Stormwater Pollution Prevention Plan

Elk Chatsworth LP

108 Chatsworth Ave
Village of Larchmont

Prepared By:

April 30, 2020
January 30, 2020
Rev: September 9, 2019
Date: March 11, 2019

Timothy S. Allen, P.E.
N.Y.S. License #: 073434

Project Information:

Project Title:	Elk Chatsworth LP
Project Address:	108 Chatsworth Ave Larchmont, NY 10538
Tax Map Numbers:	Sheet 6, Block 6, Lot 409
Total Project Area:	0.25 Acres

Applicant/Owner Information:

Applicant Name:	Elk Chatsworth LP
Applicant Address:	411 Theodore Fremd Avenue, Rye, NY 10580 c/o Gary Hirsch
Applicant Phone:	(914)-921-9400

Certifying Engineer Information:

Engineer:	Timothy S. Allen, P.E.
Engineering Firm:	Bibbo Associates, LLP
Engineering Firm Address:	293 Rt. 100, Suite 203 Somers, N.Y. 10589
Engineering Firm Phone:	914-277-5805
Engineering Firm Fax:	914-277-8210
Engineering Firm Email:	tallen@bibboassociates.com

Short-Term Responsible Party for SWPPP Implementation:
Short-term responsible parties for SWPPP Implementation will be the General Contractor.

Long-Term Responsible Party for SWPPP Implementation:
Long-term responsible parties for SWPPP Implementation will be the Owner of Record.

Table of Contents:

1.0 Introduction:

Elk Chatsworth LP is proposing to redevelop their property with the construction of new building located between Wendt Avenue and Chatsworth Avenue in the Village of Larchmont.

1.1 Project Description:

The Elk Chatsworth site contains 0.25 acres located on the south side of Chatsworth Avenue. The owner is proposing to redevelop the property and build a new building with retail space at the ground level and residential units above. The new building will be served by a public sewer system and public water supply. The existing structures located onsite shall be removed. The proposed area of disturbance is 0.30 acres and the project is located within the Long Island Sound Watershed. Drainage systems designed in accordance with New York State Department of Environmental Conservation (NYSDEC) regulations are proposed to treat stormwater runoff generated by the redevelopment project.

The project will not affect any property listed on the State or National Register of Historic Places. A map showing historic places in the vicinity of the project can be found in Appendix "C" of this report.

Assuming a timely permitting process construction is anticipated to begin in the fall of 2020. Ultimate build out will take approximately one year to complete.

The following is a list permits that must be obtained prior to receiving a building permit:

- Village of Larchmont Village Board of Trustees Zoning Amendment
- Village of Larchmont Planning Board Site Plan Approval

The proposed sequence of construction is as follows:

1. Cordon off construction area with orange construction fencing and install silt fencing as shown on the plans.
2. Remove existing pavement and structures from the site.

3. Rough grade site and begin excavation for building supports and foundation. See approved architectural plans for building construction details.
4. Install drainage structures and stormwater piping.
5. Install site utilities as shown on the approved plans.
6. Continue construction of building.
7. Final grade parking area, walkway, and sidewalks. Pave parking area and paint all required markings.
8. Remove erosion control measures once final stabilization is achieved.

1.2 Existing Site Conditions:

The 0.25 acre site is currently developed with existing retail buildings on the Chatsworth side of the site and an existing paved parking area in the rear of the property which is accessed by the existing paved common driveway connected to Wendt Avenue. An existing paved municipal parking lot borders the site to the southwest. The site is currently 100% impervious surfaces. Slopes are very mild onsite and the property generally slopes to the south towards Wendt Avenue. There are currently no stormwater treatment practices located on the site.

NRCS soil boundaries identified onsite and within the boundaries of the analysis consist of Urban Land which does not have a hydrologic group rating. For the purposes of this report, Hydrologic Soil Group C was used for the entire site. A soil map for the site can be found in Appendix "D" of this report.

2.0 *Stormwater Management:*

The Elk Chatsworth Project is considered a redevelopment project and meets the requirements of Chapter 9 of the New York State Stormwater Management Design Manual (NYSSMDM). The project site will utilize a green roof area and an infiltration drywell system as Runoff Reduction Practices to treat stormwater. A green roof area will be located on the roof of the proposed multi-family building. The 500 square feet of green roof captures runoff by a layer of vegetation and soil installed on top of the flat roof. The rooftop vegetation allows evaporation and evapotranspiration processes to reduce volume and discharge rate of runoff entering the conveyance system at the ground level. For detailed

information regarding the green roof design and location, please see the landscape plans for the project, prepared by Didona Associates. The remainder of the rooftop runoff will be treated in an underground infiltration system (NYSDEC Design I-4). The underground infiltration system will consist of Cultec Recharger infiltration chambers situated in a gravel bed. The infiltration system shall use Cultec 330XLHD chamber model. The infiltration system allows runoff to infiltrate back into the subsoil onsite through the bottom of the practice. An overflow pipe is connected to the infiltration system to allow larger storm events to outlet from the system at grade via an overflow structure located on the common drive.

The stormwater management system meets the required 3' separation distance to groundwater or bedrock layer as verified by test pits witnessed by Bibbo Associates, LLP on September 5, 2019. The results of the field testing can be found on the Site Plan.

HydroCAD v. 10.0, a computer-modeling program based upon TR-20, was used to generate peak flows from the subcatchments. In the program, the user inputs various characteristics for each subcatchment including a curve number and time of concentration. These two parameters relate runoff to the specific land characteristics of the subcatchment. Based upon the inputted data, peak flows are generated for the 1, 10, 25 and 50-year storm events for the pre-development and post-development subcatchments. The HydroCAD output reports located in Appendix "A" of this report provides detailed design information for the drywell system.

2.1 NYSDEC Requirements:

2.1.1 Water Quality Treatment:

The Elk Chatsworth redevelopment project must meet the requirements and sizing criteria of Section 9.2.1 of the (NYSSMDM). The plan proposes a to treat stormwater runoff with runoff reduction practices in order to reduce the volume of runoff leaving the project site. As per Section 9.2.1 B-II, a minimum of 25% of the existing impervious cover must be treated by the standard

stormwater management practice. One of the main goals of the stormwater design is to capture and store as much runoff onsite as practicable to reduce the volume of runoff which leaves the project site. The stormwater management practices proposed for the site effectively treat 10,274 square feet of impervious cover out of the 11,000 square foot site. So, the project proposes to treat 93.4% of the existing impervious cover which greatly exceeds the NYSDEC requirement. Furthermore, the rooftop runoff from the 25 year storm event, 6.4 inches of rainfall in a 24 hour period, is fully stored and infiltrated onsite which is greater than the NYSDEC requirement to treat the 90% storm event (1.5 inches of rainfall).

2.1.2 Stream Channel Protection Volume:

As per Section 9.2.1A-II of the (NYSSMDM), since the redevelopment results in no change in hydrology for the subcatchments onsite, channel protection is not required.

2.1.3 Overbank & Extreme Flood Control:

As per Section 9.2.1A-I of the (NYSSMDM), since the redevelopment results in no new impervious surfaces and no change in hydrology for the subcatchments onsite, overbank and extreme flood control analyses are not required.

2.1.4 Pre-Development vs. Post-Development Analysis:

Although peak flow attenuation is not required as stated in the previous sections of this report, the Village has requested that a pre-development and post-development stormwater analysis be prepared for the site to compare the peak flows generated by the project site under both conditions.

The design will result in reduced peak flows from the project site under the post-construction conditions. A summary of the pre-development and post-development peak flows can be found in the table provided on the following page. At the request of the Consulting Village Engineer, the peak flows from the smaller storm events, have also been reduced under the post-development conditions in order to prevent any potential adverse impacts to the downstream drainage systems from the more frequent storm events. See Appendix “A” for the HydroCAD output reports for each design storm.

Pre vs. Post Development Peak Flows

	90% storm event	1-year storm event	10-year storm event	25-year storm event	50-year storm event
Design Line					
Pre-Development (cfs)	0.35	0.68	1.36	1.58	1.88
Post-Development (cfs)	0.02	0.05	0.09	0.10	0.51
Change	-94.3%	-92.6%	-93.4%	-93.7%	-72.9%

Since peak flows leaving the project site are reduced through all storm events and there is no direct connection to village drainage structures, the project will not adversely impact the conditions of the village storm drain system.

3.0 Groundwater Management:

Based on the soil borings and deep test pit results found onsite, it is anticipated that groundwater will be encountered while constructing the foundation for the proposed building. During construction, the open excavation will be dewatered to place the building foundation. Dewatering during construction will be accomplished using submersible pumps which will discharge to temporary dewatering bags which filter out silt prior to releasing the groundwater at grade.

After construction is completed it is anticipated that footing drains will be required to collect any remaining groundwater in the area. The groundwater collected by the footing drain system will be managed onsite using the proposed underground infiltration system described in the previous section of this report.

Based on the soil boring results and the groundwater encountered on the neighboring construction site, dewatering around the proposed foundation is anticipated to be minimal. Additionally, the existing building has a sump pump which discharges onto the existing paved parking area in the rear of the building. Since the new basement is generally in the same footprint of the existing basement and the elevation of the new basement has been set at the same elevation as the existing basement, there will be a negligible change in the amount

of groundwater pumping from the project site between pre-development and post-development conditions. The groundwater will be recharged back into onsite soil through the proposed infiltration system rather than flowing off the site at grade to provide improved management of onsite groundwater.

If any groundwater issues or variations are found onsite during excavation, the groundwater management system shall be reevaluated by the project engineer and the consulting village engineer to confirm if any design revisions are required.

4.0 Erosion & Sediment Control:

The plans provide for specific erosion and sediment controls to be employed during construction. Since the site is completely impervious under the pre-development conditions and contains very mild slopes, the potential for soil erosion is minimal. However, it is the intent to provide effective erosion control by minimizing land disturbance at one given time, containing sediment from disturbed areas, treating runoff where possible, and stabilizing disturbed soils as soon as possible. The directives specified on the plans and in this report serve as a minimum for erosion and sediment control. Further practices and measures may be required pursuant to onsite inspections in conformance with the requirements of the NYSDEC. Inspections are to be performed by a "Qualified Inspector" on a weekly basis, consistent with the NYSDEC requirements. All erosion and sediment control practices specified for this site shall be in conformance with the New York Standards & Specifications for Erosion & Sediment Control.

4.1 Temporary Erosion & Sediment Control Practices:

Listed below are the Temporary Erosion & Sediment Control Practices specified on the Erosion Control Plan. All practices shall be installed and maintained in conformance with the New York Standards & Specifications for Erosion & Sediment Control:

- Silt Fence
- Debris Control
- Drop Inlet Protection

Silt fence for the site will consist of a geotextile fabric installed at the parameter of the site, downhill of all disturbed slopes, and parallel to the contours. The silt fence is intended to reduce runoff velocity, and intercept sediment-laden runoff.

Construction debris, such as sheet metal and wood scrap, paper and insulation products, styrofoam cups and paper wrappers which could become windblown litter over and off the site if neglected. Suitable and ample refuse containers shall be provided on the site and emptied when full. Any scattered debris shall be picked up and placed in containers on a continuous basis.

Drop inlet protect for the site will consist of silt fencing surrounding the proposed drainage system overflow catch basin. The purpose of the staked silt fence is to prevent water with large amounts of sediment to enter the drainage system through the drop inlet.

4.2 Permanent Erosion & Sediment Control Practices:

The intent of the permanent erosion and sediment control practices is to permanently stabilize the ground surface via vegetative and structural practices, while controlling and reducing runoff velocities. Since the entire project site is to be impervious and almost entirely covered by rooftop area in the post-development conditions, there are no permanent erosion control measures proposed for the site.

5.0 Maintenance & Inspection Requirements:

Maintenance and inspections are required in order to ensure the stormwater and erosion & sediment control practices are acting as designed. Inspections are to be performed by a "Qualified Inspector" on a weekly basis. Upon completion of construction, maintenance and inspections are expected to be minimal. Temporary and permanent maintenance and inspection requirements are further discussed below. Proper maintenance and inspections will ensure the longevity and effectiveness of the stormwater pollution prevention plan, and erosion and sediment control plan.

The Village of Larchmont Stormwater Management Officer may require inspections as necessary to determine compliance with Chapter 335 of the

Larchmont Village Code and may either approve that portion of the work completed or notify the applicant wherein the work fails to comply with the requirements of Chapter 335 and the stormwater pollution prevention plan (SWPPP) as approved. To obtain inspections, the applicant shall notify the Village of Larchmont enforcement official at least 48 hours before any of the following as required by the Stormwater Management Officer;

1) Start of Construction
2) Installation of sediment and erosion control measures
3) Completion of site clearing
4) Completion of rough grading
5) Completion of final grading
6) Close of construction season
7) Completion of final landscaping
8) Successful establishment of landscaping in public areas.

5.1 Short Term Maintenance and Inspection Requirements:

Inspections preformed during construction should verify all practices are functioning properly, correctly maintained, and accumulated sediment is removed from all control structures. The inspector must also examine the site for any evidence of soil erosion, the potential for pollutants to enter the storm drain system, turbid discharge at all outfalls, and the potential for soil and mud to be transported on the public roadway at the site entrance. In addition to these general guidelines, the project plans will provide more specific erosion control guidelines, as well as a construction sequence to guide the contractor through the construction process.

5.2 Long Term Maintenance and Inspection Requirements:

Once final stabilization is achieved, and construction complete maintenance and inspections will be limited to the infiltration system.

Inspections of the following items should be performed at a minimum annually and following significant rainstorm events:

Infiltrator Systems:

- Inspection of the infiltrator units to ensure accumulated water is infiltrating into the soil, and debris has not entered the infiltration units. Any debris should be removed. Once debris is removed, if stormwater is still not infiltrating contact a professional engineer licensed in the State of New York to examine the system.
- Inspection of the outlet of the overflow pipe to ensure it is not plugged or clogged.

Catch Basins and Drain Manholes:

- Inspect monthly and after heavy rainstorms > ½" in 24 hours for sediment accumulation in sumps. Accumulated sediment should be removed immediately.

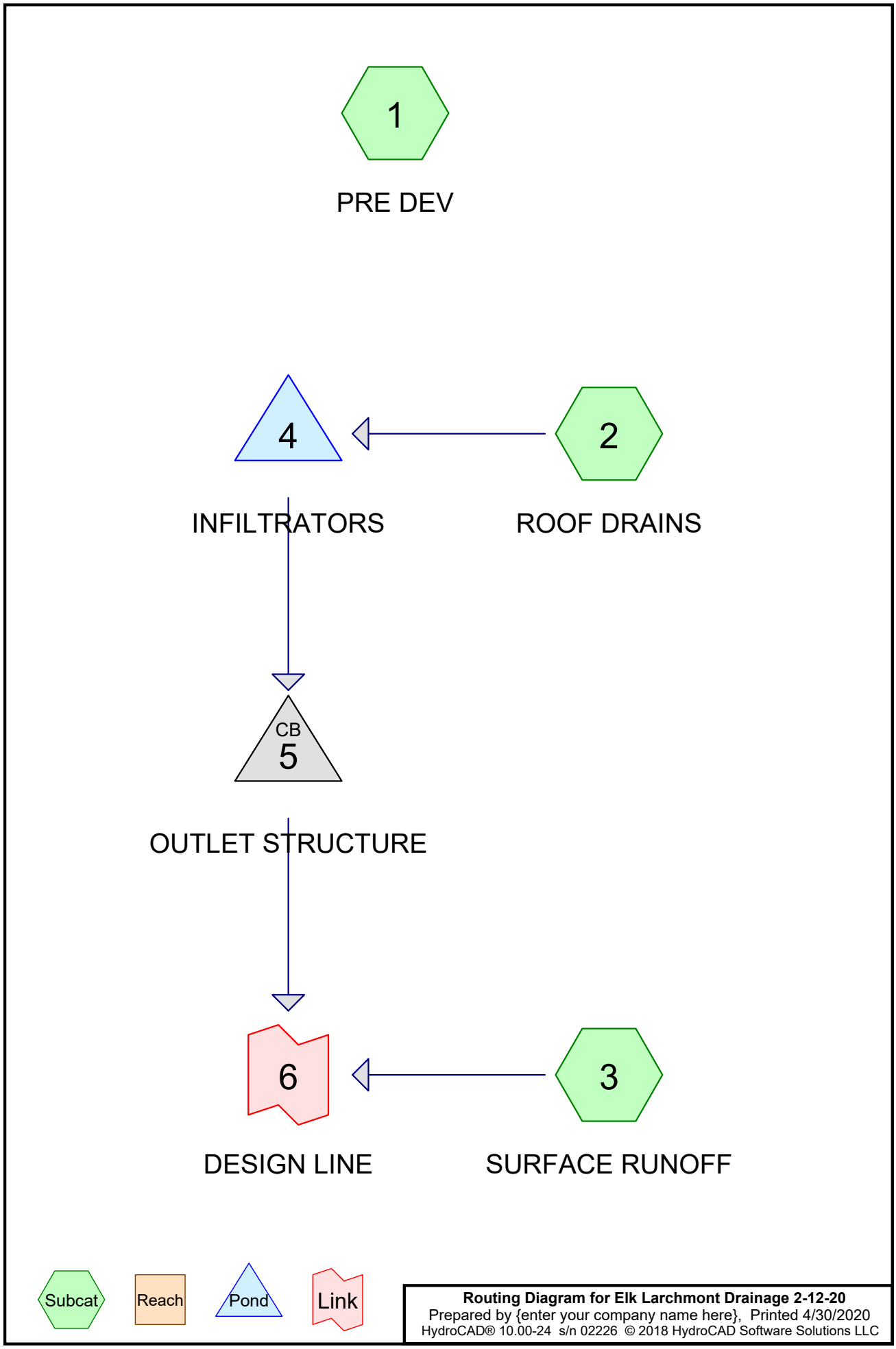
6.0 Outstanding Violations or Enforcement Actions:

There are no known outstanding violations or enforcement actions against this property, the owner or the applicant.

7.0 Conclusion:

Elk Homes is proposing to build a new multifamily building with retail space on a 0.25 acre site. The proposed area of disturbance is 0.30 acres. As part of the construction, a stormwater management system will be installed to treat the runoff from the redeveloped impervious surfaces. The stormwater management system was designed in accordance with the New York State Stormwater Management Design Manual and shall result in improved stormwater quality and with a properly implemented maintenance program will effectively mitigate any potential adverse impact of stormwater runoff from this project.

