Merrill

Engineers and Land Surveyors

August 31, 2018

Stormwater Management Report

Town of Milton

#1672-1726 Canton Avenue, Milton

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Wolcott Estate
Great Estate Planned Unit Development
#1672-1726 Canton Avenue
Canton, Massachusetts

August 31, 2018

STORMWATER MANAGEMENT REPORT AND HYDROLOGIC-HYDRAULIC ANALYSIS

Project Summary
The project proponent, Wolcott Residential, LLC, proposes to redevelop multiple parcels containing approximately 47± acres of land along Canton Avenue in Milton, Massachusetts known as the Carberry Property. The proposed redevelopment consists of an active adult residential community containing 54 dwelling units including razing several structures, rehabilitation of three existing structures (Manor House, Devens House and Wolcott House), construction of thirty-one (31) new buildings consisting of one or two unit homes, preservation of open space, approximately 3,784 linear feet of roadway, associated driveways, gravel access and parking to the Department of Conservation and Recreation (DCR) property, stormwater management facilities, gravity sewer collection system with connection to the municipal wastewater collection system, utility service connections and associated infrastructure.

The subject property is located on the south side of Canton Avenue and consists of five (5) parcels identified as Parcel ID No. M-2-2, M-2-40, M-2-4, M-2-29A and M-2-29 as shown on the Town of Milton Assessors maps. The property is located within the Residence AA District. The property is bordered by developed residentially zoned properties to the north, west and southwest while abutting DCR property to the east and southeast. Refer the Figure-1 USGS Locus Map for the location of the parcel. The property consists of a total of 47.06± acres of which approximately 46.78± acres is upland. An intermittent stream located within a manmade channel lined with high stonewalls flows through the site in a northerly direction towards Carberry Lane. The intermittent stream and associated limits of inland bank and bordering vegetated wetlands were reviewed and confirmed through an Order of Resource Area Delineation (DEP File No. 046-0512) issued on December 20, 2016. The site is not located within a Zone A, or Land Subject to Flooding resource area as shown on the current FEMA Flood Map (25023C0111J, dated July 17, 2012). Refer to Figure-2 FEMA Flood Map.

Methodology
Drainage computations were performed using the Natural Resources Conservation Services (NRCS) TR-20 method and HydroCAD® Drainage Calculation Software. Sketches of the existing and proposed watershed areas, HydroCAD® Report, and copies of the calculation sheets are included as appendices to this report.

Existing Conditions

The site presently consists of several residential homes, barns and outbuildings. The remainder of the site is comprised of wooded areas and open fields surrounding the residential homes. The site's topography is gentle to moderate with slopes ranging from 0 to 35 percent draining towards Carberry Lane via the intermittent stream to the north and on-site natural depression areas to the west along Canton Avenue. The site has frontage along Canton Avenue with three access drives.

Soil types were obtained from NRCS mapping and were found to vary from hydrologic soil group (HSG) A to D soils. In order to confirm the soil class, groundwater depth and characteristics of these soils, test pits were performed on site in December 2015 and in March 2017. Based on soil textures encountered at the time of testing, the overall site was found to have sandy soils (HSG A) along Canton Avenue while transitioning into a denser gravel till (HSG C/D) in the upper or rear portions of the site. Refer to Figure-4 NRCS Soils Map and Appendix E – Soil Testing Results for supporting documentation.

Under existing conditions, the northwesterly portion of the stormwater runoff from the project site flows overland towards the on-site intermittent stream flowing in a northerly direction towards Carberry Lane (Design Point 1). The remaining stormwater runoff from the site flows overland towards the onsite depression areas along Canton Avenue (Design Points 2 and 3. In both the existing and proposed stormwater analysis, the watershed area analyzed was approximately 92.2 acres consisting of the subject parcel and a large tributary area from the southeast (Blue Hills Reservation).

Existing conditions were established with supporting field inspections of the watershed areas and historic documentation of site conditions. All indications support the assumption that the stormwater runoff flowing towards the front of the site along Canton Avenue is contained on site within the existing natural depression areas along the stone wall. No indication of standing water within the depression areas was observed, therefore an increased infiltration rate was utilized for the existing natural depressions in the drainage analysis.

Proposed Conditions/Stormwater Management

Under the post development condition, the proposed impervious surface runoff will be discharged into multiple infiltration systems, either subsurface chambers, bioretention basin, open infiltration basin or rain gardens with pretreatment. These drainage facilities will collect and treat the proposed impervious surfaces through first defense pre-treatment units or a stone diaphragm prior to discharge to the infiltration facilities. As portions of the project are located within an area subject to protection under the Wetlands Protection Act, M.G.L. c. 131, Section 40 and are considered a redevelopment project, the stormwater management systems were designed to be in compliance with the DEP Stormwater Management Regulations (SMR) to the extent practicable.

Compliance with Stormwater Management Standards

Standard 1 – No New Untreated Discharges

No new stormwater conveyances will discharge untreated impervious runoff into, or cause erosion to downgradient areas.

Standard 2 – Peak Rate Attenuation

Peak rates of runoff were calculated using the TR-20 methodology developed by the NRCS computer-based program, HydroCAD (refer to Appendices A & B). The increase in runoff is attenuated by the proposed subsurface infiltration chamber systems, the infiltration basin, and the bioretention basin as well as existing natural depression areas onsite providing treatment, infiltration and storage volume controls. These measures will both detain and infiltrate runoff, mitigating increased rates of runoff for the 2, 10, 25 and 100-year storms events to the extent practicable.

All closed drainage structures were designed employing the rational method and the Hanover design regulations to accommodate peak flows generated by the 100-year storm event where applicable. The stormwater facilities were designed to accommodate peak flows generated by the 100-year storm event. Refer to Appendix C for closed drainage system design.

The following is a summary of pre- and post-construction rates of runoff:

	PEAK RATES OF RUNOFF					
	Design Point 1 (Stream Channel towards Carberry Lane)		Design Point 2 (Canton Avenue - North)		Design Point 3 (Canton Avenue - South)	
	EXISTING (cfs)	PROPOSED (cfs)	EXISTING (cfs)	PROPOSED (cfs)	EXISTING (cfs)	PROPOSED (cfs)
2YR	12.26	11.60	0.00	0.00	0.00	0.00
10YR	30.50	26.94	0.00	0.00	0.00	0.00
25YR	46.55	41.22	0.00	0.00	0.00	0.00
100YR	80.55	72.09	0.00	0.00	2.71	0.00

Standard 3 – Groundwater Recharge

Runoff will be infiltrated by subsurface infiltration chamber systems, infiltration basin, bioretention basin and the existing natural basins. Infiltration structures will be a minimum of two feet above seasonal high groundwater. The hydraulic conductivity was based on soil conditions found on the site via soil testing and DEP SMR Table 2.3.3 1982 Rawls Rates - values developed from Rawls, Brakensiek and Saxton, 1982. The total required groundwater recharge volume for the entire site was calculated to be 8,930 cubic feet. The proposed subsurface infiltration facilities will provide 114,053 cubic feet of recharge below the minimum outlet elevation. Refer to Appendix C for recharge volume and drawdown calculations and Appendix E for soil testing results.

Standard 4 – Water Quality

A Long-Term Source Control/Pollution Prevention Plan has been incorporated into the Operation and Maintenance Plan. Refer to Appendix D for BMP Operation and Maintenance Plans. The water quality volume was calculated using the one-inch rule as portions of the site are within an area of rapid infiltration. The total required water quality treatment volume was calculated to be 29,178 cubic feet. Refer to Appendix C for water quality calculations for each treatment stream.

In accordance with the guidelines of the Stormwater Management Policy, the Total Suspended Solids (TSS) Removal was calculated to be 80% or greater for the new treatment trains which will handle the stormwater runoff from the proposed project area. The treatment trains consist of deep hooded catch basins, first defense pretreatment units to either subsurface infiltration chamber systems or infiltration basin or a pretreatment stone diaphragm to the bio retention basin to achieve the required removal rate of 80% total suspended soils. TSS removal calculations are included in Appendix C.

Standard 5 – Land Use with Higher Potential Pollutants Loads (LUHPPL)

The proposed project is not considered a LUHPPL. Not Applicable.

Standard 6 – Critical Areas

The proposed project does not discharge to any critical areas. Not Applicable.

Standard 7 – Redevelopment and Other Projects Subject to the Standards only to the maximum extent practicable

The project site is currently developed, and the proposed project consists of razing several existing structures, restoring three historic homes and constructing thirty-one (31) new residential buildings. Portions of the site could be considered redevelopment, but for the purpose of stormwater design, the project was considered new development and has been designed to be in compliance with the stormwater standards.

Standard 8 – Construction Period Pollutions Prevention and Erosion and Sedimentation Control

Silt socks will be placed at the limit of work as erosion control barriers prior to commencement of any construction activity. A Construction Operation and Maintenance

Plan and Construction Pollution Prevention Plan have been provided. Refer to the construction detail plan for erosion control details and the BMP Operation and Maintenance Plans in Appendix D.

Standard 9 – Operation and Maintenance Plan

The Long-Term Source Control/Pollution Prevention Plan and Operation and Maintenance Plan is also provided within Appendix D.

Standard 10 – Prohibition of Illicit Discharges

No illicit discharges are anticipated on site. Measures to prevent illicit discharges are included in the Long-Term Source Control/Pollution Prevention Plan.

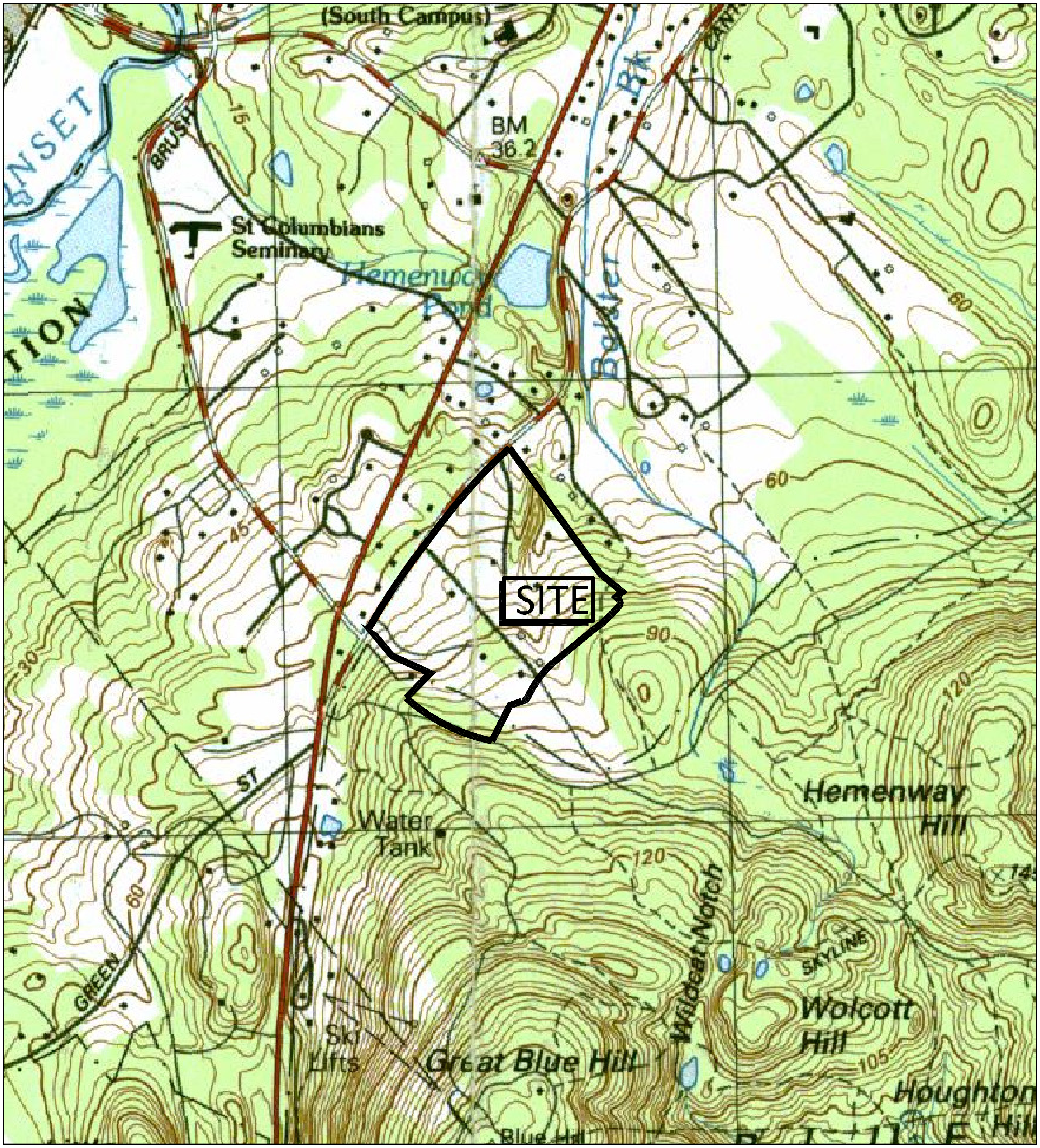

FIGURE –1

USGS Locus Map

SCALE: None

DATE: 8/31/2018

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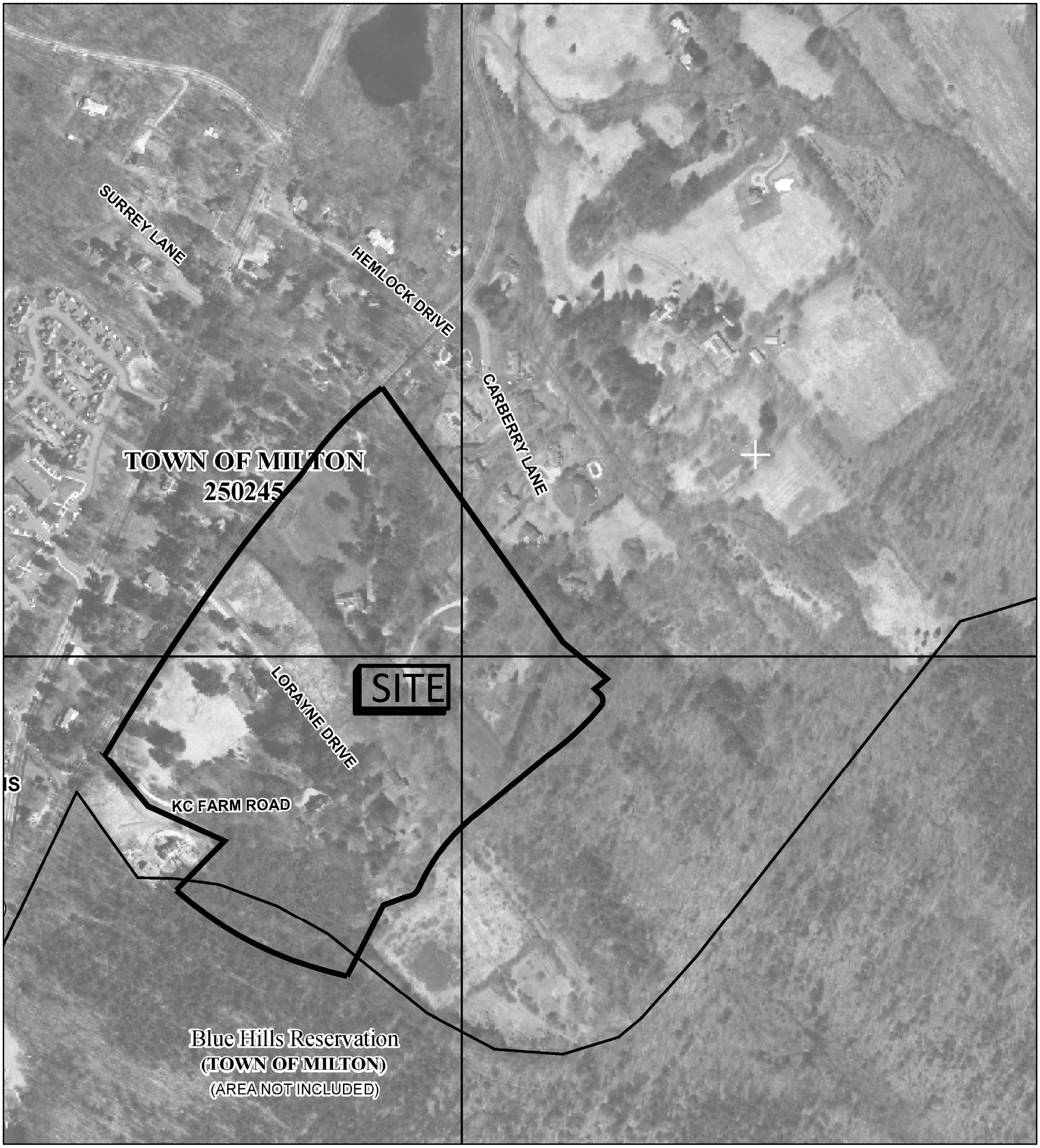

FIGURE –2
FEMA Flood Map
25023C0209J (7/17/12)

SCALE: None
DATE: 8/31/2018

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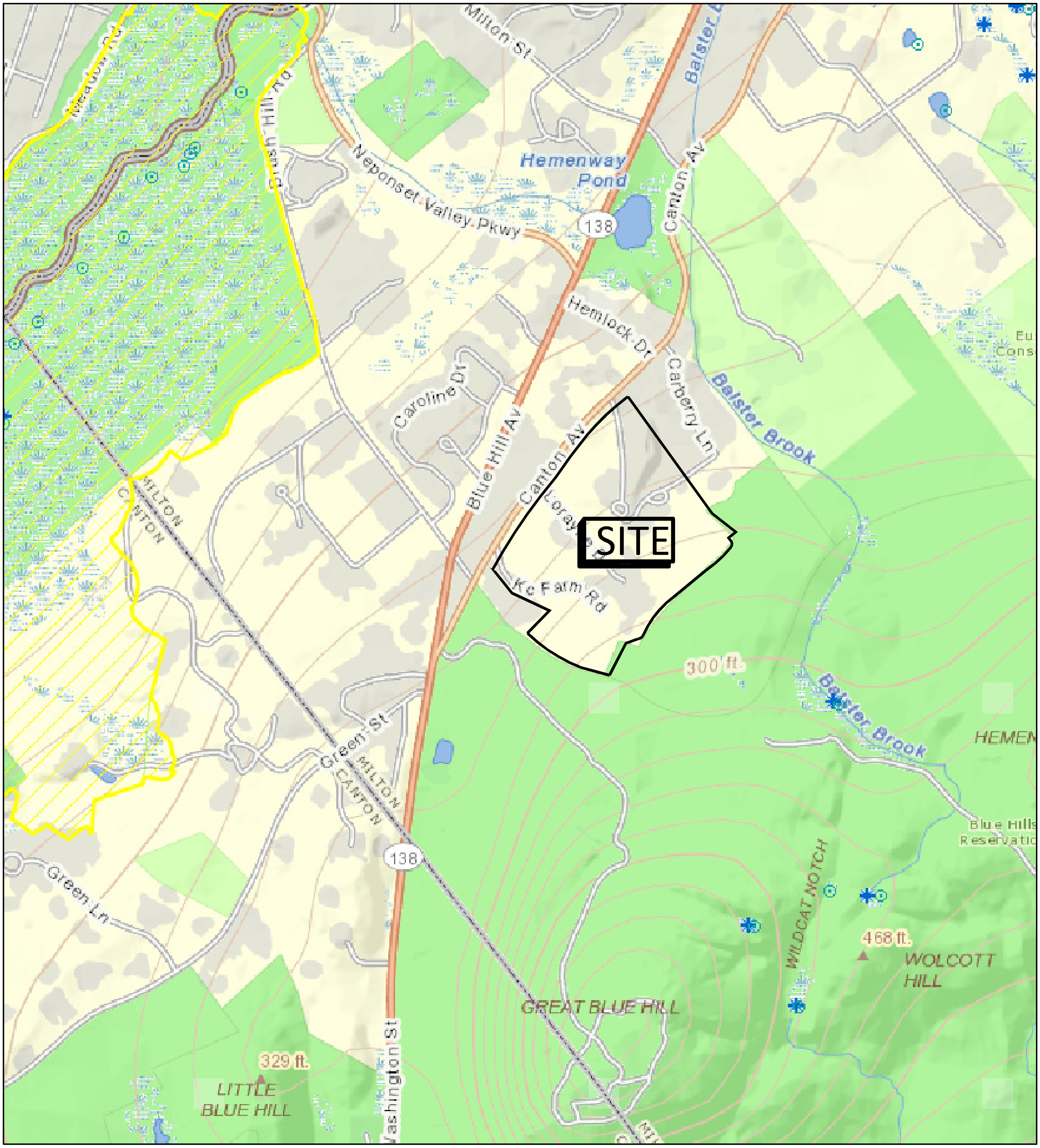

FIGURE –3

MassGIS – Wetland & NHESP Inventory

SCALE: None

DATE: 8/31/2018

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FIGURE –4
NRCS Soils Map
(Web Soil Survey)

SCALE: None
DATE: 8/31/2018

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APPENDIX A

Existing Conditions

2, 10, 25 and 100 year return storms

EXISTING CONDITIONS WATERSHED

SUBCATCHMENT 1S

DESCRIPTION	AREA (S.F.)	
WOODS (HSG A)	153,412	S.F.
GRASS (HSG B)	3,806	S.F.
IMPERVIOUS (HSG C)	3,318	S.F.
WOODS (HSG C)	1,085,438	S.F.
GRASS (HSG C)	243,725	S.F.
IMPERVIOUS (HSG D)	8,781	S.F.
WOODS (HSG D)	482,716	S.F.
GRASS (HSG D)	113,252	S.F.
WETLAND STREAM CHANNEL	6,942	S.F.
TOTAL AREA FOR 1S	2,101,390	S.F.

SUBCATCHMENT 2S

DESCRIPTION	AREA (S.F.)	
WETLAND STREAM CHANNEL	3,336	S.F.
WOODS (HSG B)	19,048	S.F.
IMPERVIOUS (HSG B)	3,460	S.F.
IMPERVIOUS (HSG C)	9,510	S.F.
GRASS (HSG C)	16,068	S.F.
WOODS (HSG C)	19,248	S.F.
GRASS (HSG D)	5,331	S.F.
WOODS (HSG D)	4,946	S.F.
TOTAL AREA FOR 2S	80,947	S.F.

SUBCATCHMENT 3S

DESCRIPTION	AREA (S.F.)	
WOODS (HSG B)	27,020	S.F.
IMPERVIOUS (HSG C)	12,576	S.F.
GRASS (HSG C)	18,196	S.F.
WOODS (HSG C)	109,957	S.F.
WETLAND STREAM CHANNEL	2,427	S.F.
TOTAL AREA FOR 3S	170,176	S.F.

SUBCATCHMENT 4S

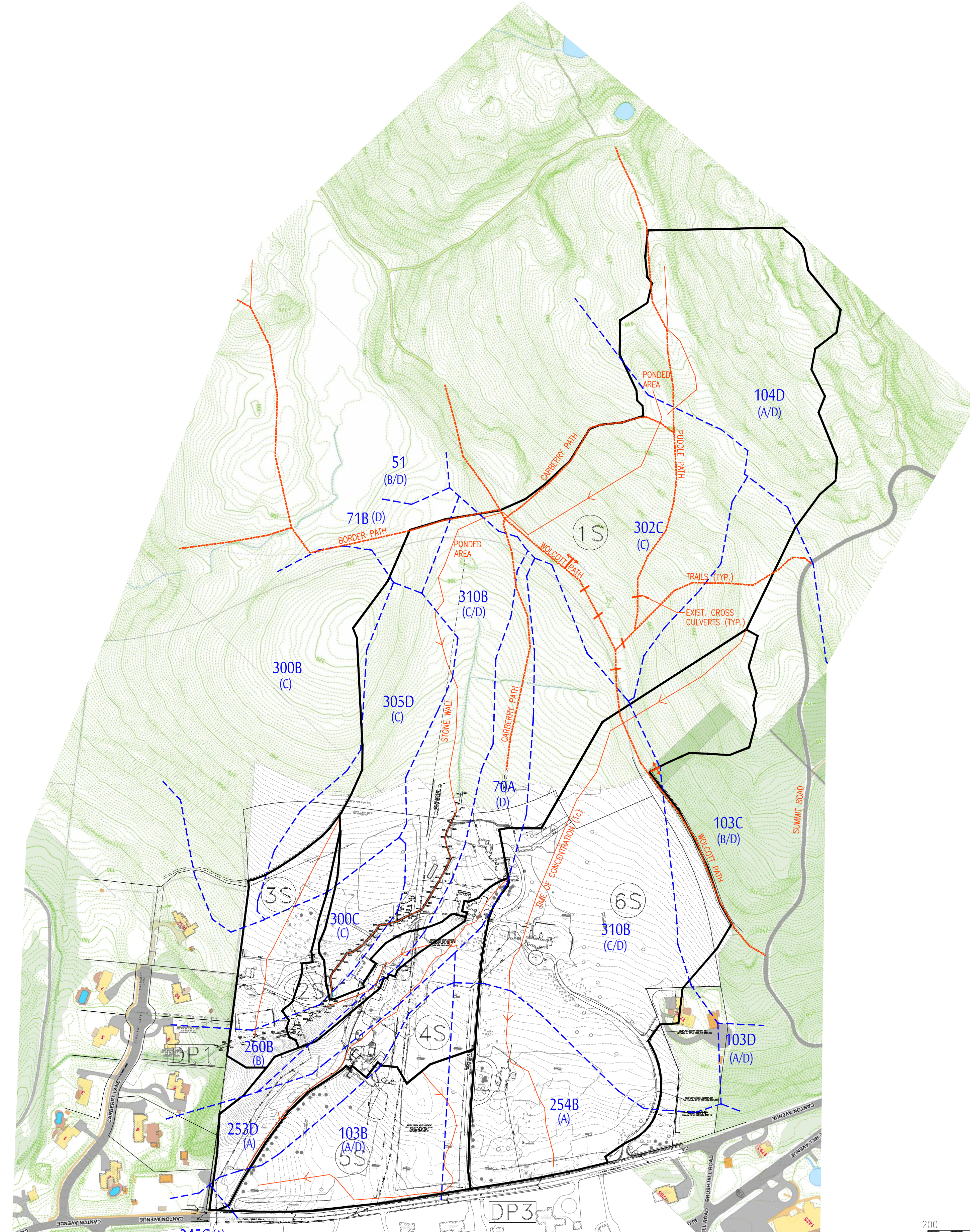
DESCRIPTION	AREA (S.F.)	
IMPERVIOUS (HSG A)	13,530	S.F.
WOODS (HSG A)	53,901	S.F.
GRASS (HSG A)	113,021	S.F.
WOODS (HSG B)	9,397	S.F.
IMPERVIOUS (HSG D)	8,787	S.F.
WOODS (HSG D)	47,201	S.F.
GRASS (HSG D)	38,190	S.F.
TOTAL AREA FOR 4S	284,027	S.F.

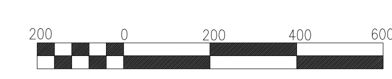
SUBCATCHMENT 5S

DESCRIPTION	AREA (S.F.)	
IMPERVIOUS (HSG A)	11,210	S.F.
WOODS (HSG A)	84,050	S.F.
GRASS (HSG A)	227,298	S.F.
TOTAL AREA FOR 5S	322,558	S.F.

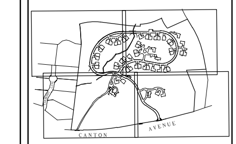
SUBCATCHMENT 6S

DESCRIPTION	AREA (S.F.)	
IMPERVIOUS (HSG A)	11,382	S.F.
WOODS (HSG A)	148,740	S.F.
GRASS (HSG A)	118,657	S.F.
WOODS (HSG B)	219,044	S.F.
IMPERVIOUS (HSG C)	34,168	S.F.
WOODS (HSG C)	515,893	S.F.
GRASS (HSG C)	11,252	S.F.
TOTAL AREA FOR 6S	1,059,136	S.F.





REVISIONS



KEY PLAN

DRAWN BY: JG

DESIGNED BY: JG/DWK

CHECKED BY: DWK

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SITE PLAN
WOLCOTT WOODS
MILTON, MASSACHUSETTS

PREPARED FOR: WOLCOTT RESIDENTIAL, LLC
80 BEHARRELL STREET, SUITE E
CONCORD, MASSACHUSETTS 01742

AUGUST 31, 2018

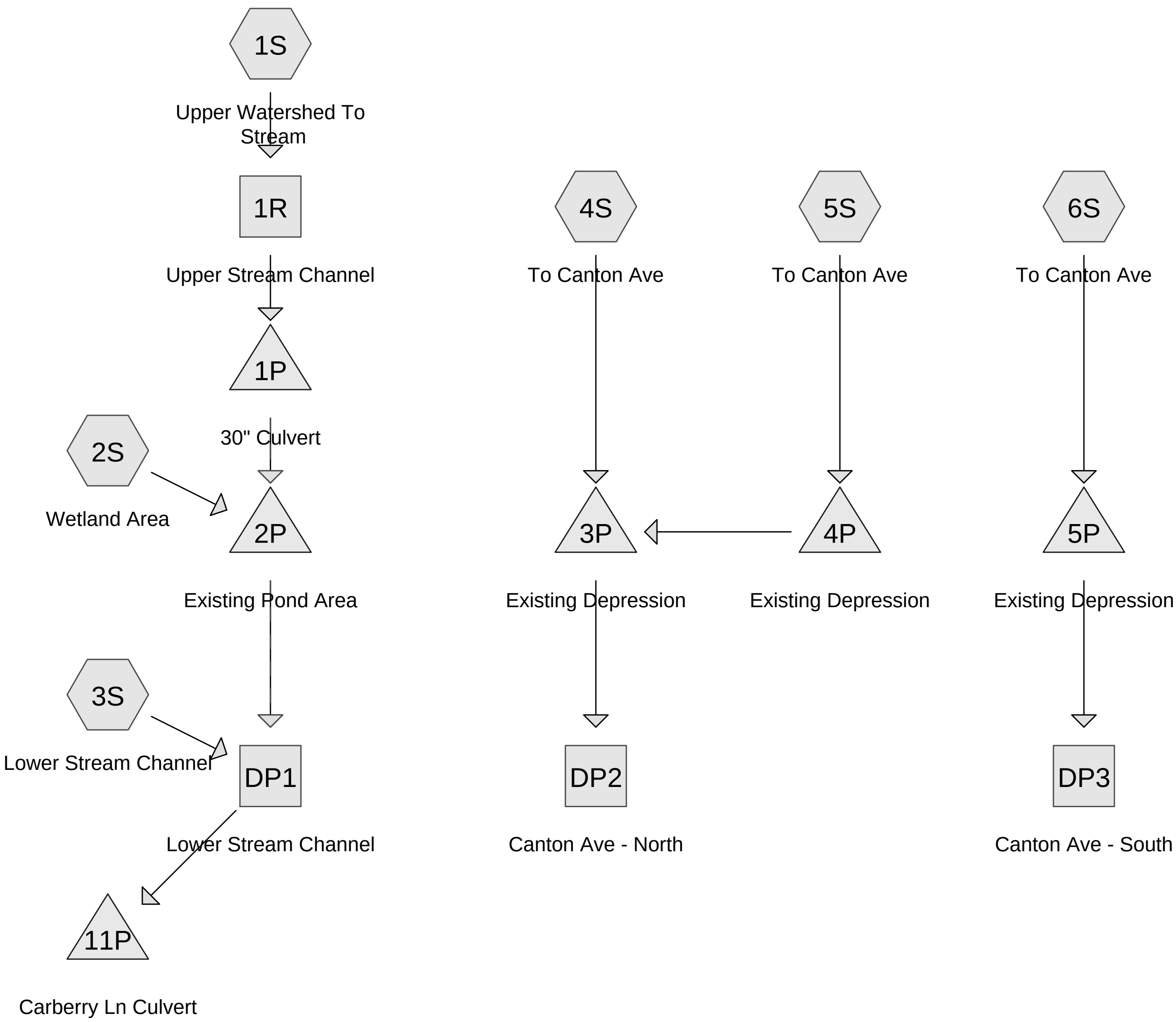
SCALE: 1" = 200'

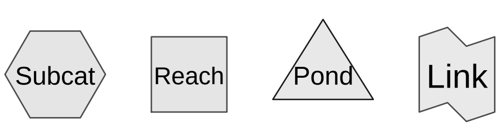
JOB No. 16-079

LATEST REVISION:

EXISTING WATERSHED PLAN

SHEET WS1





Routing Diagram for WS EX

Prepared by Merrill Engineers and Land Surveyors, Printed 9/14/2018

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
10.537	39	>75% Grass cover, Good, HSG A (4S, 5S, 6S)
0.087	61	>75% Grass cover, Good, HSG B (1S)
6.640	74	>75% Grass cover, Good, HSG C (1S, 2S, 3S, 6S)
3.599	80	>75% Grass cover, Good, HSG D (1S, 2S, 4S)
0.648	98	Paved parking, HSG A (4S, 5S, 6S)
0.603	98	Paved parking, HSG C (6S)
0.226	98	Paved parking, HSG D (1S, 4S)
0.181	98	Roofs, HSG A (4S, 5S, 6S)
0.323	98	Roofs, HSG C (1S, 2S, 6S)
0.177	98	Roofs, HSG D (1S, 4S)
0.079	98	Unconnected pavement, HSG B (2S)
0.153	98	Unconnected pavement, HSG C (2S)
0.289	98	Unconnected roofs, HSG C (3S)
0.292	83	Wetland Stream Channel (1S, 2S, 3S)
10.103	30	Woods, Good, HSG A (1S, 4S, 5S, 6S)
6.302	55	Woods, Good, HSG B (2S, 3S, 4S, 6S)
39.728	70	Woods, Good, HSG C (1S, 2S, 3S, 6S)
12.279	77	Woods, Good, HSG D (1S, 2S, 4S)
92.246	**64**	**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Upper Watershed To Runoff Area=2,101,390 sf 0.58% Impervious Runoff Depth=0.86"
Flow Length=2,544' Tc=107.3 min CN=70 Runoff=11.68 cfs 3.470 af

Subcatchment 2S: Wetland Area Runoff Area=80,947 sf 16.02% Impervious Runoff Depth=0.97"
Flow Length=590' Tc=18.6 min UI Adjusted CN=72 Runoff=1.35 cfs 0.150 af

Subcatchment 3S: Lower Stream Channel Runoff Area=170,176 sf 7.39% Impervious Runoff Depth=0.81"
Flow Length=813' Tc=20.5 min UI Adjusted CN=69 Runoff=2.18 cfs 0.265 af

Subcatchment 4S: To Canton Ave Runoff Area=284,027 sf 7.86% Impervious Runoff Depth=0.24"
Flow Length=1,402' Tc=18.4 min CN=54 Runoff=0.53 cfs 0.131 af

Subcatchment 5S: To Canton Ave Runoff Area=322,558 sf 3.48% Impervious Runoff Depth=0.00"
Flow Length=1,163' Tc=34.8 min CN=39 Runoff=0.00 cfs 0.001 af

Subcatchment 6S: To Canton Ave Runoff Area=1,059,136 sf 4.30% Impervious Runoff Depth=0.40"
Flow Length=2,255' Tc=59.2 min CN=59 Runoff=2.85 cfs 0.804 af

Reach 1R: Upper Stream Channel Avg. Flow Depth=0.65' Max Vel=4.98 fps Inflow=11.68 cfs 3.470 af
n=0.050 L=763.0' S=0.0733 '/' Capacity=146.78 cfs Outflow=11.67 cfs 3.470 af

Reach DP1: Lower Stream Channel Avg. Flow Depth=0.56' Max Vel=5.76 fps Inflow=12.26 cfs 3.883 af
n=0.035 L=528.0' S=0.0537 '/' Capacity=190.84 cfs Outflow=12.26 cfs 3.883 af

Reach DP2: Canton Ave - North Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP3: Canton Ave - South Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 1P: 30" Culvert Peak Elev=201.81' Storage=578 cf Inflow=11.67 cfs 3.470 af
Primary=11.67 cfs 3.468 af Secondary=0.00 cfs 0.000 af Outflow=11.67 cfs 3.468 af

Pond 2P: Existing Pond Area Peak Elev=190.88' Storage=2,754 cf Inflow=11.88 cfs 3.618 af
Primary=11.87 cfs 3.618 af Secondary=0.00 cfs 0.000 af Outflow=11.87 cfs 3.618 af

Pond 3P: Existing Depression Peak Elev=152.50' Storage=0 cf Inflow=0.53 cfs 0.131 af
Discarded=0.53 cfs 0.131 af Primary=0.00 cfs 0.000 af Outflow=0.53 cfs 0.131 af

Pond 4P: Existing Depression Peak Elev=156.60' Storage=0 cf Inflow=0.00 cfs 0.001 af
Discarded=0.00 cfs 0.001 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond 5P: Existing Depression Peak Elev=196.98' Storage=92 cf Inflow=2.85 cfs 0.804 af
Discarded=2.85 cfs 0.804 af Primary=0.00 cfs 0.000 af Outflow=2.85 cfs 0.804 af

Pond 11P: Carberry Ln Culvert Peak Elev=160.54' Storage=268 cf Inflow=12.26 cfs 3.883 af
Primary=12.26 cfs 3.883 af Secondary=0.00 cfs 0.000 af Outflow=12.26 cfs 3.883 af

Total Runoff Area = 92.246 ac Runoff Volume = 4.820 af Average Runoff Depth = 0.63"
97.10% Pervious = 89.566 ac 2.90% Impervious = 2.680 ac

Summary for Subcatchment 1S: Upper Watershed To Stream

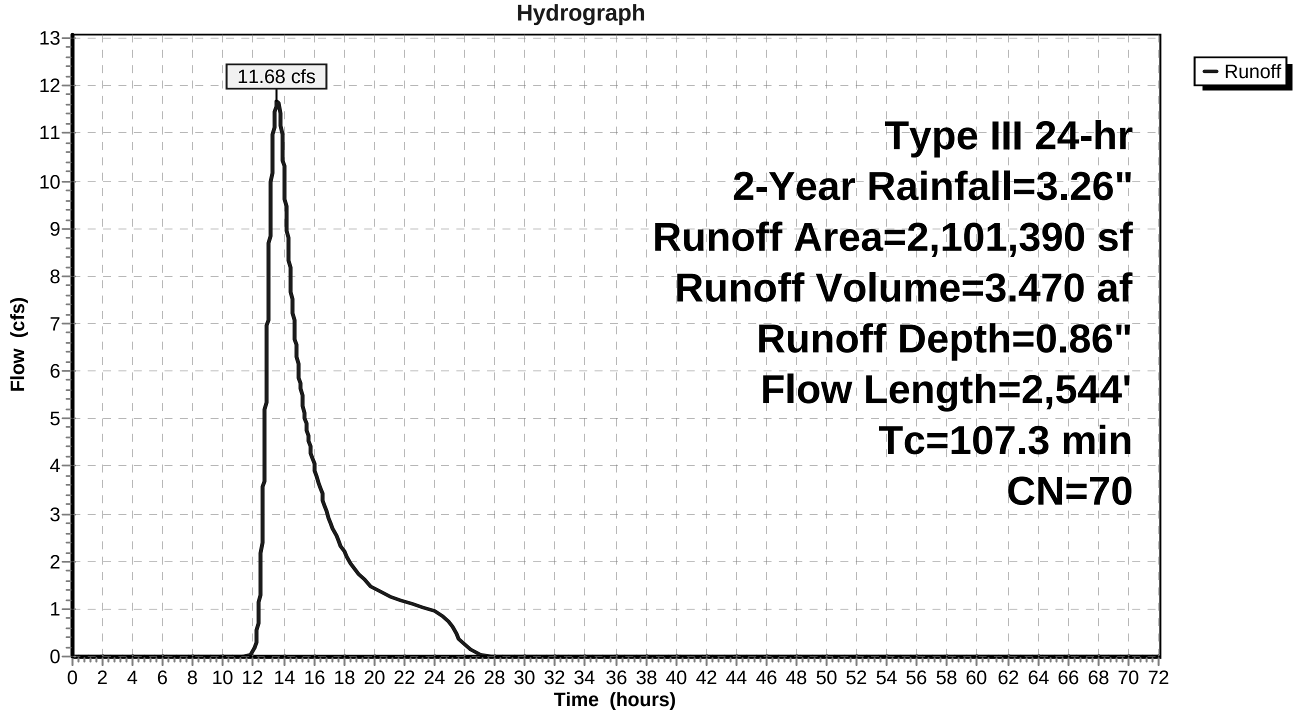
Runoff = 11.68 cfs @ 13.59 hrs, Volume= 3.470 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

	Area (sf)	CN	Description
	153,412	30	Woods, Good, HSG A
	3,806	61	>75% Grass cover, Good, HSG B
	3,318	98	Roofs, HSG C
	1,085,438	70	Woods, Good, HSG C
	243,725	74	>75% Grass cover, Good, HSG C
	2,997	98	Paved parking, HSG D
	5,784	98	Roofs, HSG D
	482,716	77	Woods, Good, HSG D
	113,252	80	>75% Grass cover, Good, HSG D
*	6,942	83	Wetland Stream Channel
	2,101,390	70	Weighted Average
	2,089,291		99.42% Pervious Area
	12,099		0.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0080	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
23.4	554	0.0250	0.40		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
10.9	116	0.0050	0.18		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
16.5	813	0.1080	0.82		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
16.7	306	0.0150	0.31		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
22.2	705	0.0450	0.53		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
107.3	2,544	Total			

Subcatchment 1S: Upper Watershed To Stream



Summary for Subcatchment 2S: Wetland Area

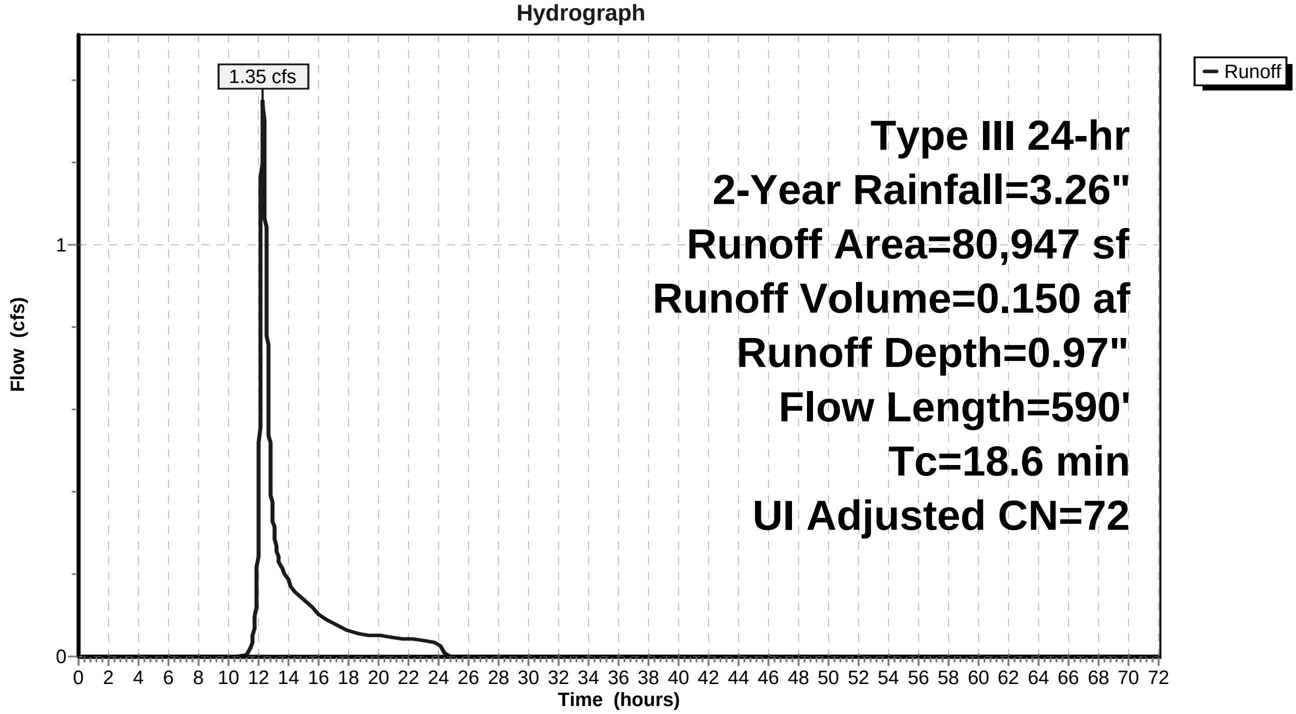
Runoff = 1.35 cfs @ 12.28 hrs, Volume= 0.150 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

	Area (sf)	CN	Adj	Description
*	3,336	83		Wetland Stream Channel
	19,048	55		Woods, Good, HSG B
	3,460	98		Unconnected pavement, HSG B
	6,652	98		Unconnected pavement, HSG C
	2,858	98		Roofs, HSG C
	16,068	74		>75% Grass cover, Good, HSG C
	19,248	70		Woods, Good, HSG C
	5,331	80		>75% Grass cover, Good, HSG D
	4,946	77		Woods, Good, HSG D
	80,947	73	72	Weighted Average, UI Adjusted
	67,977			83.98% Pervious Area
	12,970			16.02% Impervious Area
	10,112			77.96% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0350	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
7.9	271	0.0520	0.57		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.5	150	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	119	0.0920	4.55		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.6	590	Total			

Subcatchment 2S: Wetland Area



Summary for Subcatchment 3S: Lower Stream Channel

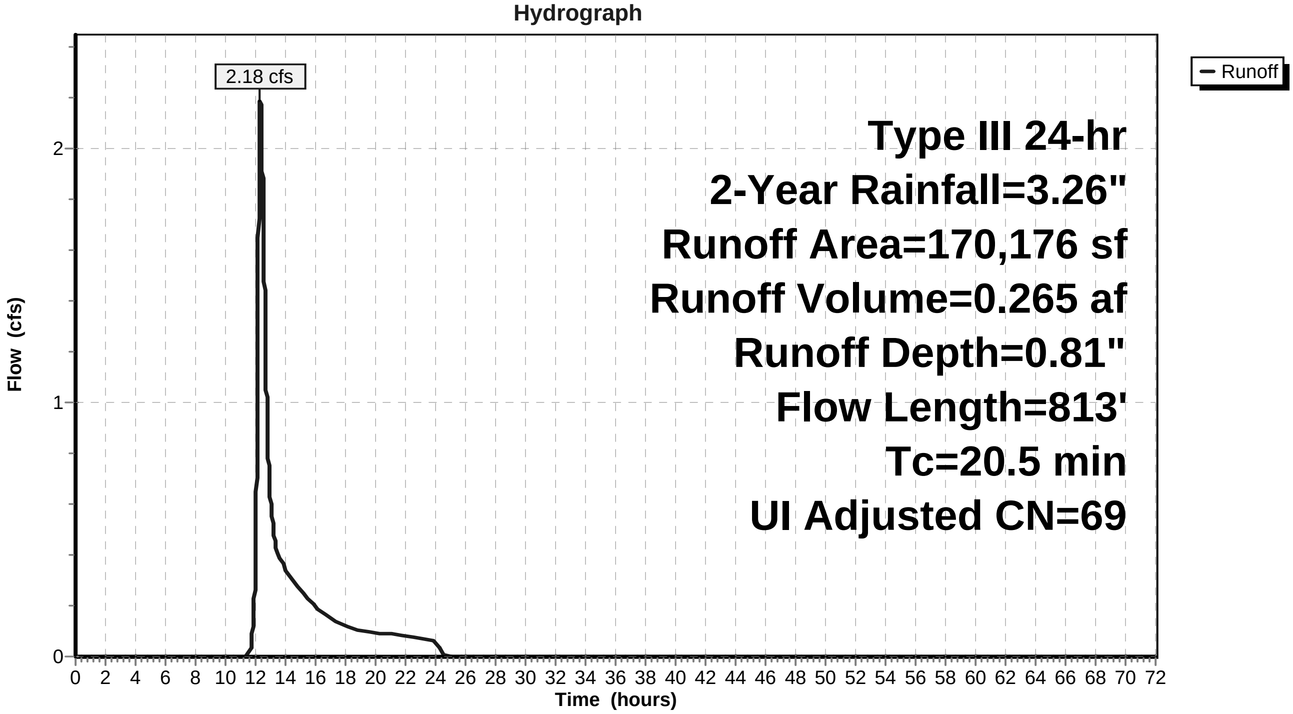
Runoff = 2.18 cfs @ 12.32 hrs, Volume= 0.265 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

	Area (sf)	CN	Adj	Description
	27,020	55		Woods, Good, HSG B
	12,576	98		Unconnected roofs, HSG C
	18,196	74		>75% Grass cover, Good, HSG C
	109,957	70		Woods, Good, HSG C
*	2,427	83		Wetland Stream Channel
	170,176	70	69	Weighted Average, UI Adjusted
	157,600			92.61% Pervious Area
	12,576			7.39% Impervious Area
	12,576			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
11.7	580	0.1100	0.83		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.1	33	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	65	0.1400	0.94		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.7	62	0.0050	1.44		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	23	0.1300	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
20.5	813	Total			

Subcatchment 3S: Lower Stream Channel



Summary for Subcatchment 4S: To Canton Ave

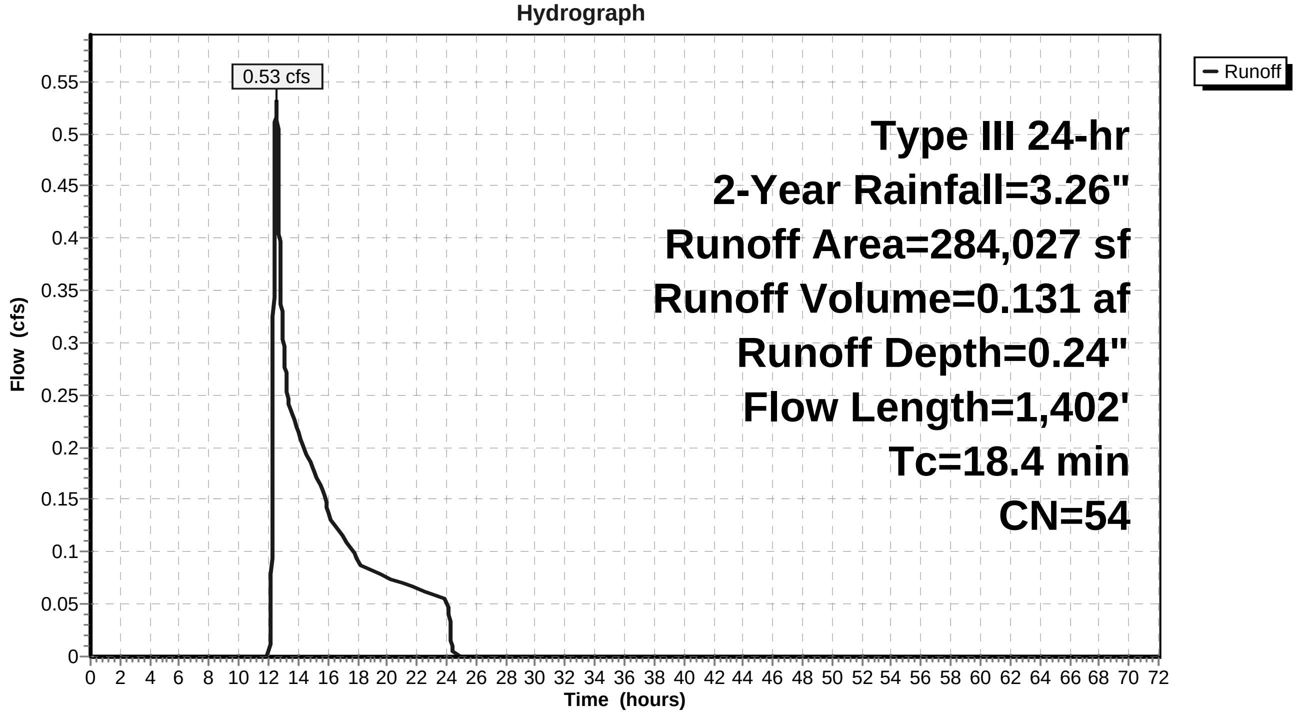
Runoff = 0.53 cfs @ 12.53 hrs, Volume= 0.131 af, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
11,177	98	Paved parking, HSG A
2,353	98	Roofs, HSG A
53,901	30	Woods, Good, HSG A
113,021	39	>75% Grass cover, Good, HSG A
9,397	55	Woods, Good, HSG B
6,856	98	Paved parking, HSG D
1,931	98	Roofs, HSG D
47,201	77	Woods, Good, HSG D
38,190	80	>75% Grass cover, Good, HSG D
284,027	54	Weighted Average
261,710		92.14% Pervious Area
22,317		7.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.6	69	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
12.4	536	0.0830	0.72		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.7	165	0.0330	3.69		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	542	0.0870	5.99		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.4	1,402	Total			

Subcatchment 4S: To Canton Ave



Summary for Subcatchment 5S: To Canton Ave

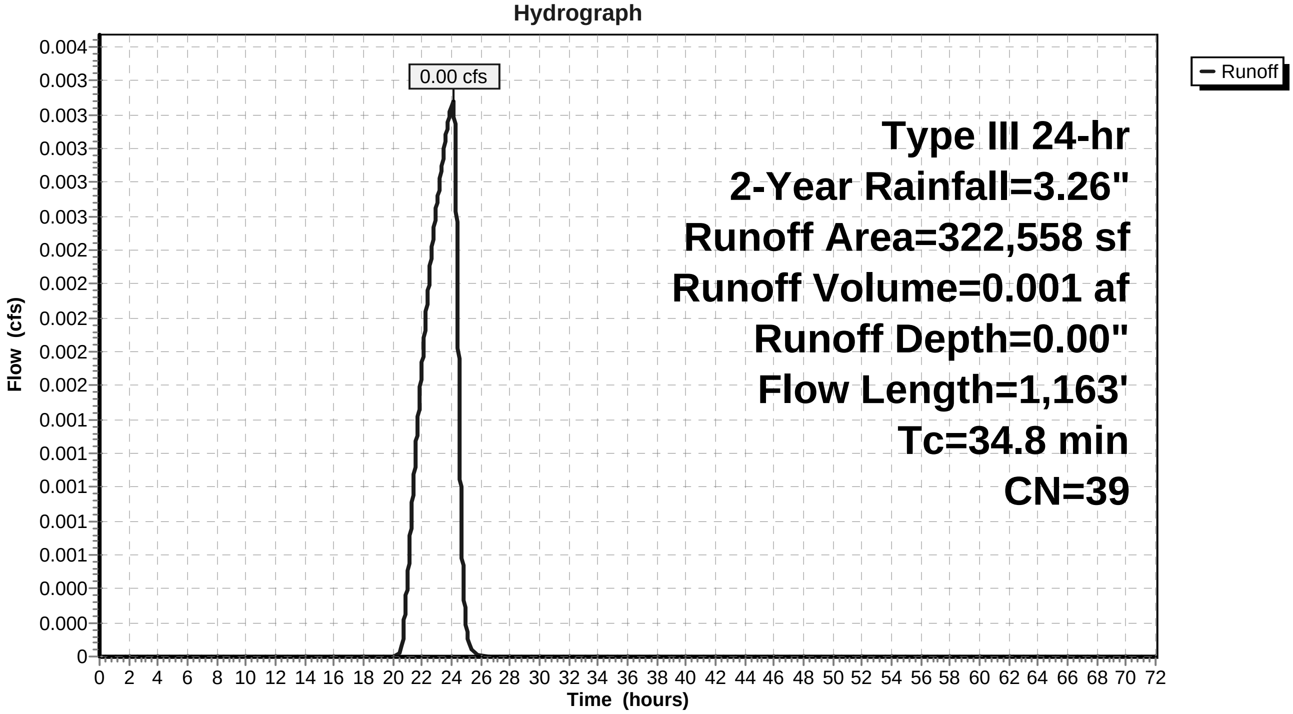
Runoff = 0.00 cfs @ 24.09 hrs, Volume= 0.001 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
8,127	98	Paved parking, HSG A
3,083	98	Roofs, HSG A
84,050	30	Woods, Good, HSG A
227,298	39	>75% Grass cover, Good, HSG A
322,558	39	Weighted Average
311,348		96.52% Pervious Area
11,210		3.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.26"
4.7	391	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.5	375	0.0400	0.50		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
7.1	75	0.0050	0.18		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.4	272	0.0750	1.92		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
34.8	1,163	Total			

Subcatchment 5S: To Canton Ave



Summary for Subcatchment 6S: To Canton Ave

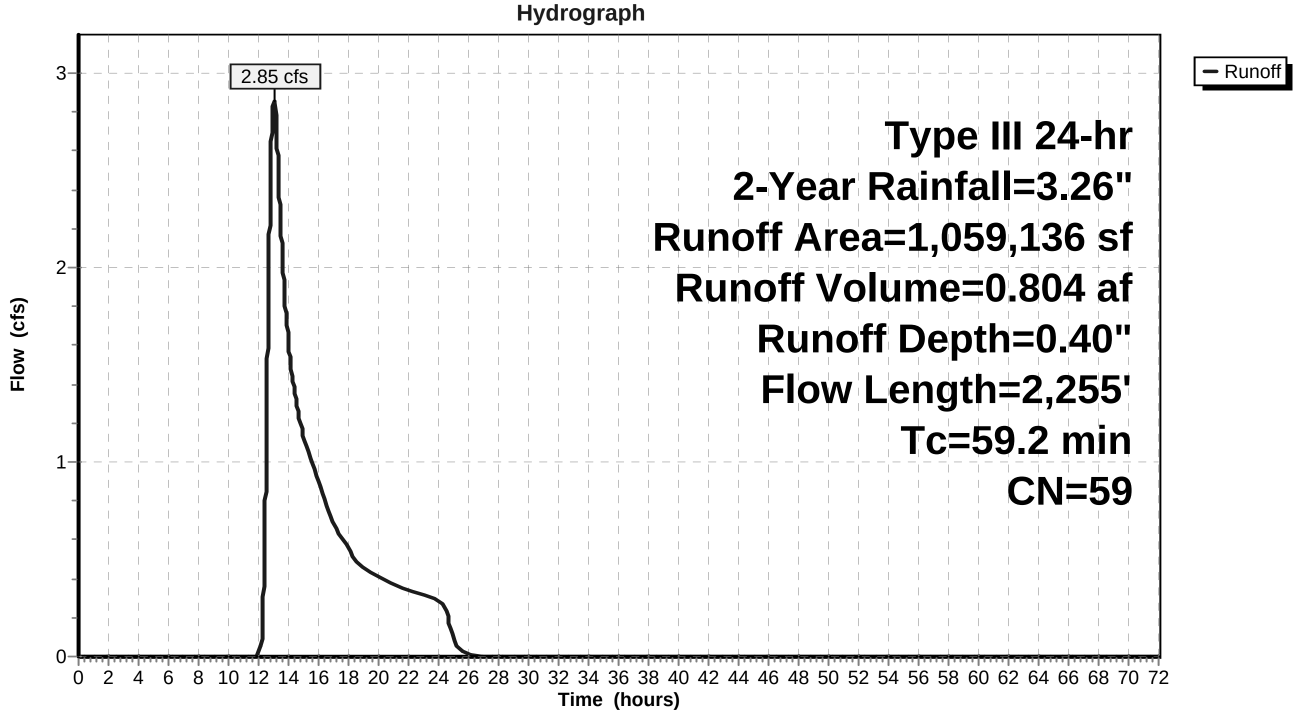
Runoff = 2.85 cfs @ 13.03 hrs, Volume= 0.804 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
8,943	98	Paved parking, HSG A
2,439	98	Roofs, HSG A
148,740	30	Woods, Good, HSG A
118,657	39	>75% Grass cover, Good, HSG A
219,044	55	Woods, Good, HSG B
26,267	98	Paved parking, HSG C
7,901	98	Roofs, HSG C
515,893	70	Woods, Good, HSG C
11,252	74	>75% Grass cover, Good, HSG C
1,059,136	59	Weighted Average
1,013,586		95.70% Pervious Area
45,550		4.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
29.2	1,300	0.0880	0.74		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.3	70	0.0360	3.85		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
21.8	835	0.0650	0.64		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
59.2	2,255	Total			

Subcatchment 6S: To Canton Ave



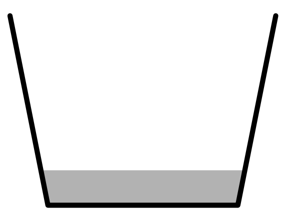
Summary for Reach 1R: Upper Stream Channel

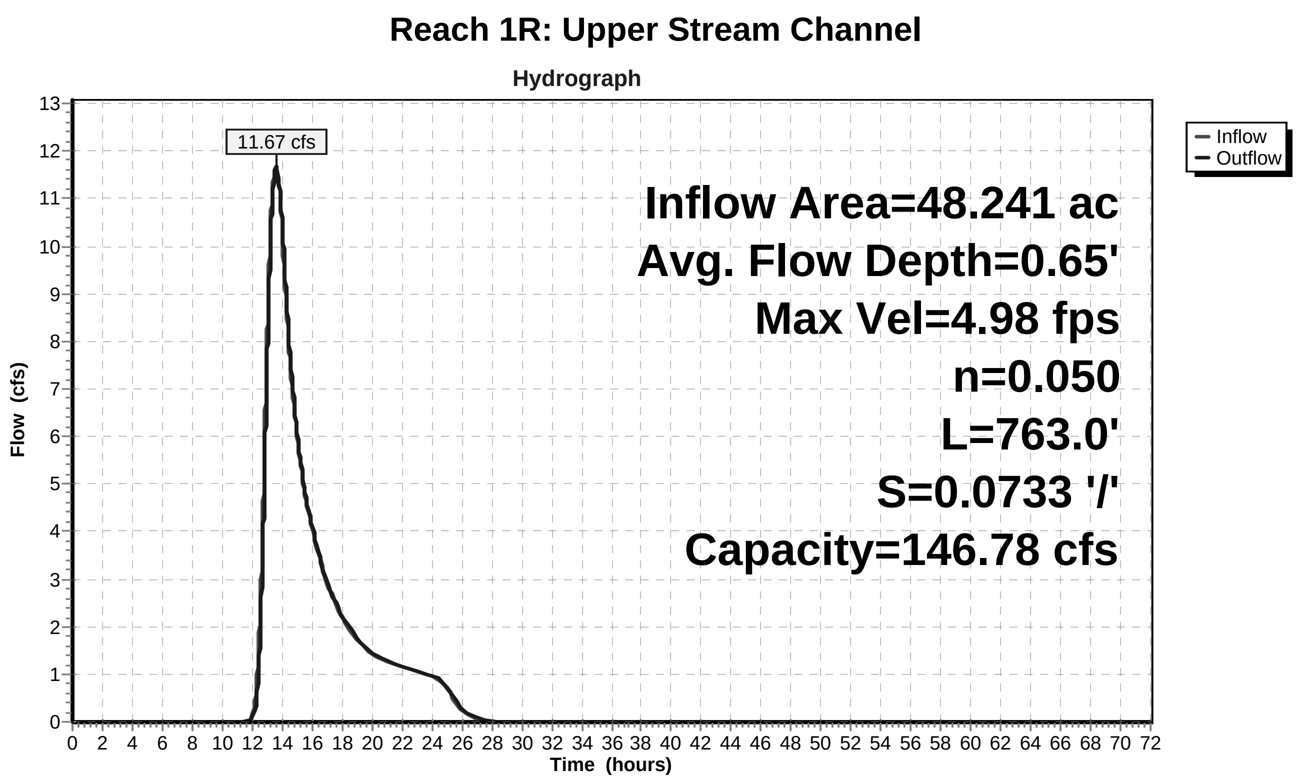
Inflow Area = 48.241 ac, 0.58% Impervious, Inflow Depth = 0.86" for 2-Year event
Inflow = 11.68 cfs @ 13.59 hrs, Volume= 3.470 af
Outflow = 11.67 cfs @ 13.60 hrs, Volume= 3.470 af, Atten= 0%, Lag= 0.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.98 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 2.29 fps, Avg. Travel Time= 5.6 min

Peak Storage= 1,788 cf @ 13.60 hrs
Average Depth at Peak Storage= 0.65'
Bank-Full Depth= 3.50' Flow Area= 14.7 sf, Capacity= 146.78 cfs

3.50' x 3.50' deep channel, n= 0.050 Earth, cobble bottom, clean sides
Side Slope Z-value= 0.2 '/' Top Width= 4.90'
Length= 763.0' Slope= 0.0733 '/'
Inlet Invert= 260.96', Outlet Invert= 205.00'





Summary for Reach DP1: Lower Stream Channel

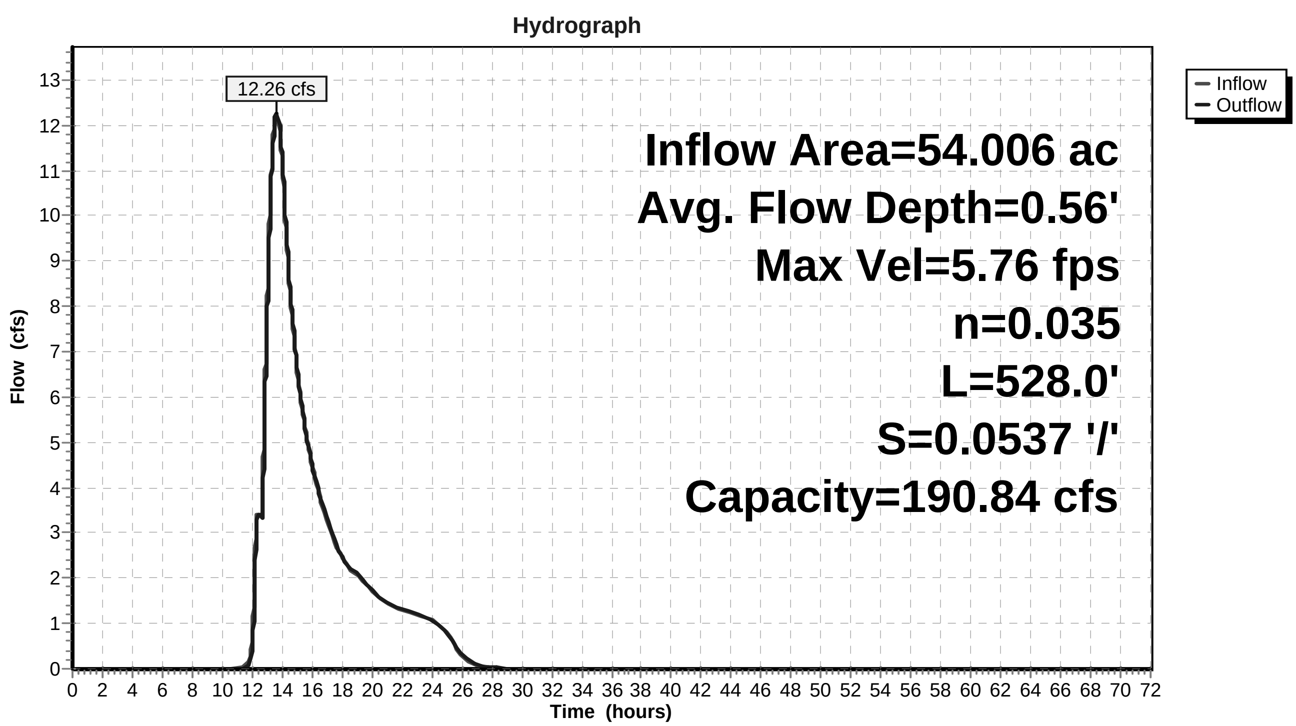
Inflow Area = 54.006 ac, 1.60% Impervious, Inflow Depth = 0.86" for 2-Year event
Inflow = 12.26 cfs @ 13.62 hrs, Volume= 3.883 af
Outflow = 12.26 cfs @ 13.64 hrs, Volume= 3.883 af, Atten= 0%, Lag= 0.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.76 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 2.53 fps, Avg. Travel Time= 3.5 min

Peak Storage= 1,124 cf @ 13.64 hrs
Average Depth at Peak Storage= 0.56'
Bank-Full Depth= 3.00' Flow Area= 15.0 sf, Capacity= 190.84 cfs

3.50' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 0.5 '/' Top Width= 6.50'
Length= 528.0' Slope= 0.0537 '/'
Inlet Invert= 187.50', Outlet Invert= 159.12'

Reach DP1: Lower Stream Channel

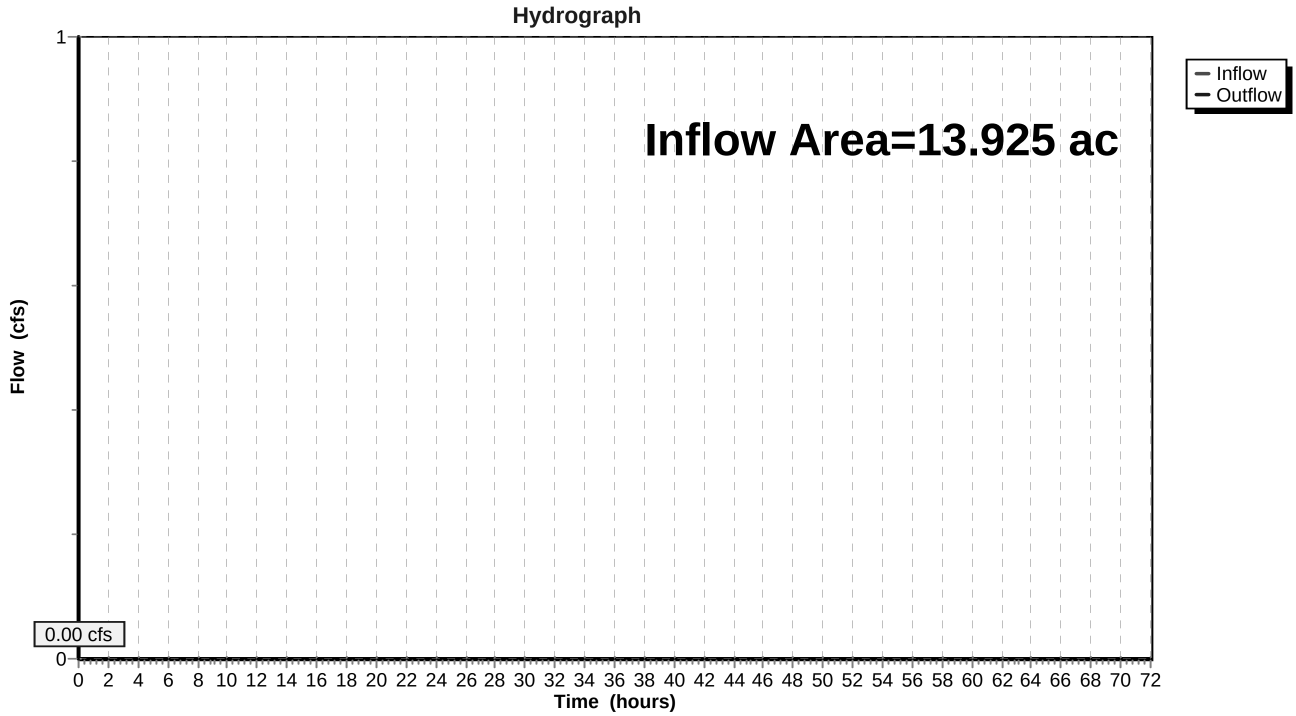


Summary for Reach DP2: Canton Ave - North

Inflow Area =	13.925 ac,	5.53% Impervious, Inflow Depth = 0.00"	for 2-Year event	
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	
Outflow =	0.00 cfs @	0.00 hrs, Volume=	0.000 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP2: Canton Ave - North

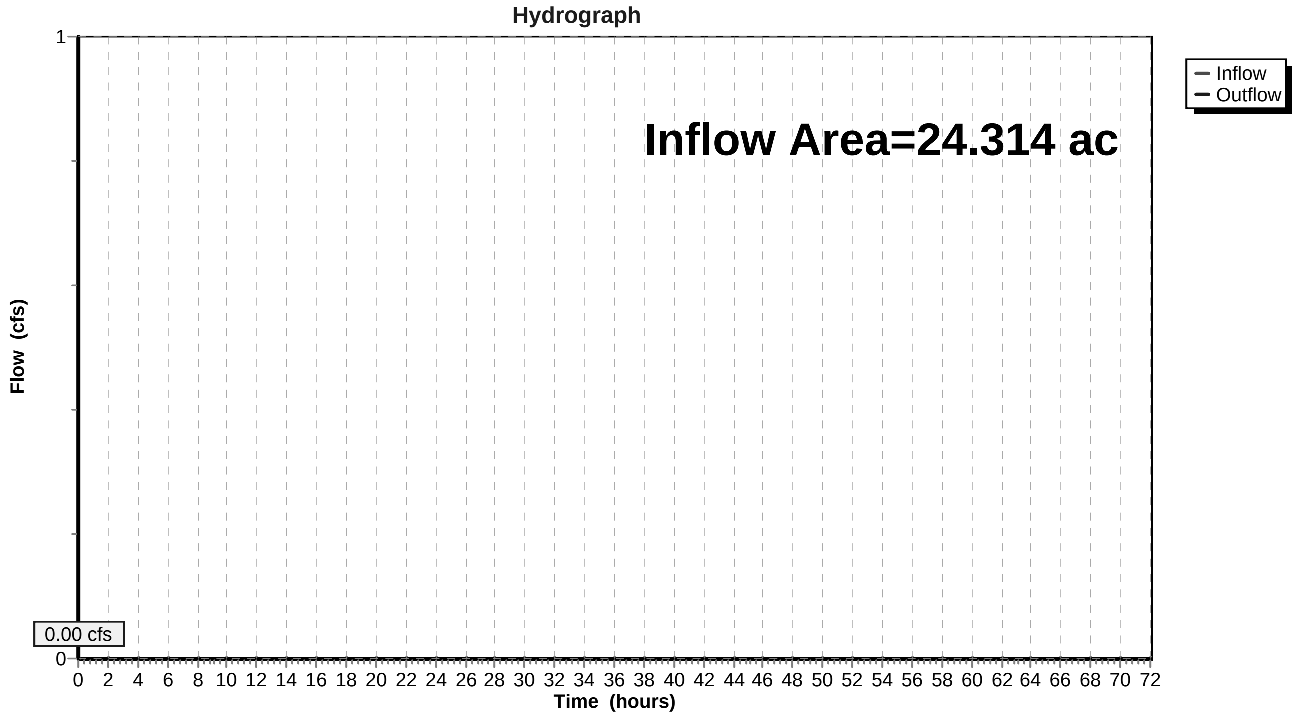


Summary for Reach DP3: Canton Ave - South

Inflow Area = 24.314 ac, 4.30% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP3: Canton Ave - South



Summary for Pond 1P: 30" Culvert

Inflow Area = 48.241 ac, 0.58% Impervious, Inflow Depth = 0.86" for 2-Year event
Inflow = 11.67 cfs @ 13.60 hrs, Volume= 3.470 af
Outflow = 11.67 cfs @ 13.61 hrs, Volume= 3.468 af, Atten= 0%, Lag= 0.5 min
Primary = 11.67 cfs @ 13.61 hrs, Volume= 3.468 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 201.81' @ 13.61 hrs Surf.Area= 439 sf Storage= 578 cf

Plug-Flow detention time= 1.8 min calculated for 3.468 af (100% of inflow)
Center-of-Mass det. time= 1.2 min (973.4 - 972.2)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	3,062 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

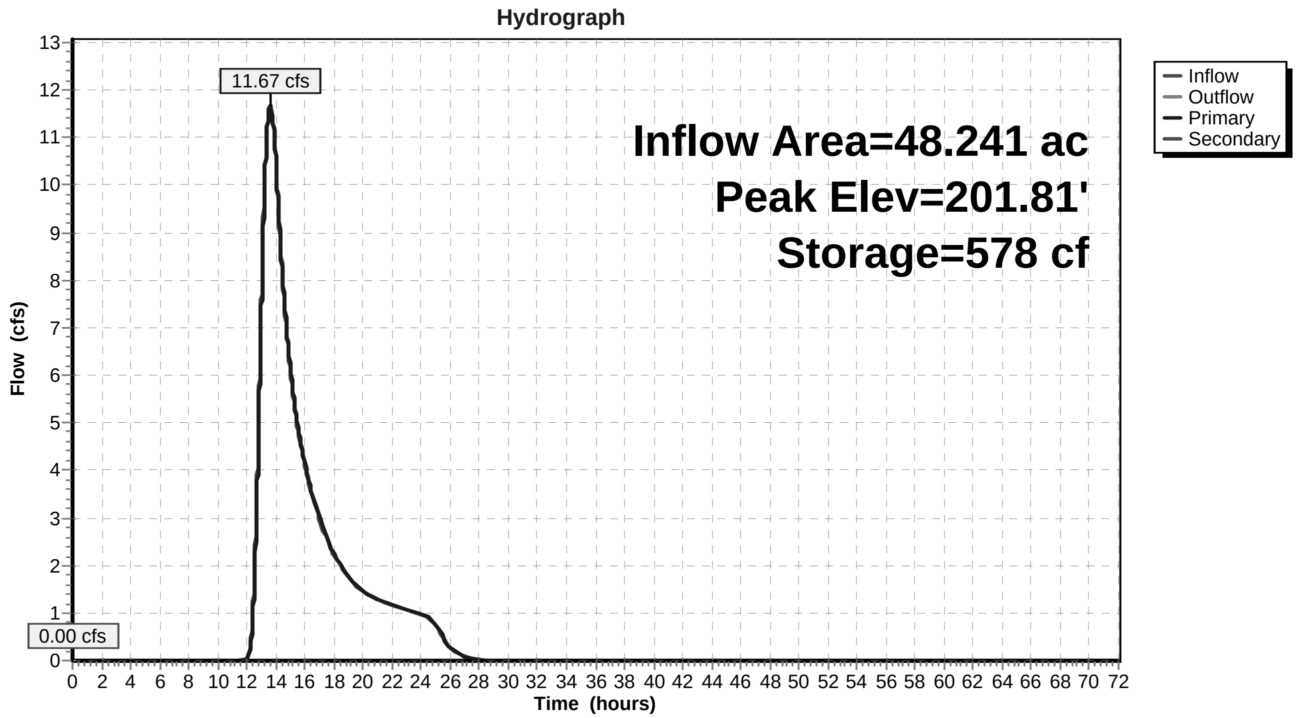
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
200.00	200	0	0
202.00	464	664	664
204.00	825	1,289	1,953
205.00	1,393	1,109	3,062

Device	Routing	Invert	Outlet Devices
#1	Primary	200.39'	**30.0" Round Culvert** L= 32.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 200.39' / 198.47' S= 0.0600 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 4.91 sf
#2	Secondary	202.20'	**10.0' long x 40.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=11.67 cfs @ 13.61 hrs HW=201.81' TW=190.88' (Dynamic Tailwater)
1=Culvert (Inlet Controls 11.67 cfs @ 4.06 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=200.00' TW=187.82' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: 30" Culvert



Summary for Pond 2P: Existing Pond Area

Inflow Area =	50.100 ac,	1.15% Impervious, Inflow Depth = 0.87" for 2-Year event		
Inflow =	11.88 cfs @	13.61 hrs,	Volume=	3.618 af
Outflow =	11.87 cfs @	13.63 hrs,	Volume=	3.618 af, Atten= 0%, Lag= 1.2 min
Primary =	11.87 cfs @	13.63 hrs,	Volume=	3.618 af
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 190.88' @ 13.63 hrs Surf.Area= 2,372 sf Storage= 2,754 cf

Plug-Flow detention time= 6.1 min calculated for 3.618 af (100% of inflow)
Center-of-Mass det. time= 6.1 min (975.6 - 969.5)

Volume	Invert	Avail.Storage	Storage Description
#1	187.82'	54,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

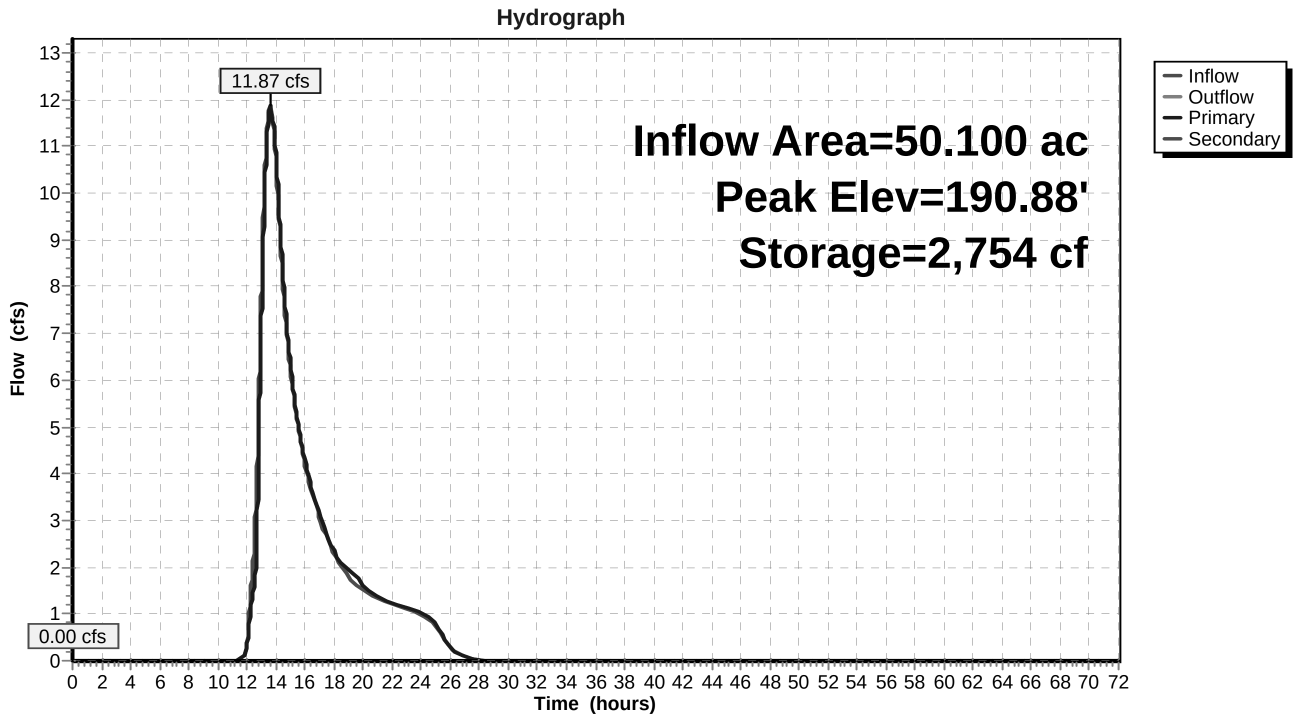
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.82	83	0	0
188.00	240	29	29
189.00	696	468	497
190.00	920	808	1,305
191.00	2,569	1,745	3,050
192.00	3,287	2,928	5,978
193.00	3,988	3,638	9,615
194.00	4,817	4,403	14,018
195.00	5,576	5,197	19,214
196.00	6,406	5,991	25,205
197.00	7,279	6,843	32,048
198.00	8,234	7,757	39,804
199.00	9,230	8,732	48,536
199.60	9,786	5,705	54,241

Device	Routing	Invert	Outlet Devices
#1	Primary	187.68'	**27.0" W x 42.0" H Box Culvert** L= 1.5' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.68' / 187.66' S= 0.0133 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.88 sf
#2	Device 1	187.71'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.75 2.50 2.50 3.50 Width (feet) 0.75 0.00 0.00 3.50 10.29
#3	Device 2	187.76'	**30.0" W x 48.0" H Box Culvert** L= 2.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.76' / 187.73' S= 0.0150 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 10.00 sf
#4	Secondary	197.90'	**18.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=11.87 cfs @ 13.63 hrs HW=190.88' TW=188.06' (Dynamic Tailwater)
└─**1=Culvert** (Passes 11.87 cfs of 29.98 cfs potential flow)
  └─**2=Custom Weir/Orifice** (Weir Controls 11.87 cfs @ 2.86 fps)
    └─**3=Culvert** (Passes 11.87 cfs of 32.25 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.82' TW=187.50' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Pond Area



Summary for Pond 3P: Existing Depression

Inflow Area = 13.925 ac, 5.53% Impervious, Inflow Depth = 0.11" for 2-Year event
Inflow = 0.53 cfs @ 12.53 hrs, Volume= 0.131 af
Outflow = 0.53 cfs @ 12.53 hrs, Volume= 0.131 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.53 cfs @ 12.53 hrs, Volume= 0.131 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 152.50' @ 12.53 hrs Surf.Area= 568 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (971.6 - 971.6)

Volume	Invert	Avail.Storage	Storage Description
#1	152.50'	20,003 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

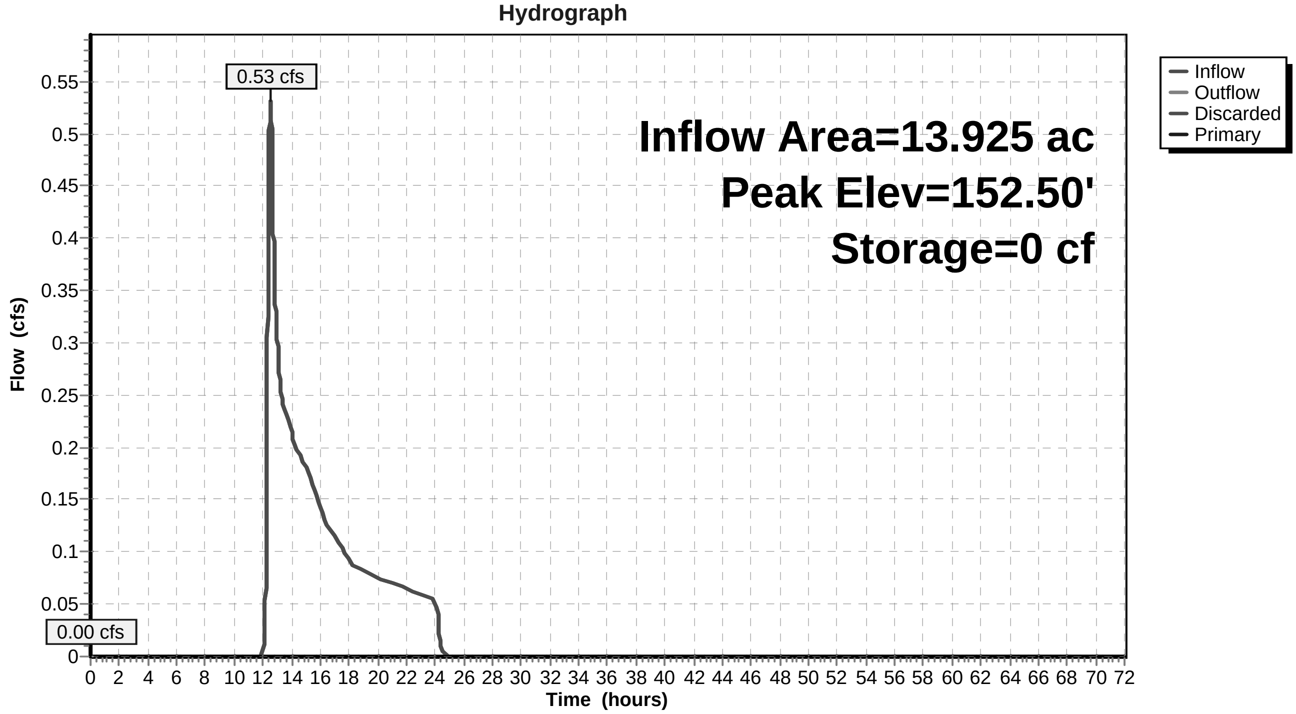
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
152.50	568	0	0
153.00	1,156	431	431
154.00	5,426	3,291	3,722
155.00	8,124	6,775	10,497
156.00	10,888	9,506	20,003

Device	Routing	Invert	Outlet Devices
#1	Discarded	152.50'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 146.20'
#2	Primary	155.50'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.79 cfs @ 12.53 hrs HW=152.50' (Free Discharge)
└─**1=Exfiltration** (Controls 0.79 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=152.50' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Existing Depression



Summary for Pond 4P: Existing Depression

Inflow Area =	7.405 ac,	3.48% Impervious,	Inflow Depth = 0.00"	for 2-Year event
Inflow =	0.00 cfs @	24.09 hrs, Volume=	0.001 af	
Outflow =	0.00 cfs @	24.09 hrs, Volume=	0.001 af,	Atten= 0%, Lag= 0.0 min
Discarded =	0.00 cfs @	24.09 hrs, Volume=	0.001 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.60' @ 0.00 hrs Surf.Area= 221 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,388.2 - 1,388.2)

Volume	Invert	Avail.Storage	Storage Description
#1	156.60'	2,689 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

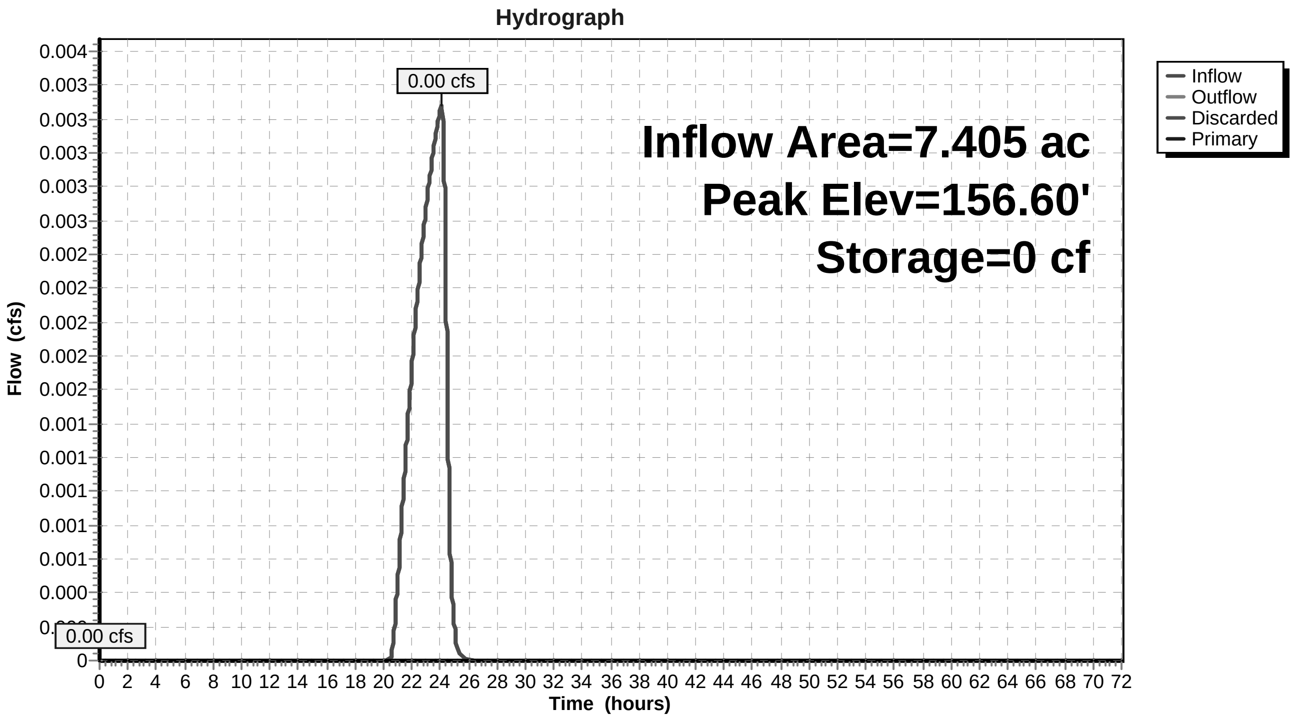
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
156.60	221	0	0
157.00	737	192	192
158.00	4,257	2,497	2,689

Device	Routing	Invert	Outlet Devices
#1	Discarded	156.60'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 150.20'
#2	Primary	157.44'	**30.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=0.00 cfs @ 24.09 hrs HW=156.60' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 0.31 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.60' TW=152.50' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: Existing Depression



Summary for Pond 5P: Existing Depression

Inflow Area =	24.314 ac,	4.30% Impervious,	Inflow Depth = 0.40"	for 2-Year event
Inflow =	2.85 cfs @	13.03 hrs, Volume=	0.804 af	
Outflow =	2.85 cfs @	13.05 hrs, Volume=	0.804 af,	Atten= 0%, Lag= 1.3 min
Discarded =	2.85 cfs @	13.05 hrs, Volume=	0.804 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 196.98' @ 13.05 hrs Surf.Area= 2,038 sf Storage= 92 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (973.2 - 973.0)

Volume	Invert	Avail.Storage	Storage Description
#1	196.90'	57,265 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

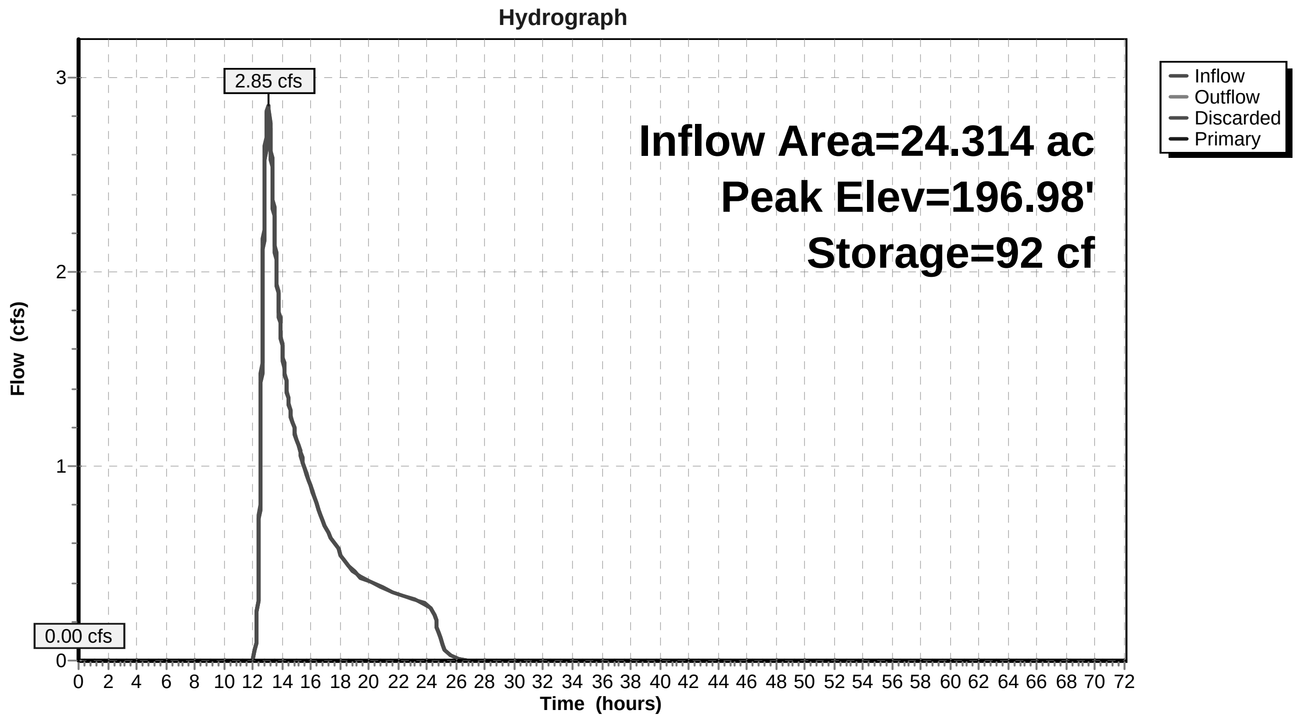
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
196.90	300	0	0
197.00	2,503	140	140
197.10	5,906	420	561
198.00	10,612	7,433	7,994
198.60	17,987	8,580	16,573
199.00	26,504	8,898	25,472
200.00	37,083	31,794	57,265

Device	Routing	Invert	Outlet Devices
#1	Discarded	196.90'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 192.20'
#2	Primary	198.75'	**28.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=2.85 cfs @ 13.05 hrs HW=196.98' (Free Discharge)
└─**1=Exfiltration** (Controls 2.85 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=196.90' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Existing Depression



Summary for Pond 11P: Carberry Ln Culvert

Inflow Area =	54.006 ac,	1.60% Impervious, Inflow Depth = 0.86"	for 2-Year event
Inflow =	12.26 cfs @	13.64 hrs, Volume=	3.883 af
Outflow =	12.26 cfs @	13.64 hrs, Volume=	3.883 af, Atten= 0%, Lag= 0.3 min
Primary =	12.26 cfs @	13.64 hrs, Volume=	3.883 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 160.54' @ 13.64 hrs Surf.Area= 236 sf Storage= 268 cf

Plug-Flow detention time= 0.6 min calculated for 3.882 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (972.7 - 972.1)

Volume	Invert	Avail.Storage	Storage Description
#1	159.12'	13,507 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

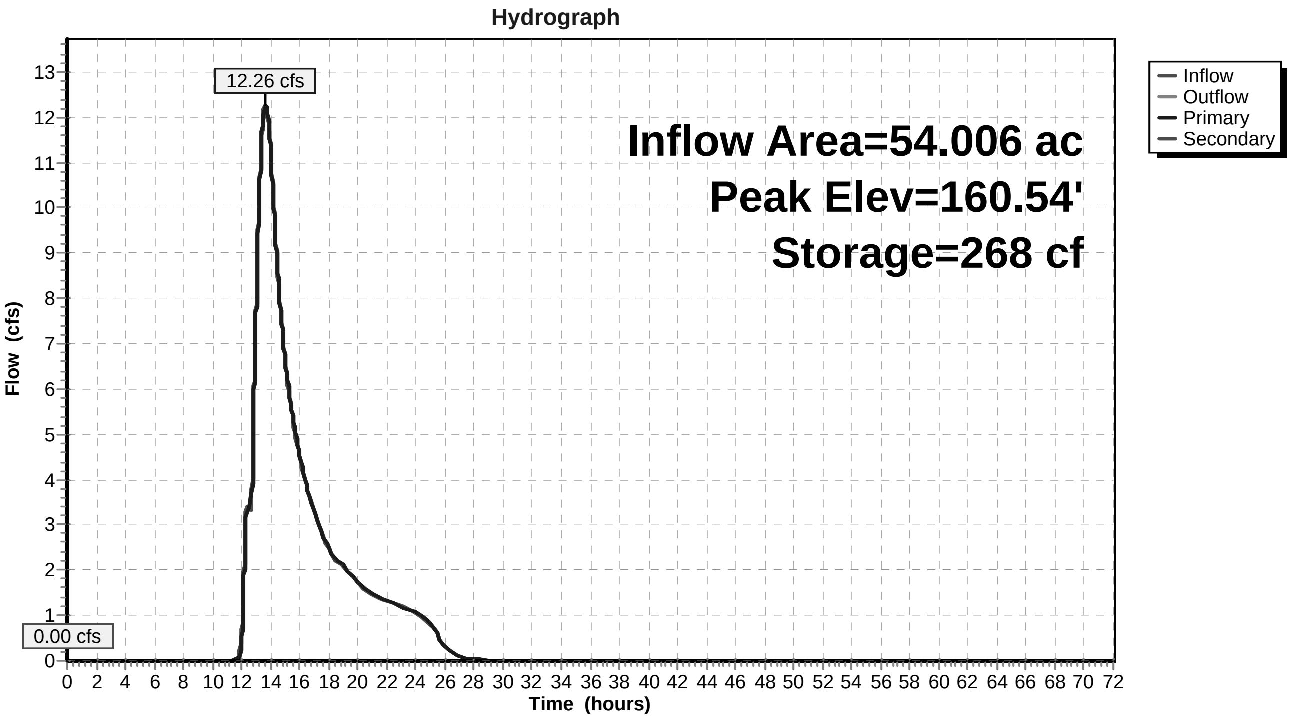
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
159.12	143	0	0
160.00	200	151	151
161.00	267	234	384
162.00	486	377	761
163.00	786	636	1,397
164.00	1,226	1,006	2,403
165.00	2,948	2,087	4,490
166.00	7,080	5,014	9,504
166.50	8,934	4,004	13,507

Device	Routing	Invert	Outlet Devices
#1	Primary	159.12'	**36.0" Round Culvert** L= 106.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.12' / 158.28' S= 0.0079 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf
#2	Secondary	165.25'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=12.26 cfs @ 13.64 hrs HW=160.54' (Free Discharge)
└─**1=Culvert** (Barrel Controls 12.26 cfs @ 5.47 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=159.12' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 11P: Carberry Ln Culvert



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Upper Watershed To Runoff Area=2,101,390 sf 0.58% Impervious Runoff Depth=1.98"
Flow Length=2,544' Tc=107.3 min CN=70 Runoff=29.37 cfs 7.949 af

Subcatchment 2S: Wetland Area Runoff Area=80,947 sf 16.02% Impervious Runoff Depth=2.14"
Flow Length=590' Tc=18.6 min UI Adjusted CN=72 Runoff=3.19 cfs 0.331 af

Subcatchment 3S: Lower Stream Channel Runoff Area=170,176 sf 7.39% Impervious Runoff Depth=1.90"
Flow Length=813' Tc=20.5 min UI Adjusted CN=69 Runoff=5.63 cfs 0.618 af

Subcatchment 4S: To Canton Ave Runoff Area=284,027 sf 7.86% Impervious Runoff Depth=0.88"
Flow Length=1,402' Tc=18.4 min CN=54 Runoff=3.56 cfs 0.479 af

Subcatchment 5S: To Canton Ave Runoff Area=322,558 sf 3.48% Impervious Runoff Depth=0.18"
Flow Length=1,163' Tc=34.8 min CN=39 Runoff=0.19 cfs 0.114 af

Subcatchment 6S: To Canton Ave Runoff Area=1,059,136 sf 4.30% Impervious Runoff Depth=1.19"
Flow Length=2,255' Tc=59.2 min CN=59 Runoff=11.69 cfs 2.410 af

Reach 1R: Upper Stream Channel Avg. Flow Depth=1.18' Max Vel=6.63 fps Inflow=29.37 cfs 7.949 af
n=0.050 L=763.0' S=0.0733 '/' Capacity=146.78 cfs Outflow=29.31 cfs 7.949 af

Reach DP1: Lower Stream Channel Avg. Flow Depth=0.99' Max Vel=7.71 fps Inflow=30.50 cfs 8.896 af
n=0.035 L=528.0' S=0.0537 '/' Capacity=190.84 cfs Outflow=30.50 cfs 8.896 af

Reach DP2: Canton Ave - North Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP3: Canton Ave - South Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 1P: 30" Culvert Peak Elev=202.58' Storage=964 cf Inflow=29.31 cfs 7.949 af
Primary=22.98 cfs 7.461 af Secondary=6.33 cfs 0.485 af Outflow=29.31 cfs 7.947 af

Pond 2P: Existing Pond Area Peak Elev=191.47' Storage=4,336 cf Inflow=29.74 cfs 8.277 af
Primary=29.67 cfs 8.277 af Secondary=0.00 cfs 0.000 af Outflow=29.67 cfs 8.277 af

Pond 3P: Existing Depression Peak Elev=153.25' Storage=862 cf Inflow=3.56 cfs 0.479 af
Discarded=3.29 cfs 0.479 af Primary=0.00 cfs 0.000 af Outflow=3.29 cfs 0.479 af

Pond 4P: Existing Depression Peak Elev=156.60' Storage=0 cf Inflow=0.19 cfs 0.114 af
Discarded=0.19 cfs 0.114 af Primary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.114 af

Pond 5P: Existing Depression Peak Elev=197.39' Storage=2,458 cf Inflow=11.69 cfs 2.410 af
Discarded=10.95 cfs 2.410 af Primary=0.00 cfs 0.000 af Outflow=10.95 cfs 2.410 af

Pond 11P: Carberry Ln Culvert Peak Elev=161.60' Storage=586 cf Inflow=30.50 cfs 8.896 af
Primary=30.50 cfs 8.896 af Secondary=0.00 cfs 0.000 af Outflow=30.50 cfs 8.896 af

Total Runoff Area = 92.246 ac Runoff Volume = 11.900 af Average Runoff Depth = 1.55"
97.10% Pervious = 89.566 ac 2.90% Impervious = 2.680 ac

Summary for Subcatchment 1S: Upper Watershed To Stream

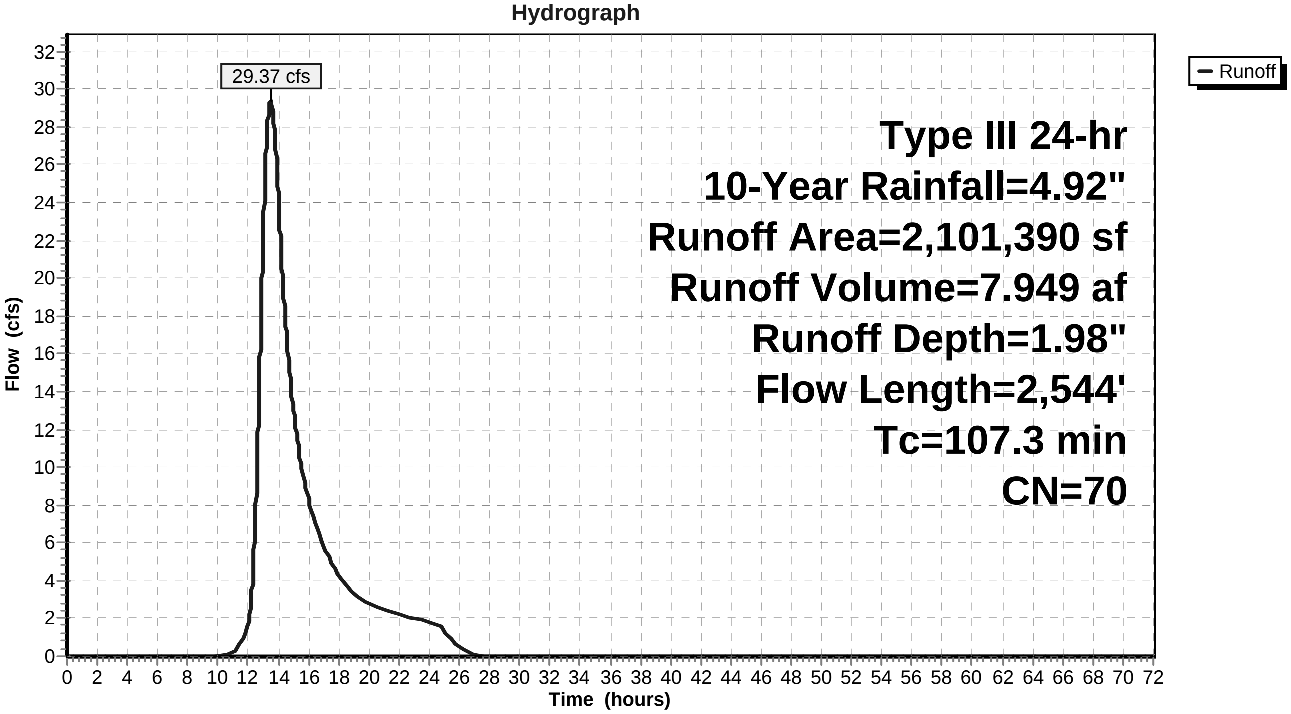
Runoff = 29.37 cfs @ 13.47 hrs, Volume= 7.949 af, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

	Area (sf)	CN	Description
	153,412	30	Woods, Good, HSG A
	3,806	61	>75% Grass cover, Good, HSG B
	3,318	98	Roofs, HSG C
	1,085,438	70	Woods, Good, HSG C
	243,725	74	>75% Grass cover, Good, HSG C
	2,997	98	Paved parking, HSG D
	5,784	98	Roofs, HSG D
	482,716	77	Woods, Good, HSG D
	113,252	80	>75% Grass cover, Good, HSG D
*	6,942	83	Wetland Stream Channel
	2,101,390	70	Weighted Average
	2,089,291		99.42% Pervious Area
	12,099		0.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0080	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
23.4	554	0.0250	0.40		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
10.9	116	0.0050	0.18		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
16.5	813	0.1080	0.82		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
16.7	306	0.0150	0.31		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
22.2	705	0.0450	0.53		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
107.3	2,544	Total			

Subcatchment 1S: Upper Watershed To Stream



Summary for Subcatchment 2S: Wetland Area

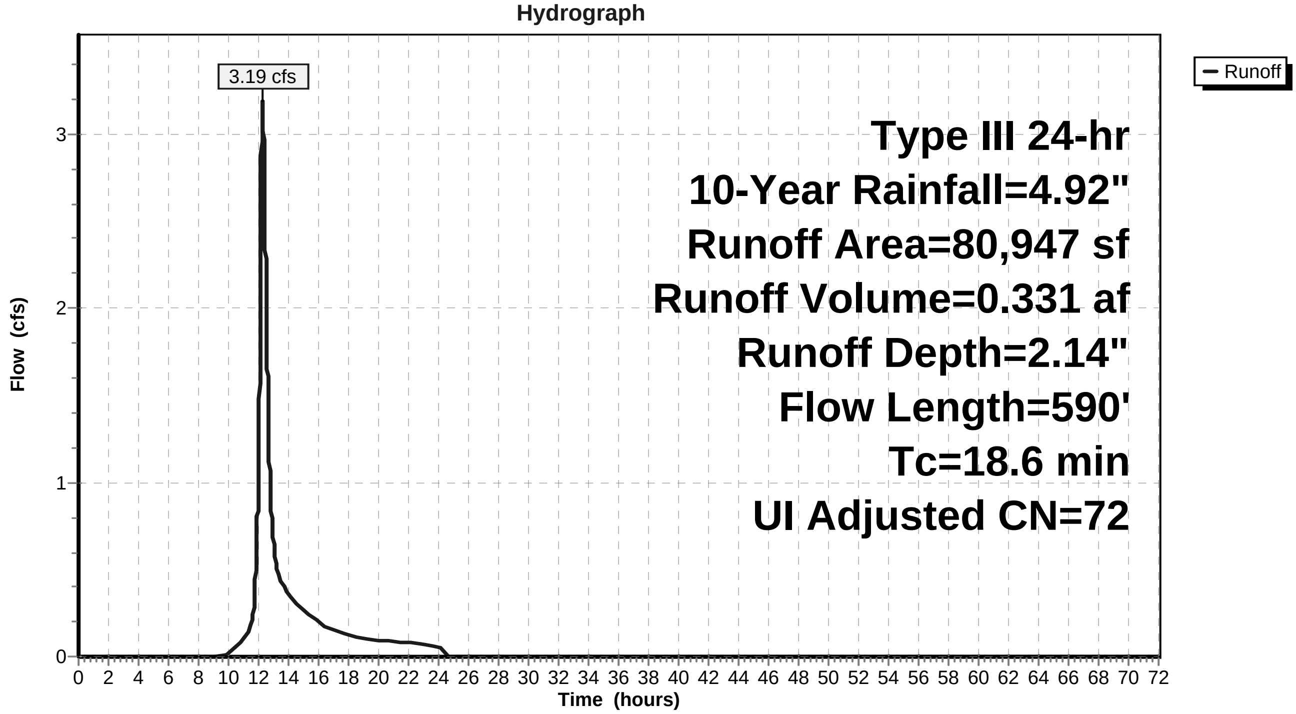
Runoff = 3.19 cfs @ 12.26 hrs, Volume= 0.331 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

	Area (sf)	CN	Adj	Description
*	3,336	83		Wetland Stream Channel
	19,048	55		Woods, Good, HSG B
	3,460	98		Unconnected pavement, HSG B
	6,652	98		Unconnected pavement, HSG C
	2,858	98		Roofs, HSG C
	16,068	74		>75% Grass cover, Good, HSG C
	19,248	70		Woods, Good, HSG C
	5,331	80		>75% Grass cover, Good, HSG D
	4,946	77		Woods, Good, HSG D
	80,947	73	72	Weighted Average, UI Adjusted
	67,977			83.98% Pervious Area
	12,970			16.02% Impervious Area
	10,112			77.96% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0350	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
7.9	271	0.0520	0.57		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.5	150	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	119	0.0920	4.55		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.6	590	Total			

Subcatchment 2S: Wetland Area



Summary for Subcatchment 3S: Lower Stream Channel

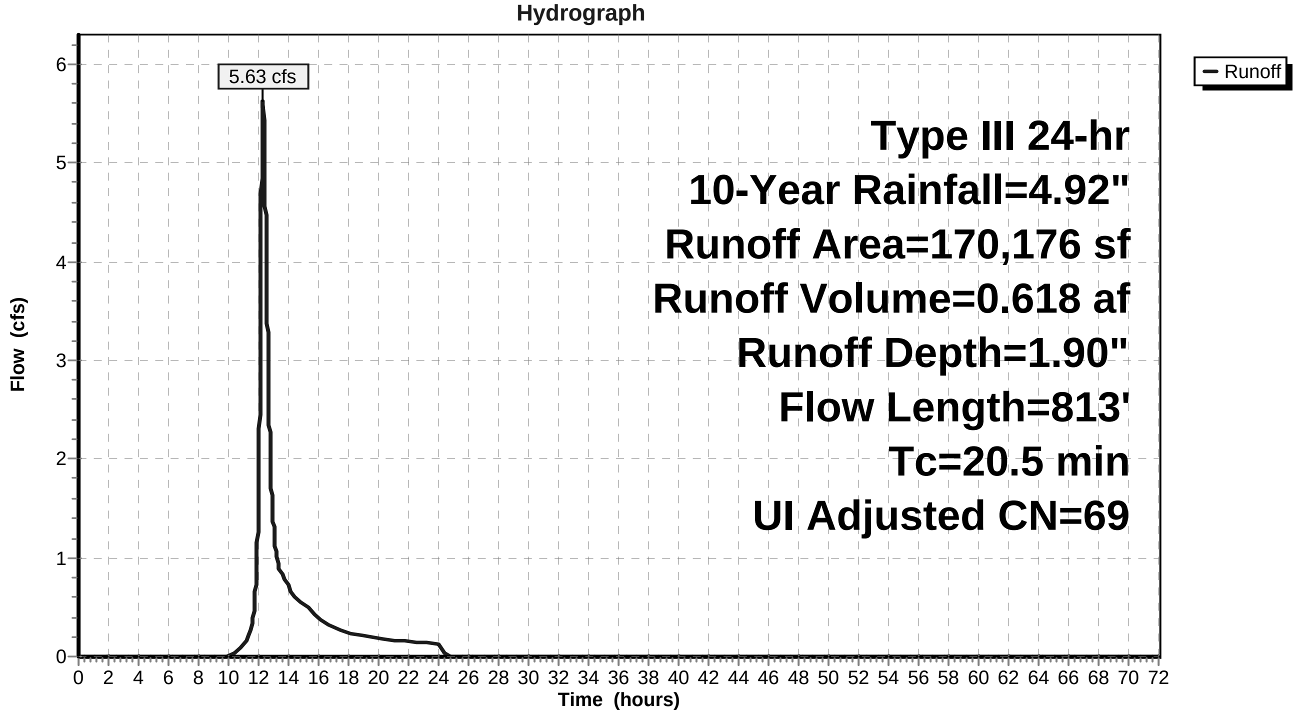
Runoff = 5.63 cfs @ 12.30 hrs, Volume= 0.618 af, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

	Area (sf)	CN	Adj	Description
	27,020	55		Woods, Good, HSG B
	12,576	98		Unconnected roofs, HSG C
	18,196	74		>75% Grass cover, Good, HSG C
	109,957	70		Woods, Good, HSG C
*	2,427	83		Wetland Stream Channel
	170,176	70	69	Weighted Average, UI Adjusted
	157,600			92.61% Pervious Area
	12,576			7.39% Impervious Area
	12,576			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
11.7	580	0.1100	0.83		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.1	33	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	65	0.1400	0.94		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.7	62	0.0050	1.44		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	23	0.1300	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
20.5	813	Total			

Subcatchment 3S: Lower Stream Channel



Summary for Subcatchment 4S: To Canton Ave

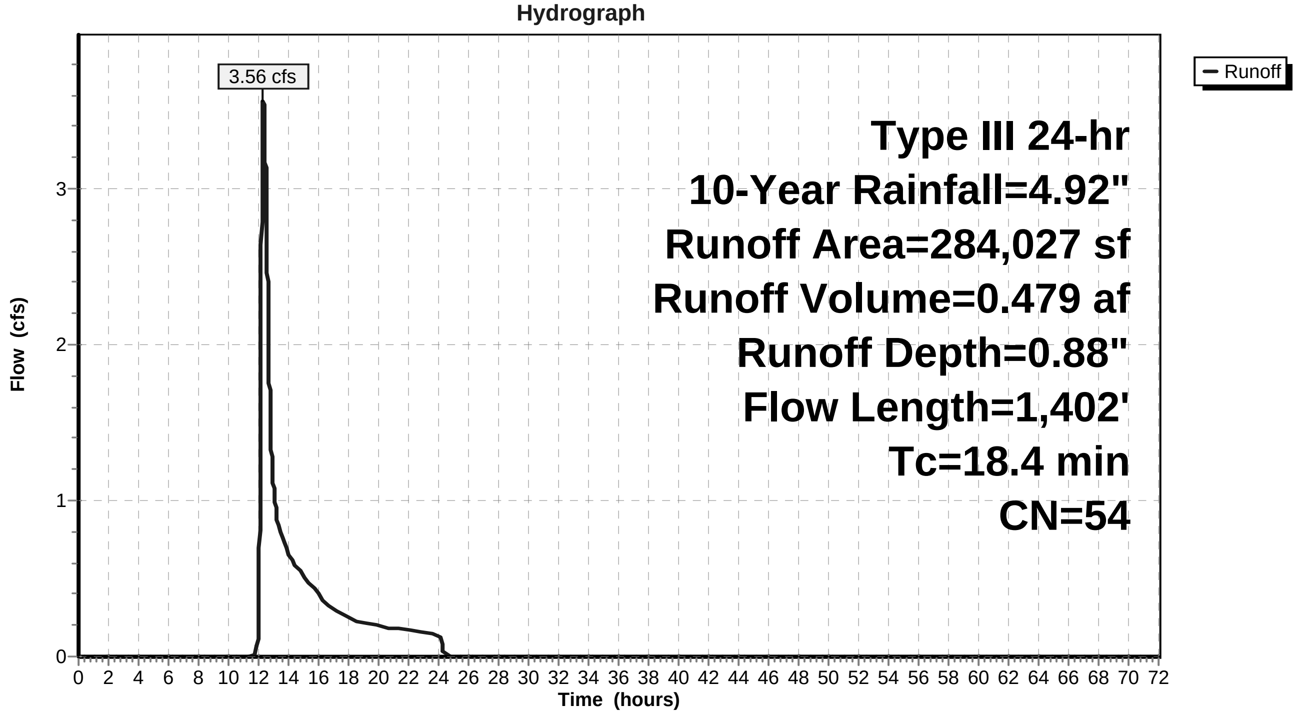
Runoff = 3.56 cfs @ 12.32 hrs, Volume= 0.479 af, Depth= 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
11,177	98	Paved parking, HSG A
2,353	98	Roofs, HSG A
53,901	30	Woods, Good, HSG A
113,021	39	>75% Grass cover, Good, HSG A
9,397	55	Woods, Good, HSG B
6,856	98	Paved parking, HSG D
1,931	98	Roofs, HSG D
47,201	77	Woods, Good, HSG D
38,190	80	>75% Grass cover, Good, HSG D
284,027	54	Weighted Average
261,710		92.14% Pervious Area
22,317		7.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.6	69	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
12.4	536	0.0830	0.72		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.7	165	0.0330	3.69		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	542	0.0870	5.99		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.4	1,402	Total			

