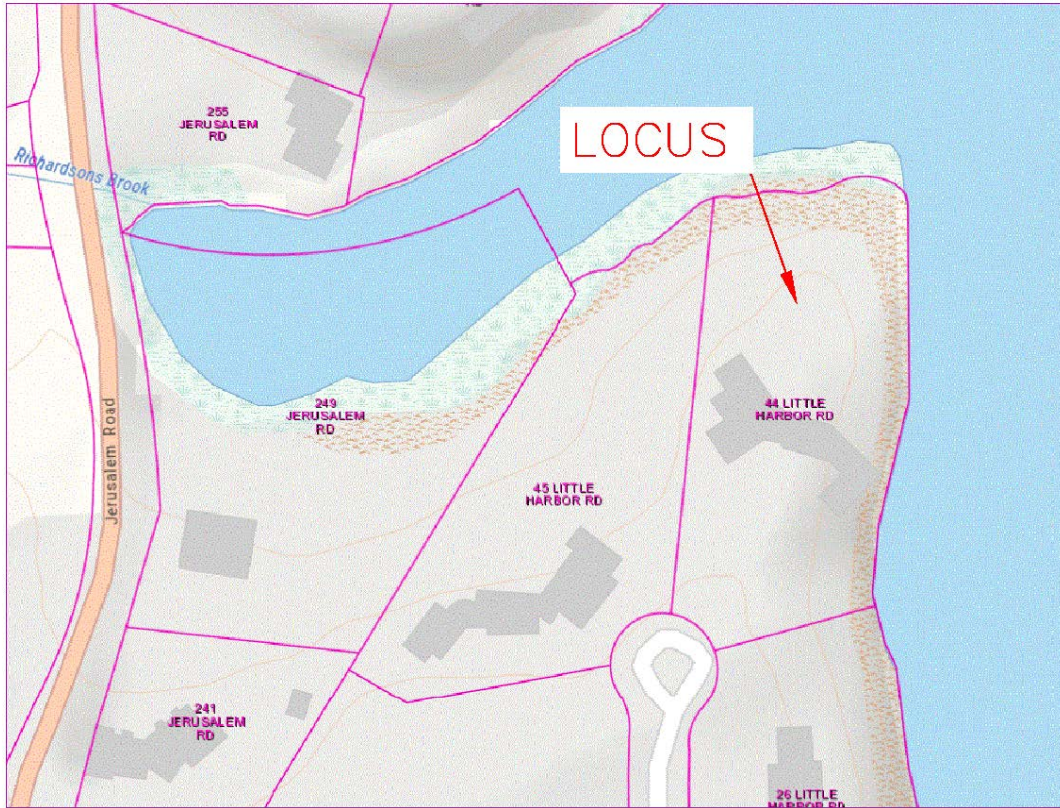


Stormwater Report

For
44 Little Harbor Rd.
Cohasset, MA



Date: March 19, 2022
By: *Matthew Pike, P.E.*
Checked By: *Joseph Hannon, P.E.*
Atlantic Coast Engineering
88 Front Street, Scituate, MA 02066

This section of the Stormwater Report includes the computations required to document compliance with the following standards:

- Standard 1 – No new untreated discharges.
- Standard 2 - Peak Rate Attenuation.
- Standard 3 – Recharge.
- Standard 4 - Water Quality.
- Standard 5 – Land Uses with Higher Pollution Pollutant Loads (LUHPPLs).
- Standard 6 – Critical Areas.
- Standard 7 – Redevelopment and Other Projects Subject to the Standards only to the Maximum Extent Practicable.
- Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control.
- Standard 9: Operation and Maintenance Plan.
- Standard 10: Prohibition of Illicit Discharges.

STANDARD 1. NO UNTREATED DISCHARGES

There are no new untreated discharges. Runoff from the impervious surfaces are directed to infiltration units via roof leader collection pipes and a catch basin with underground piping. All other runoff is via country drainage replicating existing pre-development conditions.

The outlets have been designed to eliminate erosion or scour to wetlands and waters of the Commonwealth. Per stormwater calculations, the 10 year storm outlet velocities are calculated to be less than 2 f/s, a non-erosive velocity.

STANDARD 2. PEAK RATE ATTENUATION

As per Massachusetts stormwater standards, the stormwater analysis was developed for the 2, 10, and 100-year - 24-hour storm events. As shown in table 1 below, post-development peak discharges rates do not exceed pre-development peak discharge rates. See attached HydroCad report in Appendix A for full analysis.

Table 1 - Peak Rate of Discharge (cfs)

Design Storm	Design Point	
	Pre-	Post-
2 year, 3.3"	1.59	1.06
10 year, 4.9"	2.94	2.68
100 year, 8.5"	6.83	6.44

STANDARD 3. RECHARGE

A soil analysis was provided and described previously. The proposed on-site subsurface infiltration system will meet the required recharge to groundwater per the Massachusetts Stormwater Standards.

The site soils are a combination of HSG B, C, and D soils. The larger required recharge for B soils was used for this calculation. The required recharge volume was determined by the following formula per the MA Stormwater Standards.

For HSG B Soils

$$\begin{aligned}\text{Required Recharge} &= (0.35 \text{ in} / 12 \text{ in/ft})(\text{Impervious Area in sf}) \\ &= (0.35 \text{ in} / 12 \text{ in/ft})(7,030 \text{ sf}) \\ &= 205 \text{ cf Required Recharge}\end{aligned}$$

The proposed recharge volume exceeds this volume as the stormwater management system provides 531 cf recharge volume. Furthermore, the recharge on this site as an infiltration BMP measure, will not alter or cause negative changes to the hydrologic regime.

Proposed Recharge Volume

To comply with the Massachusetts Stormwater Standards, the site requires a total recharge volume of 205 cubic feet. The proposed on-site infiltration system exceeds this volume as the Cultec infiltrators provide approximately 531 cubic feet. Also, additional recharge will be realized as runoff flows over vegetated areas on site. Therefore, the site complies with the regulations relative to recharge to groundwater.

Drawdown within 72 hours

DEP Stormwater Standards require an analysis to show that the *Required Recharge Volume* will drain down in less than 72 hours in order to provide infiltration volume for subsequent rainfall events. On-site permeability is moderate to moderately rapid, with rates ranging from 0.6 to 6 in/hr. The more conservative rate obtained from NRCS Soil Survey was used to calculate infiltration and drawdown within 72 hours. The infiltration rate of 0.6 in/hr, the storage volume, and the bottom area was utilized in the "Static" method formula:

$$\begin{aligned}\text{Time}_{\text{drawdown cultec}} &= Rv/(K)(\text{Bottom Area}) \\ &= 531\text{CF} / ((0.6 \text{ in*hr})(1 \text{ ft} / 12 \text{ in.})(375 \text{ SF})) \\ &= 28.3 \text{ hrs}\end{aligned}$$

Where:

Rv = Storage Volume

K = Saturated Hydraulic Conductivity

Bottom Area = Bottom Area of Recharge Structure

The entire system volume, which is far greater than the required recharge volume (531CF > 205 CF), will drain down in less than the required 72 hour maximum.

STANDARD 4. WATER QUALITY

The stormwater management system for this site collects runoff from the impervious surfaces, removes the required percentage of TSS, and discharges the treated runoff. After discharge from the systems, additional removal of TSS will be obtained via the natural removal of sediments from the flow across the lawn and vegetated areas. The discharge is not directed toward or near a critical area, or a Land Use with Higher Potential Pollution Loads (LUHPPL), and the site soils do not exhibit a rapid infiltration rate.

The required water quality volume (Vwq) was determined by the following formula per the the Massachusetts Stormwater Standards:

$$\begin{aligned} Vwq &= (0.5 \text{ in} / 12 \text{ in/ft})(\text{Impervious area in sf}) \\ Vwq &= (0.5 \text{ in} / 12 \text{ in/ft}) (7,030 \text{ sf}) \\ Vwq &= 293 \text{ cf Required Water Quality Volume} \end{aligned}$$

The proposed water water quality exceeds this volume as the stormwater management system provides 531 cf water quality volume.

The proposed Vwq exceeds this volume. The infiltration trenches provide approximately 531 cubic feet of water quality volume (see HydroCad calculations). Not included in the previous calculation, additional water quality will be realized as runoff flows over vegetated areas on site. The system also reduces the TSS by at least 80% (See Appendix B) as required. Therefore, the site complies with the regulations relative to water quality.

STANDARD 5. LAND USES WITH HIGHER POTENTIAL POLLUTANT LOADS

This site is not a LUHPPL. Single family home sites are not considered LUHPPLs.

STANDARD 6. CRITICAL AREAS

The project site is not located within or discharge to a Zone II, Interim Wellhead Protection area of a public water supply, or any other ACEC.

STANDARD 7. REDEVELOPMENT

This project is not a redevelopment.

STANDARD 8. CONSTRUCTION PERIOD CONTROLS

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan will be implemented generally as follows. The Owner may require the site contractor to prepare and submit specific plans if required under the NPDES program.

Narrative: As required, erosion and sedimentation control devices shall be implemented to prevent erosion during and after construction. The following erosion and sediment controls will be installed for this project:

- Initially, erosion controls will be installed at the limit of work along the down gradient site borders.
- Construction entrance apron pads will be constructed at the main site access to prevent the tracking of sediment on vehicle tires from transport onto adjacent streets if necessary.
- During construction, any slopes subject to erosion will be stabilized immediately upon completion with loam, hydroseeding and/or erosion control blankets.
- During construction, water will be used as a dust suppressant in order to control particulate matter emissions during excavation.

Names of Persons or Entity Responsible for Plan Compliance: As part of the Submittal Process, the Landowner shall submit the names of responsible parties.

Construction Period O&M Plan: All erosion control devices shall be inspected on a weekly basis and after every rain event. The construction entrance pads will be inspected on a weekly basis and flushed with clean water in the event they become clogged with dirt.

Names of Persons or Entity Responsible for Plan Compliance: The landowner shall provide the names of the individual(s) responsible for plan compliance prior to commencement of construction.

Construction Period Pollution Prevention Measures: Erosion control measures as shown on the plan and/or as are standard practice shall be installed accordingly. Best Management Practices shall be implemented such as the locations for vehicle maintenance and refueling, storage of supplies, and refuse disposal.

Erosion and Sedimentation Control Plan Drawings: Contractor to install per approved site plan and standard practice if needed.

Detail Drawings and specifications for erosion control BMPs: Contractor may be requested to submit detail drawings and specifications for diversion swales, erosion control dikes and berms, and/or temporary sedimentation basins if required.

