Nesra Engineering, LLC
111 Washington Street, Unit 2A
Plainville, MA 02762

STORMWATER MANAGEMENT REPORT AND ACCOMPANYING NOTICE OF INTENT

MARSHALL SIMONDS MIDDLE SCHOOL ATHLETIC FIELDS RENOVATION PROJECT

114 WINN STREET
BURLINGTON, MA 01803

Prepared For:

Burlington Public Schools
123 Cambridge Street
Burlington, MA 01803

Submitted By:

Nesra Engineering, LLC
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JN 240018

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1.0 Project Description

The natural turf athletic fields at Marshall Simonds School are located to the north of the Middle School building, east of the 400-meter running track and inset turf field, and are bordered by resource areas to the north and east. The current facility includes natural grass athletic fields, perimeter fencing, netting, and lighting. Electrical and drainage utilities are installed below the surface to provide power for the lighting system and facilitate stormwater drainage. A pedestrian pathway connects Mooney Road to the rear parking area at the middle school, with additional walkways linking the school to the existing track and field facility. However, the existing walkways do not currently meet ADA/AAB regulations.

The proposed project involves upgrading the athletic fields with one full size state-of-the-art synthetic turf, and one youth synthetic turf field, new lighting, two scoreboards, and walkways. The two fields will be separated by a walkway in between. The project will also include ADA/AAB-compliant routes from the fields to the school building. Terraced seating will be provided along the hillside, and ADA/AAB-compliant parking will be striped on the existing pavement located adjacent to the school.

Currently, the grass fields are sloped at 1.5% from the southern corner to the north and east. The site is outside of the 100-year floodplain.

According to the Massachusetts Natural Heritage Maps, there are no certified vernal pools located in close proximity to the project site. The same database indicates that there are no priority habitats of rare species or estimated habitats of rare wildlife located on or near the project site. Similarly, there are no areas of critical environmental concern (ACEC). <u>The site is however designated as outstanding resource waters (ORW).</u>

According to the Soil Conservation Service's "Soil Map," the historical soils on-site are as follows:

- **Udorthents-Urban Land Complex (656)** (indicating filled soils) – 90% of the site.
- **Whitman fine sandy loam (73B)** – 10% of the site.

Udorthents-Urban Land Complex is typically categorized as hydrologic soil group D. Whitman fine sandy loam is also categorized as hydrologic soil group D.

Additional information is provided in the wetland report completed by our wetland specialist, dated January 6, 2025, and included in the Notice of Intent application under a separate cover.

2.0 Background Data

Topographic conditions are based on survey data acquired by Nesra Engineering, LLC. Bordering vegetated wetlands and river front flags were placed by a wetlands consultant and the locations shown on the plans for these flags were field surveyed by Nesra Engineering, LLC. Field survey equipment used was a Leica GS18 GNSS receiver with a CS20 data collector, as well as a Leica

TS16 robotic total station. The topographic survey is on the North American Vertical Datum (NAVD 88) and the horizontal datum is on the NAD83 Massachusetts State Planes, Mainland Zone, US Foot (MA83F) coordinate system.

Resource area delineation has been performed by Nesra's wetland consultant, Stephen Chmiel. The Delineation Report is dated January 6, 2025, and is included in the Notice of Intent application under a separate cover

Based on subsequent site review with the Conservation Department, a portion of the site was revised and the additional resource areas have been updated on the existing conditions plans and referenced on all subsequent design documents.

3.0 Stormwater Management Concepts

The project has been re-designed to result in no disturbance to the existing wetlands.

3.1 Hydraulic Sub Areas

In the **pre-development** condition, the site consists of three distinct sub-catchment areas within the analyzed limits. These areas discharge runoff to two locations along the adjacent resource areas. One of the sub-catchment areas drains into a catch basins that outlet to the resource areas, while the remaining two areas sheet flow directly to the wetlands located to the north and west of the site.

In the **post-development** condition, the same sub-catchment areas remain; however, a portion of the runoff is intercepted by the synthetic turf, which directs flow to the base stone layer. This layer provides storage, promotes infiltration, and delays outflow. Effectively, the synthetic turf outfield functions as a retention and infiltration basin. As a result, the proposed development enhances site drainage and improves overall hydrologic conditions. Furthermore, the synthetic turf drainage has been updated to outflow to a rain garden, which further treats the runoff before directing it into the existing drainage system which ultimately outflows in the northwest corner of the site.

4.0 Compliance With Stormwater Standards

4.1 Untreated Stormwater (Standard 1)

The project is designed so that new stormwater conveyances (outfall/discharges) do not discharge untreated stormwater into, or cause erosion to, the wetland.

4.2 Post-Development Peak Rates (Standard 2)

A hydrologic study was performed to determine the rate of runoff for the 2, 10, 25, and 100-year storm events under pre-development (existing) conditions. Unmitigated post-development rates were then computed in a similar manner. The study points for the peak rates were taken at four locations to match the outflows from the four sub-catchment areas. From this analysis, it was determined that the proposed project and its stormwater management system would not increase the peak runoff rates above existing levels. It is the intent of the stormwater management system to minimize impacts to drainage patterns, downstream property, and wetlands while simultaneously providing water quality treatment to runoff prior to its release from the site, or discharge to wetlands.

The U.S.D.A. Soil Conservation Services (SCS) Technical Release 55 (TR-55), 1986, was used as the procedure of estimating runoff. A SCS TR-20 based computer program was used for estimating peak discharges. TR-55 is a generally accepted model for use on small sites that begin with a rainfall amount uniformly imposed on the watershed over a specified time distribution. Mass rainfall is converted to mass runoff by using a runoff curve number (CN). CN is based on soils, plant cover, impervious areas, interception, and surface storage. Runoff is then transformed into a hydrograph that depends on runoff travel time through segments of the watershed.

Development in a watershed changes its response to precipitation. The most common effects are reduced infiltration and decreased travel time, which result in significantly higher peak rates of runoff. The volume of runoff is determined primarily by the amount of precipitation and by infiltration characteristics related to soil type, antecedent rainfall, type of vegetation cover, impervious surfaces, and surface retention. Travel time is determined primarily by slope, flow length, depth of flow, and roughness of flow surfaces. Peak rates of discharge are based on the relationship of the above parameters, as well as the total drainage areas of the watershed, the location of the development in relation to the total drainage area, and the effect of any flood control works or other manmade storage. Peak rates of discharge are also influenced by the distribution of rainfall within a given storm event.

Stormwater management computations for the full-build were performed using SCS-based ‘HydroCAD’ for existing and proposed conditions, curve numbers, time of concentrations and unit hydrograph computations.

4.2.1 Existing Conditions

Table 4.2.1 shows the curve numbers, areas and times of concentration used to develop the pre-development hydrologic model of the site.

Table 4.2.1 – Existing Conditions					
Area	Surface Cover	Curve Number (CN)	Area (Acres)	Tc (Min)	Description
Sub 1S				13.0	
(Sub A)	Grass Cover	80	0.967		Grass Lawn
Sub 2S				3.9	
(Sub B)	Impervious Areas	98*	0.084		Pathway
	Grass Cover	80*	0.501		Grass Lawn
Sub 3S				14.4	
(Sub D)	Impervious Areas	98*	0.037		Pathways
	Grass Field	80*	2.703		Athletic Field
* CN is based on soil Class D, as depicted on the soils map.					

4.2.2 Proposed Conditions

For the analysis of the developed site, the analysis points are the same. There are four sub-catchment areas.

Table 4.2.2 shows the curve numbers, areas and times of concentration used to develop post-development hydrologic model of the site.

Table 4.2.2 – Proposed Conditions					
Area	Surface Cover	Curve Number (CN)	Area (Acres)	Tc (Min)	Description
Sub 1S				6.0	
(Sub A)	Grass Cover	80	0.708		Grass Lawn
Sub 2S				0.7	
(Sub B)	Impervious Areas	98*	0.310		Pathway
	Grass Cover	80*	0.129		Grass Lawn
Sub 3S				480	
(Sub D)	Impervious Areas	98*	0.254		Pathways
	Grass Field	80*	0.470		Grass Areas
	Synthetic Turf	98*	2.421		Synthetic Turf Field
* CN is based on soil Class D, as depicted on the soils map.					

*Synthetic turf Field utilizes a curve number of 98 to collect the entire volume of runoff and direct it into the base stone materials. This is because the entirety of the runoff flows directly into the base stone, since synthetic turf has an infiltration rate of 16 inches per hour. The time of concentration for the base material is calculated utilizing the hydraulic conductivity of the base material and documentation of those calculations are provided.

4.2.3 Peak Rate Summary

Table 4.2.3. shows the peak runoff and the volume of the runoff for the existing and the developed site during 2, 10 and 100-year design storms.

Table 4.2.3 – Stormwater Runoff Volume and Peak Rate Summary				
Design Storm	Existing Runoff* (CFS)	Existing Volume* (Ac-ft)	Proposed Runoff* (CFS)	Proposed Volume* (Ac-ft)
Outfall 1 (1P				
2-year	1.31	0.118	1.30	0.093
10-year	2.77	0.246	2.47	0.175
25-year	3.71	0.332	3.22	0.230
100-year	5.19	0.468	4.40	0.318
Outfall 2 (4P)				
2-year	4.12	0.409	1.59	0.097
10-year	8.63	0.850	2.50	0.157
25-year	11.58	1.146	3.06	0.194
100-year	16.17	1.616	3.91	0.253

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The proposed project results in an increase in impervious area due to the ADA/AAB accessible walkways and spectator seating areas. However, the overall stormwater performance is improved by directing runoff to an engineered infiltration system beneath the synthetic turf field and associated subsurface reservoir, which provides substantial storage, infiltration, and pretreatment prior to any overflow to the rain garden.

Runoff generated within the limits of the synthetic turf field and portions of the adjacent paved walkway is directed to the turf section and infiltrates vertically through the turf infill and sand layer, then into the underlying stone reservoir. Flows that exceed the subsurface storage capacity are conveyed via subsurface collection pipes to a downstream rain garden for additional filtration and infiltration. The stormwater system is designed such that no runoff is intended to discharge untreated; overflow is routed to the rain garden where it receives additional treatment prior to infiltration and/or controlled discharge.

1. Increased Impervious Area based on the pre and post development hydrology surface accounting used for the stormwater analysis:

   - Predevelopment Impervious Area: 5,274 square feet (S.F.)
   - Postdevelopment Impervious Area: 24,592 S.F.
   - Increase in Impervious Area: 24,592 S.F. – 5,274 S.F. = 19,321 S.F.

This increase reflects the revised layout (including reduced walkway width/extent) while maintaining accessible circulation and spectator functionality.

Note: The synthetic turf field is not treated as impervious. The field and underlying section are specifically designed as an infiltration and storage system.

1. Required Recharge Volume:

   Rv = F x impervious area

For soil group D, the recharge requirement is 0.1 inches over the impervious area as detailed in Table 2.3.2. of Massachusetts Stormwater Handbook.

NRCS HYDROLOGIC SOIL TYPE	APPROX. SOIL TEXTURE	TARGET DEPTH FACTOR (F)
A	sand	**0.6-inch**
B	loam	**0.35-inch**
C	silty loam	**0.25-inch**
D	clay	**0.1-inch**

- Recharge Volume Calculation Based on D soils (MA Stormwater Standard 3):

  Required Recharge Volume= Target Depth Factor × Impervious Area

19,321 S.F. × $\frac{0.1 \text{ inches}}{12 \text{ inches per foot}}$ =161 cubic feet (C.F.)

- Recharge Volume Calculation Based on B soils as a result of field testing.

  Required Recharge Volume= Target Depth Factor × Impervious Area

  19,321 S.F. × $\frac{0.35 \text{ inches}}{12 \text{ inches per foot}}$ =564 cubic feet (C.F.)

  Recharge Volume Provided:

  - Reservoir bottom elevation: 135.75
  - Outlet invert to rain garden (upstream): 136.14
  - Live depth to outlet invert: 0.39 ft

  56,000 S.F. × 0.39 ft (effective depth) x 0.40% Voids = 8,736 cubic feet (C.F.)

  This utilizes the static method which is very conservative.

The project provides recharge via the synthetic turf infiltration reservoir and associated sand filtration layer as described below. (The system capacity substantially exceeds the recharge volume requirement.)

Field testing indicated a measured infiltration rate of approximately 3 inches/hour at Test Pit 1. For design, a more conservative infiltration rate consistent with the soil classification was used: 1.02 inches/hour (Rawls rate for Sandy Loam). This conservative approach provides additional factor of safety in drawdown and recharge performance calculations.

3. Synthetic Turf Infiltration Reservoir / Sand Filter Interface (Storage and Infiltration)

Runoff within the limits of the synthetic turf field enters the turf/infill system and infiltrates into the underlying drainage stone. The design provides a subsurface storage reservoir footprint of approximately 56,000 SF, and includes a 3-inch sand layer at the base of the system (below geotextile) to promote filtration and infiltration while limiting migration of fines. This configuration increases detention time within the system and provides significant storage and infiltration opportunity prior to any discharge.

Greater than 2 feet of separation is maintained between the bottom of the infiltration system and the controlling seasonal high groundwater elevation at the field area. Groundwater varies across the site; the infiltration system has been designed and graded such that infiltration occurs only where separation criteria are met, and where exceedance flows are conveyed to the downstream rain garden system for additional treatment.

4. Overflow Routing to Rain Garden (No Untreated Bypass)

Any excess stormwater volume that exceeds subsurface storage capacity is conveyed via a controlled overflow outlet (12-inch HDPE) to the rain garden/bioretention BMP. The rain garden provides additional treatment (filtration through bioretention media and vegetation) and infiltration. The rain garden includes a perforated underdrain within washed stone to manage drawdown and conveyance of treated water as necessary, and also includes an overflow structure set to manage extreme storm elevations. The system is configured so that stormwater is routed through treatment features and is not designed to leave the site untreated.

5. Resulting Hydrologic Benefit / Outfall Rate Reductions

Because the post-development design routes runoff into a large subsurface reservoir system (with infiltration through sand and native soils) and provides downstream polishing via the rain garden for exceedance events, the model results show reduced outflow rates at each outfall condition, including during larger storm events. Table 4.2.3 summarizes the reduced peak outflow rates for all modeled outfalls.

Summary

- The project increases impervious area by 19,321 SF, primarily due to ADA/AAB accessible walkways and limited spectator circulation needs.
- This hard impervious runoff is intentionally directed to the synthetic turf infiltration reservoir and sand filter interface, where stormwater is detained, filtered, and infiltrated.
- The subsurface reservoir footprint (~56,000 SF) and storage/infiltration design provide substantial capacity relative to recharge needs.
- Any exceedance is routed to the rain garden for additional treatment and infiltration with controlled overflow, consistent with the project's "no untreated bypass" design intent.
- Modeled results confirm reduced peak outflow rates and volumes for all outfalls.

4.4 Removal of TSS (Standard 4)

The project does not include new paved parking areas, loading zones, or other high-pollutant land uses. The only traditional impervious areas proposed consist of ADA/AAB-accessible walkways and limited spectator/seating surfaces. Although pollutant generation is expected to be relatively low, the site is located within an Outstanding Resource Water (ORW) watershed and the stormwater system has been designed to provide enhanced water-quality treatment consistent with MassDEP Stormwater Standard 4.

4.4.1 Treatment Train and Pretreatment (How TSS Removal is Achieved)

Stormwater management is provided through a multi-stage treatment train that routes runoff through successive filtration, settling, and infiltration processes prior to overflow routing:

1. Source Control / Routing to Treatment

Runoff from the perimeter paved walkways is sloped and routed back toward the synthetic turf system, rather than discharging directly toward adjacent resource areas. This improves treatment by ensuring runoff enters the engineered infiltration and filtration layers.

2. Primary Filtration through Turf/Infill System (Pretreatment)

Runoff entering the turf field percolates through the turf fibers and infill (sand installed first during construction, followed by crumb rubber infill). This provides initial physical straining and sediment capture before water enters the underlying base layers.

3. Filtration and Storage within the Aggregate Base Reservoir

Water then moves into the engineered aggregate layers (top stone and base stone). These layers provide additional particulate capture within aggregate voids and provide subsurface storage/residence time that promotes settling and filtration.

4. Geotextile and Sand Filter Layer (Key Filtration Step)

Below the reservoir system, the design includes Mirafi 140N nonwoven geotextile separation and a 3-inch sand filter layer, providing a defined filtration interface to capture fine suspended solids and limit migration of particulate matter.

5. Subsurface Collection with Redundant Filtration

Where water is conveyed laterally, the design includes:

- Flat panel drains wrapped in filter fabric, and
- Collector pipes in a stone trench wrapped in filter fabric (Mirafi 140N), providing redundant screening/filtration prior to downstream conveyance.

6. Credited Pretreatment at Outlet (Deep Sump + Hood)

Although material transport to structures is expected to be limited because structures are subsurface and upstream filtration occurs through the turf/stone/sand system, a deep-sump, hooded catch basin is provided at the downstream outlet and similarly at/near the rain garden inlet, to capture sediment and floatables prior to discharge to the bioretention system.

7. Final Water Quality Treatment (Rain Garden / Bioretention)

Overflow from the subsurface system is routed to the rain garden, which provides final treatment through sedimentation at the inlet, filtration through bioretention media, adsorption/biological processes, and infiltration where feasible.

4.4.2 No Untreated Bypass (Design Intent)

The system is configured so that stormwater is routed through the treatment train described above prior to discharge. Under design conditions, exceedance flows are conveyed to the rain garden for treatment; the project is not designed to bypass untreated runoff.

4.4.3 TSS Removal Compliance (90% Enhanced Treatment)

For compliance documentation under Standard 4, the credited treatment train is:

- Deep sump + hooded catch basin pretreatment: 25% TSS removal credit
- Rain garden / bioretention: 90% TSS removal credit (with pretreatment)

Using the standard remaining-load method:

- Pretreatment remaining fraction: 1 − 0.25 = 0.75
- Bioretention remaining fraction: 1 − 0.90 = 0.10
- Combined remaining fraction: 0.75 × 0.10 = 0.075
- Combined removal: 1 − 0.075 = 0.925 → 92.5% TSS removal

Therefore, the credited treatment train provides approximately 92.5% TSS removal, exceeding both the 80% baseline requirement and the 90% enhanced treatment target applicable to ORW-sensitive receiving waters.

4.4.4 Long-Term Performance (O&M Linkage)

Long-term TSS performance is supported through routine inspection and maintenance, including regular turf inspection/grooming, periodic removal of accumulated material from hardscape areas (sweeping), and inspection/cleanout of deep sump/hooded structures and the rain garden inlet and media as needed, particularly following major storm events.

4.5 Land Uses with Higher Potential Pollutant Loads (Standard 5)

The proposed project does not include any Land Uses with Higher Potential Pollutant Loads (LUHPPLs) as defined by the Massachusetts Stormwater Handbook. The site is and will remain an athletic and recreational facility, which is not categorized as a LUHPPL. No vehicle fueling, maintenance, or equipment storage areas are proposed. Accordingly, Standard 5 is not applicable to this project.

4.6 Critical Areas (Standard 6 – Critical Areas)

The project is located within the watershed of an Outstanding Resource Water (ORW) and is therefore subject to MassDEP Stormwater Standard 6 (Critical Areas). Consistent with Standard 6, the proposed stormwater management system is designed to provide enhanced treatment (≥90% TSS removal) and to maintain or improve existing water quality prior to any discharge to the ORW.

Runoff from the synthetic turf field and portions of the adjacent walkway system is routed to an engineered subsurface infiltration and storage system beneath the turf. Flow entering the turf section is filtered through the turf/infill system and underlying aggregate layers, then passes through a geotextile separation layer and a 3-inch sand filter layer prior to being collected and conveyed. The turf system is designed to maintain a minimum of 2 feet of separation between the bottom of the infiltration system and seasonal high groundwater/perched groundwater, providing adequate vertical separation for recharge and pollutant attenuation.

Where stormwater volumes exceed the subsurface storage/infiltration capacity, overflow is routed through a deep-sump, hooded pretreatment structure and discharged to a rain garden (bioretention) area for final treatment through filtration, adsorption, biological uptake, and infiltration where feasible. The system is configured such that runoff is routed through the treatment train prior to discharge and is not designed to bypass untreated.

For Standard 6 enhanced treatment documentation, the credited treatment train is:

Deep sump + hooded catch basin pretreatment (25% TSS removal credit), followed by

Rain garden / bioretention (90% TSS removal credit with pretreatment).

Using the remaining-load method, the combined credited TSS removal is:

Remaining fraction = $(1 - 0.25) \times (1 - 0.90) = 0.75 \times 0.10 = 0.075$

Combined removal = $1 - 0.075 = 92.5\%$ TSS removal

Accordingly, the project provides ≥90% TSS removal consistent with the Standard 6 Critical Area requirements for ORW watersheds, avoids direct/untreated discharges to sensitive receiving waters, and is supported by the project Operations and Maintenance Plan to ensure long-term performance of the treatment features.

4.7 Redevelopment (Standard 7)

Redevelopment projects are defined by the Massachusetts Stormwater Standards as development, rehabilitation, expansion, or phased projects on previously developed sites that improve existing conditions through implementation of stormwater best management practices. While redevelopment projects may be eligible for certain flexibility when there is no net increase in impervious area, the proposed project includes a net increase in impervious area associated primarily with new ADA/AAB-compliant walkways and ancillary site features.

Based on the hydrology analysis, the impervious area increases from 5,274 SF (pre-development) to 24,592 SF (post-development), for a net increase of 19,318 SF. Accordingly, the project is evaluated under the stormwater management standards applicable to new development and is designed to meet the applicable Massachusetts Stormwater Management Standards, including enhanced treatment in the ORW watershed.

4.8 Erosion and Sedimentation Controls (Standard 8)

An Erosion and Sedimentation Control Plan is included in the construction documents and will be implemented prior to any earth disturbance. Erosion control measures will be installed and maintained throughout construction to prevent sediment transport to adjacent resource areas and storm drainage infrastructure. Controls will include, as applicable, stabilized construction entrances, silt fence and/or compost filter tubes, inlet protection, temporary stabilization (mulch/seed), stockpile protection, and sequencing of work to minimize exposed soils.

The project will obtain coverage under the NPDES Construction General Permit (CGP), as applicable. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared and maintained for the project, including inspection procedures, corrective actions, and documentation requirements, and is provided as an attachment to this report.

4.9 Operation and Maintenance (O&M) Plan (Standard 9)

A long-term Operation and Maintenance (O&M) Plan is provided as an attachment to this report. The O&M Plan identifies the responsible party, inspection schedules, routine maintenance procedures, and corrective actions required to ensure continued performance of all stormwater management features, including subsurface drainage/storage components, pretreatment structures, and the rain garden/bioretention area.

4.10 Illicit Discharge Compliance Statement (Standard 10)

In accordance with MassDEP Stormwater Standard 10, there shall be no illicit discharges to the stormwater management system. The Owner and/or designated facility representative responsible for site operations shall implement the Operation and Maintenance Plan and oversee activities to prevent illicit discharges from occurring.

It is prohibited to discharge any non-stormwater substances to the ground surface or into drainage structures, including catch basins, manholes, subsurface drainage structures, outfalls, or stormwater treatment devices. Potential sources of illicit discharge (e.g., fuels, lubricants, washwater, chemicals, wastes) shall be properly stored, handled, and disposed of.

In the event of a spill, immediate actions shall be taken to contain and clean up the spill, prevent migration to the stormwater system and resource areas, and dispose of contaminated materials in accordance with applicable regulations. Any impacted drainage structures shall be inspected and cleaned as necessary to prevent an illicit discharge.

4.11 Floodplain (310 CMR 10.57)

Based on the latest available FEMA Flood Insurance Rate Maps (FIRM), the project site is not located within the mapped 100-year floodplain (Zone AE) or within a FEMA-designated floodway. A copy of the applicable FEMA mapping is provided as an attachment to this report.

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Attachment A

Checklist for Stormwater Report

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.

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

Arsen Hambardzumian

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): Athletic Facility with minimal impervious areas.

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 (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 (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 (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 (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.

Nesra Engineering, LLC
111 Washington Street, Unit 2A
Plainville, MA 02762

Attachment B

Figures

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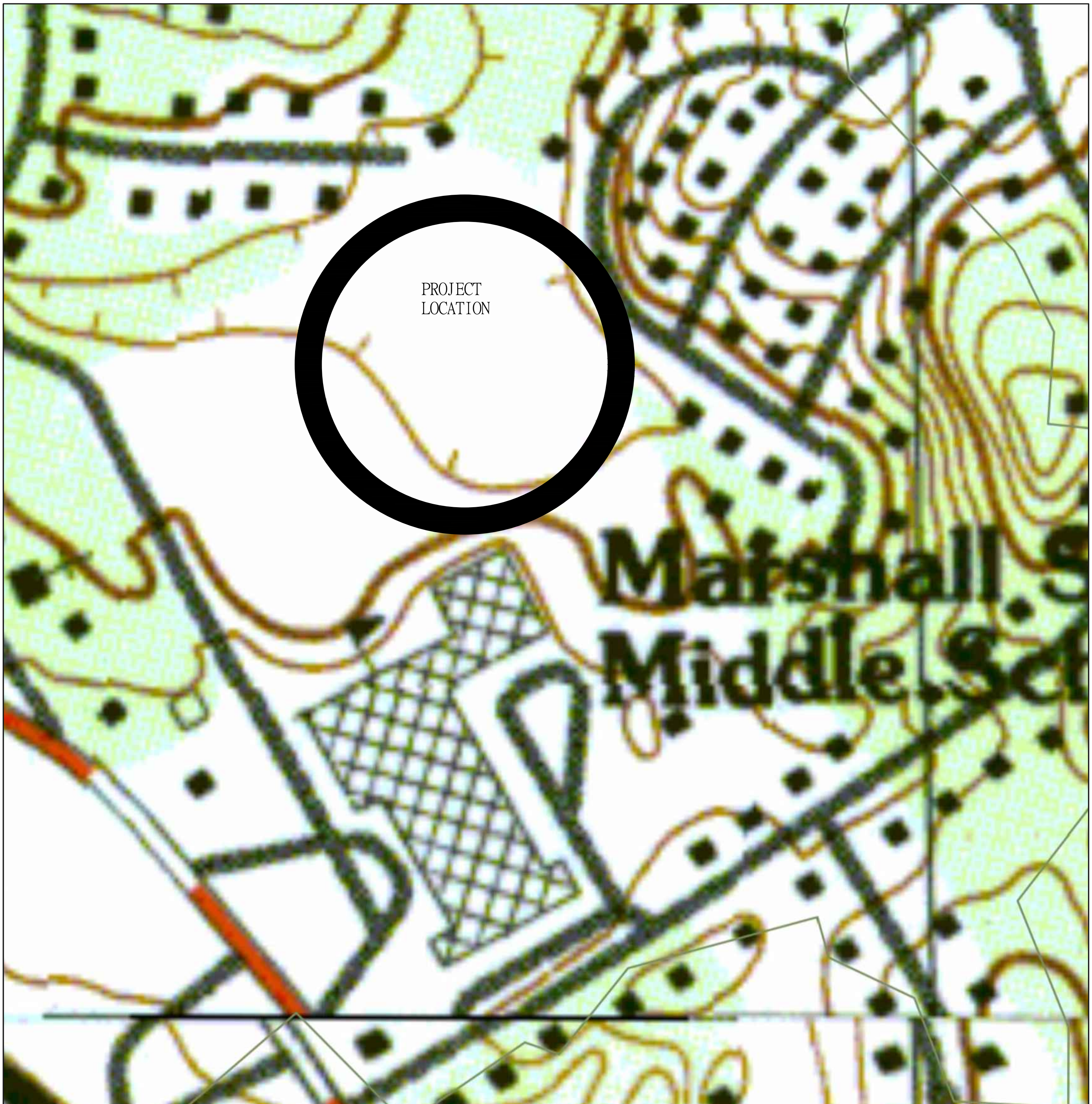
607-506-3772

MA * RI * NH * ME * FL

829 SOUTH WASHINGTON STREET
NORTH ATTLEBORO
MASSACHUSETTS 02760

PROJECT	
MARSHALL SIMONDS MIDDLE SCHOOL ATHLETIC FIELDS RENOVATION PROJECT BURLINGTON, MA 01803	AERIAL PHOTO
CLIENT	
BURLINGTON PUBLIC SCHOOLS 123 CAMBRIDGE STREET BURLINGTON, MA 01803	FIGURE 1



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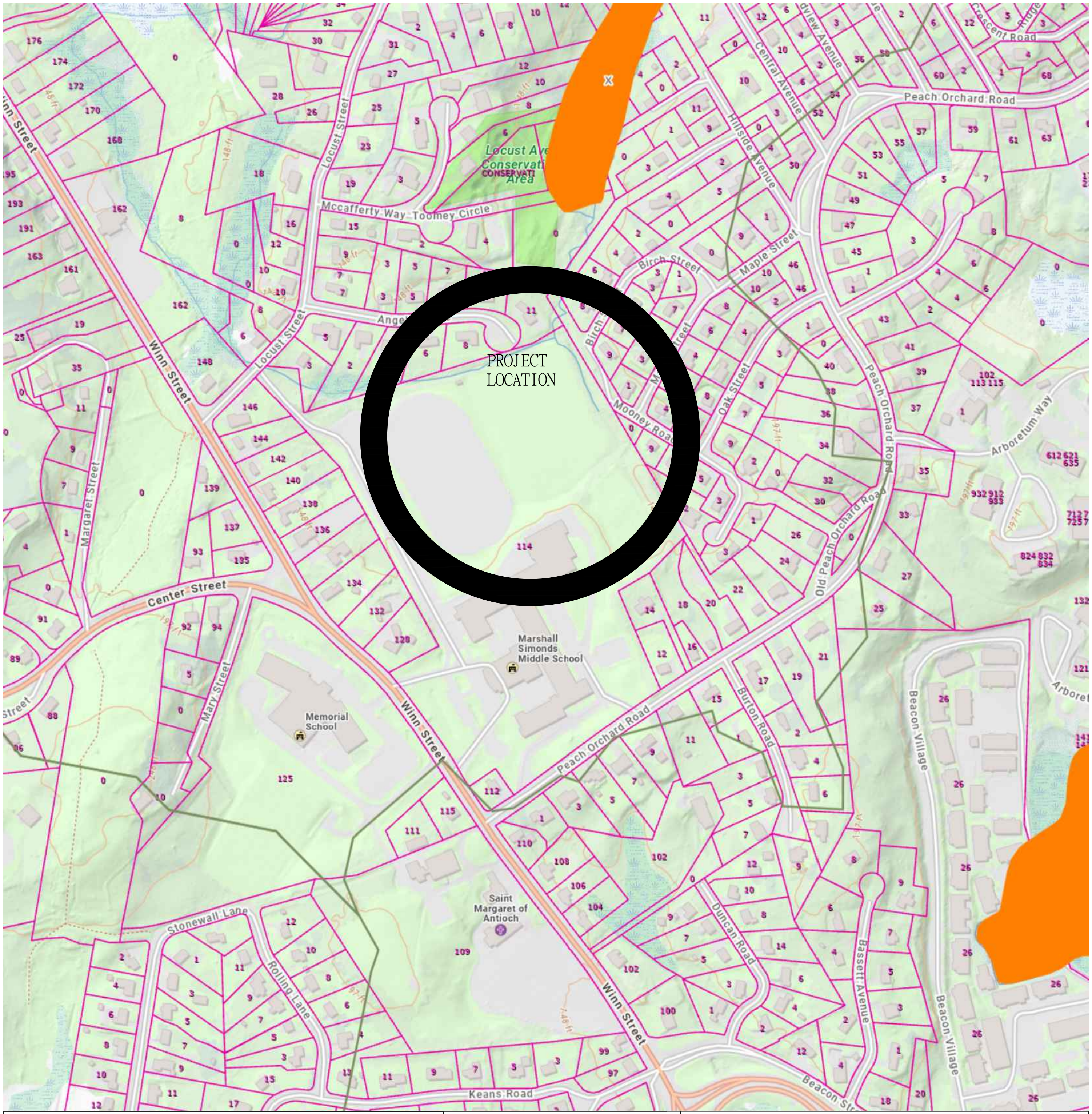
MASSACHUSETTS 02760
MA RI NH ME FL

PROJECT	
MARSHALL SIMONDS MIDDLE SCHOOL ATHLETIC FIELDS RENOVATION PROJECT BURLINGTON, MA 01803	USGS SITE MAP
CLIENT	
BURLINGTON PUBLIC SCHOOLS 123 CAMBRIDGE STREET BURLINGTON, MA 01803	FIGURE 2



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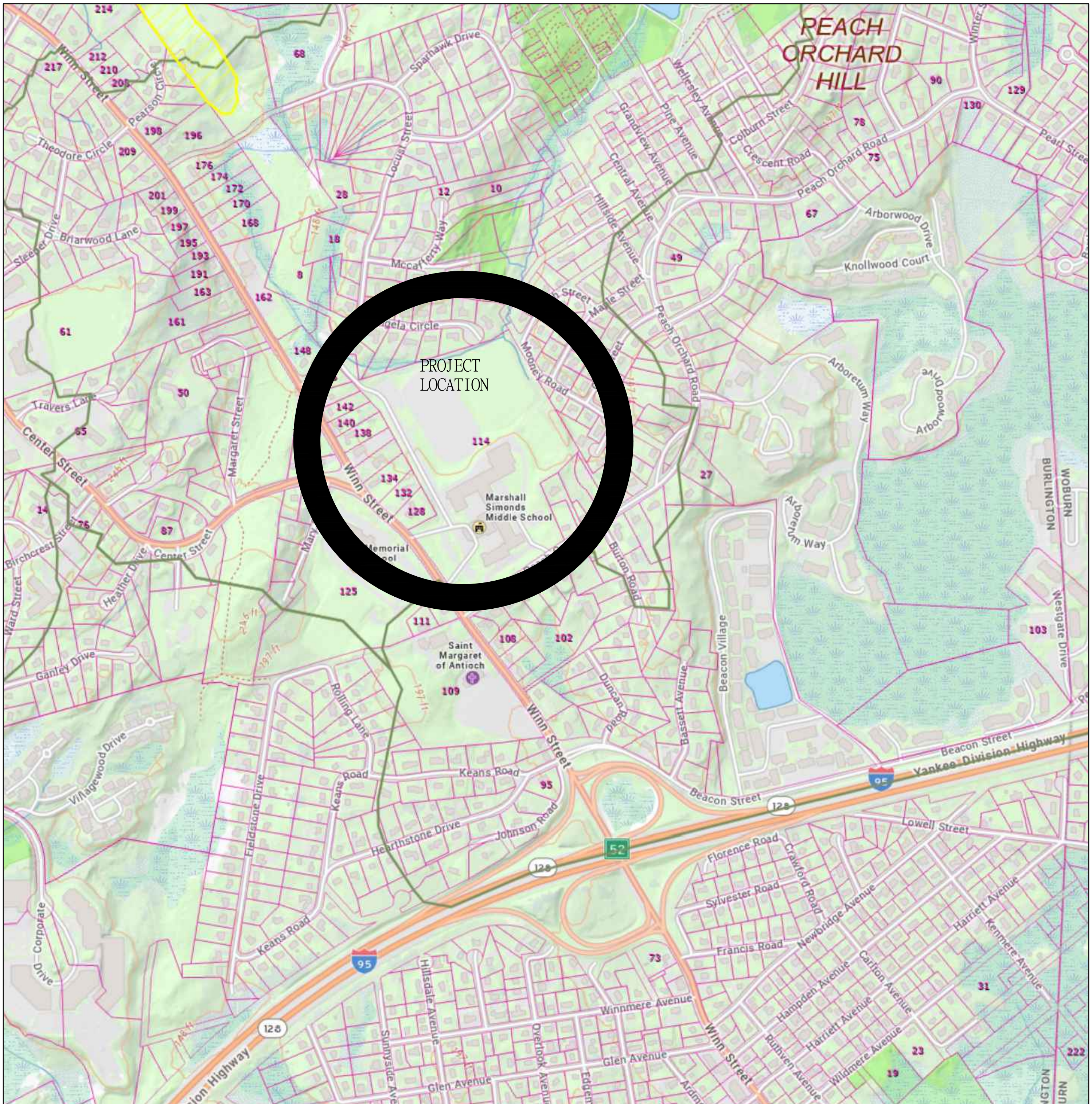
PROJECT	
MARSHALL SIMONDS MIDDLE SCHOOL ATHLETIC FIELDS RENOVATION PROJECT BURLINGTON, MA 01803	FEMA FLOOD MAP
CLIENT	
BURLINGTON PUBLIC SCHOOLS 123 CAMBRIDGE STREET BURLINGTON, MA 01803	FIGURE 3



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PROJECT	
MARSHALL SIMONDS MIDDLE SCHOOL ATHLETIC FIELDS RENOVATION PROJECT BURLINGTON, MA 01803	NHESP MAP
CLIENT	
BURLINGTON PUBLIC SCHOOLS 123 CAMBRIDGE STREET BURLINGTON, MA 01803	FIGURE 4

PROJECT	
MARSHALL SIMONDS MIDDLE SCHOOL ATHLETIC FIELDS RENOVATION PROJECT BURLINGTON, MA 01803	ACEC MAP
BURLINGTON PUBLIC SCHOOLS 123 CAMBRIDGE STREET BURLINGTON, MA 01803	FIGURE 5

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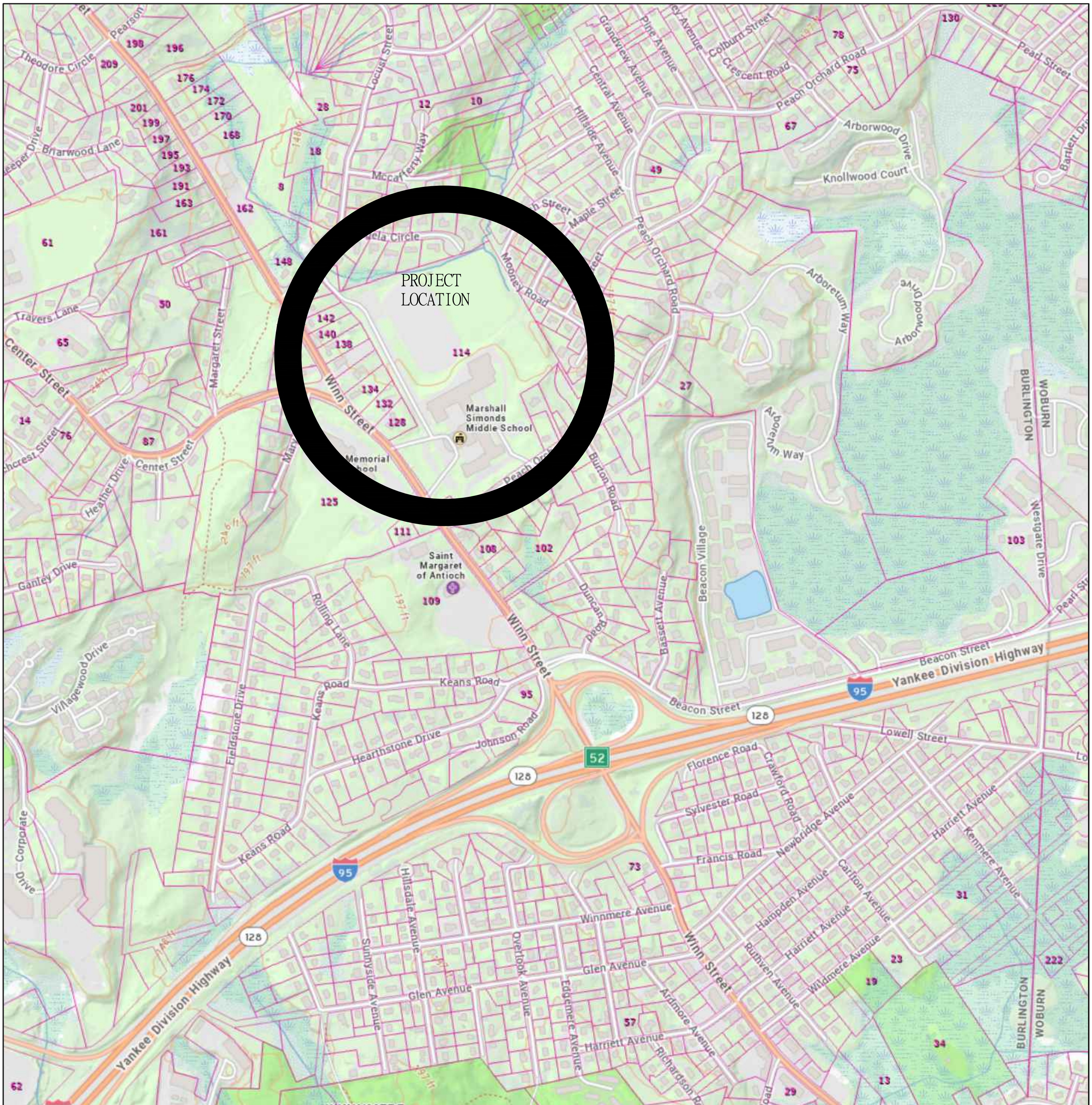
NESRA ENGINEERING WWW.NESRAENG.COM 607-506-3772 MA RI NH ME FL 829 SOUTH WASHINGTON STREET NORTH ATTLEBORO MASSACHUSETTS 02760	PROJECT MARSHALL SIMONDS MIDDLE SCHOOL ATHLETIC FIELDS RENOVATION PROJECT BURLINGTON, MA 01803	ORW MAP
	CLIENT BURLINGTON PUBLIC SCHOOLS 123 CAMBRIDGE STREET BURLINGTON, MA 01803	FIGURE 6



PROJECT	
MARSHALL SIMONDS MIDDLE SCHOOL ATHLETIC FIELDS RENOVATION PROJECT BURLINGTON, MA 01803	PARCEL MAP
CLIENT	
BURLINGTON PUBLIC SCHOOLS 123 CAMBRIDGE STREET BURLINGTON, MA 01803	FIGURE 7

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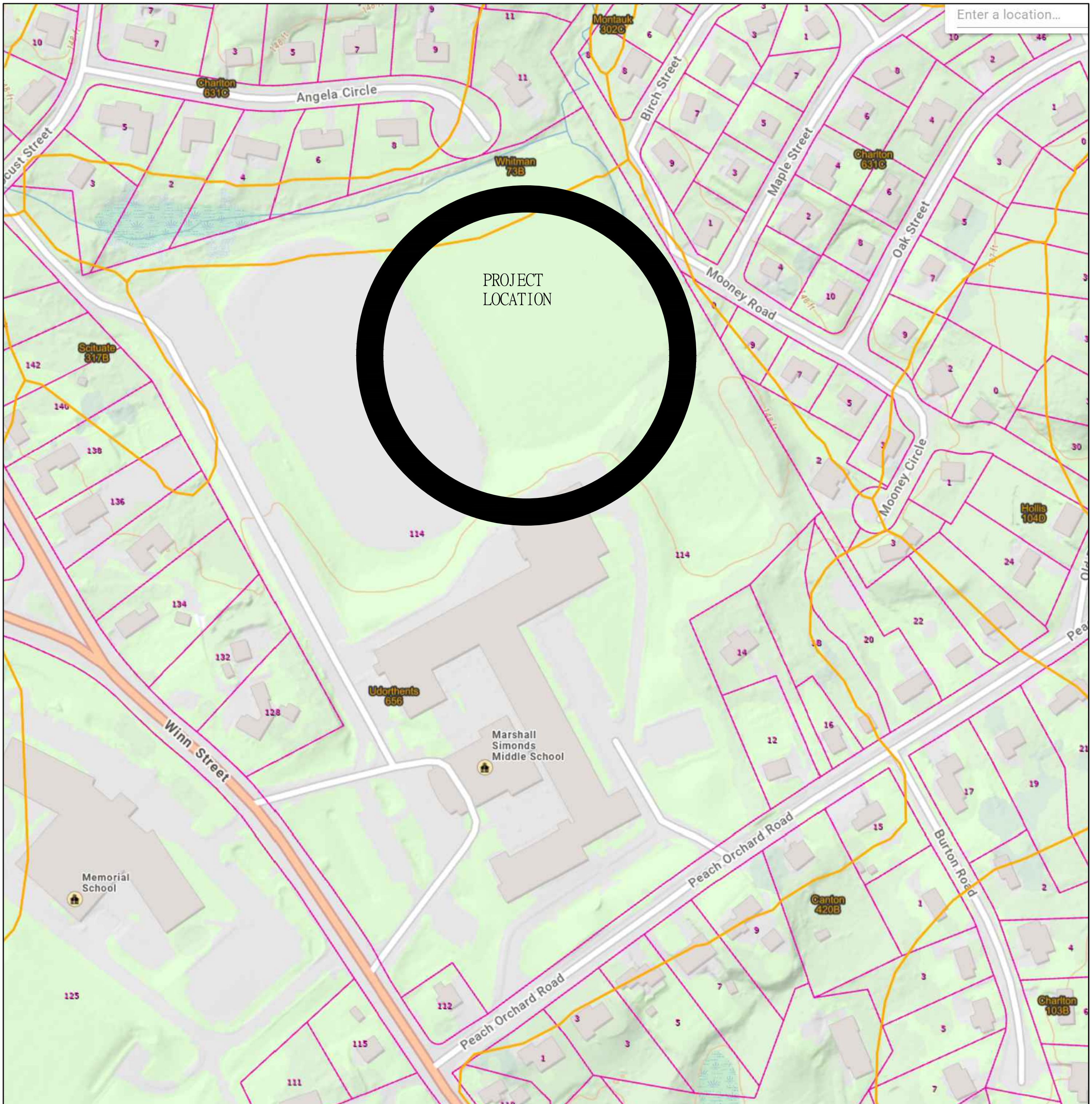

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PROJECT	
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CLIENT	
BURLINGTON PUBLIC SCHOOLS 123 CAMBRIDGE STREET BURLINGTON, MA 01803	FIGURE 8

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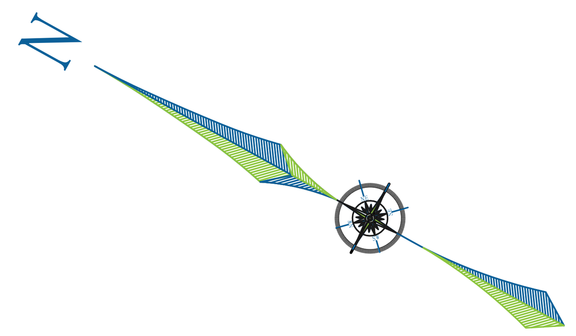
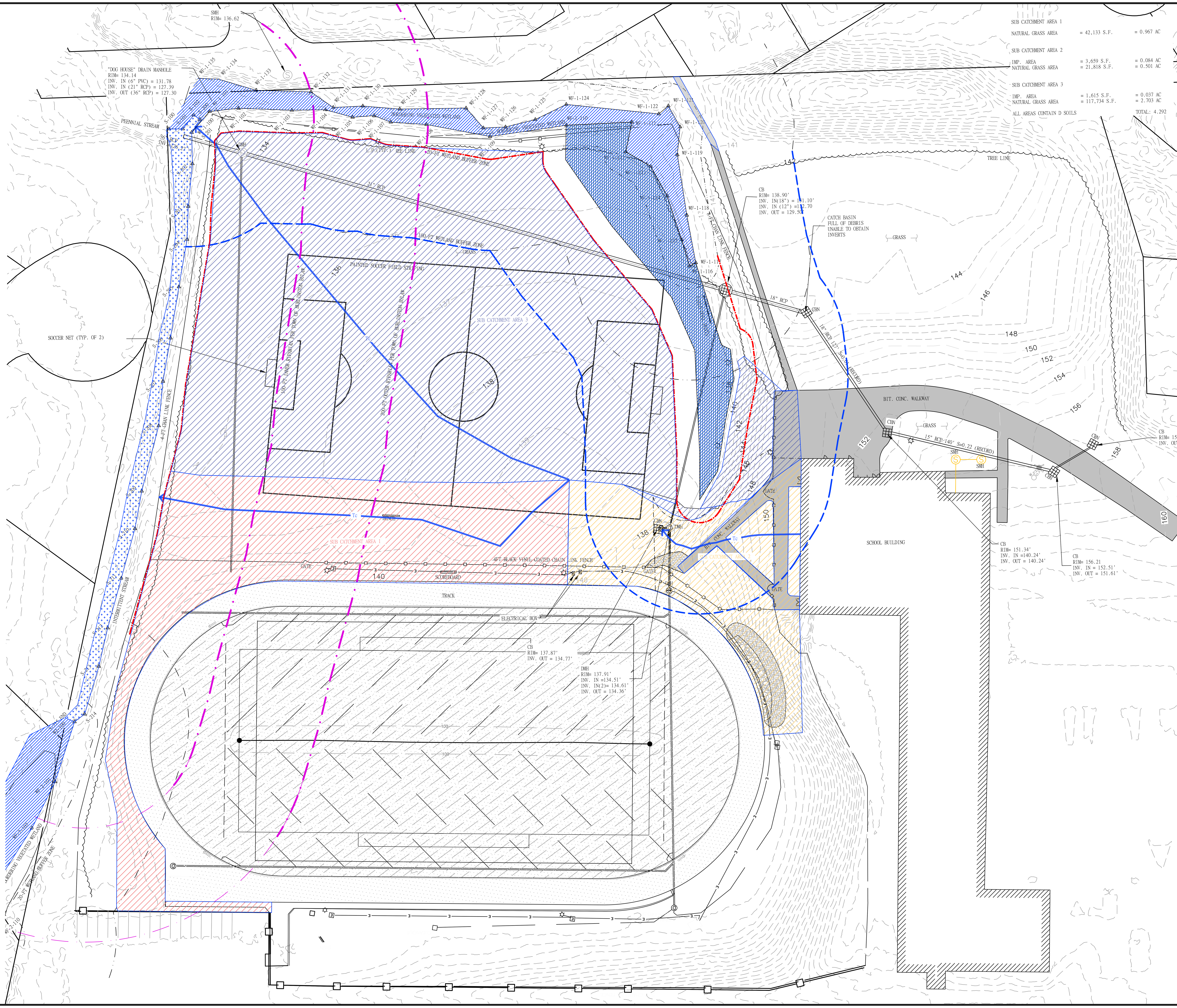
Plainville, MA 02762

Attachment C

Pre-Development Watershed and Surface Types





SUB CATCHMENT AREA 1		
NATURAL GRASS AREA	= 42,133 S.F.	= 0.967 AC
SUB CATCHMENT AREA 2		
IMP. AREA	= 3,659 S.F.	= 0.084 AC
NATURAL GRASS AREA	= 21,818 S.F.	= 0.501 AC
SUB CATCHMENT AREA 3		
IMP. AREA	= 1,615 S.F.	= 0.037 AC
NATURAL GRASS AREA	= 117,734 S.F.	= 2.703 AC
ALL AREAS CONTAIN D SOILS		TOTAL: 4.292

LEGEND

- ATHLETIC FIELD LIGHTS
- ELECTRIC HAND HOLE (EHH)
- DRAIN MANHOLE (DMH)
- CATCH BASIN (CB)
- AREA DRAIN (ADRN)
- UTILITY POLE (UP)
- GUY WIRE
- SEWER MANHOLE (SMH)
- HYDRANT (HYD)
- WATER SHUTOFF (WSO)
- WATER PIT
- TRASH RECEPTACLE
- FIELD UNDERDRAIN
- PERFORATED HDPE COLLECTOR PIPE
- SOLID DRAIN LINE
- ELECTRICAL CONDUIT
- ELECTRICAL CONDUIT
- WATER LINE
- SEWER LINE
- CHAIN LINK FENCE
- ORNAMENTAL FENCE
- MINOR CONTOURS
- MAJOR CONTOURS

S.B.	SCOREBOARD
INV.	INVERT
DMH	DRAIN MANHOLE
CB	CATCH BASIN
R.C.P.	REINFORCED CONCRETE PIPE
PERF.	PERFORATED
HDPE	HIGH DENSITY POLYETHYLENE
B.W.	BOTTOM OF WALL
T.W.	TOP OF WALL
MON.	MONUMENT
ENC.	ENCLOSURE
F.P.	FOUL POLE

NOTE:

SURVEY COORDINATES ARE BASED ON AN ASSUMED DATUM.

