Proposed Warehouse Building
1047 Washington Street / 0 Washington Street
Weymouth, Massachusetts 02189
Parcels: 30-402-5 / 30-402-4

STORMWATER MANAGEMENT PLAN

JANUARY 8, 2021

PREPARED FOR:
Mr. Joe Gratta
Atlantic Mechanical
1047 Washington Street
Weymouth, MA 02189

PREPARED BY:
The Vertex Companies, Inc.
400 Libbey Parkway
Weymouth, Massachusetts 02189
PHONE 781.952.6000

SUBMITTED TO:
Town of Weymouth Conservation Commission
Weymouth Town Hall
75 Middle Street
Weymouth, Massachusetts 02189

VERTEX PROJECT NO: 64380

January 8, 2021

Mr. Thomas Tanner, Chairman
Weymouth Conservation Commission
Weymouth Town Hall
75 Middle Street
Weymouth, Massachusetts 02189

Re: **Stormwater Management Report**
Proposed Warehouse Building
1047 Washington Street / 0 Washington Street
Weymouth, MA 02189
VERTEX Project No. 64380

To Mr. Tanner and Members of the Commission:

The Vertex Companies, Inc. (VERTEX) is pleased to submit this Stormwater Management Report for the above referenced property (the Site). The report will summarize the stormwater management system for the proposed warehouse building at 1047 Washington Street / 0 Washington Street.

Please do not hesitate to contact us at your convenience should you have any questions or comments regarding this Application.

Sincerely,

The Vertex Companies, Inc.

John Ahern
Project Engineer

Andrew Chagnon, P.E.
Vice President

THE VERTEX COMPANIES, INC.
400 LIBBEY PARKWAY
WEYMOUTH, MA 02189

781.952.6000 | VERTEXENG.COM

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 Purpose 1

1.2 Study Area Description 1

1.3 Soil Data 2

1.4 Existing Conditions of Study Area 2

1.5 Proposed Conditions of Study Area 2

2.0 MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS 4

Standard 1: No New Untreated Discharges 4

Standard 2: Post-Development Peak Discharge Rates 4

Standard 3: Recharge to Groundwater 4

Standard 4: Water Quality 5

2.4.1 TSS Removal 5

2.4.2 Water Quality Volume 5

Standard 5: Land Uses with Higher Potential Pollutant Loads 6

Standard 6: Protection of Critical Areas 6

Standard 7: Redevelopment Projects 6

Standard 8: Erosion & Sediment Control Plans 6

Standard 9: Operation & Maintenance Plan 6

Standard 10: Illicit Discharges 7

3.0 SUMMARY 8

Figures

Figure 1: Aerial Plan
Figure 2: Priority Resource Map
Figure 3: FEMA Flood Map
Figure 4: USGS Soil Survey Map

Appendices

Appendix A: Existing Hydrology Plan & Calculations
Appendix B: Proposed Hydrology Plan & Calculations
Appendix C: GW Recharge & TSS
Appendix D: NRCS Soil Report
Appendix E: MassDEP Stormwater Checklists
Appendix F: Operation & Maintenance/Stormwater Pollution Prevention Plan
Appendix G: Plan Set (separate from report)

STORMWATER MANAGEMENT PLAN
Proposed Warehouse Building
1047 Washington Street / 0 Washington Street
Weymouth, Massachusetts 02189
VERTEX Project No. 64380

1.0 INTRODUCTION

1.1 Purpose

The following report provides details regarding the proposed stormwater management system for the proposed warehouse building for Atlantic Mechanical in Weymouth, Massachusetts. The property consists of two adjacent parcels, Parcel 30-402-5 & Parcel 30-402-4, identified as 1047 Washington Street & 0 Washington Street respectively (the Site). This report will discuss the existing conditions of the Site, the proposed development, the evaluation of stormwater runoff for the existing and proposed conditions, the proposed stormwater management system design, and the recommended water quality best management practices for the Site. The proposed project includes the construction of a new 2,500 square-foot building, and additional parking on approximately 1.65 acres of land currently occupied by the existing Atlantic Mechanical building located at 1047 Washington Street in Weymouth, Massachusetts.

1.2 Study Area Description

The Site is separated by two zones; the northern portion falls within the Highway Transition District (HT) while the southern portion falls within the Residence District-1 (R-1). The entire site is falls within the Commercial Corridor Overlay (CCOD) along Washington Street. The east portion of the Site (Parcel 30-402-5) is developed with a 2,900 square foot building and asphalt paving. The proposed addition is to be on the westerly side of the Site which, at the time of the survey, consisted of an undeveloped wooded area. The proposed addition and improvements consist of a new 2,500 square-foot building, gravel parking improvements, and additional asphalt paving.

The Site does not have an existing stormwater management system. All of the runoff from the site discharges to three different areas off the site, as shown in the Existing Hydrology Plan. The

proposed stormwater management system consists of an infiltration chamber to capture the collected roof runoff from the proposed warehouse building. In addition, the site is to be improved with a vegetated filter strip and a landscape area at the south side of the site to improve the water quality of the runoff from the existing asphalt area. The Site is located in FEMA Flood Zone X, an area of minimal flood hazard.

1.3 Soil Data

According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Resources Report, the Site soils are classified as Hydrologic Soil Group A and Hydrologic Soil Group B and Hydrologic Soil Group D. Class B means soils having a moderate infiltration rate when thoroughly wet. Class D means soils having a very slow infiltration rate when thoroughly wet. Class D soils were used as a conservative assumption in portions of the drainage calculations. NRCS soil data can be found in Appendix D of this report.

1.4 Existing Conditions of Study Area

Stormwater runoff from the Site was analyzed for three (3) analysis points. The three watersheds country drain into separate areas off the site. The studied existing hydrology is included in Appendix A. Watershed areas which are not to be affected by the proposed building expansion were not included in the study.

The existing peak rates of discharge from the Site were generated for rainfall events having a return rate of 2-, 10-, 50-, and 100-year storm events using the SCS TR-20 Method. Runoff hydrographs were developed for the existing drainage areas and can be found in Appendix A.

1.5 Proposed Conditions of Study Area

The proposed Site will be redeveloped with a new 2,500 square foot (SF) building, parking lot, roadways, and landscaped areas. The proposed new building will be located on the western portion of the Site. The roof runoff for the proposed building is to be collected into an infiltration chamber that will allow the runoff to infiltrate into the ground. A vegetated filter strip has been

proposed to the south of the existing paved area to improve the water quality of the runoff prior to reaching the wetland area.

The proposed stormwater management system meets the guidelines outlined in the Massachusetts Stormwater Handbook. Drainage was designed to address peak flow-rate, runoff volume, and quality of run-off. A separate Site-wide Operations & Maintenance (O&M) Manual, which includes proposed BMPs, will be submitted under separate cover.

Design features include:

- **Underground Infiltration System:** An underground perforated trench system has been designed to store runoff from a portion of the developed Site and reduce overall peak runoff rates. Stormwater release rates are regulated with a control structure before entering the closed drainage system.

- **Vegetated Filter Strip:** A vegetated filter strip has been added to the south end of the existing paved area to increase the water quality of the runoff prior to reaching the wetland area.

The proposed peak rates of discharge from the Site were generated for rainfall events having a return rate of 2-, 10-, 25-, and 100-year storm events using the SCS TR-20 Method. Runoff hydrographs were developed for the existing drainage areas and the results of these calculations can be found in Appendix B.

2.0 MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS

The proposed stormwater management system was designed to be in compliance with the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Handbook (the Handbook), dated February 2008. The proposed work at the Site best follows the guidelines for re-development. The Site is subject to the ten (10) Stormwater Handbook standards. The system's applicability and compliance with the standards can be found below.

Standard 1: No New Untreated Discharges

No new discharges of untreated stormwater are proposed for this development.

Standard 2: Post-Development Peak Discharge Rates

The MassDEP Stormwater Handbook states that runoff rates from the developed site must not exceed existing runoff rates for the 2-year, 10-year, and 24-hour storm events. The handbook also states that the 100-year and 24-hour storm event must be evaluated to demonstrate that there will be no increase in flooding impacts off-site.

The proposed system is designed to reduce runoff rates for the 2-, 10-, 25- and 100-year storm events from existing conditions. This reduction will be achieved due to the net reduction of impervious surface. The summary pages for the 2-, 10-, 25-, and 100-year storms of the Existing and Proposed runoff hydrographs found in Appendices A and B summarizes the net difference in pre- and post-development flows. The summary pages for the 2-, 10-, 25-, and 100-year storms of the Existing and Proposed runoff hydrographs found in Appendices A and B summarizes the difference in pre- and post-development runoff volumes. Peak discharge to the wetland area does not increase in the proposed condition.

Standard 3: Recharge to Groundwater

Standard 3 states that loss of groundwater recharge from the proposed development shall be eliminated or minimized and at a minimum, the recharge volume, which is dependent on soil type, shall be recharged to the groundwater. The intent of this standard is to ensure that the

infiltration volume of precipitation into the ground under post-development conditions is at least as much as the infiltration volume under pre-development conditions. Required recharge volume calculations can be found in Appendix C.

Standard 4: Water Quality

2.4.1 TSS Removal

The Handbook requires that stormwater management systems be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). Each specific series of treatments are referred to as a treatment train. As a re-development, the proposed development of the site is required to remove 80% of only the net increase in impervious area.

Calculations for TSS removal for the Site can be found in Appendix C.

2.4.2 Water Quality Volume

The required water quality volume equals 1.0-inch times the total impervious area (IA) of the post-development Site for discharge if:

- The discharge is from a land use with a higher potential pollutant load (LUHPPL);
- Within an area with a rapid infiltration rate (greater than 2.4 inches/hour);
- Within a Zone II or Interim Wellhead Protection Area;
- Near or to an outstanding resource water, special resource water, bathing beach, shellfish growing area, or cold-water fishery;

The Site is not a LUHPPL; does discharge near, or to a critical area; does not have a rapid infiltration rate; nor within a Zone II or Interim Wellhead Protection Area, therefore the Required Water Quality Volume (WQV) for the project equals 1.0 inches of runoff times the impervious area for the post-development site.

Standard 5: Land Uses with Higher Potential Pollutant Loads

Standard 5 states that for land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. The land use for this site is not associated with higher potential pollutant loads, therefore it is not subject to this rule.

Standard 6: Protection of Critical Areas

The project site is not located within the interim Zone II of a public water supply well and the runoff does not discharge into any critical areas.

Standard 7: Redevelopment Projects

The project is a redevelopment of an existing paved area and proposes no new trafficked impervious areas. The project is required by the Handbook to meet the Stormwater Standards to the full extent for the net increase in impervious area and required to meet Standards 2, 3, 4, 5, and 6 only to the maximum extent practicable and improve existing conditions.

Standard 8: Erosion & Sediment Control Plans

Erosion and sediment control features to be installed at a minimum, include perimeter silt fencing which are shown on the Project Plans. A Construction Operations & Maintenance Plan/Pollution Prevention Plan is included in Appendix F.

Standard 9: Operation & Maintenance Plan

The Owner will be responsible for the Operation and Maintenance of the Stormwater Management System post-construction. The Stormwater Operation and Maintenance (O&M) Manual is included in Appendix F. The O&M Manual will be kept on-site.

Standard 10: Illicit Discharges

The Stormwater Management System has been designed to route stormwater through a series of stormwater best-management practices prior to discharge. To VERTEX's knowledge, based on the best-available information and in-field reviews of the current site, there does not appear to be any illicit discharges on site and the proposed project does not propose any illicit discharges.

3.0 SUMMARY

The proposed stormwater management system will provide improved water quality from the runoff reaching the existing wetland area as well as providing infiltration into the groundwater through the proposed roof runoff infiltration system. The proposed stormwater management system will improve existing conditions and is designed to protect the area's natural resources.

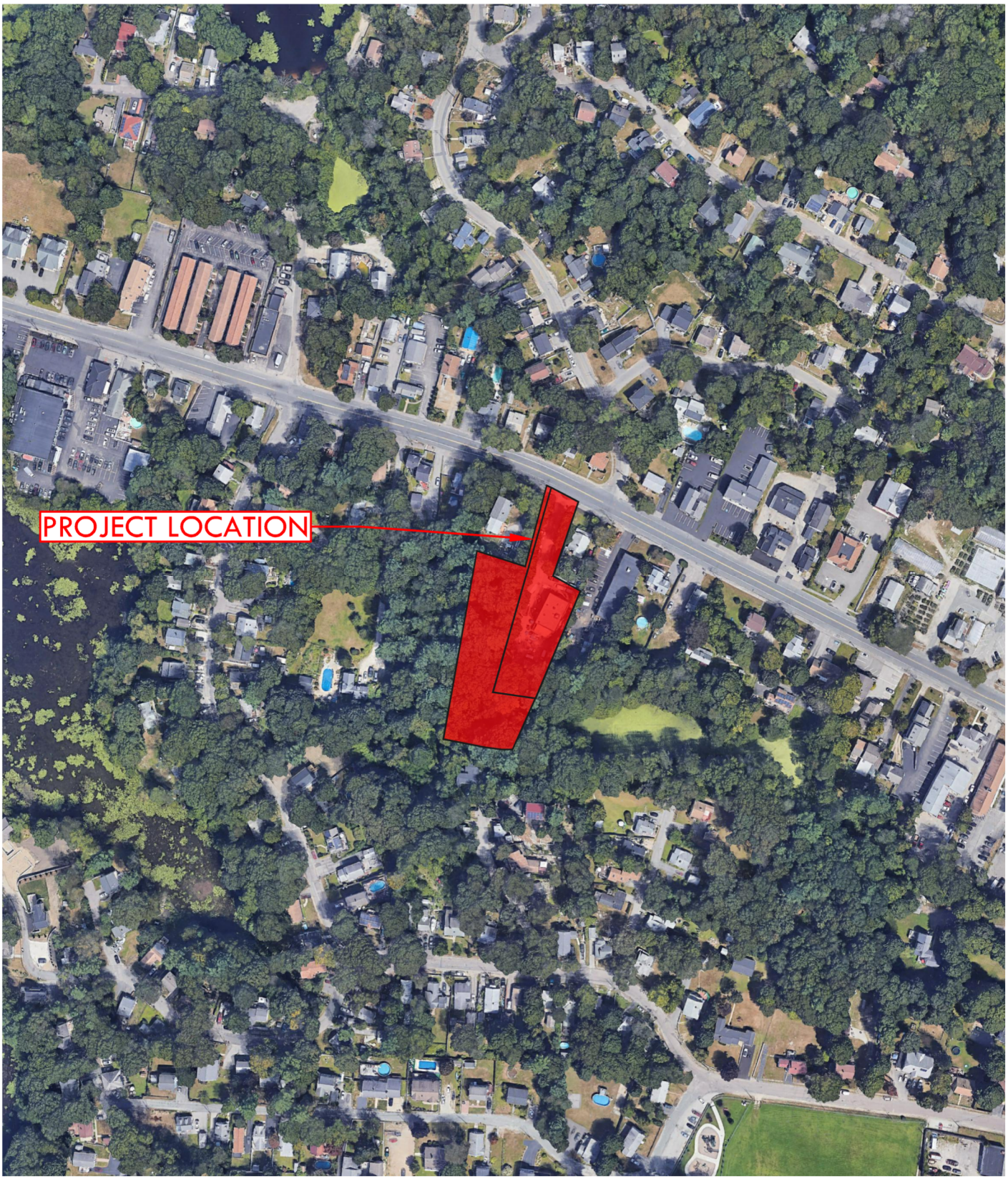
FIGURES

AERIAL PLAN

PRIORITY RESORCE MAP

FEMA FLOOD MAP

USGS SOIL SURVEY MAP



0 250'

SCALE: 1" = 250'

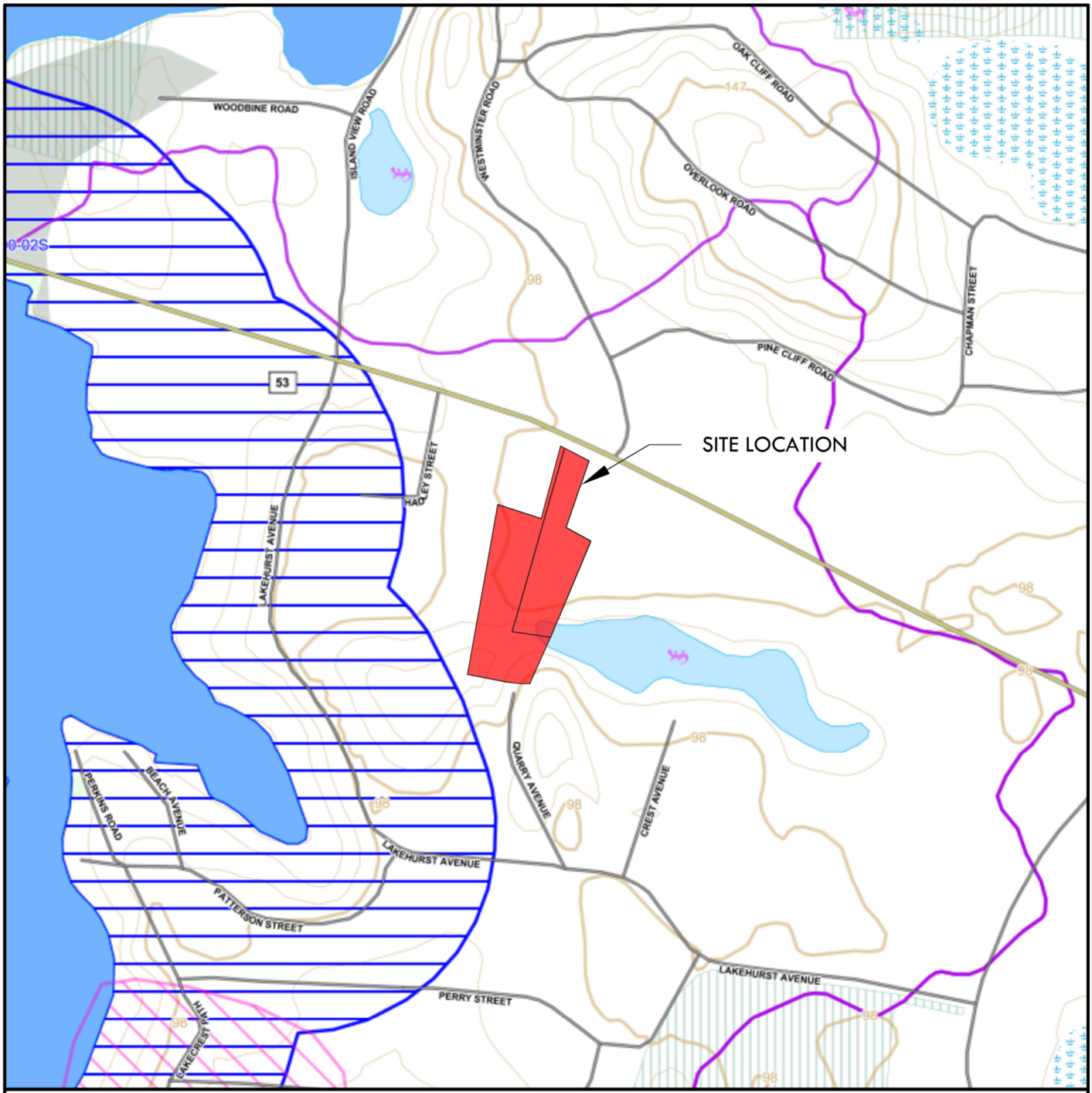
NOTES:
SOURCE: MASSGIS, COMMONWEALTH OF MASSACHUSETTS EOEA, MAXAR TECHNOLOGIES MAP DATED 2020

AERIAL PLAN

SITE: PROPOSED WAREHOUSE BUILDING 1047 WASHINGTON STREET WEYMOUTH, MA 02189	DATE: 1/6/2021 DRAWN BY: STL CHECKED BY: AJC VERTEX PROJ NO.: 64380	FIGURE 1

VERTEX®
400 Libbey Parkway | Weymouth, MA 02189
Main: 781.952.6000 | VERTEXENG.COM

Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta.Weymouth.MA\05-Engineering\Vertex Drawings\Report Figures\64380 - Figure 1 - Aerial Plan.dwg Wednesday, January 6, 2021 1:37:22 PM
Copyright: 2021 The Vertex Companies, Inc.



PRIORITY RESOURCE MAP

SITE: PROPOSED WAREHOUSE BUILDING
1047 WASHINGTON STREET
WEYMOUTH, MA 02189

DATE: 1/6/2021
DRAWN BY: JJA
CHECKED BY: AJC
VERTEX PROJ NO.: 64380

FIGURE
2

VERTEX®
400 Libbey Parkway | Weymouth, MA 02189
Main: 781.952.6000 | VERTEXENG.COM

Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta.Weymouth.MA\05-Engineering\Vertex Drawings\Report Figures\64380 - Figure 2 - Priority Resource Map.dwg Wednesday, January 6, 2021 1:44:08 PM
Copyright: 2021 The Vertex Companies, Inc.

National Flood Hazard Layer FIRMette

0 600'

SCALE: 1" = 600'

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- SPECIAL FLOOD HAZARD AREAS
  - Without Base Flood Elevation (BFE) Zone A, V, A99
  - With BFE or Depth Zone AE, AO, AH, VE, AR
  - Regulatory Floodway
- OTHER AREAS OF FLOOD HAZARD
  - 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
  - Future Conditions 1% Annual Chance Flood Hazard Zone X
  - Area with Reduced Flood Risk due to Levee. See Notes. Zone X
  - Area with Flood Risk due to Levee Zone D
- OTHER AREAS
  - NO SCREEN Area of Minimal Flood Hazard Zone X
  - Effective LOMRs
  - Area of Undetermined Flood Hazard Zone D
- GENERAL STRUCTURES
  - Channel, Culvert, or Storm Sewer
  - Levee, Dike, or Floodwall
- OTHER FEATURES
  - 20.2 Cross Sections with 1% Annual Chance
  - 17.5 Water Surface Elevation
  - Coastal Transect
  - Base Flood Elevation Line (BFE)
  - Limit of Study
  - Jurisdiction Boundary
  - Coastal Transect Baseline
  - Profile Baseline
  - Hydrographic Feature
- MAP PANELS
  - Digital Data Available
  - No Digital Data Available
  - Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/8/2020 at 9:42 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

FEMA FLOOD MAP

SITE: PROPOSED WAREHOUSE BUILDING
1047 WASHINGTON STREET
WEYMOUTH, MA 02189

DATE:	1/6/2021
DRAWN BY:	JJA
CHECKED BY:	AJC
VERTEX PROJ NO.:	64380

FIGURE 3

VERTEX®
400 Libbey Parkway I Weymouth, MA 02189
Main: 781.952.6000 I VERTEXENG.COM

Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta.Weymouth.MA\05-Engineering\Vertex Drawings\Report Figures\64380 - Figure 3 - FEMA Flood Map - mwl delete.dwg Wednesday, January 6, 2021 2:01:45 PM
Copyright: 2021 The Vertex Companies, Inc.

USGS SOIL SURVEY MAP

SITE: PROPOSED WAREHOUSE BUILDING
1047 WASHINGTON STREET
WEYMOUTH, MA 02189

DATE: 1/6/2021
DRAWN BY: JJA
CHECKED BY: AJC
VERTEX PROJ NO.: 64380

FIGURE
4

VERTEX®
400 Libbey Parkway I Weymouth, MA 02189
Main: 781.952.6000 I VERTEXENG.COM

Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta.Weymouth.MA\05-Engineering\Vertex Drawings\Report Figures\64380 - Figure 4 - USGS Soil Survey Map.dwg Wednesday, January 6, 2021 2:22:22 PM
Copyright: 2020 The Vertex Companies, Inc.

APPENDIX A

EXISTING HYDROLOGY PLAN & CALCULATIONS

EXISTING WATERSHEDS

TOTAL LOT AREA (S.F)	71,953.00		
TOTAL HYDROLOGY STUDY AREA (S.F)	55,499.56		
WATERSHED BREAKDOWN			
	IMPERVIOUS AREA	PERVIOUS AREA	TOTAL AREA
WATERSHED 1 (S.F.)	5,770.82	5,004.77	10,775.60
WATERSHED 2 (S.F.)	9,857.90	16,017.60	25,875.50
WATERSHED 3 (S.F.)	2,452.51	16,395.95	18,848.46
TOTALS (S.F.)	18,081.23	37,418.32	55,499.56
TOTAL LOT AREA (%)	25.48%	74.52%	100.00%

PLAN LEGEND

- WETLAND BOUNDARY
- EDGE OF ROAD
- CURB LINE
- ELEC — UNDERGROUND ELECTRIC
- OVHD — OVERHEAD ELECTRIC WIRE
- ST — UNDERGROUND STORMWATER
- W — UNDERGROUND WATER
- 80 — CONTOUR
- WLF — WETLAND FLAG

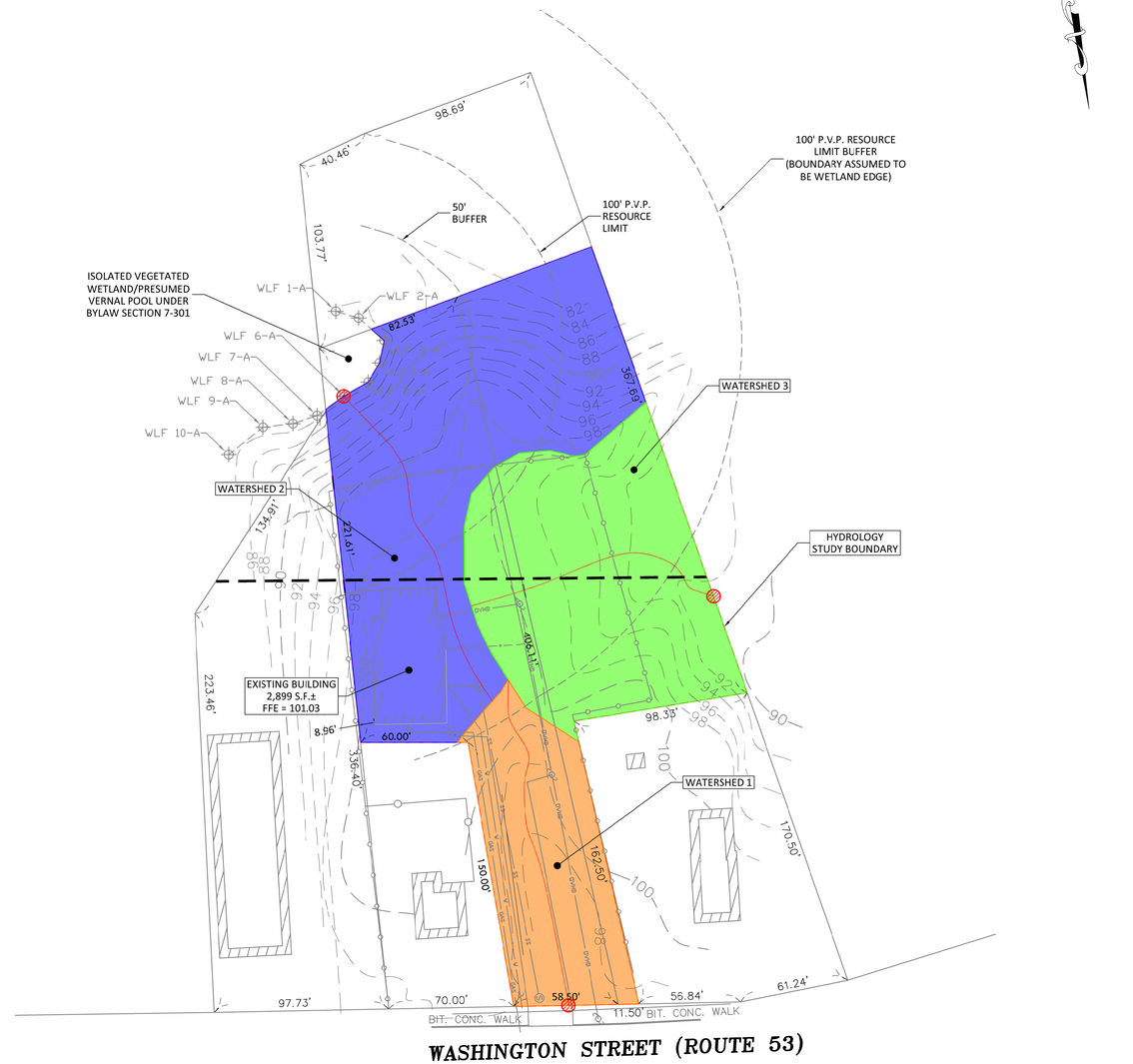
HYDROLOGY LEGEND

- HYDROLOGY STUDY BOUNDARY
- WATERSHED AREA
- TIME OF CONCENTRATION LINE
- ANALYSIS POINT

NOTES

EXISTING CONDITIONS INFORMATION FROM "PLAN OF LAND" PREPARED BY C.S. KELLEY SURVEYORS (NO DATE).

WETLAND DELINEATED BY WETLAND STRATEGIES, PLYMOUTH MA.



0' 40' 80' 120'

SCALE: 1" = 40'

811 Know what's below. Call before you dig.

VERTEX®
400 Libbey Parkway | Weymouth, MA 02189
Main: 781.952.6000 | VERTEXENG.COM

EXISTING CONDITIONS HYDROLOGY PLAN

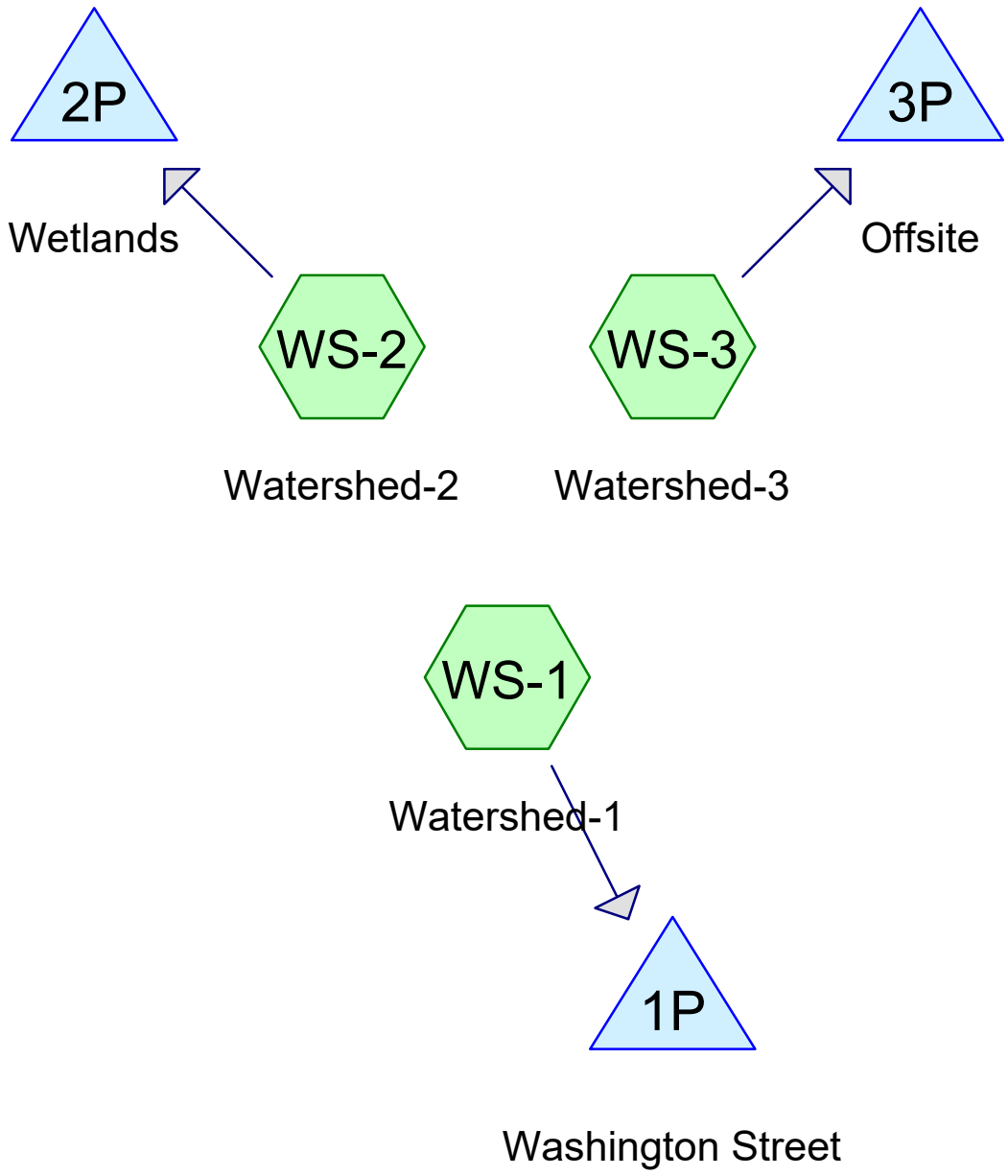
SITE: 1047 WASHINGTON STREET / 0 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS 02189

FOR: JOE GRATTA
1047 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS 02189

NO.	REVISIONS
1	10/29/2020 - CONCOM
2	1/8/2021 - CONCOM & ZBA
3	
4	
5	
6	
7	
8	
9	
10	

DATE: 1/8/2021	H1.0
DRAWN BY: JJA	
CHECKED BY: AJC	
JOB #: 64380	

Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta Weymouth MA\05-Engineering\Vertex Drawings\Stormwater Analysis\H1.0 - Existing Conditions Hydrology Plan.dwg Thursday, January 7, 2021 10:29:21 PM
Copyright: 2021 The Vertex Companies, Inc.



Subcat Reach Pond Link

Routing Diagram for Gravel Parking Area Hydrology Analysis - Existing
Prepared by {enter your company name here}, Printed 1/7/2021
HydroCAD® 10.00-25 s/n 10298 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.132	98	Paved parking, HSG B (WS-1)
0.283	98	Paved parking, HSG D (WS-2, WS-3)
0.744	77	Woods, Good, HSG D (WS-2, WS-3)
0.115	65	Woods/grass comb., Fair, HSG B (WS-1)
1.274	**83**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.247	HSG B	WS-1
0.000	HSG C	
1.027	HSG D	WS-2, WS-3
0.000	Other	
1.274		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.132	0.000	0.283	0.000	0.415	Paved parking	WS-1, WS-2, WS-3
0.000	0.000	0.000	0.744	0.000	0.744	Woods, Good	WS-2, WS-3
0.000	0.115	0.000	0.000	0.000	0.115	Woods/grass comb., Fair	WS-1
0.000	**0.247**	**0.000**	**1.027**	**0.000**	**1.274**	**TOTAL AREA**	

Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment WS-1: Watershed-1 Runoff Area=10,776 sf 53.55% Impervious Runoff Depth=1.63"
Tc=6.0 min CN=83 Runoff=0.47 cfs 0.034 af

Subcatchment WS-2: Watershed-2 Runoff Area=25,876 sf 38.10% Impervious Runoff Depth=1.77"
Tc=6.0 min CN=85 Runoff=1.23 cfs 0.088 af

Subcatchment WS-3: Watershed-3 Runoff Area=18,849 sf 13.01% Impervious Runoff Depth=1.42"
Tc=6.0 min CN=80 Runoff=0.71 cfs 0.051 af

Pond 1P: Washington Street Inflow=0.47 cfs 0.034 af
Primary=0.47 cfs 0.034 af

Pond 2P: Wetlands Inflow=1.23 cfs 0.088 af
Primary=1.23 cfs 0.088 af

Pond 3P: Offsite Inflow=0.71 cfs 0.051 af
Primary=0.71 cfs 0.051 af

Total Runoff Area = 1.274 ac Runoff Volume = 0.172 af Average Runoff Depth = 1.62"
67.42% Pervious = 0.859 ac 32.58% Impervious = 0.415 ac

Summary for Subcatchment WS-1: Watershed-1

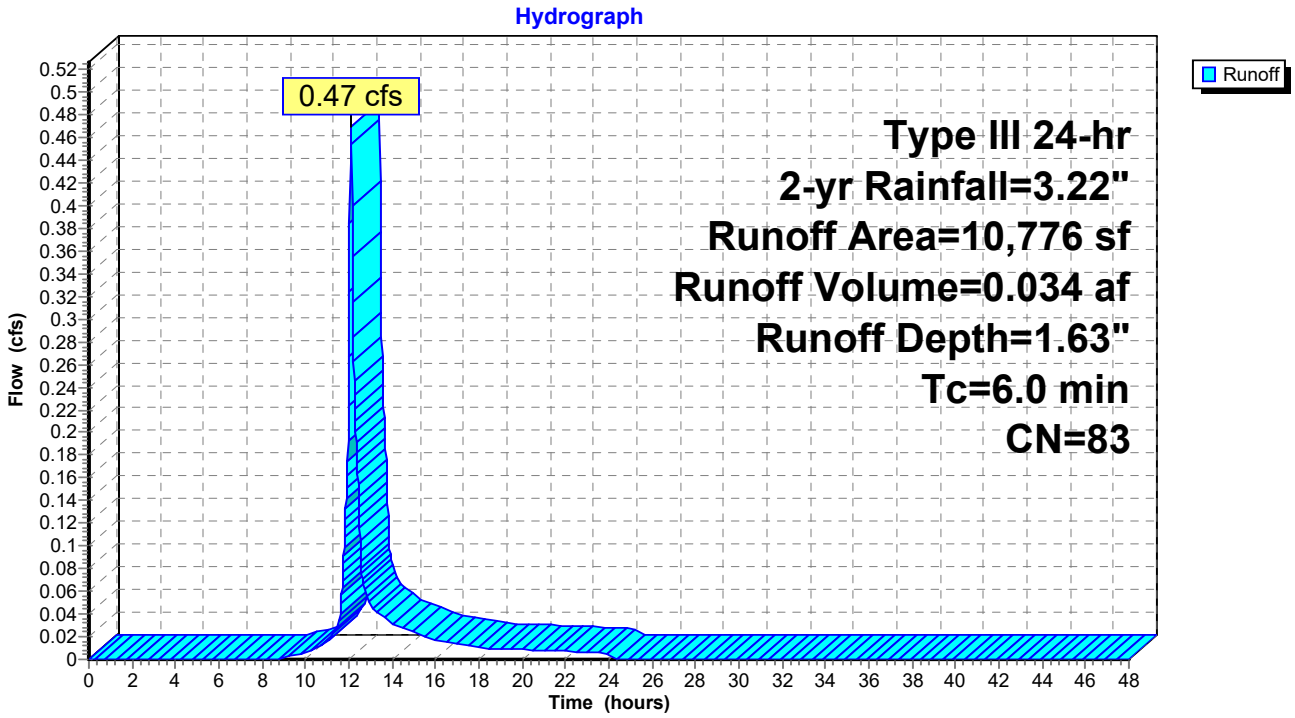
Runoff = 0.47 cfs @ 12.09 hrs, Volume= 0.034 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-yr Rainfall=3.22"

Area (sf)	CN	Description
5,005	65	Woods/grass comb., Fair, HSG B
5,771	98	Paved parking, HSG B
10,776	83	Weighted Average
5,005		46.45% Pervious Area
5,771		53.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-1**

Subcatchment WS-1: Watershed-1



Hydrograph for Subcatchment WS-1: Watershed-1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.37	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.61	0.02	0.01
11.00	0.81	0.06	0.02
12.00	1.61	0.44	**0.27**
13.00	2.42	0.99	**0.05**
14.00	2.61	1.14	0.03
15.00	2.75	1.25	0.02
16.00	2.85	1.33	0.02
17.00	2.93	1.39	0.01
18.00	2.99	1.44	0.01
19.00	3.04	1.48	0.01
20.00	3.08	1.51	0.01
21.00	3.12	1.55	0.01
22.00	3.16	1.57	0.01
23.00	3.19	1.60	0.01
24.00	**3.22**	**1.63**	0.01
25.00	3.22	1.63	0.00
26.00	3.22	1.63	0.00
27.00	3.22	1.63	0.00
28.00	3.22	1.63	0.00
29.00	3.22	1.63	0.00
30.00	3.22	1.63	0.00
31.00	3.22	1.63	0.00
32.00	3.22	1.63	0.00
33.00	3.22	1.63	0.00
34.00	3.22	1.63	0.00
35.00	3.22	1.63	0.00
36.00	3.22	1.63	0.00
37.00	3.22	1.63	0.00
38.00	3.22	1.63	0.00
39.00	3.22	1.63	0.00
40.00	3.22	1.63	0.00
41.00	3.22	1.63	0.00
42.00	3.22	1.63	0.00
43.00	3.22	1.63	0.00
44.00	3.22	1.63	0.00
45.00	3.22	1.63	0.00
46.00	3.22	1.63	0.00
47.00	3.22	1.63	0.00
48.00	3.22	1.63	0.00

Summary for Subcatchment WS-2: Watershed-2

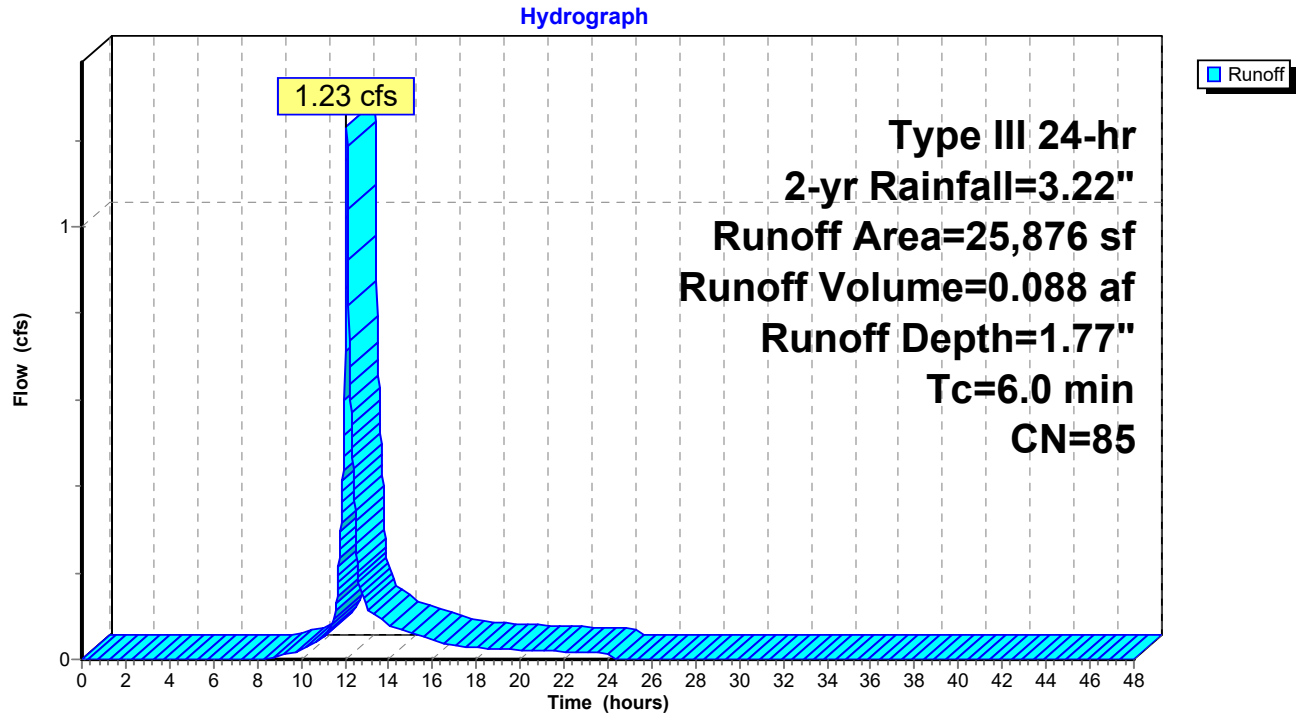
Runoff = 1.23 cfs @ 12.09 hrs, Volume= 0.088 af, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-yr Rainfall=3.22"

Area (sf)	CN	Description
16,018	77	Woods, Good, HSG D
9,858	98	Paved parking, HSG D
25,876	85	Weighted Average
16,018		61.90% Pervious Area
9,858		38.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-2**

Subcatchment WS-2: Watershed-2



Hydrograph for Subcatchment WS-2: Watershed-2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.37	0.00	0.00
9.00	0.47	0.01	0.01
10.00	0.61	0.03	0.02
11.00	0.81	0.09	0.05
12.00	1.61	0.52	**0.71**
13.00	2.42	1.11	**0.12**
14.00	2.61	1.27	0.08
15.00	2.75	1.38	0.06
16.00	2.85	1.47	0.04
17.00	2.93	1.53	0.03
18.00	2.99	1.58	0.03
19.00	3.04	1.62	0.02
20.00	3.08	1.66	0.02
21.00	3.12	1.69	0.02
22.00	3.16	1.72	0.02
23.00	3.19	1.75	0.02
24.00	**3.22**	**1.77**	0.01
25.00	3.22	1.77	0.00
26.00	3.22	1.77	0.00
27.00	3.22	1.77	0.00
28.00	3.22	1.77	0.00
29.00	3.22	1.77	0.00
30.00	3.22	1.77	0.00
31.00	3.22	1.77	0.00
32.00	3.22	1.77	0.00
33.00	3.22	1.77	0.00
34.00	3.22	1.77	0.00
35.00	3.22	1.77	0.00
36.00	3.22	1.77	0.00
37.00	3.22	1.77	0.00
38.00	3.22	1.77	0.00
39.00	3.22	1.77	0.00
40.00	3.22	1.77	0.00
41.00	3.22	1.77	0.00
42.00	3.22	1.77	0.00
43.00	3.22	1.77	0.00
44.00	3.22	1.77	0.00
45.00	3.22	1.77	0.00
46.00	3.22	1.77	0.00
47.00	3.22	1.77	0.00
48.00	3.22	1.77	0.00

Summary for Subcatchment WS-3: Watershed-3

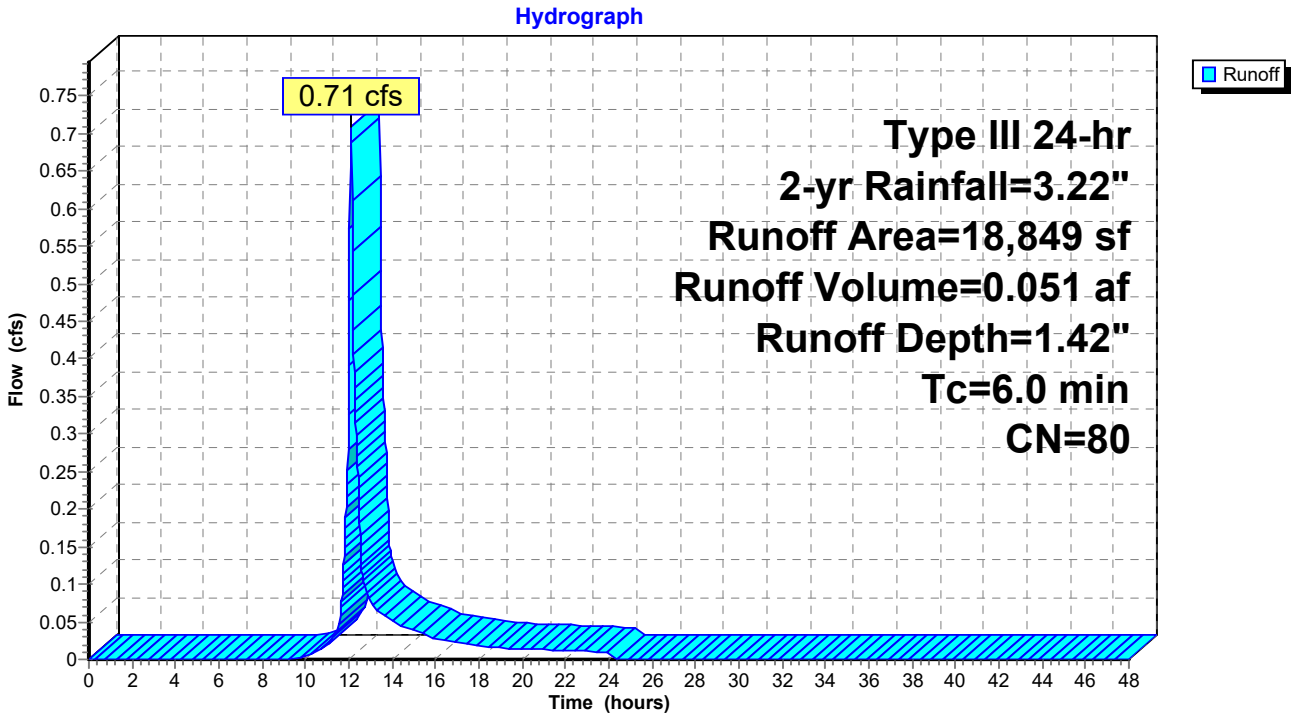
Runoff = 0.71 cfs @ 12.09 hrs, Volume= 0.051 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-yr Rainfall=3.22"

Area (sf)	CN	Description
16,396	77	Woods, Good, HSG D
2,453	98	Paved parking, HSG D
18,849	80	Weighted Average
16,396		86.99% Pervious Area
2,453		13.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-3**

Subcatchment WS-3: Watershed-3



Hydrograph for Subcatchment WS-3: Watershed-3

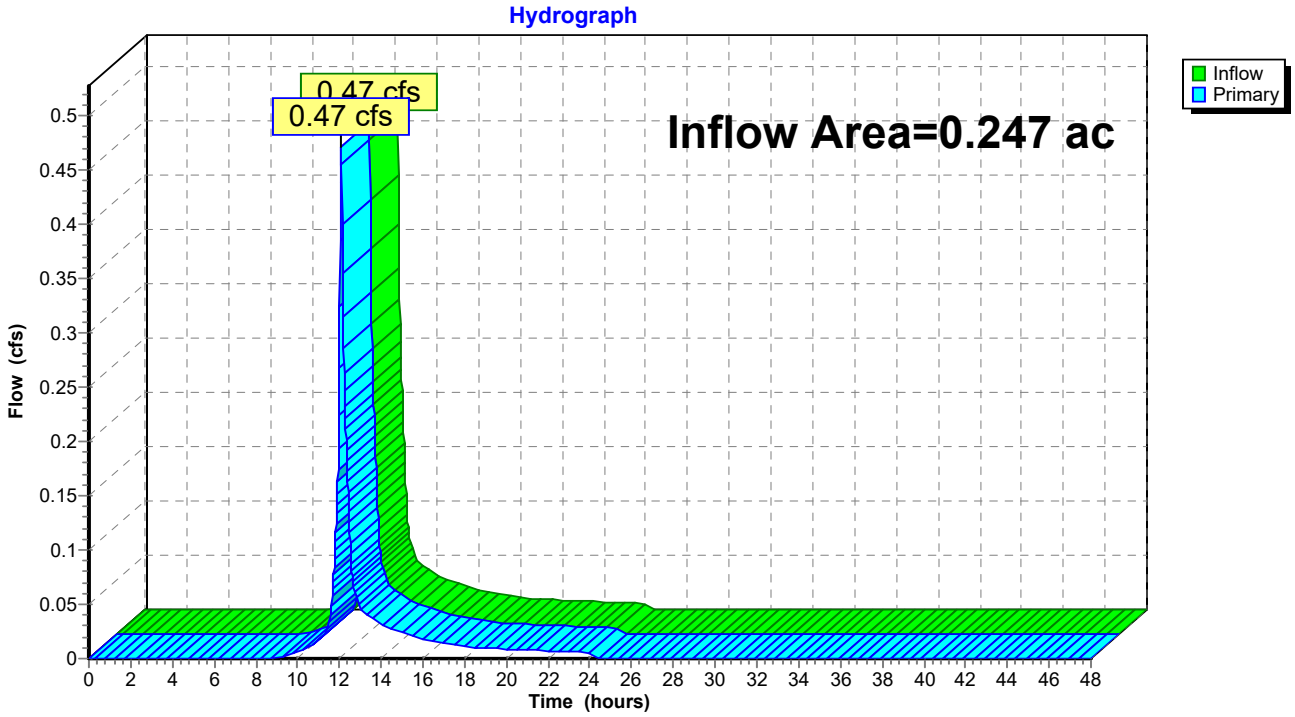
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.37	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.61	0.00	0.00
11.00	0.81	0.03	0.02
12.00	1.61	0.34	**0.39**
13.00	2.42	0.83	**0.08**
14.00	2.61	0.97	0.05
15.00	2.75	1.07	0.04
16.00	2.85	1.14	0.03
17.00	2.93	1.20	0.02
18.00	2.99	1.24	0.02
19.00	3.04	1.28	0.02
20.00	3.08	1.31	0.01
21.00	3.12	1.34	0.01
22.00	3.16	1.37	0.01
23.00	3.19	1.39	0.01
24.00	**3.22**	**1.42**	0.01
25.00	3.22	1.42	0.00
26.00	3.22	1.42	0.00
27.00	3.22	1.42	0.00
28.00	3.22	1.42	0.00
29.00	3.22	1.42	0.00
30.00	3.22	1.42	0.00
31.00	3.22	1.42	0.00
32.00	3.22	1.42	0.00
33.00	3.22	1.42	0.00
34.00	3.22	1.42	0.00
35.00	3.22	1.42	0.00
36.00	3.22	1.42	0.00
37.00	3.22	1.42	0.00
38.00	3.22	1.42	0.00
39.00	3.22	1.42	0.00
40.00	3.22	1.42	0.00
41.00	3.22	1.42	0.00
42.00	3.22	1.42	0.00
43.00	3.22	1.42	0.00
44.00	3.22	1.42	0.00
45.00	3.22	1.42	0.00
46.00	3.22	1.42	0.00
47.00	3.22	1.42	0.00
48.00	3.22	1.42	0.00

