STORMWATER MANAGEMENT REPORT

Triangle Farm
Mill Street
Holliston, Massachusetts

June 15, 2020
Revised: Sept. 10, 2020

Prepared for:

Murch Prentice Realty Trust
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Prepared by:

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Project Introduction:

The applicant, Murch Prentice Realty Trust, is proposing to develop a seven (7) lot single family Open Space Residential Subdivision located off Mill Street in Holliston, Massachusetts. The existing property consist of approximately 12.4 acres of land area, with additional land area to be considered Open Space.

The Project will be serviced by town water, onsite sewage disposal systems and other available public utilities. The stormwater generated from the Project will be captured, conveyed, treated and mitigated on-site utilizing Best Management Practices.

The purpose of these calculations is to demonstrate design compliance of the Project's stormwater management system for water quality and quantity, specifically post-development peak discharge rates per the DEP's Stormwater Management Policy, the Town of Holliston Land Subdivision Regulations. As designed, the system will mitigate peak rates of runoff for storms up to and including the 100-year event under post-construction conditions.

Methodology/Sources of Data:

The overall storm water management plan for the project is designed to maintain the peak rate of storm water runoff and runoff volumes from the site after development. The Soil Conservation Service Modified Soil Cover Complex Method, the computer program "HydroCAD" by Applied Microcomputer Systems, and the procedures specified in Urban Hydrology for storm Small Watersheds were used to determine pre-and post-developed peak flow rates of runoff from the site. The storm events have been compiled from the Soil Conservation Services Technical Report No. 55 and the U.S. Department of Commerce Technical Paper (TP 40). The 2-year, 10-year, 25-year and 100-year storm events have been utilized for hydrology calculations. The rainfall data for the Type III, 24-hour storm events follow:

24-Hour Storm	Rainfall (inches)
2	3.20
10	4.80
25	5.50
100	7.0

The storm water runoff will be controlled through the use of "Best Management Practices" and in conformance with the MADEP Stormwater Management Policy. The proposed Project will result in an improvement over the existing conditions, by constructing a storm water management system that will provide treatment, groundwater recharge and reduce the peak rates of runoff and offsite runoff volumes.

The piped drainage system has been designed utilizing the Rational Method for the 25 year storm event to size street drains.

Soils:

The Natural Resources Conservation Service (NRCS), Hydrologic Soils Group Map for Middlesex county, Massachusetts indicates that the on-site soils consist of Paxton Fine Sandy Loam-307B, and Scituate fine sandy loam-315B. NRCS assigned hydrologic soil rating for these soils ranges from C and D soil classification. The upper regions of the site consists of C hydrologic soil rating and D rating in the wetland area. On-site soil testing was performed to determine groundwater elevations and confirm soil classifications.

The soils are classified as Hydrologic Group C, Silt Loam. The Rawles Rate of 0.27 inches/hour was used in the calculations. (See Table)

Table 2.3.3. 1982 Rawls Rates

Texture Class	NRCS Hydrologic Soil Group (HSG)	Infiltration Rate Inches/Hour
Sand	A	8.27
Loamy Sand	A	2.41
Sandy Loam	B	1.02
Loam	B	0.52
Silt Loam	C	0.27
Sandy Clay Loam	C	0.17
Clay Loam	D	0.09
Silty Clay Loam	D	0.06
Sandy Clay	D	0.05
Silty Clay	D	0.04
Clay	D	0.02

Existing Conditions Overview:

The Project is located off Mill Street and identified as Assessor Map 7, Block 4, Lot 55.2 containing approximately 12.4 +/- acres. The site is currently undeveloped historical farm lands that has become overgrown with brush and woods mix. There is a bordering vegetated wetland area located at the rear of property. The site gently slopes from Mill Street (North) to the rear property boundary (South) with a change in elevation of approximately fourteen (14) feet.

The existing site is divided into three (3) existing watershed subcatchment areas. See the attached Pre-Development Subcatchment Area Plan for delineations. Subcatchment E1 flows overland towards Mill Street and the wetland area to the south. Subcatchments E1 and E2 are combined with Link 1L and discharge via overland flow the rear wetland area.

Description	Design Point Comments
E1	Overland flow to Mill Street area
E2	Overland flow to the rear wetland
E3	Overland flow to the rear wetland

Proposed Conditions Overview:

The proposal is to subdivide the property as an Open Space Residential Subdivision consisting of seven (7) single family dwellings. The proposed roadway extends from Mill Street to a cul-de-sac approximately five-hundred (500) feet in length. The proposed stormwater drainage system is designed to capture the runoff utilizing catch basins, manholes and culverts to convey the stormwater to a drainage basin located at the end of the proposed roadway. The roof runoff from the proposed dwellings will be conveyed via gutters and downspouts to underground recharge systems.

The proposed runoff areas have been divided into four (4) subcatchments. Subcatchment P1 discharges via overland flow towards Mill Street and the wetland area to the south. Subcatchments P3 and P4 bypass the proposed drainage basin and discharge via overland flow to the rear wetland. Subcatchment P4 is directed to the proposed stormwater drainage basin. The outflow from the drainage basin has been combined with the discharge from P3 and P4 in Link 2L for comparison with predeveloped flows.

The proposed systems will reduce all post-development flow rates and volumes of runoff up to and including the 100-year event to existing levels at all abutting areas. Existing uncaptured off-site runoff not associated with the Project will continue to flow overland without change.

Description	Design Point Comments
P1	Overland flow to Mill Street area
P2	Overland flow to the rear wetland
P3	Overland flow to the rear wetland
P4	To drainage basin

The following is summary comparison of Pre- and Post-Developed Rates and Volumes of Runoff:

Summary of Peak Stormwater Runoff Rates:								
Design Point	2-Yr Peak Flow (cfs)		10-Yr Peak Flow (cfs)		25-Yr Peak Flow (cfs)		100-Yr Peak Flow (cfs)	
	Existing	*Proposed*	*Existing*	*Proposed*	*Existing*	*Proposed*	*Existing*	*Proposed*
E1/ P1	2.62	2.62	6.04	5.73	6.74	6.35	11.35	10.46
1L/ 2L	4.52	3.90	10.67	9.95	11.93	11.26	20.34	19.57

The following is a summary of the Retention Basin:

Summary of Retention Basin								
Design Point	2-Yr Volume (cu.ft.)		10-Yr Volume (ac-ft)		25-Yr Volume (ac-ft)		100-Yr Volume (ac-ft)	
	Peak Elev.Ft.	*Outflow (cfs)*	*Peak Elev. Ft.*	*Outflow (cfs)*	*Peak Elev.Ft.*	*Outflow (cfs)*	*Peak Elev.Ft.*	*Outflow (cfs)*
1P	281.05	0.98	281.67	3.05	281.77	3.45	282.34	5.70

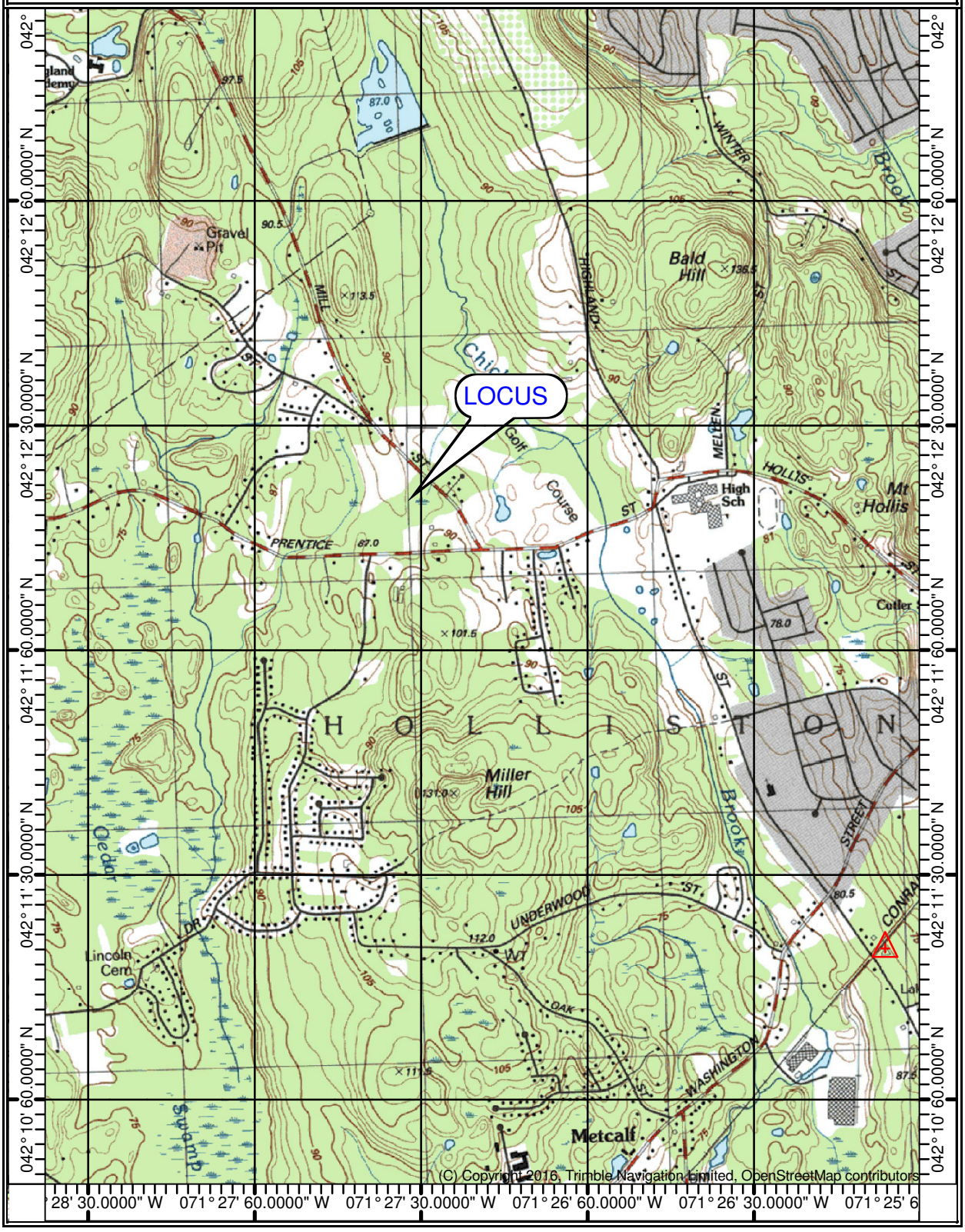
Summary:

The calculations performed for all design storm events indicate that the total peak rates and volumes of runoff for the Project as proposed will not exceed those of existing conditions with the implementation of the stormwater management system. With the implementation of the stormwater management system as designed, along with the Operation and Maintenance plan contained herein, all of the objectives of the DEP's Stormwater Management Regulations are satisfied.

Map Name: MEDFIELD
Print Date: 05/07/20

Scale: 1 inch = 2,000 ft.
Map Center: 042° 12' 09.2741" N,

Horizontal Datum: NAD27

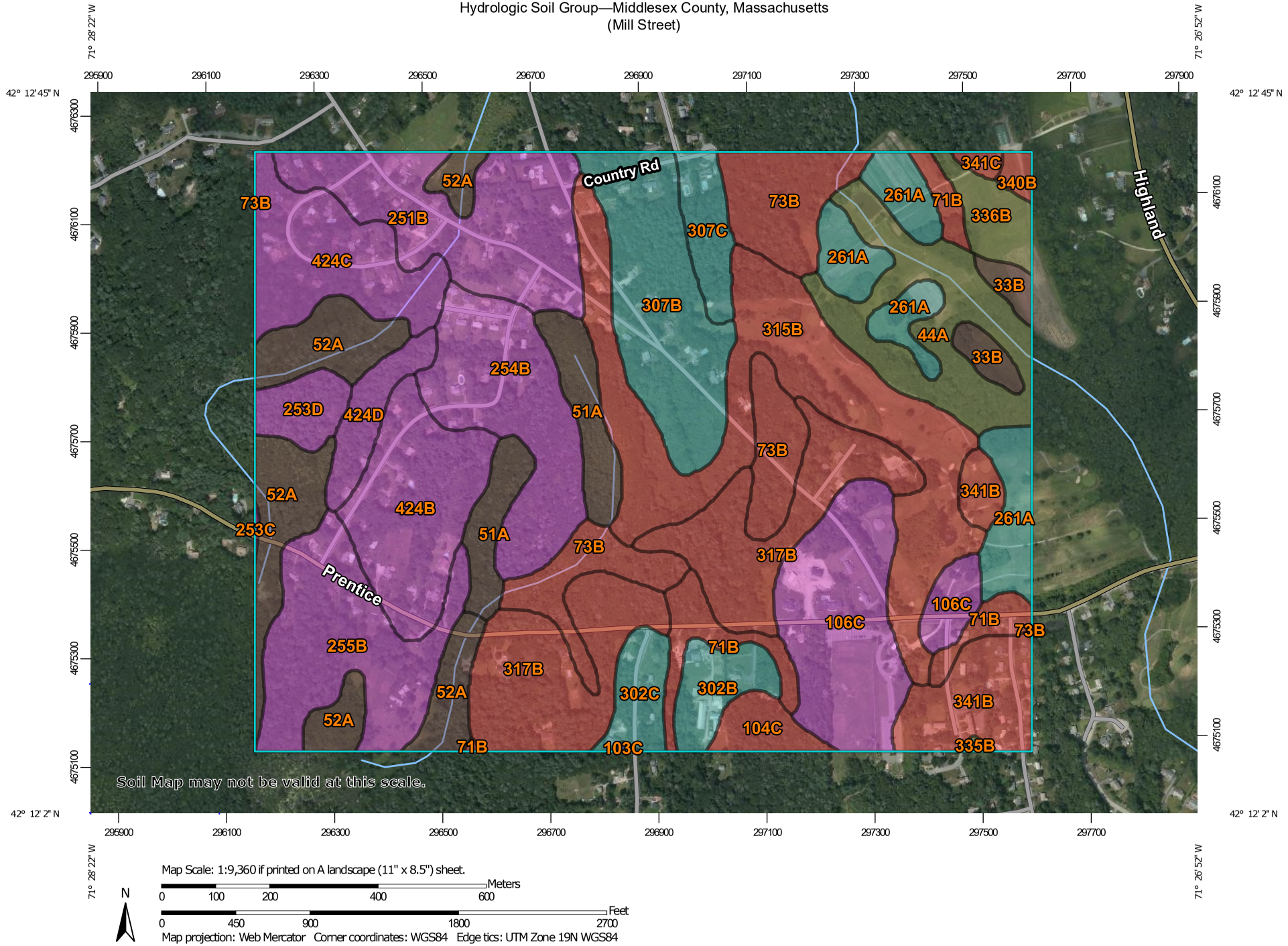


SCALE 1:24000

0 1000 2000 3000 4000 5000 6000

Feet

Hydrologic Soil Group—Middlesex County, Massachusetts
(Mill Street)



MAP LEGEND

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

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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: Middlesex County, Massachusetts
Survey Area Data: Version 19, Sep 12, 2019

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

Date(s) aerial images were photographed: Jul 28, 2019—Aug 15, 2019

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
33B	Raypol silt loam, 0 to 5 percent slopes	B/D	3.8	1.0%
44A	Birdsall mucky silt loam, 0 to 1 percent slopes	C/D	19.1	4.9%
51A	Swansea muck, 0 to 1 percent slopes	B/D	11.8	3.0%
52A	Freetown muck, 0 to 1 percent slopes	B/D	25.2	6.4%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	D	9.9	2.5%
73B	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	D	24.1	6.1%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	B	0.2	0.0%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	D	4.0	1.0%
106C	Narragansett-Hollis-Rock outcrop complex, 3 to 15 percent slopes	A	25.7	6.5%
251B	Haven silt loam, 3 to 8 percent slopes	A	24.8	6.3%
253C	Hinckley loamy sand, 8 to 15 percent slopes	A	0.1	0.0%
253D	Hinckley loamy sand, 15 to 25 percent slopes	A	4.8	1.2%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	21.6	5.5%
255B	Windsor loamy sand, 3 to 8 percent slopes	A	23.2	5.9%
261A	Tisbury silt loam, 0 to 3 percent slopes	C	16.8	4.3%
302B	Montauk fine sandy loam, 0 to 8 percent slopes, extremely stony	C	6.1	1.5%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
302C	Montauk fine sandy loam, 8 to 15 percent slopes, extremely stony	C	5.2	1.3%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	C	23.2	5.9%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	C	5.7	1.5%
315B	Scituate fine sandy loam, 3 to 8 percent slopes	D	41.2	10.4%
317B	Scituate fine sandy loam, 3 to 8 percent slopes, extremely stony	D	35.8	9.1%
335B	Rainbow silt loam, 3 to 8 percent slopes	C/D	0.2	0.1%
336B	Rainbow silt loam, 3 to 8 percent slopes, very stony	C/D	5.0	1.3%
340B	Broadbrook very fine sandy loam, 3 to 8 percent slopes	D	1.1	0.3%
341B	Broadbrook very fine sandy loam, 3 to 8 percent slopes, very stony	D	12.8	3.2%
341C	Broadbrook very fine sandy loam, 8 to 15 percent slopes, very stony	D	0.8	0.2%
424B	Canton fine sandy loam, 3 to 8 percent slopes, extremely bouldery	A	19.5	4.9%
424C	Canton fine sandy loam, 8 to 15 percent slopes, extremely bouldery	A	16.9	4.3%
424D	Canton fine sandy loam, 15 to 25 percent slopes, extremely bouldery	A	5.6	1.4%
Totals for Area of Interest			**394.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

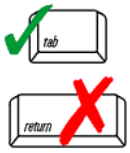
Tie-break Rule: Higher

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.

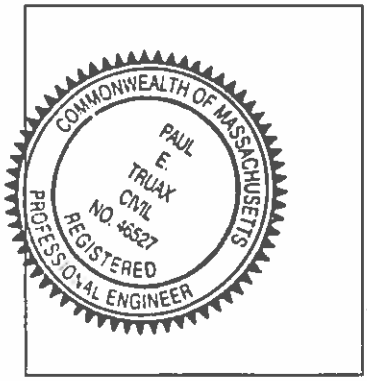
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



6-15-2020

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

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

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

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.

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.

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.

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;

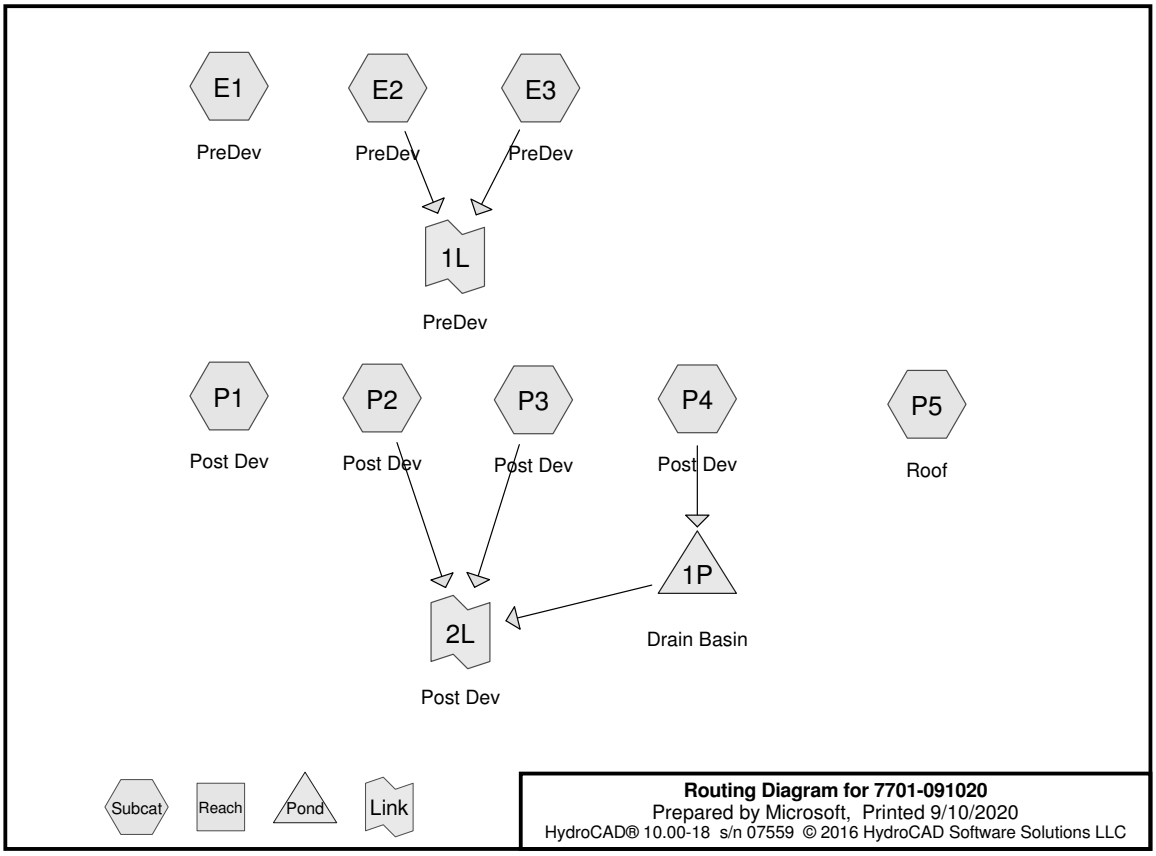
☒ An Illicit Discharge Compliance Statement is attached;

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

APPENDIX – A

Hydrogeological Calculations for Pre & Post Development
Hydraulic Design (Manning's Equation)

Standard 2



Summary for Subcatchment E1: PreDev

Runoff = 2.62 cfs @ 12.23 hrs, Volume= 11,589 cf, Depth> 0.98"

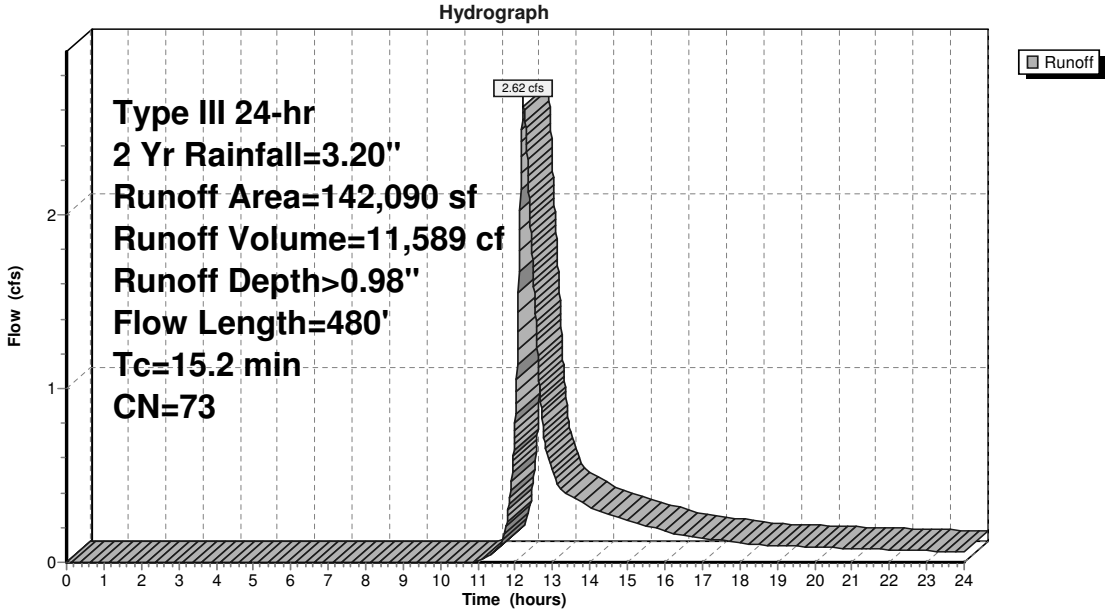
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (sf)	CN	Description
5,670	98	Paved parking, HSG C
136,420	72	Woods/grass comb., Good, HSG C
142,090	73	Weighted Average
136,420		96.01% Pervious Area
5,670		3.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0180	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	130	0.0500	3.60		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.7	300	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
15.2	480	Total			

