

# ***DRAINAGE REPORT***

Prepared for:

TOOMERFS, LLC

37 MAIN STREET UNIT 0

DURHAM, NH 03824

TAX MAP 4 LOTS 55 & 38-5

Prepared on:

January 3, 2019

Revision 2



**ENGINEERING, P.C.**  
CIVIL • STRUCTURAL • ENVIRONMENTAL

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<u>Appendix Number</u>	<u>Description</u>
A	Drainage Plan
B	Pre-Development Drainage Analysis
C	Post-Development Drainage Analysis
D	Cornell Extreme Precipitation Table
E	Ksat Table for Soils

## 1. Project Background / Purpose

Toomerfs, LLC is the owner of 18 Main St. (Lot 55) and 12 Cowell Dr. (Lot 38-5), both properties are currently used for student housing and have been for several years. The proposal is to permit and construct a new parking lot on Lot 55 with access to the lot from just 18 Main St. The 18 Main St. property is located in the Church Hill District and the 12 Cowell Dr. property is located in the Residence A district. The entire proposed parking lot is located on Lot 55 with one existing entrance way from Main St. that will be expended to accommodate the increased use. The part of the stormwater treatment system and improved culvert are the only developments on the 12 Cowell Dr. parcel. There are currently 17 spaces on Lot 55. The proposal will provide 46 parking spaces on Lot 55.

## 2. Methodology

The watershed areas have been determined via inspection by our office and a topographical survey of the site. This analysis utilizes HydroCAD modeling software which models the runoff based on the SCS TR-20 method and the time of concentration based on the SCS TR-55 method. This analysis compares the runoff rates for the 1-inch, 2, 10, and 25-year USDA/SCS Type III 24-hour extreme storm events. The rainfall data used in the model is referenced from the Cornell extreme precipitation rainfall table found in Appendix D of this report.

## 3. Soils

The soils on site consist mostly of very rocky fine sandy loam and silt loam with Hydrologic Soil Groups determined to be A, C and D. The soils in this analysis have been identified in accordance with the NRCS Web Soil Survey. The soils in the area of the development are more typical of a Hollis soil.

### *Soil Types*

Label	Description	HSG:
HcB	Hollis-Charlton Fine Sandy Loam 3-8% Slopes	A/D
SfC	Suffield Silt Loam 8-15% Slopes	C

## 4. Pre-Development Conditions

The enclosed Pre-Development portion of the Drainage Plan (Appendix B) depicts the contributing runoff area of the property. The watershed areas have been determined via inspection by our office as well as a topographical survey. The watershed boundary only encompasses areas that are directly impacted by the development of the site.

The parking area is proposed on the north side of the existing building on lot 55 in the backyard lawn area. This area slopes in a northerly direction toward Cowell Dr., across lot 38-5 and into the roadside swale along the frontage of lot 38-5 and Cowell Dr. The beginning of the swale is identified as Point of Analysis 1 (POA 1). From this point runoff flows along Cowell Dr. in the swale to a catch basin. The catch basin outlets northwesterly under Cowell Dr. and continues in a closed drainage system along Sauer Terrace and into Pettee Brook.

Subcatchment 1 is the contributing watershed area that drains to POA 1. Runoff flows across the lots and into the swale along Cowell Dr. The cover types used in the model are woods, impervious and lawn areas. The lawn and woods are considered to be in good condition.

The hydrologic analysis of the existing runoff conditions is provided as HydroCAD™ report PRE output in Appendix B.

## **5. Post-Development Conditions**

The proposal includes the construction of a new parking lot with a net of 41 spaces on Lot 55.

The location of the POA used in the Pre-Development Analysis has been maintained for the Post-Development Analysis. The hydrologic evaluation of the proposed runoff conditions is provided in the enclosed HydroCAD™ report POST output (Appendix C). The subcatchment areas have changed to reflect the proposed grading of the site. The overall outer boundary has been maintained. The cover types are the same as in the Pre-Development.

Subcatchment 1S is collected by the proposed bioretention system. The bioretention system has been designed to mitigate the effects of increased impervious coverage on the lot by filtering and infiltrating stormwater. A sediment forebay will allow for the settling of suspended solids from stormwater generated in the paved parking lot prior to entering the bioretention system. An underdrain system will collect runoff that does not infiltrate into the ground and outlet it within the lawn area. A spillway is provided for larger storm events. The spillway is designed to discharge onto the driveway then sheet flow down driveway and into the swale.

The design infiltration rate for the bioretention system was determined per the NHDES Alteration of Terrain rules. The saturated hydraulic conductivity (Ksat) for the limiting layer of the Hollis-Charlton soil series is taken as 0.6 inches per hour. A 50% multiplier is applied in accordance with NHDES (Appendix E). The resultant design infiltration rate is 0.30 in/hr.

Subcatchment 2S comprises the remaining area not captured by the bioretention system.

The hydrologic analysis of the proposed runoff conditions is provided in Appendix C.

## **6. Comparison of Pre- and Post-Development Conditions**

The following tables quantify the peak rate of discharge and discharge volume leaving the parcel at POA 1 as shown on the Pre- and Post-Development Drainage Plan. The analysis has been modeled using the extreme rainfall quantities.

Table 1: Peak Rate of Runoff at POA 1 Summary Table

<u>Storm</u>	<u>Pre-Development (cfs)</u>	<u>Post-Development (cfs)</u>	<u>Difference</u>
1-Inch	0.00	0.07	0.07
2-Year	0.99	0.87	-0.12
10-Year	2.21	1.56	-0.65
25-Year	3.25	2.81	-0.44

Table 2: Discharge Runoff Volume at POA 1 Summary Table

<u>Storm</u>	<u>Pre-Development (cf)</u>	<u>Post-Development (cf)</u>	<u>Difference</u>
1-Inch	81	70	-11
2-Year	3,397	3,297	-100
10-Year	7,382	7,161	-221
25-Year	10,889	10,612	-277

There is a reduction in the peak rate of runoff during all the design storm events at POA 1. The reduction in peak rate of discharge is attributed to the bioretention system, which provides peak flow attenuation and volume reduction. There is a small increase in the runoff volume in the smaller storms and a larger reduction in the larger storms due to the infiltration capacity of the native soils.

## 7. Stormwater Treatment and Pretreatment Practices

Stormwater pre-treatment will be provided by sediment forebays. Stormwater treatment will be provided by a bioretention system.

## 8. WQV Calculations

The groundwater recharge volume (GRV) based on the NHDES requirement is calculated by applying a factor to the area of soil replaced by impervious surfaces. A factor of 0.4 is applied to HSG A soils and 0.1 is applied to HSG C soils. The required volume to be infiltrated for this project is as follows;

Proposed impervious area: 11,614 sf HSG A Soil and 202 sf of HSG C Soil  
 $11,816 \text{ sf} \times 0.37 \times (1'/12'') = 364 \text{ cf}$

Storm	Volume Infiltrated (cf)
1 inch	526
2 Year	1,918
10 Year	2,568
25 Year	2,860

As shown in Table 3, the bioretention system does infiltrate the required GRV. The bioretention system effectively treats runoff so as not to create or contribute to water quality impairment.

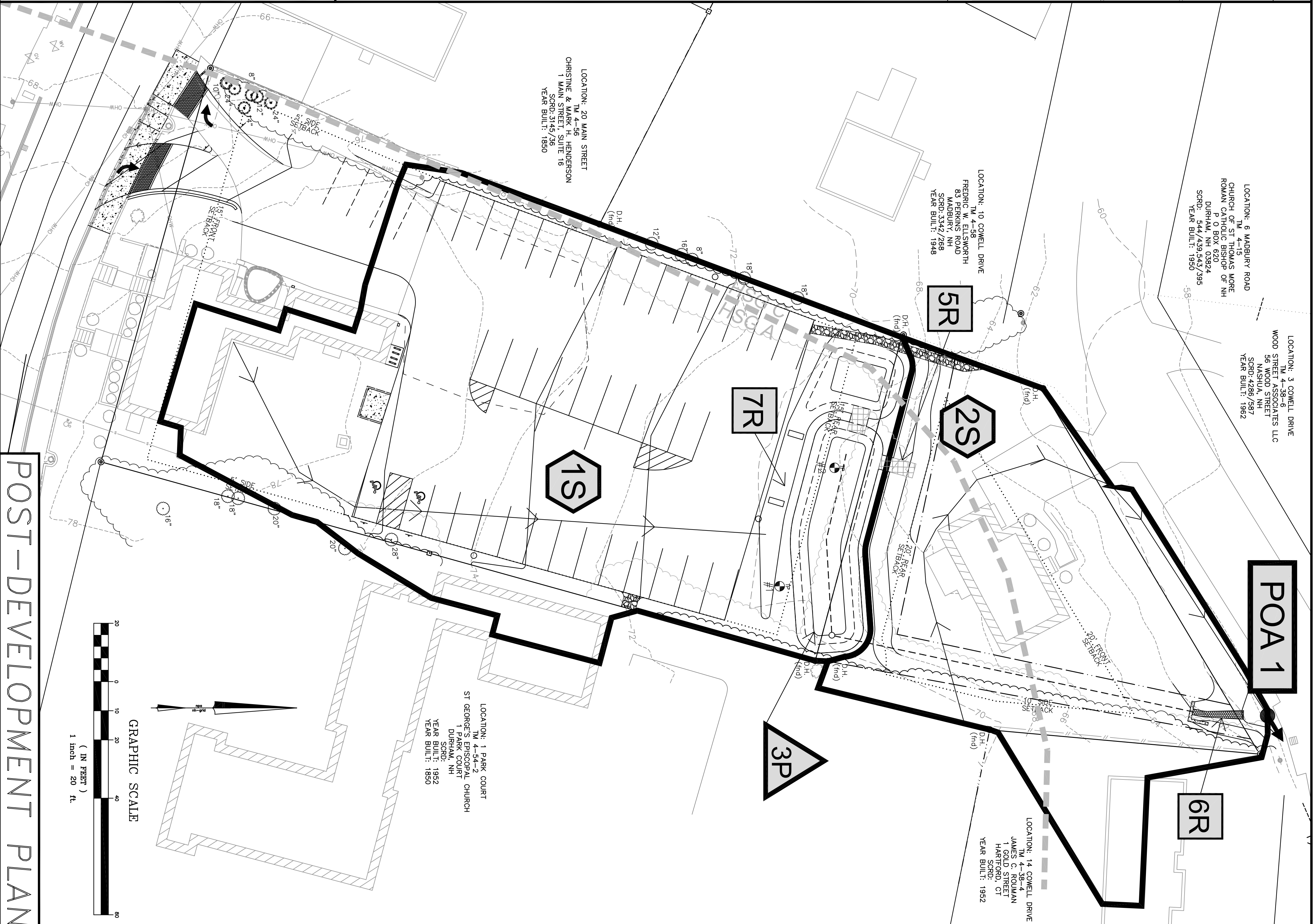
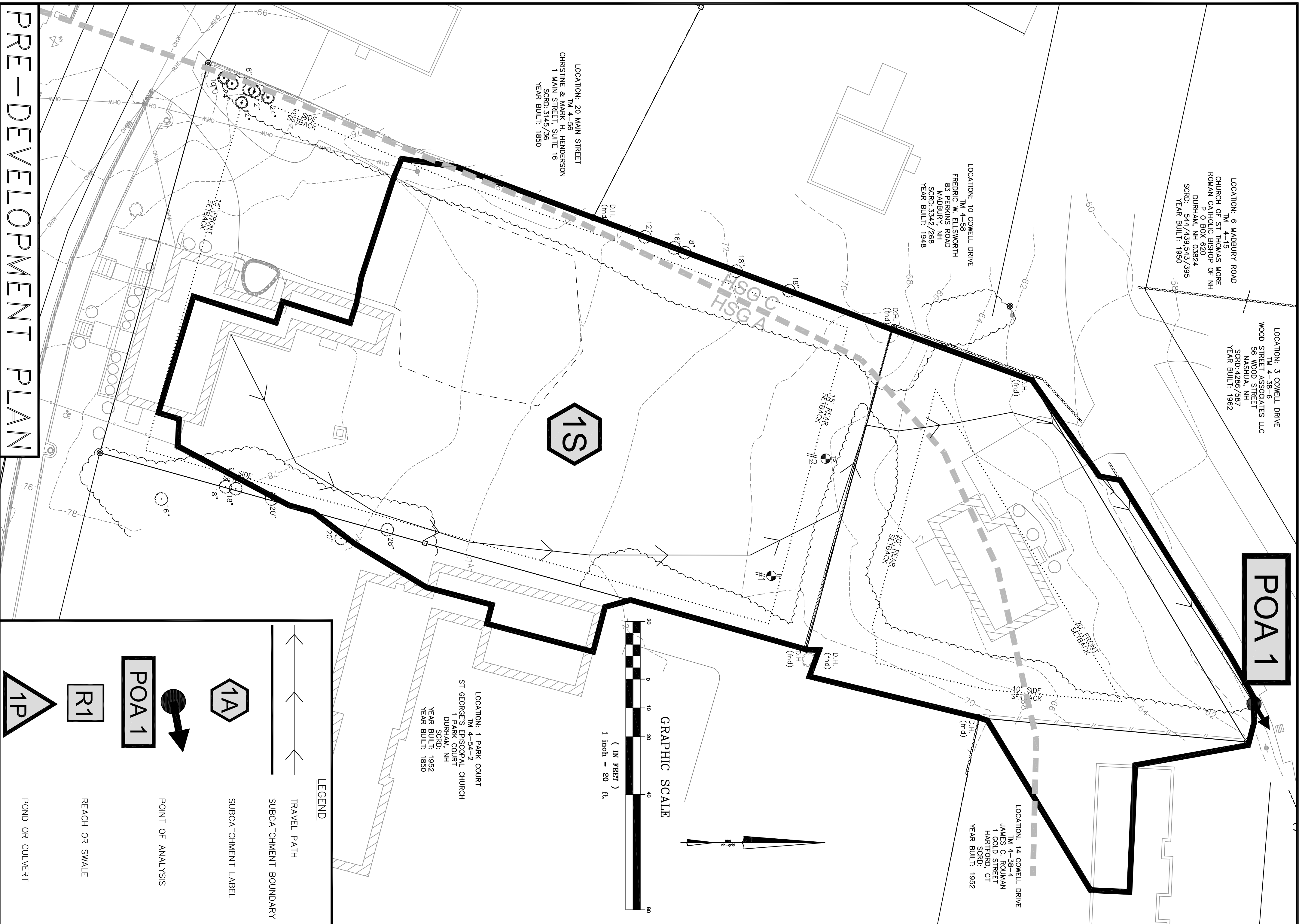
## **9. Erosion & Sediment Control**

Temporary and permanent practices are used to prevent and minimize erosion and sedimentation on site. The installation of Silt Soxx™ at the perimeter of construction areas will provide sediment retention during the construction phase of the development. Erosion control matting is proposed on all spillways, steep slopes and swales to prevent erosion prior to the establishment of permanent vegetation. In addition, stone check dams will be used to help control erosion in the treatment swale.

## **10. Conclusion**

The enclosed comparative hydrologic model provides sufficient evidence that the stormwater design will mitigate the typical increase in peak rate of stormwater discharge resulting from the proposed development of the site. Stormwater treatment practices will provide treatment of runoff from proposed paved surfaces. The use of erosion and sediment controls and proper construction practices will minimize the impact of this project to downstream surface waters.

## APPENDIX A



NO.	REVISIONS	DATE	INT.
2.	DESIGN REVISIONS PER FIRST PLANNING BOARD MEETING	1/3/19	EHK
1.	PLAN UPDATES	11/29/18	EHK
0.	INITIAL SUBMISSION TO DURHAM PLANNING BOARD	10/5/18	EHK

DATE: 10/5/18  
 SCALE: 1"=20'  
 DESIGNED BY: EHK  
 DRAWN BY: EHK  
 APPROVED BY: MJS  
 DWG FILE: 18-040 CivilJ.dwg

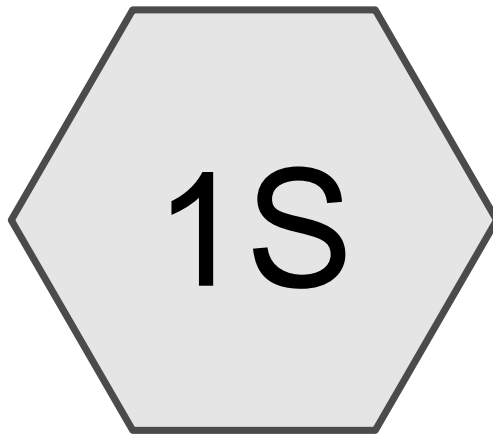
**PRE & POST DRAINAGE PLAN**  
 prepared for  
**TOOMERFS, LLC**  
 TAX MAP 4, LOTS 38-5 AND 55  
 18 MAIN ST AND 12 COWELL DR. DURHAM, NH

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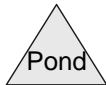
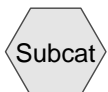
**DP**  
 JOB: 18-040



## APPENDIX B



(new Subcat)



**Routing Diagram for PRE B**

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**PRE B**

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Page 2

**Area Listing (all nodes)**

Area (sq-ft)	CN	Description (subcatchment-numbers)
3,870	39	>75% Grass cover, Good, HSG A (1S)
6,100	74	>75% Grass cover, Good, HSG C (1S)
13,433	80	>75% Grass cover, Good, HSG D (1S)
3,361	94	Newly graded area, HSG D (1S)
605	98	Paved parking, HSG A (1S)
902	98	Paved parking, HSG C (1S)
3,982	98	Roofs, HSG A (1S)
3,711	36	Woods, Fair, HSG A (1S)
2,355	73	Woods, Fair, HSG C (1S)
4,121	79	Woods, Fair, HSG D (1S)
<b>42,440</b>	<b>75</b>	<b>TOTAL AREA</b>

**PRE B**

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Page 3

**Soil Listing (all nodes)**

Area (sq-ft)	Soil Group	Subcatchment Numbers
12,168	HSG A	1S
0	HSG B	
9,357	HSG C	1S
20,915	HSG D	1S
0	Other	
<b>42,440</b>		<b>TOTAL AREA</b>

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**Ground Covers (all nodes)**

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
3,870	0	6,100	13,433	0	23,403	>75% Grass cover, Good	
0	0	0	3,361	0	3,361	Newly graded area	
605	0	902	0	0	1,507	Paved parking	
3,982	0	0	0	0	3,982	Roofs	
3,711	0	2,355	4,121	0	10,187	Woods, Fair	
<b>12,168</b>	<b>0</b>	<b>9,357</b>	<b>20,915</b>	<b>0</b>	<b>42,440</b>	<b>TOTAL AREA</b>	

**PRE B**

*Type III 24-hr 1 inch storm Rainfall=1.00"*

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

**Subcatchment 1S: (new Subcat)**

Runoff Area=42,440 sf 12.93% Impervious Runoff Depth>0.02"  
Flow Length=465' Tc=10.1 min CN=75 Runoff=0.00 cfs 81 cf

**Total Runoff Area = 42,440 sf Runoff Volume = 81 cf Average Runoff Depth = 0.02"**  
**87.07% Pervious = 36,951 sf 12.93% Impervious = 5,489 sf**

**PRE B**

Type III 24-hr 1 inch storm Rainfall=1.00"

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**Summary for Subcatchment 1S: (new Subcat)**

Runoff = 0.00 cfs @ 13.83 hrs, Volume= 81 cf, Depth> 0.02"

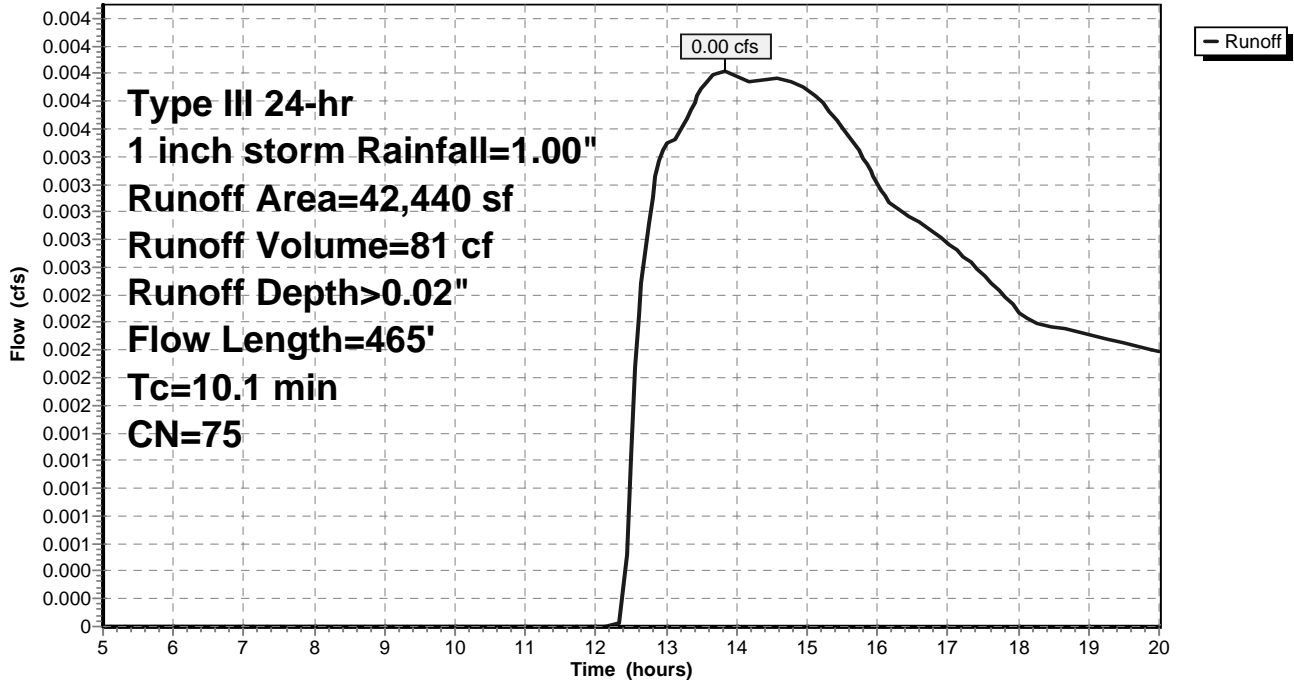
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 1 inch storm Rainfall=1.00"

Area (sf)	CN	Description
3,711	36	Woods, Fair, HSG A
2,355	73	Woods, Fair, HSG C
3,982	98	Roofs, HSG A
3,361	94	Newly graded area, HSG D
605	98	Paved parking, HSG A
902	98	Paved parking, HSG C
3,870	39	>75% Grass cover, Good, HSG A
6,100	74	>75% Grass cover, Good, HSG C
4,121	79	Woods, Fair, HSG D
13,433	80	>75% Grass cover, Good, HSG D
42,440	75	Weighted Average
36,951		87.07% Pervious Area
5,489		12.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.14"
0.3	20	0.0310	1.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.4	33	0.0600	1.22		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	62	0.0379	1.36		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.2	12	0.0379	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.6	63	0.0550	1.64		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.9	45	0.0277	0.83		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.4	54	0.1018	2.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	25	0.0400	4.06		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.7	101	0.0250	2.37		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
10.1	465	Total			

### Subcatchment 1S: (new Subcat)

Hydrograph





**PRE B**

Type III 24-hr 2 year Rainfall=3.14"

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

**Subcatchment 1S: (new Subcat)**

Runoff Area=42,440 sf 12.93% Impervious Runoff Depth>0.96"  
Flow Length=465' Tc=10.1 min CN=75 Runoff=0.99 cfs 3,397 cf

**Total Runoff Area = 42,440 sf Runoff Volume = 3,397 cf Average Runoff Depth = 0.96"**  
**87.07% Pervious = 36,951 sf 12.93% Impervious = 5,489 sf**

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Type III 24-hr 2 year Rainfall=3.14"

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**Summary for Subcatchment 1S: (new Subcat)**

Runoff = 0.99 cfs @ 12.16 hrs, Volume= 3,397 cf, Depth> 0.96"

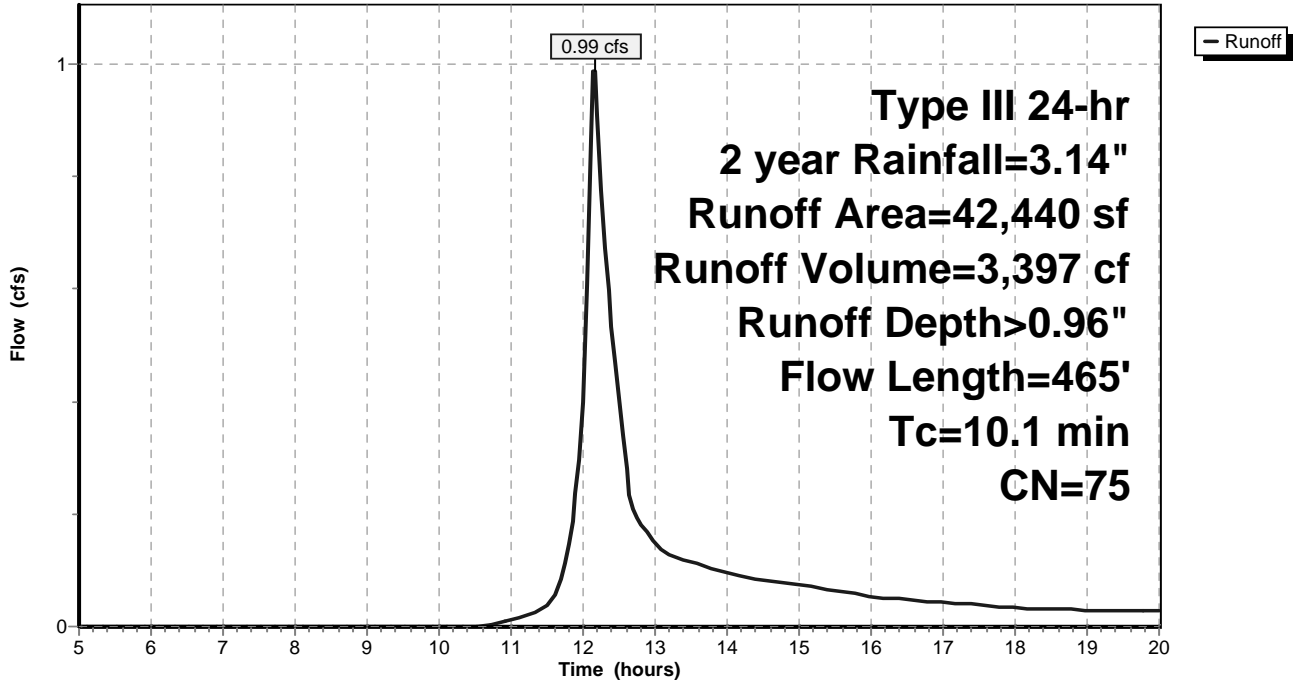
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 year Rainfall=3.14"