SURVEY ELEVATIONS ARE BASED ON AN ASSUMED DATUM.

AS-BUILT INFORMATION IS COMPILED FROM ON THE GROUND TOTAL STATION SURVEY, AND RECORD PLANS PROVIDED BY THE OWNER.

0 30 60 90

1"=30'-0"

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PROJECT

MARSHALL SIMONDS MIDDLE SCHOOL ATHLETIC FIELDS RENOVATION PROJECT
BURLINGTON, MA 01803

CLIENT

BURLINGTON PUBLIC SCHOOLS
123 CAMBRIDGE STREET
BURLINGTON, MA 01803

NO.	REVISION	DATE
2.	UPDATE 11-13-25 MEETING CHANGES	1/2/25
1.	UPDATED CATCHMENT AREAS BASED ON DESIGN CHANGES	11/2/25

SCALE - 1"=30'
DATE - 2/10/25

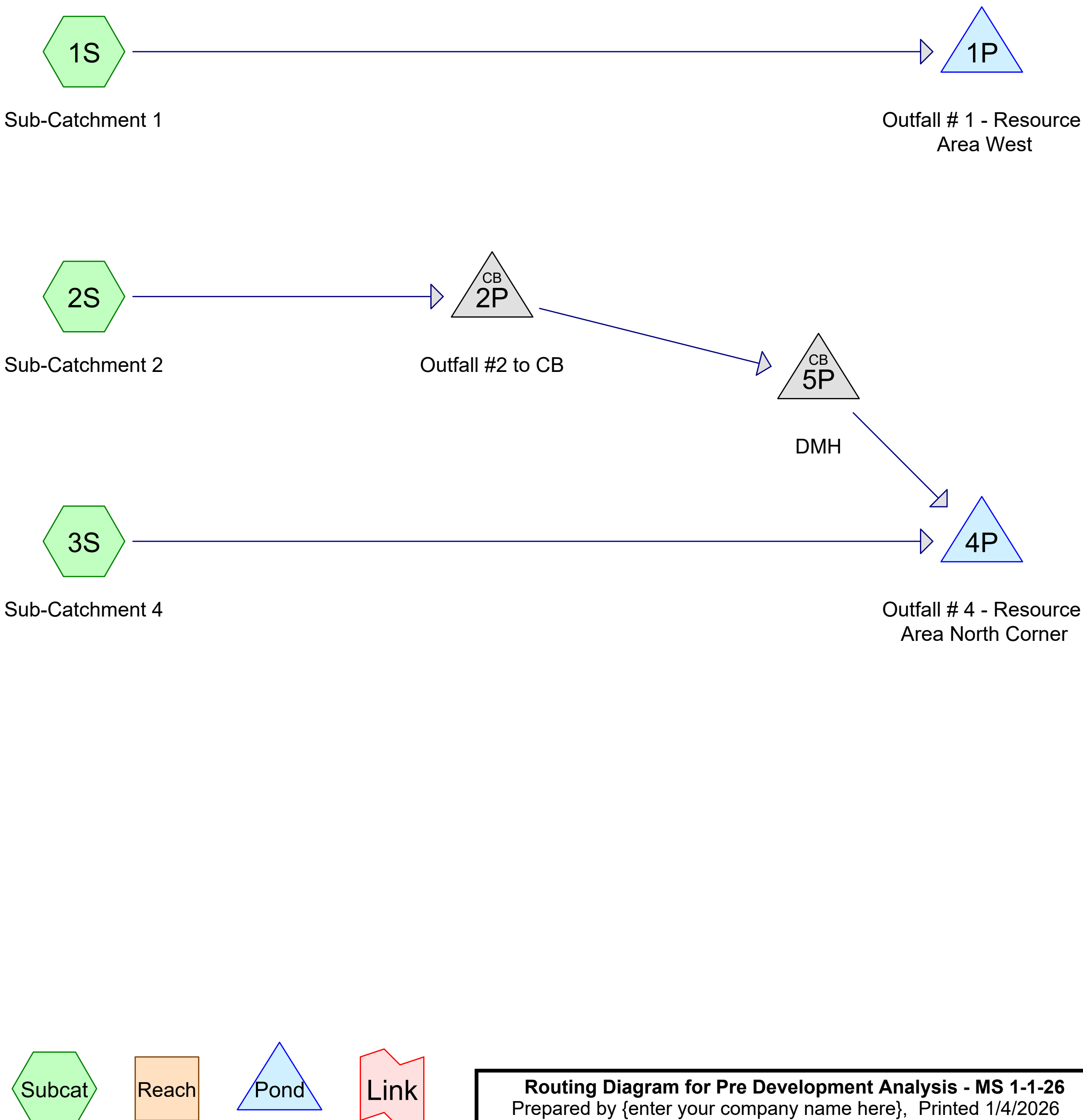
PERMIT SET

PRE-DEVELOPMENT WATERSHED AND SURFACE TYPES

SK-1

Attachment D

Pre-Development Graphic Generated by Hydro-CAD



Routing Diagram for Pre Development Analysis - MS 1-1-26
Prepared by {enter your company name here}, Printed 1/4/2026
HydroCAD® 10.00-26 s/n 07835 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.171	80	>75% Grass cover, Good, HSG D (1S, 2S, 3S)
0.037	98	Paved parking, HSG D (3S)
0.084	98	Unconnected pavement, HSG D (2S)
4.292	**81**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
4.292	HSG D	1S, 2S, 3S
0.000	Other	
4.292		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	4.171	0.000	4.171	>75% Grass cover, Good	1S, 2S, 3S
0.000	0.000	0.000	0.037	0.000	0.037	Paved parking	3S
0.000	0.000	0.000	0.084	0.000	0.084	Unconnected pavement	2S
0.000	**0.000**	**0.000**	**4.292**	**0.000**	**4.292**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	2P	134.36	132.70	215.0	0.0077	0.011	12.0	0.0	0.0
2	5P	129.50	127.39	430.0	0.0049	0.011	21.0	0.0	0.0

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Sub-Catchment 1 Runoff Area=0.967 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=388' Slope=0.0150 '/' Tc=13.0 min CN=80 Runoff=1.31 cfs 0.118 af

Subcatchment 2S: Sub-Catchment 2 Runoff Area=0.585 ac 14.36% Impervious Runoff Depth=1.53"
Flow Length=128' Tc=3.9 min UI Adjusted CN=81 Runoff=1.13 cfs 0.075 af

Subcatchment 3S: Sub-Catchment 4 Runoff Area=2.740 ac 1.35% Impervious Runoff Depth=1.46"
Flow Length=460' Slope=0.0150 '/' Tc=14.4 min CN=80 Runoff=3.57 cfs 0.334 af

Pond 1P: Outfall # 1 - Resource Area West Inflow=1.31 cfs 0.118 af
Primary=1.31 cfs 0.118 af

Pond 2P: Outfall #2 to CB Peak Elev=134.88' Inflow=1.13 cfs 0.075 af
12.0" Round Culvert n=0.011 L=215.0' S=0.0077 '/' Outflow=1.13 cfs 0.075 af

Pond 4P: Outfall # 4 - Resource Area North Corner Inflow=4.12 cfs 0.409 af
Primary=4.12 cfs 0.409 af

Pond 5P: DMH Peak Elev=129.97' Inflow=1.13 cfs 0.075 af
21.0" Round Culvert n=0.011 L=430.0' S=0.0049 '/' Outflow=1.13 cfs 0.075 af

Total Runoff Area = 4.292 ac Runoff Volume = 0.527 af Average Runoff Depth = 1.47"
97.18% Pervious = 4.171 ac 2.82% Impervious = 0.121 ac

Summary for Subcatchment 1S: Sub-Catchment 1

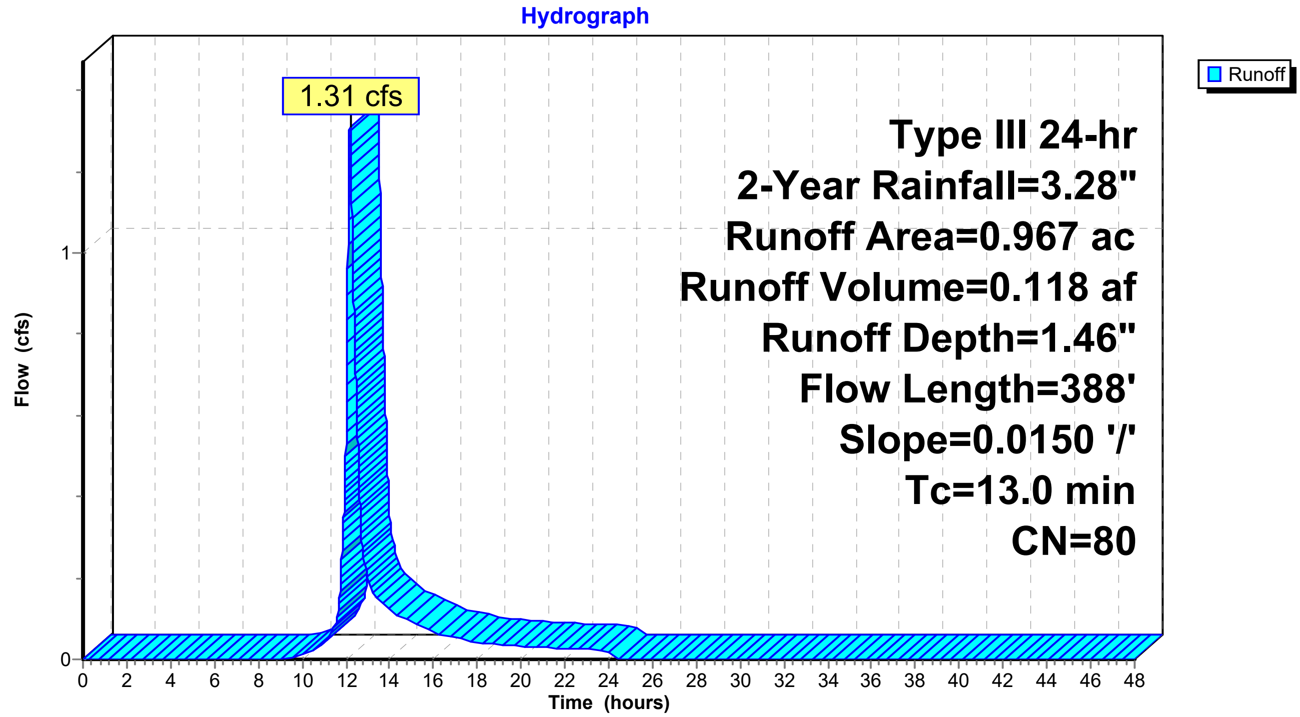
Runoff = 1.31 cfs @ 12.18 hrs, Volume= 0.118 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.28"

Area (ac)	CN	Description
0.967	80	>75% Grass cover, Good, HSG D
0.967		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0150	0.13		**Sheet Flow, Greass Area** Grass: Short n= 0.150 P2= 3.10"
6.6	338	0.0150	0.86		**Shallow Concentrated Flow, Grass Field** Short Grass Pasture Kv= 7.0 fps
13.0	388	Total			

Subcatchment 1S: Sub-Catchment 1



Summary for Subcatchment 2S: Sub-Catchment 2

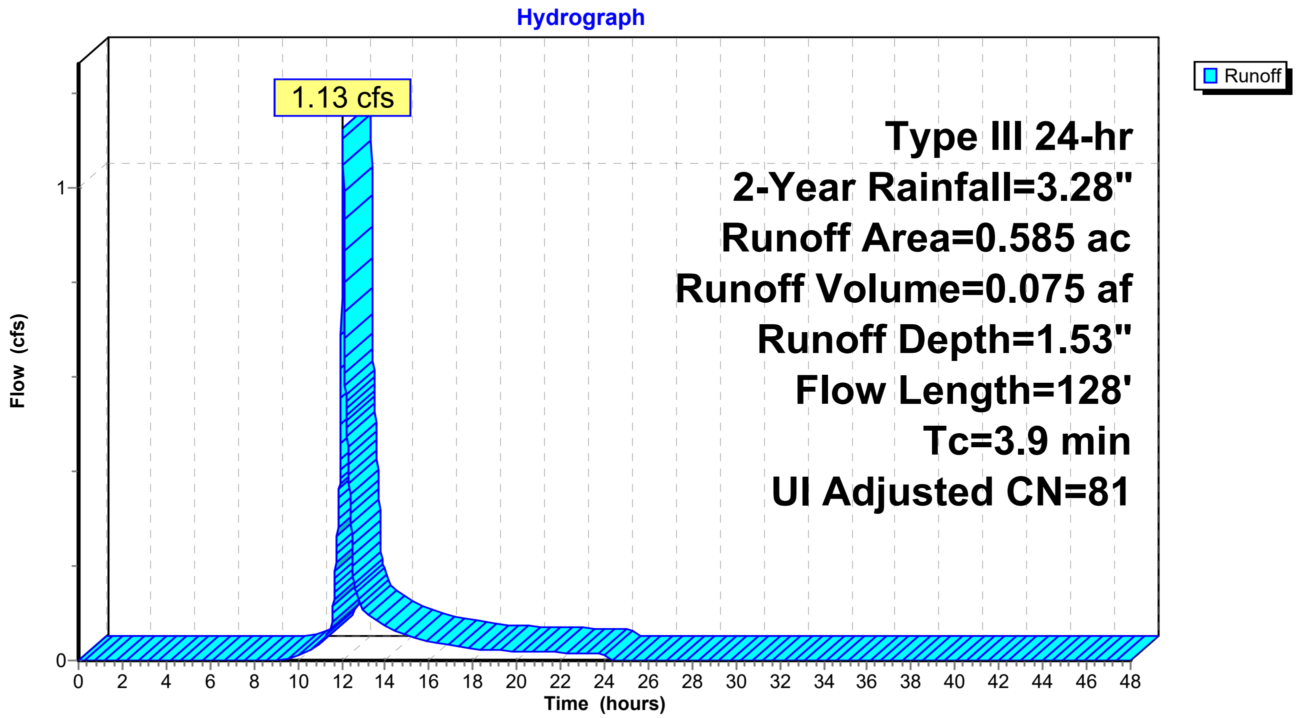
Runoff = 1.13 cfs @ 12.06 hrs, Volume= 0.075 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.28"

Area (ac)	CN	Adj	Description
0.084	98		Unconnected pavement, HSG D
0.501	80		>75% Grass cover, Good, HSG D
0.585	83	81	Weighted Average, UI Adjusted
0.501			85.64% Pervious Area
0.084			14.36% Impervious Area
0.084			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0800	0.25		**Sheet Flow, Grass Hill** Grass: Short n= 0.150 P2= 3.10"
0.6	78	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.9	128	Total			

Subcatchment 2S: Sub-Catchment 2



Summary for Subcatchment 3S: Sub-Catchment 4

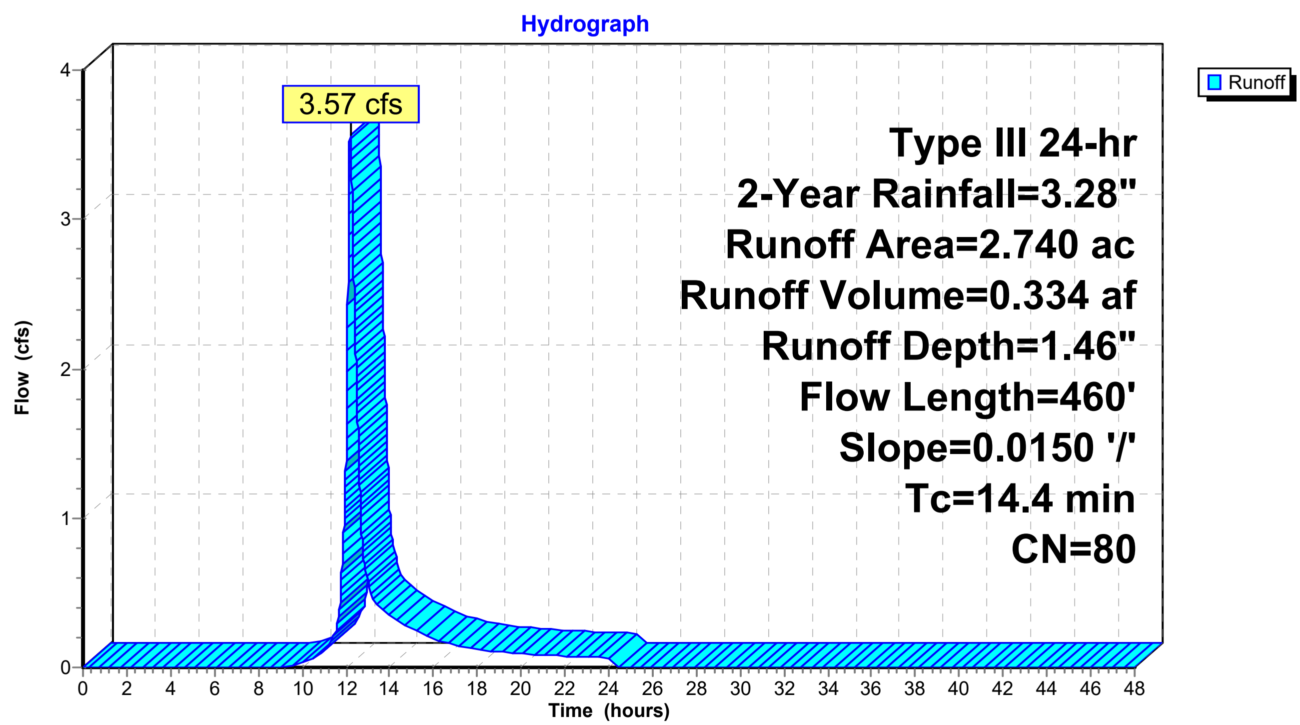
Runoff = 3.57 cfs @ 12.21 hrs, Volume= 0.334 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.28"

Area (ac)	CN	Description
0.037	98	Paved parking, HSG D
2.703	80	>75% Grass cover, Good, HSG D
2.740	80	Weighted Average
2.703		98.65% Pervious Area
0.037		1.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0150	0.13		**Sheet Flow, Clay Infield** Grass: Short n= 0.150 P2= 3.10"
8.0	410	0.0150	0.86		**Shallow Concentrated Flow, Grass Field** Short Grass Pasture Kv= 7.0 fps
14.4	460	Total			

Subcatchment 3S: Sub-Catchment 4



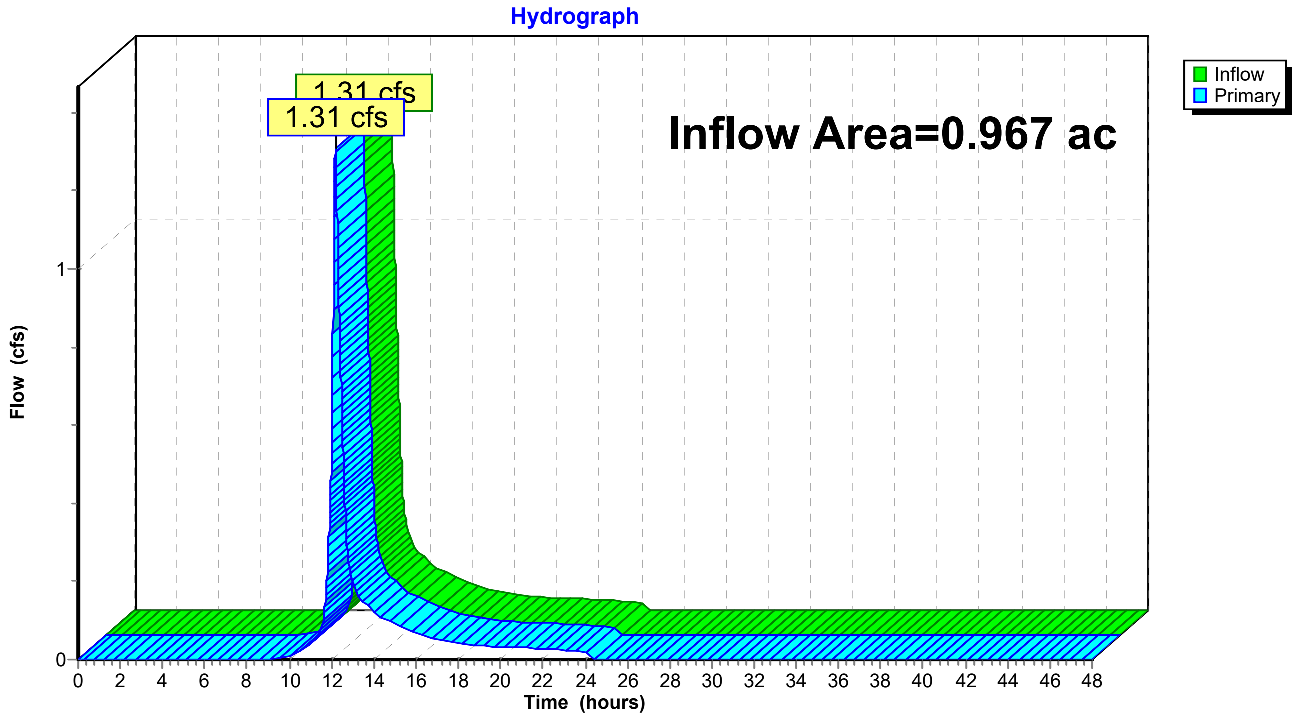
Summary for Pond 1P: Outfall # 1 - Resource Area West

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

Inflow Area =	0.967 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 2-Year event
Inflow =	1.31 cfs @	12.18 hrs, Volume=	0.118 af
Primary =	1.31 cfs @	12.18 hrs, Volume=	0.118 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 1P: Outfall # 1 - Resource Area West



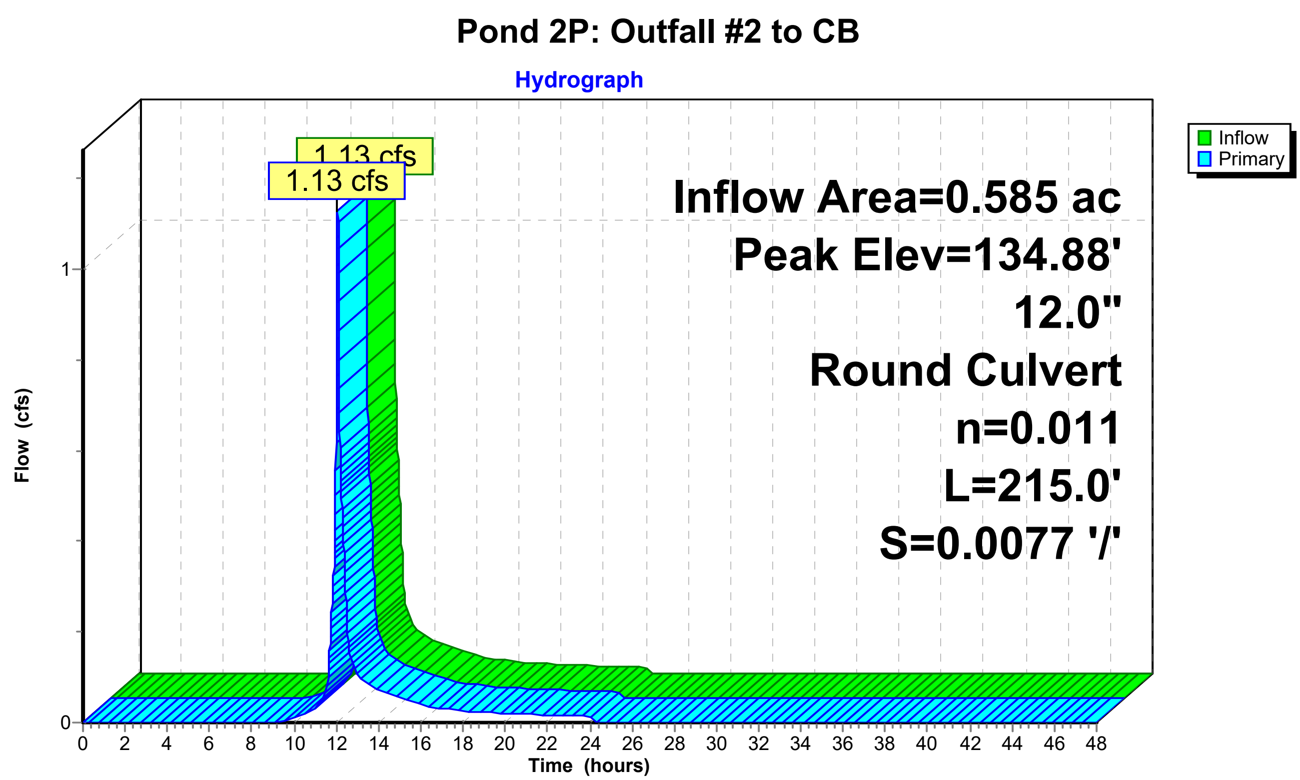
Summary for Pond 2P: Outfall #2 to CB

Inflow Area = 0.585 ac, 14.36% Impervious, Inflow Depth = 1.53" for 2-Year event
Inflow = 1.13 cfs @ 12.06 hrs, Volume= 0.075 af
Outflow = 1.13 cfs @ 12.06 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min
Primary = 1.13 cfs @ 12.06 hrs, Volume= 0.075 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 134.88' @ 12.06 hrs
Flood Elev= 138.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	134.36'	**12.0" Round Culvert** L= 215.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.36' / 132.70' S= 0.0077 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.13 cfs @ 12.06 hrs HW=134.88' (Free Discharge)
1=Culvert (Barrel Controls 1.13 cfs @ 3.98 fps)

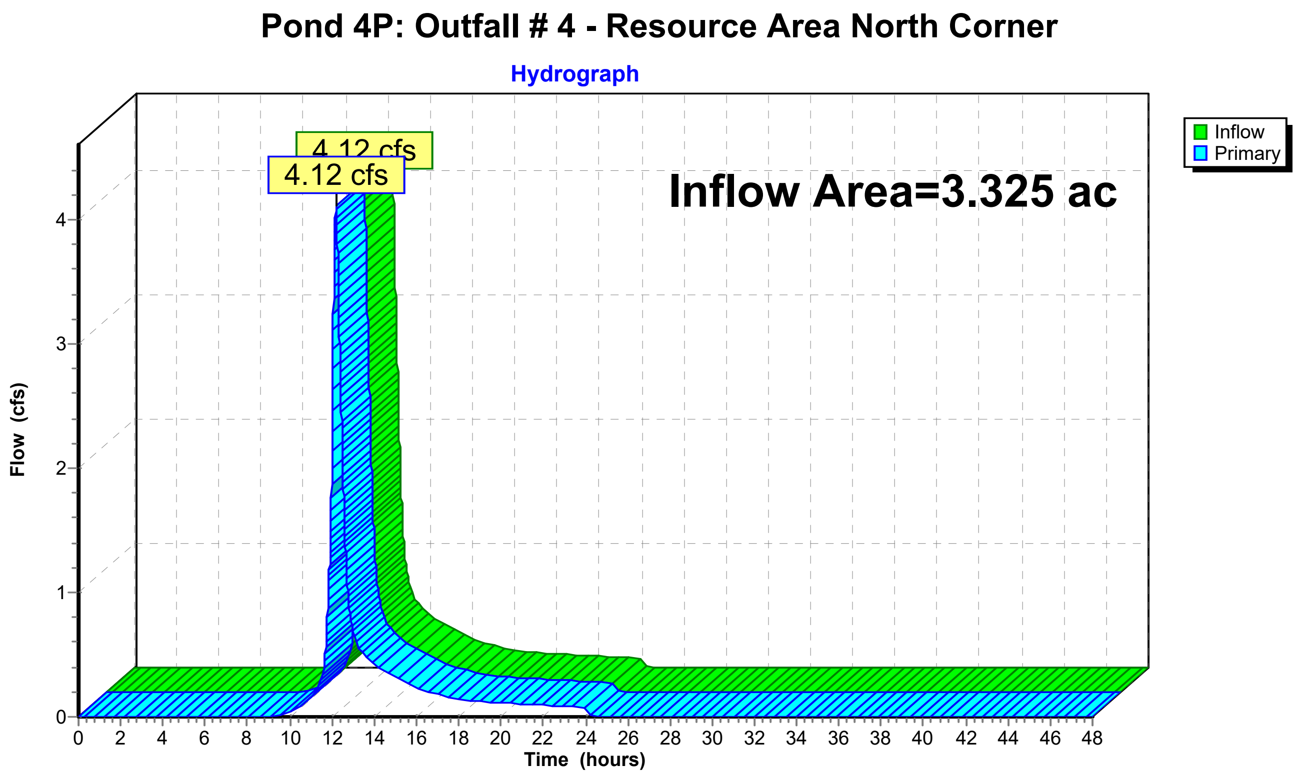


Summary for Pond 4P: Outfall # 4 - Resource Area North Corner

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

Inflow Area = 3.325 ac, 3.64% Impervious, Inflow Depth = 1.48" for 2-Year event
Inflow = 4.12 cfs @ 12.20 hrs, Volume= 0.409 af
Primary = 4.12 cfs @ 12.20 hrs, Volume= 0.409 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



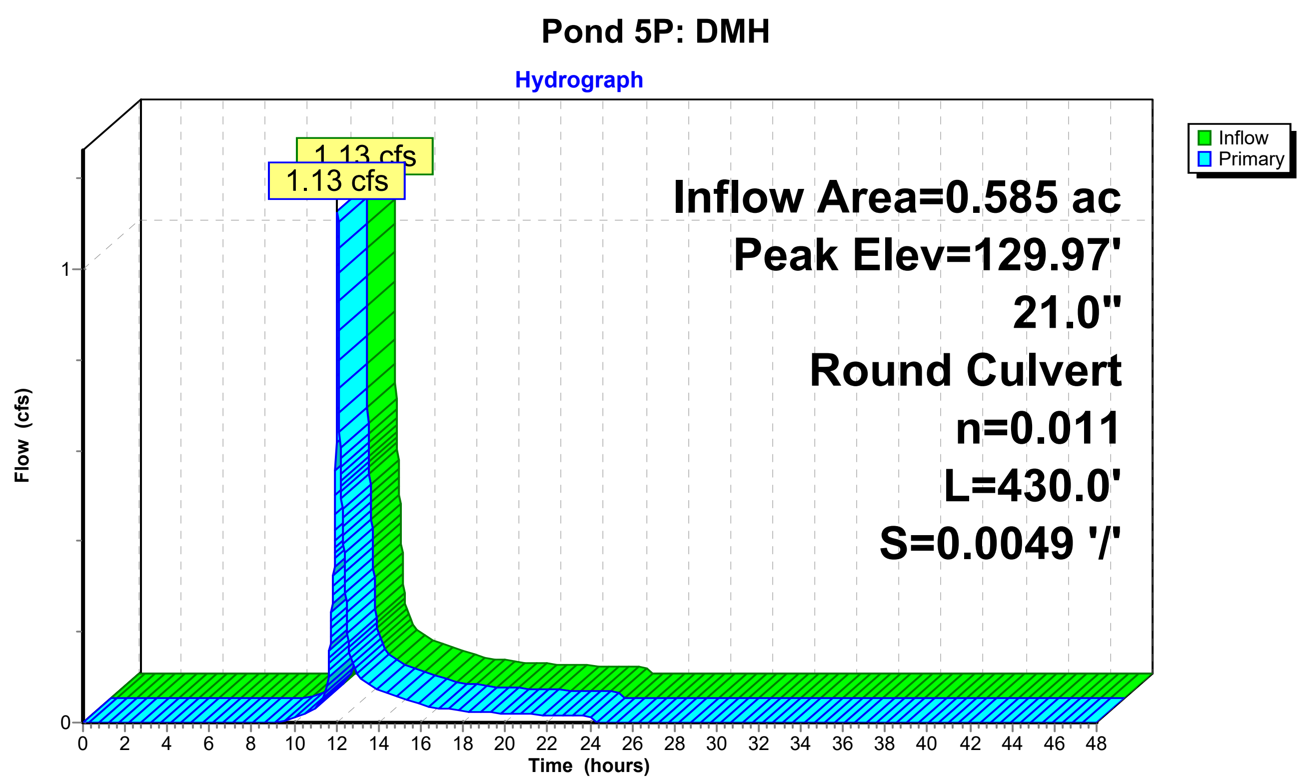
Summary for Pond 5P: DMH

Inflow Area = 0.585 ac, 14.36% Impervious, Inflow Depth = 1.53" for 2-Year event
Inflow = 1.13 cfs @ 12.06 hrs, Volume= 0.075 af
Outflow = 1.13 cfs @ 12.06 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min
Primary = 1.13 cfs @ 12.06 hrs, Volume= 0.075 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 129.97' @ 12.06 hrs
Flood Elev= 138.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.50'	**21.0" Round Culvert** L= 430.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 129.50' / 127.39' S= 0.0049 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.41 sf

Primary OutFlow Max=1.13 cfs @ 12.06 hrs HW=129.97' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 1.13 cfs @ 3.28 fps)



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Sub-Catchment 1 Runoff Area=0.967 ac 0.00% Impervious Runoff Depth=3.05"
Flow Length=388' Slope=0.0150 '/' Tc=13.0 min CN=80 Runoff=2.76 cfs 0.246 af

Subcatchment 2S: Sub-Catchment 2 Runoff Area=0.585 ac 14.36% Impervious Runoff Depth=3.14"
Flow Length=128' Tc=3.9 min UI Adjusted CN=81 Runoff=2.32 cfs 0.153 af

Subcatchment 3S: Sub-Catchment 4 Runoff Area=2.740 ac 1.35% Impervious Runoff Depth=3.05"
Flow Length=460' Slope=0.0150 '/' Tc=14.4 min CN=80 Runoff=7.53 cfs 0.697 af

Pond 1P: Outfall # 1 - Resource Area West Inflow=2.76 cfs 0.246 af
Primary=2.76 cfs 0.246 af

Pond 2P: Outfall #2 to CB Peak Elev=135.16' Inflow=2.32 cfs 0.153 af
12.0" Round Culvert n=0.011 L=215.0' S=0.0077 '/' Outflow=2.32 cfs 0.153 af

Pond 4P: Outfall # 4 - Resource Area North Corner Inflow=8.63 cfs 0.850 af
Primary=8.63 cfs 0.850 af

Pond 5P: DMH Peak Elev=130.18' Inflow=2.32 cfs 0.153 af
21.0" Round Culvert n=0.011 L=430.0' S=0.0049 '/' Outflow=2.32 cfs 0.153 af

Total Runoff Area = 4.292 ac Runoff Volume = 1.096 af Average Runoff Depth = 3.06"
97.18% Pervious = 4.171 ac 2.82% Impervious = 0.121 ac

Summary for Subcatchment 1S: Sub-Catchment 1

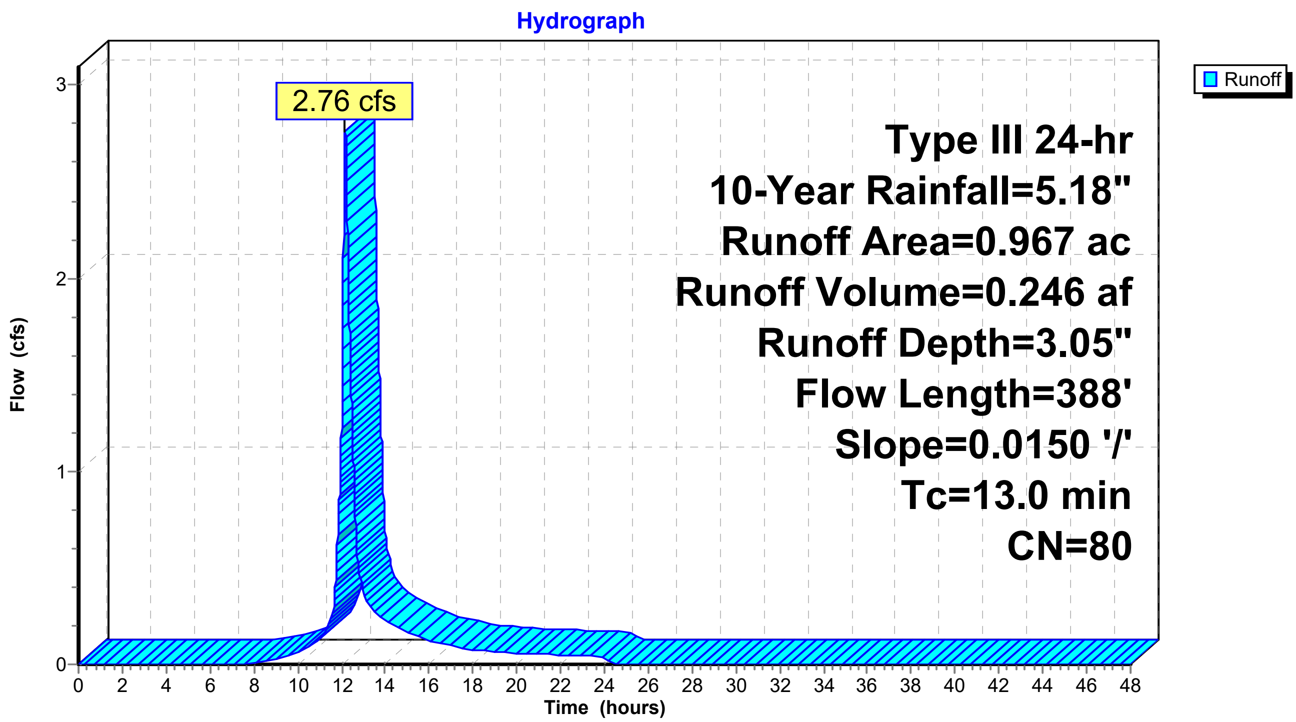
Runoff = 2.76 cfs @ 12.18 hrs, Volume= 0.246 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (ac)	CN	Description
0.967	80	>75% Grass cover, Good, HSG D
0.967		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0150	0.13		**Sheet Flow, Greass Area** Grass: Short n= 0.150 P2= 3.10"
6.6	338	0.0150	0.86		**Shallow Concentrated Flow, Grass Field** Short Grass Pasture Kv= 7.0 fps
13.0	388	Total			

Subcatchment 1S: Sub-Catchment 1



Summary for Subcatchment 2S: Sub-Catchment 2

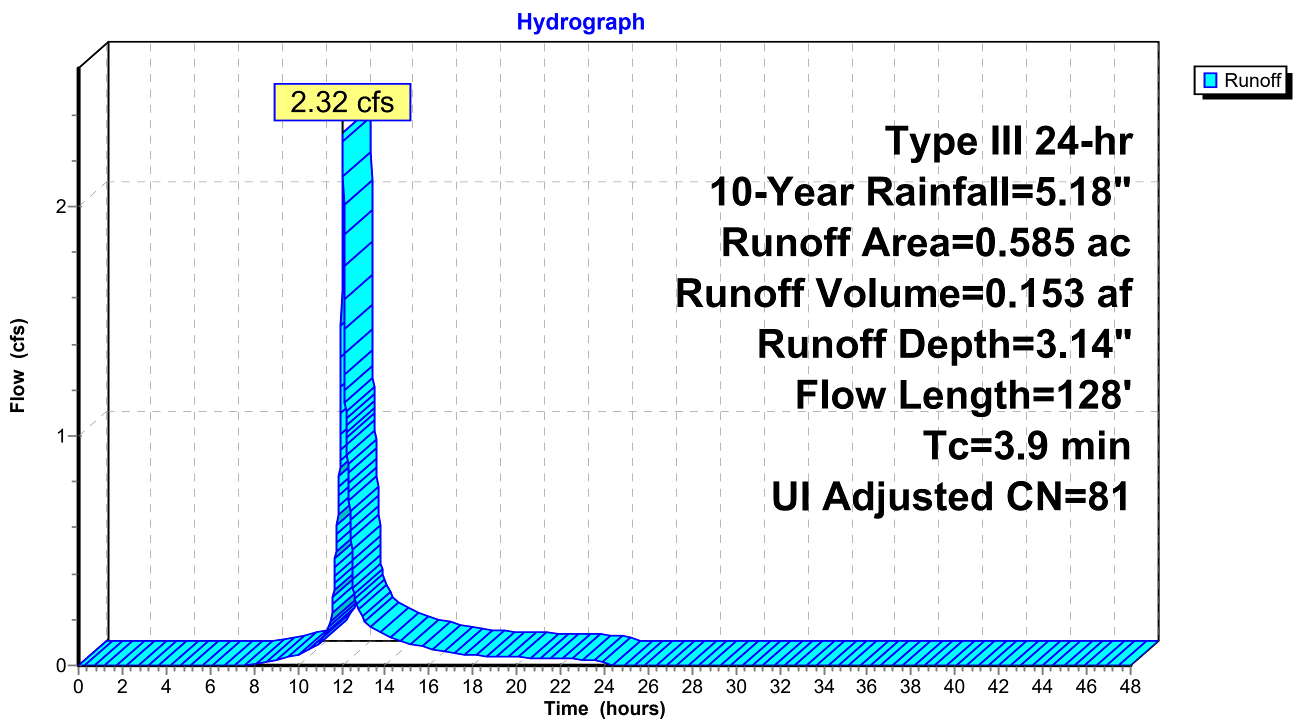
Runoff = 2.32 cfs @ 12.06 hrs, Volume= 0.153 af, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (ac)	CN	Adj	Description
0.084	98		Unconnected pavement, HSG D
0.501	80		>75% Grass cover, Good, HSG D
0.585	83	81	Weighted Average, UI Adjusted
0.501			85.64% Pervious Area
0.084			14.36% Impervious Area
0.084			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0800	0.25		**Sheet Flow, Grass Hill** Grass: Short n= 0.150 P2= 3.10"
0.6	78	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.9	128	Total			

Subcatchment 2S: Sub-Catchment 2



Summary for Subcatchment 3S: Sub-Catchment 4

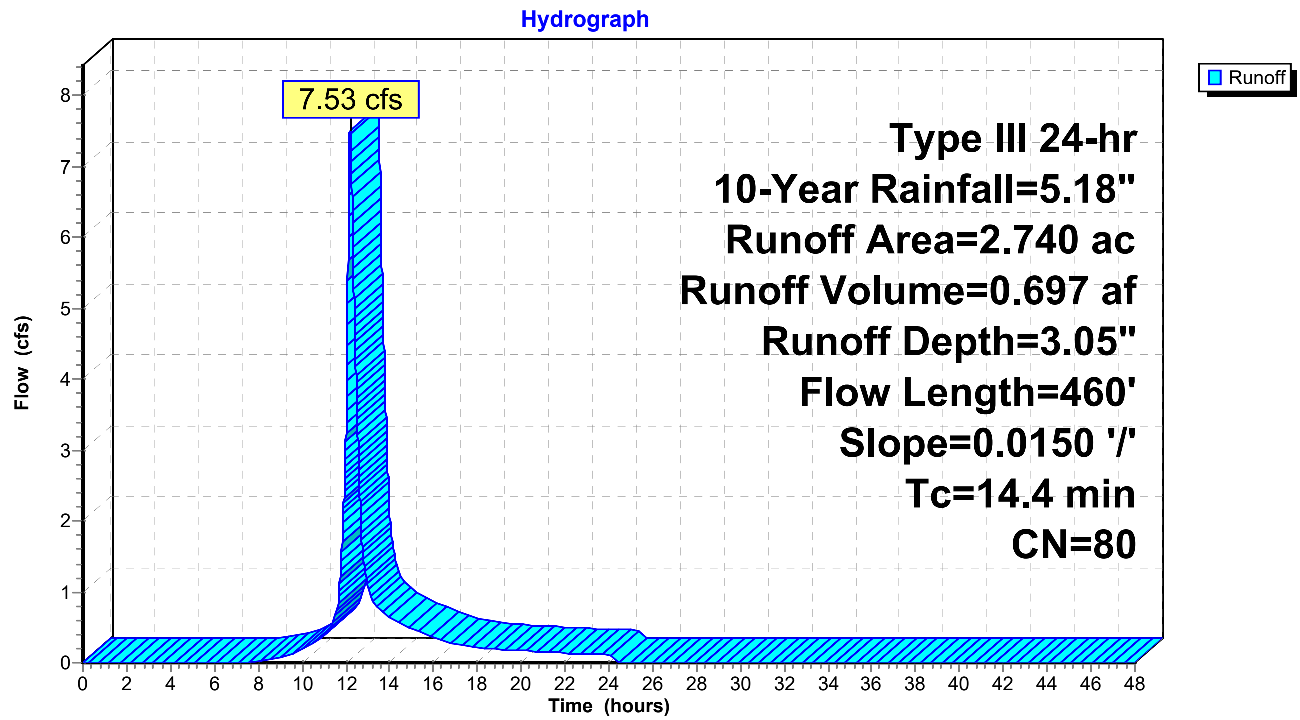
Runoff = 7.53 cfs @ 12.20 hrs, Volume= 0.697 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.18"

Area (ac)	CN	Description
0.037	98	Paved parking, HSG D
2.703	80	>75% Grass cover, Good, HSG D
2.740	80	Weighted Average
2.703		98.65% Pervious Area
0.037		1.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0150	0.13		**Sheet Flow, Clay Infield** Grass: Short n= 0.150 P2= 3.10"
8.0	410	0.0150	0.86		**Shallow Concentrated Flow, Grass Field** Short Grass Pasture Kv= 7.0 fps
14.4	460	Total			

Subcatchment 3S: Sub-Catchment 4



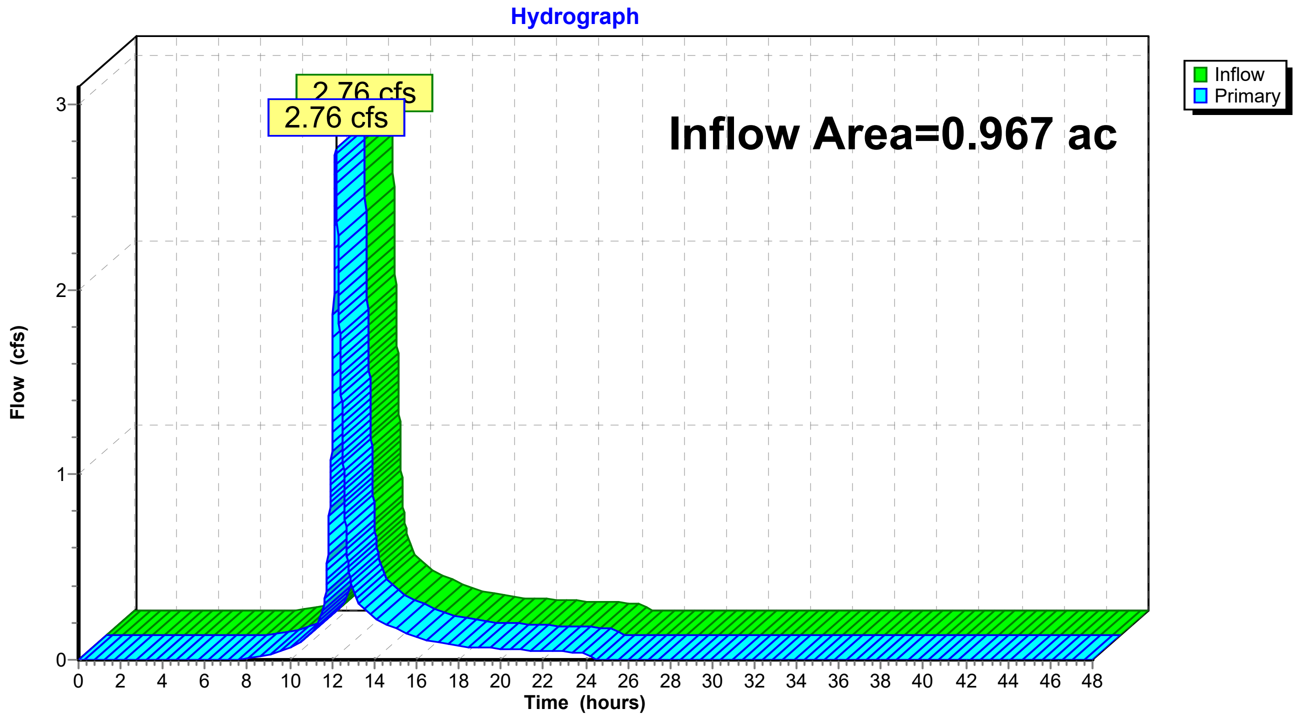
Summary for Pond 1P: Outfall # 1 - Resource Area West

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

Inflow Area =	0.967 ac,	0.00% Impervious,	Inflow Depth = 3.05"	for 10-Year event	
Inflow =	2.76 cfs @	12.18 hrs,	Volume=	0.246 af	
Primary =	2.76 cfs @	12.18 hrs,	Volume=	0.246 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 1P: Outfall # 1 - Resource Area West



Summary for Pond 2P: Outfall #2 to CB

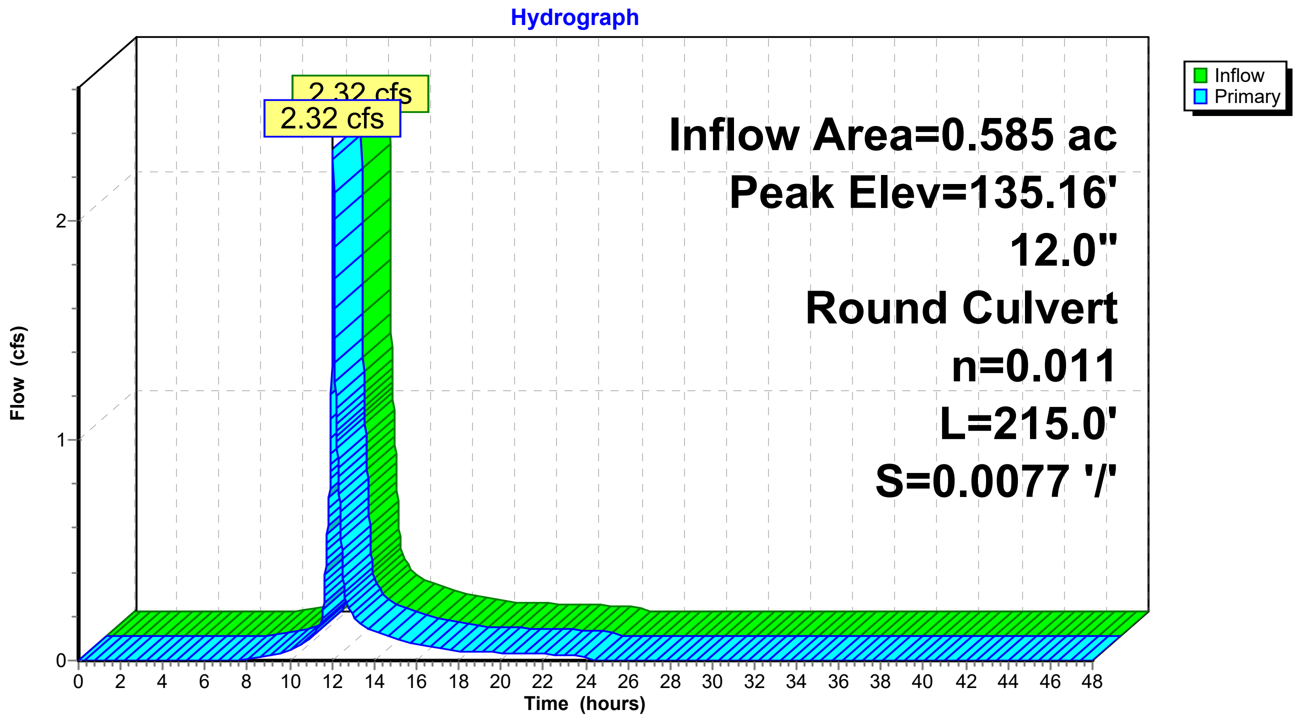
Inflow Area = 0.585 ac, 14.36% Impervious, Inflow Depth = 3.14" for 10-Year event
Inflow = 2.32 cfs @ 12.06 hrs, Volume= 0.153 af
Outflow = 2.32 cfs @ 12.06 hrs, Volume= 0.153 af, Atten= 0%, Lag= 0.0 min
Primary = 2.32 cfs @ 12.06 hrs, Volume= 0.153 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 135.16' @ 12.06 hrs
Flood Elev= 138.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	134.36'	**12.0" Round Culvert** L= 215.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.36' / 132.70' S= 0.0077 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.32 cfs @ 12.06 hrs HW=135.16' (Free Discharge)
↑**1=Culvert** (Barrel Controls 2.32 cfs @ 4.71 fps)

