

STORM WATER MANAGEMENT ANALYSIS

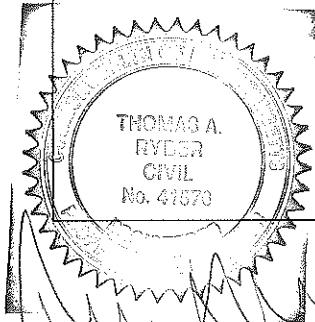
FOR

**102 McCarthy Road
Newton – MASSACHUSETTS**

PREPARED FOR:
Harvey Remodeling
And
Mr. and Mrs. Gongxiong Wu

PREPARED BY:
Clear Water Environmental
87 Bartlett Road
Kittery Point, ME 03905

102 McCarthy Road, Newton, MASSACHUSETTS	
Document:	Pre and Post Storm Water Analysis
Codes, Standards and References:	
1. Newton Onsite Drainage Requirements 2. NPDES	
Attachments:	
1. Narrative, Summary and Results; 2. FEMA Flood Map; 3. Soil Survey Map; 4. Hydrology Report Pre-existing; 5. Hydrology Report Post-Development.	



Thomas A. Ryder
6/9/14

Narrative

The purpose of this analysis is to evaluate the hydrology impacts due to a proposed demolition of an existing garage and construction of a new garage structure on a lot of land in the City of Newton. The existing property is a 2-story house located at 102 McCarthy Road, Newton, MA.

The existing property is situated in the Charles River Watershed Basin on a 10,033 square foot parcel of land. Soil conditions for the site are identified by the National Resource Conservation Services Soil Survey and consist of Merrimac 626B, Urban land complex, with 0 to 8 percent slopes. These types of soils exist on outwash plain landforms, positioned on summits whose parent material consists of loose sandy and gravelly glaciofluvial deposits and are somewhat excessively drained with a HSG of "A".

Properties and qualities described by the Soil Conservation Service indicate: 0 to 8 percent slopes; more than 80 inches to restrictive features; excessively drained; more than 80 inches to depth of water table with no frequency of flooding and no frequency of ponding.

The project proposes razing the existing garage structure on the lot; and constructing a new 2-story garage with livable second floor space. After razing the existing impervious area and rebuilding the garage and modifying the driveway, the increase in impervious area will be approximately 150 S.F which calculates to approximately 1.5 % of the lot size. Because the total increase in impervious area is less than 4%; it does not trigger the City of Newton's Stormwater Management Requirements. A small portion of the driveway near the existing garage will be removed to make way for the new garage. The garage slab will be raised 0.2 feet and a portion of the driveway near the garage will be repaved.

The garage will accommodate roof leaders that will connect to a manifold and discharge into the ground via infiltration units surrounded by stone. The volume of storage of the proposed chambers and surrounding stone is 85 cubic feet; thus exceeding the ½ inch runoff off the proposed garage of 26 cubic feet.

Erosion control will be managed at the limits of work on the property. Stabilizing grade with loam and seed and use of silt fence will be used during construction. All construction is located outside the 200' riverfront area and outside wetland buffer zones.

For more detailed information refer to the plans entitled, "Site Plan" by Clear Water Environmental dated 6/9/14 and by Cheney Engineering dated 6/9/14.

Pre-Development Summary

For all intents and purposes the existing site conditions consists of 2-catchment areas. The property is primarily lawn landscape with a small percentage of wooded area and discharges stormwater off the property in two directions. The predevelopment basin is identified as 1S, "South Property" discharges water towards the neighboring property. Predevelopment basin identified as 2S discharges towards the street.

Post-Development Summary

Upon completion of razing the existing garage and the construction of a new 2-story garage and driveway modification, the catchment areas will have a slight increase in impervious area. Due to the changes in the ground cover and reshaping of the driveway, without stormwater controls there will

likely be an increase peak rate runoff. The developer is proposing collecting the garage roof runoff for infiltration into the ground in the front yard adjacent to the driveway.

Calculation methods

The proposed storm water control system has been designed to manage the 2-year, 10-year, and Newton 100-year Type III storm events. Run-off rates and run-off volumes were determined using a hydrology software program developed by HydroCad This program analyzes site hydrology by the graphic peak discharge method documented in Technical Release No. 55 published by the USDA Soil Conservation Service.

The following variables were developed for the contributing watersheds (drainage areas) in order to complete the analysis:

- Rainfall Depth - A hydrologic analysis was performed for the 24-hour 2-year, 10-year, and Newton 100-year Type III storm event (3.2, 4.8, 7.0 inches respectively) for each drainage area. The rainfall depths for the study area were obtained from available charts published in Technical Release No. 55.
- Run-off Curve Number (RCN) - The RCN is the hydrologic characteristic that determines the depth of rainfall run-off from a given storm event. It is dependent upon soil conditions and land use. Generally, higher curve numbers are associated with less pervious soils and, hence, greater amounts of run-off. The RCN for this project was determined from the Soils Conservation Soils maps and previously used data provided for the site.

Time of Concentration - The time of concentration is defined as the time it takes run-off to travel from the hydrologically most distant point of the watershed to the design point of interest. This parameter is dependent on the characteristics of the ground surface and condition of the travel path.

Results of Analysis

A storm water analysis was performed for the 2-year, 10-year, 100-year (Newton) storm events in order to determine that there will be no increase in storm water run-off post construction.

STORM WATER RUN-OFF RATES -			DESIGN POINT- At edge of Property		
Pre- Redevelopment	1S	2S	Post-Construction	1S	2S
2-Year	0.01 cfs	0.04 cfs	2-Year	0.0 cfs	0.05 cfs
10-Year	0.04 cfs	0.15 cfs	10-Year	0.01 cfs	0.15 cfs
100-Year Newton	0.14 cfs	0.43 cfs	100-Year Newton	0.05 cfs	0.43 cfs

NPDES SUMMARY

Standard 1: No new untreated Discharges

No new discharges to the wetlands are created as part of this project.

Standard 2: Peak Attenuation

The project will not change the peak rate or volume of the stormwater runoff.

Standard 3: Recharge

The project will provide areas of recharge.

Standard 4: Water Quality

Utilizing the rechargers will provide a reduction of total suspended solids, nutrient and other possible contaminants.

Standard 5: Land Uses with Higher Potential Pollutant Loads

The project does not propose Land Uses with Higher potential Pollutant Loads- N/A

Standard 6: Critical Areas

The project is not located in a critical area- NA

Standard 7: Redevelopment

Increase of impervious areas are less than 4% and does not trigger the City of Newton stormwater requirements.

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

Erosion and sedimentation controls will be installed before construction and maintained during the project. Disturbed areas will be loamed and seeded.

Standard 9: Long Term Operation and Maintenance Plan

Operations and Maintenance Plan will be the responsibility of the homeowner. The current plan for this area is to monitor after storm events.

Standard 10: Prohibition of Illicit Discharges

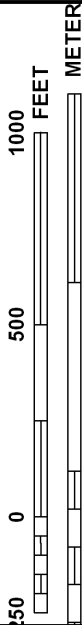
There are currently no known illicit discharges within the project limits.

CONCLUSION

This re-development will not increase flow off the property and meets the City of Newton's stormwater requirements.



MAP SCALE 1" = 500'



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0566E

FIRM
FLOOD INSURANCE RATE MAP
MIDDLESEX COUNTY,
MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 566 OF 656
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:
COMMUNITY NUMBER 250208
CITY OF NEWTON, MASSACHUSETTS
PANEL SUFFIX 0566 E

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER
25017C0566E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps, check the FEMA Flood Map Store at www.msc.fema.gov

Middlesex County, Massachusetts

626B—Merrimac-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

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

Map Unit Composition

Merrimac and similar soils: 40 percent

Urban land: 40 percent

Minor components: 20 percent

Description of Urban Land

Setting

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Base slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Excavated and filled land

Description of Merrimac

Setting

Landform: Plains, terraces

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread, rise

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Friable loamy eolian deposits over loose sandy glaciofluvial deposits derived from granite and gneiss

Typical profile

H1 - 0 to 9 inches: very strongly acid, fine sandy loam

H2 - 9 to 18 inches: strongly acid, gravelly sandy loam

H3 - 18 to 26 inches: moderately acid, very gravelly loamy coarse sand

H4 - 26 to 33 inches: moderately acid, stratified extremely gravelly coarse sand

H5 - 33 to 65 inches: moderately acid, stratified gravelly coarse sand

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High (2.00 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: Low (about 4.9 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A

Minor Components

Sudbury

Percent of map unit: 10 percent
Landform: Terraces, plains
Landform position (two-dimensional): Foothlope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Concave

Windsor

Percent of map unit: 5 percent
Landform: Flats, deltas, terraces
Landform position (two-dimensional): Foothlope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex

Hinckley

Percent of map unit: 5 percent
Landform: Terraces, ridges, eskers
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 13, Dec 17, 2013

Soil Map—Middlesex County, Massachusetts
(102 McCarthy Road, Newton)










































Map Scale: 1:1,820 if printed on A landscape (11" x 8.5") sheet.



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

MAP LEGEND

 Area of Interest (AOI)	 Spoil Area
 Soil Map Unit Polygons	 Stony Spot
 Soil Map Unit Lines	 Very Stony Spot
 Soil Map Unit Points	 Wet Spot
 Special Point Features	 Other
 Blowout	 Special Line Features
 Borrow Pit	 Streams and Canals
 Clay Spot	 Transportation
 Closed Depression	 Rails
 Gravel Pit	 Interstate Highways
 Gravelly Spot	 US Routes
 Landfill	 Major Roads
 Lava Flow	 Local Roads
 Marsh or swamp	 Background
 Mine or Quarry	 Aerial Photography
 Miscellaneous Water	
 Perennial Water	
 Rock Outcrop	
 Saline Spot	
 Sandy Spot	
 Severely Eroded Spot	
 Sinkhole	
 Slide or Slip	
 Sodic Spot	

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 13, Dec 17, 2013

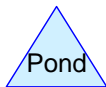
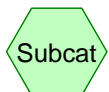
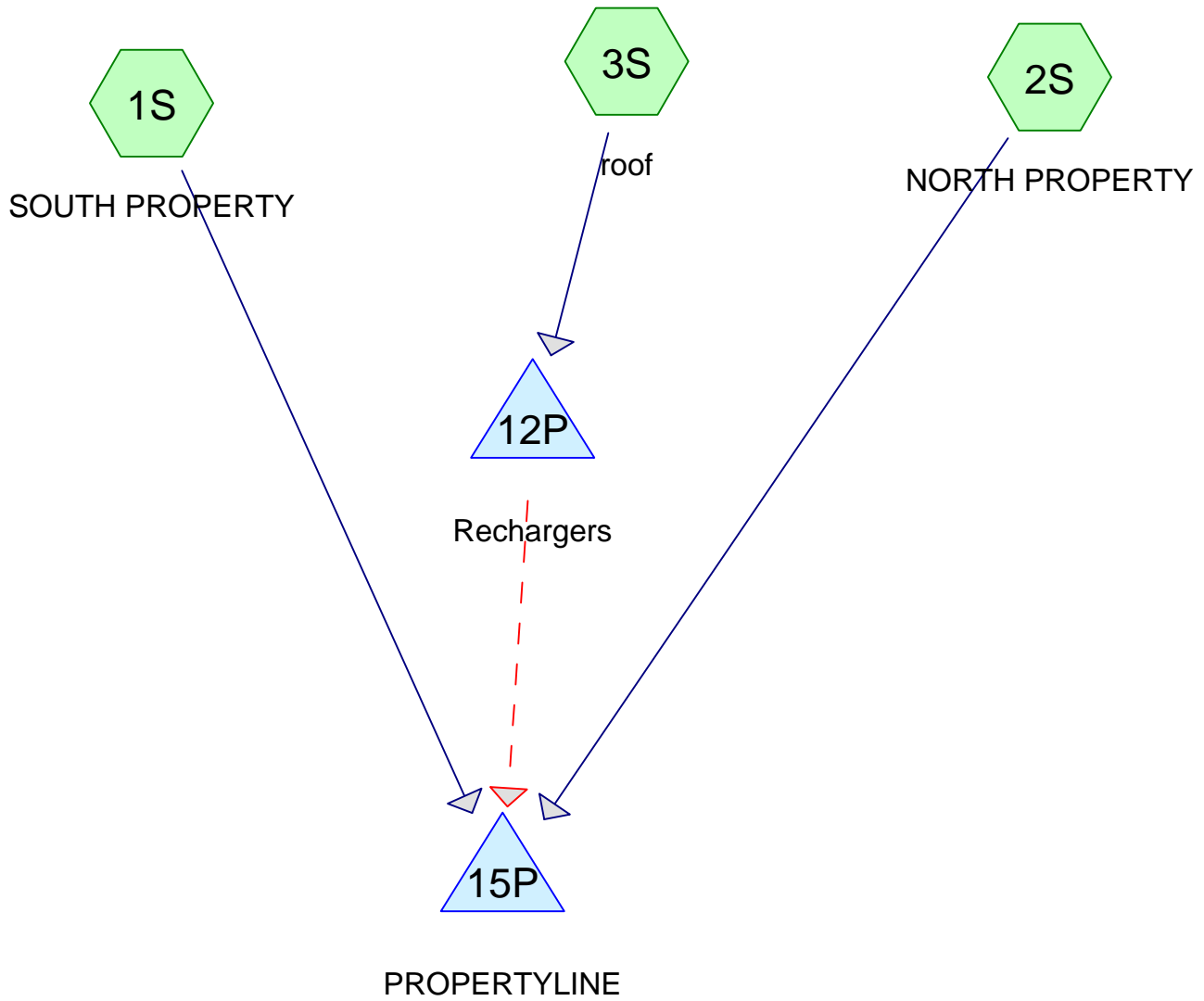
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 30, 2011—May 1, 2011

