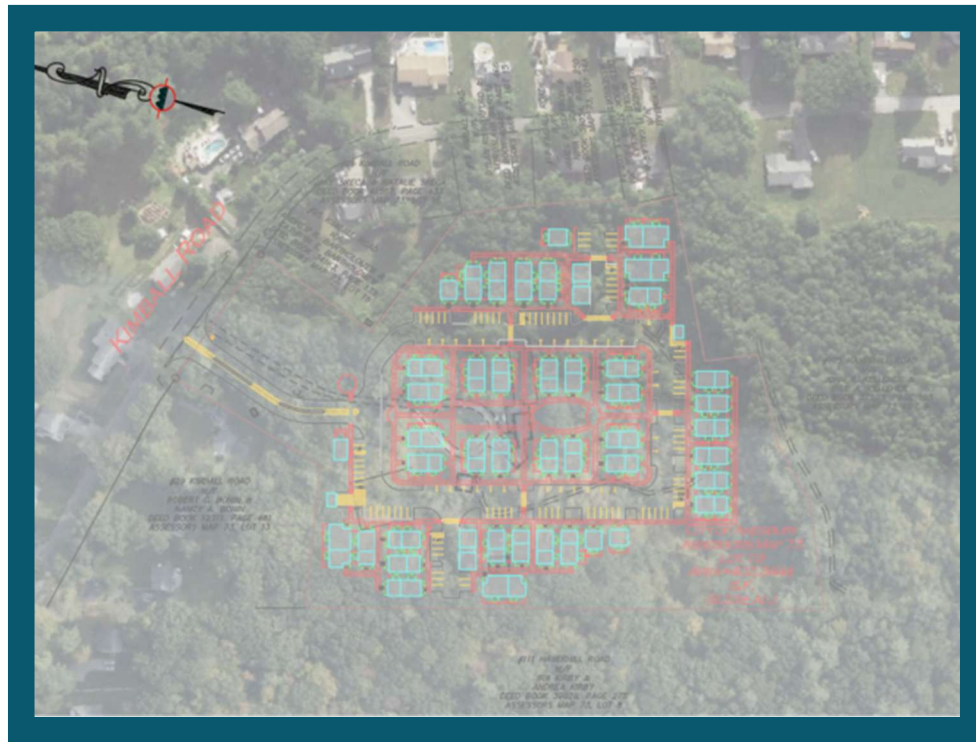




**ALLEN & MAJOR
ASSOCIATES, INC.**

DRAINAGE REPORT

27 Kimball Road
Amesbury, MA



APPLICANT:

MP Properties IV, LLC
One Boston Place
201 Washington Street, Suite 2100
Boston, MA 02108

PREPARED BY:

Allen & Major Associates, Inc.
Carlton M. Quinn, PE
100 Commerce Way, Suite 5
Woburn, Massachusetts 01801

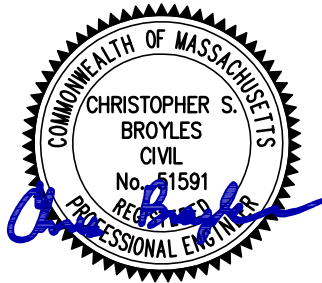


DRAINAGE REPORT

27 Kimball Road
Amesbury, MA

APPLICANT:

MP Properties IV, LLC
One Boston Place
201 Washington Street, Suite 2100
Boston, MA 02108



PREPARED BY:

Allen & Major Associates, Inc.
Carlton M. Quinn, PE
100 Commerce Way, Suite 5
Woburn, Massachusetts 01801

ISSUED:

1/26/2026

REVISED:

6/1/2026

A&M PROJECT NO.:

3410-03



TABLE OF CONTENTS

SECTION 1.0 - DRAINAGE REPORT	5
Introduction.....	6
Site Categorization for Stormwater Regulations	6
Site Location and Access	6
Existing Site Conditions	6
Watershed	7
Existing Soil Conditions	7
FEMA Floodplain/Environmental Due Diligence	7
Environmentally Sensitive Zones	7
Drainage Analysis Methodology	7
Proposed Conditions – Peak Rate of Runoff.....	8
MASSDEP Stormwater Performance Standards	9
MASSDEP Stormwater Checklist.....	15
SECTION 2.0 - OPERATION & MAINTENANCE PLAN	16
Introduction.....	17
Notification Procedures for Change of Responsibility for O&M	17
Contact Information	18
Demolition & Construction Maintenance Plan.....	18
Long-Term Pollution Prevention Plan.....	19
Long-Term Maintenance Plan – Facilities Description.....	24
Inspection and Maintenance Frequency and Corrective Measures	26
Supplemental Information	26
SECTION 3.0 - EXHIBITS.....	27
USGS Site Locus Map	28
Aerial Photo.....	29
MASSDEP Wetlands Map	30
FEMA Flood Insurance Rate Map	31
NHESP Map	32
SECTION 4.0 - EXISTING DRAINAGE ANALYSIS.....	33
Existing HydroCAD	34
Existing Watershed Plan	35



SECTION 5.0 - PROPOSED DRAINAGE ANALYSIS.....36

 Proposed HydroCAD..... 37

 Proposed Watershed Plan..... 38

SECTION 6.0 - APPENDIX.....39

 Rainfall Data 40

 Manning’s Number Tables 41

 Soils Map 42

 Geotechnical Subsurface Exploration Field Testing Memo..... 43

 MADEP Calculations 44



SECTION 1.0 - DRAINAGE REPORT



Introduction

The purpose of this drainage report is to provide an overview of the proposed stormwater management system (SMS) for the proposed residential development located at 27 Kimball Road, Amesbury, MA. The report will show by means of narrative, calculations and exhibits that the proposed stormwater management system will meet or exceed the Massachusetts Department of Environmental Protection (MassDEP) stormwater standards, and the Amesbury Stormwater Management Regulations.

The proposed site improvements include the development of 45 residential buildings for a total of 86 Units. The proposed site will include on-site drainage, above ground parking, landscaping, and utilities to service each building. The project will be serviced by municipal sewer, water and electric. The sewer service will require a pump station to connect to the municipal line upgradient.

The proposed SMS incorporates structural Best Management Practices (BMPs) to provide stormwater peak flow mitigation, quality treatment, and conveyance.

The SMS includes deep sump catch basins, proprietary separators, and detention/infiltration systems.

Site Categorization for Stormwater Regulations

The proposed site improvements at 27 Kimball Road are considered a new development under the DEP Stormwater Management Standards due to the net increase in impervious area. A new development project is required to meet all of Stormwater Management Standards listed within the MA DEP Stormwater Handbook.

Site Location and Access

The site is a single lot with 223.5 feet of frontage on Kimball Road, entirely within the City of Amesbury.

The parcel is abutted by several single-family residential houses (see existing conditions plan).

The site is accessed by an existing curb cut along Kimball Road. The proposed curb cut is along the western portion of the frontage to Kimball Road for a 33' wide drive aisle.

Existing Site Conditions

The site currently includes a two-story house with a gravel driveway and two garages. The site topography slopes from south to north with an isolated wetland at the south end of the property and a larger wetland area to the west.

The surface drainage flows were analyzed at three Study Points. Study Point #1 summarizes off-site flows generated from the eastern portion of the site. This area flows north to discharge to the municipal drainage system on Kimball Road. Study Point #2 summarizes off-site flows generated from the western portion of the site. This area flows



to the wetland west of the property. Study Point #3 summarizes the smaller subcatchment area that flows to the isolated wetland on the southern portion of the site.

Watershed

The subject property is located within the Merrimack River Watershed. The Merrimack River watershed spans 5,0510 square miles across New Hampshire and Massachusetts. The City of Amesbury is specifically within the sub-watershed of the Powow River, a tributary of the Merrimack.

Existing Soil Conditions

The on-site soils were identified using the USDA Natural Resources Conservation Services (NRCS) Soil Survey for Essex County. According to the NRCS Soil Survey, the site is entirely composed of Hydrologic Soil Group C for surface runoff. Soil Group C has been used in the design for calculating surface runoff. A copy of the NRCS Custom Soil Resource Report is included in the appendix of this report.

Further investigation on the underlying soils has been conducted by performing test pits within the site in locations identified for stormwater management. The Subsurface Data Memorandum conducted by Haley and Aldrich has been attached to the Appendix of this stormwater report. The test pits show underlying soils to be primarily Fine Sandy Loam. Fine Sandy Loam have a Hydrologic Soil Group B designation which has been used throughout the design for infiltration.

An exfiltration rate for the Fine Sandy Loam has been determined to be 1.02 inches per hour based upon Table 2.3.3 1982 Rawls Rate, Volume 3: Documenting Compliance with the Massachusetts's Stormwater Handbook.

FEMA Floodplain/Environmental Due Diligence

There are no portions of the site located within the FEMA Zone "AE" Special Flood Hazard Area Subject to Inundation by the 1% Annual Chance Flood (100-year floodplain). The official Flood Insurance Rate Map (FIRM) effective date July 8, 2025, community panel 25009C0102G. See section 3 of this report for a copy of the FEMA FIRM.

Environmentally Sensitive Zones

The Commonwealth of Massachusetts asserts control over numerous protected and regulated areas including: Areas of Critical Environmental Concern (ACEC); Outstanding Resource Waters (ORWs); Priority and Protected Habitat for rare and endangered species, and areas protected under the Wetlands Protection Act. The subject property is not located within any of these regulated areas.

Drainage Analysis Methodology

A peak rate of runoff will be determined using techniques and data found in the following:



1. Urban Hydrology for Small Watersheds – Technical Release 55 by the United States Department of Agriculture Soils Conservation Service, June 1986. Runoff curve numbers and 24-hour precipitation values were obtained from this reference.
2. HydroCAD © Stormwater Modeling System by HydroCAD Software Solutions LLC, version 10.20-7a. The HydroCAD program was used to generate the runoff hydrographs for the watershed areas, to determine discharge/ stage/storage characteristics for the stormwater BMPs, to perform drainage routing and to combine the results of the runoff hydrographs. HydroCAD uses the TR-20 methodology of the SCS Unit Hydrograph procedure (SCS-UH).

Proposed Conditions – Peak Rate of Runoff

The stormwater runoff analysis of the existing and proposed conditions includes an estimate of the peak rate of runoff from various rainfall events. Peak runoff rates were developed using TR55 Urban Hydrology for Small Watersheds, developed by the U.S. Department of Commerce, Engineering Division and the HydroCAD computer program. Further, the analysis has been prepared in accordance with the MassDEP and the City requirements and standard engineering practices. The peak rate of runoff has been estimated for each watershed during the 2, 10, 25, and 100-year storm events.

The proposed stormwater management system for the site consists of deep sump catch basins, proprietary separators, underground detention and infiltration systems, and an infiltration basin. These systems have been designed in accordance with the MA DEP Stormwater Management Policy to recharge groundwater and reduce rate of runoff from the parcel.

Study Point One summarizes off-site flows at Kimball Road generated from the site. Flows have been directed to be captured within catch basins and either routed to a large underground infiltration/detention system (UIS-3/UDS-3) or an above ground infiltration system. Both systems have been designed to hold at least 1" of the impervious runoff to satisfy local stormwater requirements. The systems discharge at a controlled rate to a proposed manhole in Kimball Road. The infiltration system contains an emergency overflow berm that would flow to Kimball Road, but the system has been designed to contain the 100-Year storm without using the emergency spillway. Additionally, there is an underground infiltration system (UIS-4) that holds the 100-year storm for groundwater recharge. A trench drain at the entrance of the site is directed to a water quality unit and a smaller detention system with an outlet control structure to control runoff rates before discharging to a second proposed manhole in Kimball Road. Detention systems are used throughout the design instead of infiltration due groundwater constraints (see test pits).

Study Point Two summarizes off-site flows generated by a western portion of the development. The flows are captured via catch basins and routed to two underground



infiltration/detention systems to satisfy recharge requirements before discharging to the wetland at a controlled rate.

Study Point Three does not exist in proposed conditions.

The stormwater runoff model indicates that the proposed site development reduces the rate of runoff during all storm events at the identified points of analysis. The following tables provide a summary of the estimated peak rate, in Cubic Feet per Second (CFS) at each of the three (3) Study Points for each of the design storm events. The HydroCAD worksheets are included in Section 4 and 5 of this report.

STUDY POINT #1				
	2-Year	10-Year	25-Year	100-Year
Existing Flow (CFS)	2.74	7.09	10.13	15.05
Proposed Flow (CFS)	1.43	6.20	9.91	15.03
Reduction %	47.8%	12.6%	2.2%	0.1%

STUDY POINT #2				
	2-Year	10-Year	25-Year	100-Year
Existing Flow (CFS)	2.68	6.88	9.82	14.52
Proposed Flow (CFS)	1.30	4.39	7.08	10.90
Reduction %	51.5%	36.2%	27.9%	24.9%

STUDY POINT #3				
	2-Year	10-Year	25-Year	100-Year
Existing Flow (CFS)	0.59	1.41	1.96	2.84
Proposed Flow (CFS)	0.00	0.00	0.00	0.00
Reduction %	100.0%	100.0%	100.0%	100.0%

MASSDEP Stormwater Performance Standards

The MA DEP Stormwater Management Policy was developed to improve water quality by implementing performance standards for stormwater management. The intent is to implement the stormwater management standards through the review of Notice of Intent filings by the issuing authority (Conservation Commission or DEP). The following section outlines how the proposed Stormwater Management System meets the standards set forth by the Policy.



BMP's implemented in the design include –

- Deep Sump Catch Basins
- Proprietary Separators
- Subsurface Structures
- Infiltration Basin

Stormwater Best Management Practices (BMP's) have been incorporated into the design of the project to mitigate the anticipated pollutant loading. An Operations and Maintenance Plan has been developed for the project, which addresses the long-term maintenance requirements of the proposed system.

Temporary erosion and sedimentation controls will be incorporated into the construction phase of the project. These temporary controls may include straw bale and/or silt fence barriers, inlet sediment traps, slope stabilization, and stabilized construction entrances.

The Massachusetts Department of Environmental Protection has established ten (10) Stormwater Management Standards. A project that meets or exceeds the standards is presumed to satisfy the regulatory requirements regarding stormwater management. The Standards are enumerated below as well as descriptions and supporting calculations as to how the Project will comply with the Standards:

1. *No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

The proposed development will not introduce any new outfalls with direct discharge to a wetland area or waters of the Commonwealth of Massachusetts. All discharges will be treated for water quality and the rate will not be increased over existing conditions.

2. *Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.*

The proposed development has been designed so that the post-development peak discharge rates do not exceed the predevelopment peak discharge rates. A summary of the existing and proposed discharge rates is included within this document.

3. *Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development*



conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The existing annual recharge for the site has been approximated in the proposed condition. There are proposed subsurface infiltration systems designed to meet this requirement. Stormwater runoff generated from the impervious areas of the proposed development are routed through these infiltration BMPs. The proposed Recharge Volume is based on the Static Method per the MA DEP Stormwater Management Standards, Volume 3, Chapter 1.

The test pit's show underlying soils to be primarily Sandy Loam. Sandy Loam have a Hydrologic Soil Group "B" designation (Table 2.3.3 1982 Rawls Rate, Volume 3: Documenting Compliance with the Massachusetts's Stormwater Handbook.)

See the appendix located at section 6 of this report for stormwater recharge calculations.

4. *Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This standard is met when:*
- *Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;*
 - *Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and*
 - *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

Standard #4 is met when structural stormwater best management practices are sized to capture and treat the required water quality volume and pretreatment is provided in accordance with the Massachusetts Stormwater Handbook. Standard #4 also requires that suitable source control measures are identified in the Long-term Pollution Prevention Plan. The water quality volume for the site development is captured and treated using deep sump catch basins, proprietary separators, and either underground detention systems or an infiltration basin.



The implemented BMPs have been designed to treat the contributing water quality volume. These water quality calculations can be seen within the appendix of this report.

The proposed stormwater management system has been designed to remove 80% of the average annual post-construction load for each treatment train. The TSS removal calculations can be seen within the appendix of this report.

The TSS removal efficiencies for the proprietary separator are based on the values assigned under the Technology Acceptance and Reciprocity Partnership (TARP) testing protocol. The TARP is a workgroup of the Environmental Council of States that was originally comprised of California, Illinois, Maryland, Massachusetts, New Jersey, New York, Pennsylvania and Virginia. TARP is recognized in the MA DEP Stormwater Management Handbook as a valid source for assigning TSS removal efficiencies for proprietary separators.

5. *For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.*

Pretreatment and Source reduction is provided to the maximum extent practicable. The drainage system will be designed to treat 1" water quality volume utilizing the BMPs listed in Table LUHPPL, within the Massachusetts Stormwater Handbook, Volume 1: Overview of the Massachusetts Stormwater Standards, Chapter 1, Page 14. This requirement only applies to stormwater discharges that come into contact with the actual area or activity on the site that may generate the higher potential pollutant load.

6. *Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area,*



require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

The project site does not discharge stormwater within a Zone II or Interim Wellhead Protection Area or near a critical area. Critical Areas are Outstanding Resource Waters as designated in 314 CMR 4.00, Special Resource Waters as designated in 314 CMR 4.00, recharge areas for public water supplies as defined in 310 CMR 22.02, bathing beaches as defined in 105 CMR 445.000, cold-water fisheries as defined in 314 CMR 9.02 and 310 CMR 10.04, and shellfish growing areas as defined in 314 CMR 9.02 and 310 CMR 10.04.