Pond 2P: Outfall #2 to CB



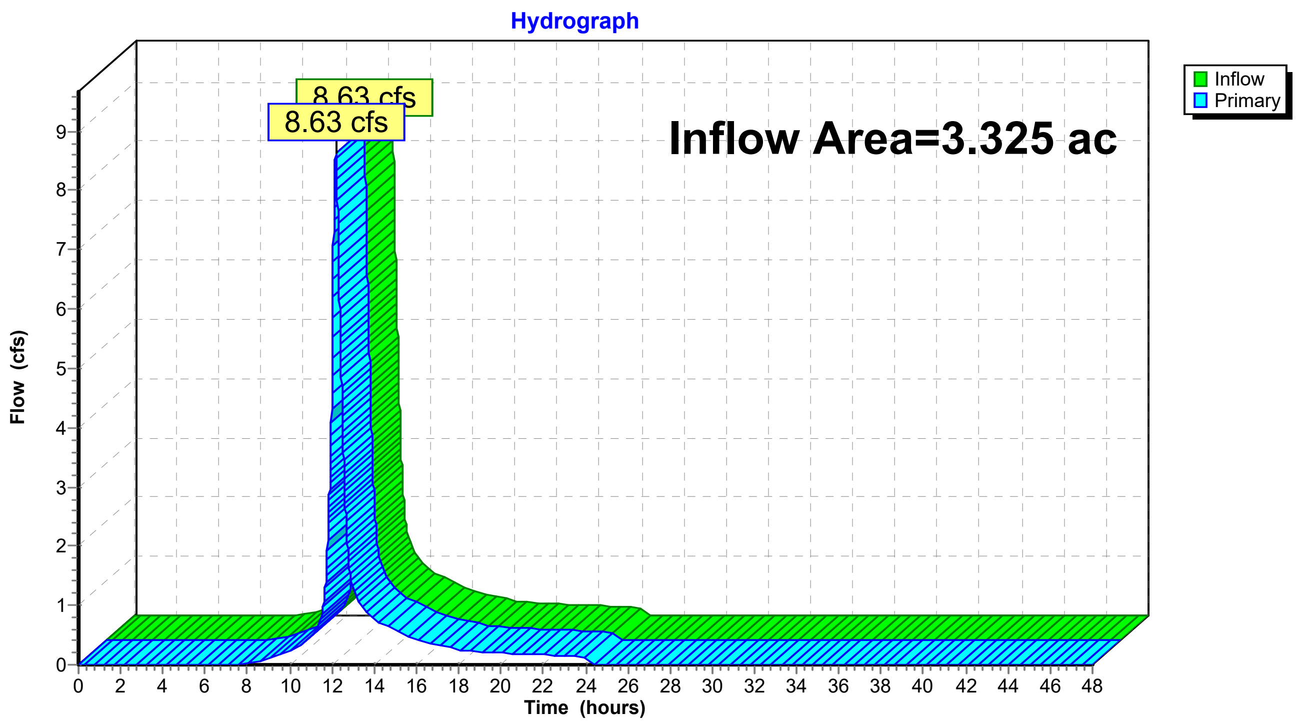
Summary for Pond 4P: Outfall # 4 - Resource Area North Corner

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

Inflow Area = 3.325 ac, 3.64% Impervious, Inflow Depth = 3.07" for 10-Year event
Inflow = 8.63 cfs @ 12.18 hrs, Volume= 0.850 af
Primary = 8.63 cfs @ 12.18 hrs, Volume= 0.850 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 4P: Outfall # 4 - Resource Area North Corner



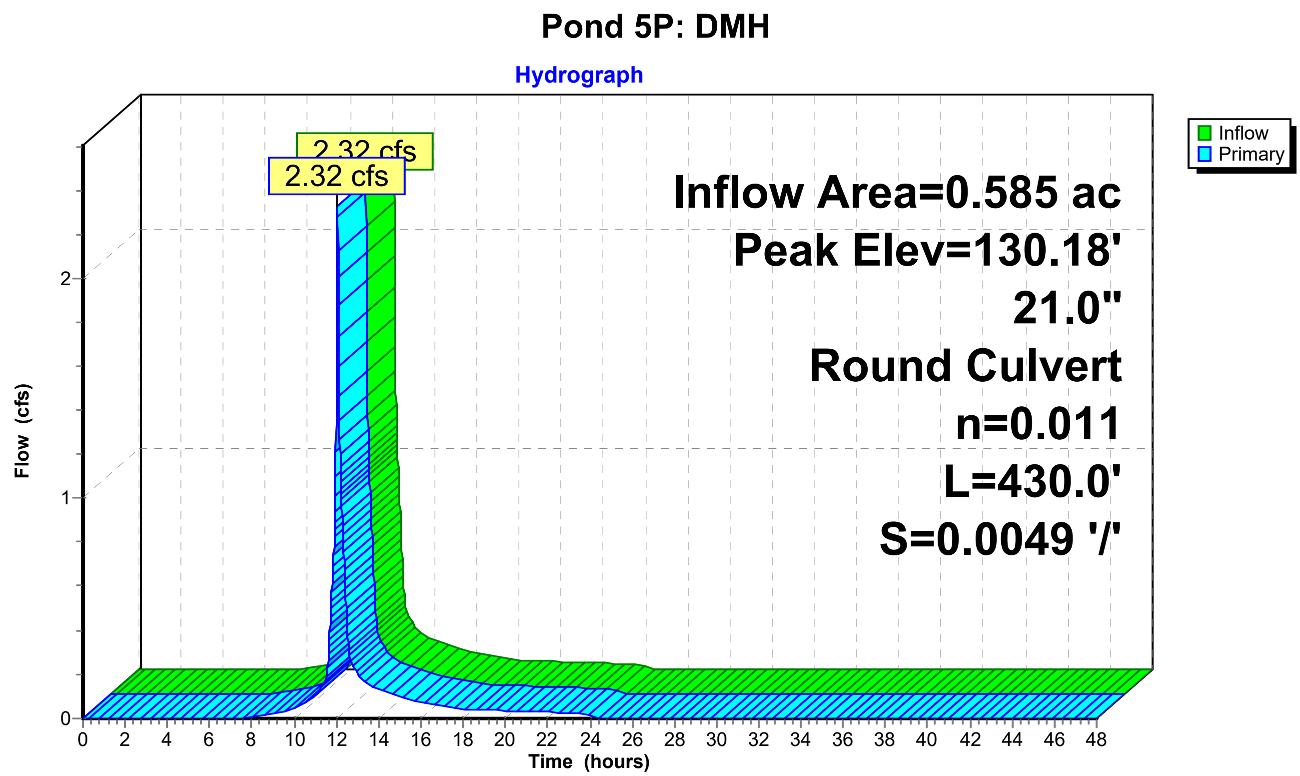
Summary for Pond 5P: DMH

Inflow Area = 0.585 ac, 14.36% Impervious, Inflow Depth = 3.14" for 10-Year event
Inflow = 2.32 cfs @ 12.06 hrs, Volume= 0.153 af
Outflow = 2.32 cfs @ 12.06 hrs, Volume= 0.153 af, Atten= 0%, Lag= 0.0 min
Primary = 2.32 cfs @ 12.06 hrs, Volume= 0.153 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 130.18' @ 12.06 hrs
Flood Elev= 138.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.50'	**21.0" Round Culvert** L= 430.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 129.50' / 127.39' S= 0.0049 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.41 sf

Primary OutFlow Max=2.32 cfs @ 12.06 hrs HW=130.18' (Free Discharge)
└─**1=Culvert** (Barrel Controls 2.32 cfs @ 4.01 fps)



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Sub-Catchment 1 Runoff Area=0.967 ac 0.00% Impervious Runoff Depth=4.12"
Flow Length=388' Slope=0.0150 '/' Tc=13.0 min CN=80 Runoff=3.71 cfs 0.332 af

Subcatchment 2S: Sub-Catchment 2 Runoff Area=0.585 ac 14.36% Impervious Runoff Depth=4.22"
Flow Length=128' Tc=3.9 min UI Adjusted CN=81 Runoff=3.10 cfs 0.206 af

Subcatchment 3S: Sub-Catchment 4 Runoff Area=2.740 ac 1.35% Impervious Runoff Depth=4.12"
Flow Length=460' Slope=0.0150 '/' Tc=14.4 min CN=80 Runoff=10.12 cfs 0.940 af

Pond 1P: Outfall # 1 - Resource Area West Inflow=3.71 cfs 0.332 af
Primary=3.71 cfs 0.332 af

Pond 2P: Outfall #2 to CB Peak Elev=135.35' Inflow=3.10 cfs 0.206 af
12.0" Round Culvert n=0.011 L=215.0' S=0.0077 '/' Outflow=3.10 cfs 0.206 af

Pond 4P: Outfall # 4 - Resource Area North Corner Inflow=11.58 cfs 1.146 af
Primary=11.58 cfs 1.146 af

Pond 5P: DMH Peak Elev=130.29' Inflow=3.10 cfs 0.206 af
21.0" Round Culvert n=0.011 L=430.0' S=0.0049 '/' Outflow=3.10 cfs 0.206 af

Total Runoff Area = 4.292 ac Runoff Volume = 1.478 af Average Runoff Depth = 4.13"
97.18% Pervious = 4.171 ac 2.82% Impervious = 0.121 ac

Summary for Subcatchment 1S: Sub-Catchment 1

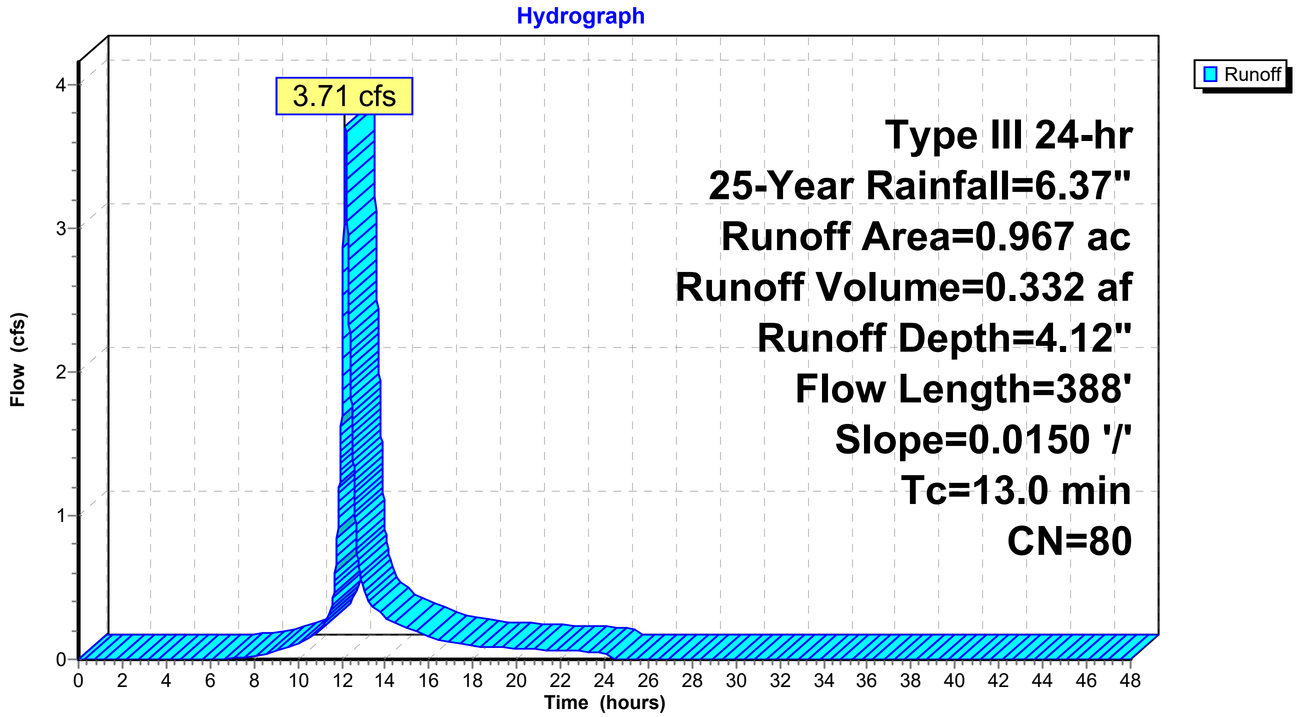
Runoff = 3.71 cfs @ 12.18 hrs, Volume= 0.332 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.37"

Area (ac)	CN	Description
0.967	80	>75% Grass cover, Good, HSG D
0.967		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0150	0.13		**Sheet Flow, Greass Area** Grass: Short n= 0.150 P2= 3.10"
6.6	338	0.0150	0.86		**Shallow Concentrated Flow, Grass Field** Short Grass Pasture Kv= 7.0 fps
13.0	388	Total			

Subcatchment 1S: Sub-Catchment 1



Summary for Subcatchment 2S: Sub-Catchment 2

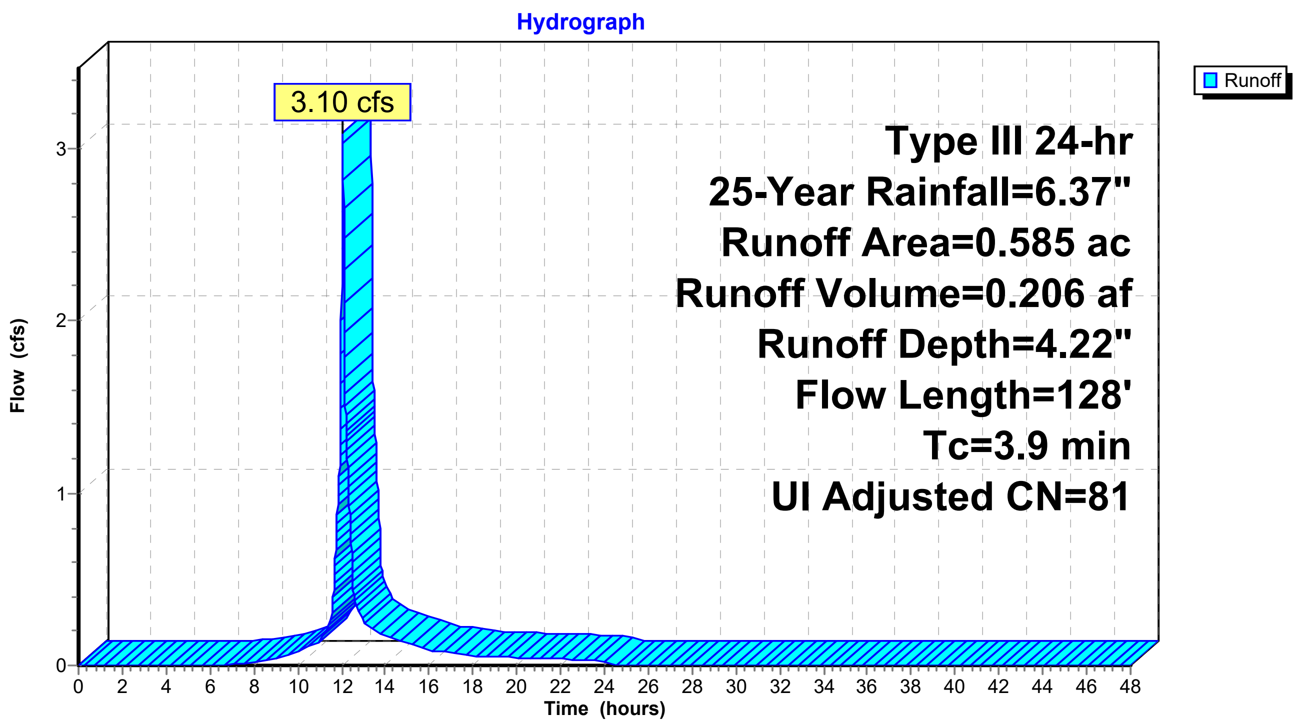
Runoff = 3.10 cfs @ 12.06 hrs, Volume= 0.206 af, Depth= 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.37"

Area (ac)	CN	Adj	Description
0.084	98		Unconnected pavement, HSG D
0.501	80		>75% Grass cover, Good, HSG D
0.585	83	81	Weighted Average, UI Adjusted
0.501			85.64% Pervious Area
0.084			14.36% Impervious Area
0.084			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0800	0.25		**Sheet Flow, Grass Hill** Grass: Short n= 0.150 P2= 3.10"
0.6	78	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.9	128	Total			

Subcatchment 2S: Sub-Catchment 2



Summary for Subcatchment 3S: Sub-Catchment 4

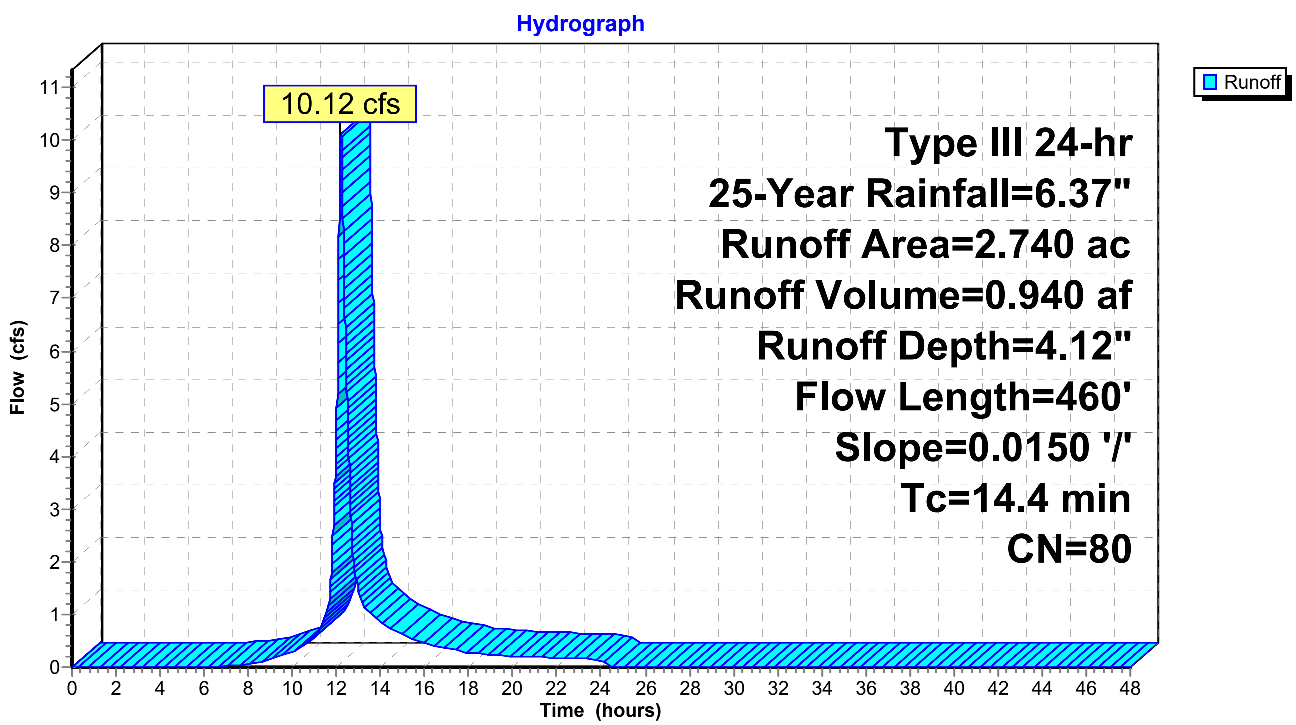
Runoff = 10.12 cfs @ 12.20 hrs, Volume= 0.940 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.37"

Area (ac)	CN	Description
0.037	98	Paved parking, HSG D
2.703	80	>75% Grass cover, Good, HSG D
2.740	80	Weighted Average
2.703		98.65% Pervious Area
0.037		1.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0150	0.13		**Sheet Flow, Clay Infield** Grass: Short n= 0.150 P2= 3.10"
8.0	410	0.0150	0.86		**Shallow Concentrated Flow, Grass Field** Short Grass Pasture Kv= 7.0 fps
14.4	460	Total			

Subcatchment 3S: Sub-Catchment 4



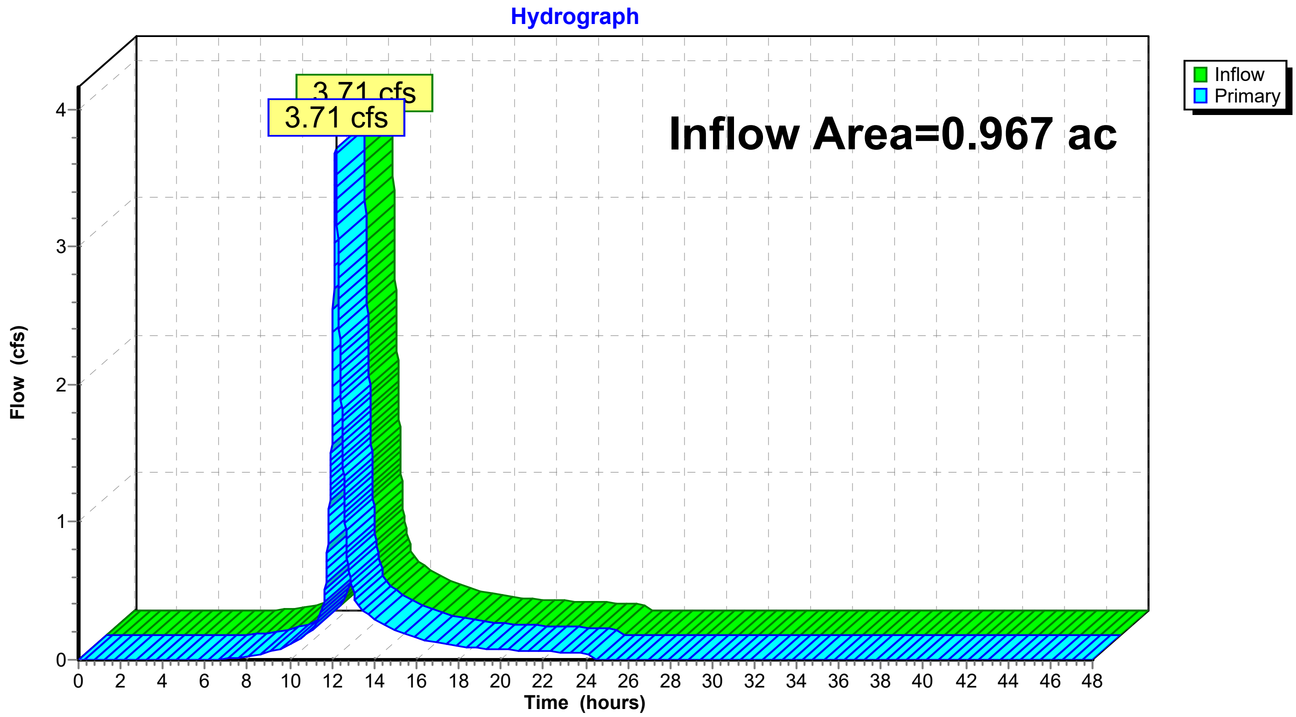
Summary for Pond 1P: Outfall # 1 - Resource Area West

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

Inflow Area =	0.967 ac,	0.00% Impervious, Inflow Depth = 4.12"	for 25-Year event	
Inflow =	3.71 cfs @	12.18 hrs, Volume=	0.332 af	
Primary =	3.71 cfs @	12.18 hrs, Volume=	0.332 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 1P: Outfall # 1 - Resource Area West



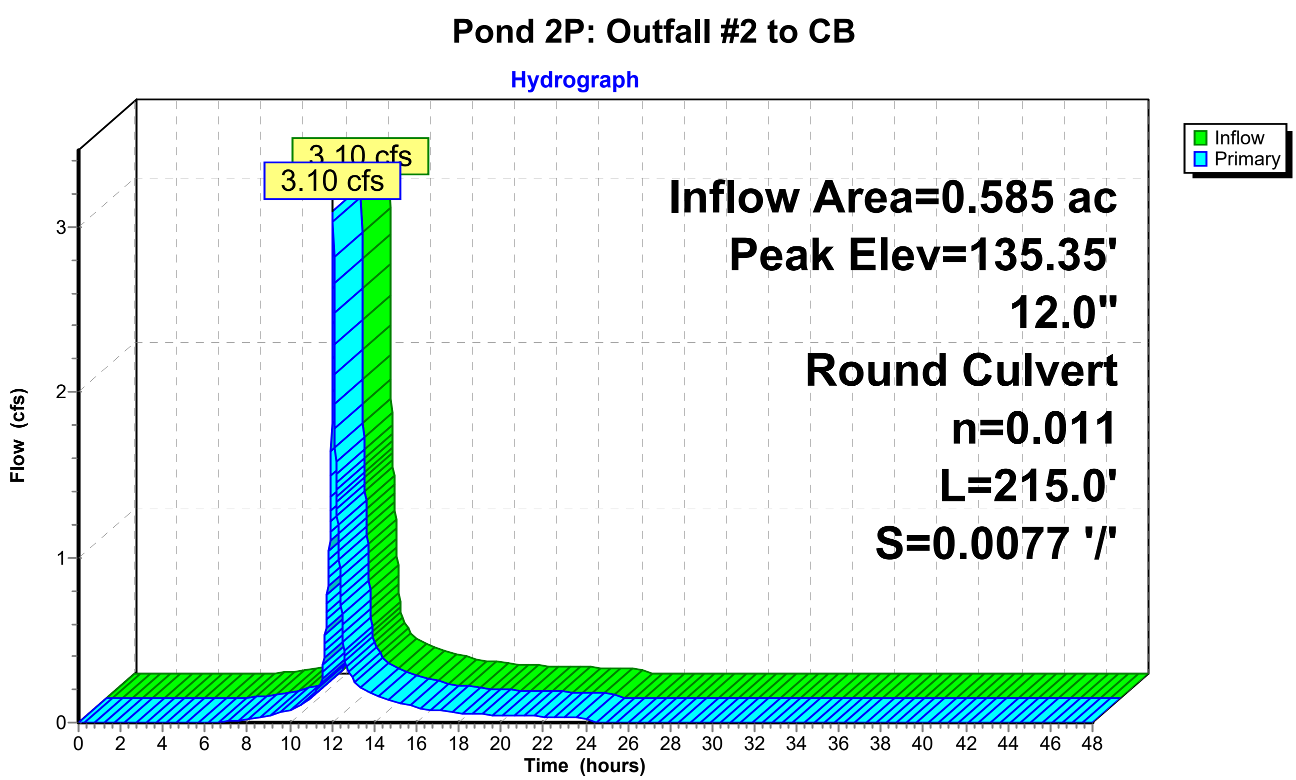
Summary for Pond 2P: Outfall #2 to CB

Inflow Area = 0.585 ac, 14.36% Impervious, Inflow Depth = 4.22" for 25-Year event
Inflow = 3.10 cfs @ 12.06 hrs, Volume= 0.206 af
Outflow = 3.10 cfs @ 12.06 hrs, Volume= 0.206 af, Atten= 0%, Lag= 0.0 min
Primary = 3.10 cfs @ 12.06 hrs, Volume= 0.206 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 135.35' @ 12.06 hrs
Flood Elev= 138.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	134.36'	**12.0" Round Culvert** L= 215.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.36' / 132.70' S= 0.0077 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.09 cfs @ 12.06 hrs HW=135.35' (Free Discharge)
└─**1=Culvert** (Barrel Controls 3.09 cfs @ 4.97 fps)



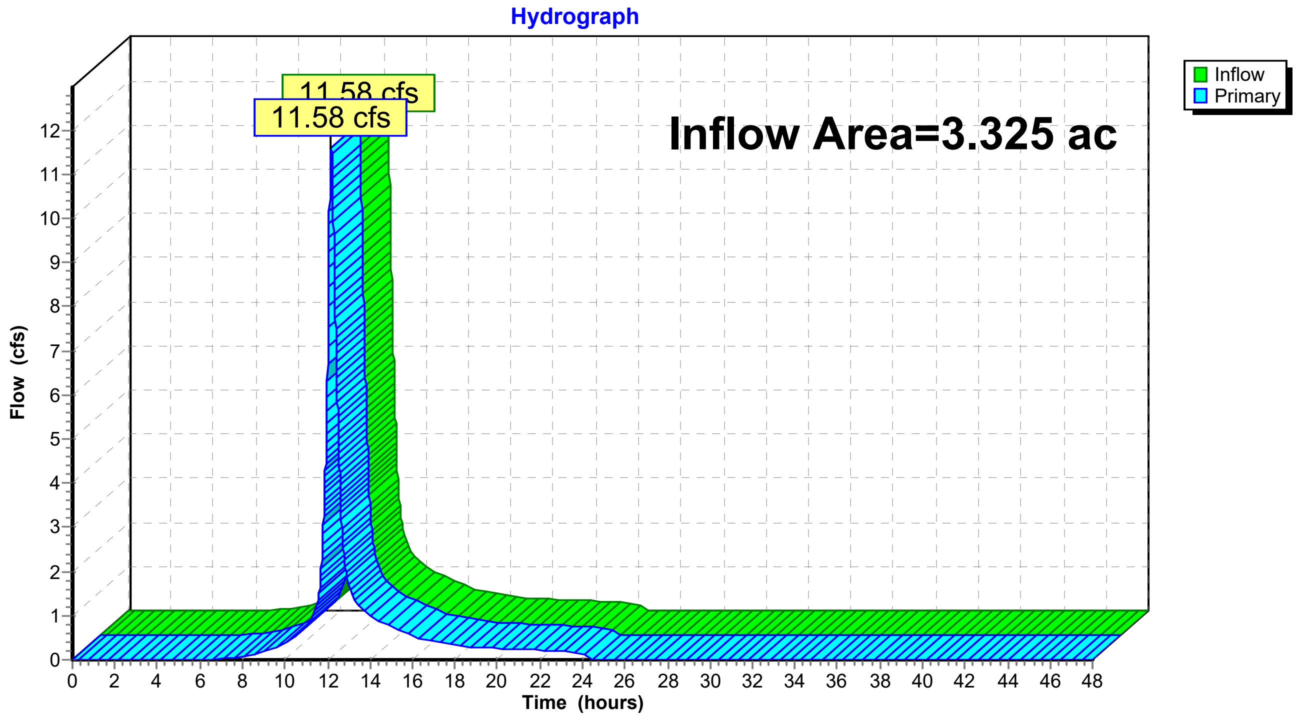
Summary for Pond 4P: Outfall # 4 - Resource Area North Corner

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

Inflow Area =	3.325 ac,	3.64% Impervious,	Inflow Depth = 4.14"	for 25-Year event	
Inflow =	11.58 cfs @	12.18 hrs,	Volume=	1.146 af	
Primary =	11.58 cfs @	12.18 hrs,	Volume=	1.146 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 4P: Outfall # 4 - Resource Area North Corner



Summary for Pond 5P: DMH

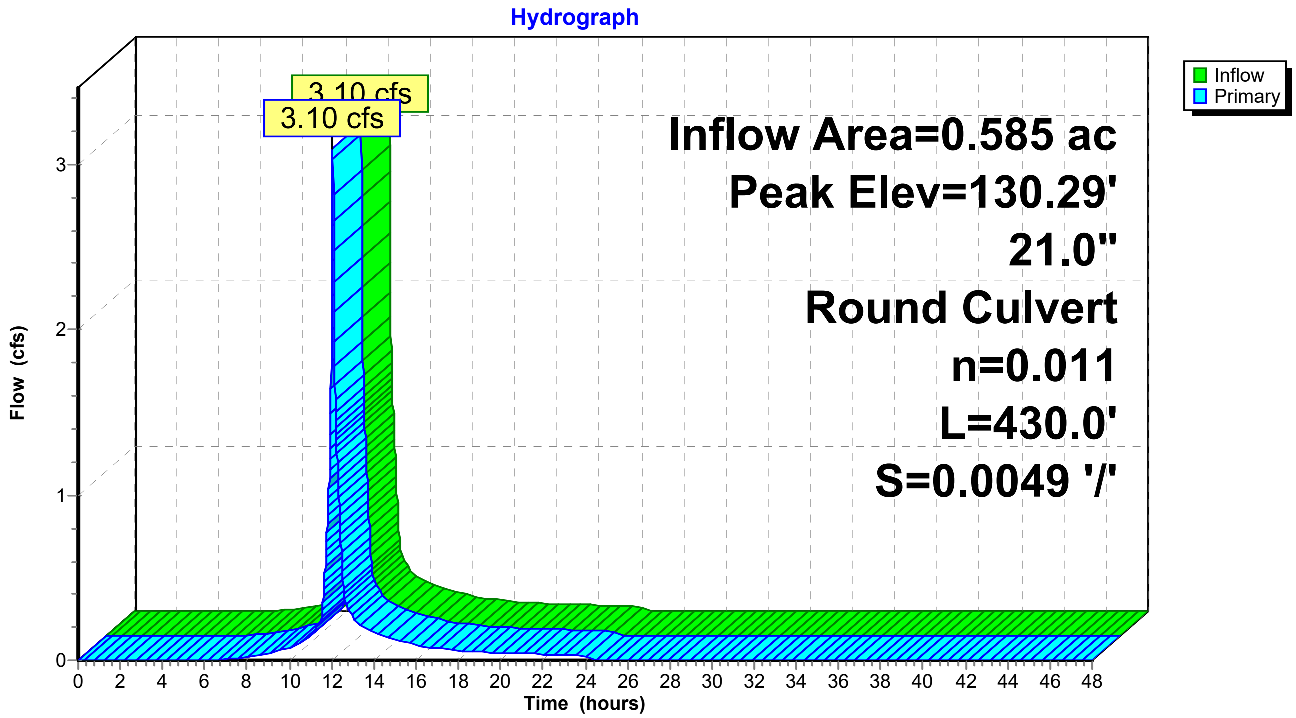
Inflow Area = 0.585 ac, 14.36% Impervious, Inflow Depth = 4.22" for 25-Year event
Inflow = 3.10 cfs @ 12.06 hrs, Volume= 0.206 af
Outflow = 3.10 cfs @ 12.06 hrs, Volume= 0.206 af, Atten= 0%, Lag= 0.0 min
Primary = 3.10 cfs @ 12.06 hrs, Volume= 0.206 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 130.29' @ 12.06 hrs
Flood Elev= 138.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.50'	**21.0" Round Culvert** L= 430.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 129.50' / 127.39' S= 0.0049 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.41 sf

Primary OutFlow Max=3.09 cfs @ 12.06 hrs HW=130.29' (Free Discharge)
└─**1=Culvert** (Barrel Controls 3.09 cfs @ 4.33 fps)

Pond 5P: DMH



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Sub-Catchment 1 Runoff Area=0.967 ac 0.00% Impervious Runoff Depth=5.81"
Flow Length=388' Slope=0.0150 '/' Tc=13.0 min CN=80 Runoff=5.19 cfs 0.468 af

Subcatchment 2S: Sub-Catchment 2 Runoff Area=0.585 ac 14.36% Impervious Runoff Depth=5.93"
Flow Length=128' Tc=3.9 min UI Adjusted CN=81 Runoff=4.30 cfs 0.289 af

Subcatchment 3S: Sub-Catchment 4 Runoff Area=2.740 ac 1.35% Impervious Runoff Depth=5.81"
Flow Length=460' Slope=0.0150 '/' Tc=14.4 min CN=80 Runoff=14.15 cfs 1.327 af

Pond 1P: Outfall # 1 - Resource Area West Inflow=5.19 cfs 0.468 af
Primary=5.19 cfs 0.468 af

Pond 2P: Outfall #2 to CB Peak Elev=136.50' Inflow=4.30 cfs 0.289 af
12.0" Round Culvert n=0.011 L=215.0' S=0.0077 '/' Outflow=4.30 cfs 0.289 af

Pond 4P: Outfall # 4 - Resource Area North Corner Inflow=16.17 cfs 1.616 af
Primary=16.17 cfs 1.616 af

Pond 5P: DMH Peak Elev=130.44' Inflow=4.30 cfs 0.289 af
21.0" Round Culvert n=0.011 L=430.0' S=0.0049 '/' Outflow=4.30 cfs 0.289 af

Total Runoff Area = 4.292 ac Runoff Volume = 2.085 af Average Runoff Depth = 5.83"
97.18% Pervious = 4.171 ac 2.82% Impervious = 0.121 ac

Summary for Subcatchment 1S: Sub-Catchment 1

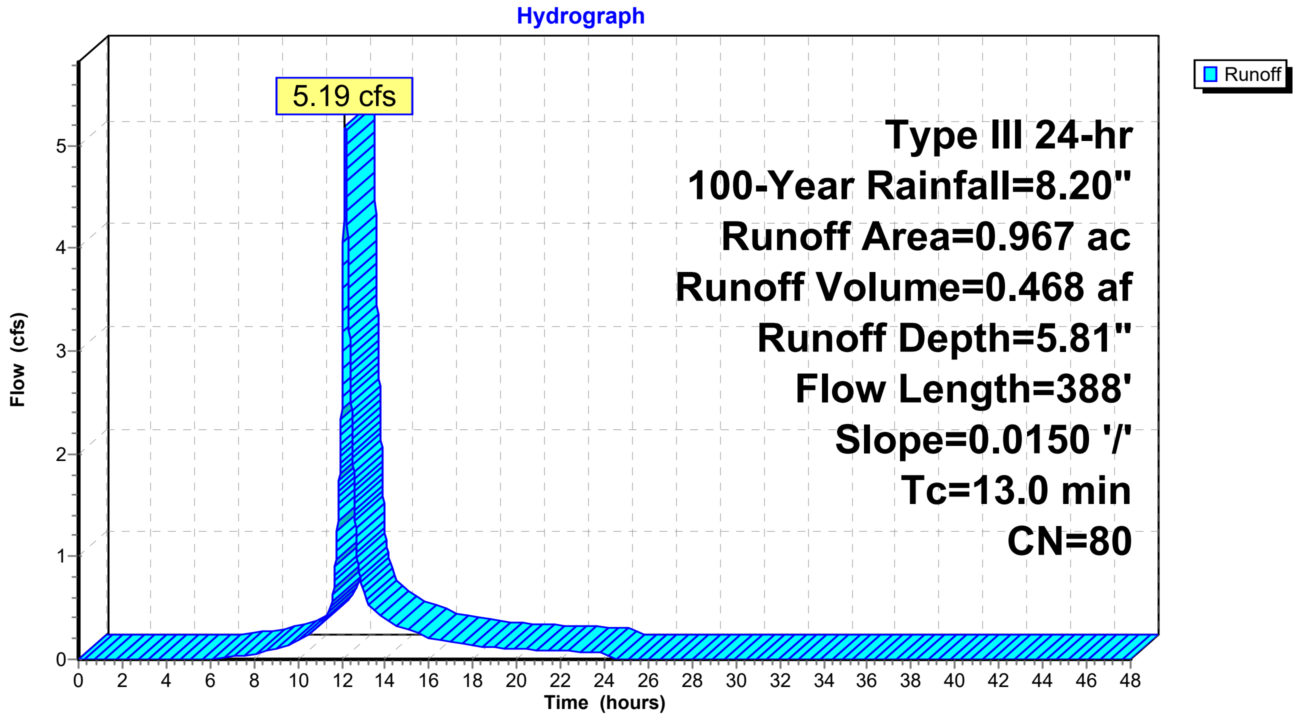
Runoff = 5.19 cfs @ 12.18 hrs, Volume= 0.468 af, Depth= 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (ac)	CN	Description
0.967	80	>75% Grass cover, Good, HSG D
0.967		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0150	0.13		**Sheet Flow, Greass Area** Grass: Short n= 0.150 P2= 3.10"
6.6	338	0.0150	0.86		**Shallow Concentrated Flow, Grass Field** Short Grass Pasture Kv= 7.0 fps
13.0	388	Total			

Subcatchment 1S: Sub-Catchment 1



Summary for Subcatchment 2S: Sub-Catchment 2

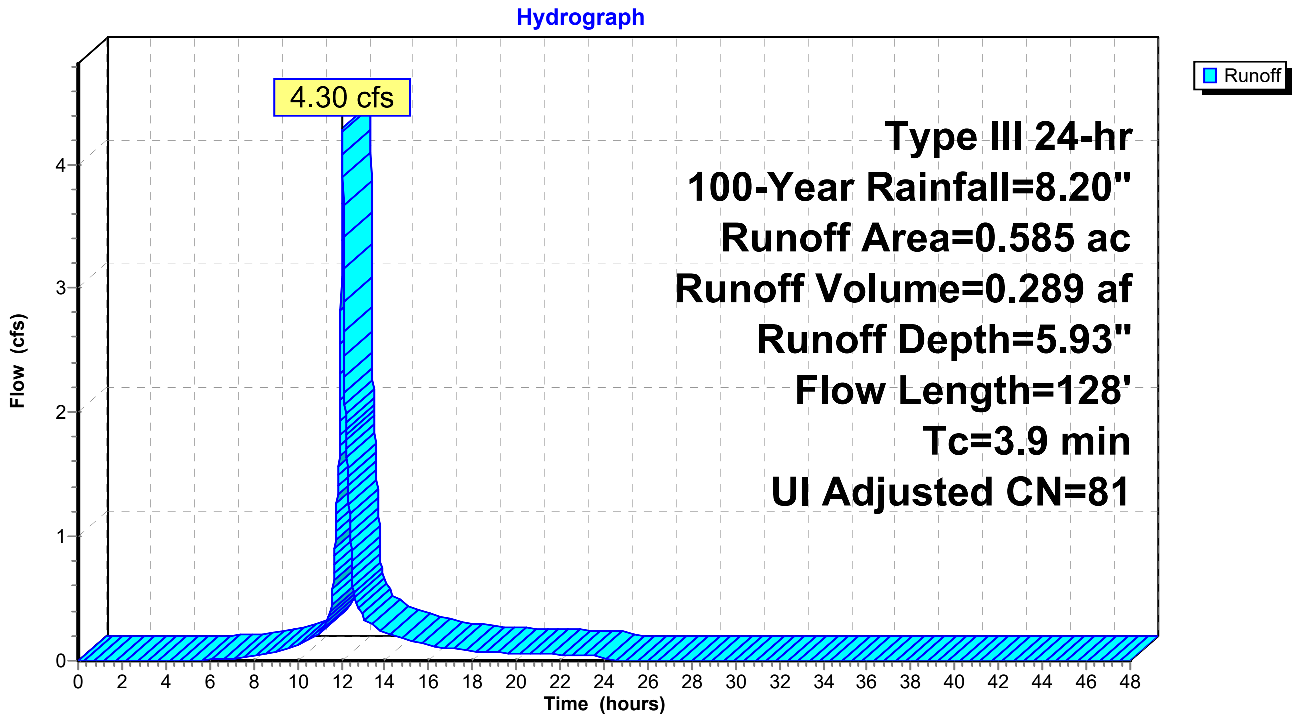
Runoff = 4.30 cfs @ 12.06 hrs, Volume= 0.289 af, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (ac)	CN	Adj	Description
0.084	98		Unconnected pavement, HSG D
0.501	80		>75% Grass cover, Good, HSG D
0.585	83	81	Weighted Average, UI Adjusted
0.501			85.64% Pervious Area
0.084			14.36% Impervious Area
0.084			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0800	0.25		**Sheet Flow, Grass Hill** Grass: Short n= 0.150 P2= 3.10"
0.6	78	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.9	128	Total			

Subcatchment 2S: Sub-Catchment 2



Summary for Subcatchment 3S: Sub-Catchment 4

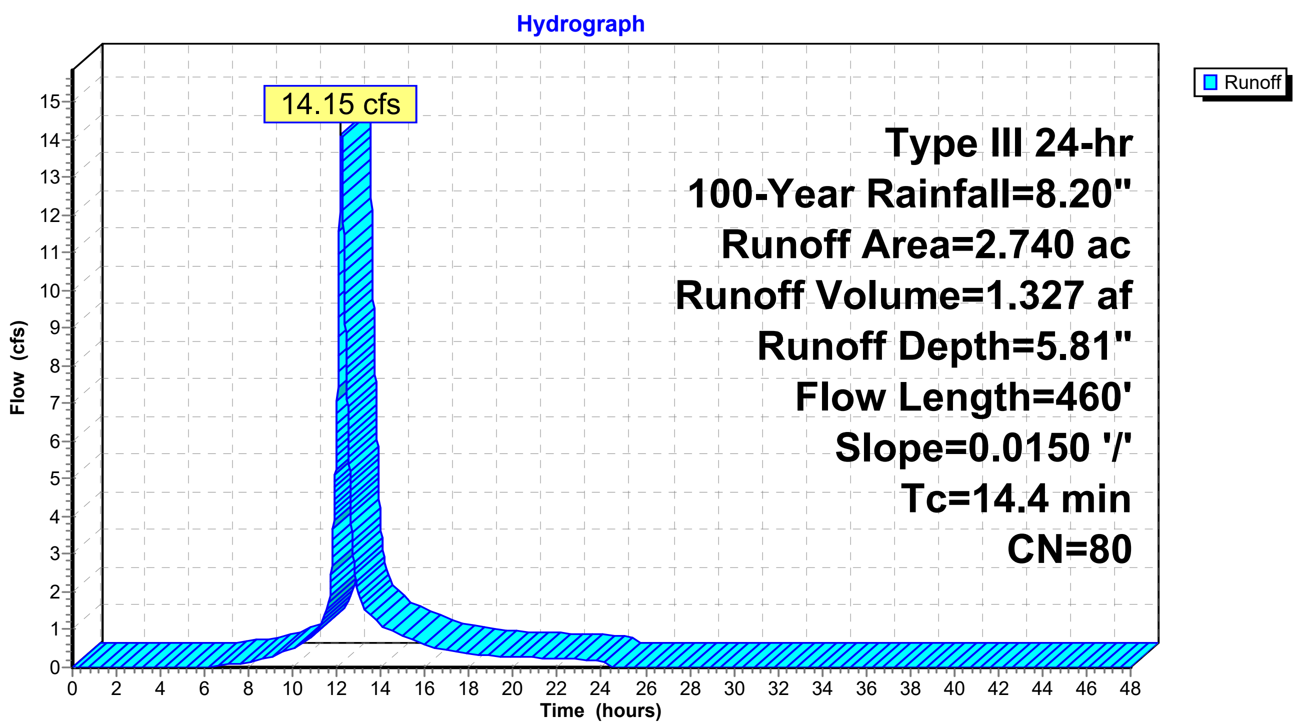
Runoff = 14.15 cfs @ 12.19 hrs, Volume= 1.327 af, Depth= 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (ac)	CN	Description
0.037	98	Paved parking, HSG D
2.703	80	>75% Grass cover, Good, HSG D
2.740	80	Weighted Average
2.703		98.65% Pervious Area
0.037		1.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0150	0.13		**Sheet Flow, Clay Infield** Grass: Short n= 0.150 P2= 3.10"
8.0	410	0.0150	0.86		**Shallow Concentrated Flow, Grass Field** Short Grass Pasture Kv= 7.0 fps
14.4	460	Total			

Subcatchment 3S: Sub-Catchment 4



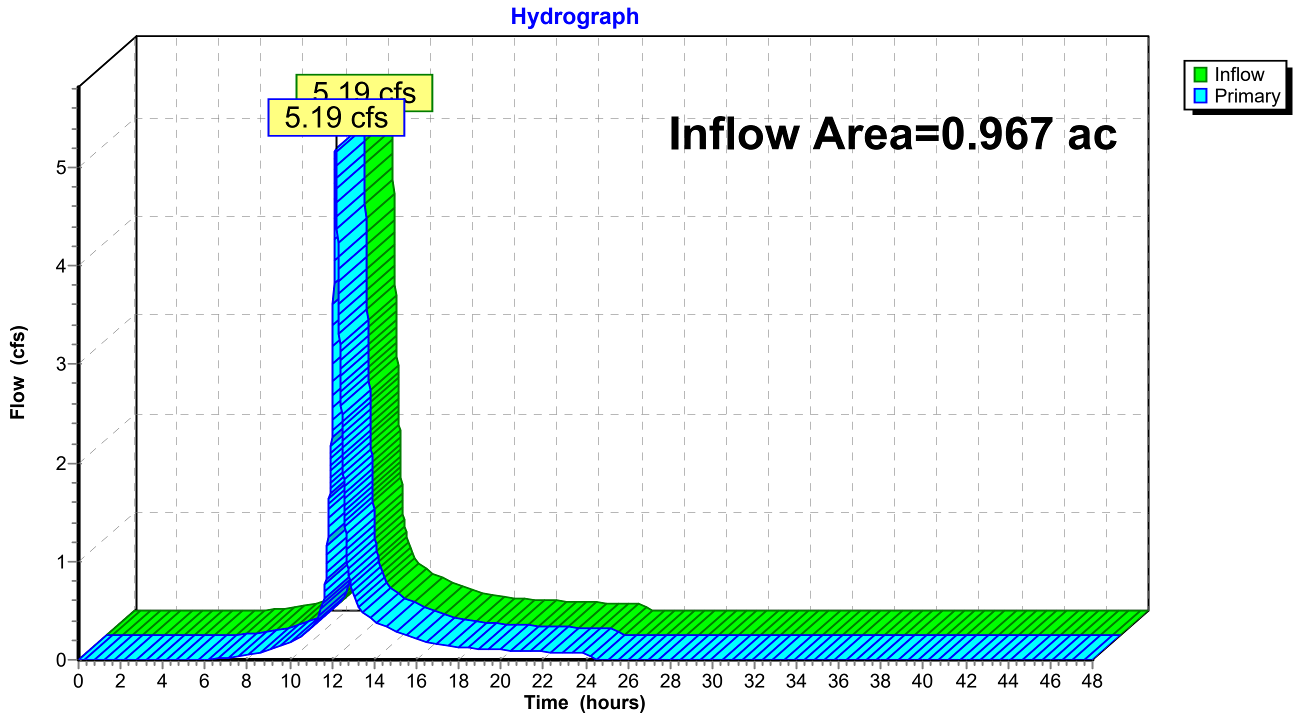
Summary for Pond 1P: Outfall # 1 - Resource Area West

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

Inflow Area = 0.967 ac, 0.00% Impervious, Inflow Depth = 5.81" for 100-Year event
Inflow = 5.19 cfs @ 12.18 hrs, Volume= 0.468 af
Primary = 5.19 cfs @ 12.18 hrs, Volume= 0.468 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 1P: Outfall # 1 - Resource Area West