Area (sf)	CN	Description
3,711	36	Woods, Fair, HSG A
2,355	73	Woods, Fair, HSG C
3,982	98	Roofs, HSG A
3,361	94	Newly graded area, HSG D
605	98	Paved parking, HSG A
902	98	Paved parking, HSG C
3,870	39	>75% Grass cover, Good, HSG A
6,100	74	>75% Grass cover, Good, HSG C
4,121	79	Woods, Fair, HSG D
13,433	80	>75% Grass cover, Good, HSG D
42,440	75	Weighted Average
36,951		87.07% Pervious Area
5,489		12.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.14"
0.3	20	0.0310	1.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.4	33	0.0600	1.22		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	62	0.0379	1.36		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.2	12	0.0379	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.6	63	0.0550	1.64		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.9	45	0.0277	0.83		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.4	54	0.1018	2.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	25	0.0400	4.06		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.7	101	0.0250	2.37		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
10.1	465	Total			

**Subcatchment 1S: (new Subcat)**

Hydrograph



**PRE B**

Type III 24-hr 10 year Rainfall=4.76"

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

**Subcatchment 1S: (new Subcat)**

Runoff Area=42,440 sf 12.93% Impervious Runoff Depth>2.09"  
Flow Length=465' Tc=10.1 min CN=75 Runoff=2.21 cfs 7,382 cf

**Total Runoff Area = 42,440 sf Runoff Volume = 7,382 cf Average Runoff Depth = 2.09"**  
**87.07% Pervious = 36,951 sf 12.93% Impervious = 5,489 sf**

**PRE B**

Type III 24-hr 10 year Rainfall=4.76"

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**Summary for Subcatchment 1S: (new Subcat)**

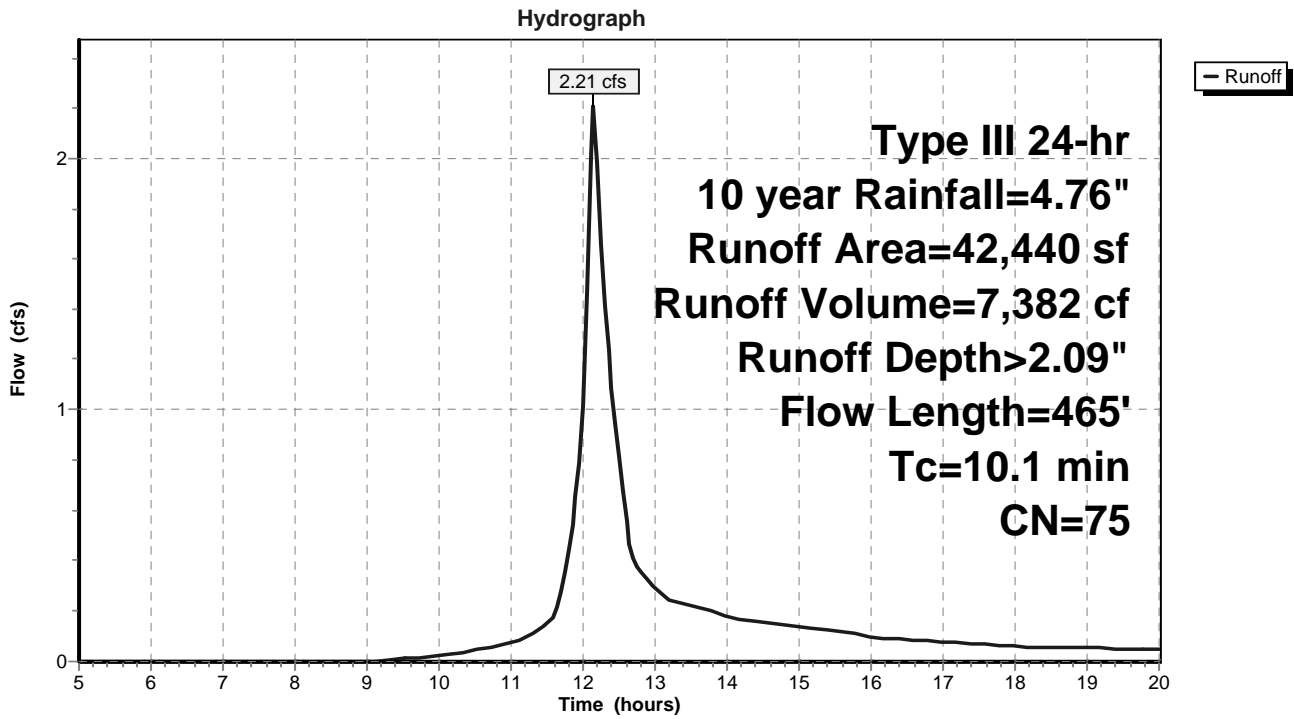
Runoff = 2.21 cfs @ 12.15 hrs, Volume= 7,382 cf, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 year Rainfall=4.76"

Area (sf)	CN	Description
3,711	36	Woods, Fair, HSG A
2,355	73	Woods, Fair, HSG C
3,982	98	Roofs, HSG A
3,361	94	Newly graded area, HSG D
605	98	Paved parking, HSG A
902	98	Paved parking, HSG C
3,870	39	>75% Grass cover, Good, HSG A
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42,440	75	Weighted Average
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5,489		12.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.14"
0.3	20	0.0310	1.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.4	33	0.0600	1.22		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
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0.7	101	0.0250	2.37		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
10.1	465	Total			

**Subcatchment 1S: (new Subcat)**



**PRE B**

*Type III 24-hr 25 year Rainfall=6.03"*

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

**Subcatchment 1S: (new Subcat)**

Runoff Area=42,440 sf 12.93% Impervious Runoff Depth>3.08"  
Flow Length=465' Tc=10.1 min CN=75 Runoff=3.25 cfs 10,889 cf

**Total Runoff Area = 42,440 sf Runoff Volume = 10,889 cf Average Runoff Depth = 3.08"**  
**87.07% Pervious = 36,951 sf 12.93% Impervious = 5,489 sf**

**PRE B**

Type III 24-hr 25 year Rainfall=6.03"

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Page 15

**Summary for Subcatchment 1S: (new Subcat)**

Runoff = 3.25 cfs @ 12.15 hrs, Volume= 10,889 cf, Depth> 3.08"

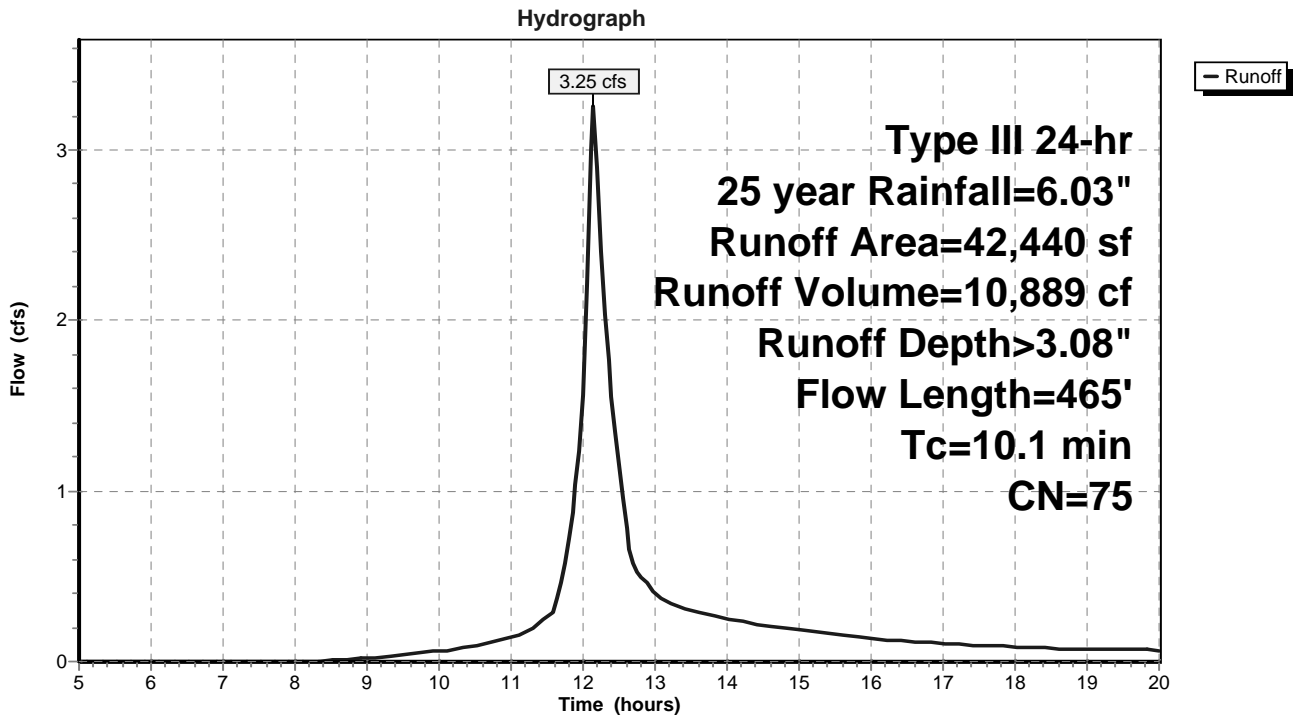
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25 year Rainfall=6.03"

Area (sf)	CN	Description
3,711	36	Woods, Fair, HSG A
2,355	73	Woods, Fair, HSG C
3,982	98	Roofs, HSG A
3,361	94	Newly graded area, HSG D
605	98	Paved parking, HSG A
902	98	Paved parking, HSG C
3,870	39	>75% Grass cover, Good, HSG A
6,100	74	>75% Grass cover, Good, HSG C
4,121	79	Woods, Fair, HSG D
13,433	80	>75% Grass cover, Good, HSG D
42,440	75	Weighted Average
36,951		87.07% Pervious Area
5,489		12.93% Impervious Area

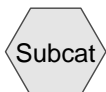
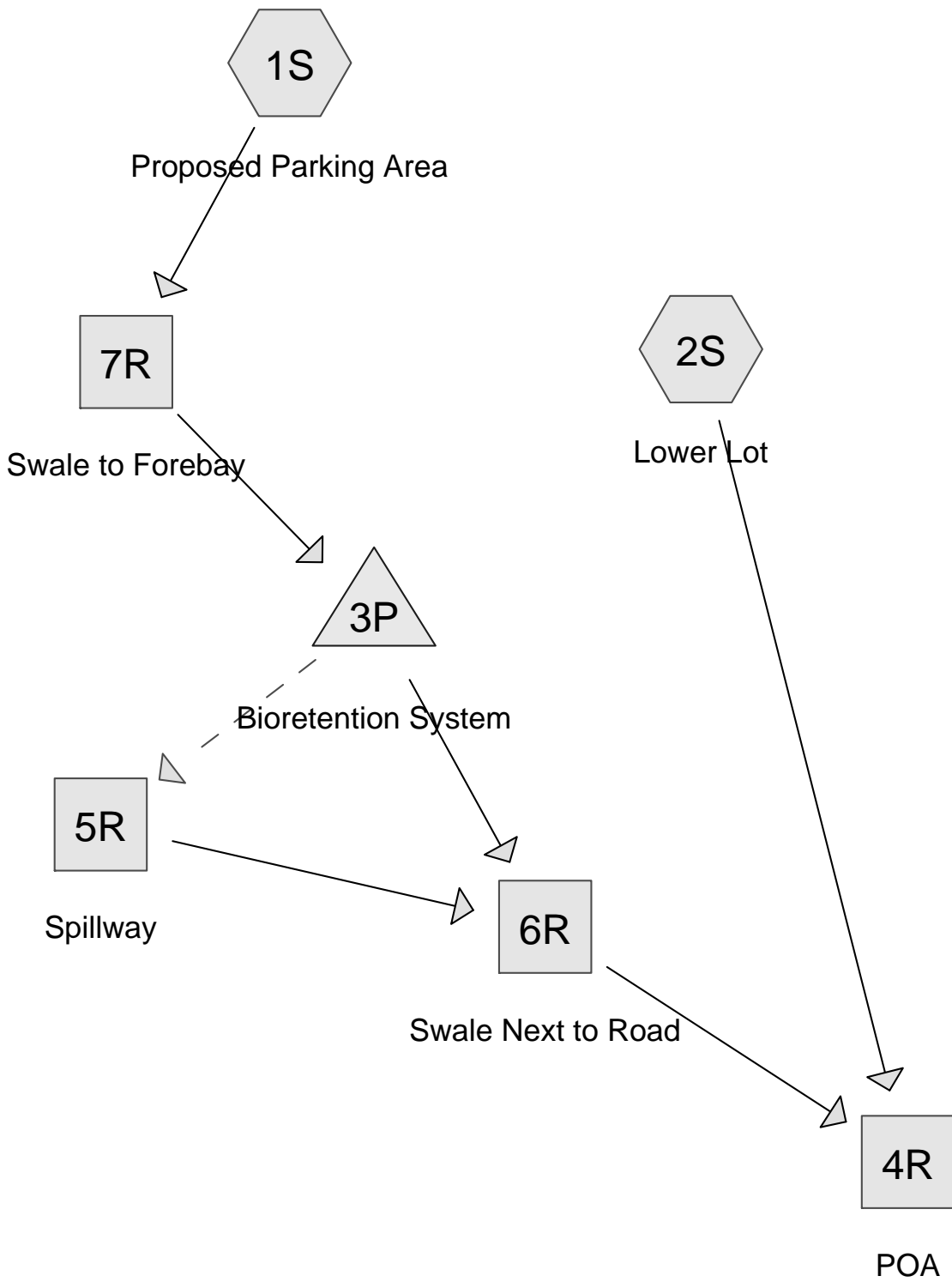
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.14"
0.3	20	0.0310	1.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.4	33	0.0600	1.22		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	62	0.0379	1.36		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.2	12	0.0379	0.97		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.6	63	0.0550	1.64		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.9	45	0.0277	0.83		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.4	54	0.1018	2.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	25	0.0400	4.06		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.7	101	0.0250	2.37		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
10.1	465	Total			



**Subcatchment 1S: (new Subcat)**



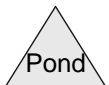
## APPENDIX C



Subcat



Reach



Pond



Link

**Routing Diagram for POST F**

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**Area Listing (all nodes)**

Area (sq-ft)	CN	Description (subcatchment-numbers)
2,868	39	>75% Grass cover, Good, HSG A (2S)
14,666	74	>75% Grass cover, Good, HSG C (1S, 2S)
15,854	98	Paved parking, HSG A (1S)
941	98	Paved parking, HSG C (2S)
2,034	98	Roofs, HSG A (1S)
1,910	98	Roofs, HSG C (2S)
1,121	36	Woods, Fair, HSG A (2S)
3,047	73	Woods, Fair, HSG C (1S, 2S)
<b>42,441</b>	<b>82</b>	<b>TOTAL AREA</b>

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**Soil Listing (all nodes)**

Area (sq-ft)	Soil Group	Subcatchment Numbers
21,877	HSG A	1S, 2S
0	HSG B	
20,564	HSG C	1S, 2S
0	HSG D	
0	Other	
<b>42,441</b>		<b>TOTAL AREA</b>

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**Ground Covers (all nodes)**

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
2,868	0	14,666	0	0	17,534	>75% Grass cover, Good	
15,854	0	941	0	0	16,795	Paved parking	
2,034	0	1,910	0	0	3,944	Roofs	
1,121	0	3,047	0	0	4,168	Woods, Fair	
<b>21,877</b>	<b>0</b>	<b>20,564</b>	<b>0</b>	<b>0</b>	<b>42,441</b>	<b>TOTAL AREA</b>	

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**Pipe Listing (all nodes)**

---

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	3P	65.00	59.80	124.5	0.0418	0.013	8.0	0.0	0.0

---

**POST F**

Type III 24-hr 1 inch storm Rainfall=1.00"

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

**Subcatchment 1S: Proposed Parking Area** Runoff Area=27,844 sf 64.24% Impervious Runoff Depth>0.26"  
Flow Length=209' Tc=6.5 min CN=89 Runoff=0.19 cfs 599 cf

**Subcatchment 2S: Lower Lot** Runoff Area=14,597 sf 19.53% Impervious Runoff Depth>0.00"  
Flow Length=234' Tc=7.2 min CN=69 Runoff=0.00 cfs 1 cf

**Reach 4R: POA** Inflow=0.07 cfs 70 cf  
Outflow=0.07 cfs 70 cf

**Reach 5R: Spillway** Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf  
n=0.016 L=90.0' S=0.0667 '/' Capacity=115.23 cfs Outflow=0.00 cfs 0 cf

**Reach 6R: Swale Next to Road** Avg. Flow Depth=0.02' Max Vel=1.47 fps Inflow=0.07 cfs 69 cf  
n=0.022 L=25.0' S=0.0800 '/' Capacity=16.25 cfs Outflow=0.07 cfs 69 cf

**Reach 7R: Swale to Forebay** Avg. Flow Depth=0.08' Max Vel=0.73 fps Inflow=0.19 cfs 599 cf  
n=0.030 L=80.0' S=0.0075 '/' Capacity=10.76 cfs Outflow=0.18 cfs 597 cf

**Pond 3P: Bioretention System** Peak Elev=65.82' Storage=75 cf Inflow=0.18 cfs 597 cf  
Discarded=0.06 cfs 526 cf Primary=0.07 cfs 69 cf Secondary=0.00 cfs 0 cf Outflow=0.12 cfs 595 cf

**Total Runoff Area = 42,441 sf Runoff Volume = 600 cf Average Runoff Depth = 0.17"**  
**51.13% Pervious = 21,702 sf 48.87% Impervious = 20,739 sf**



**POST F**

Type III 24-hr 1 inch storm Rainfall=1.00"

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**Summary for Subcatchment 1S: Proposed Parking Area**

Runoff = 0.19 cfs @ 12.11 hrs, Volume= 599 cf, Depth> 0.26"

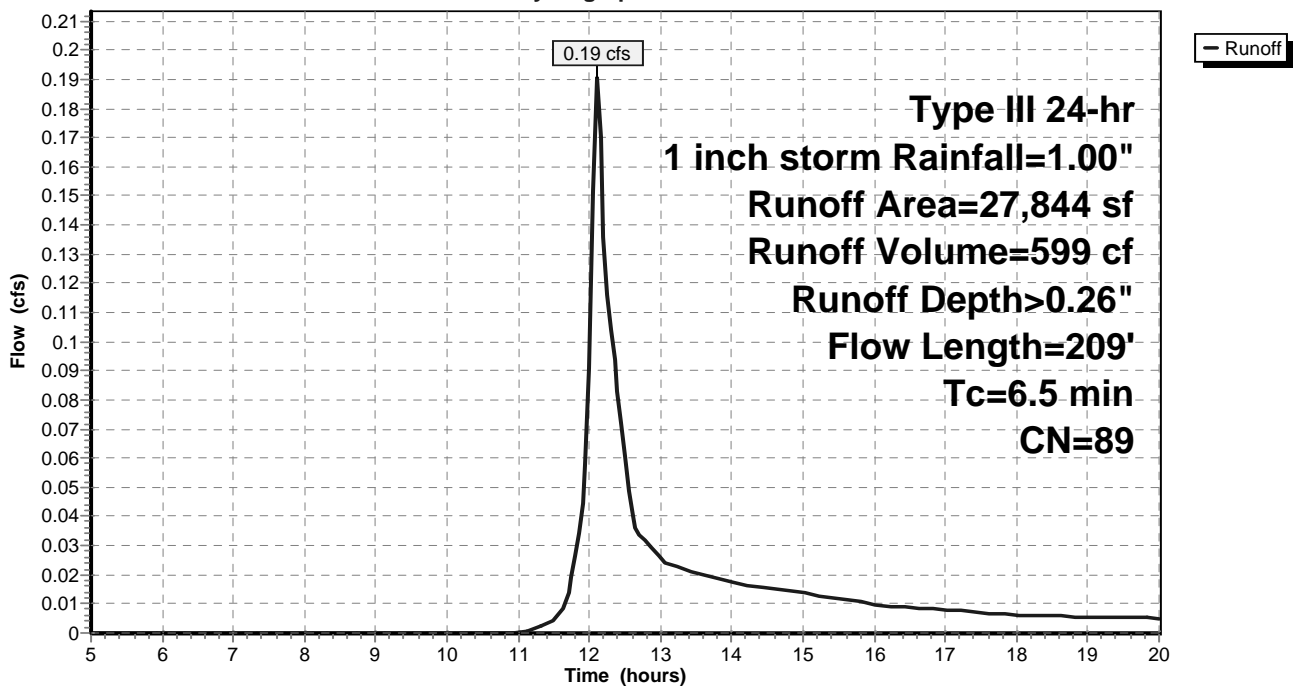
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1 inch storm Rainfall=1.00"

Area (sf)	CN	Description
8,274	74	>75% Grass cover, Good, HSG C
2,034	98	Roofs, HSG A
15,854	98	Paved parking, HSG A
1,682	73	Woods, Fair, HSG C
27,844	89	Weighted Average
9,956		35.76% Pervious Area
17,888		64.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.14"
0.3	23	0.0440	1.47		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.5	136	0.0500	4.54		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
6.5	209	Total			

**Subcatchment 1S: Proposed Parking Area**

Hydrograph



**POST F**

Type III 24-hr 1 inch storm Rainfall=1.00"

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**Summary for Subcatchment 2S: Lower Lot**

[73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 20.00 hrs, Volume= 1 cf, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1 inch storm Rainfall=1.00"

Area (sf)	CN	Description
1,121	36	Woods, Fair, HSG A
1,365	73	Woods, Fair, HSG C
941	98	Paved parking, HSG C
1,910	98	Roofs, HSG C
2,868	39	>75% Grass cover, Good, HSG A
6,392	74	>75% Grass cover, Good, HSG C
14,597	69	Weighted Average
11,746		80.47% Pervious Area
2,851		19.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	25	0.1080	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.14"
2.5	25	0.0400	0.17		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.14"
0.2	24	0.1000	2.21		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	5	0.1000	6.42		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	17	0.1000	2.21		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	42	0.0950	6.26		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.7	96	0.0208	2.16		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
7.2	234	Total			

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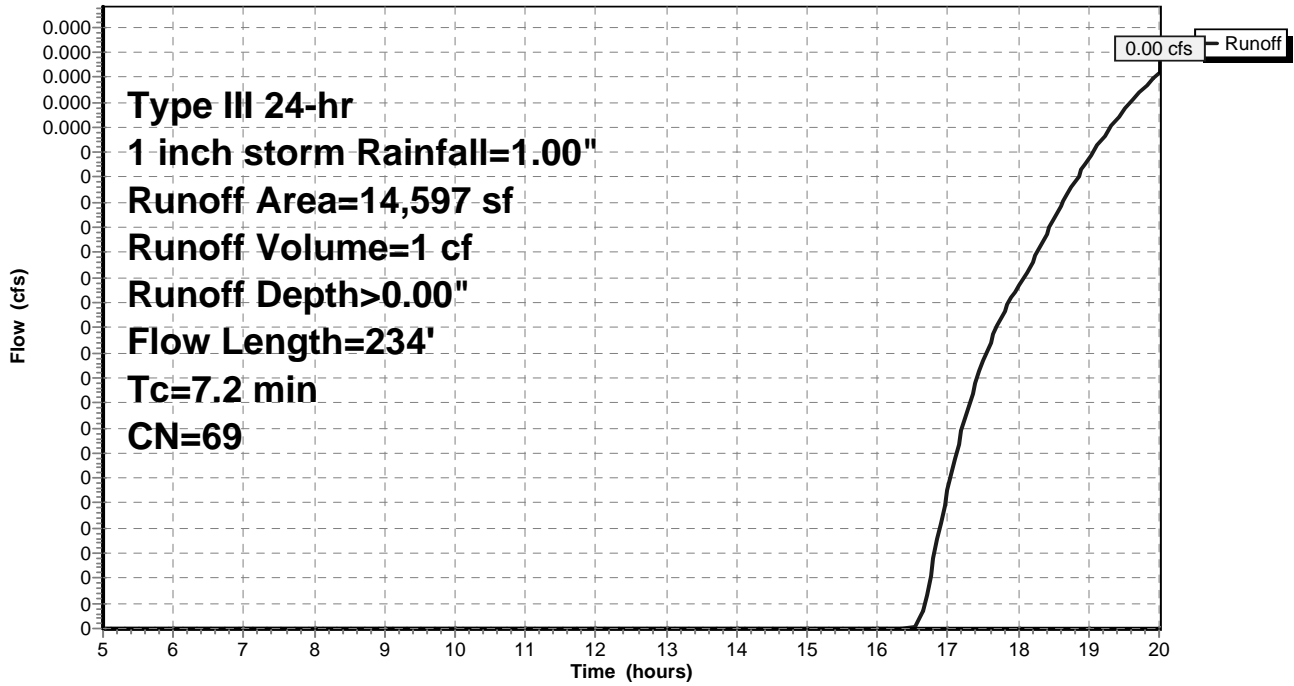
Type III 24-hr 1 inch storm Rainfall=1.00"

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**Subcatchment 2S: Lower Lot**

Hydrograph



**POST F**

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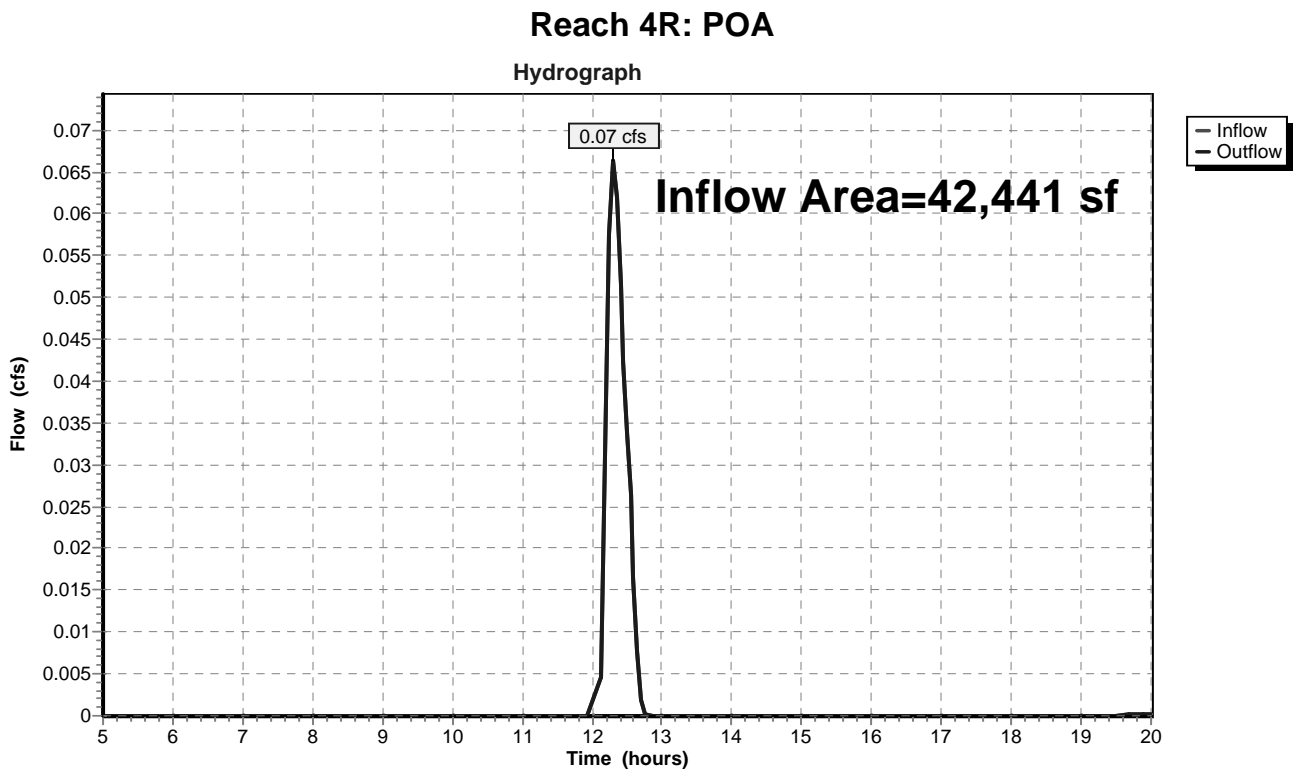
Page 10

