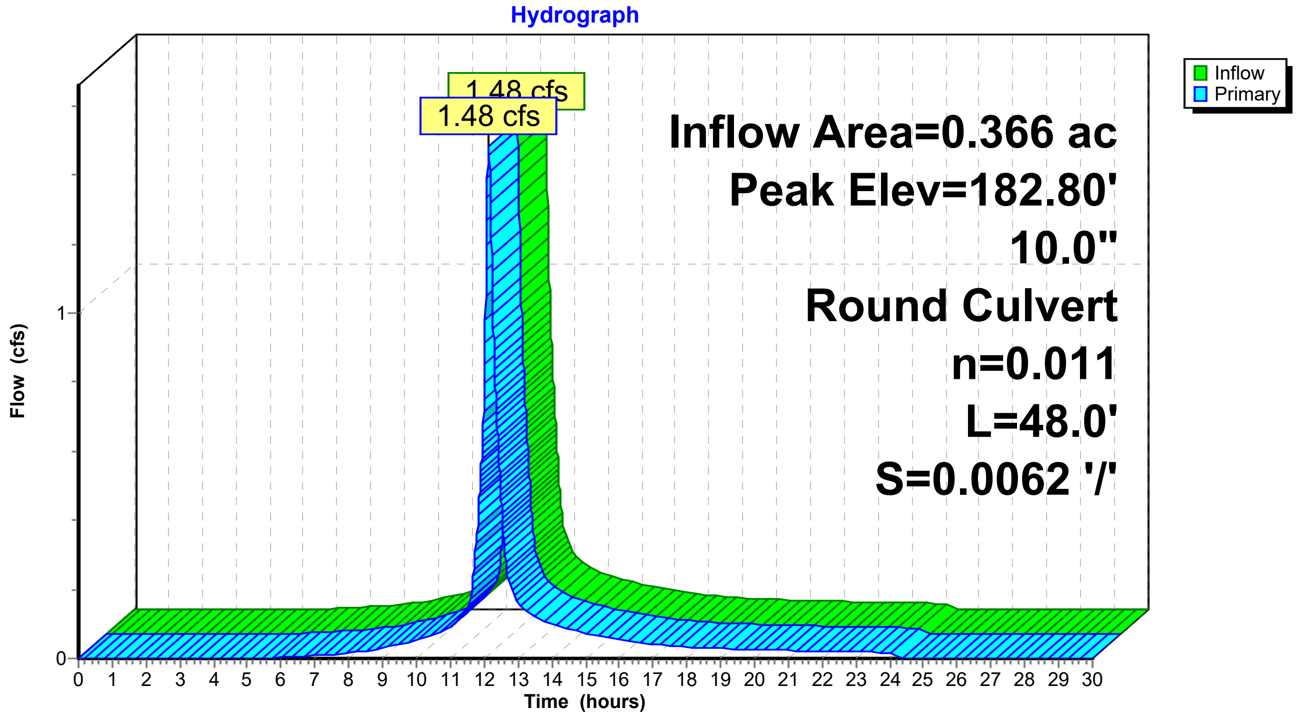
Inflow Area =	0.366 ac, 66.78% Impervious, Inflow Depth = 4.04"	for 25-YR event	
Inflow =	1.48 cfs @ 12.14 hrs, Volume=	0.123 af	
Outflow =	1.48 cfs @ 12.14 hrs, Volume=	0.123 af, Atten= 0%, Lag= 0.0 min	
Primary =	1.48 cfs @ 12.14 hrs, Volume=	0.123 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.80' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**10.0" Round Culvert** L= 48.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 182.00' / 181.70' S= 0.0062 '/' Cc= 0.900 n= 0.011, Flow Area= 0.55 sf

Primary OutFlow Max=1.48 cfs @ 12.14 hrs HW=182.80' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.48 cfs @ 3.53 fps)

Pond 9P: Trench Drain



Summary for Pond 10P: Deep Sump DMH

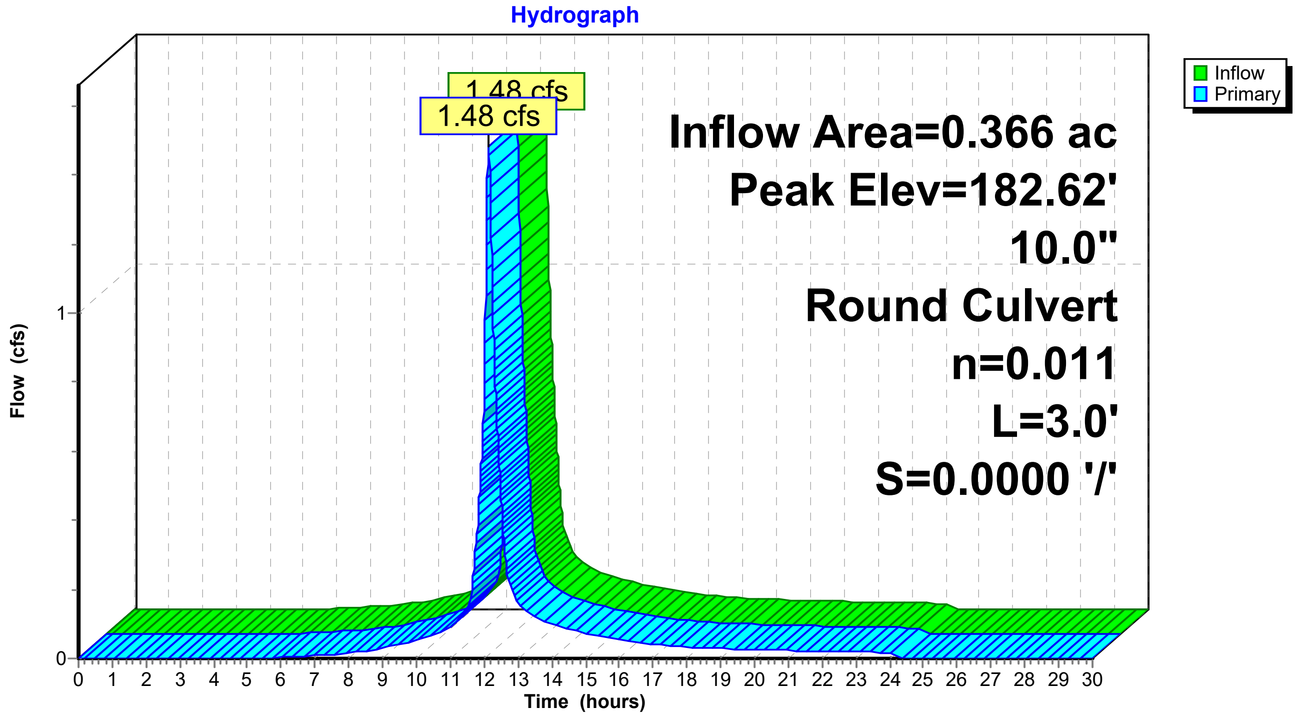
Inflow Area =	0.366 ac,	66.78% Impervious,	Inflow Depth = 4.04"	for 25-YR event
Inflow =	1.48 cfs @	12.14 hrs, Volume=	0.123 af	
Outflow =	1.48 cfs @	12.14 hrs, Volume=	0.123 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.48 cfs @	12.14 hrs, Volume=	0.123 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.62' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	181.70'	**10.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 181.70' / 181.70' S= 0.0000 '/' Cc= 0.900 n= 0.011, Flow Area= 0.55 sf

Primary OutFlow Max=1.48 cfs @ 12.14 hrs HW=182.62' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.48 cfs @ 3.07 fps)

Pond 10P: Deep Sump DMH



Summary for Subcatchment 11P: P3d

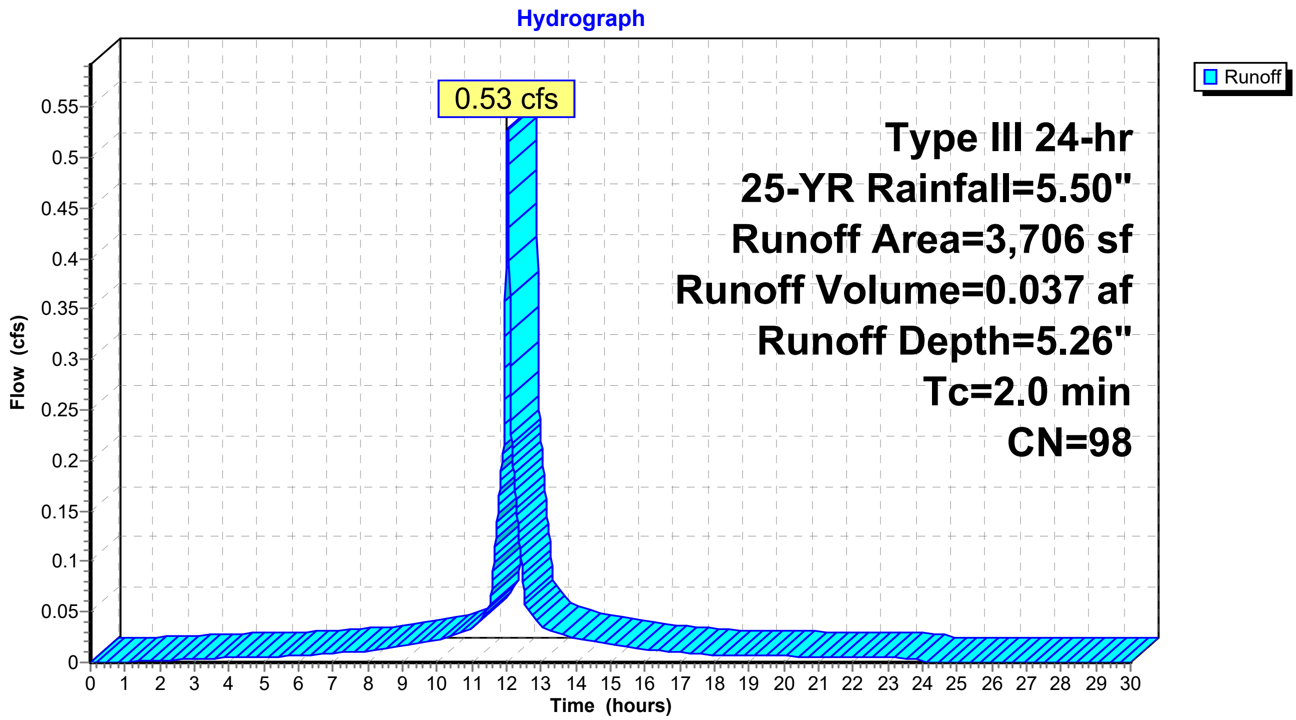
Runoff = 0.53 cfs @ 12.03 hrs, Volume= 0.037 af, Depth= 5.26"

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

Area (sf)	CN	Description
3,706	98	Roofs, HSG B
3,706		100.00% Impervious Area

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

Subcatchment 11P: P3d



Summary for Pond 12P: Infiltration Field

Inflow Area =	0.451 ac, 73.04% Impervious, Inflow Depth = 4.27" for 25-YR event		
Inflow =	1.73 cfs @ 12.12 hrs, Volume=	0.161 af	
Outflow =	1.06 cfs @ 12.29 hrs, Volume=	0.161 af,	Atten= 39%, Lag= 10.3 min
Discarded =	0.10 cfs @ 10.64 hrs, Volume=	0.099 af	
Primary =	0.96 cfs @ 12.29 hrs, Volume=	0.061 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.73' @ 12.29 hrs Surf.Area= 1,800 sf Storage= 1,661 cf

Plug-Flow detention time= 44.6 min calculated for 0.160 af (100% of inflow)
Center-of-Mass det. time= 44.6 min (832.4 - 787.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.20'	1,096 cf	**55.00'W x 32.50'L x 2.04'H Field A**
			3,649 cf Overall - 908 cf Embedded = 2,741 cf x 40.0% Voids
#2A	181.70'	908 cf	**Cultec C-100HD** x 64 Inside #1
			Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
			Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
			Row Length Adjustment= +0.50' x 1.86 sf x 16 rows
#3	181.20'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		2,043 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.20'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	181.88'	**8.0" Round Culvert**
			L= 25.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 181.88' / 181.00' S= 0.0352 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.35 sf

Discarded OutFlow Max=0.10 cfs @ 10.64 hrs HW=181.23' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.96 cfs @ 12.29 hrs HW=182.73' (Free Discharge)
└─**2=Culvert** (Inlet Controls 0.96 cfs @ 2.74 fps)

Pond 12P: Infiltration Field - Chamber Wizard Field A

Chamber Model = Cultec C-100HD (Cultec Contactor® 100HD)
Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
Row Length Adjustment= +0.50' x 1.86 sf x 16 rows

36.0" Wide + 4.0" Spacing = 40.0" C-C Row Spacing

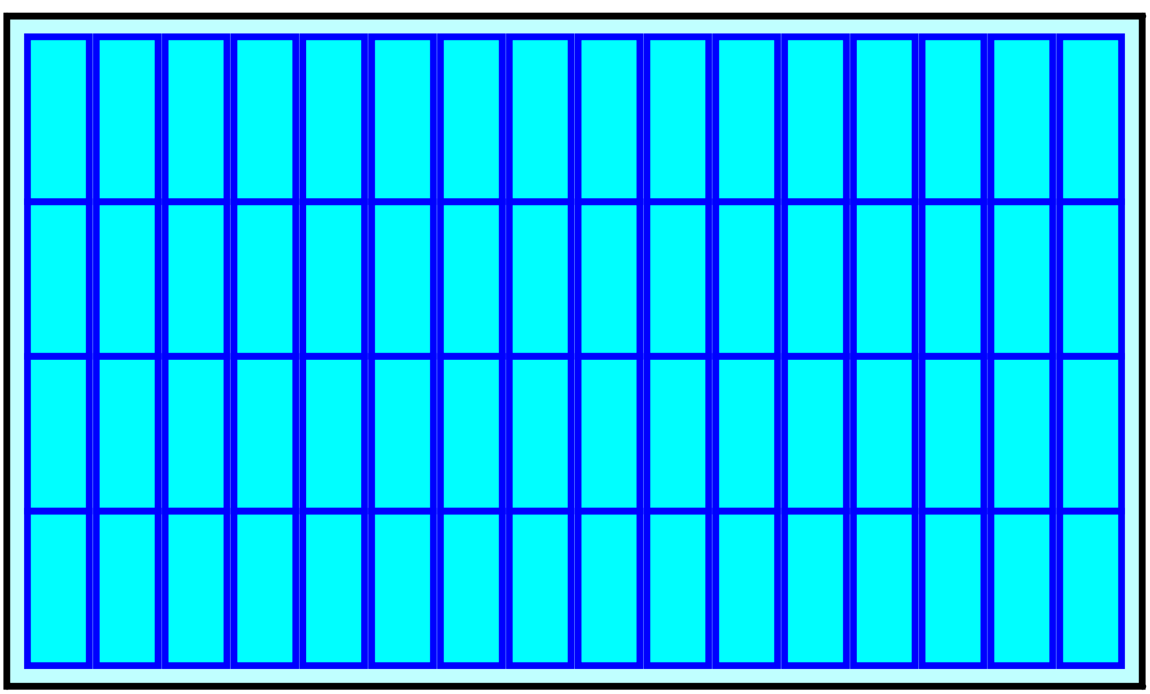
4 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 30.50' Row Length +12.0" End Stone x 2 = 32.50' Base Length
16 Rows x 36.0" Wide + 4.0" Spacing x 15 + 12.0" Side Stone x 2 = 55.00' Base Width
6.0" Base + 12.5" Chamber Height + 6.0" Cover = 2.04' Field Height

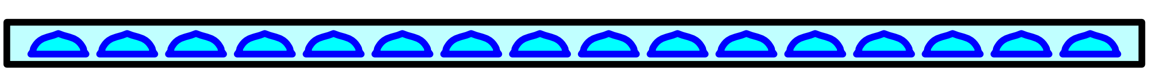
64 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 16 Rows = 908.4 cf Chamber Storage

3,649.5 cf Field - 908.4 cf Chambers = 2,741.1 cf Stone x 40.0% Voids = 1,096.4 cf Stone Storage

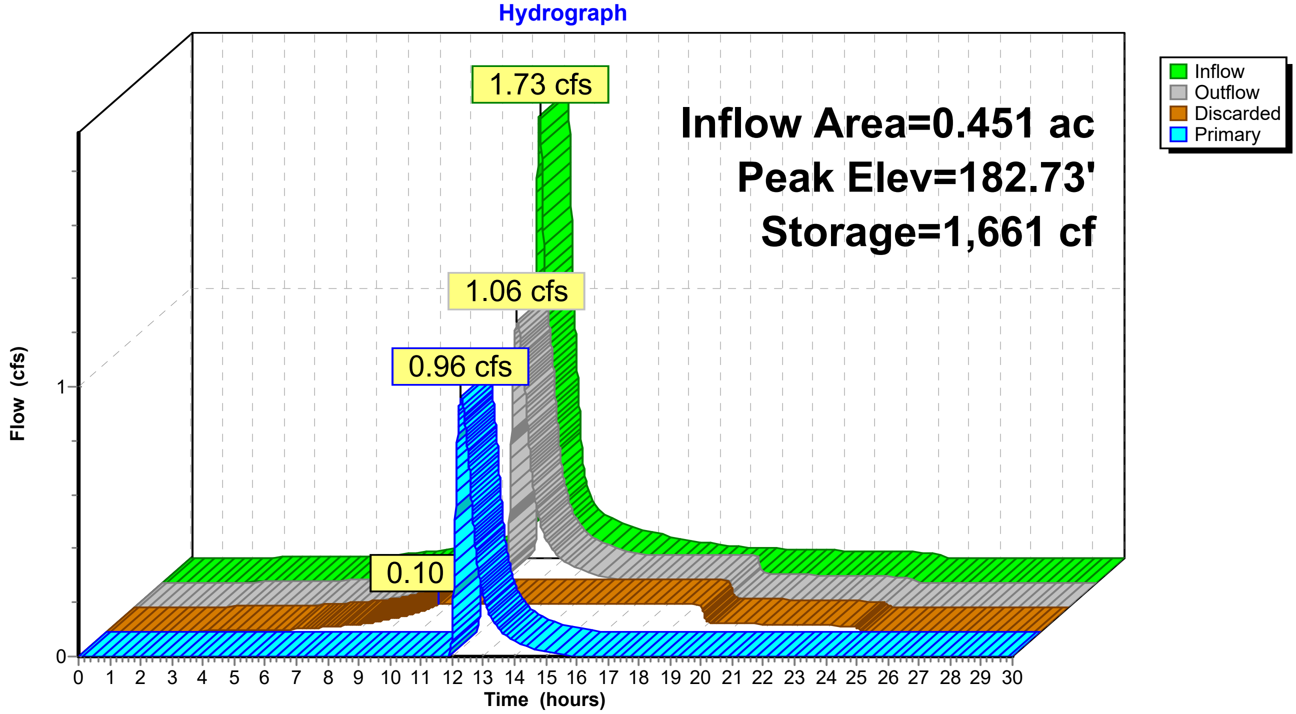
Chamber Storage + Stone Storage = 2,004.8 cf = 0.046 af
Overall Storage Efficiency = 54.9%
Overall System Size = 32.50' x 55.00' x 2.04'

64 Chambers
135.2 cy Field
101.5 cy Stone





Pond 12P: Infiltration Field



Summary for Subcatchment 24S: P3b

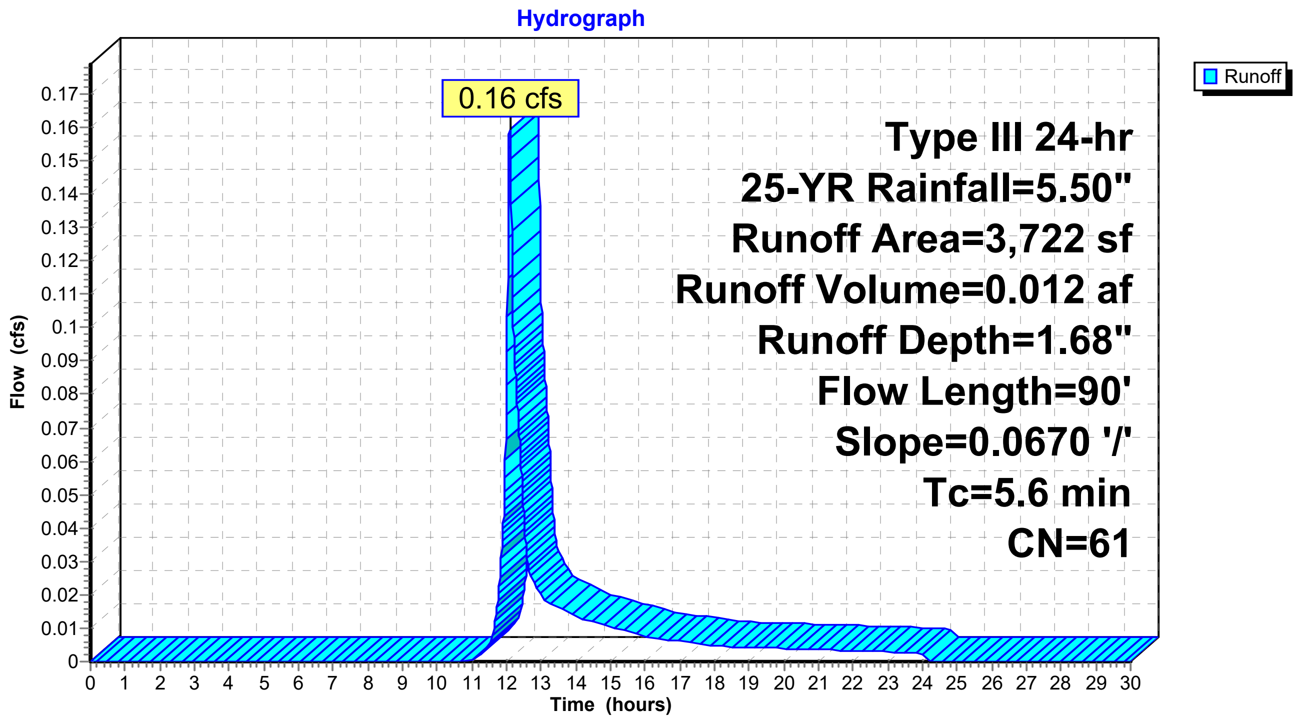
Runoff = 0.16 cfs @ 12.09 hrs, Volume= 0.012 af, Depth= 1.68"

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

Area (sf)	CN	Description
244	98	Paved parking, HSG B
3,143	61	>75% Grass cover, Good, HSG B
335	30	Woods, Good, HSG A
3,722	61	Weighted Average
3,478		93.44% Pervious Area
244		6.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	90	0.0670	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"

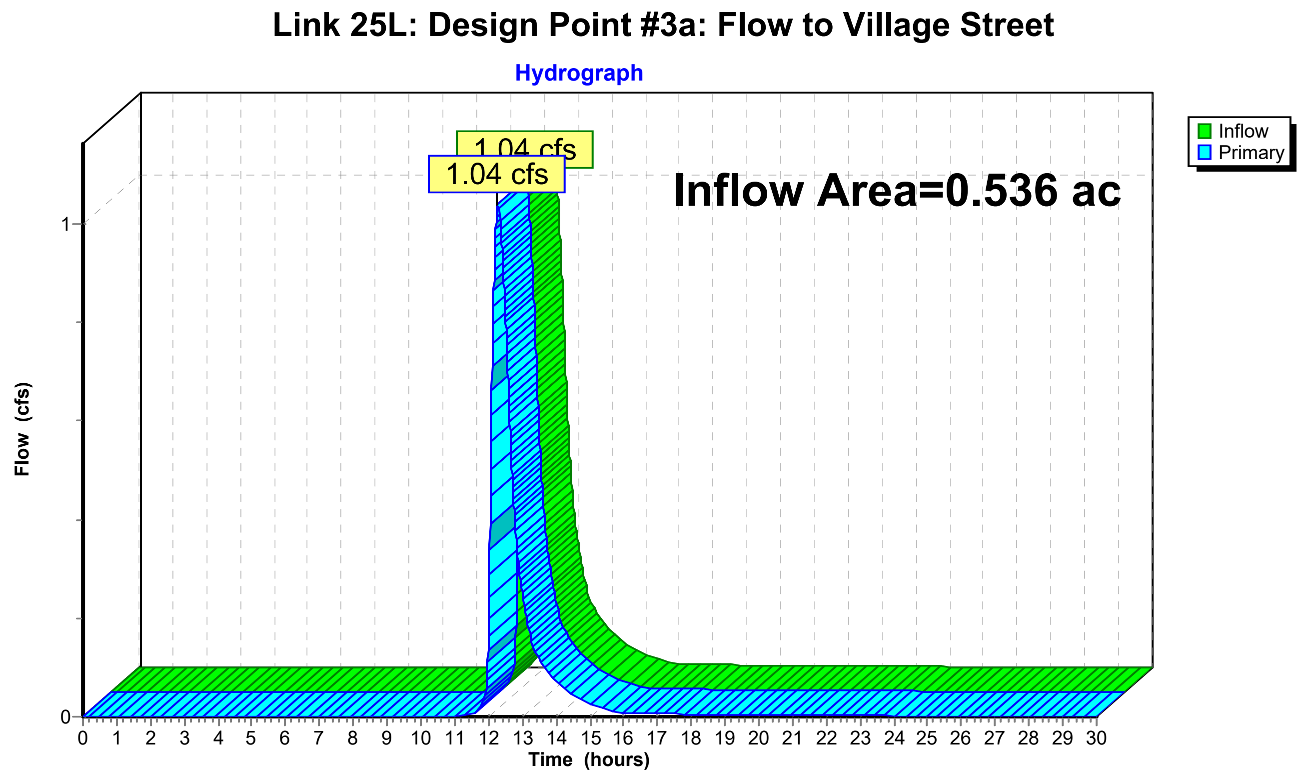
Subcatchment 24S: P3b



Summary for Link 25L: Design Point #3a: Flow to Village Street

Inflow Area =	0.536 ac, 62.45% Impervious,	Inflow Depth = 1.64"	for 25-YR event	
Inflow =	1.04 cfs @ 12.28 hrs,	Volume=	0.073 af	
Primary =	1.04 cfs @ 12.28 hrs,	Volume=	0.073 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8P: P3a Runoff Area=15,941 sf 66.78% Impervious Runoff Depth=4.61"
Flow Length=292' Tc=10.0 min CN=87 Runoff=1.68 cfs 0.141 af

Pond 9P: Trench Drain Peak Elev=182.88' Inflow=1.68 cfs 0.141 af
10.0" Round Culvert n=0.011 L=48.0' S=0.0062 '/' Outflow=1.68 cfs 0.141 af

Pond 10P: Deep Sump DMH Peak Elev=182.71' Inflow=1.68 cfs 0.141 af
10.0" Round Culvert n=0.011 L=3.0' S=0.0000 '/' Outflow=1.68 cfs 0.141 af

Subcatchment 11P: P3d Runoff Area=3,706 sf 100.00% Impervious Runoff Depth=5.86"
Tc=2.0 min CN=98 Runoff=0.59 cfs 0.042 af

Pond 12P: Infiltration Field Peak Elev=182.96' Storage=1,826 cf Inflow=1.96 cfs 0.182 af
Discarded=0.10 cfs 0.106 af Primary=1.15 cfs 0.076 af Outflow=1.25 cfs 0.182 af

Subcatchment 24S: P3b Runoff Area=3,722 sf 6.56% Impervious Runoff Depth=2.07"
Flow Length=90' Slope=0.0670 '/' Tc=5.6 min CN=61 Runoff=0.20 cfs 0.015 af

Link 25L: Design Point #3a: Flow to Village Street Inflow=1.25 cfs 0.091 af
Primary=1.25 cfs 0.091 af

Total Runoff Area = 0.536 ac Runoff Volume = 0.197 af Average Runoff Depth = 4.41"
37.55% Pervious = 0.201 ac 62.45% Impervious = 0.335 ac

Summary for Subcatchment 8P: P3a

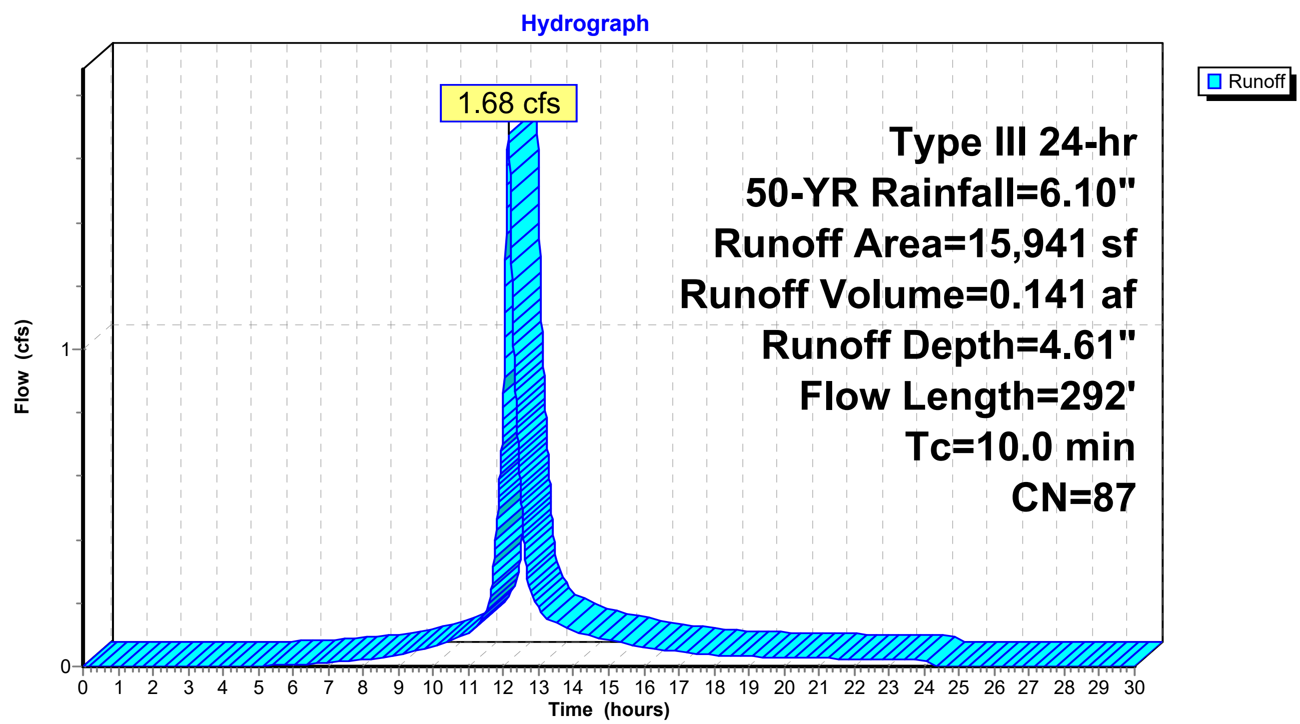
Runoff = 1.68 cfs @ 12.14 hrs, Volume= 0.141 af, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

	Area (sf)	CN	Description
	10,645	98	Paved parking, HSG B
*	476	90	Gravel
	4,820	61	>75% Grass cover, Good, HSG B
	15,941	87	Weighted Average
	5,296		33.22% Pervious Area
	10,645		66.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	40	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.2	9	0.0120	0.69		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.4	243	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.0	292	Total			

Subcatchment 8P: P3a



Summary for Pond 9P: Trench Drain

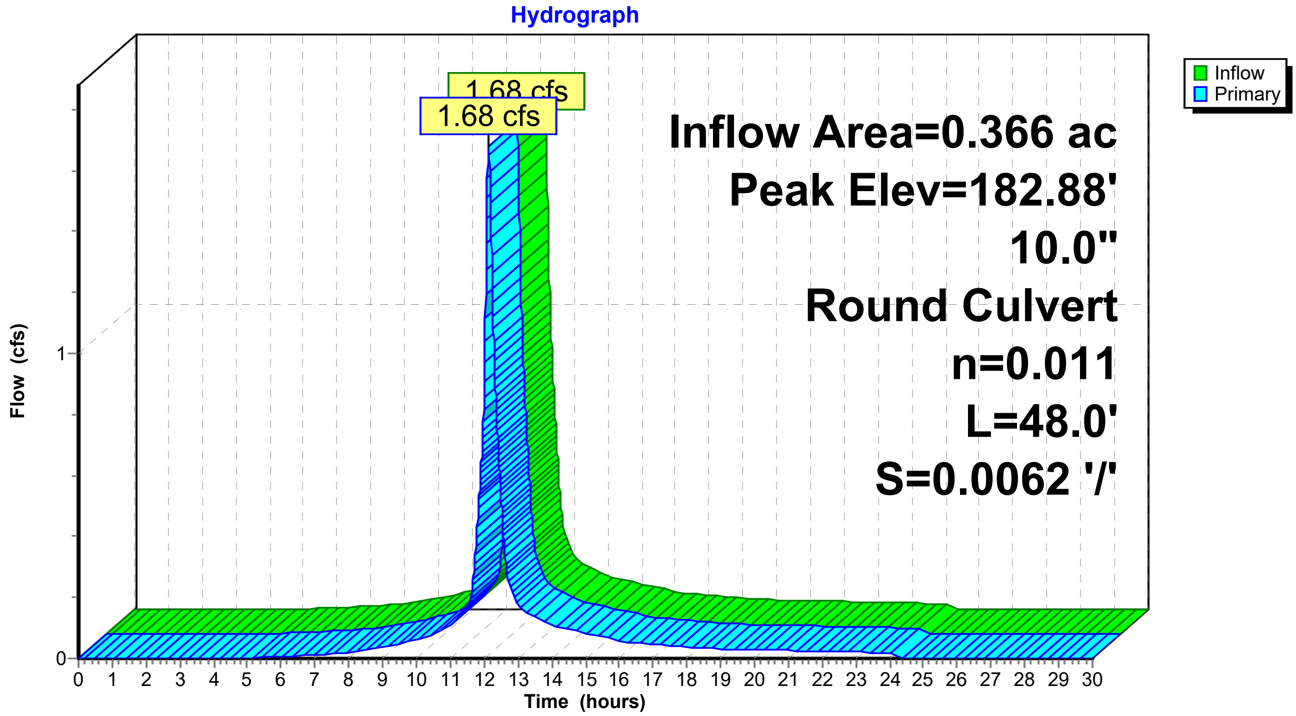
Inflow Area = 0.366 ac, 66.78% Impervious, Inflow Depth = 4.61" for 50-YR event
Inflow = 1.68 cfs @ 12.14 hrs, Volume= 0.141 af
Outflow = 1.68 cfs @ 12.14 hrs, Volume= 0.141 af, Atten= 0%, Lag= 0.0 min
Primary = 1.68 cfs @ 12.14 hrs, Volume= 0.141 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.88' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**10.0" Round Culvert** L= 48.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 182.00' / 181.70' S= 0.0062 '/' Cc= 0.900 n= 0.011, Flow Area= 0.55 sf

Primary OutFlow Max=1.68 cfs @ 12.14 hrs HW=182.88' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.68 cfs @ 3.62 fps)

Pond 9P: Trench Drain



Summary for Pond 10P: Deep Sump DMH

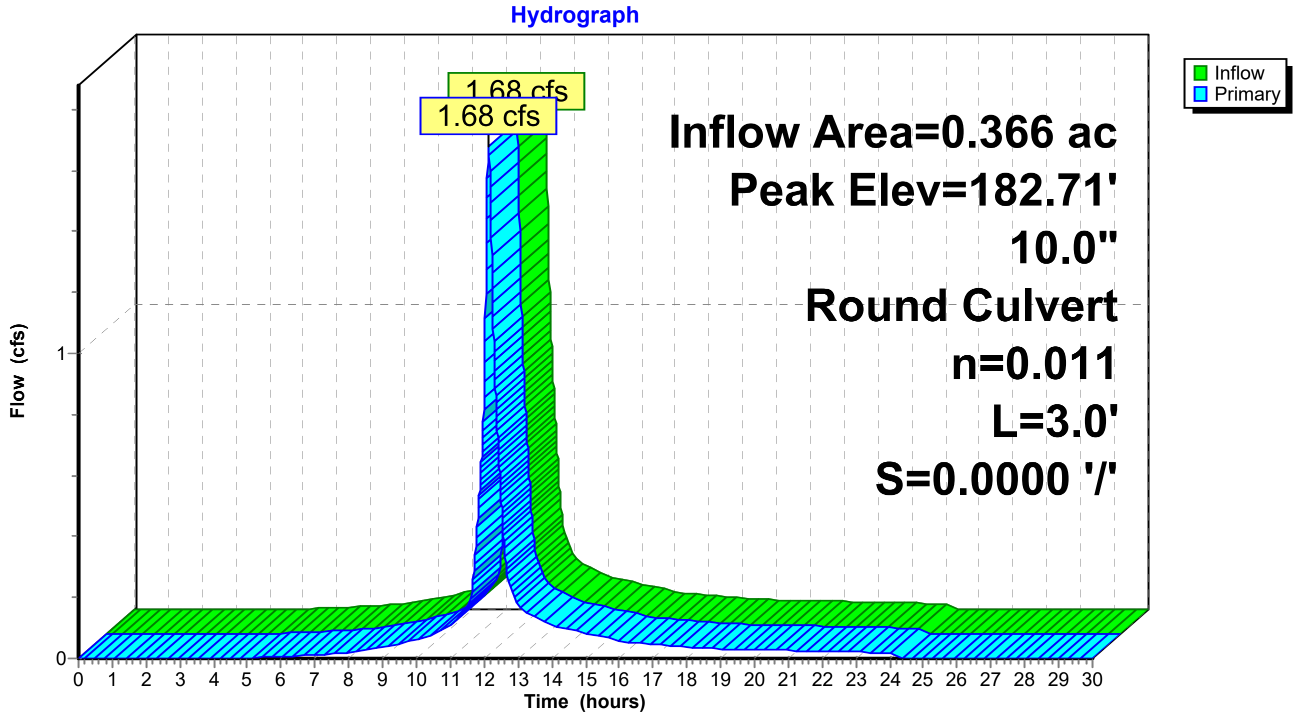
Inflow Area =	0.366 ac, 66.78% Impervious, Inflow Depth = 4.61" for 50-YR event			
Inflow =	1.68 cfs @	12.14 hrs, Volume=	0.141 af	
Outflow =	1.68 cfs @	12.14 hrs, Volume=	0.141 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.68 cfs @	12.14 hrs, Volume=	0.141 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.71' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	181.70'	**10.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 181.70' / 181.70' S= 0.0000 '/' Cc= 0.900 n= 0.011, Flow Area= 0.55 sf

Primary OutFlow Max=1.68 cfs @ 12.14 hrs HW=182.71' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.68 cfs @ 3.22 fps)

Pond 10P: Deep Sump DMH



Summary for Subcatchment 11P: P3d

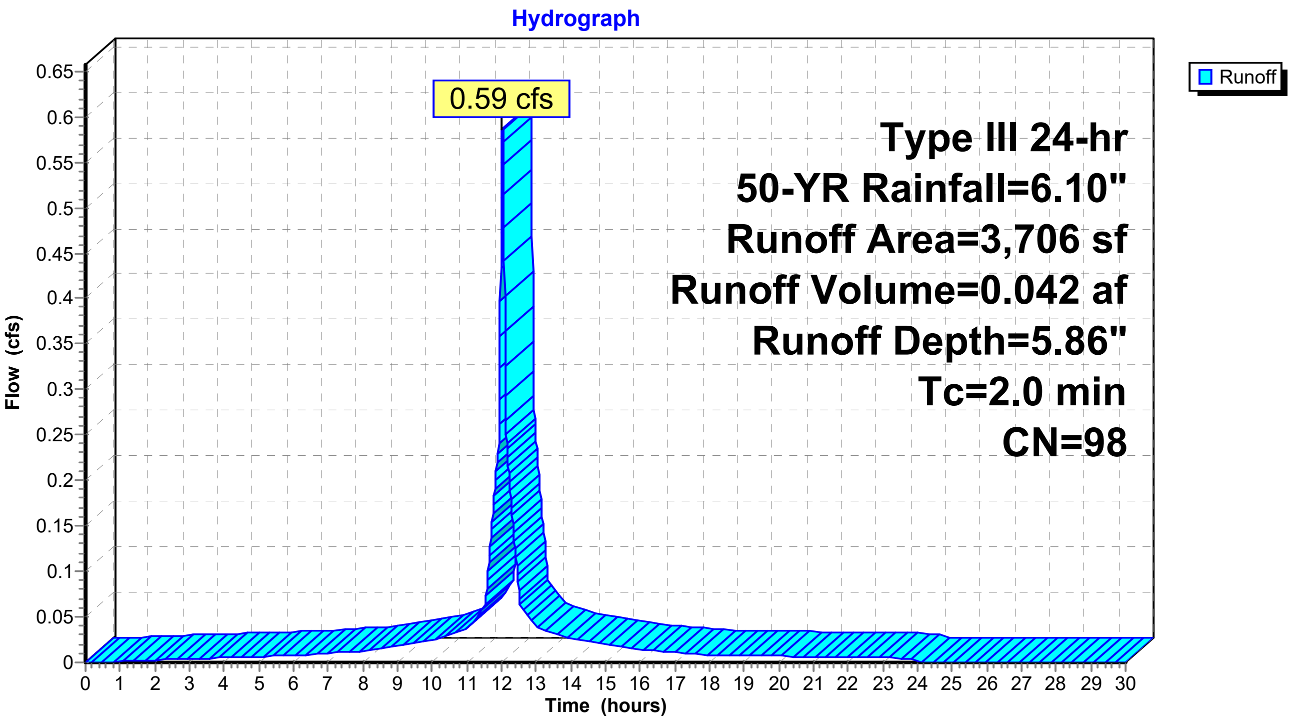
Runoff = 0.59 cfs @ 12.03 hrs, Volume= 0.042 af, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
3,706	98	Roofs, HSG B
3,706		100.00% Impervious Area

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

Subcatchment 11P: P3d



Summary for Pond 12P: Infiltration Field

Inflow Area =	0.451 ac,	73.04% Impervious,	Inflow Depth = 4.85"	for 50-YR event
Inflow =	1.96 cfs @	12.12 hrs, Volume=	0.182 af	
Outflow =	1.25 cfs @	12.27 hrs, Volume=	0.182 af,	Atten= 36%, Lag= 9.5 min
Discarded =	0.10 cfs @	10.36 hrs, Volume=	0.106 af	
Primary =	1.15 cfs @	12.27 hrs, Volume=	0.076 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.96' @ 12.27 hrs Surf.Area= 1,800 sf Storage= 1,826 cf

Plug-Flow detention time= 43.5 min calculated for 0.182 af (100% of inflow)
Center-of-Mass det. time= 43.5 min (828.4 - 784.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.20'	1,096 cf	**55.00'W x 32.50'L x 2.04'H Field A**
			3,649 cf Overall - 908 cf Embedded = 2,741 cf x 40.0% Voids
#2A	181.70'	908 cf	**Cultec C-100HD** x 64 Inside #1
			Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
			Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
			Row Length Adjustment= +0.50' x 1.86 sf x 16 rows
#3	181.20'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		2,043 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.20'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	181.88'	**8.0" Round Culvert**
			L= 25.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 181.88' / 181.00' S= 0.0352 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.35 sf

Discarded OutFlow Max=0.10 cfs @ 10.36 hrs HW=181.23' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=1.15 cfs @ 12.27 hrs HW=182.96' (Free Discharge)
└─**2=Culvert** (Inlet Controls 1.15 cfs @ 3.29 fps)

Pond 12P: Infiltration Field - Chamber Wizard Field A

Chamber Model = Cultec C-100HD (Cultec Contactor® 100HD)
Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
Row Length Adjustment= +0.50' x 1.86 sf x 16 rows

36.0" Wide + 4.0" Spacing = 40.0" C-C Row Spacing

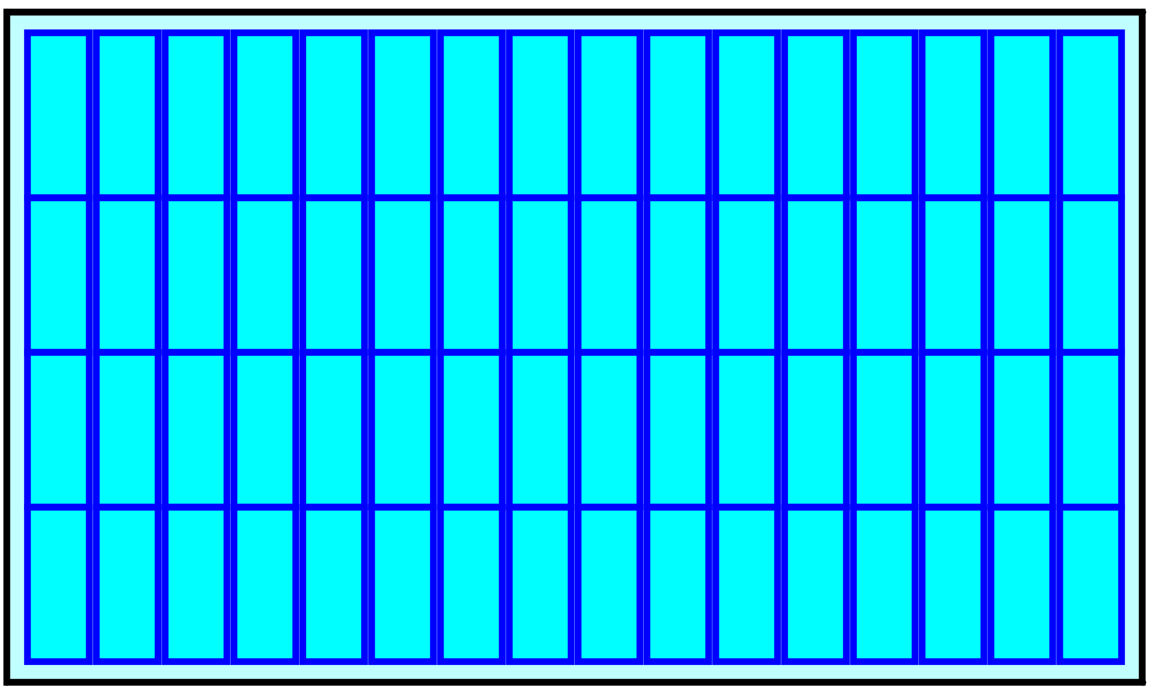
4 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 30.50' Row Length +12.0" End Stone x 2 = 32.50' Base Length
16 Rows x 36.0" Wide + 4.0" Spacing x 15 + 12.0" Side Stone x 2 = 55.00' Base Width
6.0" Base + 12.5" Chamber Height + 6.0" Cover = 2.04' Field Height

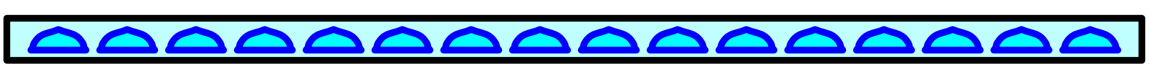
64 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 16 Rows = 908.4 cf Chamber Storage

3,649.5 cf Field - 908.4 cf Chambers = 2,741.1 cf Stone x 40.0% Voids = 1,096.4 cf Stone Storage

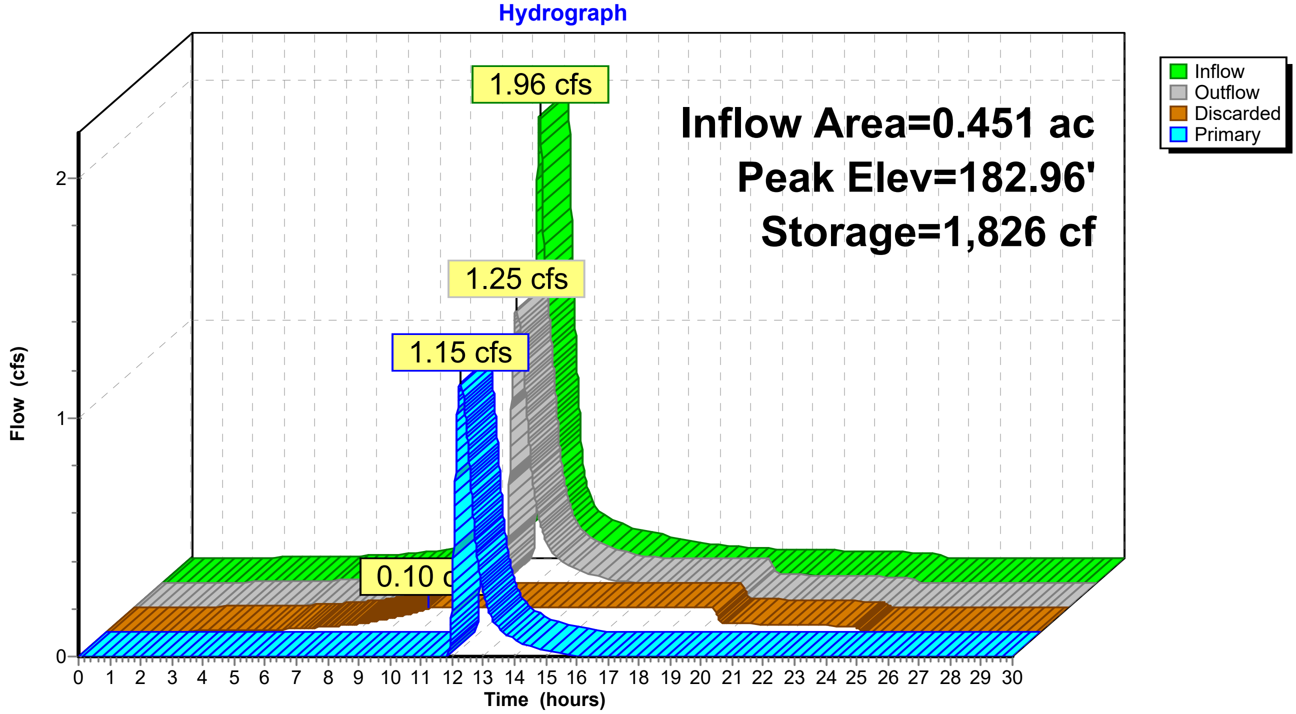
Chamber Storage + Stone Storage = 2,004.8 cf = 0.046 af
Overall Storage Efficiency = 54.9%
Overall System Size = 32.50' x 55.00' x 2.04'

