PRELIMINARY HYDROLOGIC ANALYSIS

For:

COMPREHENSIVE PERMIT DEVELOPMENT
148 WESTON ROAD
WELLESLEY, MA

Located:

148 WESTON ROAD
WELLESLEY, MASSACHUSETTS

Submitted to:
TOWN OF WELLESLEY

Prepared For:
WELLESLEY PARK, LLC
49 COOLIDGE STREET
BROOKLINE, MASSACHUSETTS 02446

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November 21, 2018

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Hydrologic Analysis
Comprehensive Permit Development
Wellesley Park, LLC
148 Weston Road, Wellesley, Massachusetts

Project Summary

The project proponent Wellesley Park, LLC, proposes to redevelop a 0.83-acre parcel of land located at 148 Weston Road in Wellesley, Massachusetts. The proposed redevelopment is being permitted under MGL Ch. 40B Comprehensive Permit and will consist of 55 multi-family residential units. The proposed development will involve the construction of a five (5) story plus one (1) basement level parking building, sidewalks, outdoor patio, retaining wall, access drive, stormwater management systems, utilities and other related infrastructure.

The project is comprised of one (1) parcel which is shown as Parcel ID 149-4 on the Town of Wellesley Assessor's Map. The site is bounded by Weston Road to the northeast, developed residential property to the southeast and municipal property owned by the Town of Wellesley to the north and west as shown on Figure 1 - USGS Locus Map.

The project will access the existing utility infrastructure located on Weston Road, including sanitary sewer, water, gas, electric, telephone, and cable television. The stormwater management system will be designed to fully comply with all standards of the Department of Environment Protection's Stormwater Management Regulations and will utilize an on-site subsurface infiltration system for stormwater storage and treatment.

The existing and proposed site conditions are illustrated on the project *site plans* entitled "Proposed Comprehensive Permit Development, 148 Weston Road", prepared by McKenzie Engineering Group, Inc. dated February 15, 2018.

This report contains stormwater runoff calculations for the pre-development and post-development conditions and includes the sizing of the proposed low impact drainage system and stormwater best management practices (BMPs). All stormwater management facilities will be designed to mitigate peak rates of runoff, provide renovation of stormwater and meet the requirements of the DEP's Stormwater Management Regulations.

Pre-Development Condition

The property is located within the Single Residence 15 (SR15) Zoning District. The majority of the 0.83 acre-parcel is vacant as the single family home was recently razed.

The existing topography generally ranges in elevation from approximately 159 ft. (Wellesley Vertical Datum) in the northeast portion of the site to an elevation of approximately 146 ft. (Wellesley Vertical Datum) in the southeast portion of the site. The parcel slopes from the northeast and southeast property lines, towards a depression in the middle of the site.

Review of available environmental databases such as MassGIS reveals that the site is not located within a mapped Natural Heritage Endangered Species Area, FEMA Flood Insurance Rate Map Panel No. 25021C0016E (refer to Figure 2 - FEMA Flood Map), or a Contributing Watershed to Outstanding Resource Water (ORW).

The site is located within Wellesley College's Zone II Wellhead Protection Area, (refer to Figure 4 - Wellhead Protection Area Map) and the Town of Wellesley's Water Supply Protection District, (refer to Figure 5 - Wellesley Zoning Map).

The Natural Resources Conservation Service (NRCS) has identified the soil on the site as 254B, Merrimac Fine Sandy Loam, 3 to 8% slopes with hydrologic soil group (HSG) A, and 630C, Charlton-Hollis-Urban land complex, 3 to 15% slopes with hydrologic soil group (HSG) A. Refer to Figure 3 - NRCS Soils Map. Soil testing conducted by McKenzie Engineering Group, Inc. (MEG) on January 31, 2018 identified the soils to be sand, sandy loam and loamy sand. Refer to the soil logs in Appendix C.

The existing watershed analyzed in this report is comprised of approximately 2.60 acres which includes the subject parcel and a portion of offsite tributary areas to the northwest. The watershed consists of one (1) sub-catchment area (1S) and one (1) Design Point (DP-1). Refer to the Pre-Development Watershed Plan WS-1 in Appendix A for a delineation of drainage subcatchments for the pre-development design condition.

The SCS Technical Release 20 (TR-20) and Technical Release 55 (TR-55) method based program "HydroCAD" was employed to develop pre- and post-development peak flows. Drainage calculations were prepared for the pre-development condition for the 2, 10, 25 and 100-year, Type III storm events. Refer to Appendix A for computer results, soil characteristics, cover descriptions and times of concentrations for all subareas.

The peak rates of runoff and elevations for this condition are as follows:

Table 1 – Pre-Development Results				
	Design Storm (flow in cfs)			
	2-Year Storm	10-Year Storm	25-Year Storm	100-Year Storm
Design Point	Flow (CFS)	Flow (CFS)	Flow (CFS)	Flow (CFS)
DP-1	0.00	0.03	0.10	0.51

	Design Storm (volume in ac-ft)			
	2-Year Storm	10-Year Storm	25-Year Storm	100-Year Storm
Design Point	Volume (AC-FT)	Volume (AC-FT)	Volume (AC-FT)	Volume (AC-FT)
DP-1	0.00	0.020	0.05	0.116

Post-Development Condition

148 Weston Road residences is proposed as a 55-unit redevelopment to be permitted in accordance with Massachusetts General Laws 40B § 20-23. The project consists of the construction of a five (5) story plus one (1) basement level parking building, sidewalks, outdoor patio, retaining wall, access drive, stormwater management systems, utilities and other related infrastructure.

The project will access the existing utility infrastructure located on Weston Road, including sanitary sewer, water, gas, electric, telephone, and cable television. The stormwater management system will be designed to fully comply with all standards of the Department of

Environment Protection's Stormwater Management Regulations and will utilize an on-site subsurface infiltration system for stormwater storage and treatment.

Watershed areas were analyzed in the post-development condition to design low impact stormwater management facilities to mitigate impacts resulting from redeveloping the property. The objective in designing the proposed drainage facilities for the project was to maintain existing drainage patterns to the extent practicable and to ensure that the post-development rates of runoff are less than pre-development rates at the design point. Refer to the Post-Development Watershed Plan WS-2 in Appendix B for a delineation of post-development drainage subareas. The design point for the post-development design conditions correspond to those analyzed for the pre-development design condition.

The subsurface infiltration chamber system was designed to accommodate peak flow generated by all storms up to the 100-year storm event. Refer to site plans for the drainage system design. All BMPs shall be supported by a comprehensive Construction Phase Pollution Prevention and Erosion Control Plan and Post-Development BMP Operation and Maintenance Plan.

Parking areas will be contained within the building and will drain to oil/sediment traps prior to discharge into the municipal sewer system, as required. The site will be designed to comply with the Stormwater Management Regulations to the extent practicable as required under Standards 6 and 7 for a redevelopment project.

The peak rates of runoff and elevations for this condition are as follows:

Table 2 – Post-Development Results

	Design Storm (flow in cfs)			
	2-Year Storm	10-Year Storm	25-Year Storm	100-Year Storm
Design Point	Flow (CFS)	Flow (CFS)	Flow (CFS)	Flow (CFS)
DP-1	0.00	0.03	0.10	0.43

	Design Storm (volume in ac-ft)			
	2-Year Storm	10-Year Storm	25-Year Storm	100-Year Storm
Design Point	Volume (AC-FT)	Volume (AC-FT)	Volume (AC-FT)	Volume (AC-FT)
DP-1	0.00	0.017	0.040	0.090

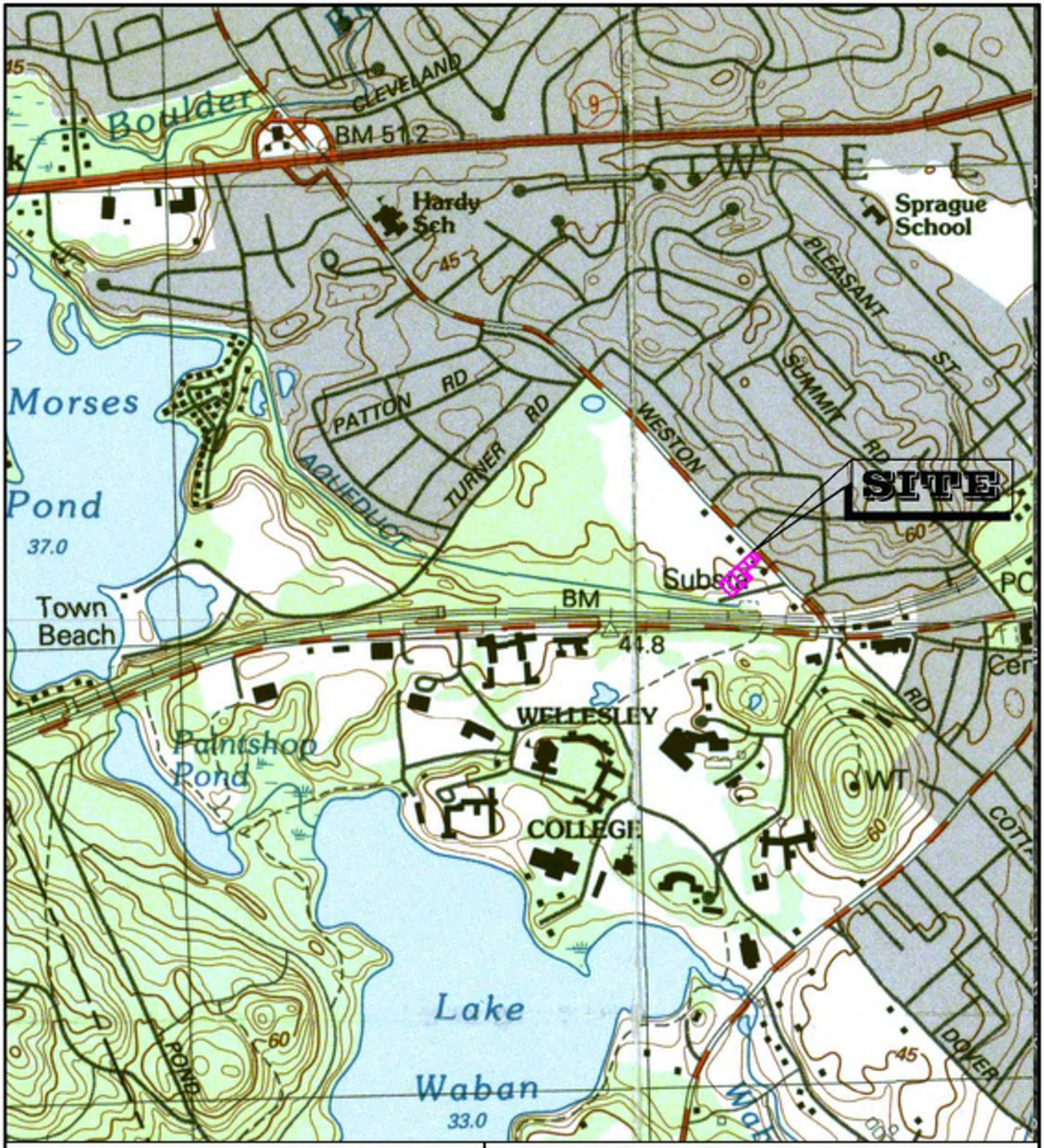

FIGURE - 1

0 1000' 2000' 2500'

U.S. GEOLOGICAL SURVEY
7.5 X 15 MINUTE SERIES

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DATE: JANUARY 4, 2018

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USGS LOCUS MAP

148 WESTON ROAD
PARCEL 149-4
WELLESLEY, MASSACHUSETTS

FIGURE - 2

0 1000' 2000' 2500'

COMMUNITY PANEL NO: 25021C0016E

EFFECTIVE DATE: JULY 17, 2012

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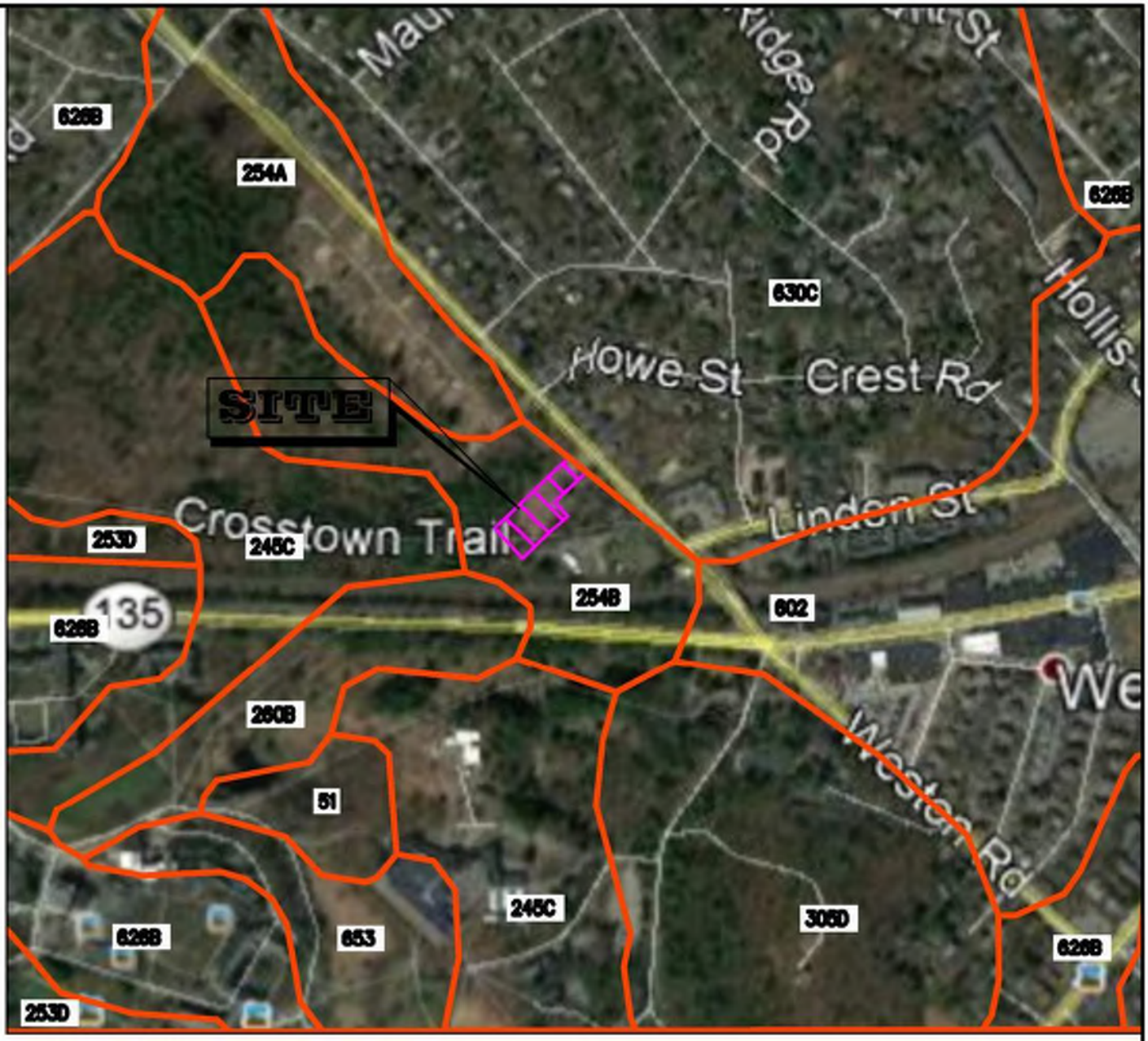
FEMA FLOOD MAP

148 WESTON ROAD
PARCEL 149-4
WELLESLEY, MASSACHUSETTS



SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
254B	MERRIMAC FINE SANDY LOAM, 3–8 PERCENT SLOPES	A
630C	CHARLTON–HOLLIS–URBAN LAND COMPLEX, 3–15 PERCENT SLOPES	A

FIGURE - 3

0 500' 1000' 1500'

NRCS SOIL SURVEY
PLYMOUTH COUNTY

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NRCS SOILS MAP

148 WESTON ROAD
PARCEL 149-4
WELLESLEY, MASSACHUSETTS

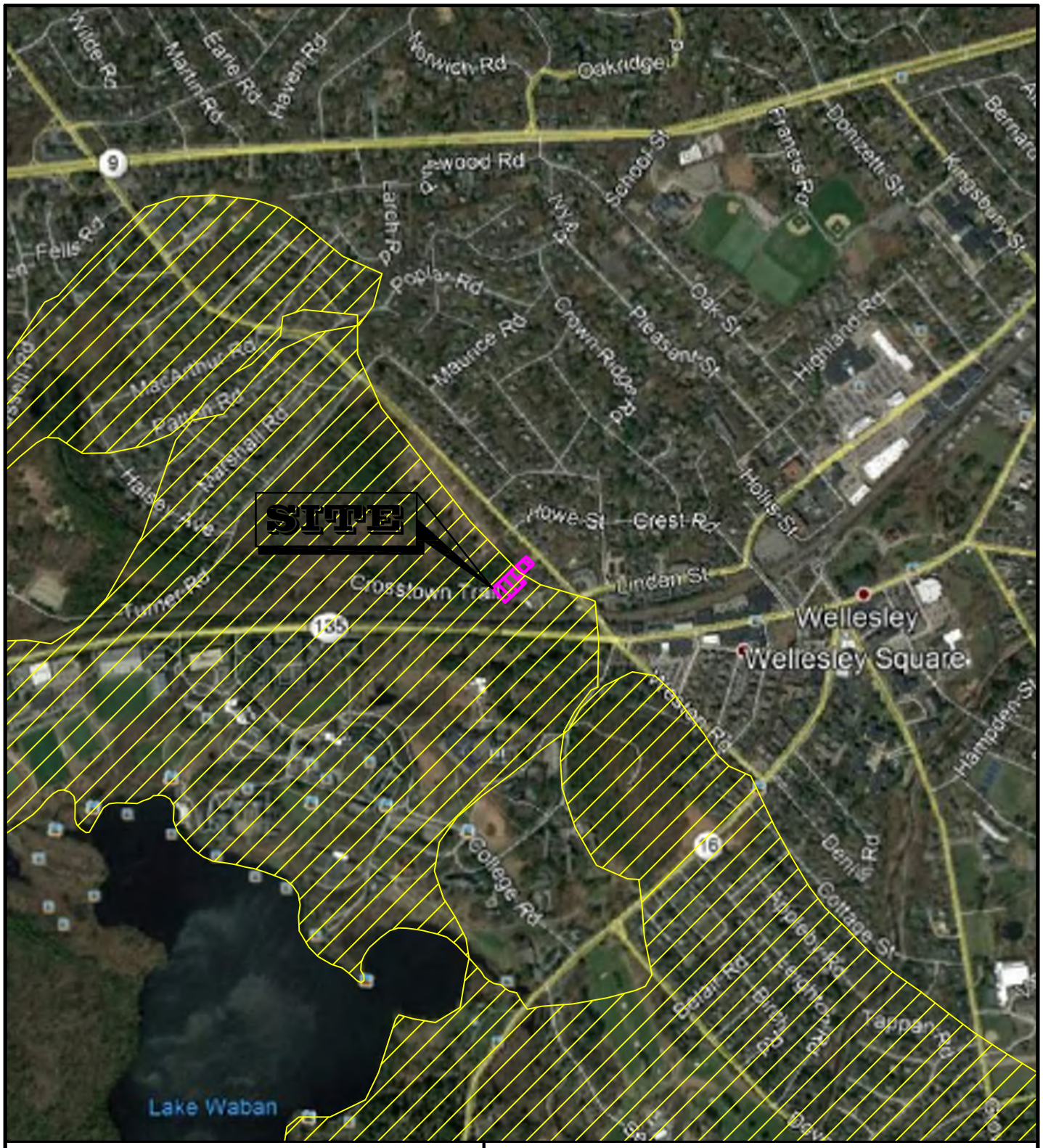

FIGURE - 4

0 1000' 2000' 2500'

MASSDEP WELLHEAD PROTECTION AREA (ZONE II)

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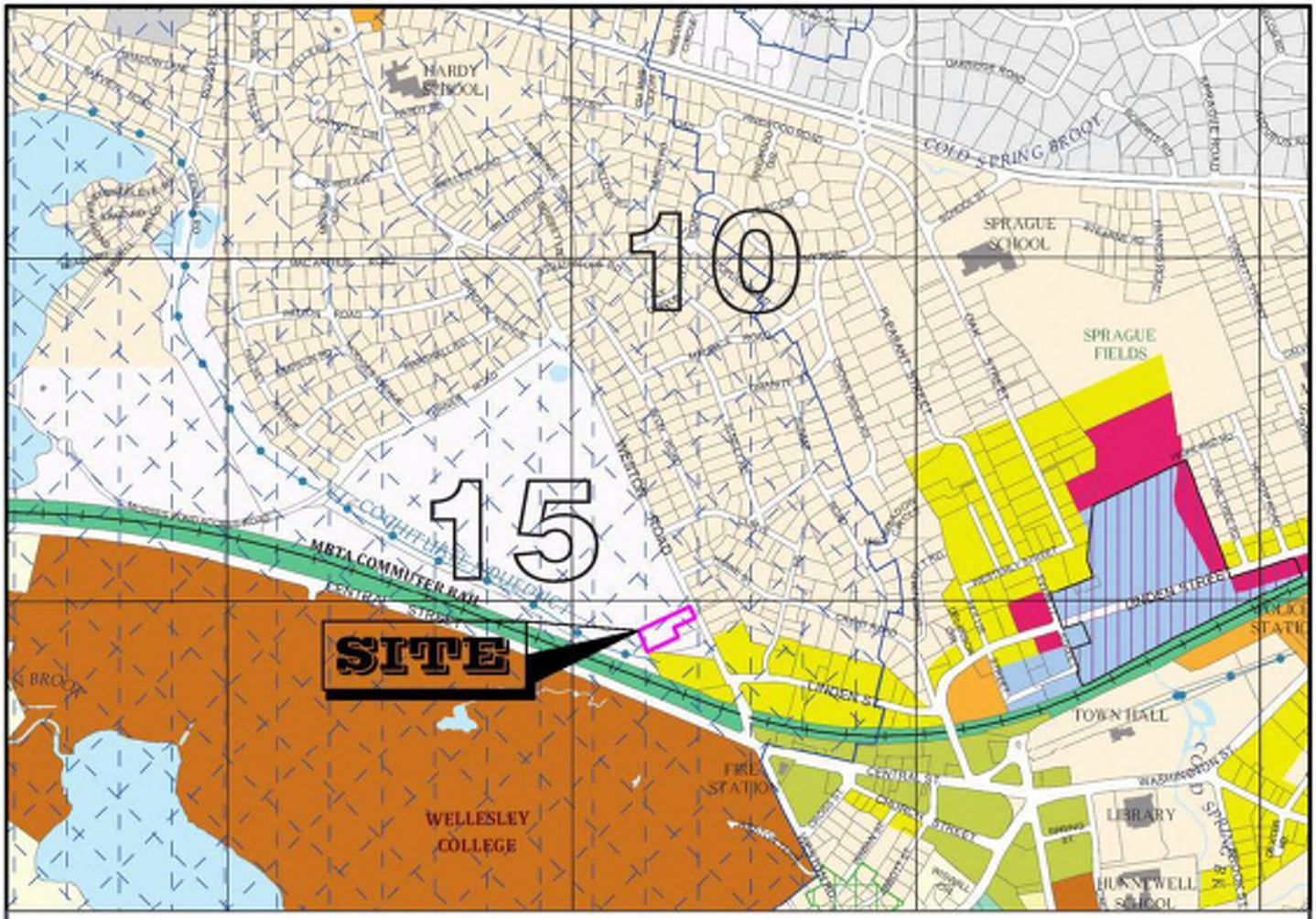
WELLHEAD PROTECTION AREA MAP

148 WESTON ROAD
PARCEL 149-4
WELLESLEY, MASSACHUSETTS



- Single Residence A
- Multi-Family Residence
- Town House
- General Residence
- Limited Residence
- Limited Apartment
- Educational
- Educational A
- Educational B
- Administrative/Professional
- Limited Business
- Business
- Business A
- Industrial
- Industrial A
- Transportation
- Conservation
- Lower Falls Village Commercial District
- Wellesley Square Commercial District
- Single Residence 10
- Single Residence 15
- Single Residence 20
- Single Residence 30
- Single Residence 40
- Historic District
- Residential Incentive Overlay District
- Water Supply Protection District
- Linden Street Corridor Overlay District

Note:
Refer to flood plain maps and watershed protection maps for adopted flood plain and watershed protection districts.

FIGURE - 5

0 1000' 2000' 2500'

TOWN OF WELLESLEY
ZONING MAP

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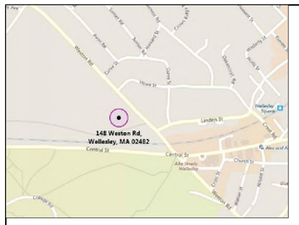
WELLESLEY ZONING MAP

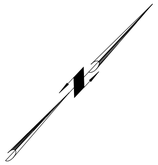
148 WESTON ROAD
PARCEL 149-4
WELLESLEY, MASSACHUSETTS

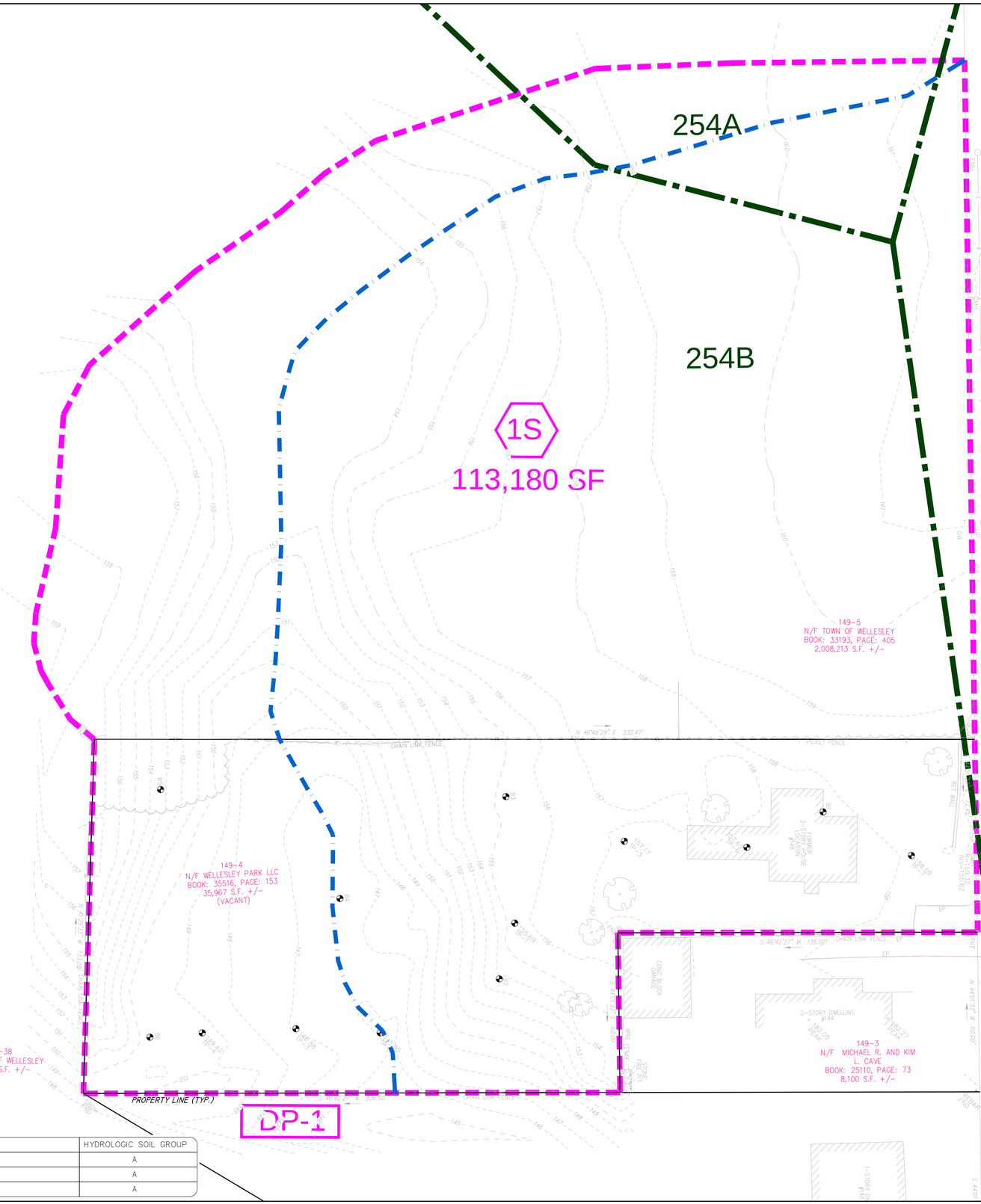
A P P E N D I X A

Pre-Development Condition



LOCUS MAP
Not to Scale





ABBREVIATIONS

FFE	FIRST FLOOR ELEVATION
BIT CONC.	BITUMINOUS CONCRETE PAVEMENT
CCB	CAPE COD BERM
EP	EDGE OF PAVEMENT
BC	BITUMINOUS CONCRETE CURB
(AM)	AS MEASURED
RET WALL	RETAINING WALL
CONC.	CONCRETE
RCP	REINFORCED CONCRETE PIPE
VCC	VERTICAL GRANITE CURB
ETW	EDGE OF TRAVEL WAY
MTL	METAL BERM
VCC	VERTICAL CONCRETE CURB
CMP	CORRUGATED METAL PIPE
TOW	TOP OF WALL
SGC	SLOPED GRANITE CURB