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

The proposed project is not considered a re-development project under the Stormwater Management Handbook guidelines as there is an increase in the amount of impervious area.

8. *A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.*

A plan to control construction-related impacts, including erosion, sedimentation and other pollutant sources during construction has been developed. A detailed Erosion and Sedimentation Control Plan is included in the Permit Drawings. The proponent will prepare and submit a Stormwater Pollution Prevention Plan



(SWPPP) prior to commencement of construction activities that will result in the disturbance of one acre of land or more.

9. *A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

A Long-Term Operation & Maintenance (O&M) Plan has been developed for the proposed stormwater management system and is included within this document. See Section 2.0 of this report.

10. *All illicit discharges to the stormwater management system are prohibited.*

There are no expected illicit discharges to the stormwater management system. The applicant will submit the Illicit Discharge Compliance Statement prior to the discharge of stormwater runoff to the post-construction stormwater best management practices and prior to the issuance of a Certificate of Compliance.

See the next page for the MassDEP Stormwater Checklist.

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 8²
- 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.

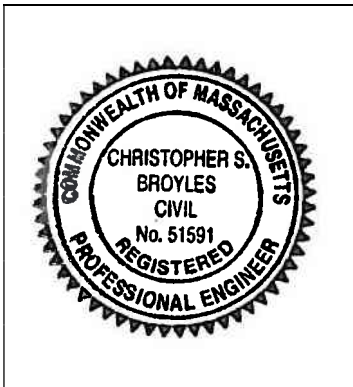
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



A handwritten signature in black ink that reads "Chris Broyles".

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): Underground Infiltration Systems, Infiltration Basin

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☐ Soil Analysis provided.
- ☒ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - ☒ Static
 - ☐ Simple Dynamic
 - ☐ Dynamic Field¹
- ☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
 - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
 - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- ☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- ☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

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

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- ☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - ☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - ☐ is within the Zone II or Interim Wellhead Protection Area
 - ☐ is near or to other critical areas
 - ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - ☐ involves runoff from land uses with higher potential pollutant loads.
 - ☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - ☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- ☒ The BMP is sized (and calculations provided) based on:
 - ☒ The ½" or 1" Water Quality Volume or
 - ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- ☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

- ☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- ☒ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- ☐ The NPDES Multi-Sector General Permit does **not** cover the land use.
- ☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- ☐ All exposure has been eliminated.
- ☐ All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- ☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- ☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- ☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

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

- ☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - ☐ Limited Project
 - ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - ☐ Bike Path and/or Foot Path
 - ☐ Redevelopment Project
 - ☐ Redevelopment portion of mix of new and redevelopment.
- ☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- ☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

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

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- ☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

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

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- ☐ The project is **not** covered by a NPDES Construction General Permit.
- ☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- ☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - ☒ Name of the stormwater management system owners;
 - ☒ Party responsible for operation and maintenance;
 - ☒ Schedule for implementation of routine and non-routine maintenance tasks;
 - ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
 - ☒ Description and delineation of public safety features;
 - ☒ Estimated operation and maintenance budget; and
 - ☒ Operation and Maintenance Log Form.
- ☐ The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- ☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- ☐ An Illicit Discharge Compliance Statement is attached;
- ☒ NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.



SECTION 2.0 - OPERATION & MAINTENANCE PLAN



Introduction

In accordance with the standards set forth by the Stormwater Management Policy issued by the Massachusetts Department of Environmental Protection (MassDEP), Allen & Major Associates, Inc. has prepared the following Operations & Maintenance (O&M) Plan for the existing development at 27 Kimball Road, Amesbury, MA.

The plan is broken down into three major sections. The first section describes construction-related erosion and sedimentation controls (Demolition & Construction Maintenance Plan). The second section describes the long-term pollution prevention measures (Long Term Pollution Prevention Plan). The third section is a post-construction operation and maintenance plan designed to address the long-term maintenance needs of the stormwater management system (Long-Term Maintenance Plan – Facilities Description).

Notification Procedures for Change of Responsibility for O&M

The Stormwater Management System (SMS) for this project shall be owned by MP Properties IV, LLC (applicant). The owner shall be legally responsible for the long-term operation and maintenance of this SMS as outlined in this Operation and Maintenance Plan.

The owner shall submit an annual summary report and the completed Operation & Maintenance Schedule & Checklist to the Conservation Commission (via email or print copy), highlighting inspection and maintenance activities including performances of BMPs. Should ownership of the SMS change, the owner will continue to be responsible until the succeeding owner shall notify the Commission that the succeeding owner has assumed such responsibility. Upon subsequent transfers, the responsibility shall continue to be that of transferring owner until the transferee owner notifies the Commission of its assumption of responsibility.

In the event the SMS will serve multiple lots/owners, such as the subdivision of the existing parcel or creation of lease areas, the owner(s) shall establish an association on other legally enforceable arrangements under which the association or a single party shall have legal responsibility for the operation and maintenance of the entire SMS. The legal instrument creating such responsibility shall be recorded with the Registry of Deeds and promptly following its recording, a copy thereof shall be furnished to the Commission.



Contact Information

Stormwater Management System Owner: MP Properties IV, LLC
201 Washington Street, Suite 2100
Boston, MA 02108
Phone: 617-780-0550

Emergency Contact Information:

MP Properties IV, LLC (Owner/Operator)	Phone: 617-780-0550
Allen & Major Associates, Inc. (Site Civil Engineer)	Phone: (781) 935-6889
Amesbury Department of Public Works	Phone: 978-388-8116
Amesbury Conservation Commission	Phone: 978-388-8110
Amesbury Fire Department (non-emergency line)	Phone: 978-388-8185
MassDEP Emergency Response	Phone: (888) 304-1133
Clean Harbors Inc (24-Hour Line)	Phone: (800) 645-8265

Demolition & Construction Maintenance Plan

1. Call Digsafe: 1-888-344-7233
2. Contact the City at least three (3) days prior to start of demolition and/or construction activities.
3. Install Erosion Control measures as shown on the Plans prepared by A&M. The City shall review the installation of straw bales and silt fencing prior to the start of any site demolition work. Install Construction fencing if determined to be necessary at the commencement of construction.
4. Install construction entrances, straw bales, and silt fence at the locations shown on the Erosion Control Plan prepared by A&M.
5. Site access shall be achieved only from the designated construction entrances.
6. Cut and clear trees in construction areas only (within the limit of work; see plans).
7. Stockpiles of materials subject to erosion shall be stabilized with erosion control matting or temporary seeding whenever practicable, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.
8. Install silt sacks and straw bales around each drain inlet prior to any demolition and or construction activities.



9. All erosion control measures shall be inspected weekly and after every rainfall event. Records of these inspections shall be kept on-site for review.
10. All erosion control measures shall be maintained, repaired, or replaced as required or at the direction of the owner's engineer or the City.
11. Sediment accumulation up-gradient of the straw bales, silt fence, and stone check dams greater than 6" in depth shall be removed and disposed of in accordance with all applicable regulations.
12. If it appears that sediment is exiting the site, silt sacks shall be installed in all catch basins adjacent to the site. Sediment accumulation on all adjacent catch basin inlets shall be removed and the silt sack replaced if torn or damaged.
13. Install stone check dams on-site during construction as needed. Refer to the erosion control details. Temporary sediment basins combined with stone check dams shall be installed on-site during construction to control and collect runoff from upland areas of this site during demolition and construction activities.
14. The contractor shall comply with the Sedimentation and Erosion Control Notes as shown on the Site Development Plans and Specifications.
15. The stabilized construction entrances shall be inspected weekly and records of inspections kept. The entrances shall be maintained by adding additional clean, angular, durable stone to remove the soil from the construction vehicle's tires when exiting the site. If soil is still leaving the site via the construction vehicle tires, adjacent roadways shall be kept clean by street sweeping.
16. Dust pollution shall be controlled using on-site water trucks and/or an approved soil stabilization product.
17. During demolition and construction activities, Status Reports on compliance with this O&M Document shall be submitted weekly. The report shall document any deficiencies and corrective actions taken by the applicant.

Long-Term Pollution Prevention Plan

Standard #4 from the MassDEP Stormwater Management Handbook requires that a Long-Term Pollution Prevention Plan (LTPPP) be prepared and incorporated as part of the Operation and Maintenance Plan of the Stormwater Management System. The purpose of the LTPPP is to identify potential sources of pollution that may affect the quality of stormwater discharges, and to describe the implementation of practices to reduce the pollutants in stormwater discharges. The following items describe the source control and proper procedures of the LTPPP.



- Housekeeping

The existing development has been designed to maintain a high level of water quality treatment for all stormwater discharge to the wetland areas. An Operation and Maintenance (O&M) plan has been prepared and is included in this section of the report. The owner (or its designee) is responsible for adherence to the O&M plan in a strict and complete manner.

- Storing of Materials & Water Products

The trash and waste program for the site includes exterior dumpsters. There is a trash contractor used to pick up the waste material in the dumpsters. The stormwater drainage system has water quality inlets designed to capture trash and debris.

- Vehicle Washing

Outdoor vehicle washing has the potential to result in high loads of nutrients, metals, and hydrocarbons during dry weather conditions, as the detergent-rich water used to wash the grime off the vehicle enters the stormwater drainage system. The existing development does not include any designated vehicle washing areas, nor is it expected that any vehicle washing will take place on-site.

- Spill Prevention & Response

Sources of potential spill hazards include vehicle fluids, liquid fuels, pesticides, paints, solvents, and liquid cleaning products. The majority of the spill hazards would likely occur within the buildings and would not enter the stormwater drainage system. However, there are spill hazards from vehicle fluids or liquid fuels located outside of the buildings. These exterior spill hazards have the potential to enter the stormwater drainage system and are to be addressed as follows:

1. Spill hazards of pesticides, paints, and solvents shall be remediated using the Manufacturers' recommended spill cleanup protocol.
2. Vehicle fluids and liquid fuel spill shall be remediated according to the local and state regulations governing fuel spills.
3. The owner shall have the following equipment and materials on hand to address a spill clean-up: brooms, dust pans, mops, rags, gloves, absorptive material, sand, sawdust, plastic and metal trash containers.
4. All spills shall be cleaned up immediately after discovery.
5. Spills of toxic or hazardous material shall be reported, regardless of size, to the Massachusetts Department of Environmental Protection at (888) 304-1333.



6. Should a spill occur, the pollution prevention plan will be adjusted to include measures to prevent another spill of a similar nature. A description of the spill, along with the causes and cleanup measures will be included in the updated pollution prevention plan.

- Maintenance of Lawns, Gardens, and Other Landscaped Areas

It should be recognized that this is a general guideline towards achieving high quality and well-groomed landscaped areas. The grounds staff/landscape contractor must recognize the shortcomings of a general maintenance plan such as this, and modify and/or augment it based on weekly, monthly, and yearly observations. In order to assure the highest quality conditions, the staff must also recognize and appreciate the need to be aware of the constantly changing conditions of the landscaping and be able to respond to them on a proactive basis. No trees shall be planted over the drain lines or recharge area, and that only shallow rooted plants and shrubs will be allowed.

- Fertilizer

Maintenance practices should be aimed at reducing environmental, mechanical and pest stresses to promote healthy and vigorous growth. When necessary, pest outbreaks should be treated with the most sensitive control measure available. Synthetic chemical controls should be used only as a last resort to organic and biological control methods. Fertilizer, synthetic chemical controls and pest management applications (when necessary) shall be performed only by licensed applicators in accordance with the manufacturer's label instructions when environmental conditions are conducive to controlled product application.

Only slow-release organic fertilizers should be used in the planting and mulch areas to limit the amount of nutrients that could enter downstream resource areas. Fertilization of the planting and mulch areas will be performed within manufacturers labeling instructions and shall not exceed an NPK ration of 1:1:1 (i.e. Triple 10 fertilizer mix), considered a low nitrogen mixture. Fertilizers approved for the use under this O&M Plan are as follows:

Type:	LESCO® 28-0-12 (Lawn Fertilizer)
	MERIT® 0.2 Plus Turf Fertilizer
	MOMENTUM™ Force Weed & Feed

- Suggested Aeration Program

In-season aeration of lawn areas is good cultural practice, and is recommended whenever feasible. It should be accomplished with a solid thin tine aeration method to reduce disruption to the use of the area. The



depth of solid tine aeration is similar to core type, but should be performed when the soil is somewhat drier for a greater overall effect.

Depending on the intensity of use, it can be expected that all landscaped lawn areas will need aeration to reduce compaction at least once per year. The first operation should occur in late May following the spring season. Methods of reducing compaction will vary based on the nature of the compaction. Compaction on newly established landscaped areas is generally limited to the top 2-3" and can be alleviated using hollow core or thin tine aeration methods.

The spring aeration should consist of two passes at opposite directions with 1/4" hollow core tines penetrating 3-5" into the soil profile. Aeration should occur when the soil is moist but not saturated. The soil cores should be shattered in place and dragged or swept back into the turf to control thatch. If desired the cores may also be removed and the area top-dressed with sand or sandy loam. If the area drains on average too slowly, the topdressing should contain a higher percentage of sand. If it is draining on average too quickly, the top dressing should contain a higher percentage of soil and organic matter.

- Landscape Maintenance Program Practices:

- Lawn

1. Mow a minimum of once a week in spring, to a height of 2" to 2 1/2" high. Mowing should be frequent enough so that no more than 1/3 of grass blade is removed at each mowing. The top growth supports the roots; the shorter the grass is cut, the less the roots will grow. Short cutting also dries out the soil and encourages weeds to germinate.
2. Mow approximately once every two weeks from July 1st to August 15th depending on lawn growth.
3. Mow on a ten-day cycle in fall, when growth is stimulated by cooler nights and increased moisture.
4. Do not remove grass clippings after mowing.
5. Keep mower blades sharp to prevent ragged cuts on grass leaves, which cause a brownish appearance and increase the chance for disease to enter a leaf.

- Shrubs

1. Mulch not more than 3" depth with shredded pine or fir bark.



2. Hand prune annually, immediately after blooming, to remove 1/3 of the above-ground biomass (older stems). Stem removals are to occur within 6" of the ground to open up shrub and maintain two-year wood (the blooming wood).
 3. Hand-prune evergreen shrubs only as needed to remove dead and damaged wood and to maintain the naturalistic form of the shrub. Never mechanically shear evergreen shrubs.
- Trees
 1. Provide aftercare of new tree plantings for the first three years.
 2. Do not fertilize trees, it artificially stimulates them (unless tree health warrants).
 3. Water once a week for the first year; twice a month for the second; once a month for the third year.
 4. Prune trees on a four-year cycle.
 - Invasive Species
 1. Inform the Conservation Commission Agent prior to the removal of invasive species proposed either through hand work or through chemical removal.
 - Storage and Use of Herbicides and Pesticides

Integrated Pest Management is the combination of all methods (of pest control) which may prevent, reduce, suppress, eliminate, or repel an insect population. The main requirements necessary to support any pest population are food, shelter and water, and any upset of the balance of these will assist in controlling a pest population. Scientific pest management is the knowledgeable use of all pest control methods (sanitation, mechanical, chemical) to benefit mankind's health, welfare, comfort, property and food. A Pest Management Professional (PMP) should be retained who is licensed with the Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, Department of Agricultural Resources.

The site manager will be provided with approved bulletin before entering into or renewing an agreement to apply pesticides for the control of indoor household or structural pests, refer to 333 CMR 13.08.

Before beginning each application, the applicator must post a Department approved notice on all of the entrances to the treated room or area. The applicator must leave such notices posted after the application. The notice will be posted at conspicuous point(s) of access to the area treated. The location and number of



signs will be determined by the configuration of the area to be treated based on the applicator's best judgment. It is intended to give sufficient notice so that no one comes into an area being treated unaware that the applicator is working and pesticides are being applied. However, if the contracting entity does not want the signs posted, he/she may sign a Department approved waiver indicating this.

The applicator or employer will provide to any person upon their request the following information on previously conducted applications:

1. Name and phone number of pest control company;
 2. Date and time of the application;
 3. Name and license number of the applicator;
 4. Target pests; and
 5. Name and EPA Registration Number of pesticide products applied.
- Pet Waste Management
The owner's landscape crew (or designee) shall remove any obvious pet waste that has been left behind by pet owners within the development. The pet waste shall be disposed of in accordance with local and state regulations.
 - Operations and Management of Septic Systems
There are no proposed septic systems within the limits of the project.
 - Management of Deicing Chemicals and Snow
Snow will be stockpiled on site until the accumulated snow becomes a hazard to the daily operations of the site. It will be the responsibility of the snow removal contractor to properly dispose of transported snow according to MassDEP, Bureau of Resource Protection – Snow Disposal Guideline #BRPG01-01, governing the proper disposal of snow. It will be the responsibility of the snow removal contractor to follow these guidelines and all applicable laws and regulations

The owner's maintenance staff (or its designee) will be responsible for the clearing of the sidewalk and building entrances. The owner may be required to use a de-icing agent such as potassium chloride to maintain a safe walking surface. If used, the de-icing agent for the walkways and building entrances will be kept within the storage rooms located within the building. If used, de-icing agents will not be stored outside. The owner's maintenance staff will limit the application of sand.

Long-Term Maintenance Plan – Facilities Description

A maintenance log will be kept (i.e. report) summarizing inspections, maintenance, and any corrective actions taken. The log will include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, the location



where the sediment and debris was disposed after removal will be indicated. The log will be made accessible to department staff and a copy provided to the department upon request.