Summary for Pond 1P: Washington Street

Inflow Area = 0.247 ac, 53.55% Impervious, Inflow Depth = 1.63" for 2-yr event
Inflow = 0.47 cfs @ 12.09 hrs, Volume= 0.034 af
Primary = 0.47 cfs @ 12.09 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 1P: Washington Street



Hydrograph for Pond 1P: Washington Street

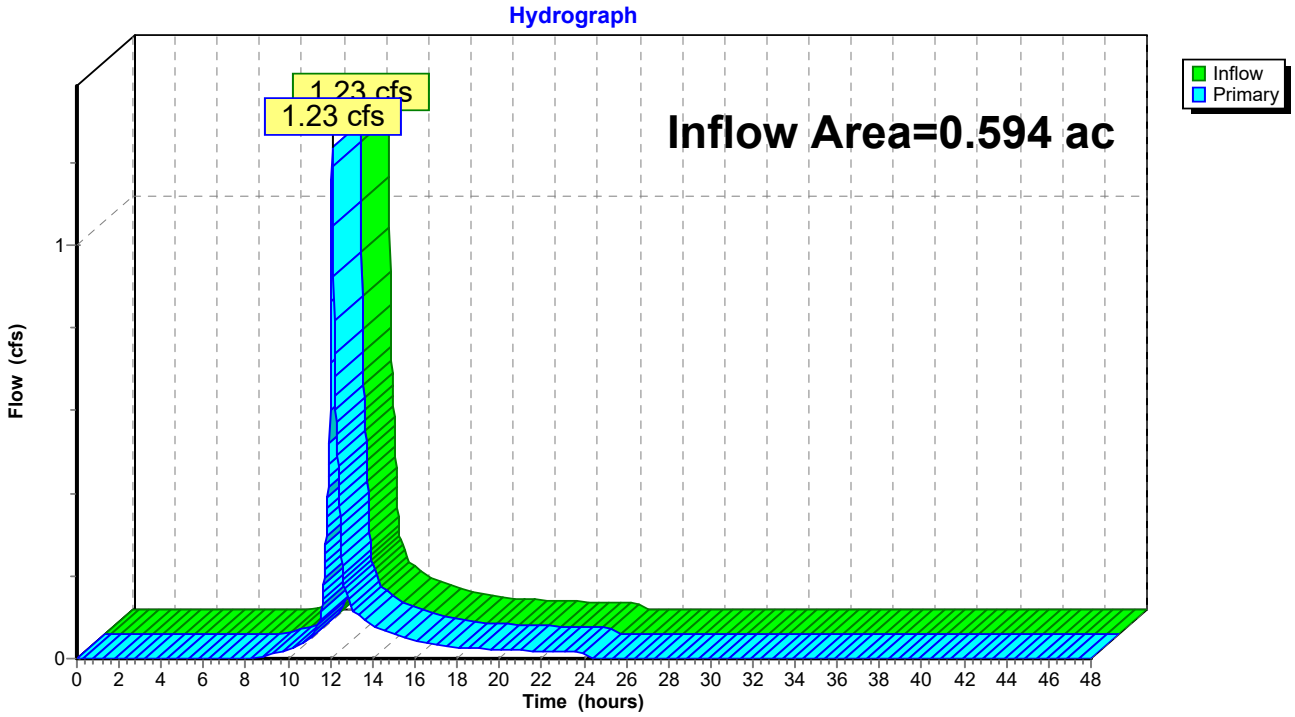
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.00		0.00
10.00	0.01		0.01
11.00	0.02		0.02
12.00	**0.27**		**0.27**
13.00	**0.05**		**0.05**
14.00	0.03		0.03
15.00	0.02		0.02
16.00	0.02		0.02
17.00	0.01		0.01
18.00	0.01		0.01
19.00	0.01		0.01
20.00	0.01		0.01
21.00	0.01		0.01
22.00	0.01		0.01
23.00	0.01		0.01
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Summary for Pond 2P: Wetlands

Inflow Area = 0.594 ac, 38.10% Impervious, Inflow Depth = 1.77" for 2-yr event
Inflow = 1.23 cfs @ 12.09 hrs, Volume= 0.088 af
Primary = 1.23 cfs @ 12.09 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 2P: Wetlands



Hydrograph for Pond 2P: Wetlands

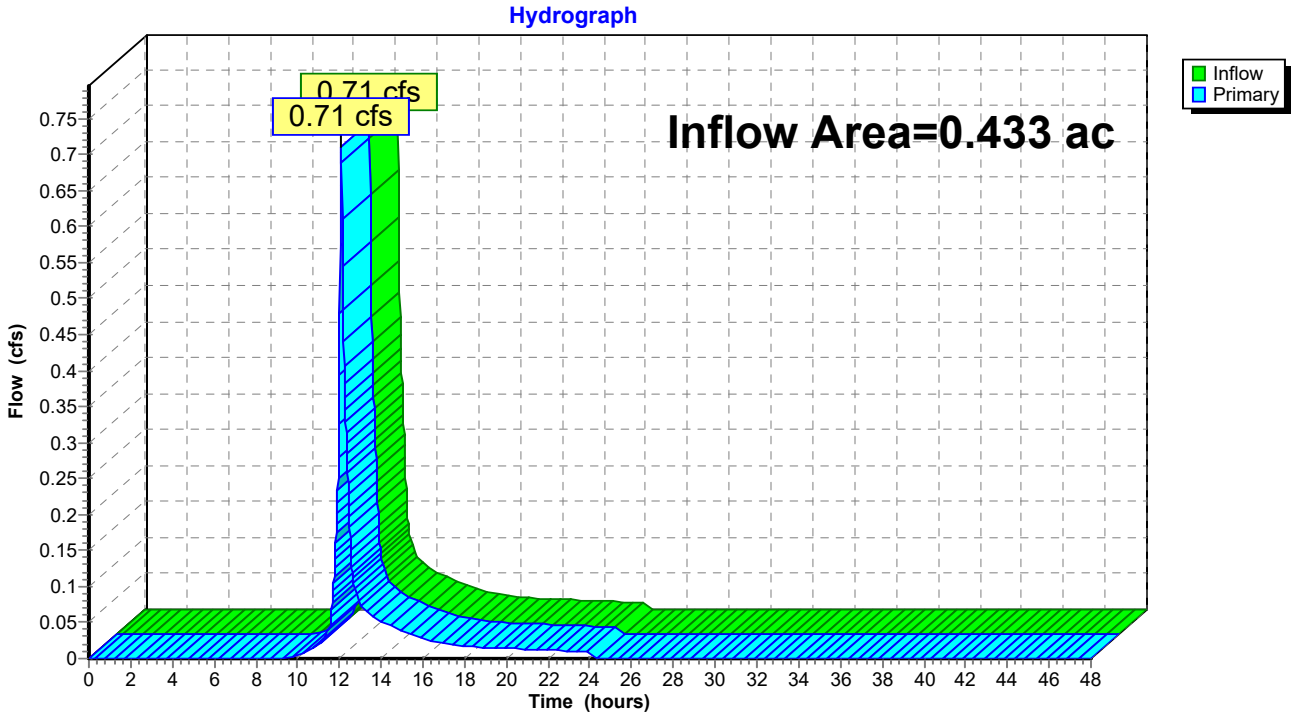
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.01		0.01
10.00	0.02		0.02
11.00	0.05		0.05
12.00	**0.71**		**0.71**
13.00	**0.12**		**0.12**
14.00	0.08		0.08
15.00	0.06		0.06
16.00	0.04		0.04
17.00	0.03		0.03
18.00	0.03		0.03
19.00	0.02		0.02
20.00	0.02		0.02
21.00	0.02		0.02
22.00	0.02		0.02
23.00	0.02		0.02
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Summary for Pond 3P: Offsite

Inflow Area = 0.433 ac, 13.01% Impervious, Inflow Depth = 1.42" for 2-yr event
Inflow = 0.71 cfs @ 12.09 hrs, Volume= 0.051 af
Primary = 0.71 cfs @ 12.09 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 3P: Offsite



Hydrograph for Pond 3P: Offsite

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.00		0.00
10.00	0.00		0.00
11.00	0.02		0.02
12.00	**0.39**		**0.39**
13.00	**0.08**		**0.08**
14.00	0.05		0.05
15.00	0.04		0.04
16.00	0.03		0.03
17.00	0.02		0.02
18.00	0.02		0.02
19.00	0.02		0.02
20.00	0.01		0.01
21.00	0.01		0.01
22.00	0.01		0.01
23.00	0.01		0.01
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment WS-1: Watershed-1 Runoff Area=10,776 sf 53.55% Impervious Runoff Depth=3.06"
Tc=6.0 min CN=83 Runoff=0.88 cfs 0.063 af

Subcatchment WS-2: Watershed-2 Runoff Area=25,876 sf 38.10% Impervious Runoff Depth=3.25"
Tc=6.0 min CN=85 Runoff=2.24 cfs 0.161 af

Subcatchment WS-3: Watershed-3 Runoff Area=18,849 sf 13.01% Impervious Runoff Depth=2.78"
Tc=6.0 min CN=80 Runoff=1.41 cfs 0.100 af

Pond 1P: Washington Street Inflow=0.88 cfs 0.063 af
Primary=0.88 cfs 0.063 af

Pond 2P: Wetlands Inflow=2.24 cfs 0.161 af
Primary=2.24 cfs 0.161 af

Pond 3P: Offsite Inflow=1.41 cfs 0.100 af
Primary=1.41 cfs 0.100 af

Total Runoff Area = 1.274 ac Runoff Volume = 0.324 af Average Runoff Depth = 3.05"
67.42% Pervious = 0.859 ac 32.58% Impervious = 0.415 ac

Summary for Subcatchment WS-1: Watershed-1

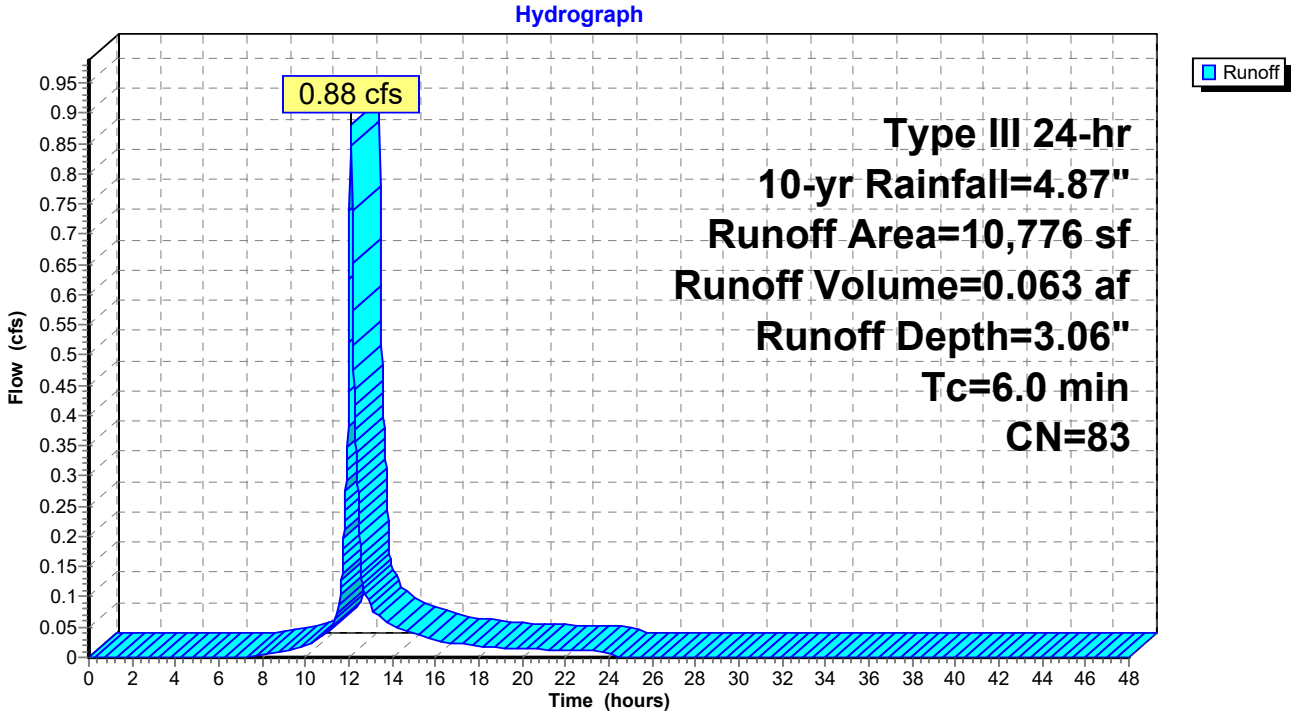
Runoff = 0.88 cfs @ 12.09 hrs, Volume= 0.063 af, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-yr Rainfall=4.87"

Area (sf)	CN	Description
5,005	65	Woods/grass comb., Fair, HSG B
5,771	98	Paved parking, HSG B
10,776	83	Weighted Average
5,005		46.45% Pervious Area
5,771		53.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-1**

Subcatchment WS-1: Watershed-1



Hydrograph for Subcatchment WS-1: Watershed-1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.10	0.00	0.00
3.00	0.15	0.00	0.00
4.00	0.21	0.00	0.00
5.00	0.28	0.00	0.00
6.00	0.35	0.00	0.00
7.00	0.44	0.00	0.00
8.00	0.56	0.01	0.00
9.00	0.71	0.04	0.01
10.00	0.92	0.10	0.02
11.00	1.22	0.23	0.04
12.00	2.43	1.01	**0.52**
13.00	3.65	1.99	**0.08**
14.00	3.95	2.24	0.05
15.00	4.16	2.43	0.04
16.00	4.31	2.56	0.03
17.00	4.43	2.66	0.02
18.00	4.52	2.74	0.02
19.00	4.59	2.81	0.02
20.00	4.66	2.87	0.01
21.00	4.72	2.92	0.01
22.00	4.78	2.97	0.01
23.00	4.83	3.02	0.01
24.00	**4.87**	**3.06**	0.01
25.00	4.87	3.06	0.00
26.00	4.87	3.06	0.00
27.00	4.87	3.06	0.00
28.00	4.87	3.06	0.00
29.00	4.87	3.06	0.00
30.00	4.87	3.06	0.00
31.00	4.87	3.06	0.00
32.00	4.87	3.06	0.00
33.00	4.87	3.06	0.00
34.00	4.87	3.06	0.00
35.00	4.87	3.06	0.00
36.00	4.87	3.06	0.00
37.00	4.87	3.06	0.00
38.00	4.87	3.06	0.00
39.00	4.87	3.06	0.00
40.00	4.87	3.06	0.00
41.00	4.87	3.06	0.00
42.00	4.87	3.06	0.00
43.00	4.87	3.06	0.00
44.00	4.87	3.06	0.00
45.00	4.87	3.06	0.00
46.00	4.87	3.06	0.00
47.00	4.87	3.06	0.00
48.00	4.87	3.06	0.00

Summary for Subcatchment WS-2: Watershed-2

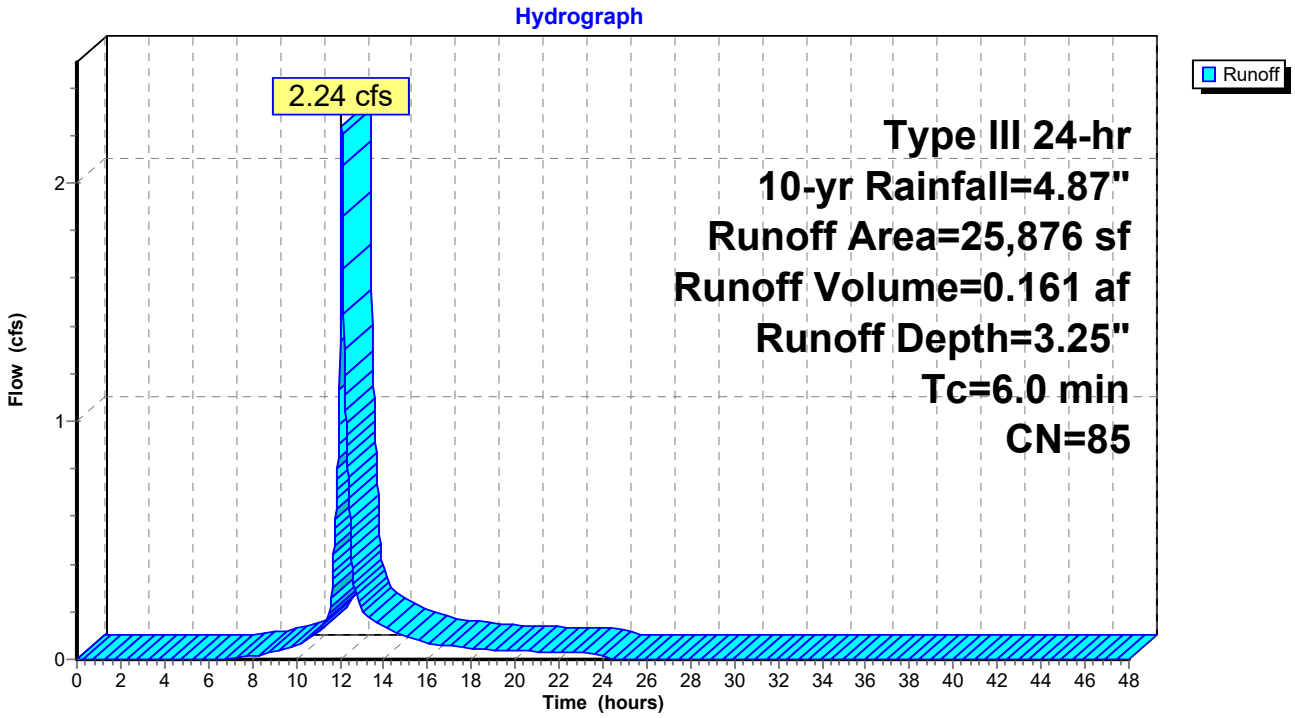
Runoff = 2.24 cfs @ 12.09 hrs, Volume= 0.161 af, Depth= 3.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-yr Rainfall=4.87"

Area (sf)	CN	Description
16,018	77	Woods, Good, HSG D
9,858	98	Paved parking, HSG D
25,876	85	Weighted Average
16,018		61.90% Pervious Area
9,858		38.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-2**

Subcatchment WS-2: Watershed-2



Hydrograph for Subcatchment WS-2: Watershed-2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.10	0.00	0.00
3.00	0.15	0.00	0.00
4.00	0.21	0.00	0.00
5.00	0.28	0.00	0.00
6.00	0.35	0.00	0.00
7.00	0.44	0.00	0.00
8.00	0.56	0.02	0.01
9.00	0.71	0.06	0.03
10.00	0.92	0.14	0.06
11.00	1.22	0.28	0.11
12.00	2.43	1.13	**1.34**
13.00	3.65	2.15	**0.21**
14.00	3.95	2.41	0.13
15.00	4.16	2.60	0.10
16.00	4.31	2.74	0.07
17.00	4.43	2.84	0.06
18.00	4.52	2.93	0.04
19.00	4.59	2.99	0.04
20.00	4.66	3.06	0.04
21.00	4.72	3.11	0.03
22.00	4.78	3.16	0.03
23.00	4.83	3.21	0.03
24.00	**4.87**	**3.25**	0.02
25.00	4.87	3.25	0.00
26.00	4.87	3.25	0.00
27.00	4.87	3.25	0.00
28.00	4.87	3.25	0.00
29.00	4.87	3.25	0.00
30.00	4.87	3.25	0.00
31.00	4.87	3.25	0.00
32.00	4.87	3.25	0.00
33.00	4.87	3.25	0.00
34.00	4.87	3.25	0.00
35.00	4.87	3.25	0.00
36.00	4.87	3.25	0.00
37.00	4.87	3.25	0.00
38.00	4.87	3.25	0.00
39.00	4.87	3.25	0.00
40.00	4.87	3.25	0.00
41.00	4.87	3.25	0.00
42.00	4.87	3.25	0.00
43.00	4.87	3.25	0.00
44.00	4.87	3.25	0.00
45.00	4.87	3.25	0.00
46.00	4.87	3.25	0.00
47.00	4.87	3.25	0.00
48.00	4.87	3.25	0.00

Summary for Subcatchment WS-3: Watershed-3

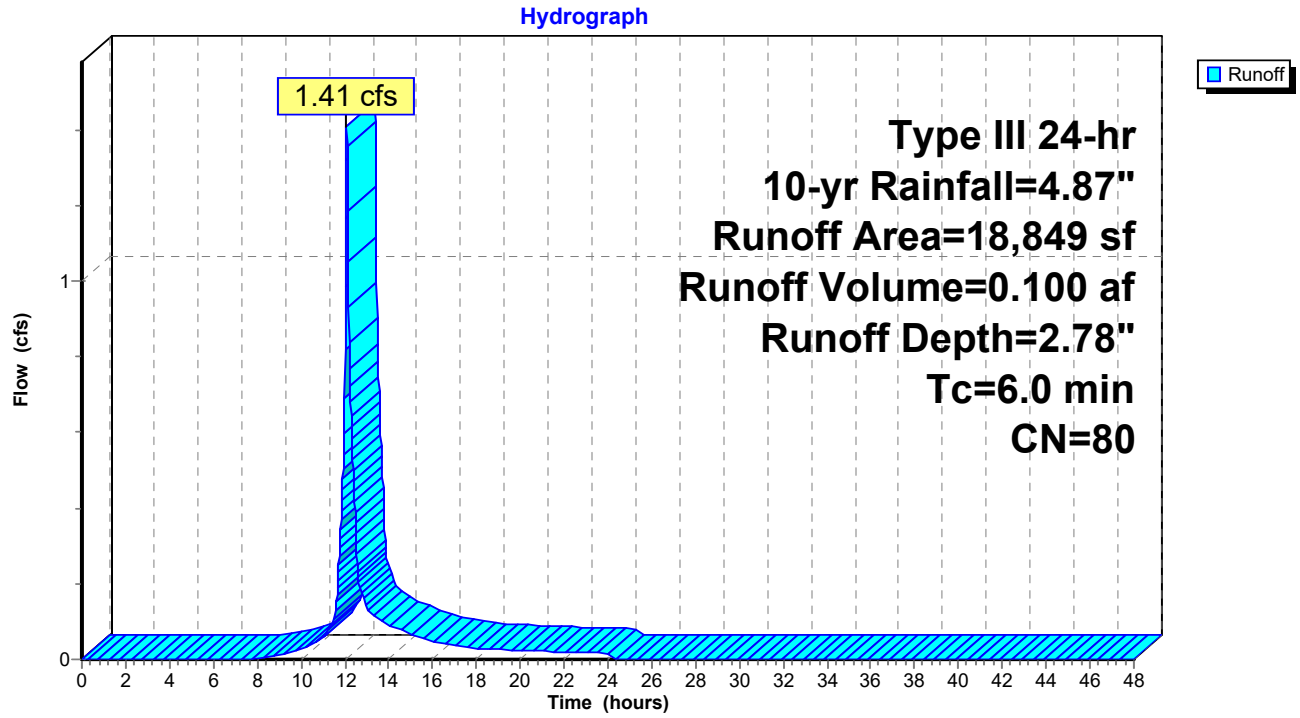
Runoff = 1.41 cfs @ 12.09 hrs, Volume= 0.100 af, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-yr Rainfall=4.87"

Area (sf)	CN	Description
16,396	77	Woods, Good, HSG D
2,453	98	Paved parking, HSG D
18,849	80	Weighted Average
16,396		86.99% Pervious Area
2,453		13.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-3**

Subcatchment WS-3: Watershed-3



Hydrograph for Subcatchment WS-3: Watershed-3

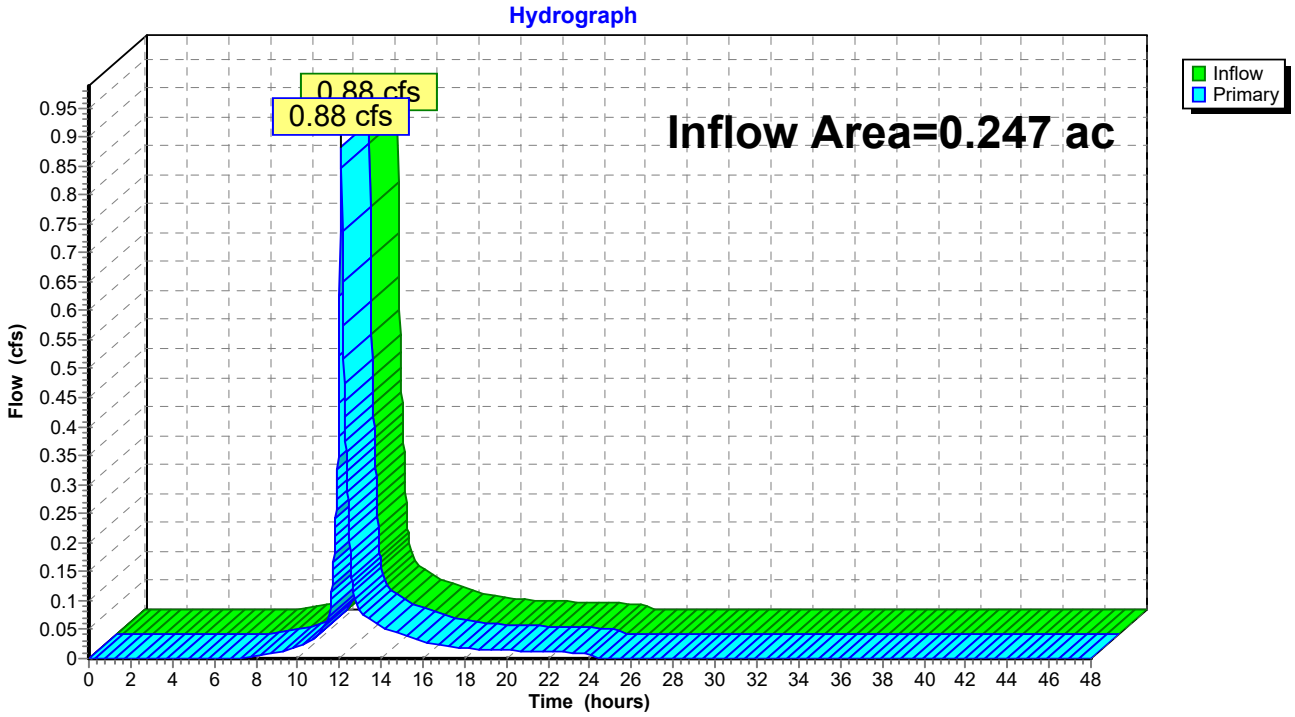
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.10	0.00	0.00
3.00	0.15	0.00	0.00
4.00	0.21	0.00	0.00
5.00	0.28	0.00	0.00
6.00	0.35	0.00	0.00
7.00	0.44	0.00	0.00
8.00	0.56	0.00	0.00
9.00	0.71	0.02	0.01
10.00	0.92	0.06	0.03
11.00	1.22	0.16	0.06
12.00	2.43	0.84	**0.82**
13.00	3.65	1.76	**0.14**
14.00	3.95	2.00	0.09
15.00	4.16	2.17	0.07
16.00	4.31	2.30	0.05
17.00	4.43	2.40	0.04
18.00	4.52	2.48	0.03
19.00	4.59	2.54	0.03
20.00	4.66	2.60	0.02
21.00	4.72	2.65	0.02
22.00	4.78	2.70	0.02
23.00	4.83	2.74	0.02
24.00	**4.87**	**2.78**	0.02
25.00	4.87	2.78	0.00
26.00	4.87	2.78	0.00
27.00	4.87	2.78	0.00
28.00	4.87	2.78	0.00
29.00	4.87	2.78	0.00
30.00	4.87	2.78	0.00
31.00	4.87	2.78	0.00
32.00	4.87	2.78	0.00
33.00	4.87	2.78	0.00
34.00	4.87	2.78	0.00
35.00	4.87	2.78	0.00
36.00	4.87	2.78	0.00
37.00	4.87	2.78	0.00
38.00	4.87	2.78	0.00
39.00	4.87	2.78	0.00
40.00	4.87	2.78	0.00
41.00	4.87	2.78	0.00
42.00	4.87	2.78	0.00
43.00	4.87	2.78	0.00
44.00	4.87	2.78	0.00
45.00	4.87	2.78	0.00
46.00	4.87	2.78	0.00
47.00	4.87	2.78	0.00
48.00	4.87	2.78	0.00

Summary for Pond 1P: Washington Street

Inflow Area = 0.247 ac, 53.55% Impervious, Inflow Depth = 3.06" for 10-yr event
Inflow = 0.88 cfs @ 12.09 hrs, Volume= 0.063 af
Primary = 0.88 cfs @ 12.09 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 1P: Washington Street



Hydrograph for Pond 1P: Washington Street

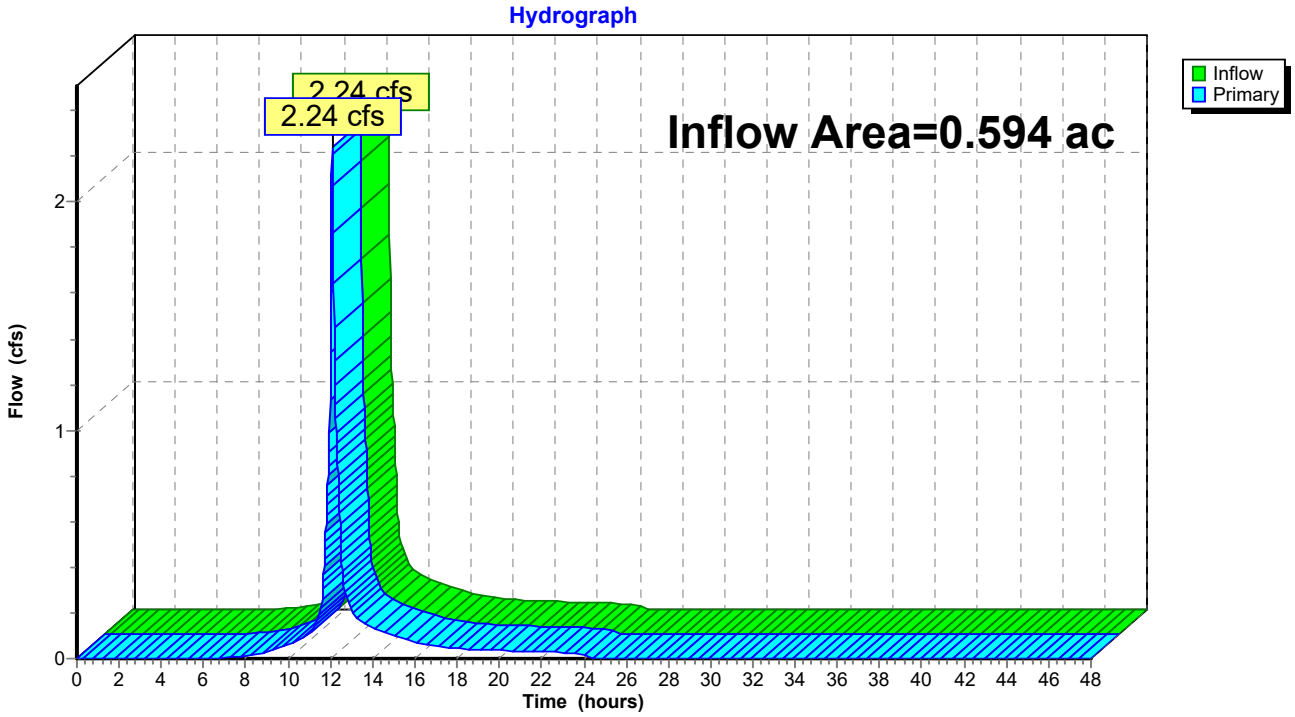
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.01		0.01
10.00	0.02		0.02
11.00	0.04		0.04
12.00	**0.52**		**0.52**
13.00	**0.08**		**0.08**
14.00	0.05		0.05
15.00	0.04		0.04
16.00	0.03		0.03
17.00	0.02		0.02
18.00	0.02		0.02
19.00	0.02		0.02
20.00	0.01		0.01
21.00	0.01		0.01
22.00	0.01		0.01
23.00	0.01		0.01
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Summary for Pond 2P: Wetlands

Inflow Area = 0.594 ac, 38.10% Impervious, Inflow Depth = 3.25" for 10-yr event
Inflow = 2.24 cfs @ 12.09 hrs, Volume= 0.161 af
Primary = 2.24 cfs @ 12.09 hrs, Volume= 0.161 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 2P: Wetlands



Hydrograph for Pond 2P: Wetlands

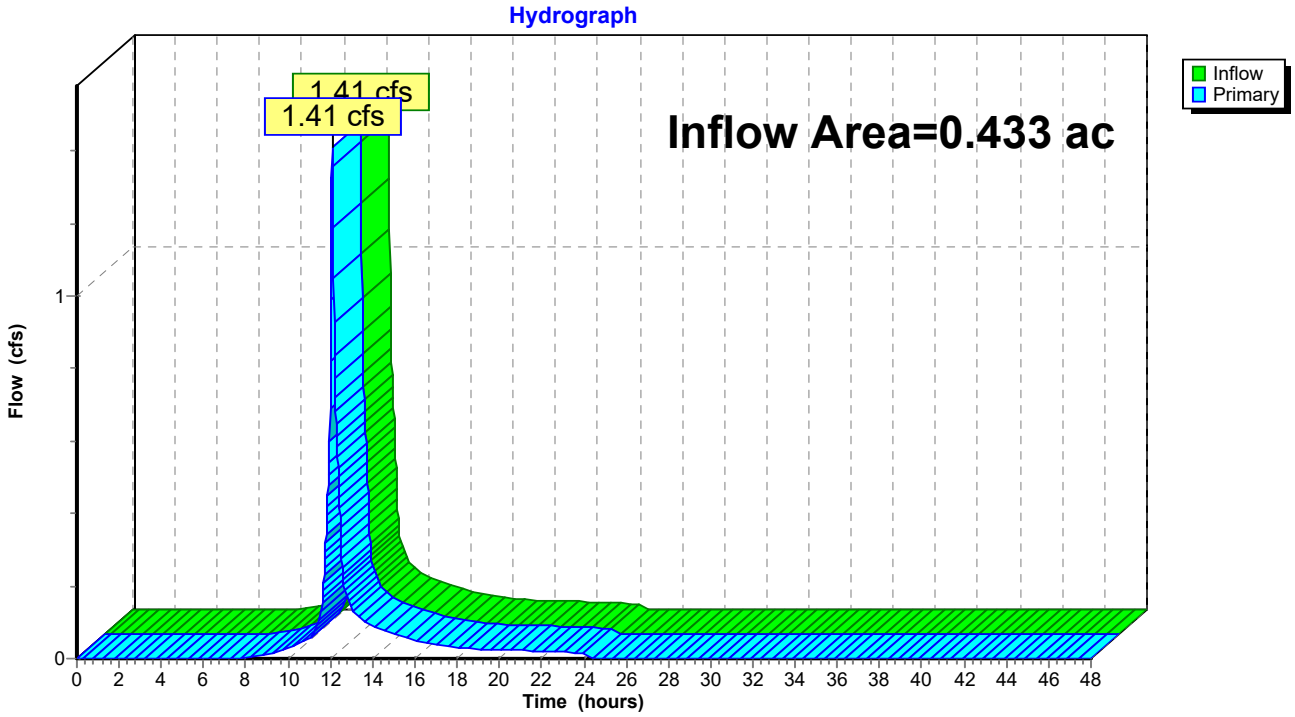
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.01		0.01
9.00	0.03		0.03
10.00	0.06		0.06
11.00	0.11		0.11
12.00	**1.34**		**1.34**
13.00	**0.21**		**0.21**
14.00	0.13		0.13
15.00	0.10		0.10
16.00	0.07		0.07
17.00	0.06		0.06
18.00	0.04		0.04
19.00	0.04		0.04
20.00	0.04		0.04
21.00	0.03		0.03
22.00	0.03		0.03
23.00	0.03		0.03
24.00	0.02		0.02
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Summary for Pond 3P: Offsite

Inflow Area = 0.433 ac, 13.01% Impervious, Inflow Depth = 2.78" for 10-yr event
Inflow = 1.41 cfs @ 12.09 hrs, Volume= 0.100 af
Primary = 1.41 cfs @ 12.09 hrs, Volume= 0.100 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 3P: Offsite



Hydrograph for Pond 3P: Offsite

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.01		0.01
10.00	0.03		0.03
11.00	0.06		0.06
12.00	**0.82**		**0.82**
13.00	**0.14**		**0.14**
14.00	0.09		0.09
15.00	0.07		0.07
16.00	0.05		0.05
17.00	0.04		0.04
18.00	0.03		0.03
19.00	0.03		0.03
20.00	0.02		0.02
21.00	0.02		0.02
22.00	0.02		0.02
23.00	0.02		0.02
24.00	0.02		0.02
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment WS-1: Watershed-1 Runoff Area=10,776 sf 53.55% Impervious Runoff Depth=4.25"
Tc=6.0 min CN=83 Runoff=1.21 cfs 0.088 af

Subcatchment WS-2: Watershed-2 Runoff Area=25,876 sf 38.10% Impervious Runoff Depth=4.46"
Tc=6.0 min CN=85 Runoff=3.04 cfs 0.221 af

Subcatchment WS-3: Watershed-3 Runoff Area=18,849 sf 13.01% Impervious Runoff Depth=3.93"
Tc=6.0 min CN=80 Runoff=1.98 cfs 0.142 af

Pond 1P: Washington Street Inflow=1.21 cfs 0.088 af
Primary=1.21 cfs 0.088 af

Pond 2P: Wetlands Inflow=3.04 cfs 0.221 af
Primary=3.04 cfs 0.221 af

Pond 3P: Offsite Inflow=1.98 cfs 0.142 af
Primary=1.98 cfs 0.142 af

Total Runoff Area = 1.274 ac Runoff Volume = 0.450 af Average Runoff Depth = 4.24"
67.42% Pervious = 0.859 ac 32.58% Impervious = 0.415 ac

Summary for Subcatchment WS-1: Watershed-1

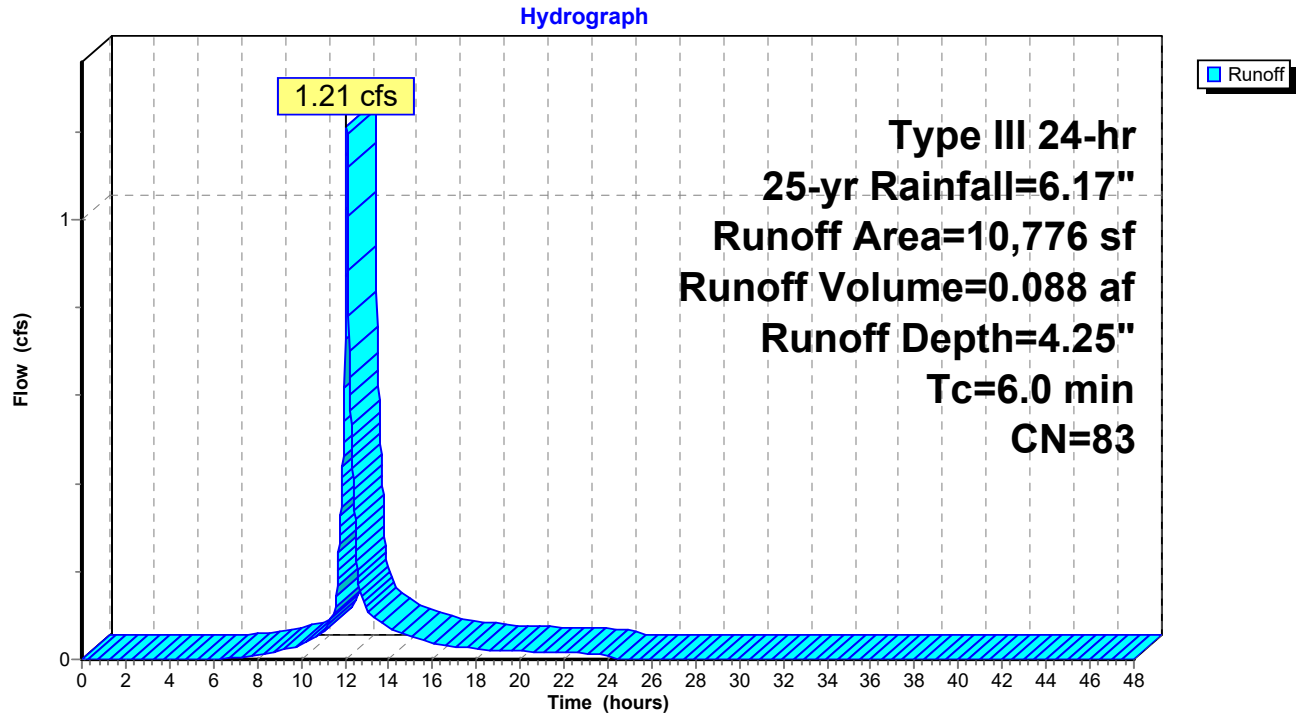
Runoff = 1.21 cfs @ 12.09 hrs, Volume= 0.088 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-yr Rainfall=6.17"

Area (sf)	CN	Description
5,005	65	Woods/grass comb., Fair, HSG B
5,771	98	Paved parking, HSG B
10,776	83	Weighted Average
5,005		46.45% Pervious Area
5,771		53.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-1**

Subcatchment WS-1: Watershed-1



Hydrograph for Subcatchment WS-1: Watershed-1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.06	0.00	0.00
2.00	0.12	0.00	0.00
3.00	0.19	0.00	0.00
4.00	0.27	0.00	0.00
5.00	0.35	0.00	0.00
6.00	0.44	0.00	0.00
7.00	0.56	0.01	0.00
8.00	0.70	0.04	0.01
9.00	0.90	0.09	0.02
10.00	1.17	0.20	0.03
11.00	1.54	0.40	0.06
12.00	3.08	1.52	**0.73**
13.00	4.63	2.84	**0.11**
14.00	5.00	3.18	0.07
15.00	5.27	3.42	0.05
16.00	5.47	3.60	0.04
17.00	5.61	3.73	0.03
18.00	5.73	3.84	0.02
19.00	5.82	3.92	0.02
20.00	5.90	4.00	0.02
21.00	5.98	4.07	0.02
22.00	6.05	4.14	0.02
23.00	6.11	4.20	0.01
24.00	**6.17**	**4.25**	0.01
25.00	6.17	4.25	0.00
26.00	6.17	4.25	0.00
27.00	6.17	4.25	0.00
28.00	6.17	4.25	0.00
29.00	6.17	4.25	0.00
30.00	6.17	4.25	0.00
31.00	6.17	4.25	0.00
32.00	6.17	4.25	0.00
33.00	6.17	4.25	0.00
34.00	6.17	4.25	0.00
35.00	6.17	4.25	0.00
36.00	6.17	4.25	0.00
37.00	6.17	4.25	0.00
38.00	6.17	4.25	0.00
39.00	6.17	4.25	0.00
40.00	6.17	4.25	0.00
41.00	6.17	4.25	0.00
42.00	6.17	4.25	0.00
43.00	6.17	4.25	0.00
44.00	6.17	4.25	0.00
45.00	6.17	4.25	0.00
46.00	6.17	4.25	0.00
47.00	6.17	4.25	0.00
48.00	6.17	4.25	0.00

Summary for Subcatchment WS-2: Watershed-2

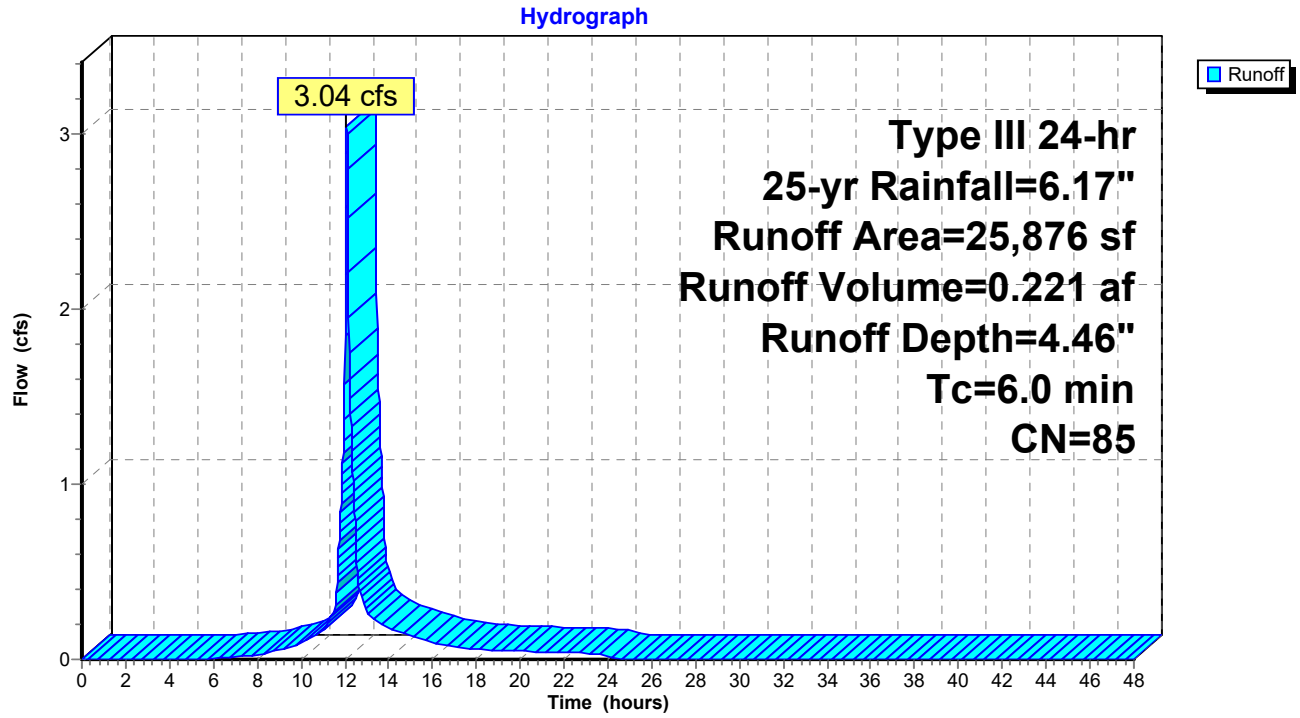
Runoff = 3.04 cfs @ 12.09 hrs, Volume= 0.221 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-yr Rainfall=6.17"

Area (sf)	CN	Description
16,018	77	Woods, Good, HSG D
9,858	98	Paved parking, HSG D
25,876	85	Weighted Average
16,018		61.90% Pervious Area
9,858		38.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-2**

Subcatchment WS-2: Watershed-2



Hydrograph for Subcatchment WS-2: Watershed-2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.06	0.00	0.00
2.00	0.12	0.00	0.00
3.00	0.19	0.00	0.00
4.00	0.27	0.00	0.00
5.00	0.35	0.00	0.00
6.00	0.44	0.00	0.01
7.00	0.56	0.02	0.01
8.00	0.70	0.06	0.03
9.00	0.90	0.13	0.05
10.00	1.17	0.26	0.09
11.00	1.54	0.48	0.17
12.00	3.08	1.66	**1.85**
13.00	4.63	3.03	**0.28**
14.00	5.00	3.37	0.17
15.00	5.27	3.62	0.13
16.00	5.47	3.80	0.09
17.00	5.61	3.94	0.07
18.00	5.73	4.04	0.06
19.00	5.82	4.13	0.05
20.00	5.90	4.21	0.05
21.00	5.98	4.29	0.04
22.00	6.05	4.35	0.04
23.00	6.11	4.41	0.03
24.00	**6.17**	**4.46**	0.03
25.00	6.17	4.46	0.00
26.00	6.17	4.46	0.00
27.00	6.17	4.46	0.00
28.00	6.17	4.46	0.00
29.00	6.17	4.46	0.00
30.00	6.17	4.46	0.00
31.00	6.17	4.46	0.00
32.00	6.17	4.46	0.00
33.00	6.17	4.46	0.00
34.00	6.17	4.46	0.00
35.00	6.17	4.46	0.00
36.00	6.17	4.46	0.00
37.00	6.17	4.46	0.00
38.00	6.17	4.46	0.00
39.00	6.17	4.46	0.00
40.00	6.17	4.46	0.00
41.00	6.17	4.46	0.00
42.00	6.17	4.46	0.00
43.00	6.17	4.46	0.00
44.00	6.17	4.46	0.00
45.00	6.17	4.46	0.00
46.00	6.17	4.46	0.00
47.00	6.17	4.46	0.00
48.00	6.17	4.46	0.00

Summary for Subcatchment WS-3: Watershed-3

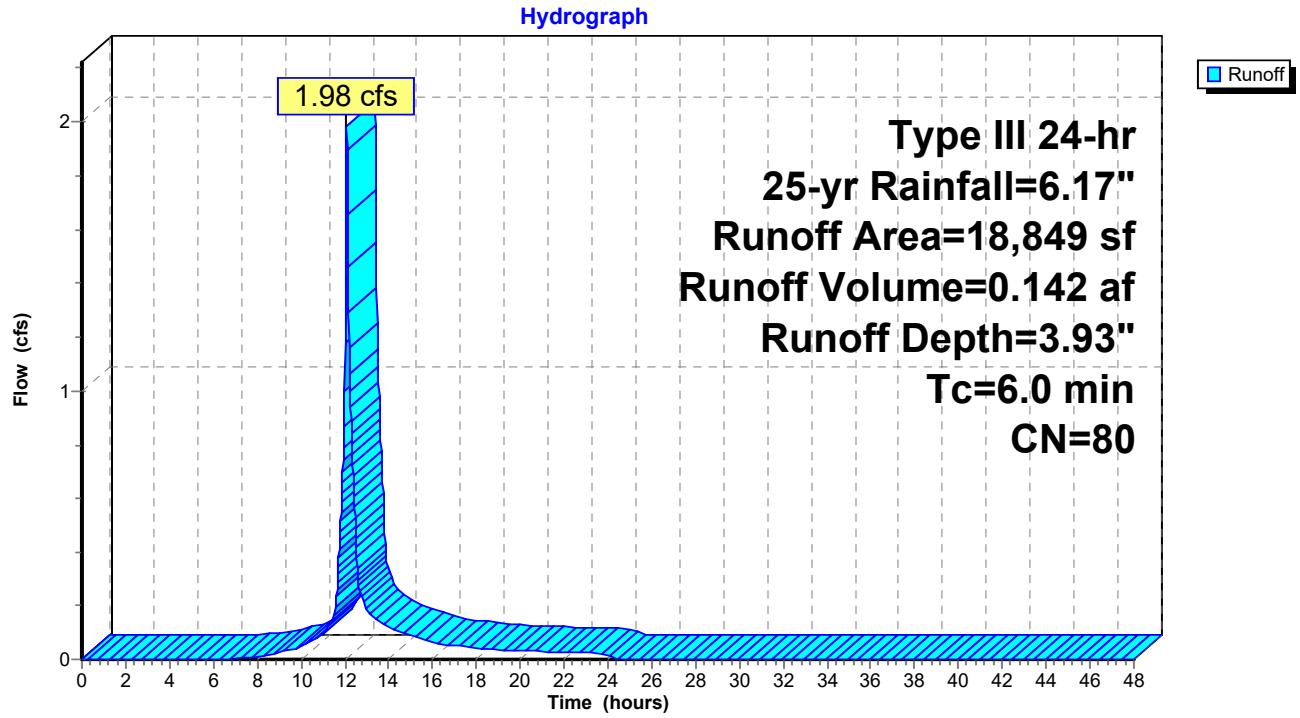
Runoff = 1.98 cfs @ 12.09 hrs, Volume= 0.142 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-yr Rainfall=6.17"