Summary for Pond 2P: Outfall #2 to CB

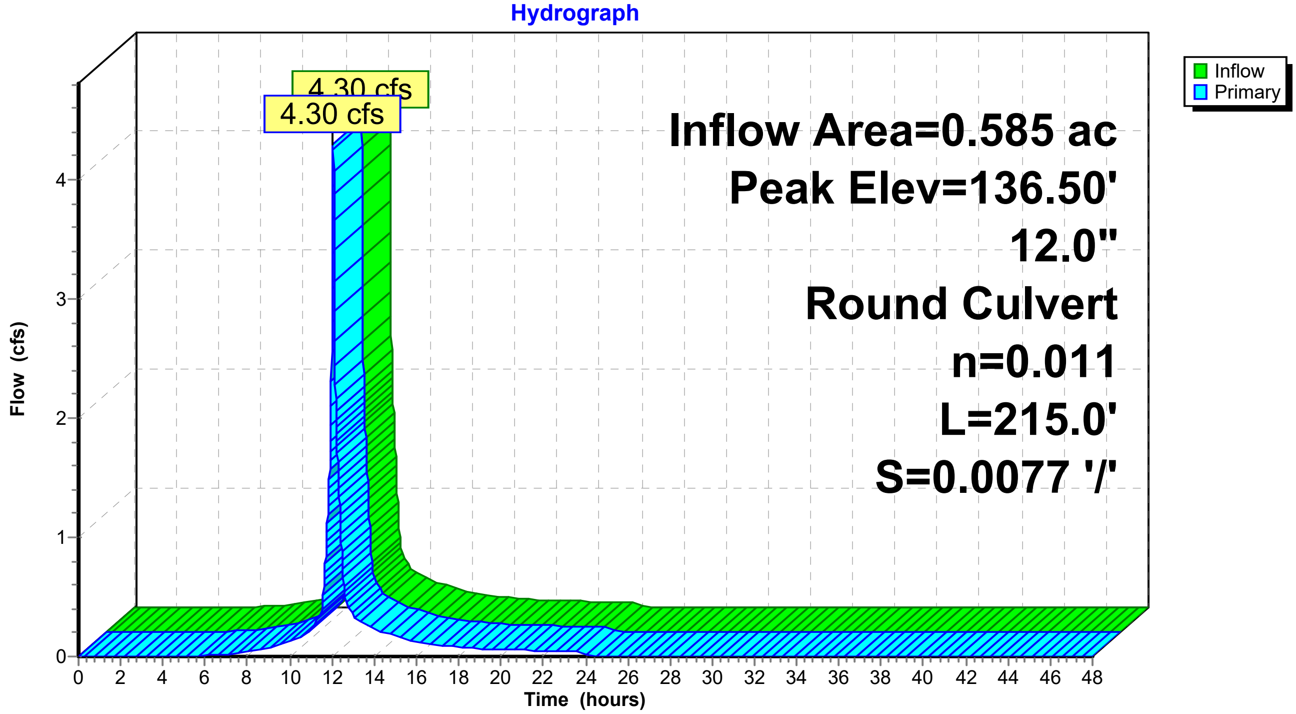
Inflow Area = 0.585 ac, 14.36% Impervious, Inflow Depth = 5.93" for 100-Year event
Inflow = 4.30 cfs @ 12.06 hrs, Volume= 0.289 af
Outflow = 4.30 cfs @ 12.06 hrs, Volume= 0.289 af, Atten= 0%, Lag= 0.0 min
Primary = 4.30 cfs @ 12.06 hrs, Volume= 0.289 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 136.50' @ 12.06 hrs
Flood Elev= 138.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	134.36'	**12.0" Round Culvert** L= 215.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.36' / 132.70' S= 0.0077 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=4.29 cfs @ 12.06 hrs HW=136.49' (Free Discharge)
↑**1=Culvert** (Barrel Controls 4.29 cfs @ 5.46 fps)

Pond 2P: Outfall #2 to CB



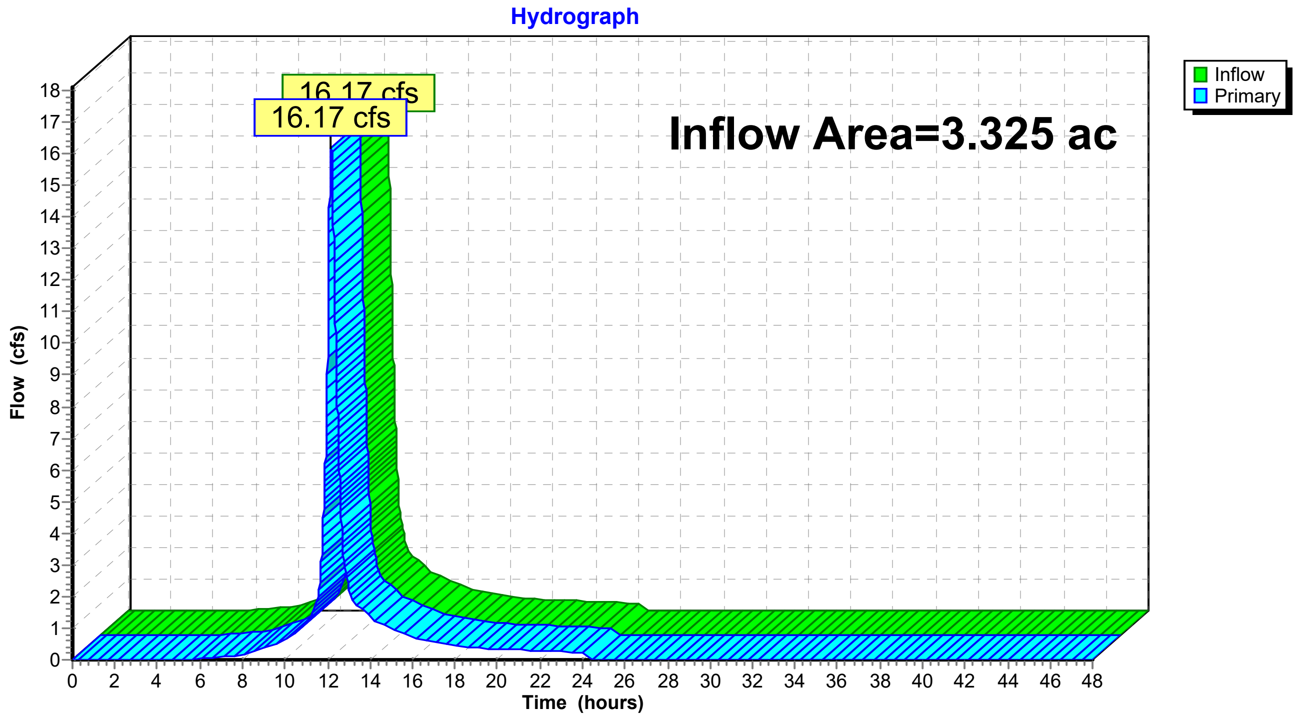
Summary for Pond 4P: Outfall # 4 - Resource Area North Corner

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

Inflow Area =	3.325 ac,	3.64% Impervious,	Inflow Depth = 5.83"	for 100-Year event	
Inflow =	16.17 cfs @	12.18 hrs,	Volume=	1.616 af	
Primary =	16.17 cfs @	12.18 hrs,	Volume=	1.616 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 4P: Outfall # 4 - Resource Area North Corner



Summary for Pond 5P: DMH

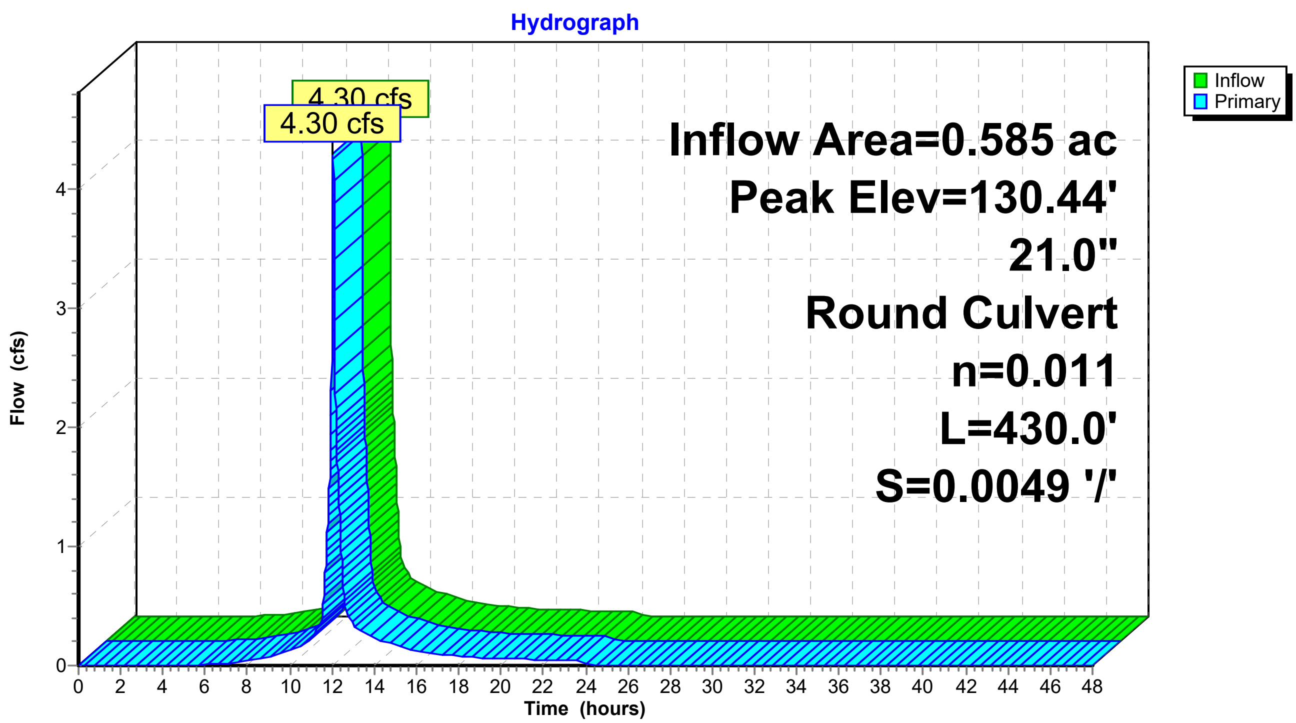
Inflow Area = 0.585 ac, 14.36% Impervious, Inflow Depth = 5.93" for 100-Year event
Inflow = 4.30 cfs @ 12.06 hrs, Volume= 0.289 af
Outflow = 4.30 cfs @ 12.06 hrs, Volume= 0.289 af, Atten= 0%, Lag= 0.0 min
Primary = 4.30 cfs @ 12.06 hrs, Volume= 0.289 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 130.44' @ 12.06 hrs
Flood Elev= 138.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.50'	**21.0" Round Culvert** L= 430.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 129.50' / 127.39' S= 0.0049 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.41 sf

Primary OutFlow Max=4.29 cfs @ 12.06 hrs HW=130.44' (Free Discharge)
└─**1=Culvert** (Barrel Controls 4.29 cfs @ 4.72 fps)

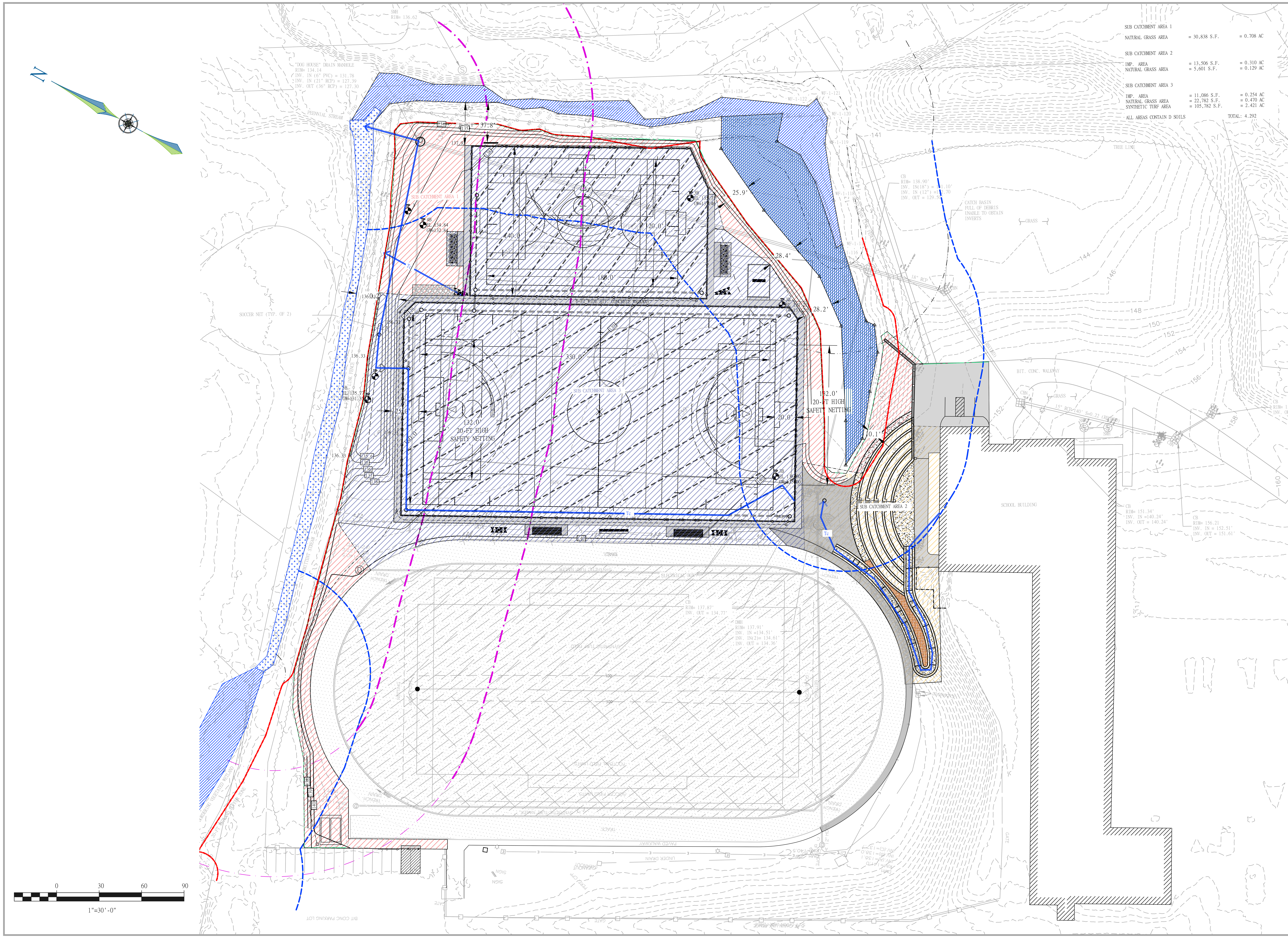
Pond 5P: DMH



Nesra Engineering, LLC
111 Washington Street, Unit 2A
Plainville, MA 02762

Attachment F

Post-Development Watershed and Surface Types



SUB CATCHMENT AREA 1		
NATURAL GRASS AREA	= 30,838 S.F.	= 0.708 AC
SUB CATCHMENT AREA 2		
IMP. AREA	= 13,506 S.F.	= 0.310 AC
NATURAL GRASS AREA	= 5,601 S.F.	= 0.129 AC
SUB CATCHMENT AREA 3		
IMP. AREA	= 11,086 S.F.	= 0.254 AC
NATURAL GRASS AREA	= 22,782 S.F.	= 0.470 AC
SYNTHETIC TURF AREA	= 105,782 S.F.	= 2.421 AC
ALL AREAS CONTAIN D SOILS		TOTAL: 4.292

NESRA ENGINEERING
MA RI NH ME FL
829 SOUTH WASHINGTON STREET
NORTH ATTLEBORO
MASSACHUSETTS 02760
WWW.NESRAENG.COM
607-506-3772

PROJECT

MARSHALL SIMONDS MIDDLE SCHOOL ATHLETIC FIELDS RENOVATION PROJECT
BURLINGTON, MA 01803

CLIENT

BURLINGTON PUBLIC SCHOOLS
123 CAMBRIDGE STREET
BURLINGTON, MA 01803

NO.	REVISION	DATE
2.	UPDATE 11-13-25 MEETING CHANGES	1/2/25
1.	UPDATED CATCHMENT AREAS BASED ON DESIGN CHANGES	11/2/25

SCALE - 1"=30'
DATE - 2/10/25

PERMIT SET

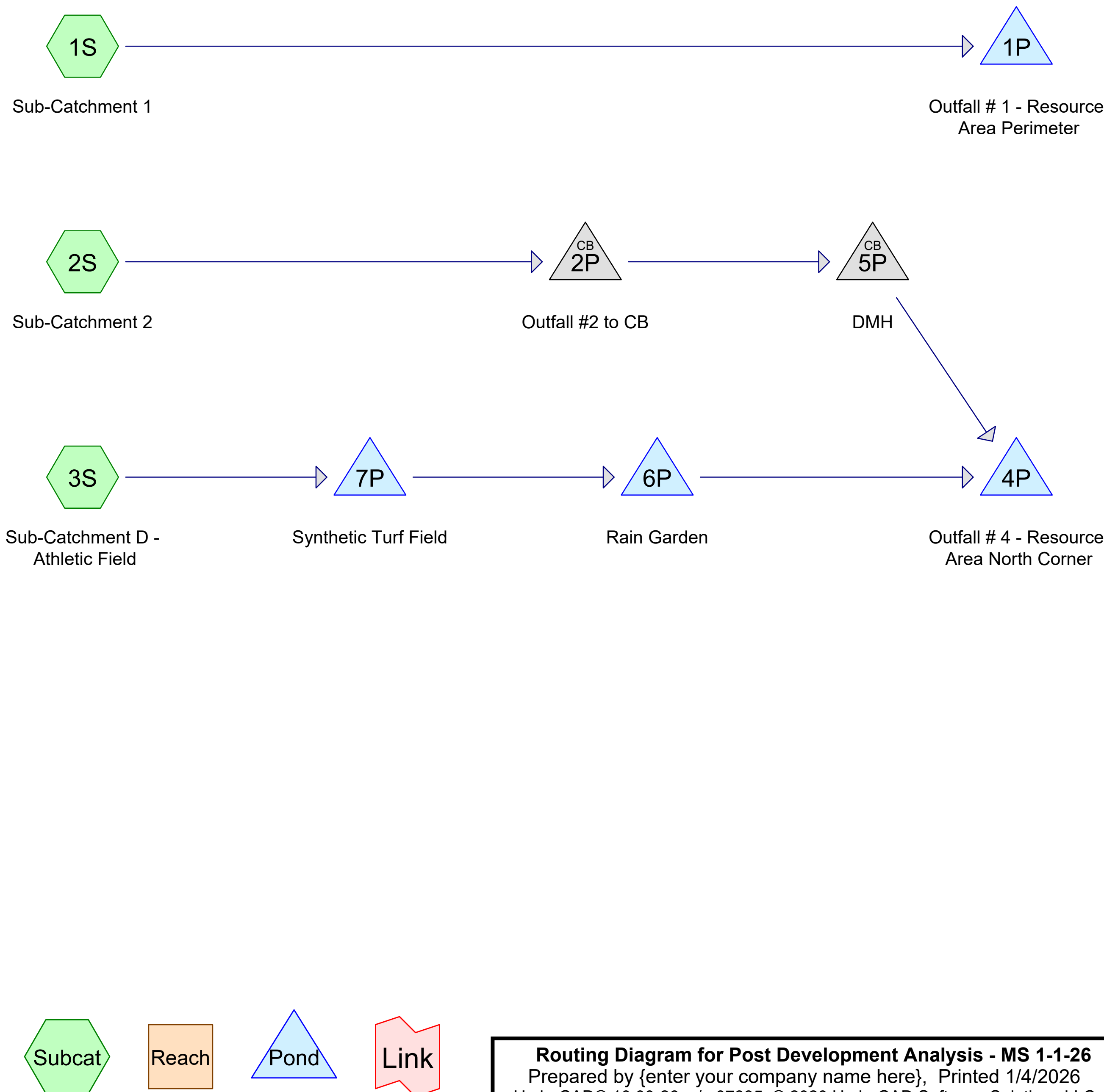
POST-DEVELOPMENT WATERSHED AND SURFACE TYPES

SK-2

Nesra Engineering, LLC
111 Washington Street, Unit 2A
Plainville, MA 02762

Attachment G

Post-Development Graphic Generated by Hydro-CAD



Routing Diagram for Post Development Analysis - MS 1-1-26
Prepared by {enter your company name here}, Printed 1/4/2026
HydroCAD® 10.00-26 s/n 07835 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.307	80	>75% Grass cover, Good, HSG D (1S, 2S, 3S)
0.254	98	Paved parking, HSG D (3S)
2.421	98	Synthetic Turf (3S)
0.310	98	Unconnected pavement, HSG D (2S)
4.292	**93**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
1.871	HSG D	1S, 2S, 3S
2.421	Other	3S
4.292		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.307	0.000	1.307	>75% Grass cover, Good	1S, 2S, 3S
0.000	0.000	0.000	0.254	0.000	0.254	Paved parking	3S
0.000	0.000	0.000	0.000	2.421	2.421	Synthetic Turf	3S
0.000	0.000	0.000	0.310	0.000	0.310	Unconnected pavement	2S
0.000	**0.000**	**0.000**	**1.871**	**2.421**	**4.292**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	2P	134.36	132.70	215.0	0.0077	0.011	12.0	0.0	0.0
2	5P	129.50	127.39	430.0	0.0049	0.011	21.0	0.0	0.0
3	7P	136.14	136.00	23.0	0.0061	0.012	12.0	0.0	0.0

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Sub-Catchment 1 Runoff Area=0.708 ac 0.00% Impervious Runoff Depth=1.57"
Flow Length=77' Slope=0.0520 '/' Tc=5.5 min CN=80 Runoff=1.32 cfs 0.093 af

Subcatchment 2S: Sub-Catchment 2 Runoff Area=0.439 ac 70.62% Impervious Runoff Depth=2.66"
Flow Length=153' Tc=0.7 min CN=93 Runoff=1.59 cfs 0.097 af

Subcatchment 3S: Sub-Catchment D - Runoff Area=3.145 ac 85.06% Impervious Runoff Depth>2.86"
Tc=480.0 min CN=95 Runoff=0.96 cfs 0.750 af

Pond 1P: Outfall # 1 - Resource Area Perimeter Inflow=1.32 cfs 0.093 af
Primary=1.32 cfs 0.093 af

Pond 2P: Outfall #2 to CB Peak Elev=134.99' Inflow=1.59 cfs 0.097 af
12.0" Round Culvert n=0.011 L=215.0' S=0.0077 '/' Outflow=1.59 cfs 0.097 af

Pond 4P: Outfall # 4 - Resource Area North Corner Inflow=1.59 cfs 0.097 af
Primary=1.59 cfs 0.097 af

Pond 5P: DMH Peak Elev=130.06' Inflow=1.59 cfs 0.097 af
21.0" Round Culvert n=0.011 L=430.0' S=0.0049 '/' Outflow=1.59 cfs 0.097 af

Pond 6P: Rain Garden Peak Elev=135.60' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 7P: Synthetic Turf Field Peak Elev=135.78' Storage=681 cf Inflow=0.96 cfs 0.750 af
Discarded=0.95 cfs 0.750 af Primary=0.00 cfs 0.000 af Outflow=0.95 cfs 0.750 af

Total Runoff Area = 4.292 ac Runoff Volume = 0.940 af Average Runoff Depth = 2.63"
30.45% Pervious = 1.307 ac 69.55% Impervious = 2.985 ac

Summary for Subcatchment 1S: Sub-Catchment 1

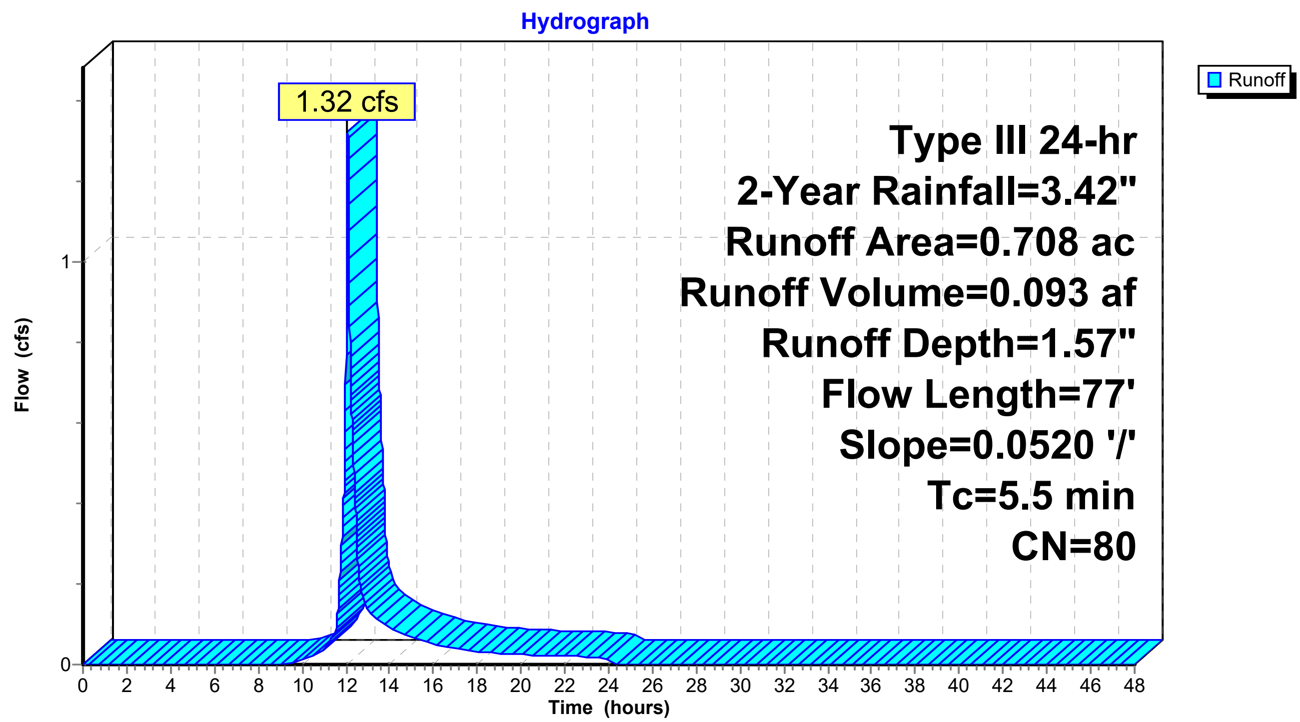
Runoff = 1.32 cfs @ 12.08 hrs, Volume= 0.093 af, Depth= 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.42"

Area (ac)	CN	Description
0.708	80	>75% Grass cover, Good, HSG D
0.708		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	77	0.0520	0.23		**Sheet Flow, Grass Area** Grass: Short n= 0.150 P2= 3.10"

Subcatchment 1S: Sub-Catchment 1



Summary for Subcatchment 2S: Sub-Catchment 2

[49] Hint: Tc<2dt may require smaller dt

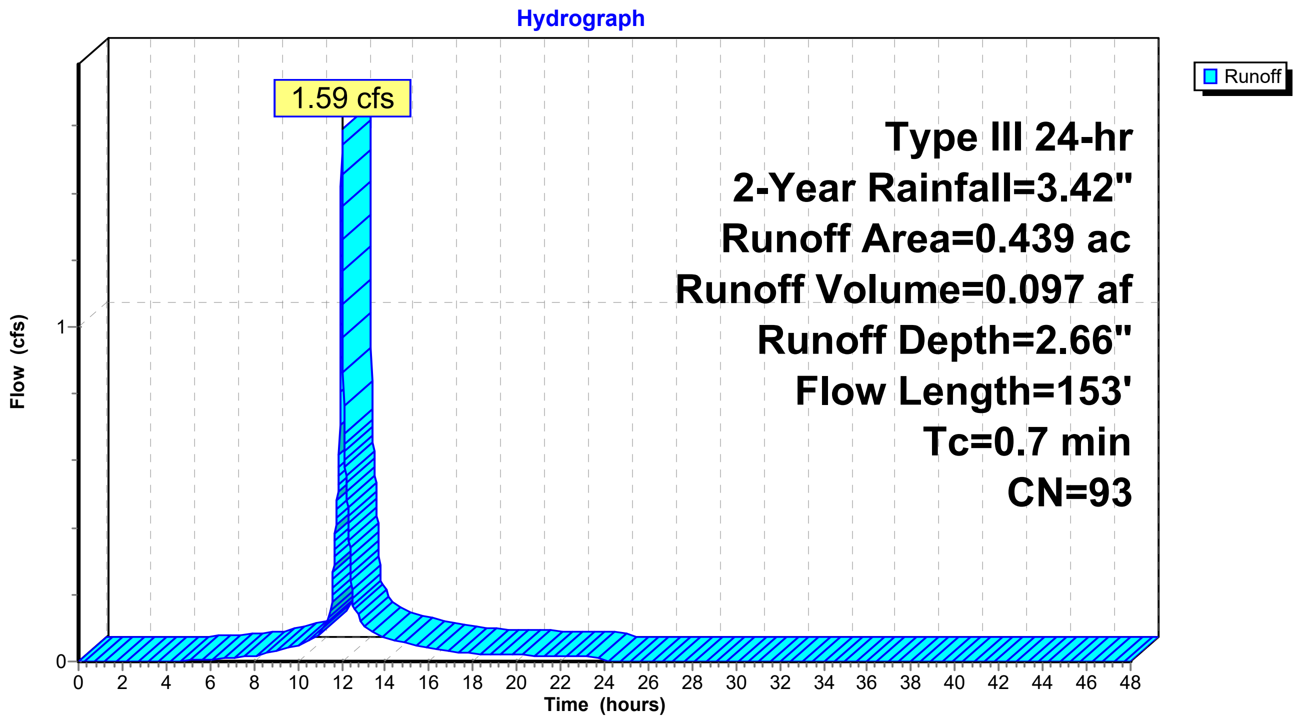
Runoff = 1.59 cfs @ 12.01 hrs, Volume= 0.097 af, Depth= 2.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.42"

Area (ac)	CN	Description
0.310	98	Unconnected pavement, HSG D
0.129	80	>75% Grass cover, Good, HSG D
0.439	93	Weighted Average
0.129		29.38% Pervious Area
0.310		70.62% Impervious Area
0.310		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0800	2.05		**Sheet Flow, Grass Hill** Smooth surfaces n= 0.011 P2= 3.10"
0.3	103	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	153	Total			

Subcatchment 2S: Sub-Catchment 2



Summary for Subcatchment 3S: Sub-Catchment D - Athletic Field

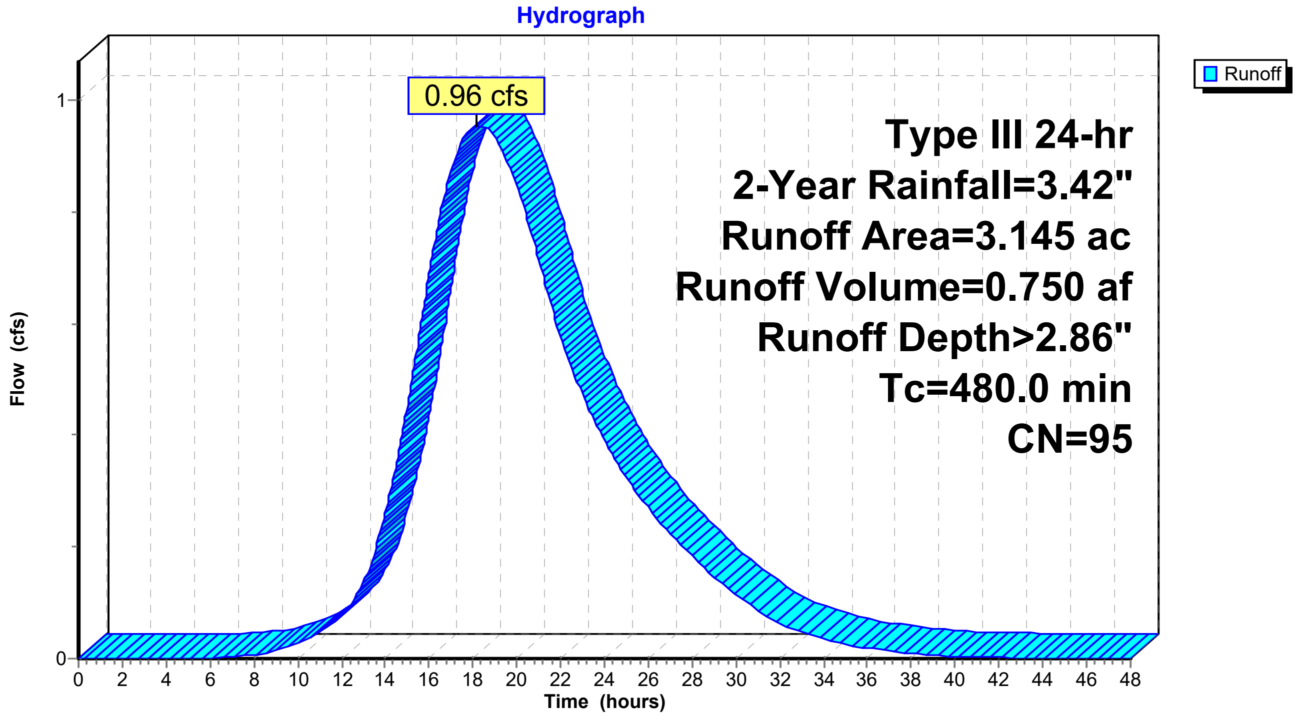
Runoff = 0.96 cfs @ 18.14 hrs, Volume= 0.750 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.42"

	Area (ac)	CN	Description
	0.254	98	Paved parking, HSG D
*	2.421	98	Synthetic Turf
	0.470	80	>75% Grass cover, Good, HSG D
	3.145	95	Weighted Average
	0.470		14.94% Pervious Area
	2.675		85.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
480.0					**Direct Entry, Turf Field Base Stone**

Subcatchment 3S: Sub-Catchment D - Athletic Field



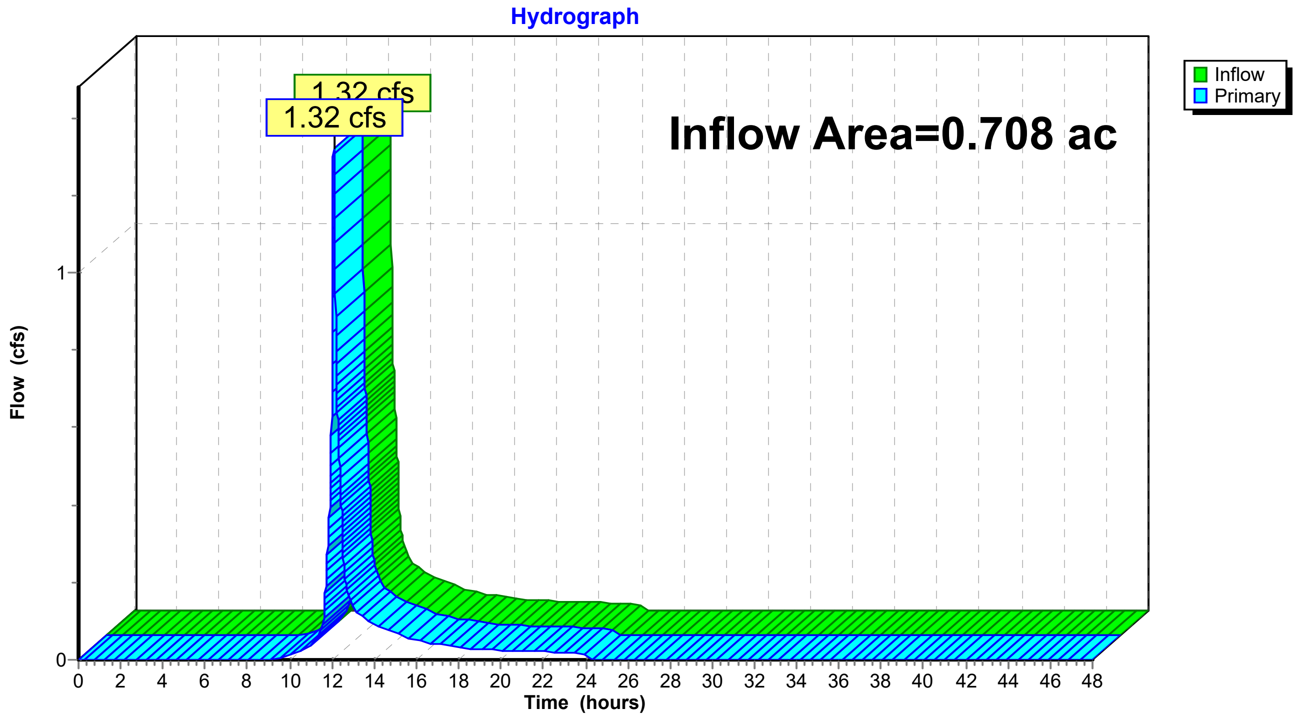
Summary for Pond 1P: Outfall # 1 - Resource Area Perimeter

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

Inflow Area =	0.708 ac,	0.00% Impervious, Inflow Depth = 1.57"	for 2-Year event
Inflow =	1.32 cfs @	12.08 hrs, Volume=	0.093 af
Primary =	1.32 cfs @	12.08 hrs, Volume=	0.093 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 1P: Outfall # 1 - Resource Area Perimeter



Summary for Pond 2P: Outfall #2 to CB

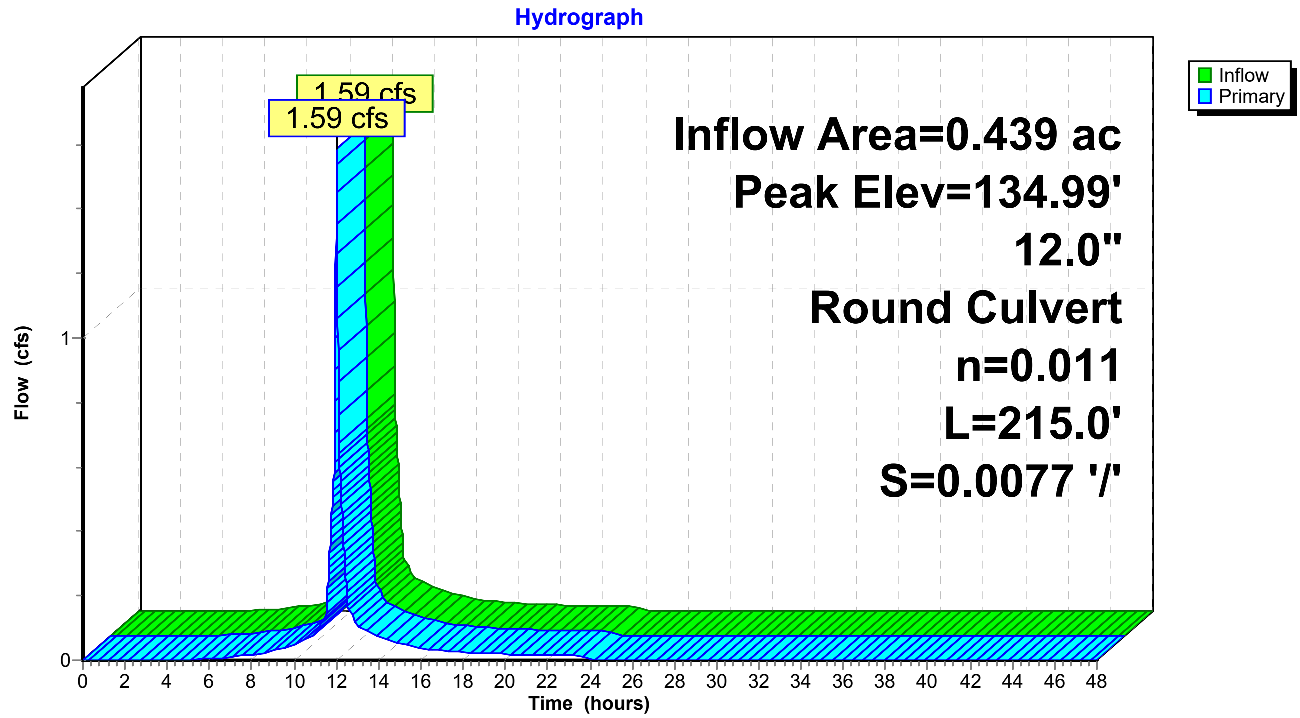
Inflow Area = 0.439 ac, 70.62% Impervious, Inflow Depth = 2.66" for 2-Year event
Inflow = 1.59 cfs @ 12.01 hrs, Volume= 0.097 af
Outflow = 1.59 cfs @ 12.01 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min
Primary = 1.59 cfs @ 12.01 hrs, Volume= 0.097 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 134.99' @ 12.01 hrs
Flood Elev= 138.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	134.36'	**12.0" Round Culvert** L= 215.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.36' / 132.70' S= 0.0077 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.59 cfs @ 12.01 hrs HW=134.99' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.59 cfs @ 4.32 fps)

Pond 2P: Outfall #2 to CB



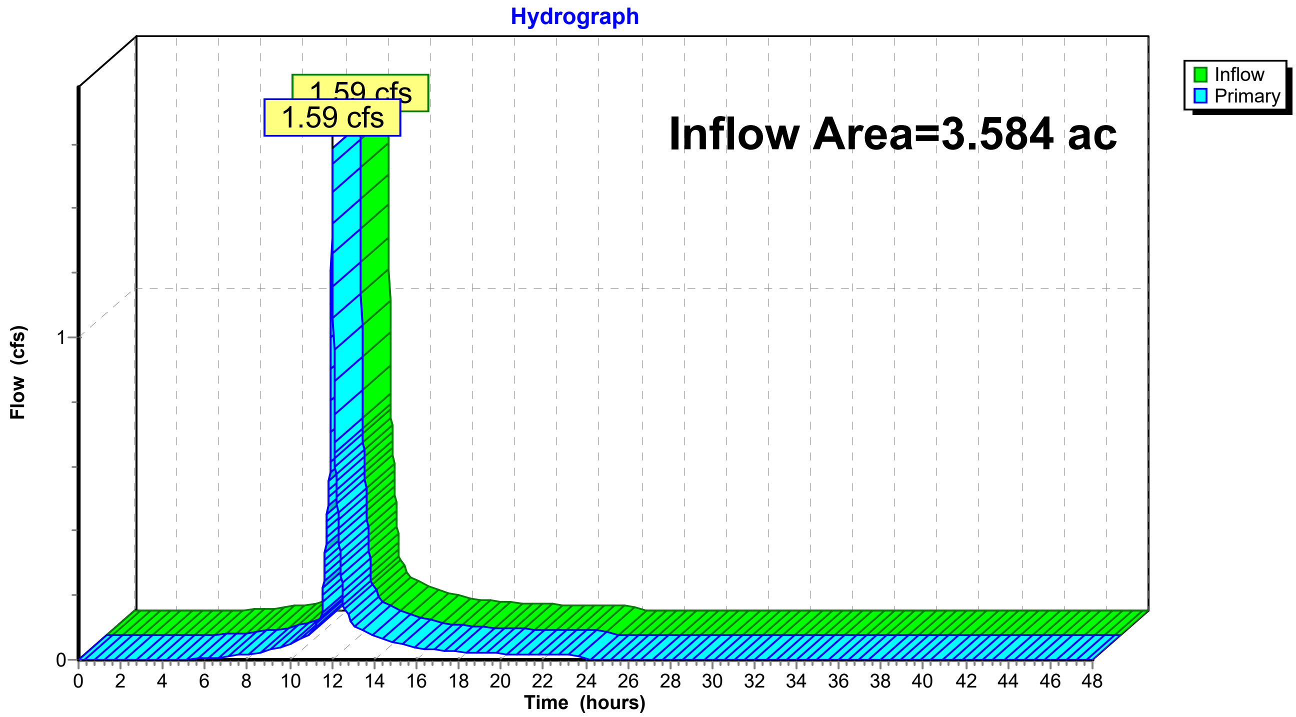
Summary for Pond 4P: Outfall # 4 - Resource Area North Corner

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

Inflow Area =	3.584 ac,	83.29% Impervious,	Inflow Depth = 0.33"	for 2-Year event
Inflow =	1.59 cfs @	12.01 hrs, Volume=	0.097 af	
Primary =	1.59 cfs @	12.01 hrs, Volume=	0.097 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 4P: Outfall # 4 - Resource Area North Corner



Summary for Pond 5P: DMH

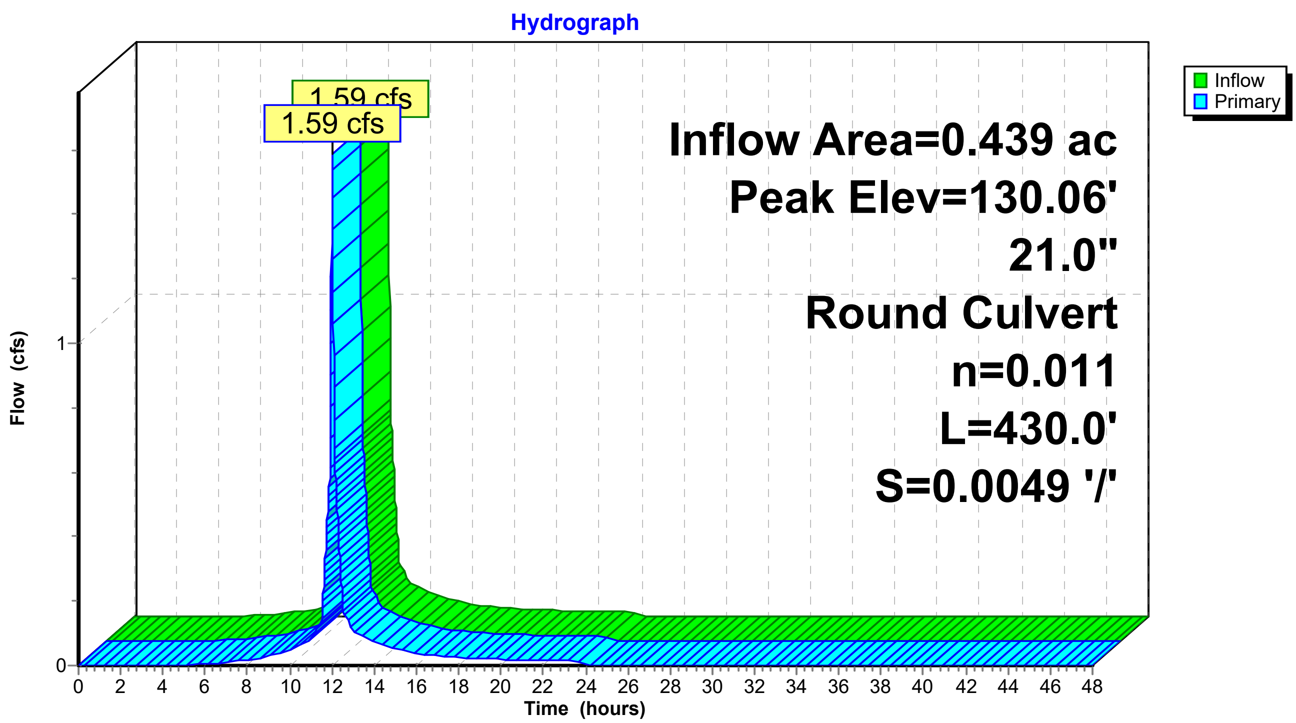
Inflow Area = 0.439 ac, 70.62% Impervious, Inflow Depth = 2.66" for 2-Year event
Inflow = 1.59 cfs @ 12.01 hrs, Volume= 0.097 af
Outflow = 1.59 cfs @ 12.01 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min
Primary = 1.59 cfs @ 12.01 hrs, Volume= 0.097 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 130.06' @ 12.01 hrs
Flood Elev= 138.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.50'	**21.0" Round Culvert** L= 430.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 129.50' / 127.39' S= 0.0049 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.41 sf

Primary OutFlow Max=1.58 cfs @ 12.01 hrs HW=130.05' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.58 cfs @ 3.61 fps)

Pond 5P: DMH



Summary for Pond 6P: Rain Garden

Inflow Area = 3.145 ac, 85.06% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 135.60' @ 0.00 hrs Surf.Area= 1,569 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	135.60'	858 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

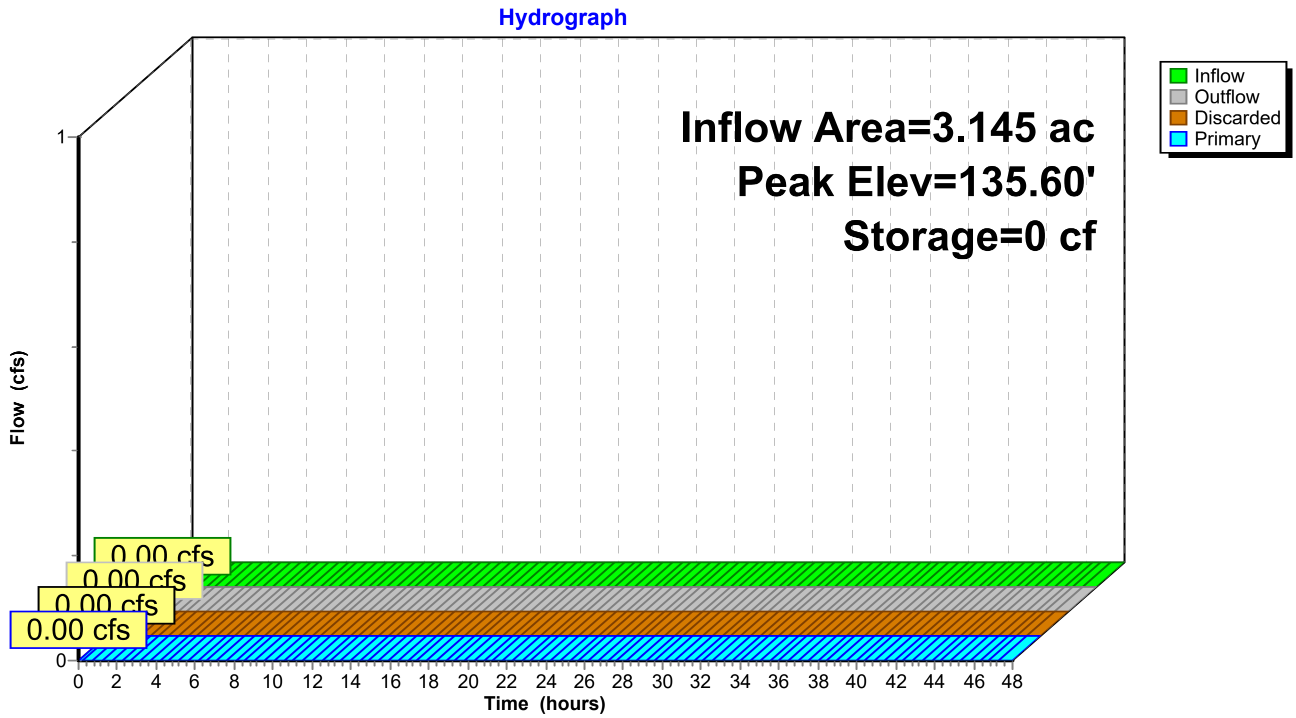
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.60	1,569	0	0
136.00	2,721	858	858

Device	Routing	Invert	Outlet Devices
#1	Primary	135.80'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	135.60'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 131.35'

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.60' (Free Discharge)
└─**2=Exfiltration** (Passes 0.00 cfs of 0.09 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.60' (Free Discharge)
└─**1=Orifice/Grate** (Controls 0.00 cfs)

Pond 6P: Rain Garden



Summary for Pond 7P: Synthetic Turf Field

Inflow Area = 3.145 ac, 85.06% Impervious, Inflow Depth > 2.86" for 2-Year event
Inflow = 0.96 cfs @ 18.14 hrs, Volume= 0.750 af
Outflow = 0.95 cfs @ 18.67 hrs, Volume= 0.750 af, Atten= 0%, Lag= 31.9 min
Discarded = 0.95 cfs @ 18.67 hrs, Volume= 0.750 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 135.78' @ 18.67 hrs Surf.Area= 56,000 sf Storage= 681 cf
Flood Elev= 137.95' Surf.Area= 104,136 sf Storage= 58,426 cf

Plug-Flow detention time= 11.9 min calculated for 0.750 af (100% of inflow)
Center-of-Mass det. time= 11.9 min (1,233.6 - 1,221.7)

Volume	Invert	Avail.Storage	Storage Description
#1	135.75'	145,869 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 364,673 cf Overall x 40.0% Voids