Appendix A:
Stormwater Quantity Analysis
(HydroCAD Output)



Routing Diagram for Elk Larchmont Drainage 2-12-20
Prepared by {enter your company name here}, Printed 4/30/2020

Time span=0.00-360.00 hrs, dt=0.01 hrs, 36001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: PRE DEV Runoff Area=11,000 sf 100.00% Impervious Runoff Depth=2.57"
Tc=6.0 min CN=98 Runoff=0.68 cfs 2,355 cf

Subcatchment 2: ROOF DRAINS Runoff Area=10,274 sf 95.13% Impervious Runoff Depth=2.36"
Tc=6.0 min CN=96 Runoff=0.61 cfs 2,017 cf

Subcatchment 3: SURFACE RUNOFF Runoff Area=726 sf 100.00% Impervious Runoff Depth=2.57"
Tc=6.0 min CN=98 Runoff=0.05 cfs 155 cf

Pond 4: INFILTRATORS Peak Elev=47.82' Storage=391 cf Inflow=0.61 cfs 2,017 cf
Discarded=0.16 cfs 2,017 cf Primary=0.00 cfs 0 cf Outflow=0.16 cfs 2,017 cf

Pond 5: OUTLET STRUCTURE Peak Elev=50.80' Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Link 6: DESIGN LINE Inflow=0.05 cfs 155 cf
Primary=0.05 cfs 155 cf

Total Runoff Area = 22,000 sf Runoff Volume = 4,527 cf Average Runoff Depth = 2.47"
2.27% Pervious = 500 sf 97.73% Impervious = 21,500 sf

Summary for Subcatchment 1: PRE DEV

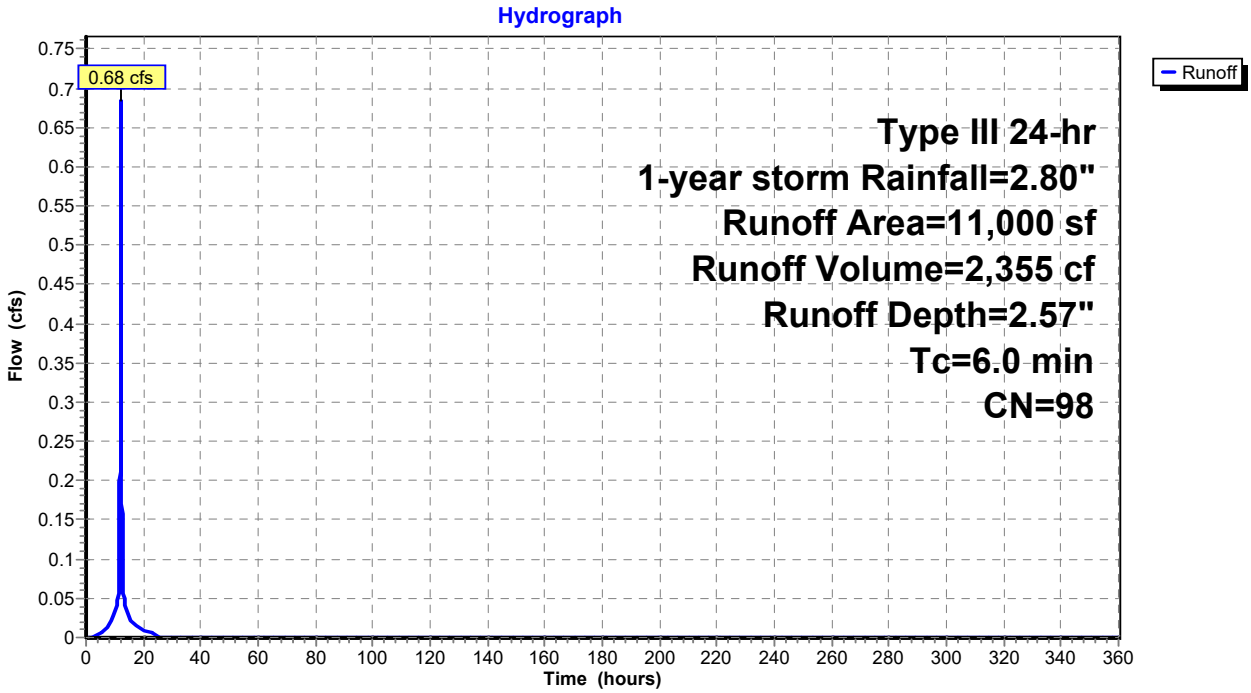
Runoff = 0.68 cfs @ 12.08 hrs, Volume= 2,355 cf, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year storm Rainfall=2.80"

Area (sf)	CN	Description
5,996	98	Roofs, HSG C
5,004	98	Paved parking, HSG C
11,000	98	Weighted Average
11,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC Min Tc TIME**

Subcatchment 1: PRE DEV



Summary for Subcatchment 2: ROOF DRAINS

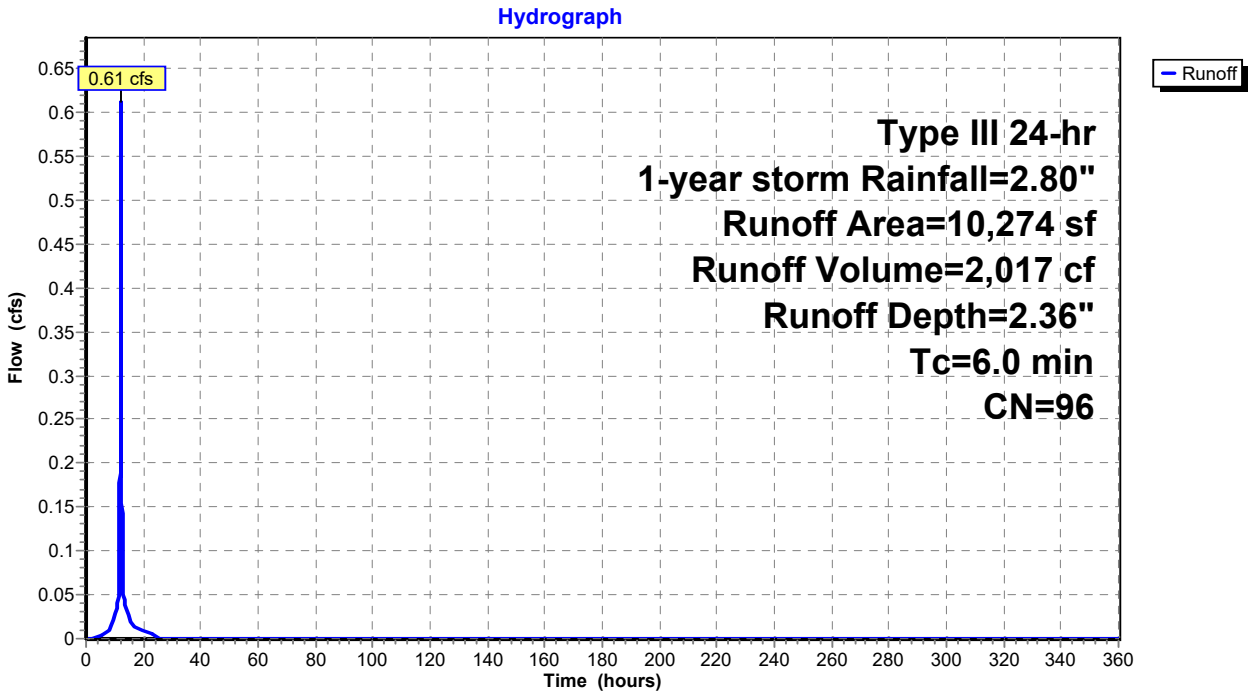
Runoff = 0.61 cfs @ 12.08 hrs, Volume= 2,017 cf, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year storm Rainfall=2.80"

Area (sf)	CN	Description
9,774	98	Roofs, HSG C
500	61	>75% Grass cover, Good, HSG B
10,274	96	Weighted Average
500		4.87% Pervious Area
9,774		95.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC MIN Tc TIME**

Subcatchment 2: ROOF DRAINS



Summary for Subcatchment 3: SURFACE RUNOFF

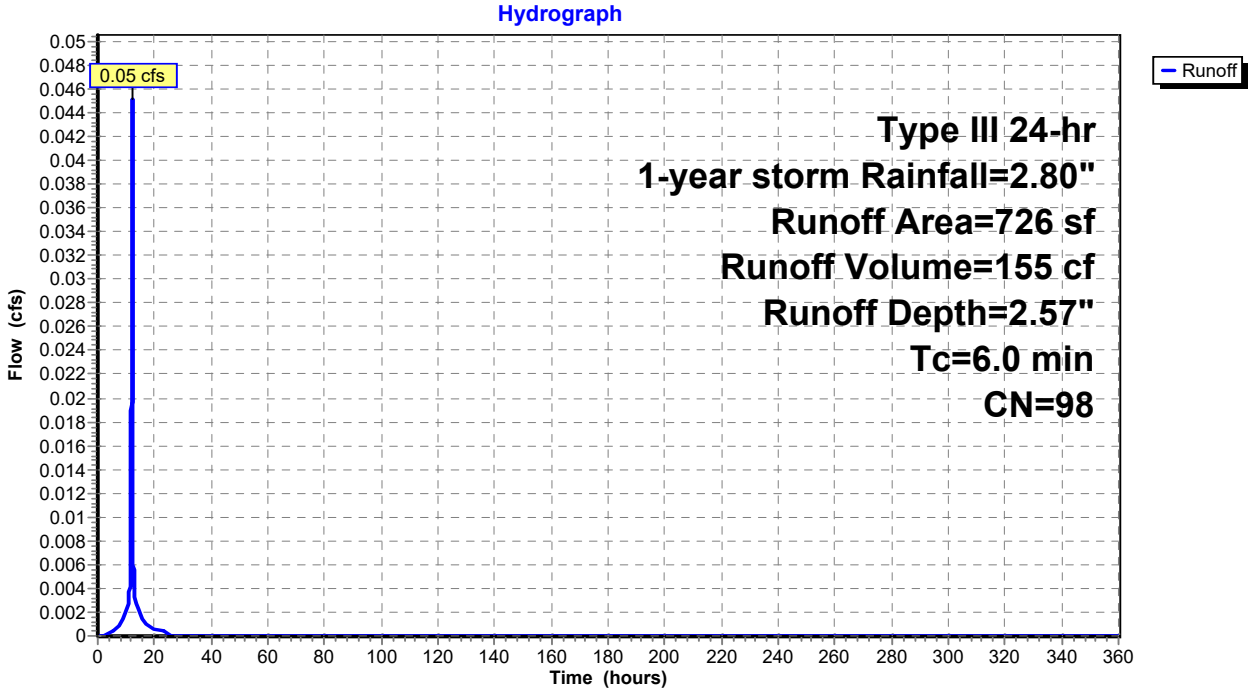
Runoff = 0.05 cfs @ 12.08 hrs, Volume= 155 cf, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-year storm Rainfall=2.80"

Area (sf)	CN	Description
726	98	Paved parking, HSG C
726		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC MIN Tc TIME**

Subcatchment 3: SURFACE RUNOFF



Summary for Pond 4: INFILTRATORS

Inflow Area = 10,274 sf, 95.13% Impervious, Inflow Depth = 2.36" for 1-year storm event
Inflow = 0.61 cfs @ 12.08 hrs, Volume= 2,017 cf
Outflow = 0.16 cfs @ 11.85 hrs, Volume= 2,017 cf, Atten= 75%, Lag= 0.0 min
Discarded = 0.16 cfs @ 11.85 hrs, Volume= 2,017 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Peak Elev= 47.82' @ 12.45 hrs Surf.Area= 840 sf Storage= 391 cf

Plug-Flow detention time= 11.8 min calculated for 2,017 cf (100% of inflow)
Center-of-Mass det. time= 11.8 min (789.8 - 777.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	738 cf	**16.00'W x 52.50'L x 3.54'H Field A** 2,975 cf Overall - 1,129 cf Embedded = 1,846 cf x 40.0% Voids
#2A	47.50'	1,129 cf	**Cultec R-330XLHD** x 21 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 3 rows
		1,867 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.00'	**8.000 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#2	Primary	50.00'	**6.0" Round Culvert X 2.00** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 50.00' / 50.00' S= 0.0000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.16 cfs @ 11.85 hrs HW=47.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=47.00' TW=50.80' (Dynamic Tailwater)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond 4: INFILTRATORS - 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 3 rows

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

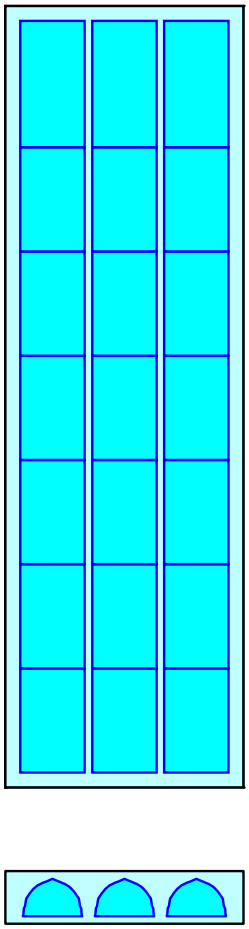
7 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 50.50' Row Length +12.0" End Stone x 2 = 52.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

21 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 1,128.8 cf Chamber Storage

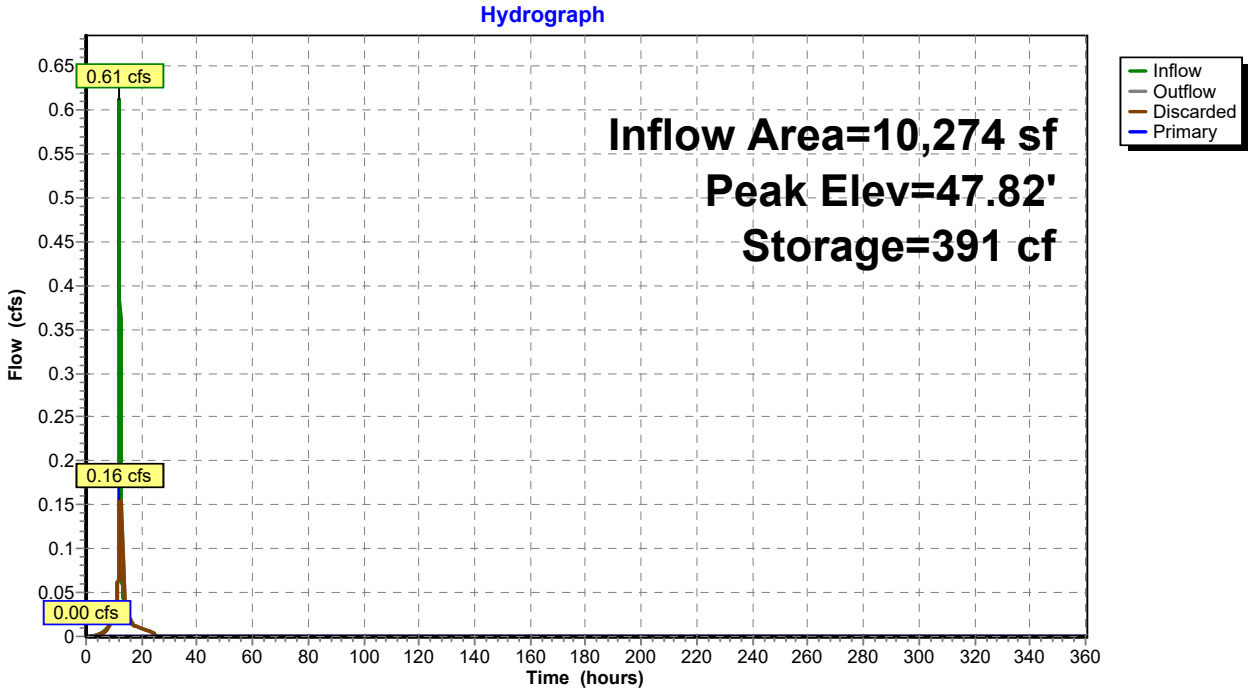
2,975.0 cf Field - 1,128.8 cf Chambers = 1,846.2 cf Stone x 40.0% Voids = 738.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,867.3 cf = 0.043 af
Overall Storage Efficiency = 62.8%
Overall System Size = 52.50' x 16.00' x 3.54'

21 Chambers
110.2 cy Field
68.4 cy Stone



Pond 4: INFILTRATORS



Summary for Pond 5: OUTLET STRUCTURE

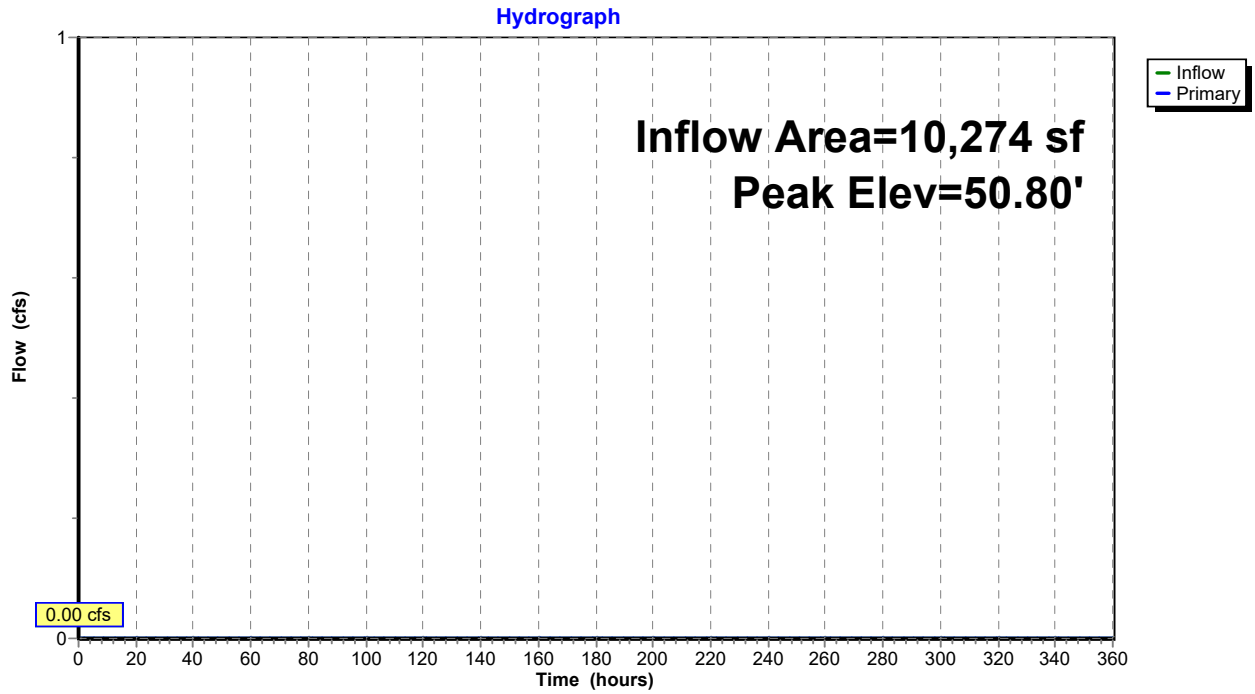
Inflow Area = 10,274 sf, 95.13% Impervious, Inflow Depth = 0.00" for 1-year storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Peak Elev= 50.80' @ 0.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	50.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=50.80' TW=0.00' (Dynamic Tailwater)
1=Orifice/Grate (Controls 0.00 cfs)