The following is a description of the Stormwater Management System for the project site.

Stormwater Collection System – On-Site:

The stormwater collection system is a series of inlets located at low points within the limits of the paved area. All of the proposed on-site catch basins incorporate a deep sump and hooded outlet. The catch basins are connected by a closed gravity pipe network that pass through proprietary separators prior to entering the underground detention chambers.

Structural Pretreatment BMPs: Regular maintenance of these BMPs is especially critical because they typically receive the highest concentration of suspended solids during the first flush of a storm event.

- **Deep Sump Catch Basin**
Inspect catch basins to ensure that the catch basins are working in their intended fashion and that they are free of debris. Structures will be skimmed of floatable debris at each inspection and sediment will be removed at a minimum once per year (typically after snow season) or when sediment has accumulated to within 2 feet of the outlet invert. If the basin outlet is designed with a hood to trap floatable materials (i.e., Snout), check to ensure watertight seal is working.
- **Proprietary Separators**
Separators shall be operated in strict accordance with manufacturer's recommended practices. Available manufacturer specific O&M plans attached as Appendix. Separators shall be inspected to ensure that they are working in their intended fashion and that they are free of debris. Structures shall be cleaned with a vacuum truck at least once annually (typically after snow season) or when sediment has accumulated to a depth of six inches (6"), whichever is more frequent.

Infiltration BMPs:

- **Infiltration Basin:**
Inspect to ensure proper functioning. Mow the buffer area, side slopes, and basin bottom if grassed floor; rake if stone bottom; remove trash and debris; remove grass clippings and accumulated organic matter.
Inspect and clean pretreatment devices.



- **Subsurface Structures:**
Because subsurface structures are installed underground, they are extremely difficult to maintain. Remove any debris that might clog the system.

Other BMPs and Accessories:

- **Outlet Structures**
Clear trash and debris as necessary/

Other Maintenance Activity:

- **Mosquito Control** - Both above ground and underground stormwater BMPs have the potential to serve as mosquito breeding areas. Good design, proper operation and maintenance, and treatment with larvicides can minimize this potential. See the supplemental information for Mosquito Control in Stormwater Management Practices, and the Operation and Maintenance Plan Schedule for inspection schedule.
- **Street Sweeping** - Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader.

Inspection and Maintenance Frequency and Corrective Measures

In accordance with MA DEP Stormwater Handbook: Volume 2, Chapter 2; the previously described BMPs will be inspected and the identified deficiencies will be corrected. Clean-out must include the removal and legal disposal of any accumulated sediments, trash, and debris. In any and all cases, operations, inspections, and maintenance activities shall utilize best practical measures to avoid and minimize impacts to wetland resource areas outside the footprint of the SMS.

Supplemental Information

- Operation & Maintenance Plan Schedule
- Massachusetts Stormwater Handbook, Chapter 5, Miscellaneous Stormwater Topics, Mosquito Control in Stormwater Management Practices.

OPERATION AND MAINTENANCE PLAN SCHEDULE

Date: 1/26/2025



Project: 27 Kimball Road
Project Address: 27 Kimball Road, Amesbury, MA

Responsible for O&M Plan: MP Properties IV, LLC
Address: One Boston Place 201 Washington Street, Suite 2100
Phone: 617-780-0550

All information within table is derived from Massachusetts Stormwater Handbook: Volume 2, Chapter 2

BMP CATEGORY	BMP OR MAINTENANCE ACTIVITY	SCHEDULE/FREQUENCY	NOTES	ESTIMATED ANNUAL MAINTENANCE COST	INSPECTION PERFORMED	
					DATE:	BY:
STRUCTURAL PRETREATMENT BMPs	DEEP SUMP CATCH BASIN	Four times per year (quarterly).	Inspect and clean catch basin units 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.	\$1,000		
	PROPRIETARY SEPARATORS	In accordance with manufacturers requirements, but no less than twice a year following installation and once a year thereafter.	Remove sediment and other trapped pollutants at frequency or level specified by manufacturer.	\$2,000		
INFILTRATION BMPs	INFILTRATION BASIN	Inspect after every major storm during first 3 months of operation and twice a year thereafter. Clean pretreatment devices twice a year and after every major storm.	Inspect to ensure proper functioning. Mow the buffer area, side slopes, and basin bottom if grassed floor; rake if stone bottom; remove trash and debris; remove grass clippings and accumulated organic matter. Inspect and clean pretreatment devices.	\$1,500		
	SUBSURFACE STRUCTURES	Inspect structure inlets at least twice a year. Remove debris that may clog the system as needed.	Because subsurface structures are installed underground, they are extremely difficult to maintain. Remove any debris that might clog the system.	\$500		
BMP ACCESSORIES	OUTLET STRUCTURES	Periodic cleaning of Outlet Control Structures as needed.	Clear trash and debris as necessary.	\$500		

OTHER MAINTENANCE ACTIVITY	MOSQUITO CONTROL	Inspect BMPs as needed to ensure the system's drainage time is less than the maximum 72 hour period.	Massachusetts stormwater handbook requires all stormwater practices that are designed to drain do so within 72 hours to reduce the number of mosquitos that mature to adults since the aquatic stage of a mosquito is 7-10 days.	\$100		
	SNOW STORAGE	Clear and remove snow to approved storage locations as necessary to ensure systems are working properly and are protected from meltwater pollutants.	Carefully select snow disposal sites before winter. Avoid dumping removed snow over catch basins, or in detention ponds, sediment forebays, rivers, wetlands, and flood plains. It is also prohibited to dump snow in the bioretention basins or gravel swales.	\$500		
	STREET SWEEPING	Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring.	Sweep, power broom or vacuum paved areas. Submit information that confirms that all street sweepings have been completed in accordance with state and local requirements	\$2,000		

Chapter 5 Miscellaneous Stormwater Topics

Mosquito Control in Stormwater Management Practices

Both aboveground and underground stormwater BMPs have the potential to serve as mosquito breeding areas. Good design, proper operation and maintenance and treatment with larvicides can minimize this potential.

EPA recommends that stormwater treatment practices dewater within 3 days (72 hours) to reduce the number of mosquitoes that mature to adults, since the aquatic stage of many mosquito species is 7 to 10 days. Massachusetts has had a 72-hour dewatering rule in its Stormwater Management Standards since 1996. The 2008 technical specifications for BMPs set forth in Volume 2, Chapter 2 of the Massachusetts Stormwater Handbook also concur with this practice by requiring that all stormwater practices designed to drain do so within 72 hours.

Some stormwater practices are designed to include permanent wet pools. These practices – if maintained properly – can limit mosquito breeding by providing habitat for mosquito predators. Additional measures that can be taken to reduce mosquito populations include increasing water circulation, attracting mosquito predators by adding suitable habitat, and applying larvicides.

The Massachusetts State Reclamation and Mosquito Control Board (SRMCB), through the Massachusetts Mosquito Control Districts, can undertake further mosquito control actions specifically for the purpose of mosquito control pursuant to Massachusetts General Law Chapter 252. The Mosquito Control Board, <http://www.mass.gov/agr/mosquito/>, describes mosquito control methods and is in the process of developing guidance documents that describe Best Management Practices for mosquito control projects.

The SRMCB and Mosquito Control Districts are not responsible for operating and maintaining stormwater BMPs to reduce mosquito populations. The owners of property that construct the stormwater BMPs or municipalities that “accept” them through local subdivision approval are responsible for their maintenance.¹ The SRMCB is composed of officials from MassDEP, Department of Agricultural Resources, and Department of Conservation and Recreation. The nine (9) Mosquito Control Districts overseen by the SRMCB are located throughout Massachusetts, covering 176 municipalities.

Construction Period Best Management Practices for Mosquito Control

To minimize mosquito breeding during construction, it is essential that the following actions be taken to minimize the creation of standing pools by taking the following actions:

- **Minimize Land Disturbance:** Minimizing land disturbance reduces the likelihood of mosquito breeding by reducing silt in runoff that will cause construction period controls to clog and retain standing pools of water for more than 72 hours.
- **Catch Basin inlets:** Inspect and refresh filter fabric, hay bales, filter socks or stone dams on a regular basis to ensure that any stormwater ponded at the inlet drains within 8 hours after precipitation stops. Shorter periods may be necessary to avoid hydroplaning in roads

¹ MassDEP and MassHighway understand that the numerous stormwater BMPs along state highways pose a unique challenge. To address this challenge, the 2004 MassHighway Stormwater Handbook will provide additional information on appropriate operation and maintenance practices for mosquito control when the Handbook is revised to reflect the 2008 changes to the Stormwater Management Standards..

caused by water ponded at the catch basin inlet. Treat catch basin sumps with larvicides such as *Bacillus sphaericus* (Bs) using a licensed pesticide applicator.

- **Check Dams:** If temporary check dams are used during the construction period to lag peak rate of runoff or pond runoff for exfiltration, inspect and repair the check dams on a regular basis to ensure that any stormwater ponded behind the check dam drains within 72 hours.
- **Design construction period sediment traps** to dewater within 72 hours after precipitation. Because these traps are subject to high silt loads and tend to clog, treat them with the larvicide Bs after it rains from June through October, until the first frost occurs.
- **Construction period open conveyances:** When temporary manmade ditches are used for channelizing construction period runoff, inspect them on a regular basis to remove any accumulated sediment to restore flow capacity to the temporary ditch.
- **Revegetating Disturbed Surfaces:** Revegetating disturbed surfaces reduces sediment in runoff that will cause construction period controls to clog and retain standing pools of water for greater than 72 hours.
- **Sediment fences/hay bale barriers:** When inspections find standing pools of water beyond the 24-hour period after a storm, take action to restore barrier to its normal function.

Post-Construction Stormwater Treatment Practices

- Mosquito control begins with the environmentally sensitive site design. Environmentally sensitive site design that minimizes impervious surfaces reduces the amount of stormwater runoff. Disconnecting runoff using the LID Site Design credits outlined in the Massachusetts Stormwater Handbook reduces the amount of stormwater that must be conveyed to a treatment practice. Utilizing green roofs minimizes runoff from smaller storms. Storage media must be designed to dewater within 72 hours after precipitation.
- Mosquito control continues with the selection of structural stormwater BMPs that are unlikely to become breeding grounds for mosquitoes, such as:
 - **Bioretention Areas/Rain Gardens/Sand Filter:** These practices tend not to result in mosquito breeding. If any level spreaders, weirs or sediment forebays are used as part of the design, inspect them and correct them as necessary to prevent standing pools of water for more than 72 hours.
 - **Infiltration Trenches:** This practice tends not to result in mosquito breeding. If any level spreaders, weirs, or sediment forebays are used as part of the design, inspect them and correct them as necessary to prevent standing pools of water for more than 72 hours.
- Another mosquito control strategy is to select BMPs that can become habitats for mosquito predators, such as:
 - **Constructed Stormwater Wetlands:** Habitat features can be incorporated in constructed stormwater wetlands to attract dragonflies, amphibians, turtles, birds, bats, and other natural predators of mosquitoes.
 - **Wet Basins:** Wet basins can be designed to incorporate fish habitat features, such as deep pools. Introduce fish in consultation with Massachusetts Division of Fisheries and Wildlife. Vegetation within wet basins designed as fish habitat must be properly managed to ensure that vegetation does not overtake the habitat. Proper design to ensure that no low circulation or “dead” zones are created may reduce the potential for mosquito breeding. Introducing bubblers may increase water circulation in the wet basin.

Effective mosquito controls require proponents to design structural BMPs to prevent ponding and facilitate maintenance and, if necessary, the application of larvicides. Examples of such design practices include the following:

- **Basins:** Provide perimeter access around wet basins, extended dry detention basins and dry detention basins for both larviciding and routine maintenance. Control vegetation to ensure that access pathways stay open.
- **BMPs without a permanent pool of water:** All structural BMPs that do not rely on a permanent pool of water must drain and completely dewater within 72 hours after precipitation. This includes dry detention basins, extended dry detention basins, infiltration basins, and dry water quality swales. Use underdrains at extended dry detention basins to drain the small pools that form due to accumulation of silts. Wallace indicates that extended dry extended detention basins may breed more mosquitoes than wet basins. It is, therefore, imperative to design outlets from extended dry detention basins to completely dewater within the 72-hour period.
- **Energy Dissipators and Flow Spreaders:** Currier and Moeller, 2000 indicate that shallow recesses in energy dissipators and flow spreaders trap water where mosquitoes breed. Set the riprap in grout to reduce the shallow recesses and minimize mosquito breeding.
- **Outlet control structures:** Debris trapped in small orifices or on trash racks of outlet control structures such as multiple stage outlet risers may clog the orifices or the trash rack, causing a standing pool of water. Optimize the orifice size or trash rack mesh size to provide required peak rate attenuation/water quality detention/retention time while minimizing clogging.
- **Rain Barrels and Cisterns:** Seal lids to reduce the likelihood of mosquitoes laying eggs in standing water. Install mosquito netting over inlets. The cistern system should be designed to ensure that all collected water is drained into it within 72 hours.
- **Subsurface Structures, Deep Sump Catch Basins, Oil Grit Separators, and Leaching Catch Basins:** Seal all manhole covers to reduce likelihood of mosquitoes laying eggs in standing water. Install mosquito netting over the outlet (CALTRANS 2004).

The Operation and Maintenance Plan should provide for mosquito prevention and control.

- **Check dams:** Inspect permanent check dams on the schedule set forth in the O&M Plan. Inspect check dams 72 hours after storms for standing water ponding behind the dam. Take corrective action if standing water is found.
- **Cisterns:** Apply *Bs* larvicide in the cistern if any evidence of mosquitoes is found. The Operation and Maintenance Plan shall specify how often larvicides should be applied to waters in the cistern.
- **Water quality swales:** Remove and properly dispose of any accumulated sediment as scheduled in the Operation and Maintenance Plan.
- **Larvicide Treatment:** The Operation and Maintenance Plan must include measures to minimize mosquito breeding, including larviciding.
- The party identified in the Operation and Maintenance Plan as responsible for maintenance shall see that larvicides are applied as necessary to the following stormwater treatment practices: catch basins, oil/grit separators, wet basins, wet water quality swales, dry extended detention basins, infiltration basins, and constructed stormwater wetlands. The Operation and Maintenance Plan must ensure that all larvicides are applied by a licensed pesticide applicator and in compliance with all pesticide label requirements.
- The Operation and Maintenance Plan should identify the appropriate larvicide and the time and method of application. For example, *Bacillus sphaericus* (*Bs*), the preferred

larvicide for stormwater BMPs, should be hand-broadcast.² Alternatively, Altosid, a Methopren product, may be used. Because some practices are designed to dewater between storms, such as dry extended detention and infiltration basins, the Operation and Maintenance Plan should provide that larviciding must be conducted during or immediately after wet weather, when the detention or infiltration basin has a standing pool of water, unless a product is used that can withstand extended dry periods.

REFERENCES

- California Department of Transportation, 2004, BMP Retrofit Pilot Program, Final Report, Report ID CTSW – RT – 1 – 050,
http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/_pdfs/new_technology/CTSW-RT-01-050.pdf#xml=http://dap1.dot.ca.gov/cgi-bin/texis/webinator/search/pdfhi.txt?query=mosquito&db=db&pr=www&prox=page&rorder=500&rprox=500&rdfreq=500&rwfreq=500&rlead=500&sufs=0&order=r&cq=&id=4673373b7
Appendix E: Vector Monitoring and Abatement,
http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/_pdfs/new_technology/
California Department of Transportation, 2001, Final Vector Report, Caltrans BMP Retrofit Project Sites, Districts 7 and 11,
http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/_pdfs/new_technology/CTSW-RT-01-050/AppendixE/01_FinalVectorReport.pdf
Currier, Brian, and Moeller, 2000, Glenn, Lessons Learned: The CALTRANS Storm Water Best Management Practice Retrofit Pilot Study, prepared by the California State University Sacramento and University of California Davis for the California Department of Transportation,
<http://www.owp.csus.edu/research/papers/papers/PP015.pdf>
Massachusetts Department of Environmental Protection, 2001, West Nile Virus, Application of Pesticides to Wetland Resource Areas and Buffer Zones and Public Water systems, Guideline No. BRPG01-02, <http://www.mass.gov/dep/water/wnvpolicy.doc>
O'Meara, G.F., 2003, Mosquitoes Associated With Stormwater Detention/Retention Areas, ENY627, University of Florida, Institute of Food and Agricultural Sciences Extension,
<http://edis.ifas.ufl.edu/mg338>
Taylor, Scott M., and Currier, Brian, 1999, A Wet Pond as a Storm Water Runoff BMP – Case Study, presented at Department of Environmental Resources Engineering, Humboldt State University, Arcata, California <http://www.owp.csus.edu/research/papers/papers/PP004.pdf>
U.S. EPA, 2005, Stormwater Structures and Mosquitoes, EPA 833-F-05-003,
http://www.epa.gov/npdes/pubs/sw_wnv.pdf
U.S. EPA, 2003, Do Stormwater Retention Ponds Contribute to Mosquito Problems, Nonpoint source News-Notes, Issue No. 71, <http://notes.tetrattech-ffx.com/newsnotes.nsf/0/143f7fa99c3ea25485256d0100618bc9?OpenDocument>
Virginia Department of Conservation and Recreation, 2003, Vector Control, Mosquitoes and Stormwater Management, Stormwater Management Technical Bulletin No. 8,
http://www.dcr.virginia.gov/soil_&_water/documents/tecbtln8.pdf
Wallace, John R., Stormwater Management and Mosquito Ecology, Stormwater Magazine, March/April 2007, http://www.gradingandexcavation.com/sw_0703_management.html

² *Bacillus thuringiensis israelensis* or *Bti* is usually applied by helicopter to wetlands and floodplains

Roads and Stormwater BMPs

In general, the stormwater BMPs used for land development projects can also be used for new roadways and roadway improvement projects. However, for improvement of existing roads, there are often constraints that limit the choice of BMP. These constraints derive from the linear configuration of the road, the limited area within the existing right-of-way, the structural and safety requirements attendant to good roadway design, and the long-term maintainability of the roadway drainage systems. The MassHighway Handbook provides strategies for dealing with the constraints associated with providing stormwater BMPs for roadway redevelopment projects.