**Summary for Reach 4R: POA**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 42,441 sf, 48.87% Impervious, Inflow Depth > 0.02" for 1 inch storm event  
Inflow = 0.07 cfs @ 12.31 hrs, Volume= 70 cf  
Outflow = 0.07 cfs @ 12.31 hrs, Volume= 70 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



**POST F**

Type III 24-hr 1 inch storm Rainfall=1.00"

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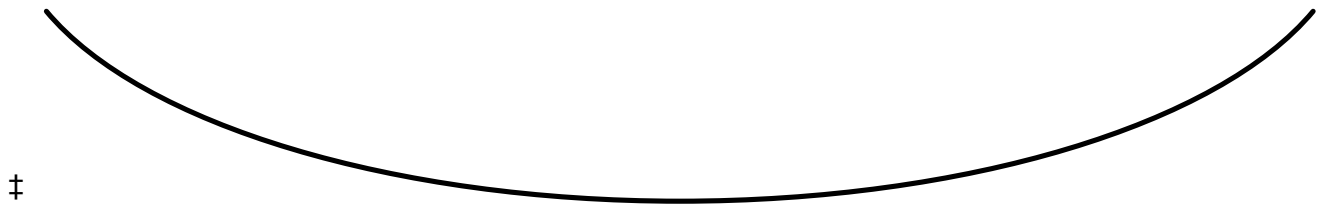
**Summary for Reach 5R: Spillway**

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf  
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

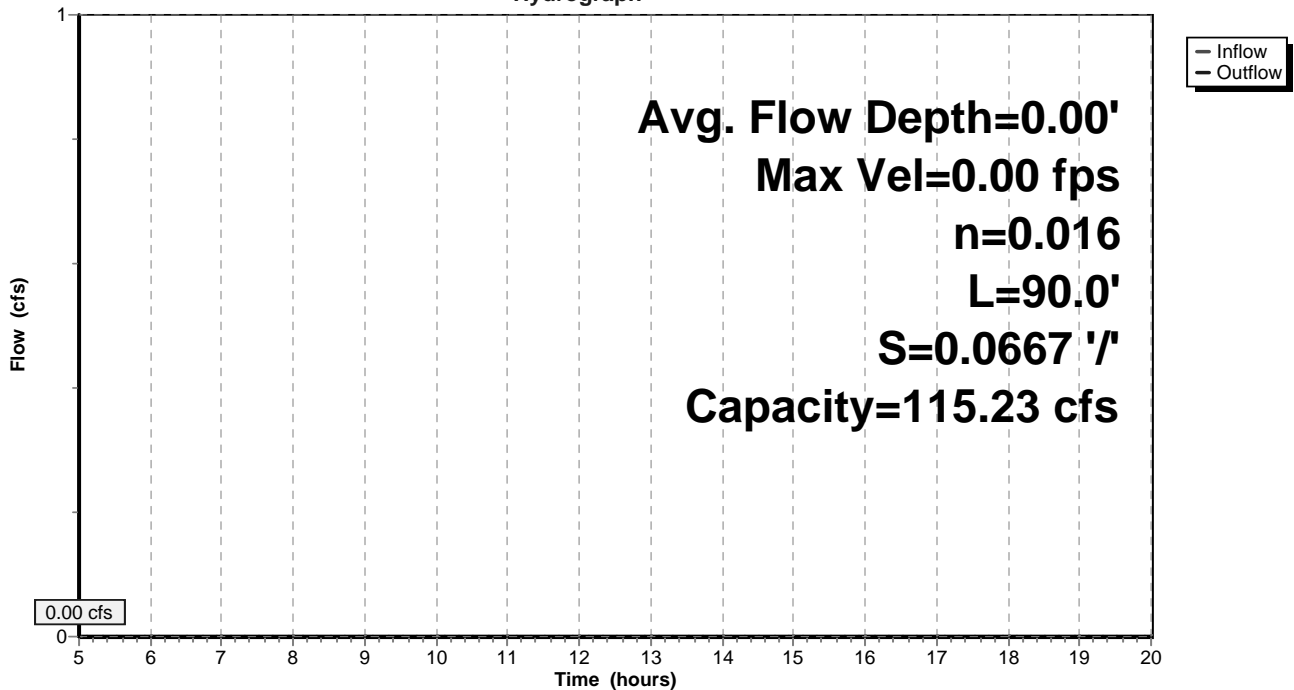
Peak Storage= 0 cf @ 5.00 hrs  
Average Depth at Peak Storage= 0.00'  
Bank-Full Depth= 0.50' Flow Area= 10.0 sf, Capacity= 115.23 cfs

30.00' x 0.50' deep Parabolic Channel, n= 0.016 Asphalt, rough  
Length= 90.0' Slope= 0.0667 '/'  
Inlet Invert= 67.00', Outlet Invert= 61.00'



**Reach 5R: Spillway**

Hydrograph



**POST F**

Type III 24-hr 1 inch storm Rainfall=1.00"

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**Summary for Reach 6R: Swale Next to Road**

Inflow Area = 27,844 sf, 64.24% Impervious, Inflow Depth = 0.03" for 1 inch storm event  
Inflow = 0.07 cfs @ 12.30 hrs, Volume= 69 cf  
Outflow = 0.07 cfs @ 12.31 hrs, Volume= 69 cf, Atten= 2%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 1.47 fps, Min. Travel Time= 0.3 min  
Avg. Velocity = 1.09 fps, Avg. Travel Time= 0.4 min

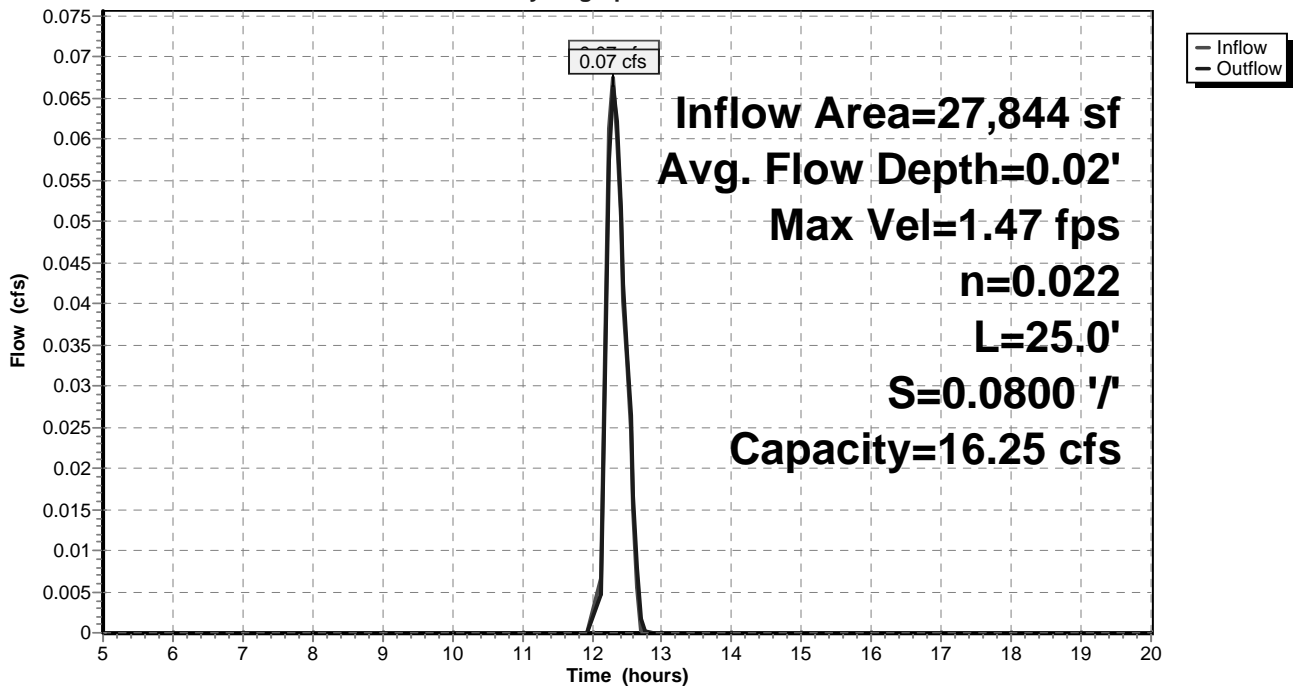
Peak Storage= 1 cf @ 12.30 hrs  
Average Depth at Peak Storage= 0.02'  
Bank-Full Depth= 0.50' Flow Area= 1.8 sf, Capacity= 16.25 cfs

2.00' x 0.50' deep channel, n= 0.022 Earth, clean & straight  
Side Slope Z-value= 3.0 '/' Top Width= 5.00'  
Length= 25.0' Slope= 0.0800 '/'  
Inlet Invert= 59.00', Outlet Invert= 57.00'



**Reach 6R: Swale Next to Road**

Hydrograph



**POST F**

Type III 24-hr 1 inch storm Rainfall=1.00"

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**Summary for Reach 7R: Swale to Forebay**

Inflow Area = 27,844 sf, 64.24% Impervious, Inflow Depth > 0.26" for 1 inch storm event  
Inflow = 0.19 cfs @ 12.11 hrs, Volume= 599 cf  
Outflow = 0.18 cfs @ 12.16 hrs, Volume= 597 cf, Atten= 6%, Lag= 3.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 0.73 fps, Min. Travel Time= 1.8 min  
Avg. Velocity = 0.28 fps, Avg. Travel Time= 4.8 min

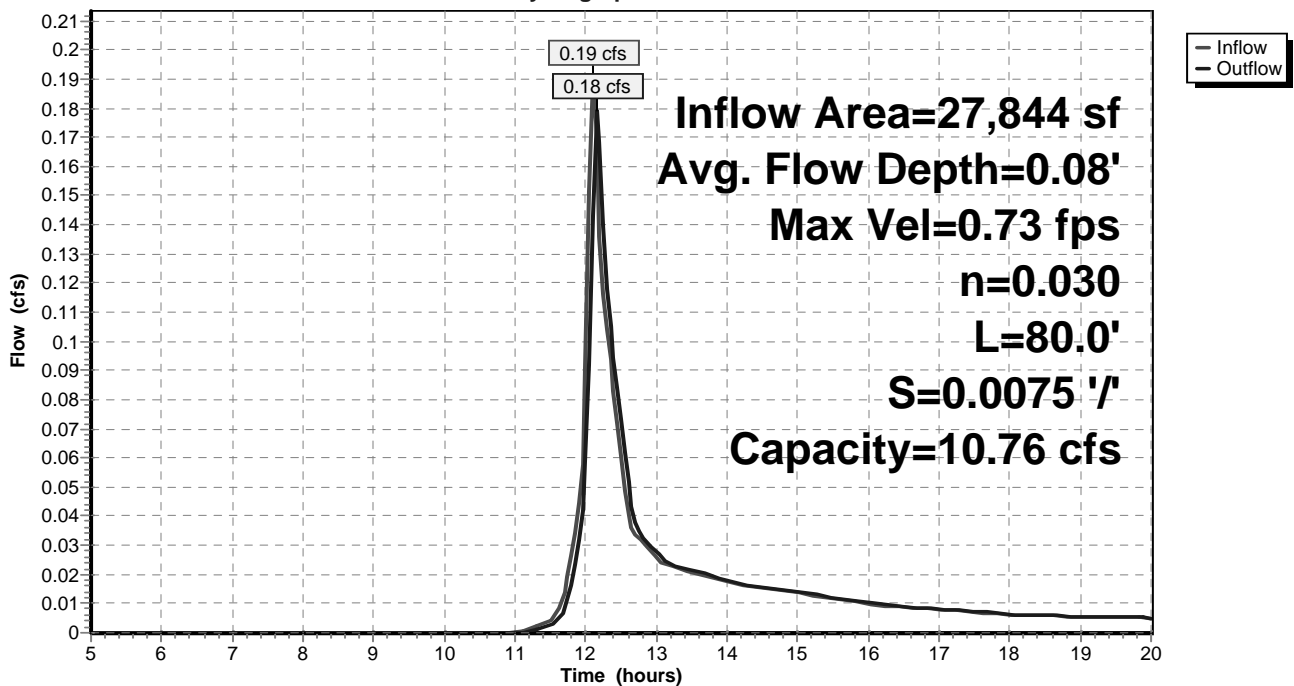
Peak Storage= 20 cf @ 12.13 hrs  
Average Depth at Peak Storage= 0.08'  
Bank-Full Depth= 0.75' Flow Area= 3.9 sf, Capacity= 10.76 cfs

3.00' x 0.75' deep channel, n= 0.030 Earth, grassed & winding  
Side Slope Z-value= 3.0 '/' Top Width= 7.50'  
Length= 80.0' Slope= 0.0075 '/'  
Inlet Invert= 69.50', Outlet Invert= 68.90'



**Reach 7R: Swale to Forebay**

Hydrograph



**POST F**

Type III 24-hr 1 inch storm Rainfall=1.00"

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**Summary for Pond 3P: Bioretention System**

Inflow Area = 27,844 sf, 64.24% Impervious, Inflow Depth > 0.26" for 1 inch storm event  
 Inflow = 0.18 cfs @ 12.16 hrs, Volume= 597 cf  
 Outflow = 0.12 cfs @ 12.30 hrs, Volume= 595 cf, Atten= 31%, Lag= 8.0 min  
 Discarded = 0.06 cfs @ 12.30 hrs, Volume= 526 cf  
 Primary = 0.07 cfs @ 12.30 hrs, Volume= 69 cf  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 65.82' @ 12.30 hrs Surf.Area= 779 sf Storage= 75 cf

Plug-Flow detention time= 7.6 min calculated for 594 cf (99% of inflow)  
 Center-of-Mass det. time= 6.8 min ( 835.2 - 828.4 )

Volume	Invert	Avail.Storage	Storage Description			
#1	65.58'	3,091 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
65.58	779	154.0	0.0	0	0	779
66.58	779	154.0	40.0	312	312	933
67.66	779	154.0	20.0	168	480	1,099
67.99	779	154.0	20.0	51	531	1,150
68.00	779	154.0	20.0	2	533	1,152
69.00	1,274	174.0	100.0	1,016	1,549	1,699
70.00	1,825	193.0	100.0	1,541	3,091	2,283

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	<b>8.0" Round Culvert</b> L= 124.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.00' / 59.80' S= 0.0418 1/ S Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Discarded	65.58'	<b>3.000 in/hr Exfiltration over Wetted area</b> Phase-In= 0.01'
#3	Secondary	69.60'	<b>5.0' long x 3.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.65 2.66 2.68 2.70 2.74 2.79 2.88
#4	Device 1	65.75'	<b>4.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#5	Device 1	68.20'	<b>4.0" Vert. Orifice/Grate</b> C= 0.600
#6	Device 1	68.80'	<b>8.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads



**POST F**

Type III 24-hr 1 inch storm Rainfall=1.00"

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**Discarded OutFlow** Max=0.06 cfs @ 12.30 hrs HW=65.82' (Free Discharge)

↳ **2=Exfiltration** (Exfiltration Controls 0.06 cfs)

**Primary OutFlow** Max=0.06 cfs @ 12.30 hrs HW=65.82' (Free Discharge)

↳ **1=Culvert** (Passes 0.06 cfs of 1.17 cfs potential flow)

↳ **4=Orifice/Grate** (Weir Controls 0.06 cfs @ 0.87 fps)

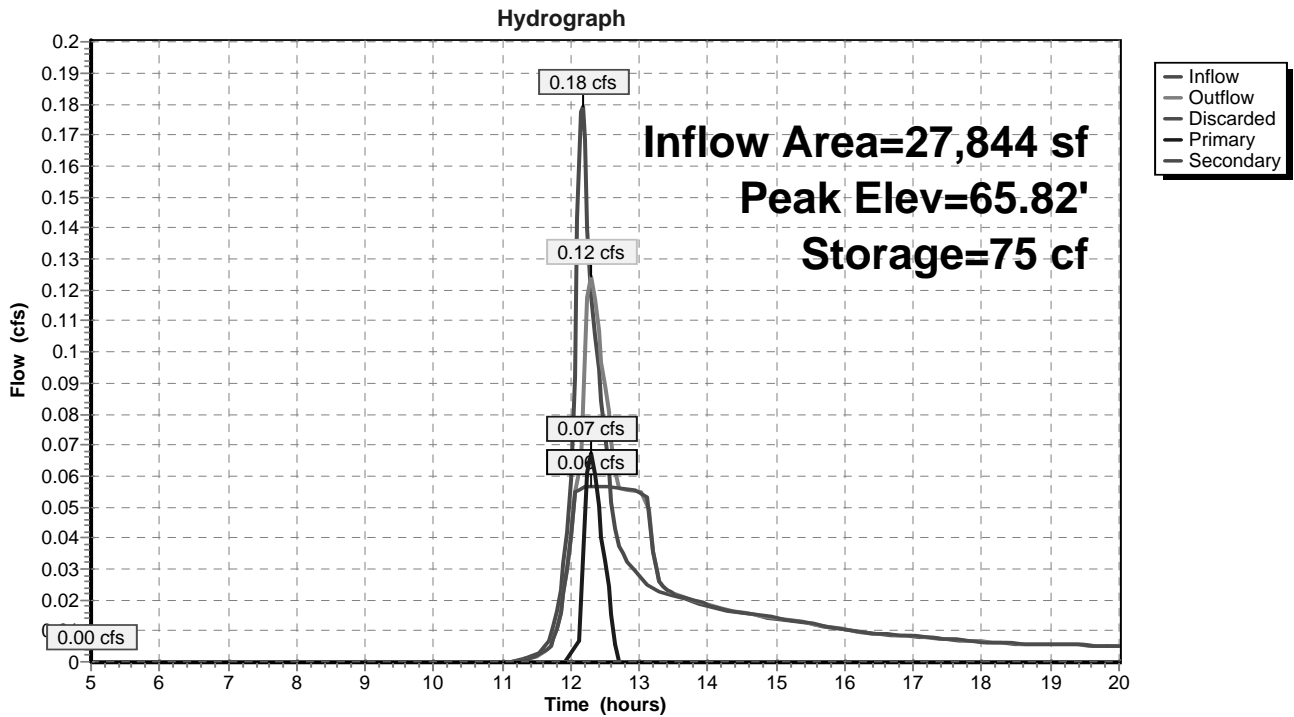
↳ **5=Orifice/Grate** ( Controls 0.00 cfs)

↳ **6=Orifice/Grate** ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=65.58' (Free Discharge)

↳ **3=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Pond 3P: Bioretention System**



**POST F**

Type III 24-hr 2 year Rainfall=3.14"

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

**Subcatchment 1S: Proposed Parking Area** Runoff Area=27,844 sf 64.24% Impervious Runoff Depth>1.90"  
Flow Length=209' Tc=6.5 min CN=89 Runoff=1.46 cfs 4,412 cf

**Subcatchment 2S: Lower Lot** Runoff Area=14,597 sf 19.53% Impervious Runoff Depth>0.67"  
Flow Length=234' Tc=7.2 min CN=69 Runoff=0.24 cfs 816 cf

**Reach 4R: POA** Inflow=0.87 cfs 3,297 cf  
Outflow=0.87 cfs 3,297 cf

**Reach 5R: Spillway** Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf  
n=0.016 L=90.0' S=0.0667 '/' Capacity=115.23 cfs Outflow=0.00 cfs 0 cf

**Reach 6R: Swale Next to Road** Avg. Flow Depth=0.09' Max Vel=3.42 fps Inflow=0.66 cfs 2,481 cf  
n=0.022 L=25.0' S=0.0800 '/' Capacity=16.25 cfs Outflow=0.66 cfs 2,481 cf

**Reach 7R: Swale to Forebay** Avg. Flow Depth=0.26' Max Vel=1.51 fps Inflow=1.46 cfs 4,412 cf  
n=0.030 L=80.0' S=0.0075 '/' Capacity=10.76 cfs Outflow=1.40 cfs 4,405 cf

**Pond 3P: Bioretention System** Peak Elev=68.21' Storage=705 cf Inflow=1.40 cfs 4,405 cf  
Discarded=0.09 cfs 1,918 cf Primary=0.66 cfs 2,481 cf Secondary=0.00 cfs 0 cf Outflow=0.75 cfs 4,399 cf

**Total Runoff Area = 42,441 sf Runoff Volume = 5,228 cf Average Runoff Depth = 1.48"**  
**51.13% Pervious = 21,702 sf 48.87% Impervious = 20,739 sf**

**POST F**

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Type III 24-hr 2 year Rainfall=3.14"

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**Summary for Subcatchment 1S: Proposed Parking Area**

Runoff = 1.46 cfs @ 12.10 hrs, Volume= 4,412 cf, Depth> 1.90"

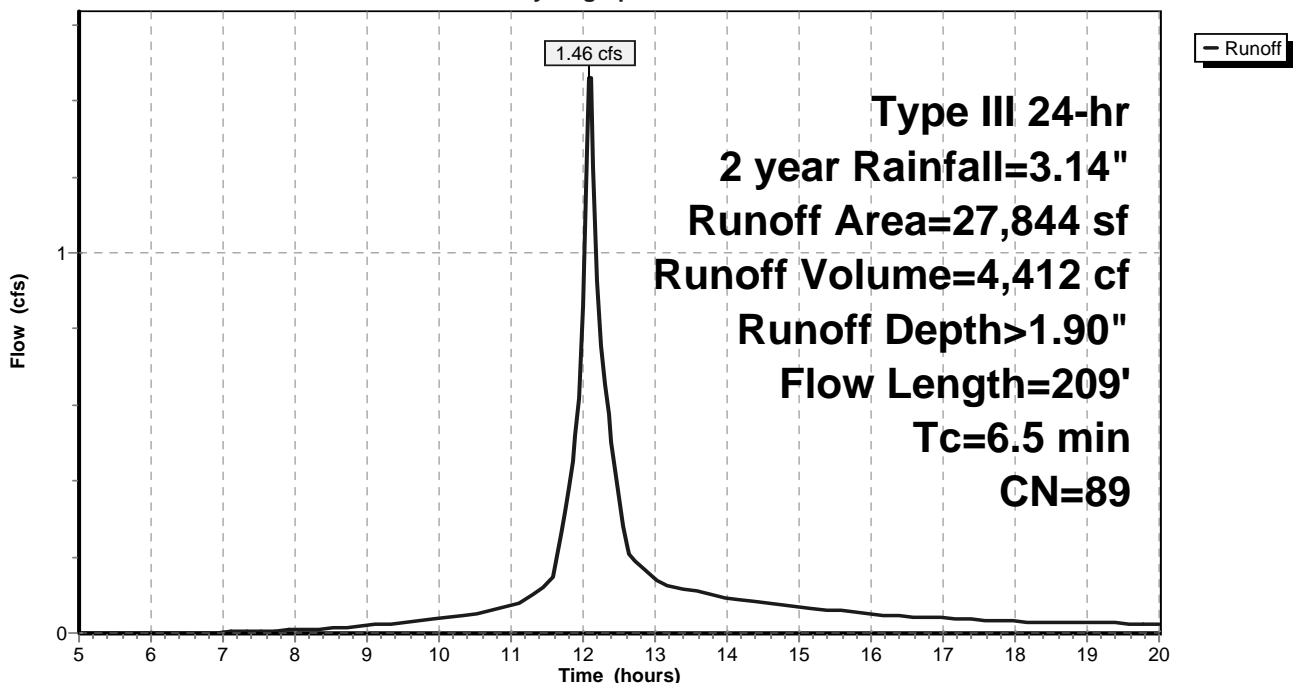
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 year Rainfall=3.14"

Area (sf)	CN	Description
8,274	74	>75% Grass cover, Good, HSG C
2,034	98	Roofs, HSG A
15,854	98	Paved parking, HSG A
1,682	73	Woods, Fair, HSG C
27,844	89	Weighted Average
9,956		35.76% Pervious Area
17,888		64.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.14"
0.3	23	0.0440	1.47		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.5	136	0.0500	4.54		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
6.5	209	Total			

**Subcatchment 1S: Proposed Parking Area**

Hydrograph



**POST F**

Type III 24-hr 2 year Rainfall=3.14"

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**Summary for Subcatchment 2S: Lower Lot**

Runoff = 0.24 cfs @ 12.12 hrs, Volume= 816 cf, Depth> 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 year Rainfall=3.14"

Area (sf)	CN	Description
1,121	36	Woods, Fair, HSG A
1,365	73	Woods, Fair, HSG C
941	98	Paved parking, HSG C
1,910	98	Roofs, HSG C
2,868	39	>75% Grass cover, Good, HSG A
6,392	74	>75% Grass cover, Good, HSG C
14,597	69	Weighted Average
11,746		80.47% Pervious Area
2,851		19.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	25	0.1080	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.14"
2.5	25	0.0400	0.17		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.14"
0.2	24	0.1000	2.21		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	5	0.1000	6.42		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	17	0.1000	2.21		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	42	0.0950	6.26		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.7	96	0.0208	2.16		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
7.2	234	Total			