Subcatchment 4S: To Canton Ave



Summary for Subcatchment 5S: To Canton Ave

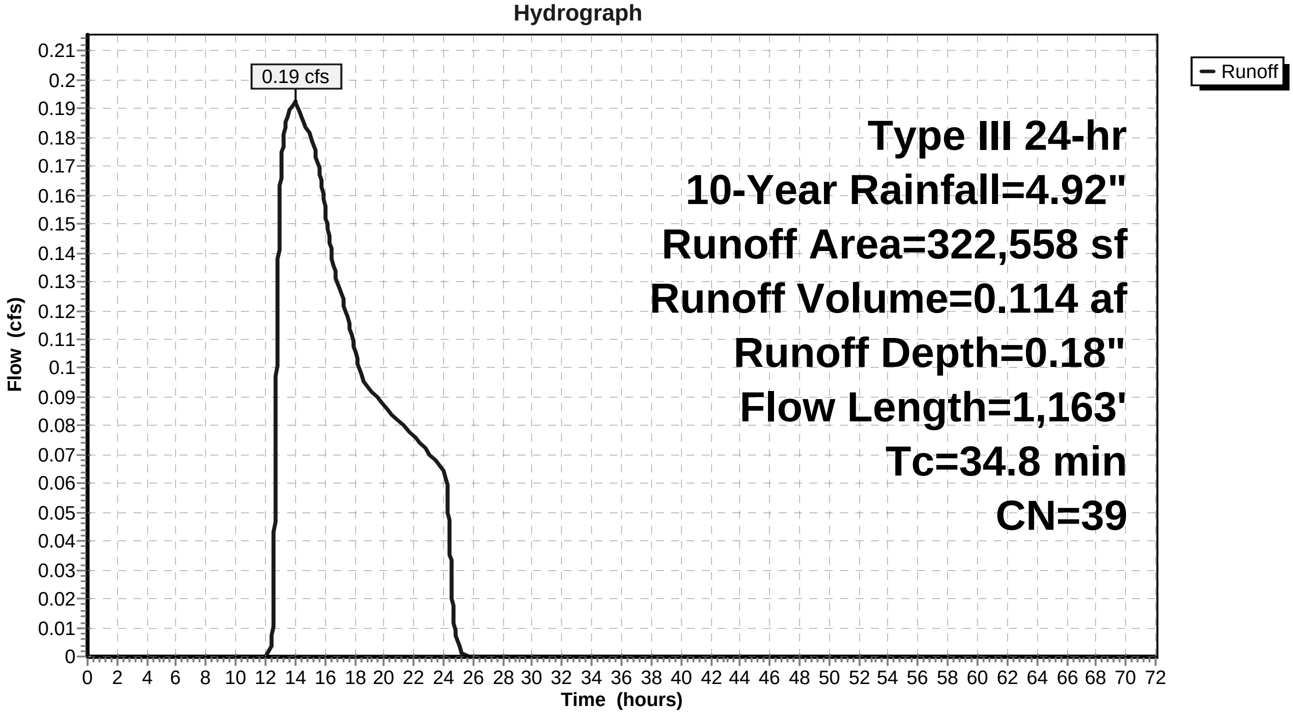
Runoff = 0.19 cfs @ 13.96 hrs, Volume= 0.114 af, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
8,127	98	Paved parking, HSG A
3,083	98	Roofs, HSG A
84,050	30	Woods, Good, HSG A
227,298	39	>75% Grass cover, Good, HSG A
322,558	39	Weighted Average
311,348		96.52% Pervious Area
11,210		3.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.26"
4.7	391	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.5	375	0.0400	0.50		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
7.1	75	0.0050	0.18		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.4	272	0.0750	1.92		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
34.8	1,163	Total			

Subcatchment 5S: To Canton Ave



Summary for Subcatchment 6S: To Canton Ave

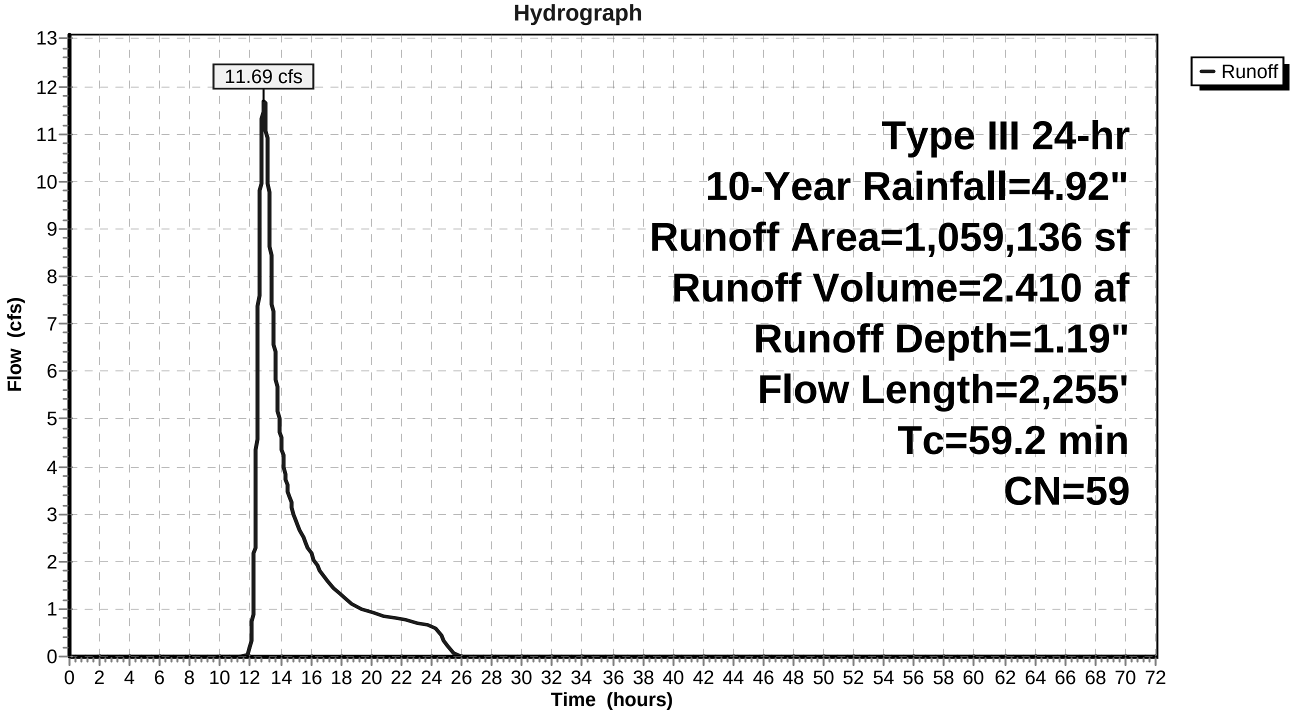
Runoff = 11.69 cfs @ 12.89 hrs, Volume= 2.410 af, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
8,943	98	Paved parking, HSG A
2,439	98	Roofs, HSG A
148,740	30	Woods, Good, HSG A
118,657	39	>75% Grass cover, Good, HSG A
219,044	55	Woods, Good, HSG B
26,267	98	Paved parking, HSG C
7,901	98	Roofs, HSG C
515,893	70	Woods, Good, HSG C
11,252	74	>75% Grass cover, Good, HSG C
1,059,136	59	Weighted Average
1,013,586		95.70% Pervious Area
45,550		4.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
29.2	1,300	0.0880	0.74		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.3	70	0.0360	3.85		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
21.8	835	0.0650	0.64		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
59.2	2,255	Total			

Subcatchment 6S: To Canton Ave



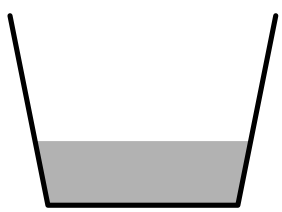
Summary for Reach 1R: Upper Stream Channel

Inflow Area = 48.241 ac, 0.58% Impervious, Inflow Depth = 1.98" for 10-Year event
Inflow = 29.37 cfs @ 13.47 hrs, Volume= 7.949 af
Outflow = 29.31 cfs @ 13.50 hrs, Volume= 7.949 af, Atten= 0%, Lag= 1.3 min

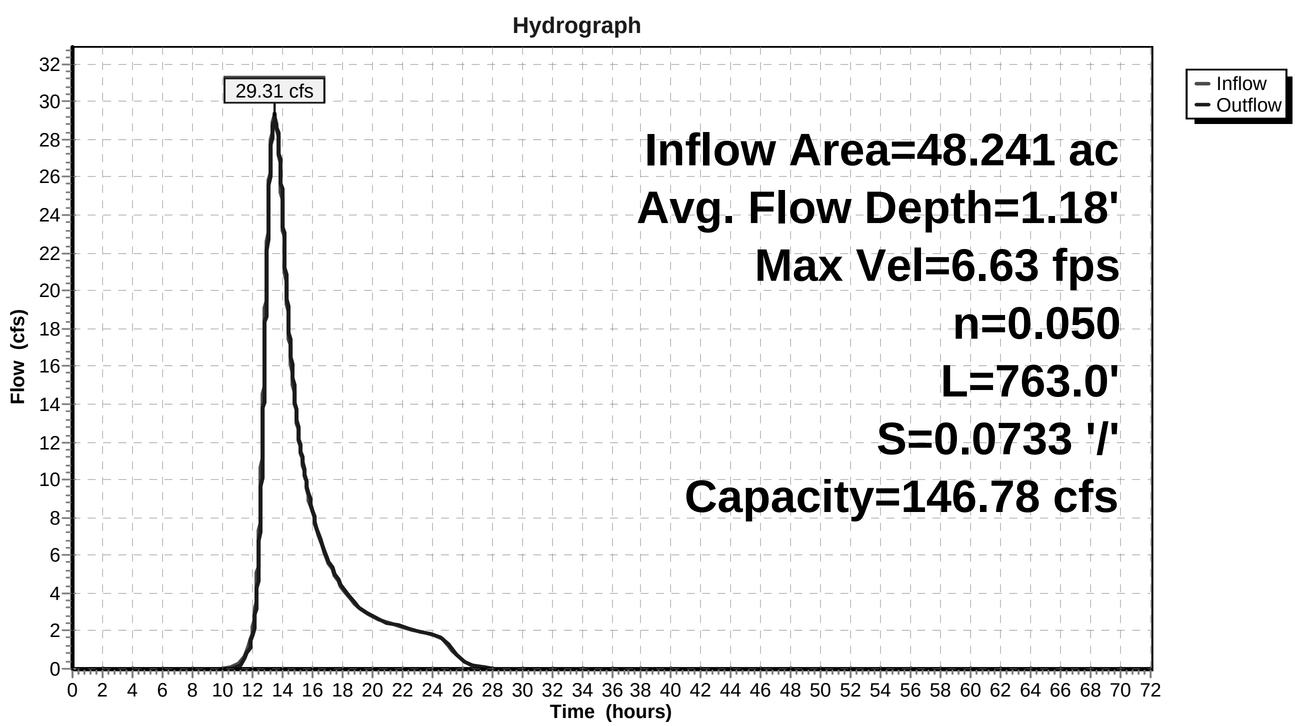
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.63 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 2.82 fps, Avg. Travel Time= 4.5 min

Peak Storage= 3,373 cf @ 13.50 hrs
Average Depth at Peak Storage= 1.18'
Bank-Full Depth= 3.50' Flow Area= 14.7 sf, Capacity= 146.78 cfs

3.50' x 3.50' deep channel, n= 0.050 Earth, cobble bottom, clean sides
Side Slope Z-value= 0.2 '/' Top Width= 4.90'
Length= 763.0' Slope= 0.0733 '/'
Inlet Invert= 260.96', Outlet Invert= 205.00'



Reach 1R: Upper Stream Channel



Summary for Reach DP1: Lower Stream Channel

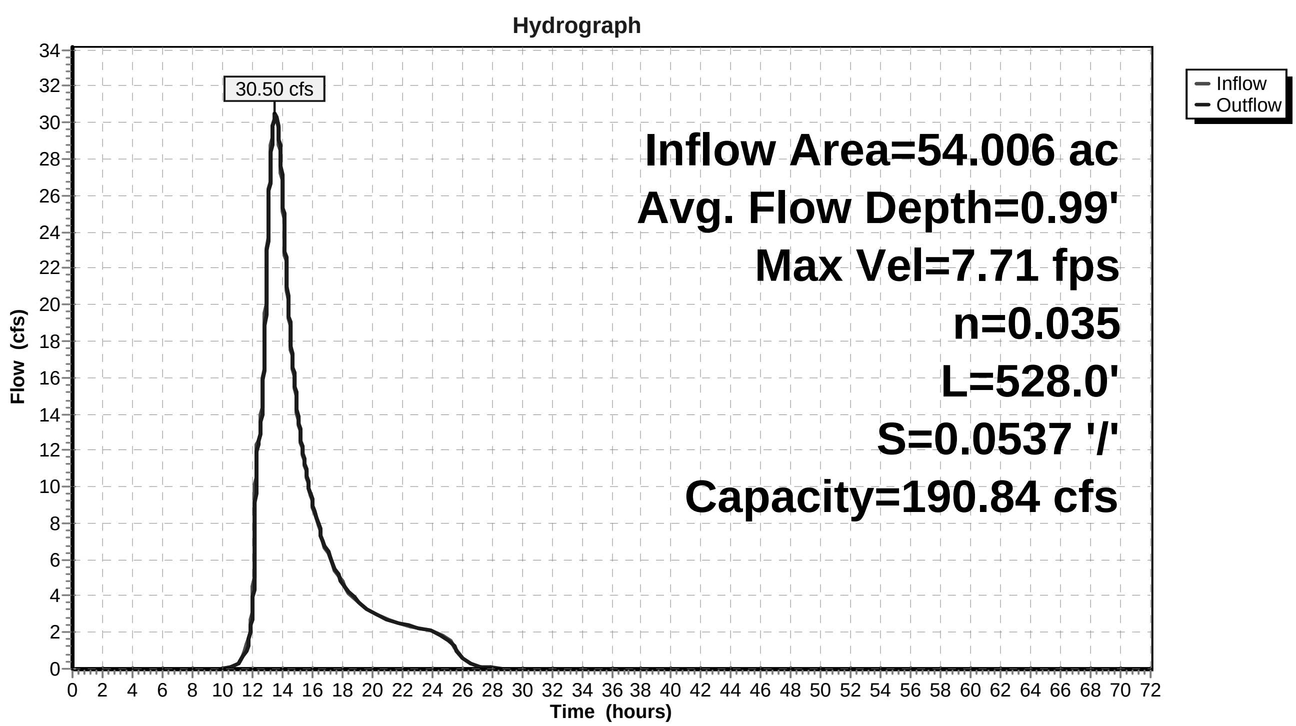
Inflow Area = 54.006 ac, 1.60% Impervious, Inflow Depth = 1.98" for 10-Year event
Inflow = 30.50 cfs @ 13.53 hrs, Volume= 8.896 af
Outflow = 30.50 cfs @ 13.55 hrs, Volume= 8.896 af, Atten= 0%, Lag= 0.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.71 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 3.11 fps, Avg. Travel Time= 2.8 min

Peak Storage= 2,090 cf @ 13.55 hrs
Average Depth at Peak Storage= 0.99'
Bank-Full Depth= 3.00' Flow Area= 15.0 sf, Capacity= 190.84 cfs

3.50' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 0.5 '/' Top Width= 6.50'
Length= 528.0' Slope= 0.0537 '/'
Inlet Invert= 187.50', Outlet Invert= 159.12'

Reach DP1: Lower Stream Channel

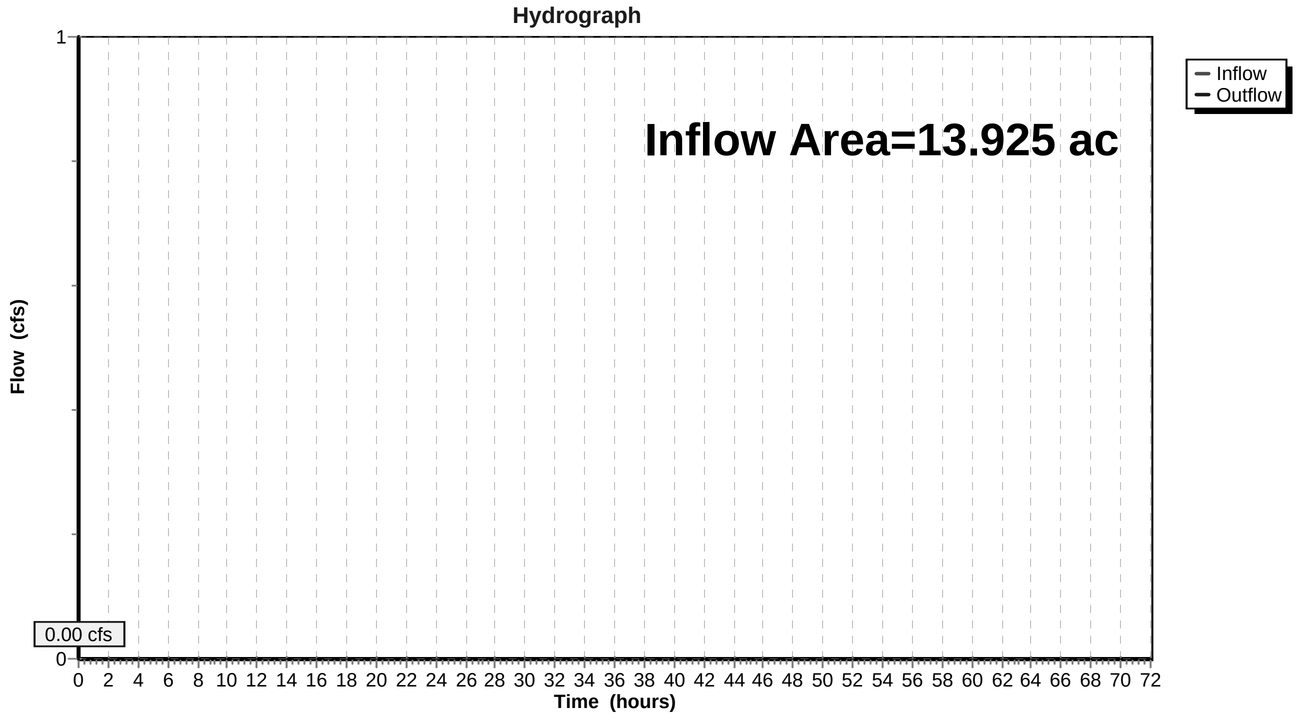


Summary for Reach DP2: Canton Ave - North

Inflow Area = 13.925 ac, 5.53% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP2: Canton Ave - North

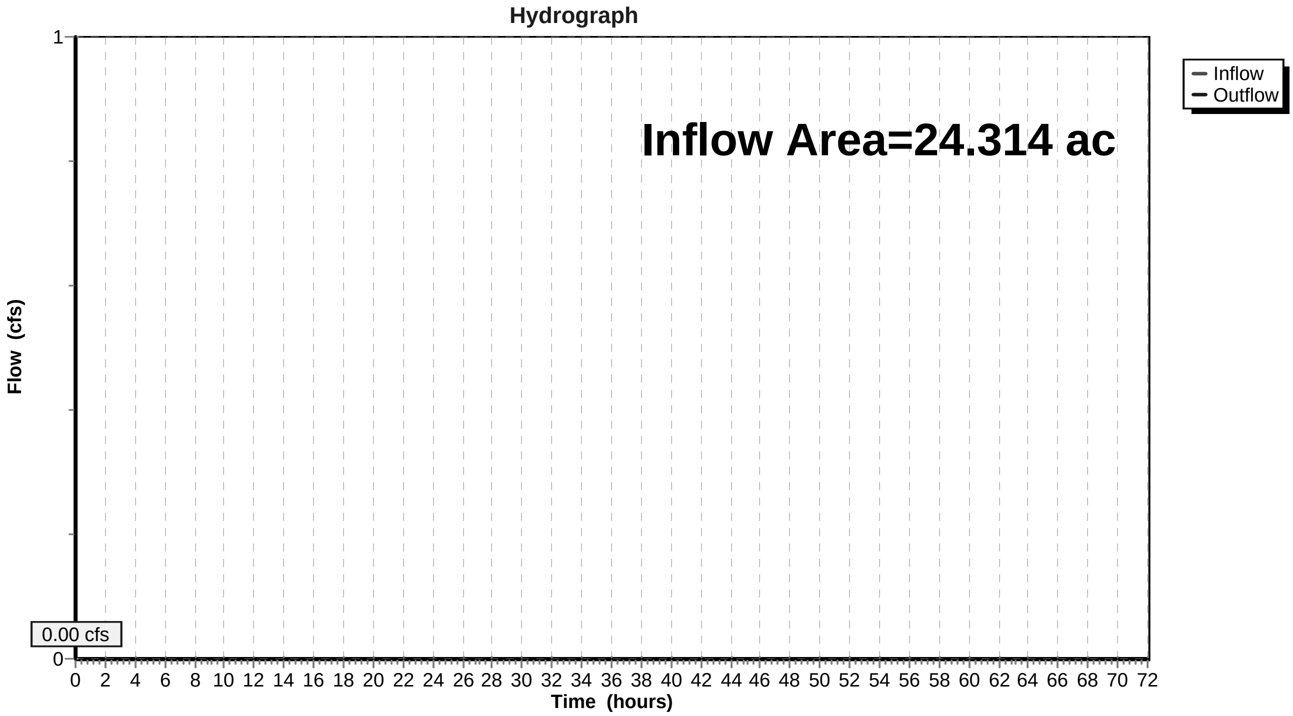


Summary for Reach DP3: Canton Ave - South

Inflow Area =	24.314 ac,	4.30% Impervious, Inflow Depth = 0.00"	for 10-Year event	
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	
Outflow =	0.00 cfs @	0.00 hrs, Volume=	0.000 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP3: Canton Ave - South



Summary for Pond 1P: 30" Culvert

Inflow Area = 48.241 ac, 0.58% Impervious, Inflow Depth = 1.98" for 10-Year event
Inflow = 29.31 cfs @ 13.50 hrs, Volume= 7.949 af
Outflow = 29.31 cfs @ 13.50 hrs, Volume= 7.947 af, Atten= 0%, Lag= 0.3 min
Primary = 22.98 cfs @ 13.50 hrs, Volume= 7.461 af
Secondary = 6.33 cfs @ 13.50 hrs, Volume= 0.485 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 202.58' @ 13.50 hrs Surf.Area= 569 sf Storage= 964 cf

Plug-Flow detention time= 1.0 min calculated for 7.945 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (946.3 - 945.5)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	3,062 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

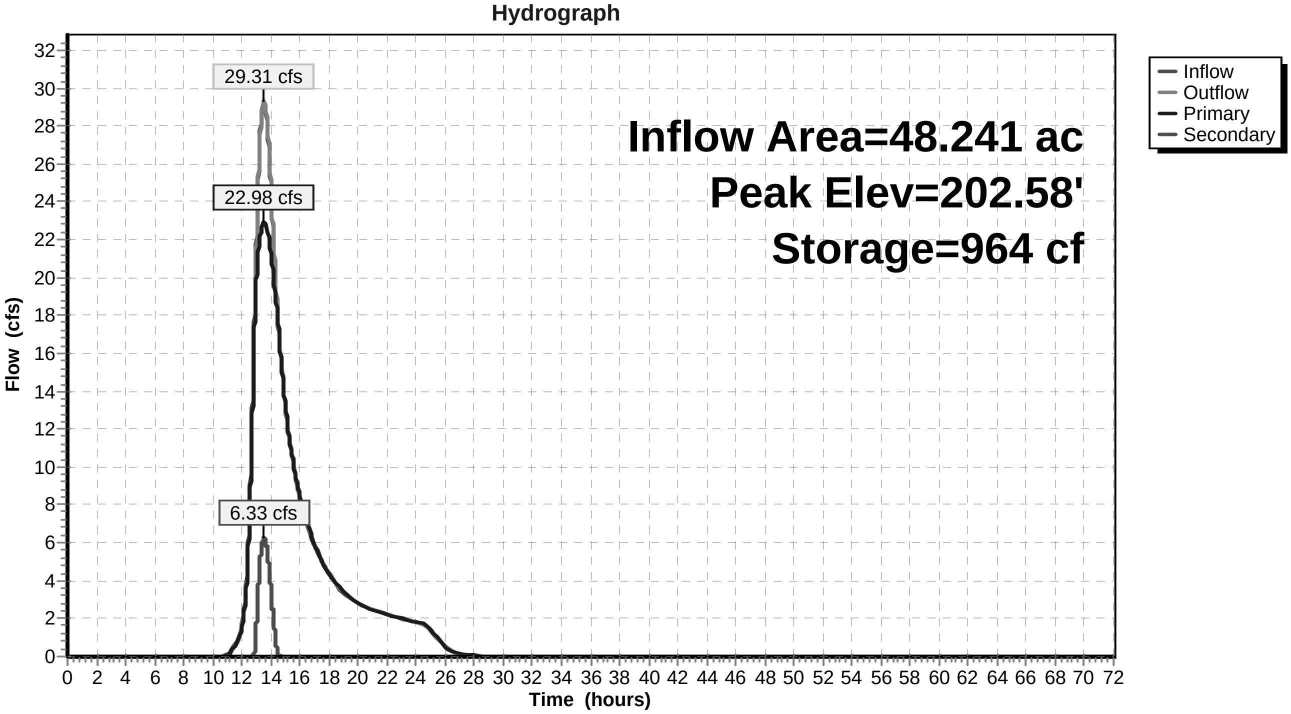
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
200.00	200	0	0
202.00	464	664	664
204.00	825	1,289	1,953
205.00	1,393	1,109	3,062

Device	Routing	Invert	Outlet Devices
#1	Primary	200.39'	**30.0" Round Culvert** L= 32.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 200.39' / 198.47' S= 0.0600 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 4.91 sf
#2	Secondary	202.20'	**10.0' long x 40.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=22.98 cfs @ 13.50 hrs HW=202.58' TW=191.47' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 22.98 cfs @ 5.04 fps)

Secondary OutFlow Max=6.33 cfs @ 13.50 hrs HW=202.58' TW=191.47' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 6.33 cfs @ 1.66 fps)

Pond 1P: 30" Culvert



Summary for Pond 2P: Existing Pond Area

Inflow Area =	50.100 ac,	1.15% Impervious, Inflow Depth = 1.98"	for 10-Year event	
Inflow =	29.74 cfs @	13.50 hrs, Volume=	8.277 af	
Outflow =	29.67 cfs @	13.54 hrs, Volume=	8.277 af,	Atten= 0%, Lag= 2.3 min
Primary =	29.67 cfs @	13.54 hrs, Volume=	8.277 af	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 191.47' @ 13.54 hrs Surf.Area= 2,906 sf Storage= 4,336 cf

Plug-Flow detention time= 4.8 min calculated for 8.276 af (100% of inflow)
Center-of-Mass det. time= 4.8 min (947.4 - 942.7)

Volume	Invert	Avail.Storage	Storage Description
#1	187.82'	54,241 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

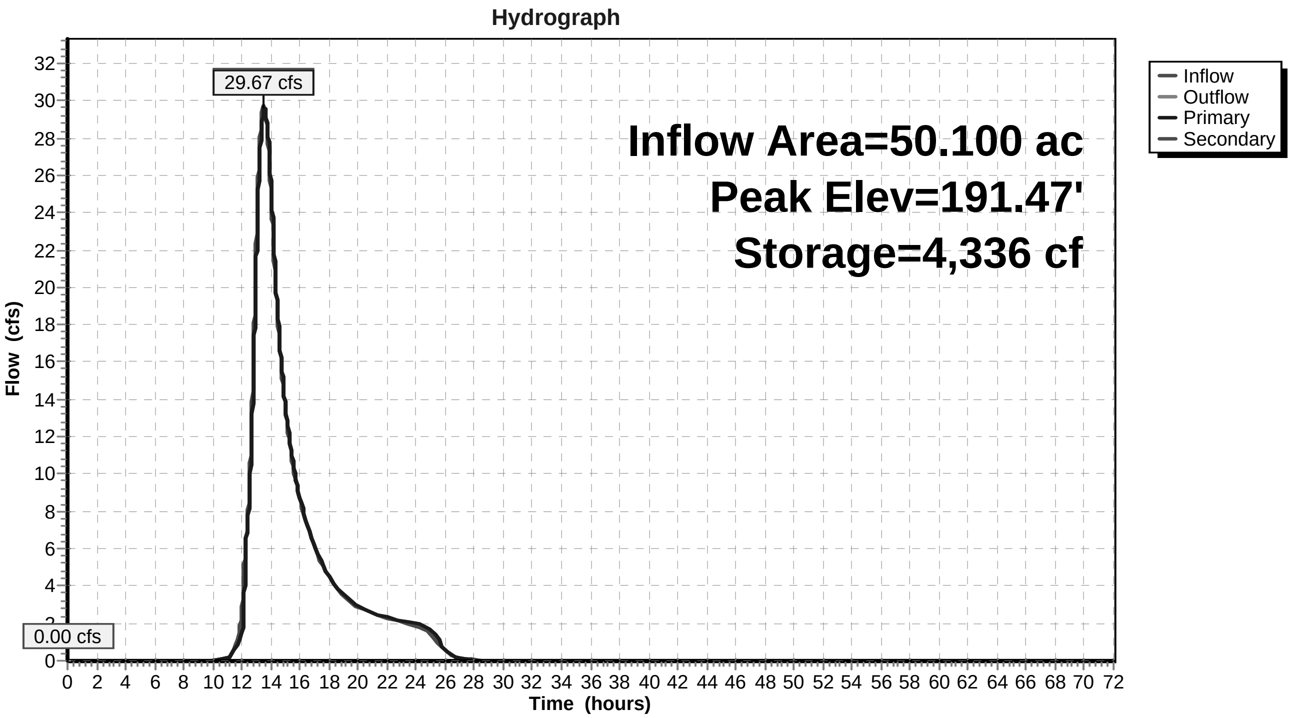
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.82	83	0	0
188.00	240	29	29
189.00	696	468	497
190.00	920	808	1,305
191.00	2,569	1,745	3,050
192.00	3,287	2,928	5,978
193.00	3,988	3,638	9,615
194.00	4,817	4,403	14,018
195.00	5,576	5,197	19,214
196.00	6,406	5,991	25,205
197.00	7,279	6,843	32,048
198.00	8,234	7,757	39,804
199.00	9,230	8,732	48,536
199.60	9,786	5,705	54,241

Device	Routing	Invert	Outlet Devices
#1	Primary	187.68'	**27.0" W x 42.0" H Box Culvert** L= 1.5' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.68' / 187.66' S= 0.0133 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.88 sf
#2	Device 1	187.71'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.75 2.50 2.50 3.50 Width (feet) 0.75 0.00 0.00 3.50 10.29
#3	Device 2	187.76'	**30.0" W x 48.0" H Box Culvert** L= 2.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.76' / 187.73' S= 0.0150 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 10.00 sf
#4	Secondary	197.90'	**18.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=29.67 cfs @ 13.54 hrs HW=191.47' TW=188.49' (Dynamic Tailwater)
└—**1=Culvert** (Passes 29.67 cfs of 38.57 cfs potential flow)
  └—**2=Custom Weir/Orifice** (Orifice Controls 29.67 cfs @ 4.13 fps)
    └—**3=Culvert** (Passes 29.67 cfs of 41.70 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.82' TW=187.50' (Dynamic Tailwater)
└—**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Pond Area



Summary for Pond 3P: Existing Depression

Inflow Area = 13.925 ac, 5.53% Impervious, Inflow Depth = 0.41" for 10-Year event
Inflow = 3.56 cfs @ 12.32 hrs, Volume= 0.479 af
Outflow = 3.29 cfs @ 12.43 hrs, Volume= 0.479 af, Atten= 8%, Lag= 6.3 min
Discarded = 3.29 cfs @ 12.43 hrs, Volume= 0.479 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.25' @ 12.43 hrs Surf.Area= 2,239 sf Storage= 862 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.6 min (911.3 - 909.8)

Volume	Invert	Avail.Storage	Storage Description
#1	152.50'	20,003 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

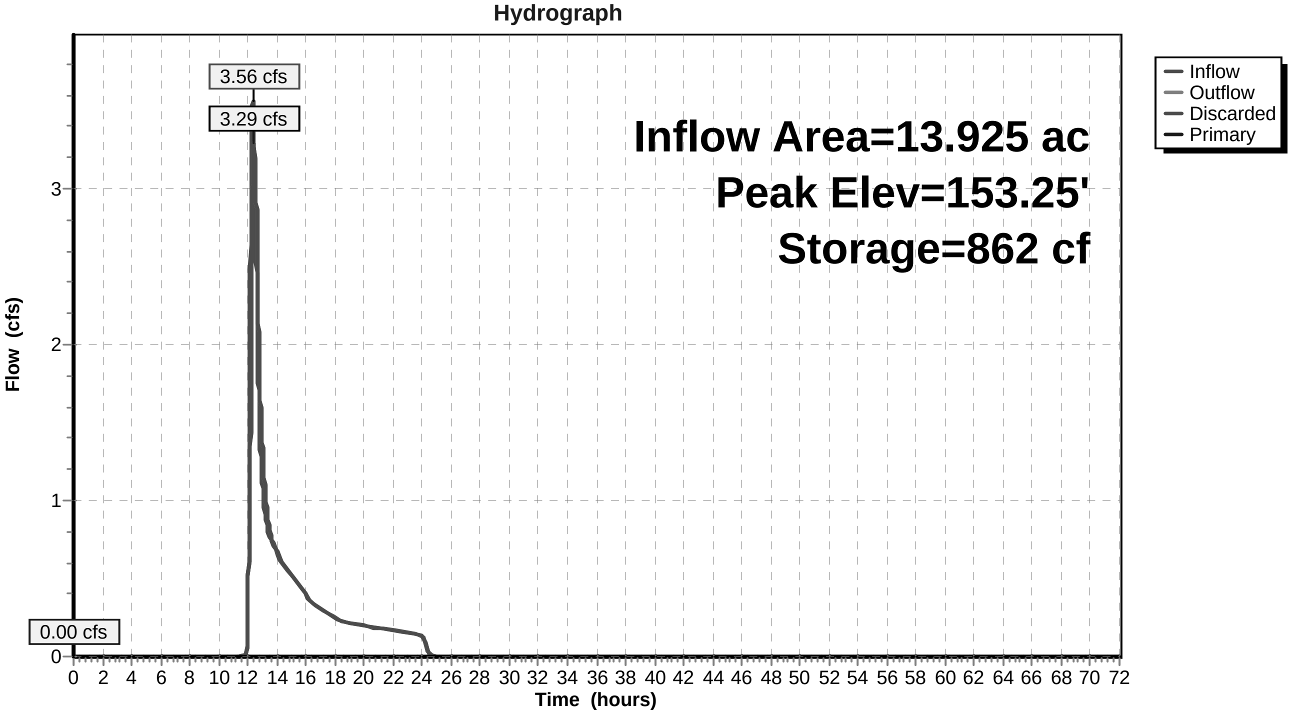
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
152.50	568	0	0
153.00	1,156	431	431
154.00	5,426	3,291	3,722
155.00	8,124	6,775	10,497
156.00	10,888	9,506	20,003

Device	Routing	Invert	Outlet Devices
#1	Discarded	152.50'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 146.20'
#2	Primary	155.50'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=3.29 cfs @ 12.43 hrs HW=153.25' (Free Discharge)
└─**1=Exfiltration** (Controls 3.29 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=152.50' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Existing Depression



Summary for Pond 4P: Existing Depression

Inflow Area = 7.405 ac, 3.48% Impervious, Inflow Depth = 0.18" for 10-Year event
Inflow = 0.19 cfs @ 13.96 hrs, Volume= 0.114 af
Outflow = 0.19 cfs @ 13.96 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.19 cfs @ 13.96 hrs, Volume= 0.114 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.60' @ 13.96 hrs Surf.Area= 221 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,042.8 - 1,042.8)

Volume	Invert	Avail.Storage	Storage Description
#1	156.60'	2,689 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

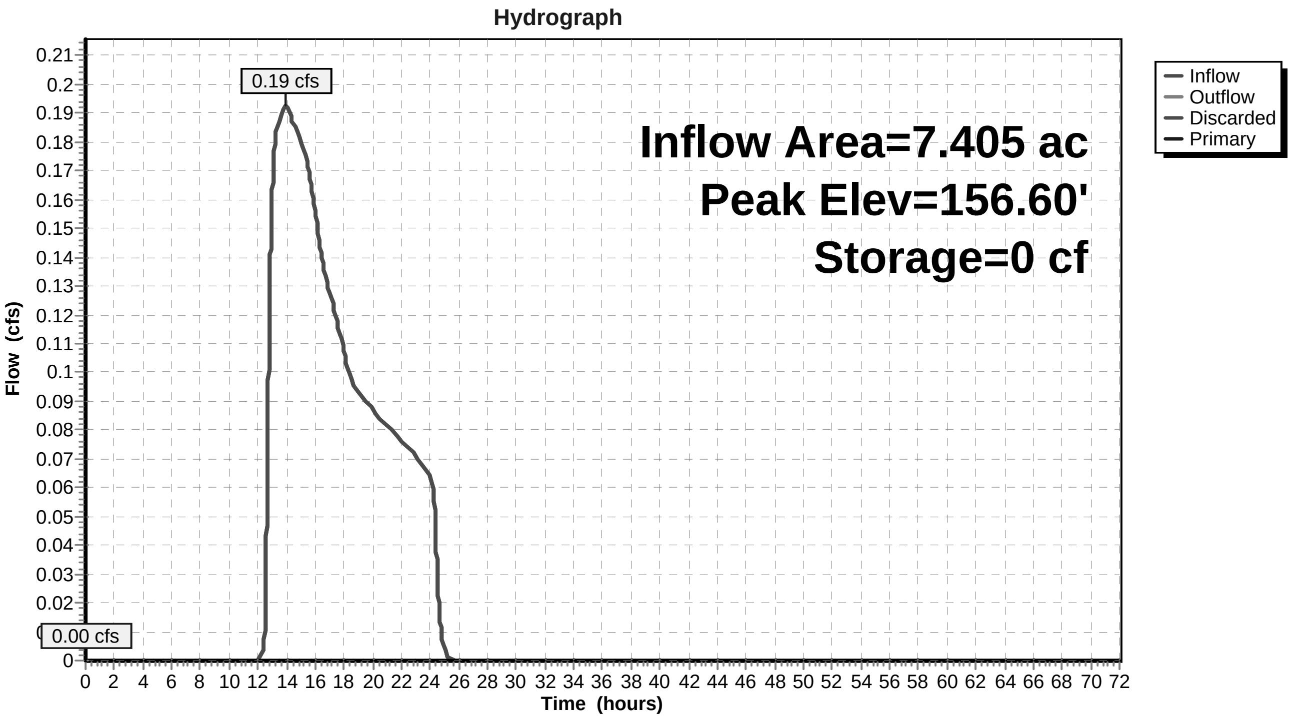
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
156.60	221	0	0
157.00	737	192	192
158.00	4,257	2,497	2,689

Device	Routing	Invert	Outlet Devices
#1	Discarded	156.60'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 150.20'
#2	Primary	157.44'	**30.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=0.31 cfs @ 13.96 hrs HW=156.60' (Free Discharge)
└—**1=Exfiltration** (Controls 0.31 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.60' TW=152.50' (Dynamic Tailwater)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: Existing Depression



Summary for Pond 5P: Existing Depression

Inflow Area =	24.314 ac,	4.30% Impervious, Inflow Depth = 1.19"	for 10-Year event
Inflow =	11.69 cfs @	12.89 hrs, Volume=	2.410 af
Outflow =	10.95 cfs @	13.07 hrs, Volume=	2.410 af, Atten= 6%, Lag= 10.6 min
Discarded =	10.95 cfs @	13.07 hrs, Volume=	2.410 af
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 197.39' @ 13.07 hrs Surf.Area= 7,397 sf Storage= 2,458 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.2 min (930.4 - 929.2)

Volume	Invert	Avail.Storage	Storage Description
#1	196.90'	57,265 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

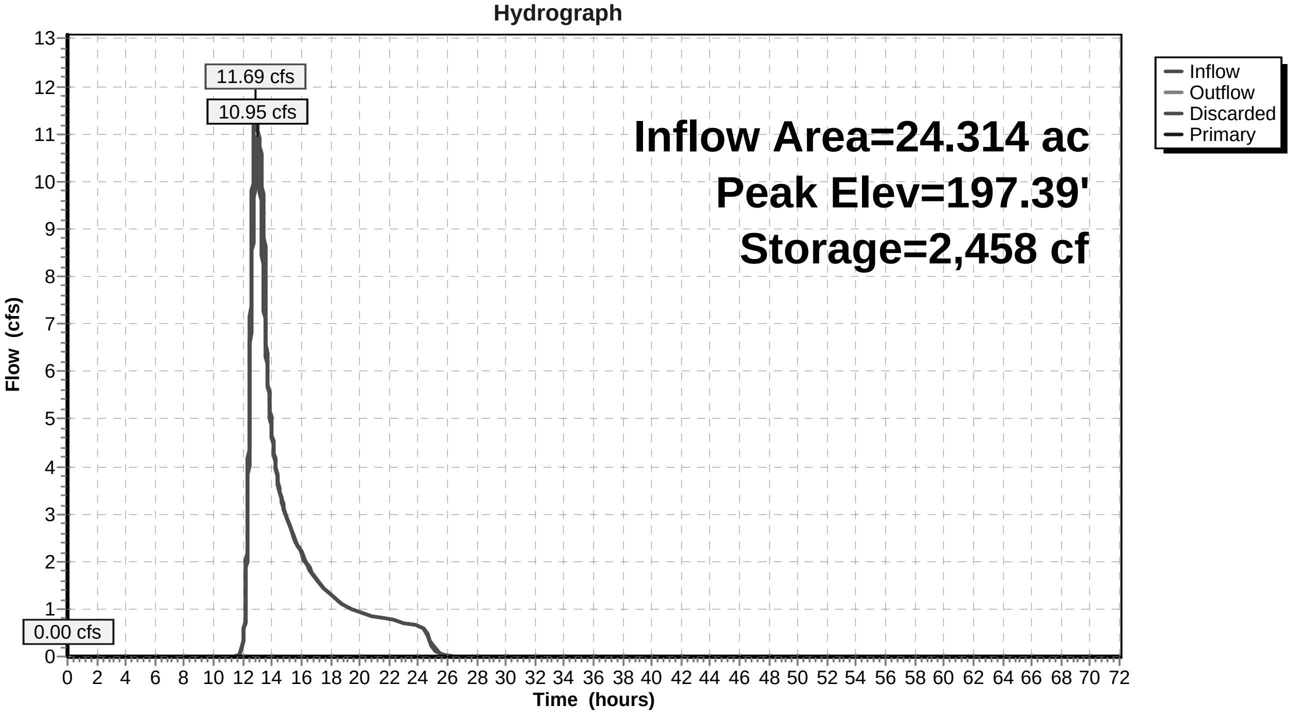
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
196.90	300	0	0
197.00	2,503	140	140
197.10	5,906	420	561
198.00	10,612	7,433	7,994
198.60	17,987	8,580	16,573
199.00	26,504	8,898	25,472
200.00	37,083	31,794	57,265

Device	Routing	Invert	Outlet Devices
#1	Discarded	196.90'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 192.20'
#2	Primary	198.75'	**28.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=10.95 cfs @ 13.07 hrs HW=197.39' (Free Discharge)
└─**1=Exfiltration** (Controls 10.95 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=196.90' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Existing Depression



Summary for Pond 11P: Carberry Ln Culvert

Inflow Area = 54.006 ac, 1.60% Impervious, Inflow Depth = 1.98" for 10-Year event
Inflow = 30.50 cfs @ 13.55 hrs, Volume= 8.896 af
Outflow = 30.50 cfs @ 13.55 hrs, Volume= 8.896 af, Atten= 0%, Lag= 0.4 min
Primary = 30.50 cfs @ 13.55 hrs, Volume= 8.896 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 161.60' @ 13.55 hrs Surf.Area= 399 sf Storage= 586 cf

Plug-Flow detention time= 0.5 min calculated for 8.896 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (943.8 - 943.4)

Volume	Invert	Avail.Storage	Storage Description
#1	159.12'	13,507 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

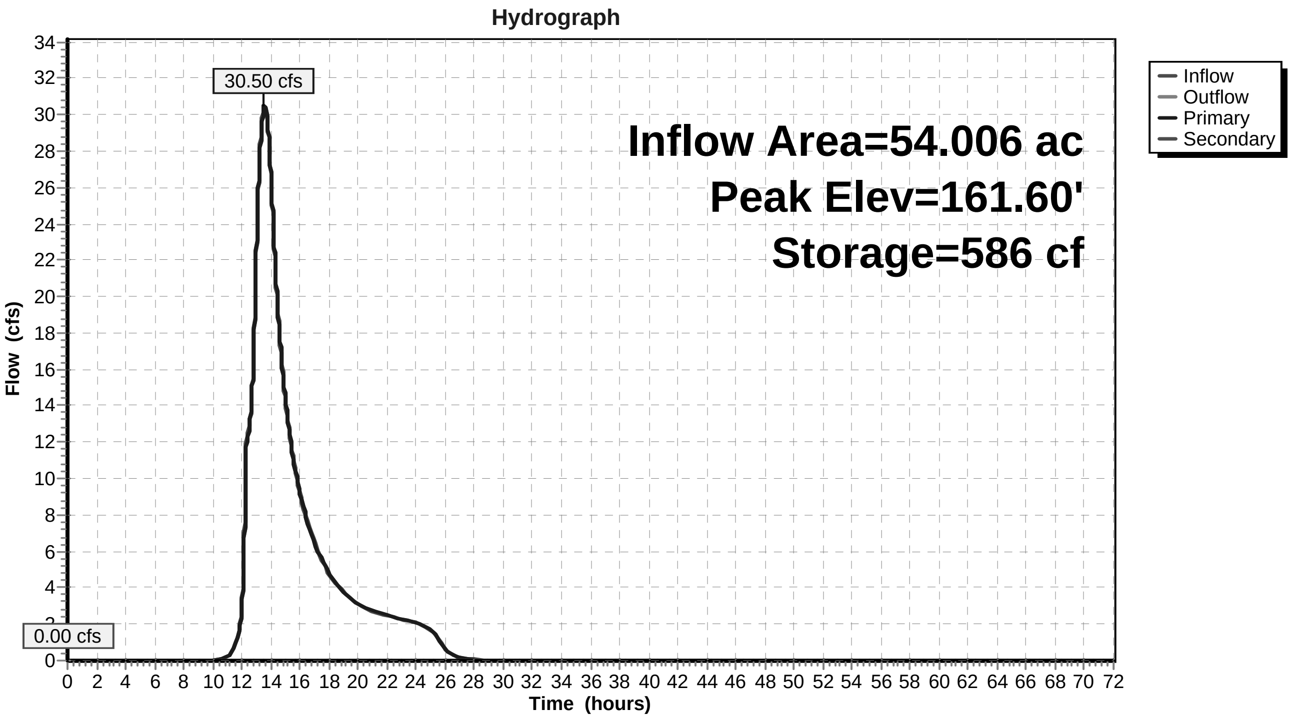
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
159.12	143	0	0
160.00	200	151	151
161.00	267	234	384
162.00	486	377	761
163.00	786	636	1,397
164.00	1,226	1,006	2,403
165.00	2,948	2,087	4,490
166.00	7,080	5,014	9,504
166.50	8,934	4,004	13,507

Device	Routing	Invert	Outlet Devices
#1	Primary	159.12'	**36.0" Round Culvert** L= 106.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.12' / 158.28' S= 0.0079 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf
#2	Secondary	165.25'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=30.49 cfs @ 13.55 hrs HW=161.60' (Free Discharge)
└─**1=Culvert** (Barrel Controls 30.49 cfs @ 6.61 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=159.12' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 11P: Carberry Ln Culvert



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Upper Watershed To Runoff Area=2,101,390 sf 0.58% Impervious Runoff Depth=2.97"
Flow Length=2,544' Tc=107.3 min CN=70 Runoff=45.12 cfs 11.951 af

Subcatchment 2S: Wetland Area Runoff Area=80,947 sf 16.02% Impervious Runoff Depth=3.17"
Flow Length=590' Tc=18.6 min UI Adjusted CN=72 Runoff=4.78 cfs 0.490 af

Subcatchment 3S: Lower Stream Channel Runoff Area=170,176 sf 7.39% Impervious Runoff Depth=2.88"
Flow Length=813' Tc=20.5 min UI Adjusted CN=69 Runoff=8.72 cfs 0.937 af

Subcatchment 4S: To Canton Ave Runoff Area=284,027 sf 7.86% Impervious Runoff Depth=1.56"
Flow Length=1,402' Tc=18.4 min CN=54 Runoff=7.30 cfs 0.847 af

Subcatchment 5S: To Canton Ave Runoff Area=322,558 sf 3.48% Impervious Runoff Depth=0.51"
Flow Length=1,163' Tc=34.8 min CN=39 Runoff=1.09 cfs 0.313 af

Subcatchment 6S: To Canton Ave Runoff Area=1,059,136 sf 4.30% Impervious Runoff Depth=1.97"
Flow Length=2,255' Tc=59.2 min CN=59 Runoff=20.90 cfs 4.000 af

Reach 1R: Upper Stream Channel Avg. Flow Depth=1.58' Max Vel=7.48 fps Inflow=45.12 cfs 11.951 af
n=0.050 L=763.0' S=0.0733 '/' Capacity=146.78 cfs Outflow=45.05 cfs 11.951 af

Reach DP1: Lower Stream Channel Avg. Flow Depth=1.29' Max Vel=8.73 fps Inflow=46.55 cfs 13.376 af
n=0.035 L=528.0' S=0.0537 '/' Capacity=190.84 cfs Outflow=46.55 cfs 13.376 af

Reach DP2: Canton Ave - North Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP3: Canton Ave - South Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 1P: 30" Culvert Peak Elev=202.97' Storage=1,197 cf Inflow=45.05 cfs 11.951 af
Primary=27.23 cfs 10.130 af Secondary=17.81 cfs 1.818 af Outflow=45.05 cfs 11.949 af

Pond 2P: Existing Pond Area Peak Elev=192.40' Storage=7,335 cf Inflow=45.65 cfs 12.439 af
Primary=45.37 cfs 12.439 af Secondary=0.00 cfs 0.000 af Outflow=45.37 cfs 12.439 af

Pond 3P: Existing Depression Peak Elev=153.70' Storage=2,292 cf Inflow=7.30 cfs 0.847 af
Discarded=6.23 cfs 0.847 af Primary=0.00 cfs 0.000 af Outflow=6.23 cfs 0.847 af

Pond 4P: Existing Depression Peak Elev=156.99' Storage=187 cf Inflow=1.09 cfs 0.313 af
Discarded=1.05 cfs 0.313 af Primary=0.00 cfs 0.000 af Outflow=1.05 cfs 0.313 af

Pond 5P: Existing Depression Peak Elev=198.11' Storage=9,232 cf Inflow=20.90 cfs 4.000 af
Discarded=19.16 cfs 4.000 af Primary=0.00 cfs 0.000 af Outflow=19.16 cfs 4.000 af

Pond 11P: Carberry Ln Culvert Peak Elev=162.55' Storage=1,071 cf Inflow=46.55 cfs 13.376 af
Primary=46.54 cfs 13.376 af Secondary=0.00 cfs 0.000 af Outflow=46.54 cfs 13.376 af

Total Runoff Area = 92.246 ac Runoff Volume = 18.538 af Average Runoff Depth = 2.41"
97.10% Pervious = 89.566 ac 2.90% Impervious = 2.680 ac

Summary for Subcatchment 1S: Upper Watershed To Stream

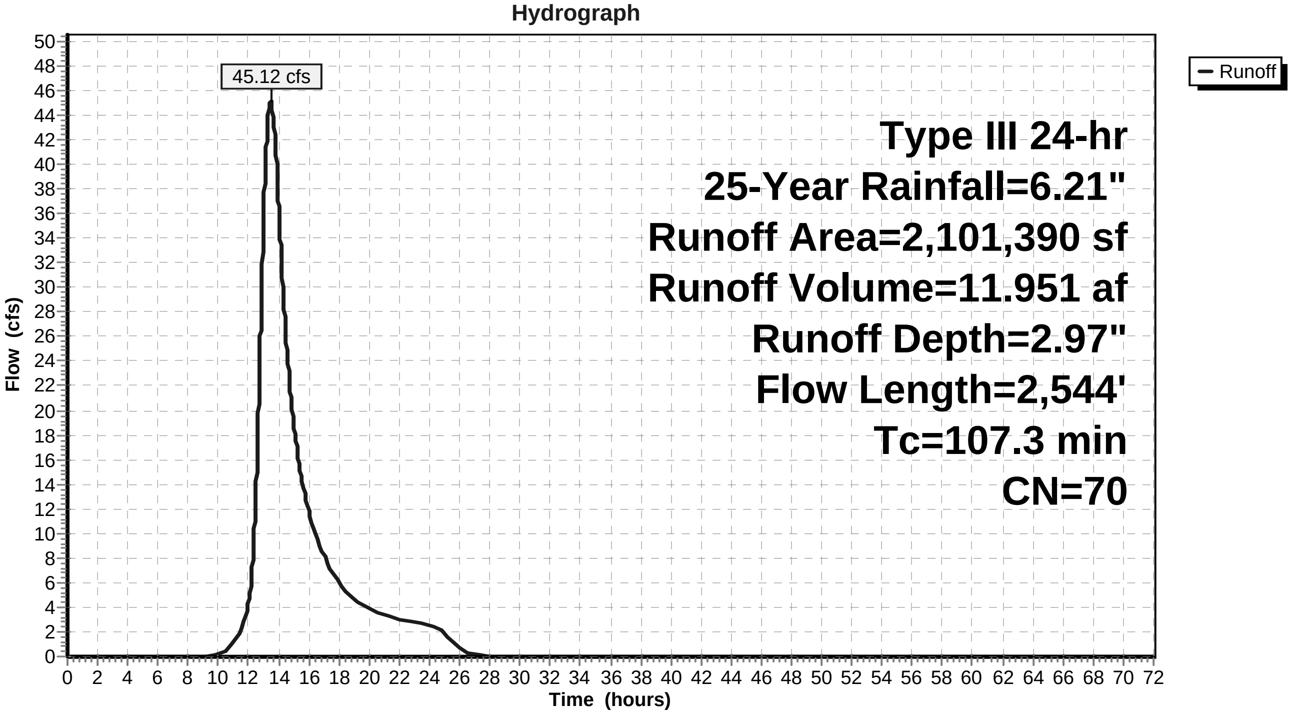
Runoff = 45.12 cfs @ 13.47 hrs, Volume= 11.951 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

	Area (sf)	CN	Description
	153,412	30	Woods, Good, HSG A
	3,806	61	>75% Grass cover, Good, HSG B
	3,318	98	Roofs, HSG C
	1,085,438	70	Woods, Good, HSG C
	243,725	74	>75% Grass cover, Good, HSG C
	2,997	98	Paved parking, HSG D
	5,784	98	Roofs, HSG D
	482,716	77	Woods, Good, HSG D
	113,252	80	>75% Grass cover, Good, HSG D
*	6,942	83	Wetland Stream Channel
	2,101,390	70	Weighted Average
	2,089,291		99.42% Pervious Area
	12,099		0.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0080	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
23.4	554	0.0250	0.40		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
10.9	116	0.0050	0.18		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
16.5	813	0.1080	0.82		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
16.7	306	0.0150	0.31		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
22.2	705	0.0450	0.53		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
107.3	2,544	Total			

Subcatchment 1S: Upper Watershed To Stream



Summary for Subcatchment 2S: Wetland Area

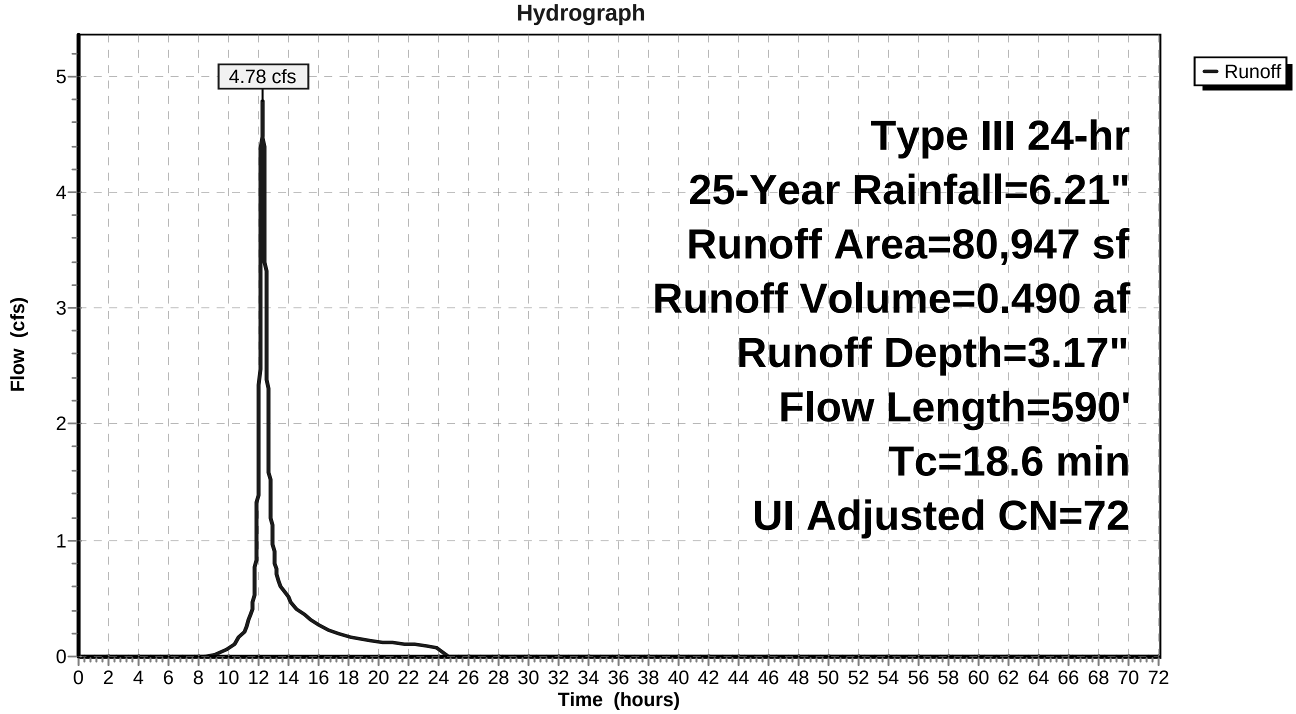
Runoff = 4.78 cfs @ 12.26 hrs, Volume= 0.490 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

	Area (sf)	CN	Adj	Description
*	3,336	83		Wetland Stream Channel
	19,048	55		Woods, Good, HSG B
	3,460	98		Unconnected pavement, HSG B
	6,652	98		Unconnected pavement, HSG C
	2,858	98		Roofs, HSG C
	16,068	74		>75% Grass cover, Good, HSG C
	19,248	70		Woods, Good, HSG C
	5,331	80		>75% Grass cover, Good, HSG D
	4,946	77		Woods, Good, HSG D
	80,947	73	72	Weighted Average, UI Adjusted
	67,977			83.98% Pervious Area
	12,970			16.02% Impervious Area
	10,112			77.96% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0350	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
7.9	271	0.0520	0.57		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.5	150	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	119	0.0920	4.55		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.6	590	Total			

Subcatchment 2S: Wetland Area



Summary for Subcatchment 3S: Lower Stream Channel

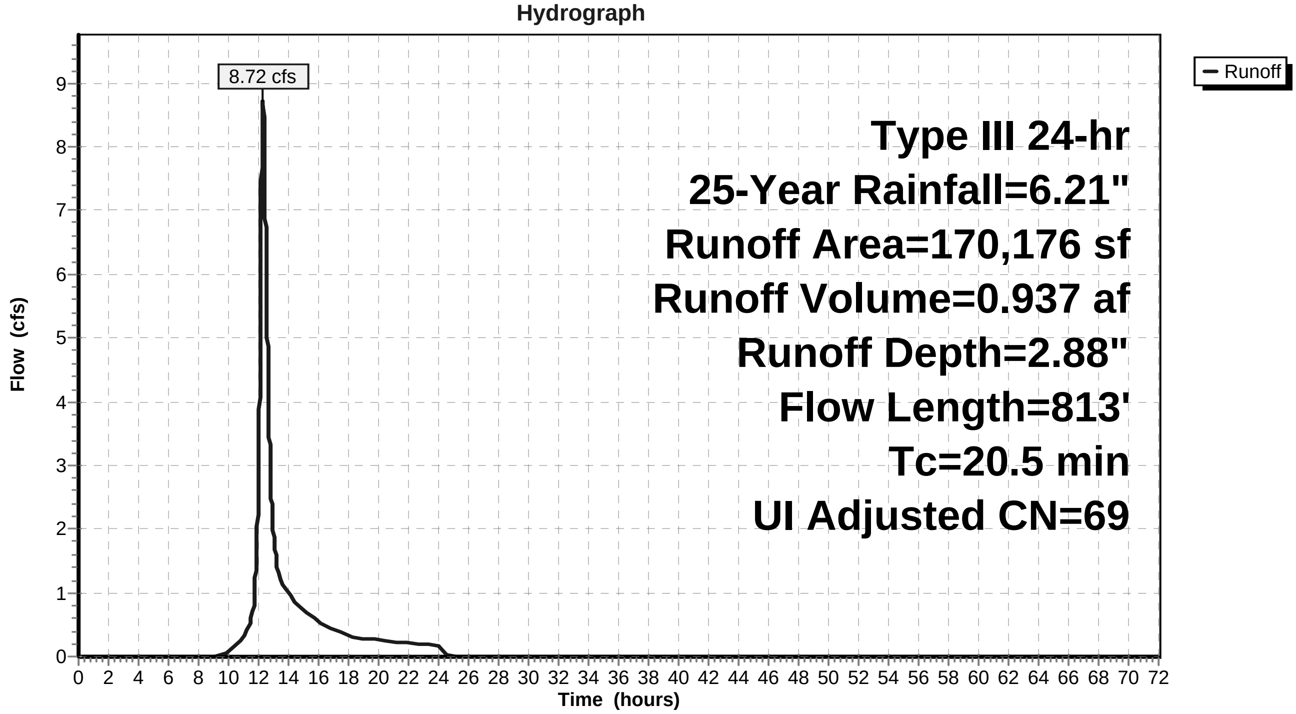
Runoff = 8.72 cfs @ 12.28 hrs, Volume= 0.937 af, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

	Area (sf)	CN	Adj	Description
	27,020	55		Woods, Good, HSG B
	12,576	98		Unconnected roofs, HSG C
	18,196	74		>75% Grass cover, Good, HSG C
	109,957	70		Woods, Good, HSG C
*	2,427	83		Wetland Stream Channel
	170,176	70	69	Weighted Average, UI Adjusted
	157,600			92.61% Pervious Area
	12,576			7.39% Impervious Area
	12,576			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
11.7	580	0.1100	0.83		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.1	33	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	65	0.1400	0.94		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.7	62	0.0050	1.44		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	23	0.1300	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
20.5	813	Total			

Subcatchment 3S: Lower Stream Channel



Summary for Subcatchment 4S: To Canton Ave

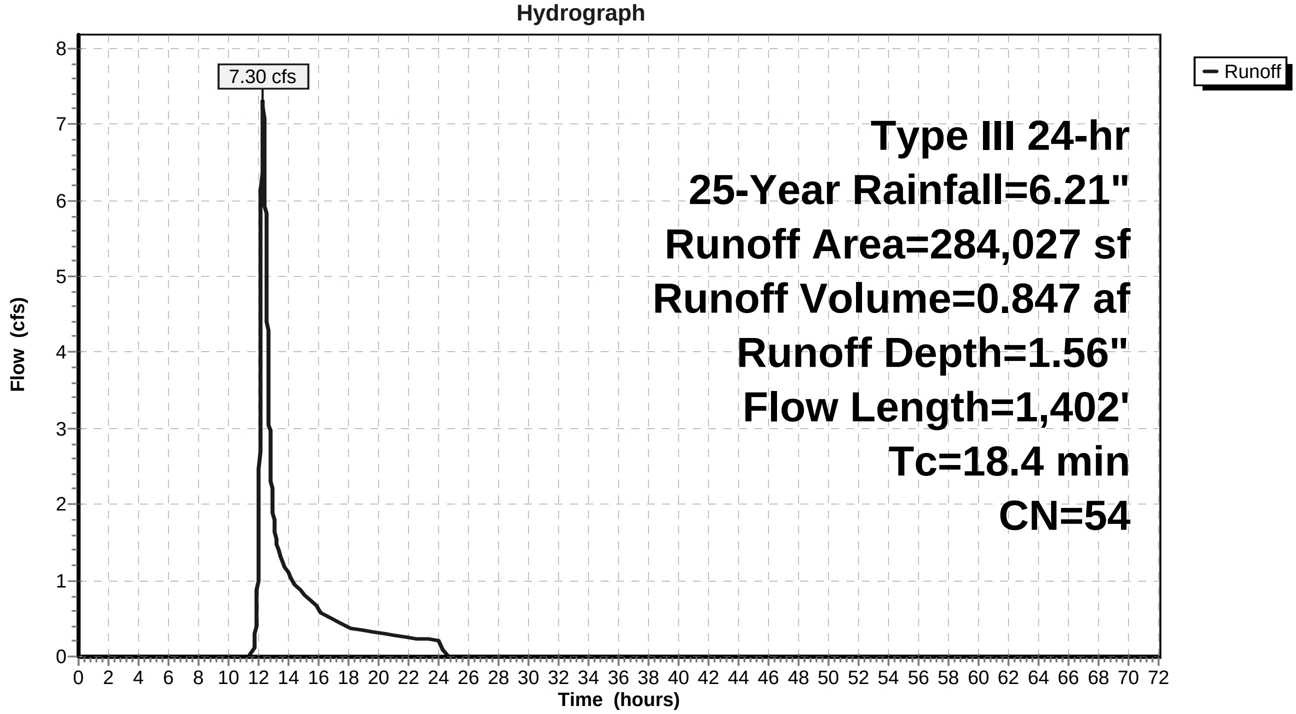
Runoff = 7.30 cfs @ 12.29 hrs, Volume= 0.847 af, Depth= 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

Area (sf)	CN	Description
11,177	98	Paved parking, HSG A
2,353	98	Roofs, HSG A
53,901	30	Woods, Good, HSG A
113,021	39	>75% Grass cover, Good, HSG A
9,397	55	Woods, Good, HSG B
6,856	98	Paved parking, HSG D
1,931	98	Roofs, HSG D
47,201	77	Woods, Good, HSG D
38,190	80	>75% Grass cover, Good, HSG D
284,027	54	Weighted Average
261,710		92.14% Pervious Area
22,317		7.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.6	69	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
12.4	536	0.0830	0.72		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.7	165	0.0330	3.69		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	542	0.0870	5.99		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.4	1,402	Total			

Subcatchment 4S: To Canton Ave



Summary for Subcatchment 5S: To Canton Ave

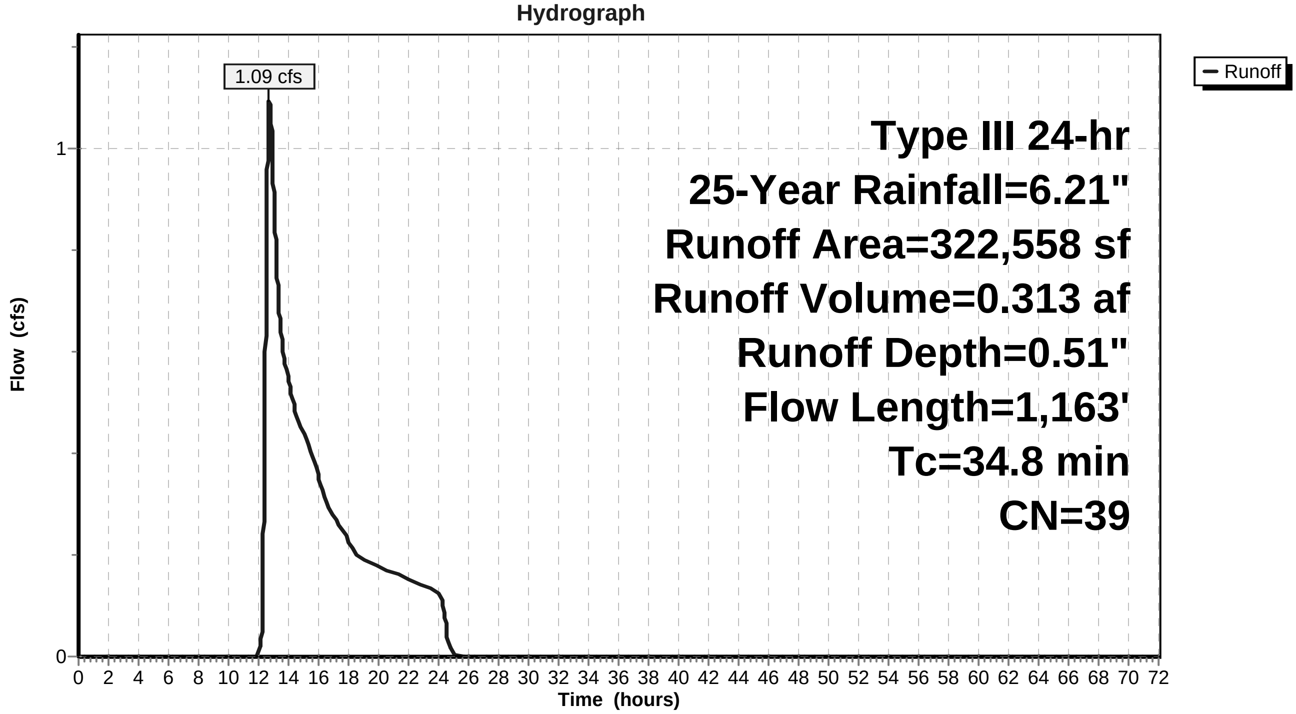
Runoff = 1.09 cfs @ 12.73 hrs, Volume= 0.313 af, Depth= 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

Area (sf)	CN	Description
8,127	98	Paved parking, HSG A
3,083	98	Roofs, HSG A
84,050	30	Woods, Good, HSG A
227,298	39	>75% Grass cover, Good, HSG A
322,558	39	Weighted Average
311,348		96.52% Pervious Area
11,210		3.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.26"
4.7	391	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.5	375	0.0400	0.50		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
7.1	75	0.0050	0.18		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.4	272	0.0750	1.92		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
34.8	1,163	Total			

Subcatchment 5S: To Canton Ave



Summary for Subcatchment 6S: To Canton Ave

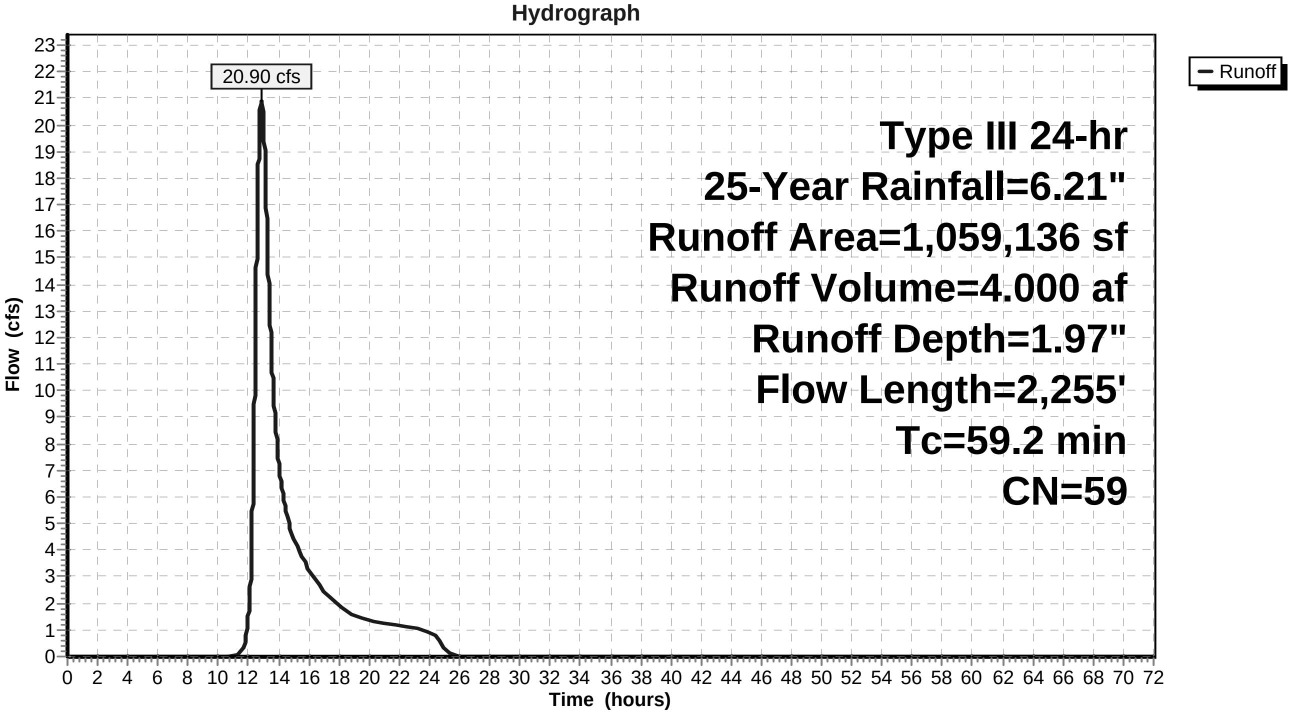
Runoff = 20.90 cfs @ 12.83 hrs, Volume= 4.000 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

Area (sf)	CN	Description
8,943	98	Paved parking, HSG A
2,439	98	Roofs, HSG A
148,740	30	Woods, Good, HSG A
118,657	39	>75% Grass cover, Good, HSG A
219,044	55	Woods, Good, HSG B
26,267	98	Paved parking, HSG C
7,901	98	Roofs, HSG C
515,893	70	Woods, Good, HSG C
11,252	74	>75% Grass cover, Good, HSG C
1,059,136	59	Weighted Average
1,013,586		95.70% Pervious Area
45,550		4.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
29.2	1,300	0.0880	0.74		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.3	70	0.0360	3.85		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
21.8	835	0.0650	0.64		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
59.2	2,255	Total			

Subcatchment 6S: To Canton Ave



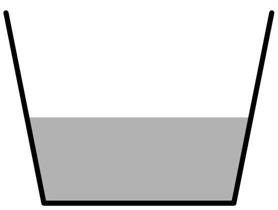
Summary for Reach 1R: Upper Stream Channel

Inflow Area = 48.241 ac, 0.58% Impervious, Inflow Depth = 2.97" for 25-Year event
Inflow = 45.12 cfs @ 13.47 hrs, Volume= 11.951 af
Outflow = 45.05 cfs @ 13.49 hrs, Volume= 11.951 af, Atten= 0%, Lag= 0.9 min

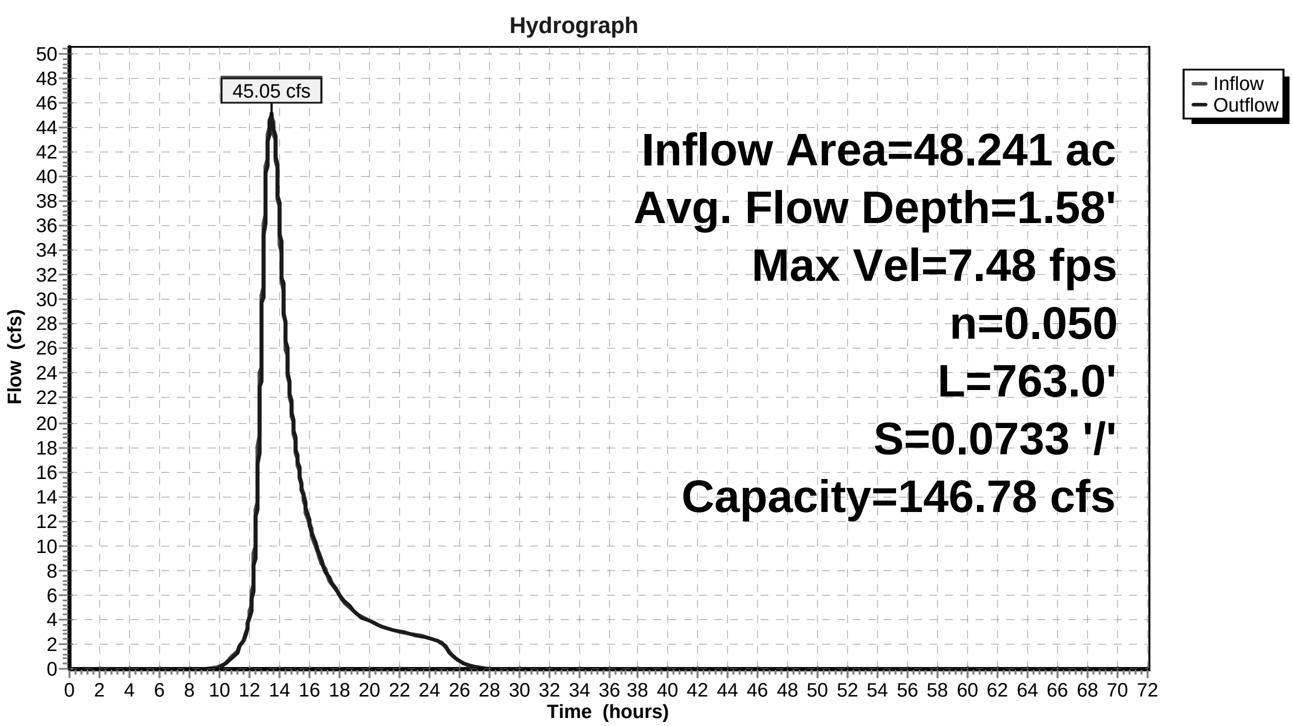
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.48 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 3.14 fps, Avg. Travel Time= 4.1 min

Peak Storage= 4,594 cf @ 13.49 hrs
Average Depth at Peak Storage= 1.58'
Bank-Full Depth= 3.50' Flow Area= 14.7 sf, Capacity= 146.78 cfs

3.50' x 3.50' deep channel, n= 0.050 Earth, cobble bottom, clean sides
Side Slope Z-value= 0.2 '/' Top Width= 4.90'
Length= 763.0' Slope= 0.0733 '/'
Inlet Invert= 260.96', Outlet Invert= 205.00'



Reach 1R: Upper Stream Channel



Summary for Reach DP1: Lower Stream Channel

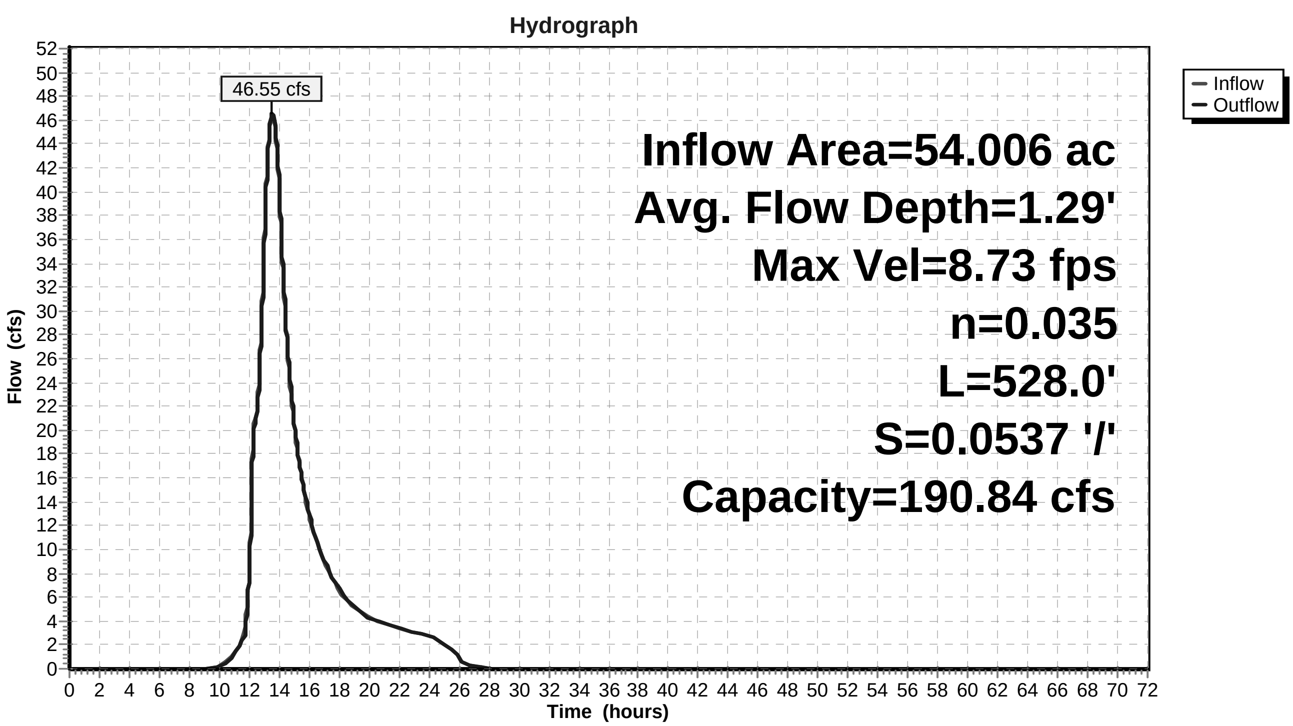
Inflow Area = 54.006 ac, 1.60% Impervious, Inflow Depth = 2.97" for 25-Year event
Inflow = 46.55 cfs @ 13.54 hrs, Volume= 13.376 af
Outflow = 46.55 cfs @ 13.56 hrs, Volume= 13.376 af, Atten= 0%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.73 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 3.45 fps, Avg. Travel Time= 2.6 min

Peak Storage= 2,814 cf @ 13.56 hrs
Average Depth at Peak Storage= 1.29'
Bank-Full Depth= 3.00' Flow Area= 15.0 sf, Capacity= 190.84 cfs

3.50' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 0.5 '/' Top Width= 6.50'
Length= 528.0' Slope= 0.0537 '/'
Inlet Invert= 187.50', Outlet Invert= 159.12'

Reach DP1: Lower Stream Channel

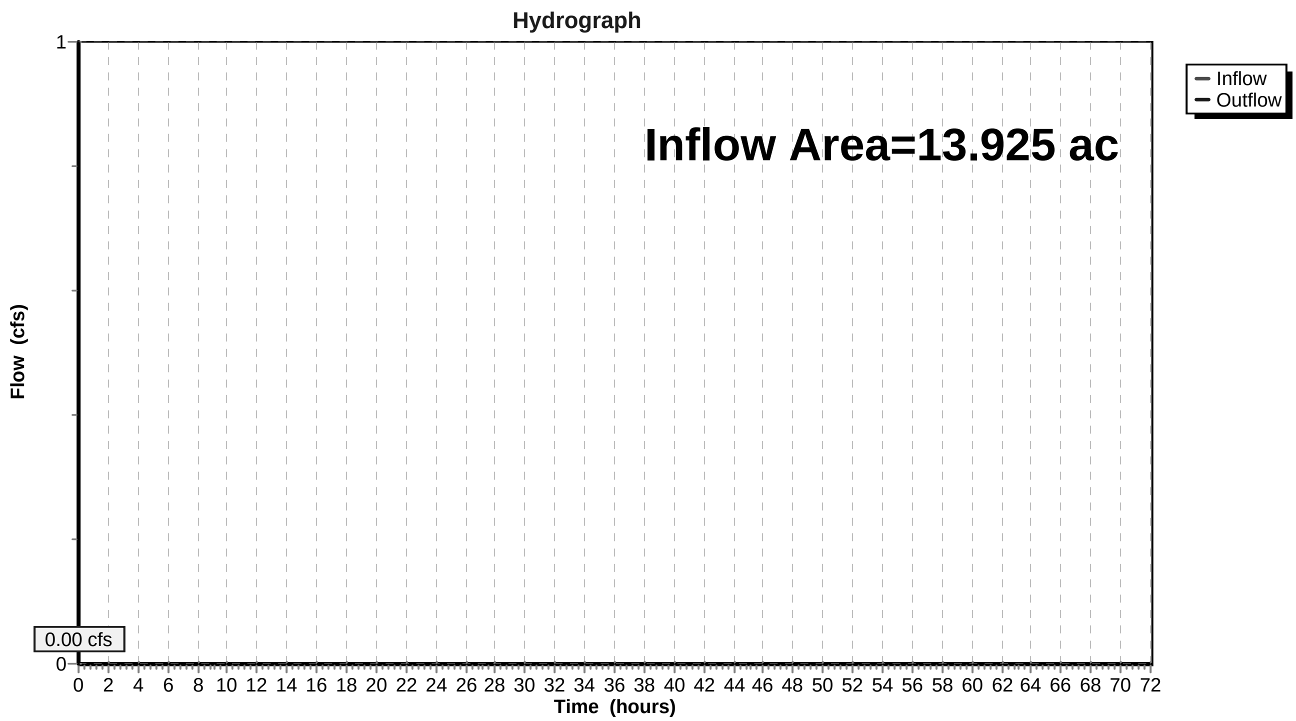


Summary for Reach DP2: Canton Ave - North

Inflow Area = 13.925 ac, 5.53% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP2: Canton Ave - North

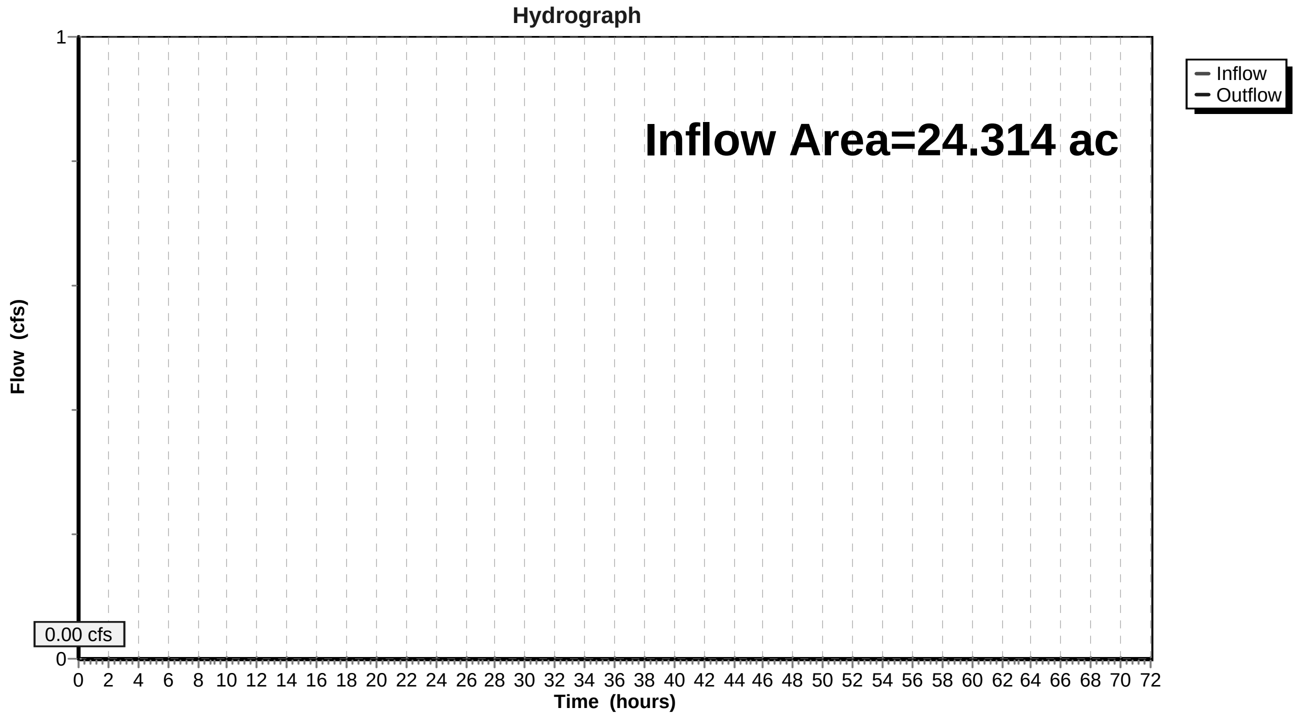


Summary for Reach DP3: Canton Ave - South

Inflow Area =	24.314 ac,	4.30% Impervious, Inflow Depth = 0.00"	for 25-Year event	
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	
Outflow =	0.00 cfs @	0.00 hrs, Volume=	0.000 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP3: Canton Ave - South



Summary for Pond 1P: 30" Culvert

Inflow Area =	48.241 ac,	0.58% Impervious, Inflow Depth = 2.97"	for 25-Year event	
Inflow =	45.05 cfs @	13.49 hrs, Volume=	11.951 af	
Outflow =	45.05 cfs @	13.49 hrs, Volume=	11.949 af,	Atten= 0%, Lag= 0.3 min
Primary =	27.23 cfs @	13.49 hrs, Volume=	10.130 af	
Secondary =	17.81 cfs @	13.49 hrs, Volume=	1.818 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 202.97' @ 13.49 hrs Surf.Area= 639 sf Storage= 1,197 cf

Plug-Flow detention time= 0.8 min calculated for 11.947 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (933.9 - 933.2)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	3,062 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

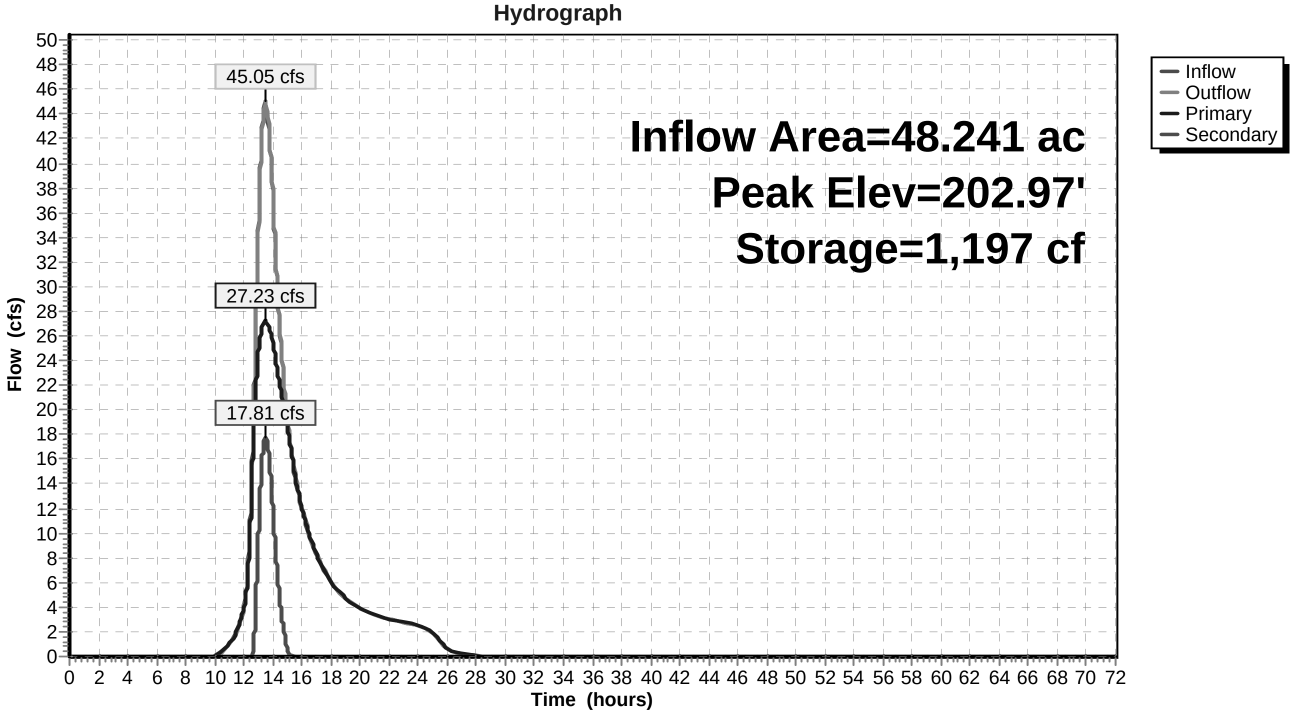
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
200.00	200	0	0
202.00	464	664	664
204.00	825	1,289	1,953
205.00	1,393	1,109	3,062

Device	Routing	Invert	Outlet Devices
#1	Primary	200.39'	**30.0" Round Culvert** L= 32.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 200.39' / 198.47' S= 0.0600 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 4.91 sf
#2	Secondary	202.20'	**10.0' long x 40.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=27.23 cfs @ 13.49 hrs HW=202.97' TW=192.38' (Dynamic Tailwater)
1=Culvert (Inlet Controls 27.23 cfs @ 5.55 fps)

Secondary OutFlow Max=17.81 cfs @ 13.49 hrs HW=202.97' TW=192.38' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 17.81 cfs @ 2.32 fps)

Pond 1P: 30" Culvert



Summary for Pond 2P: Existing Pond Area

Inflow Area =	50.100 ac,	1.15% Impervious, Inflow Depth = 2.98"	for 25-Year event
Inflow =	45.65 cfs @	13.49 hrs, Volume=	12.439 af
Outflow =	45.37 cfs @	13.55 hrs, Volume=	12.439 af, Atten= 1%, Lag= 3.5 min
Primary =	45.37 cfs @	13.55 hrs, Volume=	12.439 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 192.40' @ 13.55 hrs Surf.Area= 3,565 sf Storage= 7,335 cf

Plug-Flow detention time= 4.2 min calculated for 12.439 af (100% of inflow)
Center-of-Mass det. time= 4.1 min (934.4 - 930.3)

Volume	Invert	Avail.Storage	Storage Description
#1	187.82'	54,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

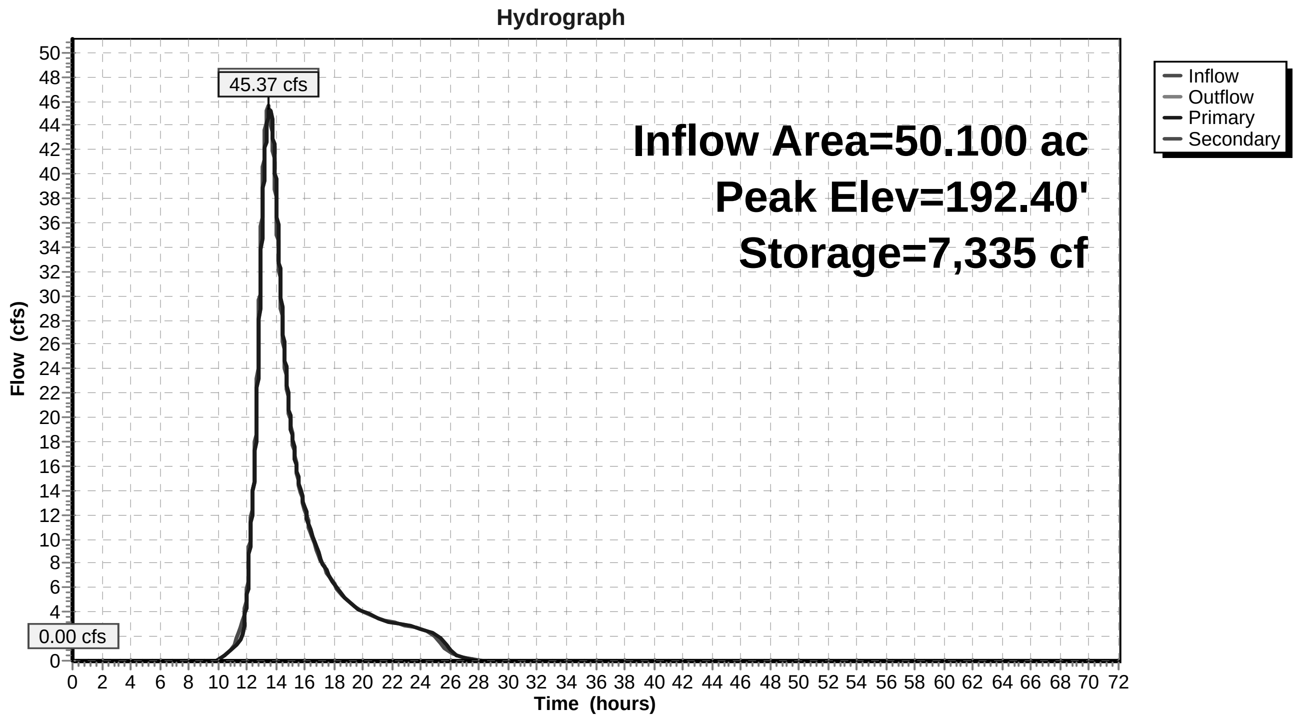
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.82	83	0	0
188.00	240	29	29
189.00	696	468	497
190.00	920	808	1,305
191.00	2,569	1,745	3,050
192.00	3,287	2,928	5,978
193.00	3,988	3,638	9,615
194.00	4,817	4,403	14,018
195.00	5,576	5,197	19,214
196.00	6,406	5,991	25,205
197.00	7,279	6,843	32,048
198.00	8,234	7,757	39,804
199.00	9,230	8,732	48,536
199.60	9,786	5,705	54,241

Device	Routing	Invert	Outlet Devices
#1	Primary	187.68'	**27.0" W x 42.0" H Box Culvert** L= 1.5' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.68' / 187.66' S= 0.0133 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.88 sf
#2	Device 1	187.71'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.75 2.50 2.50 3.50 Width (feet) 0.75 0.00 0.00 3.50 10.29
#3	Device 2	187.76'	**30.0" W x 48.0" H Box Culvert** L= 2.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.76' / 187.73' S= 0.0150 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 10.00 sf
#4	Secondary	197.90'	**18.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=45.37 cfs @ 13.55 hrs HW=192.40' TW=188.79' (Dynamic Tailwater)
└─**1=Culvert** (Passes 45.37 cfs of 53.63 cfs potential flow)
  └─**2=Custom Weir/Orifice** (Orifice Controls 45.37 cfs @ 6.32 fps)
    └─**3=Culvert** (Passes 45.37 cfs of 58.09 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.82' TW=187.50' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Pond Area



Summary for Pond 3P: Existing Depression

Inflow Area = 13.925 ac, 5.53% Impervious, Inflow Depth = 0.73" for 25-Year event
Inflow = 7.30 cfs @ 12.29 hrs, Volume= 0.847 af
Outflow = 6.23 cfs @ 12.43 hrs, Volume= 0.847 af, Atten= 15%, Lag= 8.4 min
Discarded = 6.23 cfs @ 12.43 hrs, Volume= 0.847 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.70' @ 12.43 hrs Surf.Area= 4,151 sf Storage= 2,292 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.7 min (891.8 - 889.1)

Volume	Invert	Avail.Storage	Storage Description
#1	152.50'	20,003 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

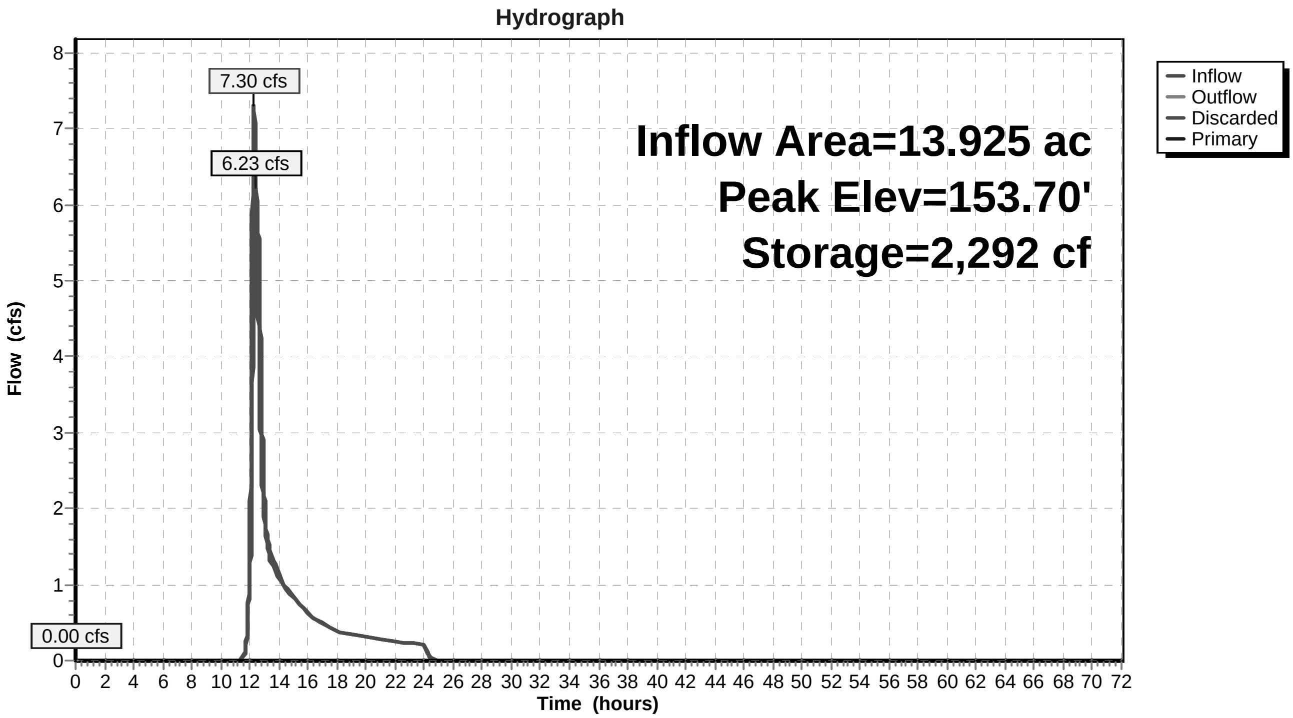
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
152.50	568	0	0
153.00	1,156	431	431
154.00	5,426	3,291	3,722
155.00	8,124	6,775	10,497
156.00	10,888	9,506	20,003

Device	Routing	Invert	Outlet Devices
#1	Discarded	152.50'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 146.20'
#2	Primary	155.50'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=6.23 cfs @ 12.43 hrs HW=153.70' (Free Discharge)
└─**1=Exfiltration** (Controls 6.23 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=152.50' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Existing Depression



Summary for Pond 4P: Existing Depression

Inflow Area = 7.405 ac, 3.48% Impervious, Inflow Depth = 0.51" for 25-Year event
Inflow = 1.09 cfs @ 12.73 hrs, Volume= 0.313 af
Outflow = 1.05 cfs @ 12.85 hrs, Volume= 0.313 af, Atten= 4%, Lag= 7.3 min
Discarded = 1.05 cfs @ 12.85 hrs, Volume= 0.313 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.99' @ 12.85 hrs Surf.Area= 730 sf Storage= 187 cf

Plug-Flow detention time= 0.9 min calculated for 0.313 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (979.9 - 979.0)

Volume	Invert	Avail.Storage	Storage Description
#1	156.60'	2,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

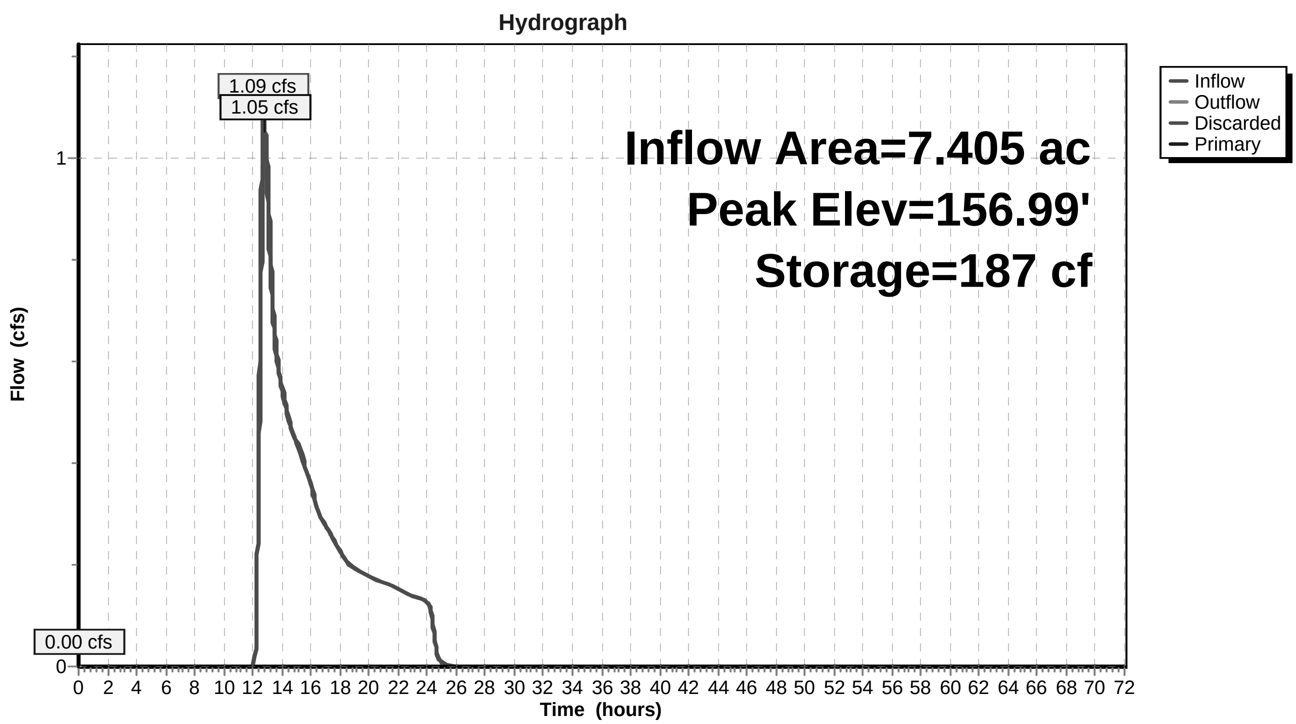
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
156.60	221	0	0
157.00	737	192	192
158.00	4,257	2,497	2,689

Device	Routing	Invert	Outlet Devices
#1	Discarded	156.60'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 150.20'
#2	Primary	157.44'	**30.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=1.05 cfs @ 12.85 hrs HW=156.99' (Free Discharge)
└─**1=Exfiltration** (Controls 1.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.60' TW=152.50' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: Existing Depression



Summary for Pond 5P: Existing Depression

Inflow Area = 24.314 ac, 4.30% Impervious, Inflow Depth = 1.97" for 25-Year event
Inflow = 20.90 cfs @ 12.83 hrs, Volume= 4.000 af
Outflow = 19.16 cfs @ 13.06 hrs, Volume= 4.000 af, Atten= 8%, Lag= 13.5 min
Discarded = 19.16 cfs @ 13.06 hrs, Volume= 4.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 198.11' @ 13.06 hrs Surf.Area= 11,960 sf Storage= 9,232 cf

Plug-Flow detention time= 3.3 min calculated for 4.000 af (100% of inflow)
Center-of-Mass det. time= 3.3 min (915.9 - 912.6)

Volume	Invert	Avail.Storage	Storage Description
#1	196.90'	57,265 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

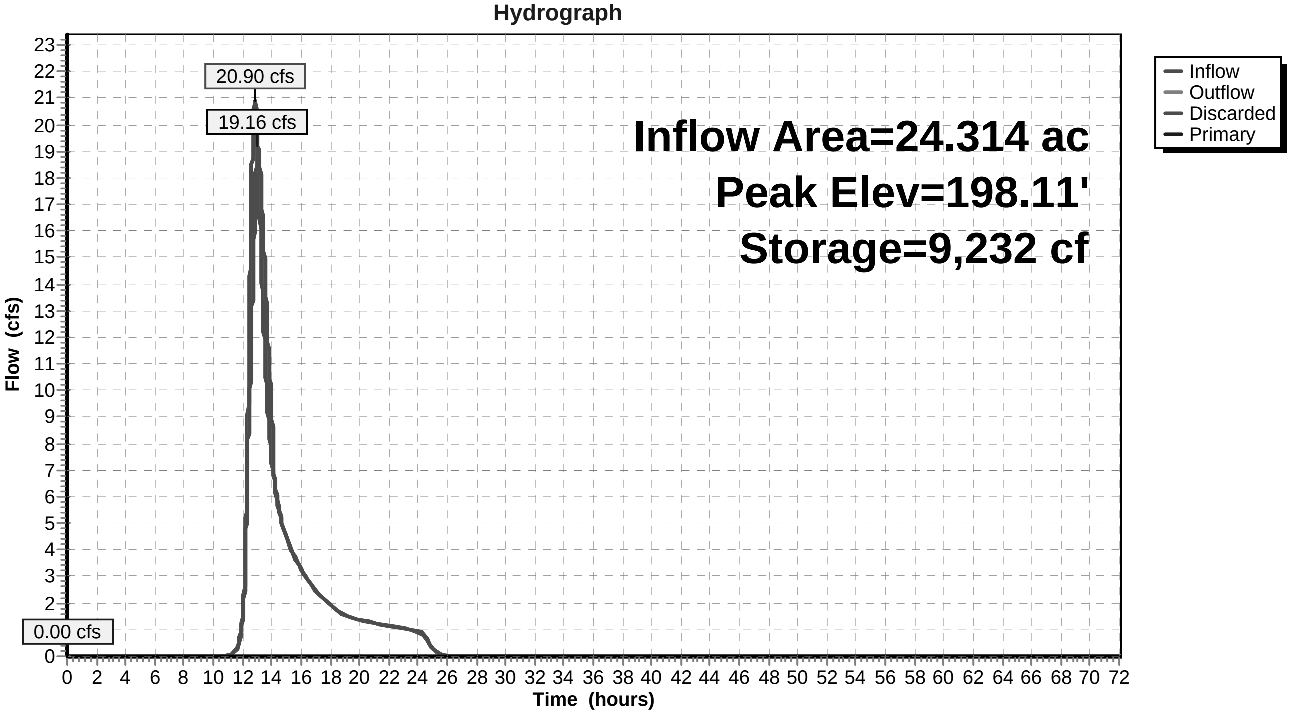
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
196.90	300	0	0
197.00	2,503	140	140
197.10	5,906	420	561
198.00	10,612	7,433	7,994
198.60	17,987	8,580	16,573
199.00	26,504	8,898	25,472
200.00	37,083	31,794	57,265

Device	Routing	Invert	Outlet Devices
#1	Discarded	196.90'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 192.20'
#2	Primary	198.75'	**28.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=19.16 cfs @ 13.06 hrs HW=198.11' (Free Discharge)
└─**1=Exfiltration** (Controls 19.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=196.90' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Existing Depression



Summary for Pond 11P: Carberry Ln Culvert

Inflow Area = 54.006 ac, 1.60% Impervious, Inflow Depth = 2.97" for 25-Year event
Inflow = 46.55 cfs @ 13.56 hrs, Volume= 13.376 af
Outflow = 46.54 cfs @ 13.57 hrs, Volume= 13.376 af, Atten= 0%, Lag= 0.8 min
Primary = 46.54 cfs @ 13.57 hrs, Volume= 13.376 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.55' @ 13.57 hrs Surf.Area= 650 sf Storage= 1,071 cf

Plug-Flow detention time= 0.4 min calculated for 13.374 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (930.6 - 930.1)

Volume	Invert	Avail.Storage	Storage Description
#1	159.12'	13,507 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

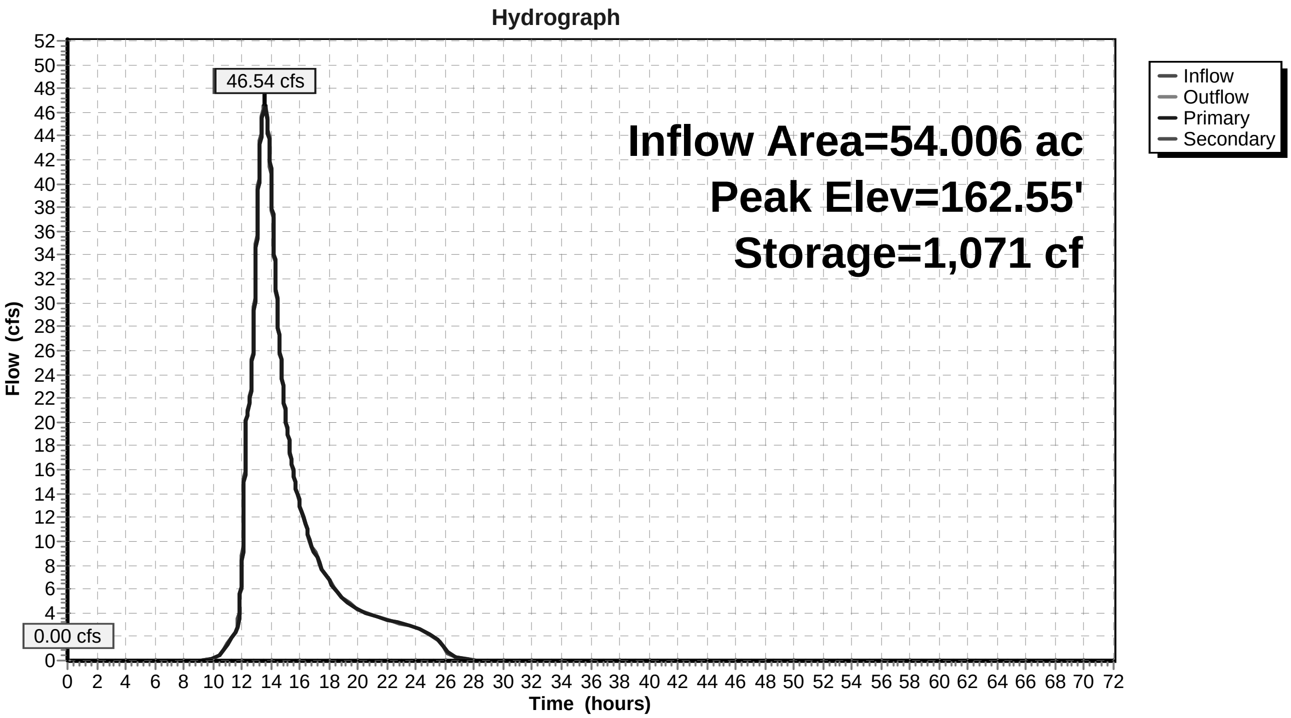
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
159.12	143	0	0
160.00	200	151	151
161.00	267	234	384
162.00	486	377	761
163.00	786	636	1,397
164.00	1,226	1,006	2,403
165.00	2,948	2,087	4,490
166.00	7,080	5,014	9,504
166.50	8,934	4,004	13,507

Device	Routing	Invert	Outlet Devices
#1	Primary	159.12'	**36.0" Round Culvert** L= 106.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.12' / 158.28' S= 0.0079 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf
#2	Secondary	165.25'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=46.54 cfs @ 13.57 hrs HW=162.55' (Free Discharge)
└─**1=Culvert** (Barrel Controls 46.54 cfs @ 7.22 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=159.12' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 11P: Carberry Ln Culvert



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Upper Watershed To Runoff Area=2,101,390 sf 0.58% Impervious Runoff Depth=5.22"
Flow Length=2,544' Tc=107.3 min CN=70 Runoff=80.11 cfs 20.987 af

Subcatchment 2S: Wetland Area Runoff Area=80,947 sf 16.02% Impervious Runoff Depth=5.47"
Flow Length=590' Tc=18.6 min UI Adjusted CN=72 Runoff=8.27 cfs 0.846 af

Subcatchment 3S: Lower Stream Channel Runoff Area=170,176 sf 7.39% Impervious Runoff Depth=5.10"
Flow Length=813' Tc=20.5 min UI Adjusted CN=69 Runoff=15.61 cfs 1.660 af

Subcatchment 4S: To Canton Ave Runoff Area=284,027 sf 7.86% Impervious Runoff Depth=3.27"
Flow Length=1,402' Tc=18.4 min CN=54 Runoff=16.81 cfs 1.779 af