Roadway design can minimize impacts caused by stormwater. Reducing roadway width reduces the total and peak volume of runoff. Designing a road with country drainage (no road shoulders or curbs) disconnects roadway runoff. Disconnection of roadway runoff is eligible for the Low Impact Site Design Credit provided the drainage is disconnected in accordance with specifications outlined in Volume 3.

Like other parties, municipalities that work within wetlands jurisdictional areas and adjacent buffer zones must design and implement structural stormwater best management practices in accordance with the Stormwater Management Standards and the Stormwater Management Handbook. In addition, in municipalities and areas where state agencies operate stormwater systems, the DPWs (or other town or state agencies) must meet the “good housekeeping” requirement of the municipality’s or agency’s MS4 permit.

MassHighway has taken stormwater management one step further by working with MassDEP to develop the MassHighway Storm Water Handbook for Highways and Bridges. The purpose of the MassHighway Handbook is to provide guidance for persons involved in the design, permitting, review and implementation of state highway projects, especially those involving existing roadways where physical constraints often limit the stormwater management options available. These constraints, like those common to redevelopment sites, may make it difficult to comply precisely with the requirements of the Stormwater Management Standards and the Massachusetts Stormwater Handbook.³ In response to these constraints, MassDEP and MHD developed specific design, permitting, review and implementation practices that meet the unique challenges of providing environmental protection for existing state roads. The information in the MassHighway Handbook may also aid in the planning and design of projects to build new highways and to add lanes to existing highways, since they may face similar difficulties in meeting the requirements of the Stormwater Management Standards.

Although it is very useful, the MassHighway Handbook does not allow MassHighway projects to proceed without individual review and approval by the issuing authority when subject to the Wetlands Protection Act Regulations, 310 CMR 10.00, or the 401 Water Quality Certification Regulations, 314 CMR 9.00. For example, MassHighway must provide a Conservation Commission with a project-specific Operation and Maintenance Plan in accordance with Standard 9 that documents how the project’s post-construction BMPs will be operated and maintained.⁴

³ The 2004 MassHighway Handbook outlines standardized methods for dealing with these constraints as they apply to highway redevelopment projects. MassDEP and MassHighway intend to work together to provide guidance for add a lane projects when the 2004 Handbook is revised to reflect the 2008 changes to the Stormwater Management Standards.

⁴ The general permit for municipal separate storm sewer systems (the MS4 Permit) requires MassHighway to develop and implement procedures for the proper operation and maintenance of stormwater BMPs. To

Some municipalities have asked if the MassHighway Handbook governs municipal road projects. The answer is no.⁵ The MassHighway Handbook was developed in response to the unique problems and challenges arising out of the management of the state highway system. Like other project proponents, cities and towns planning road or other projects in areas subject to jurisdiction under the Wetlands Protection Act must design and implement LID, non-structural and structural best management practices in accordance with the Stormwater Management Standards and the Massachusetts Stormwater Handbook.

avoid duplication of effort, MassHighway may be able rely on the same procedures to fulfill the operation and maintenance requirements of Standard 9 and the MS 4 Permit.

⁵ Although the MassHighway Handbook does not govern municipal road projects, cities and towns may find some of the information presented in the Handbook useful.



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Kathleen A. Theoharides
Secretary

Martin Suuberg
Commissioner

Massachusetts Department of Environmental Protection Bureau of Water Resources Snow Disposal Guidance

Effective Date: December 23, 2019

Applicability: Applies to all federal, state, regional and local agencies, as well as to private businesses.

Supersedes: Bureau of Resource Protection (BRP) Snow Disposal Guideline No. BRPG97-1 issued December 12, 1997 and BRPG01-01 issued March 8, 2001; Bureau of Water Resources (BWR) snow disposal guidance issued December 21, 2015 and December 12, 2018.

Approved by: Kathleen Baskin, Assistant Commissioner, Bureau of Water Resources

PURPOSE: To provide guidelines to all government agencies and private businesses regarding snow disposal site selection, site preparation and maintenance, and emergency snow disposal options that are protective of wetlands, drinking water, and water bodies, and are acceptable to the Massachusetts Department of Environmental Protection (MassDEP), Bureau of Water Resources.

APPLICABILITY: These Guidelines are issued by MassDEP's Bureau of Water Resources on behalf of all Bureau Programs (including Drinking Water Supply, Wetlands and Waterways, Wastewater Management, and Watershed Planning and Permitting). They apply to all federal agencies, state agencies, state authorities, municipal agencies and private businesses disposing of snow in the Commonwealth of Massachusetts.

INTRODUCTION

Finding a place to dispose of collected snow poses a challenge to municipalities and businesses as they clear roads, parking lots, bridges, and sidewalks. While MassDEP is aware of the threats to public safety caused by snow, collected snow that is contaminated with road salt, sand, litter, and automotive pollutants such as oil also threatens public health and the environment.

As snow melts, road salt, sand, litter, and other pollutants are transported into surface water or through the soil where they may eventually reach the groundwater. Road salt and other pollutants can contaminate water supplies and are toxic to aquatic life at certain levels. Sand washed into

This information is available in alternate format. Contact Michelle Waters-Ekanem, Director of Diversity/Civil Rights at 617-292-5751.

TTY# MassRelay Service 1-800-439-2370

MassDEP Website: www.mass.gov/dep

Printed on Recycled Paper

waterbodies can create sand bars or fill in wetlands and ponds, impacting aquatic life, causing flooding, and affecting our use of these resources.

There are several steps that communities can take to minimize the impacts of snow disposal on public health and the environment. These steps will help communities avoid the costs of a contaminated water supply, degraded waterbodies, and flooding. Everything that occurs on the land has the potential to impact the Commonwealth's water resources. Given the authority of local government over the use of the land, municipal officials and staff have a critically important role to play in protecting our water resources.

The purpose of these guidelines is to help federal agencies, state agencies, state authorities, municipalities and businesses select, prepare, and maintain appropriate snow disposal sites before the snow begins to accumulate through the winter. Following these guidelines and obtaining the necessary approvals may also help municipalities in cases when seeking reimbursement for snow disposal costs from the Federal Emergency Management Agency is possible.

RECOMMENDED GUIDELINES

These snow disposal guidelines address: (1) site selection; (2) site preparation and maintenance; and (3) emergency snow disposal.

1. SITE SELECTION

The key to selecting effective snow disposal sites is to locate them adjacent to or on pervious surfaces in upland areas or upland locations on impervious surfaces away from water resources and drinking water wells. At these locations, the snow meltwater can filter into the soil, leaving behind sand and debris which can be removed in the spring. The following conditions should be followed:

- Within water supply Zone A and Zone II, avoid storage or disposal of snow and ice containing deicing chemicals that has been collected from streets located outside these zones. Municipalities may have a water supply protection land use control that prohibits the disposal of snow and ice containing deicing chemicals from outside the Zone A and Zone II, subject to the Massachusetts Drinking Water Regulations at 310 CMR 22.20C and 310 CMR 22.21(2).
- Avoid storage or disposal of snow or ice in Interim Wellhead Protection Areas (IWPA) of public water supply wells, and within 75 feet of a private well, where road salt may contaminate water supplies.
- Avoid dumping snow into any waterbody, including rivers, the ocean, reservoirs, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Avoid dumping snow on MassDEP-designated high and medium-yield aquifers where it may contaminate groundwater.
- Avoid dumping snow in sanitary landfills and gravel pits. Snow meltwater will create more contaminated leachate in landfills posing a greater risk to groundwater, and in gravel pits, there is little opportunity for pollutants to be filtered out of the meltwater because groundwater is close to the land surface.

- Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage systems including detention basins, swales or ditches. Snow combined with sand and debris may block a stormwater drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.

Recommended Site Selection Procedures

It is important that the municipal Department of Public Works or Highway Department, Conservation Commission, and Board of Health work together to select appropriate snow disposal sites. The following steps should be taken:

- Estimate how much snow disposal capacity may be needed for the season so that an adequate number of disposal sites can be selected and prepared.
- Identify sites that could potentially be used for snow disposal, such as municipal open space (e.g., parking lots or parks).
- Select sites located in upland locations that are not likely to impact sensitive environmental resources first.
- If more storage space is still needed, prioritize the sites with the least environmental impact (using the site selection criteria, and local or MassGIS maps as a guide).

Snow Disposal Mapping Assistance

MassDEP has an online mapping tool to assist in identifying possible locations to potentially dispose of snow. MassDEP encourages municipalities to use this tool to identify possible snow disposal options. The tool identifies wetland resource areas, public drinking water supplies and other sensitive locations where snow should not be disposed. The tool may be accessed through the Internet at the following web address:

<https://maps.env.state.ma.us/dep/arcgis/js/templates/PSE/>.

2. SITE PREPARATION AND MAINTENANCE

In addition to carefully selecting disposal sites before the winter begins, it is important to prepare and maintain these sites to maximize their effectiveness. The following maintenance measures should be undertaken for all snow disposal sites:

- A silt fence or equivalent barrier should be placed securely on the downgradient side of the snow disposal site.
- Wherever possible maintain a 50-foot vegetated buffer between the disposal site and adjacent waterbodies to filter pollutants from the meltwater.
- Clear debris from the site prior to using the site for snow disposal.
- Clear debris from the site and properly dispose of it at the end of the snow season, and no later than May 15.

3. SNOW DISPOSAL APPROVALS

Proper snow disposal may be undertaken through one of the following approval procedures:

- Routine snow disposal – Minimal, if any, administrative review is required in these cases when upland and pervious snow disposal locations or upland locations on impervious surfaces that have functioning and maintained stormwater management systems have been identified, mapped, and used for snow disposal following ordinary snowfalls. Use of upland and pervious snow disposal sites avoids wetland resource areas and allows snow meltwater to recharge groundwater and will help filter pollutants, sand, and other debris. This process will address the majority of snow removal efforts until an entity exhausts all available upland snow disposal sites. The location and mapping of snow disposal sites will help facilitate each entity's routine snow management efforts.
- Emergency Certifications – If an entity demonstrates that there is no remaining capacity at upland snow disposal locations, local conservation commissions may issue an Emergency Certification under the Massachusetts Wetlands Protection regulations to authorize snow disposal in buffer zones to wetlands, certain open water areas, and certain wetland resource areas (i.e. within flood plains). Emergency Certifications can only be issued at the request of a public agency or by order of a public agency for the protection of the health or safety of citizens, and are limited to those activities necessary to abate the emergency. See 310 CMR 10.06(1)-(4). Use the following guidelines in these emergency situations:
 - Dispose of snow in open water with adequate flow and mixing to prevent ice dams from forming.
 - Do not dispose of snow in salt marshes, vegetated wetlands, certified vernal pools, shellfish beds, mudflats, drinking water reservoirs and their tributaries, Zone IIs or IWPA's of public water supply wells, Outstanding Resource Waters, or Areas of Critical Environmental Concern.
 - Do not dispose of snow where trucks may cause shoreline damage or erosion.
 - Consult with the municipal Conservation Commission to ensure that snow disposal in open water complies with local ordinances and bylaws.
- Severe Weather Emergency Declarations – In the event of a large-scale severe weather event, MassDEP may issue a broader Emergency Declaration under the Wetlands Protection Act which allows federal agencies, state agencies, state authorities, municipalities, and businesses greater flexibility in snow disposal practices. Emergency Declarations typically authorize greater snow disposal options while protecting especially sensitive resources such as public drinking water supplies, vernal pools, land containing shellfish, FEMA designated floodways, coastal dunes, and salt marsh. In the event of severe winter storm emergencies, the snow disposal site maps created by municipalities will enable MassDEP and the Massachusetts Emergency Management Agency (MEMA) in helping communities identify appropriate snow disposal locations.

If upland disposal sites have been exhausted, the Emergency Declaration issued by MassDEP allows for snow disposal near water bodies. In these situations, a buffer of at

least 50 feet, preferably vegetated, should still be maintained between the site and the waterbody. Furthermore, it is essential that the other guidelines for preparing and maintaining snow disposal sites be followed to minimize the threat to adjacent waterbodies.

Under extraordinary conditions, when all land-based snow disposal options are exhausted, the Emergency Declaration issued by MassDEP may allow disposal of snow in certain waterbodies under certain conditions. ***A federal agency, state agency, state authority, municipality or business seeking to dispose of snow in a waterbody should take the following steps:***

- Call the emergency contact phone number [(888) 304-1133]] and notify the MEMA of the municipality's intent.
- MEMA will ask for some information about where the requested disposal will take place.
- MEMA will confirm that the disposal is consistent with MassDEP's Severe Weather Emergency Declaration and these guidelines and is therefore approved.

During declared statewide snow emergency events, MassDEP's website will also highlight the emergency contact phone number [(888) 304-1133]] for authorizations and inquiries. For further non-emergency information about this Guidance you may contact your MassDEP Regional Office Service Center:

Northeast Regional Office, Wilmington, 978-694-3246

Southeast Regional Office, Lakeville, 508-946-2714

Central Regional Office, Worcester, 508-792-7650

Western Regional Office, Springfield, 413-755-2114

CDS[®] Inspection and Maintenance Guide



Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allow both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine whether the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.



CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	yd3	m3
CDS2015-4	4	1.2	3.0	0.9	0.5	0.4
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities



Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

©2010 CONTECH Stormwater Solutions

CONTECH Construction Products Inc. provides site solutions for the civil engineering industry. CONTECH's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other CONTECH division offerings, visit contech-cpi.com or call 800.338.1122

Nothing in this catalog should be construed as an expressed warranty or an implied warranty of merchantability or fitness for any particular purpose. See the CONTECH standard quotation or acknowledgement for applicable warranties and other terms and conditions of sale.

The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; 7,517,450 related foreign patents or other patents pending.

CDS Inspection & Maintenance Log

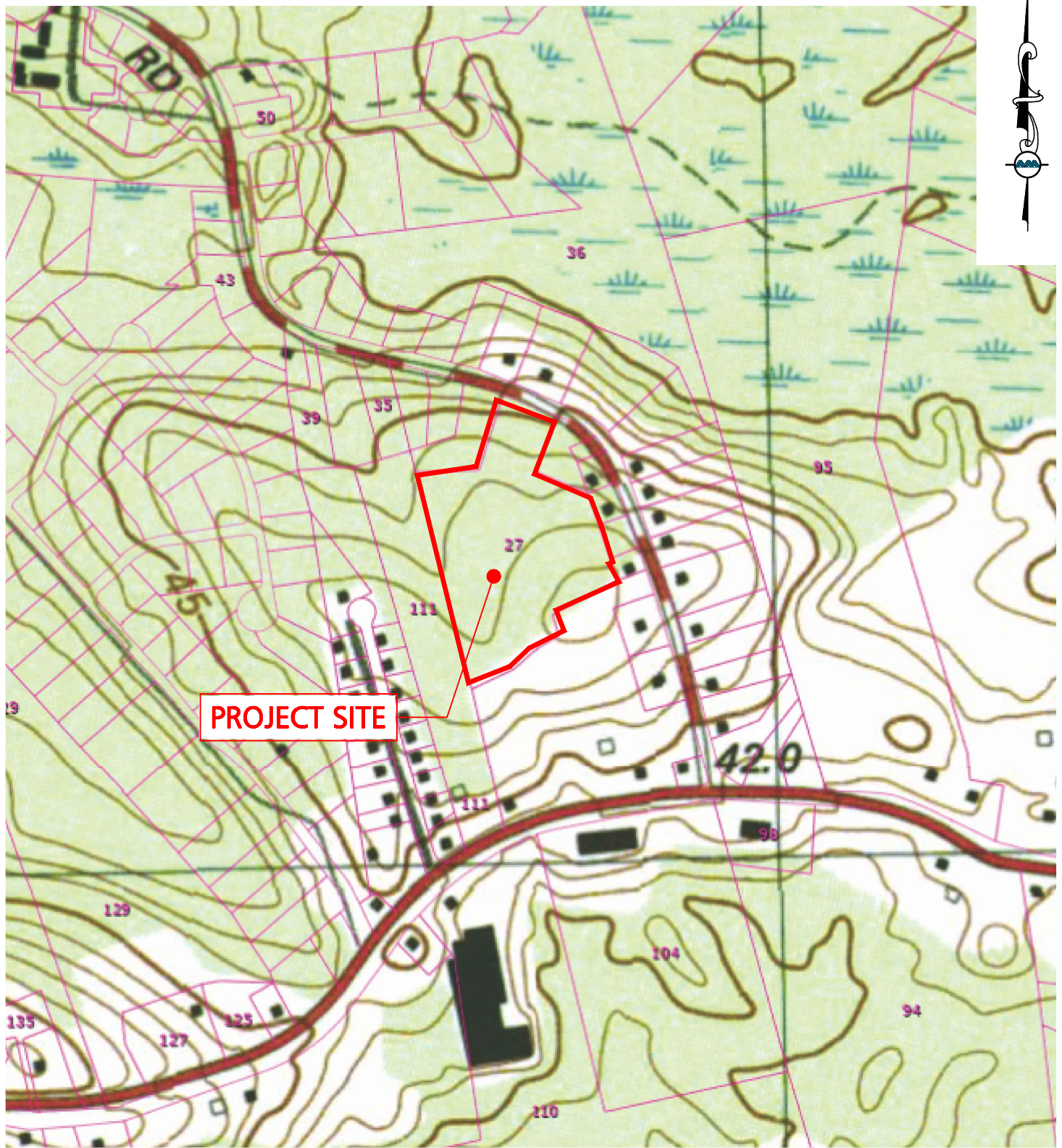
CDS Model: _____ Location: _____

[illegible]

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than eighteen inches the system should be cleaned out. **Note: To avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.