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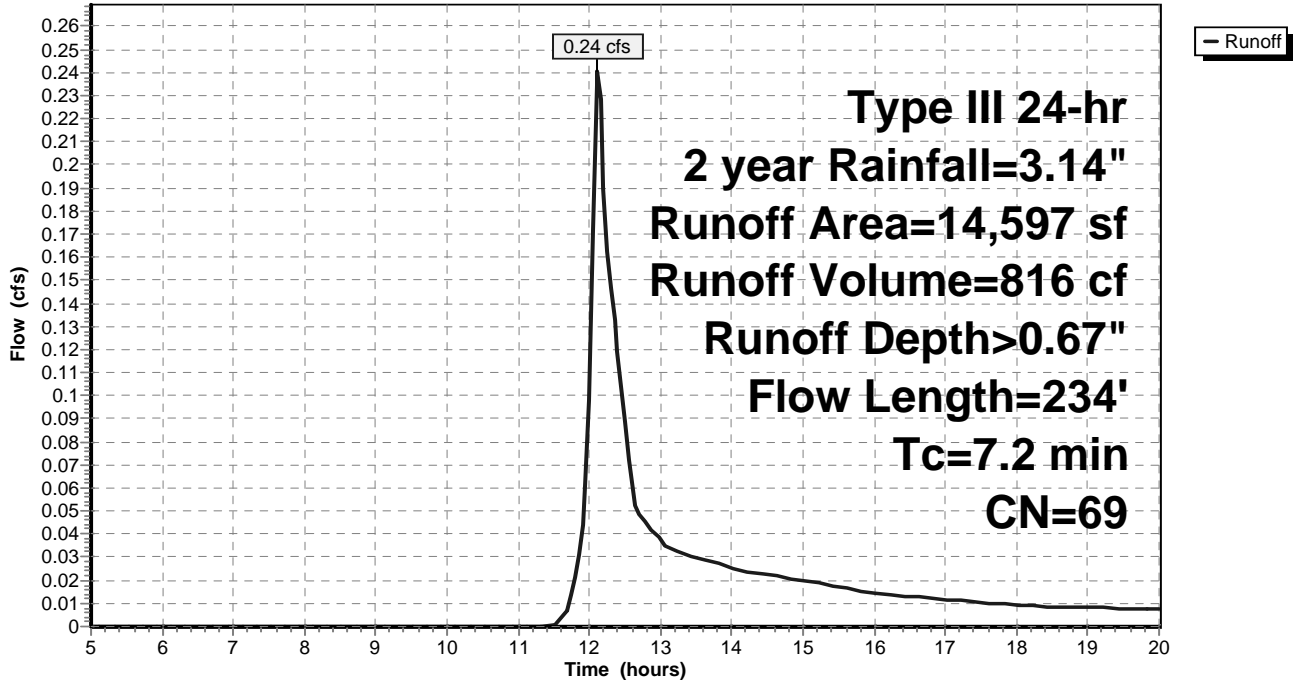
Type III 24-hr 2 year Rainfall=3.14"

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**Subcatchment 2S: Lower Lot**

Hydrograph



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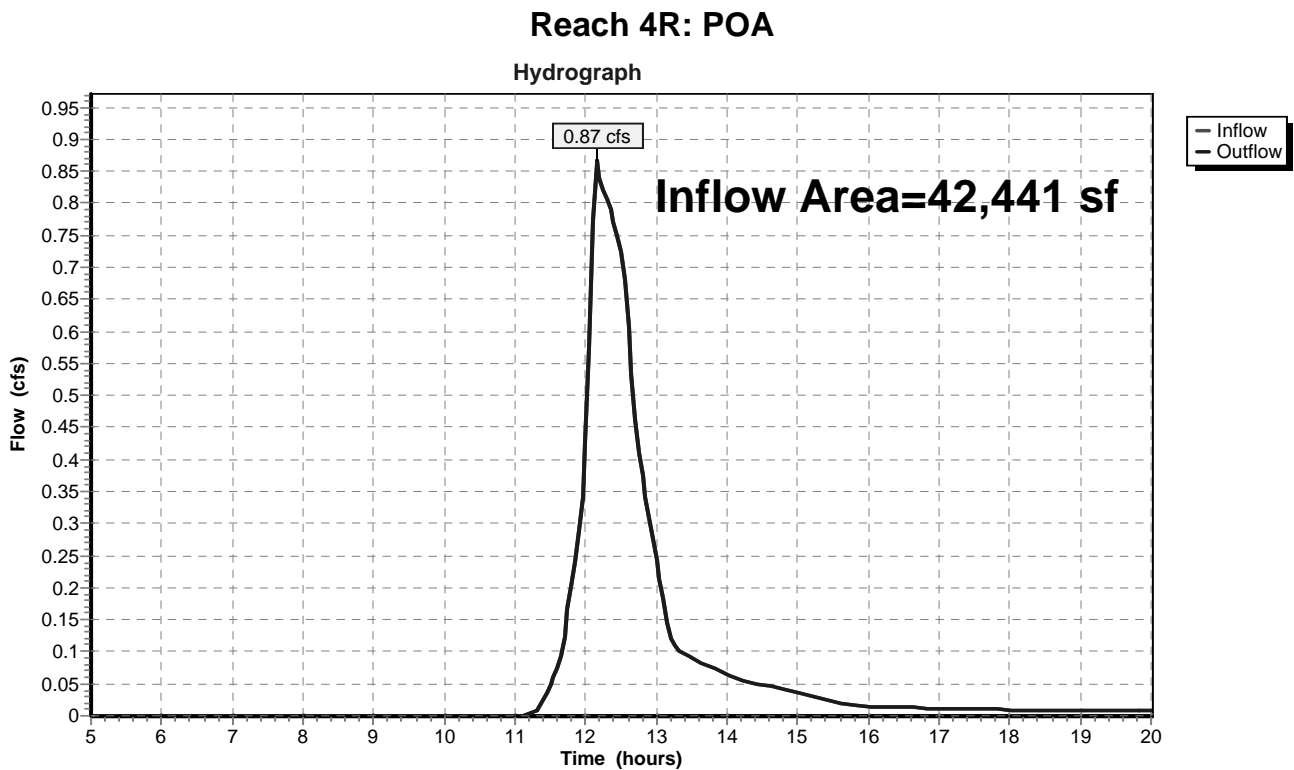
Page 20

**Summary for Reach 4R: POA**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 42,441 sf, 48.87% Impervious, Inflow Depth > 0.93" for 2 year event  
Inflow = 0.87 cfs @ 12.16 hrs, Volume= 3,297 cf  
Outflow = 0.87 cfs @ 12.16 hrs, Volume= 3,297 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



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Type III 24-hr 2 year Rainfall=3.14"

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**Summary for Reach 5R: Spillway**

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf  
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

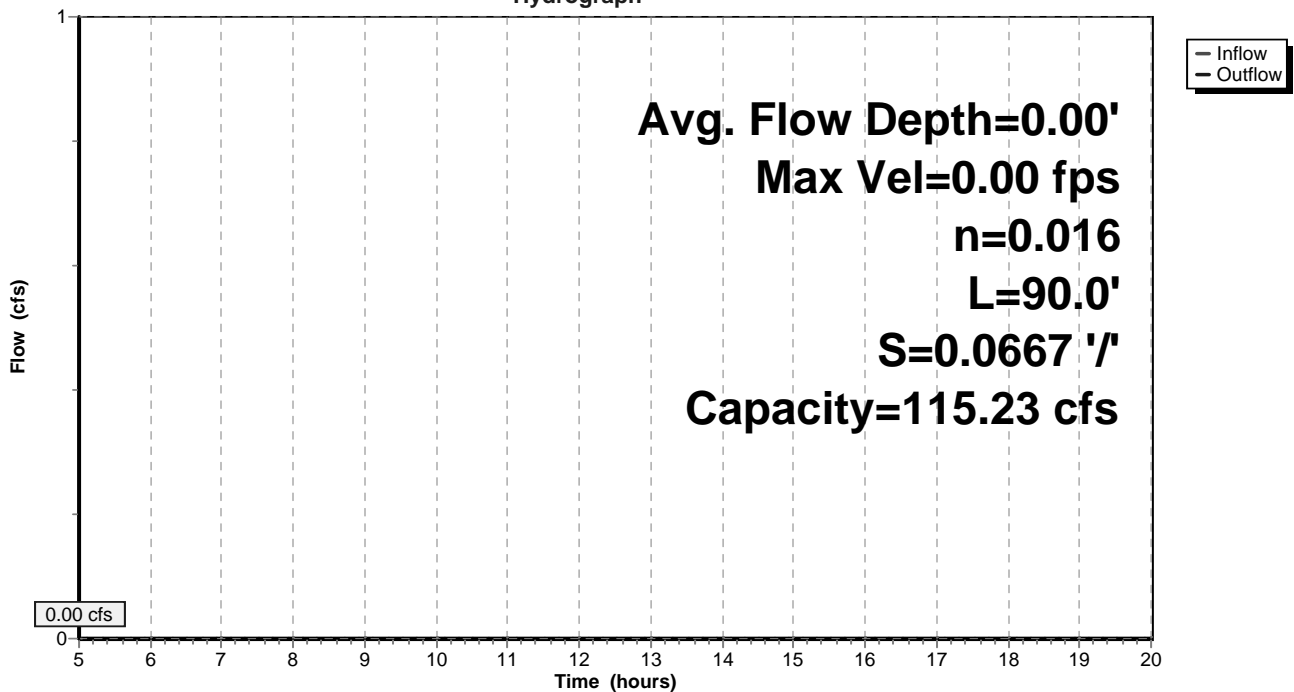
Peak Storage= 0 cf @ 5.00 hrs  
Average Depth at Peak Storage= 0.00'  
Bank-Full Depth= 0.50' Flow Area= 10.0 sf, Capacity= 115.23 cfs

30.00' x 0.50' deep Parabolic Channel, n= 0.016 Asphalt, rough  
Length= 90.0' Slope= 0.0667 '/'  
Inlet Invert= 67.00', Outlet Invert= 61.00'



**Reach 5R: Spillway**

Hydrograph



**POST F**

Type III 24-hr 2 year Rainfall=3.14"

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**Summary for Reach 6R: Swale Next to Road**

Inflow Area = 27,844 sf, 64.24% Impervious, Inflow Depth = 1.07" for 2 year event  
 Inflow = 0.66 cfs @ 12.29 hrs, Volume= 2,481 cf  
 Outflow = 0.66 cfs @ 12.29 hrs, Volume= 2,481 cf, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 3.42 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 1.59 fps, Avg. Travel Time= 0.3 min

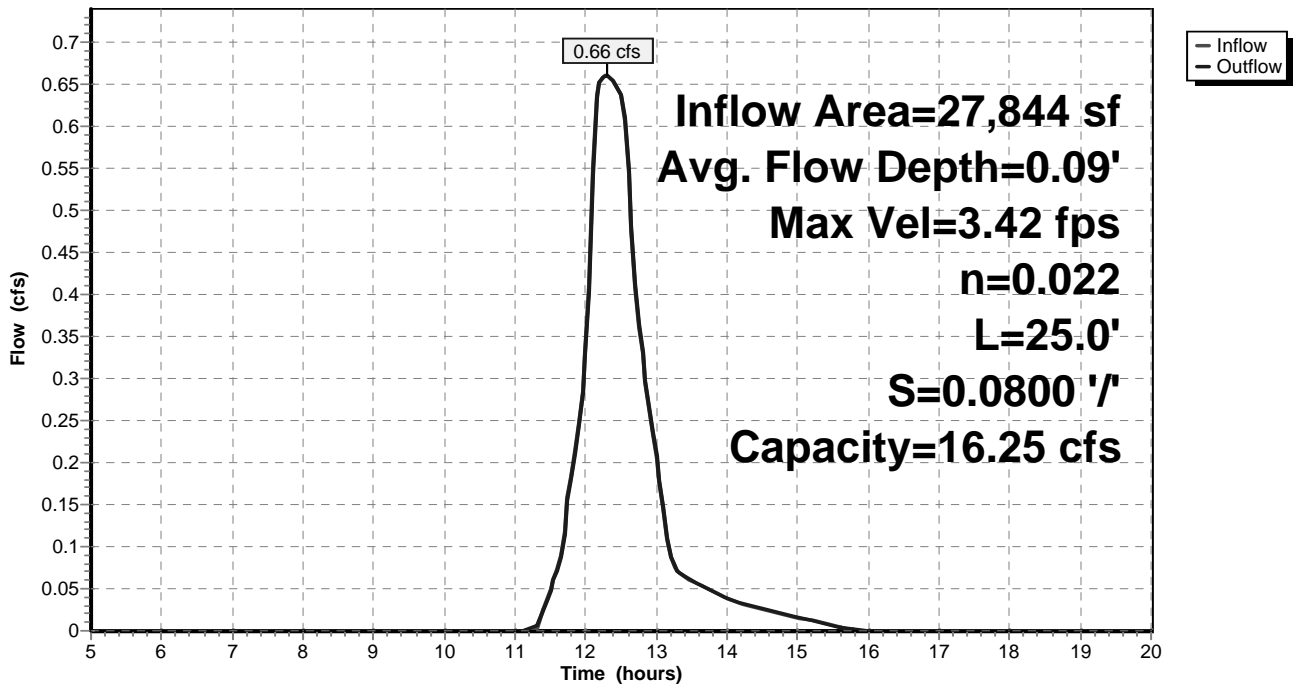
Peak Storage= 5 cf @ 12.29 hrs  
 Average Depth at Peak Storage= 0.09'  
 Bank-Full Depth= 0.50' Flow Area= 1.8 sf, Capacity= 16.25 cfs

2.00' x 0.50' deep channel, n= 0.022 Earth, clean & straight  
 Side Slope Z-value= 3.0 '/' Top Width= 5.00'  
 Length= 25.0' Slope= 0.0800 '/'  
 Inlet Invert= 59.00', Outlet Invert= 57.00'



**Reach 6R: Swale Next to Road**

Hydrograph





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Type III 24-hr 2 year Rainfall=3.14"

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**Summary for Reach 7R: Swale to Forebay**

Inflow Area = 27,844 sf, 64.24% Impervious, Inflow Depth > 1.90" for 2 year event  
 Inflow = 1.46 cfs @ 12.10 hrs, Volume= 4,412 cf  
 Outflow = 1.40 cfs @ 12.12 hrs, Volume= 4,405 cf, Atten= 4%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 1.51 fps, Min. Travel Time= 0.9 min  
 Avg. Velocity = 0.46 fps, Avg. Travel Time= 2.9 min

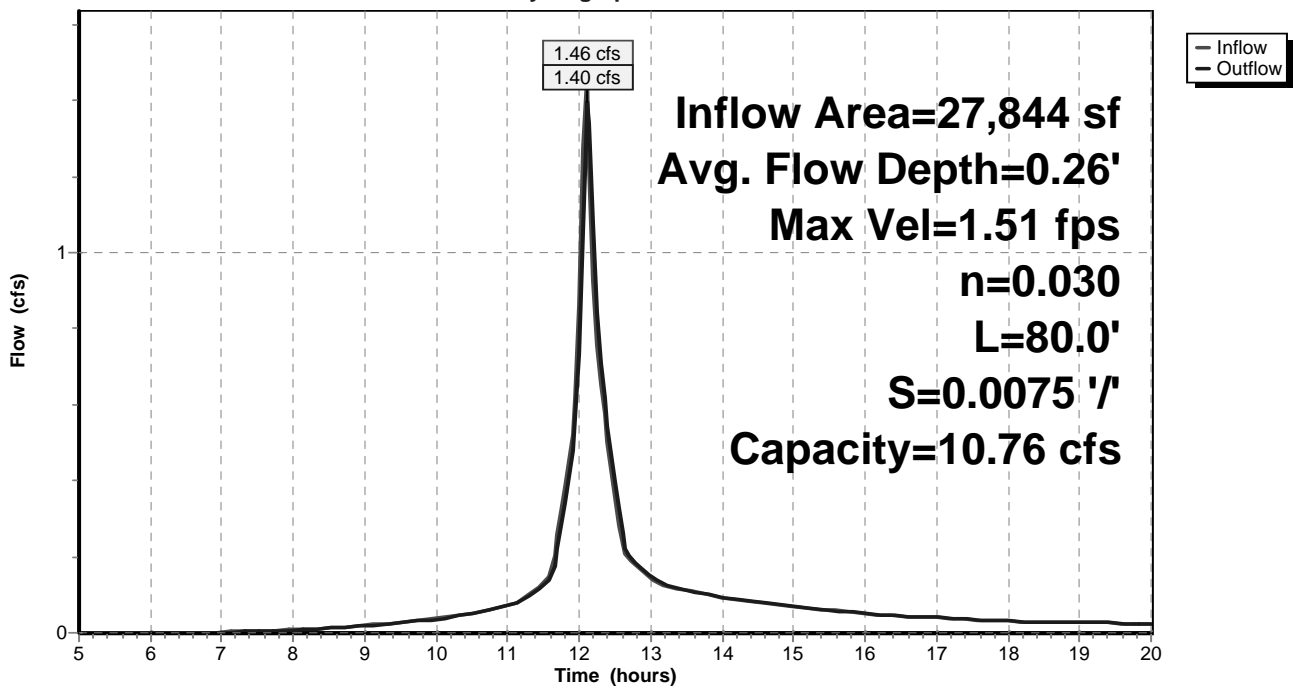
Peak Storage= 77 cf @ 12.11 hrs  
 Average Depth at Peak Storage= 0.26'  
 Bank-Full Depth= 0.75' Flow Area= 3.9 sf, Capacity= 10.76 cfs

3.00' x 0.75' deep channel, n= 0.030 Earth, grassed & winding  
 Side Slope Z-value= 3.0 '/ Top Width= 7.50'  
 Length= 80.0' Slope= 0.0075 '/  
 Inlet Invert= 69.50', Outlet Invert= 68.90'



**Reach 7R: Swale to Forebay**

Hydrograph



**POST F**

Type III 24-hr 2 year Rainfall=3.14"

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**Summary for Pond 3P: Bioretention System**

Inflow Area = 27,844 sf, 64.24% Impervious, Inflow Depth > 1.90" for 2 year event  
 Inflow = 1.40 cfs @ 12.12 hrs, Volume= 4,405 cf  
 Outflow = 0.75 cfs @ 12.29 hrs, Volume= 4,399 cf, Atten= 47%, Lag= 10.2 min  
 Discarded = 0.09 cfs @ 12.29 hrs, Volume= 1,918 cf  
 Primary = 0.66 cfs @ 12.29 hrs, Volume= 2,481 cf  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 68.21' @ 12.29 hrs Surf.Area= 872 sf Storage= 705 cf

Plug-Flow detention time= 10.9 min calculated for 4,399 cf (100% of inflow)  
 Center-of-Mass det. time= 10.4 min ( 791.7 - 781.3 )

Volume	Invert	Avail.Storage	Storage Description			
#1	65.58'	3,091 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
65.58	779	154.0	0.0	0	0	779
66.58	779	154.0	40.0	312	312	933
67.66	779	154.0	20.0	168	480	1,099
67.99	779	154.0	20.0	51	531	1,150
68.00	779	154.0	20.0	2	533	1,152
69.00	1,274	174.0	100.0	1,016	1,549	1,699
70.00	1,825	193.0	100.0	1,541	3,091	2,283

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	<b>8.0" Round Culvert</b> L= 124.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.00' / 59.80' S= 0.0418 1/1 Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Discarded	65.58'	<b>3.000 in/hr Exfiltration over Wetted area</b> Phase-In= 0.01'
#3	Secondary	69.60'	<b>5.0' long x 3.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.65 2.66 2.68 2.70 2.74 2.79 2.88
#4	Device 1	65.75'	<b>4.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#5	Device 1	68.20'	<b>4.0" Vert. Orifice/Grate</b> C= 0.600
#6	Device 1	68.80'	<b>8.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

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Type III 24-hr 2 year Rainfall=3.14"

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**Discarded OutFlow** Max=0.09 cfs @ 12.29 hrs HW=68.21' (Free Discharge)

↳ **2=Exfiltration** (Exfiltration Controls 0.09 cfs)

**Primary OutFlow** Max=0.66 cfs @ 12.29 hrs HW=68.21' (Free Discharge)

↳ **1=Culvert** (Passes 0.66 cfs of 2.72 cfs potential flow)

↳ **4=Orifice/Grate** (Orifice Controls 0.66 cfs @ 7.55 fps)

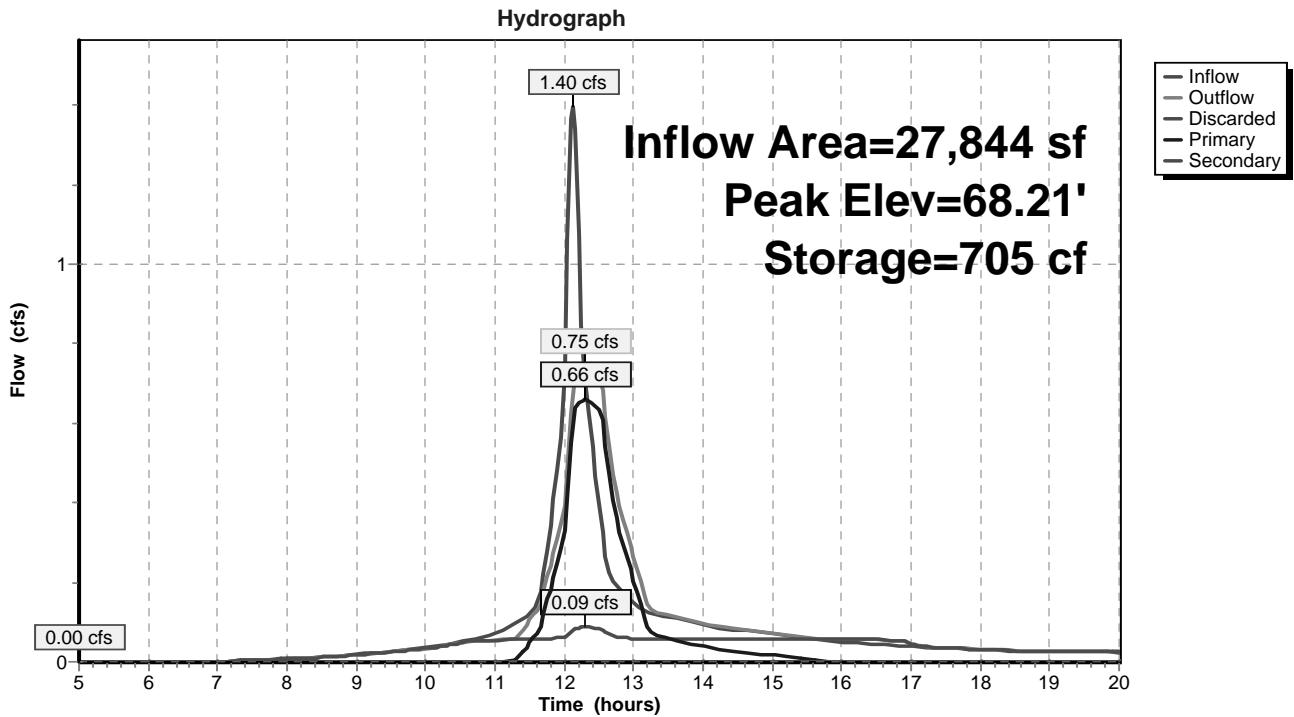
↳ **5=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.28 fps)

↳ **6=Orifice/Grate** ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=65.58' (Free Discharge)

↳ **3=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Pond 3P: Bioretention System**



**POST F**

Type III 24-hr 10 year Rainfall=4.76"

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

**Subcatchment 1S: Proposed Parking Area** Runoff Area=27,844 sf 64.24% Impervious Runoff Depth>3.34"  
Flow Length=209' Tc=6.5 min CN=89 Runoff=2.50 cfs 7,757 cf

**Subcatchment 2S: Lower Lot** Runoff Area=14,597 sf 19.53% Impervious Runoff Depth>1.64"  
Flow Length=234' Tc=7.2 min CN=69 Runoff=0.64 cfs 1,991 cf

**Reach 4R: POA** Inflow=1.56 cfs 7,161 cf  
Outflow=1.56 cfs 7,161 cf

**Reach 5R: Spillway** Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf  
n=0.016 L=90.0' S=0.0667 '/' Capacity=115.23 cfs Outflow=0.00 cfs 0 cf

**Reach 6R: Swale Next to Road** Avg. Flow Depth=0.12' Max Vel=4.17 fps Inflow=1.19 cfs 5,170 cf  
n=0.022 L=25.0' S=0.0800 '/' Capacity=16.25 cfs Outflow=1.18 cfs 5,170 cf

**Reach 7R: Swale to Forebay** Avg. Flow Depth=0.35' Max Vel=1.79 fps Inflow=2.50 cfs 7,757 cf  
n=0.030 L=80.0' S=0.0075 '/' Capacity=10.76 cfs Outflow=2.41 cfs 7,748 cf

**Pond 3P: Bioretention System** Peak Elev=68.88' Storage=1,396 cf Inflow=2.41 cfs 7,748 cf  
Discarded=0.11 cfs 2,568 cf Primary=1.19 cfs 5,170 cf Secondary=0.00 cfs 0 cf Outflow=1.30 cfs 7,738 cf

**Total Runoff Area = 42,441 sf Runoff Volume = 9,748 cf Average Runoff Depth = 2.76"**  
**51.13% Pervious = 21,702 sf 48.87% Impervious = 20,739 sf**

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**Summary for Subcatchment 1S: Proposed Parking Area**

Runoff = 2.50 cfs @ 12.10 hrs, Volume= 7,757 cf, Depth> 3.34"

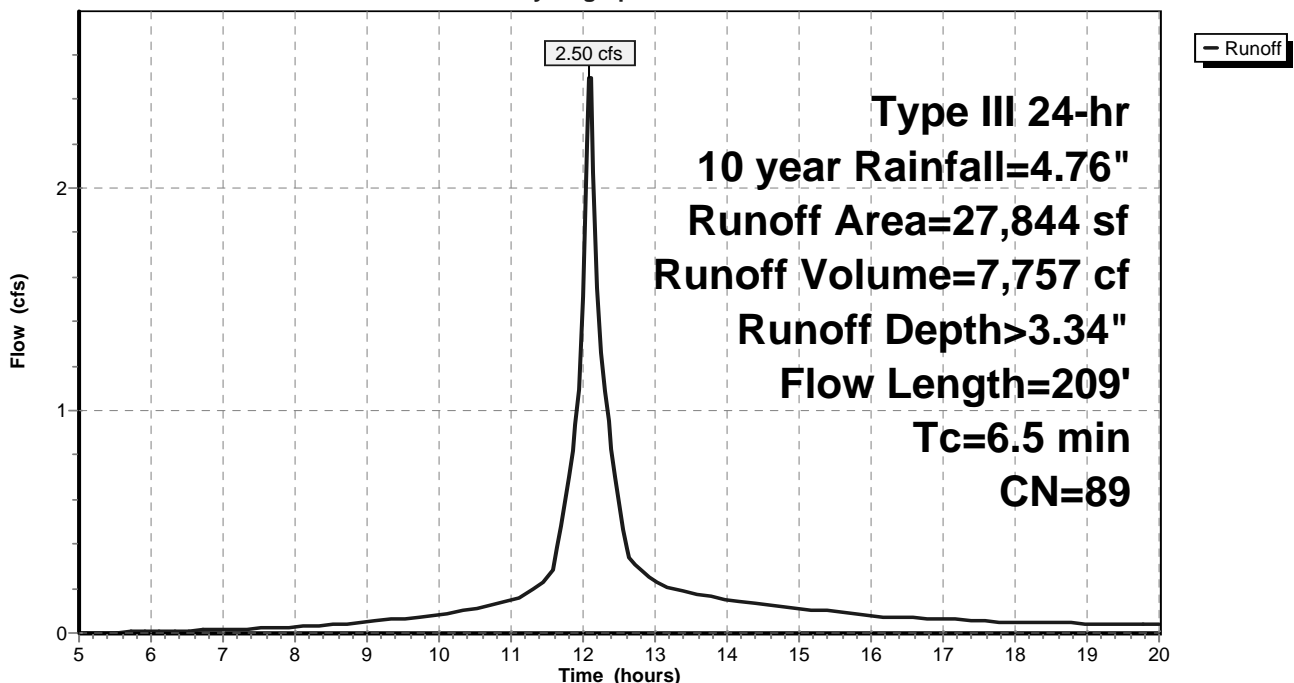
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 year Rainfall=4.76"