Vegetation Planning: Landscaping to be installed per plan.

Site Development Plan: All construction to be based upon approved plan. Plan shall have municipality stamp.

Construction Sequencing Plan: Contractor may be required to submit his plan for proposed sequencing of the work and the associated locations for any proposed diversion swales, erosion control dikes and berms, and temporary sedimentation basins.

Sequencing of Erosion and Sedimentation Controls: All Erosion and Sedimentation controls to be installed and inspected prior to any commencement of site work (other than tree removal necessary to install controls).

Inspection Schedule, Maintenance Schedule and Log Form: Attached to this report. See Appendix D.

STANDARD 9. OPERATION AND MAINTENANCE PLAN

A stormwater operation and maintenance plan is included in Appendix C.

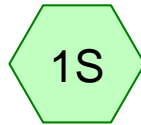
STANDARD 10. PROHIBITION OF ILLICIT DISCHARGES

See appendix E for Illicit Discharge Statement. See O&M Plan for illicit discharge inspection information.

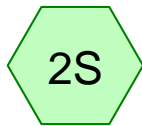
Appendix 'A'

HydroCad Calculations

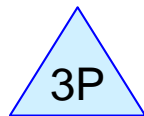
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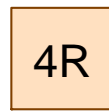
PRE



IMPERVIOUS



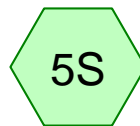
CULTEC CHAMBERS



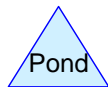
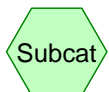
CULTEC REACH



POST LINK



POST



44 Little Harbor 3.19.22

Type III 24-hr 2 Year Storm Rainfall=3.36"

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Subcatchment 1S: PRE

Runoff = 1.59 cfs @ 12.09 hrs, Volume= 4,980 cf, Depth> 1.39"

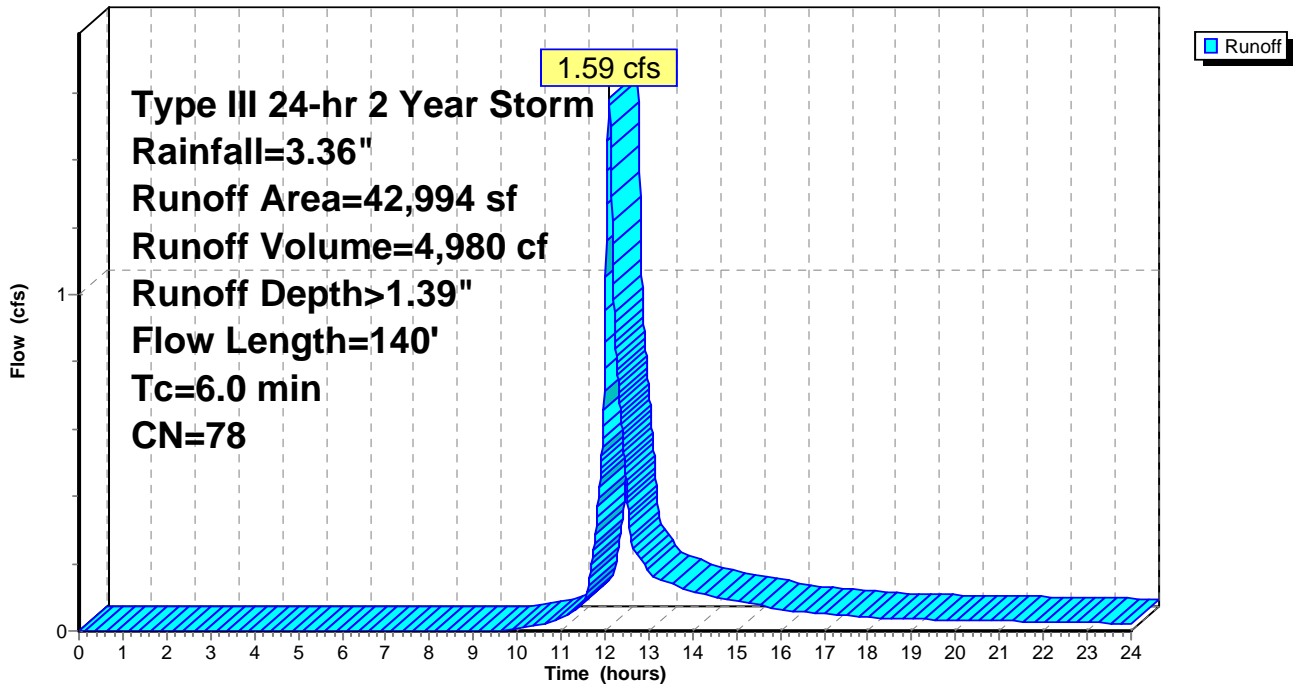
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.36"

Area (sf)	CN	Description
3,218	98	House
3,271	98	Drive
1,744	98	Ledge
7,282	65	Woods/brush comb., Fair, HSG B
8,549	76	Woods/brush comb., Fair, HSG C
8,708	69	Grass cover, Fair, HSG B
10,222	79	Grass cover, Fair, HSG C
42,994	78	Weighted Average
34,761		Pervious Area
8,233		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	140		0.47		Direct Entry, Direct
5.0	140	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S: PRE

Hydrograph



44 Little Harbor 3.19.22

Type III 24-hr 2 Year Storm Rainfall=3.36"

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Subcatchment 2S: IMPERVIOUS

Runoff = 0.53 cfs @ 12.08 hrs, Volume= 1,830 cf, Depth> 3.12"

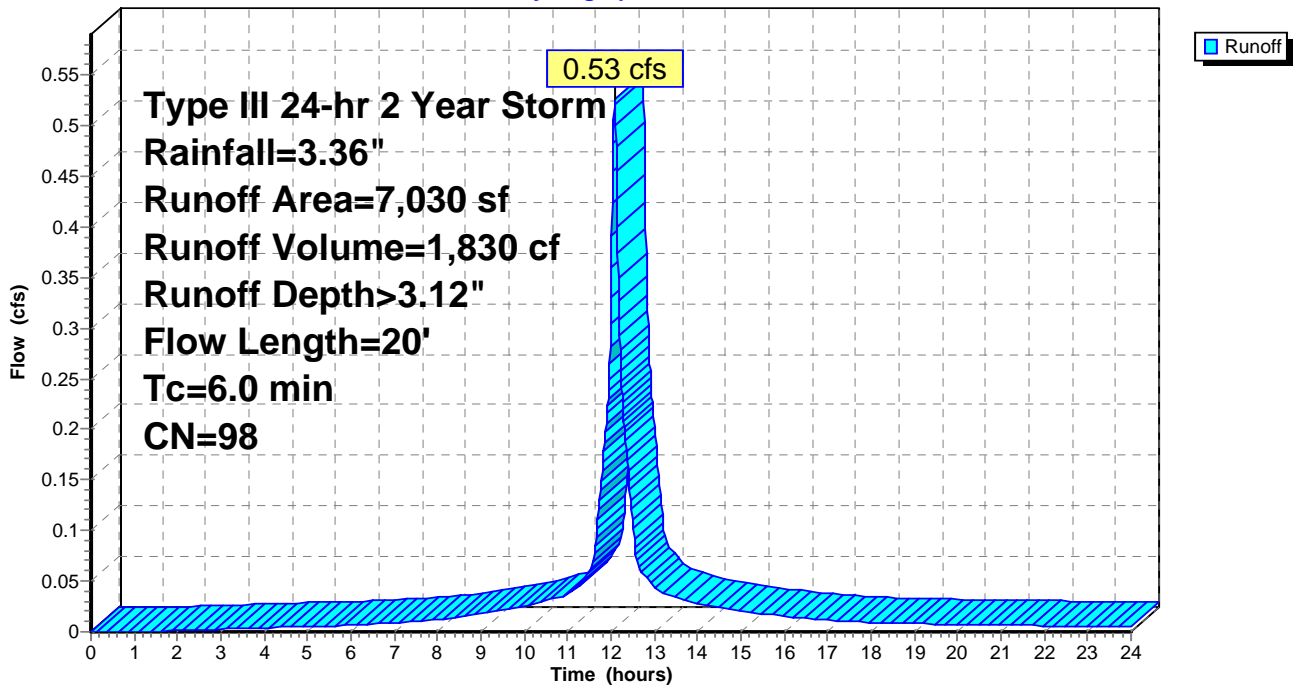
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.36"

Area (sf)	CN	Description
4,097	98	House
2,933	98	Paved
7,030	98	Weighted Average
7,030		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	20		0.07		Direct Entry, Direct
5.0	20	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: IMPERVIOUS

Hydrograph



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Type III 24-hr 2 Year Storm Rainfall=3.36"

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Subcatchment 5S: POST

Runoff = 1.06 cfs @ 12.09 hrs, Volume= 3,424 cf, Depth> 1.14"

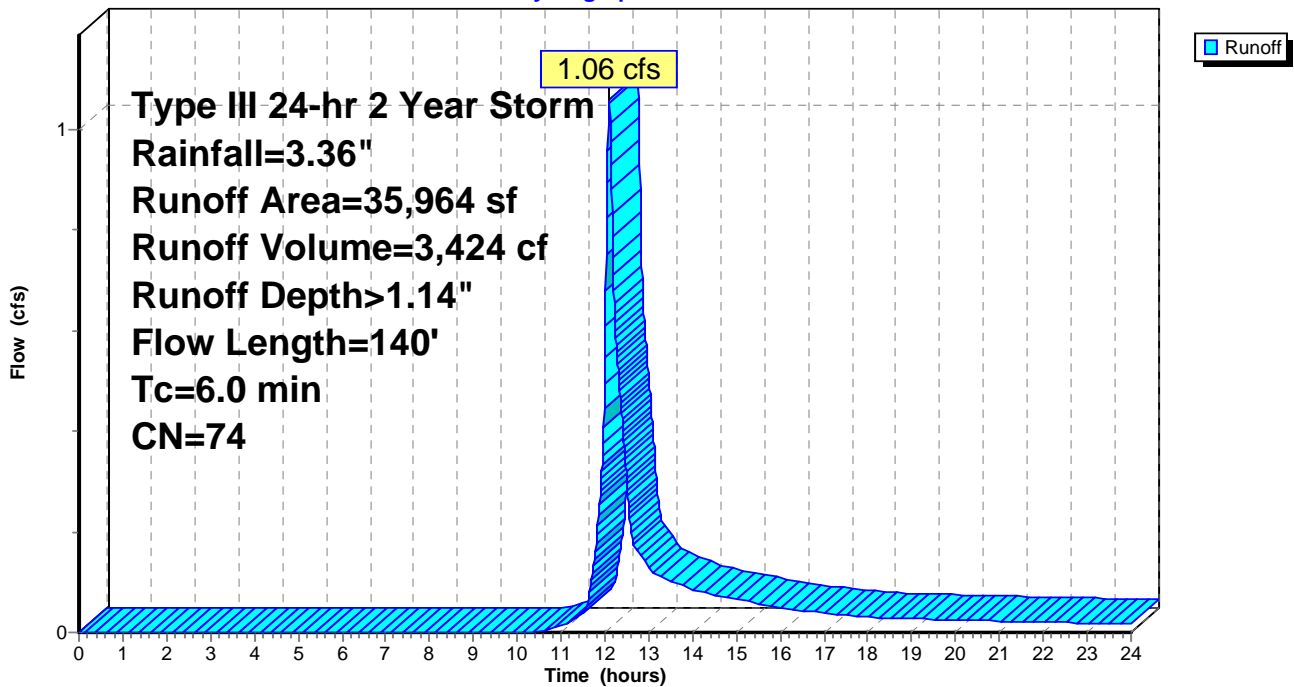
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.36"