Subcatchment E1: PreDev

Hydrograph



Summary for Subcatchment E2: PreDev

Runoff = 3.29 cfs @ 12.25 hrs, Volume= 15,066 cf, Depth> 0.93"

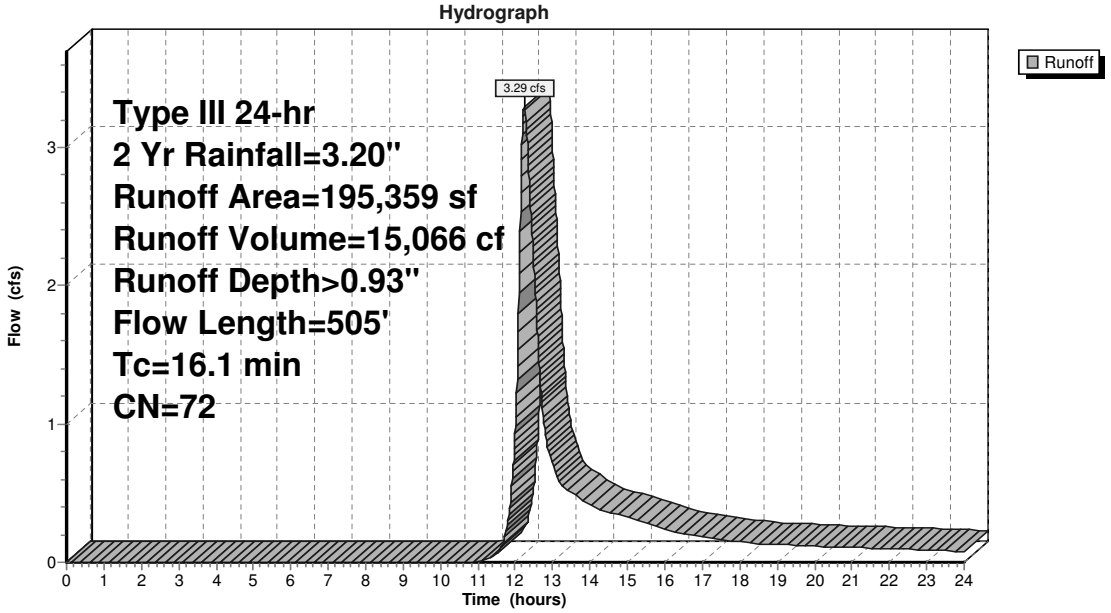
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (sf)	CN	Description
195,359	72	Woods/grass comb., Good, HSG C
195,359		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0170	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.2	270	0.0160	2.04		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.7	185	0.0800	4.55		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
16.1	505	Total			

Subcatchment E2: PreDev

Hydrograph



Summary for Subcatchment E3: PreDev

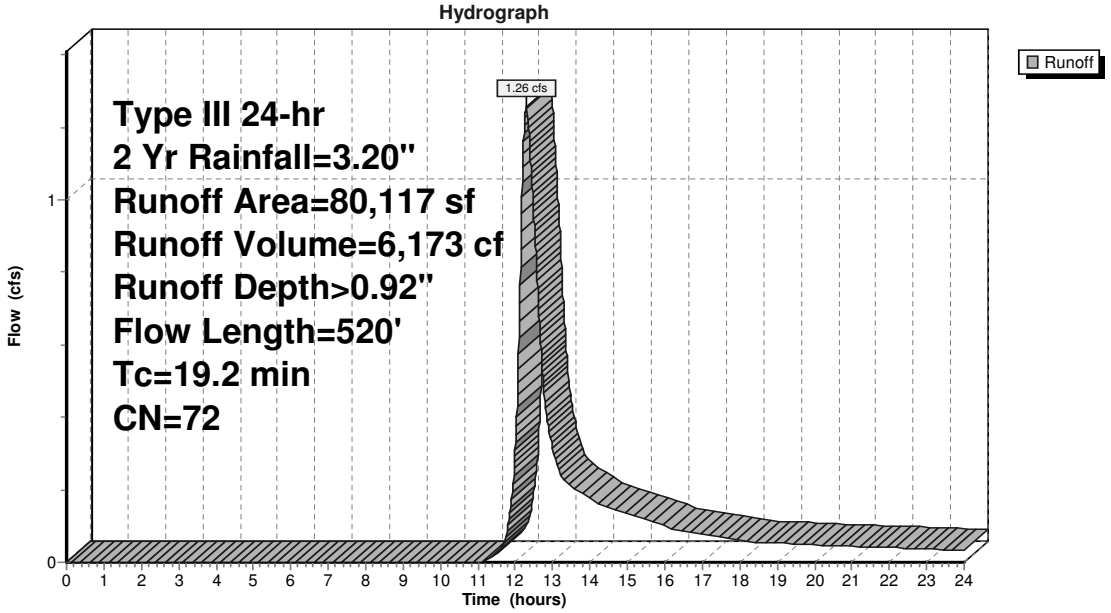
Runoff = 1.26 cfs @ 12.29 hrs, Volume= 6,173 cf, Depth> 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (sf)	CN	Description
80,117	72	Woods/grass comb., Good, HSG C
80,117		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	470	0.0280	2.69		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
19.2	520	Total			

Subcatchment E3: PreDev



Summary for Subcatchment P1: Post Dev

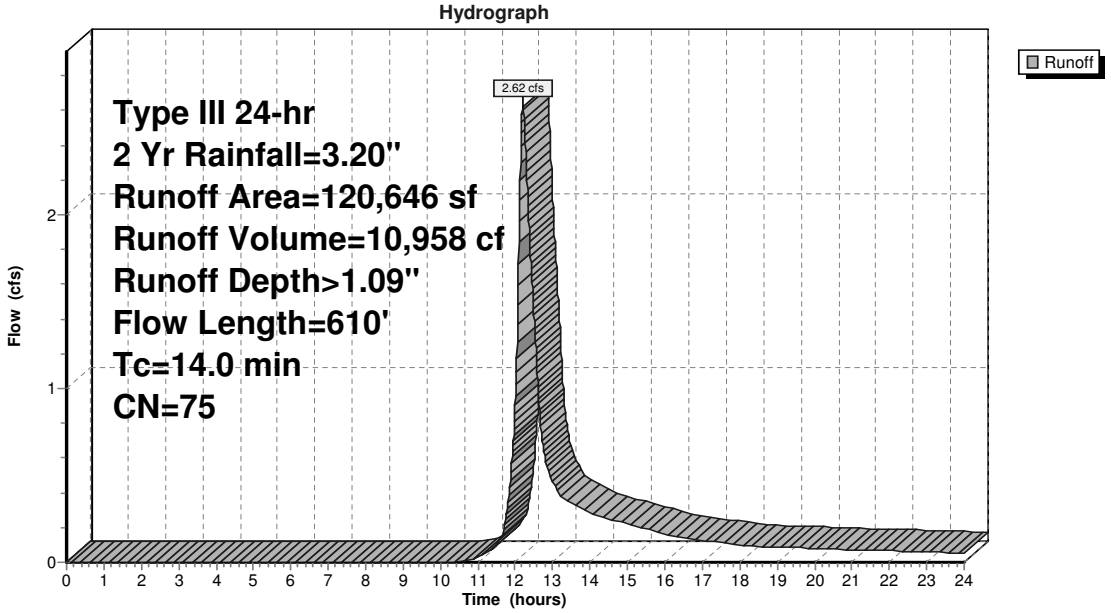
Runoff = 2.62 cfs @ 12.21 hrs, Volume= 10,958 cf, Depth> 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

	Area (sf)	CN	Description
*	2,786	98	Hse
	8,060	98	Paved parking, HSG C
	50,444	74	>75% Grass cover, Good, HSG C
	59,356	72	Woods/grass comb., Good, HSG C
	120,646	75	Weighted Average
	109,800		91.01% Pervious Area
	10,846		8.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.6	110	0.0400	3.22		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
2.6	450	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
14.0	610	Total			

Subcatchment P1: Post Dev



Summary for Subcatchment P2: Post Dev

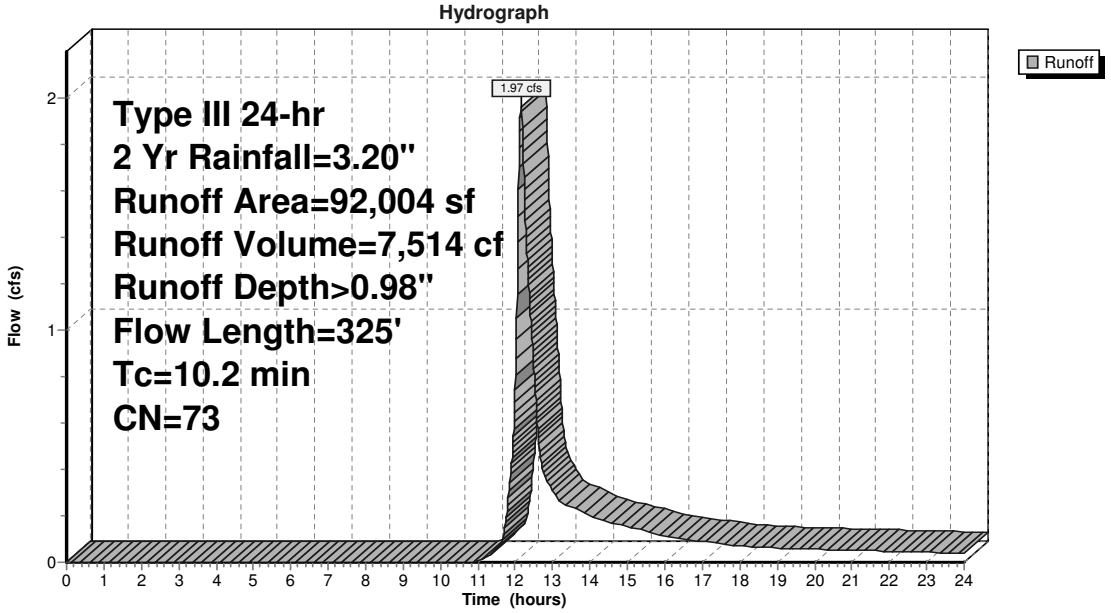
Runoff = 1.97 cfs @ 12.15 hrs, Volume= 7,514 cf, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

	Area (sf)	CN	Description
*	1,432	98	Roof
	43,772	72	Woods/grass comb., Good, HSG C
	46,800	74	>75% Grass cover, Good, HSG C
	92,004	73	Weighted Average
	90,572		98.44% Pervious Area
	1,432		1.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0150	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
1.0	275	0.0800	4.55		**Shallow Concentrated Flow, 27** Unpaved Kv= 16.1 fps
10.2	325	Total			

Subcatchment P2: Post Dev



Summary for Subcatchment P3: Post Dev

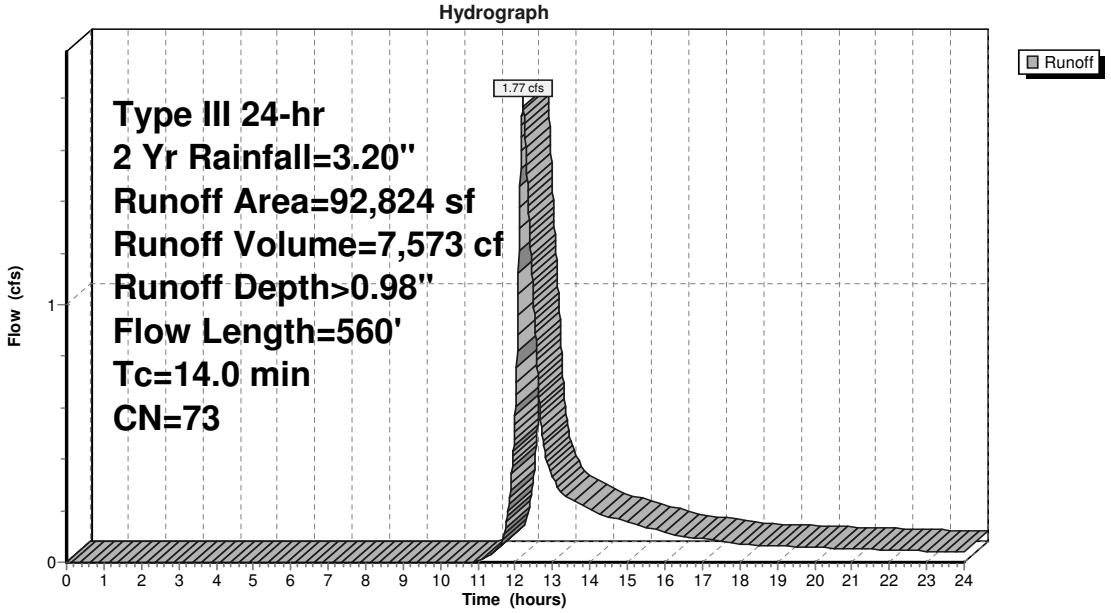
Runoff = 1.77 cfs @ 12.21 hrs, Volume= 7,573 cf, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

	Area (sf)	CN	Description
*	872	98	Roof
	62,580	72	Woods/grass comb., Good, HSG C
	29,372	74	>75% Grass cover, Good, HSG C
	92,824	73	Weighted Average
	91,952		99.06% Pervious Area
	872		0.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
3.2	510	0.0280	2.69		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
14.0	560	Total			

Subcatchment P3: Post Dev



Summary for Subcatchment P4: Post Dev

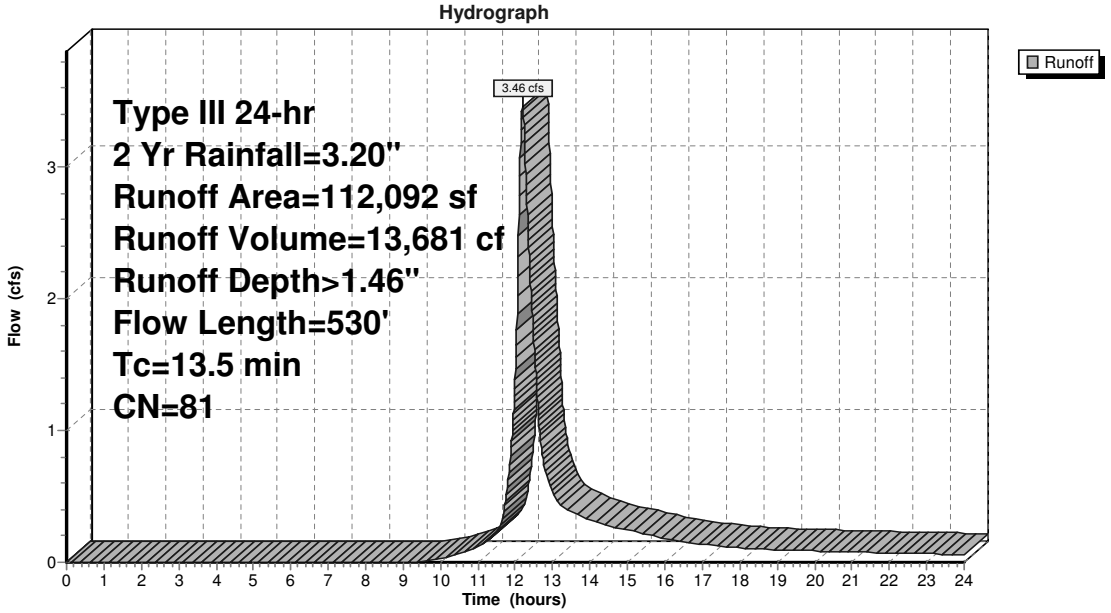
Runoff = 3.46 cfs @ 12.19 hrs, Volume= 13,681 cf, Depth> 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

	Area (sf)	CN	Description
*	8,650	98	Roofs
	12,535	98	Paved parking, HSG C
	13,138	98	Paved roads HSG C
	77,769	74	>75% Grass cover, Good, HSG C
	112,092	81	Weighted Average
	77,769		69.38% Pervious Area
	34,323		30.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
1.1	150	0.0200	2.28		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.0	160	0.0170	2.65		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.6	170	0.0100	4.54	3.56	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
13.5	530	Total			

Subcatchment P4: Post Dev



Summary for Subcatchment P5: Roof

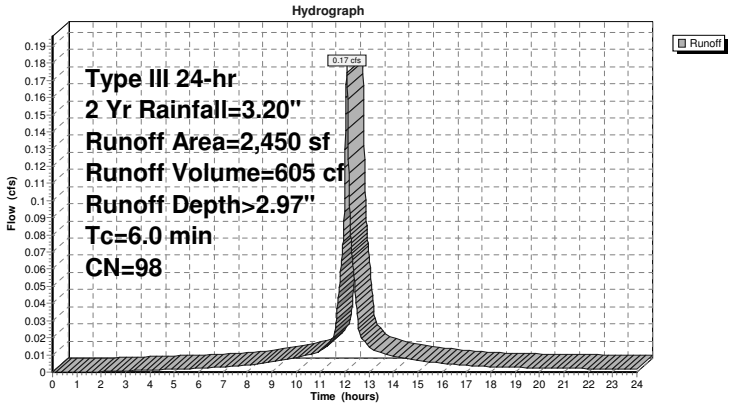
Runoff = 0.17 cfs @ 12.08 hrs, Volume= 605 cf, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (sf)	CN	Description
2,450	98	Roofs, HSG A
2,450		100.00% Impervious Area

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

Subcatchment P5: Roof



Summary for Pond 1P: Drain Basin

Inflow Area = 112,092 sf, 30.62% Impervious, Inflow Depth > 1.46" for 2 Yr event
Inflow = 3.46 cfs @ 12.19 hrs, Volume= 13,681 cf
Outflow = 1.02 cfs @ 12.65 hrs, Volume= 11,065 cf, Atten= 71%, Lag= 27.3 min
Discarded = 0.04 cfs @ 12.65 hrs, Volume= 1,197 cf
Primary = 0.98 cfs @ 12.65 hrs, Volume= 9,868 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 281.05' @ 12.65 hrs Surf.Area= 4,635 sf Storage= 5,515 cf

Plug-Flow detention time= 147.4 min calculated for 11,060 cf (81% of inflow)
Center-of-Mass det. time= 71.7 min (916.3 - 844.7)

Volume	Invert	Avail.Storage	Storage Description
#1	278.80'	19,098 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

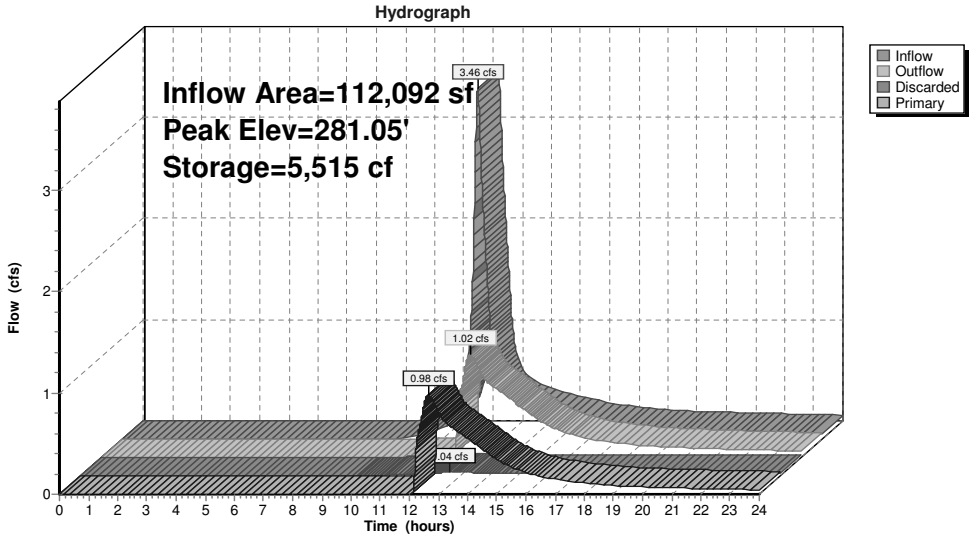
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.80	350	73.0	0	0	350
279.00	1,180	223.0	145	145	3,883
280.00	2,650	260.0	1,866	2,011	5,326
281.00	3,980	290.0	3,293	5,303	6,667
281.10	5,365	374.0	466	5,769	11,106
282.00	6,952	387.0	5,527	11,296	11,965
283.00	8,684	403.0	7,802	19,098	13,045

Device	Routing	Invert	Outlet Devices
#1	Discarded	278.80'	**0.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 276.00'
#2	Primary	278.00'	**18.0" Round Culvert** L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 278.00' / 276.50' S= 0.0600 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Device 2	280.10'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	280.90'	**1.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.1' Crest Height

Discarded OutFlow Max=0.04 cfs @ 12.65 hrs HW=281.05' (Free Discharge)
└**1=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=0.97 cfs @ 12.65 hrs HW=281.05' (Free Discharge)
└**2=Culvert** (Passes 0.97 cfs of 12.90 cfs potential flow)
└**3=Orifice/Grate** (Orifice Controls 0.79 cfs @ 4.03 fps)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 0.18 cfs @ 1.27 fps)

Pond 1P: Drain Basin

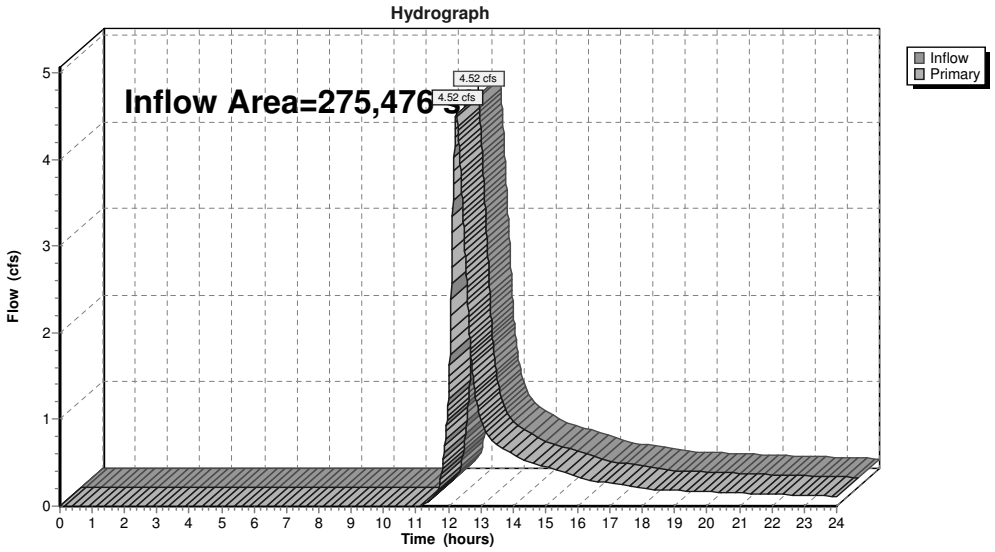


Summary for Link 1L: PreDev

Inflow Area = 275,476 sf, 0.00% Impervious, Inflow Depth > 0.93" for 2 Yr event
Inflow = 4.52 cfs @ 12.25 hrs, Volume= 21,240 cf
Primary = 4.52 cfs @ 12.25 hrs, Volume= 21,240 cf, Atten= 0%, Lag= 0.0 min