Area (sf)	CN	Description
8,274	74	>75% Grass cover, Good, HSG C
2,034	98	Roofs, HSG A
15,854	98	Paved parking, HSG A
1,682	73	Woods, Fair, HSG C
27,844	89	Weighted Average
9,956		35.76% Pervious Area
17,888		64.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.14"
0.3	23	0.0440	1.47		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.5	136	0.0500	4.54		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
6.5	209	Total			

**Subcatchment 1S: Proposed Parking Area**

Hydrograph



**POST F**

Type III 24-hr 10 year Rainfall=4.76"

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**Summary for Subcatchment 2S: Lower Lot**

Runoff = 0.64 cfs @ 12.11 hrs, Volume= 1,991 cf, Depth> 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10 year Rainfall=4.76"

Area (sf)	CN	Description
1,121	36	Woods, Fair, HSG A
1,365	73	Woods, Fair, HSG C
941	98	Paved parking, HSG C
1,910	98	Roofs, HSG C
2,868	39	>75% Grass cover, Good, HSG A
6,392	74	>75% Grass cover, Good, HSG C
14,597	69	Weighted Average
11,746		80.47% Pervious Area
2,851		19.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	25	0.1080	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.14"
2.5	25	0.0400	0.17		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.14"
0.2	24	0.1000	2.21		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	5	0.1000	6.42		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	17	0.1000	2.21		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	42	0.0950	6.26		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.7	96	0.0208	2.16		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
7.2	234	Total			

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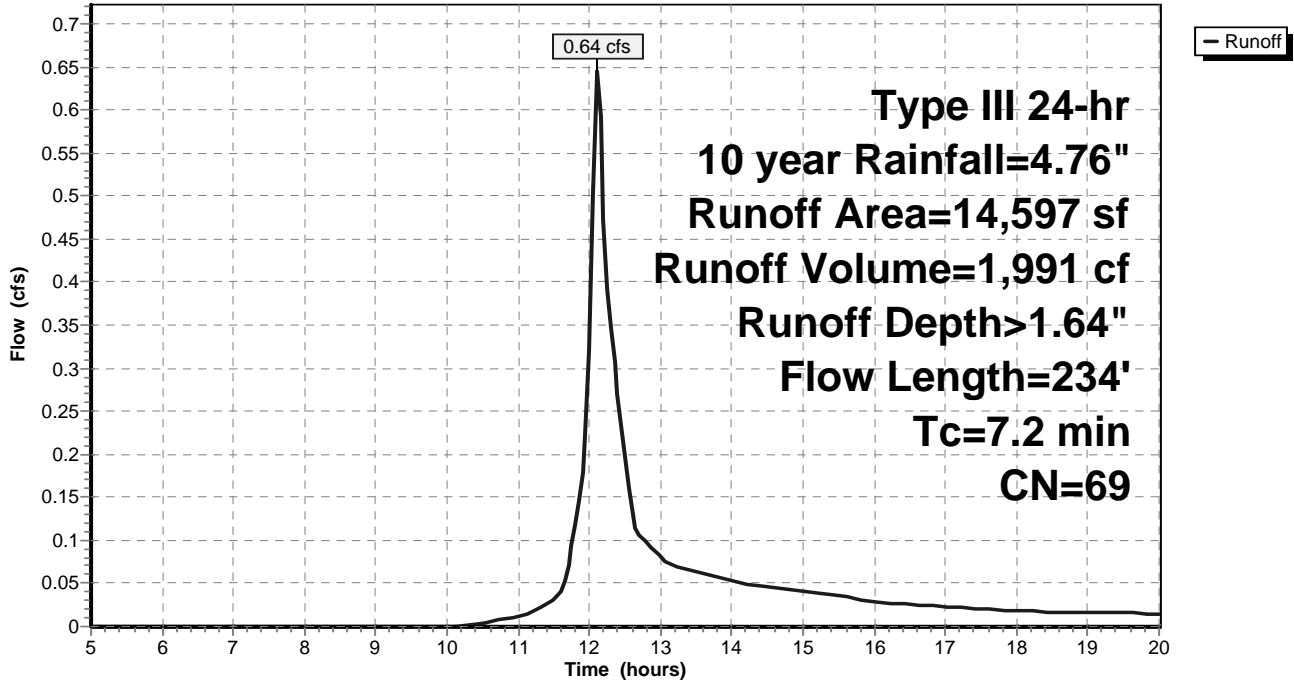
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**Subcatchment 2S: Lower Lot**

Hydrograph



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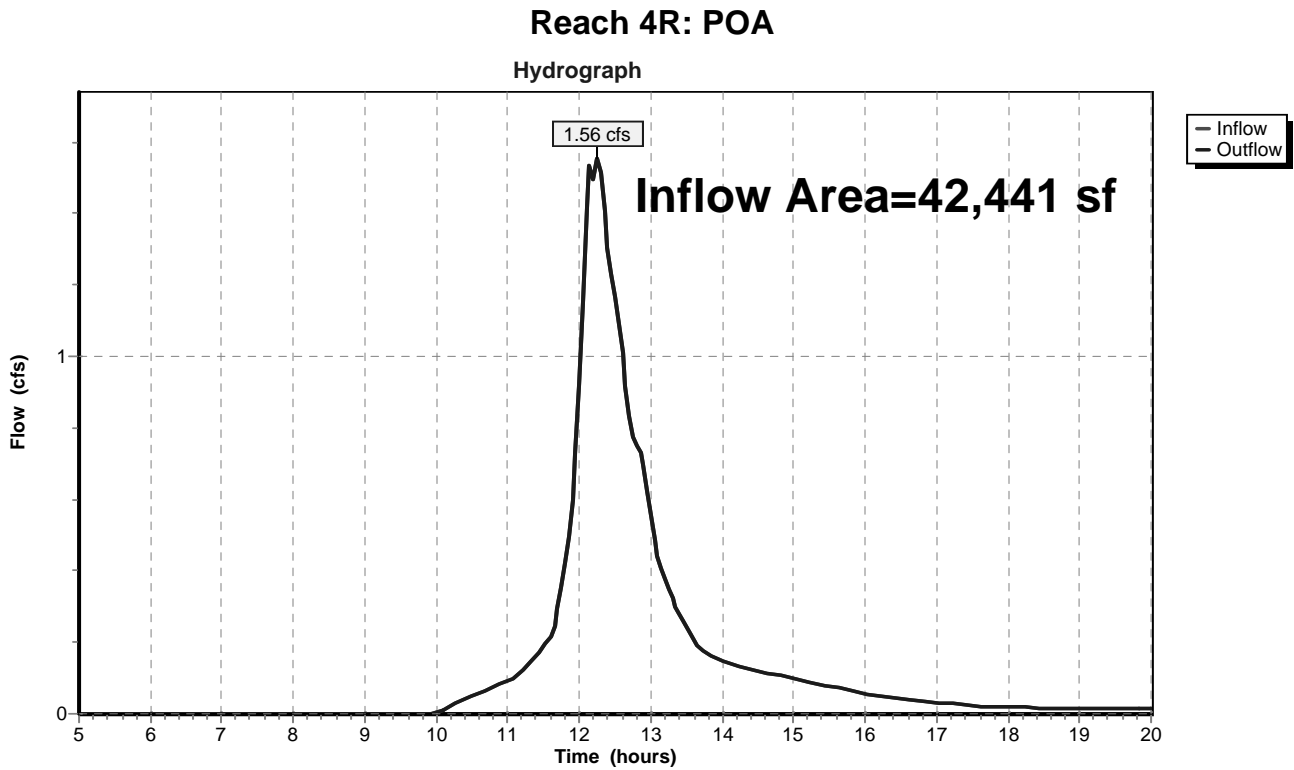
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**Summary for Reach 4R: POA**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 42,441 sf, 48.87% Impervious, Inflow Depth > 2.02" for 10 year event  
Inflow = 1.56 cfs @ 12.26 hrs, Volume= 7,161 cf  
Outflow = 1.56 cfs @ 12.26 hrs, Volume= 7,161 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs





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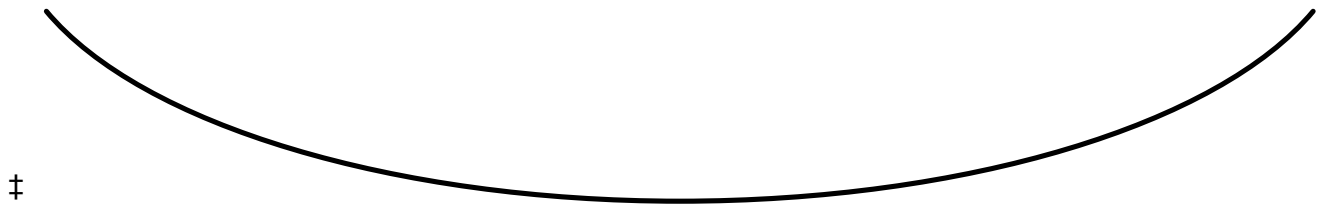
**Summary for Reach 5R: Spillway**

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf  
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

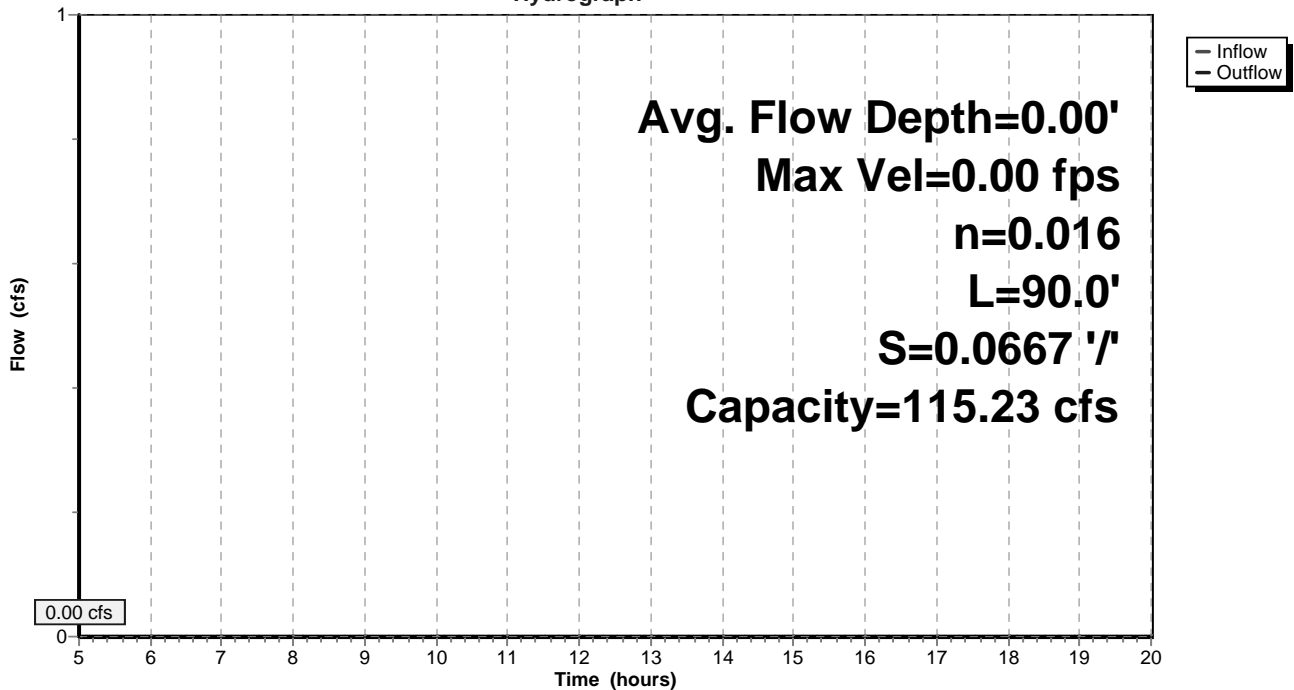
Peak Storage= 0 cf @ 5.00 hrs  
Average Depth at Peak Storage= 0.00'  
Bank-Full Depth= 0.50' Flow Area= 10.0 sf, Capacity= 115.23 cfs

30.00' x 0.50' deep Parabolic Channel, n= 0.016 Asphalt, rough  
Length= 90.0' Slope= 0.0667 '/'  
Inlet Invert= 67.00', Outlet Invert= 61.00'



**Reach 5R: Spillway**

Hydrograph



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**Summary for Reach 6R: Swale Next to Road**

Inflow Area = 27,844 sf, 64.24% Impervious, Inflow Depth = 2.23" for 10 year event  
Inflow = 1.19 cfs @ 12.27 hrs, Volume= 5,170 cf  
Outflow = 1.18 cfs @ 12.28 hrs, Volume= 5,170 cf, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 4.17 fps, Min. Travel Time= 0.1 min  
Avg. Velocity = 1.72 fps, Avg. Travel Time= 0.2 min

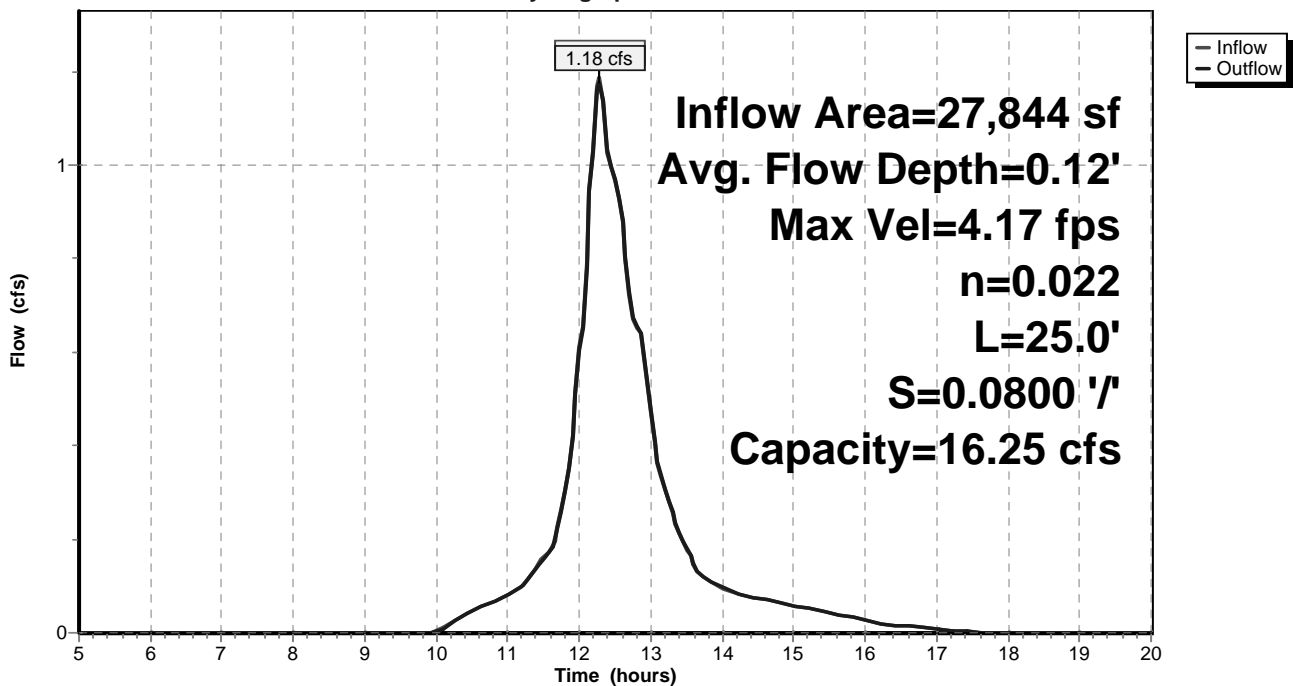
Peak Storage= 7 cf @ 12.28 hrs  
Average Depth at Peak Storage= 0.12'  
Bank-Full Depth= 0.50' Flow Area= 1.8 sf, Capacity= 16.25 cfs

2.00' x 0.50' deep channel, n= 0.022 Earth, clean & straight  
Side Slope Z-value= 3.0 '/' Top Width= 5.00'  
Length= 25.0' Slope= 0.0800 '/'  
Inlet Invert= 59.00', Outlet Invert= 57.00'



**Reach 6R: Swale Next to Road**

Hydrograph



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Type III 24-hr 10 year Rainfall=4.76"

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**Summary for Reach 7R: Swale to Forebay**

Inflow Area = 27,844 sf, 64.24% Impervious, Inflow Depth > 3.34" for 10 year event  
Inflow = 2.50 cfs @ 12.10 hrs, Volume= 7,757 cf  
Outflow = 2.41 cfs @ 12.11 hrs, Volume= 7,748 cf, Atten= 4%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 1.79 fps, Min. Travel Time= 0.7 min  
Avg. Velocity = 0.54 fps, Avg. Travel Time= 2.5 min

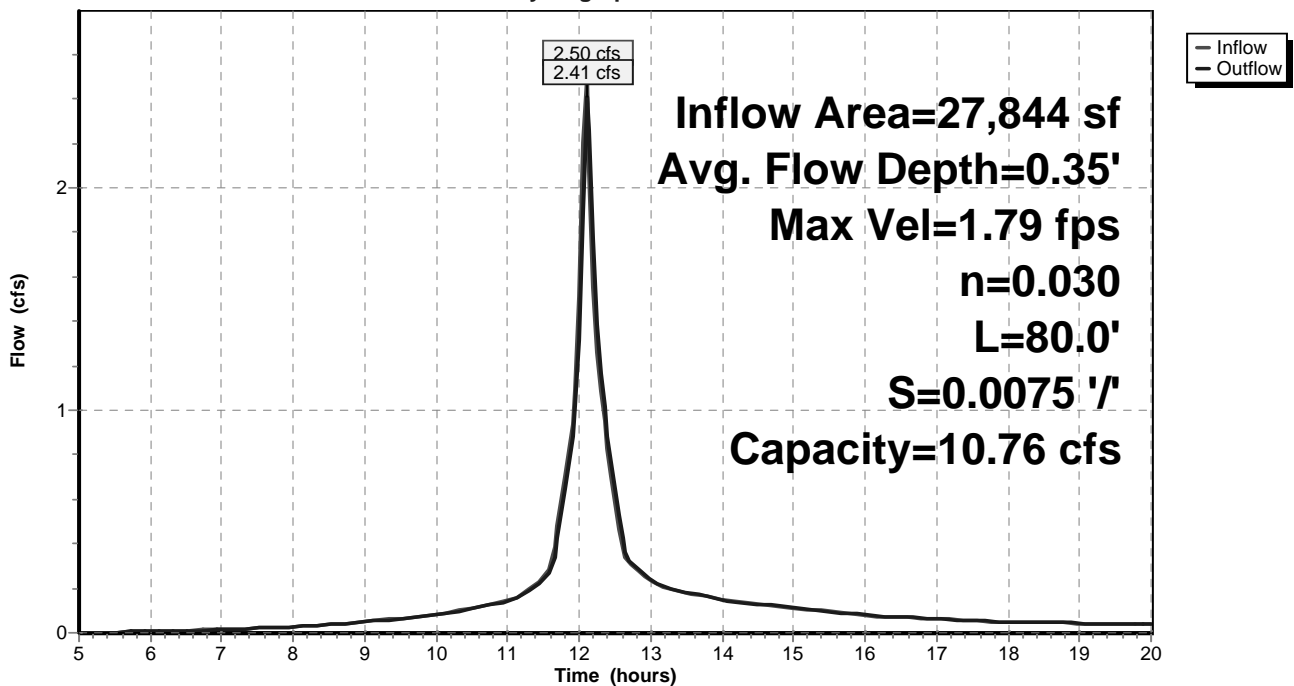
Peak Storage= 112 cf @ 12.10 hrs  
Average Depth at Peak Storage= 0.35'  
Bank-Full Depth= 0.75' Flow Area= 3.9 sf, Capacity= 10.76 cfs

3.00' x 0.75' deep channel, n= 0.030 Earth, grassed & winding  
Side Slope Z-value= 3.0 '/ Top Width= 7.50'  
Length= 80.0' Slope= 0.0075 '/  
Inlet Invert= 69.50', Outlet Invert= 68.90'



**Reach 7R: Swale to Forebay**

Hydrograph



**POST F**

Type III 24-hr 10 year Rainfall=4.76"

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**Summary for Pond 3P: Bioretention System**

Inflow Area = 27,844 sf, 64.24% Impervious, Inflow Depth > 3.34" for 10 year event  
 Inflow = 2.41 cfs @ 12.11 hrs, Volume= 7,748 cf  
 Outflow = 1.30 cfs @ 12.27 hrs, Volume= 7,738 cf, Atten= 46%, Lag= 9.6 min  
 Discarded = 0.11 cfs @ 12.27 hrs, Volume= 2,568 cf  
 Primary = 1.19 cfs @ 12.27 hrs, Volume= 5,170 cf  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 68.88' @ 12.27 hrs Surf.Area= 1,206 sf Storage= 1,396 cf

Plug-Flow detention time= 13.0 min calculated for 7,712 cf (100% of inflow)  
 Center-of-Mass det. time= 12.4 min ( 780.0 - 767.6 )

Volume	Invert	Avail.Storage	Storage Description			
#1	65.58'	3,091 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
65.58	779	154.0	0.0	0	0	779
66.58	779	154.0	40.0	312	312	933
67.66	779	154.0	20.0	168	480	1,099
67.99	779	154.0	20.0	51	531	1,150
68.00	779	154.0	20.0	2	533	1,152
69.00	1,274	174.0	100.0	1,016	1,549	1,699
70.00	1,825	193.0	100.0	1,541	3,091	2,283

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	<b>8.0" Round Culvert</b> L= 124.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.00' / 59.80' S= 0.0418 1/ S Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Discarded	65.58'	<b>3.000 in/hr Exfiltration over Wetted area</b> Phase-In= 0.01'
#3	Secondary	69.60'	<b>5.0' long x 3.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.65 2.66 2.68 2.70 2.74 2.79 2.88
#4	Device 1	65.75'	<b>4.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#5	Device 1	68.20'	<b>4.0" Vert. Orifice/Grate</b> C= 0.600
#6	Device 1	68.80'	<b>8.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

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Type III 24-hr 10 year Rainfall=4.76"

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**Discarded OutFlow** Max=0.11 cfs @ 12.27 hrs HW=68.87' (Free Discharge)

↳ **2=Exfiltration** (Exfiltration Controls 0.11 cfs)

**Primary OutFlow** Max=1.16 cfs @ 12.27 hrs HW=68.87' (Free Discharge)

↳ **1=Culvert** (Passes 1.16 cfs of 2.83 cfs potential flow)

↳ **4=Orifice/Grate** (Orifice Controls 0.74 cfs @ 8.50 fps)

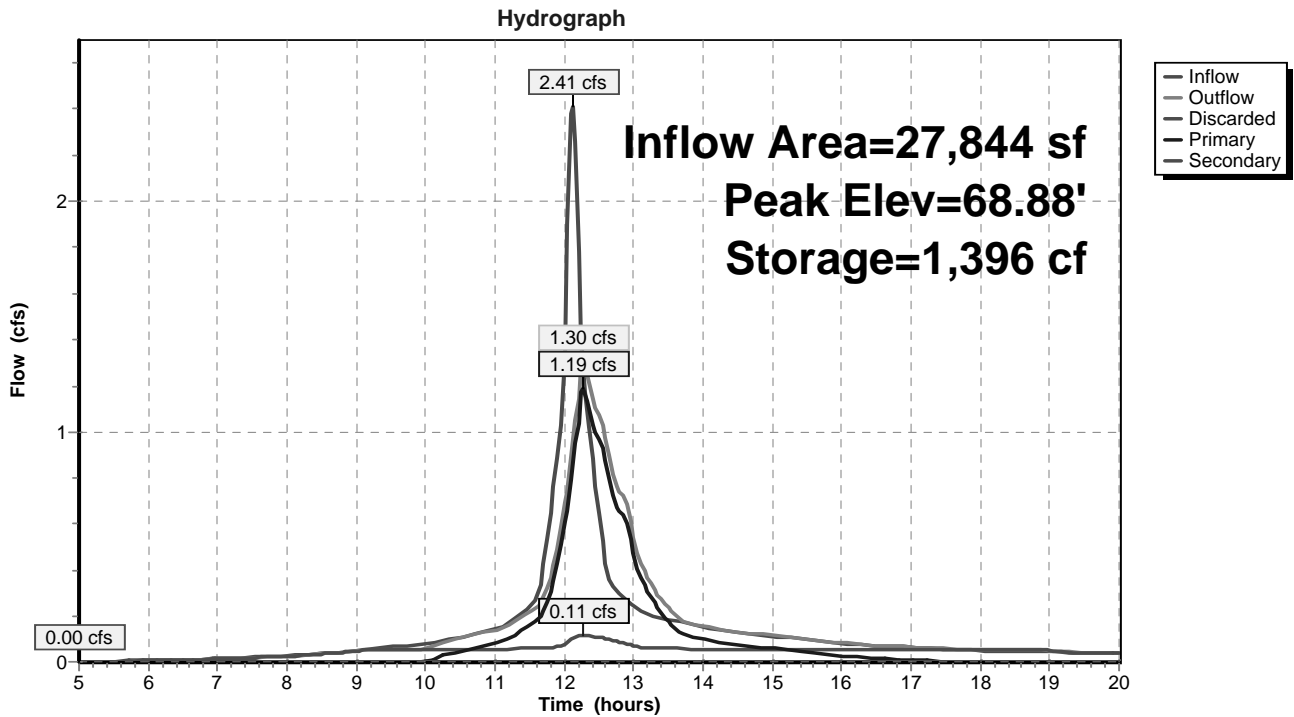
↳ **5=Orifice/Grate** (Orifice Controls 0.30 cfs @ 3.41 fps)

↳ **6=Orifice/Grate** (Weir Controls 0.12 cfs @ 0.86 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=65.58' (Free Discharge)

↳ **3=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Pond 3P: Bioretention System**



**POST F**

Type III 24-hr 25 year Rainfall=6.03"

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

**Subcatchment 1S: Proposed Parking Area** Runoff Area=27,844 sf 64.24% Impervious Runoff Depth>4.50"  
Flow Length=209' Tc=6.5 min CN=89 Runoff=3.31 cfs 10,447 cf