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

Map Unit Legend

Middlesex County, Massachusetts (MA017)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
253B	Hinckley loamy sand, 3 to 8 percent slopes	0.0	0.1%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	14.3	99.9%
Totals for Area of Interest		14.3	100.0%



Drainage Diagram for MCCARTHY102-140607-POST
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.150	39	>75% Grass cover, Good, HSG A (1S,2S)
0.082	98	Paved parking & roofs (1S,2S,3S)
0.232		TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.150	HSG A	1S, 2S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.082	Other	1S, 2S, 3S
0.232		TOTAL AREA

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102 McCarthy Road, Newton
Type III 24-hr 2-yr Rainfall=3.20"

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Time span=0.00-78.00 hrs, dt=0.05 hrs, 1561 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SOUTH PROPERTY Runoff Area=2,256 sf 11.35% Impervious Runoff Depth=0.06"
Flow Length=85' Slope=0.0100 '/' Tc=10.7 min CN=46 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: NORTH PROPERTY Runoff Area=7,235 sf 37.53% Impervious Runoff Depth=0.44"
Flow Length=140' Slope=0.0100 '/' Tc=10.8 min CN=61 Runoff=0.05 cfs 0.006 af

Subcatchment 3S: roof Runoff Area=615 sf 100.00% Impervious Runoff Depth=2.97"
Flow Length=150' Tc=2.8 min CN=98 Runoff=0.05 cfs 0.003 af

Pond 12P: Rechargers Peak Elev=117.13' Storage=0.000 af Inflow=0.05 cfs 0.003 af
Discarded=0.02 cfs 0.003 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.003 af

Pond 15P: PROPERTYLINE Inflow=0.05 cfs 0.006 af
Primary=0.05 cfs 0.006 af

Total Runoff Area = 0.232 ac Runoff Volume = 0.010 af Average Runoff Depth = 0.51"
64.52% Pervious = 0.150 ac 35.48% Impervious = 0.082 ac

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Summary for Subcatchment 1S: SOUTH PROPERTY

Runoff = 0.00 cfs @ 15.13 hrs, Volume= 0.000 af, Depth= 0.06"

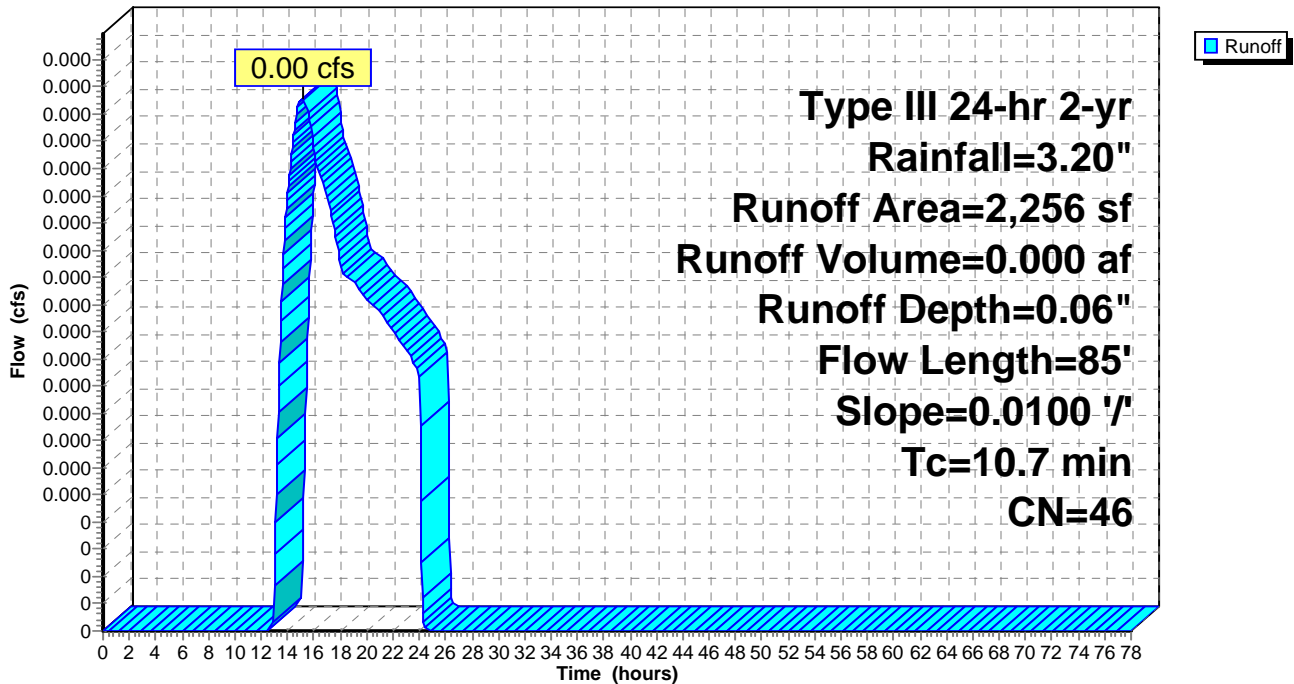
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
56	98	Paved parking & roofs
200	98	Paved parking & roofs
2,000	39	>75% Grass cover, Good, HSG A
2,256	46	Weighted Average
2,000		Pervious Area
256		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	75	0.0100	0.12		Sheet Flow, TOP OF SLOPE Grass: Short n= 0.150 P2= 3.00"
0.1	10	0.0100	1.50		Shallow Concentrated Flow, LAWN Grassed Waterway Kv= 15.0 fps
10.7	85	Total			

Subcatchment 1S: SOUTH PROPERTY

Hydrograph



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Summary for Subcatchment 2S: NORTH PROPERTY

Runoff = 0.05 cfs @ 12.22 hrs, Volume= 0.006 af, Depth= 0.44"

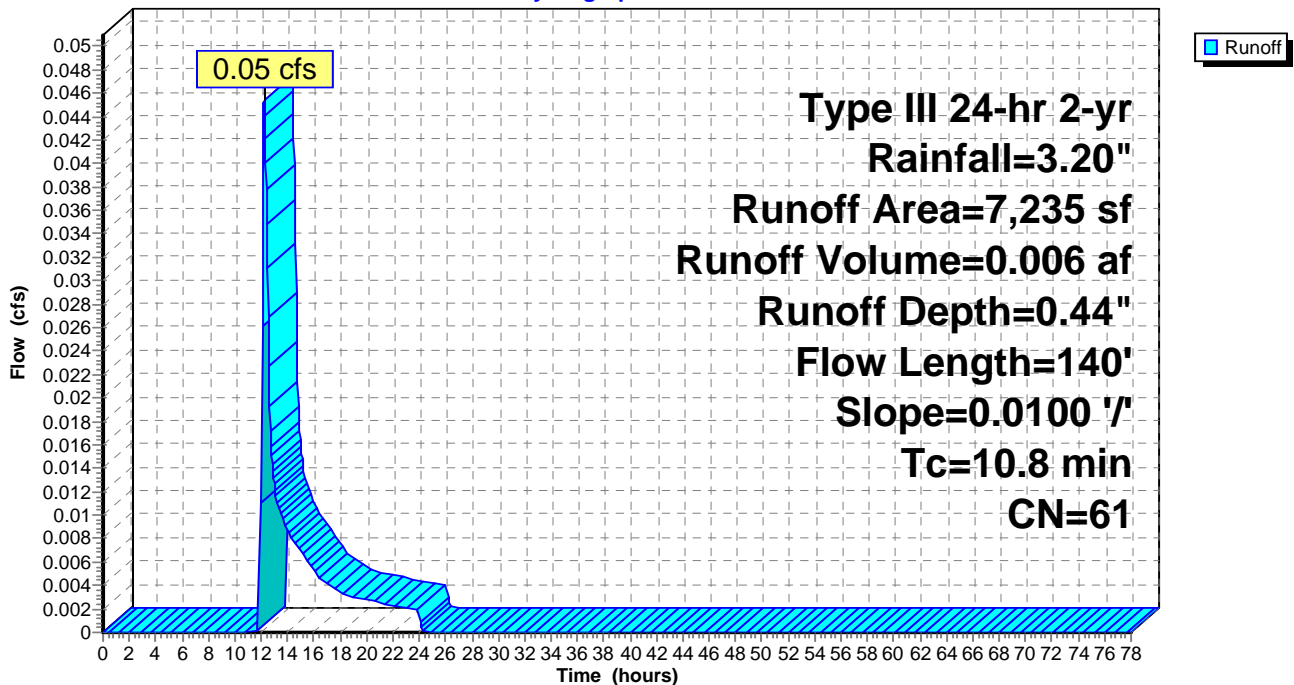
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
2,715	98	Paved parking & roofs
4,520	39	>75% Grass cover, Good, HSG A
7,235	61	Weighted Average
4,520		Pervious Area
2,715		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	60	0.0100	0.11		Sheet Flow, TOP OF SLOPE Grass: Short n= 0.150 P2= 3.00"
1.9	80	0.0100	0.70		Shallow Concentrated Flow, LAWN Short Grass Pasture Kv= 7.0 fps
10.8	140	Total			

Subcatchment 2S: NORTH PROPERTY

Hydrograph



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

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Summary for Subcatchment 3S: roof

Runoff = 0.05 cfs @ 12.04 hrs, Volume= 0.003 af, Depth= 2.97"

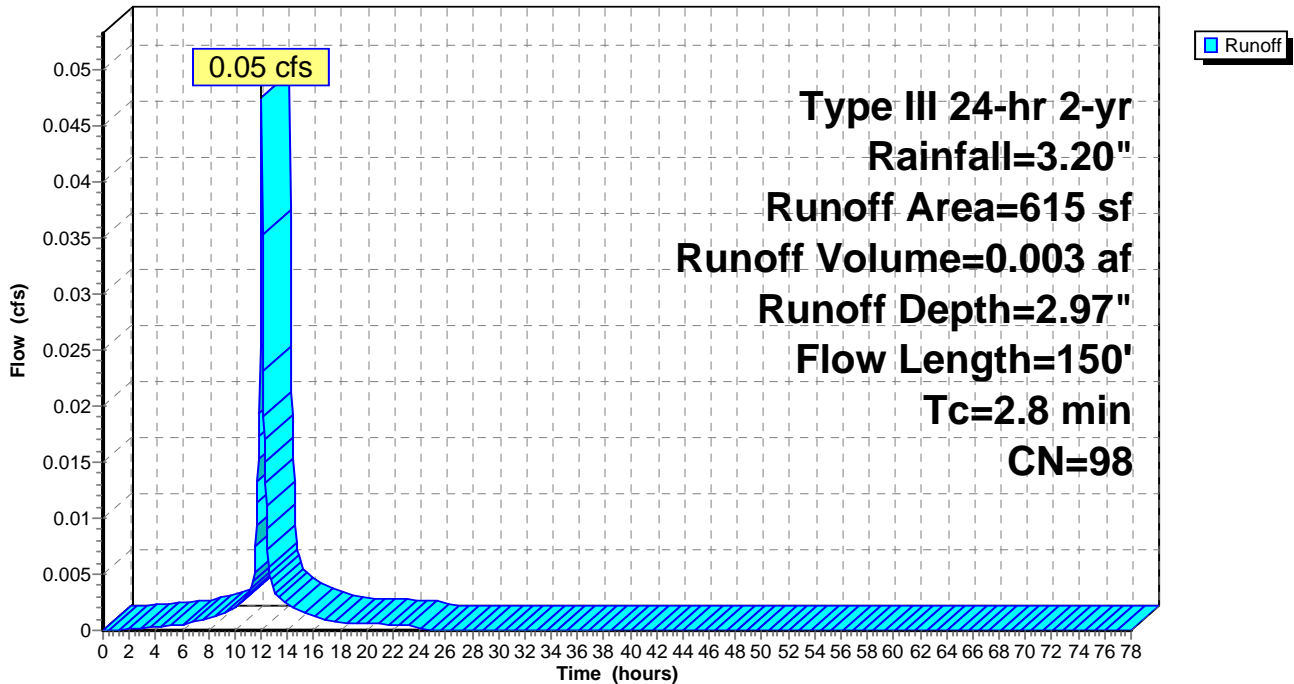
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
615	98	Paved parking & roofs
615		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.3500	3.03		Sheet Flow, roof Smooth surfaces n= 0.011 P2= 3.00"
2.7	130	0.0050	0.80	0.07	Circular Channel (pipe), leader Diam= 4.0" Area= 0.1 sf Perim= 1.0' r= 0.08' n= 0.025 Corrugated metal
2.8	150	Total			

Subcatchment 3S: roof

Hydrograph



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

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Summary for Pond 12P: Rechargers

Inflow Area = 0.014 ac, 100.00% Impervious, Inflow Depth = 2.97" for 2-yr event
 Inflow = 0.05 cfs @ 12.04 hrs, Volume= 0.003 af
 Outflow = 0.02 cfs @ 11.95 hrs, Volume= 0.003 af, Atten= 62%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 11.95 hrs, Volume= 0.003 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs / 3
 Peak Elev= 117.13' @ 12.23 hrs Surf.Area= 0.002 ac Storage= 0.000 af