64 Chambers
135.2 cy Field
101.5 cy Stone





Pond 12P: Infiltration Field



Summary for Subcatchment 24S: P3b

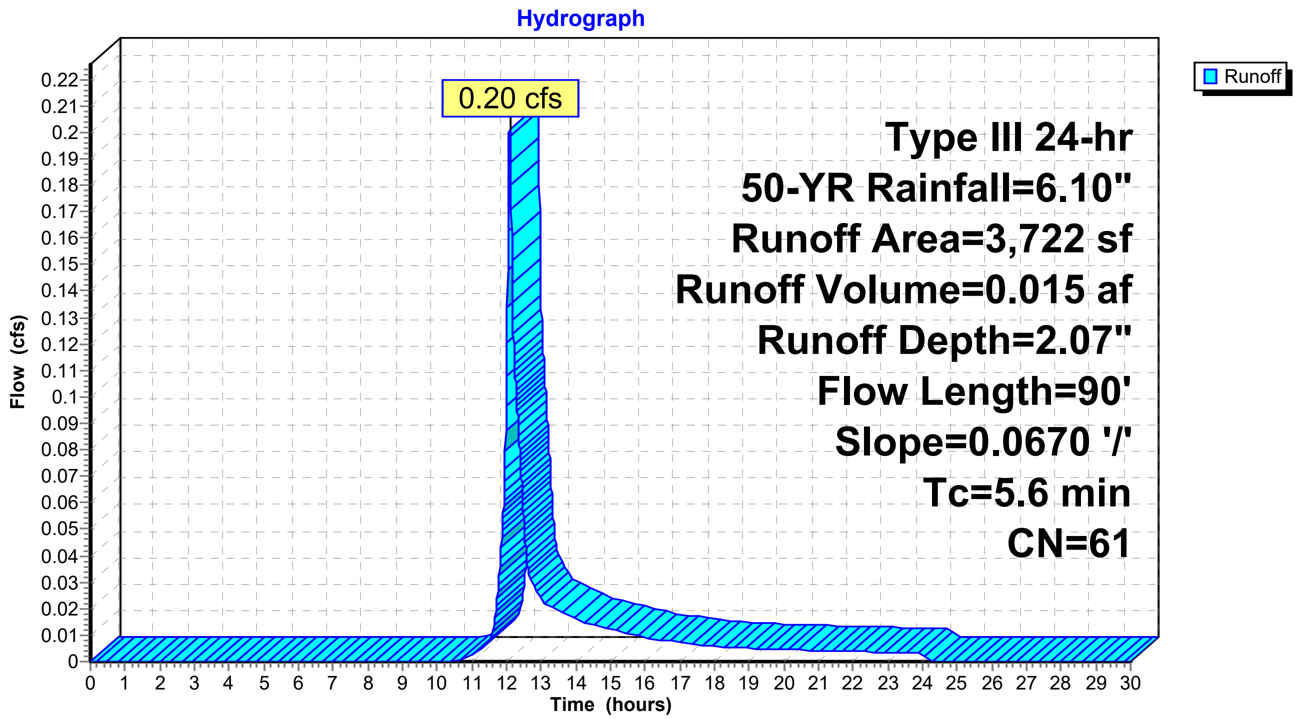
Runoff = 0.20 cfs @ 12.09 hrs, Volume= 0.015 af, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
244	98	Paved parking, HSG B
3,143	61	>75% Grass cover, Good, HSG B
335	30	Woods, Good, HSG A
3,722	61	Weighted Average
3,478		93.44% Pervious Area
244		6.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	90	0.0670	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"

Subcatchment 24S: P3b

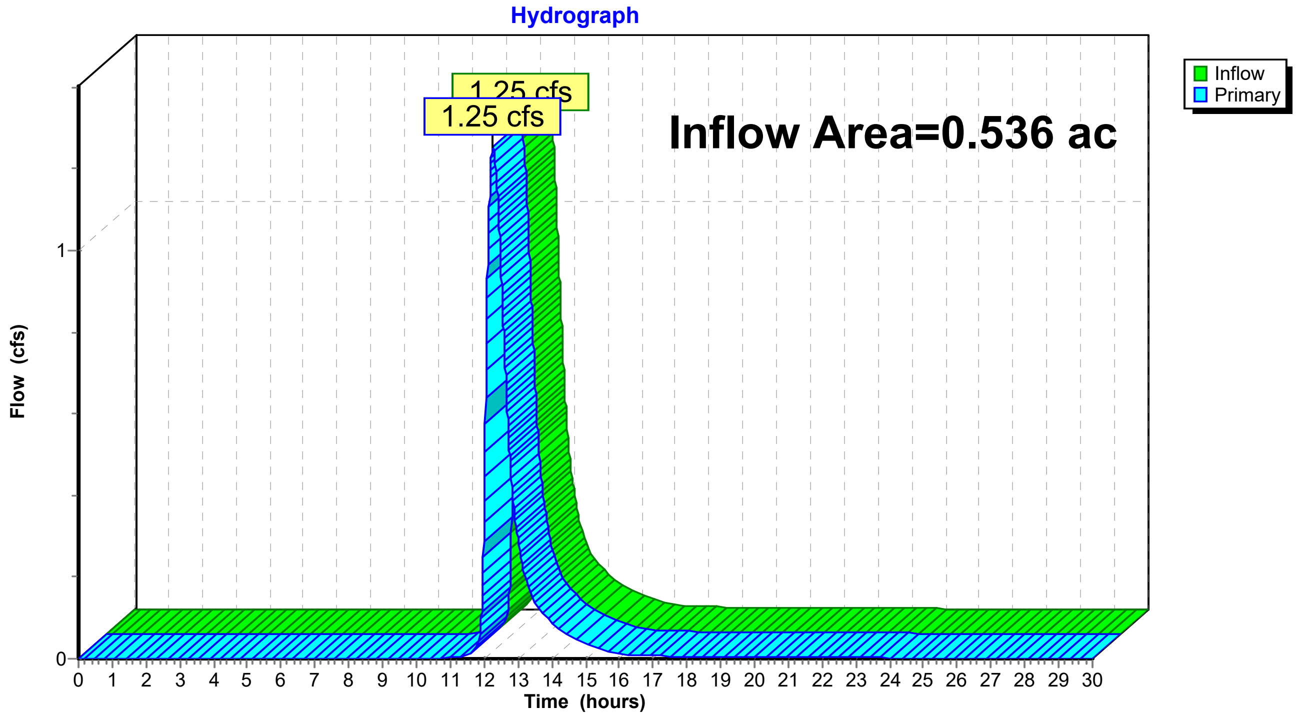


Summary for Link 25L: Design Point #3a: Flow to Village Street

Inflow Area =	0.536 ac, 62.45% Impervious,	Inflow Depth = 2.04"	for 50-YR event
Inflow =	1.25 cfs @ 12.26 hrs,	Volume=	0.091 af
Primary =	1.25 cfs @ 12.26 hrs,	Volume=	0.091 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 25L: Design Point #3a: Flow to Village Street



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8P: P3a Runoff Area=15,941 sf 66.78% Impervious Runoff Depth=5.19"
Flow Length=292' Tc=10.0 min CN=87 Runoff=1.88 cfs 0.158 af

Pond 9P: Trench Drain Peak Elev=182.98' Inflow=1.88 cfs 0.158 af
10.0" Round Culvert n=0.011 L=48.0' S=0.0062 '/' Outflow=1.88 cfs 0.158 af

Pond 10P: Deep Sump DMH Peak Elev=182.83' Inflow=1.88 cfs 0.158 af
10.0" Round Culvert n=0.011 L=3.0' S=0.0000 '/' Outflow=1.88 cfs 0.158 af

Subcatchment 11P: P3d Runoff Area=3,706 sf 100.00% Impervious Runoff Depth=6.46"
Tc=2.0 min CN=98 Runoff=0.64 cfs 0.046 af

Pond 12P: Infiltration Field Peak Elev=183.19' Storage=1,995 cf Inflow=2.18 cfs 0.204 af
Discarded=0.10 cfs 0.112 af Primary=1.31 cfs 0.092 af Outflow=1.41 cfs 0.204 af

Subcatchment 24S: P3b Runoff Area=3,722 sf 6.56% Impervious Runoff Depth=2.49"
Flow Length=90' Slope=0.0670 '/' Tc=5.6 min CN=61 Runoff=0.25 cfs 0.018 af

Link 25L: Design Point #3a: Flow to Village Street Inflow=1.44 cfs 0.110 af
Primary=1.44 cfs 0.110 af

Total Runoff Area = 0.536 ac Runoff Volume = 0.222 af Average Runoff Depth = 4.96"
37.55% Pervious = 0.201 ac 62.45% Impervious = 0.335 ac

Summary for Subcatchment 8P: P3a

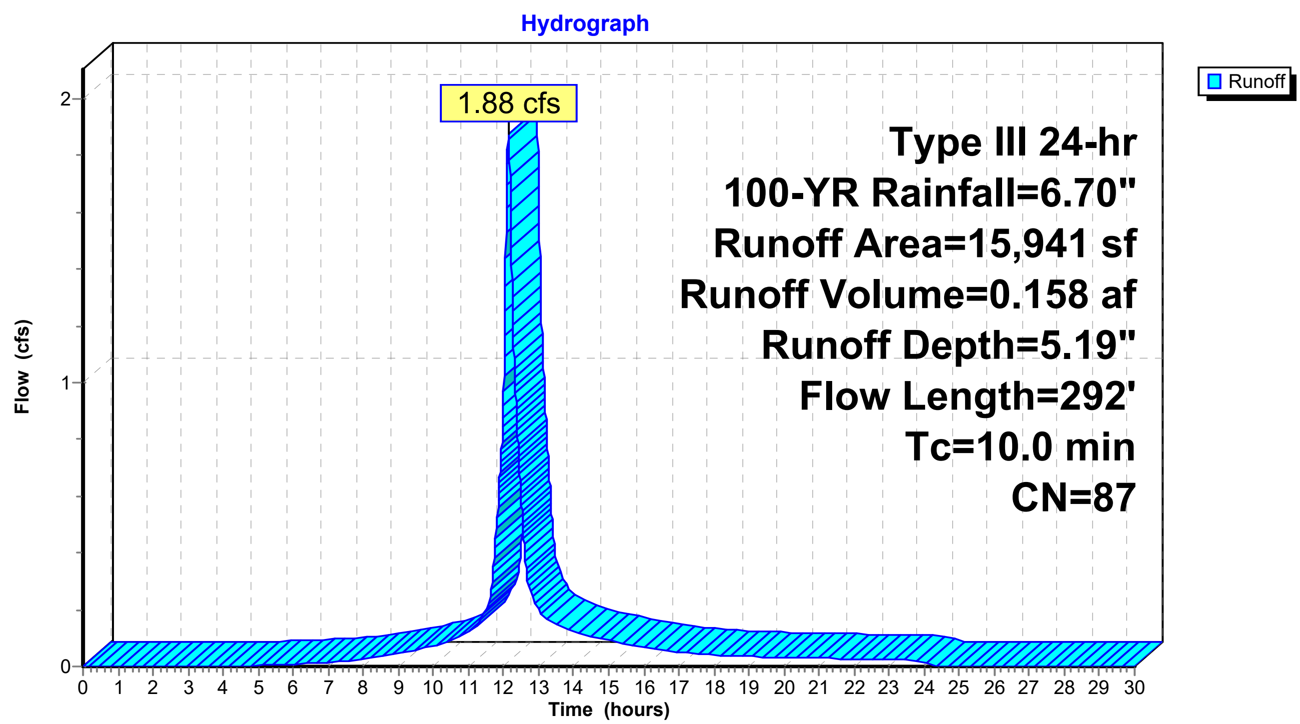
Runoff = 1.88 cfs @ 12.14 hrs, Volume= 0.158 af, Depth= 5.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

	Area (sf)	CN	Description
	10,645	98	Paved parking, HSG B
*	476	90	Gravel
	4,820	61	>75% Grass cover, Good, HSG B
	15,941	87	Weighted Average
	5,296		33.22% Pervious Area
	10,645		66.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	40	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.2	9	0.0120	0.69		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.4	243	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.0	292	Total			

Subcatchment 8P: P3a



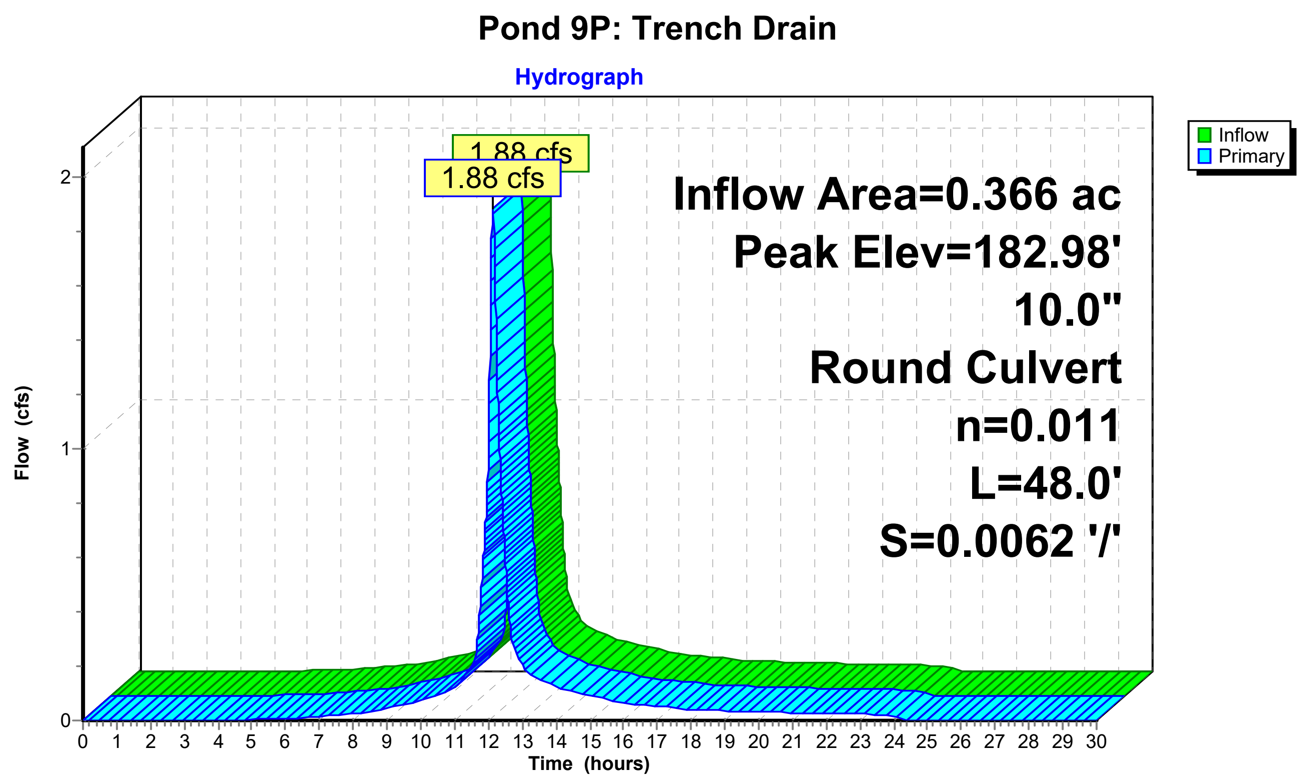
Summary for Pond 9P: Trench Drain

Inflow Area =	0.366 ac, 66.78% Impervious,	Inflow Depth = 5.19"	for 100-YR event	
Inflow =	1.88 cfs @	12.14 hrs, Volume=	0.158 af	
Outflow =	1.88 cfs @	12.14 hrs, Volume=	0.158 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.88 cfs @	12.14 hrs, Volume=	0.158 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.98' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	**10.0" Round Culvert** L= 48.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 182.00' / 181.70' S= 0.0062 '/' Cc= 0.900 n= 0.011, Flow Area= 0.55 sf

Primary OutFlow Max=1.88 cfs @ 12.14 hrs HW=182.98' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.88 cfs @ 3.69 fps)



Summary for Pond 10P: Deep Sump DMH

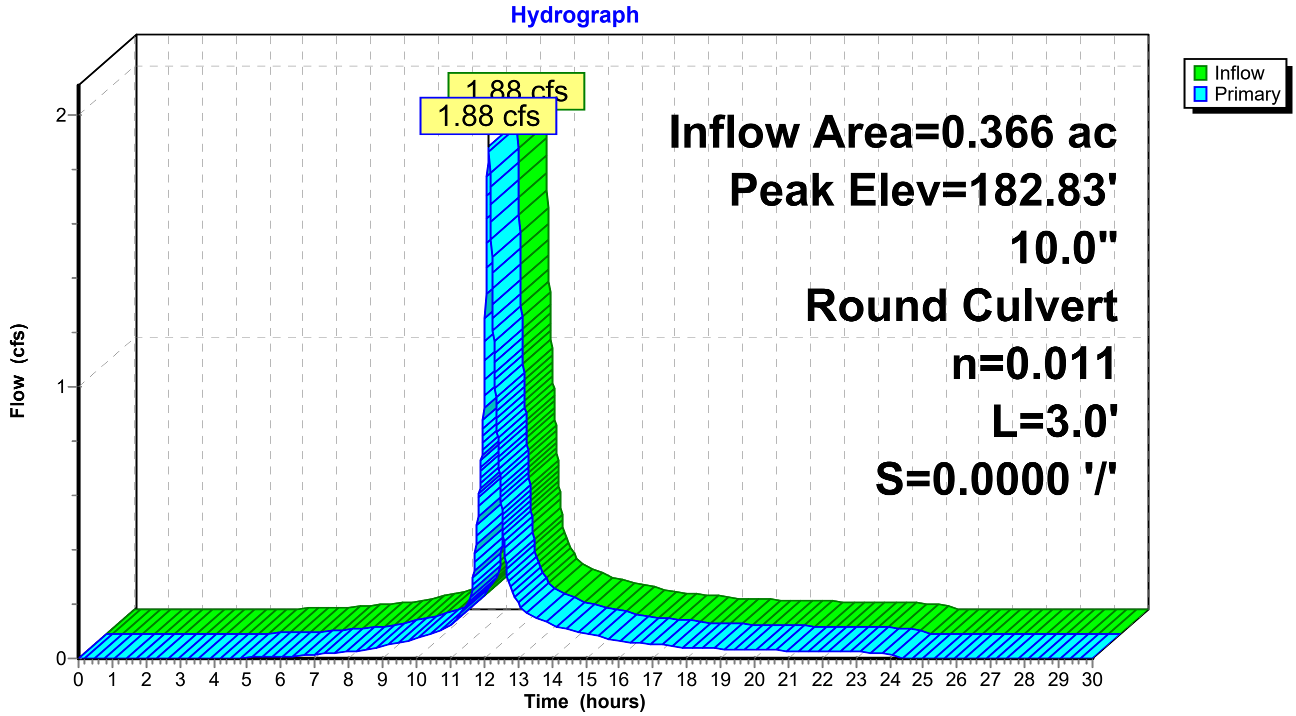
Inflow Area =	0.366 ac, 66.78% Impervious, Inflow Depth = 5.19" for 100-YR event			
Inflow =	1.88 cfs @	12.14 hrs, Volume=	0.158 af	
Outflow =	1.88 cfs @	12.14 hrs, Volume=	0.158 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.88 cfs @	12.14 hrs, Volume=	0.158 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 182.83' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	181.70'	**10.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 181.70' / 181.70' S= 0.0000 '/' Cc= 0.900 n= 0.011, Flow Area= 0.55 sf

Primary OutFlow Max=1.88 cfs @ 12.14 hrs HW=182.83' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.88 cfs @ 3.45 fps)

Pond 10P: Deep Sump DMH



Summary for Subcatchment 11P: P3d

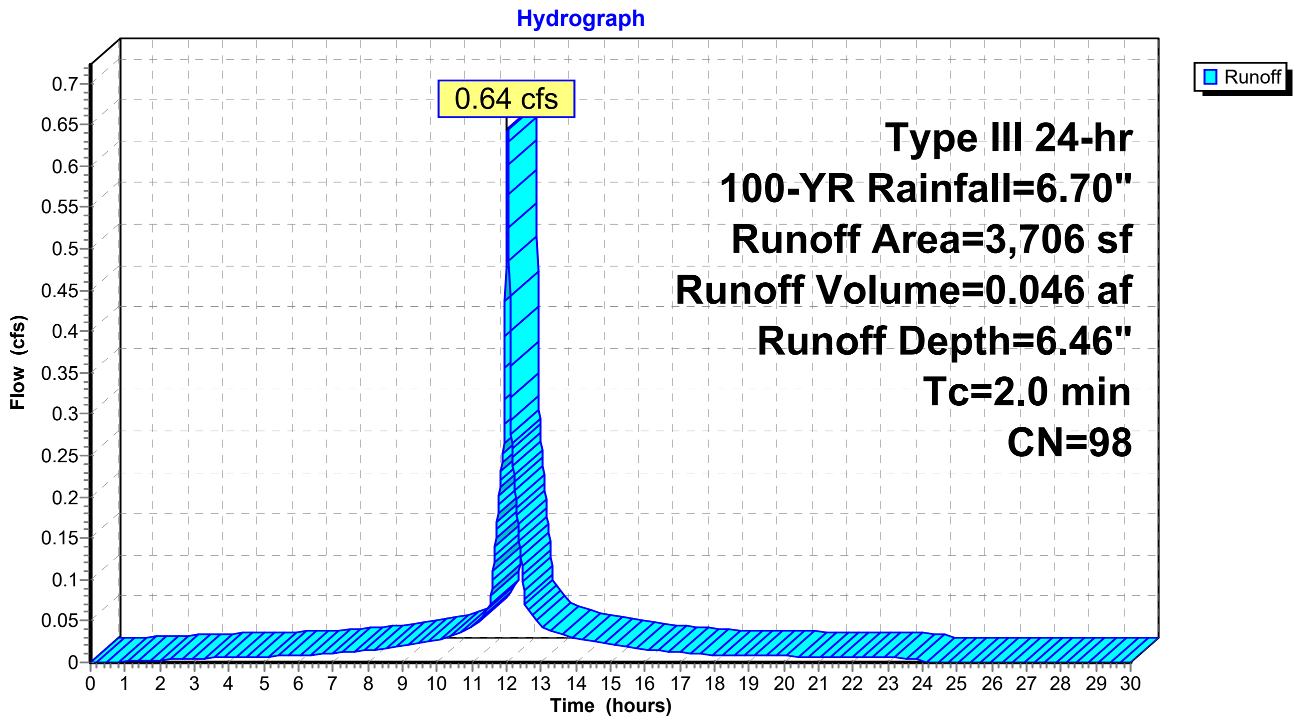
Runoff = 0.64 cfs @ 12.03 hrs, Volume= 0.046 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
3,706	98	Roofs, HSG B
3,706		100.00% Impervious Area

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

Subcatchment 11P: P3d



Summary for Pond 12P: Infiltration Field

Inflow Area =	0.451 ac,	73.04% Impervious,	Inflow Depth = 5.43"	for 100-YR event
Inflow =	2.18 cfs @	12.12 hrs, Volume=	0.204 af	
Outflow =	1.41 cfs @	12.27 hrs, Volume=	0.204 af,	Atten= 35%, Lag= 9.2 min
Discarded =	0.10 cfs @	10.09 hrs, Volume=	0.112 af	
Primary =	1.31 cfs @	12.27 hrs, Volume=	0.092 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 183.19' @ 12.27 hrs Surf.Area= 1,800 sf Storage= 1,995 cf

Plug-Flow detention time= 42.7 min calculated for 0.204 af (100% of inflow)
Center-of-Mass det. time= 42.7 min (825.0 - 782.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.20'	1,096 cf	**55.00'W x 32.50'L x 2.04'H Field A**
			3,649 cf Overall - 908 cf Embedded = 2,741 cf x 40.0% Voids
#2A	181.70'	908 cf	**Cultec C-100HD** x 64 Inside #1
			Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
			Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
			Row Length Adjustment= +0.50' x 1.86 sf x 16 rows
#3	181.20'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		2,043 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.20'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	181.88'	**8.0" Round Culvert**
			L= 25.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 181.88' / 181.00' S= 0.0352 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.35 sf

Discarded OutFlow Max=0.10 cfs @ 10.09 hrs HW=181.23' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=1.31 cfs @ 12.27 hrs HW=183.19' (Free Discharge)
└─**2=Culvert** (Inlet Controls 1.31 cfs @ 3.76 fps)

Pond 12P: Infiltration Field - Chamber Wizard Field A

Chamber Model = Cultec C-100HD (Cultec Contactor® 100HD)
Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
Row Length Adjustment= +0.50' x 1.86 sf x 16 rows

36.0" Wide + 4.0" Spacing = 40.0" C-C Row Spacing

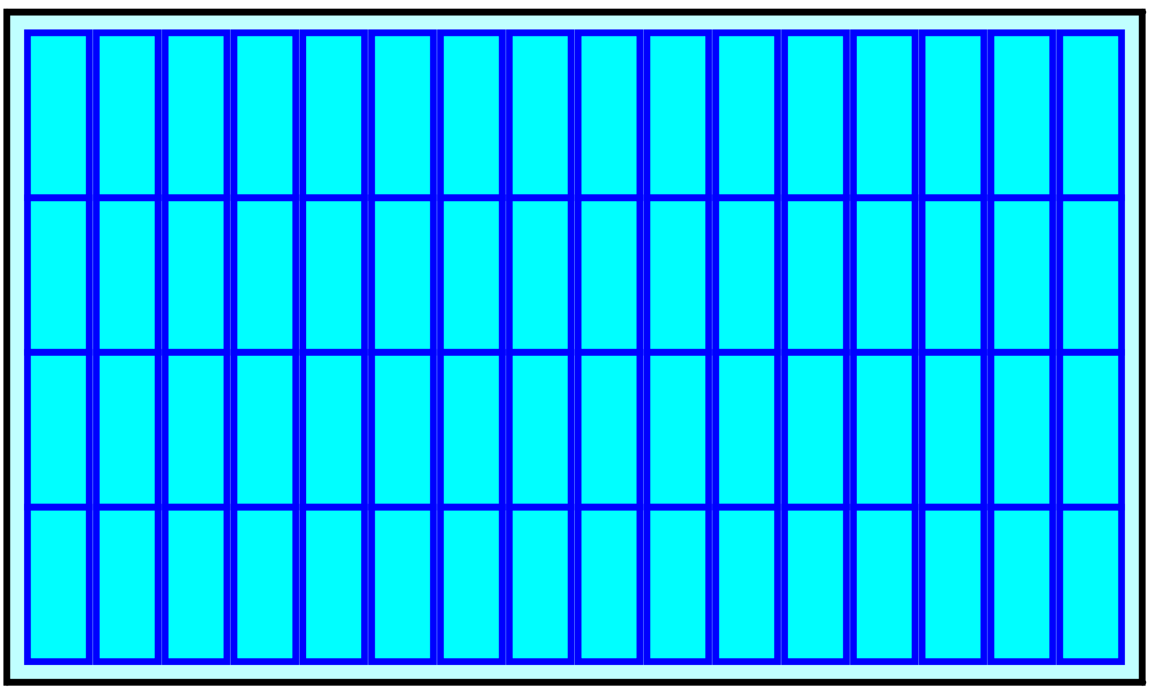
4 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 30.50' Row Length +12.0" End Stone x 2 = 32.50' Base Length
16 Rows x 36.0" Wide + 4.0" Spacing x 15 + 12.0" Side Stone x 2 = 55.00' Base Width
6.0" Base + 12.5" Chamber Height + 6.0" Cover = 2.04' Field Height

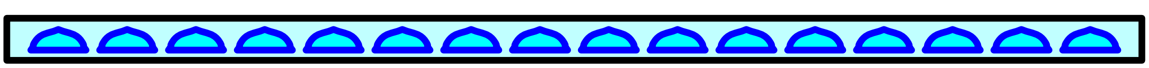
64 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 16 Rows = 908.4 cf Chamber Storage

3,649.5 cf Field - 908.4 cf Chambers = 2,741.1 cf Stone x 40.0% Voids = 1,096.4 cf Stone Storage

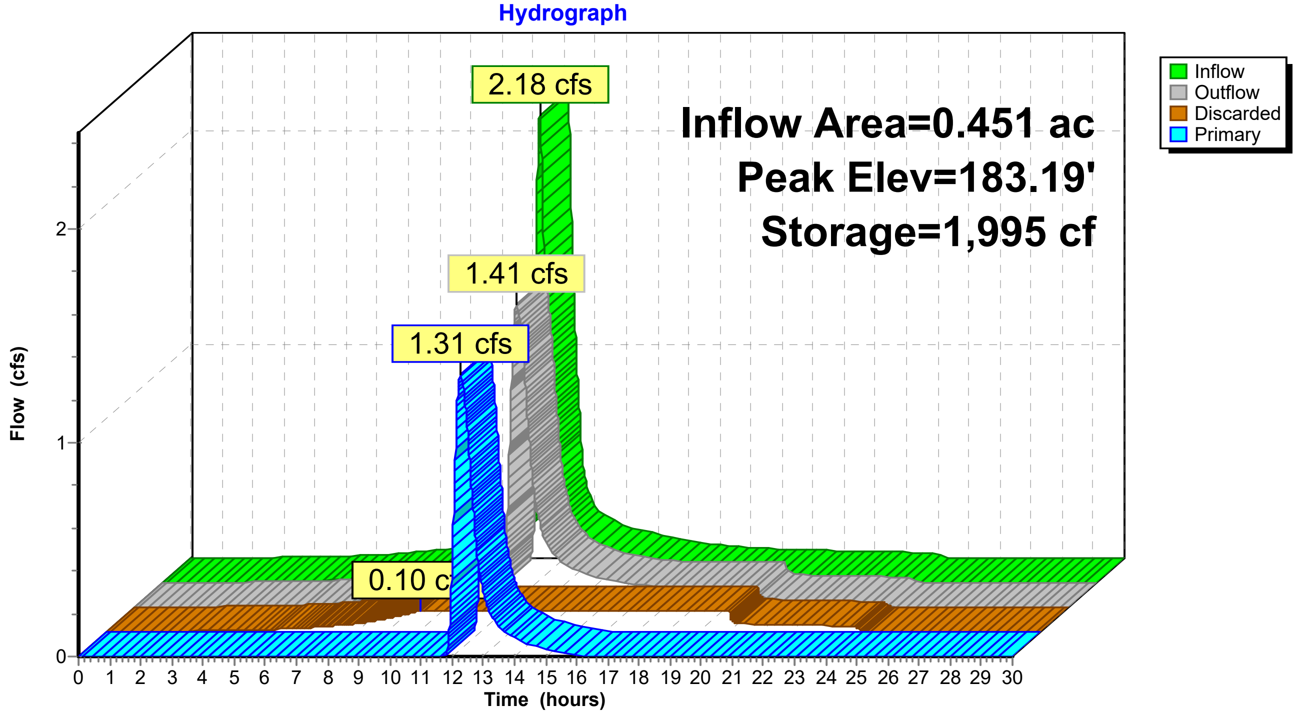
Chamber Storage + Stone Storage = 2,004.8 cf = 0.046 af
Overall Storage Efficiency = 54.9%
Overall System Size = 32.50' x 55.00' x 2.04'

64 Chambers
135.2 cy Field
101.5 cy Stone





Pond 12P: Infiltration Field



Summary for Subcatchment 24S: P3b

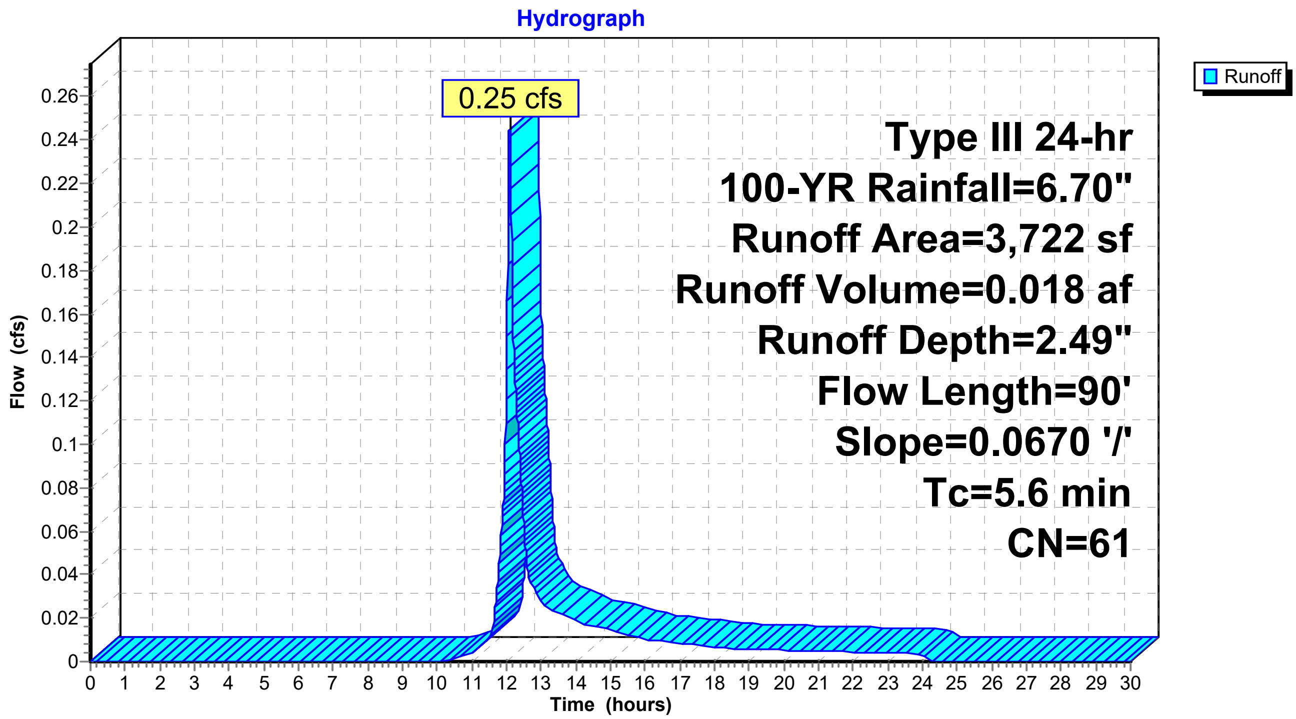
Runoff = 0.25 cfs @ 12.09 hrs, Volume= 0.018 af, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
244	98	Paved parking, HSG B
3,143	61	>75% Grass cover, Good, HSG B
335	30	Woods, Good, HSG A
3,722	61	Weighted Average
3,478		93.44% Pervious Area
244		6.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	90	0.0670	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"

Subcatchment 24S: P3b

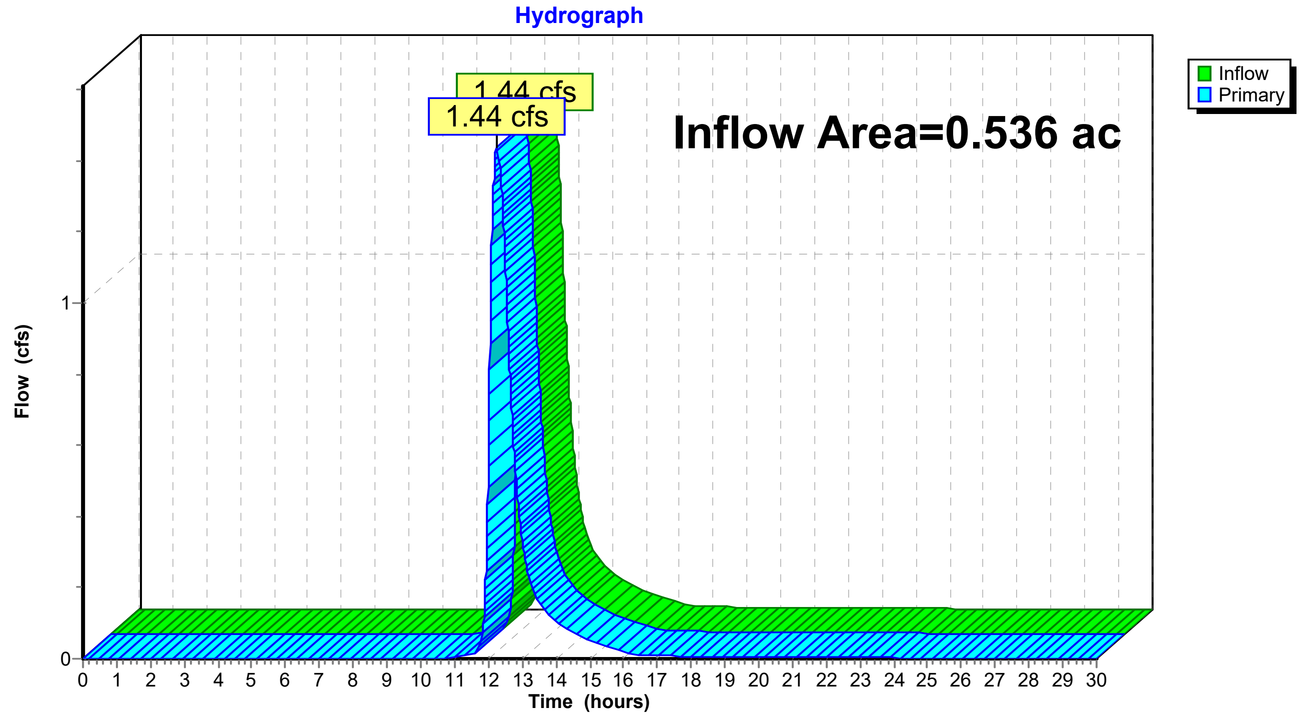


Summary for Link 25L: Design Point #3a: Flow to Village Street

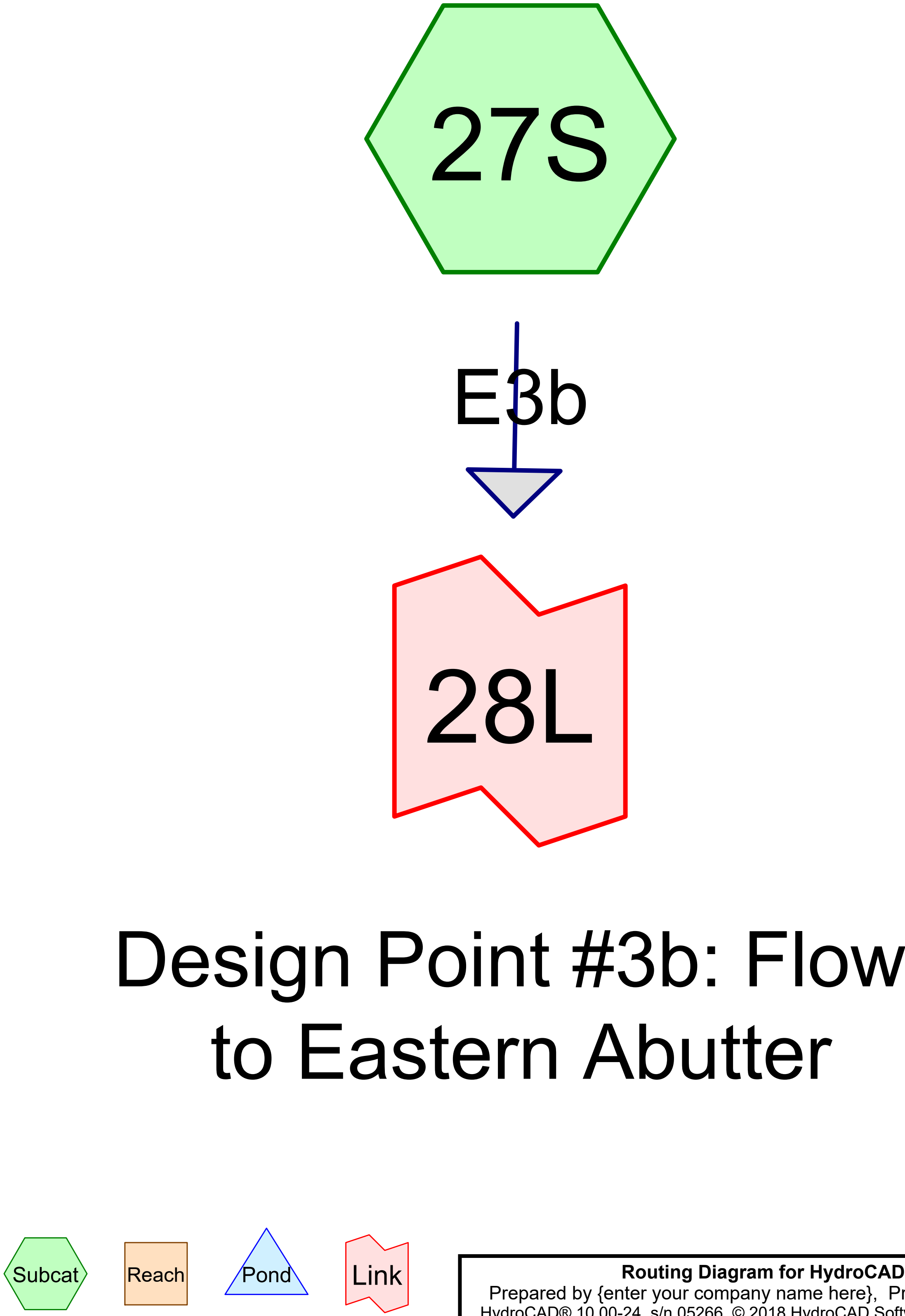
Inflow Area =	0.536 ac, 62.45% Impervious,	Inflow Depth = 2.46"	for 100-YR event
Inflow =	1.44 cfs @ 12.25 hrs,	Volume=	0.110 af
Primary =	1.44 cfs @ 12.25 hrs,	Volume=	0.110 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 25L: Design Point #3a: Flow to Village Street



DESIGN POINT #3b: FLOW TO EASTERN ABUTTER EXISTING CONDITIONS



Routing Diagram for HydroCAD2
Prepared by {enter your company name here}, Printed 6/29/2019

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.045	61	>75% Grass cover, Good, HSG B (27S)
0.003	90	Gravel, HSG B (27S)
0.064	98	Roofs, HSG B (27S)
0.062	30	Woods, Good, HSG A (27S)
0.047	55	Woods, Good, HSG B (27S)
0.222	**62**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.062	HSG A	27S
0.160	HSG B	27S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.222		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 27S: E3b Runoff Area=9,663 sf 29.03% Impervious Runoff Depth=0.48"
Flow Length=127' Tc=10.0 min CN=62 Runoff=0.07 cfs 0.009 af

Link 28L: Design Point #3b: Flow to Eastern Abutter Inflow=0.07 cfs 0.009 af
Primary=0.07 cfs 0.009 af

Total Runoff Area = 0.222 ac Runoff Volume = 0.009 af Average Runoff Depth = 0.48"
70.97% Pervious = 0.157 ac 29.03% Impervious = 0.064 ac

Summary for Subcatchment 27S: E3b

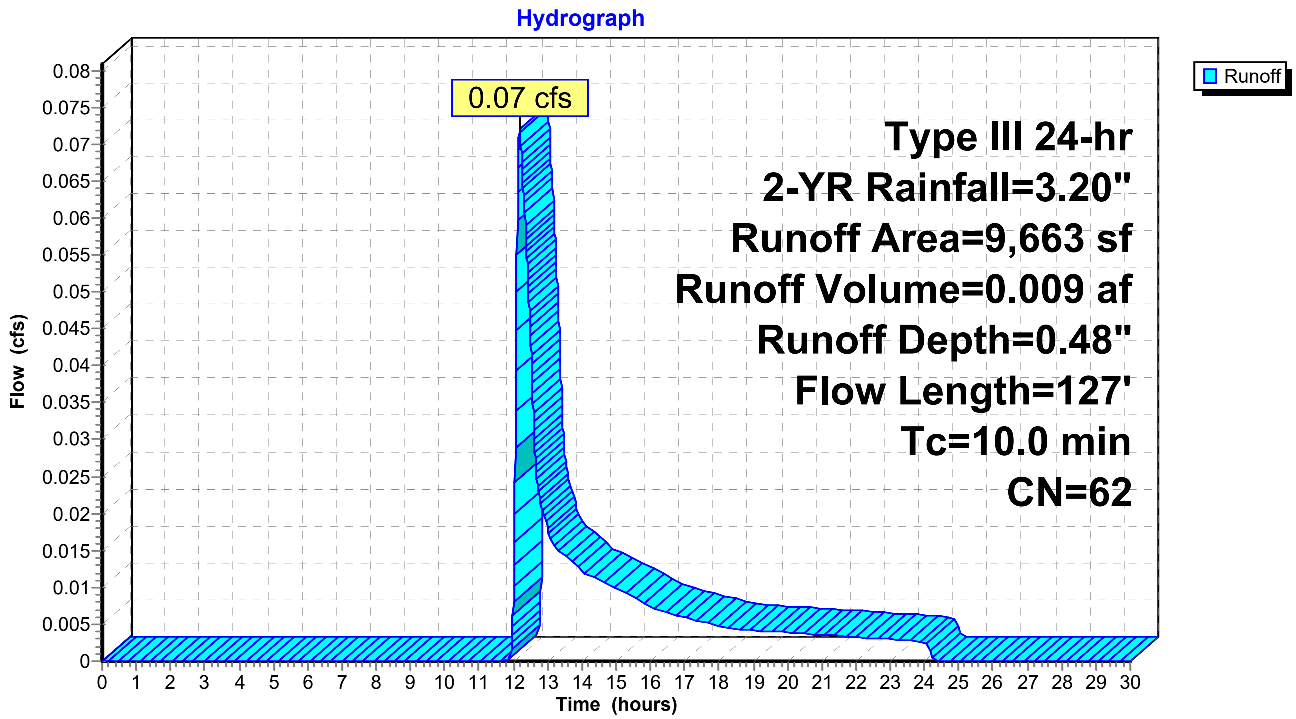
Runoff = 0.07 cfs @ 12.18 hrs, Volume= 0.009 af, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
	2,805	98	Roofs, HSG B
*	151	90	Gravel, HSG B
	1,940	61	>75% Grass cover, Good, HSG B
	2,700	30	Woods, Good, HSG A
	2,067	55	Woods, Good, HSG B
	9,663	62	Weighted Average
	6,858		70.97% Pervious Area
	2,805		29.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.6	85	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.0	127	Total			

Subcatchment 27S: E3b

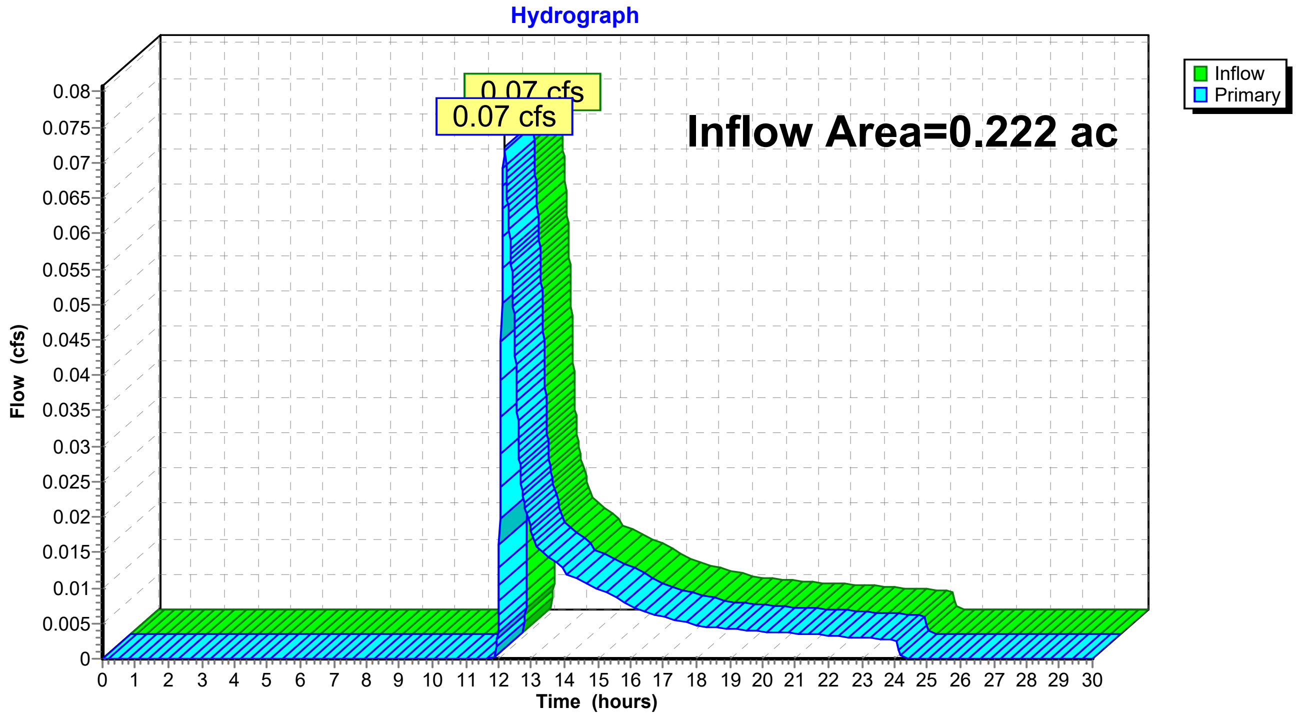


Summary for Link 28L: Design Point #3b: Flow to Eastern Abutter

Inflow Area = 0.222 ac, 29.03% Impervious, Inflow Depth = 0.48" for 2-YR event
Inflow = 0.07 cfs @ 12.18 hrs, Volume= 0.009 af
Primary = 0.07 cfs @ 12.18 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 28L: Design Point #3b: Flow to Eastern Abutter



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 27S: E3b Runoff Area=9,663 sf 29.03% Impervious Runoff Depth=1.26"
Flow Length=127' Tc=10.0 min CN=62 Runoff=0.26 cfs 0.023 af

Link 28L: Design Point #3b: Flow to Eastern Abutter Inflow=0.26 cfs 0.023 af
Primary=0.26 cfs 0.023 af

Total Runoff Area = 0.222 ac Runoff Volume = 0.023 af Average Runoff Depth = 1.26"
70.97% Pervious = 0.157 ac 29.03% Impervious = 0.064 ac