**Subcatchment 2S: Lower Lot** Runoff Area=14,597 sf 19.53% Impervious Runoff Depth>2.53"  
Flow Length=234' Tc=7.2 min CN=69 Runoff=1.01 cfs 3,077 cf

**Reach 4R: POA** Inflow=2.81 cfs 10,612 cf  
Outflow=2.81 cfs 10,612 cf

**Reach 5R: Spillway** Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf  
n=0.016 L=90.0' S=0.0667 '/' Capacity=115.23 cfs Outflow=0.00 cfs 0 cf

**Reach 6R: Swale Next to Road** Avg. Flow Depth=0.17' Max Vel=5.05 fps Inflow=2.09 cfs 7,535 cf  
n=0.022 L=25.0' S=0.0800 '/' Capacity=16.25 cfs Outflow=2.10 cfs 7,535 cf

**Reach 7R: Swale to Forebay** Avg. Flow Depth=0.40' Max Vel=1.95 fps Inflow=3.31 cfs 10,447 cf  
n=0.030 L=80.0' S=0.0075 '/' Capacity=10.76 cfs Outflow=3.21 cfs 10,436 cf

**Pond 3P: Bioretention System** Peak Elev=69.12' Storage=1,700 cf Inflow=3.21 cfs 10,436 cf  
Discarded=0.12 cfs 2,860 cf Primary=2.09 cfs 7,535 cf Secondary=0.00 cfs 0 cf Outflow=2.21 cfs 10,395 cf

**Total Runoff Area = 42,441 sf Runoff Volume = 13,524 cf Average Runoff Depth = 3.82"**  
**51.13% Pervious = 21,702 sf 48.87% Impervious = 20,739 sf**

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Type III 24-hr 25 year Rainfall=6.03"

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**Summary for Subcatchment 1S: Proposed Parking Area**

Runoff = 3.31 cfs @ 12.09 hrs, Volume= 10,447 cf, Depth> 4.50"

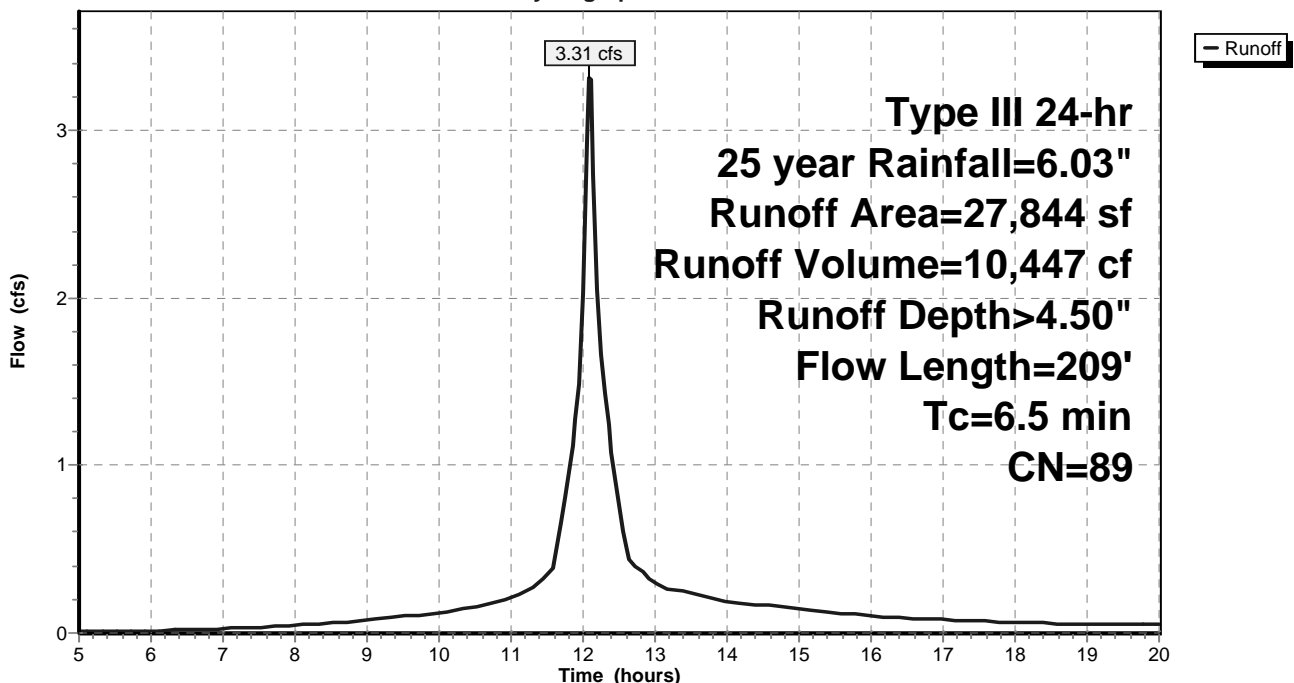
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25 year Rainfall=6.03"

Area (sf)	CN	Description
8,274	74	>75% Grass cover, Good, HSG C
2,034	98	Roofs, HSG A
15,854	98	Paved parking, HSG A
1,682	73	Woods, Fair, HSG C
27,844	89	Weighted Average
9,956		35.76% Pervious Area
17,888		64.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.14"
0.3	23	0.0440	1.47		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.5	136	0.0500	4.54		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
6.5	209	Total			

**Subcatchment 1S: Proposed Parking Area**

Hydrograph



**POST F**

Type III 24-hr 25 year Rainfall=6.03"

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**Summary for Subcatchment 2S: Lower Lot**

Runoff = 1.01 cfs @ 12.11 hrs, Volume= 3,077 cf, Depth> 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25 year Rainfall=6.03"

Area (sf)	CN	Description
1,121	36	Woods, Fair, HSG A
1,365	73	Woods, Fair, HSG C
941	98	Paved parking, HSG C
1,910	98	Roofs, HSG C
2,868	39	>75% Grass cover, Good, HSG A
6,392	74	>75% Grass cover, Good, HSG C
14,597	69	Weighted Average
11,746		80.47% Pervious Area
2,851		19.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	25	0.1080	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.14"
2.5	25	0.0400	0.17		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.14"
0.2	24	0.1000	2.21		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	5	0.1000	6.42		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	17	0.1000	2.21		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	42	0.0950	6.26		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.7	96	0.0208	2.16		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
7.2	234	Total			



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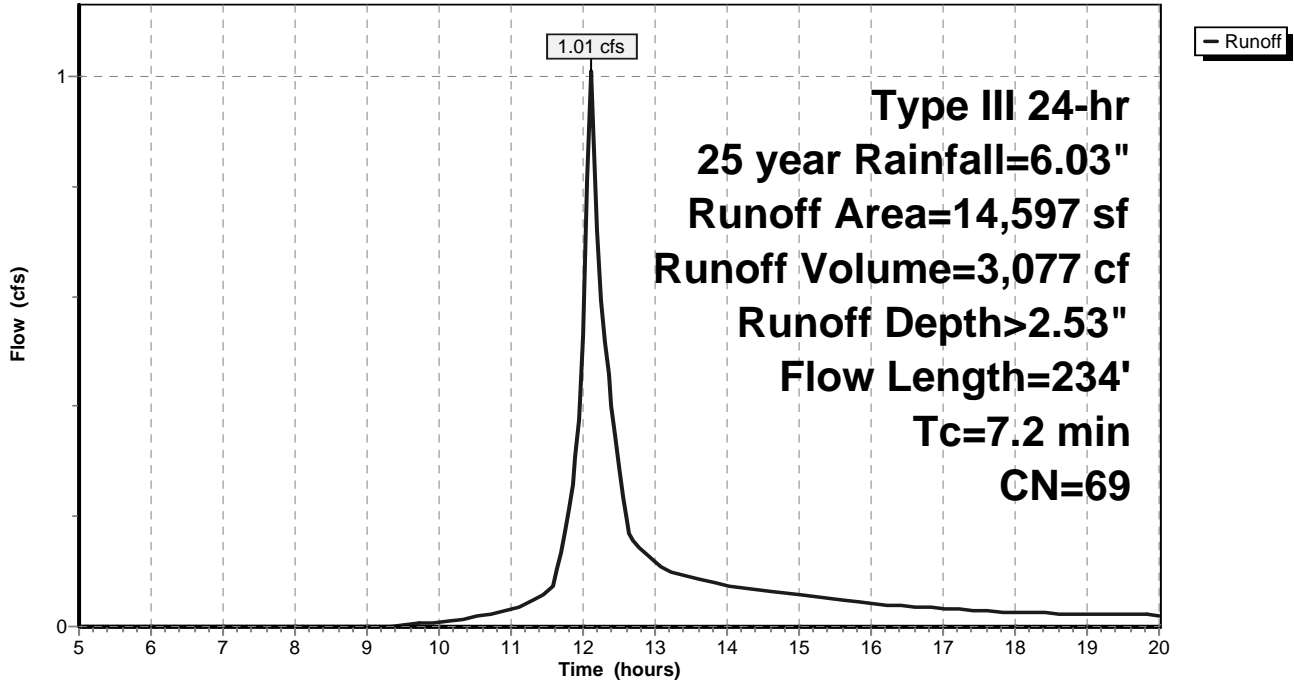
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**Subcatchment 2S: Lower Lot**

Hydrograph



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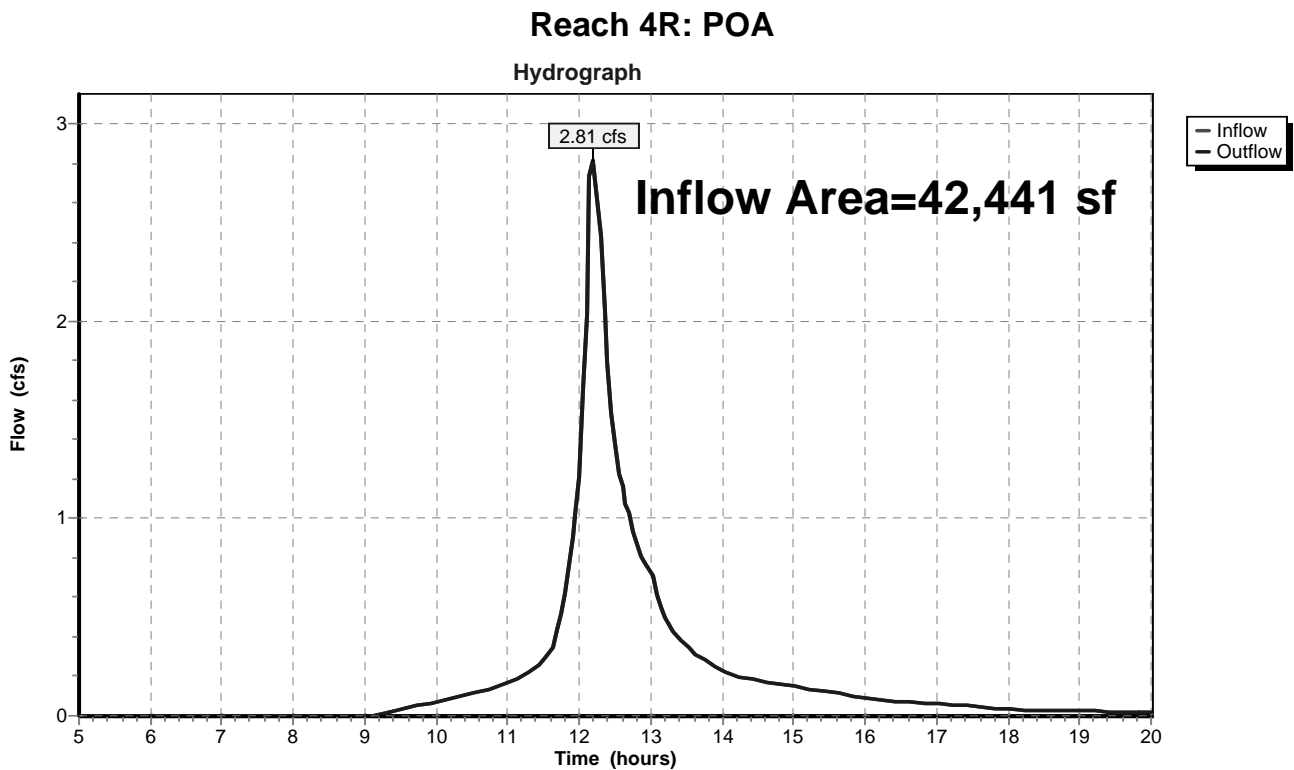
Page 40

**Summary for Reach 4R: POA**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 42,441 sf, 48.87% Impervious, Inflow Depth > 3.00" for 25 year event  
Inflow = 2.81 cfs @ 12.19 hrs, Volume= 10,612 cf  
Outflow = 2.81 cfs @ 12.19 hrs, Volume= 10,612 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



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Type III 24-hr 25 year Rainfall=6.03"

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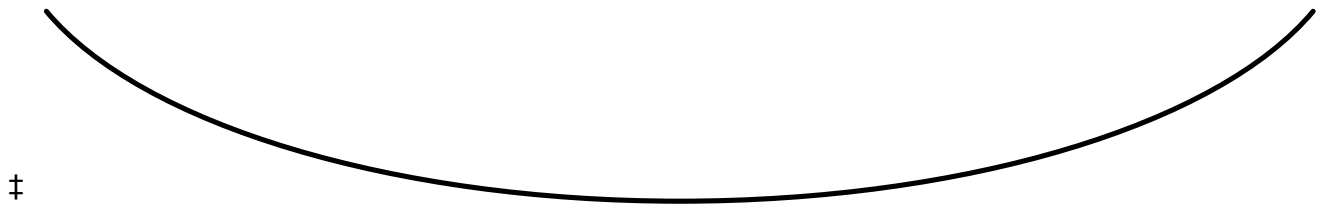
**Summary for Reach 5R: Spillway**

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf  
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

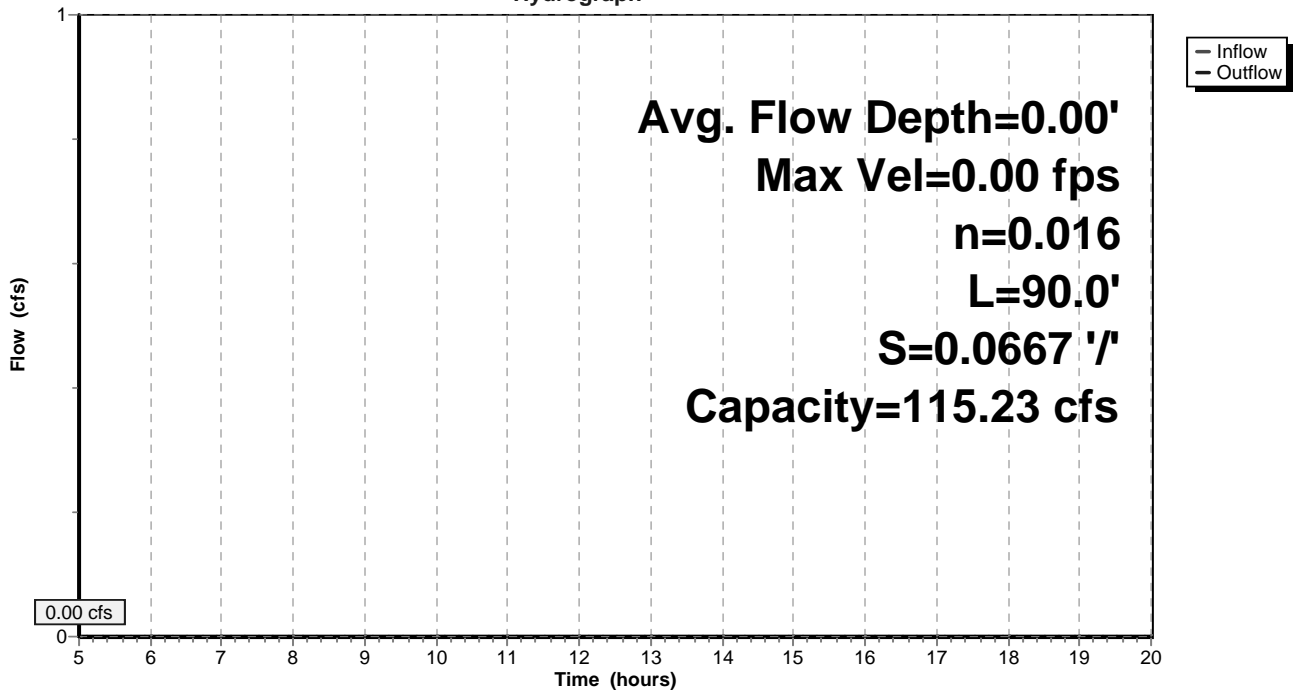
Peak Storage= 0 cf @ 5.00 hrs  
Average Depth at Peak Storage= 0.00'  
Bank-Full Depth= 0.50' Flow Area= 10.0 sf, Capacity= 115.23 cfs

30.00' x 0.50' deep Parabolic Channel, n= 0.016 Asphalt, rough  
Length= 90.0' Slope= 0.0667 '/'  
Inlet Invert= 67.00', Outlet Invert= 61.00'



**Reach 5R: Spillway**

Hydrograph



**POST F**

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**Summary for Reach 6R: Swale Next to Road**

[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area =	27,844 sf, 64.24% Impervious,	Inflow Depth =	3.25" for 25 year event
Inflow =	2.09 cfs @ 12.22 hrs, Volume=	7,535 cf	
Outflow =	2.10 cfs @ 12.22 hrs, Volume=	7,535 cf, Atten= 0%, Lag= 0.0 min	

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.05 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 1.77 fps, Avg. Travel Time= 0.2 min

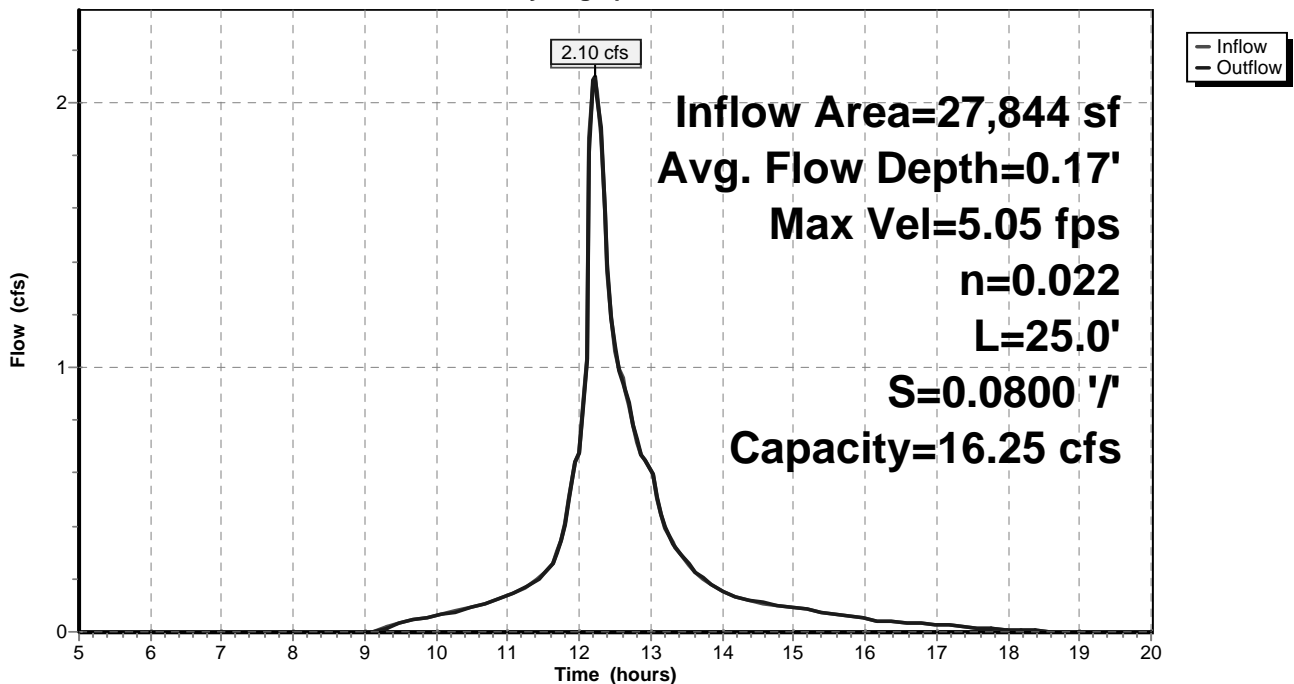
Peak Storage= 10 cf @ 12.21 hrs  
 Average Depth at Peak Storage= 0.17'  
 Bank-Full Depth= 0.50' Flow Area= 1.8 sf, Capacity= 16.25 cfs

2.00' x 0.50' deep channel, n= 0.022 Earth, clean & straight  
 Side Slope Z-value= 3.0 '/' Top Width= 5.00'  
 Length= 25.0' Slope= 0.0800 '/'  
 Inlet Invert= 59.00', Outlet Invert= 57.00'



**Reach 6R: Swale Next to Road**

Hydrograph



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Type III 24-hr 25 year Rainfall=6.03"

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**Summary for Reach 7R: Swale to Forebay**

[82] Warning: Early inflow requires earlier time span

Inflow Area = 27,844 sf, 64.24% Impervious, Inflow Depth > 4.50" for 25 year event  
 Inflow = 3.31 cfs @ 12.09 hrs, Volume= 10,447 cf  
 Outflow = 3.21 cfs @ 12.11 hrs, Volume= 10,436 cf, Atten= 3%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 1.95 fps, Min. Travel Time= 0.7 min  
 Avg. Velocity = 0.62 fps, Avg. Travel Time= 2.2 min

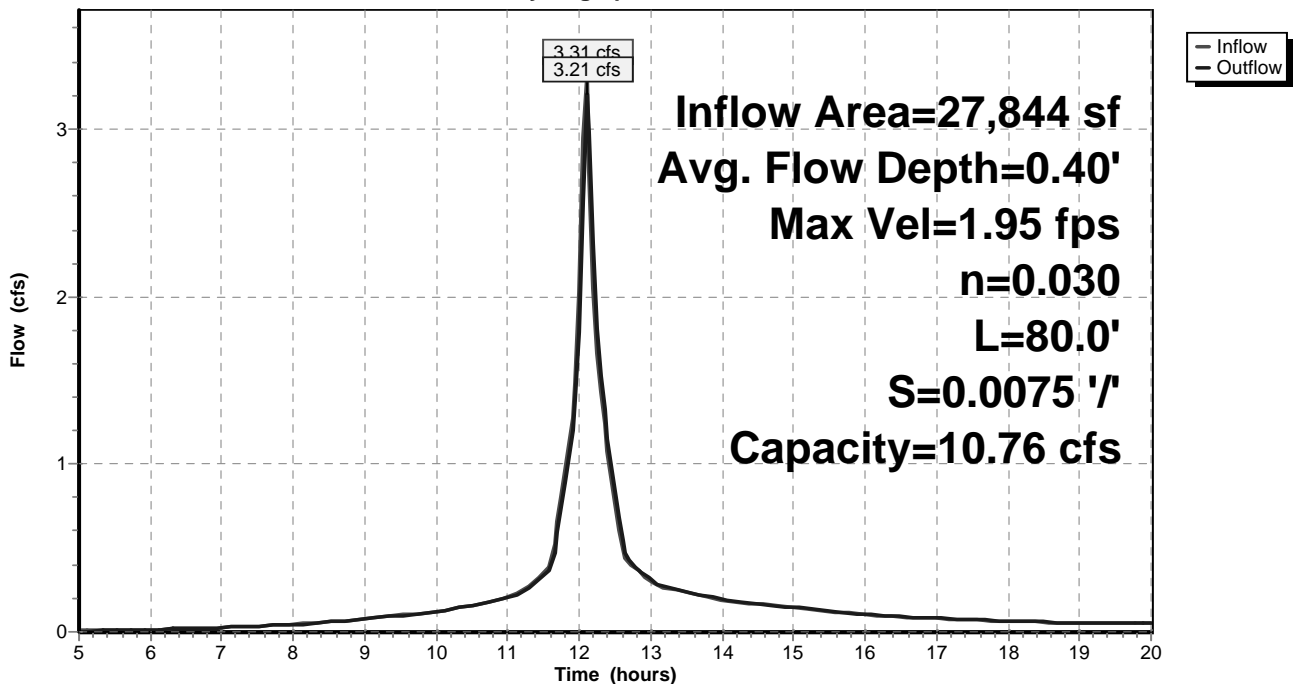
Peak Storage= 136 cf @ 12.10 hrs  
 Average Depth at Peak Storage= 0.40'  
 Bank-Full Depth= 0.75' Flow Area= 3.9 sf, Capacity= 10.76 cfs

3.00' x 0.75' deep channel, n= 0.030 Earth, grassed & winding  
 Side Slope Z-value= 3.0 '/' Top Width= 7.50'  
 Length= 80.0' Slope= 0.0075 '/  
 Inlet Invert= 69.50', Outlet Invert= 68.90'



**Reach 7R: Swale to Forebay**

Hydrograph



**POST F**

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**Summary for Pond 3P: Bioretention System**

[61] Hint: Exceeded Reach 7R outlet invert by 0.21' @ 12.20 hrs

Inflow Area = 27,844 sf, 64.24% Impervious, Inflow Depth > 4.50" for 25 year event  
 Inflow = 3.21 cfs @ 12.11 hrs, Volume= 10,436 cf  
 Outflow = 2.21 cfs @ 12.22 hrs, Volume= 10,395 cf, Atten= 31%, Lag= 6.4 min  
 Discarded = 0.12 cfs @ 12.22 hrs, Volume= 2,860 cf  
 Primary = 2.09 cfs @ 12.22 hrs, Volume= 7,535 cf  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 69.12' @ 12.22 hrs Surf.Area= 1,333 sf Storage= 1,700 cf

Plug-Flow detention time= 12.6 min calculated for 10,395 cf (100% of inflow)  
 Center-of-Mass det. time= 10.8 min ( 771.6 - 760.8 )

Volume	Invert	Avail.Storage	Storage Description			
#1	65.58'	3,091 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
65.58	779	154.0	0.0	0	0	779
66.58	779	154.0	40.0	312	312	933
67.66	779	154.0	20.0	168	480	1,099
67.99	779	154.0	20.0	51	531	1,150
68.00	779	154.0	20.0	2	533	1,152
69.00	1,274	174.0	100.0	1,016	1,549	1,699
70.00	1,825	193.0	100.0	1,541	3,091	2,283

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	<b>8.0" Round Culvert</b> L= 124.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.00' / 59.80' S= 0.0418 1/ S= 0.0418 1/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Discarded	65.58'	<b>3.000 in/hr Exfiltration over Wetted area</b> Phase-In= 0.01'
#3	Secondary	69.60'	<b>5.0' long x 3.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.66 2.65 2.65 2.65 2.65 2.65 2.66 2.68 2.70 2.74 2.79 2.88
#4	Device 1	65.75'	<b>4.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#5	Device 1	68.20'	<b>4.0" Vert. Orifice/Grate</b> C= 0.600
#6	Device 1	68.80'	<b>8.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