Pond 5: OUTLET STRUCTURE

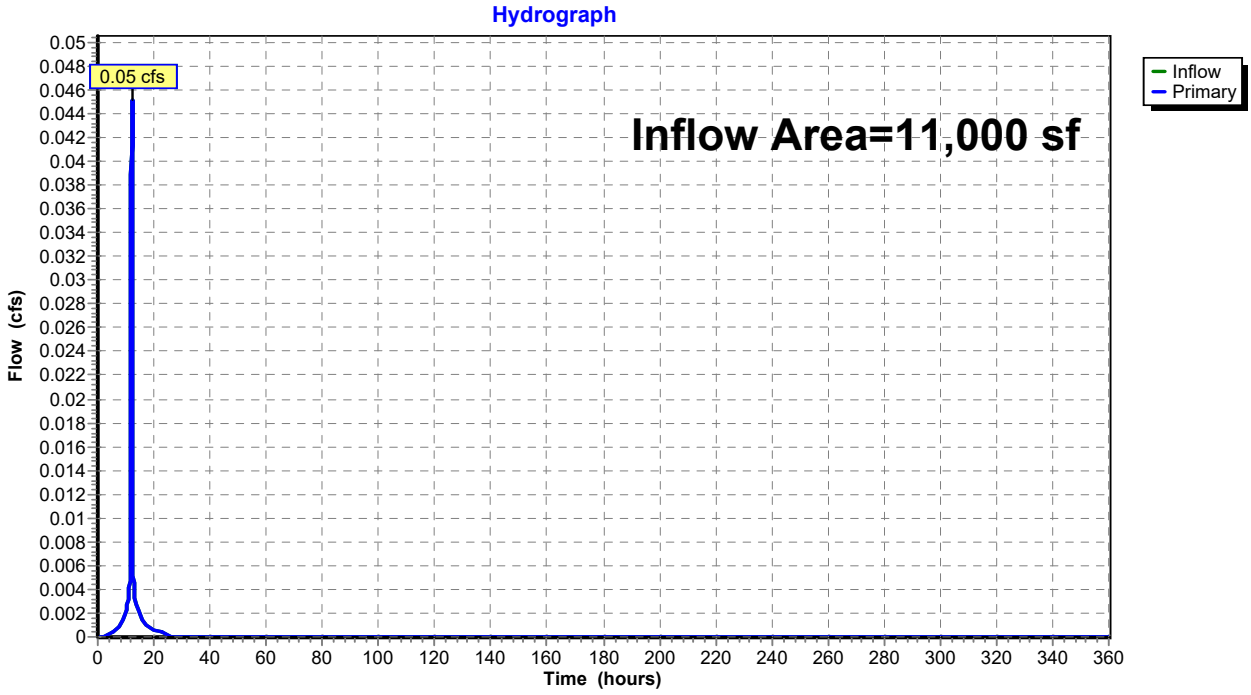


Summary for Link 6: DESIGN LINE

Inflow Area = 11,000 sf, 95.45% Impervious, Inflow Depth = 0.17" for 1-year storm event
Inflow = 0.05 cfs @ 12.08 hrs, Volume= 155 cf
Primary = 0.05 cfs @ 12.08 hrs, Volume= 155 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs

Link 6: DESIGN LINE



Time span=0.00-360.00 hrs, dt=0.01 hrs, 36001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: PRE DEV Runoff Area=11,000 sf 100.00% Impervious Runoff Depth=5.26"
Tc=6.0 min CN=98 Runoff=1.36 cfs 4,824 cf

Subcatchment 2: ROOF DRAINS Runoff Area=10,274 sf 95.13% Impervious Runoff Depth=5.03"
Tc=6.0 min CN=96 Runoff=1.25 cfs 4,306 cf

Subcatchment 3: SURFACE RUNOFF Runoff Area=726 sf 100.00% Impervious Runoff Depth=5.26"
Tc=6.0 min CN=98 Runoff=0.09 cfs 318 cf

Pond 4: INFILTRATORS Peak Elev=49.22' Storage=1,303 cf Inflow=1.25 cfs 4,306 cf
Discarded=0.16 cfs 4,306 cf Primary=0.00 cfs 0 cf Outflow=0.16 cfs 4,306 cf

Pond 5: OUTLET STRUCTURE Peak Elev=50.80' Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Link 6: DESIGN LINE Inflow=0.09 cfs 318 cf
Primary=0.09 cfs 318 cf

Total Runoff Area = 22,000 sf Runoff Volume = 9,449 cf Average Runoff Depth = 5.15"
2.27% Pervious = 500 sf 97.73% Impervious = 21,500 sf

Summary for Subcatchment 1: PRE DEV

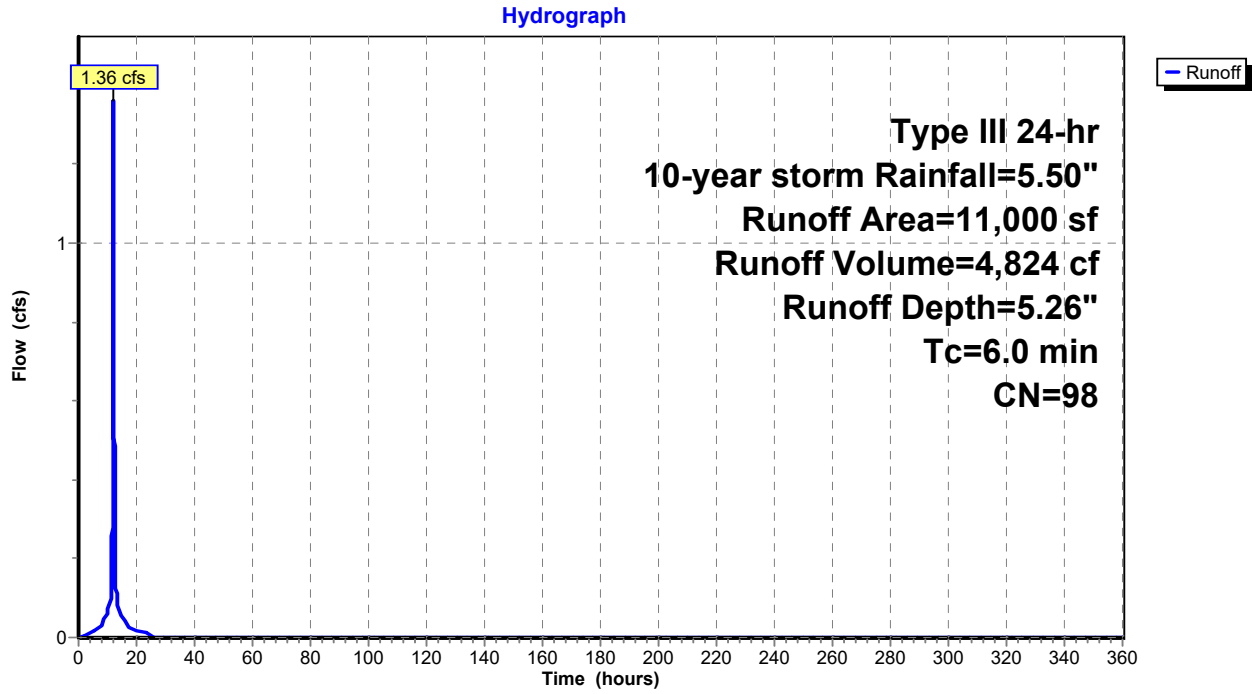
Runoff = 1.36 cfs @ 12.08 hrs, Volume= 4,824 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year storm Rainfall=5.50"

Area (sf)	CN	Description
5,996	98	Roofs, HSG C
5,004	98	Paved parking, HSG C
11,000	98	Weighted Average
11,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC Min Tc TIME**

Subcatchment 1: PRE DEV



Summary for Subcatchment 2: ROOF DRAINS

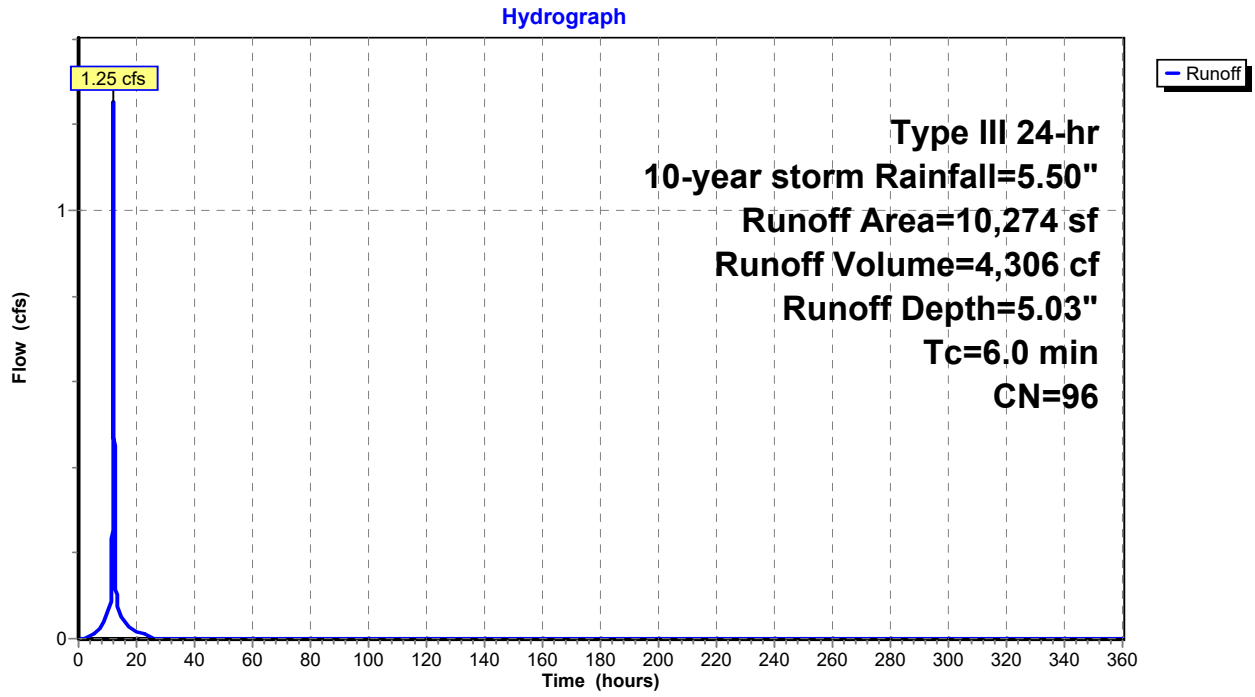
Runoff = 1.25 cfs @ 12.08 hrs, Volume= 4,306 cf, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year storm Rainfall=5.50"

Area (sf)	CN	Description
9,774	98	Roofs, HSG C
500	61	>75% Grass cover, Good, HSG B
10,274	96	Weighted Average
500		4.87% Pervious Area
9,774		95.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC MIN Tc TIME**

Subcatchment 2: ROOF DRAINS



Summary for Subcatchment 3: SURFACE RUNOFF

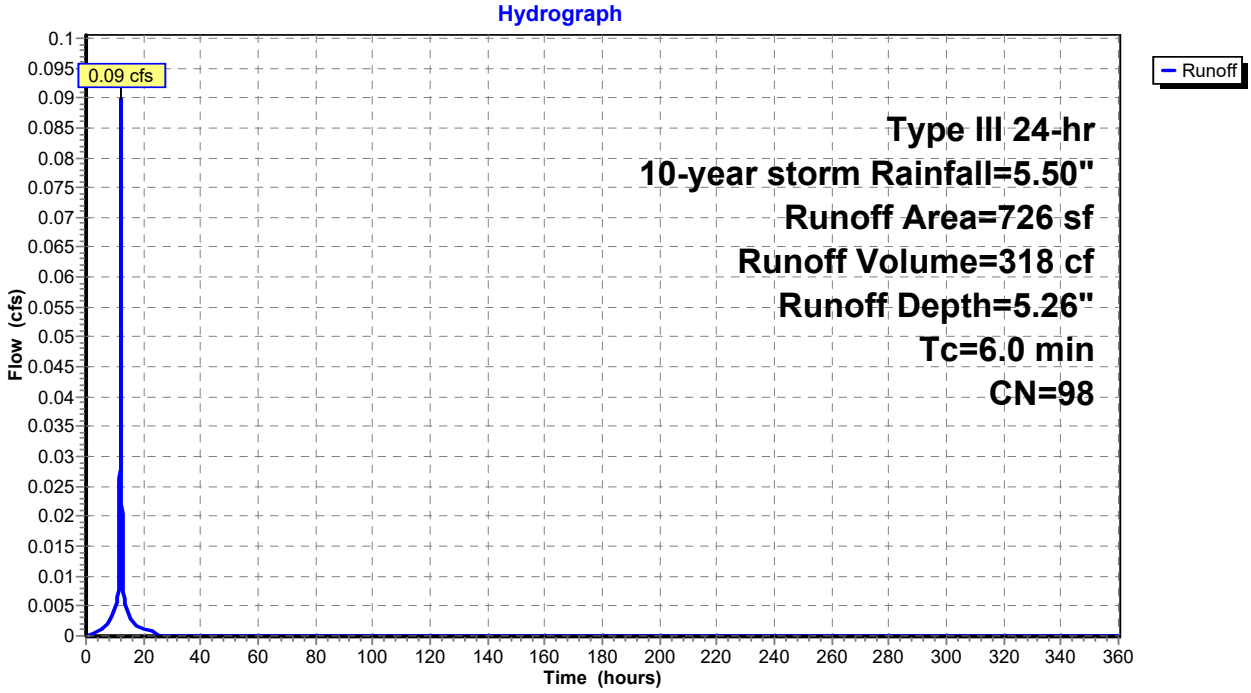
Runoff = 0.09 cfs @ 12.08 hrs, Volume= 318 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year storm Rainfall=5.50"

Area (sf)	CN	Description
726	98	Paved parking, HSG C
726		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC MIN Tc TIME**

Subcatchment 3: SURFACE RUNOFF



Summary for Pond 4: INFILTRATORS

Inflow Area = 10,274 sf, 95.13% Impervious, Inflow Depth = 5.03" for 10-year storm event
Inflow = 1.25 cfs @ 12.08 hrs, Volume= 4,306 cf
Outflow = 0.16 cfs @ 11.66 hrs, Volume= 4,306 cf, Atten= 88%, Lag= 0.0 min
Discarded = 0.16 cfs @ 11.66 hrs, Volume= 4,306 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Peak Elev= 49.22' @ 12.63 hrs Surf.Area= 840 sf Storage= 1,303 cf

Plug-Flow detention time= 51.3 min calculated for 4,306 cf (100% of inflow)
Center-of-Mass det. time= 51.3 min (811.5 - 760.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	738 cf	**16.00'W x 52.50'L x 3.54'H Field A** 2,975 cf Overall - 1,129 cf Embedded = 1,846 cf x 40.0% Voids
#2A	47.50'	1,129 cf	**Cultec R-330XLHD** x 21 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 3 rows
		1,867 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.00'	**8.000 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#2	Primary	50.00'	**6.0" Round Culvert X 2.00** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 50.00' / 50.00' S= 0.0000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.16 cfs @ 11.66 hrs HW=47.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=47.00' TW=50.80' (Dynamic Tailwater)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond 4: INFILTRATORS - 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 3 rows

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

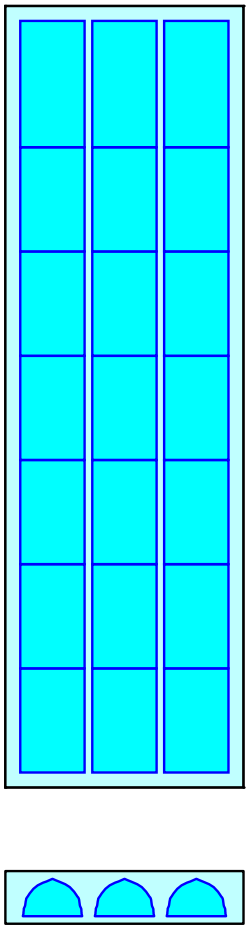
7 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 50.50' Row Length +12.0" End Stone x 2 = 52.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

21 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 1,128.8 cf Chamber Storage