Subcatchment 5S: To Canton Ave Runoff Area=322,558 sf 3.48% Impervious Runoff Depth=1.54"
Flow Length=1,163' Tc=34.8 min CN=39 Runoff=5.44 cfs 0.951 af

Subcatchment 6S: To Canton Ave Runoff Area=1,059,136 sf 4.30% Impervious Runoff Depth=3.88"
Flow Length=2,255' Tc=59.2 min CN=59 Runoff=43.29 cfs 7.857 af

Reach 1R: Upper Stream Channel Avg. Flow Depth=2.33' Max Vel=8.67 fps Inflow=80.11 cfs 20.987 af
n=0.050 L=763.0' S=0.0733 '/' Capacity=146.78 cfs Outflow=80.03 cfs 20.987 af

Reach DP1: Lower Stream Channel Avg. Flow Depth=1.80' Max Vel=10.18 fps Inflow=80.55 cfs 23.491 af
n=0.035 L=528.0' S=0.0537 '/' Capacity=190.84 cfs Outflow=80.55 cfs 23.491 af

Reach DP2: Canton Ave - North Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP3: Canton Ave - South Inflow=2.71 cfs 0.064 af
Outflow=2.71 cfs 0.064 af

Pond 1P: 30" Culvert Peak Elev=203.66' Storage=1,682 cf Inflow=80.03 cfs 20.987 af
Primary=33.58 cfs 14.946 af Secondary=46.44 cfs 6.039 af Outflow=80.02 cfs 20.985 af

Pond 2P: Existing Pond Area Peak Elev=195.72' Storage=23,453 cf Inflow=80.99 cfs 21.832 af
Primary=78.68 cfs 21.832 af Secondary=0.00 cfs 0.000 af Outflow=78.68 cfs 21.832 af

Pond 3P: Existing Depression Peak Elev=154.75' Storage=8,585 cf Inflow=16.81 cfs 1.829 af
Discarded=12.03 cfs 1.829 af Primary=0.00 cfs 0.000 af Outflow=12.03 cfs 1.829 af

Pond 4P: Existing Depression Peak Elev=157.52' Storage=1,044 cf Inflow=5.44 cfs 0.951 af
Discarded=3.77 cfs 0.901 af Primary=1.66 cfs 0.050 af Outflow=5.43 cfs 0.951 af

Pond 5P: Existing Depression Peak Elev=198.86' Storage=22,081 cf Inflow=43.29 cfs 7.857 af
Discarded=38.62 cfs 7.793 af Primary=2.71 cfs 0.064 af Outflow=41.33 cfs 7.857 af

Pond 11P: Carberry Ln Culvert Peak Elev=165.47' Storage=6,333 cf Inflow=80.55 cfs 23.491 af
Primary=74.96 cfs 23.278 af Secondary=5.54 cfs 0.213 af Outflow=80.50 cfs 23.491 af

Total Runoff Area = 92.246 ac Runoff Volume = 34.081 af Average Runoff Depth = 4.43"
97.10% Pervious = 89.566 ac 2.90% Impervious = 2.680 ac

Summary for Subcatchment 1S: Upper Watershed To Stream

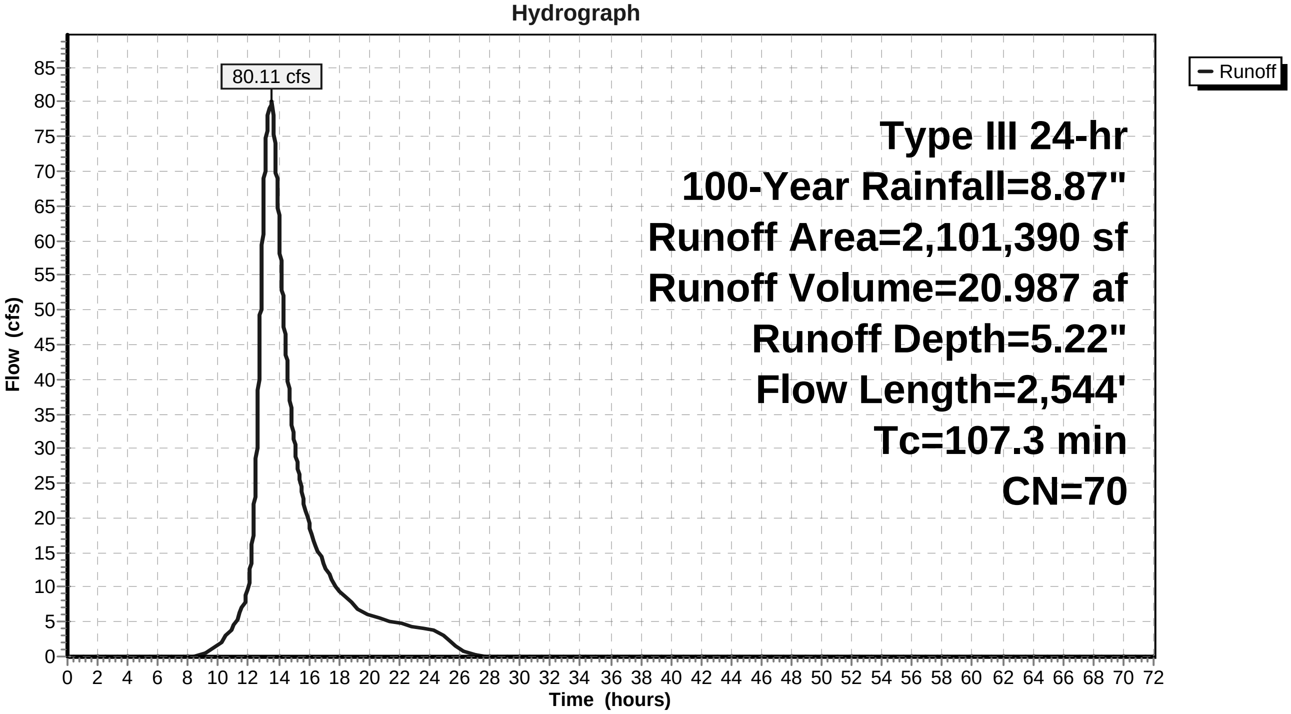
Runoff = 80.11 cfs @ 13.47 hrs, Volume= 20.987 af, Depth= 5.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

	Area (sf)	CN	Description
	153,412	30	Woods, Good, HSG A
	3,806	61	>75% Grass cover, Good, HSG B
	3,318	98	Roofs, HSG C
	1,085,438	70	Woods, Good, HSG C
	243,725	74	>75% Grass cover, Good, HSG C
	2,997	98	Paved parking, HSG D
	5,784	98	Roofs, HSG D
	482,716	77	Woods, Good, HSG D
	113,252	80	>75% Grass cover, Good, HSG D
*	6,942	83	Wetland Stream Channel
	2,101,390	70	Weighted Average
	2,089,291		99.42% Pervious Area
	12,099		0.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0080	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
23.4	554	0.0250	0.40		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
10.9	116	0.0050	0.18		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
16.5	813	0.1080	0.82		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
16.7	306	0.0150	0.31		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
22.2	705	0.0450	0.53		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
107.3	2,544	Total			

Subcatchment 1S: Upper Watershed To Stream



Summary for Subcatchment 2S: Wetland Area

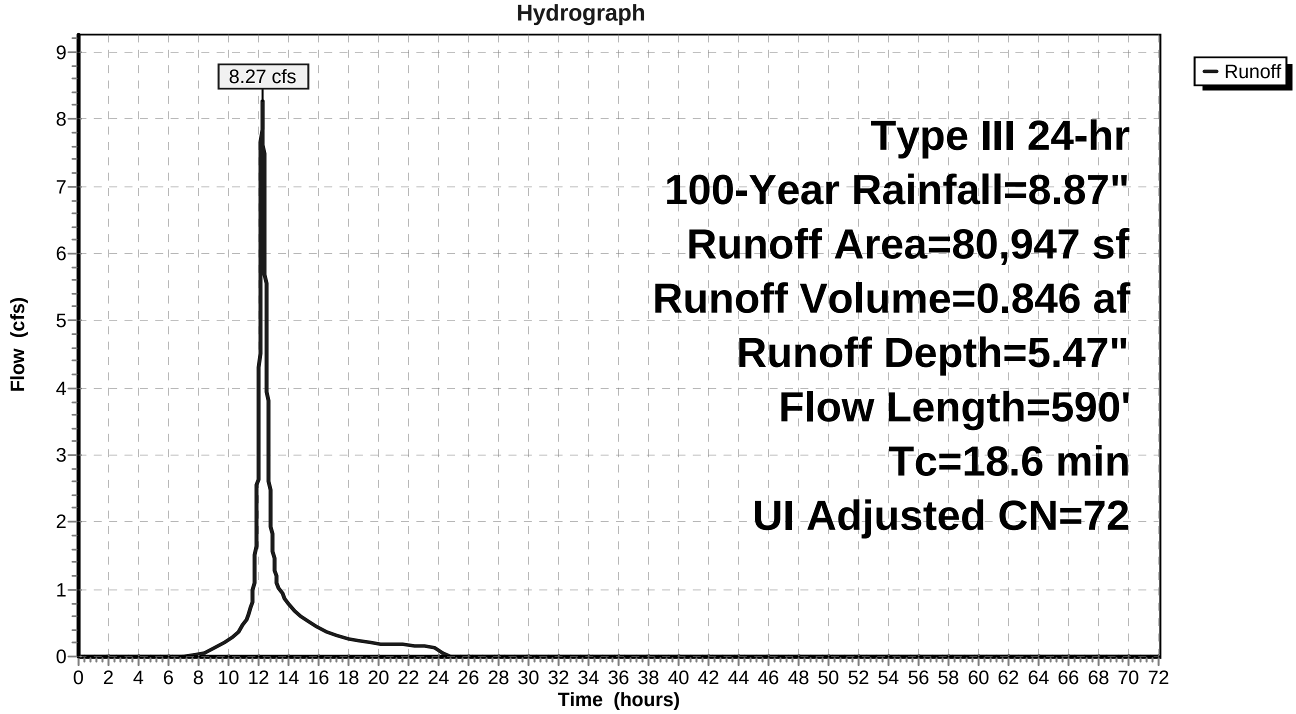
Runoff = 8.27 cfs @ 12.25 hrs, Volume= 0.846 af, Depth= 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

	Area (sf)	CN	Adj	Description
*	3,336	83		Wetland Stream Channel
	19,048	55		Woods, Good, HSG B
	3,460	98		Unconnected pavement, HSG B
	6,652	98		Unconnected pavement, HSG C
	2,858	98		Roofs, HSG C
	16,068	74		>75% Grass cover, Good, HSG C
	19,248	70		Woods, Good, HSG C
	5,331	80		>75% Grass cover, Good, HSG D
	4,946	77		Woods, Good, HSG D
	80,947	73	72	Weighted Average, UI Adjusted
	67,977			83.98% Pervious Area
	12,970			16.02% Impervious Area
	10,112			77.96% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0350	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
7.9	271	0.0520	0.57		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.5	150	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	119	0.0920	4.55		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.6	590	Total			

Subcatchment 2S: Wetland Area



Summary for Subcatchment 3S: Lower Stream Channel

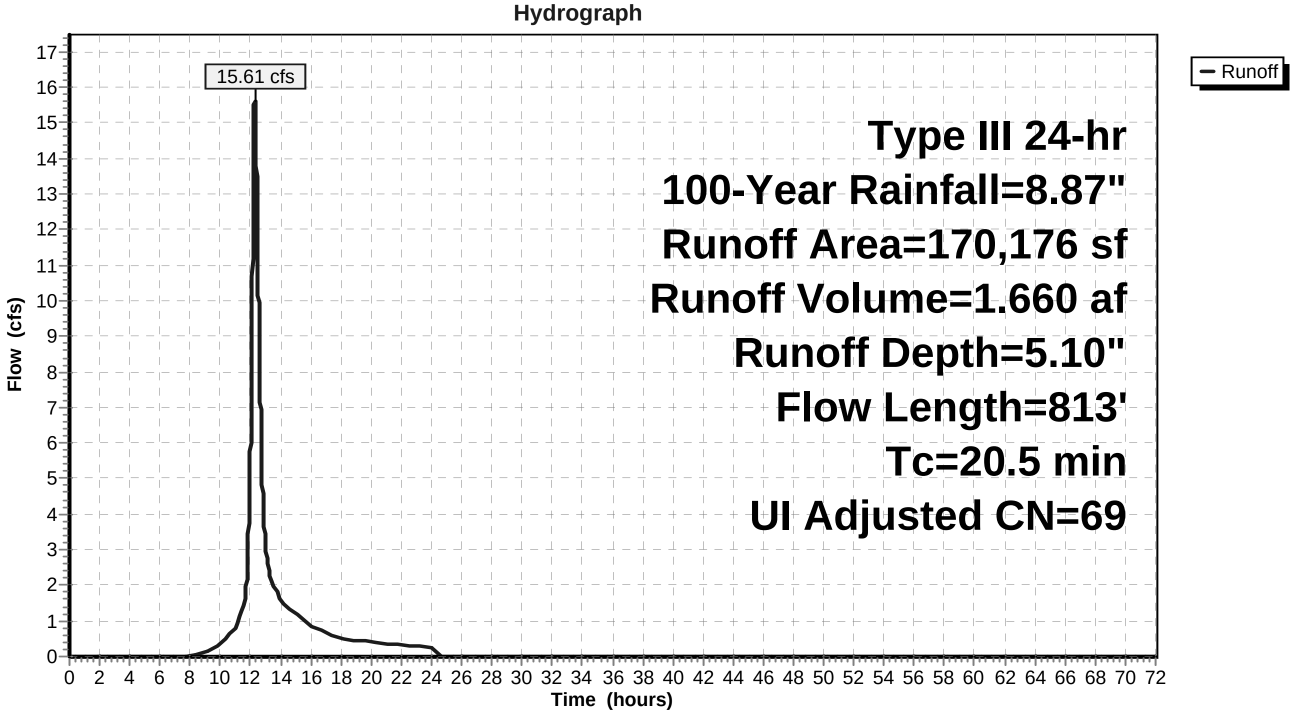
Runoff = 15.61 cfs @ 12.28 hrs, Volume= 1.660 af, Depth= 5.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

	Area (sf)	CN	Adj	Description
	27,020	55		Woods, Good, HSG B
	12,576	98		Unconnected roofs, HSG C
	18,196	74		>75% Grass cover, Good, HSG C
	109,957	70		Woods, Good, HSG C
*	2,427	83		Wetland Stream Channel
	170,176	70	69	Weighted Average, UI Adjusted
	157,600			92.61% Pervious Area
	12,576			7.39% Impervious Area
	12,576			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
11.7	580	0.1100	0.83		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.1	33	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	65	0.1400	0.94		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.7	62	0.0050	1.44		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	23	0.1300	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
20.5	813	Total			

Subcatchment 3S: Lower Stream Channel



Summary for Subcatchment 4S: To Canton Ave

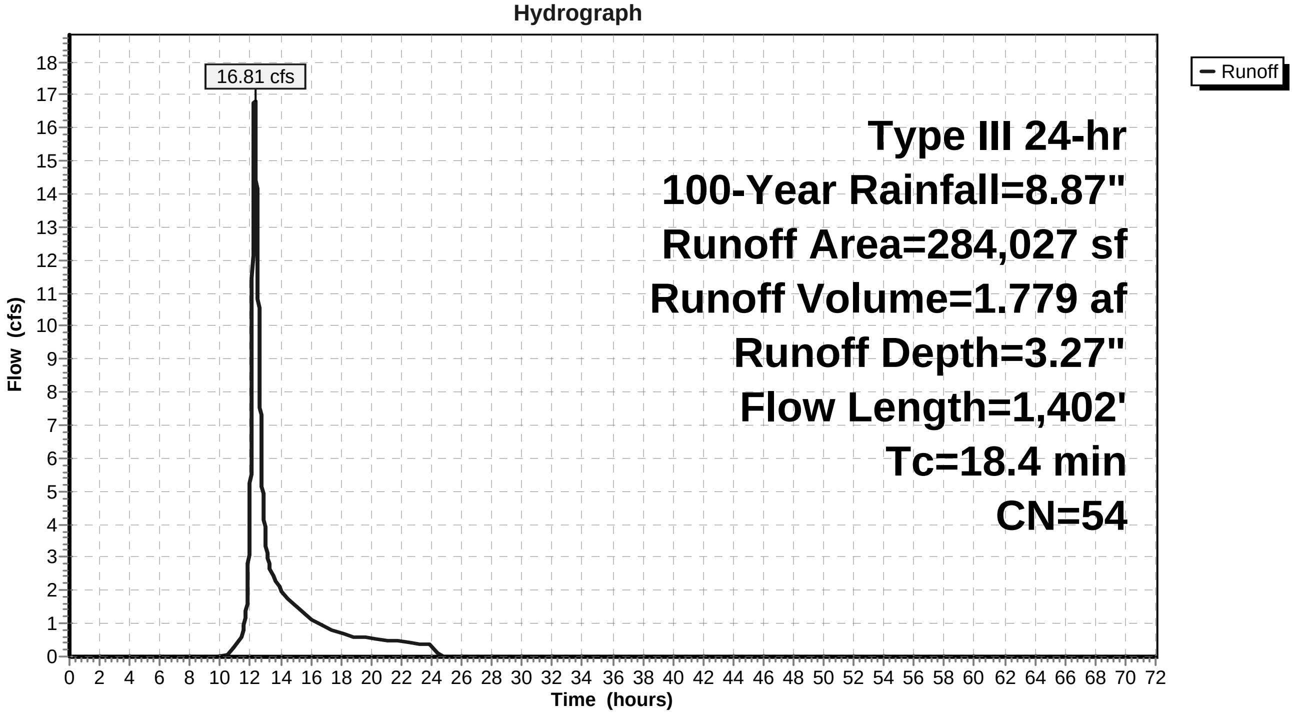
Runoff = 16.81 cfs @ 12.27 hrs, Volume= 1.779 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

Area (sf)	CN	Description
11,177	98	Paved parking, HSG A
2,353	98	Roofs, HSG A
53,901	30	Woods, Good, HSG A
113,021	39	>75% Grass cover, Good, HSG A
9,397	55	Woods, Good, HSG B
6,856	98	Paved parking, HSG D
1,931	98	Roofs, HSG D
47,201	77	Woods, Good, HSG D
38,190	80	>75% Grass cover, Good, HSG D
284,027	54	Weighted Average
261,710		92.14% Pervious Area
22,317		7.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.6	69	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
12.4	536	0.0830	0.72		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.7	165	0.0330	3.69		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	542	0.0870	5.99		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.4	1,402	Total			

Subcatchment 4S: To Canton Ave



Summary for Subcatchment 5S: To Canton Ave

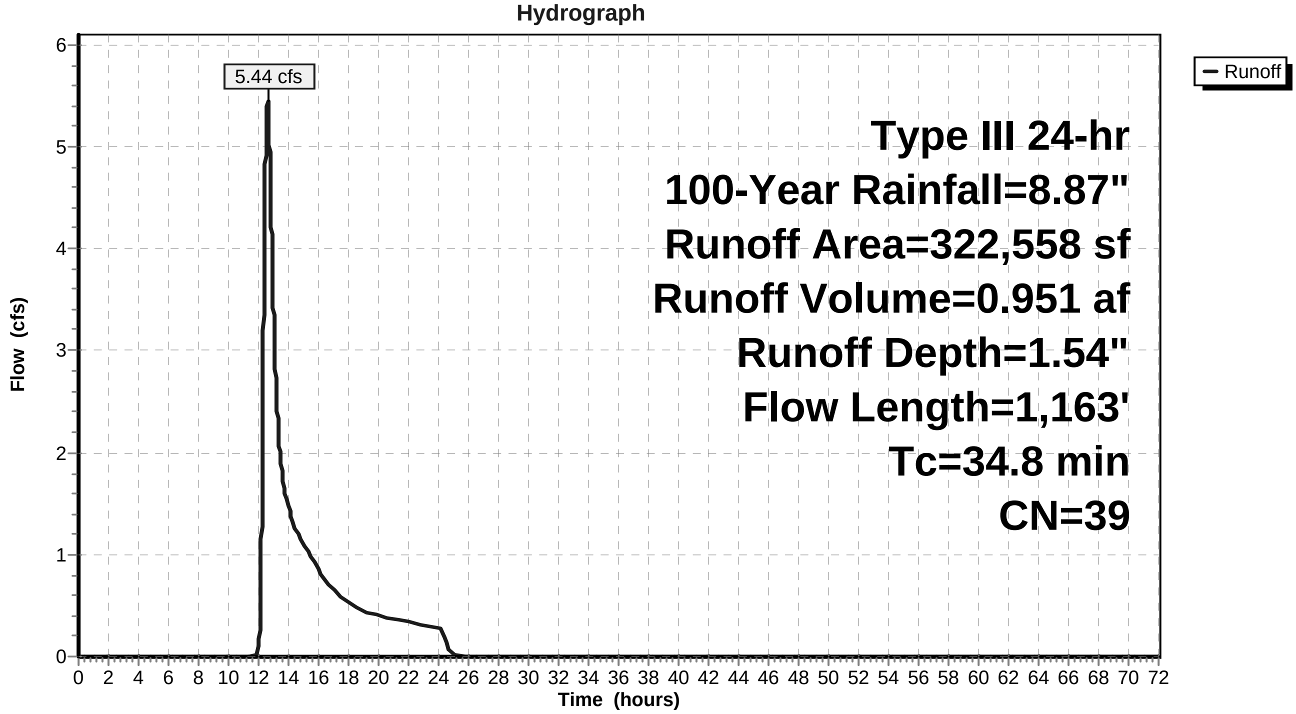
Runoff = 5.44 cfs @ 12.60 hrs, Volume= 0.951 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

Area (sf)	CN	Description
8,127	98	Paved parking, HSG A
3,083	98	Roofs, HSG A
84,050	30	Woods, Good, HSG A
227,298	39	>75% Grass cover, Good, HSG A
322,558	39	Weighted Average
311,348		96.52% Pervious Area
11,210		3.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.26"
4.7	391	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.5	375	0.0400	0.50		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
7.1	75	0.0050	0.18		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.4	272	0.0750	1.92		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
34.8	1,163	Total			

Subcatchment 5S: To Canton Ave



Summary for Subcatchment 6S: To Canton Ave

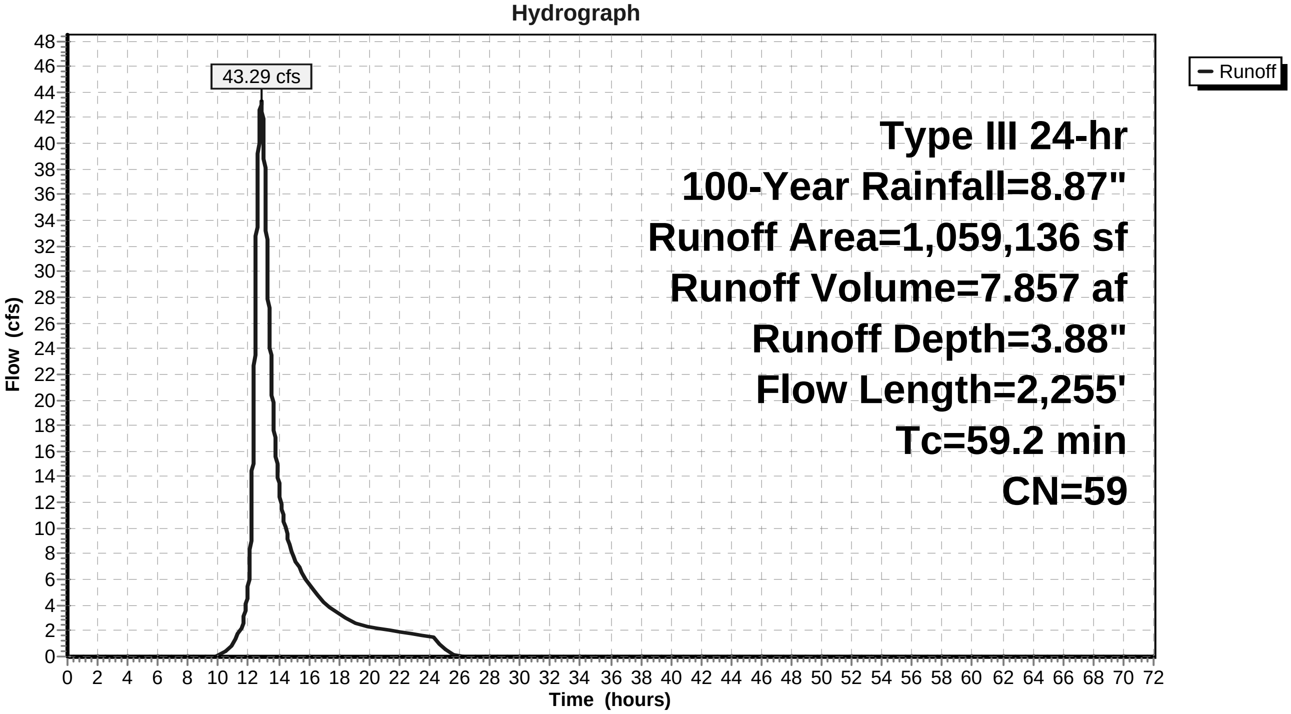
Runoff = 43.29 cfs @ 12.83 hrs, Volume= 7.857 af, Depth= 3.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

Area (sf)	CN	Description
8,943	98	Paved parking, HSG A
2,439	98	Roofs, HSG A
148,740	30	Woods, Good, HSG A
118,657	39	>75% Grass cover, Good, HSG A
219,044	55	Woods, Good, HSG B
26,267	98	Paved parking, HSG C
7,901	98	Roofs, HSG C
515,893	70	Woods, Good, HSG C
11,252	74	>75% Grass cover, Good, HSG C
1,059,136	59	Weighted Average
1,013,586		95.70% Pervious Area
45,550		4.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
29.2	1,300	0.0880	0.74		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.3	70	0.0360	3.85		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
21.8	835	0.0650	0.64		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
59.2	2,255	Total			

Subcatchment 6S: To Canton Ave



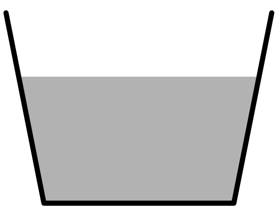
Summary for Reach 1R: Upper Stream Channel

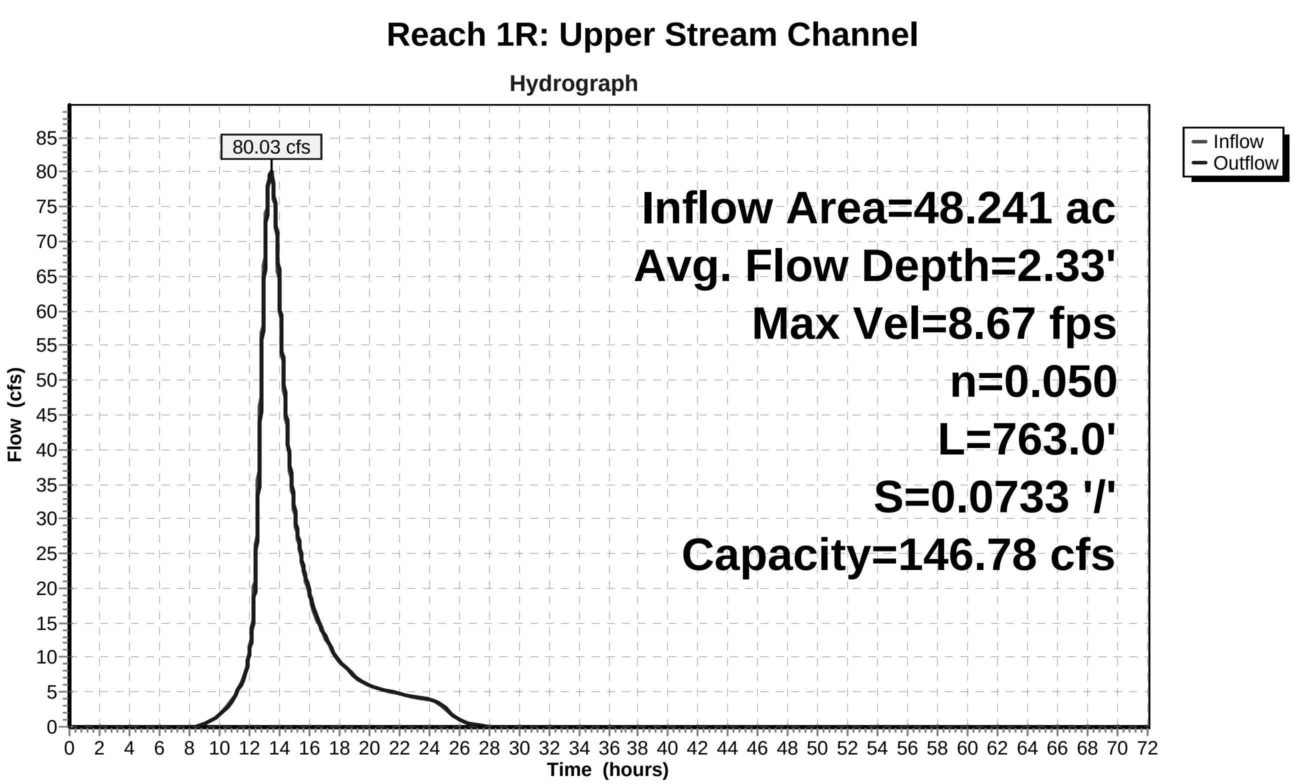
Inflow Area = 48.241 ac, 0.58% Impervious, Inflow Depth = 5.22" for 100-Year event
Inflow = 80.11 cfs @ 13.47 hrs, Volume= 20.987 af
Outflow = 80.03 cfs @ 13.48 hrs, Volume= 20.987 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.67 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 3.61 fps, Avg. Travel Time= 3.5 min

Peak Storage= 7,039 cf @ 13.48 hrs
Average Depth at Peak Storage= 2.33'
Bank-Full Depth= 3.50' Flow Area= 14.7 sf, Capacity= 146.78 cfs

3.50' x 3.50' deep channel, n= 0.050 Earth, cobble bottom, clean sides
Side Slope Z-value= 0.2 '/' Top Width= 4.90'
Length= 763.0' Slope= 0.0733 '/'
Inlet Invert= 260.96', Outlet Invert= 205.00'





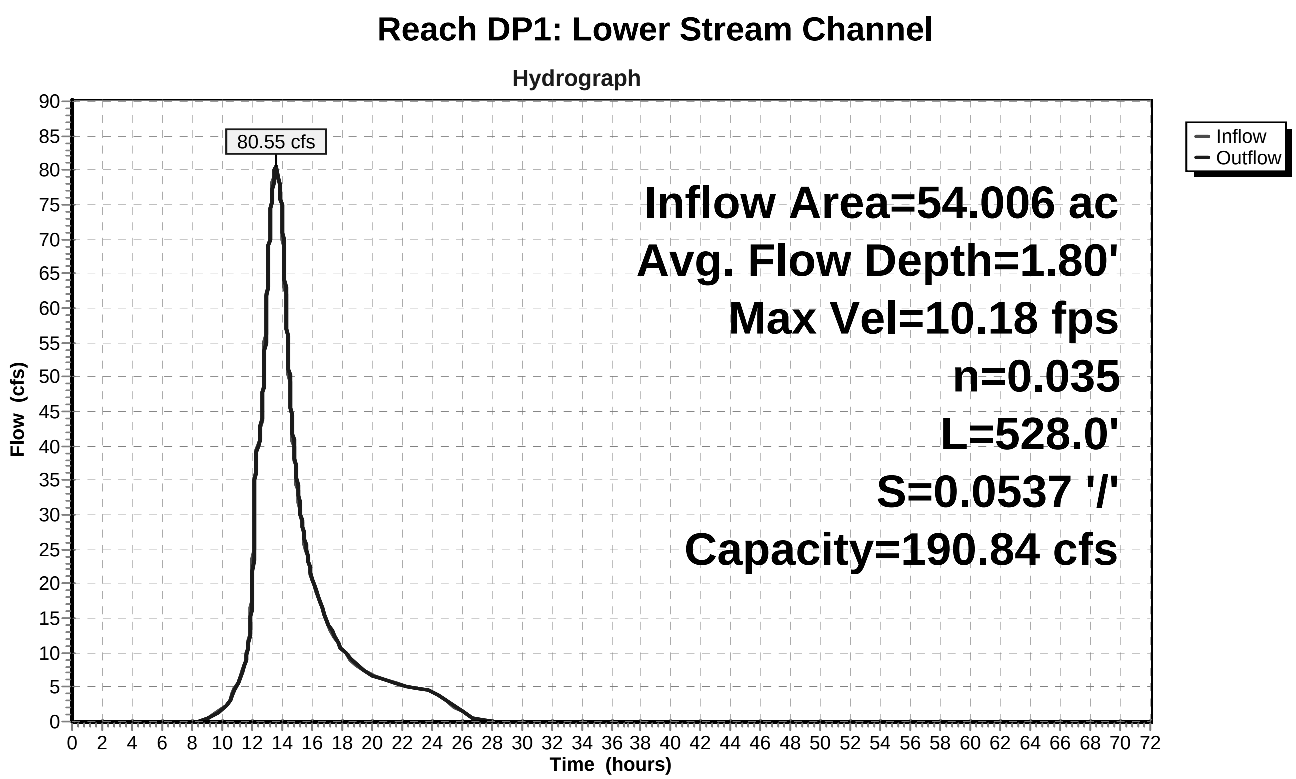
Summary for Reach DP1: Lower Stream Channel

Inflow Area = 54.006 ac, 1.60% Impervious, Inflow Depth = 5.22" for 100-Year event
Inflow = 80.55 cfs @ 13.62 hrs, Volume= 23.491 af
Outflow = 80.55 cfs @ 13.63 hrs, Volume= 23.491 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.18 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 3.98 fps, Avg. Travel Time= 2.2 min

Peak Storage= 4,177 cf @ 13.63 hrs
Average Depth at Peak Storage= 1.80'
Bank-Full Depth= 3.00' Flow Area= 15.0 sf, Capacity= 190.84 cfs

3.50' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 0.5 '/' Top Width= 6.50'
Length= 528.0' Slope= 0.0537 '/'
Inlet Invert= 187.50', Outlet Invert= 159.12'

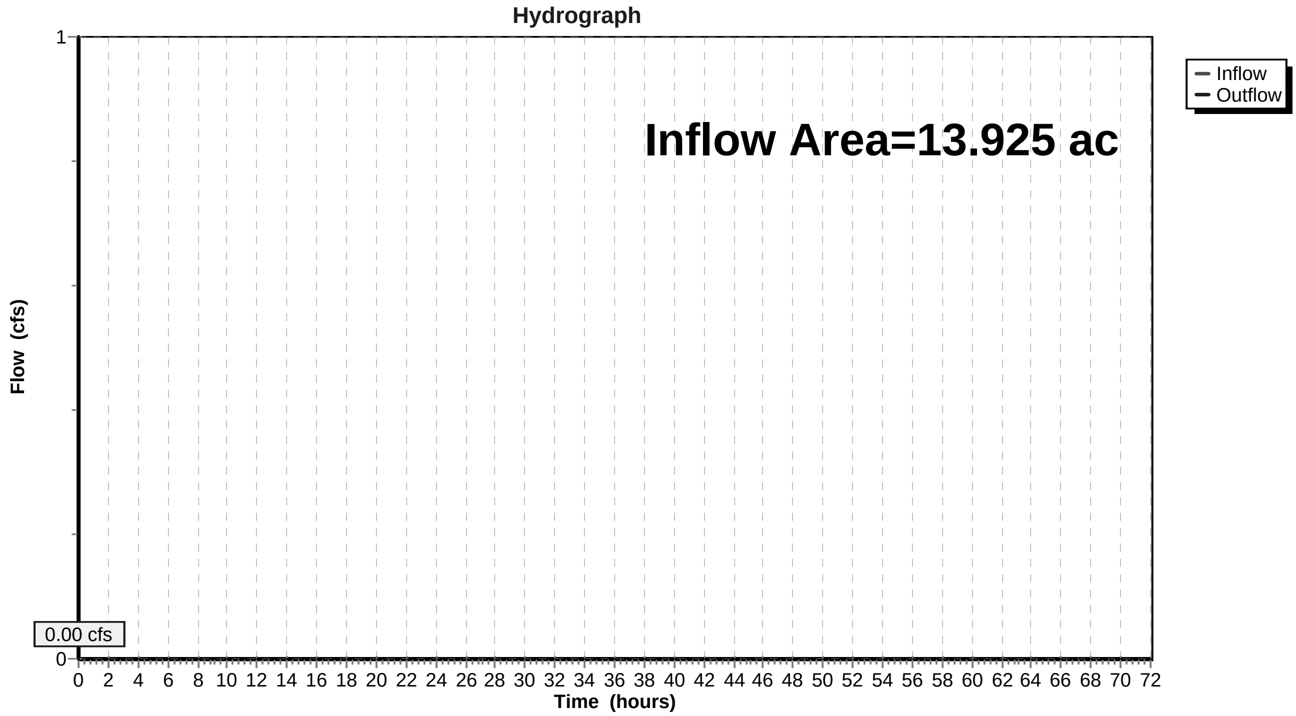


Summary for Reach DP2: Canton Ave - North

Inflow Area = 13.925 ac, 5.53% Impervious, Inflow Depth = 0.00" for 100-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP2: Canton Ave - North

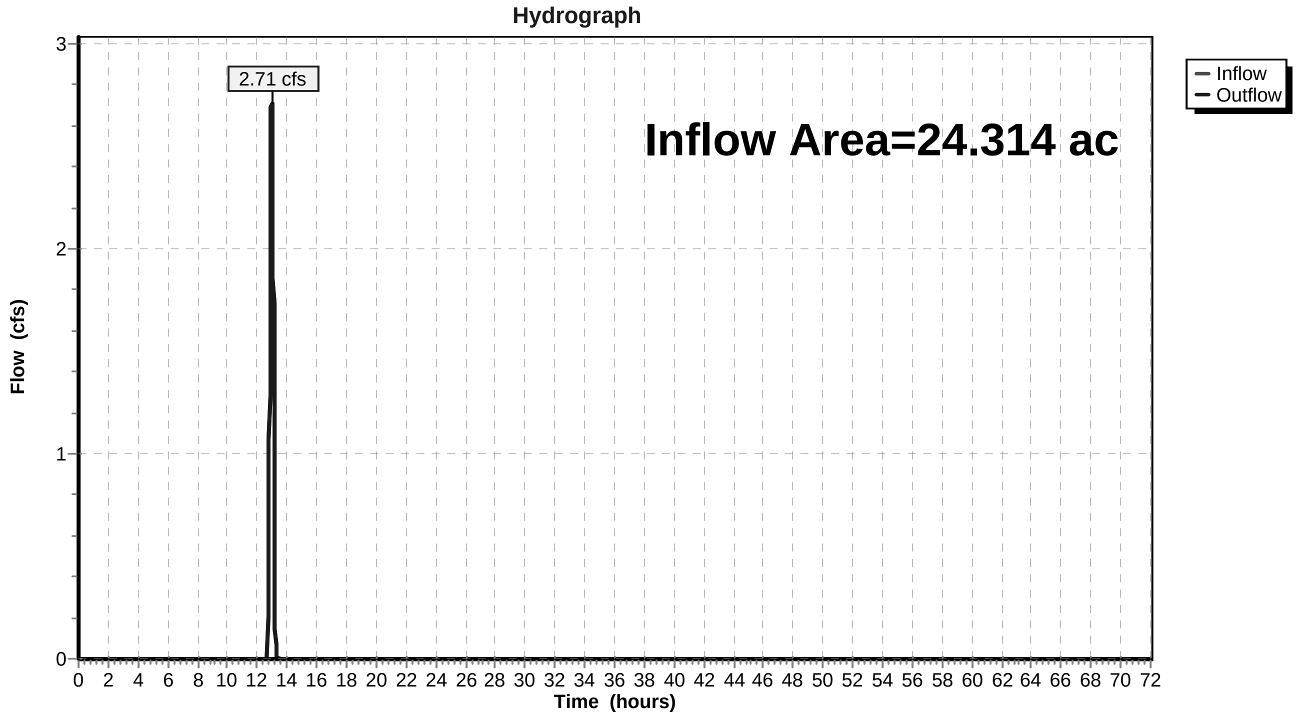


Summary for Reach DP3: Canton Ave - South

Inflow Area = 24.314 ac, 4.30% Impervious, Inflow Depth = 0.03" for 100-Year event
Inflow = 2.71 cfs @ 12.97 hrs, Volume= 0.064 af
Outflow = 2.71 cfs @ 12.97 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP3: Canton Ave - South



Summary for Pond 1P: 30" Culvert

Inflow Area = 48.241 ac, 0.58% Impervious, Inflow Depth = 5.22" for 100-Year event
Inflow = 80.03 cfs @ 13.48 hrs, Volume= 20.987 af
Outflow = 80.02 cfs @ 13.48 hrs, Volume= 20.985 af, Atten= 0%, Lag= 0.2 min
Primary = 33.58 cfs @ 13.48 hrs, Volume= 14.946 af
Secondary = 46.44 cfs @ 13.48 hrs, Volume= 6.039 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 203.66' @ 13.48 hrs Surf.Area= 763 sf Storage= 1,682 cf

Plug-Flow detention time= 0.8 min calculated for 20.985 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (917.1 - 916.5)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	3,062 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

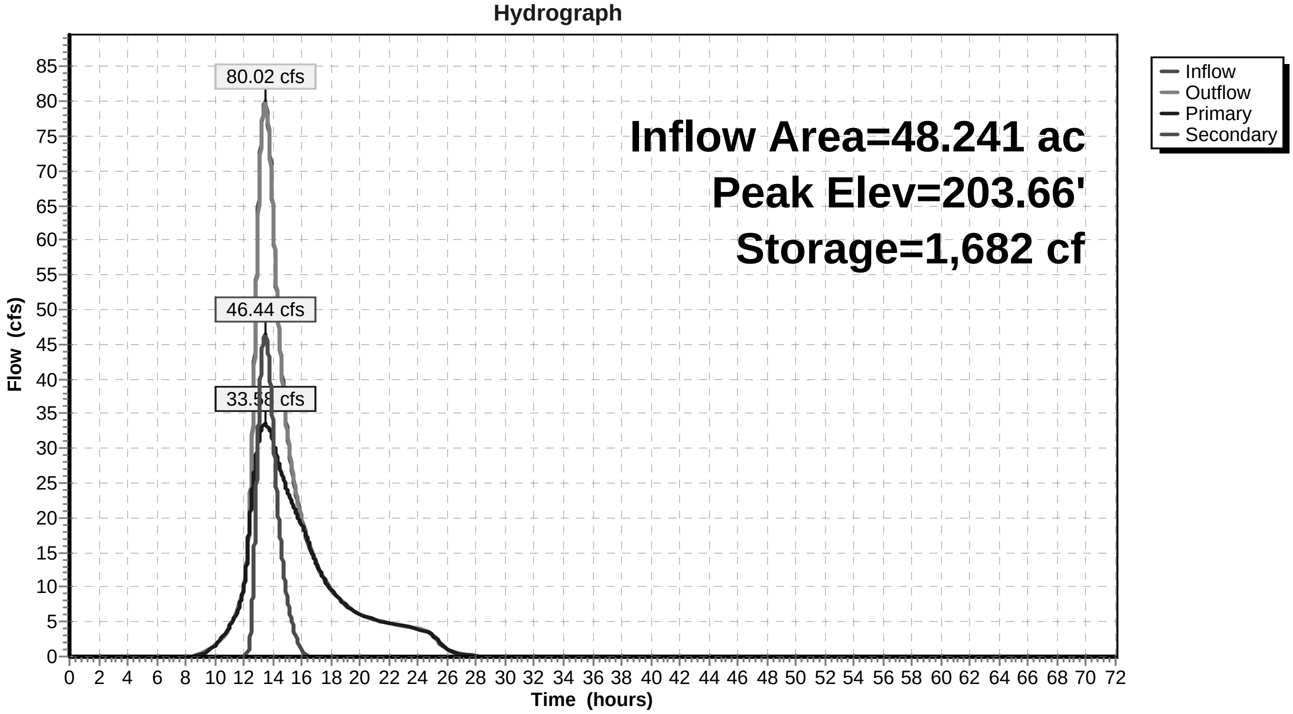
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
200.00	200	0	0
202.00	464	664	664
204.00	825	1,289	1,953
205.00	1,393	1,109	3,062

Device	Routing	Invert	Outlet Devices
#1	Primary	200.39'	**30.0" Round Culvert** L= 32.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 200.39' / 198.47' S= 0.0600 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 4.91 sf
#2	Secondary	202.20'	**10.0' long x 40.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=33.58 cfs @ 13.48 hrs HW=203.66' TW=195.57' (Dynamic Tailwater)
1=Culvert (Inlet Controls 33.58 cfs @ 6.84 fps)

Secondary OutFlow Max=46.44 cfs @ 13.48 hrs HW=203.66' TW=195.57' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 46.44 cfs @ 3.18 fps)

Pond 1P: 30" Culvert



Summary for Pond 2P: Existing Pond Area

Inflow Area = 50.100 ac, 1.15% Impervious, Inflow Depth = 5.23" for 100-Year event
Inflow = 80.99 cfs @ 13.48 hrs, Volume= 21.832 af
Outflow = 78.68 cfs @ 13.63 hrs, Volume= 21.832 af, Atten= 3%, Lag= 8.9 min
Primary = 78.68 cfs @ 13.63 hrs, Volume= 21.832 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 195.72' @ 13.63 hrs Surf.Area= 6,175 sf Storage= 23,453 cf

Plug-Flow detention time= 4.1 min calculated for 21.832 af (100% of inflow)
Center-of-Mass det. time= 4.1 min (917.8 - 913.7)

Volume	Invert	Avail.Storage	Storage Description
#1	187.82'	54,241 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

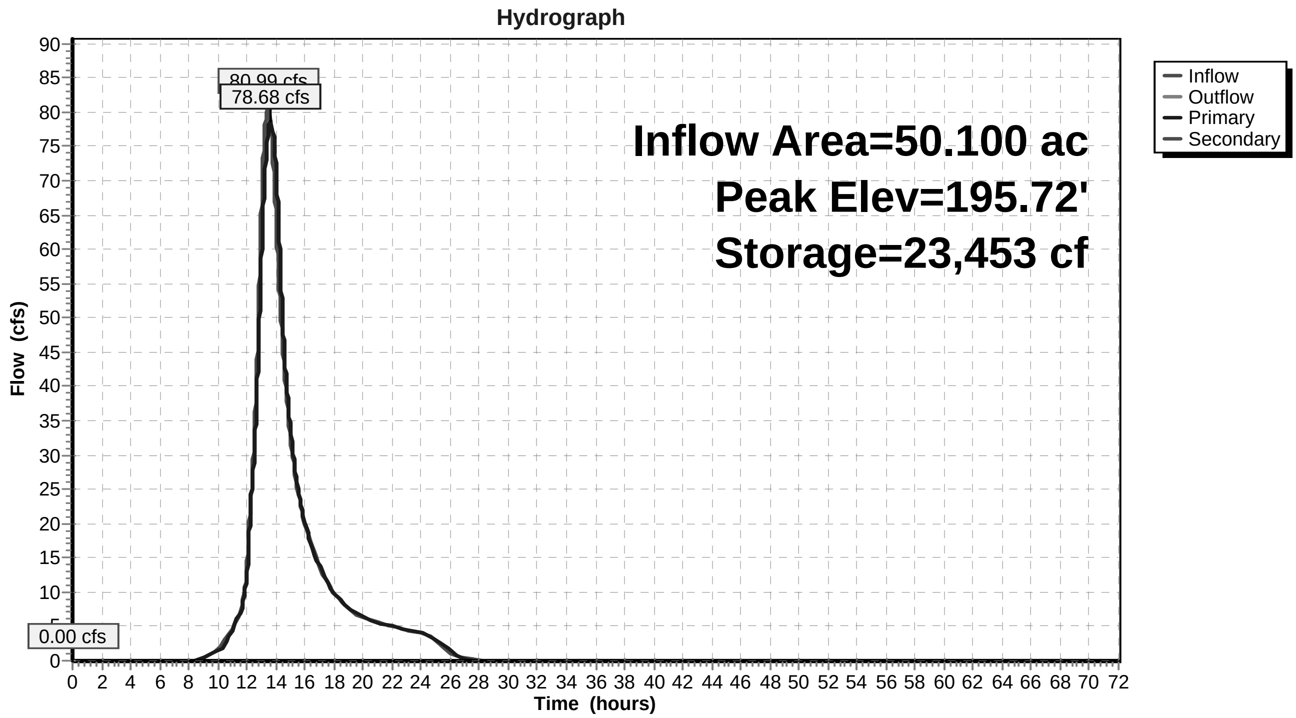
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.82	83	0	0
188.00	240	29	29
189.00	696	468	497
190.00	920	808	1,305
191.00	2,569	1,745	3,050
192.00	3,287	2,928	5,978
193.00	3,988	3,638	9,615
194.00	4,817	4,403	14,018
195.00	5,576	5,197	19,214
196.00	6,406	5,991	25,205
197.00	7,279	6,843	32,048
198.00	8,234	7,757	39,804
199.00	9,230	8,732	48,536
199.60	9,786	5,705	54,241

Device	Routing	Invert	Outlet Devices
#1	Primary	187.68'	**27.0" W x 42.0" H Box Culvert** L= 1.5' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.68' / 187.66' S= 0.0133 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.88 sf
#2	Device 1	187.71'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.75 2.50 2.50 3.50 Width (feet) 0.75 0.00 0.00 3.50 10.29
#3	Device 2	187.76'	**30.0" W x 48.0" H Box Culvert** L= 2.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.76' / 187.73' S= 0.0150 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 10.00 sf
#4	Secondary	197.90'	**18.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=78.67 cfs @ 13.63 hrs HW=195.72' TW=189.30' (Dynamic Tailwater)
└—**1=Culvert** (Passes 78.67 cfs of 81.27 cfs potential flow)
└—**2=Custom Weir/Orifice** (Orifice Controls 78.67 cfs @ 10.96 fps)
└—**3=Culvert** (Passes 78.67 cfs of 100.85 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.82' TW=187.50' (Dynamic Tailwater)
└—**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Pond Area



Summary for Pond 3P: Existing Depression

Inflow Area = 13.925 ac, 5.53% Impervious, Inflow Depth = 1.58" for 100-Year event
Inflow = 16.81 cfs @ 12.27 hrs, Volume= 1.829 af
Outflow = 12.03 cfs @ 12.54 hrs, Volume= 1.829 af, Atten= 28%, Lag= 16.3 min
Discarded = 12.03 cfs @ 12.54 hrs, Volume= 1.829 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 154.75' @ 12.54 hrs Surf.Area= 7,462 sf Storage= 8,585 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 5.8 min (868.4 - 862.6)

Volume	Invert	Avail.Storage	Storage Description
#1	152.50'	20,003 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

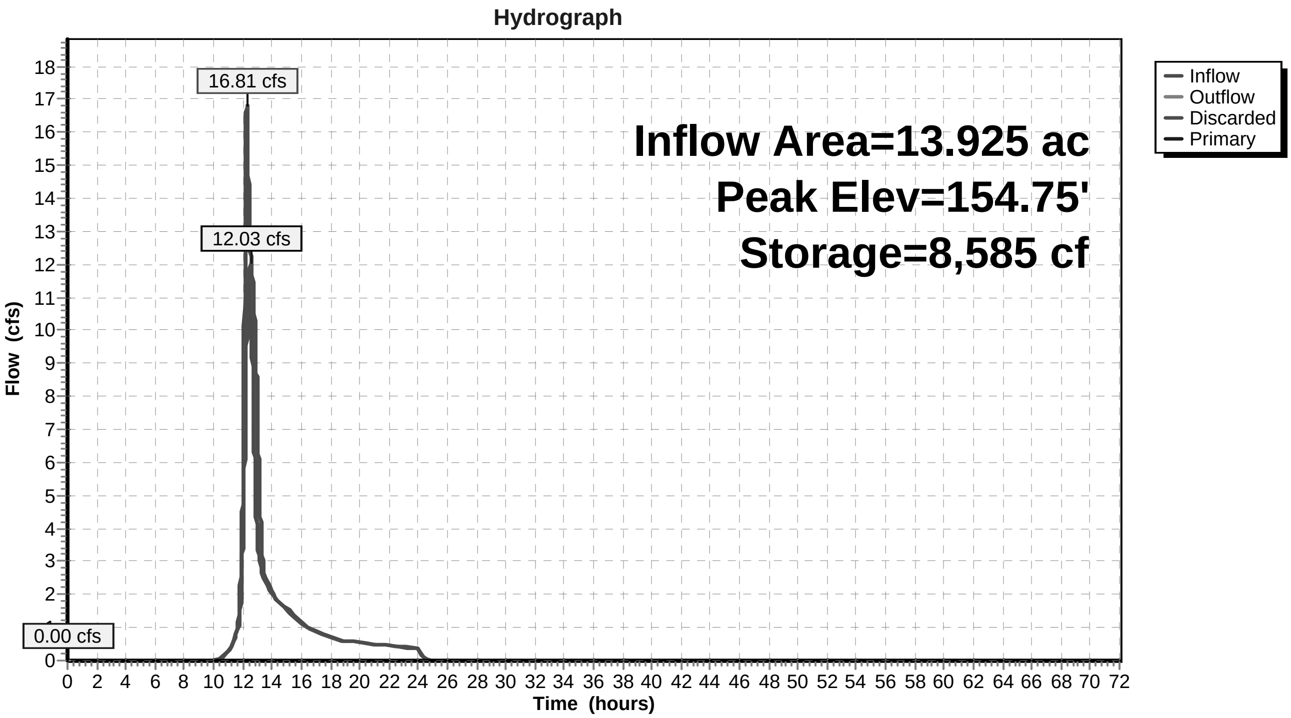
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
152.50	568	0	0
153.00	1,156	431	431
154.00	5,426	3,291	3,722
155.00	8,124	6,775	10,497
156.00	10,888	9,506	20,003

Device	Routing	Invert	Outlet Devices
#1	Discarded	152.50'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 146.20'
#2	Primary	155.50'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=12.03 cfs @ 12.54 hrs HW=154.75' (Free Discharge)
1=Exfiltration (Controls 12.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=152.50' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 3P: Existing Depression



Summary for Pond 4P: Existing Depression

Inflow Area = 7.405 ac, 3.48% Impervious, Inflow Depth = 1.54" for 100-Year event
Inflow = 5.44 cfs @ 12.60 hrs, Volume= 0.951 af
Outflow = 5.43 cfs @ 12.62 hrs, Volume= 0.951 af, Atten= 0%, Lag= 1.0 min
Discarded = 3.77 cfs @ 12.62 hrs, Volume= 0.901 af
Primary = 1.66 cfs @ 12.62 hrs, Volume= 0.050 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 157.52' @ 12.62 hrs Surf.Area= 2,559 sf Storage= 1,044 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.5 min (929.4 - 926.9)

Volume	Invert	Avail.Storage	Storage Description
#1	156.60'	2,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

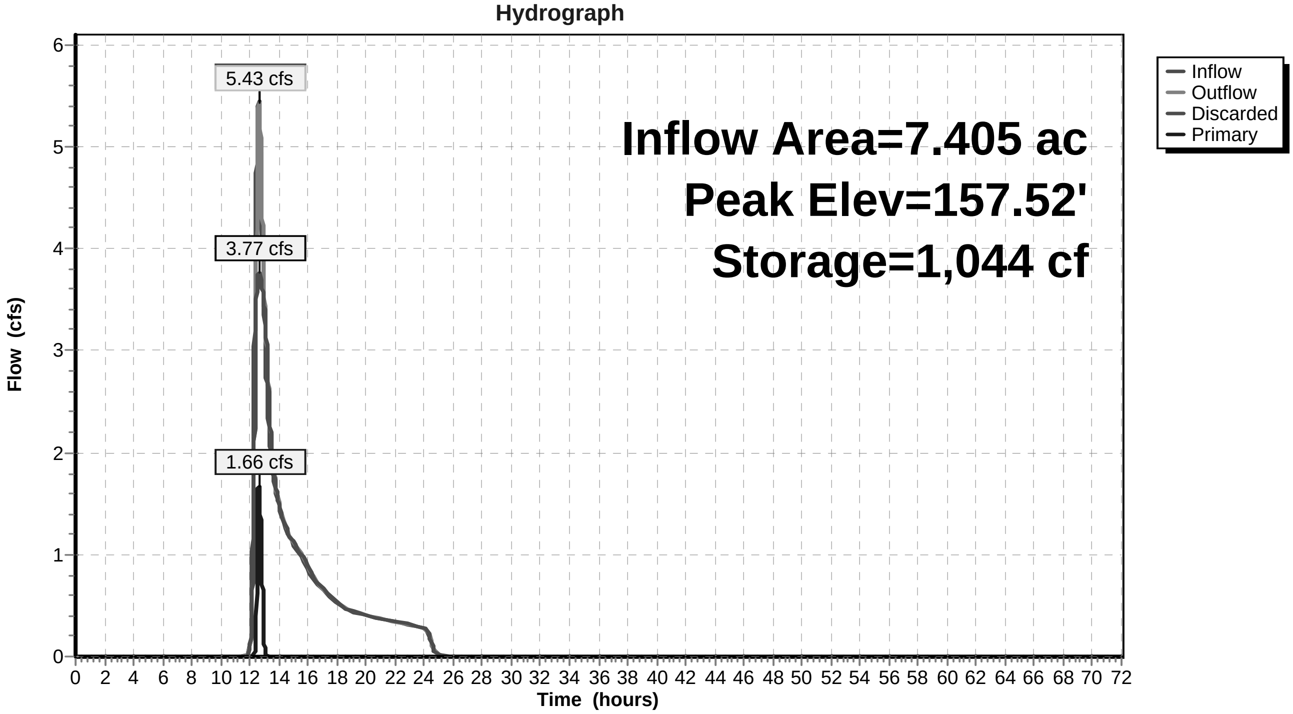
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
156.60	221	0	0
157.00	737	192	192
158.00	4,257	2,497	2,689

Device	Routing	Invert	Outlet Devices
#1	Discarded	156.60'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 150.20'
#2	Primary	157.44'	**30.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=3.77 cfs @ 12.62 hrs HW=157.52' (Free Discharge)
↑—**1=Exfiltration** (Controls 3.77 cfs)

Primary OutFlow Max=1.66 cfs @ 12.62 hrs HW=157.52' TW=154.72' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.66 cfs @ 0.72 fps)

Pond 4P: Existing Depression



Summary for Pond 5P: Existing Depression

Inflow Area = 24.314 ac, 4.30% Impervious, Inflow Depth = 3.88" for 100-Year event
Inflow = 43.29 cfs @ 12.83 hrs, Volume= 7.857 af
Outflow = 41.33 cfs @ 12.97 hrs, Volume= 7.857 af, Atten= 5%, Lag= 8.3 min
Discarded = 38.62 cfs @ 12.97 hrs, Volume= 7.793 af
Primary = 2.71 cfs @ 12.97 hrs, Volume= 0.064 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 198.86' @ 12.97 hrs Surf.Area= 23,623 sf Storage= 22,081 cf

Plug-Flow detention time= 5.3 min calculated for 7.857 af (100% of inflow)
Center-of-Mass det. time= 5.3 min (897.5 - 892.3)

Volume	Invert	Avail.Storage	Storage Description
#1	196.90'	57,265 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

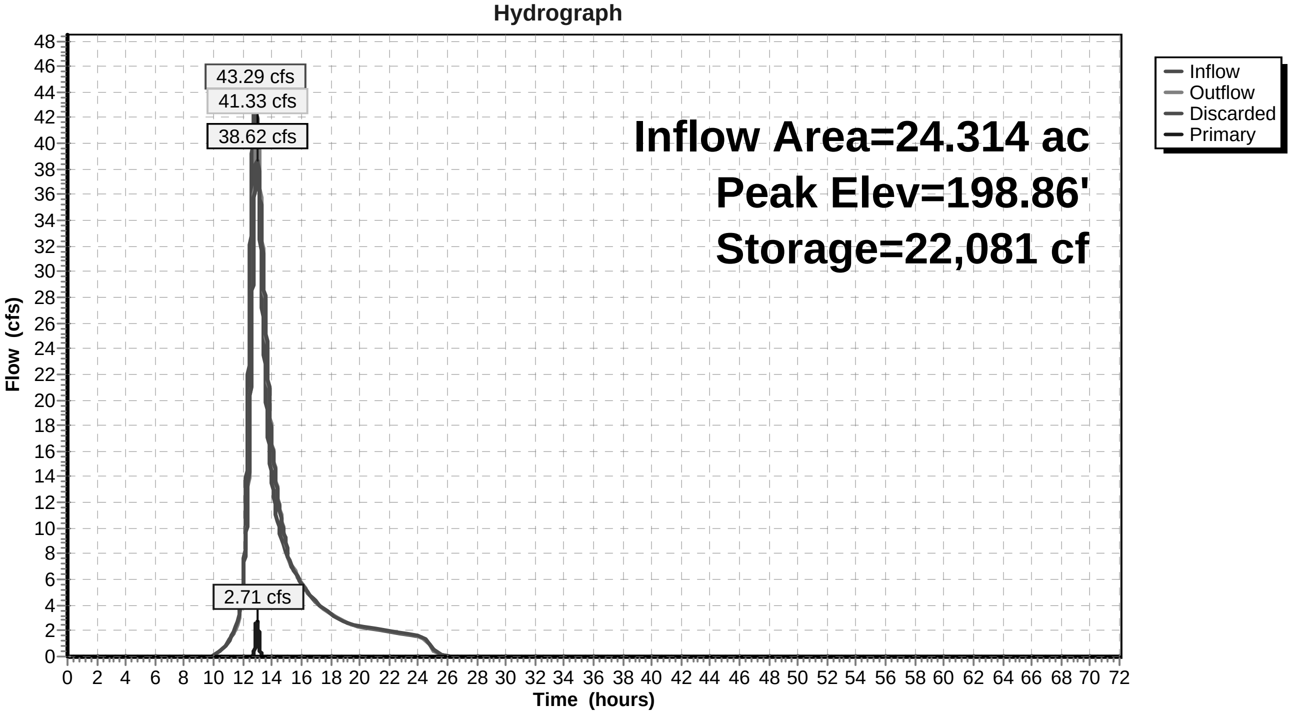
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
196.90	300	0	0
197.00	2,503	140	140
197.10	5,906	420	561
198.00	10,612	7,433	7,994
198.60	17,987	8,580	16,573
199.00	26,504	8,898	25,472
200.00	37,083	31,794	57,265

Device	Routing	Invert	Outlet Devices
#1	Discarded	196.90'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 192.20'
#2	Primary	198.75'	**28.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=38.62 cfs @ 12.97 hrs HW=198.86' (Free Discharge)
↑—**1=Exfiltration** (Controls 38.62 cfs)

Primary OutFlow Max=2.71 cfs @ 12.97 hrs HW=198.86' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 2.71 cfs @ 0.84 fps)

Pond 5P: Existing Depression



Summary for Pond 11P: Carberry Ln Culvert

Inflow Area = 54.006 ac, 1.60% Impervious, Inflow Depth = 5.22" for 100-Year event
Inflow = 80.55 cfs @ 13.63 hrs, Volume= 23.491 af
Outflow = 80.50 cfs @ 13.66 hrs, Volume= 23.491 af, Atten= 0%, Lag= 1.8 min
Primary = 74.96 cfs @ 13.66 hrs, Volume= 23.278 af
Secondary = 5.54 cfs @ 13.66 hrs, Volume= 0.213 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 165.47' @ 13.66 hrs Surf.Area= 4,891 sf Storage= 6,333 cf

Plug-Flow detention time= 0.7 min calculated for 23.488 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (913.9 - 913.2)

Volume	Invert	Avail.Storage	Storage Description
#1	159.12'	13,507 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

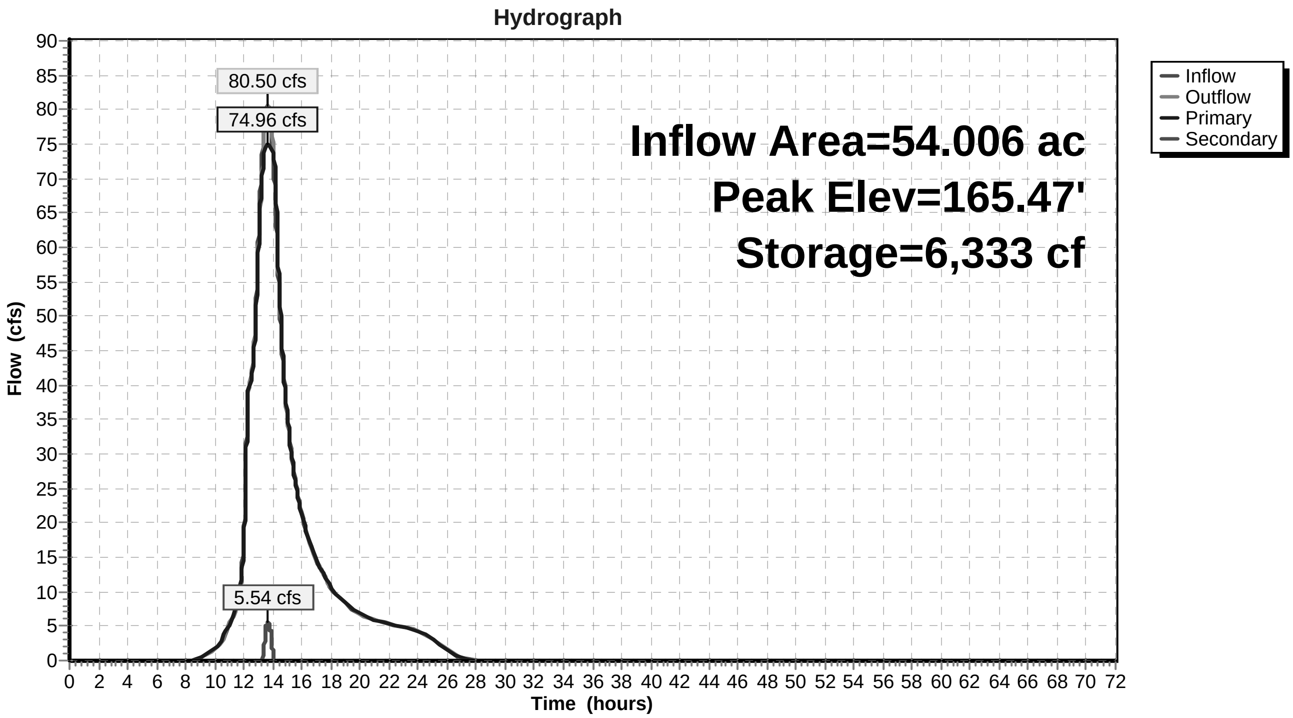
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
159.12	143	0	0
160.00	200	151	151
161.00	267	234	384
162.00	486	377	761
163.00	786	636	1,397
164.00	1,226	1,006	2,403
165.00	2,948	2,087	4,490
166.00	7,080	5,014	9,504
166.50	8,934	4,004	13,507

Device	Routing	Invert	Outlet Devices
#1	Primary	159.12'	**36.0" Round Culvert** L= 106.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.12' / 158.28' S= 0.0079 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf
#2	Secondary	165.25'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=74.96 cfs @ 13.66 hrs HW=165.47' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 74.96 cfs @ 10.60 fps)

Secondary OutFlow Max=5.54 cfs @ 13.66 hrs HW=165.47' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 5.54 cfs @ 1.26 fps)

Pond 11P: Carberry Ln Culvert



APPENDIX B

Proposed Conditions

2, 10, 25 and 100 year return storms

PROPOSED CONDITIONS WATERSHED

SUBCATCHMENT 1S

DESCRIPTION	AREA (S.F.)	
WOODS (HSG A)	153,412	S.F.
WOODS (HSG C)	929,681	S.F.
GRASS (HSG C)	185,864	S.F.
WOODS (HSG D)	459,084	S.F.
GRASS (HSG D)	84,545	S.F.
WETLAND STREAM CHANNEL	946	S.F.
TOTAL AREA FOR 1S	1,813,532	S.F.

SUBCATCHMENT 2S

DESCRIPTION	AREA (S.F.)	
WETLAND STREAM CHANNEL	3,336	S.F.
WOODS (HSG B)	17,332	S.F.
GRASS (HSG C)	624	S.F.
WOODS (HSG C)	3,464	S.F.
TOTAL AREA FOR 2S	24,756	S.F.

SUBCATCHMENT 3S

DESCRIPTION	AREA (S.F.)	
WOODS (HSG B)	27,020	S.F.
GRASS (HSG C)	30,772	S.F.
WOODS (HSG C)	58,057	S.F.
WETLAND STREAM CHANNEL	2,427	S.F
TOTAL AREA FOR 3S	118,276	S.F.

SUBCATCHMENT 4S

DESCRIPTION	AREA (S.F.)	
IMPERVIOUS (HSG A)	27,302	S.F.
WOODS (HSG A)	44,334	S.F.
GRASS (HSG A)	54,496	S.F.
WOODS (HSG B)	9,397	S.F.
WOODS (HSG D)	22,408	S.F.
GRASS (HSG D)	9,406	S.F.
IMPERVIOUS (HSG D)	8,628	S.F.
TOTAL AREA FOR 4S	175,971	S.F.

SUBCATCHMENT 5S

DESCRIPTION	AREA (S.F.)	
IMPERVIOUS (HSG A)	6,592	S.F.
WOODS (HSG A)	114,707	S.F.
GRASS (HSG A)	230,226	S.F.
TOTAL AREA FOR 5S	351,525	S.F.

SUBCATCHMENT 6S

DESCRIPTION	AREA (S.F.)	
WOODS (HSG A)	82,018	S.F.
GRASS (HSG A)	54,246	S.F.
WOODS (HSG C)	155,461	S.F.
GRASS (HSG C)	52,059	S.F.
IMPERVIOUS (HSG C)	23,141	S.F.
IMPERVIOUS (HSG A)	31,002	S.F.
WOODS (HSG B)	71,285	S.F.
TOTAL AREA FOR 6S	469,212	S.F.

SUBCATCHMENT 7S

DESCRIPTION	AREA (S.F.)	
IMPERVIOUS (HSG A)	9,963	S.F.
WOODS (HSG A)	40,675	S.F.
IMPERVIOUS (HSG C)	10,854	S.F.
WOODS (HSG C)	11,139	S.F.
GRASS (HSG A)	45,027	S.F.
GRASS (HSG C)	19,832	S.F.
TOTAL AREA FOR 7S	137,490	S.F.

SUBCATCHMENT 8S

DESCRIPTION	AREA (S.F.)	
IMPERVIOUS (HSG C)	10,854	S.F.
WOODS (HSG C)	56,850	S.F.
GRASS (HSG C)	39,960	S.F.
IMPERVIOUS (HSG D)	6,997	S.F.
GRASS (HSG D)	13,257	S.F.
GRASS (HSG B)	4,792	S.F.
WETLAND STREAM CHANNEL	5,996	S.F.
TOTAL AREA FOR 8S	138,706	S.F.

SUBCATCHMENT 9S

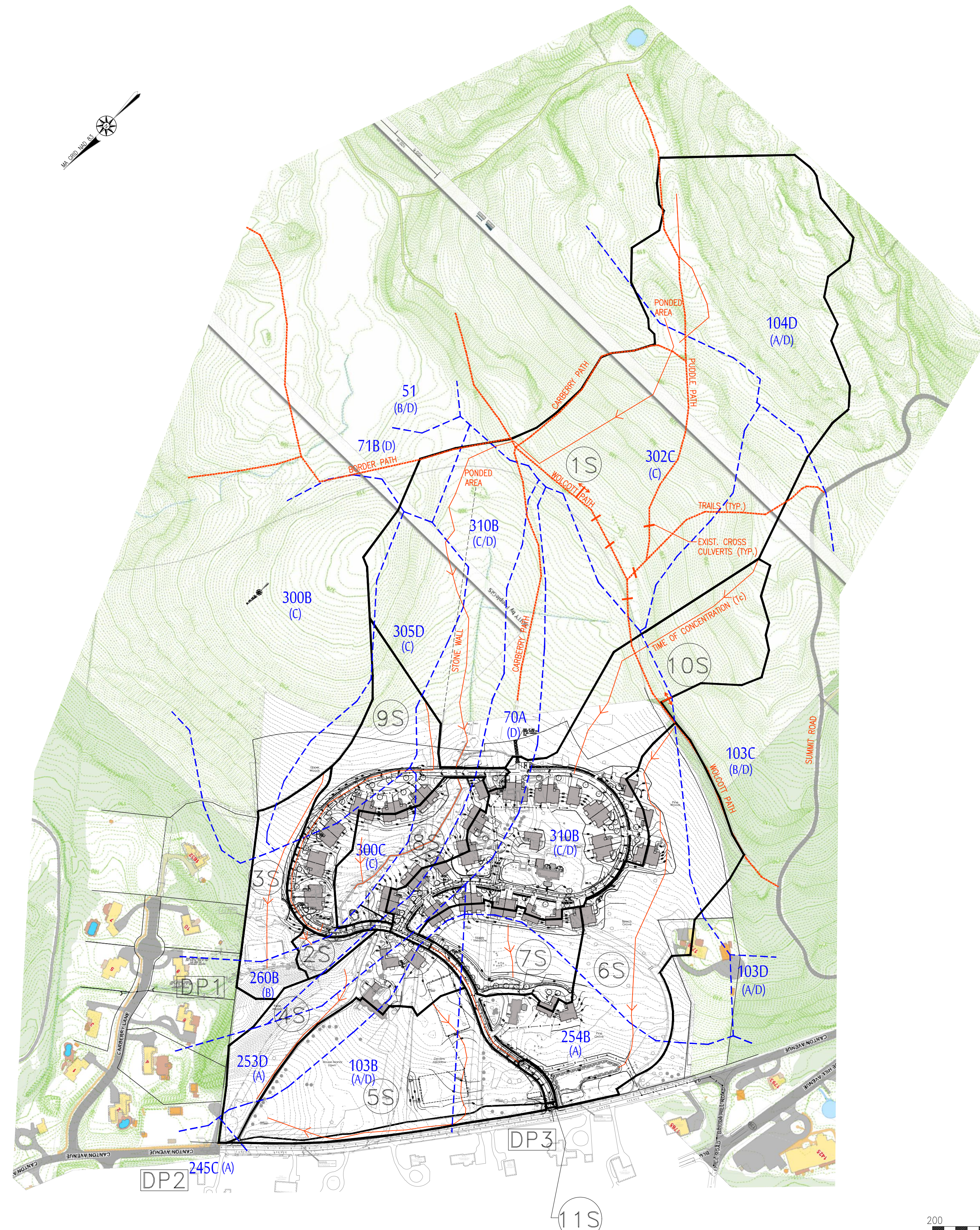
DESCRIPTION	AREA (S.F.)	
IMPERVIOUS (HSG C)	75,189	S.F.
WOODS (HSG C)	92,096	S.F.
GRASS (HSG C)	65,408	S.F
TOTAL AREA FOR 9S	232,693	S.F.

SUBCATCHMENT 10S

DESCRIPTION	AREA (S.F.)	
IMPERVIOUS (HSG A)	1,375	S.F.
GRASS (HSG A)	1,811	S.F.
WOODS (HSG B)	126,272	S.F.
IMPERVIOUS (HSG D)	44,988	S.F.
GRASS (HSG D)	34,183	S.F.
IMPERVIOUS (HSG C)	87,376	S.F.
WOODS (HSG C)	121,146	S.F.
GRASS (HSG C)	129,363	S.F.
GRAVEL (HSG C)	2,400	S.F.
TOTAL AREA FOR 10S	548,914	S.F.

SUBCATCHMENT 11S

DESCRIPTION	AREA (S.F.)	
IMPERVIOUS (HSG A)	5,800	S.F.
GRASS (HSG A)	1,360	S.F.
TOTAL AREA FOR 11S	7,160	S.F.



200 0 200 400 600
SCALE IN FEET

REVISIONS

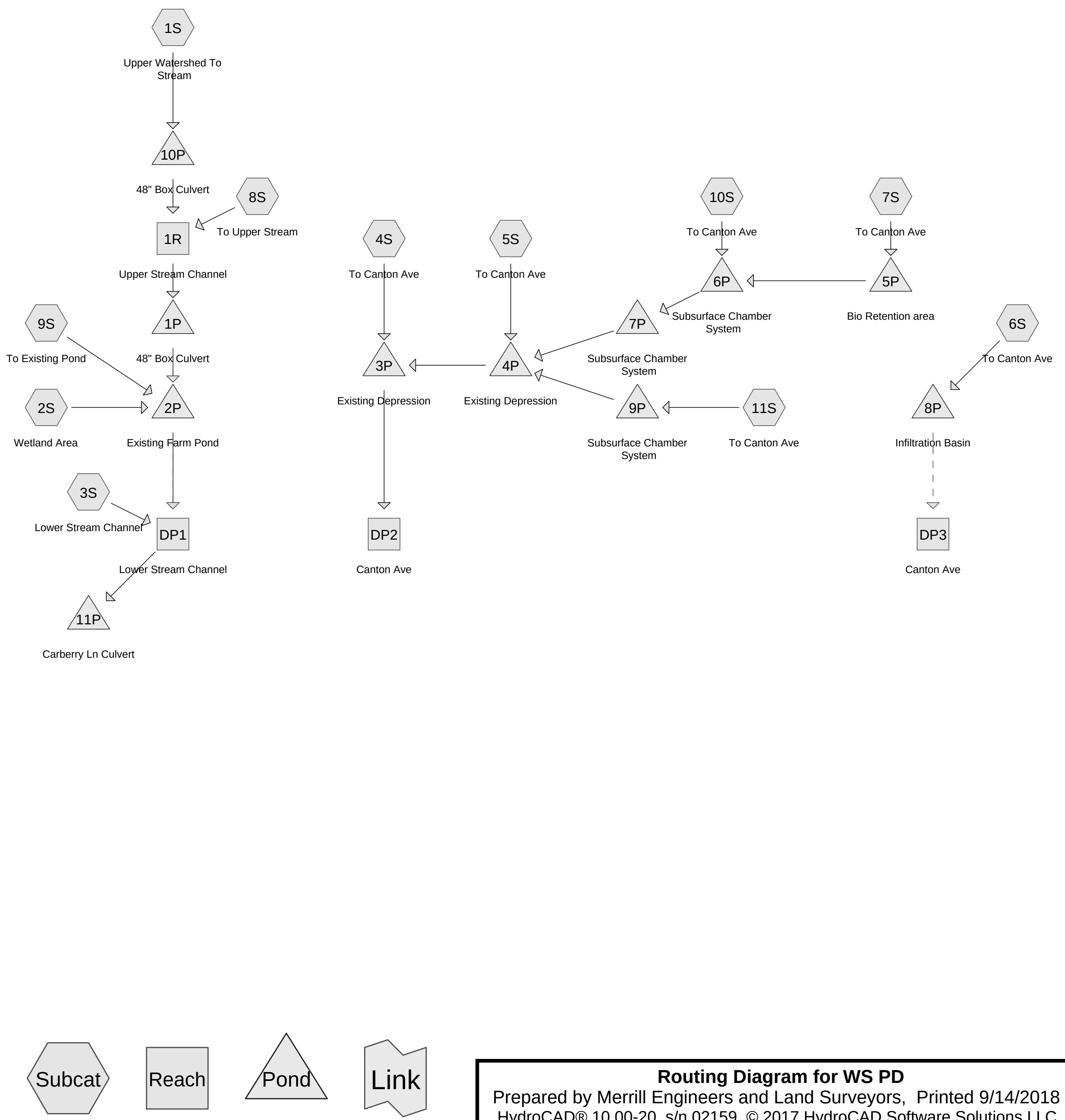
KEY PLAN

DRAWN BY: JG
DESIGNED BY: JG/DWK
CHECKED BY: DWK

Merrill
Engineers and Land Surveyors
427 COLUMBIA ROAD, HANOVER, MA 02339 / T: (781) 826-9200
26 UNION STREET, PLYMOUTH MA 02360 / T: (508) 746-6060
WWW.MERRILLINC.COM

SITE PLAN
WOLCOTT WOODS
MILTON, MASSACHUSETTS
PREPARED FOR: WOLCOTT RESIDENTIAL, LLC
80 BEHARRELL STREET, SUITE E
CONCORD, MASSACHUSETTS 01742

AUGUST 31, 2018
SCALE: 1" = 200'
JOB No. 16-079
LATEST REVISION:
PROPOSED WATERSHED PLAN
SHEET WS2



Routing Diagram for WS PD
Prepared by Merrill Engineers and Land Surveyors, Printed 9/14/2018
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
8.888	39	>75% Grass cover, Good, HSG A (4S, 5S, 6S, 7S, 10S, 11S)
0.110	61	>75% Grass cover, Good, HSG B (8S)
12.027	74	>75% Grass cover, Good, HSG C (1S, 2S, 3S, 6S, 7S, 8S, 9S, 10S)
3.246	80	>75% Grass cover, Good, HSG D (1S, 4S, 8S, 10S)
0.055	96	Gravel surface, HSG C (10S)
1.402	98	Paved parking, HSG A (4S, 5S, 6S, 7S, 11S)
2.789	98	Paved parking, HSG C (6S, 9S, 10S)
0.788	98	Paved parking, HSG D (4S, 10S)
0.482	98	Roofs, HSG A (4S, 5S, 6S, 7S, 10S)
1.973	98	Roofs, HSG C (6S, 7S, 8S, 9S, 10S)
0.604	98	Roofs, HSG D (8S, 10S)
0.292	83	Wetland Stream Channel (1S, 2S, 3S, 8S)
9.990	30	Woods, Good, HSG A (1S, 4S, 5S, 6S, 7S)
5.769	55	Woods, Good, HSG B (2S, 3S, 4S, 6S, 10S)
32.780	70	Woods, Good, HSG C (1S, 2S, 3S, 6S, 7S, 8S, 9S, 10S)
11.054	77	Woods, Good, HSG D (1S, 4S)
92.246	**66**	**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Upper Watershed To Runoff Area=1,813,532 sf 0.00% Impervious Runoff Depth=0.81"
Flow Length=2,658' Tc=107.5 min CN=69 Runoff=9.33 cfs 2.823 af

Subcatchment 2S: Wetland Area Runoff Area=24,756 sf 0.00% Impervious Runoff Depth=0.47"
Flow Length=47' Slope=0.0800 '/' Tc=6.7 min CN=61 Runoff=0.20 cfs 0.022 af

Subcatchment 3S: Lower Stream Channel Runoff Area=118,276 sf 0.00% Impervious Runoff Depth=0.77"
Flow Length=683' Tc=19.4 min CN=68 Runoff=1.43 cfs 0.173 af

Subcatchment 4S: To Canton Ave Runoff Area=175,971 sf 20.42% Impervious Runoff Depth=0.33"
Flow Length=549' Tc=10.0 min CN=57 Runoff=0.63 cfs 0.111 af

Subcatchment 5S: To Canton Ave Runoff Area=351,525 sf 1.88% Impervious Runoff Depth=0.00"
Flow Length=1,139' Tc=30.3 min CN=37 Runoff=0.00 cfs 0.000 af

Subcatchment 6S: To Canton Ave Runoff Area=469,212 sf 11.54% Impervious Runoff Depth=0.47"
Flow Length=1,260' Tc=29.5 min CN=61 Runoff=2.35 cfs 0.421 af

Subcatchment 7S: To Canton Ave Runoff Area=137,490 sf 15.14% Impervious Runoff Depth=0.21"
Flow Length=233' Tc=12.2 min CN=53 Runoff=0.22 cfs 0.056 af

Subcatchment 8S: To Upper Stream Runoff Area=138,706 sf 12.87% Impervious Runoff Depth=1.19"
Flow Length=154' Tc=8.1 min CN=76 Runoff=4.01 cfs 0.317 af

Subcatchment 9S: To Existing Pond Runoff Area=232,693 sf 32.31% Impervious Runoff Depth=1.45"
Flow Length=1,168' Tc=15.6 min CN=80 Runoff=6.68 cfs 0.645 af

Subcatchment 10S: To Canton Ave Runoff Area=548,914 sf 24.36% Impervious Runoff Depth=1.13"
Flow Length=1,017' Tc=26.7 min CN=75 Runoff=9.55 cfs 1.192 af

Subcatchment 11S: To Canton Ave Runoff Area=7,160 sf 81.01% Impervious Runoff Depth=1.97"
Flow Length=300' Tc=4.0 min CN=87 Runoff=0.41 cfs 0.027 af

Reach 1R: Upper Stream Channel Avg. Flow Depth=0.49' Max Vel=5.54 fps Inflow=9.73 cfs 3.139 af
n=0.040 L=575.0' S=0.0779 '/' Capacity=189.10 cfs Outflow=9.72 cfs 3.139 af

Reach DP1: Lower Stream Channel Avg. Flow Depth=0.54' Max Vel=5.64 fps Inflow=11.60 cfs 3.978 af
n=0.035 L=528.0' S=0.0537 '/' Capacity=190.84 cfs Outflow=11.53 cfs 3.978 af

Reach DP2: Canton Ave Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP3: Canton Ave Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 1P: 48" Box Culvert Peak Elev=201.22' Storage=343 cf Inflow=9.72 cfs 3.139 af
Primary=9.72 cfs 3.137 af Secondary=0.00 cfs 0.000 af Outflow=9.72 cfs 3.137 af

Pond 2P: Existing Farm Pond Peak Elev=190.83' Storage=2,633 cf Inflow=10.55 cfs 3.804 af
Primary=10.54 cfs 3.804 af Secondary=0.00 cfs 0.000 af Outflow=10.54 cfs 3.804 af

Pond 3P: Existing Depression Peak Elev=152.50' Storage=0 cf Inflow=0.63 cfs 0.111 af
Discarded=0.63 cfs 0.111 af Primary=0.00 cfs 0.000 af Outflow=0.63 cfs 0.111 af

Pond 4P: Existing Depression Peak Elev=156.60' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 5P: Bio Retention area Peak Elev=217.00' Storage=0 cf Inflow=0.22 cfs 0.056 af
Discarded=0.22 cfs 0.056 af Primary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.056 af

Pond 6P: Subsurface Chamber System Peak Elev=209.58' Storage=9,891 cf Inflow=9.55 cfs 1.192 af
Discarded=3.84 cfs 1.191 af Primary=0.03 cfs 0.001 af Outflow=3.87 cfs 1.192 af

Pond 7P: Subsurface Chamber System Peak Elev=194.00' Storage=0 cf Inflow=0.03 cfs 0.001 af
Discarded=0.03 cfs 0.001 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.001 af

Pond 8P: Infiltration Basin Peak Elev=195.13' Storage=1,029 cf Inflow=2.35 cfs 0.421 af
Discarded=1.56 cfs 0.421 af Secondary=0.00 cfs 0.000 af Outflow=1.56 cfs 0.421 af

Pond 9P: Subsurface Chamber System Peak Elev=194.48' Storage=139 cf Inflow=0.41 cfs 0.027 af
Discarded=0.16 cfs 0.027 af Primary=0.00 cfs 0.000 af Outflow=0.16 cfs 0.027 af

Pond 10P: 48" Box Culvert Peak Elev=256.11' Storage=228 cf Inflow=9.33 cfs 2.823 af
48.0" x 48.0" Box Culvert n=0.013 L=34.0' S=0.0735 '/' Outflow=9.33 cfs 2.823 af

Pond 11P: Carberry Ln Culvert Peak Elev=160.49' Storage=256 cf Inflow=11.53 cfs 3.978 af
Primary=11.52 cfs 3.978 af Secondary=0.00 cfs 0.000 af Outflow=11.52 cfs 3.978 af

Total Runoff Area = 92.246 ac Runoff Volume = 5.786 af Average Runoff Depth = 0.75"
91.29% Pervious = 84.210 ac 8.71% Impervious = 8.036 ac

Summary for Subcatchment 1S: Upper Watershed To Stream

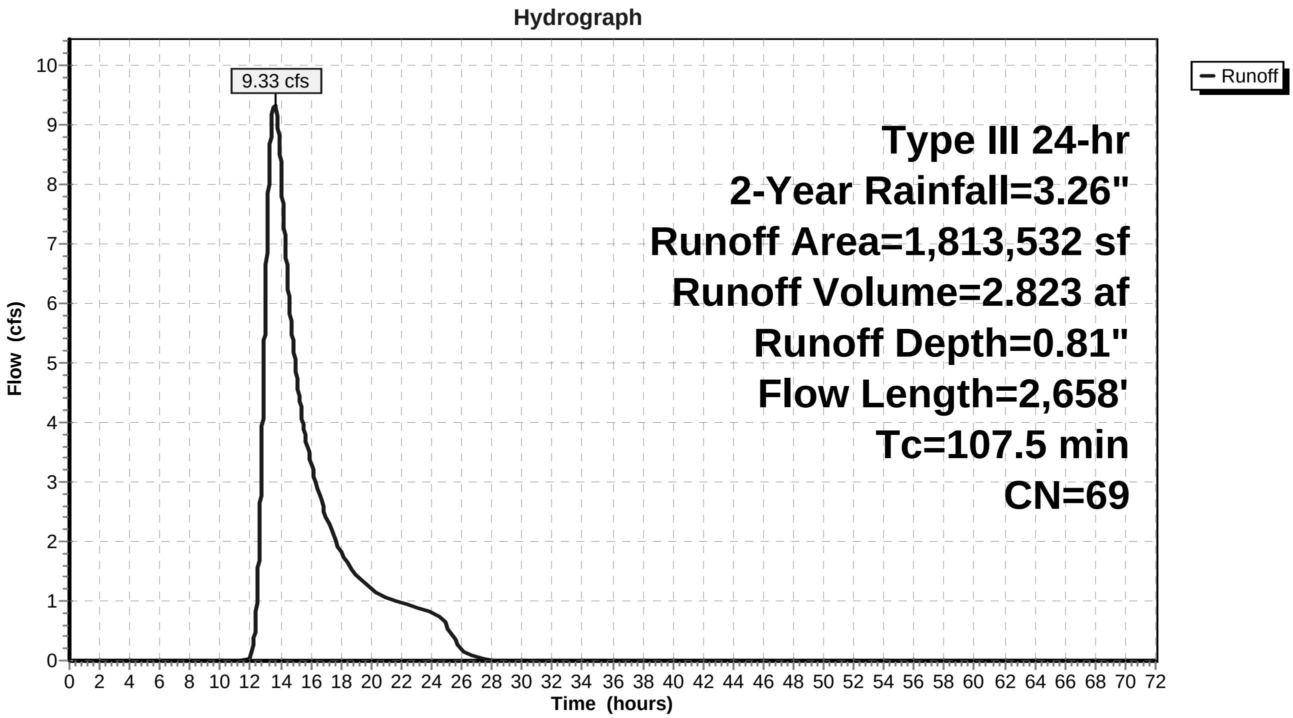
Runoff = 9.33 cfs @ 13.61 hrs, Volume= 2.823 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

	Area (sf)	CN	Description
	153,412	30	Woods, Good, HSG A
	929,681	70	Woods, Good, HSG C
	185,864	74	>75% Grass cover, Good, HSG C
	459,084	77	Woods, Good, HSG D
	84,545	80	>75% Grass cover, Good, HSG D
*	946	83	Wetland Stream Channel
	1,813,532	69	Weighted Average
	1,813,532		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0080	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
23.4	554	0.0250	0.40		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
10.9	116	0.0050	0.18		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
16.5	813	0.1080	0.82		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
16.7	306	0.0150	0.31		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
22.2	705	0.0450	0.53		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.2	114	0.0560	9.72	118.54	**Channel Flow,** Area= 12.2 sf Perim= 10.5' r= 1.16' n= 0.040 Earth, cobble bottom, clean sides
107.5	2,658	Total			

Subcatchment 1S: Upper Watershed To Stream



Summary for Subcatchment 2S: Wetland Area

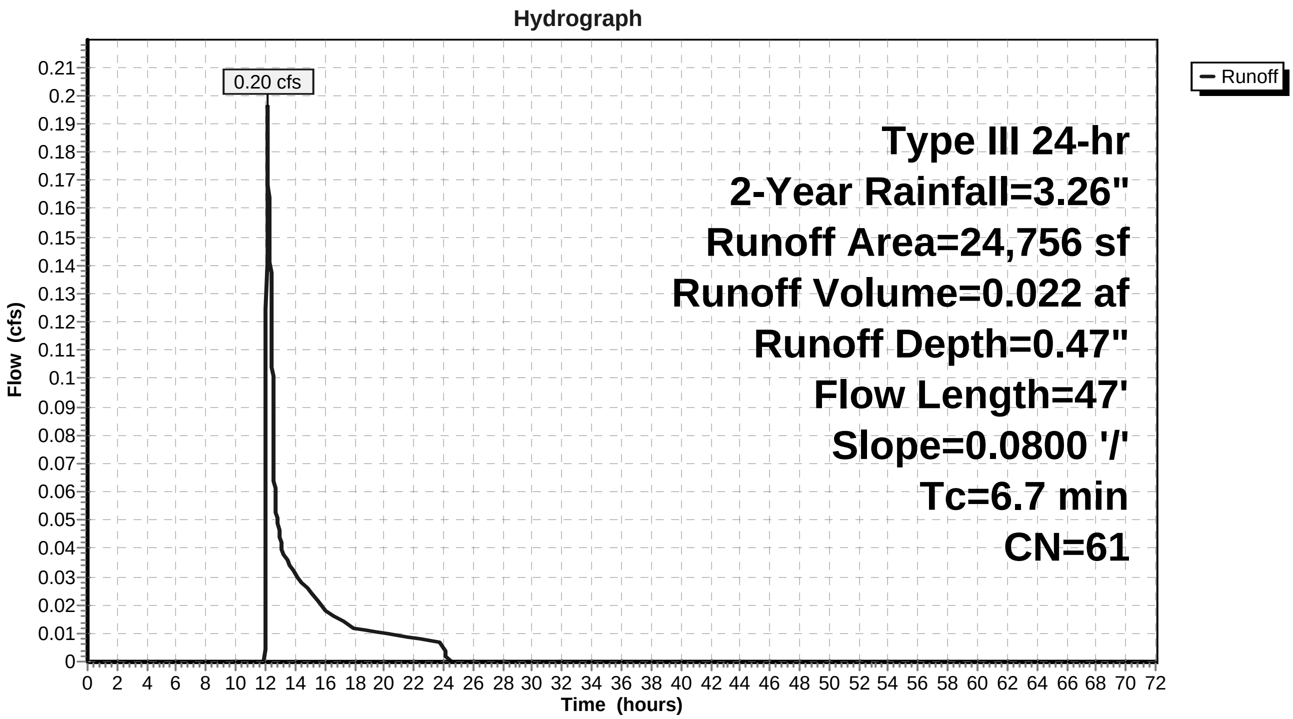
Runoff = 0.20 cfs @ 12.13 hrs, Volume= 0.022 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

	Area (sf)	CN	Description
*	3,336	83	Wetland Stream Channel
	17,332	55	Woods, Good, HSG B
	624	74	>75% Grass cover, Good, HSG C
	3,464	70	Woods, Good, HSG C
	24,756	61	Weighted Average
	24,756		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	47	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"

Subcatchment 2S: Wetland Area



Summary for Subcatchment 3S: Lower Stream Channel

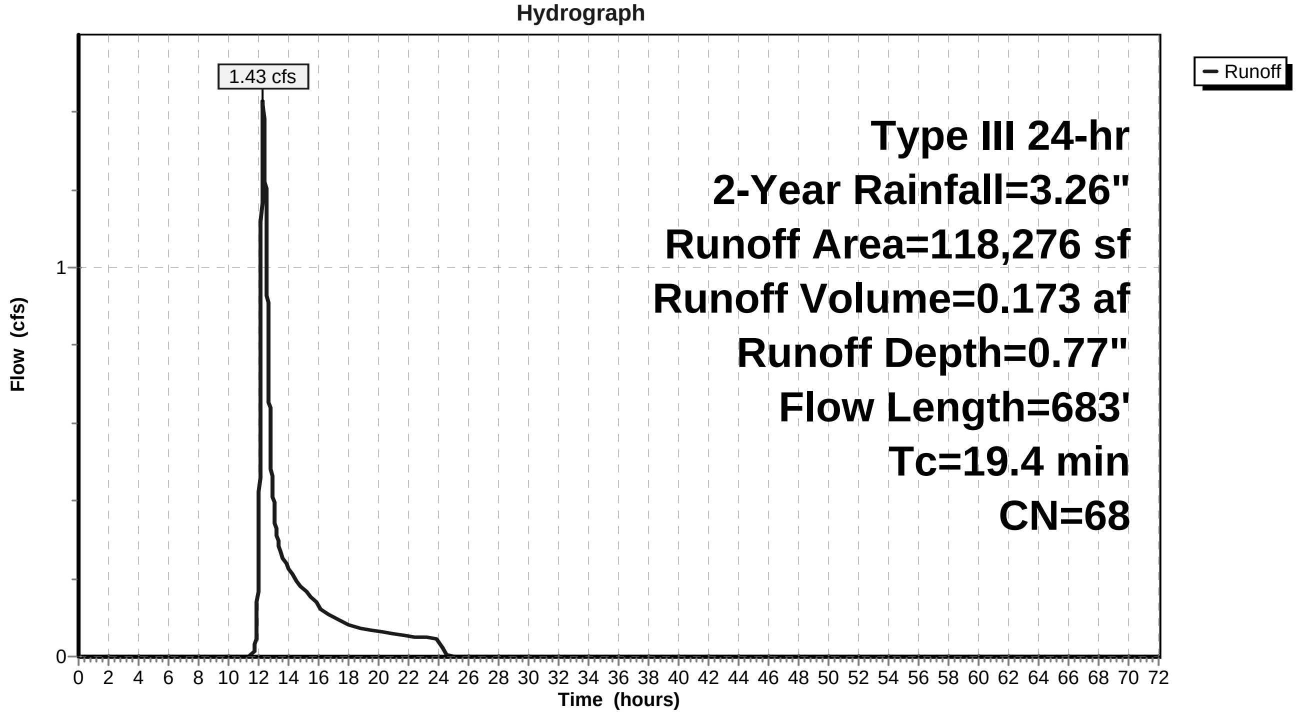
Runoff = 1.43 cfs @ 12.31 hrs, Volume= 0.173 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

	Area (sf)	CN	Description
	27,020	55	Woods, Good, HSG B
	30,772	74	>75% Grass cover, Good, HSG C
	58,057	70	Woods, Good, HSG C
*	2,427	83	Wetland Stream Channel
	118,276	68	Weighted Average
	118,276		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
9.0	450	0.1100	0.83		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.3	33	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	65	0.1400	0.94		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.1	62	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	23	0.1300	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
19.4	683	Total			

Subcatchment 3S: Lower Stream Channel



Summary for Subcatchment 4S: To Canton Ave

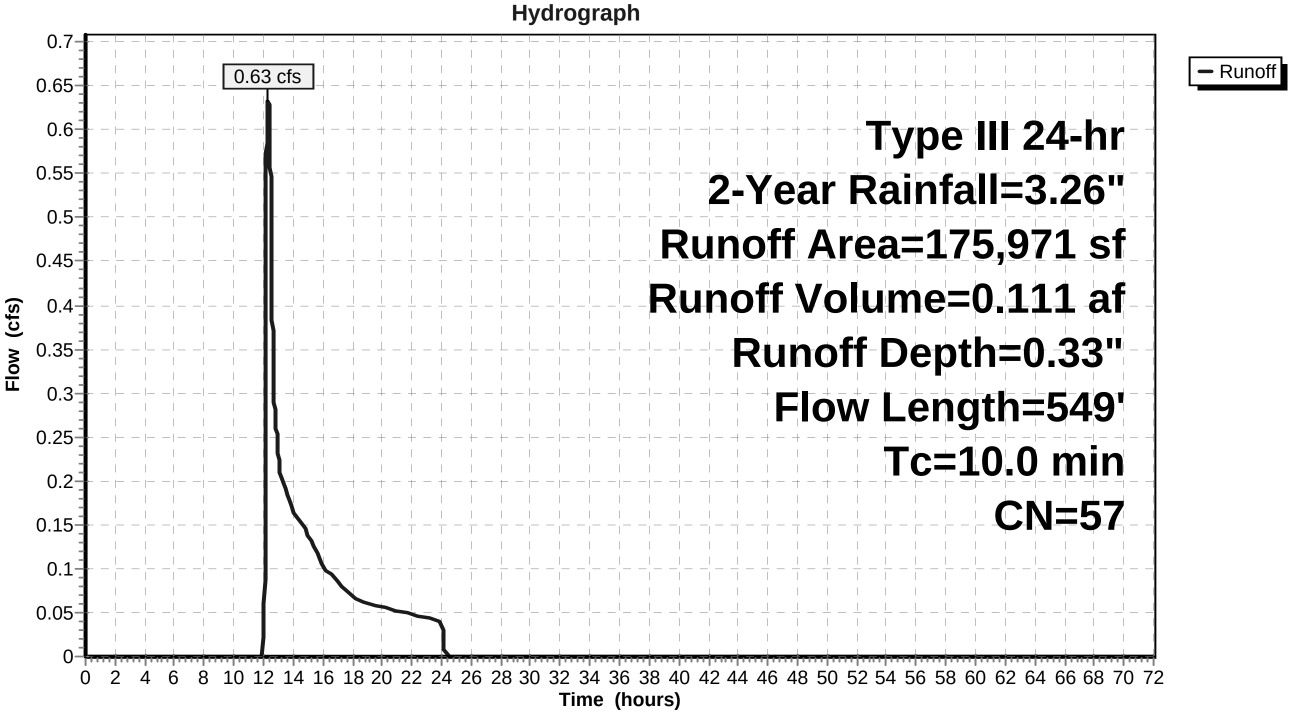
Runoff = 0.63 cfs @ 12.32 hrs, Volume= 0.111 af, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
9,654	98	Roofs, HSG A
17,648	98	Paved parking, HSG A
44,334	30	Woods, Good, HSG A
54,496	39	>75% Grass cover, Good, HSG A
9,397	55	Woods, Good, HSG B
22,408	77	Woods, Good, HSG D
9,406	80	>75% Grass cover, Good, HSG D
8,628	98	Paved parking, HSG D
175,971	57	Weighted Average
140,041		79.58% Pervious Area
35,930		20.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
3.0	150	0.1100	0.83		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
1.0	349	0.0870	5.99		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.0	549	Total			

Subcatchment 4S: To Canton Ave



Summary for Subcatchment 5S: To Canton Ave

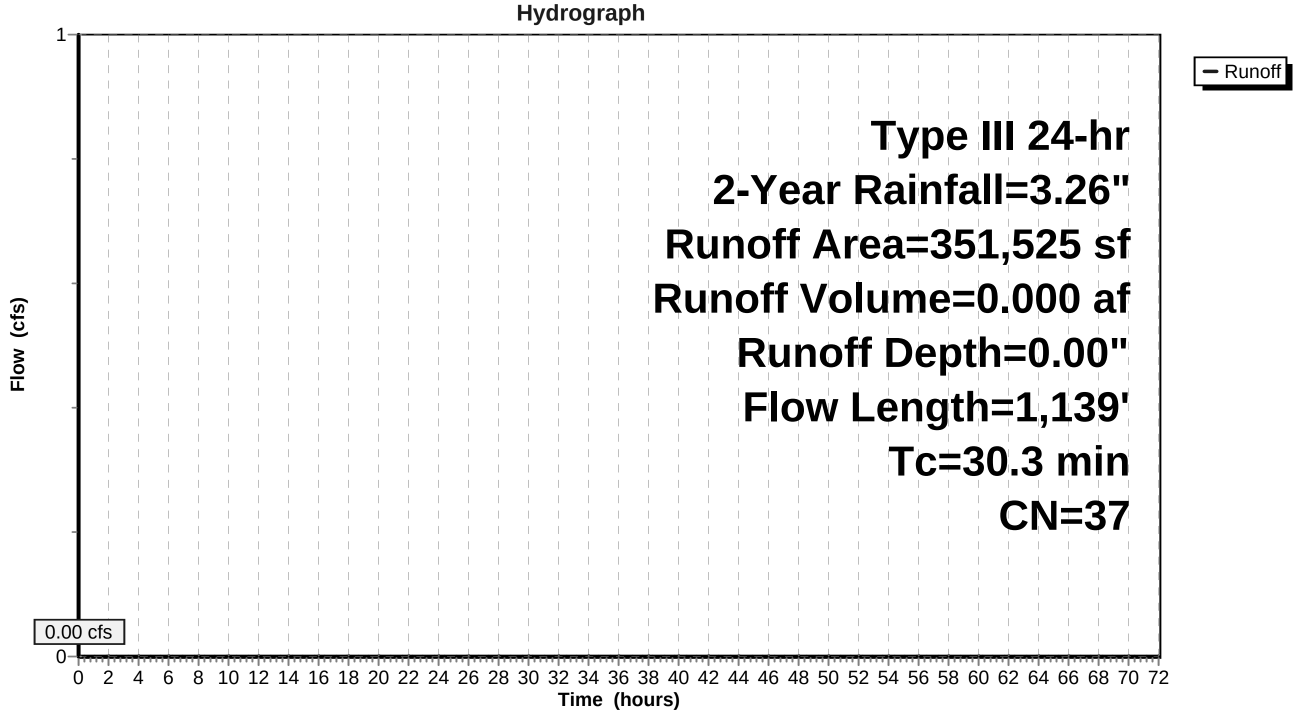
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
2,800	98	Roofs, HSG A
3,792	98	Paved parking, HSG A
114,707	30	Woods, Good, HSG A
230,226	39	>75% Grass cover, Good, HSG A
351,525	37	Weighted Average
344,933		98.12% Pervious Area
6,592		1.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
4.7	391	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.3	592	0.0520	0.57		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.9	106	0.0850	2.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
30.3	1,139	Total			

Subcatchment 5S: To Canton Ave



Summary for Subcatchment 6S: To Canton Ave

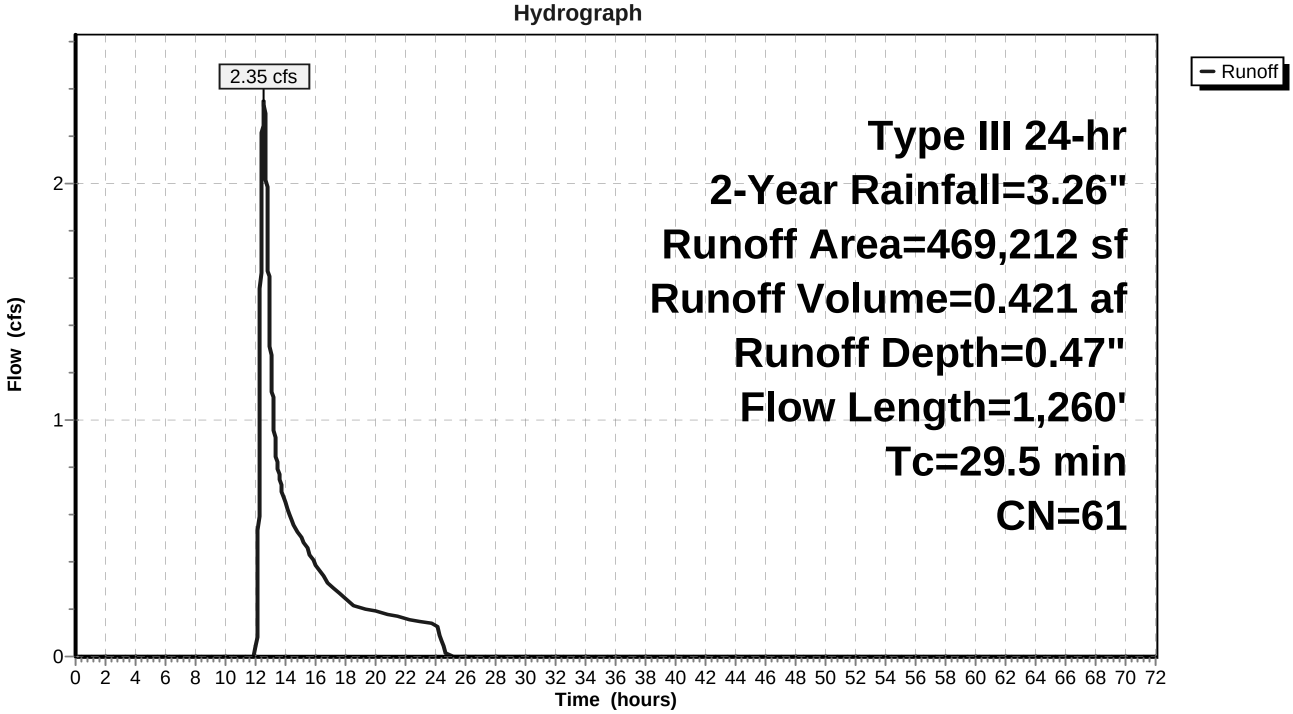
Runoff = 2.35 cfs @ 12.55 hrs, Volume= 0.421 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
82,018	30	Woods, Good, HSG A
54,246	39	>75% Grass cover, Good, HSG A
155,461	70	Woods, Good, HSG C
52,059	74	>75% Grass cover, Good, HSG C
16,193	98	Paved parking, HSG C
6,948	98	Roofs, HSG C
5,851	98	Roofs, HSG A
25,151	98	Paved parking, HSG A
71,285	55	Woods, Good, HSG B
469,212	61	Weighted Average
415,069		88.46% Pervious Area
54,143		11.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
2.9	137	0.1000	0.79		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
3.5	365	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.7	708	0.0800	0.71		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
29.5	1,260	Total			

Subcatchment 6S: To Canton Ave



Summary for Subcatchment 7S: To Canton Ave

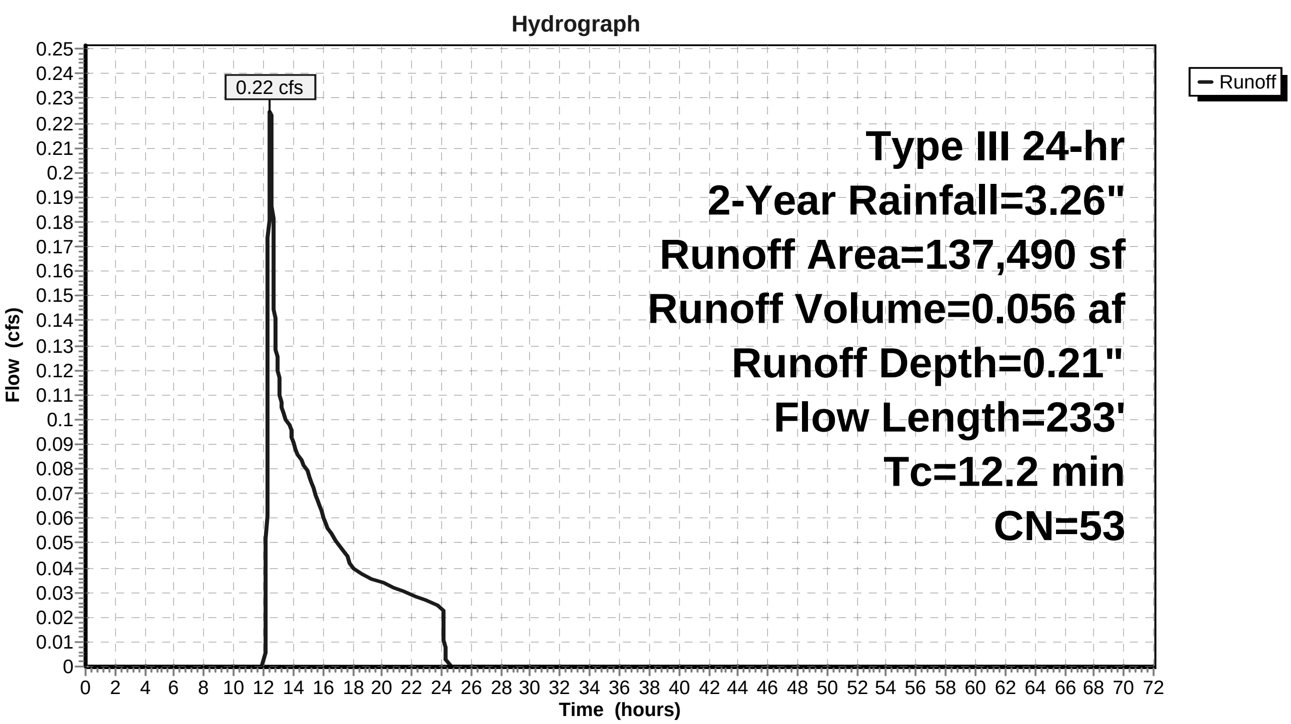
Runoff = 0.22 cfs @ 12.46 hrs, Volume= 0.056 af, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
10,854	98	Roofs, HSG C
1,300	98	Roofs, HSG A
45,027	39	>75% Grass cover, Good, HSG A
19,832	74	>75% Grass cover, Good, HSG C
40,675	30	Woods, Good, HSG A
11,139	70	Woods, Good, HSG C
8,663	98	Paved parking, HSG A
137,490	53	Weighted Average
116,673		84.86% Pervious Area
20,817		15.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0750	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
5.0	183	0.0600	0.61		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
12.2	233	Total			

Subcatchment 7S: To Canton Ave



Summary for Subcatchment 8S: To Upper Stream

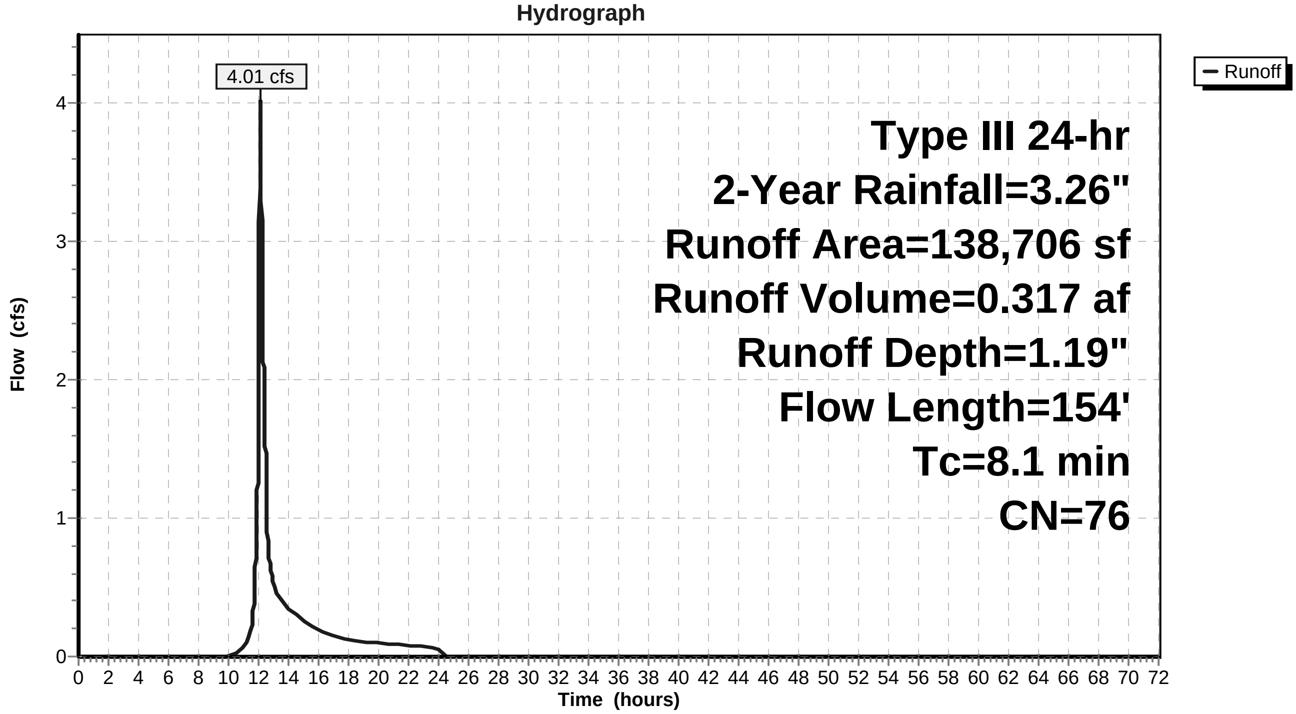
Runoff = 4.01 cfs @ 12.12 hrs, Volume= 0.317 af, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

	Area (sf)	CN	Description
	10,854	98	Roofs, HSG C
	56,850	70	Woods, Good, HSG C
	39,960	74	>75% Grass cover, Good, HSG C
	6,997	98	Roofs, HSG D
	13,257	80	>75% Grass cover, Good, HSG D
*	5,996	83	Wetland Stream Channel
	4,792	61	>75% Grass cover, Good, HSG B
	138,706	76	Weighted Average
	120,855		87.13% Pervious Area
	17,851		12.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
1.4	76	0.1310	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.3	28	0.3200	1.41		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
8.1	154	Total			