Area (sf)	CN	Description
1,744	98	Ledge
6,972	65	Woods/brush comb., Fair, HSG B
8,184	76	Woods/brush comb., Fair, HSG C
1,813	69	Grass cover, Fair, HSG B
2,128	79	Grass cover, Fair, HSG C
15,123	74	Grass cover, compost amended
35,964	74	Weighted Average
34,220		Pervious Area
1,744		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	140		0.47		Direct Entry, Direct
5.0	140	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 5S: POST

Hydrograph



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Type III 24-hr 2 Year Storm Rainfall=3.36"

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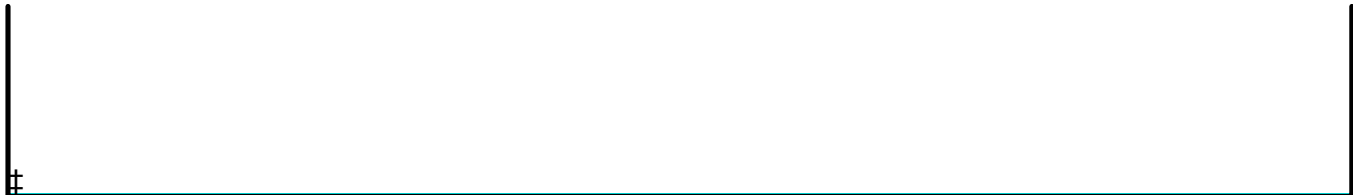
Reach 4R: CULTEC REACH

Inflow Area = 7,030 sf, Inflow Depth = 0.60" for 2 Year Storm event
Inflow = 0.70 cfs @ 12.12 hrs, Volume= 353 cf
Outflow = 0.28 cfs @ 12.25 hrs, Volume= 353 cf, Atten= 60%, Lag= 7.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.69 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 4.7 min

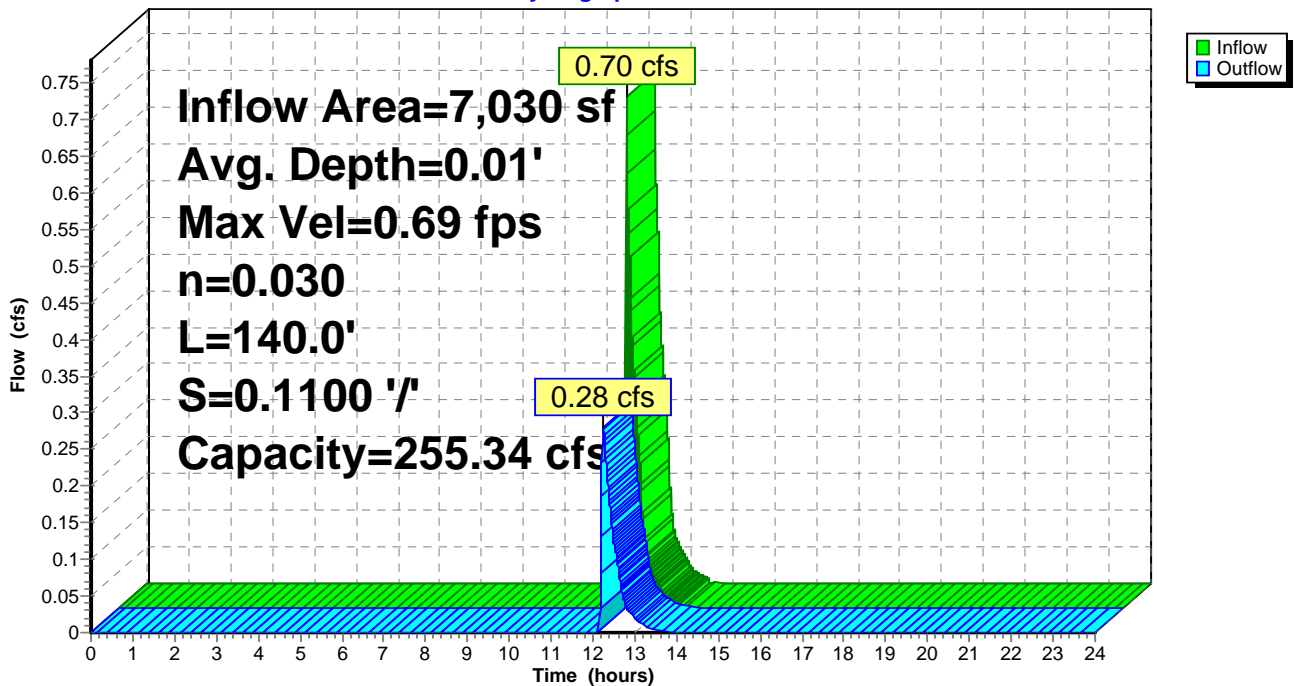
Peak Storage= 56 cf @ 12.19 hrs, Average Depth at Peak Storage= 0.01'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 255.34 cfs

50.00' x 0.50' deep channel, n= 0.030 Short grass
Length= 140.0' Slope= 0.1100 '/'
Inlet Invert= 20.00', Outlet Invert= 4.60'



Reach 4R: CULTEC REACH

Hydrograph



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Type III 24-hr 2 Year Storm Rainfall=3.36"

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Pond 3P: CULTEC CHAMBERS

Inflow Area = 7,030 sf, Inflow Depth > 3.12" for 2 Year Storm event
 Inflow = 0.53 cfs @ 12.08 hrs, Volume= 1,830 cf
 Outflow = 0.73 cfs @ 12.12 hrs, Volume= 1,783 cf, Atten= 0%, Lag= 2.2 min
 Discarded = 0.03 cfs @ 12.11 hrs, Volume= 1,430 cf
 Primary = 0.70 cfs @ 12.12 hrs, Volume= 353 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 22.91' @ 12.12 hrs Surf.Area= 375 sf Storage= 531 cf

Plug-Flow detention time= 141.2 min calculated for 1,783 cf (97% of inflow)
 Center-of-Mass det. time= 125.1 min (879.9 - 754.8)

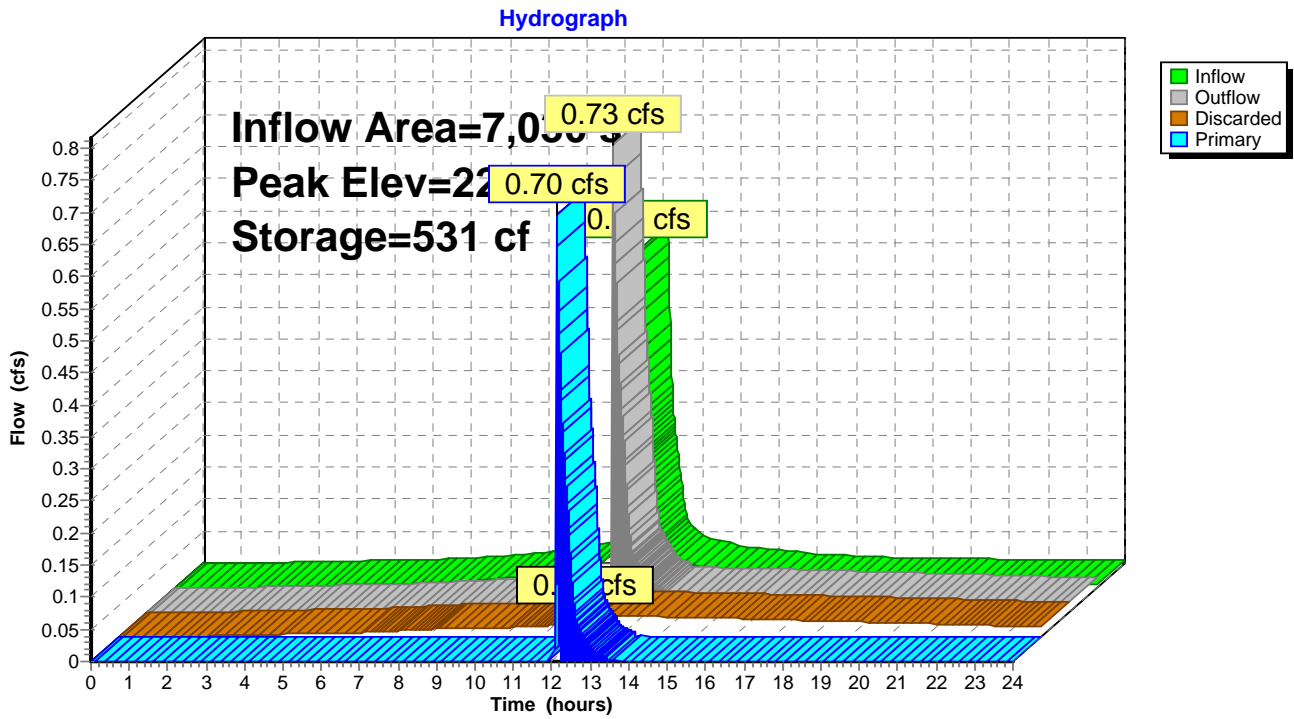
Volume	Invert	Avail.Storage	Storage Description
#1	21.00'	218 cf	33.6"W x 20.0"H x 6.33'L Cultec R-180 x 10 Inside #2
#2	20.00'	313 cf	5.00'W x 15.00'L x 2.67'H Prisma toid x 5
			1,001 cf Overall - 218 cf Embedded = 784 cf x 40.0% Voids
		531 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	1.500 in/hr Exfiltration over Wetted area
#2	Primary	22.67'	4.0" x 10.0' long Culvert X 5.00 Box, headwall w/3 rounded edges, Ke= 0.200 Outlet Invert= 22.47' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Discarded OutFlow Max=0.03 cfs @ 12.11 hrs HW=22.79' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.69 cfs @ 12.12 hrs HW=22.91' (Free Discharge)
 ↑2=Culvert (Inlet Controls 0.69 cfs @ 2.07 fps)

Pond 3P: CULTEC CHAMBERS



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Type III 24-hr 2 Year Storm Rainfall=3.36"

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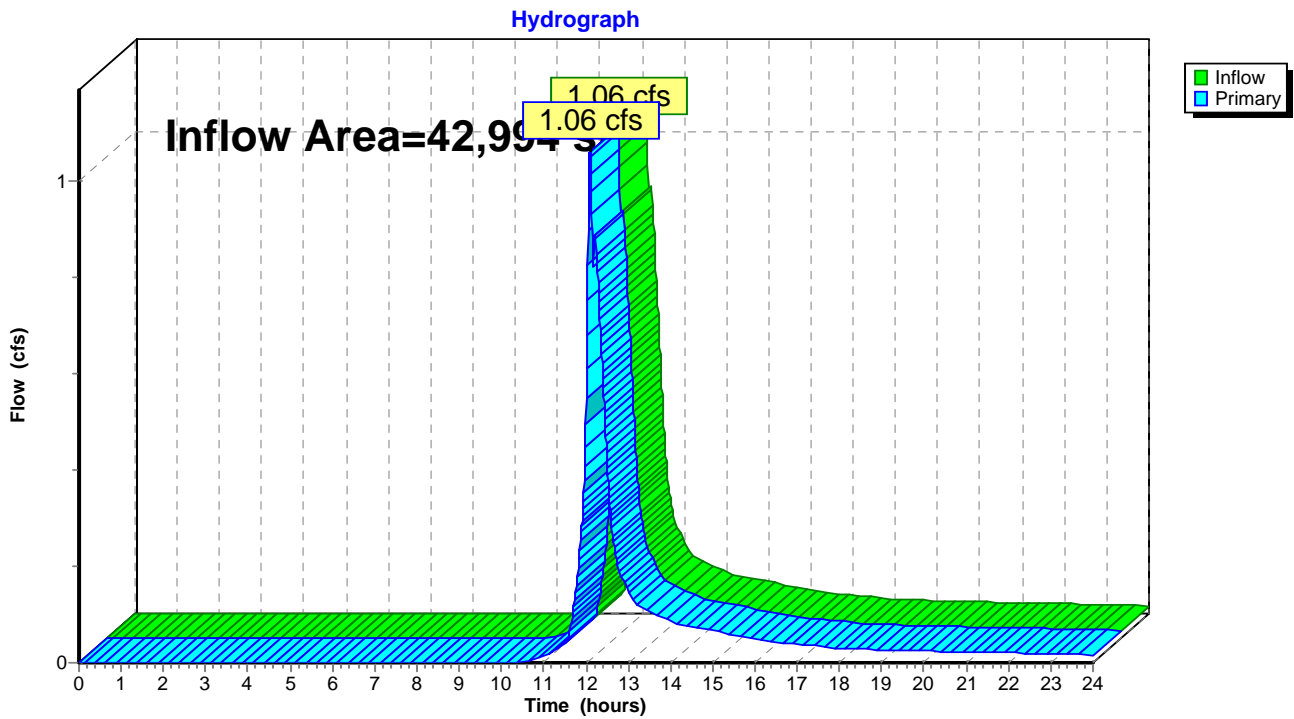
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Link 6L: POST LINK

Inflow Area = 42,994 sf, Inflow Depth > 1.05" for 2 Year Storm event
Inflow = 1.06 cfs @ 12.09 hrs, Volume= 3,778 cf
Primary = 1.06 cfs @ 12.09 hrs, Volume= 3,778 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 6L: POST LINK



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Type III 24-hr 10 Year Storm Rainfall=4.80"

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Subcatchment 1S: PRE

Runoff = 2.94 cfs @ 12.09 hrs, Volume= 9,099 cf, Depth> 2.54"

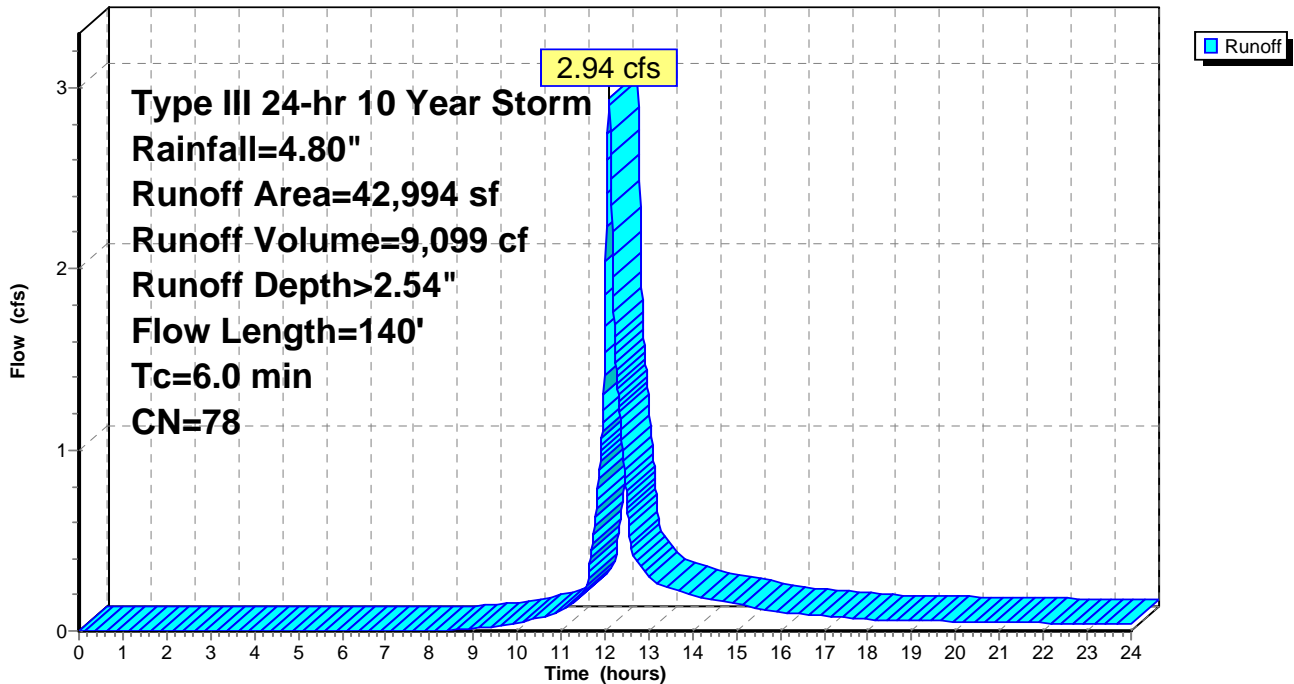
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.80"

Area (sf)	CN	Description
3,218	98	House
3,271	98	Drive
1,744	98	Ledge
7,282	65	Woods/brush comb., Fair, HSG B
8,549	76	Woods/brush comb., Fair, HSG C
8,708	69	Grass cover, Fair, HSG B
10,222	79	Grass cover, Fair, HSG C
42,994	78	Weighted Average
34,761		Pervious Area
8,233		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	140		0.47		Direct Entry, Direct
5.0	140	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S: PRE

Hydrograph



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Type III 24-hr 10 Year Storm Rainfall=4.80"

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Subcatchment 2S: IMPERVIOUS

Runoff = 0.76 cfs @ 12.08 hrs, Volume= 2,671 cf, Depth> 4.56"

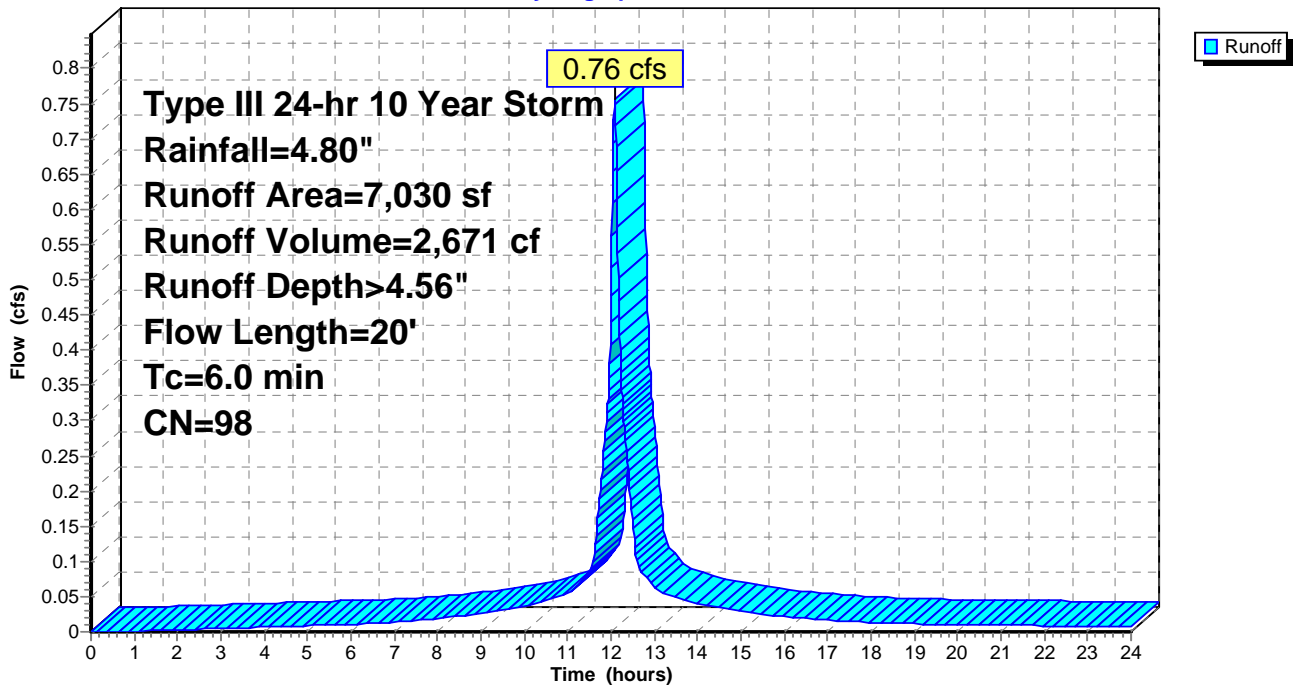
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.80"

Area (sf)	CN	Description
4,097	98	House
2,933	98	Paved
7,030	98	Weighted Average
7,030		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	20		0.07		Direct Entry, Direct
5.0	20	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: IMPERVIOUS

Hydrograph



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Type III 24-hr 10 Year Storm Rainfall=4.80"

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Subcatchment 5S: POST

Runoff = 2.12 cfs @ 12.09 hrs, Volume= 6,602 cf, Depth> 2.20"

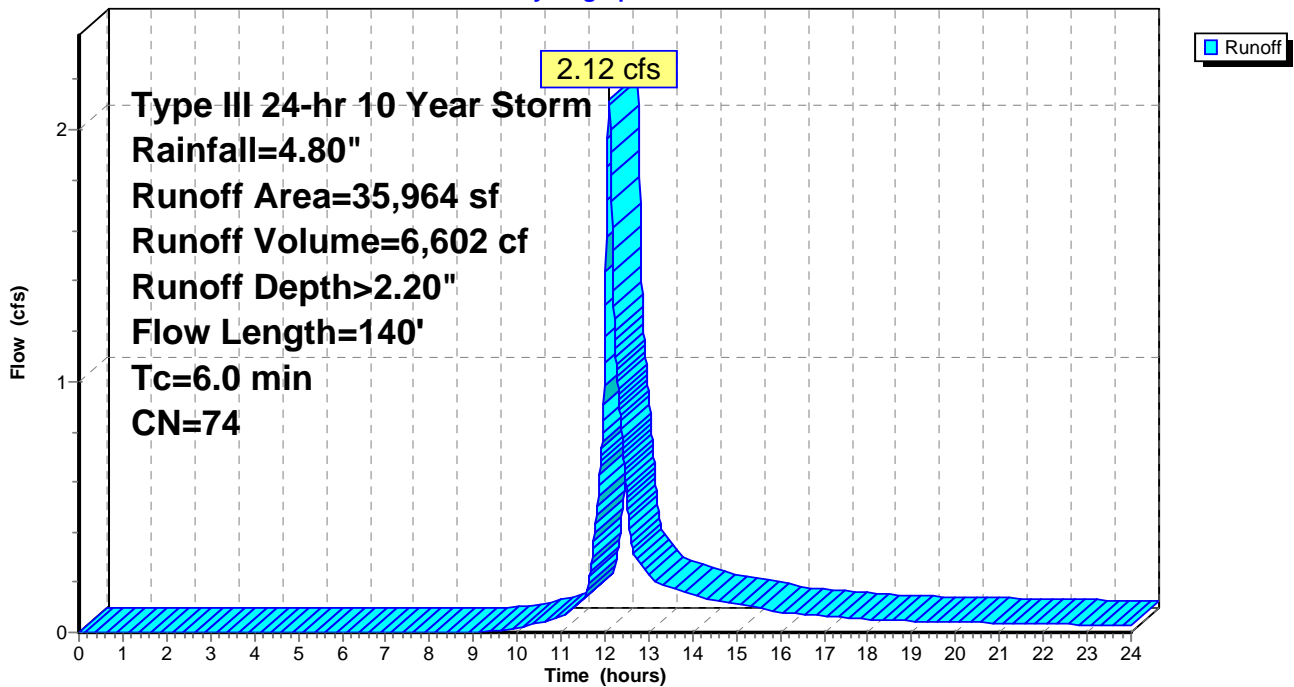
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.80"

Area (sf)	CN	Description
1,744	98	Ledge
6,972	65	Woods/brush comb., Fair, HSG B
8,184	76	Woods/brush comb., Fair, HSG C
1,813	69	Grass cover, Fair, HSG B
2,128	79	Grass cover, Fair, HSG C
15,123	74	Grass cover, compost amended
35,964	74	Weighted Average
34,220		Pervious Area
1,744		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	140		0.47		Direct Entry, Direct
5.0	140	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 5S: POST

Hydrograph



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Type III 24-hr 10 Year Storm Rainfall=4.80"

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Reach 4R: CULTEC REACH

Inflow Area = 7,030 sf, Inflow Depth = 1.58" for 10 Year Storm event
Inflow = 0.85 cfs @ 12.08 hrs, Volume= 925 cf
Outflow = 0.69 cfs @ 12.15 hrs, Volume= 925 cf, Atten= 18%, Lag= 4.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.97 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 4.4 min

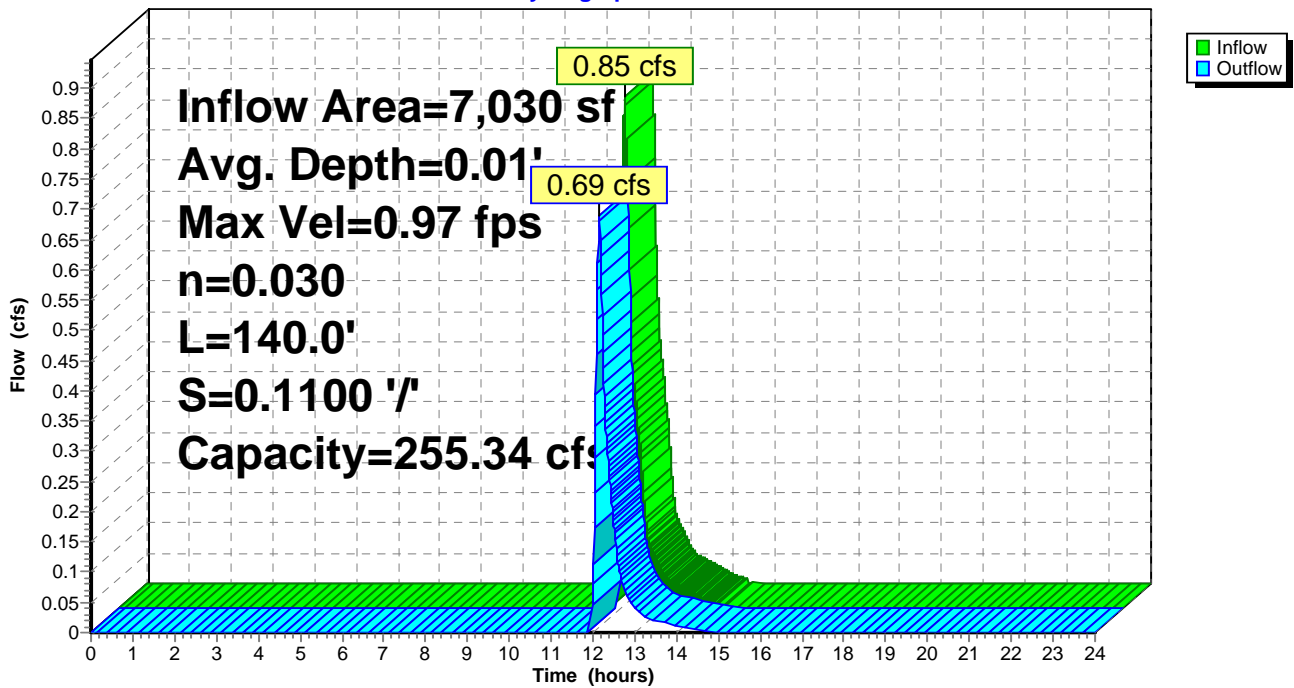
Peak Storage= 99 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.01'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 255.34 cfs

50.00' x 0.50' deep channel, n= 0.030 Short grass
Length= 140.0' Slope= 0.1100 '/'
Inlet Invert= 20.00', Outlet Invert= 4.60'



Reach 4R: CULTEC REACH

Hydrograph



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Type III 24-hr 10 Year Storm Rainfall=4.80"

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Pond 3P: CULTEC CHAMBERS

Inflow Area = 7,030 sf, Inflow Depth > 4.56" for 10 Year Storm event
 Inflow = 0.76 cfs @ 12.08 hrs, Volume= 2,671 cf
 Outflow = 0.88 cfs @ 12.08 hrs, Volume= 2,548 cf, Atten= 0%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 11.95 hrs, Volume= 1,623 cf
 Primary = 0.85 cfs @ 12.08 hrs, Volume= 925 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 22.94' @ 12.08 hrs Surf.Area= 375 sf Storage= 531 cf

Plug-Flow detention time= 116.6 min calculated for 2,548 cf (95% of inflow)
 Center-of-Mass det. time= 89.4 min (837.5 - 748.2)

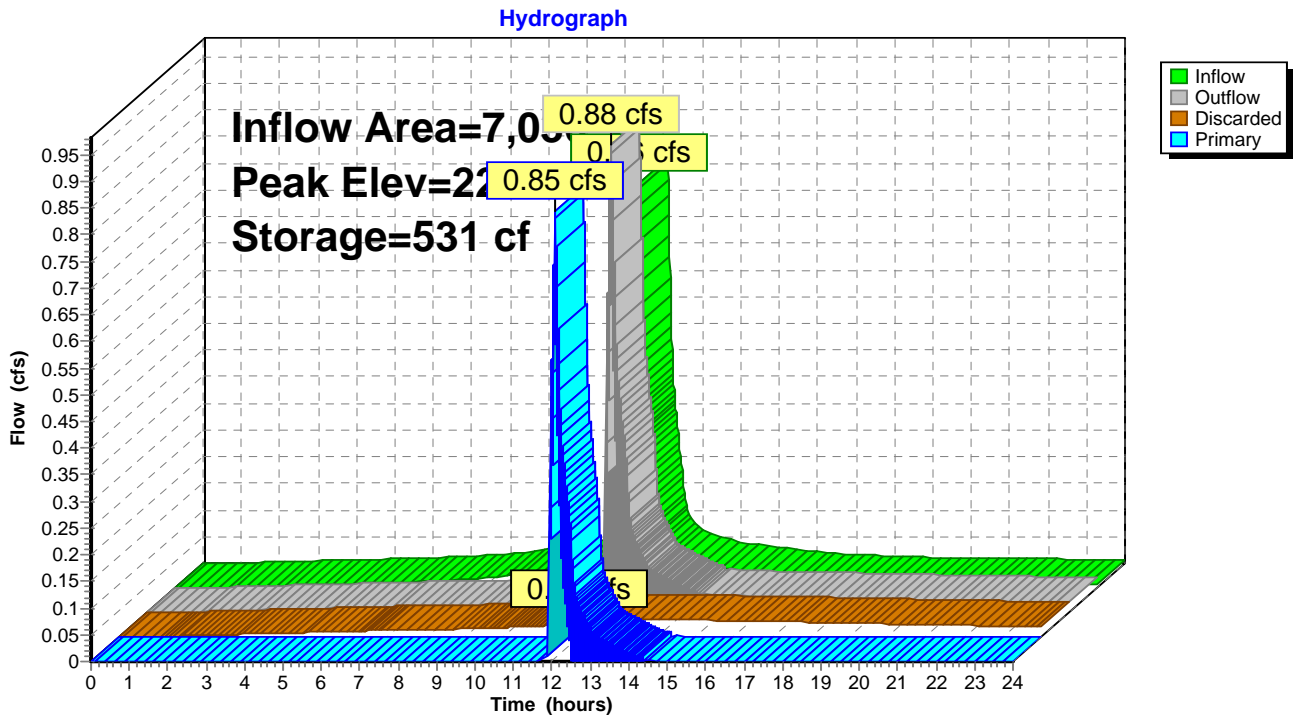
Volume	Invert	Avail.Storage	Storage Description
#1	21.00'	218 cf	33.6"W x 20.0"H x 6.33'L Cultec R-180 x 10 Inside #2
#2	20.00'	313 cf	5.00'W x 15.00'L x 2.67'H Prisma toid x 5
			1,001 cf Overall - 218 cf Embedded = 784 cf x 40.0% Voids
		531 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	1.500 in/hr Exfiltration over Wetted area
#2	Primary	22.67'	4.0" x 10.0' long Culvert X 5.00 Box, headwall w/3 rounded edges, Ke= 0.200 Outlet Invert= 22.47' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Discarded OutFlow Max=0.03 cfs @ 11.95 hrs HW=22.78' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.84 cfs @ 12.08 hrs HW=22.94' (Free Discharge)
 ↑2=Culvert (Barrel Controls 0.84 cfs @ 3.02 fps)

Pond 3P: CULTEC CHAMBERS



44 Little Harbor 3.19.22

Type III 24-hr 10 Year Storm Rainfall=4.80"

Prepared by Atlantic Coast Engineering

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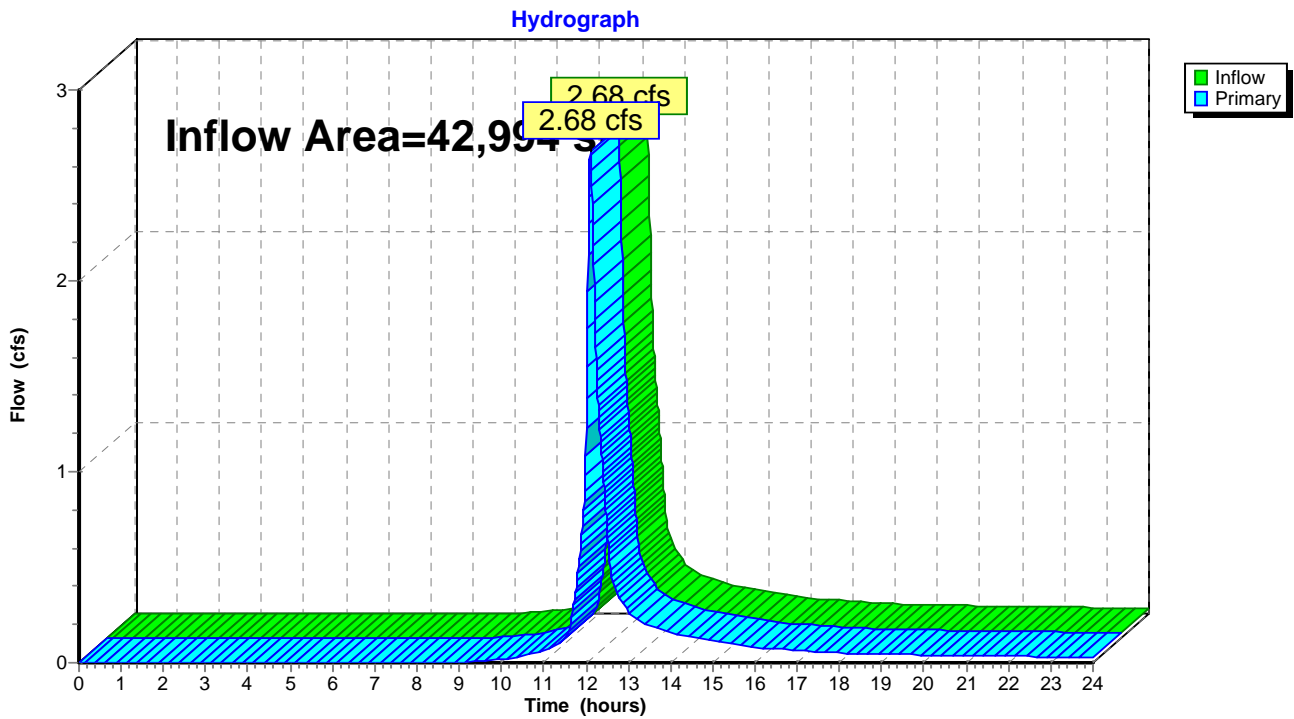
3/19/2022

Link 6L: POST LINK

Inflow Area = 42,994 sf, Inflow Depth > 2.10" for 10 Year Storm event
Inflow = 2.68 cfs @ 12.11 hrs, Volume= 7,528 cf
Primary = 2.68 cfs @ 12.11 hrs, Volume= 7,528 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 6L: POST LINK



44 Little Harbor 3.19.22

Type III 24-hr 100 Year Storm Rainfall=8.64"

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Subcatchment 1S: PRE

Runoff = 6.83 cfs @ 12.09 hrs, Volume= 21,423 cf, Depth> 5.98"

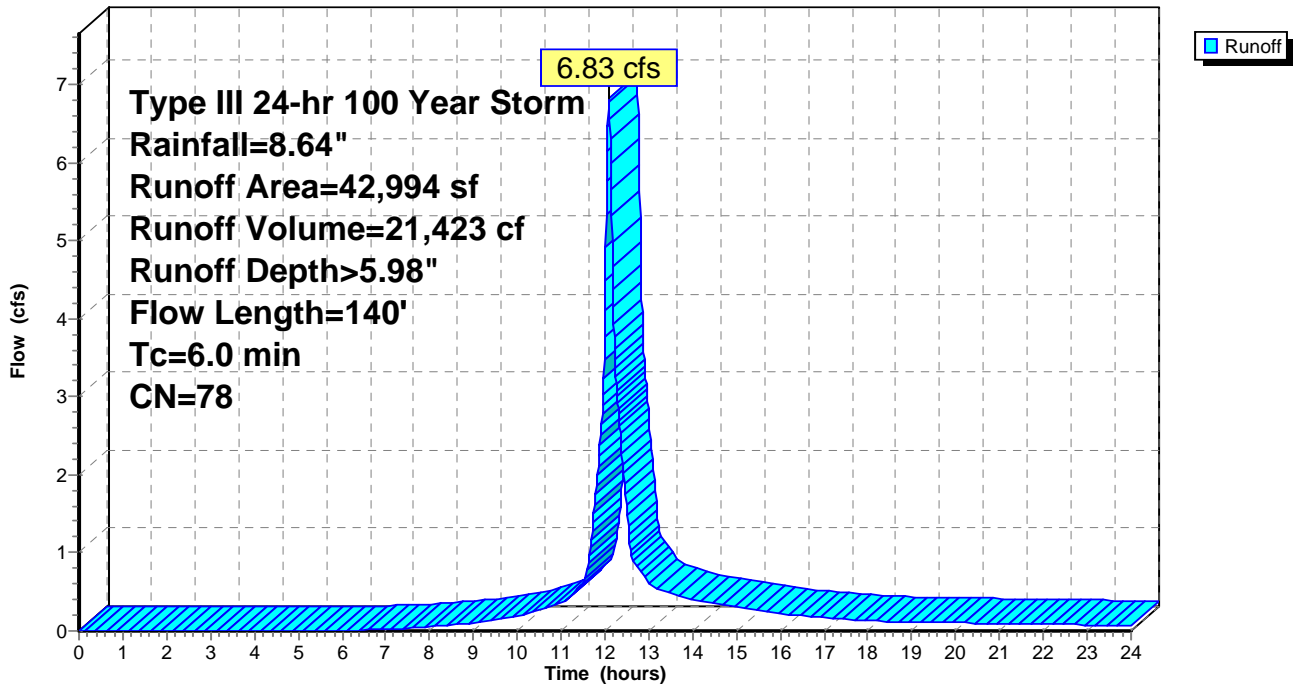
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=8.64"

Area (sf)	CN	Description
3,218	98	House
3,271	98	Drive
1,744	98	Ledge
7,282	65	Woods/brush comb., Fair, HSG B
8,549	76	Woods/brush comb., Fair, HSG C
8,708	69	Grass cover, Fair, HSG B
10,222	79	Grass cover, Fair, HSG C
42,994	78	Weighted Average
34,761		Pervious Area
8,233		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	140		0.47		Direct Entry, Direct
5.0	140	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S: PRE

Hydrograph



44 Little Harbor 3.19.22

Type III 24-hr 100 Year Storm Rainfall=8.64"

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Subcatchment 2S: IMPERVIOUS

Runoff = 1.37 cfs @ 12.08 hrs, Volume= 4,917 cf, Depth> 8.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

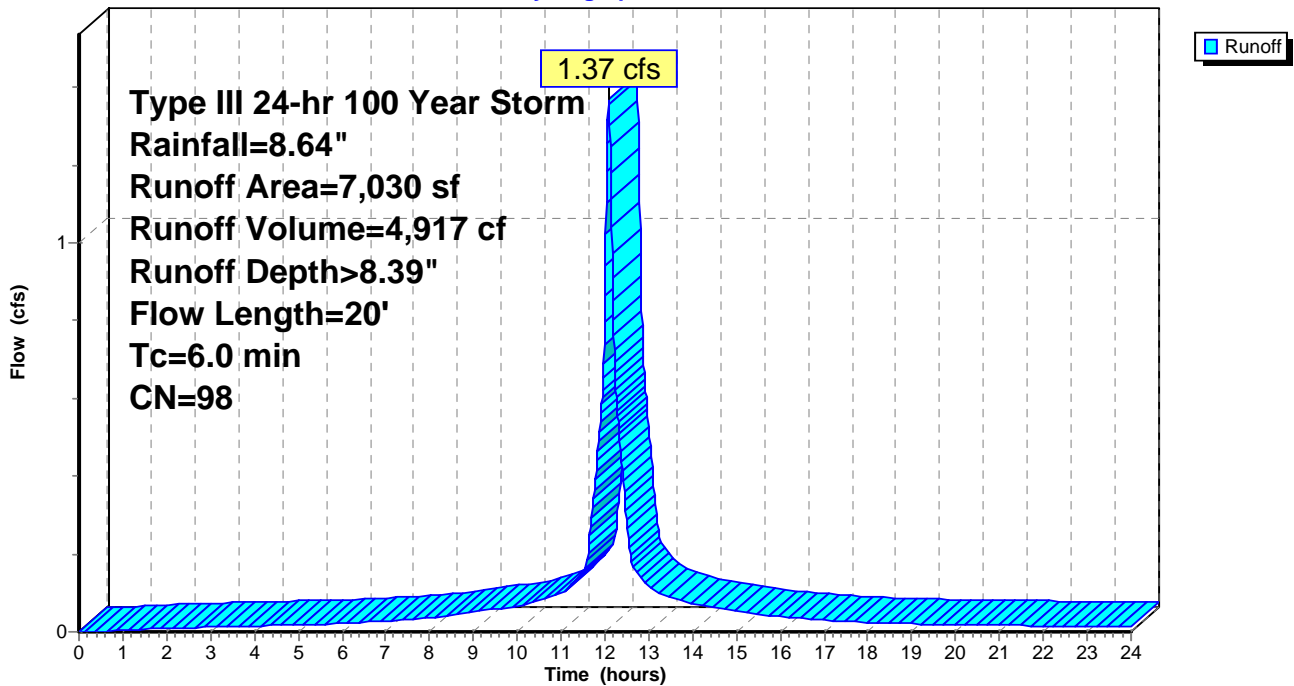
Type III 24-hr 100 Year Storm Rainfall=8.64"

Area (sf)	CN	Description
4,097	98	House
2,933	98	Paved
7,030	98	Weighted Average
7,030		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	20		0.07		Direct Entry, Direct
5.0	20	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: IMPERVIOUS

Hydrograph



44 Little Harbor 3.19.22

Type III 24-hr 100 Year Storm Rainfall=8.64"

Prepared by Atlantic Coast Engineering

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3/19/2022

Subcatchment 5S: POST

Runoff = 5.30 cfs @ 12.09 hrs, Volume= 16,471 cf, Depth> 5.50"

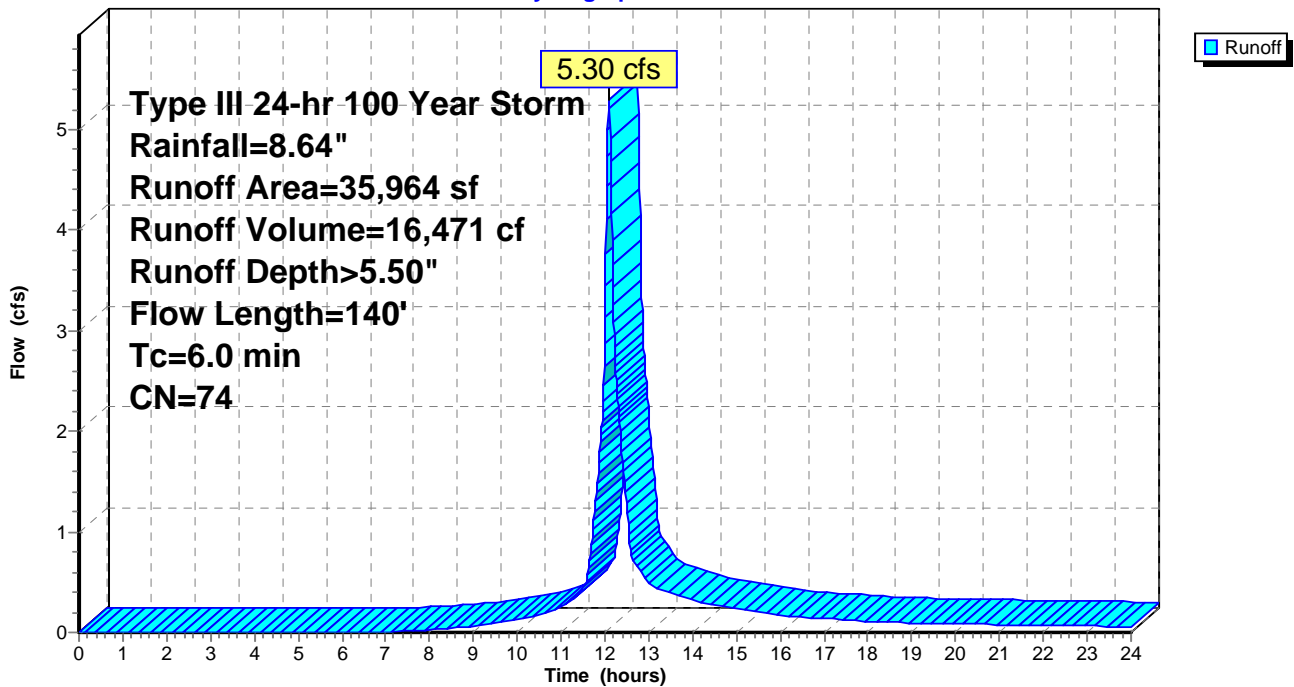
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=8.64"

Area (sf)	CN	Description
1,744	98	Ledge
6,972	65	Woods/brush comb., Fair, HSG B
8,184	76	Woods/brush comb., Fair, HSG C
1,813	69	Grass cover, Fair, HSG B
2,128	79	Grass cover, Fair, HSG C
15,123	74	Grass cover, compost amended
35,964	74	Weighted Average
34,220		Pervious Area
1,744		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	140		0.47		Direct Entry, Direct
5.0	140	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 5S: POST

Hydrograph



44 Little Harbor 3.19.22

Type III 24-hr 100 Year Storm Rainfall=8.64"

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Reach 4R: CULTEC REACH

Inflow Area = 7,030 sf, Inflow Depth = 4.54" for 100 Year Storm event
Inflow = 1.35 cfs @ 12.09 hrs, Volume= 2,662 cf
Outflow = 1.30 cfs @ 12.13 hrs, Volume= 2,662 cf, Atten= 3%, Lag= 2.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.25 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 0.54 fps, Avg. Travel Time= 4.3 min

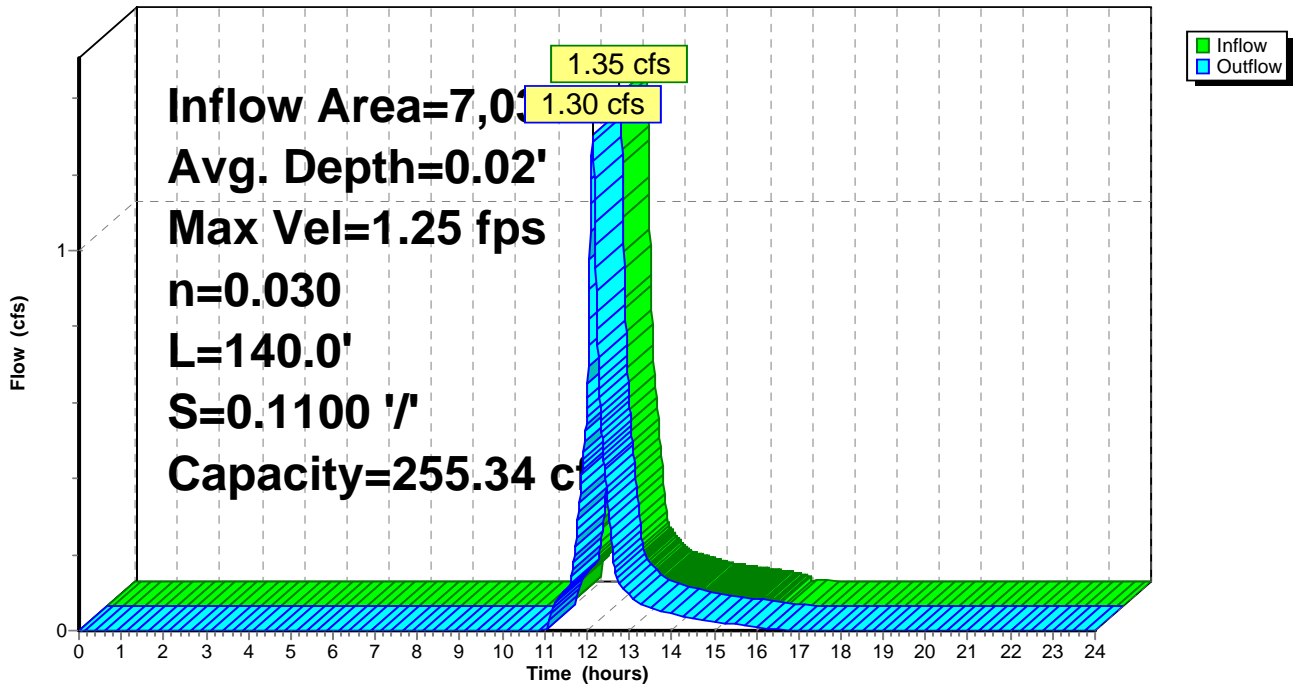
Peak Storage= 146 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 255.34 cfs

50.00' x 0.50' deep channel, n= 0.030 Short grass
Length= 140.0' Slope= 0.1100 '/'
Inlet Invert= 20.00', Outlet Invert= 4.60'



Reach 4R: CULTEC REACH

Hydrograph



44 Little Harbor 3.19.22

Type III 24-hr 100 Year Storm Rainfall=8.64"

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Pond 3P: CULTEC CHAMBERS

Inflow Area = 7,030 sf, Inflow Depth > 8.39" for 100 Year Storm event
 Inflow = 1.37 cfs @ 12.08 hrs, Volume= 4,917 cf
 Outflow = 1.38 cfs @ 12.09 hrs, Volume= 4,627 cf, Atten= 0%, Lag= 0.3 min
 Discarded = 0.03 cfs @ 11.05 hrs, Volume= 1,965 cf
 Primary = 1.35 cfs @ 12.09 hrs, Volume= 2,662 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 23.10' @ 12.09 hrs Surf.Area= 375 sf Storage= 531 cf

Plug-Flow detention time= 82.9 min calculated for 4,627 cf (94% of inflow)
 Center-of-Mass det. time= 49.2 min (788.9 - 739.7)

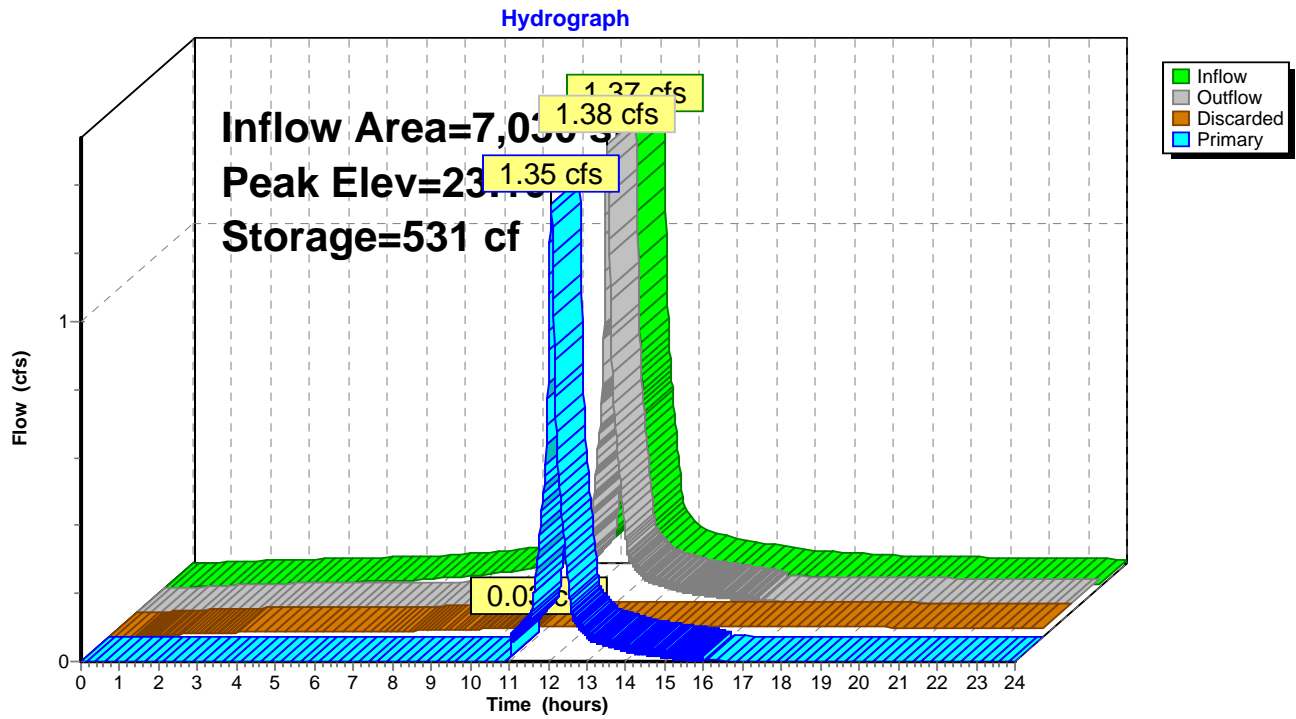
Volume	Invert	Avail.Storage	Storage Description
#1	21.00'	218 cf	33.6"W x 20.0"H x 6.33'L Cultec R-180 x 10 Inside #2
#2	20.00'	313 cf	5.00'W x 15.00'L x 2.67'H Prisma toid x 5
			1,001 cf Overall - 218 cf Embedded = 784 cf x 40.0% Voids
		531 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	1.500 in/hr Exfiltration over Wetted area
#2	Primary	22.67'	4.0" x 10.0' long Culvert X 5.00 Box, headwall w/3 rounded edges, Ke= 0.200 Outlet Invert= 22.47' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Discarded OutFlow Max=0.03 cfs @ 11.05 hrs HW=22.74' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.34 cfs @ 12.09 hrs HW=23.10' (Free Discharge)
 ↑2=Culvert (Inlet Controls 1.34 cfs @ 3.08 fps)

Pond 3P: CULTEC CHAMBERS



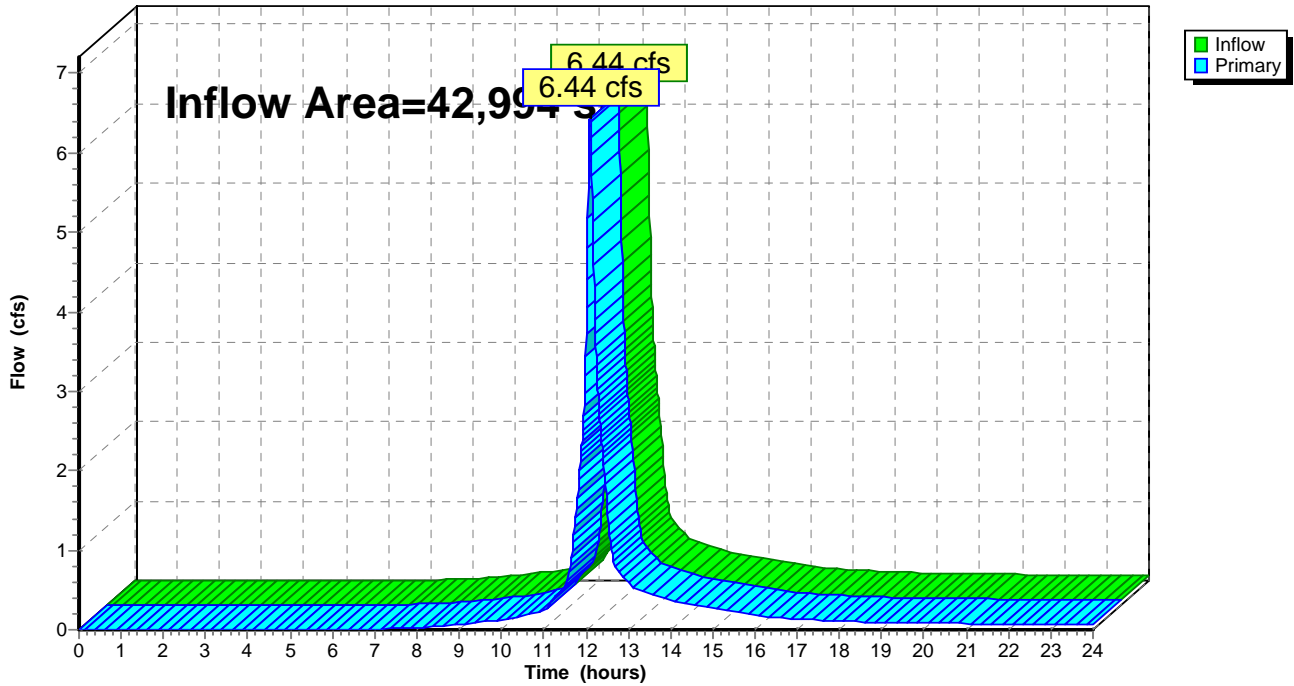
Link 6L: POST LINK

Inflow Area = 42,994 sf, Inflow Depth > 5.34" for 100 Year Storm event
Inflow = 6.44 cfs @ 12.10 hrs, Volume= 19,133 cf
Primary = 6.44 cfs @ 12.10 hrs, Volume= 19,133 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 6L: POST LINK

Hydrograph



Appendix 'B'

TSS Calculations

(Attached)

Infiltrator

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location:

	B BMP ¹	C TSS Removal Rate ¹	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
TSS Removal Calculation Worksheet	Infiltration Basin	0.80	1.00	0.80	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20

Total TSS Removal =

80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project:

Prepared By:

Date:

*Equals remaining load from previous BMP (E) which enters the BMP

Appendix 'C'

OPERATION AND MAINTENANCE PLAN/ Long Term Pollution Prevention Plan

for

44 Little Harbor Road, Cohasset, MA

The proponent/owner is responsible for the operation and maintenance of the proposed stormwater management system as follows:

Stormwater Management System Owners: _____

Party Responsible for the O & M: Home owner

Schedule for Implementation: see O & M Schedule

Plan showing the location of all Stormwater BMPs: See Site Plan Titled – Plan of Land Prepared for 44 Little Harbor Rd., Cohasset, MA by Atlantic Coast Engineering, dated 3/19/22.

Log Form: See below.

Description of proposed O & M:

After construction, the site shall be inspected to assure that the landscaping is stabilized. If the site is stabilized, then any previously required perimeter erosion control devices shall be removed.

The proposed underground infiltration system shall have at least one PVC inspection port to inspect the system. If excessive buildup of sediment or prolonged periods of standing water are found, the systems will require maintenance by a company familiar with the long-term maintenance and repair of these types of systems.

Other site areas, including the grassed waterway shall be inspected for erosion and repairs implemented as needed and with the frequency shown in the attached schedule.

All illicit non-stormwater discharges into the stormwater system are prohibited.

Accepted By: _____ Date: _____

Appendix 'D'

Scheduled
Maintenance Log
(Attached)

Stormwater Management Operation and Maintenance Schedule

Property: 44 Little Harbor Road, Cohasset, MA

Date: _____

BMP	Frequency	Date Performed	Comments	Cleaning/ Repair Needed? Yes/No	Date of Cleaning/ Repair	Performed By
<u>Subsurface Infiltration Systems</u> Inspect for proper functioning	After every major storm during first three months and twice per year thereafter.					
<u>Overflow Discharge outlets</u> Inspect for erosion.	After every major storm during first three months and twice per year thereafter.					
<u>Roof Drains & Gutters</u> Inspect for proper functioning	Cleaned and maintained as needed.					
<u>Illicit Discharges</u> Inspect system to verify no illicit discharges exist.	Once per year during dry season.					

Appendix 'E'

Illicit Discharge
Compliance Statement
(Attached)

Illicit Discharge Compliance Statement

Responsibility:

The Owner is responsible for ultimate compliance with all provisions of the Massachusetts Stormwater Management Policy, the USEPA NPDES Construction General Permit (if required) and responsible for identifying and eliminating illicit discharges (as defined by the USEPA).

OWNER NAME: _____

ADDRESS: _____

TEL. NUMBER: _____

Engineer's Compliance Statement:

To the best of my knowledge, the attached plans, computations and specifications meet the requirements of Standard 10 of the Massachusetts Stormwater Handbook regarding illicit discharges to the stormwater management system and that no detectable illicit discharges exist on the site. All documents and were prepared under my direction and qualified personnel properly gathered and evaluated the information submitted, to the best of my knowledge.

Included with this statement are site plans, drawn to scale, that identify the location of systems for conveying stormwater on the site and show that these systems do not allow the entry of any illicit discharges into the stormwater management system. The plans also show any systems for conveying wastewater and/or groundwater on the site and show that there are no connections between the stormwater and wastewater systems.

For a redevelopment project (if applicable), all actions taken to identify and remove illicit discharges, including without limitation, visual screening, dye or smoke testing, and the removal of any sources of illicit discharges to the stormwater management system are documented and included with this statement.