Area (sf)	CN	Description
16,396	77	Woods, Good, HSG D
2,453	98	Paved parking, HSG D
18,849	80	Weighted Average
16,396		86.99% Pervious Area
2,453		13.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-3**

Subcatchment WS-3: Watershed-3



Hydrograph for Subcatchment WS-3: Watershed-3

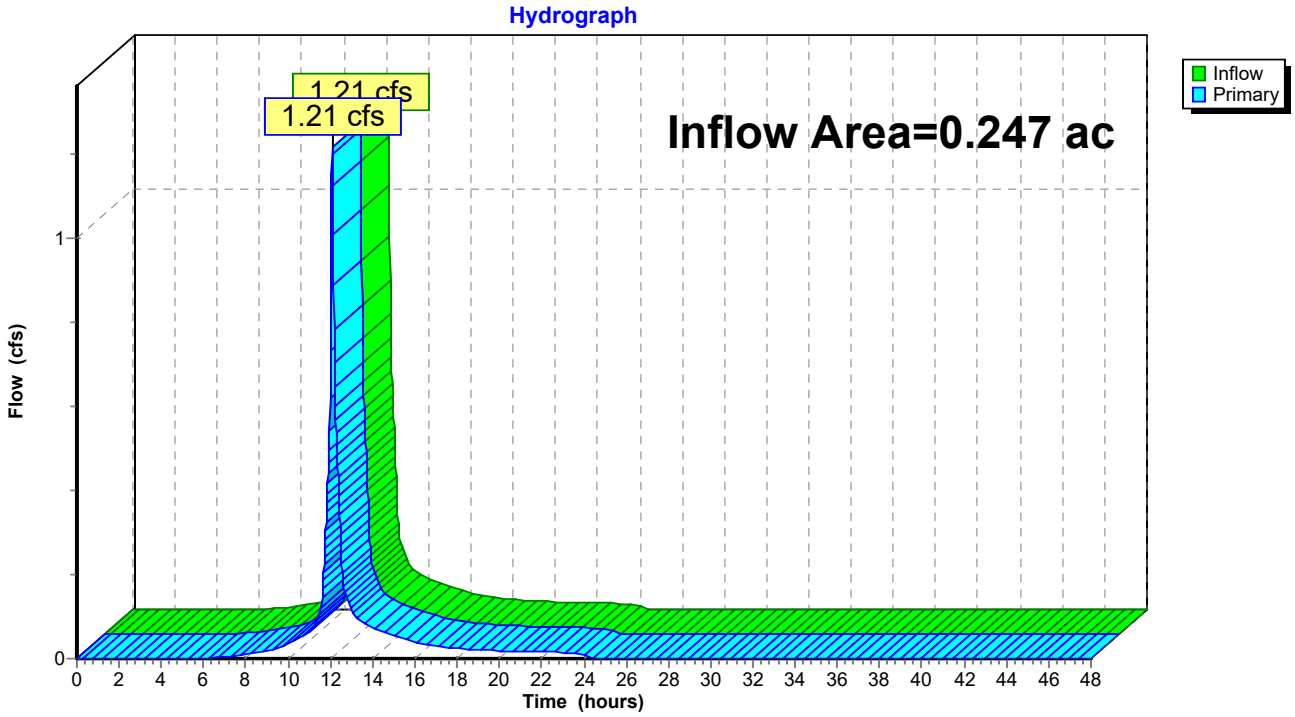
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.06	0.00	0.00
2.00	0.12	0.00	0.00
3.00	0.19	0.00	0.00
4.00	0.27	0.00	0.00
5.00	0.35	0.00	0.00
6.00	0.44	0.00	0.00
7.00	0.56	0.00	0.00
8.00	0.70	0.02	0.01
9.00	0.90	0.05	0.02
10.00	1.17	0.14	0.05
11.00	1.54	0.31	0.09
12.00	3.08	1.31	**1.18**
13.00	4.63	2.57	**0.19**
14.00	5.00	2.90	0.12
15.00	5.27	3.13	0.09
16.00	5.47	3.30	0.06
17.00	5.61	3.43	0.05
18.00	5.73	3.53	0.04
19.00	5.82	3.62	0.04
20.00	5.90	3.70	0.03
21.00	5.98	3.76	0.03
22.00	6.05	3.83	0.03
23.00	6.11	3.88	0.02
24.00	**6.17**	**3.93**	0.02
25.00	6.17	3.93	0.00
26.00	6.17	3.93	0.00
27.00	6.17	3.93	0.00
28.00	6.17	3.93	0.00
29.00	6.17	3.93	0.00
30.00	6.17	3.93	0.00
31.00	6.17	3.93	0.00
32.00	6.17	3.93	0.00
33.00	6.17	3.93	0.00
34.00	6.17	3.93	0.00
35.00	6.17	3.93	0.00
36.00	6.17	3.93	0.00
37.00	6.17	3.93	0.00
38.00	6.17	3.93	0.00
39.00	6.17	3.93	0.00
40.00	6.17	3.93	0.00
41.00	6.17	3.93	0.00
42.00	6.17	3.93	0.00
43.00	6.17	3.93	0.00
44.00	6.17	3.93	0.00
45.00	6.17	3.93	0.00
46.00	6.17	3.93	0.00
47.00	6.17	3.93	0.00
48.00	6.17	3.93	0.00

Summary for Pond 1P: Washington Street

Inflow Area = 0.247 ac, 53.55% Impervious, Inflow Depth = 4.25" for 25-yr event
Inflow = 1.21 cfs @ 12.09 hrs, Volume= 0.088 af
Primary = 1.21 cfs @ 12.09 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 1P: Washington Street



Hydrograph for Pond 1P: Washington Street

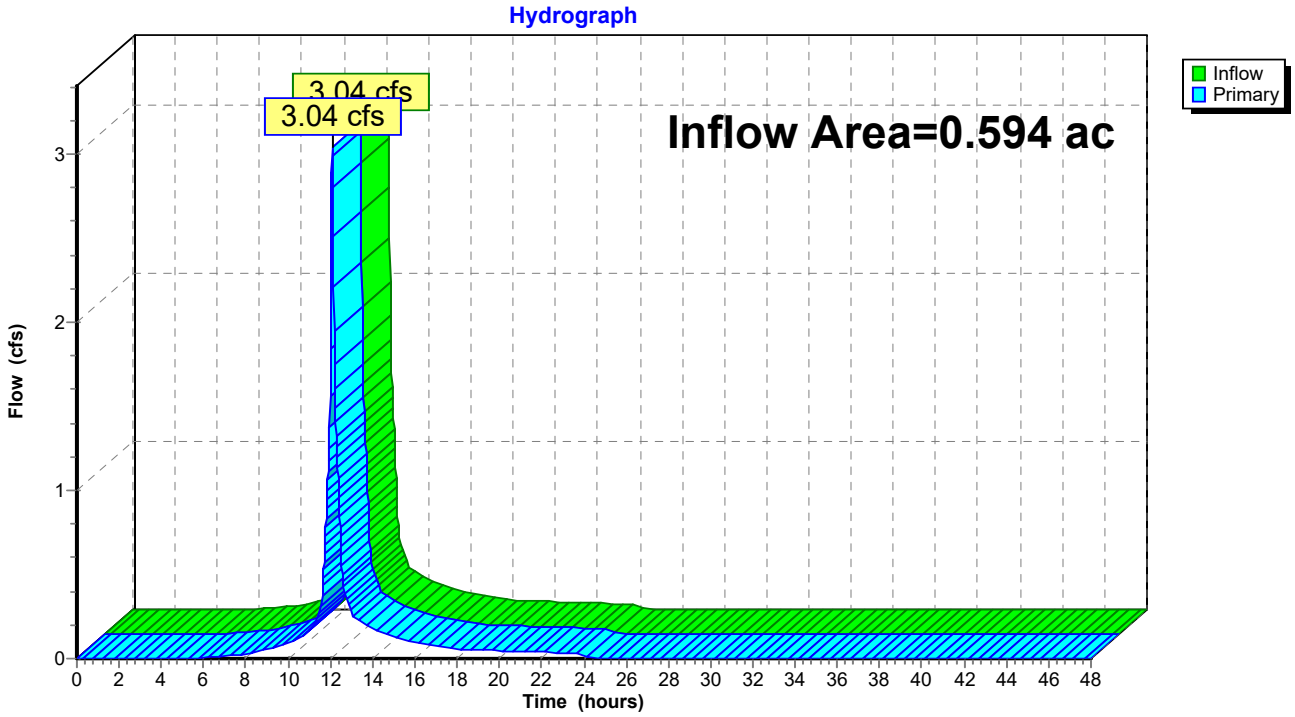
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.01		0.01
9.00	0.02		0.02
10.00	0.03		0.03
11.00	0.06		0.06
12.00	**0.73**		**0.73**
13.00	**0.11**		**0.11**
14.00	0.07		0.07
15.00	0.05		0.05
16.00	0.04		0.04
17.00	0.03		0.03
18.00	0.02		0.02
19.00	0.02		0.02
20.00	0.02		0.02
21.00	0.02		0.02
22.00	0.02		0.02
23.00	0.01		0.01
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Summary for Pond 2P: Wetlands

Inflow Area = 0.594 ac, 38.10% Impervious, Inflow Depth = 4.46" for 25-yr event
Inflow = 3.04 cfs @ 12.09 hrs, Volume= 0.221 af
Primary = 3.04 cfs @ 12.09 hrs, Volume= 0.221 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 2P: Wetlands



Hydrograph for Pond 2P: Wetlands

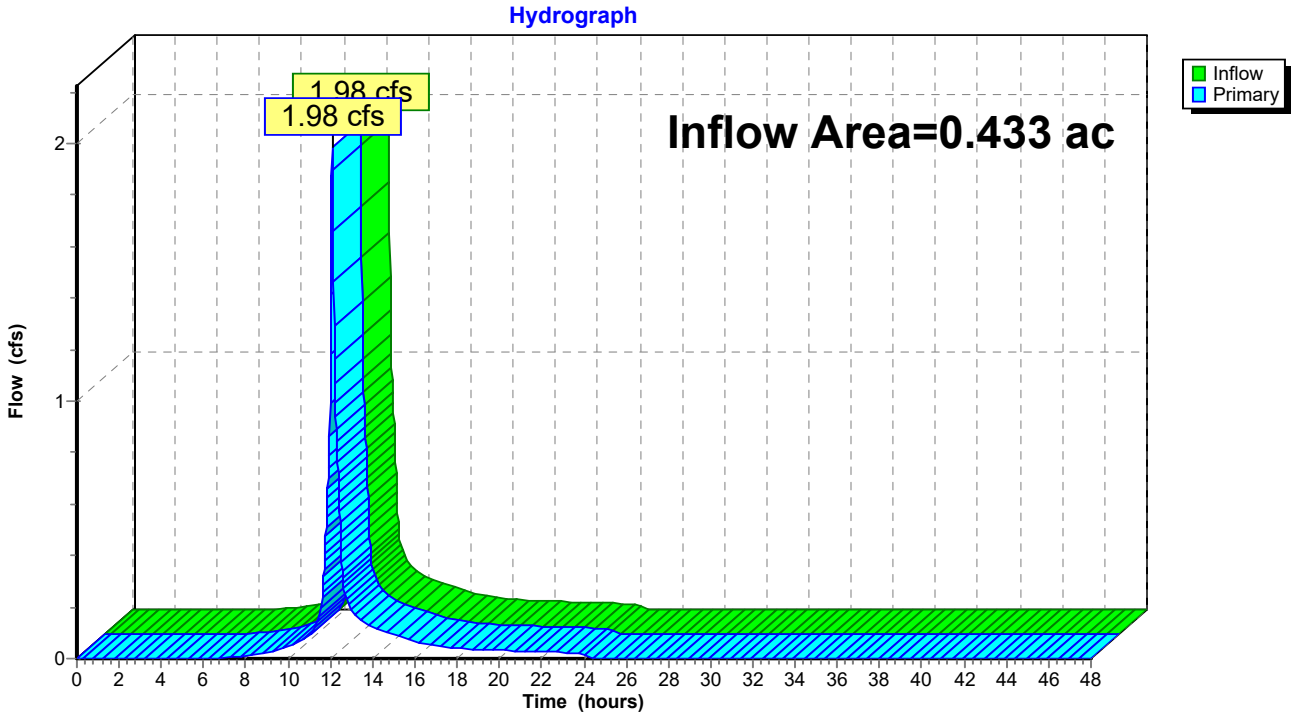
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.01		0.01
7.00	0.01		0.01
8.00	0.03		0.03
9.00	0.05		0.05
10.00	0.09		0.09
11.00	0.17		0.17
12.00	**1.85**		**1.85**
13.00	**0.28**		**0.28**
14.00	0.17		0.17
15.00	0.13		0.13
16.00	0.09		0.09
17.00	0.07		0.07
18.00	0.06		0.06
19.00	0.05		0.05
20.00	0.05		0.05
21.00	0.04		0.04
22.00	0.04		0.04
23.00	0.03		0.03
24.00	0.03		0.03
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Summary for Pond 3P: Offsite

Inflow Area = 0.433 ac, 13.01% Impervious, Inflow Depth = 3.93" for 25-yr event
Inflow = 1.98 cfs @ 12.09 hrs, Volume= 0.142 af
Primary = 1.98 cfs @ 12.09 hrs, Volume= 0.142 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 3P: Offsite



Hydrograph for Pond 3P: Offsite

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.01		0.01
9.00	0.02		0.02
10.00	0.05		0.05
11.00	0.09		0.09
12.00	**1.18**		**1.18**
13.00	**0.19**		**0.19**
14.00	0.12		0.12
15.00	0.09		0.09
16.00	0.06		0.06
17.00	0.05		0.05
18.00	0.04		0.04
19.00	0.04		0.04
20.00	0.03		0.03
21.00	0.03		0.03
22.00	0.03		0.03
23.00	0.02		0.02
24.00	0.02		0.02
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment WS-1: Watershed-1 Runoff Area=10,776 sf 53.55% Impervious Runoff Depth=6.79"
Tc=6.0 min CN=83 Runoff=1.90 cfs 0.140 af

Subcatchment WS-2: Watershed-2 Runoff Area=25,876 sf 38.10% Impervious Runoff Depth=7.04"
Tc=6.0 min CN=85 Runoff=4.69 cfs 0.348 af

Subcatchment WS-3: Watershed-3 Runoff Area=18,849 sf 13.01% Impervious Runoff Depth=6.43"
Tc=6.0 min CN=80 Runoff=3.19 cfs 0.232 af

Pond 1P: Washington Street Inflow=1.90 cfs 0.140 af
Primary=1.90 cfs 0.140 af

Pond 2P: Wetlands Inflow=4.69 cfs 0.348 af
Primary=4.69 cfs 0.348 af

Pond 3P: Offsite Inflow=3.19 cfs 0.232 af
Primary=3.19 cfs 0.232 af

Total Runoff Area = 1.274 ac Runoff Volume = 0.720 af Average Runoff Depth = 6.78"
67.42% Pervious = 0.859 ac 32.58% Impervious = 0.415 ac

Summary for Subcatchment WS-1: Watershed-1

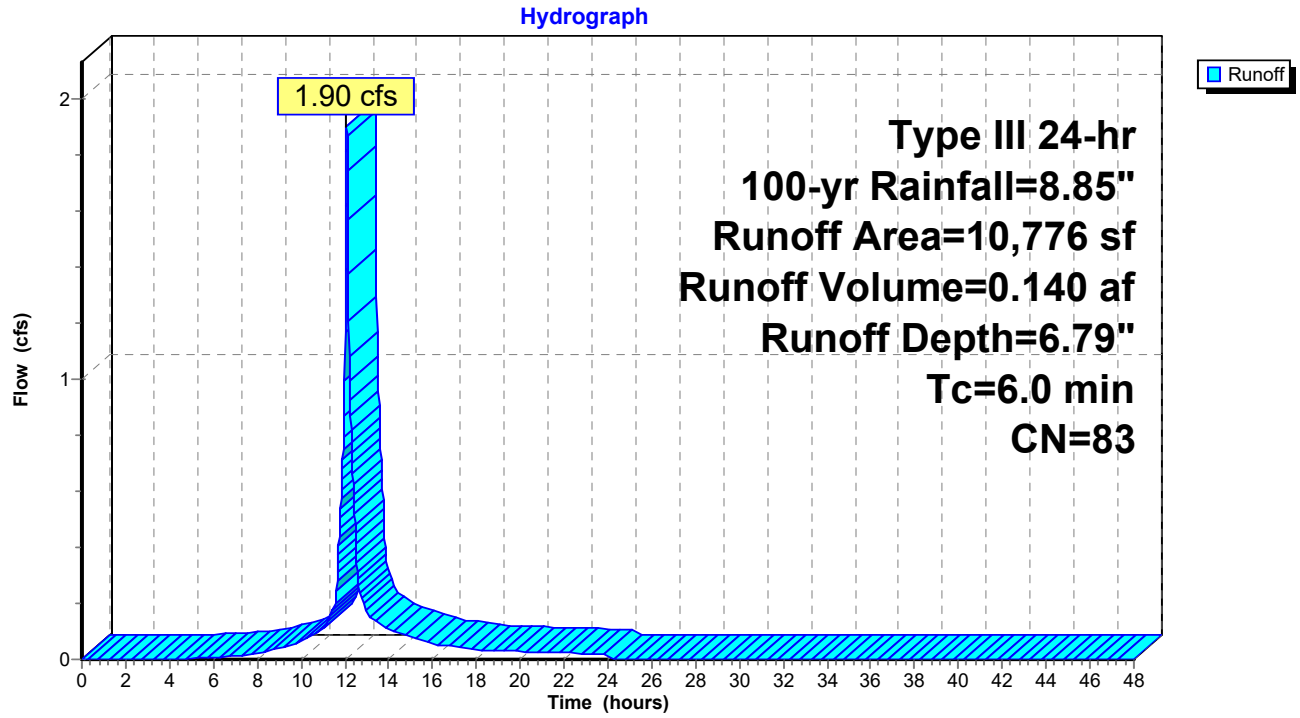
Runoff = 1.90 cfs @ 12.09 hrs, Volume= 0.140 af, Depth= 6.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-yr Rainfall=8.85"

Area (sf)	CN	Description
5,005	65	Woods/grass comb., Fair, HSG B
5,771	98	Paved parking, HSG B
10,776	83	Weighted Average
5,005		46.45% Pervious Area
5,771		53.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-1**

Subcatchment WS-1: Watershed-1



Hydrograph for Subcatchment WS-1: Watershed-1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.09	0.00	0.00
2.00	0.18	0.00	0.00
3.00	0.27	0.00	0.00
4.00	0.38	0.00	0.00
5.00	0.50	0.00	0.00
6.00	0.64	0.02	0.01
7.00	0.80	0.06	0.01
8.00	1.01	0.14	0.02
9.00	1.29	0.26	0.04
10.00	1.67	0.48	0.06
11.00	2.21	0.84	0.11
12.00	4.42	2.66	**1.17**
13.00	6.64	4.69	**0.17**
14.00	7.18	5.20	0.11
15.00	7.56	5.56	0.08
16.00	7.84	5.83	0.06
17.00	8.05	6.02	0.05
18.00	8.21	6.18	0.03
19.00	8.35	6.31	0.03
20.00	8.47	6.43	0.03
21.00	8.58	6.53	0.03
22.00	8.68	6.63	0.02
23.00	8.77	6.72	0.02
24.00	**8.85**	**6.79**	0.02
25.00	8.85	6.79	0.00
26.00	8.85	6.79	0.00
27.00	8.85	6.79	0.00
28.00	8.85	6.79	0.00
29.00	8.85	6.79	0.00
30.00	8.85	6.79	0.00
31.00	8.85	6.79	0.00
32.00	8.85	6.79	0.00
33.00	8.85	6.79	0.00
34.00	8.85	6.79	0.00
35.00	8.85	6.79	0.00
36.00	8.85	6.79	0.00
37.00	8.85	6.79	0.00
38.00	8.85	6.79	0.00
39.00	8.85	6.79	0.00
40.00	8.85	6.79	0.00
41.00	8.85	6.79	0.00
42.00	8.85	6.79	0.00
43.00	8.85	6.79	0.00
44.00	8.85	6.79	0.00
45.00	8.85	6.79	0.00
46.00	8.85	6.79	0.00
47.00	8.85	6.79	0.00
48.00	8.85	6.79	0.00

Summary for Subcatchment WS-2: Watershed-2

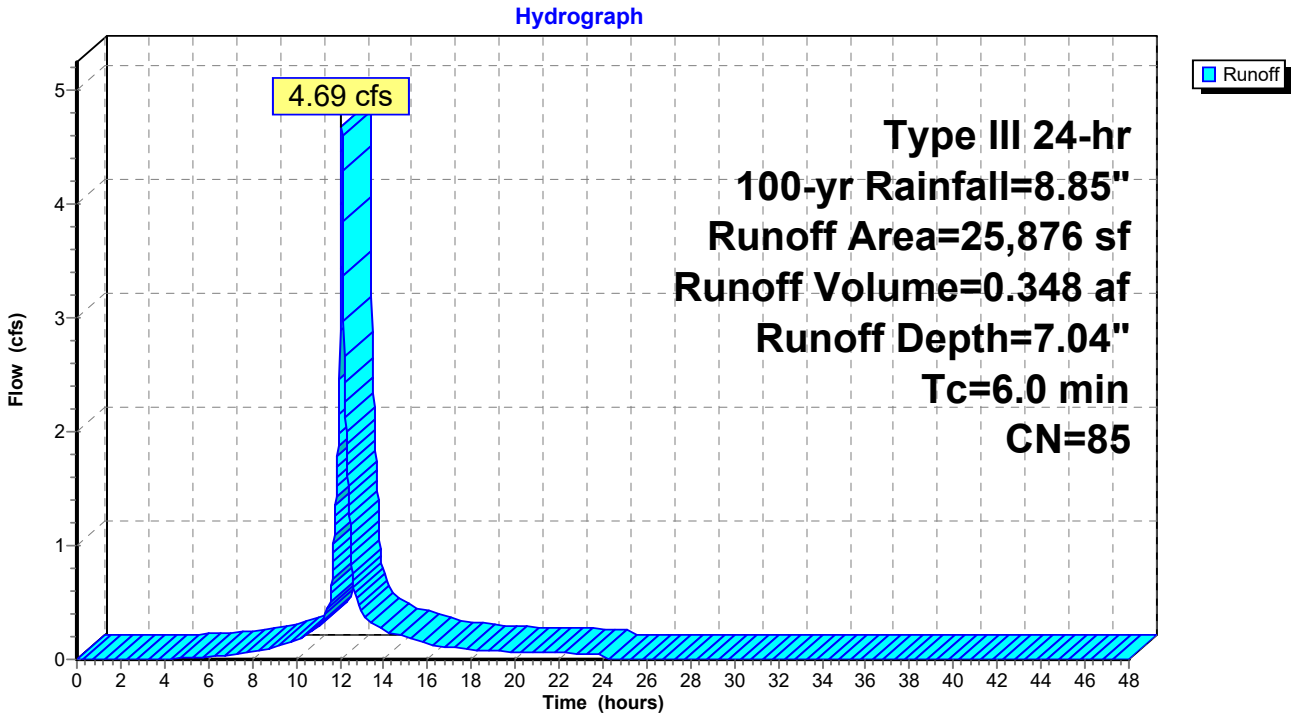
Runoff = 4.69 cfs @ 12.08 hrs, Volume= 0.348 af, Depth= 7.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-yr Rainfall=8.85"

Area (sf)	CN	Description
16,018	77	Woods, Good, HSG D
9,858	98	Paved parking, HSG D
25,876	85	Weighted Average
16,018		61.90% Pervious Area
9,858		38.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-2**

Subcatchment WS-2: Watershed-2



Hydrograph for Subcatchment WS-2: Watershed-2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.09	0.00	0.00
2.00	0.18	0.00	0.00
3.00	0.27	0.00	0.00
4.00	0.38	0.00	0.00
5.00	0.50	0.01	0.01
6.00	0.64	0.04	0.02
7.00	0.80	0.09	0.04
8.00	1.01	0.18	0.06
9.00	1.29	0.32	0.11
10.00	1.67	0.56	0.17
11.00	2.21	0.95	0.28
12.00	4.42	2.84	**2.89**
13.00	6.64	4.91	**0.41**
14.00	7.18	5.42	0.26
15.00	7.56	5.79	0.20
16.00	7.84	6.06	0.14
17.00	8.05	6.26	0.11
18.00	8.21	6.42	0.08
19.00	8.35	6.55	0.08
20.00	8.47	6.67	0.07
21.00	8.58	6.77	0.06
22.00	8.68	6.87	0.06
23.00	8.77	6.96	0.05
24.00	**8.85**	**7.04**	0.04
25.00	8.85	7.04	0.00
26.00	8.85	7.04	0.00
27.00	8.85	7.04	0.00
28.00	8.85	7.04	0.00
29.00	8.85	7.04	0.00
30.00	8.85	7.04	0.00
31.00	8.85	7.04	0.00
32.00	8.85	7.04	0.00
33.00	8.85	7.04	0.00
34.00	8.85	7.04	0.00
35.00	8.85	7.04	0.00
36.00	8.85	7.04	0.00
37.00	8.85	7.04	0.00
38.00	8.85	7.04	0.00
39.00	8.85	7.04	0.00
40.00	8.85	7.04	0.00
41.00	8.85	7.04	0.00
42.00	8.85	7.04	0.00
43.00	8.85	7.04	0.00
44.00	8.85	7.04	0.00
45.00	8.85	7.04	0.00
46.00	8.85	7.04	0.00
47.00	8.85	7.04	0.00
48.00	8.85	7.04	0.00

Summary for Subcatchment WS-3: Watershed-3

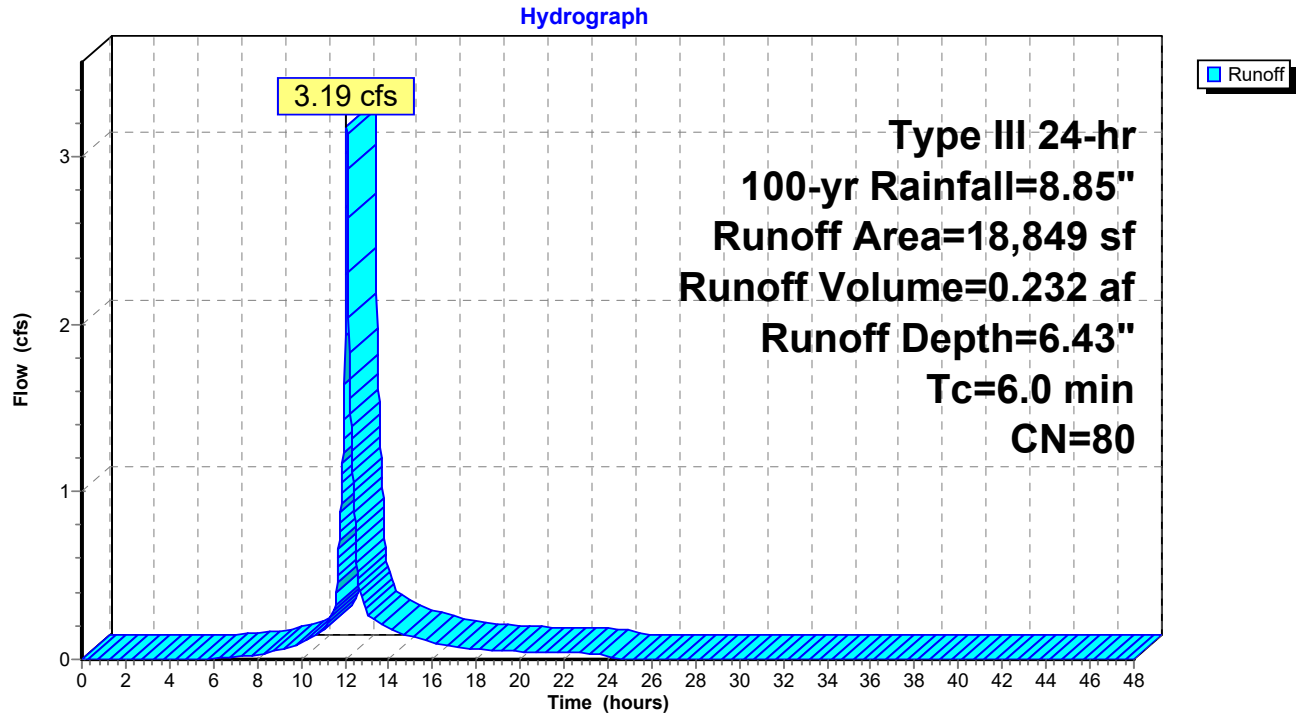
Runoff = 3.19 cfs @ 12.09 hrs, Volume= 0.232 af, Depth= 6.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-yr Rainfall=8.85"

Area (sf)	CN	Description
16,396	77	Woods, Good, HSG D
2,453	98	Paved parking, HSG D
18,849	80	Weighted Average
16,396		86.99% Pervious Area
2,453		13.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-3**

Subcatchment WS-3: Watershed-3



Hydrograph for Subcatchment WS-3: Watershed-3

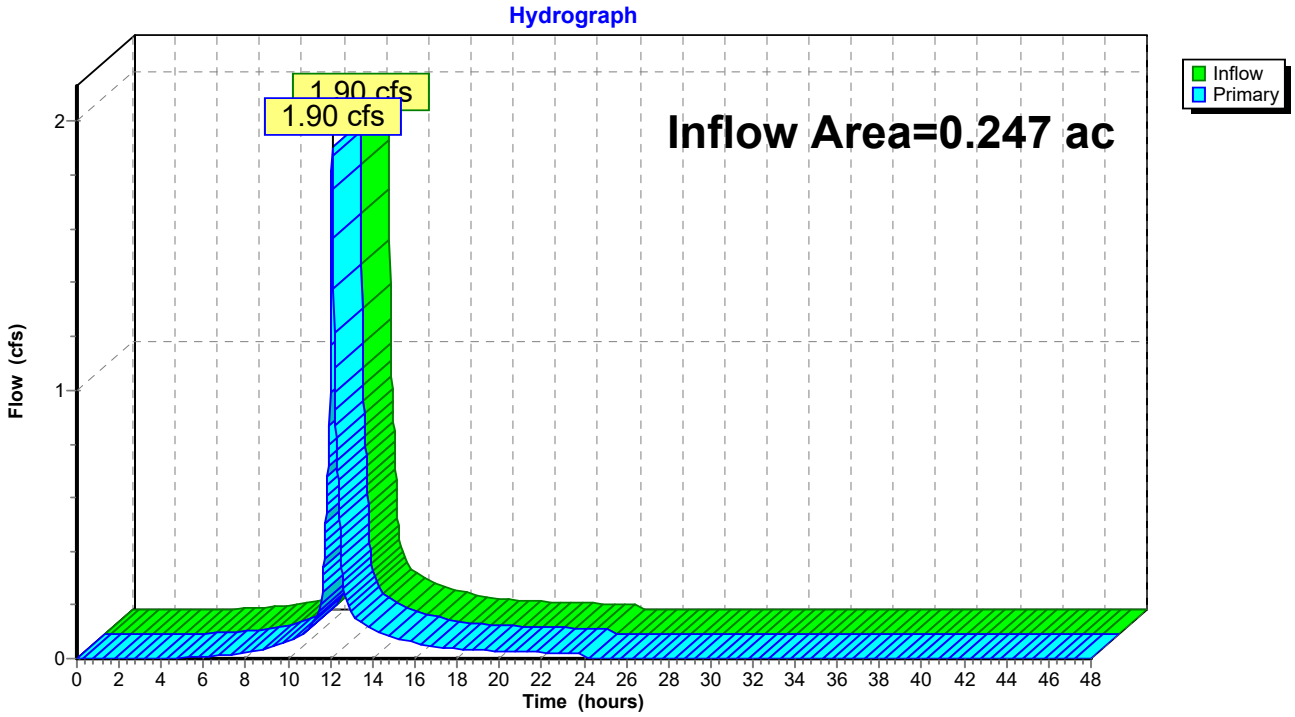
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.09	0.00	0.00
2.00	0.18	0.00	0.00
3.00	0.27	0.00	0.00
4.00	0.38	0.00	0.00
5.00	0.50	0.00	0.00
6.00	0.64	0.01	0.01
7.00	0.80	0.03	0.02
8.00	1.01	0.09	0.03
9.00	1.29	0.19	0.06
10.00	1.67	0.37	0.10
11.00	2.21	0.70	0.17
12.00	4.42	2.40	**1.94**
13.00	6.64	4.36	**0.29**
14.00	7.18	4.86	0.18
15.00	7.56	5.21	0.14
16.00	7.84	5.48	0.10
17.00	8.05	5.67	0.08
18.00	8.21	5.82	0.06
19.00	8.35	5.95	0.05
20.00	8.47	6.07	0.05
21.00	8.58	6.17	0.04
22.00	8.68	6.26	0.04
23.00	8.77	6.35	0.04
24.00	**8.85**	**6.43**	0.03
25.00	8.85	6.43	0.00
26.00	8.85	6.43	0.00
27.00	8.85	6.43	0.00
28.00	8.85	6.43	0.00
29.00	8.85	6.43	0.00
30.00	8.85	6.43	0.00
31.00	8.85	6.43	0.00
32.00	8.85	6.43	0.00
33.00	8.85	6.43	0.00
34.00	8.85	6.43	0.00
35.00	8.85	6.43	0.00
36.00	8.85	6.43	0.00
37.00	8.85	6.43	0.00
38.00	8.85	6.43	0.00
39.00	8.85	6.43	0.00
40.00	8.85	6.43	0.00
41.00	8.85	6.43	0.00
42.00	8.85	6.43	0.00
43.00	8.85	6.43	0.00
44.00	8.85	6.43	0.00
45.00	8.85	6.43	0.00
46.00	8.85	6.43	0.00
47.00	8.85	6.43	0.00
48.00	8.85	6.43	0.00

Summary for Pond 1P: Washington Street

Inflow Area = 0.247 ac, 53.55% Impervious, Inflow Depth = 6.79" for 100-yr event
Inflow = 1.90 cfs @ 12.09 hrs, Volume= 0.140 af
Primary = 1.90 cfs @ 12.09 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 1P: Washington Street



Hydrograph for Pond 1P: Washington Street

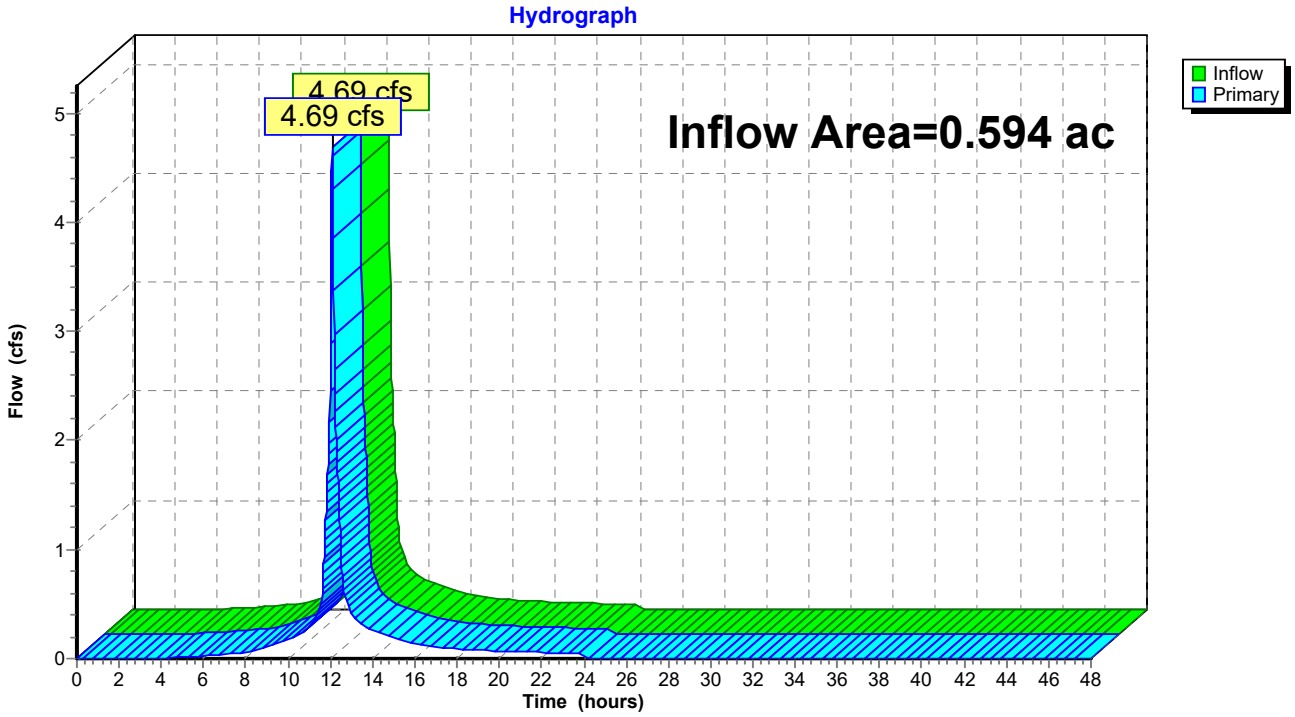
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.01		0.01
7.00	0.01		0.01
8.00	0.02		0.02
9.00	0.04		0.04
10.00	0.06		0.06
11.00	0.11		0.11
12.00	**1.17**		**1.17**
13.00	**0.17**		**0.17**
14.00	0.11		0.11
15.00	0.08		0.08
16.00	0.06		0.06
17.00	0.05		0.05
18.00	0.03		0.03
19.00	0.03		0.03
20.00	0.03		0.03
21.00	0.03		0.03
22.00	0.02		0.02
23.00	0.02		0.02
24.00	0.02		0.02
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Summary for Pond 2P: Wetlands

Inflow Area = 0.594 ac, 38.10% Impervious, Inflow Depth = 7.04" for 100-yr event
Inflow = 4.69 cfs @ 12.08 hrs, Volume= 0.348 af
Primary = 4.69 cfs @ 12.08 hrs, Volume= 0.348 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 2P: Wetlands



Hydrograph for Pond 2P: Wetlands

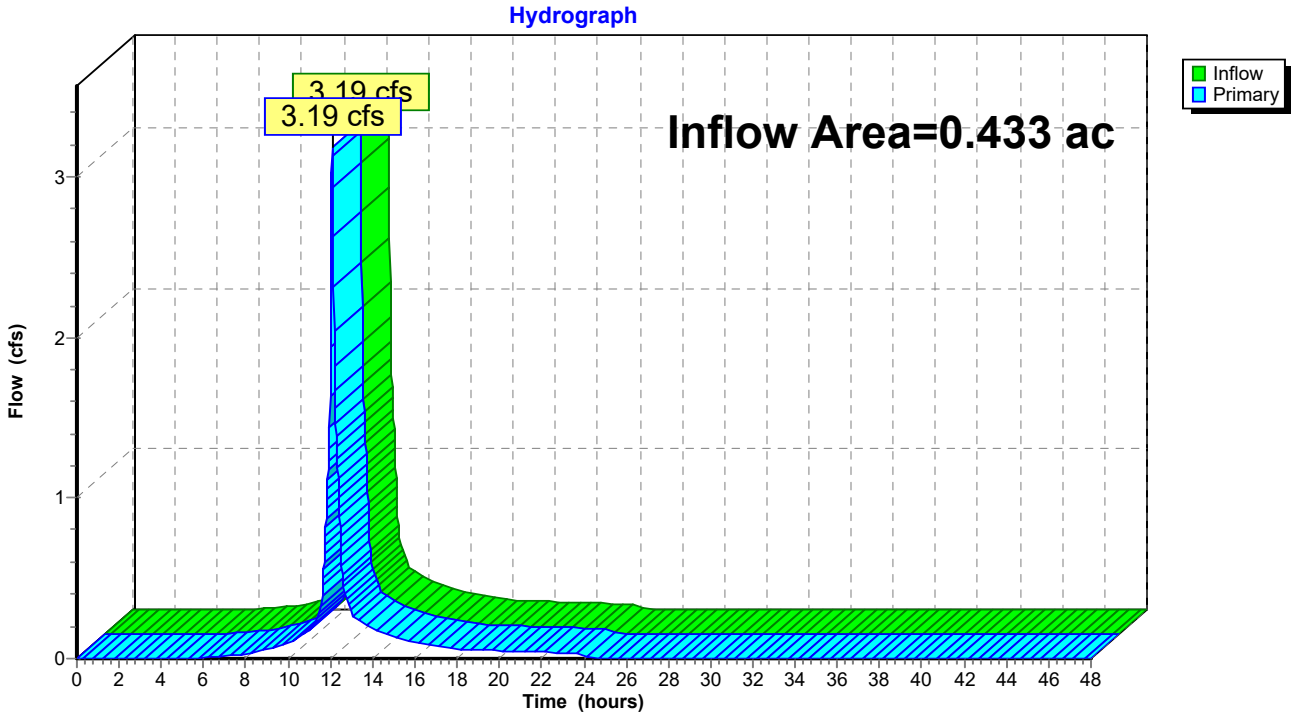
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.01		0.01
6.00	0.02		0.02
7.00	0.04		0.04
8.00	0.06		0.06
9.00	0.11		0.11
10.00	0.17		0.17
11.00	0.28		0.28
12.00	**2.89**		**2.89**
13.00	**0.41**		**0.41**
14.00	0.26		0.26
15.00	0.20		0.20
16.00	0.14		0.14
17.00	0.11		0.11
18.00	0.08		0.08
19.00	0.08		0.08
20.00	0.07		0.07
21.00	0.06		0.06
22.00	0.06		0.06
23.00	0.05		0.05
24.00	0.04		0.04
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Summary for Pond 3P: Offsite

Inflow Area = 0.433 ac, 13.01% Impervious, Inflow Depth = 6.43" for 100-yr event
Inflow = 3.19 cfs @ 12.09 hrs, Volume= 0.232 af
Primary = 3.19 cfs @ 12.09 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 3P: Offsite



Hydrograph for Pond 3P: Offsite

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.01		0.01
7.00	0.02		0.02
8.00	0.03		0.03
9.00	0.06		0.06
10.00	0.10		0.10
11.00	0.17		0.17
12.00	**1.94**		**1.94**
13.00	**0.29**		**0.29**
14.00	0.18		0.18
15.00	0.14		0.14
16.00	0.10		0.10
17.00	0.08		0.08
18.00	0.06		0.06
19.00	0.05		0.05
20.00	0.05		0.05
21.00	0.04		0.04
22.00	0.04		0.04
23.00	0.04		0.04
24.00	0.03		0.03
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

APPENDIX B

PROPOSED HYDROLOGY PLAN & CALCULATIONS

PROPOSED WATERSHEDS

TOTAL LOT AREA (S.F)	71,953.00		
TOTAL HYDROLOGY STUDY AREA (S.F)	55,499.56		
WATERSHED BREAKDOWN			
	IMPERVIOUS AREA	PERVIOUS AREA	TOTAL AREA
WATERSHED 1 (S.F.)	10,541.30	234.30	10,775.60
WATERSHED 2 (S.F.)	17,745.16	16,708.75	34,453.91
WATERSHED 3 (S.F.)	338.50	7,452.42	7,790.92
WATERSHED 4 (S.F.)	2,479.15	0.00	2,479.15
TOTALS (S.F.)	31,104.10	24,395.46	55,499.56
TOTAL LOT AREA (%)	43.83%	56.17%	100.00%

PLAN LEGEND

- WETLAND BOUNDARY
- EDGE OF ROAD
- CURB LINE
- ELEC — UNDERGROUND ELECTRIC
- OVHD — OVERHEAD ELECTRIC WIRE
- ST — UNDERGROUND STORMWATER
- W — UNDERGROUND WATER
- 80 — CONTOUR
- WLF — WETLAND FLAG

HYDROLOGY LEGEND

- HYDROLOGY STUDY BOUNDARY
- WATERSHED AREA
- TIME OF CONCENTRATION LINE
- ANALYSIS POINT

NOTES

EXISTING CONDITIONS INFORMATION FROM "PLAN OF LAND" PREPARED BY C.S. KELLEY SURVEYORS (NO DATE).

WETLAND DELINEATED BY WETLAND STRATEGIES, PLYMOUTH MA.

0' 40' 80' 120'

SCALE: 1" = 40'

811 Know what's below. Call before you dig.

VERTEX®
400 Libbey Parkway | Weymouth, MA 02189
Main: 781.952.6000 | VERTEXENG.COM

PROPOSED CONDITIONS HYDROLOGY PLAN

SITE: 1047 WASHINGTON STREET / 0 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS 02189

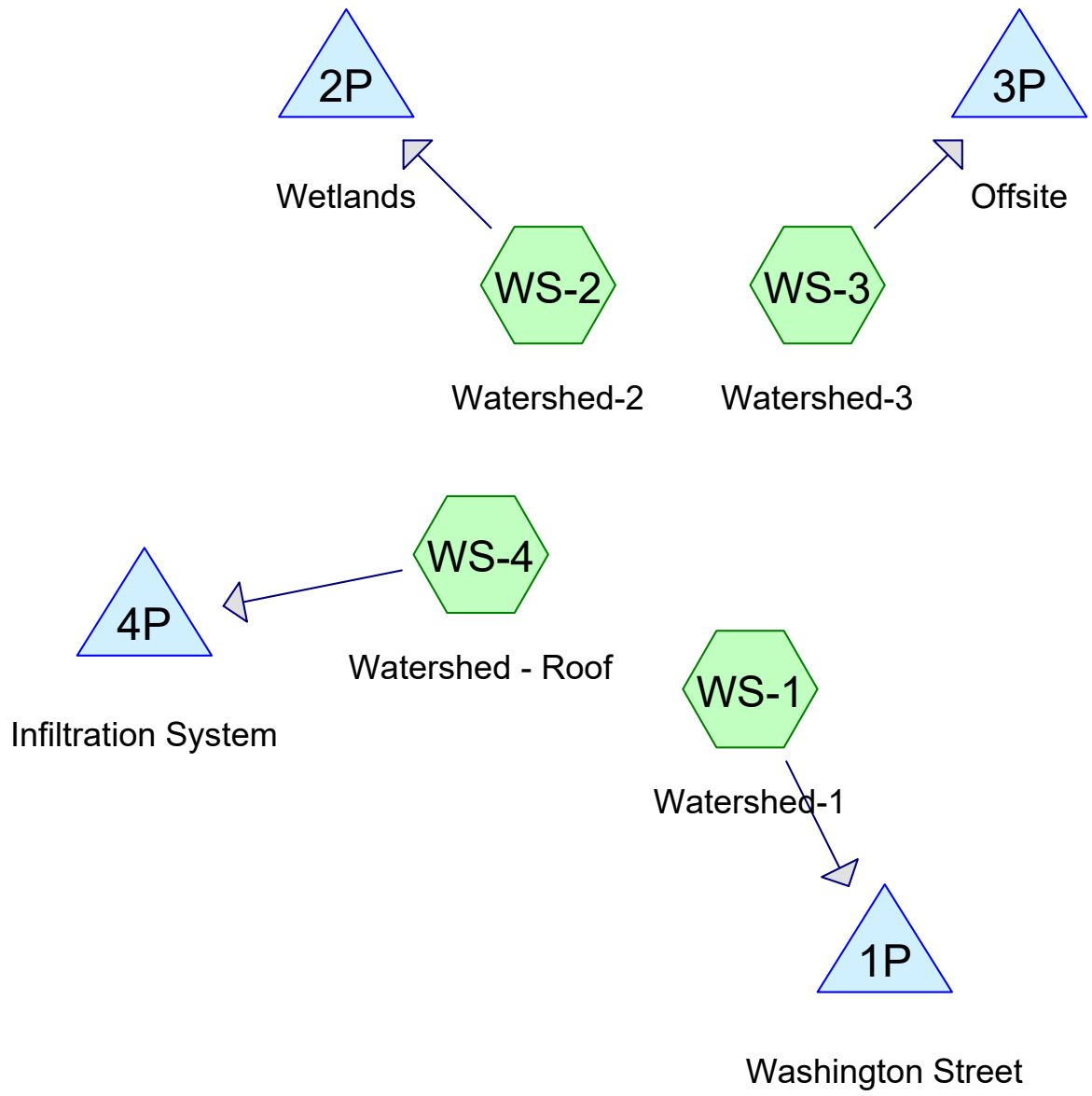
FOR: JOE GRATTA
1047 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS 02189

NO.	REVISIONS
1	10/29/2020 - CONCOM
2	1/8/2021 - CONCOM & ZBA
3	
4	
5	
6	
7	
8	
9	
10	

DATE: 1/8/2021
DRAWN BY: JJA
CHECKED BY: AJC
JOB #: 64380

H2.0

Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta.Weymouth.MA\05-Engineering\Vertex Drawings\Stormwater Analysis\H2.0 - Proposed Conditions Hydrology Plan.dwg Thursday, January 7, 2021 11:10:41 PM
Copyright: 2021 The Vertex Companies, Inc.