LEGEND

SURVEY SYMBOLS

- REBAR
- ANGLE IRON
- CB/DH — CONCRETE BOUND WITH DRILL HOLE
- SB — STONE BOUND
- SB/DH — STONE BOUND

UTILITY SYMBOLS

- CHIMNEY
- ELECTRIC HAND HOLE
- GUY POLE
- GW — GUY WIRE
- HVAC UNIT
- BUILDING LIGHT W/MAST
- BUILDING LIGHT
- TRANSFORMER
- WATER GATE
- EXH — EXHAUST VENT
- AIR VENT
- DRAINAGE SUMP
- EMH — ELECTRIC MANHOLE
- SMH — SEWER MANHOLE
- DMH — DRAIN MANHOLE
- TMH — TELEPHONE MANHOLE
- CBN — DRAINAGE CATCH BASIN
- DOOR WAY THRESHOLD
- HYDRANT
- POST INDICATER VALVE
- UTILITY POLE
- YARD LIGHT
- RIP RAP
- B — BOLLARD
- SIGN
- FA — FIRE ALARM
- DECIDUOUS TREE
- CONIFEROUS TREE

LINE DESIGNATORS

- W — WATER MAIN
- HANDRAIL
- JERSEY BARRIER
- GUARD RAIL
- RAILROAD TRACKS
- OHW — OVERHEAD WIRES
- G — GAS LINE
- WS — WATER SERVICE
- E — UNDERGROUND ELECTRIC
- D — STORM DRAIN LINE
- S — SANITARY SEWER LINE
- DRAINAGE SWALE
- X — CHAIN LINK FENCE

LEGEND

- TIME OF CONCENTRATION FLOW PATH
- LIMIT OF WATERSHED
- SOIL TYPE BOUNDARY

SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
254A	MERRIMAC FINE SANDY LOAM, 0-3 PERCENT SLOPES	A
254B	MERRIMAC FINE SANDY LOAM, 3-8 PERCENT SLOPES	A
630C	CHARLTON-HOLLIS-URBAN LAND COMPLEX, 3-15 PERCENT SLOPES	A

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REV	DATE	DESCRIPTION	BY	APP
-	-	-	-	-

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PROPOSED COMPREHENSIVE PERMIT DEVELOPMENT

(PARCEL ID 149-4)
148 WESTON ROAD
WELLESLEY, MASSACHUSETTS

PROFESSIONAL ENGINEER:

NOT FOR CONSTRUCTION

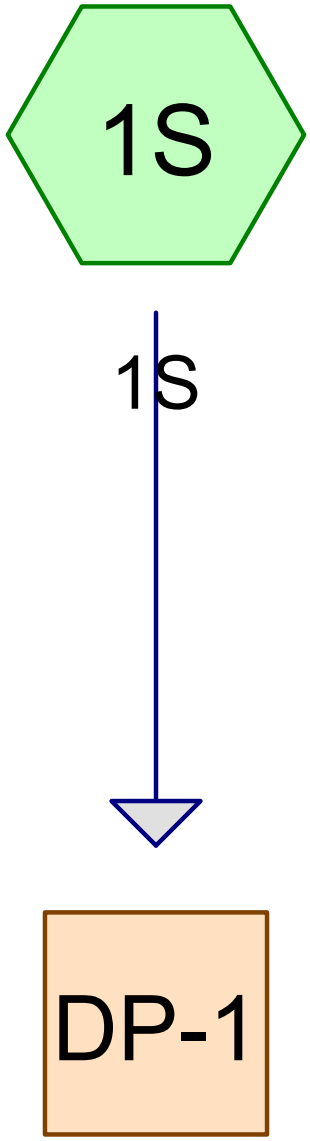
APPLICANT:
WELLESLEY PARK LLC,
49 COOLIDGE STREET
BROOKLINE, MASSACHUSETTS 02446

DRAWN BY:	ESS
DESIGNED BY:	ESS
CHECKED BY:	BCM
APPROVED BY:	BCM
DATE:	NOVEMBER 21, 2018
SCALE:	1"=20'
PROJECT NO.:	217-177

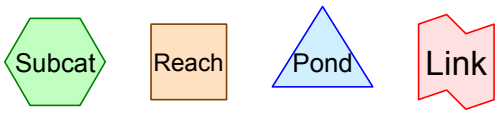
DWG. TITLE:
PRE-DEV. WATERSHED PLAN

DWG. NO:
WS-1

M:\MEG\2017 PROJECTS\217-177 (OAKGROVE- WESTON ROAD WELLESLY)\DWGS\SUBMISSIONS\PROJECT CHANGE\217-177 WATERSHED (PC).DWG



PROPERTY LINE



Routing Diagram for 217-177 Pre Development (PC)
Prepared by McKenzie Engineering Group, Inc.
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.110	39	>75% Grass cover, Good, HSG A (1S)
0.204	39	>75% Grass cover, Good, HSG A (offsite) (1S)
0.018	96	Gravel surface, HSG A (1S)
0.116	96	Gravel surface, HSG A (offsite) (1S)
0.014	98	Paved parking, HSG A (1S)
0.040	98	Roofs, HSG A (1S)
0.044	98	Roofs, HSG A (offsite) (1S)
0.648	30	Woods, Good, HSG A (1S)
1.404	30	Woods, Good, HSG A (offsite) (1S)
2.598	**37**	**TOTAL AREA**

Soil Listing (all nodes)

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

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.314	0.000	0.000	0.000	0.000	0.314	>75% Grass cover, Good	1S
0.134	0.000	0.000	0.000	0.000	0.134	Gravel surface	1S
0.014	0.000	0.000	0.000	0.000	0.014	Paved parking	1S
0.084	0.000	0.000	0.000	0.000	0.084	Roofs	1S
2.052	0.000	0.000	0.000	0.000	2.052	Woods, Good	1S
2.598	**0.000**	**0.000**	**0.000**	**0.000**	**2.598**	**TOTAL AREA**	

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

Subcatchment1S: 1S Runoff Area=113,180 sf 3.79% Impervious Runoff Depth=0.00"
Flow Length=557' Tc=17.2 min CN=37 Runoff=0.00 cfs 0.000 af

Reach DP-1: PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 2.598 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"
96.21% Pervious = 2.500 ac 3.79% Impervious = 0.099 ac

Summary for Subcatchment 1S: 1S

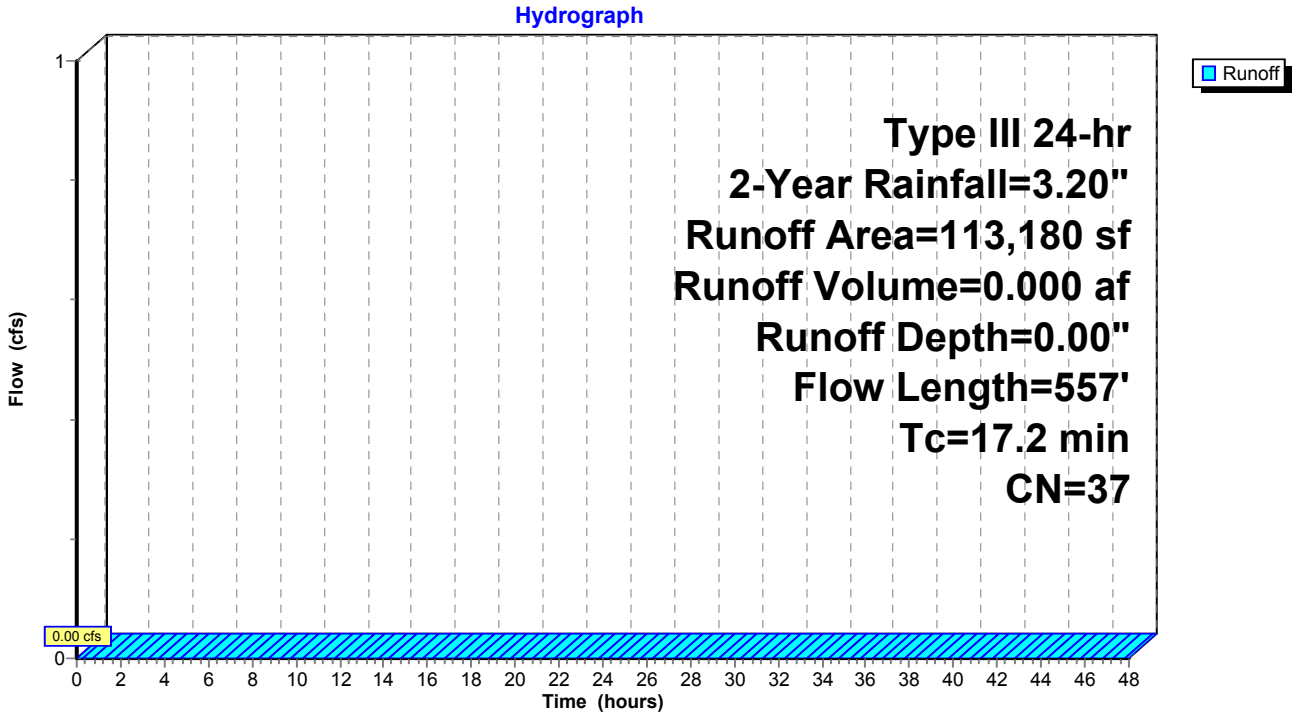
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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

	Area (sf)	CN	Description
*	61,141	30	Woods, Good, HSG A (offsite)
*	5,064	96	Gravel surface, HSG A (offsite)
*	8,886	39	>75% Grass cover, Good, HSG A (offsite)
*	1,919	98	Roofs, HSG A (offsite)
	780	96	Gravel surface, HSG A
	1,742	98	Roofs, HSG A
	630	98	Paved parking, HSG A
	4,775	39	>75% Grass cover, Good, HSG A
	28,243	30	Woods, Good, HSG A
	113,180	37	Weighted Average
	108,889		96.21% Pervious Area
	4,291		3.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0150	0.06		**Sheet Flow, SHEET FLOW** Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	507	0.0236	2.47		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
17.2	557	Total			

Subcatchment 1S: 1S

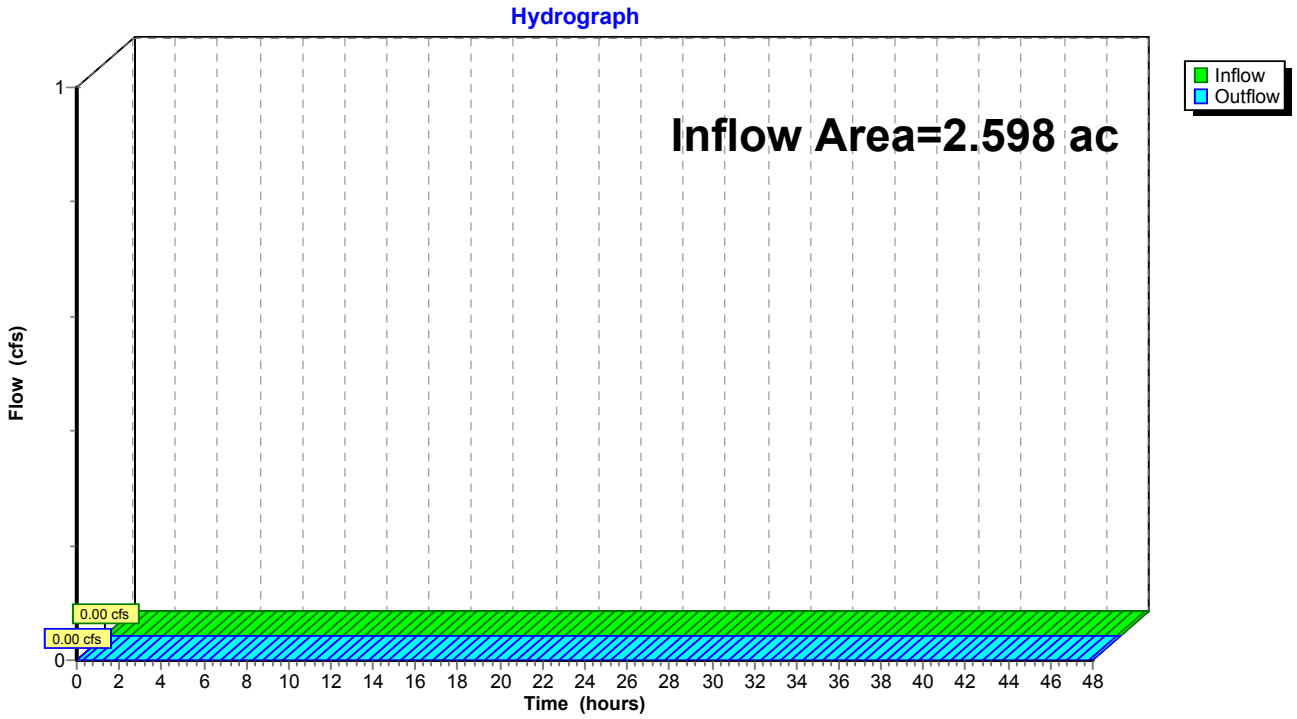


Summary for Reach DP-1: PROPERTY LINE

Inflow Area = 2.598 ac, 3.79% 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= 0.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: PROPERTY LINE



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

Subcatchment1S: 1S Runoff Area=113,180 sf 3.79% Impervious Runoff Depth=0.09"
Flow Length=557' Tc=17.2 min CN=37 Runoff=0.03 cfs 0.020 af

Reach DP-1: PROPERTY LINE Inflow=0.03 cfs 0.020 af
Outflow=0.03 cfs 0.020 af

Total Runoff Area = 2.598 ac Runoff Volume = 0.020 af Average Runoff Depth = 0.09"
96.21% Pervious = 2.500 ac 3.79% Impervious = 0.099 ac

Summary for Subcatchment 1S: 1S

Runoff = 0.03 cfs @ 15.13 hrs, Volume= 0.020 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	61,141	30	Woods, Good, HSG A (offsite)
*	5,064	96	Gravel surface, HSG A (offsite)
*	8,886	39	>75% Grass cover, Good, HSG A (offsite)
*	1,919	98	Roofs, HSG A (offsite)
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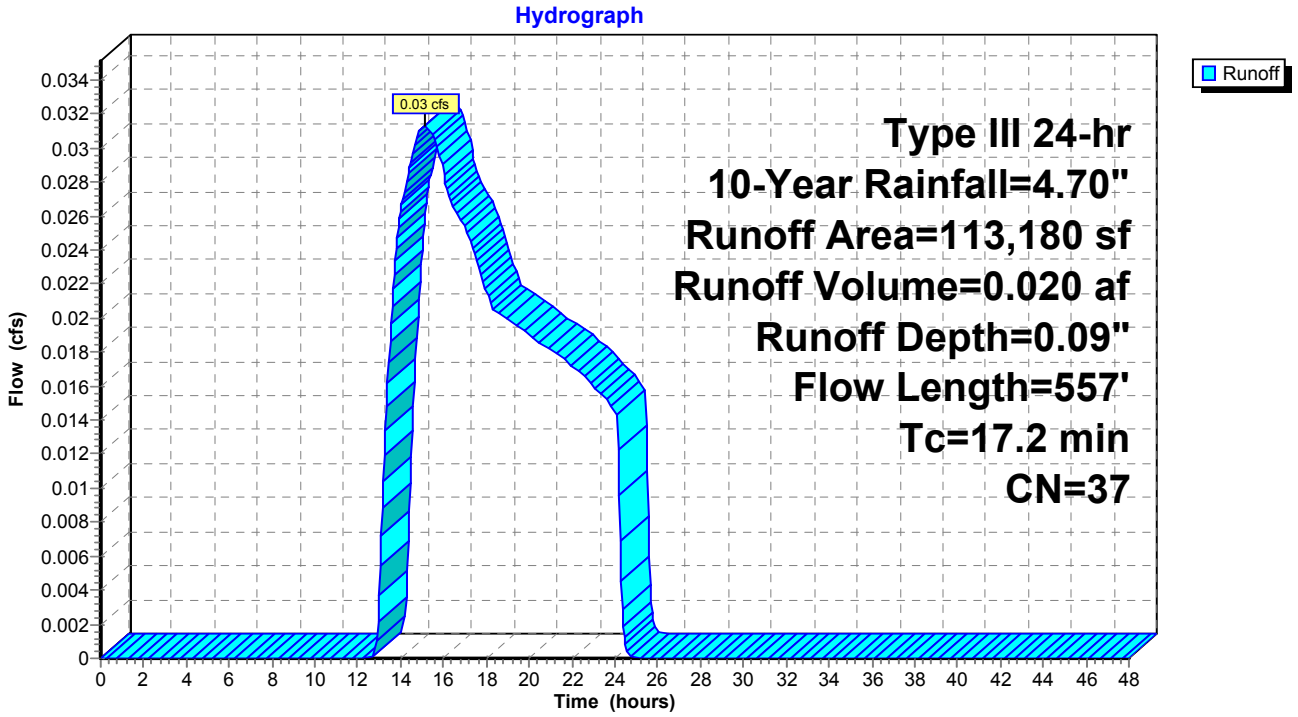
	28,243	30	Woods, Good, HSG A
	113,180	37	Weighted Average
	108,889		96.21% Pervious Area
	4,291		3.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0150	0.06		**Sheet Flow, SHEET FLOW** Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	507	0.0236	2.47		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
17.2	557	Total			

Subcatchment 1S: 1S

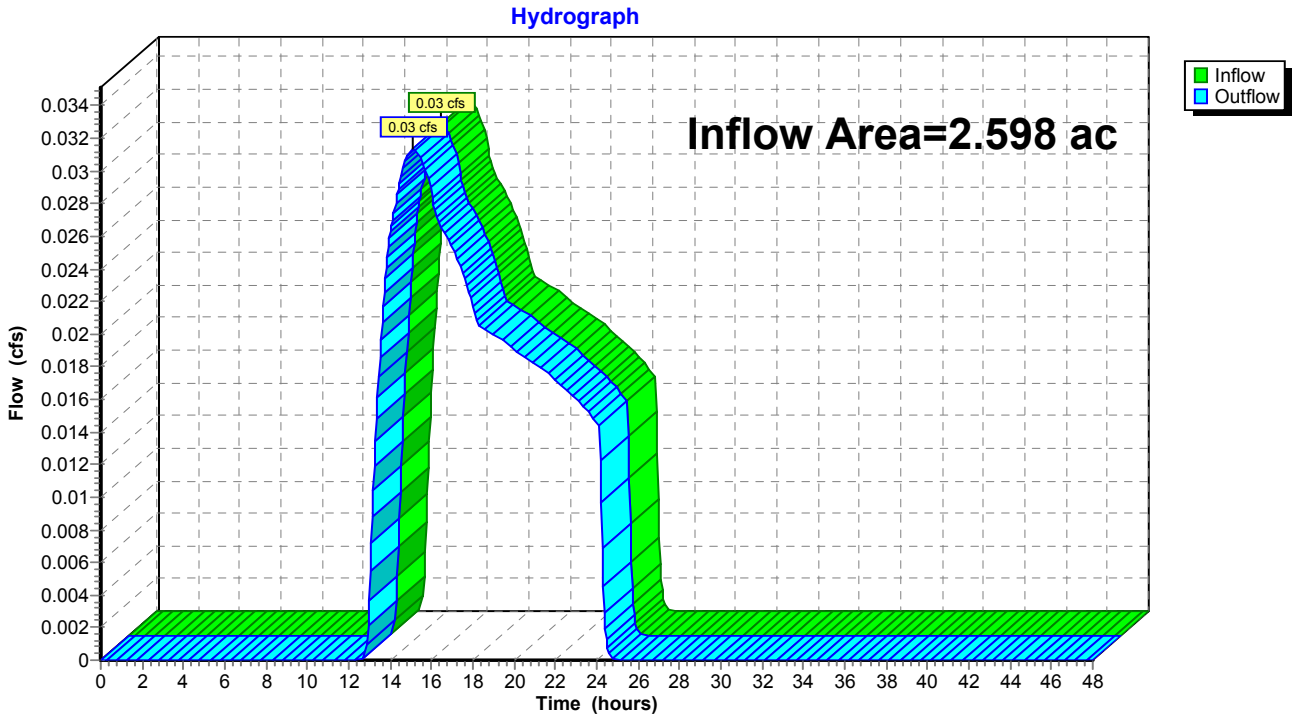


Summary for Reach DP-1: PROPERTY LINE

Inflow Area = 2.598 ac, 3.79% Impervious, Inflow Depth = 0.09" for 10-Year event
Inflow = 0.03 cfs @ 15.13 hrs, Volume= 0.020 af
Outflow = 0.03 cfs @ 15.13 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: PROPERTY LINE



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

Subcatchment1S: 1S Runoff Area=113,180 sf 3.79% Impervious Runoff Depth=0.23"
Flow Length=557' Tc=17.2 min CN=37 Runoff=0.10 cfs 0.050 af

Reach DP-1: PROPERTY LINE Inflow=0.10 cfs 0.050 af
Outflow=0.10 cfs 0.050 af

Total Runoff Area = 2.598 ac Runoff Volume = 0.050 af Average Runoff Depth = 0.23"
96.21% Pervious = 2.500 ac 3.79% Impervious = 0.099 ac

Summary for Subcatchment 1S: 1S

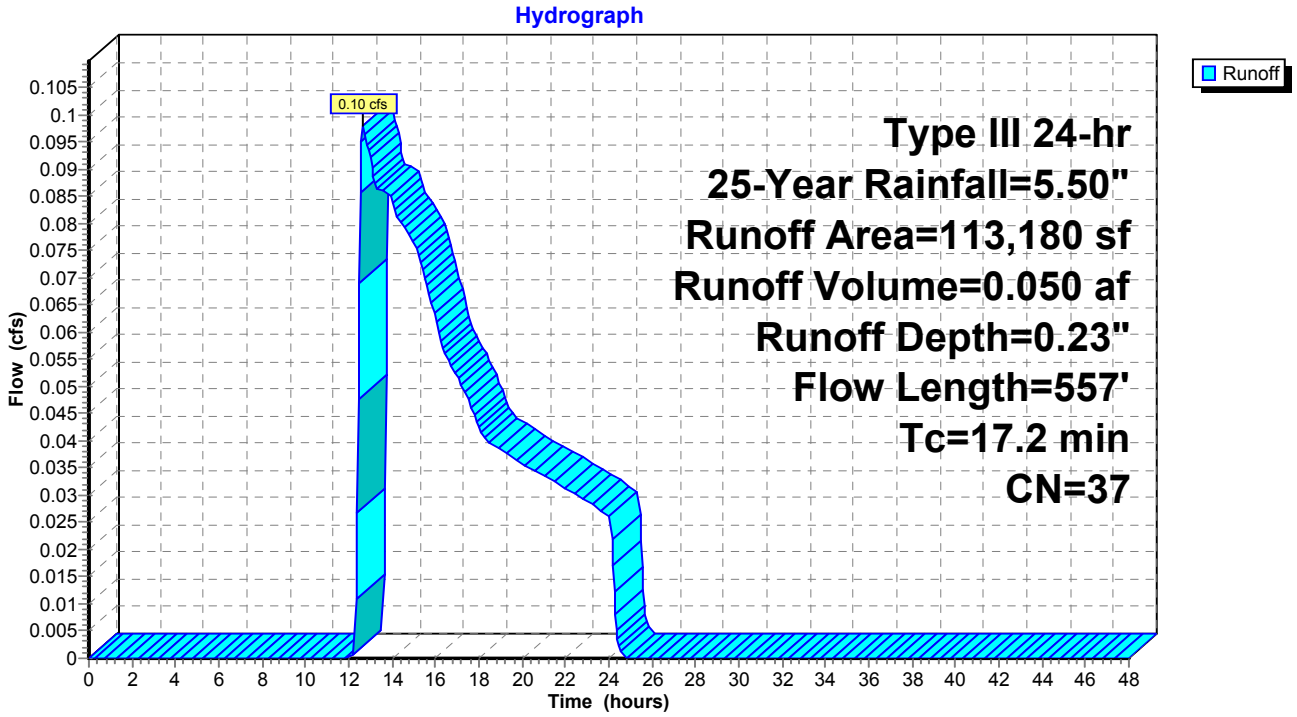
Runoff = 0.10 cfs @ 12.67 hrs, Volume= 0.050 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	61,141	30	Woods, Good, HSG A (offsite)
*	5,064	96	Gravel surface, HSG A (offsite)
*	8,886	39	>75% Grass cover, Good, HSG A (offsite)
*	1,919	98	Roofs, HSG A (offsite)
	780	96	Gravel surface, HSG A
	1,742	98	Roofs, HSG A
	630	98	Paved parking, HSG A
	4,775	39	>75% Grass cover, Good, HSG A
	28,243	30	Woods, Good, HSG A
	113,180	37	Weighted Average
	108,889		96.21% Pervious Area
	4,291		3.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0150	0.06		**Sheet Flow, SHEET FLOW** Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	507	0.0236	2.47		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
17.2	557	Total			

Subcatchment 1S: 1S

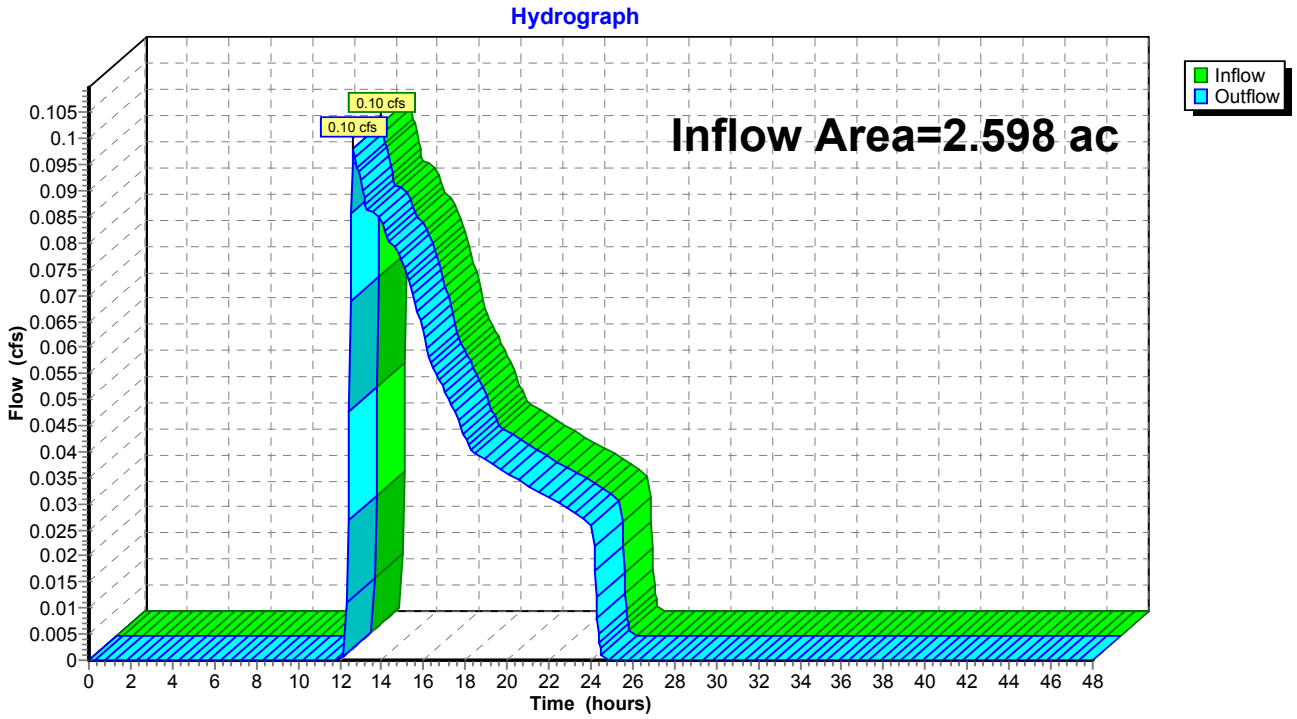


Summary for Reach DP-1: PROPERTY LINE

Inflow Area = 2.598 ac, 3.79% Impervious, Inflow Depth = 0.23" for 25-Year event
Inflow = 0.10 cfs @ 12.67 hrs, Volume= 0.050 af
Outflow = 0.10 cfs @ 12.67 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: PROPERTY LINE



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

Subcatchment1S: 1S Runoff Area=113,180 sf 3.79% Impervious Runoff Depth=0.53"
Flow Length=557' Tc=17.2 min CN=37 Runoff=0.51 cfs 0.116 af

Reach DP-1: PROPERTY LINE Inflow=0.51 cfs 0.116 af
Outflow=0.51 cfs 0.116 af

Total Runoff Area = 2.598 ac Runoff Volume = 0.116 af Average Runoff Depth = 0.53"
96.21% Pervious = 2.500 ac 3.79% Impervious = 0.099 ac