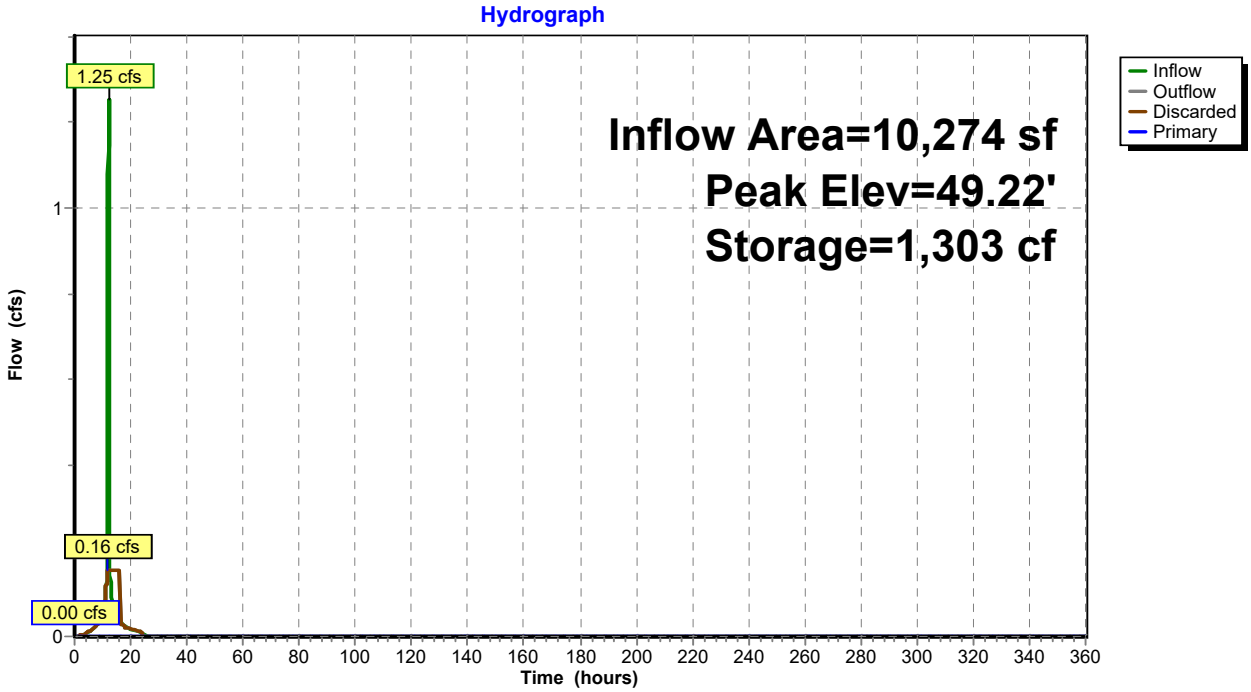
2,975.0 cf Field - 1,128.8 cf Chambers = 1,846.2 cf Stone x 40.0% Voids = 738.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,867.3 cf = 0.043 af
Overall Storage Efficiency = 62.8%
Overall System Size = 52.50' x 16.00' x 3.54'

21 Chambers
110.2 cy Field
68.4 cy Stone



Pond 4: INFILTRATORS



Summary for Pond 5: OUTLET STRUCTURE

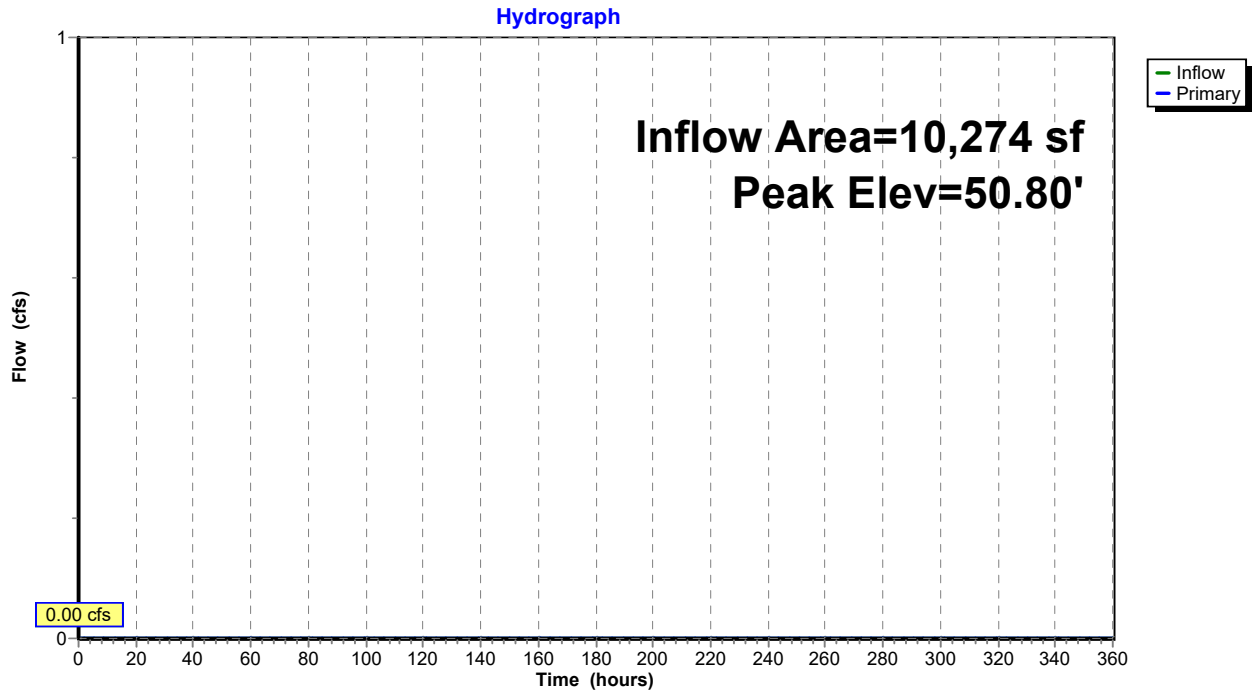
Inflow Area = 10,274 sf, 95.13% Impervious, Inflow Depth = 0.00" for 10-year storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Peak Elev= 50.80' @ 0.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	50.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=50.80' TW=0.00' (Dynamic Tailwater)
1=Orifice/Grate (Controls 0.00 cfs)

Pond 5: OUTLET STRUCTURE

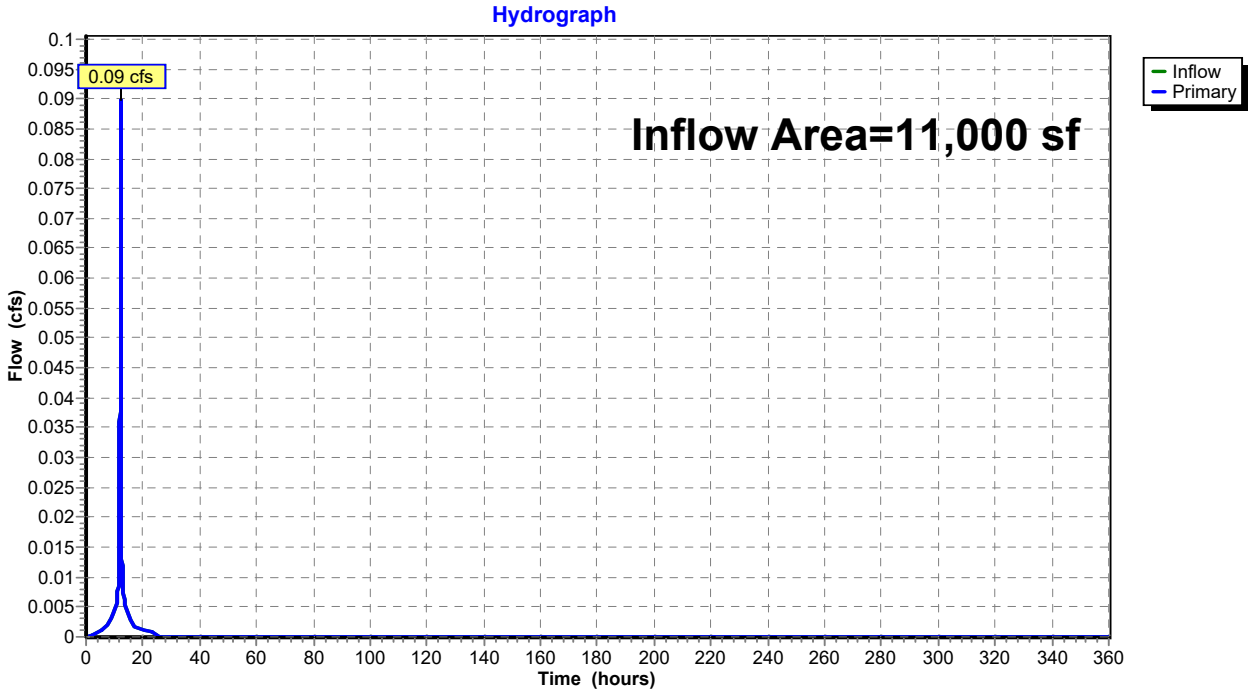


Summary for Link 6: DESIGN LINE

Inflow Area = 11,000 sf, 95.45% Impervious, Inflow Depth = 0.35" for 10-year storm event
Inflow = 0.09 cfs @ 12.08 hrs, Volume= 318 cf
Primary = 0.09 cfs @ 12.08 hrs, Volume= 318 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs

Link 6: DESIGN LINE



Time span=0.00-360.00 hrs, dt=0.01 hrs, 36001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: PRE DEV Runoff Area=11,000 sf 100.00% Impervious Runoff Depth=6.16"
Tc=6.0 min CN=98 Runoff=1.58 cfs 5,648 cf

Subcatchment 2: ROOF DRAINS Runoff Area=10,274 sf 95.13% Impervious Runoff Depth=5.93"
Tc=6.0 min CN=96 Runoff=1.46 cfs 5,073 cf

Subcatchment 3: SURFACE RUNOFF Runoff Area=726 sf 100.00% Impervious Runoff Depth=6.16"
Tc=6.0 min CN=98 Runoff=0.10 cfs 373 cf

Pond 4: INFILTRATORS Peak Elev=49.86' Storage=1,633 cf Inflow=1.46 cfs 5,073 cf
Discarded=0.16 cfs 5,073 cf Primary=0.00 cfs 0 cf Outflow=0.16 cfs 5,073 cf

Pond 5: OUTLET STRUCTURE Peak Elev=50.80' Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Link 6: DESIGN LINE Inflow=0.10 cfs 373 cf
Primary=0.10 cfs 373 cf

Total Runoff Area = 22,000 sf Runoff Volume = 11,094 cf Average Runoff Depth = 6.05"
2.27% Pervious = 500 sf 97.73% Impervious = 21,500 sf

Summary for Subcatchment 1: PRE DEV

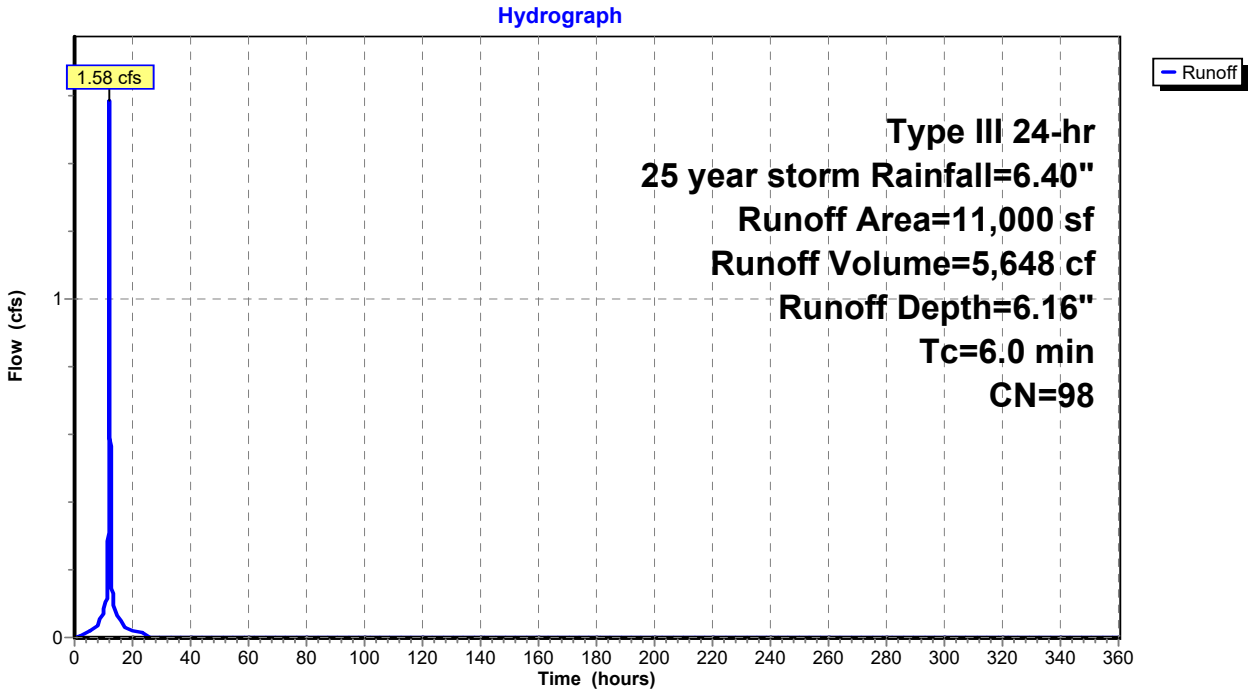
Runoff = 1.58 cfs @ 12.08 hrs, Volume= 5,648 cf, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year storm Rainfall=6.40"

Area (sf)	CN	Description
5,996	98	Roofs, HSG C
5,004	98	Paved parking, HSG C
11,000	98	Weighted Average
11,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC Min Tc TIME**

Subcatchment 1: PRE DEV



Summary for Subcatchment 2: ROOF DRAINS

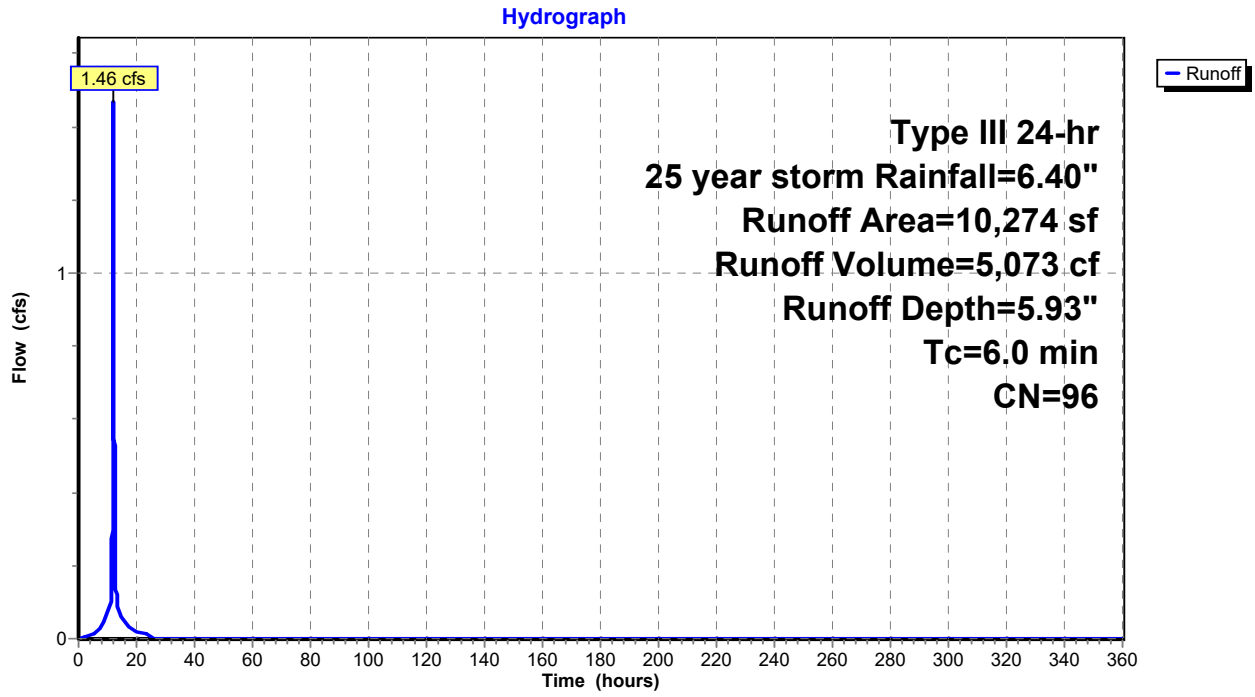
Runoff = 1.46 cfs @ 12.08 hrs, Volume= 5,073 cf, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year storm Rainfall=6.40"

Area (sf)	CN	Description
9,774	98	Roofs, HSG C
500	61	>75% Grass cover, Good, HSG B
10,274	96	Weighted Average
500		4.87% Pervious Area
9,774		95.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC MIN Tc TIME**

Subcatchment 2: ROOF DRAINS



Summary for Subcatchment 3: SURFACE RUNOFF

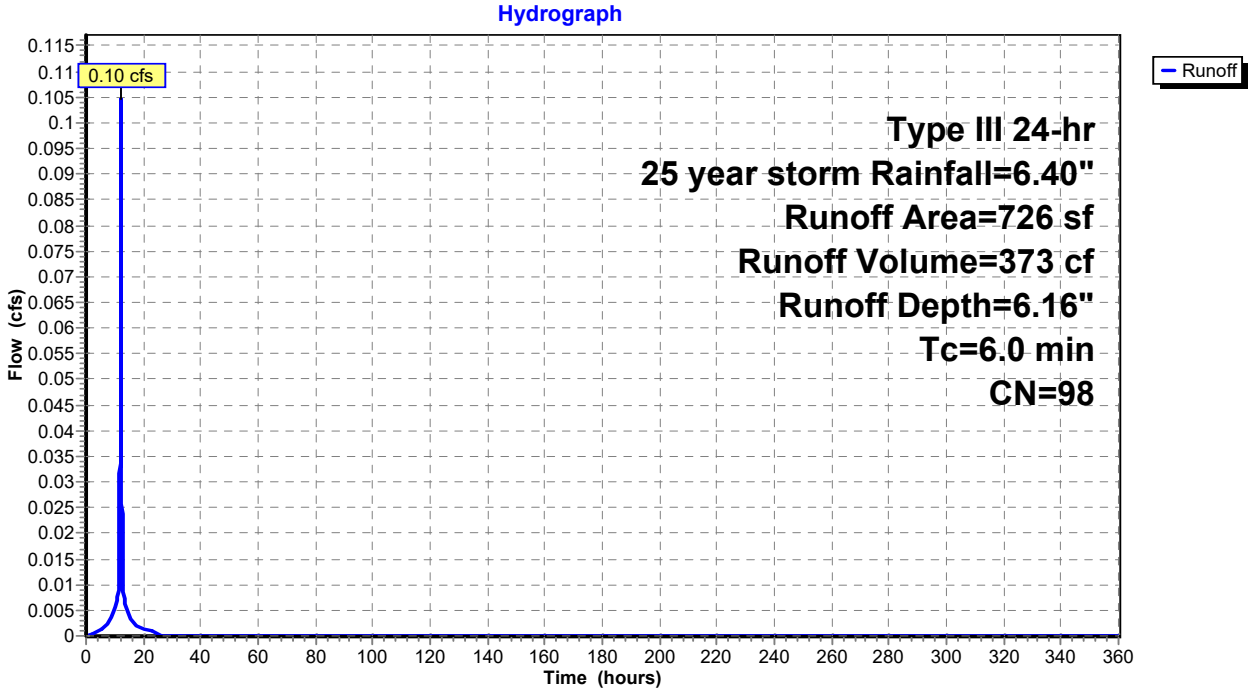
Runoff = 0.10 cfs @ 12.08 hrs, Volume= 373 cf, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year storm Rainfall=6.40"