Subcat Reach Pond Link

Routing Diagram for Gravel Parking Area Hydrology Analysis - Proposed

Prepared by {enter your company name here}, Printed 1/7/2021

HydroCAD® 10.00-25 s/n 10298 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.045	73	Brush, Good, HSG D (WS-2)
0.110	85	Gravel roads, HSG B (WS-1)
0.120	91	Gravel roads, HSG D (WS-2, WS-3)
0.132	98	Paved parking, HSG B (WS-1)
0.295	98	Paved parking, HSG D (WS-2)
0.057	98	Roofs, HSG D (WS-4)
0.510	77	Woods, Good, HSG D (WS-2, WS-3)
0.005	65	Woods/grass comb., Fair, HSG B (WS-1)
1.275	**87**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.247	HSG B	WS-1
0.000	HSG C	
1.027	HSG D	WS-2, WS-3, WS-4
0.000	Other	
1.275		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.045	0.000	0.045	Brush, Good	WS-2
0.000	0.110	0.000	0.120	0.000	0.230	Gravel roads	WS-1, WS-2, WS-3
0.000	0.132	0.000	0.295	0.000	0.427	Paved parking	WS-1, WS-2
0.000	0.000	0.000	0.057	0.000	0.057	Roofs	WS-4
0.000	0.000	0.000	0.510	0.000	0.510	Woods, Good	WS-2, WS-3
0.000	0.005	0.000	0.000	0.000	0.005	Woods/grass comb., Fair	WS-1
0.000	**0.247**	**0.000**	**1.027**	**0.000**	**1.275**	**TOTAL AREA**	

Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment WS-1: Watershed-1 Runoff Area=10,775 sf 53.56% Impervious Runoff Depth=2.37"
Tc=6.0 min CN=92 Runoff=0.67 cfs 0.049 af

Subcatchment WS-2: Watershed-2 Runoff Area=34,454 sf 37.28% Impervious Runoff Depth=1.93"
Tc=6.0 min CN=87 Runoff=1.79 cfs 0.127 af

Subcatchment WS-3: Watershed-3 Runoff Area=7,790 sf 0.00% Impervious Runoff Depth=1.29"
Tc=6.0 min CN=78 Runoff=0.26 cfs 0.019 af

Subcatchment WS-4: Watershed - Roof Runoff Area=2,500 sf 100.00% Impervious Runoff Depth=2.99"
Tc=6.0 min CN=98 Runoff=0.18 cfs 0.014 af

Pond 1P: Washington Street Inflow=0.67 cfs 0.049 af
Primary=0.67 cfs 0.049 af

Pond 2P: Wetlands Inflow=1.79 cfs 0.127 af
Primary=1.79 cfs 0.127 af

Pond 3P: Offsite Inflow=0.26 cfs 0.019 af
Primary=0.26 cfs 0.019 af

Pond 4P: Infiltration System Peak Elev=92.66' Storage=163 cf Inflow=0.18 cfs 0.014 af
Discarded=0.03 cfs 0.014 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.014 af

Total Runoff Area = 1.275 ac Runoff Volume = 0.210 af Average Runoff Depth = 1.97"
61.97% Pervious = 0.790 ac 38.03% Impervious = 0.485 ac

Summary for Subcatchment WS-1: Watershed-1

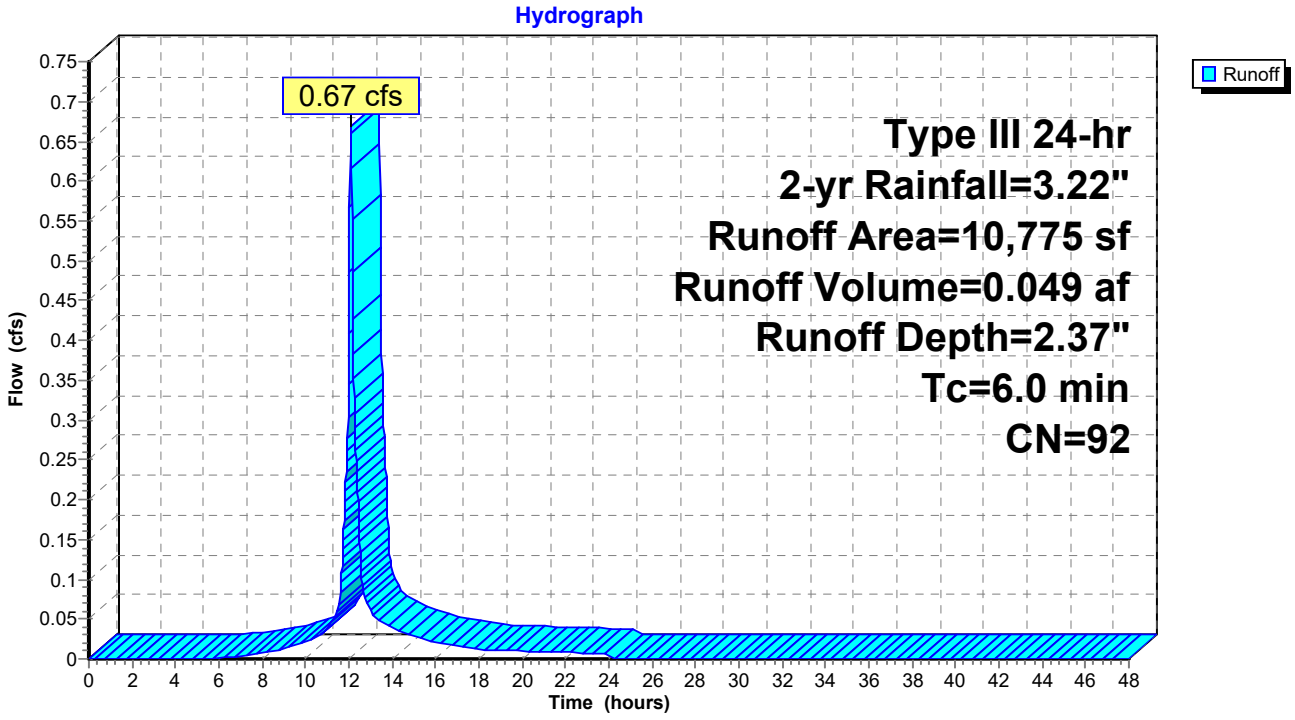
Runoff = 0.67 cfs @ 12.09 hrs, Volume= 0.049 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-yr Rainfall=3.22"

Area (sf)	CN	Description
234	65	Woods/grass comb., Fair, HSG B
5,771	98	Paved parking, HSG B
4,770	85	Gravel roads, HSG B
10,775	92	Weighted Average
5,004		46.44% Pervious Area
5,771		53.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-1**

Subcatchment WS-1: Watershed-1



Hydrograph for Subcatchment WS-1: Watershed-1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.01	0.00
8.00	0.37	0.04	0.01
9.00	0.47	0.07	0.01
10.00	0.61	0.14	0.02
11.00	0.81	0.27	0.04
12.00	1.61	0.89	**0.41**
13.00	2.42	1.61	**0.06**
14.00	2.61	1.80	0.04
15.00	2.75	1.93	0.03
16.00	2.85	2.02	0.02
17.00	2.93	2.09	0.02
18.00	2.99	2.15	0.01
19.00	3.04	2.20	0.01
20.00	3.08	2.24	0.01
21.00	3.12	2.28	0.01
22.00	3.16	2.31	0.01
23.00	3.19	2.34	0.01
24.00	**3.22**	**2.37**	0.01
25.00	3.22	2.37	0.00
26.00	3.22	2.37	0.00
27.00	3.22	2.37	0.00
28.00	3.22	2.37	0.00
29.00	3.22	2.37	0.00
30.00	3.22	2.37	0.00
31.00	3.22	2.37	0.00
32.00	3.22	2.37	0.00
33.00	3.22	2.37	0.00
34.00	3.22	2.37	0.00
35.00	3.22	2.37	0.00
36.00	3.22	2.37	0.00
37.00	3.22	2.37	0.00
38.00	3.22	2.37	0.00
39.00	3.22	2.37	0.00
40.00	3.22	2.37	0.00
41.00	3.22	2.37	0.00
42.00	3.22	2.37	0.00
43.00	3.22	2.37	0.00
44.00	3.22	2.37	0.00
45.00	3.22	2.37	0.00
46.00	3.22	2.37	0.00
47.00	3.22	2.37	0.00
48.00	3.22	2.37	0.00

Summary for Subcatchment WS-2: Watershed-2

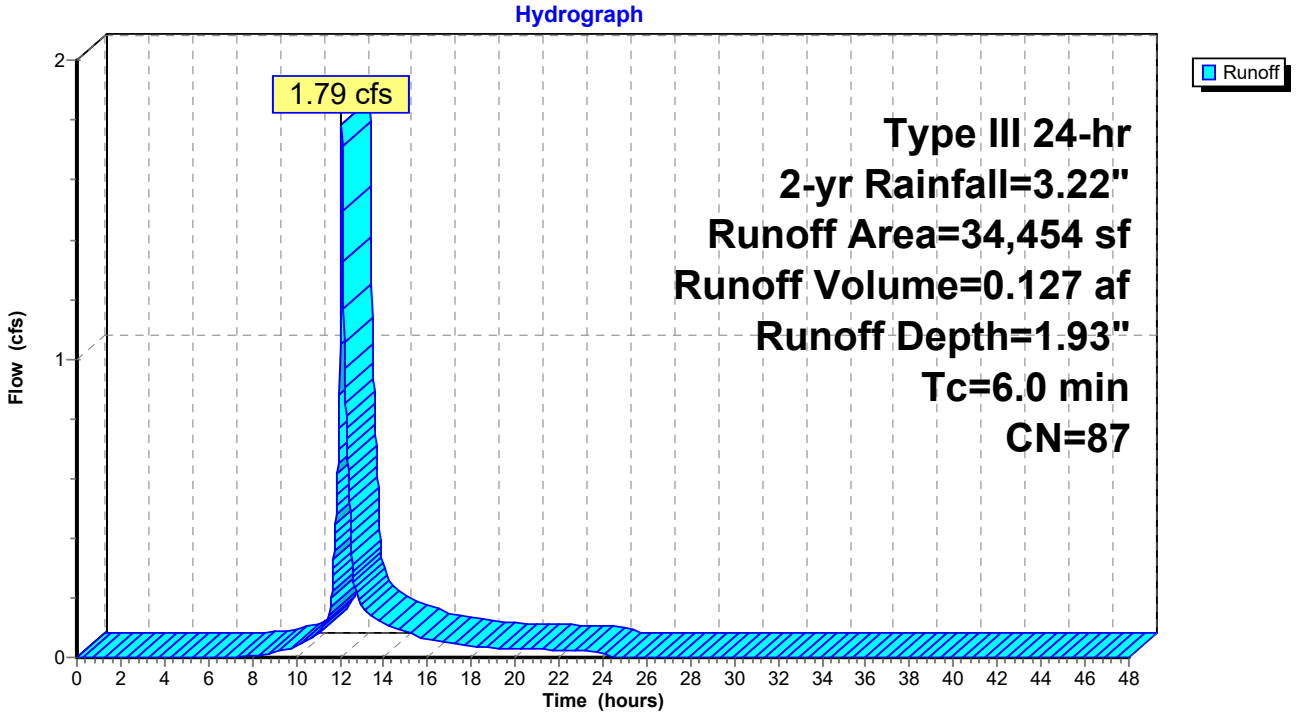
Runoff = 1.79 cfs @ 12.09 hrs, Volume= 0.127 af, Depth= 1.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-yr Rainfall=3.22"

Area (sf)	CN	Description
14,767	77	Woods, Good, HSG D
1,941	73	Brush, Good, HSG D
12,844	98	Paved parking, HSG D
4,902	91	Gravel roads, HSG D
34,454	87	Weighted Average
21,610		62.72% Pervious Area
12,844		37.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-2**

Subcatchment WS-2: Watershed-2



Hydrograph for Subcatchment WS-2: Watershed-2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.37	0.00	0.01
9.00	0.47	0.02	0.02
10.00	0.61	0.05	0.04
11.00	0.81	0.13	0.08
12.00	1.61	0.61	**1.05**
13.00	2.42	1.24	**0.17**
14.00	2.61	1.40	0.11
15.00	2.75	1.52	0.08
16.00	2.85	1.61	0.06
17.00	2.93	1.68	0.05
18.00	2.99	1.73	0.04
19.00	3.04	1.77	0.03
20.00	3.08	1.81	0.03
21.00	3.12	1.85	0.03
22.00	3.16	1.88	0.02
23.00	3.19	1.91	0.02
24.00	**3.22**	**1.93**	0.02
25.00	3.22	1.93	0.00
26.00	3.22	1.93	0.00
27.00	3.22	1.93	0.00
28.00	3.22	1.93	0.00
29.00	3.22	1.93	0.00
30.00	3.22	1.93	0.00
31.00	3.22	1.93	0.00
32.00	3.22	1.93	0.00
33.00	3.22	1.93	0.00
34.00	3.22	1.93	0.00
35.00	3.22	1.93	0.00
36.00	3.22	1.93	0.00
37.00	3.22	1.93	0.00
38.00	3.22	1.93	0.00
39.00	3.22	1.93	0.00
40.00	3.22	1.93	0.00
41.00	3.22	1.93	0.00
42.00	3.22	1.93	0.00
43.00	3.22	1.93	0.00
44.00	3.22	1.93	0.00
45.00	3.22	1.93	0.00
46.00	3.22	1.93	0.00
47.00	3.22	1.93	0.00
48.00	3.22	1.93	0.00

Summary for Subcatchment WS-3: Watershed-3

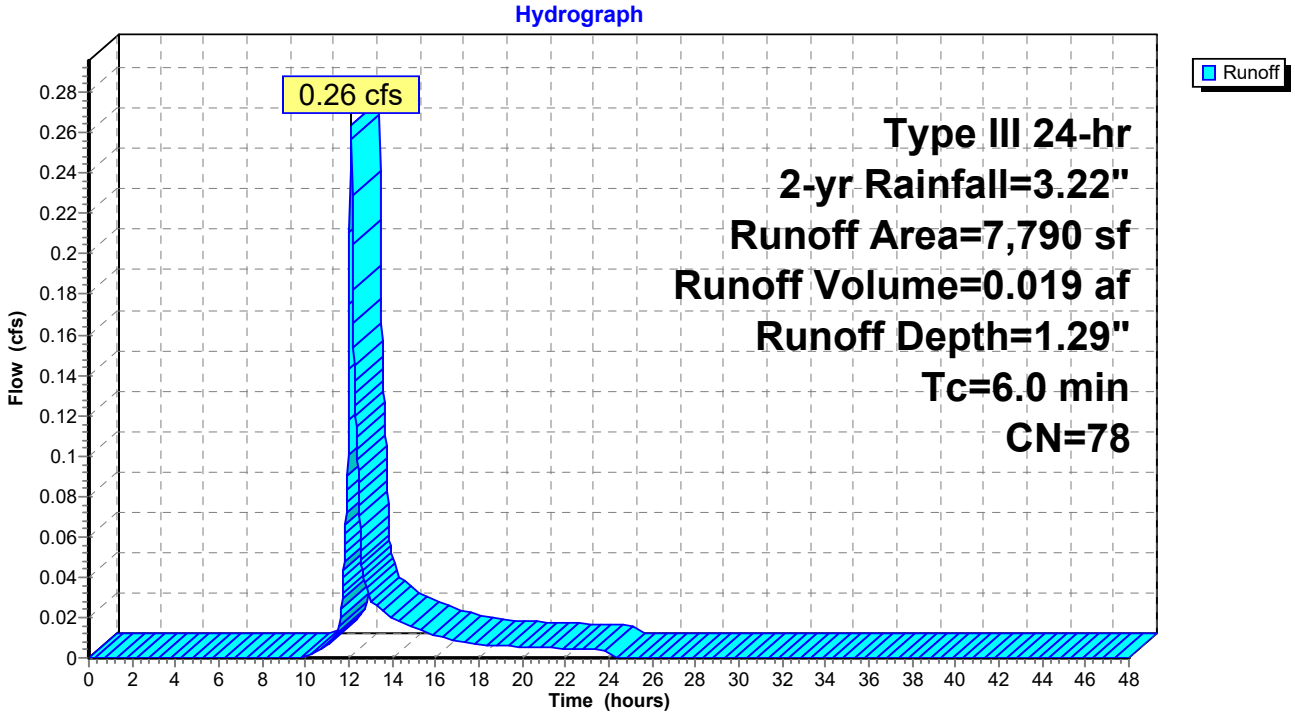
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 0.019 af, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-yr Rainfall=3.22"

Area (sf)	CN	Description
7,452	77	Woods, Good, HSG D
338	91	Gravel roads, HSG D
7,790	78	Weighted Average
7,790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-3**

Subcatchment WS-3: Watershed-3



Hydrograph for Subcatchment WS-3: Watershed-3

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.37	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.61	0.00	0.00
11.00	0.81	0.02	0.01
12.00	1.61	0.28	**0.14**
13.00	2.42	0.73	**0.03**
14.00	2.61	0.86	0.02
15.00	2.75	0.95	0.02
16.00	2.85	1.03	0.01
17.00	2.93	1.08	0.01
18.00	2.99	1.12	0.01
19.00	3.04	1.16	0.01
20.00	3.08	1.19	0.01
21.00	3.12	1.22	0.01
22.00	3.16	1.24	0.00
23.00	3.19	1.27	0.00
24.00	**3.22**	**1.29**	0.00
25.00	3.22	1.29	0.00
26.00	3.22	1.29	0.00
27.00	3.22	1.29	0.00
28.00	3.22	1.29	0.00
29.00	3.22	1.29	0.00
30.00	3.22	1.29	0.00
31.00	3.22	1.29	0.00
32.00	3.22	1.29	0.00
33.00	3.22	1.29	0.00
34.00	3.22	1.29	0.00
35.00	3.22	1.29	0.00
36.00	3.22	1.29	0.00
37.00	3.22	1.29	0.00
38.00	3.22	1.29	0.00
39.00	3.22	1.29	0.00
40.00	3.22	1.29	0.00
41.00	3.22	1.29	0.00
42.00	3.22	1.29	0.00
43.00	3.22	1.29	0.00
44.00	3.22	1.29	0.00
45.00	3.22	1.29	0.00
46.00	3.22	1.29	0.00
47.00	3.22	1.29	0.00
48.00	3.22	1.29	0.00

Summary for Subcatchment WS-4: Watershed - Roof

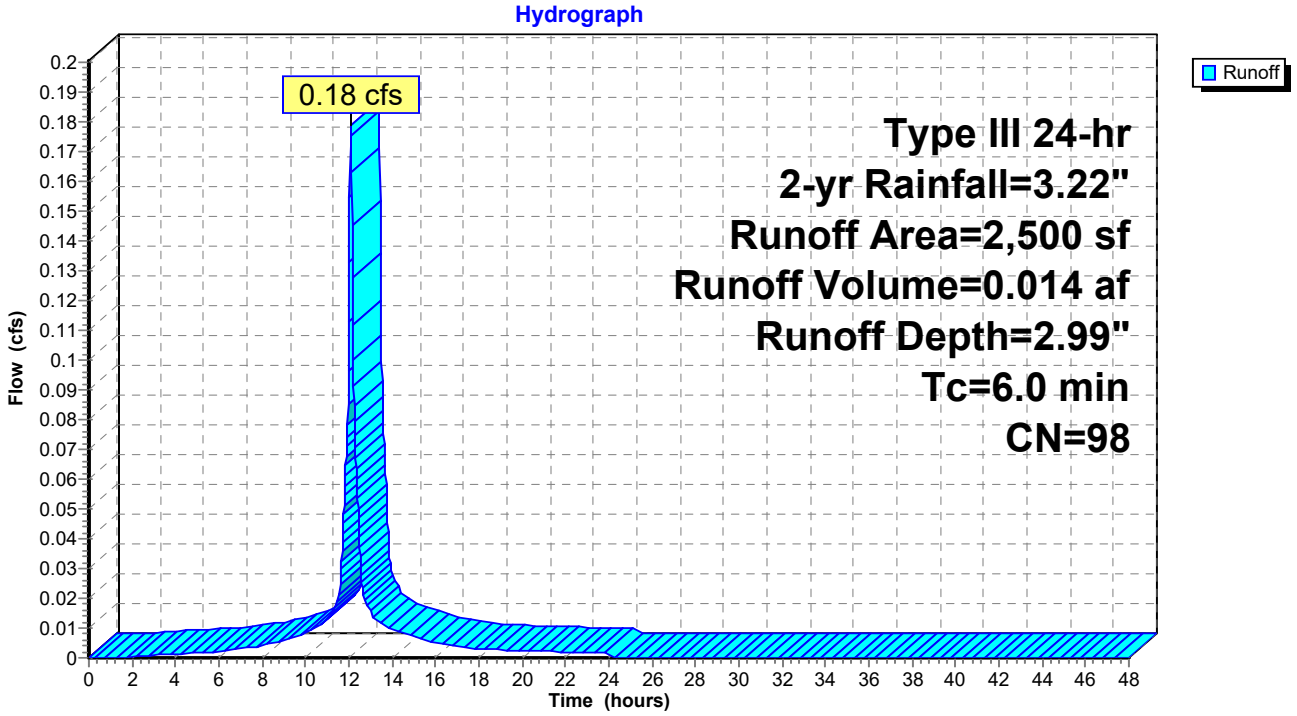
Runoff = 0.18 cfs @ 12.08 hrs, Volume= 0.014 af, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-yr Rainfall=3.22"

Area (sf)	CN	Description
2,500	98	Roofs, HSG D
2,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc of 6 minutes**

Subcatchment WS-4: Watershed - Roof



Hydrograph for Subcatchment WS-4: Watershed - Roof

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.01	0.00
4.00	0.14	0.03	0.00
5.00	0.18	0.06	0.00
6.00	0.23	0.09	0.00
7.00	0.29	0.14	0.00
8.00	0.37	0.20	0.00
9.00	0.47	0.29	0.01
10.00	0.61	0.42	0.01
11.00	0.81	0.60	0.01
12.00	1.61	1.39	**0.11**
13.00	2.42	2.19	**0.02**
14.00	2.61	2.38	0.01
15.00	2.75	2.52	0.01
16.00	2.85	2.62	0.01
17.00	2.93	2.70	0.00
18.00	2.99	2.76	0.00
19.00	3.04	2.81	0.00
20.00	3.08	2.85	0.00
21.00	3.12	2.89	0.00
22.00	3.16	2.93	0.00
23.00	3.19	2.96	0.00
24.00	**3.22**	**2.99**	0.00
25.00	3.22	2.99	0.00
26.00	3.22	2.99	0.00
27.00	3.22	2.99	0.00
28.00	3.22	2.99	0.00
29.00	3.22	2.99	0.00
30.00	3.22	2.99	0.00
31.00	3.22	2.99	0.00
32.00	3.22	2.99	0.00
33.00	3.22	2.99	0.00
34.00	3.22	2.99	0.00
35.00	3.22	2.99	0.00
36.00	3.22	2.99	0.00
37.00	3.22	2.99	0.00
38.00	3.22	2.99	0.00
39.00	3.22	2.99	0.00
40.00	3.22	2.99	0.00
41.00	3.22	2.99	0.00
42.00	3.22	2.99	0.00
43.00	3.22	2.99	0.00
44.00	3.22	2.99	0.00
45.00	3.22	2.99	0.00
46.00	3.22	2.99	0.00
47.00	3.22	2.99	0.00
48.00	3.22	2.99	0.00

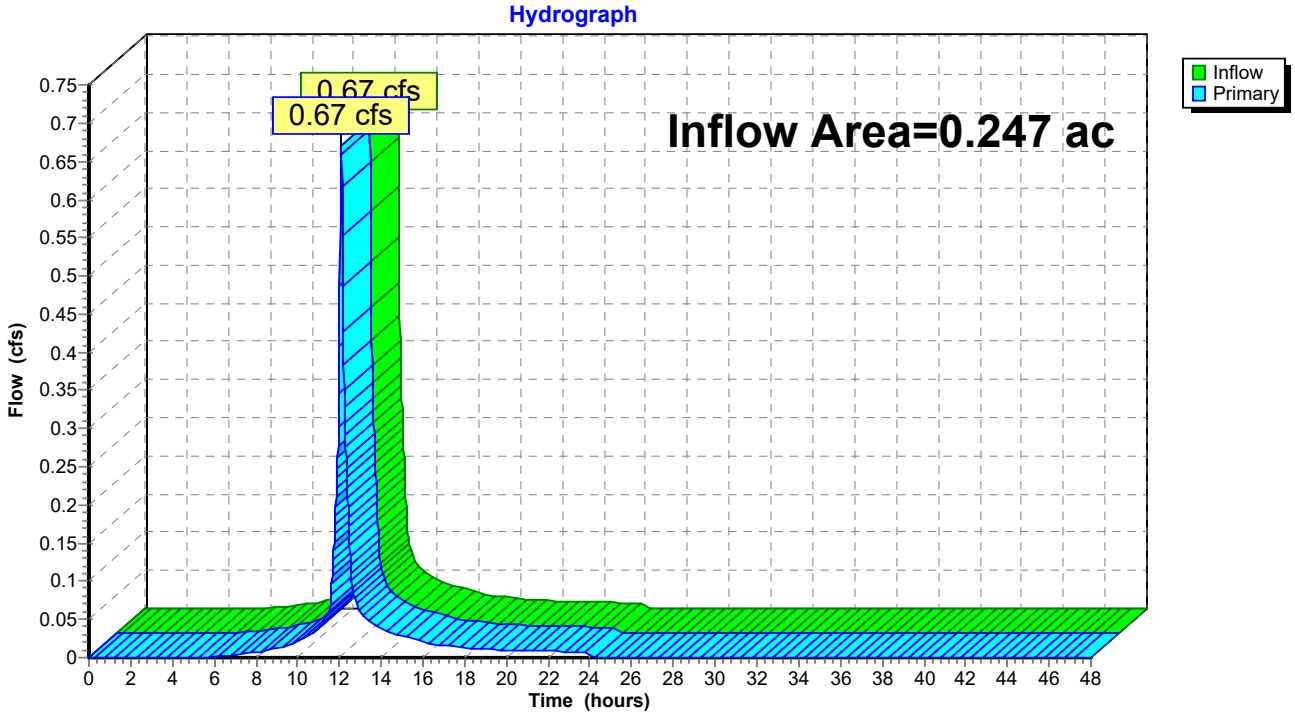
Summary for Pond 1P: Washington Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.247 ac, 53.56% Impervious, Inflow Depth = 2.37" for 2-yr event
Inflow = 0.67 cfs @ 12.09 hrs, Volume= 0.049 af
Primary = 0.67 cfs @ 12.09 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 1P: Washington Street



Hydrograph for Pond 1P: Washington Street

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.01		0.01
9.00	0.01		0.01
10.00	0.02		0.02
11.00	0.04		0.04
12.00	**0.41**		**0.41**
13.00	**0.06**		**0.06**
14.00	0.04		0.04
15.00	0.03		0.03
16.00	0.02		0.02
17.00	0.02		0.02
18.00	0.01		0.01
19.00	0.01		0.01
20.00	0.01		0.01
21.00	0.01		0.01
22.00	0.01		0.01
23.00	0.01		0.01
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

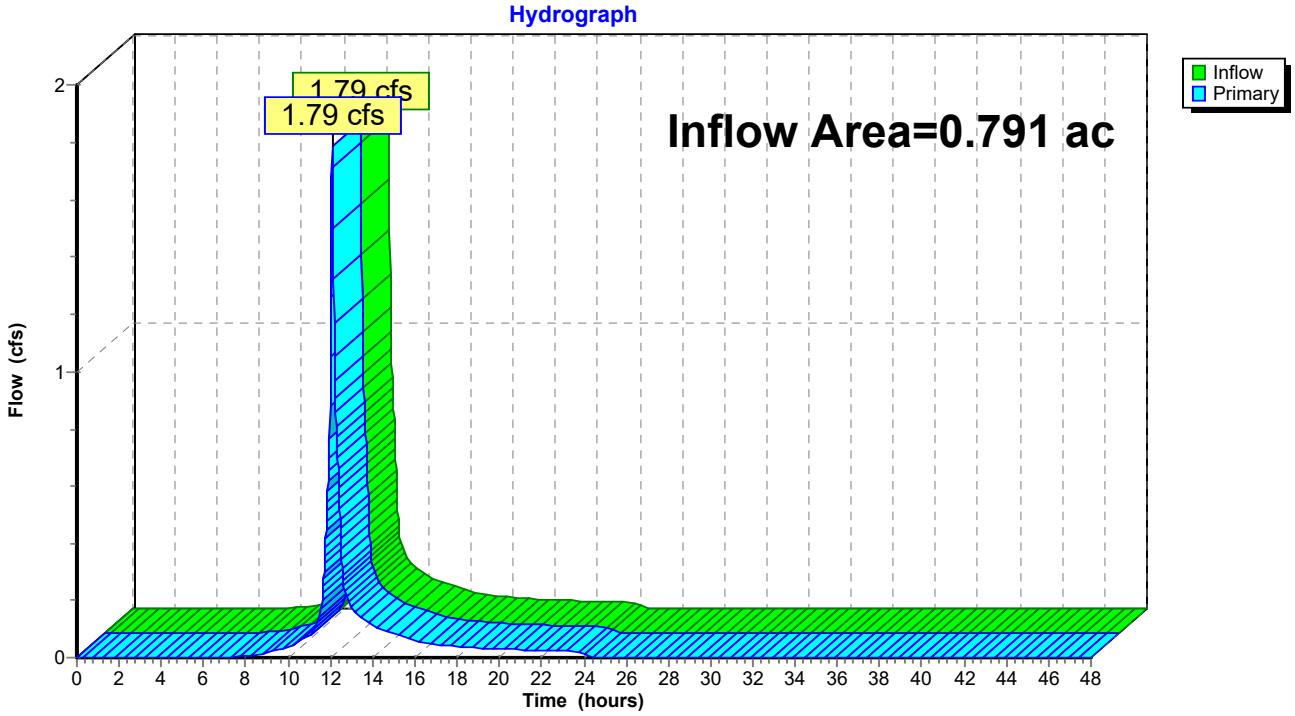
Summary for Pond 2P: Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.791 ac, 37.28% Impervious, Inflow Depth = 1.93" for 2-yr event
Inflow = 1.79 cfs @ 12.09 hrs, Volume= 0.127 af
Primary = 1.79 cfs @ 12.09 hrs, Volume= 0.127 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 2P: Wetlands



Hydrograph for Pond 2P: Wetlands

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.01		0.01
9.00	0.02		0.02
10.00	0.04		0.04
11.00	0.08		0.08
12.00	**1.05**		**1.05**
13.00	**0.17**		**0.17**
14.00	0.11		0.11
15.00	0.08		0.08
16.00	0.06		0.06
17.00	0.05		0.05
18.00	0.04		0.04
19.00	0.03		0.03
20.00	0.03		0.03
21.00	0.03		0.03
22.00	0.02		0.02
23.00	0.02		0.02
24.00	0.02		0.02
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

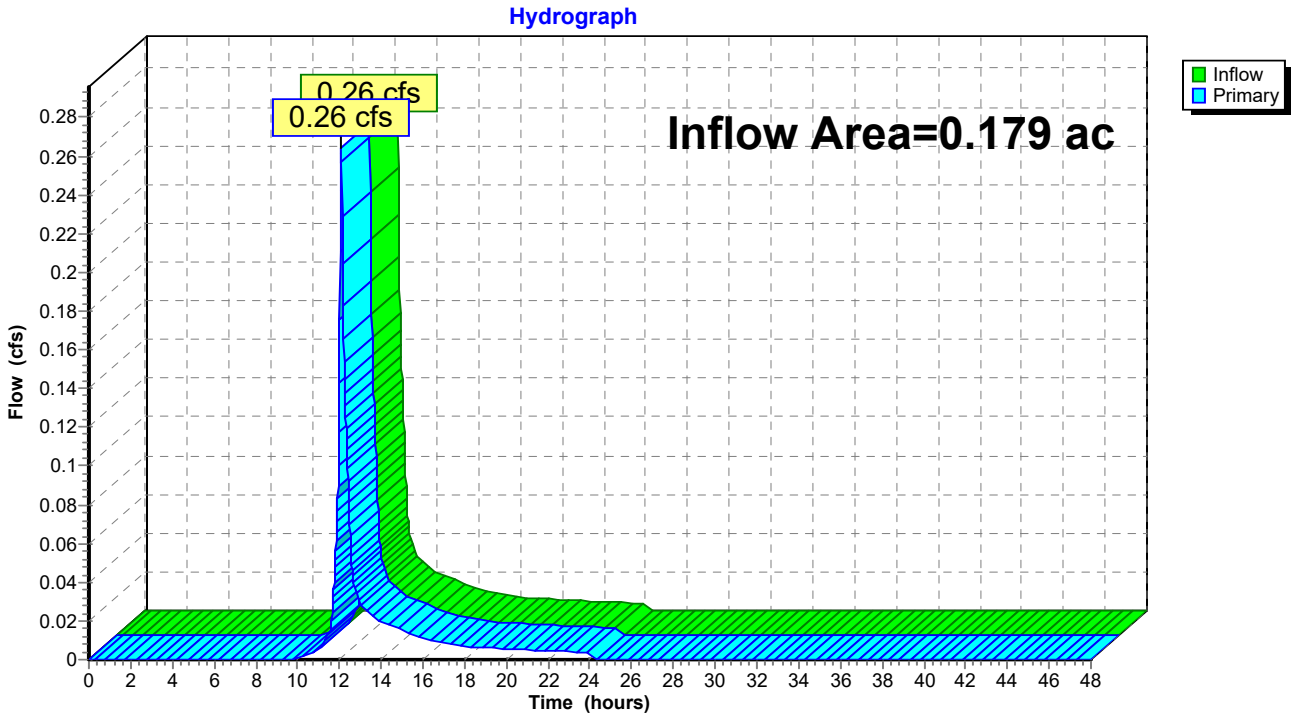
Summary for Pond 3P: Offsite

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.179 ac, 0.00% Impervious, Inflow Depth = 1.29" for 2-yr event
Inflow = 0.26 cfs @ 12.09 hrs, Volume= 0.019 af
Primary = 0.26 cfs @ 12.09 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 3P: Offsite



Hydrograph for Pond 3P: Offsite

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.00		0.00
10.00	0.00		0.00
11.00	0.01		0.01
12.00	**0.14**		**0.14**
13.00	**0.03**		**0.03**
14.00	0.02		0.02
15.00	0.02		0.02
16.00	0.01		0.01
17.00	0.01		0.01
18.00	0.01		0.01
19.00	0.01		0.01
20.00	0.01		0.01
21.00	0.01		0.01
22.00	0.00		0.00
23.00	0.00		0.00
24.00	0.00		0.00
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Summary for Pond 4P: Infiltration System

[92] Warning: Device #2 is above defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=228)

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth = 2.99" for 2-yr event
Inflow = 0.18 cfs @ 12.08 hrs, Volume= 0.014 af
Outflow = 0.03 cfs @ 14.56 hrs, Volume= 0.014 af, Atten= 82%, Lag= 148.6 min
Discarded = 0.03 cfs @ 14.56 hrs, Volume= 0.014 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 92.66' @ 12.54 hrs Surf.Area= 492 sf Storage= 163 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 27.9 min (784.2 - 756.3)

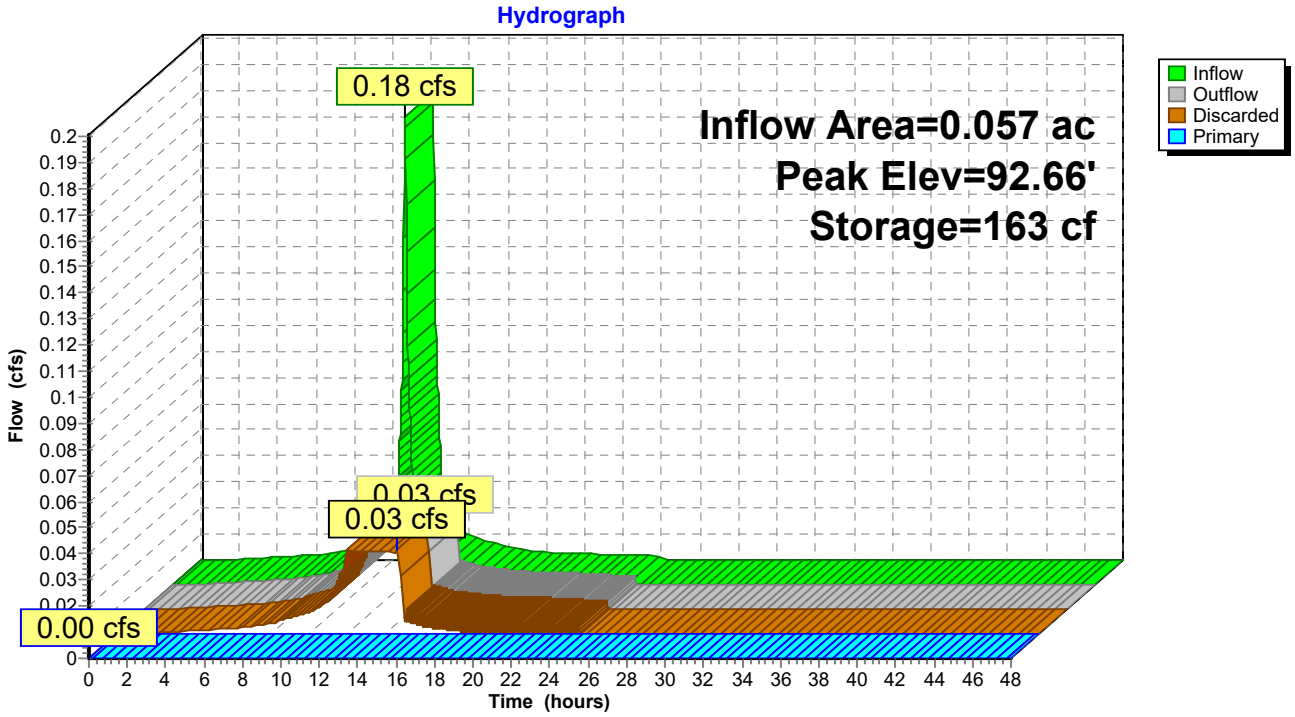
Volume	Invert	Avail.Storage	Storage Description
#1	92.00'	288 cf	**10.00'W x 36.00'L x 2.00'H Prismatoid** 720 cf Overall x 40.0% Voids
#2	92.17'	178 cf	**Cultec R-180** x 8 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 1 rows
		466 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	92.00'	**2.750 in/hr Exfiltration over Surface area**
#2	Primary	99.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.03 cfs @ 14.56 hrs HW=92.17' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=92.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 4P: Infiltration System



Hydrograph for Pond 4P: Infiltration System

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	92.00	0.00	0.00	**0.00**
1.00	0.00	0	92.00	0.00	0.00	0.00
2.00	0.00	0	92.00	0.00	0.00	0.00
3.00	0.00	0	92.00	0.00	0.00	0.00
4.00	0.00	0	92.00	0.00	0.00	0.00
5.00	0.00	0	92.00	0.00	0.00	0.00
6.00	0.00	0	92.00	0.00	0.00	0.00
7.00	0.00	0	92.00	0.00	0.00	0.00
8.00	0.00	0	92.00	0.00	0.00	0.00
9.00	0.01	0	92.00	0.01	0.01	0.00
10.00	0.01	0	92.00	0.01	0.01	0.00
11.00	0.01	0	92.00	0.01	0.01	0.00
12.00	**0.11**	**45**	**92.24**	0.03	0.03	0.00
13.00	**0.02**	**143**	**92.59**	0.03	0.03	0.00
14.00	0.01	72	92.34	**0.03**	**0.03**	0.00
15.00	0.01	1	92.00	**0.02**	**0.02**	0.00
16.00	0.01	0	92.00	0.00	0.00	0.00
17.00	0.00	0	92.00	0.00	0.00	0.00
18.00	0.00	0	92.00	0.00	0.00	0.00
19.00	0.00	0	92.00	0.00	0.00	0.00
20.00	0.00	0	92.00	0.00	0.00	0.00
21.00	0.00	0	92.00	0.00	0.00	0.00
22.00	0.00	0	92.00	0.00	0.00	0.00
23.00	0.00	0	92.00	0.00	0.00	0.00
24.00	0.00	0	92.00	0.00	0.00	0.00
25.00	0.00	0	92.00	0.00	0.00	0.00
26.00	0.00	0	92.00	0.00	0.00	0.00
27.00	0.00	0	92.00	0.00	0.00	0.00
28.00	0.00	0	92.00	0.00	0.00	0.00
29.00	0.00	0	92.00	0.00	0.00	0.00
30.00	0.00	0	92.00	0.00	0.00	0.00
31.00	0.00	0	92.00	0.00	0.00	0.00
32.00	0.00	0	92.00	0.00	0.00	0.00
33.00	0.00	0	92.00	0.00	0.00	0.00
34.00	0.00	0	92.00	0.00	0.00	0.00
35.00	0.00	0	92.00	0.00	0.00	0.00
36.00	0.00	0	92.00	0.00	0.00	0.00
37.00	0.00	0	92.00	0.00	0.00	0.00
38.00	0.00	0	92.00	0.00	0.00	0.00
39.00	0.00	0	92.00	0.00	0.00	0.00
40.00	0.00	0	92.00	0.00	0.00	0.00
41.00	0.00	0	92.00	0.00	0.00	0.00
42.00	0.00	0	92.00	0.00	0.00	0.00
43.00	0.00	0	92.00	0.00	0.00	0.00
44.00	0.00	0	92.00	0.00	0.00	0.00
45.00	0.00	0	92.00	0.00	0.00	0.00
46.00	0.00	0	92.00	0.00	0.00	0.00
47.00	0.00	0	92.00	0.00	0.00	0.00
48.00	0.00	0	92.00	0.00	0.00	0.00

Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment WS-1: Watershed-1 Runoff Area=10,775 sf 53.56% Impervious Runoff Depth=3.96"
Tc=6.0 min CN=92 Runoff=1.09 cfs 0.082 af

Subcatchment WS-2: Watershed-2 Runoff Area=34,454 sf 37.28% Impervious Runoff Depth=3.45"
Tc=6.0 min CN=87 Runoff=3.14 cfs 0.227 af

Subcatchment WS-3: Watershed-3 Runoff Area=7,790 sf 0.00% Impervious Runoff Depth=2.60"
Tc=6.0 min CN=78 Runoff=0.54 cfs 0.039 af

Subcatchment WS-4: Watershed - Roof Runoff Area=2,500 sf 100.00% Impervious Runoff Depth=4.63"
Tc=6.0 min CN=98 Runoff=0.27 cfs 0.022 af

Pond 1P: Washington Street Inflow=1.09 cfs 0.082 af
Primary=1.09 cfs 0.082 af

Pond 2P: Wetlands Inflow=3.14 cfs 0.227 af
Primary=3.14 cfs 0.227 af

Pond 3P: Offsite Inflow=0.54 cfs 0.039 af
Primary=0.54 cfs 0.039 af

Pond 4P: Infiltration System Peak Elev=93.21' Storage=308 cf Inflow=0.27 cfs 0.022 af
Discarded=0.03 cfs 0.022 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.022 af

Total Runoff Area = 1.275 ac Runoff Volume = 0.370 af Average Runoff Depth = 3.48"
61.97% Pervious = 0.790 ac 38.03% Impervious = 0.485 ac

Summary for Subcatchment WS-1: Watershed-1

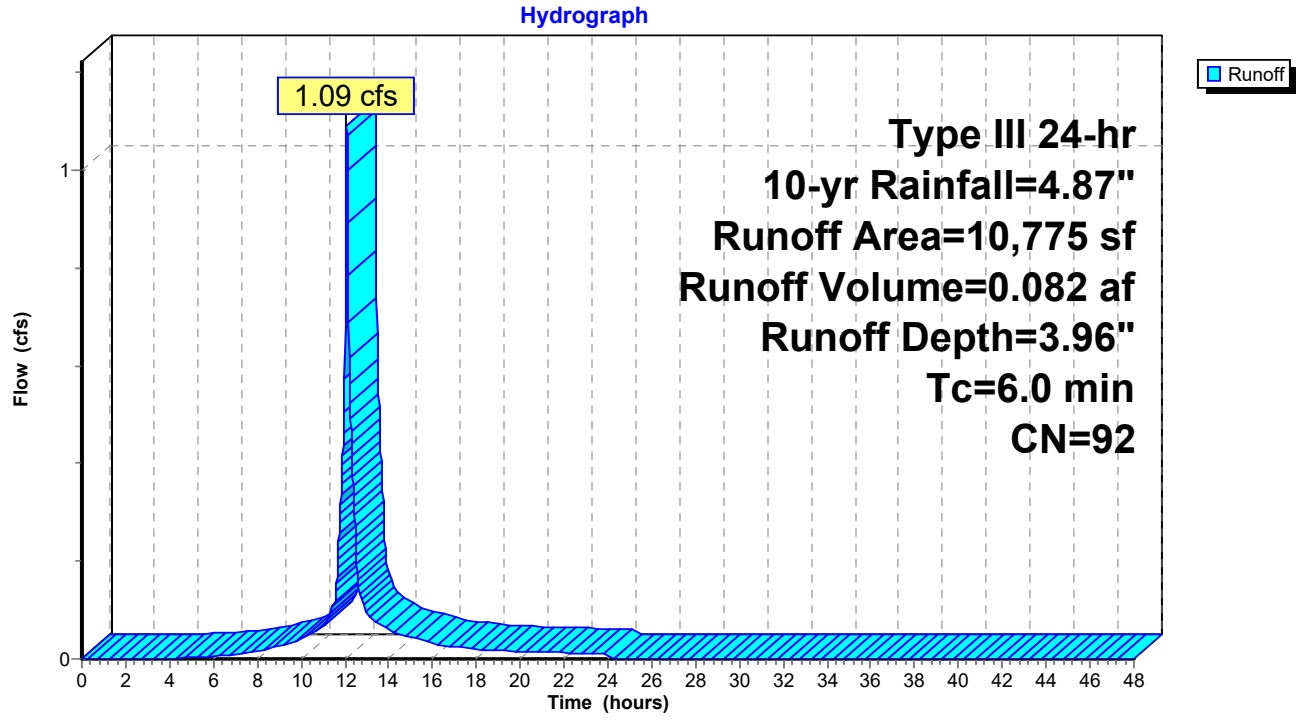
Runoff = 1.09 cfs @ 12.08 hrs, Volume= 0.082 af, Depth= 3.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-yr Rainfall=4.87"

Area (sf)	CN	Description
234	65	Woods/grass comb., Fair, HSG B
5,771	98	Paved parking, HSG B
4,770	85	Gravel roads, HSG B
10,775	92	Weighted Average
5,004		46.44% Pervious Area
5,771		53.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-1**

Subcatchment WS-1: Watershed-1



Hydrograph for Subcatchment WS-1: Watershed-1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.10	0.00	0.00
3.00	0.15	0.00	0.00
4.00	0.21	0.00	0.00
5.00	0.28	0.01	0.00
6.00	0.35	0.03	0.01
7.00	0.44	0.06	0.01
8.00	0.56	0.12	0.02
9.00	0.71	0.20	0.03
10.00	0.92	0.34	0.04
11.00	1.22	0.57	0.07
12.00	2.43	1.63	**0.68**
13.00	3.65	2.78	**0.10**
14.00	3.95	3.07	0.06
15.00	4.16	3.27	0.05
16.00	4.31	3.42	0.03
17.00	4.43	3.53	0.03
18.00	4.52	3.62	0.02
19.00	4.59	3.69	0.02
20.00	4.66	3.76	0.02
21.00	4.72	3.82	0.01
22.00	4.78	3.87	0.01
23.00	4.83	3.92	0.01
24.00	**4.87**	**3.96**	0.01
25.00	4.87	3.96	0.00
26.00	4.87	3.96	0.00
27.00	4.87	3.96	0.00
28.00	4.87	3.96	0.00
29.00	4.87	3.96	0.00
30.00	4.87	3.96	0.00
31.00	4.87	3.96	0.00
32.00	4.87	3.96	0.00
33.00	4.87	3.96	0.00
34.00	4.87	3.96	0.00
35.00	4.87	3.96	0.00
36.00	4.87	3.96	0.00
37.00	4.87	3.96	0.00
38.00	4.87	3.96	0.00
39.00	4.87	3.96	0.00
40.00	4.87	3.96	0.00
41.00	4.87	3.96	0.00
42.00	4.87	3.96	0.00
43.00	4.87	3.96	0.00
44.00	4.87	3.96	0.00
45.00	4.87	3.96	0.00
46.00	4.87	3.96	0.00
47.00	4.87	3.96	0.00
48.00	4.87	3.96	0.00

Summary for Subcatchment WS-2: Watershed-2

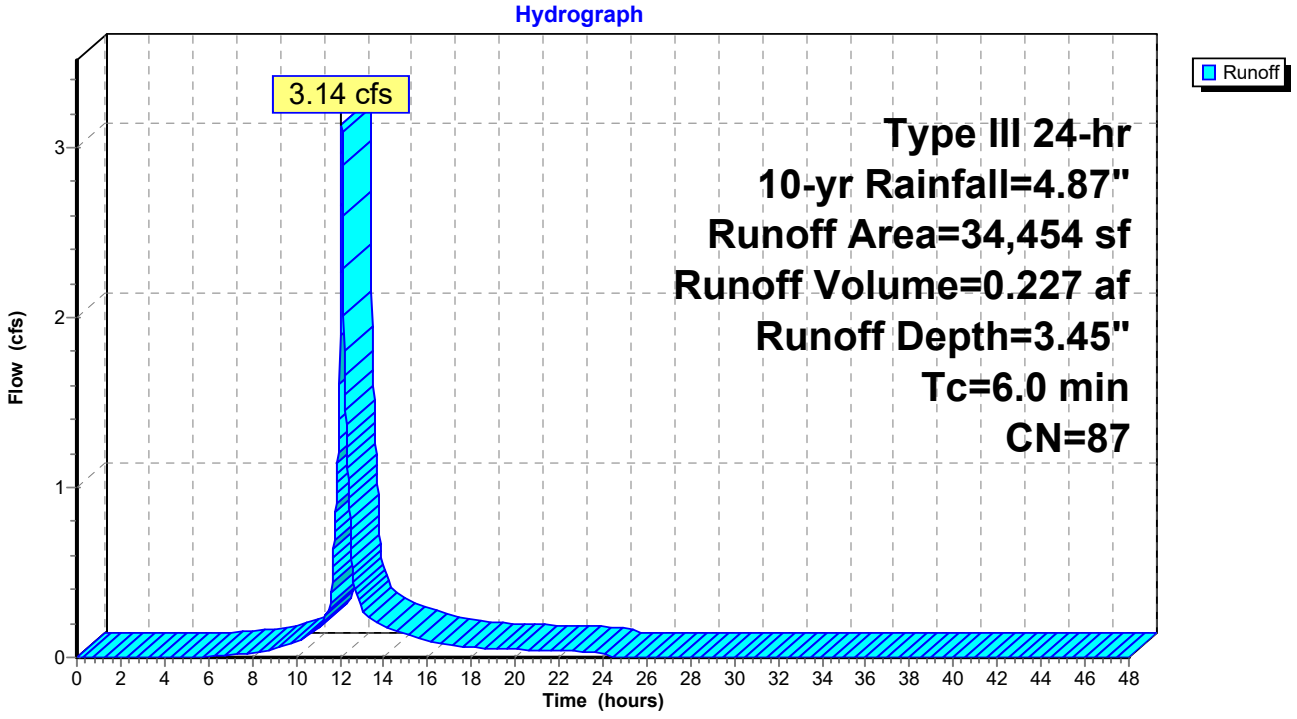
Runoff = 3.14 cfs @ 12.09 hrs, Volume= 0.227 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-yr Rainfall=4.87"

Area (sf)	CN	Description
14,767	77	Woods, Good, HSG D
1,941	73	Brush, Good, HSG D
12,844	98	Paved parking, HSG D
4,902	91	Gravel roads, HSG D
34,454	87	Weighted Average
21,610		62.72% Pervious Area
12,844		37.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-2**

Subcatchment WS-2: Watershed-2



Hydrograph for Subcatchment WS-2: Watershed-2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.10	0.00	0.00
3.00	0.15	0.00	0.00
4.00	0.21	0.00	0.00
5.00	0.28	0.00	0.00
6.00	0.35	0.00	0.00
7.00	0.44	0.01	0.01
8.00	0.56	0.04	0.03
9.00	0.71	0.09	0.05
10.00	0.92	0.18	0.09
11.00	1.22	0.35	0.17
12.00	2.43	1.26	**1.90**
13.00	3.65	2.32	**0.29**
14.00	3.95	2.59	0.18
15.00	4.16	2.78	0.14
16.00	4.31	2.93	0.10
17.00	4.43	3.03	0.08
18.00	4.52	3.12	0.06
19.00	4.59	3.19	0.05
20.00	4.66	3.25	0.05
21.00	4.72	3.31	0.04
22.00	4.78	3.36	0.04
23.00	4.83	3.40	0.04
24.00	**4.87**	**3.45**	0.03
25.00	4.87	3.45	0.00
26.00	4.87	3.45	0.00
27.00	4.87	3.45	0.00
28.00	4.87	3.45	0.00
29.00	4.87	3.45	0.00
30.00	4.87	3.45	0.00
31.00	4.87	3.45	0.00
32.00	4.87	3.45	0.00
33.00	4.87	3.45	0.00
34.00	4.87	3.45	0.00
35.00	4.87	3.45	0.00
36.00	4.87	3.45	0.00
37.00	4.87	3.45	0.00
38.00	4.87	3.45	0.00
39.00	4.87	3.45	0.00
40.00	4.87	3.45	0.00
41.00	4.87	3.45	0.00
42.00	4.87	3.45	0.00
43.00	4.87	3.45	0.00
44.00	4.87	3.45	0.00
45.00	4.87	3.45	0.00
46.00	4.87	3.45	0.00
47.00	4.87	3.45	0.00
48.00	4.87	3.45	0.00