Plug-Flow detention time= 8.2 min calculated for 0.003 af (100% of inflow)
 Center-of-Mass det. time= 8.7 min (762.1 - 753.4)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	0.000 af	4.0"D x 16.00'L Horizontal Cylinder S= 1.0000 'I'
#2	116.50'	0.001 af	5.00'W x 18.00'L x 1.50'H excavation 0.003 af Overall - 0.001 af Embedded = 0.002 af x 30.0% Voids
#3	117.00'	0.001 af	32.1"W x 12.0"H x 7.50'L Cultec C-100 x 2 Inside #2
		0.001 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	8.600 in/hr Exfiltration over Surface area
#2	Secondary	120.00'	4.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.02 cfs @ 11.95 hrs HW=116.74' (Free Discharge)
 ↳ **1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=116.50' (Free Discharge)
 ↳ **2=Orifice/Grate** (Controls 0.00 cfs)

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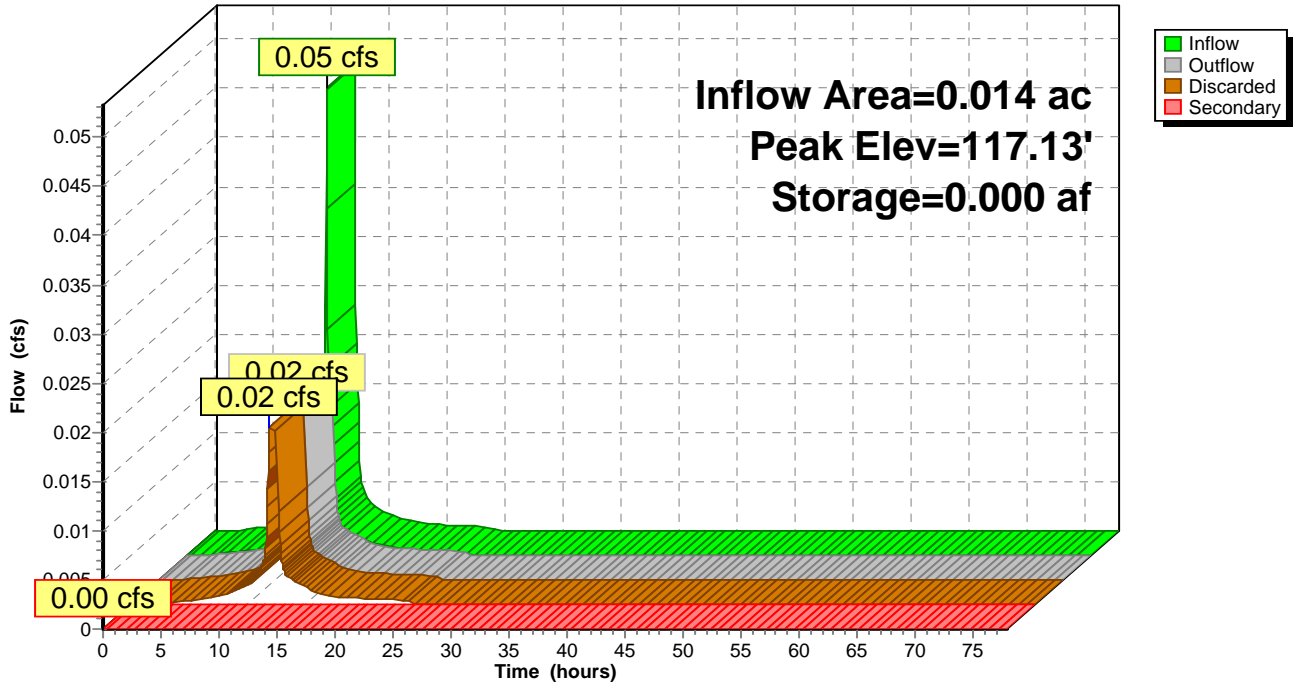
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Type III 24-hr 2-yr Rainfall=3.20"

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Pond 12P: Rechargers

Hydrograph



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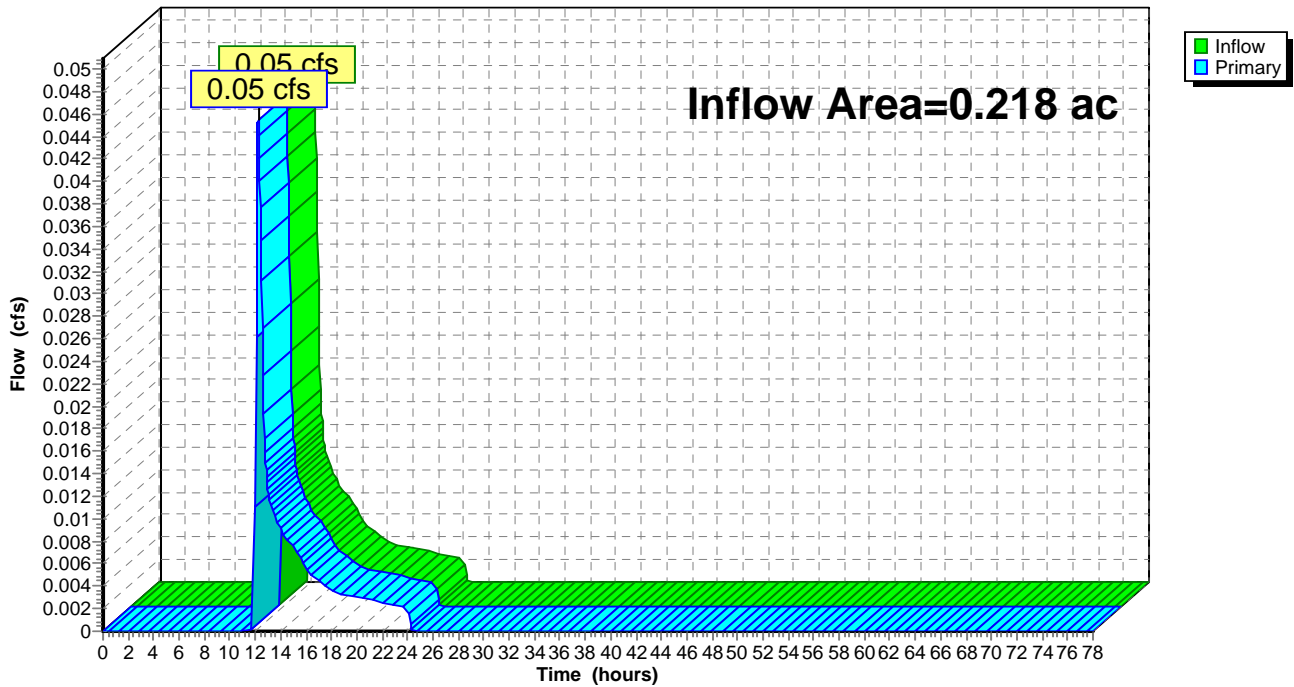
Summary for Pond 15P: PROPERTYLINE

Inflow Area = 0.218 ac, 31.30% Impervious, Inflow Depth = 0.35" for 2-yr event
Inflow = 0.05 cfs @ 12.22 hrs, Volume= 0.006 af
Primary = 0.05 cfs @ 12.22 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs

Pond 15P: PROPERTYLINE

Hydrograph



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102 McCarthy Road, Newton
Type III 24-hr 10-yr Rainfall=4.50"

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Time span=0.00-78.00 hrs, dt=0.05 hrs, 1561 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SOUTH PROPERTY Runoff Area=2,256 sf 11.35% Impervious Runoff Depth=0.33"
Flow Length=85' Slope=0.0100 '/ Tc=10.7 min CN=46 Runoff=0.01 cfs 0.001 af

Subcatchment 2S: NORTH PROPERTY Runoff Area=7,235 sf 37.53% Impervious Runoff Depth=1.08"
Flow Length=140' Slope=0.0100 '/ Tc=10.8 min CN=61 Runoff=0.15 cfs 0.015 af

Subcatchment 3S: roof Runoff Area=615 sf 100.00% Impervious Runoff Depth=4.26"
Flow Length=150' Tc=2.8 min CN=98 Runoff=0.07 cfs 0.005 af

Pond 12P: Rechargers Peak Elev=117.51' Storage=0.001 af Inflow=0.07 cfs 0.005 af
Discarded=0.02 cfs 0.005 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.005 af

Pond 15P: PROPERTYLINE Inflow=0.16 cfs 0.016 af
Primary=0.16 cfs 0.016 af

Total Runoff Area = 0.232 ac Runoff Volume = 0.021 af Average Runoff Depth = 1.11"
64.52% Pervious = 0.150 ac 35.48% Impervious = 0.082 ac

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Type III 24-hr 10-yr Rainfall=4.50"

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Summary for Subcatchment 1S: SOUTH PROPERTY

Runoff = 0.01 cfs @ 12.42 hrs, Volume= 0.001 af, Depth= 0.33"

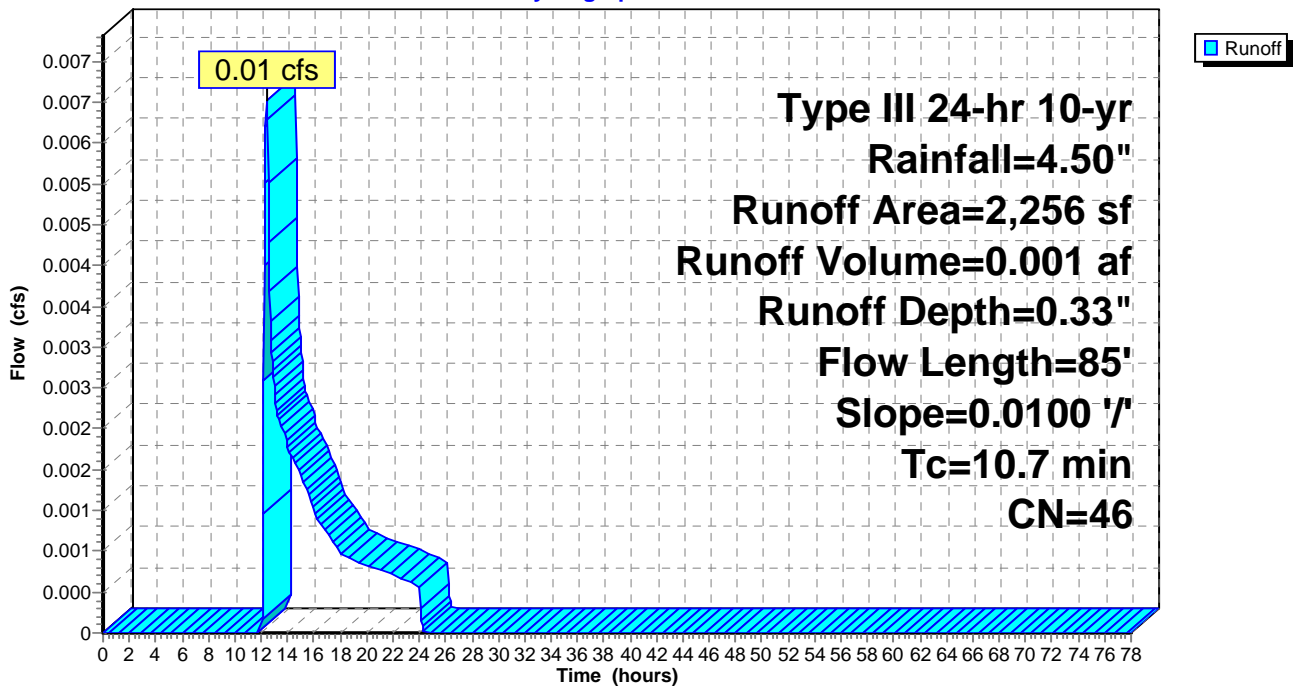
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
56	98	Paved parking & roofs
200	98	Paved parking & roofs
2,000	39	>75% Grass cover, Good, HSG A
2,256	46	Weighted Average
2,000		Pervious Area
256		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	75	0.0100	0.12		Sheet Flow, TOP OF SLOPE Grass: Short n= 0.150 P2= 3.00"
0.1	10	0.0100	1.50		Shallow Concentrated Flow, LAWN Grassed Waterway Kv= 15.0 fps
10.7	85	Total			

Subcatchment 1S: SOUTH PROPERTY

Hydrograph



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Summary for Subcatchment 2S: NORTH PROPERTY

Runoff = 0.15 cfs @ 12.17 hrs, Volume= 0.015 af, Depth= 1.08"