Area (sf)	CN	Description
726	98	Paved parking, HSG C
726		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC MIN Tc TIME**

Subcatchment 3: SURFACE RUNOFF



Summary for Pond 4: INFILTRATORS

Inflow Area = 10,274 sf, 95.13% Impervious, Inflow Depth = 5.93" for 25 year storm event
Inflow = 1.46 cfs @ 12.08 hrs, Volume= 5,073 cf
Outflow = 0.16 cfs @ 11.61 hrs, Volume= 5,073 cf, Atten= 89%, Lag= 0.0 min
Discarded = 0.16 cfs @ 11.61 hrs, Volume= 5,073 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Peak Elev= 49.86' @ 12.77 hrs Surf.Area= 840 sf Storage= 1,633 cf

Plug-Flow detention time= 68.0 min calculated for 5,073 cf (100% of inflow)
Center-of-Mass det. time= 68.0 min (824.8 - 756.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	738 cf	**16.00'W x 52.50'L x 3.54'H Field A** 2,975 cf Overall - 1,129 cf Embedded = 1,846 cf x 40.0% Voids
#2A	47.50'	1,129 cf	**Cultec R-330XLHD** x 21 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 3 rows
		1,867 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.00'	**8.000 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#2	Primary	50.00'	**6.0" Round Culvert X 2.00** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 50.00' / 50.00' S= 0.0000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.16 cfs @ 11.61 hrs HW=47.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=47.00' TW=50.80' (Dynamic Tailwater)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond 4: INFILTRATORS - 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 3 rows

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

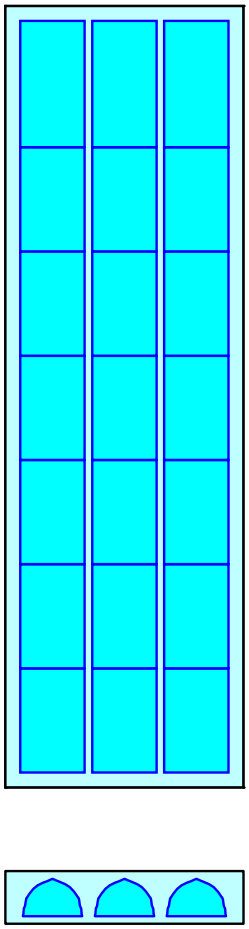
7 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 50.50' Row Length +12.0" End Stone x 2 = 52.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

21 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 1,128.8 cf Chamber Storage

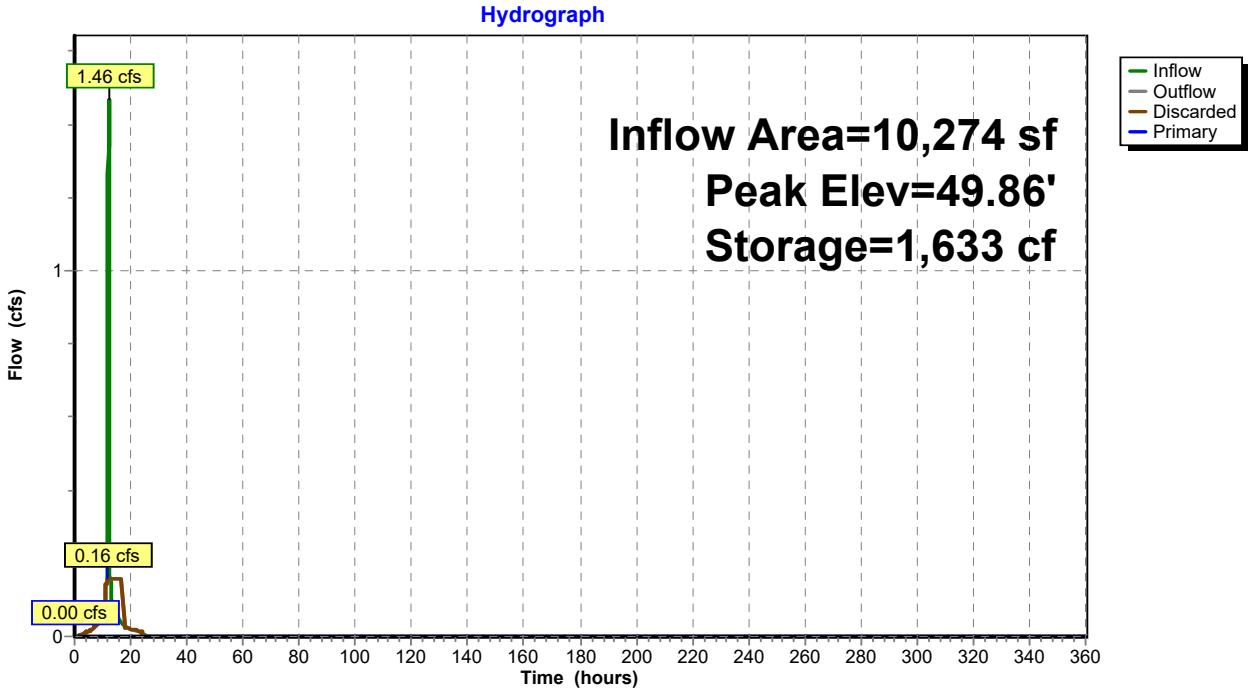
2,975.0 cf Field - 1,128.8 cf Chambers = 1,846.2 cf Stone x 40.0% Voids = 738.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,867.3 cf = 0.043 af
Overall Storage Efficiency = 62.8%
Overall System Size = 52.50' x 16.00' x 3.54'

21 Chambers
110.2 cy Field
68.4 cy Stone



Pond 4: INFILTRATORS



Summary for Pond 5: OUTLET STRUCTURE

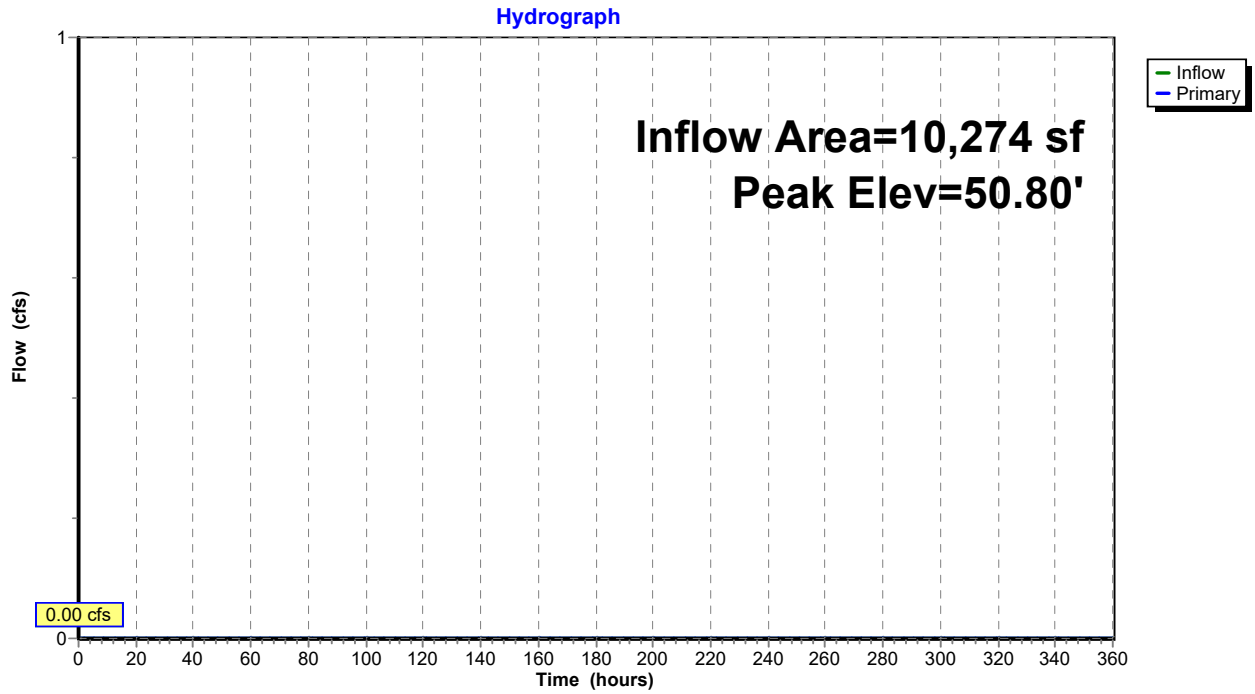
Inflow Area = 10,274 sf, 95.13% Impervious, Inflow Depth = 0.00" for 25 year storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Peak Elev= 50.80' @ 0.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	50.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=50.80' TW=0.00' (Dynamic Tailwater)
1=Orifice/Grate (Controls 0.00 cfs)

Pond 5: OUTLET STRUCTURE

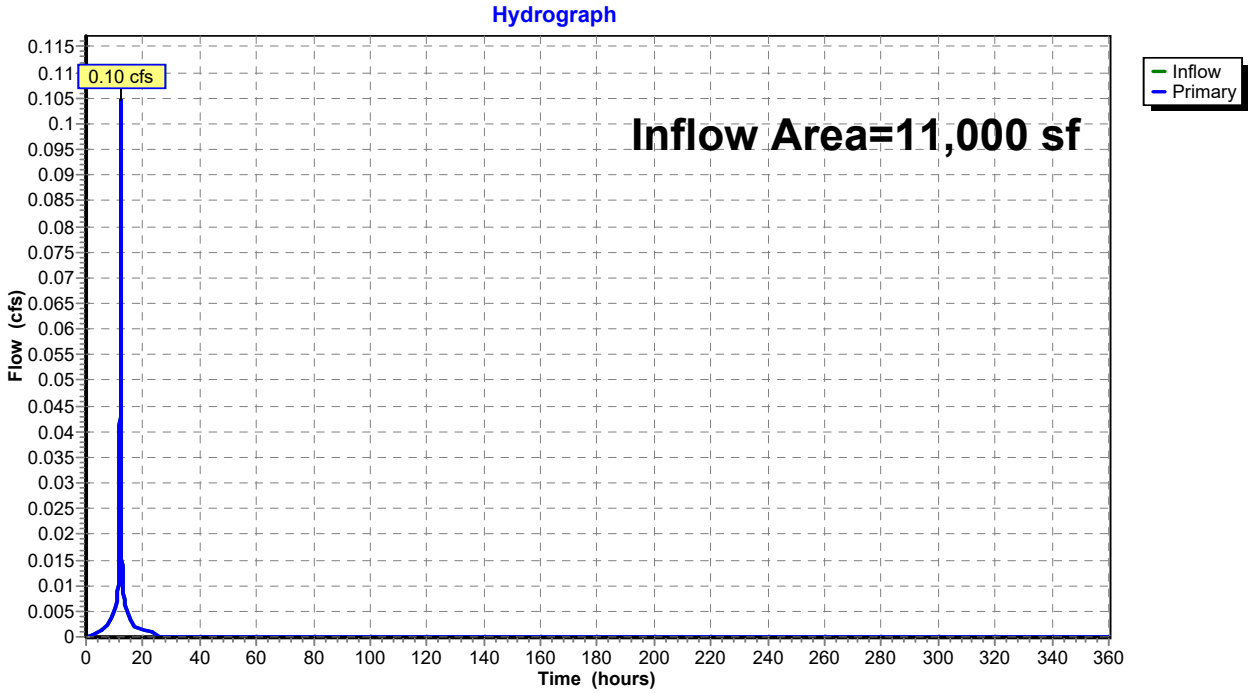


Summary for Link 6: DESIGN LINE

Inflow Area = 11,000 sf, 95.45% Impervious, Inflow Depth = 0.41" for 25 year storm event
Inflow = 0.10 cfs @ 12.08 hrs, Volume= 373 cf
Primary = 0.10 cfs @ 12.08 hrs, Volume= 373 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs

Link 6: DESIGN LINE



Time span=0.00-360.00 hrs, dt=0.01 hrs, 36001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: PRE DEV Runoff Area=11,000 sf 100.00% Impervious Runoff Depth=7.35"
Tc=6.0 min CN=98 Runoff=1.88 cfs 6,738 cf

Subcatchment 2: ROOF DRAINS Runoff Area=10,274 sf 95.13% Impervious Runoff Depth=7.11"
Tc=6.0 min CN=96 Runoff=1.74 cfs 6,089 cf

Subcatchment 3: SURFACE RUNOFF Runoff Area=726 sf 100.00% Impervious Runoff Depth=7.35"
Tc=6.0 min CN=98 Runoff=0.12 cfs 445 cf

Pond 4: INFILTRATORS Peak Elev=50.91' Storage=1,867 cf Inflow=1.74 cfs 6,089 cf
Discarded=0.16 cfs 5,851 cf Primary=0.47 cfs 238 cf Outflow=0.63 cfs 6,089 cf

Pond 5: OUTLET STRUCTURE Peak Elev=50.87' Inflow=0.47 cfs 238 cf
Outflow=0.47 cfs 238 cf

Link 6: DESIGN LINE Inflow=0.51 cfs 682 cf
Primary=0.51 cfs 682 cf

Total Runoff Area = 22,000 sf Runoff Volume = 13,272 cf Average Runoff Depth = 7.24"
2.27% Pervious = 500 sf 97.73% Impervious = 21,500 sf

Summary for Subcatchment 1: PRE DEV

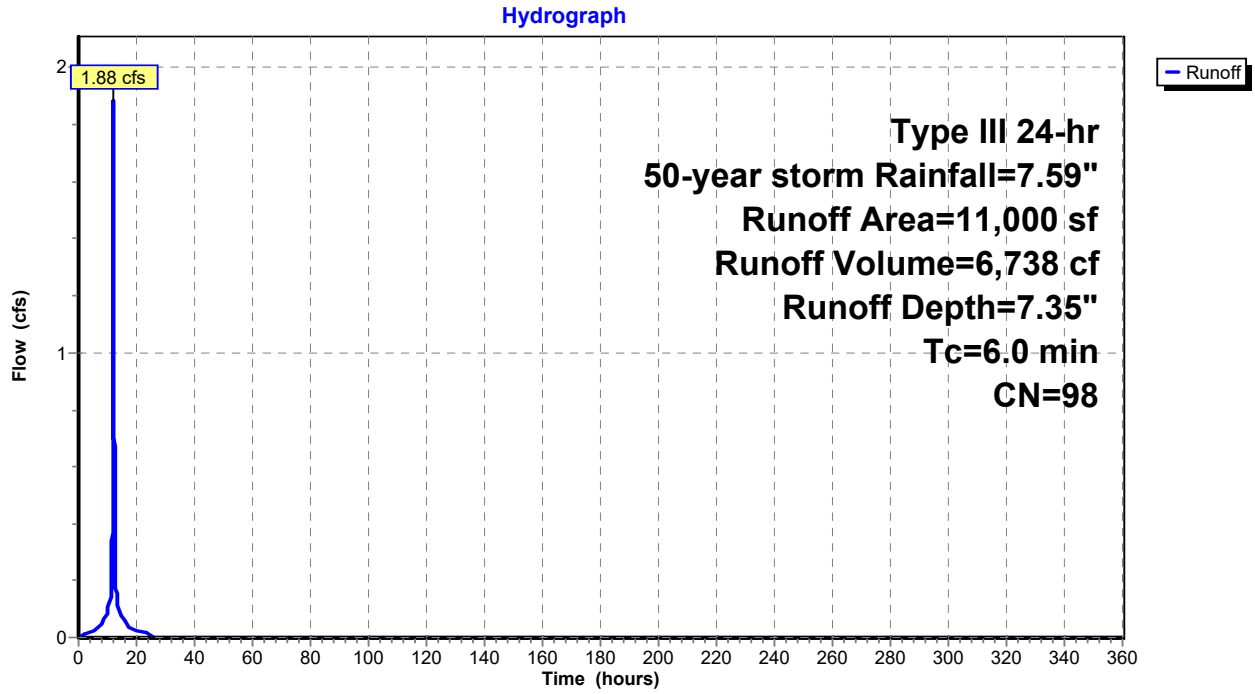
Runoff = 1.88 cfs @ 12.08 hrs, Volume= 6,738 cf, Depth= 7.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year storm Rainfall=7.59"

Area (sf)	CN	Description
5,996	98	Roofs, HSG C
5,004	98	Paved parking, HSG C
11,000	98	Weighted Average
11,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC Min Tc TIME**

Subcatchment 1: PRE DEV



Summary for Subcatchment 2: ROOF DRAINS

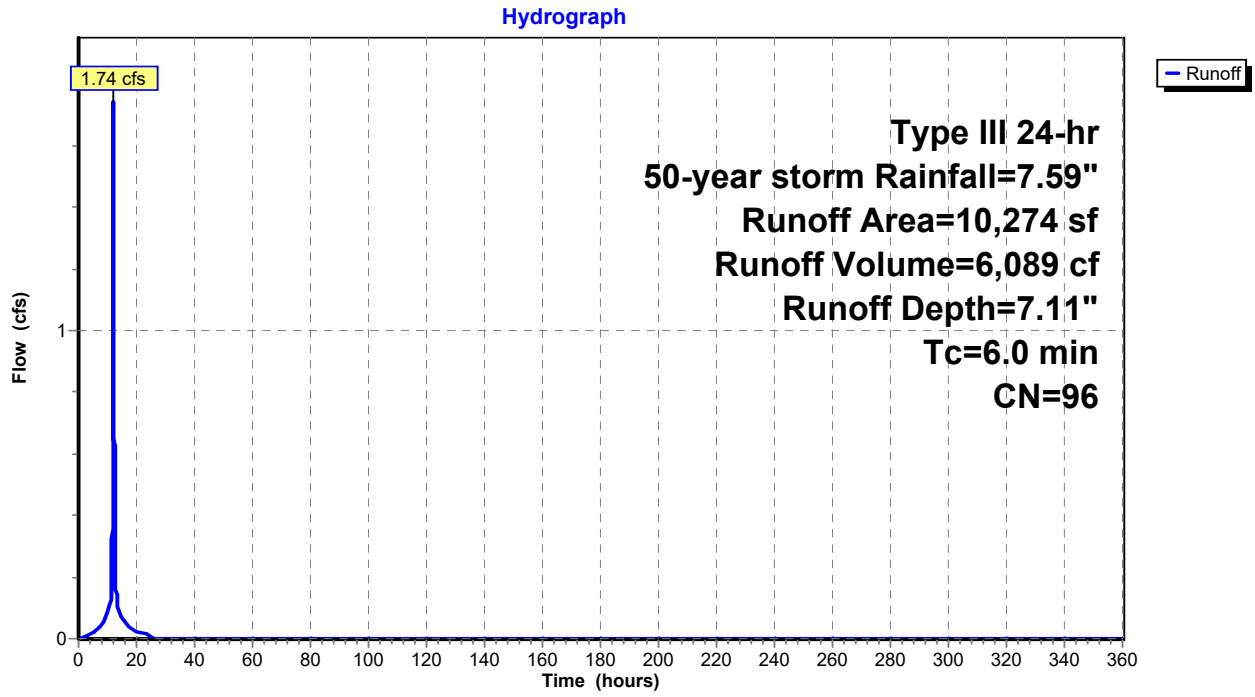
Runoff = 1.74 cfs @ 12.08 hrs, Volume= 6,089 cf, Depth= 7.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year storm Rainfall=7.59"