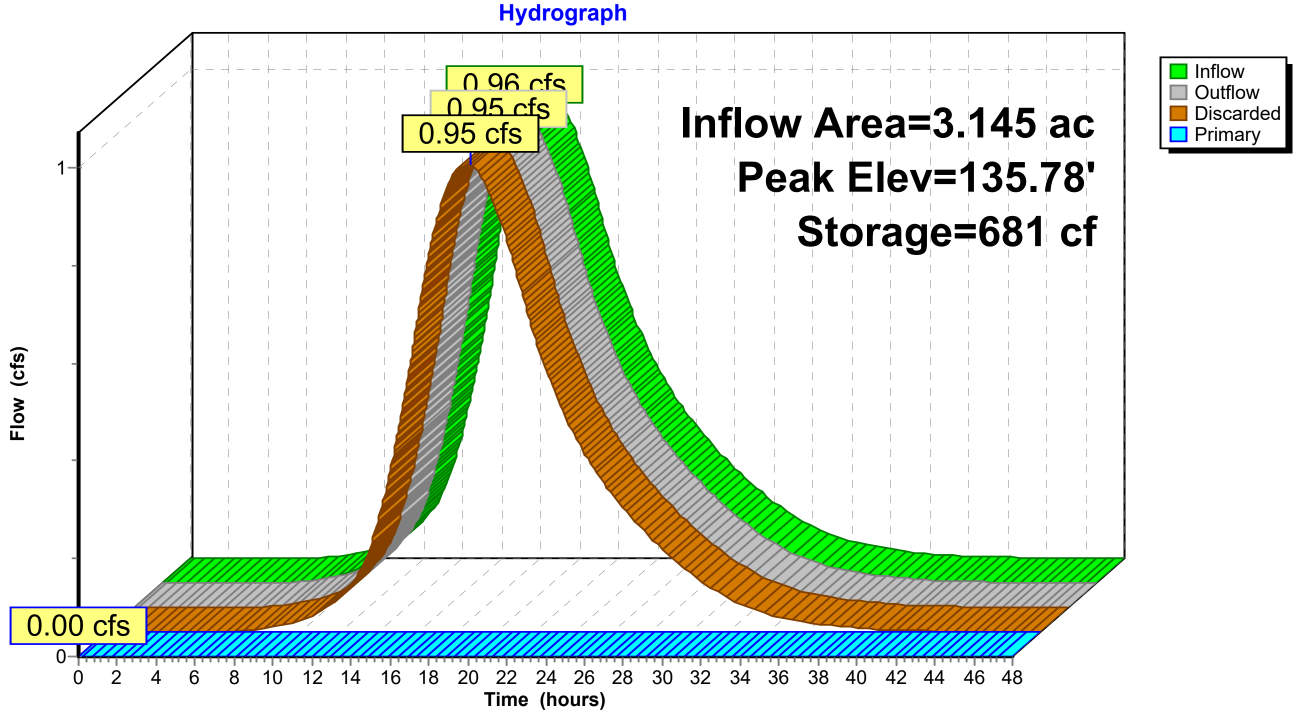
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.75	56,000	0	0
136.00	56,000	14,000	14,000
137.00	56,000	56,000	70,000
138.00	106,669	81,335	151,335
139.00	106,669	106,669	258,004
140.00	106,669	106,669	364,673

Device	Routing	Invert	Outlet Devices
#1	Primary	136.14'	**12.0" Round Culvert** L= 23.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 136.14' / 136.00' S= 0.0061 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	135.75'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 131.35'
#3	Primary	137.95'	**14.5' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=1.33 cfs @ 18.67 hrs HW=135.78' (Free Discharge)
└─**2=Exfiltration** (Controls 1.33 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.75' (Free Discharge)
├─**1=Culvert** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Synthetic Turf Field



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Sub-Catchment 1 Runoff Area=0.708 ac 0.00% Impervious Runoff Depth=2.97"
Flow Length=77' Slope=0.0520 '/' Tc=5.5 min CN=80 Runoff=2.51 cfs 0.175 af

Subcatchment 2S: Sub-Catchment 2 Runoff Area=0.439 ac 70.62% Impervious Runoff Depth=4.29"
Flow Length=153' Tc=0.7 min CN=93 Runoff=2.50 cfs 0.157 af

Subcatchment 3S: Sub-Catchment D - Runoff Area=3.145 ac 85.06% Impervious Runoff Depth>4.51"
Tc=480.0 min CN=95 Runoff=1.49 cfs 1.182 af

Pond 1P: Outfall # 1 - Resource Area Perimeter Inflow=2.51 cfs 0.175 af
Primary=2.51 cfs 0.175 af

Pond 2P: Outfall #2 to CB Peak Elev=135.20' Inflow=2.50 cfs 0.157 af
12.0" Round Culvert n=0.011 L=215.0' S=0.0077 '/' Outflow=2.50 cfs 0.157 af

Pond 4P: Outfall # 4 - Resource Area North Corner Inflow=2.50 cfs 0.157 af
Primary=2.50 cfs 0.157 af

Pond 5P: DMH Peak Elev=130.20' Inflow=2.50 cfs 0.157 af
21.0" Round Culvert n=0.011 L=430.0' S=0.0049 '/' Outflow=2.50 cfs 0.157 af

Pond 6P: Rain Garden Peak Elev=135.60' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 7P: Synthetic Turf Field Peak Elev=135.84' Storage=2,005 cf Inflow=1.49 cfs 1.182 af
Discarded=1.35 cfs 1.182 af Primary=0.00 cfs 0.000 af Outflow=1.35 cfs 1.182 af

Total Runoff Area = 4.292 ac Runoff Volume = 1.514 af Average Runoff Depth = 4.23"
30.45% Pervious = 1.307 ac 69.55% Impervious = 2.985 ac

Summary for Subcatchment 1S: Sub-Catchment 1

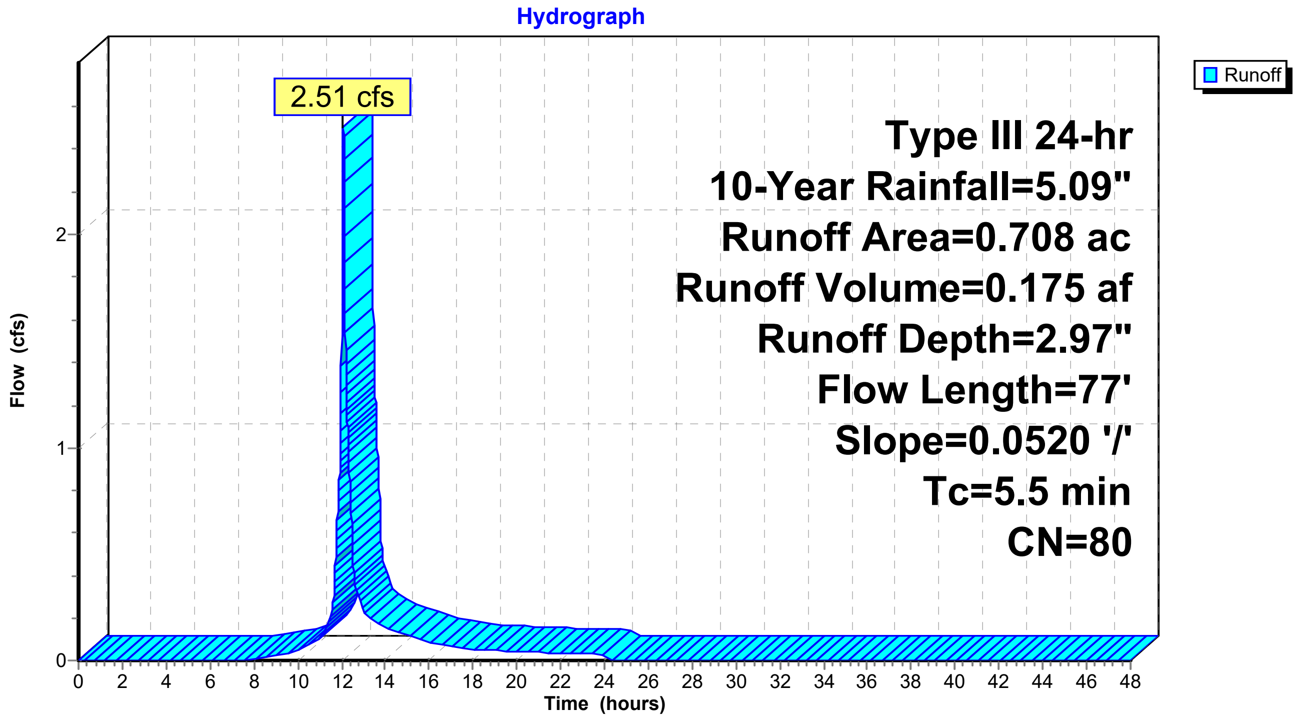
Runoff = 2.51 cfs @ 12.08 hrs, Volume= 0.175 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.09"

Area (ac)	CN	Description
0.708	80	>75% Grass cover, Good, HSG D
0.708		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	77	0.0520	0.23		**Sheet Flow, Grass Area** Grass: Short n= 0.150 P2= 3.10"

Subcatchment 1S: Sub-Catchment 1



Summary for Subcatchment 2S: Sub-Catchment 2

[49] Hint: Tc<2dt may require smaller dt

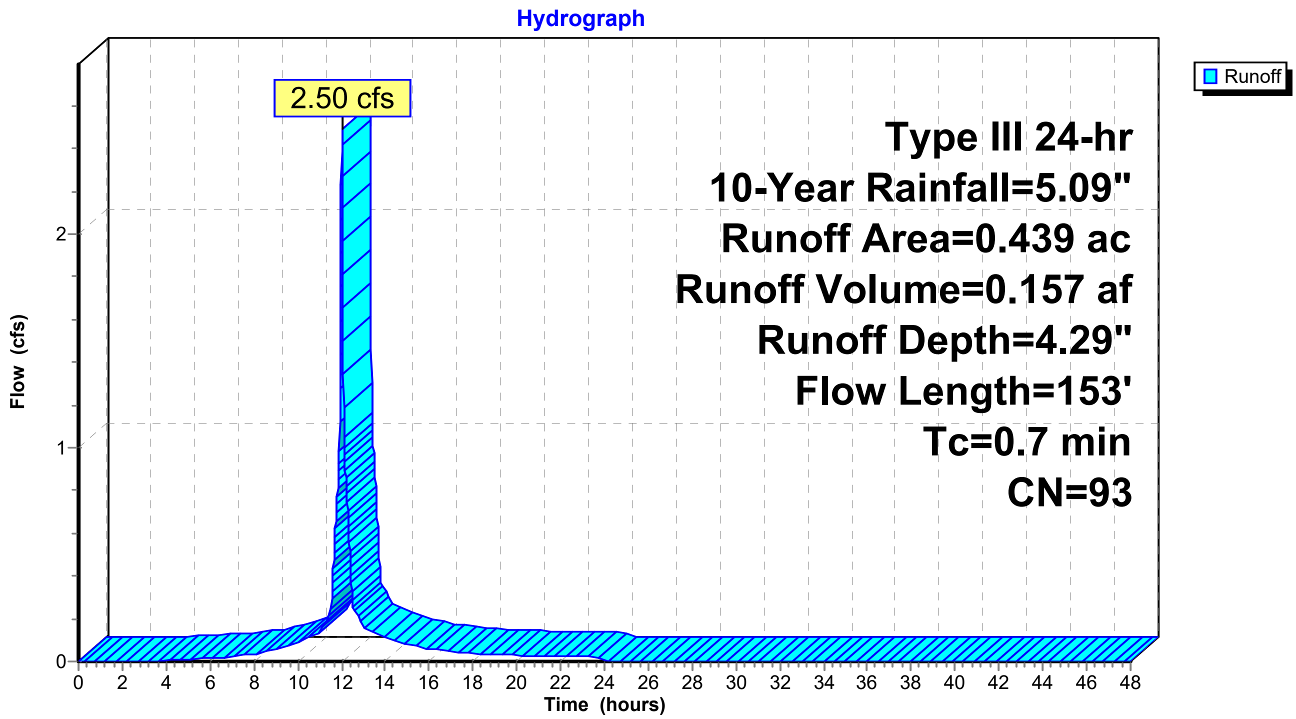
Runoff = 2.50 cfs @ 12.01 hrs, Volume= 0.157 af, Depth= 4.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.09"

Area (ac)	CN	Description
0.310	98	Unconnected pavement, HSG D
0.129	80	>75% Grass cover, Good, HSG D
0.439	93	Weighted Average
0.129		29.38% Pervious Area
0.310		70.62% Impervious Area
0.310		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0800	2.05		**Sheet Flow, Grass Hill** Smooth surfaces n= 0.011 P2= 3.10"
0.3	103	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	153	Total			

Subcatchment 2S: Sub-Catchment 2



Summary for Subcatchment 3S: Sub-Catchment D - Athletic Field

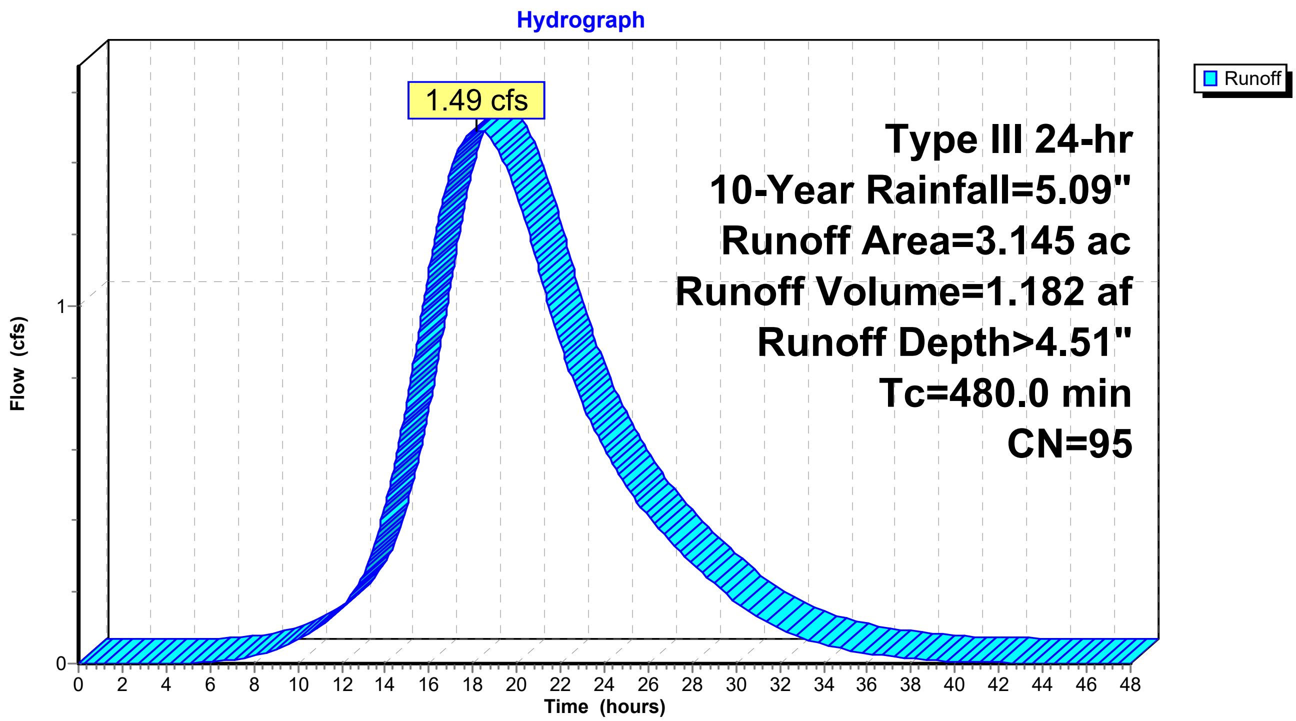
Runoff = 1.49 cfs @ 18.14 hrs, Volume= 1.182 af, Depth> 4.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.09"

	Area (ac)	CN	Description
	0.254	98	Paved parking, HSG D
*	2.421	98	Synthetic Turf
	0.470	80	>75% Grass cover, Good, HSG D
	3.145	95	Weighted Average
	0.470		14.94% Pervious Area
	2.675		85.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
480.0					**Direct Entry, Turf Field Base Stone**

Subcatchment 3S: Sub-Catchment D - Athletic Field



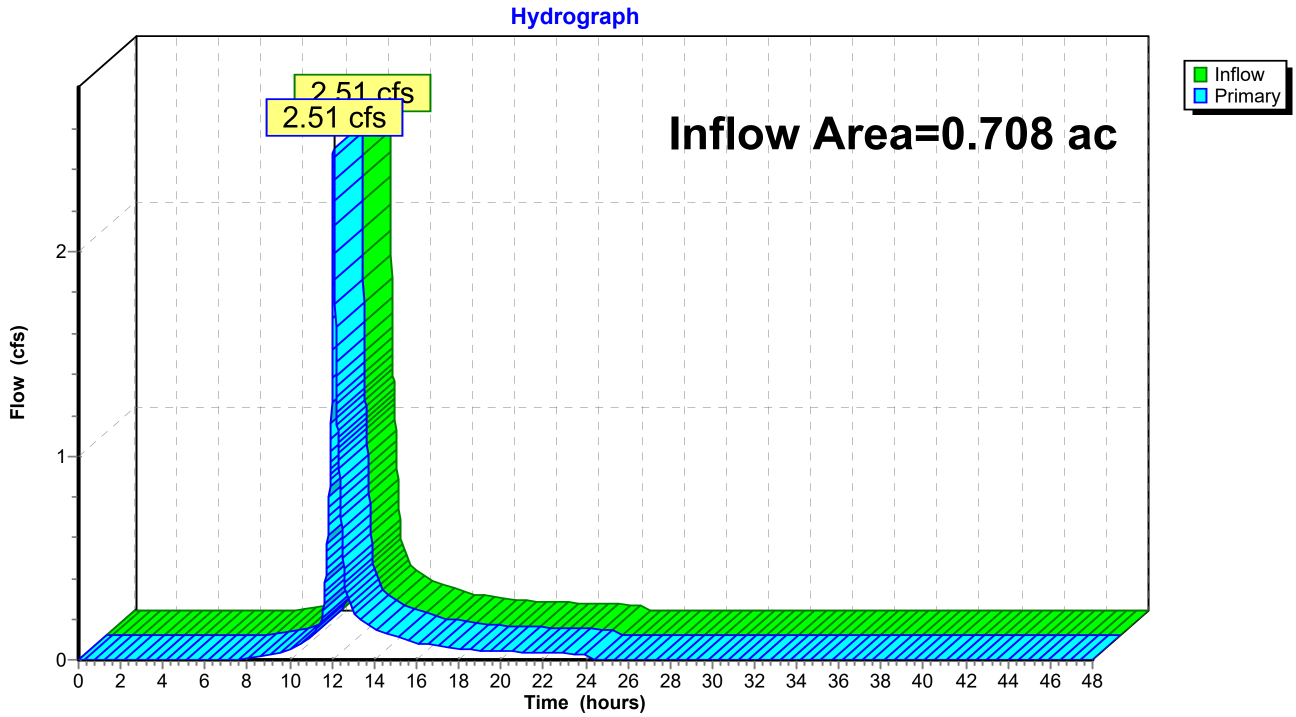
Summary for Pond 1P: Outfall # 1 - Resource Area Perimeter

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

Inflow Area = 0.708 ac, 0.00% Impervious, Inflow Depth = 2.97" for 10-Year event
Inflow = 2.51 cfs @ 12.08 hrs, Volume= 0.175 af
Primary = 2.51 cfs @ 12.08 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 1P: Outfall # 1 - Resource Area Perimeter



Summary for Pond 2P: Outfall #2 to CB

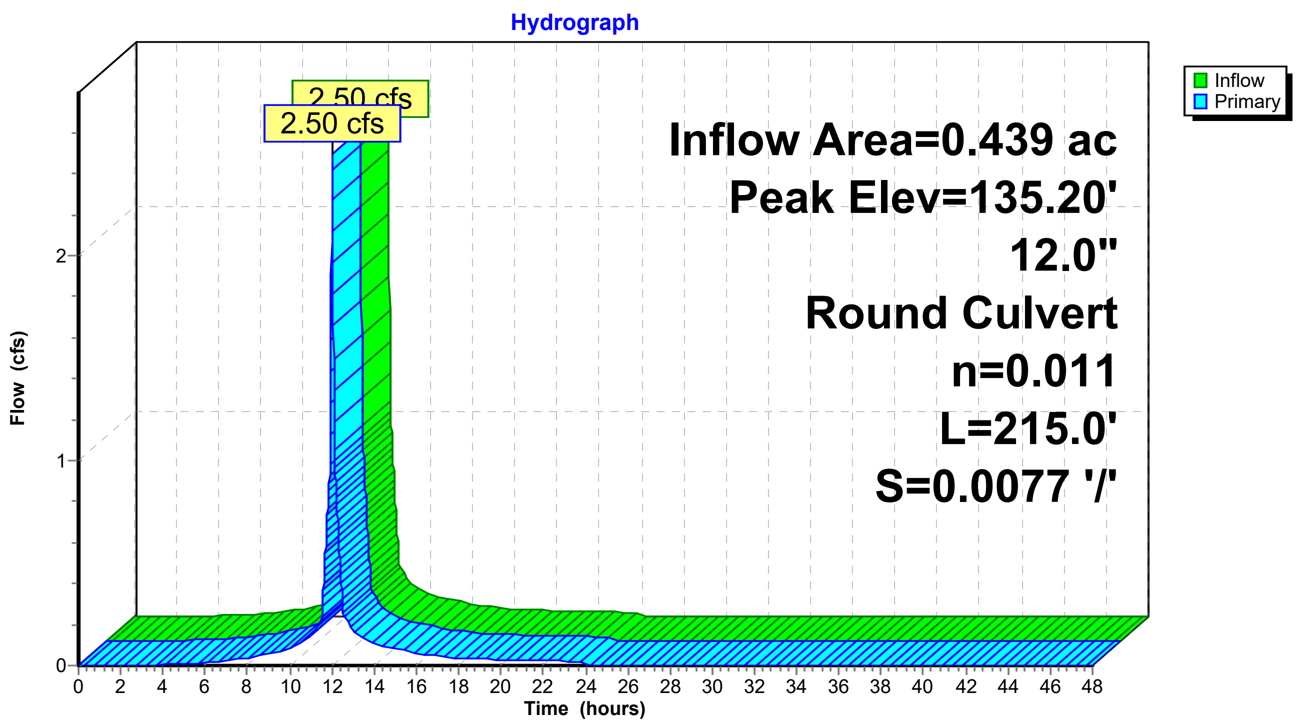
Inflow Area = 0.439 ac, 70.62% Impervious, Inflow Depth = 4.29" for 10-Year event
Inflow = 2.50 cfs @ 12.01 hrs, Volume= 0.157 af
Outflow = 2.50 cfs @ 12.01 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min
Primary = 2.50 cfs @ 12.01 hrs, Volume= 0.157 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 135.20' @ 12.01 hrs
Flood Elev= 138.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	134.36'	**12.0" Round Culvert** L= 215.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.36' / 132.70' S= 0.0077 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.49 cfs @ 12.01 hrs HW=135.20' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 2.49 cfs @ 4.78 fps)

Pond 2P: Outfall #2 to CB



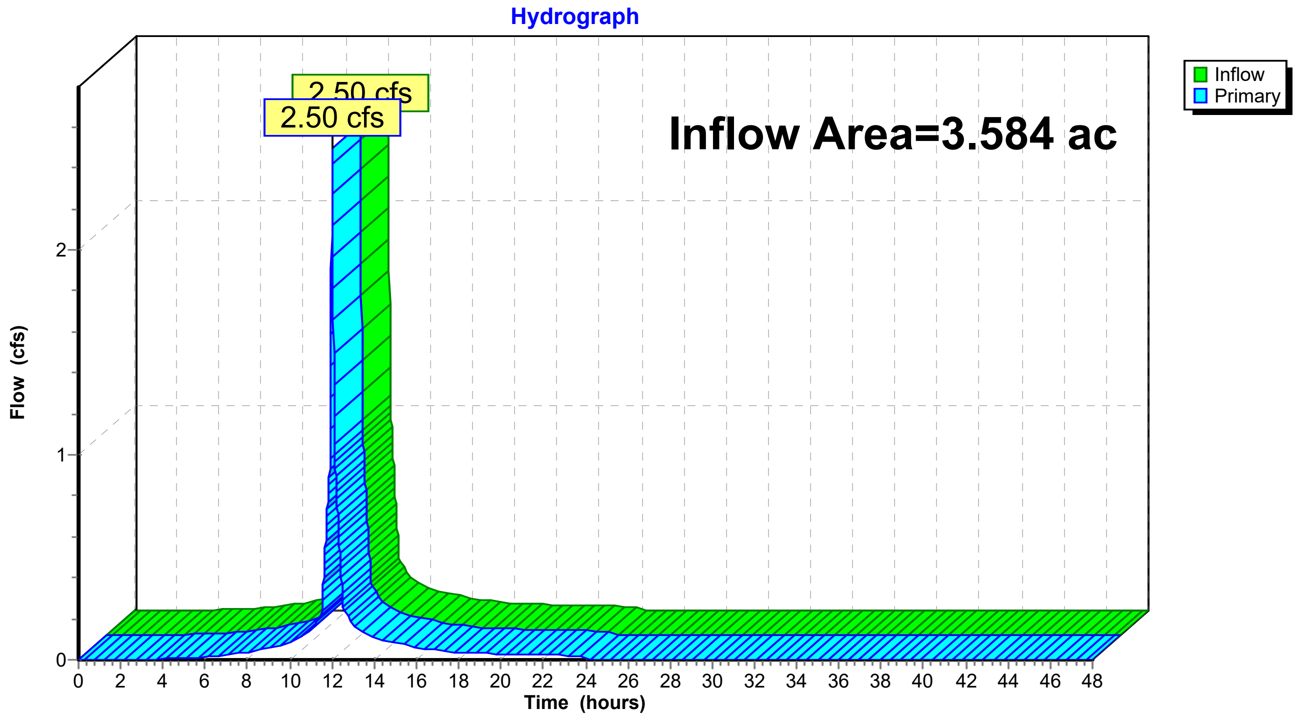
Summary for Pond 4P: Outfall # 4 - Resource Area North Corner

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

Inflow Area = 3.584 ac, 83.29% Impervious, Inflow Depth = 0.53" for 10-Year event
Inflow = 2.50 cfs @ 12.01 hrs, Volume= 0.157 af
Primary = 2.50 cfs @ 12.01 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 4P: Outfall # 4 - Resource Area North Corner



Summary for Pond 5P: DMH

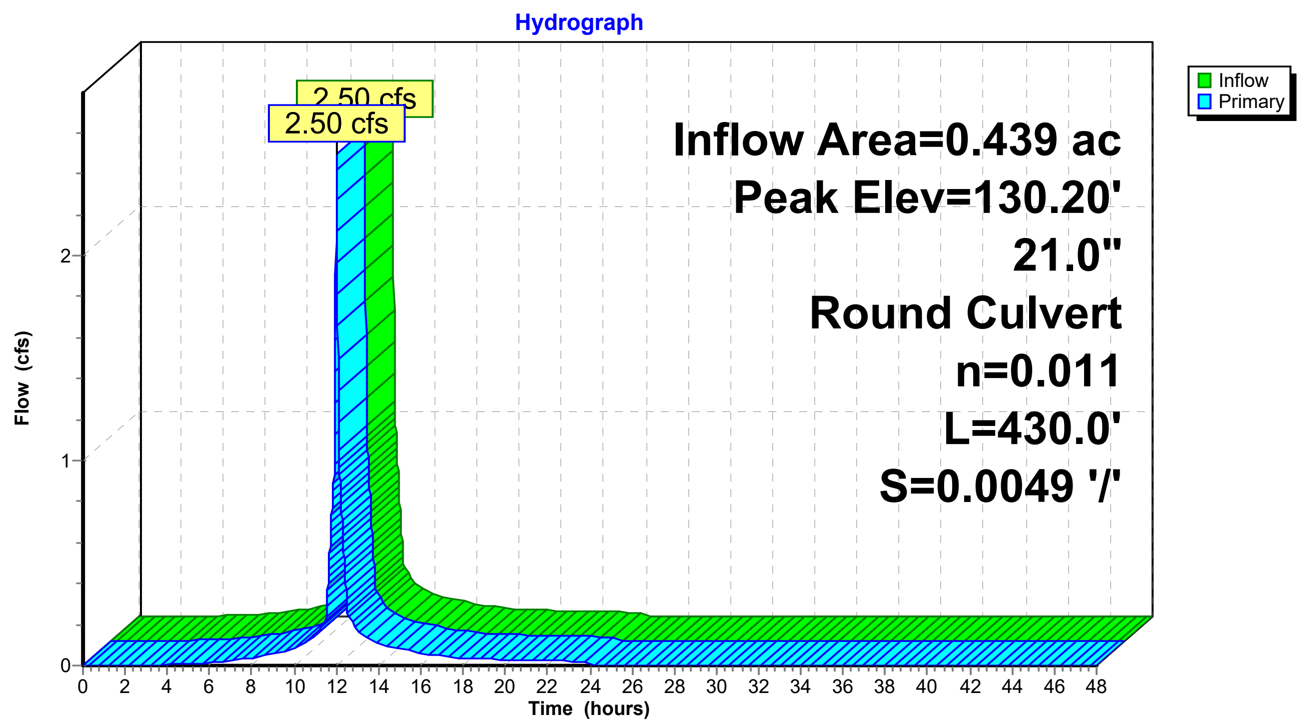
Inflow Area = 0.439 ac, 70.62% Impervious, Inflow Depth = 4.29" for 10-Year event
Inflow = 2.50 cfs @ 12.01 hrs, Volume= 0.157 af
Outflow = 2.50 cfs @ 12.01 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min
Primary = 2.50 cfs @ 12.01 hrs, Volume= 0.157 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 130.20' @ 12.01 hrs
Flood Elev= 138.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.50'	**21.0" Round Culvert** L= 430.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 129.50' / 127.39' S= 0.0049 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.41 sf

Primary OutFlow Max=2.48 cfs @ 12.01 hrs HW=130.20' (Free Discharge)
↑**1=Culvert** (Barrel Controls 2.48 cfs @ 4.09 fps)

Pond 5P: DMH



Summary for Pond 6P: Rain Garden

Inflow Area = 3.145 ac, 85.06% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 135.60' @ 0.00 hrs Surf.Area= 1,569 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	135.60'	858 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

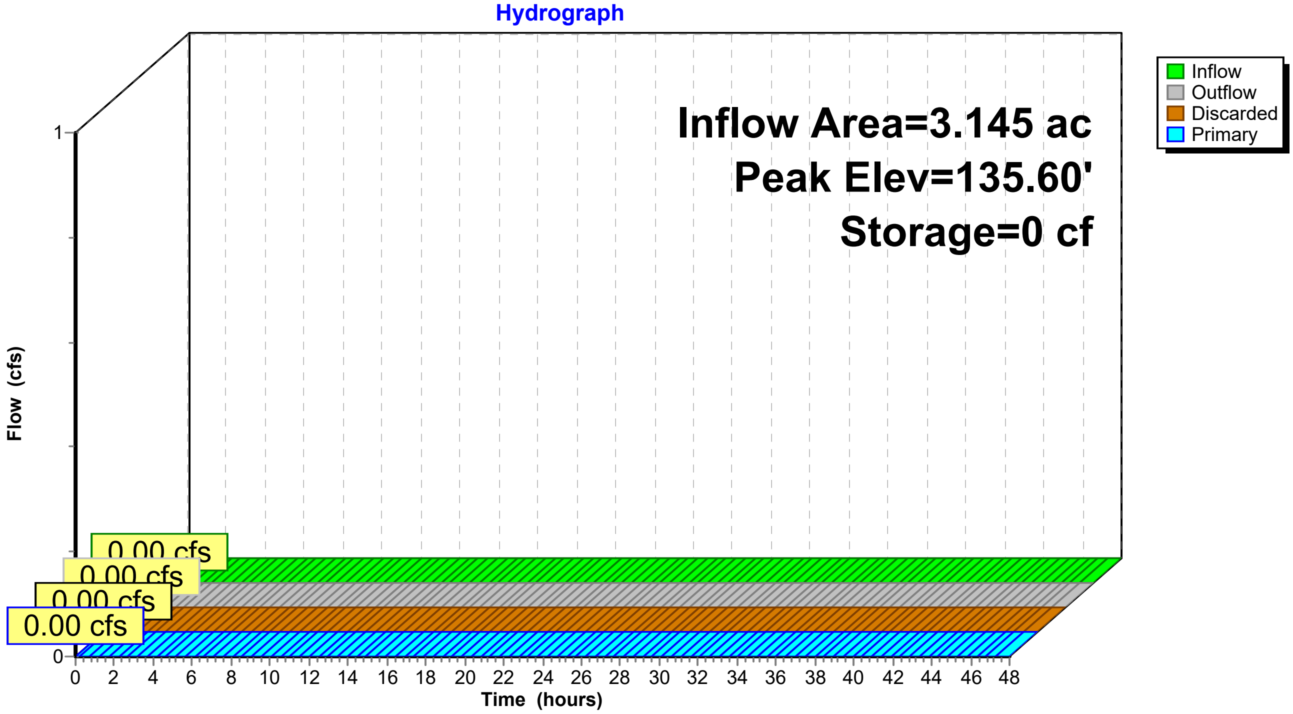
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.60	1,569	0	0
136.00	2,721	858	858

Device	Routing	Invert	Outlet Devices
#1	Primary	135.80'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	135.60'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 131.35'

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.60' (Free Discharge)
└─**2=Exfiltration** (Passes 0.00 cfs of 0.09 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.60' (Free Discharge)
└─**1=Orifice/Grate** (Controls 0.00 cfs)

Pond 6P: Rain Garden



Summary for Pond 7P: Synthetic Turf Field

Inflow Area = 3.145 ac, 85.06% Impervious, Inflow Depth > 4.51" for 10-Year event
Inflow = 1.49 cfs @ 18.14 hrs, Volume= 1.182 af
Outflow = 1.35 cfs @ 19.78 hrs, Volume= 1.182 af, Atten= 10%, Lag= 98.3 min
Discarded = 1.35 cfs @ 19.78 hrs, Volume= 1.182 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 135.84' @ 19.78 hrs Surf.Area= 56,000 sf Storage= 2,005 cf
Flood Elev= 137.95' Surf.Area= 104,136 sf Storage= 58,426 cf

Plug-Flow detention time= 15.2 min calculated for 1.181 af (100% of inflow)
Center-of-Mass det. time= 15.2 min (1,225.6 - 1,210.4)

Volume	Invert	Avail.Storage	Storage Description
#1	135.75'	145,869 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 364,673 cf Overall x 40.0% Voids

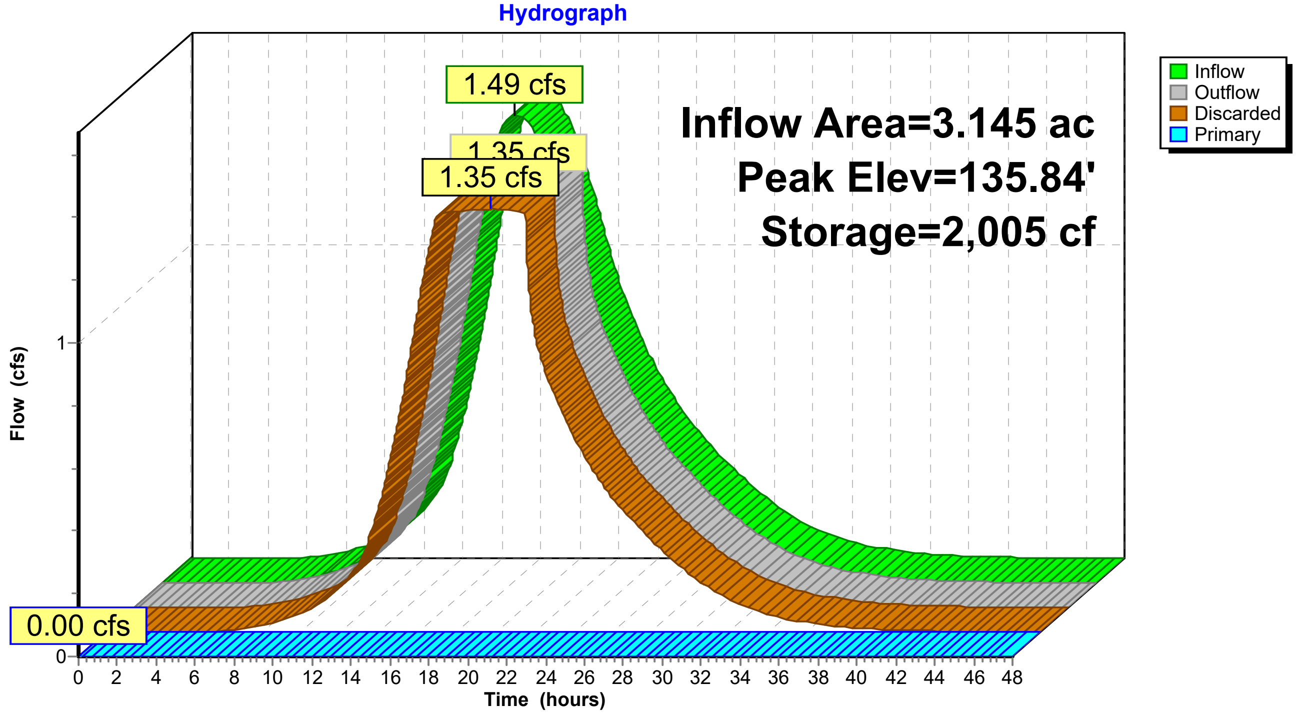
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.75	56,000	0	0
136.00	56,000	14,000	14,000
137.00	56,000	56,000	70,000
138.00	106,669	81,335	151,335
139.00	106,669	106,669	258,004
140.00	106,669	106,669	364,673

Device	Routing	Invert	Outlet Devices
#1	Primary	136.14'	**12.0" Round Culvert** L= 23.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 136.14' / 136.00' S= 0.0061 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	135.75'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 131.35'
#3	Primary	137.95'	**14.5' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=1.35 cfs @ 19.78 hrs HW=135.84' (Free Discharge)
└─**2=Exfiltration** (Controls 1.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.75' (Free Discharge)
├─**1=Culvert** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Synthetic Turf Field



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Sub-Catchment 1 Runoff Area=0.708 ac 0.00% Impervious Runoff Depth=3.90"
Flow Length=77' Slope=0.0520 '/' Tc=5.5 min CN=80 Runoff=3.28 cfs 0.230 af

Subcatchment 2S: Sub-Catchment 2 Runoff Area=0.439 ac 70.62% Impervious Runoff Depth=5.31"
Flow Length=153' Tc=0.7 min CN=93 Runoff=3.06 cfs 0.194 af

Subcatchment 3S: Sub-Catchment D - Runoff Area=3.145 ac 85.06% Impervious Runoff Depth>5.54"
Tc=480.0 min CN=95 Runoff=1.82 cfs 1.452 af

Pond 1P: Outfall # 1 - Resource Area Perimeter Inflow=3.28 cfs 0.230 af
Primary=3.28 cfs 0.230 af

Pond 2P: Outfall #2 to CB Peak Elev=135.34' Inflow=3.06 cfs 0.194 af
12.0" Round Culvert n=0.011 L=215.0' S=0.0077 '/' Outflow=3.06 cfs 0.194 af

Pond 4P: Outfall # 4 - Resource Area North Corner Inflow=3.06 cfs 0.194 af
Primary=3.06 cfs 0.194 af

Pond 5P: DMH Peak Elev=130.28' Inflow=3.06 cfs 0.194 af
21.0" Round Culvert n=0.011 L=430.0' S=0.0049 '/' Outflow=3.06 cfs 0.194 af

Pond 6P: Rain Garden Peak Elev=135.60' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 7P: Synthetic Turf Field Peak Elev=136.02' Storage=6,097 cf Inflow=1.82 cfs 1.452 af
Discarded=1.40 cfs 1.452 af Primary=0.00 cfs 0.000 af Outflow=1.40 cfs 1.452 af

Total Runoff Area = 4.292 ac Runoff Volume = 1.876 af Average Runoff Depth = 5.25"
30.45% Pervious = 1.307 ac 69.55% Impervious = 2.985 ac

Summary for Subcatchment 1S: Sub-Catchment 1

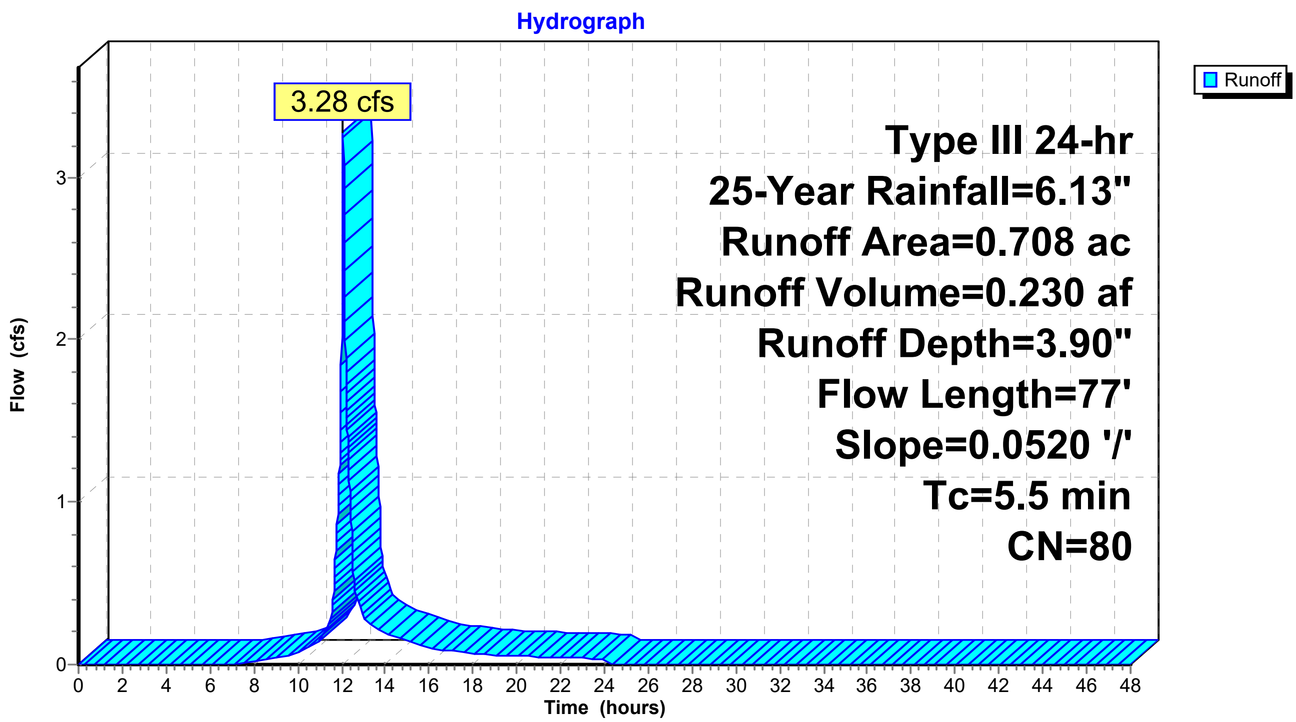
Runoff = 3.28 cfs @ 12.08 hrs, Volume= 0.230 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.13"

Area (ac)	CN	Description
0.708	80	>75% Grass cover, Good, HSG D
0.708		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	77	0.0520	0.23		**Sheet Flow, Grass Area** Grass: Short n= 0.150 P2= 3.10"

Subcatchment 1S: Sub-Catchment 1



Summary for Subcatchment 2S: Sub-Catchment 2

[49] Hint: Tc<2dt may require smaller dt

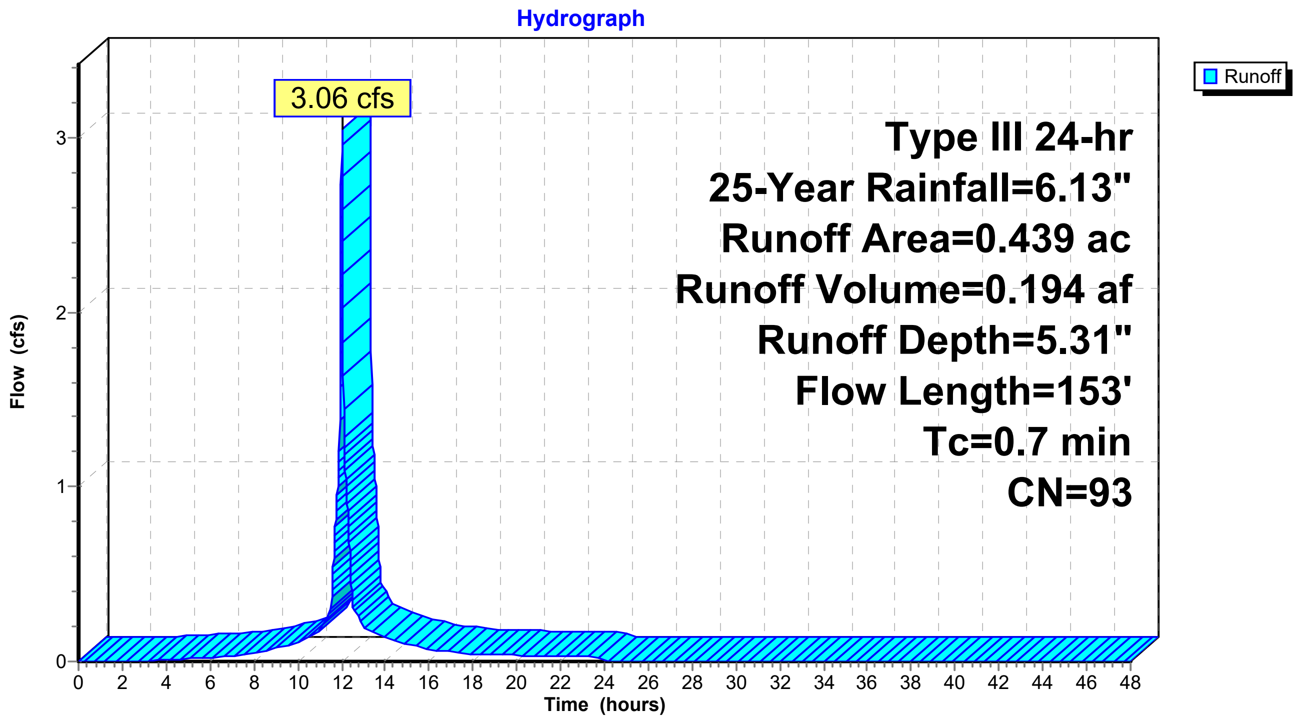
Runoff = 3.06 cfs @ 12.01 hrs, Volume= 0.194 af, Depth= 5.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.13"

Area (ac)	CN	Description
0.310	98	Unconnected pavement, HSG D
0.129	80	>75% Grass cover, Good, HSG D
0.439	93	Weighted Average
0.129		29.38% Pervious Area
0.310		70.62% Impervious Area
0.310		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0800	2.05		**Sheet Flow, Grass Hill** Smooth surfaces n= 0.011 P2= 3.10"
0.3	103	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	153	Total			

Subcatchment 2S: Sub-Catchment 2



Summary for Subcatchment 3S: Sub-Catchment D - Athletic Field

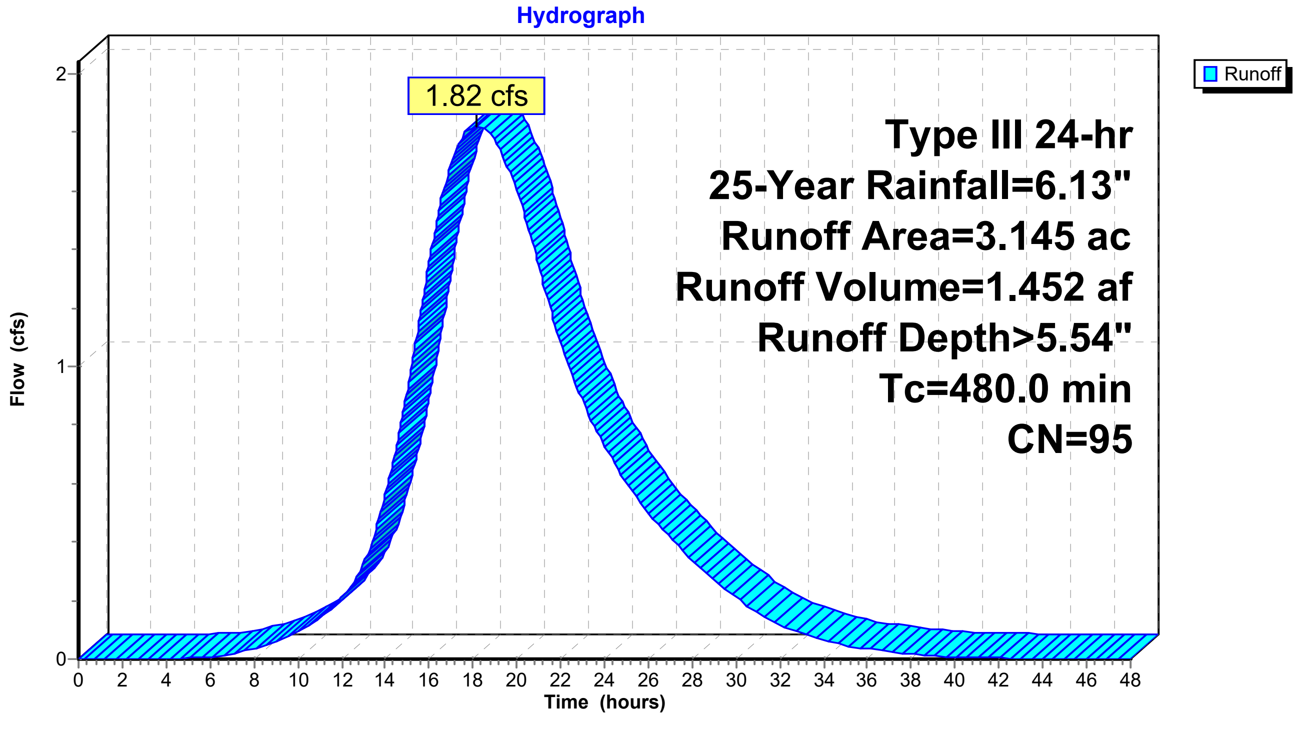
Runoff = 1.82 cfs @ 18.14 hrs, Volume= 1.452 af, Depth> 5.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.13"

	Area (ac)	CN	Description
	0.254	98	Paved parking, HSG D
*	2.421	98	Synthetic Turf
	0.470	80	>75% Grass cover, Good, HSG D
	3.145	95	Weighted Average
	0.470		14.94% Pervious Area
	2.675		85.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
480.0					**Direct Entry, Turf Field Base Stone**

Subcatchment 3S: Sub-Catchment D - Athletic Field



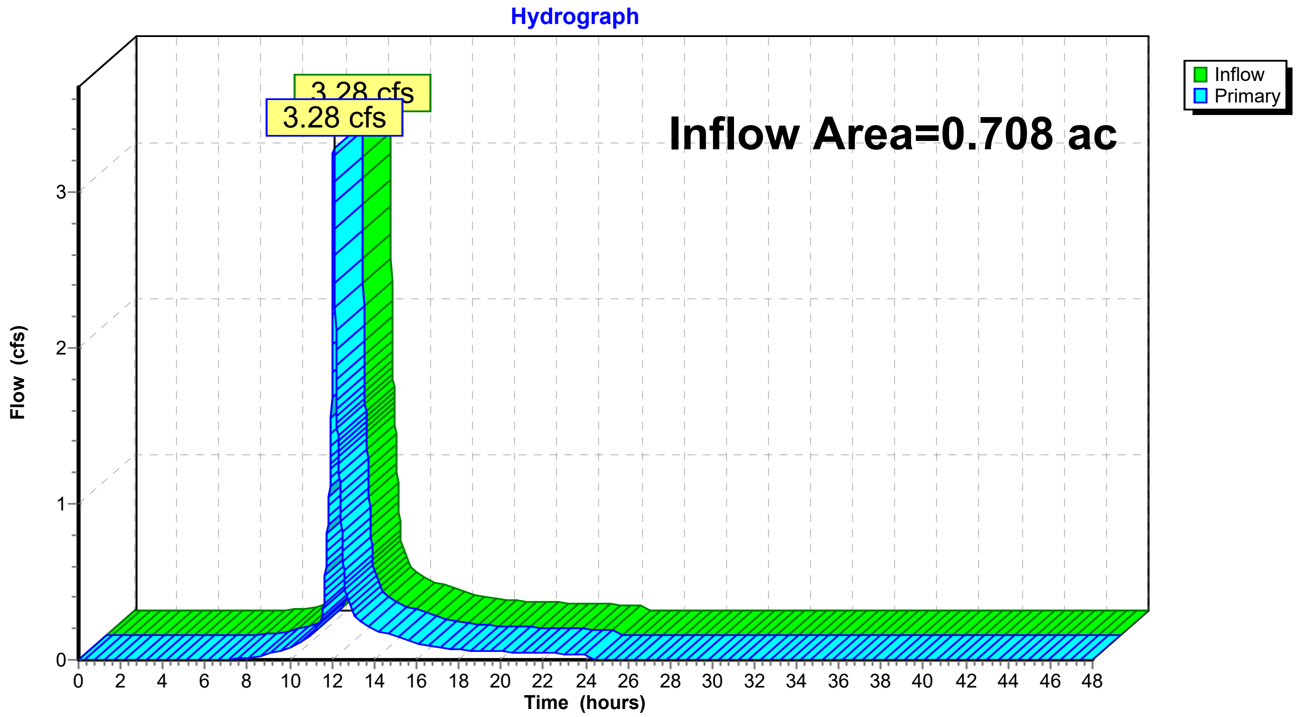
Summary for Pond 1P: Outfall # 1 - Resource Area Perimeter