Summary for Subcatchment 27S: E3b

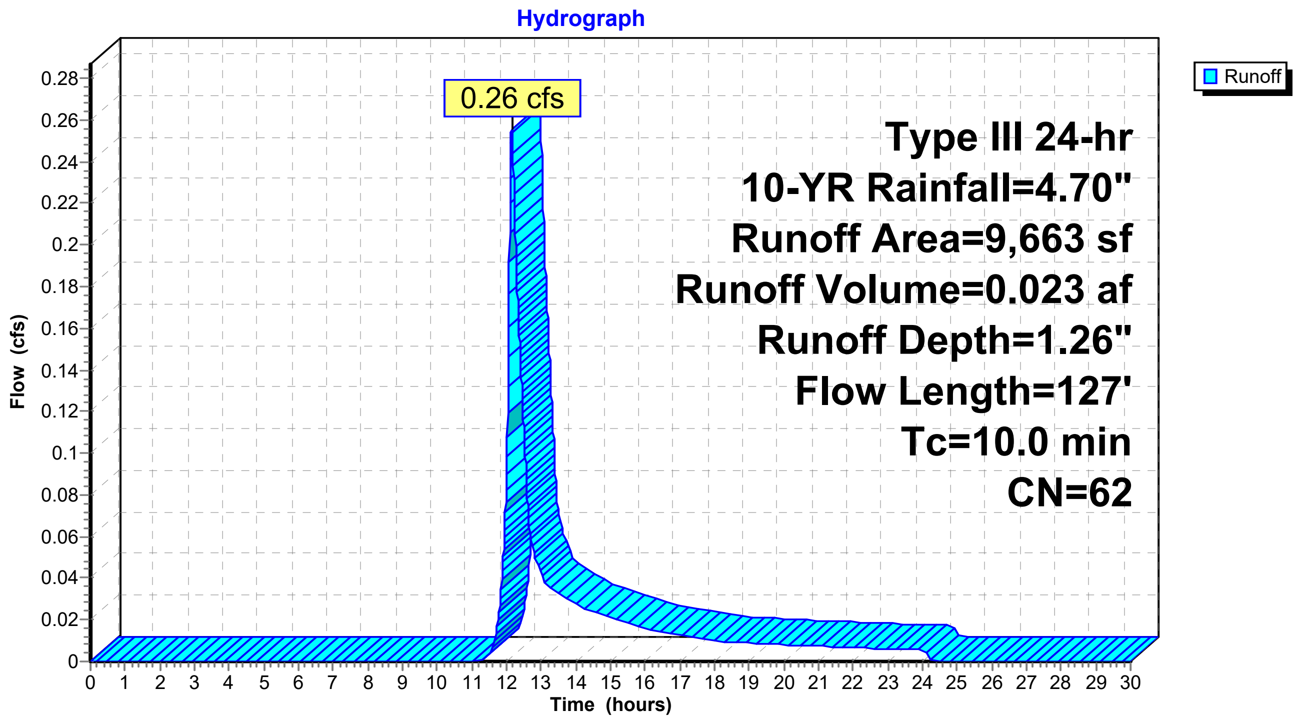
Runoff = 0.26 cfs @ 12.15 hrs, Volume= 0.023 af, Depth= 1.26"

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

	Area (sf)	CN	Description
	2,805	98	Roofs, HSG B
*	151	90	Gravel, HSG B
	1,940	61	>75% Grass cover, Good, HSG B
	2,700	30	Woods, Good, HSG A
	2,067	55	Woods, Good, HSG B
	9,663	62	Weighted Average
	6,858		70.97% Pervious Area
	2,805		29.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.6	85	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.0	127	Total			

Subcatchment 27S: E3b

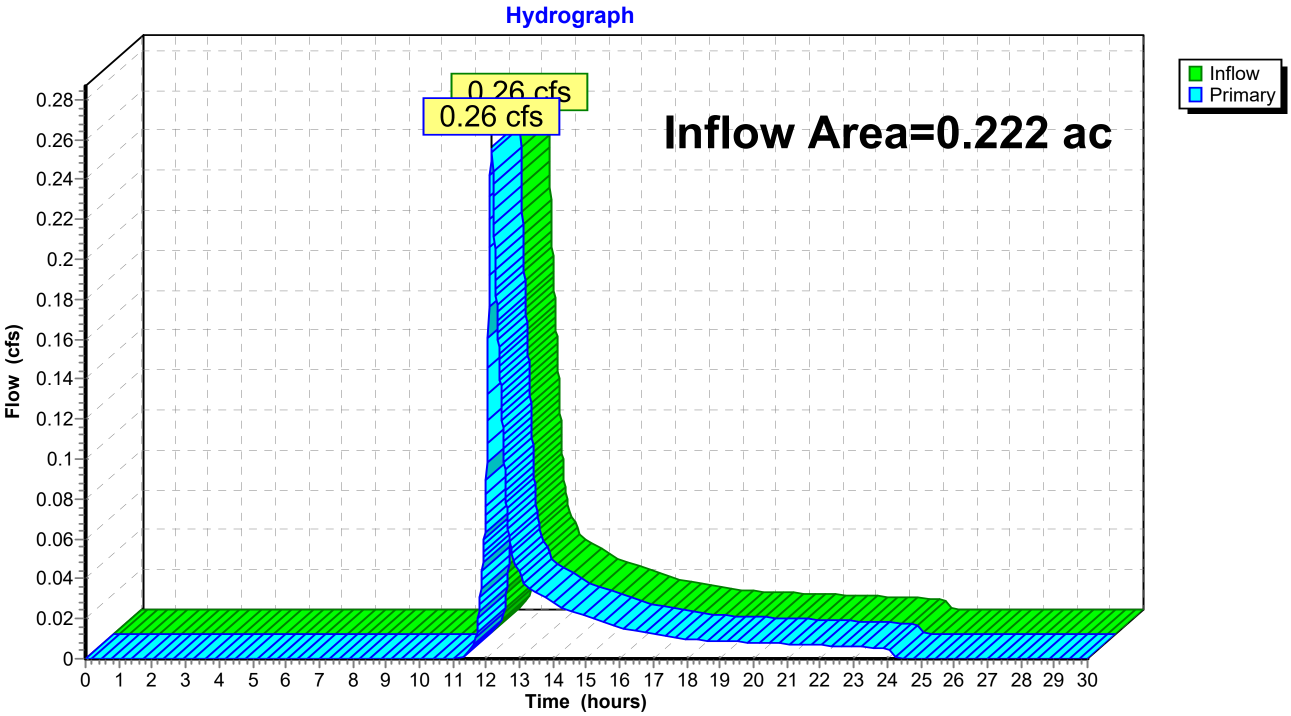


Summary for Link 28L: Design Point #3b: Flow to Eastern Abutter

Inflow Area = 0.222 ac, 29.03% Impervious, Inflow Depth = 1.26" for 10-YR event
Inflow = 0.26 cfs @ 12.15 hrs, Volume= 0.023 af
Primary = 0.26 cfs @ 12.15 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 28L: Design Point #3b: Flow to Eastern Abutter



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 27S: E3b Runoff Area=9,663 sf 29.03% Impervious Runoff Depth=1.76"
Flow Length=127' Tc=10.0 min CN=62 Runoff=0.37 cfs 0.032 af

Link 28L: Design Point #3b: Flow to Eastern Abutter Inflow=0.37 cfs 0.032 af
Primary=0.37 cfs 0.032 af

Total Runoff Area = 0.222 ac Runoff Volume = 0.032 af Average Runoff Depth = 1.76"
70.97% Pervious = 0.157 ac 29.03% Impervious = 0.064 ac

Summary for Subcatchment 27S: E3b

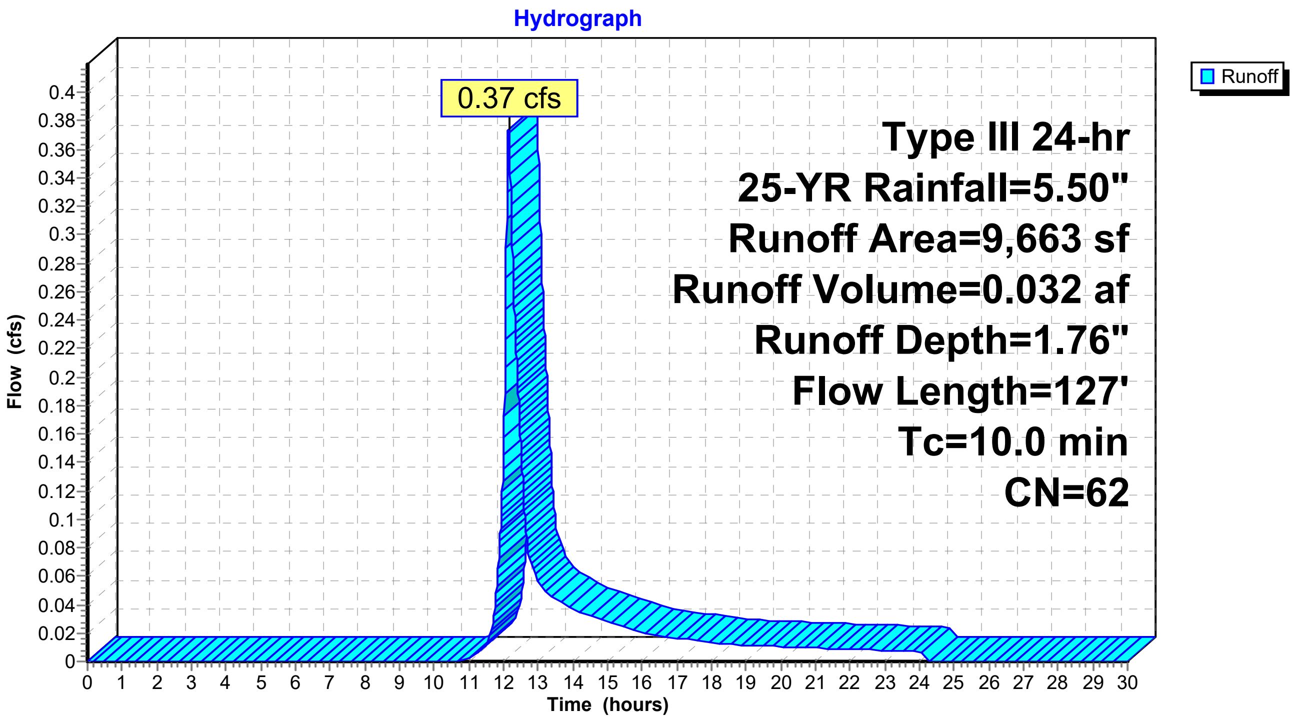
Runoff = 0.37 cfs @ 12.15 hrs, Volume= 0.032 af, Depth= 1.76"

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

	Area (sf)	CN	Description
	2,805	98	Roofs, HSG B
*	151	90	Gravel, HSG B
	1,940	61	>75% Grass cover, Good, HSG B
	2,700	30	Woods, Good, HSG A
	2,067	55	Woods, Good, HSG B
	9,663	62	Weighted Average
	6,858		70.97% Pervious Area
	2,805		29.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.6	85	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.0	127	Total			

Subcatchment 27S: E3b

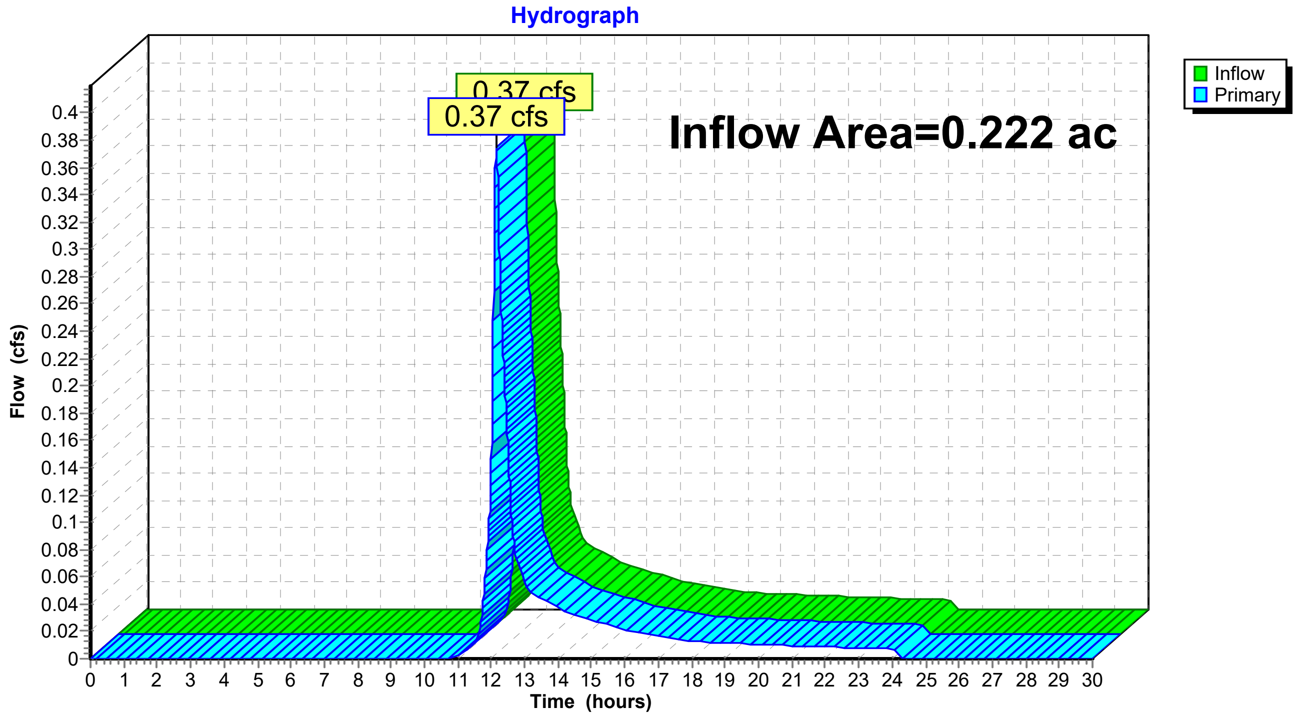


Summary for Link 28L: Design Point #3b: Flow to Eastern Abutter

Inflow Area = 0.222 ac, 29.03% Impervious, Inflow Depth = 1.76" for 25-YR event
Inflow = 0.37 cfs @ 12.15 hrs, Volume= 0.032 af
Primary = 0.37 cfs @ 12.15 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 28L: Design Point #3b: Flow to Eastern Abutter



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 27S: E3b Runoff Area=9,663 sf 29.03% Impervious Runoff Depth=2.16"
Flow Length=127' Tc=10.0 min CN=62 Runoff=0.47 cfs 0.040 af

Link 28L: Design Point #3b: Flow to Eastern Abutter Inflow=0.47 cfs 0.040 af
Primary=0.47 cfs 0.040 af

Total Runoff Area = 0.222 ac Runoff Volume = 0.040 af Average Runoff Depth = 2.16"
70.97% Pervious = 0.157 ac 29.03% Impervious = 0.064 ac

Summary for Subcatchment 27S: E3b

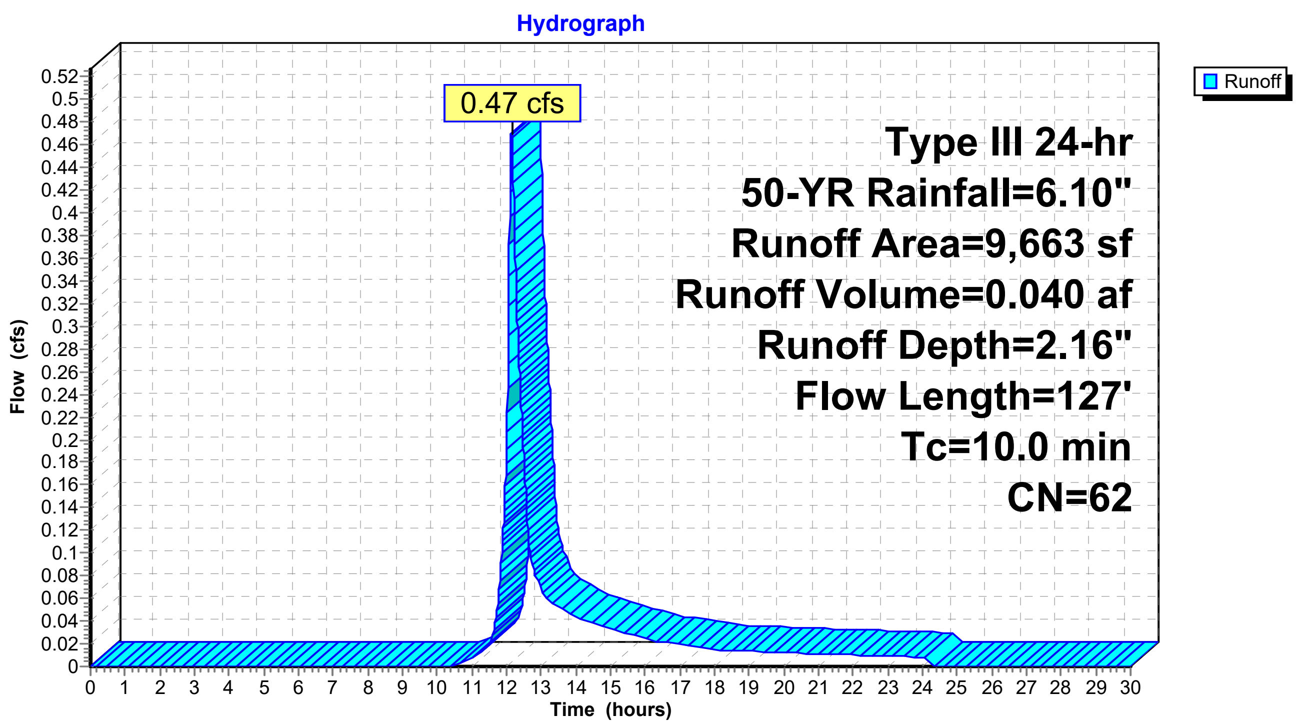
Runoff = 0.47 cfs @ 12.15 hrs, Volume= 0.040 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

	Area (sf)	CN	Description
	2,805	98	Roofs, HSG B
*	151	90	Gravel, HSG B
	1,940	61	>75% Grass cover, Good, HSG B
	2,700	30	Woods, Good, HSG A
	2,067	55	Woods, Good, HSG B
	9,663	62	Weighted Average
	6,858		70.97% Pervious Area
	2,805		29.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.6	85	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.0	127	Total			

Subcatchment 27S: E3b

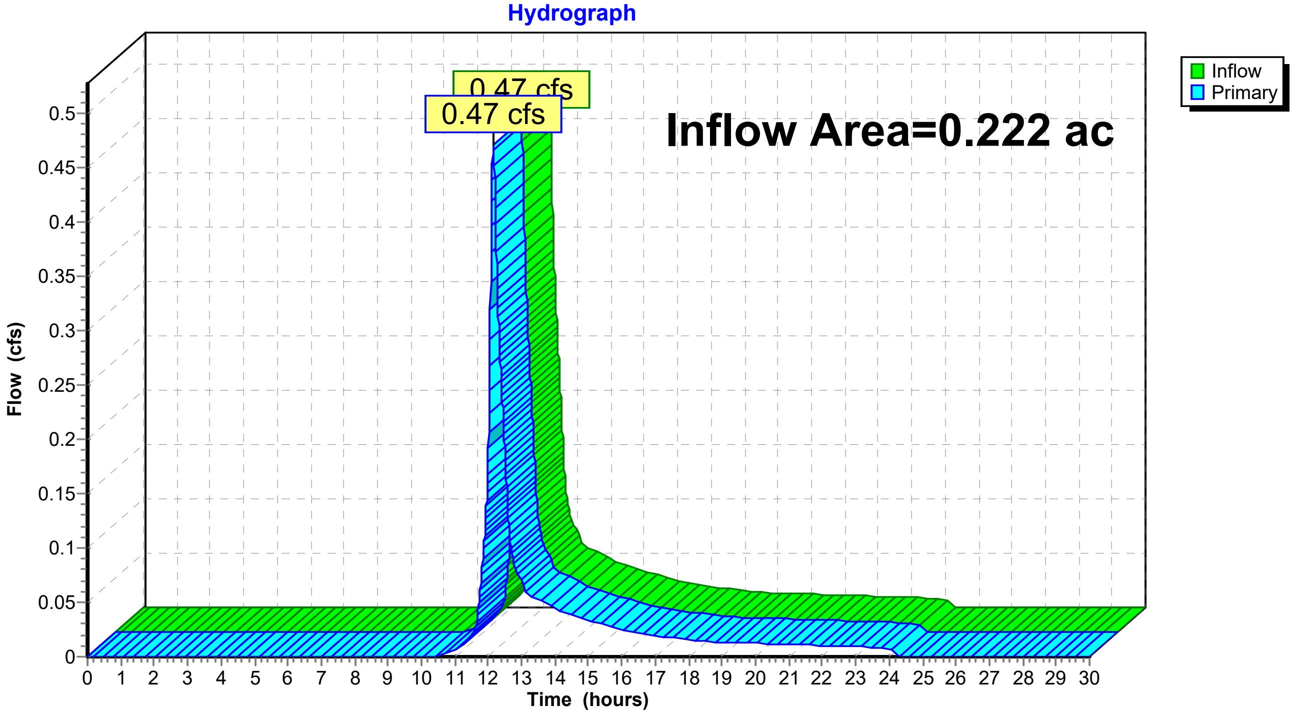


Summary for Link 28L: Design Point #3b: Flow to Eastern Abutter

Inflow Area = 0.222 ac, 29.03% Impervious, Inflow Depth = 2.16" for 50-YR event
Inflow = 0.47 cfs @ 12.15 hrs, Volume= 0.040 af
Primary = 0.47 cfs @ 12.15 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 28L: Design Point #3b: Flow to Eastern Abutter



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 27S: E3b Runoff Area=9,663 sf 29.03% Impervious Runoff Depth=2.58"
Flow Length=127' Tc=10.0 min CN=62 Runoff=0.57 cfs 0.048 af

Link 28L: Design Point #3b: Flow to Eastern Abutter Inflow=0.57 cfs 0.048 af
Primary=0.57 cfs 0.048 af

Total Runoff Area = 0.222 ac Runoff Volume = 0.048 af Average Runoff Depth = 2.58"
70.97% Pervious = 0.157 ac 29.03% Impervious = 0.064 ac

Summary for Subcatchment 27S: E3b

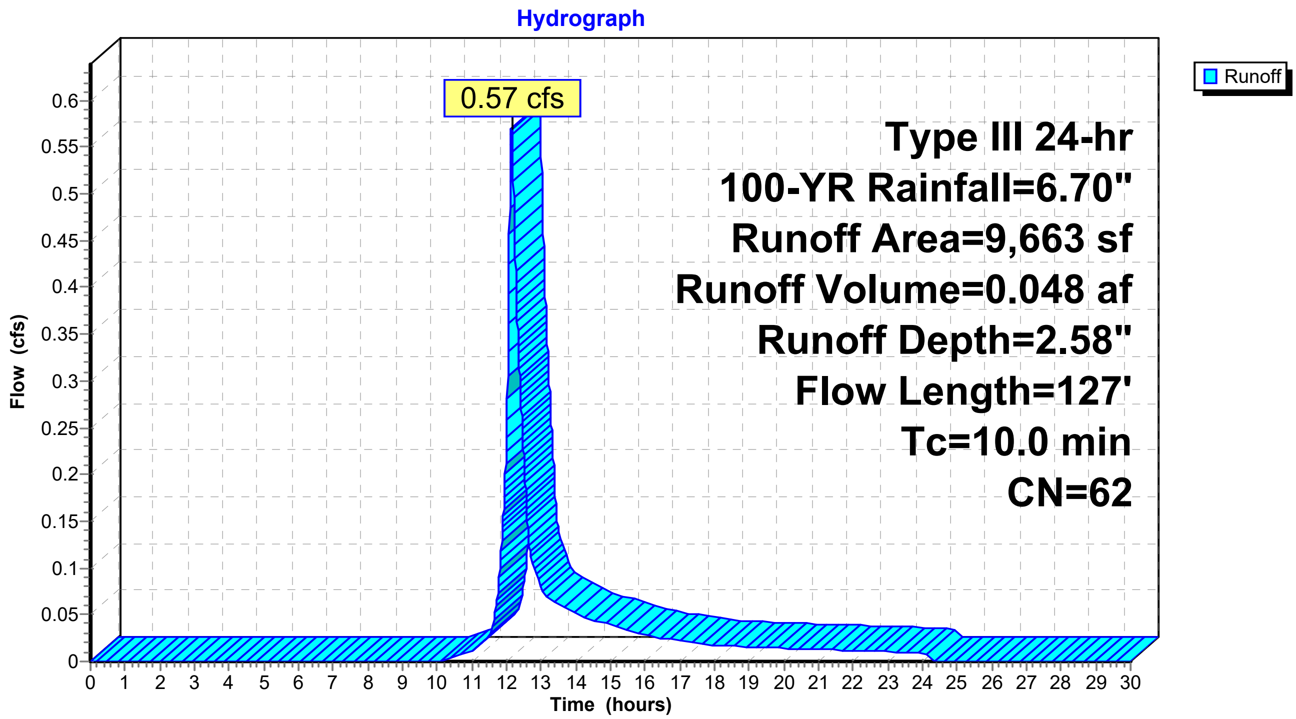
Runoff = 0.57 cfs @ 12.15 hrs, Volume= 0.048 af, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

	Area (sf)	CN	Description
	2,805	98	Roofs, HSG B
*	151	90	Gravel, HSG B
	1,940	61	>75% Grass cover, Good, HSG B
	2,700	30	Woods, Good, HSG A
	2,067	55	Woods, Good, HSG B
	9,663	62	Weighted Average
	6,858		70.97% Pervious Area
	2,805		29.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.6	85	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.0	127	Total			

Subcatchment 27S: E3b

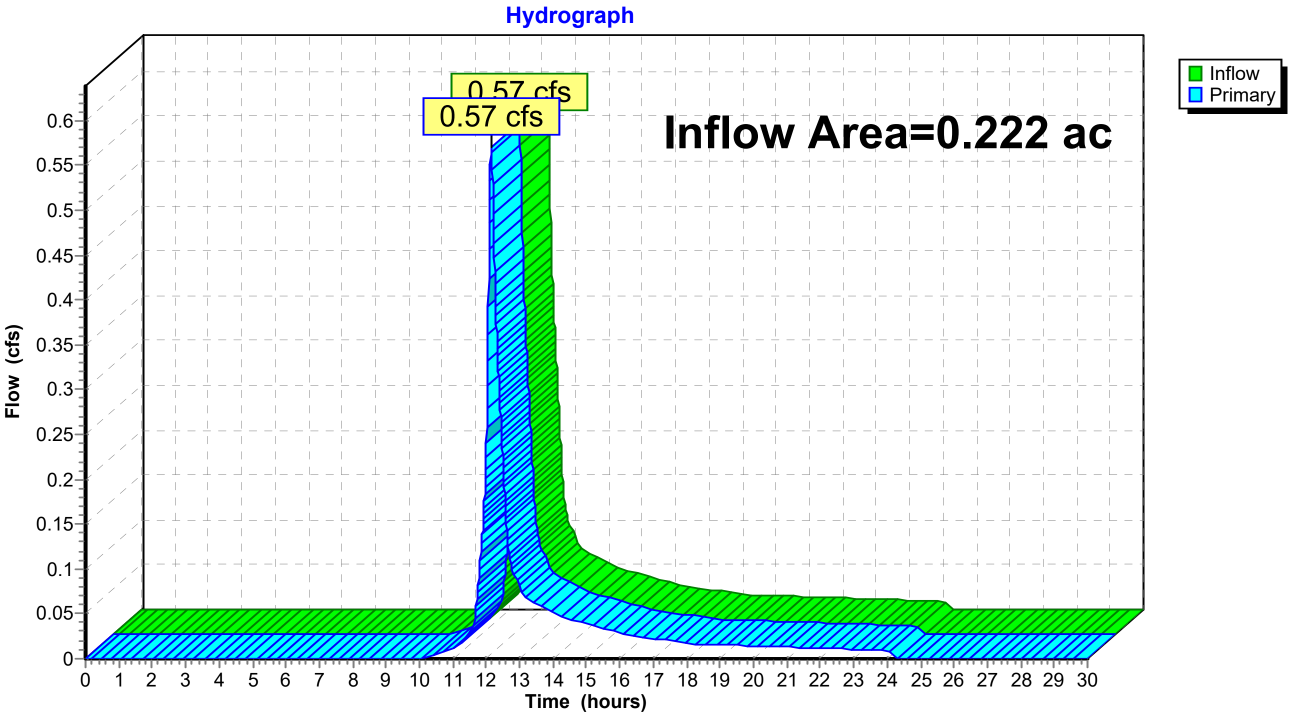


Summary for Link 28L: Design Point #3b: Flow to Eastern Abutter

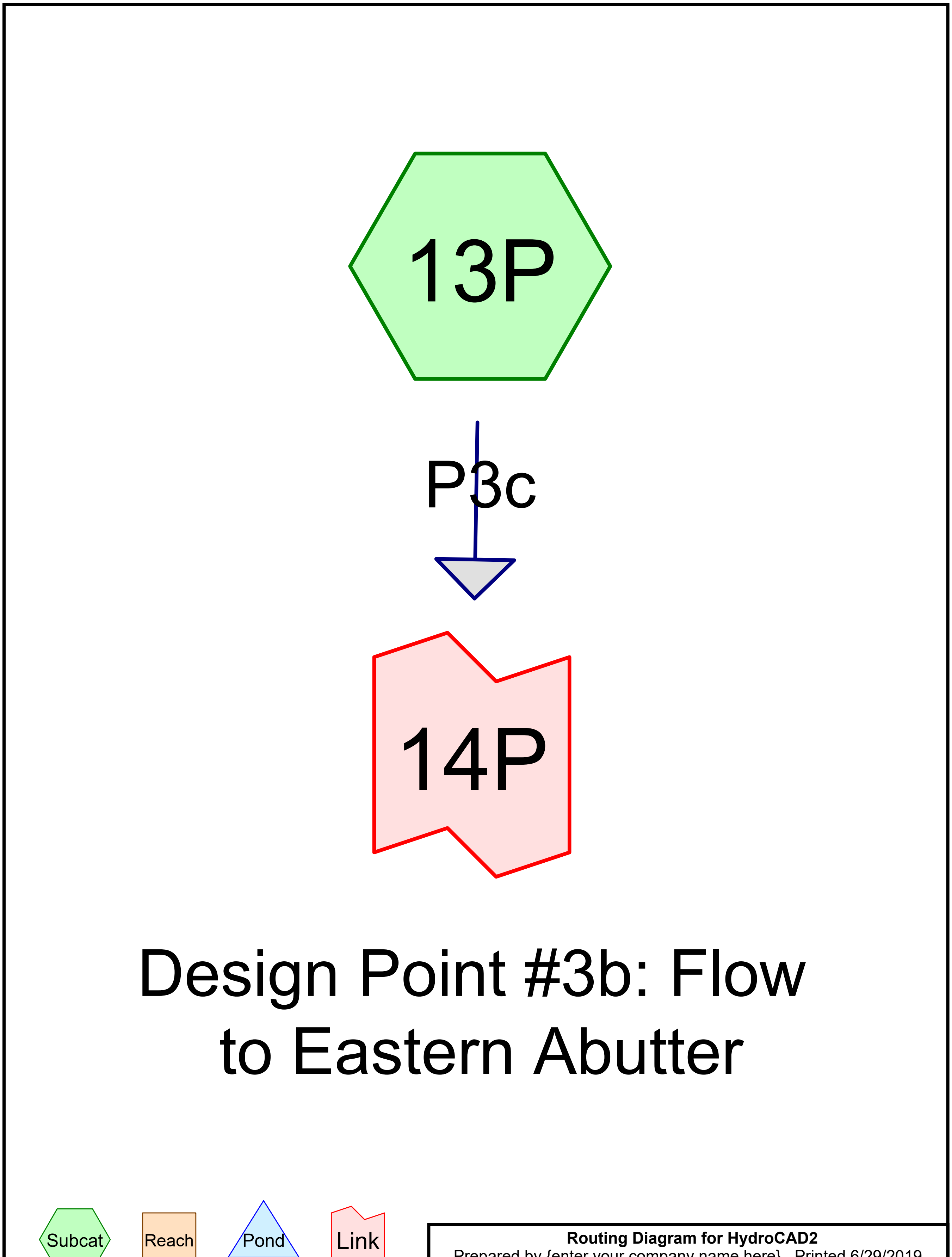
Inflow Area = 0.222 ac, 29.03% Impervious, Inflow Depth = 2.58" for 100-YR event
Inflow = 0.57 cfs @ 12.15 hrs, Volume= 0.048 af
Primary = 0.57 cfs @ 12.15 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 28L: Design Point #3b: Flow to Eastern Abutter



DESIGN POINT #3b: FLOW TO EASTERN ABUTTER PROPOSED CONDITIONS



Routing Diagram for HydroCAD2
Prepared by {enter your company name here}, Printed 6/29/2019

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.061	39	>75% Grass cover, Good, HSG A (13P)
0.078	61	>75% Grass cover, Good, HSG B (13P)
0.026	90	Gravel, HSG B (13P)
0.004	98	Paved parking, HSG A (13P)
0.005	98	Paved parking, HSG B (13P)
0.174	**60**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.065	HSG A	13P
0.110	HSG B	13P
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.174		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 13P: P3c Runoff Area=7,586 sf 5.17% Impervious Runoff Depth=0.41"
Flow Length=90' Slope=0.0670 '/' Tc=5.6 min CN=60 Runoff=0.05 cfs 0.006 af

Link 14P: Design Point #3b: Flow to Eastern Abutter Inflow=0.05 cfs 0.006 af
Primary=0.05 cfs 0.006 af

Total Runoff Area = 0.174 ac Runoff Volume = 0.006 af Average Runoff Depth = 0.41"
94.83% Pervious = 0.165 ac 5.17% Impervious = 0.009 ac

Summary for Subcatchment 13P: P3c

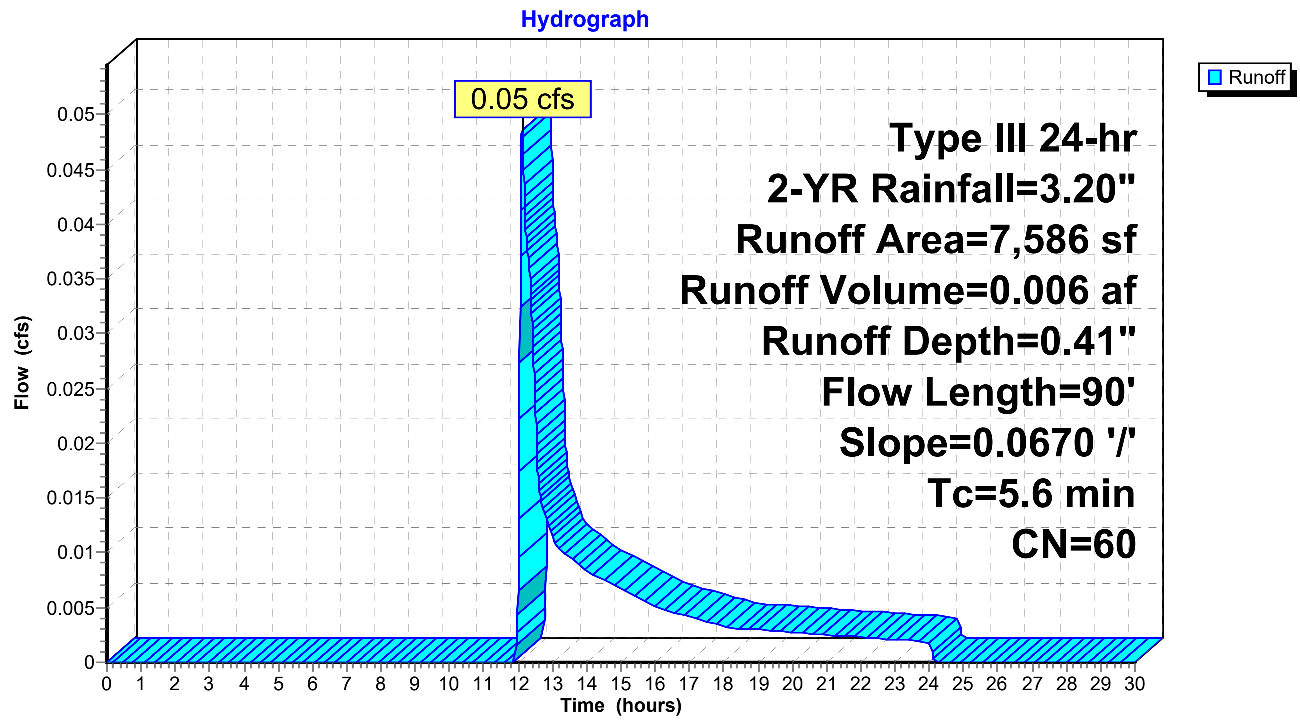
Runoff = 0.05 cfs @ 12.12 hrs, Volume= 0.006 af, Depth= 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
	161	98	Paved parking, HSG A
	231	98	Paved parking, HSG B
*	1,128	90	Gravel, HSG B
	2,655	39	>75% Grass cover, Good, HSG A
	3,411	61	>75% Grass cover, Good, HSG B
	7,586	60	Weighted Average
	7,194		94.83% Pervious Area
	392		5.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	90	0.0670	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"

Subcatchment 13P: P3c

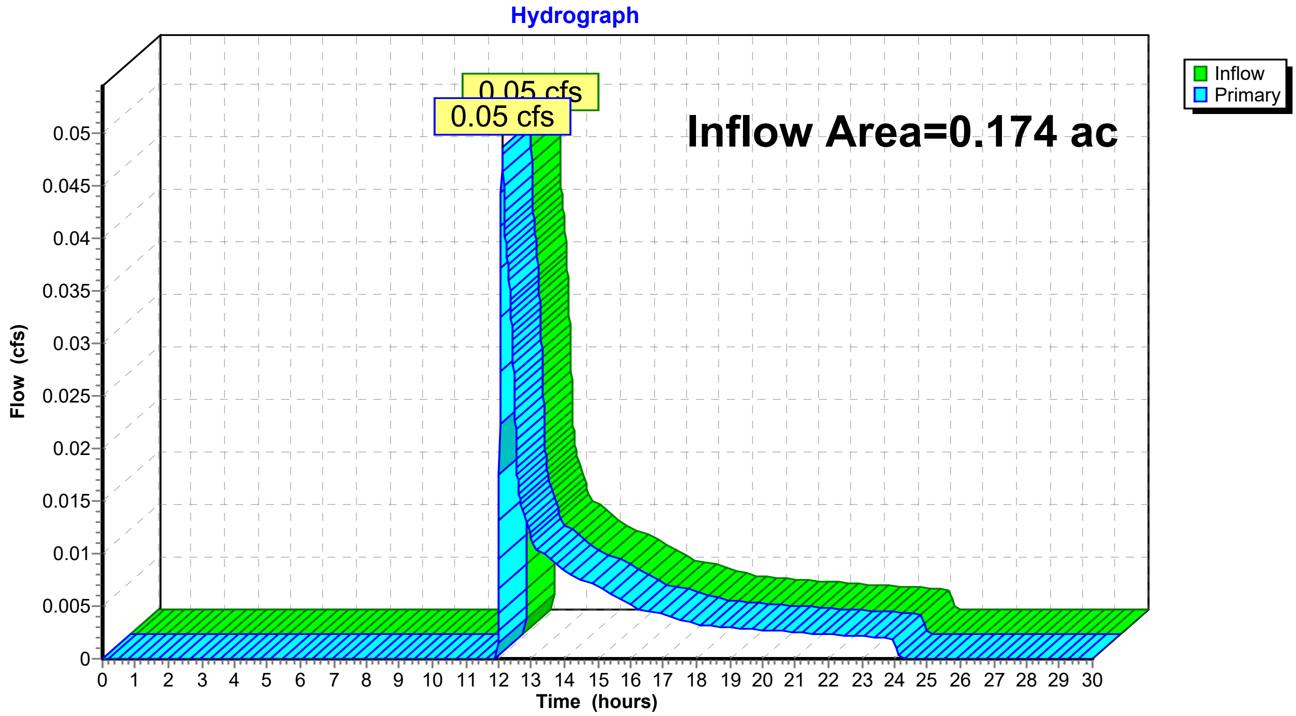


Summary for Link 14P: Design Point #3b: Flow to Eastern Abutter

Inflow Area =	0.174 ac,	5.17% Impervious,	Inflow Depth = 0.41"	for 2-YR event	
Inflow =	0.05 cfs @	12.12 hrs,	Volume=	0.006 af	
Primary =	0.05 cfs @	12.12 hrs,	Volume=	0.006 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 14P: Design Point #3b: Flow to Eastern Abutter



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 13P: P3c Runoff Area=7,586 sf 5.17% Impervious Runoff Depth=1.13"
Flow Length=90' Slope=0.0670 '/' Tc=5.6 min CN=60 Runoff=0.20 cfs 0.016 af

Link 14P: Design Point #3b: Flow to Eastern Abutter Inflow=0.20 cfs 0.016 af
Primary=0.20 cfs 0.016 af

Total Runoff Area = 0.174 ac Runoff Volume = 0.016 af Average Runoff Depth = 1.13"
94.83% Pervious = 0.165 ac 5.17% Impervious = 0.009 ac

Summary for Subcatchment 13P: P3c

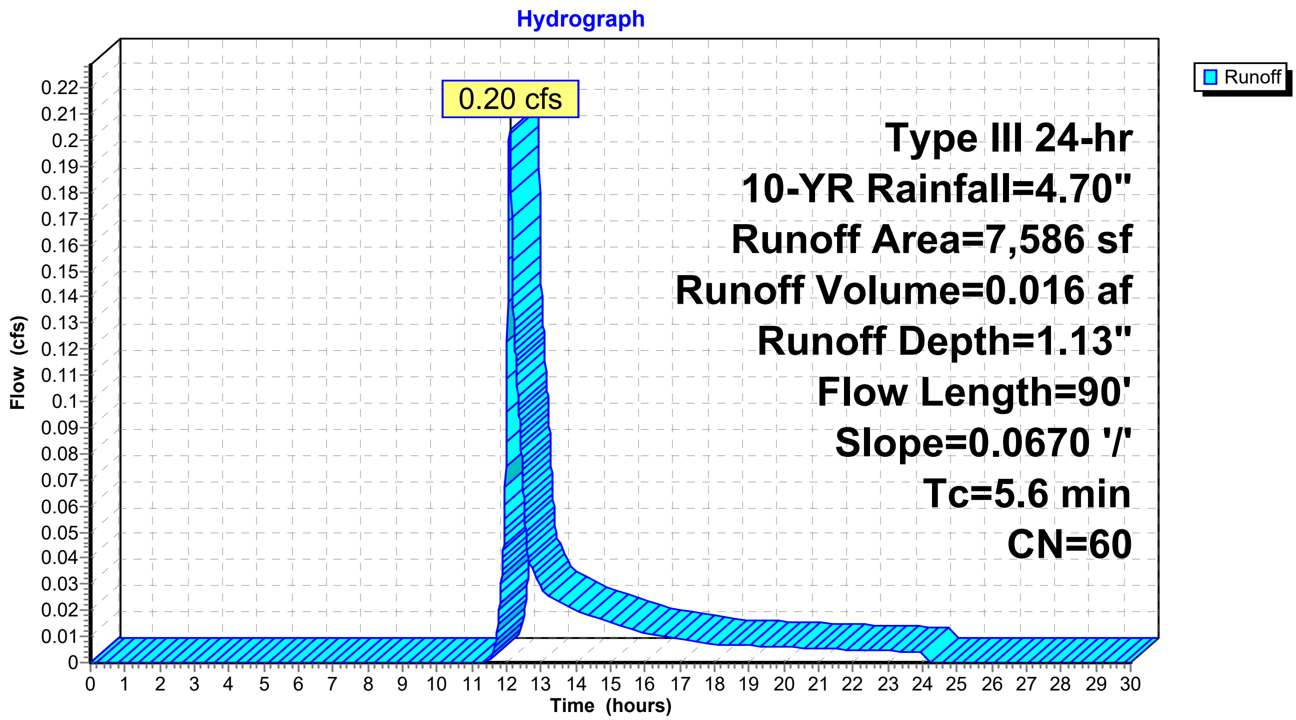
Runoff = 0.20 cfs @ 12.10 hrs, Volume= 0.016 af, Depth= 1.13"

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

	Area (sf)	CN	Description
	161	98	Paved parking, HSG A
	231	98	Paved parking, HSG B
*	1,128	90	Gravel, HSG B
	2,655	39	>75% Grass cover, Good, HSG A
	3,411	61	>75% Grass cover, Good, HSG B
	7,586	60	Weighted Average
	7,194		94.83% Pervious Area
	392		5.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	90	0.0670	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"

Subcatchment 13P: P3c

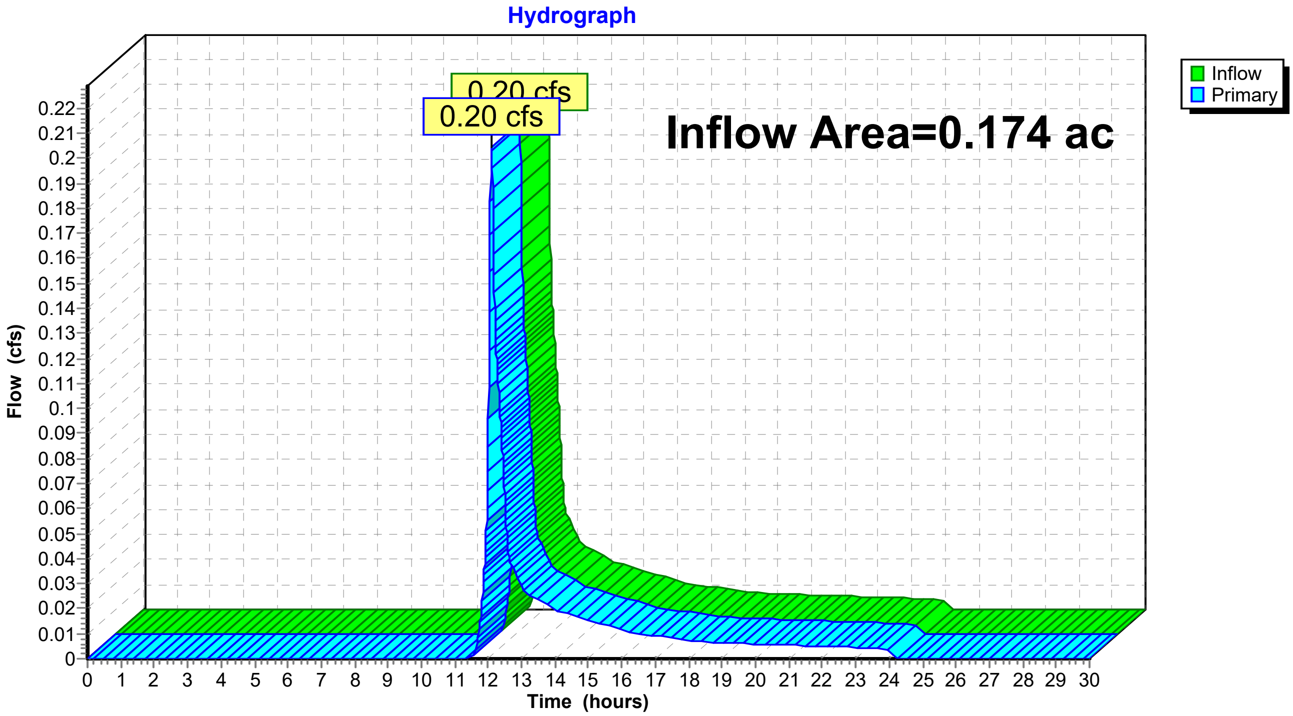


Summary for Link 14P: Design Point #3b: Flow to Eastern Abutter

Inflow Area =	0.174 ac,	5.17% Impervious,	Inflow Depth = 1.13"	for 10-YR event	
Inflow =	0.20 cfs @	12.10 hrs,	Volume=	0.016 af	
Primary =	0.20 cfs @	12.10 hrs,	Volume=	0.016 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 14P: Design Point #3b: Flow to Eastern Abutter



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 13P: P3c Runoff Area=7,586 sf 5.17% Impervious Runoff Depth=1.60"
Flow Length=90' Slope=0.0670 '/' Tc=5.6 min CN=60 Runoff=0.31 cfs 0.023 af

Link 14P: Design Point #3b: Flow to Eastern Abutter Inflow=0.31 cfs 0.023 af
Primary=0.31 cfs 0.023 af

Total Runoff Area = 0.174 ac Runoff Volume = 0.023 af Average Runoff Depth = 1.60"
94.83% Pervious = 0.165 ac 5.17% Impervious = 0.009 ac