Area (sf)	CN	Description
9,774	98	Roofs, HSG C
500	61	>75% Grass cover, Good, HSG B
10,274	96	Weighted Average
500		4.87% Pervious Area
9,774		95.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC MIN Tc TIME**

Subcatchment 2: ROOF DRAINS



Summary for Subcatchment 3: SURFACE RUNOFF

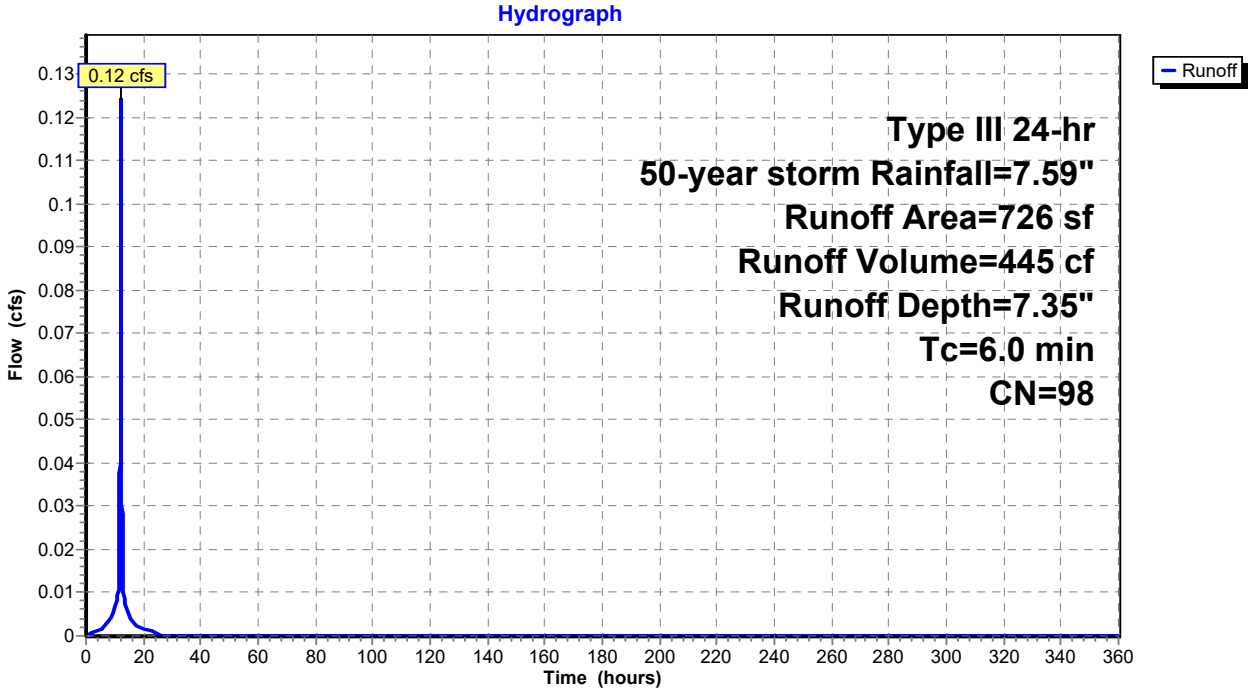
Runoff = 0.12 cfs @ 12.08 hrs, Volume= 445 cf, Depth= 7.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year storm Rainfall=7.59"

Area (sf)	CN	Description
726	98	Paved parking, HSG C
726		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC MIN Tc TIME**

Subcatchment 3: SURFACE RUNOFF



Summary for Pond 4: INFILTRATORS

Inflow Area = 10,274 sf, 95.13% Impervious, Inflow Depth = 7.11" for 50-year storm event
Inflow = 1.74 cfs @ 12.08 hrs, Volume= 6,089 cf
Outflow = 0.63 cfs @ 12.37 hrs, Volume= 6,089 cf, Atten= 64%, Lag= 17.4 min
Discarded = 0.16 cfs @ 11.44 hrs, Volume= 5,851 cf
Primary = 0.47 cfs @ 12.37 hrs, Volume= 238 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Peak Elev= 50.91' @ 12.39 hrs Surf.Area= 840 sf Storage= 1,867 cf

Plug-Flow detention time= 78.0 min calculated for 6,089 cf (100% of inflow)
Center-of-Mass det. time= 78.0 min (831.3 - 753.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	738 cf	**16.00'W x 52.50'L x 3.54'H Field A** 2,975 cf Overall - 1,129 cf Embedded = 1,846 cf x 40.0% Voids
#2A	47.50'	1,129 cf	**Cultec R-330XLHD** x 21 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 3 rows
		1,867 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.00'	**8.000 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#2	Primary	50.00'	**6.0" Round Culvert X 2.00** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 50.00' / 50.00' S= 0.0000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.16 cfs @ 11.44 hrs HW=47.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.19 cfs @ 12.37 hrs HW=50.87' TW=50.86' (Dynamic Tailwater)
2=Culvert (Outlet Controls 0.19 cfs @ 0.49 fps)

Pond 4: INFILTRATORS - 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 3 rows

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

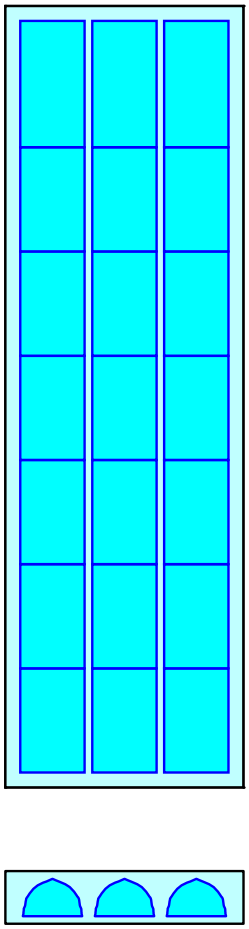
7 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 50.50' Row Length +12.0" End Stone x 2 = 52.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

21 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 1,128.8 cf Chamber Storage

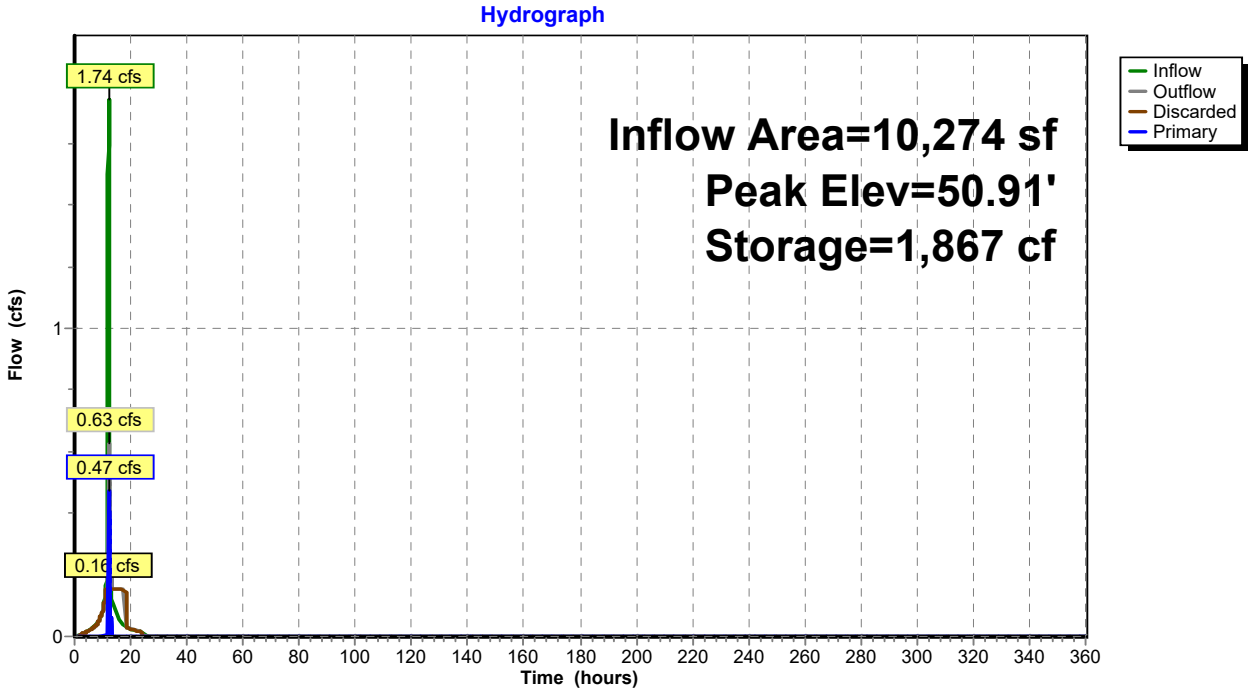
2,975.0 cf Field - 1,128.8 cf Chambers = 1,846.2 cf Stone x 40.0% Voids = 738.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,867.3 cf = 0.043 af
Overall Storage Efficiency = 62.8%
Overall System Size = 52.50' x 16.00' x 3.54'

21 Chambers
110.2 cy Field
68.4 cy Stone



Pond 4: INFILTRATORS



Summary for Pond 5: OUTLET STRUCTURE

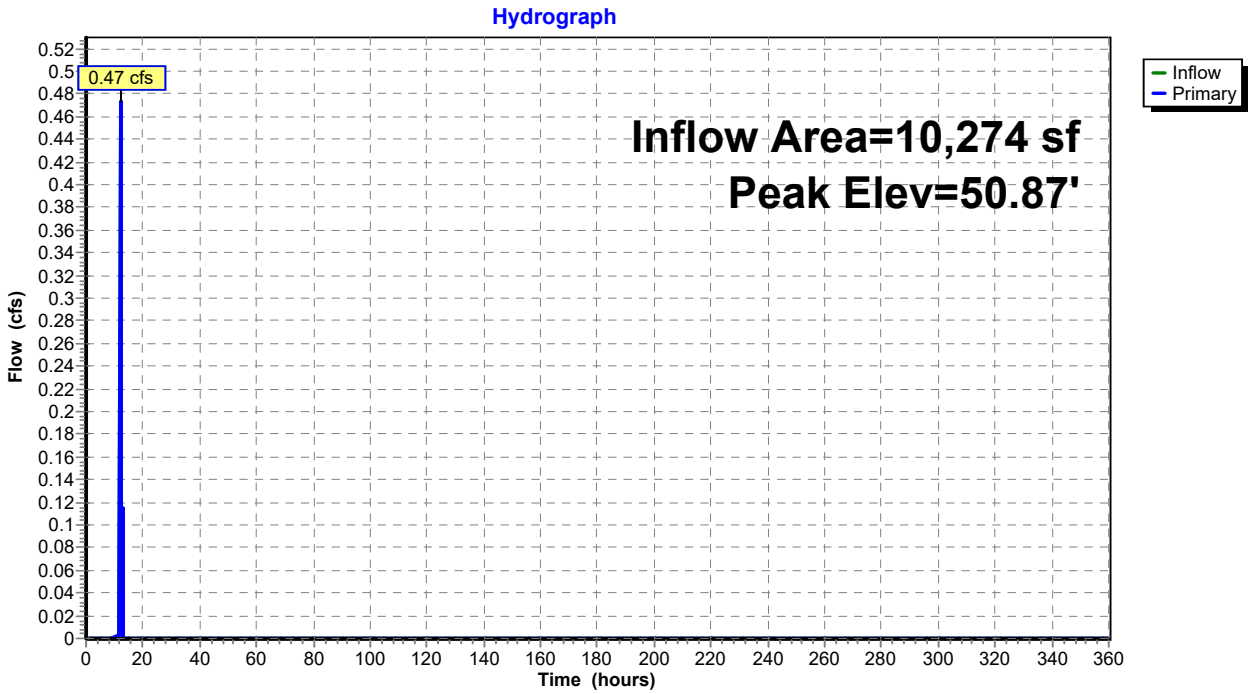
Inflow Area = 10,274 sf, 95.13% Impervious, Inflow Depth = 0.28" for 50-year storm event
Inflow = 0.47 cfs @ 12.37 hrs, Volume= 238 cf
Outflow = 0.47 cfs @ 12.37 hrs, Volume= 238 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.47 cfs @ 12.37 hrs, Volume= 238 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Peak Elev= 50.87' @ 12.37 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	50.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.41 cfs @ 12.37 hrs HW=50.86' TW=0.00' (Dynamic Tailwater)
1=Orifice/Grate (Weir Controls 0.41 cfs @ 0.82 fps)

Pond 5: OUTLET STRUCTURE

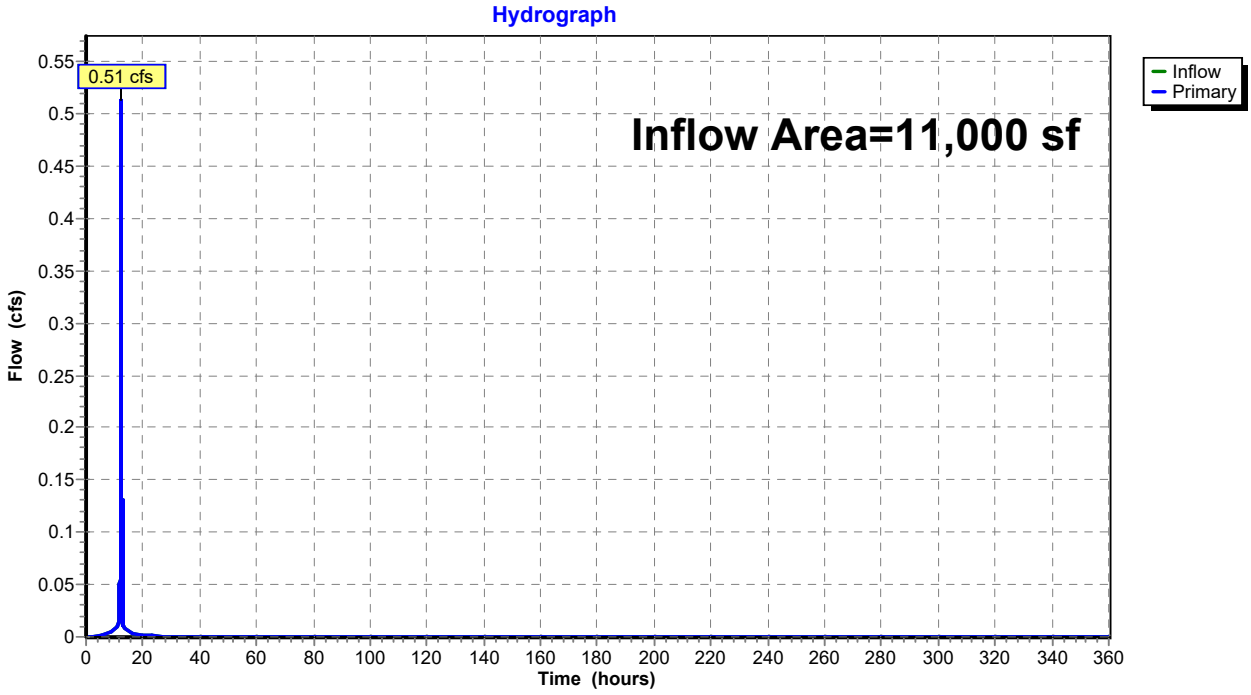


Summary for Link 6: DESIGN LINE

Inflow Area = 11,000 sf, 95.45% Impervious, Inflow Depth = 0.74" for 50-year storm event
Inflow = 0.51 cfs @ 12.37 hrs, Volume= 682 cf
Primary = 0.51 cfs @ 12.37 hrs, Volume= 682 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs

Link 6: DESIGN LINE



Time span=0.00-360.00 hrs, dt=0.01 hrs, 36001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: PRE DEV Runoff Area=11,000 sf 100.00% Impervious Runoff Depth=1.28"
Tc=6.0 min CN=98 Runoff=0.35 cfs 1,173 cf

Subcatchment 2: ROOF DRAINS Runoff Area=10,274 sf 95.13% Impervious Runoff Depth=1.09"
Tc=6.0 min CN=96 Runoff=0.30 cfs 937 cf

Subcatchment 3: SURFACE RUNOFF Runoff Area=726 sf 100.00% Impervious Runoff Depth=1.28"
Tc=6.0 min CN=98 Runoff=0.02 cfs 77 cf

Pond 4: INFILTRATORS Peak Elev=47.20' Storage=67 cf Inflow=0.30 cfs 937 cf
Discarded=0.16 cfs 937 cf Primary=0.00 cfs 0 cf Outflow=0.16 cfs 937 cf

Pond 5: OUTLET STRUCTURE Peak Elev=50.80' Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Link 6: DESIGN LINE Inflow=0.02 cfs 77 cf
Primary=0.02 cfs 77 cf

Total Runoff Area = 22,000 sf Runoff Volume = 2,188 cf Average Runoff Depth = 1.19"
2.27% Pervious = 500 sf 97.73% Impervious = 21,500 sf