Summary for Subcatchment 1S: 1S

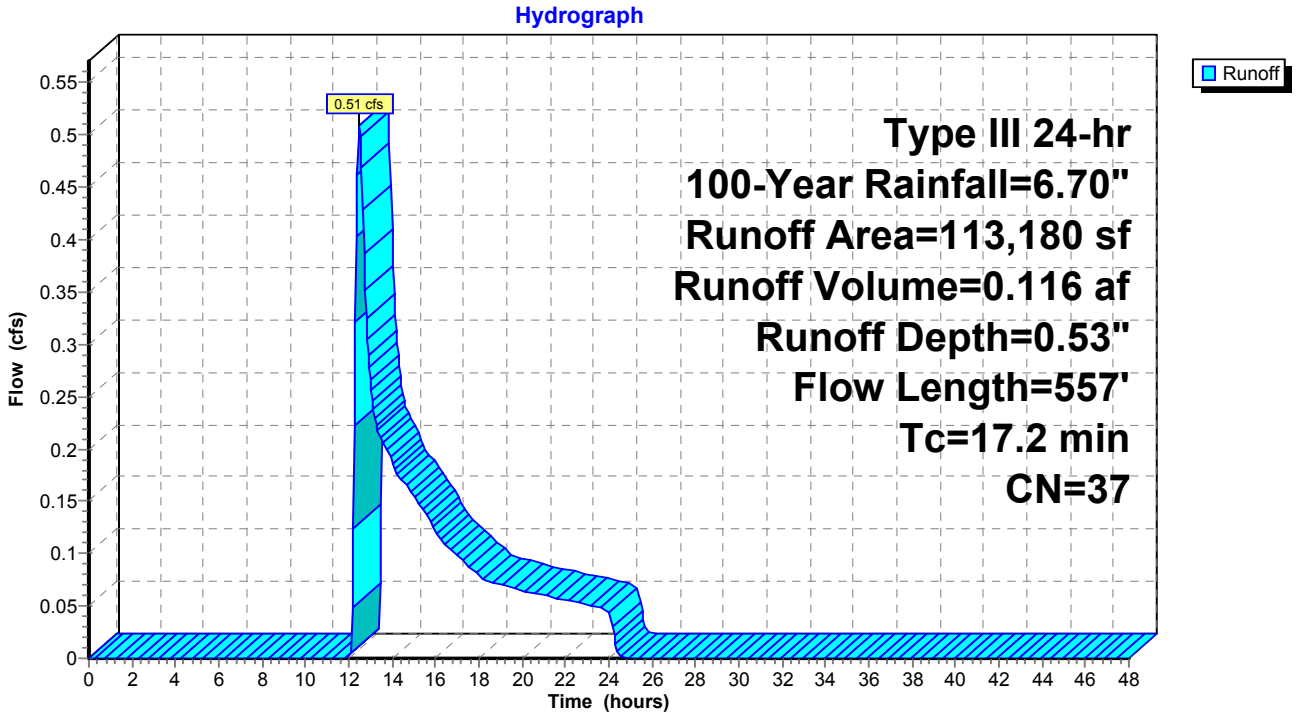
Runoff = 0.51 cfs @ 12.50 hrs, Volume= 0.116 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	61,141	30	Woods, Good, HSG A (offsite)
*	5,064	96	Gravel surface, HSG A (offsite)
*	8,886	39	>75% Grass cover, Good, HSG A (offsite)
*	1,919	98	Roofs, HSG A (offsite)
	780	96	Gravel surface, HSG A
	1,742	98	Roofs, HSG A
	630	98	Paved parking, HSG A
	4,775	39	>75% Grass cover, Good, HSG A
	28,243	30	Woods, Good, HSG A
	113,180	37	Weighted Average
	108,889		96.21% Pervious Area
	4,291		3.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0150	0.06		**Sheet Flow, SHEET FLOW** Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	507	0.0236	2.47		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
17.2	557	Total			

Subcatchment 1S: 1S

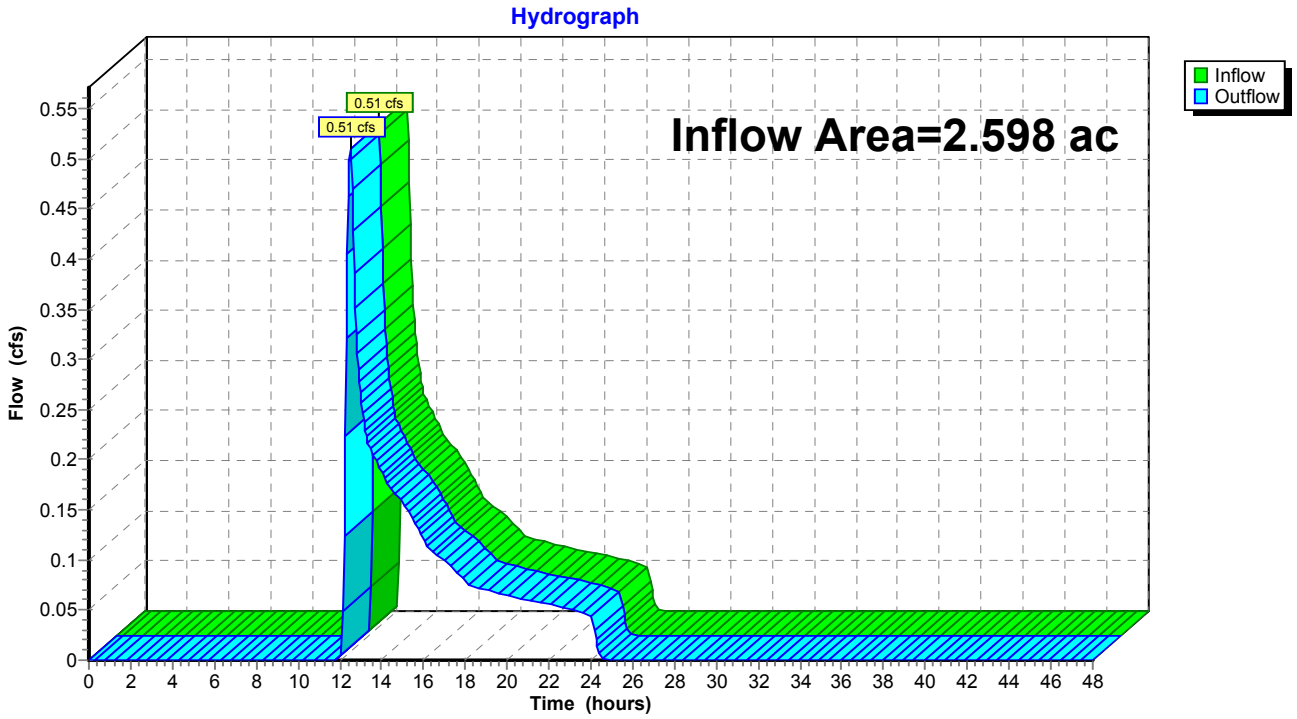


Summary for Reach DP-1: PROPERTY LINE

Inflow Area = 2.598 ac, 3.79% Impervious, Inflow Depth = 0.53" for 100-Year event
Inflow = 0.51 cfs @ 12.50 hrs, Volume= 0.116 af
Outflow = 0.51 cfs @ 12.50 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min

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

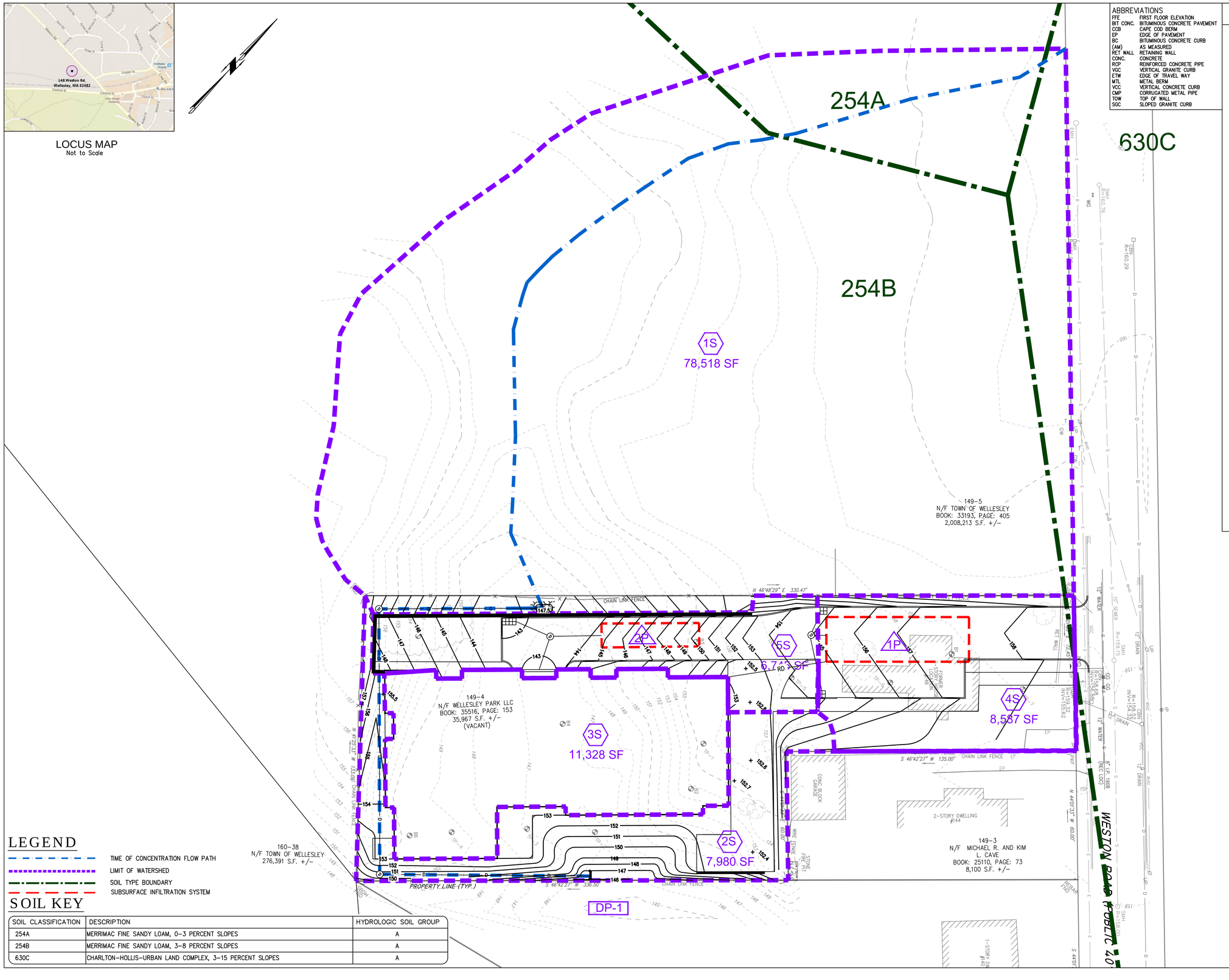
Reach DP-1: PROPERTY LINE



A P P E N D I X B

Post-Development Condition

LOCUS MAP
Not to Scale



ABBREVIATIONS

FFE	FIRST FLOOR ELEVATION
BIT CONC.	BITUMINOUS CONCRETE PAVEMENT
CCB	CAPE COD BERM
EP	EDGE OF PAVEMENT
BC	BITUMINOUS CONCRETE CURB
(AM)	AS MEASURED
RET WALL	RETAINING WALL
CONC.	CONCRETE
RCP	REINFORCED CONCRETE PIPE
VGC	VERTICAL GRANITE CURB
ETW	EDGE OF TRAVEL WAY
MTL	METAL BERM
VCC	VERTICAL CONCRETE CURB
CMP	CORRUGATED METAL PIPE
TOW	TOP OF WALL
SGC	SLOPED GRANITE CURB

LEGEND

SURVEY SYMBOLS

- REBAR
- ANGLE IRON
- CB/DH — CONCRETE BOUND WITH DRILL HOLE
- SB — STONE BOUND
- SB/DH — STONE BOUND

UTILITY SYMBOLS

- CHIMNEY
- ELECTRIC HAND HOLE
- GUY POLE
- GW — GUY WIRE
- HVAC UNIT
- BUILDING LIGHT W/MAST
- BUILDING LIGHT
- TRANSFORMER
- WATER GATE
- EXH — EXHAUST VENT
- AIR VENT
- DRAINAGE SUMP
- EMH — ELECTRIC MANHOLE
- SMH — SEWER MANHOLE
- DMH — DRAIN MANHOLE
- TMH — TELEPHONE MANHOLE
- CBN — DRAINAGE CATCH BASIN
- DOOR WAY THRESHOLD
- HYDRANT
- POST INDICATER VALVE
- UTILITY POLE
- YARD LIGHT
- RIP RAP
- B — BOLLARD
- SIGN
- FA — FIRE ALARM
- DECIDUOUS TREE
- CONIFEROUS TREE

LINE DESIGNATORS

- W — WATER MAIN
- HANDRAIL
- JERSEY BARRIER
- GUARD RAIL
- RAILROAD TRACKS
- OHW — OVERHEAD WIRES
- G — GAS LINE
- WS — WATER SERVICE
- E — UNDERGROUND ELECTRIC
- D — STORM DRAIN LINE
- S — SANITARY SEWER LINE
- DRAINAGE SWALE
- X — CHAIN LINK FENCE

LEGEND

- TIME OF CONCENTRATION FLOW PATH
- LIMIT OF WATERSHED
- SOIL TYPE BOUNDARY
- SUBSURFACE INFILTRATION SYSTEM

SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
254A	MERRIMAC FINE SANDY LOAM, 0-3 PERCENT SLOPES	A
254B	MERRIMAC FINE SANDY LOAM, 3-8 PERCENT SLOPES	A
630C	CHARLTON-HOLLIS-URBAN LAND COMPLEX, 3-15 PERCENT SLOPES	A

REV	DATE	DESCRIPTION	BY	APP
-	-	-	-	-

MCKENZIE ENGINEERING GROUP
Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061
781.792.3900
www.mckeng.com

PROPOSED COMPREHENSIVE PERMIT DEVELOPMENT

(PARCEL ID 149-4)
148 WESTON ROAD
WELLESLEY, MASSACHUSETTS

PROFESSIONAL ENGINEER:

NOT FOR CONSTRUCTION

APPLICANT:
WELLESLEY PARK, LLC
49 COOLIDGE STREET
BROOKLINE, MASSACHUSETTS 02446

DRAWN BY:	ESS
DESIGNED BY:	ESS
CHECKED BY:	BCM
APPROVED BY:	BCM
DATE:	NOVEMBER 21, 2018
SCALE:	1"=20'
PROJECT NO.:	217-177

DWG. TITLE:
POST-DEV. WATERSHED PLAN

DWG. NO:
WS-2

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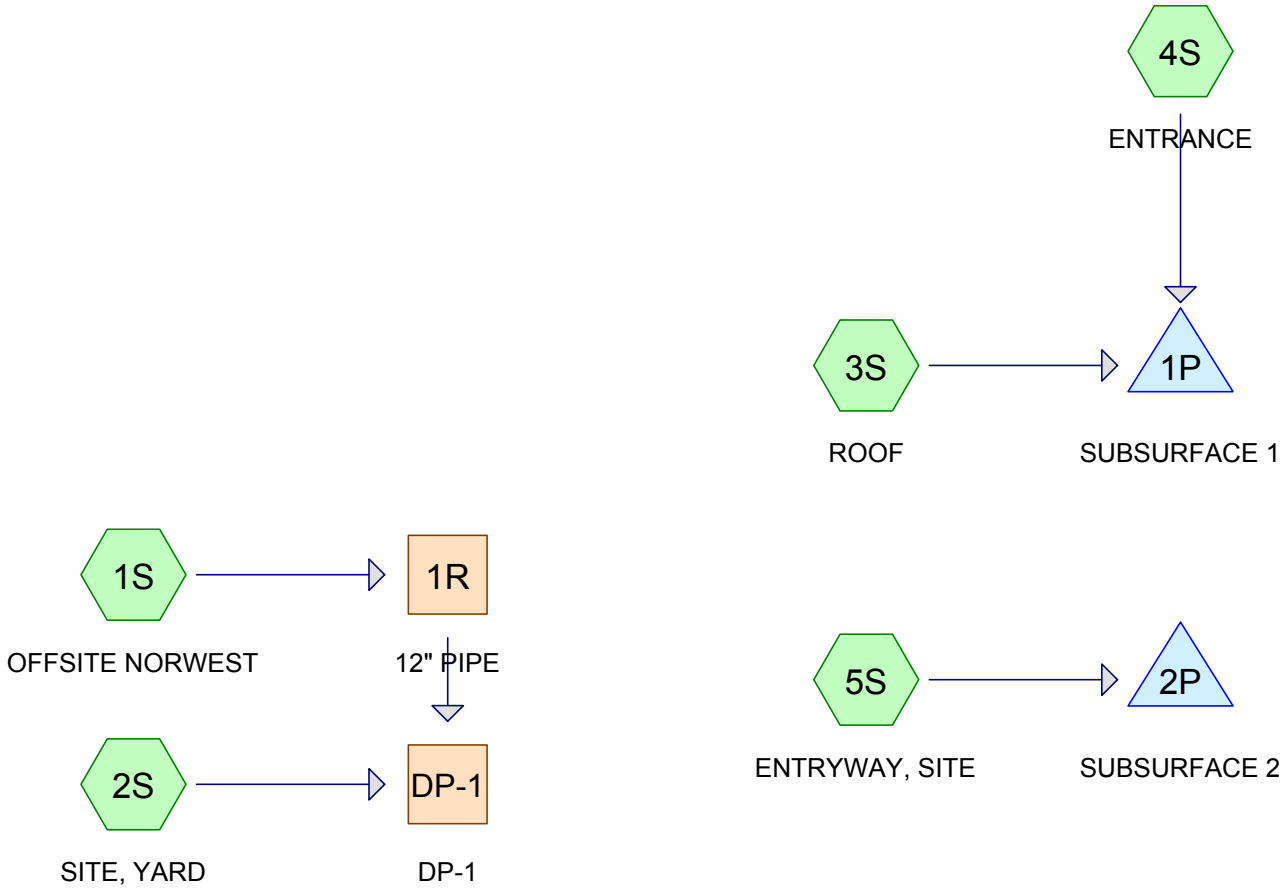
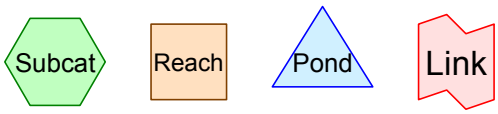
M:\MEG\2017 PROJECTS\217-177 (OAKGROVE- WESTON ROAD WELLESLY)\DWGS\SUBMISSIONS\PROJECT CHANGE\217-177 MAIN (PC).DWG





Routing Diagram for 217-177 Post Development Final (PC)
Prepared by McKenzie Engineering Group, Inc.
HydroCAD® 10.00-21 s/n 00452 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.274	39	>75% Grass cover, Good, HSG A (1S, 2S, 4S, 5S)
0.204	39	>75% Grass cover, Good, HSG A (offsite) (1S)
0.116	96	Gravel surface, HSG A (offsite) (1S)
0.209	98	Paved parking, HSG A (4S, 5S)
0.041	64	Permeable pavers, HSG A (2S)
0.028	65	Permeable pavers, HSG A (5S)
0.044	98	Roofs, HSG A (offsite) (1S)
0.007	98	Unconnected pavement, HSG A (5S)
0.272	98	Unconnected roofs, HSG A (2S, 3S)
1.404	30	Woods, Good, HSG A (offsite) (1S)
2.598	**49**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.598	HSG A	1S, 2S, 3S, 4S, 5S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
2.598		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.478	0.000	0.000	0.000	0.000	0.478	>75% Grass cover, Good	1S, 2S, 4S, 5S
0.116	0.000	0.000	0.000	0.000	0.116	Gravel surface	1S
0.209	0.000	0.000	0.000	0.000	0.209	Paved parking	4S, 5S
0.068	0.000	0.000	0.000	0.000	0.068	Permeable pavers	2S, 5S
0.044	0.000	0.000	0.000	0.000	0.044	Roofs	1S
0.007	0.000	0.000	0.000	0.000	0.007	Unconnected pavement	5S
0.272	0.000	0.000	0.000	0.000	0.272	Unconnected roofs	2S, 3S
1.404	0.000	0.000	0.000	0.000	1.404	Woods, Good	1S
2.598	**0.000**	**0.000**	**0.000**	**0.000**	**2.598**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1R	147.80	146.37	287.0	0.0050	0.013	12.0	0.0	0.0

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

Subcatchment1S: OFFSITE NORWEST Runoff Area=78,954 sf 2.43% Impervious Runoff Depth=0.00"
Flow Length=557' Tc=17.2 min CN=37 Runoff=0.00 cfs 0.000 af

Subcatchment2S: SITE, YARD Runoff Area=7,566 sf 6.61% Impervious Runoff Depth=0.07"
Flow Length=240' Tc=6.6 min UI Adjusted CN=47 Runoff=0.00 cfs 0.001 af

Subcatchment3S: ROOF Runoff Area=11,328 sf 100.00% Impervious Runoff Depth=2.97"
Tc=5.0 min CN=98 Runoff=0.81 cfs 0.064 af

Subcatchment4S: ENTRANCE Runoff Area=8,587 sf 58.68% Impervious Runoff Depth=1.04"
Tc=5.0 min CN=74 Runoff=0.23 cfs 0.017 af

Subcatchment5S: ENTRYWAY, SITE Runoff Area=6,745 sf 64.88% Impervious Runoff Depth=1.54"
Tc=5.0 min CN=82 Runoff=0.28 cfs 0.020 af

Reach 1R: 12" PIPE Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
12.0" Round Pipe n=0.013 L=287.0' S=0.0050 '/' Capacity=2.51 cfs Outflow=0.00 cfs 0.000 af

Reach DP-1: DP-1 Inflow=0.00 cfs 0.001 af
Outflow=0.00 cfs 0.001 af

Pond 1P: SUBSURFACE1 Peak Elev=151.72' Storage=0.015 af Inflow=1.04 cfs 0.081 af
Outflow=0.27 cfs 0.082 af

Pond 2P: SUBSURFACE2 Peak Elev=140.05' Storage=0.003 af Inflow=0.28 cfs 0.020 af
Outflow=0.10 cfs 0.020 af

Total Runoff Area = 2.598 ac Runoff Volume = 0.102 af Average Runoff Depth = 0.47"
79.54% Pervious = 2.067 ac 20.46% Impervious = 0.532 ac

Summary for Subcatchment 1S: OFFSITE NORWEST

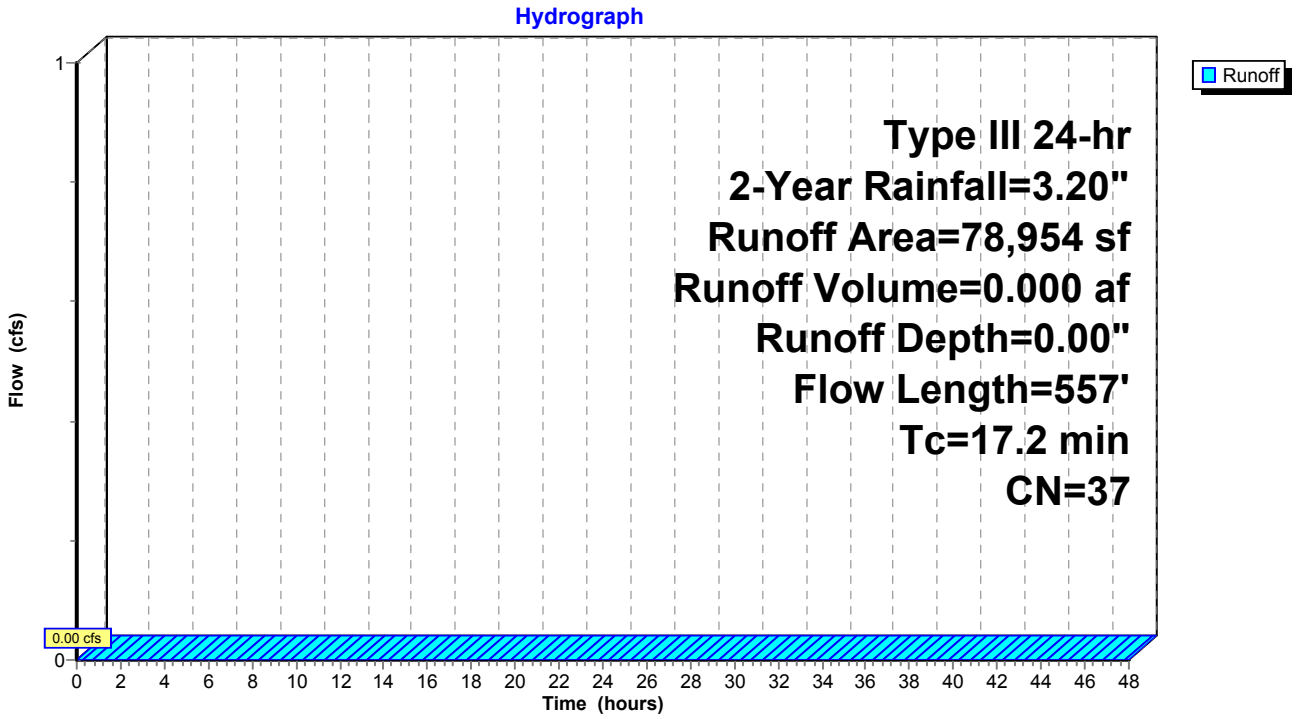
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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

	Area (sf)	CN	Description
*	61,141	30	Woods, Good, HSG A (offsite)
*	5,064	96	Gravel surface, HSG A (offsite)
*	8,886	39	>75% Grass cover, Good, HSG A (offsite)
*	1,919	98	Roofs, HSG A (offsite)
	1,944	39	>75% Grass cover, Good, HSG A
	78,954	37	Weighted Average
	77,035		97.57% Pervious Area
	1,919		2.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0150	0.06		**Sheet Flow, SHEET FLOW** Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	507	0.0236	2.47		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
17.2	557	Total			

Subcatchment 1S: OFFSITE NORWEST



Summary for Subcatchment 2S: SITE, YARD

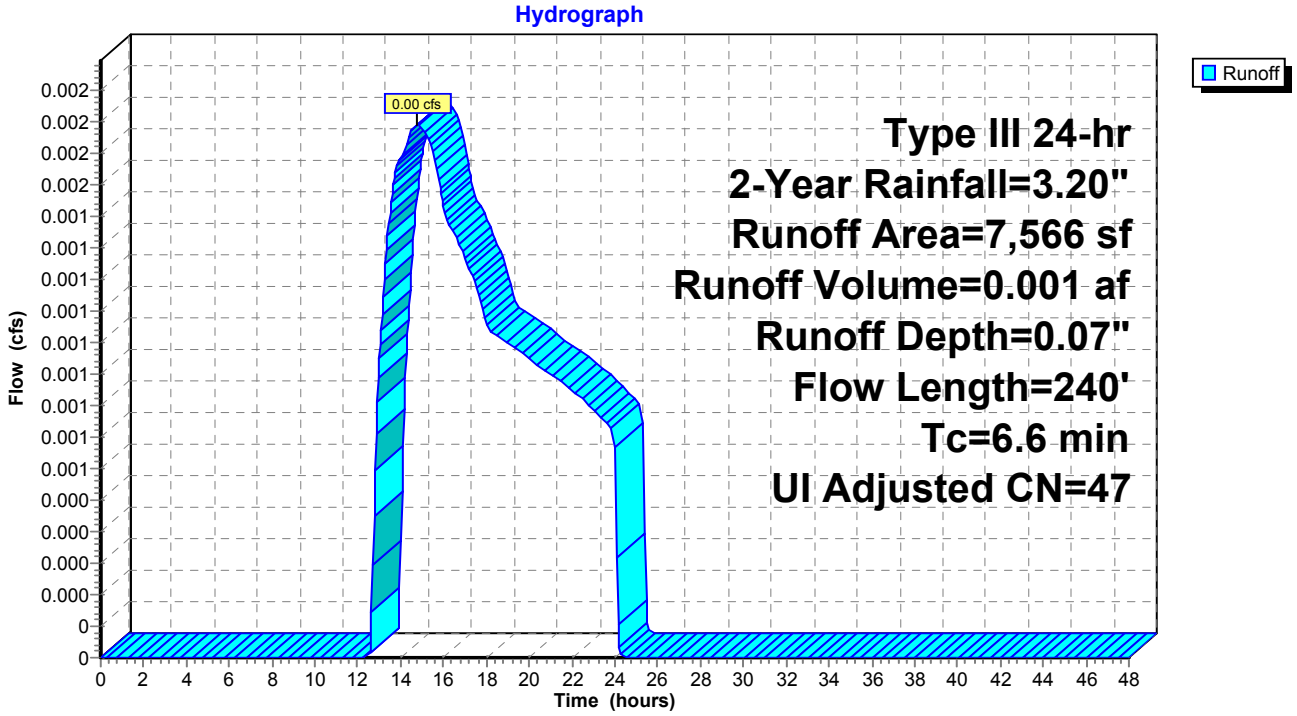
Runoff = 0.00 cfs @ 14.80 hrs, Volume= 0.001 af, Depth= 0.07"

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

	Area (sf)	CN	Adj	Description
	5,296	39		>75% Grass cover, Good, HSG A
*	1,770	64		Permeable pavers, HSG A
	500	98		Unconnected roofs, HSG A
	7,566	49	47	Weighted Average, UI Adjusted
	7,066			93.39% Pervious Area
	500			6.61% Impervious Area
	500			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, sheet** Grass: Short n= 0.150 P2= 3.20"
1.0	190	0.0370	3.10		**Shallow Concentrated Flow, conc.** Unpaved Kv= 16.1 fps
6.6	240	Total			