Summary for Subcatchment WS-3: Watershed-3

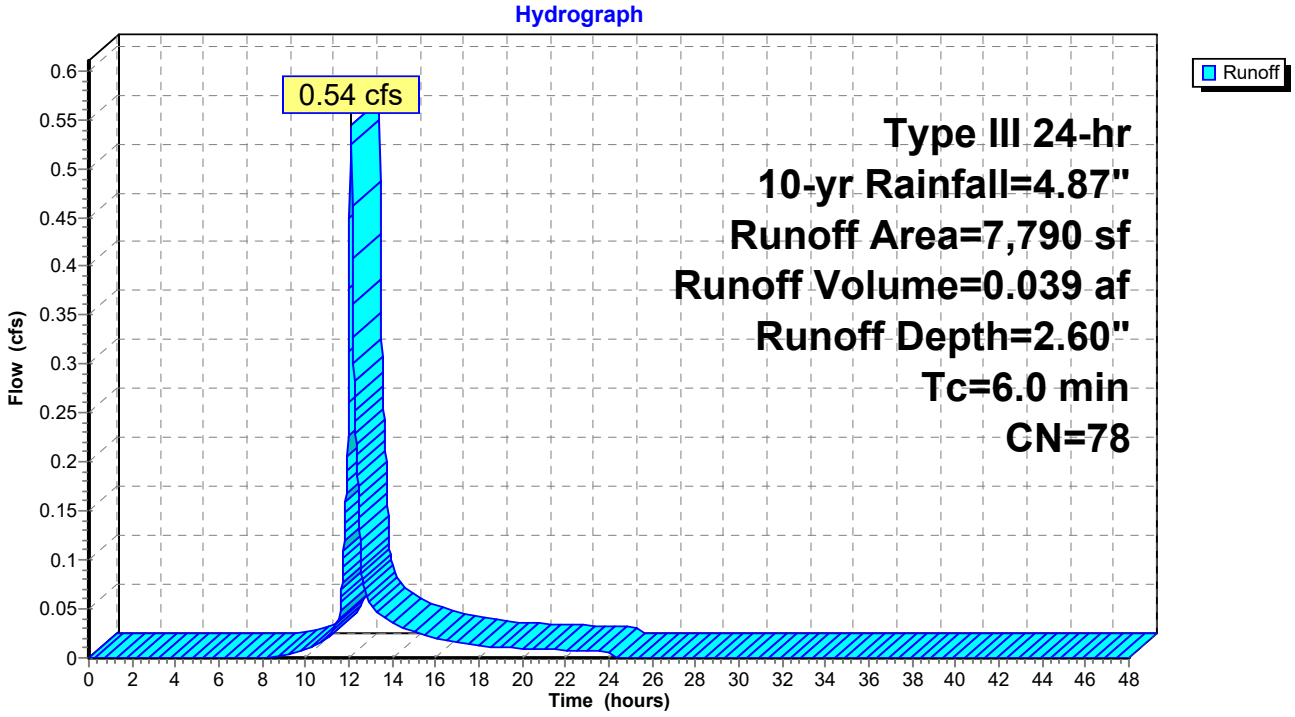
Runoff = 0.54 cfs @ 12.09 hrs, Volume= 0.039 af, Depth= 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-yr Rainfall=4.87"

Area (sf)	CN	Description
7,452	77	Woods, Good, HSG D
338	91	Gravel roads, HSG D
7,790	78	Weighted Average
7,790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-3**

Subcatchment WS-3: Watershed-3



Hydrograph for Subcatchment WS-3: Watershed-3

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.10	0.00	0.00
3.00	0.15	0.00	0.00
4.00	0.21	0.00	0.00
5.00	0.28	0.00	0.00
6.00	0.35	0.00	0.00
7.00	0.44	0.00	0.00
8.00	0.56	0.00	0.00
9.00	0.71	0.01	0.00
10.00	0.92	0.04	0.01
11.00	1.22	0.12	0.02
12.00	2.43	0.75	**0.31**
13.00	3.65	1.61	**0.06**
14.00	3.95	1.85	0.04
15.00	4.16	2.02	0.03
16.00	4.31	2.14	0.02
17.00	4.43	2.23	0.02
18.00	4.52	2.31	0.01
19.00	4.59	2.37	0.01
20.00	4.66	2.43	0.01
21.00	4.72	2.48	0.01
22.00	4.78	2.52	0.01
23.00	4.83	2.56	0.01
24.00	**4.87**	**2.60**	0.01
25.00	4.87	2.60	0.00
26.00	4.87	2.60	0.00
27.00	4.87	2.60	0.00
28.00	4.87	2.60	0.00
29.00	4.87	2.60	0.00
30.00	4.87	2.60	0.00
31.00	4.87	2.60	0.00
32.00	4.87	2.60	0.00
33.00	4.87	2.60	0.00
34.00	4.87	2.60	0.00
35.00	4.87	2.60	0.00
36.00	4.87	2.60	0.00
37.00	4.87	2.60	0.00
38.00	4.87	2.60	0.00
39.00	4.87	2.60	0.00
40.00	4.87	2.60	0.00
41.00	4.87	2.60	0.00
42.00	4.87	2.60	0.00
43.00	4.87	2.60	0.00
44.00	4.87	2.60	0.00
45.00	4.87	2.60	0.00
46.00	4.87	2.60	0.00
47.00	4.87	2.60	0.00
48.00	4.87	2.60	0.00

Summary for Subcatchment WS-4: Watershed - Roof

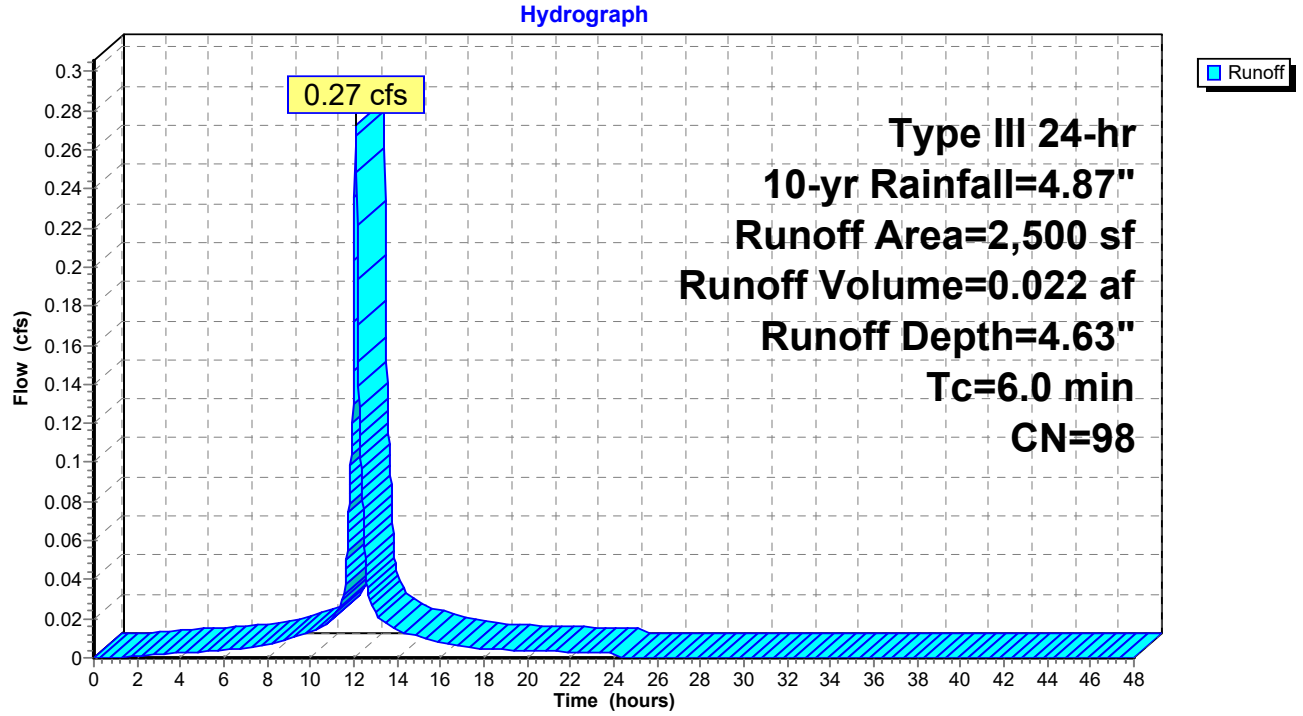
Runoff = 0.27 cfs @ 12.08 hrs, Volume= 0.022 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-yr Rainfall=4.87"

Area (sf)	CN	Description
2,500	98	Roofs, HSG D
2,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc of 6 minutes**

Subcatchment WS-4: Watershed - Roof



Hydrograph for Subcatchment WS-4: Watershed - Roof

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.10	0.01	0.00
3.00	0.15	0.04	0.00
4.00	0.21	0.08	0.00
5.00	0.28	0.13	0.00
6.00	0.35	0.19	0.00
7.00	0.44	0.26	0.01
8.00	0.56	0.37	0.01
9.00	0.71	0.51	0.01
10.00	0.92	0.71	0.01
11.00	1.22	1.00	0.02
12.00	2.43	2.21	**0.17**
13.00	3.65	3.42	**0.02**
14.00	3.95	3.71	0.01
15.00	4.16	3.92	0.01
16.00	4.31	4.08	0.01
17.00	4.43	4.19	0.01
18.00	4.52	4.28	0.00
19.00	4.59	4.36	0.00
20.00	4.66	4.42	0.00
21.00	4.72	4.48	0.00
22.00	4.78	4.54	0.00
23.00	4.83	4.59	0.00
24.00	**4.87**	**4.63**	0.00
25.00	4.87	4.63	0.00
26.00	4.87	4.63	0.00
27.00	4.87	4.63	0.00
28.00	4.87	4.63	0.00
29.00	4.87	4.63	0.00
30.00	4.87	4.63	0.00
31.00	4.87	4.63	0.00
32.00	4.87	4.63	0.00
33.00	4.87	4.63	0.00
34.00	4.87	4.63	0.00
35.00	4.87	4.63	0.00
36.00	4.87	4.63	0.00
37.00	4.87	4.63	0.00
38.00	4.87	4.63	0.00
39.00	4.87	4.63	0.00
40.00	4.87	4.63	0.00
41.00	4.87	4.63	0.00
42.00	4.87	4.63	0.00
43.00	4.87	4.63	0.00
44.00	4.87	4.63	0.00
45.00	4.87	4.63	0.00
46.00	4.87	4.63	0.00
47.00	4.87	4.63	0.00
48.00	4.87	4.63	0.00

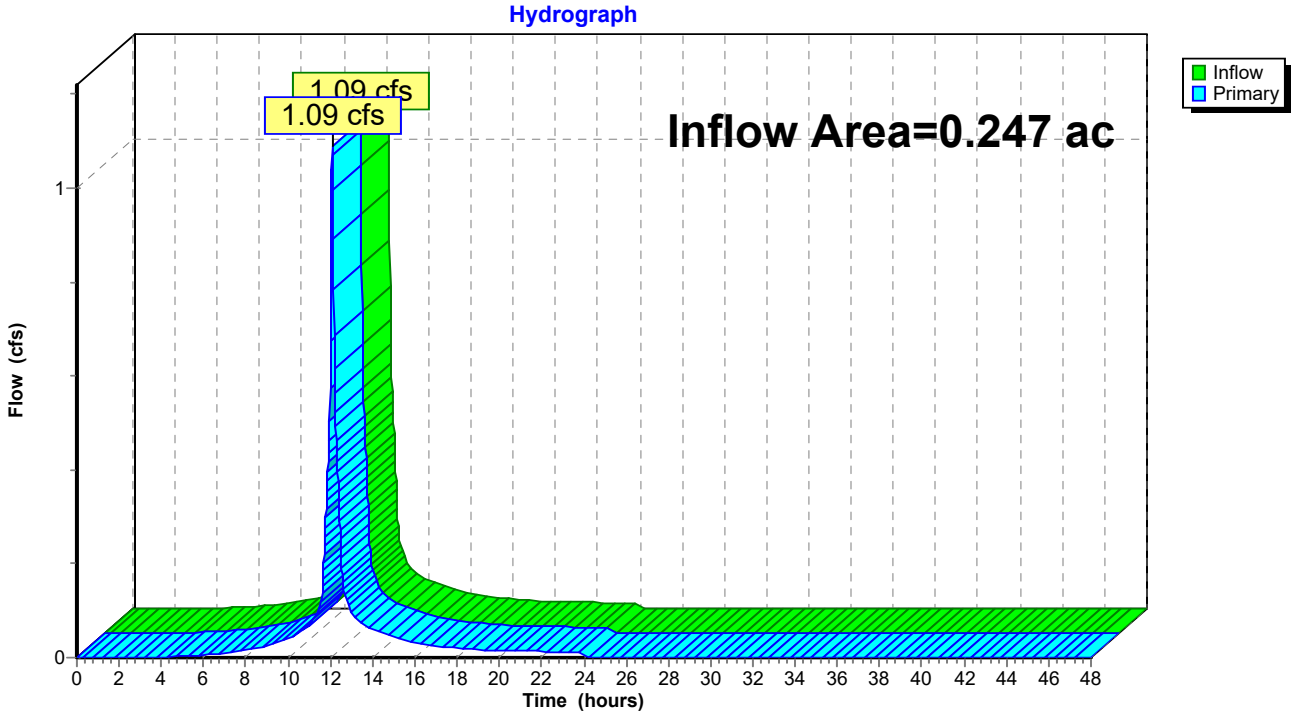
Summary for Pond 1P: Washington Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.247 ac, 53.56% Impervious, Inflow Depth = 3.96" for 10-yr event
Inflow = 1.09 cfs @ 12.08 hrs, Volume= 0.082 af
Primary = 1.09 cfs @ 12.08 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 1P: Washington Street



Hydrograph for Pond 1P: Washington Street

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.01		0.01
7.00	0.01		0.01
8.00	0.02		0.02
9.00	0.03		0.03
10.00	0.04		0.04
11.00	0.07		0.07
12.00	**0.68**		**0.68**
13.00	**0.10**		**0.10**
14.00	0.06		0.06
15.00	0.05		0.05
16.00	0.03		0.03
17.00	0.03		0.03
18.00	0.02		0.02
19.00	0.02		0.02
20.00	0.02		0.02
21.00	0.01		0.01
22.00	0.01		0.01
23.00	0.01		0.01
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

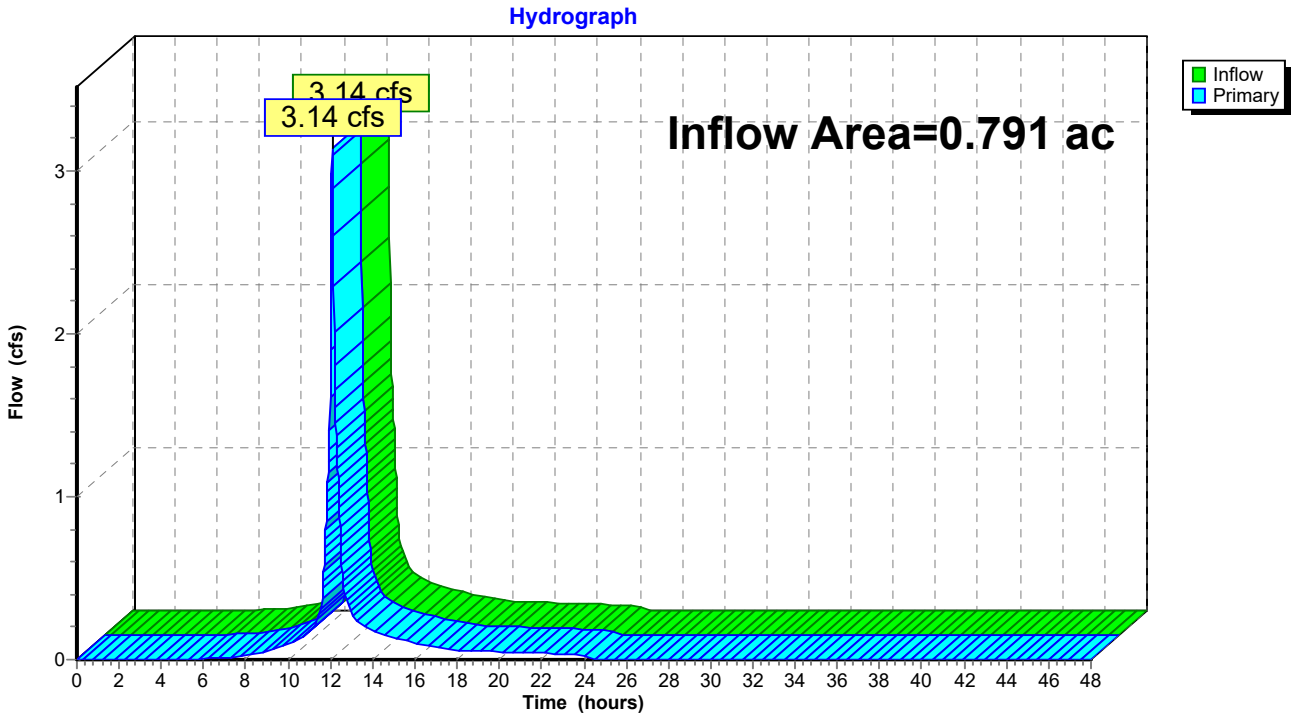
Summary for Pond 2P: Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.791 ac, 37.28% Impervious, Inflow Depth = 3.45" for 10-yr event
Inflow = 3.14 cfs @ 12.09 hrs, Volume= 0.227 af
Primary = 3.14 cfs @ 12.09 hrs, Volume= 0.227 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 2P: Wetlands



Hydrograph for Pond 2P: Wetlands

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.01		0.01
8.00	0.03		0.03
9.00	0.05		0.05
10.00	0.09		0.09
11.00	0.17		0.17
12.00	**1.90**		**1.90**
13.00	**0.29**		**0.29**
14.00	0.18		0.18
15.00	0.14		0.14
16.00	0.10		0.10
17.00	0.08		0.08
18.00	0.06		0.06
19.00	0.05		0.05
20.00	0.05		0.05
21.00	0.04		0.04
22.00	0.04		0.04
23.00	0.04		0.04
24.00	0.03		0.03
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

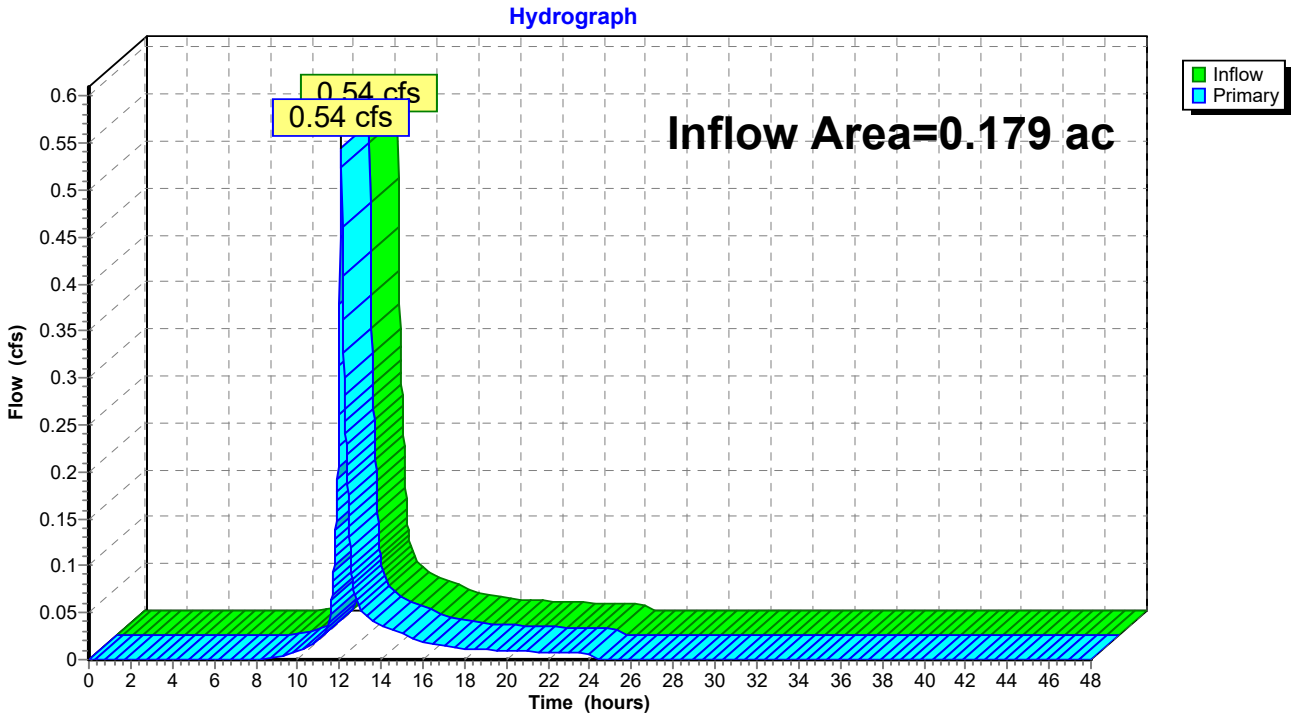
Summary for Pond 3P: Offsite

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.179 ac, 0.00% Impervious, Inflow Depth = 2.60" for 10-yr event
Inflow = 0.54 cfs @ 12.09 hrs, Volume= 0.039 af
Primary = 0.54 cfs @ 12.09 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 3P: Offsite



Hydrograph for Pond 3P: Offsite

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.00		0.00
10.00	0.01		0.01
11.00	0.02		0.02
12.00	**0.31**		**0.31**
13.00	**0.06**		**0.06**
14.00	0.04		0.04
15.00	0.03		0.03
16.00	0.02		0.02
17.00	0.02		0.02
18.00	0.01		0.01
19.00	0.01		0.01
20.00	0.01		0.01
21.00	0.01		0.01
22.00	0.01		0.01
23.00	0.01		0.01
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Summary for Pond 4P: Infiltration System

[92] Warning: Device #2 is above defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=169)

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-yr event
Inflow = 0.27 cfs @ 12.08 hrs, Volume= 0.022 af
Outflow = 0.03 cfs @ 17.00 hrs, Volume= 0.022 af, Atten= 88%, Lag= 295.0 min
Discarded = 0.03 cfs @ 17.00 hrs, Volume= 0.022 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 93.21' @ 12.74 hrs Surf.Area= 466 sf Storage= 308 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 64.2 min (812.6 - 748.5)

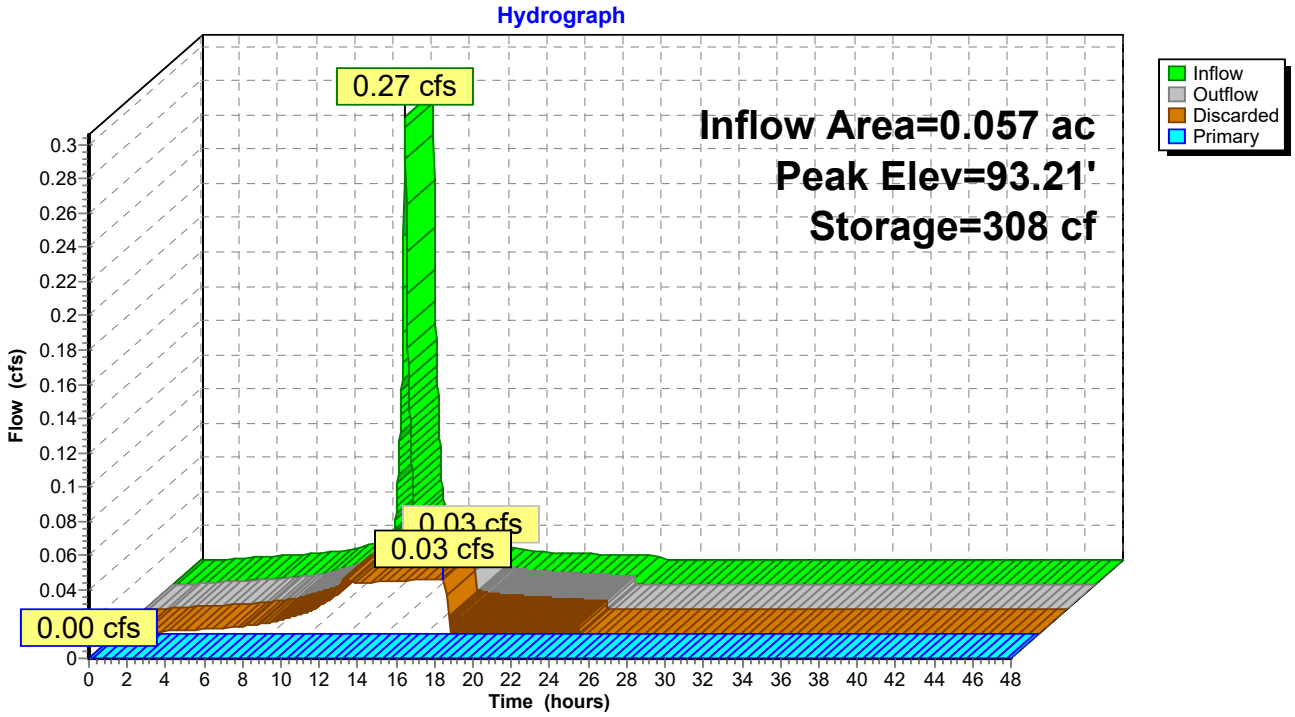
Volume	Invert	Avail.Storage	Storage Description
#1	92.00'	288 cf	**10.00'W x 36.00'L x 2.00'H Prismatoid** 720 cf Overall x 40.0% Voids
#2	92.17'	178 cf	**Cultec R-180** x 8 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 1 rows
		466 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	92.00'	**2.750 in/hr Exfiltration over Surface area**
#2	Primary	99.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.03 cfs @ 17.00 hrs HW=92.17' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=92.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 4P: Infiltration System



Hydrograph for Pond 4P: Infiltration System

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	92.00	0.00	0.00	**0.00**
1.00	0.00	0	92.00	0.00	0.00	0.00
2.00	0.00	0	92.00	0.00	0.00	0.00
3.00	0.00	0	92.00	0.00	0.00	0.00
4.00	0.00	0	92.00	0.00	0.00	0.00
5.00	0.00	0	92.00	0.00	0.00	0.00
6.00	0.00	0	92.00	0.00	0.00	0.00
7.00	0.01	0	92.00	0.01	0.01	0.00
8.00	0.01	0	92.00	0.01	0.01	0.00
9.00	0.01	0	92.00	0.01	0.01	0.00
10.00	0.01	0	92.00	0.01	0.01	0.00
11.00	0.02	0	92.00	0.02	0.02	0.00
12.00	**0.17**	**91**	**92.41**	0.03	0.03	0.00
13.00	**0.02**	**305**	**93.19**	0.03	0.03	0.00
14.00	0.01	261	93.02	0.03	0.03	0.00
15.00	0.01	195	92.78	0.03	0.03	0.00
16.00	0.01	115	92.49	0.03	0.03	0.00
17.00	0.01	25	92.17	**0.03**	**0.03**	0.00
18.00	0.00	0	92.00	0.01	0.01	0.00
19.00	0.00	0	92.00	0.01	0.01	0.00
20.00	0.00	0	92.00	0.01	0.01	0.00
21.00	0.00	0	92.00	0.01	0.01	0.00
22.00	0.00	0	92.00	0.01	0.01	0.00
23.00	0.00	0	92.00	0.01	0.01	0.00
24.00	0.00	0	92.00	0.00	0.00	0.00
25.00	0.00	0	92.00	0.00	0.00	0.00
26.00	0.00	0	92.00	0.00	0.00	0.00
27.00	0.00	0	92.00	0.00	0.00	0.00
28.00	0.00	0	92.00	0.00	0.00	0.00
29.00	0.00	0	92.00	0.00	0.00	0.00
30.00	0.00	0	92.00	0.00	0.00	0.00
31.00	0.00	0	92.00	0.00	0.00	0.00
32.00	0.00	0	92.00	0.00	0.00	0.00
33.00	0.00	0	92.00	0.00	0.00	0.00
34.00	0.00	0	92.00	0.00	0.00	0.00
35.00	0.00	0	92.00	0.00	0.00	0.00
36.00	0.00	0	92.00	0.00	0.00	0.00
37.00	0.00	0	92.00	0.00	0.00	0.00
38.00	0.00	0	92.00	0.00	0.00	0.00
39.00	0.00	0	92.00	0.00	0.00	0.00
40.00	0.00	0	92.00	0.00	0.00	0.00
41.00	0.00	0	92.00	0.00	0.00	0.00
42.00	0.00	0	92.00	0.00	0.00	0.00
43.00	0.00	0	92.00	0.00	0.00	0.00
44.00	0.00	0	92.00	0.00	0.00	0.00
45.00	0.00	0	92.00	0.00	0.00	0.00
46.00	0.00	0	92.00	0.00	0.00	0.00
47.00	0.00	0	92.00	0.00	0.00	0.00
48.00	0.00	0	92.00	0.00	0.00	0.00

Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment WS-1: Watershed-1 Runoff Area=10,775 sf 53.56% Impervious Runoff Depth=5.24"
Tc=6.0 min CN=92 Runoff=1.42 cfs 0.108 af

Subcatchment WS-2: Watershed-2 Runoff Area=34,454 sf 37.28% Impervious Runoff Depth=4.68"
Tc=6.0 min CN=87 Runoff=4.20 cfs 0.308 af

Subcatchment WS-3: Watershed-3 Runoff Area=7,790 sf 0.00% Impervious Runoff Depth=3.73"
Tc=6.0 min CN=78 Runoff=0.78 cfs 0.056 af

Subcatchment WS-4: Watershed - Roof Runoff Area=2,500 sf 100.00% Impervious Runoff Depth=5.93"
Tc=6.0 min CN=98 Runoff=0.35 cfs 0.028 af

Pond 1P: Washington Street Inflow=1.42 cfs 0.108 af
Primary=1.42 cfs 0.108 af

Pond 2P: Wetlands Inflow=4.20 cfs 0.308 af
Primary=4.20 cfs 0.308 af

Pond 3P: Offsite Inflow=0.78 cfs 0.056 af
Primary=0.78 cfs 0.056 af

Pond 4P: Infiltration System Peak Elev=93.90' Storage=452 cf Inflow=0.35 cfs 0.028 af
Discarded=0.03 cfs 0.028 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.028 af

Total Runoff Area = 1.275 ac Runoff Volume = 0.500 af Average Runoff Depth = 4.71"
61.97% Pervious = 0.790 ac 38.03% Impervious = 0.485 ac

Summary for Subcatchment WS-1: Watershed-1

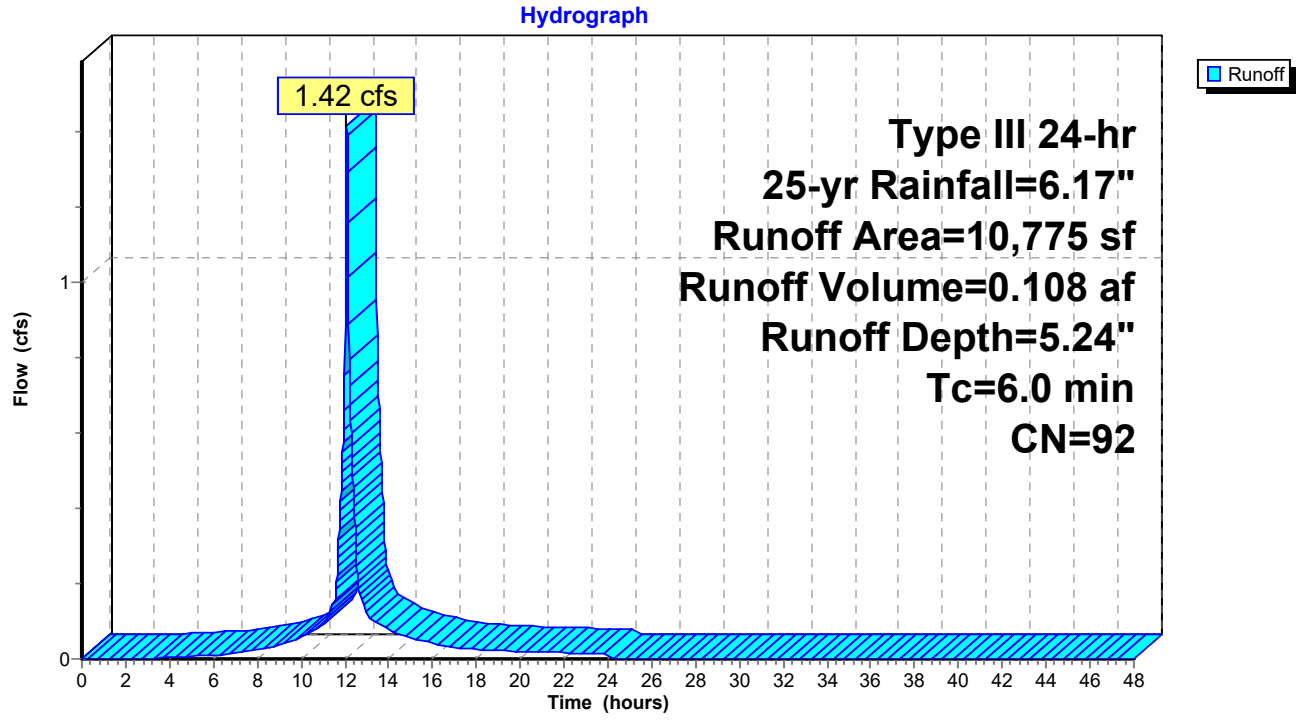
Runoff = 1.42 cfs @ 12.08 hrs, Volume= 0.108 af, Depth= 5.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-yr Rainfall=6.17"

Area (sf)	CN	Description
234	65	Woods/grass comb., Fair, HSG B
5,771	98	Paved parking, HSG B
4,770	85	Gravel roads, HSG B
10,775	92	Weighted Average
5,004		46.44% Pervious Area
5,771		53.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-1**

Subcatchment WS-1: Watershed-1



Hydrograph for Subcatchment WS-1: Watershed-1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.06	0.00	0.00
2.00	0.12	0.00	0.00
3.00	0.19	0.00	0.00
4.00	0.27	0.01	0.00
5.00	0.35	0.03	0.01
6.00	0.44	0.06	0.01
7.00	0.56	0.12	0.02
8.00	0.70	0.20	0.02
9.00	0.90	0.33	0.04
10.00	1.17	0.53	0.06
11.00	1.54	0.84	0.09
12.00	3.08	2.24	**0.88**
13.00	4.63	3.73	**0.12**
14.00	5.00	4.09	0.08
15.00	5.27	4.35	0.06
16.00	5.47	4.55	0.04
17.00	5.61	4.69	0.03
18.00	5.73	4.80	0.02
19.00	5.82	4.89	0.02
20.00	5.90	4.98	0.02
21.00	5.98	5.05	0.02
22.00	6.05	5.12	0.02
23.00	6.11	5.18	0.01
24.00	**6.17**	**5.24**	0.01
25.00	6.17	5.24	0.00
26.00	6.17	5.24	0.00
27.00	6.17	5.24	0.00
28.00	6.17	5.24	0.00
29.00	6.17	5.24	0.00
30.00	6.17	5.24	0.00
31.00	6.17	5.24	0.00
32.00	6.17	5.24	0.00
33.00	6.17	5.24	0.00
34.00	6.17	5.24	0.00
35.00	6.17	5.24	0.00
36.00	6.17	5.24	0.00
37.00	6.17	5.24	0.00
38.00	6.17	5.24	0.00
39.00	6.17	5.24	0.00
40.00	6.17	5.24	0.00
41.00	6.17	5.24	0.00
42.00	6.17	5.24	0.00
43.00	6.17	5.24	0.00
44.00	6.17	5.24	0.00
45.00	6.17	5.24	0.00
46.00	6.17	5.24	0.00
47.00	6.17	5.24	0.00
48.00	6.17	5.24	0.00

Summary for Subcatchment WS-2: Watershed-2

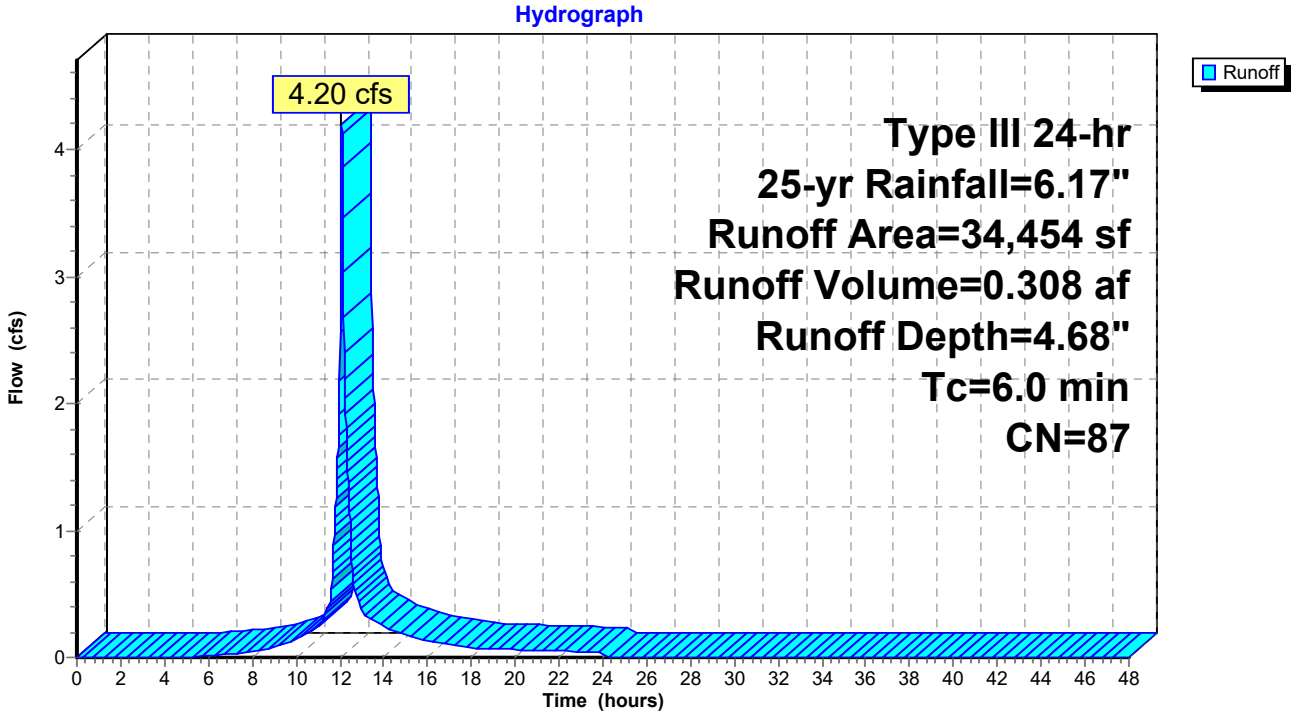
Runoff = 4.20 cfs @ 12.09 hrs, Volume= 0.308 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-yr Rainfall=6.17"

Area (sf)	CN	Description
14,767	77	Woods, Good, HSG D
1,941	73	Brush, Good, HSG D
12,844	98	Paved parking, HSG D
4,902	91	Gravel roads, HSG D
34,454	87	Weighted Average
21,610		62.72% Pervious Area
12,844		37.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-2**

Subcatchment WS-2: Watershed-2



Hydrograph for Subcatchment WS-2: Watershed-2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.06	0.00	0.00
2.00	0.12	0.00	0.00
3.00	0.19	0.00	0.00
4.00	0.27	0.00	0.00
5.00	0.35	0.00	0.00
6.00	0.44	0.01	0.01
7.00	0.56	0.04	0.03
8.00	0.70	0.09	0.05
9.00	0.90	0.17	0.09
10.00	1.17	0.32	0.14
11.00	1.54	0.56	0.24
12.00	3.08	1.81	**2.57**
13.00	4.63	3.22	**0.37**
14.00	5.00	3.57	0.24
15.00	5.27	3.82	0.18
16.00	5.47	4.01	0.13
17.00	5.61	4.15	0.10
18.00	5.73	4.26	0.08
19.00	5.82	4.35	0.07
20.00	5.90	4.43	0.06
21.00	5.98	4.50	0.06
22.00	6.05	4.57	0.05
23.00	6.11	4.63	0.05
24.00	**6.17**	**4.68**	0.04
25.00	6.17	4.68	0.00
26.00	6.17	4.68	0.00
27.00	6.17	4.68	0.00
28.00	6.17	4.68	0.00
29.00	6.17	4.68	0.00
30.00	6.17	4.68	0.00
31.00	6.17	4.68	0.00
32.00	6.17	4.68	0.00
33.00	6.17	4.68	0.00
34.00	6.17	4.68	0.00
35.00	6.17	4.68	0.00
36.00	6.17	4.68	0.00
37.00	6.17	4.68	0.00
38.00	6.17	4.68	0.00
39.00	6.17	4.68	0.00
40.00	6.17	4.68	0.00
41.00	6.17	4.68	0.00
42.00	6.17	4.68	0.00
43.00	6.17	4.68	0.00
44.00	6.17	4.68	0.00
45.00	6.17	4.68	0.00
46.00	6.17	4.68	0.00
47.00	6.17	4.68	0.00
48.00	6.17	4.68	0.00

Summary for Subcatchment WS-3: Watershed-3

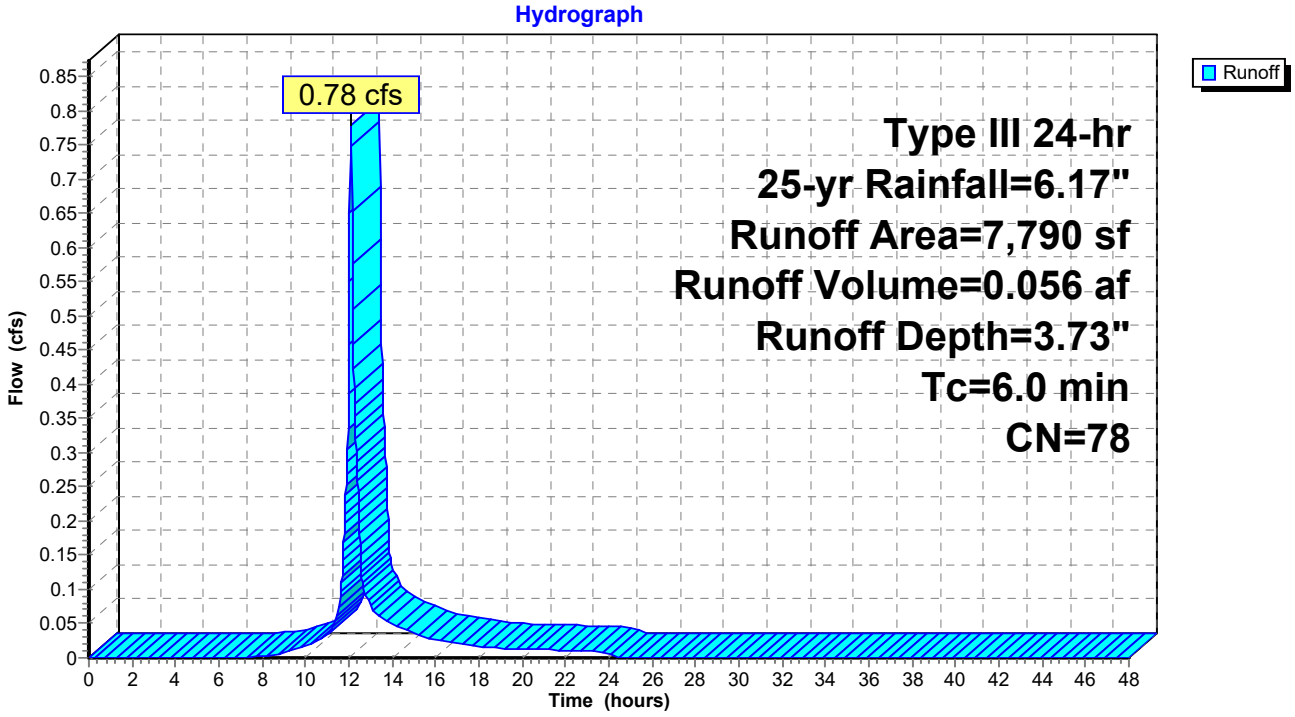
Runoff = 0.78 cfs @ 12.09 hrs, Volume= 0.056 af, Depth= 3.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-yr Rainfall=6.17"

Area (sf)	CN	Description
7,452	77	Woods, Good, HSG D
338	91	Gravel roads, HSG D
7,790	78	Weighted Average
7,790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-3**

Subcatchment WS-3: Watershed-3



Hydrograph for Subcatchment WS-3: Watershed-3

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.06	0.00	0.00
2.00	0.12	0.00	0.00
3.00	0.19	0.00	0.00
4.00	0.27	0.00	0.00
5.00	0.35	0.00	0.00
6.00	0.44	0.00	0.00
7.00	0.56	0.00	0.00
8.00	0.70	0.01	0.00
9.00	0.90	0.04	0.01
10.00	1.17	0.11	0.02
11.00	1.54	0.25	0.03
12.00	3.08	1.19	**0.46**
13.00	4.63	2.40	**0.08**
14.00	5.00	2.71	0.05
15.00	5.27	2.94	0.04
16.00	5.47	3.11	0.03
17.00	5.61	3.24	0.02
18.00	5.73	3.34	0.02
19.00	5.82	3.42	0.01
20.00	5.90	3.49	0.01
21.00	5.98	3.56	0.01
22.00	6.05	3.62	0.01
23.00	6.11	3.68	0.01
24.00	**6.17**	**3.73**	0.01
25.00	6.17	3.73	0.00
26.00	6.17	3.73	0.00
27.00	6.17	3.73	0.00
28.00	6.17	3.73	0.00
29.00	6.17	3.73	0.00
30.00	6.17	3.73	0.00
31.00	6.17	3.73	0.00
32.00	6.17	3.73	0.00
33.00	6.17	3.73	0.00
34.00	6.17	3.73	0.00
35.00	6.17	3.73	0.00
36.00	6.17	3.73	0.00
37.00	6.17	3.73	0.00
38.00	6.17	3.73	0.00
39.00	6.17	3.73	0.00
40.00	6.17	3.73	0.00
41.00	6.17	3.73	0.00
42.00	6.17	3.73	0.00
43.00	6.17	3.73	0.00
44.00	6.17	3.73	0.00
45.00	6.17	3.73	0.00
46.00	6.17	3.73	0.00
47.00	6.17	3.73	0.00
48.00	6.17	3.73	0.00

Summary for Subcatchment WS-4: Watershed - Roof

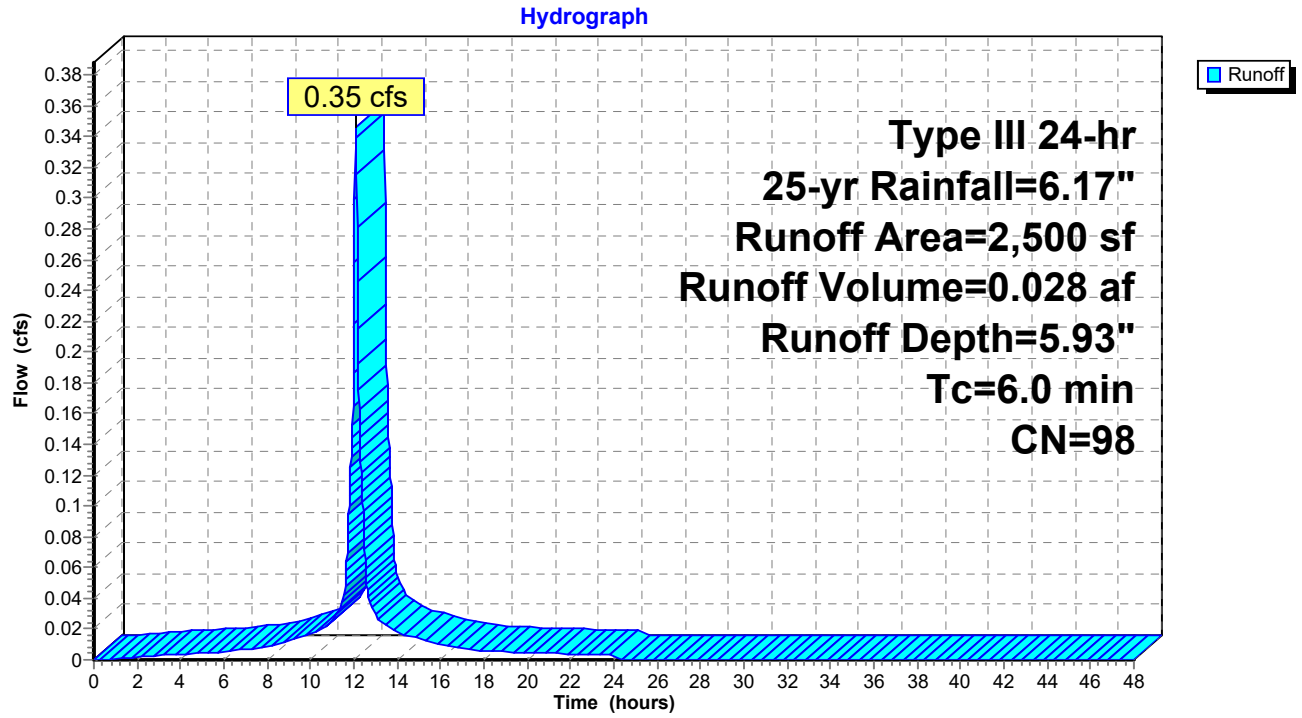
Runoff = 0.35 cfs @ 12.08 hrs, Volume= 0.028 af, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-yr Rainfall=6.17"

Area (sf)	CN	Description
2,500	98	Roofs, HSG D
2,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc of 6 minutes**

Subcatchment WS-4: Watershed - Roof



Hydrograph for Subcatchment WS-4: Watershed - Roof

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.06	0.00	0.00
2.00	0.12	0.02	0.00
3.00	0.19	0.06	0.00
4.00	0.27	0.12	0.00
5.00	0.35	0.19	0.00
6.00	0.44	0.27	0.01
7.00	0.56	0.37	0.01
8.00	0.70	0.51	0.01
9.00	0.90	0.69	0.01
10.00	1.17	0.95	0.02
11.00	1.54	1.32	0.02
12.00	3.08	2.85	**0.22**
13.00	4.63	4.39	**0.03**
14.00	5.00	4.77	0.02
15.00	5.27	5.03	0.01
16.00	5.47	5.23	0.01
17.00	5.61	5.37	0.01
18.00	5.73	5.49	0.01
19.00	5.82	5.58	0.01
20.00	5.90	5.67	0.00
21.00	5.98	5.74	0.00
22.00	6.05	5.81	0.00
23.00	6.11	5.88	0.00
24.00	**6.17**	**5.93**	0.00
25.00	6.17	5.93	0.00
26.00	6.17	5.93	0.00
27.00	6.17	5.93	0.00
28.00	6.17	5.93	0.00
29.00	6.17	5.93	0.00
30.00	6.17	5.93	0.00
31.00	6.17	5.93	0.00
32.00	6.17	5.93	0.00
33.00	6.17	5.93	0.00
34.00	6.17	5.93	0.00
35.00	6.17	5.93	0.00
36.00	6.17	5.93	0.00
37.00	6.17	5.93	0.00
38.00	6.17	5.93	0.00
39.00	6.17	5.93	0.00
40.00	6.17	5.93	0.00
41.00	6.17	5.93	0.00
42.00	6.17	5.93	0.00
43.00	6.17	5.93	0.00
44.00	6.17	5.93	0.00
45.00	6.17	5.93	0.00
46.00	6.17	5.93	0.00
47.00	6.17	5.93	0.00
48.00	6.17	5.93	0.00