Summary for Subcatchment 1: PRE DEV

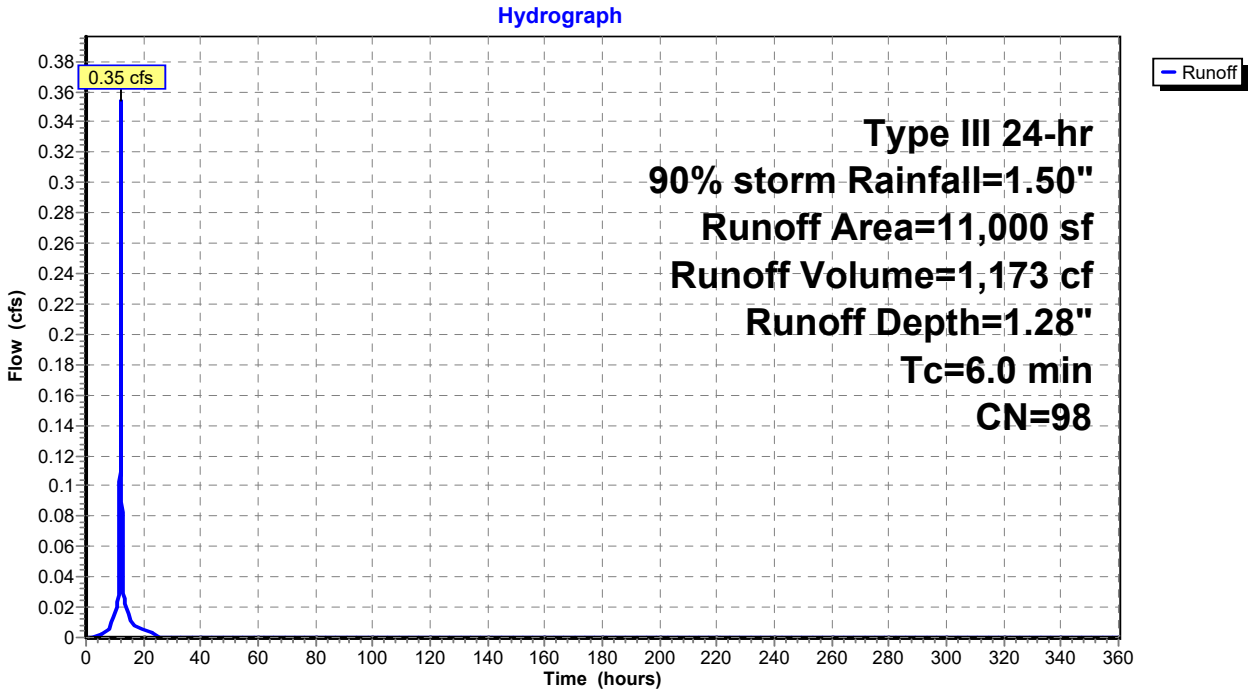
Runoff = 0.35 cfs @ 12.08 hrs, Volume= 1,173 cf, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 90% storm Rainfall=1.50"

Area (sf)	CN	Description
5,996	98	Roofs, HSG C
5,004	98	Paved parking, HSG C
11,000	98	Weighted Average
11,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC Min Tc TIME**

Subcatchment 1: PRE DEV



Summary for Subcatchment 2: ROOF DRAINS

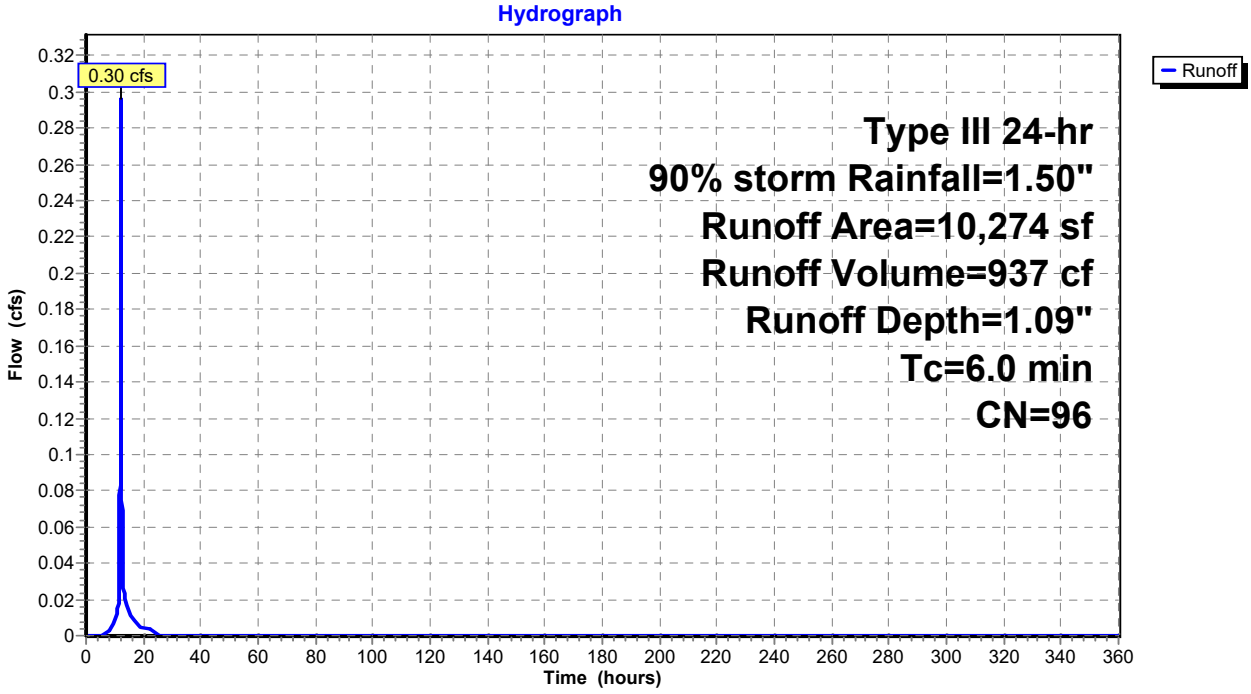
Runoff = 0.30 cfs @ 12.09 hrs, Volume= 937 cf, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 90% storm Rainfall=1.50"

Area (sf)	CN	Description
9,774	98	Roofs, HSG C
500	61	>75% Grass cover, Good, HSG B
10,274	96	Weighted Average
500		4.87% Pervious Area
9,774		95.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC MIN Tc TIME**

Subcatchment 2: ROOF DRAINS



Summary for Subcatchment 3: SURFACE RUNOFF

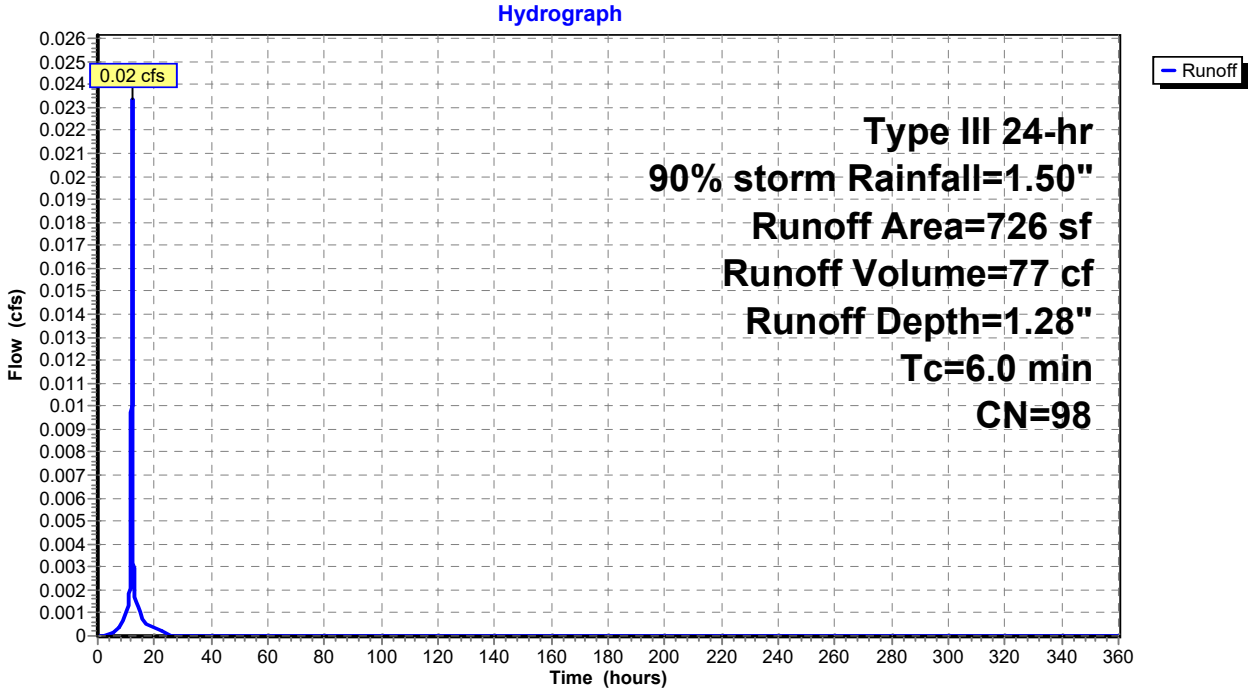
Runoff = 0.02 cfs @ 12.08 hrs, Volume= 77 cf, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Type III 24-hr 90% storm Rainfall=1.50"

Area (sf)	CN	Description
726	98	Paved parking, HSG C
726		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, NYSDEC MIN Tc TIME**

Subcatchment 3: SURFACE RUNOFF



Summary for Pond 4: INFILTRATORS

Inflow Area = 10,274 sf, 95.13% Impervious, Inflow Depth = 1.09" for 90% storm event
Inflow = 0.30 cfs @ 12.09 hrs, Volume= 937 cf
Outflow = 0.16 cfs @ 12.04 hrs, Volume= 937 cf, Atten= 47%, Lag= 0.0 min
Discarded = 0.16 cfs @ 12.04 hrs, Volume= 937 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Peak Elev= 47.20' @ 12.22 hrs Surf.Area= 840 sf Storage= 67 cf

Plug-Flow detention time= 1.7 min calculated for 937 cf (100% of inflow)
Center-of-Mass det. time= 1.7 min (800.3 - 798.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	738 cf	**16.00'W x 52.50'L x 3.54'H Field A** 2,975 cf Overall - 1,129 cf Embedded = 1,846 cf x 40.0% Voids
#2A	47.50'	1,129 cf	**Cultec R-330XLHD** x 21 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 3 rows
		1,867 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.00'	**8.000 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#2	Primary	50.00'	**6.0" Round Culvert X 2.00** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 50.00' / 50.00' S= 0.0000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.16 cfs @ 12.04 hrs HW=47.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=47.00' TW=50.80' (Dynamic Tailwater)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond 4: INFILTRATORS - 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 3 rows

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

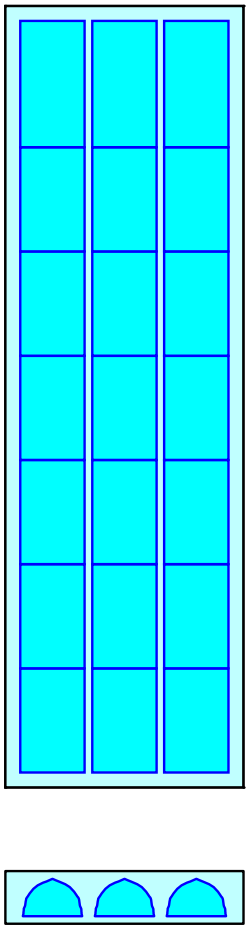
7 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 50.50' Row Length +12.0" End Stone x 2 = 52.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

21 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 1,128.8 cf Chamber Storage

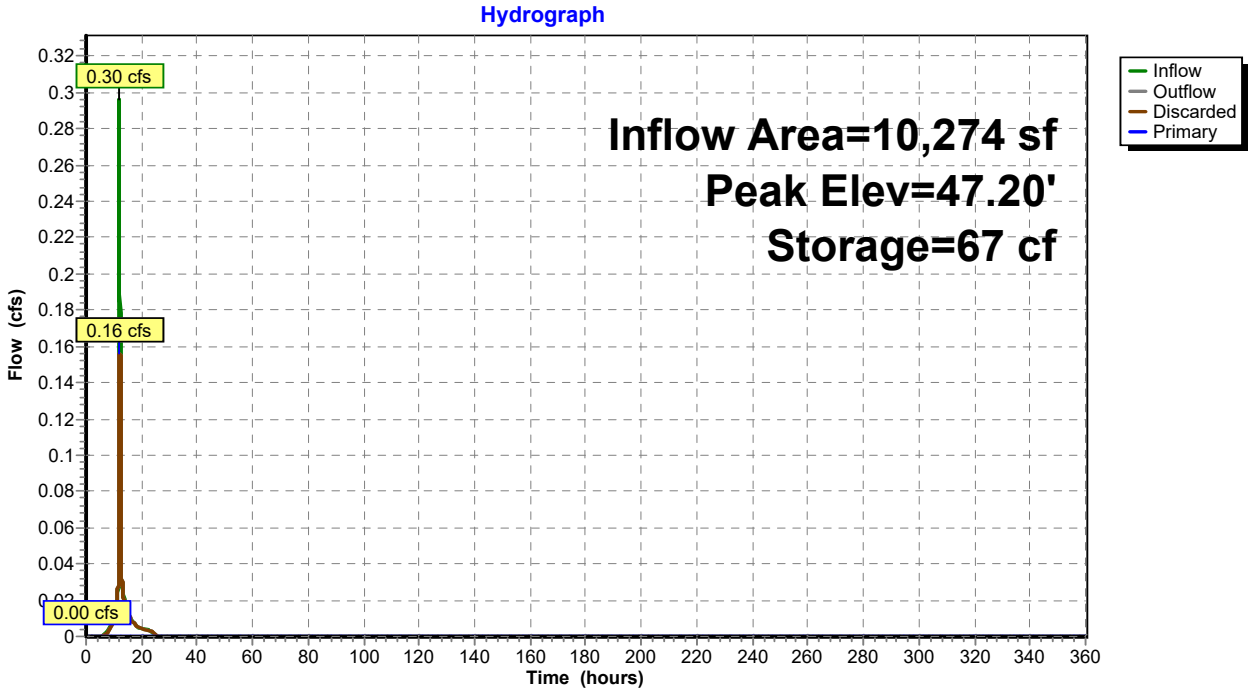
2,975.0 cf Field - 1,128.8 cf Chambers = 1,846.2 cf Stone x 40.0% Voids = 738.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,867.3 cf = 0.043 af
Overall Storage Efficiency = 62.8%
Overall System Size = 52.50' x 16.00' x 3.54'

21 Chambers
110.2 cy Field
68.4 cy Stone



Pond 4: INFILTRATORS



Summary for Pond 5: OUTLET STRUCTURE

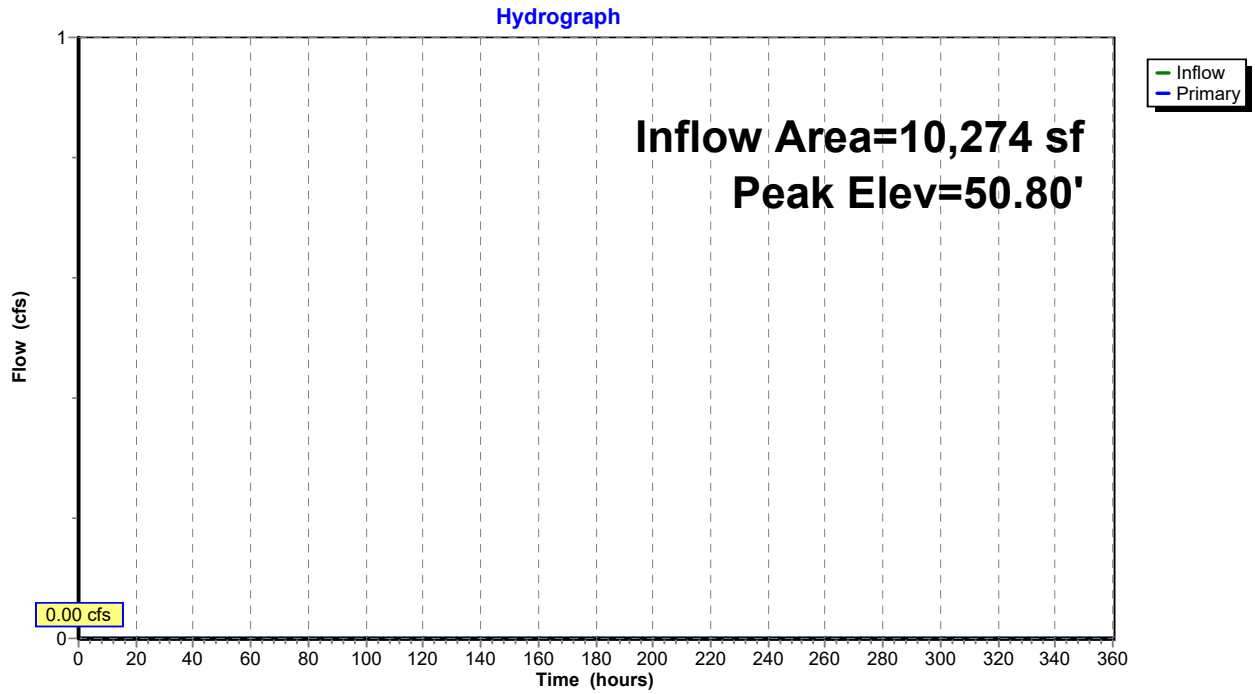
Inflow Area = 10,274 sf, 95.13% Impervious, Inflow Depth = 0.00" for 90% storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs
Peak Elev= 50.80' @ 0.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	50.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=50.80' TW=0.00' (Dynamic Tailwater)
1=Orifice/Grate (Controls 0.00 cfs)

Pond 5: OUTLET STRUCTURE

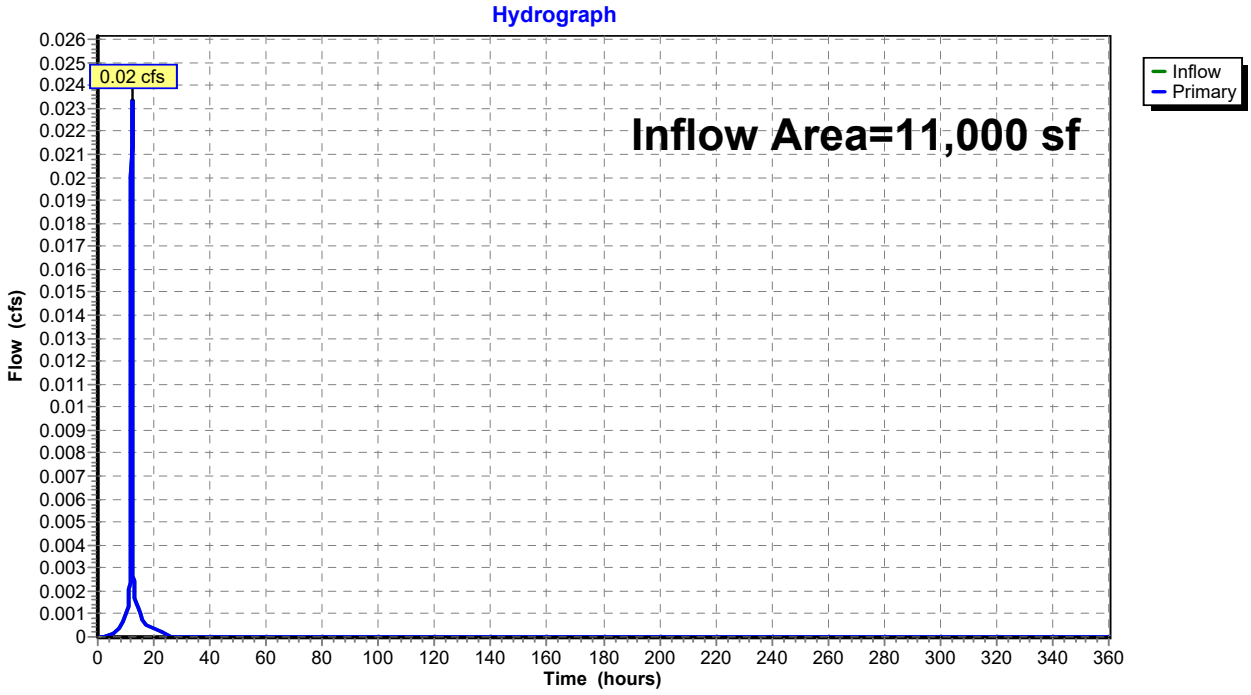


Summary for Link 6: DESIGN LINE

Inflow Area = 11,000 sf, 95.45% Impervious, Inflow Depth = 0.08" for 90% storm event
Inflow = 0.02 cfs @ 12.08 hrs, Volume= 77 cf
Primary = 0.02 cfs @ 12.08 hrs, Volume= 77 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-360.00 hrs, dt= 0.01 hrs

Link 6: DESIGN LINE



Appendix B:
Redevelopment Water Quality Calculations

Elk Chatsworht LP – 108 Chatsworth Ave, Village of Larchmont
REDEVELOPMENT WATER QUALITY CALCULATIONS
Prepared By: Bibbo Associates, L.L.P.
Dated: March 11, 2019
Revised: April 30, 2020

The water quality requirements have been determined using "New York State Stormwater Management Design Manual - Chapter 9 – Section 9.2.1B-II

Sizing Criteria
Section 9.2.1B-II of the Design Manual states, "The plan proposes that a minimum of 25 % of the water quality volume (WQv) from the disturbed, impervious area is captured and treated by the implementation of standard SMP or reduced by application of green infrastructure techniques."