Subcatchment 2S: SITE, YARD



Summary for Subcatchment 3S: ROOF

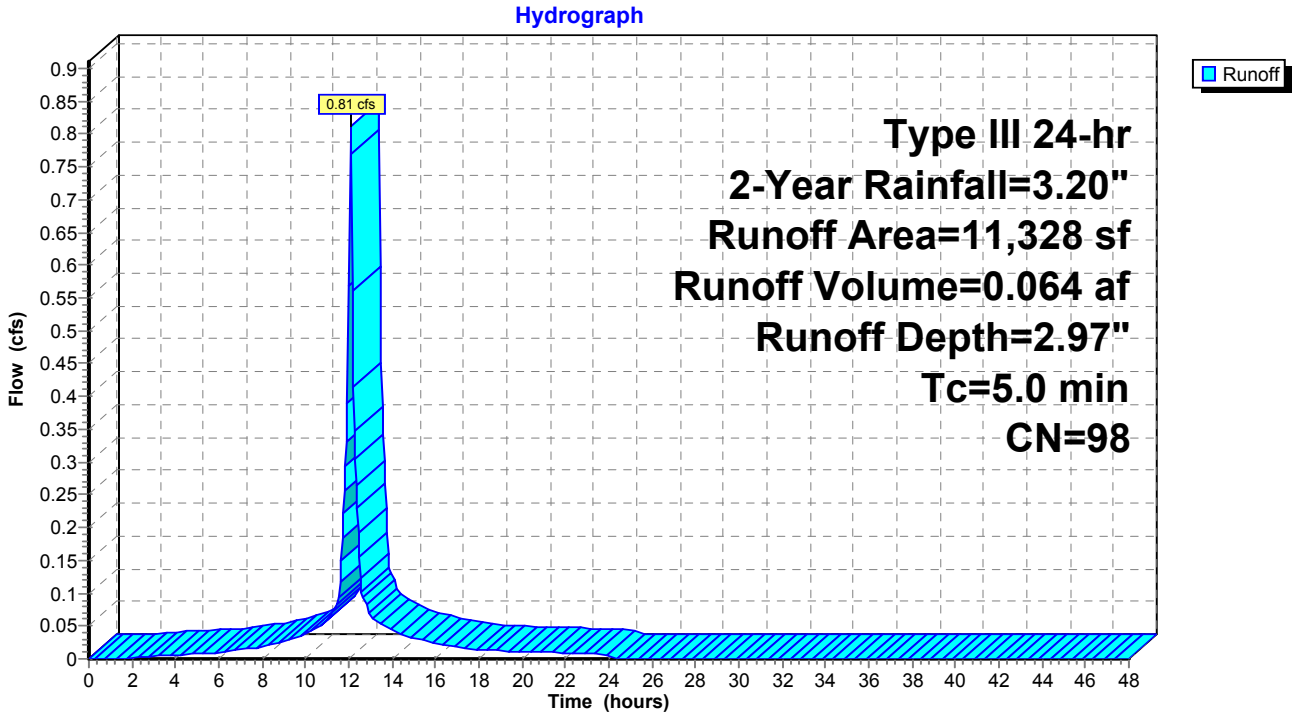
Runoff = 0.81 cfs @ 12.07 hrs, Volume= 0.064 af, Depth= 2.97"

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

Area (sf)	CN	Description
11,328	98	Unconnected roofs, HSG A
11,328		100.00% Impervious Area
11,328		100.00% Unconnected

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

Subcatchment 3S: ROOF



Summary for Subcatchment 4S: ENTRANCE

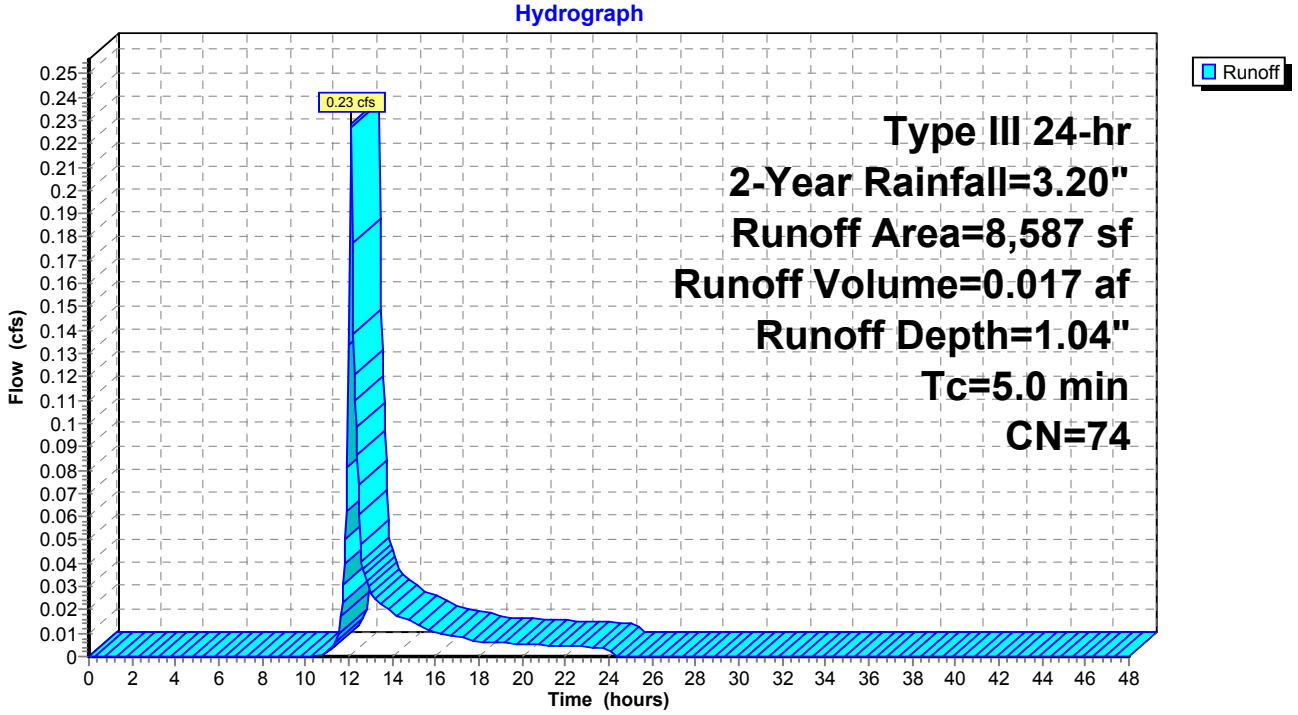
Runoff = 0.23 cfs @ 12.09 hrs, Volume= 0.017 af, Depth= 1.04"

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

Area (sf)	CN	Description
3,548	39	>75% Grass cover, Good, HSG A
5,039	98	Paved parking, HSG A
8,587	74	Weighted Average
3,548		41.32% Pervious Area
5,039		58.68% Impervious Area

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

Subcatchment 4S: ENTRANCE



Summary for Subcatchment 5S: ENTRYWAY, SITE

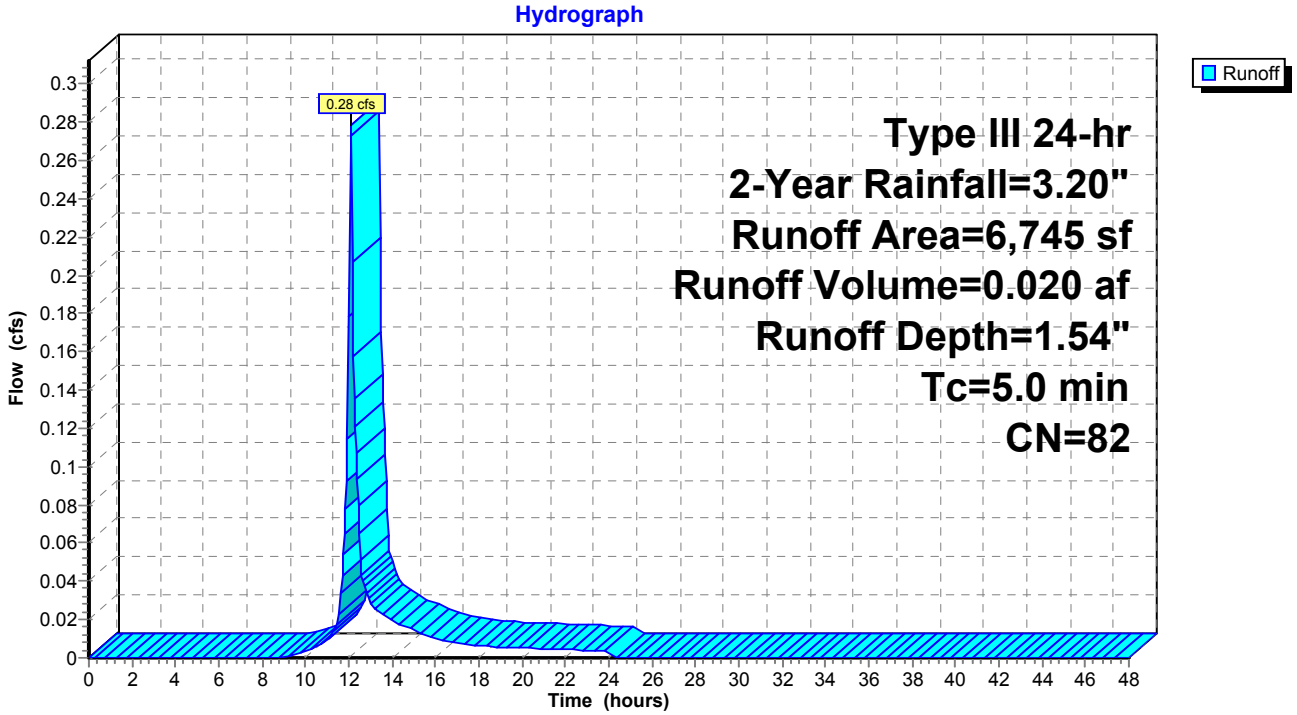
Runoff = 0.28 cfs @ 12.08 hrs, Volume= 0.020 af, Depth= 1.54"

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

	Area (sf)	CN	Description
*	1,209	65	Permeable pavers, HSG A
	4,065	98	Paved parking, HSG A
	1,160	39	>75% Grass cover, Good, HSG A
	311	98	Unconnected pavement, HSG A
	6,745	82	Weighted Average
	2,369		35.12% Pervious Area
	4,376		64.88% Impervious Area
	311		7.11% Unconnected

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

Subcatchment 5S: ENTRYWAY, SITE



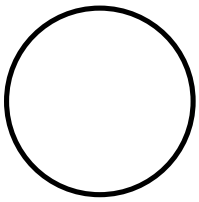
Summary for Reach 1R: 12" PIPE

Inflow Area = 1.813 ac, 2.43% 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

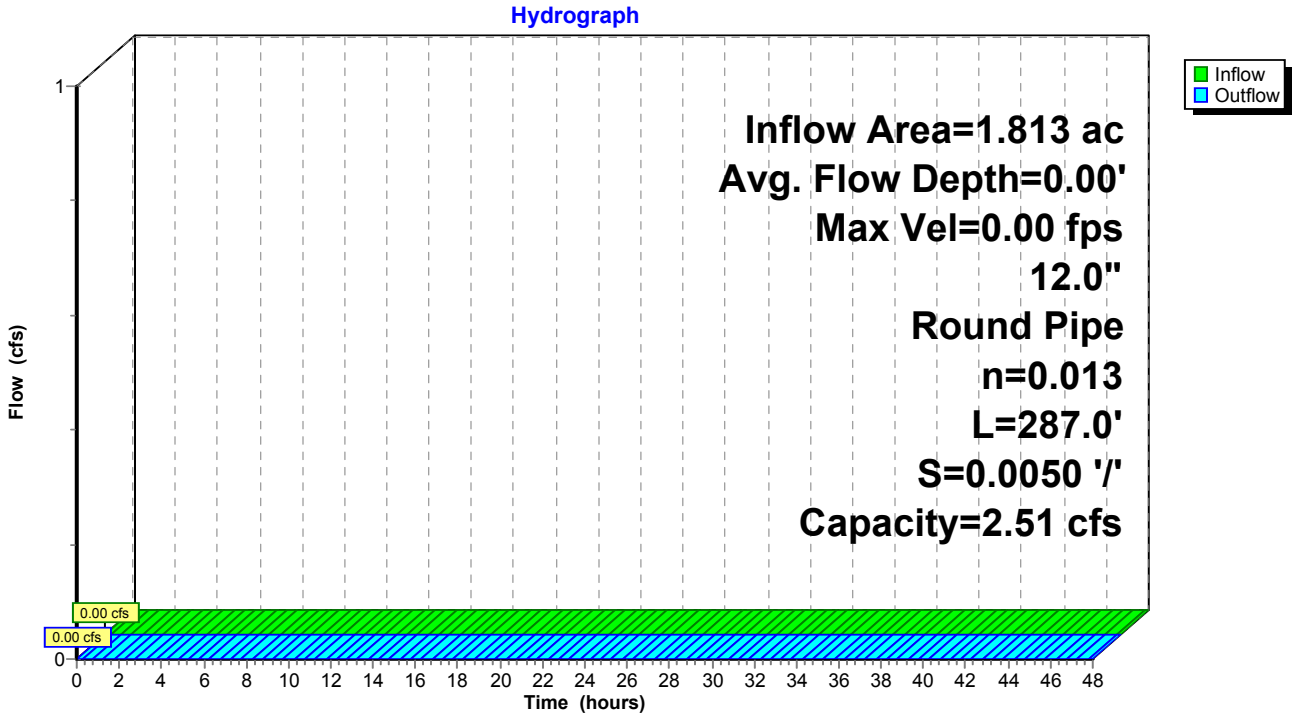
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.51 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 287.0' Slope= 0.0050 '/'
Inlet Invert= 147.80', Outlet Invert= 146.37'



Reach 1R: 12" PIPE

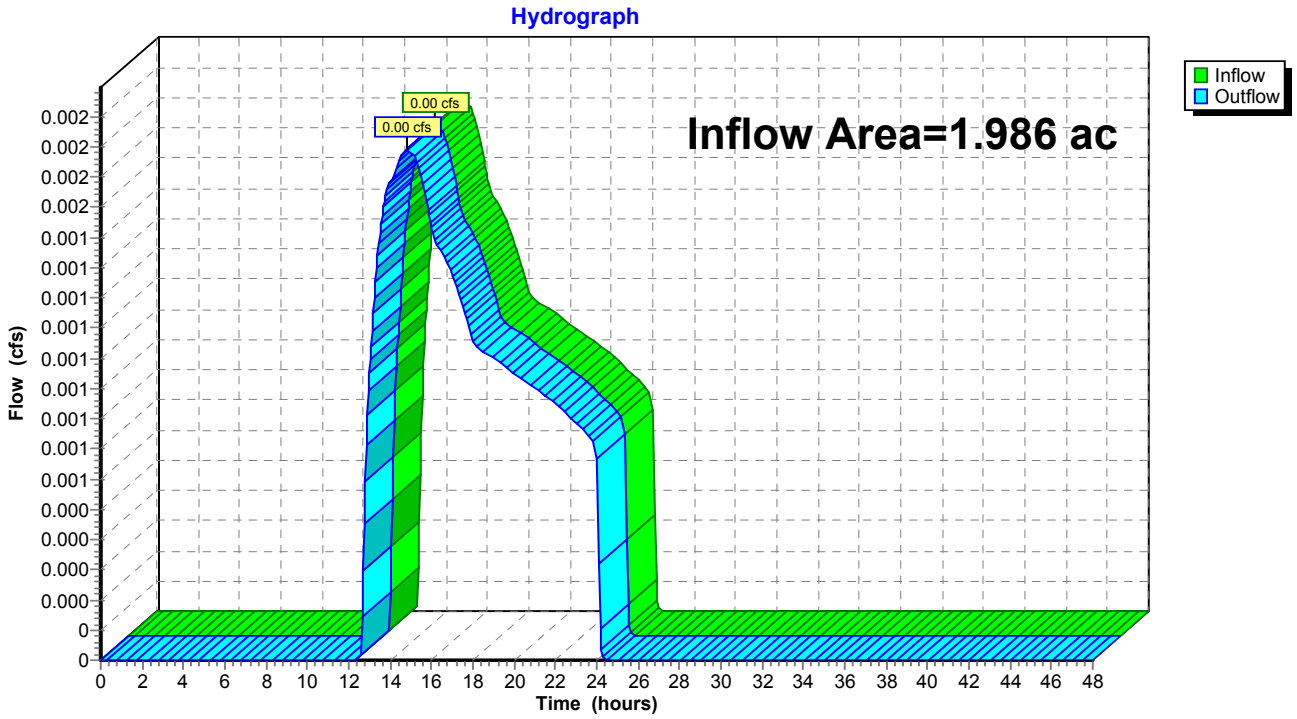


Summary for Reach DP-1: DP-1

Inflow Area = 1.986 ac, 2.80% Impervious, Inflow Depth = 0.01" for 2-Year event
Inflow = 0.00 cfs @ 14.80 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 14.80 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: DP-1



Summary for Pond 1P: SUBSURFACE 1

Inflow Area = 0.457 ac, 82.18% Impervious, Inflow Depth = 2.14" for 2-Year event
Inflow = 1.04 cfs @ 12.07 hrs, Volume= 0.081 af
Outflow = 0.27 cfs @ 11.90 hrs, Volume= 0.082 af, Atten= 74%, Lag= 0.0 min
Discarded = 0.27 cfs @ 11.90 hrs, Volume= 0.082 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 151.72' @ 12.45 hrs Surf.Area= 0.032 ac Storage= 0.015 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 11.6 min (789.2 - 777.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	150.90'	0.027 af	**20.83'W x 66.50'L x 3.54'H Field A** 0.113 af Overall - 0.044 af Embedded = 0.069 af x 40.0% Voids
#2A	151.40'	0.044 af	**Cultec R-330XLHD** x 36 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.072 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	150.90'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.27 cfs @ 11.90 hrs HW=150.96' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Pond 1P: SUBSURFACE 1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

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

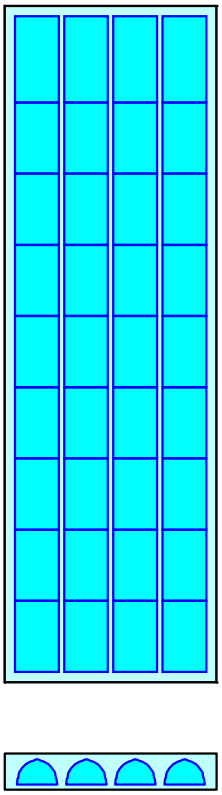
9 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 64.50' Row Length +12.0" End Stone x 2 = 66.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

36 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,922.4 cf Chamber Storage

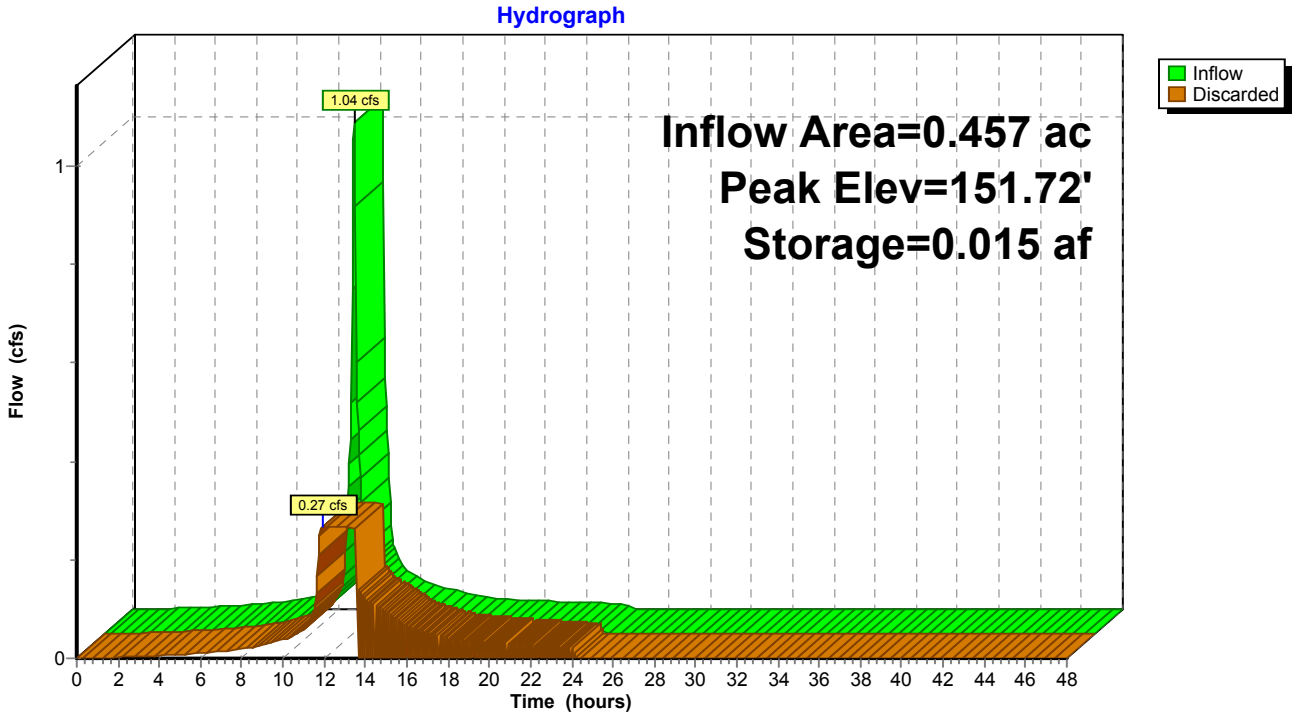
4,906.7 cf Field - 1,922.4 cf Chambers = 2,984.3 cf Stone x 40.0% Voids = 1,193.7 cf Stone Storage

Chamber Storage + Stone Storage = 3,116.1 cf = 0.072 af
Overall Storage Efficiency = 63.5%
Overall System Size = 66.50' x 20.83' x 3.54'

36 Chambers
181.7 cy Field
110.5 cy Stone



Pond 1P: SUBSURFACE 1



Summary for Pond 2P: SUBSURFACE 2

Inflow Area = 0.155 ac, 64.88% Impervious, Inflow Depth = 1.54" for 2-Year event
Inflow = 0.28 cfs @ 12.08 hrs, Volume= 0.020 af
Outflow = 0.10 cfs @ 12.00 hrs, Volume= 0.020 af, Atten= 65%, Lag= 0.0 min
Discarded = 0.10 cfs @ 12.00 hrs, Volume= 0.020 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 140.05' @ 12.39 hrs Surf.Area= 0.012 ac Storage= 0.003 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 6.0 min (841.3 - 835.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	139.50'	0.011 af	**11.17'W x 45.50'L x 3.54'H Field A** 0.041 af Overall - 0.015 af Embedded = 0.026 af x 40.0% Voids
#2A	140.00'	0.015 af	**Cultec R-330XLHD** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		0.025 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	139.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.10 cfs @ 12.00 hrs HW=139.55' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Pond 2P: SUBSURFACE 2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

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

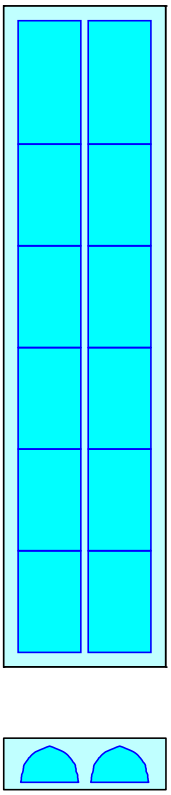
6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

12 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 648.2 cf Chamber Storage

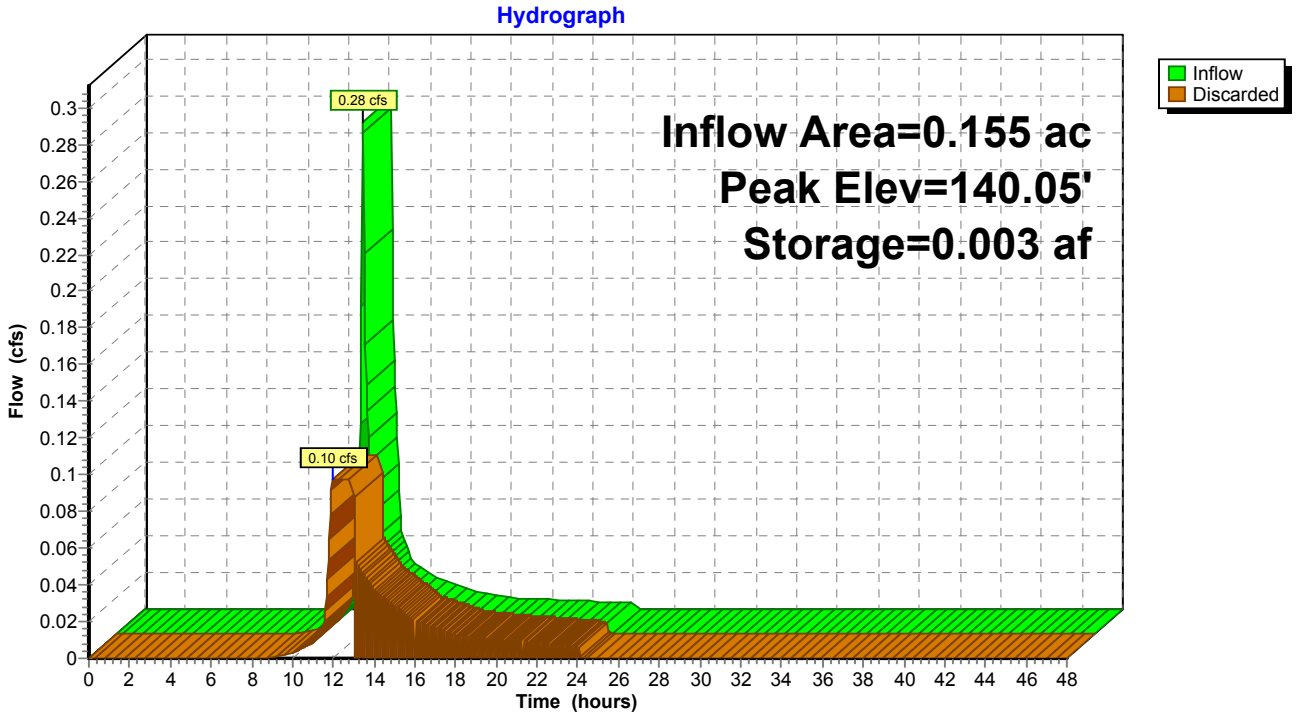
1,799.5 cf Field - 648.2 cf Chambers = 1,151.2 cf Stone x 40.0% Voids = 460.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,108.7 cf = 0.025 af
Overall Storage Efficiency = 61.6%
Overall System Size = 45.50' x 11.17' x 3.54'

12 Chambers
66.6 cy Field
42.6 cy Stone



Pond 2P: SUBSURFACE 2



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

Subcatchment1S: OFFSITE NORWEST Runoff Area=78,954 sf 2.43% Impervious Runoff Depth=0.09"
Flow Length=557' Tc=17.2 min CN=37 Runoff=0.02 cfs 0.014 af

Subcatchment2S: SITE, YARD Runoff Area=7,566 sf 6.61% Impervious Runoff Depth=0.44"
Flow Length=240' Tc=6.6 min UI Adjusted CN=47 Runoff=0.03 cfs 0.006 af

Subcatchment3S: ROOF Runoff Area=11,328 sf 100.00% Impervious Runoff Depth=4.46"
Tc=5.0 min CN=98 Runoff=1.20 cfs 0.097 af

Subcatchment4S: ENTRANCE Runoff Area=8,587 sf 58.68% Impervious Runoff Depth=2.13"
Tc=5.0 min CN=74 Runoff=0.49 cfs 0.035 af

Subcatchment5S: ENTRYWAY, SITE Runoff Area=6,745 sf 64.88% Impervious Runoff Depth=2.81"
Tc=5.0 min CN=82 Runoff=0.51 cfs 0.036 af

Reach 1R: 12" PIPE Avg. Flow Depth=0.07' Max Vel=0.99 fps Inflow=0.02 cfs 0.014 af
12.0" Round Pipe n=0.013 L=287.0' S=0.0050 '/' Capacity=2.51 cfs Outflow=0.02 cfs 0.014 af

Reach DP-1: DP-1 Inflow=0.03 cfs 0.020 af
Outflow=0.03 cfs 0.020 af

Pond 1P: SUBSURFACE1 Peak Elev=152.50' Storage=0.035 af Inflow=1.69 cfs 0.132 af
Outflow=0.27 cfs 0.132 af

Pond 2P: SUBSURFACE2 Peak Elev=140.76' Storage=0.009 af Inflow=0.51 cfs 0.036 af
Outflow=0.10 cfs 0.036 af

Total Runoff Area = 2.598 ac Runoff Volume = 0.188 af Average Runoff Depth = 0.87"
79.54% Pervious = 2.067 ac 20.46% Impervious = 0.532 ac