SECTION 3.0 - EXHIBITS



PREPARED BY:



**ALLEN & MAJOR
ASSOCIATES, INC.**

civil engineering land surveying
environmental consulting landscape architecture
www.allenmajor.com

100 COMMERCE WAY
P.O. BOX 2118

WOBURN MA 01888-0118

TEL: (781) 935-6889

FAX: (781) 935-2896

WOBURN, MA ♦ LAKEVILLE, MA ♦ MANCHESTER, NH

PROJECT:

**27 KIMBALL ROAD
AMESBURY, MA**

Copyright © 2026 Allen & Major Associates, Inc.
All Rights Reserved

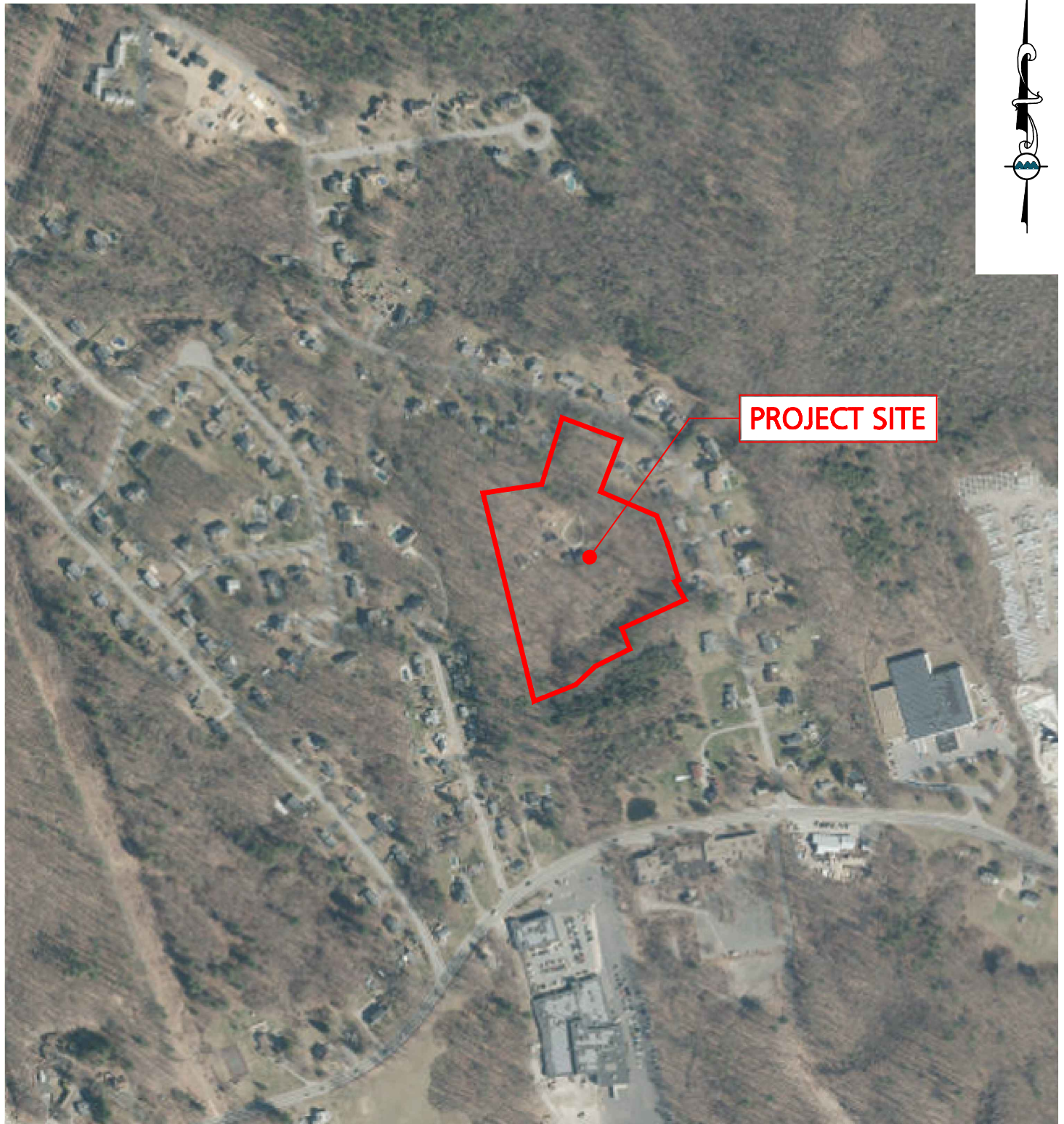
USGS SITE LOCUS MAP

PROJECT NO.	3410-03	DATE:	TBD
SCALE:	1"=500'	DWG. NAME:	EXHIBITS
DESIGNED BY:	BDP	CHECKED BY:	CMQ

THIS DRAWING HAS BEEN PREPARED IN ELECTRONIC FORMAT. CLIENT/CLIENT'S REPRESENTATIVE OR CONSULTANT MAY BE PROVIDED COPIES OF DRAWINGS AND SPECIFICATIONS ON MAGNETIC MEDIA FOR HIS/HER INFORMATION AND USE FOR SPECIFIC APPLICATION TO THIS PROJECT. DUE TO THE POTENTIAL THAT THE MAGNETIC INFORMATION MAY BE MODIFIED UNINTENTIONALLY OR OTHERWISE, ALLEN & MAJOR ASSOCIATES, INC. MAY REMOVE ALL INDICATION OF THE DOCUMENT'S AUTHORSHIP ON THE MAGNETIC MEDIA. PRINTED REPRESENTATIONS OF THE DRAWINGS AND SPECIFICATIONS ISSUED SHALL BE THE ONLY RECORD COPIES OF ALLEN & MAJOR ASSOCIATES, INC.'S WORK PRODUCT.

SHEET No.

EX-1



PREPARED BY:



**ALLEN & MAJOR
ASSOCIATES, INC.**

civil engineering land surveying
environmental consulting landscape architecture
www.allenmajor.com

100 COMMERCE WAY

P.O. BOX 2118

WOBURN MA 01888-0118

TEL: (781) 935-6889

FAX: (781) 935-2896

WOBURN, MA ♦ LAKEVILLE, MA ♦ MANCHESTER, NH

PROJECT:

**27 KIMBALL ROAD
AMESBURY, MA**

Copyright © 2026 Allen & Major Associates, Inc.
All Rights Reserved

AERIAL PHOTO

PROJECT NO.	3410-03	DATE:	TBD
SCALE:	1"=500'	DWG. NAME:	EXHIBITS
DESIGNED BY:	BDP	CHECKED BY:	CMQ

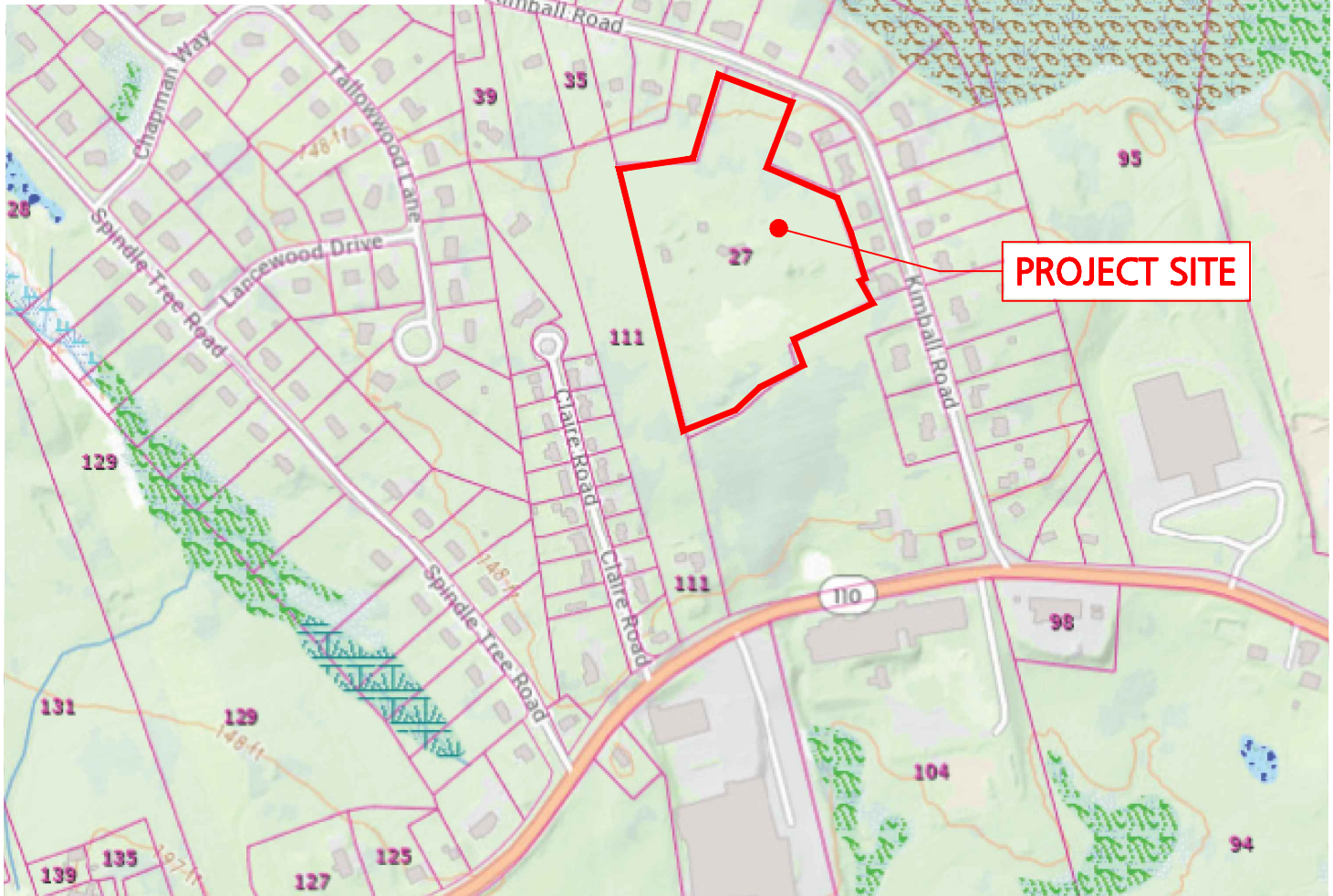
THIS DRAWING HAS BEEN PREPARED IN ELECTRONIC FORMAT. CLIENT/CLIENT'S REPRESENTATIVE OR CONSULTANT MAY BE PROVIDED COPIES OF DRAWINGS AND SPECIFICATIONS ON MAGNETIC MEDIA FOR HIS/HER INFORMATION AND USE FOR SPECIFIC APPLICATION TO THIS PROJECT. DUE TO THE POTENTIAL THAT THE MAGNETIC INFORMATION MAY BE MODIFIED UNINTENTIONALLY OR OTHERWISE, ALLEN & MAJOR ASSOCIATES, INC. MAY REMOVE ALL INDICATION OF THE DOCUMENT'S AUTHORSHIP ON THE MAGNETIC MEDIA. PRINTED REPRESENTATIONS OF THE DRAWINGS AND SPECIFICATIONS ISSUED SHALL BE THE ONLY RECORD COPIES OF ALLEN & MAJOR ASSOCIATES, INC.'S WORK PRODUCT.

SHEET No.

EX-2

LEGEND

- Coastal Bank Bluff or Sea Cliff
- Coastal Beach
- Coastal Dune
- Cranberry Bog
- Deep Marsh
- Barrier Beach-Open Water
- Open Water
- Rocky Intertidal Shore
- Salt Marsh
- Shallow Marsh Meadow or Fen
- Shrub Swamp
- Tidal Flat
- Wooded Swamp Coniferous
- Wooded Swamp Deciduous
- Wooded Swamp Mixed Trees



PROJECT SITE

MA MAPPER DEP WETLANDS

PREPARED BY:



**ALLEN & MAJOR
ASSOCIATES, INC.**

civil engineering land surveying
environmental consulting landscape architecture
www.allenmajor.com

100 COMMERCE WAY

P.O. BOX 2118

WOBURN MA 01888-0118

TEL: (781) 935-6889

FAX: (781) 935-2896

WOBURN, MA ♦ LAKEVILLE, MA ♦ MANCHESTER, NH

PROJECT:

**27 KIMBALL ROAD
AMESBURY, MA**

Copyright © 2026 Allen & Major Associates, Inc.
All Rights Reserved

WETLANDS MAP

PROJECT NO.	3410-03	DATE:	TBD
SCALE:	1"=500'	DWG. NAME:	EXHIBITS
DESIGNED BY:	BDP	CHECKED BY:	CMQ

THIS DRAWING HAS BEEN PREPARED IN ELECTRONIC FORMAT. CLIENT/CLIENT'S REPRESENTATIVE OR CONSULTANT MAY BE PROVIDED COPIES OF DRAWINGS AND SPECIFICATIONS ON MAGNETIC MEDIA FOR HIS/HER INFORMATION AND USE FOR SPECIFIC APPLICATION TO THIS PROJECT. DUE TO THE POTENTIAL THAT THE MAGNETIC INFORMATION MAY BE MODIFIED UNINTENTIONALLY OR OTHERWISE, ALLEN & MAJOR ASSOCIATES, INC. MAY REMOVE ALL INDICATION OF THE DOCUMENT'S AUTHORSHIP ON THE MAGNETIC MEDIA. PRINTED REPRESENTATIONS OF THE DRAWINGS AND SPECIFICATIONS ISSUED SHALL BE THE ONLY RECORD COPIES OF ALLEN & MAJOR ASSOCIATES, INC.'S WORK PRODUCT.

SHEET No.

EX-3

LEGEND

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

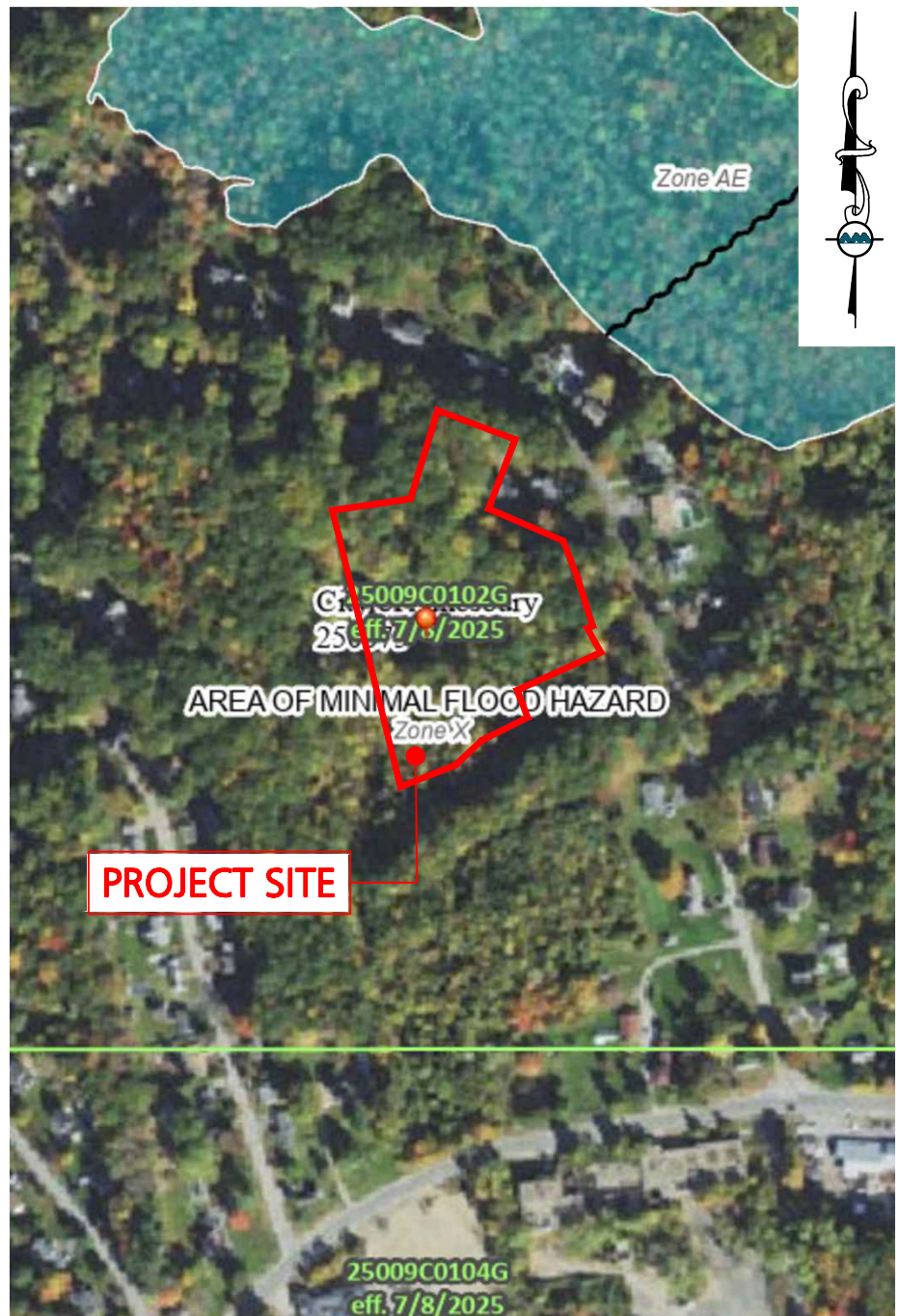
SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, A1, A2, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/31/2025 at 6:23 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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