Subcatchment 8S: To Upper Stream



Summary for Subcatchment 9S: To Existing Pond

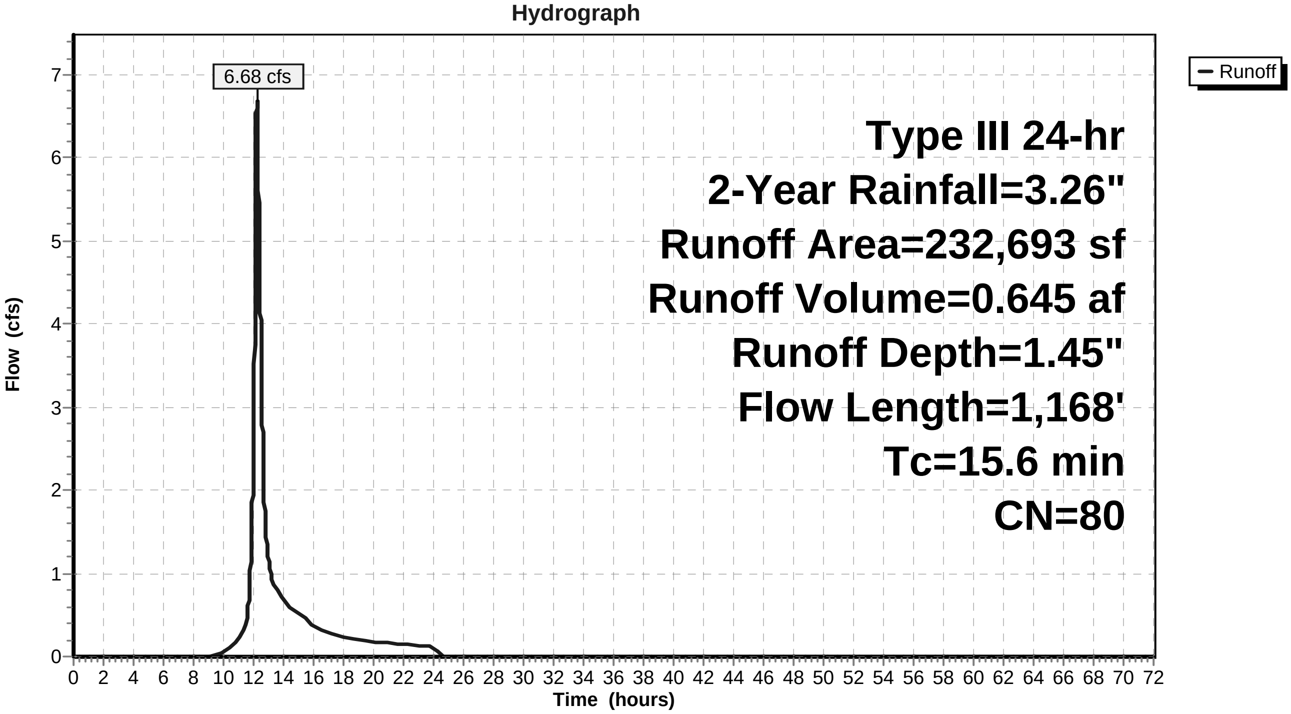
Runoff = 6.68 cfs @ 12.22 hrs, Volume= 0.645 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
51,672	98	Paved parking, HSG C
23,517	98	Roofs, HSG C
92,096	70	Woods, Good, HSG C
65,408	74	>75% Grass cover, Good, HSG C
232,693	80	Weighted Average
157,504		67.69% Pervious Area
75,189		32.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
4.5	180	0.0720	0.67		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.9	230	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	708	0.0800	12.83	10.08	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
15.6	1,168	Total			

Subcatchment 9S: To Existing Pond



Summary for Subcatchment 10S: To Canton Ave

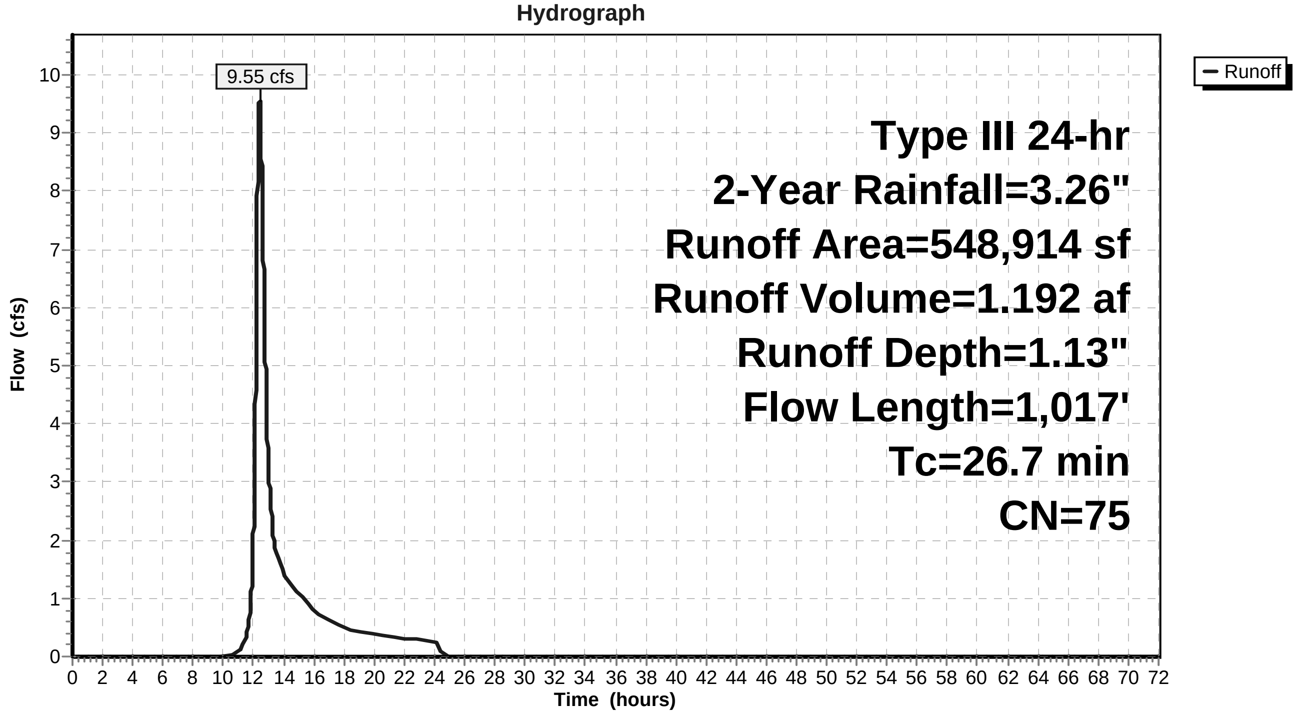
Runoff = 9.55 cfs @ 12.40 hrs, Volume= 1.192 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
1,375	98	Roofs, HSG A
1,811	39	>75% Grass cover, Good, HSG A
126,272	55	Woods, Good, HSG B
25,692	98	Paved parking, HSG D
19,296	98	Roofs, HSG D
34,183	80	>75% Grass cover, Good, HSG D
33,768	98	Roofs, HSG C
53,608	98	Paved parking, HSG C
121,146	70	Woods, Good, HSG C
129,363	74	>75% Grass cover, Good, HSG C
2,400	96	Gravel surface, HSG C
548,914	75	Weighted Average
415,175		75.64% Pervious Area
133,739		24.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
10.1	544	0.1300	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.3	246	0.0650	1.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.0	177	0.0560	0.59		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
26.7	1,017	Total			

Subcatchment 10S: To Canton Ave



Summary for Subcatchment 11S: To Canton Ave

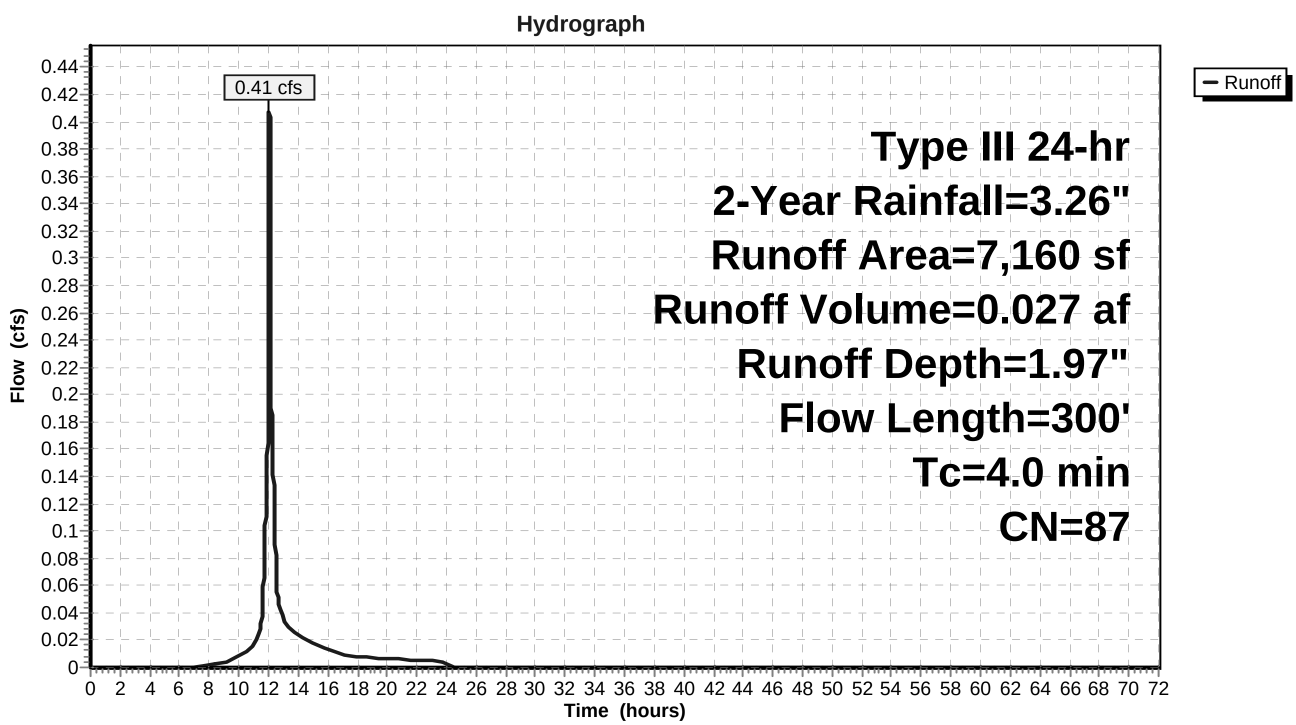
Runoff = 0.41 cfs @ 12.06 hrs, Volume= 0.027 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
5,800	98	Paved parking, HSG A
1,360	39	>75% Grass cover, Good, HSG A
7,160	87	Weighted Average
1,360		18.99% Pervious Area
5,800		81.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	25	0.0800	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.26"
1.3	275	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.0	300	Total			

Subcatchment 11S: To Canton Ave



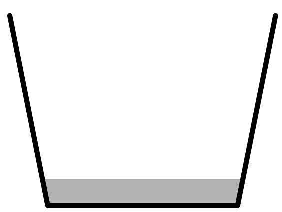
Summary for Reach 1R: Upper Stream Channel

Inflow Area = 44.817 ac, 0.91% Impervious, Inflow Depth = 0.84" for 2-Year event
Inflow = 9.73 cfs @ 13.61 hrs, Volume= 3.139 af
Outflow = 9.72 cfs @ 13.62 hrs, Volume= 3.139 af, Atten= 0%, Lag= 0.5 min

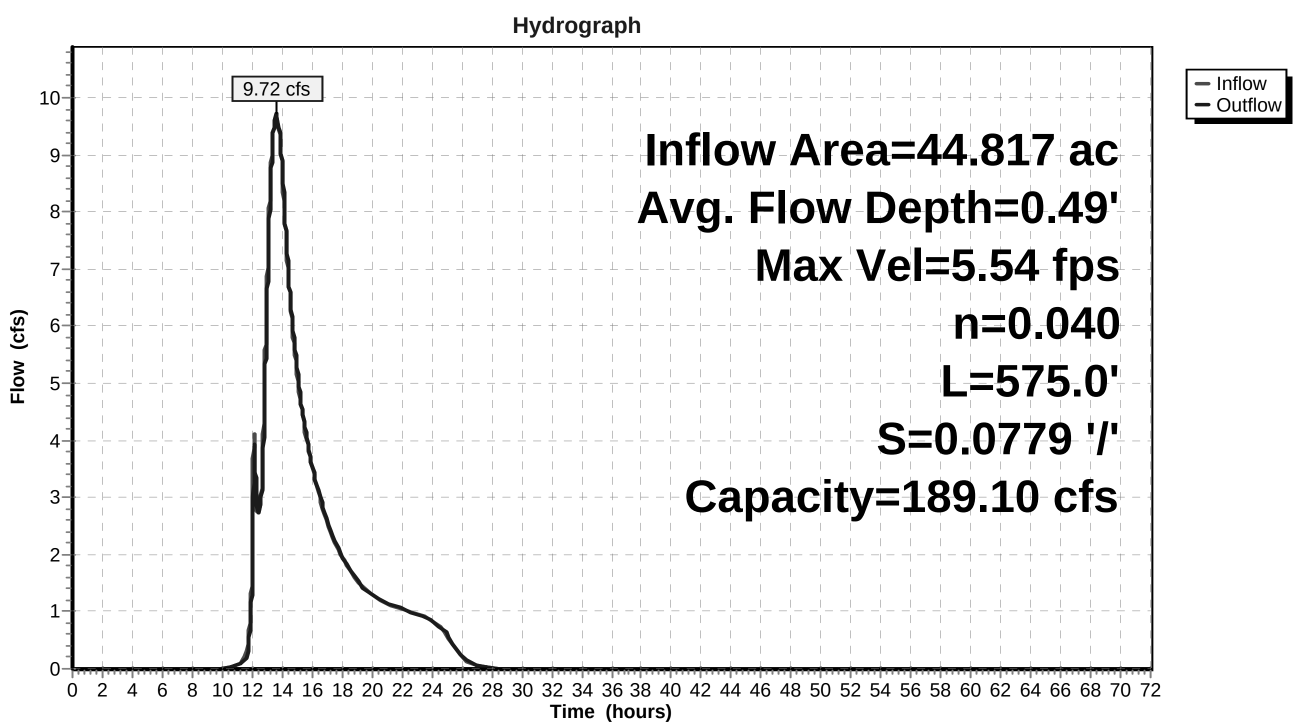
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.54 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 2.58 fps, Avg. Travel Time= 3.7 min

Peak Storage= 1,009 cf @ 13.62 hrs
Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 3.50' Flow Area= 14.7 sf, Capacity= 189.10 cfs

3.50' x 3.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 0.2 '/' Top Width= 4.90'
Length= 575.0' Slope= 0.0779 '/'
Inlet Invert= 252.80', Outlet Invert= 208.00'



Reach 1R: Upper Stream Channel



Summary for Reach DP1: Lower Stream Channel

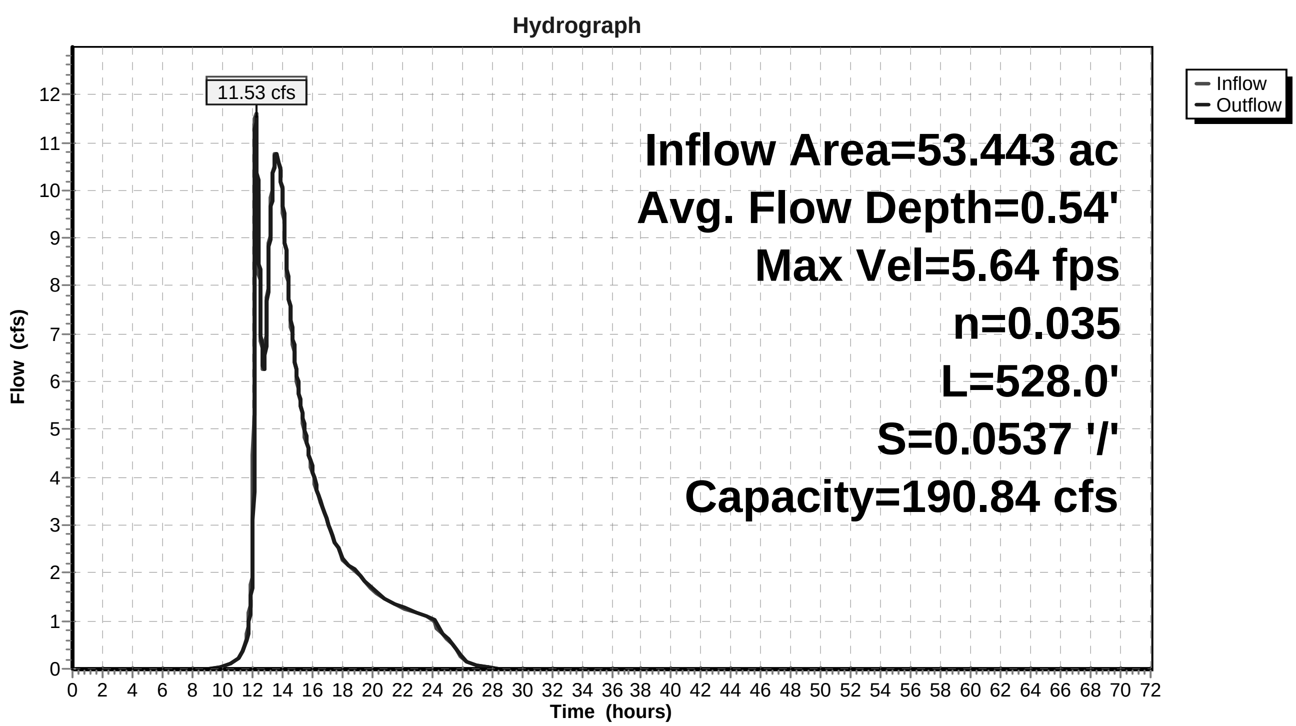
Inflow Area = 53.443 ac, 4.00% Impervious, Inflow Depth = 0.89" for 2-Year event
Inflow = 11.60 cfs @ 12.23 hrs, Volume= 3.978 af
Outflow = 11.53 cfs @ 12.25 hrs, Volume= 3.978 af, Atten= 1%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.64 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 2.56 fps, Avg. Travel Time= 3.4 min

Peak Storage= 1,079 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.54'
Bank-Full Depth= 3.00' Flow Area= 15.0 sf, Capacity= 190.84 cfs

3.50' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 0.5 '/' Top Width= 6.50'
Length= 528.0' Slope= 0.0537 '/'
Inlet Invert= 187.50', Outlet Invert= 159.12'

Reach DP1: Lower Stream Channel

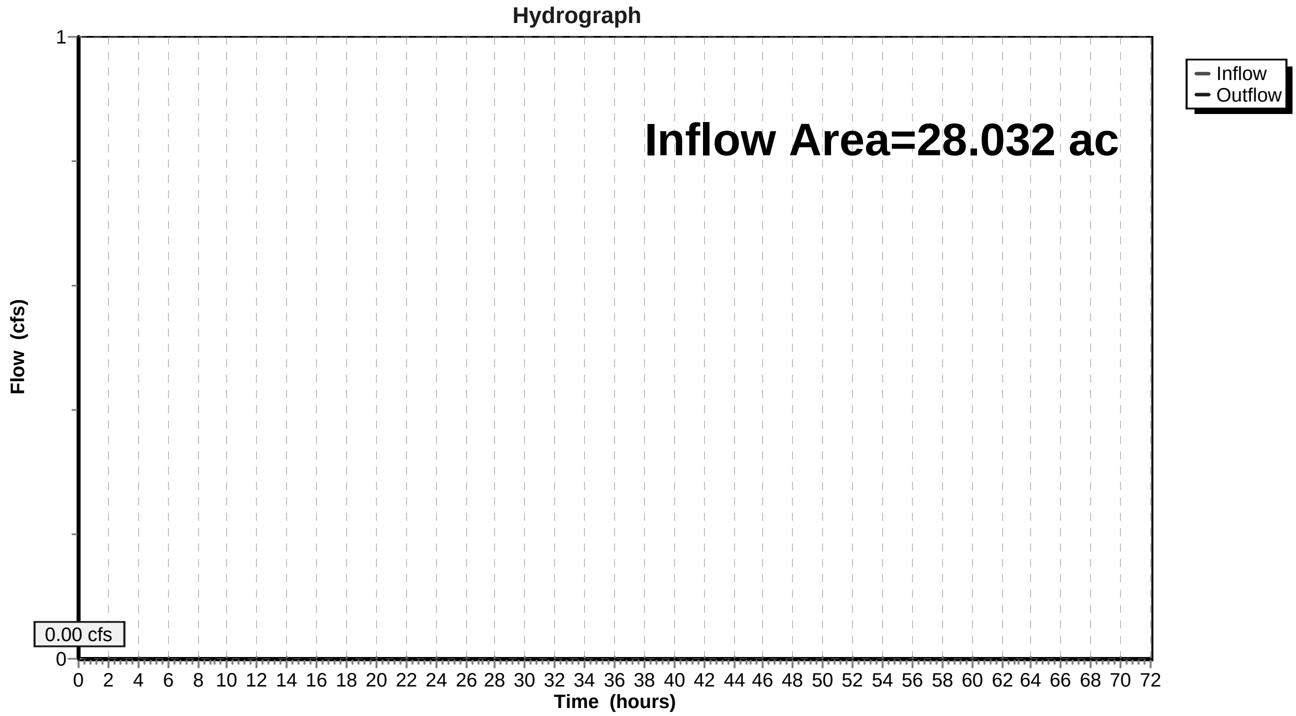


Summary for Reach DP2: Canton Ave

Inflow Area = 28.032 ac, 16.61% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP2: Canton Ave

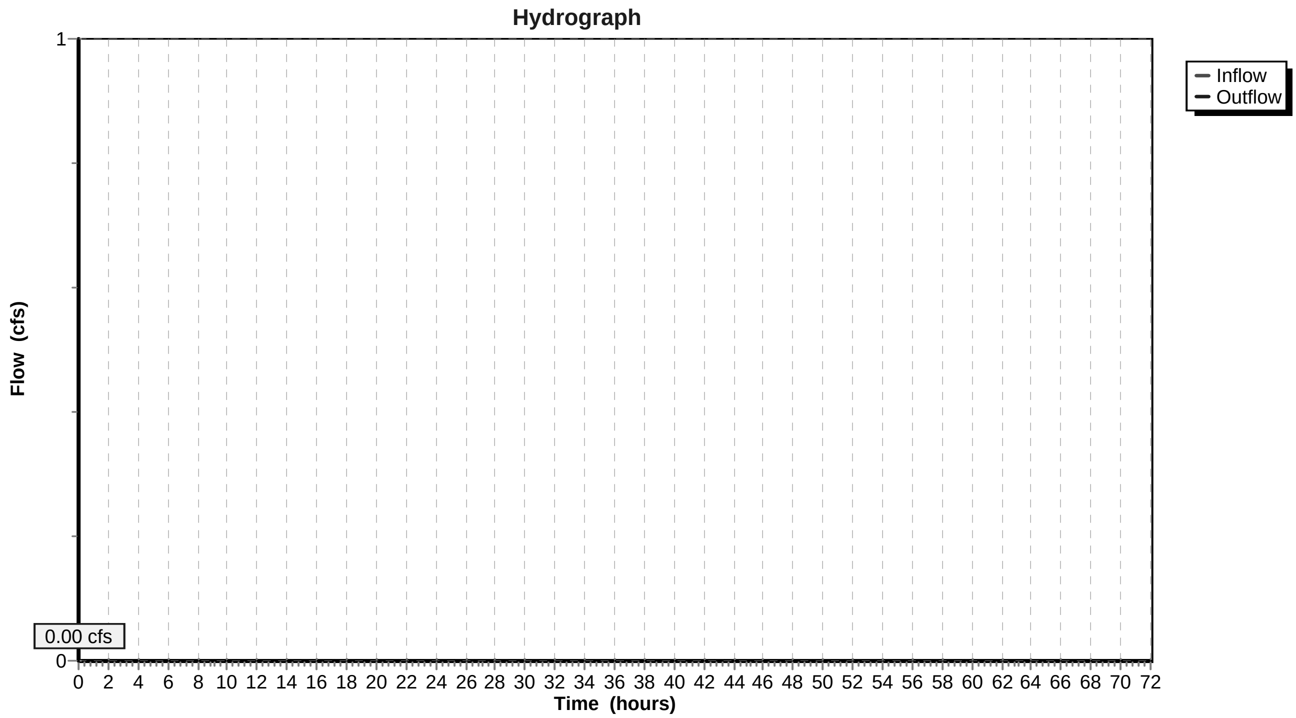


Summary for Reach DP3: Canton Ave

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af	
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP3: Canton Ave



Summary for Pond 1P: 48" Box Culvert

Inflow Area = 44.817 ac, 0.91% Impervious, Inflow Depth = 0.84" for 2-Year event
Inflow = 9.72 cfs @ 13.62 hrs, Volume= 3.139 af
Outflow = 9.72 cfs @ 13.63 hrs, Volume= 3.137 af, Atten= 0%, Lag= 0.3 min
Primary = 9.72 cfs @ 13.63 hrs, Volume= 3.137 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 201.22' @ 13.63 hrs Surf.Area= 361 sf Storage= 343 cf

Plug-Flow detention time= 1.2 min calculated for 3.137 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (964.4 - 963.6)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	19,230 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

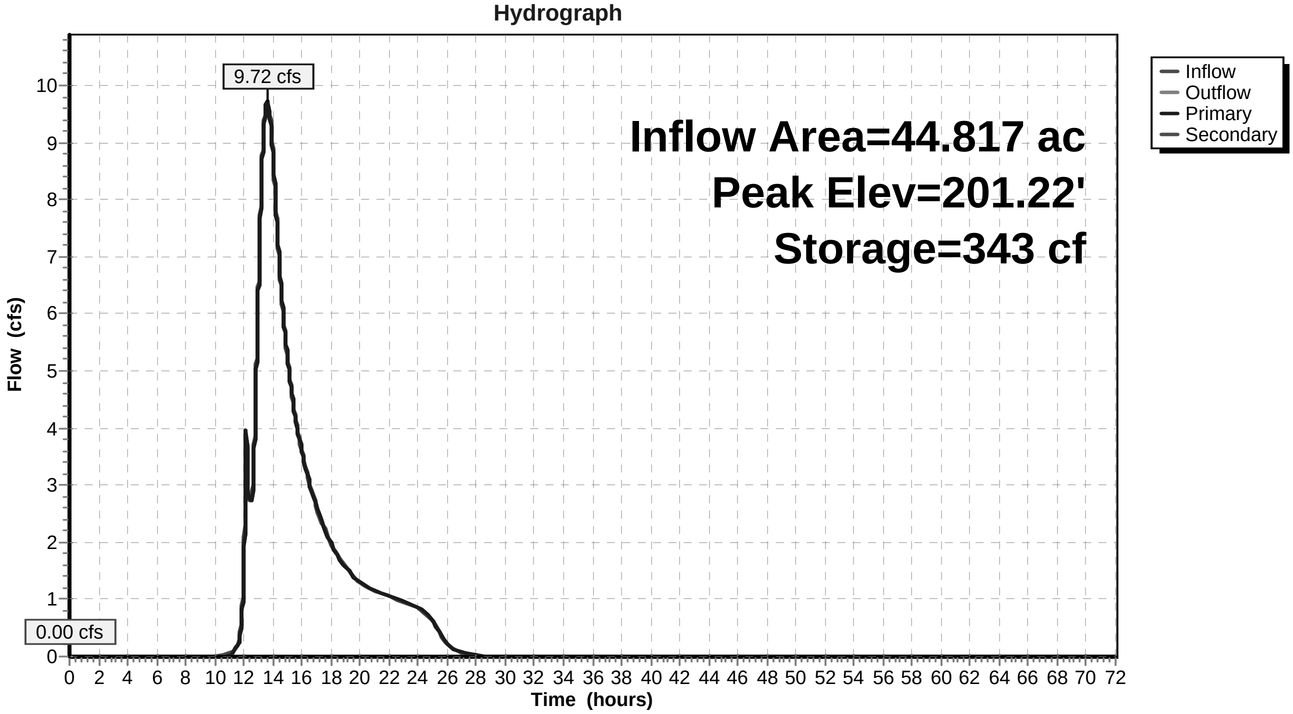
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
200.00	200	0	0
202.00	464	664	664
204.00	1,719	2,183	2,847
206.00	3,867	5,586	8,433
208.00	6,930	10,797	19,230

Device	Routing	Invert	Outlet Devices
#1	Primary	200.39'	**48.0" W x 48.0" H Box Culvert** L= 38.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.39' / 198.47' S= 0.0505 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 16.00 sf
#2	Secondary	206.50'	**30.0' long x 26.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=9.72 cfs @ 13.63 hrs HW=201.22' TW=190.83' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 9.72 cfs @ 2.93 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=200.00' TW=187.82' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: 48" Box Culvert



Summary for Pond 2P: Existing Farm Pond

Inflow Area = 50.727 ac, 4.21% Impervious, Inflow Depth = 0.90" for 2-Year event
Inflow = 10.55 cfs @ 13.57 hrs, Volume= 3.804 af
Outflow = 10.54 cfs @ 13.61 hrs, Volume= 3.804 af, Atten= 0%, Lag= 2.6 min
Primary = 10.54 cfs @ 13.61 hrs, Volume= 3.804 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 190.83' @ 13.61 hrs Surf.Area= 2,286 sf Storage= 2,633 cf

Plug-Flow detention time= 6.1 min calculated for 3.804 af (100% of inflow)
Center-of-Mass det. time= 6.1 min (950.9 - 944.8)

Volume	Invert	Avail.Storage	Storage Description
#1	187.82'	54,241 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

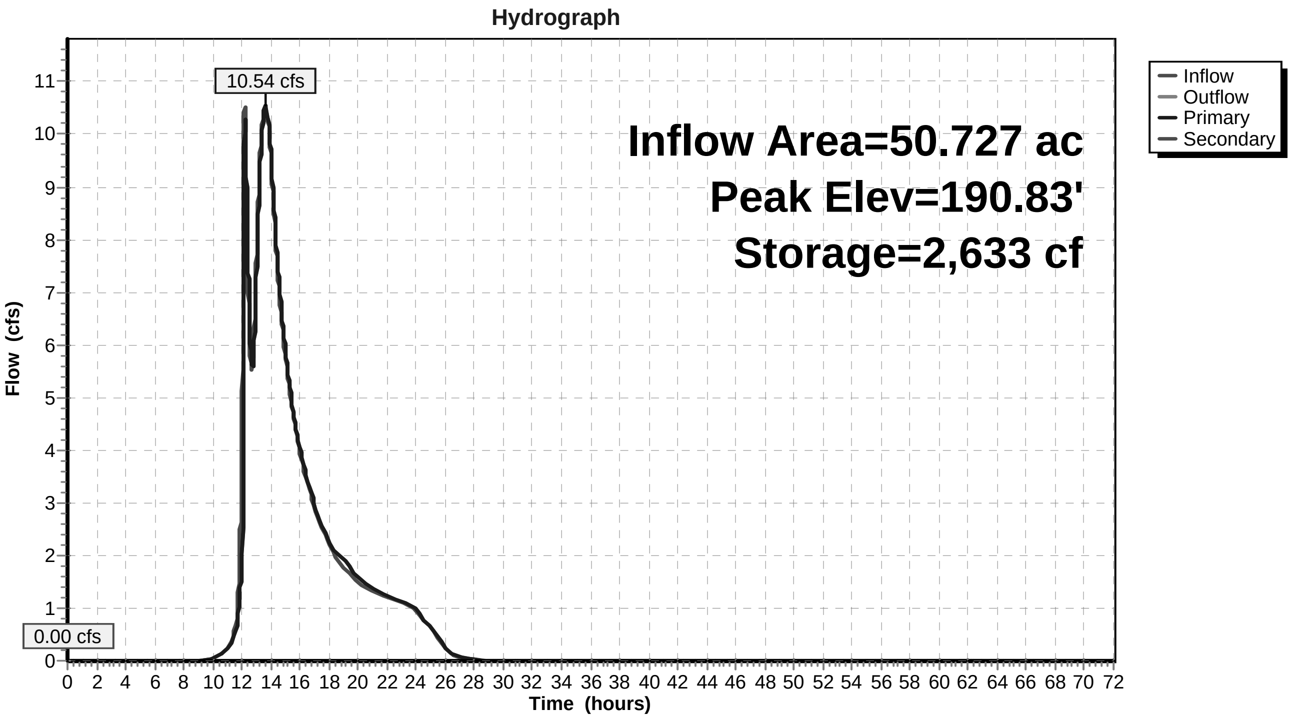
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.82	83	0	0
188.00	240	29	29
189.00	696	468	497
190.00	920	808	1,305
191.00	2,569	1,745	3,050
192.00	3,287	2,928	5,978
193.00	3,988	3,638	9,615
194.00	4,817	4,403	14,018
195.00	5,576	5,197	19,214
196.00	6,406	5,991	25,205
197.00	7,279	6,843	32,048
198.00	8,234	7,757	39,804
199.00	9,230	8,732	48,536
199.60	9,786	5,705	54,241

Device	Routing	Invert	Outlet Devices
#1	Primary	187.68'	**27.0" W x 42.0" H Box Culvert** L= 1.5' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.68' / 187.66' S= 0.0133 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.88 sf
#2	Device 1	187.71'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.75 2.50 2.50 3.50 Width (feet) 0.75 0.00 0.00 3.50 10.29
#3	Device 2	187.76'	**30.0" W x 48.0" H Box Culvert** L= 2.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.76' / 187.73' S= 0.0150 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 10.00 sf
#4	Secondary	197.90'	**18.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=10.54 cfs @ 13.61 hrs HW=190.83' TW=188.02' (Dynamic Tailwater)
└─**1=Culvert** (Passes 10.54 cfs of 29.25 cfs potential flow)
  └─**2=Custom Weir/Orifice** (Weir Controls 10.54 cfs @ 2.82 fps)
    └─**3=Culvert** (Passes 10.54 cfs of 31.45 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.82' TW=187.50' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Farm Pond



Summary for Pond 3P: Existing Depression

Inflow Area =	28.032 ac,	16.61% Impervious,	Inflow Depth = 0.05"	for 2-Year event	
Inflow =	0.63 cfs @	12.32 hrs,	Volume=	0.111 af	
Outflow =	0.63 cfs @	12.32 hrs,	Volume=	0.111 af,	Atten= 0%, Lag= 0.0 min
Discarded =	0.63 cfs @	12.32 hrs,	Volume=	0.111 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 152.50' @ 12.32 hrs Surf.Area= 568 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (940.2 - 940.2)

Volume	Invert	Avail.Storage	Storage Description
#1	152.50'	20,003 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

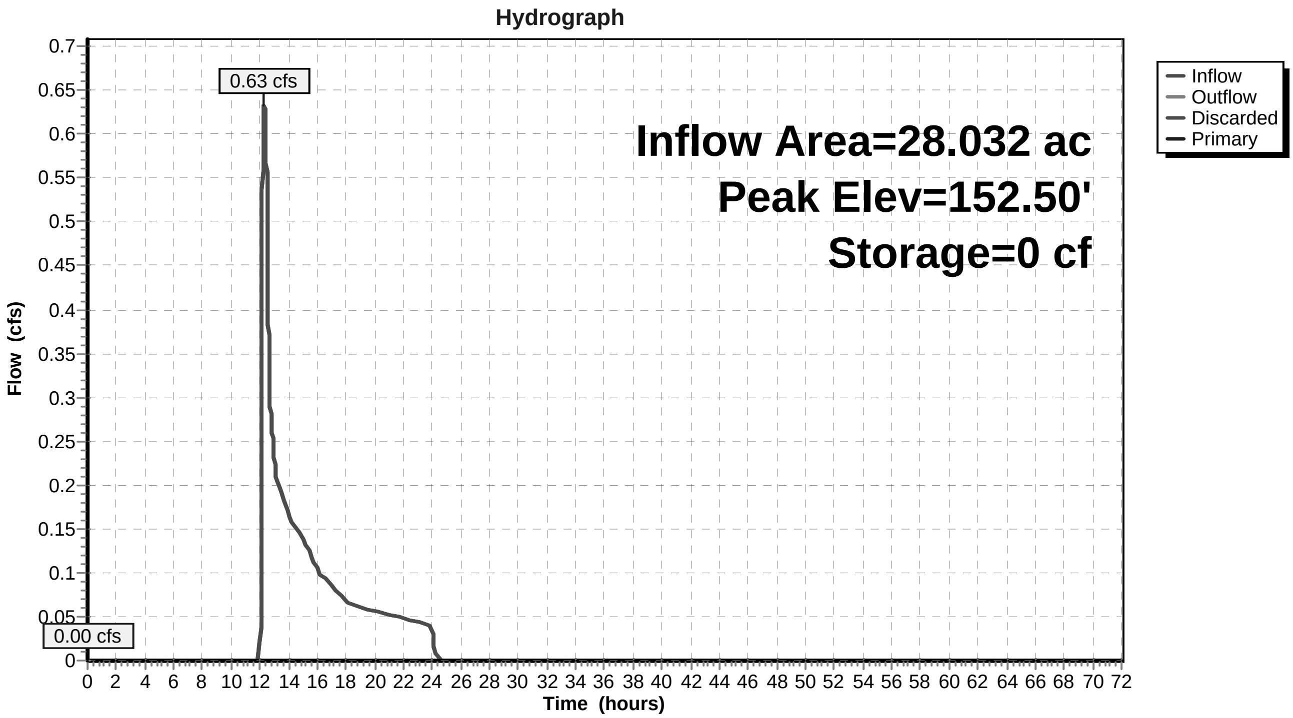
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
152.50	568	0	0
153.00	1,156	431	431
154.00	5,426	3,291	3,722
155.00	8,124	6,775	10,497
156.00	10,888	9,506	20,003

Device	Routing	Invert	Outlet Devices
#1	Discarded	152.50'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 146.20'
#2	Primary	155.50'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.79 cfs @ 12.32 hrs HW=152.50' (Free Discharge)
1=Exfiltration (Controls 0.79 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=152.50' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 3P: Existing Depression



Summary for Pond 4P: Existing Depression

Inflow Area = 23.992 ac, 15.97% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.60' @ 0.00 hrs Surf.Area= 221 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	156.60'	2,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

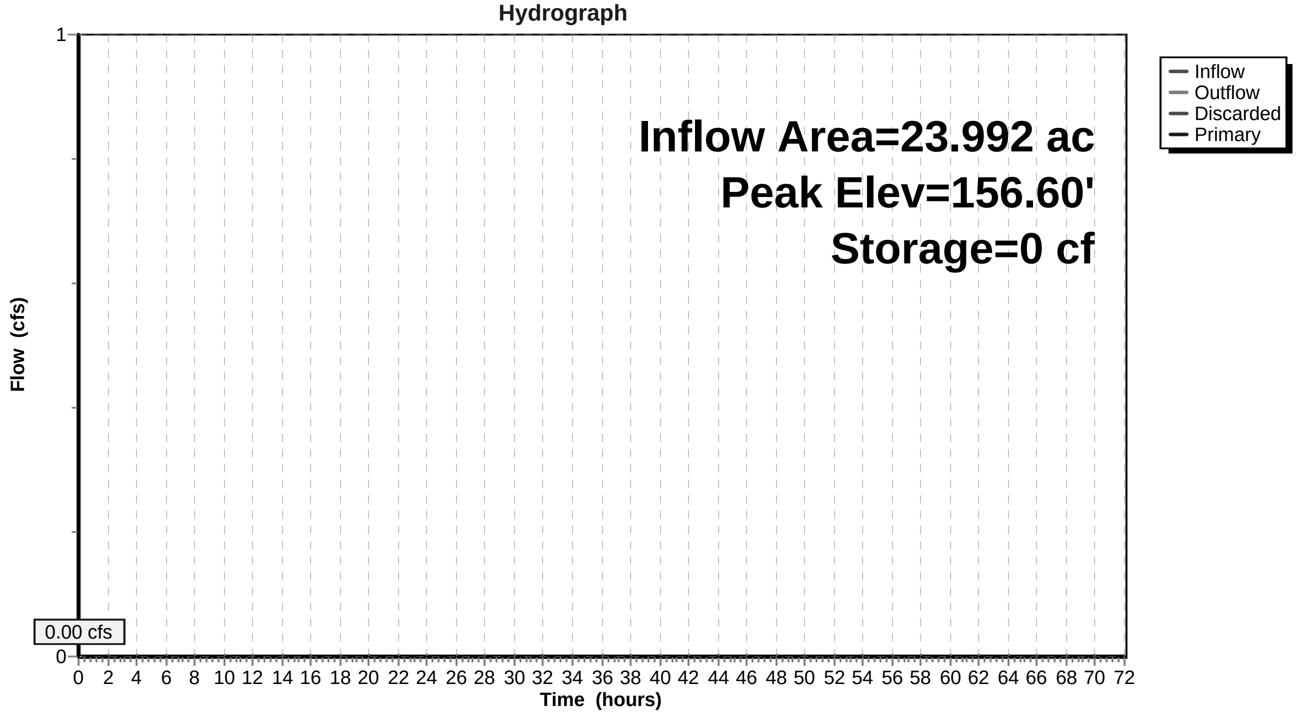
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
156.60	221	0	0
157.00	737	192	192
158.00	4,257	2,497	2,689

Device	Routing	Invert	Outlet Devices
#1	Discarded	156.60'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 150.20'
#2	Primary	157.44'	**30.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.60' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 0.31 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.60' TW=152.50' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: Existing Depression



Summary for Pond 5P: Bio Retention area

Inflow Area = 3.156 ac, 15.14% Impervious, Inflow Depth = 0.21" for 2-Year event
Inflow = 0.22 cfs @ 12.46 hrs, Volume= 0.056 af
Outflow = 0.22 cfs @ 12.46 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.22 cfs @ 12.46 hrs, Volume= 0.056 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 217.00' @ 12.46 hrs Surf.Area= 4,844 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (975.2 - 975.2)

Volume	Invert	Avail.Storage	Storage Description
#1	217.00'	14,362 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

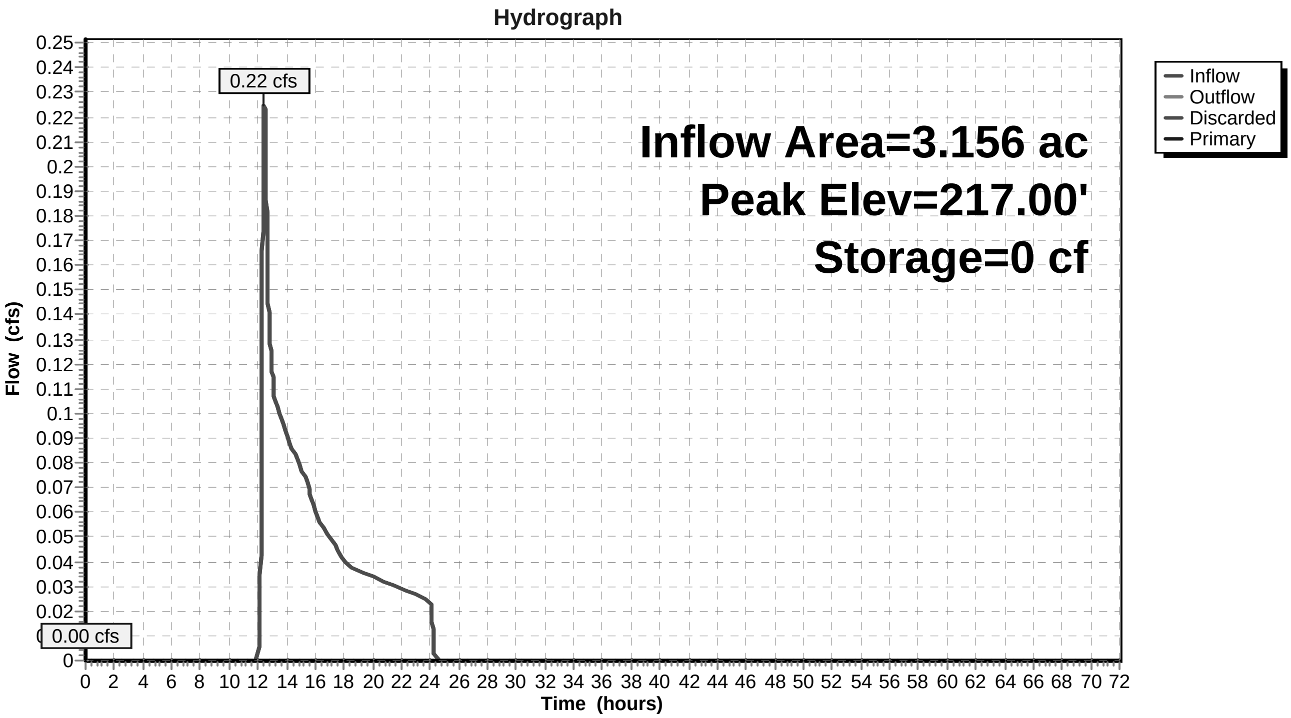
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
217.00	4,844	0	0
218.00	6,617	5,731	5,731
218.50	8,810	3,857	9,587
219.00	10,289	4,775	14,362

Device	Routing	Invert	Outlet Devices
#1	Discarded	217.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 212.00'
#2	Primary	214.55'	**12.0" Round Culvert** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.55' / 213.41' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	218.00'	**3.5' long x 1.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.27 cfs @ 12.46 hrs HW=217.00' (Free Discharge)
└─**1=Exfiltration** (Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=217.00' TW=208.50' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.00 cfs of 5.28 cfs potential flow)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Bio Retention area



Summary for Pond 6P: Subsurface Chamber System

Inflow Area =	15.758 ac, 22.52% Impervious, Inflow Depth = 0.91" for 2-Year event			
Inflow =	9.55 cfs @	12.40 hrs, Volume=	1.192 af	
Outflow =	3.87 cfs @	12.91 hrs, Volume=	1.192 af,	Atten= 59%, Lag= 30.5 min
Discarded =	3.84 cfs @	12.91 hrs, Volume=	1.191 af	
Primary =	0.03 cfs @	12.91 hrs, Volume=	0.001 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 209.58' @ 12.91 hrs Surf.Area= 16,762 sf Storage= 9,891 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 15.5 min (892.4 - 876.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	208.50'	23,012 cf	**87.25'W x 192.12'L x 5.50'H Field A** 92,194 cf Overall - 34,663 cf Embedded = 57,531 cf x 40.0% Voids
#2A	209.25'	34,663 cf	**ADS_StormTech MC-3500 d +Cap** x 312 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 12 Rows of 26 Chambers Cap Storage= +14.9 cf x 2 x 12 rows = 357.6 cf
		57,675 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	208.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 203.00'
#2	Primary	206.00'	**24.0" Round Culvert** L= 120.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 206.00' / 200.00' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	212.00'	**4.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)
#4	Device 2	209.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=3.84 cfs @ 12.91 hrs HW=209.58' (Free Discharge)
└─**1=Exfiltration** (Controls 3.84 cfs)

Primary OutFlow Max=0.03 cfs @ 12.91 hrs HW=209.58' TW=194.00' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.03 cfs of 24.31 cfs potential flow)
  ├─**3=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 0.03 cfs @ 0.98 fps)

Pond 6P: Subsurface Chamber System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 12 rows = 357.6 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

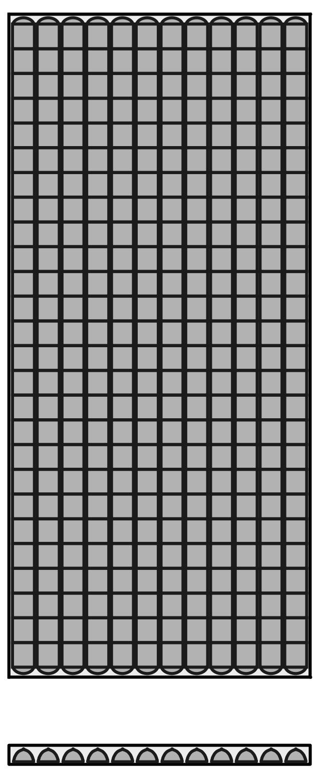
26 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 190.12' Row Length +12.0" End Stone x 2 = 192.12' Base Length
12 Rows x 77.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 87.25' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

312 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 12 Rows = 34,662.6 cf Chamber Storage

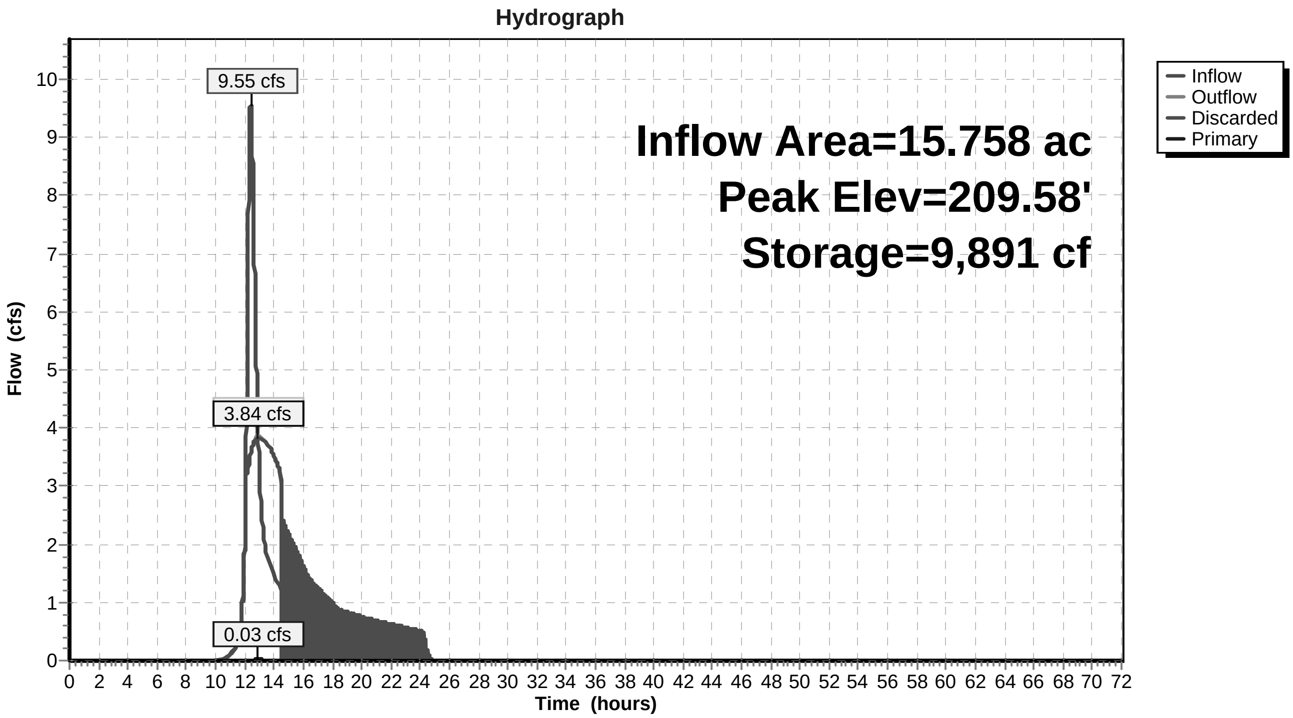
92,193.6 cf Field - 34,662.6 cf Chambers = 57,531.0 cf Stone x 40.0% Voids = 23,012.4 cf Stone Storage

Chamber Storage + Stone Storage = 57,675.0 cf = 1.324 af
Overall Storage Efficiency = 62.6%
Overall System Size = 192.12' x 87.25' x 5.50'

312 Chambers
3,414.6 cy Field
2,130.8 cy Stone



Pond 6P: Subsurface Chamber System



Summary for Pond 7P: Subsurface Chamber System

Inflow Area = 15.758 ac, 22.52% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.03 cfs @ 12.91 hrs, Volume= 0.001 af
Outflow = 0.03 cfs @ 12.91 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.03 cfs @ 12.91 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 194.00' @ 0.00 hrs Surf.Area= 14,754 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (775.8 - 775.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	194.00'	20,298 cf	**94.42'W x 156.27'L x 5.50'H Field A** 81,150 cf Overall - 30,404 cf Embedded = 50,745 cf x 40.0% Voids
#2A	194.75'	30,404 cf	**ADS_StormTech MC-3500 d +Cap** x 273 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 13 Rows of 21 Chambers Cap Storage= +14.9 cf x 2 x 13 rows = 387.4 cf
		50,702 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	194.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 190.00'
#2	Primary	197.00'	**18.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 197.00' / 196.60' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	197.00'	**12.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	199.00'	**4.0' long x 1.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.00 cfs @ 12.91 hrs HW=194.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.82 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=194.00' TW=156.60' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Pond 7P: Subsurface Chamber System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 13 rows = 387.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

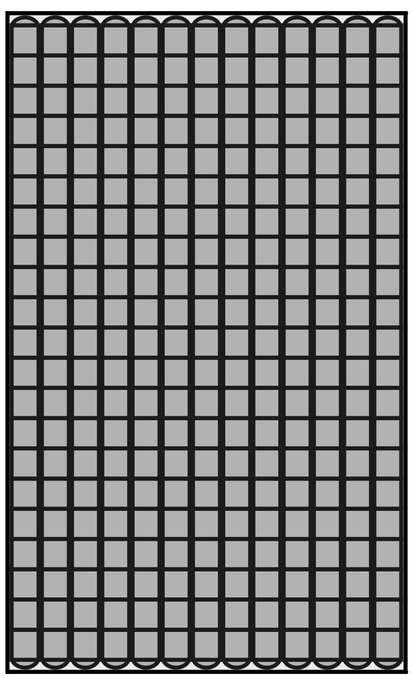
21 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 154.27' Row Length +12.0" End Stone x 2 = 156.27' Base Length
13 Rows x 77.0" Wide + 9.0" Spacing x 12 + 12.0" Side Stone x 2 = 94.42' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

273 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 13 Rows = 30,404.3 cf Chamber Storage

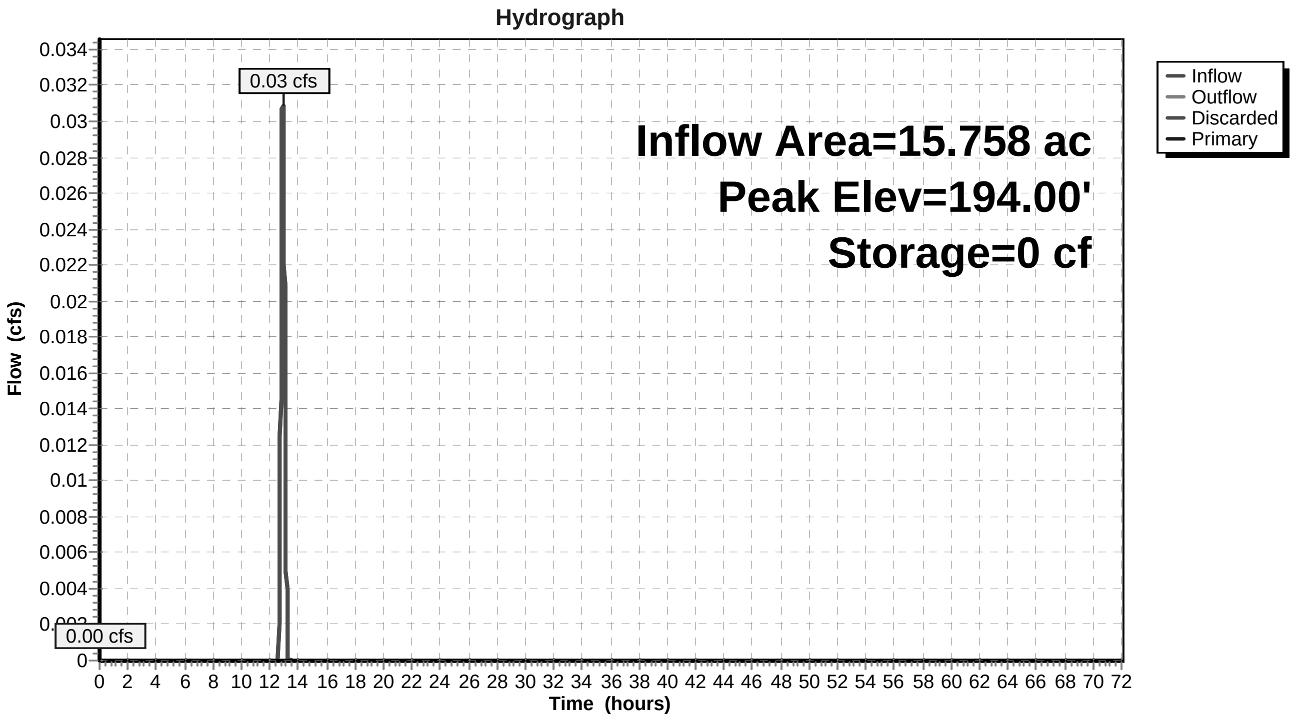
81,149.7 cf Field - 30,404.3 cf Chambers = 50,745.4 cf Stone x 40.0% Voids = 20,298.2 cf Stone Storage

Chamber Storage + Stone Storage = 50,702.5 cf = 1.164 af
Overall Storage Efficiency = 62.5%
Overall System Size = 156.27' x 94.42' x 5.50'

273 Chambers
3,005.5 cy Field
1,879.5 cy Stone



Pond 7P: Subsurface Chamber System



Summary for Pond 8P: Infiltration Basin

Inflow Area = 10.772 ac, 11.54% Impervious, Inflow Depth = 0.47" for 2-Year event
Inflow = 2.35 cfs @ 12.55 hrs, Volume= 0.421 af
Outflow = 1.56 cfs @ 12.88 hrs, Volume= 0.421 af, Atten= 33%, Lag= 20.0 min
Discarded = 1.56 cfs @ 12.88 hrs, Volume= 0.421 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 195.13' @ 12.88 hrs Surf.Area= 7,966 sf Storage= 1,029 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.4 min (936.6 - 934.2)

Volume	Invert	Avail.Storage	Storage Description
#1	195.00'	100,696 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

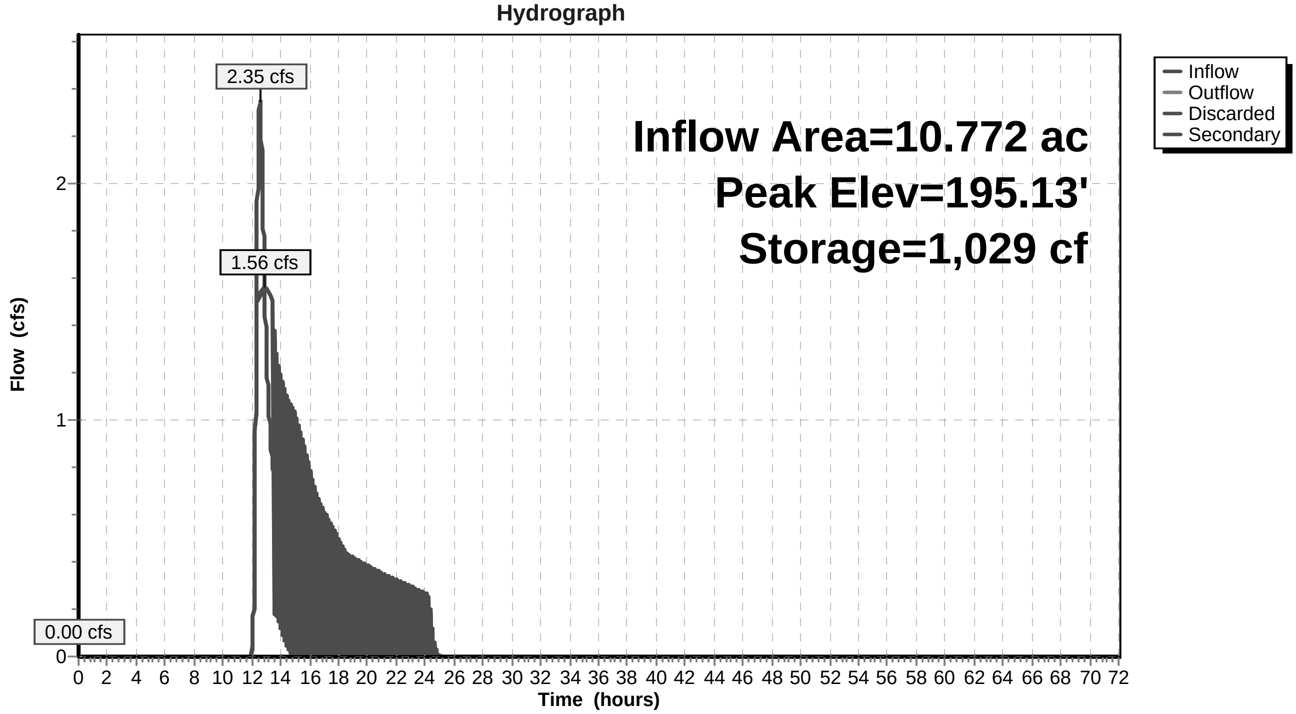
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
195.00	7,783	0	0
196.00	9,185	8,484	8,484
197.00	13,503	11,344	19,828
198.00	16,254	14,879	34,707
199.00	20,337	18,296	53,002
200.00	23,556	21,947	74,949
201.00	27,938	25,747	100,696

Device	Routing	Invert	Outlet Devices
#1	Discarded	195.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 190.00'
#2	Secondary	200.00'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=1.56 cfs @ 12.88 hrs HW=195.13' (Free Discharge)
└─**1=Exfiltration** (Controls 1.56 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=195.00' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Infiltration Basin



Summary for Pond 9P: Subsurface Chamber System

Inflow Area =	0.164 ac, 81.01% Impervious, Inflow Depth = 1.97" for 2-Year event		
Inflow =	0.41 cfs @ 12.06 hrs, Volume=	0.027 af	
Outflow =	0.16 cfs @ 12.28 hrs, Volume=	0.027 af,	Atten= 62%, Lag= 13.2 min
Discarded =	0.16 cfs @ 12.28 hrs, Volume=	0.027 af	
Primary =	0.00 cfs @ 0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 194.48' @ 12.28 hrs Surf.Area= 730 sf Storage= 139 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.9 min (820.1 - 816.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	194.00'	691 cf	**15.75'W x 46.34'L x 3.50'H Field A** 2,554 cf Overall - 827 cf Embedded = 1,727 cf x 40.0% Voids
#2A	194.50'	827 cf	**ADS_StormTech SC-740 +Cap** x 18 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 3 Rows of 6 Chambers
#3	197.50'	13 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		1,531 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
197.50	13	0	0
198.50	13	13	13

Device	Routing	Invert	Outlet Devices
#1	Discarded	194.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 190.00'
#2	Primary	198.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.16 cfs @ 12.28 hrs HW=194.48' (Free Discharge)
└─**1=Exfiltration** (Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=194.00' TW=156.60' (Dynamic Tailwater)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 9P: Subsurface Chamber System - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

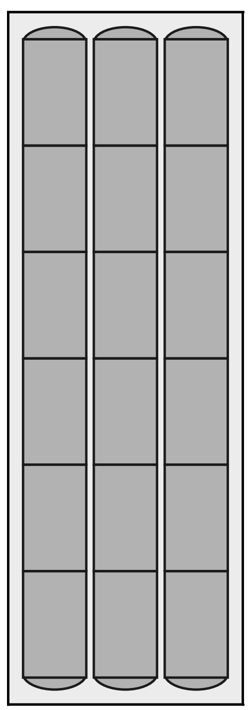
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

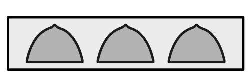
18 Chambers x 45.9 cf = 826.9 cf Chamber Storage

2,554.3 cf Field - 826.9 cf Chambers = 1,727.4 cf Stone x 40.0% Voids = 691.0 cf Stone Storage

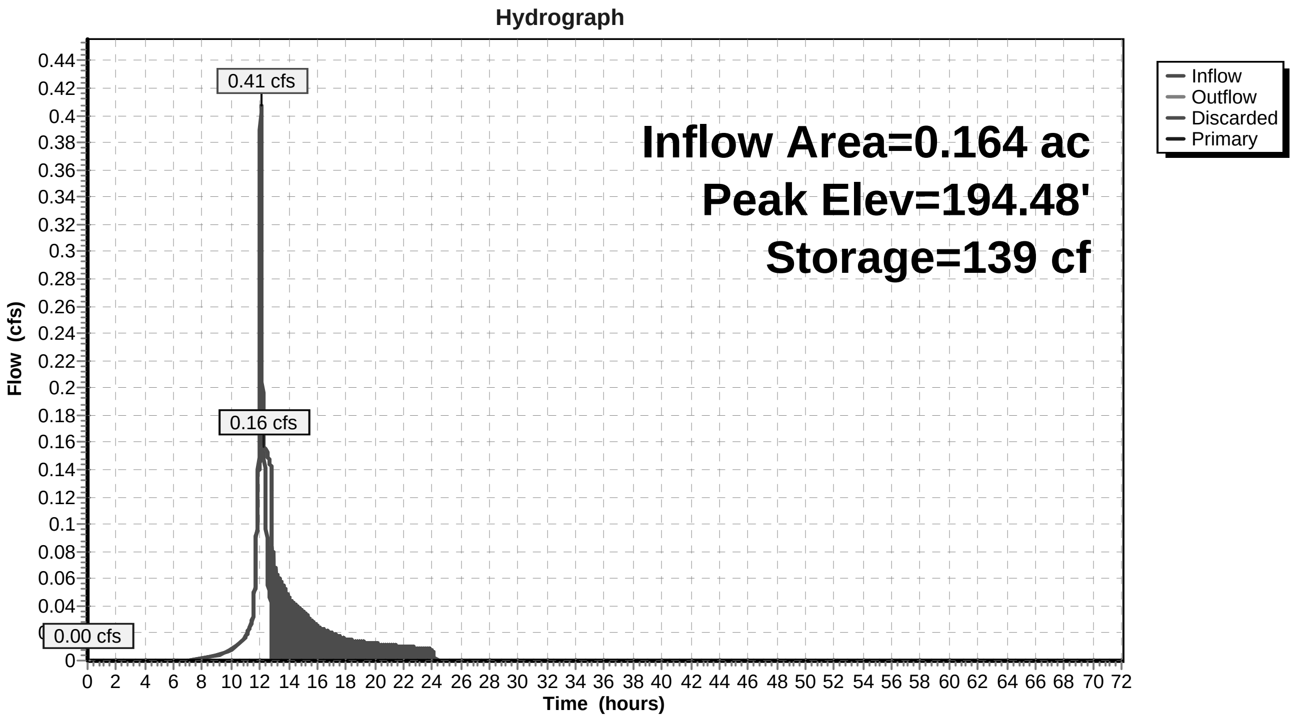
Chamber Storage + Stone Storage = 1,517.9 cf = 0.035 af
Overall Storage Efficiency = 59.4%
Overall System Size = 46.34' x 15.75' x 3.50'

18 Chambers
94.6 cy Field
64.0 cy Stone





Pond 9P: Subsurface Chamber System



Summary for Pond 10P: 48" Box Culvert

Inflow Area = 41.633 ac, 0.00% Impervious, Inflow Depth = 0.81" for 2-Year event
Inflow = 9.33 cfs @ 13.61 hrs, Volume= 2.823 af
Outflow = 9.33 cfs @ 13.62 hrs, Volume= 2.823 af, Atten= 0%, Lag= 0.3 min
Primary = 9.33 cfs @ 13.62 hrs, Volume= 2.823 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 256.11' @ 13.62 hrs Surf.Area= 363 sf Storage= 228 cf

Plug-Flow detention time= 0.7 min calculated for 2.823 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (972.7 - 972.2)

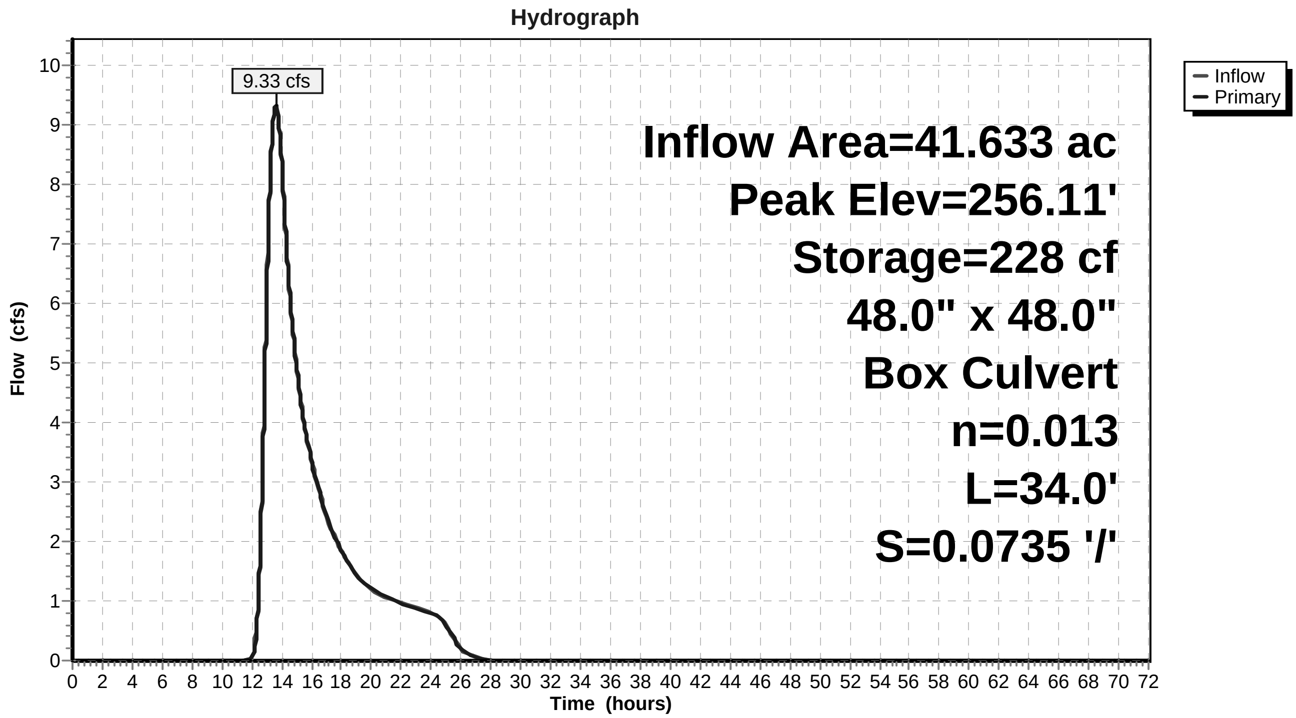
Volume	Invert	Avail.Storage	Storage Description
#1	255.30'	12,405 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.30	200	0	0
256.00	343	190	190
258.00	710	1,053	1,243
260.00	2,017	2,727	3,970
262.00	6,418	8,435	12,405

Device	Routing	Invert	Outlet Devices
#1	Primary	255.30'	**48.0" W x 48.0" H Box Culvert** L= 34.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 255.30' / 252.80' S= 0.0735 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 16.00 sf

Primary OutFlow Max=9.33 cfs @ 13.62 hrs HW=256.11' TW=253.29' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 9.33 cfs @ 2.89 fps)

Pond 10P: 48" Box Culvert



Summary for Pond 11P: Carberry Ln Culvert

Inflow Area = 53.443 ac, 4.00% Impervious, Inflow Depth = 0.89" for 2-Year event
Inflow = 11.53 cfs @ 12.25 hrs, Volume= 3.978 af
Outflow = 11.52 cfs @ 12.26 hrs, Volume= 3.978 af, Atten= 0%, Lag= 0.3 min
Primary = 11.52 cfs @ 12.26 hrs, Volume= 3.978 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 160.49' @ 12.26 hrs Surf.Area= 233 sf Storage= 256 cf

Plug-Flow detention time= 0.7 min calculated for 3.978 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (951.3 - 950.7)

Volume	Invert	Avail.Storage	Storage Description
#1	159.12'	13,507 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

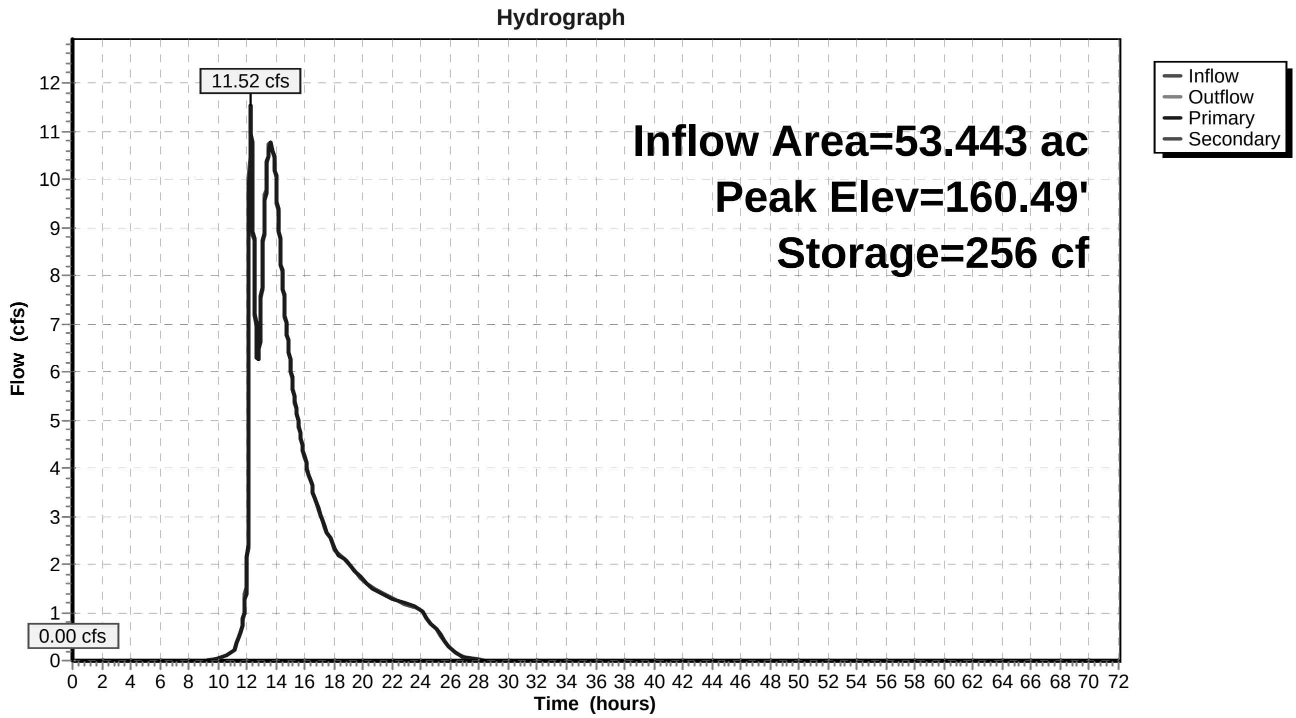
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
159.12	143	0	0
160.00	200	151	151
161.00	267	234	384
162.00	486	377	761
163.00	786	636	1,397
164.00	1,226	1,006	2,403
165.00	2,948	2,087	4,490
166.00	7,080	5,014	9,504
166.50	8,934	4,004	13,507

Device	Routing	Invert	Outlet Devices
#1	Primary	159.12'	**36.0" Round Culvert** L= 106.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.12' / 158.28' S= 0.0079 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf
#2	Secondary	165.25'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=11.52 cfs @ 12.26 hrs HW=160.49' (Free Discharge)
└─**1=Culvert** (Barrel Controls 11.52 cfs @ 5.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=159.12' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 11P: Carberry Ln Culvert



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Upper Watershed To Runoff Area=1,813,532 sf 0.00% Impervious Runoff Depth=1.90"
Flow Length=2,658' Tc=107.5 min CN=69 Runoff=24.18 cfs 6.590 af

Subcatchment 2S: Wetland Area Runoff Area=24,756 sf 0.00% Impervious Runoff Depth=1.32"
Flow Length=47' Slope=0.0800 '/' Tc=6.7 min CN=61 Runoff=0.78 cfs 0.063 af

Subcatchment 3S: Lower Stream Channel Runoff Area=118,276 sf 0.00% Impervious Runoff Depth=1.82"
Flow Length=683' Tc=19.4 min CN=68 Runoff=3.82 cfs 0.412 af

Subcatchment 4S: To Canton Ave Runoff Area=175,971 sf 20.42% Impervious Runoff Depth=1.06"
Flow Length=549' Tc=10.0 min CN=57 Runoff=3.64 cfs 0.358 af

Subcatchment 5S: To Canton Ave Runoff Area=351,525 sf 1.88% Impervious Runoff Depth=0.12"
Flow Length=1,139' Tc=30.3 min CN=37 Runoff=0.13 cfs 0.083 af

Subcatchment 6S: To Canton Ave Runoff Area=469,212 sf 11.54% Impervious Runoff Depth=1.32"
Flow Length=1,260' Tc=29.5 min CN=61 Runoff=8.59 cfs 1.186 af

Subcatchment 7S: To Canton Ave Runoff Area=137,490 sf 15.14% Impervious Runoff Depth=0.82"
Flow Length=233' Tc=12.2 min CN=53 Runoff=1.79 cfs 0.217 af

Subcatchment 8S: To Upper Stream Runoff Area=138,706 sf 12.87% Impervious Runoff Depth=2.47"
Flow Length=154' Tc=8.1 min CN=76 Runoff=8.56 cfs 0.655 af

Subcatchment 9S: To Existing Pond Runoff Area=232,693 sf 32.31% Impervious Runoff Depth=2.82"
Flow Length=1,168' Tc=15.6 min CN=80 Runoff=13.19 cfs 1.257 af

Subcatchment 10S: To Canton Ave Runoff Area=548,914 sf 24.36% Impervious Runoff Depth=2.38"
Flow Length=1,017' Tc=26.7 min CN=75 Runoff=20.91 cfs 2.504 af

Subcatchment 11S: To Canton Ave Runoff Area=7,160 sf 81.01% Impervious Runoff Depth=3.49"
Flow Length=300' Tc=4.0 min CN=87 Runoff=0.71 cfs 0.048 af

Reach 1R: Upper Stream Channel Avg. Flow Depth=0.90' Max Vel=7.54 fps Inflow=24.93 cfs 7.245 af
n=0.040 L=575.0' S=0.0779 '/' Capacity=189.10 cfs Outflow=24.91 cfs 7.245 af

Reach DP1: Lower Stream Channel Avg. Flow Depth=0.92' Max Vel=7.42 fps Inflow=26.94 cfs 8.975 af
n=0.035 L=528.0' S=0.0537 '/' Capacity=190.84 cfs Outflow=26.93 cfs 8.975 af

Reach DP2: Canton Ave Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP3: Canton Ave Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 1P: 48" Box Culvert Peak Elev=201.95' Storage=639 cf Inflow=24.91 cfs 7.245 af
Primary=24.90 cfs 7.243 af Secondary=0.00 cfs 0.000 af Outflow=24.90 cfs 7.243 af

Pond 2P: Existing Farm Pond Peak Elev=191.33' Storage=3,944 cf Inflow=26.42 cfs 8.563 af
Primary=26.38 cfs 8.563 af Secondary=0.00 cfs 0.000 af Outflow=26.38 cfs 8.563 af

Pond 3P: Existing Depression Peak Elev=153.22' Storage=783 cf Inflow=3.64 cfs 0.358 af
Discarded=3.06 cfs 0.358 af Primary=0.00 cfs 0.000 af Outflow=3.06 cfs 0.358 af

Pond 4P: Existing Depression Peak Elev=156.60' Storage=0 cf Inflow=0.13 cfs 0.083 af
Discarded=0.13 cfs 0.083 af Primary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.083 af

Pond 5P: Bio Retention area Peak Elev=217.48' Storage=2,504 cf Inflow=1.79 cfs 0.217 af
Discarded=0.35 cfs 0.217 af Primary=0.00 cfs 0.000 af Outflow=0.35 cfs 0.217 af

Pond 6P: Subsurface Chamber System Peak Elev=210.92' Storage=28,529 cf Inflow=20.91 cfs 2.504 af
Discarded=4.62 cfs 2.105 af Primary=3.62 cfs 0.399 af Outflow=8.24 cfs 2.505 af

Pond 7P: Subsurface Chamber System Peak Elev=194.22' Storage=1,323 cf Inflow=3.62 cfs 0.399 af
Discarded=2.98 cfs 0.399 af Primary=0.00 cfs 0.000 af Outflow=2.98 cfs 0.399 af

Pond 8P: Infiltration Basin Peak Elev=196.51' Storage=13,714 cf Inflow=8.59 cfs 1.186 af
Discarded=2.69 cfs 1.186 af Secondary=0.00 cfs 0.000 af Outflow=2.69 cfs 1.186 af

Pond 9P: Subsurface Chamber System Peak Elev=195.01' Storage=440 cf Inflow=0.71 cfs 0.048 af
Discarded=0.18 cfs 0.048 af Primary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.048 af

Pond 10P: 48" Box Culvert Peak Elev=256.82' Storage=535 cf Inflow=24.18 cfs 6.590 af
48.0" x 48.0" Box Culvert n=0.013 L=34.0' S=0.0735 '/' Outflow=24.17 cfs 6.590 af

Pond 11P: Carberry Ln Culvert Peak Elev=161.41' Storage=512 cf Inflow=26.93 cfs 8.975 af
Primary=26.93 cfs 8.975 af Secondary=0.00 cfs 0.000 af Outflow=26.93 cfs 8.975 af

Total Runoff Area = 92.246 ac Runoff Volume = 13.373 af Average Runoff Depth = 1.74"
91.29% Pervious = 84.210 ac 8.71% Impervious = 8.036 ac

Summary for Subcatchment 1S: Upper Watershed To Stream

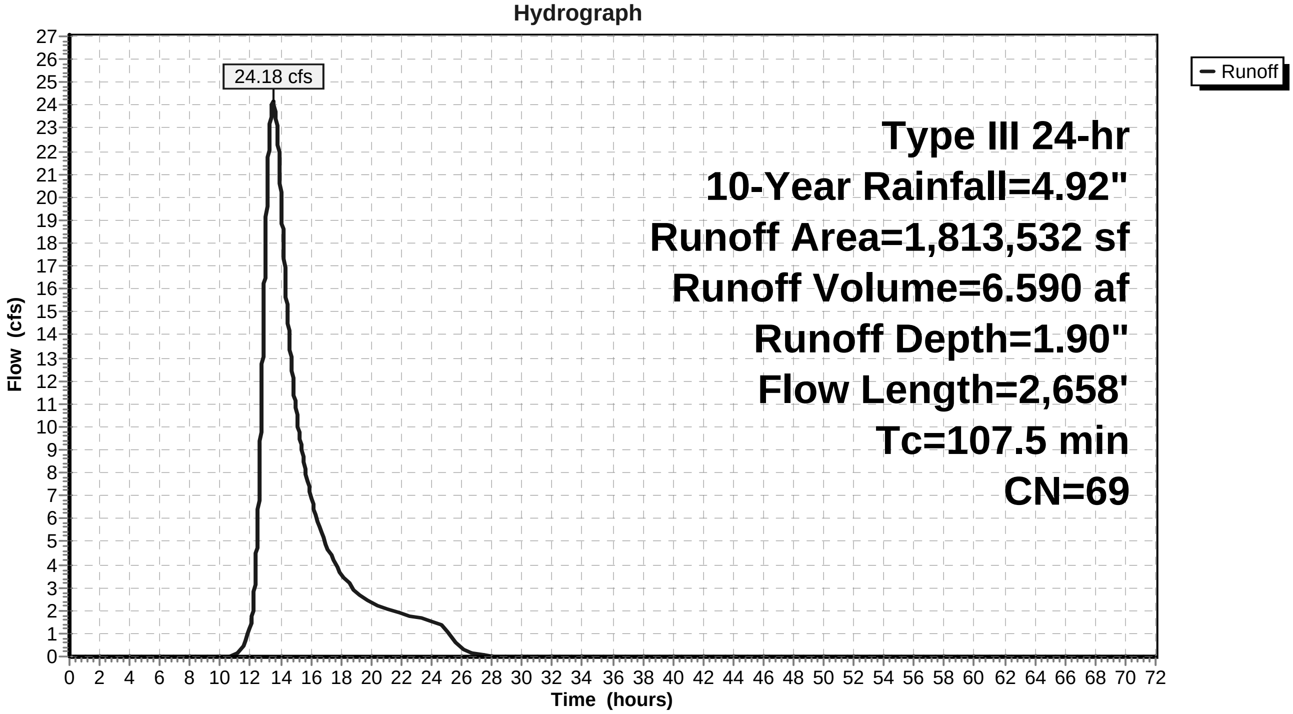
Runoff = 24.18 cfs @ 13.50 hrs, Volume= 6.590 af, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

	Area (sf)	CN	Description
	153,412	30	Woods, Good, HSG A
	929,681	70	Woods, Good, HSG C
	185,864	74	>75% Grass cover, Good, HSG C
	459,084	77	Woods, Good, HSG D
	84,545	80	>75% Grass cover, Good, HSG D
*	946	83	Wetland Stream Channel
	1,813,532	69	Weighted Average
	1,813,532		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0080	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
23.4	554	0.0250	0.40		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
10.9	116	0.0050	0.18		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
16.5	813	0.1080	0.82		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
16.7	306	0.0150	0.31		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
22.2	705	0.0450	0.53		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.2	114	0.0560	9.72	118.54	**Channel Flow,** Area= 12.2 sf Perim= 10.5' r= 1.16' n= 0.040 Earth, cobble bottom, clean sides
107.5	2,658	Total			

Subcatchment 1S: Upper Watershed To Stream



Summary for Subcatchment 2S: Wetland Area

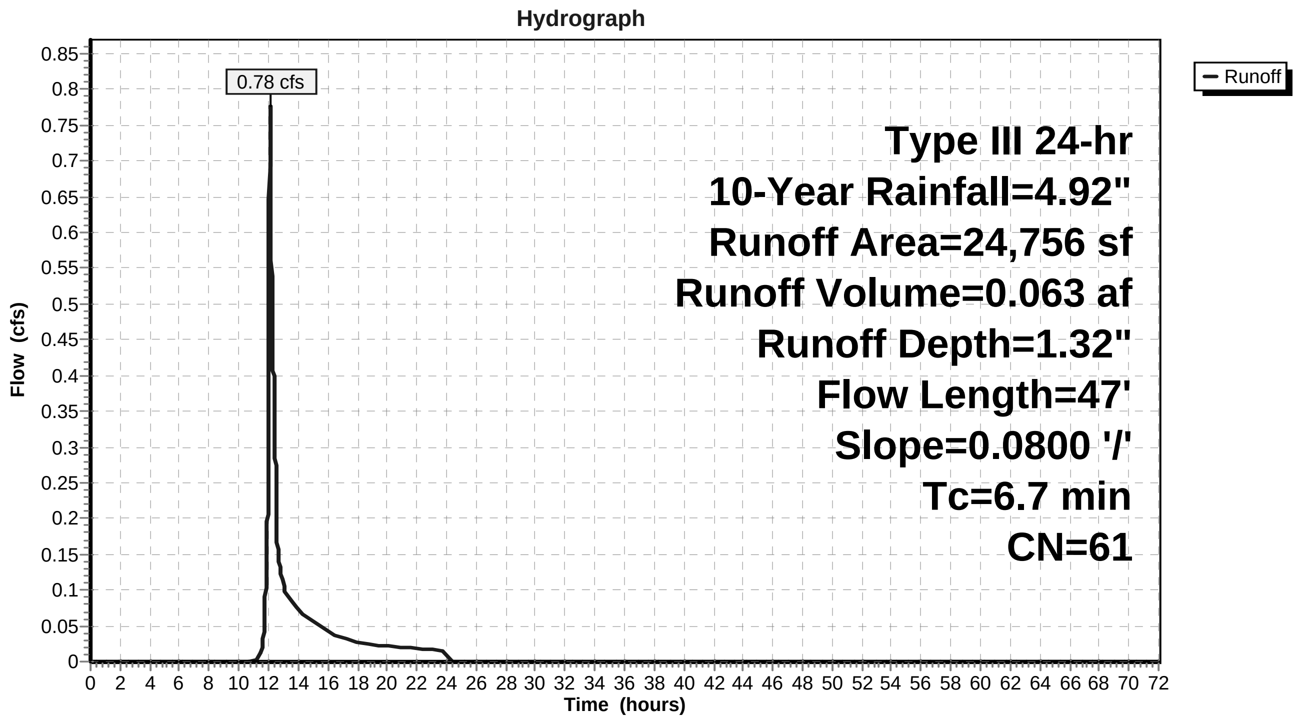
Runoff = 0.78 cfs @ 12.11 hrs, Volume= 0.063 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

	Area (sf)	CN	Description
*	3,336	83	Wetland Stream Channel
	17,332	55	Woods, Good, HSG B
	624	74	>75% Grass cover, Good, HSG C
	3,464	70	Woods, Good, HSG C
	24,756	61	Weighted Average
	24,756		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	47	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"

Subcatchment 2S: Wetland Area



Summary for Subcatchment 3S: Lower Stream Channel

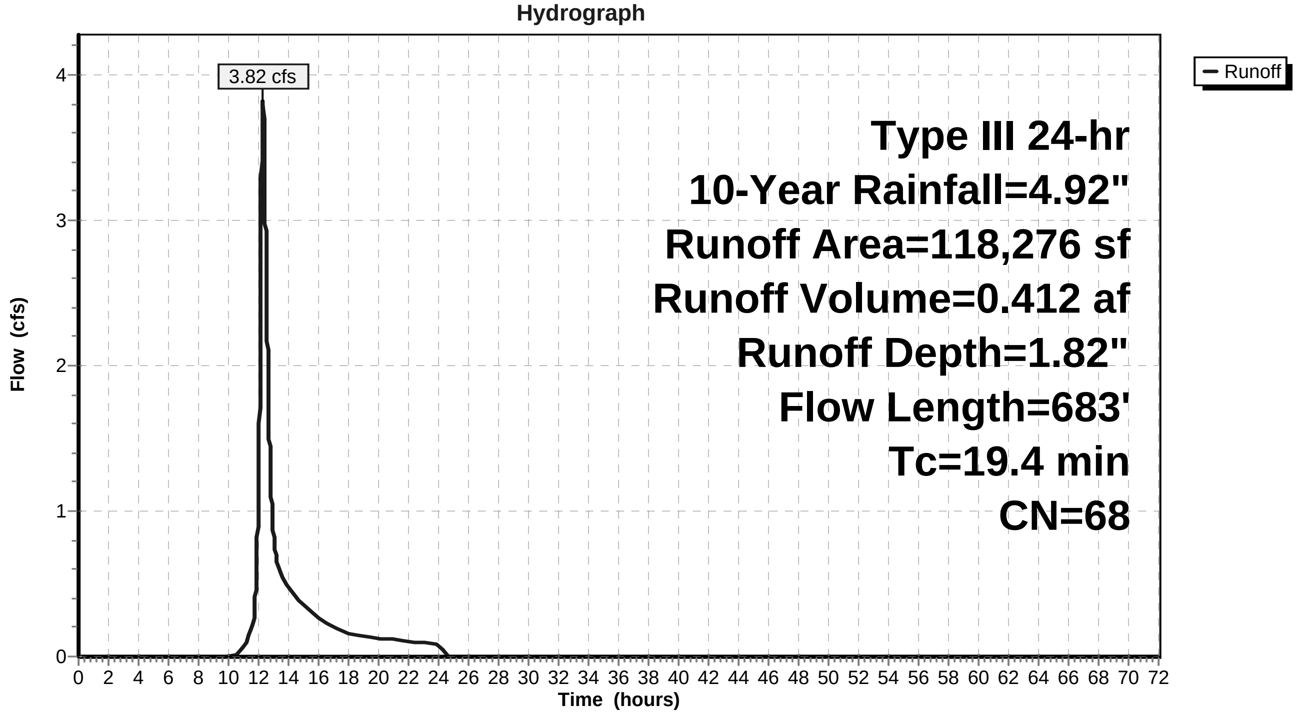
Runoff = 3.82 cfs @ 12.28 hrs, Volume= 0.412 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

	Area (sf)	CN	Description
	27,020	55	Woods, Good, HSG B
	30,772	74	>75% Grass cover, Good, HSG C
	58,057	70	Woods, Good, HSG C
*	2,427	83	Wetland Stream Channel
	118,276	68	Weighted Average
	118,276		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
9.0	450	0.1100	0.83		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.3	33	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	65	0.1400	0.94		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.1	62	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	23	0.1300	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
19.4	683	Total			

Subcatchment 3S: Lower Stream Channel



Summary for Subcatchment 4S: To Canton Ave

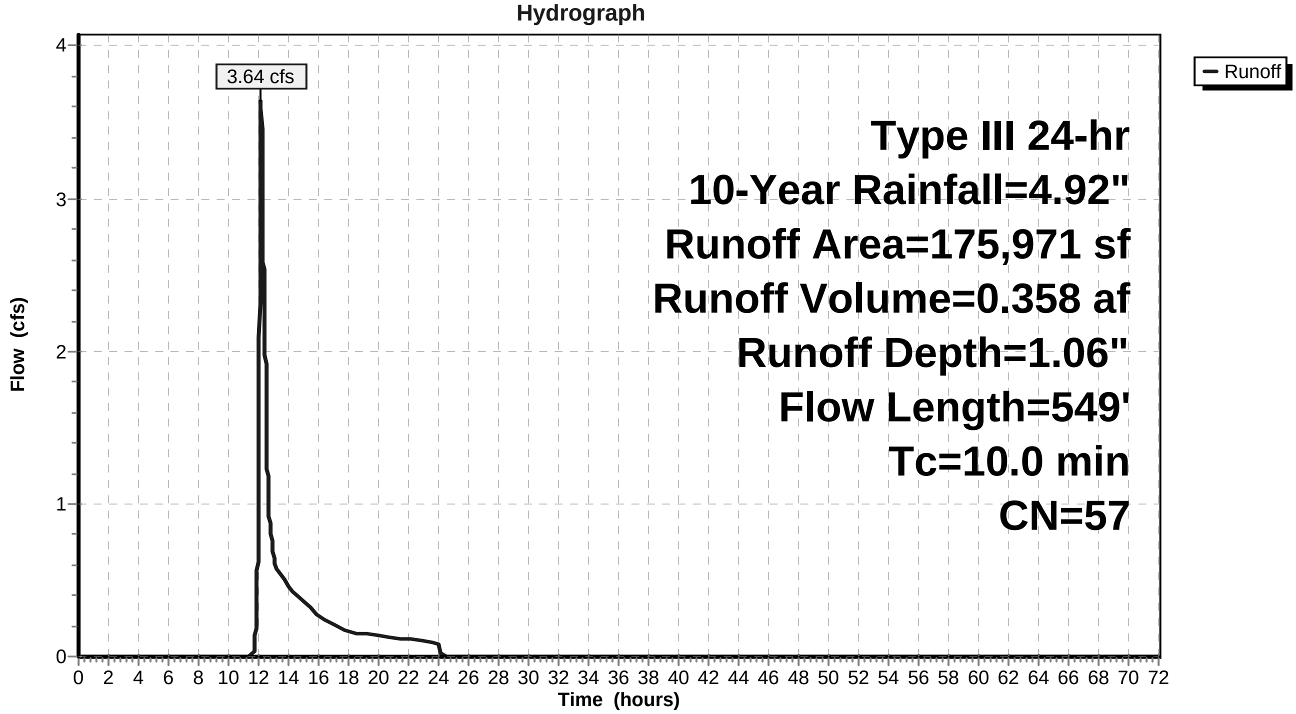
Runoff = 3.64 cfs @ 12.16 hrs, Volume= 0.358 af, Depth= 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
9,654	98	Roofs, HSG A
17,648	98	Paved parking, HSG A
44,334	30	Woods, Good, HSG A
54,496	39	>75% Grass cover, Good, HSG A
9,397	55	Woods, Good, HSG B
22,408	77	Woods, Good, HSG D
9,406	80	>75% Grass cover, Good, HSG D
8,628	98	Paved parking, HSG D
175,971	57	Weighted Average
140,041		79.58% Pervious Area
35,930		20.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
3.0	150	0.1100	0.83		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
1.0	349	0.0870	5.99		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.0	549	Total			

Subcatchment 4S: To Canton Ave



Summary for Subcatchment 5S: To Canton Ave

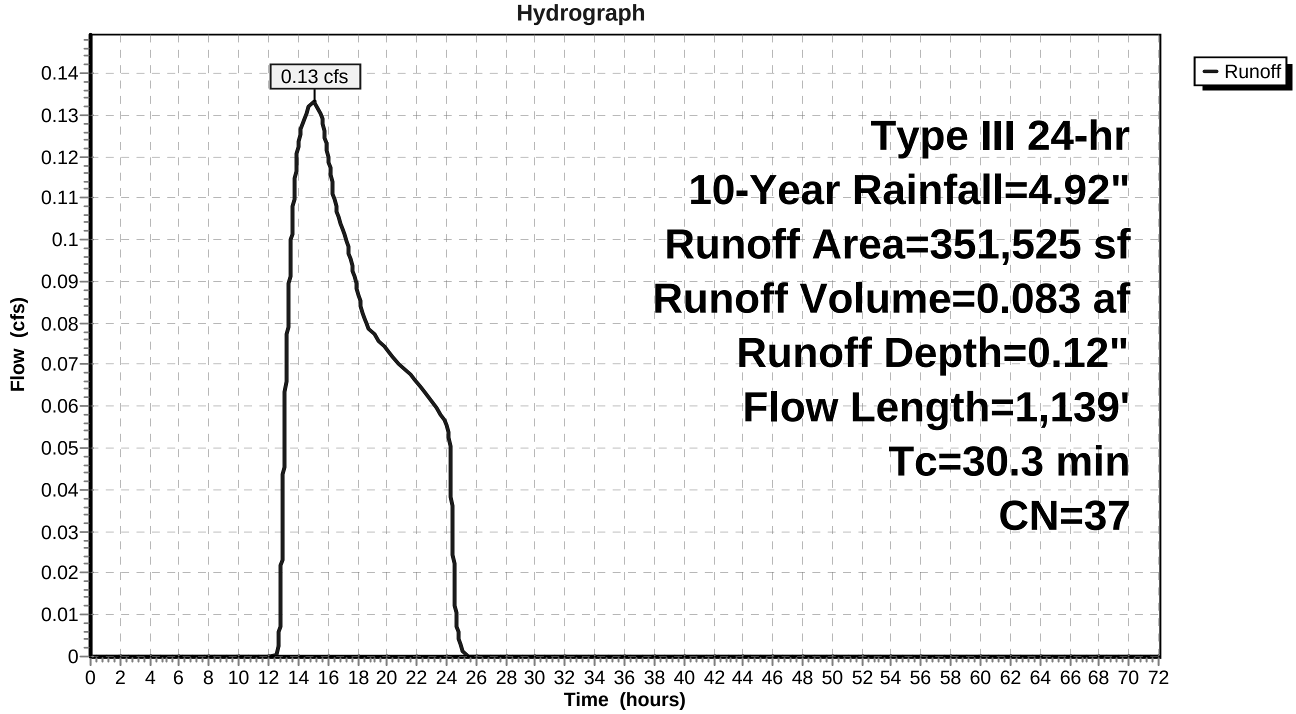
Runoff = 0.13 cfs @ 15.05 hrs, Volume= 0.083 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
2,800	98	Roofs, HSG A
3,792	98	Paved parking, HSG A
114,707	30	Woods, Good, HSG A
230,226	39	>75% Grass cover, Good, HSG A
351,525	37	Weighted Average
344,933		98.12% Pervious Area
6,592		1.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
4.7	391	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.3	592	0.0520	0.57		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.9	106	0.0850	2.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
30.3	1,139	Total			

Subcatchment 5S: To Canton Ave



Summary for Subcatchment 6S: To Canton Ave

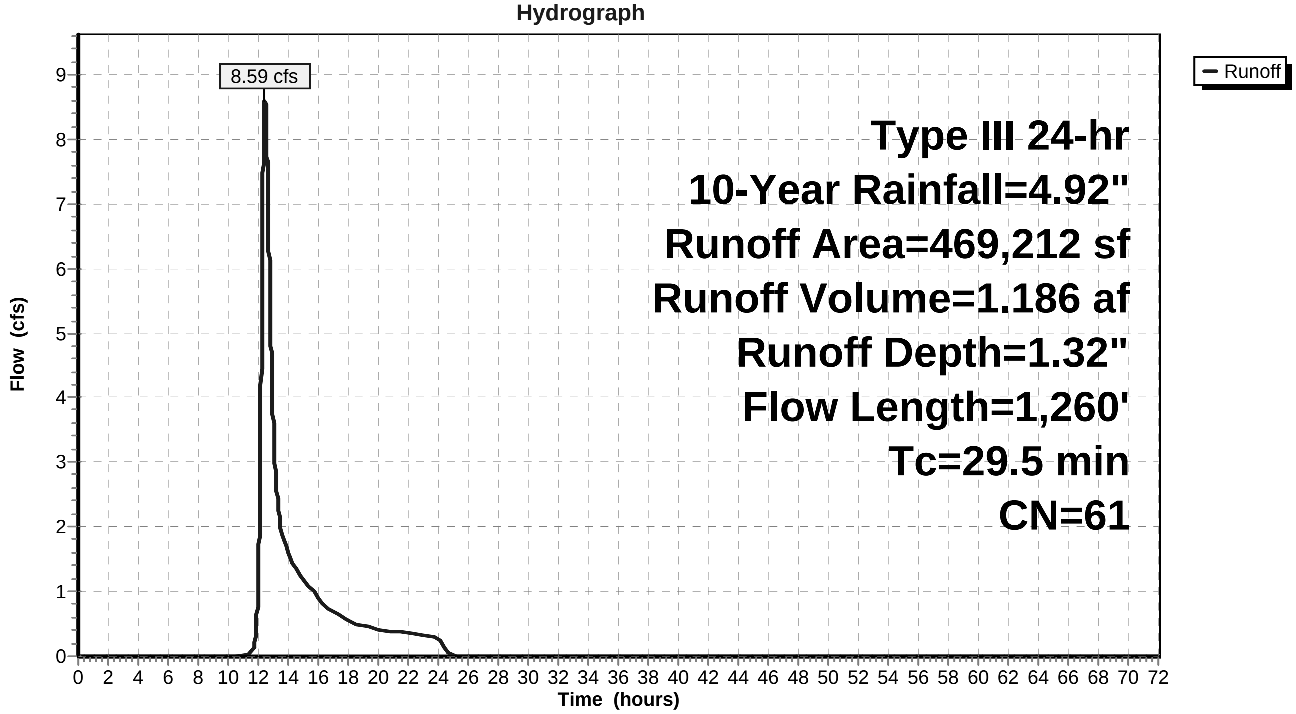
Runoff = 8.59 cfs @ 12.46 hrs, Volume= 1.186 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
82,018	30	Woods, Good, HSG A
54,246	39	>75% Grass cover, Good, HSG A
155,461	70	Woods, Good, HSG C
52,059	74	>75% Grass cover, Good, HSG C
16,193	98	Paved parking, HSG C
6,948	98	Roofs, HSG C
5,851	98	Roofs, HSG A
25,151	98	Paved parking, HSG A
71,285	55	Woods, Good, HSG B
469,212	61	Weighted Average
415,069		88.46% Pervious Area
54,143		11.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
2.9	137	0.1000	0.79		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
3.5	365	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.7	708	0.0800	0.71		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
29.5	1,260	Total			

Subcatchment 6S: To Canton Ave



Summary for Subcatchment 7S: To Canton Ave

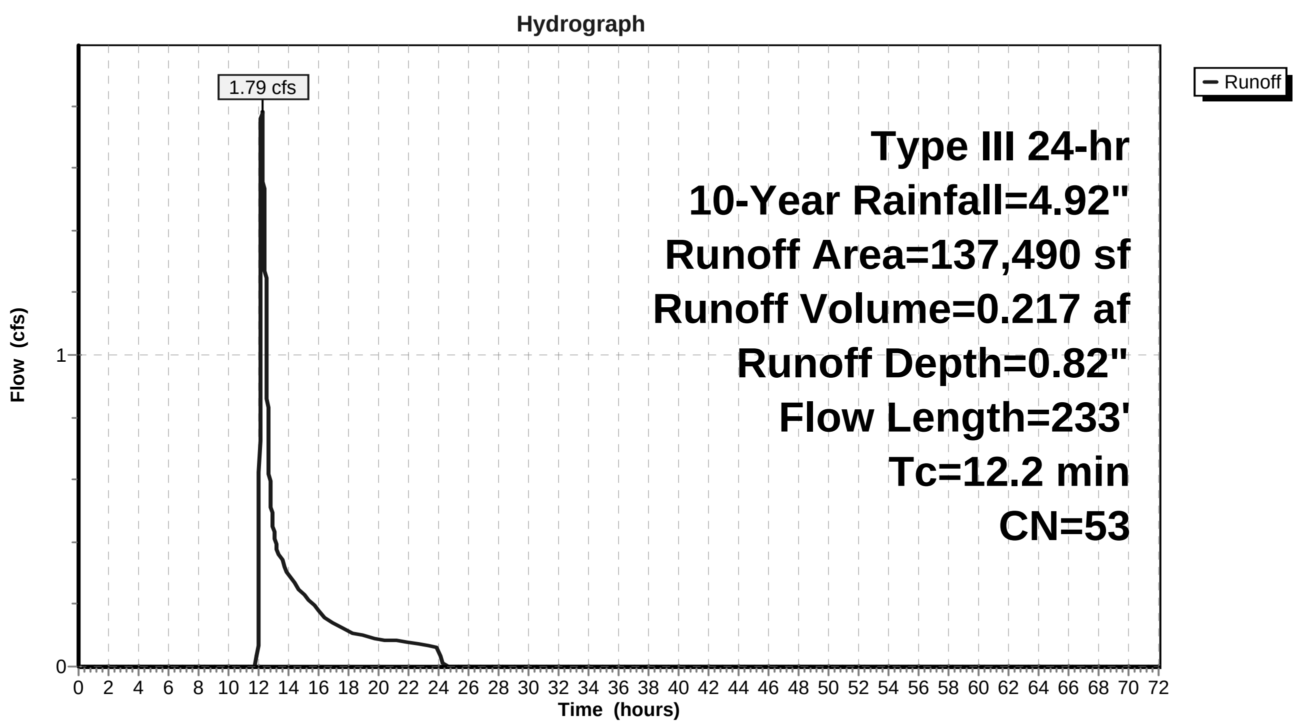
Runoff = 1.79 cfs @ 12.21 hrs, Volume= 0.217 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
10,854	98	Roofs, HSG C
1,300	98	Roofs, HSG A
45,027	39	>75% Grass cover, Good, HSG A
19,832	74	>75% Grass cover, Good, HSG C
40,675	30	Woods, Good, HSG A
11,139	70	Woods, Good, HSG C
8,663	98	Paved parking, HSG A
137,490	53	Weighted Average
116,673		84.86% Pervious Area
20,817		15.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0750	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
5.0	183	0.0600	0.61		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
12.2	233	Total			

Subcatchment 7S: To Canton Ave



Summary for Subcatchment 8S: To Upper Stream

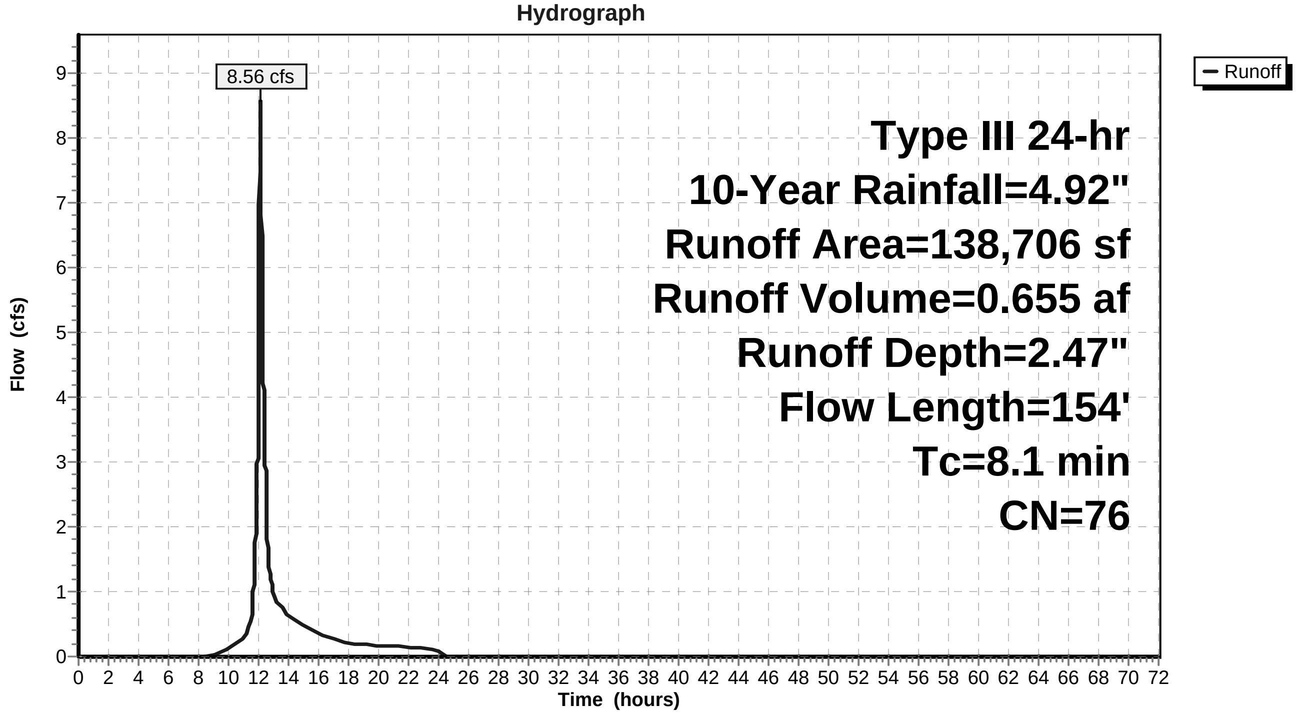
Runoff = 8.56 cfs @ 12.12 hrs, Volume= 0.655 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

	Area (sf)	CN	Description
	10,854	98	Roofs, HSG C
	56,850	70	Woods, Good, HSG C
	39,960	74	>75% Grass cover, Good, HSG C
	6,997	98	Roofs, HSG D
	13,257	80	>75% Grass cover, Good, HSG D
*	5,996	83	Wetland Stream Channel
	4,792	61	>75% Grass cover, Good, HSG B
	138,706	76	Weighted Average
	120,855		87.13% Pervious Area
	17,851		12.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
1.4	76	0.1310	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.3	28	0.3200	1.41		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
8.1	154	Total			

Subcatchment 8S: To Upper Stream



Summary for Subcatchment 9S: To Existing Pond

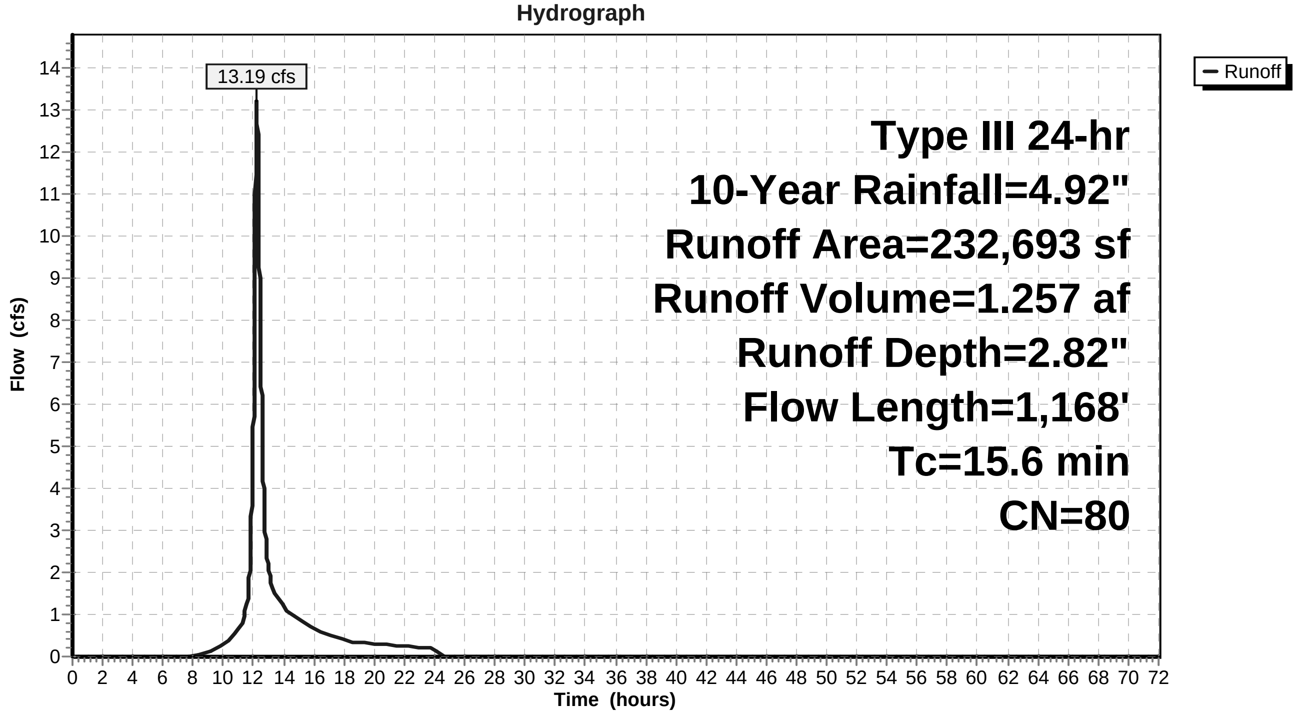
Runoff = 13.19 cfs @ 12.22 hrs, Volume= 1.257 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
51,672	98	Paved parking, HSG C
23,517	98	Roofs, HSG C
92,096	70	Woods, Good, HSG C
65,408	74	>75% Grass cover, Good, HSG C
232,693	80	Weighted Average
157,504		67.69% Pervious Area
75,189		32.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
4.5	180	0.0720	0.67		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.9	230	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	708	0.0800	12.83	10.08	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
15.6	1,168	Total			

Subcatchment 9S: To Existing Pond



Summary for Subcatchment 10S: To Canton Ave

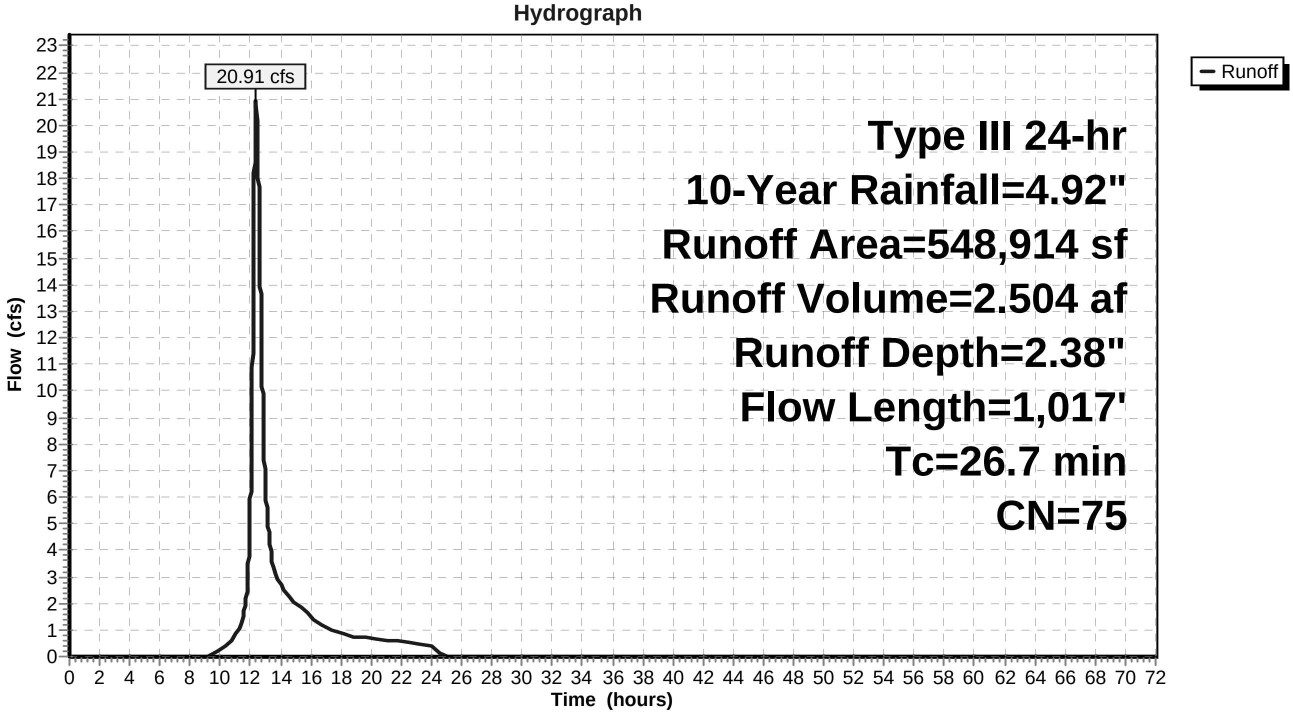
Runoff = 20.91 cfs @ 12.37 hrs, Volume= 2.504 af, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
1,375	98	Roofs, HSG A
1,811	39	>75% Grass cover, Good, HSG A
126,272	55	Woods, Good, HSG B
25,692	98	Paved parking, HSG D
19,296	98	Roofs, HSG D
34,183	80	>75% Grass cover, Good, HSG D
33,768	98	Roofs, HSG C
53,608	98	Paved parking, HSG C
121,146	70	Woods, Good, HSG C
129,363	74	>75% Grass cover, Good, HSG C
2,400	96	Gravel surface, HSG C
548,914	75	Weighted Average
415,175		75.64% Pervious Area
133,739		24.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
10.1	544	0.1300	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.3	246	0.0650	1.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.0	177	0.0560	0.59		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
26.7	1,017	Total			