Summary for Subcatchment 13P: P3c

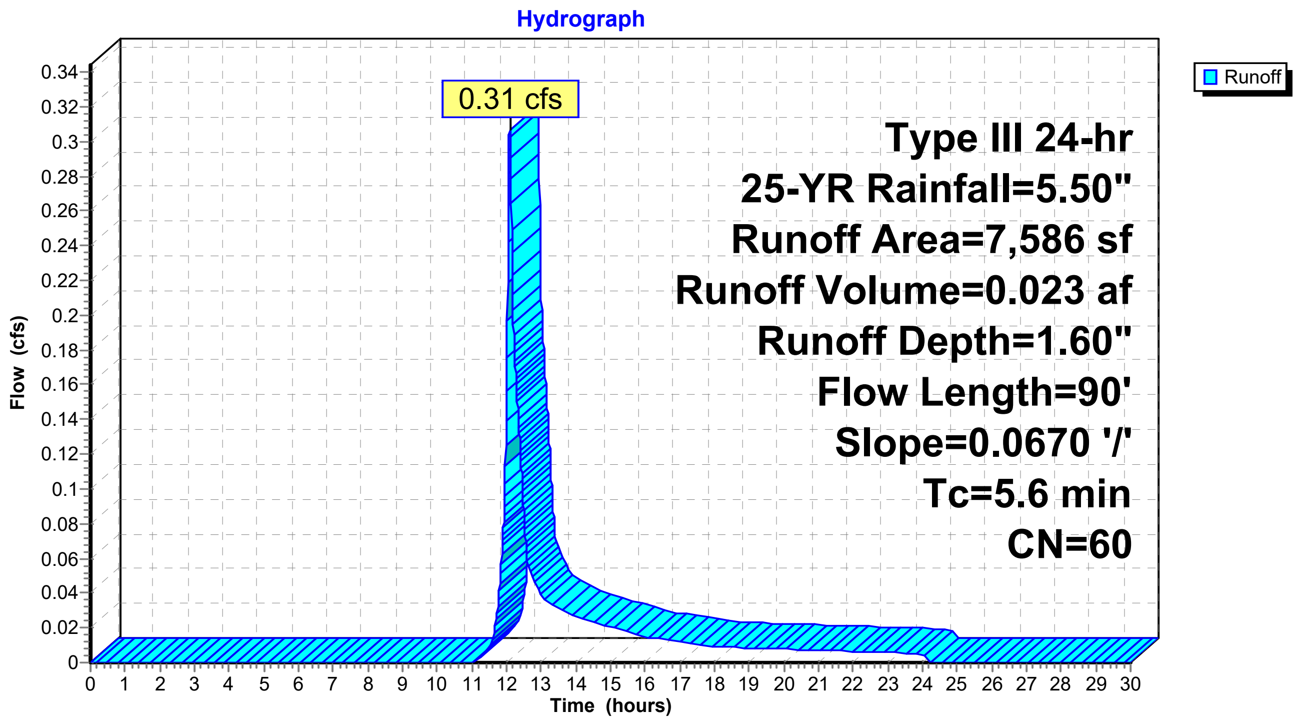
Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 1.60"

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

	Area (sf)	CN	Description
	161	98	Paved parking, HSG A
	231	98	Paved parking, HSG B
*	1,128	90	Gravel, HSG B
	2,655	39	>75% Grass cover, Good, HSG A
	3,411	61	>75% Grass cover, Good, HSG B
	7,586	60	Weighted Average
	7,194		94.83% Pervious Area
	392		5.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	90	0.0670	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"

Subcatchment 13P: P3c

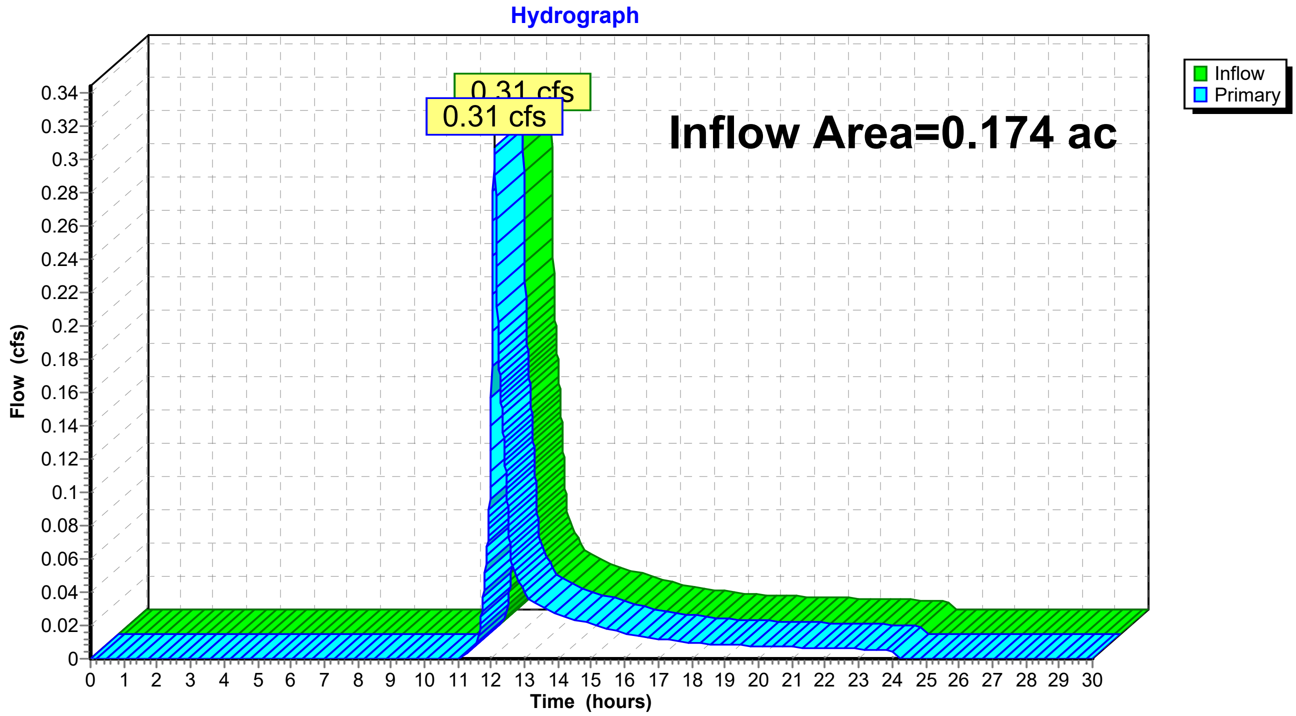


Summary for Link 14P: Design Point #3b: Flow to Eastern Abutter

Inflow Area =	0.174 ac,	5.17% Impervious, Inflow Depth = 1.60"	for 25-YR event	
Inflow =	0.31 cfs @	12.09 hrs, Volume=	0.023 af	
Primary =	0.31 cfs @	12.09 hrs, Volume=	0.023 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 14P: Design Point #3b: Flow to Eastern Abutter



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 13P: P3c Runoff Area=7,586 sf 5.17% Impervious Runoff Depth=1.99"
Flow Length=90' Slope=0.0670 '/' Tc=5.6 min CN=60 Runoff=0.39 cfs 0.029 af

Link 14P: Design Point #3b: Flow to Eastern Abutter Inflow=0.39 cfs 0.029 af
Primary=0.39 cfs 0.029 af

Total Runoff Area = 0.174 ac Runoff Volume = 0.029 af Average Runoff Depth = 1.99"
94.83% Pervious = 0.165 ac 5.17% Impervious = 0.009 ac

Summary for Subcatchment 13P: P3c

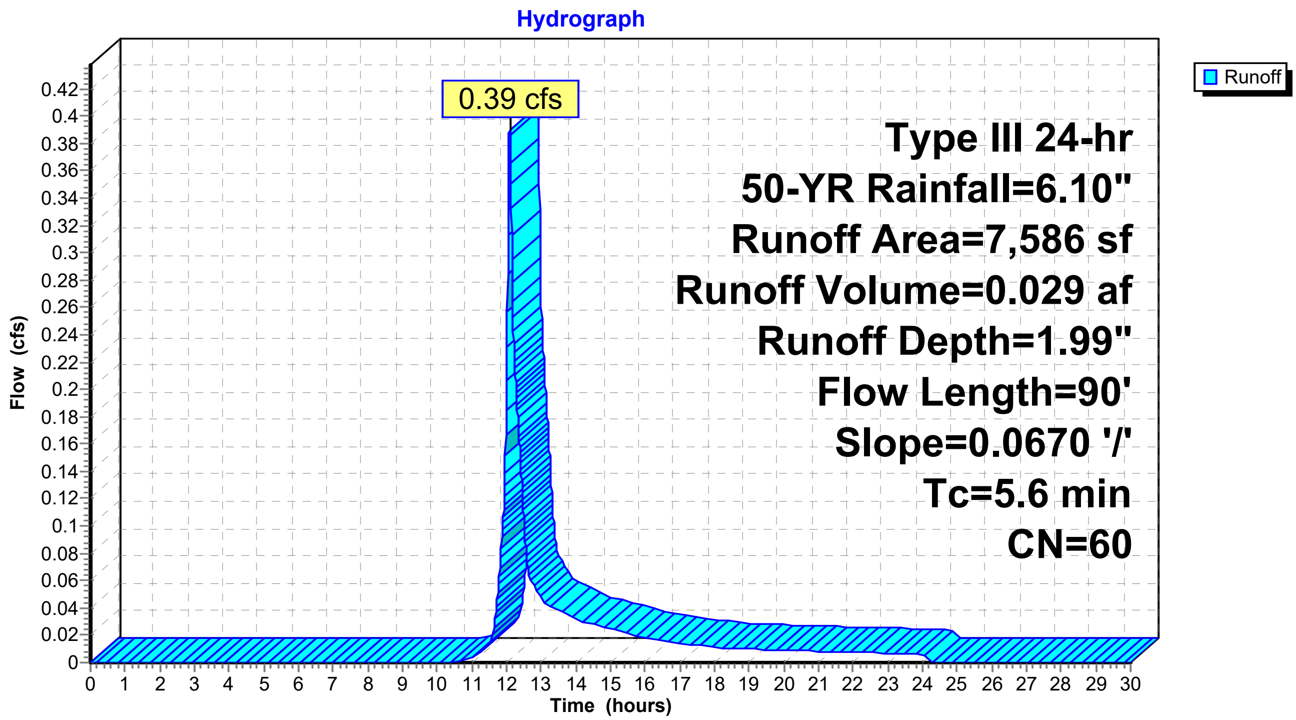
Runoff = 0.39 cfs @ 12.09 hrs, Volume= 0.029 af, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

	Area (sf)	CN	Description
	161	98	Paved parking, HSG A
	231	98	Paved parking, HSG B
*	1,128	90	Gravel, HSG B
	2,655	39	>75% Grass cover, Good, HSG A
	3,411	61	>75% Grass cover, Good, HSG B
	7,586	60	Weighted Average
	7,194		94.83% Pervious Area
	392		5.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	90	0.0670	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"

Subcatchment 13P: P3c

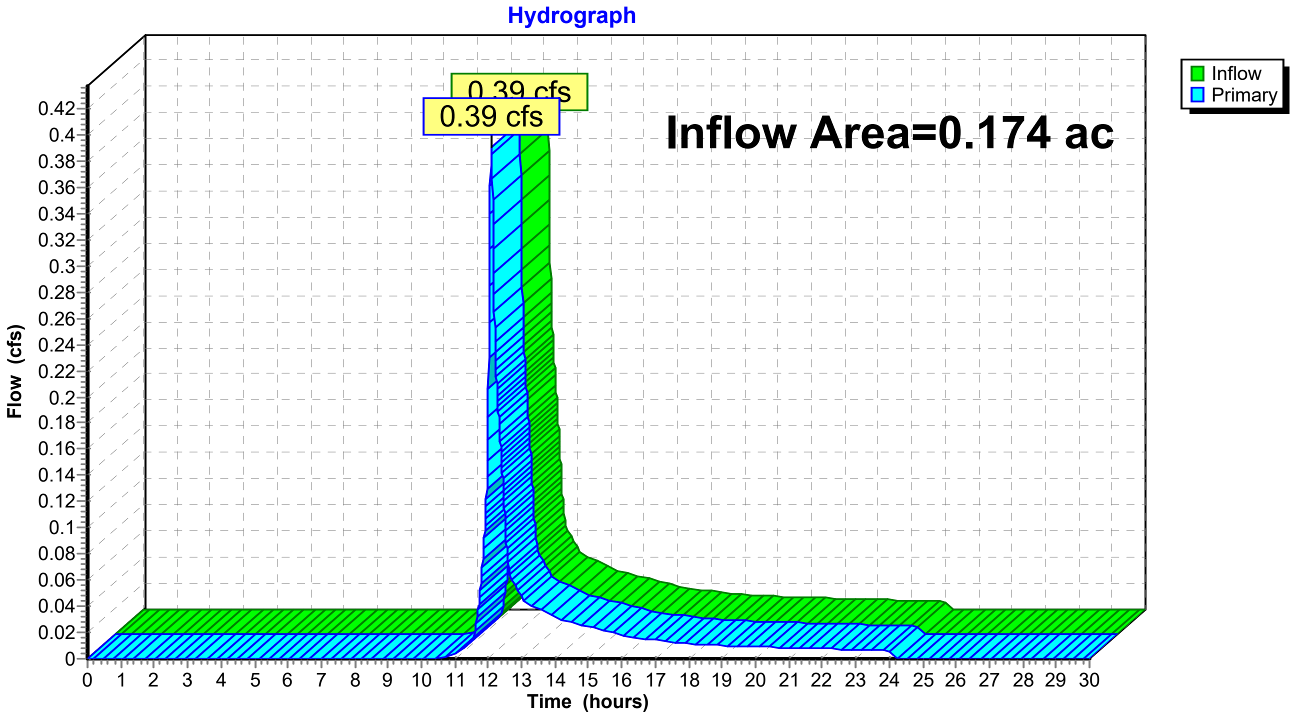


Summary for Link 14P: Design Point #3b: Flow to Eastern Abutter

Inflow Area =	0.174 ac,	5.17% Impervious,	Inflow Depth = 1.99"	for 50-YR event	
Inflow =	0.39 cfs @	12.09 hrs,	Volume=	0.029 af	
Primary =	0.39 cfs @	12.09 hrs,	Volume=	0.029 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 14P: Design Point #3b: Flow to Eastern Abutter



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 13P: P3c Runoff Area=7,586 sf 5.17% Impervious Runoff Depth=2.39"
Flow Length=90' Slope=0.0670 '/' Tc=5.6 min CN=60 Runoff=0.48 cfs 0.035 af

Link 14P: Design Point #3b: Flow to Eastern Abutter Inflow=0.48 cfs 0.035 af
Primary=0.48 cfs 0.035 af

Total Runoff Area = 0.174 ac Runoff Volume = 0.035 af Average Runoff Depth = 2.39"
94.83% Pervious = 0.165 ac 5.17% Impervious = 0.009 ac

Summary for Subcatchment 13P: P3c

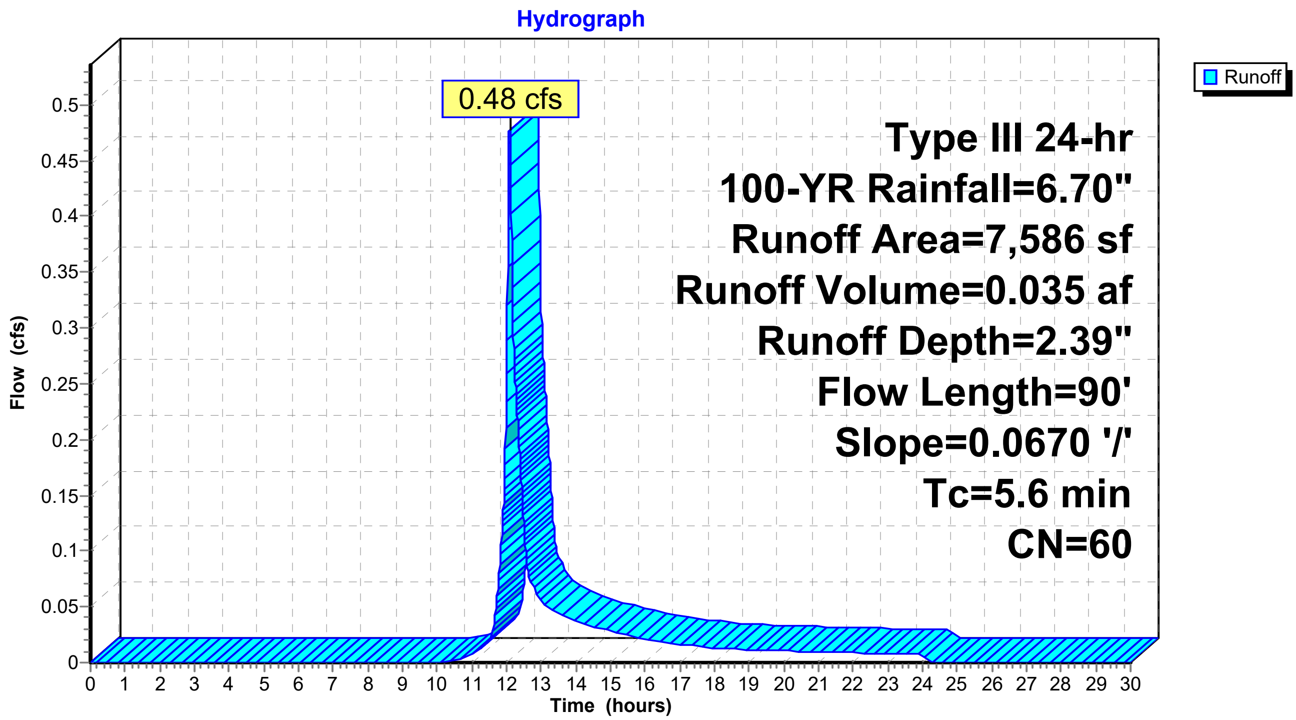
Runoff = 0.48 cfs @ 12.09 hrs, Volume= 0.035 af, Depth= 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

	Area (sf)	CN	Description
	161	98	Paved parking, HSG A
	231	98	Paved parking, HSG B
*	1,128	90	Gravel, HSG B
	2,655	39	>75% Grass cover, Good, HSG A
	3,411	61	>75% Grass cover, Good, HSG B
	7,586	60	Weighted Average
	7,194		94.83% Pervious Area
	392		5.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	90	0.0670	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"

Subcatchment 13P: P3c

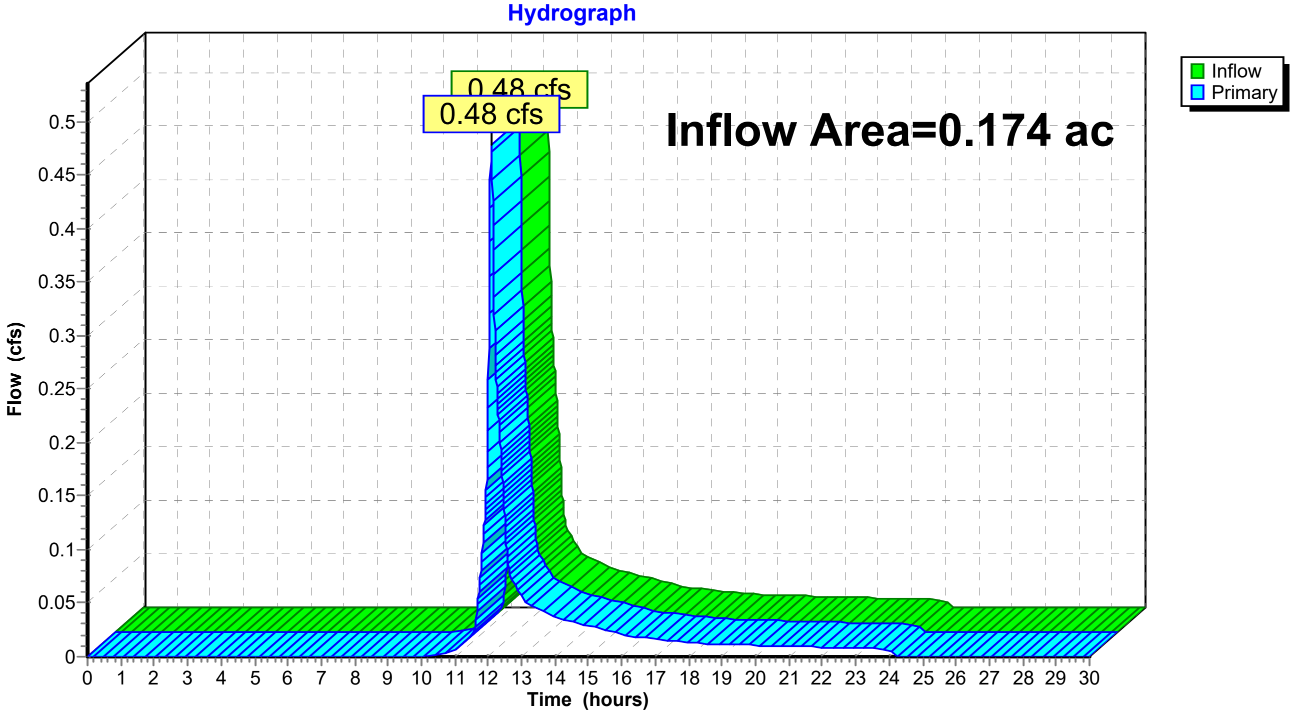


Summary for Link 14P: Design Point #3b: Flow to Eastern Abutter

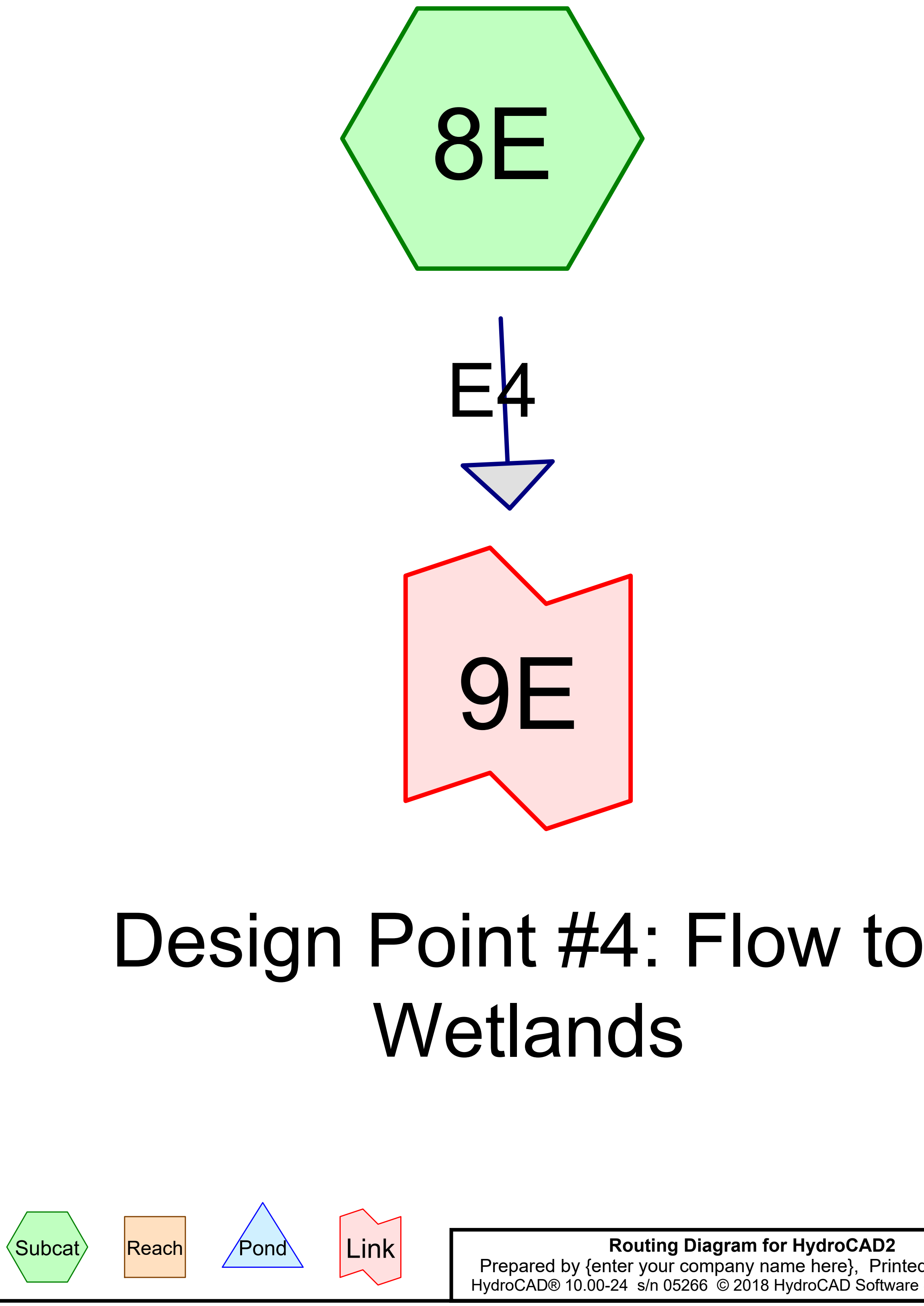
Inflow Area = 0.174 ac, 5.17% Impervious, Inflow Depth = 2.39" for 100-YR event
Inflow = 0.48 cfs @ 12.09 hrs, Volume= 0.035 af
Primary = 0.48 cfs @ 12.09 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 14P: Design Point #3b: Flow to Eastern Abutter



DESIGN POINT #4: FLOW TO WETLANDS EXISTING CONDITIONS



Routing Diagram for HydroCAD2
Prepared by {enter your company name here}, Printed 6/29/2019

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.379	61	>75% Grass cover, Good, HSG B (8E)
0.094	90	Gravel (8E)
0.178	98	Paved parking/Conc Pads, HSG B (8E)
0.043	98	Roofs, HSG B (8E)
0.990	55	Woods, Good, HSG B (8E)
1.683	**64**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
1.589	HSG B	8E
0.000	HSG C	
0.000	HSG D	
0.094	Other	8E
1.683		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8E: E4 Runoff Area=73,325 sf 13.11% Impervious Runoff Depth=0.56"
Flow Length=227' Tc=13.9 min CN=64 Runoff=0.63 cfs 0.078 af

Link 9E: Design Point #4: Flow to Wetlands Inflow=0.63 cfs 0.078 af
Primary=0.63 cfs 0.078 af

Total Runoff Area = 1.683 ac Runoff Volume = 0.078 af Average Runoff Depth = 0.56"
86.89% Pervious = 1.463 ac 13.11% Impervious = 0.221 ac

Summary for Subcatchment 8E: E4

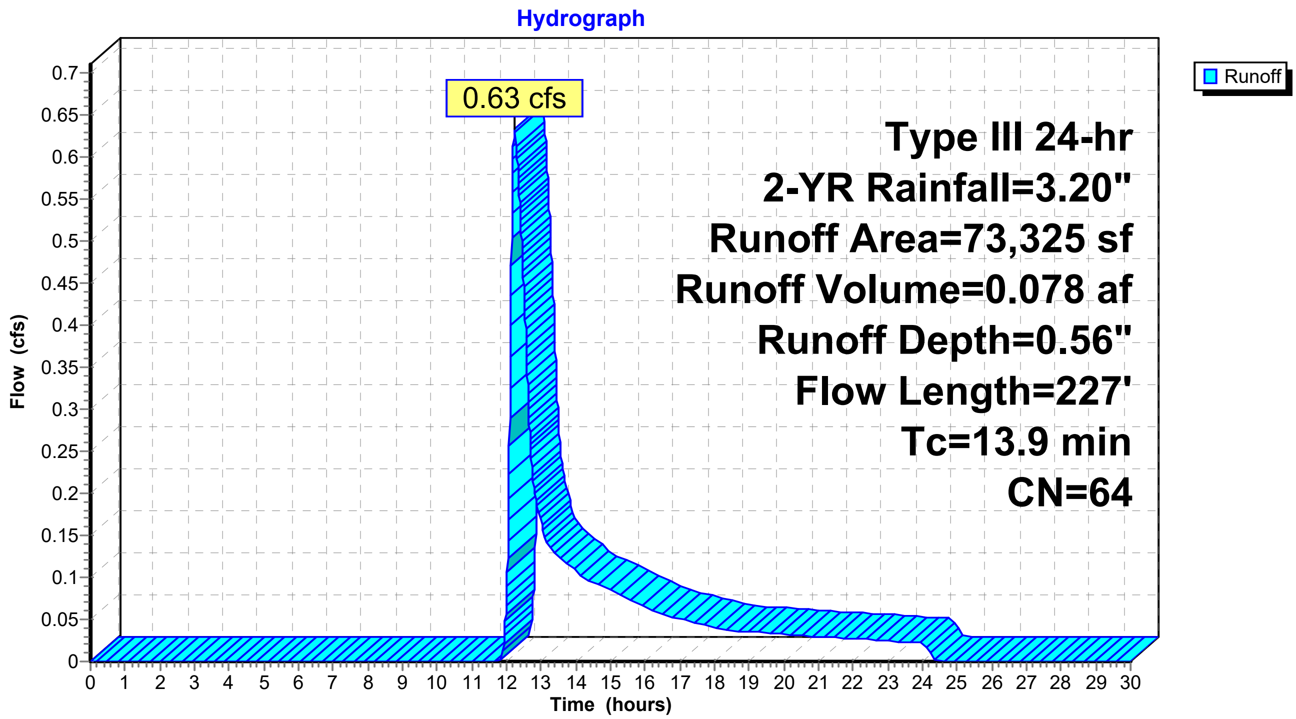
Runoff = 0.63 cfs @ 12.24 hrs, Volume= 0.078 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
*	7,745	98	Paved parking/Conc Pads, HSG B
	1,867	98	Roofs, HSG B
*	4,090	90	Gravel
	16,510	61	>75% Grass cover, Good, HSG B
	43,113	55	Woods, Good, HSG B
	73,325	64	Weighted Average
	63,713		86.89% Pervious Area
	9,612		13.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	27	0.0120	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
4.7	200	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.9	227	Total			

Subcatchment 8E: E4

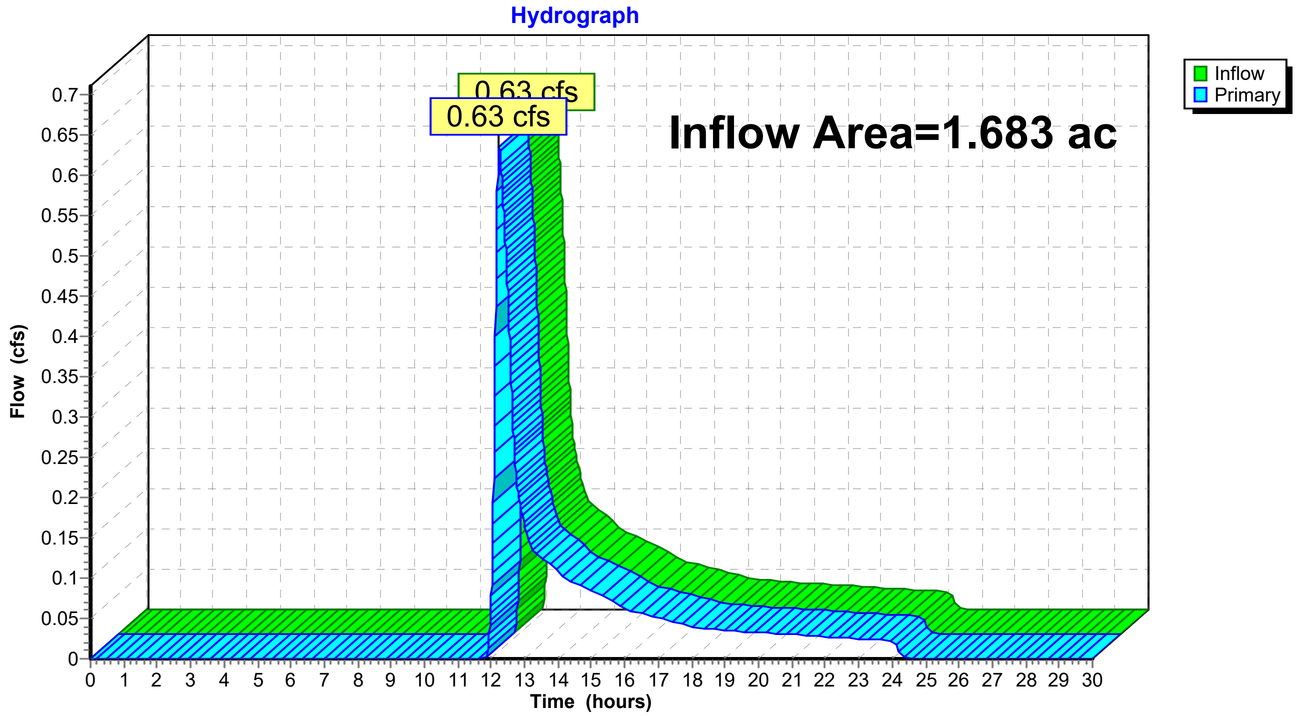


Summary for Link 9E: Design Point #4: Flow to Wetlands

Inflow Area = 1.683 ac, 13.11% Impervious, Inflow Depth = 0.56" for 2-YR event
Inflow = 0.63 cfs @ 12.24 hrs, Volume= 0.078 af
Primary = 0.63 cfs @ 12.24 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 9E: Design Point #4: Flow to Wetlands



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8E: E4 Runoff Area=73,325 sf 13.11% Impervious Runoff Depth=1.39"
Flow Length=227' Tc=13.9 min CN=64 Runoff=1.96 cfs 0.195 af

Link 9E: Design Point #4: Flow to Wetlands Inflow=1.96 cfs 0.195 af
Primary=1.96 cfs 0.195 af

Total Runoff Area = 1.683 ac Runoff Volume = 0.195 af Average Runoff Depth = 1.39"
86.89% Pervious = 1.463 ac 13.11% Impervious = 0.221 ac

Summary for Subcatchment 8E: E4

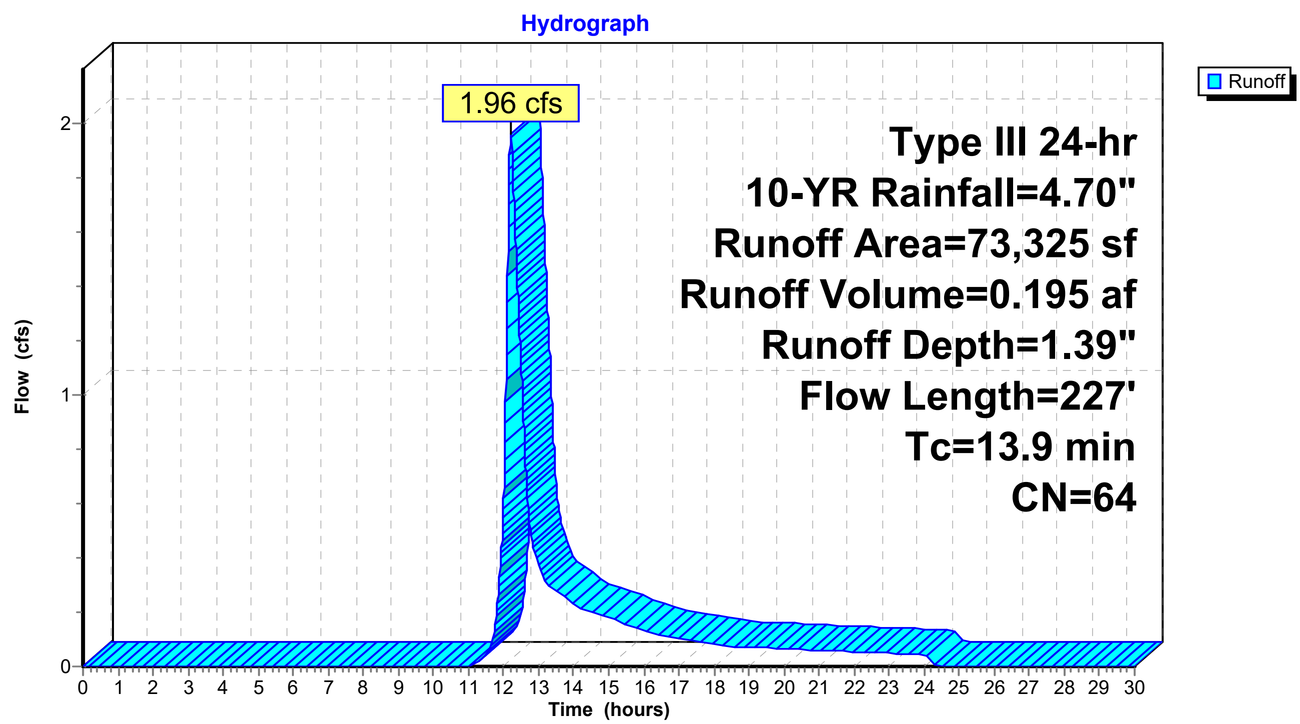
Runoff = 1.96 cfs @ 12.21 hrs, Volume= 0.195 af, Depth= 1.39"

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

	Area (sf)	CN	Description
*	7,745	98	Paved parking/Conc Pads, HSG B
	1,867	98	Roofs, HSG B
*	4,090	90	Gravel
	16,510	61	>75% Grass cover, Good, HSG B
	43,113	55	Woods, Good, HSG B
	73,325	64	Weighted Average
	63,713		86.89% Pervious Area
	9,612		13.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	27	0.0120	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
4.7	200	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.9	227	Total			

Subcatchment 8E: E4

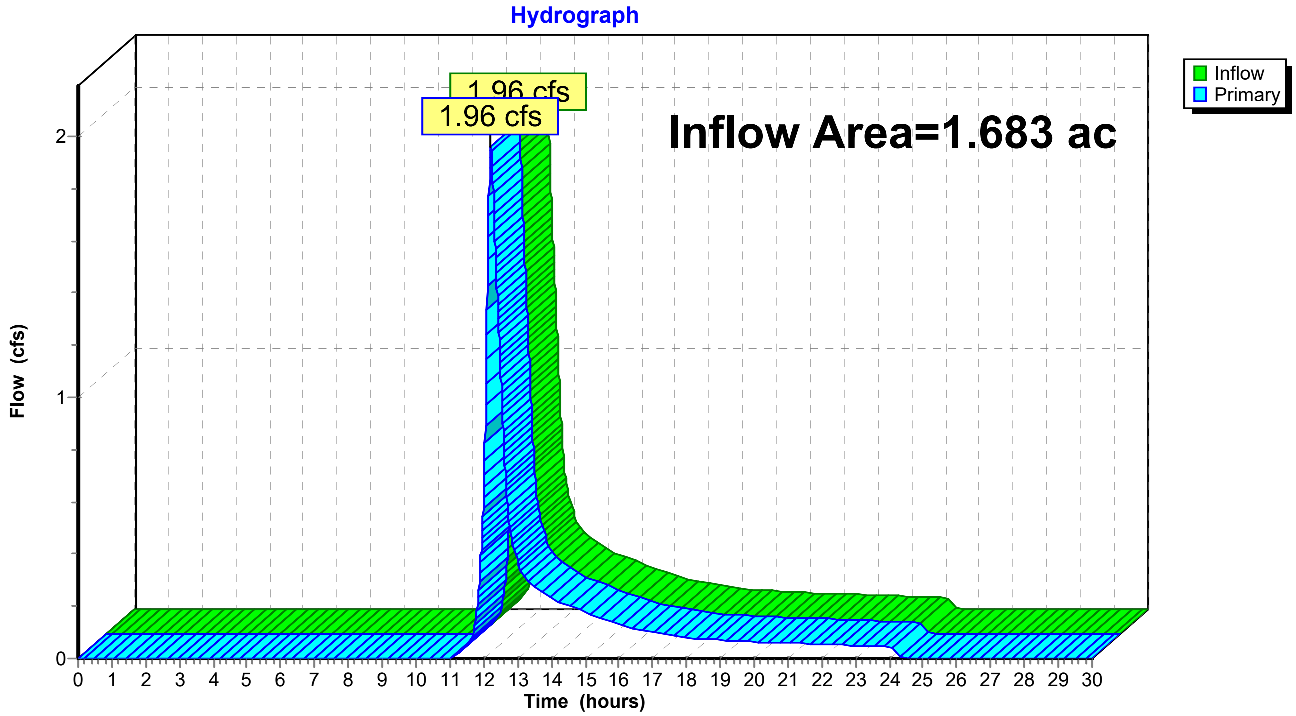


Summary for Link 9E: Design Point #4: Flow to Wetlands

Inflow Area = 1.683 ac, 13.11% Impervious, Inflow Depth = 1.39" for 10-YR event
Inflow = 1.96 cfs @ 12.21 hrs, Volume= 0.195 af
Primary = 1.96 cfs @ 12.21 hrs, Volume= 0.195 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 9E: Design Point #4: Flow to Wetlands



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8E: E4 Runoff Area=73,325 sf 13.11% Impervious Runoff Depth=1.91"
Flow Length=227' Tc=13.9 min CN=64 Runoff=2.80 cfs 0.268 af

Link 9E: Design Point #4: Flow to Wetlands Inflow=2.80 cfs 0.268 af
Primary=2.80 cfs 0.268 af

Total Runoff Area = 1.683 ac Runoff Volume = 0.268 af Average Runoff Depth = 1.91"
86.89% Pervious = 1.463 ac 13.11% Impervious = 0.221 ac

Summary for Subcatchment 8E: E4

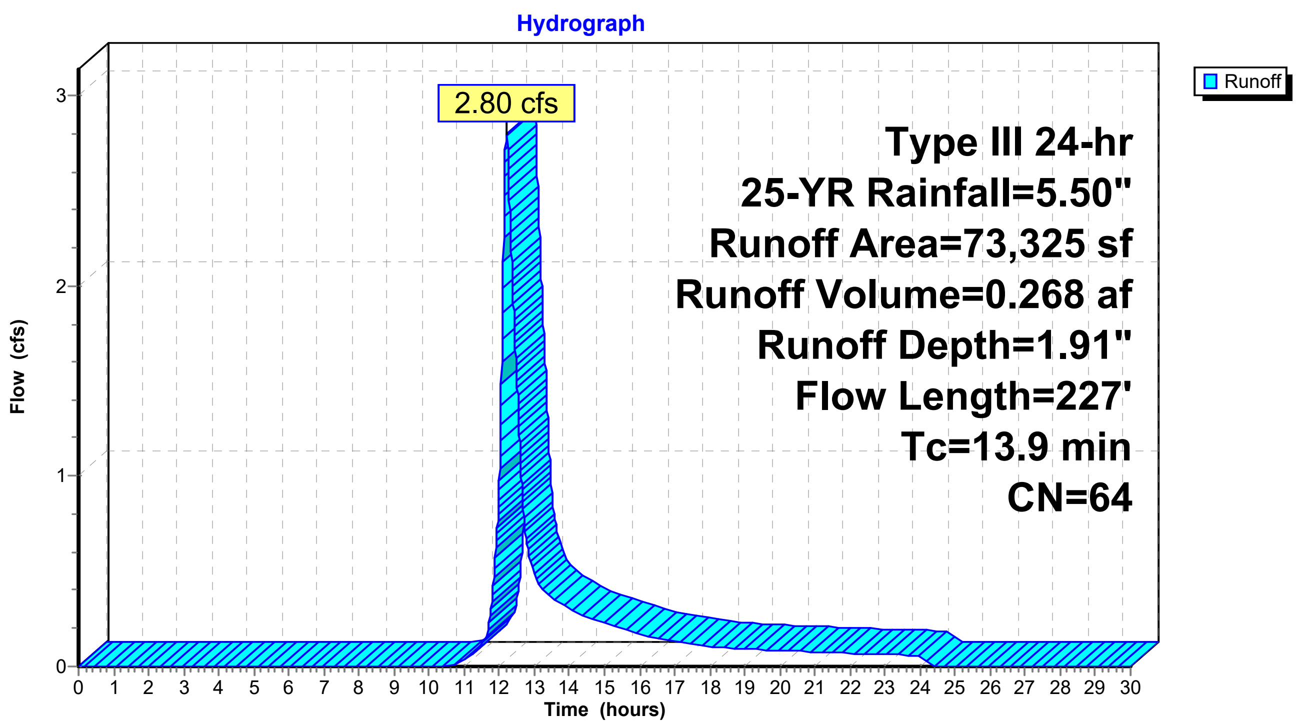
Runoff = 2.80 cfs @ 12.20 hrs, Volume= 0.268 af, Depth= 1.91"

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

	Area (sf)	CN	Description
*	7,745	98	Paved parking/Conc Pads, HSG B
	1,867	98	Roofs, HSG B
*	4,090	90	Gravel
	16,510	61	>75% Grass cover, Good, HSG B
	43,113	55	Woods, Good, HSG B
	73,325	64	Weighted Average
	63,713		86.89% Pervious Area
	9,612		13.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	27	0.0120	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
4.7	200	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.9	227	Total			

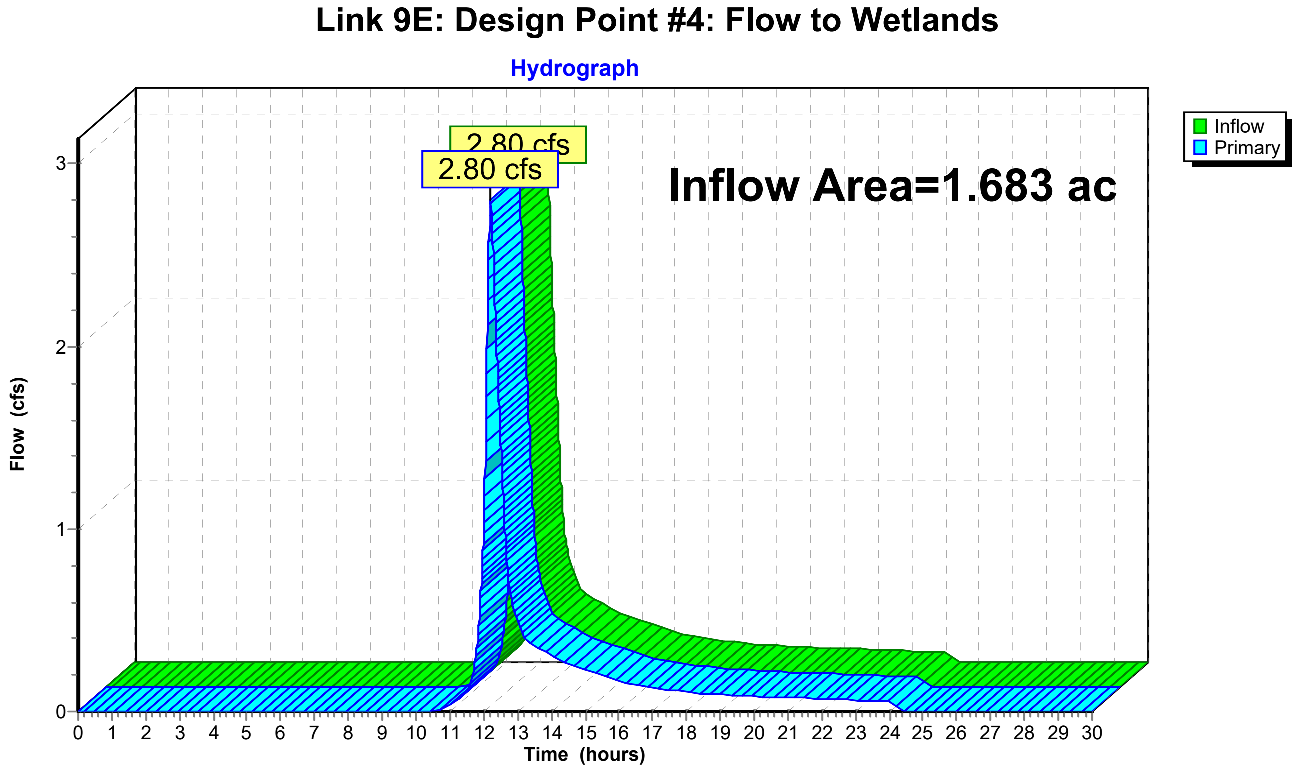
Subcatchment 8E: E4



Summary for Link 9E: Design Point #4: Flow to Wetlands

Inflow Area = 1.683 ac, 13.11% Impervious, Inflow Depth = 1.91" for 25-YR event
Inflow = 2.80 cfs @ 12.20 hrs, Volume= 0.268 af
Primary = 2.80 cfs @ 12.20 hrs, Volume= 0.268 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8E: E4 Runoff Area=73,325 sf 13.11% Impervious Runoff Depth=2.33"
Flow Length=227' Tc=13.9 min CN=64 Runoff=3.48 cfs 0.328 af

Link 9E: Design Point #4: Flow to Wetlands Inflow=3.48 cfs 0.328 af
Primary=3.48 cfs 0.328 af

Total Runoff Area = 1.683 ac Runoff Volume = 0.328 af Average Runoff Depth = 2.33"
86.89% Pervious = 1.463 ac 13.11% Impervious = 0.221 ac

Summary for Subcatchment 8E: E4

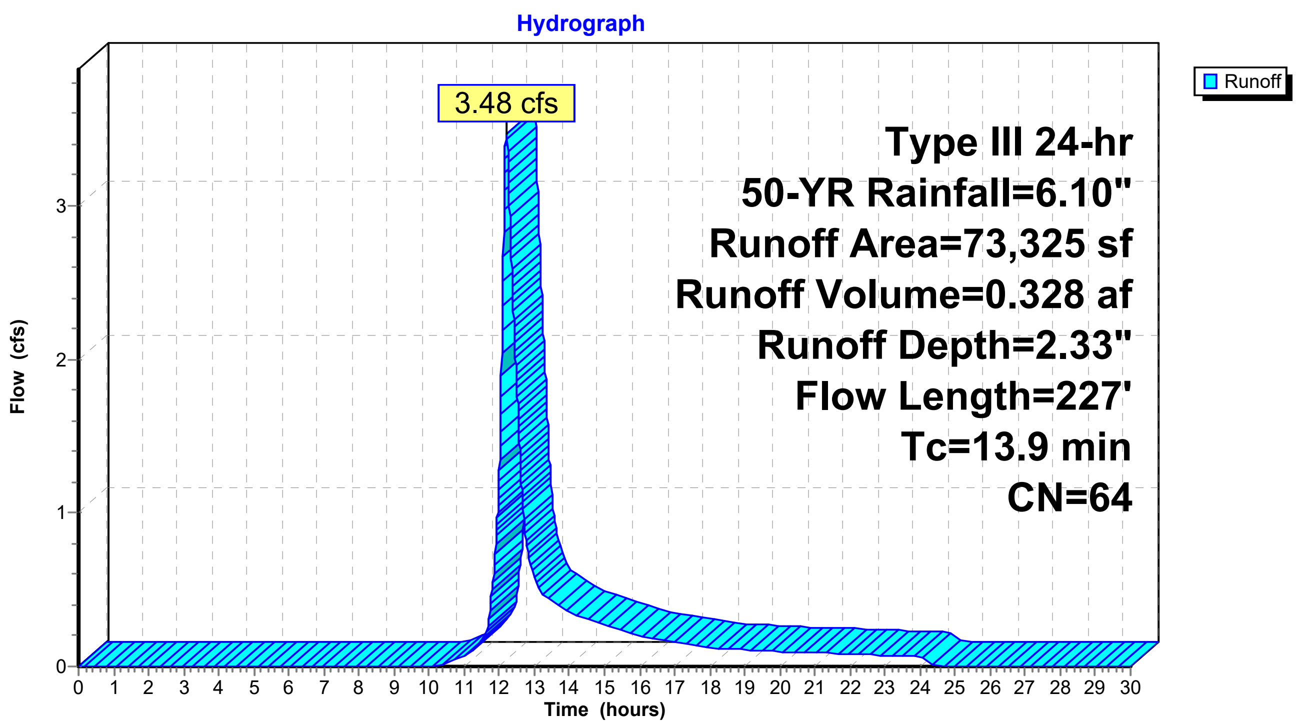
Runoff = 3.48 cfs @ 12.20 hrs, Volume= 0.328 af, Depth= 2.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