FEMA FLOOD INSURANCE RATE MAP
MAP NUMBER 25009C0102G
EFFECTIVE DATE: JULY 8, 2025

PREPARED BY:



ALLEN & MAJOR ASSOCIATES, INC.

civil engineering land surveying
environmental consulting landscape architecture
www.allenmajor.com

100 COMMERCE WAY

P.O. BOX 2118

WOBURN MA 01888-0118

TEL: (781) 935-6889

FAX: (781) 935-2896

WOBURN, MA ♦ LAKEVILLE, MA ♦ MANCHESTER, NH

PROJECT:

**27 KIMBALL ROAD
AMESBURY, MA**

Copyright © 2026 Allen & Major Associates, Inc.
All Rights Reserved

FEMA FIRM MAP

PROJECT NO.	3410-03	DATE:	TBD
SCALE:	1"=500'	DWG. NAME:	EXHIBITS
DESIGNED BY:	BDP	CHECKED BY:	CMQ

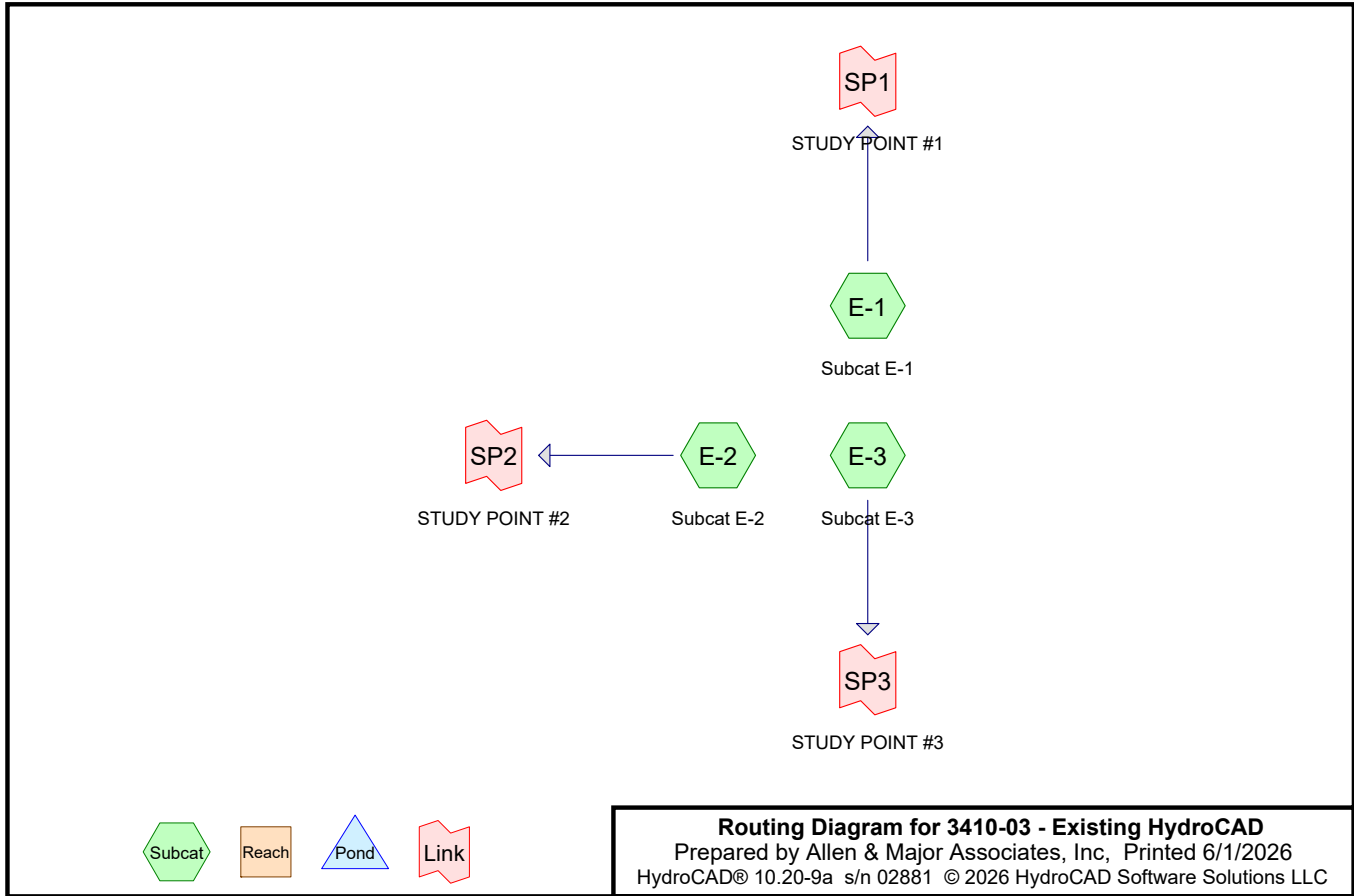
THIS DRAWING HAS BEEN PREPARED IN ELECTRONIC FORMAT. CLIENT/CLIENT'S REPRESENTATIVE OR CONSULTANT MAY BE PROVIDED COPIES OF DRAWINGS AND SPECIFICATIONS ON MAGNETIC MEDIA FOR HIS/HER INFORMATION AND USE FOR SPECIFIC APPLICATION TO THIS PROJECT. DUE TO THE POTENTIAL THAT THE MAGNETIC INFORMATION MAY BE MODIFIED UNINTENTIONALLY OR OTHERWISE, ALLEN & MAJOR ASSOCIATES, INC. MAY REMOVE ALL INDICATION OF THE DOCUMENT'S AUTHORSHIP ON THE MAGNETIC MEDIA. PRINTED REPRESENTATIONS OF THE DRAWINGS AND SPECIFICATIONS ISSUED SHALL BE THE ONLY RECORD COPIES OF ALLEN & MAJOR ASSOCIATES, INC.'S WORK PRODUCT.

SHEET No.

EX-4



SECTION 4.0 - EXISTING DRAINAGE ANALYSIS



3410-03 - Existing HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Printed 6/1/2026
Page 2

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NRCC 24-hr	D	Default	24.00	1	3.37	2
2	10-Year	NRCC 24-hr	D	Default	24.00	1	5.33	2
3	25-Year	NRCC 24-hr	D	Default	24.00	1	6.56	2
4	100-Year	NRCC 24-hr	D	Default	24.00	1	8.45	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
16,661	74	>75% Grass cover, Good, HSG C (E-1, E-2)
3,844	87	Dirt roads, HSG C (E-2, E-3)
7,940	89	Gravel roads, HSG C (E-1)
710	98	Paved parking, HSG C (E-1, E-2)
3,037	98	Roofs, HSG C (E-1, E-2)
4,417	98	Water Surface, HSG C (E-3)
372,725	70	Woods, Good, HSG C (E-1, E-2, E-3)
409,335	71	TOTAL AREA

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
409,335	HSG C	E-1, E-2, E-3
0	HSG D	
0	Other	
409,335		TOTAL AREA

Ground Covers (all nodes)							
HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
0	0	16,661	0	0	16,661	>75% Grass cover, Good	E-1, E-2
0	0	3,844	0	0	3,844	Dirt roads	E-2, E-3
0	0	7,940	0	0	7,940	Gravel roads	E-1
0	0	710	0	0	710	Paved parking	E-1, E-2
0	0	3,037	0	0	3,037	Roofs	E-1, E-2
0	0	4,417	0	0	4,417	Water Surface	E-3
0	0	372,725	0	0	372,725	Woods, Good	E-1, E-2, E-3
0	0	409,335	0	0	409,335	TOTAL AREA	

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 E-1: Subcat E-1	Runoff Area=215,540 sf 0.86% Impervious Runoff Depth=0.98" Flow Length=530' Tc=26.5 min CN=71 Runoff=2.74 cfs 17,639 cf
Subcatchment E-2: Subcat E-2	Runoff Area=163,062 sf 1.16% Impervious Runoff Depth=0.98" Flow Length=520' Tc=15.8 min CN=71 Runoff=2.68 cfs 13,344 cf
Subcatchment E-3: Subcat E-3	Runoff Area=30,732 sf 14.37% Impervious Runoff Depth=1.15" Flow Length=75' Tc=16.9 min CN=74 Runoff=0.59 cfs 2,948 cf
Link SP1: STUDY POINT #1	Inflow=2.74 cfs 17,639 cf Primary=2.74 cfs 17,639 cf
Link SP2: STUDY POINT #2	Inflow=2.68 cfs 13,344 cf Primary=2.68 cfs 13,344 cf
Link SP3: STUDY POINT #3	Inflow=0.59 cfs 2,948 cf Primary=0.59 cfs 2,948 cf

Total Runoff Area = 409,335 sf Runoff Volume = 33,931 cf Average Runoff Depth = 0.99"
98.01% Pervious = 401,171 sf 1.99% Impervious = 8,164 sf

Summary for Subcatchment E-1: Subcat E-1

Runoff = 2.74 cfs @ 12.40 hrs, Volume= 17,639 cf, Depth= 0.98"
Routed to Link SP1 : STUDY POINT #1

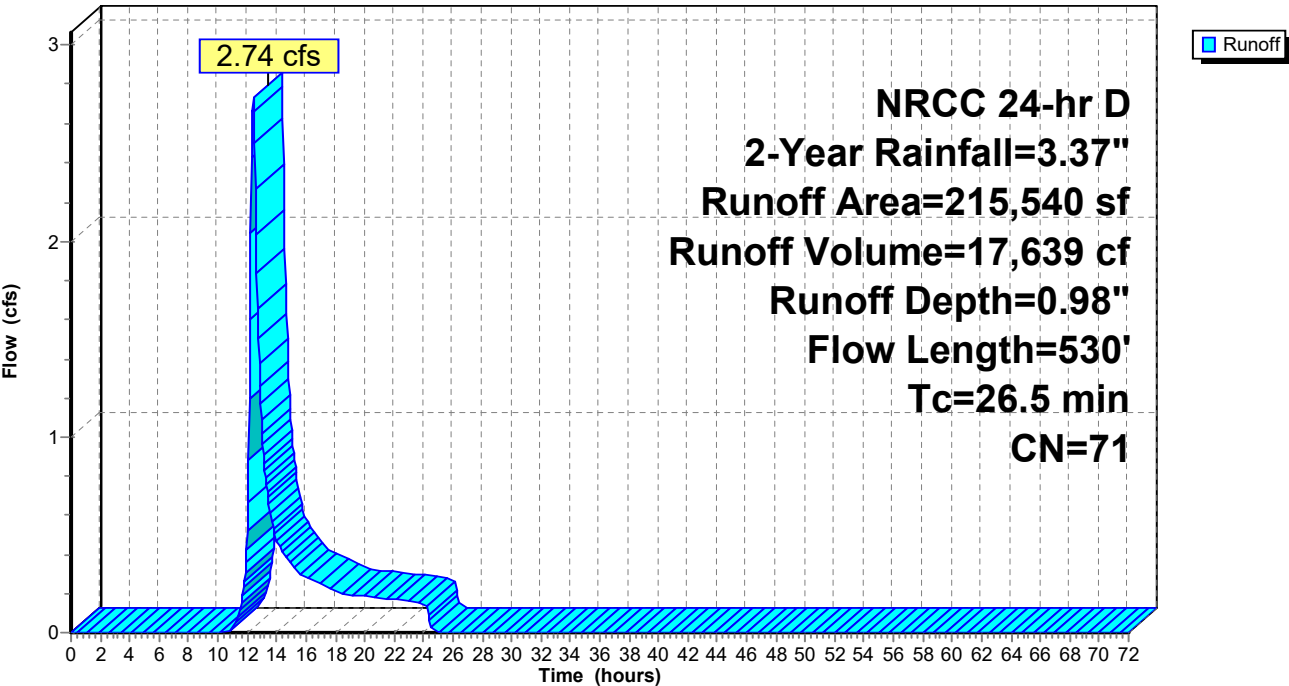
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
16,069	74	>75% Grass cover, Good, HSG C
7,940	89	Gravel roads, HSG C
545	98	Paved parking, HSG C
1,308	98	Roofs, HSG C
189,678	70	Woods, Good, HSG C
215,540	71	Weighted Average
213,687		99.14% Pervious Area
1,854		0.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	50	0.0230	0.04		Sheet Flow, A-B
					Woods: Dense underbrush n= 0.800 P2= 3.37"
6.7	480	0.0570	1.19		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
26.5	530	Total			

Subcatchment E-1: Subcat E-1

Hydrograph



Summary for Subcatchment E-2: Subcat E-2

Runoff = 2.68 cfs @ 12.26 hrs, Volume= 13,344 cf, Depth= 0.98"
Routed to Link SP2 : STUDY POINT #2

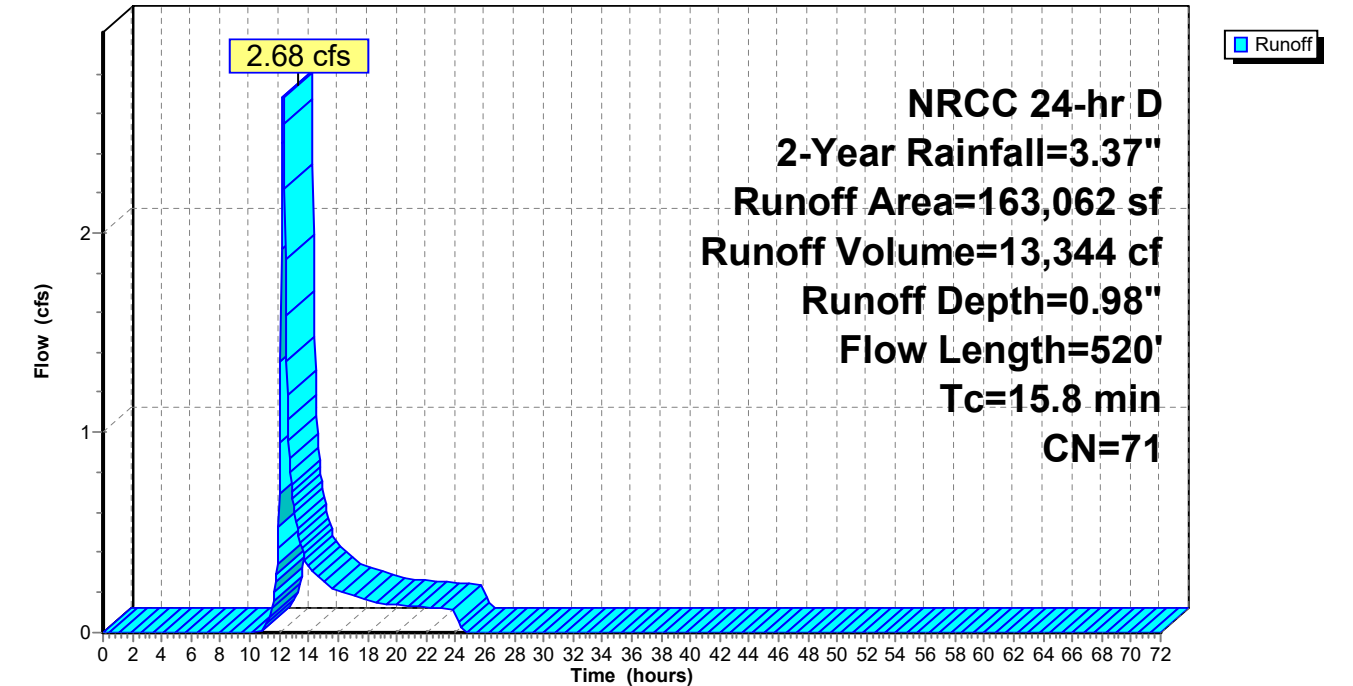
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
592	74	>75% Grass cover, Good, HSG C
3,038	87	Dirt roads, HSG C
165	98	Paved parking, HSG C
1,729	98	Roofs, HSG C
157,539	70	Woods, Good, HSG C
163,062	71	Weighted Average
161,169		98.84% Pervious Area
1,893		1.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.2100	0.10		Sheet Flow, A-B
					Woods: Dense underbrush n= 0.800 P2= 3.37"
7.6	470	0.0420	1.02		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
15.8	520	Total			