Subcatchment 10S: To Canton Ave



Summary for Subcatchment 11S: To Canton Ave

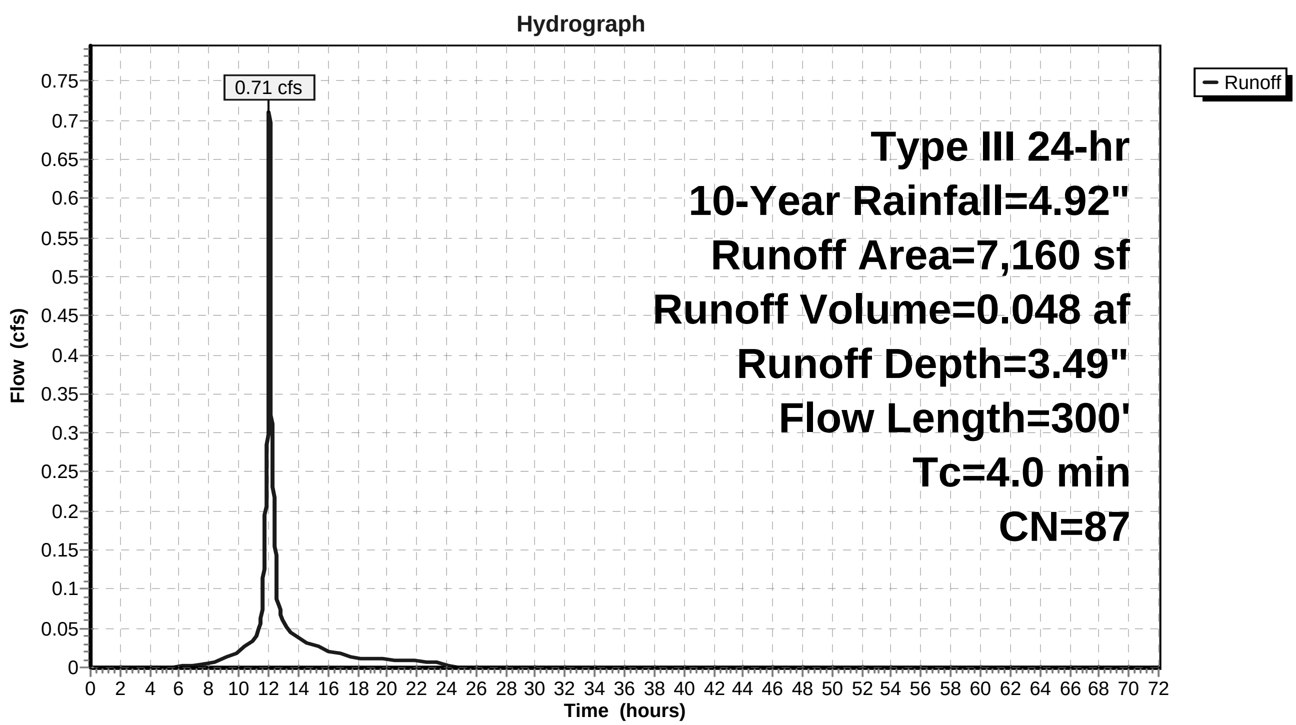
Runoff = 0.71 cfs @ 12.06 hrs, Volume= 0.048 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
5,800	98	Paved parking, HSG A
1,360	39	>75% Grass cover, Good, HSG A
7,160	87	Weighted Average
1,360		18.99% Pervious Area
5,800		81.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	25	0.0800	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.26"
1.3	275	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.0	300	Total			

Subcatchment 11S: To Canton Ave



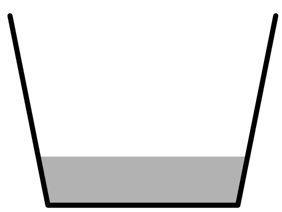
Summary for Reach 1R: Upper Stream Channel

Inflow Area = 44.817 ac, 0.91% Impervious, Inflow Depth = 1.94" for 10-Year event
Inflow = 24.93 cfs @ 13.50 hrs, Volume= 7.245 af
Outflow = 24.91 cfs @ 13.52 hrs, Volume= 7.245 af, Atten= 0%, Lag= 0.7 min

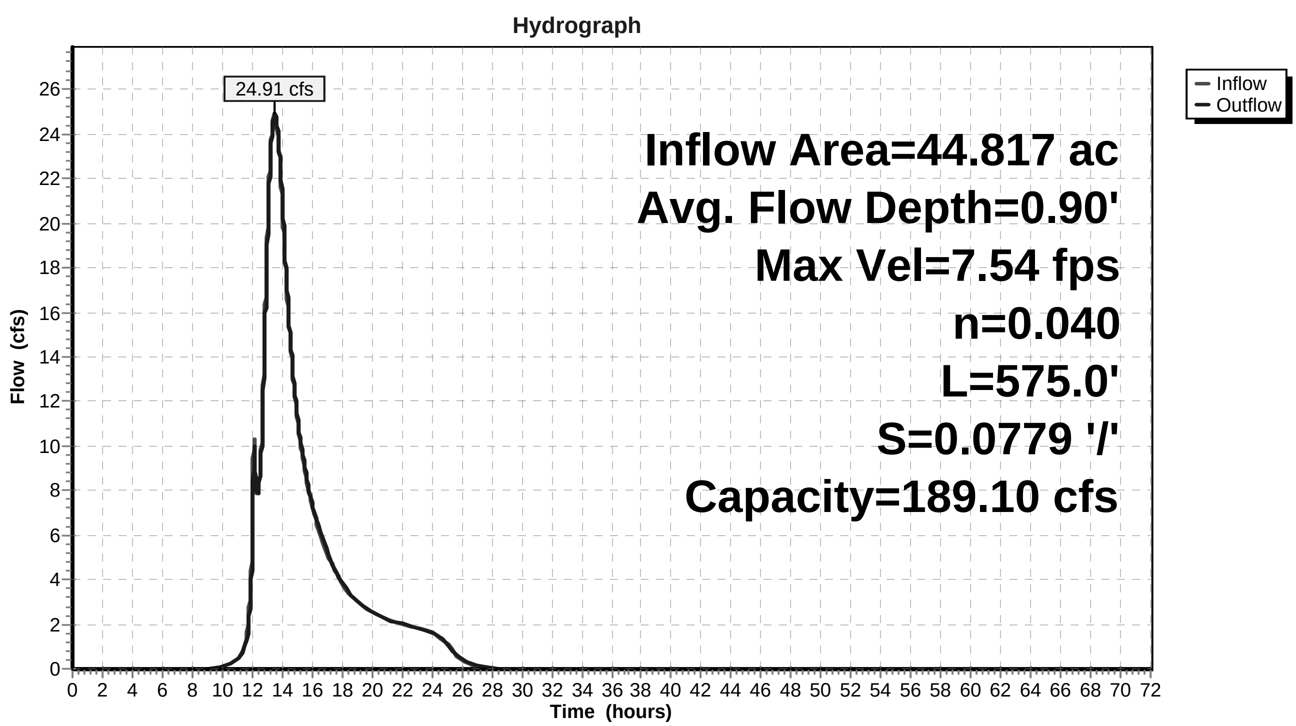
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.54 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 3.18 fps, Avg. Travel Time= 3.0 min

Peak Storage= 1,900 cf @ 13.52 hrs
Average Depth at Peak Storage= 0.90'
Bank-Full Depth= 3.50' Flow Area= 14.7 sf, Capacity= 189.10 cfs

3.50' x 3.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 0.2 '/' Top Width= 4.90'
Length= 575.0' Slope= 0.0779 '/'
Inlet Invert= 252.80', Outlet Invert= 208.00'



Reach 1R: Upper Stream Channel



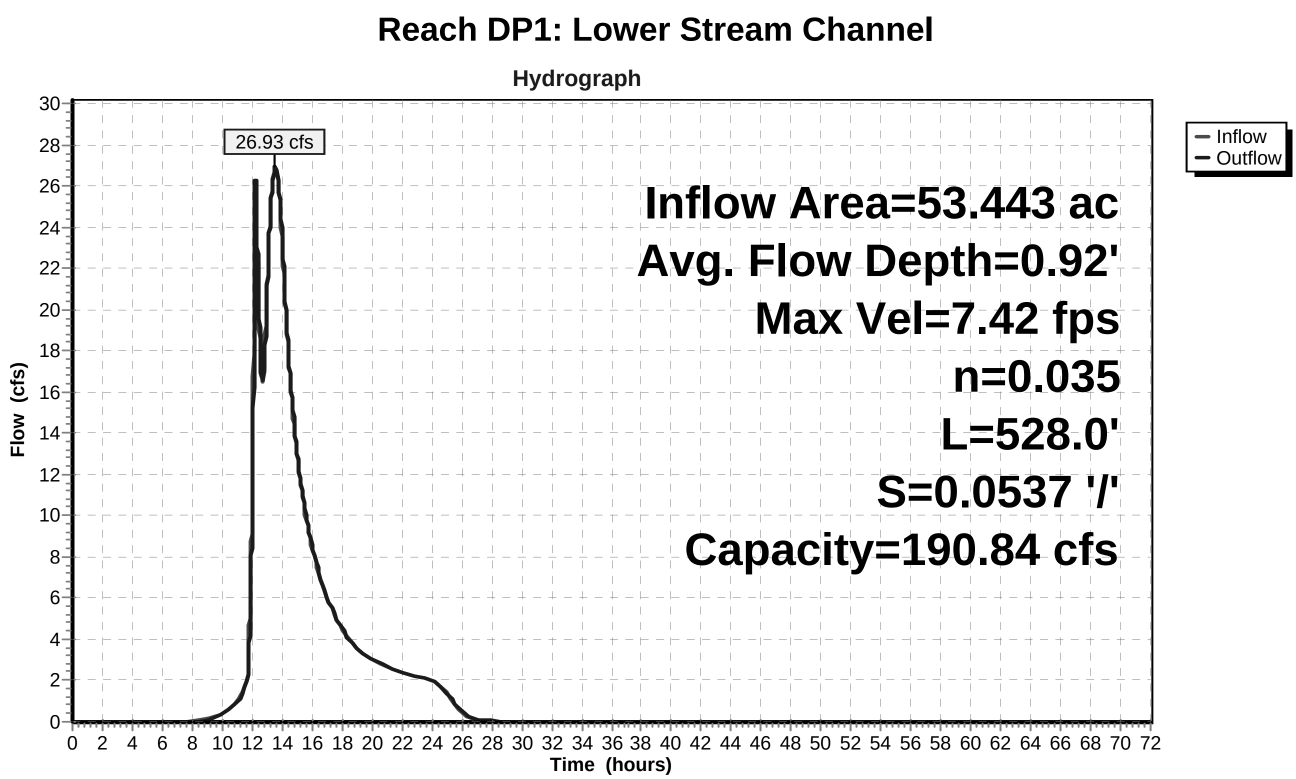
Summary for Reach DP1: Lower Stream Channel

Inflow Area = 53.443 ac, 4.00% Impervious, Inflow Depth = 2.02" for 10-Year event
Inflow = 26.94 cfs @ 13.54 hrs, Volume= 8.975 af
Outflow = 26.93 cfs @ 13.55 hrs, Volume= 8.975 af, Atten= 0%, Lag= 0.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.42 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 3.16 fps, Avg. Travel Time= 2.8 min

Peak Storage= 1,917 cf @ 13.55 hrs
Average Depth at Peak Storage= 0.92'
Bank-Full Depth= 3.00' Flow Area= 15.0 sf, Capacity= 190.84 cfs

3.50' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 0.5 '/' Top Width= 6.50'
Length= 528.0' Slope= 0.0537 '/'
Inlet Invert= 187.50', Outlet Invert= 159.12'

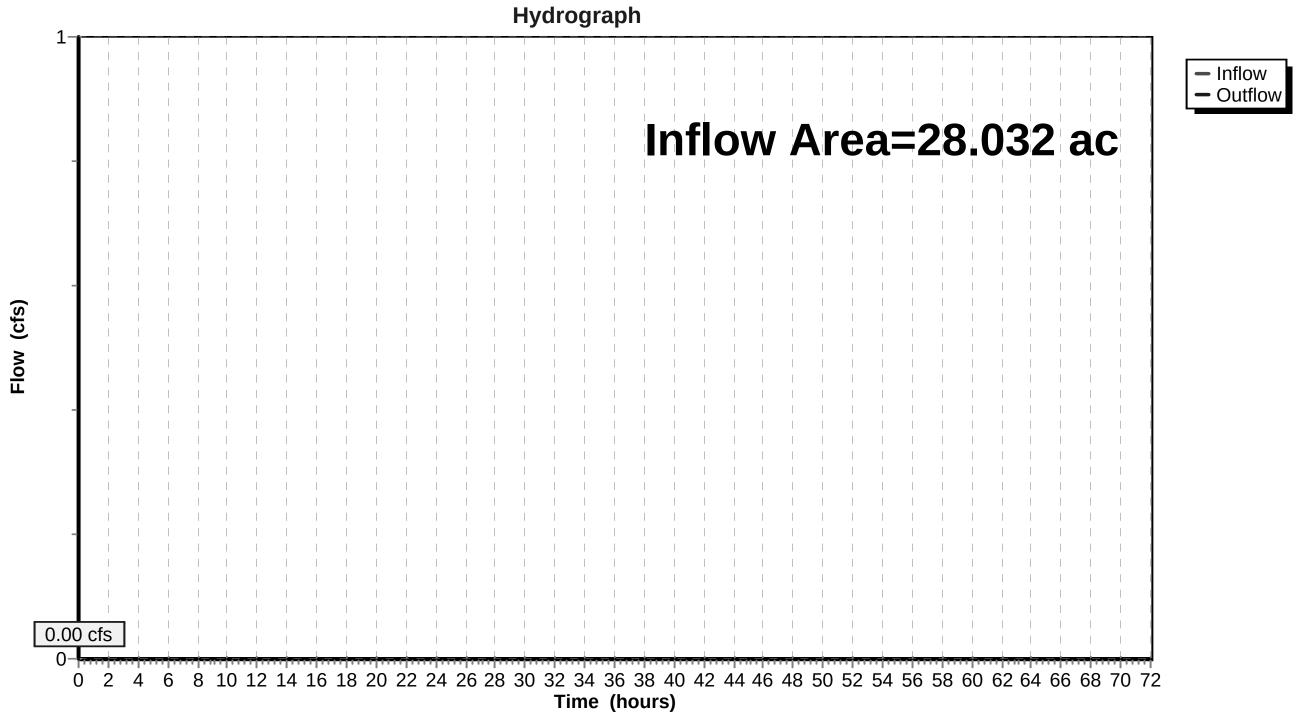


Summary for Reach DP2: Canton Ave

Inflow Area = 28.032 ac, 16.61% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP2: Canton Ave

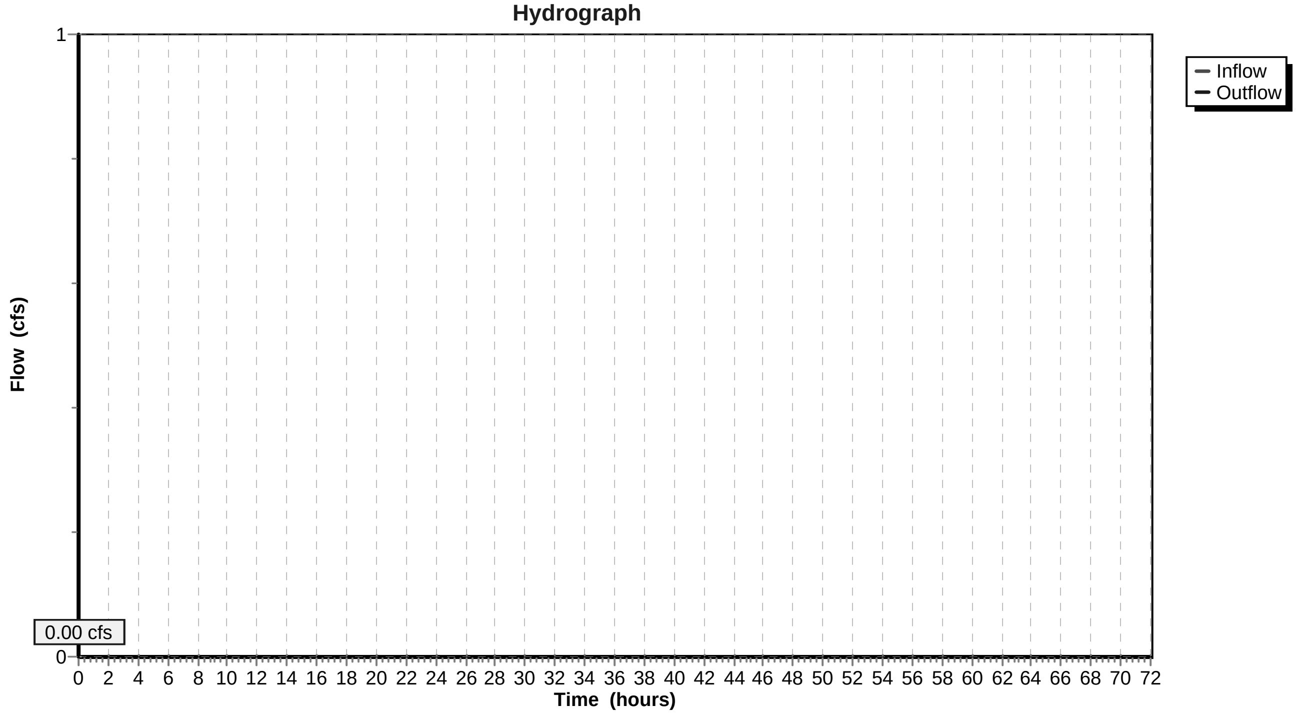


Summary for Reach DP3: Canton Ave

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP3: Canton Ave



Summary for Pond 1P: 48" Box Culvert

Inflow Area =	44.817 ac,	0.91% Impervious, Inflow Depth = 1.94"	for 10-Year event
Inflow =	24.91 cfs @	13.52 hrs, Volume=	7.245 af
Outflow =	24.90 cfs @	13.52 hrs, Volume=	7.243 af, Atten= 0%, Lag= 0.3 min
Primary =	24.90 cfs @	13.52 hrs, Volume=	7.243 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 201.95' @ 13.52 hrs Surf.Area= 457 sf Storage= 639 cf

Plug-Flow detention time= 0.8 min calculated for 7.242 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (938.3 - 937.8)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	19,230 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

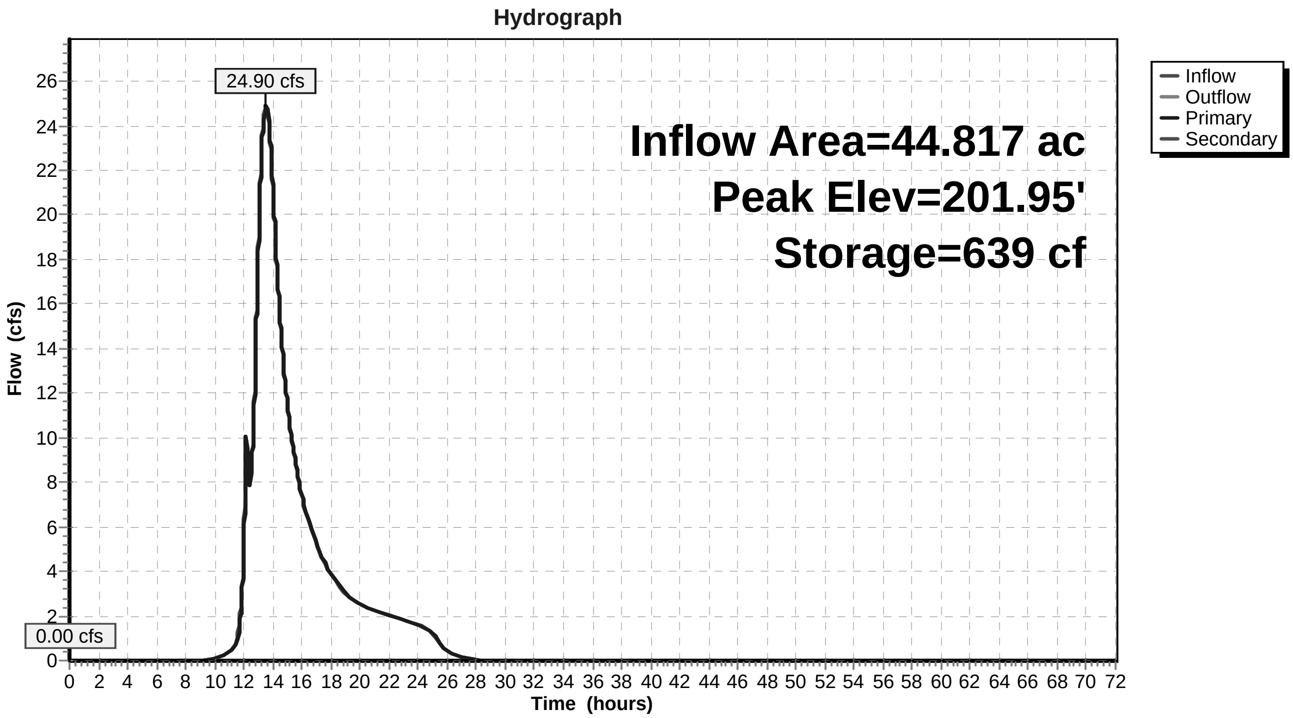
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
200.00	200	0	0
202.00	464	664	664
204.00	1,719	2,183	2,847
206.00	3,867	5,586	8,433
208.00	6,930	10,797	19,230

Device	Routing	Invert	Outlet Devices
#1	Primary	200.39'	**48.0" W x 48.0" H Box Culvert** L= 38.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.39' / 198.47' S= 0.0505 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 16.00 sf
#2	Secondary	206.50'	**30.0' long x 26.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=24.90 cfs @ 13.52 hrs HW=201.95' TW=191.33' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 24.90 cfs @ 4.00 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=200.00' TW=187.82' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: 48" Box Culvert



Summary for Pond 2P: Existing Farm Pond

Inflow Area =	50.727 ac,	4.21% Impervious, Inflow Depth = 2.03"	for 10-Year event
Inflow =	26.42 cfs @	13.52 hrs, Volume=	8.563 af
Outflow =	26.38 cfs @	13.54 hrs, Volume=	8.563 af, Atten= 0%, Lag= 1.4 min
Primary =	26.38 cfs @	13.54 hrs, Volume=	8.563 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 191.33' @ 13.54 hrs Surf.Area= 2,808 sf Storage= 3,944 cf

Plug-Flow detention time= 4.7 min calculated for 8.561 af (100% of inflow)
Center-of-Mass det. time= 4.7 min (926.9 - 922.2)

Volume	Invert	Avail.Storage	Storage Description
#1	187.82'	54,241 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

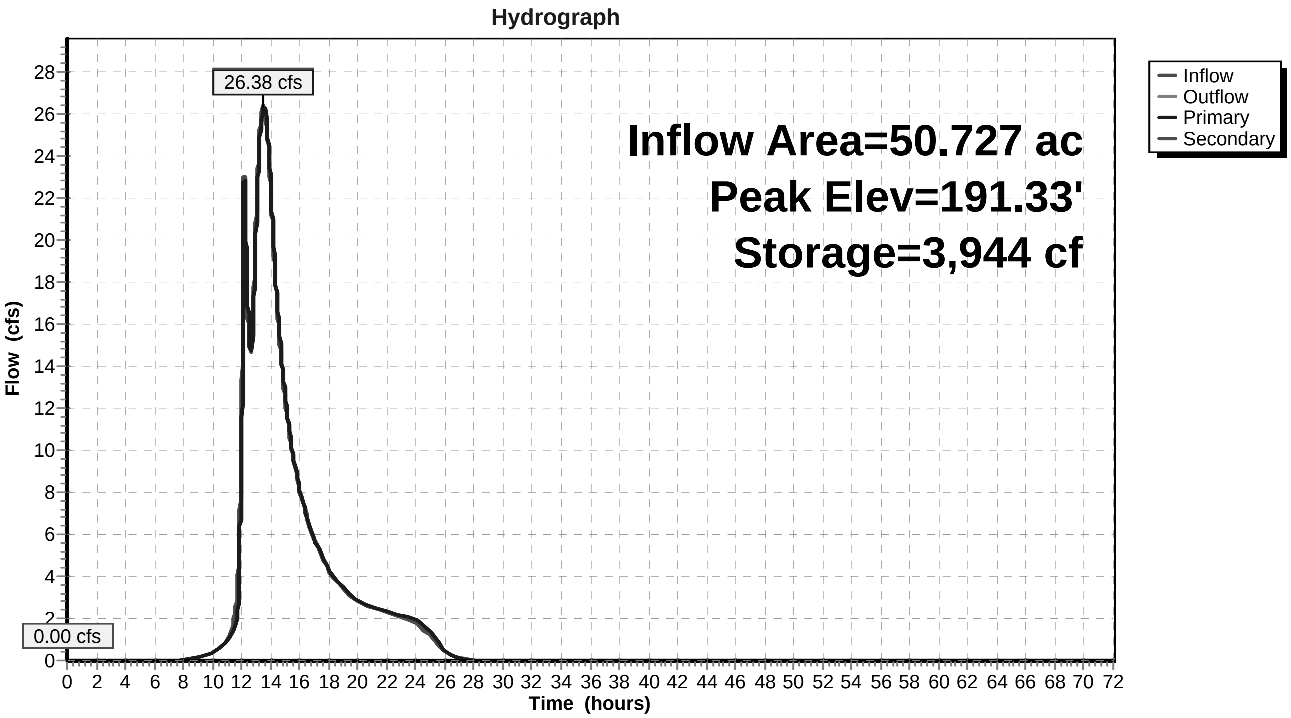
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.82	83	0	0
188.00	240	29	29
189.00	696	468	497
190.00	920	808	1,305
191.00	2,569	1,745	3,050
192.00	3,287	2,928	5,978
193.00	3,988	3,638	9,615
194.00	4,817	4,403	14,018
195.00	5,576	5,197	19,214
196.00	6,406	5,991	25,205
197.00	7,279	6,843	32,048
198.00	8,234	7,757	39,804
199.00	9,230	8,732	48,536
199.60	9,786	5,705	54,241

Device	Routing	Invert	Outlet Devices
#1	Primary	187.68'	**27.0" W x 42.0" H Box Culvert** L= 1.5' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.68' / 187.66' S= 0.0133 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.88 sf
#2	Device 1	187.71'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.75 2.50 2.50 3.50 Width (feet) 0.75 0.00 0.00 3.50 10.29
#3	Device 2	187.76'	**30.0" W x 48.0" H Box Culvert** L= 2.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.76' / 187.73' S= 0.0150 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 10.00 sf
#4	Secondary	197.90'	**18.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=26.38 cfs @ 13.54 hrs HW=191.33' TW=188.42' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 26.38 cfs of 36.51 cfs potential flow)
  ↑—**2=Custom Weir/Orifice** (Orifice Controls 26.38 cfs @ 3.68 fps)
    ↑—**3=Culvert** (Passes 26.38 cfs of 39.43 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.82' TW=187.50' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Farm Pond



Summary for Pond 3P: Existing Depression

Inflow Area =	28.032 ac, 16.61% Impervious, Inflow Depth = 0.15"	for 10-Year event		
Inflow =	3.64 cfs @ 12.16 hrs,	Volume=	0.358 af	
Outflow =	3.06 cfs @ 12.25 hrs,	Volume=	0.358 af,	Atten= 16%, Lag= 5.2 min
Discarded =	3.06 cfs @ 12.25 hrs,	Volume=	0.358 af	
Primary =	0.00 cfs @ 0.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.22' @ 12.25 hrs Surf.Area= 2,083 sf Storage= 783 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.5 min (891.9 - 890.4)

Volume	Invert	Avail.Storage	Storage Description
#1	152.50'	20,003 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

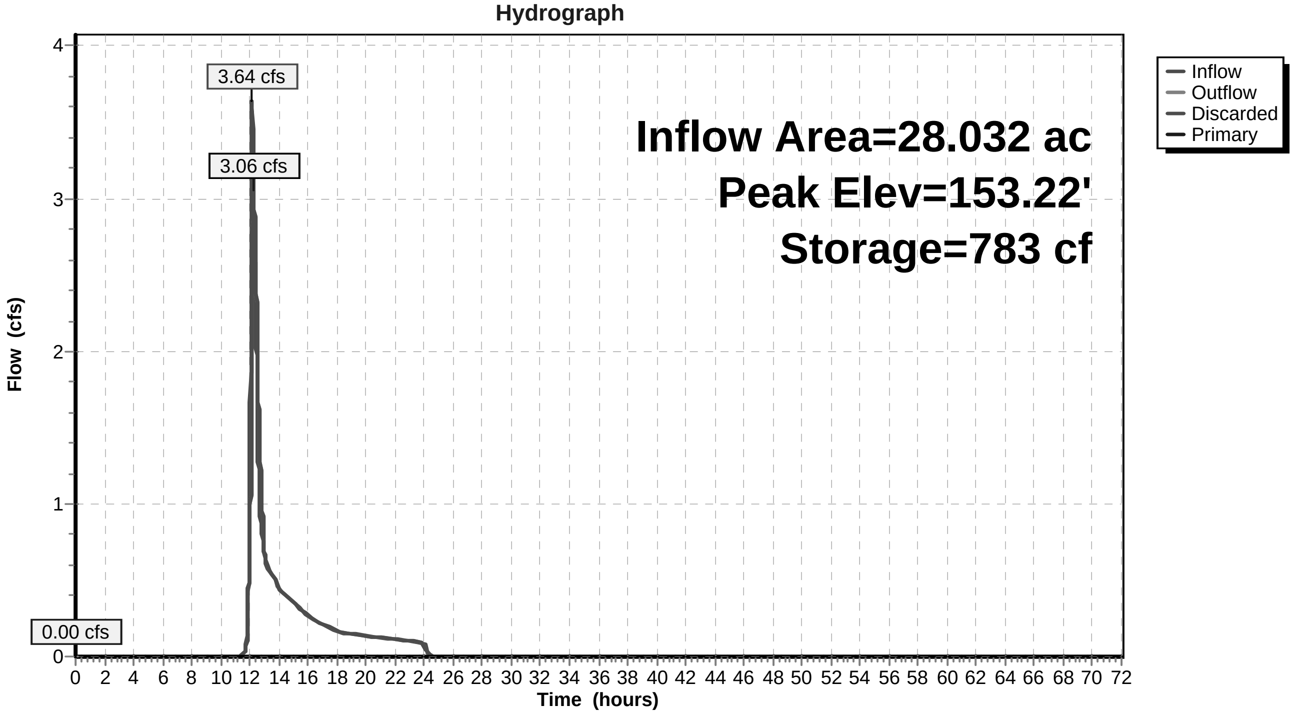
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
152.50	568	0	0
153.00	1,156	431	431
154.00	5,426	3,291	3,722
155.00	8,124	6,775	10,497
156.00	10,888	9,506	20,003

Device	Routing	Invert	Outlet Devices
#1	Discarded	152.50'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 146.20'
#2	Primary	155.50'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=3.06 cfs @ 12.25 hrs HW=153.22' (Free Discharge)
└─**1=Exfiltration** (Controls 3.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=152.50' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Existing Depression



Summary for Pond 4P: Existing Depression

Inflow Area =	23.992 ac, 15.97% Impervious, Inflow Depth = 0.04" for 10-Year event				
Inflow =	0.13 cfs @	15.05 hrs,	Volume=	0.083 af	
Outflow =	0.13 cfs @	15.05 hrs,	Volume=	0.083 af,	Atten= 0%, Lag= 0.0 min
Discarded =	0.13 cfs @	15.05 hrs,	Volume=	0.083 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.60' @ 0.00 hrs Surf.Area= 221 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	156.60'	2,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

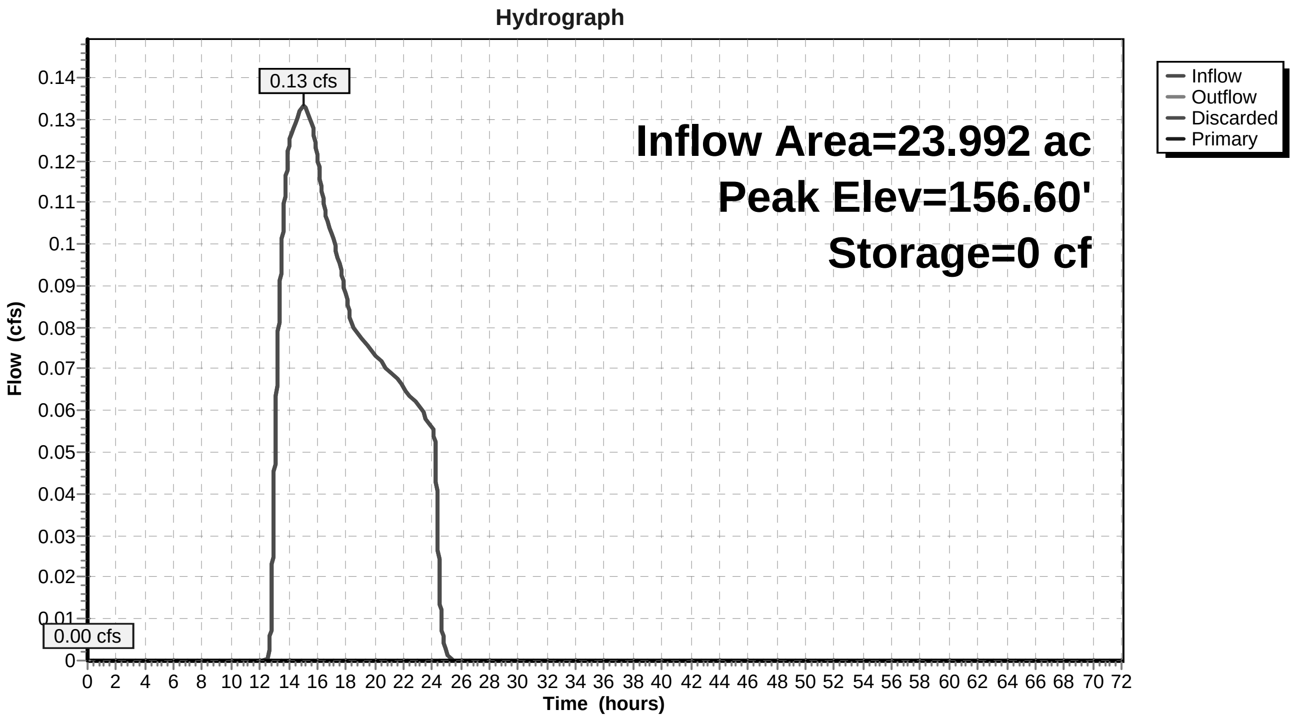
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
156.60	221	0	0
157.00	737	192	192
158.00	4,257	2,497	2,689

Device	Routing	Invert	Outlet Devices
#1	Discarded	156.60'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 150.20'
#2	Primary	157.44'	**30.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=0.00 cfs @ 15.05 hrs HW=156.60' (Free Discharge)
1=Exfiltration (Passes 0.00 cfs of 0.31 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.60' TW=152.50' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Existing Depression



Summary for Pond 5P: Bio Retention area

Inflow Area = 3.156 ac, 15.14% Impervious, Inflow Depth = 0.82" for 10-Year event
Inflow = 1.79 cfs @ 12.21 hrs, Volume= 0.217 af
Outflow = 0.35 cfs @ 13.51 hrs, Volume= 0.217 af, Atten= 81%, Lag= 77.7 min
Discarded = 0.35 cfs @ 13.51 hrs, Volume= 0.217 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 217.48' @ 13.51 hrs Surf.Area= 5,687 sf Storage= 2,504 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 69.4 min (977.7 - 908.3)

Volume	Invert	Avail.Storage	Storage Description
#1	217.00'	14,362 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

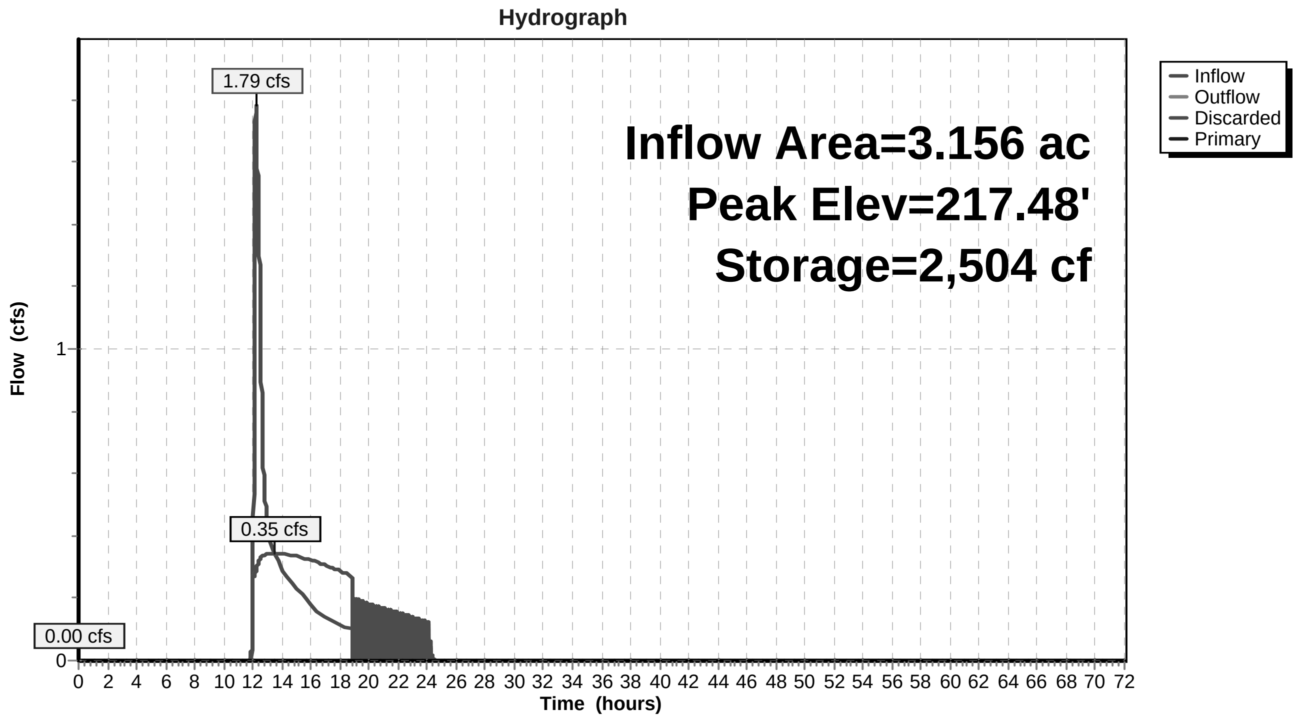
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
217.00	4,844	0	0
218.00	6,617	5,731	5,731
218.50	8,810	3,857	9,587
219.00	10,289	4,775	14,362

Device	Routing	Invert	Outlet Devices
#1	Discarded	217.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 212.00'
#2	Primary	214.55'	**12.0" Round Culvert** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.55' / 213.41' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	218.00'	**3.5' long x 1.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.35 cfs @ 13.51 hrs HW=217.48' (Free Discharge)
└─**1=Exfiltration** (Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=217.00' TW=208.50' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.00 cfs of 5.28 cfs potential flow)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Bio Retention area



Summary for Pond 6P: Subsurface Chamber System

Inflow Area = 15.758 ac, 22.52% Impervious, Inflow Depth = 1.91" for 10-Year event
Inflow = 20.91 cfs @ 12.37 hrs, Volume= 2.504 af
Outflow = 8.24 cfs @ 12.88 hrs, Volume= 2.505 af, Atten= 61%, Lag= 30.2 min
Discarded = 4.62 cfs @ 12.88 hrs, Volume= 2.105 af
Primary = 3.62 cfs @ 12.88 hrs, Volume= 0.399 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 210.92' @ 12.88 hrs Surf.Area= 16,762 sf Storage= 28,529 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 33.0 min (887.8 - 854.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	208.50'	23,012 cf	**87.25'W x 192.12'L x 5.50'H Field A** 92,194 cf Overall - 34,663 cf Embedded = 57,531 cf x 40.0% Voids
#2A	209.25'	34,663 cf	**ADS_StormTech MC-3500 d +Cap** x 312 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 12 Rows of 26 Chambers Cap Storage= +14.9 cf x 2 x 12 rows = 357.6 cf
		57,675 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	208.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 203.00'
#2	Primary	206.00'	**24.0" Round Culvert** L= 120.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 206.00' / 200.00' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	212.00'	**4.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)
#4	Device 2	209.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=4.62 cfs @ 12.88 hrs HW=210.92' (Free Discharge)
└─**1=Exfiltration** (Controls 4.62 cfs)

Primary OutFlow Max=3.62 cfs @ 12.88 hrs HW=210.92' TW=194.10' (Dynamic Tailwater)
└─**2=Culvert** (Passes 3.62 cfs of 29.94 cfs potential flow)
  ├─**3=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 3.62 cfs @ 4.61 fps)

Pond 6P: Subsurface Chamber System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 12 rows = 357.6 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

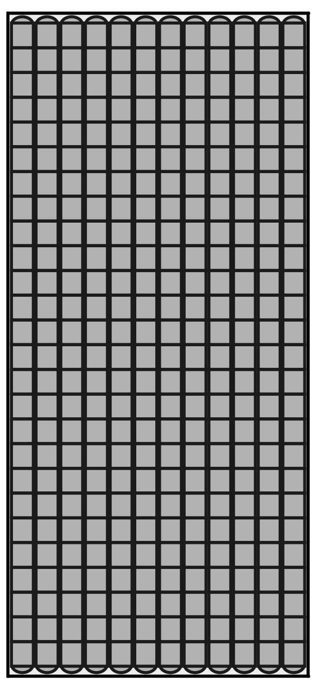
26 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 190.12' Row Length +12.0" End Stone x 2 = 192.12' Base Length
12 Rows x 77.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 87.25' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

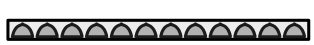
312 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 12 Rows = 34,662.6 cf Chamber Storage

92,193.6 cf Field - 34,662.6 cf Chambers = 57,531.0 cf Stone x 40.0% Voids = 23,012.4 cf Stone Storage

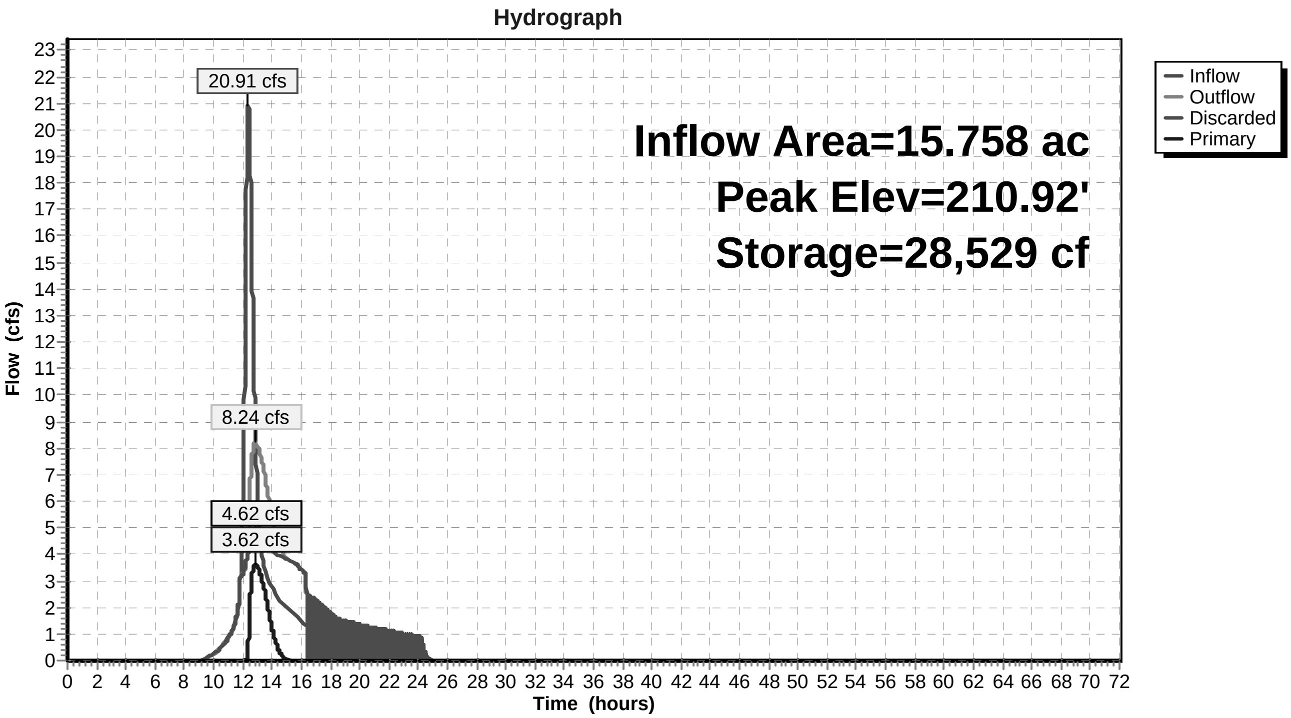
Chamber Storage + Stone Storage = 57,675.0 cf = 1.324 af
Overall Storage Efficiency = 62.6%
Overall System Size = 192.12' x 87.25' x 5.50'

312 Chambers
3,414.6 cy Field
2,130.8 cy Stone





Pond 6P: Subsurface Chamber System



Summary for Pond 7P: Subsurface Chamber System

Inflow Area =	15.758 ac, 22.52% Impervious, Inflow Depth = 0.30" for 10-Year event			
Inflow =	3.62 cfs @	12.88 hrs, Volume=	0.399 af	
Outflow =	2.98 cfs @	13.34 hrs, Volume=	0.399 af,	Atten= 18%, Lag= 27.8 min
Discarded =	2.98 cfs @	13.34 hrs, Volume=	0.399 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 194.22' @ 13.34 hrs Surf.Area= 14,754 sf Storage= 1,323 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.7 min (797.2 - 793.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	194.00'	20,298 cf	**94.42'W x 156.27'L x 5.50'H Field A** 81,150 cf Overall - 30,404 cf Embedded = 50,745 cf x 40.0% Voids
#2A	194.75'	30,404 cf	**ADS_StormTech MC-3500 d +Cap** x 273 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 13 Rows of 21 Chambers Cap Storage= +14.9 cf x 2 x 13 rows = 387.4 cf
		50,702 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	194.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 190.00'
#2	Primary	197.00'	**18.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 197.00' / 196.60' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	197.00'	**12.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	199.00'	**4.0' long x 1.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=2.98 cfs @ 13.34 hrs HW=194.22' (Free Discharge)
└─**1=Exfiltration** (Controls 2.98 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=194.00' TW=156.60' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Pond 7P: Subsurface Chamber System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 13 rows = 387.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

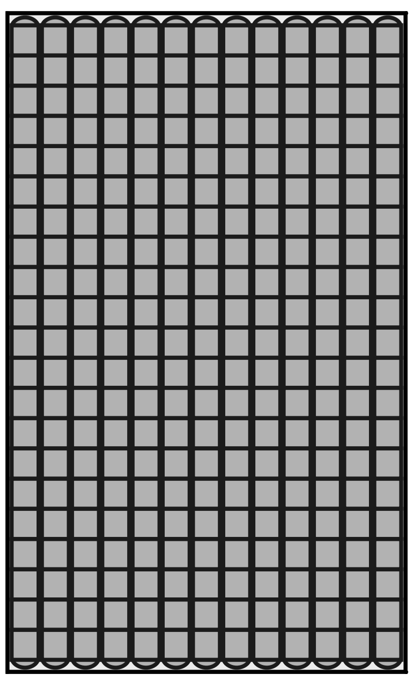
21 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 154.27' Row Length +12.0" End Stone x 2 = 156.27' Base Length
13 Rows x 77.0" Wide + 9.0" Spacing x 12 + 12.0" Side Stone x 2 = 94.42' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

273 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 13 Rows = 30,404.3 cf Chamber Storage

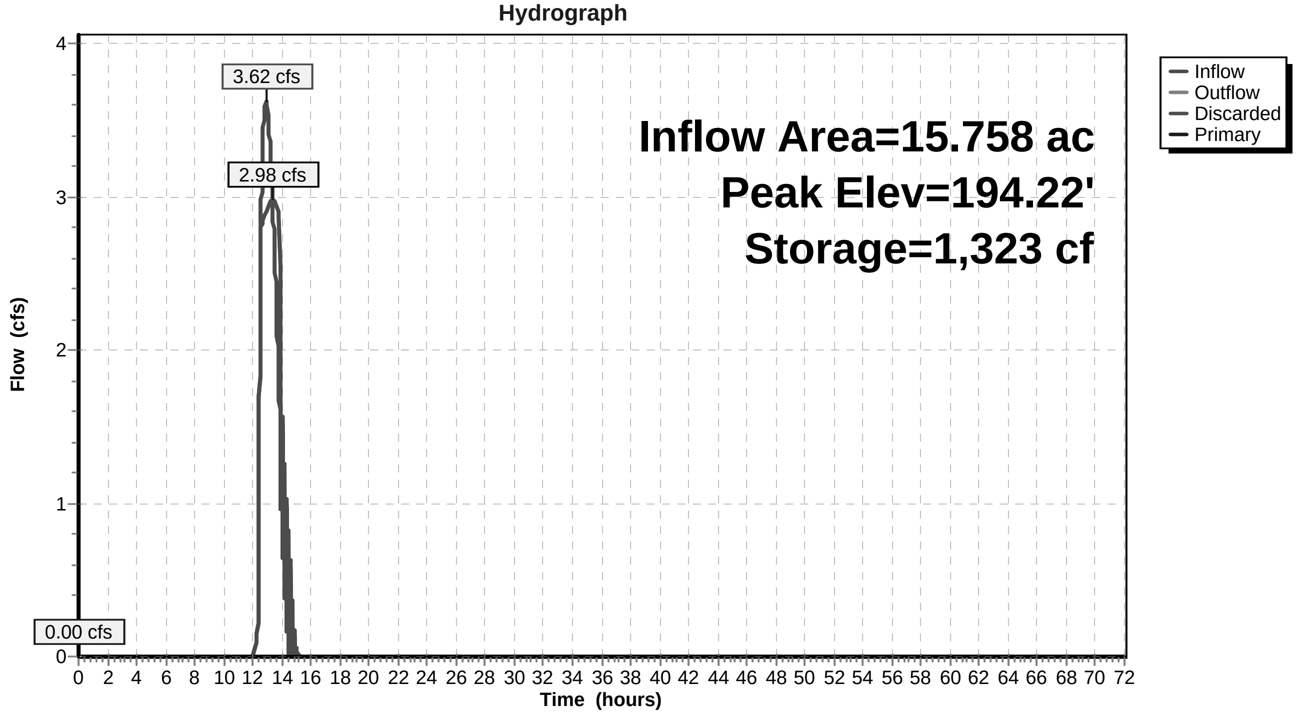
81,149.7 cf Field - 30,404.3 cf Chambers = 50,745.4 cf Stone x 40.0% Voids = 20,298.2 cf Stone Storage

Chamber Storage + Stone Storage = 50,702.5 cf = 1.164 af
Overall Storage Efficiency = 62.5%
Overall System Size = 156.27' x 94.42' x 5.50'

273 Chambers
3,005.5 cy Field
1,879.5 cy Stone



Pond 7P: Subsurface Chamber System



Summary for Pond 8P: Infiltration Basin

Inflow Area = 10.772 ac, 11.54% Impervious, Inflow Depth = 1.32" for 10-Year event
Inflow = 8.59 cfs @ 12.46 hrs, Volume= 1.186 af
Outflow = 2.69 cfs @ 13.20 hrs, Volume= 1.186 af, Atten= 69%, Lag= 44.5 min
Discarded = 2.69 cfs @ 13.20 hrs, Volume= 1.186 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 196.51' @ 13.20 hrs Surf.Area= 11,381 sf Storage= 13,714 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 47.2 min (942.5 - 895.3)

Volume	Invert	Avail.Storage	Storage Description
#1	195.00'	100,696 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

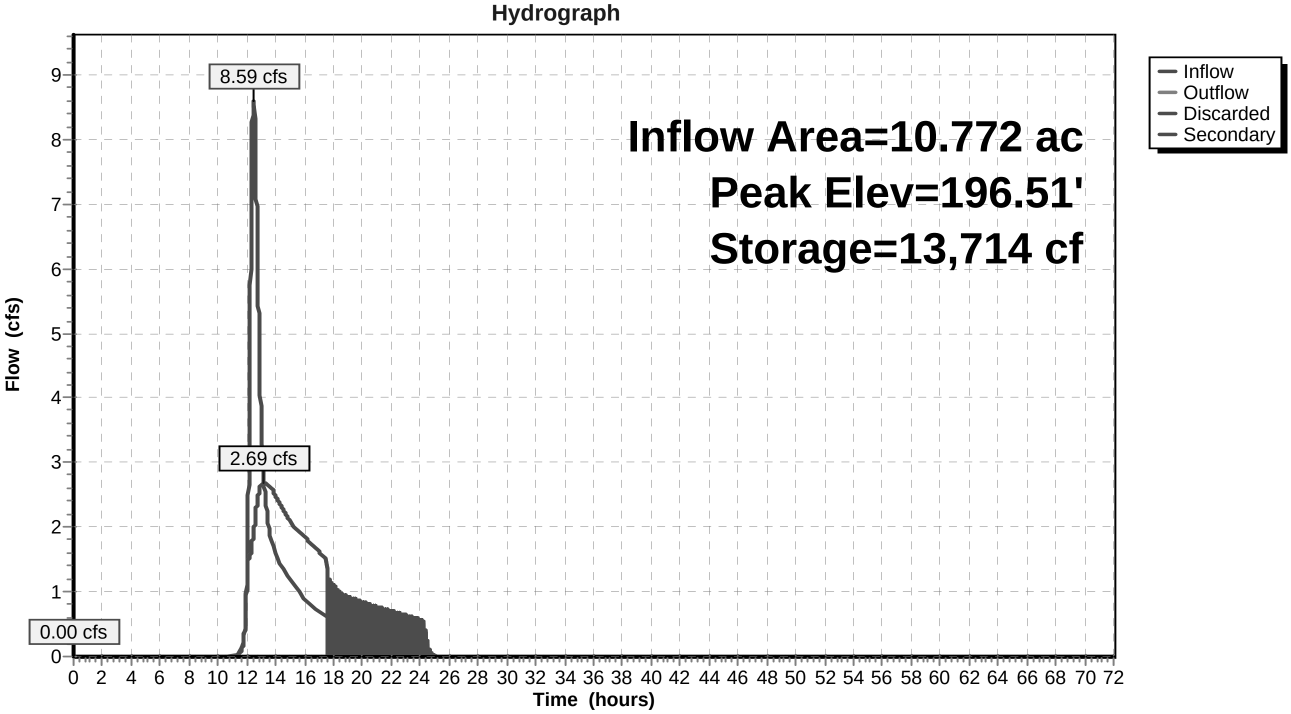
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
195.00	7,783	0	0
196.00	9,185	8,484	8,484
197.00	13,503	11,344	19,828
198.00	16,254	14,879	34,707
199.00	20,337	18,296	53,002
200.00	23,556	21,947	74,949
201.00	27,938	25,747	100,696

Device	Routing	Invert	Outlet Devices
#1	Discarded	195.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 190.00'
#2	Secondary	200.00'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=2.69 cfs @ 13.20 hrs HW=196.51' (Free Discharge)
1=Exfiltration (Controls 2.69 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=195.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 8P: Infiltration Basin



Summary for Pond 9P: Subsurface Chamber System

Inflow Area = 0.164 ac, 81.01% Impervious, Inflow Depth = 3.49" for 10-Year event
Inflow = 0.71 cfs @ 12.06 hrs, Volume= 0.048 af
Outflow = 0.18 cfs @ 12.42 hrs, Volume= 0.048 af, Atten= 75%, Lag= 21.9 min
Discarded = 0.18 cfs @ 12.42 hrs, Volume= 0.048 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 195.01' @ 12.42 hrs Surf.Area= 730 sf Storage= 440 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 13.4 min (813.4 - 800.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	194.00'	691 cf	**15.75'W x 46.34'L x 3.50'H Field A**
			2,554 cf Overall - 827 cf Embedded = 1,727 cf x 40.0% Voids
#2A	194.50'	827 cf	**ADS_StormTech SC-740 +Cap** x 18 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			3 Rows of 6 Chambers
#3	197.50'	13 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		1,531 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
197.50	13	0	0
198.50	13	13	13

Device	Routing	Invert	Outlet Devices
#1	Discarded	194.00'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 190.00'
#2	Primary	198.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.18 cfs @ 12.42 hrs HW=195.01' (Free Discharge)
└─**1=Exfiltration** (Controls 0.18 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=194.00' TW=156.60' (Dynamic Tailwater)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 9P: Subsurface Chamber System - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

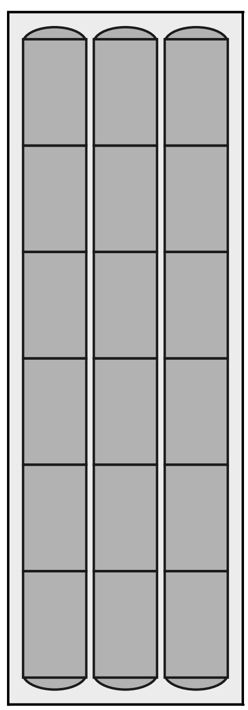
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

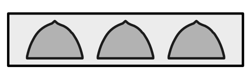
18 Chambers x 45.9 cf = 826.9 cf Chamber Storage

2,554.3 cf Field - 826.9 cf Chambers = 1,727.4 cf Stone x 40.0% Voids = 691.0 cf Stone Storage

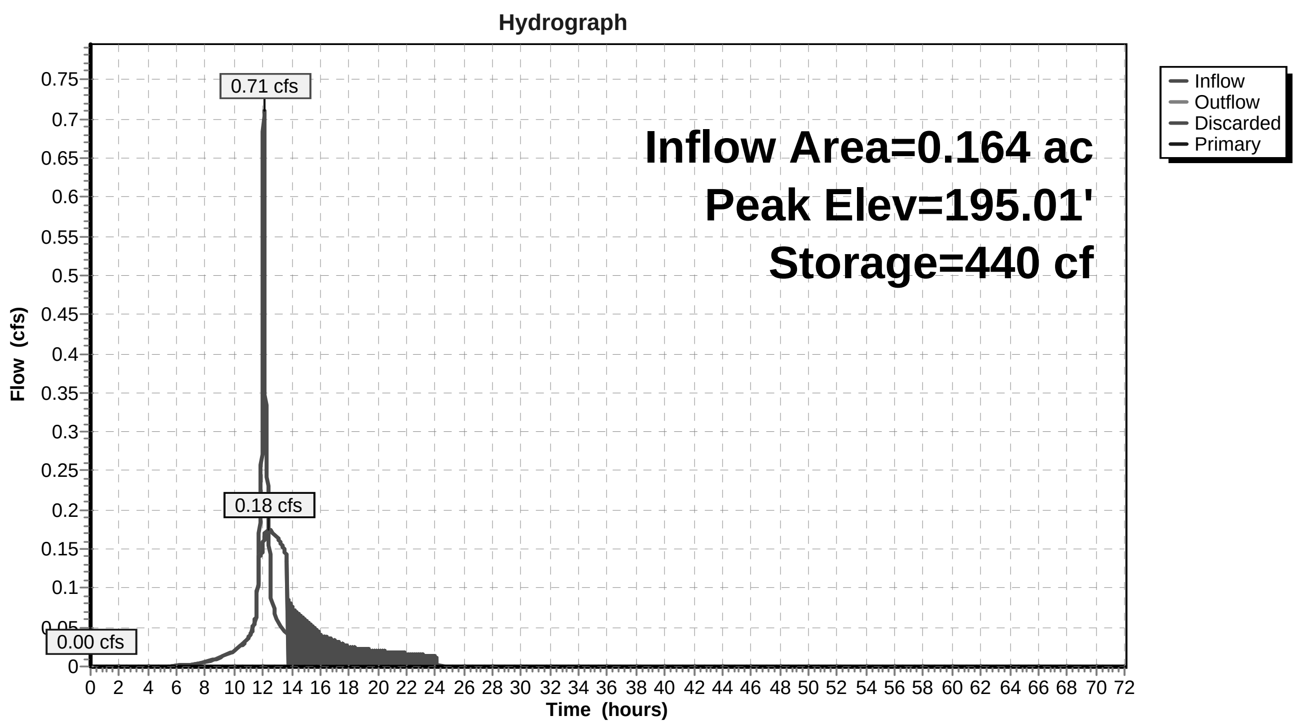
Chamber Storage + Stone Storage = 1,517.9 cf = 0.035 af
Overall Storage Efficiency = 59.4%
Overall System Size = 46.34' x 15.75' x 3.50'

18 Chambers
94.6 cy Field
64.0 cy Stone





Pond 9P: Subsurface Chamber System



Summary for Pond 10P: 48" Box Culvert

Inflow Area = 41.633 ac, 0.00% Impervious, Inflow Depth = 1.90" for 10-Year event
Inflow = 24.18 cfs @ 13.50 hrs, Volume= 6.590 af
Outflow = 24.17 cfs @ 13.50 hrs, Volume= 6.590 af, Atten= 0%, Lag= 0.3 min
Primary = 24.17 cfs @ 13.50 hrs, Volume= 6.590 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 256.82' @ 13.50 hrs Surf.Area= 494 sf Storage= 535 cf

Plug-Flow detention time= 0.6 min calculated for 6.590 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (945.9 - 945.5)

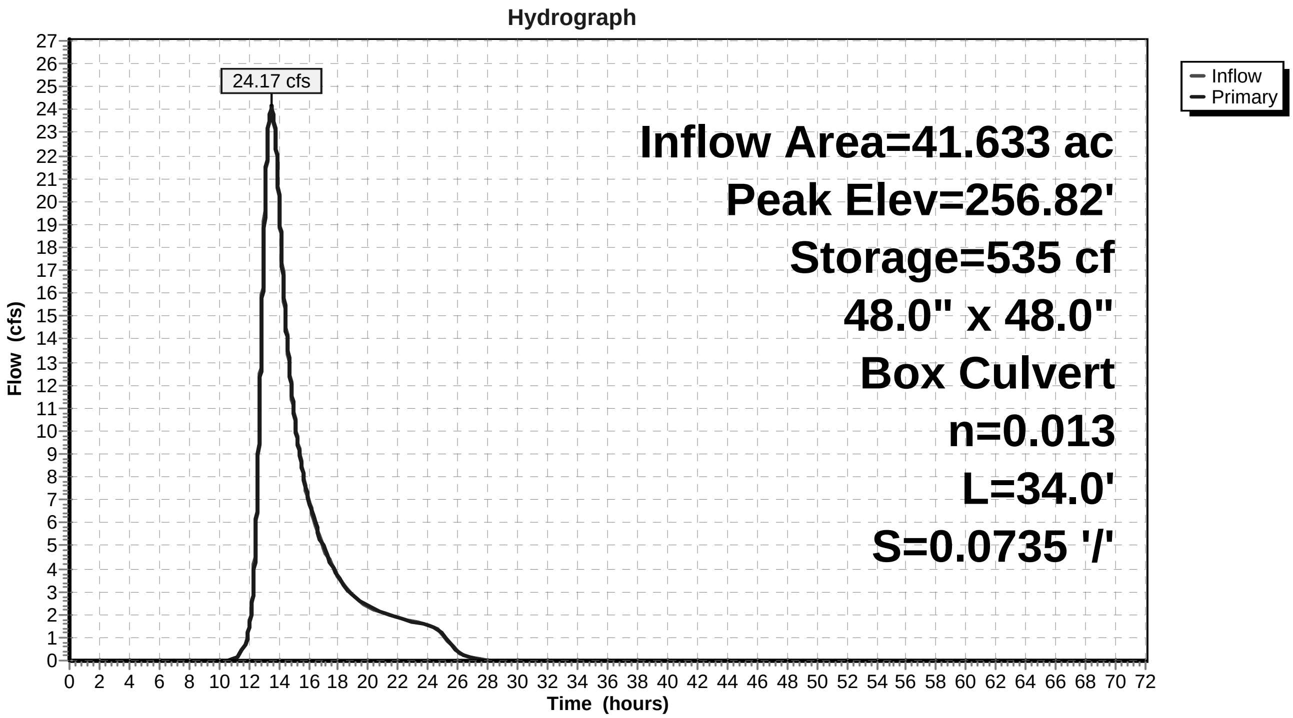
Volume	Invert	Avail.Storage	Storage Description
#1	255.30'	12,405 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.30	200	0	0
256.00	343	190	190
258.00	710	1,053	1,243
260.00	2,017	2,727	3,970
262.00	6,418	8,435	12,405

Device	Routing	Invert	Outlet Devices
#1	Primary	255.30'	**48.0" W x 48.0" H Box Culvert** L= 34.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 255.30' / 252.80' S= 0.0735 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 16.00 sf

Primary OutFlow Max=24.17 cfs @ 13.50 hrs HW=256.82' TW=253.70' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 24.17 cfs @ 3.96 fps)

Pond 10P: 48" Box Culvert



Summary for Pond 11P: Carberry Ln Culvert

Inflow Area = 53.443 ac, 4.00% Impervious, Inflow Depth = 2.02" for 10-Year event
Inflow = 26.93 cfs @ 13.55 hrs, Volume= 8.975 af
Outflow = 26.93 cfs @ 13.56 hrs, Volume= 8.975 af, Atten= 0%, Lag= 0.3 min
Primary = 26.93 cfs @ 13.56 hrs, Volume= 8.975 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 161.41' @ 13.56 hrs Surf.Area= 356 sf Storage= 512 cf

Plug-Flow detention time= 0.6 min calculated for 8.975 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (926.2 - 925.8)

Volume	Invert	Avail.Storage	Storage Description
#1	159.12'	13,507 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

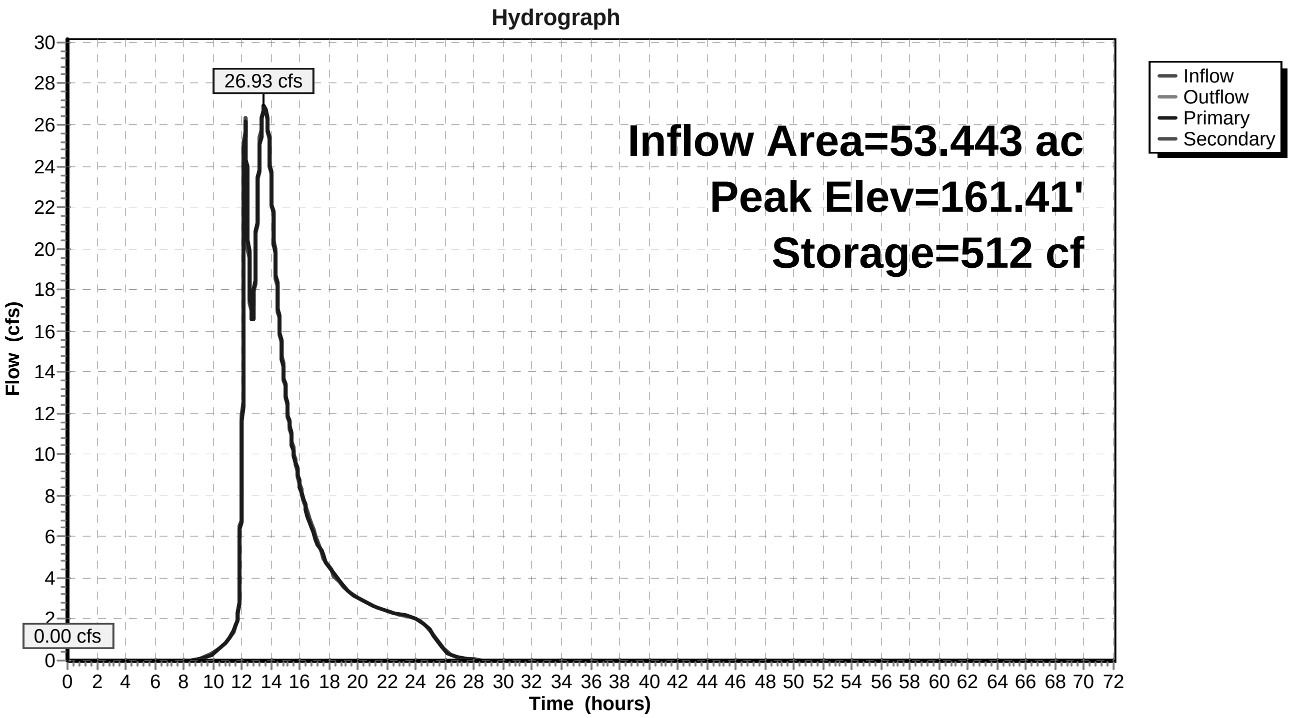
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
159.12	143	0	0
160.00	200	151	151
161.00	267	234	384
162.00	486	377	761
163.00	786	636	1,397
164.00	1,226	1,006	2,403
165.00	2,948	2,087	4,490
166.00	7,080	5,014	9,504
166.50	8,934	4,004	13,507

Device	Routing	Invert	Outlet Devices
#1	Primary	159.12'	**36.0" Round Culvert** L= 106.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.12' / 158.28' S= 0.0079 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf
#2	Secondary	165.25'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=26.93 cfs @ 13.56 hrs HW=161.41' (Free Discharge)
└─**1=Culvert** (Barrel Controls 26.93 cfs @ 6.44 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=159.12' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 11P: Carberry Ln Culvert



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Upper Watershed To Runoff Area=1,813,532 sf 0.00% Impervious Runoff Depth=2.88"
Flow Length=2,658' Tc=107.5 min CN=69 Runoff=37.50 cfs 9.983 af

Subcatchment 2S: Wetland Area Runoff Area=24,756 sf 0.00% Impervious Runoff Depth=2.15"
Flow Length=47' Slope=0.0800 '/' Tc=6.7 min CN=61 Runoff=1.34 cfs 0.102 af

Subcatchment 3S: Lower Stream Channel Runoff Area=118,276 sf 0.00% Impervious Runoff Depth=2.78"
Flow Length=683' Tc=19.4 min CN=68 Runoff=5.98 cfs 0.630 af

Subcatchment 4S: To Canton Ave Runoff Area=175,971 sf 20.42% Impervious Runoff Depth=1.80"
Flow Length=549' Tc=10.0 min CN=57 Runoff=6.86 cfs 0.608 af

Subcatchment 5S: To Canton Ave Runoff Area=351,525 sf 1.88% Impervious Runoff Depth=0.40"
Flow Length=1,139' Tc=30.3 min CN=37 Runoff=0.79 cfs 0.267 af

Subcatchment 6S: To Canton Ave Runoff Area=469,212 sf 11.54% Impervious Runoff Depth=2.15"
Flow Length=1,260' Tc=29.5 min CN=61 Runoff=14.77 cfs 1.928 af

Subcatchment 7S: To Canton Ave Runoff Area=137,490 sf 15.14% Impervious Runoff Depth=1.48"
Flow Length=233' Tc=12.2 min CN=53 Runoff=3.85 cfs 0.389 af

Subcatchment 8S: To Upper Stream Runoff Area=138,706 sf 12.87% Impervious Runoff Depth=3.56"
Flow Length=154' Tc=8.1 min CN=76 Runoff=12.37 cfs 0.945 af

Subcatchment 9S: To Existing Pond Runoff Area=232,693 sf 32.31% Impervious Runoff Depth=3.97"
Flow Length=1,168' Tc=15.6 min CN=80 Runoff=18.49 cfs 1.768 af

Subcatchment 10S: To Canton Ave Runoff Area=548,914 sf 24.36% Impervious Runoff Depth=3.46"
Flow Length=1,017' Tc=26.7 min CN=75 Runoff=30.53 cfs 3.635 af

Subcatchment 11S: To Canton Ave Runoff Area=7,160 sf 81.01% Impervious Runoff Depth=4.72"
Flow Length=300' Tc=4.0 min CN=87 Runoff=0.95 cfs 0.065 af

Reach 1R: Upper Stream Channel Avg. Flow Depth=1.20' Max Vel=8.59 fps Inflow=38.53 cfs 10.928 af
n=0.040 L=575.0' S=0.0779 '/' Capacity=189.10 cfs Outflow=38.51 cfs 10.928 af

Reach DP1: Lower Stream Channel Avg. Flow Depth=1.19' Max Vel=8.43 fps Inflow=41.22 cfs 13.426 af
n=0.035 L=528.0' S=0.0537 '/' Capacity=190.84 cfs Outflow=41.21 cfs 13.426 af

Reach DP2: Canton Ave Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP3: Canton Ave Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 1P: 48" Box Culvert Peak Elev=202.47' Storage=951 cf Inflow=38.51 cfs 10.928 af
Primary=38.50 cfs 10.926 af Secondary=0.00 cfs 0.000 af Outflow=38.50 cfs 10.926 af

Pond 2P: Existing Farm Pond Peak Elev=192.06' Storage=6,169 cf Inflow=40.56 cfs 12.796 af
Primary=40.42 cfs 12.796 af Secondary=0.00 cfs 0.000 af Outflow=40.42 cfs 12.796 af

Pond 3P: Existing Depression Peak Elev=153.57' Storage=1,801 cf Inflow=6.86 cfs 0.608 af
Discarded=5.38 cfs 0.608 af Primary=0.00 cfs 0.000 af Outflow=5.38 cfs 0.608 af

Pond 4P: Existing Depression Peak Elev=156.85' Storage=93 cf Inflow=0.79 cfs 0.267 af
Discarded=0.77 cfs 0.267 af Primary=0.00 cfs 0.000 af Outflow=0.77 cfs 0.267 af

Pond 5P: Bio Retention area Peak Elev=218.05' Storage=6,082 cf Inflow=3.85 cfs 0.389 af
Discarded=0.45 cfs 0.375 af Primary=0.14 cfs 0.015 af Outflow=0.59 cfs 0.389 af

Pond 6P: Subsurface Chamber System Peak Elev=212.25' Storage=44,621 cf Inflow=30.53 cfs 3.650 af
Discarded=5.40 cfs 2.731 af Primary=7.30 cfs 0.918 af Outflow=12.69 cfs 3.650 af

Pond 7P: Subsurface Chamber System Peak Elev=195.18' Storage=9,866 cf Inflow=7.30 cfs 0.918 af
Discarded=3.65 cfs 0.919 af Primary=0.00 cfs 0.000 af Outflow=3.65 cfs 0.919 af

Pond 8P: Infiltration Basin Peak Elev=197.52' Storage=27,189 cf Inflow=14.77 cfs 1.928 af
Discarded=3.84 cfs 1.928 af Secondary=0.00 cfs 0.000 af Outflow=3.84 cfs 1.928 af

Pond 9P: Subsurface Chamber System Peak Elev=195.51' Storage=711 cf Inflow=0.95 cfs 0.065 af
Discarded=0.19 cfs 0.065 af Primary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.065 af

Pond 10P: 48" Box Culvert Peak Elev=257.34' Storage=816 cf Inflow=37.50 cfs 9.983 af
48.0" x 48.0" Box Culvert n=0.013 L=34.0' S=0.0735 '/' Outflow=37.49 cfs 9.983 af

Pond 11P: Carberry Ln Culvert Peak Elev=162.21' Storage=868 cf Inflow=41.21 cfs 13.426 af
Primary=41.21 cfs 13.426 af Secondary=0.00 cfs 0.000 af Outflow=41.21 cfs 13.426 af

Total Runoff Area = 92.246 ac Runoff Volume = 20.318 af Average Runoff Depth = 2.64"
91.29% Pervious = 84.210 ac 8.71% Impervious = 8.036 ac

Summary for Subcatchment 1S: Upper Watershed To Stream

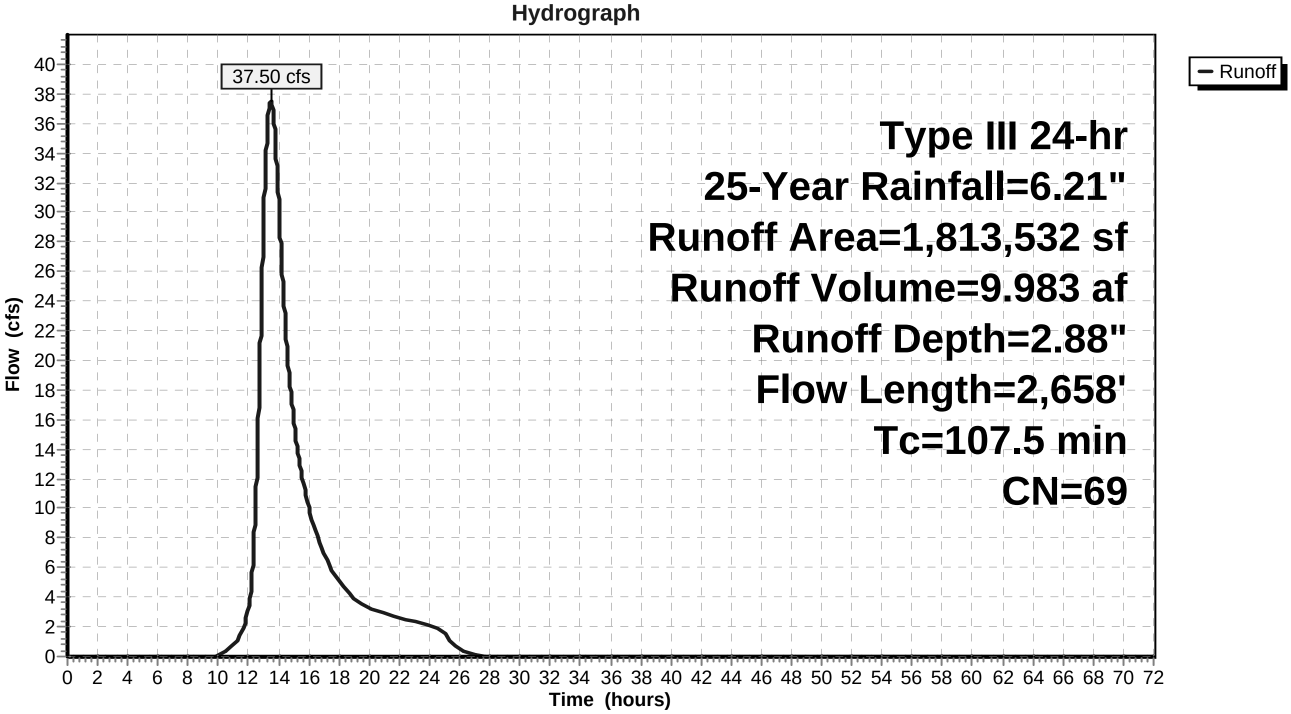
Runoff = 37.50 cfs @ 13.50 hrs, Volume= 9.983 af, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

	Area (sf)	CN	Description
	153,412	30	Woods, Good, HSG A
	929,681	70	Woods, Good, HSG C
	185,864	74	>75% Grass cover, Good, HSG C
	459,084	77	Woods, Good, HSG D
	84,545	80	>75% Grass cover, Good, HSG D
*	946	83	Wetland Stream Channel
	1,813,532	69	Weighted Average
	1,813,532		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0080	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
23.4	554	0.0250	0.40		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
10.9	116	0.0050	0.18		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
16.5	813	0.1080	0.82		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
16.7	306	0.0150	0.31		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
22.2	705	0.0450	0.53		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.2	114	0.0560	9.72	118.54	**Channel Flow,** Area= 12.2 sf Perim= 10.5' r= 1.16' n= 0.040 Earth, cobble bottom, clean sides
107.5	2,658	Total			

Subcatchment 1S: Upper Watershed To Stream



Summary for Subcatchment 2S: Wetland Area

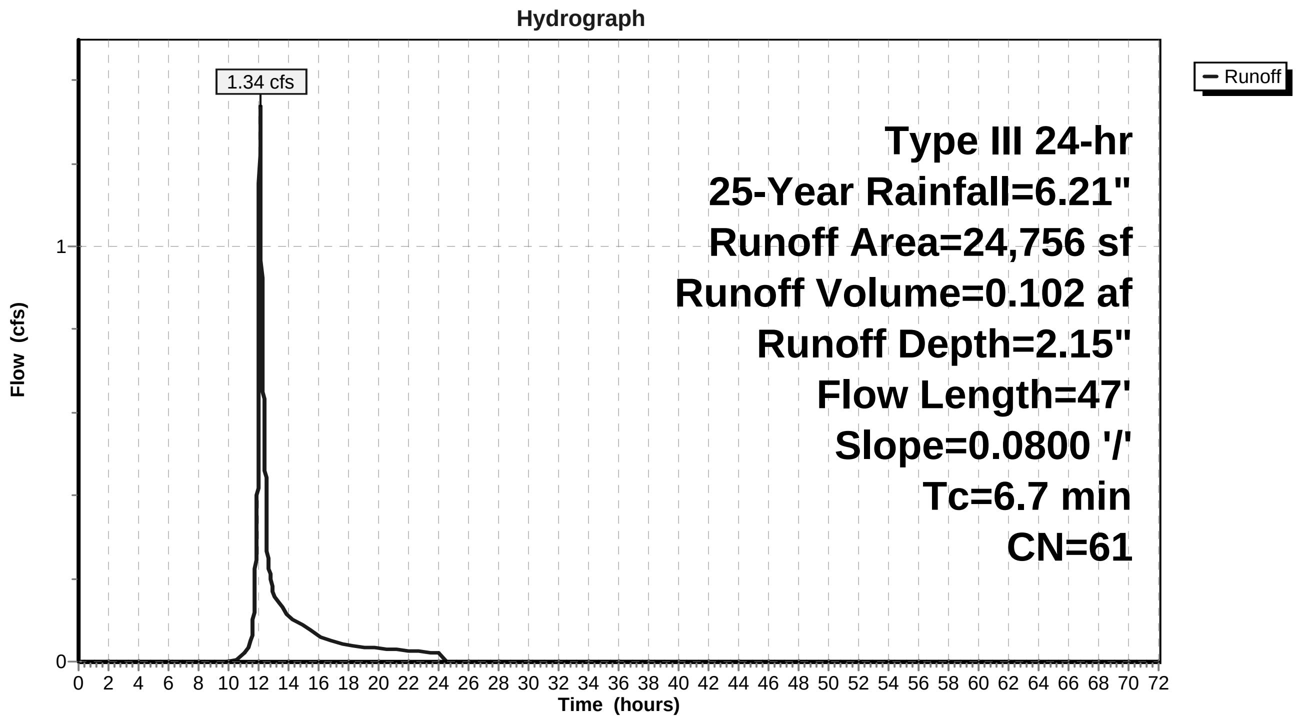
Runoff = 1.34 cfs @ 12.10 hrs, Volume= 0.102 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

	Area (sf)	CN	Description
*	3,336	83	Wetland Stream Channel
	17,332	55	Woods, Good, HSG B
	624	74	>75% Grass cover, Good, HSG C
	3,464	70	Woods, Good, HSG C
	24,756	61	Weighted Average
	24,756		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	47	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"

Subcatchment 2S: Wetland Area



Summary for Subcatchment 3S: Lower Stream Channel

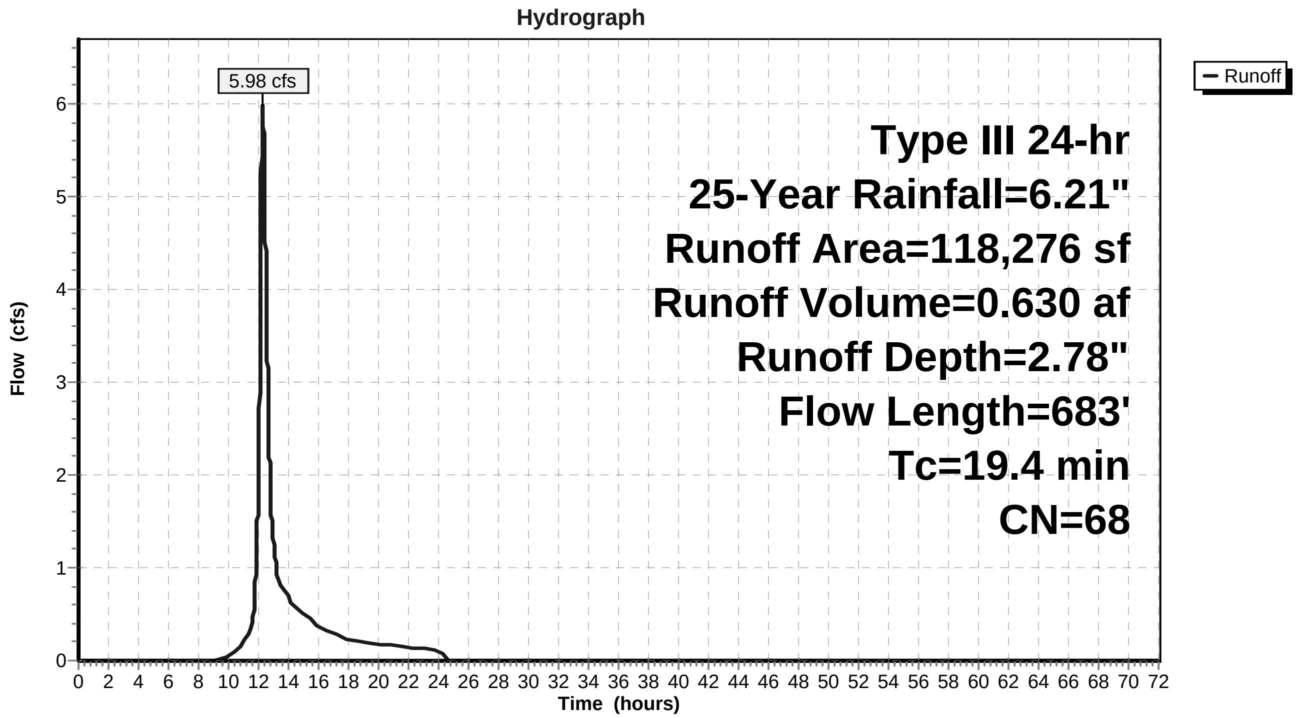
Runoff = 5.98 cfs @ 12.27 hrs, Volume= 0.630 af, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

	Area (sf)	CN	Description
	27,020	55	Woods, Good, HSG B
	30,772	74	>75% Grass cover, Good, HSG C
	58,057	70	Woods, Good, HSG C
*	2,427	83	Wetland Stream Channel
	118,276	68	Weighted Average
	118,276		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
9.0	450	0.1100	0.83		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.3	33	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	65	0.1400	0.94		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.1	62	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	23	0.1300	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
19.4	683	Total			

Subcatchment 3S: Lower Stream Channel



Summary for Subcatchment 4S: To Canton Ave

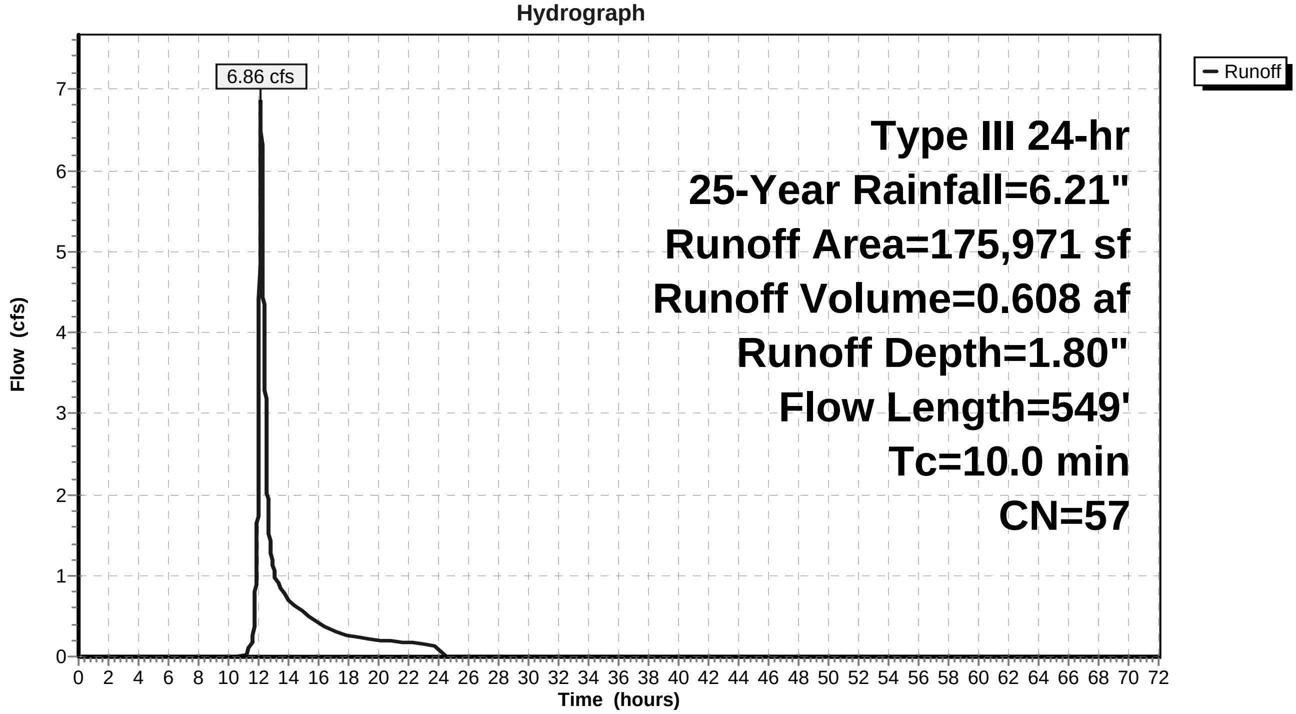
Runoff = 6.86 cfs @ 12.15 hrs, Volume= 0.608 af, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

Area (sf)	CN	Description
9,654	98	Roofs, HSG A
17,648	98	Paved parking, HSG A
44,334	30	Woods, Good, HSG A
54,496	39	>75% Grass cover, Good, HSG A
9,397	55	Woods, Good, HSG B
22,408	77	Woods, Good, HSG D
9,406	80	>75% Grass cover, Good, HSG D
8,628	98	Paved parking, HSG D
175,971	57	Weighted Average
140,041		79.58% Pervious Area
35,930		20.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
3.0	150	0.1100	0.83		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
1.0	349	0.0870	5.99		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.0	549	Total			

Subcatchment 4S: To Canton Ave



Summary for Subcatchment 5S: To Canton Ave

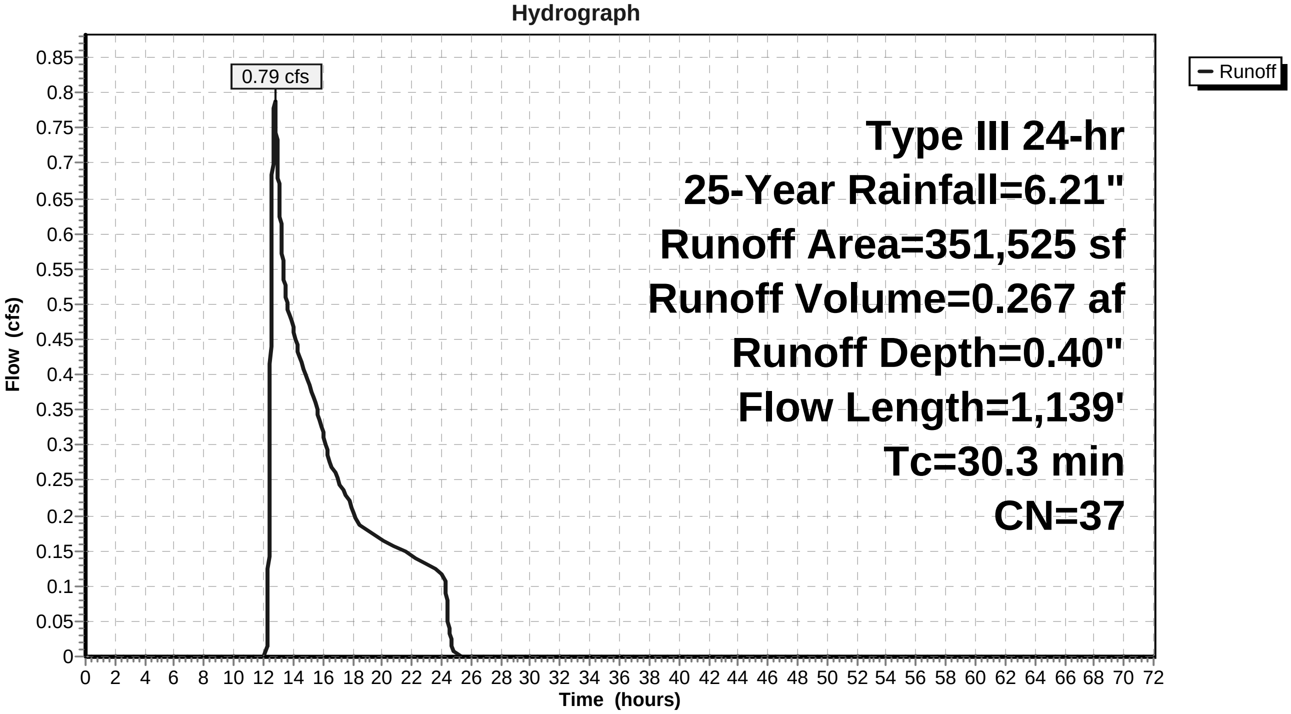
Runoff = 0.79 cfs @ 12.76 hrs, Volume= 0.267 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

Area (sf)	CN	Description
2,800	98	Roofs, HSG A
3,792	98	Paved parking, HSG A
114,707	30	Woods, Good, HSG A
230,226	39	>75% Grass cover, Good, HSG A
351,525	37	Weighted Average
344,933		98.12% Pervious Area
6,592		1.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
4.7	391	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.3	592	0.0520	0.57		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.9	106	0.0850	2.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
30.3	1,139	Total			

Subcatchment 5S: To Canton Ave



Summary for Subcatchment 6S: To Canton Ave

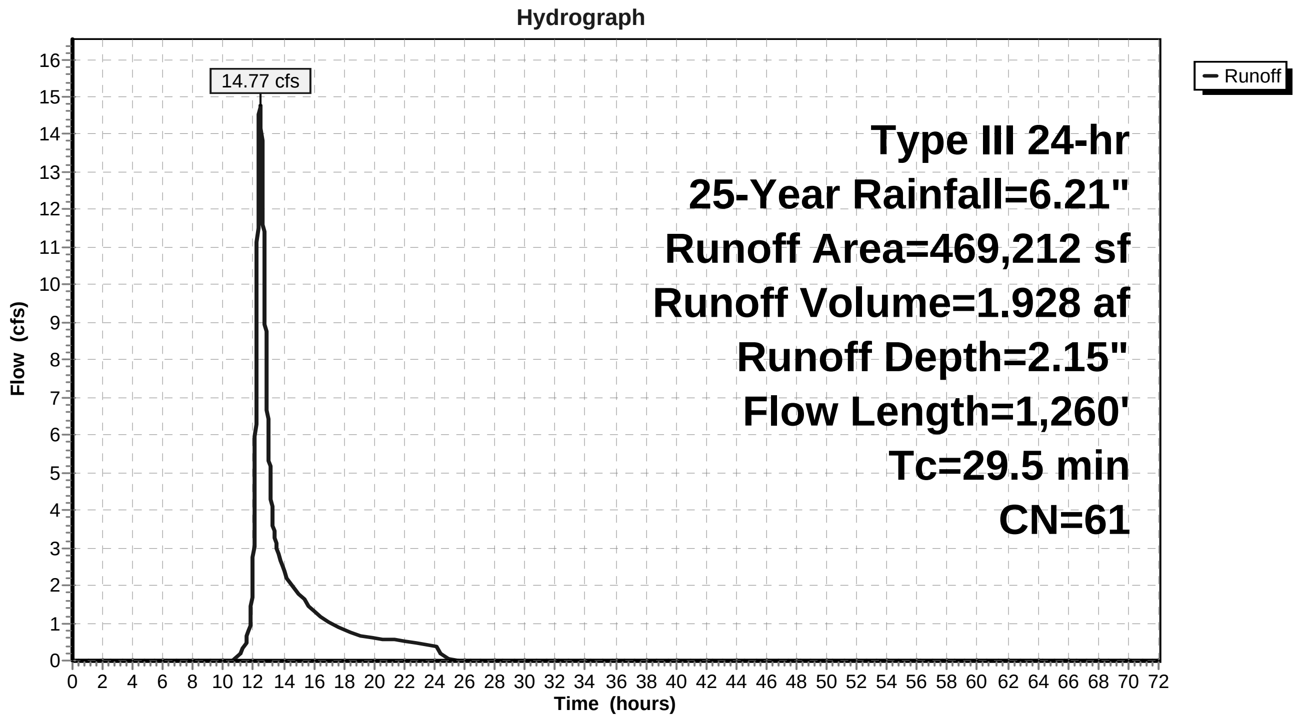
Runoff = 14.77 cfs @ 12.43 hrs, Volume= 1.928 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

Area (sf)	CN	Description
82,018	30	Woods, Good, HSG A
54,246	39	>75% Grass cover, Good, HSG A
155,461	70	Woods, Good, HSG C
52,059	74	>75% Grass cover, Good, HSG C
16,193	98	Paved parking, HSG C
6,948	98	Roofs, HSG C
5,851	98	Roofs, HSG A
25,151	98	Paved parking, HSG A
71,285	55	Woods, Good, HSG B
469,212	61	Weighted Average
415,069		88.46% Pervious Area
54,143		11.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
2.9	137	0.1000	0.79		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
3.5	365	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.7	708	0.0800	0.71		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
29.5	1,260	Total			

Subcatchment 6S: To Canton Ave



Summary for Subcatchment 7S: To Canton Ave

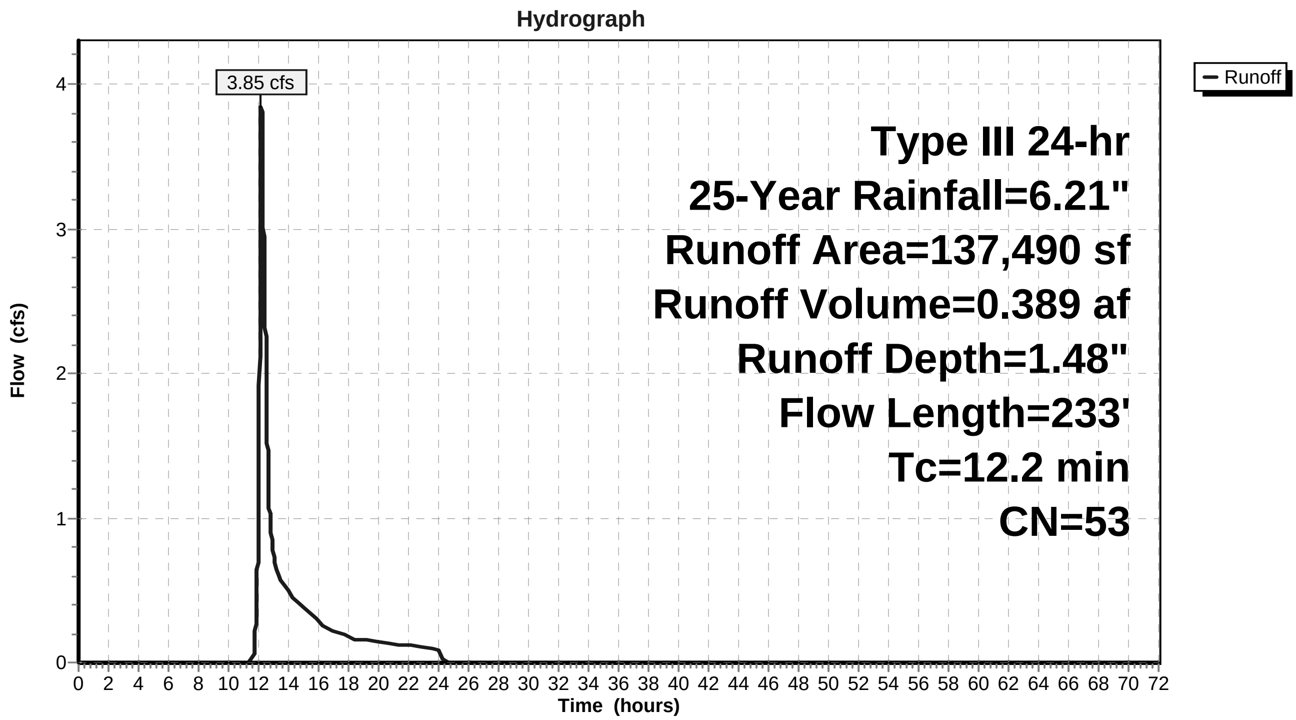
Runoff = 3.85 cfs @ 12.19 hrs, Volume= 0.389 af, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

Area (sf)	CN	Description
10,854	98	Roofs, HSG C
1,300	98	Roofs, HSG A
45,027	39	>75% Grass cover, Good, HSG A
19,832	74	>75% Grass cover, Good, HSG C
40,675	30	Woods, Good, HSG A
11,139	70	Woods, Good, HSG C
8,663	98	Paved parking, HSG A
137,490	53	Weighted Average
116,673		84.86% Pervious Area
20,817		15.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0750	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
5.0	183	0.0600	0.61		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
12.2	233	Total			

Subcatchment 7S: To Canton Ave



Summary for Subcatchment 8S: To Upper Stream

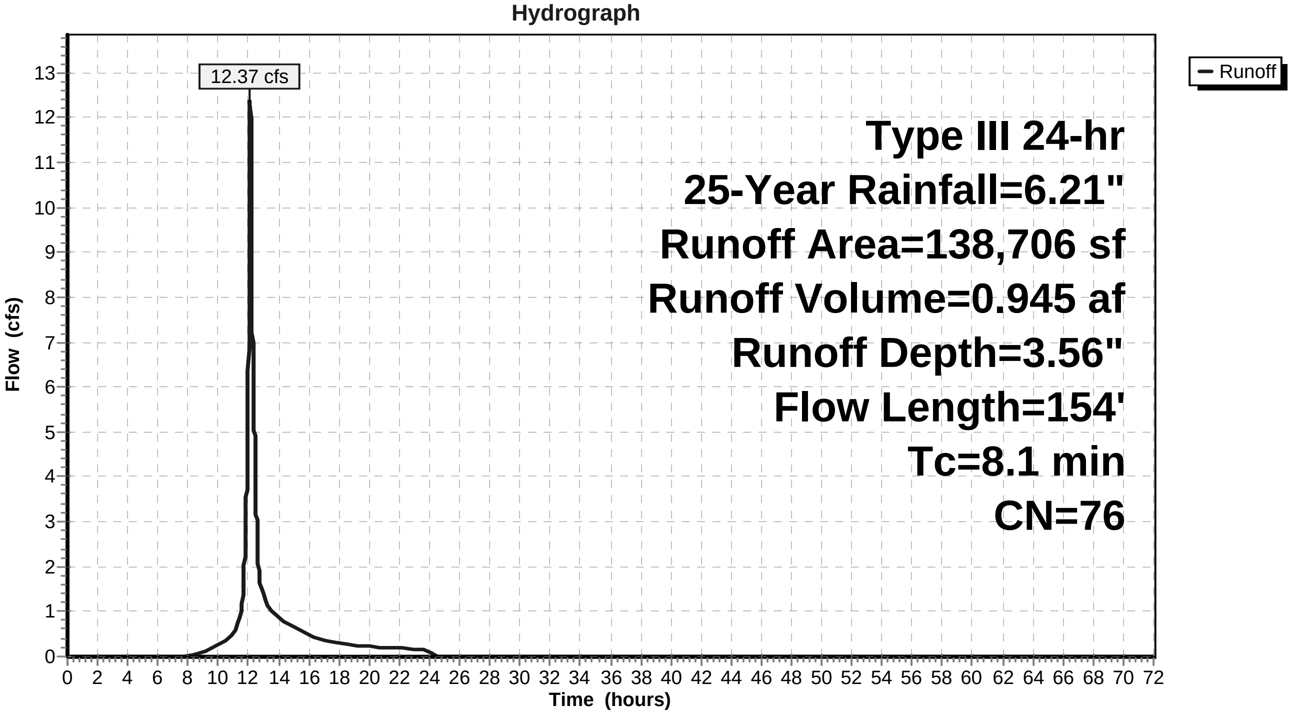
Runoff = 12.37 cfs @ 12.12 hrs, Volume= 0.945 af, Depth= 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

	Area (sf)	CN	Description
	10,854	98	Roofs, HSG C
	56,850	70	Woods, Good, HSG C
	39,960	74	>75% Grass cover, Good, HSG C
	6,997	98	Roofs, HSG D
	13,257	80	>75% Grass cover, Good, HSG D
*	5,996	83	Wetland Stream Channel
	4,792	61	>75% Grass cover, Good, HSG B
	138,706	76	Weighted Average
	120,855		87.13% Pervious Area
	17,851		12.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
1.4	76	0.1310	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.3	28	0.3200	1.41		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
8.1	154	Total			

Subcatchment 8S: To Upper Stream



Summary for Subcatchment 9S: To Existing Pond

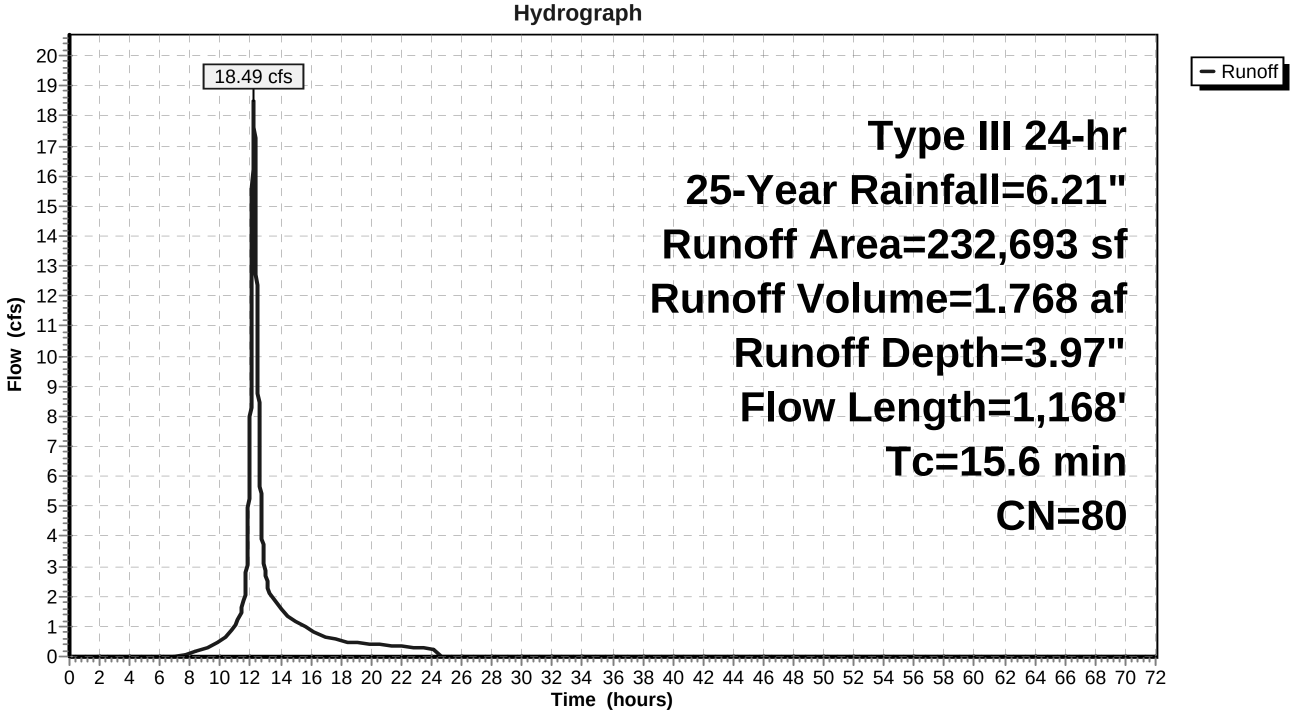
Runoff = 18.49 cfs @ 12.22 hrs, Volume= 1.768 af, Depth= 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

Area (sf)	CN	Description
51,672	98	Paved parking, HSG C
23,517	98	Roofs, HSG C
92,096	70	Woods, Good, HSG C
65,408	74	>75% Grass cover, Good, HSG C
232,693	80	Weighted Average
157,504		67.69% Pervious Area
75,189		32.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
4.5	180	0.0720	0.67		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.9	230	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	708	0.0800	12.83	10.08	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
15.6	1,168	Total			

Subcatchment 9S: To Existing Pond



Summary for Subcatchment 10S: To Canton Ave

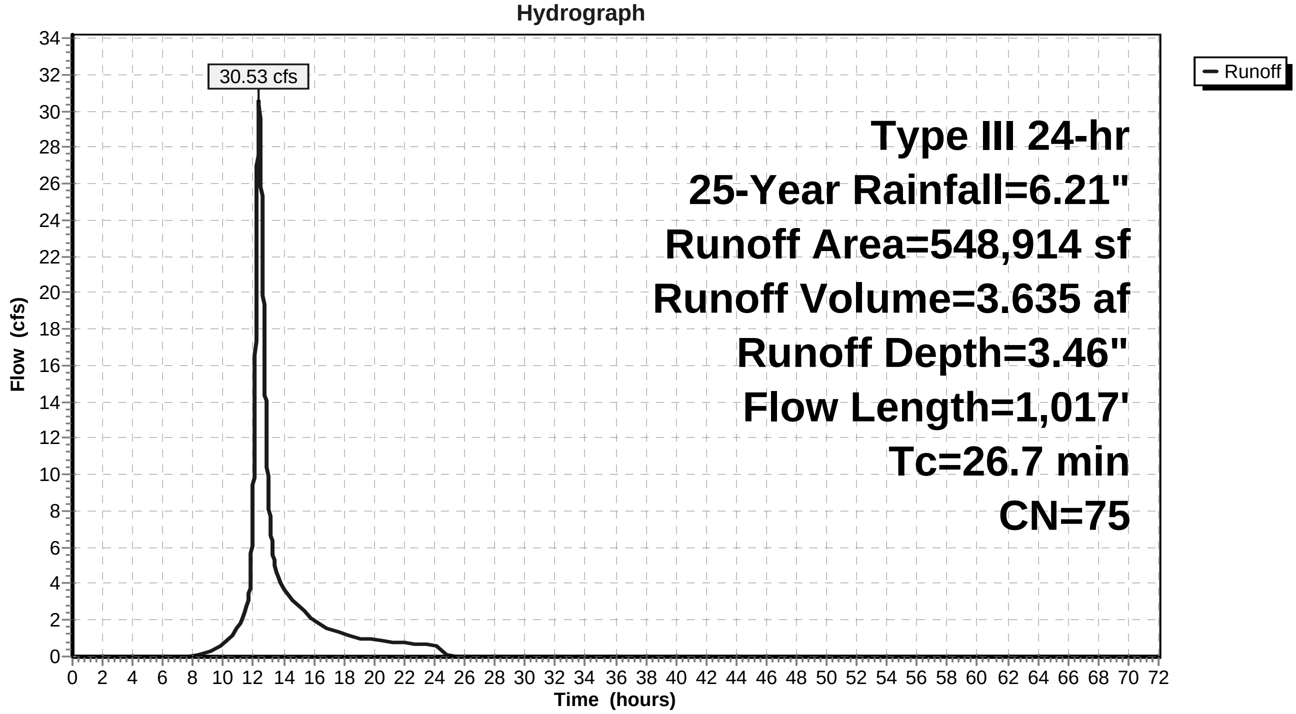
Runoff = 30.53 cfs @ 12.37 hrs, Volume= 3.635 af, Depth= 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

Area (sf)	CN	Description
1,375	98	Roofs, HSG A
1,811	39	>75% Grass cover, Good, HSG A
126,272	55	Woods, Good, HSG B
25,692	98	Paved parking, HSG D
19,296	98	Roofs, HSG D
34,183	80	>75% Grass cover, Good, HSG D
33,768	98	Roofs, HSG C
53,608	98	Paved parking, HSG C
121,146	70	Woods, Good, HSG C
129,363	74	>75% Grass cover, Good, HSG C
2,400	96	Gravel surface, HSG C
548,914	75	Weighted Average
415,175		75.64% Pervious Area
133,739		24.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
10.1	544	0.1300	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.3	246	0.0650	1.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.0	177	0.0560	0.59		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
26.7	1,017	Total			

Subcatchment 10S: To Canton Ave



Summary for Subcatchment 11S: To Canton Ave

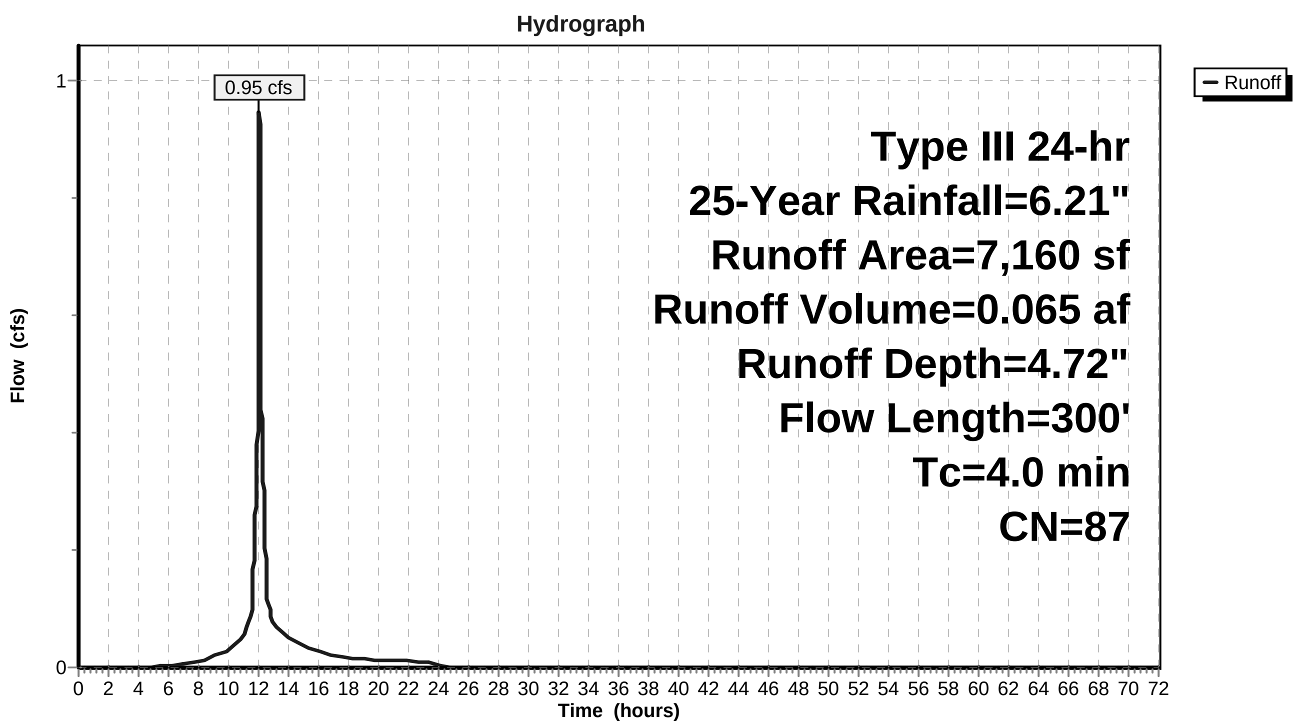
Runoff = 0.95 cfs @ 12.06 hrs, Volume= 0.065 af, Depth= 4.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.21"

Area (sf)	CN	Description
5,800	98	Paved parking, HSG A
1,360	39	>75% Grass cover, Good, HSG A
7,160	87	Weighted Average
1,360		18.99% Pervious Area
5,800		81.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	25	0.0800	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.26"
1.3	275	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.0	300	Total			

Subcatchment 11S: To Canton Ave



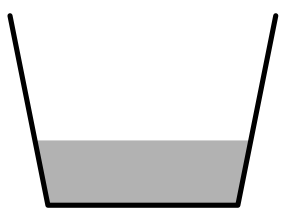
Summary for Reach 1R: Upper Stream Channel

Inflow Area = 44.817 ac, 0.91% Impervious, Inflow Depth = 2.93" for 25-Year event
Inflow = 38.53 cfs @ 13.50 hrs, Volume= 10.928 af
Outflow = 38.51 cfs @ 13.51 hrs, Volume= 10.928 af, Atten= 0%, Lag= 0.6 min

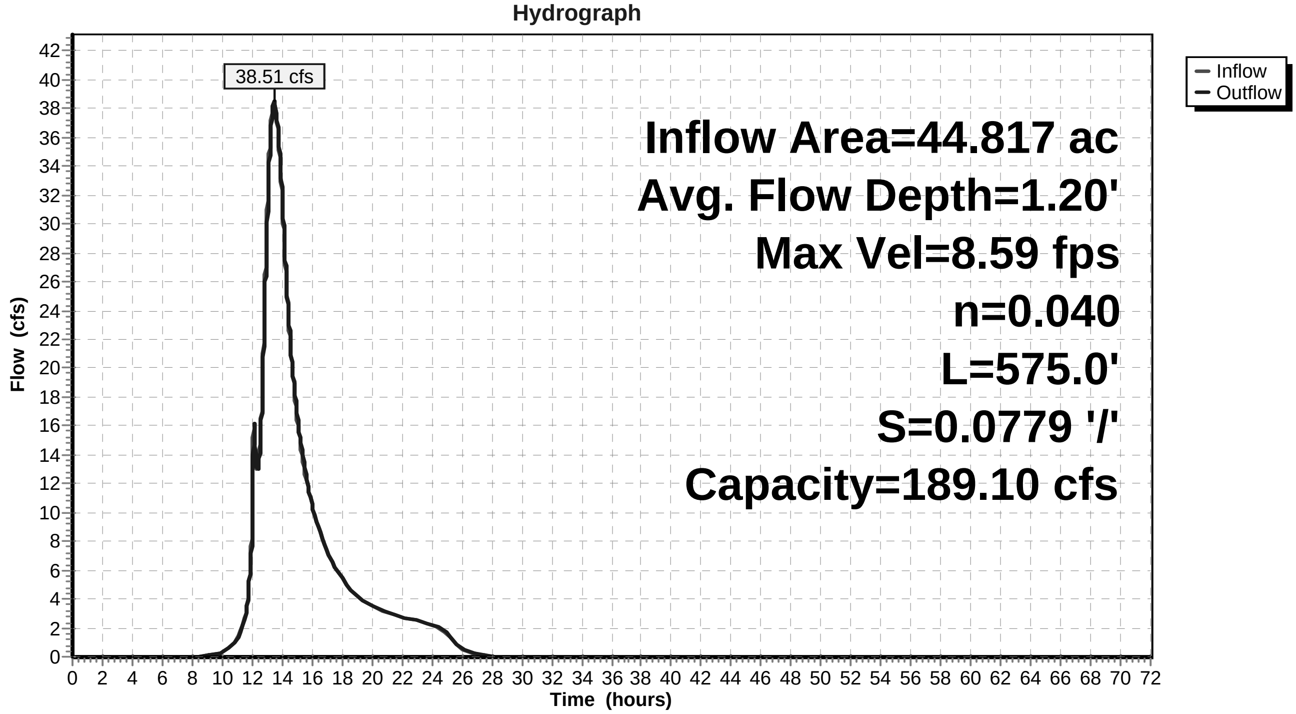
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.59 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 3.53 fps, Avg. Travel Time= 2.7 min