Summary for Subcatchment 1S: OFFSITE NORWEST

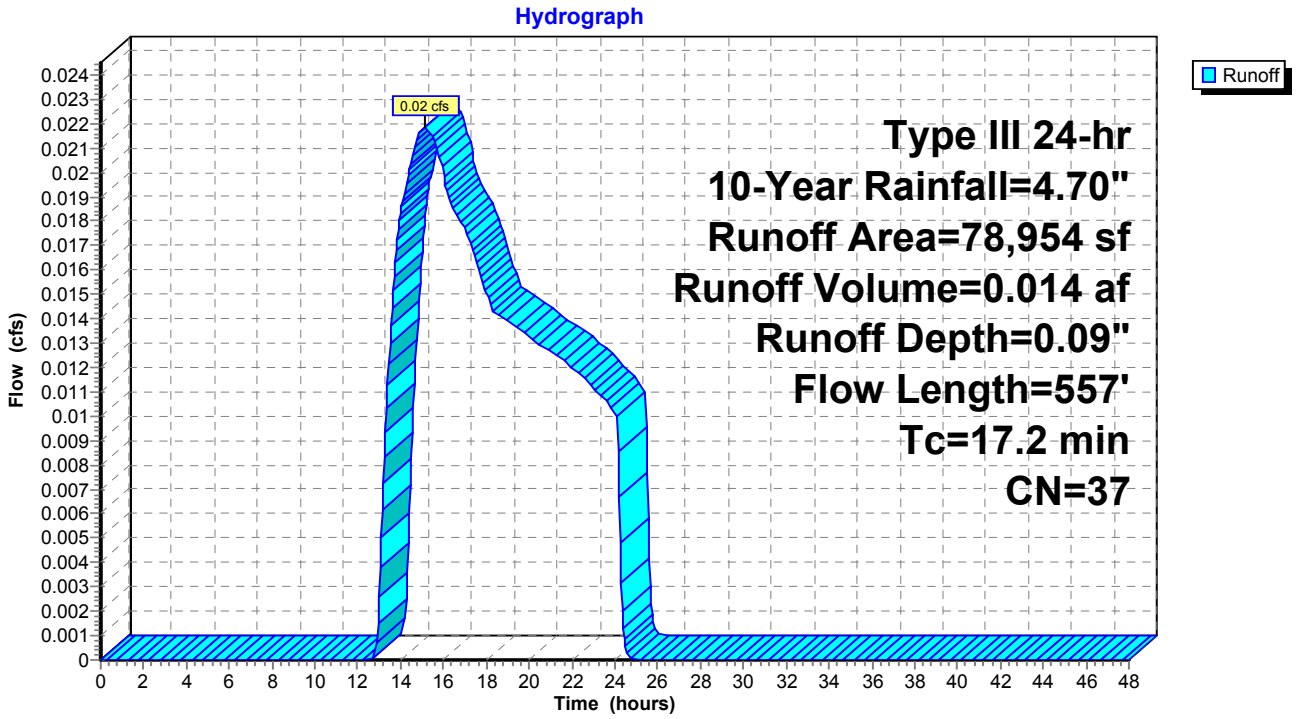
Runoff = 0.02 cfs @ 15.13 hrs, Volume= 0.014 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	61,141	30	Woods, Good, HSG A (offsite)
*	5,064	96	Gravel surface, HSG A (offsite)
*	8,886	39	>75% Grass cover, Good, HSG A (offsite)
*	1,919	98	Roofs, HSG A (offsite)
	1,944	39	>75% Grass cover, Good, HSG A
	78,954	37	Weighted Average
	77,035		97.57% Pervious Area
	1,919		2.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0150	0.06		**Sheet Flow, SHEET FLOW** Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	507	0.0236	2.47		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
17.2	557	Total			

Subcatchment 1S: OFFSITE NORWEST



Summary for Subcatchment 2S: SITE, YARD

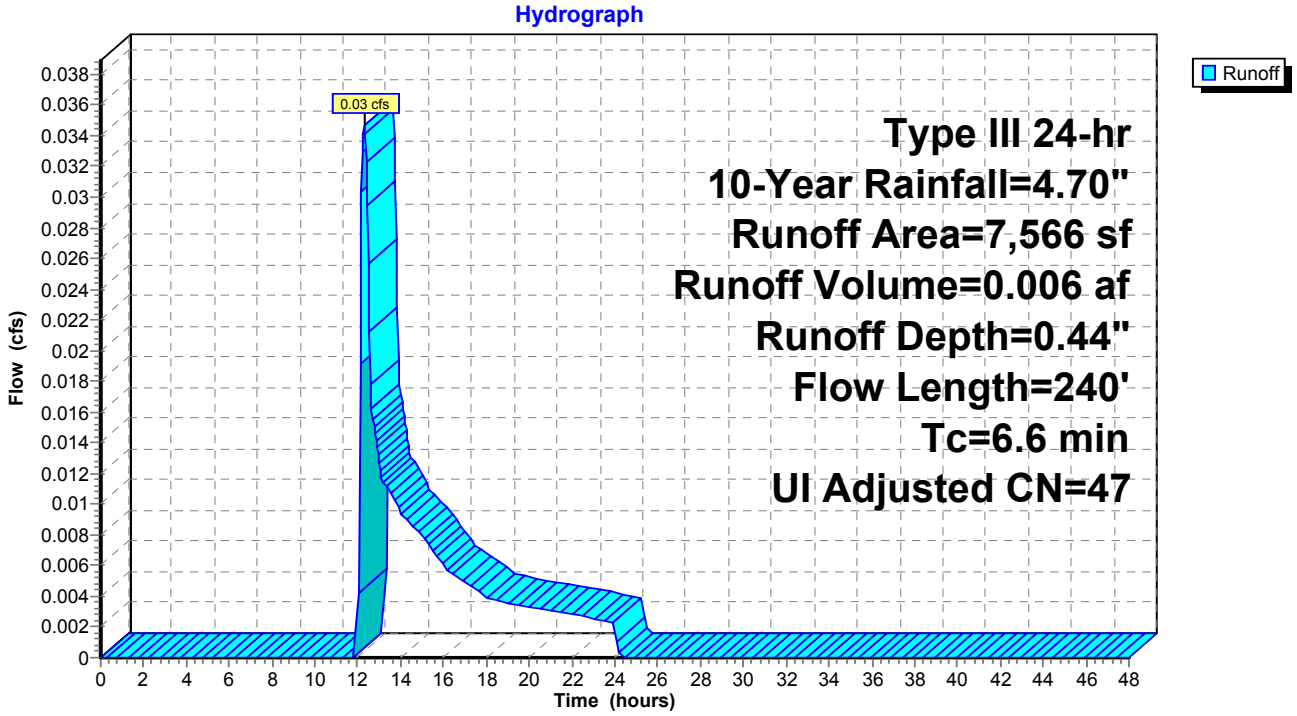
Runoff = 0.03 cfs @ 12.30 hrs, Volume= 0.006 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Adj	Description
	5,296	39		>75% Grass cover, Good, HSG A
*	1,770	64		Permeable pavers, HSG A
	500	98		Unconnected roofs, HSG A
	7,566	49	47	Weighted Average, UI Adjusted
	7,066			93.39% Pervious Area
	500			6.61% Impervious Area
	500			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, sheet** Grass: Short n= 0.150 P2= 3.20"
1.0	190	0.0370	3.10		**Shallow Concentrated Flow, conc.** Unpaved Kv= 16.1 fps
6.6	240	Total			

Subcatchment 2S: SITE, YARD



Summary for Subcatchment 3S: ROOF

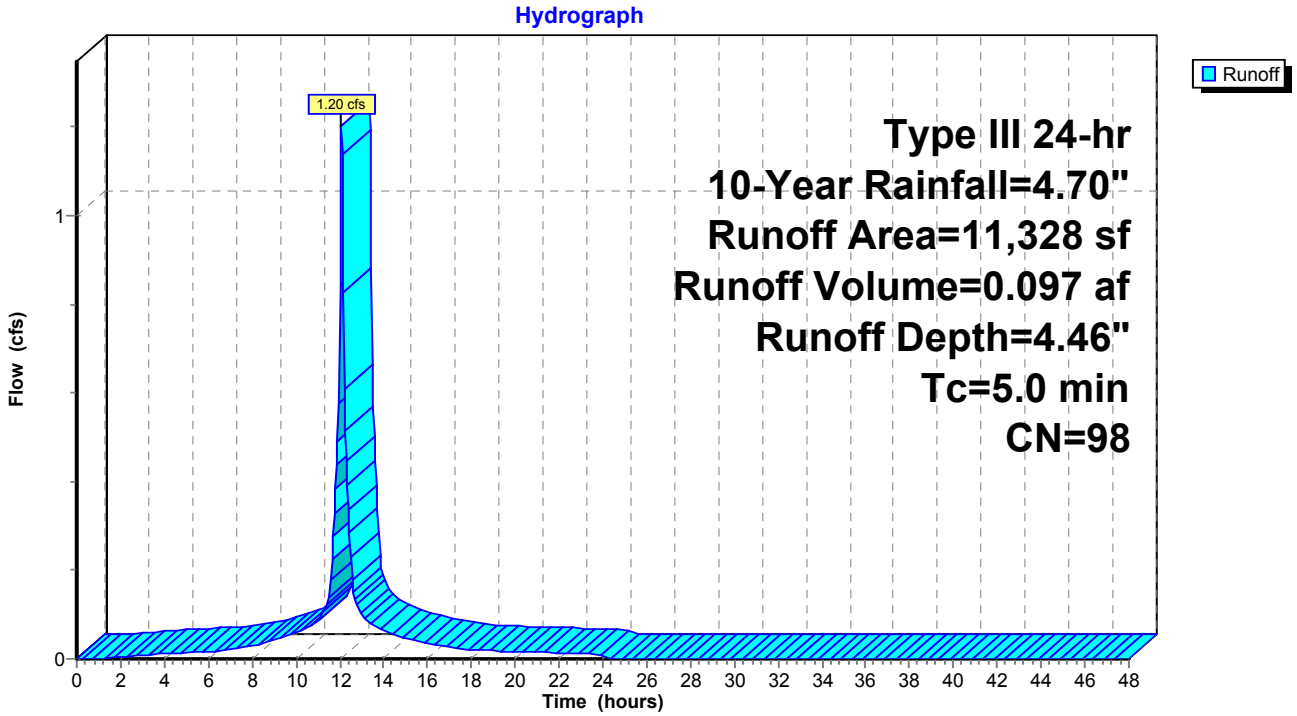
Runoff = 1.20 cfs @ 12.07 hrs, Volume= 0.097 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
11,328	98	Unconnected roofs, HSG A
11,328		100.00% Impervious Area
11,328		100.00% Unconnected

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

Subcatchment 3S: ROOF



Summary for Subcatchment 4S: ENTRANCE

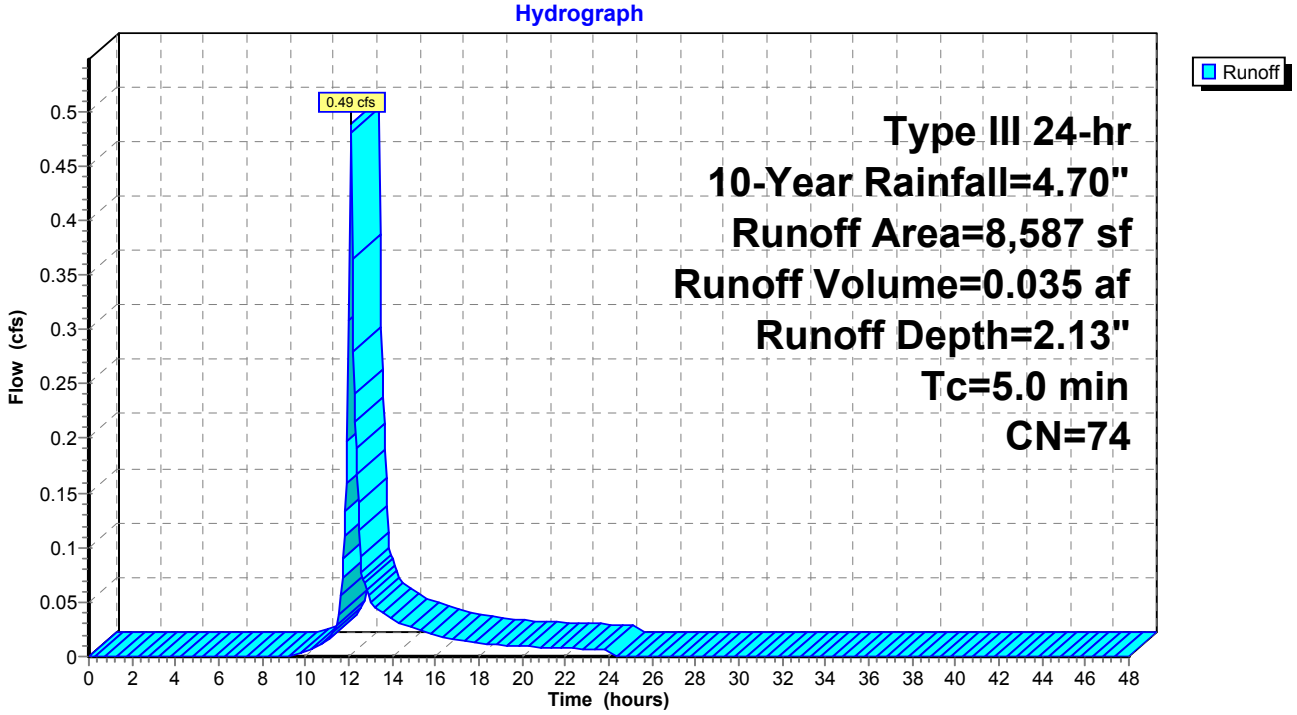
Runoff = 0.49 cfs @ 12.08 hrs, Volume= 0.035 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
3,548	39	>75% Grass cover, Good, HSG A
5,039	98	Paved parking, HSG A
8,587	74	Weighted Average
3,548		41.32% Pervious Area
5,039		58.68% Impervious Area

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

Subcatchment 4S: ENTRANCE



Summary for Subcatchment 5S: ENTRYWAY, SITE

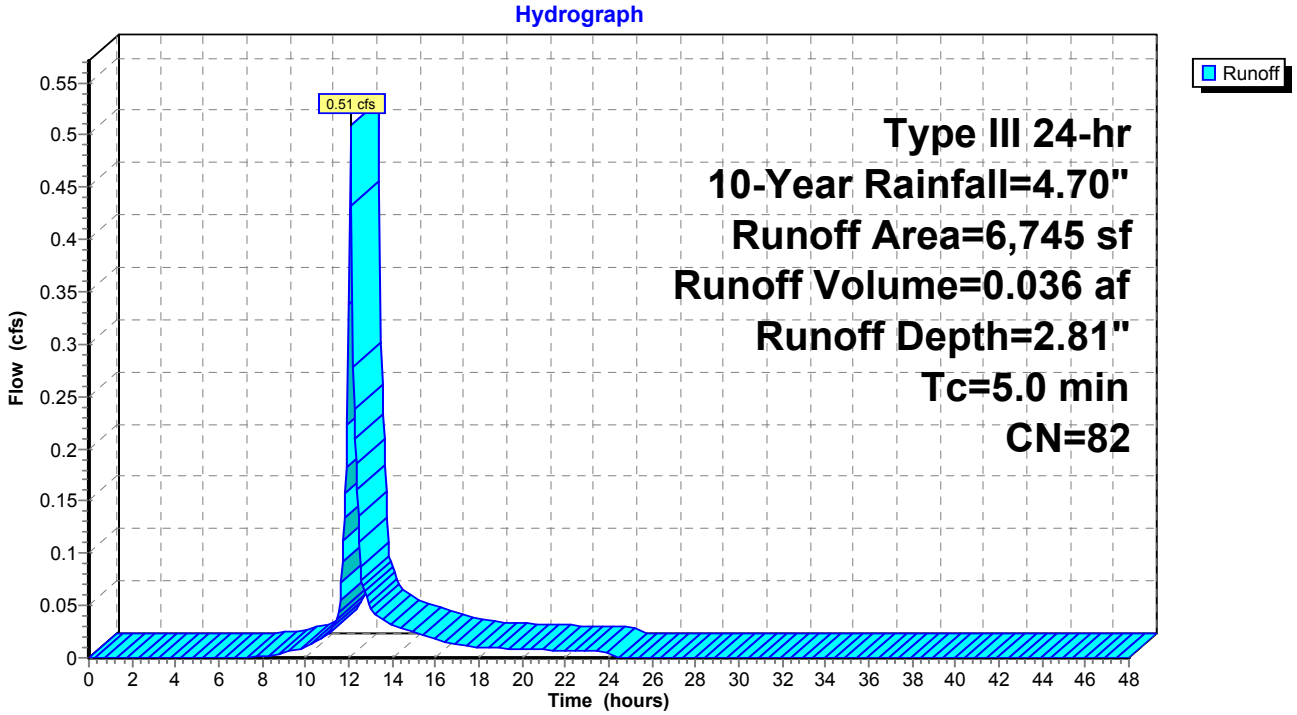
Runoff = 0.51 cfs @ 12.08 hrs, Volume= 0.036 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	1,209	65	Permeable pavers, HSG A
	4,065	98	Paved parking, HSG A
	1,160	39	>75% Grass cover, Good, HSG A
	311	98	Unconnected pavement, HSG A
	6,745	82	Weighted Average
	2,369		35.12% Pervious Area
	4,376		64.88% Impervious Area
	311		7.11% Unconnected

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

Subcatchment 5S: ENTRYWAY, SITE



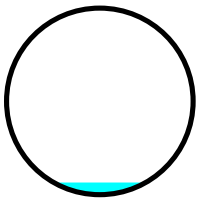
Summary for Reach 1R: 12" PIPE

Inflow Area = 1.813 ac, 2.43% Impervious, Inflow Depth = 0.09" for 10-Year event
Inflow = 0.02 cfs @ 15.13 hrs, Volume= 0.014 af
Outflow = 0.02 cfs @ 15.20 hrs, Volume= 0.014 af, Atten= 0%, Lag= 4.2 min

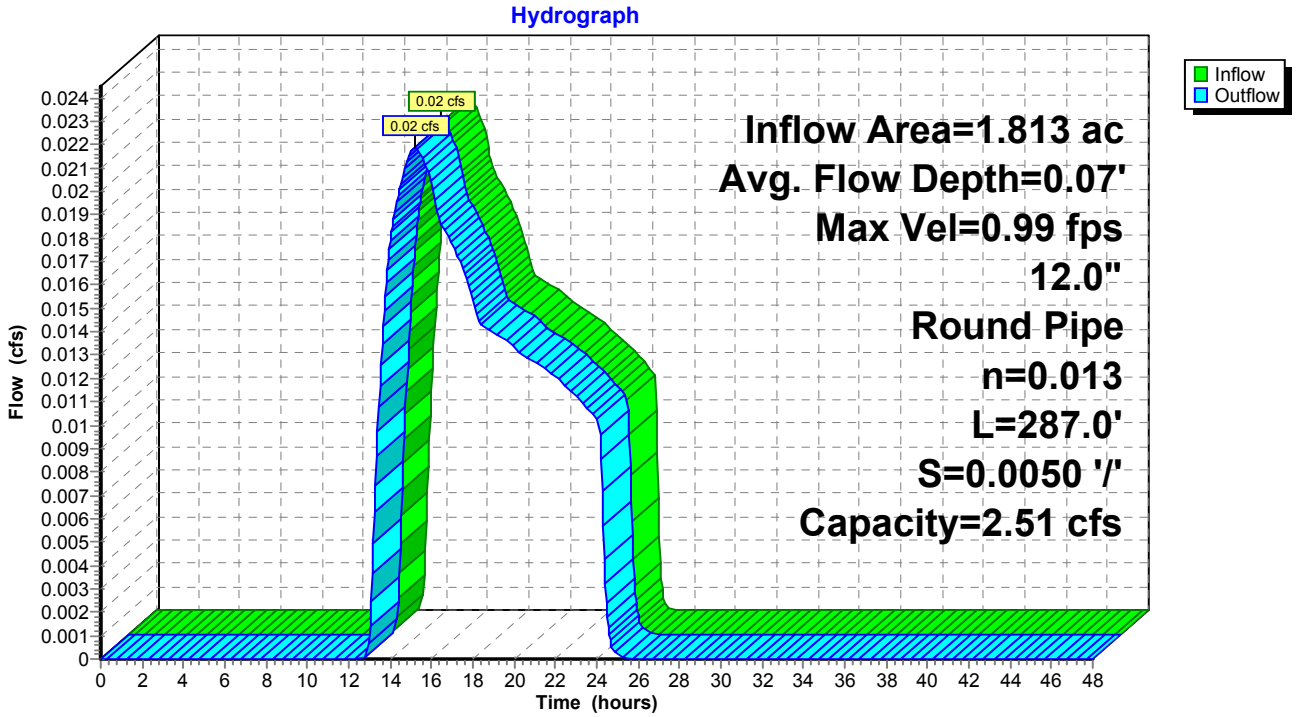
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.99 fps, Min. Travel Time= 4.8 min
Avg. Velocity = 0.81 fps, Avg. Travel Time= 5.9 min

Peak Storage= 6 cf @ 15.20 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.51 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 287.0' Slope= 0.0050 '/'
Inlet Invert= 147.80', Outlet Invert= 146.37'



Reach 1R: 12" PIPE

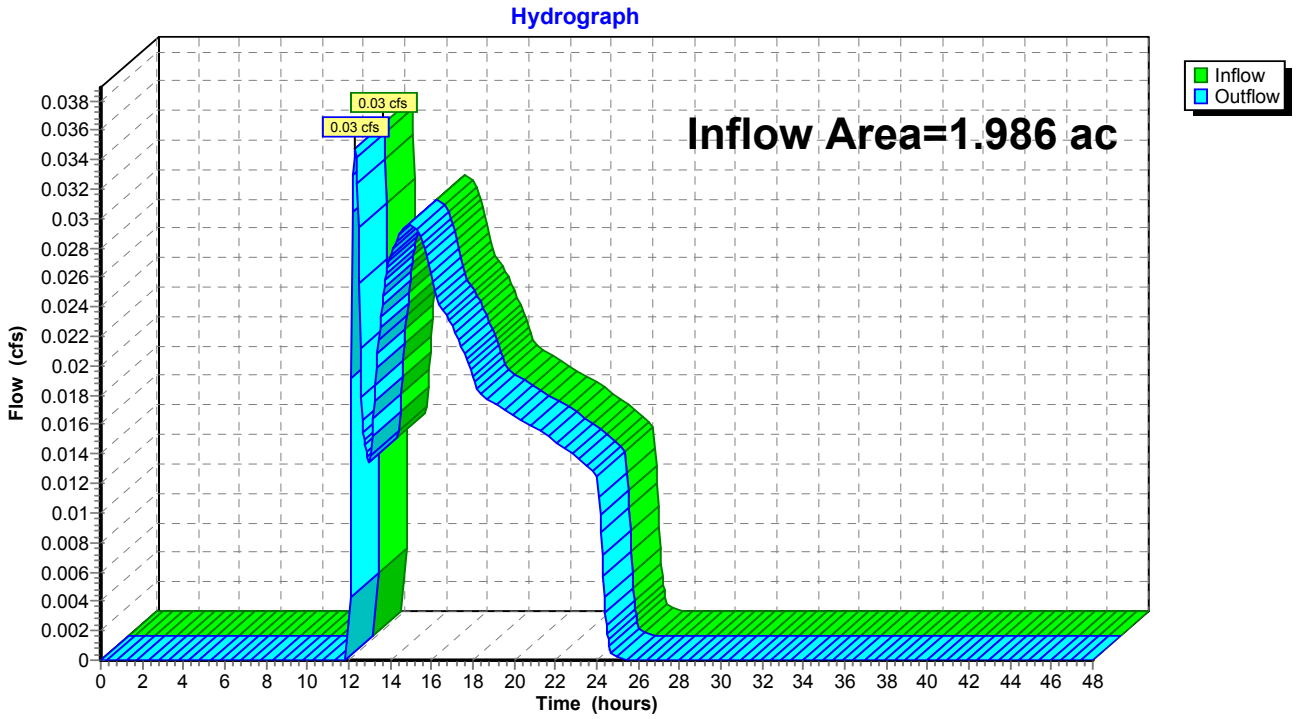


Summary for Reach DP-1: DP-1

Inflow Area = 1.986 ac, 2.80% Impervious, Inflow Depth = 0.12" for 10-Year event
Inflow = 0.03 cfs @ 12.30 hrs, Volume= 0.020 af
Outflow = 0.03 cfs @ 12.30 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: DP-1



Summary for Pond 1P: SUBSURFACE 1

Inflow Area = 0.457 ac, 82.18% Impervious, Inflow Depth = 3.46" for 10-Year event
Inflow = 1.69 cfs @ 12.07 hrs, Volume= 0.132 af
Outflow = 0.27 cfs @ 11.75 hrs, Volume= 0.132 af, Atten= 84%, Lag= 0.0 min
Discarded = 0.27 cfs @ 11.75 hrs, Volume= 0.132 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 152.50' @ 12.56 hrs Surf.Area= 0.032 ac Storage= 0.035 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 33.4 min (805.8 - 772.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	150.90'	0.027 af	**20.83'W x 66.50'L x 3.54'H Field A** 0.113 af Overall - 0.044 af Embedded = 0.069 af x 40.0% Voids
#2A	151.40'	0.044 af	**Cultec R-330XLHD** x 36 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.072 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	150.90'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.27 cfs @ 11.75 hrs HW=150.96' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Pond 1P: SUBSURFACE 1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

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

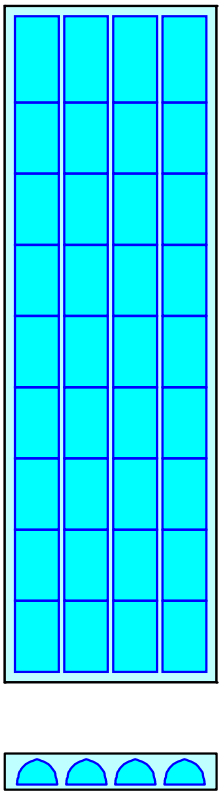
9 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 64.50' Row Length +12.0" End Stone x 2 = 66.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

36 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,922.4 cf Chamber Storage

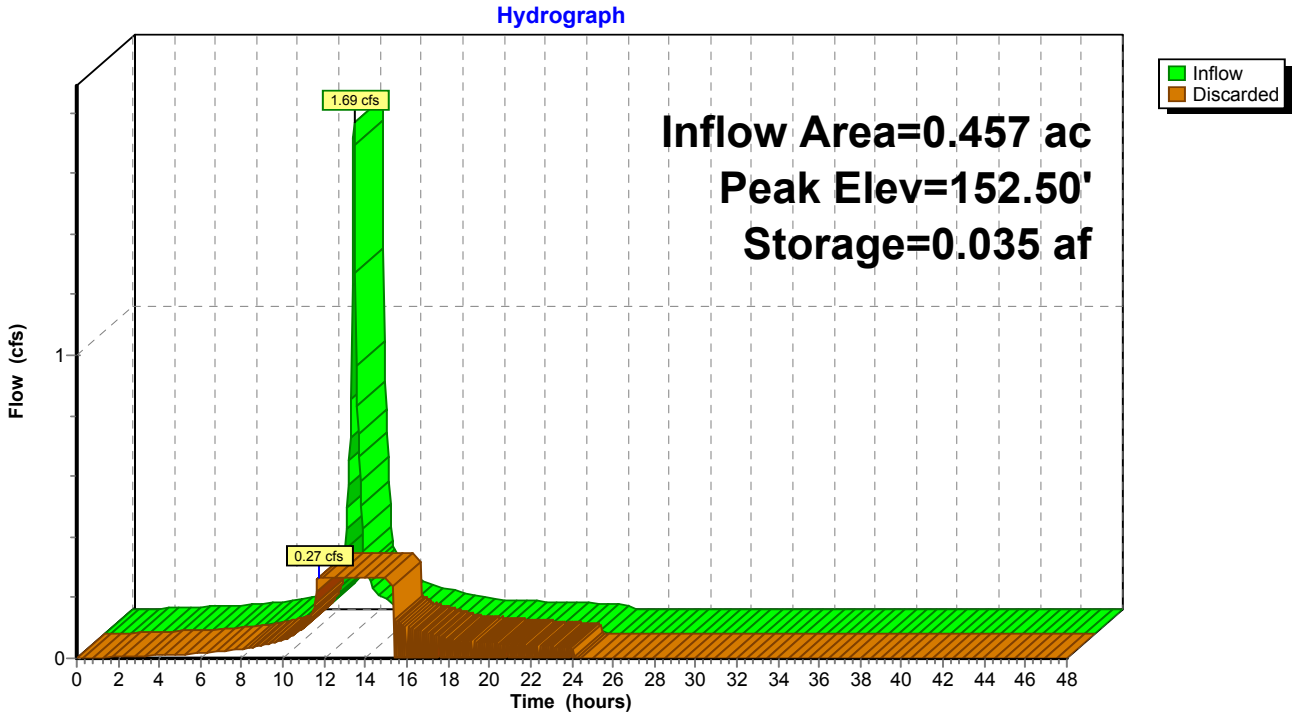
4,906.7 cf Field - 1,922.4 cf Chambers = 2,984.3 cf Stone x 40.0% Voids = 1,193.7 cf Stone Storage

Chamber Storage + Stone Storage = 3,116.1 cf = 0.072 af
Overall Storage Efficiency = 63.5%
Overall System Size = 66.50' x 20.83' x 3.54'

36 Chambers
181.7 cy Field
110.5 cy Stone



Pond 1P: SUBSURFACE 1



Summary for Pond 2P: SUBSURFACE 2

Inflow Area = 0.155 ac, 64.88% Impervious, Inflow Depth = 2.81" for 10-Year event
Inflow = 0.51 cfs @ 12.08 hrs, Volume= 0.036 af
Outflow = 0.10 cfs @ 11.85 hrs, Volume= 0.036 af, Atten= 81%, Lag= 0.0 min
Discarded = 0.10 cfs @ 11.85 hrs, Volume= 0.036 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 140.76' @ 12.53 hrs Surf.Area= 0.012 ac Storage= 0.009 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 24.7 min (842.7 - 817.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	139.50'	0.011 af	**11.17'W x 45.50'L x 3.54'H Field A** 0.041 af Overall - 0.015 af Embedded = 0.026 af x 40.0% Voids
#2A	140.00'	0.015 af	**Cultec R-330XLHD** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		0.025 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	139.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.10 cfs @ 11.85 hrs HW=139.57' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Pond 2P: SUBSURFACE 2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