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

Inflow Area = 0.708 ac, 0.00% Impervious, Inflow Depth = 3.90" for 25-Year event
Inflow = 3.28 cfs @ 12.08 hrs, Volume= 0.230 af
Primary = 3.28 cfs @ 12.08 hrs, Volume= 0.230 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 1P: Outfall # 1 - Resource Area Perimeter



Summary for Pond 2P: Outfall #2 to CB

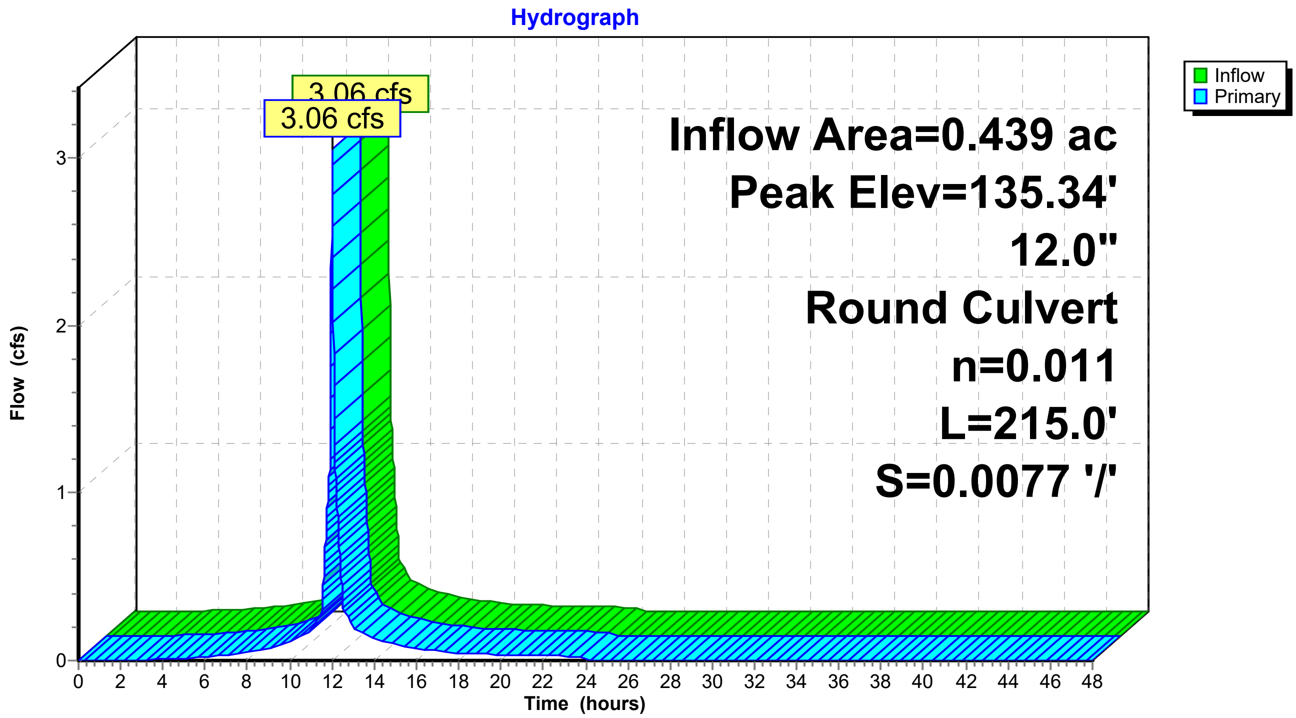
Inflow Area =	0.439 ac,	70.62% Impervious,	Inflow Depth = 5.31"	for 25-Year event
Inflow =	3.06 cfs @	12.01 hrs, Volume=	0.194 af	
Outflow =	3.06 cfs @	12.01 hrs, Volume=	0.194 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.06 cfs @	12.01 hrs, Volume=	0.194 af	

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 135.34' @ 12.01 hrs
Flood Elev= 138.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	134.36'	**12.0" Round Culvert** L= 215.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.36' / 132.70' S= 0.0077 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.05 cfs @ 12.01 hrs HW=135.33' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.05 cfs @ 4.96 fps)

Pond 2P: Outfall #2 to CB



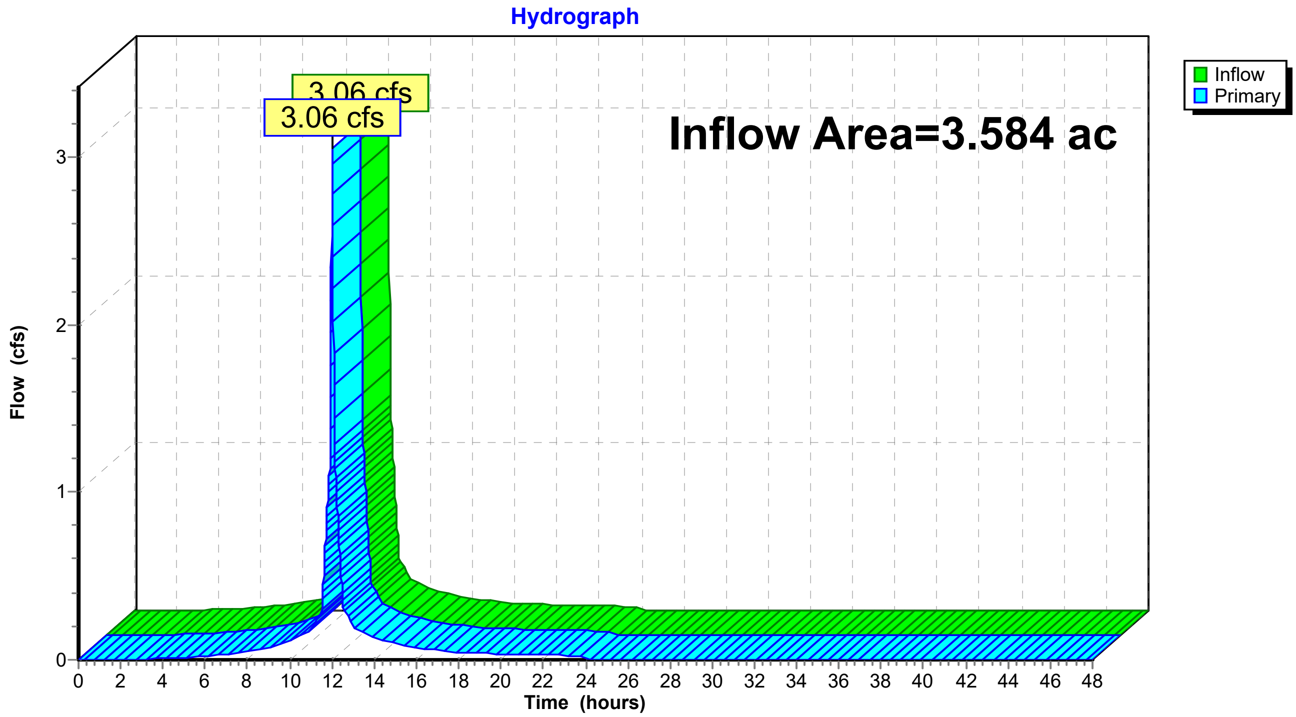
Summary for Pond 4P: Outfall # 4 - Resource Area North Corner

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

Inflow Area = 3.584 ac, 83.29% Impervious, Inflow Depth = 0.65" for 25-Year event
Inflow = 3.06 cfs @ 12.01 hrs, Volume= 0.194 af
Primary = 3.06 cfs @ 12.01 hrs, Volume= 0.194 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 4P: Outfall # 4 - Resource Area North Corner



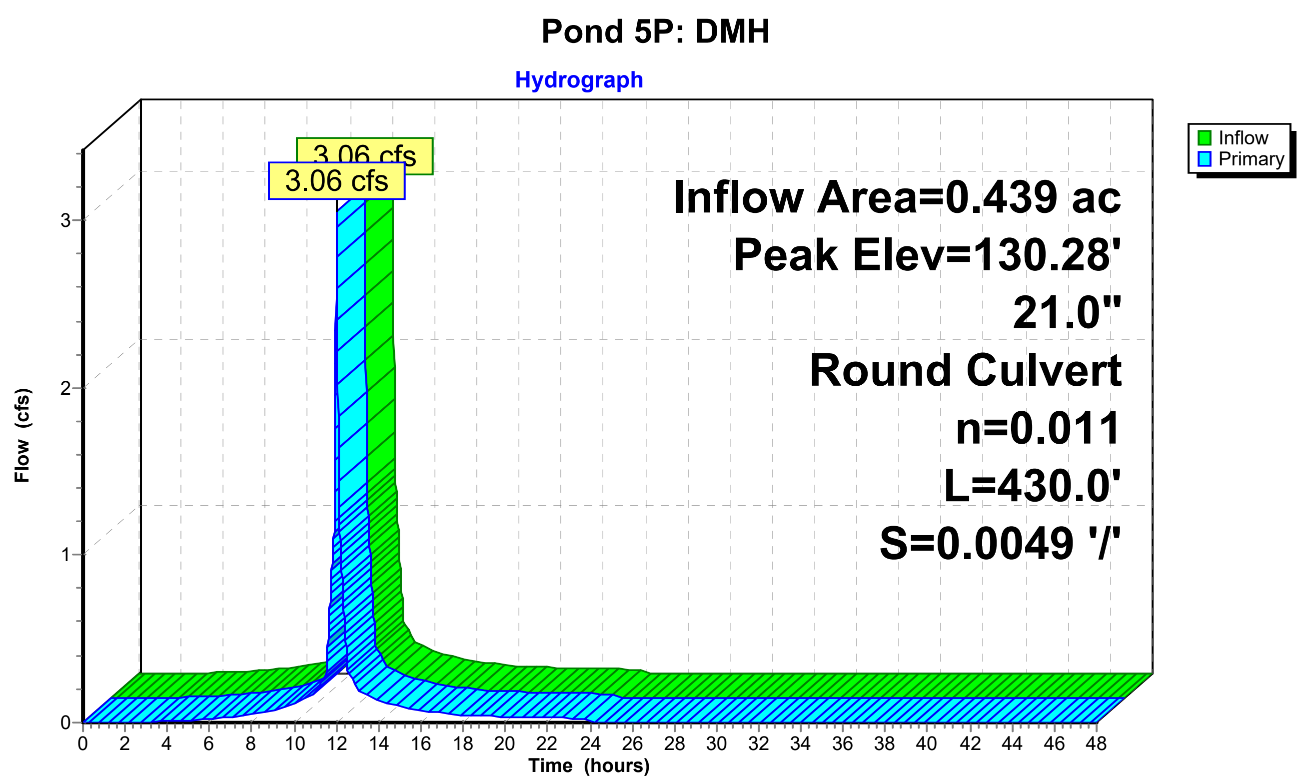
Summary for Pond 5P: DMH

Inflow Area = 0.439 ac, 70.62% Impervious, Inflow Depth = 5.31" for 25-Year event
Inflow = 3.06 cfs @ 12.01 hrs, Volume= 0.194 af
Outflow = 3.06 cfs @ 12.01 hrs, Volume= 0.194 af, Atten= 0%, Lag= 0.0 min
Primary = 3.06 cfs @ 12.01 hrs, Volume= 0.194 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 130.28' @ 12.01 hrs
Flood Elev= 138.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.50'	**21.0" Round Culvert** L= 430.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 129.50' / 127.39' S= 0.0049 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.41 sf

Primary OutFlow Max=3.04 cfs @ 12.01 hrs HW=130.28' (Free Discharge)
↑**1=Culvert** (Barrel Controls 3.04 cfs @ 4.32 fps)



Summary for Pond 6P: Rain Garden

Inflow Area = 3.145 ac, 85.06% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 135.60' @ 0.00 hrs Surf.Area= 1,569 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	135.60'	858 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

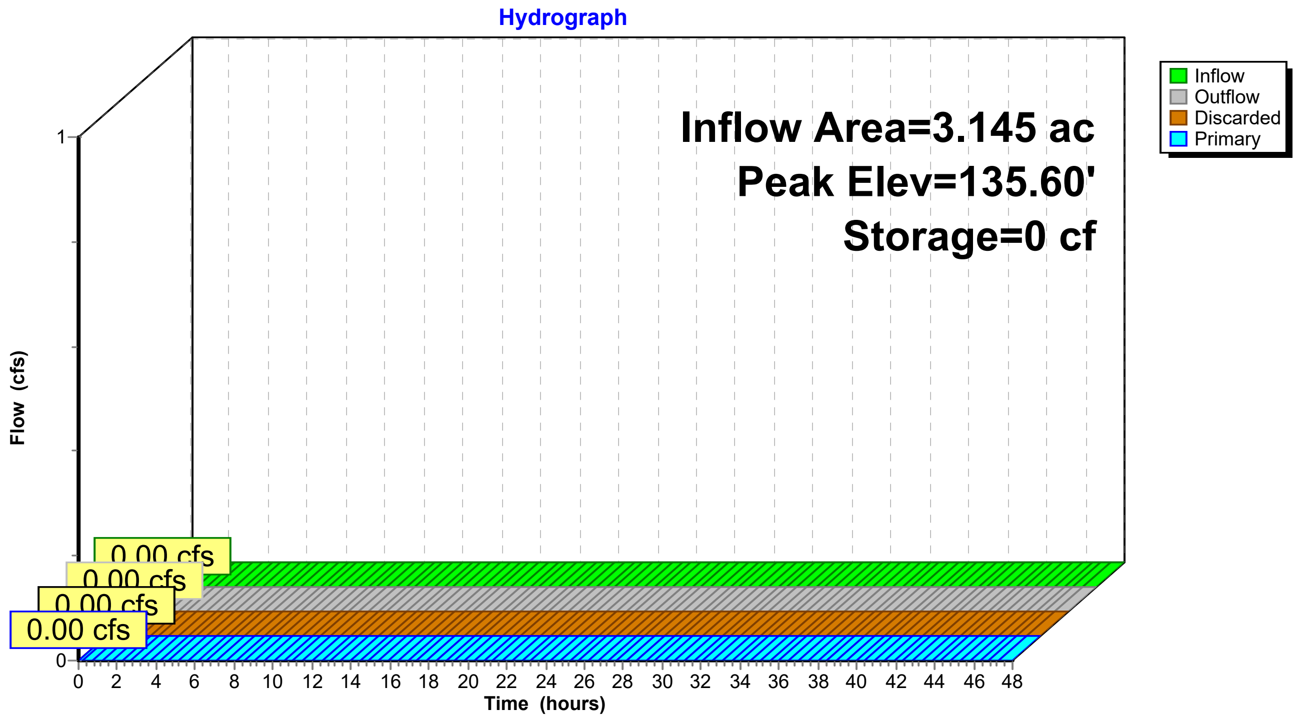
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.60	1,569	0	0
136.00	2,721	858	858

Device	Routing	Invert	Outlet Devices
#1	Primary	135.80'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	135.60'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 131.35'

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.60' (Free Discharge)
↑—**2=Exfiltration** (Passes 0.00 cfs of 0.09 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.60' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Pond 6P: Rain Garden



Summary for Pond 7P: Synthetic Turf Field

Inflow Area = 3.145 ac, 85.06% Impervious, Inflow Depth > 5.54" for 25-Year event
Inflow = 1.82 cfs @ 18.14 hrs, Volume= 1.452 af
Outflow = 1.40 cfs @ 20.80 hrs, Volume= 1.452 af, Atten= 23%, Lag= 159.7 min
Discarded = 1.40 cfs @ 20.80 hrs, Volume= 1.452 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 136.02' @ 20.80 hrs Surf.Area= 56,000 sf Storage= 6,097 cf
Flood Elev= 137.95' Surf.Area= 104,136 sf Storage= 58,426 cf

Plug-Flow detention time= 35.3 min calculated for 1.452 af (100% of inflow)
Center-of-Mass det. time= 35.3 min (1,241.1 - 1,205.7)

Volume	Invert	Avail.Storage	Storage Description
#1	135.75'	145,869 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 364,673 cf Overall x 40.0% Voids

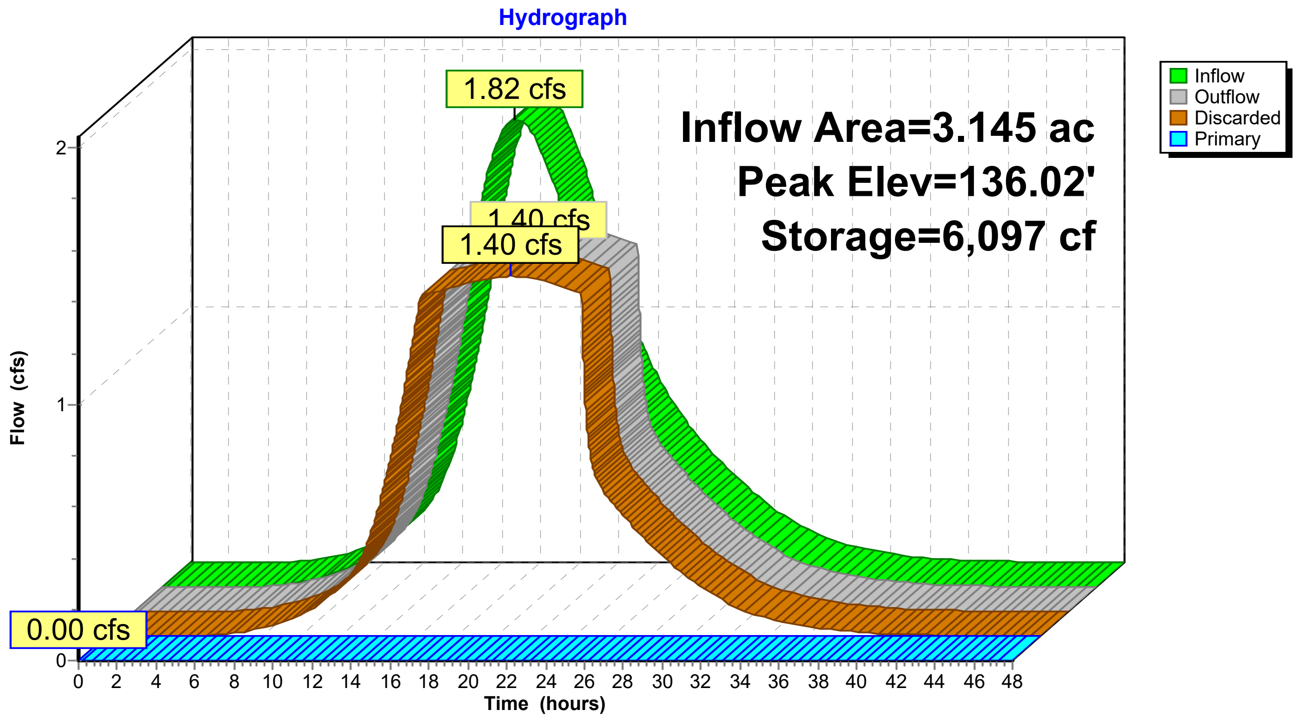
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.75	56,000	0	0
136.00	56,000	14,000	14,000
137.00	56,000	56,000	70,000
138.00	106,669	81,335	151,335
139.00	106,669	106,669	258,004
140.00	106,669	106,669	364,673

Device	Routing	Invert	Outlet Devices
#1	Primary	136.14'	**12.0" Round Culvert** L= 23.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 136.14' / 136.00' S= 0.0061 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	135.75'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 131.35'
#3	Primary	137.95'	**14.5' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=1.40 cfs @ 20.80 hrs HW=136.02' (Free Discharge)
└─**2=Exfiltration** (Controls 1.40 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.75' (Free Discharge)
├─**1=Culvert** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Synthetic Turf Field



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Sub-Catchment 1 Runoff Area=0.708 ac 0.00% Impervious Runoff Depth=5.38"
Flow Length=77' Slope=0.0520 '/' Tc=5.5 min CN=80 Runoff=4.48 cfs 0.318 af

Subcatchment 2S: Sub-Catchment 2 Runoff Area=0.439 ac 70.62% Impervious Runoff Depth=6.90"
Flow Length=153' Tc=0.7 min CN=93 Runoff=3.91 cfs 0.253 af

Subcatchment 3S: Sub-Catchment D - Runoff Area=3.145 ac 85.06% Impervious Runoff Depth>7.14"
Tc=480.0 min CN=95 Runoff=2.34 cfs 1.872 af

Pond 1P: Outfall # 1 - Resource Area Perimeter Inflow=4.48 cfs 0.318 af
Primary=4.48 cfs 0.318 af

Pond 2P: Outfall #2 to CB Peak Elev=136.03' Inflow=3.91 cfs 0.253 af
12.0" Round Culvert n=0.011 L=215.0' S=0.0077 '/' Outflow=3.91 cfs 0.253 af

Pond 4P: Outfall # 4 - Resource Area North Corner Inflow=3.91 cfs 0.253 af
Primary=3.91 cfs 0.253 af

Pond 5P: DMH Peak Elev=130.39' Inflow=3.91 cfs 0.253 af
21.0" Round Culvert n=0.011 L=430.0' S=0.0049 '/' Outflow=3.91 cfs 0.253 af

Pond 6P: Rain Garden Peak Elev=135.71' Storage=194 cf Inflow=0.14 cfs 0.035 af
Discarded=0.11 cfs 0.035 af Primary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.035 af

Pond 7P: Synthetic Turf Field Peak Elev=136.35' Storage=13,399 cf Inflow=2.34 cfs 1.872 af
Discarded=1.50 cfs 1.837 af Primary=0.14 cfs 0.035 af Outflow=1.64 cfs 1.872 af

Total Runoff Area = 4.292 ac Runoff Volume = 2.442 af Average Runoff Depth = 6.83"
30.45% Pervious = 1.307 ac 69.55% Impervious = 2.985 ac

Summary for Subcatchment 1S: Sub-Catchment 1

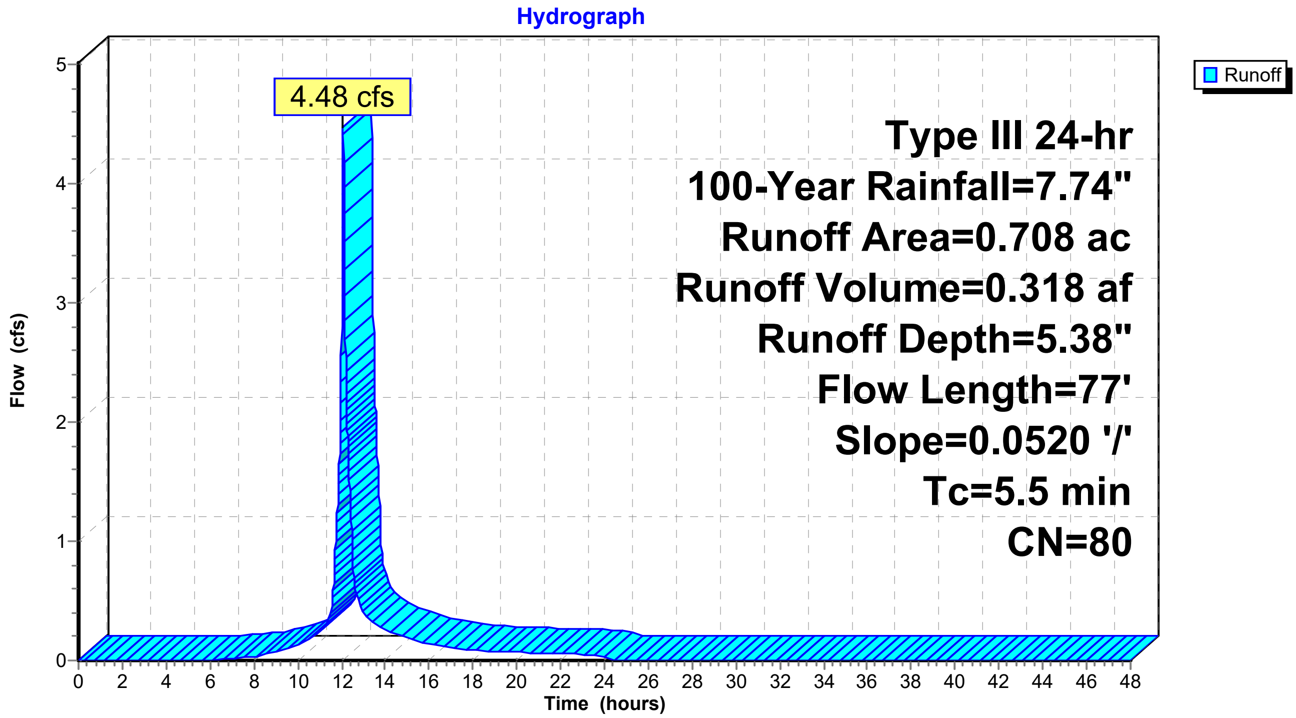
Runoff = 4.48 cfs @ 12.08 hrs, Volume= 0.318 af, Depth= 5.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=7.74"

Area (ac)	CN	Description
0.708	80	>75% Grass cover, Good, HSG D
0.708		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	77	0.0520	0.23		**Sheet Flow, Grass Area** Grass: Short n= 0.150 P2= 3.10"

Subcatchment 1S: Sub-Catchment 1



Summary for Subcatchment 2S: Sub-Catchment 2

[49] Hint: Tc<2dt may require smaller dt

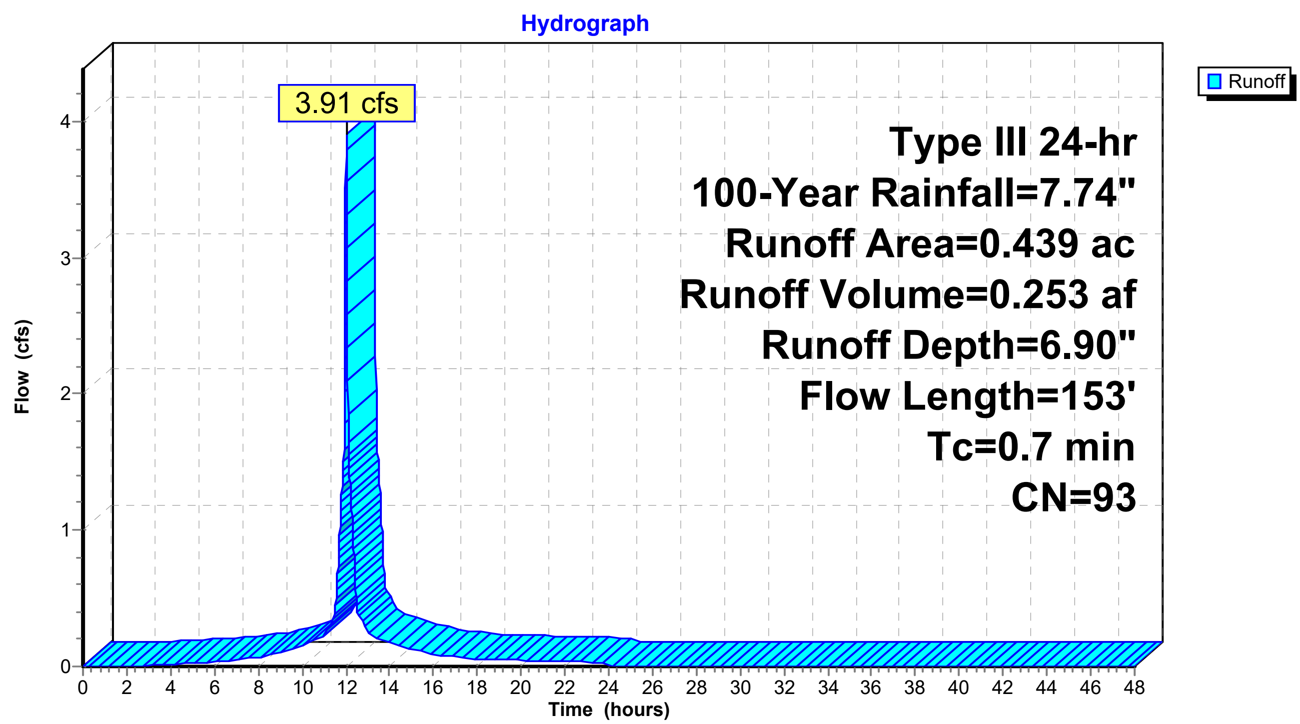
Runoff = 3.91 cfs @ 12.01 hrs, Volume= 0.253 af, Depth= 6.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=7.74"

Area (ac)	CN	Description
0.310	98	Unconnected pavement, HSG D
0.129	80	>75% Grass cover, Good, HSG D
0.439	93	Weighted Average
0.129		29.38% Pervious Area
0.310		70.62% Impervious Area
0.310		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0800	2.05		**Sheet Flow, Grass Hill** Smooth surfaces n= 0.011 P2= 3.10"
0.3	103	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	153	Total			

Subcatchment 2S: Sub-Catchment 2



Summary for Subcatchment 3S: Sub-Catchment D - Athletic Field

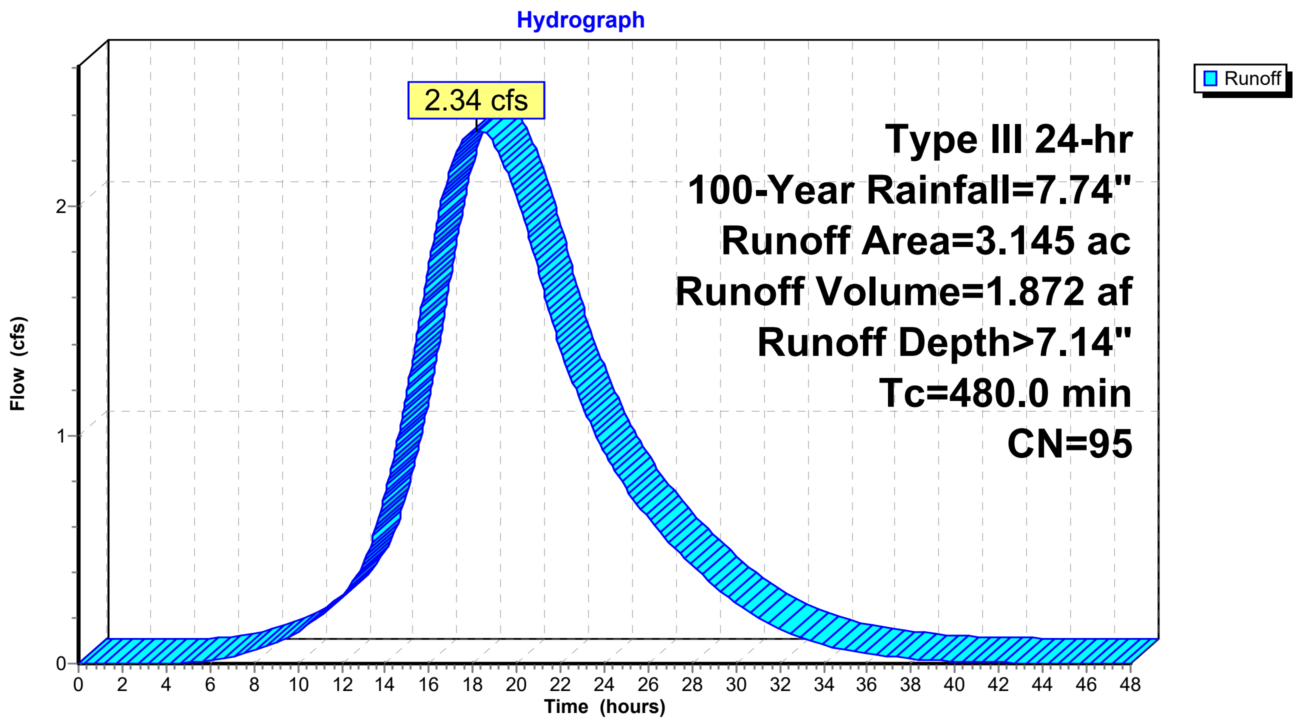
Runoff = 2.34 cfs @ 18.14 hrs, Volume= 1.872 af, Depth> 7.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=7.74"

	Area (ac)	CN	Description
	0.254	98	Paved parking, HSG D
*	2.421	98	Synthetic Turf
	0.470	80	>75% Grass cover, Good, HSG D
	3.145	95	Weighted Average
	0.470		14.94% Pervious Area
	2.675		85.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
480.0					**Direct Entry, Turf Field Base Stone**

Subcatchment 3S: Sub-Catchment D - Athletic Field



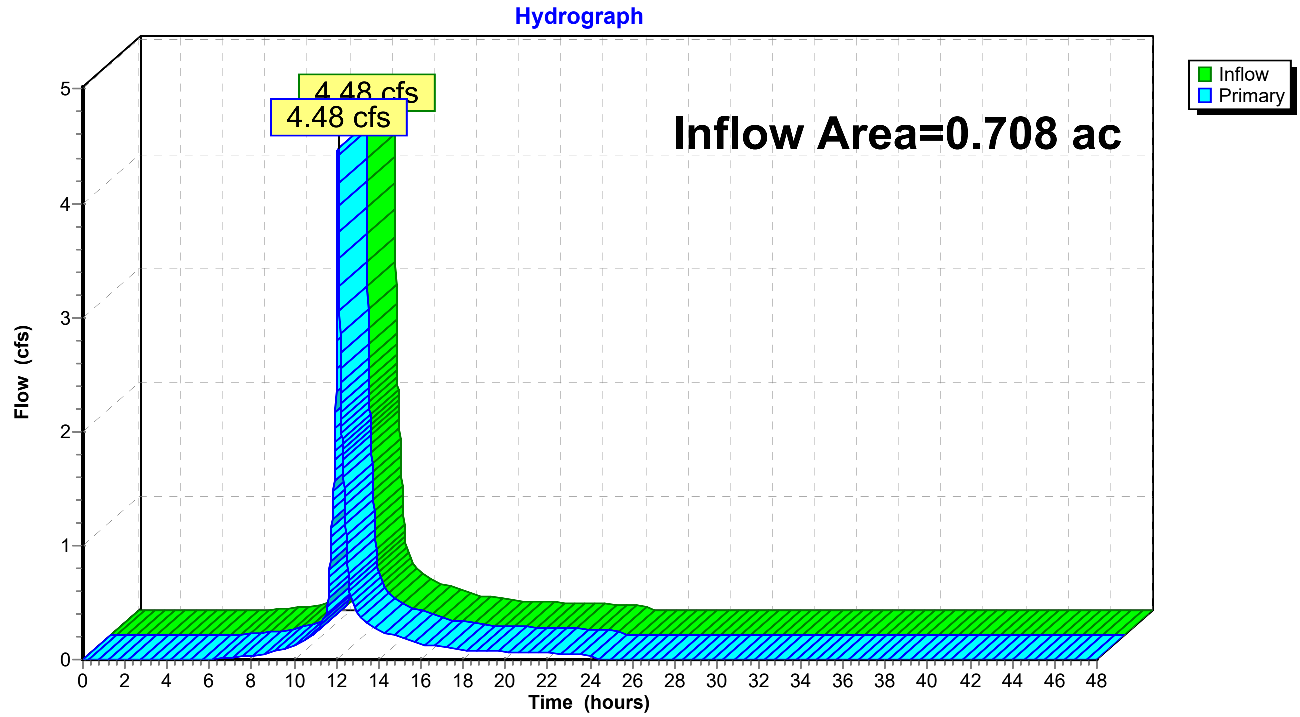
Summary for Pond 1P: Outfall # 1 - Resource Area Perimeter

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

Inflow Area = 0.708 ac, 0.00% Impervious, Inflow Depth = 5.38" for 100-Year event
Inflow = 4.48 cfs @ 12.08 hrs, Volume= 0.318 af
Primary = 4.48 cfs @ 12.08 hrs, Volume= 0.318 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 1P: Outfall # 1 - Resource Area Perimeter



Summary for Pond 2P: Outfall #2 to CB

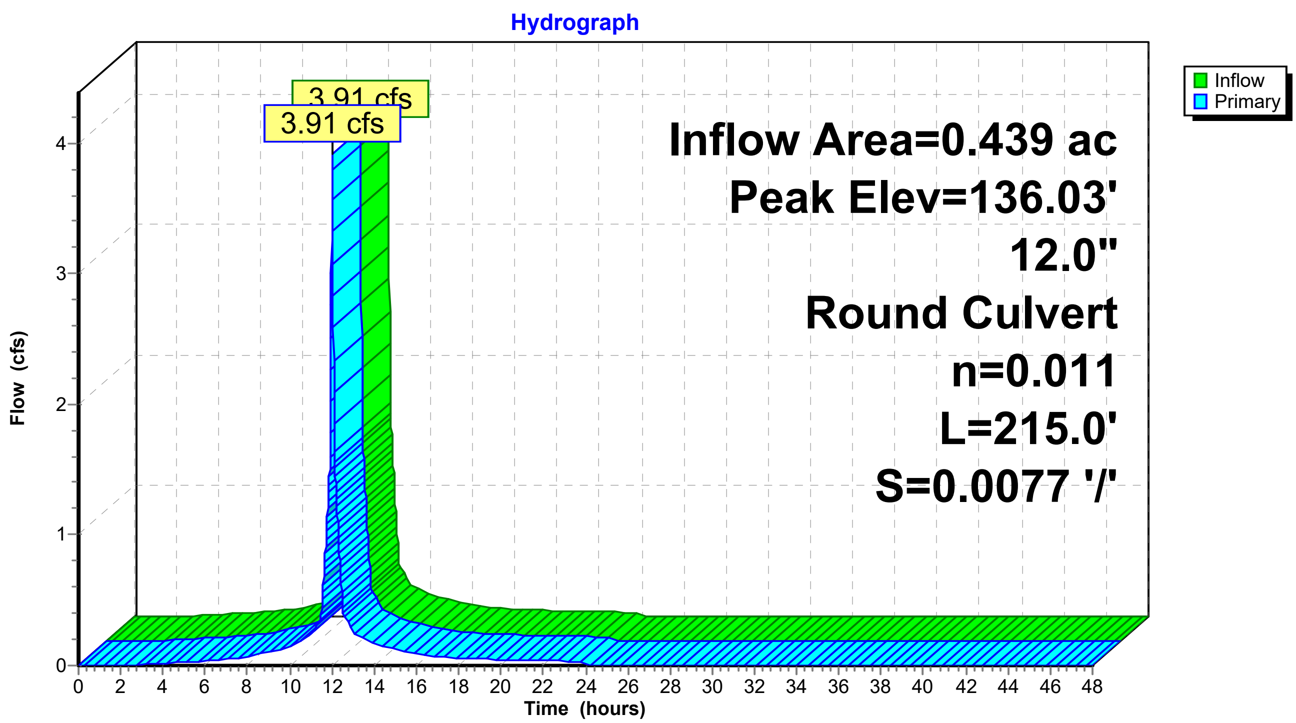
Inflow Area = 0.439 ac, 70.62% Impervious, Inflow Depth = 6.90" for 100-Year event
Inflow = 3.91 cfs @ 12.01 hrs, Volume= 0.253 af
Outflow = 3.91 cfs @ 12.01 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min
Primary = 3.91 cfs @ 12.01 hrs, Volume= 0.253 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 136.03' @ 12.01 hrs
Flood Elev= 138.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	134.36'	**12.0" Round Culvert** L= 215.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.36' / 132.70' S= 0.0077 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.89 cfs @ 12.01 hrs HW=136.00' (Free Discharge)
↑**1=Culvert** (Barrel Controls 3.89 cfs @ 4.96 fps)

Pond 2P: Outfall #2 to CB



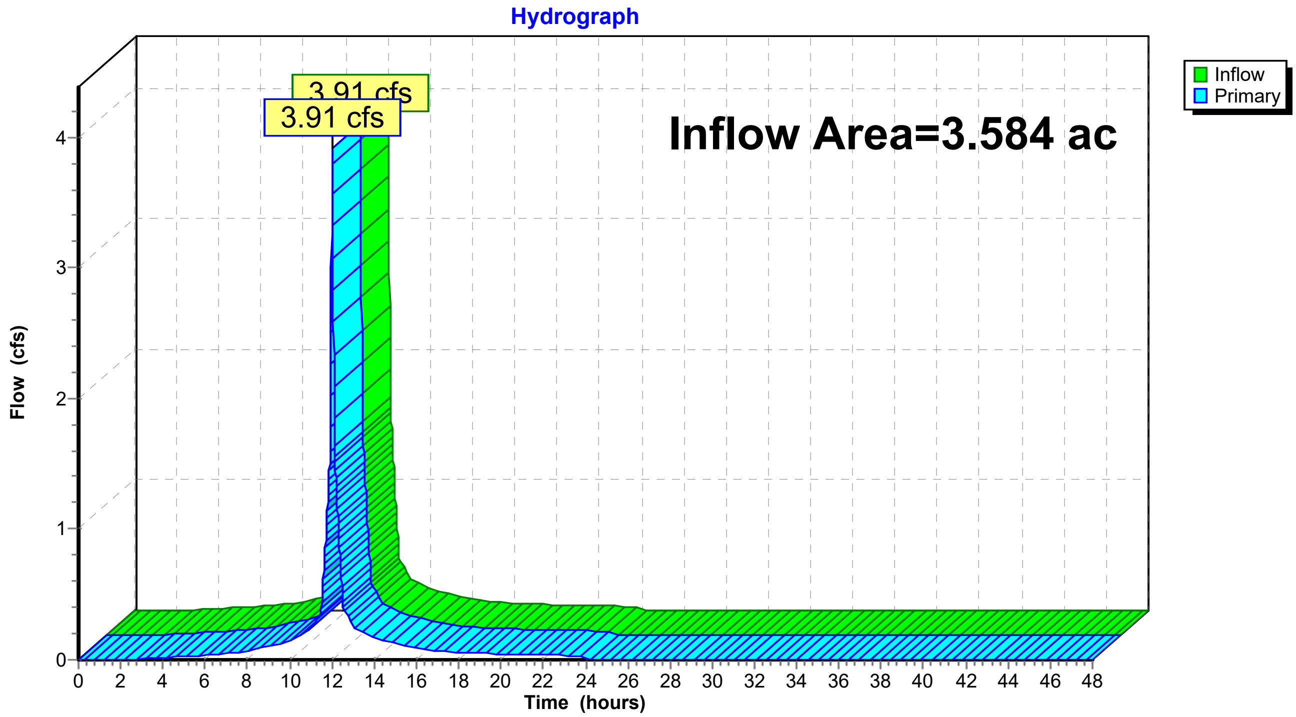
Summary for Pond 4P: Outfall # 4 - Resource Area North Corner

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

Inflow Area = 3.584 ac, 83.29% Impervious, Inflow Depth = 0.85" for 100-Year event
Inflow = 3.91 cfs @ 12.01 hrs, Volume= 0.253 af
Primary = 3.91 cfs @ 12.01 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond 4P: Outfall # 4 - Resource Area North Corner



Summary for Pond 5P: DMH

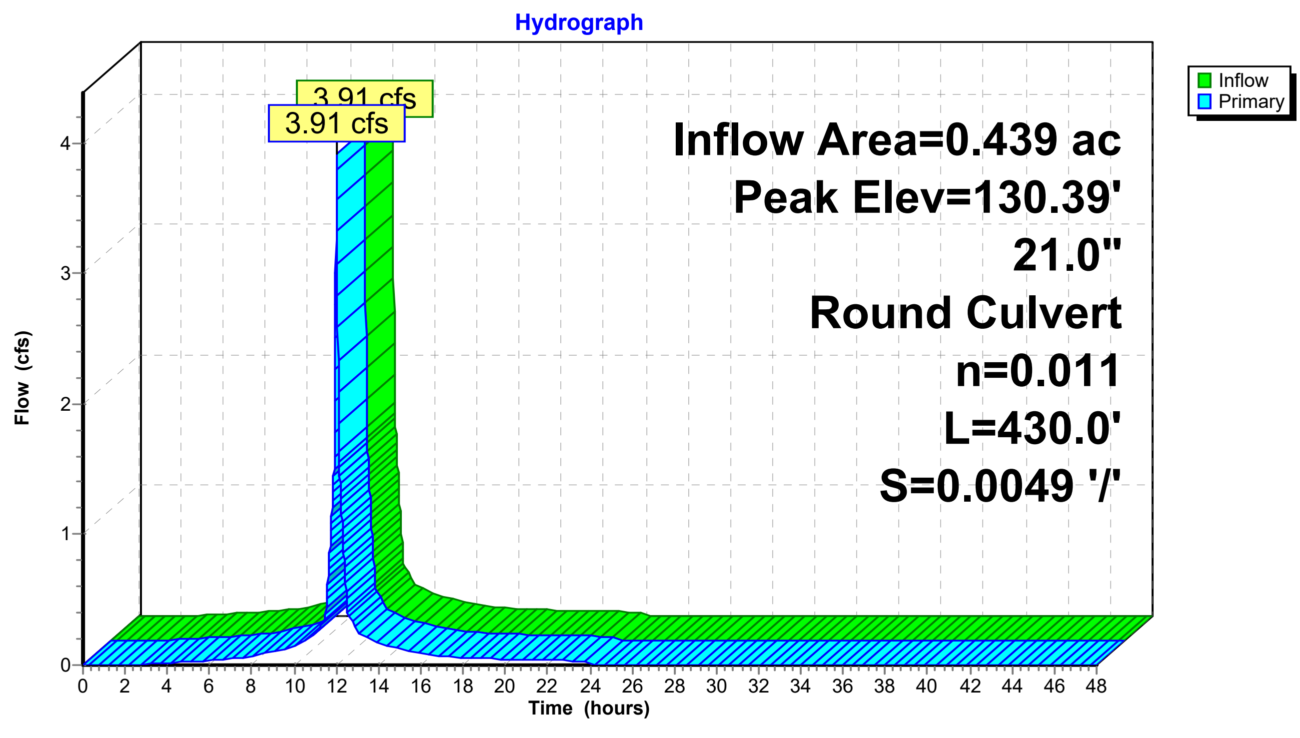
Inflow Area = 0.439 ac, 70.62% Impervious, Inflow Depth = 6.90" for 100-Year event
Inflow = 3.91 cfs @ 12.01 hrs, Volume= 0.253 af
Outflow = 3.91 cfs @ 12.01 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min
Primary = 3.91 cfs @ 12.01 hrs, Volume= 0.253 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 130.39' @ 12.01 hrs
Flood Elev= 138.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.50'	**21.0" Round Culvert** L= 430.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 129.50' / 127.39' S= 0.0049 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.41 sf

Primary OutFlow Max=3.90 cfs @ 12.01 hrs HW=130.39' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.90 cfs @ 4.61 fps)

Pond 5P: DMH



Summary for Pond 6P: Rain Garden

Inflow Area = 3.145 ac, 85.06% Impervious, Inflow Depth = 0.13" for 100-Year event
Inflow = 0.14 cfs @ 21.21 hrs, Volume= 0.035 af
Outflow = 0.11 cfs @ 22.21 hrs, Volume= 0.035 af, Atten= 21%, Lag= 59.8 min
Discarded = 0.11 cfs @ 22.21 hrs, Volume= 0.035 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 135.71' @ 22.21 hrs Surf.Area= 1,892 sf Storage= 194 cf

Plug-Flow detention time= 16.5 min calculated for 0.035 af (100% of inflow)
Center-of-Mass det. time= 16.5 min (1,300.4 - 1,284.0)

Volume	Invert	Avail.Storage	Storage Description
#1	135.60'	858 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

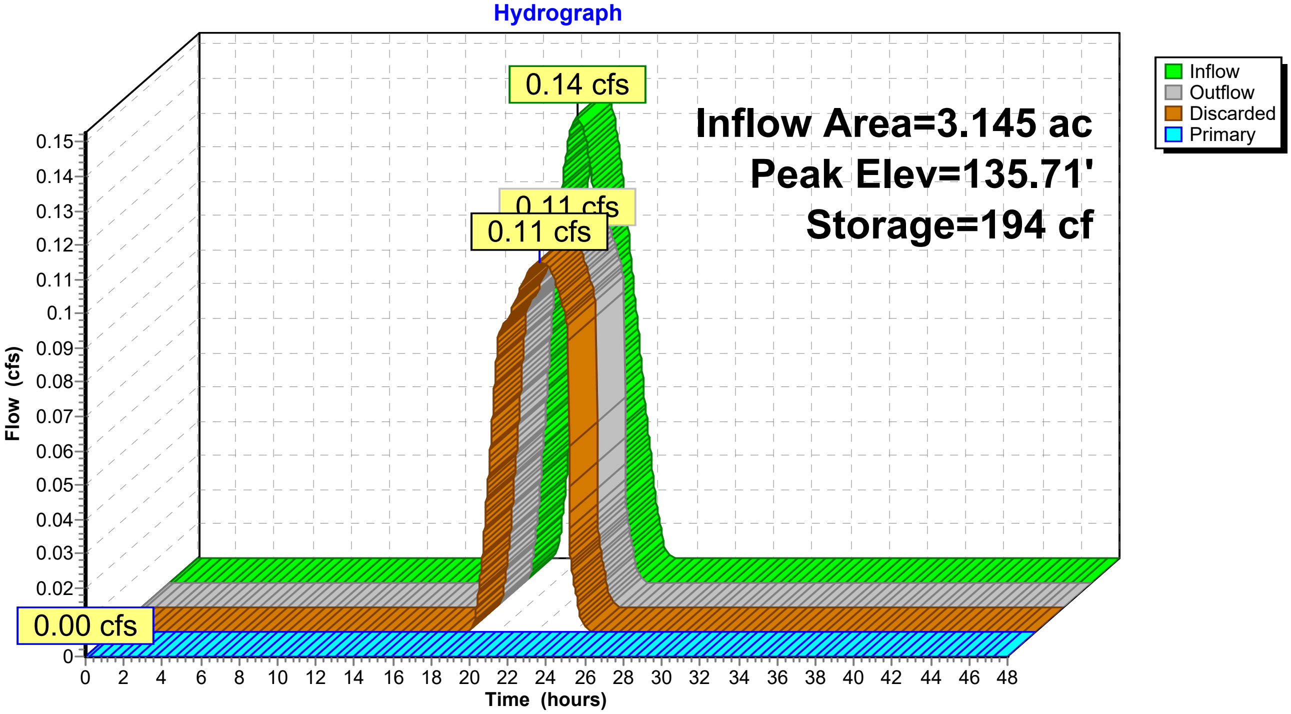
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.60	1,569	0	0
136.00	2,721	858	858

Device	Routing	Invert	Outlet Devices
#1	Primary	135.80'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	135.60'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 131.35'

Discarded OutFlow Max=0.11 cfs @ 22.21 hrs HW=135.71' (Free Discharge)
└─**2=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.60' (Free Discharge)
└─**1=Orifice/Grate** (Controls 0.00 cfs)

Pond 6P: Rain Garden



Summary for Pond 7P: Synthetic Turf Field

Inflow Area = 3.145 ac, 85.06% Impervious, Inflow Depth > 7.14" for 100-Year event
Inflow = 2.34 cfs @ 18.14 hrs, Volume= 1.872 af
Outflow = 1.64 cfs @ 21.21 hrs, Volume= 1.872 af, Atten= 30%, Lag= 184.5 min
Discarded = 1.50 cfs @ 21.21 hrs, Volume= 1.837 af
Primary = 0.14 cfs @ 21.21 hrs, Volume= 0.035 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 136.35' @ 21.21 hrs Surf.Area= 56,000 sf Storage= 13,399 cf
Flood Elev= 137.95' Surf.Area= 104,136 sf Storage= 58,426 cf

Plug-Flow detention time= 75.2 min calculated for 1.872 af (100% of inflow)
Center-of-Mass det. time= 75.2 min (1,275.6 - 1,200.4)

Volume	Invert	Avail.Storage	Storage Description
#1	135.75'	145,869 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 364,673 cf Overall x 40.0% Voids

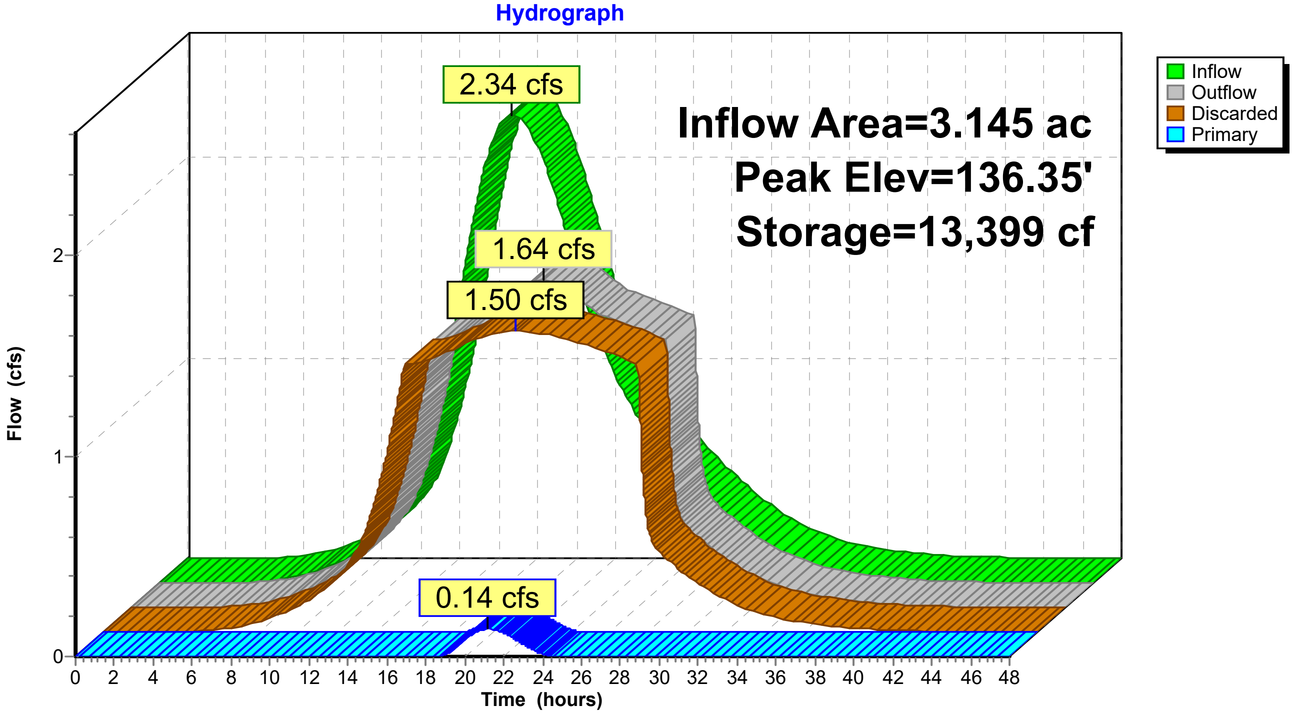
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
135.75	56,000	0	0
136.00	56,000	14,000	14,000
137.00	56,000	56,000	70,000
138.00	106,669	81,335	151,335
139.00	106,669	106,669	258,004
140.00	106,669	106,669	364,673

Device	Routing	Invert	Outlet Devices
#1	Primary	136.14'	**12.0" Round Culvert** L= 23.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 136.14' / 136.00' S= 0.0061 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Discarded	135.75'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 131.35'
#3	Primary	137.95'	**14.5' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=1.50 cfs @ 21.21 hrs HW=136.35' (Free Discharge)
└─**2=Exfiltration** (Controls 1.50 cfs)

Primary OutFlow Max=0.14 cfs @ 21.21 hrs HW=136.35' (Free Discharge)
├─**1=Culvert** (Barrel Controls 0.14 cfs @ 1.74 fps)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Synthetic Turf Field



Attachment I

Permeability/Conductivity Calculation

Synthetic Turf Base Stone Permeability/Conductivity Calculation

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COMPONENTS

The following table provides typical ranges of permeability (hydraulic Conductivity)
It is obtained from Essentials of Soil Mechanics and Foundations, Basic Geotechnics, 5th Edition by David F. McCarthy

Provided Range = 10 TO 10^{-2} OR 10 - 0.01 (MM/SEC)

Value used for k is 10^{-1} mm/sec = 0.1 mm/sec

1mm/sec=0.2ft/min ⟶ 0.1mm/sec = 0.02 ft/min

0.02 ft/min x 12in/ft = 0.24 in/min ⟶ 1 min = 0.24"

1" = 1min/[0.24in/min] ⟶ 1"=4.2 min

To be conservative, we have used 2 minutes per inch (2min/in)

Table 6-2 Typical Ranges of Permeability (Hydraulic Conductivity): Water and Different Soil Types*

Soil Type	Relative Degree of Permeability	k, Coefficient of Permeability or Hydraulic Conductivity (mm/sec)**	Drainage Properties
Clean gravel	High	10 to 100	Good
⟶ Clean sand, sand and gravel mixtures	Medium	10 to 10^{-2}	Good
Fine sands, silts	Low	10^{-2} to 10^{-4}	Fair–poor
Sand–silt–clay mixtures, glacial tills	Very low	10^{-3} to 10^{-6}	Poor–practically impervious
Homogeneous clays	Very low–practically impermeable	$<10^{-6}$	Practically impervious

*For other fluids, values of k are expected to vary from those shown, refer Eq. 6-5.
**To convert, use 1 mm/sec = 0.2 ft/min = 86.4 m/day.