Peak Storage= 2,577 cf @ 13.51 hrs
Average Depth at Peak Storage= 1.20'
Bank-Full Depth= 3.50' Flow Area= 14.7 sf, Capacity= 189.10 cfs

3.50' x 3.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 0.2 '/' Top Width= 4.90'
Length= 575.0' Slope= 0.0779 '/'
Inlet Invert= 252.80', Outlet Invert= 208.00'



Reach 1R: Upper Stream Channel



Summary for Reach DP1: Lower Stream Channel

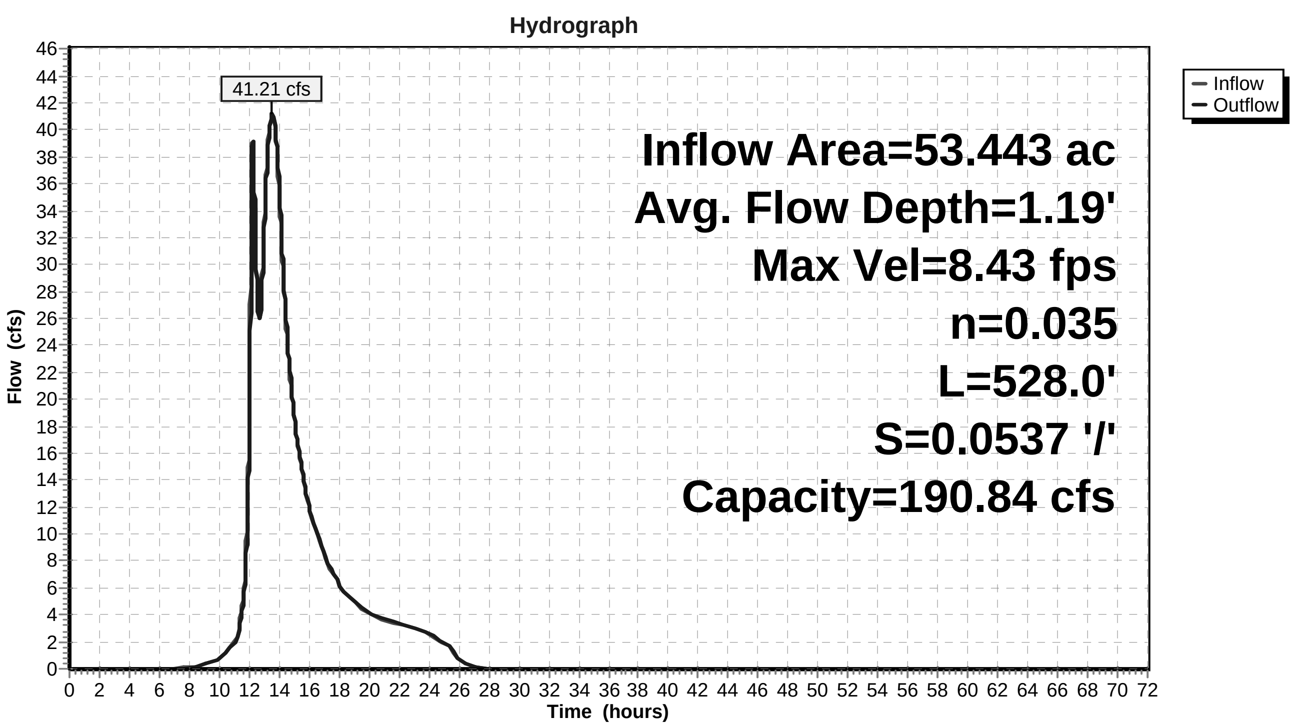
Inflow Area = 53.443 ac, 4.00% Impervious, Inflow Depth = 3.01" for 25-Year event
Inflow = 41.22 cfs @ 13.54 hrs, Volume= 13.426 af
Outflow = 41.21 cfs @ 13.56 hrs, Volume= 13.426 af, Atten= 0%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.43 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 3.50 fps, Avg. Travel Time= 2.5 min

Peak Storage= 2,581 cf @ 13.56 hrs
Average Depth at Peak Storage= 1.19'
Bank-Full Depth= 3.00' Flow Area= 15.0 sf, Capacity= 190.84 cfs

3.50' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 0.5 '/' Top Width= 6.50'
Length= 528.0' Slope= 0.0537 '/'
Inlet Invert= 187.50', Outlet Invert= 159.12'

Reach DP1: Lower Stream Channel

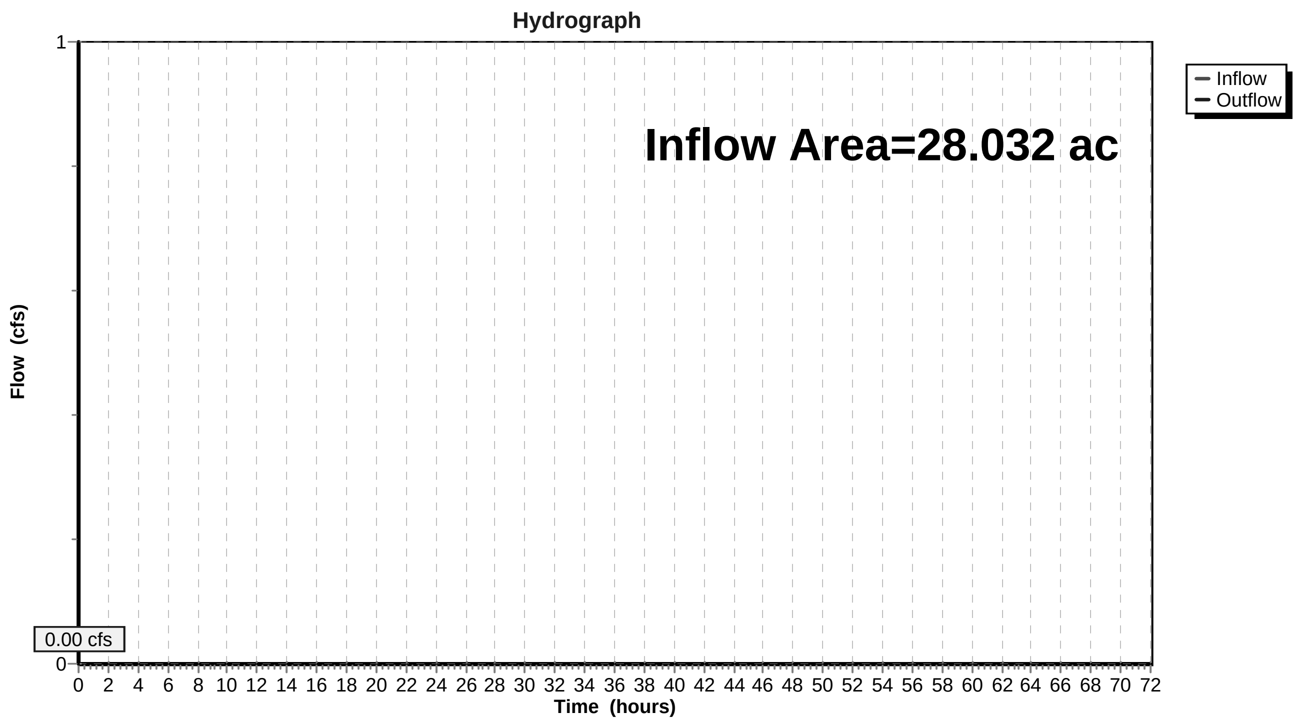


Summary for Reach DP2: Canton Ave

Inflow Area = 28.032 ac, 16.61% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP2: Canton Ave

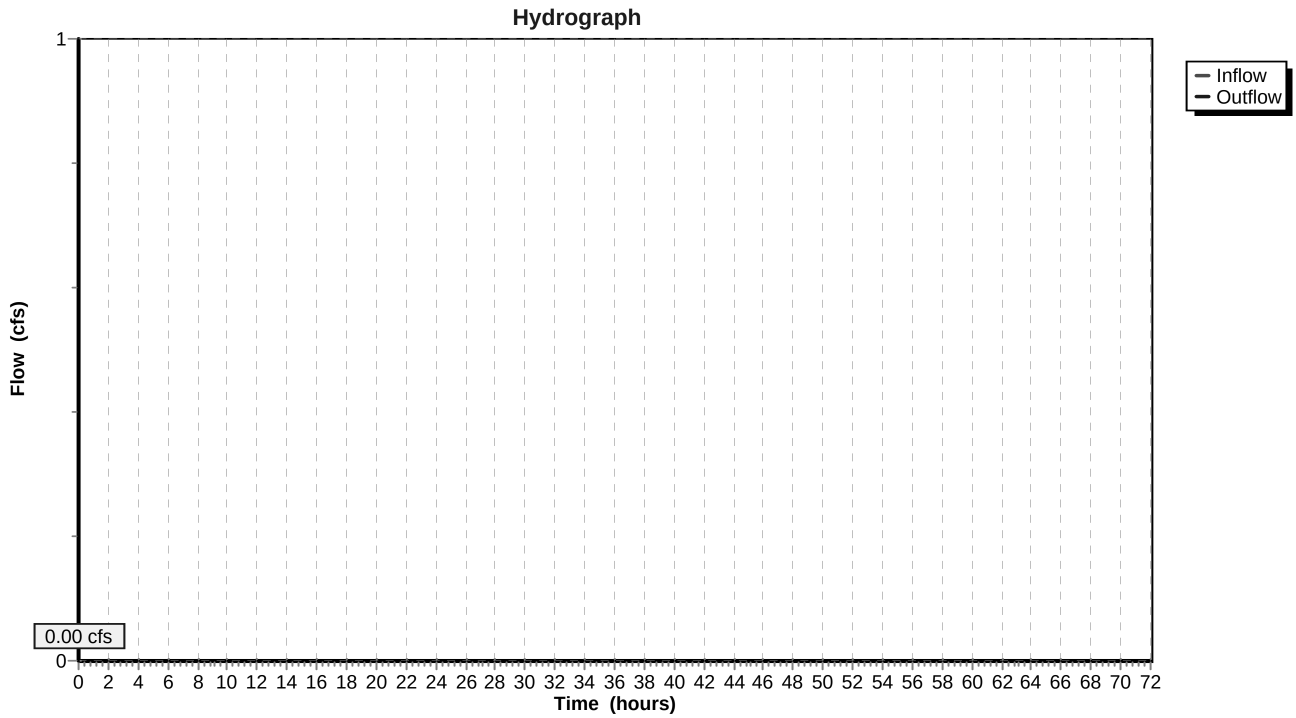


Summary for Reach DP3: Canton Ave

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP3: Canton Ave



Summary for Pond 1P: 48" Box Culvert

Inflow Area = 44.817 ac, 0.91% Impervious, Inflow Depth = 2.93" for 25-Year event
Inflow = 38.51 cfs @ 13.51 hrs, Volume= 10.928 af
Outflow = 38.50 cfs @ 13.52 hrs, Volume= 10.926 af, Atten= 0%, Lag= 0.4 min
Primary = 38.50 cfs @ 13.52 hrs, Volume= 10.926 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 202.47' @ 13.52 hrs Surf.Area= 758 sf Storage= 951 cf

Plug-Flow detention time= 0.8 min calculated for 10.926 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (926.3 - 925.8)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	19,230 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

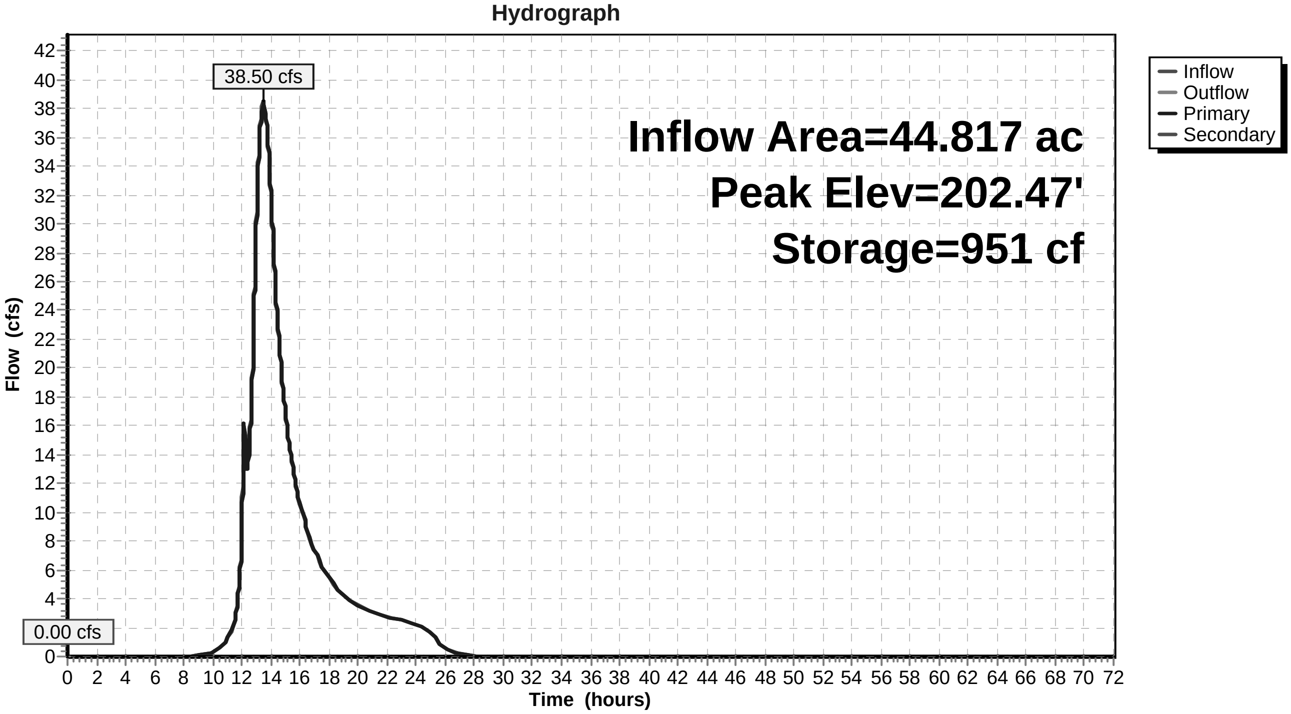
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
200.00	200	0	0
202.00	464	664	664
204.00	1,719	2,183	2,847
206.00	3,867	5,586	8,433
208.00	6,930	10,797	19,230

Device	Routing	Invert	Outlet Devices
#1	Primary	200.39'	**48.0" W x 48.0" H Box Culvert** L= 38.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.39' / 198.47' S= 0.0505 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 16.00 sf
#2	Secondary	206.50'	**30.0' long x 26.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=38.50 cfs @ 13.52 hrs HW=202.47' TW=192.05' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 38.50 cfs @ 4.63 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=200.00' TW=187.82' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: 48" Box Culvert



Summary for Pond 2P: Existing Farm Pond

Inflow Area =	50.727 ac,	4.21% Impervious,	Inflow Depth = 3.03"	for 25-Year event
Inflow =	40.56 cfs @	13.51 hrs, Volume=	12.796 af	
Outflow =	40.42 cfs @	13.55 hrs, Volume=	12.796 af,	Atten= 0%, Lag= 2.1 min
Primary =	40.42 cfs @	13.55 hrs, Volume=	12.796 af	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 192.06' @ 13.55 hrs Surf.Area= 3,328 sf Storage= 6,169 cf

Plug-Flow detention time= 4.2 min calculated for 12.796 af (100% of inflow)
Center-of-Mass det. time= 4.0 min (915.3 - 911.3)

Volume	Invert	Avail.Storage	Storage Description
#1	187.82'	54,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

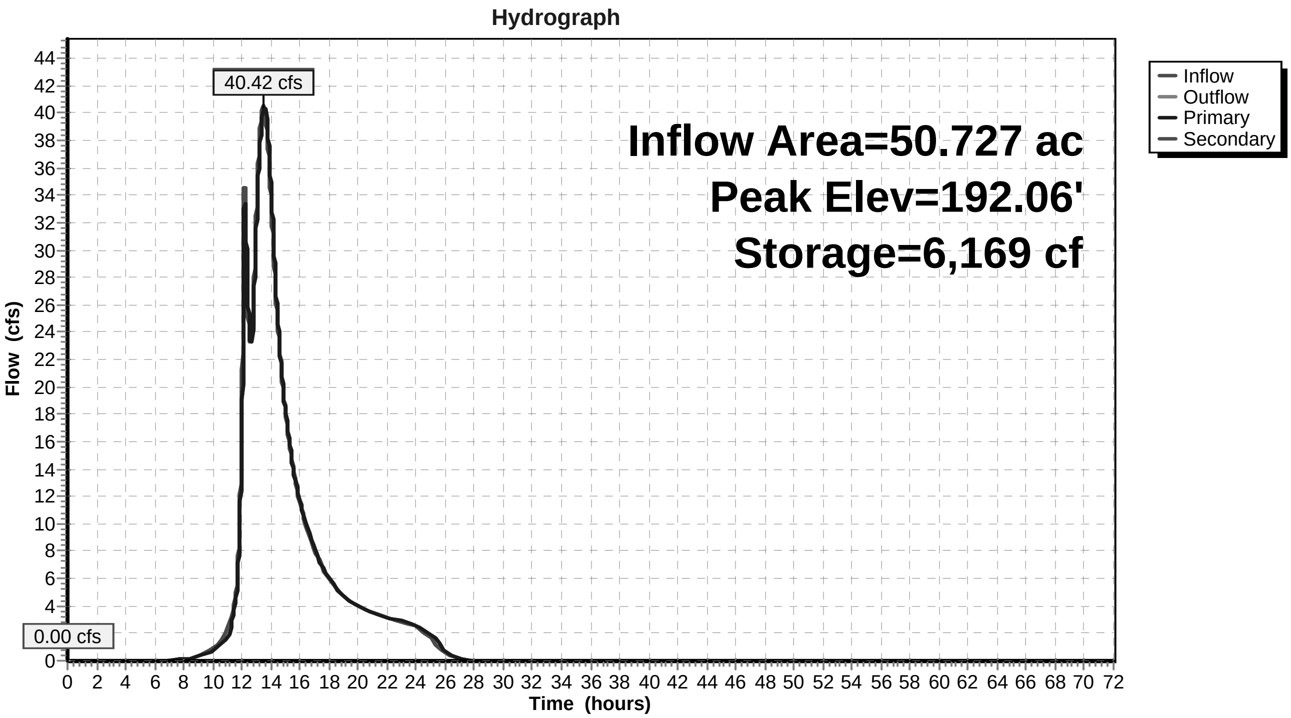
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.82	83	0	0
188.00	240	29	29
189.00	696	468	497
190.00	920	808	1,305
191.00	2,569	1,745	3,050
192.00	3,287	2,928	5,978
193.00	3,988	3,638	9,615
194.00	4,817	4,403	14,018
195.00	5,576	5,197	19,214
196.00	6,406	5,991	25,205
197.00	7,279	6,843	32,048
198.00	8,234	7,757	39,804
199.00	9,230	8,732	48,536
199.60	9,786	5,705	54,241

Device	Routing	Invert	Outlet Devices
#1	Primary	187.68'	**27.0" W x 42.0" H Box Culvert** L= 1.5' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.68' / 187.66' S= 0.0133 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.88 sf
#2	Device 1	187.71'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.75 2.50 2.50 3.50 Width (feet) 0.75 0.00 0.00 3.50 10.29
#3	Device 2	187.76'	**30.0" W x 48.0" H Box Culvert** L= 2.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.76' / 187.73' S= 0.0150 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 10.00 sf
#4	Secondary	197.90'	**18.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=40.42 cfs @ 13.55 hrs HW=192.06' TW=188.69' (Dynamic Tailwater)
└─**1=Culvert** (Passes 40.42 cfs of 47.83 cfs potential flow)
  └─**2=Custom Weir/Orifice** (Orifice Controls 40.42 cfs @ 5.63 fps)
    └─**3=Culvert** (Passes 40.42 cfs of 51.90 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.82' TW=187.50' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Farm Pond



Summary for Pond 3P: Existing Depression

Inflow Area = 28.032 ac, 16.61% Impervious, Inflow Depth = 0.26" for 25-Year event
Inflow = 6.86 cfs @ 12.15 hrs, Volume= 0.608 af
Outflow = 5.38 cfs @ 12.25 hrs, Volume= 0.608 af, Atten= 22%, Lag= 6.0 min
Discarded = 5.38 cfs @ 12.25 hrs, Volume= 0.608 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.57' @ 12.25 hrs Surf.Area= 3,610 sf Storage= 1,801 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.2 min (874.7 - 872.4)

Volume	Invert	Avail.Storage	Storage Description
#1	152.50'	20,003 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

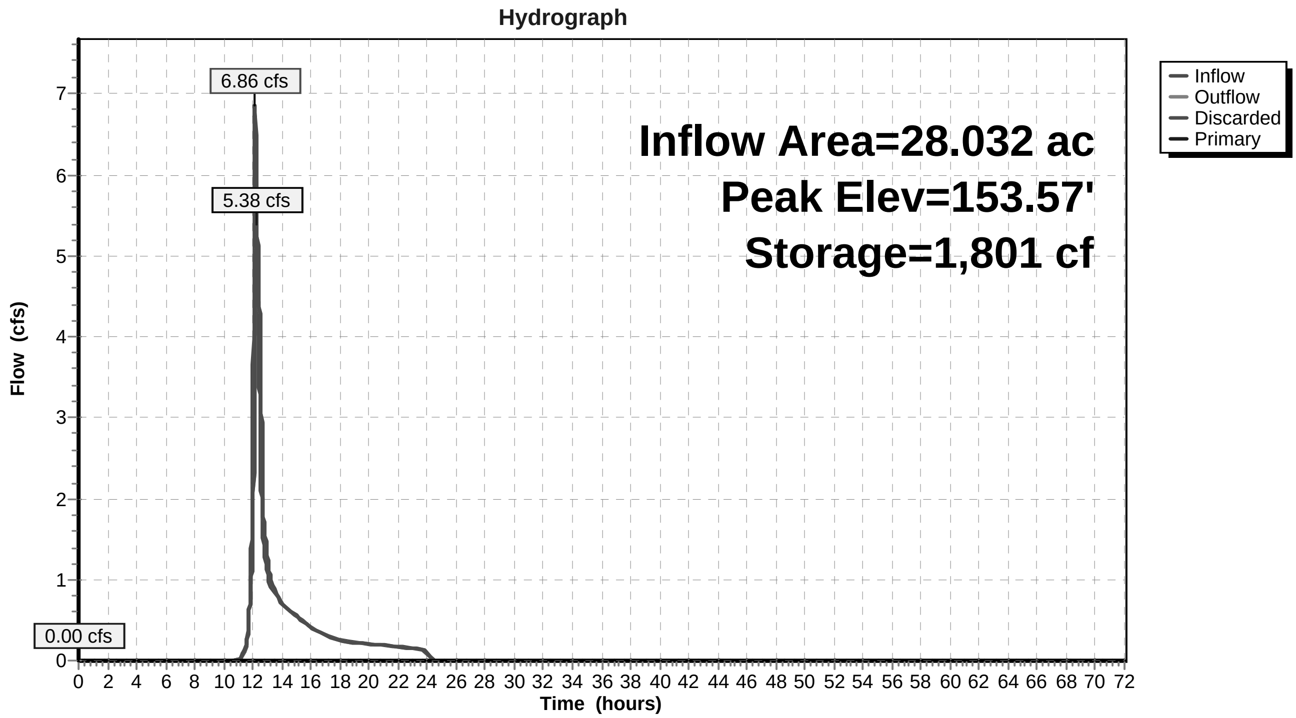
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
152.50	568	0	0
153.00	1,156	431	431
154.00	5,426	3,291	3,722
155.00	8,124	6,775	10,497
156.00	10,888	9,506	20,003

Device	Routing	Invert	Outlet Devices
#1	Discarded	152.50'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 146.20'
#2	Primary	155.50'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=5.38 cfs @ 12.25 hrs HW=153.57' (Free Discharge)
└─**1=Exfiltration** (Controls 5.38 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=152.50' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Existing Depression



Summary for Pond 4P: Existing Depression

Inflow Area =	23.992 ac, 15.97% Impervious, Inflow Depth = 0.13" for 25-Year event			
Inflow =	0.79 cfs @	12.76 hrs, Volume=	0.267 af	
Outflow =	0.77 cfs @	12.83 hrs, Volume=	0.267 af,	Atten= 3%, Lag= 4.3 min
Discarded =	0.77 cfs @	12.83 hrs, Volume=	0.267 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.85' @ 12.83 hrs Surf.Area= 538 sf Storage= 93 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.5 min (994.4 - 993.9)

Volume	Invert	Avail.Storage	Storage Description
#1	156.60'	2,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

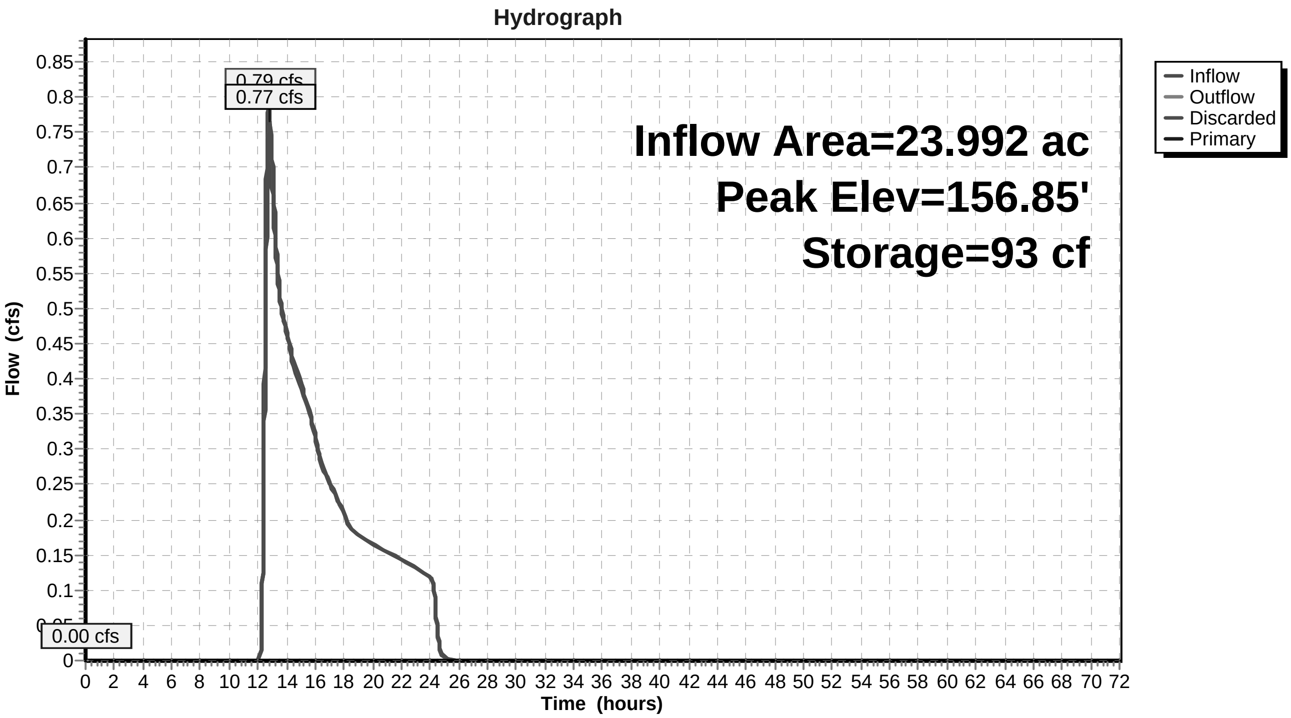
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
156.60	221	0	0
157.00	737	192	192
158.00	4,257	2,497	2,689

Device	Routing	Invert	Outlet Devices
#1	Discarded	156.60'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 150.20'
#2	Primary	157.44'	**30.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=0.77 cfs @ 12.83 hrs HW=156.85' (Free Discharge)
└─**1=Exfiltration** (Controls 0.77 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=156.60' TW=152.50' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: Existing Depression



Summary for Pond 5P: Bio Retention area

Inflow Area = 3.156 ac, 15.14% Impervious, Inflow Depth = 1.48" for 25-Year event
Inflow = 3.85 cfs @ 12.19 hrs, Volume= 0.389 af
Outflow = 0.59 cfs @ 13.43 hrs, Volume= 0.389 af, Atten= 85%, Lag= 74.5 min
Discarded = 0.45 cfs @ 13.43 hrs, Volume= 0.375 af
Primary = 0.14 cfs @ 13.43 hrs, Volume= 0.015 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 218.05' @ 13.43 hrs Surf.Area= 6,846 sf Storage= 6,082 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 150.5 min (1,037.0 - 886.5)

Volume	Invert	Avail.Storage	Storage Description
#1	217.00'	14,362 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

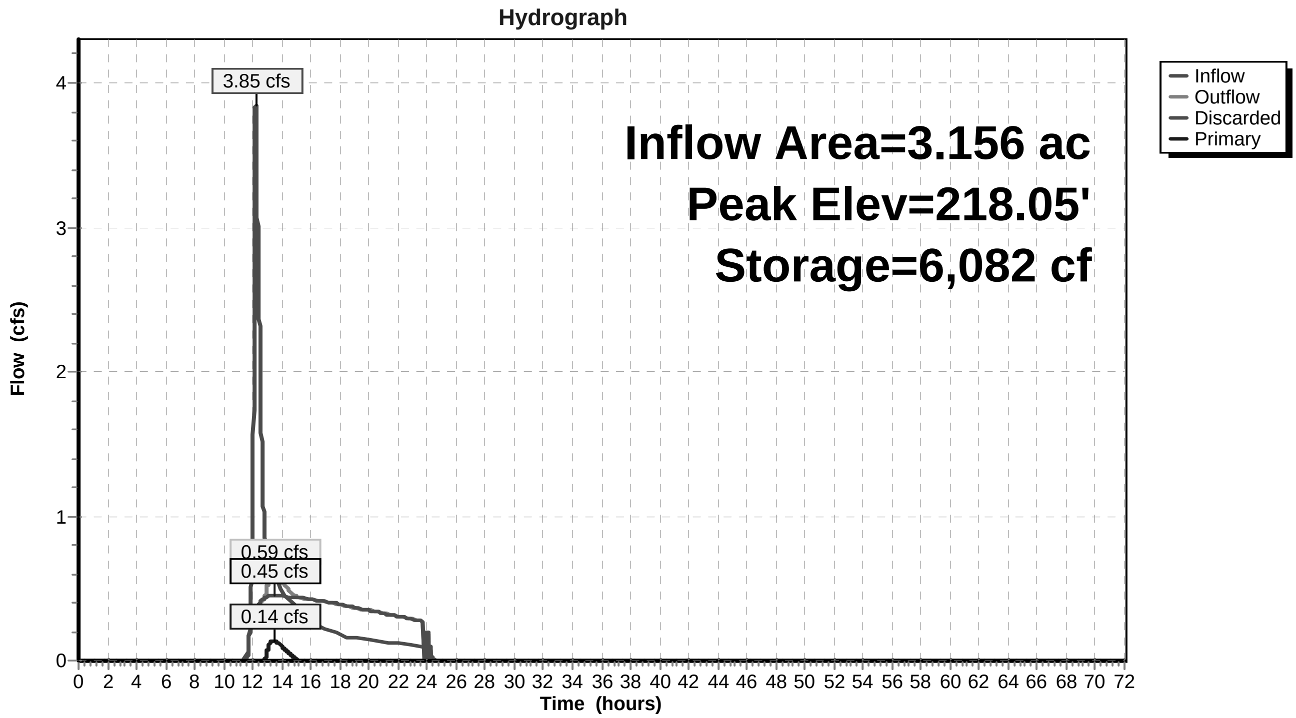
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
217.00	4,844	0	0
218.00	6,617	5,731	5,731
218.50	8,810	3,857	9,587
219.00	10,289	4,775	14,362

Device	Routing	Invert	Outlet Devices
#1	Discarded	217.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 212.00'
#2	Primary	214.55'	**12.0" Round Culvert** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.55' / 213.41' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	218.00'	**3.5' long x 1.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.45 cfs @ 13.43 hrs HW=218.05' (Free Discharge)
└─**1=Exfiltration** (Controls 0.45 cfs)

Primary OutFlow Max=0.14 cfs @ 13.43 hrs HW=218.05' TW=211.63' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.14 cfs of 6.55 cfs potential flow)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.14 cfs @ 0.75 fps)

Pond 5P: Bio Retention area



Summary for Pond 6P: Subsurface Chamber System

Inflow Area = 15.758 ac, 22.52% Impervious, Inflow Depth = 2.78" for 25-Year event
Inflow = 30.53 cfs @ 12.37 hrs, Volume= 3.650 af
Outflow = 12.69 cfs @ 12.84 hrs, Volume= 3.650 af, Atten= 58%, Lag= 28.1 min
Discarded = 5.40 cfs @ 12.84 hrs, Volume= 2.731 af
Primary = 7.30 cfs @ 12.84 hrs, Volume= 0.918 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 212.25' @ 12.84 hrs Surf.Area= 16,762 sf Storage= 44,621 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 39.8 min (883.8 - 844.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	208.50'	23,012 cf	**87.25'W x 192.12'L x 5.50'H Field A** 92,194 cf Overall - 34,663 cf Embedded = 57,531 cf x 40.0% Voids
#2A	209.25'	34,663 cf	**ADS_StormTech MC-3500 d +Cap** x 312 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 12 Rows of 26 Chambers Cap Storage= +14.9 cf x 2 x 12 rows = 357.6 cf
		57,675 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	208.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 203.00'
#2	Primary	206.00'	**24.0" Round Culvert** L= 120.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 206.00' / 200.00' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	212.00'	**4.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)
#4	Device 2	209.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=5.40 cfs @ 12.84 hrs HW=212.25' (Free Discharge)
└─**1=Exfiltration** (Controls 5.40 cfs)

Primary OutFlow Max=7.30 cfs @ 12.84 hrs HW=212.25' TW=194.64' (Dynamic Tailwater)
└─**2=Culvert** (Passes 7.30 cfs of 34.66 cfs potential flow)
  ├─**3=Sharp-Crested Vee/Trap Weir** (Weir Controls 1.62 cfs @ 1.63 fps)
  └─**4=Orifice/Grate** (Orifice Controls 5.67 cfs @ 7.22 fps)

Pond 6P: Subsurface Chamber System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 12 rows = 357.6 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

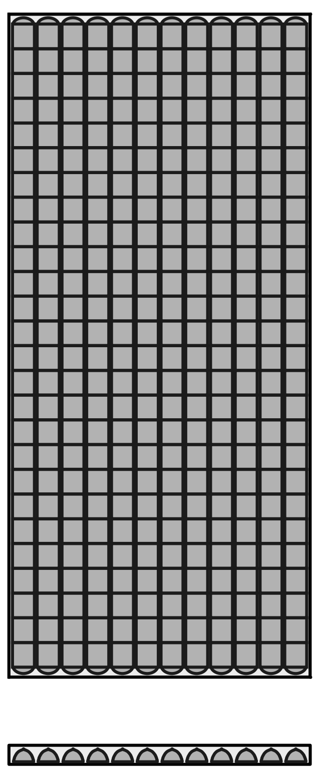
26 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 190.12' Row Length +12.0" End Stone x 2 = 192.12' Base Length
12 Rows x 77.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 87.25' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

312 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 12 Rows = 34,662.6 cf Chamber Storage

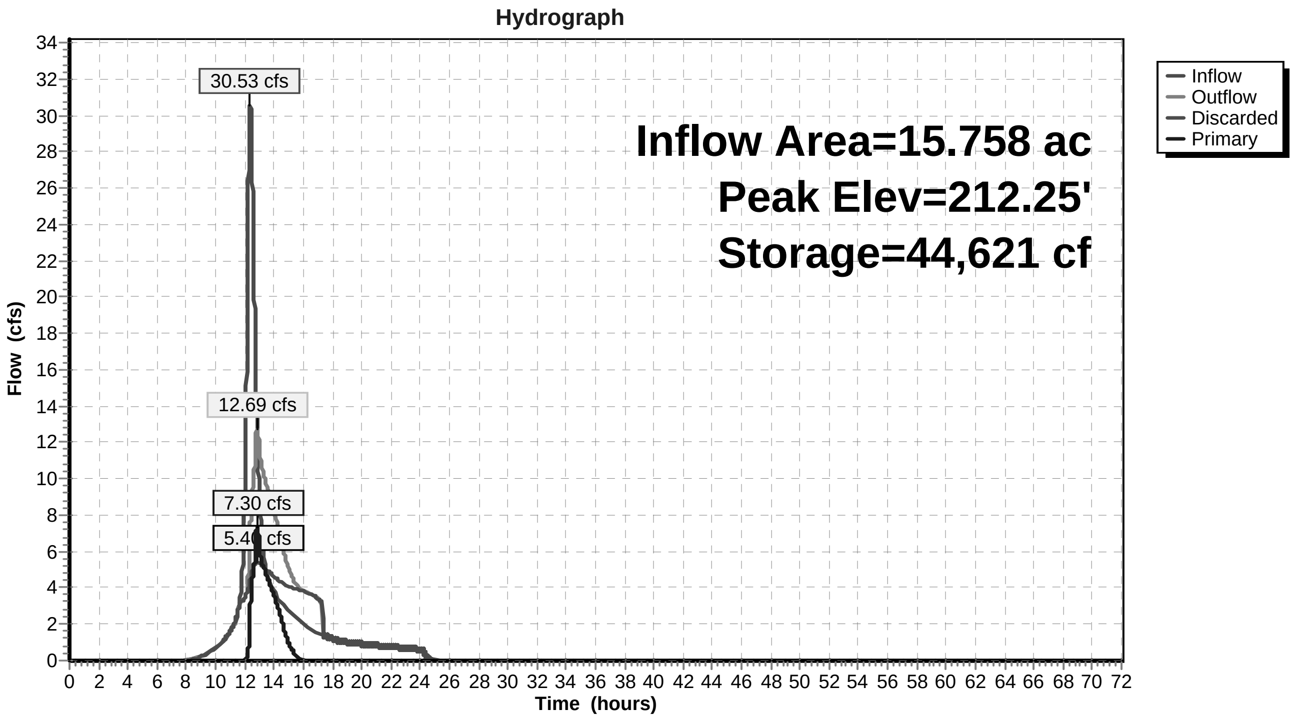
92,193.6 cf Field - 34,662.6 cf Chambers = 57,531.0 cf Stone x 40.0% Voids = 23,012.4 cf Stone Storage

Chamber Storage + Stone Storage = 57,675.0 cf = 1.324 af
Overall Storage Efficiency = 62.6%
Overall System Size = 192.12' x 87.25' x 5.50'

312 Chambers
3,414.6 cy Field
2,130.8 cy Stone



Pond 6P: Subsurface Chamber System



Summary for Pond 7P: Subsurface Chamber System

Inflow Area =	15.758 ac, 22.52% Impervious, Inflow Depth = 0.70" for 25-Year event			
Inflow =	7.30 cfs @	12.84 hrs, Volume=	0.918 af	
Outflow =	3.65 cfs @	13.96 hrs, Volume=	0.919 af,	Atten= 50%, Lag= 67.2 min
Discarded =	3.65 cfs @	13.96 hrs, Volume=	0.919 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 195.18' @ 13.96 hrs Surf.Area= 14,754 sf Storage= 9,866 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 29.7 min (836.4 - 806.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	194.00'	20,298 cf	**94.42'W x 156.27'L x 5.50'H Field A** 81,150 cf Overall - 30,404 cf Embedded = 50,745 cf x 40.0% Voids
#2A	194.75'	30,404 cf	**ADS_StormTech MC-3500 d +Cap** x 273 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 13 Rows of 21 Chambers Cap Storage= +14.9 cf x 2 x 13 rows = 387.4 cf
		50,702 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	194.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 190.00'
#2	Primary	197.00'	**18.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 197.00' / 196.60' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	197.00'	**12.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	199.00'	**4.0' long x 1.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=3.65 cfs @ 13.96 hrs HW=195.18' (Free Discharge)
└─**1=Exfiltration** (Controls 3.65 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=194.00' TW=156.60' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Pond 7P: Subsurface Chamber System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 13 rows = 387.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

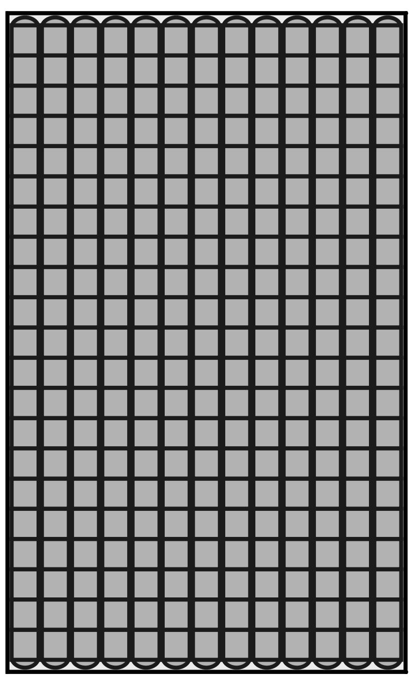
21 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 154.27' Row Length +12.0" End Stone x 2 = 156.27' Base Length
13 Rows x 77.0" Wide + 9.0" Spacing x 12 + 12.0" Side Stone x 2 = 94.42' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

273 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 13 Rows = 30,404.3 cf Chamber Storage

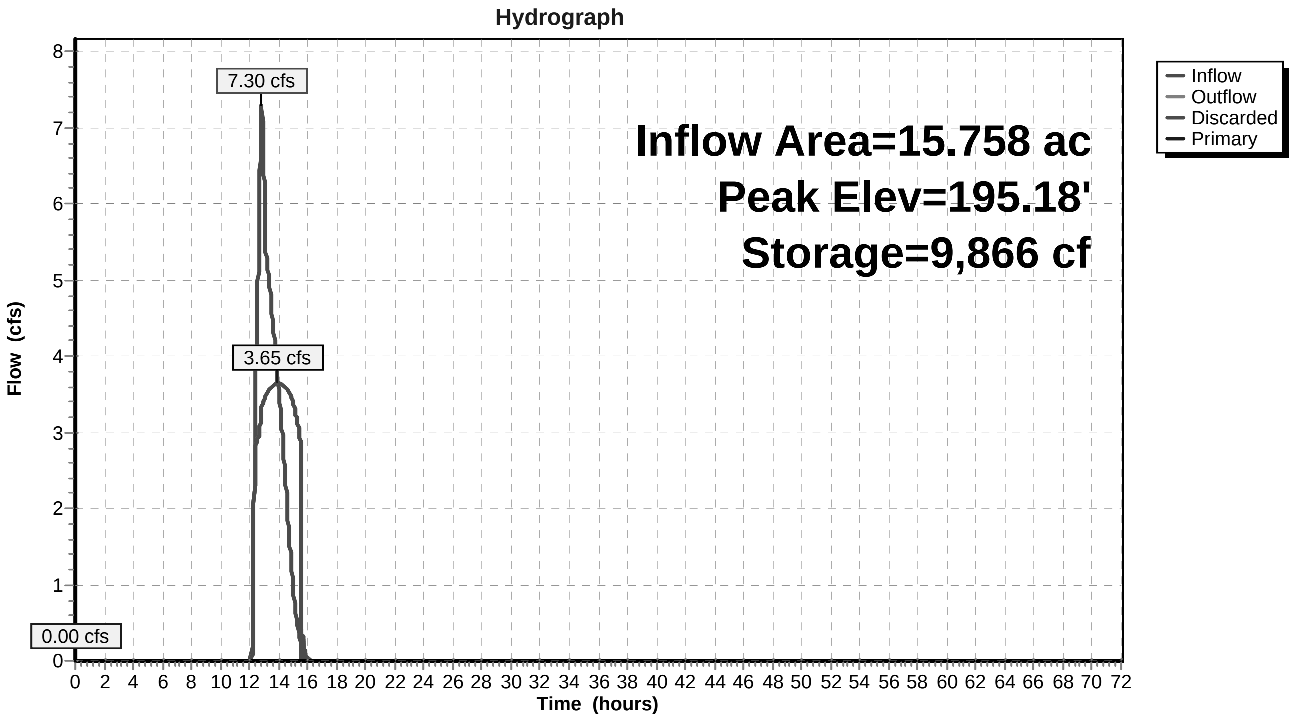
81,149.7 cf Field - 30,404.3 cf Chambers = 50,745.4 cf Stone x 40.0% Voids = 20,298.2 cf Stone Storage

Chamber Storage + Stone Storage = 50,702.5 cf = 1.164 af
Overall Storage Efficiency = 62.5%
Overall System Size = 156.27' x 94.42' x 5.50'

273 Chambers
3,005.5 cy Field
1,879.5 cy Stone



Pond 7P: Subsurface Chamber System



Summary for Pond 8P: Infiltration Basin

Inflow Area = 10.772 ac, 11.54% Impervious, Inflow Depth = 2.15" for 25-Year event
Inflow = 14.77 cfs @ 12.43 hrs, Volume= 1.928 af
Outflow = 3.84 cfs @ 13.27 hrs, Volume= 1.928 af, Atten= 74%, Lag= 50.2 min
Discarded = 3.84 cfs @ 13.27 hrs, Volume= 1.928 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 197.52' @ 13.27 hrs Surf.Area= 14,928 sf Storage= 27,189 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 73.7 min (953.6 - 879.9)

Volume	Invert	Avail.Storage	Storage Description
#1	195.00'	100,696 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

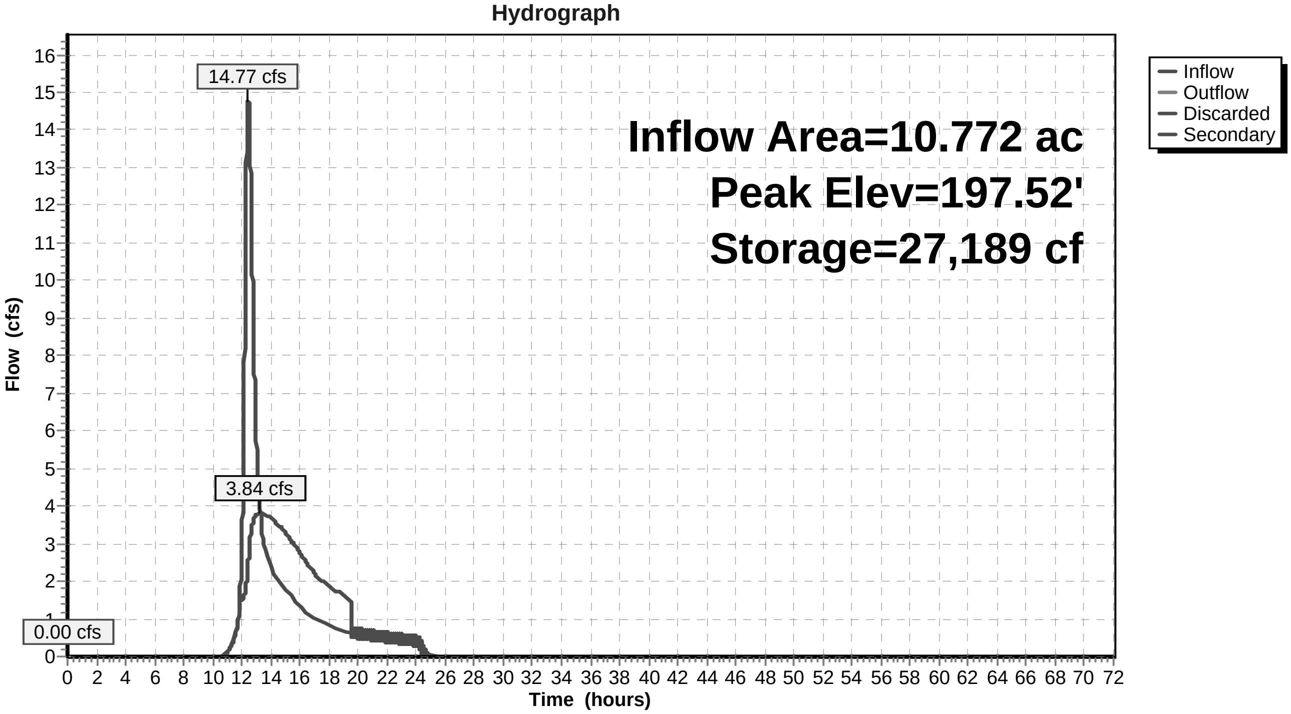
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
195.00	7,783	0	0
196.00	9,185	8,484	8,484
197.00	13,503	11,344	19,828
198.00	16,254	14,879	34,707
199.00	20,337	18,296	53,002
200.00	23,556	21,947	74,949
201.00	27,938	25,747	100,696

Device	Routing	Invert	Outlet Devices
#1	Discarded	195.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 190.00'
#2	Secondary	200.00'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=3.84 cfs @ 13.27 hrs HW=197.52' (Free Discharge)
└─**1=Exfiltration** (Controls 3.84 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=195.00' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Infiltration Basin



Summary for Pond 9P: Subsurface Chamber System

Inflow Area = 0.164 ac, 81.01% Impervious, Inflow Depth = 4.72" for 25-Year event
Inflow = 0.95 cfs @ 12.06 hrs, Volume= 0.065 af
Outflow = 0.19 cfs @ 12.47 hrs, Volume= 0.065 af, Atten= 80%, Lag= 24.6 min
Discarded = 0.19 cfs @ 12.47 hrs, Volume= 0.065 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 195.51' @ 12.47 hrs Surf.Area= 730 sf Storage= 711 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 21.9 min (813.5 - 791.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	194.00'	691 cf	**15.75'W x 46.34'L x 3.50'H Field A** 2,554 cf Overall - 827 cf Embedded = 1,727 cf x 40.0% Voids
#2A	194.50'	827 cf	**ADS_StormTech SC-740 +Cap** x 18 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 3 Rows of 6 Chambers
#3	197.50'	13 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		1,531 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
197.50	13	0	0
198.50	13	13	13

Device	Routing	Invert	Outlet Devices
#1	Discarded	194.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 190.00'
#2	Primary	198.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.19 cfs @ 12.47 hrs HW=195.51' (Free Discharge)
└─**1=Exfiltration** (Controls 0.19 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=194.00' TW=156.60' (Dynamic Tailwater)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 9P: Subsurface Chamber System - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

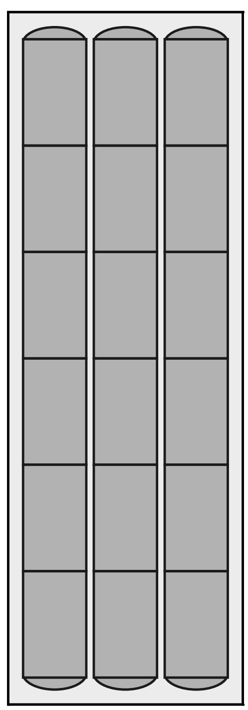
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

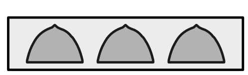
18 Chambers x 45.9 cf = 826.9 cf Chamber Storage

2,554.3 cf Field - 826.9 cf Chambers = 1,727.4 cf Stone x 40.0% Voids = 691.0 cf Stone Storage

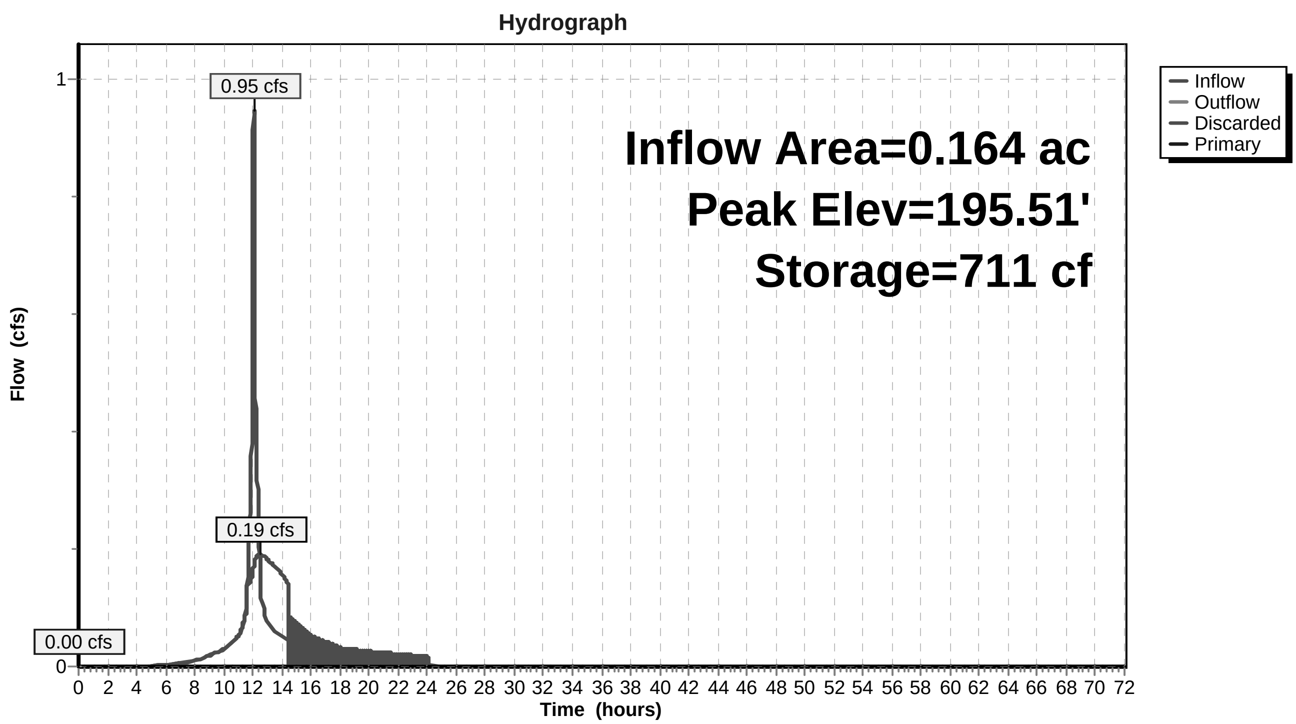
Chamber Storage + Stone Storage = 1,517.9 cf = 0.035 af
Overall Storage Efficiency = 59.4%
Overall System Size = 46.34' x 15.75' x 3.50'

18 Chambers
94.6 cy Field
64.0 cy Stone





Pond 9P: Subsurface Chamber System



Summary for Pond 10P: 48" Box Culvert

Inflow Area = 41.633 ac, 0.00% Impervious, Inflow Depth = 2.88" for 25-Year event
Inflow = 37.50 cfs @ 13.50 hrs, Volume= 9.983 af
Outflow = 37.49 cfs @ 13.50 hrs, Volume= 9.983 af, Atten= 0%, Lag= 0.2 min
Primary = 37.49 cfs @ 13.50 hrs, Volume= 9.983 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 257.34' @ 13.50 hrs Surf.Area= 589 sf Storage= 816 cf

Plug-Flow detention time= 0.4 min calculated for 9.982 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (933.6 - 933.2)

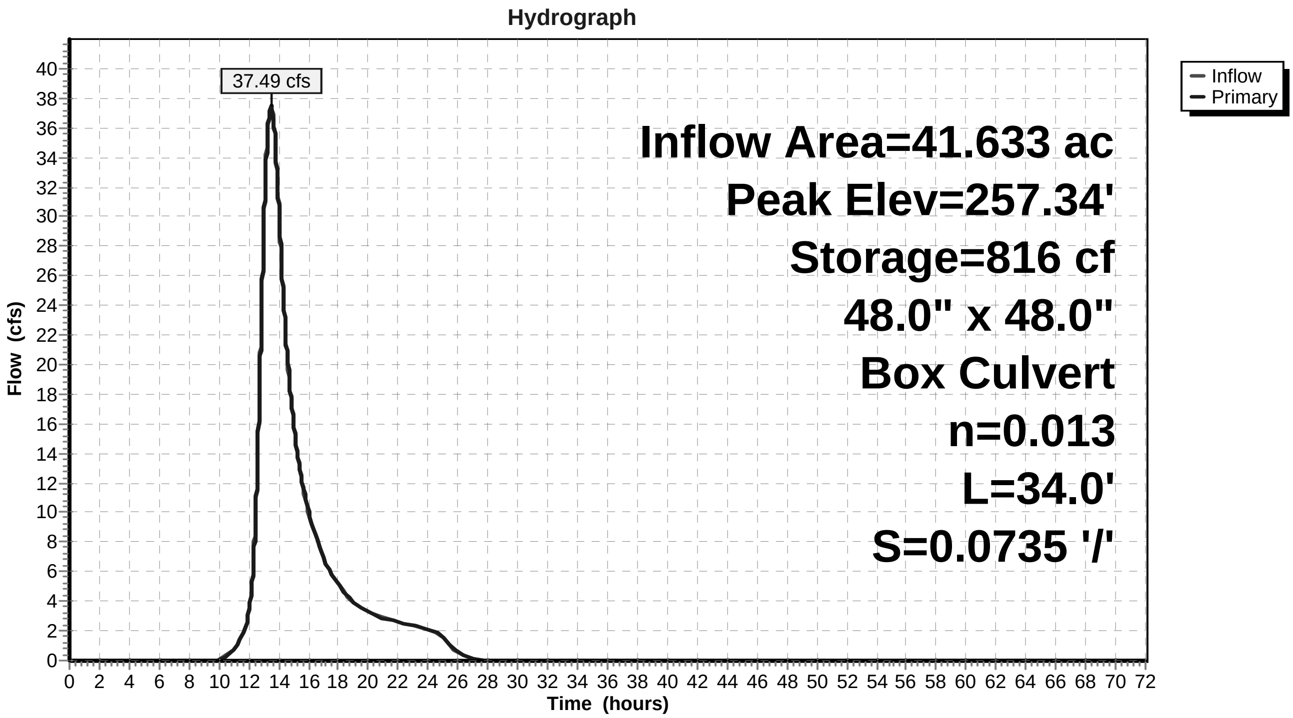
Volume	Invert	Avail.Storage	Storage Description
#1	255.30'	12,405 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.30	200	0	0
256.00	343	190	190
258.00	710	1,053	1,243
260.00	2,017	2,727	3,970
262.00	6,418	8,435	12,405

Device	Routing	Invert	Outlet Devices
#1	Primary	255.30'	**48.0" W x 48.0" H Box Culvert** L= 34.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 255.30' / 252.80' S= 0.0735 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 16.00 sf

Primary OutFlow Max=37.49 cfs @ 13.50 hrs HW=257.34' TW=254.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 37.49 cfs @ 4.59 fps)

Pond 10P: 48" Box Culvert



Summary for Pond 11P: Carberry Ln Culvert

Inflow Area = 53.443 ac, 4.00% Impervious, Inflow Depth = 3.01" for 25-Year event
Inflow = 41.21 cfs @ 13.56 hrs, Volume= 13.426 af
Outflow = 41.21 cfs @ 13.56 hrs, Volume= 13.426 af, Atten= 0%, Lag= 0.5 min
Primary = 41.21 cfs @ 13.56 hrs, Volume= 13.426 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.21' @ 13.56 hrs Surf.Area= 548 sf Storage= 868 cf

Plug-Flow detention time= 0.4 min calculated for 13.424 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (914.4 - 914.0)

Volume	Invert	Avail.Storage	Storage Description
#1	159.12'	13,507 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

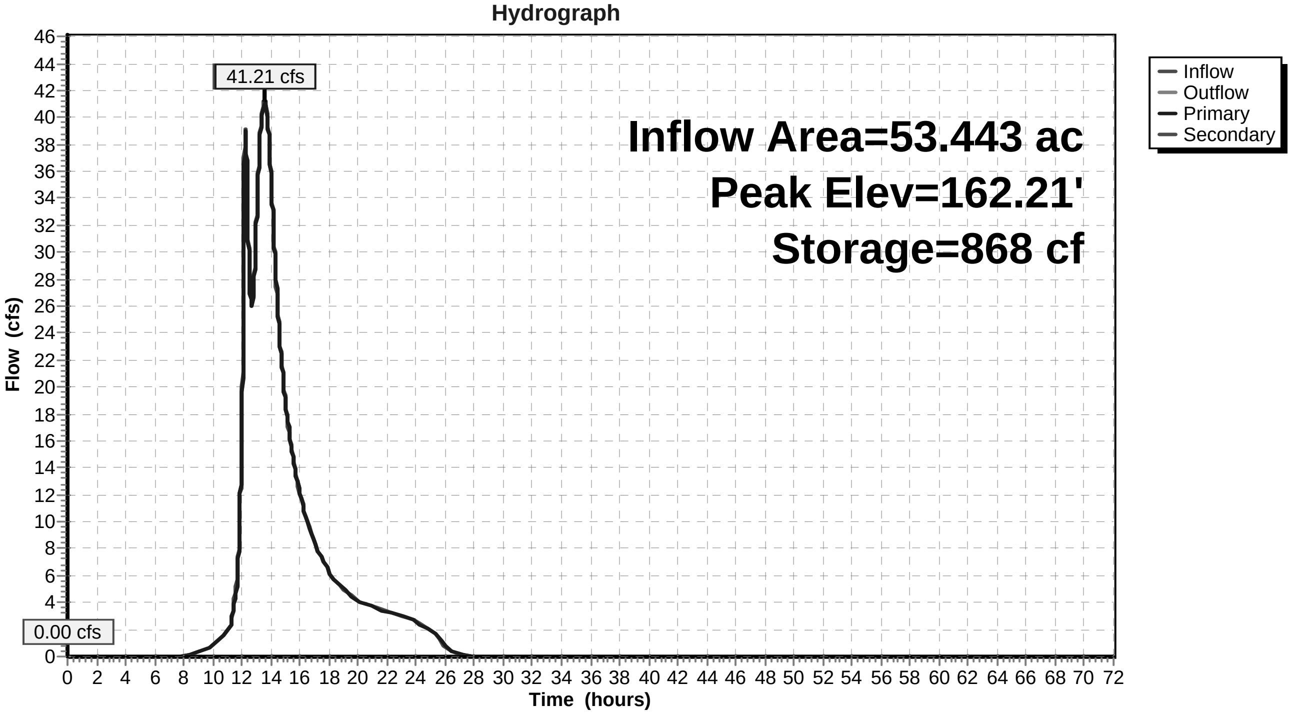
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
159.12	143	0	0
160.00	200	151	151
161.00	267	234	384
162.00	486	377	761
163.00	786	636	1,397
164.00	1,226	1,006	2,403
165.00	2,948	2,087	4,490
166.00	7,080	5,014	9,504
166.50	8,934	4,004	13,507

Device	Routing	Invert	Outlet Devices
#1	Primary	159.12'	**36.0" Round Culvert** L= 106.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.12' / 158.28' S= 0.0079 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf
#2	Secondary	165.25'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=41.21 cfs @ 13.56 hrs HW=162.21' (Free Discharge)
└─**1=Culvert** (Barrel Controls 41.21 cfs @ 7.04 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=159.12' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 11P: Carberry Ln Culvert



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Upper Watershed To Runoff Area=1,813,532 sf 0.00% Impervious Runoff Depth=5.10"
Flow Length=2,658' Tc=107.5 min CN=69 Runoff=67.26 cfs 17.687 af

Subcatchment 2S: Wetland Area Runoff Area=24,756 sf 0.00% Impervious Runoff Depth=4.12"
Flow Length=47' Slope=0.0800 '/' Tc=6.7 min CN=61 Runoff=2.66 cfs 0.195 af

Subcatchment 3S: Lower Stream Channel Runoff Area=118,276 sf 0.00% Impervious Runoff Depth=4.98"
Flow Length=683' Tc=19.4 min CN=68 Runoff=10.83 cfs 1.126 af

Subcatchment 4S: To Canton Ave Runoff Area=175,971 sf 20.42% Impervious Runoff Depth=3.64"
Flow Length=549' Tc=10.0 min CN=57 Runoff=14.74 cfs 1.224 af

Subcatchment 5S: To Canton Ave Runoff Area=351,525 sf 1.88% Impervious Runoff Depth=1.33"
Flow Length=1,139' Tc=30.3 min CN=37 Runoff=5.04 cfs 0.893 af

Subcatchment 6S: To Canton Ave Runoff Area=469,212 sf 11.54% Impervious Runoff Depth=4.12"
Flow Length=1,260' Tc=29.5 min CN=61 Runoff=29.45 cfs 3.699 af

Subcatchment 7S: To Canton Ave Runoff Area=137,490 sf 15.14% Impervious Runoff Depth=3.15"
Flow Length=233' Tc=12.2 min CN=53 Runoff=9.13 cfs 0.830 af

Subcatchment 8S: To Upper Stream Runoff Area=138,706 sf 12.87% Impervious Runoff Depth=5.96"
Flow Length=154' Tc=8.1 min CN=76 Runoff=20.49 cfs 1.580 af

Subcatchment 9S: To Existing Pond Runoff Area=232,693 sf 32.31% Impervious Runoff Depth=6.44"
Flow Length=1,168' Tc=15.6 min CN=80 Runoff=29.56 cfs 2.869 af

Subcatchment 10S: To Canton Ave Runoff Area=548,914 sf 24.36% Impervious Runoff Depth=5.83"
Flow Length=1,017' Tc=26.7 min CN=75 Runoff=51.18 cfs 6.125 af

Subcatchment 11S: To Canton Ave Runoff Area=7,160 sf 81.01% Impervious Runoff Depth=7.30"
Flow Length=300' Tc=4.0 min CN=87 Runoff=1.43 cfs 0.100 af

Reach 1R: Upper Stream Channel Avg. Flow Depth=1.77' Max Vel=10.09 fps Inflow=68.87 cfs 19.268 af
n=0.040 L=575.0' S=0.0779 '/' Capacity=189.10 cfs Outflow=68.86 cfs 19.268 af

Reach DP1: Lower Stream Channel Avg. Flow Depth=1.68' Max Vel=9.88 fps Inflow=72.09 cfs 23.456 af
n=0.035 L=528.0' S=0.0537 '/' Capacity=190.84 cfs Outflow=72.08 cfs 23.456 af

Reach DP2: Canton Ave Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP3: Canton Ave Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 1P: 48" Box Culvert Peak Elev=203.45' Storage=2,001 cf Inflow=68.86 cfs 19.268 af
Primary=68.85 cfs 19.266 af Secondary=0.00 cfs 0.000 af Outflow=68.85 cfs 19.266 af

Pond 2P: Existing Farm Pond Peak Elev=194.77' Storage=17,962 cf Inflow=72.02 cfs 22.330 af
Primary=70.80 cfs 22.330 af Secondary=0.00 cfs 0.000 af Outflow=70.80 cfs 22.330 af

Pond 3P: Existing Depression Peak Elev=154.30' Storage=5,442 cf Inflow=14.74 cfs 1.542 af
Discarded=9.72 cfs 1.542 af Primary=0.00 cfs 0.000 af Outflow=9.72 cfs 1.542 af

Pond 4P: Existing Depression Peak Elev=157.63' Storage=1,360 cf Inflow=10.91 cfs 1.414 af
Discarded=4.39 cfs 1.096 af Primary=6.49 cfs 0.318 af Outflow=10.87 cfs 1.414 af

Pond 5P: Bio Retention area Peak Elev=218.49' Storage=9,529 cf Inflow=9.13 cfs 0.830 af
Discarded=0.59 cfs 0.503 af Primary=4.09 cfs 0.326 af Outflow=4.68 cfs 0.830 af

Pond 6P: Subsurface Chamber System Peak Elev=213.88' Storage=56,872 cf Inflow=54.88 cfs 6.452 af
Discarded=6.35 cfs 3.718 af Primary=39.68 cfs 2.734 af Outflow=46.03 cfs 6.452 af

Pond 7P: Subsurface Chamber System Peak Elev=199.36' Storage=49,892 cf Inflow=39.68 cfs 2.734 af
Discarded=6.61 cfs 2.213 af Primary=8.02 cfs 0.521 af Outflow=14.63 cfs 2.734 af

Pond 8P: Infiltration Basin Peak Elev=199.44' Storage=62,222 cf Inflow=29.45 cfs 3.699 af
Discarded=6.27 cfs 3.699 af Secondary=0.00 cfs 0.000 af Outflow=6.27 cfs 3.699 af

Pond 9P: Subsurface Chamber System Peak Elev=196.74' Storage=1,291 cf Inflow=1.43 cfs 0.100 af
Discarded=0.24 cfs 0.100 af Primary=0.00 cfs 0.000 af Outflow=0.24 cfs 0.100 af

Pond 10P: 48" Box Culvert Peak Elev=258.32' Storage=1,500 cf Inflow=67.26 cfs 17.687 af
48.0" x 48.0" Box Culvert n=0.013 L=34.0' S=0.0735 '/' Outflow=67.26 cfs 17.687 af

Pond 11P: Carberry Ln Culvert Peak Elev=165.05' Storage=4,657 cf Inflow=72.08 cfs 23.456 af
Primary=71.67 cfs 23.456 af Secondary=0.00 cfs 0.000 af Outflow=71.67 cfs 23.456 af

Total Runoff Area = 92.246 ac Runoff Volume = 36.329 af Average Runoff Depth = 4.73"
91.29% Pervious = 84.210 ac 8.71% Impervious = 8.036 ac

Summary for Subcatchment 1S: Upper Watershed To Stream

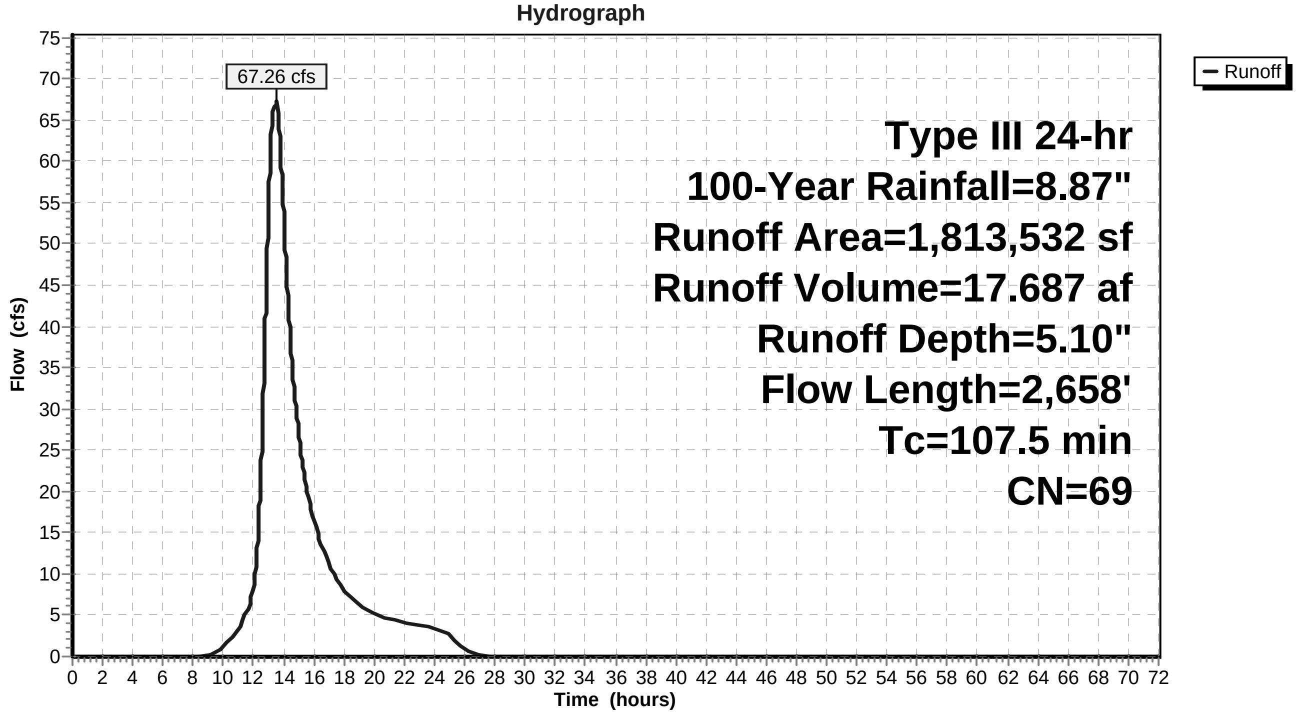
Runoff = 67.26 cfs @ 13.49 hrs, Volume= 17.687 af, Depth= 5.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

	Area (sf)	CN	Description
	153,412	30	Woods, Good, HSG A
	929,681	70	Woods, Good, HSG C
	185,864	74	>75% Grass cover, Good, HSG C
	459,084	77	Woods, Good, HSG D
	84,545	80	>75% Grass cover, Good, HSG D
*	946	83	Wetland Stream Channel
	1,813,532	69	Weighted Average
	1,813,532		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0080	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
23.4	554	0.0250	0.40		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
10.9	116	0.0050	0.18		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
16.5	813	0.1080	0.82		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
16.7	306	0.0150	0.31		**Shallow Concentrated Flow, Ponded Area** Forest w/Heavy Litter Kv= 2.5 fps
22.2	705	0.0450	0.53		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.2	114	0.0560	9.72	118.54	**Channel Flow,** Area= 12.2 sf Perim= 10.5' r= 1.16' n= 0.040 Earth, cobble bottom, clean sides
107.5	2,658	Total			

Subcatchment 1S: Upper Watershed To Stream



Summary for Subcatchment 2S: Wetland Area

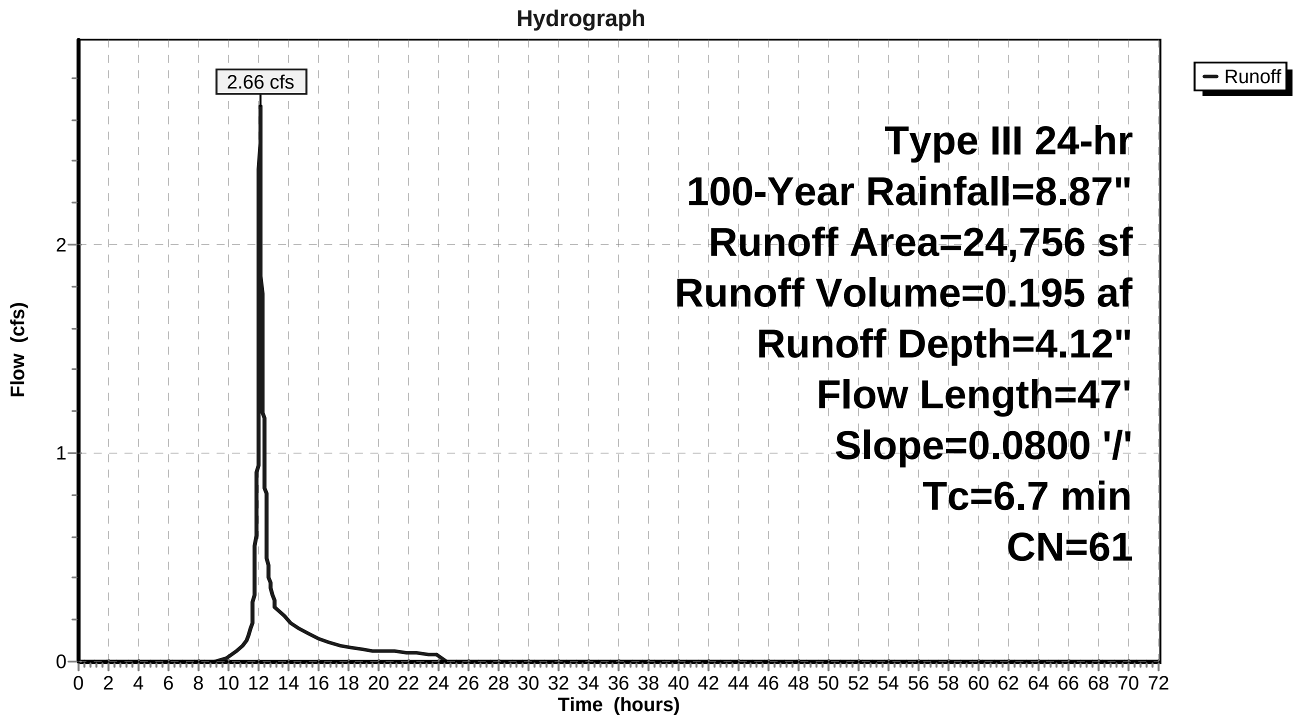
Runoff = 2.66 cfs @ 12.10 hrs, Volume= 0.195 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

	Area (sf)	CN	Description
*	3,336	83	Wetland Stream Channel
	17,332	55	Woods, Good, HSG B
	624	74	>75% Grass cover, Good, HSG C
	3,464	70	Woods, Good, HSG C
	24,756	61	Weighted Average
	24,756		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	47	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"

Subcatchment 2S: Wetland Area



Summary for Subcatchment 3S: Lower Stream Channel

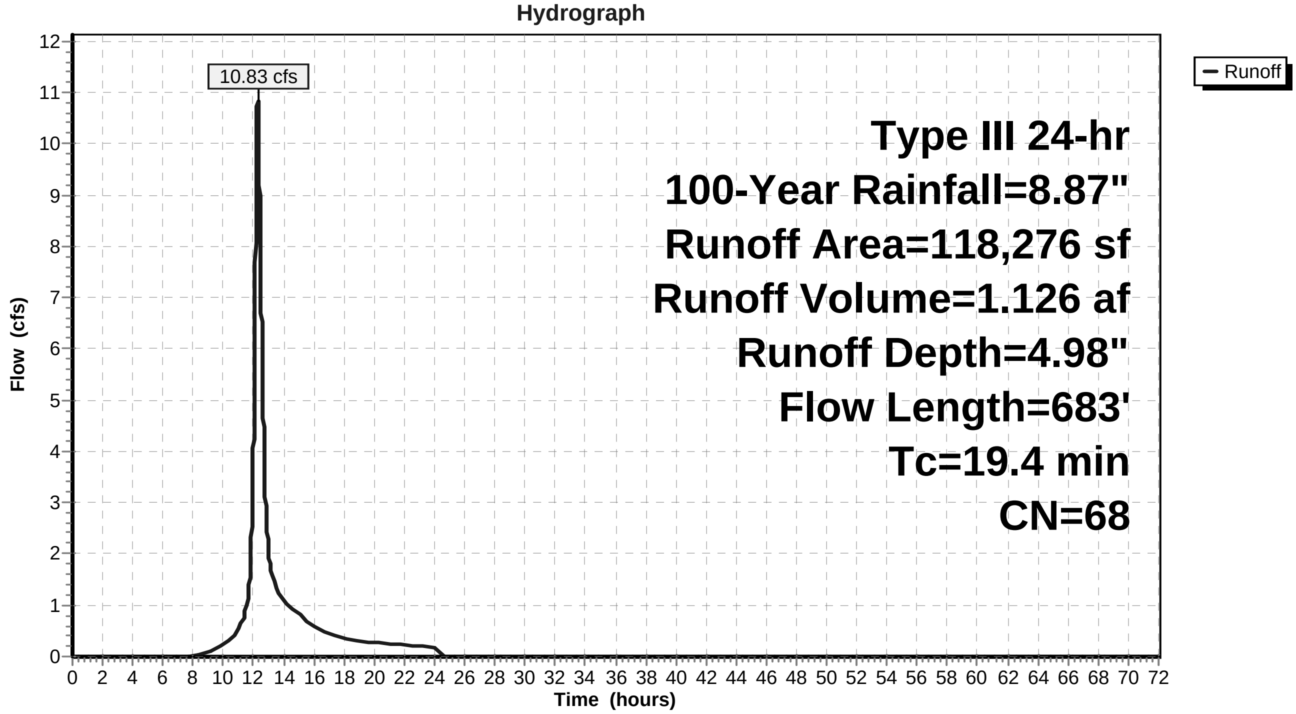
Runoff = 10.83 cfs @ 12.27 hrs, Volume= 1.126 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

	Area (sf)	CN	Description
	27,020	55	Woods, Good, HSG B
	30,772	74	>75% Grass cover, Good, HSG C
	58,057	70	Woods, Good, HSG C
*	2,427	83	Wetland Stream Channel
	118,276	68	Weighted Average
	118,276		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
9.0	450	0.1100	0.83		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.3	33	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	65	0.1400	0.94		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.1	62	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	23	0.1300	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
19.4	683	Total			

Subcatchment 3S: Lower Stream Channel



Summary for Subcatchment 4S: To Canton Ave

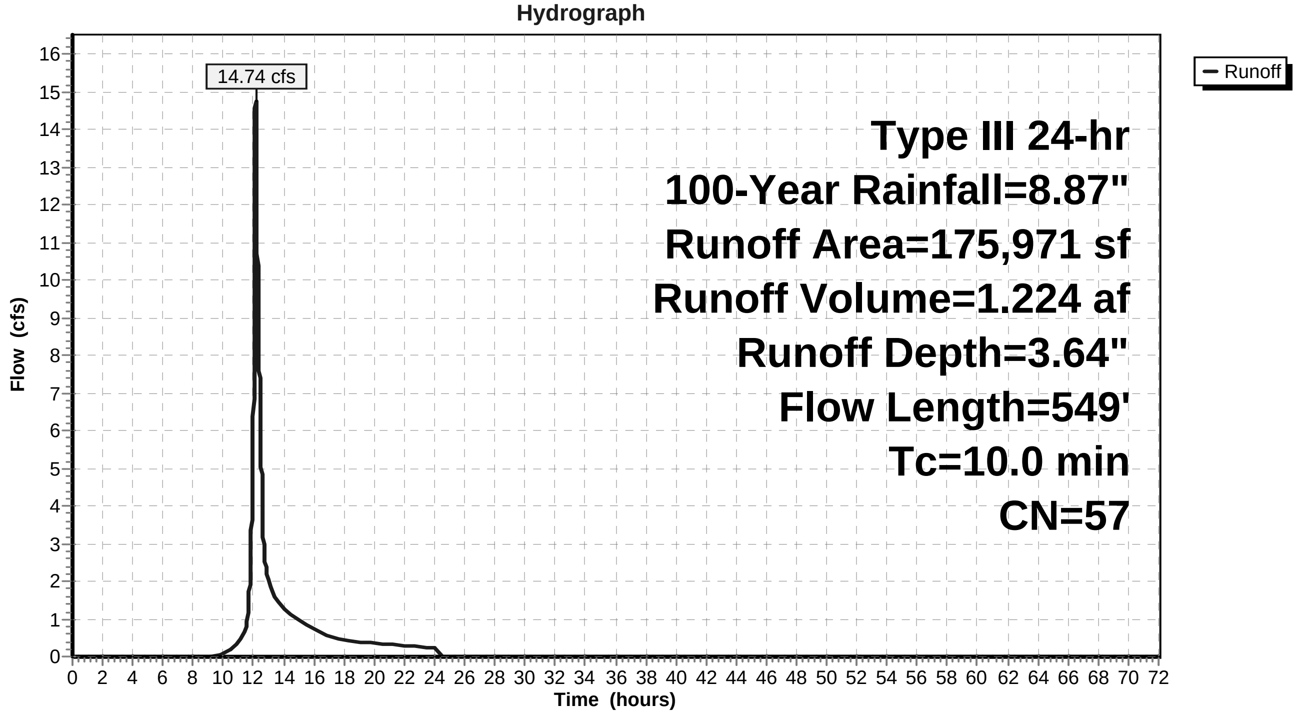
Runoff = 14.74 cfs @ 12.14 hrs, Volume= 1.224 af, Depth= 3.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

Area (sf)	CN	Description
9,654	98	Roofs, HSG A
17,648	98	Paved parking, HSG A
44,334	30	Woods, Good, HSG A
54,496	39	>75% Grass cover, Good, HSG A
9,397	55	Woods, Good, HSG B
22,408	77	Woods, Good, HSG D
9,406	80	>75% Grass cover, Good, HSG D
8,628	98	Paved parking, HSG D
175,971	57	Weighted Average
140,041		79.58% Pervious Area
35,930		20.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
3.0	150	0.1100	0.83		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
1.0	349	0.0870	5.99		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.0	549	Total			

Subcatchment 4S: To Canton Ave



Summary for Subcatchment 5S: To Canton Ave

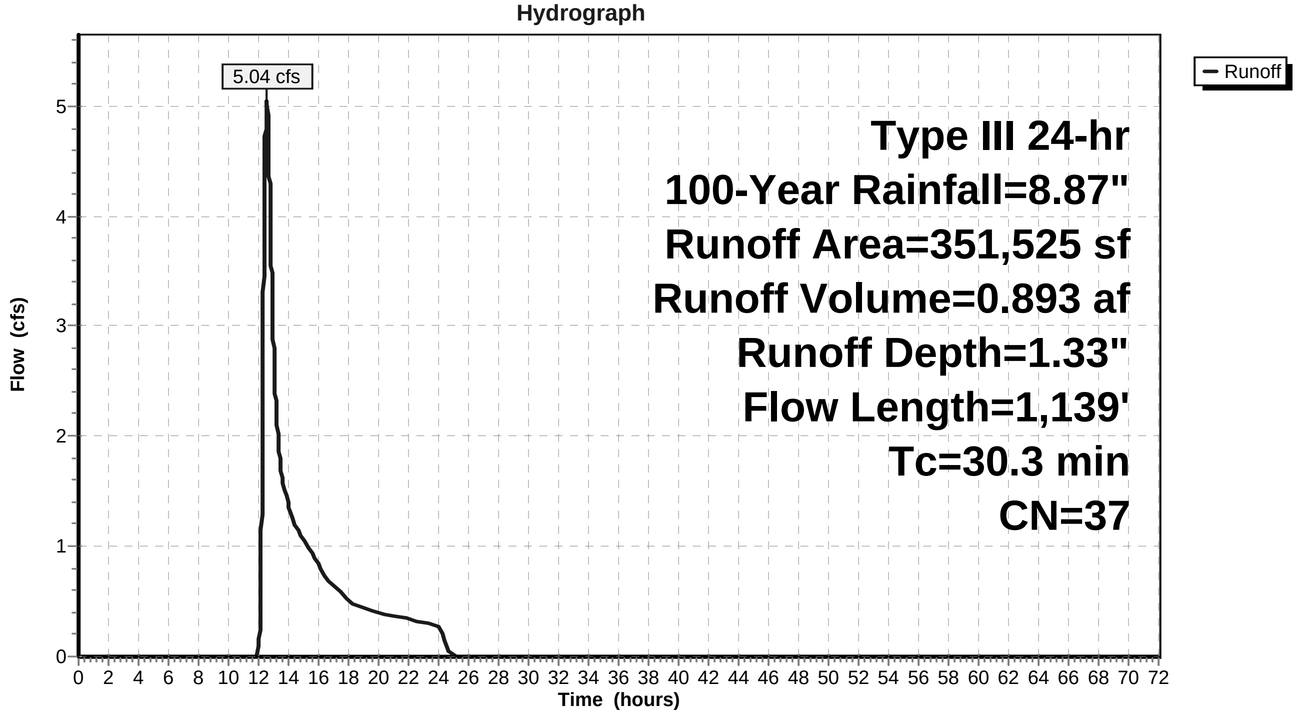
Runoff = 5.04 cfs @ 12.56 hrs, Volume= 0.893 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

Area (sf)	CN	Description
2,800	98	Roofs, HSG A
3,792	98	Paved parking, HSG A
114,707	30	Woods, Good, HSG A
230,226	39	>75% Grass cover, Good, HSG A
351,525	37	Weighted Average
344,933		98.12% Pervious Area
6,592		1.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
4.7	391	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.3	592	0.0520	0.57		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.9	106	0.0850	2.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
30.3	1,139	Total			

Subcatchment 5S: To Canton Ave



Summary for Subcatchment 6S: To Canton Ave

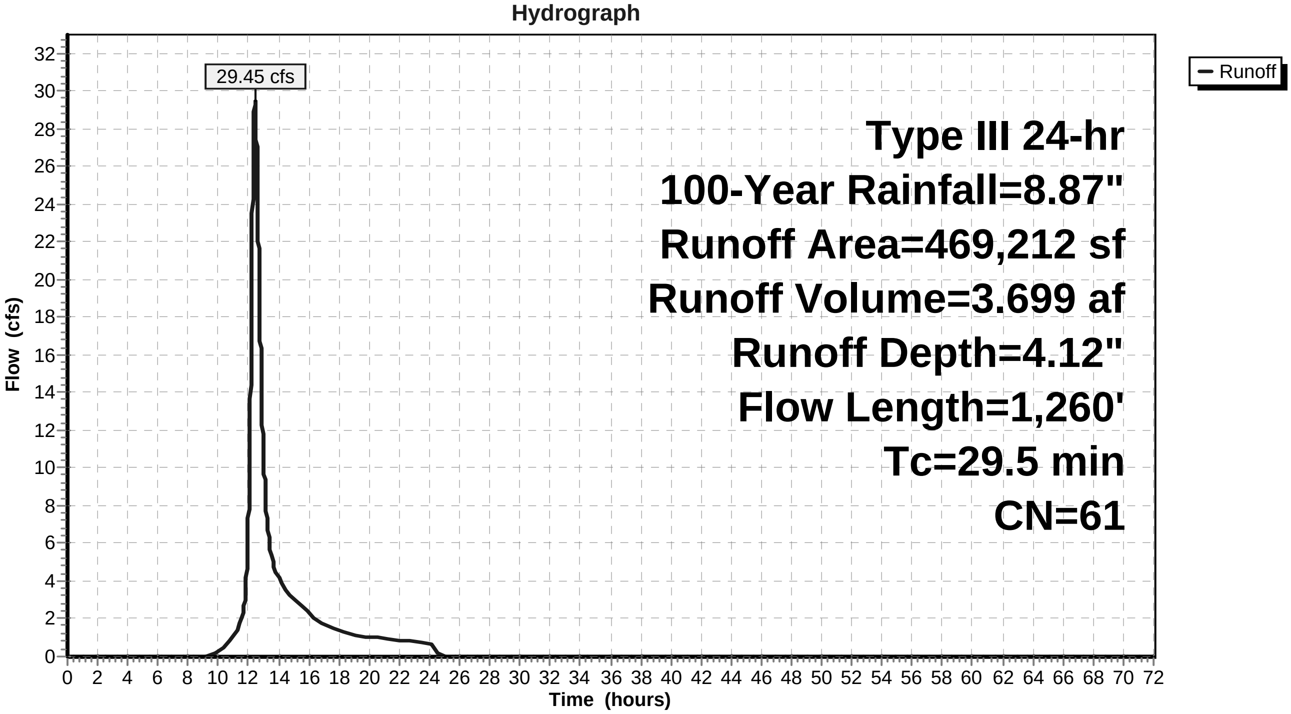
Runoff = 29.45 cfs @ 12.42 hrs, Volume= 3.699 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

Area (sf)	CN	Description
82,018	30	Woods, Good, HSG A
54,246	39	>75% Grass cover, Good, HSG A
155,461	70	Woods, Good, HSG C
52,059	74	>75% Grass cover, Good, HSG C
16,193	98	Paved parking, HSG C
6,948	98	Roofs, HSG C
5,851	98	Roofs, HSG A
25,151	98	Paved parking, HSG A
71,285	55	Woods, Good, HSG B
469,212	61	Weighted Average
415,069		88.46% Pervious Area
54,143		11.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
2.9	137	0.1000	0.79		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
3.5	365	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.7	708	0.0800	0.71		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
29.5	1,260	Total			

Subcatchment 6S: To Canton Ave



Summary for Subcatchment 7S: To Canton Ave

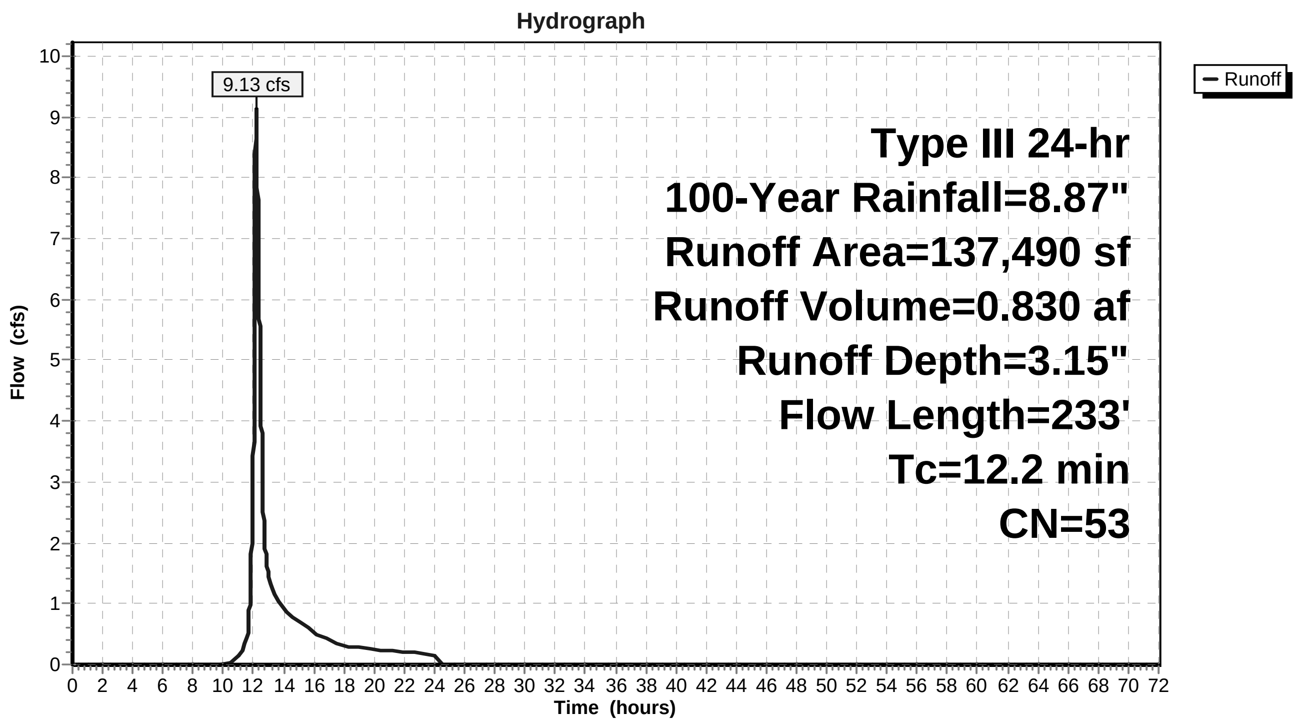
Runoff = 9.13 cfs @ 12.18 hrs, Volume= 0.830 af, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

Area (sf)	CN	Description
10,854	98	Roofs, HSG C
1,300	98	Roofs, HSG A
45,027	39	>75% Grass cover, Good, HSG A
19,832	74	>75% Grass cover, Good, HSG C
40,675	30	Woods, Good, HSG A
11,139	70	Woods, Good, HSG C
8,663	98	Paved parking, HSG A
137,490	53	Weighted Average
116,673		84.86% Pervious Area
20,817		15.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0750	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
5.0	183	0.0600	0.61		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
12.2	233	Total			

Subcatchment 7S: To Canton Ave



Summary for Subcatchment 8S: To Upper Stream

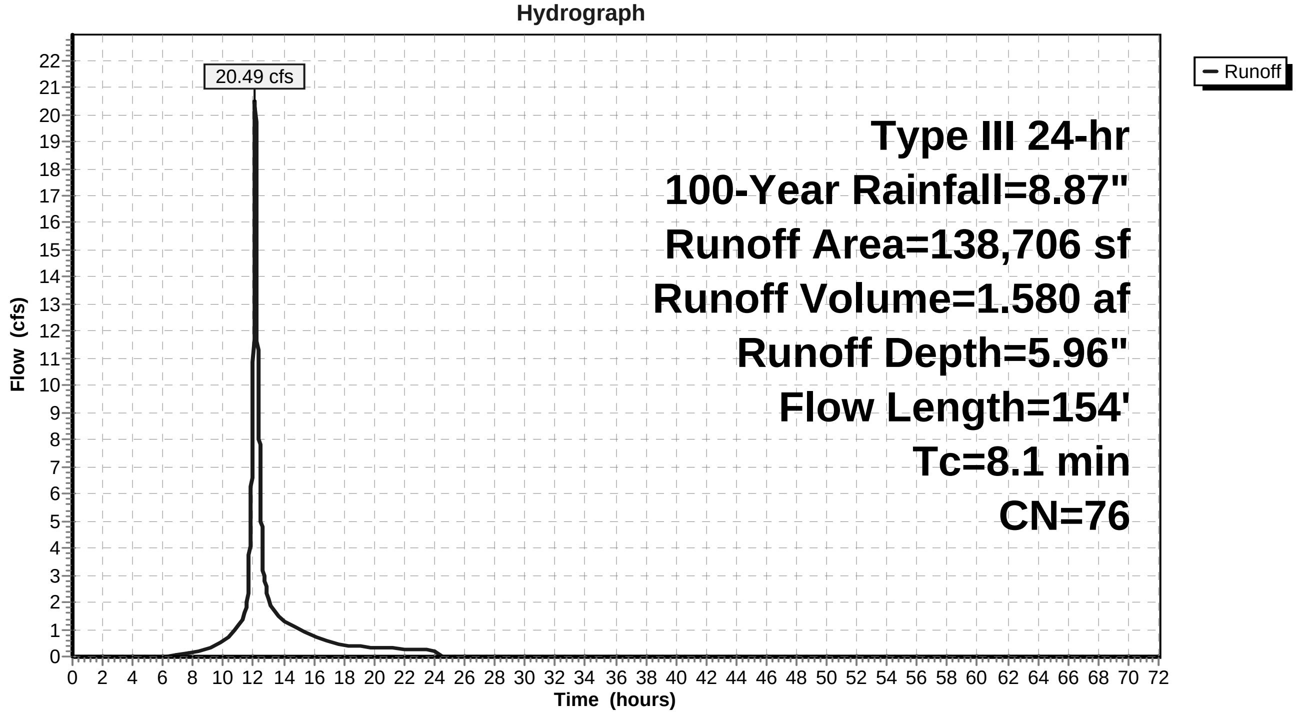
Runoff = 20.49 cfs @ 12.11 hrs, Volume= 1.580 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

	Area (sf)	CN	Description
	10,854	98	Roofs, HSG C
	56,850	70	Woods, Good, HSG C
	39,960	74	>75% Grass cover, Good, HSG C
	6,997	98	Roofs, HSG D
	13,257	80	>75% Grass cover, Good, HSG D
*	5,996	83	Wetland Stream Channel
	4,792	61	>75% Grass cover, Good, HSG B
	138,706	76	Weighted Average
	120,855		87.13% Pervious Area
	17,851		12.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
1.4	76	0.1310	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.3	28	0.3200	1.41		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
8.1	154	Total			

Subcatchment 8S: To Upper Stream



Summary for Subcatchment 9S: To Existing Pond

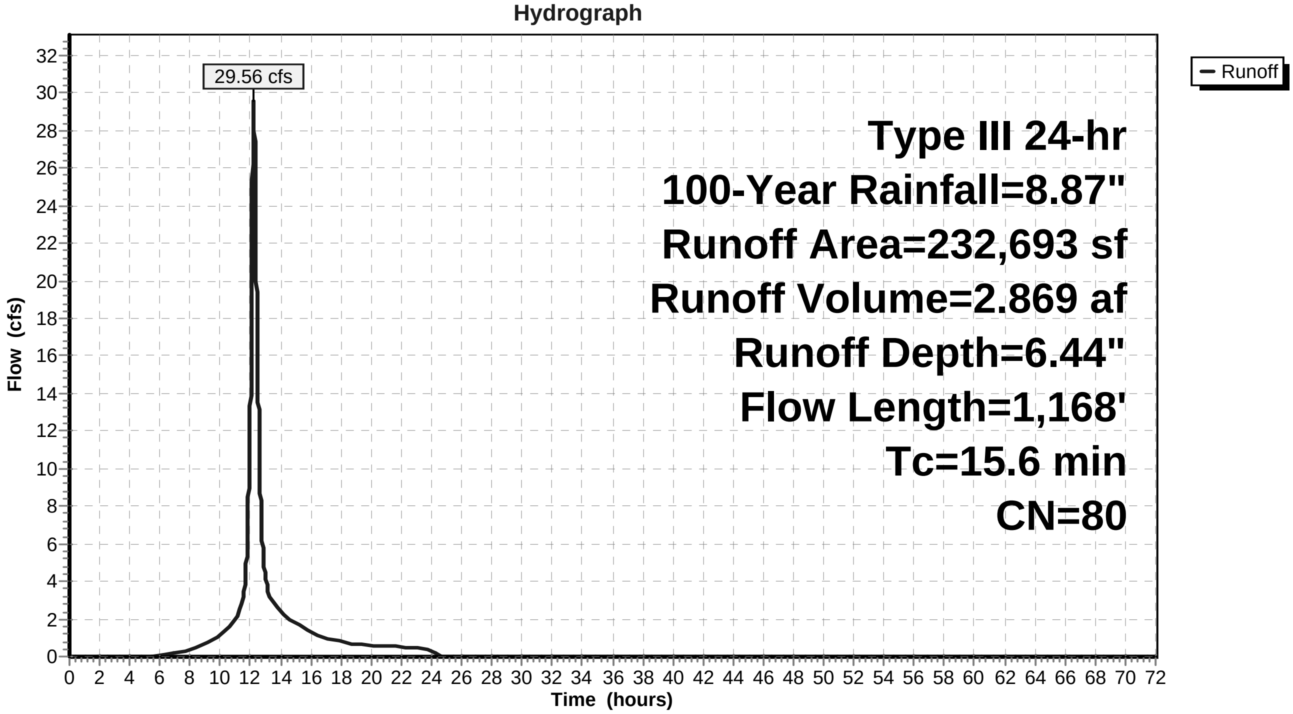
Runoff = 29.56 cfs @ 12.21 hrs, Volume= 2.869 af, Depth= 6.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

Area (sf)	CN	Description
51,672	98	Paved parking, HSG C
23,517	98	Roofs, HSG C
92,096	70	Woods, Good, HSG C
65,408	74	>75% Grass cover, Good, HSG C
232,693	80	Weighted Average
157,504		67.69% Pervious Area
75,189		32.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
4.5	180	0.0720	0.67		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.9	230	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	708	0.0800	12.83	10.08	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
15.6	1,168	Total			

Subcatchment 9S: To Existing Pond



Summary for Subcatchment 10S: To Canton Ave

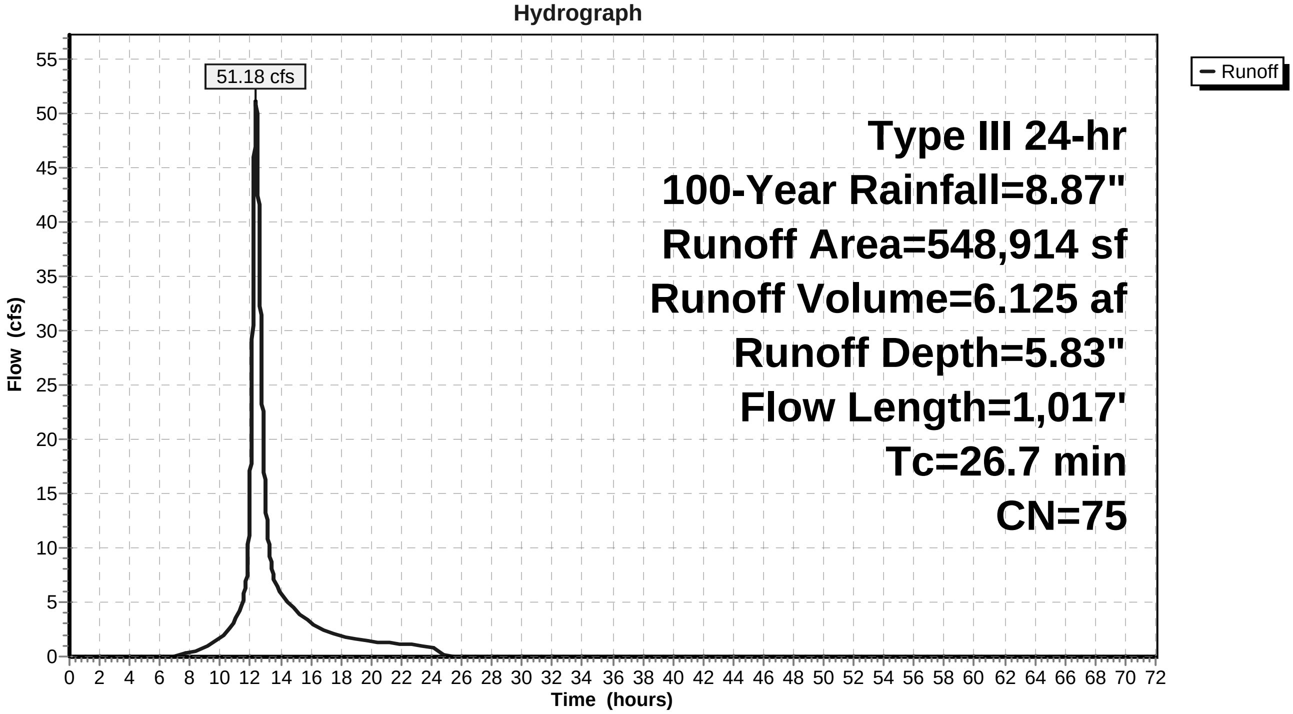
Runoff = 51.18 cfs @ 12.37 hrs, Volume= 6.125 af, Depth= 5.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

Area (sf)	CN	Description
1,375	98	Roofs, HSG A
1,811	39	>75% Grass cover, Good, HSG A
126,272	55	Woods, Good, HSG B
25,692	98	Paved parking, HSG D
19,296	98	Roofs, HSG D
34,183	80	>75% Grass cover, Good, HSG D
33,768	98	Roofs, HSG C
53,608	98	Paved parking, HSG C
121,146	70	Woods, Good, HSG C
129,363	74	>75% Grass cover, Good, HSG C
2,400	96	Gravel surface, HSG C
548,914	75	Weighted Average
415,175		75.64% Pervious Area
133,739		24.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
10.1	544	0.1300	0.90		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.3	246	0.0650	1.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.0	177	0.0560	0.59		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
26.7	1,017	Total			

Subcatchment 10S: To Canton Ave



Summary for Subcatchment 11S: To Canton Ave

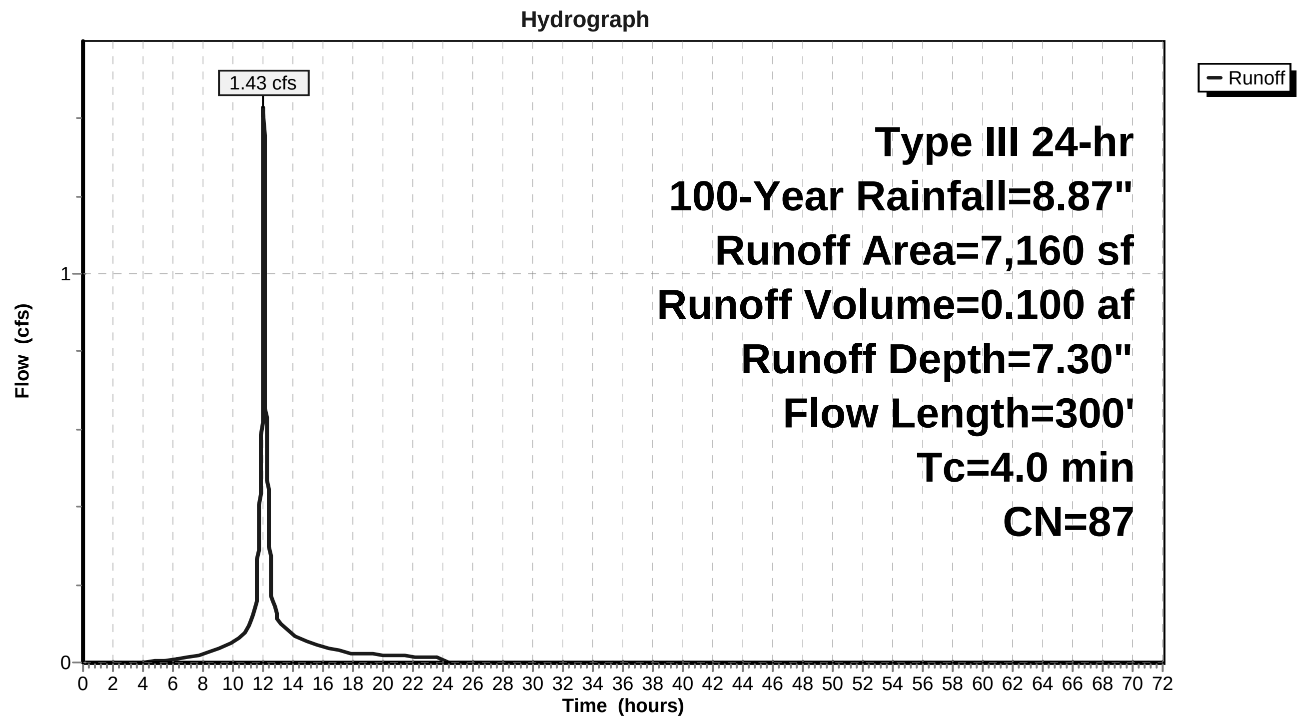
Runoff = 1.43 cfs @ 12.06 hrs, Volume= 0.100 af, Depth= 7.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.87"

Area (sf)	CN	Description
5,800	98	Paved parking, HSG A
1,360	39	>75% Grass cover, Good, HSG A
7,160	87	Weighted Average
1,360		18.99% Pervious Area
5,800		81.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	25	0.0800	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.26"
1.3	275	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.0	300	Total			

Subcatchment 11S: To Canton Ave



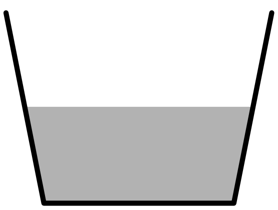
Summary for Reach 1R: Upper Stream Channel

Inflow Area = 44.817 ac, 0.91% Impervious, Inflow Depth = 5.16" for 100-Year event
Inflow = 68.87 cfs @ 13.49 hrs, Volume= 19.268 af
Outflow = 68.86 cfs @ 13.50 hrs, Volume= 19.268 af, Atten= 0%, Lag= 0.3 min

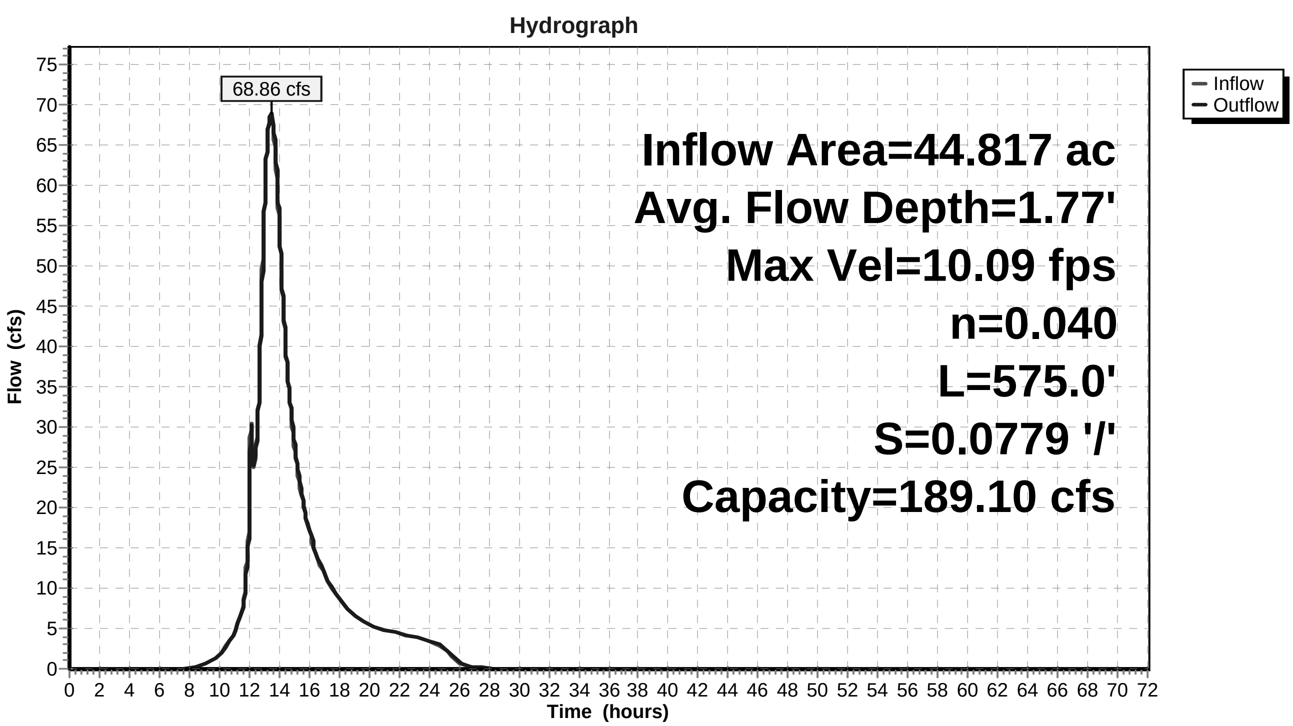
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.09 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 4.07 fps, Avg. Travel Time= 2.4 min

Peak Storage= 3,924 cf @ 13.50 hrs
Average Depth at Peak Storage= 1.77'
Bank-Full Depth= 3.50' Flow Area= 14.7 sf, Capacity= 189.10 cfs

3.50' x 3.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 0.2 '/' Top Width= 4.90'
Length= 575.0' Slope= 0.0779 '/'
Inlet Invert= 252.80', Outlet Invert= 208.00'



Reach 1R: Upper Stream Channel



Summary for Reach DP1: Lower Stream Channel

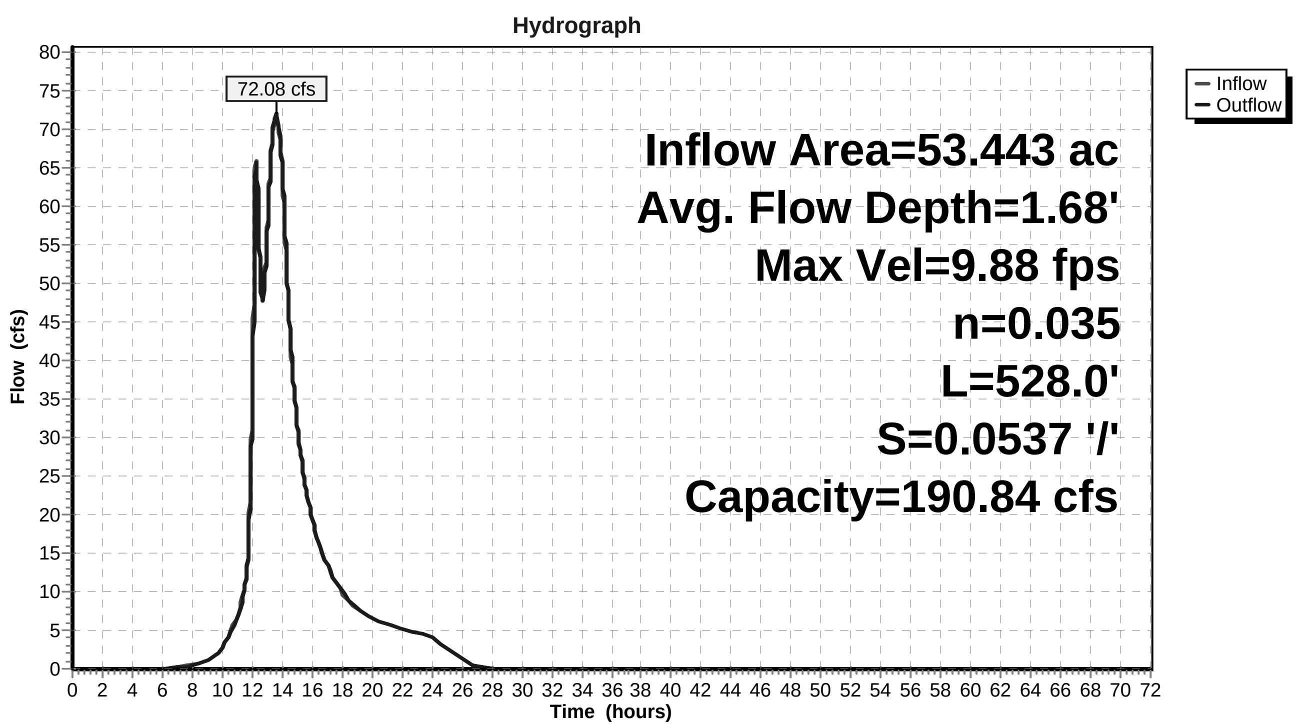
Inflow Area = 53.443 ac, 4.00% Impervious, Inflow Depth = 5.27" for 100-Year event
Inflow = 72.09 cfs @ 13.60 hrs, Volume= 23.456 af
Outflow = 72.08 cfs @ 13.61 hrs, Volume= 23.456 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.88 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 4.03 fps, Avg. Travel Time= 2.2 min