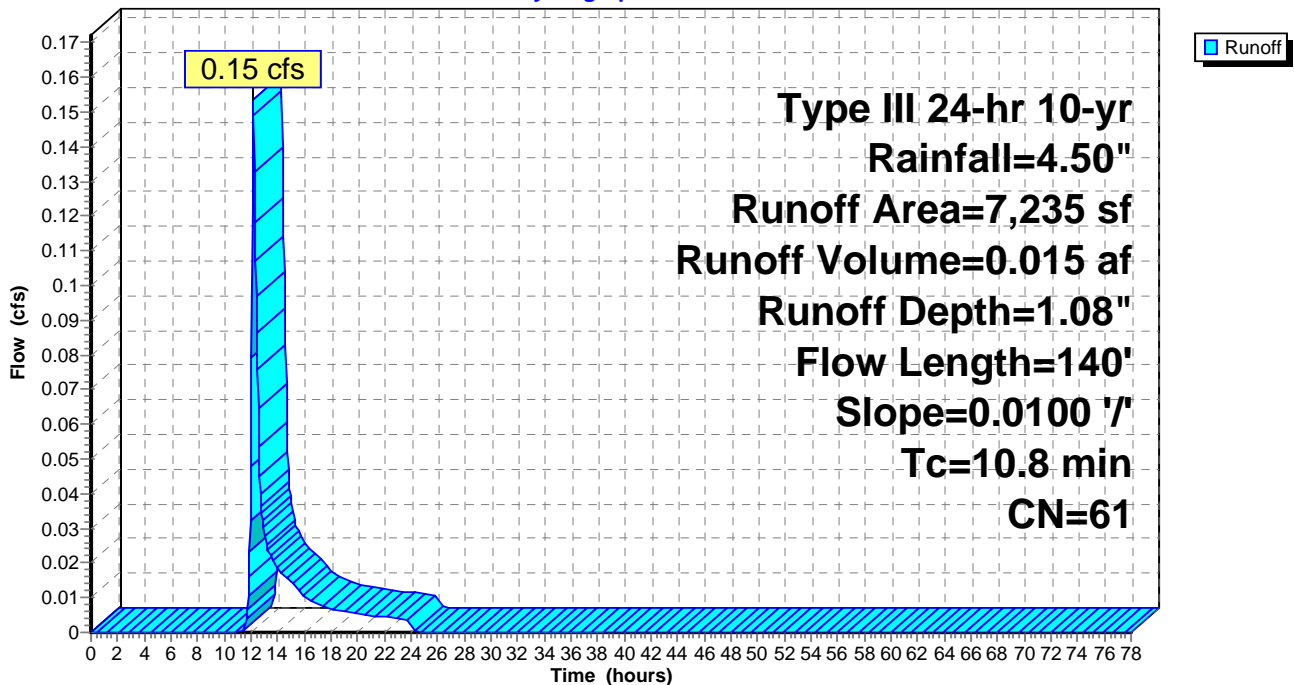
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
2,715	98	Paved parking & roofs
4,520	39	>75% Grass cover, Good, HSG A
7,235	61	Weighted Average
4,520		Pervious Area
2,715		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	60	0.0100	0.11		Sheet Flow, TOP OF SLOPE Grass: Short n= 0.150 P2= 3.00"
1.9	80	0.0100	0.70		Shallow Concentrated Flow, LAWN Short Grass Pasture Kv= 7.0 fps
10.8	140	Total			

Subcatchment 2S: NORTH PROPERTY

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Type III 24-hr 10-yr Rainfall=4.50"

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Summary for Subcatchment 3S: roof

Runoff = 0.07 cfs @ 12.04 hrs, Volume= 0.005 af, Depth= 4.26"

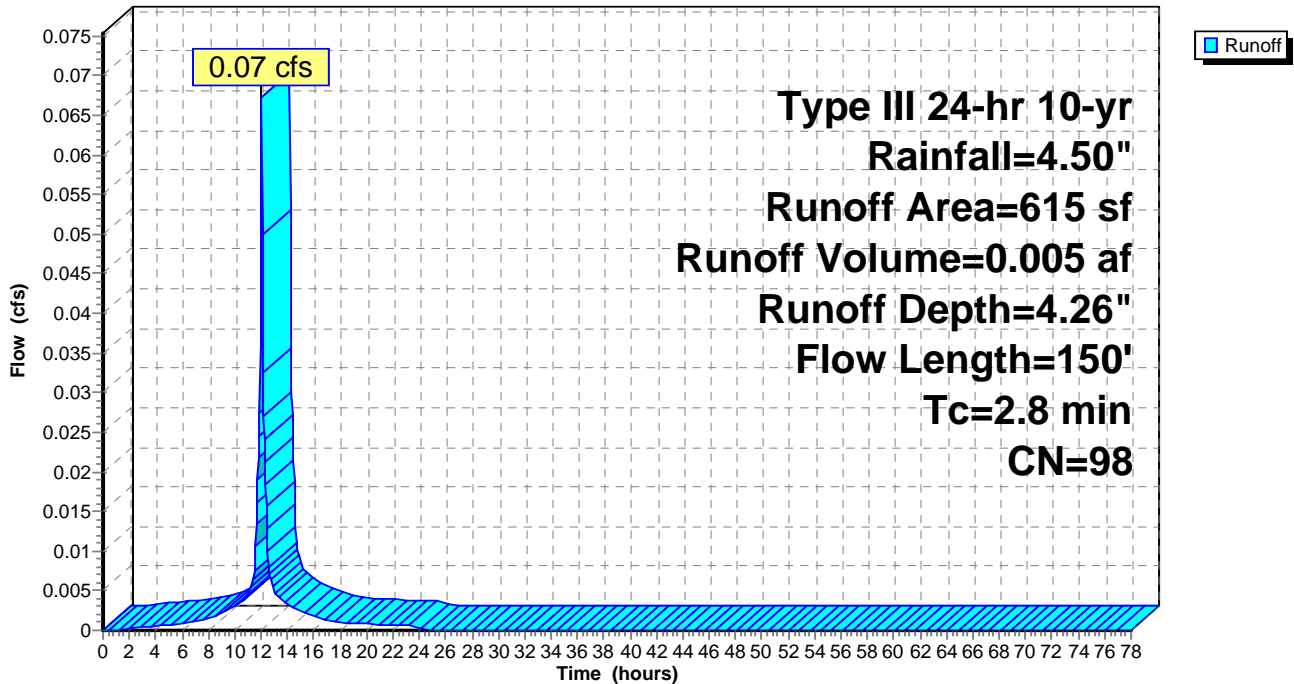
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
615	98	Paved parking & roofs
615		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.3500	3.03		Sheet Flow, roof Smooth surfaces n= 0.011 P2= 3.00"
2.7	130	0.0050	0.80	0.07	Circular Channel (pipe), leader Diam= 4.0" Area= 0.1 sf Perim= 1.0' r= 0.08' n= 0.025 Corrugated metal
2.8	150	Total			

Subcatchment 3S: roof

Hydrograph



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Type III 24-hr 10-yr Rainfall=4.50"

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Summary for Pond 12P: Rechargers

Inflow Area = 0.014 ac, 100.00% Impervious, Inflow Depth = 4.26" for 10-yr event
 Inflow = 0.07 cfs @ 12.04 hrs, Volume= 0.005 af
 Outflow = 0.02 cfs @ 11.85 hrs, Volume= 0.005 af, Atten= 73%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 11.85 hrs, Volume= 0.005 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs / 3
 Peak Elev= 117.51' @ 12.36 hrs Surf.Area= 0.002 ac Storage= 0.001 af

Plug-Flow detention time= 13.7 min calculated for 0.005 af (100% of inflow)
 Center-of-Mass det. time= 13.5 min (760.4 - 746.9)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	0.000 af	4.0"D x 16.00'L Horizontal Cylinder S= 1.0000 'I'
#2	116.50'	0.001 af	5.00'W x 18.00'L x 1.50'H excavation 0.003 af Overall - 0.001 af Embedded = 0.002 af x 30.0% Voids
#3	117.00'	0.001 af	32.1"W x 12.0"H x 7.50'L Cultec C-100 x 2 Inside #2
		0.001 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	8.600 in/hr Exfiltration over Surface area
#2	Secondary	120.00'	4.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.02 cfs @ 11.85 hrs HW=116.76' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=116.50' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

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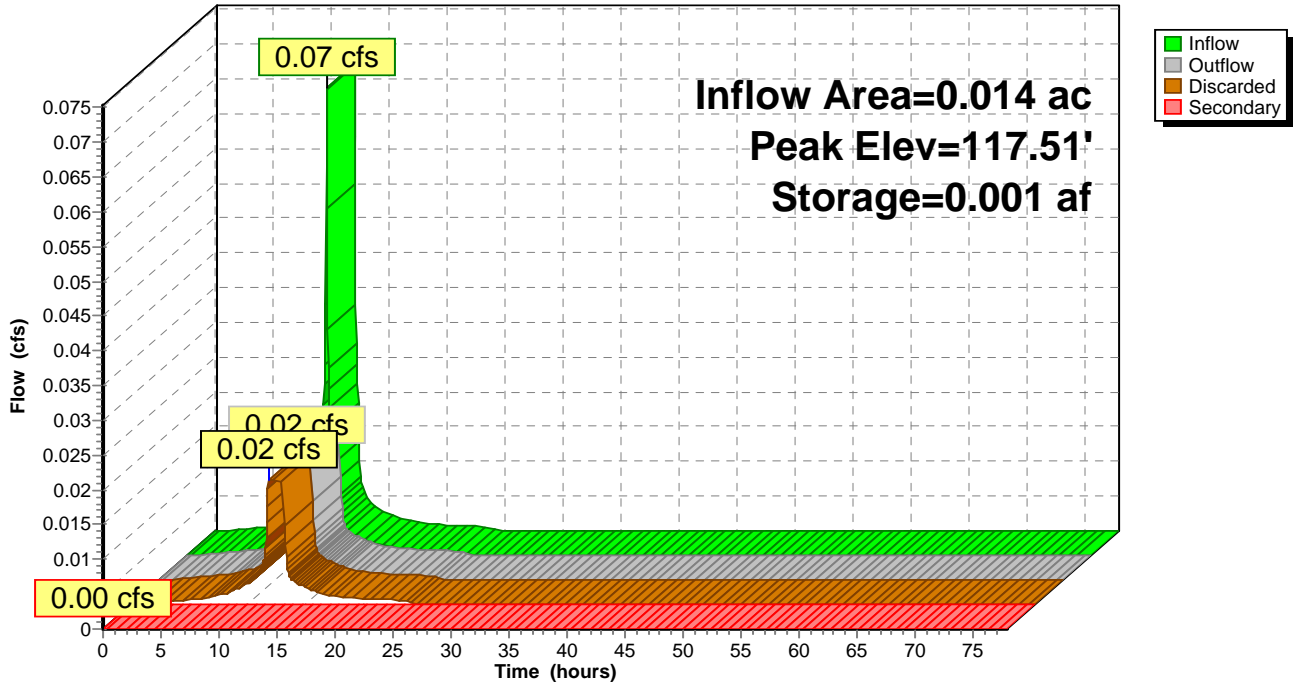
102 McCarthy Road, Newton
Type III 24-hr 10-yr Rainfall=4.50"

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Pond 12P: Rechargers

Hydrograph



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Type III 24-hr 10-yr Rainfall=4.50"

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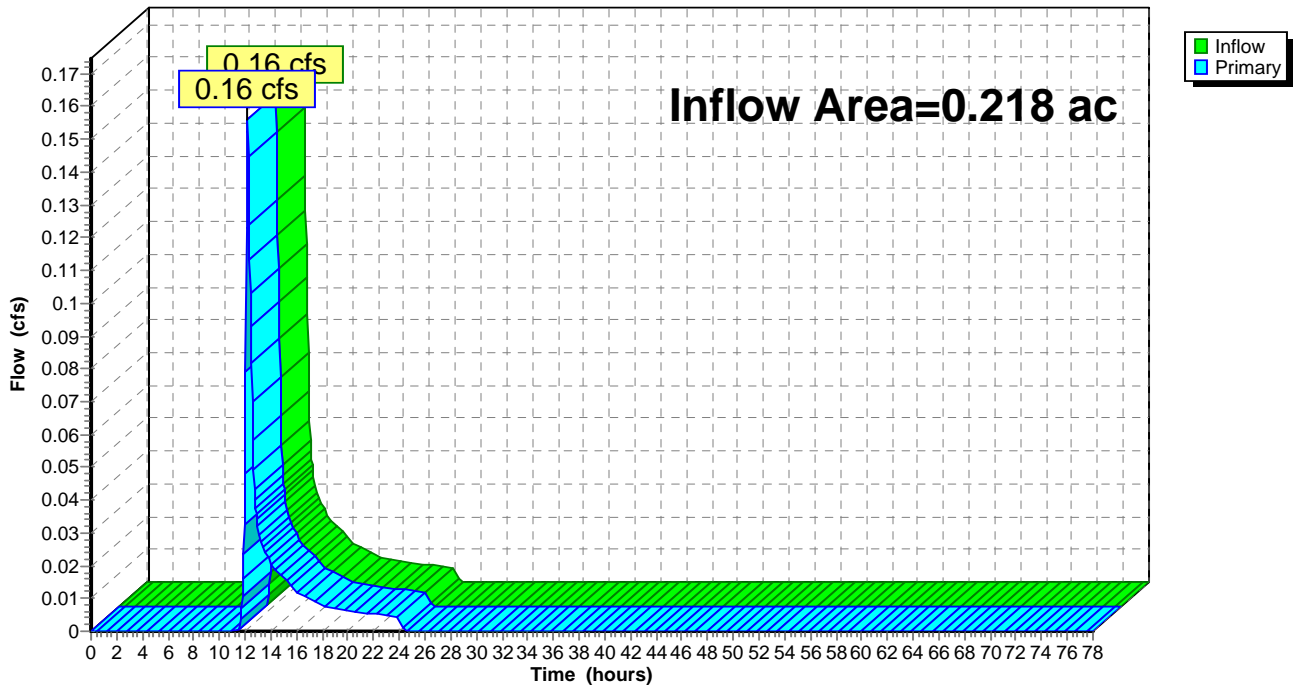
Summary for Pond 15P: PROPERTYLINE