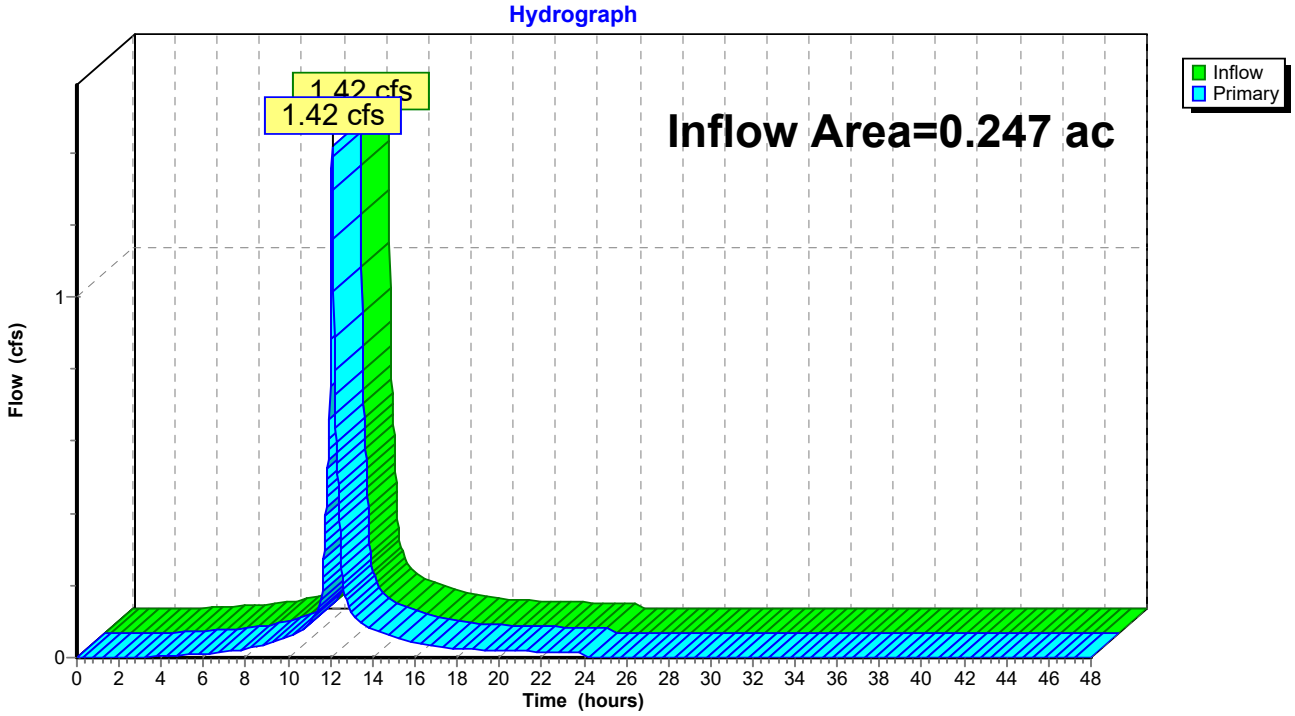
Summary for Pond 1P: Washington Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.247 ac, 53.56% Impervious, Inflow Depth = 5.24" for 25-yr event
Inflow = 1.42 cfs @ 12.08 hrs, Volume= 0.108 af
Primary = 1.42 cfs @ 12.08 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 1P: Washington Street



Hydrograph for Pond 1P: Washington Street

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.01		0.01
6.00	0.01		0.01
7.00	0.02		0.02
8.00	0.02		0.02
9.00	0.04		0.04
10.00	0.06		0.06
11.00	0.09		0.09
12.00	**0.88**		**0.88**
13.00	**0.12**		**0.12**
14.00	0.08		0.08
15.00	0.06		0.06
16.00	0.04		0.04
17.00	0.03		0.03
18.00	0.02		0.02
19.00	0.02		0.02
20.00	0.02		0.02
21.00	0.02		0.02
22.00	0.02		0.02
23.00	0.01		0.01
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

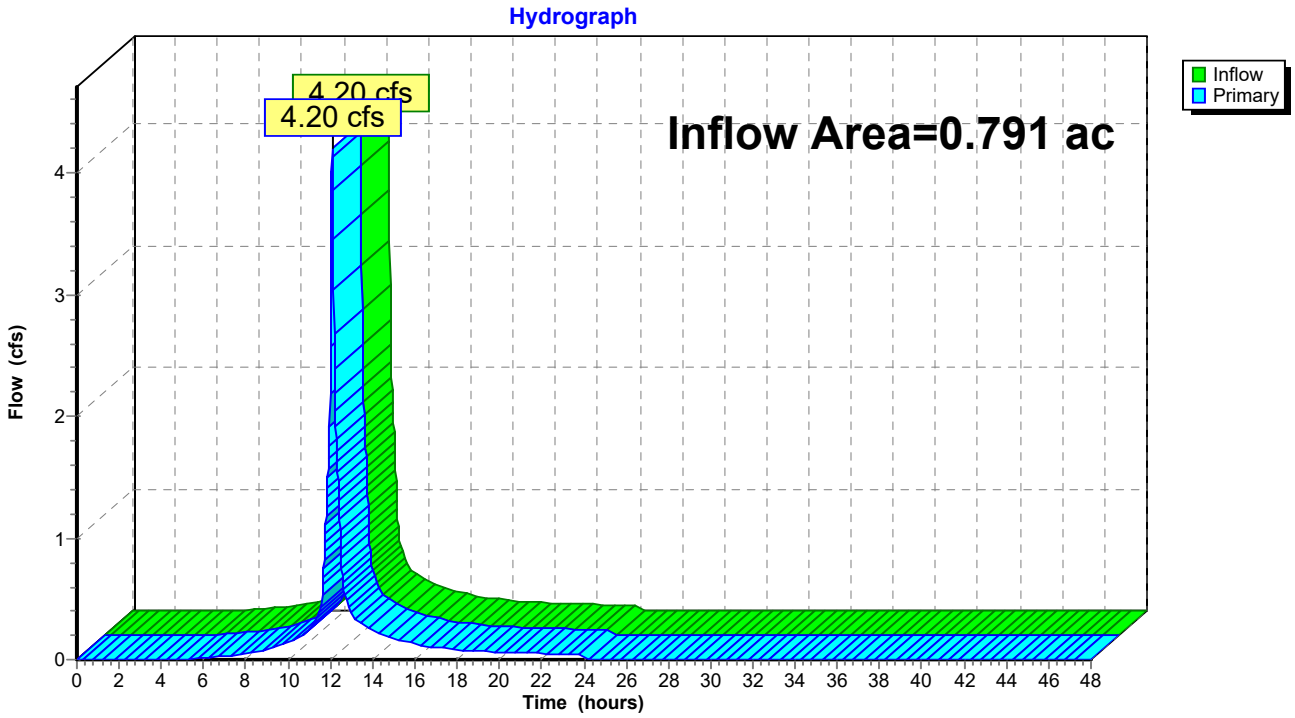
Summary for Pond 2P: Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.791 ac, 37.28% Impervious, Inflow Depth = 4.68" for 25-yr event
Inflow = 4.20 cfs @ 12.09 hrs, Volume= 0.308 af
Primary = 4.20 cfs @ 12.09 hrs, Volume= 0.308 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 2P: Wetlands



Hydrograph for Pond 2P: Wetlands

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.01		0.01
7.00	0.03		0.03
8.00	0.05		0.05
9.00	0.09		0.09
10.00	0.14		0.14
11.00	0.24		0.24
12.00	**2.57**		**2.57**
13.00	**0.37**		**0.37**
14.00	0.24		0.24
15.00	0.18		0.18
16.00	0.13		0.13
17.00	0.10		0.10
18.00	0.08		0.08
19.00	0.07		0.07
20.00	0.06		0.06
21.00	0.06		0.06
22.00	0.05		0.05
23.00	0.05		0.05
24.00	0.04		0.04
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

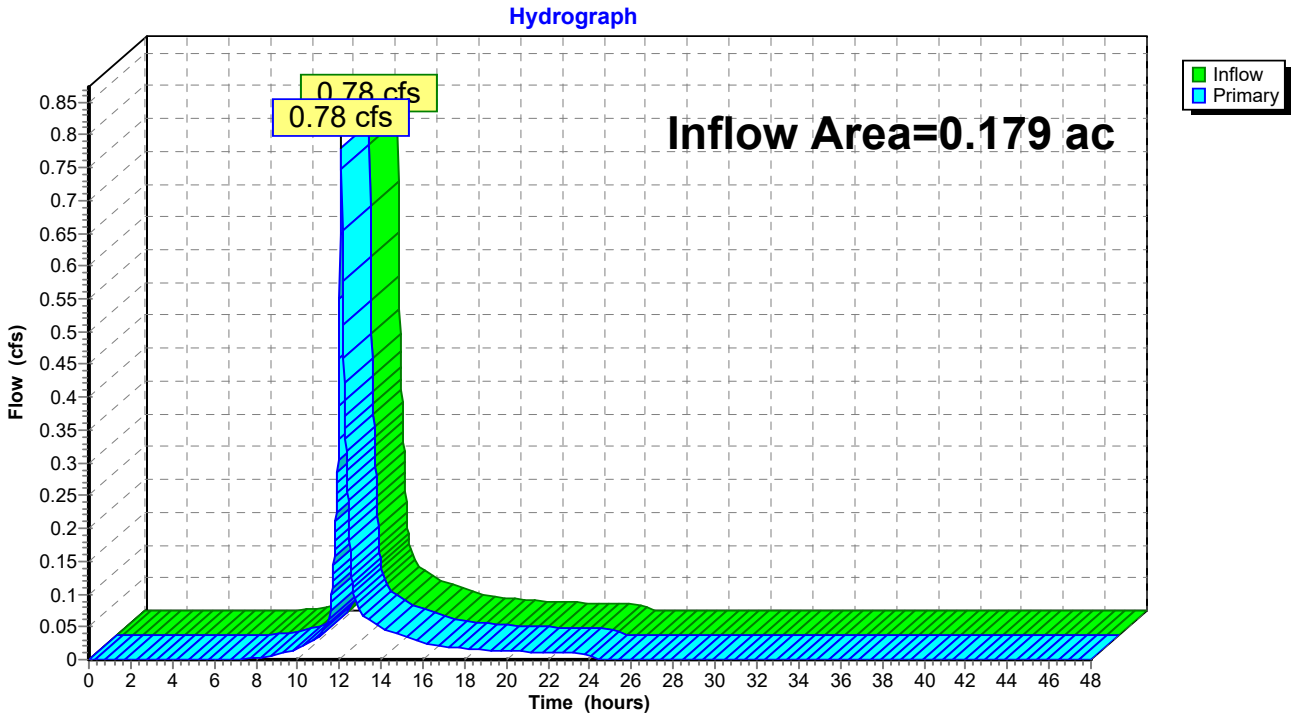
Summary for Pond 3P: Offsite

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.179 ac, 0.00% Impervious, Inflow Depth = 3.73" for 25-yr event
Inflow = 0.78 cfs @ 12.09 hrs, Volume= 0.056 af
Primary = 0.78 cfs @ 12.09 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 3P: Offsite



Hydrograph for Pond 3P: Offsite

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.01		0.01
10.00	0.02		0.02
11.00	0.03		0.03
12.00	**0.46**		**0.46**
13.00	**0.08**		**0.08**
14.00	0.05		0.05
15.00	0.04		0.04
16.00	0.03		0.03
17.00	0.02		0.02
18.00	0.02		0.02
19.00	0.01		0.01
20.00	0.01		0.01
21.00	0.01		0.01
22.00	0.01		0.01
23.00	0.01		0.01
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Summary for Pond 4P: Infiltration System

[92] Warning: Device #2 is above defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=100)

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth = 5.93" for 25-yr event
Inflow = 0.35 cfs @ 12.08 hrs, Volume= 0.028 af
Outflow = 0.03 cfs @ 19.80 hrs, Volume= 0.028 af, Atten= 91%, Lag= 463.0 min
Discarded = 0.03 cfs @ 19.80 hrs, Volume= 0.028 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 93.90' @ 13.33 hrs Surf.Area= 377 sf Storage= 452 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 118.5 min (863.2 - 744.7)

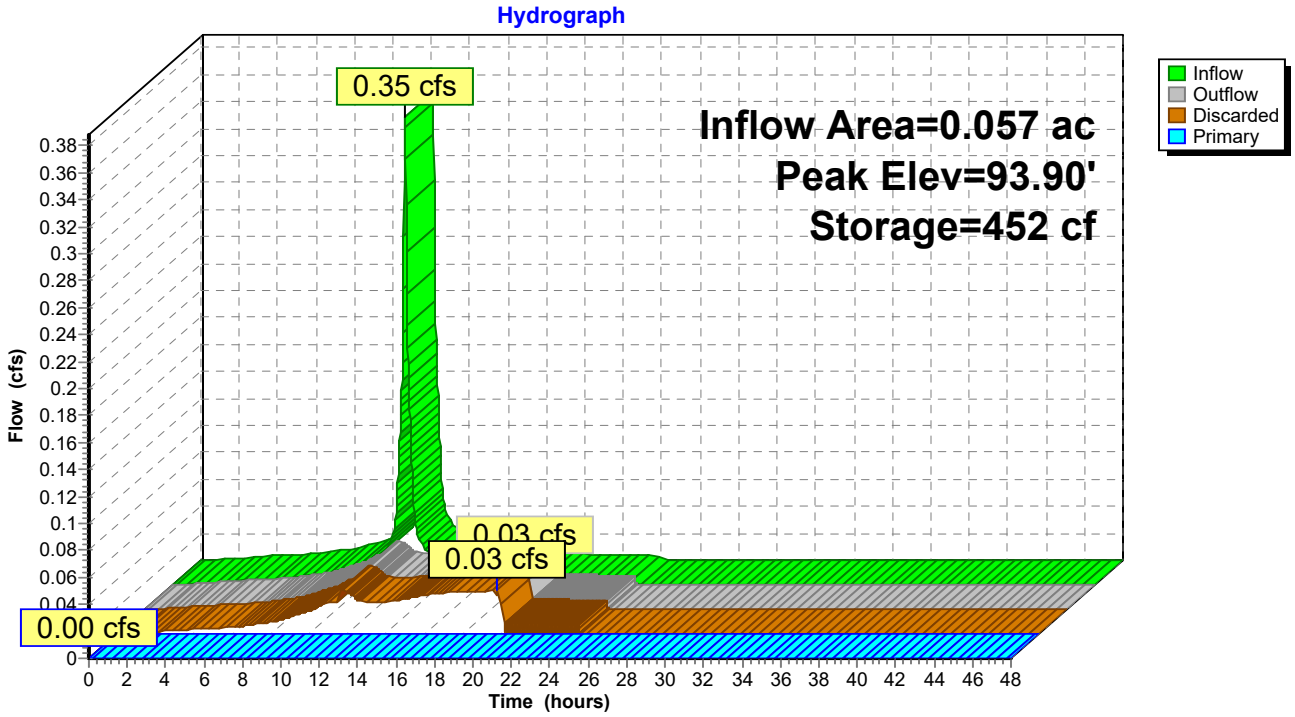
Volume	Invert	Avail.Storage	Storage Description
#1	92.00'	288 cf	**10.00'W x 36.00'L x 2.00'H Prismatoid** 720 cf Overall x 40.0% Voids
#2	92.17'	178 cf	**Cultec R-180** x 8 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 1 rows
		466 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	92.00'	**2.750 in/hr Exfiltration over Surface area**
#2	Primary	99.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.03 cfs @ 19.80 hrs HW=92.17' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=92.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 4P: Infiltration System



Hydrograph for Pond 4P: Infiltration System

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	92.00	0.00	0.00	**0.00**
1.00	0.00	0	92.00	0.00	0.00	0.00
2.00	0.00	0	92.00	0.00	0.00	0.00
3.00	0.00	0	92.00	0.00	0.00	0.00
4.00	0.00	0	92.00	0.00	0.00	0.00
5.00	0.00	0	92.00	0.00	0.00	0.00
6.00	0.01	0	92.00	0.01	0.01	0.00
7.00	0.01	0	92.00	0.01	0.01	0.00
8.00	0.01	0	92.00	0.01	0.01	0.00
9.00	0.01	0	92.00	0.01	0.01	0.00
10.00	0.02	0	92.00	0.02	0.02	0.00
11.00	0.02	1	92.01	0.02	0.02	0.00
12.00	**0.22**	136	92.57	0.03	0.03	0.00
13.00	**0.03**	**450**	**93.89**	0.02	0.02	0.00
14.00	0.02	**445**	**93.86**	0.02	0.02	0.00
15.00	0.01	413	93.67	0.03	0.03	0.00
16.00	0.01	356	93.41	0.03	0.03	0.00
17.00	0.01	281	93.10	0.03	0.03	0.00
18.00	0.01	195	92.78	0.03	0.03	0.00
19.00	0.01	102	92.44	**0.03**	**0.03**	0.00
20.00	0.00	11	92.08	**0.02**	**0.02**	0.00
21.00	0.00	0	92.00	0.01	0.01	0.00
22.00	0.00	0	92.00	0.01	0.01	0.00
23.00	0.00	0	92.00	0.01	0.01	0.00
24.00	0.00	0	92.00	0.01	0.01	0.00
25.00	0.00	0	92.00	0.00	0.00	0.00
26.00	0.00	0	92.00	0.00	0.00	0.00
27.00	0.00	0	92.00	0.00	0.00	0.00
28.00	0.00	0	92.00	0.00	0.00	0.00
29.00	0.00	0	92.00	0.00	0.00	0.00
30.00	0.00	0	92.00	0.00	0.00	0.00
31.00	0.00	0	92.00	0.00	0.00	0.00
32.00	0.00	0	92.00	0.00	0.00	0.00
33.00	0.00	0	92.00	0.00	0.00	0.00
34.00	0.00	0	92.00	0.00	0.00	0.00
35.00	0.00	0	92.00	0.00	0.00	0.00
36.00	0.00	0	92.00	0.00	0.00	0.00
37.00	0.00	0	92.00	0.00	0.00	0.00
38.00	0.00	0	92.00	0.00	0.00	0.00
39.00	0.00	0	92.00	0.00	0.00	0.00
40.00	0.00	0	92.00	0.00	0.00	0.00
41.00	0.00	0	92.00	0.00	0.00	0.00
42.00	0.00	0	92.00	0.00	0.00	0.00
43.00	0.00	0	92.00	0.00	0.00	0.00
44.00	0.00	0	92.00	0.00	0.00	0.00
45.00	0.00	0	92.00	0.00	0.00	0.00
46.00	0.00	0	92.00	0.00	0.00	0.00
47.00	0.00	0	92.00	0.00	0.00	0.00
48.00	0.00	0	92.00	0.00	0.00	0.00

Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment WS-1: Watershed-1 Runoff Area=10,775 sf 53.56% Impervious Runoff Depth=7.89"
Tc=6.0 min CN=92 Runoff=2.09 cfs 0.163 af

Subcatchment WS-2: Watershed-2 Runoff Area=34,454 sf 37.28% Impervious Runoff Depth=7.28"
Tc=6.0 min CN=87 Runoff=6.38 cfs 0.480 af

Subcatchment WS-3: Watershed-3 Runoff Area=7,790 sf 0.00% Impervious Runoff Depth=6.18"
Tc=6.0 min CN=78 Runoff=1.28 cfs 0.092 af

Subcatchment WS-4: Watershed - Roof Runoff Area=2,500 sf 100.00% Impervious Runoff Depth=8.61"
Tc=6.0 min CN=98 Runoff=0.50 cfs 0.041 af

Pond 1P: Washington Street Inflow=2.09 cfs 0.163 af
Primary=2.09 cfs 0.163 af

Pond 2P: Wetlands Inflow=6.38 cfs 0.480 af
Primary=6.38 cfs 0.480 af

Pond 3P: Offsite Inflow=1.28 cfs 0.092 af
Primary=1.28 cfs 0.092 af

Pond 4P: Infiltration System Peak Elev=99.87' Storage=466 cf Inflow=0.50 cfs 0.041 af
Discarded=0.03 cfs 0.034 af Primary=0.38 cfs 0.007 af Outflow=0.40 cfs 0.041 af

Total Runoff Area = 1.275 ac Runoff Volume = 0.776 af Average Runoff Depth = 7.30"
61.97% Pervious = 0.790 ac 38.03% Impervious = 0.485 ac

Summary for Subcatchment WS-1: Watershed-1

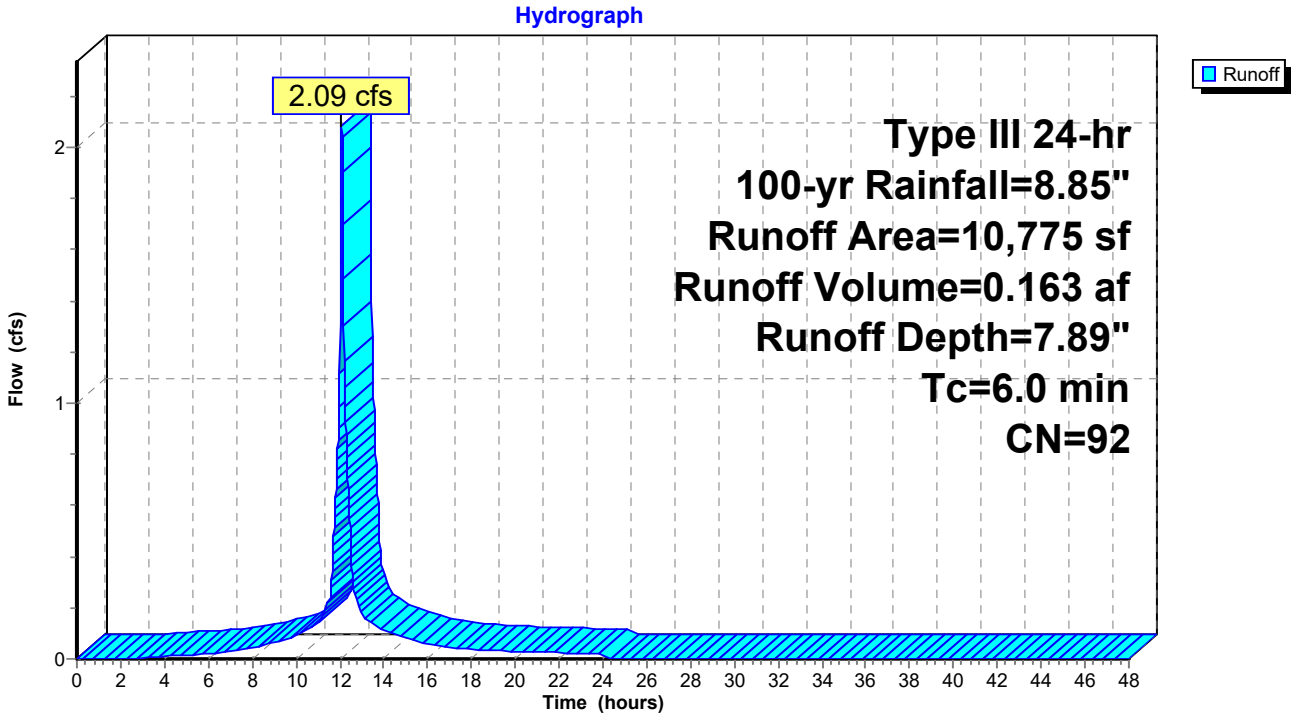
Runoff = 2.09 cfs @ 12.08 hrs, Volume= 0.163 af, Depth= 7.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-yr Rainfall=8.85"

Area (sf)	CN	Description
234	65	Woods/grass comb., Fair, HSG B
5,771	98	Paved parking, HSG B
4,770	85	Gravel roads, HSG B
10,775	92	Weighted Average
5,004		46.44% Pervious Area
5,771		53.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-1**

Subcatchment WS-1: Watershed-1



Hydrograph for Subcatchment WS-1: Watershed-1

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.09	0.00	0.00
2.00	0.18	0.00	0.00
3.00	0.27	0.01	0.00
4.00	0.38	0.04	0.01
5.00	0.50	0.09	0.01
6.00	0.64	0.16	0.02
7.00	0.80	0.26	0.03
8.00	1.01	0.41	0.04
9.00	1.29	0.63	0.06
10.00	1.67	0.95	0.09
11.00	2.21	1.43	0.14
12.00	4.42	3.53	**1.31**
13.00	6.64	5.70	**0.18**
14.00	7.18	6.23	0.11
15.00	7.56	6.61	0.08
16.00	7.84	6.89	0.06
17.00	8.05	7.09	0.05
18.00	8.21	7.25	0.04
19.00	8.35	7.39	0.03
20.00	8.47	7.51	0.03
21.00	8.58	7.62	0.03
22.00	8.68	7.72	0.02
23.00	8.77	7.81	0.02
24.00	**8.85**	**7.89**	0.02
25.00	8.85	7.89	0.00
26.00	8.85	7.89	0.00
27.00	8.85	7.89	0.00
28.00	8.85	7.89	0.00
29.00	8.85	7.89	0.00
30.00	8.85	7.89	0.00
31.00	8.85	7.89	0.00
32.00	8.85	7.89	0.00
33.00	8.85	7.89	0.00
34.00	8.85	7.89	0.00
35.00	8.85	7.89	0.00
36.00	8.85	7.89	0.00
37.00	8.85	7.89	0.00
38.00	8.85	7.89	0.00
39.00	8.85	7.89	0.00
40.00	8.85	7.89	0.00
41.00	8.85	7.89	0.00
42.00	8.85	7.89	0.00
43.00	8.85	7.89	0.00
44.00	8.85	7.89	0.00
45.00	8.85	7.89	0.00
46.00	8.85	7.89	0.00
47.00	8.85	7.89	0.00
48.00	8.85	7.89	0.00

Summary for Subcatchment WS-2: Watershed-2

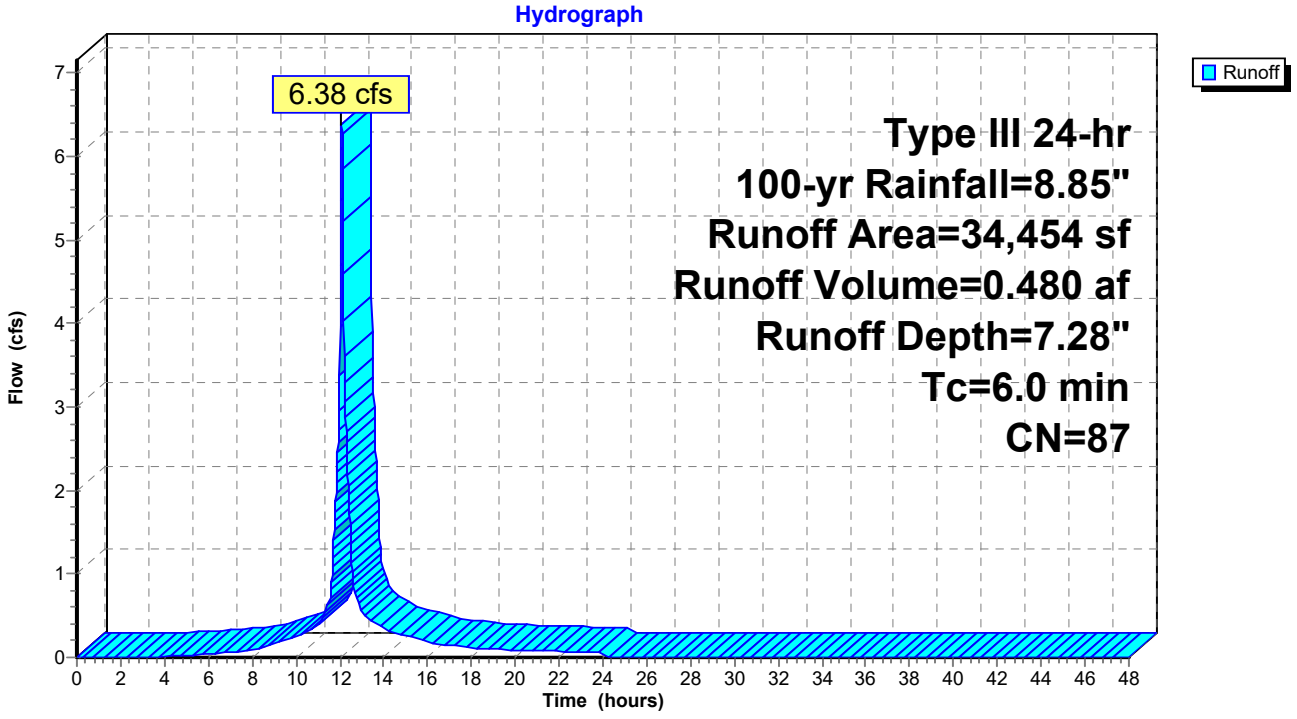
Runoff = 6.38 cfs @ 12.08 hrs, Volume= 0.480 af, Depth= 7.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-yr Rainfall=8.85"

Area (sf)	CN	Description
14,767	77	Woods, Good, HSG D
1,941	73	Brush, Good, HSG D
12,844	98	Paved parking, HSG D
4,902	91	Gravel roads, HSG D
34,454	87	Weighted Average
21,610		62.72% Pervious Area
12,844		37.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-2**

Subcatchment WS-2: Watershed-2



Hydrograph for Subcatchment WS-2: Watershed-2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.09	0.00	0.00
2.00	0.18	0.00	0.00
3.00	0.27	0.00	0.00
4.00	0.38	0.00	0.01
5.00	0.50	0.02	0.02
6.00	0.64	0.06	0.04
7.00	0.80	0.13	0.06
8.00	1.01	0.23	0.10
9.00	1.29	0.40	0.16
10.00	1.67	0.66	0.24
11.00	2.21	1.07	0.40
12.00	4.42	3.03	**3.96**
13.00	6.64	5.13	**0.55**
14.00	7.18	5.65	0.35
15.00	7.56	6.02	0.26
16.00	7.84	6.30	0.19
17.00	8.05	6.50	0.15
18.00	8.21	6.66	0.11
19.00	8.35	6.79	0.10
20.00	8.47	6.91	0.09
21.00	8.58	7.01	0.08
22.00	8.68	7.11	0.07
23.00	8.77	7.20	0.07
24.00	**8.85**	**7.28**	0.06
25.00	8.85	7.28	0.00
26.00	8.85	7.28	0.00
27.00	8.85	7.28	0.00
28.00	8.85	7.28	0.00
29.00	8.85	7.28	0.00
30.00	8.85	7.28	0.00
31.00	8.85	7.28	0.00
32.00	8.85	7.28	0.00
33.00	8.85	7.28	0.00
34.00	8.85	7.28	0.00
35.00	8.85	7.28	0.00
36.00	8.85	7.28	0.00
37.00	8.85	7.28	0.00
38.00	8.85	7.28	0.00
39.00	8.85	7.28	0.00
40.00	8.85	7.28	0.00
41.00	8.85	7.28	0.00
42.00	8.85	7.28	0.00
43.00	8.85	7.28	0.00
44.00	8.85	7.28	0.00
45.00	8.85	7.28	0.00
46.00	8.85	7.28	0.00
47.00	8.85	7.28	0.00
48.00	8.85	7.28	0.00

Summary for Subcatchment WS-3: Watershed-3

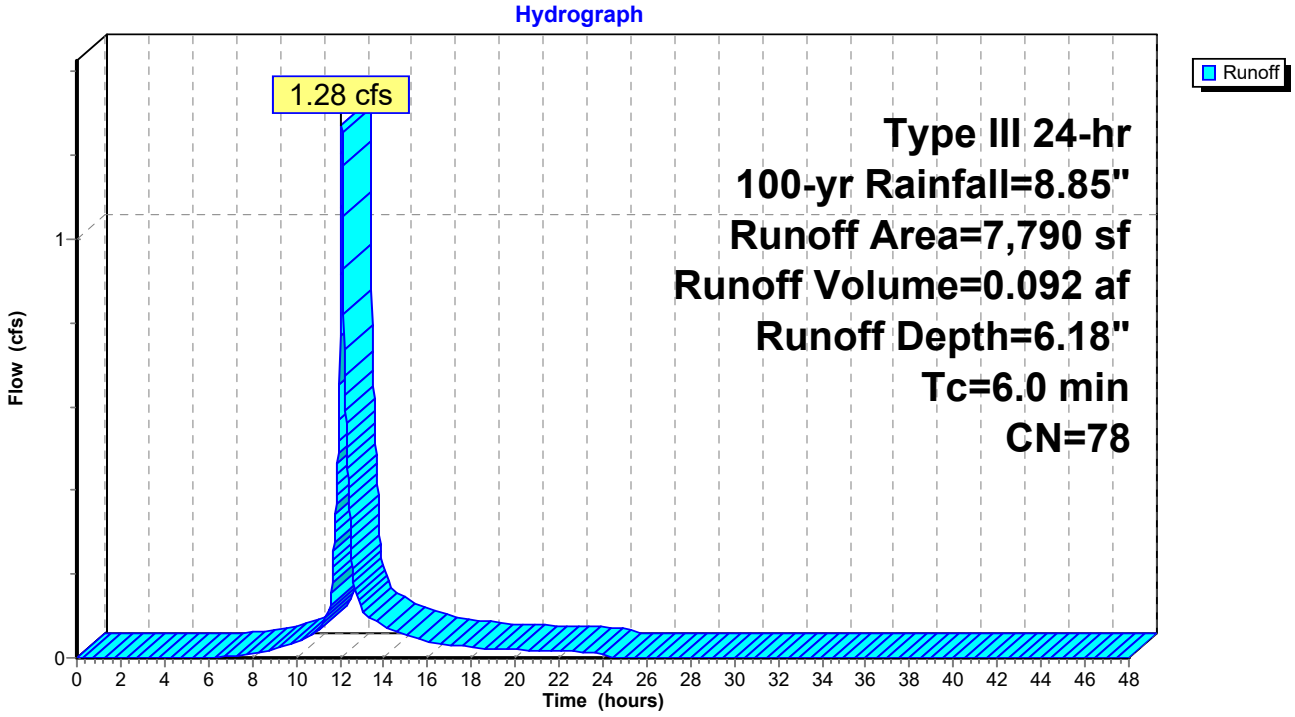
Runoff = 1.28 cfs @ 12.09 hrs, Volume= 0.092 af, Depth= 6.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-yr Rainfall=8.85"

Area (sf)	CN	Description
7,452	77	Woods, Good, HSG D
338	91	Gravel roads, HSG D
7,790	78	Weighted Average
7,790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry: WS-3**

Subcatchment WS-3: Watershed-3



Hydrograph for Subcatchment WS-3: Watershed-3

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.09	0.00	0.00
2.00	0.18	0.00	0.00
3.00	0.27	0.00	0.00
4.00	0.38	0.00	0.00
5.00	0.50	0.00	0.00
6.00	0.64	0.00	0.00
7.00	0.80	0.02	0.00
8.00	1.01	0.06	0.01
9.00	1.29	0.15	0.02
10.00	1.67	0.31	0.04
11.00	2.21	0.61	0.07
12.00	4.42	2.23	**0.77**
13.00	6.64	4.15	**0.12**
14.00	7.18	4.64	0.07
15.00	7.56	4.99	0.06
16.00	7.84	5.24	0.04
17.00	8.05	5.44	0.03
18.00	8.21	5.59	0.02
19.00	8.35	5.71	0.02
20.00	8.47	5.83	0.02
21.00	8.58	5.93	0.02
22.00	8.68	6.02	0.02
23.00	8.77	6.11	0.01
24.00	**8.85**	**6.18**	0.01
25.00	8.85	6.18	0.00
26.00	8.85	6.18	0.00
27.00	8.85	6.18	0.00
28.00	8.85	6.18	0.00
29.00	8.85	6.18	0.00
30.00	8.85	6.18	0.00
31.00	8.85	6.18	0.00
32.00	8.85	6.18	0.00
33.00	8.85	6.18	0.00
34.00	8.85	6.18	0.00
35.00	8.85	6.18	0.00
36.00	8.85	6.18	0.00
37.00	8.85	6.18	0.00
38.00	8.85	6.18	0.00
39.00	8.85	6.18	0.00
40.00	8.85	6.18	0.00
41.00	8.85	6.18	0.00
42.00	8.85	6.18	0.00
43.00	8.85	6.18	0.00
44.00	8.85	6.18	0.00
45.00	8.85	6.18	0.00
46.00	8.85	6.18	0.00
47.00	8.85	6.18	0.00
48.00	8.85	6.18	0.00

Summary for Subcatchment WS-4: Watershed - Roof

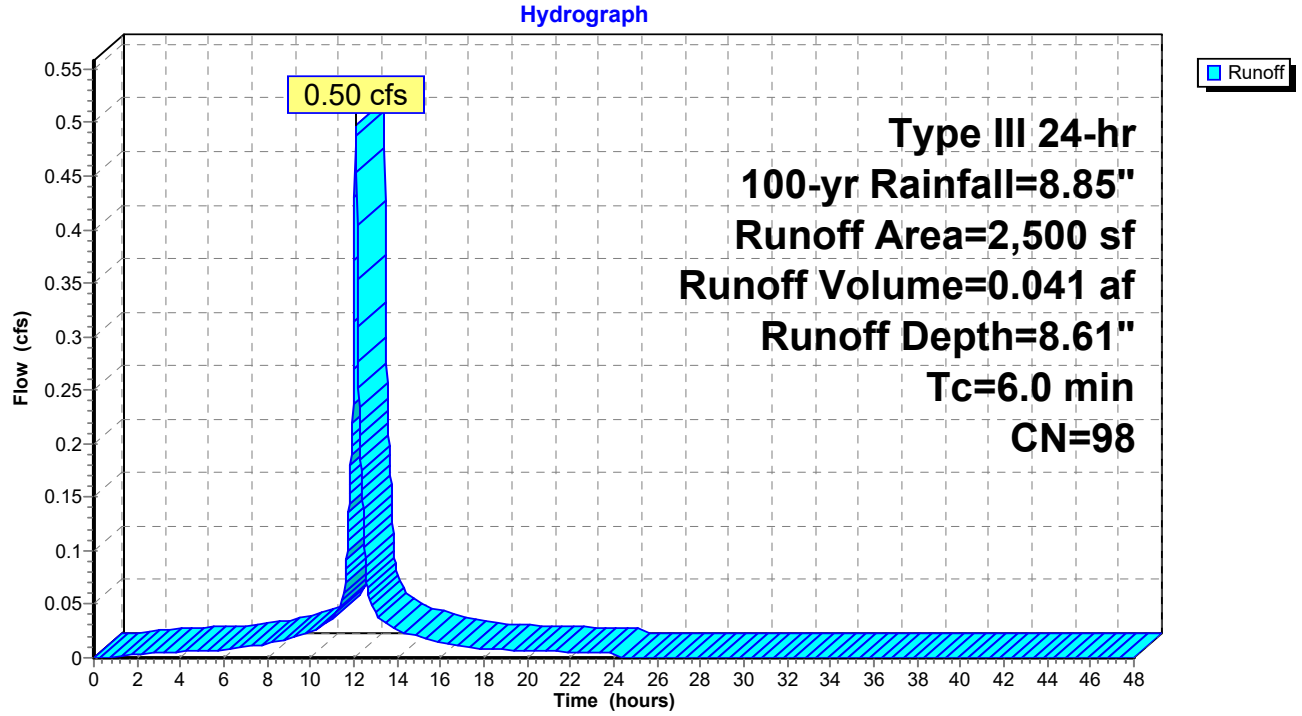
Runoff = 0.50 cfs @ 12.08 hrs, Volume= 0.041 af, Depth= 8.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-yr Rainfall=8.85"

Area (sf)	CN	Description
2,500	98	Roofs, HSG D
2,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc of 6 minutes**

Subcatchment WS-4: Watershed - Roof



Hydrograph for Subcatchment WS-4: Watershed - Roof

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.09	0.01	0.00
2.00	0.18	0.05	0.00
3.00	0.27	0.12	0.00
4.00	0.38	0.21	0.01
5.00	0.50	0.32	0.01
6.00	0.64	0.44	0.01
7.00	0.80	0.60	0.01
8.00	1.01	0.80	0.01
9.00	1.29	1.07	0.02
10.00	1.67	1.45	0.02
11.00	2.21	1.99	0.04
12.00	4.42	4.19	**0.31**
13.00	6.64	6.40	**0.04**
14.00	7.18	6.94	0.03
15.00	7.56	7.32	0.02
16.00	7.84	7.60	0.01
17.00	8.05	7.81	0.01
18.00	8.21	7.97	0.01
19.00	8.35	8.11	0.01
20.00	8.47	8.23	0.01
21.00	8.58	8.34	0.01
22.00	8.68	8.44	0.01
23.00	8.77	8.53	0.00
24.00	**8.85**	**8.61**	0.00
25.00	8.85	8.61	0.00
26.00	8.85	8.61	0.00
27.00	8.85	8.61	0.00
28.00	8.85	8.61	0.00
29.00	8.85	8.61	0.00
30.00	8.85	8.61	0.00
31.00	8.85	8.61	0.00
32.00	8.85	8.61	0.00
33.00	8.85	8.61	0.00
34.00	8.85	8.61	0.00
35.00	8.85	8.61	0.00
36.00	8.85	8.61	0.00
37.00	8.85	8.61	0.00
38.00	8.85	8.61	0.00
39.00	8.85	8.61	0.00
40.00	8.85	8.61	0.00
41.00	8.85	8.61	0.00
42.00	8.85	8.61	0.00
43.00	8.85	8.61	0.00
44.00	8.85	8.61	0.00
45.00	8.85	8.61	0.00
46.00	8.85	8.61	0.00
47.00	8.85	8.61	0.00
48.00	8.85	8.61	0.00

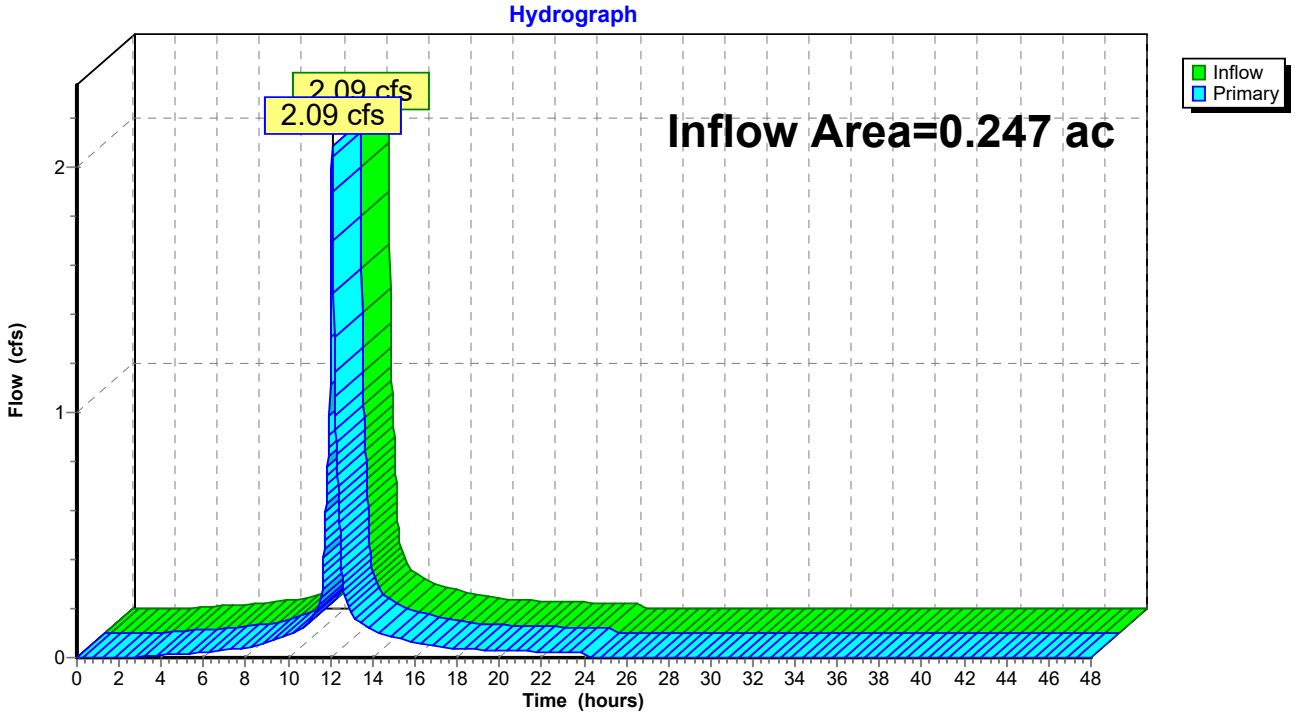
Summary for Pond 1P: Washington Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.247 ac, 53.56% Impervious, Inflow Depth = 7.89" for 100-yr event
Inflow = 2.09 cfs @ 12.08 hrs, Volume= 0.163 af
Primary = 2.09 cfs @ 12.08 hrs, Volume= 0.163 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 1P: Washington Street



Hydrograph for Pond 1P: Washington Street

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.01		0.01
5.00	0.01		0.01
6.00	0.02		0.02
7.00	0.03		0.03
8.00	0.04		0.04
9.00	0.06		0.06
10.00	0.09		0.09
11.00	0.14		0.14
12.00	**1.31**		**1.31**
13.00	**0.18**		**0.18**
14.00	0.11		0.11
15.00	0.08		0.08
16.00	0.06		0.06
17.00	0.05		0.05
18.00	0.04		0.04
19.00	0.03		0.03
20.00	0.03		0.03
21.00	0.03		0.03
22.00	0.02		0.02
23.00	0.02		0.02
24.00	0.02		0.02
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

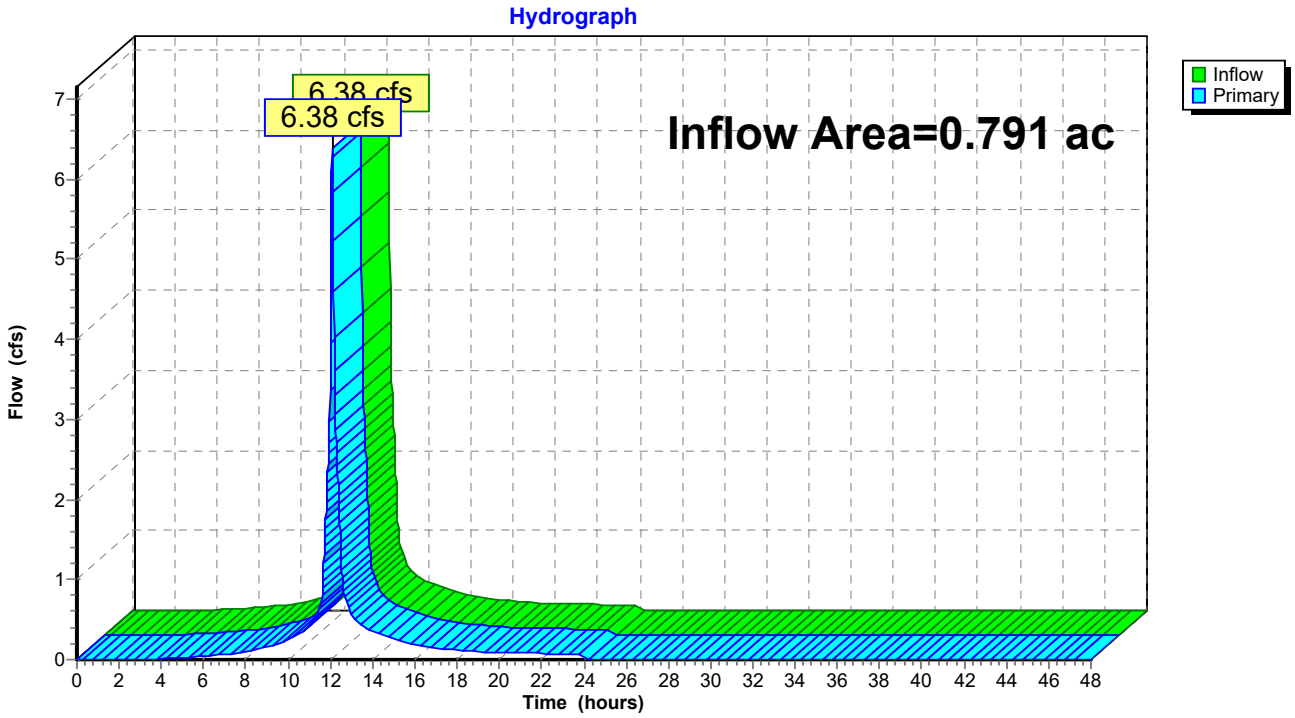
Summary for Pond 2P: Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.791 ac, 37.28% Impervious, Inflow Depth = 7.28" for 100-yr event
Inflow = 6.38 cfs @ 12.08 hrs, Volume= 0.480 af
Primary = 6.38 cfs @ 12.08 hrs, Volume= 0.480 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 2P: Wetlands



Hydrograph for Pond 2P: Wetlands

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.01		0.01
5.00	0.02		0.02
6.00	0.04		0.04
7.00	0.06		0.06
8.00	0.10		0.10
9.00	0.16		0.16
10.00	0.24		0.24
11.00	0.40		0.40
12.00	**3.96**		**3.96**
13.00	**0.55**		**0.55**
14.00	0.35		0.35
15.00	0.26		0.26
16.00	0.19		0.19
17.00	0.15		0.15
18.00	0.11		0.11
19.00	0.10		0.10
20.00	0.09		0.09
21.00	0.08		0.08
22.00	0.07		0.07
23.00	0.07		0.07
24.00	0.06		0.06
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

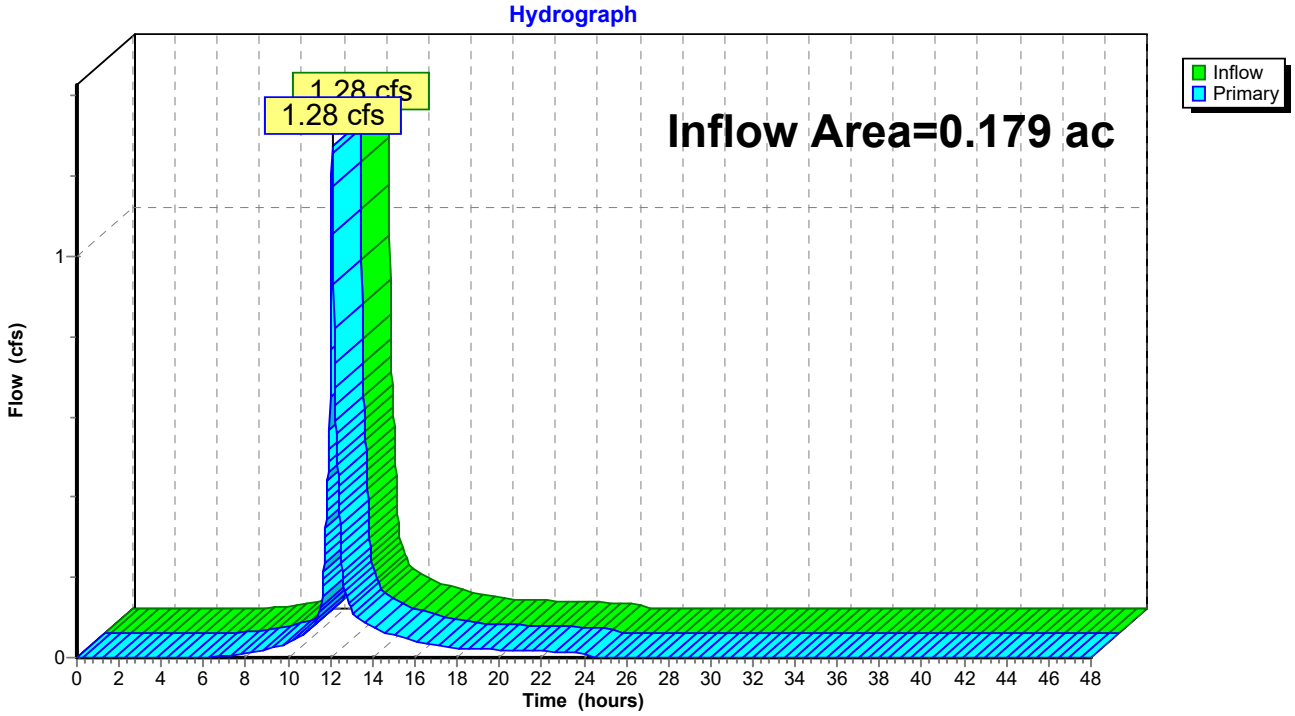
Summary for Pond 3P: Offsite

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.179 ac, 0.00% Impervious, Inflow Depth = 6.18" for 100-yr event
Inflow = 1.28 cfs @ 12.09 hrs, Volume= 0.092 af
Primary = 1.28 cfs @ 12.09 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond 3P: Offsite