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**Discarded OutFlow** Max=0.12 cfs @ 12.22 hrs HW=69.11' (Free Discharge)

↳ **2=Exfiltration** (Exfiltration Controls 0.12 cfs)

**Primary OutFlow** Max=2.06 cfs @ 12.22 hrs HW=69.10' (Free Discharge)

↳ **1=Culvert** (Passes 2.06 cfs of 2.87 cfs potential flow)

↳ **4=Orifice/Grate** (Orifice Controls 0.77 cfs @ 8.82 fps)

↳ **5=Orifice/Grate** (Orifice Controls 0.36 cfs @ 4.14 fps)

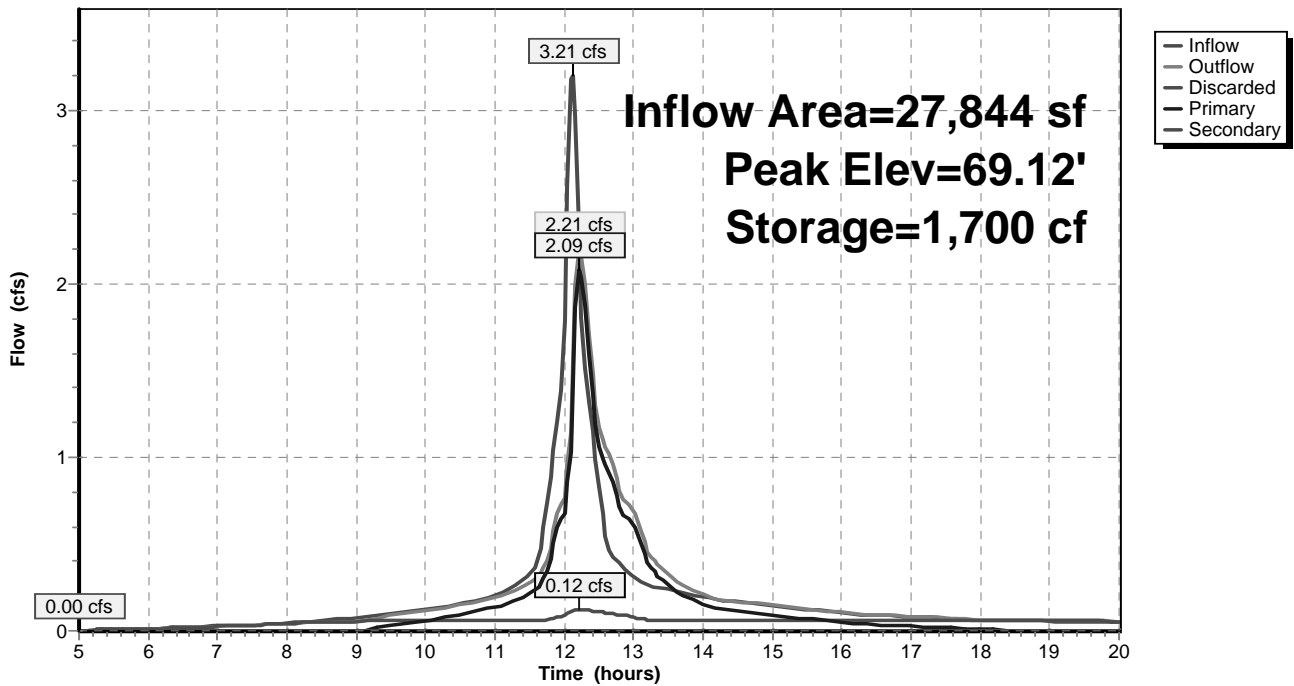
↳ **6=Orifice/Grate** (Orifice Controls 0.93 cfs @ 2.66 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=65.58' (Free Discharge)

↳ **3=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Pond 3P: Bioretention System**

Hydrograph



## APPENDIX D



# Extreme Precipitation Tables

## Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

<b>Smoothing</b>	Yes
<b>State</b>	New Hampshire
<b>Location</b>	
<b>Longitude</b>	70.917 degrees West
<b>Latitude</b>	43.129 degrees North
<b>Elevation</b>	0 feet
<b>Date/Time</b>	Mon, 23 Oct 2017 15:42:17 -0400

### Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.26	0.40	0.50	0.65	0.81	1.03	<b>1yr</b>	0.70	0.98	1.20	1.55	2.00	2.61	2.84	<b>1yr</b>	2.31	2.74	3.14	3.86	4.44	<b>1yr</b>
<b>2yr</b>	0.32	0.49	0.61	0.81	1.01	1.29	<b>2yr</b>	0.88	1.17	1.50	1.91	2.44	3.14	3.48	<b>2yr</b>	2.78	3.34	3.84	4.57	5.21	<b>2yr</b>
<b>5yr</b>	0.37	0.57	0.72	0.96	1.23	1.58	<b>5yr</b>	1.06	1.44	1.85	2.38	3.07	3.98	4.46	<b>5yr</b>	3.52	4.29	4.90	5.79	6.55	<b>5yr</b>
<b>10yr</b>	0.40	0.63	0.80	1.09	1.42	1.85	<b>10yr</b>	1.22	1.69	2.18	2.83	3.66	4.76	5.39	<b>10yr</b>	4.21	5.18	5.90	6.92	7.80	<b>10yr</b>
<b>25yr</b>	0.46	0.74	0.94	1.29	1.72	2.27	<b>25yr</b>	1.48	2.09	2.69	3.53	4.62	6.03	6.91	<b>25yr</b>	5.34	6.65	7.53	8.78	9.83	<b>25yr</b>
<b>50yr</b>	0.51	0.83	1.06	1.48	2.00	2.66	<b>50yr</b>	1.72	2.46	3.18	4.19	5.51	7.22	8.36	<b>50yr</b>	6.39	8.04	9.06	10.51	11.72	<b>50yr</b>
<b>100yr</b>	0.58	0.93	1.20	1.70	2.32	3.12	<b>100yr</b>	2.00	2.89	3.74	4.97	6.56	8.64	10.11	<b>100yr</b>	7.65	9.72	10.91	12.58	13.97	<b>100yr</b>
<b>200yr</b>	0.64	1.04	1.35	1.95	2.69	3.67	<b>200yr</b>	2.32	3.40	4.43	5.91	7.84	10.36	12.22	<b>200yr</b>	9.16	11.75	13.14	15.07	16.66	<b>200yr</b>
<b>500yr</b>	0.75	1.24	1.61	2.34	3.29	4.53	<b>500yr</b>	2.84	4.22	5.50	7.40	9.89	13.16	15.72	<b>500yr</b>	11.64	15.12	16.81	19.15	21.05	<b>500yr</b>

### Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.24	0.37	0.45	0.60	0.74	0.90	<b>1yr</b>	0.64	0.88	0.91	1.26	1.56	2.02	2.52	<b>1yr</b>	1.79	2.42	2.93	3.27	4.01	<b>1yr</b>
<b>2yr</b>	0.31	0.49	0.60	0.81	1.00	1.18	<b>2yr</b>	0.86	1.16	1.37	1.83	2.36	3.04	3.39	<b>2yr</b>	2.69	3.26	3.74	4.46	5.05	<b>2yr</b>
<b>5yr</b>	0.35	0.54	0.67	0.92	1.16	1.40	<b>5yr</b>	1.01	1.37	1.62	2.15	2.78	3.72	4.14	<b>5yr</b>	3.29	3.98	4.59	5.43	6.14	<b>5yr</b>
<b>10yr</b>	0.38	0.59	0.73	1.02	1.32	1.60	<b>10yr</b>	1.14	1.57	1.82	2.45	3.13	4.30	4.82	<b>10yr</b>	3.80	4.63	5.34	6.30	7.08	<b>10yr</b>
<b>25yr</b>	0.44	0.67	0.83	1.18	1.56	1.91	<b>25yr</b>	1.35	1.87	2.11	2.85	3.66	5.03	5.87	<b>25yr</b>	4.45	5.65	6.54	7.68	8.56	<b>25yr</b>
<b>50yr</b>	0.48	0.74	0.92	1.32	1.77	2.19	<b>50yr</b>	1.53	2.14	2.36	3.20	4.11	5.77	6.81	<b>50yr</b>	5.11	6.55	7.63	8.92	9.87	<b>50yr</b>
<b>100yr</b>	0.54	0.82	1.02	1.48	2.03	2.51	<b>100yr</b>	1.75	2.45	2.64	3.59	4.60	6.60	7.89	<b>100yr</b>	5.84	7.59	8.91	10.35	11.35	<b>100yr</b>
<b>200yr</b>	0.60	0.90	1.15	1.66	2.31	2.87	<b>200yr</b>	2.00	2.80	2.94	4.01	5.14	7.55	9.15	<b>200yr</b>	6.68	8.80	10.41	12.02	13.08	<b>200yr</b>
<b>500yr</b>	0.70	1.05	1.34	1.95	2.78	3.45	<b>500yr</b>	2.40	3.37	3.42	4.65	5.98	8.99	11.12	<b>500yr</b>	7.95	10.69	12.80	14.67	15.72	<b>500yr</b>

### Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.28	0.43	0.53	0.71	0.87	1.08	<b>1yr</b>	0.75	1.05	1.24	1.75	2.22	2.84	3.03	<b>1yr</b>	2.51	2.91	3.38	4.18	4.78	<b>1yr</b>
<b>2yr</b>	0.33	0.51	0.62	0.84	1.04	1.25	<b>2yr</b>	0.90	1.22	1.48	1.95	2.50	3.26	3.58	<b>2yr</b>	2.88	3.44	3.95	4.71	5.40	<b>2yr</b>
<b>5yr</b>	0.39	0.60	0.75	1.03	1.31	1.58	<b>5yr</b>	1.13	1.55	1.85	2.50	3.19	4.23	4.77	<b>5yr</b>	3.74	4.59	5.22	6.16	6.93	<b>5yr</b>
<b>10yr</b>	0.46	0.70	0.87	1.21	1.57	1.92	<b>10yr</b>	1.35	1.88	2.23	3.04	3.84	5.21	5.94	<b>10yr</b>	4.61	5.71	6.48	7.56	8.45	<b>10yr</b>
<b>25yr</b>	0.55	0.84	1.05	1.50	1.97	2.48	<b>25yr</b>	1.70	2.42	2.87	3.96	4.93	7.05	7.95	<b>25yr</b>	6.24	7.65	8.59	9.94	11.01	<b>25yr</b>
<b>50yr</b>	0.64	0.97	1.21	1.74	2.34	2.99	<b>50yr</b>	2.02	2.92	3.48	4.83	5.99	8.73	9.93	<b>50yr</b>	7.73	9.55	10.65	12.21	13.47	<b>50yr</b>
<b>100yr</b>	0.74	1.12	1.41	2.03	2.79	3.61	<b>100yr</b>	2.40	3.53	4.23	5.91	7.27	10.81	12.40	<b>100yr</b>	9.57	11.92	13.19	15.02	16.48	<b>100yr</b>
<b>200yr</b>	0.86	1.29	1.64	2.37	3.31	4.38	<b>200yr</b>	2.86	4.28	5.14	7.23	8.81	13.43	15.50	<b>200yr</b>	11.88	14.91	16.34	18.47	20.19	<b>200yr</b>
<b>500yr</b>	1.05	1.56	2.01	2.92	4.15	5.63	<b>500yr</b>	3.58	5.50	6.63	9.47	11.40	17.92	20.82	<b>500yr</b>	15.86	20.02	21.69	24.30	26.43	<b>500yr</b>



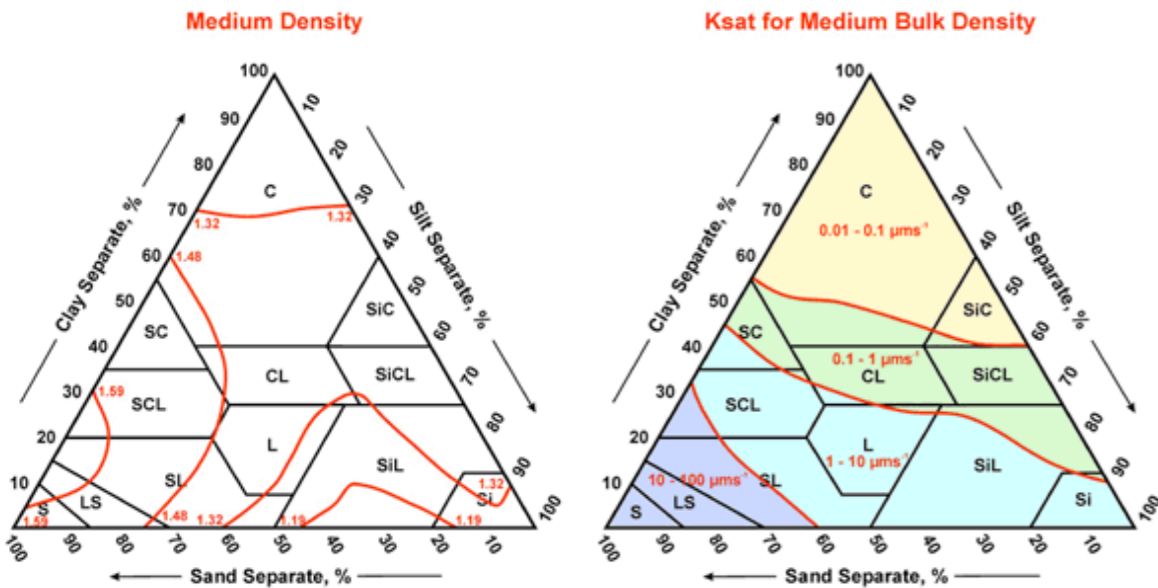
## APPENDIX E

# **$K_{sat}$ VALUES**

## **FOR**

### **NEW HAMPSHIRE SOILS**

**(Including Hydrologic and DES Soil Lot Sizing Groups)**



From: Guide for Estimating Ksat from Soil Properties (Exhibit 618-9). (<http://soils.usda.gov/technical/handbook/contents/part618ex.html>)

Sponsored by the Society of Soil Scientists of Northern New England  
 SSSNNE Special Publication No. 5  
 September, 2009

# **K<sub>sat</sub> VALUES FOR NEW HAMPSHIRE SOILS**

## **ABOUT THE SOCIETY OF SOIL SCIENTISTS OF NORTHERN NEW ENGLAND**

The Society of Soil Scientists of Northern New England (SSSNNE) is a non-profit professional organization of soil scientists, both in the private and public sectors, which is dedicated to the advancement of soil science. The Society fosters the profession of soil classification, mapping and interpretation, and encourages the dissemination of information concerning soil science. With the intent of contributing to the general human welfare, the Society seeks to educate the public on the wise use of soils and the associated natural resources.

## **INTRODUCTION**

The publication “K<sub>sat</sub> Values for New Hampshire Soils” is designed to assist soil scientists, engineers, and other professionals by assembling tables of existing data for all soil series currently on the state soil legend with regard to K<sub>sat</sub> values and hydrologic groupings (Hyd.Grp.). The need for this information has become more important since the adoption by the New Hampshire Department of Environmental Services of the revised Alteration of Terrain rules for stormwater management. Additional information has been provided for each soil series with regard to landform, temperature regime (Temp.), soil textures, NHDES Soil Lot Size Groupings (Group), whether the soil is a Spodosol (Spodosol?) and other information which will be valuable to a variety of soil information users.

The data for each soil series has been sorted 3 ways for ease of searching:

Table A-Sorted by Numerical Legend

Table B-Sorted by Soil Series Name

Table C-Sorted by NHDES Soil Group for Establishing Lot Size

The report represents cumulative efforts by private soil scientists and NHDES staff with assistance from the USDA Natural Resource Conservation Service.

Comments or inquires on the information in this publication may be directed to the Board of Directors at the following address:

**Society of Soil Scientists  
of Northern New England  
PO Box 76  
Durham, NH 03824**

## **SATURATED HYDRAULIC CONDUCTIVITY ( $K_{SAT}$ )**

$K_{sat}$  refers to the ease with which pores in a saturated soil transmit water. The estimates presented here are expressed in terms of inches per hour (NRCS official data presents  $K_{sat}$  in both micrometers per second and inches per hour).  $K_{sat}$  values are based on soil characteristics observed in the field, particularly structure, consistence, porosity, and texture. (USDA NRCS, Web Soil Survey)

Saturated flow occurs when the soil water pressure is positive; that is, when the soil matric potential is zero (satiated wet condition). In most soils this situation takes place when about 95 percent of the total pore space is filled with water. The remaining 5 percent is filled with entrapped air. Saturated hydraulic conductivity cannot be used to describe water movement under unsaturated conditions. (Soil Survey Manual, 1993)

It is commonly known that soil features (and thus data) for a certain soil series name may be slightly different from one county soil survey to the next and the range in characteristics (via the Typical Pedon) may be slightly different. For example – a Marlow soil (series) in Carroll County may have a higher sand content in its B horizon as opposed to a Marlow soil (series) in Coos County; resulting in a slightly different  $K_{sat}$  range for the B horizon.

The  $K_{sat}$  data for this publication was obtained from the USDA-NRCS Soil Data Mart using the Typical Pedon from the county that best reflected the soil and/or had the most acres of that soil. This data is presented in B and C horizons only as it is assumed that the topsoil (A or  $A_p$  horizon) will be removed in typical construction practices.

### References:

Web Soil Survey. *Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at <http://websoilsurvey.nrcs.usda.gov/>.*

Soil Data Mart. <http://soildatamart.nrcs.usda.gov/>.

Soil Survey Manual. *Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.*

## HYDROLOGIC SOIL GROUPS

Hydrologic group is a group of soils having the same runoff potential under similar storm and cover conditions.

Hydrologic groups are used in equations that estimate runoff from rainfall. These estimates are needed for solving hydrologic problems that arise in planning stormwater management, watershed protection, and flood-prevention projects and for planning or designing structures for the use, control, and disposal of water.

Classifications assigned to soils were based on the use of rainfall-runoff data from small watersheds and infiltrometer plots. From these data, relationships between soil properties and hydrologic groups were established. Assignment of soils to hydrologic groups is based on the relationship between soil properties and hydrologic groups. Wetness characteristics, permeability after prolonged wetting, and depth to very slowly permeable layers are properties that assist in estimating hydrologic groups. Minimum annual steady ponded infiltration rate for a bare ground surface determines the hydrologic soil groups.

Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonally high water table, intake rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. (The influence of ground cover is treated independently, not in hydrologic soil groups.).

The soils in the United States are placed into four groups, A, B, C, and D, and three dual classes, *A/D*, *B/D*, and *C/D*. In the definitions of the classes, infiltration rate is the rate at which water enters the soil at the surface and is controlled by the surface conditions. Transmission rate is the rate at which water moves in the soil and is controlled by soil properties. Definitions of the classes are as follows:

**Group A-** Saturated hydraulic conductivity is very high or in the upper half of high and internal free water occurrence is very deep. Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely through the soil. Group A soils typically have less than 10 percent clay and more than 90 percent sand or gravel and have gravel or sand textures. Some soils having loamy sand, sandy loam, loam or silt loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group A are as follows. The saturated hydraulic conductivity of all soil layers exceeds 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer are in group A if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 10 micrometers per second (1.42 inches per hour).

**Group B-** Saturated hydraulic conductivity is in the lower half of high or in the upper half of moderately high and free water occurrence is deep or very deep. Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded. Group B soils typically have between 10 percent and 20 percent clay and 50 percent to 90 percent sand and have loamy sand or sandy loam textures. Some soils having loam, silt loam, silt, or sandy clay loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group B are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] ranges from 10.0 micrometers per second (1.42 inches per hour) to 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer or water table are in group B if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 4.0 micrometers per second (0.57 inches per hour) but is less than 10.0 micrometers per second (1.42 inches per hour).

**Group C-** Saturated hydraulic conductivity is in the lower half of moderately high or in the upper half of moderately low and internal free water occurrence is deeper than shallow. Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted. Group C soils typically have between 20 percent and 40 percent clay and less than 50 percent sand and have loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures. Some soils having clay, silty clay, or sandy clay textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group C are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] is between 1.0 micrometers per second (0.14 inches per hour) and 10.0 micrometers per second (1.42 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a restriction or water table are in group C if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 0.40 micrometers per second (0.06 inches per hour) but is less than 4.0 micrometers per second (0.57 inches per hour).

**Group D-** Saturated hydraulic conductivity is below the upper half of moderately low, and/or internal free water occurrence is shallow or very shallow and transitory through permanent. Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. In some areas, they also have high shrink-swell potential. All soils with a depth to a water impermeable layer less than 50 centimeters [20 inches] and all soils with a water table within 60 centimeters [24 inches] of the surface are in this group, although some may have a dual classification, as described in the next section, if they can be adequately drained. The limits on the physical diagnostic characteristics of group D are as follows. For soils with a water impermeable layer at a depth between 50 centimeters and 100 centimeters [20 and 40 inches], the saturated hydraulic conductivity in the least transmissive soil layer is less than or equal to 1.0 micrometers per second (0.14 inches per hour). For soils that are deeper than 100 centimeters [40 inches] to a restriction or water table, the saturated hydraulic

conductivity of all soil layers within 100 centimeters [40 inches] of the surface is less than or equal to 0.40 micrometers per second (0.06 inches per hour).

**Dual hydrologic soil groups**-Certain wet soils are placed in group D based solely on the presence of a water table within 60 centimeters [24 inches] of the surface even though the saturated hydraulic conductivity may be favorable for water transmission. If these soils can be adequately drained, then they are assigned to dual hydrologic soil groups (*A/D*, *B/D*, and *C/D*) based on their saturated hydraulic conductivity and the water table depth when drained. The first letter applies to the drained condition and the second to the undrained condition. For the purpose of hydrologic soil group, adequately drained means that the seasonal high water table is kept at least 60 centimeters [24 inches] below the surface in a soil where it would be higher in a natural state.

#### References:

National Engineering Handbook, Natural Resource Conservation Service, U.S. Department of Agriculture.

Soil Data Mart. <http://soildatamart.nrcs.usda.gov/>.

Soil Survey Manual. *Soil Survey Division Staff. 1993. Soil survey manual. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 18.*



## **TABLE A**

### **NUMERICAL LEGEND**

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Occum	1	0.6	2.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Suncook	2	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Lim	3	0.6	2.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Pootatuck	4	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Rippowam	5	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Saco	6	0.6	2.0	6.00	20.0	D	6	Flood Plain (Bottom Land)	mesic	silty	no	strata
Hadley	8	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Winooski	9	0.6	6.0	0.60	6.0	B		Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Merrimac	10	2.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	gravely sand	no	loamy cap
Gloucester	11	6.0	20.0	6.00	20.0	A	1	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Hinckley	12	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Sheepscot	14	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravely coarse sand
Searsport	15	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Saugatuck	16	0.06	0.2	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Colton, gravelly	21	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravely surface
Colton	22	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Masardis	23	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Agawam	24	6.0	20.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Windsor	26	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	sandy	no	
Groveton	27	0.6	2.0	0.60	6.0	B	2	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Madawaska	28	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Woodbridge	29	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Unadilla	30	0.6	2.0	2.00	20.0	B	2	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Hartland	31	0.6	2.0	0.20	2.0	B	2	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Boxford	32	0.1	0.2	0.00	0.2	C	3	Silt and Clay Deposits	mesic	fine	no	silty clay loam
Scitico	33	0.0	0.2	0.00	0.2	C	5	Silt and Clay Deposits	mesic	fine	no	
Wareham	34	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Champlain	35	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	gravely sand	no	
Adams	36	6.0	20.0	20.00	99.0	A	1	Outwash and Stream Terraces	frigid	sandy	yes	
Melrose	37	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Eldridge	38	6.0	20.0	0.06	0.6	C	3	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Millis	39					C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Canton	42	2.0	6.0	6.00	20.0	B	2	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Montauk	44	0.6	6.0	0.06	0.6	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Henniker	46	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Madawaska, aquatic	48	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Whitman	49	0.0	0.2	0.00	0.2	D	6	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Hermon	55	2.0	20.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Becket	56	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	gravely sandy loam in Cd
Waumbeck	58	2.0	20.0	6.00	20.0	B	3	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Charlton	62	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Paxton	66	0.6	2.0	0.00	0.2	C	3	Firm, platy, loamy till	mesic	loamy	no	
Sutton	68	0.6	6.0	0.60	6.0	B	3	Loose till, loamy textures	mesic	loamy	no	
Berkshire	72	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Marlow	76	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Peru	78	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	
Thorndike	84	0.6	2.0	0.60	2.0	C/D	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Hollis	86	0.6	6.0	0.60	6.0	C/D	4	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Winnecook	88	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Chatfield	89	0.6	6.0	0.60	6.0	B	4	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Hogback	91	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Lyman	92	2.0	6.0	2.00	6.0	A/D	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Woodstock	93	2.0	6.0	2.00	6.0	C/D	4	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep
Rawsonville	98	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Tunbridge	99	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Ondawa	101	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Sunday	102	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Winooski	103	0.6	6.0	0.60	6.0	B	3	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Podunk	104	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Rumney	105	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	frigid	loamy	no	
Hadley	108	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Limerick	109	0.6	2.0	0.60	2.0	C	5	Flood Plain (Bottom Land)	mesic	silty	no	
Scarboro	115	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Finch	116					C	3	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)
Sudbury	118	2.0	6.0	2.00	20.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand
Telos	123	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Chesuncook	126	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Allagash	127	0.6	2.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Elliottsville	128	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Hitchcock	130	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Burnham	131	0.2	6.0	0.02	0.2	D	6	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over silt
Dartmouth	132	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Monson	133	0.6	2.0	0.60	2.0	D	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Maybid	134	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	mesic	fine	no	silt over clay
Shapleigh	136					C/D	4	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Monadnock	142	0.6	2.0	2.00	6.0	B	2	Loose till, sandy textures	frigid	loamy over sandy, sandy-skeletal	yes	gravelly loamy sand in C
Acton	146	2.0	20.0	2.00	20.0	B	3	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Vassalboro	150					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Success	154	2.0	6.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	cemented
Canterbury	166	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Sunapee	168	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	
Waskish	195					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Ondawa	201	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Sunday	202	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Fryeburg	208	0.6	2.0	2.00	6.0	B	2	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Charles	209	0.6	100.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	silty	no	
Warwick	210	2.0	6.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Naumburg	214	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Boscawen	220	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Bemis	224	0.6	0.2	0.00	0.2	C	5	Firm, platy, loamy till	cryic	loamy	no	
Bice	226	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	no	sandy loam
Lanesboro	228	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Poocham	230	0.6	2.0	0.20	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Buxton	232	0.1	0.6	0.00	0.2	C	3	Silt and Clay Deposits	frigid	fine	no	silty clay
Scantic	233	0.0	0.2	0.00	0.2	D	5	Silt and Clay Deposits	frigid	fine	no	
Biddeford	234	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	frigid	fine	no	organic over clay
Buckland	237	0.6	2.0	0.06	0.2	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Elmridge	238	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Brayton	240	0.6	2.0	0.06	0.6	C	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Lyme	246	0.6	6.0	0.60	6.0	C	5	Loose till, sandy textures	frigid	loamy	no	
Millsite	251	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Macomber	252	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Lombard	259	0.6	6.0	2.00	20.0	C/D	2	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Sunapee var	269	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	frigid dystrodept
Chatfield Var.	289	0.6	6.0	0.60	6.0	B	3	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Greenwood	295					A/D	6	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Catden	296					A/D	6	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Lovewell	307	0.6	2.0	0.60	2.0	B	3	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Quonset	310	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Deerfield	313	6.0	20.0	20.00	100.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	single grain in C