Inflow Area = 0.218 ac, 31.30% Impervious, Inflow Depth = 0.90" for 10-yr event
Inflow = 0.16 cfs @ 12.17 hrs, Volume= 0.016 af
Primary = 0.16 cfs @ 12.17 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs

Pond 15P: PROPERTYLINE

Hydrograph



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Type III 24-hr 100-yr NEWTON Rainfall=7.00"

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Time span=0.00-78.00 hrs, dt=0.05 hrs, 1561 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SOUTH PROPERTY Runoff Area=2,256 sf 11.35% Impervious Runoff Depth=1.32"
Flow Length=85' Slope=0.0100 '/ Tc=10.7 min CN=46 Runoff=0.05 cfs 0.006 af

Subcatchment 2S: NORTH PROPERTY Runoff Area=7,235 sf 37.53% Impervious Runoff Depth=2.70"
Flow Length=140' Slope=0.0100 '/ Tc=10.8 min CN=61 Runoff=0.43 cfs 0.037 af

Subcatchment 3S: roof Runoff Area=615 sf 100.00% Impervious Runoff Depth=6.76"
Flow Length=150' Tc=2.8 min CN=98 Runoff=0.11 cfs 0.008 af

Pond 12P: Rechargers Peak Elev=120.14' Storage=0.001 af Inflow=0.11 cfs 0.008 af
Discarded=0.02 cfs 0.007 af Secondary=0.06 cfs 0.001 af Outflow=0.07 cfs 0.008 af

Pond 15P: PROPERTYLINE Inflow=0.53 cfs 0.044 af
Primary=0.53 cfs 0.044 af

Total Runoff Area = 0.232 ac Runoff Volume = 0.051 af Average Runoff Depth = 2.64"
64.52% Pervious = 0.150 ac 35.48% Impervious = 0.082 ac

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Type III 24-hr 100-yr NEWTON Rainfall=7.00"

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Summary for Subcatchment 1S: SOUTH PROPERTY

Runoff = 0.05 cfs @ 12.19 hrs, Volume= 0.006 af, Depth= 1.32"

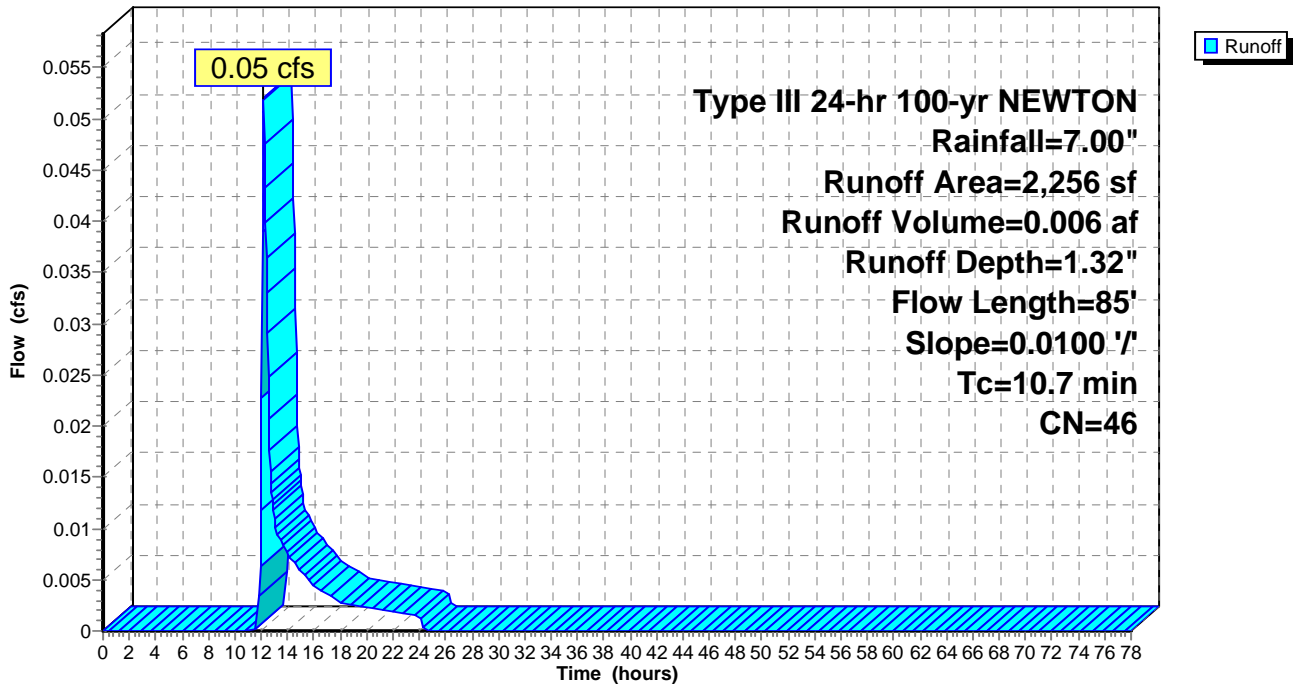
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr NEWTON Rainfall=7.00"

Area (sf)	CN	Description
56	98	Paved parking & roofs
200	98	Paved parking & roofs
2,000	39	>75% Grass cover, Good, HSG A
2,256	46	Weighted Average
2,000		Pervious Area
256		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	75	0.0100	0.12		Sheet Flow, TOP OF SLOPE Grass: Short n= 0.150 P2= 3.00"
0.1	10	0.0100	1.50		Shallow Concentrated Flow, LAWN Grassed Waterway Kv= 15.0 fps
10.7	85	Total			

Subcatchment 1S: SOUTH PROPERTY

Hydrograph



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Type III 24-hr 100-yr NEWTON Rainfall=7.00"

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Summary for Subcatchment 2S: NORTH PROPERTY

Runoff = 0.43 cfs @ 12.16 hrs, Volume= 0.037 af, Depth= 2.70"

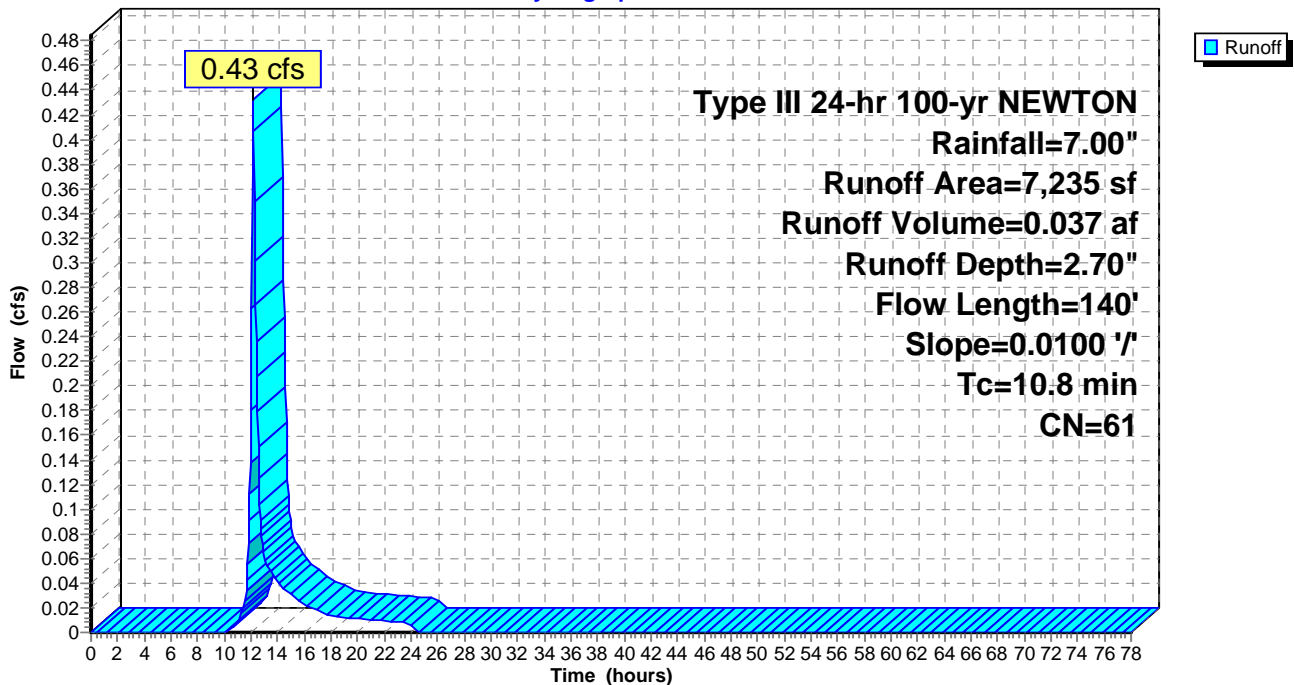
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-yr NEWTON Rainfall=7.00"

Area (sf)	CN	Description
2,715	98	Paved parking & roofs
4,520	39	>75% Grass cover, Good, HSG A
7,235	61	Weighted Average
4,520		Pervious Area
2,715		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	60	0.0100	0.11		Sheet Flow, TOP OF SLOPE Grass: Short n= 0.150 P2= 3.00"
1.9	80	0.0100	0.70		Shallow Concentrated Flow, LAWN Short Grass Pasture Kv= 7.0 fps
10.8	140	Total			

Subcatchment 2S: NORTH PROPERTY

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Summary for Subcatchment 3S: roof

Runoff = 0.11 cfs @ 12.04 hrs, Volume= 0.008 af, Depth= 6.76"

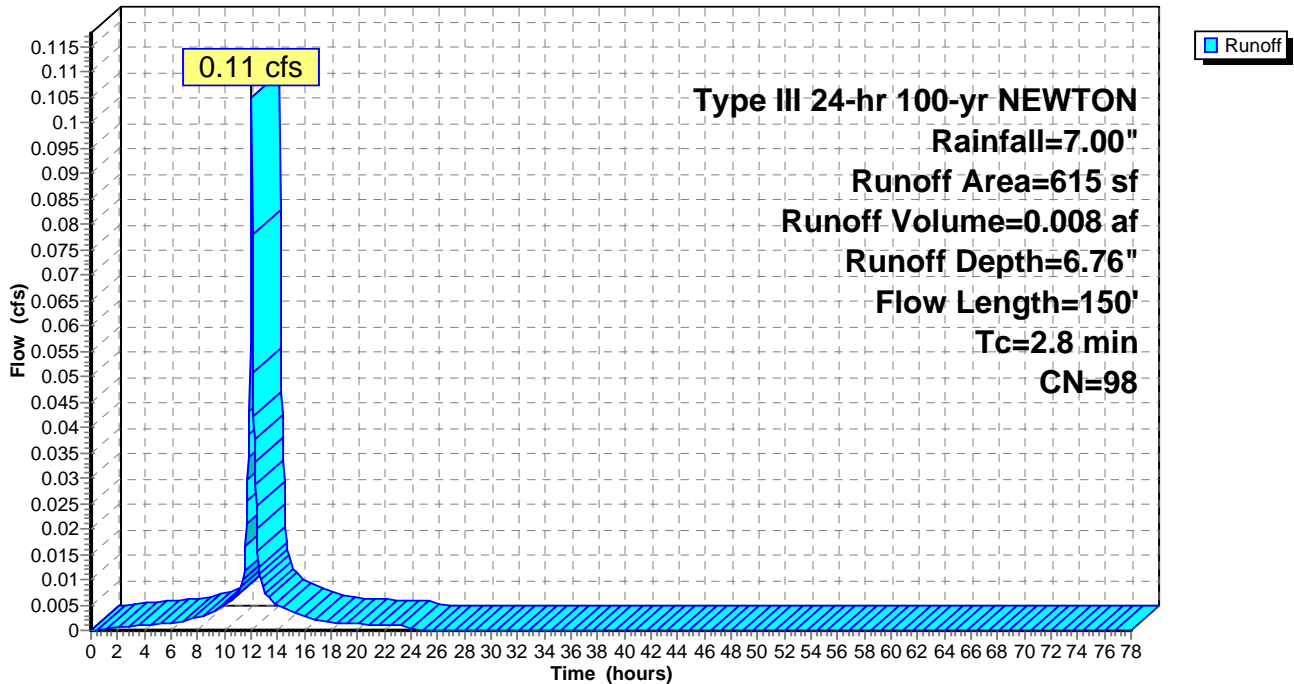
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr NEWTON Rainfall=7.00"

Area (sf)	CN	Description
615	98	Paved parking & roofs
615		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.3500	3.03		Sheet Flow, roof Smooth surfaces n= 0.011 P2= 3.00"
2.7	130	0.0050	0.80	0.07	Circular Channel (pipe), leader Diam= 4.0" Area= 0.1 sf Perim= 1.0' r= 0.08" n= 0.025 Corrugated metal
2.8	150	Total			

Subcatchment 3S: roof

Hydrograph



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Type III 24-hr 100-yr NEWTON Rainfall=7.00"

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Summary for Pond 12P: Rechargers