Hydrograph for Pond 3P: Offsite

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.01		0.01
9.00	0.02		0.02
10.00	0.04		0.04
11.00	0.07		0.07
12.00	**0.77**		**0.77**
13.00	**0.12**		**0.12**
14.00	0.07		0.07
15.00	0.06		0.06
16.00	0.04		0.04
17.00	0.03		0.03
18.00	0.02		0.02
19.00	0.02		0.02
20.00	0.02		0.02
21.00	0.02		0.02
22.00	0.02		0.02
23.00	0.01		0.01
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00

Summary for Pond 4P: Infiltration System

[92] Warning: Device #2 is above defined storage
[93] Warning: Storage range exceeded by 5.87'
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=107)

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth = 8.61" for 100-yr event
Inflow = 0.50 cfs @ 12.08 hrs, Volume= 0.041 af
Outflow = 0.40 cfs @ 12.18 hrs, Volume= 0.041 af, Atten= 19%, Lag= 5.7 min
Discarded = 0.03 cfs @ 11.00 hrs, Volume= 0.034 af
Primary = 0.38 cfs @ 12.18 hrs, Volume= 0.007 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 99.87' @ 12.18 hrs Surf.Area= 377 sf Storage= 466 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 109.3 min (849.3 - 740.0)

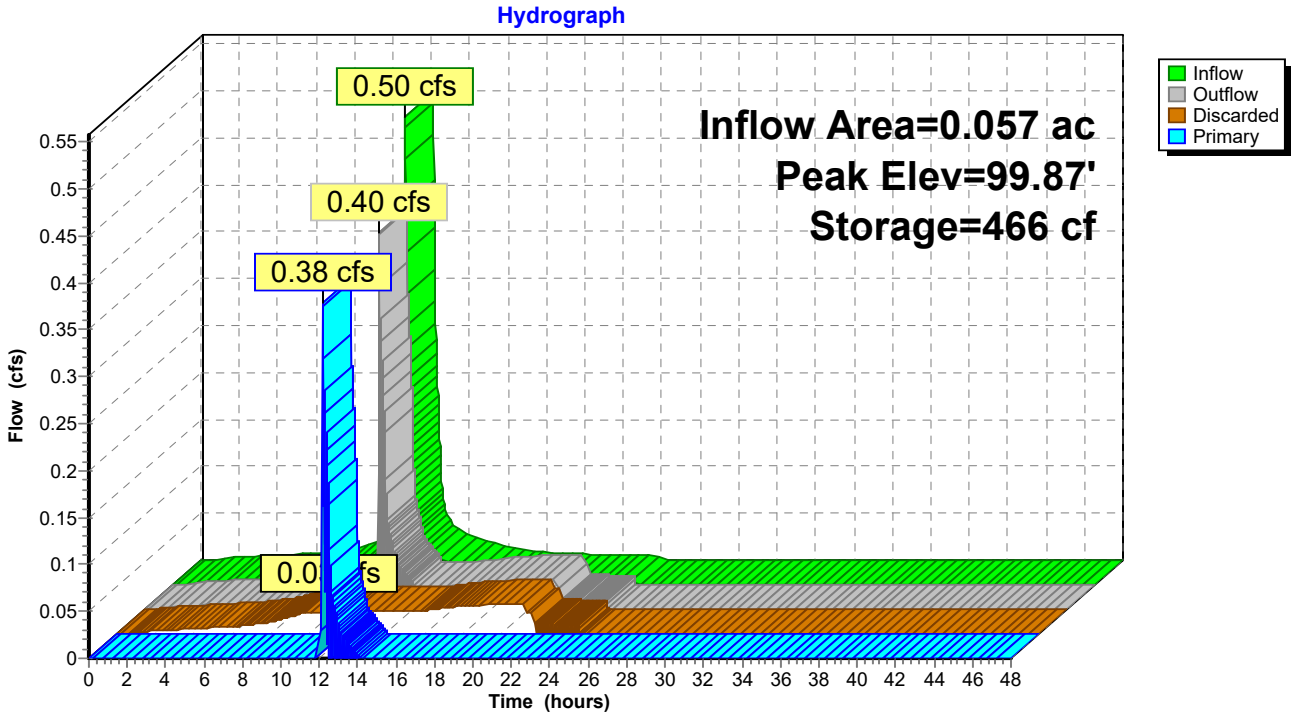
Volume	Invert	Avail.Storage	Storage Description
#1	92.00'	288 cf	**10.00'W x 36.00'L x 2.00'H Prismatoid** 720 cf Overall x 40.0% Voids
#2	92.17'	178 cf	**Cultec R-180** x 8 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 1 rows
		466 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	92.00'	**2.750 in/hr Exfiltration over Surface area**
#2	Primary	99.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.03 cfs @ 11.00 hrs HW=92.17' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.36 cfs @ 12.18 hrs HW=99.85' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.36 cfs @ 2.08 fps)

Pond 4P: Infiltration System



Hydrograph for Pond 4P: Infiltration System

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	92.00	0.00	0.00	0.00
1.00	0.00	0	92.00	0.00	0.00	0.00
2.00	0.00	0	92.00	0.00	0.00	0.00
3.00	0.00	0	92.00	0.00	0.00	0.00
4.00	0.01	0	92.00	0.01	0.01	0.00
5.00	0.01	0	92.00	0.01	0.01	0.00
6.00	0.01	0	92.00	0.01	0.01	0.00
7.00	0.01	0	92.00	0.01	0.01	0.00
8.00	0.01	0	92.00	0.01	0.01	0.00
9.00	0.02	0	92.00	0.02	0.02	0.00
10.00	0.02	1	92.00	0.02	0.02	0.00
11.00	0.04	25	92.17	0.03	**0.03**	0.00
12.00	**0.31**	**241**	**92.95**	**0.03**	0.03	**0.00**
13.00	**0.04**	**466**	**94.00**	**0.02**	0.02	**0.00**
14.00	0.03	466	94.00	0.02	0.02	0.00
15.00	0.02	460	93.96	0.02	0.02	0.00
16.00	0.01	434	93.79	0.02	0.02	0.00
17.00	0.01	385	93.53	0.03	0.03	0.00
18.00	0.01	316	93.24	0.03	0.03	0.00
19.00	0.01	236	92.93	0.03	0.03	0.00
20.00	0.01	150	92.61	0.03	0.03	0.00
21.00	0.01	59	92.29	0.03	0.03	0.00
22.00	0.01	0	92.00	0.01	0.01	0.00
23.00	0.00	0	92.00	0.01	0.01	0.00
24.00	0.00	0	92.00	0.01	0.01	0.00
25.00	0.00	0	92.00	0.00	0.00	0.00
26.00	0.00	0	92.00	0.00	0.00	0.00
27.00	0.00	0	92.00	0.00	0.00	0.00
28.00	0.00	0	92.00	0.00	0.00	0.00
29.00	0.00	0	92.00	0.00	0.00	0.00
30.00	0.00	0	92.00	0.00	0.00	0.00
31.00	0.00	0	92.00	0.00	0.00	0.00
32.00	0.00	0	92.00	0.00	0.00	0.00
33.00	0.00	0	92.00	0.00	0.00	0.00
34.00	0.00	0	92.00	0.00	0.00	0.00
35.00	0.00	0	92.00	0.00	0.00	0.00
36.00	0.00	0	92.00	0.00	0.00	0.00
37.00	0.00	0	92.00	0.00	0.00	0.00
38.00	0.00	0	92.00	0.00	0.00	0.00
39.00	0.00	0	92.00	0.00	0.00	0.00
40.00	0.00	0	92.00	0.00	0.00	0.00
41.00	0.00	0	92.00	0.00	0.00	0.00
42.00	0.00	0	92.00	0.00	0.00	0.00
43.00	0.00	0	92.00	0.00	0.00	0.00
44.00	0.00	0	92.00	0.00	0.00	0.00
45.00	0.00	0	92.00	0.00	0.00	0.00
46.00	0.00	0	92.00	0.00	0.00	0.00
47.00	0.00	0	92.00	0.00	0.00	0.00
48.00	0.00	0	92.00	0.00	0.00	0.00

APPENDIX C

GROUNDWATER RECHARGE CALCULATION

TSS REMOVAL CALCULATIONS

GROUNDWATER RECHARGE CALCULATION

Project: Atlantic Mechanical
Project Number: 64380
Date: 1/8/2021
Computations By: JJA
Checked By: AJC

Required Recharve Volume Equation: $R_v = (F)(IA)$

R_v = Required Recharge Volume (in cubic feet)
F = Target Depth Factor (Hydrologic Soil Group D = 0.1-inch)
IA = Impervious Area

Required Recharge Volume Calculation

IA = 0.714 acres
F = 0.1 inch

R_v = (0.1in/12)(0.714 acre)
= 0.00595 acre-feet
= 0.00595 acre-feet x 43560 square feet/acre-feet
= 259.18 cubic feet

Capture Area Adjustment

Capture area adjustment factor = IA/ IA tributary to infiltration

Total Impervous Area = 0.714 acre
Impervious area tributary to infiltration = 0.057 acre
Capture area adjustment factor = 12.53

Adjusted Minimum Required Recharge Volume

$A\ R_v$ = *Capture area adjustment factor x* R_v

$A\ R_v$ = (12.53)(259.18)
= 3,247.53 cubic feet

Actual Recharge Volume Provided = 3,247.53 cubic feet

Reference: Massachusetts Stormwater Handbook Volume 3: Documenting compliance with the Massachusetts Stormwater Management Standards

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Watershed 2 (34,454 SF)

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Vegetated Filter Strip >50 FT	**0.45**	**1.00**	**0.45**	**0.55**

Total TSS Removal = **45%**

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

Project: **Atlantic Mechanical**

Prepared By: **John Ahern**

Date: **1/8/2021**

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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Watershed 4 (2,479 SF)

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Proprietary Treatment Device	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = **80%**

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

Project: **Atlantic Mechanical**

Prepared By: **John Ahern**

Date: **1/8/2021**

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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Atlantic Mechanical (55,499.56 SF)

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Vegetated Filter Strip >50 ft	**0.45**	**1.00**	**0.45**	**0.55**
Proprietary Treatment Device	**0.80**	**0.55**	**0.44**	**0.11**

Total TSS Removal = **89%**

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

Project: **Atlantic Mechanical**

Prepared By: **John Ahern**

Date: **1/8/2021**

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

APPENDIX D

NRCS SOIL REPORT

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Norfolk and Suffolk Counties, Massachusetts

October 29, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....11
Map Unit Descriptions.....11
Norfolk and Suffolk Counties, Massachusetts.....13
53—Freetown muck, ponded, 0 to 1 percent slopes.....13
104C—Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes.....14
104D—Hollis-Rock outcrop-Charlton complex, 15 to 35 percent slopes.....17
245C—Hinckley loamy sand, 8 to 15 percent slopes.....19
253D—Hinckley loamy sand, 15 to 35 percent slopes.....21
626B—Merrimac-Urban land complex, 0 to 8 percent slopes.....22
References.....25

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,140 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 16, Jun 11, 2020

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

Date(s) aerial images were photographed: Aug 10, 2014—Aug 25, 2014

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
53	Freetown muck, ponded, 0 to 1 percent slopes	3.6	20.7%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	5.3	30.5%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 35 percent slopes	0.6	3.2%
245C	Hinckley loamy sand, 8 to 15 percent slopes	2.5	14.3%
253D	Hinckley loamy sand, 15 to 35 percent slopes	0.1	0.7%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	5.4	30.6%
Totals for Area of Interest		**17.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor

components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Norfolk and Suffolk Counties, Massachusetts

53—Freetown muck, ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t2qc
Elevation: 0 to 1,140 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Freetown, ponded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown, Ponded

Setting

Landform: Bogs, depressions, depressions, marshes, kettles, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material

Typical profile

Oe - 0 to 2 inches: mucky peat
Oa - 2 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water capacity: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Whitman, ponded

Percent of map unit: 5 percent
Landform: Depressions on ground moraines
Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea, ponded

Percent of map unit: 5 percent
Landform: Marshes, swamps, bogs, kettles, depressions, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

104C—Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w69p
Elevation: 0 to 1,270 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis, extremely stony, and similar soils: 35 percent
Charlton, extremely stony, and similar soils: 25 percent
Rock outcrop: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis, Extremely Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Charlton, Extremely Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills, ridges
Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Canton, extremely stony

Percent of map unit: 7 percent
Landform: Ridges, hills, moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Chatfield, extremely stony

Percent of map unit: 6 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Montauk, extremely stony

Percent of map unit: 1 percent
Landform: Drumlins, ground moraines, recessionial moraines, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex

Across-slope shape: Convex
Hydric soil rating: No

Scituate, extremely stony

Percent of map unit: 1 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Footslope, backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

104D—Hollis-Rock outcrop-Charlton complex, 15 to 35 percent slopes

Map Unit Setting

National map unit symbol: vkvh
Elevation: 20 to 610 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis and similar soils: 35 percent
Rock outcrop: 30 percent
Charlton and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Shallow, friable loamy ablation till derived from igneous and metamorphic rock

Typical profile

H1 - 0 to 3 inches: fine sandy loam
H2 - 3 to 14 inches: gravelly fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent

Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Parent material: Igneous and metamorphic rock

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Description of Charlton

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable coarse-loamy ablation till derived from granite

Typical profile

H1 - 0 to 6 inches: fine sandy loam
H2 - 6 to 36 inches: fine sandy loam
H3 - 36 to 60 inches: fine sandy loam

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Canton

Percent of map unit: 5 percent
Hydric soil rating: No

Chatfield

Percent of map unit: 5 percent
Hydric soil rating: No

245C—Hinckley loamy sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2svm9
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, kame terraces, outwash plains, kames, eskers, moraines, outwash terraces
Landform position (two-dimensional): Shoulder, toeslope, footslope, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser
Down-slope shape: Convex, concave, linear
Across-slope shape: Concave, linear, convex
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand

Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Eskers, moraines, outwash terraces, outwash plains, kames
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Side slope, head slope, nose slope, crest, riser
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Moraines, kame terraces, outwash plains, outwash terraces, outwash deltas, kames, eskers
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser
Down-slope shape: Convex, linear, concave
Across-slope shape: Linear, convex, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash terraces, kame terraces, outwash plains, moraines, outwash deltas
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

253D—Hinckley loamy sand, 15 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2svmd
Elevation: 0 to 860 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash plains, kames, eskers, moraines, outwash terraces, outwash deltas, kame terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Crest, nose slope, side slope, head slope, riser
Down-slope shape: Concave, convex, linear
Across-slope shape: Linear, convex, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 10 percent
Landform: Moraines, kame terraces, outwash plains, outwash terraces, outwash deltas, kames, eskers
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, crest, side slope, head slope, riser
Down-slope shape: Convex, linear, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Merrimac

Percent of map unit: 3 percent
Landform: Kames, eskers, moraines, outwash terraces, outwash plains, kame terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, crest, head slope, nose slope, riser
Down-slope shape: Convex, concave, linear
Across-slope shape: Concave, convex, linear
Hydric soil rating: No

Sudbury

Percent of map unit: 2 percent
Landform: Moraines, outwash terraces, kame terraces, outwash plains, outwash deltas
Landform position (two-dimensional): Backslope, footslope, toeslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: No

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

Map Unit Setting

National map unit symbol: 2tyr9
Elevation: 0 to 820 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Merrimac and similar soils: 45 percent
Urban land: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Eskers, moraines, outwash terraces, outwash plains, kames
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Windsor

Percent of map unit: 5 percent
Landform: Dunes, outwash terraces, deltas, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Eskers, kames, deltas, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX E

MASSDEP STORMWATER CHECKLIST

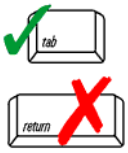
REDEVELOPMENT CHECKLIST

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

---

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

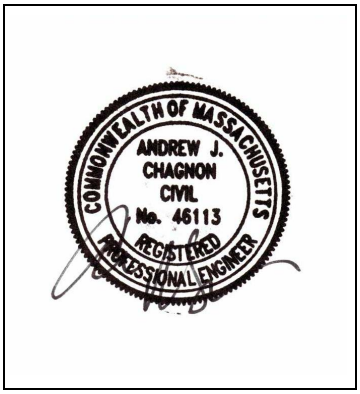
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



1/8/2020

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☒ Use of “country drainage” versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☒ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

☐ is within the Zone II or Interim Wellhead Protection Area

☐ is near or to other critical areas

☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)

☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☒ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

☐ Limited Project

☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.

☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area

☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff

☐ Bike Path and/or Foot Path

☐ Redevelopment Project

☒ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☒ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Chapter 3

Checklist for Redevelopment Projects

Standard 7: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

Redevelopment is defined to include

- Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems, and repaving;
- Development rehabilitation, expansion and phased projects on previously developed sites, provided the redevelopment results in no net increase in impervious area; and
- Remedial projects specifically designed to provide improved stormwater management, such as projects to separate storm drains and sanitary sewers, and stormwater retrofit projects.

Components of redevelopment projects that include development of previously undeveloped sites do not meet this definition. The portion of the project located in a previously developed area must meet Standard 7, but project components within undeveloped areas must meet all the Standards.

MassDEP recognizes that site constraints often make it difficult to comply with all the Standards at a redevelopment site. These constraints are as follows:

Lack of space. Because of the presence of existing structures, on-site subsurface sewage disposal systems, stormwater best management practices, and water bodies and wetlands, and easements, the space available for the installation of additional stormwater BMPs may be quite limited. On many suites it may be difficult or impossible to use space-intensive BMPs such as wet detention basins.

Soils: The presence of bedrock or clay can limit the effectiveness of infiltration or detention BMPs. Often soils at redevelopment sites have been compacted by buildings and heavy traffic, impairing their ability to infiltrate stormwater into the ground.

Underground utilities. The presence of underground utilities including gas and water mains, sewer pipes and electric cable conduits can greatly reduce the amount of land available for BMPs.

This chapter provides specific guidance and checklists to ensure that the applicant has met his/her obligations under Standard 7. Because it may be difficult for a redevelopment project to comply with all the Stormwater Management Standards, Standard 7 provides that a redevelopment project is required to comply with the following Standards only "to the maximum extent practicable": Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing outfalls shall be brought into compliance with Standard 1 only to the maximum extent practicable.

As set forth in Standard 7, the phrase "to the maximum extent practicable" means that:

(1) Proponents of redevelopment projects have made all reasonable efforts to meet the requirements of Standards 2 and 3 and the pretreatment and structural stormwater best management practices requirements of Standards 4, 5, and 6 and to bring existing outfalls into compliance with Standard 1.

(2) They have made a complete evaluation of possible stormwater management measures, including environmentally sensitive site design that minimizes land disturbance and impervious surfaces, low impact development techniques and structural stormwater BMPs; and

(3) If not in full compliance with Standard 1 for existing outfalls, Standards 2 and 3 and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6, they are implementing the highest practicable level of stormwater management.

Generally, an alternative is practicable if it can be implemented within the site being redeveloped, taking into consideration cost, land area requirements, soils and other site constraints. However, offsite alternatives may also be practicable. Proponents must document the evaluation of practicable alternatives with sufficient information to support the conclusions of the analysis.

At the same time, stormwater runoff from redevelopment projects must be properly managed. To this end, Standard 7 provides that redevelopment projects shall comply with all other requirements of the Stormwater Management Standards, including, without limitation, the pollution prevention requirements of Standards 4, 5, and 6, the erosion and sedimentation control requirements of Standard 8, the operation and maintenance requirements of Standard 9, and the prohibition of illicit discharge set forth in Standard 10. Proponents must also improve existing conditions.

Proponents of redevelopment projects shall document their compliance with these requirements. To assist proponents and reviewers in determining whether a redevelopment project complies with Standard 7, MassDEP has prepared the following redevelopment checklist.

[*Proponents of MassHighway redevelopment projects and Conservation Commissions reviewing such projects may follow the guidelines for redevelopment provided in the MassHighway Stormwater Handbook for Highways and Bridges (May 2004 or latest version) in lieu of the guidance set forth in this chapter.*[1] *The MassHighway Stormwater Handbook was developed by the Massachusetts Highway Department and issued by joint correspondence of May 7, 2004 by MassHighway and MassDEP. It provides detailed guidance on the evaluation and implementation of stormwater management practices for MassHighway road and bridge redevelopment projects, including a methodology for screening and selecting Best Management Practices (BMPs). Proponents and reviewers of other public roadway redevelopment projects may find useful information in the MassHighway Stormwater Handbook.*]

[1] The MassHighway Handbook published in 2004 must be revised to make it consistent with this Handbook.

Redevelopment Checklist

Existing Conditions

- On-site: For all redevelopment projects, proponents should document existing conditions, including a description of extent of impervious surfaces, soil types, existing land uses with higher potential pollutant loads, and current onsite stormwater management practices.
- Watershed: Proponents should determine whether the project is located in a watershed or subwatershed, where flooding, low streamflow or poor water quality is an issue.

The Project

Is the project a redevelopment project? **Yes**

- Maintenance and improvement of existing roadways
- Development of rehabilitation, expansion or phased project on redeveloped site, or
- Remedial stormwater project

For non-roadway projects, is any portion of the project outside the definition of redevelopment? **No**

- Development of previously undeveloped area
- Increase in impervious surface

If a component of the project is not a redevelopment project, the proponent shall use the checklist set forth below to document that at a minimum the proposed stormwater management system fully meets each Standard for that component. The proponent shall also document that the proposed stormwater management system meets the requirements of Standard 7 for the remainder of the project.

The Stormwater Management Standards

The redevelopment checklist reviews compliance with each of the Stormwater Management Standards in order.

Standard 1: (Untreated discharges)
No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.
Same rule applies for new developments and redevelopments.

Full compliance with Standard 1 is required for new outfalls.

- What BMPs are proposed to ensure that all new discharges associated with the discharge are adequately treated? **Stormwater quality is achieved and maintained by routing stormwater through treatment BMP devices and via sediment removal by proprietary devices.**
- What BMPs are proposed to ensure that no new discharges cause erosion in wetlands or waters of the Commonwealth? **At a minimum, erosion control features to be installed include perimeter silt fencing, which can be found on the Project Plans.**

- Will the proposed discharge comply with all applicable requirements of the Massachusetts Clean Waters Act and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00? **Yes, the proposed discharge is compliant with 314 CMR 3.00, 4.00, and 5.00.**

Existing outfalls shall be brought into compliance with Standard 1 to the maximum extent practicable.

- Are there any existing discharges associated with the redevelopment project for which new treatment could be provided? **Yes, existing discharges will be routed through stormwater treatment BMP devices where possible and via sediment removal by proprietary devices.**
- If so, the proponent shall specify the stormwater BMP retrofit measures that have been considered to ensure that the discharges are adequately treated and indicate the reasons for adopting or rejecting those measures. (See Section entitled "Retrofit of Existing BMPs".) **Stormwater treatment BMPs have a total suspended solids (TSS) removal rate of at least 80% for the entire site.**
- What BMPs have been considered to prevent erosion from existing stormwater discharges? **At a minimum, erosion control features to be installed include perimeter silt fencing, which can be found on the Project Plans.**

Standard 2: (Peak rate control and flood prevention)

Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for land subject to coastal storm flowage.

Full compliance for any component that is not a redevelopment

Compliance to the Maximum Extent Practicable:

- Does the redevelopment design meet Standard 2, comparing post-development to pre-development conditions? **Yes, the proposed system is designed to reduce runoff rates for the 2-, 10-, 25-, and 100-year storm events. The reduction is achieved by controlling stormwater runoff via an underground detention system.**
- If not, the applicant shall document an analysis of alternative approaches for meeting the Standard. (See Menu of Strategies to Reduce Runoff and Peak Flows and/or Increase Recharge Menu included at the end of this chapter.) **Not applicable**

Improvement of existing conditions:

- Does the project reduce the volume and/or rate of runoff to less than current estimated conditions? Has the applicant considered all the alternatives for reducing the volume and/or rate of runoff from the site? (See Menu.) **Yes, the proposed system reduces the runoff rate to less than the current conditions.**
- Is the project located within a watershed subject to damage by flooding during the 2-year or 10-year 24-hour storm event? If so, does the project design provide for attenuation of the 2-year and 10-year 24-hour storm event to less than current estimated conditions? Have measures been implemented to reduce the volume of runoff from the site resulting from the 2 year or 10 year 24 hour storm event? (See Menu.) **No, the project is not located within a watershed subject to damage by flooding during the 2- or 10-year 24-hour storm event.**
- Is the project located adjacent to a water body or watercourse subject to adverse impacts from flooding during the 100-year 24-hour storm event? If so, are portions of the site available to increase flood storage adjacent to existing Bordering Land Subject to Flooding (BLSF)? **Adverse**

impacts from flooding during the 100-year 24-hour storm will be prevented using an underground detention system.

- Have measures been implemented to attenuate peak rates of discharge during the 100-year 24-hour storm event to less than the peak rates under current estimated conditions? Have measures been implemented to reduce the volume of runoff from the site resulting from the 100-year 24-hour storm event? (See Menu.) **The proposed system is designed to reduce runoff rates for the 100-year storm. This reduction is achieved by controlling stormwater runoff via an underground detention system.**

Standard 3: (Recharge to Ground water)

Loss of annual recharge to ground water shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from the pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusettss Stormwater Handbook.

Full compliance for any component that is not a redevelopment

Compliance to the Maximum Extent Practicable:

- Does the redevelopment design meet Standard 3, comparing post-development to pre-development conditions? **Yes, the difference in groundwater recharge from existing conditions to proposed conditions will be negligible.**
- If not, the applicant shall document an analysis of alternative approaches for meeting the Standard? **Not applicable.**
- What soil types are present on the site? Is the site is comprised solely of C and D soils and bedrock at the land surface? **The Site is comprised of B/D soils. Class B means soils having a moderate infiltration rate when thoroughly wet. Class D means soils having a very slow infiltration rate when thoroughly wet. The Class D soils were used as a conservative assumption.**
- Does the project include sites where recharge is proposed at or adjacent to an area classified as contaminated, sites where contamination has been capped in place, sites that have an Activity and Use Limitation (AUL) that precludes inducing runoff to the groundwater, pursuant to MGL Chapter 21E and the Massachusetts Contingency Plan 310 CMR 40.0000; sites that are the location of a solid waste landfill as defined in 310 CMR 19.000; or sites where groundwater from the recharge location flows directly toward a solid waste landfill or 21E site?[2] **No, the Site is not adjacent or an area classified as contaminated, a site where contamination has been capped in place, a site that has an Activity and Use Limitation (AUL) or a Site located within proximity of a solid waste landfill.**
- Is the stormwater runoff from a land use with a higher potential pollutant load? **Yes, the stormwater runoff is from a land use with a higher potential pollutant load.**
- Is the discharge to the ground located within the Zone II or Interim Wellhead Protection Area of a public water supply? **No, the site is not located within the interim Zone II of a public water supply well.**
- Does the site have an infiltration rate greater than 2.4 inches per hour? **Yes. An infiltration rate of 2.75 inches per hour was used based on engineer's determination.**

[2] A mounding analysis is needed if a site falls within this category. See Volume 3.

Improvements to Existing Conditions:

- Does the project increase the required recharge volume over existing (developed) conditions? If so, can the project be redesigned to reduce the required recharge volume by decreasing impervious surfaces (make building higher, put parking under the building, narrower roads, sidewalks on only one side of street, etc.) or using low impact development techniques such as porous pavement? **Yes, there is an increase in required recharge volume compared to the existing conditions. However, this proposed infiltration system provides the required recharge volume.**
- Is the project located within a basin or sub-basin that has been categorized as under high or medium stress by the Massachusetts Water Resources Commission, or where there is other evidence that there are rivers and streams experiencing low flow problems? If so, have measures been considered to replace the natural recharge lost as a result of the prior development? (See Menu.) **No, the project is not located within a basin or sub-basin that has been categorized as under high or medium stress by the Massachusetts Water Resources Commission, or where there is other evidence that there are rivers and streams experiencing low flow problems.**
- Has the applicant evaluated measures for reducing site runoff? (See Menu.) **Yes, measures for reducing site runoff have been evaluated and implemented where appropriate.**

Standard 4: (80% TSS Removal)

Stormwater management systems must be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This standard is met when:

a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan and thereafter are implemented and maintained;

b. Stormwater BMPs are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and

c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

Full compliance for any component that is not a redevelopment

Full compliance with the long-term pollution plan requirement for new developments and redevelopments.

- Has the proponent developed a long-term pollution plan that fully meets the requirements of Standard 4? **Yes, an Operations & Maintenance and Pollution Prevention Plan was developed for the project Site.**
- Does the pollution prevention plan include the following source control measures?
  - Street sweeping **- Yes**
  - Proper management of snow, salt, sand and other deicing chemicals **- Yes**
  - Proper management of fertilizers, herbicides and pesticides **- Yes**
  - Stabilization of existing eroding surfaces **- Yes**

Compliance to the Maximum Extent Practicable for the other requirements:

- Does the redevelopment design provide for treatment of all runoff from existing (as well as new) impervious areas to achieve 80% TSS removal? If 80% TSS removal is not achieved, has the stormwater management system been designed to remove TSS to the maximum extent practicable? **Yes, the proposed development is designed to remove 80% of the annual TSS load from only the net increase in impervious area, however the proposed development removes 80% of the annual TSS load from all proposed areas contributing to the annual TSS load.**
- Have the proposed stormwater BMPs been properly sized to capture the prescribed runoff volume? **Yes - The Site does not discharge near, or to a critical area, therefore the required**

Water Quality Volume (WQV) for the project equals 1.0 inches of runoff times the impervious area of the post-development site.

- One inch rule applies for discharge
  - within a Zone II or Interim Wellhead Protection Area,
  - near or to another critical area,
  - from a land use with a higher potential pollutant load
  - to the ground where the infiltration rate is greater than 2.4 inches per hour

- Has adequate pretreatment been proposed? **TSS removal is achieved through BMPs designed in accordance with the Handbook. Nonproprietary BMPs are modeled in the TSS removal calculations to perform to the TSS removal efficiencies designated by the Handbook.**
  - 44% TSS Removal Pretreatment Requirement applies if:
    - Stormwater runoff is from a land use with a higher potential pollutant load
    - Stormwater is discharged
      - To the ground within the Zone II or Interim Wellhead Protection Area of a Public Water Supply
      - To the ground with an infiltration rate greater than 2.4 inches per hour
      - Near or to an Outstanding Resource Water, Special Resource Water, Cold-Water Fishery, Shellfish Growing Area, or Bathing Beach.

- If the stormwater BMPs do not meet all the requirements set forth above, the applicant shall document an analysis of alternative approaches for meeting the these requirements. (See Section on Retrofitting Existing BMPs (the "Retrofit Section"). **The stormwater BMPs on the project Site meet the requirements of the Massachusetts Stormwater Handbook.**

Improvements to Existing Conditions:

- Have measures been provided to achieve at least partial compliance with the TSS removal standard? **Yes, the proposed development is designed to remove 80% of the annual TSS load from only the net increase in impervious area, however the proposed development removes 80% of the annual TSS load from all proposed areas contributing to the annual TSS load.**
  - Have any of the best management practices in the Retrofit Section been considered? **Yes, existing BMPs are being used in the proposed stormwater management system, as well as new BMP devices and systems will be installed.**
  - Have any of the following pollution prevention measures been considered? **Yes, applicable pollution prevention measures below can be found in the Operations & Maintenance Plan designed for the project Site.**
    - Reduction or elimination of winter sanding, where safe and prudent to do so - **Yes**
    - Tighter controls over the application of fertilizers, herbicides, and pesticides - **Yes**
    - Landscaping that reduces the need for fertilizer, herbicides and pesticides - **Yes**
    - High frequency sweeping of paved surfaces using vacuum sweepers - **Yes**
    - Improved catch basin cleaning - **No**
    - Waterfowl control programs - **No**
  - Are there any discharges (new or existing) to impaired waters? If so, see TMDL section. **No, there are no discharges (new or existing) to impaired waters.**

<u>Standard 5 (Higher Potential Pollutant Loads (HPPL)</u>

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention, all land uses with higher potential pollutant loads cannot

be completely protected from exposure to rain, snow, snow melt and stormwater runoff, the proponent shall use the specific stormwater BMPs determined by the Department to be suitable for such use as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.
Full compliance for any component that is not a redevelopment.
Full compliance with pollution prevention requirements for new developments and redevelopments.

Pollution Prevention

- Has the proponent considered any of the following operational source control measures? **Yes, applicable operational source control measures, and associated schedules, below can be found in the Operations & Maintenance Plan designed for the project Site.**
  - Formation of a pollution prevention team, **- Yes**
  - Good housekeeping practices, **- Yes**
  - Preventive maintenance procedures, **- Yes**
  - Spill prevention and clean up, **- Yes**
  - Employee training, and **- Yes**
  - Regular inspection of pollutant sources. **- Yes**

- Has the proponent considered implementation of any of the following operational changes to reduce the quantity of pollutants on site? **Yes, any feasible operational changes to reduce the quantity of pollutants on Site have been addressed, and applicable changes have been made.**
  - Process changes,
  - Raw material changes,
  - Product changes, or
  - Recycling.

- Has the proponent considered making capital improvements to protect the land uses with higher potential pollutant loads from exposure to rain, snow, snow melt, and stormwater runoff? **No, the project Site is not defined as a land use with high potential pollutant load.**

  - Enclosing and/or covering pollutant sources (e.g. placing pollutant sources within a building or other enclosure, placing a roof over storage and working areas, placing tarps under pollutant source) **Not applicable**

  - Installing a containment system with an emergency shutoff to contain spills? **Not applicable**

  - Physically segregating the pollutant source to prevent run-on of uncontaminated stormwater? **Not applicable**

Treatment

- If applicable, compliance with the treatment and pretreatment requirements of Standard 5 only to the Maximum Extent Practicable by directing the stormwater runoff from land uses with higher potential pollutant loads to appropriate stormwater BMPs? **Not applicable**

  - Are the BMPs selected capable of removing the pollutants associated with the higher potential pollutant load land ("LUHPPL") use? **Not applicable**

- Is the land use likely to generate stormwater with high concentrations of oil and grease? If so, has an oil grit separator, sand filter, filtering bioretention area or equivalent been proposed for pretreatment? **Not applicable**

Improvement of Existing Conditions.

- If the redevelopment converts a site from a non-LUHPPL use to a LUHPPL use, the applicant shall document how the stormwater BMPs shall be modified or replaced to come into compliance with Standard 5. **Not applicable**

- What specific measures have been considered to offset the anticipated impacts of land uses with higher potential pollutant loads? **Not applicable**

- If the redevelopment proposal is a brownfield project, the applicant shall demonstrate how the stormwater management measures have been designed to prevent mobilization or remobilization of soil and groundwater contamination. (See Brownfield section) **Not applicable**

Other Requirements

- Does the discharge comply with all applicable requirements of the Massachusetts Clean Waters Act, 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00? **Not applicable**

Standard 6 (Critical Areas)
Stormwater discharges to a Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or any other critical area require the use of the specific source control and pollution prevention measures and the specific stormwater best management practices determined by the Department to be suitable for managing discharges to such area, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters or Special Resource Waters shall be set back from the receiving water and receive the highest and best practical method of treatment. A "stormwater discharge," as defined in 314 CMR 3.04(2)(a)1. or (b), to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of the public water supply.
Full compliance for component of project that is not a redevelopment
Full compliance with pollution prevention requirements for new developments and redevelopments.

If applicable, compliance to the Maximum Extent Practicable with the pretreatment and treatment requirements of Standard 6:

- Does the redevelopment project utilize the pretreatment, treatment and infiltration BMPs approved for discharges near or to critical areas? **Standard 6 is not applicable to the Site.**
- If the redevelopment project does not comply with Standard 6, the applicant shall document an analysis of alternative measures for meeting Standard 6. (See Section on Specific Redevelopment Projects.) **The project is not applicable to Standard 6.**

Improvements to Existing Conditions:

- Have measures to protect critical areas been considered, including additional pollution prevention measures and structural and non-structural BMPs? **Not applicable**

Other Requirements

- Does the discharge comply with the Massachusetts Clean Waters Act, 314 CMR 3.00, 314 CMR 4.00, and 314 CMR 5.00? **Not applicable**

Standard 8: (Erosion, Sediment Control)
A plan to control construction-related impacts, including erosion sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan), must be developed and implemented.

All redevelopment projects shall fully comply with Standard 8.

- Has the proponent submitted a construction period erosion, sedimentation and pollution prevention plan that meets the requirements of Standard 8? **Yes, a Pollution Prevention Plan which meets the requirements of Standard 8 has been submitted for this project.**

Standard 9: (Operation and Maintenance)
A long-term operation and maintenance plan must be developed and implemented to ensure that stormwater management systems function as designed.
All redevelopment projects shall fully comply with Standard 9.

- Has the proponent submitted a long-term Operation and Maintenance plan that meets the requirements of Standard 9? **Yes, an Operations & Maintenance (O&M) Plan which meets the requirements of Standard 9 has been submitted for this project.**

Standard 10 (Illicit Discharges)
All illicit discharges to the stormwater management system are prohibited.
All redevelopment projects shall fully comply with Standard 10.

- Are there any known or suspected illicit discharges to the stormwater management system at the redevelopment project site? **To VERTEX's knowledge, based on the best-available information and in-field reviews of the current site, there does not appear to be any illicit discharges on site and the proposed project does not propose any illicit discharges.**
- Has an illicit connection detection program been implemented using visual screening, dye or smoke testing? **Not applicable**
- Have an Illicit Discharge Compliance Statement and associated site map been submitted verifying that there are no illicit discharges to the stormwater management system at the site? **Not applicable**

Improvements to Existing Conditions:

- Once all illicit discharges are removed, has the proponent implemented any measures to prevent additional illicit discharges? **Not applicable**

Figure 5-1

Menu of Strategies to Reduce Runoff or Peak Flows and/or Increase Recharge

- Rehabilitate the soils
- Plant trees and other vegetation
- Install a green roof
- Maximize naturally vegetated areas
- Reduce impervious surfaces
- Disconnect roof runoff from direct discharge to the drainage system
- Disconnect other existing paved areas from direct discharge to the drainage system, allowing controlled flow over pervious areas or through BMPs providing at least partial recharge
- Install porous pavement and/or other recharge measures (where sustainable and maintainable for promoting infiltration)
- Apply LID techniques for runoff reduction
- Install additional structural BMPs that are appropriate for redevelopment sites including infiltration trenches, subsurface structures, oil-grit separators, proprietary BMPs
- Retrofit existing BMPs

Retrofitting Existing BMPs

Many BMPs can be effectively retrofitted depending on site conditions and the water quantity or quality objectives trying to be achieved.[3] The objective of stormwater retrofitting is to remedy problems associated with, and improve water quality mitigation functions of, older, poorly designed, or poorly maintained stormwater management systems. Prior to the development of the stormwater standards, site drainage design did not require stormwater detention for controlling post-development peak flows. As a result, drainage, flooding, and erosion problems can be common in many older developed areas of the state. Furthermore, a majority of the dry detention basins throughout the state have been designed to control peak flows, without regard to water quality mitigation. Therefore, many existing dry detention basins provide only minimal water quality benefit. Incorporating stormwater retrofits into existing developed sites or into redevelopment projects can reduce the adverse impacts of uncontrolled stormwater runoff.

Bioretention Area Retrofits - can be used as a stormwater retrofit, by modifying existing landscaped areas, or if a parking lot is being resurfaced. In highly urban watersheds, they are one of the few practical retrofit options.

Catch Basin Retrofits or Reconstruction - Older catch basins without sumps can be replaced with catch basins having four foot-deep sumps. Sumps provide storage volume for coarse sediments, assuming that accumulated sediment is removed on a regular basis. Hooded outlets, which are covers over the catch basin outlets that extend below the standing water line, can also be used to trap litter and other floatable materials. Leaching catch basins can be installed adjacent to deep sump catch basins to achieve 80% TSS removal. Be aware, however, that many products are being touted as catch basin inserts, but the effectiveness of these devices can vary significantly.

Dry Detention Basin Retrofits - Traditional dry detention basins can be modified to become extended dry detention basins, wet basins, or constructed stormwater wetlands for enhanced pollutant removal. This is one of the most commonly and easily implemented retrofits, since it typically requires little or no additional land area, capitalizes on an existing facility for which there is already some resident acceptance of stormwater management, and involves minimal impacts to environmental resources (Claytor, Center for Watershed Protection, 2000).

There are numerous retrofit options that will enhance the removal of pollutants in detention basins:

- Excavate the basin bottom to create more permanent pool storage.
- Raise the basin embankment to obtain additional storage for extended detention.
- Modify the outfall structure to create a two-stage release to better control small storms while not significantly compromising flood control detention for large storms.
- Increase the flow path from inflow to outflow and eliminate short-circuiting by using baffles, earthen berms or micro-pond topography to increase residence time.
- Incorporate stilling basins at inlets and outlets.
- Regrade the basin bottom to create a wetland area near the basin outlet or revegetate parts of the basin bottom with wetland vegetation to enhance pollutant removal, reduce mowing, and improve aesthetics.
- Create a wetland shelf along the perimeter of a wet basin to improve shoreline stabilization, enhance pollutant filtering, and enhance aesthetic and habitat functions.
- Create a low maintenance “no-mow” wildflower ecosystem in the drier portions of the basin.

[3] Additional information on retrofitting stormwater BMPs can be found in the Urban Stormwater Retrofit Practices Manual. See http://www.cwp.org/Downloads/ELC_USRM3app.pdf.

- Provide a high flow bypass to avoid resuspension of captured sediments/pollutants during high flows.
- Eliminate low-flow bypasses.

Drainage Channel Retrofits - Existing channelized streams and drainage conveyances such as drainage channels can be modified to reduce flow velocities and enhance pollutant removal. Weir walls or riprap check dams placed across a channel create opportunities for ponding, infiltration, and establishment of wetland vegetation upstream of the retrofit. In-stream retrofit practices include stream bank stabilization of eroded areas and placement of habitat improvement structures (i.e., flow deflectors, boulders, pools/riffles, and low-flow channels) in natural streams and along stream banks. In-stream retrofits may require an evaluation of potential flooding and floodplain impacts resulting from altered channel conveyance, as well as requirements for local, state, or federal approval for work in wetlands and watercourses.

Parking Lots and Roadways- Parking lots offer ideal opportunities for a wide range of stormwater retrofits:

1. Incorporate bioretention areas into parking lot islands and landscaped areas; tree planter boxes can be converted into functional bioretention areas, rain gardens, or treebox filters to reduce and treat stormwater runoff.
2. Remove curbing and add slotted curb stops. Curbs along the edges of parking lots can sometimes be removed or slotted to re-route runoff to vegetated filter strips, water quality swales, grass channels, or bioretention facilities. The capacity of existing swales may need to be evaluated and expanded as part of this retrofit option.
3. Incorporate new treatment practices such as bioretention areas, sand filters, and constructed stormwater wetlands at the edges of parking lots.
4. In overflow parking or other low-traffic areas, asphalt can be replaced with porous pavement.

Sand Filter Retrofits - are suitable where space is limited, because they consume little surface space and have few site restrictions. Since sand filters cannot treat large drainage areas, retrofitting many small individual sites may be the only option. This option may be expensive.

Storm Drain Outfalls - New stormwater treatment practices can be constructed at the outfalls of existing drainage systems. The new stormwater treatment practices are commonly designed as *off-line devices* to treat the first flush volume and bypass larger storms. Water quality swales, bioretention areas, sand filters, constructed stormwater wetlands, and wet basins are commonly used for this type of retrofit. Other stormwater treatment practices may also be used if there is enough space for construction and maintenance.

Specific Redevelopment Projects

Redevelopment projects present unique challenges for controlling stormwater. It is possible that site constraints may prevent a redevelopment project from complying with one or more of the Stormwater Management Standards. Even if a redevelopment project cannot meet all of the Standards, there may be ample opportunity to improve existing site conditions depending on the other water quality or quantity issues in the watershed. The following special considerations provide unique opportunities for identifying how existing conditions may be improved:

A. Groundwater Recharge Areas - Redevelopment projects located within these areas (Zone II, Interim Wellhead Protection Areas (IWPA), aquifer protection districts, etc.) should place a high priority on ground water recharge BMPs.
   1) Disconnecting Rooftop Runoff – In some instances, building roof drains connected to the stormwater drainage system can be disconnected and re-directed to vegetated filter strips, bioretention facilities, or infiltration structures (dry wells or infiltration trenches).
   2) Use of Porous Paving Materials - Existing impermeable pavement in overflow parking or other low-traffic areas can sometimes be replaced with alternative permeable materials such as modular concrete paving blocks, modular concrete or plastic lattice, or cast-in-place concrete grids. Site-specific factors including traffic volumes, soil permeability, maintenance, sediment loads, and land use must be carefully considered prior to selection.

B. Cold-Water Fisheries - Redevelopment projects adjacent to these areas should place a high priority on mitigating potential thermal impacts. Techniques to consider include:

   1) Maintain Time of Concentration - Time of concentration (Tc) is based on the flow path and length, ground cover, slope and channel shape. When development occurs, Tc is often shortened due to the impervious area, causing greater flows to occur over a shorter period of time. Increasing the Tc will help to reduce the thermal impact of stormwater runoff from warm surface areas. Options to consider include:
      - Increasing the length of the runoff flow path
      - Increasing the surface roughness of the flow path
      - Detaining flows on site
      - Minimizing land disturbance
      - Creating flatter slopes.
   2) Disconnecting impervious areas – Breaking up large impervious expanses with vegetated zones will reduce the potential temperature increases of stormwater flowing across hot pavement.

.

C. Brownfield Redevelopment – Redeveloping urban and non-urban brownfield sites (which in Massachusetts includes most "disposal sites" under the Massachusetts Contingency Plan [MCP]) are a Commonwealth priority, with ramifications for urban sprawl as well as the remediation of historically contaminated properties. Proponents of brownfield redevelopment projects should evaluate BMPs that will prevent the significant uncontrolled mobilization or remobilization of soil or ground water contamination. BMP considerations at these sites should consider such factors as:
   - The location of stormwater infiltration units with respect to contaminated areas
   - Ground water mounding effects on the rate and direction of migration of ground water contaminants
   - The location of outfalls
   - Water quality BMPs.

D. Runoff to Impaired Water Bodies – If MassDEP has issued a Total Maximum Daily Load (TMDL) that establishes a waste load allocation for stormwater discharge and/or a TMDL Implementation Plan that identifies remedies aimed at reducing the amount of pollutants from stormwater discharges, proponents may be required to install stormwater BMPs that are consistent with the TMDL.

E. Runoff to Areas of Localized Flooding – Project proponents must also understand the potential impacts of stormwater runoff in areas prone to localized flooding. When completing the checklist, proponents should consider the capacity of the receiving water and/or storm drainage system. When evaluating discharges to areas subject to localized flooding, the proponent should evaluate the ability to maintain and/or improve existing site cover and reduce runoff volume.

APPENDIX F

OPERATIONS & MAINTENANCE PLAN

Atlantic Mechanical
1047/0 Washington Street
Weymouth, Massachusetts 02189

SITE OPERATIONS & MAINTENANCE MANUAL AND POLLUTION PREVENTION PLAN

JANUARY 7, 2021

PREPARED FOR:
Atlantic Mechanical
1047/0 Washington Street
Weymouth, Massachusetts 02189

PREPARED BY:
The Vertex Companies, Inc.
400 Libbey Parkway
Weymouth, Massachusetts 02189
PHONE 781.952.6000

VERTEX PROJECT NO: 64380

TABLE OF CONTENTS

1.0 INTRODUCTION 4
1.1 General Information 4
1.2 Definitions 4
1.3 Site Description 4
1.4 Drainage System Operation 4
1.5 Responsible Parties 5
1.5.1 Atlantic Mechanical ..... **Error! Bookmark not defined.**
2.0 INSPECTION AND MONITORING REQUIREMENTS 6
2.1 General 6
2.2 Frequency of Tasks 7
2.2.1 Monitoring 7
2.2.2 Special Inspections 7
2.2.3 Maintenance Inspections 7
2.3 Organizing for Inspections 8
2.3.1 Recording Inspections and Observations 8
2.3.2 Coverage 9
2.3.3 Sequence 9
2.3.4 Record Keeping 9
2.3.5 Crucial Inspection Times 10
2.4 Descriptions and Inspection Frequency of Major Features 10
2.4.1 Underground Infiltration System 10
2.4.2 Vegetated Filter Strip 10
3.0 MAINTENANCE INSTRUCTIONS 11
3.1 General 11
3.2 Maintenance Priorities 11
3.2.1 Required Maintenance at the Earliest Possible Date 11
3.2.2 Continuing Maintenance 12
3.3 Guidelines 12
3.3.1 Removal of Debris 12
3.3.2 Underground Infiltration System 12
3.3.3 Vegetated Filter Strip 12

3.3.4 Sweeping 12
3.3.5 Spring Clean-Up 13
3.3.6 Mulching 13
3.3.7 Lawn Fertilization 13
3.3.8 Tree and Shrub Fertilization 13
3.3.9 Grass Mowing 13
3.3.10 Manual Weed Control 14
3.3.11 Insects and Disease Control 14
3.3.12 Chemical Weed Control 14
3.3.13 Pruning 15
3.3.14 Aeration 15
3.3.15 Fall Clean-Up 15
3.3.16 Tree Replacement 15

Tables

Table 1: Telephone List

Figures

Figure 1: Site Locus Map
Figure 2: Existing Site Plan
Figure 3: Proposed Drainage Plans

Appendices

Appendix A: Inspection Schedule
Appendix B: Maintenance Record Log
Appendix C: Stormwater System Inspection Form

SITE OPERATIONS & MAINTENANCE MANUAL AND POLLUTION PREVENTION PLAN

Atlantic Mechanical
1047 Washington Street/0 Washington Street
Weymouth, Massachusetts 02189
VERTEX Project No. 64380

PREAMBLE: This Operation and Maintenance Manual (O&M) and Pollution Prevention Plan (PPP) was prepared for the Owner of Atlantic Mechanical to establish a basis for continuing maintenance and inspection of the Atlantic Mechanical property. The Operation and Maintenance Manual stresses the importance of the proper drainage and landscaping maintenance of the property.

The Owner of the site has a direct influence on the operation of the property. As such, the Owner should play a direct role in the development of a continuing maintenance program, which includes important elements such as inspecting, monitoring and maintaining the site. It is recommended that as personnel change, a comprehensive briefing be conducted for new workers/personnel to familiarize them with the site structures and the components of the Operation and Maintenance Manual as well as other documents specific to the site.

RESPONSIBLE PARTIES

Owner: Atlantic Mechanical

Operator: Atlantic Mechanical

Contacts: Atlantic Mechanical

CONTACT: Joe Gratta

PHONE: 781-335-8635

I, the undersigned, understand the Operation and Maintenance procedures outlined in this manual and will be the responsible party for the Operation and Maintenance set forth in this manual (Sign, Print Name, and Date)

Signature: 

Name (Printed): Joe Gratta

Date: 1/8/21

1.0 INTRODUCTION

1.1 General Information

The Site Operation and Maintenance Manual outlines the inspection program and an overview of the necessary maintenance tasks that are required to maintain the site in an operable condition. Continued and proper operations and maintenance is the best method to limit emergency conditions from occurring at the site. The Operation and Maintenance Manual should be housed in a three-ring binder to facilitate updates to the plan and updated annually to ensure that the information contained in the plan is current.

This O&M has also been prepared to guide the on-going maintenance.

1.2 Definitions

For purposes of this manual the following terms are defined as noted

Owner:	Atlantic Mechanical
Operator/Caretaker:	Atlantic Mechanical

1.3 Site Description

Atlantic Mechanical (the Property) is located at 1047 Washington Street/0 Washington Street in Weymouth, Massachusetts, as shown in Figure 1. The Site is bounded to the north by Washington Street, to the east by residential property and Mutton Lane, to the south by residential property, a small body of water, and Quarry Ave, and to the west by residential property and Hadley Street.

1.4 Drainage System Operation

Water quality mitigation features employed in the design include catch basins, street sweeping, an infiltration system, and a vegetated filter strip. Many of these storm water quality measures work in a treatment train and act together to perform the desired TSS removal. The calculations

for TSS removal can be found in Appendix H of the Atlantic Mechanical Property Stormwater Management Plan submitted with this report.