Peak Storage= 3,853 cf @ 13.61 hrs
Average Depth at Peak Storage= 1.68'
Bank-Full Depth= 3.00' Flow Area= 15.0 sf, Capacity= 190.84 cfs

3.50' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 0.5 '/' Top Width= 6.50'
Length= 528.0' Slope= 0.0537 '/'
Inlet Invert= 187.50', Outlet Invert= 159.12'

Reach DP1: Lower Stream Channel

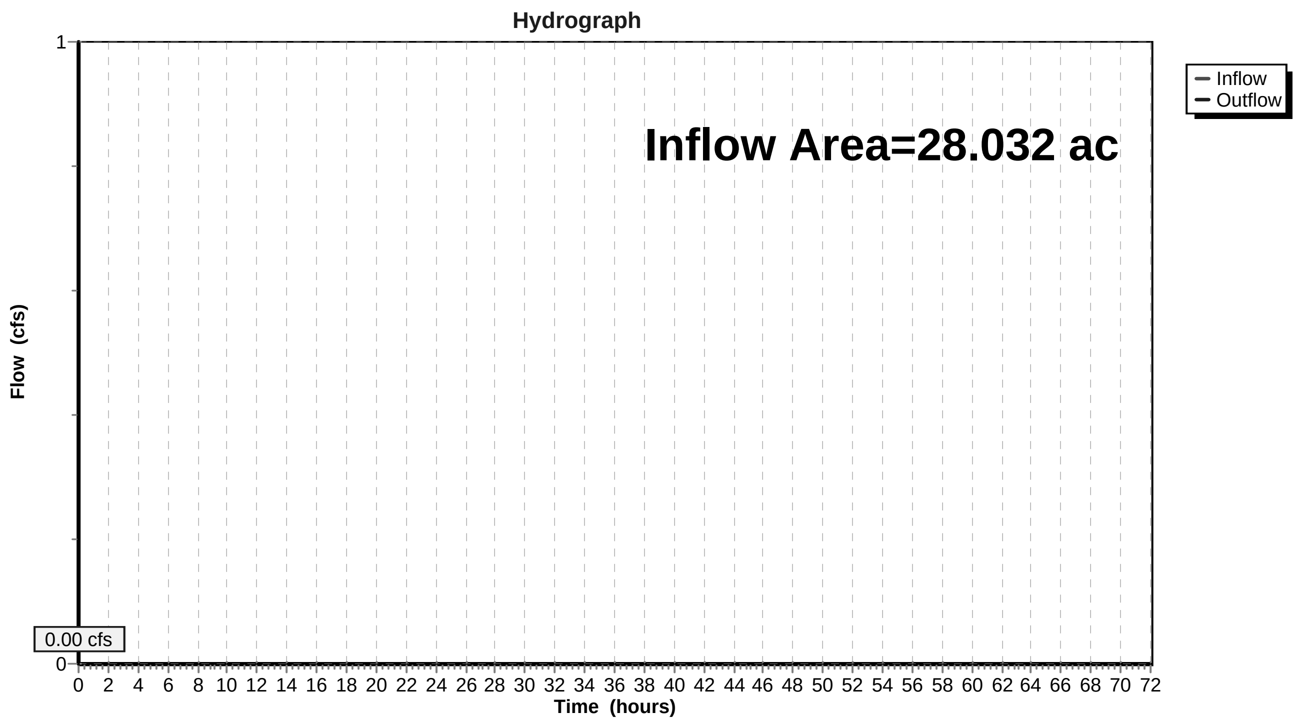


Summary for Reach DP2: Canton Ave

Inflow Area = 28.032 ac, 16.61% Impervious, Inflow Depth = 0.00" for 100-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP2: Canton Ave

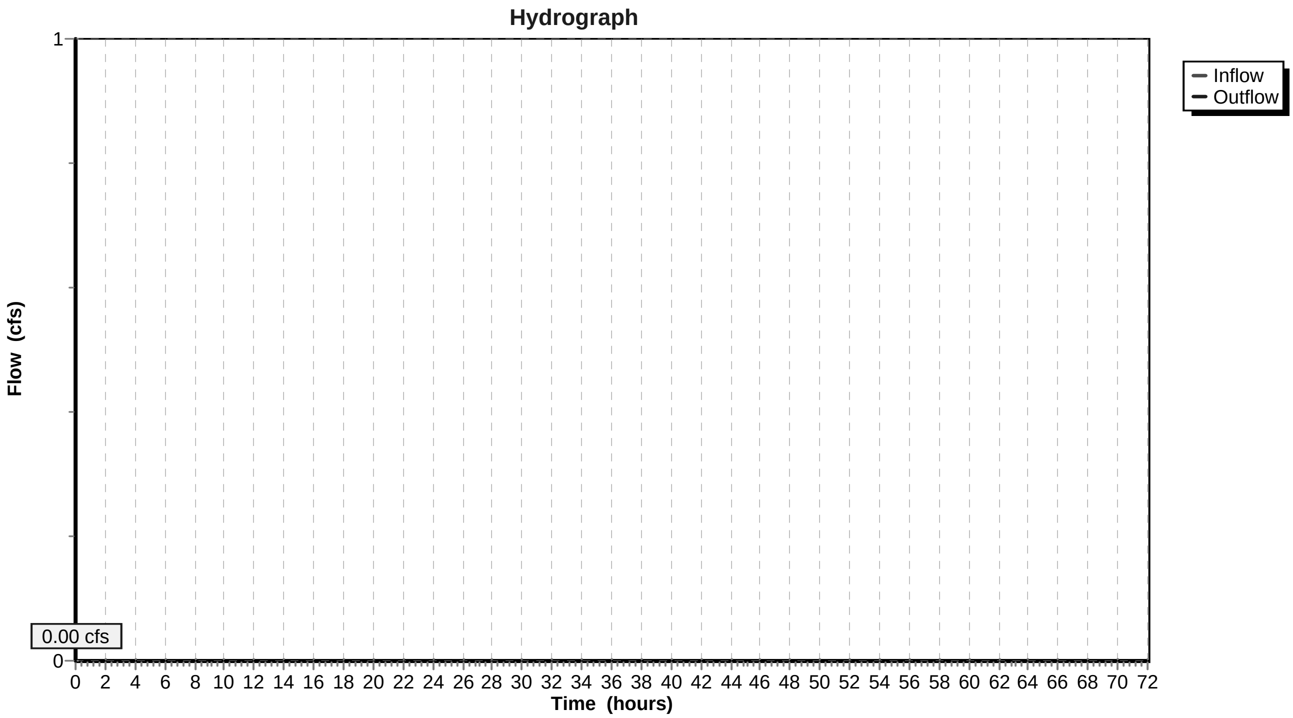


Summary for Reach DP3: Canton Ave

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af	
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach DP3: Canton Ave



Summary for Pond 1P: 48" Box Culvert

Inflow Area = 44.817 ac, 0.91% Impervious, Inflow Depth = 5.16" for 100-Year event
Inflow = 68.86 cfs @ 13.50 hrs, Volume= 19.268 af
Outflow = 68.85 cfs @ 13.51 hrs, Volume= 19.266 af, Atten= 0%, Lag= 0.5 min
Primary = 68.85 cfs @ 13.51 hrs, Volume= 19.266 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 203.45' @ 13.51 hrs Surf.Area= 1,376 sf Storage= 2,001 cf

Plug-Flow detention time= 0.7 min calculated for 19.266 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (910.1 - 909.7)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	19,230 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

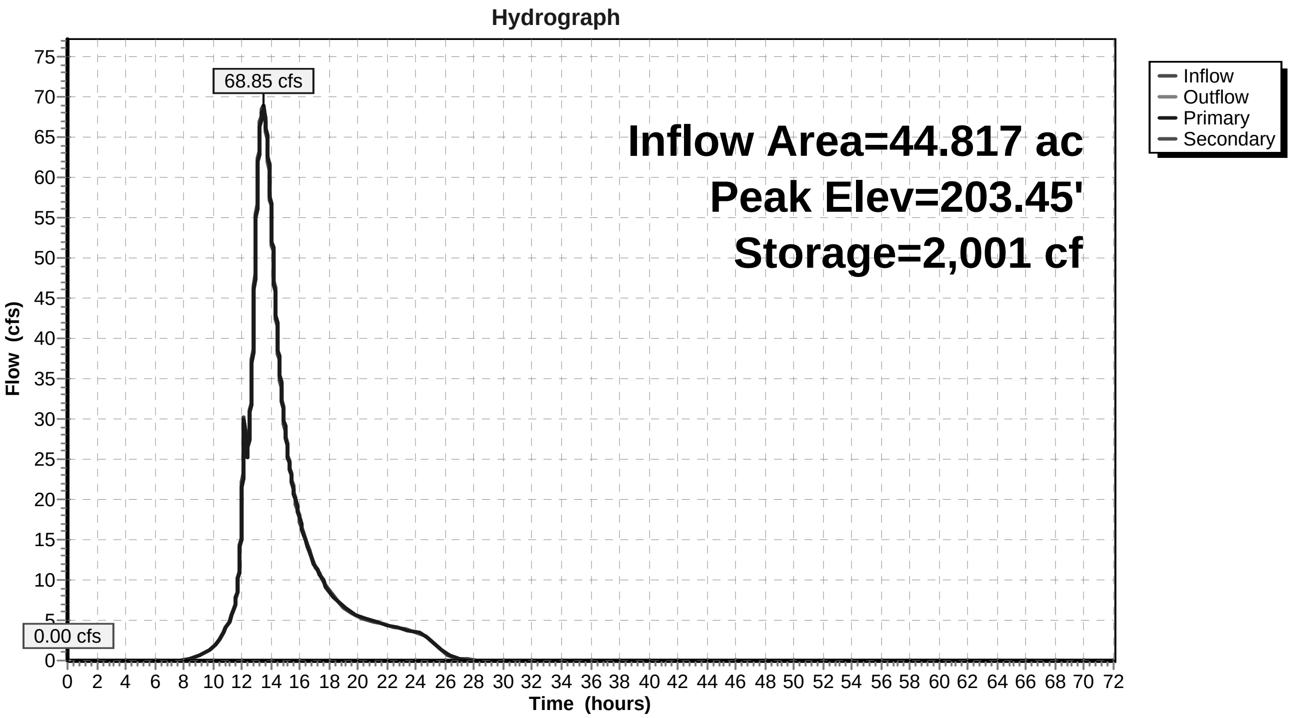
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
200.00	200	0	0
202.00	464	664	664
204.00	1,719	2,183	2,847
206.00	3,867	5,586	8,433
208.00	6,930	10,797	19,230

Device	Routing	Invert	Outlet Devices
#1	Primary	200.39'	**48.0" W x 48.0" H Box Culvert** L= 38.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.39' / 198.47' S= 0.0505 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 16.00 sf
#2	Secondary	206.50'	**30.0' long x 26.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=68.84 cfs @ 13.51 hrs HW=203.45' TW=194.72' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 68.84 cfs @ 5.62 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=200.00' TW=187.82' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: 48" Box Culvert



Summary for Pond 2P: Existing Farm Pond

Inflow Area = 50.727 ac, 4.21% Impervious, Inflow Depth = 5.28" for 100-Year event
Inflow = 72.02 cfs @ 13.50 hrs, Volume= 22.330 af
Outflow = 70.80 cfs @ 13.60 hrs, Volume= 22.330 af, Atten= 2%, Lag= 6.0 min
Primary = 70.80 cfs @ 13.60 hrs, Volume= 22.330 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 194.77' @ 13.60 hrs Surf.Area= 5,403 sf Storage= 17,962 cf

Plug-Flow detention time= 3.9 min calculated for 22.327 af (100% of inflow)
Center-of-Mass det. time= 3.9 min (900.3 - 896.4)

Volume	Invert	Avail.Storage	Storage Description
#1	187.82'	54,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

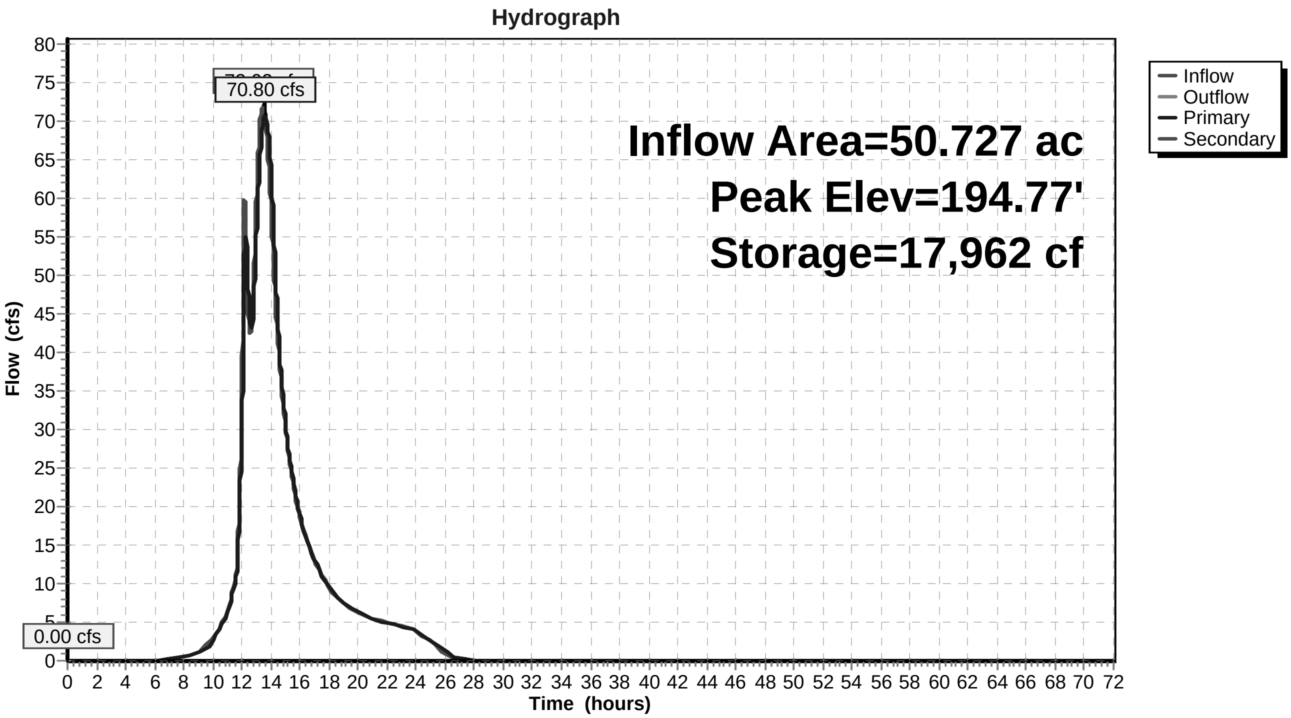
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.82	83	0	0
188.00	240	29	29
189.00	696	468	497
190.00	920	808	1,305
191.00	2,569	1,745	3,050
192.00	3,287	2,928	5,978
193.00	3,988	3,638	9,615
194.00	4,817	4,403	14,018
195.00	5,576	5,197	19,214
196.00	6,406	5,991	25,205
197.00	7,279	6,843	32,048
198.00	8,234	7,757	39,804
199.00	9,230	8,732	48,536
199.60	9,786	5,705	54,241

Device	Routing	Invert	Outlet Devices
#1	Primary	187.68'	**27.0" W x 42.0" H Box Culvert** L= 1.5' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.68' / 187.66' S= 0.0133 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 7.88 sf
#2	Device 1	187.71'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.75 2.50 2.50 3.50 Width (feet) 0.75 0.00 0.00 3.50 10.29
#3	Device 2	187.76'	**30.0" W x 48.0" H Box Culvert** L= 2.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 187.76' / 187.73' S= 0.0150 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 10.00 sf
#4	Secondary	197.90'	**18.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=70.80 cfs @ 13.60 hrs HW=194.77' TW=189.18' (Dynamic Tailwater)
└─**1=Culvert** (Passes 70.80 cfs of 74.79 cfs potential flow)
  └─**2=Custom Weir/Orifice** (Orifice Controls 70.80 cfs @ 9.87 fps)
    └─**3=Culvert** (Passes 70.80 cfs of 92.28 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.82' TW=187.50' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Existing Farm Pond



Summary for Pond 3P: Existing Depression

Inflow Area =	28.032 ac,	16.61% Impervious,	Inflow Depth = 0.66"	for 100-Year event	
Inflow =	14.74 cfs @	12.14 hrs,	Volume=	1.542 af	
Outflow =	9.72 cfs @	12.29 hrs,	Volume=	1.542 af,	Atten= 34%, Lag= 8.9 min
Discarded =	9.72 cfs @	12.29 hrs,	Volume=	1.542 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 154.30' @ 12.29 hrs Surf.Area= 6,223 sf Storage= 5,442 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.8 min (842.2 - 837.4)

Volume	Invert	Avail.Storage	Storage Description
#1	152.50'	20,003 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

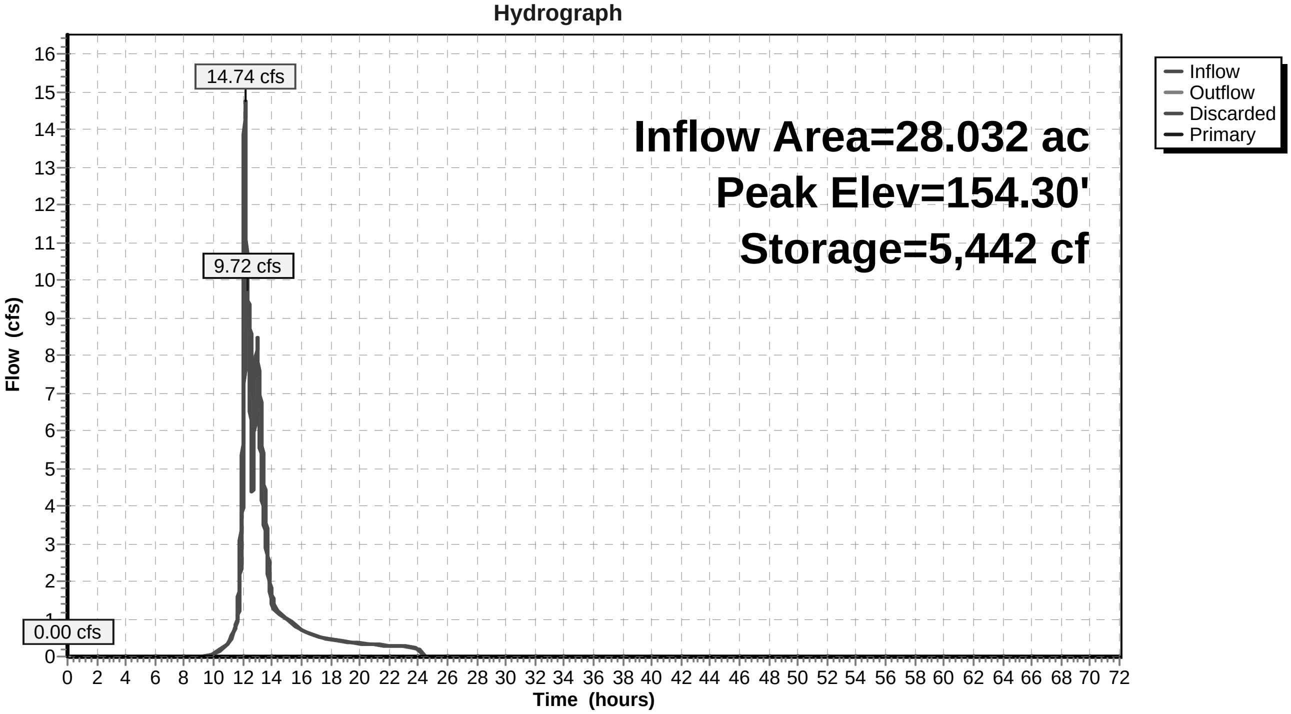
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
152.50	568	0	0
153.00	1,156	431	431
154.00	5,426	3,291	3,722
155.00	8,124	6,775	10,497
156.00	10,888	9,506	20,003

Device	Routing	Invert	Outlet Devices
#1	Discarded	152.50'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 146.20'
#2	Primary	155.50'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=9.72 cfs @ 12.29 hrs HW=154.30' (Free Discharge)
1=Exfiltration (Controls 9.72 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=152.50' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 3P: Existing Depression



Summary for Pond 4P: Existing Depression

Inflow Area =	23.992 ac,	15.97% Impervious,	Inflow Depth = 0.71"	for 100-Year event	
Inflow =	10.91 cfs @	12.98 hrs,	Volume=	1.414 af	
Outflow =	10.87 cfs @	12.99 hrs,	Volume=	1.414 af,	Atten= 0%, Lag= 0.9 min
Discarded =	4.39 cfs @	12.99 hrs,	Volume=	1.096 af	
Primary =	6.49 cfs @	12.99 hrs,	Volume=	0.318 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 157.63' @ 12.99 hrs Surf.Area= 2,962 sf Storage= 1,360 cf

Plug-Flow detention time= 2.5 min calculated for 1.414 af (100% of inflow)
Center-of-Mass det. time= 2.5 min (886.4 - 883.9)

Volume	Invert	Avail.Storage	Storage Description
#1	156.60'	2,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

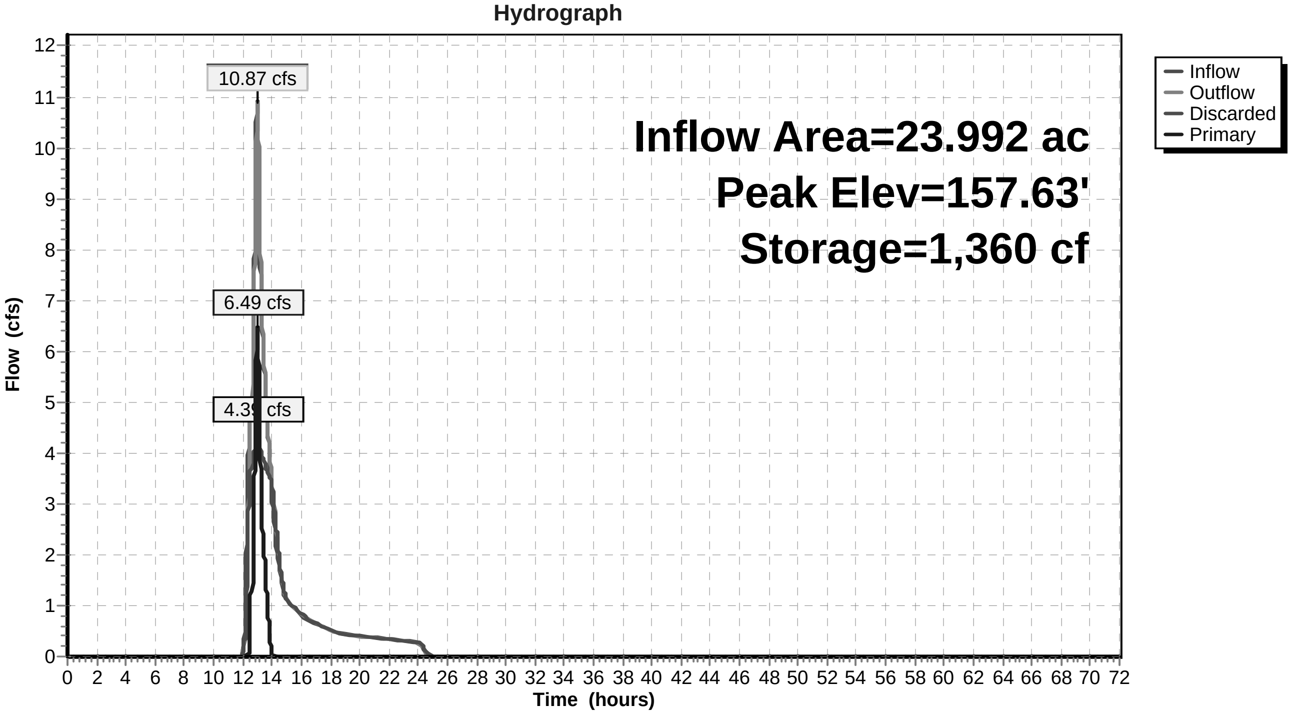
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
156.60	221	0	0
157.00	737	192	192
158.00	4,257	2,497	2,689

Device	Routing	Invert	Outlet Devices
#1	Discarded	156.60'	**60.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 150.20'
#2	Primary	157.44'	**30.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=4.39 cfs @ 12.99 hrs HW=157.63' (Free Discharge)
└─**1=Exfiltration** (Controls 4.39 cfs)

Primary OutFlow Max=6.48 cfs @ 12.99 hrs HW=157.63' TW=153.82' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 6.48 cfs @ 1.13 fps)

Pond 4P: Existing Depression



Summary for Pond 5P: Bio Retention area

Inflow Area =	3.156 ac,	15.14% Impervious,	Inflow Depth = 3.15"	for 100-Year event	
Inflow =	9.13 cfs @	12.18 hrs,	Volume=	0.830 af	
Outflow =	4.68 cfs @	12.47 hrs,	Volume=	0.830 af,	Atten= 49%, Lag= 17.5 min
Discarded =	0.59 cfs @	12.47 hrs,	Volume=	0.503 af	
Primary =	4.09 cfs @	12.47 hrs,	Volume=	0.326 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 218.49' @ 12.47 hrs Surf.Area= 8,781 sf Storage= 9,529 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 109.5 min (971.5 - 862.1)

Volume	Invert	Avail.Storage	Storage Description
#1	217.00'	14,362 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

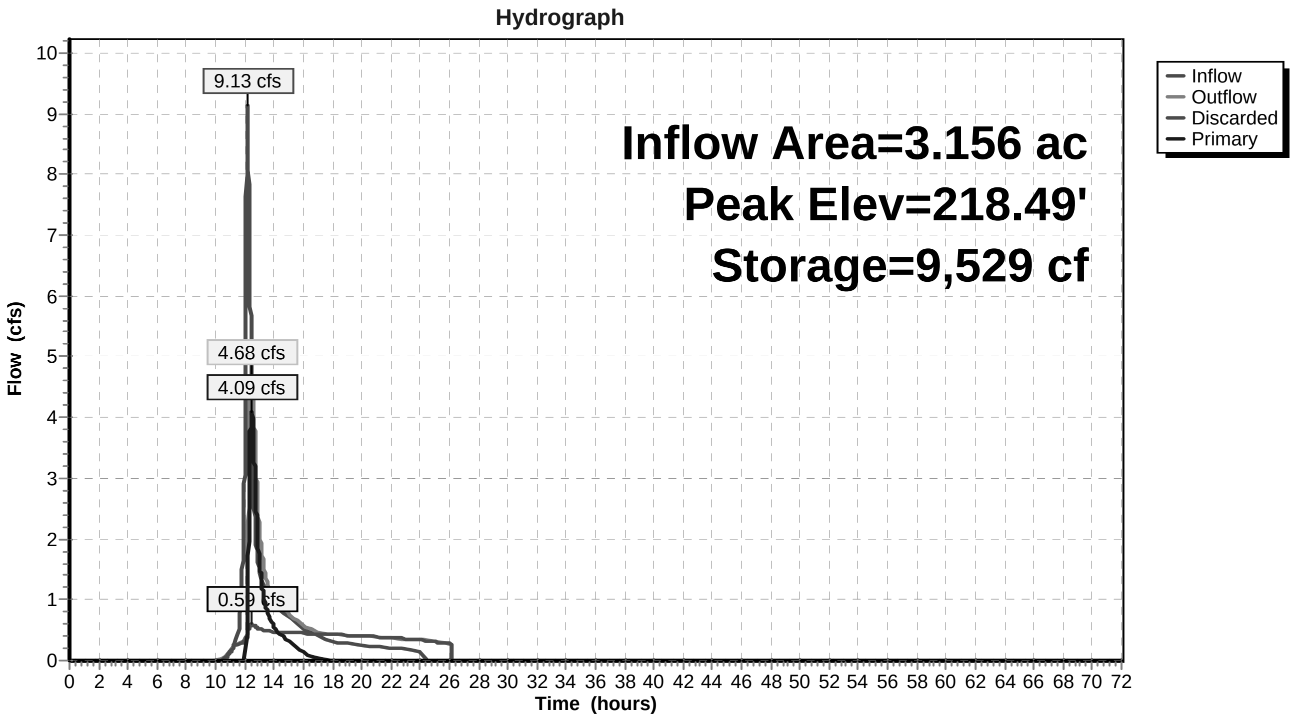
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
217.00	4,844	0	0
218.00	6,617	5,731	5,731
218.50	8,810	3,857	9,587
219.00	10,289	4,775	14,362

Device	Routing	Invert	Outlet Devices
#1	Discarded	217.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 212.00'
#2	Primary	214.55'	**12.0" Round Culvert** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.55' / 213.41' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	218.00'	**3.5' long x 1.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.59 cfs @ 12.47 hrs HW=218.49' (Free Discharge)
└─**1=Exfiltration** (Controls 0.59 cfs)

Primary OutFlow Max=4.09 cfs @ 12.47 hrs HW=218.49' TW=213.78' (Dynamic Tailwater)
└─**2=Culvert** (Passes 4.09 cfs of 7.02 cfs potential flow)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 4.09 cfs @ 2.44 fps)

Pond 5P: Bio Retention area



Summary for Pond 6P: Subsurface Chamber System

Inflow Area = 15.758 ac, 22.52% Impervious, Inflow Depth = 4.91" for 100-Year event
Inflow = 54.88 cfs @ 12.37 hrs, Volume= 6.452 af
Outflow = 46.03 cfs @ 12.54 hrs, Volume= 6.452 af, Atten= 16%, Lag= 9.8 min
Discarded = 6.35 cfs @ 12.54 hrs, Volume= 3.718 af
Primary = 39.68 cfs @ 12.54 hrs, Volume= 2.734 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 213.88' @ 12.54 hrs Surf.Area= 16,762 sf Storage= 56,872 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 34.8 min (862.2 - 827.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	208.50'	23,012 cf	**87.25'W x 192.12'L x 5.50'H Field A** 92,194 cf Overall - 34,663 cf Embedded = 57,531 cf x 40.0% Voids
#2A	209.25'	34,663 cf	**ADS_StormTech MC-3500 d +Cap** x 312 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 12 Rows of 26 Chambers Cap Storage= +14.9 cf x 2 x 12 rows = 357.6 cf
		57,675 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	208.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 203.00'
#2	Primary	206.00'	**24.0" Round Culvert** L= 120.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 206.00' / 200.00' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	212.00'	**4.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)
#4	Device 2	209.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=6.35 cfs @ 12.54 hrs HW=213.88' (Free Discharge)
└─**1=Exfiltration** (Controls 6.35 cfs)

Primary OutFlow Max=39.68 cfs @ 12.54 hrs HW=213.88' TW=195.96' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 39.68 cfs @ 12.63 fps)
  ├─**3=Sharp-Crested Vee/Trap Weir** (Passes < 33.76 cfs potential flow)
  └─**4=Orifice/Grate** (Passes < 7.45 cfs potential flow)

Pond 6P: Subsurface Chamber System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 12 rows = 357.6 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

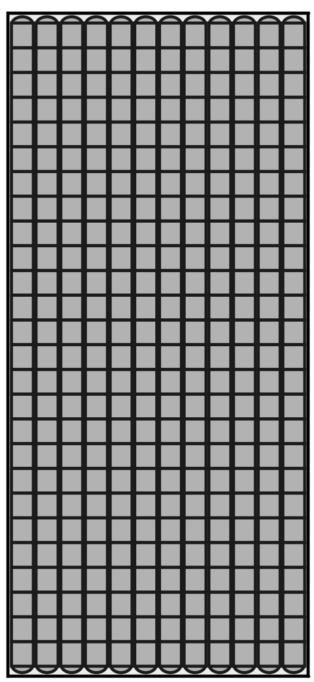
26 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 190.12' Row Length +12.0" End Stone x 2 = 192.12' Base Length
12 Rows x 77.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 87.25' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

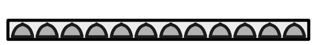
312 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 12 Rows = 34,662.6 cf Chamber Storage

92,193.6 cf Field - 34,662.6 cf Chambers = 57,531.0 cf Stone x 40.0% Voids = 23,012.4 cf Stone Storage

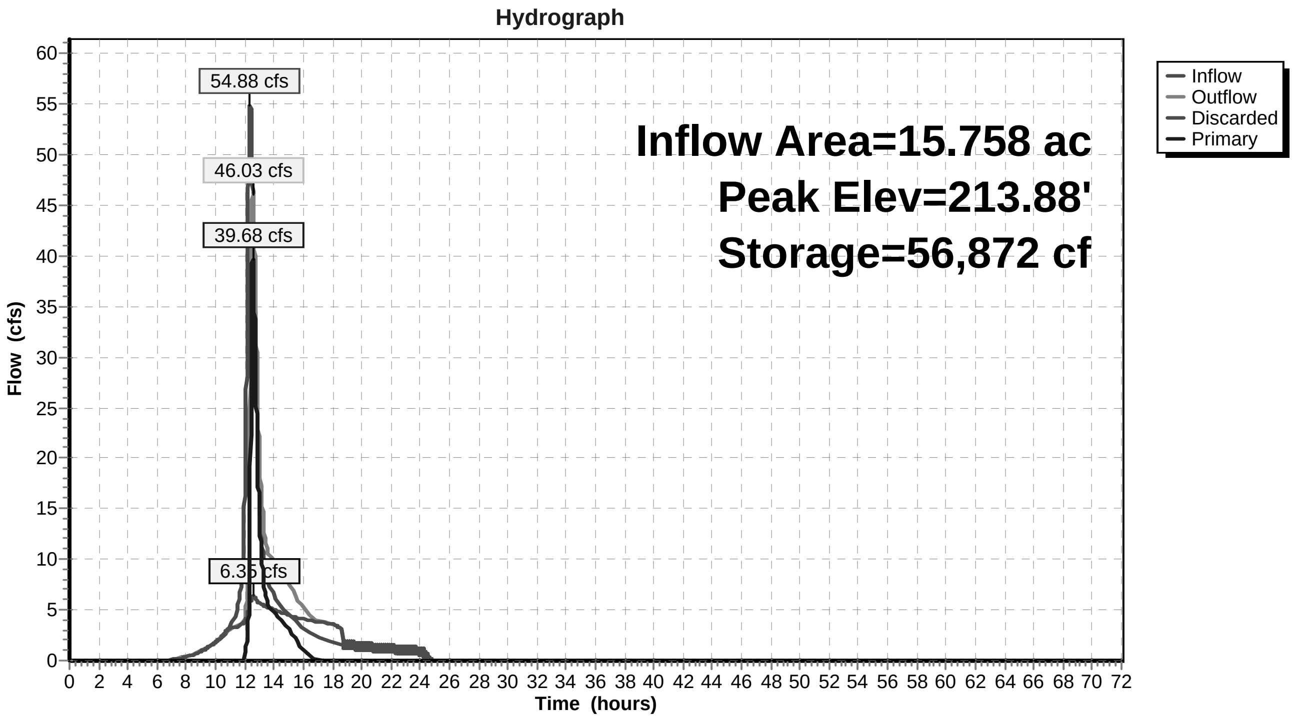
Chamber Storage + Stone Storage = 57,675.0 cf = 1.324 af
Overall Storage Efficiency = 62.6%
Overall System Size = 192.12' x 87.25' x 5.50'

312 Chambers
3,414.6 cy Field
2,130.8 cy Stone





Pond 6P: Subsurface Chamber System



Summary for Pond 7P: Subsurface Chamber System

Inflow Area = 15.758 ac, 22.52% Impervious, Inflow Depth = 2.08" for 100-Year event
Inflow = 39.68 cfs @ 12.54 hrs, Volume= 2.734 af
Outflow = 14.63 cfs @ 12.99 hrs, Volume= 2.734 af, Atten= 63%, Lag= 27.4 min
Discarded = 6.61 cfs @ 12.99 hrs, Volume= 2.213 af
Primary = 8.02 cfs @ 12.99 hrs, Volume= 0.521 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 199.36' @ 12.99 hrs Surf.Area= 14,754 sf Storage= 49,892 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 75.2 min (869.5 - 794.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	194.00'	20,298 cf	**94.42'W x 156.27'L x 5.50'H Field A** 81,150 cf Overall - 30,404 cf Embedded = 50,745 cf x 40.0% Voids
#2A	194.75'	30,404 cf	**ADS_StormTech MC-3500 d +Cap** x 273 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 13 Rows of 21 Chambers Cap Storage= +14.9 cf x 2 x 13 rows = 387.4 cf
		50,702 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	194.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 190.00'
#2	Primary	197.00'	**18.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 197.00' / 196.60' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	197.00'	**12.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	199.00'	**4.0' long x 1.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=6.61 cfs @ 12.99 hrs HW=199.36' (Free Discharge)
└─**1=Exfiltration** (Controls 6.61 cfs)

Primary OutFlow Max=8.02 cfs @ 12.99 hrs HW=199.36' TW=157.63' (Dynamic Tailwater)
└─**2=Culvert** (Passes 8.02 cfs of 10.80 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 5.16 cfs @ 6.57 fps)
  └─**4=Sharp-Crested Vee/Trap Weir** (Weir Controls 2.86 cfs @ 1.97 fps)

Pond 7P: Subsurface Chamber System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 13 rows = 387.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

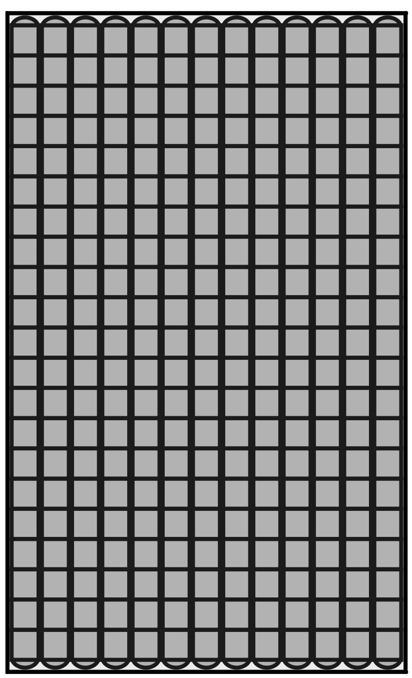
21 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 154.27' Row Length +12.0" End Stone x 2 = 156.27' Base Length
13 Rows x 77.0" Wide + 9.0" Spacing x 12 + 12.0" Side Stone x 2 = 94.42' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

273 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 13 Rows = 30,404.3 cf Chamber Storage

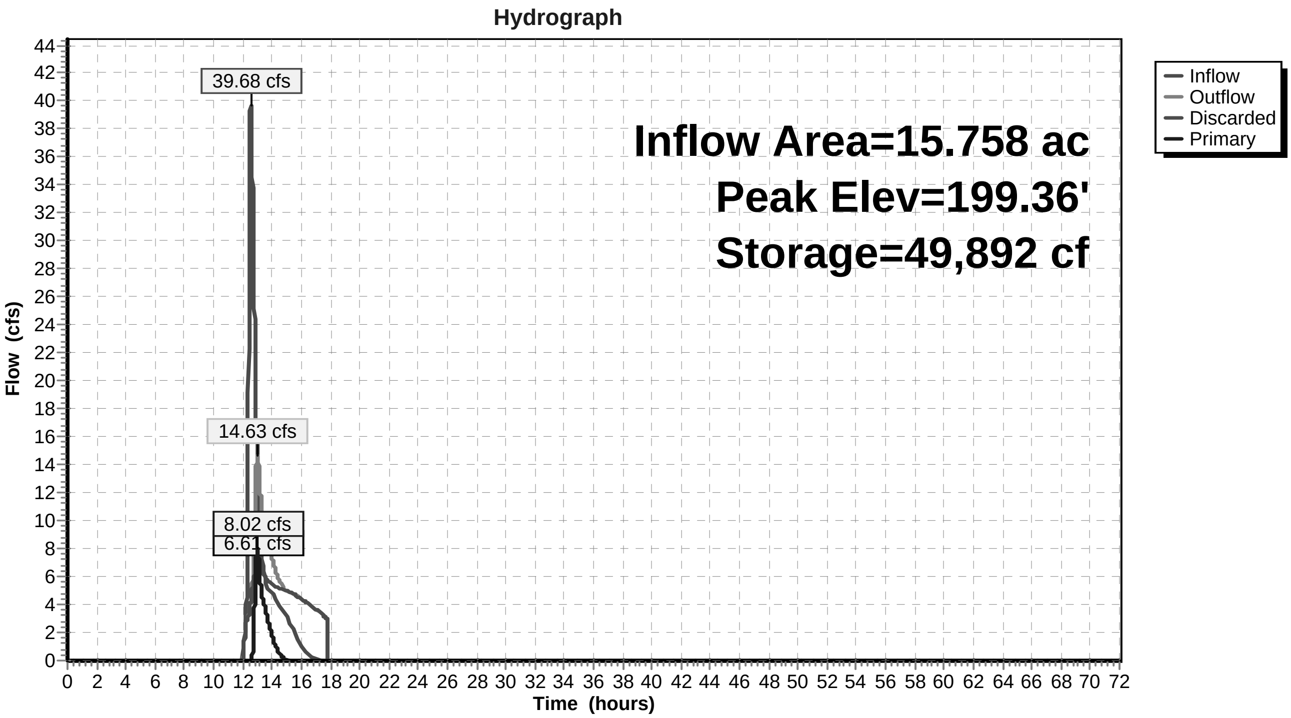
81,149.7 cf Field - 30,404.3 cf Chambers = 50,745.4 cf Stone x 40.0% Voids = 20,298.2 cf Stone Storage

Chamber Storage + Stone Storage = 50,702.5 cf = 1.164 af
Overall Storage Efficiency = 62.5%
Overall System Size = 156.27' x 94.42' x 5.50'

273 Chambers
3,005.5 cy Field
1,879.5 cy Stone



Pond 7P: Subsurface Chamber System



Summary for Pond 8P: Infiltration Basin

Inflow Area = 10.772 ac, 11.54% Impervious, Inflow Depth = 4.12" for 100-Year event
Inflow = 29.45 cfs @ 12.42 hrs, Volume= 3.699 af
Outflow = 6.27 cfs @ 13.35 hrs, Volume= 3.699 af, Atten= 79%, Lag= 55.5 min
Discarded = 6.27 cfs @ 13.35 hrs, Volume= 3.699 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 199.44' @ 13.35 hrs Surf.Area= 21,747 sf Storage= 62,222 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 115.7 min (976.2 - 860.5)

Volume	Invert	Avail.Storage	Storage Description
#1	195.00'	100,696 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

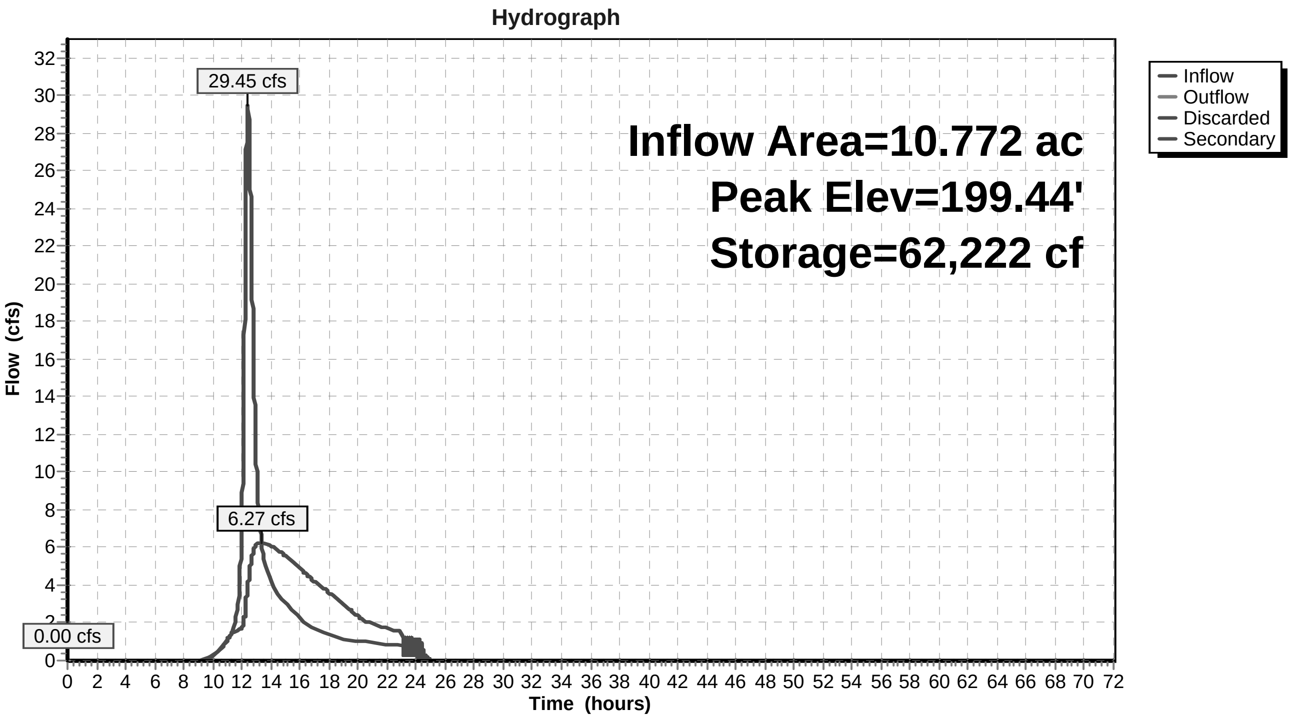
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
195.00	7,783	0	0
196.00	9,185	8,484	8,484
197.00	13,503	11,344	19,828
198.00	16,254	14,879	34,707
199.00	20,337	18,296	53,002
200.00	23,556	21,947	74,949
201.00	27,938	25,747	100,696

Device	Routing	Invert	Outlet Devices
#1	Discarded	195.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 190.00'
#2	Secondary	200.00'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=6.27 cfs @ 13.35 hrs HW=199.44' (Free Discharge)
↑—**1=Exfiltration** (Controls 6.27 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=195.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Infiltration Basin



Summary for Pond 9P: Subsurface Chamber System

Inflow Area =	0.164 ac, 81.01% Impervious, Inflow Depth = 7.30" for 100-Year event				
Inflow =	1.43 cfs @	12.06 hrs,	Volume=	0.100 af	
Outflow =	0.24 cfs @	12.51 hrs,	Volume=	0.100 af,	Atten= 84%, Lag= 27.0 min
Discarded =	0.24 cfs @	12.51 hrs,	Volume=	0.100 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 196.74' @ 12.51 hrs Surf.Area= 730 sf Storage= 1,291 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 38.0 min (817.8 - 779.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	194.00'	691 cf	**15.75'W x 46.34'L x 3.50'H Field A** 2,554 cf Overall - 827 cf Embedded = 1,727 cf x 40.0% Voids
#2A	194.50'	827 cf	**ADS_StormTech SC-740 +Cap** x 18 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 3 Rows of 6 Chambers
#3	197.50'	13 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		1,531 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
197.50	13	0	0
198.50	13	13	13

Device	Routing	Invert	Outlet Devices
#1	Discarded	194.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 190.00'
#2	Primary	198.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.24 cfs @ 12.51 hrs HW=196.74' (Free Discharge)
└─**1=Exfiltration** (Controls 0.24 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=194.00' TW=156.60' (Dynamic Tailwater)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 9P: Subsurface Chamber System - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

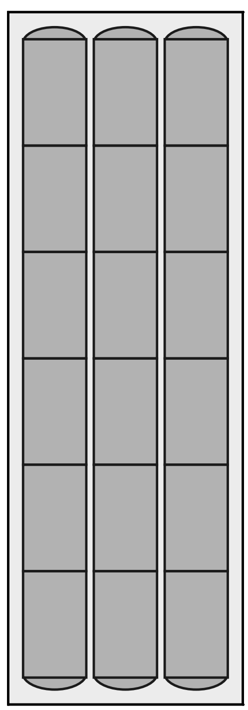
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

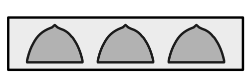
18 Chambers x 45.9 cf = 826.9 cf Chamber Storage

2,554.3 cf Field - 826.9 cf Chambers = 1,727.4 cf Stone x 40.0% Voids = 691.0 cf Stone Storage

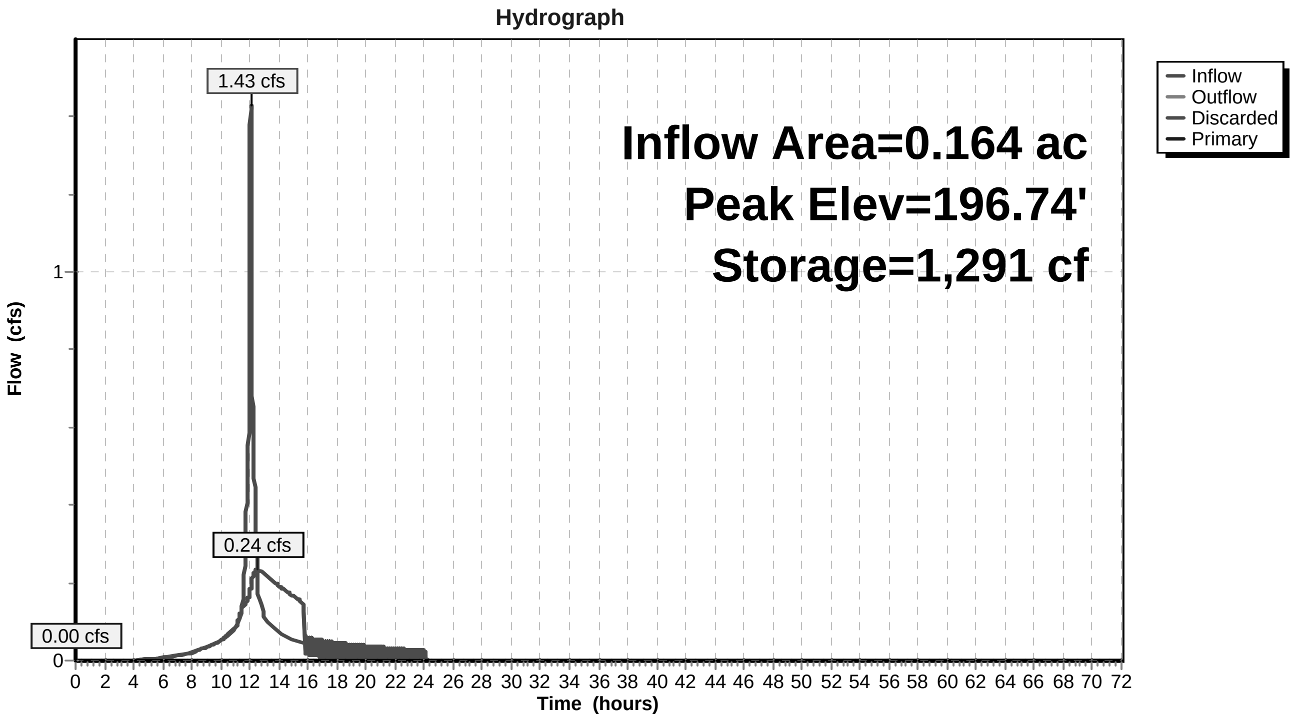
Chamber Storage + Stone Storage = 1,517.9 cf = 0.035 af
Overall Storage Efficiency = 59.4%
Overall System Size = 46.34' x 15.75' x 3.50'

18 Chambers
94.6 cy Field
64.0 cy Stone





Pond 9P: Subsurface Chamber System



Summary for Pond 10P: 48" Box Culvert

Inflow Area = 41.633 ac, 0.00% Impervious, Inflow Depth = 5.10" for 100-Year event
Inflow = 67.26 cfs @ 13.49 hrs, Volume= 17.687 af
Outflow = 67.26 cfs @ 13.50 hrs, Volume= 17.687 af, Atten= 0%, Lag= 0.3 min
Primary = 67.26 cfs @ 13.50 hrs, Volume= 17.687 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 258.32' @ 13.50 hrs Surf.Area= 917 sf Storage= 1,500 cf

Plug-Flow detention time= 0.6 min calculated for 17.687 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (917.1 - 916.7)

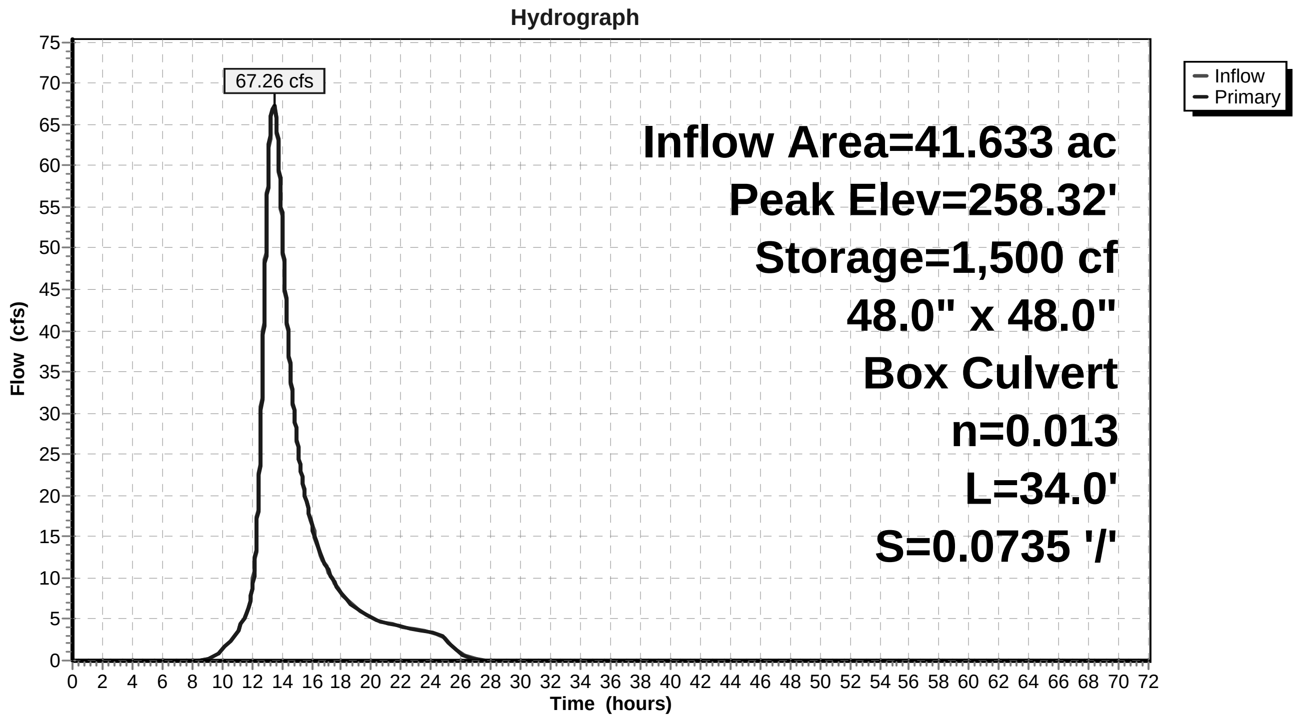
Volume	Invert	Avail.Storage	Storage Description
#1	255.30'	12,405 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.30	200	0	0
256.00	343	190	190
258.00	710	1,053	1,243
260.00	2,017	2,727	3,970
262.00	6,418	8,435	12,405

Device	Routing	Invert	Outlet Devices
#1	Primary	255.30'	**48.0" W x 48.0" H Box Culvert** L= 34.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 255.30' / 252.80' S= 0.0735 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 16.00 sf

Primary OutFlow Max=67.25 cfs @ 13.50 hrs HW=258.32' TW=254.57' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 67.25 cfs @ 5.57 fps)

Pond 10P: 48" Box Culvert



Summary for Pond 11P: Carberry Ln Culvert

Inflow Area = 53.443 ac, 4.00% Impervious, Inflow Depth = 5.27" for 100-Year event
Inflow = 72.08 cfs @ 13.61 hrs, Volume= 23.456 af
Outflow = 71.67 cfs @ 13.70 hrs, Volume= 23.456 af, Atten= 1%, Lag= 5.6 min
Primary = 71.67 cfs @ 13.70 hrs, Volume= 23.456 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 165.05' @ 13.70 hrs Surf.Area= 3,174 sf Storage= 4,657 cf

Plug-Flow detention time= 0.7 min calculated for 23.456 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (899.0 - 898.5)

Volume	Invert	Avail.Storage	Storage Description
#1	159.12'	13,507 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

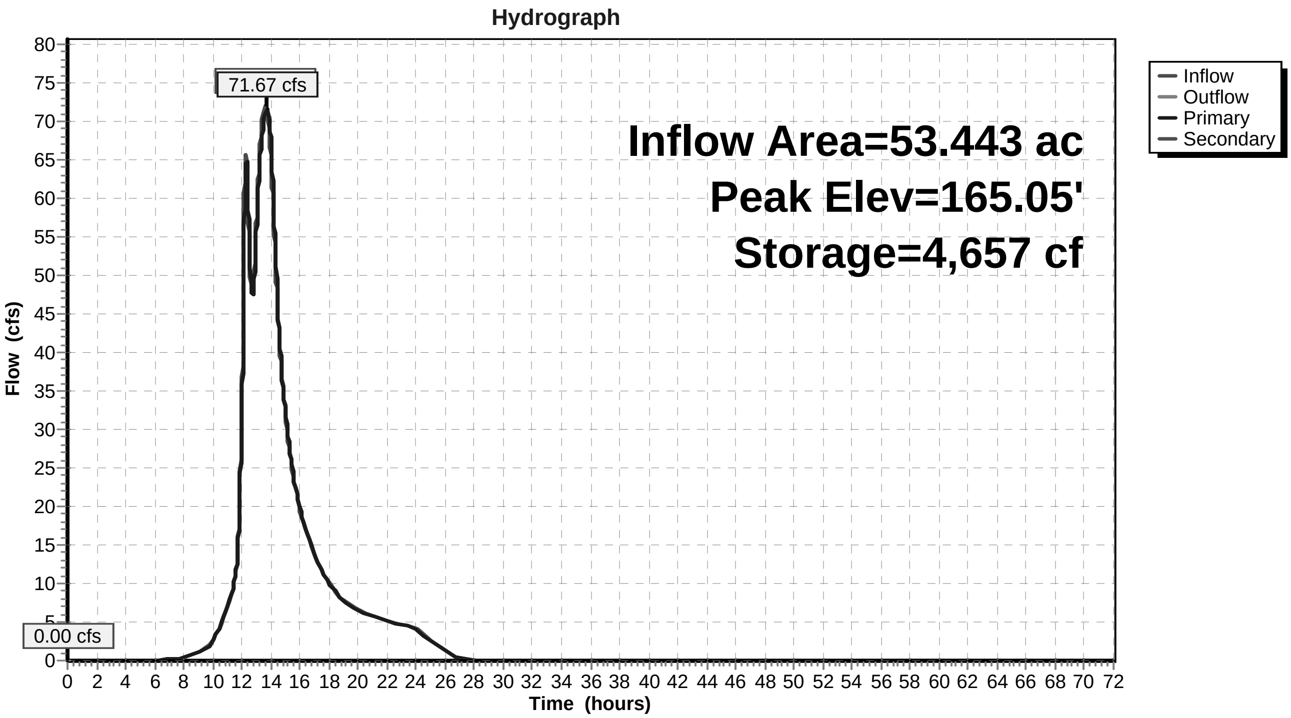
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
159.12	143	0	0
160.00	200	151	151
161.00	267	234	384
162.00	486	377	761
163.00	786	636	1,397
164.00	1,226	1,006	2,403
165.00	2,948	2,087	4,490
166.00	7,080	5,014	9,504
166.50	8,934	4,004	13,507

Device	Routing	Invert	Outlet Devices
#1	Primary	159.12'	**36.0" Round Culvert** L= 106.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.12' / 158.28' S= 0.0079 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf
#2	Secondary	165.25'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=71.67 cfs @ 13.70 hrs HW=165.05' (Free Discharge)
└─**1=Culvert** (Inlet Controls 71.67 cfs @ 10.14 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=159.12' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 11P: Carberry Ln Culvert



APPENDIX C

Stormwater Management Calculations:

1. **Recharge Volumes Calculation**
2. **Drawdown Calculations for Infiltration Systems**
3. **Water Quality Volume**
4. **TSS Removal Calculations**
5. **Closed Drainage System Calculations**

MERRILL ENGINEERS AND LAND SURVEYORS	JOB	16-079		
427 COLUMBIA ROAD, HANOVER, MA. 02339	SHEET N0.	1	of	2
TEL. (781) 826-9200	CALCULATED BY	JG		
	CHECKED BY	DK		8/31/2018

GROUNDWATER RECHARGE VOLUMES (STANDARD #3)

Location: **Wolcott Woods, Canton Ave, Milton MA**

Total Area (Ac.)=	8.04	(Total impervious watershed area)
Total Impervious Area A Soil (Ac.)=	1.88	
Total Impervious Area B Soil (Ac.)=	0.00	
Total Impervious Area C Soil (Ac.)=	4.76	
Total Impervious Area D Soil (Ac.)=	1.39	Roofs, Drives, Road and Sidewalk

	Vol. To Recharge (inches per Imp. Acre)	Volume (Imp. Area x inches per Acre)	
Recharge Volume (A soil)	0.60	1.13	
Recharge Volume (B soil)	0.35	0.00	
Recharge Volume (C soil)	0.25	1.19	
Recharge Volume (D soil)	0.10	0.14	
		2.46	AC-IN
Total Required Recharge Volume:		0.205	AC-FT
		8930	C.F.

Recharge volume provided within Infiltration Facilities (basin and subsurface chambers) **114,053** C.F.

(Rv will be total storage volume below lowest outlet elevation)

Drawdown Calculations for Infiltration Systems:

Drawdown Time = Rv/(k)(basin bottom area) where Rv will be total storage volume below lowest outlet elevation

BioRetention Basin (Pond 5P)		5.89	< 72 hrs.
	Rv =	5731	cf
	k=	2.41	in/hr (convert to ft)
	Bot. Area=	4844	sf
Subsurface Infiltration System		0.75	< 72 hrs.
(Pond 6P)	Rv =	8679	cf
	k=	8.27	in/hr (convert to ft)
	Bot. Area=	16762	sf
Subsurface Infiltration System		3.11	< 72 hrs.
(Pond 7P)	Rv =	31647	cf
	k=	8.27	in/hr (convert to ft)
	Bot. Area=	14754	sf

Open Infiltration Basin			10.50	< 72 hrs.
(Pond 8P)	Rv =	66465	cf	
	k=	8.27	in/hr (convert to ft)	
	Bot. Area=	9185	sf	
Subsurface Infiltration System			3.04	< 72 hrs.
(Pond 9P)	Rv =	1531	cf	
	k=	8.27	in/hr (convert to ft)	
	Bot. Area=	730	sf	

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TEL. (781) 826-9200	CALCULATED BY	JG			
	CHECKED BY	DK			8/31/2018

WATER QUALITY VOLUME (STANDARD #4)

Location: **Wolcott Woods, Canton Ave, Milton MA**

Entrance Subsurface Chamber System

First Defense Unit (FD1) (9P):

Proprietary Treatment Unit: Q=(qu)(A)(WQV)

qu for Tc of 6 min.	774	(csm/in)		
Impervious Area: AC*0.0015625mi^2/AC	0.0002	mi^2	0.14	AC
WQV Treated:	1.00	in		
Q (Peak flow rate for 1" WQV):	**0.17**	cfs		
Proposed FD-3HC Max. Treated Flow Rate:	**0.84**	cfs		
	Max flow rate = 15 cfs			

Entrance Infiltration Basin

First Defense Inlet (FD2) (8P):

Proprietary Treatment Unit: Q=(qu)(A)(WQV)

qu for Tc of 11.5 min.	677	(csm/in)		
Impervious Area: AC*0.0015625mi^2/AC	0.0007	mi^2	0.46	AC
WQV Treated:	1.00	in		
Q (Peak flow rate for 1" WQV):	**0.49**	cfs		
Proposed FD-4HC Max. Treated Flow Rate:	**1.50**	cfs		
	Max flow rate = 18 cfs			

Open Field Subsurface Chamber System

First Defense Unit (FD3) (6P):

Proprietary Treatment Unit: Q=(qu)(A)(WQV)

qu for Tc of 29.2 min.	510	(csm/in)		
Impervious Area: AC*0.0015625mi^2/AC	0.0051	mi^2	3.28	AC
WQV Treated:	1.00	in		
Q (Peak flow rate for 1" WQV):	**2.61**	cfs		
Proposed FD-6HC Max. Treated Flow Rate:	**3.38**	cfs		
	Max flow rate = 32 cfs			

Farm Pond

First Defense Unit (FD4 & FD5) (2P):

Proprietary Treatment Unit: Q=(qu)(A)(WQV)

qu for Tc of 18.1 min.	593	(csm/in)		
Impervious Area: AC*0.0015625mi^2/AC	0.0023	mi^2	1.44	AC
WQV Treated:	1.00	in		
Q (Peak flow rate for 1" WQV):	**1.33**	cfs		
Proposed FD-4HC Max. Treated Flow Rate:	**1.50**	cfs		
	Max flow rate = 18 cfs			

BioRetention Basin

(Pond 5P)

5%-7% of contributing area minimum

Bioretention Area:

			Bioretention Area Media Volume (Void Ratio=0.25)	
Contributing Impervious Area:	20,817	SF		
Bioretention area provided:	4,844	SF	2422	CF
Percentage of Contributing area:	23.27%	(meets minimum requirement of 5% - 7%)		

Required Water Quality Volume: (WQ Treatment * Imp. Area)	1734.8 CF	<	2422 CF	

Water Quality Volume - Total Site Improvements

Total Impervious Area:

Proposed Roof	3.06	
Proposed Pavement/Sidewalk	4.98	
Total Area:	8.04	AC

Water Quality Volume using: 0.5 or 1.0 inch x Imp. Area (per S.W. Mgmt Policy)

1	inch x Imp. Area	**29,178**	CF (min)

WQ Treatment within Units & BioRetention Basin =	**21,734**	
Recharge volume provided by Infiltration Systems =	**108,322**	
Total Walter Quality Volume Provided =	**130,056**	CF (min)

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

TSS Removal Calculation Worksheet

Location: Wolcott Woods, Milton MA

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Proprietary Treatment Practice	0.00	0.75	0.00	0.75
Infiltration Basin	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

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

Project: 16-079
Prepared By: DWK
Date: 8/31/2018

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

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

TSS Removal Calculation Worksheet

Location: Wolcott Woods, Milton MA

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Proprietary Treatment Practice	**0.00**	**0.75**	**0.00**	**0.75**
Subsurface Infiltration Structure	**0.80**	**0.75**	**0.60**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**

Total TSS Removal = 85%

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

Project: **16-079**
Prepared By: **DWK**
Date: **8/31/2018**

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

TSS Removal Calculation Worksheet

Location: Wolcott Woods, Milton MA

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Bioretention Area	**0.90**	**1.00**	**0.90**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**

Total TSS Removal = 90%

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

Project: 16-079
Prepared By: **DWK**
Date: **8/31/2018**

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

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

TSS Removal Calculation Worksheet

Closed Drainage System

Location: Wolcott Woods, Milton MA

Proj. No.: 16-079
Date: 8/31/2018
Computed by: DWK

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
Deep sump & hooded Catch Basin	25	1.00	0.25	0.75
First Defense Unit	50	0.75	0.38	0.38
First Defense Unit	50	0.38	0.19	0.19

Total TSS Removal= 81%

Notes:
*Starting TSS Load for first BMP= 1.00. TSS load for subsequent BMP's is equal to the Remaining Load (E) from the previous BMP.

TSS Removal Calculation Worksheet

For Pretreatment: First Defense Unit

Location: Wolcott Woods, Milton MA

Proj. No.: 16-079
Date: 8/31/2018
Computed by: DWK

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
First Defense Unit	50	1.00	0.5	0.50

Total TSS Removal= **50%**

> 44% Pre-treatment

Notes:
*Starting TSS Load for first BMP= 1.00. TSS load for subsequent BMP's is equal to the Remaining Load (E) from the previous BMP.

Storm Drainage Computations

Name: Wolcott Woods
Canton Ave, Milton MA

Client: Wolcott Residential, LLC

Proj. No.: 16-079
Date: 8/31/2018
Computed by: JG
Checked by: DK

Design Parameters:
100 Year Storm Boston, MA

k_e= 0.5

DESCRIPTION	LOCATION		AREA	C	C x A	SUM	FLOW TIME (MIN)		i*	DESIGN					CAPACITY		PROFILE						
	FROM	TO	(AC.)			C x A	PIPE	CONC TIME		Q cfs	V fps	n	PIPE SIZE	SLOPE	Q full ft^3/s	V full ft/s	LENGTH ft	FALL ft	RIM	INV UPPER	INV LOWER	W.S.E. ft	Freeboard ft
	CB1	DMH 1	0.05	0.90	0.05	0.05	0.02	6.0	7.0	0.3	2.8	0.013	12	0.0200	5.0	6.4	3	0.06	197.66	195.06	195.00	195.0	2.7
	CB2	DMH1	0.10	0.81	0.08	0.08	0.15	6.0	7.0	0.6	2.1	0.013	12	0.0050	2.5	3.2	19	0.10	197.66	195.06	194.96	195.0	2.7
	DMH1	FD1	---	---	---	0.13	0.09	6.1	7.0	0.9	2.5	0.013	12	0.0050	2.5	3.2	14	0.07	197.77	194.96	194.89	194.9	2.9
	CB 21	DMH19	0.11	0.85	0.10	0.10	0.06	6.0	7.0	0.7	3.6	0.013	12	0.0200	5.0	6.4	13	0.26	260.00	255.80	255.54	255.6	4.4
	CB 22	DMH19	0.08	0.75	0.06	0.06	0.03	6.0	7.0	0.4	3.0	0.013	12	0.0200	5.0	6.4	5	0.10	260.00	255.80	255.70	255.7	4.3
	DMH19	DMH20	---	---	---	0.16	0.64	6.1	7.0	1.1	5.1	0.013	12	0.0350	6.7	8.5	196	6.86	260.05	255.44	248.58	255.1	4.9
	CB 23	DMH20	0.14	0.74	0.10	0.10	0.06	6.0	7.0	0.7	3.7	0.013	12	0.0200	5.0	6.4	13	0.26	253.27	249.07	248.81	248.9	4.4
	CB 24	DMH20	1.79	0.23	0.42	0.42	0.01	16.9	5.0	2.1	5.1	0.013	12	0.0200	5.0	6.4	4	0.08	253.27	249.07	248.99	248.7	4.5
	DMH20	DMH21	---	---	---	0.68	0.31	16.9	5.0	3.4	8.2	0.013	12	0.0500	8.0	10.1	154	7.70	253.19	246.83	239.13	246.0	7.2
	DMH21	DMH22	---	---	---	0.68	0.26	17.2	4.9	3.4	8.2	0.013	12	0.0500	8.0	10.1	130	6.50	243.31	235.63	229.13	234.8	8.5
	CB 25	DMH22	0.75	0.67	0.50	0.50	0.03	7.9	6.5	3.2	5.8	0.013	12	0.0200	5.0	6.4	10	0.20	233.03	228.83	228.63	228.4	4.6
	CB 26	DMH22	0.82	0.35	0.29	0.29	0.02	8.4	6.4	1.8	4.9	0.013	12	0.0200	5.0	6.4	7	0.14	233.03	228.83	228.69	228.5	4.5
	DMH22	DMH23	---	---	---	1.46	0.23	17.5	4.9	7.2	10.3	0.013	12	0.0500	8.0	10.1	142	7.10	232.70	224.63	217.53	223.3	9.4
	DMH23	DMH24	---	---	---	1.46	0.16	17.7	4.9	7.1	10.3	0.013	12	0.0500	8.0	10.1	100	5.00	221.00	214.03	209.03	212.7	8.3
	CB 27	DMH24	0.36	0.65	0.23	0.23	0.04	6.0	7.0	1.6	4.9	0.013	12	0.0200	5.0	6.4	12	0.24	213.08	208.88	208.64	208.6	4.5
	CB 28	DMH24	0.08	0.78	0.06	0.06	0.02	6.0	7.0	0.4	3.6	0.013	12	0.0400	7.1	9.1	4	0.16	213.08	208.88	208.72	208.7	4.4
	DMH24	DMH25	---	---	---	1.76	0.12	17.8	4.9	8.5	8.8	0.013	15	0.0300	11.2	9.1	65	1.95	212.85	206.03	204.08	205.1	7.8
	DMH25	FD4	---	---	---	1.76	0.14	18.0	4.8	8.5	8.8	0.013	15	0.0300	11.2	9.1	76	2.28	207.75	203.33	201.05	202.4	5.4
	CB 29	FD4	0.18	0.72	0.13	0.13	0.04	6.0	7.0	0.9	3.9	0.013	12	0.0200	5.0	6.4	10	0.20	205.77	201.57	201.37	201.4	4.4
	CB 30	FD4	0.14	0.78	0.11	0.11	0.04	6.0	7.0	0.8	3.8	0.013	12	0.0200	5.0	6.4	10	0.20	205.77	201.57	201.37	201.4	4.4
	FD4	FD5	---	---	---	2.00	0.04	18.1	4.8	9.6	8.7	0.013	15	0.0250	10.2	8.3	22	0.55	206.15	201.05	200.50	200.1	6.0
	FD5	HDW	---	---	---	2.00	0.02	18.2	4.8	9.6	8.7	0.013	15	0.0250	10.2	8.3	10	0.25	206.44	200.50	200.25	199.6	6.9
	CB 19	DMH 16	0.30	0.52	0.16	0.16	0.06	9.2	6.2	1.0	4.6	0.013	12	0.0300	6.2	7.9	16	0.48	267.67	263.47	262.99	263.2	4.5
	CB 20	DMH 16	2.98	0.28	0.83	0.83	0.07	27.3	3.9	3.3	5.8	0.013	12	0.0200	5.0	6.4	24	0.48	267.67	263.47	262.99	263.0	4.6
	DMH 16	DMH 17	---	---	---	0.99	0.13	27.4	3.9	3.9	8.4	0.013	12	0.0500	8.0	10.1	68	3.40	267.25	261.05	257.65	260.2	7.1
	DMH 17	DMH 18	---	---	---	0.99	0.09	27.5	3.9	3.9	8.4	0.013	12	0.0500	8.0	10.1	43	2.15	261.80	256.65	254.50	255.8	6.0

Storm Drainage Computations

Name: Wolcott Woods
Canton Ave, Milton MA

Client: Wolcott Residential, LLC

Proj. No.: 16-079
Date: 8/31/2018
Computed by: JG
Checked by: DK

Design Parameters:
100 Year Storm Boston, MA

k_e= 0.5

DESCRIPTION	LOCATION		AREA	C	C x A	SUM	FLOW TIME (MIN)		i*	DESIGN					CAPACITY		PROFILE						
	FROM	TO	(AC.)			C x A	PIPE	CONC TIME		Q cfs	V fps	n	PIPE SIZE	SLOPE	Q full ft^3/s	V full ft/s	LENGTH ft	FALL ft	RIM	INV UPPER	INV LOWER	W.S.E. ft	Freeboard ft
	DMH18	DMH12	---	---	---	0.99	0.38	27.6	3.9	3.9	8.4	0.013	12	0.0500	8.0	10.1	193	9.65	258.50	253.90	244.25	253.0	5.5
	CB 17	DMH 15	0.44	0.66	0.29	0.29	0.05	8.3	6.4	1.9	3.9	0.013	12	0.0100	3.6	4.5	12	0.12	260.20	256.00	255.88	255.8	4.4
	CB 18	DMH 15	1.73	0.39	0.68	0.68	0.02	14.6	5.3	3.6	6.0	0.013	12	0.0200	5.0	6.4	6	0.12	260.20	256.00	255.88	255.5	4.7
	DMH 15	DMH 14	---	---	---	0.97	0.24	14.6	5.3	5.1	8.5	0.013	12	0.0400	7.1	9.1	123	4.92	260.00	254.25	249.33	253.3	6.7
	DMH 14	DMH 13	---	---	---	0.97	0.22	14.8	5.3	5.1	8.5	0.013	12	0.0400	7.1	9.1	112	4.48	252.60	249.23	244.75	248.3	4.3
	CB 15	DMH 13	1.32	0.39	0.52	0.52	0.04	11.5	5.8	3.0	5.6	0.013	12	0.0200	5.0	6.4	12	0.24	249.60	245.40	245.16	245.0	4.6
	CB 16	DMH 13	0.18	0.80	0.14	0.14	0.02	6.0	7.0	1.0	4.1	0.013	12	0.0200	5.0	6.4	4	0.08	249.60	245.40	245.32	245.2	4.4
	DMH 13	DMH 11	---	---	---	1.63	0.49	15.1	5.2	8.5	8.3	0.013	15	0.0260	10.4	8.5	245	6.37	249.70	244.50	238.13	243.6	6.1
	CB 13	DMH 12	0.58	0.51	0.29	0.29	0.01	8.1	6.5	1.9	5.0	0.013	12	0.0200	5.0	6.4	4	0.08	248.64	244.44	244.36	244.1	4.5
	CB 14	DMH 12	0.59	0.63	0.37	0.37	0.02	7.2	6.7	2.5	4.5	0.013	12	0.0120	3.9	5.0	6	0.07	248.64	244.44	244.36	244.2	4.5
	DMH 12	DMH 11	---	---	---	1.66	0.12	28.0	3.9	6.4	9.9	0.013	12	0.0500	8.0	10.1	73	3.65	248.58	244.15	240.50	242.9	5.7
	CB 11	DMH 11	0.68	0.46	0.31	0.31	0.07	8.1	6.5	2.0	5.1	0.013	12	0.0200	5.0	6.4	22	0.44	245.10	240.90	240.46	240.6	4.5
	CB 12	DMH 11	0.41	0.65	0.27	0.27	0.04	9.3	6.2	1.7	4.9	0.013	12	0.0200	5.0	6.4	12	0.24	244.90	240.70	240.46	240.4	4.5
	DMH 11	DMH 10	---	---	---	3.86	0.17	28.1	3.9	15.0	11.3	0.013	18	0.0410	21.3	12.0	116	4.76	244.80	237.63	232.87	236.0	8.8
	DMH 10	DMH 9	---	---	---	3.86	0.14	28.3	3.9	14.9	11.3	0.013	18	0.0410	21.3	12.0	94	3.85	237.26	230.87	227.01	229.3	8.0
	CB 9	DMH 9	0.53	0.53	0.28	0.28	0.04	6.0	7.0	2.0	5.1	0.013	12	0.0200	5.0	6.4	12	0.24	230.76	226.56	226.32	226.2	4.5
	CB 10	DMH 9	0.36	0.66	0.24	0.24	0.01	6.0	7.0	1.7	4.9	0.013	12	0.0200	5.0	6.4	4	0.08	230.76	226.56	226.48	226.3	4.5
	DMH 9	DMH 8	---	---	---	4.38	0.09	28.4	3.9	16.9	12.5	0.013	18	0.0500	23.5	13.3	68	3.40	230.56	225.51	222.11	223.6	7.0
	DMH 8	DMH 7	---	---	---	4.38	0.13	28.5	3.8	16.9	12.5	0.013	18	0.0500	23.5	13.3	94	4.70	225.68	220.11	215.41	218.2	7.5
	CB 7	DMH 7	0.05	0.90	0.04	0.04	0.28	6.0	7.0	0.3	2.0	0.013	12	0.0100	3.6	4.5	33	0.33	217.51	214.31	213.98	214.3	3.2
	CB 8	DMH 7	0.69	0.63	0.44	0.44	0.12	6.0	7.0	3.1	4.5	0.013	12	0.0100	3.6	4.5	33	0.33	217.51	214.31	213.98	214.1	3.5
	DMH 7	FD3	---	---	---	4.86	0.39	28.6	3.8	18.6	7.1	0.013	24	0.0100	22.6	7.2	166	1.66	219.22	212.48	210.82	211.8	7.4
	FD3	DMH 5	---	---	---	4.86	0.17	29.0	3.8	18.5	7.1	0.013	24	0.0100	22.6	7.2	71	0.71	220.08	210.82	210.11	210.2	9.9
	DMH 5	SUB	---	---	---	4.86	0.00	29.2	3.8	18.5	7.1	0.013	24	0.0100	22.6	7.2		0.00	218.80	210.10	210.00	209.5	9.3
	CB 5	DMH 4	0.07	0.90	0.06	0.06	0.07	6.0	7.0	0.4	3.0	0.013	12	0.0200	5.0	6.4	13	0.26	218.39	214.19	213.93	214.1	4.3
	CB 6	DMH 4	0.19	0.66	0.13	0.13	0.02	6.0	7.0	0.9	3.9	0.013	12	0.0200	5.0	6.4	4	0.08	218.33	214.13	214.05	213.9	4.4
	DMH 4	DMH 3	---	---	---	0.19	0.61	6.1	7.0	1.3	4.6	0.013	12	0.0200	5.0	6.4	166	3.32	218.40	212.17	208.85	211.9	6.5

Storm Drainage Computations

Name: Wolcott Woods
Canton Ave, Milton MA

Client: Wolcott Residential, LLC

Proj. No.: **16-079**
Date: 8/31/2018
Computed by: **JG**
Checked by: **DK**

Design Parameters:
100 **Year Storm** Boston, MA

k_e= **0.5**

DESCRIPTION	LOCATION		AREA	C	C x A	SUM	FLOW TIME (MIN)		i*	DESIGN					CAPACITY		PROFILE						
	FROM	TO	(AC.)			C x A	PIPE	CONC TIME		Q cfs	V fps	n	PIPE SIZE	SLOPE	Q full ft^3/s	V full ft/s	LENGTH ft	FALL ft	RIM	INV UPPER	INV LOWER	W.S.E. ft	Freeboard ft
	DMH 3	DMH 2	---	---	---	0.19	0.37	6.7	6.8	1.3	5.9	0.013	12	0.0450	7.6	9.6	130	5.85	215.67	208.75	202.90	208.3	7.3
	CB 3	DMH 2	0.08	0.90	0.07	0.07	0.07	6.0	7.0	0.5	3.3	0.013	12	0.0200	5.0	6.4	13	0.26	208.13	203.63	203.37	203.5	4.6
	CB 4	DMH 2	0.37	0.61	0.22	0.45	0.02	11.5	5.8	2.6	6.4	0.013	12	0.0300	6.2	7.9	8	0.24	208.13	203.63	203.39	203.1	5.0
	DMH2	FD2	---	---	---	0.71	0.03	11.5	5.8	4.1	8.6	0.013	12	0.0500	8.0	10.1	14	0.70	207.15	202.80	202.10	201.9	5.3
	FD2	HW1	---	---	---	0.71	0.17	11.6	5.8	4.1	8.0	0.013	12	0.0400	7.1	9.1	82	3.28	206.20	202.10	198.82	201.3	4.9

Weighted Runoff Coefficients

Name:	Wolcott Woods	Proj. No.:	**16-079**
	Canton Ave, Milton MA	Date:	**8/31/2018**
Client:	Wolcott Residential, LLC	Computed by:	**JG**
		Checked by:	**DK**

Description of Area CB1	Area (acres)	Runoff Coefficient	A x C
Impervious	0.05	0.90	0.05
Pervious (G)	0.00	0.30	0.00
Pervious (W)	0.00	0.20	0.00
Totals =	0.05		0.05

Weighted Runoff Coefficient : **Σ(AxC) / ΣA =** **0.90**

Description of Area CB2	Area (acres)	Runoff Coefficient	A x C
Impervious	0.09	0.90	0.08
Pervious (G)	0.01	0.30	0.00
Pervious (W)	0.00	0.20	0.00
Totals =	0.10		0.08

Weighted Runoff Coefficient : **Σ(AxC) / ΣA =** **0.81**

Description of Area CB3	Area (acres)	Runoff Coefficient	A x C
Impervious	0.08	0.90	0.07
Pervious (G)	0.00	0.30	0.00
Pervious (W)	0.00	0.20	0.00
Totals =	0.08		0.07

Weighted Runoff Coefficient : **Σ(AxC) / ΣA =** **0.90**

Description of Area CB4	Area (acres)	Runoff Coefficient	A x C
Impervious	0.19	0.90	0.17
Pervious (G)	0.18	0.30	0.05
Pervious (W)	0.00	0.20	0.00
Totals =	0.37		0.22

Weighted Runoff Coefficient : **Σ(AxC) / ΣA =** **0.61**

Description of Area CB5	Area (acres)	Runoff Coefficient	A x C
Impervious	0.07	0.90	0.06
Pervious (G)	0.00	0.30	0.00
Pervious (W)	0.00	0.20	0.00
Totals =	0.07		0.06

Weighted Runoff Coefficient : **Σ(AxC) / ΣA =** **0.90**

Weighted Runoff Coefficients

Name:	Wolcott Woods	Proj. No.:	16-079
	Canton Ave, Milton MA	Date:	8/31/2018
Client:	Wolcott Residential, LLC	Computed by:	JG
		Checked by:	DK

Description of Area CB6	Area (acres)	Runoff Coefficient	A x C
Impervious	0.12	0.90	0.11
Pervious (G)	0.08	0.30	0.02
Pervious (W)	0.00	0.20	0.00
Totals =	0.19		0.13

Weighted Runoff Coefficient : Σ(AxC) / ΣA = **0.66**

Description of Area CB7	Area (acres)	Runoff Coefficient	A x C
Impervious	0.05	0.90	0.04
Pervious (G)	0.00	0.30	0.00
Pervious (W)	0.00	0.20	0.00
Totals =	0.05		0.04

Weighted Runoff Coefficient : Σ(AxC) / ΣA = **0.90**

Description of Area CB8	Area (acres)	Runoff Coefficient	A x C
Impervious	0.38	0.90	0.34
Pervious (G)	0.32	0.30	0.09
Pervious (W)	0.00	0.20	0.00
Totals =	0.69		0.44

Weighted Runoff Coefficient : Σ(AxC) / ΣA = **0.63**

Description of Area CB9	Area (acres)	Runoff Coefficient	A x C
Impervious	0.20	0.90	0.18
Pervious (G)	0.33	0.30	0.10
Pervious (W)	0.00	0.20	0.00
Totals =	0.53		0.28

Weighted Runoff Coefficient : Σ(AxC) / ΣA = **0.53**

Description of Area CB10	Area (acres)	Runoff Coefficient	A x C
Impervious	0.22	0.90	0.19
Pervious (G)	0.14	0.30	0.04
Pervious (W)	0.00	0.20	0.00
Totals =	0.36		0.24

Weighted Runoff Coefficient : Σ(AxC) / ΣA = **0.66**

Weighted Runoff Coefficients

Name:	Wolcott Woods	Proj. No.:	16-079
	Canton Ave, Milton MA	Date:	8/31/2018
Client:	Wolcott Residential, LLC	Computed by:	JG
		Checked by:	DK

Description of Area CB11	Area (acres)	Runoff Coefficient	A x C
Impervious	0.18	0.90	0.16
Pervious (G)	0.50	0.30	0.15
Pervious (W)	0.00	0.20	0.00
Totals =	0.68		0.31

Weighted Runoff Coefficient : **Σ(AxC) / ΣA = 0.46**

Description of Area CB12	Area (acres)	Runoff Coefficient	A x C
Impervious	0.24	0.90	0.21
Pervious (G)	0.18	0.30	0.05
Pervious (W)	0.00	0.20	0.00
Totals =	0.41		0.27

Weighted Runoff Coefficient : **Σ(AxC) / ΣA = 0.65**

Description of Area CB15	Area (acres)	Runoff Coefficient	A x C
Impervious	0.24	0.90	0.22
Pervious (G)	0.86	0.30	0.26
Pervious (W)	0.22	0.20	0.04
Totals =	1.32		0.52

Weighted Runoff Coefficient : **Σ(AxC) / ΣA = 0.39**

Description of Area CB16	Area (acres)	Runoff Coefficient	A x C
Impervious	0.15	0.90	0.13
Pervious (G)	0.03	0.30	0.01
Pervious (W)	0.00	0.20	0.00
Totals =	0.18		0.14

Weighted Runoff Coefficient : **Σ(AxC) / ΣA = 0.80**

Description of Area CB17	Area (acres)	Runoff Coefficient	A x C
Impervious	0.26	0.90	0.23
Pervious (G)	0.18	0.30	0.05
Pervious (W)	0.00	0.20	0.00
Totals =	0.44		0.29

Weighted Runoff Coefficient : **Σ(AxC) / ΣA = 0.66**

Weighted Runoff Coefficients

Name:	Wolcott Woods	Proj. No.:	16-079
	Canton Ave, Milton MA	Date:	8/31/2018
Client:	Wolcott Residential, LLC	Computed by:	JG
		Checked by:	DK

Description of Area CB18	Area (acres)	Runoff Coefficient	A x C
Impervious	0.40	0.90	0.36
Pervious (G)	0.54	0.30	0.16
Pervious (W)	0.80	0.20	0.16
Totals =	1.73		0.68

Weighted Runoff Coefficient : Σ(AxC) / ΣA = **0.39**

Description of Area CB19	Area (acres)	Runoff Coefficient	A x C
Impervious	0.11	0.90	0.10
Pervious (G)	0.19	0.30	0.06
Pervious (W)	0.00	0.20	0.00
Totals =	0.30		0.16

Weighted Runoff Coefficient : Σ(AxC) / ΣA = **0.52**

Description of Area CB 20	Area (acres)	Runoff Coefficient	A x C
Impervious	0.32	0.90	0.29
Pervious (G)	0.11	0.30	0.03
Pervious (W)	2.54	0.20	0.51
Totals =	2.98		0.83

Weighted Runoff Coefficient : Σ(AxC) / ΣA = **0.28**

Description of Area CB 21	Area (acres)	Runoff Coefficient	A x C
Impervious	0.11	0.90	0.09
Pervious (G)	0.01	0.30	0.00
Pervious (W)	0.00	0.20	0.00
Totals =	0.11		0.10

Weighted Runoff Coefficient : Σ(AxC) / ΣA = **0.85**

Description of Area CB 22	Area (acres)	Runoff Coefficient	A x C
Impervious	0.06	0.90	0.06
Pervious (G)	0.02	0.30	0.01
Pervious (W)	0.00	0.20	0.00
Totals =	0.08		0.06

Weighted Runoff Coefficient : Σ(AxC) / ΣA = **0.75**

Weighted Runoff Coefficients

Name:	Wolcott Woods	Proj. No.:	16-079
	Canton Ave, Milton MA	Date:	8/31/2018
Client:	Wolcott Residential, LLC	Computed by:	JG
		Checked by:	DK

Description of Area CB 23	Area (acres)	Runoff Coefficient	A x C
Impervious	0.10	0.90	0.09
Pervious (G)	0.04	0.30	0.01
Pervious (W)	0.00	0.20	0.00
Totals =	0.14		0.10

Weighted Runoff Coefficient : $\Sigma(AxC) / \Sigma A =$ **0.74**

Description of Area CB 24	Area (acres)	Runoff Coefficient	A x C
Impervious	0.06	0.90	0.06
Pervious (G)	0.15	0.30	0.05
Pervious (W)	1.58	0.20	0.32
Totals =	1.79		0.42

Weighted Runoff Coefficient : $\Sigma(AxC) / \Sigma A =$ **0.23**

Description of Area CB 25	Area (acres)	Runoff Coefficient	A x C
Impervious	0.46	0.90	0.41
Pervious (G)	0.29	0.30	0.09
Pervious (W)	0.00	0.20	0.00
Totals =	0.75		0.50

Weighted Runoff Coefficient : $\Sigma(AxC) / \Sigma A =$ **0.67**

Description of Area CB 26	Area (acres)	Runoff Coefficient	A x C
Impervious	0.15	0.90	0.14
Pervious (G)	0.15	0.30	0.05
Pervious (W)	0.51	0.20	0.10
Totals =	0.82		0.29

Weighted Runoff Coefficient : $\Sigma(AxC) / \Sigma A =$ **0.35**

Description of Area CB 27	Area (acres)	Runoff Coefficient	A x C
Impervious	0.21	0.90	0.19
Pervious (G)	0.15	0.30	0.04
Pervious (W)	0.00	0.20	0.00
Totals =	0.36		0.23

Weighted Runoff Coefficient : $\Sigma(AxC) / \Sigma A =$ **0.65**

Weighted Runoff Coefficients

Name:	Wolcott Woods	Proj. No.:	16-079
	Canton Ave, Milton MA	Date:	8/31/2018
Client:	Wolcott Residential, LLC	Computed by:	JG
		Checked by:	DK

Description of Area CB 28	Area (acres)	Runoff Coefficient	A x C
Impervious	0.06	0.90	0.06
Pervious (G)	0.02	0.30	0.00
Pervious (W)	0.00	0.20	0.00
Totals =	0.08		0.06

Weighted Runoff Coefficient : **Σ(AxC) / ΣA = 0.78**

Description of Area CB 29	Area (acres)	Runoff Coefficient	A x C
Impervious	0.12	0.90	0.11
Pervious (G)	0.05	0.30	0.02
Pervious (W)	0.00	0.20	0.00
Totals =	0.18		0.13

Weighted Runoff Coefficient : **Σ(AxC) / ΣA = 0.72**

Description of Area CB 30	Area (acres)	Runoff Coefficient	A x C
Impervious	0.11	0.90	0.10
Pervious (G)	0.03	0.30	0.01
Pervious (W)	0.00	0.20	0.00
Totals =	0.14		0.11

Weighted Runoff Coefficient : **Σ(AxC) / ΣA = 0.78**

Description of Area CB13	Area (acres)	Runoff Coefficient	A x C
Impervious	0.20	0.90	0.18
Pervious (G)	0.37	0.30	0.11
Pervious (W)	0.00	0.20	0.00
Totals =	0.58		0.29

Weighted Runoff Coefficient : **Σ(AxC) / ΣA = 0.51**

Description of Area CB14	Area (acres)	Runoff Coefficient	A x C
Impervious	0.33	0.90	0.29
Pervious (G)	0.27	0.30	0.08
Pervious (W)	0.00	0.20	0.00
Totals =	0.59		0.37

Weighted Runoff Coefficient : **Σ(AxC) / ΣA = 0.63**

Time of Concentration

Name:	Wolcott Woods	Proj. No.:	16-079
	Canton Ave, Milton MA	Date:	8/31/2018
Client:	Wolcott Residential, LLC	Computed by:	JG
		Checked by:	DK

CB 1	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (Impervious)	8.00%	50	-	0.39
Shallow Concentrated Flow (Impervious)	7.69%	117	5.75	0.34
			Time of Concentration, T_c =	0.73
			Use T_c =	6.00

CB 2	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (Impervious)	8.00%	50	-	0.39
Shallow Concentrated Flow (Impervious)	7.69%	117	5.75	0.34
			Time of Concentration, T_c =	0.73
			Use T_c =	6.00

CB 3	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (Impervious)	1.00%	50	-	0.90
Shallow Concentrated Flow (Impervious)	8.00%	264	4	1.10
			Time of Concentration, T_c =	2.00
			Use T_c =	6.00

CB 4	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (Pervious)	1.00%	50	-	10.90
Shallow Concentrated Flow (Imervious)	3.00%	17	3.5	0.08
Shallow Concentrated Flow (Impervious)	6.00%	155	5	0.52
			Time of Concentration, T_c =	11.50
			Use T_c =	11.50

CB 5	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (Impervious)	1.00%	50	-	0.90
Shallow Concentrated Flow (Impervious)	1.00%	189	2	1.58
			Time of Concentration, T_c =	2.47
			Use T_c =	6.00

Time of Concentration

Name:	Wolcott Woods	Proj. No.:	16-079
	Canton Ave, Milton MA	Date:	8/31/2018
Client:	Wolcott Residential, LLC	Computed by:	JG
		Checked by:	DK

CB 6	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	13.00%	50	-	3.91
Shallow Concentrated Flow (Impervious)	1.00%	232	2	1.93
			Time of Concentration, T_c =	5.84
			Use T_c =	6.00

CB 7	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (Impervious)	1.50%	50	-	0.76
Shallow Concentrated Flow (Impervious)	2.75%	72	3.5	0.34
			Time of Concentration, T_c =	1.10
			Use T_c =	6.00

CB 8	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	8.00%	50	-	4.75
Shallow Concentrated Flow (Impervious)	6.63%	117	5	0.39
			Time of Concentration, T_c =	5.14
			Use T_c =	6.00

CB 9	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	9.00%	50	-	4.53
Shallow Concentrated Flow (pervious)	9.50%	29	1.5	0.32
Shallow Concentrated Flow (Impe	6.63%	169	5.25	0.54
			Time of Concentration, T_c =	5.39
			Use T_c =	6.00

CB 10	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (Impervious)	4.50%	50	-	0.49
Shallow Concentrated Flow (Impervious)	6.63%	184	5.25	0.58
			Time of Concentration, T_c =	1.08
			Use T_c =	6.00

Time of Concentration

Name:	Wolcott Woods	Proj. No.:	16-079
	Canton Ave, Milton MA	Date:	8/31/2018
Client:	Wolcott Residential, LLC	Computed by:	JG
		Checked by:	DK

CB 11	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	3.50%	50	-	6.61
Shallow Concentrated Flow (pervious)	6.60%	154	1.8	1.43
Shallow Concentrated Flow (Impervious)	3.25%	23	3.75	0.10
Shallow Concentrated Flow (Pervious)	7.90%	92	2	0.77
Shallow Concentrated Flow (Impervious)	3.60%	56	4	0.23
			Time of Concentration, T_c =	8.13
			Use T_c =	8.13

CB 12	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	2.00%	50	-	8.26
Shallow Concentrated Flow (impervious)	2.00%	7	2.9	0.04
Shallow Concentrated Flow (Impervious)	2.20%	182	3	1.01
			Time of Concentration, T_c =	9.32
			Use T_c =	9.32

CB 15	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious-woods)	5.00%	50	-	8.34
Shallow Concentrated Flow (pervious-woods)	6.10%	36	0.6	1.00
Shallow Concentrated Flow (pervious)	6.00%	190	1.5	2.11
Shallow Concentrated Flow (Impervious)	3.00%	37	3.5	0.18
			Time of Concentration, T_c =	11.45
			Use T_c =	11.45

CB 16	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (Impervious)	8.00%	50	-	0.39
Shallow Concentrated Flow (Impervious)	3.50%	212	3.75	0.94
			Time of Concentration, T_c =	1.33
			Use T_c =	6.00

Time of Concentration

Name:	Wolcott Woods	Proj. No.:	16-079
	Canton Ave, Milton MA	Date:	8/31/2018
Client:	Wolcott Residential, LLC	Computed by:	JG
		Checked by:	DK

CB 17	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	2.50%	50	-	7.56
Shallow Concentrated Flow (Impervious)	6.00%	218	5	0.73
			Time of Concentration, T_c =	8.29
			Use T_c =	8.29

CB 18	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious-woods)	10.00%	50	-	6.32
Shallow Concentrated Flow (pervious-woods)	10.00%	369	0.8	7.69
Shallow Concentrated Flow (pervious)	7.50%	69	2	0.58
Shallow Concentrated Flow (Impervious)	4.50%	327	4.25	1.28
			Time of Concentration, T_c =	14.59
			Use T_c =	14.59

CB 19	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	2.00%	50	-	8.26
Shallow Concentrated Flow (pervious)	3.50%	10	1.5	0.11
Shallow Concentrated Flow (Impervious)	2.70%	170	3.3	0.86
			Time of Concentration, T_c =	9.23
			Use T_c =	9.23

CB 20	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious-woods)	6.00%	50	-	7.76
Shallow Concentrated Flow (pervious-woods)	10.00%	923	0.8	19.23
Shallow Concentrated Flow (pervious)	7.00%	44	2.25	0.33
Shallow Concentrated Flow (Impervious)	2.70%	219	3.3	1.11
			Time of Concentration, T_c =	27.31
			Use T_c =	27.31

Time of Concentration

Name:	Wolcott Woods	Proj. No.:	16-079
	Canton Ave, Milton MA	Date:	8/31/2018
Client:	Wolcott Residential, LLC	Computed by:	JG
		Checked by:	DK

CB 21	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (Impervious)	2.00%	50	-	0.68
Shallow Concentrated Flow (Impervious)	2.70%	226	3.3	1.14
			Time of Concentration, T_c =	1.82
			Use T_c =	6.00

CB 22	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (Impervious)	2.00%	50	-	0.68
Shallow Concentrated Flow (Impervious)	2.70%	226	3.3	1.14
			Time of Concentration, T_c =	1.82
			Use T_c =	6.00

CB 23	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	5.00%	20	-	2.75
Shallow Concentrated Flow (impervious)	3.75%	100	3.9	0.43
			Time of Concentration, T_c =	3.18
			Use T_c =	6.00

CB 24	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious-woods)	7.00%	50	-	7.29
Shallow Concentrated Flow (pervious-woods)	9.70%	438	0.8	9.13
Shallow Concentrated Flow (pervious)	12.00%	67	2.5	0.45
Shallow Concentrated Flow (Impervious)	3.20%	189	3.5	0.90
			Time of Concentration, T_c =	16.86
			Use T_c =	16.86

CB 25	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	4.00%	50	-	6.26
Shallow Concentrated Flow (impervious)	2.70%	149	3.3	0.75
Shallow Concentrated Flow (Impervious)	7.00%	286	5.25	0.91
			Time of Concentration, T_c =	7.92
			Use T_c =	7.92

Time of Concentration

Name:	Wolcott Woods	Proj. No.:	16-079
	Canton Ave, Milton MA	Date:	8/31/2018
Client:	Wolcott Residential, LLC	Computed by:	JG
		Checked by:	DK

CB 26	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious-woods)	13.00%	50	-	5.69
Shallow Concentrated Flow (pervious-woods)	10.00%	124	0.8	2.58
Shallow Concentrated Flow (pervious)	30.00%	26	4	0.11
Shallow Concentrated Flow (Impervious)	7.00%	285	5.25	0.90
			Time of Concentration, T_c =	8.38
			Use T_c =	8.38

CB 27	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	14.00%	50	-	3.79
Shallow Concentrated Flow (pervious)	8.00%	47	2	0.39
Shallow Concentrated Flow (Impervious)	8.00%	190	5.75	0.55
			Time of Concentration, T_c =	4.74
			Use T_c =	6.00

CB 28	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	8.00%	50	-	0.39
Shallow Concentrated Flow (pervious)	8.00%	215	5.75	0.62
			Time of Concentration, T_c =	1.01
			Use T_c =	6.00

CB 29	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	16.00%	50	-	3.60
Shallow Concentrated Flow (pervious)	8.00%	188	5.75	0.54
			Time of Concentration, T_c =	4.14
			Use T_c =	6.00

Time of Concentration

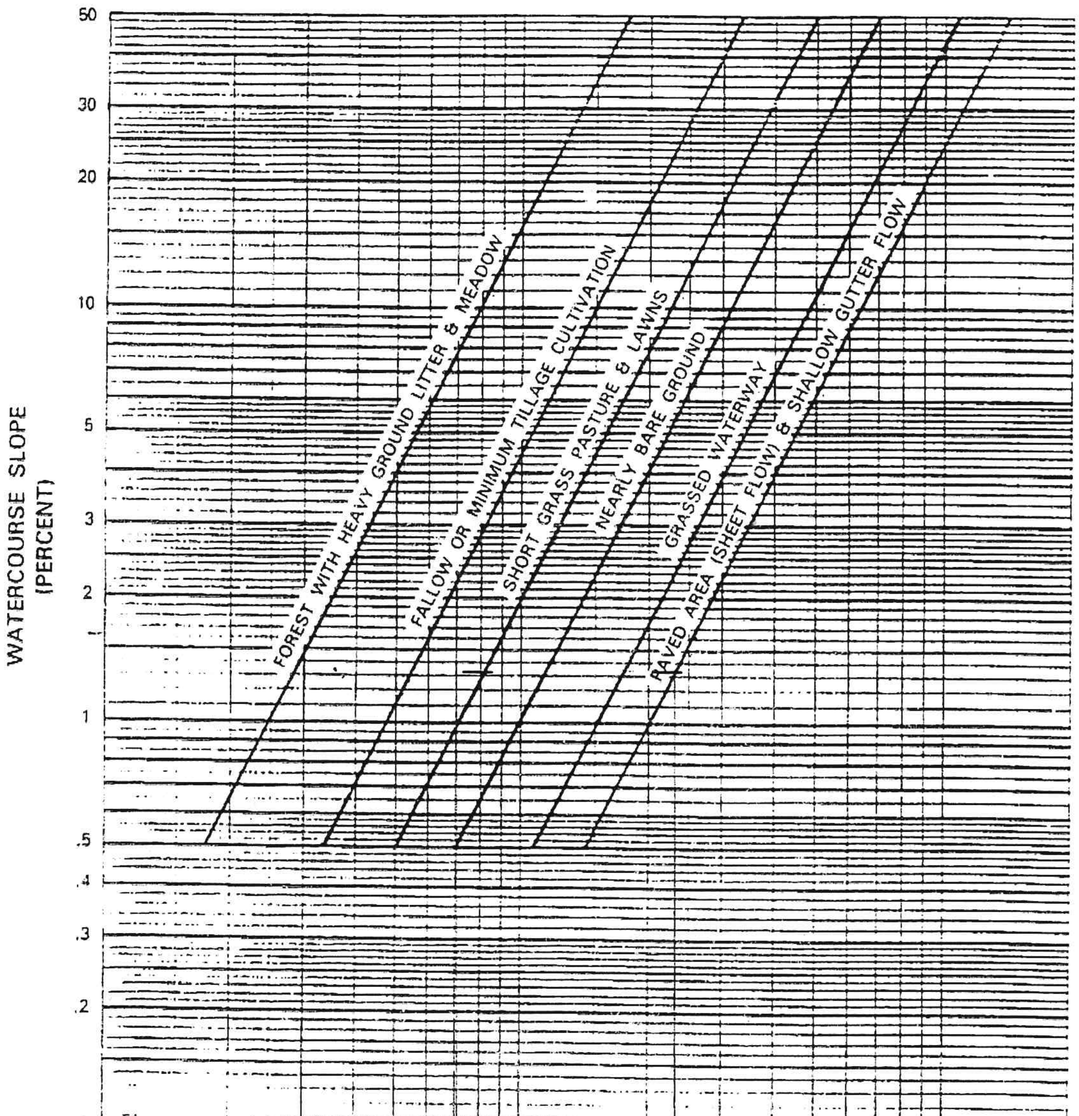
Name:	Wolcott Woods	Proj. No.:	16-079
	Canton Ave, Milton MA	Date:	8/31/2018
Client:	Wolcott Residential, LLC	Computed by:	JG
		Checked by:	DK

CB 30	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (impervious)	8.00%	50	-	0.39
Shallow Concentrated Flow (pervious)	8.00%	181	5.75	0.52
			Time of Concentration, T_c =	0.91
			Use T_c =	6.00

CB 13	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	3.00%	50	-	7.03
Shallow Concentrated Flow (pervious)	6.40%	69	1.75	0.66
Shallow Concentrated Flow (impervious)	9.50%	138	6.25	0.37
			Time of Concentration, T_c =	8.05
			Use T_c =	8.05

CB 14	Slope (%)	Length (feet)	Velocity* (ft/sec)	Travel Time, Tt (L/V) / 60 (min)
Sheet Flow (pervious)	4.00%	50	-	6.26
Shallow Concentrated Flow (pervious)	6.60%	45	1.75	0.43
Shallow Concentrated Flow (Impervious)	5.80%	136	4.9	0.46
			Time of Concentration, T_c =	7.15
			Use T_c =	7.15

Exhibit 8-11
Average Velocities for Overland Flow



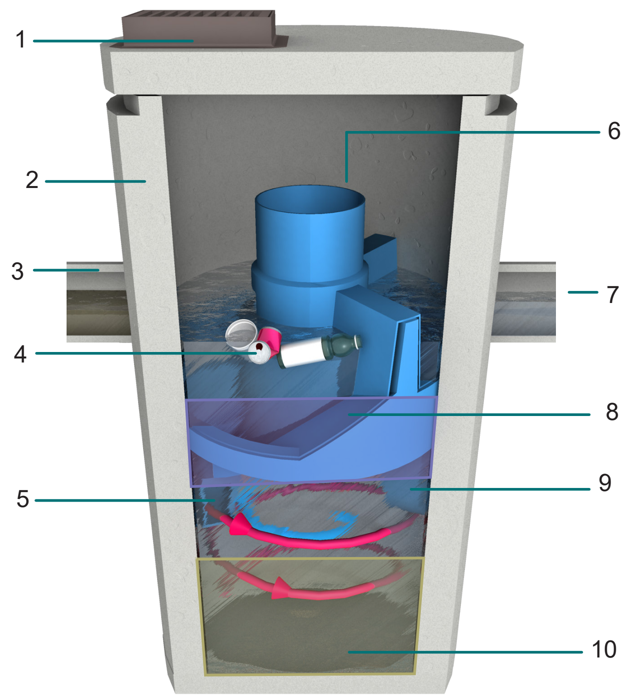
Source: TR55 - Urban Hydrology for Small Wetlands, NRCS

First Defense® High Capacity

A Simple Solution for your Trickiest Sites

Verified by NJCAT and NJDEP

Fig.1 The First Defense® High Capacity has internal components designed to efficiently capture pollutants and prevent washout at peak flows.



Components

1. Inlet Grate (optional)
2. Precast chamber
3. Inlet Pipe (optional)
4. Floatables Draw Off Slot (not pictured)
5. Inlet Chute
6. Internal Bypass
7. Outlet pipe
8. Oil and Floatables Storage
9. Outlet chute
10. Sediment Storage Sump

Product Profile

The First Defense® High Capacity is an enhanced vortex separator that combines an effective stormwater treatment chamber with an integral peak flow bypass. It efficiently removes sediment total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® High Capacity is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints (**Table 1**, next page).

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for “offline” arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 450% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

How it Works

The First Defense® High Capacity has internal components designed to remove and retain gross debris, total suspended solids (TSS) and hydrocarbons (**Fig.1**).

Contaminated stormwater runoff enters the inlet chute from a surface grate and/or inlet pipe. The inlet chute introduces flow into the chamber tangentially to create a low energy vortex flow regime (magenta arrow) that directs sediment into the sump while oils, floating trash and debris rise to the surface.

Treated stormwater exits through a submerged outlet chute located opposite to the direction of the rotating flow (blue arrow). Enhanced vortex separation is provided by forcing the rotating flow within the vessel to follow the longest path possible rather than directly from inlet to outlet.

Higher flows bypass the treatment chamber to prevent turbulence and washout of captured pollutants. An internal bypass conveys infrequent peak flows directly to the outlet eliminating the need for, and expense of, external bypass control structures. A floatables draw off slot functions to convey floatables into the treatment chamber prior to bypass.

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

First Defense® High Capacity

Sizing & Design

This adaptable online treatment system works easily with large pipes, multiple inlet pipes, inlet grates and now, contains a high capacity bypass for the conveyance of large peak flows. Designed with site flexibility in mind, the First Defense® High Capacity allows engineers to maximize available site space without compromising treatment level.

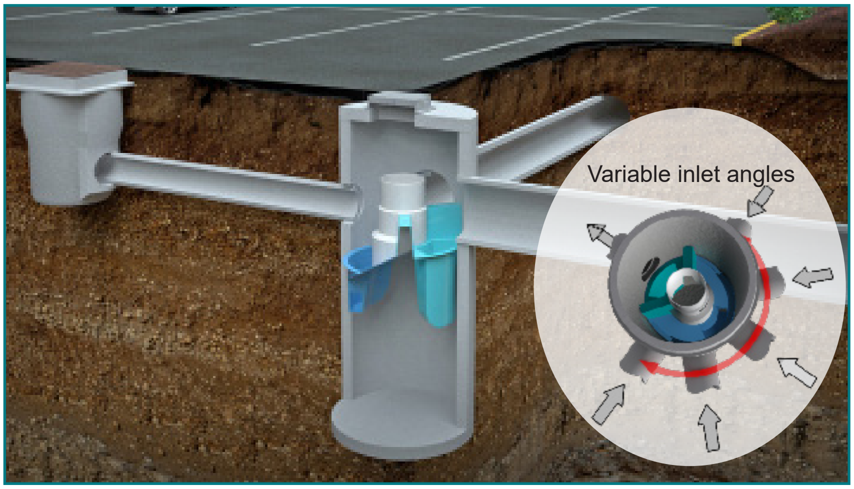


Fig 2. Works with multiple inlet pipes and grates

Inspection and Maintenance

Nobody maintains our systems better than we do. To ensure optimal, ongoing device performance, be sure to recommend Hydro International as a preferred service and maintenance provider to your clients.

Call **1 (800) 848-2706** to schedule an inspection and cleanout or learn more at **hydro-int.com/service**

Sizing Calculator for Engineers

This simple online tool will recommend the best separatror, model size and online/offline arrangement based on site-specific data entered by the user.

Go to hydro-int.com/sizing to access the tool.

Fig 3. Maintenance is done with a vactor truck

Table 1. First Defense® High Capacity Design Criteria.

First Defense® High Capacity Model Number	Diameter	Typical TSS Treatment Flow Rates		Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
		NJDEP Certified	110µm						
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd^3 / m^3)	(ft / m)	(ft / m)
FD-3HC	3 / 0.9	0.84 / 23.7	1.06 / 30.0	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.71 / 1.13
FD-4HC	4 / 1.2	1.50 / 42.4	1.88 / 53.2	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	4.97 / 1.5
FD-5HC*	5 / 1.5	2.34 / 66.2	2.94 / 83.2	20 / 566	24 / 600	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.19 / 1.5
FD-6HC	6 / 1.8	3.38 / 95.7	4.23 / 119.8	32 / 906	30 / 750	496 / 1,878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	5.97 / 1.8
FD-8HC	8 / 2.4	6.00 / 169.9	7.52 / 212.9	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 -1.8	7.40 / 2.2

***Coming soon**
[1]Contact Hydro International when larger pipe sizes are required.
[2]Contact Hydro International when custom sediment storage capacity is required.
[3]Minimum distance for models depends on pipe diameter.

Center for Environmental Systems
Stevens Institute of Technology
One Castle Point
Hoboken, NJ 07030-0000

January 9, 2016

Titus Magnanao
NJDEP
Division of Water Quality
Bureau of Non-Point Pollution Control
401-02B
PO Box 420
Trenton, NJ 08625-0420

Dear Mr. Magnanao,

Based on my review, evaluation and assessment of the testing conducted on the First Defense® HC (FDHC) Stormwater Treatment Device by Hydro International and observed by FB Environmental Associates, the test protocol requirements contained in the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" (NJDEP HDS Protocol) were met or exceeded. Specifically:

Test Sediment Feed

The mean PSD of Hydro Internationals test sediments comply with the PSD criteria established by the NJDEP HDS protocol. The Hydro International removal efficiency test sediment PSD analysis was plotted against the NJDEP removal efficiency test PSD specification. The test sediment was shown to be slightly finer than the sediment blend specified by the protocol. The Hydro International scour test sediment PSD analysis was plotted against the NJDEP removal efficiency test PSD specification and shown to be much finer than specified by the protocol.

Removal Efficiency Testing

In accordance with the NJDEP HDS Protocol, removal efficiency testing was executed on the 4-ft. laboratory unit in order to establish the ability of the FDHC to remove the specified test sediment at 25%, 50%, 75%, 100% and 125% of the target MTFR. Prior to the start of testing Hydro International reviewed existing data and decided to utilize a target MTFR of 675 gpm (1.50 cfs). This target was chosen based on the ultimate goal of demonstrating greater than 50% annualized weighted solids removal as defined in the NJDEP HDS Protocol. The flow rates, feed rates and influent concentration all met the NJDEP HDS test protocol's coefficient of variance requirements and the background concentration for all five test runs never exceeded 20 mg/L.

Scour Testing

In order to demonstrate the ability of the FDHC to be used as an online treatment device scour testing was conducted at greater than 200% of MTFR in accordance with the NJDEP HDS Protocol. The average flow rate during the online scour test was 3.24 cfs, which represents 216% of the MTFR (MTFR = 1.50 cfs). Background concentrations were 2 mg/L throughout the scour testing, which complies with the 20 mg/L maximum background concentration specified by the test protocol. Unadjusted effluent concentrations ranged from 2 mg/L to 4 mg/L with a mean of 2.1 mg/L. When adjusted for background concentrations, the effluent concentrations range from 0 to 2 mg/L with a mean of 0.1 mg/L. These results confirm that the 4-ft. FDHC did not scour at 216% MTFR and meets the criteria for online use.

Maintenance Frequency

The predicted maintenance frequency for all models is 44 months.

Sincerely,

Richard S Magee

Richard S. Magee, Sc.D., P.E., BCEE

Stormwater Solutions

Hydro International

Turning Water Around...®

December 21, 2015

Dr. Richard Magee, Sc.D., P.E., BCEE
Technical Director
New Jersey Corporation for Advanced Technology
c/o Center for Environmental Systems
Stevens Institute of Technology
One Castle Point on Hudson
Hoboken, NJ 07030

Re: Verification of First Defense® HC to NJDEP HDS Laboratory Testing Protocol

Dear Dr. Magee:

Hydro International's First Defense® HC (FDHC) vortex separator for stormwater treatment recently underwent verification testing according to the NJDEP HDS Laboratory Testing Protocol. As required by the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology", this letter serves as Hydro International's statement that all procedures and requirements identified in the aforementioned protocol and process document were met or exceeded. The 4-ft FDHC removal efficiency and scour tests conducted at Hydro International's laboratory facility in Portland, Maine were done so under the direct supervision of FB Environmental Associates. All water quality samples were analyzed by the independent analytical lab, Maine Environmental Laboratory. The removal efficiency particle size distribution was analyzed by the independent analytical laboratory, GeoTesting Express. The scour test particle size distribution was analyzed at Hydro International's facility under the supervision of FB Environmental Associates. Additionally, the preparation of the verification report and the documentation contained therein fulfill the submission requirements of the process document and protocol.