Subcatchment E-2: Subcat E-2

Hydrograph



Summary for Subcatchment E-3: Subcat E-3

Runoff = 0.59 cfs @ 12.27 hrs, Volume= 2,948 cf, Depth= 1.15"
Routed to Link SP3 : STUDY POINT #3

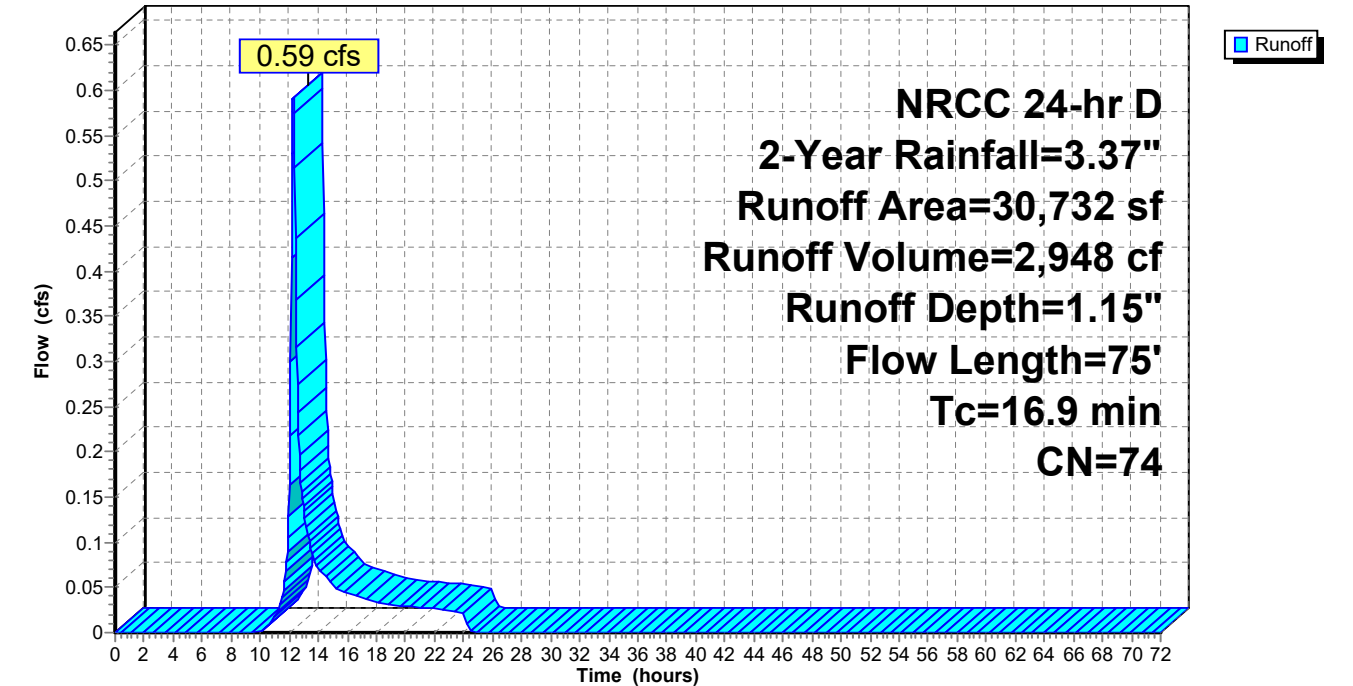
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
807	87	Dirt roads, HSG C
4,417	98	Water Surface, HSG C
25,508	70	Woods, Good, HSG C
30,732	74	Weighted Average
26,315		85.63% Pervious Area
4,417		14.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.7	50	0.0350	0.05		Sheet Flow, A-B
					Woods: Dense underbrush n= 0.800 P2= 3.37"
0.2	25	0.2200	2.35		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
16.9	75	Total			

Subcatchment E-3: Subcat E-3

Hydrograph



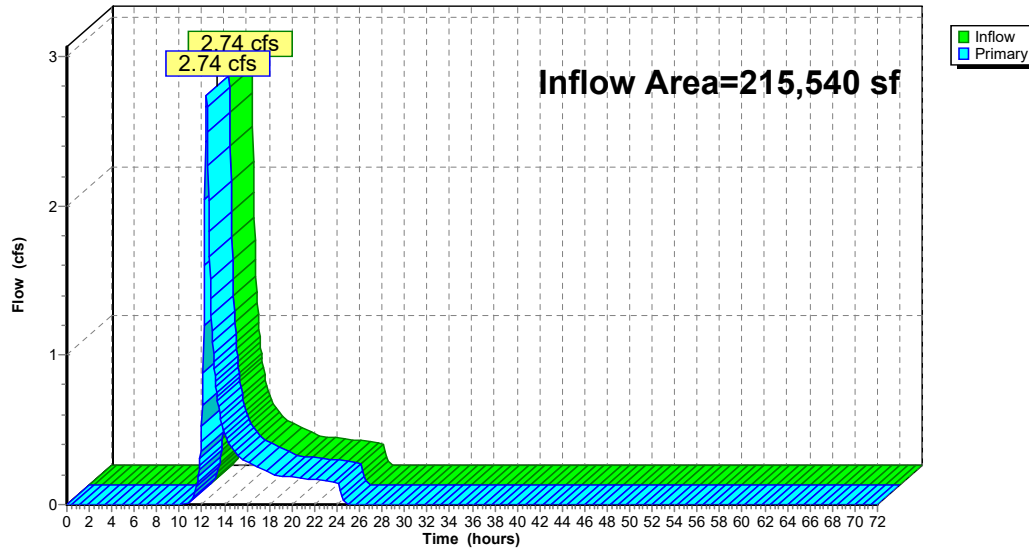
Summary for Link SP1: STUDY POINT #1

Inflow Area = 215,540 sf, 0.86% Impervious, Inflow Depth = 0.98" for 2-Year event
Inflow = 2.74 cfs @ 12.40 hrs, Volume= 17,639 cf
Primary = 2.74 cfs @ 12.40 hrs, Volume= 17,639 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP1: STUDY POINT #1

Hydrograph



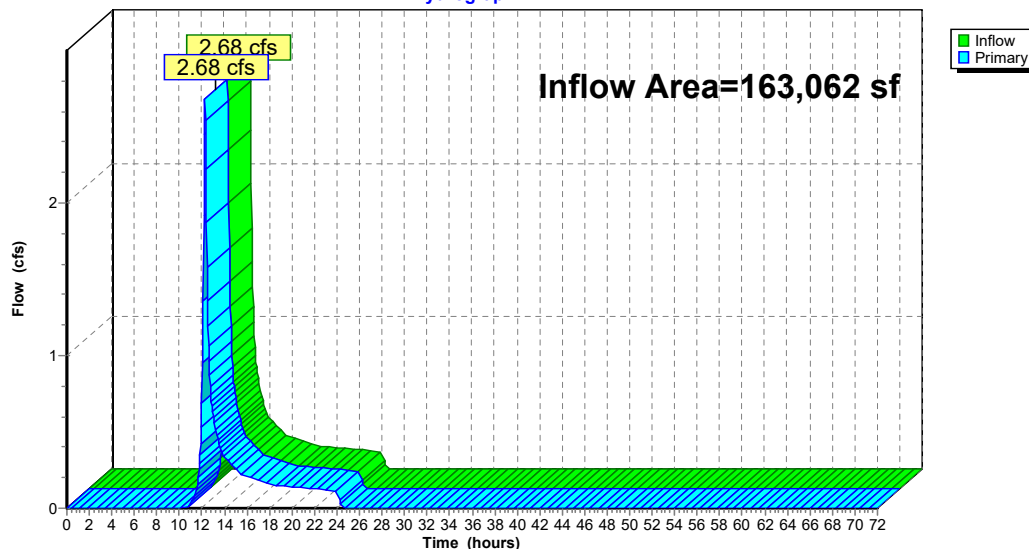
Summary for Link SP2: STUDY POINT #2

Inflow Area = 163,062 sf, 1.16% Impervious, Inflow Depth = 0.98" for 2-Year event
Inflow = 2.68 cfs @ 12.26 hrs, Volume= 13,344 cf
Primary = 2.68 cfs @ 12.26 hrs, Volume= 13,344 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP2: STUDY POINT #2

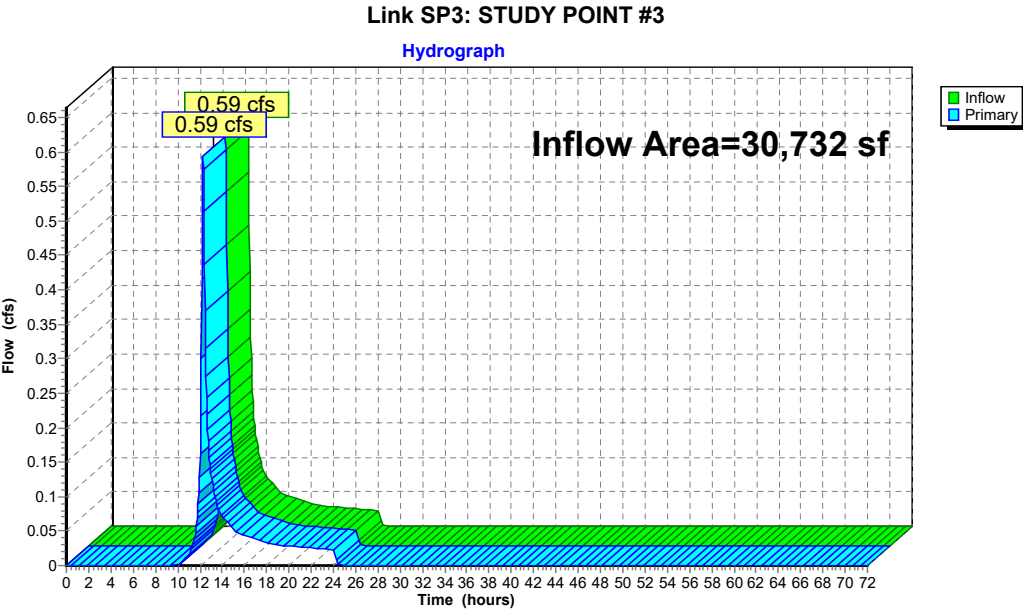
Hydrograph



Summary for Link SP3: STUDY POINT #3

Inflow Area = 30,732 sf, 14.37% Impervious, Inflow Depth = 1.15" for 2-Year event
Inflow = 0.59 cfs @ 12.27 hrs, Volume= 2,948 cf
Primary = 0.59 cfs @ 12.27 hrs, Volume= 2,948 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 E-1: Subcat E-1	Runoff Area=215,540 sf 0.86% Impervious Runoff Depth=2.37" Flow Length=530' Tc=26.5 min CN=71 Runoff=7.09 cfs 42,552 cf
Subcatchment E-2: Subcat E-2	Runoff Area=163,062 sf 1.16% Impervious Runoff Depth=2.37" Flow Length=520' Tc=15.8 min CN=71 Runoff=6.88 cfs 32,192 cf
Subcatchment E-3: Subcat E-3	Runoff Area=30,732 sf 14.37% Impervious Runoff Depth=2.63" Flow Length=75' Tc=16.9 min CN=74 Runoff=1.41 cfs 6,736 cf
Link SP1: STUDY POINT #1	Inflow=7.09 cfs 42,552 cf Primary=7.09 cfs 42,552 cf
Link SP2: STUDY POINT #2	Inflow=6.88 cfs 32,192 cf Primary=6.88 cfs 32,192 cf
Link SP3: STUDY POINT #3	Inflow=1.41 cfs 6,736 cf Primary=1.41 cfs 6,736 cf

Total Runoff Area = 409,335 sf Runoff Volume = 81,480 cf Average Runoff Depth = 2.39"
98.01% Pervious = 401,171 sf 1.99% Impervious = 8,164 sf

Summary for Subcatchment E-1: Subcat E-1

Runoff = 7.09 cfs @ 12.38 hrs, Volume= 42,552 cf, Depth= 2.37"
Routed to Link SP1 : STUDY POINT #1

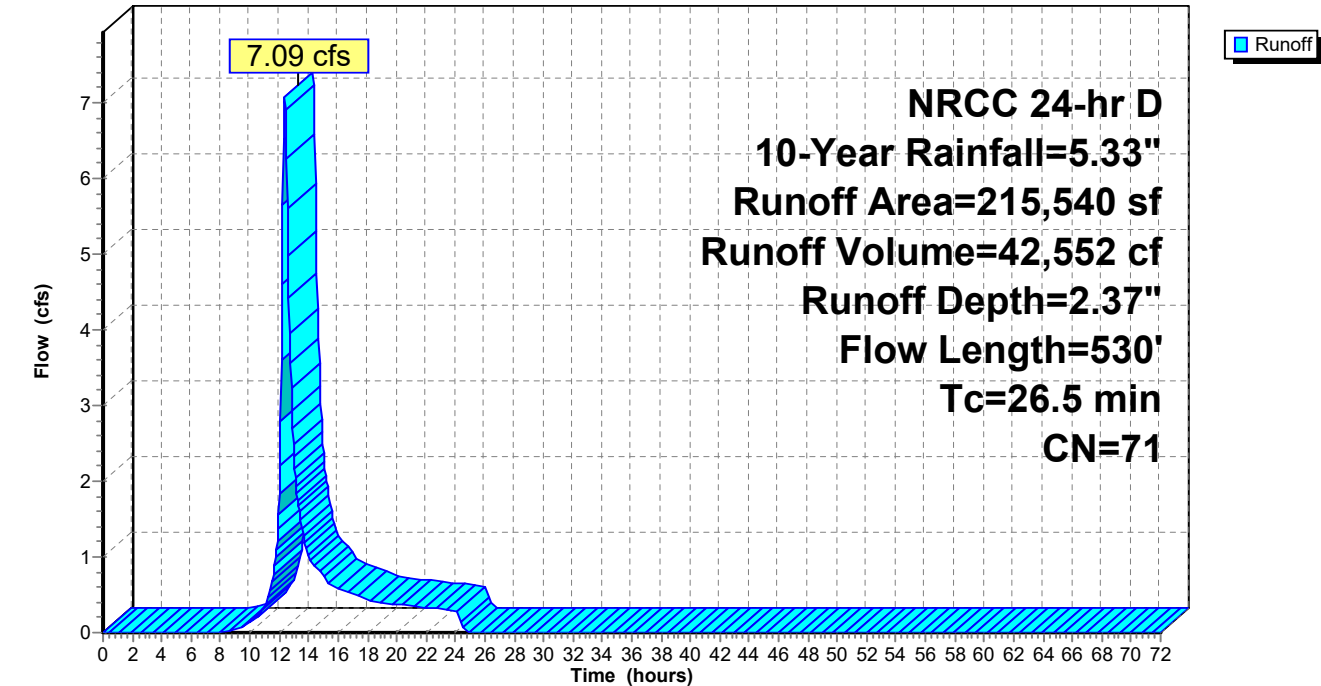
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
16,069	74	>75% Grass cover, Good, HSG C
7,940	89	Gravel roads, HSG C
545	98	Paved parking, HSG C
1,308	98	Roofs, HSG C
189,678	70	Woods, Good, HSG C
215,540	71	Weighted Average
213,687		99.14% Pervious Area
1,854		0.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	50	0.0230	0.04		Sheet Flow, A-B
					Woods: Dense underbrush n= 0.800 P2= 3.37"
6.7	480	0.0570	1.19		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
26.5	530	Total			

Subcatchment E-1: Subcat E-1

Hydrograph



Summary for Subcatchment E-2: Subcat E-2

Runoff = 6.88 cfs @ 12.25 hrs, Volume= 32,192 cf, Depth= 2.37"
Routed to Link SP2 : STUDY POINT #2

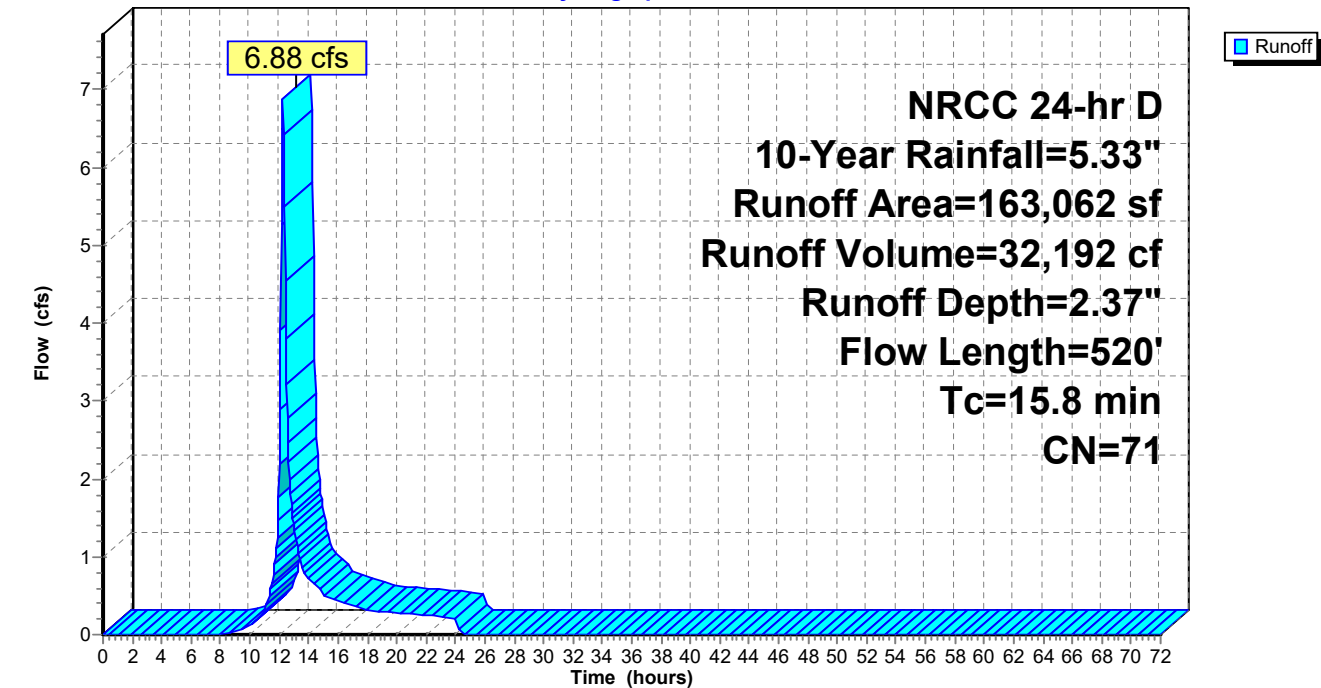
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
592	74	>75% Grass cover, Good, HSG C
3,038	87	Dirt roads, HSG C
165	98	Paved parking, HSG C
1,729	98	Roofs, HSG C
157,539	70	Woods, Good, HSG C
163,062	71	Weighted Average
161,169		98.84% Pervious Area
1,893		1.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.2100	0.10		Sheet Flow, A-B
					Woods: Dense underbrush n= 0.800 P2= 3.37"
7.6	470	0.0420	1.02		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
15.8	520	Total			