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

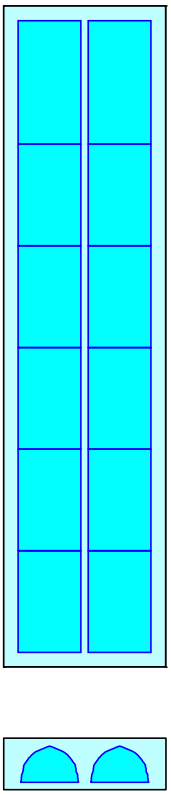
6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

12 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 648.2 cf Chamber Storage

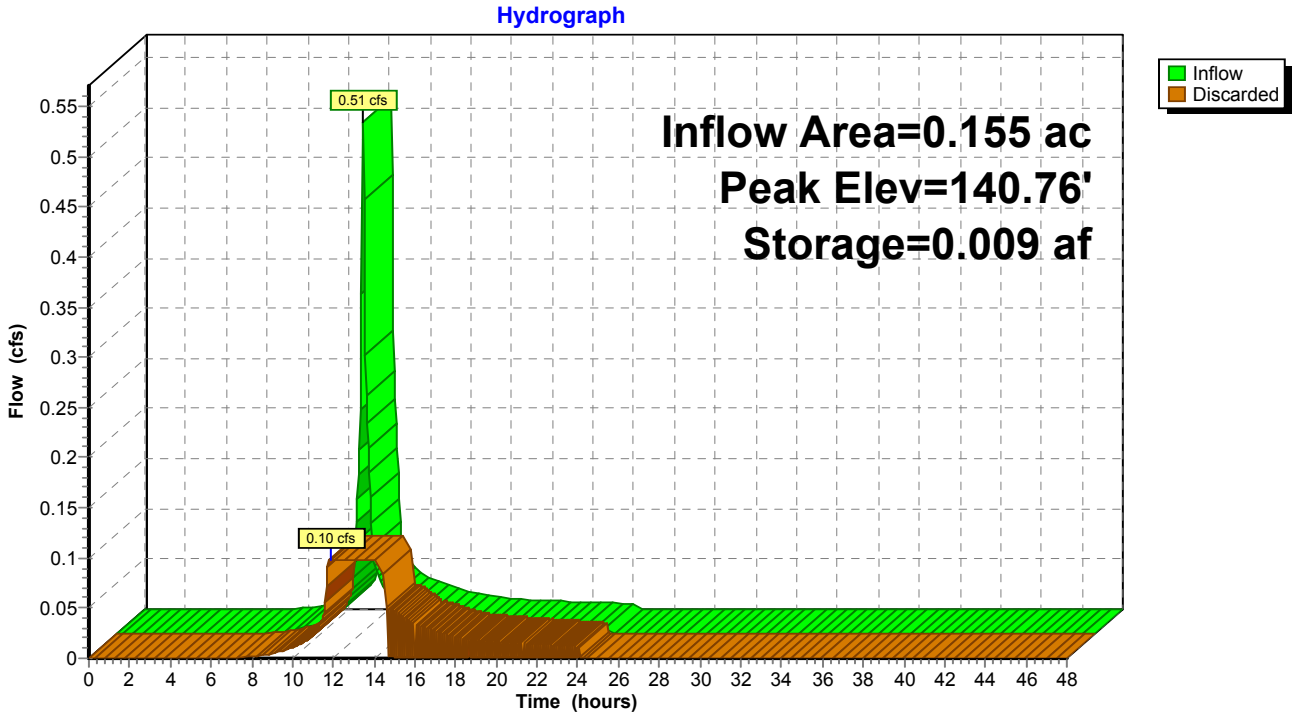
1,799.5 cf Field - 648.2 cf Chambers = 1,151.2 cf Stone x 40.0% Voids = 460.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,108.7 cf = 0.025 af
Overall Storage Efficiency = 61.6%
Overall System Size = 45.50' x 11.17' x 3.54'

12 Chambers
66.6 cy Field
42.6 cy Stone



Pond 2P: SUBSURFACE 2



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

Subcatchment1S: OFFSITE NORWEST Runoff Area=78,954 sf 2.43% Impervious Runoff Depth=0.23"
Flow Length=557' Tc=17.2 min CN=37 Runoff=0.07 cfs 0.035 af

Subcatchment2S: SITE, YARD Runoff Area=7,566 sf 6.61% Impervious Runoff Depth=0.73"
Flow Length=240' Tc=6.6 min UI Adjusted CN=47 Runoff=0.08 cfs 0.010 af

Subcatchment3S: ROOF Runoff Area=11,328 sf 100.00% Impervious Runoff Depth=5.26"
Tc=5.0 min CN=98 Runoff=1.41 cfs 0.114 af

Subcatchment4S: ENTRANCE Runoff Area=8,587 sf 58.68% Impervious Runoff Depth=2.77"
Tc=5.0 min CN=74 Runoff=0.64 cfs 0.045 af

Subcatchment5S: ENTRYWAY, SITE Runoff Area=6,745 sf 64.88% Impervious Runoff Depth=3.53"
Tc=5.0 min CN=82 Runoff=0.64 cfs 0.046 af

Reach 1R: 12" PIPE Avg. Flow Depth=0.11' Max Vel=1.39 fps Inflow=0.07 cfs 0.035 af
12.0" Round Pipe n=0.013 L=287.0' S=0.0050 '/' Capacity=2.51 cfs Outflow=0.07 cfs 0.035 af

Reach DP-1: DP-1 Inflow=0.09 cfs 0.045 af
Outflow=0.09 cfs 0.045 af

Pond 1P: SUBSURFACE1 Peak Elev=152.99' Storage=0.047 af Inflow=2.05 cfs 0.160 af
Outflow=0.27 cfs 0.160 af

Pond 2P: SUBSURFACE2 Peak Elev=141.21' Storage=0.013 af Inflow=0.64 cfs 0.046 af
Outflow=0.10 cfs 0.046 af

Total Runoff Area = 2.598 ac Runoff Volume = 0.250 af Average Runoff Depth = 1.16"
79.54% Pervious = 2.067 ac 20.46% Impervious = 0.532 ac

Summary for Subcatchment 1S: OFFSITE NORWEST

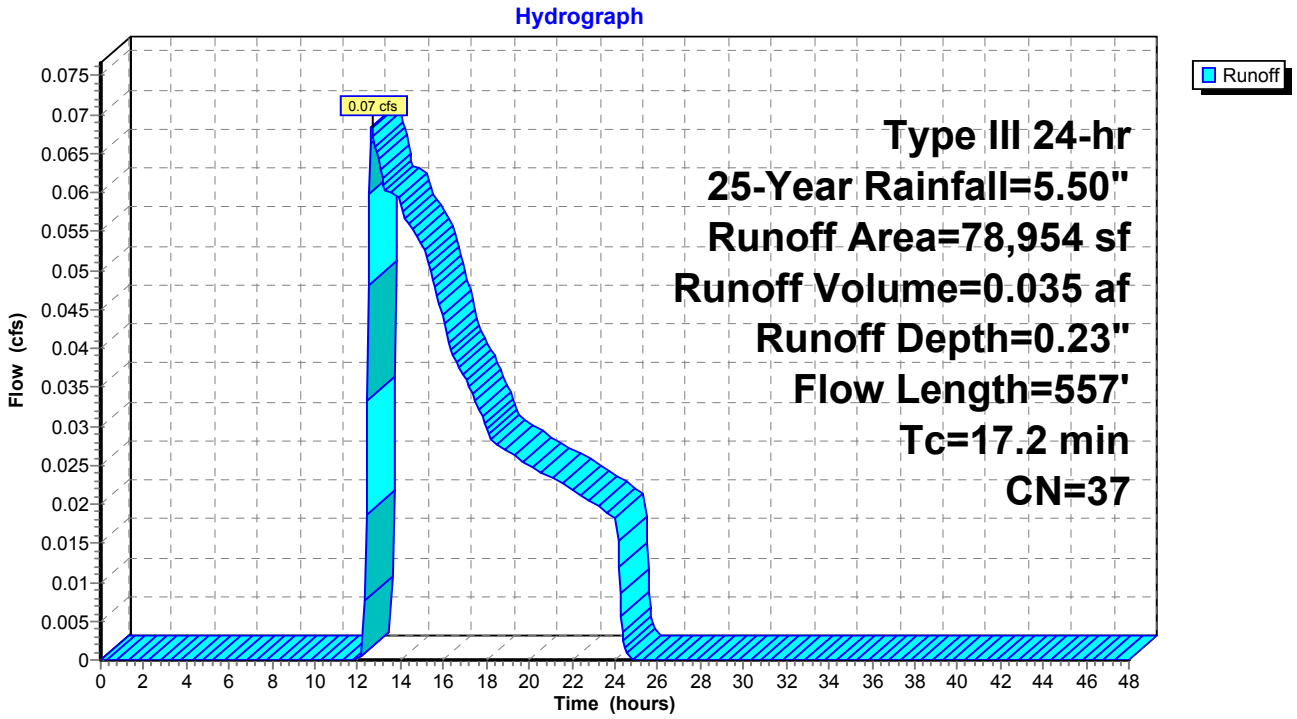
Runoff = 0.07 cfs @ 12.67 hrs, Volume= 0.035 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	61,141	30	Woods, Good, HSG A (offsite)
*	5,064	96	Gravel surface, HSG A (offsite)
*	8,886	39	>75% Grass cover, Good, HSG A (offsite)
*	1,919	98	Roofs, HSG A (offsite)
	1,944	39	>75% Grass cover, Good, HSG A
	78,954	37	Weighted Average
	77,035		97.57% Pervious Area
	1,919		2.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0150	0.06		**Sheet Flow, SHEET FLOW** Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	507	0.0236	2.47		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
17.2	557	Total			

Subcatchment 1S: OFFSITE NORWEST



Summary for Subcatchment 2S: SITE, YARD

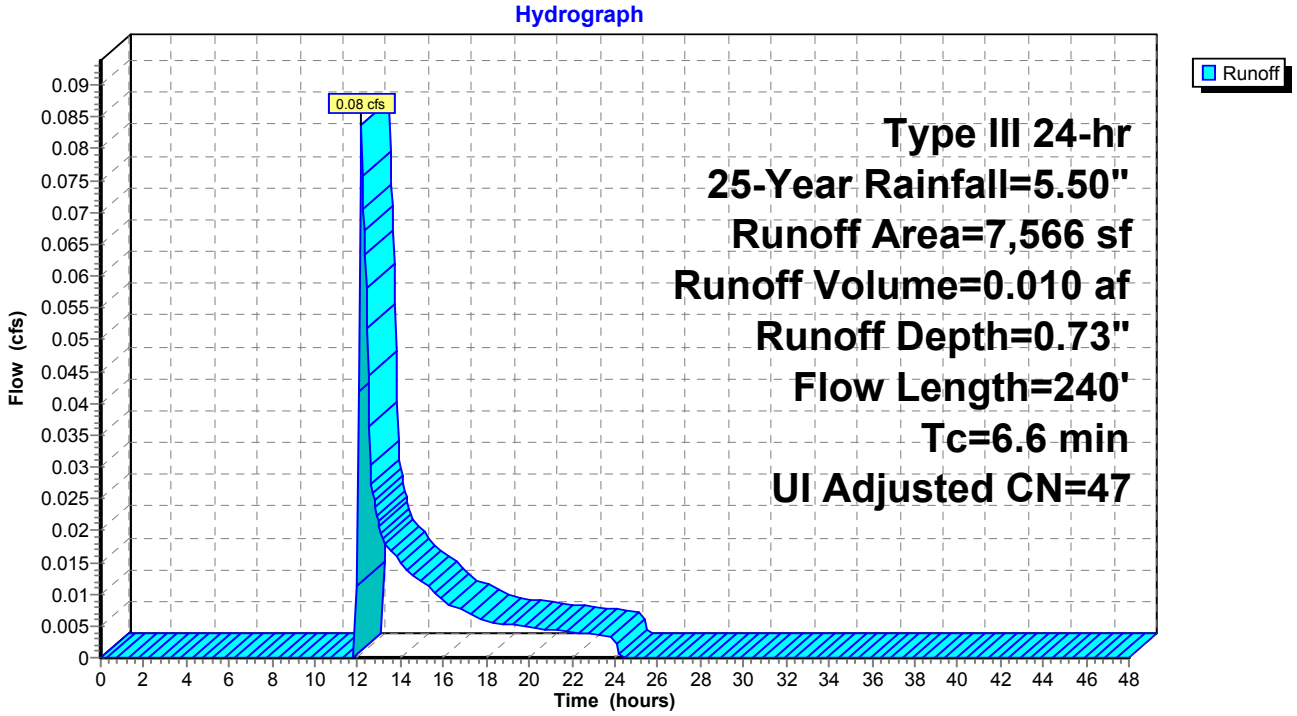
Runoff = 0.08 cfs @ 12.15 hrs, Volume= 0.010 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Adj	Description
	5,296	39		>75% Grass cover, Good, HSG A
*	1,770	64		Permeable pavers, HSG A
	500	98		Unconnected roofs, HSG A
	7,566	49	47	Weighted Average, UI Adjusted
	7,066			93.39% Pervious Area
	500			6.61% Impervious Area
	500			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, sheet** Grass: Short n= 0.150 P2= 3.20"
1.0	190	0.0370	3.10		**Shallow Concentrated Flow, conc.** Unpaved Kv= 16.1 fps
6.6	240	Total			

Subcatchment 2S: SITE, YARD



Summary for Subcatchment 3S: ROOF

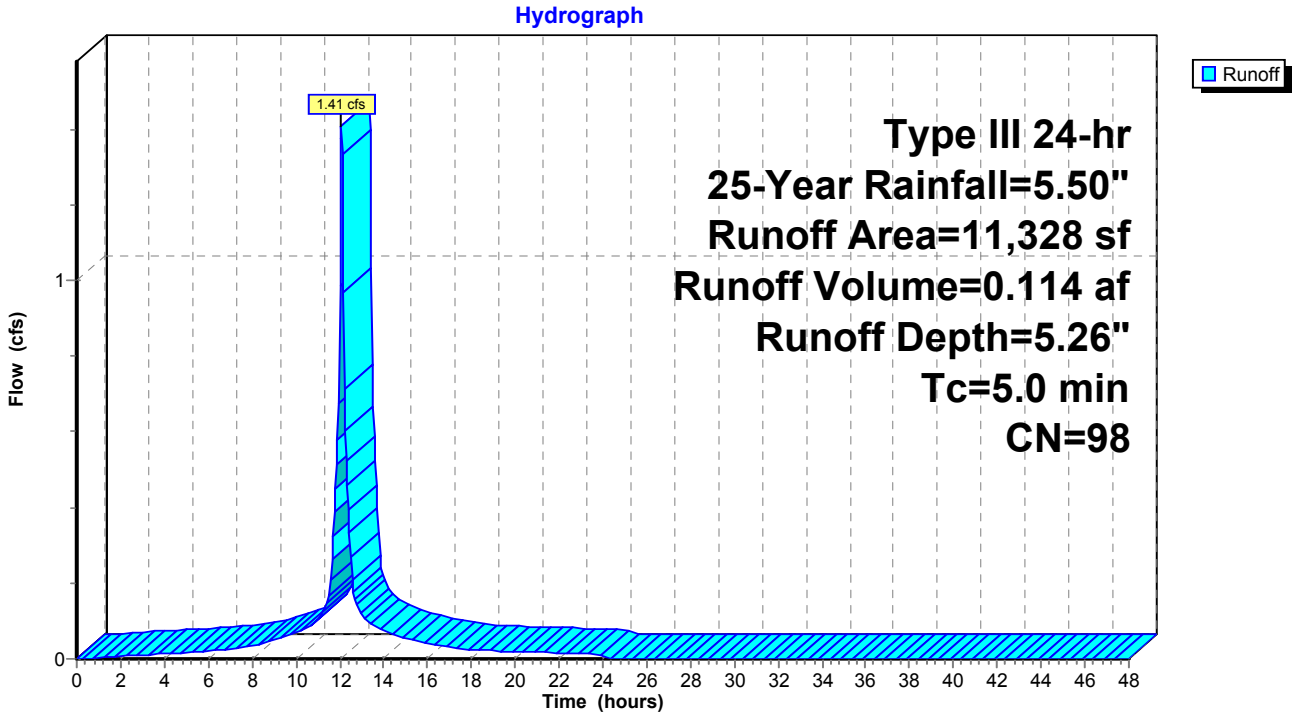
Runoff = 1.41 cfs @ 12.07 hrs, Volume= 0.114 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
11,328	98	Unconnected roofs, HSG A
11,328		100.00% Impervious Area
11,328		100.00% Unconnected

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

Subcatchment 3S: ROOF



Summary for Subcatchment 4S: ENTRANCE

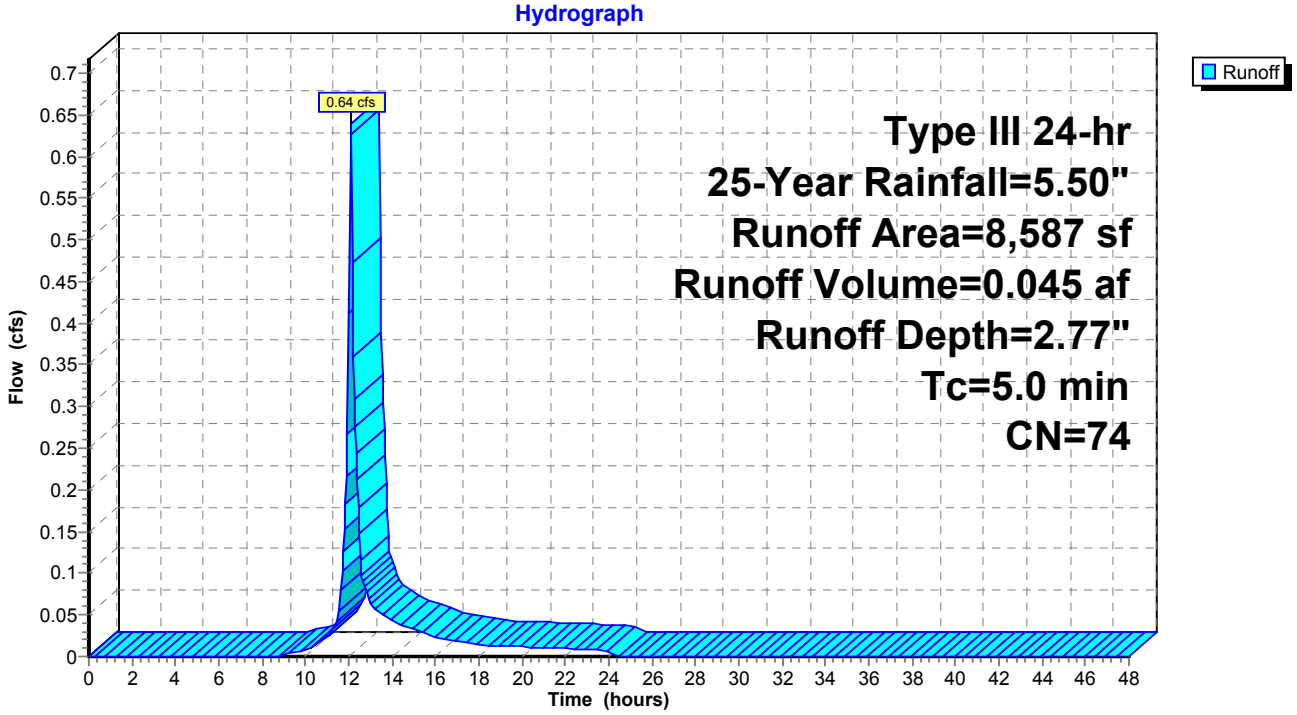
Runoff = 0.64 cfs @ 12.08 hrs, Volume= 0.045 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
3,548	39	>75% Grass cover, Good, HSG A
5,039	98	Paved parking, HSG A
8,587	74	Weighted Average
3,548		41.32% Pervious Area
5,039		58.68% Impervious Area

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

Subcatchment 4S: ENTRANCE



Summary for Subcatchment 5S: ENTRYWAY, SITE

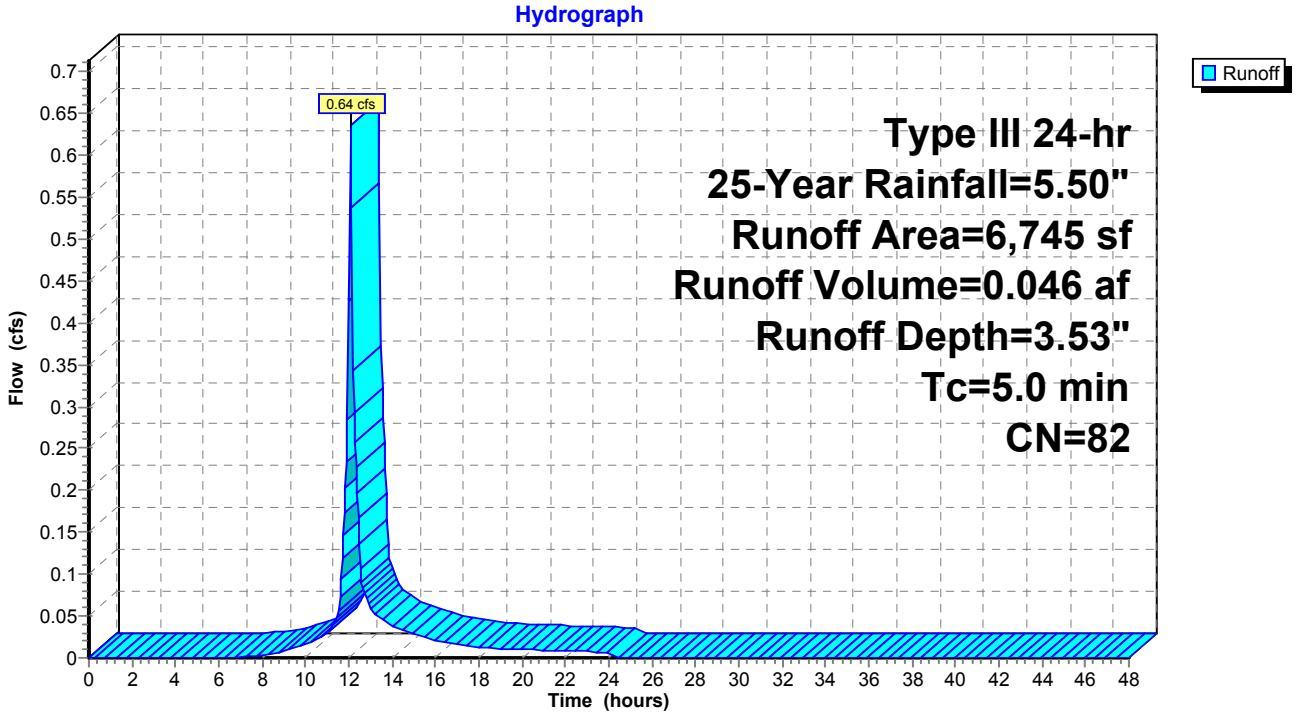
Runoff = 0.64 cfs @ 12.08 hrs, Volume= 0.046 af, Depth= 3.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	1,209	65	Permeable pavers, HSG A
	4,065	98	Paved parking, HSG A
	1,160	39	>75% Grass cover, Good, HSG A
	311	98	Unconnected pavement, HSG A
	6,745	82	Weighted Average
	2,369		35.12% Pervious Area
	4,376		64.88% Impervious Area
	311		7.11% Unconnected

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

Subcatchment 5S: ENTRYWAY, SITE



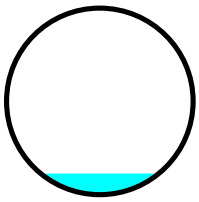
Summary for Reach 1R: 12" PIPE

Inflow Area = 1.813 ac, 2.43% Impervious, Inflow Depth = 0.23" for 25-Year event
Inflow = 0.07 cfs @ 12.67 hrs, Volume= 0.035 af
Outflow = 0.07 cfs @ 12.72 hrs, Volume= 0.035 af, Atten= 1%, Lag= 3.4 min

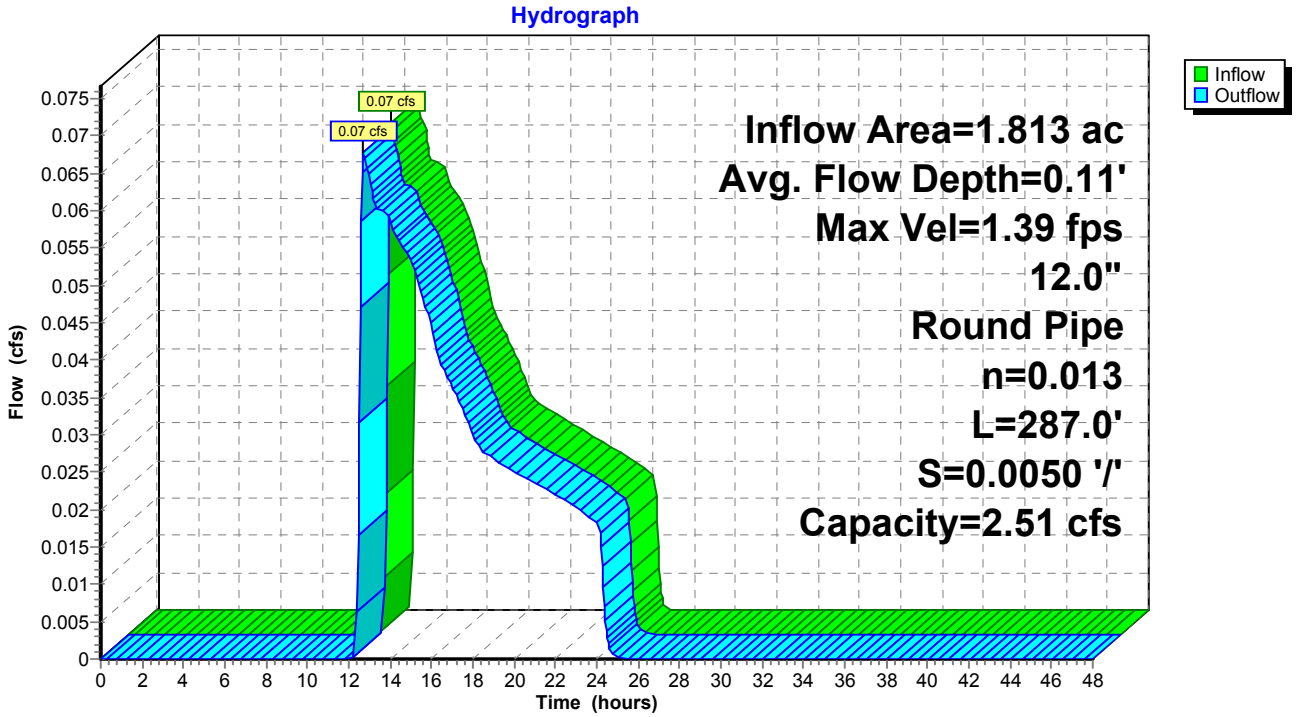
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.39 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 1.04 fps, Avg. Travel Time= 4.6 min

Peak Storage= 14 cf @ 12.72 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.51 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 287.0' Slope= 0.0050 '/'
Inlet Invert= 147.80', Outlet Invert= 146.37'



Reach 1R: 12" PIPE

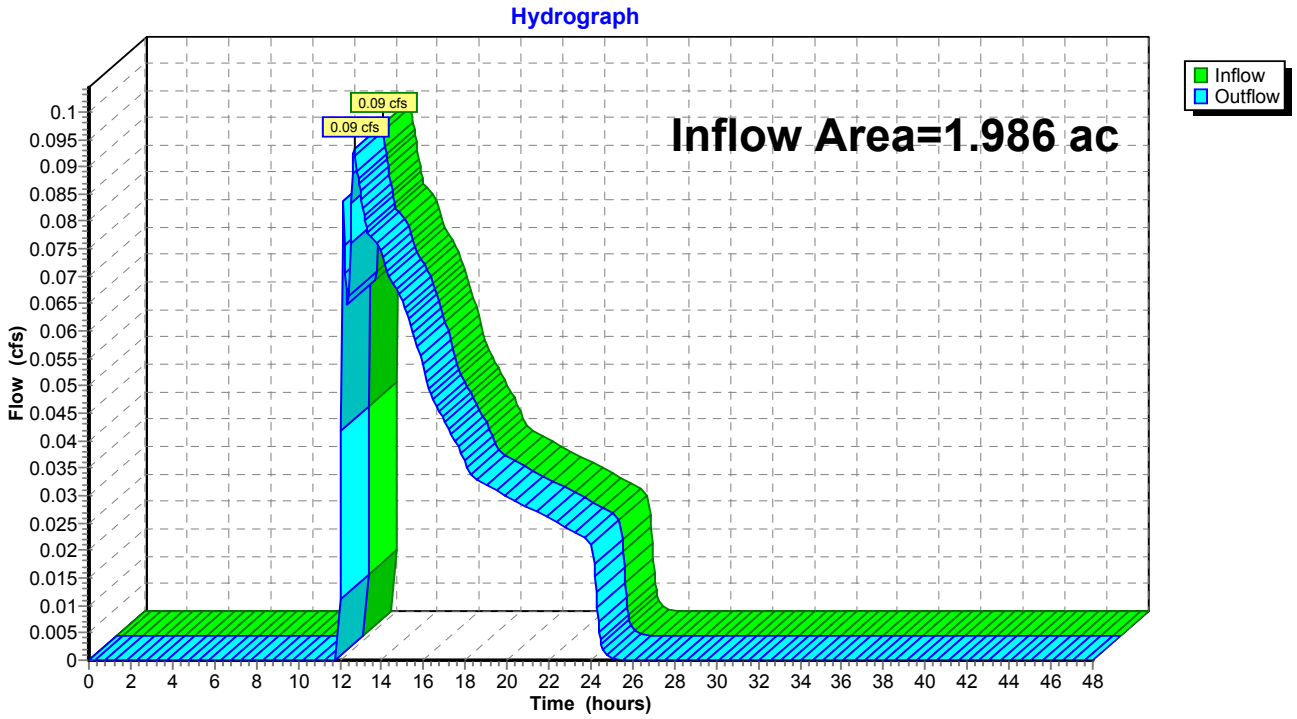


Summary for Reach DP-1: DP-1

Inflow Area = 1.986 ac, 2.80% Impervious, Inflow Depth = 0.27" for 25-Year event
Inflow = 0.09 cfs @ 12.70 hrs, Volume= 0.045 af
Outflow = 0.09 cfs @ 12.70 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: DP-1