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

Link 1L: PreDev

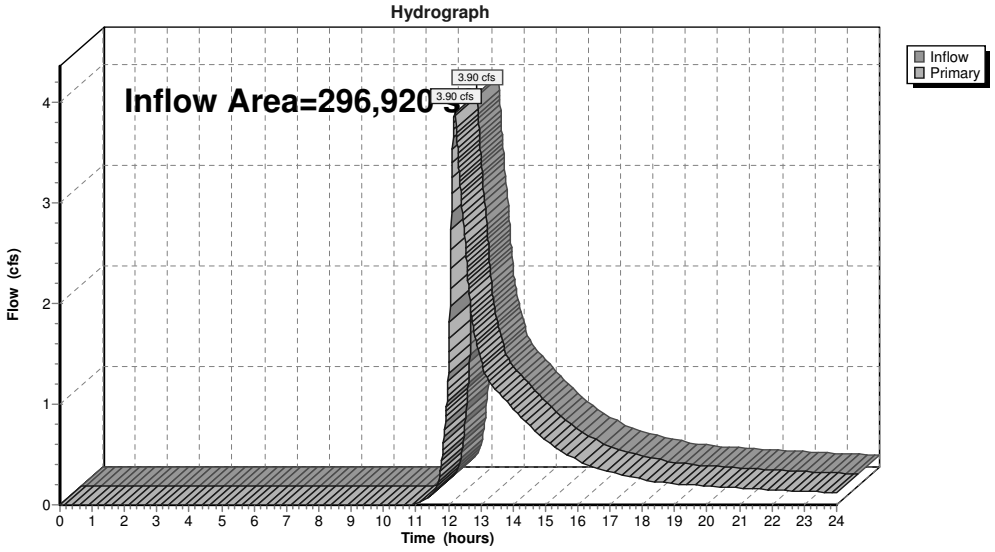


Summary for Link 2L: Post Dev

Inflow Area = 296,920 sf, 12.34% Impervious, Inflow Depth > 1.01" for 2 Yr event
Inflow = 3.90 cfs @ 12.20 hrs, Volume= 24,956 cf
Primary = 3.90 cfs @ 12.20 hrs, Volume= 24,956 cf, Atten= 0%, Lag= 0.0 min

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

Link 2L: Post Dev



Summary for Subcatchment E1: PreDev

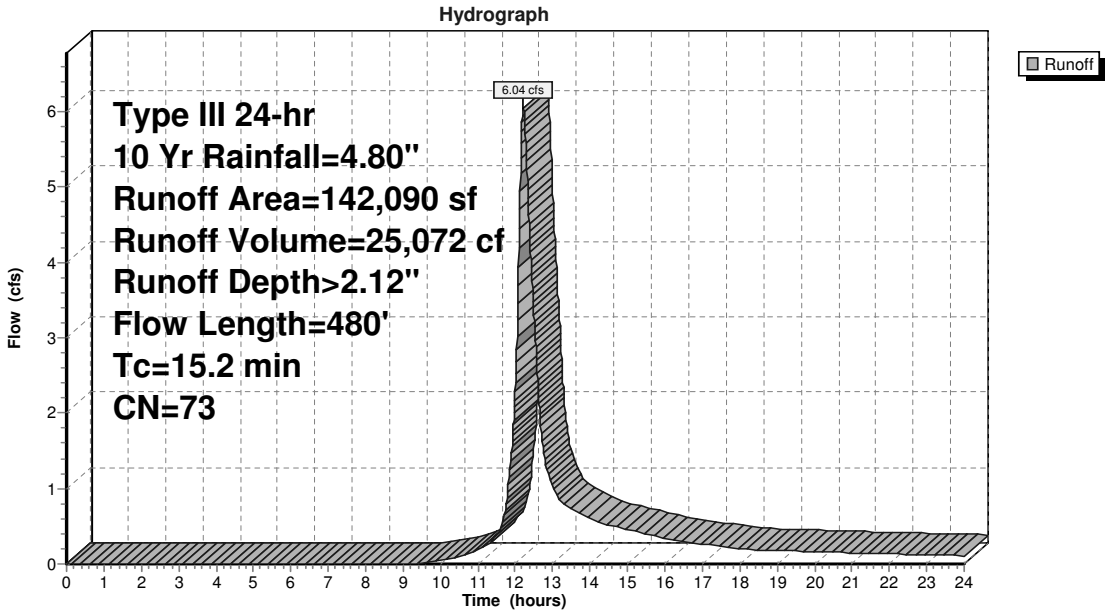
Runoff = 6.04 cfs @ 12.21 hrs, Volume= 25,072 cf, Depth> 2.12"

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

Area (sf)	CN	Description
5,670	98	Paved parking, HSG C
136,420	72	Woods/grass comb., Good, HSG C
142,090	73	Weighted Average
136,420		96.01% Pervious Area
5,670		3.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0180	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	130	0.0500	3.60		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.7	300	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
15.2	480	Total			

Subcatchment E1: PreDev



Summary for Subcatchment E2: PreDev

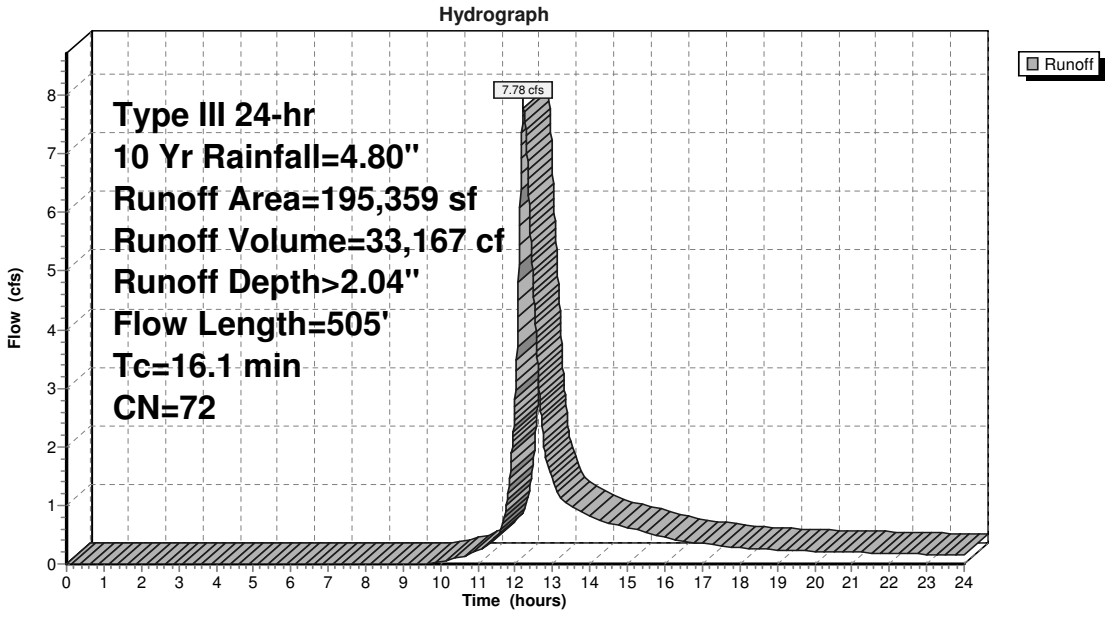
Runoff = 7.78 cfs @ 12.22 hrs, Volume= 33,167 cf, Depth> 2.04"

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

Area (sf)	CN	Description
195,359	72	Woods/grass comb., Good, HSG C
195,359		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0170	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.2	270	0.0160	2.04		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.7	185	0.0800	4.55		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
16.1	505	Total			

Subcatchment E2: PreDev



Summary for Subcatchment E3: PreDev

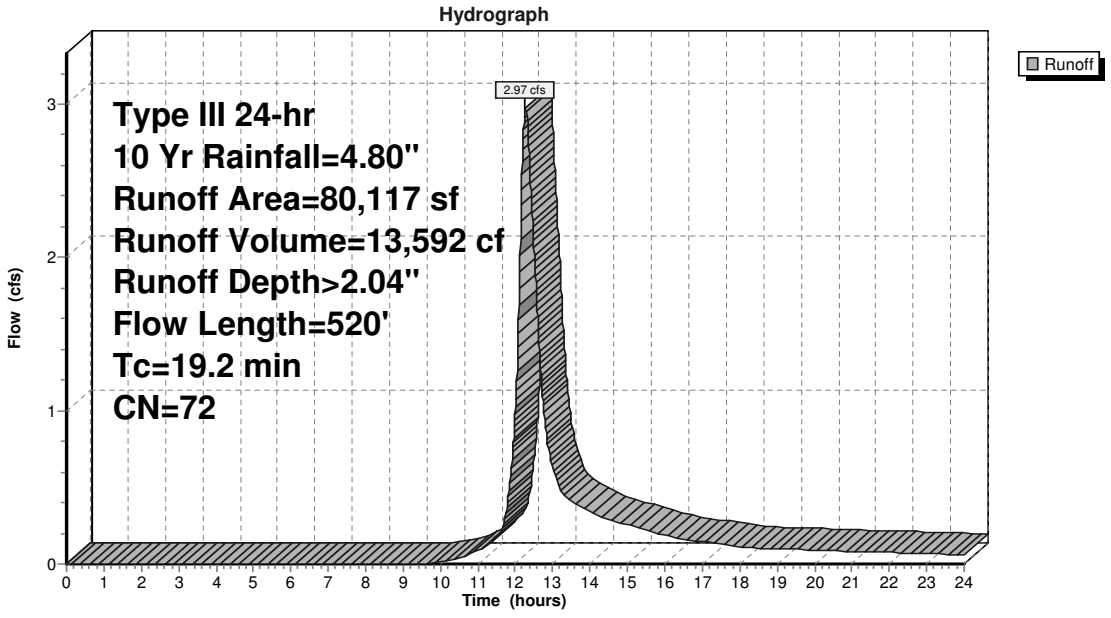
Runoff = 2.97 cfs @ 12.27 hrs, Volume= 13,592 cf, Depth> 2.04"

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

Area (sf)	CN	Description
80,117	72	Woods/grass comb., Good, HSG C
80,117		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	470	0.0280	2.69		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
19.2	520	Total			

Subcatchment E3: PreDev



Summary for Subcatchment P1: Post Dev

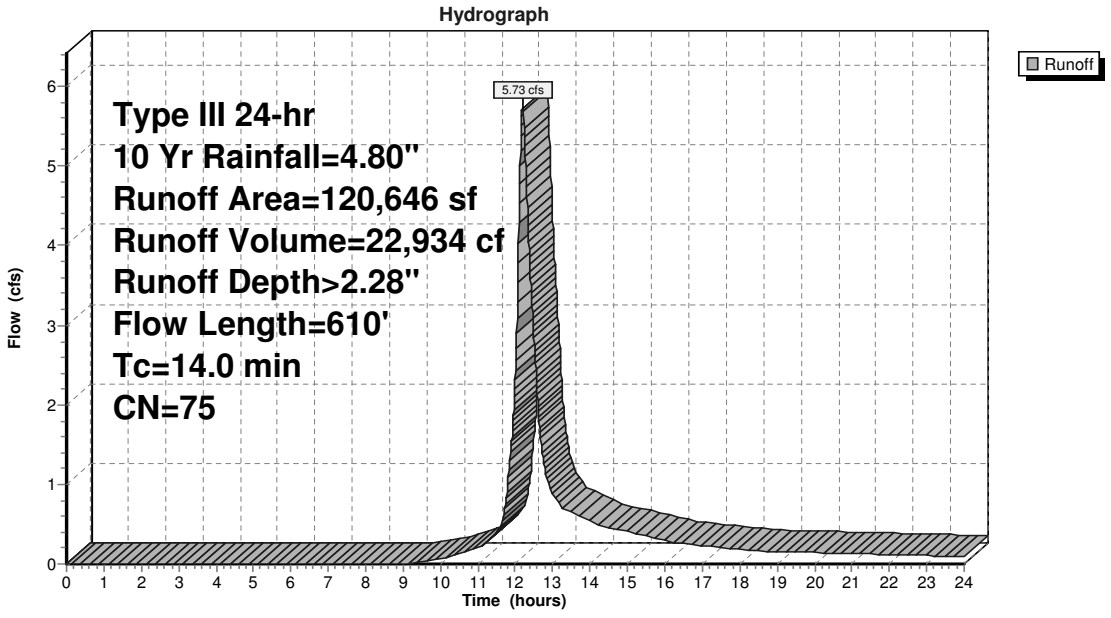
Runoff = 5.73 cfs @ 12.20 hrs, Volume= 22,934 cf, Depth> 2.28"

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

	Area (sf)	CN	Description
*	2,786	98	Hse
	8,060	98	Paved parking, HSG C
	50,444	74	>75% Grass cover, Good, HSG C
	59,356	72	Woods/grass comb., Good, HSG C
	120,646	75	Weighted Average
	109,800		91.01% Pervious Area
	10,846		8.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.6	110	0.0400	3.22		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
2.6	450	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
14.0	610	Total			

Subcatchment P1: Post Dev



Summary for Subcatchment P2: Post Dev

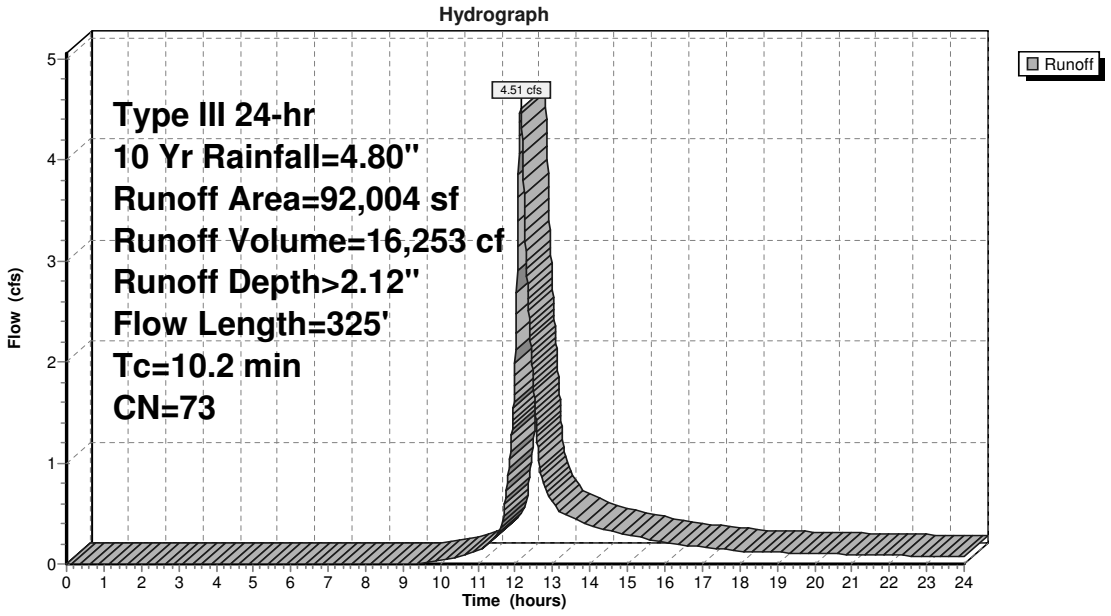
Runoff = 4.51 cfs @ 12.15 hrs, Volume= 16,253 cf, Depth> 2.12"

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

	Area (sf)	CN	Description
*	1,432	98	Roof
	43,772	72	Woods/grass comb., Good, HSG C
	46,800	74	>75% Grass cover, Good, HSG C
	92,004	73	Weighted Average
	90,572		98.44% Pervious Area
	1,432		1.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0150	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
1.0	275	0.0800	4.55		**Shallow Concentrated Flow, 27** Unpaved Kv= 16.1 fps
10.2	325	Total			

Subcatchment P2: Post Dev



Summary for Subcatchment P3: Post Dev

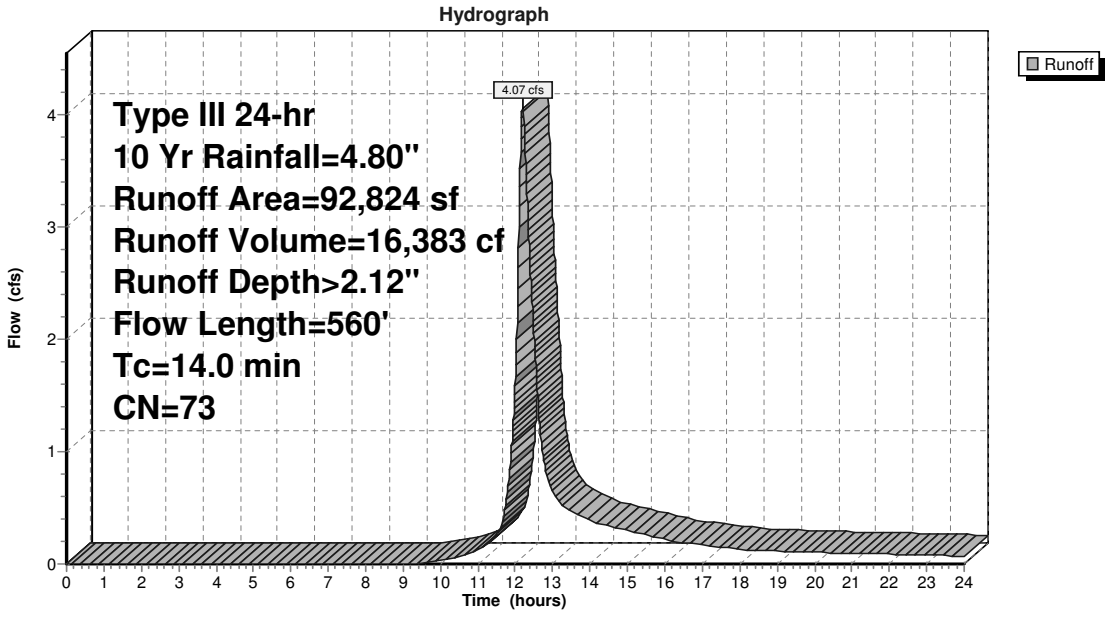
Runoff = 4.07 cfs @ 12.20 hrs, Volume= 16,383 cf, Depth> 2.12"

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

	Area (sf)	CN	Description
*	872	98	Roof
	62,580	72	Woods/grass comb., Good, HSG C
	29,372	74	>75% Grass cover, Good, HSG C
	92,824	73	Weighted Average
	91,952		99.06% Pervious Area
	872		0.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
3.2	510	0.0280	2.69		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
14.0	560	Total			

Subcatchment P3: Post Dev



Summary for Subcatchment P4: Post Dev

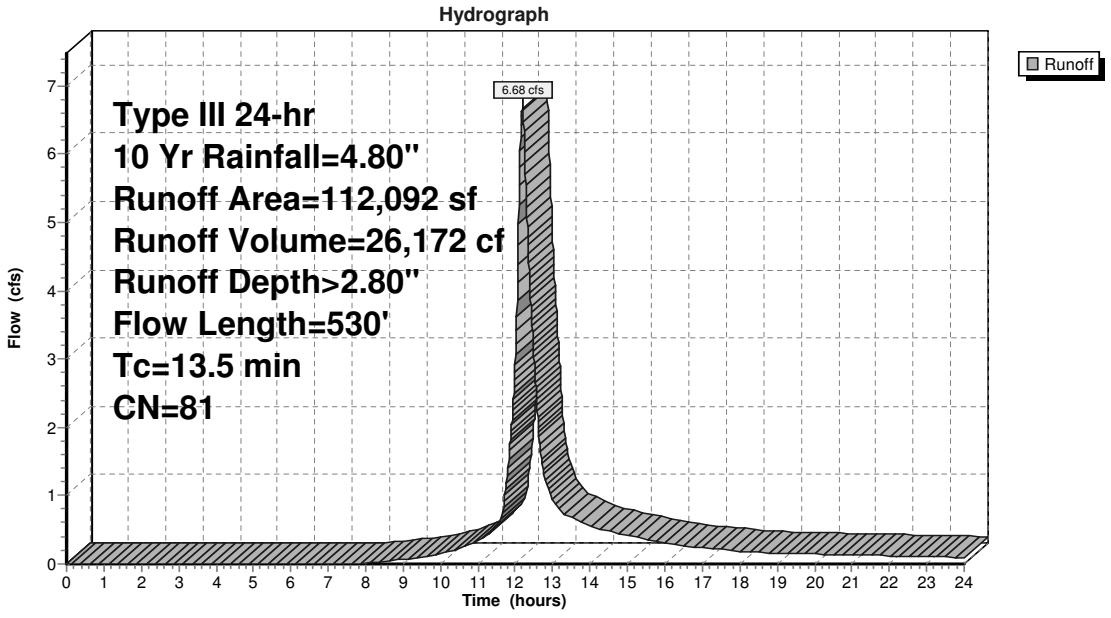
Runoff = 6.68 cfs @ 12.19 hrs, Volume= 26,172 cf, Depth> 2.80"

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

	Area (sf)	CN	Description
*	8,650	98	Roofs
	12,535	98	Paved parking, HSG C
	13,138	98	Paved roads HSG C
	77,769	74	>75% Grass cover, Good, HSG C
	112,092	81	Weighted Average
	77,769		69.38% Pervious Area
	34,323		30.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
1.1	150	0.0200	2.28		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.0	160	0.0170	2.65		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.6	170	0.0100	4.54	3.56	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
13.5	530	Total			

Subcatchment P4: Post Dev



Summary for Subcatchment P5: Roof

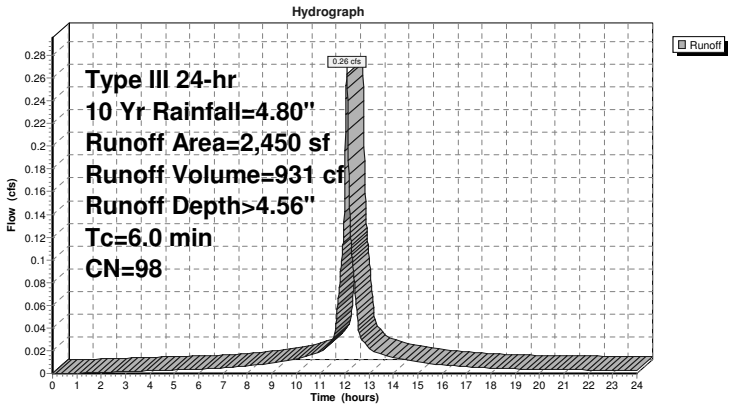
Runoff = 0.26 cfs @ 12.08 hrs, Volume= 931 cf, Depth> 4.56"

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

Area (sf)	CN	Description
2,450	98	Roofs, HSG A
2,450		100.00% Impervious Area

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

Subcatchment P5: Roof



Summary for Pond 1P: Drain Basin

Inflow Area = 112,092 sf, 30.62% Impervious, Inflow Depth > 2.80" for 10 Yr event
Inflow = 6.68 cfs @ 12.19 hrs, Volume= 26,172 cf
Outflow = 3.11 cfs @ 12.49 hrs, Volume= 23,406 cf, Atten= 53%, Lag= 18.2 min
Discarded = 0.06 cfs @ 12.49 hrs, Volume= 1,455 cf
Primary = 3.05 cfs @ 12.49 hrs, Volume= 21,951 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 281.67' @ 12.49 hrs Surf.Area= 6,353 sf Storage= 9,128 cf

Plug-Flow detention time= 105.1 min calculated for 23,406 cf (89% of inflow)
Center-of-Mass det. time= 55.3 min (881.4 - 826.1)

Volume	Invert	Avail.Storage	Storage Description
#1	278.80'	19,098 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