The flat panel drains will be placed 20-ft on center. 20 ft x 12in/ft = 240 inches.

240 inches x 2 minutes per inch = 480 minutes

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111 Washington Street, Unit 2A
Plainville, MA 02762

Attachment J

Rainfall Frequency Data (NOAA)

NOAA Rainfall Data

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PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.310** (0.240-0.391)	**0.375** (0.291-0.473)	**0.482** (0.372-0.610)	**0.571** (0.438-0.727)	**0.693** (0.516-0.924)	**0.784** (0.574-1.07)	**0.881** (0.628-1.25)	**0.995** (0.668-1.43)	**1.16** (0.752-1.74)	**1.30** (0.826-1.99)
10-min	**0.439** (0.340-0.553)	**0.532** (0.412-0.671)	**0.684** (0.527-0.866)	**0.809** (0.621-1.03)	**0.982** (0.731-1.31)	**1.11** (0.812-1.52)	**1.25** (0.890-1.77)	**1.41** (0.948-2.03)	**1.65** (1.07-2.46)	**1.85** (1.17-2.81)
15-min	**0.517** (0.400-0.651)	**0.626** (0.484-0.789)	**0.804** (0.620-1.02)	**0.952** (0.730-1.21)	**1.16** (0.861-1.54)	**1.31** (0.955-1.78)	**1.47** (1.05-2.08)	**1.66** (1.11-2.39)	**1.94** (1.26-2.89)	**2.18** (1.38-3.31)
30-min	**0.709** (0.549-0.893)	**0.859** (0.665-1.08)	**1.10** (0.852-1.40)	**1.31** (1.00-1.67)	**1.59** (1.18-2.12)	**1.80** (1.32-2.46)	**2.02** (1.44-2.87)	**2.29** (1.54-3.30)	**2.68** (1.73-4.00)	**3.01** (1.90-4.58)
60-min	**0.900** (0.698-1.13)	**1.09** (0.845-1.38)	**1.41** (1.08-1.78)	**1.67** (1.28-2.12)	**2.02** (1.51-2.70)	**2.29** (1.68-3.12)	**2.58** (1.84-3.66)	**2.92** (1.96-4.20)	**3.42** (2.21-5.10)	**3.84** (2.43-5.85)
2-hr	**1.16** (0.909-1.46)	**1.42** (1.11-1.78)	**1.84** (1.43-2.31)	**2.19** (1.69-2.76)	**2.66** (2.00-3.54)	**3.02** (2.23-4.10)	**3.40** (2.45-4.83)	**3.87** (2.61-5.54)	**4.60** (2.99-6.82)	**5.23** (3.32-7.90)
3-hr	**1.35** (1.06-1.69)	**1.65** (1.30-2.06)	**2.14** (1.67-2.68)	**2.55** (1.98-3.21)	**3.11** (2.35-4.12)	**3.53** (2.62-4.78)	**3.98** (2.88-5.64)	**4.54** (3.07-6.48)	**5.42** (3.52-8.00)	**6.18** (3.93-9.30)
6-hr	**1.74** (1.38-2.16)	**2.13** (1.68-2.64)	**2.77** (2.18-3.44)	**3.30** (2.58-4.12)	**4.02** (3.06-5.29)	**4.56** (3.40-6.14)	**5.14** (3.75-7.24)	**5.88** (3.99-8.32)	**7.02** (4.58-10.3)	**8.02** (5.12-12.0)
12-hr	**2.21** (1.76-2.72)	**2.71** (2.15-3.33)	**3.52** (2.79-4.34)	**4.19** (3.30-5.20)	**5.12** (3.91-6.68)	**5.80** (4.35-7.75)	**6.55** (4.79-9.14)	**7.47** (5.09-10.5)	**8.91** (5.84-12.9)	**10.2** (6.50-15.0)
24-hr	**2.65** (2.12-3.23)	**3.28** (2.63-4.01)	**4.32** (3.45-5.30)	**5.18** (4.11-6.39)	**6.37** (4.90-8.27)	**7.24** (5.47-9.63)	**8.20** (6.05-11.4)	**9.41** (6.44-13.1)	**11.3** (7.43-16.3)	**13.0** (8.32-19.0)
2-day	**3.00** (2.43-3.64)	**3.80** (3.06-4.60)	**5.10** (4.10-6.20)	**6.17** (4.93-7.55)	**7.66** (5.94-9.90)	**8.73** (6.66-11.6)	**9.94** (7.41-13.8)	**11.5** (7.90-16.0)	**14.1** (9.26-20.1)	**16.3** (10.5-23.8)
3-day	**3.29** (2.67-3.97)	**4.14** (3.36-5.00)	**5.54** (4.47-6.71)	**6.70** (5.37-8.16)	**8.29** (6.46-10.7)	**9.45** (7.24-12.5)	**10.8** (8.06-14.9)	**12.5** (8.58-17.2)	**15.2** (10.1-21.7)	**17.7** (11.4-25.7)
4-day	**3.56** (2.90-4.28)	**4.44** (3.61-5.35)	**5.88** (4.76-7.11)	**7.08** (5.70-8.60)	**8.72** (6.82-11.2)	**9.92** (7.61-13.1)	**11.3** (8.45-15.6)	**13.0** (8.98-17.9)	**15.9** (10.5-22.6)	**18.5** (11.9-26.7)
7-day	**4.33** (3.54-5.17)	**5.24** (4.29-6.27)	**6.74** (5.49-8.09)	**7.98** (6.45-9.63)	**9.68** (7.60-12.3)	**10.9** (8.42-14.3)	**12.3** (9.26-16.8)	**14.1** (9.78-19.3)	**17.1** (11.3-24.1)	**19.7** (12.8-28.3)
10-day	**5.02** (4.13-5.98)	**5.96** (4.90-7.11)	**7.50** (6.13-8.97)	**8.77** (7.13-10.6)	**10.5** (8.28-13.3)	**11.8** (9.11-15.3)	**13.2** (9.93-17.9)	**15.0** (10.4-20.5)	**17.9** (11.9-25.2)	**20.5** (13.3-29.3)
20-day	**7.01** (5.80-8.28)	**8.04** (6.65-9.51)	**9.72** (8.01-11.5)	**11.1** (9.10-13.3)	**13.0** (10.3-16.2)	**14.5** (11.2-18.4)	**16.0** (11.9-21.1)	**17.8** (12.4-23.9)	**20.3** (13.6-28.3)	**22.5** (14.6-32.0)
30-day	**8.65** (7.20-10.2)	**9.75** (8.11-11.5)	**11.6** (9.56-13.7)	**13.0** (10.7-15.5)	**15.1** (11.9-18.6)	**16.7** (12.8-21.0)	**18.3** (13.5-23.8)	**20.0** (14.0-26.7)	**22.3** (15.0-30.9)	**24.2** (15.8-34.2)
45-day	**10.7** (8.98-12.6)	**11.9** (9.95-14.0)	**13.9** (11.5-16.3)	**15.4** (12.8-18.3)	**17.6** (14.0-21.6)	**19.4** (14.9-24.1)	**21.0** (15.6-27.0)	**22.7** (16.0-30.2)	**24.9** (16.7-34.2)	**26.4** (17.3-37.2)
60-day	**12.5** (10.5-14.6)	**13.8** (11.5-16.1)	**15.8** (13.2-18.5)	**17.5** (14.5-20.6)	**19.8** (15.7-24.1)	**21.6** (16.7-26.8)	**23.3** (17.2-29.7)	**25.0** (17.6-33.1)	**27.0** (18.2-37.1)	**28.4** (18.6-39.9)

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Attachment K

Total Suspended Solids (TSS) Calculation Sheet

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

Version 1, Automated: Mar. 4, 2008

Location: 114 Winn Street, Burlington, MA

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
Rain Garden	0.90	0.95	0.86	0.10
Deep Sump and Hooded Catch Basin	0.25	0.10	0.02	0.07
	0.00	0.07	0.00	0.07
	0.00	0.07	0.00	0.07

Total TSS Removal = 93%

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

Project: Marshall Simonds
Prepared By: AH
Date: 2/10/2025

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

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111 Washington Street, Unit 2A
Plainville, MA 02762

Attachment L

Stormwater Pollution Prevention Plan (SWPPP)

Stormwater Pollution Prevention Plan

For:

Marshall Simonds Middle School
Athletic Fields Renovation Project
114 Winn Street
Burlington, MA 01803

Operator(s):

T.B.P.

SWPPP Contact(s):

Nesra Engineering, LLC
Hip Aguilera
111 Washington St.
Plainville, MA 02762
508-723-2403
HA@NersaEng.com

SWPPP Preparation Date:

2/12/25
Updated 12/28/25

Estimated Project Dates:

Project Start Date: Spring 2026
Project Completion Date: Fall 2026

Contents

SECTION 1: SITE EVALUATION, ASSESSMENT, AND PLANNING

1.1 Project/Site Information

Instructions:

- In this section, you can gather some basic site information that will be helpful to you later when you file for permit coverage.
- For more information, see *Developing Your Stormwater Pollution Prevention Plan: A SWPPP Guide for Construction Sites* (also known as the *SWPPP Guide*), Chapter 2
- Detailed information on determining your site's latitude and longitude can be found at www.epa.gov/npdes/stormwater/latlong

Project/Site Name: Marshall Simonds Middle School Athletic Fields Renovation Project

Project Street/Location: 114 Winn Street

City: Burlington State: MA ZIP Code: 01803

County or Similar Subdivision: Middlesex

Latitude/Longitude (Use **one** of three possible formats, and specify method)

Latitude:	Longitude:
1. _ _ º _ _ ' _ _" N (degrees, minutes, seconds)	1. _ _ º _ _ ' _ _" W (degrees, minutes, seconds)
2. _ _ º _ _ . _ _' N (degrees, minutes, decimal)	2. _ _ º _ _ . _ _' W (degrees, minutes, decimal)
3. 42.503213 º N (decimal)	3. -71.180758º W (decimal)

Method for determining latitude/longitude:

☐ USGS topographic map (specify scale: ____________) ☐ EPA Web site ☒ GPS

☒ Other (please specify): LatLong.net/Google Maps

Is the project located in Indian country? ☐ Yes ☒ No

If yes, name of Reservation, or if not part of a Reservation, indicate "not applicable."__________

Is this project considered a federal facility? ☐ Yes ☒ No

NPDES project or permit tracking number*: T.B.P.

**(This is the unique identifying number assigned to your project by your permitting authority after you have applied for coverage under the appropriate National Pollutant Discharge Elimination System (NPDES) construction general permit.)*

1.2 Contact Information/Responsable Parties

Instructions:

- List the operator(s), project managers, stormwater contact(s), and person or organization that prepared the SWPPP. Indicate respective responsibilities, where appropriate.
- Also, list subcontractors expected to work on-site. Notify subcontractors of stormwater requirements applicable to their work.
- See *SWPPP Guide*, Chapter 2.B.

Operator(s):
T.B.P.

Project Manager(s) or Site Supervisor(s):
T.B.P.

SWPPP Contact(s):
Nesra Engineering, LLC
Hip Aguilera
111 Washington St.
Plainville, MA 02762
508-723-2403
HA@NersaEng.com

This SWPPP was Prepared by:
Nesra Engineering, LLC
Hip Aguilera
111 Washington St.
Plainville, MA 02762
508-723-2403
HA@NersaEng.com

Subcontractor(s):
T.B.P.

Emergency 24-Hour Contact:
T.B.P.

1.3 Nature and Sequence of Construction Activity

Instructions:

- Briefly describe the nature of the construction activity and approximate time frames (one or more paragraphs, depending on the nature and complexity of the project).
- For more information, see *SWPPP Guide*, Chapter 3.A.

Describe the general scope of the work for the project, major phases of construction, etc:

Overall scope of work includes:

- Construction fencing and temporary and permanent erosion/sediment control measures.
- Inlet protection at all catch basins.
- Site preparation and earthwork.
- Excess soil to be properly stockpiled, erosion control measures applied to stabilize, and or removed from site as needed.
- Remove and properly dispose all structures, asphalt, fencing, and other items directly called out in the Drawings and Contract Documents.
- Perform utility work, including drainage and electrical as specified.
- Installation of lighting, concrete curbing, concrete pads, and portable bleachers, seat walls, etc.
- Pavement and surfacing to include bituminous concrete paving for walkways.
- Install synthetic turf field.
- Install athletic structures and appurtenances.
- Place topsoil, fertilizing, and seeding, etc. as indicated in the Drawings and Contract Documents.
- Inspect and maintain grading, erosion control and sediment control practices weekly and immediately after rainstorms with more than ½ inch precipitation in 24 hrs.
- Maintenance of all erosion and sediment control components and installation of additional erosion and sediment control components shall be an ongoing practice and in strict accordance with the contract specifications.

Demolition:

- Work includes demolition, including but not limited to the removal of existing asphalt, concrete pavement, fencing, and other amenities specified in the Drawings.
- Strip, remove, and dispose of grass and topsoil as indicated on Demolition and Erosion control plan. For any topsoil stockpiled on site, associated erosion control measures, like mulch, are to be installed. Excess soil material from site will be removed as needed.
- Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option and in full compliance with all applicable disposal regulations.

Construction:

- Work entails enhanced drainage, two new synthetic turf fields, new ADA parking lot, ADA walkways, seating, and various appurtenances.

- The new drainage system is designed to enhance stormwater management by both increasing water storage capacity and reducing flow rates. Key components include:
  - Enhanced Storage Capacity: An additional 12 inches of dense-graded stone will be installed beneath the field to significantly increase the volume of water that can be stored.
  - Efficient Conveyance: Laterally installed HDPE perforated pipes, in combination with strategically placed collector pipes, will channel runoff more effectively.
  - System Optimization: Cleaning and upgrading existing drain structures, including the perimeter trench drain system, will further reduce the rate of flow and improve overall drainage.

What is the function of the construction activity?

☐ Residential ☐ Commercial ☐ Industrial ☐ Road Construction ☐ Linear Utility

☒ Other (please specify): Athletic Fields

Estimated Project Start Date: Spring 2025

Estimated Project Completion Date: Fall 2025

1.4 Soils, Slopes, Vegetation, and Current Drainage Patterns

Instructions:

- Describe the existing soil conditions at the construction site including soil types, slopes and slope lengths, drainage patterns, and other topographic features that might affect erosion and sediment control.
- Also, note any historic site contamination evident from existing site features and known past usage of the site.
- This information should also be included on your site maps (See *SWPPP Guide*, Chapter 3.C.).
- For more information, see *SWPPP Guide*, Chapter 3.A.

Soil type(s):

According to USDA Natural Resources Conservation Services Web Soil Survey and National Cooperative Soil Survey the site consists of approximately of:

- Udorthents-Urban Land Complex (656) (indicating filled soils) – 90% of the site.
- Whitman fine sandy loam (73B) – 10% of the site.

Slopes (describe current slopes and note any changes due to grading or fill activities):

Typical site slopes range from 1 to 3 percent. The area has been leveled in the past for use as athletic fields.

Drainage Patterns (describe current drainage patterns and note any changes dues to grading or fill activities):

Currently, runoff originates from the south side of the property and flows northward across the parcel. Stormwater from the building and parking lot divides into two main paths: one portion flows northeast into a vegetated grass field before discharging into a catch basin, while the remainder moves north and northwest over a grassy hill and into a wetland categorized as a wood swamp deciduous wetland by MassDEP—adjacent to walking path that leads to the School. Additional runoff from the field continues north, eventually emptying into a linear wetland along the property's northern and eastern sections.

The proposed construction will include an approximately 12” drainage layer under the synthetic turf field, perforated lateral pipes, and 12” perforated collector pipes. Additionally there will be a rain garden installed to capture stormwater from the proposed ADA parking lot to treat the surface runoff.

Grading activity is proposed to modify the site slopes to 1 percent. The proposed grading will channel the surface water to each of the athletic field while allowing interception into collector pipes in stone trenches.

Vegetation:
Existing vegetation is lined with natural grass, primarily a mix of cool-season grasses such as Kentucky bluegrass and fescue. No tree clearing is anticipated, and appropriate tree protection measures will be implemented for trees designated to be preserved, as indicated in the plans. Any invasive species within the limit of work will be removed. In areas where seeding is to take place, the grass mix will consist of native grasses, such as Kentucky bluegrass and fescue.

1.5 Construction Site Estimates

Instructions:

- Estimate the area to be disturbed by excavation, grading, or other construction activities, including dedicated off-site borrow and fill areas.
- Calculate the percentage of impervious surface area before and after construction
- Calculate the runoff coefficients before and after construction.
- For more information, see *SWPPP Guide*, Chapter 3.A and Appendix C.

The following are estimates of the construction site.

Total project area:	5.9 acres
Construction site area to be disturbed:	4.66 acres

1.6 Receiving Waters

Instructions:

- List the waterbody(s) that would receive stormwater from your site, including streams, rivers, lakes, coastal waters, and wetlands. Describe each as clearly as possible, such as *Mill Creek, a tributary to the Potomac River*, and so on.
- Indicate the location of all waters, including wetlands, on the site map.
- Note any stream crossings, if applicable.
- List the storm sewer system or drainage system that stormwater from your site could discharge to and the waterbody(s) that it ultimately discharges to.
- If any of the waterbodies above are impaired and/or subject to Total Maximum Daily Loads (TMDLs), please list the pollutants causing the impairment and any specific requirements in the TMDL(s) that are applicable to construction sites. Your SWPPP should specifically include measures to prevent the discharge of these pollutants.
- For more information, see *SWPPP Guide*, Chapter 3.A and 3.B.
- Also, for more information and a list of TMDL contacts and links by state, visit www.epa.gov/npdes/stormwater/tmdl.

Description of receiving waters:

1) The receiving water for the Marshall Simonds Middle School stormwater system is Maple Meadow Brook, an intermittent waterbody located along the northern perimeter of the site. It serves as the primary conduit for stormwater flowing through the wetlands before discharging off-site. Maple Meadow Brook is characterized by its seasonal flow, draining from west to east, and it plays a critical role in managing runoff from the property.

Description of storm sewer systems:

Existing storm sewer system consists of a catch basins and drain manholes located on both the east and west areas of the site. They eventually tie into a pipe that flows towards the north end of the parcel, where it empties into the nearby wetlands and into Maple Meadow Brook.

Description of impaired waters or waters subject to TMDLs: N/A

No impaired or TMDLs were listed.

1.7 Site Features and Sensitive Areas to be Protected

Instructions:

- Describe unique site features including streams, stream buffers, wetlands, specimen trees, natural vegetation, steep slopes, or highly erodible soils that are to be preserved.
- Describe measures to protect these features.
- Include these features and areas on your site maps.
- For more information, see *SWPPP Guide*, Chapter 3.A and 3.B.

The existing stormwater system at Marshall Simonds Middle School handles runoff primarily from the south side of the property. Water flows from the building and parking lot areas, with part of it moving northeast toward a vegetated grass field, where it discharges into a catch basin. The remainder of the runoff flows north and northwest over a grassy hill and enters a deciduous wood swamp wetland near the school's walking path. Water from the athletic fields moves further north, where it drains into a linear wetland located along the property's northern and eastern perimeters. This system includes intermittent water features such as Maple Meadow Brook, which runs along the northern boundary of the site. Current runoff patterns rely heavily on natural water flow into wetlands and a catch basin, with limited infrastructure in place to manage flow rates and storage capacity. The wetlands are less than approximately less than 50FT from the edge of the exiting field.

The limits of the construction site to the north and east will have a hay bale installed prior to start of construction to protect with migration of silts and sand. Additionally existing catch basins and drainage outlets will be protected with hay bales. Only areas within the limits of the construction fence will be disturbed.

1.8 Potential Sources of Pollution

Instructions:

- Identify and list all potential sources of sediment, which may reasonably be expected to affect the quality of stormwater discharges from the construction site.
- Identify and list all potential sources of pollution, other than sediment, which may reasonably be expected to affect the quality of stormwater discharges from the construction site.
- For more information, see *SWPPP Guide*, Chapter 3.A.

Potential sources of sediment to stormwater runoff:

Clearing, grading, excavation and un-stabilized areas; Paving operations, Demolition and debris disposal; Dewatering operations; Landscaping operations.

Potential pollutants and sources, other than sediment, to stormwater runoff:

Trade Name Material	Stormwater Pollutants	Location
Pesticides (insecticides, fongicides, herbicides, rodenticides)	Chlorinated hydrocarbons, organophosphates, carbonates, arsenic	Herbicides used for noxious weed control
Fertilizer	Nitrogen, Phosphorous	Newly seeded areas
Asphalt	Oil, petroleum distillates	Walkways
Concrete	Limestone, sand, pH, chromium	Curbing, foundations, slabs
Curing compounds	Naphtha	Curbing, foundations, slabs
Hydraulic oil/fluids	Mineral oil	Leaks or broken hoses from equipment
Gasoline	Benzene, ethyl benzene, toluene, xylene, MTBE	Secondary containment / staging area
Diesel Fuel	Petroleum distillate, oil and grease, naphthalene, xylenes	Secondary containment / staging area
Kerosene	Coal oil, petroleum distillates	Secondary containment / staging area
Antifreeze/coolant	Ethylene glycol, propylene glycol, heavy metals	Leaks or broken hoses from equipment
Sanitary toilets	Bacteria, parasites, and viruses	Staging area

1.9 Endangered Species Certification

Instructions:

- Before beginning construction, determine whether endangered or threatened species or their critical habitats are on or near your site.
- Adapt this section as needed for state or tribal endangered species requirements and, if applicable, document any measures deemed necessary to protect endangered or threatened species or their critical habitats.
- For more information on this topic, see *SWPPP Guide*, Chapter 3.B.
- Additional information on Endangered Species Act (ESA) provisions is at www.epa.gov/npdes/stormwater/esa

Are endangered or threatened species and critical habitats on or near the project area?

☐ Yes ☒ No

Describe how this determination was made:

The latest Natural Heritage & Endangered Species Program Atlas for Estimated and Priority Habitat of Rare Species.

1.10 Historic Preservation

Instructions:

- Before you begin construction, you should review federal and any applicable state, local, or tribal historic preservation laws and determine if there are historic sites on or near your project. If so, you might need to make adjustments to your construction plans or to your stormwater controls to ensure that these historic sites are not damaged.
- For more information, see *SWPPP Guide*, Chapter 3.B or contact your state or tribal historic preservation officer.

Are there any historic sites on or near the construction site?

☐ Yes ☒ No

Describe how this determination was made:

Review of the Inventory of Historic and Archaeological Assets of the Commonwealth.

1.11 Applicable Federal, Tribal, State or Local Programs

Instructions:

- Note other applicable federal, tribal, state or local soil and erosion control and stormwater management requirements that apply to your construction site.

The Contractor will obtain copies of any local and state regulations that are applicable to stormwater management, erosion control and pollution minimization at the job site and will comply with such regulations. The contractor will comply with all conditions of the NPDES Construction General Permit, including the conditions related to maintaining the SWPPP and evidence of compliance with the SWPPP at the job site and allow regulatory personnel access to the job site and to records in order to determine compliance.

1.12 Maps

Instructions:

- Attach site maps. For most projects, a series of site maps is recommended. The first should show the undeveloped site and its current features. An additional map or maps should be created to show the developed site or for more complicated sites show the major phases of development.

These maps should include the following:

- Direction(s) of stormwater flow and approximate slopes before and after major grading activities;
- Areas and timing of soil disturbance;
- Areas that will not be disturbed;
- Natural features to be preserved;
- Locations of major structural and non-structural BMPs identified in the SWPPP;
- Locations and timing of stabilization measures;
- Locations of off-site material, waste, borrow, or equipment storage areas;
- Locations of all waters of the United States, including wetlands;
- Locations where stormwater discharges to a surface water;
- Locations of storm drain inlets; and
- Areas where final stabilization has been accomplished.
- For more information, see *SWPPP Guide*, Chapter 3.C.

Include the site maps with the SWPPP.

All maps are attached in the Appendix.

SECTION 2: EROSION AND SEDIMENT CONTROL BMPS

Instructions:

- Describe the BMPs that will be implemented to control pollutants in stormwater discharges. For each major activity identified, do the following
  - ✓ Clearly describe appropriate control measures.
  - ✓ Describe the general sequence during the construction process in which the measures will be implemented.
  - ✓ Describe the maintenance and inspection procedures that will be used for that specific BMP.
  - ✓ Include protocols, thresholds, and schedules for cleaning, repairing, or replacing damaged or failing BMPs.
  - ✓ Identify staff responsible for maintaining BMPs.
  - ✓ (If your SWPPP is shared by multiple operators, indicate the operator responsible for each BMP.)
- Categorize each BMP under one of the following 10 areas of BMP activity as described below:
  - ***2.1 Minimize disturbed area and protect natural features and soil***
  - ***2.2 Phase Construction Activity***
  - ***2.3 Control Stormwater flowing onto and through the project***
  - ***2.4 Stabilize Soils***
  - ***2.5 Protect Slopes***
  - ***2.6 Protect Storm Drain Inlets***
  - ***2.7 Establish Perimeter Controls and Sediment Barriers***
  - ***2.8 Retain Sediment On-Site and Control Dewatering Practices***
  - ***2.9 Establish Stabilized Construction Exits***
  - ***2.10 Any Additional BMPs***
- Note the location of each BMP on your site map(s).
- For any structural BMPs, you should provide design specifications and details and refer to them. Attach them as appendices to the SWPPP or within the text of the SWPPP.
- For more information, see *SWPPP Guide*, Chapter 4.
- Consult your state's design manual or one of those listed in Appendix D of the *SWPPP Guide*.
- For more information or ideas on BMPs, see EPA's National Menu of BMPs http://www.epa.gov/npdes/stormwater/menuofbmps

The Erosion and Sediment Control Plans represent the suggested best management practices proposed for the project. The Contractor's approach to controlling stormwater runoff from the site may vary.

The Contractor shall strictly implement and maintain the erosion and sedimentation controls shown on the Drawings to protect adjacent riverfront and wetland resource areas. Any proposed substitutions or modifications to these controls shall be submitted for review and shall not be used unless approved by the Conservation Commission and documented in the applicable section of this Appendix. The use of erosion and sediment controls are mandatory and must be employed to minimize impacts to adjacent areas during construction.

Once infill (sand and crumb rubber) is installed, any off-site migration or accumulation of crumb rubber and sediment shall be removed promptly, at a frequency sufficient to minimize off-site impacts and following each major storm event.

The control practices which are required to minimize stormwater pollution during construction must remain functional until disturbed areas have been stabilized. Erosion control products are to be installed and maintained in accordance with manufacturer's specifications and good engineering practices.

2.1 Minimize Disturbed Area and Protect Natural Features and Soil

BMP Description: The disturbed area will be limited to the construction area shown on the plans. All areas outside of the construction limits will be preserved. The limits of construction will be marked out with 6-ft chain link temporary fencing. The supports for the fabric will be placed on the ground and weighted down.	
Installation Schedule:	The temporary construction fence will be installed before construction begins at the site
Maintenance and Inspection:	The perimeter construction fence will be inspected weekly to ensure there has not been any breach in the fencing.
Responsible Staff:	Contractor

BMP Description: Topsoil stripped from the immediate construction area will be stockpiled as identified on the plans. The stockpiles will be in areas that will not interfere with construction phases and at least 15 feet away from area of concentrated flows or pavement. The slopes of the stockpile will be roughened by equipment and will not exceed 2:1 to prevent erosion. A silt fence will be installed around the stockpile as necessary.	
Installation Schedule:	Topsoil stockpiles will be established during grading activities. The temporary erosion controls will be installed immediately after the stockpile has been placed.
Maintenance and Inspection:	The area will be inspected weekly for erosion and immediately after storm events. Areas on or around the stockpile that have eroded
Responsible Staff:	Contractor

The contractor is responsible for the maintenance and repair of all erosion control devices on-site. All erosion control devices will be regularly inspected. At no time will silt-laden water be allowed to enter sensitive areas. Any runoff from disturbed surfaces will be directed through a sedimentation process prior to being discharged to the existing on site drainage system.

Additional erosion control techniques proposed include hay bale barriers, inlet sediment traps, a stabilized construction entrance, temporary diversion channels, and temporary sedimentation ponds when applicable. During the growing season, slope stabilization will be achieved by applying topsoil followed by seeding and mulching as soon as final grades are achieved. Organic mulching, jute netting, geo-textiles, or a combination will be used to stabilize slopes completed outside of the growing season.

2.2 Phase Construction Activity

Instructions:

- Describe the intended construction sequencing and timing of major activities, including any opportunities for phasing grading and stabilization activities to minimize the overall amount of disturbed soil that will be subject to potential erosion at one time. Also, describe opportunities for timing grading and stabilization so that all or a majority of the soil disturbance occurs during a time of year with less erosion potential (i.e., during the dry or less windy season). (For more information, see *SWPPP Guide*, Chapter 4, ESC Principle 2.) It might be useful to develop a separate, detailed site map for each phase of construction.
- Also, see EPA's *Construction Sequencing BMP Fact Sheet* at http://www.epa.gov/npdes/stormwater/menuofbmps/construction/cons_seq)

The project is anticipated to be constructed in one general phase. The following is a broad outline of the sequence of the major activities that disturb the soil at the site.

1. Install construction fencing around the limits of work.
2. Install hay bales around the proposed work areas, which are upgrdient of sensitive areas such as river front areas, wetlands, additional watercourses, and adjacent properties.
3. Install hay bales and/or filter bags around all existing drainage structures.
4. Install stabilized construction entrance.
5. Perform clearing, grubbing, and topsoil removal as specified.
6. Dust on site shall be minimized by spraying water on dry areas on the site. The use of oils and other petroleum base or toxic liquids for dust suppression is prohibited.
7. Stabilize denuded areas and stockpiles within 14 days of last construction activity in that area.

8. Begin site grading operations.
9. Begin installation of all underground utility lines and chambers as shown on the plans with appropriate erosion control measures to eliminate silt from entering the pipe systems.
10. Installation of bituminous concrete pavement and concrete pads.
11. Installation of synthetic turf field.
12. Remove hay bales and silt fencing only after exposed surfaces are stabilized.
13. Remove temporary construction exists only prior to cleaning up these areas.

2.3 Control Stormwater Flowing onto and through the Project

Instructions:

– Describe structural practices (e.g., diversions, berms, ditches, storage basins) including design specifications and details used to divert flows from exposed soils, retain or detain flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. (For more information, see *SWPPP Guide*, Chapter 4, ESC Principle 3.)

BMP Description: Earth Dikes may be constructed horizontally along the uphill perimeter of the southern slope to convey stormwater away from the project site. The dike may be constructed of compacted soil and have a top width of 4 feet, a height of 2 feet and 2:1 side slopes.

Installation Schedule:	Earth dikes will be installed if necessary, prior to anticipated storm events.
Maintenance and Inspection:	Earth dikes will be inspected after each storm event and washouts are to be fixed upon discovery.
Responsible Staff:	Contractor

BMP Description**:** Diversion Channels may be used to intercept and divert runoff which flows onto and through the project site. These diversions will minimize the development of concentrated runoff down slopes, which would produce gully erosion. Diversions will also be used to collect runoff from construction areas and convey it to temporary sediment basins or traps.

Installation Schedule**:**	Temporary diversions will be installed as needed and will remain in place until slopes are stabilized or graded level. If vegetation of the diversion channel is required to avoid erosion of the channel, the channel will be temporarily stabilized to ensure viability of the grass seed.

***Maintenance and Inspection*:**	The diversions will be inspected weekly and maintained as necessary to prevent erosion.
***Responsible Staff*:**	Contractor

2.4 Stabilize Soils

Instructions:

- Describe controls (e.g., interim seeding with native vegetation, hydroseeding) to stabilize exposed soils where construction activities have temporarily or permanently ceased. Also describe measures to control dust generation. Avoid using impervious surfaces for stabilization whenever possible. (For more information, see *SWPPP Guide*, Chapter 4, ESC Principle 4.)
- Also, see EPA's *Seeding BMP Fact Sheet* at www.epa.gov/npdes/stormwater/menuofbmps/construction/seeding

BMP Description: Temporary soil stabilization will be achieved using rip rap, filter fabric, Geotextile or hydro-seeding. The contractor will not disturb more area than can be stabilized within 14 days unless the area is to remain active.

☐ ***Permanent***	☒ ***Temporary***
Installation Schedule:	All disturbed surfaces will be stabilized a minimum of 14 days after construction in any portion of the project site is completed or is temporarily halte4d, unless additional construction is intended to be initiated within 21 days.
Maintenance and Inspection:	Stabilization devises will be inspected weekly and maintained as necessary to prevent washouts.
Responsible Staff:	Contractor

BMP Description: All disturbed areas not under structures will be seeded and maintained until the seed has taken hold.

☒ ***Permanent***	☐ ***Temporary***
Installation Schedule:	All disturbed surfaces will be stabilized a minimum of 14 days after construction in any portion of the project site is completed.
Maintenance and Inspection:	The grass will be inspected and bare spots will be reseeded.
Responsible Staff:	Contractor

2.5 Protect Slopes

Instructions:

- Describe controls (e.g., erosion control blankets, tackifiers) including design specifications and details that will be implemented to protect all slopes. (For more information, see *SWPPP Guide*, Chapter 4, ESC Principle 5.)
- Also, see EPA's *Geotextiles BMP Fact Sheet* at www.epa.gov/npdes/stormwater/menuofbmps/construction/geotextiles

BMP Description: Slopes greater than three to one horizontal to vertical will be stabilized with seed, organic mulch, jute fabric, or rip-rap, as appropriate, to prevent erosion during construction.

Installation Schedule:	Slope stabilization measures will be taken once slopes of 3:1 or greater are created.
Maintenance and Inspection:	Slopes will be inspected after storm events to make sure erosion has not taken place. If areas of erosion are discovered, additional measures will be taken to prevent future erosion. After disturbed areas have been stabilized, the temporary erosion control measures will be removed and accumulated sediment will be removed and disposed of properly.
Responsible Staff:	Contractor

2.6 Protect Storm Drain Inlets

Instructions:

- Describe controls (e.g., inserts, rock-filled bags, or block and gravel) including design specifications and details that will be implemented to protect all inlets receiving stormwater from the project during the entire project. (For more information, see *SWPPP Guide*, Chapter 4, ESC Principle 6.)
- Also, see EPA's *Storm Drain Inlet Protection BMP Fact Sheet* at www.epa.gov/npdes/stormwater/menuofbmps/construction/storm_drain

BMP Description: Hay bale sediment traps will be installed at drainage structures to prevent sediment from entering the structures.

Installation Schedule:	Hay bales will be installed around catch basins and drainage structure inlets prior to start of construction
Maintenance and Inspection:	Hay bales will be replaced if sufficient sediment is accumulated where it may enter the drainage system. BMP will be inspected weekly and after each storm event.
Responsible Staff:	Contractor

BMP Description: As an alternate to hay bales, silt sacks may be installed on drainage structures to prevent migration of silt in to the structures.

Installation Schedule:	Silt sacks will be installed prior to any construction activity.
Maintenance and Inspection:	Silt sacks will be inspected weekly and after all storm events. They will be removed and cleaned as necessary.

2.7 Establish Perimeter Controls and Sediment Barriers

Instructions:

- Describe structural practices (e.g., silt fences or fiber rolls) including design specifications and details to filter and trap sediment before it leaves the construction site. (For more information, see *SWPPP Guide*, Chapter 4, ESC Principle 7.)
- Also see, EPA's *Silt Fence BMP Fact Sheet* at www.epa.gov/npdes/stormwater/menuofbmps/construction/silt_fences, or *Fiber Rolls BMP Fact Sheet* at www.epa.gov/npdes/stormwater/menuofbmps/construction/fiber_rolls

BMP Description: Hay bales will be installed on the west, north and east sides of the construction site per approved plans. The existing and proposed slopes channel surface runoff to these areas; therefore installation of hay bales is only necessary for that area.

Installation Schedule:	Hay bales will be installed prior to start of construction activity.
Maintenance and Inspection:	Hay bales will be inspected weekly and replaced as necessary to prevent silt migration.
Responsible Staff:	Contractor

2.8 Retain Sediment On-Site

Instructions:

- Describe sediment control practices (e.g., sediment trap or sediment basin), including design specifications and details (volume, dimensions, outlet structure) that will be implemented at the construction site to retain sediments on-site. (For more information, see *SWPPP Guide*, Chapter 4, ESC Principle 8.)
- Also, see EPA's *Sediment Basin BMP Fact Sheet* at www.epa.gov/npdes/stormwater/menuofbmps/construction/sediment_basins

BMP Description: Hay bales on the down grade of the project site will function to retain sediment on site.

Installation Schedule:	Hay bales will be installed prior to construction activity.
Maintenance and Inspection:	They will be inspected weekly and repaired and cleaned as necessary.
Responsible Staff:	Contractor

BMP Description: A stone trench will be installed which will intercept runoff, remove solids and allow the runoff to infiltrate prior to releasing the excess runoff in to the installed drain lines.

Installation Schedule:	Stone trench will be installed during the drainage installation for the site.
Maintenance and Inspection:	The trench will be inspected weekly and maintained as necessary to prevent migration of the sediment in to the perforated pipes.
Responsible Staff:	Contractor

2.9 Establish Stabilized Construction Exits

Instructions:

- Describe location(s) of vehicle entrance(s) and exit(s), procedures to remove accumulated sediment off-site (e.g., vehicle tracking), and stabilization practices (e.g., stone pads or wash racks or both) to minimize off-site vehicle tracking of sediments and discharges to stormwater. (For more information, see *SWPPP Guide*, Chapter 4, ESC Principle 9.)
- Also, see EPA's *Construction Entrances BMP Fact Sheet* at www.epa.gov/npdes/stormwater/menuofbmps/construction/cons_entrance

BMP Description: A stone construction exit will be installed to trap sediment and dirt off the construction vehicle tires.

Installation Schedule:	Construction entrance/exit will be installed during the initial phases of construction
Maintenance and Inspection:	The area will be inspected weekly, and additional stone will be placed as necessary.
Responsible Staff:	Contractor

SECTION 3: GOOD HOUSEKEEPING BMPS

Instructions:

- Describe the key good housekeeping and pollution prevention (P2) BMPs that will be implemented to control pollutants in stormwater.
- Categorize each good housekeeping and pollution prevention (P2) BMP under one of the following seven categories:
  - ***3.1 Material Handling and Waste Management***
  - ***3.2 Establish Proper Building Material Staging Areas***
  - ***3.3 Designate Washout Areas***
  - ***3.4 Establish Proper Equipment/Vehicle Fueling and Maintenance Practices***
  - ***3.5 Allowable Non-Stormwater Discharges and Control Equipment/Vehicle Washing***
  - ***3.6 Spill Prevention and Control Plan***
  - ***3.7 Any Additional BMPs***
- For more information, see *SWPPP Guide*, Chapter 5.
- Consult your state's design manual or resources in Appendix D of the *SWPPP Guide*.
- For more information or ideas on BMPs, see EPA's National Menu of BMPs http://www.epa.gov/npdes/stormwater/menuofbmps

3.1 Material Handling and Waste Management

Instructions:

- Describe measures (e.g., trash disposal, sanitary wastes, recycling, and proper material handling) to prevent the discharge of solid materials to receiving waters, except as authorized by a permit issued under section 404 of the CWA (For more information, see *SWPPP Guide*, Chapter 5, P2 Principle 1.)
- Also, see EPA's *General Construction Site Waste Management BMP Fact Sheet* at www.epa.gov/npdes/stormwater/menuofbmps/construction/cons_wasteman

BMP Description: All waste materials will be collected and disposed of in metal dumpsters in the staging area. Dumpsters will be placed away from stormwater conveyance and drains, and meet all local and state solid-waste management regulations. Only trash and construction debris from the site will be deposited in the dumpsters.

Installation Schedule:	Trash dumpsters will be installed once the staging area has been established.
Maintenance and Inspection:	The dumpsters will be inspected weekly and immediately after storm events. The dumpster will be emptied weekly. If trash and construction debris are exceeding the dumpsters capacity, the dumpster will be emptied more frequently.
Responsible Staff:	Contractor

BMP Description: Temporary sanitary facilities (portable toilets) will be provided at the site in the staging area. The toilets will be away from concentrated flow paths and traffic flow and will have collection pans underneath as secondary containment.	
Installation Schedule:	The portable toilets will be brought to the site once the staging area has been established.
Maintenance and Inspection:	All sanitary waste will be collected from the portable toilets a minimum of once per week by a sanitary service. The toilets will be inspected weekly for evidence of leaking holding tanks. Toilets with leaking holding tanks will be removed from the site and replaced with new portable toilets.
Responsible Staff:	Contractor

3.2 Establish Proper Building Material Staging Areas

Instructions:

- Describe construction materials expected to be stored on-site and procedures for storage of materials to minimize exposure of the materials to stormwater. (For more information, see *SWPPP Guide*, Chapter 5, P2 Principle 2.)

BMP Description: Construction equipment and maintenance material will be stored at the staging area and materials storage area. They should be elevated on wood blocks or pallets to minimize contact with runoff.	
Installation Schedule:	The staging and materials storage area will be installed after grading. Material will be stored as it is delivered to the site
Maintenance and Inspection:	Storage area will be inspected weekly and after storm events. Storage areas will be kept clean, and organized. Materials will be kept elevated on wood blocks or pallets.
Responsible Staff:	Contractor

3.3 Designate Washout Areas

Instructions:

- Describe location(s) and controls to eliminate the potential for discharges from washout areas for concrete mixers, paint, stucco, and so on. (For more information, see *SWPPP Guide*, Chapter 5, P2 Principle 3.)
- Also, see EPA's *Concrete Washout BMP Fact Sheet* at www.epa.gov/npdes/stormwater/menuofbmps/construction/concrete_wash

BMP Description: Wheel Wash Stations will be provided adjacent to the construction entrance which leads directly to public ways.	
Installation Schedule:	Wheel wash stations will be installed after the stabilized construction entrance.
Maintenance and Inspection:	Vehicles will be inspected as they leave the construction site, and the wheels will be washed as necessary to minimize migration of soils on to public ways.
Responsible Staff:	Contractor

BMP Description: Concrete Washouts will be accomplished in specific areas which have been diked and prepared to prevent contact with stormwater runoff. Waste generated from concrete wash water shall not be allowed to flow into drainage ways, inlets, receiving waters o any location other than the designated concrete washout area.	
Installation Schedule:	Concrete washout stations shall be prepared prior to concrete work on site.
Maintenance and Inspection:	The hardened residue from the concrete washout dike areas will be disposed of I the same manner as other non-hazardous construction waste materials or may be broken up and used on site as deemed appropriate by the Contractor.
Responsible Staff:	Contractor.

3.4 Establish Proper Equipment/Vehicle Fueling and Maintenance Practices

BMP Description: Equipment fuel storage and refueling operations will be in an upland area at a horizontal distance greater than 100 feet from any recourse boundary. The fueling areas will include secondary containment. Fueling will be done near the staging area, away from any resource and buffer zones.

Installation Schedule:	Fueling station will be prepared prior to any fueling operations on site.
Maintenance and Inspection:	The area will be inspected and cleaned weekly.
Responsible Staff:	Contractor.

3.5 Control Equipment/Vehicle Washing

Instructions:

- Describe equipment/vehicle washing practices that will be implemented to control pollutants to stormwater. (For more information, see *SWPPP Guide*, Chapter 5, P2 Principle 5.)
- Also, see EPA's *Vehicle Maintenance and Washing Areas BMP Fact Sheet* at www.epa.gov/npdes/stormwater/menuofbmps/construction/vehicile_maintain

BMP Description: *N/A*

Installation Schedule:	
Maintenance and Inspection:	
Responsible Staff:	

Vehicle Washing will be done off site.

3.6 Spill Prevention and Control Plan

Instructions:

- Describe the spill prevention and control plan to include ways to reduce the chance of spills, stop the source of spills, contain and clean up spills, dispose of materials contaminated by spills, and train personnel responsible for spill prevention and control. (For more information, see *SWPPP Guide*, Chapter 5, P2 Principle 6.)
- Also, see EPA's *Spill Prevention and Control Plan BMP Fact sheet* at www.epa.gov/npdes/stormwater/menuofbmps/construction/spill_control

1. Employee Training: All employees will be trained via biweekly tailgate sessions

2. Vehicle Maintenance: Vehicles and equipment will be maintained off-site. All vehicles and equipment including subcontractor vehicles will be checked for leaking oil and fluids. Vehicles leaking fluids will not be allowed on-site.

3. Spill Kits: Spill kits will be within the materials storage area and concrete washout areas.

4. Spills: All spills will be cleaned up immediately upon discovery. Spent absorbent materials and rags will be hauled off-site immediately after the spill is cleaned up for disposal at and appropriate landfill. Spills large enough to discharge to surface water will be reported to the appropriate federal, state and or local government agency.

5. Material safety data sheets, material inventory, and emergency contact information will be maintained at the site project trailer.

The spill prevention and control procedures will be implemented once construction begins on-site. All personnel will be instructed during tailgate training sessions, regarding the correct procedure for spill prevention and control.

3.7 Any Additional BMPs

Instructions:

- Describe any additional BMPs that do not fit into the above categories. Indicate the problem they are intended to address.