For the proposed site:
Area of existing impervious surfaces = 11,000 SF
Existing impervious areas to be treated by standard SMP = 10,274 SF

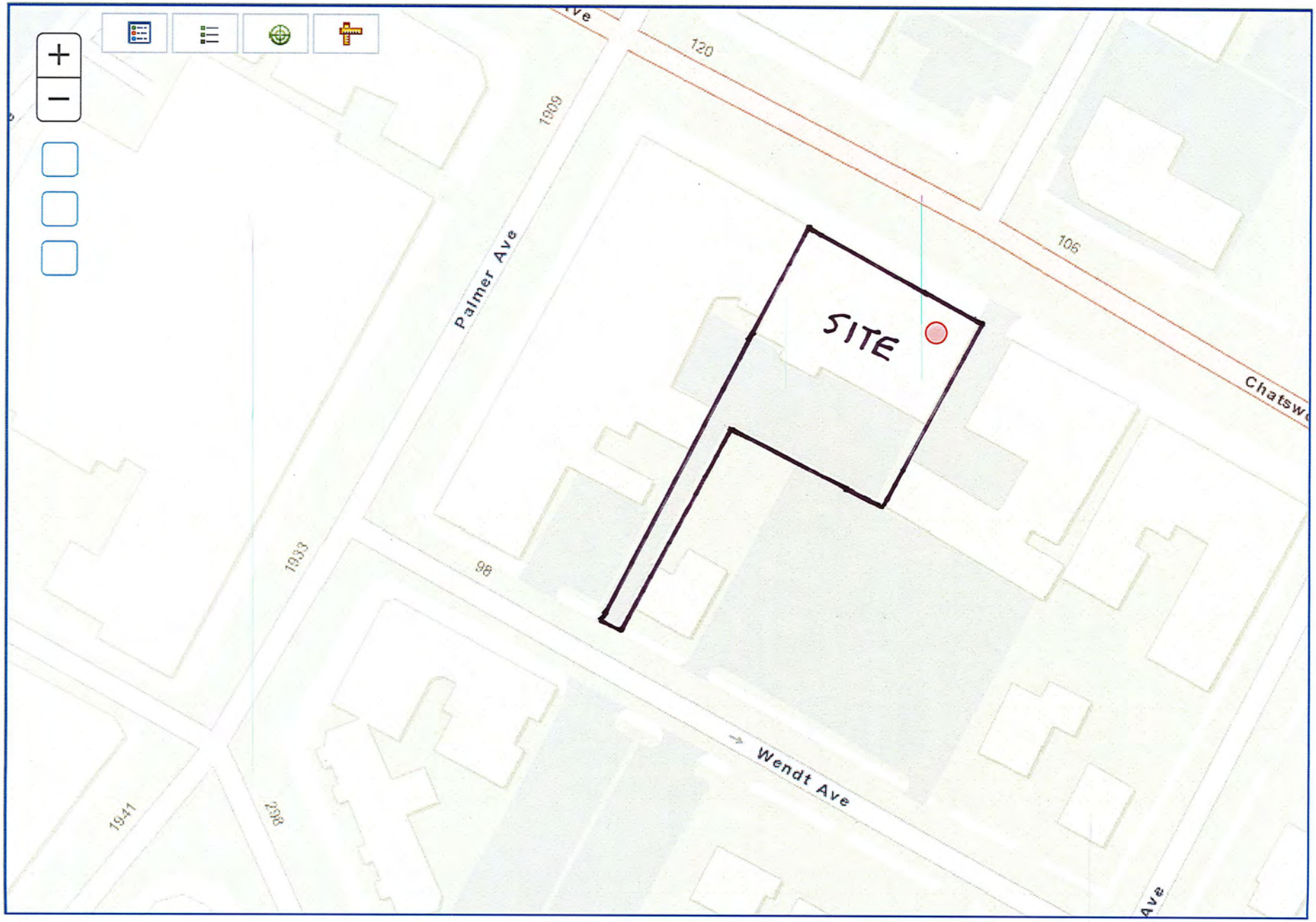
% of existing impervious treated by standard SMP = (10,274/11,000)*100 = 93.4%
% Runoff Reduction (500 SF Green Roof) = 4.9% of rooftop area

Conclusion
The proposed the redevelopment project treats 93.4% of the exiting impervious surfaces which is greater than the required 25% treatment.

Appendix C:
Map of Historic Places in Vicinity of the Project

CRIS NYS
Cultural Resource Information System

HISTORIC PLACES IN VICINITY OF THE PROJECT



Appendix D:
NRCS Soil Map

Map Scale: 1:833 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 40 80 160 240

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Westchester County, New York
Survey Area Data: Version 14, Sep 3, 2018

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

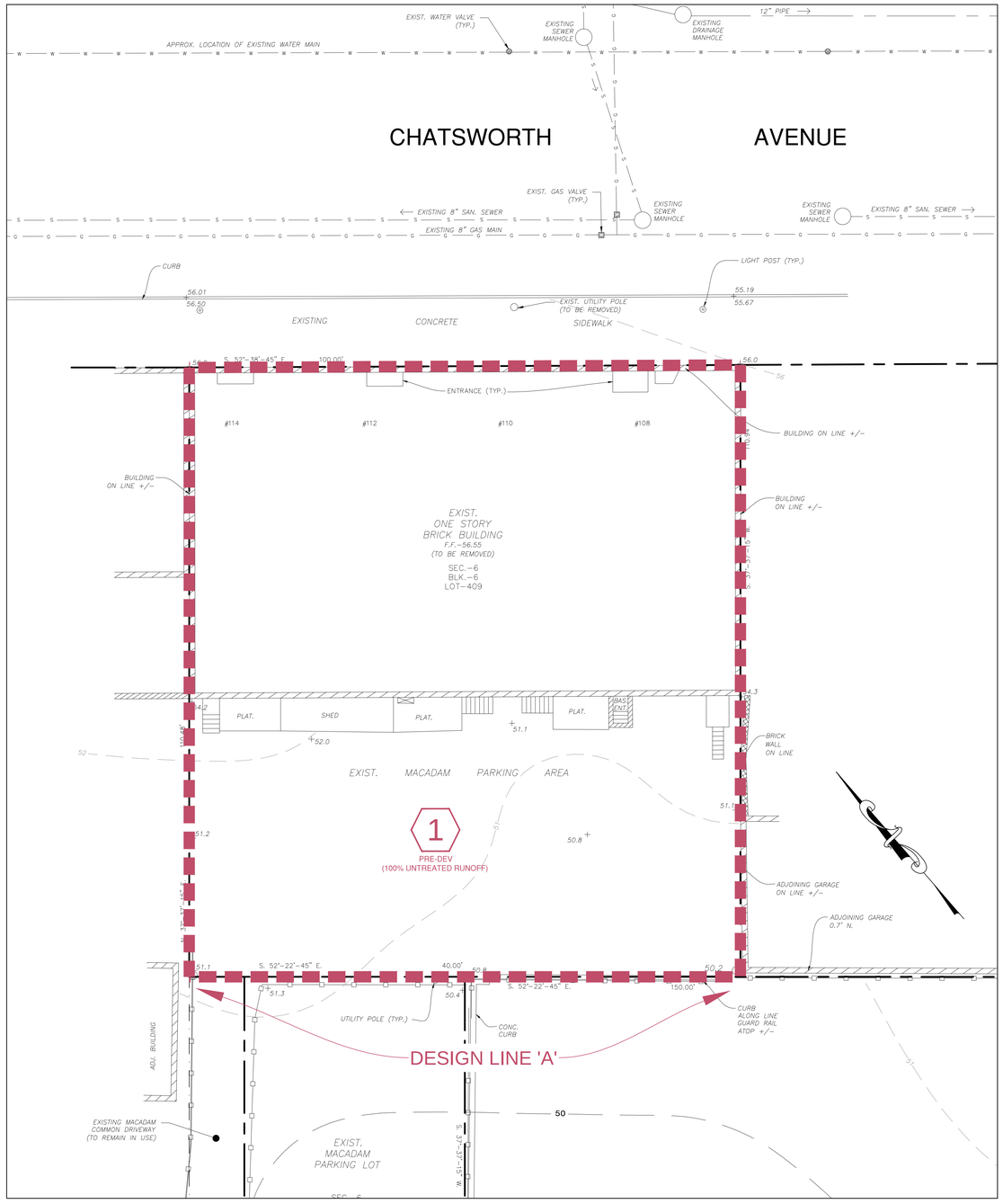
Date(s) aerial images were photographed: Jul 21, 2014—Aug 27, 2014

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

Map Unit Legend

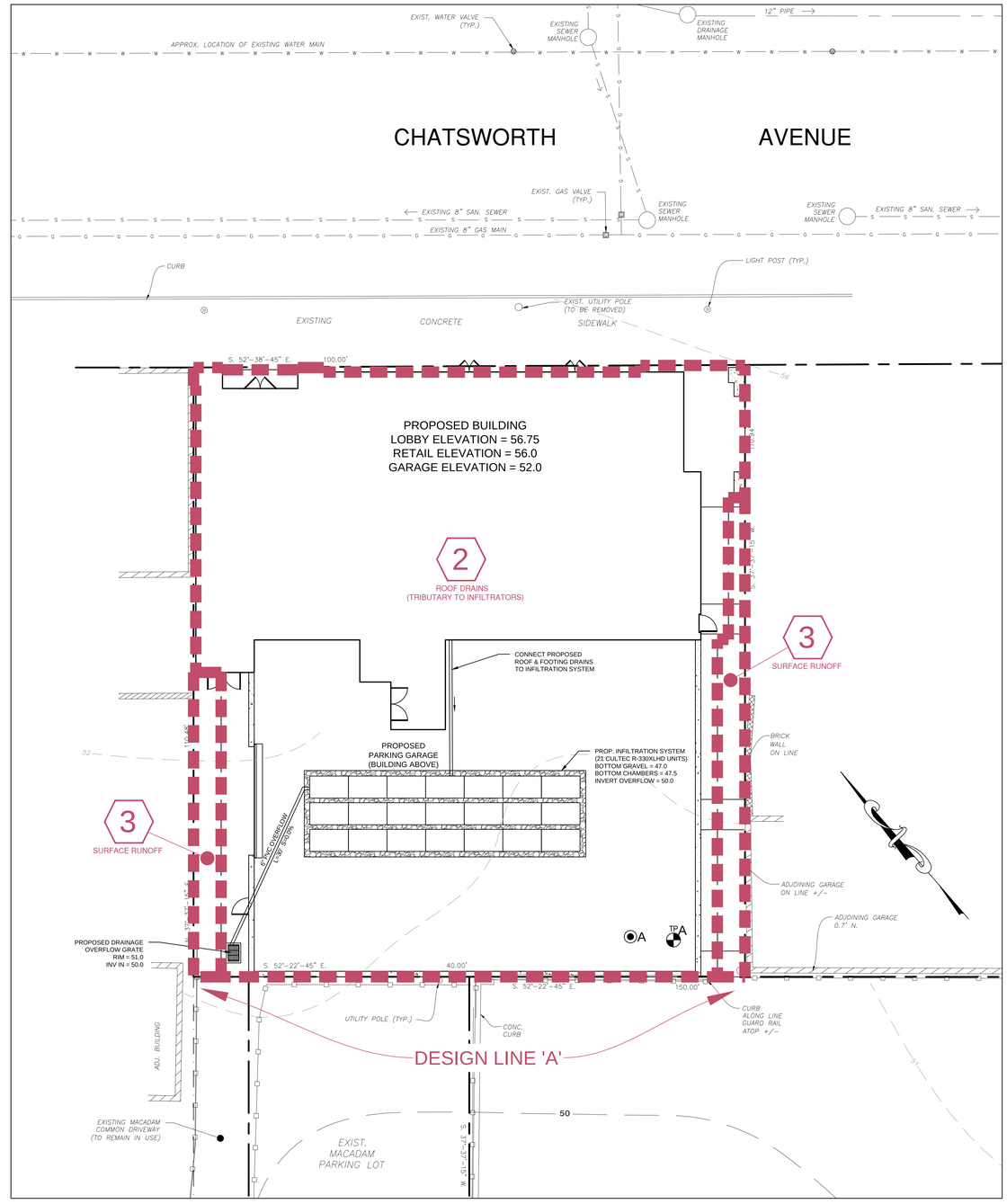
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Uf	Urban land	1.6	100.0%
Totals for Area of Interest		**1.6**	**100.0%**

Figure 1:
Watershed Boundary Map



PRE-DEVELOPMENT WATERSHED

SCALE: 1" = 10'



POST-DEVELOPMENT WATERSHED

SCALE: 1" = 10'

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.

LEGEND

- EXISTING PROPERTY LINE
- 50 EXISTING 10' CONTOUR
- 51 EXISTING 1' CONTOUR
- 51.2 EXISTING SPOT ELEVATION
- ADJACENT STRUCTURES
- EXISTING STORM DRAIN PIPE
- 6" PVC PROPOSED DRAINAGE PIPE
- DIRECTION OF OVERLAND DRAINAGE FLOW
- x 56.75 PROPOSED SPOT ELEVATION
- TP A SOIL TEST PIT LOCATION
- A INFILTRATION TEST LOCATION
- WATERSHED BOUNDARY LINE
- 1 WATERSHED IDENTIFICATION

PRE-DEVELOPMENT VS. POST-DEVELOPMENT STORMWATER ANALYSIS

PRE-DEVELOPMENT PEAK FLOW RATE (CFS)	POST-DEVELOPMENT PEAK FLOW RATE (CFS)	PEAK FLOW RATE % CHANGE	PRE-DEVELOPMENT RUNOFF VOLUME (CF)	POST-DEVELOPMENT RUNOFF VOLUME (CF)	RUNOFF VOLUME % CHANGE
90% STORM EVENT					
0.35	0.02	-94.3%	1,173	77	-93.4%
1 YEAR STORM EVENT					
0.68	0.05	-92.6%	2,355	155	-93.4%
10 YEAR STORM EVENT					
1.36	0.09	-93.4%	4,824	318	-93.4%
25 YEAR STORM EVENT					
1.58	0.10	-93.7%	5,648	373	-93%

STORMWATER SOIL INFILTRATION RATES

SW PRACTICE I.D.	INFILTRATION RATE (INCHES PER HOUR)
A	8 IN/HR
WITNESSED BY: BIBBO ASSOCIATES, LLP DATE OF TESTING: 09/5/2019	

STORMWATER SOIL DEEP TEST RESULTS

TEST PIT I.D.	DESCRIPTION	FULL DEPTH	DEPTH TO LEDGE ROCK	DEPTH TO GROUND WATER
TP A	6" PAVEMENT, 12" COMPACTED PAVEMENT BASE, 12" ORANGE/BROWN FINE SANDY LOAM, 104" BROWN/GREY SANDY LOAM WITH SOME SILT MODERATE COMPACTION	11'-2"	-	10'-2"
DEEP TEST PITS BY: ALFREDO SITE DEVELOPMENT WITNESSED BY: BIBBO ASSOCIATES, LLP DATE OF TESTING: 09/5/2019				

REVISIONS						
4-18-19	REVISED BASEMENT PLAN	DK/NG	4-30-20	VILLAGE SUBMISSION	NG/TA
9-9-19	VILLAGE COMMENTS	DK/NG			
3-11-20	NEW BUILDING & DRAINAGE LAYOUT	NG/TA			
DATE:	DESCRIPTION	BY/CK	DATE:	DESCRIPTION	BY/CK

STATE OF NEW YORK · TIMOTHY S. ALLEN · 023434 · LICENSED PROFESSIONAL ENGINEER

TIMOTHY S. ALLEN, P.E.

WATERSHED BOUNDARY MAP

ELK CHATSWORTH LP
108-114 CHATSWORTH AVENUE
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DATE:	3-13-19
SCALE:	1" = 10'
FILE:	4H
DSGN / CHK:	NG/TA
DRN. BY:	NG
SHT NO.	FIGURE 1
DWG NO.	WM