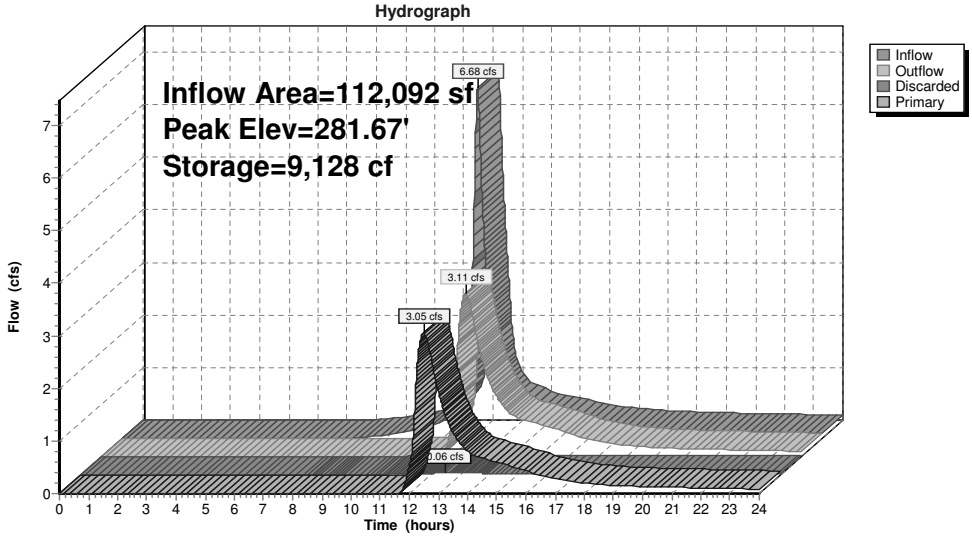
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.80	350	73.0	0	0	350
279.00	1,180	223.0	145	145	3,883
280.00	2,650	260.0	1,866	2,011	5,326
281.00	3,980	290.0	3,293	5,303	6,667
281.10	5,365	374.0	466	5,769	11,106
282.00	6,952	387.0	5,527	11,296	11,965
283.00	8,684	403.0	7,802	19,098	13,045

Device	Routing	Invert	Outlet Devices
#1	Discarded	278.80'	**0.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 276.00'
#2	Primary	278.00'	**18.0" Round Culvert** L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 278.00' / 276.50' S= 0.0600 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Device 2	280.10'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	280.90'	**1.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.1' Crest Height

Discarded OutFlow Max=0.06 cfs @ 12.49 hrs HW=281.67' (Free Discharge)
└**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=3.05 cfs @ 12.49 hrs HW=281.67' (Free Discharge)
└**2=Culvert** (Passes 3.05 cfs of 14.55 cfs potential flow)
└**3=Orifice/Grate** (Orifice Controls 1.09 cfs @ 5.54 fps)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 1.97 cfs @ 3.01 fps)

Pond 1P: Drain Basin

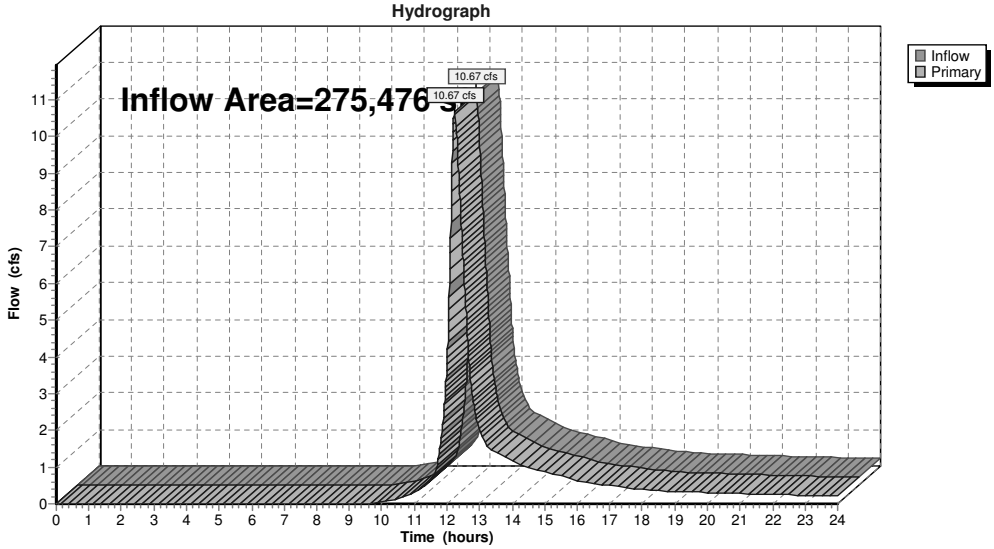


Summary for Link 1L: PreDev

Inflow Area = 275,476 sf, 0.00% Impervious, Inflow Depth > 2.04" for 10 Yr event
Inflow = 10.67 cfs @ 12.24 hrs, Volume= 46,759 cf
Primary = 10.67 cfs @ 12.24 hrs, Volume= 46,759 cf, Atten= 0%, Lag= 0.0 min

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

Link 1L: PreDev

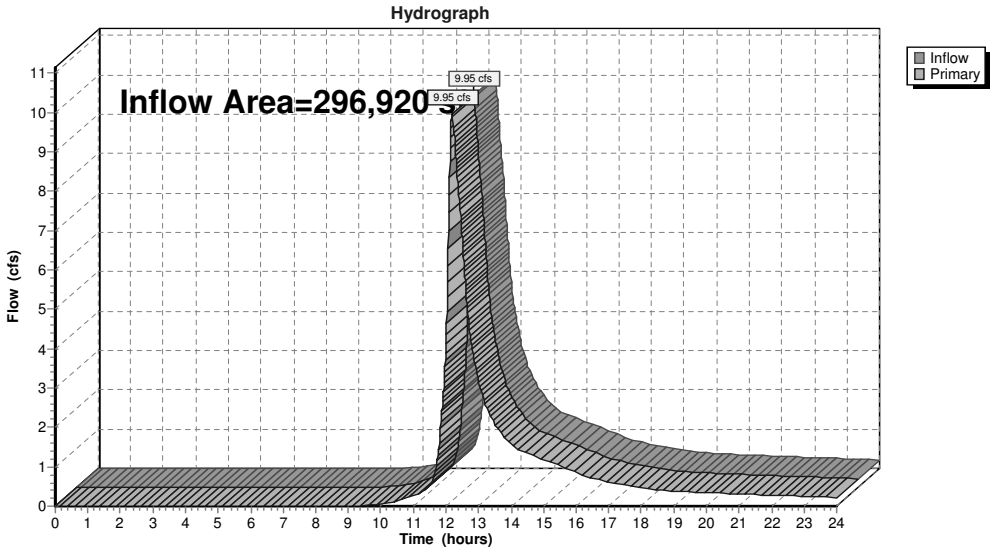


Summary for Link 2L: Post Dev

Inflow Area = 296,920 sf, 12.34% Impervious, Inflow Depth > 2.21" for 10 Yr event
Inflow = 9.95 cfs @ 12.19 hrs, Volume= 54,587 cf
Primary = 9.95 cfs @ 12.19 hrs, Volume= 54,587 cf, Atten= 0%, Lag= 0.0 min

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

Link 2L: Post Dev



Summary for Subcatchment E1: PreDev

Runoff = 6.74 cfs @ 12.21 hrs, Volume= 27,839 cf, Depth> 2.35"

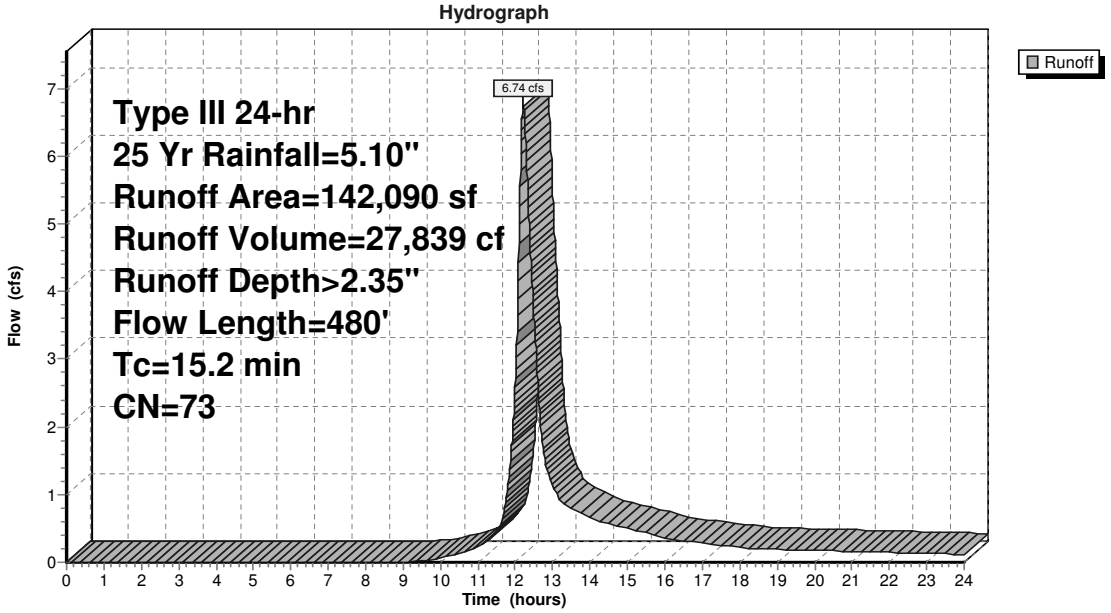
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr Rainfall=5.10"

Area (sf)	CN	Description
5,670	98	Paved parking, HSG C
136,420	72	Woods/grass comb., Good, HSG C
142,090	73	Weighted Average
136,420		96.01% Pervious Area
5,670		3.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0180	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	130	0.0500	3.60		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.7	300	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
15.2	480	Total			

Subcatchment E1: PreDev

Hydrograph



Summary for Subcatchment E2: PreDev

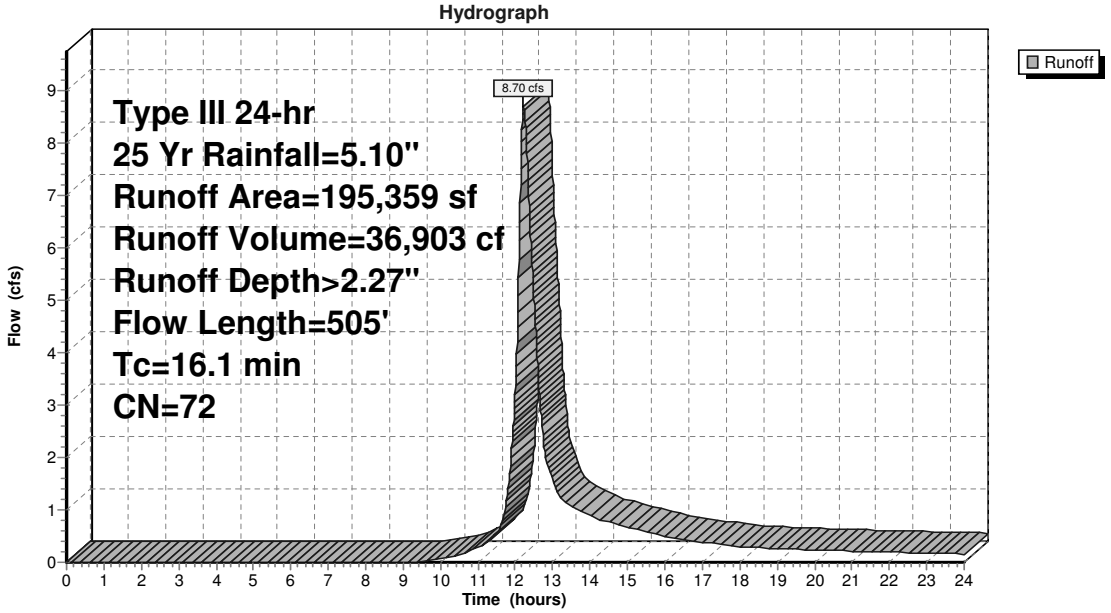
Runoff = 8.70 cfs @ 12.22 hrs, Volume= 36,903 cf, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr Rainfall=5.10"

Area (sf)	CN	Description
195,359	72	Woods/grass comb., Good, HSG C
195,359		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0170	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.2	270	0.0160	2.04		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.7	185	0.0800	4.55		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
16.1	505	Total			

Subcatchment E2: PreDev



Summary for Subcatchment E3: PreDev

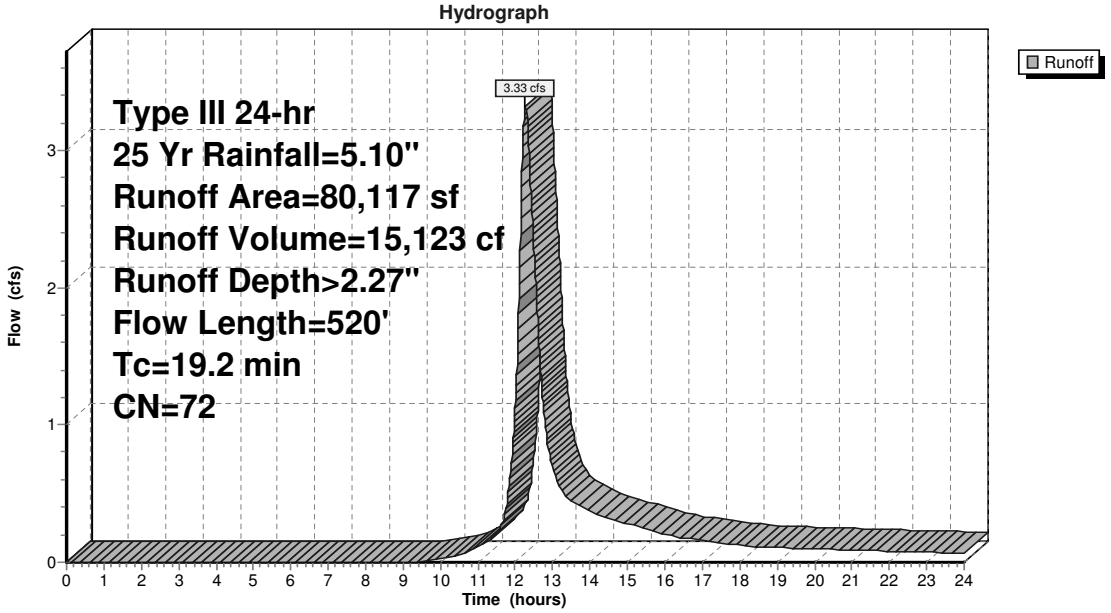
Runoff = 3.33 cfs @ 12.27 hrs, Volume= 15,123 cf, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr Rainfall=5.10"

Area (sf)	CN	Description
80,117	72	Woods/grass comb., Good, HSG C
80,117		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	470	0.0280	2.69		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
19.2	520	Total			

Subcatchment E3: PreDev



Summary for Subcatchment P1: Post Dev

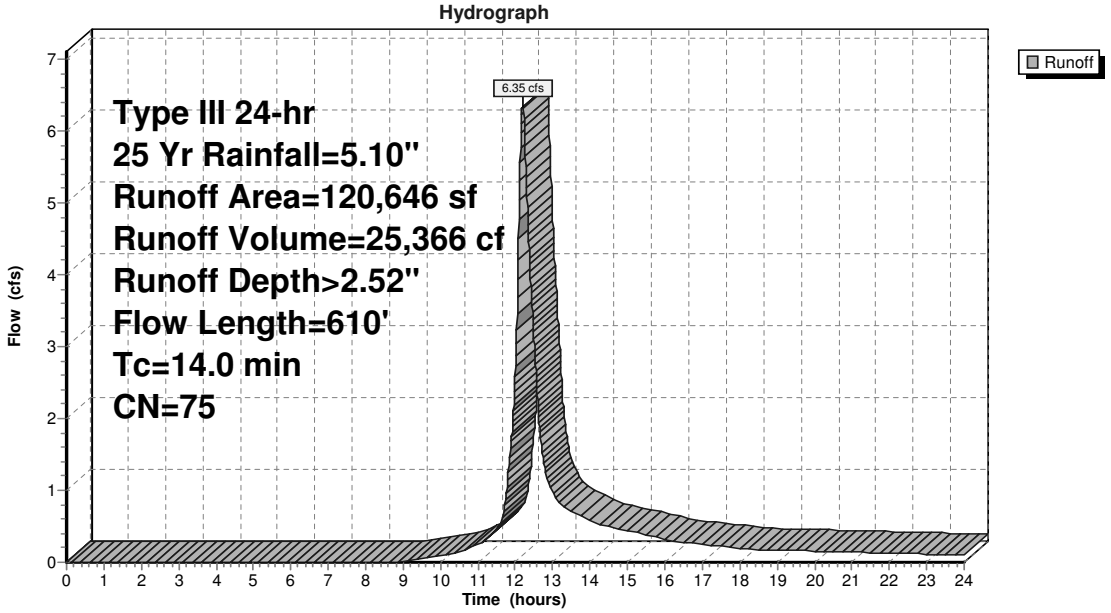
Runoff = 6.35 cfs @ 12.20 hrs, Volume= 25,366 cf, Depth> 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr Rainfall=5.10"

	Area (sf)	CN	Description
*	2,786	98	Hse
	8,060	98	Paved parking, HSG C
	50,444	74	>75% Grass cover, Good, HSG C
	59,356	72	Woods/grass comb., Good, HSG C
	120,646	75	Weighted Average
	109,800		91.01% Pervious Area
	10,846		8.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.6	110	0.0400	3.22		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
2.6	450	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
14.0	610	Total			

Subcatchment P1: Post Dev



Summary for Subcatchment P2: Post Dev

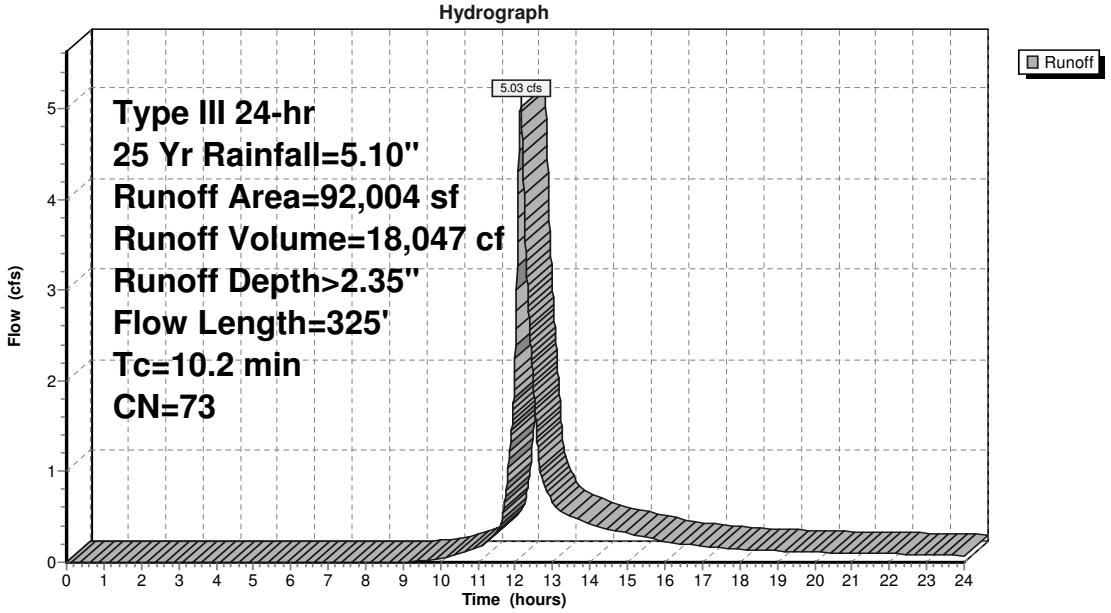
Runoff = 5.03 cfs @ 12.14 hrs, Volume= 18,047 cf, Depth> 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr Rainfall=5.10"

	Area (sf)	CN	Description
*	1,432	98	Roof
	43,772	72	Woods/grass comb., Good, HSG C
	46,800	74	>75% Grass cover, Good, HSG C
	92,004	73	Weighted Average
	90,572		98.44% Pervious Area
	1,432		1.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0150	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
1.0	275	0.0800	4.55		**Shallow Concentrated Flow, 27** Unpaved Kv= 16.1 fps
10.2	325	Total			

Subcatchment P2: Post Dev



Summary for Subcatchment P3: Post Dev

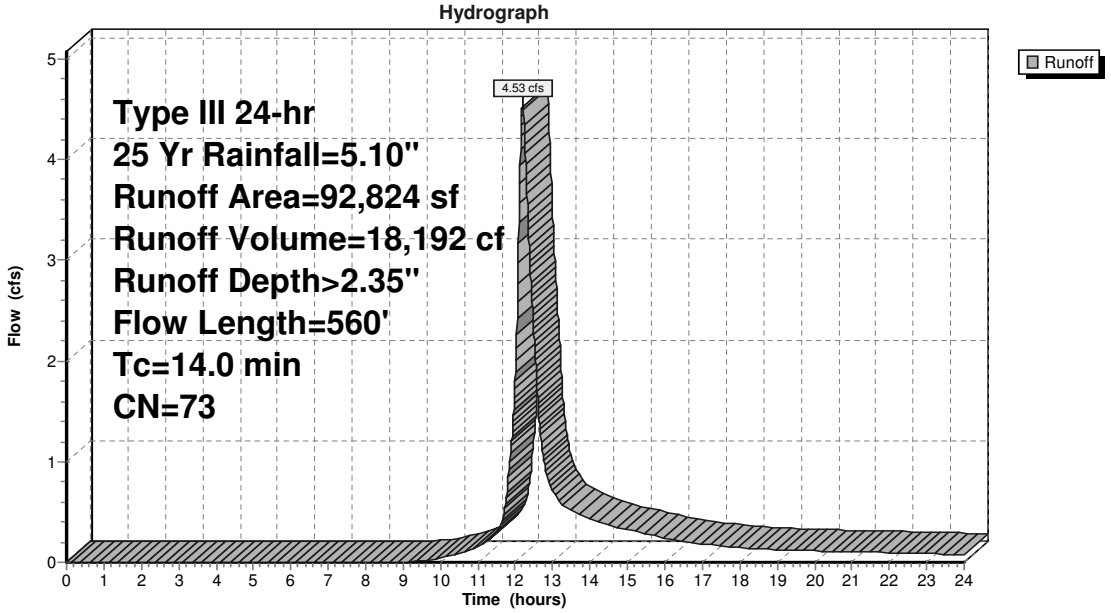
Runoff = 4.53 cfs @ 12.20 hrs, Volume= 18,192 cf, Depth> 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr Rainfall=5.10"

	Area (sf)	CN	Description
*	872	98	Roof
	62,580	72	Woods/grass comb., Good, HSG C
	29,372	74	>75% Grass cover, Good, HSG C
	92,824	73	Weighted Average
	91,952		99.06% Pervious Area
	872		0.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
3.2	510	0.0280	2.69		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
14.0	560	Total			