If you have any questions or comments regarding the verification of the FDHC, please do not hesitate to contact us.

Sincerely,

Lisa Lemont, CPSWQ
Business Development Manager

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Statement of Third Party Observer

STATEMENT OF THIRD PARTY OBSERVER

To: Lisa Lemont, Hydro International, Portland, Maine

From: Forrest Bell, FB Environmental Associates

Subject: Third Party Review under *Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology* (NJDEP, January 25 2013)[1]

Date: December 31, 2015

cc: Andrew Anastasio, Hydro International; Jeremy Fink, Hydro International
Margaret Burns, FB Environmental Associates

Statement of Third Party Observer

FB Environmental has served as the third-party observer for tests performed by Hydro International in October through December 2015. The tests assessed the First Defense HC Stormwater Treatment Device as a 50% Total Suspended Solids (TSS) removal device under the New Jersey Department of Environmental Protection certification. Tests were performed by Hydro International staff at their laboratory located at 94 Hutchinson Drive in Portland, Maine, to meet the standards described in *Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology* (NJDEP, January 25 2013)[1]. On May 10, 2014, we also submitted a statement of qualifications, as required by NJCAT MTD process.

A member of our staff verified compliance with the laboratory test protocol above, and our staff member was physically present to observe the full duration of all laboratory testing. We have also reviewed the data, calculations, and conclusions associated with the removal efficiency testing in the *Verification Testing Report for the First Defense® HC Stormwater Treatment Device* by Hydro International, dated December 29, 2015, and state that they conform to what we saw during our supervision as third-party observer.

Forrest Bell

Signed:

December 31, 2015

Date:

[1] Available at http://www.nj.gov/dep/stormwater/treatment.html

1 of 1

Statement of Disclosure

STATEMENT OF DISCLOSURE – THIRD PARTY OBSERVER

To: Lisa Lemont, Hydro International, Portland, Maine

From: Forrest Bell, FB Environmental Associates

Subject: Third Party Observer Statement of Disclosure under *Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology* (NJDEP, January 25 2013)[1]

Date: December 31, 2015

cc: Andrew Anastasio, Hydro International
Margaret Burns, FB Environmental Associates

Statement of Disclosure – Third Party Observer

FB Environmental has no financial conflict of interest regarding the test results of the stormwater device testing outlined in the *Verification Testing Report for the First Defense ® HC Stormwater Treatment Device* by Hydro International, dated December 29, 2015.

Disclosure Record

FB Environmental has provided the service of third party observer for tests performed by Hydro International in October through December of 2015. The tests assessed the First Defense HC Stormwater Treatment Device as a 50% Total Suspended Solids (TSS) removal device under the New Jersey Department of Environmental Protection certification as outlined in the *Verification Testing Report for the First Defense ® HC Stormwater Treatment Device* by Hydro International, dated December 29, 2015. Beyond this, FB Environmental and Hydro International have no relationships that would constitute a conflict of interest, as outlined in *Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology* (NJDEP 2013). For example, we have no ownership stake, do not receive commissions, do not have licensing agreements, and do not receive funds or grants beyond those associated with the testing program.

Forrest Bell

December 31, 2015

Signed: Date:

[1] Available at http://www.nj.gov/dep/stormwater/treatment.html

1 of 1

APPENDIX D

Operation and Maintenance Plans:

1. **Stormwater Report Checklist**
2. **Construction Operation and Maintenance Plan / Construction Pollution Prevention Plan with Inspection Schedule and Evaluation Checklist**
3. **Long Term Source Control / Pollution Prevention Plan & Operation and Maintenance Plan with Inspection Schedule and Evaluation Checklist**

Merrill
Engineers and Land Surveyors

August 31, 2018

Construction Phase
Operation & Maintenance Plan

#1672-1726 Canton Avenue, Milton

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CONSTRUCTION PHASE
OPERATION AND MAINTENANCE PLAN
Dated: August 31, 2018

Wolcott Woods
1672-1726 Canton Avenue
Milton, MA

The structural and stabilization practices utilized on site correspond with plans entitled "Wolcott Woods, Great Estate Planned Unit Development, 1672-1726 Canton Avenue, Milton, Massachusetts", dated August 31, 2018 as revised hereinafter referred to as the Site Plans.

Responsible Party for Operation and Maintenance Contact Information:

Wolcott Residential, LLC
80 Beharrell Street, Suite E
Concord, Massachusetts 01742
P: 781.229.4700

Source of Funding:

Operation and Maintenance of this stormwater management system will be the responsibility of the property owner to include its successor and/or assigns, as the same may appear on record with the appropriate register of deeds.

Project Description:

The project proponent, Wolcott Residential, LLC, proposes to redevelop multiple parcels containing approximately 47± acres of land along Canton Avenue in Milton, Massachusetts known as the Carberry Property. The proposed redevelopment consists of an active adult residential community containing 54 dwelling units including razing several structures, rehabilitation of three existing structures (Manor House, Devens House and Wolcott House), construction of thirty-one (31) new buildings consisting of one or two unit homes, preservation of open space, approximately 3,784 linear feet of roadway, associated driveways, gravel access and parking to the Department of Conservation and Recreation (DCR) property, stormwater management facilities, gravity sewer collection system with connection to the municipal wastewater collection system, utility service connections and associated infrastructure.

The subject property is located on the south side of Canton Avenue and consists of five (5) parcels identified as Parcel ID No. M-2-2, M-2-40, M-2-4, M-2-29A and M-2-29 as shown on the Town of Milton Assessors maps. The property is located within the Residence AA District. The property is bordered by developed residentially zoned properties to the north, west and southwest while abutting DCR property to the east and southeast. Refer the Figure-1 USGS Locus Map for the location of the parcel. The property consists of a total of 47.06± acres of which approximately 46.78± acres is upland. An intermittent stream located within a manmade channel lined with high stonewalls flows through the site in a northerly direction towards Carberry Lane. The intermittent stream and associated limits of inland bank and bordering vegetated wetlands were reviewed and confirmed through an Order of Resource Area Delineation (DEP File No. 046-0512) issued on December 20, 2016. The site is not located within a Zone A, or Land Subject to Flooding resource area as shown on the current FEMA Flood Map (25023C0111J, dated July 17, 2012). Refer to Figure-2 FEMA Flood Map.

Pre-Development Condition

The site presently consists of several residential homes, barns and outbuildings. The remainder of the site is comprised of wooded areas and open fields surrounding the residential homes. The site's topography is gentle to moderate with slopes ranging from 0 to 35 percent draining towards Carberry Lane via the intermittent stream to the north and on-site natural depression areas to the west along Canton Avenue. The site has frontage along Canton Avenue with three access drives.

Soils

Soil types were obtained from NRCS mapping and were found to vary from hydrologic soil group (HSG) A to D soils. In order to confirm the soil class, groundwater depth and characteristics of these soils, test pits were performed on site in December 2015 and in March 2017. Based on soil textures encountered at the time of testing, the overall site was found to have sandy soils (HSG A) along Canton Avenue while transitioning into a denser gravel till (HSG C/D) in the upper or rear portions of the site. Refer to Figure-4 NRCS Soils Map.

Post-Development Condition

Under the post development condition, the proposed impervious surface runoff will be discharged into multiple infiltration systems, either subsurface chambers, bioretention basin, open infiltration basin or rain gardens with pretreatment. These drainage facilities will collect and treat the proposed impervious surfaces through first defense pre-treatment units or a stone diaphragm prior to discharge to the infiltration facilities. As portions of the project are located within an area subject to protection under the Wetlands Protection Act, M.G.L. c. 131, Section 40 and are considered a redevelopment project, the stormwater management systems were designed to be in compliance with the DEP Stormwater Management Regulations (SMR) to the extent practicable.

Erosion and Sedimentation Control Best Management Practices:

Structural Practices:

1) **Silt Sock Erosion Control Barrier** – A silt sock barrier will be constructed along downward slopes at the limit of work in locations shown on the plans. This control will be installed prior to major soil disturbance on the site. The sediment silt sock barrier should be installed as shown on the Construction Detail Plan.

Silt Sock Installation Requirements

a) Locate the silt sock where identified on the plans.

b) The silt sock line should be nearly level through most of its length to impound a broad, temporary pool. The last 10 to 20 feet at each end of the silt sack should be swung slightly uphill (approximately 0.5 feet in elevation) to provide storage capacity.

c) The silt sock shall be staked every 8 linear feet with 1-inch by 1-inch stakes.

d) Sediment silt socks should be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized through one growing season. Retained sediment must be removed and properly disposed of, or mulched and seeded.

Silt Sock Inspection/Maintenance

a) Silt socks should be inspected immediately after each rainfall event of 1-inch or greater, and at least daily during prolonged rainfall. Inspect the depth of sediment, fabric tears, and to see that the stakes are firmly in the ground. Repair or replace as necessary.

b) Remove sediment deposits promptly after storm events to provide adequate storage volume for the next rain and to reduce pressure on the fence. Sediment will be removed from behind the sediment fence when it becomes about ½ foot deep at the silt sock. Take care to avoid undermining fence during cleanout.

c) If the fabric tears, decomposes, or in any way becomes ineffective, replace it immediately.

d) Remove all silt sock materials after the contributing drainage area has been properly stabilized. Sediment deposits remaining after the fabric has been removed should be graded to conform with the existing topography and vegetated.

2) **Sediment Fence Control Barrier** – A sediment fence barrier will be installed along the limit of work in areas where silt sock barriers can not be used. This control will be installed prior to major soil disturbance on the site. The sediment fence should be installed as shown on the Erosion Control Detail Plan and be Amoco woven polypropylene 1198 or equivalent.

Sediment Fence Design/Installation Requirements

a) Locate the fence where necessary.

b) The fence line should be nearly level through most of its length to impound a broad, temporary pool. The last 10 to 20 feet at each end of the fence should be swung slightly uphill (approximately 0.5 feet in elevation) to provide storage capacity.

c) Excavate a trench approximately 8 inches deep and 4 inches wide, or a V-trench; along the line of the fence, upslope side.

d) Fasten support wire fence (14 gauge with 6-inch mesh) securely to the upslope side of the fence posts with wire ties or staples. Wire should extend 6 inches into the trench.

e) Attach continuous length of fabric to upslope side of fence posts. Avoid joints, particularly at low points in the fence line. Where joints are necessary, fasten fabric securely to support posts and overlap to the next post.

f) Place the bottom one foot of fabric in the trench. Backfill with compacted earth or gravel.

g) Filter cloth shall be fastened securely to the woven wire fence with ties spaced every 24 inches at the top, mid-section, and bottom.

h) Sediment fences should be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized through one growing season. Retained sediment must be removed and properly disposed of, or mulched and seeded.

Sediment Fence Inspection/Maintenance

a) Silt fences should be inspected immediately after each rainfall event of 1-inch or greater, and at least daily during prolonged rainfall. Inspect the depth of sediment, fabric tears, if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground. Repair or replace as necessary.

b) Remove sediment deposits promptly after storm events to provide adequate storage volume for the next rain and to reduce pressure on the fence. Sediment will be removed from behind the sediment fence when it becomes about ½ foot deep at the fence. Take care to avoid undermining fence during cleanout.

c) If the fabric tears, decomposes, or in any way becomes ineffective, replace it immediately.

d) Remove all fencing materials after the contributing drainage area has been properly stabilized. Sediment deposits remaining after the fabric has been removed should be graded to conform with the existing topography and vegetated.

3) **Stabilized Construction Entrances** – A stabilized construction entrance will be placed at the existing central driveway at Canton Avenue for Phase One construction. The following phases shall install a stabilized construction entrance at the access point to each phase. The construction entrances will keep mud and sediment from being tracked off the construction site onto surrounding streets by vehicles leaving the site. The stabilized construction entrance will be installed prior to any major soil disturbance on site. The construction entrances will be graded to contain stormwater runoff from the entrance to prevent sediment from washing onto the adjacent ground

surface. The stabilized construction entrances shall be constructed as shown on the Site Plans.

Construction Entrance Installation Requirements

a) Grade foundation of construction entrance with slightly concave shape to contain runoff within the entrance to prevent sediment from washing onto the adjacent ground surface.

b) Stone for a stabilized construction entrance shall consist of 1 to 3-inch stone placed on a stable foundation.

c) Pad dimensions: The minimum length of the gravel pad should be 30 feet. The pad should extend the full width of the proposed roadway, or wide enough so that the largest construction vehicle will fit in the entrance with room to spare; whichever is greater.

d) A geotextile filter fabric shall be placed between the stone fill and the earth surface below the pad to reduce the migration of soil particles from the underlying soil into the stone and vice versa. The filter fabric should be Amoco woven polypropylene 1198 or equivalent.

e) Washing: If the site conditions are such that the majority of mud is not removed from the vehicle tires by the gravel pad, then the tires should be washed before the vehicle enters the road or street. The wash area shall be located at the stabilized construction entrance.

f) Water employed in the washing process shall be directed to the temporary sedimentation basin/dewatering area as shown on the plans prior to discharge. Sediment should be prevented from entering any watercourses.

Construction Entrance Maintenance

a) The entrance should be maintained in a condition that will prevent tracking or flowing of sediment onto Canton Avenue. This may require periodic topdressing with additional stone

b) The construction entrance and sediment disposal area shall be inspected weekly and after heavy rains or heavy use.

c) Mud and sediment tracked or washed onto public road shall be immediately removed by sweeping.

d) Once mud and soil particles clog the voids in the gravel and the effectiveness of the gravel pad is no longer satisfactory, the pad must be topdressed with new stone. Replacement of the entire pad may be necessary when the pad becomes completely clogged.

e) If washing facilities are used, the temporary sedimentation basin/dewatering area should be cleaned out as often as necessary to assure that adequate trapping efficiency and storage volume is available. Any water pumped from the temporary sedimentation basin shall be directed into a sediment dirt bag or equivalent inlet protection prior to discharge. Discharge should not be across the disturbed construction site but rather to undisturbed areas.

f) The pad shall be reshaped as needed for drainage and runoff control.

g) Broken road pavement on Canton Avenue shall be repaired immediately.

h) All temporary erosion and sediment control measures shall be removed within 30 days after final site stabilization is achieved or after the temporary practices are no longer needed and only following approval by the Engineering Department or their representative. Trapped sediment shall be removed or stabilized on site. Disturbed soil areas resulting from removal shall be permanently stabilized.

4) **Temporary Sediment Basin** – A temporary sediment basins shall be constructed in locations as determined by the Site Contractor as necessary. The temporary sediment basins will handle storm water, filtering out sediment until the permanent stormwater drainage system is functioning properly. The temporary sediment basins will be lined with sediment erosion barrier controls.

Sediment Basin Design/Installation Requirements

a) Divert runoff from undisturbed areas away from basins.

b) The sediment basins should have a minimum volume based on ½ inch of storage for each acre of drainage area.

c) The length-to-width ratio should be 2:1 or greater; divert inflow to upper end of basin to avoid short-circuiting flow. Length is defined as the average distance from the inlet to the outlet of the trap.

d) Utilize side slopes of 3:1.

e) The sediment basins should be located as close to the sediment source as site conditions permit considering soils, pool area, dam length, and spillway conditions.

f) Line bottom with gravel and stabilize as soon as possible.

Sediment Basin and Swale Inspection/Maintenance

a) The sediment basins should be readily accessible for maintenance and sediment removal. The sediment basins should remain in operation and be properly maintained until the site area is permanently stabilized by vegetation and/or when permanent structures are in place.

b) Inspect the sediment basins after each significant rainfall.

c) Remove and properly dispose of sediment when it accumulates to one-half design volume (level marked by reference stake). The effectiveness of a sediment pond is based less on its size than on regular sediment removal.

d) Check embankment and outlet for erosion damage.

e) Check embankment for: settlement, seepage, or slumping along the toe. Repair immediately. Remove trash and other debris from principal spillway and pool area.

f) Clean or replace gravel when sediment pool does not drain properly.

5) **Inlet Protection** – Inlet Protection will be utilized around the existing catch basin grates as shown on the site plans. The inlet protection will prevent any sediment from entering the street(s) and or site's closed drainage system. Siltsack or equivalent will be utilized for the inlet protection. Siltsack is manufactured by ACF Environmental. The telephone number is 1-800-437-6746. Regular flow siltsack will be utilized, and if it does not allow enough storm water flow, hi-flow siltsack will be utilized.

Silt Sack (or equivalent) Inlet Protection Maintenance Requirements

a) The silt sack trapping device and the catch basin should be inspected after every rain storm and repairs made as necessary.

b) Sediment should be removed from the silt sack after the sediment has reached a maximum depth of one-half the depth of the trap.

c) Sediment should be disposed of in a suitable area and protected from erosion by either structural or vegetative means. Sediment material removed shall be disposed of in accordance with all applicable local, state, and federal regulations.

d) The silt sack must be replaced if it is ripped or torn in any way.

e) Temporary traps should be removed and the area repaired as soon as the contributing drainage area to the inlet has been completely stabilized.

Stabilization Practices:

Stabilization measures shall be implemented as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased, with the following exceptions.

- Where the initiation of stabilization measures by the 14^{th} day after construction activity temporary or permanently cease is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.
- Where construction activity will resume on a portion of the site within 21 days from when activities ceased, then stabilization measures do not have to be initiated on that portion of the site by the 14^{th} day after construction activity temporarily ceased.

1) **Temporary Seeding** – Temporary seeding will allow a short-term vegetative cover on disturbed site areas that may be in danger of erosion. Temporary seeding will be done at stock piles and disturbed portions of the site where construction activity will temporarily cease for at least 21 days. The temporary seedings will stabilize cleared and unvegetated areas that will not be brought into final grade for several weeks or months.

Temporary Seeding Planting Procedures

a) Planting should preferably be done between April 1st and June 30th, and September 1st through September 31st. If planting is done in the months of July and August, irrigation may be required. If planting is done between October 1st and March 31st, mulching should be applied immediately after planting. If seeding is done during the summer months, irrigation of some sort will probably be necessary.

b) Before seeding, install structural practice controls. Utilize Amoco supergro or equivalent.

c) The seedbed should be firm with a fairly fine surface. Perform all cultural operations across or at right angles to the slope. A minimum of 2 to 4-inches of tilled topsoil is required. The topsoil must have a sandy loam to silt loam texture with 15% to 20% organic content.

d) Apply uniformly 2 tons of ground limestone per acre (100 lbs. Per 1,000 sq.ft.) or according to soil test. Apply uniformly 10-10-10 analysis fertilizer at the rate of 400 lbs. per acre (14 lbs. per 1,000 sq.ft.) or as indicated by soil test. Forty percent of the nitrogen should be in organic form. Work in lime and fertilizer to a depth of 4-inches using any suitable equipment.

e) Select the appropriate seed species for temporary cover from the following table.

Species	Seeding Rate (lbs/1,000 sq.ft.)	Seeding Rate (lbs/acre)	Recommended Seeding Dates	Seed Cover required
Annual Ryegrass	1	40	April 1st to June 1st August 15th to Sept. 15th	¼ inch
Foxtail Millet	0.7	30	May 1st to June 30th	½ to ¾ inch
Oats	2	80	April 1st to July 1st August 15th to Sept. 15th	1 to 1-½ inch
Winter Rye	3	120	August 15th to Oct. 15th	1 to 1-½ inch

f) Apply the seed uniformly by hydroseeding, broadcasting, or by hand.

g) Use effective mulch, such as clean grain straw; tacked and/or tied with netting to protect seedbed and encourage plant growth.

Temporary Seeding Maintenance

a) Inspect within 6 weeks of planting to see if stands are adequate. Check for damage within 24 hours of the end to a heavy rainfall, defined as a 2-year storm event (i.e., 3.35 inches of rainfall within a twenty-four hour period). Stands should be uniform and dense. Reseed and mulch damaged and sparse areas immediately. Tack or tie down mulch as necessary.

b) Seeds should be supplied with adequate moisture. Furnish water as needed, especially in abnormally hot or dry weather. Water application rates should be controlled to prevent runoff.

2) **Geotextiles** - Geotextiles such as jute netting will be used in combination with other practices such as mulching to stabilize slopes. The following geotextile materials or equivalent are to be utilized for structural and nonstructural controls as shown in the following table.

Practice	Manufacturer	Product	Remarks
Sediment Fence	Amoco	Woven polypropylene 1198 or equivalent	0.425 mm opening
Construction Entrance	Amoco	Woven polypropylene 2002 or equivalent	0.300 mm opening
Outlet Protection	Amoco	Nonwoven polypropylene 4551 or equivalent	0.150 mm opening
Erosion Control (slope stability)	Amoco	Supergro or equivalent	Erosion control revegetation mix, open polypropylene fiber on degradable polypropylene net scrim

Amoco may be reached at (800) 445-7732

Geotextile Installation

a) Netting and matting require firm, continuous contact between the materials and the soil. If there is no contact, the material will not hold the soil and erosion will occur underneath the material.

Geotextile Maintenance

a) In the field, regular inspections should be made to check for cracks, tears, or breaches in the fabric. The appropriate repairs should be made.

3) **Mulching and Netting** – Mulching will provide immediate protection to exposed soils during the period of short construction delays, or over winter months through the application of plant residues, or other suitable materials, to exposed soil areas. In areas, which have been seeded either for temporary or permanent cover, mulching should immediately follow seeding. On steep slopes, mulch must be supplemented with netting. The preferred mulching material is straw.

Mulch (Straw) Installation

a) Straw has been found to be one of the most effective organic mulch materials. The specifications for straw are described below, but other material may be appropriate. The straw should be air-dried; free of undesirable seeds & coarse materials. The application rate per 1,000 sq.ft. is 90-100 lbs. (2-3 bales) and the application rate per acre is 2 tons (100-120 bales). The application should cover about 90% of the surface. The use of straw mulch is appropriate where mulch is maintained for more than three months. Straw mulch is subject to wind blowing unless anchored, is the most commonly used mulching material, and has the best microenvironment for germinating seeds.

Mulch Maintenance

a) Inspect after rainstorms to check for movement of mulch or erosion. If washout, breakage, or erosion occurs, repair surface, reseed, remulch, and install new netting.

b) Straw or grass mulches that blow or wash away should be repaired promptly.

c) If plastic netting is used to anchor mulch, care should be taken during initial mowings to keep the mower height high. Otherwise, the netting can wrap up on the mower blade shafts. After a period of time, the netting degrades and becomes less of a problem.

d) Continue inspections until vegetation is well established.

4) **Land Grading** – Grading on fill slopes, cut slopes, and stockpile areas will be done with full siltation controls in place.

Land Grading Requirements

a) Areas to be graded should be cleared and grubbed of all timber, logs, brush, rubbish, and vegetated matter that will interfere with the grading operation. Topsoil should be stripped and stockpiled for use on critical disturbed areas for establishment of vegetation. Cut slopes to be topsoiled should be thoroughly scarified to a minimum depth of 3-inches prior to placement of topsoil.

b) Fill materials should be generally free of brush, rubbish, rocks, and stumps. Frozen materials or soft and easily compressible materials should not be used in fills intended to support buildings, parking lots, roads, conduits, or other structures.

c) Earth fill intended to support structural measures should be compacted to a minimum of 90 percent of Standard Proctor Test density with proper moisture control, or as otherwise specified by the engineer responsible for the design. Compaction of other fills should be to the density required to control sloughing, erosion or excessive moisture content. Maximum thickness of fill layers prior to compaction should not exceed 9 inches.

d) The uppermost one foot of fill slopes should be compacted to at least 85 percent of the maximum unit weight (based on the modified AASHTO compaction test). This is usually accomplished by running heavy equipment over the fill.

e) Fill should consist of material from borrow areas and excess cut will be stockpiled in areas shown on the Site Plans. All disturbed areas should be free draining, left with a neat and finished appearance, and should be protected from erosion.

Land Grading Stabilization Maintenance

a) All slopes should be checked periodically to see that vegetation is in good condition. Any rills or damage from erosion and animal burrowing should be repaired immediately to avoid further damage.

b) If seeps develop on the slopes, the area should be evaluated to determine if the seep will cause an unstable condition. Subsurface drains or a gravel mulch may be required to solve seep problems. However, no seeps are anticipated.

c) Areas requiring revegetation should be repaired immediately. Control undesirable vegetation such as weeds and woody growth to avoid bank stability problems in the future.

5) **Topsoiling** – Topsoiling will help establish vegetation on all disturbed areas throughout the site during the seeding process. The soil texture of the topsoil to be used will be a sandy loam to a silt loam texture with 15% to 20% organic content.

Topsoiling Placement

a) Topsoil should not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed seeding.

b) Do not place topsoil on slopes steeper than 2.5:1, as it will tend to erode.

c) If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method is to actually work the topsoil into the layer below for a depth of at least 6 inches.

6) **Permanent Seeding** – Permanent Seeding should be done immediately after the final design grades are achieved. Native species of plants should be used to establish perennial vegetative cover on disturbed areas. The revegetation should be done early enough in the fall so that a good cover is established before cold weather comes and growth stops until the spring. A good cover is defined as vegetation covering 75 percent or more of the ground surface.

Permanent Seeding Seedbed Preparation

a) In infertile or coarse-textured subsoil, it is best to stockpile topsoil and re-spread it over the finished slope at a minimum 2 to 6-inch depth and roll it to provide a firm seedbed. The topsoil must have a sandy loam to silt loam texture with 15% to 20% organic content. If construction fill operations have left soil exposed with a loose, rough, or irregular surface, smooth with blade and roll.

b) Loosen the soil to a depth of 3-5 inches with suitable agricultural or construction equipment.

c) Areas not to receive topsoil shall be treated to firm the seedbed after incorporation of the lime and fertilizer so that it is depressed no more than ½ - 1 inch when stepped on with a shoe. Areas to receive topsoil shall not be firmed until after topsoiling and lime and fertilizer is applied and incorporated, at which time it shall be treated to firm the seedbed as described above.

Permanent Seeding Grass Selection/Application

a) Select an appropriate cool or warm season grass based on site conditions and seeding date. Apply the seed uniformly by hydro-seeding, broadcasting, or by hand. Uniform seed distribution is essential. On steep slopes, hydroseeding may be the most effective seeding method. Surface roughening is particularly important when preparing slopes for hydroseeding.

b) Lime and fertilize. Organic fertilizer shall be utilized in areas within the 100 foot buffer zone to a wetland resource area.

c) Mulch the seedings with straw applied at the rate of ½ tons per acre. Anchor the mulch with erosion control netting or fabric on sloping areas. Amoco supergro or equivalent should be utilized.

Permanent Seeding Inspection/Maintenance

a) Frequently inspect seeded areas for failure and make necessary repairs and reseed immediately. Conduct or follow-up survey after one year and replace failed plants where necessary.

b) If vegetative cover is inadequate to prevent rill erosion, overseed and fertilize in accordance with soil test results.

c) If a stand has less than 40% cover, reevaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand following seedbed preparation and seeding recommendations, omitting lime and fertilizer in the absence of soil test results. If the season prevents resowing, mulch or jute netting is an effective temporary cover.

d) Seeded areas should be fertilized during the second growing season. Lime and fertilize thereafter at periodic intervals, as needed. Organic fertilizer shall be utilized in areas within the 100-foot buffer zone to a wetland resource area.

Dust Control:

Dust control will be utilized throughout the entire construction process of the site. For example, keeping disturbed surfaces moist during windy periods will be an effective control measure, especially along vehicle circulation paths. The use of dust control will prevent the movement of soil to offsite areas. However, care must be taken to not create runoff from excessive use of water to control dust. The following are methods of dust control that may be used on-site:

- Vegetative Cover – The most practical method for disturbed areas not subject to traffic.
- Calcium Chloride – Calcium chloride may be applied by mechanical spreader as loose, dry granules or flakes at a rate that keeps the surface moist but not so high as to cause water pollution or plant damage.

- Sprinkling – The site may be sprinkled until the surface is wet. Sprinkling will be effective for dust control on haul roads and other traffic routes.
- Stone – Stone will be used to stabilize construction roads; will also be effective for dust control.

The general contractor shall employ an on-site water vehicle for the control of dust as necessary.

Non-Stormwater Discharges:

The construction de-watering and all non-stormwater discharges will be directed into a sediment dirt bag (or equivalent inlet protection) or a sediment basin. Sediment material removed shall be disposed of in accordance with all applicable local, state, and federal regulations.

The developer and site general contractor will comply with the E.P.A.'s Final General Permit for Construction De-watering Discharges, (N.P.D.E.S., Section 402 and 40 C.F.R. 122.26(b)(14)(x).

Soil Stockpiling:

Topsoil and subsoil from the roadway grading will be stockpiled in locations shown on the plans.

Stockpile Material Construction Procedure

1) Topsoil and subsoil that are stripped will be stockpiled for later distribution on disturbed areas.
2) The stockpiles will be located as shown on the plans. These locations will allow them to not interfere with work on the site.
3) Seed the stockpiles with a temporary erosion control mix if the stockpile is to remain undisturbed for more than 30 days. The stockpiles must be stable and the side slopes should not exceed 2:1.
4) Sediment erosion control measures should be placed surrounding each stockpile.
5) As needed, the stockpiled topsoil and subsoil are redistributed throughout the site.

Pollution Prevention:

Spill Prevention and Response:

The site supervisor or their representative shall be present on the job site at all times during the course of work and shall be present during the delivery, removal of any liquid/chemical materials to or from the job site. They will also be present during any refueling practices. All subcontractors will be notified of their responsibilities in writing. In the event a spill occurs, the site supervisor shall be notified immediately.
The site supervisor shall have in place a spill prevention plan and resources to contain and clean up any potential spills in a timely manner. Refer to the attached Spill

Containment & Management Plan, including Spill Report, Emergency Response Equipment Inventory, and Emergency Notification and phone numbers.

Fueling and Maintenance of Equipment or Vehicles:

The site supervisor shall produce a written document received by all subcontractors and employees that delineates their responsibilities on site. This document shall include language that shall permit the maintenance of vehicles only in designated locations on the job site. The site supervisor shall document receipt of these instructions by obtaining the signatures of subcontractors and individuals that may enter the site and the date in which they were notified of their responsibilities.

Several types of vehicles and equipment will be used on-site throughout the project, including graders, scrapers, excavators, loaders, paving equipment, rollers, trucks and trailers, backhoes, and forklifts. Vehicles requiring refueling or lubrication shall be brought to a designated portion of the site away from environmentally sensitive areas (such as storm drains, steep slopes, etc.) or shall utilize temporary drip protection measures at the location of fueling. The operator shall take precautions to ensure that drips, spills or seeps do not enter the ground. The use of absorbent towels beneath the fuel tank is recommended. Absorbent, spill cleanup materials and spill kits should be kept on site. Refueling or maintenance of equipment in locations other than those designated for such activity shall be performed under the supervision of the site supervisor or his/her designee. The site supervisor shall have a fuel spill plan and measures on site to initiate containment and clean-up in the event a fuel spill occurs.

1. Fueling operations shall take place in designated area(s) as shown on site maps. Provide temporary drip protection during fueling operations which take place outside of designated area(s). Materials necessary to address a spill shall be made readily available in a location known to the site supervisor or his/her designee.
2. Fueling operation procedures shall be in effect throughout the project duration.

Maintenance Requirements -

1. Vehicles and equipment will be inspected on each day of use. Leaks will be repaired immediately, or the problem vehicle or equipment will be removed from the project site.
2. All emergency response equipment listed in the Emergency Response Equipment Inventory shall be made readily available and kept in a designated location known to the site supervisor or his/her designee. All such materials shall be replenished as necessary to the listed amounts.

Washing of Equipment and Vehicles:

The site supervisor shall produce a written document received by all subcontractors and employees that delineates their responsibilities on site. The site supervisor shall document receipt of these instructions by obtaining the signatures of subcontractors and individuals that may enter the site and the date in which they were notified of their responsibilities. This document shall include language that shall not permit vehicle washing on the job site. Concrete trucks shall be exempt from this rule. Concrete truck cleaning shall be confined within the work area and conducted in a manner to prevent water drainage beyond the specified area of work.

Concrete truck washout shall be conducted in designated areas only and shall not be discharged in areas which would allow wash water to leave the site or enter protected areas.

Maintenance Requirements -

1. The site supervisor shall maintain a log of individuals receiving these instructions.

Storage, Handling, and Disposal of Construction Products, Materials, and Wastes:

Building products stored on site shall be kept in designated materials storage areas as shown on the site map(s). Storage areas shall properly contain materials and prevent materials or their containers/wrappers from being strewn about the site. Any leaking containers shall be removed and properly disposed of immediately. Weather sensitive materials shall be safely stored in closed temporary containers as necessary.

1. Place all materials being stored for future use in designated storage areas.
2. Place all weather sensitive materials in closed temporary containers as necessary. Care should be taken to store materials in accordance with manufacturer's recommendations and to avoid storing combinations of materials which may cause a noxious, volatile or otherwise dangerous condition.
3. All non-hazardous solid waste shall be disposed of in a trash receptacle (dumpster) which shall be removed and disposed of at an approved land fill.

Maintenance Requirements -

1. The site supervisor shall inspect the designated storage areas weekly and after storm events as well as any portions of the site under construction to ensure that all materials are properly stored. The storage areas will be kept clean, well-organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.

Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials

The use of pesticides and herbicides is not currently anticipated for this site. Fertilizers and landscape materials will be used to stabilize slopes and other disturbed areas.

1. Store all fertilizers and landscape materials in designated secure locations. Store all weather sensitive materials in closed containers in accordance with manufacturer's recommendations.

Maintenance Requirements

1. The site supervisor shall inspect the designated storage areas weekly as well as any portions of the site under construction to ensure that all materials are properly stored. Storage issues shall be immediately addressed.

Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

Storage of diesel fuel, oil hydraulic fluids and other petroleum products/chemicals shall be in a secure area protected from the outside elements.

Refueling and maintenance for vehicles or equipment shall occur either within the designated area or shall utilize temporary drip protection measures at the location of fueling. The site supervisor shall have a fuel spill plan and measures on site to initiate containment and clean-up in the event a fuel spill occurs.

Refueling or maintenance of equipment in locations other than those designated for such activity shall be performed under the supervision of the site supervisor or his/her designee and shall employ drip pans or other suitable means of preventing fuel, hydraulic fluid, etc. from spilling or being otherwise carried offsite or into protected areas.

Hazardous or Toxic Waste

(Note: Examples include paints, solvents, petroleum-based products, wood preservatives, additives, curing compounds, acids.)

Hazardous or toxic waste associated with paints, solvents, petroleum-based products, wood preservatives, additives, curing compounds, acids shall be stored in sealed containers to prevent leakage and corrosion, and which are labeled in accordance with applicable Resource Conservation and Recover Act (RCRA) and all other applicable federal, state and local requirements.

Hazardous or toxic waste shall be collected in approved containers and disposed of in accordance with municipal, state and federal regulations.

Hazardous and toxic waste shall not be disposed of in solid waste containers intended for non-hazardous construction debris.

Maintenance Requirements

1. The site supervisor shall inspect all portions of the project under construction weekly and after storm events to ensure that all hazardous or toxic materials are stored and disposed of in accordance with the practices detailed above and shall immediately correct any improper storage or disposal practices.

Construction and Domestic Waste:

(Note: Examples include packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, styrofoam, concrete, and other trash or building materials.)

All construction and domestic waste shall be collected and disposed of into dumpsters. Dumpsters will be placed away from stormwater conveyances and drains, and meet all federal, state, and municipal regulations. Only trash and construction debris from the site will be deposited in the dumpster. No construction materials will be buried on-site. Any overflow from containers/dumpsters shall be cleaned up immediately. All personnel will be instructed regarding the correct disposal of trash and construction debris. Notices that state these practices will be posted in the job site trailer and the individual who manages day-to-day operations will be responsible for seeing that these practices are followed.

Recyclable waste material shall be stored in an appropriate container or in a designated location on site until it can be removed.

1. Dumpsters and recyclable waste material containers shall be located as needed throughout the site.

Maintenance Requirements

1. The site supervisor shall inspect all dumpsters and containers to confirm that construction and domestic waste is properly contained and shall also ascertain that waste is being picked up in a timely manner to ensure that no receptacles are overflowing. Pick-up schedules shall be modified, or the number of receptacles shall be increased as needed.

Sanitary Waste

Sanitary facilities (portable toilets) will be provided at the site throughout the construction phase. The portable toilets will be located away from a concentrated flow paths or traffic flow.

Sanitary facilities will be brought to the site at the start of construction.

Maintenance Requirements

1. If necessary, the site supervisor shall execute a contract with a vendor to supply and maintain portable toilets throughout the site for the project duration. The portable toilets shall be inspected weekly for evidence of leaking holding tanks. Toilets with leaking holding tanks will be removed from the site and replaced with new portable toilets. The site supervisor shall determine if a sufficient number of toilets are present to meet staffing levels and shall ensure that the toilets are regularly and properly maintained.

Washing of Applicators and Containers used for Paint, Concrete or Other Materials

Concrete washout shall be restricted to designated areas only. Paints, form release oils, curing compounds, etc. shall be recycled and/or disposed of utilizing appropriate containers in accordance with manufacturer's recommendations and EPA guidelines.

1. Direct all wash water into a leak-proof container or leak-proof pit at the appropriate designated location. The washout location shall be designated before concrete pours commence. The container or pit must be designed so that no overflow can occur due to inadequate sizing or precipitation. Concrete trucks shall wash out only at washout pit or container such as a portable roll-off washout pit.
2. Signs will be posted marking the location of the washout area to ensure that the concrete and other equipment operators use the proper facility. Concrete pours or other material application will not be conducted during or before an anticipated storm event.
3. Provide suitable containers for recycling or disposal for cleanup of paints, form release oils, curing compounds, etc.

Maintenance Requirements

1. The site supervisor shall inspect concrete washout pits (or other acceptable facility) daily to ensure that they are properly maintained. Washout pits shall be cleaned out when the area is filled to 75% of holding capacity. If necessary, wash water in a washout pit shall be vacuumed off and the hardened concrete broken up and recycled. Wash water and broken up concrete shall be properly disposed of at

a suitable facility. If necessary, the washout pit shall be repaired and relined with plastic prior to continued use.

2. Containers for waste paint, form release oil, curing compounds, etc. shall be sealed and removed from the site and properly disposed of at a suitable facility. Empty containers shall replace those being removed for disposal.

Fertilizers

Fertilizers shall be used only as necessary to establish vegetative stabilized slopes and disturbed areas. Apply at recommended rates. Use only slow release fertilizers to minimize discharge of nitrogen or phosphorous.

1. Store all fertilizers in designated locations. Store all weather sensitive materials in closed containers in accordance with manufacturer's recommendations.
2. To prevent accidental release of fertilizers, the site supervisor shall attempt to coordinate delivery of fertilizers to coincide with application and reduce the need to warehouse large quantities on-site.
3. Avoid applying before heavy rains that could cause excess nutrients to be discharged.
4. Never apply to frozen ground or apply to stormwater conveyance channels with flowing water.
5. Follow all other federal, state, and local requirements regarding fertilizer applications.

Maintenance Requirements

1. Site supervisor shall make regular inspections to ensure that fertilizer is being applied at proper rates and that all perimeter controls are in place and properly maintained to control runoff which may contain fertilizer.

Inspection and Corrective Action:

Operator personnel must inspect the construction site at least once every 7 calendar days and within 24 hours of a storm event of ½-inch or greater. The owner shall be responsible to secure the services of a design professional or similar "qualified person" (inspector) on an on-going basis throughout all phases of the project. The inspector should review the erosion and sediment controls with respect to the following:

- Whether or not the measure was installed/performed correctly.
- Whether or not there has been damage to the measure or ineffective controls since it was installed or performed.
- What corrective actions should be done to correct any problems with the measure.

The inspector should complete the Stormwater Management Best Management Practices Inspection Schedule and Evaluation Checklist – Construction Phase, as attached or provided in the Site's Stormwater Pollution Prevention Plan, for documenting the findings and should request the required maintenance or repair for the pollution prevention measures when the inspector finds that it is necessary for the measure to be effective. The inspector should notify the appropriate person to make the changes.

It is essential that the inspector document the inspection of the pollution prevention measures. These records will be used to request maintenance and repair and to prove that the inspection and maintenance were performed.

Spill Containment and Management Plan

August 31, 2018

Initial Notification

In the event of a spill, the facility manager will be notified immediately.

Facility Managers (name) ______________________________

____

Facility Manager (phone) ______________________________

Assessment - Initial Containment

The supervisor will assess the incident and initiate containment control measures with the appropriate spill containment equipment included in the spill kit kept on-site. The supervisor will first contact the Fire Department and then notify the Police Department, Department of Public Works, Board of Health and Conservation Commission. The fire department is ultimately responsible for matters of public health and safety and should be notified immediately.

Contact:	Phone Number:
Fire Department:	911
Police Department:	911
Department of Public Works:	(617) 898-4900
Board of Health Phone:	(617) 898-4886
Conservation Commission Phone:	(617) 898-4974

Further Notification

Based on the assessment from the Fire Chief, additional notification to a cleanup contractor may be made. The Massachusetts Department of Environmental Protection (DEP) and the EPA may be notified depending upon the nature and severity of the spill. The Fire Chief will be responsible for determining the level of cleanup and notification required. The attached list of emergency phone numbers shall be posted in the facility office and readily accessible to all employees.

HAZARDOUS WASTE / OIL SPILL REPORT

Date____/_____/______ Time_____________ AM / PM

Exact location (Transformer #)____

Type of equipment____________________________Make______________Size_______________

S / N___________________________________Weather Conditions_____________________

On or near water ☐ Yes If yes, name of body of water______________________

☐ No

Type of chemical / oil spilled___________________________

Amount of chemical / oil spilled_________________________

Cause of spill____

____

____

Measures taken to contain or clean up spill____

____

____

Amount of chemical / oil recovered_________________Method______________________________

Material collected as a result of clean up

______________drums containing____

______________drums containing____

______________drums containing____

Location and method of debris disposal____

____

Name and address of any person, firm, or corporation suffering damages_____________________

____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring____

____

Spill reported to General Office by____________________________Time______________AM / PM

Spill reported to DEP / National Response Center by______________________________________

DEP Date____/_____/______ Time__________ AM / PM Inspector________________

NRC Date____/_____/______ Time__________ AM / PM Inspector________________

Additional comments____

____

____

EMERGENCY RESPONSE EQUIPMENT
INVENTORY

The following equipment and materials shall be maintained at all times and stored in a secure area for long-term emergency response need.

--	SORBENT PADS	1 BALE
--	SAND BAGS (empty)	5
--	SPEEDI-DRI ABSORBENT	1 – 40LB BAGS
--	12” INFLATABLE PIPE PLUG	1
--	15” INFLATABLE PIPE PLUG	1
--	18” INFLATABLE PIPE PLUG	1
--	24” INFLATABLE PIPE PLUG	1
--	SQUARE END SHOVELS	1
--	PRY BAR	1

EMERGENCY NOTIFICATION PHONE NUMBERS

1. FACILITY MANAGER

    NAME: ____________ BEEPER: ____________

    PHONE: ____________ CELL PHONE: ____________

    ALTERNATE:

    NAME: ____________ BEEPER: N/A ____________

    PHONE: ____________ CEL PHONE: ____________

2. FIRE DEPARTMENT

    EMERGENCY: 911

    BUSINESS: (617) 898-4901

3. POLICE DEPARTMENT

    EMERGENCY: 911

    BUSINESS: (617) 698-3800

4. MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

    EMERGENCY: (888) 340-1133

    NORTHEAST REGION - WILMINGTON OFFICE: (978) 694-3200

5. NATIONAL RESPONSE CENTER

    PHONE: (800) 424-8802

    ALTERNATE: U.S. ENVIRONMENTAL PROTECTION AGENCY

    EMERGENCY: (617) 223-7265

    BUSINESS: (617) 860-4300

6. DEPARTMENT OF PUBLIC WORKS

    CONTACT: Chase P. Berkeley, Director of Public Works

    PHONE: (617) 898-4900

7. CONSERVATION COMMISSION

    CONTACT: Kathy Bowen, Administrative Assistant

    PHONE: (617) 898-4974

8. BOARD OF HEALTH

    CONTACT: Erin Egan, MPH Health Agent

    PHONE: (617) 898-4886

STORMWATER MANAGEMENT
BEST MANAGEMENT PRACTICES
INSPECTION SCHEDULE AND EVALUATION CHECKLIST – CONSTRUCTION PHASE

PROJECT LOCATION: **Wolcott Woods, Canton Ave, Milton, MA** Latest Revision: ____________

Best Management Practice	Inspection Frequency (1)	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/ Repair Needed yes/no List items	Date of Cleaning/Repair	Performed By	Water Level in System
Silt Sock Erosion Control Barrier	Weekly or after every major storm event – minimum weekly			Check sediment levels and remove when reaches ¼ to ½ the height of sock				
Stabilized Construction Entrance	Weekly or after every major storm event – minimum weekly			Check sediment levels in stone				
Temporary Sedimentation Basin	Weekly or after every major storm event – minimum weekly			Check sediment levels				
Catch Basin & Pre-treatment Structure (Inlet Protection)	Weekly or after every major storm event – minimum weekly			Check silt sack for sediment levels, tears or any damage				
Stockpiles	Weekly or after every major storm event – minimum weekly			Ensure surrounding erosion control measure are intact				
Temp/Prop Seeding for Stabilization	Weekly or after every major storm event – minimum weekly							
Geotextiles/ Mulching & Netting	Weekly or after every major storm event – minimum weekly							

Dust Control	Weekly							

(1) Refer to the Massachusetts Stormwater Management, Volume Two: Stormwater Technical Handbook (2008) for recommendations regarding frequency for inspection and maintenance of specific BMPs.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended. Slow release fertilizer recommended.
Other notes:(Include deviations from: Con Com Order of Conditions, PB Approval, Construction Sequence and Approved Plan)

Stormwater Control Manager: ______________________________ **Stamp**

Merrill
Engineers and Land Surveyors

August 31, 2018

Long-Term Pollution Prevention Plan
Operation & Maintenance Plan

#1672-1726 Canton Avenue, Milton

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Hydro International First Defense Unit Operation and Maintenance Manual

StormTech Chamber Inspection and Maintenance

LONG TERM POLLUTION PREVENTION PLAN / OPERATION AND MAINTENANCE PLAN

Date: August 31, 2018

Wolcott Woods
1672-1726 Canton Avenue
Milton, MA

Responsible Party for Operation and Maintenance Contact Information:

Wolcott Residential, LLC
80 Beharrell Street, Suite E
Concord, Massachusetts 01742
P: 781.229.4700

Best Management Practices (BMPs) of the Commonwealth of Massachusetts Department of Environmental Protection’s (DEP’s) Stormwater Management Policy (SMP) have been implemented and utilized for the project. The following information provided is to be used as a guideline for monitoring and maintaining the performance of the drainage facilities and to ensure that the quality of water runoff meets the standards set forth by the SMP. The structural Best Management Practices (BMPs) shall be inspected during rainfall conditions during the first year of operation to verify functionality.

General Conditions

1. The BMP’s will be owned and maintained by the Developer until such time that a Homeowner's Association is created, then the Homeowner's Association will own and maintain the BMP’s located on the site.
2. All Stormwater BMP’s shall be operated and maintained in accordance with the design plans and the following Long-Term Operations and Maintenance Plan.
3. The Responsible Party shall:
    a. Maintain an Operation and Maintenance Log (see Attachment A). The Log shall include all BMP inspections, repairs, replacement activities and disposal activities (disposal material and disposal location shall be included in the Log);
    b. Retain inspection and maintenance logs for a period of three years, on an ongoing basis;
    c. Make the logs available to the Town upon request;
    d. Allow members and agents of the Milton DPW and Conservation Commission to enter the premises and ensure that the Responsible Party has complied with the Operation and Maintenance Plan requirements for each BMP.
4. An inspection and maintenance schedule should be adhered to at a minimum for the first year of service of all BMP’s referenced in this document. After the first year of service, a more accurate inspection/maintenance schedule should be determined based on the level of service for this site.

Operation and Maintenance

1.0 Requirements for Routine Inspections and Maintenance of Stormwater Best Management Practices

Note: The Town shall be notified immediately if a change in ownership or maintenance responsibility occurs at the site.

Drain lines

After construction, the drainlines shall be inspected after every major storm for the first few months to ensure proper functions. Presence of accumulated sand and silt would indicate more frequent maintenance of the pre-treatment devices is required. Thereafter, the drainlines shall be inspected at least once per year.

Deep sump and hooded Catch Basins

Catch basin grates shall be checked quarterly and following heavy rainfalls to verify that the inlet openings are not clogged by debris. Debris shall be removed from the grates and disposed of properly. Deep sump catch basins shall be inspected and cleaned bi-annually of all accumulated sediments. Catch basins with hoods shall be inspected annually to check oil build-up and outlet obstructions. Material shall be removed from catch basins and disposed of in accordance with all applicable regulations.

Pre-treatment Structures – First Defense FD-3HC, FD-4HC and FD-6HC

The proprietary pretreatment units shall be inspected and maintained from the surface, without entry into the unit biannually and following heavy rain events defined as a storm event exceeding one inch of rainfall within a twenty-four hour period to verify that the inlet opening is not clogged by debris.

During the first year of installation, perform inspection regularly, so an accurate maintenance schedule can be established. Perform oil and floatables removal once per year and immediately in the event of a spill. Oil shall be removed by using a small portable pump and disposed of properly. Perform sediment removal once per year or as needed and following a spill event. Sediment shall be removed from the unit using a vacuum truck. The requirements for the disposal from the units should be in compliance with all local, state and federal regulations.

Please refer to the attached manufacturer's maintenance manual for additional detail on proper inspection and maintenance of the First Defense units.

Subsurface Infiltration Chamber Systems

Proper maintenance of the subsurface infiltration systems is essential to the long-term effectiveness of the infiltration function. After construction, the subsurface infiltration chamber systems shall be inspected for proper function after every major storm event until the site is completely developed and stabilized. After the site has been stabilized, the subsurface infiltration chamber systems shall be inspected at least twice per year or if lack of performance is observed and perform necessary corrective measures to maintain infiltration capacity; as required by the Stormwater Management Policy.

The systems shall have inspection ports for proper inspections. Inspections shall include checking the water level in the system after a major storm event, and performing necessary corrective action if water is observed 72 hours following the storm. The owner shall retain a qualified stormwater professional to assess the cause of this condition and develop a corrective action plan for restoring the infiltration function. The owner shall immediately implement the corrective action to restore the infiltration function. Documentation of these actions shall be maintained in the inspection and maintenance records.

Inspection & Maintenance Steps

Accumulated sediment must be removed from the bottom of the chambers. Material removed from the systems shall be disposed of in accordance with all applicable local, state, and federal regulations.

Step 1. Inspect chamber rows for sediment and water levels

7.0 Inspection Ports

a. Remove/open lid on nyloplast inspection port
b. Remove and clean flexstorm filter if installed
c. Using a flashlight and stadia rod, measure depth of sediment or water level and record on maintenance log
d. Lower camera into chamber row for visual inspection of sediment or water levels (optional)
e. If water is observed 72 hours following a storm event, proceed to Step 3. If not, proceed to Step 4

8.0 Clean out locations

8.1 Remove clean out cover

8.2 Using a flashlight, inspect down the chamber row through the manifold pipe

8.3 If sediment is at, or above 3” at inlet chambers, proceed to Step 2. If not, proceed to Step 4.

Step 2. Clean out inlet chambers (first 12.5 ft. only) using the jetvac process if sediment build up is observed

a. A fixed culvert cleaning nozzle with rear facing spread of 45” or more is preferred
b. Apply multiple passes of jetvac until backflush water is clean
c. Vacuum structure sump as required

Step 3. Repair chamber system when water levels do not infiltrate after 72 hours. A corrective action plan shall be prepared by a qualified stormwater professional and immediately implemented.

Step 4. Replace all covers, grates, filters, and lids; record observations and actions.

Step 5. Inspect and clean basins and manholes upstream of the chamber system.

Please refer to the attached manufacturer's maintenance manual for additional detail on proper inspection and maintenance of the StormTech chamber systems.

Stormwater Infiltration Basin

After construction, the stormwater infiltration basin shall be inspected for proper function after every major storm event until the site is completely developed and stabilized. After the site has been stabilized the stormwater infiltration system shall be inspected at least twice per year or if lack of performance is observed and perform necessary corrective measures to maintain infiltration capacity; as required by the Stormwater Management Policy. Inspections shall include checking the water level in the system after a major storm event, and performing necessary corrective action if water is observed 72 hours following the storm.

Disposal of the accumulated sediment must be in accordance with applicable local, state and federal guidelines and regulations.

Inspections shall be performed by qualified professionals of the basin bottoms and outlet control structure. The embankments should also be inspected for signs of settlement, significant erosion, animal burrows, growth of woody vegetation, and other conditions that could affect embankment integrity. Repairs should be made immediately based on these inspections.

The bottoms and sides of the stormwater basin should be mowed, limed, aerated, and overseeded along with the regular maintenance of other loamed & seeded areas on the project site. Liming shall be limited to once per year.

Basin Repair and Renovation Plan

In the event that the time for the stormwater basin to drain exceeds 72 hours, the basin shall be renovated. The following procedure shall be followed:

1. The Conservation Commission shall be notified of the status of the drainage facility.
2. An evaluation and determination for the slow drain time shall be performed by a Professional Engineer. The following shall be considered:
    a. Higher sediment loading than anticipated
    b. Extreme hydrologic events
    c. Poor installation (i.e., excessive compaction of soils and low spots)
    d. Poor maintenance.
3. In the case of higher than anticipated sediment loading, the schedule for maintenance shall be increased from the recommended yearly cleaning to bi-annual. For all other failures, the repair and renovation shall be made in accordance with the original approved plan and the inspection shall remain the same as specified in the Operation and Maintenance Plan.

4. Prior to construction, the contractor shall secure all necessary State, municipal and other utility permits and verify the existing locations of the utilities with the utility companies.

5. The contractor shall notify "Digsafe" (1.888.344.7233) at least four days prior to construction.

6. The work shall be performed in accordance with the specifications of the appropriate department. The contractor shall notify the Planning Board at least four days prior to construction.

7. Install erosion control barriers along limit of construction and at the following locations:

    a. At the interface between the silt trap-erosion control pad and the bottom of the basin.

    b. At the interface between the bottom of the basin and the outlet control structure.

8. A Professional Engineer shall develop a plan for handling stormwater during repair and renovation.

    a. The plan shall include the use of temporary basins, swales with check dams, additional water quality controls prior to discharge, etc.

    b. The plan should be based on the specific circumstances of where and how the basin failed

9. The repair and renovation shall proceed as follows:

    a. Construction shall not take place until the floor of the basin is thoroughly dry

    b. Prior to tilling, grass clippings and accumulated organic matter should be removed to prevent the formation of an impervious organic mat. Trash and debris should also be removed at this time.

    c. Light equipment which will not compact the underlying soils should be used to remove the top layer and replace with loam as required. The remaining soils should be deeply tilled and re-vegetated as soon as possible.

10. The basin to be inspected weekly and after every storm event and maintained until grass has stabilized disturbed areas.

11. At the completion of all construction, the contractor is to remove the erosion control barrier and re-establish flows to the drainage basin.

Bioretention Area and Rain Gardens

Inspect pretreatment stone apron/grass slope and bioretention cells regularly for sediment build-up, structural damage, and standing water.

Replace stone on an "as needed" basis when showing signs of clogging and bound with sediment.

Inspect soil and repair eroded areas monthly. Re-mulch void areas as needed. Remove litter and debris monthly. Treat diseased vegetation as needed. Remove and replace dead vegetation twice per year (spring and fall.)

Proper selection of plant species and support during establishment of vegetation should minimize-if not eliminate-the need for fertilizers and pesticides. Remove invasive species as needed to prevent these species from spreading into the bioretention area. Replace mulch every two years, in the early spring. Upon failure, excavate bioretention area, scarify bottom and sides, replace the soil, replant, and mulch.

The soil medium filters contaminants from runoff; the cation exchange capacity of the soil media will eventually be exhausted. When the cation exchange capacity of the soil media decreases, change the soil media to prevent contaminants from migrating to the ground water, or from being discharged via an underdrain outlet. Using small shrubs and plants instead of larger trees will make it easier to replace the media with clean material when needed.

Plant maintenance is critical. Concentrated salts in roadway runoff may kill plants, necessitating removal of dead vegetation each spring and replanting.

Never store snow in bioretention areas.

Outlet Protection

All outfall protection structures shall be inspected quarterly and following major storm events defined as a storm event exceeding one inch of rainfall within a twenty-four hour period to check for signs for erosion. Any necessary repairs shall be performed promptly and cleaned to remove accumulated sediment as necessary. Material removed shall be disposed of in accordance with all applicable local, state, and federal regulations. Rip-Rap overflow structure shall be weeded and cleaned on a quarterly basis to ensure that water overflowing the spillway will not become obstructed by debris.

Roadway Pavement Maintenance

Vacuum sweepers shall sweep the roadway periodically during dry weather to remove excess sediments to reduce the amount of sediments that the drainage system shall have to remove from the runoff. The sweeping should be conducted four times per year and will be the responsibility of the Developer/Homeowners Association.

Salt used for de-icing on the roadway during winter months should be limited as much as possible as this will reduce the need for removal and treatment.

Sand containing the minimum amount of calcium chloride (or approved equivalent) needed for handling may be applied as part of the routine winter maintenance activities.

2.0 Inspections

The responsible party shall secure the services of a Licensed Engineer or similar professional (inspector) on an on-going basis. The inspector shall review the project with respect to the following:

- Proper installation and performance of the Stormwater Management System.
- Review of the controls to determine any damaged or ineffective controls.
- Corrective actions.

The inspector shall prepare a report documenting the findings and should request the required maintenance or repair for the pollution prevention controls when the inspector finds that it is necessary for the control to be effective.

If hydrocarbons or any petroleum products are detected in any stormwater structure during an inspection, immediate measures shall be taken to remove and dispose of the material in accordance with all applicable regulations. The inspector shall notify the Owner to make the changes.

The owner shall be responsible for retaining the inspection and maintenance records for a period of three years, on an ongoing basis.

For additional information, refer to Performance, Standards and Guidelines for Stormwater Management in Massachusetts, published by the Department of Environmental Protection.

Pollution Prevention Plan

Good Housekeeping

To develop and implement an operation and maintenance program with the goal of preventing or reducing pollutant runoff by keeping potential pollutants from coming into contact with stormwater or being transported off site without treatment, the following efforts will be made:

- Property Management awareness and training on how to incorporate pollution prevention techniques into maintenance operations.
- Follow appropriate best management practices (BMPs) by proper maintenance and inspection procedures.
- Homeowner education outreach, including promoting recycling through the Town of Milton Transfer Station.

1.0 Storage and Disposal of Household Waste and Toxics

This management measure involves educating the general public on the management considerations for hazardous materials. Failure to properly store hazardous materials dramatically increases the probability that they will end up in local waterways. Many people have hazardous chemicals stored throughout their homes, especially in garages and storage sheds. Practices such as covering hazardous materials or even storing them properly, can have dramatic impacts. Property owners are encouraged to support the household hazardous product collection events sponsored by the Town of Milton.

MADEP has prepared several materials for homeowners on how to properly use and dispose of household hazardous materials:

http://www.mass.gov/dep/recycle/reduce/househol.htm

For consumer questions on household hazardous waste call the following number:

DEP Household Hazardous Waste Hotline 800-343-3420

The following is a list of management considerations for hazardous materials as outlined by the EPA:

- Ensuring sufficient aisle space to provide access for inspections and to improve the ease of material transport;
- Storing materials well away from high-traffic areas to reduce the likelihood of accidents that might cause spills or damage to drums, bags, or containers.
- Stacking containers in accordance with the manufacturers' directions to avoid damaging the container or the product itself;
- Storing containers on pallets or equivalent structures. This facilitates inspection for leaks and prevents the containers from coming into contact with wet floors, which can cause corrosion. This consideration also reduces the incidence of damage by pests.

The following is a list of commonly used hazardous materials used in the household:

Batteries – automotive and rechargeable
nickel cadmium batteries
(no alkaline batteries)
Gasoline
Oil-based paints
Fluorescent light bulbs and lamps
Pool chemicals
Propane tanks
Lawn chemicals,
fertilizers and weed killers
Turpentine
Bug sprays
Antifreeze
Paint thinners, strippers, varnishes and
stains
Arts and crafts chemicals
Charcoal lighter fluid

Disinfectant
Drain clog dissolvers
Driveway sealer
Flea dips, sprays and collars
Houseplant insecticides
Metal polishes
Mothballs
Motor oil and filters
Muriatic acid (concrete cleaner)
Nail polishes and nail polish
removers
Oven cleaner
Household pest and rat poisons
Rug and upholstery cleaners
Shoe polish
Windshield wiper fluid

2.0 Vehicle Washing

This management measure involves educating the general public on the water quality impacts of the outdoor washing of automobiles and how to avoid allowing polluted runoff to enter the storm drain system. Outdoor car washing has the potential to result in high loads of nutrients, metals, and hydrocarbons during dry weather conditions in many watersheds, as the detergent-rich water used to wash the grime off our cars flows down the street and into the storm drain. The following management practices will be encouraged:

- Washing cars on gravel, grass, or other permeable surfaces.
- Blocking off the storm drain during car washing and redirecting wash water onto grass or landscaping to provide filtration.
- Using hoses with nozzles that automatically turn off when left unattended.
- Using only biodegradable soaps.
- Minimize the amounts of soap and water used. Wash cars less frequently.
- Promote use of commercial car wash services.

3.0 Landscape Maintenance

This management measure seeks to control the storm water impacts of landscaping and
lawn care practices through education and outreach on methods that reduce nutrient loadings and the amount of storm water runoff generated from lawns. Nutrient loads generated by fertilizer use on suburban lawns can be significant, and recent research has shown that lawns produce more surface runoff than previously thought.

Using proper landscaping techniques can effectively increase the value of a property while benefiting the environment. These practices can benefit the environment by reducing water use; decreasing energy use (because less water pumping and treatment is required); minimizing runoff of storm and irrigation water that transports soils, fertilizers, and pesticides; and creating additional habitat for plants and wildlife. The following lawn and landscaping management practices will be encouraged:

- Mow lawns at the highest recommended height.
- Minimize lawn size and maintain existing native vegetation.
- Collect rainwater for landscaping/gardening needs (rain barrels and cisterns to capture roof runoff).
- Raise public awareness for promoting the water efficient maintenance practices by informing users of water efficient irrigation techniques and other innovative approaches to water conservation.
- Abide by water restrictions and other conservation measures implemented by the Town of Milton

- Water only when necessary.
- Use automatic irrigation systems to reduce water use.

4. **Integrated Pest Management (IPM)**

This management measure seeks to limit the adverse impacts of insecticides and herbicides by providing information on alternative pest control techniques other than chemicals or explaining how to determine the correct dosages needed to manage pests.

The presence of pesticides in stormwater runoff has a direct impact on the health of aquatic organisms and can present a threat to humans through contamination of drinking water supplies. The pesticides of greatest concern are insecticides, such as diazinon and chlorpyrifos, which even at very low levels can be harmful to aquatic life. The major source of pesticides to urban steams is home application of products designed to kill insects and weeds in the lawn and garden.

The following IPM practices will be encouraged:

- Pesticides and herbicides shall be used sparingly. Fertilizers should be restricted to the use of organic fertilizers only.
- Lawn care and landscaping management programs including appropriate pesticide use management as part of program.

5. **Pet Waste Management**

Pet waste management involves using a combination of pet waste collection programs, pet awareness and education, to alert residents to the proper disposal techniques for pet droppings. The following management practices will be encouraged:

- Raise awareness of homeowners that are also pet owners that they are encouraged to pick up after their pets and dispose of the waste either in the trash, including on their own lawns and walking trails.
- Provide signage along walking trails.

6. **Proper Management of Deicing Chemicals and Snow**

The following deicing chemicals and snow storage practices will be encouraged:

- Select effective snow disposal sites adjacent to or on pervious surfaces in upland areas away from water resources and wells. At these locations, the snow meltwater can filter in to the soil, leaving behind sand and debris, which can be removed in the springtime.
- No roadway deicing materials shall be stockpiled on site unless all storage areas are protected from exposure to rain, snow, snowmelt and runoff.
- Avoid dumping snow into any waterbody, including wetlands, cranberry bogs, detention/infiltration basins, and grassed swales/channels.
- Avoid disposing of snow on top of storm drain catch basins.

7. <u>Illicit Discharge Statement</u>

Illicit discharges are non-stormwater discharges to the storm drain system which typically contain bacteria or other pollutants. All illicit discharges are prohibited. Any illicit discharges should be reported to MassDOT and/or the DPW as applicable to be addressed in accordance with their respective policies.

Allowable Non-Stormwater Discharges

The following non-stormwater discharges are authorized provided it has been determined by the permittee that they are not significant contributors of pollutants to the MS4. If these discharges are identified as significant contributors to the MS4, they must be addressed in the Illicit Discharge Detection and Elimination minimum control measure described in Parts II, III, IV and V.

1. water line flushing,
2. landscape irrigation,
3. diverted stream flows,
4. rising ground waters,
5. uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)),
6. uncontaminated pumped ground water,
7. discharge from potable water sources,
8. foundation drains,
9. air conditioning condensation,
10. irrigation water, springs,
11. water from crawl space pumps,
12. footing drains,
13. lawn watering,
14. flows from riparian habitats and wetlands,
15. dechlorinated swimming pool discharges,
16. street wash water, and
17. discharges or flows from fire fighting activities occur during emergency situations. The permittee is not expected to evaluate fire fighting discharges with regard to pollutant contributions. Therefore, these discharges are authorized as allowable non-storm water discharges, unless identified, by EPA, as significant sources of pollutants to Waters of the U.S..

STORMWATER MANAGEMENT
BEST MANAGEMENT PRACTICES
INSPECTION SCHEDULE AND EVALUATION CHECKLIST – POST CONSTRUCTION PHASE

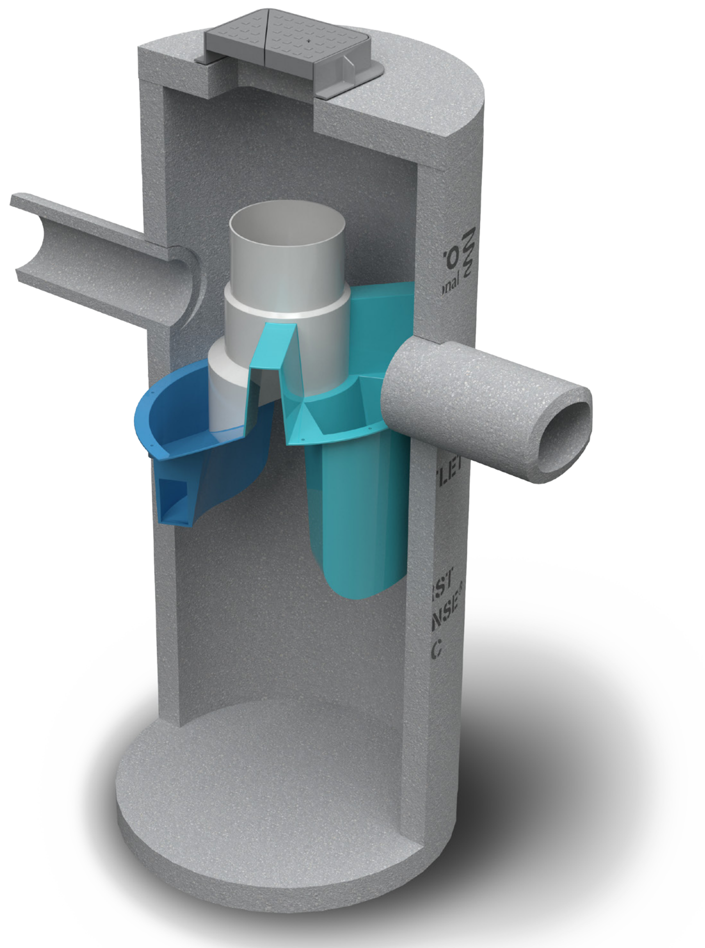
PROJECT LOCATION: **Wolcott Woods, Canton Ave, Milton, MA** Latest Revision:________________

Best Management Practice	Inspection Frequency (1)	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/ Repair Needed yes/no List items	Date of Cleaning/Repair	Performed By	Water Level in Detention System
Drain Lines	Yearly			-Sediment build-up -Trash and debris				
Deep Sump Hooded Catch Basins	Quarterly			-Sediment level exceeds 8” -Trach and debris - Floatable oils or hydrocarbon - Grate or outlet blockage				
Pre-Treatment Structure (First Defense Units)	Quarterly			-Sediment not to exceed 18” -Floating contaminates shall be removed by vacuum pump prior to sediment removal -Outlet blockages				
Bioretention Area and Rain Garden	Twice a Year			-Sediment build-up -Trash and debris -Dead vegetation -Standing water greater than 72 hours				
Infiltration Basin	Twice a Year			-Sediment build-up -Trash and debris -Dead vegetation -Standing water greater than 72 hours				
Subsurface Infiltration Chamber Systems	Twice a Year			-Sediment buildup -Standing water greater than 48 hours				
Outlet Protection	Twice a Year			-Check for clogging -Remove sediment buildup -Inspect for signs of settlement or erosion				
Roadway Pavement Maintenance	Quarterly							

(1) Refer to the Massachusetts Stormwater Management, Volume Two: Stormwater Technical Handbook (2008) for recommendations regarding frequency for inspection and maintenance of specific BMPs.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended. Slow release fertilizer recommended.
Other notes:(Include deviations from: Con Com Order of Conditions, PB Approval, Construction Sequence and Approved Plan)

Stormwater Control Manager: ____ **Stamp**



Operation and Maintenance Manual

First Defense® and First Defense® High Capacity

Vortex Separator for Stormwater Treatment

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- **Introduction**
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- **Maintenance Equipment Considerations**
- **Determining Your Maintenance Schedule**

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8 **First Defense® Installation Log**

9 **First Defense® Inspection and Maintenance Log**

I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations (refer to *Section II. Model Sizes & Configurations*, page 4) to accommodate a wide range of pipe sizes, peak flows and depth constraints.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for "offline" arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 500% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

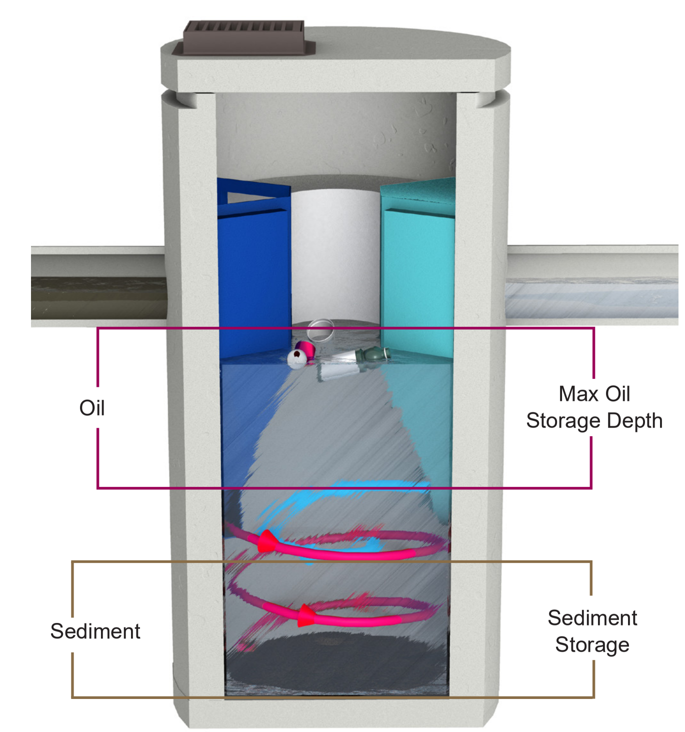


Fig.1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

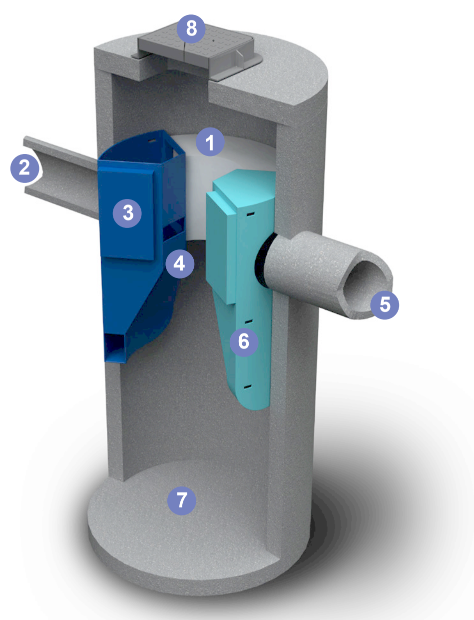
The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components of the First Defense®-4HC and First Defense®-6HC have modified geometries as to allow greater design flexibility needed to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2a - 2b). First Defense® model parameters and design criteria are shown in Table 1.

First Defense® Components

1. **Built-In Bypass**
2. **Inlet Pipe**
3. **Inlet Chute**
4. **Floatables Draw-off Port**
5. **Outlet Pipe**
6. **Floatables Storage**
7. **Sediment Storage**
8. **Inlet Grate or Cover**

a.



b.

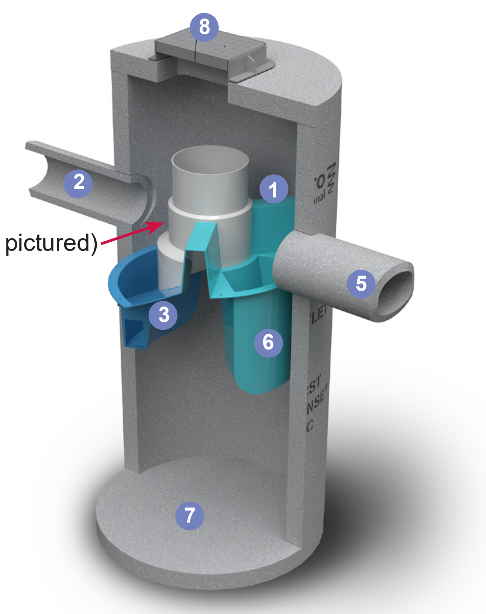


Fig.2a) First Defense®-4 and First Defense®-6; b) First Defense®-4HC and First Defense®-6HC, with higher capacity dual internal bypass and larger maximum pipe diameter.

First Defense® High Capacity Model Number	Diameter	Typical TSS Treatment Flow Rates NJDEP Certified	Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Chamber Depth
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd³ / m³)	(ft / m)	(ft / m)
FD-3HC	3 / 0.9	0.85 / 24.0	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.75 / 1.14
FD-4HC	4 / 1.2	1.50 / 42.4	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	5.00 / 1.52
FD-5HC	5 / 1.5	2.35 / 66.2	20 / 566	24 / 609	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.25 / 1.60
FD-6HC	6 / 1.8	3.38 / 95.7	32 / 906	30 / 750	496 / 1878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	6.25 / 1.90
FD-7HC	7 / 2.1	4.60 / 130.2	40 / 1133	42 / 1067	750 / 2839	2.1 / 1.9	3.0 - 5.5 / 0.9 - 1.7	7.25 / 2.20
FD-8HC	8 / 2.4	6.00 / 169.9	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 -1.8	8.00 / 2.43

[1]Contact Hydro International when larger pipe sizes are required.
[2]Contact Hydro International when custom sediment storage capacity is required.
[3]Minimum distance for models depends on pipe diameter.

III. Maintenance

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil. Maximum pollutant storage capacities are provided in Table 1.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense®-HC have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

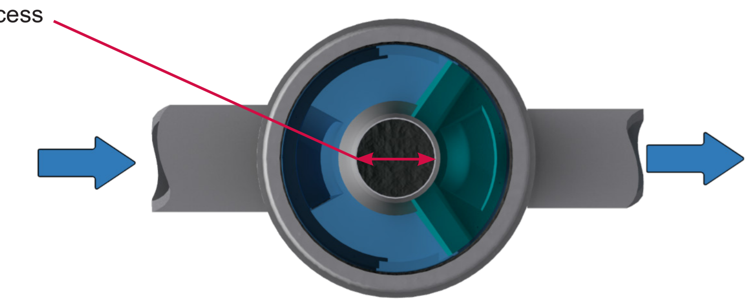


Fig.3 The central opening to the sump of the First Defense®-HC is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / flotables removal, for a 6-ft First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.
4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.
5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.
6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.
7. Securely replace the grate or lid.
8. Take down safety equipment.
9. Notify Hydro International of any irregularities noted during inspection.

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.5).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose and skimmer pole to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.
- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.

Fig.4 Floatables are removed with a vactor hose (First Defense model FD-4, shown).

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (flexible hose recommended)
- First Defense® Maintenance Log

Floatables and sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. Remove oil and floatables stored on the surface of the water with the vactor hose (Fig.5) or with the skimmer or net (not pictured).
5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).
6. Once all floatables have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris off the sump floor (Fig.5).
7. Retract the vactor hose from the vessel.
8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.
9. Securely replace the grate or lid.

Fig.5 Sediment is removed with a vactor hose (First Defense model FD-4, shown).

Maintenance at a Glance

Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area
NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.	

Hydro International®

First Defense® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL SIZE (CIRCLE ONE): **FD-3HC** **FD-4** **FD-4HC** **FD-5HC** **FD-6** **FD-6HC** **FD-7HC** **FD-8HC**

INLET (CIRCLE ALL THAT APPLY): **GRATED INLET (CATCH BASIN)** **INLET PIPE (FLOW THROUGH)**

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Hydro International®

First Defense® Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment Depth Measured	Volume of Sediment Removed	Site Activity and Comments

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Stormwater Solutions

94 Hutchins Drive
Portland, ME 04102

Tel: (207) 756-6200
Fax: (207) 756-6212
stormwaterinquiry@hydro-int.com

www.hydro-int.com

Turning Water Around...®

FDHC_O+M_H_1703

9.0 Inspection and Maintenance

9.1 ISOLATOR ROW INSPECTION

Regular inspection and maintenance are essential to assure a properly functioning stormwater system. Inspection is easily accomplished through the manhole or optional inspection ports of an Isolator Row. Please follow local and OSHA rules for a confined space entry.

Inspection ports can allow inspection to be accomplished completely from the surface without the need for a confined space entry. Inspection ports provide visual access to the system with the use of a flashlight. A stadia rod may be inserted to determine the depth of sediment. If upon visual inspection it is found that sediment has accumulated to an average depth exceeding 3” (76 mm), cleanout is required.

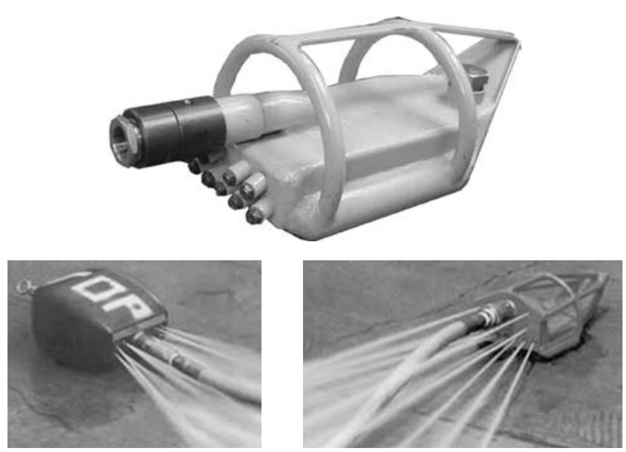
A StormTech Isolator Row should initially be inspected immediately after completion of the site’s construction. While every effort should be made to prevent sediment from entering the system during construction, it is during this time that excess amounts of sediments are most likely to enter any stormwater system. Inspection and maintenance, if necessary, should be performed prior to passing responsibility over to the site’s owner. Once in normal service, a StormTech Isolator Row should be inspected bi-annually until an understanding of the sites characteristics is developed. The site’s maintenance manager can then revise the inspection schedule based on experience or local requirements.

9.2 ISOLATOR ROW MAINTENANCE

JetVac maintenance is recommended if sediment has been collected to an average depth of 3” (76 mm) inside the Isolator Row. More frequent maintenance may be required to maintain minimum flow rates through the Isolator Row. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, a wave of suspended sediments is flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/ JetVac combination vehicles. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45” (1143 mm) are best. The JetVac process shall only be performed on StormTech Rows that have AASHTO class 1 woven geotextile over their foundation stone (ADS 315WTM or equal).

Looking down the Isolator Row

A typical JetVac truck (This is not a StormTech product.)



Examples of culvert cleaning nozzles appropriate for Isolator Row maintenance. (These are not StormTech products).

APPENDIX E

Soil Testing Results (Drainage Facilities)

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Carberry Family Limited Partnership
Owner Name

1602 Canton Ave. | Map 2, Lots 2, 4, 29, 29A, 40
Street Address | Map/Lot #

Milton | MA | 02186
City | State | Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: Web Soil Survey (Source) 254B (Soil Map Unit)

   Merrimac fine sandy loam (Soil Name) Few limitations for development (Soil Limitations)

   Outwash (Geologic/Parent Material) Kame terrace (Landform)

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1965 (Year Published/Source) 1:24,000 (Publication Scale) Kt (Map Unit)

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No
   If Yes, continue to #5.
   Within the 100-year flood boundary? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No MassGIS Wetland Data Layer: ______ (Wetland Type)

7. Current Water Resource Conditions (USGS): Dec. 2015 (Month/Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-1 — Date: 12/31/15 — Time: 8:40 AM — Weather: Cloudy, foggy, 40 degrees

1. Location

   Ground Elevation at Surface of Hole: 196+/- feet — Latitude/Longitude: 42 13' 27.4" / 71 6' 57.4

   Description of Location: ______

2. Land Use: Wooded (e.g., woodland, agricultural field, vacant lot, etc.) — Surface Stones (e.g., cobbles, stones, boulders, etc.): Few — Slope (%): 3-5%

   Vegetation: Pine, oak beech — Landform: Kame terrace — Position on Landscape (SU, SH, BS, FS, TS): ______

3. Distances from:

   Open Water Body >100' feet — Drainage Way >100' feet — Wetlands >100' feet

   Property Line 50'+/- feet — Drinking Water Well >100' feet — Other ______ feet

4. Parent Material: Outwash — Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No — If yes: ______ Depth Weeping from Pit ______ Depth Standing Water in Hole

   Estimated Depth to High Groundwater: >120" inches ______ elevation

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-1

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-12"	A	10YR3/3			0	Sandy loam	0-5%	<5%	Weak	Friable	
12"-26"	B	10YR4/4			0	Sandy loam	5%	<5%	Weak	Friable	
26"-44"	C1	2.5Y5/4			0	Loamy sand	5-10%	<5%	Weak	Very friable	Medium
44"-70"	C2	2.5Y5/3			0	Sand	10-15%	5%	Single grain	Loose	Medium
70"-120"	C3	2.5Y5/3			0	Sand	30-40%	10-15%	Single grain	Loose	Medium-coarse

Additional Notes:

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-2 | Date: 12/31/15 | Time: 9:40 AM | Weather: Sunny, Clear, 40 degrees

1. Location

   Ground Elevation at Surface of Hole: 215+/- feet

   Latitude/Longitude: 42 13' 26.0 / 71 6 52.0"

2. Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.)

   Surface Stones (e.g., cobbles, stones, boulders, etc.): Few

   Slope (%): 3-5%

   Vegetation: Grass

   Landform: Kame terrace

   Position on Landscape (SU, SH, BS, FS,

3. Distances from:

   Open Water Body: >100' feet | Drainage Way: >100' feet | Wetlands: >100' feet

   Property Line: 130'+/- feet | Drinking Water Well: >100' feet | Other: ______ feet

4. Parent Material: Outwash

   Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No

   If yes: ______ Depth Weeping from Pit ______ Depth Standing Water in Hole

   Estimated Depth to High Groundwater: >150" inches ______ elevation

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-2

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-12"	A	10YR2/2			0	Sandy loam	5-10%	<5%	Weak	Friable	
12"-20"	B	10YR4/4			0	Sandy loam	20%	5%	Weak	Friable	
20"-150"	C1	2.5Y4/4			0	Sand	30-35%	10%	Single grain	Loose	Medium-coarse

Additional Notes:

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # TP-1	Obs. Hole # TP-2
☒ Depth observed standing water in observation hole	>120" inches	>150" inches
☐ Depth weeping from side of observation hole	inches	inches
☐ Depth to soil redoximorphic features (mottles)	inches	inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	inches	inches

Index Well Number ______ Reading Date ______

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole # ____ S_c ____ S_r ____ OW_c ____ OW_{max} ____ OW_r ____ S_h ____

Obs. Hole # ____ S_c ____ S_r ____ OW_c ____ OW_{max} ____ OW_r ____ S_h ____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed? Upper boundary: 20 inches Lower boundary: 150 inches

c. If no, at what depth was impervious material observed? Upper boundary: ____ inches Lower boundary: ____ inches

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Board of Health Witness

Name of Board of Health Witness	Board of Health

G. Soil Evaluator Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

	12/31/15
Signature of Soil Evaluator	Date
Alan W. Loomis / Soil Evaluator #1405	June 30, 2016
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Carberry Family Limited Partnership
Owner Name

1602 Canton Ave. — Street Address
Map 2, Lots 2, 4, 29, 29A, 40 — Map/Lot #

Milton — City
MA — State
02186 — Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No
   If yes: Web Soil Survey (Source) 254B, 310B (Soil Map Unit)

   Merrimac fine sandy loam/Woodbridge fine sandy loam — Soil Name
   Few limitations for development/Limitations due to high grndwtr — Soil Limitations

   Outwash/till — Geologic/Parent Material
   Landform:

3. Surficial Geological Report Available? ☒ Yes ☐ No
   If yes: 1965 (Year Published/Source) 1:24,000 (Publication Scale) Kt (Map Unit)

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No
   If Yes, continue to #5.
   Within the 100-year flood boundary? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No
   MassGIS Wetland Data Layer: Wetland Type

7. Current Water Resource Conditions (USGS): Dec. 2015 (Month/Year)
   Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-3 | 12/31/15 (Date) | 10:30 AM (Time) | Sunny, Clear, 40 degrees (Weather)

1. Location

   Ground Elevation at Surface of Hole: 232+/- feet Latitude/Longitude: 42 13' 23.4" / 71 6' 50.8"

   Description of Location: ______

2. Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.) Few (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

   Grassed (Vegetation) Kame terrace (Landform) ______ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from:

   Open Water Body >100' feet Drainage Way >100' feet Wetlands >100' feet

   Property Line 20'+/- feet Drinking Water Well >100' feet Other ______ feet

4. Parent Material: Outwash Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 90" (Depth Weeping from Pit) ______ (Depth Standing Water in Hole)

   Estimated Depth to High Groundwater: 48" inches ______ elevation

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-3

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-12"	A	10YR2/2			0	Sandy loam	5-10%	5%	Weak	Friable	
12"-24"	B	10YR4/4			0	Sandy loam	10-15%	10%	Weak	Friable	
24"-48"	C1	2.5Y5/4			0	Sand	30-35%	25	Single grain	Loose	Medium
48"-54"	C2	2.5Y5/3	48"		40	Sandy loam	10-15%	10%	Slightly blocky	Firm	Medium
54"-126"	C3	2.5Y5/3			0	Loamy sand	5-10%	5%	Weak	Friable	Medium

Additional Notes:

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-4 | Date: 12/31/15 | Time: 11:10 AM | Weather: Sunny, Clear, 40 degrees

1. Location

   Ground Elevation at Surface of Hole: 230+/- feet   Latitude/Longitude: 42 13' 23.7 / 71 6 46.9"

2. Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.)   Surface Stones (e.g., cobbles, stones, boulders, etc.): Few   Slope (%): 8-15%

   Vegetation: Grass   Landform: Ground moraine   Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100' feet	Drainage Way	70'+/- feet	Wetlands	>100' feet
Property Line	30'+/- feet	Drinking Water Well	>100' feet	Other	feet

4. Parent Material: Glacial till   Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No   If yes: 36 Depth Weeping from Pit   Depth Standing Water in Hole

   Estimated Depth to High Groundwater: 18" inches   elevation

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-4

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-12"	A	10YR2/2			0	Sandy loam	20%	10%	Weak	Friable	
12"-24	B	10YR4/4	18"		40	Sandy loam	20%	10%	Weak	Friable	
24"-36"	C1	2.5Y4/4			40	Sandy loam	20%	5%	Blocky	Firm	Medium
36"-114"	C2	2.5Y4/4			0	Sandy loam	25-30%	10%	Massive	Slightly firm	Muddy feel

Additional Notes:

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # TP-3	Obs. Hole # TP-4
☐ Depth observed standing water in observation hole	inches	inches
☐ Depth weeping from side of observation hole	inches	inches
☒ Depth to soil redoximorphic features (mottles)	48" inches	18" inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	inches	inches

Index Well Number ______ Reading Date ______

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole # ____ S_c ____ S_r ____ OW_c ____ OW_{max} ____ OW_r ____ S_h ____

Obs. Hole # ____ S_c ____ S_r ____ OW_c ____ OW_{max} ____ OW_r ____ S_h ____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed? Upper boundary: 36 inches Lower boundary: 114 inches

c. If no, at what depth was impervious material observed? Upper boundary: ____ inches Lower boundary: ____ inches

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Board of Health Witness

Name of Board of Health Witness	Board of Health

G. Soil Evaluator Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

	12/31/15
Signature of Soil Evaluator	Date
Alan W. Loomis / Soil Evaluator #1405	June 30, 2016
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Carberry Family Limited Partnership
Owner Name

1602 Canton Ave. — Street Address
Map 2, Lots 2, 4, 29, 29A, 40 — Map/Lot #

Milton — City
MA — State
02186 — Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No
   If yes: Web Soil Survey (Source) 254B, 310B (Soil Map Unit)

   Merrimac fine sandy loam/Woodbridge fine sandy loam — Soil Name
   Few limitations for development/Limitations due to high grndwtr — Soil Limitations

   Outwash/till — Geologic/Parent Material
   Kame terrace/Ground moraine — Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No
   If yes: 1965 (Year Published/Source) 1:24,000 (Publication Scale) Kt/Gm (Map Unit)

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No
   If Yes, continue to #5.
   Within the 100-year flood boundary? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No
   MassGIS Wetland Data Layer: ________ Wetland Type

7. Current Water Resource Conditions (USGS): Dec. 2015 (Month/Year)
   Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed: ________

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-5 | Date: 12/31/15 | Time: 12:00 PM | Weather: Sunny, Clear, 45 degrees

1. Location

   Ground Elevation at Surface of Hole: 264+/- feet   Latitude/Longitude: 42 13' 19.1" / 71 6' 51.7"

   Description of Location: ______

2. Land Use: Lawn/woods (e.g., woodland, agricultural field, vacant lot, etc.)   Surface Stones (e.g., cobbles, stones, boulders, etc.): Few   Slope (%): 5-8%

   Vegetation: Grassed   Landform: Ground moraine   Position on Landscape (SU, SH, BS, FS, TS): ______

3. Distances from:

   Open Water Body: >100' feet   Drainage Way: >100' feet   Wetlands: >100' feet

   Property Line: 250'+/- feet   Drinking Water Well: >100' feet   Other: ______ feet

4. Parent Material: Glacial till   Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No   If yes: ______ Depth Weeping from Pit   ______ Depth Standing Water in Hole

   Estimated Depth to High Groundwater: 30" inches   ______ elevation

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-5

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-10"	A	10YR2/2			0	Sandy loam	5-10%	5%	Weak	Friable	
10"-18"	B	10YR4/4			0	Sandy loam	10-15%	10%	Weak	Friable	
18"-30"	C1	2.5Y4/4			0	Loamy sand	15-20%	15	Single grain	Loose	
30"-48"	C2	2.5Y5/3	30"		30	Sandy loam	10-15%	10%	Blocky	Firm	Medium
48"-108"	C3	2.5Y5/3			0	Sandy loam	15-20%	10%	Massive	Very firm to firm	Medium

Additional Notes:

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-6 | Date: 12/31/15 | Time: 12:30 PM | Weather: Sunny, Clear, 40 degrees

1. Location

   Ground Elevation at Surface of Hole: 218+/- feet   Latitude/Longitude: 42 13' 23.4 / 71 6 56.3"

2. Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.)   Surface Stones (e.g., cobbles, stones, boulders, etc.): Few   Slope (%): 8-15%

   Vegetation: Grass   Landform: Ground moraine   Position on Landscape (SU, SH, BS, FS,

3. Distances from:

   Open Water Body >100' feet   Drainage Way >100' feet   Wetlands >100' feet

   Property Line 310'+/- feet   Drinking Water Well >100' feet   Other ____ feet

4. Parent Material: Glacial till   Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No   If yes: 42 Depth Weeping from Pit   ____ Depth Standing Water in Hole

   Estimated Depth to High Groundwater: 42" inches   ____ elevation

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-6

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-12"	A	10YR2/2			0	Sandy loam	10-15%	10%	Weak	Friable	
12"-24	B	10YR4/4			0	Sandy loam	15-20%	15%	Weak	Friable	
24"-42"	C1	2.5Y4/4			0	Sand	25-30%	25%	Single grain	Loose	Medium-coarse
42"-60"	C2	2.5Y5/4	42"		40-50	Sandy loam	10-15%	10%	Blocky	Firm	
60"-90"	C3	2.5Y5/4			0	Sandy loam	10-15%	10%	Massive	Firm	

Additional Notes:

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # TP-5	Obs. Hole # TP-6
☐ Depth observed standing water in observation hole	____ inches	____ inches
☐ Depth weeping from side of observation hole	____ inches	____ inches
☒ Depth to soil redoximorphic features (mottles)	30" inches	42" inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	____ inches	____ inches

Index Well Number ____________ Reading Date ____________

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole # ____ S_c ____ S_r ____ OW_c ____ OW_{max} ____ OW_r ____ S_h ____

Obs. Hole # ____ S_c ____ S_r ____ OW_c ____ OW_{max} ____ OW_r ____ S_h ____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

   ☒ Yes ☐ No

   b. If yes, at what depth was it observed? Upper boundary: 18 inches Lower boundary: 108 inches

   c. If no, at what depth was impervious material observed? Upper boundary: ____ inches Lower boundary: ____ inches

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Board of Health Witness

Name of Board of Health Witness	Board of Health

G. Soil Evaluator Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

	12/31/15
Signature of Soil Evaluator	Date
Alan W. Loomis / Soil Evaluator #1405	June 30, 2016
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Carberry Family Limited Partnership
Owner Name

1602 Canton Ave. — Street Address
Map 2, Lots 2, 4, 29, 29A, 40 — Map/Lot #

Milton — City
MA — State
02186 — Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: Web Soil Survey (Source) 254B (Soil Map Unit)

   Merrimac fine sandy loam — Soil Name
   Few limitations for development — Soil Limitations
   Outwash — Geologic/Parent Material
   Kame terrace — Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1965 (Year Published/Source) 1:24,000 (Publication Scale) Kt (Map Unit)

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No
   If Yes, continue to #5.
   Within the 100-year flood boundary? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No MassGIS Wetland Data Layer: ____ (Wetland Type)

7. Current Water Resource Conditions (USGS): Dec. 2015 (Month/Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7 — Date: 12/31/15 — Time: 1:00 PM — Weather: Cloudy, 45 degrees

1. Location

Ground Elevation at Surface of Hole: 202+/- feet — Latitude/Longitude: 42 13' 23.7" / 71 7' 1.0"

Description of Location: ____

2. Land Use: Wooded (e.g., woodland, agricultural field, vacant lot, etc.) — Surface Stones (e.g., cobbles, stones, boulders, etc.): Few — Slope (%): 3-5%

Vegetation: Pine, oak beech — Landform: Kame terrace — Position on Landscape (SU, SH, BS, FS, TS): ____

3. Distances from:

Open Water Body	>100' feet	Drainage Way	>100' feet	Wetlands	>100' feet
Property Line	40'+/- feet	Drinking Water Well	>100' feet	Other	____ feet

4. Parent Material: Outwash — Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No — If yes: ____ Depth Weeping from Pit — ____ Depth Standing Water in Hole

Estimated Depth to High Groundwater: >108" inches — ____ elevation

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-7

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-12"	A	10YR2/2			0	Sandy loam	5-10%	5%	Weak	Friable	
12"-24"	B	10YR4/4			0	Loamy sand	10-15%	15%	Weak	Friable	
24"-108"	C1	2.5Y4/4			0	Sand	25-30%	25%	Single grain	Loose	Medium-coarse

Additional Notes:

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-8 | Date: 12/31/15 | Time: 1:30 PM | Weather: Cloudy, 40 degrees

1. Location

   Ground Elevation at Surface of Hole: 158+/- feet   Latitude/Longitude: 42 13' 33.5" / 71 6 50.0"

2. Land Use: Field (e.g., woodland, agricultural field, vacant lot, etc.)   Surface Stones (e.g., cobbles, stones, boulders, etc.): Few   Slope (%): 5-8%

   Vegetation: Grass   Landform: Kame terrace   Position on Landscape (SU, SH, BS, FS,:

3. Distances from: Open Water Body >100' feet   Drainage Way >100' feet   Wetlands >100' feet

   Property Line 90'+/- feet   Drinking Water Well >100' feet   Other ______ feet

4. Parent Material: Outwash   Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No   If yes: ______ Depth Weeping from Pit   ______ Depth Standing Water in Hole

   Estimated Depth to High Groundwater: >108" inches   ______ elevation

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-8

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-12"	A	10YR2/2			0	Sandy loam	10-15%	10%	Weak	Friable	
12"-24"	B	10YR4/4			0	Loamy sand	15-20%	15%	Weak	Friable	
24"-108"	C1	2.5Y5/4			0	Sand	50%	25%	Single grain	Loose	Medium-coarse
											Rounded coarse
											particles

Additional Notes:

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # TP-7	Obs. Hole # TP-8
☒ Depth observed standing water in observation hole	>108" inches	>108" inches
☐ Depth weeping from side of observation hole	inches	inches
☐ Depth to soil redoximorphic features (mottles)	inches	inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	inches	inches

______ Index Well Number ______ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole # ______ S_c ______ S_r ______ OW_c ______ OW_{max} ______ OW_r ______ S_h ______

Obs. Hole # ______ S_c ______ S_r ______ OW_c ______ OW_{max} ______ OW_r ______ S_h ______

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

   ☒ Yes ☐ No

   b. If yes, at what depth was it observed? Upper boundary: 24 inches Lower boundary: 108 inches

   c. If no, at what depth was impervious material observed? Upper boundary: ______ inches Lower boundary: ______ inches

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Board of Health Witness

Name of Board of Health Witness	Board of Health

G. Soil Evaluator Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

	12/31/15
Signature of Soil Evaluator	Date
Alan W. Loomis / Soil Evaluator #1405	June 30, 2016
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Carberry Family Limited Partnership
Owner Name

1602 Canton Ave. — Street Address
Map 2, Lots 2, 4, 29, 29A, 40 — Map/Lot #

Milton — City
MA — State
02186 — Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No
   If yes: Web Soil Survey — Source; 254B — Soil Map Unit
   Merrimac fine sandy loam — Soil Name
   Few limitations for development — Soil Limitations
   Outwash — Geologic/Parent Material
   Kame terrace — Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No
   If yes: 1965 — Year Published/Source; 1:24,000 — Publication Scale; Kt — Map Unit

4. Flood Rate Insurance Map
   Above the 500-year flood boundary? ☒ Yes ☐ No
   If Yes, continue to #5.
   Within the 100-year flood boundary? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No
   MassGIS Wetland Data Layer: ______ Wetland Type

7. Current Water Resource Conditions (USGS): Dec. 2015 — Month/Year
   Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Milton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-9 | Date: 12/31/15 | Time: 1:50 PM | Weather: Cloudy, 40 degrees

1. Location

Ground Elevation at Surface of Hole: 182+/- feet   Latitude/Longitude: 42 13' 31.3" / 71 6' 52.6"

Description of Location: ________

2. Land Use: Grassed (e.g., woodland, agricultural field, vacant lot, etc.)   Surface Stones (e.g., cobbles, stones, boulders, etc.): Few   Slope (%): 3-5%

Vegetation: Grass   Landform: Kame terrace   Position on Landscape (SU, SH, BS, FS, TS): ________

3. Distances from:

Open Water Body	>100' feet	Drainage Way	>100' feet	Wetlands	>100' feet
Property Line	100'+/- feet	Drinking Water Well	>100' feet	Other	feet

4. Parent Material: Outwash   Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No   If yes: ____ Depth Weeping from Pit ____ Depth Standing Water in Hole

Estimated Depth to High Groundwater: >96" inches   ____ elevation

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-9

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-12"	A	10YR2/2			0	Sandy loam	5-10%	5%	Weak	Friable	
12"-24"	B	10YR4/6			0	Sandy loam	10-15%	10%	Weak	Friable	
24"-96"	C1	2.5Y4/4			0	Sand	25-25%	20%	Single grain	Loose	Medium-coarse

Additional Notes:

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # TP-9	Obs. Hole #
☒ Depth observed standing water in observation hole	>96" inches	inches
☐ Depth weeping from side of observation hole	inches	inches
☐ Depth to soil redoximorphic features (mottles)	inches	inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	inches	inches

Index Well Number ______ Reading Date ______

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole # ______ S_c ______ S_r ______ OW_c ______ OW_{max} ______ OW_r ______ S_h ______

Obs. Hole # ______ S_c ______ S_r ______ OW_c ______ OW_{max} ______ OW_r ______ S_h ______

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

   ☒ Yes ☐ No

   b. If yes, at what depth was it observed? Upper boundary: 24 inches Lower boundary: 96 inches

   c. If no, at what depth was impervious material observed? Upper boundary: ______ inches Lower boundary: ______ inches

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Board of Health Witness

Name of Board of Health Witness	Board of Health

G. Soil Evaluator Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

	12/31/15
Signature of Soil Evaluator	Date
Alan W. Loomis / Soil Evaluator #1405	June 30, 2016
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Merrill Associates, Inc.
427 Columbia Road
Hanover, MA 02339
1-781-826-9200

FORM 11 - SOIL EVALUATOR FORM

Project No. 16-079

Date: 3/23/17
Revision: ______

Commonwealth of Massachusetts
Milton , Massachusetts

Soil Suitability Assessment for On-site Sewage Disposal

Performed By:	Bradley Lemont, E.I.T.	Test Dates:	3/23/17
Performed By:		Test Dates:	
Witnessed By:	Steve Ward, Milton BOH	Testhole #:	
Witnessed By:		Testhole #:	

FACILITY INFORMATION

Site Location:		Owner/ Applicant Information:	
Builder's lot #:		Name:	Northland Residential Corporation
Street Address:	1702 Canton Avenue	Address:	20 Mall Road
Town, State, Zip:	Milton. MA 02186	Town, State, Zip:	Burlington, MA 01803
Assessor's Map:		Telephone no.:	

SITE INFORMATION

Construction Type:

New Construction: ☐ Repair: ☐ Upgrade: ☐

Published Soil Survey Available: No: ☐ Yes: ☒

Year Published: ______ Publication Scale: ______ a. Soil Map Unit: 254B Drainage Class: ______
b. Soil Map Unit: ______ Drainage Class: ______

Soil Name: a. Merrimac b. ______ Soil Limitations: Few

Surficial Geologic Report Available: No: ☐ Yes: ☒

Year Published: 1965 Publication Scale: 1:24,000

Geological Material/map unit: KT

Landform: Outwash

Flood Insurance Rate Map:

Above 500 year flood boundary? No: ☐ Yes: ☒ Within a velocity zone? No: ☒ Yes: ☐

Within 500 year flood boundary? No: ☒ Yes: ☐ Within 100 year flood boundary? No: ☒ Yes: ☐

Wetland Area:

National Wetland Inventory Map: (map unit) N/A Name: ______

Wetlands Conservancy Program Map: (map unit) N/A Name: ______

Current Water Resource Conditions (USGS): (Month/year) ______

Range: Above Normal: ☐ Normal: ☐ Below Normal: ☐

Other References Reviewed: ______

Merrill Corporation
427 Columbia Road
Hanover, MA 02339
1-781-826-9200

FORMS 11 AND 12
SOIL EVALUATOR FORM

ON-SITE REVIEW

DEEP HOLE #: A DATE: 3/23/17 TIME: 9:00 AM WEATHER: Sunny, 10 degrees

SITE ADDRESS or MAP/LOT #:

OWNER: JOB NO.: 16-079

LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Field SURFACE STONES: Yes: ☐ No: X SLOPE (%):

VEGETATION: Long grass / hay LANDFORM: Kame Terrace

DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >100 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >100 ft

DRINKING WATER WELL: ft OTHER:

DEEP OBSERVATION HOLE LOG

Depth (inches)	**Soil Hor./ Layer**	**Soil Texture (USDA)**	**Soil Color (Munsell)**	**Redoximorphic Features**	**Other (Structure, Consistency,% Gravels, Stones, Boulders**
0-10	A	Sandy Loam	10YR 2/2		Granular, Friable
10-24	B	Loamy Sand	10YR 5/4		Blocky, Friable
24-36	C1	Fine Sand	10YR 5/3		Massive, Loose
36-120	C2	Med-Coarse Sand	10YR 4/3		Single Grain, Loose, 25% gravel, 10% Cobbles

PARENT MATERIAL: Outwash Unsuitable Material Present? Yes: ☐ No: X If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☐ No: X If Yes: What is the depth of Groundwater:

Standing in Hole: Weeping from Face: Saturating the Face: Mottling:

Estimated Depth to Seasonal High Ground Water :

PERCOLATION TEST

Percolation Hole #:			Percolation Hole #:		
Test Date:			Test Date:		
Depth of Perc:			Depth of Perc:		
Start of Presoak:			Start of Presoak:		
End of Presoak:			End of Presoak:		
Time @ 12":			Time @ 12":		
Time @ 9":			Time @ 9":		
Time Elapse:(12"-9")			Time Elapse:(12"-9")		
Time AT 6":			Time AT 6":		
Time Elapse: (9"-6"):			Time Elapse: (9"-6"):		
Rate: (min/in.):			Rate: (min/in.):		
Test Passed/ Failed/ Discon/ Add. Test Req'd:			Test Passed/ Failed/ Discon/ Add. Testing Req'd:		

Performed By: Bradley Lemont, E.I.T. Witnessed By: Mach./Oper.:

Comments:

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

Merrill Corporation
427 Columbia Road
Hanover, MA 02339
1-781-826-9200

FORMS 11 AND 12
SOIL EVALUATOR FORM

ON-SITE REVIEW

DEEP HOLE #: B DATE: 3/23/17 TIME: 10:00 AM WEATHER: Sunny, 10 degrees
SITE ADDRESS or MAP/LOT #:
OWNER: JOB NO.: 16-079
LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Field SURFACE STONES: Yes: [ ] No: [X] SLOPE (%):

VEGETATION: Long grass / hay LANDFORM: Kame Terrace
DISTANCES FROM:
OPEN WATER BODY: >100 ft PROPERTY LINE: >100 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >100 ft
DRINKING WATER WELL: ft OTHER:

DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders
0-10	A	Sandy Loam	7.5YR 2.5/2		Granular, Friable
10-18	B	Sandy Loam	5YR 4/6		Blocky, Friable
18-120	C1	Med-Coarse Sand	10YR 4/3		Single Grain, Loose, 25% gravel, 10% Cobbles

PARENT MATERIAL: Outwash Unsuitable Material Present? Yes: [ ] No: [X] If Yes:
Disturbed Soil: [ ] Fill Mat'l: [ ] Impervious Layer(s): [ ] Weathered/Fractured Rock: [ ] Bedrock: [ ]

GROUNDWATER OBSERVED: Yes: [ ] No: [X] If Yes: What is the depth of Groundwater:
Standing in Hole: Weeping from Face: Saturating the Face: Mottling:
Estimated Depth to Seasonal High Ground Water :

PERCOLATION TEST

Percolation Hole #:			Percolation Hole #:		
Test Date:			Test Date:		
Depth of Perc:			Depth of Perc:		
Start of Presoak:			Start of Presoak:		
End of Presoak:			End of Presoak:		
Time @ 12":			Time @ 12":		
Time @ 9":			Time @ 9":		
Time Elapse:(12"-9")			Time Elapse:(12"-9")		
Time AT 6":			Time AT 6":		
Time Elapse: (9"-6"):			Time Elapse: (9"-6"):		
Rate: (min/in.):			Rate: (min/in.):		
Test Passed/ Failed/ Discon/ Add. Test Req'd:			Test Passed/ Failed/ Discon/ Add. Testing Req'd:		

Performed By: Bradley Lemont, E.I.T. Witnessed By: Mach./Oper.:
Comments:

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

Merrill Corporation
427 Columbia Road
Hanover, MA 02339
1-781-826-9200

FORMS 11 AND 12
SOIL EVALUATOR FORM

ON-SITE REVIEW

DEEP HOLE #: C DATE: 3/23/17 TIME: 10:00 AM WEATHER: Sunny, 10 degrees
SITE ADDRESS or MAP/LOT #:
OWNER: JOB NO.: 16-079
LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Field SURFACE STONES: Yes: [ ] No: [X] SLOPE (%):

VEGETATION: Long grass / hay LANDFORM: Kame Terrace
DISTANCES FROM:
OPEN WATER BODY: >100 ft PROPERTY LINE: >100 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >100 ft
DRINKING WATER WELL: ft OTHER:
DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders
0-19	A	Sandy Loam	7.5YR 2.5/2		Granular, Friable
19-26	B	Sandy Loam	5YR 4/6		Blocky, Friable
26-103	C1	Med-Coarse Sand	10YR 4/3	96"	Single Grain, Loose, 25% gravel, 10% Cobbles
103-120	C2	Fine-Medium Sand	2.5Y 6/3		Massive, Loose, Some fines

PARENT MATERIAL: Outwash Unsuitable Material Present? Yes: [ ] No: [X] If Yes:
Disturbed Soil: [ ] Fill Mat'l: [ ] Impervious Layer(s): [ ] Weathered/Fractured Rock: [ ] Bedrock: [ ]
GROUNDWATER OBSERVED: Yes: [X] No: [ ] If Yes: What is the depth of Groundwater:
Standing in Hole: Weeping from Face: Saturating the Face: Mottling: 96"
Estimated Depth to Seasonal High Ground Water : 96"

PERCOLATION TEST

Percolation Hole #:			Percolation Hole #:		
Test Date:			Test Date:		
Depth of Perc:			Depth of Perc:		
Start of Presoak:			Start of Presoak:		
End of Presoak:			End of Presoak:		
Time @ 12":			Time @ 12":		
Time @ 9":			Time @ 9":		
Time Elapse:(12"-9")			Time Elapse:(12"-9")		
Time AT 6":			Time AT 6":		
Time Elapse: (9"-6"):			Time Elapse: (9"-6"):		
Rate: (min/in.):			Rate: (min/in.):		
Test Passed/ Failed/ Discon/ Add. Test Req'd:			Test Passed/ Failed/ Discon/ Add. Testing Req'd:		

Performed By: Bradley Lemont, E.I.T. Witnessed By: Mach./Oper.:
Comments:

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

Norfolk and Suffolk Counties, Massachusetts

70A—Ridgebury fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2w69f
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury

Setting

Landform: Depressions, ground moraines, hills, drumlins, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Woodbridge

Percent of map unit: 9 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Crest, base slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Whitman

Percent of map unit: 5 percent
Landform: Depressions, ground moraines, hills, drumlins, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Leicester

Percent of map unit: 1 percent
Landform: Depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

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

Norfolk and Suffolk Counties, Massachusetts

71B—Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w69c
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, extremely stony, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

Landform: Depressions, ground moraines, hills, drumlins, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Woodbridge, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Footslope, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Whitman, extremely stony

Percent of map unit: 8 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Paxton, extremely stony

Percent of map unit: 2 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Data Source Information

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

Norfolk and Suffolk Counties, Massachusetts

103B—Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: vktd
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Charlton and similar soils: 40 percent
Hollis and similar soils: 25 percent
Rock outcrop: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable coarse-loamy ablation till derived from granite

Typical profile

H1 - 0 to 6 inches: fine sandy loam
H2 - 6 to 36 inches: fine sandy loam
H3 - 36 to 60 inches: fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: A
Hydric soil rating: No

Description of Hollis

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Shallow, friable loamy ablation till derived from igneous rock

Typical profile

H1 - 0 to 3 inches: fine sandy loam
H2 - 3 to 14 inches: gravelly fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 8 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Rock Outcrop

Setting

Parent material: Igneous and metamorphic rock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Canton

Percent of map unit: 7 percent
Hydric soil rating: No

Chatfield

Percent of map unit: 5 percent
Hydric soil rating: No

Scituate

Percent of map unit: 2 percent
Hydric soil rating: No

Whitman

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

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

Norfolk and Suffolk Counties, Massachusetts

104D—Hollis-Rock outcrop-Charlton complex, 15 to 35 percent slopes

Map Unit Setting

National map unit symbol: vkvh
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis and similar soils: 35 percent
Rock outcrop: 30 percent
Charlton and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Shallow, friable loamy ablation till derived from igneous and metamorphic rock

Typical profile

H1 - 0 to 3 inches: fine sandy loam
H2 - 3 to 14 inches: gravelly fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D
Hydric soil rating: No

Description of Rock Outcrop

Setting

Parent material: Igneous and metamorphic rock

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Description of Charlton

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable coarse-loamy ablation till derived from granite

Typical profile

H1 - 0 to 6 inches: fine sandy loam
H2 - 6 to 36 inches: fine sandy loam
H3 - 36 to 60 inches: fine sandy loam

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Canton

Percent of map unit: 5 percent
Hydric soil rating: No

Chatfield

Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

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

Norfolk and Suffolk Counties, Massachusetts

245C—Hinckley loamy sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2svm9
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Eskers, moraines, outwash plains, kames, kame terraces, outwash terraces, outwash deltas
Landform position (two-dimensional): Shoulder, toeslope, footslope, backslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, riser
Down-slope shape: Convex, concave, linear
Across-slope shape: Concave, linear, convex
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Eskers, moraines, outwash plains, kames, outwash terraces
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Side slope, head slope, nose slope, crest, riser
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Eskers, moraines, outwash plains, kames, kame terraces, outwash terraces, outwash deltas
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser
Down-slope shape: Convex, concave, linear
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Moraines, outwash plains, kame terraces, outwash terraces, outwash deltas
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Data Source Information

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

Norfolk and Suffolk Counties, Massachusetts

253D—Hinckley loamy sand, 15 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2svmd
Elevation: 0 to 860 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Eskers, moraines, outwash plains, kames, kame terraces, outwash terraces, outwash deltas
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Crest, nose slope, side slope, head slope, riser
Down-slope shape: Linear, convex, concave
Across-slope shape: Linear, concave, convex
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 10 percent
Landform: Eskers, moraines, outwash plains, kames, kame terraces, outwash terraces, outwash deltas
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Crest, nose slope, side slope, head slope, riser
Down-slope shape: Concave, convex, linear
Across-slope shape: Linear, concave, convex
Hydric soil rating: No

Merrimac

Percent of map unit: 3 percent
Landform: Eskers, moraines, kames, outwash plains, kame terraces, outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, head slope, nose slope, crest, riser
Down-slope shape: Convex, linear, concave
Across-slope shape: Linear, convex, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 2 percent
Landform: Moraines, outwash plains, kame terraces, outwash terraces, outwash deltas
Landform position (two-dimensional): Backslope, footslope, toeslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: No

Data Source Information

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

Norfolk and Suffolk Counties, Massachusetts

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqs
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Eskers, moraines, kames, outwash plains, outwash terraces
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0

Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Eskers, deltas, outwash plains, kames
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Deltas, outwash plains, dunes, outwash terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Eskers, moraines, kames, stream terraces, outwash plains, outwash terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Data Source Information

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

Norfolk and Suffolk Counties, Massachusetts

260B—Sudbury fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: vky4
Elevation: 0 to 2,100 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sudbury and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sudbury

Setting

Landform: Outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Friable coarse-loamy eolian deposits over loose sandy glaciofluvial deposits

Typical profile

H1 - 0 to 11 inches: sandy loam
H2 - 11 to 22 inches: sandy loam
H3 - 22 to 60 inches: gravelly coarse sand

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 18 to 36 inches to strongly contrasting textural stratification
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Walpole

Percent of map unit: 5 percent
Landform: Terraces
Hydric soil rating: Yes

Deerfield

Percent of map unit: 5 percent
Landform: Outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

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

Norfolk and Suffolk Counties, Massachusetts

300B—Montauk fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyrh
Elevation: 0 to 1,030 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Montauk and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Montauk

Setting

Landform: Ground moraines, hills, drumlins, recessional moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 26 inches: fine sandy loam
Bw2 - 26 to 34 inches: sandy loam
2Cd - 34 to 72 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Scituate

Percent of map unit: 6 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Canton

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 4 percent
Landform: Depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

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

Norfolk and Suffolk Counties, Massachusetts

302C—Montauk fine sandy loam, 8 to 15 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w80s
Elevation: 0 to 1,080 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Montauk, extremely stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Montauk, Extremely Stony

Setting

Landform: Ground moraines, hills, drumlins, recessionial moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 6 inches: fine sandy loam
Bw1 - 6 to 28 inches: fine sandy loam
Bw2 - 28 to 36 inches: sandy loam
2Cd - 36 to 74 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Scituate, extremely stony

Percent of map unit: 8 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Canton, extremely stony

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 2 percent
Landform: Depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

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

Norfolk and Suffolk Counties, Massachusetts

305D—Paxton fine sandy loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2w67j
Elevation: 0 to 1,450 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 8 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge

Percent of map unit: 6 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 1 percent
Landform: Depressions, ground moraines, hills, drumlins, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Data Source Information

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

Norfolk and Suffolk Counties, Massachusetts

310B—Woodbridge fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2ql
Elevation: 0 to 1,470 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Woodbridge, fine sandy loam, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Fine Sandy Loam

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D

Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 10 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 8 percent
Landform: Depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

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