Inflow Area = 0.014 ac, 100.00% Impervious, Inflow Depth = 6.76" for 100-yr NEWTON event
 Inflow = 0.11 cfs @ 12.04 hrs, Volume= 0.008 af
 Outflow = 0.07 cfs @ 12.14 hrs, Volume= 0.008 af, Atten= 30%, Lag= 5.5 min
 Discarded = 0.02 cfs @ 11.70 hrs, Volume= 0.007 af
 Secondary = 0.06 cfs @ 12.14 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs / 3
 Peak Elev= 120.14' @ 12.15 hrs Surf.Area= 0.002 ac Storage= 0.001 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 17.6 min (757.6 - 740.0)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	0.000 af	4.0"D x 16.00'L Horizontal Cylinder S= 1.0000 'I'
#2	116.50'	0.001 af	5.00'W x 18.00'L x 1.50'H excavation 0.003 af Overall - 0.001 af Embedded = 0.002 af x 30.0% Voids
#3	117.00'	0.001 af	32.1"W x 12.0"H x 7.50'L Cultec C-100 x 2 Inside #2
		0.001 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	8.600 in/hr Exfiltration over Surface area
#2	Secondary	120.00'	4.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.02 cfs @ 11.70 hrs HW=116.75' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Secondary OutFlow Max=0.04 cfs @ 12.14 hrs HW=120.13' (Free Discharge)
 ↑**2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 1.24 fps)

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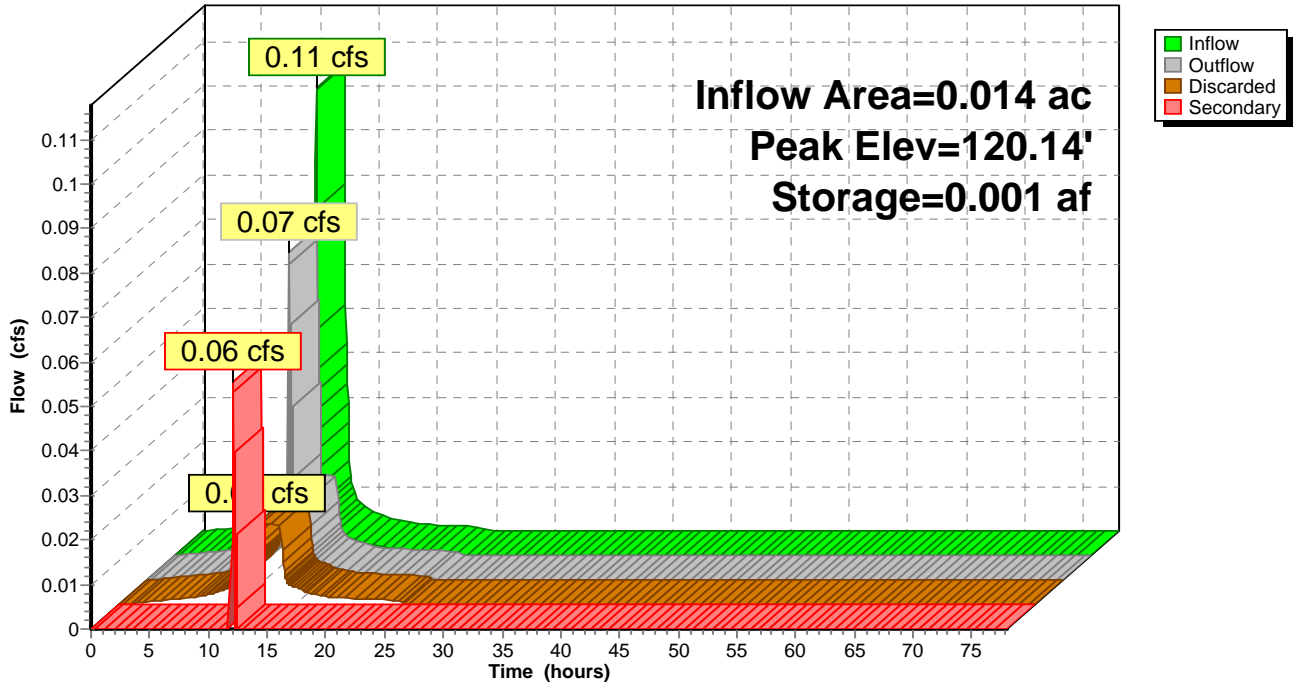
Type III 24-hr 100-yr NEWTON Rainfall=7.00"

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Pond 12P: Rechargers

Hydrograph



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Type III 24-hr 100-yr NEWTON Rainfall=7.00"

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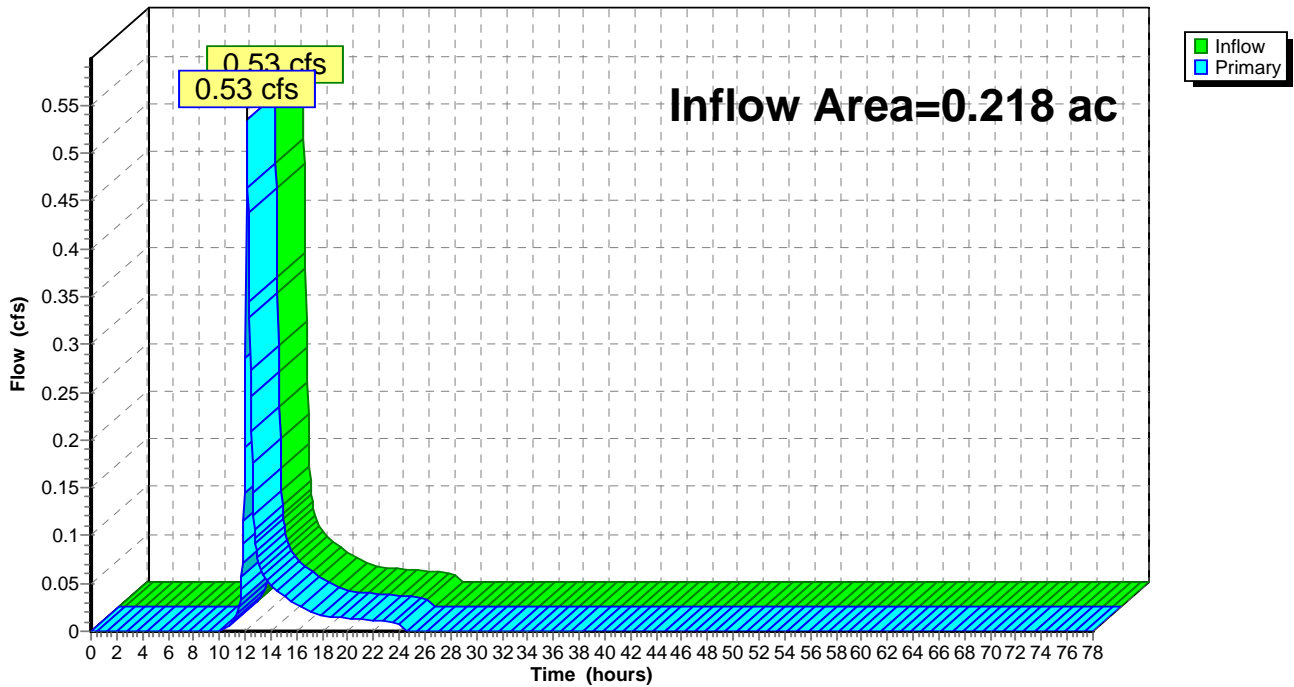
Summary for Pond 15P: PROPERTYLINE

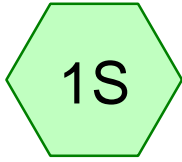
Inflow Area = 0.218 ac, 31.30% Impervious, Inflow Depth = 2.41" for 100-yr NEWTON event
Inflow = 0.53 cfs @ 12.15 hrs, Volume= 0.044 af
Primary = 0.53 cfs @ 12.15 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-78.00 hrs, dt= 0.05 hrs

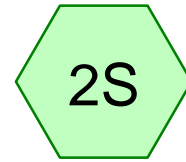
Pond 15P: PROPERTYLINE

Hydrograph

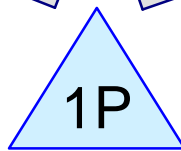




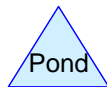
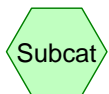
SOUTH PROPERTY



NORTH PROPERTY



PROPERTYLINE



Drainage Diagram for MCCARTHY102-140607-PRE
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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.150	39	>75% Grass cover, Good, HSG A (1S,2S)
0.081	98	Paved parking & roofs (1S,2S)
0.230		TOTAL AREA

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Page 3

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.150	HSG A	1S, 2S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.081	Other	1S, 2S
0.230		TOTAL AREA

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102 McCarthy, Newton
Type III 24-hr 2-yr Rainfall=3.20"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SOUTH PROPERTY Runoff Area=2,896 sf 30.94% Impervious Runoff Depth=0.31"
Flow Length=85' Slope=0.0100 '/' Tc=10.7 min CN=57 Runoff=0.01 cfs 0.002 af

Subcatchment 2S: NORTH PROPERTY Runoff Area=7,135 sf 36.65% Impervious Runoff Depth=0.44"
Flow Length=140' Slope=0.0100 '/' Tc=10.8 min CN=61 Runoff=0.04 cfs 0.006 af

Pond 1P: PROPERTYLINE Inflow=0.05 cfs 0.008 af
Primary=0.05 cfs 0.008 af

Total Runoff Area = 0.230 ac Runoff Volume = 0.008 af Average Runoff Depth = 0.41"
65.00% Pervious = 0.150 ac 35.00% Impervious = 0.081 ac

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

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Summary for Subcatchment 1S: SOUTH PROPERTY

Runoff = 0.01 cfs @ 12.36 hrs, Volume= 0.002 af, Depth= 0.31"

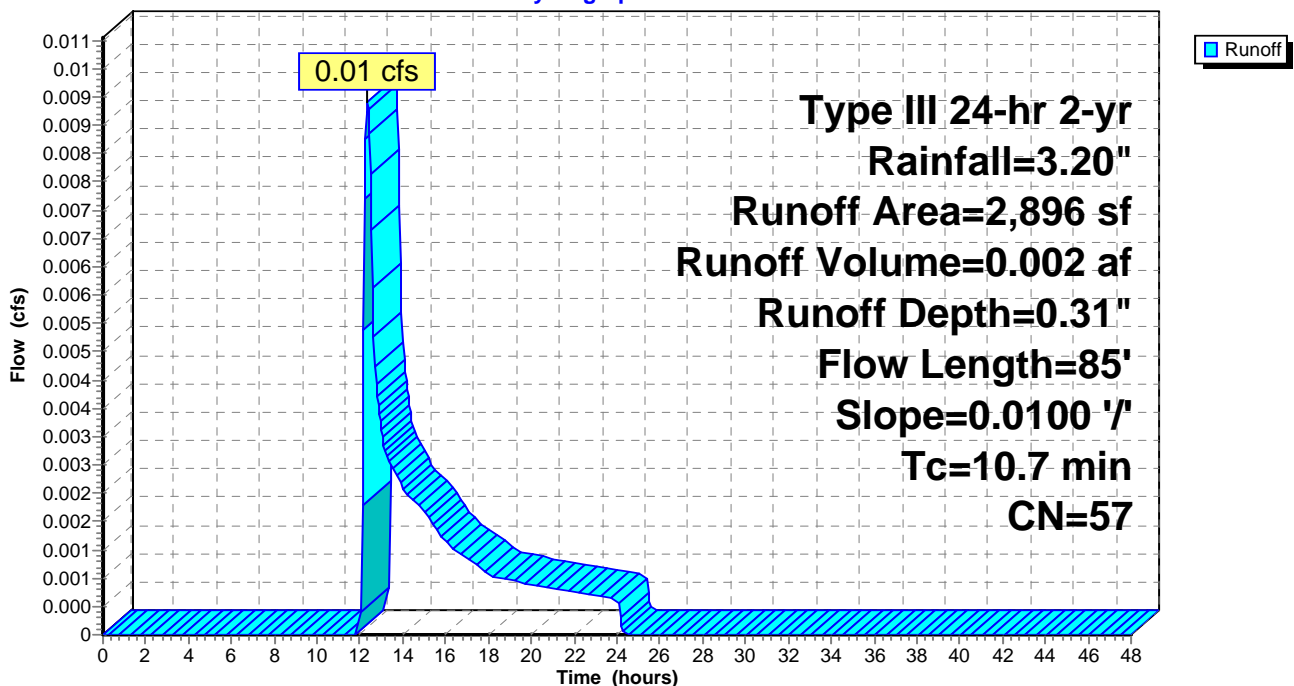
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
300	98	Paved parking & roofs
240	98	Paved parking & roofs
56	98	Paved parking & roofs
300	98	Paved parking & roofs
2,000	39	>75% Grass cover, Good, HSG A
2,896	57	Weighted Average
2,000		Pervious Area
896		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	75	0.0100	0.12		Sheet Flow, TOP OF SLOPE Grass: Short n= 0.150 P2= 3.00"
0.1	10	0.0100	1.50		Shallow Concentrated Flow, LAWN Grassed Waterway Kv= 15.0 fps
10.7	85	Total			

Subcatchment 1S: SOUTH PROPERTY

Hydrograph



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102 McCarthy, Newton
Type III 24-hr 2-yr Rainfall=3.20"

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Summary for Subcatchment 2S: NORTH PROPERTY

Runoff = 0.04 cfs @ 12.22 hrs, Volume= 0.006 af, Depth= 0.44"