Subcatchment P3: Post Dev



Summary for Subcatchment P4: Post Dev

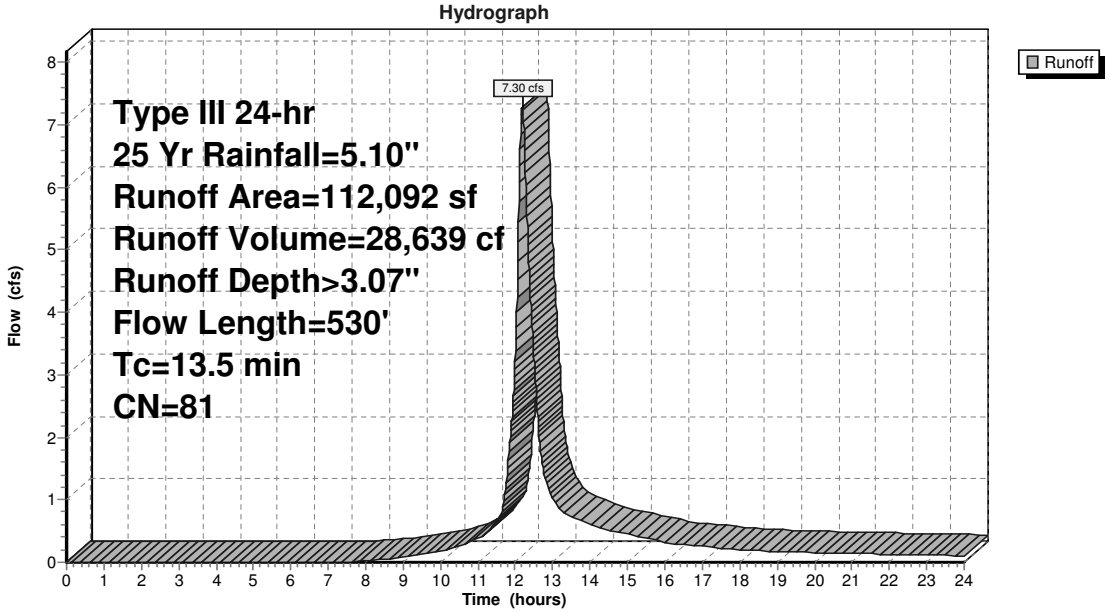
Runoff = 7.30 cfs @ 12.19 hrs, Volume= 28,639 cf, Depth> 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr Rainfall=5.10"

	Area (sf)	CN	Description
*	8,650	98	Roofs
	12,535	98	Paved parking, HSG C
	13,138	98	Paved roads HSG C
	77,769	74	>75% Grass cover, Good, HSG C
	112,092	81	Weighted Average
	77,769		69.38% Pervious Area
	34,323		30.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
1.1	150	0.0200	2.28		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.0	160	0.0170	2.65		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.6	170	0.0100	4.54	3.56	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
13.5	530	Total			

Subcatchment P4: Post Dev



Summary for Subcatchment P5: Roof

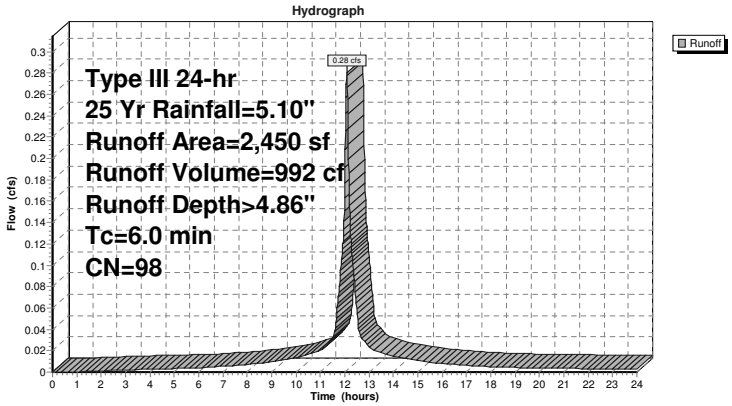
Runoff = 0.28 cfs @ 12.08 hrs, Volume= 992 cf, Depth> 4.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr Rainfall=5.10"

Area (sf)	CN	Description
2,450	98	Roofs, HSG A
2,450		100.00% Impervious Area

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

Subcatchment P5: Roof



Summary for Pond 1P: Drain Basin

Inflow Area = 112,092 sf, 30.62% Impervious, Inflow Depth > 3.07" for 25 Yr event
Inflow = 7.30 cfs @ 12.19 hrs, Volume= 28,639 cf
Outflow = 3.51 cfs @ 12.48 hrs, Volume= 25,848 cf, Atten= 52%, Lag= 17.5 min
Discarded = 0.06 cfs @ 12.48 hrs, Volume= 1,499 cf
Primary = 3.45 cfs @ 12.48 hrs, Volume= 24,350 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 281.77' @ 12.48 hrs Surf.Area= 6,535 sf Storage= 9,777 cf

Plug-Flow detention time= 100.8 min calculated for 25,848 cf (90% of inflow)
Center-of-Mass det. time= 53.9 min (877.4 - 823.6)

Volume	Invert	Avail.Storage	Storage Description
#1	278.80'	19,098 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

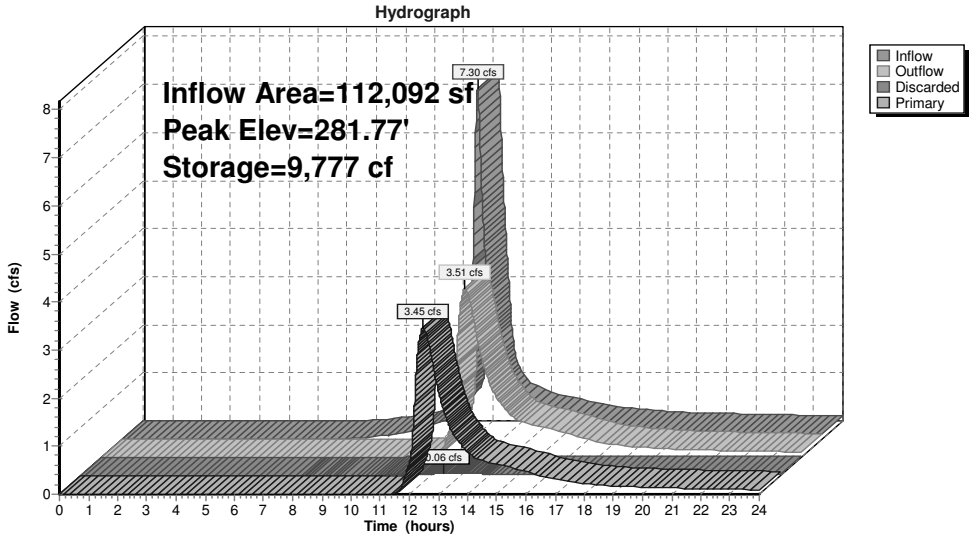
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.80	350	73.0	0	0	350
279.00	1,180	223.0	145	145	3,883
280.00	2,650	260.0	1,866	2,011	5,326
281.00	3,980	290.0	3,293	5,303	6,667
281.10	5,365	374.0	466	5,769	11,106
282.00	6,952	387.0	5,527	11,296	11,965
283.00	8,684	403.0	7,802	19,098	13,045

Device	Routing	Invert	Outlet Devices
#1	Discarded	278.80'	**0.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 276.00'
#2	Primary	278.00'	**18.0" Round Culvert** L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 278.00' / 276.50' S= 0.0600 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Device 2	280.10'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	280.90'	**1.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.1' Crest Height

Discarded OutFlow Max=0.06 cfs @ 12.48 hrs HW=281.77' (Free Discharge)
└**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=3.45 cfs @ 12.48 hrs HW=281.77' (Free Discharge)
└**2=Culvert** (Passes 3.45 cfs of 14.80 cfs potential flow)
  └**3=Orifice/Grate** (Orifice Controls 1.13 cfs @ 5.75 fps)
  └**4=Sharp-Crested Rectangular Weir** (Weir Controls 2.32 cfs @ 3.21 fps)

Pond 1P: Drain Basin

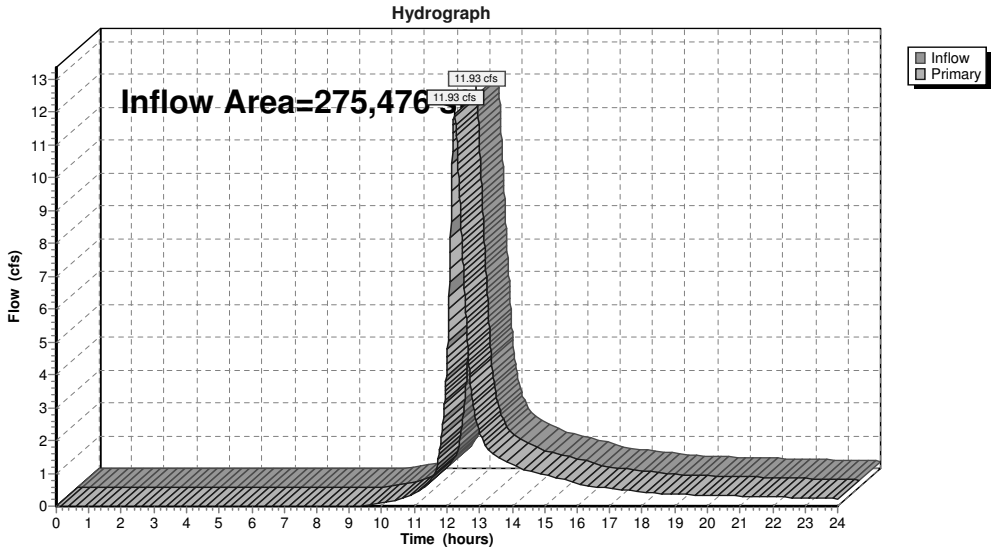


Summary for Link 1L: PreDev

Inflow Area = 275,476 sf, 0.00% Impervious, Inflow Depth > 2.27" for 25 Yr event
Inflow = 11.93 cfs @ 12.24 hrs, Volume= 52,026 cf
Primary = 11.93 cfs @ 12.24 hrs, Volume= 52,026 cf, Atten= 0%, Lag= 0.0 min

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

Link 1L: PreDev

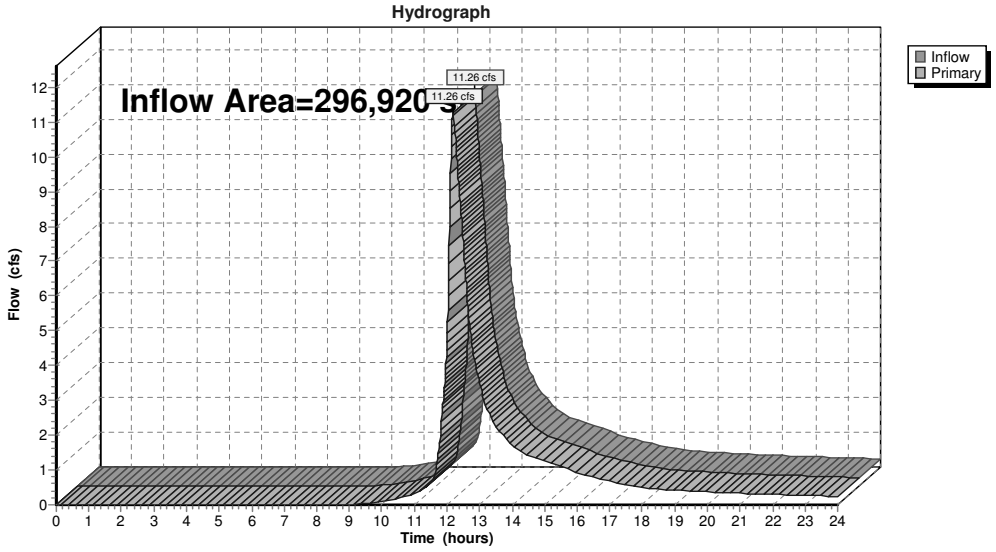


Summary for Link 2L: Post Dev

Inflow Area = 296,920 sf, 12.34% Impervious, Inflow Depth > 2.45" for 25 Yr event
Inflow = 11.26 cfs @ 12.18 hrs, Volume= 60,588 cf
Primary = 11.26 cfs @ 12.18 hrs, Volume= 60,588 cf, Atten= 0%, Lag= 0.0 min

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

Link 2L: Post Dev



Summary for Subcatchment E1: PreDev

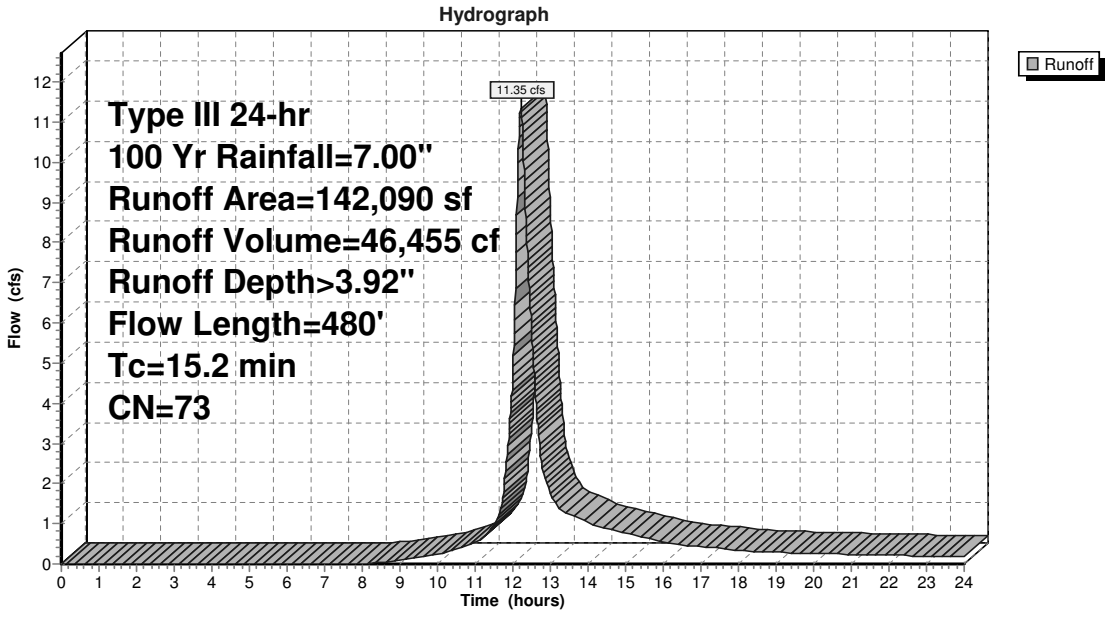
Runoff = 11.35 cfs @ 12.21 hrs, Volume= 46,455 cf, Depth> 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr Rainfall=7.00"

Area (sf)	CN	Description
5,670	98	Paved parking, HSG C
136,420	72	Woods/grass comb., Good, HSG C
142,090	73	Weighted Average
136,420		96.01% Pervious Area
5,670		3.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0180	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	130	0.0500	3.60		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.7	300	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
15.2	480	Total			

Subcatchment E1: PreDev



Summary for Subcatchment E2: PreDev

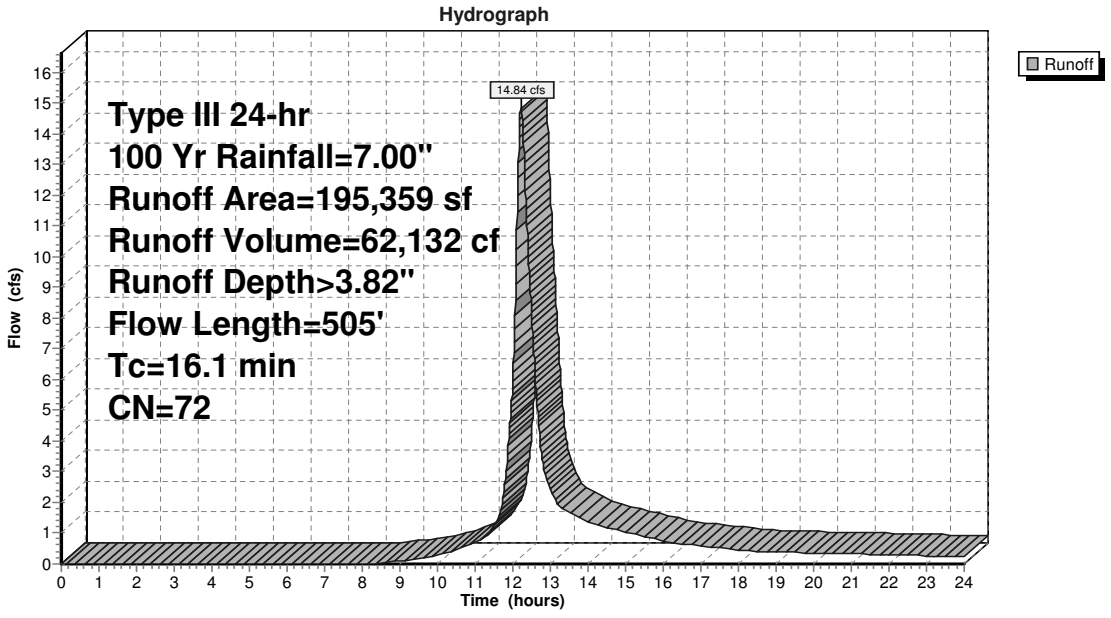
Runoff = 14.84 cfs @ 12.22 hrs, Volume= 62,132 cf, Depth> 3.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr Rainfall=7.00"

Area (sf)	CN	Description
195,359	72	Woods/grass comb., Good, HSG C
195,359		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0170	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.2	270	0.0160	2.04		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.7	185	0.0800	4.55		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
16.1	505	Total			

Subcatchment E2: PreDev



Summary for Subcatchment E3: PreDev

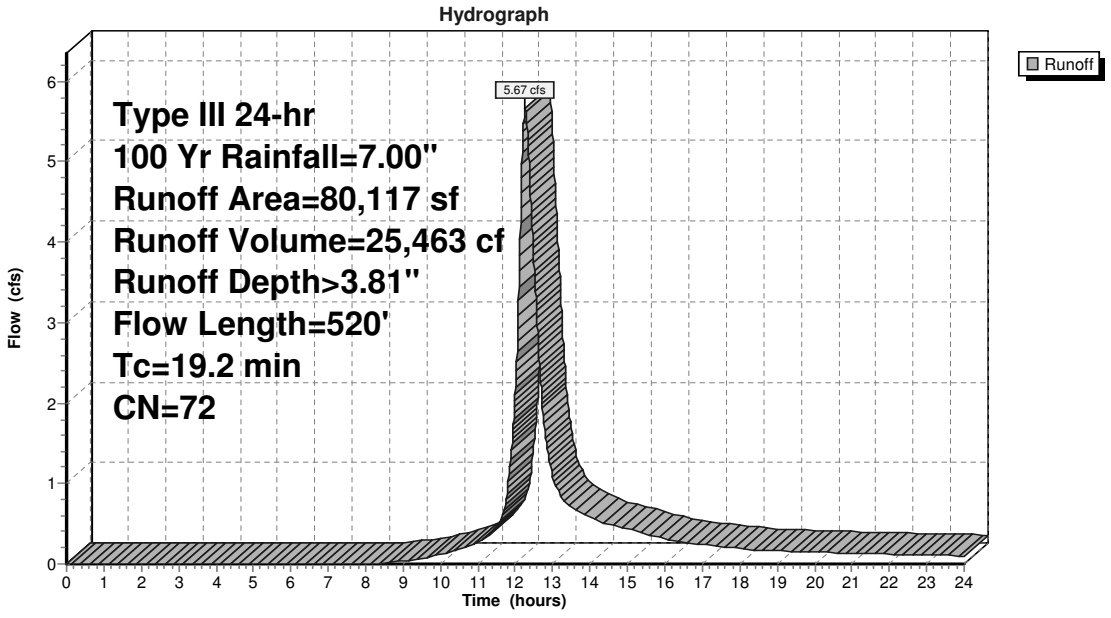
Runoff = 5.67 cfs @ 12.27 hrs, Volume= 25,463 cf, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr Rainfall=7.00"

Area (sf)	CN	Description
80,117	72	Woods/grass comb., Good, HSG C
80,117		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	470	0.0280	2.69		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
19.2	520	Total			

Subcatchment E3: PreDev



Summary for Subcatchment P1: Post Dev

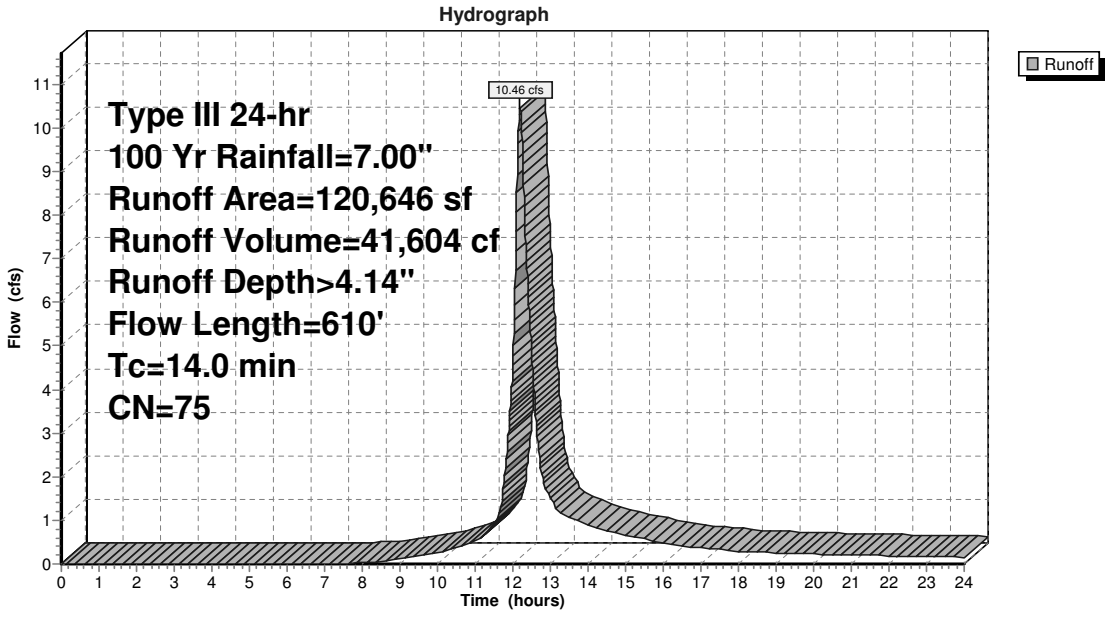
Runoff = 10.46 cfs @ 12.19 hrs, Volume= 41,604 cf, Depth> 4.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr Rainfall=7.00"

	Area (sf)	CN	Description
*	2,786	98	Hse
	8,060	98	Paved parking, HSG C
	50,444	74	>75% Grass cover, Good, HSG C
	59,356	72	Woods/grass comb., Good, HSG C
	120,646	75	Weighted Average
	109,800		91.01% Pervious Area
	10,846		8.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.6	110	0.0400	3.22		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
2.6	450	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
14.0	610	Total			