	Area (sf)	CN	Description
*	7,745	98	Paved parking/Conc Pads, HSG B
	1,867	98	Roofs, HSG B
*	4,090	90	Gravel
	16,510	61	>75% Grass cover, Good, HSG B
	43,113	55	Woods, Good, HSG B
	73,325	64	Weighted Average
	63,713		86.89% Pervious Area
	9,612		13.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	27	0.0120	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
4.7	200	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.9	227	Total			

Subcatchment 8E: E4

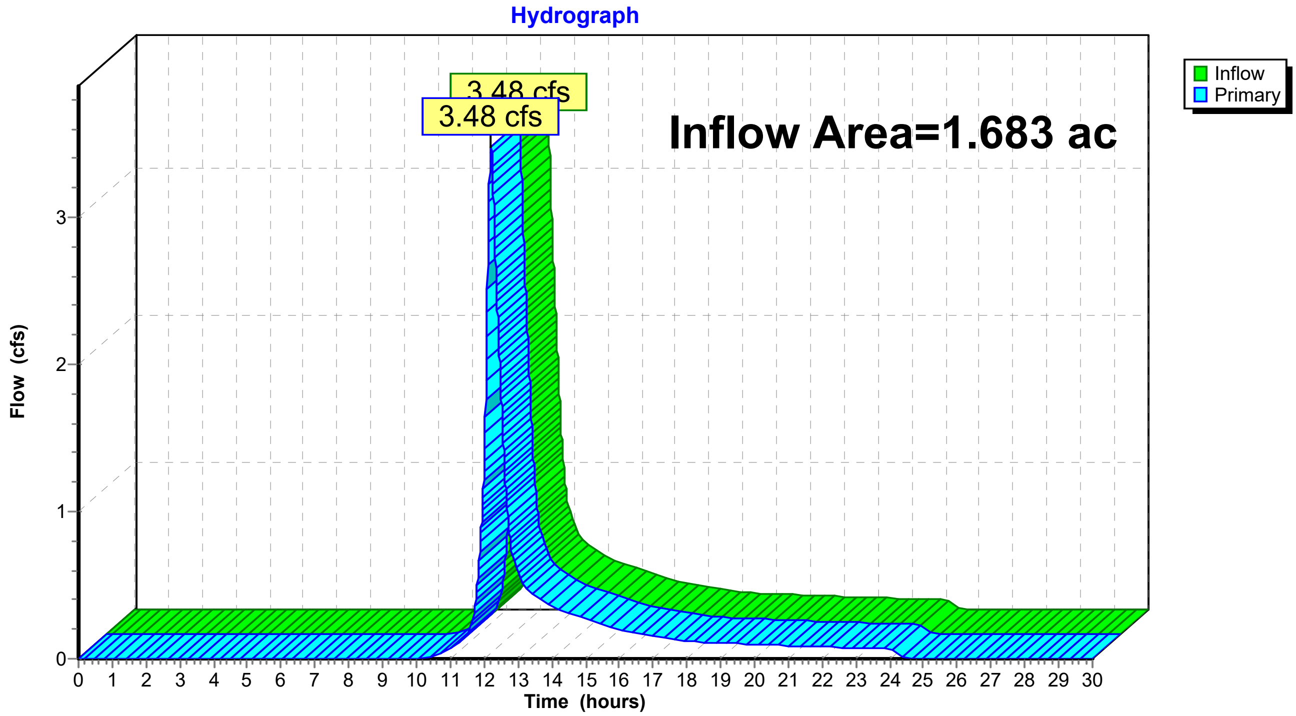


Summary for Link 9E: Design Point #4: Flow to Wetlands

Inflow Area =	1.683 ac,	13.11% Impervious,	Inflow Depth = 2.33"	for 50-YR event	
Inflow =	3.48 cfs @	12.20 hrs,	Volume=	0.328 af	
Primary =	3.48 cfs @	12.20 hrs,	Volume=	0.328 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 9E: Design Point #4: Flow to Wetlands



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8E: E4 Runoff Area=73,325 sf 13.11% Impervious Runoff Depth=2.78"
Flow Length=227' Tc=13.9 min CN=64 Runoff=4.18 cfs 0.389 af

Link 9E: Design Point #4: Flow to Wetlands Inflow=4.18 cfs 0.389 af
Primary=4.18 cfs 0.389 af

Total Runoff Area = 1.683 ac Runoff Volume = 0.389 af Average Runoff Depth = 2.78"
86.89% Pervious = 1.463 ac 13.11% Impervious = 0.221 ac

Summary for Subcatchment 8E: E4

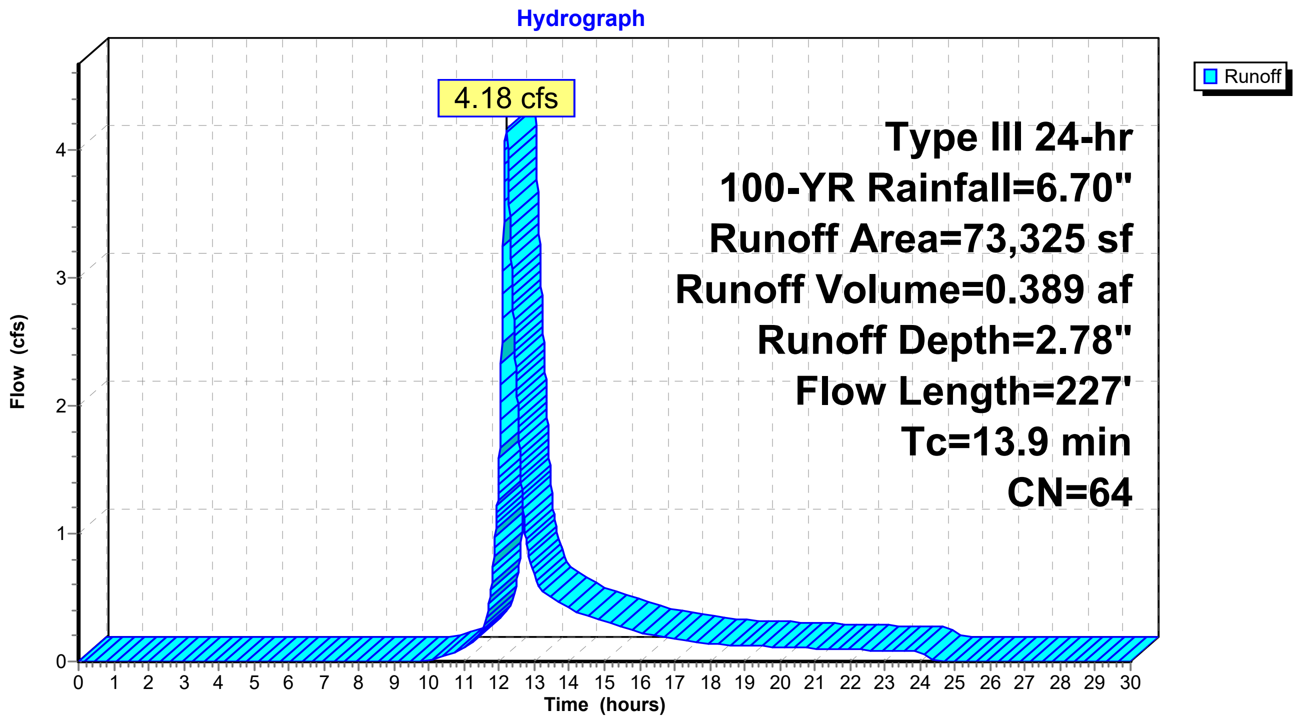
Runoff = 4.18 cfs @ 12.20 hrs, Volume= 0.389 af, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

	Area (sf)	CN	Description
*	7,745	98	Paved parking/Conc Pads, HSG B
	1,867	98	Roofs, HSG B
*	4,090	90	Gravel
	16,510	61	>75% Grass cover, Good, HSG B
	43,113	55	Woods, Good, HSG B
	73,325	64	Weighted Average
	63,713		86.89% Pervious Area
	9,612		13.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	27	0.0120	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
4.7	200	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.9	227	Total			

Subcatchment 8E: E4

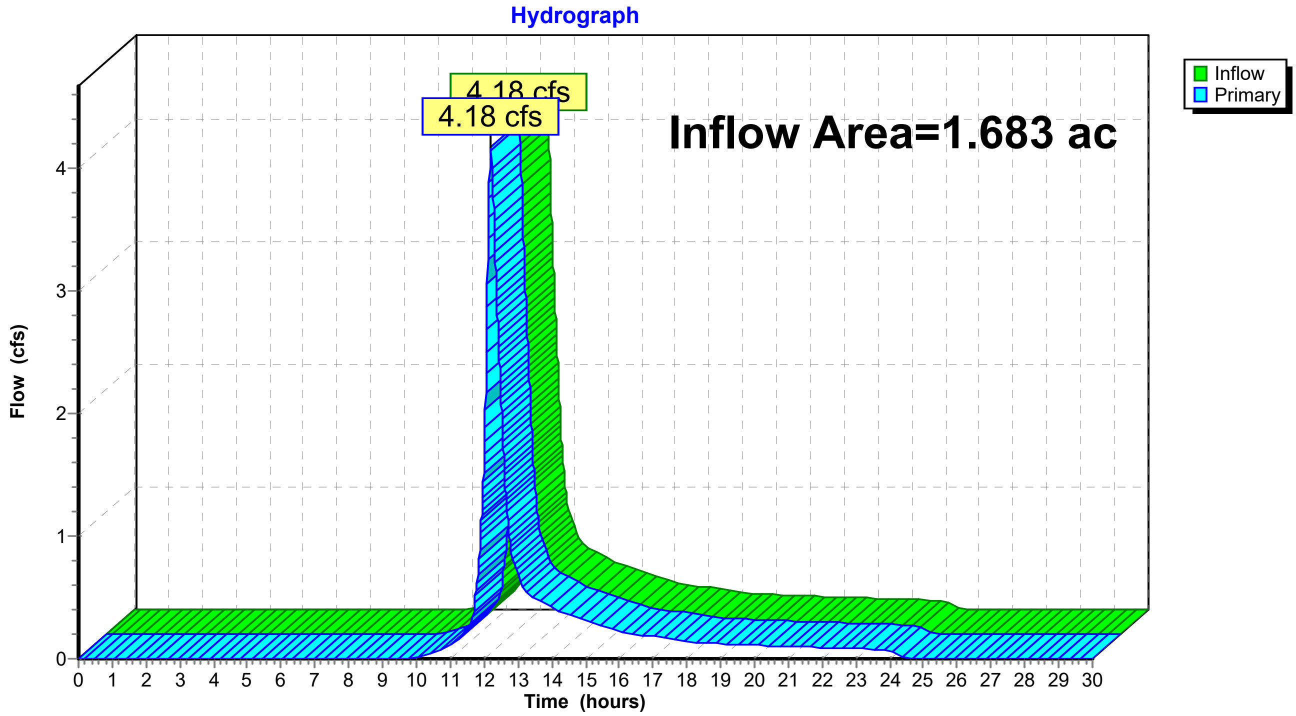


Summary for Link 9E: Design Point #4: Flow to Wetlands

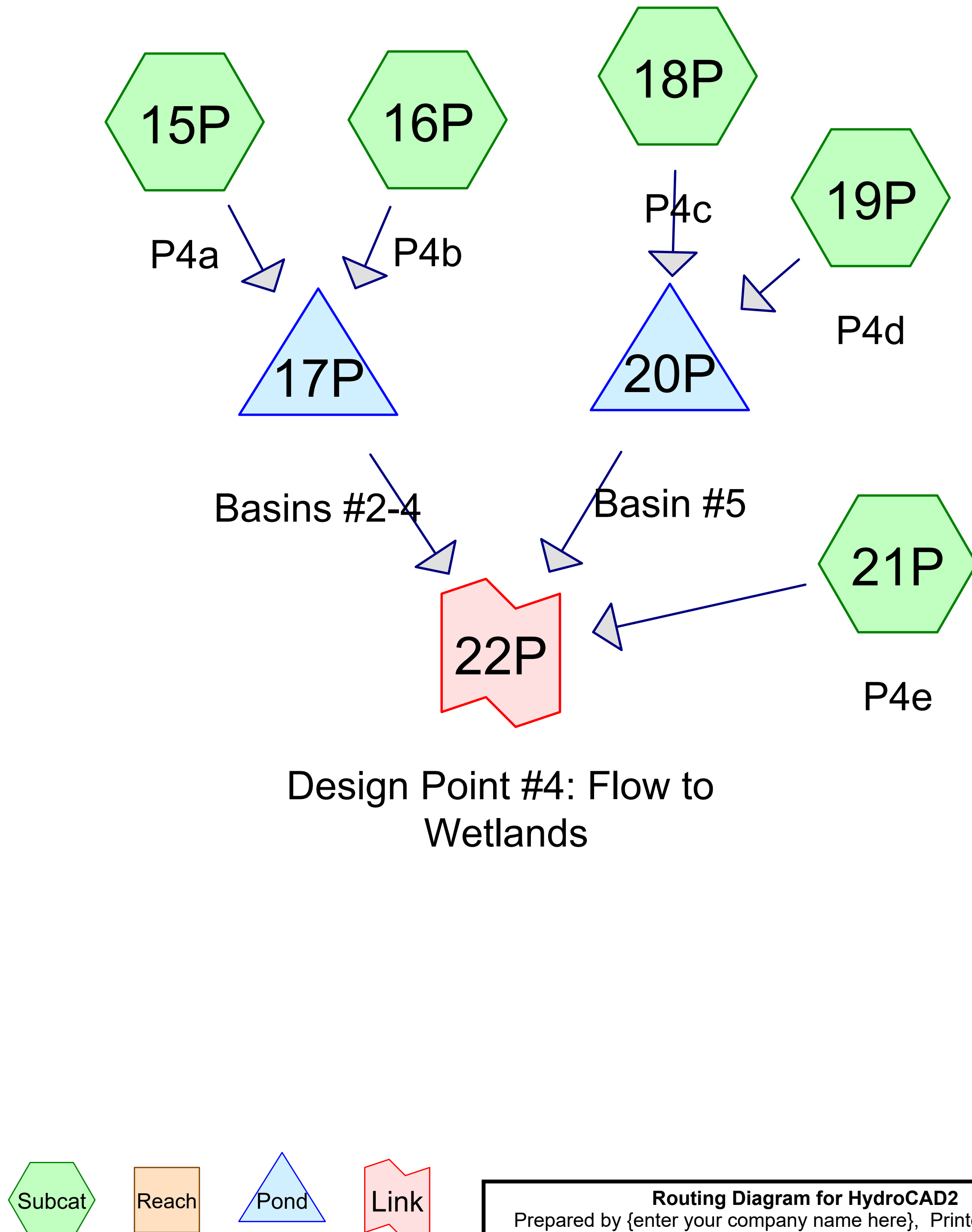
Inflow Area = 1.683 ac, 13.11% Impervious, Inflow Depth = 2.78" for 100-YR event
Inflow = 4.18 cfs @ 12.20 hrs, Volume= 0.389 af
Primary = 4.18 cfs @ 12.20 hrs, Volume= 0.389 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 9E: Design Point #4: Flow to Wetlands



DESIGN POINT #4: FLOW TO WETLANDS PROPOSED CONDITIONS



Routing Diagram for HydroCAD2
Prepared by {enter your company name here}, Printed 6/29/2019
HydroCAD® 10.00-24 s/n 05266 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.913	61	>75% Grass cover, Good, HSG B (15P, 18P, 21P)
0.036	98	Patios, HSG B (18P, 21P)
0.480	98	Paved parking, HSG B (15P)
0.128	98	Roofs, HSG B (16P)
0.170	98	Unconnected roofs, HSG B (19P)
0.371	55	Woods, Good, HSG B (21P)
2.097	**74**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
2.097	HSG B	15P, 16P, 18P, 19P, 21P
0.000	HSG C	
0.000	HSG D	
0.000	Other	
2.097		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 15P: P4a Runoff Area=42,468 sf 49.24% Impervious Runoff Depth=1.34"
Flow Length=55' Slope=0.0150 '/' Tc=6.5 min CN=79 Runoff=1.48 cfs 0.109 af

Subcatchment 16P: P4b Runoff Area=5,559 sf 100.00% Impervious Runoff Depth=2.97"
Tc=2.0 min CN=98 Runoff=0.46 cfs 0.032 af

Pond 17P: Basins #2-4 Peak Elev=185.32' Storage=1,904 cf Inflow=1.79 cfs 0.140 af
Discarded=0.32 cfs 0.131 af Primary=0.14 cfs 0.009 af Outflow=0.47 cfs 0.140 af

Subcatchment 18P: P4c Runoff Area=4,586 sf 8.55% Impervious Runoff Depth=0.56"
Flow Length=42' Slope=0.0100 '/' Tc=9.4 min CN=64 Runoff=0.05 cfs 0.005 af

Subcatchment 19P: P4d Runoff Area=7,412 sf 100.00% Impervious Runoff Depth=2.97"
Tc=2.0 min CN=98 Runoff=0.61 cfs 0.042 af

Pond 20P: Basin #5 Peak Elev=185.84' Storage=483 cf Inflow=0.63 cfs 0.047 af
Discarded=0.05 cfs 0.013 af Primary=0.07 cfs 0.034 af Outflow=0.12 cfs 0.047 af

Subcatchment 21P: P4e Runoff Area=31,336 sf 3.69% Impervious Runoff Depth=0.37"
Flow Length=129' Tc=11.1 min CN=59 Runoff=0.14 cfs 0.022 af

Link 22P: Design Point #4: Flow to Wetlands Inflow=0.34 cfs 0.065 af
Primary=0.34 cfs 0.065 af

Total Runoff Area = 2.097 ac Runoff Volume = 0.210 af Average Runoff Depth = 1.20"
61.22% Pervious = 1.284 ac 38.78% Impervious = 0.813 ac

Summary for Subcatchment 15P: P4a

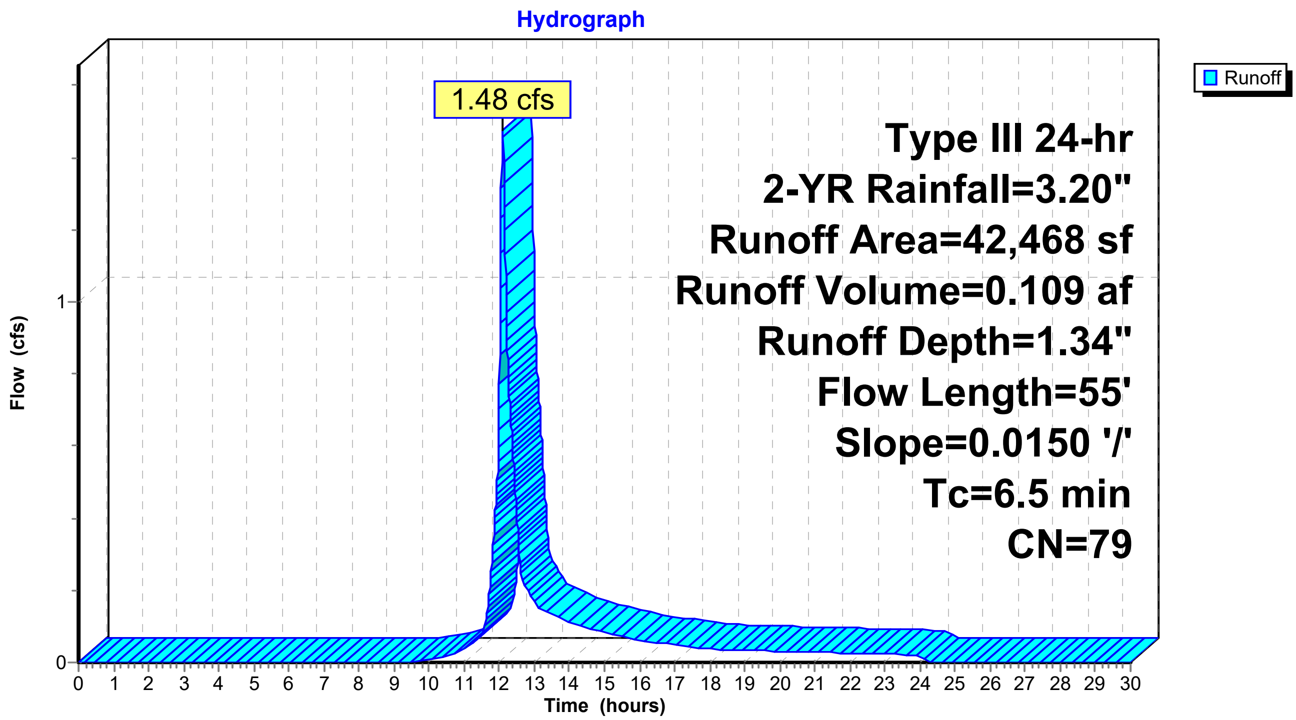
Runoff = 1.48 cfs @ 12.10 hrs, Volume= 0.109 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
20,913	98	Paved parking, HSG B
21,555	61	>75% Grass cover, Good, HSG B
42,468	79	Weighted Average
21,555		50.76% Pervious Area
20,913		49.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	30	0.0150	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.4	25	0.0150	0.93		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.5	55	Total			

Subcatchment 15P: P4a



Summary for Subcatchment 16P: P4b

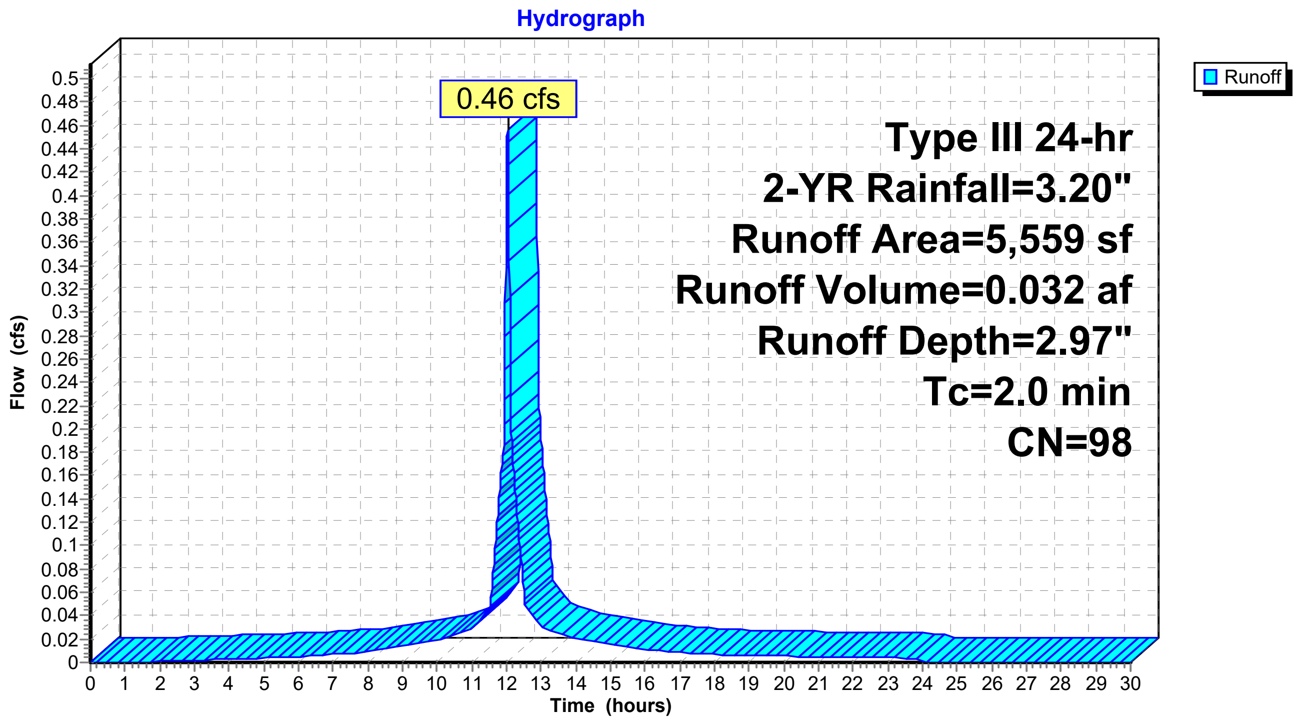
Runoff = 0.46 cfs @ 12.03 hrs, Volume= 0.032 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
5,559	98	Roofs, HSG B
5,559		100.00% Impervious Area

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

Subcatchment 16P: P4b



Summary for Pond 17P: Basins #2-4

Inflow Area = 1.103 ac, 55.12% Impervious, Inflow Depth = 1.53" for 2-YR event
Inflow = 1.79 cfs @ 12.08 hrs, Volume= 0.140 af
Outflow = 0.47 cfs @ 12.50 hrs, Volume= 0.140 af, Atten= 74%, Lag= 24.8 min
Discarded = 0.32 cfs @ 12.50 hrs, Volume= 0.131 af
Primary = 0.14 cfs @ 12.50 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 185.32' @ 12.50 hrs Surf.Area= 5,782 sf Storage= 1,904 cf

Plug-Flow detention time= 66.5 min calculated for 0.140 af (100% of inflow)
Center-of-Mass det. time= 66.5 min (891.8 - 825.3)

Volume	Invert	Avail.Storage	Storage Description
#1	185.00'	3,934 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
#2	184.50'	2,534 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
#3	185.20'	3,261 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
		9,729 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.00	3,531	264.0	0	0	3,531
186.00	4,351	282.0	3,934	3,934	4,359

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.50	575	96.0	0	0	575
186.00	1,092	128.0	1,230	1,230	1,170
187.00	1,528	150.0	1,304	2,534	1,676

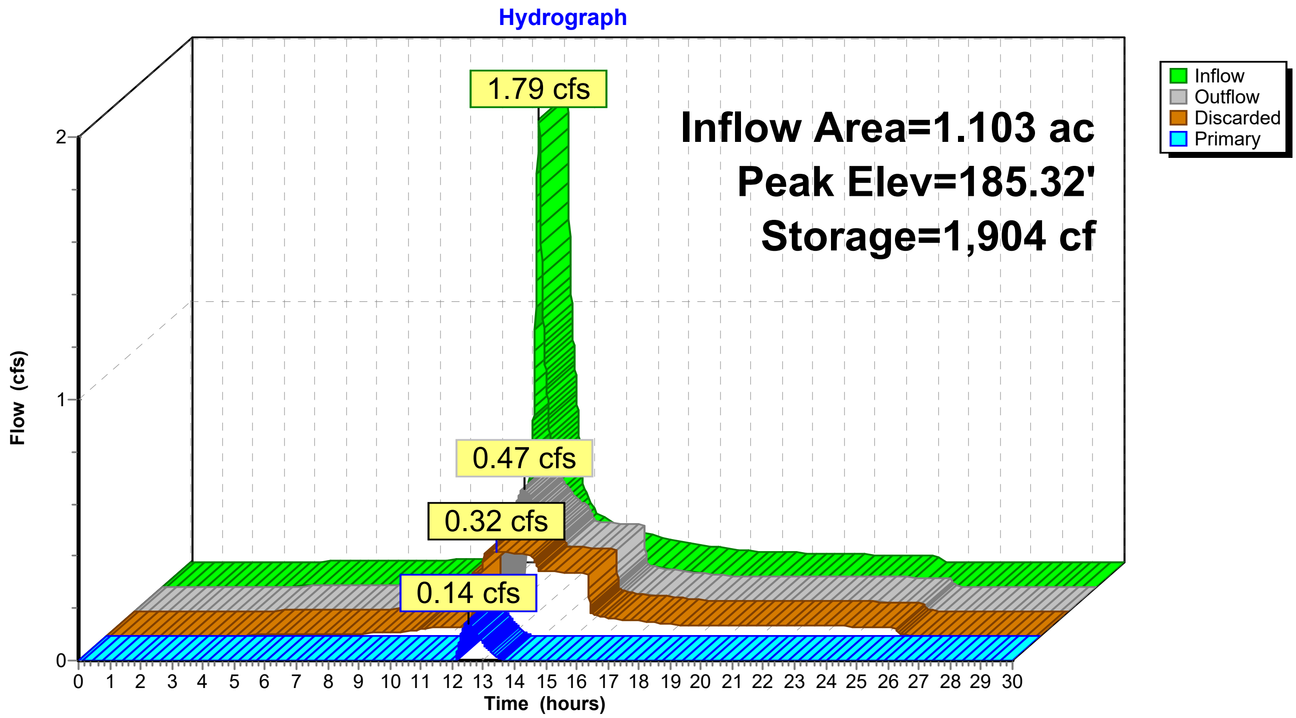
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.20	1,063	270.0	0	0	1,063
186.00	1,729	285.0	1,106	1,106	1,762
187.00	2,612	304.0	2,155	3,261	2,700

Device	Routing	Invert	Outlet Devices
#1	Discarded	184.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	185.20'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 185.20 185.80 185.80 186.00 Width (feet) 1.00 1.00 5.00 5.00

Discarded OutFlow Max=0.32 cfs @ 12.50 hrs HW=185.32' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.32 cfs)

Primary OutFlow Max=0.14 cfs @ 12.50 hrs HW=185.32' (Free Discharge)
└─**2=Custom Weir/Orifice** (Weir Controls 0.14 cfs @ 1.15 fps)

Pond 17P: Basins #2-4



Summary for Subcatchment 18P: P4c

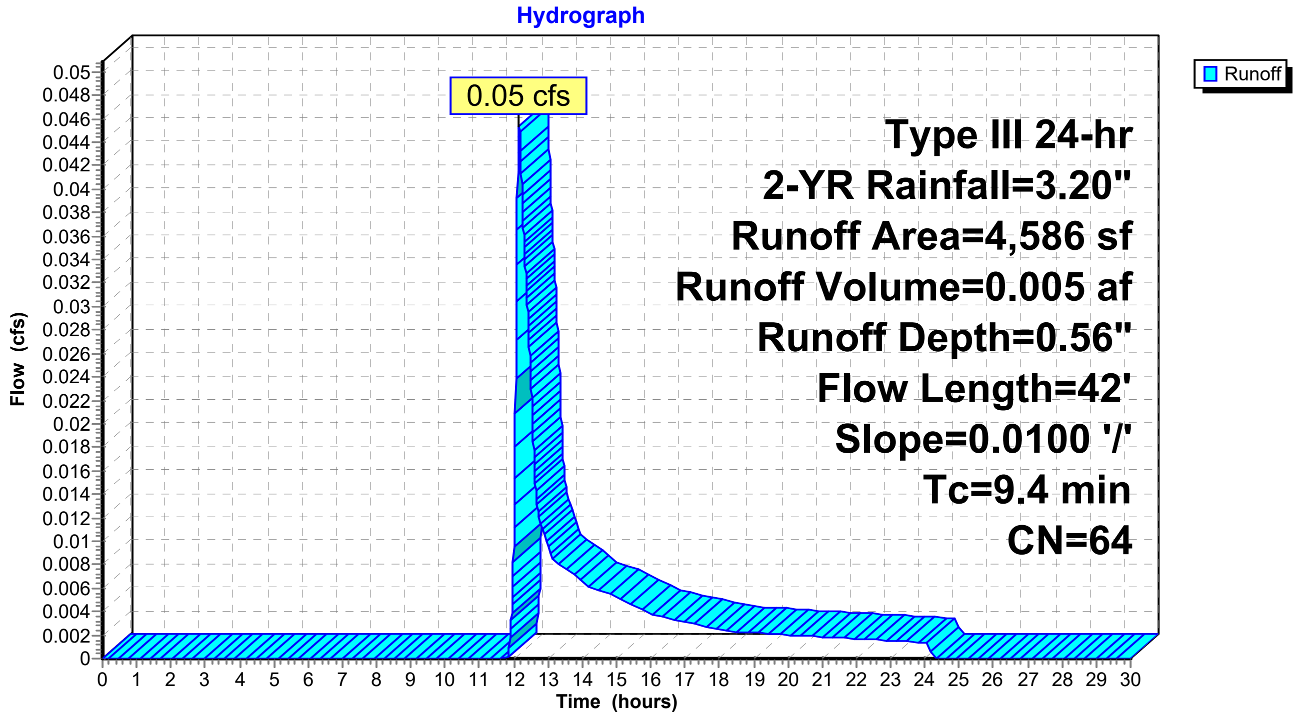
Runoff = 0.05 cfs @ 12.16 hrs, Volume= 0.005 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
*	392	98	Patios, HSG B
	4,194	61	>75% Grass cover, Good, HSG B
	4,586	64	Weighted Average
	4,194		91.45% Pervious Area
	392		8.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 18P: P4c



Summary for Subcatchment 19P: P4d

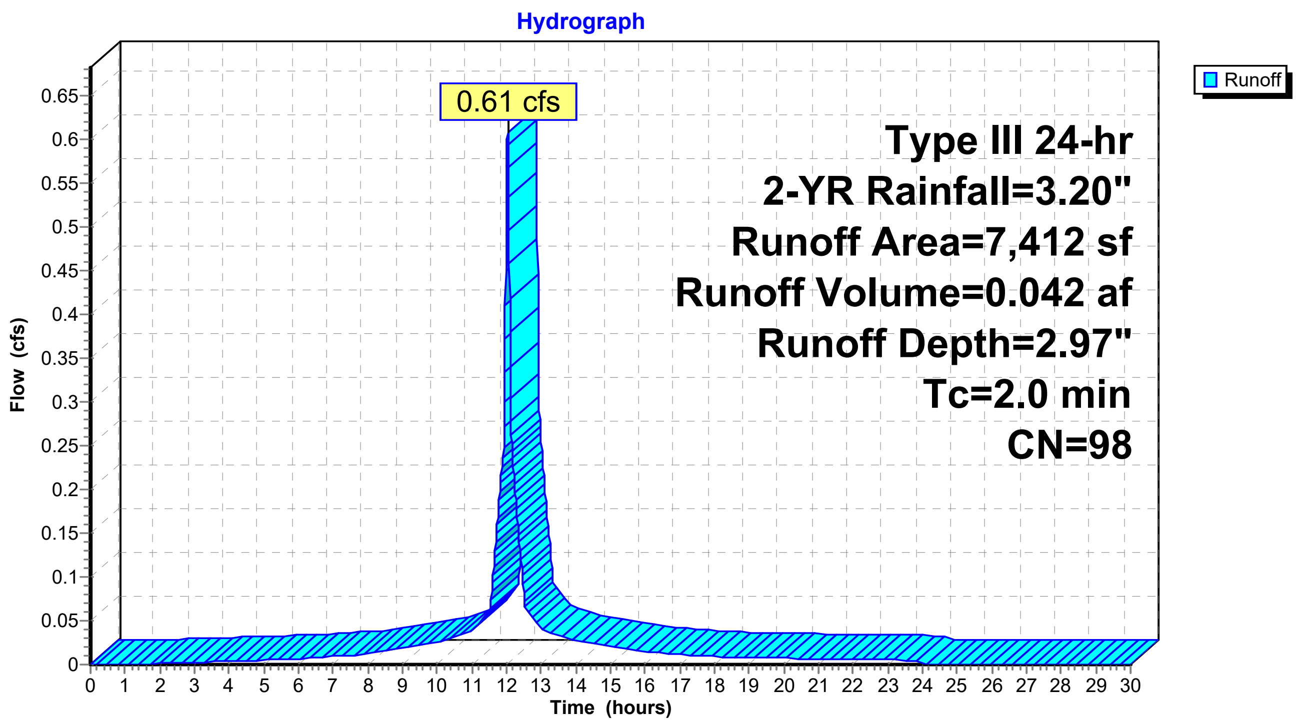
Runoff = 0.61 cfs @ 12.03 hrs, Volume= 0.042 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
7,412	98	Unconnected roofs, HSG B
7,412		100.00% Impervious Area
7,412		100.00% Unconnected

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

Subcatchment 19P: P4d



Summary for Pond 20P: Basin #5

Inflow Area = 0.275 ac, 65.04% Impervious, Inflow Depth = 2.05" for 2-YR event
Inflow = 0.63 cfs @ 12.03 hrs, Volume= 0.047 af
Outflow = 0.12 cfs @ 12.47 hrs, Volume= 0.047 af, Atten= 81%, Lag= 26.4 min
Discarded = 0.05 cfs @ 12.47 hrs, Volume= 0.013 af
Primary = 0.07 cfs @ 12.47 hrs, Volume= 0.034 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 185.84' @ 12.47 hrs Surf.Area= 859 sf Storage= 483 cf

Plug-Flow detention time= 23.1 min calculated for 0.047 af (100% of inflow)
Center-of-Mass det. time= 23.1 min (791.5 - 768.4)

Volume	Invert	Avail.Storage	Storage Description
#1	185.00'	1,957 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

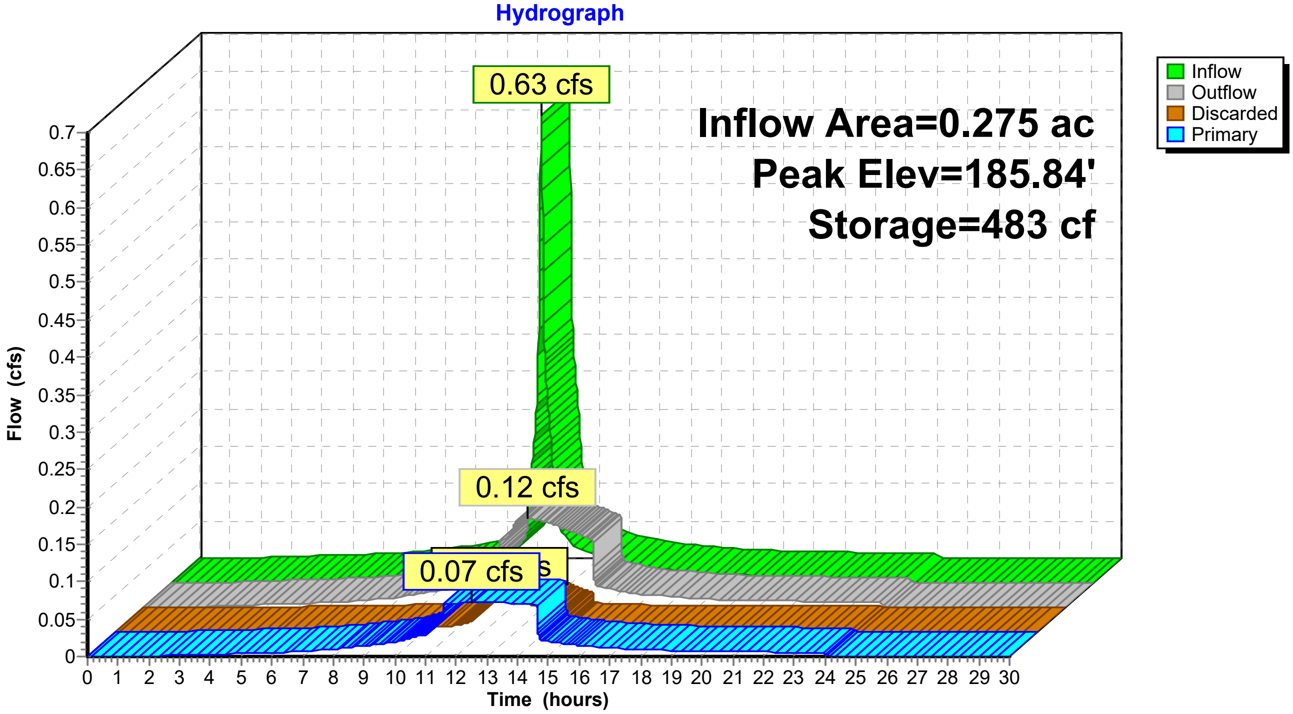
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.00	333	208.0	0	0	333
186.00	987	227.0	631	631	1,026
187.00	1,697	246.0	1,326	1,957	1,779

Device	Routing	Invert	Outlet Devices
#1	Discarded	185.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	186.70'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 186.70 187.00 Width (feet) 5.00 5.00
#3	Primary	165.80'	**1.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.80' / 165.00' S= 0.0800 '/' Cc= 0.900 n= 0.011, Flow Area= 0.01 sf

Discarded OutFlow Max=0.05 cfs @ 12.47 hrs HW=185.84' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.07 cfs @ 12.47 hrs HW=185.84' (Free Discharge)
├**2=Custom Weir/Orifice** (Controls 0.00 cfs)
└**3=Culvert** (Barrel Controls 0.07 cfs @ 13.20 fps)

Pond 20P: Basin #5



Summary for Subcatchment 21P: P4e

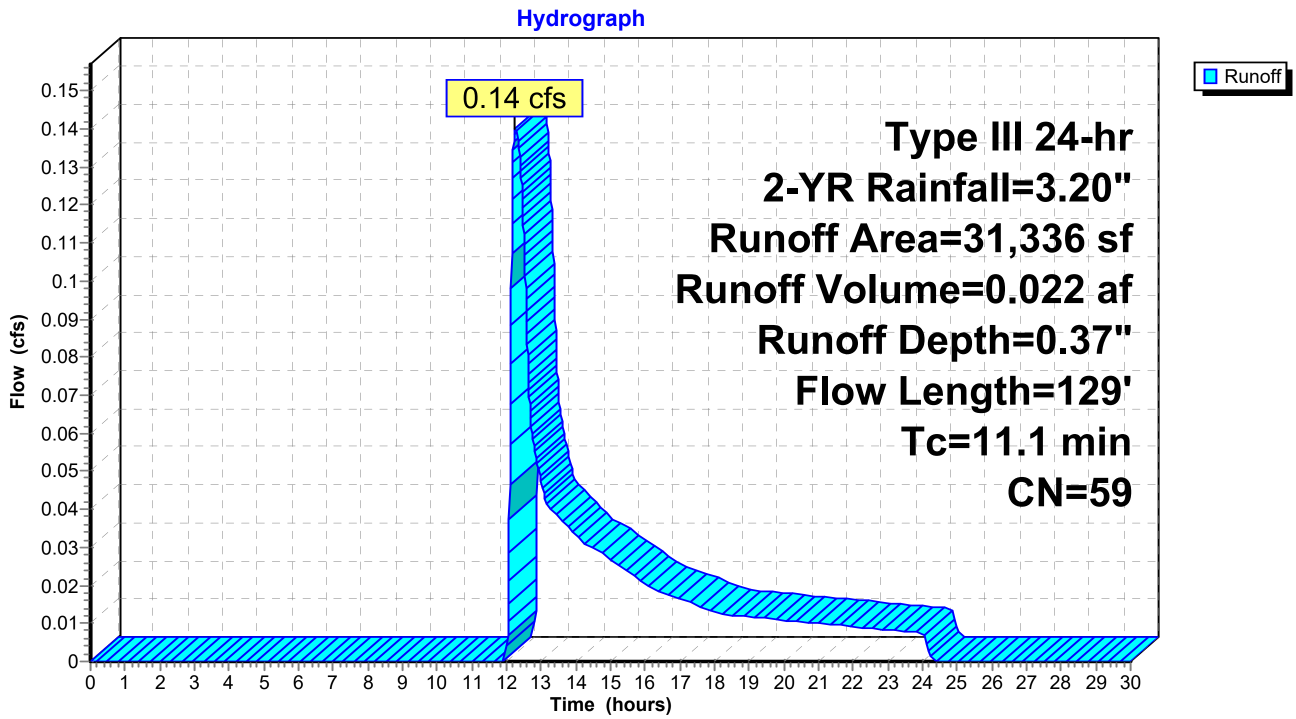
Runoff = 0.14 cfs @ 12.25 hrs, Volume= 0.022 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
*	1,155	98	Patios, HSG B
	14,033	61	>75% Grass cover, Good, HSG B
	16,148	55	Woods, Good, HSG B
	31,336	59	Weighted Average
	30,181		96.31% Pervious Area
	1,155		3.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.6	67	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	20	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	129	Total			

Subcatchment 21P: P4e

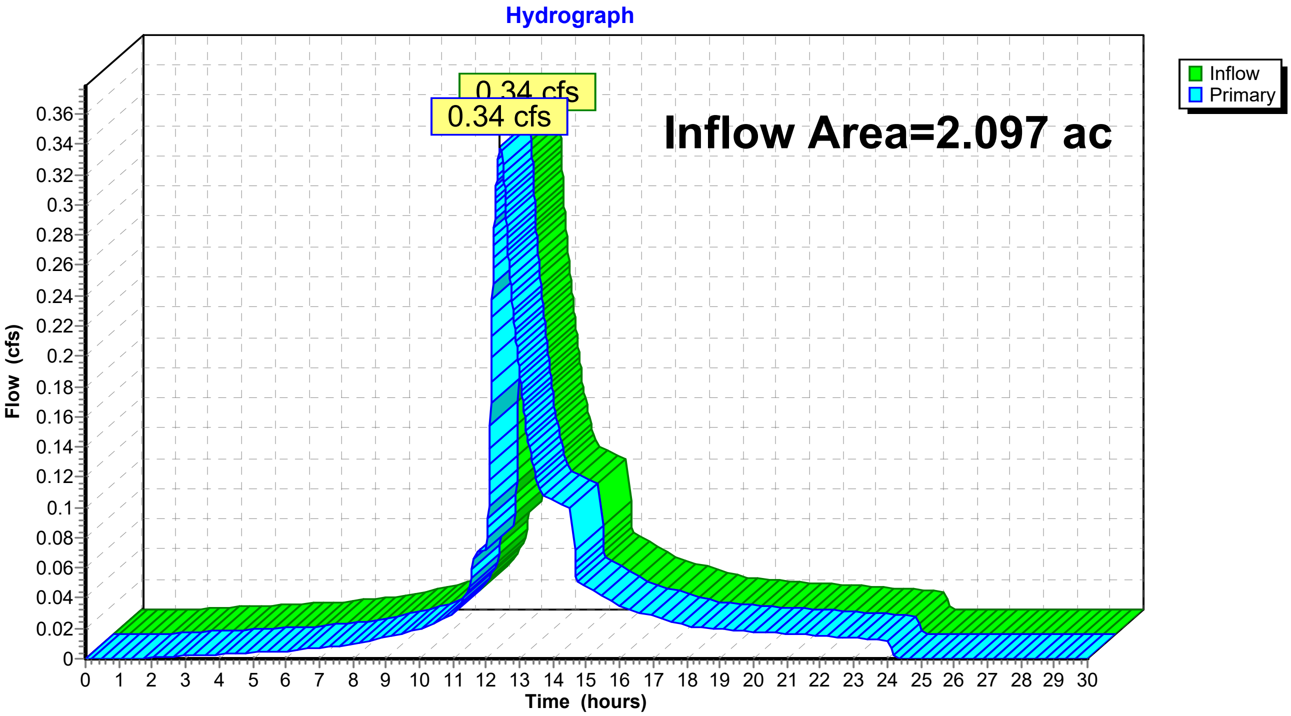


Summary for Link 22P: Design Point #4: Flow to Wetlands

Inflow Area = 2.097 ac, 38.78% Impervious, Inflow Depth = 0.37" for 2-YR event
Inflow = 0.34 cfs @ 12.42 hrs, Volume= 0.065 af
Primary = 0.34 cfs @ 12.42 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 22P: Design Point #4: Flow to Wetlands



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 15P: P4a Runoff Area=42,468 sf 49.24% Impervious Runoff Depth=2.55"
Flow Length=55' Slope=0.0150 '/' Tc=6.5 min CN=79 Runoff=2.86 cfs 0.207 af

Subcatchment 16P: P4b Runoff Area=5,559 sf 100.00% Impervious Runoff Depth=4.46"
Tc=2.0 min CN=98 Runoff=0.68 cfs 0.047 af

Pond 17P: Basins #2-4 Peak Elev=185.57' Storage=3,352 cf Inflow=3.32 cfs 0.254 af
Discarded=0.35 cfs 0.192 af Primary=0.72 cfs 0.062 af Outflow=1.07 cfs 0.254 af

Subcatchment 18P: P4c Runoff Area=4,586 sf 8.55% Impervious Runoff Depth=1.39"
Flow Length=42' Slope=0.0100 '/' Tc=9.4 min CN=64 Runoff=0.14 cfs 0.012 af

Subcatchment 19P: P4d Runoff Area=7,412 sf 100.00% Impervious Runoff Depth=4.46"
Tc=2.0 min CN=98 Runoff=0.90 cfs 0.063 af

Pond 20P: Basin #5 Peak Elev=186.31' Storage=965 cf Inflow=0.97 cfs 0.075 af
Discarded=0.07 cfs 0.025 af Primary=0.07 cfs 0.050 af Outflow=0.14 cfs 0.075 af

Subcatchment 21P: P4e Runoff Area=31,336 sf 3.69% Impervious Runoff Depth=1.07"
Flow Length=129' Tc=11.1 min CN=59 Runoff=0.64 cfs 0.064 af

Link 22P: Design Point #4: Flow to Wetlands Inflow=1.26 cfs 0.177 af
Primary=1.26 cfs 0.177 af

Total Runoff Area = 2.097 ac Runoff Volume = 0.394 af Average Runoff Depth = 2.25"
61.22% Pervious = 1.284 ac 38.78% Impervious = 0.813 ac