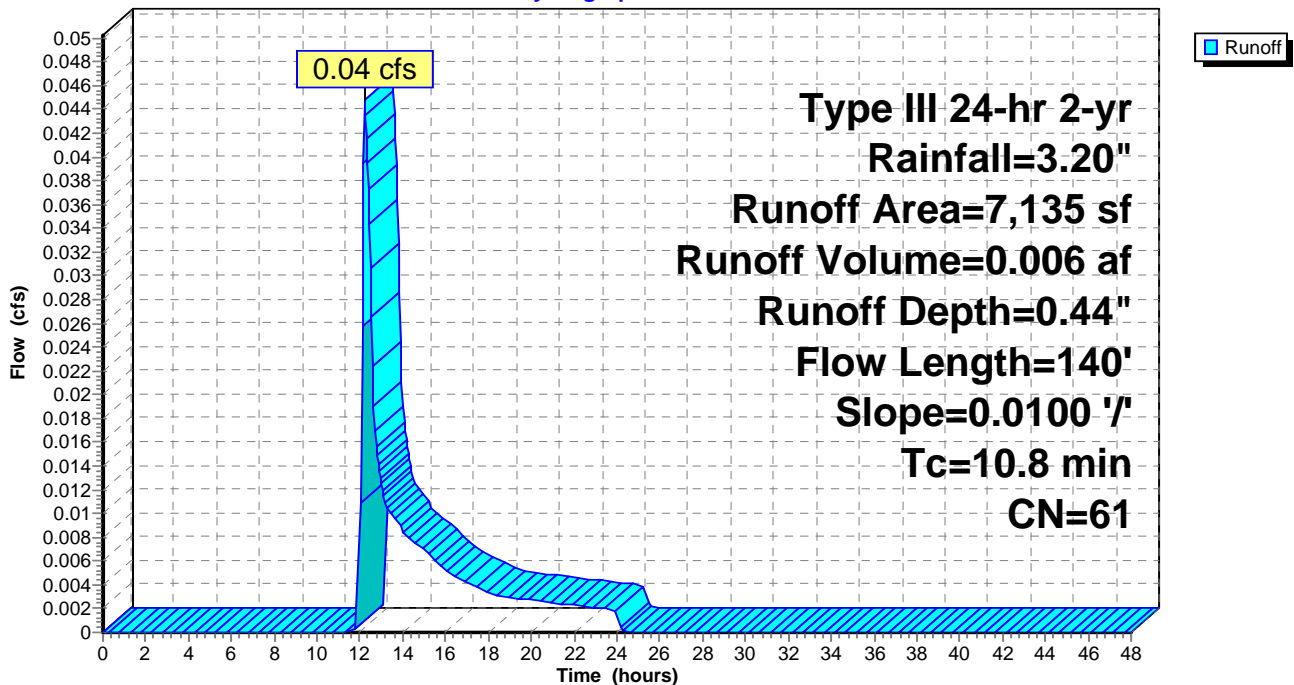
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
2,615	98	Paved parking & roofs
4,520	39	>75% Grass cover, Good, HSG A
7,135	61	Weighted Average
4,520		Pervious Area
2,615		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	60	0.0100	0.11		Sheet Flow, TOP OF SLOPE Grass: Short n= 0.150 P2= 3.00"
1.9	80	0.0100	0.70		Shallow Concentrated Flow, LAWN Short Grass Pasture Kv= 7.0 fps
10.8	140	Total			

Subcatchment 2S: NORTH PROPERTY

Hydrograph



MCCARTHY102-140607-PRE

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102 McCarthy, Newton
Type III 24-hr 2-yr Rainfall=3.20"

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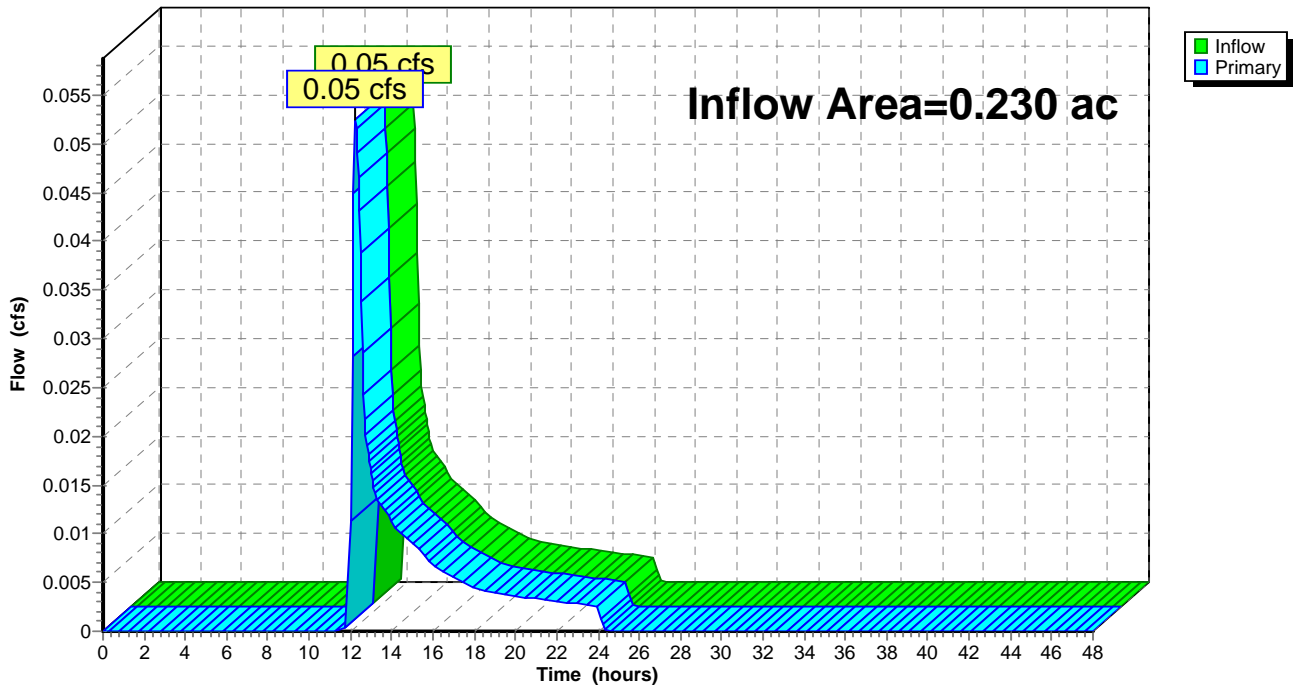
Summary for Pond 1P: PROPERTYLINE

Inflow Area = 0.230 ac, 35.00% Impervious, Inflow Depth = 0.41" for 2-yr event
Inflow = 0.05 cfs @ 12.23 hrs, Volume= 0.008 af
Primary = 0.05 cfs @ 12.23 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond 1P: PROPERTYLINE

Hydrograph



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Type III 24-hr 10-yr Rainfall=4.50"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SOUTH PROPERTY Runoff Area=2,896 sf 30.94% Impervious Runoff Depth=0.85"
Flow Length=85' Slope=0.0100 '/' Tc=10.7 min CN=57 Runoff=0.04 cfs 0.005 af

Subcatchment 2S: NORTH PROPERTY Runoff Area=7,135 sf 36.65% Impervious Runoff Depth=1.08"
Flow Length=140' Slope=0.0100 '/' Tc=10.8 min CN=61 Runoff=0.15 cfs 0.015 af

Pond 1P: PROPERTYLINE Inflow=0.20 cfs 0.019 af
Primary=0.20 cfs 0.019 af

Total Runoff Area = 0.230 ac Runoff Volume = 0.019 af Average Runoff Depth = 1.01"
65.00% Pervious = 0.150 ac 35.00% Impervious = 0.081 ac

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Type III 24-hr 10-yr Rainfall=4.50"

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Summary for Subcatchment 1S: SOUTH PROPERTY

Runoff = 0.04 cfs @ 12.19 hrs, Volume= 0.005 af, Depth= 0.85"

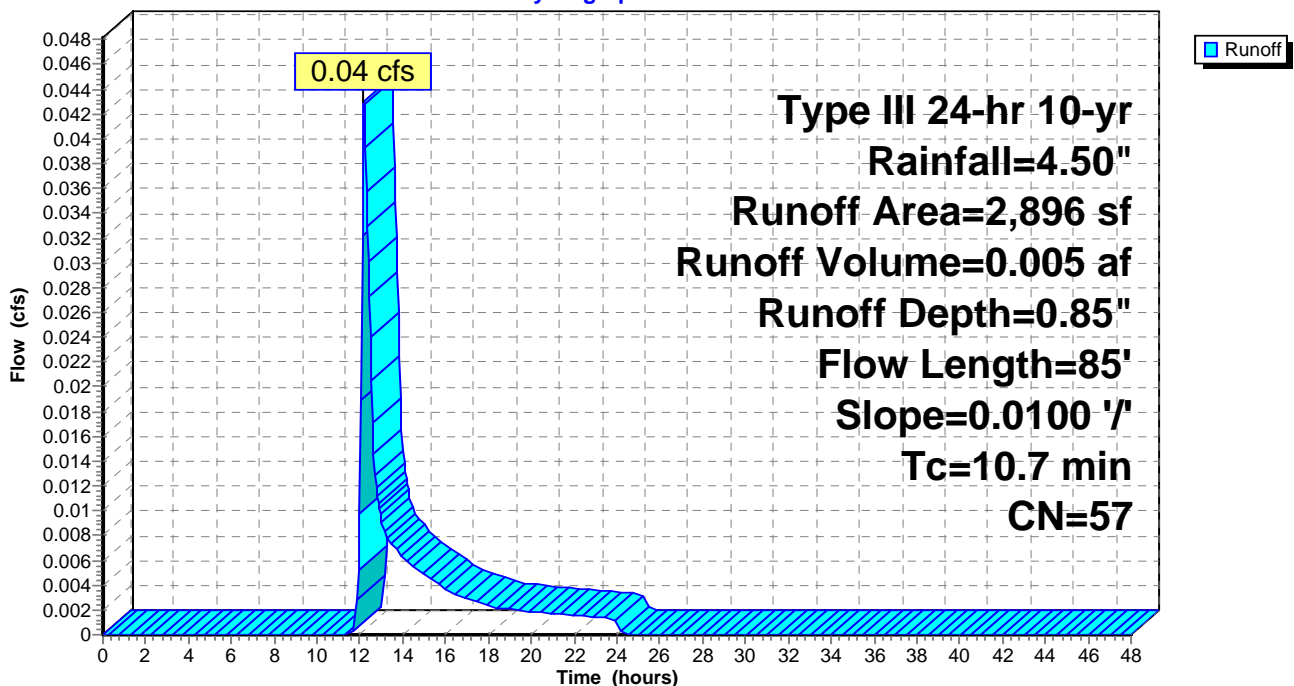
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
300	98	Paved parking & roofs
240	98	Paved parking & roofs
56	98	Paved parking & roofs
300	98	Paved parking & roofs
2,000	39	>75% Grass cover, Good, HSG A
2,896	57	Weighted Average
2,000		Pervious Area
896		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	75	0.0100	0.12		Sheet Flow, TOP OF SLOPE Grass: Short n= 0.150 P2= 3.00"
0.1	10	0.0100	1.50		Shallow Concentrated Flow, LAWN Grassed Waterway Kv= 15.0 fps
10.7	85	Total			

Subcatchment 1S: SOUTH PROPERTY

Hydrograph



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Type III 24-hr 10-yr Rainfall=4.50"

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Summary for Subcatchment 2S: NORTH PROPERTY

Runoff = 0.15 cfs @ 12.17 hrs, Volume= 0.015 af, Depth= 1.08"

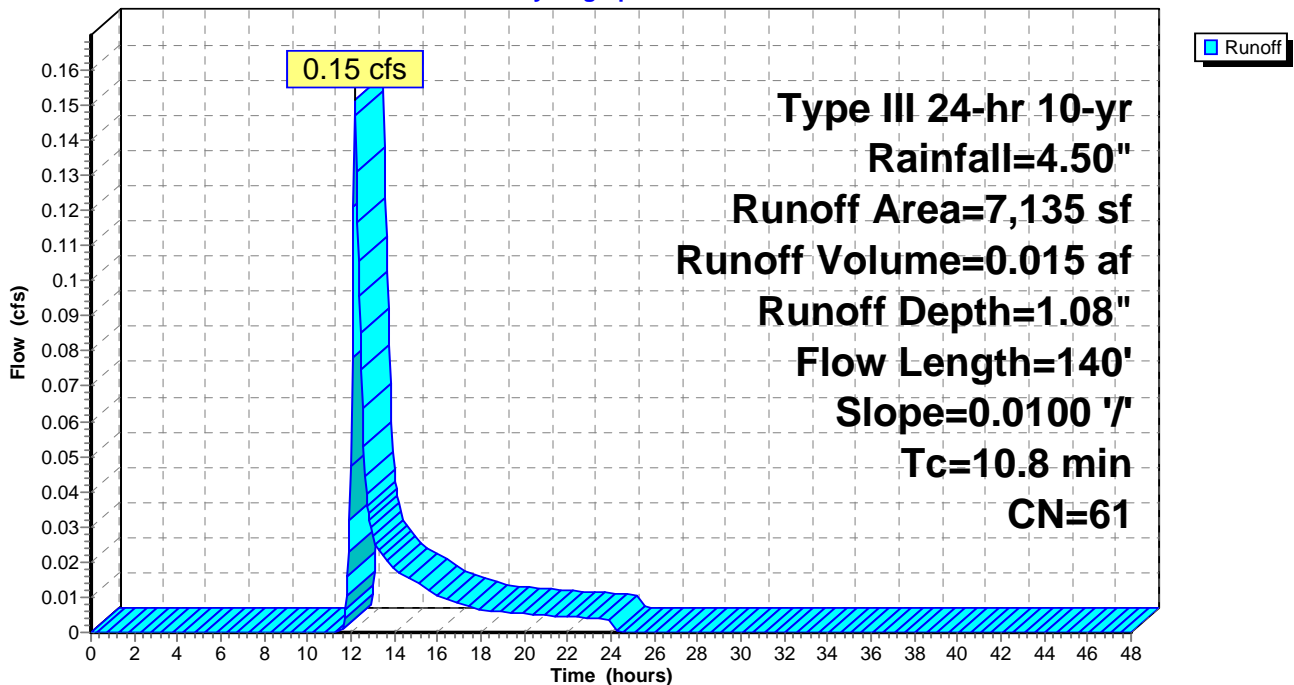
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
2,615	98	Paved parking & roofs
4,520	39	>75% Grass cover, Good, HSG A
7,135	61	Weighted Average
4,520		Pervious Area
2,615		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	60	0.0100	0.11		Sheet Flow, TOP OF SLOPE Grass: Short n= 0.150 P2= 3.00"
1.9	80	0.0100	0.70		Shallow Concentrated Flow, LAWN Short Grass Pasture Kv= 7.0 fps
10.8	140	Total			