Subcatchment P1: Post Dev



Summary for Subcatchment P2: Post Dev

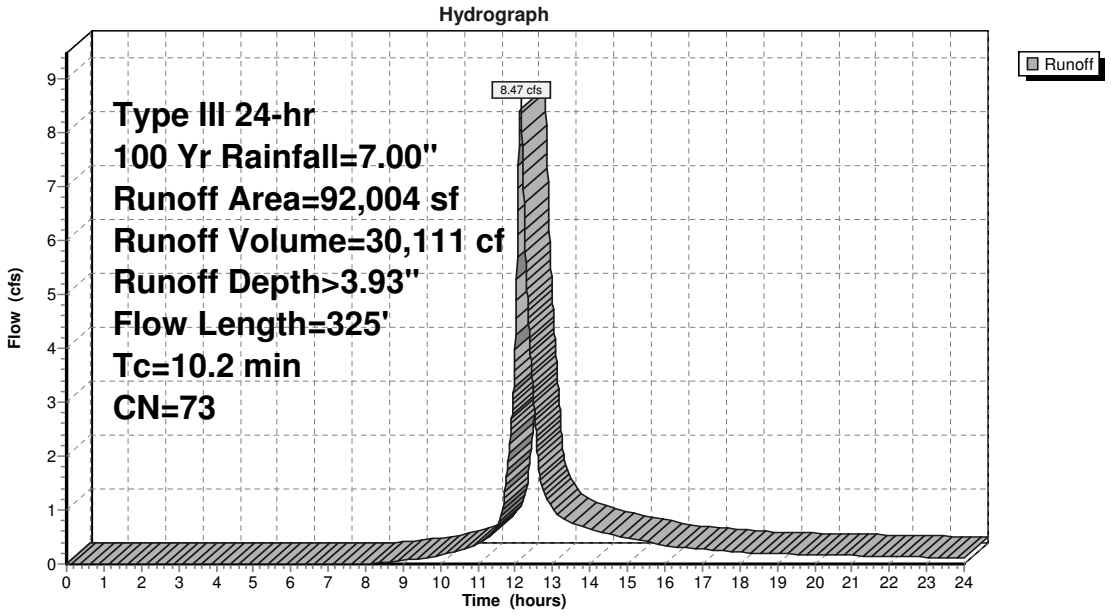
Runoff = 8.47 cfs @ 12.14 hrs, Volume= 30,111 cf, Depth> 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr Rainfall=7.00"

	Area (sf)	CN	Description
*	1,432	98	Roof
	43,772	72	Woods/grass comb., Good, HSG C
	46,800	74	>75% Grass cover, Good, HSG C
	92,004	73	Weighted Average
	90,572		98.44% Pervious Area
	1,432		1.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0150	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
1.0	275	0.0800	4.55		**Shallow Concentrated Flow, 27** Unpaved Kv= 16.1 fps
10.2	325	Total			

Subcatchment P2: Post Dev



Summary for Subcatchment P3: Post Dev

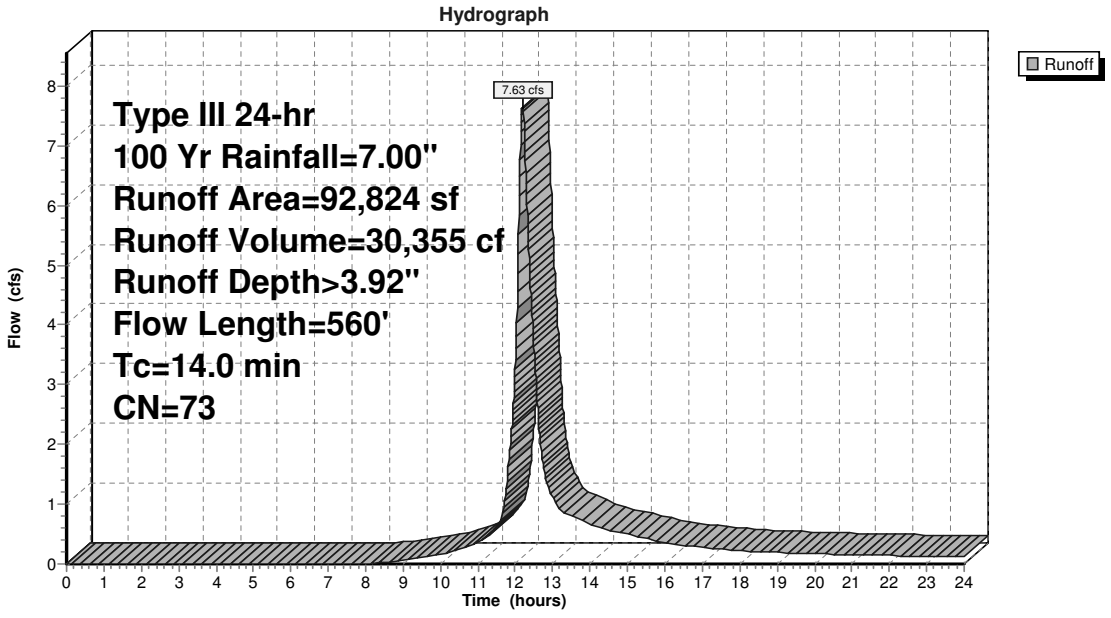
Runoff = 7.63 cfs @ 12.19 hrs, Volume= 30,355 cf, Depth> 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr Rainfall=7.00"

	Area (sf)	CN	Description
*	872	98	Roof
	62,580	72	Woods/grass comb., Good, HSG C
	29,372	74	>75% Grass cover, Good, HSG C
	92,824	73	Weighted Average
	91,952		99.06% Pervious Area
	872		0.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
3.2	510	0.0280	2.69		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
14.0	560	Total			

Subcatchment P3: Post Dev



Summary for Subcatchment P4: Post Dev

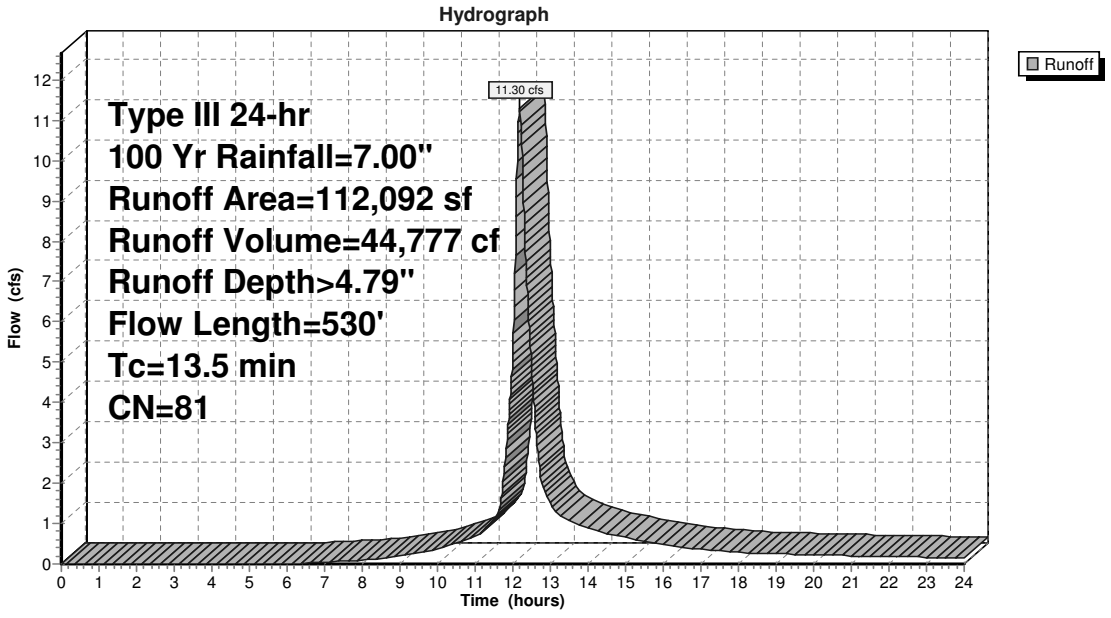
Runoff = 11.30 cfs @ 12.18 hrs, Volume= 44,777 cf, Depth> 4.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr Rainfall=7.00"

	Area (sf)	CN	Description
*	8,650	98	Roofs
	12,535	98	Paved parking, HSG C
	13,138	98	Paved roads HSG C
	77,769	74	>75% Grass cover, Good, HSG C
	112,092	81	Weighted Average
	77,769		69.38% Pervious Area
	34,323		30.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
1.1	150	0.0200	2.28		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.0	160	0.0170	2.65		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.6	170	0.0100	4.54	3.56	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
13.5	530	Total			

Subcatchment P4: Post Dev



Summary for Subcatchment P5: Roof

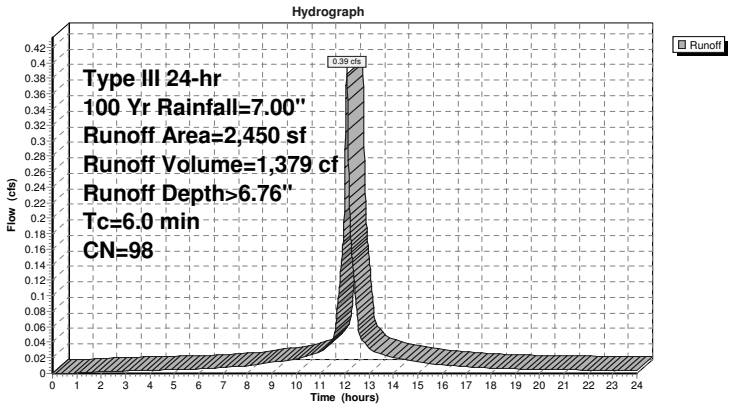
Runoff = 0.39 cfs @ 12.08 hrs, Volume= 1,379 cf, Depth> 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr Rainfall=7.00"

Area (sf)	CN	Description
2,450	98	Roofs, HSG A
2,450		100.00% Impervious Area

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

Subcatchment P5: Roof



Summary for Pond 1P: Drain Basin

Inflow Area = 112,092 sf, 30.62% Impervious, Inflow Depth > 4.79" for 100 Yr event
Inflow = 11.30 cfs @ 12.18 hrs, Volume= 44,777 cf
Outflow = 5.77 cfs @ 12.45 hrs, Volume= 41,847 cf, Atten= 49%, Lag= 15.8 min
Discarded = 0.07 cfs @ 12.45 hrs, Volume= 1,759 cf
Primary = 5.70 cfs @ 12.45 hrs, Volume= 40,088 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 282.34' @ 12.45 hrs Surf.Area= 7,520 sf Storage= 13,760 cf

Plug-Flow detention time= 82.8 min calculated for 41,829 cf (93% of inflow)
Center-of-Mass det. time= 48.5 min (859.5 - 811.0)

Volume	Invert	Avail.Storage	Storage Description
#1	278.80'	19,098 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

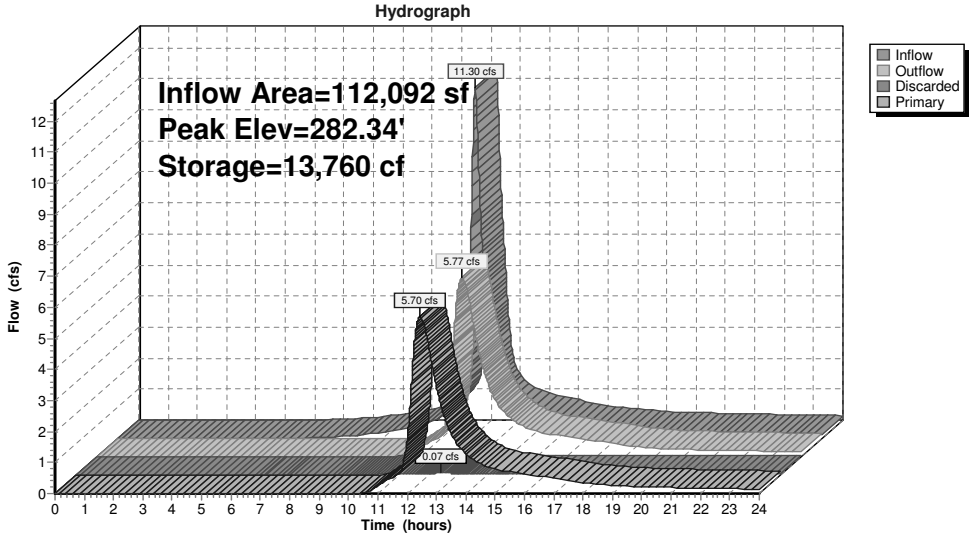
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.80	350	73.0	0	0	350
279.00	1,180	223.0	145	145	3,883
280.00	2,650	260.0	1,866	2,011	5,326
281.00	3,980	290.0	3,293	5,303	6,667
281.10	5,365	374.0	466	5,769	11,106
282.00	6,952	387.0	5,527	11,296	11,965
283.00	8,684	403.0	7,802	19,098	13,045

Device	Routing	Invert	Outlet Devices
#1	Discarded	278.80'	**0.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 276.00'
#2	Primary	278.00'	**18.0" Round Culvert** L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 278.00' / 276.50' S= 0.0600 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Device 2	280.10'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	280.90'	**1.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.1' Crest Height

Discarded OutFlow Max=0.07 cfs @ 12.45 hrs HW=282.34' (Free Discharge)
└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=5.70 cfs @ 12.45 hrs HW=282.34' (Free Discharge)
└**2=Culvert** (Passes 5.70 cfs of 16.12 cfs potential flow)
  └**3=Orifice/Grate** (Orifice Controls 1.33 cfs @ 6.79 fps)
  └**4=Sharp-Crested Rectangular Weir** (Weir Controls 4.36 cfs @ 4.25 fps)

Pond 1P: Drain Basin

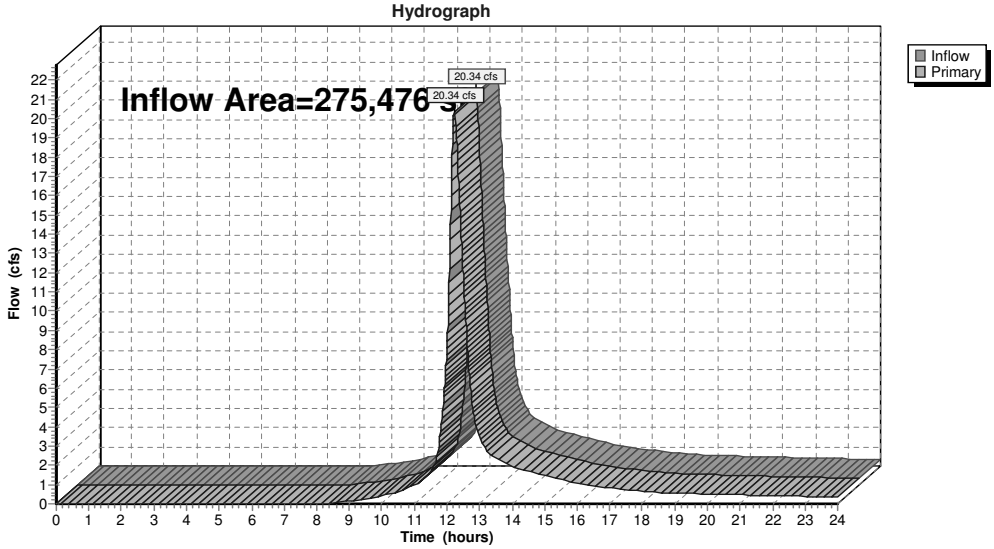


Summary for Link 1L: PreDev

Inflow Area = 275,476 sf, 0.00% Impervious, Inflow Depth > 3.82" for 100 Yr event
Inflow = 20.34 cfs @ 12.23 hrs, Volume= 87,595 cf
Primary = 20.34 cfs @ 12.23 hrs, Volume= 87,595 cf, Atten= 0%, Lag= 0.0 min

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

Link 1L: PreDev

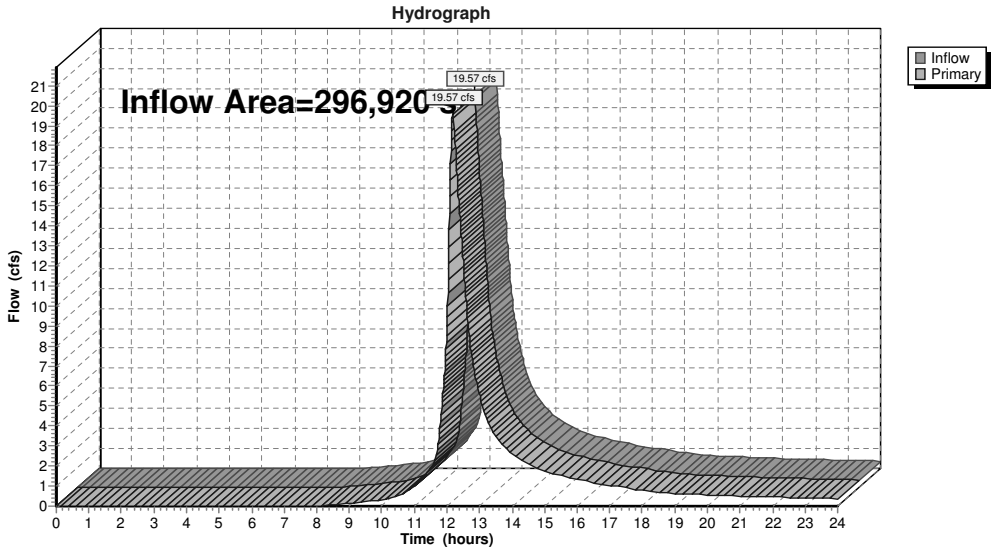


Summary for Link 2L: Post Dev

Inflow Area = 296,920 sf, 12.34% Impervious, Inflow Depth > 4.06" for 100 Yr event
Inflow = 19.57 cfs @ 12.18 hrs, Volume= 100,554 cf
Primary = 19.57 cfs @ 12.18 hrs, Volume= 100,554 cf, Atten= 0%, Lag= 0.0 min

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

Link 2L: Post Dev



APPENDIX – B

Hydraulic Design (Manning's Equation)
Time of Flow, Average CN values
Groundwater Mounding Calculations

Standard 2

STORM DRAINAGE CALCULATIONS

Pipe Flow Calculations - Manning's Equation

i = Rainfall Intensity at 25 Year Storm

Date: **5/7/20**
Revised: **9/10/20**
Job No: **7,701**
Calc. by: **rst**

Project: **Triangle Farm**
Town: **Holliston, MA**

Line		Length	Drain Area	Total Area	Runoff	Time of Concentration (min.)			Rainfall i	Required Capacity Q(cfs)		Pipe Diameter	Slope	Design Conditions		Invert Elevation		Rim Elev.	
From	To	(Feet)	(Ac)	(Ac)	"C"	Upper End	In Pipe	Total	(in./hr.)	Inlet	Pipe	(in.)	(ft./ft.)	Depth (in.)	Velocity (f.p.s.)	Upper	Lower	Upper	n
CB 1	DMH 3	10	0.22		0.50	16.08	0.04	16.12	4.33	0.49		12	0.020	2.50	4.10	284.50	284.30	287.61	0.013
CB 2	DMH 3	5	0.42		0.41	23.29	0.01	23.30	3.67	0.63		12	0.040	2.40	5.60	284.50	284.30	287.61	0.013
DMH 3	DMH 4	260		0.64	0.44	23.30	1.40	24.70	3.67		1.05	12	0.005	5.40	3.10	284.20	282.90	288.12	0.013
CB 5	DMH 4	10	0.29		0.48	13.19	0.03	13.22	4.69	0.66		12	0.060	2.20	6.50	283.50	282.90	288.03	0.013
CB 6	DMH 4	5	0.33		0.45	12.34	0.01	12.34	4.81	0.72		12	0.120	2.00	8.60	283.50	282.90	288.03	0.013
DMH 4	DMH 7	110		1.26	0.46	24.70	0.51	25.21	3.57		2.05	12	0.005	8.20	3.60	282.80	282.20	287.92	0.013
CB 8	DMH 7	2	0.73		0.56	12.34	0.00	12.34	4.81	1.95		12	0.100	3.40	10.70	282.40	282.20	286.00	0.013
DMH 7	HW 9	40		1.99	0.49	25.21	0.09	25.30	3.53		3.46	12	0.015	7.10	7.20	282.10	281.50	286.10	0.013

OVERLAND FLOW TRAVEL TIME

STORM RUNOFF DATA

Date: **5/7/20**
Revised:

Project: **Triangle Farm**
Town: **Holliston, MA**

Job No: **7,701**
Calc. by: **rst**

Structure	Impervious			Lawn			Wooded			Total
	Length (ft)	Slope ('/')	Time (min.)	Length (ft)	Slope ('/')	Time (min.)	Length (ft)	Slope ('/')	Time (min.)	Travel Time (min.)
1	90	0.008	1.60	80	0.020	14.48				16.08
2	90	0.008	1.60	190	0.020	21.69				23.29
5	140	0.017	1.68	60	0.030	11.51				13.19
6	140	0.015	1.77	50	0.030	10.57				12.34
8	140	0.015	1.77	50.00	0.030	10.57				12.34

AVERAGE 'c' VALUE FOR STRUCTURES

STORM RUNOFF DATA

Date: **5/7/20**
Revised:

Project: **Triangle Farm**
Town: **Holliston, MA**

Job No: **7,701**
Calc. by: **RST**

Structure	Total Area (SF)	Ground Cover	Area (SF)	c	Σ(Area*c)	Average c	Total Area (Ac)
CB#1	9,766	imp	3,058	0.95	2,905.10	0.50	0.224
		lawn	6,708	0.30	2,012.40		
		wooded	0	0.20	0.00		
CB#2	18,259	imp	3,111	0.95	2,955.45	0.41	0.419
		lawn	15,148	0.30	4,544.40		
		wooded	0	0.20	0.00		
CB#5	12,630	imp	3,549	0.95	3,371.55	0.48	0.290
		lawn	9,081	0.30	2,724.30		
		wooded	0	0.20	0.00		
CB#6	14,304	imp	3,399	0.95	3,229.05	0.45	0.328
		lawn	10,905	0.30	3,271.50		
		wooded	0	0.20	0.00		
CB#8	31,753	imp	12,554	0.95	11,926.30	0.56	0.729
		lawn	19,199	0.30	5,759.70		
		wooded	0	0.20	0.00		

Mound Calculation Basin
Triangle Farm, Holliston, MA
Date: 05/8/2020

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
0.2300	***R***	**Recharge (infiltration) rate (feet/day)**
0.200	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
5.40	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
55.000	**x**	**1/2 length of basin (x direction, in feet)**
12.000	**y**	**1/2 width of basin (y direction, in feet)**
1.000	**t**	**duration of infiltration period (days)**
25.000	**hi(0)**	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

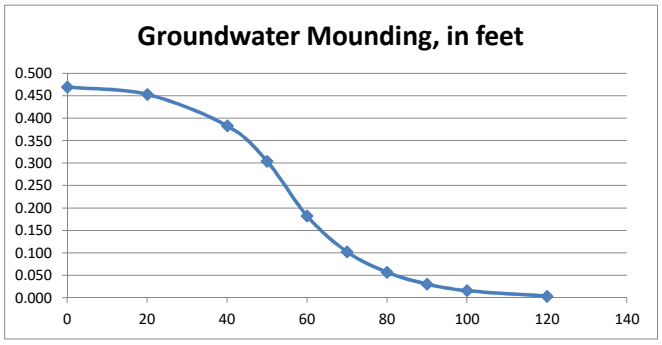
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

25.470	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.470	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.470	0
0.453	20
0.383	40
0.304	50
0.182	60
0.103	70
0.057	80
0.031	90
0.016	100
0.004	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

APPENDIX – C

Stormwater Recharge Calculations, Water Quality Volumes, TSS Removal & Infiltration BMP Drain Time
Groundwater Mounding Calculations

Standards 3 & 4:

APPENDIX – B
Stormwater Recharge, Water Quality & Forebay Calculations
Standard 3 & 4:

Project:
Triangle Farm
Holliston, Massachusetts
Date: May 8, 2020

Water Quality Volume (WQV): Based on 1.0 inch rainfall
Recharge Volume(Rv): Based on Soil Classification

Rv = F * Impervious Area
Rv = Required Recharge Volume
F = Depth Factor
Soil Type A – 0.60 inch
Soil Type B – 0.35 inch
Soil Type C – 0.25 inch
Soil Type D – 0.00 inch

Total Impervious Area:

Roadway/Drives:	25,673 s.f. (To drainage basin)
Roadway(bypass basin)	2,390 s.f.
Roof: (to basins)	13,184 s.f.
Total Imp. Area:	41,247 s.f.