Summary for Subcatchment 15P: P4a

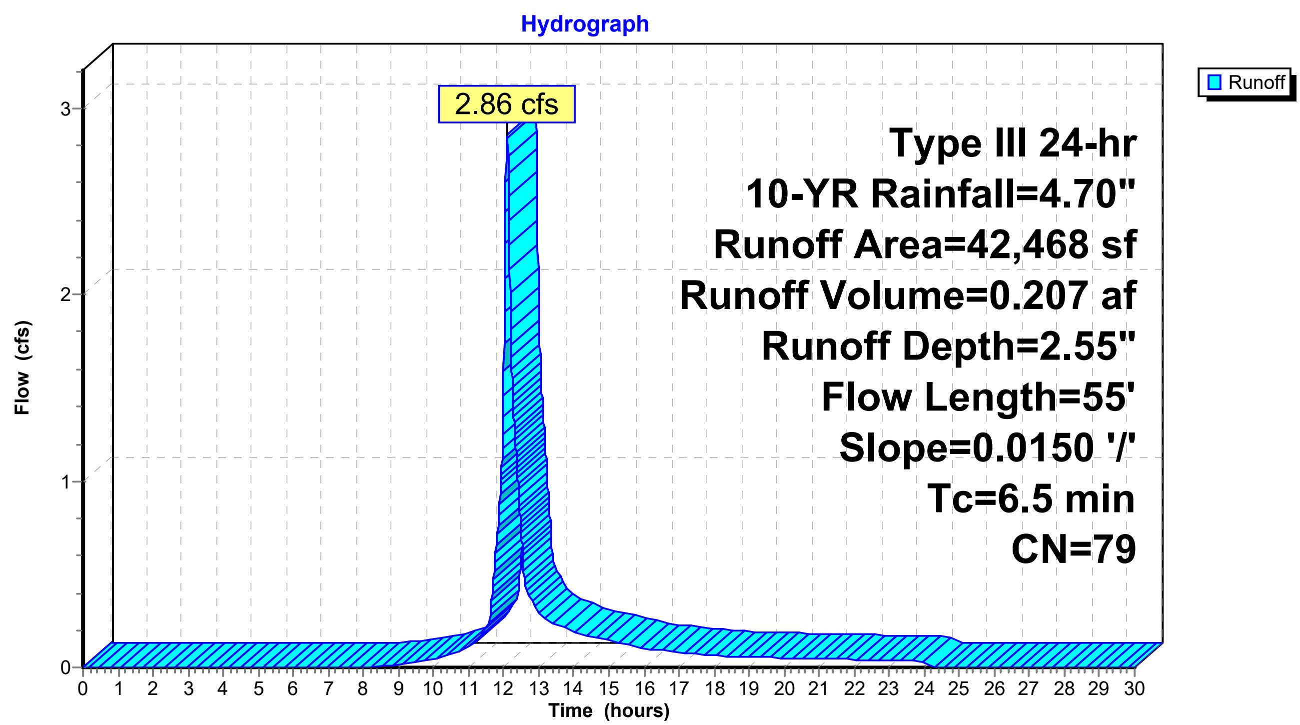
Runoff = 2.86 cfs @ 12.10 hrs, Volume= 0.207 af, Depth= 2.55"

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

Area (sf)	CN	Description
20,913	98	Paved parking, HSG B
21,555	61	>75% Grass cover, Good, HSG B
42,468	79	Weighted Average
21,555		50.76% Pervious Area
20,913		49.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	30	0.0150	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.4	25	0.0150	0.93		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.5	55	Total			

Subcatchment 15P: P4a



Summary for Subcatchment 16P: P4b

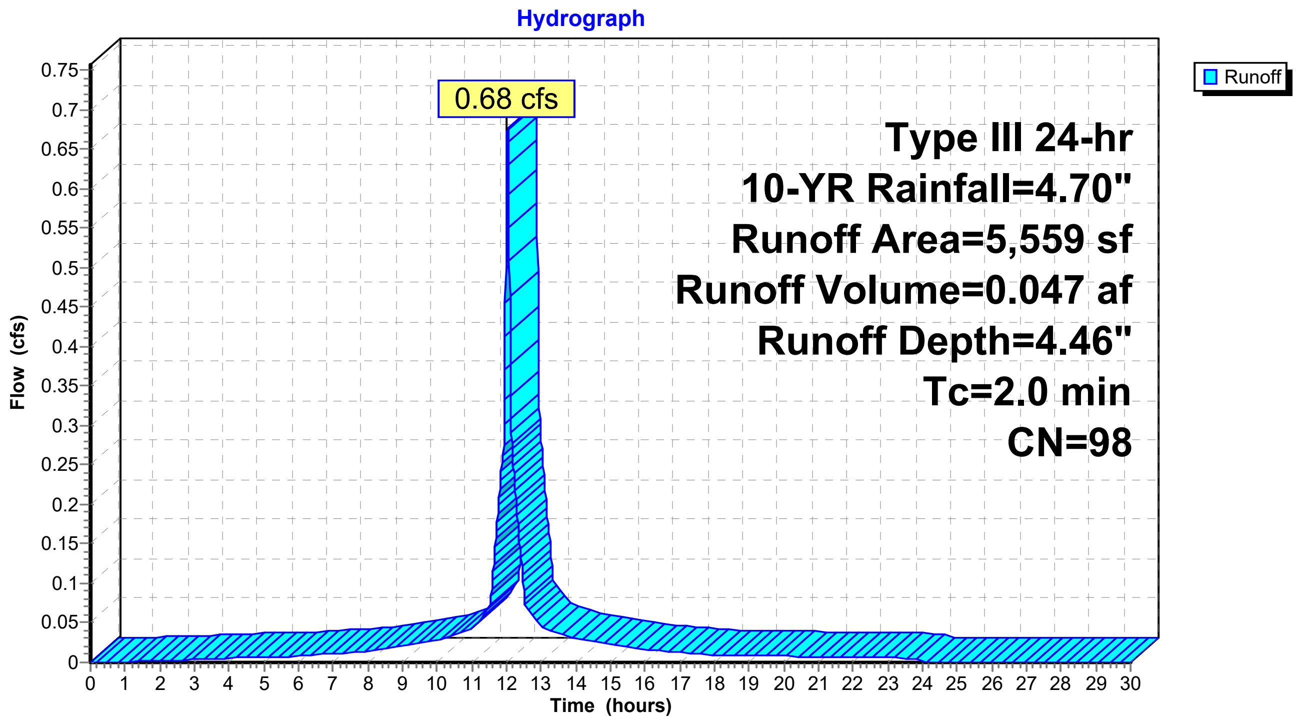
Runoff = 0.68 cfs @ 12.03 hrs, Volume= 0.047 af, Depth= 4.46"

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

Area (sf)	CN	Description
5,559	98	Roofs, HSG B
5,559		100.00% Impervious Area

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

Subcatchment 16P: P4b



Summary for Pond 17P: Basins #2-4

Inflow Area = 1.103 ac, 55.12% Impervious, Inflow Depth = 2.77" for 10-YR event
Inflow = 3.32 cfs @ 12.08 hrs, Volume= 0.254 af
Outflow = 1.07 cfs @ 12.42 hrs, Volume= 0.254 af, Atten= 68%, Lag= 20.3 min
Discarded = 0.35 cfs @ 12.42 hrs, Volume= 0.192 af
Primary = 0.72 cfs @ 12.42 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 185.57' @ 12.42 hrs Surf.Area= 6,256 sf Storage= 3,352 cf

Plug-Flow detention time= 60.2 min calculated for 0.254 af (100% of inflow)
Center-of-Mass det. time= 60.2 min (872.5 - 812.3)

Volume	Invert	Avail.Storage	Storage Description
#1	185.00'	3,934 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)
#2	184.50'	2,534 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)
#3	185.20'	3,261 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)
		9,729 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.00	3,531	264.0	0	0	3,531
186.00	4,351	282.0	3,934	3,934	4,359

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.50	575	96.0	0	0	575
186.00	1,092	128.0	1,230	1,230	1,170
187.00	1,528	150.0	1,304	2,534	1,676

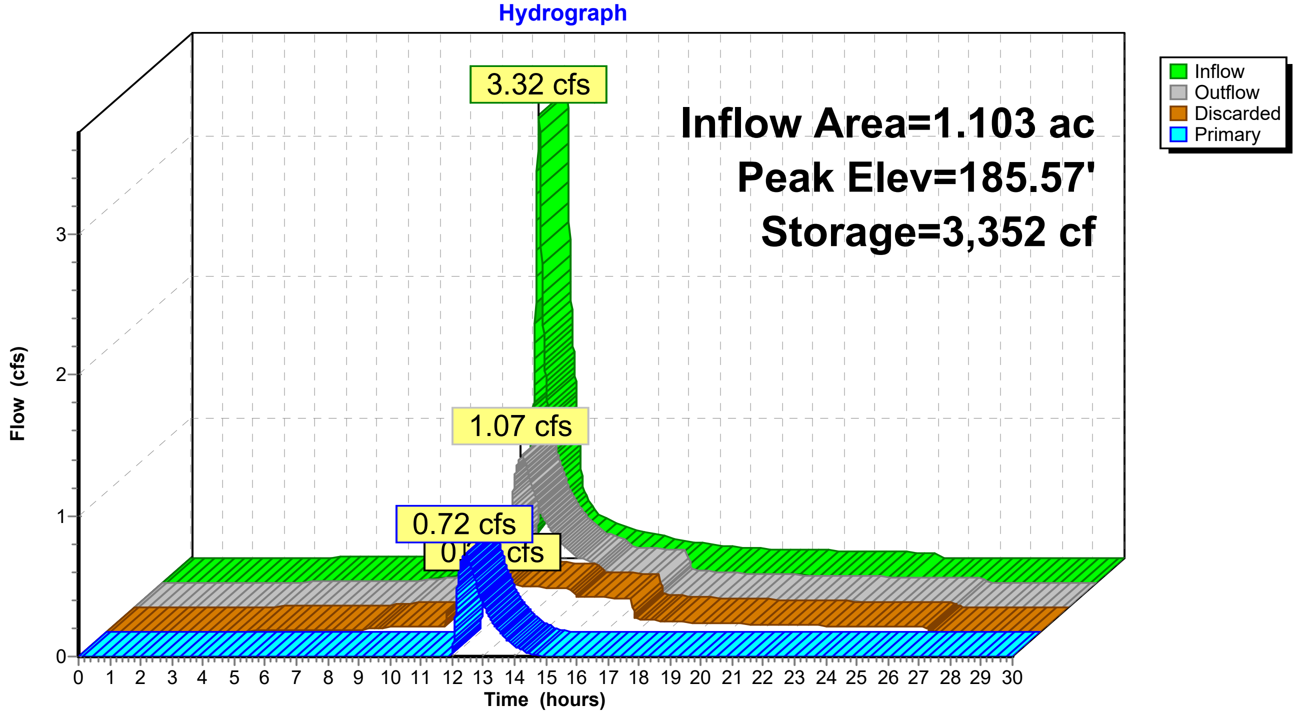
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.20	1,063	270.0	0	0	1,063
186.00	1,729	285.0	1,106	1,106	1,762
187.00	2,612	304.0	2,155	3,261	2,700

Device	Routing	Invert	Outlet Devices
#1	Discarded	184.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	185.20'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 185.20 185.80 185.80 186.00 Width (feet) 1.00 1.00 5.00 5.00

Discarded OutFlow Max=0.35 cfs @ 12.42 hrs HW=185.56' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.72 cfs @ 12.42 hrs HW=185.56' (Free Discharge)
└─**2=Custom Weir/Orifice** (Weir Controls 0.72 cfs @ 1.98 fps)

Pond 17P: Basins #2-4



Summary for Subcatchment 18P: P4c

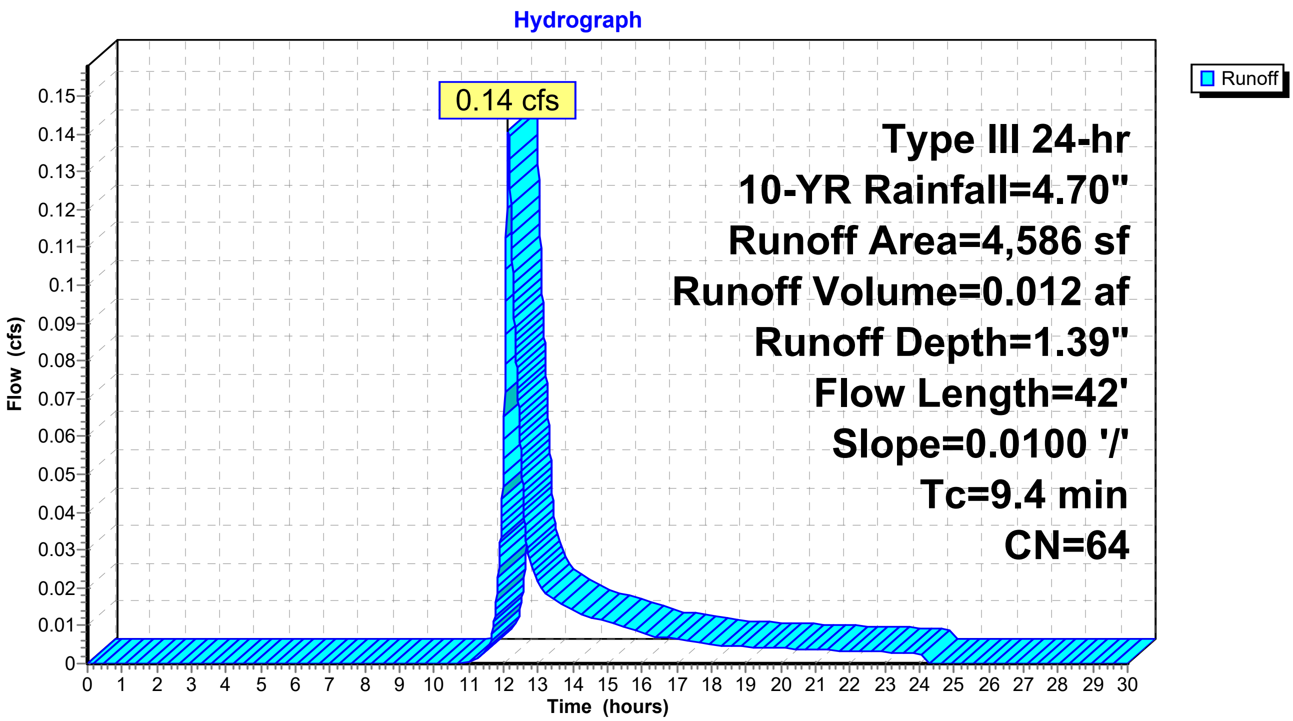
Runoff = 0.14 cfs @ 12.14 hrs, Volume= 0.012 af, Depth= 1.39"

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

	Area (sf)	CN	Description
*	392	98	Patios, HSG B
	4,194	61	>75% Grass cover, Good, HSG B
	4,586	64	Weighted Average
	4,194		91.45% Pervious Area
	392		8.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 18P: P4c



Summary for Subcatchment 19P: P4d

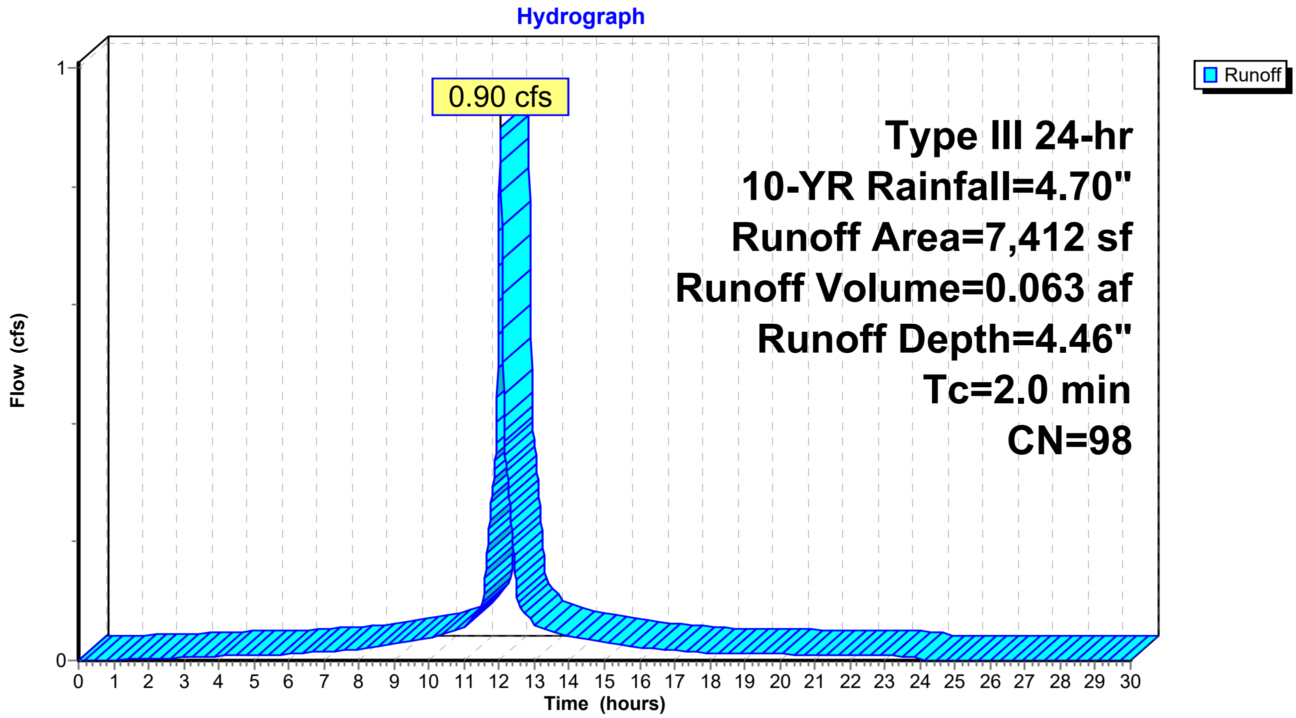
Runoff = 0.90 cfs @ 12.03 hrs, Volume= 0.063 af, Depth= 4.46"

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

Area (sf)	CN	Description
7,412	98	Unconnected roofs, HSG B
7,412		100.00% Impervious Area
7,412		100.00% Unconnected

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

Subcatchment 19P: P4d



Summary for Pond 20P: Basin #5

Inflow Area = 0.275 ac, 65.04% Impervious, Inflow Depth = 3.29" for 10-YR event
Inflow = 0.97 cfs @ 12.03 hrs, Volume= 0.075 af
Outflow = 0.14 cfs @ 12.56 hrs, Volume= 0.075 af, Atten= 86%, Lag= 31.8 min
Discarded = 0.07 cfs @ 12.56 hrs, Volume= 0.025 af
Primary = 0.07 cfs @ 12.56 hrs, Volume= 0.050 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 186.31' @ 12.56 hrs Surf.Area= 1,185 sf Storage= 965 cf

Plug-Flow detention time= 47.2 min calculated for 0.075 af (100% of inflow)
Center-of-Mass det. time= 47.2 min (812.9 - 765.6)

Volume	Invert	Avail.Storage	Storage Description
#1	185.00'	1,957 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

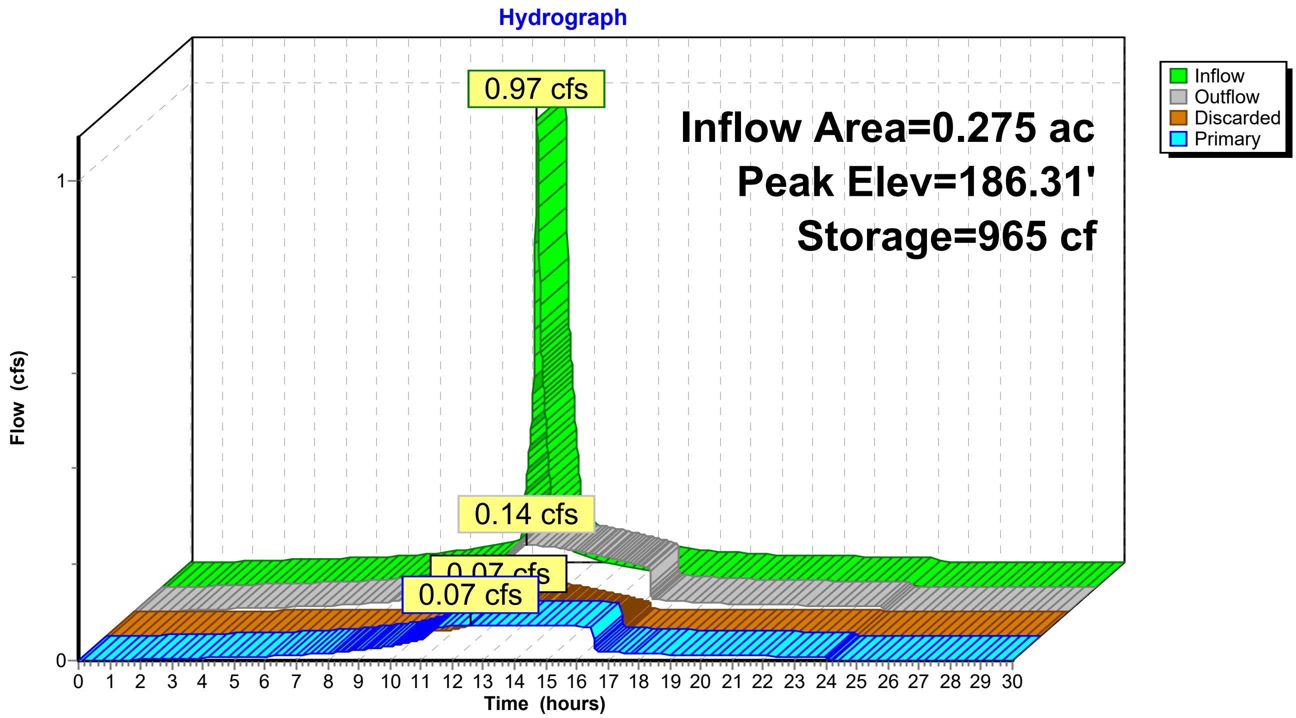
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.00	333	208.0	0	0	333
186.00	987	227.0	631	631	1,026
187.00	1,697	246.0	1,326	1,957	1,779

Device	Routing	Invert	Outlet Devices
#1	Discarded	185.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	186.70'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 186.70 187.00 Width (feet) 5.00 5.00
#3	Primary	165.80'	**1.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.80' / 165.00' S= 0.0800 '/' Cc= 0.900 n= 0.011, Flow Area= 0.01 sf

Discarded OutFlow Max=0.07 cfs @ 12.56 hrs HW=186.31' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.07 cfs @ 12.56 hrs HW=186.31' (Free Discharge)
├─**2=Custom Weir/Orifice** (Controls 0.00 cfs)
└─**3=Culvert** (Barrel Controls 0.07 cfs @ 13.35 fps)

Pond 20P: Basin #5



Summary for Subcatchment 21P: P4e

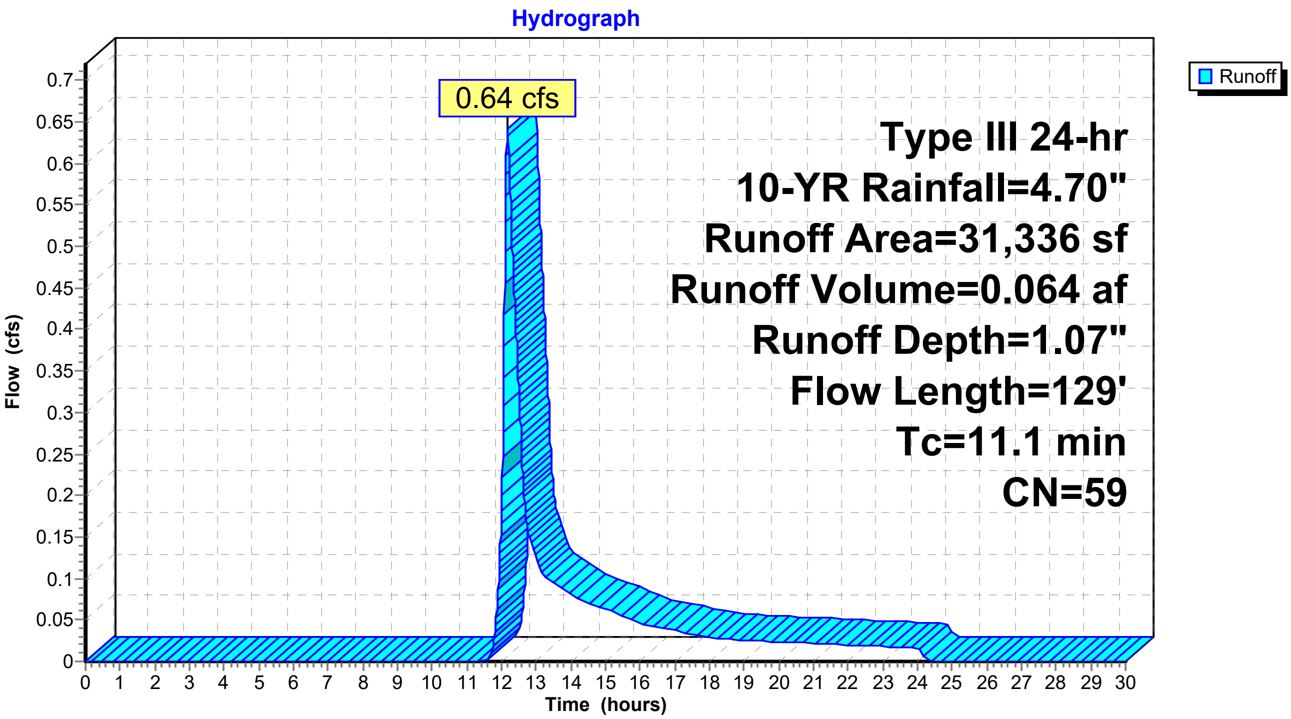
Runoff = 0.64 cfs @ 12.17 hrs, Volume= 0.064 af, Depth= 1.07"

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

	Area (sf)	CN	Description
*	1,155	98	Patios, HSG B
	14,033	61	>75% Grass cover, Good, HSG B
	16,148	55	Woods, Good, HSG B
	31,336	59	Weighted Average
	30,181		96.31% Pervious Area
	1,155		3.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.6	67	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	20	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	129	Total			

Subcatchment 21P: P4e

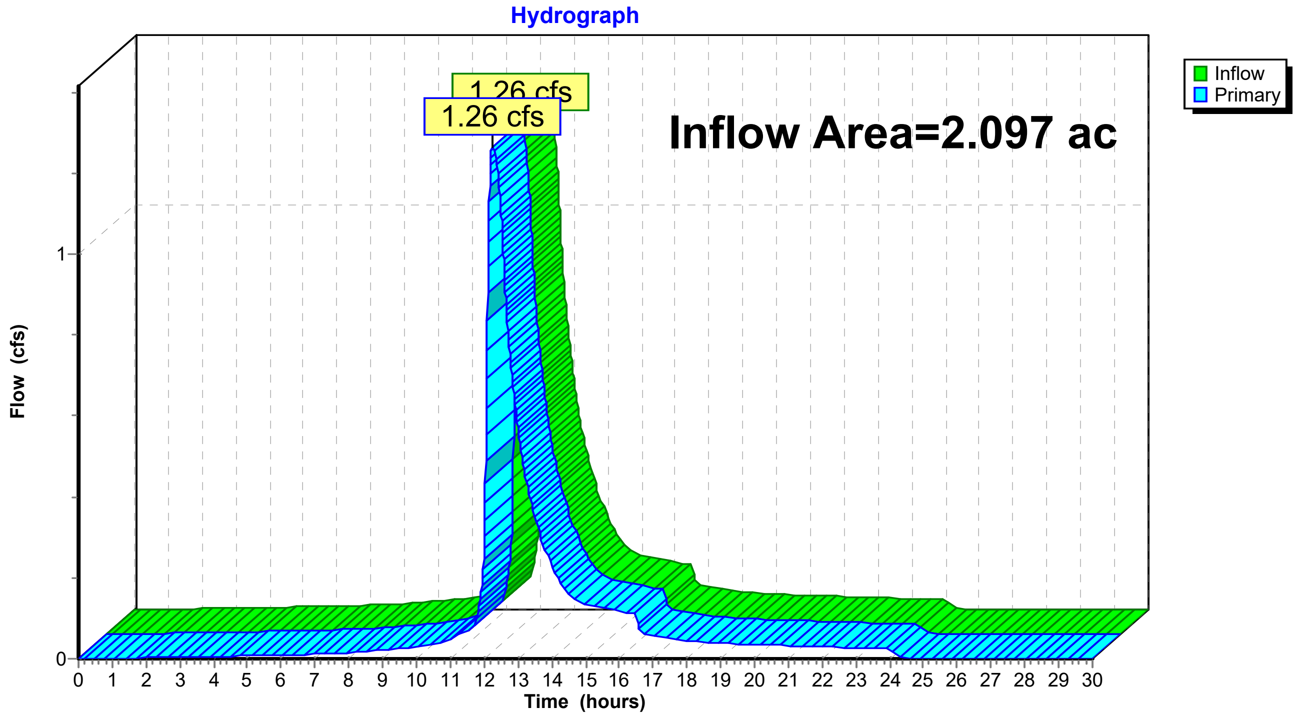


Summary for Link 22P: Design Point #4: Flow to Wetlands

Inflow Area = 2.097 ac, 38.78% Impervious, Inflow Depth = 1.01" for 10-YR event
Inflow = 1.26 cfs @ 12.24 hrs, Volume= 0.177 af
Primary = 1.26 cfs @ 12.24 hrs, Volume= 0.177 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 22P: Design Point #4: Flow to Wetlands



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 15P: P4a Runoff Area=42,468 sf 49.24% Impervious Runoff Depth=3.24"
Flow Length=55' Slope=0.0150 '/' Tc=6.5 min CN=79 Runoff=3.63 cfs 0.263 af

Subcatchment 16P: P4b Runoff Area=5,559 sf 100.00% Impervious Runoff Depth=5.26"
Tc=2.0 min CN=98 Runoff=0.79 cfs 0.056 af

Pond 17P: Basins #2-4 Peak Elev=185.68' Storage=4,106 cf Inflow=4.18 cfs 0.319 af
Discarded=0.36 cfs 0.220 af Primary=1.10 cfs 0.099 af Outflow=1.46 cfs 0.319 af

Subcatchment 18P: P4c Runoff Area=4,586 sf 8.55% Impervious Runoff Depth=1.91"
Flow Length=42' Slope=0.0100 '/' Tc=9.4 min CN=64 Runoff=0.20 cfs 0.017 af

Subcatchment 19P: P4d Runoff Area=7,412 sf 100.00% Impervious Runoff Depth=5.26"
Tc=2.0 min CN=98 Runoff=1.06 cfs 0.075 af

Pond 20P: Basin #5 Peak Elev=186.54' Storage=1,259 cf Inflow=1.17 cfs 0.091 af
Discarded=0.08 cfs 0.033 af Primary=0.07 cfs 0.059 af Outflow=0.15 cfs 0.091 af

Subcatchment 21P: P4e Runoff Area=31,336 sf 3.69% Impervious Runoff Depth=1.53"
Flow Length=129' Tc=11.1 min CN=59 Runoff=0.99 cfs 0.092 af

Link 22P: Design Point #4: Flow to Wetlands Inflow=1.95 cfs 0.249 af
Primary=1.95 cfs 0.249 af

Total Runoff Area = 2.097 ac Runoff Volume = 0.502 af Average Runoff Depth = 2.87"
61.22% Pervious = 1.284 ac 38.78% Impervious = 0.813 ac

Summary for Subcatchment 15P: P4a

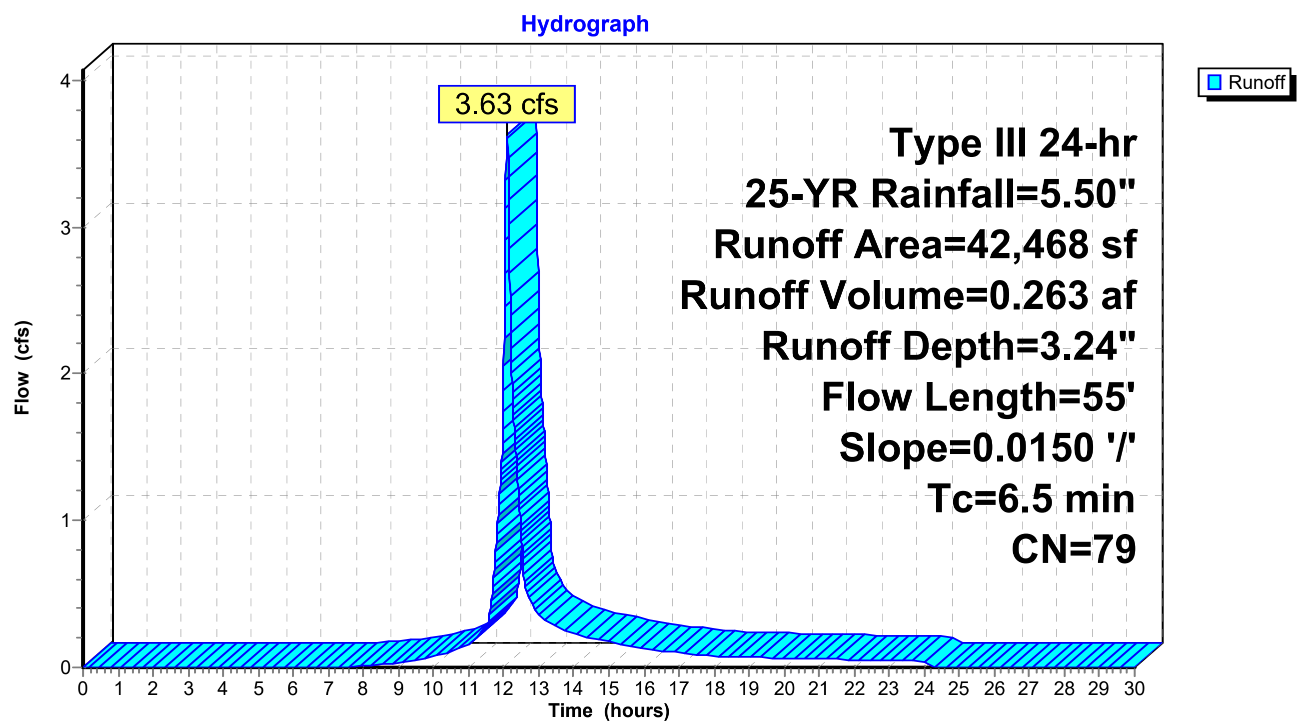
Runoff = 3.63 cfs @ 12.09 hrs, Volume= 0.263 af, Depth= 3.24"

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

Area (sf)	CN	Description
20,913	98	Paved parking, HSG B
21,555	61	>75% Grass cover, Good, HSG B
42,468	79	Weighted Average
21,555		50.76% Pervious Area
20,913		49.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	30	0.0150	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.4	25	0.0150	0.93		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.5	55	Total			

Subcatchment 15P: P4a



Summary for Subcatchment 16P: P4b

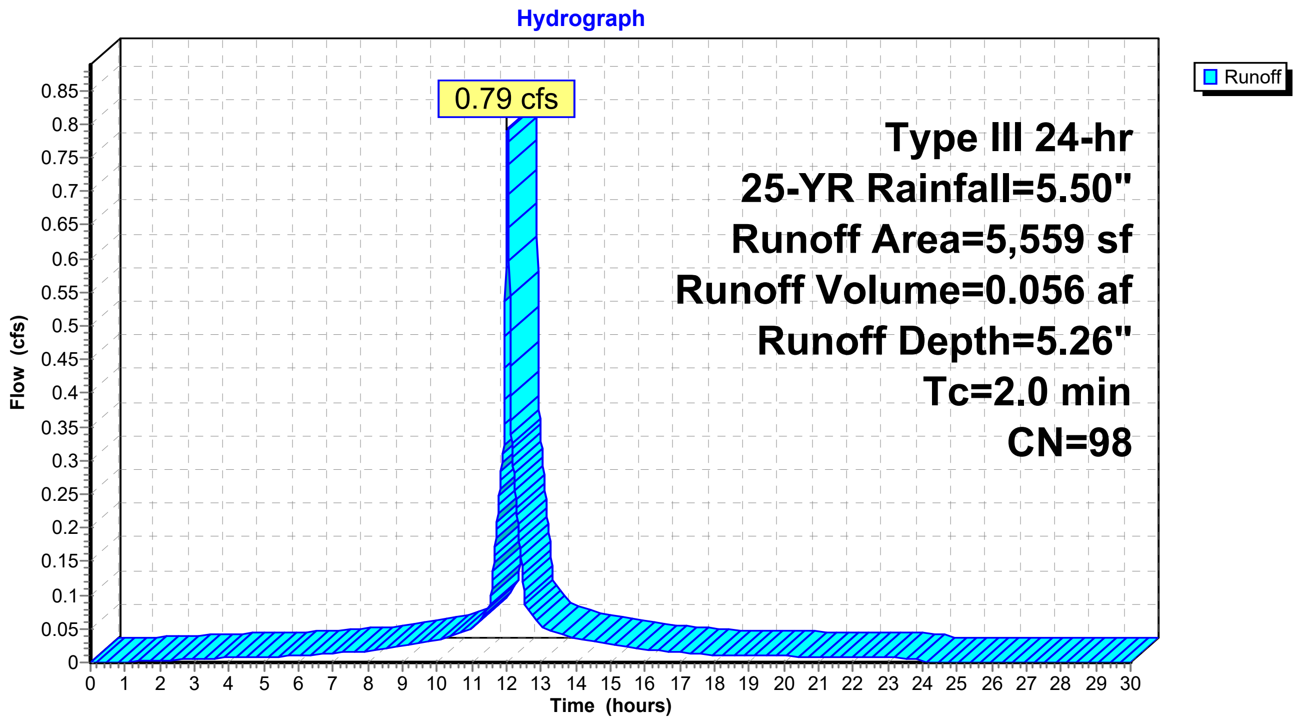
Runoff = 0.79 cfs @ 12.03 hrs, Volume= 0.056 af, Depth= 5.26"

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

Area (sf)	CN	Description
5,559	98	Roofs, HSG B
5,559		100.00% Impervious Area

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

Subcatchment 16P: P4b



Summary for Pond 17P: Basins #2-4

Inflow Area = 1.103 ac, 55.12% Impervious, Inflow Depth = 3.47" for 25-YR event
Inflow = 4.18 cfs @ 12.08 hrs, Volume= 0.319 af
Outflow = 1.46 cfs @ 12.39 hrs, Volume= 0.319 af, Atten= 65%, Lag= 18.3 min
Discarded = 0.36 cfs @ 12.39 hrs, Volume= 0.220 af
Primary = 1.10 cfs @ 12.39 hrs, Volume= 0.099 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 185.68' @ 12.39 hrs Surf.Area= 6,497 sf Storage= 4,106 cf

Plug-Flow detention time= 56.4 min calculated for 0.319 af (100% of inflow)
Center-of-Mass det. time= 56.4 min (863.5 - 807.1)

Volume	Invert	Avail.Storage	Storage Description
#1	185.00'	3,934 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
#2	184.50'	2,534 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
#3	185.20'	3,261 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
		9,729 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.00	3,531	264.0	0	0	3,531
186.00	4,351	282.0	3,934	3,934	4,359

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.50	575	96.0	0	0	575
186.00	1,092	128.0	1,230	1,230	1,170
187.00	1,528	150.0	1,304	2,534	1,676

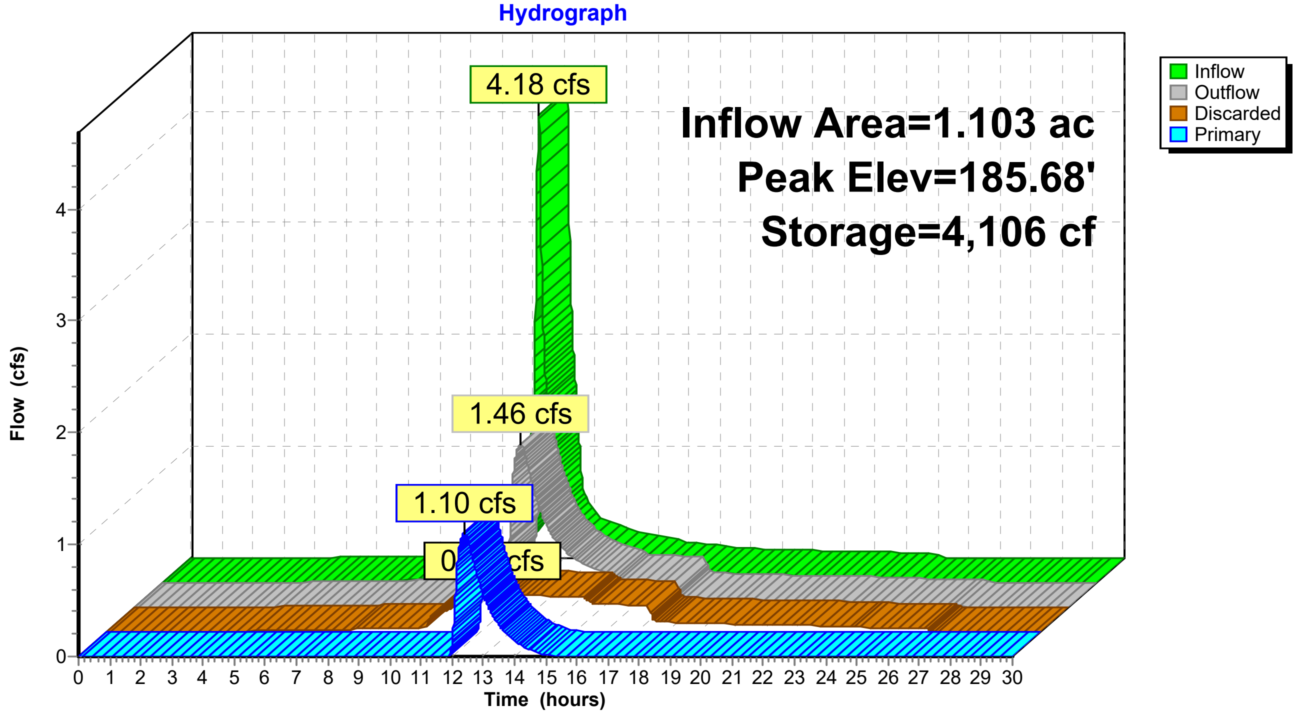
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.20	1,063	270.0	0	0	1,063
186.00	1,729	285.0	1,106	1,106	1,762
187.00	2,612	304.0	2,155	3,261	2,700

Device	Routing	Invert	Outlet Devices
#1	Discarded	184.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	185.20'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 185.20 185.80 185.80 186.00 Width (feet) 1.00 1.00 5.00 5.00

Discarded OutFlow Max=0.36 cfs @ 12.39 hrs HW=185.68' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.36 cfs)

Primary OutFlow Max=1.10 cfs @ 12.39 hrs HW=185.68' (Free Discharge)
└─**2=Custom Weir/Orifice** (Weir Controls 1.10 cfs @ 2.28 fps)

Pond 17P: Basins #2-4



Summary for Subcatchment 18P: P4c

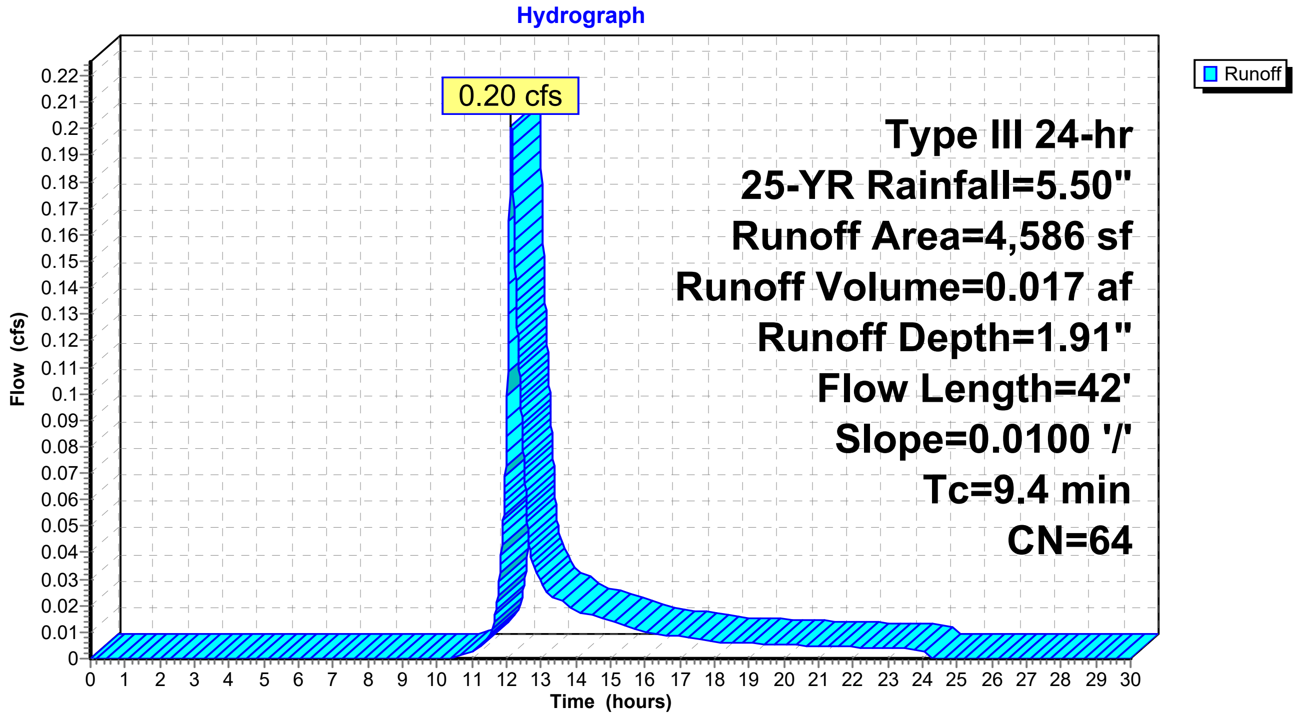
Runoff = 0.20 cfs @ 12.14 hrs, Volume= 0.017 af, Depth= 1.91"

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

	Area (sf)	CN	Description
*	392	98	Patios, HSG B
	4,194	61	>75% Grass cover, Good, HSG B
	4,586	64	Weighted Average
	4,194		91.45% Pervious Area
	392		8.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 18P: P4c



Summary for Subcatchment 19P: P4d

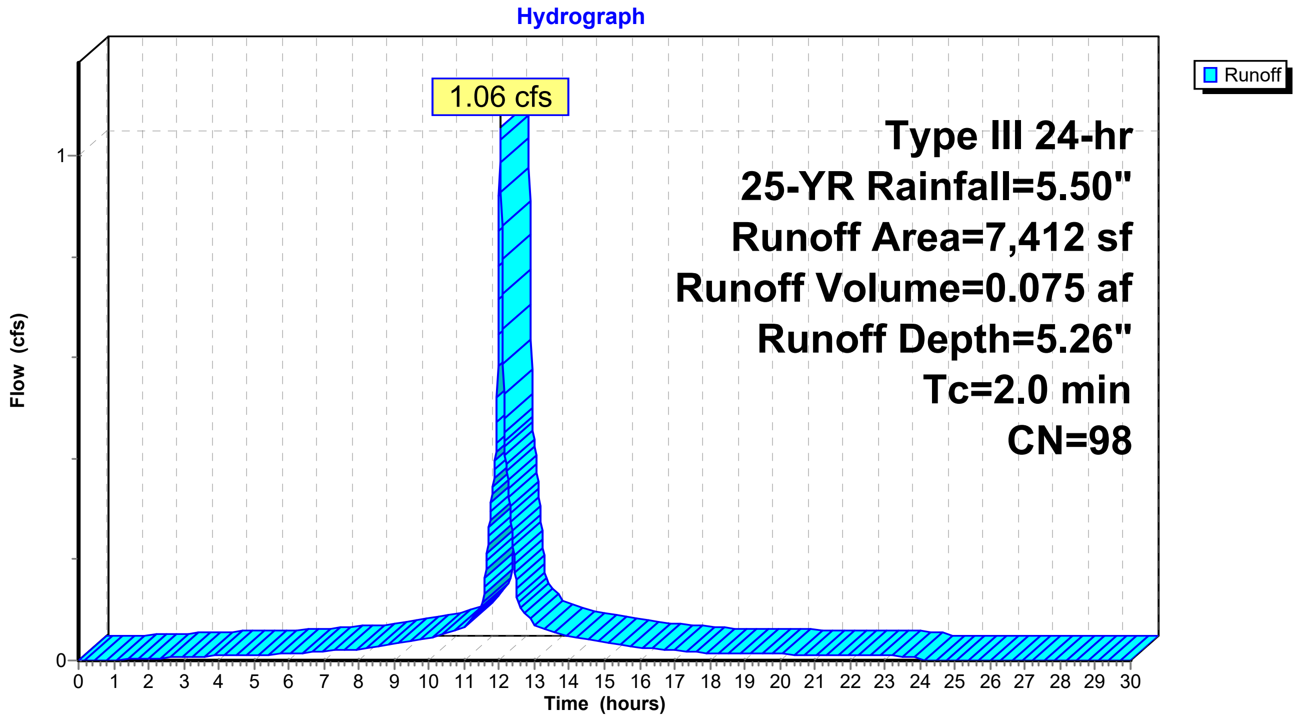
Runoff = 1.06 cfs @ 12.03 hrs, Volume= 0.075 af, Depth= 5.26"

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

Area (sf)	CN	Description
7,412	98	Unconnected roofs, HSG B
7,412		100.00% Impervious Area
7,412		100.00% Unconnected

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

Subcatchment 19P: P4d



Summary for Pond 20P: Basin #5

Inflow Area = 0.275 ac, 65.04% Impervious, Inflow Depth = 3.98" for 25-YR event
Inflow = 1.17 cfs @ 12.03 hrs, Volume= 0.091 af
Outflow = 0.15 cfs @ 12.64 hrs, Volume= 0.091 af, Atten= 87%, Lag= 36.3 min
Discarded = 0.08 cfs @ 12.64 hrs, Volume= 0.033 af
Primary = 0.07 cfs @ 12.64 hrs, Volume= 0.059 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 186.54' @ 12.64 hrs Surf.Area= 1,347 sf Storage= 1,259 cf

Plug-Flow detention time= 61.8 min calculated for 0.091 af (100% of inflow)
Center-of-Mass det. time= 61.8 min (826.2 - 764.5)

Volume	Invert	Avail.Storage	Storage Description
#1	185.00'	1,957 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