TSS removal calculations were performed in compliance with the Massachusetts Department of Environmental Protection Stormwater Handbook Volume 1, 2, and 3. The required water quality volume to be treated on this site is 1 inch of runoff times the total vehicular impervious area of the post-development project. TSS removal for this site is achieved through a series of treatment trains. These treatment trains control water quality flows and trap containments from moving further downstream. Treatment trains can be found on the TSS calculation sheet for individual areas. Some areas experience even more TSS removal than what is shown on the calculation sheet but conservatively, the treatment train shown on the calculation sheet is for the runoff with the least treatment at any analysis point. Maintenance is a key factor in maintaining the TSS removal efficiency.

1.5 Responsible Parties

1.5.1 Atlantic Mechanical

As Owner of the site, Atlantic Mechanical is responsible for maintaining the site in a safe condition, implementing routine operations and maintenance, completing informal and formal inspections, and undertaking repairs as required.

2.0 INSPECTION AND MONITORING REQUIREMENTS

2.1 General

An effective inspection program is essential for identifying problems and providing maintenance of the site. The inspection program involves three types of inspections:

1. **Monitoring** of the site should be routinely conducted to observe operation and assess performance. On-site monitoring may be accomplished by anyone, including the owner, operators, O&M personnel, property faculty, surrounding landowners, and other persons who may note unusual conditions at the site. Continuing effort by site personnel should be performed in the course of their normal duties. As new personnel become involved in the inspection of the sites, education is required to continue the effectiveness of the inspections.

2. **Special inspections** shall be made during or immediately following the occurrence of major events such as floods, earthquakes, vandalism, and heavy rain events.

3. **Maintenance** inspections shall be performed on all structural practices to determine if they are functioning as designed. Maintenance inspections are in order to identify, at an early stage, any developments that may be detrimental to the site. They involve assessing the operational capability as well as structural stability of the sites. Documentation including notes, photographs, and other records of observed conditions should be maintained for this type of inspection.

Visual inspection, performed on a regular basis, is one of the most economical means a site owner can use to assure the safety and long life of a site. Visual inspection involves careful examination of the surface and all parts of the structure, including the adjacent environment.

It is recommended that the Owner develop a logbook to contain copies of all of the inspection reports and a record and date of all personnel involved in the inspections. Sample maintenance

logs have been included in Appendix B, and sample inspection logs have been included in Appendix C.

2.2 Frequency of Tasks

2.2.1 Monitoring

Monitoring should be performed continuously as part of the normal operations and maintenance of the site. During routine visits to the site, site operators should be trained to visually evaluate the current condition of the site and be familiar with the site components to the extent necessary to note any changed conditions. Informal observations are to be made whenever the site is operated, and at regular intervals during the year to identify and address maintenance issues before further deterioration compromises the its operation. Notes of observations and work performed should be included within an inspection logbook.

Passive monitoring can also be accomplished through public use of the area and by surrounding residents and faculty. Contact information should be posted at the site to facilitate notification of appropriate personnel should any party not formally involved with the operation or maintenance of the site note unusual or suspicious activity.

2.2.2 Special Inspections

Special inspections shall be made during or immediately following the occurrence of major events such as floods, earthquakes, vandalism, and significant rain events. Dependent upon the severity of the event or observed conditions, a registered professional engineer with experience in the inspection and evaluation of sites should be consulted to assist with the inspection.

2.2.3 Maintenance Inspections

Maintenance inspections should be performed by qualified personnel as outlined within the Maintenance Section of this report. A qualified employee would be someone who is familiar with the site, its operation, and has been instructed on the procedures for observing, identifying, and

documenting deficiencies. An inspection checklist should be completed during each maintenance inspection. Sample checklists are included in Appendix A.

2.3 Organizing for Inspections

All inspections should be organized and systematic; inspectors should use equipment appropriate for the task, record observations accurately, and survey the structure and the site comprehensively.

2.3.1 Recording Inspections and Observations

An accurate and detailed description of conditions observed during each inspection will enable meaningful comparison of conditions observed at different times. All measurements and observed details required to get an accurate picture of the sites' current condition and potential problems should be recorded. The information has three key elements:

1. Location - The location of any questionable area or condition must be accurately described so that the area or condition can be evaluated for changes over time or examined further by experts. Photographs are often helpful in this regard. The location of the photo should be established and recorded.

2. Extent of Area - The length, width, depth or height of any suspected problem should be determined.

3. Descriptive Detail - A brief, yet detailed description of any anomalous condition should be given. Some items to include are:

    - Sediment built up within catch basins
    - Color and/or quantity of sediment in the sump
    - Condition of concrete
    - Condition of outlet controls
    - Extent of moist, wet or saturated areas
    - Adequacy of surface drainage

- Changes in conditions

2.3.2 Coverage

For the Property, a minimum of 2 passes along the site is suggested. The first pass should focus on the landscaped areas. The second pass should focus on the above ground and underground drainage structures.

2.3.3 Sequence

A suggested in the section above, a sequence of inspection ensuring systematic coverage of an entire site is:

- Surface landscape features
- Above ground drainage features
- Underground drainage structures

Following a consistent sequence lessens the chance of an important condition being overlooked. Reporting inspection results in the same sequence is recommended to ensure consistent records. Customized inspection forms are included in Appendix C. The forms should be supplemented with additional information or photographs that are generated during each inspection.

2.3.4 Record Keeping

A dated report should be filed for each inspection conducted and filed with any photographs taken (Photographs should be dated). In addition to inspection observations, monitoring measurements and weather conditions should be recorded.

Immediately following an inspection, observations should be compared with previous records to see if there are any trends that may indicate developing problems. If a change or trend is noted, quick reaction to questionable conditions will ensure the safety and long life of the site and could prevent costly repairs.

2.3.5 Crucial Inspection Times

There are at least four times when an inspection of the sites is recommended regardless of the schedule.

1. Prior to a predicted major rainstorm or heavy snow melt.
2. During or after a severe rainstorm.
3. During or following a severe windstorm; check performance during the storm and after the storm has subsided
4. Following an earthquake, the site and its appurtenant structures should be inspected by a qualified professional engineer.

2.4 Descriptions and Inspection Frequency of Major Features

The major features at the Property that require inspection are included and described below:

2.4.1 Underground Infiltration System

Underground Infiltration Systems are designed primarily to reduce the quantity of stormwater runoff from a site. Infiltration techniques reduce the amount of surface flow and direct the water back into the ground. There are different types of infiltration systems, including chamber systems. These are typically manufactured pipes containing open bottoms and sometimes perforations. The chambers are placed atop a stone bed.

It is recommended that system inlets be inspected at least twice per year.

2.4.2 Vegetated Filter Strip

Grassed channels, or vegetated filter strips, convey and treat stormwater. Properly designed grass channels are ideal when used adjacent to roadways or parking lots, where runoff from the impervious surfaces can be directed to the channel via sheet flow.

It is recommended that these areas be inspected the first few months after construction, and twice per year thereafter.

3.0 MAINTENANCE INSTRUCTIONS

3.1 General

A good maintenance program will protect the site against deterioration and prolong its life. Nearly all components of the site and the materials used in the site construction are susceptible to deterioration. A well implemented maintenance program provides protection not only for the site owner, but for the general public as well. Moreover, the cost of a proper maintenance program is small compared to the cost of major repairs.

The prescribed maintenance program is based primarily on systematic and frequent inspections. During the inspections, a checklist of items calling for maintenance should be developed and kept as part of the site's permanent record.

All work associated with invasive management, and grass areas shall be performed by a qualified individual with demonstrated experienced in the identification and control of invasive vegetation.

Chemical application in sensitive areas shall be in accordance with manufacturer's recommendations and as determined by the qualified individual noted herein.

3.2 Maintenance Priorities

3.2.1 Required Maintenance at the Earliest Possible Date

The following actions should be completed as soon as possible after the defective conditions are noted:

- Structures that are filled with sediment, including catch basins

3.2.2 Continuing Maintenance

- Routine vegetation control and general maintenance including weekly street sweeping
- Litter removal

3.3 Guidelines

3.3.1 Removal of Debris

As previously mentioned, the proper operation of drainage systems requires regular and thorough debris removal and cleaning. Cleaning is especially important after storms, which tend to deposit more debris onto the site.

The Owner shall remove all litter and debris found within the site (including parking lots). Litter and debris shall be removed from all grass areas prior to mowing operations.

3.3.2 Underground Infiltration System

Maintenance of the Underground Infiltration System should occur when there is no flow entering the system. Remove any debris that might clog the system. Mosquito prevention measures may be necessary if evidence of standing water is present. For proprietary systems, follow manufacturer's protocol for maintenance procedures.

3.3.3 Vegetated Filter Strip

Maintenance of the vegetated filter strip should occur as necessary throughout the year. Mow areas as needed, remove any sediment and debris manually at least once per year, and re-seed as necessary.

3.3.4 Sweeping

Street and sidewalk sweeping shall be performed to remove sediment from parking areas and access driveways once per week from spring to fall. Alternatively, sweeping shall be performed with a high efficiency vacuum sweeper monthly from spring to fall.

3.3.5 Spring Clean-Up

During the spring growing season, a general clean-up should include the removal of all leaves, branches, twigs and debris from all lawn areas, tree and shrub beds and from individual tree beds. Lawns should be de-thatched and mowed. All debris should be removed from the site and disposed of legally.

3.3.6 Mulching

All shrub and tree beds and individual trees previously mulched shall be mulched with no more than 2" of aged hardwood bark mulch. Mulch should be dark brown, free of dye and debris. Immediately before the installation of mulch, all areas receiving mulch shall be lightly raked, weeds removed and disposed of manually including root mass, bedlines re-edged and debris removed and disposed of. Mulched areas should be inspected in the late summer/early fall to determine if weed removal, re-edging and top dressing with mulch is needed.

3.3.7 Lawn Fertilization

All lawns should receive maintenance fertilizer. The type of fertilizer and schedule of application should follow the town-wide standard that is used on all other property campus and recreational spaces. Fertilization should be based on annual soil sample results and recommendations.

3.3.8 Tree and Shrub Fertilization

All planted trees and shrubs, both individual and in beds, should receive an application of maintenance fertilizer in the spring and fall based on the results of annual soil samples. The type of fertilizer and schedule of application should follow the town-wide standard that is used on all other property campus and recreational spaces.

3.3.9 Grass Mowing

All lawn areas shall be mowed to maintain a stand of evenly mowed grass at a grass height of 2" to 2 1/2" during normal growing seasons. The mowing frequency may be increased or decreased

depending on the growth rate of the grass, and wet and dry conditions. As a rule, the grass should be cut so that only one third (1/3) of its total length is removed during cutting operations.

Neat trimming shall be performed around all poles, curbs, posts, signs, mulched areas, and other structures falling within the lawn areas. Trimming shall be conducted simultaneously with the mowing operation. All sidewalks, mulch areas, and road surfaces shall be left free of all grass clippings. Care shall be taken to prevent trimmer damage of any kind to trees and shrubs.

3.3.10 Manual Weed Control

Weeds shall be removed by hand including the root mass, including grass from tree and shrub beds and from individual tree beds. Woody growth, vines, and other undesirable volunteers including Poison Ivy (*Toxicodendron radicans*) shall be removed and legally disposed of including all roots and root mass. Weed control activities shall be performed in such a manner so as not to disturb or destroy plant material or mulched areas. This task shall be done when mulching activities occur as well as during monthly inspections.

3.3.11 Insects and Disease Control

Prevention of disease or infestation is the first step of pest management. A plant that is in overall good health is far less susceptible to disease. General landscape maintenance can reduce problems from disease. Inspection of plant materials for signs of disease or infestation are to be performed monthly by the landscape crew.

3.3.12 Chemical Weed Control

When applying pesticides safety measures shall be required. Providing proper safety measures, for the landscape maintenance crews, will be the responsibility of the Landscape Maintenance Contractor, or the Owner. Pre-emergent weed control is recommended for lawn areas prior to mulching activities.

3.3.13 Pruning

Pruning shall be performed on all trees and shrubs (both previously planted and naturally occurring) adjacent to the grass areas, roadways, parking, walkways and buildings. Pruning shall be performed according to American Nursery and Landscape Association, "American Standard for Nursery Stock", ANSI Z60.1-2004, or latest edition.

Tree and shrubs shall be pruned in a manner which promotes the typical or natural shape and symmetry of the plant. All broken, dead, or injured branches shall be removed. All sucker growth and die back shall be removed. The pruning or removing of a tree's central leader shall be avoided.

All cuts shall be made parallel to and as close to the branch or stem collar as possible. Cuts shall be made in a manner which prevents damage to the bark.

3.3.14 Aeration

Following inspections of lawn areas, Owner shall determine if aeration is needed to de-compact the soil layer. A core aeration machine with tines measuring approximately three inches (3") long by a half inch (1/2") in diameter shall be used.

3.3.15 Fall Clean-Up

During the fall growing season there should be monthly removal of leaves, branches, twigs and other debris from the developed site area.

3.3.16 Tree Replacement

If any vegetation requires removal because of death, injury, disease or other reasons, a good faith and reasonable effort shall be made to replace trees with same or similar species, at a reasonable readily available size and at the same or similar location.

4.0 POLLUTION PREVENTION

4.1 Introduction

The Site Pollution Prevention Plan outlines the necessary tasks that are required to reduce, eliminate or prevent pollution at its source. Continued and proper storage and usage of materials is the best method to limit emergency conditions from occurring at the site. The Pollution Prevention Plan should be housed in a three-ring binder to facilitate updates to the plan and updated annually to ensure that the information contained in the plan is current.

This PPP has also been prepared to guide the on-going maintenance.

4.2 Vehicle Washing Controls

There will be no vehicle washing operations allowed within the property.

4.3 Spill Prevention

4.3.1 Fertilizers, Pesticides, Herbicides

If used, they will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be within homes or in covered sheds. The contents of any partially used bags will be transferred to a sealable plastic bin to avoid spills.

4.3.2 Paints

All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the stormwater management system but will be properly disposed of according to manufacturers' instructions or State and local regulations.

4.4 Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include but not be limited to brooms, dustpans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate State or local government agency, protective clothing, regardless of the size.
- The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one. A description of the spill, what cause it, and the cleanup measures will also be included.

4.5 Solid Waste

Solid Waste and recyclables shall be removed from the site and transported to approved public or private transfer stations for proper disposal. All solid waste shall be disposed of in accordance with State, Federal, and Local regulations.

END OF MANUAL

TABLES

TABLE 1: TELEPHONE LIST

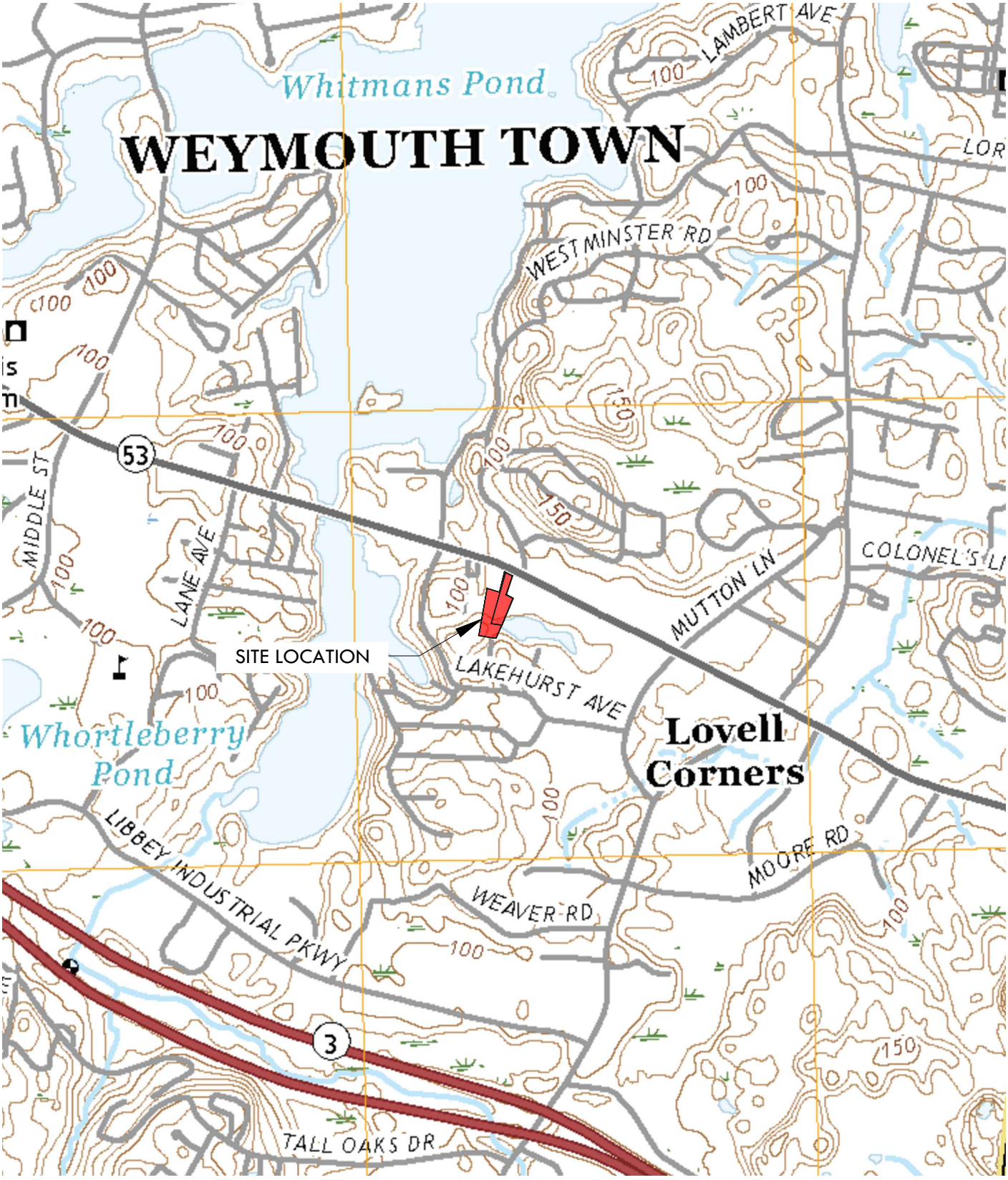
TABLE 1: TELEPHONE LIST	
OWNER & OPERATOR: ATLANTIC MECHANICAL	
Contact	Joe Gratta
Phone	781-335-8635
E-Mail	jgratta@atlanticmechanical.com
WEYMOUTH CONSERVATION COMISSION	
Contact	Mary Ellen Schloss, Casey Tocchio
Phone	781-340-5007, 781-682-6124
E-Mail	N/A

FIGURES

SITE LOCUS MAP

SITE PLAN

PROPOSED DRAINAGE PLANS



N

0 1,000'

SCALE: 1" = 1,000'

NOTES:
SOURCE: UNITED STATES GEOLOGICAL SURVEY MAP
WEYMOUTH, MA QUADRANGLE 7.5 MINUTES SERIES (2018)

USGS LOCUS PLAN

SITE: PROPOSED BUILDING EXPANSION
1047 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS
02189

DATE: 11/25/2020
DRAWN BY: JJA
CHECKED BY: AJC
VERTEX PROJ NO.: 64380

FIGURE
1

VERTEX®
400 Libbey Parkway | Weymouth, MA 02189
Main: 781.952.6000 | VERTEXENG.COM

Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta.Weymouth.MA\05-Engineering\Vertex Drawings\Report Figures\64380 - Figure 1 - Locus Map.dwg Tuesday, November 24, 2020 11:44:31 AM
Copyright: 2020 The Vertex Companies, Inc.

EXISTING LEGEND

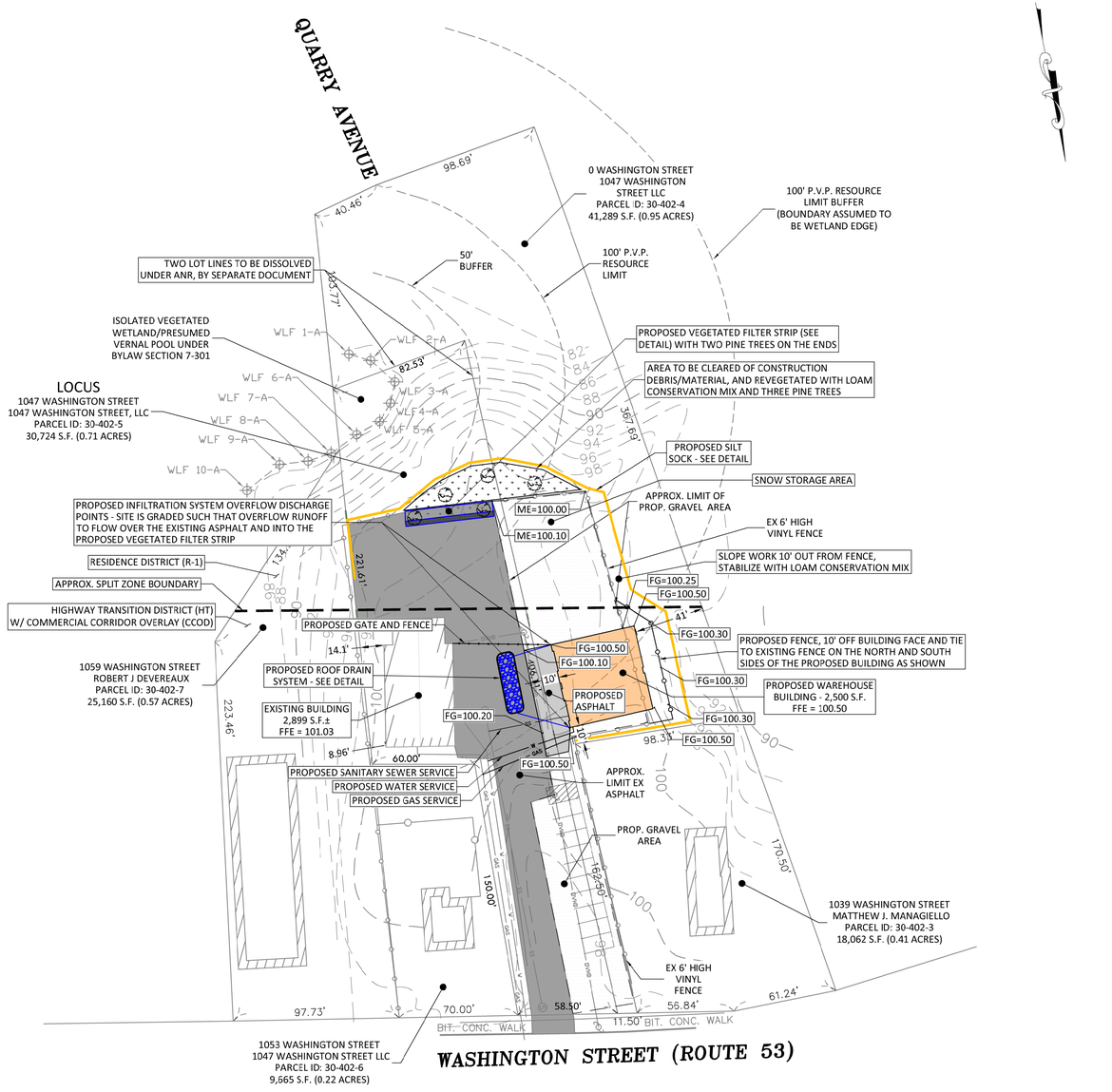
- WETLAND BOUNDARY
- EDGE OF ROAD
- CURB LINE
- ELEC — UNDERGROUND ELECTRIC
- OVHD — OVERHEAD ELECTRIC WIRE
- SS — UNDERGROUND SANITARY SEWER
- GAS — UNDERGROUND GAS LINE
- W — UNDERGROUND WATER LINE
- 80 — CONTOUR
- WLF — WETLAND FLAG

PROPOSED LEGEND

- EROSION CONTROL/LIMIT OF DISTURBANCE
- SS — UNDERGROUND SANITARY SEWER
- W — UNDERGROUND WATER LINE
- GAS — UNDERGROUND GAS LINE

NOTES

1. EXISTING CONDITIONS INFORMATION FROM "PLAN OF LAND" PREPARED BY C.S. KELLEY SURVEYORS (NO DATE) AND PROVIDED BY ATLANTIC MECHANICAL.
2. EXISTING UTILITY INVERTS/DEPTHS ARE UNKNOWN. CONTRACTOR TO ACQUIRE AND CONFIRM ALL APPLICABLE HORIZONTAL AND VERTICAL DATA PRIOR TO ANY UTILITY INSTALLATION. NOTIFY ENGINEER OF ANY DISCREPANCIES.
3. WETLAND DELINEATION BY WETLAND STRATEGIES, INC., PLYMOUTH MA, PER REPORT DATED AUGUST 11, 2020.
4. TEMPORARY ON-SITE, STORAGE CONTAINERS TO BE REMOVED UPON COMPLETION OF NEW BUILDING.



0' 40' 80' 120'

SCALE: 1" = 40'

811 Know what's below. Call before you dig.

VERTEX®
400 Libbey Parkway | Weymouth, MA 02189
Main: 781.952.6000 | VERTEXENG.COM

SITE PLAN

SITE: 1047 WASHINGTON STREET / 0 WASHINGTON STREET WEYMOUTH, MASSACHUSETTS 02189

FOR: JOE GRATTA 1047 WASHINGTON STREET WEYMOUTH, MASSACHUSETTS 02189

NO.	REVISIONS
1	10/29/2020 - CONCOM
2	1/8/2021 - CONCOM & ZBA
3	
4	
5	
6	
7	
8	
9	
10	

DATE: 1/8/2021
DRAWN BY: JJA
CHECKED BY: AJC
JOB #: 64380

C1.0

Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta.Weymouth.MA\05-Engineering\Vertex Drawings\C1.0 - Site Plan.dwg Friday, January 8, 2021 10:04:39 AM
Copyright: 2021 The Vertex Companies, Inc.

PROPOSED WATERSHEDS

TOTAL LOT AREA (S.F)	71,953.00		
TOTAL HYDROLOGY STUDY AREA (S.F)	55,499.56		
WATERSHED BREAKDOWN			
	IMPERVIOUS AREA	PERVIOUS AREA	TOTAL AREA
WATERSHED 1 (S.F.)	10,541.30	234.30	10,775.60
WATERSHED 2 (S.F.)	17,745.16	16,708.75	34,453.91
WATERSHED 3 (S.F.)	338.50	7,452.42	7,790.92
WATERSHED 4 (S.F.)	2,479.15	0.00	2,479.15
TOTALS (S.F.)	31,104.10	24,395.46	55,499.56
TOTAL LOT AREA (%)	43.83%	56.17%	100.00%

PLAN LEGEND

- WETLAND BOUNDARY
- EDGE OF ROAD
- CURB LINE
- ELEC — UNDERGROUND ELECTRIC
- OVHD — OVERHEAD ELECTRIC WIRE
- ST — UNDERGROUND STORMWATER
- W — UNDERGROUND WATER
- 80 — CONTOUR
- WLF — WETLAND FLAG

HYDROLOGY LEGEND

- HYDROLOGY STUDY BOUNDARY
- WATERSHED AREA
- TIME OF CONCENTRATION LINE
- ANALYSIS POINT

NOTES

EXISTING CONDITIONS INFORMATION FROM "PLAN OF LAND" PREPARED BY C.S. KELLEY SURVEYORS (NO DATE).

WETLAND DELINEATED BY WETLAND STRATEGIES, PLYMOUTH MA.

0' 40' 80' 120'

SCALE: 1" = 40'

811 Know what's below. Call before you dig.

VERTEX®
400 Libbey Parkway | Weymouth, MA 02189
Main: 781.952.6000 | VERTEXENG.COM

PROPOSED CONDITIONS HYDROLOGY PLAN

SITE: 1047 WASHINGTON STREET / 0 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS 02189

FOR: JOE GRATTA
1047 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS 02189

NO.	REVISIONS
1	10/29/2020 - CONCOM
2	1/8/2021 - CONCOM & ZBA
3	
4	
5	
6	
7	
8	
9	
10	

DATE: 1/8/2021
DRAWN BY: JJA
CHECKED BY: AJC
JOB #: 64380

H2.0

Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta.Weymouth.MA\05-Engineering\Vertex Drawings\Stormwater Analysis\H2.0 - Proposed Conditions Hydrology Plan.dwg Thursday, January 7, 2021 11:10:41 PM
Copyright: 2021 The Vertex Companies, Inc.

APPENDIX A

INSPECTION SCHEDULE

ATLANTIC MECHANICAL
SITE OPERATIONS & MAINTENANCE PLAN
Inspection Schedule and Evaluation Checklist

Best Management Practice	Inspection Frequency[1]	Date Inspected	Contractor	Current Conditions and Minimum Maintenance/Repairs, if necessary	Completed Maintenance/Repair (i.e. date, tasks completed)
Street Sweeping	Weekly (April - October)				
Drainage Manholes	Biannually				
Parking Lots, Roadways, and Sidewalks	Biannually				
Low Maintenance Areas	Monthly (April - October)				
Vegetated Filter Strip	Monthly (April – October)				
Planting Beds	Monthly (April – October)				

[1] Per the Massachusetts Stormwater Handbook Volume 2 Chapter 2

ATLANTIC MECHANICAL
SITE OPERATIONS & MAINTENANCE PLAN
Inspection Schedule and Evaluation Checklist

Best Management Practice	Inspection Frequency[1]	Date Inspected	Contractor	Current Conditions and Minimum Maintenance/Repairs, if necessary	Completed Maintenance/Repair (i.e. date, tasks completed)
Overall Site Conditions	Quarterly				
Underground Infiltration System	Biannually				

APPENDIX B

MAINTENANCE RECORD LOG

Atlantic Mechanical
Maintenance Record Log

Inspection No.	Date	Inspections Performed	Maintenance Actions Taken
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			

Atlantic Mechanical
Maintenance Record Log

Inspection No.	Date	Inspections Performed	Maintenance Actions Taken
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			

Atlantic Mechanical
Maintenance Record Log

Inspection No.	Date	Inspections Performed	Maintenance Actions Taken
45			
46			
47			
48			
49			
50			
51			
52			
53			
54			
55			
56			
57			
58			
59			
60			
61			
62			
63			
64			
65			
66			

Atlantic Mechanical
Maintenance Record Log

Inspection No.	Date	Inspections Performed	Maintenance Actions Taken
67			
68			
69			
70			
71			
72			
73			
74			
75			
76			
78			
79			
80			
81			
82			
83			
84			
85			
86			
87			
88			
89			

Atlantic Mechanical
Maintenance Record Log

Inspection No.	Date	Inspections Performed	Maintenance Actions Taken
90			
91			
92			
93			
94			
95			
96			
97			
98			
99			
100			

*Additional sheets shall be added as needed

APPENDIX C

STORMWATER SYSTEM INSPECTION FORM

Atlantic Mechanical
Stormwater System Inspection Report

GENERAL INFORMATION			
Location:			
Date of Inspection:			
Inspector's Name(s):		**Start/End Time:**	
Inspector's Title(s):			
Inspector's Contact Information			
Purpose of Inspection:			
WEATHER INFORMATION			
Has it rained since the last inspection?			
Weather at time of this inspection?			

SITE-SPECIFIC STORMWATER DEVICES				
	Description	**Installed & Operating Properly?**	**Corrective Actions Needed**	**Date for Corrective Action/Responsible Person**
1		Y ☐ N ☐		
2		Y ☐ N ☐		
3		Y ☐ N ☐		
4		Y ☐ N ☐		
5		Y ☐ N ☐		
6		Y ☐ N ☐		
7		Y ☐ N ☐		

Atlantic Mechanical
Stormwater System Inspection Report

SITE-WIDE STORMWATER				
	Description		**Corrective Action**	**Date for Corrective Action/Responsible Person**
1	Are all slopes properly stabilized?	Y ☐ N ☐		
2	Are natural resource areas (e.g. streams, wetlands, etc.) being subjected to erosion?	Y ☐ N ☐		
3	Are discharge points free of sediment deposits?	Y ☐ N ☐		

Print Name: _____

Signature: _____ **Date:** _____

APPENDIX G

PLAN SET

(SEPARATE FROM REPORT)

PROPOSED WAREHOUSE BUILDING

1047 WASHINGTON STREET / 0 WASHINGTON STREET - WEYMOUTH, MASSACHUSETTS

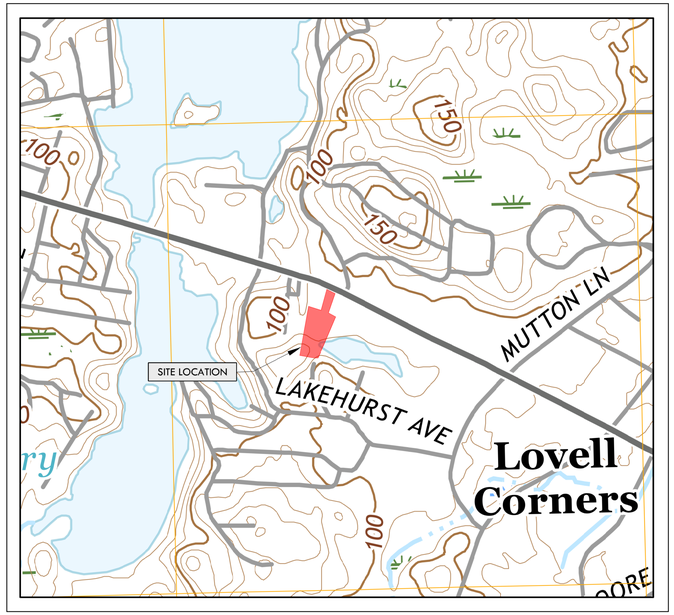
CIVIL DESIGN PLANS

APPLICANT

JOE GRATTA
1047 Washington Street
Weymouth, MA 02189
Tel: (781) 335-8635

CIVIL ENGINEERS

THE VERTEX COMPANIES, INC.
400 Libbey Parkway
Weymouth, MA 02189
Tel: (781) 952-6000
Fax: (781) 335-3543



AREA MAP

SCALE: 1"= 500'

SHEET INDEX

C0.0	COVER SHEET
C1.0	SITE PLAN
C2.0	SITE DETAILS
C2.1	SITE DETAILS

Know what's below. Call before you dig.

VERTEX®
400 Libbey Parkway | Weymouth, MA 02189
Main: 781.952.6000 | VERTEXENG.COM

COMMONWEALTH OF MASSACHUSETTS
ANDREW J. CHAGNON
CIVIL
No. 46113
REGISTERED PROFESSIONAL ENGINEER

COVER SHEET

SITE: 1047 WASHINGTON STREET / 0 WASHINGTON STREET WEYMOUTH, MASSACHUSETTS 02189

FOR: JOE GRATTA 1047 WASHINGTON STREET WEYMOUTH, MASSACHUSETTS 02189

NO.	REVISIONS
1	10/29/2020 - CONCOM
2	1/8/2021 - CONCOM & BZA
3	
4	
5	
6	
7	
8	
9	
10	

DATE: 1/8/2021
DRAWN BY: JJA
CHECKED BY: AJC
JOB #: 64380

C0.0

Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta.Weymouth.MA\05-Engineering\Vertex Drawings\C0.0 Cover Sheet.dwg Friday, January 8, 2021 1:53:33 PM
Copyright 2021 The Vertex Companies, Inc.

ZONING & ENVIRONMENTAL CONSTRAINTS

PARCEL SIZE:	70,971 SF (1.65 ACRES) 29,740 SF EXCLUSIVE OF WETLANDS	
ZONING DISTRICT:	HIGHWAY TRANSITION DISTRICT (HT) & RESIDENCE DISTRICT (R-1)	
OVERLAY DISTRICTS:	COMMERCIAL CORRIDOR OVERLAY DISTRICT (CCOD)	
LOT COVERAGE:	EXISTING	18,081± S.F. (25.48%)
	MAXIMUM LOT COVERAGE	35,4057± S.F. (50.0%)
	PROPOSED	31,104± S.F. (43.83%)
LANDSCAPING COVERAGE:	EXISTING	52,890± S.F. (74.52%)
	MINIMUM LANDSCAPING COVERAGE	17,992± S.F. (25.0%)
	PROPOSED	39,867± S.F. (56.17%)
FLOOR AREA RATIO (FAR):	BUILDABLE LAND AREA	17,655± S.F.
	FLOOR AREA	2,500± S.F.
	FLOOR AREA/BUILDABLE LAND AREA	0.14
FLOOD ZONE: FLOOD MAP	ZONE X, FIRM COMMUNITY PANEL NUMBER 25021C 0233E DATE: JULY 17, 2012	

EXISTING LEGEND

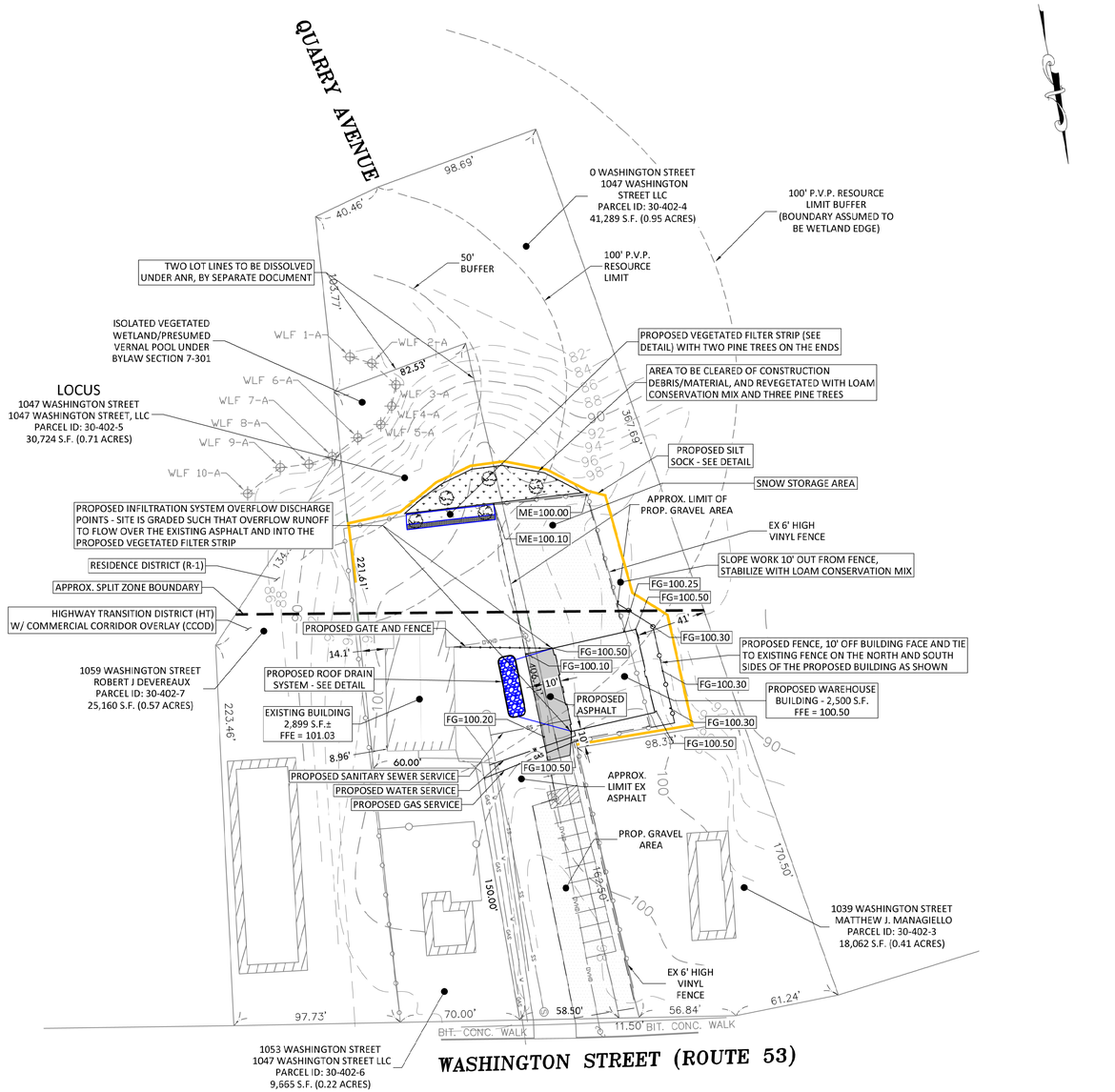
- WETLAND BOUNDARY
- EDGE OF ROAD
- CURB LINE
- ELEC — UNDERGROUND ELECTRIC
- OVHD — OVERHEAD ELECTRIC WIRE
- SS — UNDERGROUND SANITARY SEWER
- GAS — UNDERGROUND GAS LINE
- W — UNDERGROUND WATER LINE
- 80 — CONTOUR
- WLF — WETLAND FLAG

PROPOSED LEGEND

- EROSION CONTROL/LIMIT OF DISTURBANCE
- SS — UNDERGROUND SANITARY SEWER
- W — UNDERGROUND WATER LINE
- GAS — UNDERGROUND GAS LINE

NOTES

1. EXISTING CONDITIONS INFORMATION FROM "PLAN OF LAND" PREPARED BY C.S. KELLEY SURVEYORS (NO DATE) AND PROVIDED BY ATLANTIC MECHANICAL.
2. EXISTING UTILITY INVERTS/DEPTHS ARE UNKNOWN. CONTRACTOR TO ACQUIRE AND CONFIRM ALL APPLICABLE HORIZONTAL AND VERTICAL DATA PRIOR TO ANY UTILITY INSTALLATION. NOTIFY ENGINEER OF ANY DISCREPANCIES.
3. WETLAND DELINEATION BY WETLAND STRATEGIES, INC., PLYMOUTH MA, PER REPORT DATED AUGUST 11, 2020.
4. TEMPORARY ON-SITE, STORAGE CONTAINERS TO BE REMOVED UPON COMPLETION OF NEW BUILDING.



0' 40' 80' 120'

SCALE: 1" = 40'

VERTEX®
400 Libbey Parkway | Weymouth, MA 02189
Main: 781.952.6000 | VERTEXENG.COM

COMMONWEALTH OF MASSACHUSETTS
ANDREW J. CHAGNON
CIVIL
No. 46113
REGISTERED PROFESSIONAL ENGINEER

SITE PLAN

SITE: 1047 WASHINGTON STREET / 0 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS 02189

FOR: JOE GRATTA
1047 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS 02189

NO.	REVISIONS
1	10/29/2020 - CONCOM
2	1/8/2021 - CONCOM & BZA
3	
4	
5	
6	
7	
8	
9	
10	

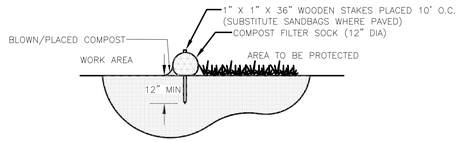
DATE: 1/8/2021
DRAWN BY: JJA
CHECKED BY: AJC
JOB #: 64380

C1.0

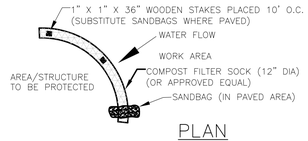
Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta.Weymouth.MA\05-Engineering\Vertex Drawings\C1.0 - Site Plan.dwg Friday, January 8, 2021 1:56:47 PM
Copyright: 2021 The Vertex Companies, Inc.

Know what's below. Call before you dig.

SILTATION BARRIER
NOT TO SCALE

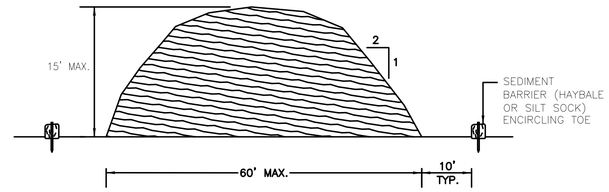


SECTION



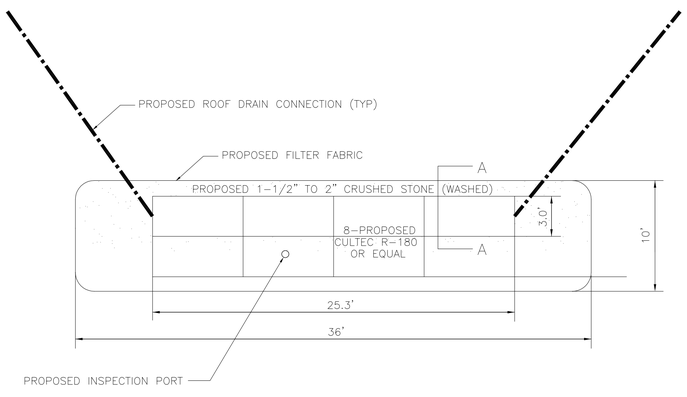
PLAN

NOTES:
1. INSPECT AND MAINTAIN THROUGHOUT CONSTRUCTION.
2. SOCK AND COMPOST MATERIAL TO BE REMOVED FROM SITE WHEN CONSTRUCTION COMPLETE.

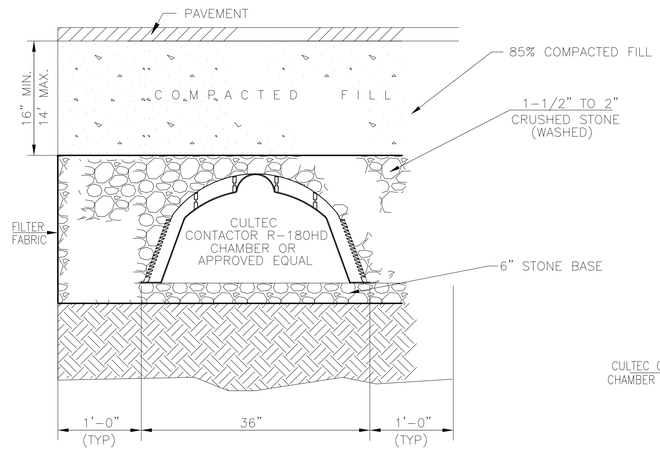


NOTES:
1. STOCKPILE AREA SHALL NOT EXCEED SPECIFIED DIMENSIONS WITHOUT APPROVAL FROM ENGINEER.
2. STOCKPILED ERODIBLE MATERIAL THAT WILL NOT BE USED FOR GREATER THAN 30 DAYS SHALL BE STABILIZED WITH TEMPORARY VEGETATION OR COVERED IMMEDIATELY FOLLOWING PLACEMENT.
3. NO STOCKPILE SHALL BE PLACED WITHIN THE 100 FOOT WETLAND BUFFER.

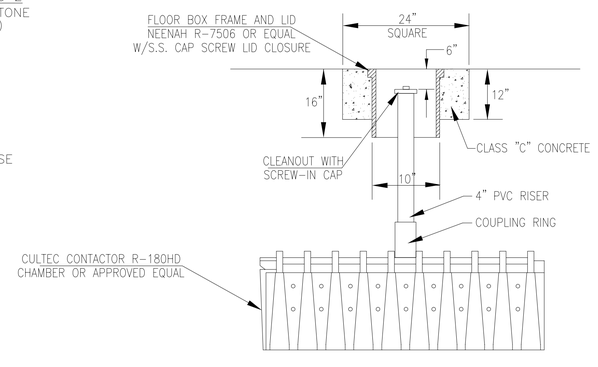
ERODIBLE MATERIAL STOCKPILE
NOT TO SCALE



ROOF DRAIN SYSTEM – PLAN VIEW
(NOT TO SCALE)



SECTION A–A – TYPICAL ROOF DRAIN SYSTEM
(NOT TO SCALE)



DETAIL – INSPECTION PORT @ ROOF DRAIN SYSTEM
(NOT TO SCALE)

VERTEX®
400 Libbey Parkway I Weymouth, MA 02189
Main: 781.952.6000 I VERTEXENG.COM

COMMONWEALTH OF MASSACHUSETTS
ANDREW J. CHAGNON
CIVIL
No. 46113
REGISTERED PROFESSIONAL ENGINEER

SITE DETAILS

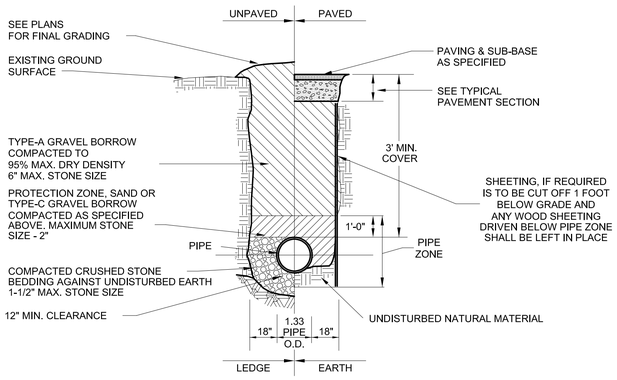
SITE: 1047 WASHINGTON STREET / 0 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS 02189

FOR: JOE GRATTA
1047 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS 02189

NO.	REVISIONS
1	10/29/2020 - CONCOM
2	1/8/2021 - CONCOM & BZA
3	
4	
5	
6	
7	
8	
9	
10	

DATE: 1/8/2021	C2.0
DRAWN BY: JJA	
CHECKED BY: AJC	
JOB #: 64380	

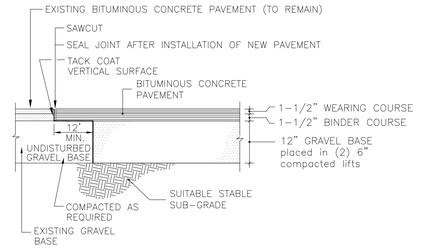
Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta.Weymouth.MA\05-Engineering\Vertex Drawings\C2.0 Details.dwg Friday, January 8, 2021 2:17:33 PM
Copyright 2021 The Vertex Companies, Inc.



TYPICAL UTILITY TRENCH DETAIL

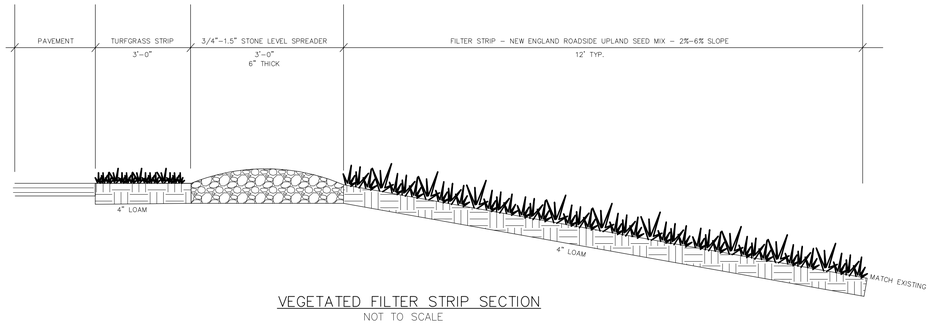
(NOT TO SCALE)

1. GRAVEL BORROW SHALL CONFORM TO MASS HIGHWAY SPECIFICATION M1.03.0.
2. CRUSHED STONE BEDDING SHALL CONFORM TO MASS HIGHWAY SPECIFICATION M2.01.1.



BITUMINOUS CONCRETE PAVEMENT SECTION

NOT TO SCALE



VEGETATED FILTER STRIP SECTION

NOT TO SCALE

VERTEX®
400 Libbey Parkway | Weymouth, MA 02189
Main: 781.952.6000 | VERTEXENG.COM

COMMONWEALTH OF MASSACHUSETTS
ANDREW J. CHAGNON
CIVIL
No. 46113
REGISTERED PROFESSIONAL ENGINEER

SITE DETAILS

SITE: 1047 WASHINGTON STREET /
0 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS 02189

FOR: JOE GRATTA
1047 WASHINGTON STREET
WEYMOUTH, MASSACHUSETTS 02189

NO.	REVISIONS
1	10/29/2020 - CONCOM
2	1/8/2021 - CONCOM & BZA
3	
4	
5	
6	
7	
8	
9	
10	

DATE: 1/8/2021
DRAWN BY: JJA
CHECKED BY: AJC
JOB #: 64380

C2.1

Know what's below. Call before you dig.

Z:\Shared\Projects\64000-64999\64300-64399\64380.Paul Gratta.Weymouth.MA\05-Engineering\Vertex Drawings\C2.0 Details.dwg Friday, January 8, 2021 2:18:47 PM
Copyright 2021 The Vertex Companies, Inc.