Total Impervious to Recharge Basins: 38,857 s.f.
Total Impervious Area Uncaptured: 2,390 s.f.
Capture Adjustment:
38,857 s.f. / 41,247 s.f. = 94.2% > 65%
41,247 s.f. / 38,857 s.f. = 1.06 capture adjustment

Recharge Volume required Roof Area:
Each system captures 50% of the roof area.
Roof Area: (Largest house) 1,988 s.f
Rv = (0.25 inch * 994 s.f.)/ 12 = 21 c.f.

Recharge Volume Provided:
Cultec Unit C-100HD w/stone:
Tot. Volume: 50 c.f.

Time to drain:
Drawdown time = Volume/(K*Bottom Area)
Volume = 21 cf
K=0.27 in/hr = 0.023 ft/hr
Bottom Area = 50 sf
Drawdown time = 21/(0.023 ft/hr x 50 sf)
Drawdown time = 18 hr < 72 hr ***ok***

Drainage Basin #1 :
Imp. Area Pavement: 25,673 s.f.
WQV = (25,673 sf * 1.0 in)/12 = 2139 c.f.

Recharge Volume Required: (Soil Type C – 0.25 inch)
Tot. Imp Area: 25,673 s.f.
Rv = (25,673 sf * 0.25 in)/12 = 534 c.f. x Capture Adjustment (1.06) = 567 c.f.

Storage Volume below outlet
"Static" Storage Volume Provided:
Volume (Outlet 280.1) provided = 2,284 c.f.
2,282 > 2,139 c.f. **OK**

Forebay Sizing:
Forebay Volume Required: (Paved Area) x 0.10 inch of runoff
(25,673 s.f. x 0.10 in)/12 =214 cu.ft.
Forebay Volume Provided:

Elev. (ft.)	Area (s.f.)	Inc.Store (cu.ft.)	Cum.Store (cu.ft.)
280.0	702	0	0
281.0	1195	950	950

Total Storage Povided: 950 c.f.
950 cf > 214 cf ***ok***

Time to drain:
Drawdown time = Volume/(K*Bottom Area)
Volume = 2139 cf
K=0.27 in/hr = 0.023 ft/hr
Bottom Area = 2622 sf
Drawdown time = 2139/(0.023 ft/hr x 2622 sf)
Drawdown time = 35 hr < 72 hr ***ok***

Stage-Area-Storage for Pond 1P: Drain Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
278.80	350	0	280.60	3,416	3,826	282.40	7,622	14,210
278.85	512	21	280.65	3,484	3,998	282.45	7,708	14,593
278.90	704	52	280.70	3,553	4,174	282.50	7,794	14,981
278.95	927	92	280.75	3,622	4,354	282.55	7,881	15,373
279.00	1,180	145	280.80	3,692	4,536	282.60	7,968	15,769
279.05	1,240	205	280.85	3,763	4,723	282.65	8,056	16,169
279.10	1,301	269	280.90	3,835	4,913	282.70	8,144	16,574
279.15	1,363	335	280.95	3,907	5,106	282.75	8,233	16,984
279.20	1,427	405	281.00	3,980	5,303	282.80	8,322	17,398
279.25	1,492	478	281.05	4,647	5,519	282.85	8,412	17,816
279.30	1,559	554	281.10	5,365	5,769	282.90	8,502	18,239
279.35	1,628	634	281.15	5,448	6,039	282.95	8,593	18,666
279.40	1,698	717	281.20	5,531	6,314	283.00	**8,684**	**19,098**
279.45	1,769	804	281.25	5,615	6,592			
279.50	1,842	894	281.30	5,700	6,875			
279.55	1,916	988	281.35	5,785	7,162			
279.60	1,992	1,086	281.40	5,871	7,454			
279.65	2,069	1,187	281.45	5,958	7,750			
279.70	2,147	1,293	281.50	6,045	8,050			
279.75	2,227	1,402	281.55	6,133	8,354			
279.80	2,309	1,515	281.60	6,221	8,663			
279.85	2,392	1,633	281.65	6,310	8,976			
279.90	2,477	1,755	281.70	6,400	9,294			
279.95	2,563	1,881	281.75	6,491	9,616			
280.00	2,650	2,011	281.80	6,582	9,943			
280.05	2,710	2,145	281.85	6,673	10,274			
280.10	2,771	2,282	281.90	6,766	10,610			
280.15	2,832	2,422	281.95	6,858	10,951			
280.20	2,894	2,565	282.00	6,952	11,296			
280.25	2,957	2,712	282.05	7,034	11,646			
280.30	3,021	2,861	282.10	7,117	12,000			
280.35	3,085	3,014	282.15	7,200	12,358			
280.40	3,150	3,169	282.20	7,283	12,720			
280.45	3,215	3,329	282.25	7,367	13,086			
280.50	3,281	3,491	282.30	7,451	13,456			
280.55	3,348	3,657	282.35	7,536	13,831			

APPENDIX – D

Stormwater Operation and Maintenance Plan
and
Long Term Pollution Prevention Plan

Standard 9

Stormwater Management Operation and Maintenance Plan And Long Term Pollution Prevention Plan

Triangle Farm
Holliston, Massachusetts

May 8, 2020
Revised: September 10, 2020

In accordance with Standard 9 of the Massachusetts Department of Environmental Protection Stormwater Handbook (February 2008), the attached on-site maintenance program for the proposed stormwater management system has been developed to ensure the Best Management Practices (BMP's) in place will remain functioning as designed. The Plan contains both construction period operations and maintenance as well as post construction responsibilities that shall "run" with the property if ownership is transferred.

Land Owner/Operator:

Thomas Murch
Murch Prentice Realty Trust
5855 Lyman Road
Turin, NY 13473

_____ _____
Date

Estimated Maintenance Yearly Budget:

Annual Catch Basin and Oil/Grit Chamber Cleaning:	$ 600.00
Mowing, vegetation maintenance of Drainage Basins:	$ 300.00
Repairs:	$ 250.00
Total	$1,150.00

Construction Period Operation and Maintenance:

Good Housekeeping Practices:

- Remove all debris from site and dispose of in trash dumpsters
- Plan for adequate disposal of scrap, waste and surplus materials
- Keep work area clean
- Secure loose or light material that is stored on the site
- Store flammable materials apart from other materials
- Secure all materials at the end of each work day
- Maintain a clean neat and orderly site

Safety:

Keep safety considerations at the forefront of inspection procedures at all times. Likely hazards should be anticipated and avoided. Never enter a confined space (outlet structure, manhole, etc) without proper training or equipment. A confined space should never be entered without at least one additional person present. If a toxic or flammable substance is discovered, leave the immediate area and contact the local authorities at 911.

All cast iron storm water structure grates and covers shall be kept in good condition and kept closed at all times. Any damaged or broken structures will be replaced immediately upon discovery.

Erosion Control Barriers:

Compost filter socks shall be installed where indicated on the plans and in other appropriate locations where warranted. These barriers shall be installed prior to the commencement of any work on-site and in accordance with the construction plans. A supply of filter socks and compost filter material shall be kept on-site to replace and/or repair barriers that are damaged or degraded. The barriers shall be observed and maintained on a weekly basis during construction.

Construction Entrances:

The existing paved site entrance shall be utilized for construction access.

Catch Basin Protection:

Temporary inlet protection barriers consisting of Silt Sacks® will be placed within all constructed inlets to prevent inflow of sediments into the constructed drainage system. The barriers shall remain in place until a permanent cover is established or diversions away from the inlets are constructed. The barriers shall be observed and maintained as necessary on a weekly basis and after every rainfall of 0.5 inches or more.

Dust Control:

Soils information for the site indicates that it is comprised of sandy soils. Therefore, Dust control BMPs to reduce surface activities and air movement that causes dust to be generated from disturbed soil surfaces will be required. The preferred measure for dust control is sprinkling/irrigation. This is an on-going/as-needed requirement until surfaces have been stabilized. There shall be a water truck on-site available as needed.

Spill Control:

A contingency plan to address the spillage/release of petroleum products and any hazardous materials will be implemented for the site during construction. The plan will include the following measures:

- Equipment necessary to quickly attend to inadvertent spills or leaks shall be on-site in a secure but accessible location. Such equipment will include, but not be limited to, the following: urethane drain cover seals (mats), a spill containment kit which includes sand and shovels, suitable absorbent materials, storage containers, safety goggles, chemically resistant gloves and overshoe boots, water and chemical fire extinguishers, and first aid equipment.
- Spills or leaks will be treated properly according to material type, volume of spillage and location of spill. Mitigation will include preventing further spillage, containing any spilled material to the smallest practical area, removing spilled material in a safe and environmentally friendly manner, and remediating any damage to the environment.
- The contractor shall be familiar with the reporting requirements of the Massachusetts Contingency Plan (310 CMR 40.00) as issued by the Massachusetts Department of Environmental Protection (DEP); specifically Subpart C Notification of Releases and Threats of Release of Oil and Hazardous Materials and Subpart D Preliminary Response Activities and Risk Reduction Measures.
- For any large spills. The Massachusetts DEP Hazardous Waste Incident Response Group shall be notified immediately at 1-617-792-7653 and an emergency response contractor will be called in.

Post-Construction Period Operation and Maintenance:

Pavement Sweeping:
Sweeping has been shown to be an effective initial treatment for reducing contaminants in stormwater runoff. Sweeping is not required to meet TSS removal goals in this case but should be performed in the spring to remove winter accumulations or at other when warranted.

Gutter Cleaning:
Gutter cleaning shall be done at least once per year, in the fall after the trees have dropped their leaves. Inspect downspouts and overflows periodically to prevent debris buildup.

Deep Sump Catch Basins:
Deep sump catch basins remain effective at removing pollutants only if they are cleaned out frequently. Inspection should be done four (4) times per year and cleaned when sediment depth of deposits is greater than or equal to one half the depth from the bottom of the invert to the lowest pipe in the basin. Catch basins shall be cleaned at least once (1) time per year, at the end of the foliage and snow removal seasons. Clamshell buckets or vacuum trucks shall be utilized.

Recharge Systems (Infiltration Chambers) :
The inlet pipe and observation access port shall be inspected 4 times per year. Inspect recharge facilities following a rainfall event greater than 2.5 inches in a 24 hour period. Any accumulated debris shall be removed.

If standing water is observed for more than 72 hours following a storm event, immediately retain a qualified professional to assess whether infiltration function has been lost and develop recommended correction actions.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the chambers, clean-out should be performed. Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles.

Drainage Basin & Forebay:
Vehicle access if necessary will be via the 10 foot wide access around the top of the retention basin. The drainage easement shall be mowed twice a year and kept clear of any trees. The easement will be used for access to the basin.

Inspect it after every major storm for the first few months to ensure it is stabilized and functioning properly and if necessary to take corrective action. Also inspect the basin every time there is a discharge through the high outlet weir. A major storm is defined as a storm that is equal to or greater than the 2.5 inches in a 24-hour storm. Note how long the water remains standing after a

storm. If longer than 72 hours, there may be clogging of the infiltrative surfaces. Inspect the basin and mow it as needed. When mowing keep the grass height no greater than 6 inches. Set mower blades no lower than 3 to 4 inches. Remove grass clippings, organic matter and trash. Use deep tilling to break up compacted or clogged surfaces.

Check for signs of gullying and repair as needed. After removing the sediment, replace any vegetation damaged during the clean-out by reseeding.

Outlet Structure:
Inspection: Inspect semi-annually the first year, and at least once a year thereafter. Inspect the grass for growth and the side slopes for signs of erosion and formation of rills and gullies. Plant an alternative grass species if the original grass cover is not successfully established.
The stone riprap outlet channel shall be inspected semi-annually for debri, sediment buildup and any vegetated growth.
Sediment Removal: Check on a yearly basis and clean as needed. Use hand methods (i.e., a person with a shovel) when cleaning to minimize disturbance to vegetation and underlying soils.

Snow Removal and De-icing:
The use of Sodium Chloride ("rock salt") for de-icing of paved surfaces will be limited; except when found to be necessary for safety of the workers. Sand will be the primary icing control agent. Alternative de-icing products such as calcium chloride may be used as temperatures or other conditions warrant.

Fertilizer:
Slow release organic fertilizers will be used in landscape areas to limit nutrient transport to groundwater and wetland areas. Application will be limited to 3 lbs. per 1000 sf of lawn area.

Spill Control:
See Construction Period Spill control requirements.

Stormwater Construction Site Inspection Report

General Information			
Project Name	Triangle Farm		
MA DEP File No.		**Location**	
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			
Type of Inspection: ❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? ❑Yes ❑No **If yes, provide:** Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? ❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds ❑ Other: Temperature:			
Have any discharges occurred since the last inspection? ❑Yes ❑No **If yes, describe:**			
Are there any discharges at the time of inspection? ❑Yes ❑No **If yes, describe:**			

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
1	Deep Sump Catch Basins (Inspections 4 times per year & cleaning a min. of 1 time per year)	❑Yes ❑No	❑Yes ❑No	
2	Drainage Basin (Siltation buildup, grass mowing, side slopes and removal of sediment)	❑Yes ❑No	❑Yes ❑No	

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
3	Outlet Structure (Inspect semi annually, riprap, debri, sediment buildup and vegetative growth)	❑Yes ❑No	❑Yes ❑No	
		❑Yes ❑No	❑Yes ❑No	

Non-Compliance

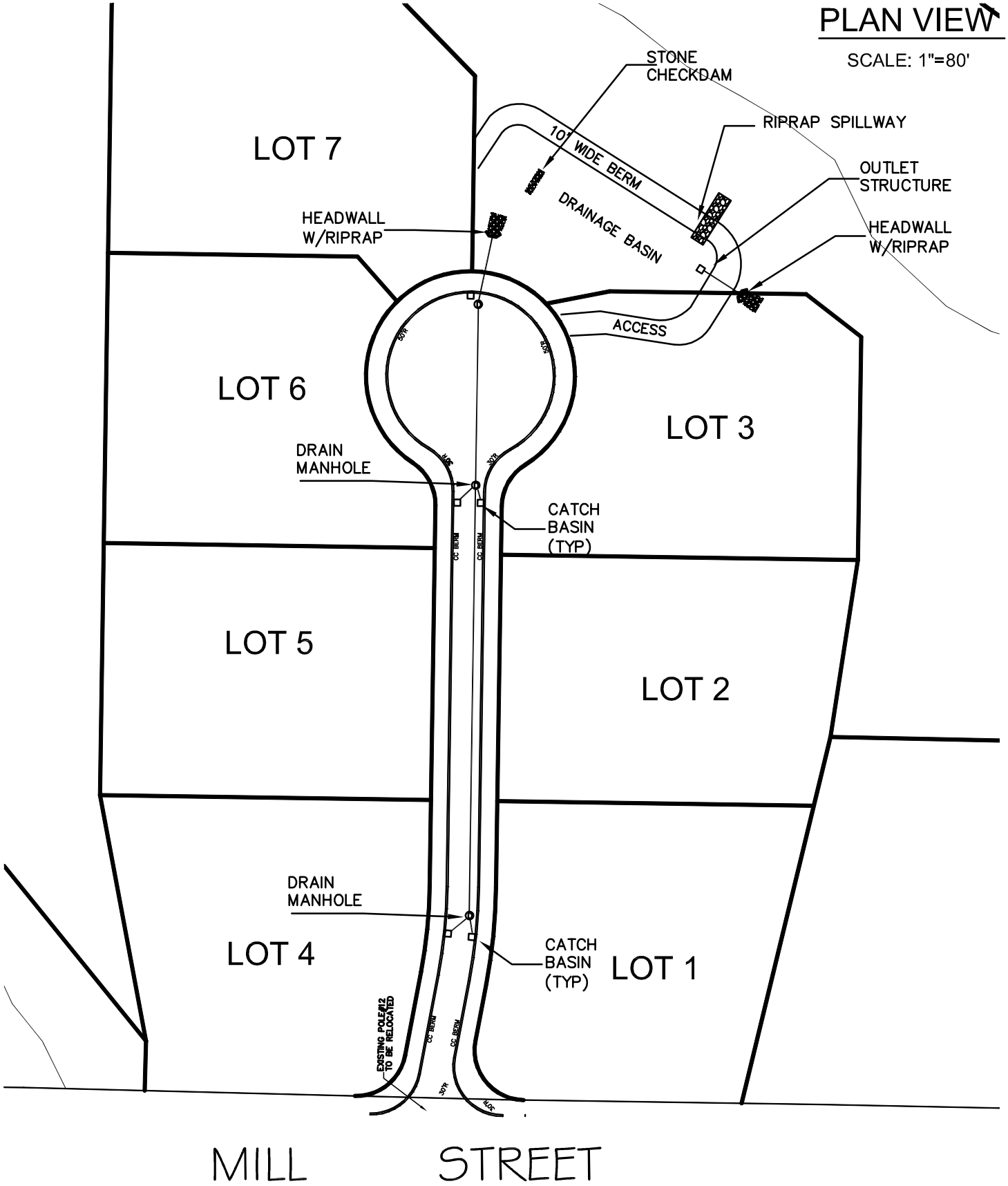
Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title: _____

Signature:_____ **Date:**_____



STORMWATER BMP LOCATION PLAN
"TRIANGLE FARM"
HOLLISTON, MA

SEPT. 10, 2020

APPENDIX – E

Illicit Discharge Statement

Standard 10

Illicit Discharge Compliance Statement

Triangle Farm
Holliston, Massachusetts

May 8, 2020

This statement is provided in accordance with the provisions of the Massachusetts Stormwater Management Standard #10.

To the best of the applicant's/owners knowledge there are no illicit discharges to the site's stormwater manangement system.

All proposed uses on the site will not generate, store or discharge any pollutants to the groundwater and/or wetland resource areas.

Any illicit discharges identified during or after construction will be terminated immediately.

Applicant/Owner:

Thomas Murch, Trustee
Murch Prentice Realty Trust
2855 Lyman Road
Turin, NY 13743

_____ _____

Signature Date

APPENDIX – F

Soil Evaluation Forms

Location Address or Lot No. LOT 2 MILL ST. HOLLISTON

On-site Review

Deep Hole Number 2A Date: 5/12/97 Time: AM Weather 50° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones No
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	-	feet	Drainage way	-	feet
Possible Wet Area	140+	feet	Property Line		feet
Drinking Water Well	-	feet	Other		

DEEP OBSERVATION HOLE LOG*

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
9	Ap	Loam	10YR 3/3		
25"	Bw	Sandy Loam	10YR 5/6		
42"	C1		2.5Y 5/2		30% GRAVEL
68"	C2		2.5Y 5/4	68"	COARSE 70% GRAVEL
124"	C3		2.5Y 5/2		30% GRAVEL

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock N/A
Depth to Groundwater: Standing Water in the Hole: Weeping from Pit Face: 68"
Estimated Seasonal High Ground Water: 68"

Location Address or Lot No. LOT 2 MILL ST. HOLLISTON

On-site Review

Deep Hole Number 2B Date: 5/12/97 Time: AM Weather 52° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones No
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	-	feet	Drainage way	-	feet
Possible Wet Area	140+	feet	Property Line		feet
Drinking Water Well	-	feet	Other		

DEEP OBSERVATION HOLE LOG*

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistence, % Gravel)
12"	Ap	Loam	10YR 3/3		
26"	Bw	Sandy Loam	10YR 5/6		
130"	C	SANDY LOAM	2.5Y 5/2	@ 46"	20% GRAVEL

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock N/A
Depth to Groundwater: Standing Water in the Hole: Weeping from Pit Face: 104"
Estimated Seasonal High Ground Water: 46"

Location Address or Lot No. Lot 2 Mill St. Holliston

On-site Review

HSE Hole
Deep Hole Number 2C Date: 5/12/97 Time: AM Weather: 50° Sun
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones No
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	- feet	Drainage way	- feet
Possible Wet Area	140+ feet	Property Line	feet
Drinking Water Well	- feet	Other	

DEEP OBSERVATION HOLE LOG*

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
10	Ap	Loam	10YR 5/3		
32"	Bw	Sandy Loam	10YR 5/6	@ 32"	
120"	C	Sandy Loam	2.5Y5/2		

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Till Depth to Bedrock: N/A
Depth to Groundwater: Standing Water in the Hole: Weeping from Pit Face:
Estimated Seasonal High Ground Water: 32"

FORM 12 - PERCOLATION TEST

Location Address or Lot No. LOT 2 MILL STREET HOLLISTON

COMMONWEALTH OF MASSACHUSETTS

, Massachusetts

Percolation Test*		
Date: 5/12/97	Time:	
Observation Hole #	1	2 OVERNIGHT
Depth of Perc	46"	50"
Start Pre-soak	11:17	8:13
End Pre-soak	11:32	8:28
Time at 12"	11:32	8:28
Time at 9"	11:55	9:01
Time at 6"	12:25	10:00
Time (9"-6")		
Rate Min./Inch	10:0	20.0

* Minimum of 1 percolation test must be performed in both the primary area AND reserve area.

Site Passed ☒ Site Failed ☐

Performed By: JOSEPH NIHILL

Witnessed By: _____

Comments: _____

DEP

DEP APPROVED FORM - 12/07/95

Location Address or Lot No. LOT 18 MILL ST. HOLLISTON

On-site Review

Deep Hole Number 18A Date: 10/20/98 Time: AM Weather 50 SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	—	feet	Drainage way	—	feet
Possible Wet Area	120+	feet	Property Line		feet
Drinking Water Well	—	feet	Other		

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
8"	A_p	LOAM	10YR 3/2		
24"	B_w	SANDY LOAM	10YR 5/6		
120"	C	SANDY LOAM	2.5Y 5/3	@ 24"	20% GRAVEL COBBLES / STONES

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock: N/A
Depth to Groundwater: Standing Water in the Hole: NONE Weeping from Pit Face: 100"
Estimated Seasonal High Ground Water: 24"

Location Address or Lot No. Lot 18 Mill St. Holliston

On-site Review

Deep Hole Number 18B Date: 10/20/98 Time: AM Weather 50° Sun
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones No
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	- feet	Drainage way	- feet
Possible Wet Area	140+ feet	Property Line	feet
Drinking Water Well	- feet	Other	

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
10"	Ap	Loam	10YR 3/2		
24"	Bw	Sandy Loam	10YR 5/6		
122"	C	Sandy Loam	2.5Y 5/3	@ 28"	15% Gravel

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Till Depth to Bedrock: N/A
Depth to Groundwater: Standing Water in the Hole: no Weeping from Pit Face: 90"
Estimated Seasonal High Ground Water: 28"

FORM 12 - PERCOLATION TEST

Location Address or Lot No. LOT 18 MILL ST. HOLLISTON

COMMONWEALTH OF MASSACHUSETTS

, Massachusetts

Percolation Test*		
Date: 10/21/98	Time:	
Observation Hole #	1	2
Depth of Perc	42"	42"
Start Pre-soak (OVERNIGHTS)	8:26	8:28
End Pre-soak	8:41	8:43
Time at 12"	8:41	8:43
Time at 9"	9:32	9:05
Time at 6"	11:02	9:34
Time (9"-6")	90 MIN.	29 MIN.
Rate Min./Inch	30	10

* Minimum of 1 percolation test must be performed in both the primary area AND reserve area.