Summary for Pond 1P: SUBSURFACE 1

Inflow Area = 0.457 ac, 82.18% Impervious, Inflow Depth = 4.19" for 25-Year event
Inflow = 2.05 cfs @ 12.07 hrs, Volume= 0.160 af
Outflow = 0.27 cfs @ 11.70 hrs, Volume= 0.160 af, Atten= 87%, Lag= 0.0 min
Discarded = 0.27 cfs @ 11.70 hrs, Volume= 0.160 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 152.99' @ 12.62 hrs Surf.Area= 0.032 ac Storage= 0.047 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 48.4 min (818.6 - 770.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	150.90'	0.027 af	**20.83'W x 66.50'L x 3.54'H Field A** 0.113 af Overall - 0.044 af Embedded = 0.069 af x 40.0% Voids
#2A	151.40'	0.044 af	**Cultec R-330XLHD** x 36 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.072 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	150.90'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.27 cfs @ 11.70 hrs HW=150.95' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Pond 1P: SUBSURFACE 1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

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

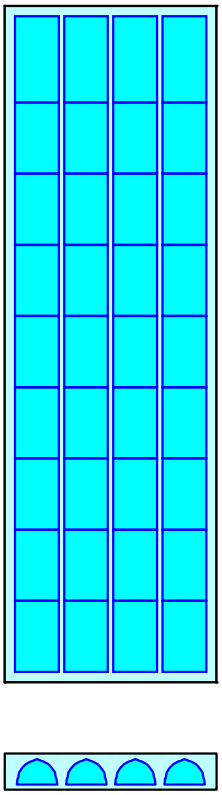
9 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 64.50' Row Length +12.0" End Stone x 2 = 66.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

36 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,922.4 cf Chamber Storage

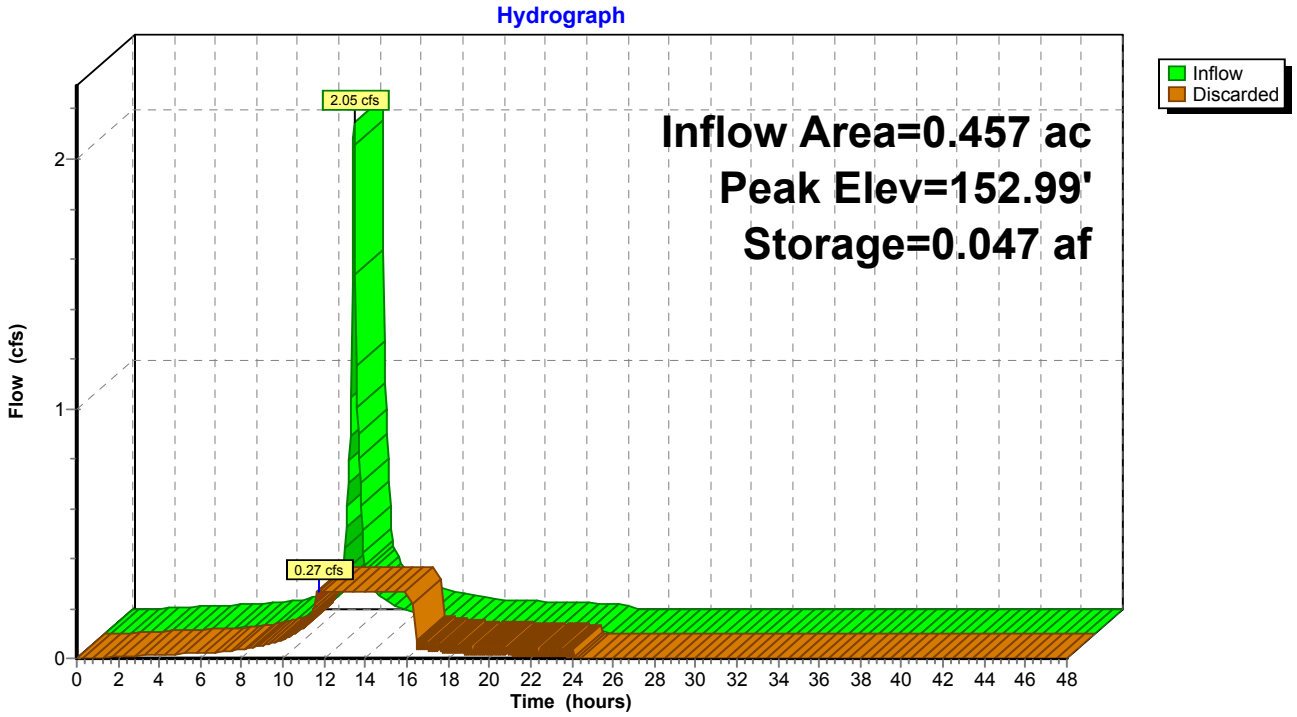
4,906.7 cf Field - 1,922.4 cf Chambers = 2,984.3 cf Stone x 40.0% Voids = 1,193.7 cf Stone Storage

Chamber Storage + Stone Storage = 3,116.1 cf = 0.072 af
Overall Storage Efficiency = 63.5%
Overall System Size = 66.50' x 20.83' x 3.54'

36 Chambers
181.7 cy Field
110.5 cy Stone



Pond 1P: SUBSURFACE 1



Summary for Pond 2P: SUBSURFACE 2

Inflow Area = 0.155 ac, 64.88% Impervious, Inflow Depth = 3.53" for 25-Year event
Inflow = 0.64 cfs @ 12.08 hrs, Volume= 0.046 af
Outflow = 0.10 cfs @ 11.75 hrs, Volume= 0.046 af, Atten= 85%, Lag= 0.0 min
Discarded = 0.10 cfs @ 11.75 hrs, Volume= 0.046 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 141.21' @ 12.58 hrs Surf.Area= 0.012 ac Storage= 0.013 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 39.2 min (850.7 - 811.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	139.50'	0.011 af	**11.17'W x 45.50'L x 3.54'H Field A** 0.041 af Overall - 0.015 af Embedded = 0.026 af x 40.0% Voids
#2A	140.00'	0.015 af	**Cultec R-330XLHD** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		0.025 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	139.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.10 cfs @ 11.75 hrs HW=139.54' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Pond 2P: SUBSURFACE 2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

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

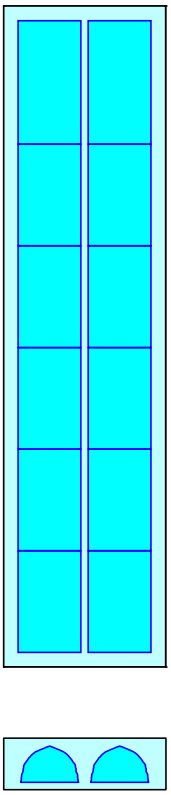
6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

12 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 648.2 cf Chamber Storage

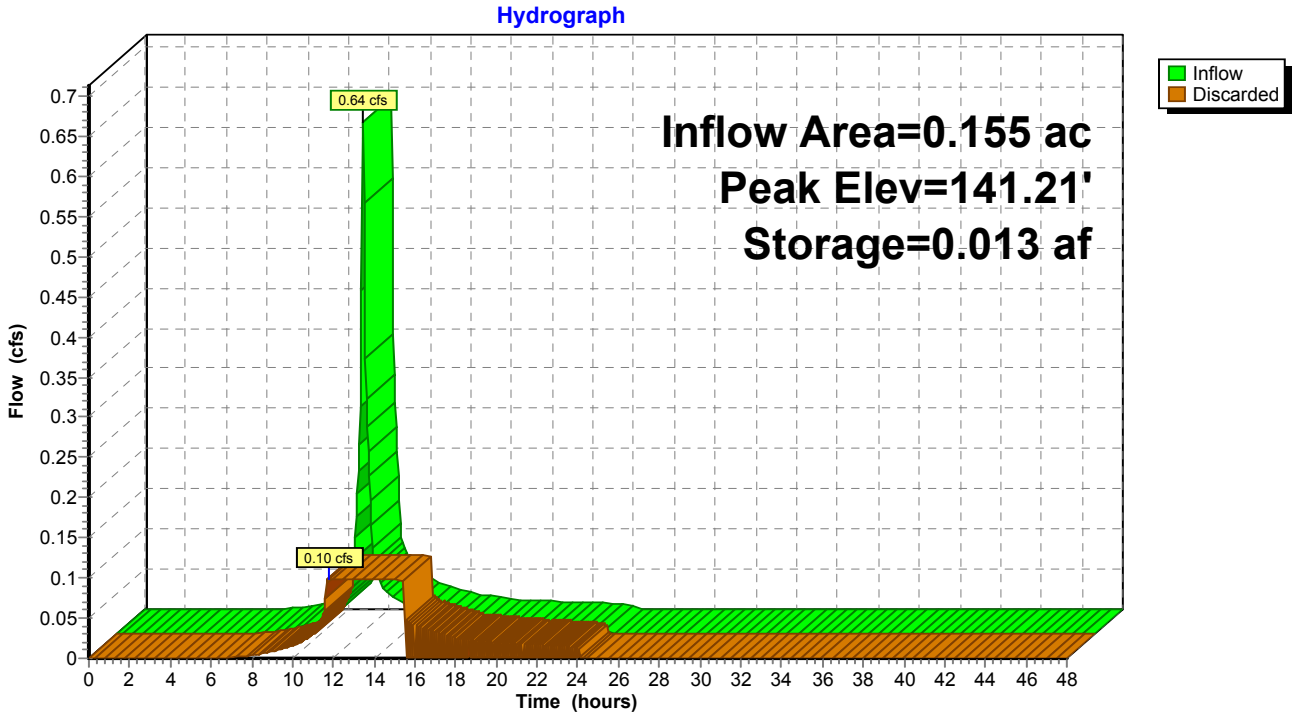
1,799.5 cf Field - 648.2 cf Chambers = 1,151.2 cf Stone x 40.0% Voids = 460.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,108.7 cf = 0.025 af
Overall Storage Efficiency = 61.6%
Overall System Size = 45.50' x 11.17' x 3.54'

12 Chambers
66.6 cy Field
42.6 cy Stone



Pond 2P: SUBSURFACE 2



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

Subcatchment1S: OFFSITE NORWEST Runoff Area=78,954 sf 2.43% Impervious Runoff Depth=0.53"
Flow Length=557' Tc=17.2 min CN=37 Runoff=0.36 cfs 0.081 af

Subcatchment2S: SITE, YARD Runoff Area=7,566 sf 6.61% Impervious Runoff Depth=1.26"
Flow Length=240' Tc=6.6 min UI Adjusted CN=47 Runoff=0.19 cfs 0.018 af

Subcatchment3S: ROOF Runoff Area=11,328 sf 100.00% Impervious Runoff Depth=6.46"
Tc=5.0 min CN=98 Runoff=1.72 cfs 0.140 af

Subcatchment4S: ENTRANCE Runoff Area=8,587 sf 58.68% Impervious Runoff Depth=3.78"
Tc=5.0 min CN=74 Runoff=0.87 cfs 0.062 af

Subcatchment5S: ENTRYWAY, SITE Runoff Area=6,745 sf 64.88% Impervious Runoff Depth=4.64"
Tc=5.0 min CN=82 Runoff=0.83 cfs 0.060 af

Reach 1R: 12" PIPE Avg. Flow Depth=0.25' Max Vel=2.26 fps Inflow=0.36 cfs 0.081 af
12.0" Round Pipe n=0.013 L=287.0' S=0.0050 '/' Capacity=2.51 cfs Outflow=0.35 cfs 0.081 af

Reach DP-1: DP-1 Inflow=0.43 cfs 0.099 af
Outflow=0.43 cfs 0.099 af

Pond 1P: SUBSURFACE1 Peak Elev=154.05' Storage=0.067 af Inflow=2.60 cfs 0.202 af
Outflow=0.27 cfs 0.202 af

Pond 2P: SUBSURFACE2 Peak Elev=142.02' Storage=0.020 af Inflow=0.83 cfs 0.060 af
Outflow=0.10 cfs 0.060 af

Total Runoff Area = 2.598 ac Runoff Volume = 0.361 af Average Runoff Depth = 1.67"
79.54% Pervious = 2.067 ac 20.46% Impervious = 0.532 ac

Summary for Subcatchment 1S: OFFSITE NORWEST

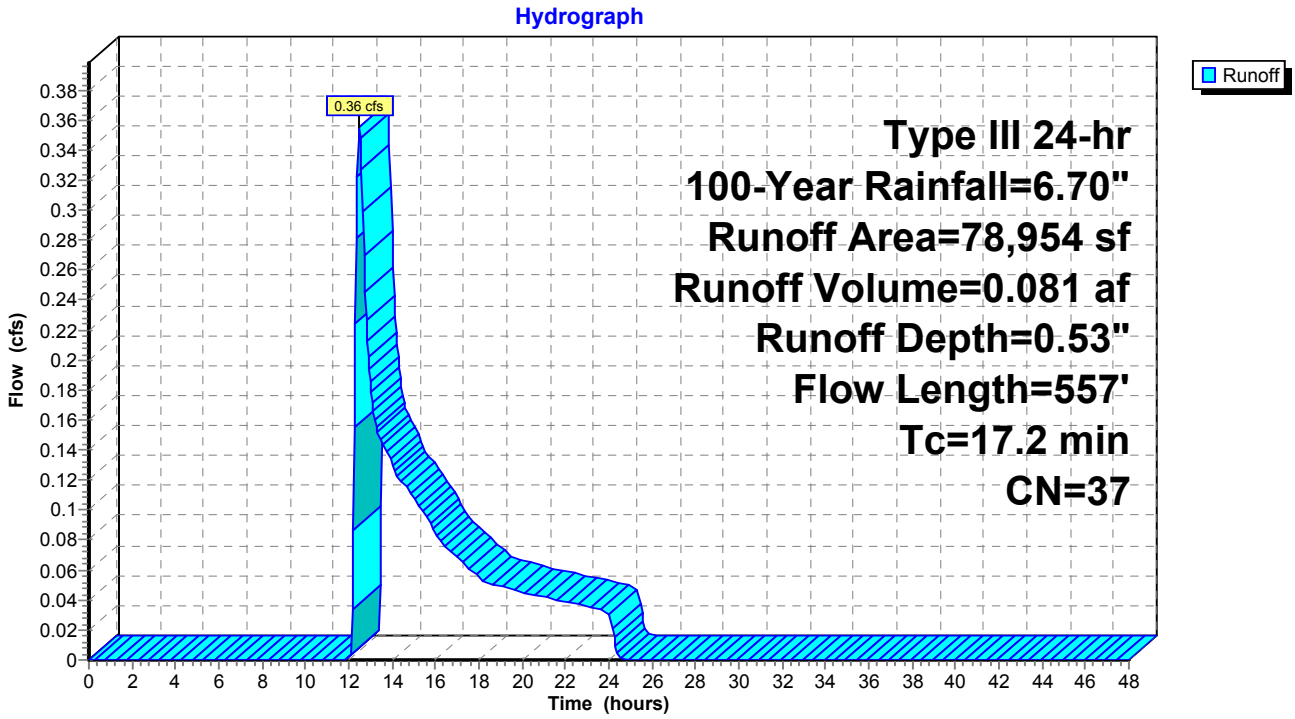
Runoff = 0.36 cfs @ 12.50 hrs, Volume= 0.081 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	61,141	30	Woods, Good, HSG A (offsite)
*	5,064	96	Gravel surface, HSG A (offsite)
*	8,886	39	>75% Grass cover, Good, HSG A (offsite)
*	1,919	98	Roofs, HSG A (offsite)
	1,944	39	>75% Grass cover, Good, HSG A
	78,954	37	Weighted Average
	77,035		97.57% Pervious Area
	1,919		2.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0150	0.06		**Sheet Flow, SHEET FLOW** Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	507	0.0236	2.47		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
17.2	557	Total			

Subcatchment 1S: OFFSITE NORWEST



Summary for Subcatchment 2S: SITE, YARD

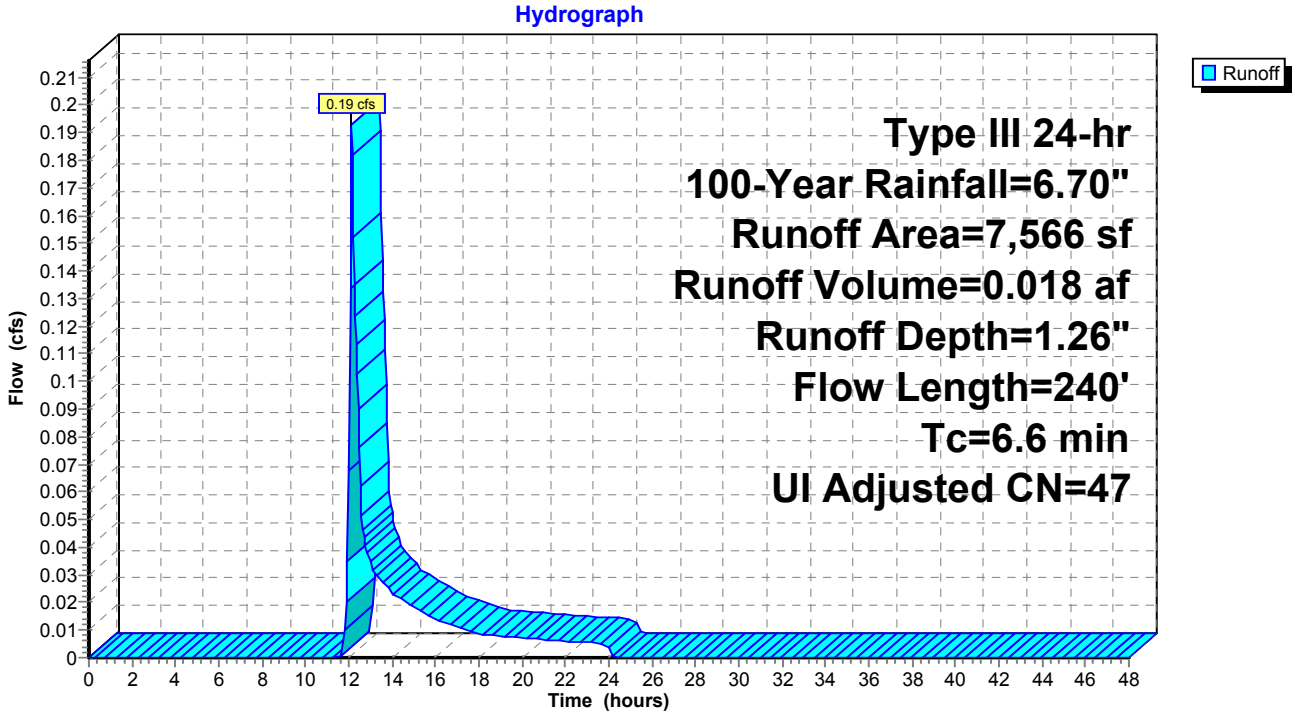
Runoff = 0.19 cfs @ 12.12 hrs, Volume= 0.018 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Adj	Description
	5,296	39		>75% Grass cover, Good, HSG A
*	1,770	64		Permeable pavers, HSG A
	500	98		Unconnected roofs, HSG A
	7,566	49	47	Weighted Average, UI Adjusted
	7,066			93.39% Pervious Area
	500			6.61% Impervious Area
	500			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, sheet** Grass: Short n= 0.150 P2= 3.20"
1.0	190	0.0370	3.10		**Shallow Concentrated Flow, conc.** Unpaved Kv= 16.1 fps
6.6	240	Total			

Subcatchment 2S: SITE, YARD



Summary for Subcatchment 3S: ROOF

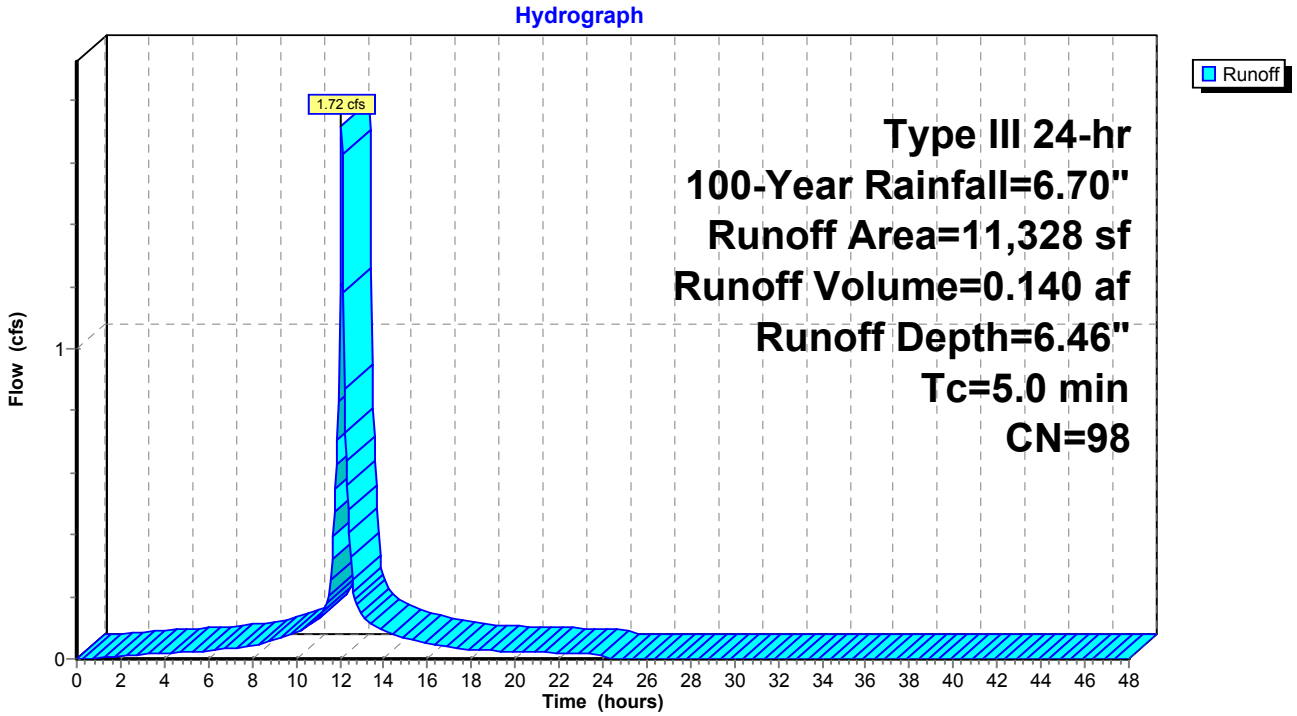
Runoff = 1.72 cfs @ 12.07 hrs, Volume= 0.140 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
11,328	98	Unconnected roofs, HSG A
11,328		100.00% Impervious Area
11,328		100.00% Unconnected

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

Subcatchment 3S: ROOF



Summary for Subcatchment 4S: ENTRANCE

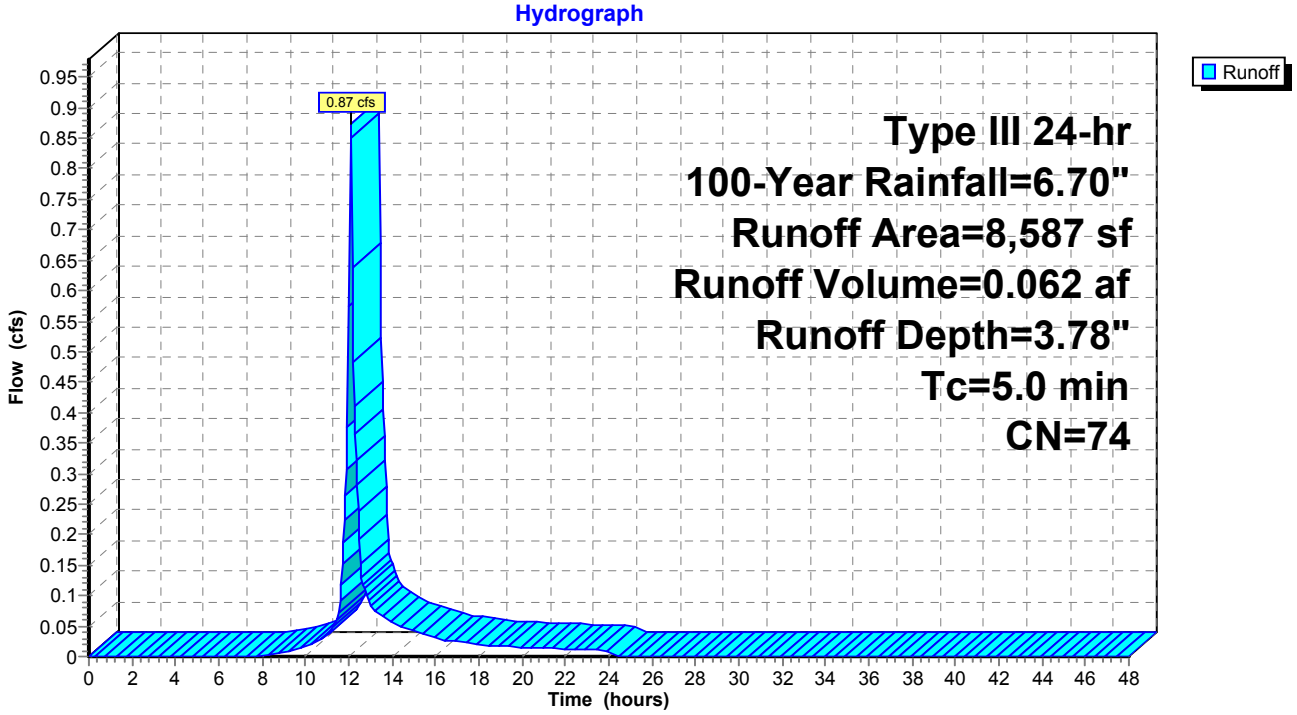
Runoff = 0.87 cfs @ 12.08 hrs, Volume= 0.062 af, Depth= 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
3,548	39	>75% Grass cover, Good, HSG A
5,039	98	Paved parking, HSG A
8,587	74	Weighted Average
3,548		41.32% Pervious Area
5,039		58.68% Impervious Area

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

Subcatchment 4S: ENTRANCE



Summary for Subcatchment 5S: ENTRYWAY, SITE

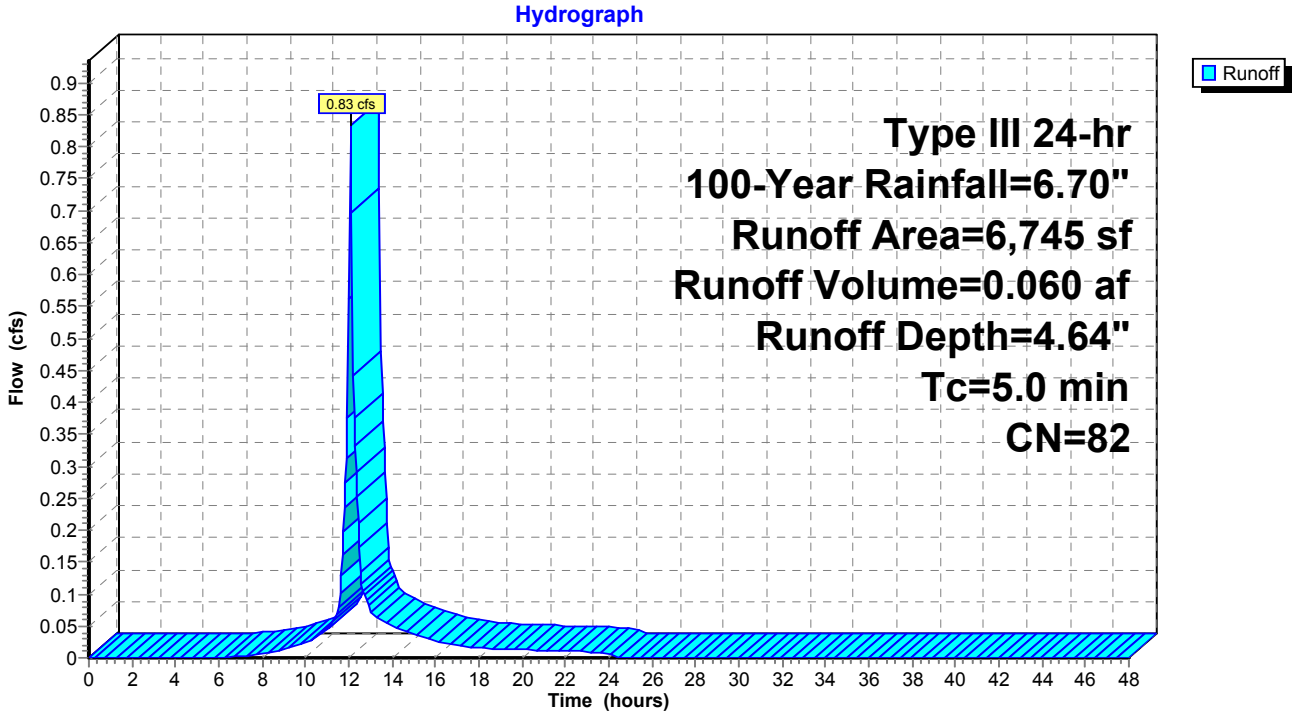
Runoff = 0.83 cfs @ 12.07 hrs, Volume= 0.060 af, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	1,209	65	Permeable pavers, HSG A
	4,065	98	Paved parking, HSG A
	1,160	39	>75% Grass cover, Good, HSG A
	311	98	Unconnected pavement, HSG A
	6,745	82	Weighted Average
	2,369		35.12% Pervious Area
	4,376		64.88% Impervious Area
	311		7.11% Unconnected