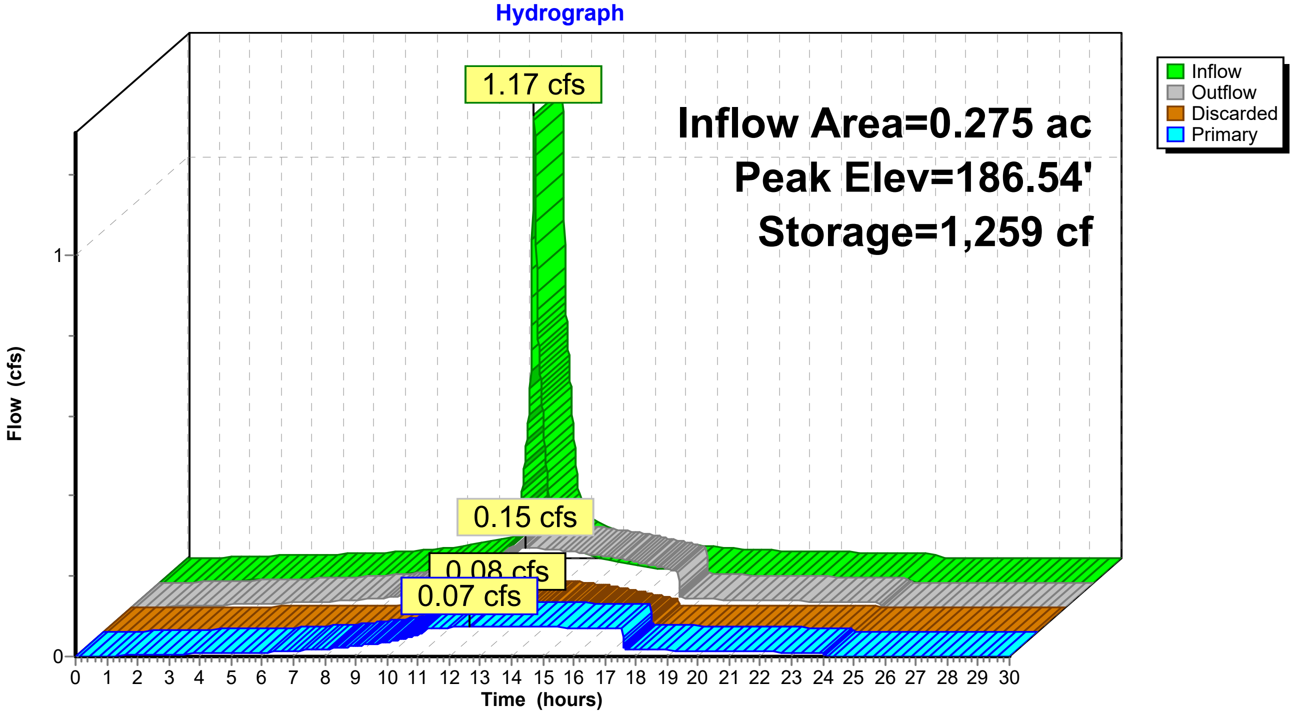
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.00	333	208.0	0	0	333
186.00	987	227.0	631	631	1,026
187.00	1,697	246.0	1,326	1,957	1,779

Device	Routing	Invert	Outlet Devices
#1	Discarded	185.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	186.70'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 186.70 187.00 Width (feet) 5.00 5.00
#3	Primary	165.80'	**1.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.80' / 165.00' S= 0.0800 '/' Cc= 0.900 n= 0.011, Flow Area= 0.01 sf

Discarded OutFlow Max=0.08 cfs @ 12.64 hrs HW=186.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.07 cfs @ 12.64 hrs HW=186.54' (Free Discharge)
├**2=Custom Weir/Orifice** (Controls 0.00 cfs)
└**3=Culvert** (Barrel Controls 0.07 cfs @ 13.42 fps)

Pond 20P: Basin #5



Summary for Subcatchment 21P: P4e

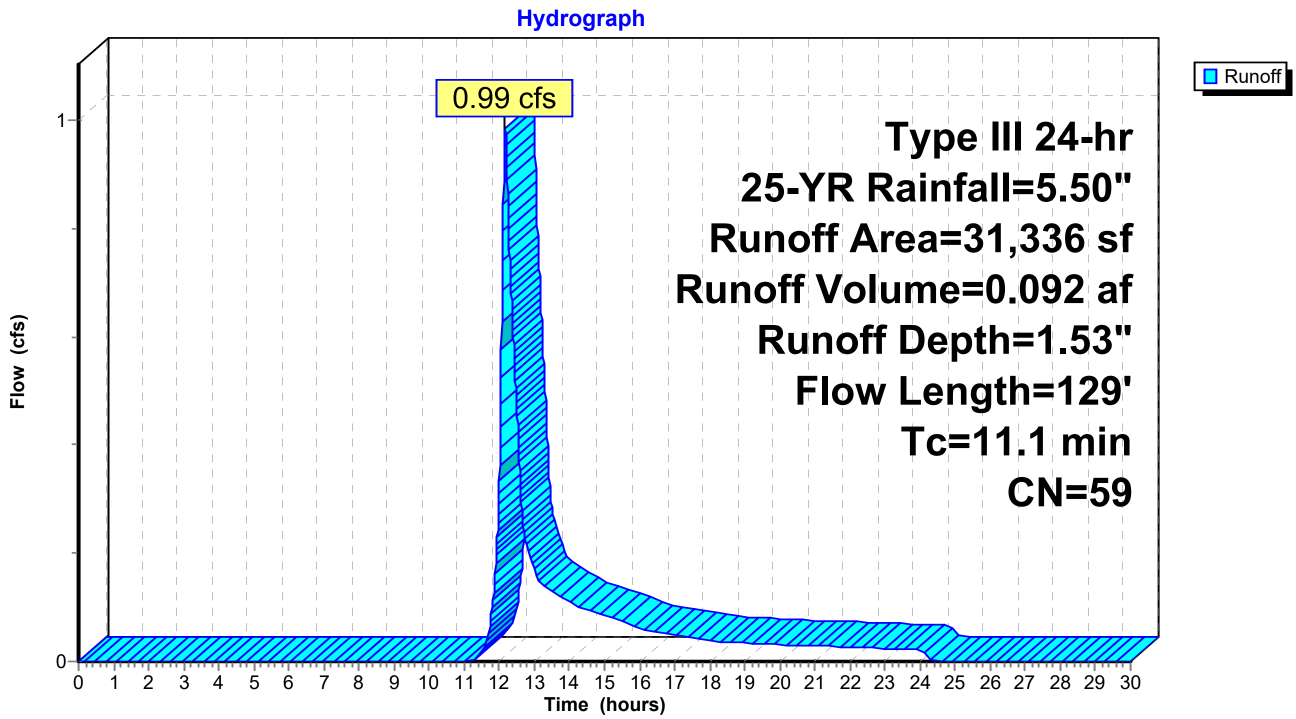
Runoff = 0.99 cfs @ 12.17 hrs, Volume= 0.092 af, Depth= 1.53"

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

	Area (sf)	CN	Description
*	1,155	98	Patios, HSG B
	14,033	61	>75% Grass cover, Good, HSG B
	16,148	55	Woods, Good, HSG B
	31,336	59	Weighted Average
	30,181		96.31% Pervious Area
	1,155		3.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.6	67	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	20	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	129	Total			

Subcatchment 21P: P4e

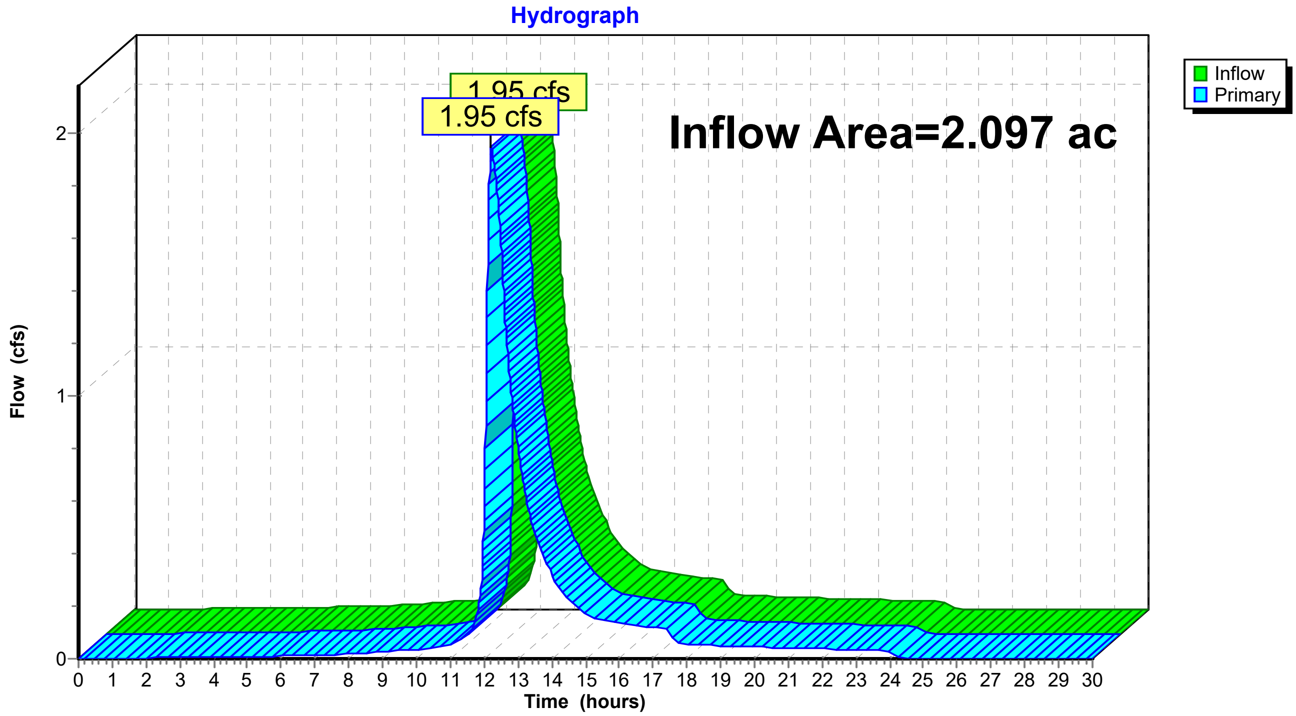


Summary for Link 22P: Design Point #4: Flow to Wetlands

Inflow Area =	2.097 ac,	38.78% Impervious,	Inflow Depth = 1.43"	for 25-YR event
Inflow =	1.95 cfs @	12.21 hrs, Volume=	0.249 af	
Primary =	1.95 cfs @	12.21 hrs, Volume=	0.249 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 22P: Design Point #4: Flow to Wetlands



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 15P: P4a Runoff Area=42,468 sf 49.24% Impervious Runoff Depth=3.77"
Flow Length=55' Slope=0.0150 '/' Tc=6.5 min CN=79 Runoff=4.22 cfs 0.306 af

Subcatchment 16P: P4b Runoff Area=5,559 sf 100.00% Impervious Runoff Depth=5.86"
Tc=2.0 min CN=98 Runoff=0.88 cfs 0.062 af

Pond 17P: Basins #2-4 Peak Elev=185.77' Storage=4,670 cf Inflow=4.83 cfs 0.369 af
Discarded=0.37 cfs 0.240 af Primary=1.41 cfs 0.129 af Outflow=1.78 cfs 0.369 af

Subcatchment 18P: P4c Runoff Area=4,586 sf 8.55% Impervious Runoff Depth=2.33"
Flow Length=42' Slope=0.0100 '/' Tc=9.4 min CN=64 Runoff=0.25 cfs 0.020 af

Subcatchment 19P: P4d Runoff Area=7,412 sf 100.00% Impervious Runoff Depth=5.86"
Tc=2.0 min CN=98 Runoff=1.17 cfs 0.083 af

Pond 20P: Basin #5 Peak Elev=186.70' Storage=1,491 cf Inflow=1.31 cfs 0.104 af
Discarded=0.08 cfs 0.039 af Primary=0.08 cfs 0.065 af Outflow=0.17 cfs 0.104 af

Subcatchment 21P: P4e Runoff Area=31,336 sf 3.69% Impervious Runoff Depth=1.90"
Flow Length=129' Tc=11.1 min CN=59 Runoff=1.26 cfs 0.114 af

Link 22P: Design Point #4: Flow to Wetlands Inflow=2.51 cfs 0.308 af
Primary=2.51 cfs 0.308 af

Total Runoff Area = 2.097 ac Runoff Volume = 0.586 af Average Runoff Depth = 3.35"
61.22% Pervious = 1.284 ac 38.78% Impervious = 0.813 ac

Summary for Subcatchment 15P: P4a

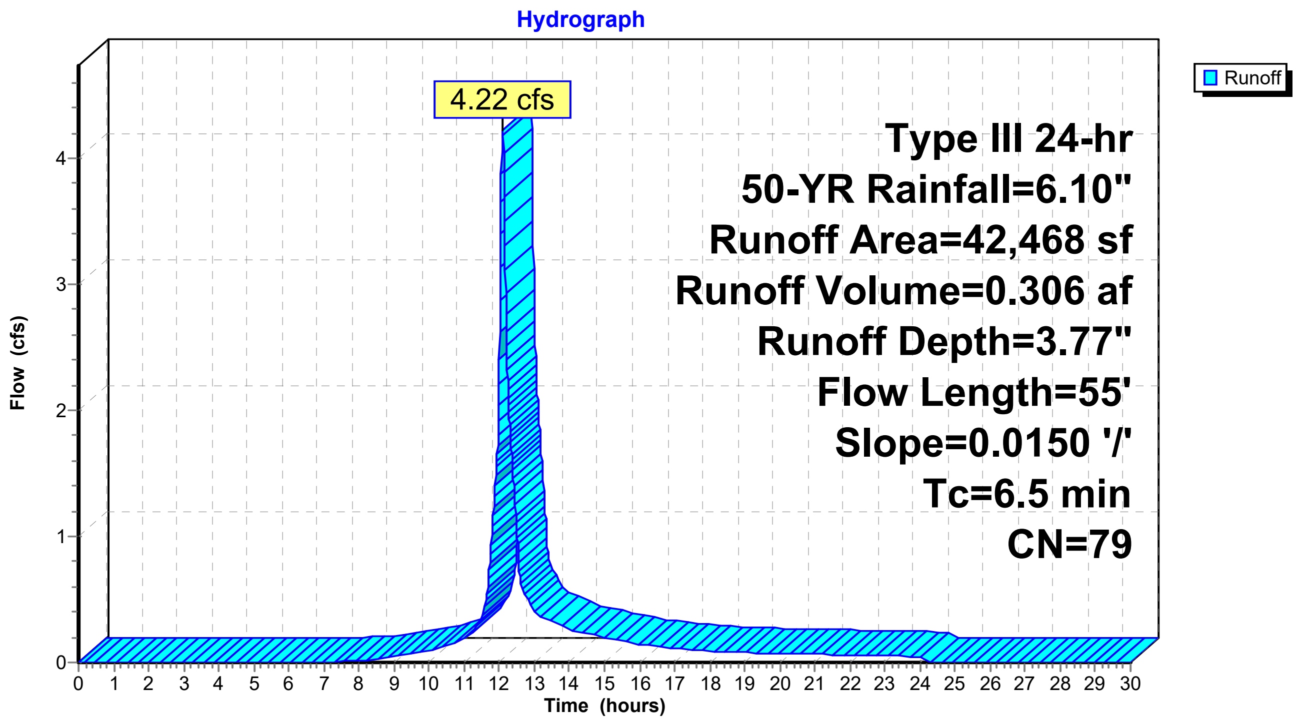
Runoff = 4.22 cfs @ 12.09 hrs, Volume= 0.306 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
20,913	98	Paved parking, HSG B
21,555	61	>75% Grass cover, Good, HSG B
42,468	79	Weighted Average
21,555		50.76% Pervious Area
20,913		49.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	30	0.0150	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.4	25	0.0150	0.93		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.5	55	Total			

Subcatchment 15P: P4a



Summary for Subcatchment 16P: P4b

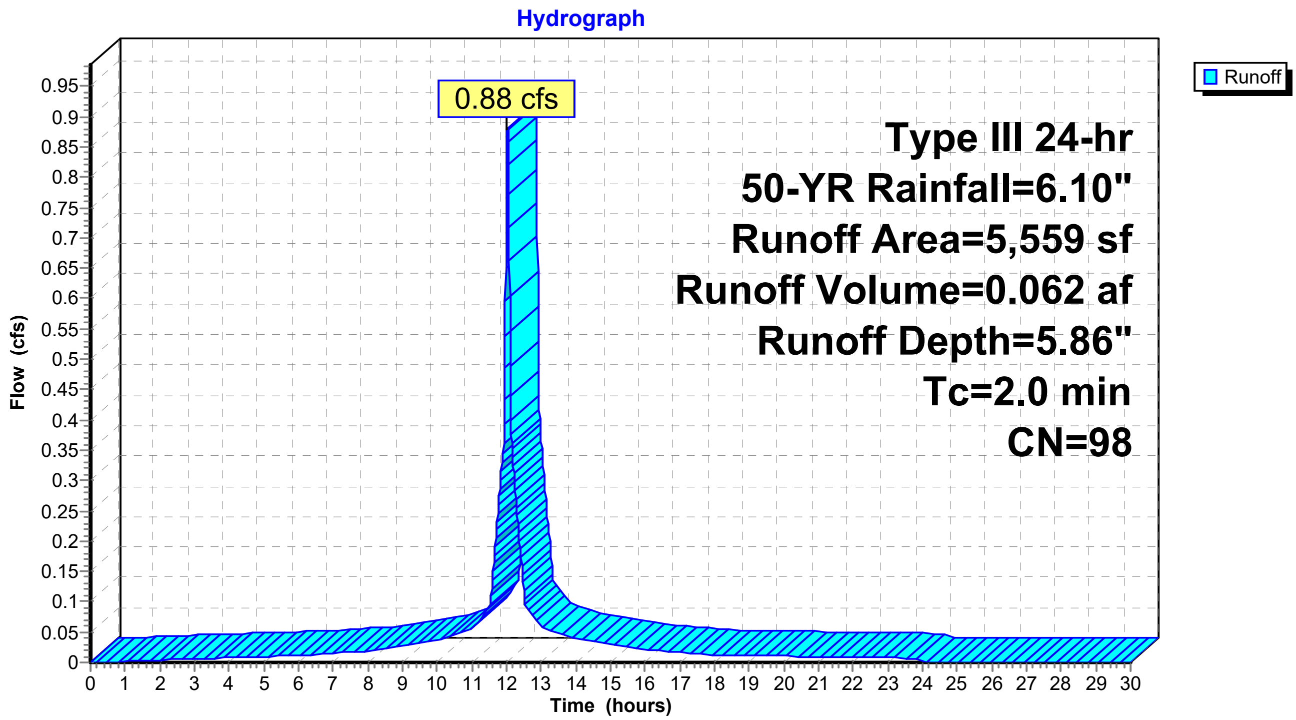
Runoff = 0.88 cfs @ 12.03 hrs, Volume= 0.062 af, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
5,559	98	Roofs, HSG B
5,559		100.00% Impervious Area

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

Subcatchment 16P: P4b



Summary for Pond 17P: Basins #2-4

Inflow Area = 1.103 ac, 55.12% Impervious, Inflow Depth = 4.01" for 50-YR event
Inflow = 4.83 cfs @ 12.08 hrs, Volume= 0.369 af
Outflow = 1.78 cfs @ 12.37 hrs, Volume= 0.369 af, Atten= 63%, Lag= 17.1 min
Discarded = 0.37 cfs @ 12.37 hrs, Volume= 0.240 af
Primary = 1.41 cfs @ 12.37 hrs, Volume= 0.129 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 185.77' @ 12.37 hrs Surf.Area= 6,676 sf Storage= 4,670 cf

Plug-Flow detention time= 54.2 min calculated for 0.368 af (100% of inflow)
Center-of-Mass det. time= 54.2 min (857.9 - 803.7)

Volume	Invert	Avail.Storage	Storage Description
#1	185.00'	3,934 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
#2	184.50'	2,534 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
#3	185.20'	3,261 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
		9,729 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.00	3,531	264.0	0	0	3,531
186.00	4,351	282.0	3,934	3,934	4,359

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.50	575	96.0	0	0	575
186.00	1,092	128.0	1,230	1,230	1,170
187.00	1,528	150.0	1,304	2,534	1,676

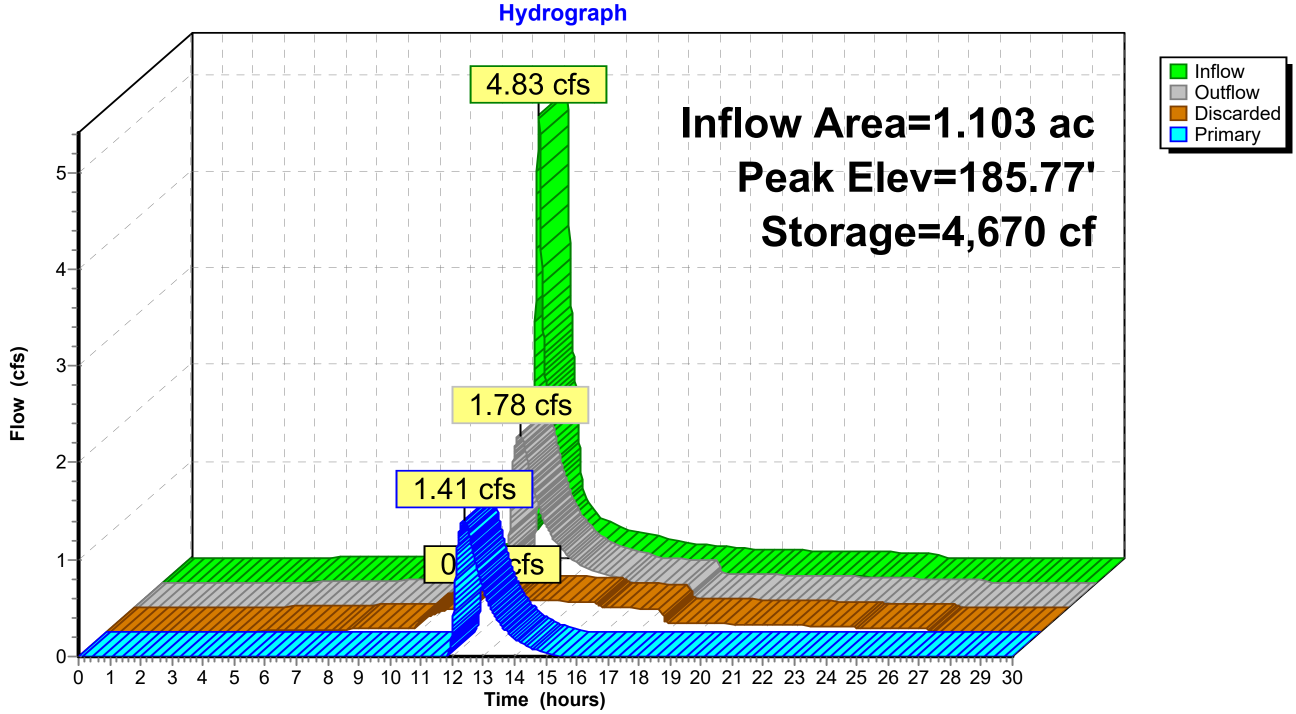
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.20	1,063	270.0	0	0	1,063
186.00	1,729	285.0	1,106	1,106	1,762
187.00	2,612	304.0	2,155	3,261	2,700

Device	Routing	Invert	Outlet Devices
#1	Discarded	184.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	185.20'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 185.20 185.80 185.80 186.00 Width (feet) 1.00 1.00 5.00 5.00

Discarded OutFlow Max=0.37 cfs @ 12.37 hrs HW=185.77' (Free Discharge)
└—**1=Exfiltration** (Exfiltration Controls 0.37 cfs)

Primary OutFlow Max=1.41 cfs @ 12.37 hrs HW=185.77' (Free Discharge)
└—**2=Custom Weir/Orifice** (Weir Controls 1.41 cfs @ 2.47 fps)

Pond 17P: Basins #2-4



Summary for Subcatchment 18P: P4c

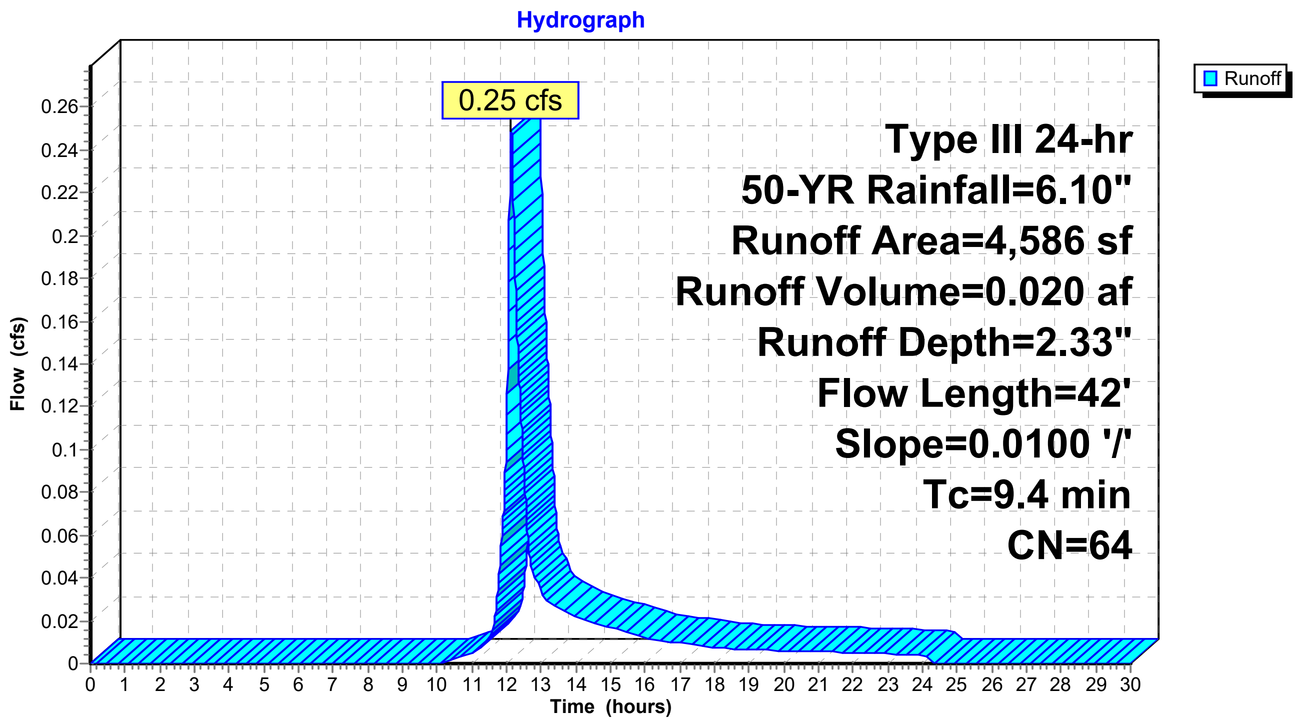
Runoff = 0.25 cfs @ 12.14 hrs, Volume= 0.020 af, Depth= 2.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

	Area (sf)	CN	Description
*	392	98	Patios, HSG B
	4,194	61	>75% Grass cover, Good, HSG B
	4,586	64	Weighted Average
	4,194		91.45% Pervious Area
	392		8.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 18P: P4c



Summary for Subcatchment 19P: P4d

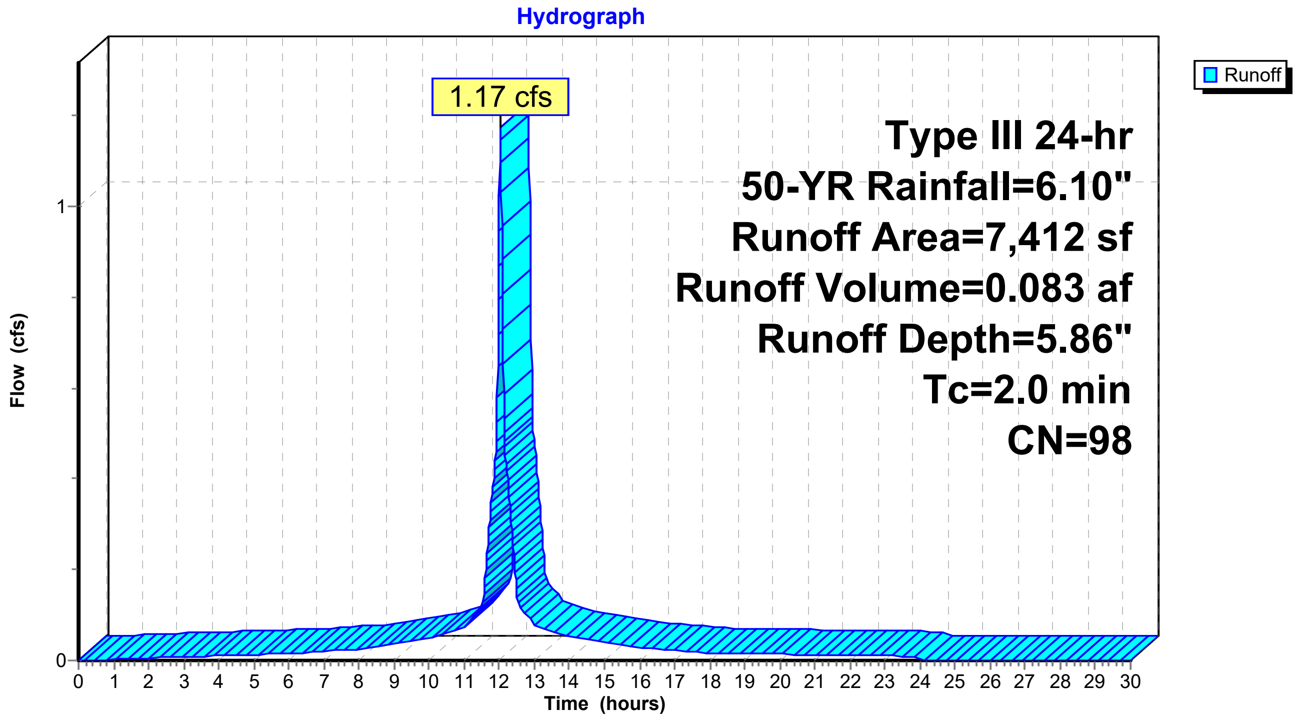
Runoff = 1.17 cfs @ 12.03 hrs, Volume= 0.083 af, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

Area (sf)	CN	Description
7,412	98	Unconnected roofs, HSG B
7,412		100.00% Impervious Area
7,412		100.00% Unconnected

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

Subcatchment 19P: P4d



Summary for Pond 20P: Basin #5

Inflow Area = 0.275 ac, 65.04% Impervious, Inflow Depth = 4.51" for 50-YR event
Inflow = 1.31 cfs @ 12.03 hrs, Volume= 0.104 af
Outflow = 0.17 cfs @ 12.64 hrs, Volume= 0.104 af, Atten= 87%, Lag= 36.8 min
Discarded = 0.08 cfs @ 12.64 hrs, Volume= 0.039 af
Primary = 0.08 cfs @ 12.64 hrs, Volume= 0.065 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 186.70' @ 12.64 hrs Surf.Area= 1,468 sf Storage= 1,491 cf

Plug-Flow detention time= 72.6 min calculated for 0.104 af (100% of inflow)
Center-of-Mass det. time= 72.6 min (836.2 - 763.7)

Volume	Invert	Avail.Storage	Storage Description
#1	185.00'	1,957 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

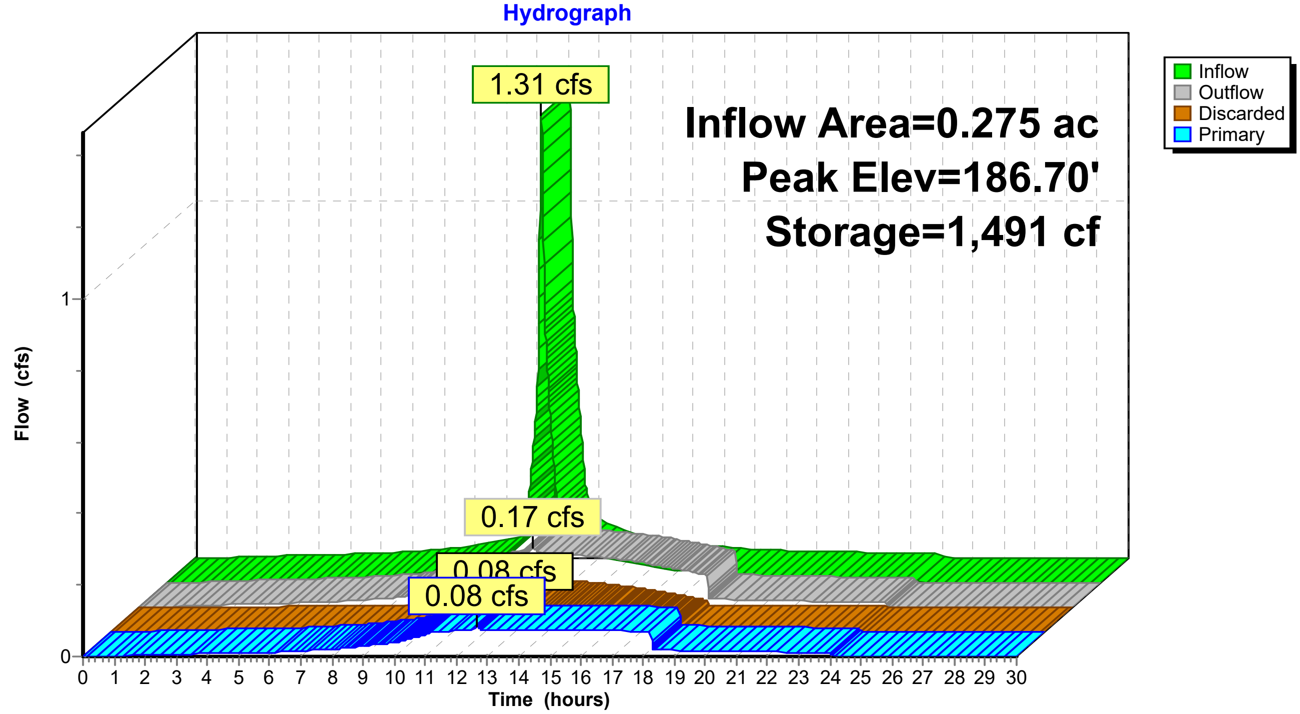
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.00	333	208.0	0	0	333
186.00	987	227.0	631	631	1,026
187.00	1,697	246.0	1,326	1,957	1,779

Device	Routing	Invert	Outlet Devices
#1	Discarded	185.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	186.70'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 186.70 187.00 Width (feet) 5.00 5.00
#3	Primary	165.80'	**1.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.80' / 165.00' S= 0.0800 '/' Cc= 0.900 n= 0.011, Flow Area= 0.01 sf

Discarded OutFlow Max=0.08 cfs @ 12.64 hrs HW=186.70' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.08 cfs @ 12.64 hrs HW=186.70' (Free Discharge)
├─**2=Custom Weir/Orifice** (Weir Controls 0.01 cfs @ 0.23 fps)
└─**3=Culvert** (Barrel Controls 0.07 cfs @ 13.47 fps)

Pond 20P: Basin #5



Summary for Subcatchment 21P: P4e

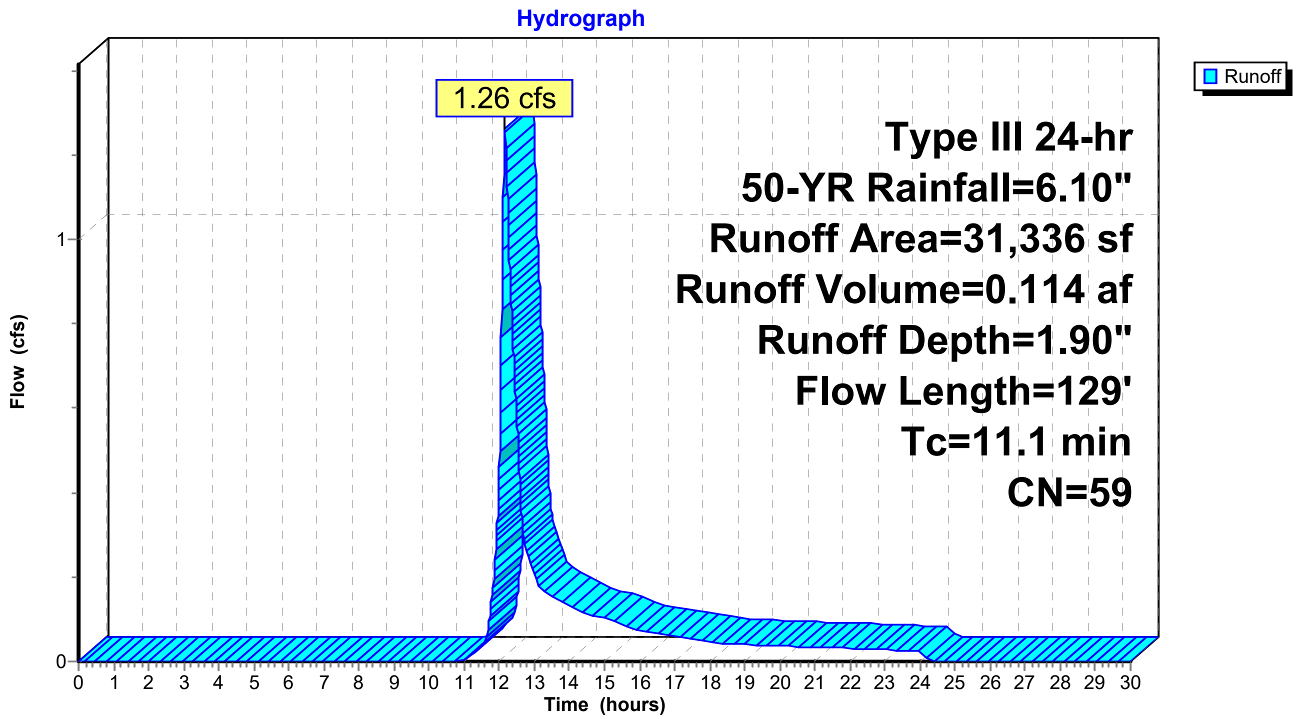
Runoff = 1.26 cfs @ 12.17 hrs, Volume= 0.114 af, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YR Rainfall=6.10"

	Area (sf)	CN	Description
*	1,155	98	Patios, HSG B
	14,033	61	>75% Grass cover, Good, HSG B
	16,148	55	Woods, Good, HSG B
	31,336	59	Weighted Average
	30,181		96.31% Pervious Area
	1,155		3.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.6	67	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	20	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	129	Total			

Subcatchment 21P: P4e

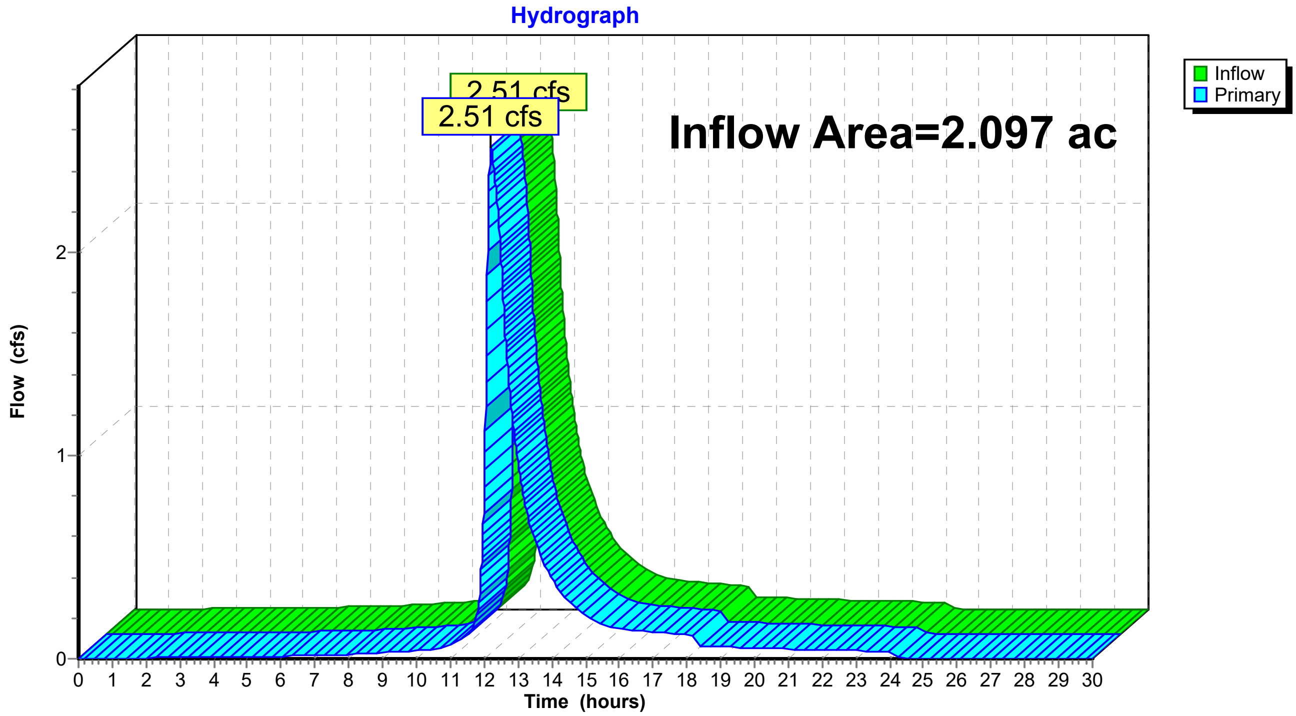


Summary for Link 22P: Design Point #4: Flow to Wetlands

Inflow Area =	2.097 ac, 38.78% Impervious,	Inflow Depth = 1.76"	for 50-YR event
Inflow =	2.51 cfs @ 12.20 hrs,	Volume= 0.308 af	
Primary =	2.51 cfs @ 12.20 hrs,	Volume= 0.308 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 22P: Design Point #4: Flow to Wetlands



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 15P: P4a Runoff Area=42,468 sf 49.24% Impervious Runoff Depth=4.31"
Flow Length=55' Slope=0.0150 '/' Tc=6.5 min CN=79 Runoff=4.81 cfs 0.350 af

Subcatchment 16P: P4b Runoff Area=5,559 sf 100.00% Impervious Runoff Depth=6.46"
Tc=2.0 min CN=98 Runoff=0.97 cfs 0.069 af

Pond 17P: Basins #2-4 Peak Elev=185.85' Storage=5,194 cf Inflow=5.49 cfs 0.419 af
Discarded=0.38 cfs 0.258 af Primary=1.84 cfs 0.161 af Outflow=2.22 cfs 0.419 af

Subcatchment 18P: P4c Runoff Area=4,586 sf 8.55% Impervious Runoff Depth=2.78"
Flow Length=42' Slope=0.0100 '/' Tc=9.4 min CN=64 Runoff=0.30 cfs 0.024 af

Subcatchment 19P: P4d Runoff Area=7,412 sf 100.00% Impervious Runoff Depth=6.46"
Tc=2.0 min CN=98 Runoff=1.29 cfs 0.092 af

Pond 20P: Basin #5 Peak Elev=186.76' Storage=1,573 cf Inflow=1.46 cfs 0.116 af
Discarded=0.08 cfs 0.042 af Primary=0.31 cfs 0.074 af Outflow=0.40 cfs 0.116 af

Subcatchment 21P: P4e Runoff Area=31,336 sf 3.69% Impervious Runoff Depth=2.30"
Flow Length=129' Tc=11.1 min CN=59 Runoff=1.56 cfs 0.138 af

Link 22P: Design Point #4: Flow to Wetlands Inflow=3.14 cfs 0.373 af
Primary=3.14 cfs 0.373 af

Total Runoff Area = 2.097 ac Runoff Volume = 0.673 af Average Runoff Depth = 3.85"
61.22% Pervious = 1.284 ac 38.78% Impervious = 0.813 ac

Summary for Subcatchment 15P: P4a

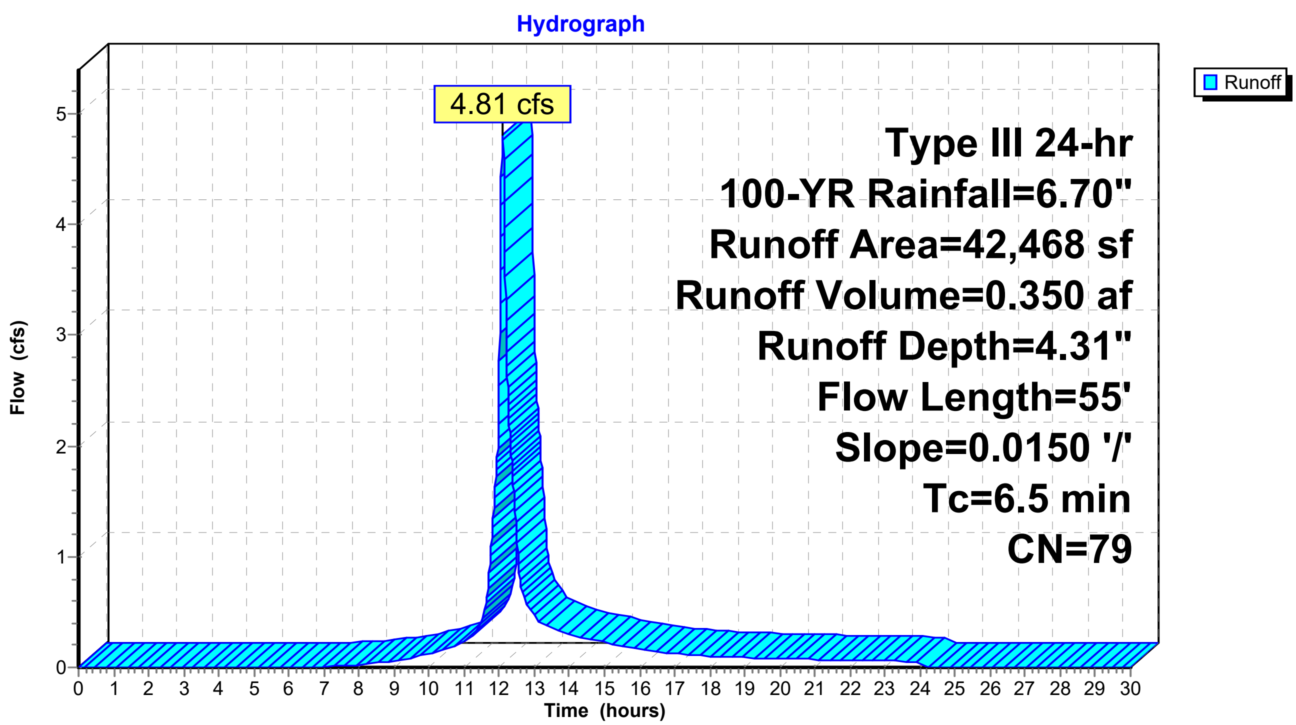
Runoff = 4.81 cfs @ 12.09 hrs, Volume= 0.350 af, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
20,913	98	Paved parking, HSG B
21,555	61	>75% Grass cover, Good, HSG B
42,468	79	Weighted Average
21,555		50.76% Pervious Area
20,913		49.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	30	0.0150	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.4	25	0.0150	0.93		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
6.5	55	Total			

Subcatchment 15P: P4a



Summary for Subcatchment 16P: P4b

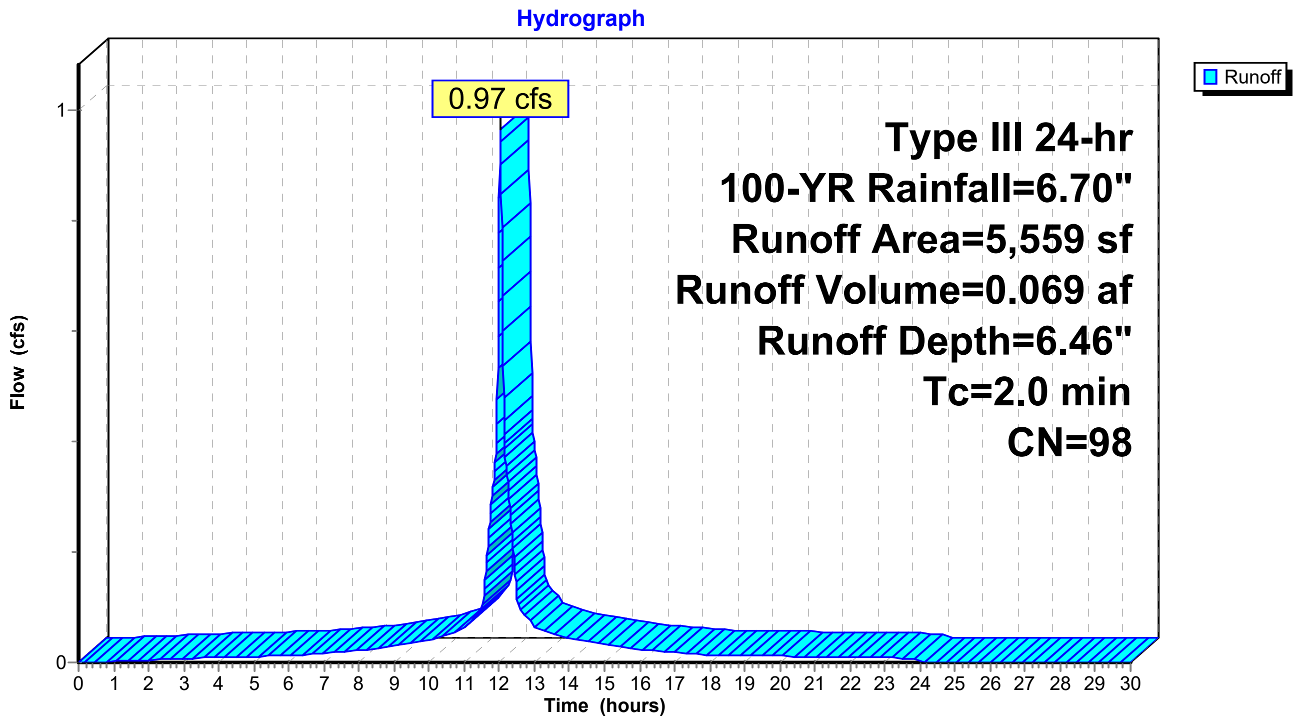
Runoff = 0.97 cfs @ 12.03 hrs, Volume= 0.069 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
5,559	98	Roofs, HSG B
5,559		100.00% Impervious Area

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

Subcatchment 16P: P4b



Summary for Pond 17P: Basins #2-4

Inflow Area = 1.103 ac, 55.12% Impervious, Inflow Depth = 4.56" for 100-YR event
Inflow = 5.49 cfs @ 12.08 hrs, Volume= 0.419 af
Outflow = 2.22 cfs @ 12.33 hrs, Volume= 0.419 af, Atten= 60%, Lag= 14.8 min
Discarded = 0.38 cfs @ 12.33 hrs, Volume= 0.258 af
Primary = 1.84 cfs @ 12.33 hrs, Volume= 0.161 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 185.85' @ 12.33 hrs Surf.Area= 6,840 sf Storage= 5,194 cf

Plug-Flow detention time= 52.3 min calculated for 0.419 af (100% of inflow)
Center-of-Mass det. time= 52.3 min (853.0 - 800.7)

Volume	Invert	Avail.Storage	Storage Description
#1	185.00'	3,934 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
#2	184.50'	2,534 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
#3	185.20'	3,261 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
		9,729 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.00	3,531	264.0	0	0	3,531
186.00	4,351	282.0	3,934	3,934	4,359

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.50	575	96.0	0	0	575
186.00	1,092	128.0	1,230	1,230	1,170
187.00	1,528	150.0	1,304	2,534	1,676

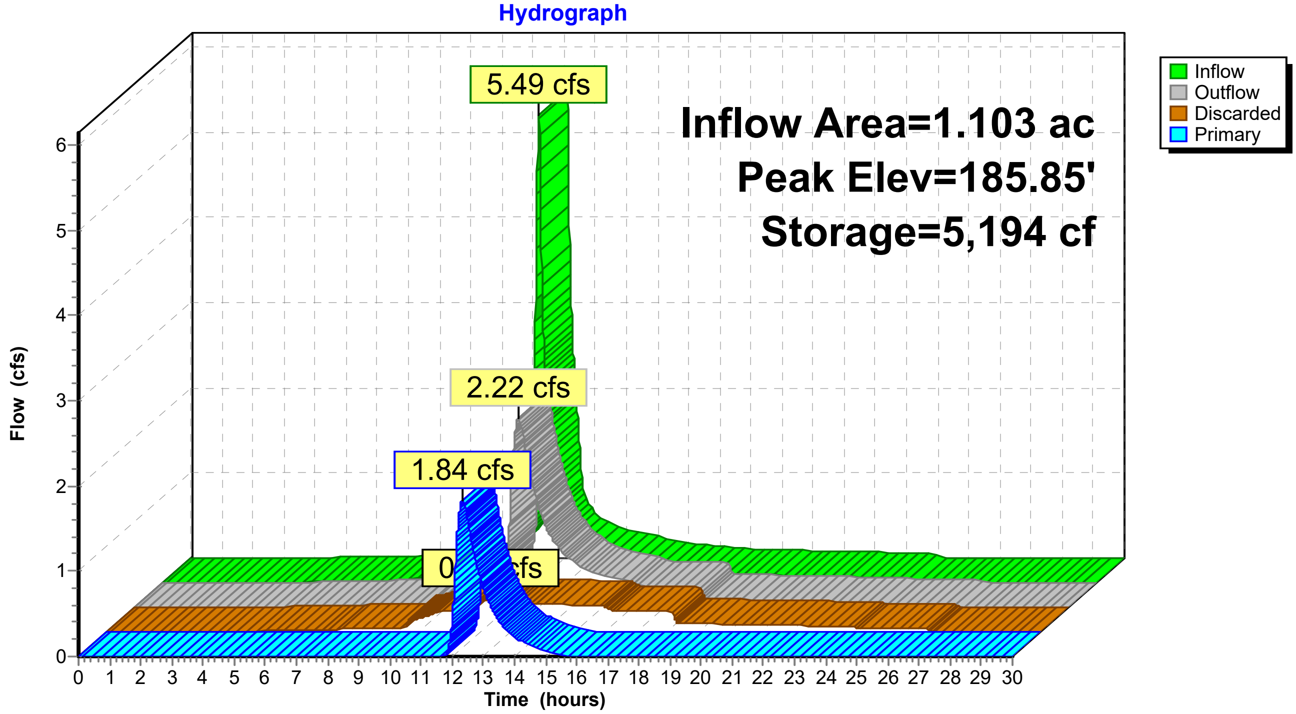
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.20	1,063	270.0	0	0	1,063
186.00	1,729	285.0	1,106	1,106	1,762
187.00	2,612	304.0	2,155	3,261	2,700

Device	Routing	Invert	Outlet Devices
#1	Discarded	184.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	185.20'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 185.20 185.80 185.80 186.00 Width (feet) 1.00 1.00 5.00 5.00

Discarded OutFlow Max=0.38 cfs @ 12.33 hrs HW=185.85' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.38 cfs)

Primary OutFlow Max=1.83 cfs @ 12.33 hrs HW=185.85' (Free Discharge)
└─**2=Custom Weir/Orifice** (Weir Controls 1.83 cfs @ 2.20 fps)

Pond 17P: Basins #2-4



Summary for Subcatchment 18P: P4c

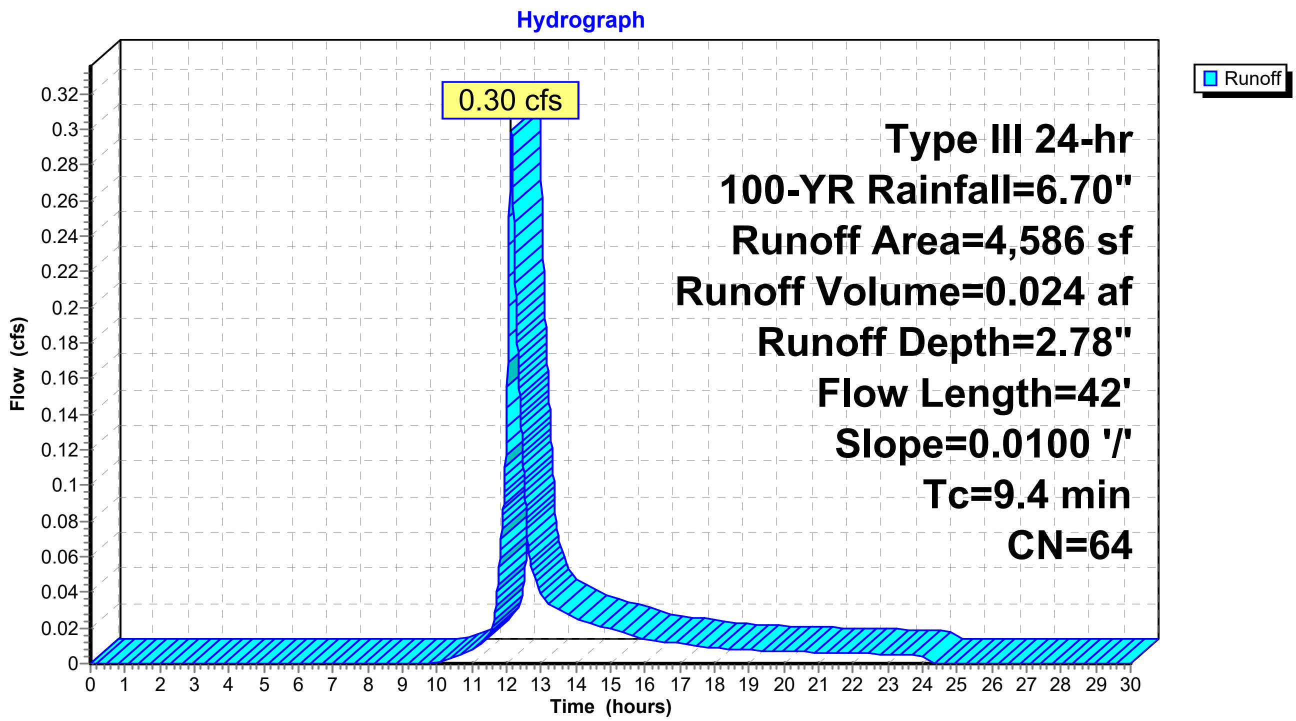
Runoff = 0.30 cfs @ 12.14 hrs, Volume= 0.024 af, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

	Area (sf)	CN	Description
*	392	98	Patios, HSG B
	4,194	61	>75% Grass cover, Good, HSG B
	4,586	64	Weighted Average
	4,194		91.45% Pervious Area
	392		8.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"

Subcatchment 18P: P4c



Summary for Subcatchment 19P: P4d

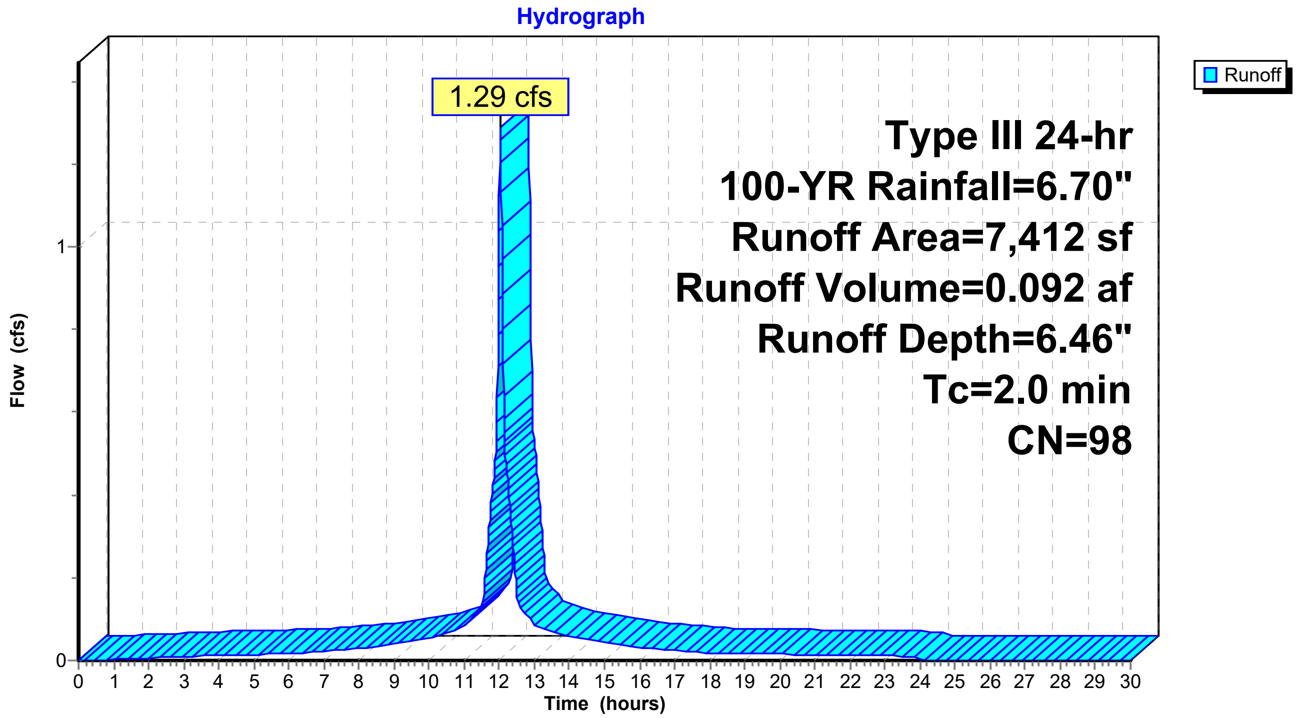
Runoff = 1.29 cfs @ 12.03 hrs, Volume= 0.092 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

Area (sf)	CN	Description
7,412	98	Unconnected roofs, HSG B
7,412		100.00% Impervious Area
7,412		100.00% Unconnected

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

Subcatchment 19P: P4d



Summary for Pond 20P: Basin #5

Inflow Area = 0.275 ac, 65.04% Impervious, Inflow Depth = 5.05" for 100-YR event
Inflow = 1.46 cfs @ 12.03 hrs, Volume= 0.116 af
Outflow = 0.40 cfs @ 12.41 hrs, Volume= 0.116 af, Atten= 73%, Lag= 22.7 min
Discarded = 0.08 cfs @ 12.41 hrs, Volume= 0.042 af
Primary = 0.31 cfs @ 12.41 hrs, Volume= 0.074 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 186.76' @ 12.41 hrs Surf.Area= 1,509 sf Storage= 1,573 cf

Plug-Flow detention time= 70.8 min calculated for 0.116 af (100% of inflow)
Center-of-Mass det. time= 70.8 min (833.7 - 762.9)

Volume	Invert	Avail.Storage	Storage Description
#1	185.00'	1,957 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

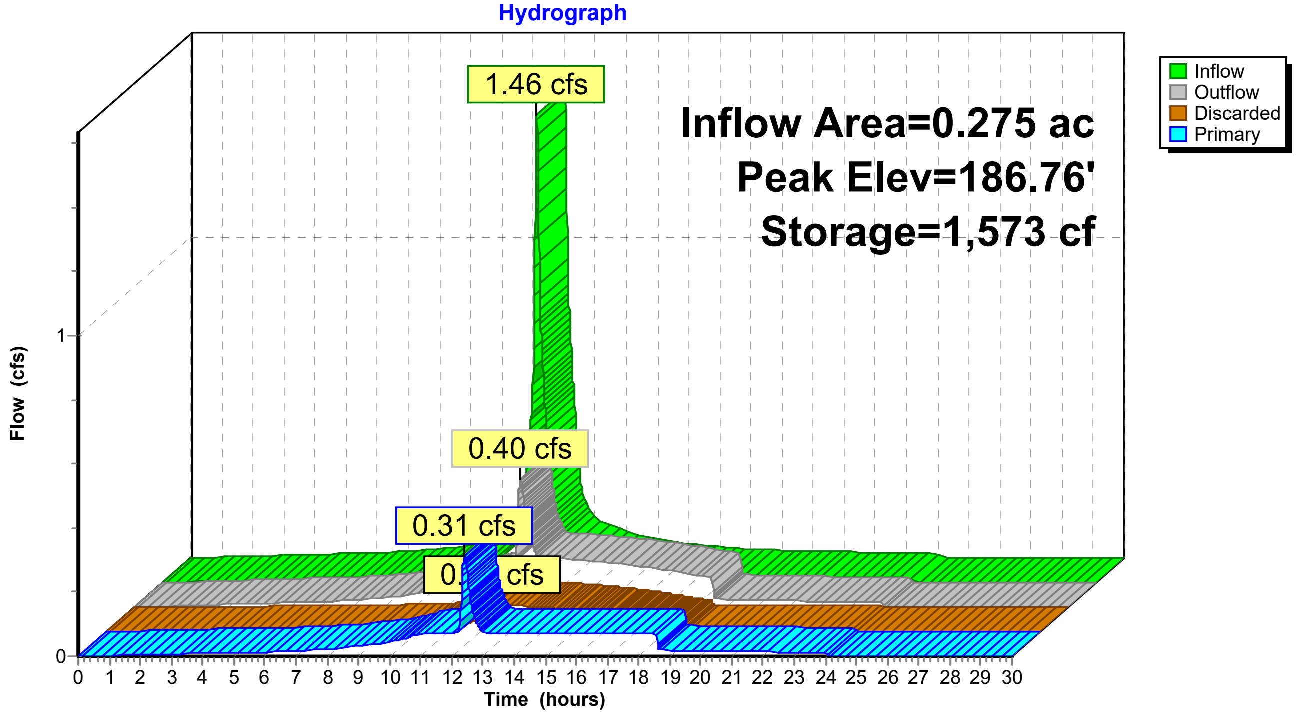
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.00	333	208.0	0	0	333
186.00	987	227.0	631	631	1,026
187.00	1,697	246.0	1,326	1,957	1,779

Device	Routing	Invert	Outlet Devices
#1	Discarded	185.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	186.70'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 186.70 187.00 Width (feet) 5.00 5.00
#3	Primary	165.80'	**1.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.80' / 165.00' S= 0.0800 '/' Cc= 0.900 n= 0.011, Flow Area= 0.01 sf

Discarded OutFlow Max=0.08 cfs @ 12.41 hrs HW=186.76' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.31 cfs @ 12.41 hrs HW=186.76' (Free Discharge)
├─**2=Custom Weir/Orifice** (Weir Controls 0.24 cfs @ 0.80 fps)
└─**3=Culvert** (Barrel Controls 0.07 cfs @ 13.49 fps)

Pond 20P: Basin #5



Summary for Subcatchment 21P: P4e

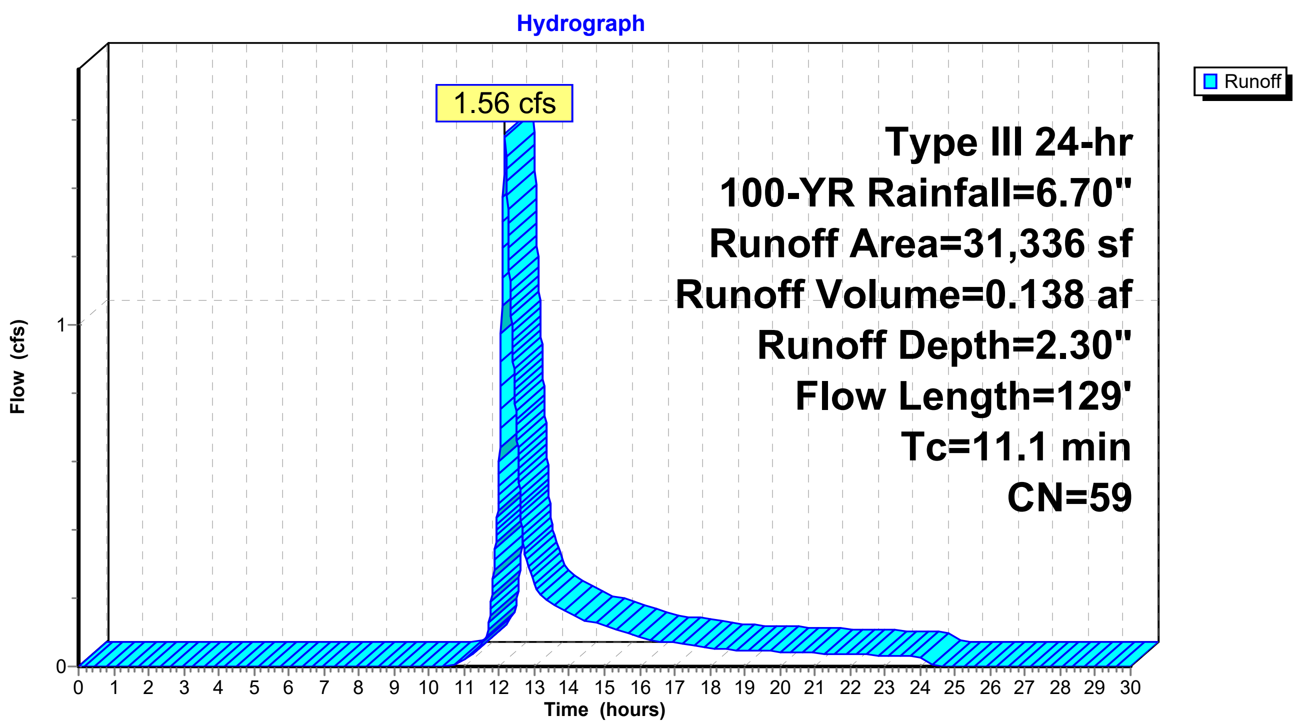
Runoff = 1.56 cfs @ 12.16 hrs, Volume= 0.138 af, Depth= 2.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=6.70"

	Area (sf)	CN	Description
*	1,155	98	Patios, HSG B
	14,033	61	>75% Grass cover, Good, HSG B
	16,148	55	Woods, Good, HSG B
	31,336	59	Weighted Average
	30,181		96.31% Pervious Area
	1,155		3.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	42	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.6	67	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	20	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.1	129	Total			

Subcatchment 21P: P4e

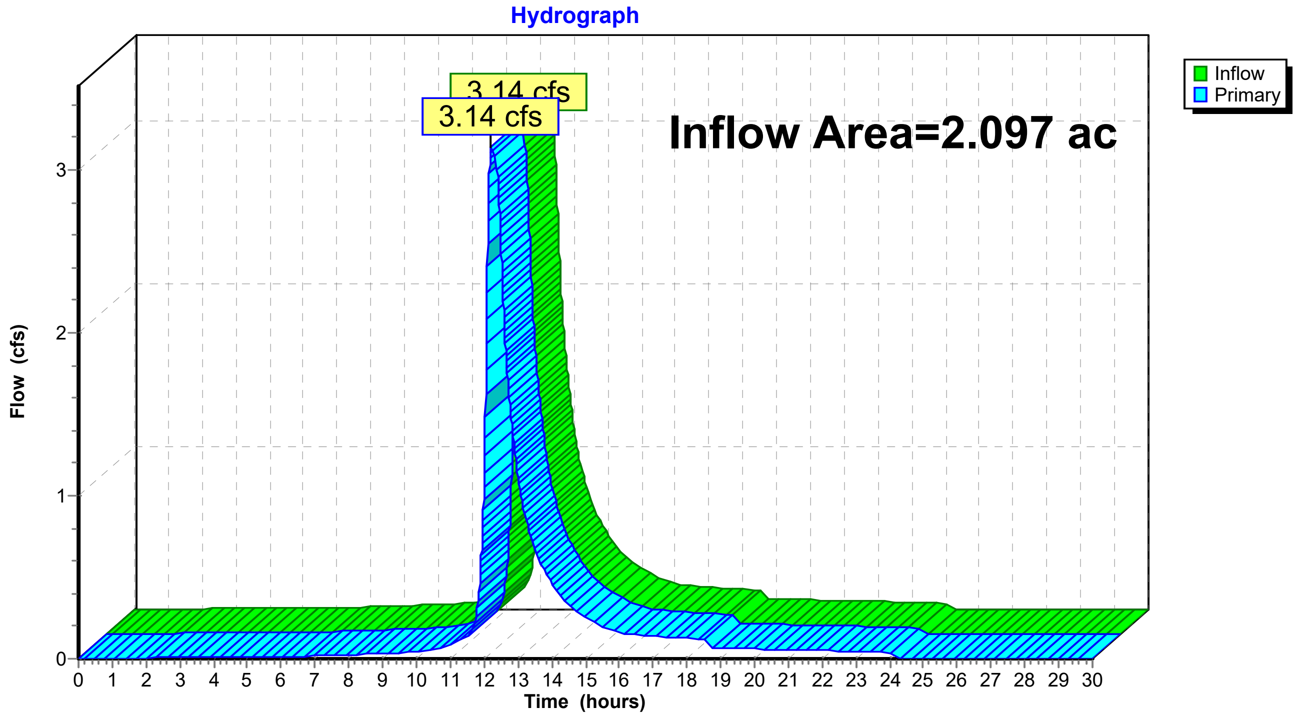


Summary for Link 22P: Design Point #4: Flow to Wetlands

Inflow Area = 2.097 ac, 38.78% Impervious, Inflow Depth = 2.14" for 100-YR event
Inflow = 3.14 cfs @ 12.21 hrs, Volume= 0.373 af
Primary = 3.14 cfs @ 12.21 hrs, Volume= 0.373 af, Atten= 0%, Lag= 0.0 min

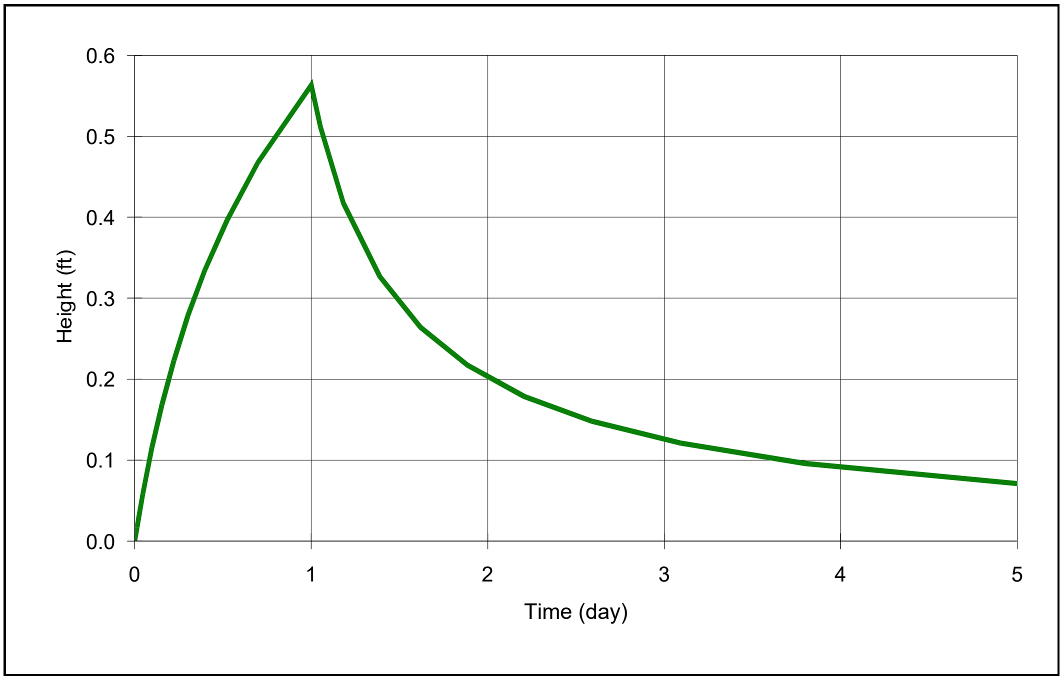
Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 22P: Design Point #4: Flow to Wetlands



ATTACHMENT L: Mounding Calculations

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Legacy Engineering LLC

PROJECT: Infiltration Basin #1

ANALYST: Daniel J. Merrikin, P.E.

DATE: 5/10/2019 TIME: 8:50:05 AM

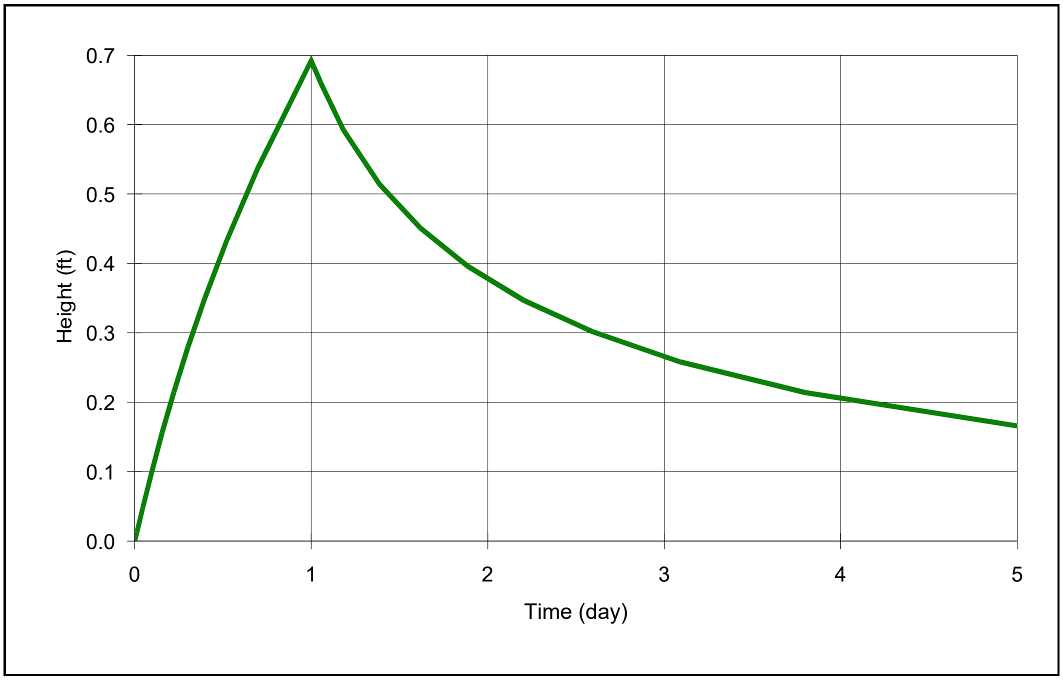
INPUT PARAMETERS

Application rate: 0.26 c.ft/day/sq. ft
Duration of application: 1 day
Total simulation time: 5 day
Fillable porosity: 0.2
Hydraulic conductivity: 4.8 ft/day
Initial saturated thickness: 20 ft
Length of application area: 65 ft
Width of application area: 24 ft
No constant head boundary used
Groundwater mounding @
X coordinate: 0 ft
Y coordinate: 0 ft
Total volume applied: 405.6 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.02
0	0.06
0.1	0.12
0.2	0.17
0.2	0.22
0.3	0.28
0.4	0.34
0.5	0.4
0.7	0.47
1	0.56
1.1	0.51
1.2	0.42
1.4	0.33
1.6	0.26
1.9	0.22
2.2	0.18
2.6	0.15
3.1	0.12
3.8	0.1
5	0.07

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Legacy Engineering LLC

PROJECT: Infiltration Basin #2-4

ANALYST: Daniel J. Merrikin, P.E.

DATE: 5/10/2019 TIME: 8:50:55 AM

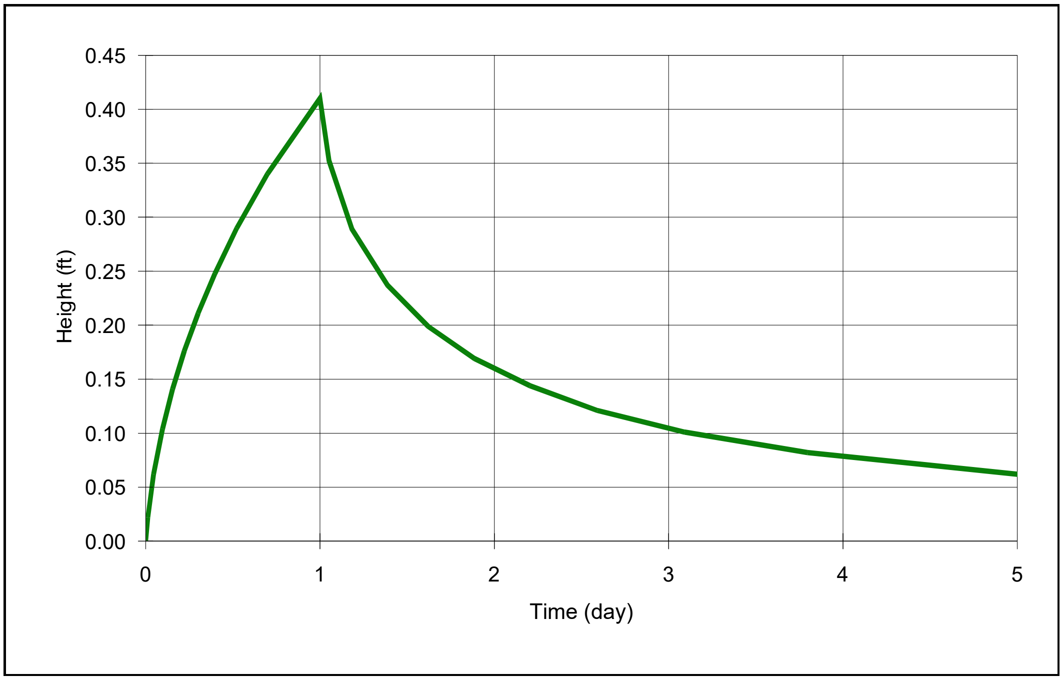
INPUT PARAMETERS

Application rate: 0.21 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: 135 ft
Width of application area: 38 ft
No constant head boundary used
Groundwater mounding @
X coordinate: 0 ft
Y coordinate: 0 ft
Total volume applied: 1077.3 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.01
0	0.05
0.1	0.1
0.2	0.16
0.2	0.22
0.3	0.28
0.4	0.35
0.5	0.43
0.7	0.54
1	0.69
1.1	0.66
1.2	0.59
1.4	0.51
1.6	0.45
1.9	0.4
2.2	0.35
2.6	0.3
3.1	0.26
3.8	0.21
5	0.17

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Legacy Engineering LLC

PROJECT: Infiltration Basin #5

ANALYST: Daniel J. Merrikin, P.E.

DATE: 5/10/2019 TIME: 8:51:10 AM

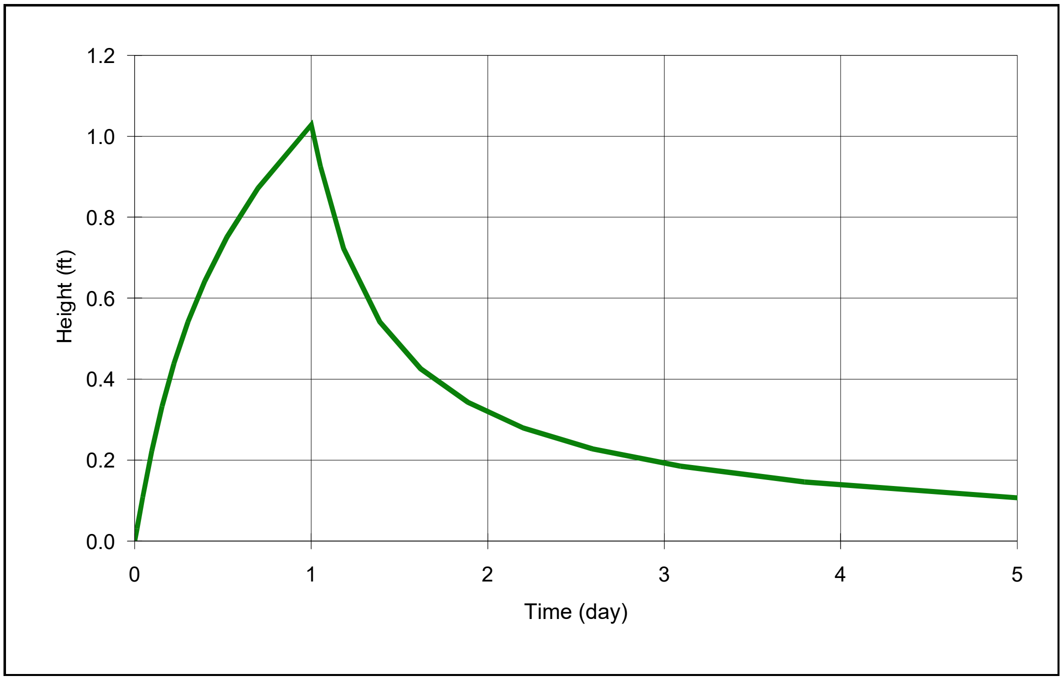
INPUT PARAMETERS

Application rate: 0.38 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: 105 ft
Width of application area: 9.4 ft
No constant head boundary used
Groundwater mounding @
X coordinate: 0 ft
Y coordinate: 0 ft
Total volume applied: 375.06 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.02
0	0.06
0.1	0.1
0.2	0.14
0.2	0.18
0.3	0.21
0.4	0.25
0.5	0.29
0.7	0.34
1	0.41
1.1	0.35
1.2	0.29
1.4	0.24
1.6	0.2
1.9	0.17
2.2	0.14
2.6	0.12
3.1	0.1
3.8	0.08
5	0.06

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Legacy Engineering LLC

PROJECT: Infiltration Field

ANALYST: Daniel J. Merrikin, P.E.

DATE: 5/10/2019 TIME: 8:51:27 AM

INPUT PARAMETERS

Application rate: 0.48 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: 38.3 ft
Width of application area: 32.5 ft
No constant head boundary used
Groundwater mounding @
X coordinate: 0 ft
Y coordinate: 0 ft
Total volume applied: 597.48 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.03
0	0.11
0.1	0.22
0.2	0.33
0.2	0.44
0.3	0.54
0.4	0.64
0.5	0.75
0.7	0.87
1	1.03
1.1	0.92
1.2	0.72
1.4	0.54
1.6	0.43
1.9	0.34
2.2	0.28
2.6	0.23
3.1	0.18
3.8	0.15
5	0.11

ATTACHMENT M: 1-Inch Storm Calculations

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 3P: Basin #1 Peak Elev=186.04' Storage=67 cf Inflow=0.22 cfs 0.014 af
Discarded=0.09 cfs 0.014 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.014 af

Pond 12P: Infiltration Field Peak Elev=181.24' Storage=26 cf Inflow=0.12 cfs 0.012 af
Discarded=0.10 cfs 0.012 af Primary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.012 af

Pond 17P: Basins #2-4 Peak Elev=184.66' Storage=99 cf Inflow=0.13 cfs 0.014 af
Discarded=0.03 cfs 0.014 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.014 af

Summary for Pond 3P: Basin #1

Inflow Area = 0.382 ac, 56.90% Impervious, Inflow Depth = 0.44" for 1-Inch event
Inflow = 0.22 cfs @ 12.03 hrs, Volume= 0.014 af
Outflow = 0.09 cfs @ 12.16 hrs, Volume= 0.014 af, Atten= 58%, Lag= 7.5 min
Discarded = 0.09 cfs @ 12.16 hrs, Volume= 0.014 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 186.04' @ 12.16 hrs Surf.Area= 1,626 sf Storage= 67 cf

Plug-Flow detention time= 4.9 min calculated for 0.014 af (100% of inflow)
Center-of-Mass det. time= 4.9 min (789.1 - 784.2)

Volume	Invert	Avail.Storage	Storage Description
#1	186.00'	1,878 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

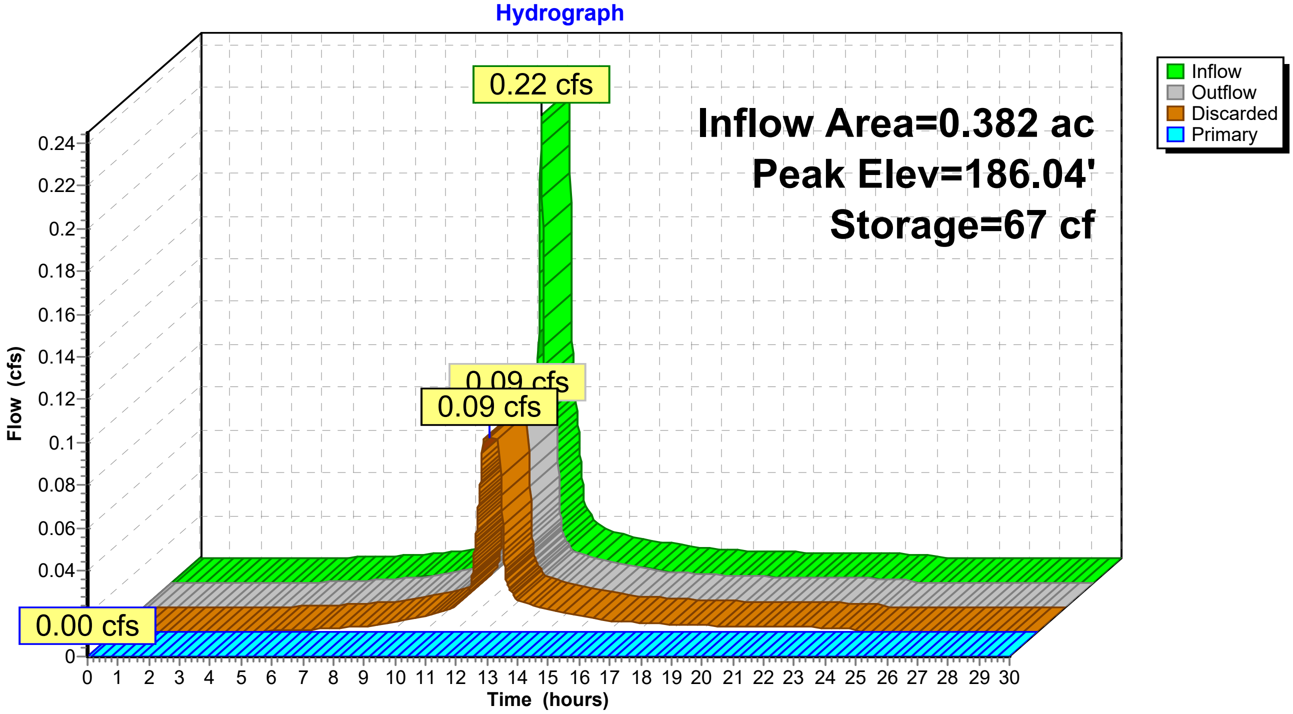
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
186.00	1,604	177.0	0	0	1,604
187.00	2,165	196.0	1,878	1,878	2,198

Device	Routing	Invert	Outlet Devices
#1	Discarded	186.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	186.60'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 186.60 187.00 Width (feet) 4.00 4.00

Discarded OutFlow Max=0.09 cfs @ 12.16 hrs HW=186.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=186.00' (Free Discharge)
↑**2=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond 3P: Basin #1



Summary for Pond 12P: Infiltration Field

Inflow Area = 0.451 ac, 73.04% Impervious, Inflow Depth = 0.33" for 1-Inch event
Inflow = 0.12 cfs @ 12.05 hrs, Volume= 0.012 af
Outflow = 0.10 cfs @ 12.08 hrs, Volume= 0.012 af, Atten= 16%, Lag= 1.9 min
Discarded = 0.10 cfs @ 12.08 hrs, Volume= 0.012 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 181.24' @ 12.20 hrs Surf.Area= 1,800 sf Storage= 26 cf

Plug-Flow detention time= 3.7 min calculated for 0.012 af (100% of inflow)
Center-of-Mass det. time= 3.7 min (845.0 - 841.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.20'	1,096 cf	**55.00'W x 32.50'L x 2.04'H Field A** 3,649 cf Overall - 908 cf Embedded = 2,741 cf x 40.0% Voids
#2A	181.70'	908 cf	**Cultec C-100HD** x 64 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 16 rows
#3	181.20'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		2,043 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.20'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	181.88'	**8.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.88' / 181.00' S= 0.0352 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Discarded OutFlow Max=0.10 cfs @ 12.08 hrs HW=181.23' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=181.20' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 12P: Infiltration Field - Chamber Wizard Field A

Chamber Model = Cultec C-100HD (Cultec Contactor® 100HD)
Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
Row Length Adjustment= +0.50' x 1.86 sf x 16 rows

36.0" Wide + 4.0" Spacing = 40.0" C-C Row Spacing

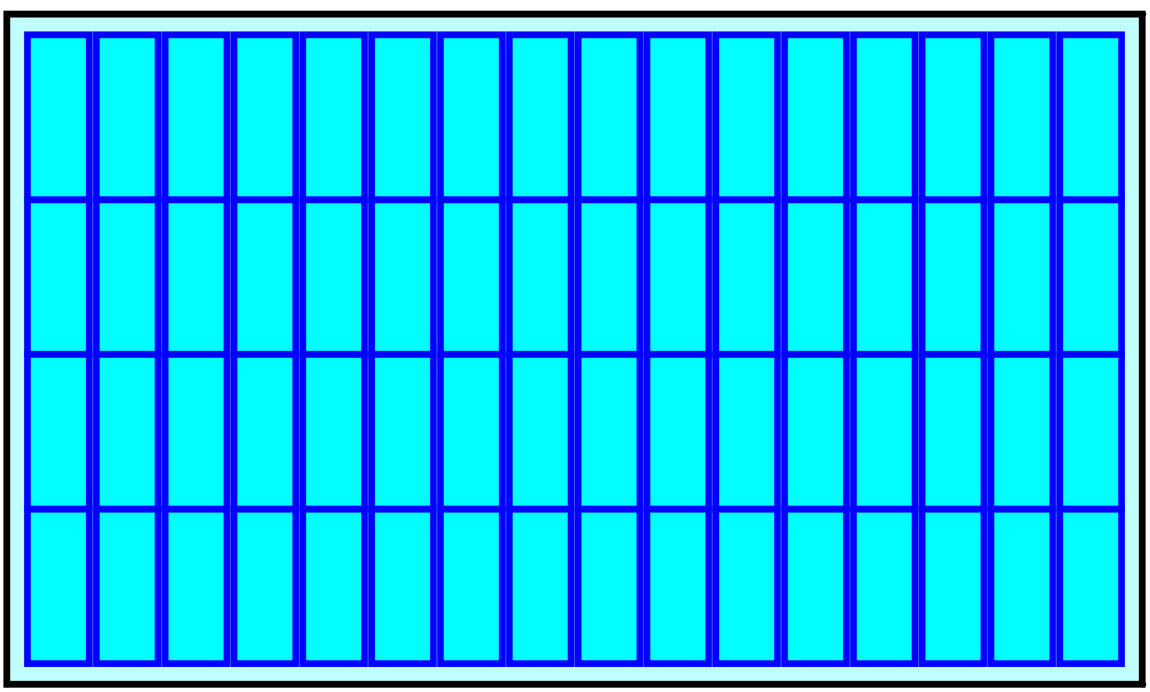
4 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 30.50' Row Length +12.0" End Stone x 2 = 32.50' Base Length
16 Rows x 36.0" Wide + 4.0" Spacing x 15 + 12.0" Side Stone x 2 = 55.00' Base Width
6.0" Base + 12.5" Chamber Height + 6.0" Cover = 2.04' Field Height

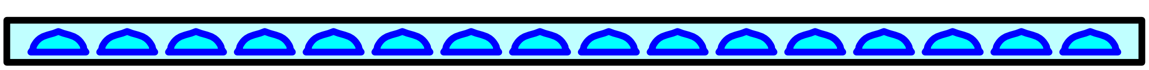
64 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 16 Rows = 908.4 cf Chamber Storage

3,649.5 cf Field - 908.4 cf Chambers = 2,741.1 cf Stone x 40.0% Voids = 1,096.4 cf Stone Storage

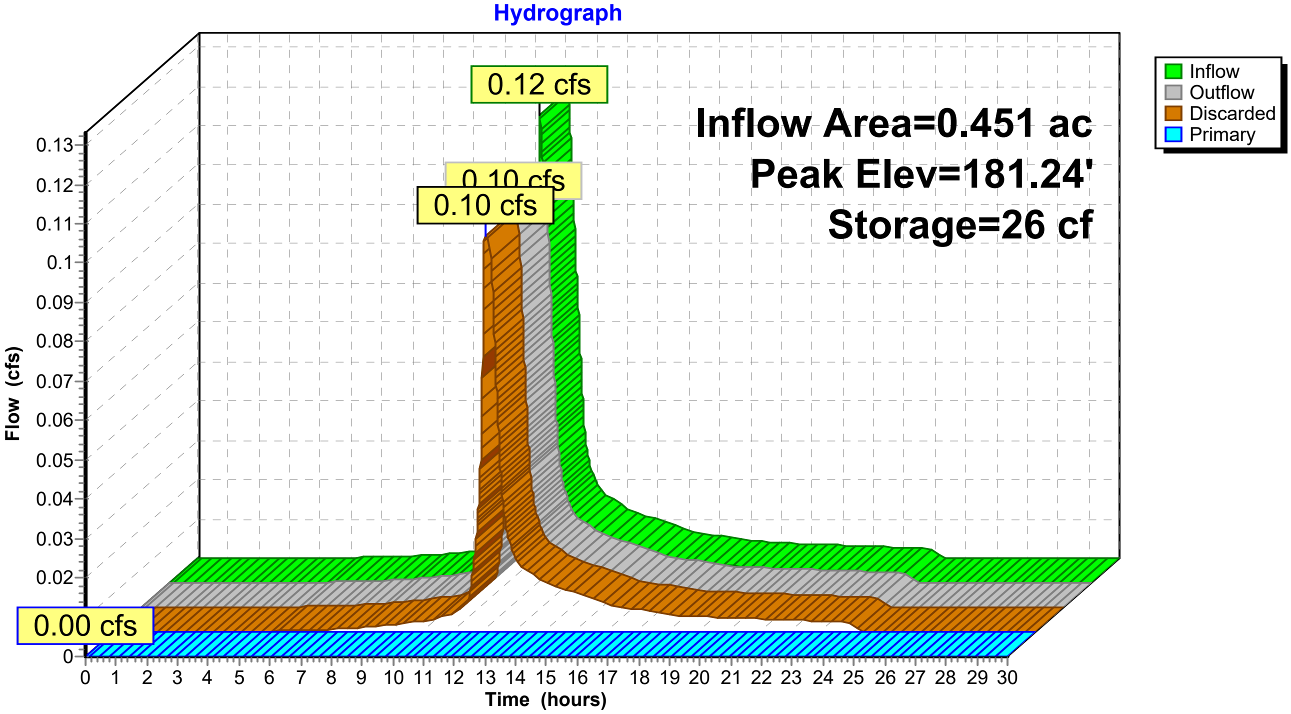
Chamber Storage + Stone Storage = 2,004.8 cf = 0.046 af
Overall Storage Efficiency = 54.9%
Overall System Size = 32.50' x 55.00' x 2.04'

64 Chambers
135.2 cy Field
101.5 cy Stone





Pond 12P: Infiltration Field



Summary for Pond 17P: Basins #2-4

Inflow Area = 1.103 ac, 55.12% Impervious, Inflow Depth = 0.15" for 1-Inch event
Inflow = 0.13 cfs @ 12.03 hrs, Volume= 0.014 af
Outflow = 0.03 cfs @ 12.53 hrs, Volume= 0.014 af, Atten= 73%, Lag= 29.8 min
Discarded = 0.03 cfs @ 12.53 hrs, Volume= 0.014 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 184.66' @ 12.53 hrs Surf.Area= 624 sf Storage= 99 cf

Plug-Flow detention time= 18.3 min calculated for 0.014 af (100% of inflow)
Center-of-Mass det. time= 18.3 min (875.3 - 857.0)

Volume	Invert	Avail.Storage	Storage Description
#1	185.00'	3,934 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
#2	184.50'	2,534 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
#3	185.20'	3,261 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
		9,729 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.00	3,531	264.0	0	0	3,531
186.00	4,351	282.0	3,934	3,934	4,359

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.50	575	96.0	0	0	575
186.00	1,092	128.0	1,230	1,230	1,170
187.00	1,528	150.0	1,304	2,534	1,676

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
185.20	1,063	270.0	0	0	1,063
186.00	1,729	285.0	1,106	1,106	1,762
187.00	2,612	304.0	2,155	3,261	2,700

Device	Routing	Invert	Outlet Devices
#1	Discarded	184.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	185.20'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 185.20 185.80 185.80 186.00 Width (feet) 1.00 1.00 5.00 5.00

Discarded OutFlow Max=0.03 cfs @ 12.53 hrs HW=184.66' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=184.50' (Free Discharge)
└─**2=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond 17P: Basins #2-4