Site Passed ☑ Site Failed ☐

Performed By: JOSEPH NIHILL

Witnessed By: NICOLE LETENDRE

Comments:

DEP APPROVED FORM - 12/07/95

Location Address or Lot No. LOT 17 MILL ST. HOLLISTON

On-site Review

Deep Hole Number 17 A Date: 10/20/98 Time: A M Weather 50° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	– feet	Drainage way	– feet
Possible Wet Area	120+ feet	Property Line	feet
Drinking Water Well	– feet	Other	

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
12"	A_p	Loam	10YR 3/2		
24"	B_w	Sandy Loam	10YR 5/6	@20"	
126"	C	Sandy Loam	2.5Y 5/3		15% GRAVEL COBBLES / STONES

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock: N/A
Depth to Groundwater: Standing Water in the Hole: 96" Weeping from Pit Face: 50"
Estimated Seasonal High Ground Water: 20"

Location Address or Lot No. LOT 17 MILL ST. HOLLISTON

On-site Review

Deep Hole Number 17B Date: 10/20/98 Time: A M Weather 50° Sun
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	– feet	Drainage way	– feet
Possible Wet Area	120+ feet	Property Line	feet
Drinking Water Well	– feet	Other	

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
6"	A_p	LOAM	10YR 3/2		
24"	B_w	SANDY LOAM	10YR 5/6	22"	
34"	C_1	SILTY LOAM	10YR 4/4		
120"	C_2	SANDY LOAM	2.5Y 5/4		20% GRAVEL COBBLES/STONES

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock: N/A
Depth to Groundwater: Standing Water in the Hole: 72" Weeping from Pit Face: 72"
Estimated Seasonal High Ground Water: 22"

Location Address or Lot No. LOT 16 MILL ST. HOLLISTON

On-site Review

Deep Hole Number 16A Date: 10/20/98 Time: A M Weather 50° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	– feet	Drainage way	– feet
Possible Wet Area	100+/ feet	Property Line	feet
Drinking Water Well	– feet	Other	

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
8"	Ap	Loam	10YR 3/2		
24"	Bw	Sandy Loam	10YR 5/6	@16"	
126"	C	Sandy Loam	2.5Y 5/3		10% Gravel Cobbles / Bldrs

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Till Depth to Bedrock: N/A
Depth to Groundwater: Standing Water in the Hole: – Weeping from Pit Face: 92"
Estimated Seasonal High Ground Water: 16"

Location Address or Lot No. LOT 16 MILL ST. HOLLISTON

On-site Review

Deep Hole Number 16B Date: 10/20/98 Time: A M Weather 50° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	— feet	Drainage way	— feet
Possible Wet Area	100+/ feet	Property Line	feet
Drinking Water Well	— feet	Other	

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
12"	Ap	Loam	10YR 3/2		
28"	Bw	Sandy Loam	10YR 5/6	@ 22"	
132"	C	Sandy Loam	2.5Y 5/3		20% GRAVEL COBBLES/STONES

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock: N/A
Depth to Groundwater: Standing Water in the Hole: 108" Weeping from Pit Face: 72"
Estimated Seasonal High Ground Water: 22"

Location Address or Lot No. LOT 15 MILL ST HOLLISTON

On-site Review

Deep Hole Number 15A Date: 10/20/98 Time: AM Weather 50° Sun
Location (identify on site plan)
Land Use FIELD Slope (%) < 5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	–	feet	Drainage way	–	feet
Possible Wet Area	130+	feet	Property Line		feet
Drinking Water Well	–	feet	Other		

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
12"	A_p	LOAM	10YR 3/2		
28"	B_w	SANDY LOAM	10YR 5/6	@ 20"	
50"	C_1	SILTY LOAM	10YR 4/4		COBBLES / BLDRS
122"	C_2	SANDY LOAM	2.5Y 5/4		25% GRAVEL COBBLES/BLDRS

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock: N/A
Depth to Groundwater: Standing Water in the Hole: 100" Weeping from Pit Face: 72"
Estimated Seasonal High Ground Water: 20"

Location Address or Lot No. Lot 15 Mill St. Holliston

On-site Review

Deep Hole Number 15B Date: 10/20/98 Time: AM Weather 50° Sun
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation High Grass
Landform Terrace
Position on landscape (sketch on the back)
Distances from:

Open Water Body	–	feet	Drainage way	–	feet
Possible Wet Area	130+	feet	Property Line		feet
Drinking Water Well	–	feet	Other		

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
10"	A_p	Loam	10YR 3/2		
24"	B_w	Sandy Loam	10YR 5/6	@ 20"	
52"	C_1	Silty Loam	10YR 4/4		
124"	C_2	Sandy Loam	2.5Y 5/4		15% Gravel Cobbles/Bldrs

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Till Depth to Bedrock: N/A
Depth to Groundwater: Standing Water in the Hole: 96" Weeping from Pit Face: 60"
Estimated Seasonal High Ground Water: 20"

Location Address or Lot No. LOT 15 MILL ST. HOLLISTON (RETEST)

On-site Review

Deep Hole Number 1 Date: 5/23/01 Time: AM Weather 50° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	- feet	Drainage way	- feet
Possible Wet Area	140+ feet	Property Line	feet
Drinking Water Well	- feet	Other	

DEEP OBSERVATION HOLE LOG*

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
12	Ap	LOAM	10YR 3/2		
24"	Bw	SANDY LOAM	10YR 5/6		
120	C	SANDY LOAM	2.5Y5/3	C 24"	MED-FINE 10% Cobbles Cob/ STONES

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock: N/A
Depth to Groundwater: Standing Water in the Hole Weeping from Pit Face: 100"
Estimated Seasonal High Ground Water: 24"

Location Address or Lot No. LOT 15 MILL ST. HOLLISTON (RE-TEST)

On-site Review

Deep Hole Number 2 Date: 5/23/01 Time: AM Weather: 50° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	-	feet	Drainage way	-	feet
Possible Wet Area	140+	feet	Property Line		feet
Drinking Water Well	-	feet	Other		

DEEP OBSERVATION HOLE LOG*

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
10	Ap	Loam	10YR 3/2		
24"	Bw	Sandy Loam	10YR 5/6		
120"	C	SANDY LOAM	2.5Y 5/3	@ 24"	MED-FINE 10% GRAVEL COB/STONES

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock: N/A
Depth to Groundwater: Standing Water in the Hole Weeping from Pit Face: 112"
Estimated Seasonal High Ground Water: 24"

FORM 12 - PERCOLATION TEST

Location Address or Lot No. LOT 15 MILL ST HOLLISTON

COMMONWEALTH OF MASSACHUSETTS

, Massachusetts

Percolation Test*		
Date: 5/23/01	Time:	
Observation Hole #	1	2
Depth of Perc	OVERNIGHT 36" - 54"	OVERNIGHT 32"/50"
Start Pre-soak	7:55	7:52
End Pre-soak	8:10	8:07
Time at 12"	8:10	8:07
Time at 9"	8:50	9:01
Time at 6"	10:00	10:25
Time (9"-6")		
Rate Min./Inch	24:0	28.0

* Minimum of 1 percolation test must be performed in both the primary area AND reserve area.

Site Passed ☒ Site Failed ☐

Performed By: JOSEPH NIHILL

Witnessed By: _____

Comments: _____

DEP

DEP APPROVED FORM - 12/07/95

Location Address or Lot No. LOT 4 MILL ST. HOLLISTON

On-site Review

Deep Hole Number 4A Date: 5/12/97 Time: AM Weather: 50° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	-	feet	Drainage way	-	feet
Possible Wet Area	140+	feet	Property Line		feet
Drinking Water Well	-	feet	Other		

DEEP OBSERVATION HOLE LOG*

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
10"	Ap	LOAM	10YR 3/2		
24"	Bw	SANDY LOAM	10YR 5/6		
120"	C	SANDY LOAM	2.5Y 5/3	@ 24"	20% GRAVEL w/ Cobbles

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock N/A
Depth to Groundwater: Standing Water in the Hole Weeping from Pit Face: 28"
Estimated Seasonal High Ground Water: 24"

Location Address or Lot No. LOT 4 MILL ST. HOLLISTON

On-site Review

Deep Hole Number 4B Date: 5/12/97 Time: AM Weather 50° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	- feet	Drainage way	- feet
Possible Wet Area	140+ feet	Property Line	feet
Drinking Water Well	- feet	Other	

DEEP OBSERVATION HOLE LOG*

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
10"	Ap	Loam	10YR 3/3		
24"	Bw	Sandy Loam	10YR 5/6		
132"	C	Sandy Loam	2.5Y 5/2	@ 24"	20% GRAVEL w/ Cobbles

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock N/A
Depth to Groundwater: Standing Water in the Hole: Weeping from Pit Face: 32"
Estimated Seasonal High Ground Water: 24"

Location Address or Lot No. LOT 4 MILL ST. HOLLISTON

On-site Review

HSE Hole
Deep Hole Number 4C Date: 5/12/97 Time: AM Weather 50° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	-	feet	Drainage way	-	feet
Possible Wet Area	140+	feet	Property Line		feet
Drinking Water Well	-	feet	Other		

DEEP OBSERVATION HOLE LOG*

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
10	Ap	Loam	10YR 3/3		
20"	Bw	Sandy Loam	10YR 5/6		
120"	C	SANDY Loam	2.5Y 5/2	@ 24"	

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock N/A
Depth to Groundwater: Standing Water in the Hole Weeping from Pit Face: 24"
Estimated Seasonal High Ground Water: 24"

FORM 12 - PERCOLATION TEST

Location Address or Lot No. Lot 4 Mill St Hollis NH

COMMONWEALTH OF MASSACHUSETTS

, Massachusetts

Percolation Test*		
Date: 9/10/97	Time:	
Observation Hole #	1 OVERNIGHT	2 OVERNIGHT
Depth of Perc	44"	40"
Start Pre-soak	~~7:07~~ 8:07	8:10
End Pre-soak	8:22	8:26
Time at 12"	8:22	8:26
Time at 9"	9:05	8:57
Time at 6"	10:14	9:50
Time (9"-6")		
Rate Min./Inch	25.0	18.0

* Minimum of 1 percolation test must be performed in both the primary area AND reserve area.

Site Passed ☒ Site Failed ☐

Performed By: Joseph Nihill

Witnessed By: _____

Comments: _____

DEP

DEP APPROVED FORM - 12/07/95

Location Address or Lot No. LOT 3 MILL ST. HOLLISTON

On-site Review

Deep Hole Number 3A Date: 5/12/97 Time: AM Weather 52° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Wate: Body	- feet	Drainage way	- feet
Possible Wet Area	140+ feet	Property Line	feet
Drinking Water Well	- feet	Other	

DEEP OBSERVATION HOLE LOG*

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
12"	Ap	Loam	10YR3/3		
28"	Bw	Sandy Loam	10YR5/6		
				@ 32"	
134"	C	SANDY LOAM	2.5Y5/2		POCKETS OF COARSE GRAVEL

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock N/A
Depth to Groundwater: Standing Water in the Hole: Weeping from Pit Face: 96"
Estimated Seasonal High Ground Water: 32"

Location Address or Lot No. LOT 3 MILL ST. HOLLISTON

On-site Review

Deep Hole Number 3B Date: 5/12/97 Time: AM Weather: 50° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	- feet	Drainage way	- feet
Possible Wet Area	140+ feet	Property Line	feet
Drinking Water Well	- feet	Other	

DEEP OBSERVATION HOLE LOG*

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
10"	Ap	Loam	10YR 3/3		
24"	Bw	Sandy Loam	10YR 5/6		
128"	C	SANDY LOAM	2.5Y 5/3	@ 32"	Pockets of FINE SAND

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock: N/A
Depth to Groundwater: Standing Water in the Hole: Weeping from Pit Face: 64"
Estimated Seasonal High Ground Water: 32"

Location Address or Lot No. LOT 3 MILL ST. HOLLISTON

On-site Review

HOUSE HOLE
Deep Hole Number 3C Date: 5/12/97 Time: AM Weather: 50° SUN
Location (identify on site plan)
Land Use OPEN FIELD Slope (%) <5 Surface Stones NO
Vegetation HIGH GRASS
Landform TERRACE
Position on landscape (sketch on the back)
Distances from:

Open Water Body	- feet	Drainage way	- feet
Possible Wet Area	140+ feet	Property Line	feet
Drinking Water Well	- feet	Other	

DEEP OBSERVATION HOLE LOG*

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
12"	Ap	Loam	10YR 3/3		
30"	Bw	Sandy Loam	10YR 5/6		
132"	C	SANDY LOAM	2.5Y5/2	@ 28"	

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) TILL Depth to Bedrock N/A
Depth to Groundwater: Standing Water in the Hole: Weeping from Pit Face: 72"
Estimated Seasonal High Ground Water: 28"

FORM 12 - PERCOLATION TEST

Location Address or Lot No. Lot 3 Mill St Holliston

COMMONWEALTH OF MASSACHUSETTS

, Massachusetts

Percolation Test*		
Date:	Time:	
Observation Hole #	1	2
Depth of Perc	44"	44"
Start Pre-soak	12:55	1:52
End Pre-soak	1:11	2:07
Time at 12"	1:11	2:07
Time at 9"	1:18	2:26
Time at 6"	1:28	2:54
Time (9"-6")		
Rate Min./Inch	4.0	10.0

* Minimum of 1 percolation test must be performed in both the primary area AND reserve area.

Site Passed ☒ Site Failed ☐

Performed By: Joseph N. Hill

Witnessed By: _____

Comments: _____

DEP

DEP APPROVED FORM - 12/07/95

APPENDIX – G

Supplemental Stormwater Plans

Pre-Development Subcatchment Areas
Post-Development Subcatchment Areas
Hydraulic Subcatchment Areas

E2 PRE-DEVELOPED SUBCATCHMENT

1L PRE-DEVELOPED LINK

ASSESSOR'S REFERENCE:
MAP 7, BLOCK 4, PARCEL 55.1
MAP 7, BLOCK 4, PARCEL 55.2

DEED REFERENCE:
MIDDLESEX COUNTY REGISTRY OF DEEDS
Bk. 70305, Pg. 336

PLAN REFERENCE:
MIDDLESEX COUNTY REGISTRY OF DEEDS
1. PLAN No. 753 OF 2015
2. PLAN No. 834 OF 2012
3. PLAN No. 142 OF 2001, Bk. 32361, Pg. 140
4. PLAN No. 402 OF 1998, Bk. 28461, Pg. 37

OWNER OF RECORD:
THOMAS MURCH et.al. TRUSTEE
MURCH PRENTICE REALTY TRUST
5855 LYMAN ROAD
TURIN, NY 13473

ZONING CLASSIFICATION:
AG-RES DIST B
LOT AREA: 40,000 S.F.
FRONTAGE: 200 FT.
DEPTH: 180 FT.
SETBACKS:
FRONT: 40'
SIDE: 30'
REAR: 40'

NRCS SOIL GROUP
315B

NRCS SOIL GROUP
370B

NRCS SOIL GROUP
315B

N/F
F&D REALTY CORP. INC.

N/F
MURCH PRENTICE REALTY TRUST

N/F
MURCH PRENTICE REALTY TRUST

N/F
LINDA & THOMAS KRPATA

E1

E2

E3

1L

470' S=0.028

185' S=0.08

270' S=0.016

130' S=0.05

Tc Flow Path

50' WETLAND BUFFER

EDGE OF WETLANDS

A

B

C

D

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

MILL STREET (PUBLIC – VARIABLE WIDTH)

EXIST. HYDRANT

PRE-DEVELOPED RUNOFF

REVISIONS		
No.	DATE	DESCRIPTION
1	09/10/20	REVIEW COMMENTS

DEFINITIVE OPEN SPACE SUBDIVISION "TRIANGLE FARM" A 7 LOT SINGLE FAMILY SUBDIVISION HOLLISTON, MASSACHUSETTS

PREPARED FOR:
THOMAS MURCH et.al., TRUSTEE
MURCH PRENTICE REALTY TRUST
5855 LYMAN ROAD
TURIN, NY 13473

GLM Engineering Consultants, Inc.
19 EXCHANGE STREET
HOLLISTON, MA 01746
P: 508-429-1100
F: 508-429-7160
www.GLMengineering.com

JOB No.	7701DEF
DATE:	MAY 8, 2020
SCALE:	1"=40'
SHEET:	1 of 3
PLAN #:	27,404

P2 POST-DEVELOPED SUBCATCHMENT

2L POST-DEVELOPED LINK

ASSESSOR'S REFERENCE:
MAP 7, BLOCK 4, PARCEL 55.1
MAP 7, BLOCK 4, PARCEL 55.2

DEED REFERENCE:
MIDDLESEX COUNTY REGISTRY OF DEEDS
Bk. 70305, Pg. 336

PLAN REFERENCE:
MIDDLESEX COUNTY REGISTRY OF DEEDS
1. PLAN No. 753 OF 2015
2. PLAN No. 834 OF 2012
3. PLAN No. 142 OF 2001, Bk. 32361, Pg. 140
4. PLAN No. 402 OF 1998, Bk. 28461, Pg. 37

OWNER OF RECORD:
THOMAS MURCH et.al. TRUSTEE
MURCH PRENTICE REALTY TRUST
5855 LYMAN ROAD
TURIN, NY 13473

ZONING CLASSIFICATION:
AG-RES DIST B
LOT AREA: 40,000 S.F.
FRONTAGE: 200 FT.
DEPTH: 180 FT.
SETBACKS:
FRONT: 40'
SIDE: 30'
REAR: 40'

NRCS SOIL GROUP
315B

PARCEL A
OPEN SPACE AREA
293,715 ± S.F.
6.74 AC
UPLAND AREA: 178,768 S.F.

PARCEL B
332,115 ±S.F.
7.62 ±ACRES
UPLAND AREA: 83,033 S.F.

LOT 7
34,839 ±S.F.
0.80 ±ACRES

LOT 6
30,376 ±S.F.
0.70 ±ACRES

LOT 5
30,352 ±S.F.
0.70 ±ACRES

LOT 4
31,485 ±S.F.
0.72 ±ACRES

LOT 3
30,052 ±S.F.
0.69 ±ACRES

LOT 2
30,349 ±S.F.
0.70 ±ACRES

LOT 1
30,483 ±S.F.
0.70 ±ACRES

NRCS SOIL GROUP
370B

N/F F&D REALTY CORP. INC.

N/F MURCH PRENTICE REALTY TRUST

N/F MURCH PRENTICE REALTY TRUST

N/F LINDA & THOMAS KRPATA

EROSION CONTROL BARRIER

50' WETLAND BUFFER

EDGE OF WETLANDS

PROPOSED CHECKDAM ELEV=281.0 (SEE DETAIL)

SAND BOTTOM EL=278.8 (SEE DETAIL)

LOW FLOW DRAIN (SEE DETAIL)

RIPRAP 6' WIDE SPILLWAY EL=282.5 (SEE DETAIL)

OUTLET STRUCTURE (SEE DETAIL)

HEADWALL W/RIPRAP 18"INV=277.5

HEADWALL #9 W/RIPRAP 12 INV=281.5

PROPOSED HYDRANT

10' WIDE ACCESS

FOREBAY

DRAINAGE BASIN

PROPOSED SUBDRAIN (SEE DETAIL)

EXISTING DRAINAGE TO BE ABANDONED

Tc FLow Path 275' S=0.08

Tc FLow Path

Tc FLow Path 110' S=0.04

510' S=0.028

50' S=0.01

50' S=0.015

50' S=0.01

450' S=0.02

MILL STREET (PUBLIC – VARIABLE WIDTH)

EXIST. HIGHWAY

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

POST-DEVELOPED RUNOFF

REVISIONS		
No.	DATE	DESCRIPTION
1	09/10/20	REVIEW COMMENTS

DEFINITIVE OPEN SPACE SUBDIVISION "TRIANGLE FARM" A 7 LOT SINGLE FAMILY SUBDIVISION HOLLISTON, MASSACHUSETTS

PREPARED FOR:
THOMAS MURCH et.al., TRUSTEE
MURCH PRENTICE REALTY TRUST
5855 LYMAN ROAD
TURIN, NY 13473

GLM Engineering Consultants, Inc.
19 EXCHANGE STREET
HOLLISTON, MA 01746
P: 508-429-1100
F: 508-429-7160
www.GLMengineering.com

JOB No.	7701DEF
DATE:	MAY 8, 2020
SCALE:	1"=40'
SHEET:	2 fo 3
PLAN #:	27,404

ASSESSOR'S REFERENCE:
MAP 7, BLOCK 4, PARCEL 55.1
MAP 7, BLOCK 4, PARCEL 55.2

DEED REFERENCE:
MIDDLESEX COUNTY REGISTRY OF DEEDS
Bk. 70305, Pg. 336

PLAN REFERENCE:
MIDDLESEX COUNTY REGISTRY OF DEEDS
1. PLAN No. 753 OF 2015
2. PLAN No. 834 OF 2012
3. PLAN No. 142 OF 2001, Bk. 32361, Pg. 140
4. PLAN No. 402 OF 1998, Bk. 28461, Pg. 37

OWNER OF RECORD:
THOMAS MURCH et.al. TRUSTEE
MURCH PRENTICE REALTY TRUST
5855 LYMAN ROAD
TURIN, NY 13473

ZONING CLASSIFICATION:
AG-RES DIST B
LOT AREA: 40,000 S.F.
FRONTAGE: 200 FT.
DEPTH: 180 FT.
SETBACKS:
FRONT: 40'
SIDE: 30'
REAR: 40'

PARCEL A
OPEN SPACE AREA
293,715 ± S.F.
6.74 AC
UPLAND AREA: 178,768 S.F.

PARCEL B
332,115 ±S.F.
7.62 ±ACRES
UPLAND AREA: 83,033 S.F.

LOT 7
34,839 ±S.F.
0.80 ±ACRES

LOT 6
30,376 ±S.F.
0.70 ±ACRES

LOT 5
30,355 ±S.F.
0.70 ±ACRES

LOT 4
31,485 ±S.F.
0.72 ±ACRES

LOT 3
30,052 ±S.F.
0.69 ±ACRES

LOT 2
30,349 ±S.F.
0.70 ±ACRES

LOT 1
30,483 ±S.F.
0.70 ±ACRES

CB#8
31,753 S.F.

CB#5
12,630 S.F.

CB#6
14,504 S.F.

CB#1
9,766 S.F.

CB#2
18,259 S.F.

PROPOSED CHECKDAM ELEV=281.0 (SEE DETAIL)
SAND BOTTOM EL=278.8 (SEE DETAIL)
LOW FLOW DRAIN (SEE DETAIL)
RIPRAP 6' WIDE SPILLWAY EL=282.5 (SEE DETAIL)
OUTLET STRUCTURE (SEE DETAIL)
HEADWALL W/RIPRAP 18"INV=277.5
HEADWALL #9 W/RIPRAP 18"INV=283.5
EXISTING POLE #12 TO BE RELOCATED
10' WIDE ACCESS
10' WIDE TOP OF BERM
FOREBAY
DRAINAGE BASIN
EROSION CONTROL BARRIER
50' WETLAND BUFFER
100' WETLAND BUFFER
EDGE OF WETLANDS
PROPOSED HSE TC=294
PROPOSED HSE TC=292
PROPOSED HSE TC=295.0
PROPOSED HSE TC=293.0
PROPOSED HSE TC=292.5
PROPOSED BERM (SEE DETAIL)
ROOF DRAIN
ROCK DRAIN
SEPTIC AREA
N/F F&D REALTY CORP. INC.
N/F MURCH PRENTICE REALTY TRUST
N/F MURCH PRENTICE REALTY TRUST
N/F LINDA & THOMAS KRPATA
MILL STREET (PUBLIC - VARIABLE WIDTH)
EXIST. UTILITY POLE #1

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

CATCH BASIN DRAINAGE AREAS

REVISIONS		
No.	DATE	DESCRIPTION
1	09/10/20	REVIEW COMMENTS

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A 7 LOT SINGLE FAMILY SUBDIVISION
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SHEET:	3 of 3
PLAN #:	27,404