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Pipestone	314					B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Mashpee	315	6.0	20.0	6.00	20.0	B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Bernardston	330	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Roundabout	333	0.2	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Pittstown	334	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Elmwood	338	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Stissing	340	0.6	2.0	0.06	0.2	C	5	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Cardigan	357	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Kearsarge	359	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Dutchess	366	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Dixfield	378	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Timakwa	393			6.00	100.0	D	6	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Chocorua	395			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Ipswich	397					D	6	Tidal Flat	mesic	hemic/sapric	no	deep organic
Suncook	402	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Metallak	404	6.0	100.0	6.00	100.0	B	3	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Medomak	406	0.6	2.0	0.60	2.0	D	6	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Haven	410	0.6	2.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Duane	413	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Moosilauke	414	6.0	20.0	6.00	20.0	C	5	Loose till, sandy textures	frigid	sandy	no	
Grange	433	0.6	2.0	0.60	2.0	C	5	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Swanton	438	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Shaker	439	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Chichester	442	0.6	2.0	2.00	6.0	B	3	Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Newfields	444	0.6	2.0	0.60	2.0	B	3	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Scituate	448	0.6	2.0	0.06	0.2	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Metacomet	458	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Pennichuck	460	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Gilmanton	478	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Ossipee	495			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Natchaug	496			0.20	2.0	D	6	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Pawcatuck	497			20.00	100.0	D	6	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Abenaki	501	0.6	2.0	6.00	99.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Cohas	505	0.6	2.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Hoosic	510	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Ninigret	513	0.6	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Leicester	514	0.6	6.0	0.60	20.0	C	5	Loose till, loamy textures	mesic	loamy	no	
Au Gres	516					B	5	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Machias	520	2.0	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Stetson	523	0.6	6.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Caesar	526	20.0	100.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	coarse sand	no	
Scio	531	0.6	2.0	0.60	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Belgrade	532	0.6	2.0	0.06	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Raynham	533	0.2	2.0	0.06	0.2	C	5	Terraces and glacial lake plains	mesic	silty	no	
Binghamville	534	0.2	2.0	0.06	0.2	D	5	Terraces and glacial lake plains	mesic	silty	no	
Suffield	536	0.6	2.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Squamscott	538	6.0	20.0	0.06	0.6	C	5	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Raypol	540	0.6	2.0	6.00	100.0	D	5	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Walpole	546	2.0	6.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Peacham	549	0.6	2.0	0.00	0.2	D	6	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over loam
Skerry	558	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Plaisted	563	0.6	2.0	0.06	0.6	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Howland	566	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Monarda	569	0.2	2.0	0.02	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Bangor	572	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Dixmont	578	0.6	2.0	0.60	2.0	C	3	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Cabot	589	0.6	2.0	0.06	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Westbrook	597			0.00	2.0	D	6	Tidal Flat	mesic	loamy	no	organic over loam
Mundal	610	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	gravely sandy loam in Cd
Croghan	613	20.0	100.0	20.00	100.0	B	3	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Kinsman	614	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Salmon	630	0.6	2.0	0.60	2.0	B	2	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Nicholville	632	0.6	2.0	0.60	2.0	C	3	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Pemi	633	0.6	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	
Pillsbury	646	0.6	2.0	0.06	0.2	C	5	Firm, platy, loamy till	frigid	silty	no	
Ridgebury	656	0.6	6.0	0.00	0.2	C	5	Firm, platy, loamy till	mesic	loamy	no	
Canaan	663	2.0	20.0	2.00	20.0	C	4	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Redstone	665	2.0	6.0	6.00	20.0	A	1	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Sisk	667	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Surplus	669	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Glebe	671	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Saddleback	673	0.6	2.0	0.60	2.0	C/D	4	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Ricker	674	2.0	6.0	2.00	6.0	A	4	Organic over bedrock (up to 4" of mineral)	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Houghtonville	795	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Matunuck	797			20.00	100.0	D	6	Tidal Flat	mesic	sandy	no	organic over sand
Meadowsedge	894					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Bucksport	895					D	6	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Colonel	927	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Pondicherry	992			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Wonsqueak	995			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Glover	NA	0.6	2.0	0.60	2	D	4	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep



no longer recognized  
organic materials

**TABLE B**  
**SOIL SERIES**

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Abenaki	501	0.6	2.0	6.00	99.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Acton	146	2.0	20.0	2.00	20.0	B	3	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Adams	36	6.0	20.0	20.00	99.0	A	1	Outwash and Stream Terraces	frigid	sandy	yes	
Agawam	24	6.0	20.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Allagash	127	0.6	2.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Au Gres	516					B	5	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Bangor	572	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam
Becket	56	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy loam in Cd
Belgrade	532	0.6	2.0	0.06	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Bemis	224	0.6	0.2	0.00	0.2	C	5	Firm, platy, loamy till	cryc	loamy	no	
Berkshire	72	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Bernardston	330	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Bice	226	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	no	sandy loam
Biddeford	234	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	frigid	fine	no	organic over clay
Binghamville	534	0.2	2.0	0.06	0.2	D	5	Terraces and glacial lake plains	mesic	silty	no	
Boscawen	220	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Boxford	32	0.1	0.2	0.00	0.2	C	3	Silt and Clay Deposits	mesic	fine	no	silty clay loam
Brayton	240	0.6	2.0	0.06	0.6	C	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Buckland	237	0.6	2.0	0.06	0.2	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Bucksport	895					D	6	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Burnham	131	0.2	6.0	0.02	0.2	D	6	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over silt
Buxton	232	0.1	0.6	0.00	0.2	C	3	Silt and Clay Deposits	frigid	fine	no	silty clay
Cabot	589	0.6	2.0	0.06	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Caesar	526	20.0	100.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	coarse sand	no	
Canaan	663	2.0	20.0	2.00	20.0	C	4	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Canterbury	166	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Canton	42	2.0	6.0	6.00	20.0	B	2	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Cardigan	357	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Catden	296					A/D	6	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Champlain	35	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	gravelly sand	no	
Charles	209	0.6	100.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	silty	no	
Charlton	62	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Chatfield	89	0.6	6.0	0.60	6.0	B	4	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Chatfield Var.	289	0.6	6.0	0.60	6.0	B	3	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Chesuncook	126	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Chichester	442	0.6	2.0	2.00	6.0	B		Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Chocorua	395			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Cohas	505	0.6	2.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Colonel	927	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Colton	22	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Colton, gravelly	21	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Croghan	613	20.0	100.0	20.00	100.0	B	3	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Dartmouth	132	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Deerfield	313	6.0	20.0	20.00	100.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	single grain in C
Dixfield	378	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Dixmont	578	0.6	2.0	0.60	2.0	C	3	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Duane	413	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Dutchess	366	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Eldridge	38	6.0	20.0	0.06	0.6	C	3	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Elliottsville	128	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Elmridge	238	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Elmwood	338	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Finch	116					C	3	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Fryeburg	208	0.6	2.0	2.00	6.0	B	2	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Gilmanton	478	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Glebe	671	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Gloucester	11	6.0	20.0	6.00	20.0	A	1	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Glover	NA	0.6	2.0	0.60	2	D	4	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep
Grange	433	0.6	2.0	0.60	2.0	C	5	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Greenwood	295					A/D	6	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Groveton	27	0.6	2.0	0.60	6.0	B	2	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Hadley	8	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Hadley	108	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Hartland	31	0.6	2.0	0.20	2.0	B	2	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Haven	410	0.6	2.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Henniker	46	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Hermon	55	2.0	20.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Hinckley	12	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Hitchcock	130	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Hogback	91	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Hollis	86	0.6	6.0	0.60	6.0	C/D	4	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Hoosic	510	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Houghtonville	795	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Howland	566	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Ipswich	397					D	6	Tidal Flat	mesic	hemic/sapric	no	deep organic
Kearsarge	359	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Kinsman	614	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Lanesboro	228	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Leicester	514	0.6	6.0	0.60	20.0	C	5	Loose till, loamy textures	mesic	loamy	no	
Lim	3	0.6	2.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Limerick	109	0.6	2.0	0.60	2.0	C	5	Flood Plain (Bottom Land)	mesic	silty	no	
Lombard	259	0.6	6.0	2.00	20.0	C/D	2	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Lovewell	307	0.6	2.0	0.60	2.0	B	3	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Lyman	92	2.0	6.0	2.00	6.0	A/D	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Lyme	246	0.6	6.0	0.60	6.0	C	5	Loose till, sandy textures	frigid	loamy	no	
Machias	520	2.0	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Macomber	252	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Madawaska	28	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Madawaska, aquet	48	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Marlow	76	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Masardis	23	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Mashpee	315	6.0	20.0	6.00	20.0	B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Matunuck	797			20.00	100.0	D	6	Tidal Flat	mesic	sandy	no	organic over sand
Maybid	134	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	mesic	fine	no	silt over clay
Meadowsedge	894					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Medomak	406	0.6	2.0	0.60	2.0	D	6	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Melrose	37	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Merrimac	10	2.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Metacomet	458	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Metallak	404	6.0	100.0	6.00	100.0	B	3	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Millis	39					C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Millsite	251	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Monadnock	142	0.6	2.0	2.00	6.0	B	2	Loose till, sandy textures	frigid	loamy over sandy, sandy-skeletal	yes	gravelly loamy sand in C
Monarda	569	0.2	2.0	0.02	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Monson	133	0.6	2.0	0.60	2.0	D	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Montauk	44	0.6	6.0	0.06	0.6	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Moosilauke	414	6.0	20.0	6.00	20.0	C	5	Loose till, sandy textures	frigid	sandy	no	



Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Mundal	610	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	gravelly sandy loam in Cd
Natchaug	496			0.20	2.0	D	6	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Naumburg	214	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Newfields	444	0.6	2.0	0.60	2.0	B	3	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Nicholville	632	0.6	2.0	0.60	2.0	C	3	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Ninigret	513	0.6	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Occum	1	0.6	2.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Ondawa	101	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Ondawa	201	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Ossipee	495			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Pawcatuck	497			20.00	100.0	D	6	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Paxton	66	0.6	2.0	0.00	0.2	C	3	Firm, platy, loamy till	mesic	loamy	no	
Peacham	549	0.6	2.0	0.00	0.2	D	6	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over loam
Pemi	633	0.6	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	
Pennichuck	460	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Peru	78	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	
Pillsbury	646	0.6	2.0	0.06	0.2	C	5	Firm, platy, loamy till	frigid	silty	no	
Pipestone	314					B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Pittstown	334	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Plaisted	563	0.6	2.0	0.06	0.6	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Podunk	104	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Pondicherry	992			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Poocham	230	0.6	2.0	0.20	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Pootatuck	4	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Quonset	310	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Rawsonville	98	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Raynham	533	0.2	2.0	0.06	0.2	C	5	Terraces and glacial lake plains	mesic	silty	no	
Raypol	540	0.6	2.0	6.00	100.0	D	5	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Redstone	665	2.0	6.0	6.00	20.0	A	1	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Ricker	674	2.0	6.0	2.00	6.0	A	4	Organic over bedrock (up to 4" of mineral)	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Ridgebury	656	0.6	6.0	0.00	0.2	C	5	Firm, platy, loamy till	mesic	loamy	no	
Rippowam	5	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Roundabout	333	0.2	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Rumney	105	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	frigid	loamy	no	
Saco	6	0.6	2.0	6.00	20.0	D	6	Flood Plain (Bottom Land)	mesic	silty	no	strata
Saddleback	673	0.6	2.0	0.60	2.0	C/D	4	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Salmon	630	0.6	2.0	0.60	2.0	B	2	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Saugatuck	16	0.06	0.2	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Scantic	233	0.0	0.2	0.00	0.2	D	5	Silt and Clay Deposits	frigid	fine	no	
Scarboro	115	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Scio	531	0.6	2.0	0.60	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Scitico	33	0.0	0.2	0.00	0.2	C	5	Silt and Clay Deposits	mesic	fine	no	
Scituate	448	0.6	2.0	0.06	0.2	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Searsport	15	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Shaker	439	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Shapleigh	136					C/D	4	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Sheepscoot	14	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly coarse sand
Sisk	667	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Skerry	558	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Squamscott	538	6.0	20.0	0.06	0.6	C	5	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Stetson	523	0.6	6.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Stissing	340	0.6	2.0	0.06	0.2	C	5	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Success	154	2.0	6.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	cemented
Sudbury	118	2.0	6.0	2.00	20.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Suffield	536	0.6	2.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Sunapee	168	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	
Sunapee var	269	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	frigid dystrodept
Suncook	2	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Suncook	402	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Sunday	102	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Sunday	202	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Surplus	669	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Sutton	68	0.6	6.0	0.60	6.0	B	3	Loose till, loamy textures	mesic	loamy	no	
Swanton	438	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Telos	123	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Thorndike	84	0.6	2.0	0.60	2.0	C/D	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Timakwa	393			6.00	100.0	D	6	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Tunbridge	99	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Unadilla	30	0.6	2.0	2.00	20.0	B	2	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Vassalboro	150					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Walpole	546	2.0	6.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Wareham	34	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Warwick	210	2.0	6.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Waskish	195					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Waumbeck	58	2.0	20.0	6.00	20.0	B	3	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Westbrook	597			0.00	2.0	D	6	Tidal Flat	mesic	loamy	no	organic over loam
Whitman	49	0.0	0.2	0.00	0.2	D	6	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Windsor	26	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	sandy	no	
Winnecook	88	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Winooski	9	0.6	6.0	0.60	6.0	B		Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Winooski	103	0.6	6.0	0.60	6.0	B	3	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Wonsqueak	995			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Woodbridge	29	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Woodstock	93	2.0	6.0	2.00	6.0	C/D	4	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep

 no longer recognized  
 organic materials

**TABLE C**

**NHDES SOIL GROUPINGS**

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Adams	36	1	6.0	20.0	20.00	99.0	A	Outwash and Stream Terraces	frigid	sandy	yes	
Boscawen	220	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Caesar	526	1	20.0	100.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	coarse sand	no	
Champlain	35	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	gravelly sand	no	
Colton	22	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Colton, gravelly	21	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Gloucester	11	1	6.0	20.0	6.00	20.0	A	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Hermon	55	1	2.0	20.0	6.00	20.0	A	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Hinckley	12	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Hoosic	510	1	2.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Masardis	23	1	6.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Merrimac	10	1	2.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Quonset	310	1	2.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Redstone	665	1	2.0	6.0	6.00	20.0	A	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Success	154	1	2.0	6.0	6.00	20.0	A	Sandy Till	frigid	sandy-skeletal	yes	cemented
Suncook	2	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Suncook	402	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Sunday	102	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Sunday	202	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Warwick	210	1	2.0	6.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Windsor	26	1	6.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	mesic	sandy	no	
Abenaki	501	2	0.6	2.0	6.00	99.0	B	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Agawam	24	2	6.0	20.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Allagash	127	2	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Bangor	572	2	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam
Berkshire	72	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Bice	226	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	no	sandy loam
Canton	42	2	2.0	6.0	6.00	20.0	B	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Charlton	62	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Dutchess	366	2	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Fryeburg	208	2	0.6	2.0	2.00	6.0	B	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Groveton	27	2	0.6	2.0	0.60	6.0	B	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Hadley	8	2	0.6	2.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Hadley	108	2	0.6	2.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Hartland	31	2	0.6	2.0	0.20	2.0	B	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Haven	410	2	0.6	2.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Houghtonville	795	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Lombard	259	2	0.6	6.0	2.00	20.0	C/D	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Monadnock	142	2	0.6	2.0	2.00	6.0	B	Loose till, sandy textures	frigid	loamy over sandy, sandy-skeletal	yes	gravelly loamy sand in C
Occum	1	2	0.6	2.0	6.00	20.0	B	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Ondawa	101	2	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Ondawa	201	2	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Salmon	630	2	0.6	2.0	0.60	2.0	B	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Stetson	523	2	0.6	6.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Unadilla	30	2	0.6	2.0	2.00	20.0	B	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Chichester	442	2	0.6	2.0	2.00	6.0	B	Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Acton	146	3	2.0	20.0	2.00	20.0	B	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Becket	56	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy loam in Cd
Belgrade	532	3	0.6	2.0	0.06	2.0	B	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Bernardston	330	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Boxford	32	3	0.1	0.2	0.00	0.2	C	Silt and Clay Deposits	mesic	fine	no	silty clay loam

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Buckland	237	3	0.6	2.0	0.06	0.2	C	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Buxton	232	3	0.1	0.6	0.00	0.2	C	Silt and Clay Deposits	frigid	fine	no	silty clay
Canterbury	166	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Chatfield Var.	289	3	0.6	6.0	0.60	6.0	B	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Chesuncook	126	3	0.6	2.0	0.02	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Colonel	927	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Croghan	613	3	20.0	100.0	20.00	100.0	B	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Dartmouth	132	3	0.6	2.0	0.06	0.6	B	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Deerfield	313	3	6.0	20.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	sandy	no	single grain in C
Dixfield	378	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Dixmont	578	3	0.6	2.0	0.60	2.0	C	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Duane	413	3	6.0	20.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Eldridge	38	3	6.0	20.0	0.06	0.6	C	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Elmridge	238	3	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Elmwood	338	3	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Finch	116	3					C	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)
Gilmanton	478	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Henniker	46	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Hitchcock	130	3	0.6	2.0	0.06	0.6	B	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Howland	566	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Lanesboro	228	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Lovewell	307	3	0.6	2.0	0.60	2.0	B	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Machias	520	3	2.0	6.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Madawaska	28	3	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Madawaska, aquat	48	3	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Marlow	76	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Melrose	37	3	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Metacomet	458	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Metallak	404	3	6.0	100.0	6.00	100.0	B	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Millis	39	3					C	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Montauk	44	3	0.6	6.0	0.06	0.6	C	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Mundal	610	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	gravely sandy loam in Cd
Newfields	444	3	0.6	2.0	0.60	2.0	B	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Nicholville	632	3	0.6	2.0	0.60	2.0	C	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Ninigret	513	3	0.6	6.0	6.00	20.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Paxton	66	3	0.6	2.0	0.00	0.2	C	Firm, platy, loamy till	mesic	loamy	no	
Peru	78	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	
Pittstown	334	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Plaisted	563	3	0.6	2.0	0.06	0.6	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Podunk	104	3	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Poocham	230	3	0.6	2.0	0.20	2.0	B	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Pootatuck	4	3	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Scio	531	3	0.6	2.0	0.60	2.0	B	Terraces and glacial lake plains	mesic	silty	no	gravely sand in 2C
Scituate	448	3	0.6	2.0	0.06	0.2	C	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Sheepscot	14	3	6.0	20.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravely coarse sand
Sisk	667	3	0.6	2.0	0.00	0.6	C	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Skerry	558	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Sudbury	118	3	2.0	6.0	2.00	20.0	B	Outwash and Stream Terraces	mesic	sandy	no	loam over gravely sand
Suffield	536	3	0.6	2.0	0.00	0.2	C	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Sunapee	168	3	0.6	2.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	
Sunapee var	269	3	0.6	2.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	frigid dystrodept
Surplus	669	3	0.6	2.0	0.00	0.6	C	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Sutton	68	3	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	mesic	loamy	no	
Telos	123	3	0.6	2.0	0.02	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd

Sorted by DES Soil Group for Establishing Lot Size  
K<sub>sat</sub> B and C horizons  
SSSNNE pub no. 5

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Waumbeck	58	3	2.0	20.0	6.00	20.0	B	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Winooski	103	3	0.6	6.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Woodbridge	29	3	0.6	2.0	0.00	0.6	C	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Winooski	9	3	0.6	6.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Canaan	663	4	2.0	20.0	2.00	20.0	C	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Cardigan	357	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Chatfield	89	4	0.6	6.0	0.60	6.0	B	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Elliottsville	128	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Glebe	671	4	2.0	6.0	2.00	6.0	C	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Glover	NA	4	0.6	2.0	0.60	2	D	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep
Hogback	91	4	2.0	6.0	2.00	6.0	C	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Hollis	86	4	0.6	6.0	0.60	6.0	C/D	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Kearsarge	359	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Lyman	92	4	2.0	6.0	2.00	6.0	A/D	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Macomber	252	4	0.6	2.0	0.60	2.0	C	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Millsite	251	4	0.6	6.0	0.60	6.0	C	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Monson	133	4	0.6	2.0	0.60	2.0	D	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Pennichuck	460	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Rawsonville	98	4	0.6	6.0	0.60	6.0	C	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Ricker	674	4	2.0	6.0	2.00	6.0	A	rganic over bedrock (up to 4" of mineral)	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Saddleback	673	4	0.6	2.0	0.60	2.0	C/D	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Shapleigh	136	4					C/D	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Thorndike	84	4	0.6	2.0	0.60	2.0	C/D	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Tunbridge	99	4	0.6	6.0	0.60	6.0	C	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Winnecook	88	4	0.6	2.0	0.60	2.0	C	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Woodstock	93	4	2.0	6.0	2.00	6.0	C/D	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep
Au Gres	516	5					B	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Bemis	224	5	0.6	0.2	0.00	0.2	C	Firm, platy, loamy till	cryic	loamy	no	
Binghamville	534	5	0.2	2.0	0.06	0.2	D	Terraces and glacial lake plains	mesic	silty	no	
Brayton	240	5	0.6	2.0	0.06	0.6	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Cabot	589	5	0.6	2.0	0.06	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Charles	209	5	0.6	100.0	0.60	100.0	C	Flood Plain (Bottom Land)	frigid	silty	no	
Cohas	505	5	0.6	2.0	0.60	100.0	C	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Grange	433	5	0.6	2.0	0.60	2.0	C	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Kinsman	614	5	6.0	20.0	6.00	20.0	C	Outwash and Stream Terraces	frigid	sandy	yes	
Leicester	514	5	0.6	6.0	0.60	20.0	C	Loose till, loamy textures	mesic	loamy	no	
Lim	3	5	0.6	2.0	6.00	20.0	C	Flood Plain (Bottom Land)	mesic	loamy	no	
Limerick	109	5	0.6	2.0	0.60	2.0	C	Flood Plain (Bottom Land)	mesic	silty	no	
Lyme	246	5	0.6	6.0	0.60	6.0	C	Loose till, sandy textures	frigid	loamy	no	
Mashpee	315	5	6.0	20.0	6.00	20.0	B	Outwash and Stream Terraces	mesic	sandy	yes	
Monarda	569	5	0.2	2.0	0.02	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Moosilauke	414	5	6.0	20.0	6.00	20.0	C	Loose till, sandy textures	frigid	sandy	no	
Naumburg	214	5	6.0	20.0	6.00	20.0	C	Outwash and Stream Terraces	frigid	sandy	yes	
Pemi	633	5	0.6	2.0	0.06	0.6	C	Terraces and glacial lake plains	frigid	silty	no	
Pillsbury	646	5	0.6	2.0	0.06	0.2	C	Firm, platy, loamy till	frigid	silty	no	
Pipestone	314	5					B	Outwash and Stream Terraces	mesic	sandy	yes	
Raynham	533	5	0.2	2.0	0.06	0.2	C	Terraces and glacial lake plains	mesic	silty	no	
Raypol	540	5	0.6	2.0	6.00	100.0	D	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Ridgebury	656	5	0.6	6.0	0.00	0.2	C	Firm, platy, loamy till	mesic	loamy	no	
Rippowam	5	5	0.6	6.0	6.00	20.0	C	Flood Plain (Bottom Land)	mesic	loamy	no	
Roundabout	333	5	0.2	2.0	0.06	0.6	C	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Rumney	105	5	0.6	6.0	6.00	20.0	C	Flood Plain (Bottom Land)	frigid	loamy	no	

Sorted by DES Soil Group for Establishing Lot Size  
K<sub>sat</sub> B and C horizons  
SSSNNE pub no. 5

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Saugatuck	16	5	0.06	0.2	6.00	20.0	C	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Scantic	233	5	0.0	0.2	0.00	0.2	D	Silt and Clay Deposits	frigid	fine	no	
Scitico	33	5	0.0	0.2	0.00	0.2	C	Silt and Clay Deposits	mesic	fine	no	
Shaker	439	5	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Squamscott	538	5	6.0	20.0	0.06	0.6	C	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Stissing	340	5	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Swanton	438	5	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Walpole	546	5	2.0	6.0	6.00	20.0	C	Outwash and Stream Terraces	mesic	sandy	no	
Wareham	34	5	6.0	20.0	6.00	20.0	C	Outwash and Stream Terraces	mesic	sandy	no	
Biddeford	234	6	0.0	0.2	0.00	0.2	D	Silt and Clay Deposits	frigid	fine	no	organic over clay
Bucksport	895	6					D	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Burnham	131	6	0.2	6.0	0.02	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over silt
Catden	296	6					A/D	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Chocorua	395	6			6.00	20.0	D	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Greenwood	295	6					A/D	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Ipswich	397	6					D	Tidal Flat	mesic	hemic/sapric	no	deep organic
Matunuck	797	6			20.00	100.0	D	Tidal Flat	mesic	sandy	no	organic over sand
Maybid	134	6	0.0	0.2	0.00	0.2	D	Silt and Clay Deposits	mesic	fine	no	silt over clay
Meadowsedge	894	6					D	Organic Materials - Freshwater	frigid	peat	no	deep organic
Medomak	406	6	0.6	2.0	0.60	2.0	D	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Natchaug	496	6			0.20	2.0	D	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Ossipee	495	6			0.20	2.0	D	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Pawcatuck	497	6			20.00	100.0	D	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Peacham	549	6	0.6	2.0	0.00	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over loam
Pondicherry	992	6			6.00	20.0	D	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Saco	6	6	0.6	2.0	6.00	20.0	D	Flood Plain (Bottom Land)	mesic	silty	no	strata
Scarboro	115	6	6.0	20.0	6.00	20.0	D	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Searsport	15	6	6.0	20.0	6.00	20.0	D	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Timakwa	393	6			6.00	100.0	D	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Vassalboro	150	6					D	Organic Materials - Freshwater	frigid	peat	no	deep organic
Waskish	195	6					D	Organic Materials - Freshwater	frigid	peat	no	deep organic
Westbrook	597	6			0.00	2.0	D	Tidal Flat	mesic	loamy	no	organic over loam
Whitman	49	6	0.0	0.2	0.00	0.2	D	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Wonsqueak	995	6			0.20	2.0	D	Organic Materials - Freshwater	frigid	loamy	no	organic over loam

no longer recognized      organic materials      denotes break between Soil Group

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