Subcatchment 2S: NORTH PROPERTY

Hydrograph



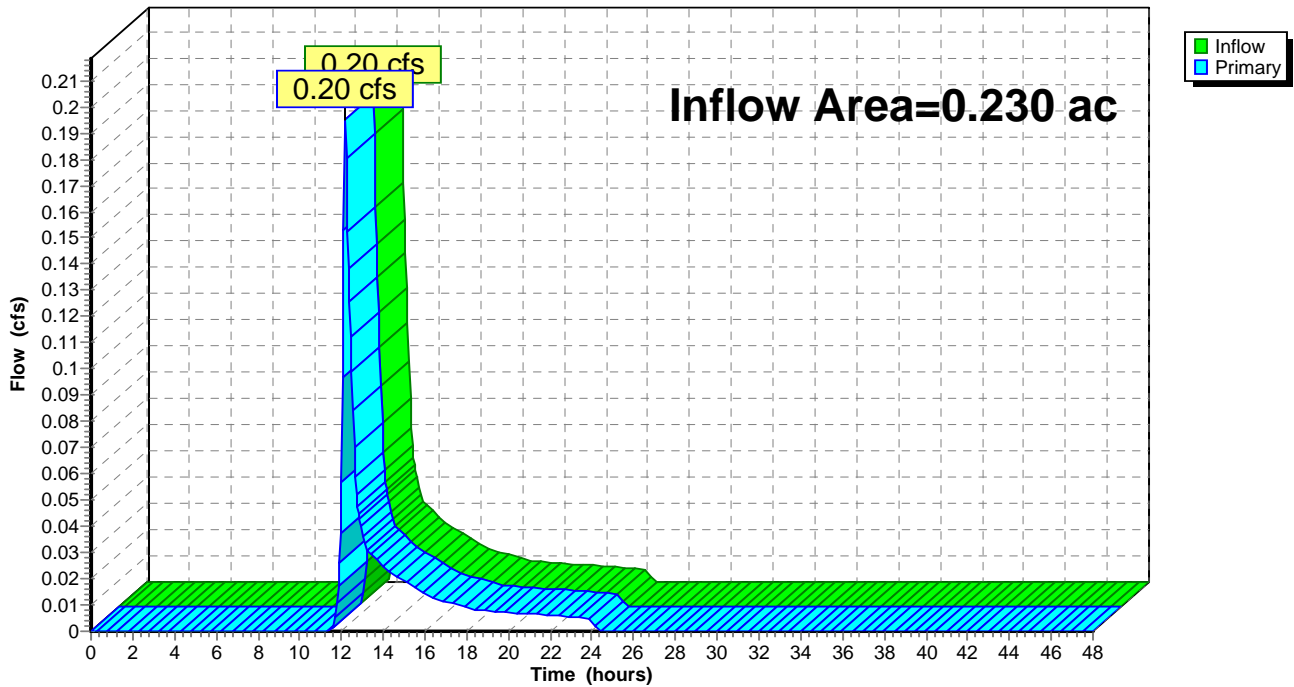
Summary for Pond 1P: PROPERTYLINE

Inflow Area = 0.230 ac, 35.00% Impervious, Inflow Depth = 1.01" for 10-yr event
Inflow = 0.20 cfs @ 12.17 hrs, Volume= 0.019 af
Primary = 0.20 cfs @ 12.17 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond 1P: PROPERTYLINE

Hydrograph



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Type III 24-hr 100-yr NEWTON Rainfall=7.00"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SOUTH PROPERTY Runoff Area=2,896 sf 30.94% Impervious Runoff Depth=2.31"
Flow Length=85' Slope=0.0100 '/' Tc=10.7 min CN=57 Runoff=0.14 cfs 0.013 af

Subcatchment 2S: NORTH PROPERTY Runoff Area=7,135 sf 36.65% Impervious Runoff Depth=2.70"
Flow Length=140' Slope=0.0100 '/' Tc=10.8 min CN=61 Runoff=0.43 cfs 0.037 af

Pond 1P: PROPERTYLINE Inflow=0.57 cfs 0.050 af
Primary=0.57 cfs 0.050 af

Total Runoff Area = 0.230 ac Runoff Volume = 0.050 af Average Runoff Depth = 2.59"
65.00% Pervious = 0.150 ac 35.00% Impervious = 0.081 ac

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Type III 24-hr 100-yr NEWTON Rainfall=7.00"

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Summary for Subcatchment 1S: SOUTH PROPERTY

Runoff = 0.14 cfs @ 12.16 hrs, Volume= 0.013 af, Depth= 2.31"

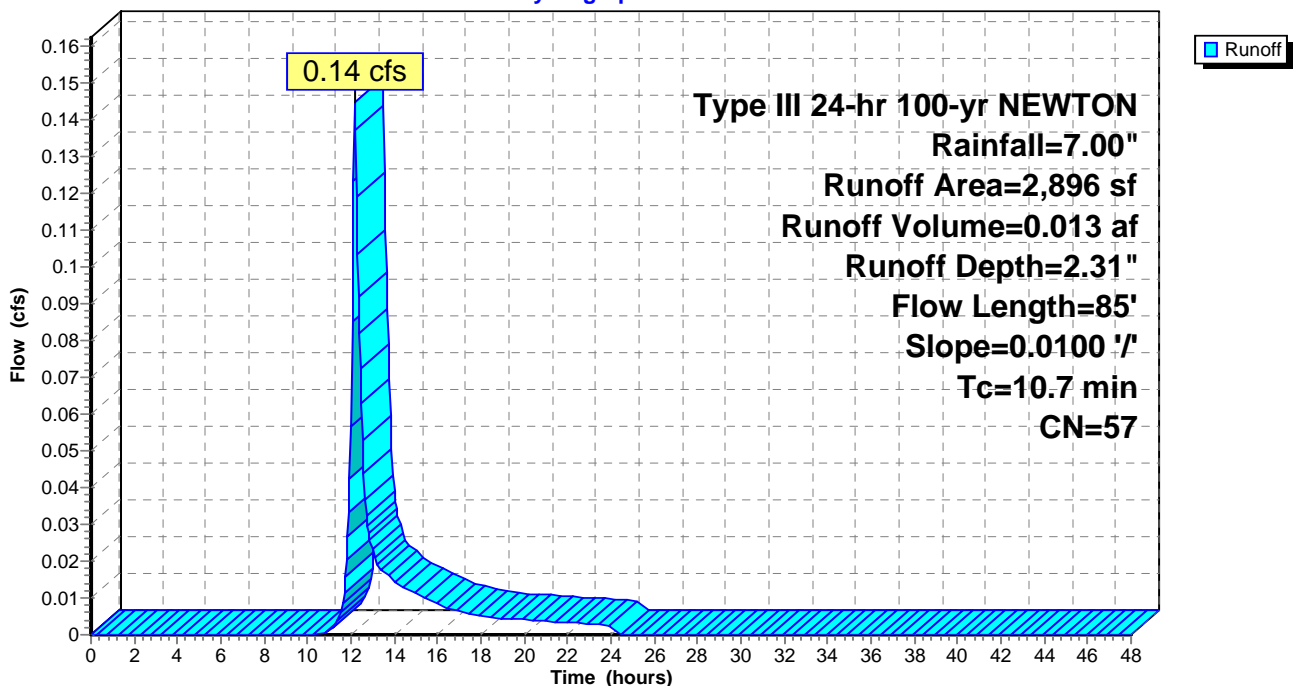
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr NEWTON Rainfall=7.00"

Area (sf)	CN	Description
300	98	Paved parking & roofs
240	98	Paved parking & roofs
56	98	Paved parking & roofs
300	98	Paved parking & roofs
2,000	39	>75% Grass cover, Good, HSG A
2,896	57	Weighted Average
2,000		Pervious Area
896		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	75	0.0100	0.12		Sheet Flow, TOP OF SLOPE Grass: Short n= 0.150 P2= 3.00"
0.1	10	0.0100	1.50		Shallow Concentrated Flow, LAWN Grassed Waterway Kv= 15.0 fps
10.7	85	Total			

Subcatchment 1S: SOUTH PROPERTY

Hydrograph



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Type III 24-hr 100-yr NEWTON Rainfall=7.00"

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Summary for Subcatchment 2S: NORTH PROPERTY

Runoff = 0.43 cfs @ 12.16 hrs, Volume= 0.037 af, Depth= 2.70"

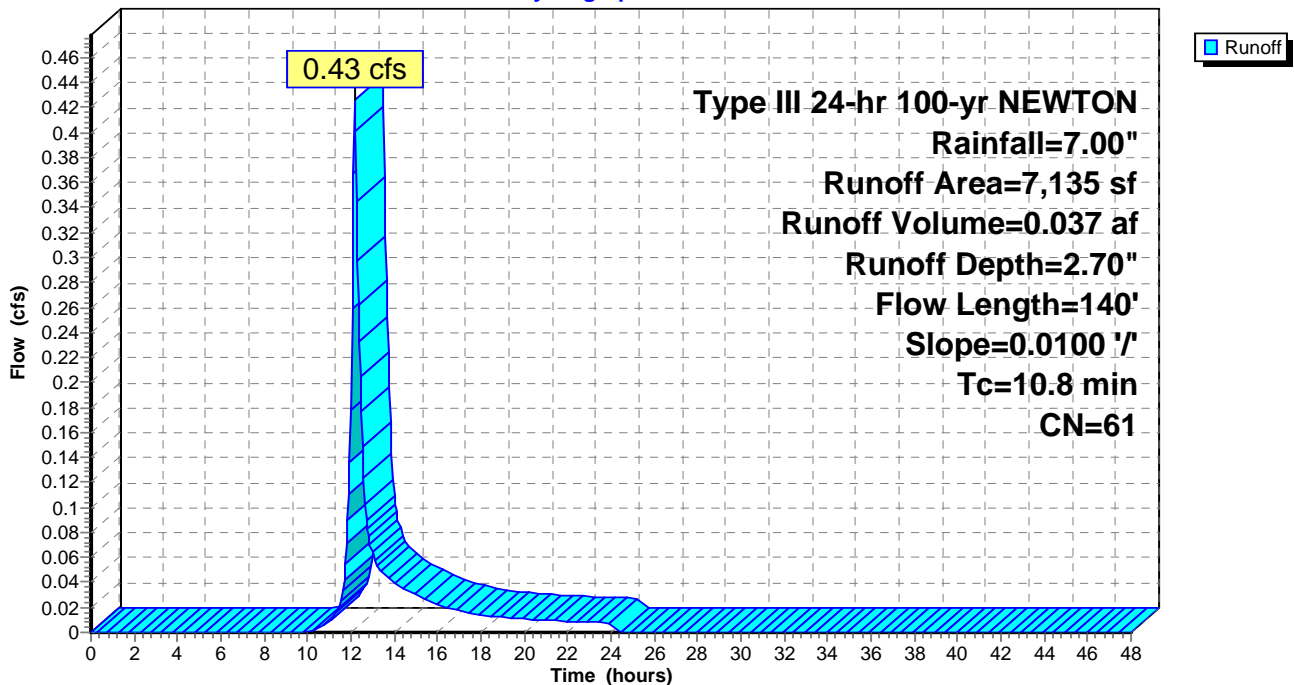
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr NEWTON Rainfall=7.00"

Area (sf)	CN	Description
2,615	98	Paved parking & roofs
4,520	39	>75% Grass cover, Good, HSG A
7,135	61	Weighted Average
4,520		Pervious Area
2,615		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	60	0.0100	0.11		Sheet Flow, TOP OF SLOPE Grass: Short n= 0.150 P2= 3.00"
1.9	80	0.0100	0.70		Shallow Concentrated Flow, LAWN Short Grass Pasture Kv= 7.0 fps
10.8	140	Total			

Subcatchment 2S: NORTH PROPERTY

Hydrograph



Summary for Pond 1P: PROPERTYLINE

Inflow Area = 0.230 ac, 35.00% Impervious, Inflow Depth = 2.59" for 100-yr NEWTON event
Inflow = 0.57 cfs @ 12.16 hrs, Volume= 0.050 af
Primary = 0.57 cfs @ 12.16 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond 1P: PROPERTYLINE

Hydrograph