BMP Description: ***Additional stormwater maintenance components/activities are detailed in the O&M Plan. The table below is provided as a brief reference; refer to the O&M Plan for more information.***

Installation Schedule:	
Maintenance and Inspection:	

Component	Inspection Frequency	Key Maintenance Activities
Synthetic Turf Fields	Monthly Apr–Nov	Inspect surface for settlement, seams, or infill migration; sweep/sanitize as needed.
	Quarterly	Brush/groom turf to redistribute infill and maintain infiltration.
	Annual	Inspect underdrain outlets for clear flow.
Rain Garden	Monthly from Apr–Oct	Inspect vegetation and inflow points; remove sediment/debris.
	Semi-annual	Check mulch depth, replace if < 2 in.; remove invasive species.
	After major storm > 1 in.	Verify ponding drains within 72 hrs; if not, till top 3 in. and restore infiltration.
Underdrain Outlets / Overflow Structures	Quarterly	Flush as needed to prevent clogging.
Sweeping Walkways and Perimeter Edges	Monthly	Sweep debris, inspect curb edges for infill migration; return material to field.
Turf Inspection & Periodic Turf Grooming	Quarterly	Inspect and groom field once per quarter to maintain infill distribution and stability. Inspection and maintenance to be performed after major storm events.
Sanitizing/Spraying Procedures	As Needed	Spot-clean only as needed for spills or bodily fluids. Use a biodegradable, phosphate-free, non-toxic disinfectant/cleaner labeled for synthetic turf. Apply in minimal quantities, prevent runoff, and do not allow wash water or residual cleaners to enter catch basins, drainage inlets, or adjacent resource areas; remove and dispose of contaminated material per manufacturer recommendations.
Upper Parking Lot Sweeping	Semi-annual	Parking lot sweeping to be performed in the parking areas at least 2 times per year. Once in the spring and again in the fall. It should be noted the adjacent road to the parking lot (Locust St.) has a low potential for accumulation of total suspended solids due to the use after construction is completed. The Town/School may need to provide mechanical sweeping based on their predetermined schedule.
Deep Sump Hooded Catch Basins	Quarterly	Conduct inspections at least four times per year. Remove infill & debris to ensure proper flow. Cleaning shall occur at least four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin. Rehabilitate the basin as needed if it fails due to clogging.
Invasive Species Control & No-mow in Riverfront Areas	Semi-annual	Inspect twice per year (spring/early summer and late summer/early fall). Remove invasives by hand where feasible (pull seedlings/small plants); for woody species, hand-pull or cut at the base with hand tools. Minimize soil disturbance, no grubbing/grading, avoid creating bare soil. No mowing is permitted within the riverfront area. Maintain a no-mow boundary as only passive maintenance is allowed (inspection, hand removal of invasives, and litter/debris removal). Any mowing or mechanical clearing for safety/access requires Con Comm approval.
Snow Stockpile Area	As Needed	Plowing synthetic turf fields is not typical and is not anticipated at the location of the fields. However, if plowing is necessary, snow stockpiling shall be located in the areas designated on the plan and shall not be stored in the resource areas (wetlands, riverfront, or raingarden).
Water Quality Monitoring & Reporting	Annually	Monitoring shall include a visual inspection of the rain garden/overflow points and any discharge locations for evidence of sediment, turbidity, odors, sheen, algae, or erosion. If flowing water is present during the inspection, collect basic field observations (e.g., clarity/turbidity and general condition) and document findings with photos and a brief log (date, weather, antecedent conditions, observed issues, and any corrective actions). Any deficiencies observed (e.g., persistent turbidity, sediment transport, or erosion) shall be addressed promptly through maintenance and/or repairs.

		If applicable, water testing shall be performed if requested by the Town/Conservation Commission under the Order of Conditions. Annual testing for metals, PFAS, 6PPD-q, oil &grease, etc. to be provided to the Conservation Commission on an annual basis.

3.8 Allowable Non-Stormwater Discharge Management

Instructions:

- Identify all allowable sources of non-stormwater discharges that are not identified. The allowable non-stormwater discharges identified might include the following (see your permit for an exact list):
  - ✓ Waters used to wash vehicles where detergents are not used
  - ✓ Water used to control dust
  - ✓ Potable water including uncontaminated water line flushings
  - ✓ Routine external building wash down that does not use detergents
  - ✓ Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used
  - ✓ Uncontaminated air conditioning or compressor condensate
  - ✓ Uncontaminated ground water or spring water
  - ✓ Foundation or footing drains where flows are not contaminated with process materials such as solvents
  - ✓ Uncontaminated excavation dewatering
  - ✓ Landscape irrigation
- Identify measures used to eliminate or reduce these discharges and the BMPs used to prevent them from becoming contaminated.
- For more information, see *SWPPP Guide*, Chapter 3.A.

List allowable non-stormwater discharges and the measures used to eliminate or reduce them and to prevent them from becoming contaminated:

Certain types of discharges are allowed under the NPDES General Permit for Construction Activity, and it's the intent of this SWPPP to allow such discharges. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come into contact with the water prior to or after its discharge. The control measures that have been outlined previous in this SWPPP will be strictly followed to ensure that no contamination of these non-stormwater discharges take place. The following non-stormwater discharges that may occur from the job site include:

1. Discharge from fire-fighting activity
2. Fire Hydrant flushing.
3. Waters used to wash vehicles where detergent are not used.

4. Waters used to control dust in accordance with off-site vehicle tracking
5. Potable water including uncontaminated water line flushing.
6. Routine external building wash down that does not use detergents.
7. Pavement was water where spills or leaks of toxic or hazardous materials have not occurred and where detergents are not used.
8. Uncontaminated air conditioner compressor condensate.
9. Uncontaminated ground water or spring water.
10. Foundation or footing drains where flows are not contaminated with process materials such as solvents.
11. Uncontaminated excavation dewatering.
12. Landscape irrigation.

SECTION 4: SELECTING POST-CONSTRUCTION BMPs

Instructions:

- Describe all post-construction stormwater management measures that will be installed during the construction process to control pollutants in stormwater discharges after construction operations have been completed. Examples of post-construction BMPs include the following:
  - ✓ Biofilters
  - ✓ Detention/retention devices
  - ✓ Earth dikes, drainage swales, and lined ditches
  - ✓ Infiltration basins
  - ✓ Porous pavement
  - ✓ Other proprietary permanent structural BMPs
  - ✓ Outlet protection/velocity dissipation devices
  - ✓ Slope protection
  - ✓ Vegetated strips and/or swales
- Identify any applicable federal, state, local, or tribal requirements for design or installation.
- Describe how low-impact designs or smart growth considerations have been incorporated into the design.
- For any structural BMPs, you should have design specifications and details and refer to them. Attach them as appendices to the SWPPP or within the text of the SWPPP.
- For more information on this topic, see your state's stormwater manual.
- You might also want to consult one of the references listed in Appendix D of the *SWPPP Guide*.
- Visit the post-construction section of EPA's Menu of BMPs at: www.epa.gov/npes/menuofbmps

BMP Description: There are drainage structures, catch basins, drain manholes on site. It is important to inspect these structures to ensure they do not become clogged. After site construction is completed, drainage structures should be inspected at regular intervals and after heavy storms.

Installation Schedule:	N/A
Maintenance and Inspection:	Manholes should be inspected twice a year to remove any intrusions and ensure proper flow. Catch basins and storm clean-out structures should be cleaned of any debris 4 times a year and after heavy storms.
Responsible Staff:	Owner

BMP Description: A Rain Garden is a depressed area in the landscape that collects rainwater from a driveway or street and allows it to soak into the ground. Rain gardens are planted with native grasses and flowering perennials designed to filter and reduce runoff. No rain gardens are proposed at this site.

Installation Schedule:	The rain garden will be installed early in the construction phase to

	provide pre-treatment of the ADA parking lot once it is built.
Maintenance and Inspection:	Years 1 & 2: New rain gardens will need to be watered for the first one or two years until the garden is established. Apply mulch twice per year until groundcover establishes. After the first season, it may be obvious what plants were successful and what plants do not work for your rain garden. Weeding will be needed the first two years. Remove weeds by hand, including their roots. Years 3+: In the third year and beyond, the native grasses, sedges, rushes, and wildflowers will begin to mature and will outcompete the weeds. Weeding isolated patches might still be needed on occasion. After each growing season, the stems and seed heads can be left for winter interest, wildlife cover and bird food. Once spring arrives and new growth is 4-6-inches tall, cut all tattered plants back. If the growth is thick, hand-cut the largest plants and then use a string trimmer to reduce the planting back to a height of six to eight inches. Dead plant material can also be removed with a string trimmer or weed whacker (scythe) and composted or disposed of as appropriate. Then, rake up and compost or properly dispose of the dead plant material. If the mower deck won't rise that high, use a string trimmer or weed-eater to cut the stems at a height of 6-8 inches. On thicker stems, such as cup plant, goldenrods and some asters, a string trimmer may not be strong enough. For these, use hand clippers or pruning shears to cut the individual stems. Since the rain garden serves the purpose of catchment, sediment will tend to accumulate within the garden. Remove sediment as necessary. Core aerate or cultivate bare areas annually if surface becomes clogged with fine sediments. Replant or seed if there are areas of exposed soil. Replace dead or diseased plantings. Evaluate the health of native plantings. Plant more of the successful species in the rain garden as necessary. Replace rocks that may be diverting flow out of the garden.
Responsible Staff:	Owner

SECTION 5: INSPECTIONS

5.1 Inspections

Instructions:

- Identify the individual(s) responsible for conducting inspections and describe their qualifications. Reference or attach the inspection form that will be used.
- Describe the frequency that inspections will occur at your site including any correlations to storm frequency and intensity.
- Note that inspection details for particular BMPs should be included in Sections 2 and 3.
- You should also document the repairs and maintenance that you undertake as a result of your inspections. These actions can be documented in the corrective action log described in Part 5.3 below.
- For more on this topic, see *SWPPP Guide*, Chapters 6 and 8.
- Also, see suggested inspection form in Appendix B of the *SWPPP Guide*.

1. ***Inspection Personnel:*** Identify the person(s) who will be responsible for conducting inspections and describe their qualifications:

Construction personnel will conduct inspections as identified in the inspection and maintenance section of each BMP. Personnel will be trained during tailgate session on the proper inspection and maintenance of the BMPs.

If specified, a representative from Nesra Engineering, LLC will make routine site visits and conduct inspections of the BMPs during the construction process. Additional inspections will be conducted by Nesra after significant storm events during the construction phase.

2. ***Inspection Schedule and Procedures:***

Describe the inspection schedules and procedures you have developed for your site (include frequency of inspections for each BMP or group of BMPs, indicate when you will inspect, e.g., before/during/and after rain events, spot inspections):

Describe the general procedures for correcting problems when they are identified. Include responsible staff and time frames for making corrections: Attach a copy of the inspection report you will use for your site.

As stated above inspections will be conducted by both the contractor's construction personnel and Nesra Engineering LLC representative. Contractor personnel will conduct inspections as required by the Maintenance and Inspection section of each BMP. In addition Nesra's representative will conduct routine inspections.

If a problem is noted during the inspection, a copy of the inspection form will be provided to the Contractor, who will be responsible for correcting the issue that day. In subsequent inspections the area will be re-inspected and corrections will be noted.
A copy of the inspection report to be used is included in the appendix section.

5.2 Delegation of Authority

Instructions:

- Identify the individual(s) or specifically describe the position where the construction site operator has delegated authority for the purposes of signing inspection reports, certifications, or other information.
- Attach the delegation of authority form that will be used.
- For more on this topic, see *SWPPP Guide*, Chapter 7.

Duly Authorized Representative(s) or Position(s):

Nesra Engineering, LLC
Hip Aguilera
111 Washington St.
Plainville, MA 02762
508-723-2403
HA@NersaEng.com

A copy of the signed delegation of authority form is attached in Appendix K.

5.3 Corrective Action Log

Instructions:

- Create here, or as an attachment, a corrective action log. This log should describe repair, replacement, and maintenance of BMPs undertaken as a result of the inspections and maintenance procedures described above. Actions related to the findings of inspections should reference the specific inspection report.
- This log should describe actions taken, date completed, and note the person that completed the work.

Corrective Action Log:

A Copy of the corrective log is included in the Appendix.

SECTION 6: RECORDKEEPING AND TRAINING

6.1 Recordkeeping

Instructions:

- The following is a list of records you should keep at your project site available for inspectors to review:
- Dates of grading, construction activity, and stabilization (which is covered in Sections 2 and 3)
- A copy of the construction general permit (attach)
- The signed and certified NOI form or permit application form (attach)
- A copy of the letter from EPA or/the state notifying you of their receipt of your complete NOI/application (attach)
- Inspection reports (attach)
- Records relating to endangered species and historic preservation (attach)
- Check your permit for additional details
- For more on this subject, see *SWPPP Guide*, Chapter 6.C.

Records will be retained for a minimum period of at least 3 years after the permit is terminated.

Date(s) when major grading activities occur:
T.B.P.

Date(s) when construction activities temporarily or permanently cease on a portion of the site:
T.B.P.

Date(s) when an area is either temporarily or permanently stabilized:
T.B.P.

6.2 Log of Changes to the SWPPP

Instructions:

- Create a log here, or as an attachment, of changes and updates to the SWPPP. You should include additions of new BMPs, replacement of failed BMPs, significant changes in the activities or their timing on the project, changes in personnel, changes in inspection and maintenance procedures, updates to site maps, and so on.

Log of changes and updates to the SWPPP
Updated on 12/28/25 (See Log).

6.3 Training

Instructions:

- Training your staff and subcontractors is an effective BMP. As with the other steps you take to prevent stormwater problems at your site, you should document the training that you conduct for your staff, for those with specific stormwater responsibilities (e.g. installing, inspecting, and maintaining BMPs), and for subcontractors.
- Include dates, number of attendees, subjects covered, and length of training.
- For more on this subject, see *SWPPP Guide*, Chapter 8.

Individual(s) Responsible for Training:

Contractor. Additional info T.B.P.

Describe Training Conducted:

- General stormwater and BMP awareness training for staff and subcontractors:
- Detailed training for staff and subcontractors with specific stormwater responsibilities:

SECTION 7: FINAL STABILIZATION

Instructions:

- Describe procedures for final stabilization. If you complete major construction activities on part of your site, you can document your final stabilization efforts for that portion of the site. Many permits will allow you to then discontinue inspection activities in these areas (be sure to check your permit for exact requirements). You can amend or add to this section as areas of your project are finally stabilized.
- Update your site plans to indicate areas that have achieved final stabilization.
- Note that dates for areas that have achieved final stabilization should be included in Section 6, Part 6.1 of this SWPPP.
- For more on this topic, see *SWPPP Guide*, Chapter 9.

BMP Description: Installation and establishment of hydroseeded areas outside of the limits of the athletic field

Installation Schedule:	After installation of the drainage improvements, structures specified in the contract documents and final grading.
Maintenance and Inspection:	Maintenance and inspection of the installed natural turf areas will be in accordance with the design drawings and specifications.
Responsible Staff:	Contractor

SECTION 8: CERTIFICATION AND NOTIFICATION

Instructions:

- The SWPPP should be signed and certified by the construction operator(s). Attach a copy of the NOI and permit authorization letter received from EPA or the state in Appendix D.

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.

Name: ______________________________ Title: ______________________________

Signature: ______________________________________ Date: __________________

SWPPP APPENDICES

Attach the following documentation to the SWPPP:

Appendix A – General Location Map

Appendix B – Site Maps

Appendix C – Construction General Permit

Appendix D – NOI and Acknowledgement Letter from EPA/State

Appendix E – Inspection Reports Template

Appendix F – Corrective Action Log (or in Part 5.3)

Appendix G – SWPPP Amendment Log (or in Part 6.2)

Appendix H – Subcontractor Certifications/Agreements

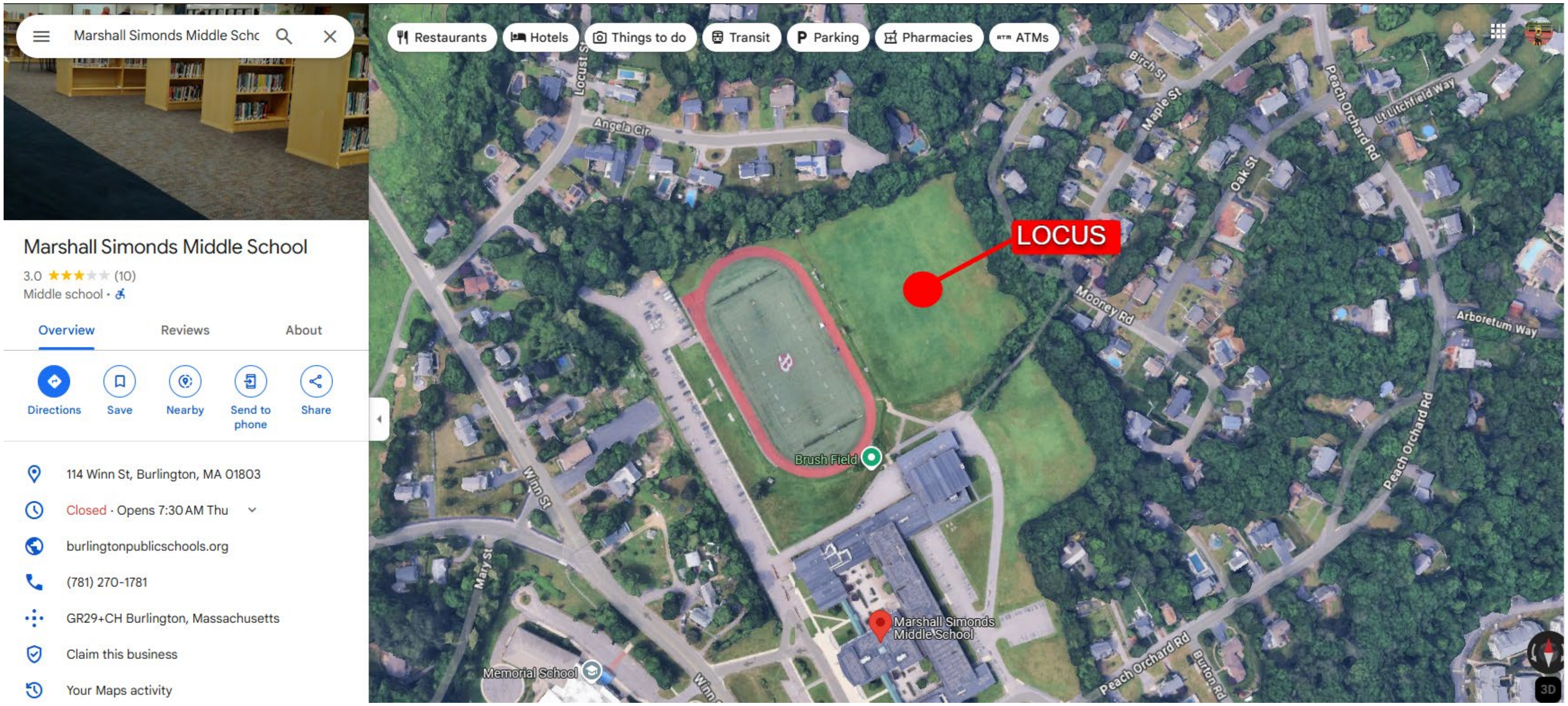
Appendix I – Grading and Stabilization Activities Log (or in Part 6.1)

Appendix J – Training Log

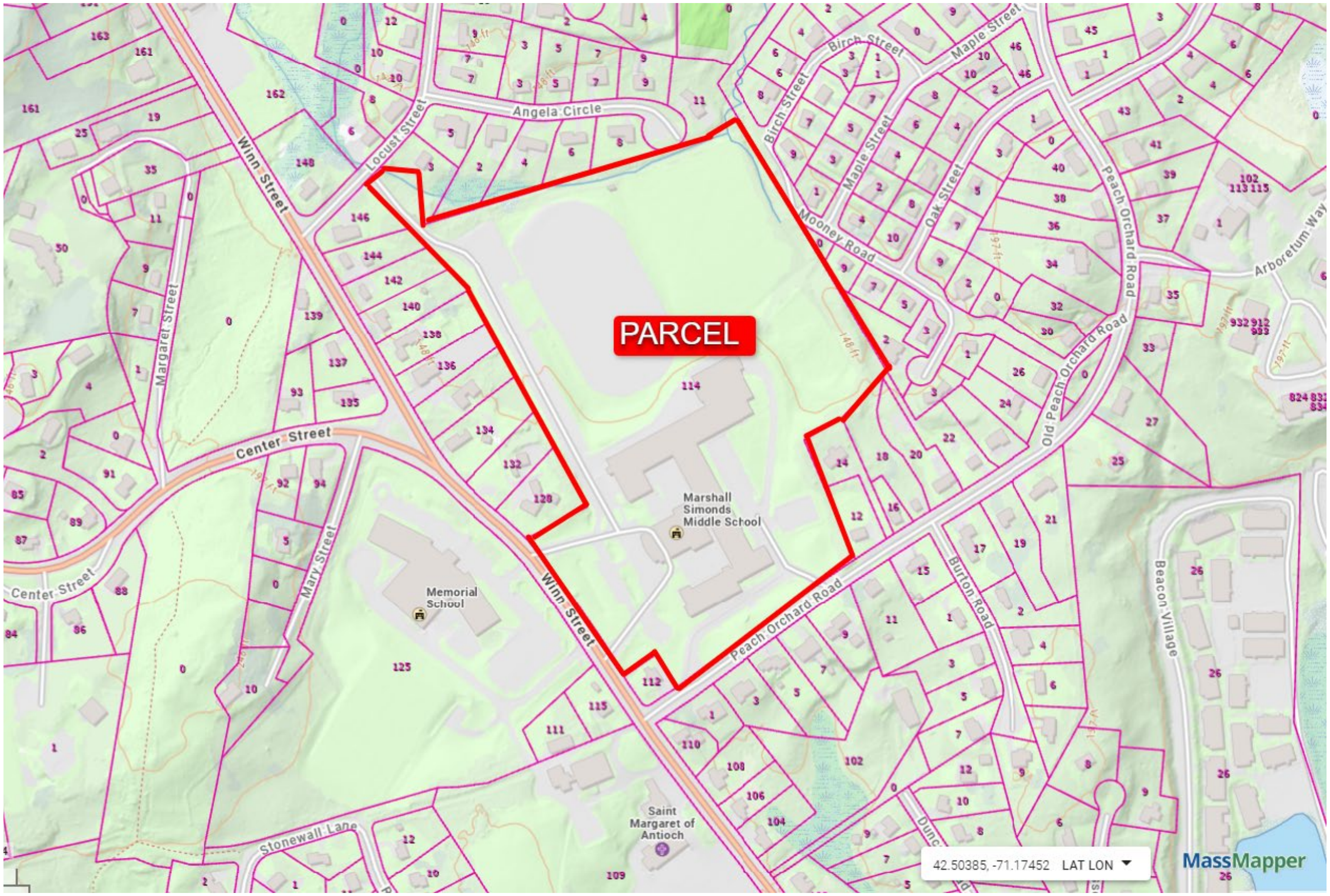
Appendix K – Delegation of Authority

Appendix L – Additional Information (i.e., Endangered Species and Historic Preservation Documentation, Soil Report)

Appendix A – General Location Map



Appendix B – Site Maps



Appendix C – Construction General Permit

To be provided by the contractor.

Appendix D – NOI and Acknowledgement Letter from EPA/State

- *T.B.P.*

Appendix E – Inspection Reports

Stormwater Construction Site Inspection Report

General Information	
Project Name:	
Location:	
Date of Inspection:	Start/End Time:
Inspector's Name:	
Inspector's Title: P.E.	
Inspector's Contact Information:	
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:

Overall Site Issues

General site locations/issues assessed during inspection.

BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1. All inactive slopes and disturbed areas have been stabilized.	☐ Yes ☐ No	☐ Yes ☐ No	
2. Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	☐ Yes ☐ No	☐ Yes ☐ No	
3. Are all sanitary waste receptacles placed in secondary containment and free of leaks?	☐ Yes ☐ No	☐ Yes ☐ No	

4. Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	☐ Yes ☐ No	☐ Yes ☐ No	
5. Are discharge points and receiving waters free of any sediment deposits?	☐ Yes ☐ No	☐ Yes ☐ No	
6. Are storm drain inlets properly protected?	☐ Yes ☐ No	☐ Yes ☐ No	
7. Is the construction exit preventing sediment from being tracked into the street?	☐ Yes ☐ No	☐ Yes ☐ No	
8. Is trash/litter from work areas collected and placed in covered dumpsters?	☐ Yes ☐ No	☐ Yes ☐ No	
9. Are vehicle and equipment fueling,	☐ Yes ☐ No	☐ Yes ☐ No	

cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?			
10. Are materials that are potential stormwater contaminants stored inside or under cover?	☐ Yes ☐ No	☐ Yes ☐ No	
11. Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	☐ Yes ☐ No	☐ Yes ☐ No	
12. (Other)	☐Yes ☐ No	☐Yes ☐ No	N/A

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."

____.

Signature of Inspector *Date*

Appendix F – Corrective Action Log

Project Name:
SWPPP Contact:

Inspection Date	Inspector Name(s)	Description of BMP Deficiency	Corrective Action Needed (including planned date/responsible person)	Date Action Taken/Responsible person

Appendix G – SWPPP Amendment Log

Project Name:
SWPPP Contact:

Amendment No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title]
1	SWPPP Created.	2/12/25	Hipolito Aguilera, CSI, CSL Construction Supervisor
2	Updates to Erosion and Sediment Control and BMPs.	12/28/25	Hipolito Aguilera, CSI, CSL Construction Supervisor

Appendix H – Subcontractor Certifications/Agreements

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: ____________________

Project Title: ____________________

Operator(s): ____________________

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the BMPs and practices described in the SWPPP.

This certification is hereby signed in reference to the above named project:

Company: ____________________

Address: ____________________

Telephone Number: ____________________

Type of construction service to be provided: ____________________

____

____

Signature: ____________________

Title: ____________________

Date: ____________________

Appendix I – Grading and Stabilization Activities Log

Project Name:
SWPPP Contact:

Date Grading Activity Initiated	Description of Grading Activity	Date Grading Activity Ceased (Indicate Temporary or Permanent)	Date When Stabilization Measures are Initiated	Description of Stabilization Measure and Location

Appendix J – SWPPP Training Log

Stormwater Pollution Prevention Training Log

Project Name:

Project Location:

Instructor's Name(s):

Instructor's Title(s):

Course Location: ______________________________________ Date: ____________________

Course Length (hours): _________________________________

Stormwater Training Topic: *(check as appropriate)*

- ❑ **Erosion Control BMPs**
- ❑ **Emergency Procedures**
- ❑ **Sediment Control BMPs**
- ❑ **Good Housekeeping BMPs**
- ❑ **Non-Stormwater BMPs**

Specific Training Objective:____

____

Attendee Roster: *(attach additional pages as necessary)*

No.	Name of Attendee	Company
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Appendix K – Delegation of Authority Form

Delegation of Authority

I, ________________________ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Construction General Permit, at the ______________________________________ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

____ (name of person or position)
____ (company)
____ (address)
____ (city, state, zip)
____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in ______________________________________ (Reference State Permit), and that the designee above meets the definition of a "duly authorized representative" as set forth in ______________________________________ (Reference State Permit).

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.

Name: ____

Company: ____

Title: ____

Signature: ____

Date: ____

Appendix L – Additional Information

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for

Middlesex County, Massachusetts

Marshall Simonds Athletic Fields Renovation Project

February 12, 2025

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

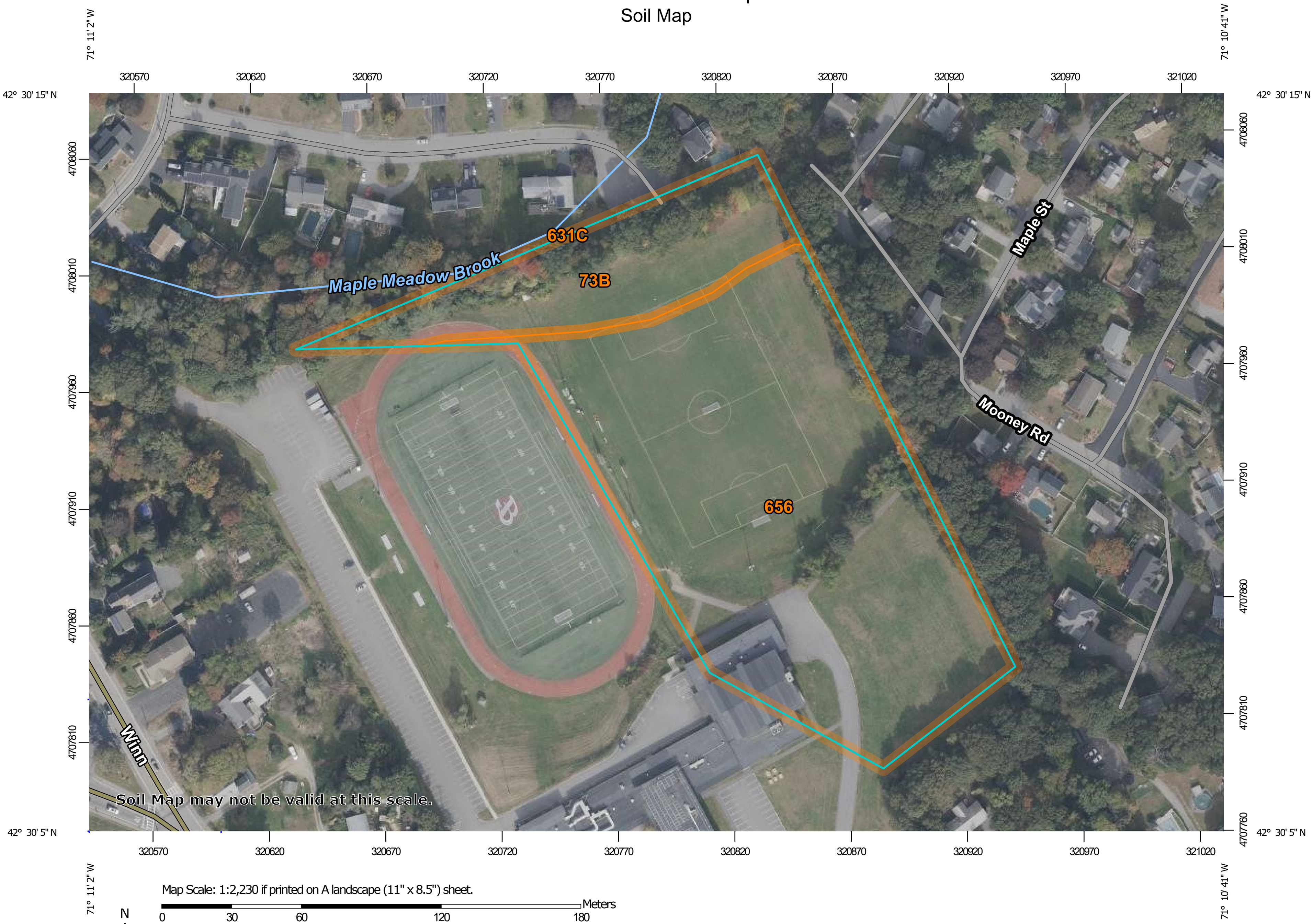
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Soil Map



Map Scale: 1:2,230 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 30, 60, 120, 180

Feet: 0, 100, 200, 400, 600

N

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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 24, Aug 27, 2024

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

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
73B	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	1.7	21.9%
631C	Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky	0.0	0.0%
656	Udorthents-Urban land complex	6.1	78.1%
Totals for Area of Interest		**7.9**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Middlesex County, Massachusetts

73B—Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w695
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Whitman, extremely stony, and similar soils: 81 percent
Minor components: 19 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Whitman, Extremely Stony

Setting

Landform: Drumlins, ground moraines, hills, drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 1 inches: peat
A - 1 to 10 inches: fine sandy loam
Bg - 10 to 17 inches: gravelly fine sandy loam
Cdg - 17 to 61 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 7 to 38 inches to densic material
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY041MA - Very Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Ridgebury, extremely stony

Percent of map unit: 10 percent
Landform: Drumlins, depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Drainageways, depressions, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 3 percent
Landform: Marshes, bogs, swamps
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Woodbridge, extremely stony

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

631C—Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky

Map Unit Setting

National map unit symbol: vr1g
Elevation: 0 to 1,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Charlton and similar soils: 45 percent
Urban land: 35 percent
Hollis and similar soils: 10 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting

Landform: Ground moraines, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits over friable loamy basal till derived from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 22 inches: sandy loam
H3 - 22 to 65 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Urban Land

Setting

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land

Description of Hollis

Setting

Landform: Hillslopes, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable, shallow loamy basal till over granite and gneiss

Typical profile

H1 - 0 to 2 inches: fine sandy loam

H2 - 2 to 14 inches: fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Minor Components

Canton

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Backslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Udorthents, loamy

Percent of map unit: 2 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Landform: Ledges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave

Scituate

Percent of map unit: 1 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Summit, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Montauk

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Head slope, nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

656—Udorthents-Urban land complex

Map Unit Setting

National map unit symbol: 995k
Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 45 percent
Urban land: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Description of Urban Land

Setting

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land

Minor Components

Canton

Percent of map unit: 10 percent

Landform: Hills
Landform position (two-dimensional): Backslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent
Landform: Terraces, plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Paxton

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

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Nesra Engineering, LLC
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Plainville, MA 02762

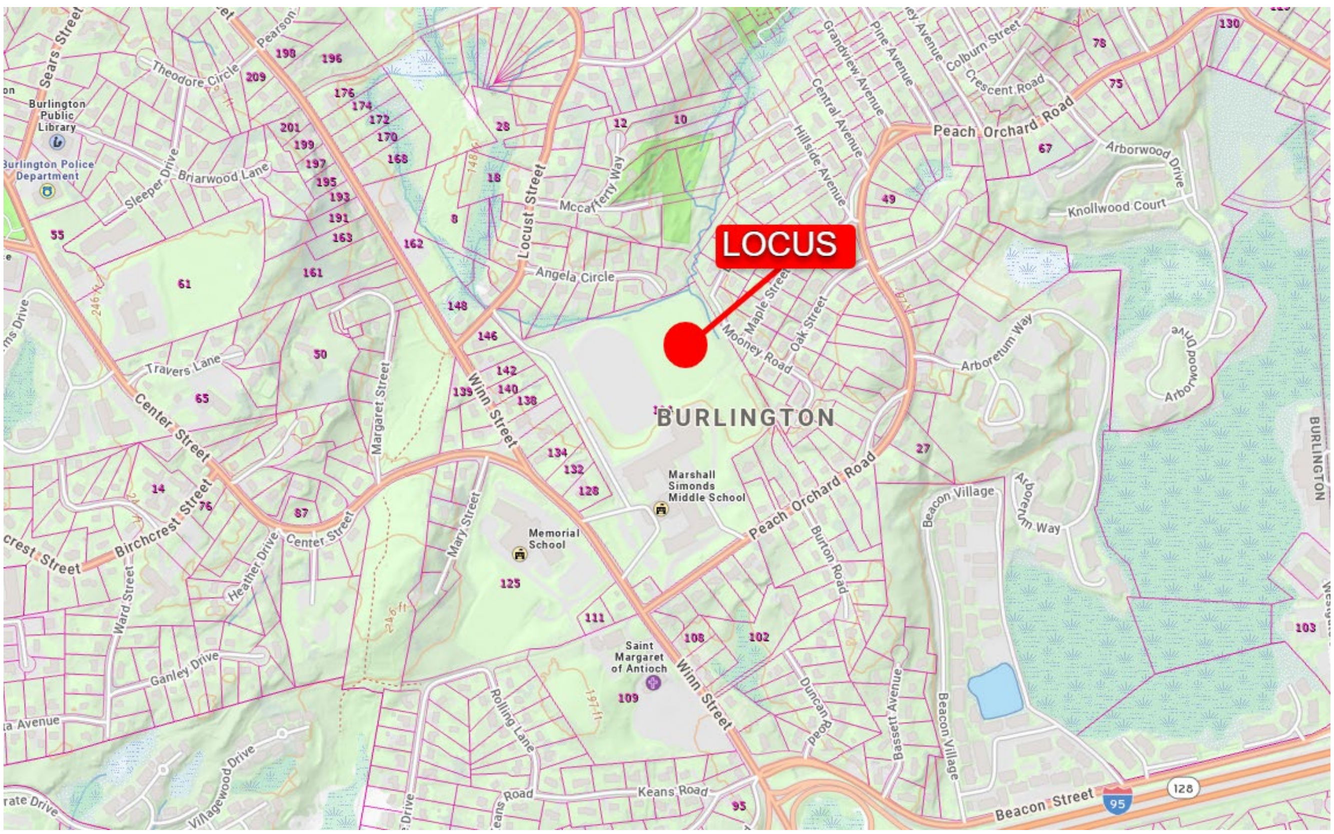
Attachment M

Operations and Maintenance Plan (O&M Plan)

Long-Term Stormwater Operations and Maintenance Plan

Marshall Simonds Middle School Athletic Fields Renovation Project
Burlington, MA

Revised 12-28-25



Overview

The following Long Term Stormwater Operations and Maintenance plan has been completed as required by the NPDES Construction General Permit, the associated Stormwater Pollution Prevention Plan (SWPPP), and Federal, State, Local regulatory guidelines, as well as common civil engineering practices. All of which will be submitted by the contractor prior to start of construction and reviewed by Nesra Engineering LLC.

The purpose and intent of this Long-Term Stormwater Operations and Maintenance plan is to provide additional project-specific information related to the effective stormwater management implementation, operations and maintenance of stormwater measures. The information provided herein is intended to provide the operational and maintenance basis of all stormwater measures on-site, subject to updates, amendments, or revisions, as necessary. The property owner shall be notified in writing of this plan and be provided with a copy, along with a complete set of the approved project drawings depicting all stormwater elements.

The following outline is a basic summary of the stormwater operations and maintenance plan key elements:

Section A

Introduction

1. Purpose
2. Responsible Parties
3. Temporary Stormwater Measures
4. Permanent Stormwater Measures
5. Estimated Annual Costs

Section B

Stormwater Operations

1. Material and Equipment Storage
2. Stormwater Systems
3. Stormwater Operations and Maintenance
4. Source Control / Preventing Illicit Discharges

Section C

Stormwater Maintenance

1. Management, Training, and Certification
2. Observation Log
3. Correction Action Log

Section A

Introduction

The project involves replacing the existing natural grass fields adjacent to Marshall Simonds Middle School, 114 Winn Street, Burlington, MA, with one full-size synthetic multipurpose athletic field and one smaller youth/practice field. The design eliminates the previously proposed ADA parking area and associated drive, reducing impervious cover. Runoff from both fields and adjacent walkways is directed through the permeable turf base and collected by an underdrain system that discharges to a new bioretention rain garden for final filtration and infiltration before connecting to existing infrastructure. The project also includes new walkways, fencing, terraced seating, and minor grading improvements.

Currently, runoff originates from the south side of the property and flows northward across the parcel. Stormwater from the building and parking lot divides into two main paths: one portion flows northeast into a vegetated grass field before discharging into a catch basin, while the remainder moves north and northwest over a grassy hill and into a wetland categorized as a wood swamp deciduous wetland by MassDEP—adjacent to walking path that leads to the School. Additional runoff from the field continues north, eventually emptying into a linear wetland along the property's northern and eastern sections.

Purpose

The purpose of this Stormwater Operations and Maintenance Plan is to (1) identify the primary differences between temporary and permanent stormwater measures, proper operations, and system maintenance and (2) ensure the inspection of the system removal of accumulated sediments, oils, and debris, and the implementation of corrective action as well as record-keeping activities. The ongoing responsibility resides on the Owner(s), its successors, and assigns. Adequate maintenance is defined in this document in good working condition.

Stormwater management facilities are commonly installed in development projects such as the proposed renovation of the Winch Tennis Courts. The complexity and goals of these systems vary with the nature of the receiving waters as well as the type of change/renovation proposed. In general, stormwater runoff from areas may contain contaminants which can have an adverse impact on receiving waters. The installation of stormwater management systems that are properly designed, installed, and maintained can significantly reduce the non-point discharge from construction and developed areas. These measures are particularly important to the project in sensitive water bodies. The temporary and permanent stormwater measures are further described in the permit plans, construction documents, and Stormwater Pollution Prevention Plan.

The stormwater management system can protect and enhance the stormwater runoff water quality through the removal of sediments and pollutants, and source control significantly reduces the number of pollutants entering the system.

This Long-Term Stormwater Management System Operations and Maintenance (O&M) Manual shall be implemented to ensure that the stormwater management system functions as designed. The Owner possesses the primary responsibility for overseeing and implementing the O&M plan and assigning a person or persons who will be responsible for the proper operation and maintenance of the stormwater structures.

Included in this manual is an overall site plan which identifies the locations of the key components of the stormwater management system and a log for tracking the inspections and maintenance.

Owner(s) & Responsible Parties

Name: Burlington Public Schools

Address: 123 Cambridge St.

Town: Barrington

State: MA

Contact: 01803

Telephone: 781-238-5690

The Owner may sell, re-assign, or transfer ownership at any time, but not prior to the creation, documentation, and establishment of a successor. In the event the project ownership is sold, re-assigned or transferred, the stormwater operation and maintenance responsibilities shall also be transferred to the new Owner.

Temporary Stormwater Measures

Temporary stormwater measures are all those structural or non-structural practices intended to reduce or eliminate stormwater degradation and site erosion during active or inactive construction activities. Specifically, these temporary stormwater measures are purposefully chosen, sized and placed in such a manner that will result in stormwater and soil erosion mitigation. Ultimately, the monitoring and successful operations of all temporary stormwater measures shall be the Owner and Site Contractor's responsibility.

The proposed temporary stormwater measures are as follows (reasonable guide, not limited too):

- ❖ Stabilized construction entrance
- ❖ Hay Bales
- ❖ Silt Fence
- ❖ Silt Sock
- ❖ Material Stockpile Stabilization
- ❖ Mulching or Hydroseed or Erosion Control Blankets or Crushed Gravel Cover (travel lanes)
- ❖ Temporary Sediment Basins (where needed)
- ❖ Leaching Catch Basin Inlet Protection with Silt Sacks

All temporary stormwater measures costs are the responsibility of the Owner and Site Contractor. The Owner, Developer (if applicable), and Site Contractor are responsible to operate, maintain, replace or replace all temporary stormwater measures until the project is completely stabilized.

Permanent Stormwater Measures

Permanent stormwater measures are all those structural or non-structural practices intended to reduce or eliminate stormwater degradation and site erosion following construction completion, site stabilization, and property occupancy. Specifically, these permanent measures are purposefully chosen, sized and placed in such a manner that will result in measurable stormwater quality, volume and velocity controls. Ultimately, the monitoring and successful operations of all permanent stormwater measures shall initially be the Contractor's responsibility. Once the site is completely stable, the stormwater system(s) are one hundred (100) percent complete and fully functional, as designed and approved, the Contractor may transfer operational and maintenance responsibilities to the financially responsible entity.

It is highly recommended that a trained third-party stormwater agent is contracted by the Owner or property manager to operate and maintain the stormwater system. Any and all such contractual arrangements will be added to the final Stormwater Operations and Maintenance Plan, as an addendum with continual updates, business registrations, certifications, and proper insurances, as applicable.

The proposed Project's permanent stormwater measures and structures are as follows:

- ❖ Permeable synthetic turf system with engineered infiltration stone base
- ❖ Underdrain collection piping and overflow connections
- ❖ Bioretention Rain Garden (receives all field and walkway runoff)
- ❖ Overflow to existing closed drainage system

❖ Stone edge drains and vegetated perimeter slopes
❖ Turf inspection & periodic grooming for infill containment
❖ Sweeping perimeter walkways for infill containment
❖ Upper Parking Lot Sweeping
❖ Deep Sump Hooded Catch Basins
❖ Invasive Species Control
❖ No-mow policy in riverfront area
❖ Snow Stock Pile area
❖ Water quality monitoring and reporting

Estimated Annual Costs

Estimated annual stormwater operation and maintenance cost is **approximately $5,000 per year**, with potential peaks to $10,000 every fifth year for specialized turf grooming or media replacement. It is anticipated this plan will be fully implemented by the Town or a single company specializing in the stormwater maintenance of similar facilities.

Section B

Stormwater Operations

This section provides additional project-specific permanent (fully occupied, stabilized site, functional systems) stormwater O&M information, including the equipment storage during construction, snow management, stormwater systems, and general site operations and maintenance. All temporary measures, prior to full ownership transfer will be the Contractor's responsibility.

Material and Equipment Storage

Material and equipment storage will be done in a safe and proper manner during all construction activities. Landscape contractors, pest management contractors and general maintenance staff shall follow all applicable product manufacturers, state and federal guidelines for the storage and handling of materials and chemicals on site.

All debris shall be collected and disposed of offsite in a legal manner. Temporary snow storage may be permitted, in accordance with the approved permit plans in the pre-determined locations only. Yard waste and snow are prohibited from being deposited in, near or adjacent to the onsite stormwater resources.

After the construction phase is completed, it is anticipated that the Owner, Contractor, or HOA (if applicable) will contract all services and not have any onsite facilities to store property operational or maintenance material or equipment.

Stormwater Systems

The permanent stormwater system consists of two permeable turf fields draining through dense-graded stone and underdrains to the bioretention rain garden. The engineered system provides on-site capture, infiltration, and treatment of all precipitation up to the 100-year storm. No untreated discharge reaches resource areas.

Key Components:

❖ Turf infiltration base (stone depth ≈ 12–18 in.)

❖ Underdrain network routed to rain garden

❖ Rain Garden with engineered soil, vegetation, and overflow structure

❖ Existing outfall connection (unchanged)

Stormwater Operations and Maintenance

The permanent onsite drainage systems operations and maintenance can be self-performed by the Town, or assigned party/entity responsible. Typically, a long-term contract is established with industry-specific trained and licensed professionals capable of operating, inspecting, and maintaining the site-specific designed stormwater system.

In general, good housekeeping, common sense, responsible site operations, and timely maintenance include the following activities:

- **Site Maintenance:** The site and all its components shall be kept in a neat, orderly, and clean fashion. Routine upkeep shall be performed by the Parks and Rec Department.. Typical site maintenance activities shall include, but not be limited to responsible construction practices, road sweeping, using a vacuum sweeper and landscape management including intensive spring and fall season cleaning.
- **Trash Disposal:** After construction is completed, all common waste materials will be (1) the Town's responsibility. (1) The Town will be responsible for trash disposal according to their predetermined pick-up trash pick-up schedule.
- **Spill Control & Containment:** Spill control practices will be followed to minimize stormwater contamination from vehicle oil and petroleum leaks during the construction phase.

Stormwater Management System Maintenance

Component	Inspection Frequency	Key Maintenance Activities
Synthetic Turf Fields	Monthly Apr–Nov	Inspect surface for settlement, seams, or infill migration; sweep/sanitize as needed.
	Quarterly	Brush/groom turf to redistribute infill and maintain infiltration.
	Annual	Inspect underdrain outlets for clear flow.
Rain Garden	Monthly from Apr–Oct	Inspect vegetation and inflow points; remove sediment/debris.
	Semi-annual	Check mulch depth, replace if < 2 in.; remove invasive species.
	After major storm > 1 in.	Verify ponding drains within 72 hrs; if not, till top 3 in. and restore infiltration.
Underdrain Outlets / Overflow Structures	Quarterly	Flush as needed to prevent clogging.
Sweeping Walkways and Perimeter Edges	Monthly	Sweep debris, inspect curb edges for infill migration; return material to field.
Turf Inspection & Periodic Turf Grooming	Quarterly	Inspect and groom field once per quarter to maintain infill distribution and stability. Inspection and maintenance to be performed after major storm events.
Sanitizing/Spraying Procedures	As Needed	Spot-clean only as needed for spills or bodily fluids. Use a biodegradable, phosphate-free, non-toxic disinfectant/cleaner labeled for synthetic turf. Apply in minimal quantities, prevent runoff, and do not allow wash water or residual cleaners to enter catch basins, drainage inlets, or adjacent resource areas; remove and dispose of contaminated material per manufacturer recommendations.

Upper Parking Lot Sweeping	Semi-annual	Parking lot sweeping to be performed in the parking areas at least 2 times per year. Once in the spring and again in the fall. It should be noted the adjacent road to the parking lot (Locust St.) has a low potential for accumulation of total suspended solids due to the use after construction is completed. The Town/School may need to provide mechanical sweeping based on their predetermined schedule.
Deep Sump Hooded Catch Basins	Quarterly	Conduct inspections at least four times per year. Remove any infill and debris to ensure proper flow. Cleaning shall occur at least four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin. Rehabilitate the basin as needed if it fails due to clogging.
Invasive Species Control & No-mow in Riverfront Areas	Semi-annual	Inspect twice per year (spring/early summer and late summer/early fall). Remove invasives by hand where feasible (pull seedlings/small plants); for woody species, hand-pull or cut at the base with hand tools. Minimize soil disturbance—no grubbing/grading—and avoid creating bare soil. No mowing is permitted within the riverfront area. Maintain a no-mow boundary as only passive maintenance is allowed (inspection, hand removal of invasives, and litter/debris removal). Any mowing or mechanical clearing for safety/access requires Conservation Commission approval.
Snow Stockpile Area	As Needed	Plowing synthetic turf fields is not typical and is not anticipated at the location of the fields. However, if plowing is necessary, snow stockpiling shall be located in the areas designated on the plan and shall not be stored in the resource areas (wetlands, riverfront, or raingarden).
Water Quality Monitoring & Reporting	Annually	Monitoring shall include a visual inspection of the rain garden/overflow points and any discharge locations for evidence of sediment, turbidity, odors, sheen, algae, or erosion. If flowing water is present during the inspection, collect basic field observations (e.g., clarity/turbidity and general condition) and document findings with photos and a brief log (date, weather, antecedent conditions, observed issues, and any corrective actions). Any deficiencies observed (e.g., persistent turbidity, sediment transport, or erosion) shall be addressed promptly through maintenance and/or repairs. If applicable, water testing shall be performed if requested by the Town/Conservation Commission under the Order of Conditions. Annual testing for metals, PFAS, 6PPD-q, oil &grease, etc. to be provided to the Conservation Commission on an annual basis.

Source Control & Preventing Illicit Discharges

The following source control and pollution prevention measures shall be employed on the site to prevent contamination of stormwater runoff:

- Illicit discharges and unauthorized connections or discharge to the drainage system, rain garden, and catch basins are strictly prohibited.
- Routine maintenance will prevent migration of crumb-rubber infill beyond the field perimeter.

- No discharges from the turf drainage system will bypass the rain garden.
- No coal tar-based pavement sealants are to be used on site.

Section C

Management, Training, and Certification

This section will provide additional project-specific stormwater maintenance information, including management, training and certifications, observation log, correction action log, and project representative BMP library.

Permanent stormwater systems are to be monitored, operated, and maintained by trained individuals, certified in stormwater management practices. Either the Contractor, Developer, HOA (if applicable) or Property Management staff may become trained and certified or utilize a professional contractor with the appropriate training and certifications, capable of responsible stormwater systems operation and maintenance compliance.

The Contractor, Owner, HOA (if applicable) or Property Management shall maintain current records of stormwater management training and certifications of all, as typically required and performed within the SWPPP documentation.

Observation Log

The Contractor, Owner, or Property Management and/or their stormwater consultants are responsible for completing stormwater observation logs in compliance with state and local stormwater compliance regulations, in addition to the suggested manufacturer specifications.

Correction Action Log

When required and as necessary, corrective action logs shall be prepared. The purpose and intent of correction action logs are to document stormwater occurrences that require additional, amended, or revised stormwater measures than those approved/permitted devices in operation.

Stormwater measures may require corrective action logs. The creation, documentation and corrective action log reporting shall be the Contractor, Owner, HOA or Property Management's and/or their stormwater consultant(s) responsibility.

Annual O&M review meetings shall be held between the Burlington School Department, the Parks and Recreation Department, and contracted turf maintenance vendor to confirm system performance and coordinate any adaptive management actions recommended by Nesra Engineering.

Compliance and Certification Statement

To the best of my knowledge and understanding, the undersigned recognizes the validity and importance of compliance with the Stormwater Operations and Maintenance Plan, as generally outlined and described herein. The undersigned further agrees to participate in the advancement and notification of this document and all future interested parties or entities responsible for the effective and meaningful operations and maintenance of both temporary and permanent stormwater systems.

____

Contractor (Company, Name and Title) Date

____

Owner (Name and Title) Date

NESRA ENGINEERING

APPENDIX

Stormwater Management System Operation and Maintenance Forms

STORMWATER MANAGEMENT SYSTEM

OPERATIONS AND MAINTENANCE MANUAL

TURF UNDERDRAIN OUTLETS

Inspection Date	Satisfactory			Location	Maintenance Needed and Description	Implementation Date of Maintenance
	Yes	No	N/A			

Name of Inspector: ____ Title: ________________________________

Signature: ____

STORMWATER MANAGEMENT SYSTEM

OPERATIONS AND MAINTENANCE MANUAL

RAIN GARDEN

Inspection Date	Satisfactory			Location	Maintenance Needed and Description	Implementation Date of Maintenance
	Yes	No	N/A			

Name of Inspector: ____ Title: ___________________________________

Signature: ____

STORMWATER MANAGEMENT SYSTEM

OPERATIONS AND MAINTENANCE MANUAL

DEEP SUMP HOODED CATCH BASINS

Inspection Date	Satisfactory			Location	Maintenance Needed and Description	Implementation Date of Maintenance
	Yes	No	N/A			

Name of Inspector: ____ Title: ___________________________________

Signature: ____