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

Subcatchment 5S: ENTRYWAY, SITE



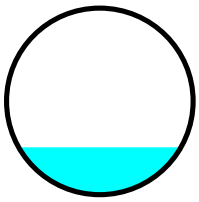
Summary for Reach 1R: 12" PIPE

Inflow Area = 1.813 ac, 2.43% Impervious, Inflow Depth = 0.53" for 100-Year event
Inflow = 0.36 cfs @ 12.50 hrs, Volume= 0.081 af
Outflow = 0.35 cfs @ 12.53 hrs, Volume= 0.081 af, Atten= 1%, Lag= 1.5 min

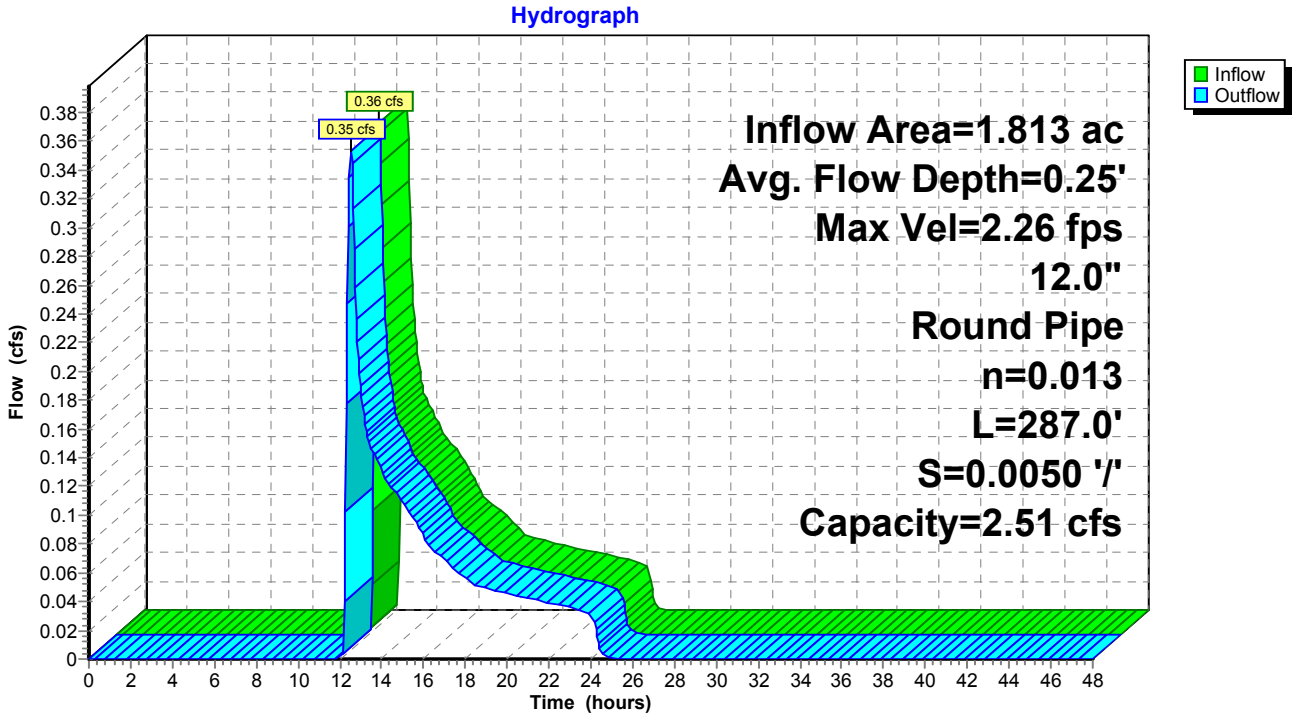
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.26 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.29 fps, Avg. Travel Time= 3.7 min

Peak Storage= 45 cf @ 12.53 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.51 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 287.0' Slope= 0.0050 '/'
Inlet Invert= 147.80', Outlet Invert= 146.37'



Reach 1R: 12" PIPE

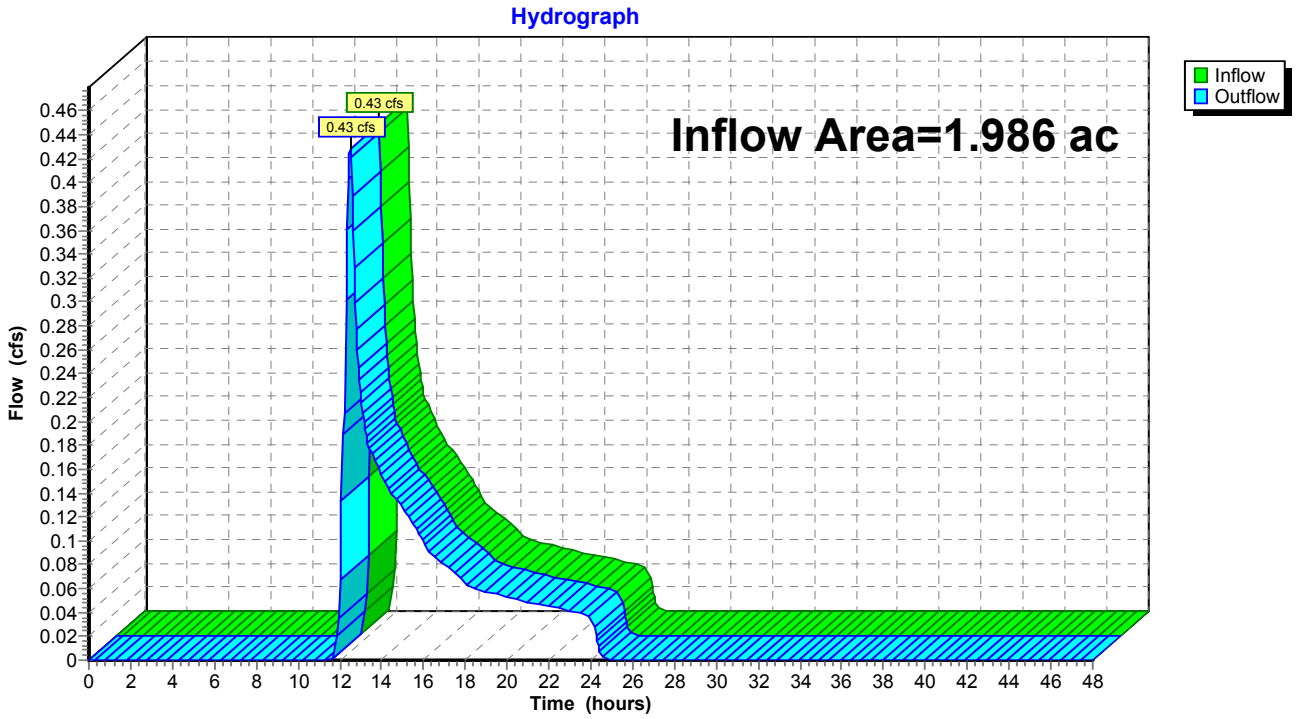


Summary for Reach DP-1: DP-1

Inflow Area = 1.986 ac, 2.80% Impervious, Inflow Depth = 0.60" for 100-Year event
Inflow = 0.43 cfs @ 12.48 hrs, Volume= 0.099 af
Outflow = 0.43 cfs @ 12.48 hrs, Volume= 0.099 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: DP-1



Summary for Pond 1P: SUBSURFACE 1

Inflow Area = 0.457 ac, 82.18% Impervious, Inflow Depth = 5.31" for 100-Year event
Inflow = 2.60 cfs @ 12.07 hrs, Volume= 0.202 af
Outflow = 0.27 cfs @ 11.65 hrs, Volume= 0.202 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.27 cfs @ 11.65 hrs, Volume= 0.202 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 154.05' @ 12.84 hrs Surf.Area= 0.032 ac Storage= 0.067 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 75.2 min (842.5 - 767.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	150.90'	0.027 af	**20.83'W x 66.50'L x 3.54'H Field A** 0.113 af Overall - 0.044 af Embedded = 0.069 af x 40.0% Voids
#2A	151.40'	0.044 af	**Cultec R-330XLHD** x 36 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.072 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	150.90'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.27 cfs @ 11.65 hrs HW=150.96' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Pond 1P: SUBSURFACE 1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

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

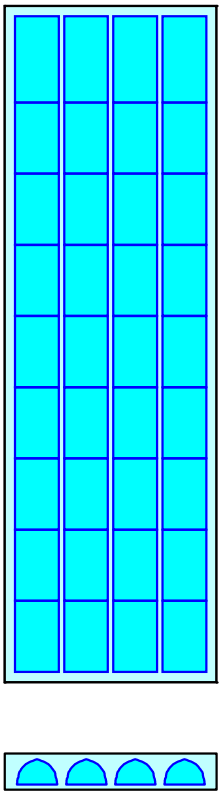
9 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 64.50' Row Length +12.0" End Stone x 2 = 66.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

36 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,922.4 cf Chamber Storage

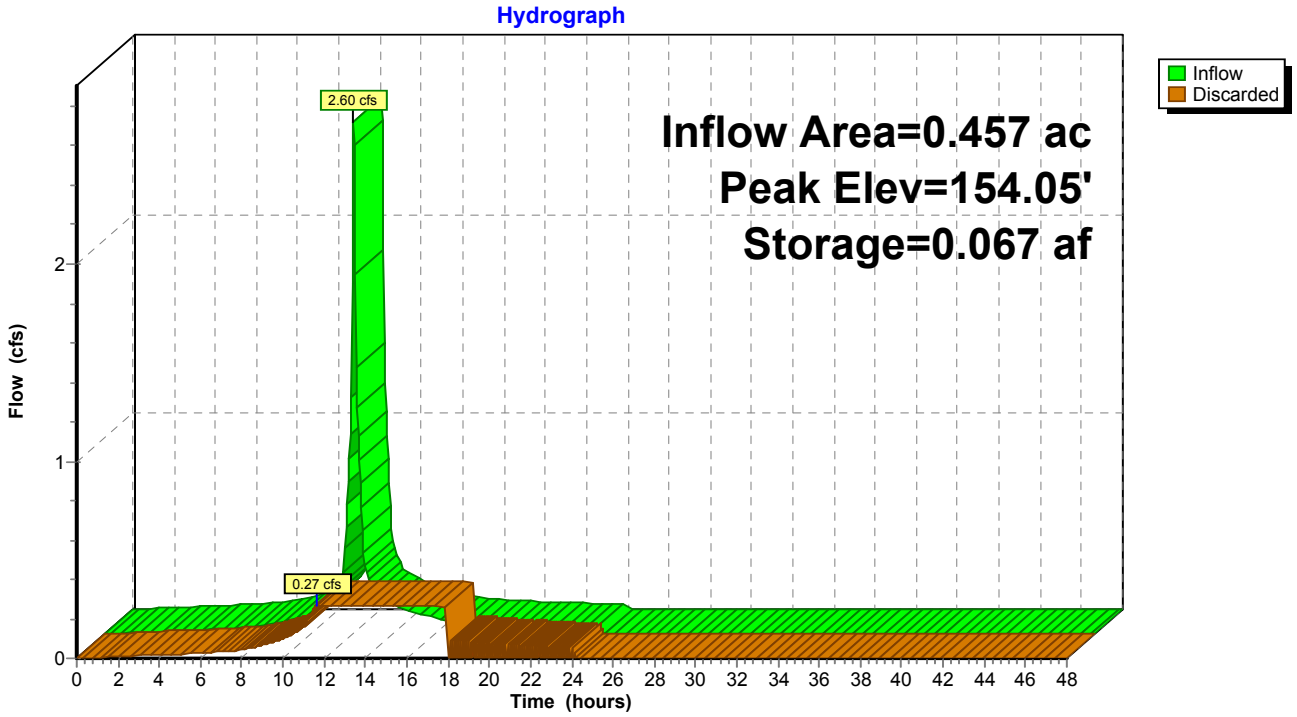
4,906.7 cf Field - 1,922.4 cf Chambers = 2,984.3 cf Stone x 40.0% Voids = 1,193.7 cf Stone Storage

Chamber Storage + Stone Storage = 3,116.1 cf = 0.072 af
Overall Storage Efficiency = 63.5%
Overall System Size = 66.50' x 20.83' x 3.54'

36 Chambers
181.7 cy Field
110.5 cy Stone



Pond 1P: SUBSURFACE 1



Summary for Pond 2P: SUBSURFACE 2

Inflow Area = 0.155 ac, 64.88% Impervious, Inflow Depth = 4.64" for 100-Year event
Inflow = 0.83 cfs @ 12.07 hrs, Volume= 0.060 af
Outflow = 0.10 cfs @ 11.70 hrs, Volume= 0.060 af, Atten= 88%, Lag= 0.0 min
Discarded = 0.10 cfs @ 11.70 hrs, Volume= 0.060 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 142.02' @ 12.73 hrs Surf.Area= 0.012 ac Storage= 0.020 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 64.1 min (867.8 - 803.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	139.50'	0.011 af	**11.17'W x 45.50'L x 3.54'H Field A** 0.041 af Overall - 0.015 af Embedded = 0.026 af x 40.0% Voids
#2A	140.00'	0.015 af	**Cultec R-330XLHD** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		0.025 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	139.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.10 cfs @ 11.70 hrs HW=139.56' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Pond 2P: SUBSURFACE 2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

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

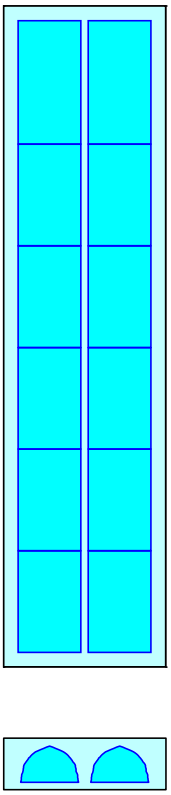
6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

12 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 648.2 cf Chamber Storage

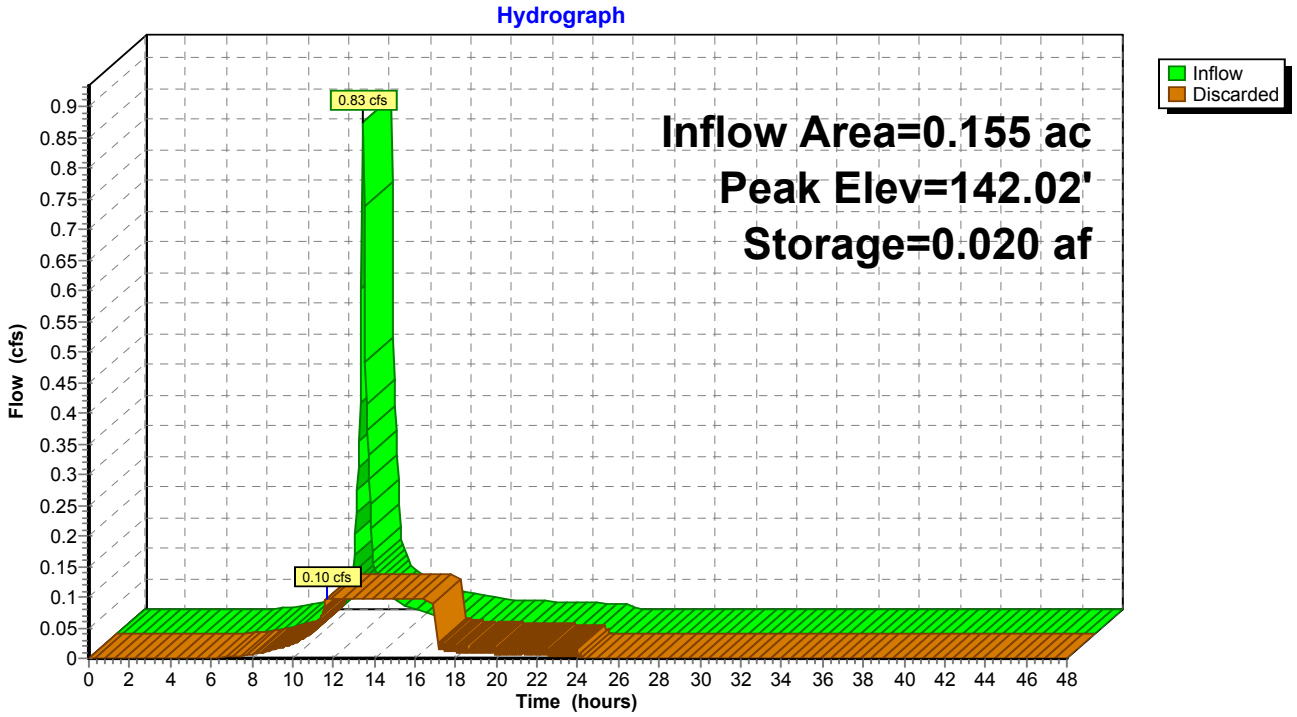
1,799.5 cf Field - 648.2 cf Chambers = 1,151.2 cf Stone x 40.0% Voids = 460.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,108.7 cf = 0.025 af
Overall Storage Efficiency = 61.6%
Overall System Size = 45.50' x 11.17' x 3.54'

12 Chambers
66.6 cy Field
42.6 cy Stone



Pond 2P: SUBSURFACE 2



A P P E N D I X C

Soil Testing Data

Commonwealth of Massachusetts
City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Wellesley Park, LLC
Owner Name

148 Weston Road
Street Address

149 - 4
Map/Lot #

Wellesley
City

MA
State

02482
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) No major limitations for site development (Soil Limitations)

   Outwash (Geologic/Parent Material) (Landform)

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1974 (Year Published/Source) 1:24,000 (Publication Scale) Olc4 (Map Unit)

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
   If Yes, continue to #5.

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): Jan. 2018 (Month/Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Wellesley

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 | 1/31/18 (Date) | 8:30 AM (Time) | Sunny 28 degrees (Weather)

1. Location

Ground Elevation at Surface of Hole: 155.7+/- feet Latitude/Longitude: 42 17'49.9" / 71 18'5.6"

Description of Location:

2. Land Use: Vacant lot (e.g.. woodland, agricultural field, vacant lot, etc.) Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Pine, oak, maple (Vegetation) 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	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: >100" inches <147.4+/- elevation

Commonwealth of Massachusetts
City/Town of Wellesley

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"-56"	F					Fill					
56"-100"	C1	10YR4/6			0%	Sand	5-10%	<5%	Single grain	Loose	Medium

Additional Notes:

Commonwealth of Massachusetts
City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-2 | 1/31/18 (Date) | 9:15 AM (Time) | Sunny 28 degrees (Weather)

1. Location

Ground Elevation at Surface of Hole: 146.0+/- feet Latitude/Longitude: 42 17'49.4" / 71 18'5.6"

2. Land Use: Vacant lot (e.g., woodland, agricultural field, vacant lot, etc.) | Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Pine, oak, maple (Vegetation) | Landform | Position on Landscape (SU, SH, BS, FS,

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: Depth Weeping from Pit | Depth Standing Water in Hole

Estimated Depth to High Groundwater: >92" inches <138.3+/- elevation

Commonwealth of Massachusetts
City/Town of Wellesley

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"-20"	Ap	10YR3/2			0%	Sandy loam	5-10%	10%	Granular	Friable	
20"-32"	Bw	10YR4/6			0%	Sandy loam	10-15%	15%	Granular	Friable	
32"-92"	C1	2.5Y4/6			0%	Loamy sand	20-25%	20%	Single grain	Firm in place	Medium

Additional Notes:

Commonwealth of Massachusetts
City/Town of Wellesley

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	>100" inches	>92" 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: _____ inches Lower boundary: _____ inches

   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Wellesley

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.

Signature of Soil Evaluator

Jan. 31, 2018
Date

Alan W. Loomis, Soil Evaluator #1405
Typed or Printed Name of Soil Evaluator / License #

June 30, 2019
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.

Field Diagrams

Use this sheet for field diagrams:

Commonwealth of Massachusetts
City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Wellesley Park, LLC
Owner Name

148 Weston Road — Street Address
149 - 4 — Map/Lot #

Wellesley — City
MA — State
02482 — 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
   No major limitations for site development — Soil Limitations

   Outwash — Geologic/Parent Material
   Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1974 (Year Published/Source) 1:24,000 (Publication Scale) Qlc4 (Map Unit)

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
   If Yes, continue to #5.

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): Jan. 2018 (Month/Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Wellesley

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 | 1/31/18 (Date) | 10:00 AM (Time) | Sunny 28 degrees (Weather)

1. Location

Ground Elevation at Surface of Hole: 146.9+/- feet Latitude/Longitude: 42 17'49.1" / 71 18'6.0"

Description of Location:

2. Land Use: Vacant lot (e.g., woodland, agricultural field, vacant lot, etc.) Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Pine, oak, maple (Vegetation) 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: Depth Weeping from Pit Depth Standing Water in Hole

Estimated Depth to High Groundwater: >96" Inches <138.9+/- elevation

Commonwealth of Massachusetts
City/Town of Wellesley

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"-8"	Ap	10YR3/2			0%	Sandy loam	10-15%	15%	Granular	Friable	
8"-15"	Bw	7.5YR3/4			0%	Sand	40%	20%	Single grain	Loose	Coarse
15"-38"	C1	10YR3/4			0%	Sand	40%	25%	Single grain	Loose	Coarse
38"-96"	C2	2.5Y4/4			0%	Loamy sand	25-30%	25%	Granular	Friable, firm in pl.	

Additional Notes:

Commonwealth of Massachusetts
City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-4 | 1/31/18 (Date) | 10:45 AM (Time) | Sunny 30 degrees (Weather)

1. Location

Ground Elevation at Surface of Hole: 149.4+/- feet Latitude/Longitude: 42 17'48.9" / 71 18'6.2"

2. Land Use: Vacant lot (e.g., woodland. agricultural field. vacant lot, etc.) Common (Surface Stones (e.g.. cobbles, stones. boulders. etc.)) 3-5% (Slope (%))

Pine. oak. maple (Vegetation) Landform: Position on Landscape (SU, SH. BS, FS.

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: Depth Weeping from Pit Depth Standing Water in Hole

Estimated Depth to High Groundwater: >96" inches <141.4+/- elevation

Commonwealth of Massachusetts
City/Town of Wellesley

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"-2"	Ap	10YR3/2			0%	Sandy loam	10-15%	15%	Granular	Friable	
2"-22"	Bw	7.5YR3/4			0%	Sand	40%	20%	Single grain	Loose	Coarse
22"-36"	C1	10YR3/4			0%	Sand	40%	25%	Single grain	Loose	Coarse
36"-96"	C2	2.5Y4/4			0%	Loamy sand	25-30%	25%	Granular	Friable	Firm in place

Additional Notes:

Commonwealth of Massachusetts
City/Town of Wellesley

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	>96" inches	>96" 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: _____ inches Lower boundary: _____ inches
   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Wellesley

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.

Signature of Soil Evaluator

Jan. 31, 2018
Date

Alan W. Loomis, Soil Evaluator #1405
Typed or Printed Name of Soil Evaluator / License #

June 30, 2019
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.

Field Diagrams

Use this sheet for field diagrams:

Commonwealth of Massachusetts
City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Wellesley Park, LLC
Owner Name

148 Weston Road — 149 - 4
Street Address — Map/Lot #

Wellesley — MA — 02482
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) — No major limitations for site development (Soil Limitations)

   Outwash (Geologic/Parent Material) — (Landform)

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1974 (Year Published/Source) 1:24,000 (Publication Scale) Qlc4 (Map Unit)

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
   If Yes, continue to #5.

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): Jan. 2018 (Month/Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Wellesley

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 | 1/31/18 (Date) | 11:15 AM (Time) | Sunny 30 degrees (Weather)

1. Location

Ground Elevation at Surface of Hole: 157.2+/- feet Latitude/Longitude: 42 17'50.5" / 71 18'5.3"

Description of Location:

2. Land Use: Vacant lot (e.g., woodland, agricultural field, vacant lot. etc.) Common (Surface Stones (e.g.. cobbles. stones. boulders, etc.)) 1-3% (Slope (%))

Pine, oak, maple (Vegetation) 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	25'+/- 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: >106" inches <148.4+/- elevation

Commonwealth of Massachusetts
City/Town of Wellesley

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"	Ap	10YR3/2			0%	Sandy loam	5-10%	<5%	Granular	Friable	
10"-24"	Bw	10YR4/6			0%	Sandy loam	5-10%	<5%	Granular	Friable	
24"-30"	C1	7.5YR4/6			0%	Sand	5-10%	<5%	Single grain	Loose	Medium-coarse
30"-106"	C2	2.5Y4/4			0%	Sand	5%	<5%	Single grain	Loose	Medium-coarse

Additional Notes:

Commonwealth of Massachusetts
City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-6 | 1/31/18 (Date) | 11:45 AM (Time) | Sunny 30 degrees (Weather)

1. Location

Ground Elevation at Surface of Hole: 157.7+/- feet Latitude/Longitude: 42 17'50.8" / 71 18'4.9"

2. Land Use: Vacant lot (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones (e.g., cobbles, stones, boulders, etc.): Common Slope (%): 1-3%

Vegetation: Pine, oak, maple Landform: Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100' feet	Drainage Way	>100' feet	Wetlands	>100' feet
Property Line	25'+/- 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: >106" inches <148.9+/- elevation

Commonwealth of Massachusetts
City/Town of Wellesley

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"-27"	F					Fill					
27"-106"	C1	2.5Y4/4			0%	Sand	20-25%	15%	Single grain	Loose	Coarse

Additional Notes:

Commonwealth of Massachusetts
City/Town of Wellesley

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	>106" inches	>106" 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: _____ inches Lower boundary: _____ inches
   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Wellesley
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.

Signature of Soil Evaluator

Jan. 31, 2018
Date

Alan W. Loomis, Soil Evaluator #1405
Typed or Printed Name of Soil Evaluator / License #

June 30, 2019
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.

Field Diagrams

Use this sheet for field diagrams:

Commonwealth of Massachusetts
City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Wellesley Park, LLC
Owner Name

148 Weston Road — 149 - 4
Street Address — Map/Lot #

Wellesley — MA — 02482
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) — No major limitations for site development (Soil Limitations)

   Outwash (Geologic/Parent Material) — (Landform)

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1974 (Year Published/Source) 1:24,000 (Publication Scale) Qlc4 (Map Unit)

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
   If Yes, continue to #5.

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): Jan. 2018 (Month/Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Wellesley

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 | 1/31/18 (Date) | 12:20 PM (Time) | Sunny 30 degrees (Weather)

1. Location

Ground Elevation at Surface of Hole: 158.1+/- feet Latitude/Longitude: 42 17'51.1" / 71 18'4.3"

Description of Location:

2. Land Use: Vacant lot (e.g., woodland, agricultural field, vacant lot, etc.) Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 1-3% (Slope (%))

Pine, oak, maple (Vegetation) 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	25'+/- 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: >106" inches <149.3+/- elevation

Commonwealth of Massachusetts
City/Town of Wellesley

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"-26"	F					Fill					
26"-39"	Ap	10YR3/2			0%	Sandy loam	5-10%	<5%	Granular	Friable	
39"-66"	Bw	10YR4/6			0%	Sandy loam	5-10%	<5%	Granular	Friable	
66"-106"	C1	2.5Y4/4			0%	Sand	5-10%	<5%	Single grain	Loose	Medium-coarse

Additional Notes:

Commonwealth of Massachusetts
City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: _____ Date _____ Time _____ Weather _____

1. Location

   Ground Elevation at Surface of Hole: _____ feet Latitude/Longitude: _____ / _____

2. Land Use _____ (e.g., woodland, agricultural field, vacant lot, etc.) _____ Surface Stones (e.g., cobbles, stones, boulders, etc.) _____ Slope (%)

   _____ Vegetation _____ Landform _____ Position on Landscape (SU, SH, BS, FS,

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Wetlands _____ feet

   Property Line _____ feet Drinking Water Well _____ feet Other _____ feet

4. Parent Material: _____ 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: _____ inches _____ elevation

Commonwealth of Massachusetts
City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: _____

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			

Additional Notes:

_____

_____

_____

Commonwealth of Massachusetts
City/Town of Wellesley

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 #_____
☒ Depth observed standing water in observation hole	>106" 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: _____ inches Lower boundary: _____ inches
   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Wellesley

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.

Signature of Soil Evaluator

Jan. 31, 2018
Date

Alan W. Loomis, Soil Evaluator #1405
Typed or Printed Name of Soil Evaluator / License #

June 30, 2019
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.

Field Diagrams

Use this sheet for field diagrams: