STORMWATER CALCULATIONS
&
MAINTENANCE PLAN
FOR
PROPOSED 24 RESIDENTIAL UNITS
AT
340 MAIN STREET (REAR)
BOURNE, MA 02532

APPLICANT:

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PREPARED BY:

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CEG #22-621
April 28, 2023

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Supporting Documents

PROJECT DESCRIPTION

The attached plans and supporting documents are for the development of the rear section of 340 Main Street Bourne, MA. The subject property is identified as Assessor's Reference 20.4-6-0 (340 Main Street) and measures 179,987 square feet (4.13 acres). The property is located in the Downtown Gateway (DTG) District. It is bound to the north by Main Street (Route 6), east and west by properties owned by United States of America and to the south by the Canal Sportsman Club. Access to the site is via two existing driveways from Main Street.

Currently the northern front portion of the property approximately 1.2 acres abutting Main Street is under construction for a new 6,000 square-foot mixed-use building, with five multiple fuel dispensing pumps and a 164'x24' steel overhead canopy structure including two underground double walled fiberglass fuel storage tanks with a total capacity of 30,000 gallons. The proposed mixed-use building would include a 2,000 square-foot convenience store, a 2,000 square-foot fast food restaurant and a 2,000 square-foot deli/fast food restaurant on the first floor. The second floor of the building would have six two-bedroom residential apartments. The mixed use building, including the gasoline filling station and site improvements were approved by a Site Plan Review/Special Permit from the Bourne Planning Board back in February of 2020 (Site Plan Review/Special Permit #13-2019).

The Applicant is proposing to develop the remaining southerly portion of the property (approximately 2.9 acres) to accommodate 12 residential duplexes/ town house style buildings with a total of 24 residential units including site improvements, utility improvements and landscape. This portion of the parcel is covered with wooded surfaces and steep slopes ranging from 20% to 25%. Access and egress to the residential rear portion of the site would be from the existing and improved driveways on Main Street as approved per the Massachusetts Department of Transportation (MassDOT).

Presently runoff generated from the undeveloped southerly wooded area sheet flows in a southerly direction and drains to adjacent properties to the south. There are no drainage structures or a stormwater collection system on site.

An erosion barrier consisting of staked silt sock with a siltation fence will be placed around the entire proposed limits of construction as shown on the site plan prior to construction. In addition, a tracking gravel pad will be installed prior to construction at existing entrances for dust control. The contractor will be responsible for maintaining the erosion barrier and gravel pad during the entire construction period. Erosion control devices will be removed after construction is completed and all disturbed areas are restored to pre-existing conditions.

The project is subject to a Site Plan Review/Special Permit approval from the Town of Bourne Planning Board. In addition, the Applicant would apply for and obtain all applicable Building permits, Board of Health, Conservation permits and Fire Department permits associated with the project in compliance with local, state, and federal requirements. Construction is anticipated to start in late Fall of 2023.

EXISTING CONDITIONS

Runoff from approximately 2.9 acres (total of 4 watersheds) from the undeveloped wooded southerly portion of the property sheet flows in a northeasterly (EWS1), southeasterly (EWS2), southwesterly (EWS3), and northwesterly (EWS4) directions to the adjacent properties along the southerly, easterly, and westerly sides of the property. This portion of the parcel is covered with wooded surfaces and steep slopes ranging from 20% to 25%.

Presently there are no drainage structures or a stormwater collection system on the southerly portion of the property site (refer to Existing Conditions Plan).

Existing runoff from site to Northeast (EWS1, Point of Analysis #1):

Q (2-yr. storm) = 0.00 CFS
Q (10-yr. storm) = 0.00 CFS
Q (100-yr. storm) = 0.02 CFS

Existing runoff from site to Southeast (EWS2, Point of Analysis #2):

Q (2-yr. storm) = 0.00 CFS
Q (10-yr. storm) = 0.00 CFS
Q (100-yr. storm) = 0.01 CFS

Existing runoff from site to Southwest (EWS3, Point of Analysis #3):

Q (2-yr. storm) = 0.00 CFS
Q (10-yr. storm) = 0.00 CFS
Q (100-yr. storm) = 0.03 CFS

Existing runoff from site to Northwest (EWS4, Point of Analysis #4):

Q (2-yr. storm) = 0.00 CFS
Q (10-yr. storm) = 0.00 CFS
Q (100-yr. storm) = 0.03 CFS

(Refer to Appendix A for computations)

PROPOSED CONDITIONS

With the proposed site development runoff from the 2.9 developed acres including paved roadways, paved parking and driveways, roof tops and landscaped yards (except small portions of existing watershed 3 and existing watershed 4 which will be left intact in their wooded form) will be collected by a closed drainage system, treated, and discharged to four separate on-site infiltration systems designed to accommodate the 100-year storm (refer to Drainage Plan and calculations of infiltration systems).

With the proposed pre-treatment structures, runoff water quality from the site would be improved over the existing conditions where runoff collected by the closed drainage system is pre-treated to achieve 93% TSS (Total Suspended Solids) removal rates in compliance with the Town of Bourne Stormwater Management Ordinances and the Massachusetts Department of Environmental Protection Guidelines.

Proposed runoff from site to Northeast (EWS1, Point of Analysis #1):

Q (2-yr. storm) = 0.00 CFS
Q (10-yr. storm) = 0.00 CFS
Q (100-yr. storm) = 0.00 CFS

Proposed runoff from site to Southeast (EWS2, Point of Analysis #2):

Q (2-yr. storm) = 0.00 CFS
Q (10-yr. storm) = 0.00 CFS
Q (100-yr. storm) = 0.00 CFS

Proposed runoff from site to Southwest (EWS3, Point of Analysis #3):

Q (2-yr. storm) = 0.00 CFS
Q (10-yr. storm) = 0.00 CFS
Q (100-yr. storm) = 0.00 CFS

Proposed runoff from site to Northwest (EWS4, Point of Analysis #4):

Q (2-yr. storm) = 0.00 CFS
Q (10-yr. storm) = 0.00 CFS
Q (100-yr. storm) = 0.00 CFS

(Refer to Appendix B for computations)

SUMMARY

In conclusion, with the proposed development runoff from site to Main Street would be eliminated by collecting and directing runoff from paved surfaces, building roof tops and landscaped areas to an on-site stormwater systems designed to accommodate the 100 year storm event.

In addition, with the proposed pre-treatment structures, runoff water quality from site would be improved where runoff collected by the closed drainage system is pre-treated to achieve 92.5% TSS (Total Suspended Solids) removal rates in compliance with the Town of Bourne Stormwater Management Ordinances and the Massachusetts Department of Environmental Protection Guidelines.

RUNOFF SUMMARY

	Existing Runoff to Northeast (point of analysis 1)	**Proposed Runoff to Northeast (point of analysis 1)**
2- year Storm	0.00 cfs	0.00 cfs
10- year Storm	0.00 cfs	0.00 cfs
100- year Storm	0.02 cfs	0.00 cfs

	Existing Runoff to Southeast (point of analysis 2)	**Proposed Runoff to Southeast (point of analysis 2)**
2- year Storm	0.00 cfs	0.00 cfs
10- year Storm	0.00 cfs	0.00 cfs
100- year Storm	0.01 cfs	0.00 cfs

	Existing Runoff to Southwest (point of analysis 3)	**Proposed Runoff to Southwest (point of analysis 3)**
2- year Storm	0.00 cfs	0.00 cfs
10- year Storm	0.00 cfs	0.00 cfs
100- year Storm	0.03 cfs	0.01 cfs

	Existing Runoff to Northwest (point of analysis 4)	**Proposed Runoff to Northwest (point of analysis 4)**
2- year Storm	0.00 cfs	0.00 cfs
10- year Storm	0.00 cfs	0.00 cfs
100- year Storm	0.03 cfs	0.01 cfs

TSS REMOVAL (* Per DEP Technical Guidance Manual)

	A	B	C	D	E	F
	BMP	TSS Removal Rate*	Starting TSS Load	Amount Removed (BXC)	Cumulative Removed (D1 To D2)	Amount Remaining (C-D)
1	Catch Basin & Manhole Structures with Oil/Water Separators	25%	100	25.0	25.0	75.0
2	STORMCEPTOR (STC 450i)	50%	75.0	37.5	62.5	37.5
3	Infiltration Basins	80%	37.5	30.0	92.5	7.5

(Refer to Appendix A & B for computations)

STORMWATER MANAGEMENT STANDARDS

The proposed stormwater management system is designed to meet the standards of the *MADEP Stormwater Management Standards* and the Town of Bourne for water quality and flood control and does not increase the discharge rate of runoff from existing conditions. Stormwater runoff rates were calculated utilizing HydroCAD, a computer aided design program that utilizes the NRCS SCS TR-20 method.

The following is a brief explanation of how the stormwater management standards set forth in the *MADEP Stormwater Policy Handbook* is met by the proposed design.

With the proposed site development all runoff from impervious surfaces and landscape areas would be collected treated and discharged to four on-site infiltration systems. Runoff from site to the adjacent properties will not change from existing conditions. (Refer to Proposed Grading and Drainage Plan).

In addition, with the proposed pre-treatment structures and the on-site infiltration systems runoff collected by the closed drainage system is pre-treated to achieve 92.5% TSS (Total Suspended Solids) removal rates before discharge to the on-site infiltration system in compliance with the Town of Bourne and the Massachusetts Department of Environmental Protection Stormwater Management Guidelines.

Standard Nº1 – No untreated Discharges or Erosion to Wetlands

With the proposed site development all runoff from impervious surfaces and landscape areas would be collected treated and discharged to four on-site infiltration systems. Runoff from site to the adjacent properties will not change from existing conditions. There will be no discharge or erosion to wetlands.

With the proposed pre-treatment structures and the on-site infiltration systems runoff collected by the closed drainage system is pre-treated to achieve 92.5% TSS (Total Suspended Solids) removal rates in compliance with the Town of Bourne and the Massachusetts Department of Environmental Protection Stormwater Management Protection Guidelines.

Standard Nº2 – Peak Rate Attenuation

With the proposed site modifications all runoff from impervious surfaces and landscape areas on site would be collected treated and discharged to an on-site infiltration system. Runoff from site to the wetlands will not change from existing conditions. There will be no discharge or erosion to wetlands.

With the proposed pre-treatment structures and the on-site infiltration systems runoff collected by the closed drainage system is pre-treated to achieve 92.5% TSS (Total Suspended Solids) removal rates in compliance with the Town of Bourne and the Massachusetts Department of Environmental Protection Stormwater Management Protection Guidelines.

RUNOFF SUMMARY

	Existing Runoff to Northeast (point of analysis 1)	**Proposed Runoff to Northeast (point of analysis 1)**
2- year Storm	0.00 cfs	0.00 cfs
10- year Storm	0.00 cfs	0.00 cfs
100- year Storm	0.02 cfs	0.00 cfs

	Existing Runoff to Southeast (point of analysis 2)	**Proposed Runoff to Southeast (point of analysis 2)**
2- year Storm	0.00 cfs	0.00 cfs
10- year Storm	0.00 cfs	0.00 cfs
100- year Storm	0.01 cfs	0.00 cfs

	Existing Runoff to Southwest (point of analysis 3)	**Proposed Runoff to Southwest (point of analysis 3)**
2- year Storm	0.00 cfs	0.00 cfs
10- year Storm	0.00 cfs	0.00 cfs
100- year Storm	0.03 cfs	0.01 cfs

	Existing Runoff to Northwest (point of analysis 4)	**Proposed Runoff to Northwest (point of analysis 4)**
2- year Storm	0.00 cfs	0.00 cfs
10- year Storm	0.00 cfs	0.00 cfs
100- year Storm	0.03 cfs	0.01 cfs

Standard Nº3 – Stormwater Recharge

Impervious area (Paved Surfaces = 0.73 acres of roadways, parking and driveways)

Required Recharge Volume.
Rv = (0.6"/12 inches/foot) (0.73 acres) (43,560 square feet/acre)
Rv = 1,590 cubic feet

The entire runoff collected from the site would be infiltrated.

Standard Nº4 – Water Quality

Runoff collected by the closed drainage system with oil/water separators and discharged to the on-site infiltration system is pre-treated to achieve 92.5% TSS (Total Suspended Solids) removal rates in compliance with the Massachusetts Department of Environmental Protection Guidelines.

TSS REMOVAL (* Per DEP Technical Guidance Manual

	A	B	C	D	E	F
	BMP	TSS Removal Rate	Starting TSS Load	Amount Removed (BXC)	Cumulative Removed (D1 To D2)	Amount Remaining (C-D)
1	Deep Sump Catch Basins & Manholes with Oil/Water Separator	25%	100	25.0	25.0	75.0
2	STORMCEPTOR (STC 450i)	50%	75.0	37.5	62.5	37.5
3	Infiltration Basins	80%	37.5	30.0	92.5	7.5

Required Water Quality Volume
Vwq = (Dwq/12 inches/foot) (Area of Impervious X 43,560 square foot/Acre)
Impervious Area = 0.68 Acres
Vwq = (1.0"/12inches/foot) (0.73 acres x 43,560 square foot/acre)
= 2,650.0 C.F. (0.92 cfs)

Use four Stormceptors 450i units

(Refer to Appendix C for computations)

Infiltration
Soil data obtained from 4 test pits onsite confirmed soil is fine sand 3' to 4' below existing grade. For infiltration design a rate of 8.27 in/hr for loamy sand soil was used.

(see soils data & infiltration calculations)

(Refer to Appendix D)

Standard Nº5 – Land Uses with Higher Potential Pollutant Loads
With the proposed site modifications all runoff from impervious surfaces and landscape areas on site would be collected treated and discharged to an on-site infiltration system. Runoff from site to the adjacent properties will not change from existing conditions. There will be no discharges to adjacent properties from the site.

In addition, water quality would be improved by directing collected runoff from paved surfaces to a closed drainage system with drainage structures equipped with oil/water separators, and stormceptors for pre-treatment of runoff prior to discharge to the on-site infiltration systems. The stormwater system is designed to achieve 92.5% TSS (Total Suspended Solids) removal rates in compliance with the Massachusetts Department of Environmental Protection Guidelines.

Proposed modifications to the site have been made to meet applicable Stormwater Management Standards and Guidelines regarding water quality and quantity management.

Standard Nº6 – Critical Areas

The site is not located within critical areas.

Standard Nº7 – Redevelopment

The project is not a redevelopment site. There will be no discharges to adjacent properties from the site. Runoff is collected via a closed drainage system where it is treated before discharging to an on-site infiltration system. (Refer to Proposed Grading and Drainage Plan).

Proposed modifications to the site have been made to meet applicable Stormwater Management Standards and Guidelines regarding water quality and quantity management.

Standard Nº8 – Construction Period Control

This Standard will be met by installing a silt fence and sock bales during construction and stabilizing existing sandy surfaces with loam and seed as shown on the plan. In addition, a tracking gravel pad will be installed prior to construction at the existing entrance for dust control.

Any stockpiled soil on site will be placed on poly and securely covered with poly with sock bales around stockpiles in properly designated areas until proper disposal can occur. The contractor is responsible for the inspection and maintenance of the erosion control devices on a daily basis as stated in the design plans.

The project will result in an earth disturbance greater than 1 acre, therefore an EPA NOI and SWPPP will be filed in accordance with the NPDES Construction General Permit.

Standard Nº9 – Operation and Maintenance Plan

Once accepted as-built, the owner shall perform routine maintenance of the Stormwater management system. The owner shall coordinate/schedule stormceptors to be cleaned and all accumulated sediments and hydrocarbons shall be properly managed in accordance with local, state, federal guidelines, and regulations (refer to Appendix "E" Stormwater Management Operation and Maintenance Plan.

Routine Site Maintenance
Parking lot maintenance in the form of sweeping shall be conducted once per month, during the months of April through November. Sweeping provides important non-point source pollution control. When practical and as weather permits, accumulated sediments should be swept and removed on an as needed basis during the month of January through March.

BMP Structure Maintenance
Stormceptor structures should be maintained annually or when the sediments volume in the unit reaches 15% of the total storage capacity per manufacturer's specifications. In case of any hazardous material spill, maintenance should be performed immediately by a licensed liquid hauler. Oil is removed through the 6" inspection/oil port and sediments are removed through the 24" diameter outlet riser pipe. An updated Inspection and Maintenance Log listing individual BMP's, including the sweeping program, the inspection and maintenance requirements and the dates performed should be kept on site.

Catch Basins and Drainage Manholes
Catch Basins and Drainage Manholes will be constructed with deep sumps and hoods. Drainage Structures shall be inspected four times per year. All structures will be cleaned two times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom to the invert of the lowest pipe in the basin at the end of the foliage and snow removal seasons. Catch Basins will be cleaned using a vacuum truck so as to completely remove trapped sediment and water/oil from the deep sump.

Infiltration system
Inspection shall be conducted annually and after each storm event where rainfall exceeds 3" water. The water level within the detention infiltration/basin shall be monitored for elevation over the next 24 hours. The drop in water levels shall be monitored to ensure adequate performance.

Standard Nº10 – Illicit Discharges to Drainage system
Illicit discharges to the drainage system from the site are prohibited. The Owner of records of the property would comply with local, state, and federal regulations regarding discharges to stormwater drainage system. In addition, runoff collected from site is pre-treated prior to discharge to the on-site infiltration/detention basin. The owner is responsible for the inspection and maintenance of the drainage and basin structure.

Responsible Party Information

340 Main Street, LLC
Johnny Hatem, Manager
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Falmouth, MA 02536
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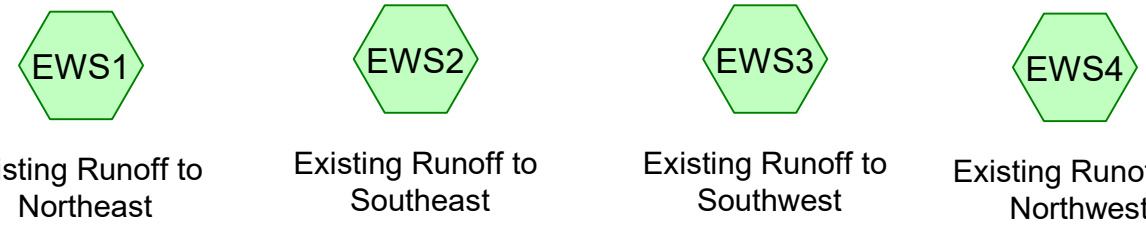
Appendix "A"

Existing Watershed Data
(2 year – 10 year – 100 year storm events)



Subcat Reach Pond Link

Routing Diagram for 340 (Rear) Main Street, Bourne MA (existing)
Prepared by Choubah Enginnering Group, P.C., Printed 4/21/2023

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.938	30	Woods, Good, HSG A (EWS1, EWS2, EWS3, EWS4)

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.938	HSG A	EWS1, EWS2, EWS3, EWS4
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
2.938	0.000	0.000	0.000	0.000	2.938	Woods, Good	EWS1, EWS2, EWS3, EWS4

Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWS1: Existing Runoff to Runoff Area=29,460 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=220' Slope=0.1600 '/' Tc=10.6 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment EWS2: Existing Runoff to Runoff Area=9,014 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=80' Slope=0.1000 '/' Tc=16.2 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment EWS3: Existing Runoff to Runoff Area=43,944 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=400' Slope=0.1000 '/' Tc=14.8 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment EWS4: Existing Runoff to Runoff Area=45,545 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=450' Slope=0.1000 '/' Tc=10.6 min CN=30 Runoff=0.00 cfs 0.000 af

Summary for Subcatchment EWS1: Existing Runoff to Northeast

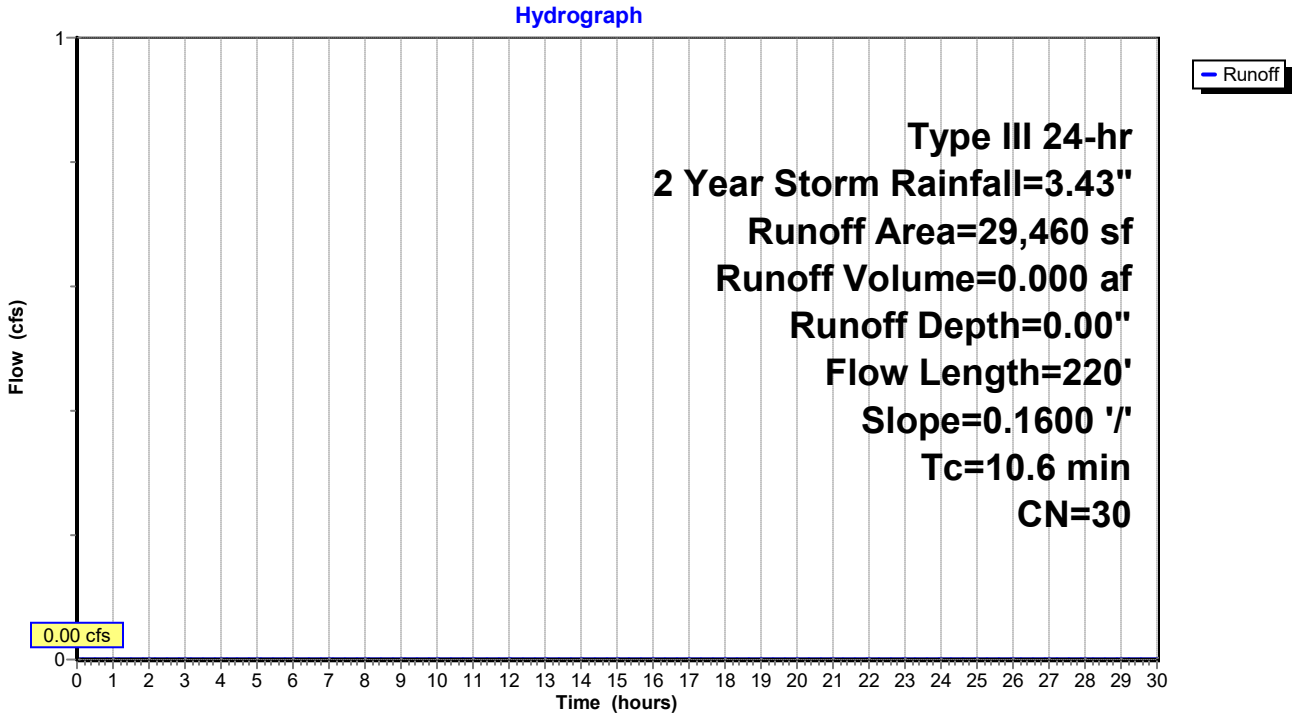
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

Area (sf)	CN	Description
29,460	30	Woods, Good, HSG A
29,460		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.1600	0.09		**Sheet Flow, wooded** Woods: Dense underbrush n= 0.800 P2= 3.30"
1.4	170	0.1600	2.00		**Shallow Concentrated Flow, wooded** Woodland Kv= 5.0 fps
10.6	220	Total			

Subcatchment EWS1: Existing Runoff to Northeast



Summary for Subcatchment EWS2: Existing Runoff to Southeast

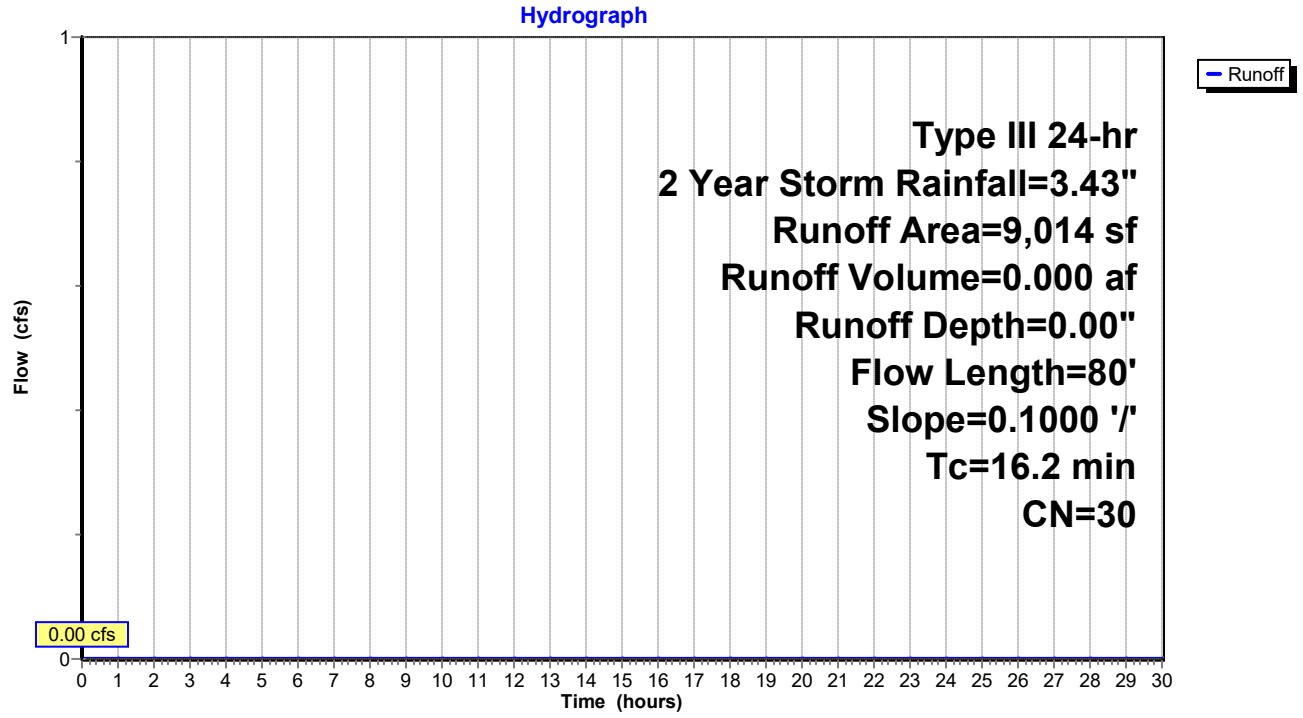
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

Area (sf)	CN	Description
9,014	30	Woods, Good, HSG A
9,014		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	80	0.1000	0.08		**Sheet Flow, wooded** Woods: Dense underbrush n= 0.800 P2= 3.30"

Subcatchment EWS2: Existing Runoff to Southeast



Summary for Subcatchment EWS3: Existing Runoff to Southwest

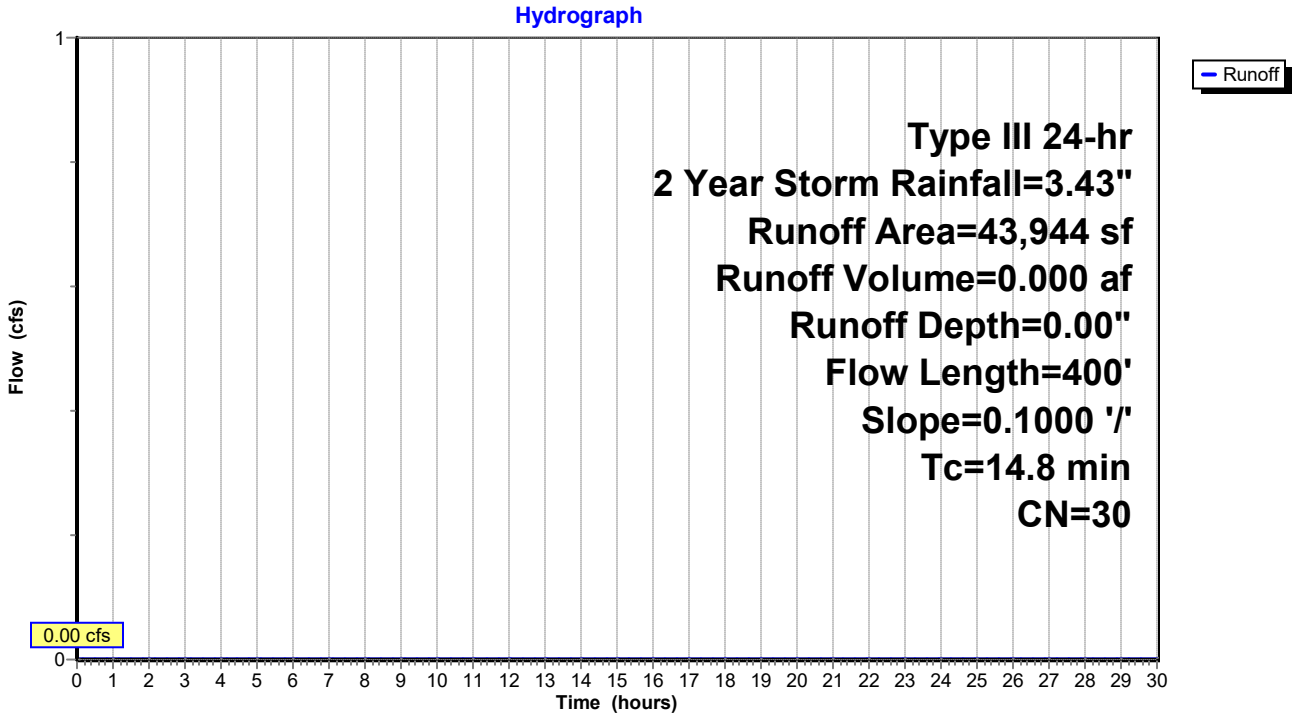
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

Area (sf)	CN	Description
43,944	30	Woods, Good, HSG A
43,944		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.1000	0.08		**Sheet Flow, wooded** Woods: Dense underbrush n= 0.800 P2= 3.30"
3.7	350	0.1000	1.58		**Shallow Concentrated Flow, wooded** Woodland Kv= 5.0 fps
14.8	400	Total			

Subcatchment EWS3: Existing Runoff to Southwest



Summary for Subcatchment EWS4: Existing Runoff to Northwest

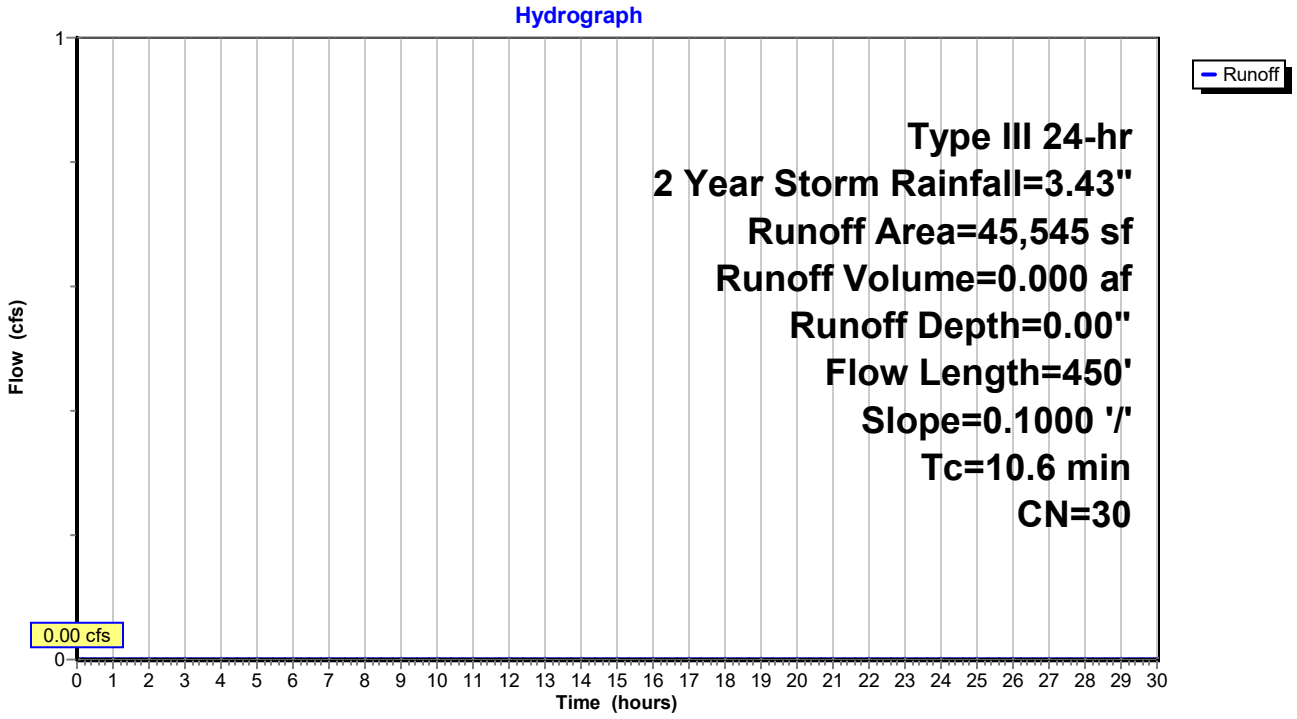
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

Area (sf)	CN	Description
45,545	30	Woods, Good, HSG A
45,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow, wooded undeveloped** Woods: Light underbrush n= 0.400 P2= 3.30"
4.2	400	0.1000	1.58		**Shallow Concentrated Flow, wooded** Woodland Kv= 5.0 fps
10.6	450	Total			

Subcatchment EWS4: Existing Runoff to Northwest



Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWS1: Existing Runoff to Runoff Area=29,460 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=220' Slope=0.1600 '/' Tc=10.6 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment EWS2: Existing Runoff to Runoff Area=9,014 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=80' Slope=0.1000 '/' Tc=16.2 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment EWS3: Existing Runoff to Runoff Area=43,944 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=400' Slope=0.1000 '/' Tc=14.8 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment EWS4: Existing Runoff to Runoff Area=45,545 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=450' Slope=0.1000 '/' Tc=10.6 min CN=30 Runoff=0.00 cfs 0.000 af

Summary for Subcatchment EWS1: Existing Runoff to Northeast

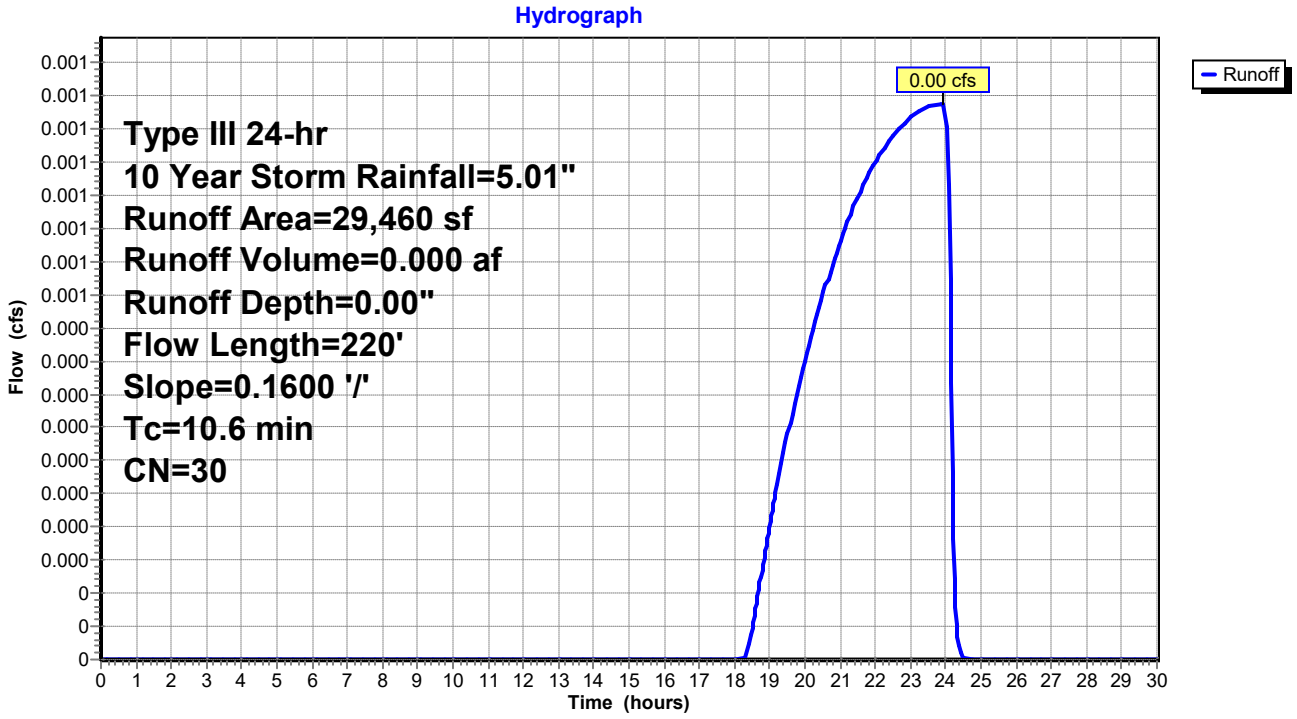
Runoff = 0.00 cfs @ 23.91 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 Year Storm Rainfall=5.01"

Area (sf)	CN	Description
29,460	30	Woods, Good, HSG A
29,460		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.1600	0.09		**Sheet Flow, wooded** Woods: Dense underbrush n= 0.800 P2= 3.30"
1.4	170	0.1600	2.00		**Shallow Concentrated Flow, wooded** Woodland Kv= 5.0 fps
10.6	220	Total			

Subcatchment EWS1: Existing Runoff to Northeast



Summary for Subcatchment EWS2: Existing Runoff to Southeast

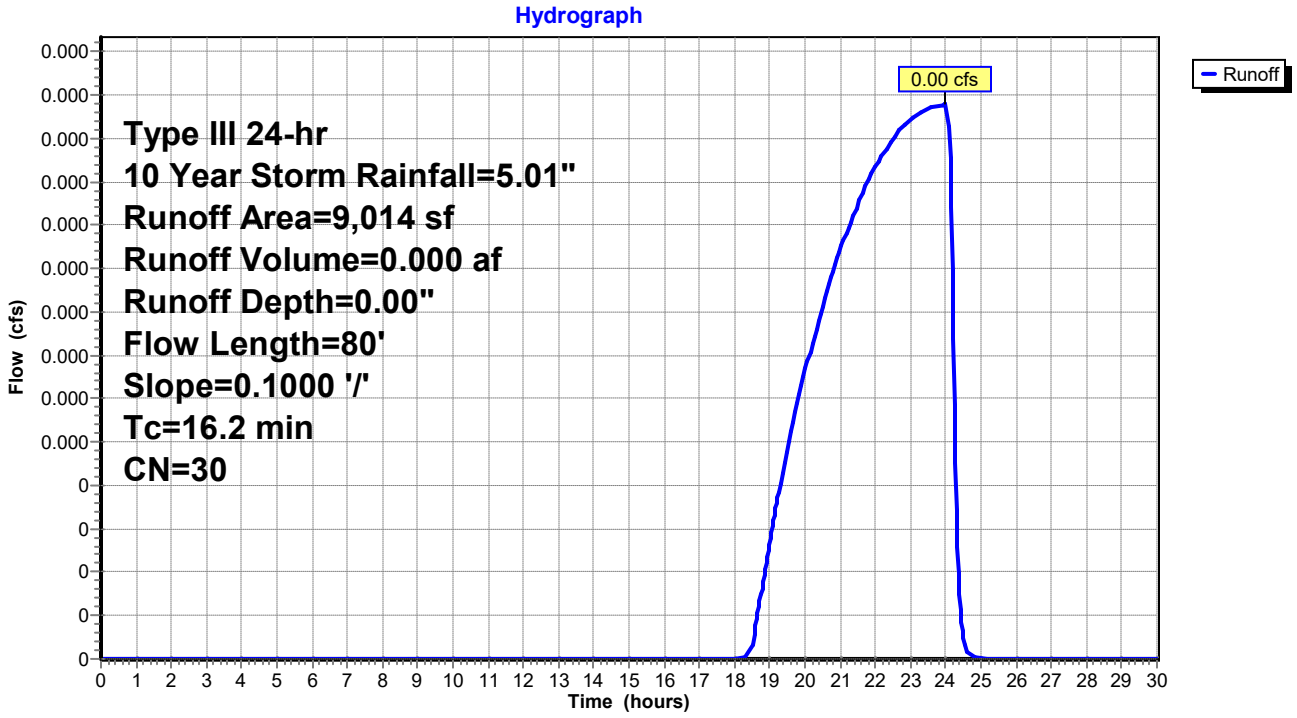
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 Year Storm Rainfall=5.01"

Area (sf)	CN	Description
9,014	30	Woods, Good, HSG A
9,014		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	80	0.1000	0.08		**Sheet Flow, wooded** Woods: Dense underbrush n= 0.800 P2= 3.30"

Subcatchment EWS2: Existing Runoff to Southeast



Summary for Subcatchment EWS3: Existing Runoff to Southwest

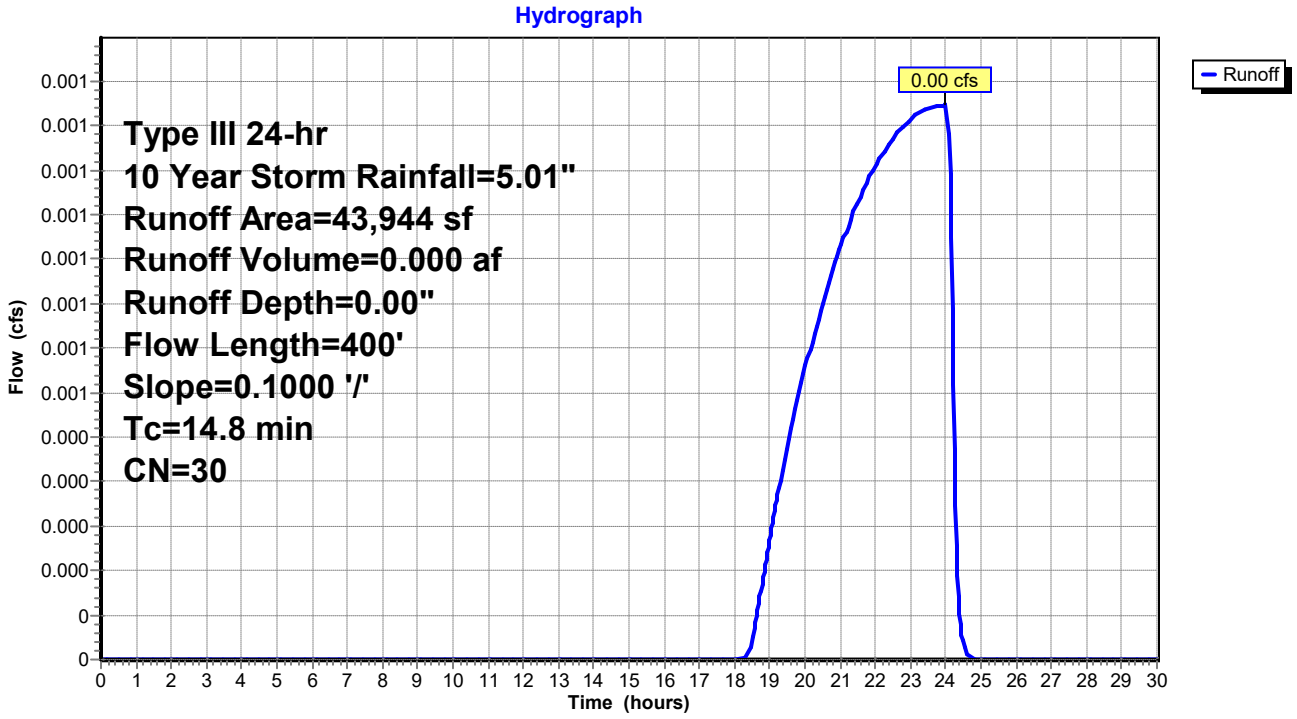
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 Year Storm Rainfall=5.01"

Area (sf)	CN	Description
43,944	30	Woods, Good, HSG A
43,944		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.1000	0.08		**Sheet Flow, wooded** Woods: Dense underbrush n= 0.800 P2= 3.30"
3.7	350	0.1000	1.58		**Shallow Concentrated Flow, wooded** Woodland Kv= 5.0 fps
14.8	400	Total			

Subcatchment EWS3: Existing Runoff to Southwest



Summary for Subcatchment EWS4: Existing Runoff to Northwest

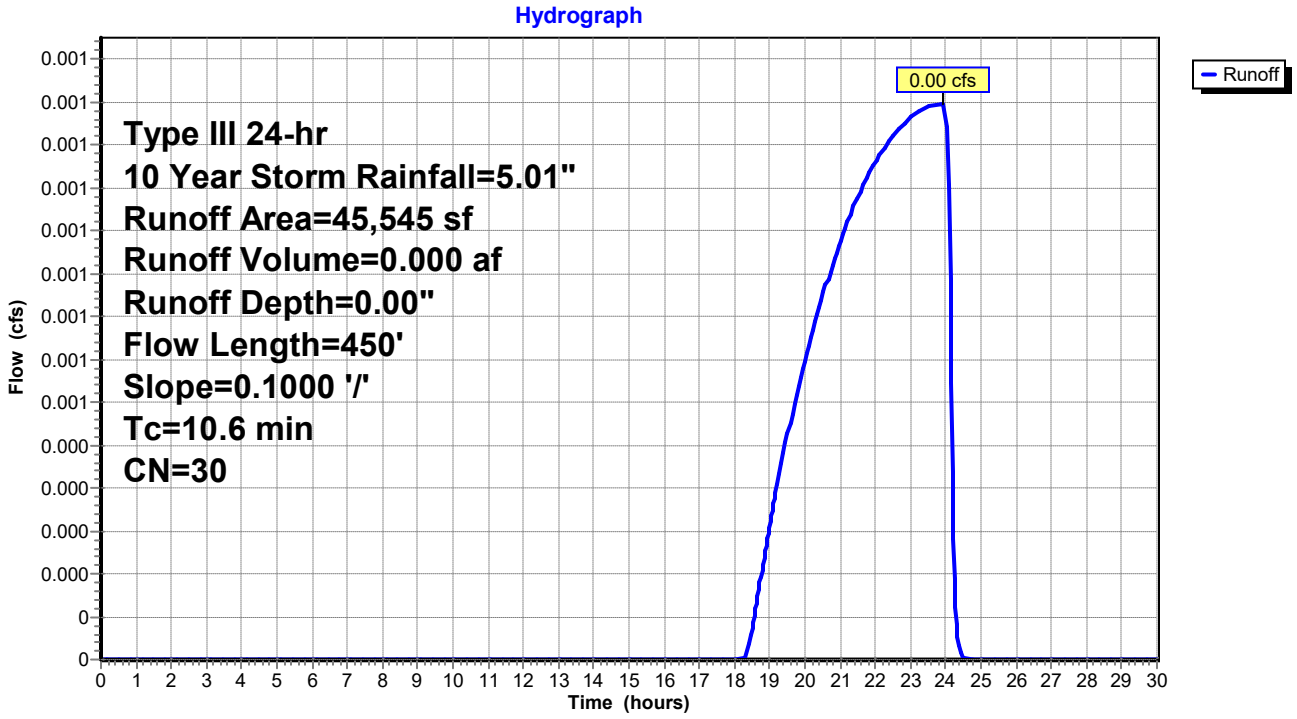
Runoff = 0.00 cfs @ 23.91 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 Year Storm Rainfall=5.01"

Area (sf)	CN	Description
45,545	30	Woods, Good, HSG A
45,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow, wooded undeveloped** Woods: Light underbrush n= 0.400 P2= 3.30"
4.2	400	0.1000	1.58		**Shallow Concentrated Flow, wooded** Woodland Kv= 5.0 fps
10.6	450	Total			

Subcatchment EWS4: Existing Runoff to Northwest



Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWS1: Existing Runoff to Runoff Area=29,460 sf 0.00% Impervious Runoff Depth=0.23"
Flow Length=220' Slope=0.1600 '/' Tc=10.6 min CN=30 Runoff=0.02 cfs 0.013 af

Subcatchment EWS2: Existing Runoff to Runoff Area=9,014 sf 0.00% Impervious Runoff Depth=0.23"
Flow Length=80' Slope=0.1000 '/' Tc=16.2 min CN=30 Runoff=0.01 cfs 0.004 af

Subcatchment EWS3: Existing Runoff to Runoff Area=43,944 sf 0.00% Impervious Runoff Depth=0.23"
Flow Length=400' Slope=0.1000 '/' Tc=14.8 min CN=30 Runoff=0.03 cfs 0.019 af

Subcatchment EWS4: Existing Runoff to Runoff Area=45,545 sf 0.00% Impervious Runoff Depth=0.23"
Flow Length=450' Slope=0.1000 '/' Tc=10.6 min CN=30 Runoff=0.03 cfs 0.020 af

Summary for Subcatchment EWS1: Existing Runoff to Northeast

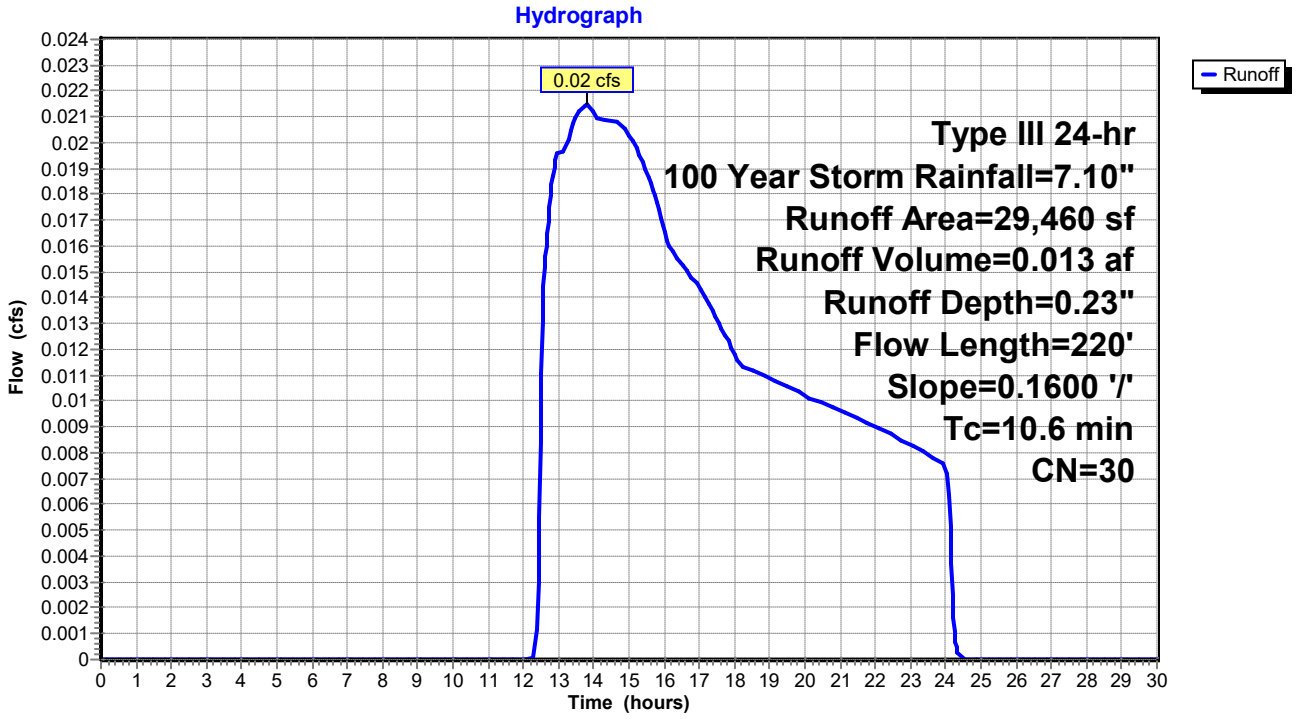
Runoff = 0.02 cfs @ 13.79 hrs, Volume= 0.013 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100 Year Storm Rainfall=7.10"

Area (sf)	CN	Description
29,460	30	Woods, Good, HSG A
29,460		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.1600	0.09		**Sheet Flow, wooded** Woods: Dense underbrush n= 0.800 P2= 3.30"
1.4	170	0.1600	2.00		**Shallow Concentrated Flow, wooded** Woodland Kv= 5.0 fps
10.6	220	Total			

Subcatchment EWS1: Existing Runoff to Northeast



Summary for Subcatchment EWS2: Existing Runoff to Southeast

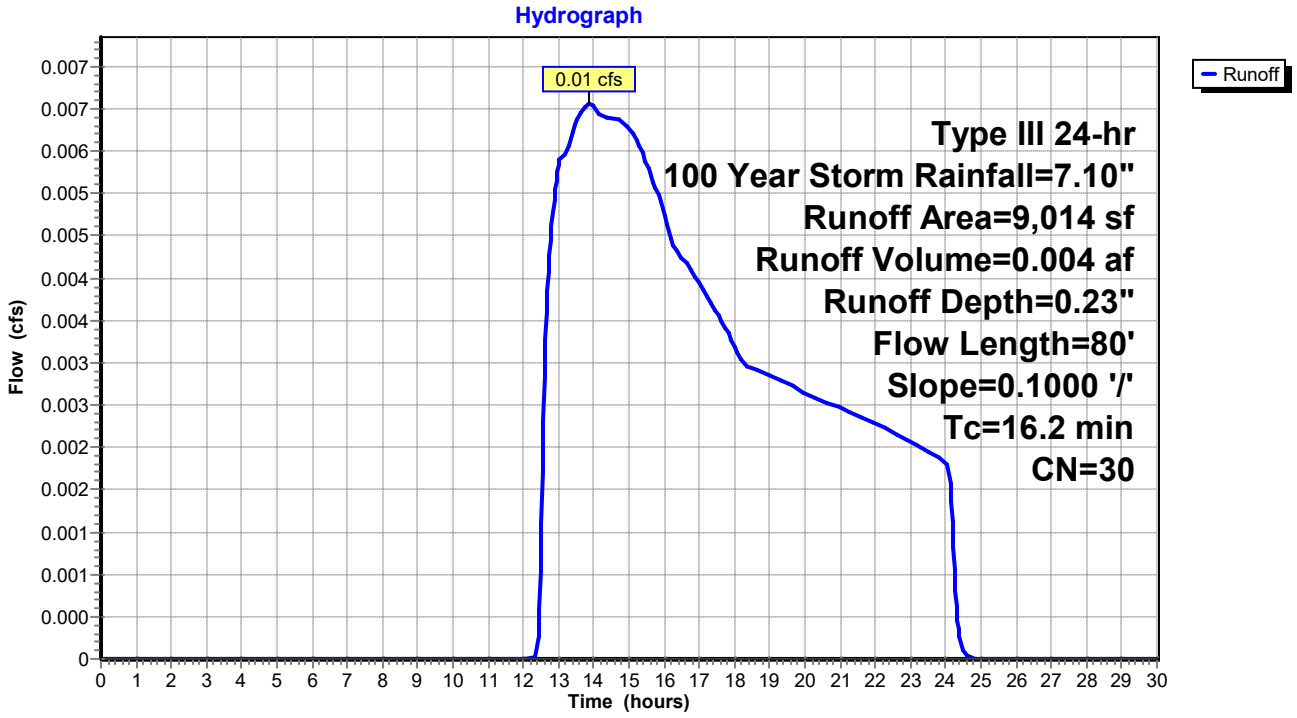
Runoff = 0.01 cfs @ 13.87 hrs, Volume= 0.004 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100 Year Storm Rainfall=7.10"

Area (sf)	CN	Description
9,014	30	Woods, Good, HSG A
9,014		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	80	0.1000	0.08		**Sheet Flow, wooded** Woods: Dense underbrush n= 0.800 P2= 3.30"

Subcatchment EWS2: Existing Runoff to Southeast



Summary for Subcatchment EWS3: Existing Runoff to Southwest

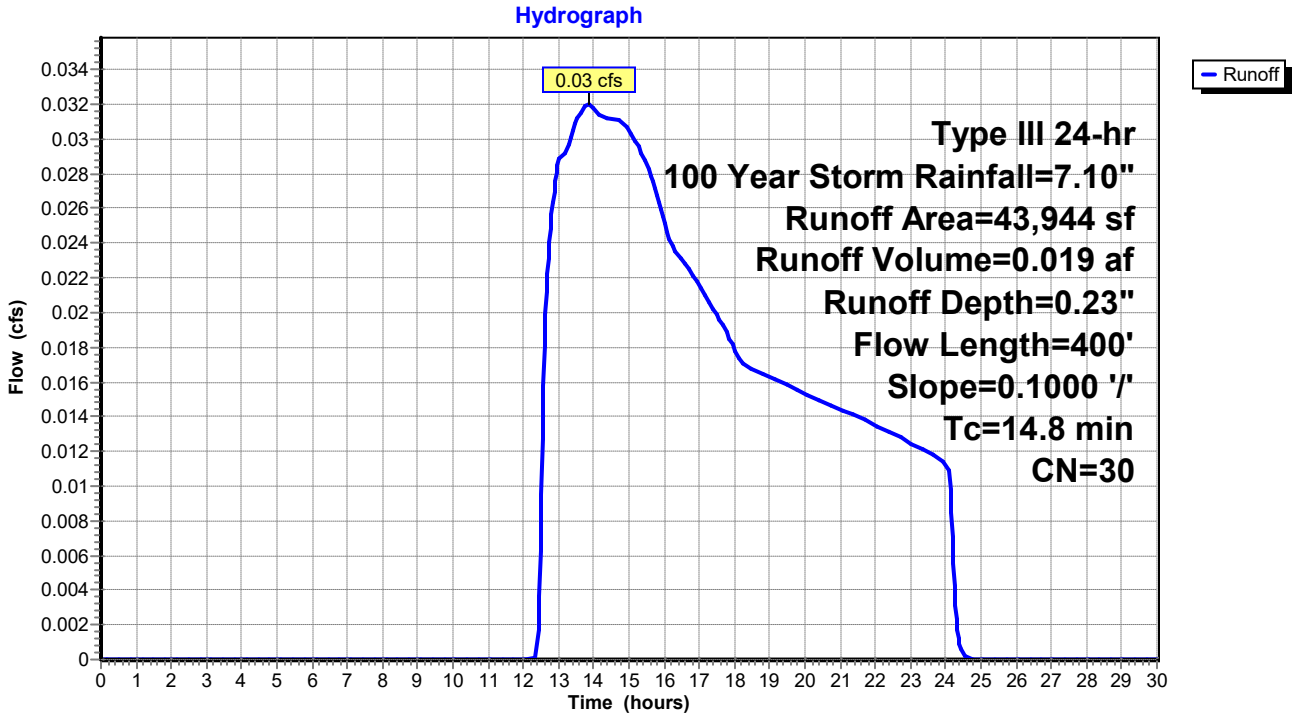
Runoff = 0.03 cfs @ 13.85 hrs, Volume= 0.019 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100 Year Storm Rainfall=7.10"

Area (sf)	CN	Description
43,944	30	Woods, Good, HSG A
43,944		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.1000	0.08		**Sheet Flow, wooded** Woods: Dense underbrush n= 0.800 P2= 3.30"
3.7	350	0.1000	1.58		**Shallow Concentrated Flow, wooded** Woodland Kv= 5.0 fps
14.8	400	Total			

Subcatchment EWS3: Existing Runoff to Southwest



Summary for Subcatchment EWS4: Existing Runoff to Northwest

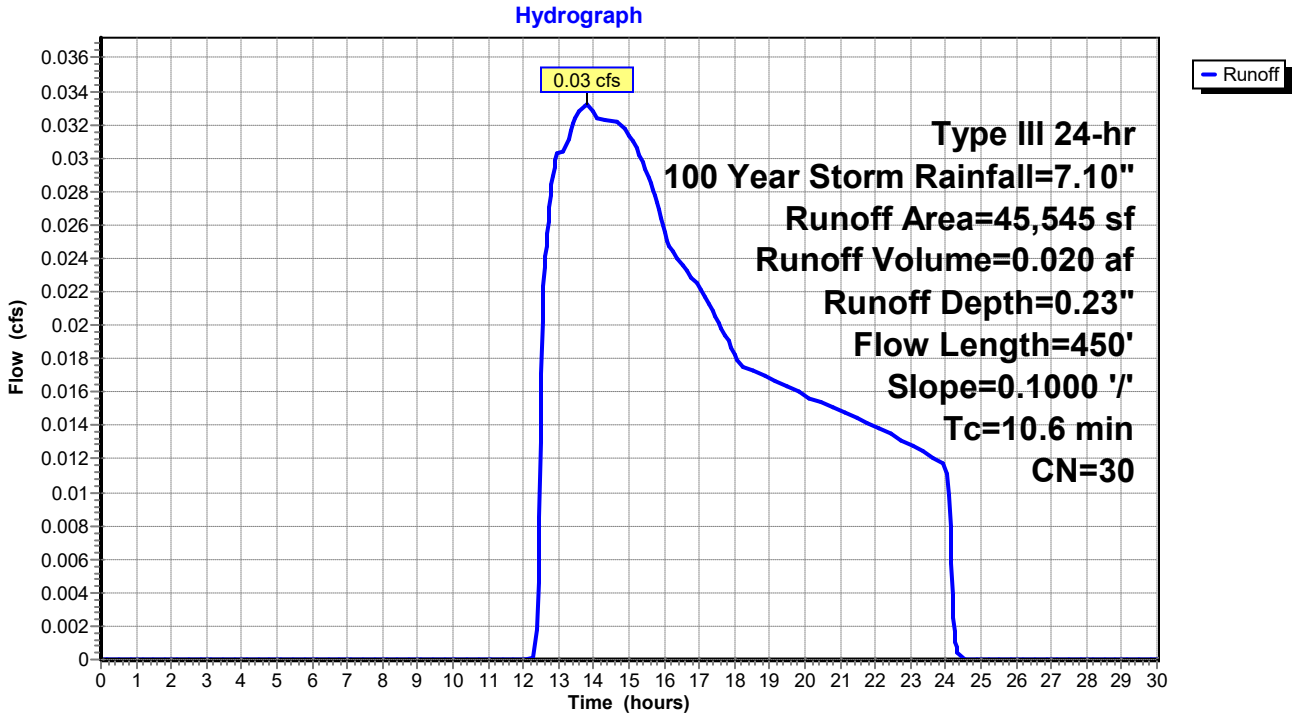
Runoff = 0.03 cfs @ 13.79 hrs, Volume= 0.020 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100 Year Storm Rainfall=7.10"

Area (sf)	CN	Description
45,545	30	Woods, Good, HSG A
45,545		100.00% Pervious Area

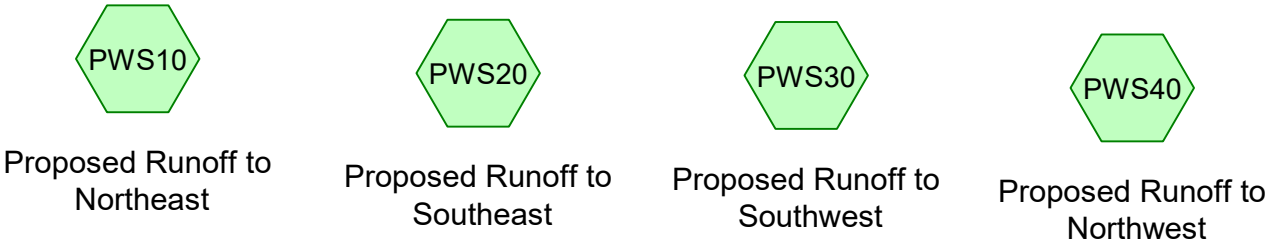
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow, wooded undeveloped** Woods: Light underbrush n= 0.400 P2= 3.30"
4.2	400	0.1000	1.58		**Shallow Concentrated Flow, wooded** Woodland Kv= 5.0 fps
10.6	450	Total			

Subcatchment EWS4: Existing Runoff to Northwest



Appendix "B"

Proposed Watershed Data
(2 year – 10 year – 100 year storm events)



Subcat Reach Pond Link

Routing Diagram for 340 (Rear) Main Street, Bourne MA (proposed)
Prepared by Choubah Enginnering Group, P.C., Printed 4/21/2023

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.556	30	Woods, Good, HSG A (PWS30, PWS40)

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.556	HSG A	PWS30, PWS40
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.556	0.000	0.000	0.000	0.000	0.556	Woods, Good	PWS30, PWS40

Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWS10: Proposed Runoff to Runoff Area=0 sf 0.00% Impervious Runoff Depth=0.00"
Tc=0.0 min CN=0 Runoff=0.00 cfs 0.000 af

Subcatchment PWS20: Proposed Runoff to Runoff Area=0 sf 0.00% Impervious Runoff Depth=0.00"
Tc=0.0 min CN=0 Runoff=0.00 cfs 0.000 af

Subcatchment PWS30: Proposed Runoff to Runoff Area=12,071 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=400' Tc=21.8 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment PWS40: Proposed Runoff to Runoff Area=12,136 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=50' Slope=0.1000 '/' Tc=6.4 min CN=30 Runoff=0.00 cfs 0.000 af

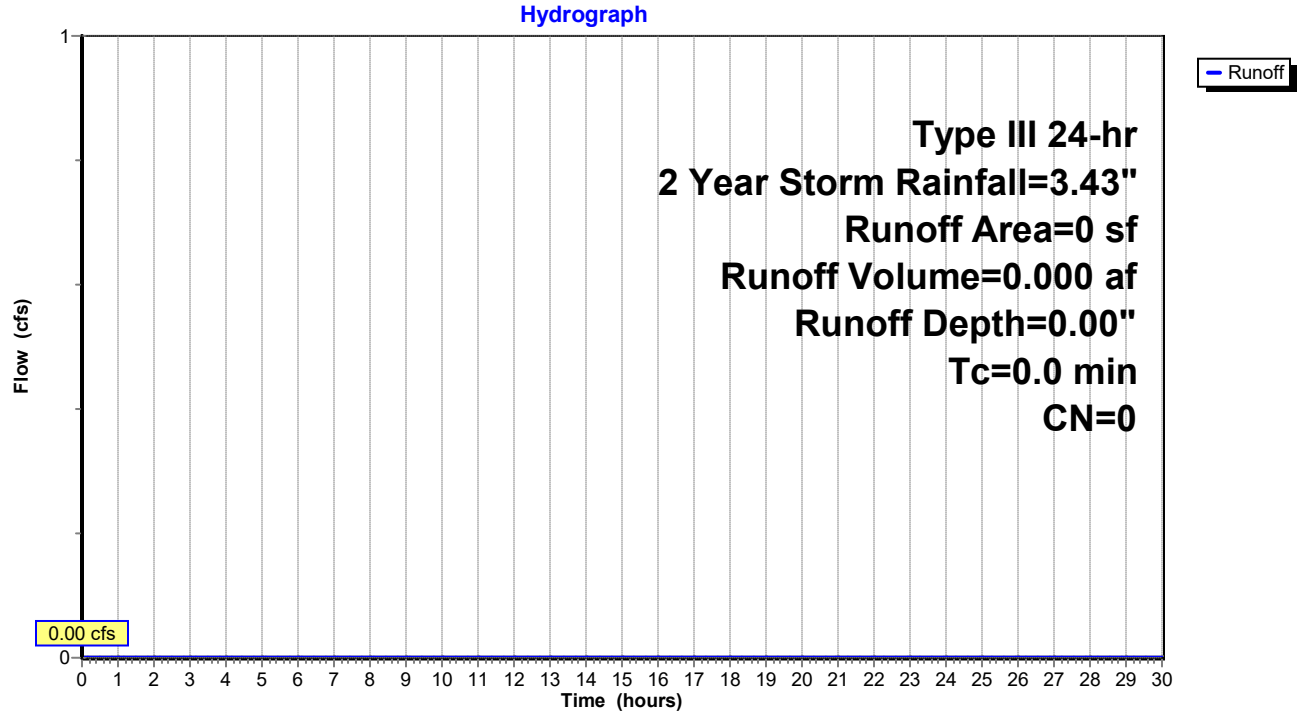
Summary for Subcatchment PWS10: Proposed Runoff to Northeast

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

Area (sf)	CN	Description
0	30	Woods, Good, HSG A

Subcatchment PWS10: Proposed Runoff to Northeast



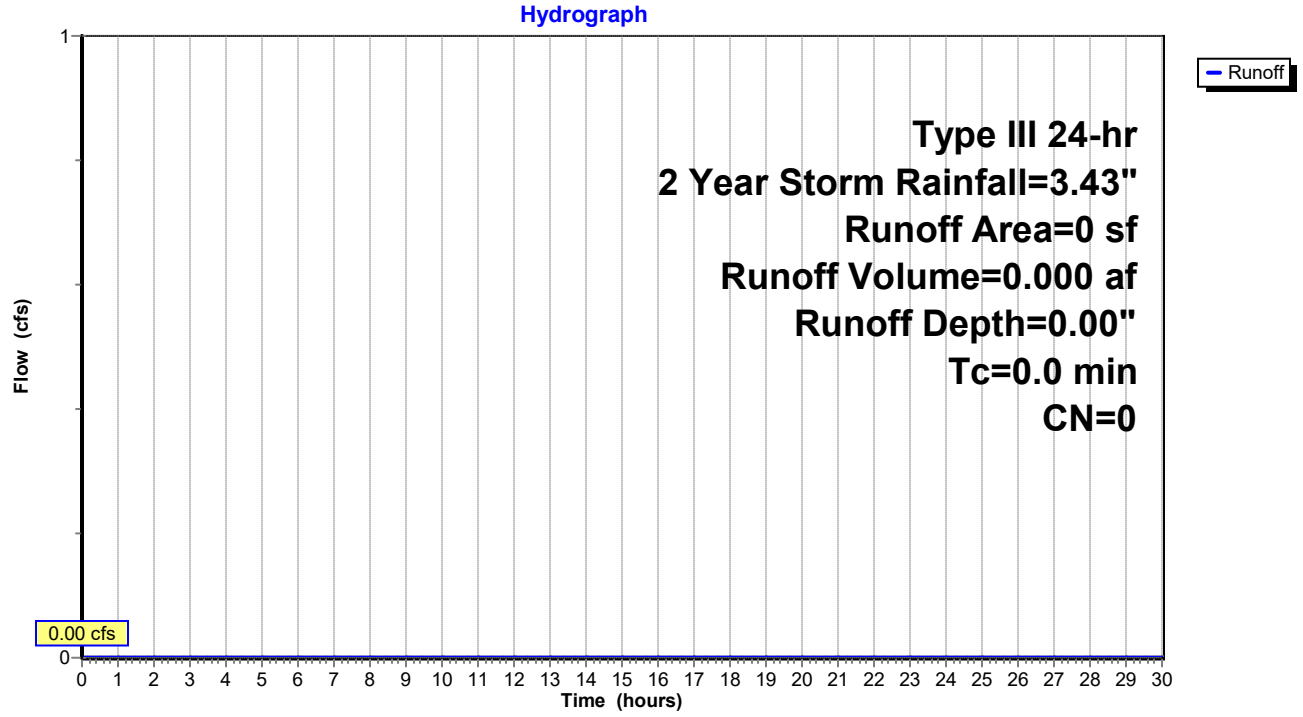
Summary for Subcatchment PWS20: Proposed Runoff to Southeast

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

Area (sf)	CN	Description
0	30	Woods, Good, HSG A

Subcatchment PWS20: Proposed Runoff to Southeast



Summary for Subcatchment PWS30: Proposed Runoff to Southwest

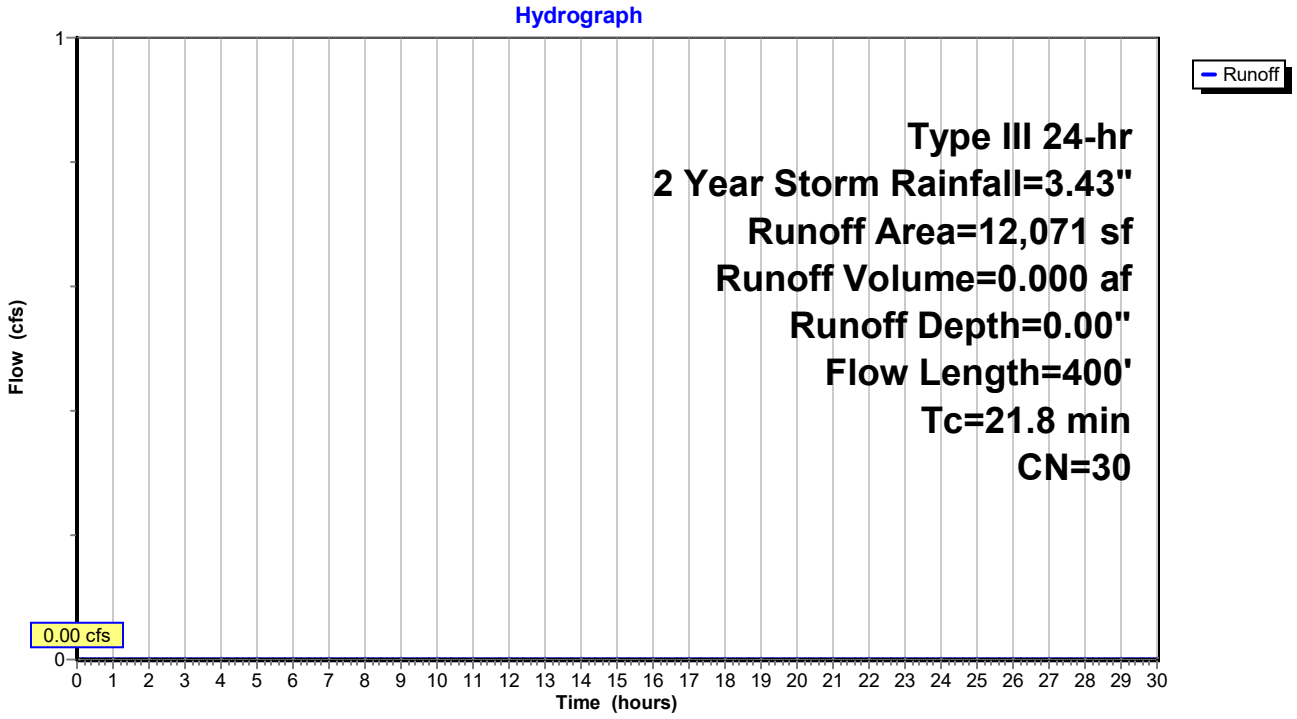
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

Area (sf)	CN	Description
12,071	30	Woods, Good, HSG A
12,071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	50	0.0600	0.06		**Sheet Flow, wooded** Woods: Dense underbrush n= 0.800 P2= 3.30"
8.2	350	0.0200	0.71		**Shallow Concentrated Flow, wooded** Woodland Kv= 5.0 fps
21.8	400	Total			

Subcatchment PWS30: Proposed Runoff to Southwest



Summary for Subcatchment PWS40: Proposed Runoff to Northwest

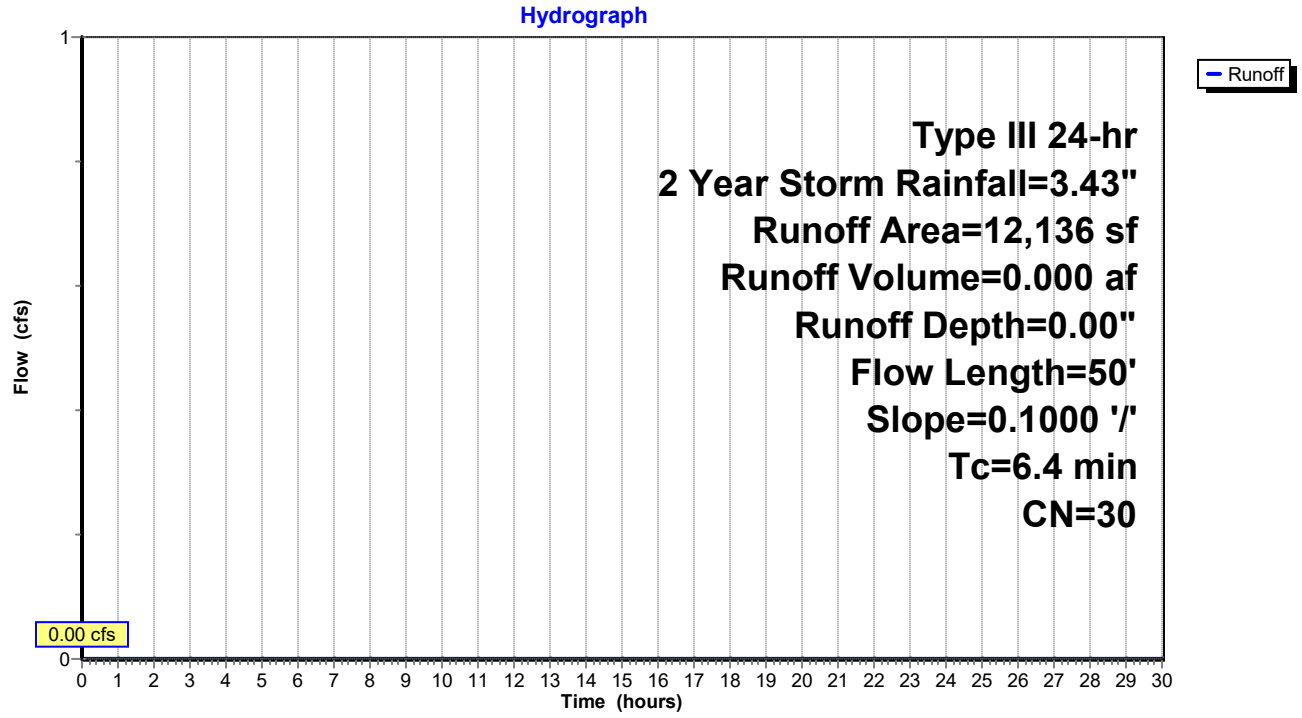
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

Area (sf)	CN	Description
12,136	30	Woods, Good, HSG A
12,136		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow, wooded** Woods: Light underbrush n= 0.400 P2= 3.30"

Subcatchment PWS40: Proposed Runoff to Northwest



Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWS10: Proposed Runoff to Runoff Area=0 sf 0.00% Impervious Runoff Depth=0.00"
Tc=0.0 min CN=0 Runoff=0.00 cfs 0.000 af

Subcatchment PWS20: Proposed Runoff to Runoff Area=0 sf 0.00% Impervious Runoff Depth=0.00"
Tc=0.0 min CN=0 Runoff=0.00 cfs 0.000 af

Subcatchment PWS30: Proposed Runoff to Runoff Area=12,071 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=400' Tc=21.8 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment PWS40: Proposed Runoff to Runoff Area=12,136 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=50' Slope=0.1000 '/' Tc=6.4 min CN=30 Runoff=0.00 cfs 0.000 af

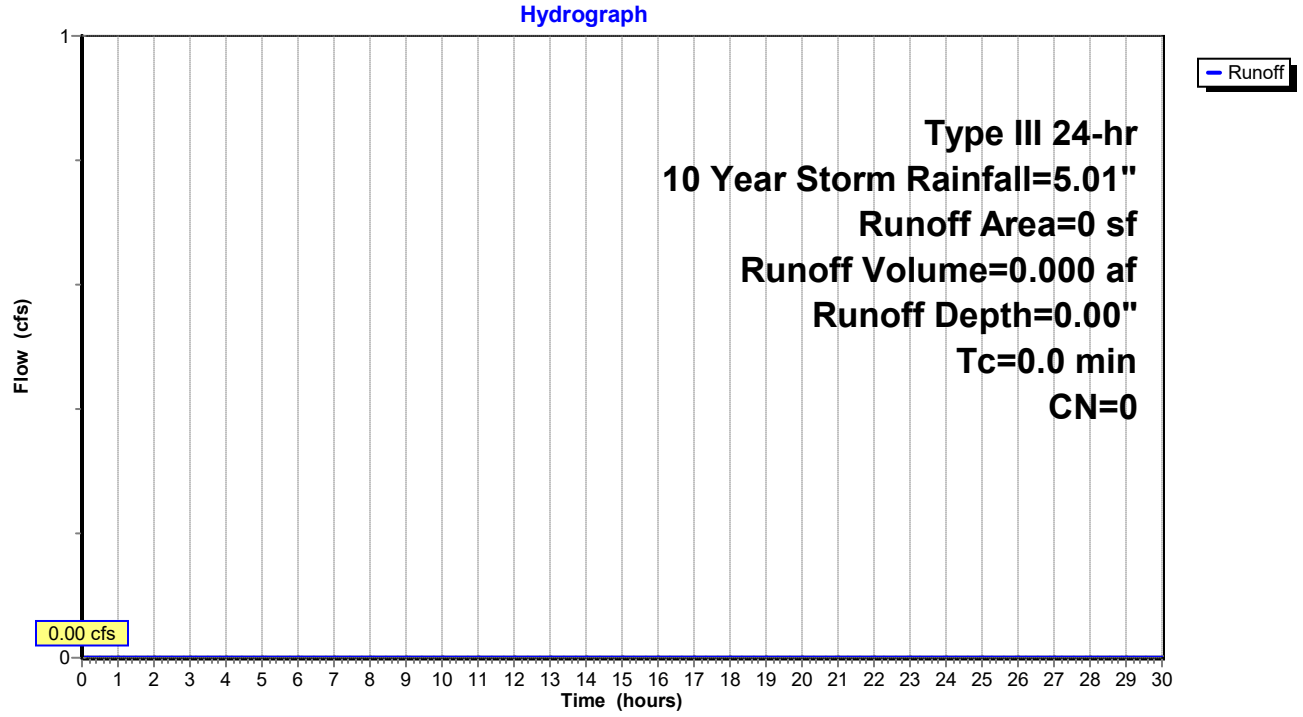
Summary for Subcatchment PWS10: Proposed Runoff to Northeast

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 Year Storm Rainfall=5.01"

Area (sf)	CN	Description
0	30	Woods, Good, HSG A

Subcatchment PWS10: Proposed Runoff to Northeast



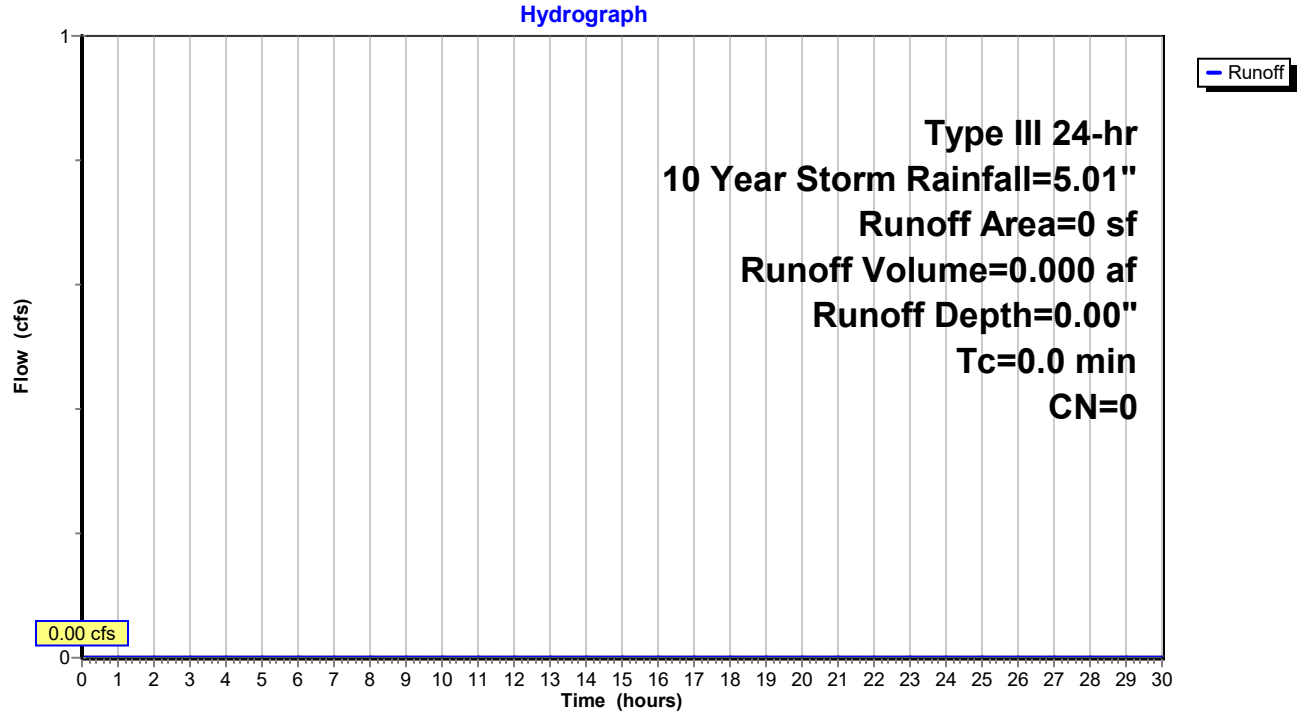
Summary for Subcatchment PWS20: Proposed Runoff to Southeast

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 Year Storm Rainfall=5.01"

Area (sf)	CN	Description
0	30	Woods, Good, HSG A

Subcatchment PWS20: Proposed Runoff to Southeast



Summary for Subcatchment PWS30: Proposed Runoff to Southwest

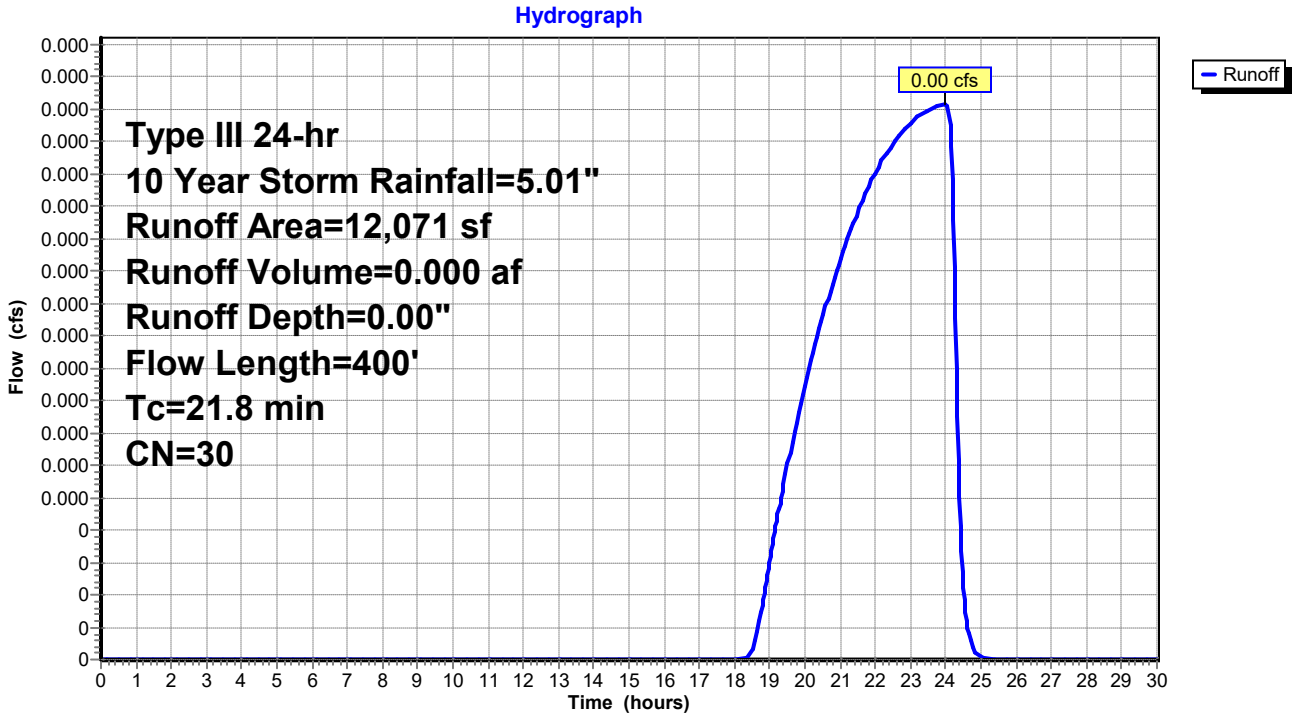
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 Year Storm Rainfall=5.01"

Area (sf)	CN	Description
12,071	30	Woods, Good, HSG A
12,071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	50	0.0600	0.06		**Sheet Flow, wooded** Woods: Dense underbrush n= 0.800 P2= 3.30"
8.2	350	0.0200	0.71		**Shallow Concentrated Flow, wooded** Woodland Kv= 5.0 fps
21.8	400	Total			

Subcatchment PWS30: Proposed Runoff to Southwest



Summary for Subcatchment PWS40: Proposed Runoff to Northwest

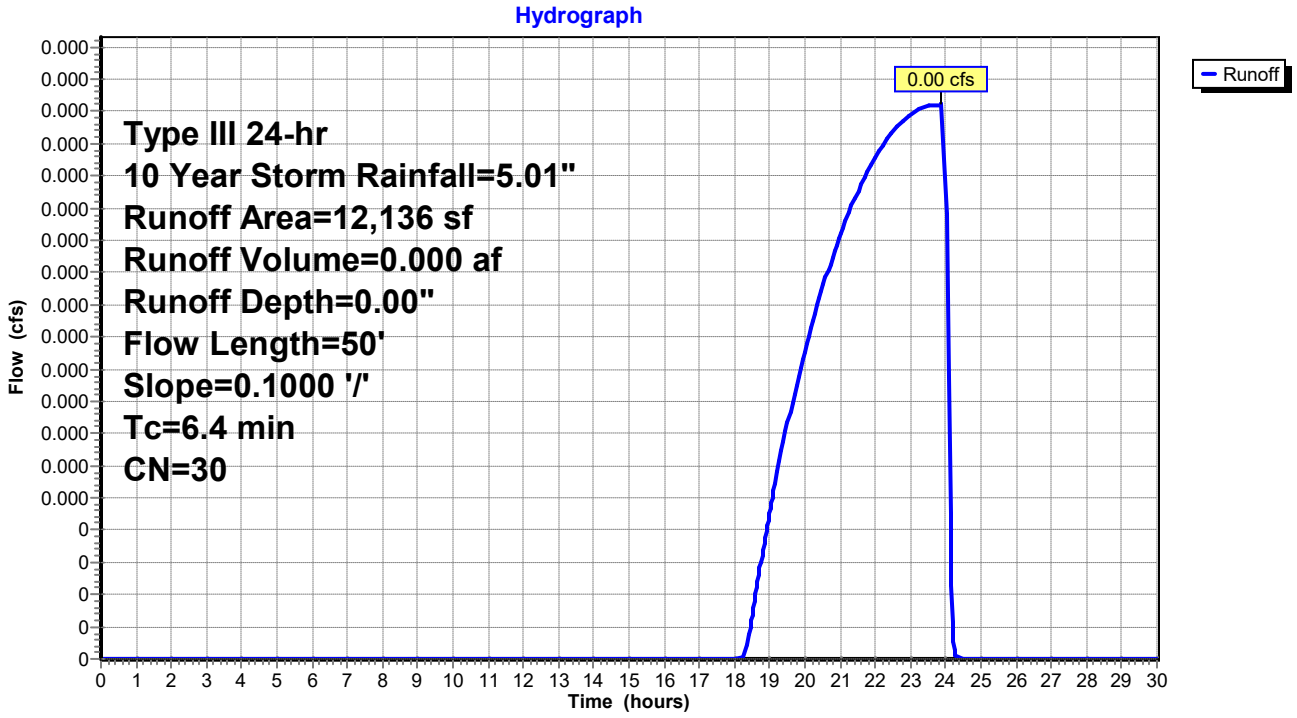
Runoff = 0.00 cfs @ 23.89 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 Year Storm Rainfall=5.01"

Area (sf)	CN	Description
12,136	30	Woods, Good, HSG A
12,136		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow, wooded** Woods: Light underbrush n= 0.400 P2= 3.30"

Subcatchment PWS40: Proposed Runoff to Northwest



Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWS10: Proposed Runoff to Runoff Area=0 sf 0.00% Impervious Runoff Depth=0.00"
Tc=0.0 min CN=0 Runoff=0.00 cfs 0.000 af

Subcatchment PWS20: Proposed Runoff to Runoff Area=0 sf 0.00% Impervious Runoff Depth=0.00"
Tc=0.0 min CN=0 Runoff=0.00 cfs 0.000 af

Subcatchment PWS30: Proposed Runoff to Runoff Area=12,071 sf 0.00% Impervious Runoff Depth=0.23"
Flow Length=400' Tc=21.8 min CN=30 Runoff=0.01 cfs 0.005 af

Subcatchment PWS40: Proposed Runoff to Runoff Area=12,136 sf 0.00% Impervious Runoff Depth=0.23"
Flow Length=50' Slope=0.1000 '/' Tc=6.4 min CN=30 Runoff=0.01 cfs 0.005 af

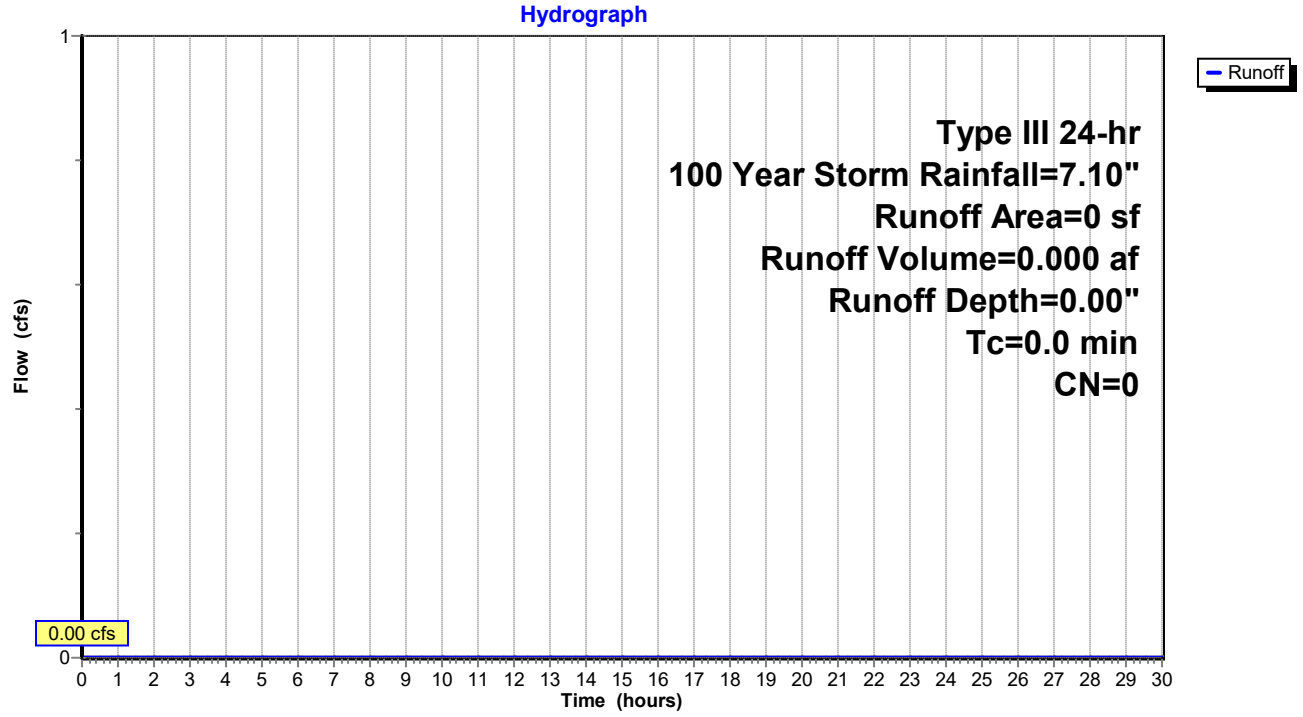
Summary for Subcatchment PWS10: Proposed Runoff to Northeast

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100 Year Storm Rainfall=7.10"

Area (sf)	CN	Description
0	30	Woods, Good, HSG A

Subcatchment PWS10: Proposed Runoff to Northeast



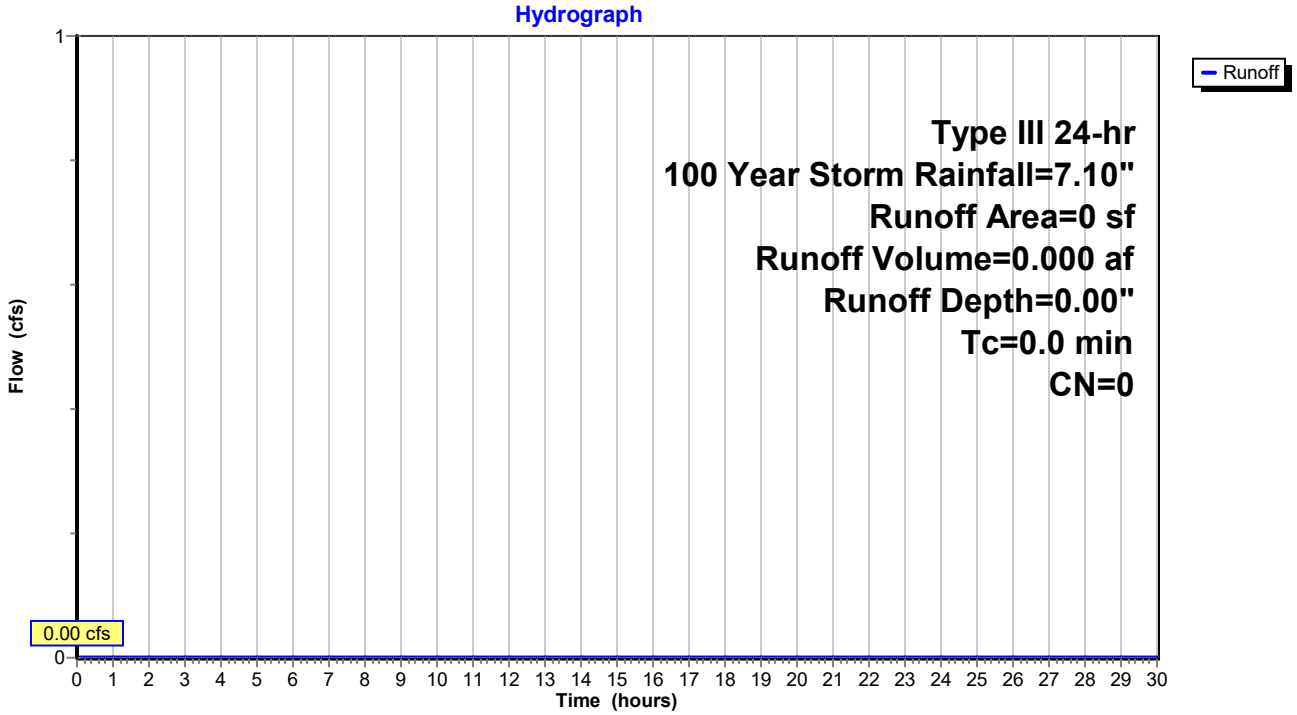
Summary for Subcatchment PWS20: Proposed Runoff to Southeast

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100 Year Storm Rainfall=7.10"

Area (sf)	CN	Description
0	30	Woods, Good, HSG A

Subcatchment PWS20: Proposed Runoff to Southeast



Summary for Subcatchment PWS30: Proposed Runoff to Southwest

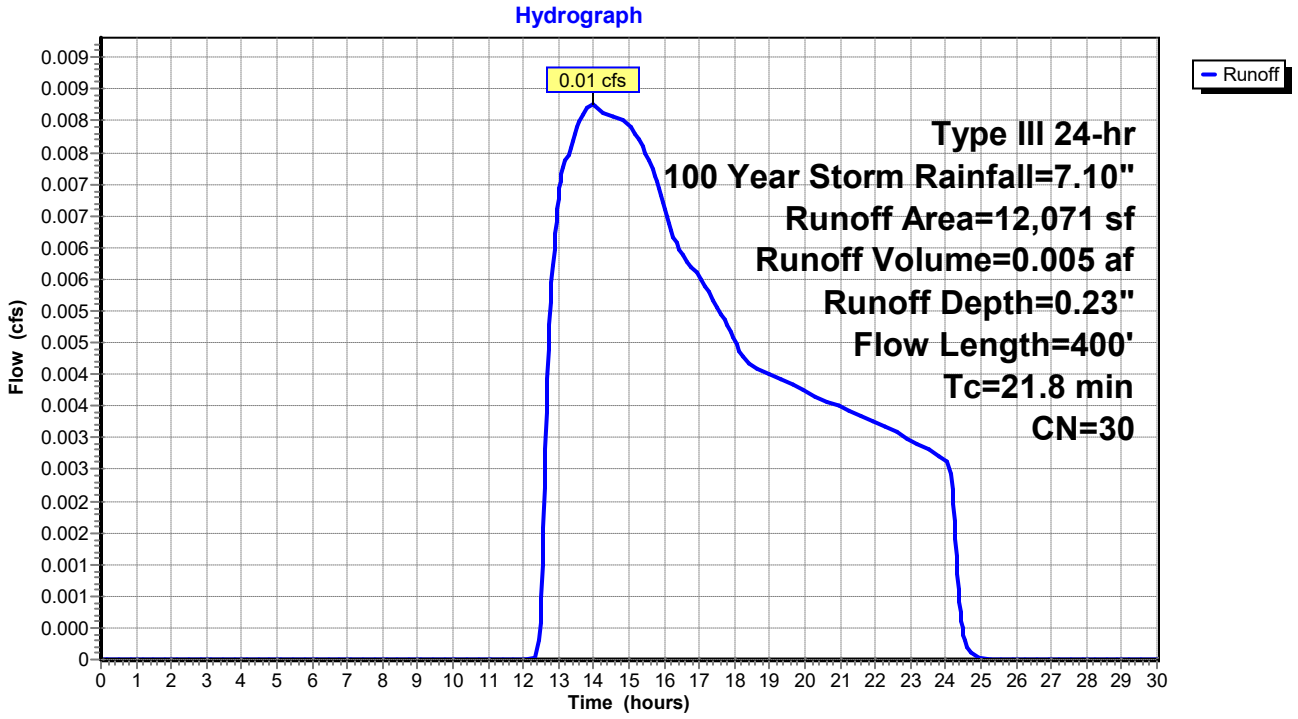
Runoff = 0.01 cfs @ 13.97 hrs, Volume= 0.005 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100 Year Storm Rainfall=7.10"

Area (sf)	CN	Description
12,071	30	Woods, Good, HSG A
12,071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	50	0.0600	0.06		**Sheet Flow, wooded** Woods: Dense underbrush n= 0.800 P2= 3.30"
8.2	350	0.0200	0.71		**Shallow Concentrated Flow, wooded** Woodland Kv= 5.0 fps
21.8	400	Total			

Subcatchment PWS30: Proposed Runoff to Southwest



Summary for Subcatchment PWS40: Proposed Runoff to Northwest

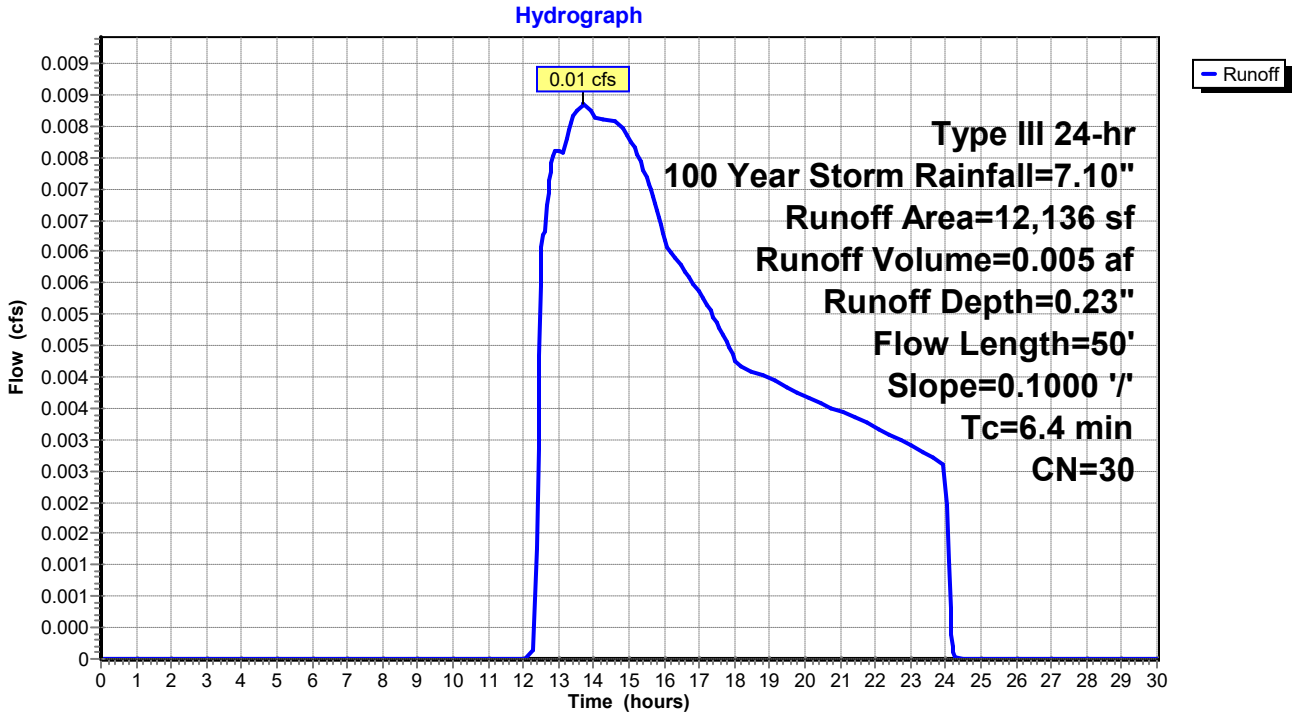
Runoff = 0.01 cfs @ 13.71 hrs, Volume= 0.005 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100 Year Storm Rainfall=7.10"

Area (sf)	CN	Description
12,136	30	Woods, Good, HSG A
12,136		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow, wooded** Woods: Light underbrush n= 0.400 P2= 3.30"

Subcatchment PWS40: Proposed Runoff to Northwest



Appendix “C”

Water Quality Volume (WQv)
(Water quality flow & tss removal calculations)

1.0" Water Quality Volume Calculations

Project: 340 Main Street, (Rear)	
Location: Bourne, MA	
Calc. By: HC	Date: 04/28/2023
Chk. By: HC	Date: 04/28/2023

IA10 Water Quality Volume (WQ_V)

Total Contributing Area (ft 2) = (Impervious 8,112 s.f.)

WQ_V (ft^3) = Contributing Impervious Area (ft^2) x 1.0"x 1 ft/12 in

Impervious Area (ft^2)= 8,112

WQ_V (ft^3) = 676

IA20 Water Quality Volume (WQ_V)

Total Contributing Area (ft 2) = (Impervious 7,967 s.f.)

WQ_V (ft 3) = Contributing Impervious Area (ft 2) x 1.0"x 1 ft/12 in

Impervious Area (ft 2) = 7,967

WQ_V (ft^3) = 664

IA30 Water Quality Volume (WQ_V)

Total Contributing Area (ft 2) = (Impervious 8,163 s.f.)

WQ_V (ft 3) = Contributing Impervious Area (ft 2) x 1.0"x 1 ft/12 in

Impervious Area (ft 2) = 8,163

WQ_V (ft 3) = 680

IA40 Water Quality Volume (WQ_V)

Total Contributing Area (ft 2) = (Impervious 7,349 s.f.)

WQ_V (ft 3) = Contributing Impervious Area (ft 2) x 1.0"x 1 ft/12 in

Impervious Area (ft 2) = 7,349

WQ_V (ft 3) = 612

Water quality measures will be achieved thru the use of Stormceptor Hydrodynamic Separator sized in accordance with MassDEP *Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Practices*
See attached modified CN and Water Quality Flow Calculations

1.0" Water Quality Flow Calculations

Project: 340 Main Street, (Rear)

Location: Bourne, MA

Calc. By: HC Date: 04/28/2023

Chk. By: HC Date: 04/28/2023

Sheet 1 of 1

IA10 Water Quality Flow

Q=(qu)(A)(WQV)

Tc = (6 minutes) /(60 minutes/hr) = 0.1

Impervious Area (Ac.) = 0.19

Impervious Area (mi ^{2}) = 0.000297

WQV (in) = 1.0

qu = 800

Q (cfs) = 0.24

IA20 Water Quality Flow

Q=(qu)(A)(WQV)

Tc = (6 minutes) /(60 minutes/hr) = 0.1

Impervious Area (Ac.) = 0.18

Impervious Area (mi ^{2}) = 0.000281

WQV (in) = 1.0

qu = 800

Q (cfs)= 0.23

IA30 Water Quality Flow

Q=(qu)(A)(WQV)

Tc = (6 minutes) /(60 minutes/hr) = 0.1

Impervious Area (Ac.)= 0.19

Impervious Area (mi ^{2})= 0.000297

WQV (in) = 1.0

qu = 800

Q (cfs)= 0.24

IA40 Water Quality Flow

Q=(qu)(A)(WQV)

Tc = (6 minutes) /(60 minutes/hr) = 0.1

Impervious Area (Ac.)= 0.17

Impervious Area (mi ^{2})= 0.000266

WQV (in) = 1.0

qu = 800

Q (cfs)= 0.21

TOTAL SITE Water Quality Flow (CFS) = 0.92

FOUR STORMCEPTOR STC-450i STRUCTURES WILL BE UTILIZED TO MEET WATER STANDARDS

AND PROVIDE PRETREATMENT PRIOR TO ENTERING INFILTRATION BASIN

Water quality measures will be achieved thru the use of STORMCEPTOR Hydrodynamic Separators sized in accordance with *MassDEP Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Practices*

Q_1 = (qu)(A)(WQV)

qu = the unit peak discharge, in csm/in. (Determined by using Table in Figure 4)

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1.0-inches in this case)

Tc = (6 minutes) /(60 minutes/hr) = 0.1 hours

1 acre = 0.0015625 mi ^{2}

Stormceptor® STC

Stormceptor STC is the recognized leader in stormwater treatment, offering a range of versatile treatment systems that effectively remove pollutants from stormwater and snowmelt runoff. Stormceptor is flexibly designed to protect waterways from hazardous material spills and stormwater pollution, including suspended sediment, free oils, and other pollutants that attach to particles, no matter how fierce the storm.

Stormceptor's scour prevention technology ensures pollutants are captured and contained during all rainfall events.

Ideal uses

- Sediment (TSS) removal
- Spill control
- Debris and small floatables capture
- Pretreatment for filtration, detention/retention systems, ponds, wetlands, Low Impact Development (LID), green infrastructure, and water-sensitive urban design

Learn More:
www.ContechES.com/stormceptor

Proven performance

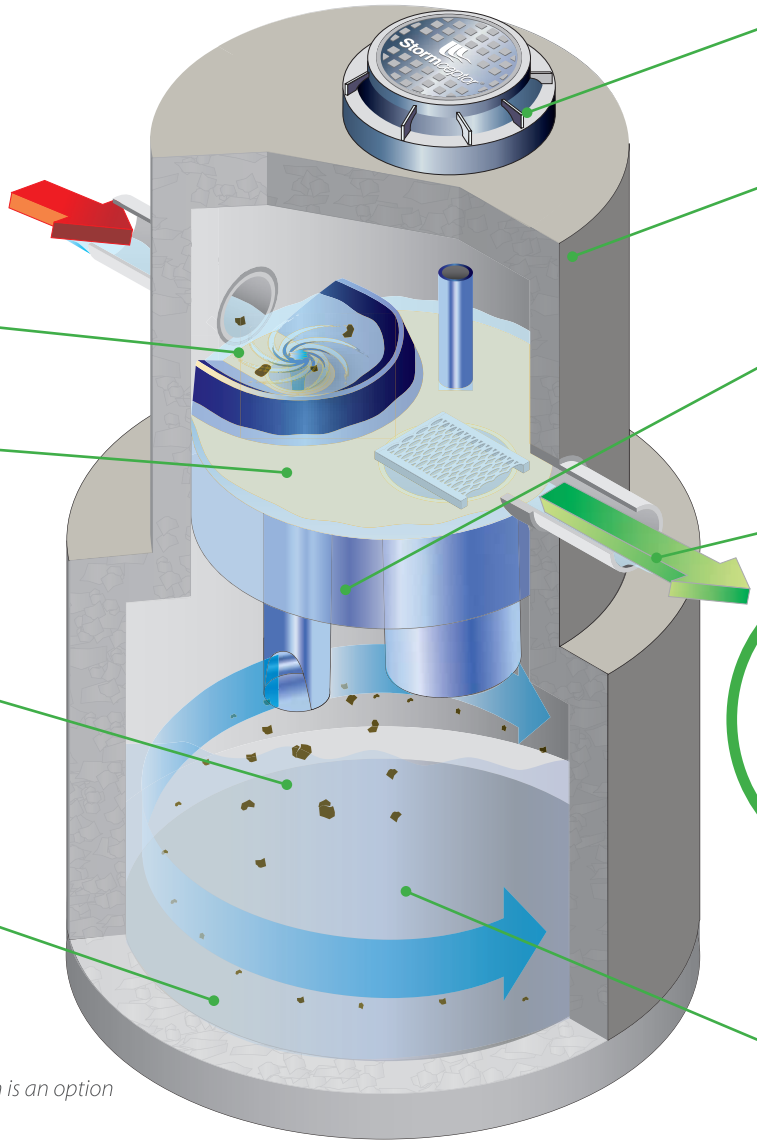
With more than 20 years of industry experience, Stormceptor has been performance tested and verified by some of the most stringent technology evaluation programs in North America.

- NJCAT
- Washington ECOLOGY
- EN858 Class 2

FEATURE	BENEFIT
Patented scour prevention technology	Superior pollutant removal and retention
Can take the place of a conventional junction or inlet structure	Eliminates the need for additional structures
Minimal drop between inlet and outlet	Site flexibility
Multiple inlets can connect to a single unit	Design flexibility
3rd party tested and verified performance (Sediment & Oil)	Eliminates the need for a separate bypass structure

With over 40,000 units operating worldwide, Stormceptor performs and protects every day, in every storm.

Stormceptor® STC



Surface access for ease of maintenance

Durable precast concrete

Impervious liner provides double wall containment for hydrocarbons

Treated water exits the unit

Free oils are trapped for later removal

Weir directs water into lower chamber

Patented technology prevents captured pollutant from scouring

Captures and stores a wide range of particle sizes, from 20 to 2,000 microns, for later removal

Sediment lies dormant for later removal

Quiescent chamber creates ideal conditions for free oils to rise and sediment to settle

* *Fiberglass construction is an option*

EASY TO INSTALL

Small footprint saves time and money with limited disruption to your site.

SEAMLESS

Minimal drop between inlet and outlet pipes makes Stormceptor ideal for retrofits and new development projects.

FLEXIBLE

Multiple inlets can connect to a single unit. Can be used as a bend structure.

A calm treatment environment

Stormceptor® STC

Stormceptor® is an underground stormwater quality treatment device that is unparalleled in its effectiveness for pollutant capture and retention. With thousands of systems operating worldwide, Stormceptor delivers protection every day in every storm.

With patented technology, optimal treatment occurs by allowing free oil to rise and sediment to settle. The Stormceptor design prohibits scour and release of previously captured pollutants, ensuring superior treatment and protection during even the most extreme storm events.

Stormceptor is very easy to design and provides flexibility under varying site constraints such as tight right-of-ways, zero lot lines and retrofit projects. Design flexibility allows for a cost-effective approach to stormwater treatment. Stormceptor has proven performance backed by the longest record of lab and field verification in the industry.

Tested Performance

- Fine particle capture
- Prevents scour or release
- 95%+ Oil removal

Massachusetts – Water Quality (Q) Flow Rate

Stormceptor STC Model	Inside Diameter	Typical Depth Below Inlet Pipe Invert [1]	Water Quality Flow Rate Q [2]	Peak Conveyance Flow Rate [3]	Hydrocarbon Capacity [4]	Maximum Sediment Capacity [4]
	(ft)	(in)	(cfs)	(cfs)	(Gallons)	(ft^3)
STC 450i	4	68	0.40	5.5	86	46
STC 900	6	63	0.89	22	251	89
STC 2400	8	104	1.58	22	840	205
STC 4800	10	140	2.47	22	909	543
STC 7200	12	148	3.56	22	1,059	839
STC 11000	2 x 10	142	4.94	48	2,792	1,086
STC 16000	2 x 12	148	7.12	48	3,055	1,677

[1] Depth Below Pipe Inlet Invert to the Bottom of Base Slab, and Maximum Sediment Capacity can vary to accommodate specific site designs and pollutant loads. Depths can vary to accommodate special designs or site conditions. Contact your local representative for assistance.
[2] Water Quality Flow Rate (Q) is based on 80% annual average TSS removal of the OK110 particle size distribution.
[3] Peak Conveyance Flow Rate is based upon ideal velocity of 3 feet per second and outlet pipe diameters of 18-inch, 36-inch, and 54-inch diameters.
[4] Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.

Stormceptor®
www.stormceptor.com

Rinker MATERIALS™
www.rinkerstormceptor.com
Manufacturing Plant: Westfield, MA
Phone: (413) 562-3647
11-22-13-R13-802 MDEP

Appendix “D”

Infiltration Computations & Soils Data

IA–10 DRAINAGE DESIGN CRITERIA (100 YEAR STORM, 24 HR TYPE III STORM)

DESIGN FOR 7.1" OF PAVED AREAS
PERCOLATION RATE = 8.27"*/hr X 24 hours/12"/FT
(*SANDY SOIL PER SOIL DATA) = 16.6 FEET/DAY

TOTAL IMPERVIOUS AREAS TO DRAINAGE SYSTEM (PAVEMENT)
VOLUME OF RUNOFF= 7.1"/12"/FT x 7,349 S.F.x 0.9 =3,913 C.F.

TOTAL LANDSCAPED AREAS TO DRAINAGE SYSTEM (GRASS)
VOLUME OF RUNOFF= 7.1"/12"/FT x 13,403 S.F.x 0.3 = 2,379 C.F.

TOTAL RUNOFF TO DRAINAGE SYSTEM
VOLUME OF RUNOFF= 3,913 C.F. + 2,379 C.F. =6,292 C.F.

SYSTEM STORAGE CAPACITY

USE (6' DIAMETER) x (6' DEEP) CONCRETE GALLEYS WITH 1' CRUSHED STONE BETWEEN AND AROUND GALLEYS & 1' UNDER.

VOLUME OF STORAGE PER GALLEY (INSIDE VOLUME) = $(R)^2$ x (DEPTH) =
$\pi(3)^2$ x 6' = 170 CF/GALLEY

VOLUME OF STONE STORAGE (40% POROSITY) = (TOTAL SYSTEM VOLUME – VOLUME OF GALLEY) x 0.40

= $(\pi(R)^2$ x DEPTH – 170) x 0.40
= $(3.14(4)^2$ x 7 – 170) x 0.40
= 73 CF/GALLEY

TOTAL CAPACITY PER UNIT = 170 C.F. + 73 C.F. = 243 C.F./UNIT
TOTAL SYSTEM STORAGE CAPACITY = (243 C.F.) x (5 UNIT) = 1,215 C.F.

SYSTEM INFILTRATION CAPACITY

INFILTRATION BOTTOM AREA = (8' X 8') X 5 UNITS = 320 S.F.
INFILTRATION RATE = (INFILTRATION AREA) x (INFILTRATION RATE)
= (320 S.F.) x (16.6 FEET/DAY) = 5,312 C.F.

TOTAL CAPACITY = (TOTAL STORAGE + INFILTRATION CAPACITY)
= (1,215 C.F. + 5,312 C.F.) = 6,527 C.F.

TOTAL SYSTEM CAPACITY = (6,527 C.F.) > (6,292 C.F.) REQUIRED (SYSTEM OK)

IA–10 = PROPOSED INFILTRATION AREA TO INFILTRATION SYSTEM #1

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Project:
PROPOSED 24 UNITS RESIDENTIAL DEVELOPMENT AT
340 MAIN STREET (REAR), BOURNE, MA 02532

Prepared For:
340 MAIN STREET, LLC
561 THOMAS B LANDERS RD, FALMOUTH, MA

Issue Date: 04/20/2023
Project Number: 22-621
Revisions
Scale: Not to Scale

No.	Date	Description

Drawn By: C.M.S.
Designed By: C.M.S.

Sheet Title:
DRAINAGE DESIGN COMPUTATIONS (IA-10)

IA–20 DRAINAGE DESIGN CRITERIA (100 YEAR STORM, 24 HR TYPE III STORM)

DESIGN FOR 7.1" OF PAVED AREAS
PERCOLATION RATE = 8.27"*/hr X 24 hours/12"/FT
(*SANDY SOIL PER SOIL DATA) = 16.6 FEET/DAY

TOTAL IMPERVIOUS AREAS TO DRAINAGE SYSTEM (PAVEMENT)
VOLUME OF RUNOFF= 7.1"/12"/FT x 7,849 S.F.x 0.9 =4,180 C.F.

TOTAL LANDSCAPED AREAS TO DRAINAGE SYSTEM (GRASS)
VOLUME OF RUNOFF= 7.1"/12"/FT x 12,410 S.F.x 0.3 = 2,203 C.F.

TOTAL RUNOFF TO DRAINAGE SYSTEM
VOLUME OF RUNOFF= 4,180 C.F. + 2,203 C.F. =6,726 C.F.

SYSTEM STORAGE CAPACITY

USE (6' DIAMETER) x (6' DEEP) CONCRETE GALLEYS WITH 1' CRUSHED STONE BETWEEN AND AROUND GALLEYS & 1' UNDER.

VOLUME OF STORAGE PER GALLEY (INSIDE VOLUME) = $(R)^2$ x (DEPTH) =
$\pi(3)^2$ x 6' = 170 CF/GALLEY

VOLUME OF STONE STORAGE (40% POROSITY) = (TOTAL SYSTEM VOLUME – VOLUME OF GALLEY) x 0.40

= $(\pi(R)^2$ x DEPTH – 170) x 0.40
= $(3.14(4)^2$ x 7 – 170) x 0.40
= 73 CF/GALLEY

TOTAL CAPACITY PER UNIT = 170 C.F. + 73 C.F. = 243 C.F./UNIT
TOTAL SYSTEM STORAGE CAPACITY = (243 C.F.) x (5 UNIT) = 1,215 C.F.

SYSTEM INFILTRATION CAPACITY

INFILTRATION BOTTOM AREA = (8' X 8') X 5 UNITS = 320 S.F.
INFILTRATION RATE = (INFILTRATION AREA) x (INFILTRATION RATE)
= (320 S.F.) x (16.6 FEET/DAY) = 5,312 C.F.

TOTAL CAPACITY = (TOTAL STORAGE + INFILTRATION CAPACITY)
= (1,215 C.F. + 5,312 C.F.) = 6,527 C.F.

TOTAL SYSTEM CAPACITY = (6,527 C.F.) > (6,383 C.F.) REQUIRED (SYSTEM OK)

IA–20 = PROPOSED INFILTRATION AREA TO INFILTRATION SYSTEM #2

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Project:
PROPOSED 24 UNITS RESIDENTIAL DEVELOPMENT AT
340 MAIN STREET (REAR), BOURNE, MA 02532

Prepared For:
340 MAIN STREET, LLC
561 THOMAS B LANDERS RD,
FALMOUTH, MA

Issue Date: 04/28/2023
Revisions

No.	Date	Description

Project Number: 22-621
Scale: Not to Scale
Drawn By: C.M.S.
Designed By: C.M.S.

Sheet Title:
DRAINAGE DESIGN COMPUTATIONS (IA-20)

IA–30 DRAINAGE DESIGN CRITERIA (100 YEAR STORM, 24 HR TYPE III STORM)

DESIGN FOR 7.1" OF PAVED AREAS
PERCOLATION RATE = 8.27"*/hr X 24 hours/12"/FT
(*SANDY SOIL PER SOIL DATA) = 16.6 FEET/DAY

TOTAL IMPERVIOUS AREAS TO DRAINAGE SYSTEM (PAVEMENT)
VOLUME OF RUNOFF= 7.1"/12"/FT x 7,967 S.F.x 0.9 =4,242 C.F.

TOTAL LANDSCAPED AREAS TO DRAINAGE SYSTEM (GRASS)
VOLUME OF RUNOFF= 7.1"/12"/FT x 4,877 S.F.x 0.3 = 866 C.F.

TOTAL RUNOFF TO DRAINAGE SYSTEM
VOLUME OF RUNOFF= 4,242 C.F. + 866 C.F. =5,108 C.F.

SYSTEM STORAGE CAPACITY

USE (6' DIAMETER) x (6' DEEP) CONCRETE GALLEYS WITH 1' CRUSHED STONE BETWEEN AND AROUND GALLEYS & 1' UNDER.

VOLUME OF STORAGE PER GALLEY (INSIDE VOLUME) = $(R)^2$ x (DEPTH) =
$\pi(3)^2$ x 6' = 170 CF/GALLEY

VOLUME OF STONE STORAGE (40% POROSITY) = (TOTAL SYSTEM VOLUME – VOLUME OF GALLEY) x 0.40

= $(\pi(R)^2$ x DEPTH – 170) x 0.40
= $(3.14(4)^2$ x 7 – 170) x 0.40
= 73 CF/GALLEY

TOTAL CAPACITY PER UNIT = 170 C.F. + 73 C.F. = 243 C.F./UNIT
TOTAL SYSTEM STORAGE CAPACITY = (243 C.F.) x (4 UNIT) = 972 C.F.

SYSTEM INFILTRATION CAPACITY

INFILTRATION BOTTOM AREA = (8' X 8') X 4 UNITS = 256 S.F.
INFILTRATION RATE = (INFILTRATION AREA) x (INFILTRATION RATE)
= (256 S.F.) x (16.6 FEET/DAY) = 4,250 C.F.

TOTAL CAPACITY = (TOTAL STORAGE + INFILTRATION CAPACITY)
= (972 C.F. + 4,250 C.F.) = 5,222 C.F.

TOTAL SYSTEM CAPACITY = (5,222 C.F.) > (5,108 C.F.) REQUIRED (SYSTEM OK)

IA–30 = PROPOSED INFILTRATION AREA TO INFILTRATION SYSTEM #3

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Project:
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Prepared For:
340 MAIN STREET, LLC
561 THOMAS B LANDERS RD,
FALMOUTH, MA

Issue Date: 04/28/2023
Project Number: 22-621
Revisions
Scale: Not to Scale

No.	Date	Description

Drawn By: C.M.S.
Designed By: C.M.S.

Sheet Title:
DRAINAGE DESIGN COMPUTATIONS (IA-30)

IA–40 DRAINAGE DESIGN CRITERIA (100 YEAR STORM, 24 HR TYPE III STORM)

DESIGN FOR 7.1" OF PAVED AREAS
PERCOLATION RATE = 8.27"*/hr X 24 hours/12"/FT
(*SANDY SOIL PER SOIL DATA) = 16.6 FEET/DAY

TOTAL IMPERVIOUS AREAS TO DRAINAGE SYSTEM (PAVEMENT)
VOLUME OF RUNOFF= 7.1"/12"/FT x 8,112 S.F.x 0.9 =4,320 C.F.

TOTAL LANDSCAPED AREAS TO DRAINAGE SYSTEM (GRASS)
VOLUME OF RUNOFF= 7.1"/12"/FT x 9,037 S.F.x 0.3 = 1,604 C.F.

TOTAL RUNOFF TO DRAINAGE SYSTEM
VOLUME OF RUNOFF= 4,320 C.F. + 1,604 C.F. =5,924 C.F.

SYSTEM STORAGE CAPACITY

USE (6' DIAMETER) x (6' DEEP) CONCRETE GALLEYS WITH 1' CRUSHED STONE
BETWEEN AND AROUND GALLEYS & 1' UNDER.

VOLUME OF STORAGE PER GALLEY (INSIDE VOLUME) = $(R)^2$ x (DEPTH) =
$\pi(3)^2$ x 6' = 170 CF/GALLEY

VOLUME OF STONE STORAGE (40% POROSITY) = (TOTAL SYSTEM VOLUME – VOLUME OF GALLEY) x 0.40

= $(\pi(R)^2$ x DEPTH – 170) x 0.40
= $(3.14(4)^2$ x 7 – 170) x 0.40
= 73 CF/GALLEY

TOTAL CAPACITY PER UNIT = 170 C.F. + 73 C.F. = 243 C.F./UNIT
TOTAL SYSTEM STORAGE CAPACITY = (243 C.F.) x (5 UNIT) = 1,215 C.F.

SYSTEM INFILTRATION CAPACITY

INFILTRATION BOTTOM AREA = (8' X 8') X 5 UNITS = 320 S.F.
INFILTRATION RATE = (INFILTRATION AREA) x (INFILTRATION RATE)
= (320 S.F.) x (16.6 FEET/DAY) = 5,312 C.F.

TOTAL CAPACITY = (TOTAL STORAGE + INFILTRATION CAPACITY)
= (1,215 C.F. + 5,312 C.F.) = 6,527 C.F.

TOTAL SYSTEM CAPACITY = (6,527 C.F.) > (5,924 C.F.) REQUIRED (SYSTEM OK)

IA–40 = PROPOSED INFILTRATION AREA TO INFILTRATION SYSTEM #4

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Prepared For:
340 MAIN STREET, LLC
561 THOMAS B LANDERS RD,
FALMOUTH, MA

Issue Date: 04/28/2023
Revisions

No.	Date	Description

Project Number: 22-621
Scale: Not to Scale
Drawn By: C.M.S.
Designed By: C.M.S.

Sheet Title:
DRAINAGE DESIGN COMPUTATIONS (IA-40)

ROOF TOP DRAINAGE DESIGN CRITERIA (100 YEAR STORM, 24 HR TYPE III STORM)

TOTAL IMPERVIOUS AREAS TO DRAINAGE SYSTEM (ROOF TOPS) = 2,000 S.F.
VOLUME OF RUNOFF= (7.1"/12"/FT x 2,000 S.F.) = 1,183 C.F.

SYSTEM STORAGE CAPACITY

(1) 500 GALLON RECTANGULAR DRYWELL 1' CRUSHED STONE
AROUND DRYWELL & 1' UNDER PER BUILDING

VOLUME OF RECTANGULAR GALLEY
= (L x W x DEPTH)
= (8.5' x 4.8' x 2') = 82 CF/GALLEY

VOLUME OF STONE STORAGE (40% POROSITY)
= (TOTAL SYSTEM VOLUME – VOLUME OF GALLEY) x 0.4 x 7.48 GALLONS
= ((10.5' x 6.8' X 3') – 82.0) x 0.4 = 53 C.F.

TOTAL VOLUME = 82 C.F. + 53 C.F. = 135 C.F.

SYSTEM INFILTRATION CAPACITY

INFILTRATION BOTTOM AREA = (10.5' X 6.8') = 71.4 S.F.
INFILTRATION RATE = (INFILTRATION AREA) x (INFILTRATION RATE)
= (71.4 S.F.) x (16.6 FEET/DAY) = 1,185 C.F.

TOTAL CAPACITY = (TOTAL STORAGE + INFILTRATION CAPACITY)
= (135 C.F. + 1,185 C.F.) = 1,320 C.F

TOTAL SYSTEM CAPACITY = (1,320 C.F.) > (1,183 C.F.) REQUIRED (SYSTEM OK)
– USE ONE UNIT PER BUILDING (TYPICAL)

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FALMOUTH, MA

Issue Date: 04/28/2023
Revisions

No.	Date	Description

Project Number: 22-621
Scale: Not to Scale
Drawn By: C.M.S.
Designed By: C.M.S.

Sheet Title:
DRAINAGE DESIGN COMPUTATIONS (ROOF TOP)

SITE: 340 MAIN ST., BOURNE, MA

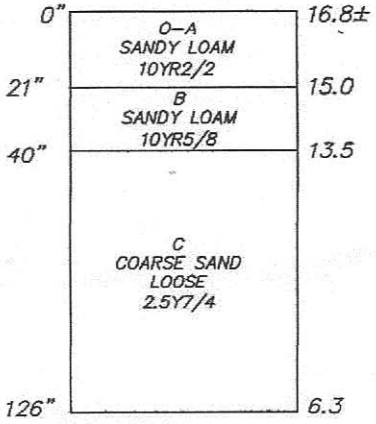
COMMENTS:

SOIL EVALUATIONS PERFORMED BY MASSACHUSETTS CERTIFIED DEP SOIL EVALUATOR ON SEPTEMBER 3 & 5, 2019.

Thomas Roux

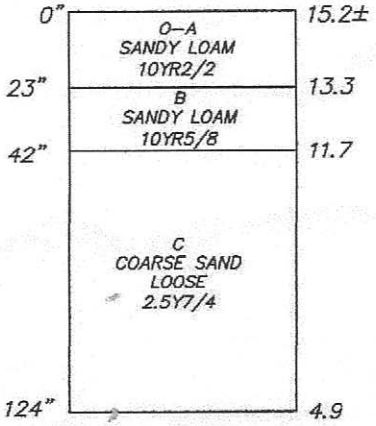
THOMAS C. ROUX, SE 2703

TP–1
9–5–19



MOTTLES: NONE VISIBLE
WATER STANDING: NONE VISIBLE
WEEPING: NONE VISIBLE

TP–2
9–5–19



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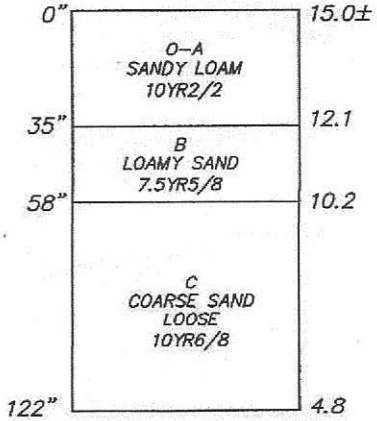
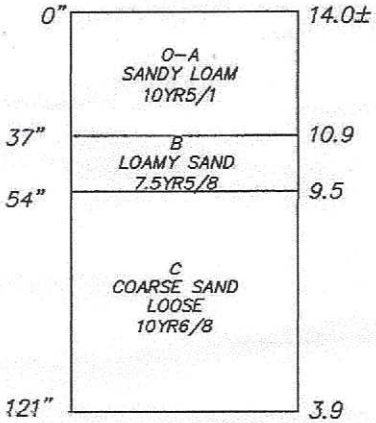
WATER STANDING: NONE VISIBLE
WEEPING: NONE VISIBLE

TP–3
9–3–19



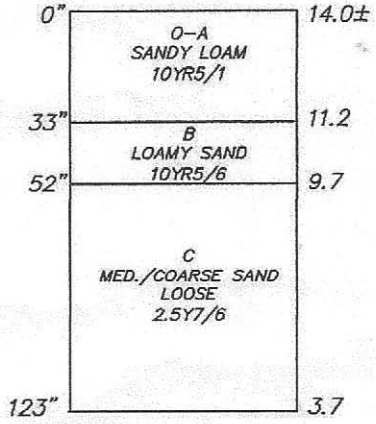
MOTTLES: NONE VISIBLE
WATER STANDING: NONE VISIBLE
WEEPING: NONE VISIBLE

TP–4
9–3–19



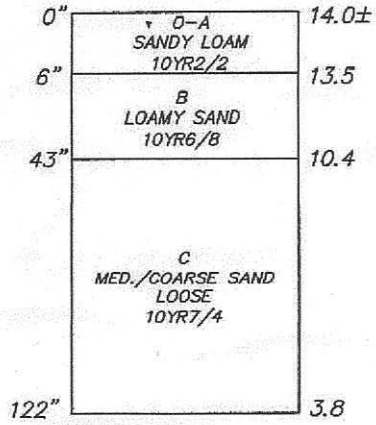
MOTTLES: NONE VISIBLE
WATER STANDING: NONE VISIBLE
WEEPING: NONE VISIBLE

TP–5
9–3–19



MOTTLES: NONE VISIBLE
WATER STANDING: NONE VISIBLE
WEEPING: NONE VISIBLE

TP–6
9–3–19



MOTTLES: NONE VISIBLE
WATER STANDING: NONE VISIBLE
WEEPING: NONE VISIBLE

Appendix “E”

Stormwater Operation & Maintenance Plan

STORMWATER OPERATION
&
MAINTENANCE PLAN
FOR
PROPOSED 24 RESIDENTIAL UNITS
AT
340 MAIN STREET
BOURNE, MA 02532

PREPARED FOR:

340 MAIN STREET, LLC
561 THOMAS B. LANDERS ROAD
FALMOUTH, MA 02536
jhatem@comcast.net
(508) 246-7937

PREPARED BY:

CHOUBAH ENGINEERING GROUP, P.C.
CONSULTING PROFESSIONAL ENGINEERS
112 STATE ROAD (RTE.6)
N. DARMOUTH, MA 02747

CEG # 22-621
April 28, 2023

Stormwater Operation
&
Maintenance Plan
For
340 Main Street
Bourne, MA

Introduction

The following Operations and maintenance plan has been prepared for the proposed 24 residential units, at 340 Main Street, in Bourne Massachusetts. The purpose of this plan is to provide guidance and procedures for proper stormwater management for the project during and post construction. During construction, an erosion barrier consisting of staked silt sock with a siltation fence will be placed along the proposed limits of construction as shown on the site plan prior to construction. A gravel tracking pad will be place at the entrance driveway in compliance with the Town of Bourne erosion control ordinance. The contractor will be responsible for maintaining the erosion barriers and pads during the entire construction period. Erosion control devices will be removed after construction is completed and all disturbed areas are restored and accepted.

Routine Site Maintenance

Road maintenance in the form of sweeping with high efficiency vacuum sweeper shall be conducted on a monthly average with sweeping scheduled primarily in spring and fall. Sweeping provides important non-point source pollution control. When practical and as weather permits, accumulated sediments should be swept and removed on an as needed basis during the month of January through March.

Preventive Measures

Spill Prevention and Response Plan

The owner of the development shall train all maintenance personnel in the proper handling and cleanup of spilled Hazardous Substances or Oil. No spilled Hazardous Substances or Oil shall be allowed to come in contact with stormwater discharges. If such contact occurs, the stormwater discharge shall be contained on site until appropriate measures in compliance with state and federal regulations are taken to dispose such contaminated stormwater. It shall be the responsibilities of the tenant/operator to train all personnel in spill prevention and cleanup procedures.

In order to prevent or minimize the potential for a spill of Hazardous Substances or Oil to come into contact with stormwater, the following steps shall be implemented:

A spill control and containment kit (containing for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles and eye wear protection, plastic, and metal trash containers, etc.) shall be readily available. Any spill on site shall be

reported by the owner of the development to the Massachusetts Department of Environmental protection MASSDEP and local fire department in compliance with all applicable local and state fire and environmental regulations.

Manufacture's recommendation for spill cleanup shall be known and maintenance personnel shall be trained regarding these procedures and the location of the information and cleanup supplies.

It is the responsibility of the owner to insure that all hazardous waste discovered or generated at the site are disposed by a licensed hazardous materials disposal company.

In the event of a spill of hazardous substances the responsible parties shall take all necessary measures to contain and abate the spill and to prevent the discharge of the hazardous substance or oil to stormwater system or off-site.

Any spill that occurs shall be documented on a spill report form that is enclosed in this document.

There should be no storage or disposal of toxic materials on site.

There should be no discharges of non-stormwater to the stormwater system.

Fertilizers should only be used in the minimum amounts as recommended by the manufacturers. The contents of any un-used fertilizers shall be transferred to a clearly labeled, sealable plastic bin to avoid spillage.

Fueling of construction equipment and concrete washout activities on site will be within secured designated areas as shown on plans.

Snow Storage:

Snow is being stored on site within paved surfaces to prevent the transfer of oil and petroleum base products to the ground via infiltration. With the proposed site grading snow melt from snow storage area is collected by catch basins and drainage manholes with deep sumps and then directed to a proprietary stormwater BMP structure for pre-treatment of runoff prior to discharge to on–site infiltration system. The stormwater system is designed to achieve TSS (Total Suspended Solids) removal rates in compliance with the Massachusetts Department of Environmental Protection Guidelines.

Stormwater: runoff collected from paved surfaces on site will be conveyed to catch basins and drainage manholes with deep sumps and directed to a BMP structure equipped with an oil/water separator for pre-treatment.

Maintenance of Fences and landscape

As part of the parking lot maintenance the owner of the development shall conduct at least a yearly inspection at the end of each winter and plowing season to insure all existing fences and landscape are in good working condition. The owner shall replace broken fences and dead trees or shrubs as needed to maintain a functional buffer from the adjacent properties.

Maintenance of Stromwater management Devices

Catch Basins/Drainage Manholes

All Structures will be inspected four times per year. Structures will be cleaned twice a year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin and at the end of the foliage and snow removal seasons. All Structures will be cleaned using a vacuum truck to remove trapped sediment and water/oil from the deep sumps. Material or fluid removed during cleanings will be disposed in accordance with all federal, state, and local regulations.

Stormceptor Maintenance

A proprietary separator, ("Stormceptor") will be inspected in accordance with the manufacturer requirements, but no less than twice a year following installation, and no less than once a year thereafter.

- Units should be inspected post construction, prior to being put into service.
- Inspect every six months for the first year to determine the oil and sediment accumulation rate.
- In subsequent years, inspections can be based on first-year observations or local requirements.
- Cleaning is required once the sediment depth reaches 15% of storage capacity, (generally taking one year or longer). Local regulations for maintenance frequency may vary.
- Inspect the unit immediately after an oil, fuel, or chemical spill.
- A licensed waste management company should remove oil and sediment and dispose responsibly.

Sediment and other trapped pollutants will be removed and the structures will be cleaned at the frequency specified by the manufacturer. Cleaning of the units will be conducted using the method specified by the manufacturer.

Underground Infiltration Systems Maintenance

Infiltration systems will be aggressively maintained on a regular schedule. Units will be inspected every six months. For the first year of installation infiltration units shall be checked and inspected after every major storm event (2 year return frequency). Inlet pipes will be checked monthly to determine if they are clogged and accumulated sediment, trash, debris, leaves, and vegetation will be removed. If infiltration system fails to fully dewater within 72 hours of a storm event, then the responsible party (facility Owner/Operator) shall retain a qualified professional engineer to assess the cause of failure of the system and develop recommendations for corrective action. Corrective action must be implemented immediately to restore system function.

Inspection of infiltration system is through inspection ports.

Measure sediment in the chambers and inlet pipes. If sediment is at 3" or higher clean out chamber and inlet pipes by vacuum pumping the material from the chamber and inlet pipe.

Care should be taken to avoid flushing sediments out through the outlet pipes and into the chamber.

On Site Maintenance

An updated, Inspection and Maintenance Log listing individual BMP's, including the sweeping program, the inspection and maintenance requirements and the dates performed should be kept on site for a minimum of 3 years, on an ongoing basis.

BMP'S Maintenance Log

Date	Inspector			

Ownership and Responsibility

During construction of the development and the stormwater management system the contractor will be responsible for all day to day operation and maintenance of all stormwater control systems. After construction is completed, 340 Main Street, LLC will take over all maintenance requirements for the stormwater control system in compliance with this Operation & Maintenance Plan.

Responsible Party Contact Information

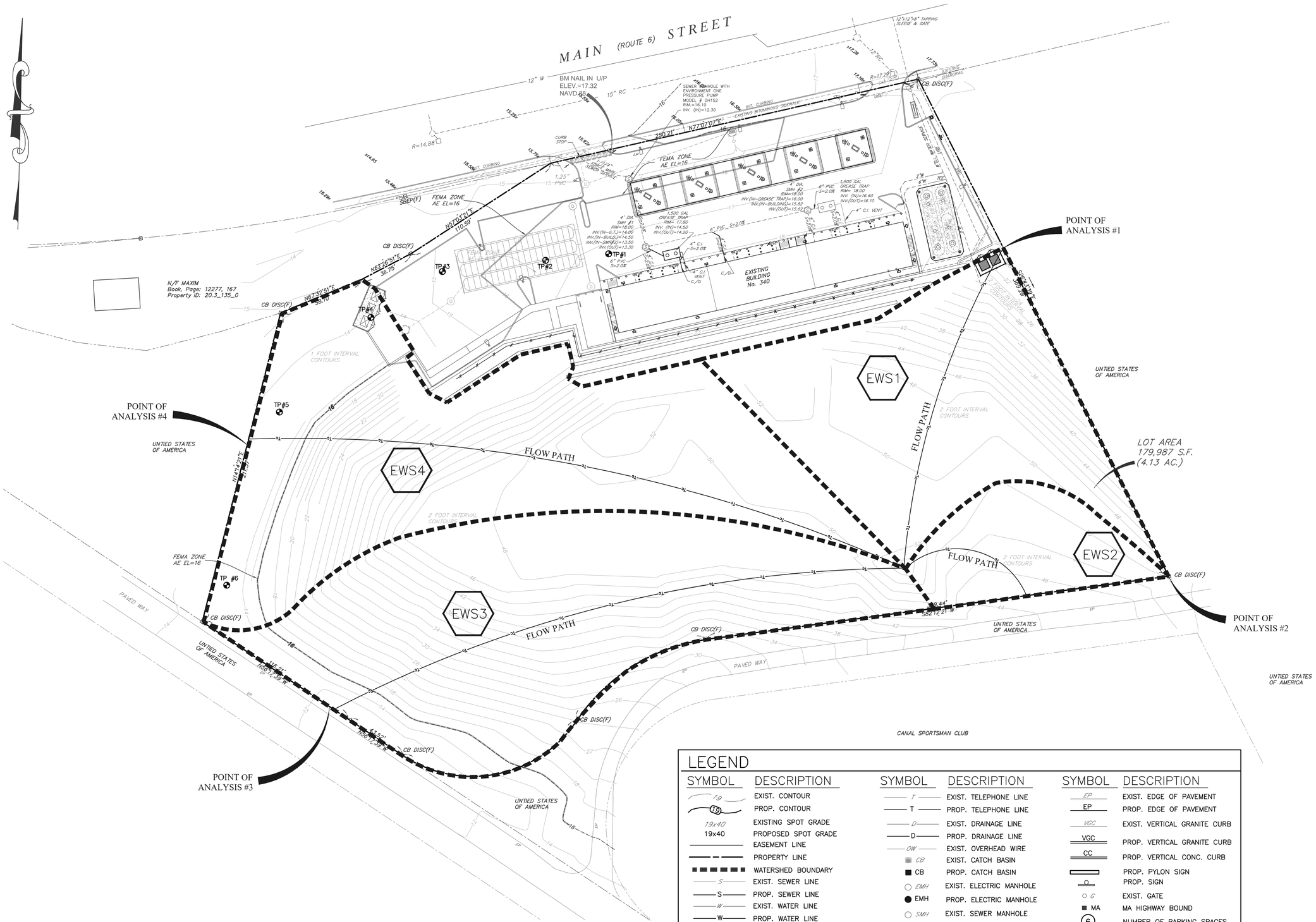
Jonny Hatem
340 Main Street, LLC
561 Thomas B. Landers Road
Falmouth, MA 02536
(508) 246-7937

Preliminary Stormwater O&M Maintenance Budget

Inspection and Maintenance = $500.00 x 4 times per year = $2,000.00

Appendix “F”

Existing & Proposed Watershed Plans



LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
19	EXIST. CONTOUR	T	EXIST. TELEPHONE LINE	EP	EXIST. EDGE OF PAVEMENT
19	PROP. CONTOUR	T	PROP. TELEPHONE LINE	EP	PROP. EDGE OF PAVEMENT
19x40	EXISTING SPOT GRADE	D	EXIST. DRAINAGE LINE	VGC	EXIST. VERTICAL GRANITE CURB
19x40	PROPOSED SPOT GRADE	D	PROP. DRAINAGE LINE	VGC	PROP. VERTICAL GRANITE CURB
	EASEMENT LINE	OW	EXIST. OVERHEAD WIRE	CC	PROP. VERTICAL CONC. CURB
	PROPERTY LINE	CB	EXIST. CATCH BASIN		PROP. PYLON SIGN
	WATERSHED BOUNDARY	CB	PROP. CATCH BASIN		PROP. SIGN
S	EXIST. SEWER LINE	EMH	EXIST. ELECTRIC MANHOLE	G	EXIST. GATE
S	PROP. SEWER LINE	EMH	PROP. ELECTRIC MANHOLE	MA	MA HIGHWAY BOUND
W	EXIST. WATER LINE	SMH	EXIST. SEWER MANHOLE	6	NUMBER OF PARKING SPACES
W	PROP. WATER LINE	SMH	PROP. SEWER MANHOLE	EWS	EXIST. WATER SHED
E	EXIST. ELECTRIC LINE	LP	PROP. LIGHT POLE	IA	PROP. INFILTRATION AREA
UGE	PROP. UNDERGROUND ELECTRIC LINE		PROP. SNOW STORAGE AREA		
G	EXIST. GAS LINE	TP	TEST PIT		
GAS	PROP. GAS LINE				

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www.choubahgroup.com

Prepared For:

340 MAIN STREET, LLC
561 THOMAS B LANDRS RD
FALMOUTH, MA 02536

Project:

PROPOSED 24 UNITS RESIDENTIAL DEVELOPMENT
AT 340 MAIN STREET REAR,
BOURNE, MA 02532

COMMONWEALTH OF MASSACHUSETTS
HALIM A. CHOUBAH
CIVIL
No.38736
REGISTERED PROFESSIONAL ENGINEER

SITE PLAN REVIEW/ SPECIAL PERMIT SET

Issue Date: 04/28/2023

Revisions

No.	Date	Description

Sheet Title:

EXISTING WATERSHED PLAN

Sheet Number. 1 OF 2

LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
19	EXIST. CONTOUR	T	EXIST. TELEPHONE LINE	EP	EXIST. EDGE OF PAVEMENT
19	PROP. CONTOUR	T	PROP. TELEPHONE LINE	EP	PROP. EDGE OF PAVEMENT
19x40	EXISTING SPOT GRADE	D	EXIST. DRAINAGE LINE	VGC	EXIST. VERTICAL GRANITE CURB
19x40	PROPOSED SPOT GRADE	D	PROP. DRAINAGE LINE	VGC	PROP. VERTICAL GRANITE CURB
	EASEMENT LINE	OW	EXIST. OVERHEAD WIRE	CC	PROP. VERTICAL CONC. CURB
	PROPERTY LINE	CB	EXIST. CATCH BASIN		PROP. PYLON SIGN
	WATERSHED BOUNDARY	CB	PROP. CATCH BASIN		PROP. SIGN
S	EXIST. SEWER LINE	EMH	EXIST. ELECTRIC MANHOLE	G	EXIST. GATE
S	PROP. SEWER LINE	EMH	PROP. ELECTRIC MANHOLE	MA	MA HIGHWAY BOUND
W	EXIST. WATER LINE	SMH	EXIST. SEWER MANHOLE	6	NUMBER OF PARKING SPACES
W	PROP. WATER LINE	SMH	PROP. SEWER MANHOLE	EWS	EXIST. WATER SHED
E	EXIST. ELECTRIC LINE	LP	PROP. LIGHT POLE	IA	PROP. INFILTRATION AREA
UGE	PROP. UNDERGROUND ELECTRIC LINE		PROP. SNOW STORAGE AREA		
G	EXIST. GAS LINE	TP	TEST PIT		
GAS	PROP. GAS LINE				

- IA-10 INFILTRATION AREA 10 DISCHARGES TO INFILTRATION SYSTEM #1
- IA-20 INFILTRATION AREA 20 DISCHARGES TO INFILTRATION SYSTEM #2
- IA-30 INFILTRATION AREA 30 DISCHARGES TO INFILTRATION SYSTEM #3
- IA-40 INFILTRATION AREA 40 DISCHARGES TO INFILTRATION SYSTEM #4

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Sheet Title:

PROPOSED WATERSHED PLAN