Subcatchment E-2: Subcat E-2

Hydrograph



Summary for Subcatchment E-3: Subcat E-3

Runoff = 1.41 cfs @ 12.26 hrs, Volume= 6,736 cf, Depth= 2.63"
Routed to Link SP3 : STUDY POINT #3

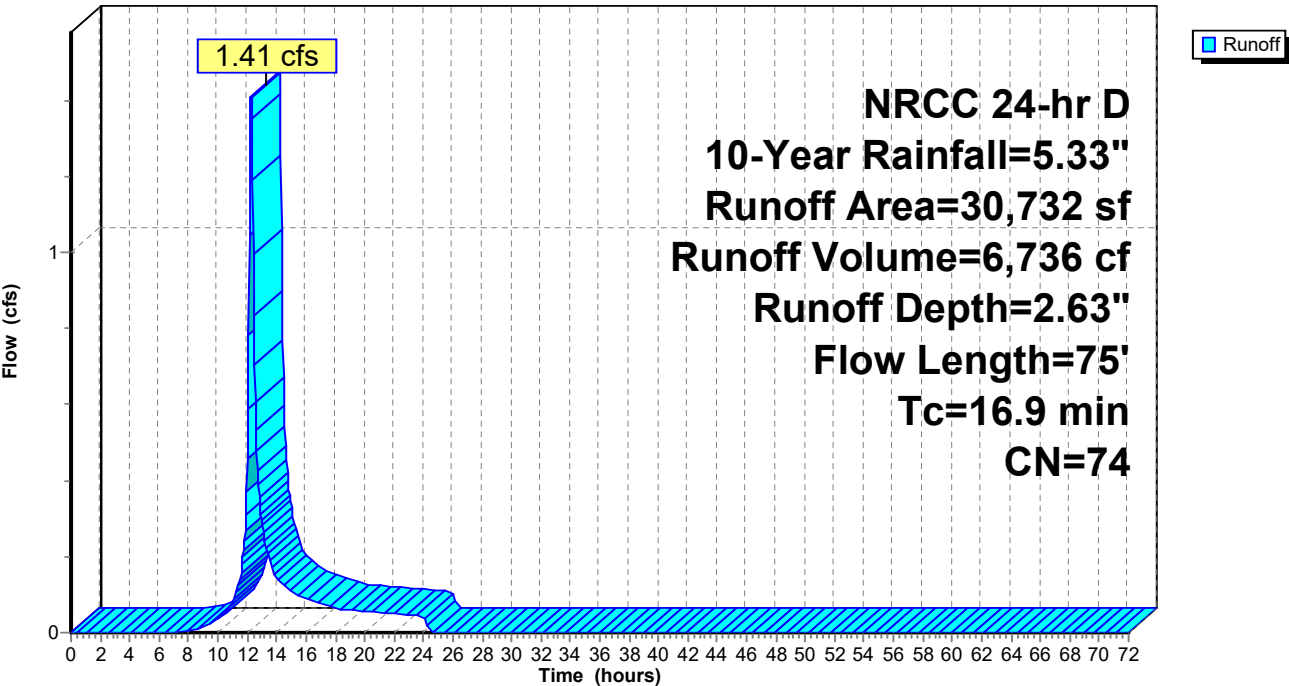
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
807	87	Dirt roads, HSG C
4,417	98	Water Surface, HSG C
25,508	70	Woods, Good, HSG C
30,732	74	Weighted Average
26,315		85.63% Pervious Area
4,417		14.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.7	50	0.0350	0.05		Sheet Flow, A-B
					Woods: Dense underbrush n= 0.800 P2= 3.37"
0.2	25	0.2200	2.35		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
16.9	75	Total			

Subcatchment E-3: Subcat E-3

Hydrograph

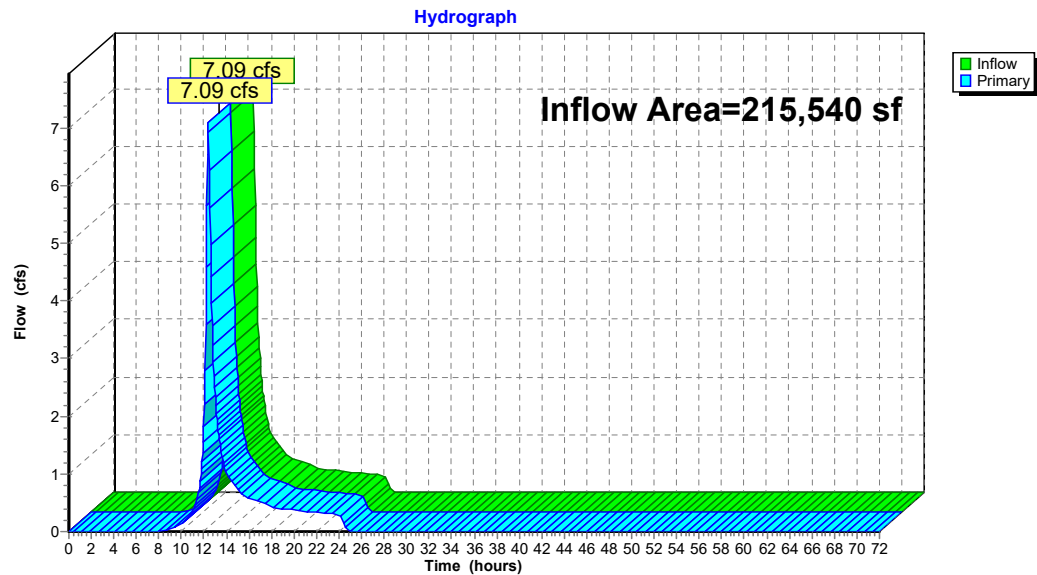


Summary for Link SP1: STUDY POINT #1

Inflow Area = 215,540 sf, 0.86% Impervious, Inflow Depth = 2.37" for 10-Year event
Inflow = 7.09 cfs @ 12.38 hrs, Volume= 42,552 cf
Primary = 7.09 cfs @ 12.38 hrs, Volume= 42,552 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP1: STUDY POINT #1

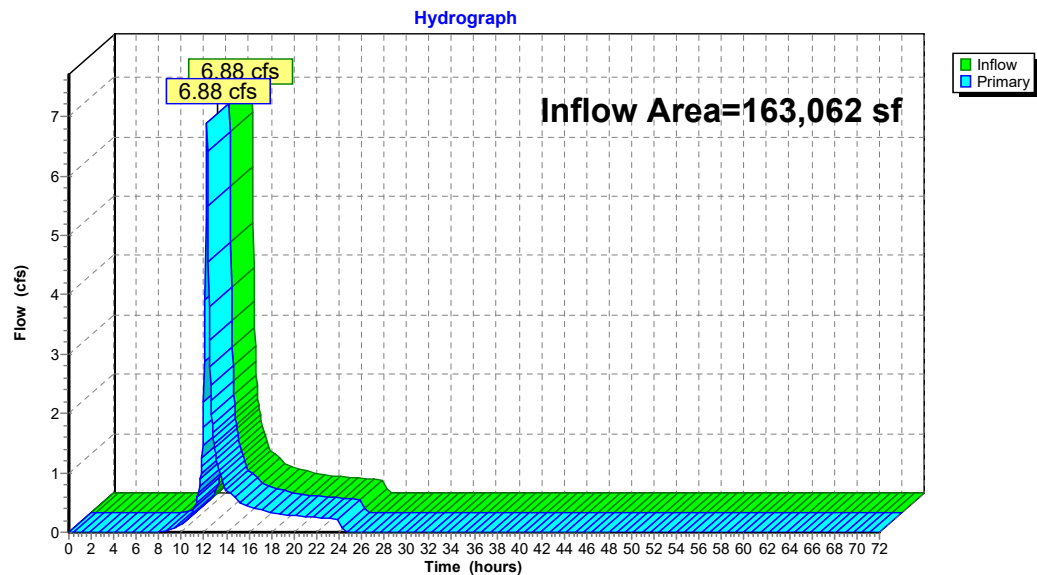


Summary for Link SP2: STUDY POINT #2

Inflow Area = 163,062 sf, 1.16% Impervious, Inflow Depth = 2.37" for 10-Year event
Inflow = 6.88 cfs @ 12.25 hrs, Volume= 32,192 cf
Primary = 6.88 cfs @ 12.25 hrs, Volume= 32,192 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

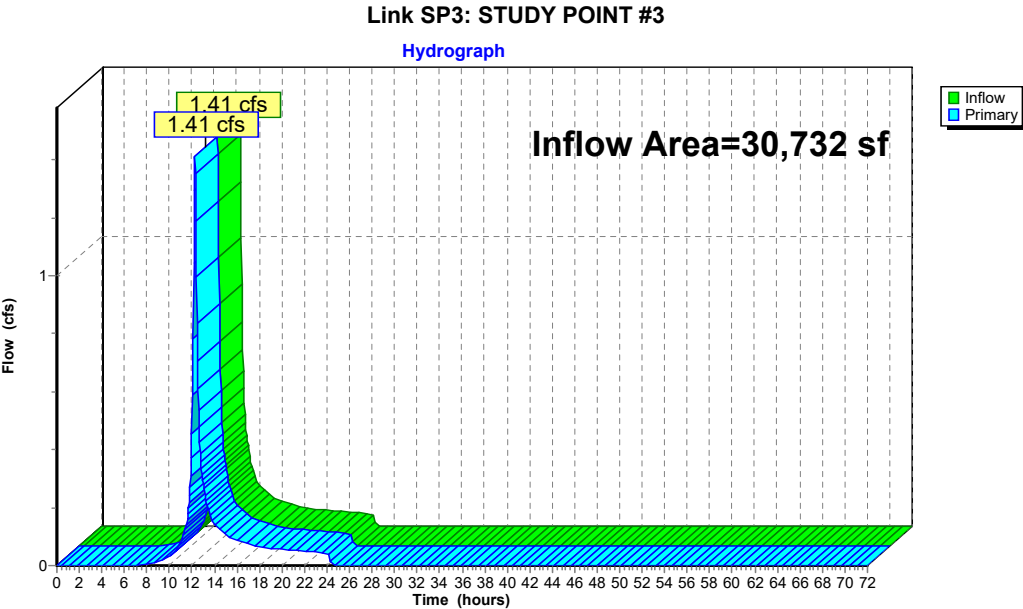
Link SP2: STUDY POINT #2



Summary for Link SP3: STUDY POINT #3

Inflow Area = 30,732 sf, 14.37% Impervious, Inflow Depth = 2.63" for 10-Year event
Inflow = 1.41 cfs @ 12.26 hrs, Volume= 6,736 cf
Primary = 1.41 cfs @ 12.26 hrs, Volume= 6,736 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 E-1: Subcat E-1	Runoff Area=215,540 sf 0.86% Impervious Runoff Depth=3.36" Flow Length=530' Tc=26.5 min CN=71 Runoff=10.13 cfs 60,283 cf
Subcatchment E-2: Subcat E-2	Runoff Area=163,062 sf 1.16% Impervious Runoff Depth=3.36" Flow Length=520' Tc=15.8 min CN=71 Runoff=9.82 cfs 45,606 cf
Subcatchment E-3: Subcat E-3	Runoff Area=30,732 sf 14.37% Impervious Runoff Depth=3.66" Flow Length=75' Tc=16.9 min CN=74 Runoff=1.96 cfs 9,376 cf
Link SP1: STUDY POINT #1	Inflow=10.13 cfs 60,283 cf Primary=10.13 cfs 60,283 cf
Link SP2: STUDY POINT #2	Inflow=9.82 cfs 45,606 cf Primary=9.82 cfs 45,606 cf
Link SP3: STUDY POINT #3	Inflow=1.96 cfs 9,376 cf Primary=1.96 cfs 9,376 cf

Total Runoff Area = 409,335 sf Runoff Volume = 115,265 cf Average Runoff Depth = 3.38"
98.01% Pervious = 401,171 sf 1.99% Impervious = 8,164 sf

Summary for Subcatchment E-1: Subcat E-1

Runoff = 10.13 cfs @ 12.38 hrs, Volume= 60,283 cf, Depth= 3.36"
Routed to Link SP1 : STUDY POINT #1

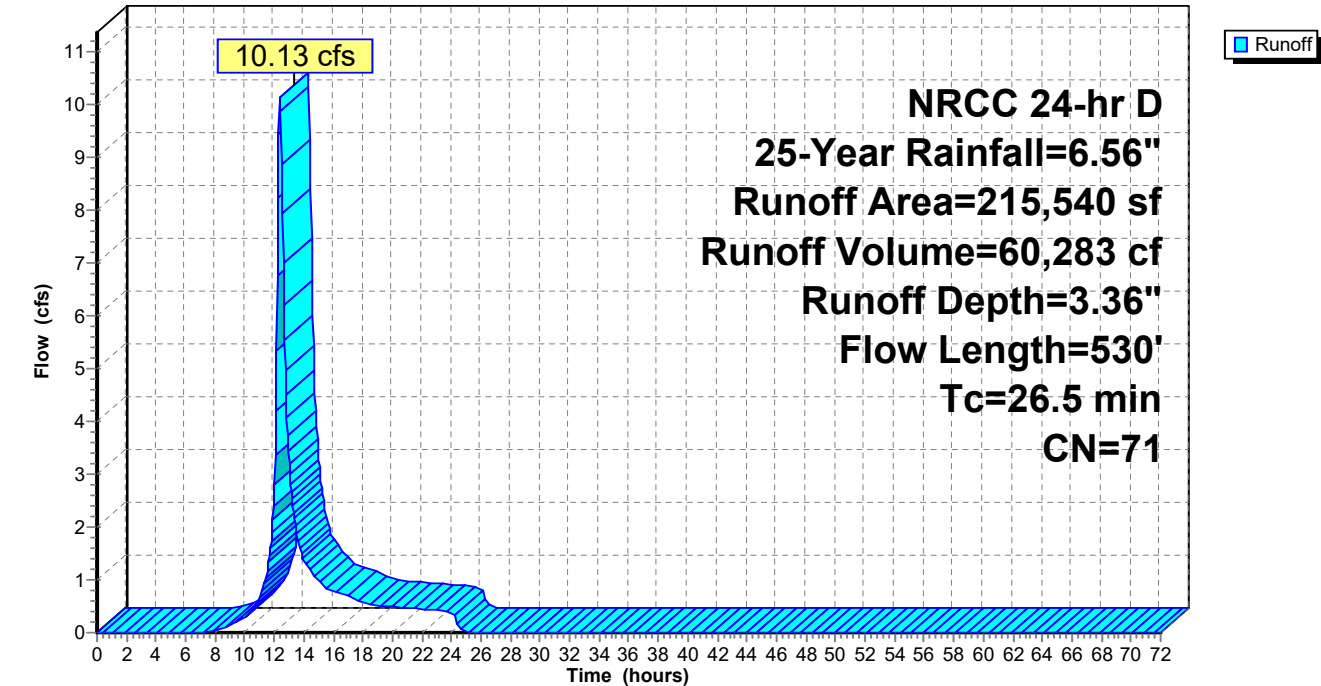
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
16,069	74	>75% Grass cover, Good, HSG C
7,940	89	Gravel roads, HSG C
545	98	Paved parking, HSG C
1,308	98	Roofs, HSG C
189,678	70	Woods, Good, HSG C
215,540	71	Weighted Average
213,687		99.14% Pervious Area
1,854		0.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	50	0.0230	0.04		Sheet Flow, A-B
					Woods: Dense underbrush n= 0.800 P2= 3.37"
6.7	480	0.0570	1.19		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
26.5	530	Total			

Subcatchment E-1: Subcat E-1

Hydrograph



Summary for Subcatchment E-2: Subcat E-2

Runoff = 9.82 cfs @ 12.25 hrs, Volume= 45,606 cf, Depth= 3.36"
Routed to Link SP2 : STUDY POINT #2

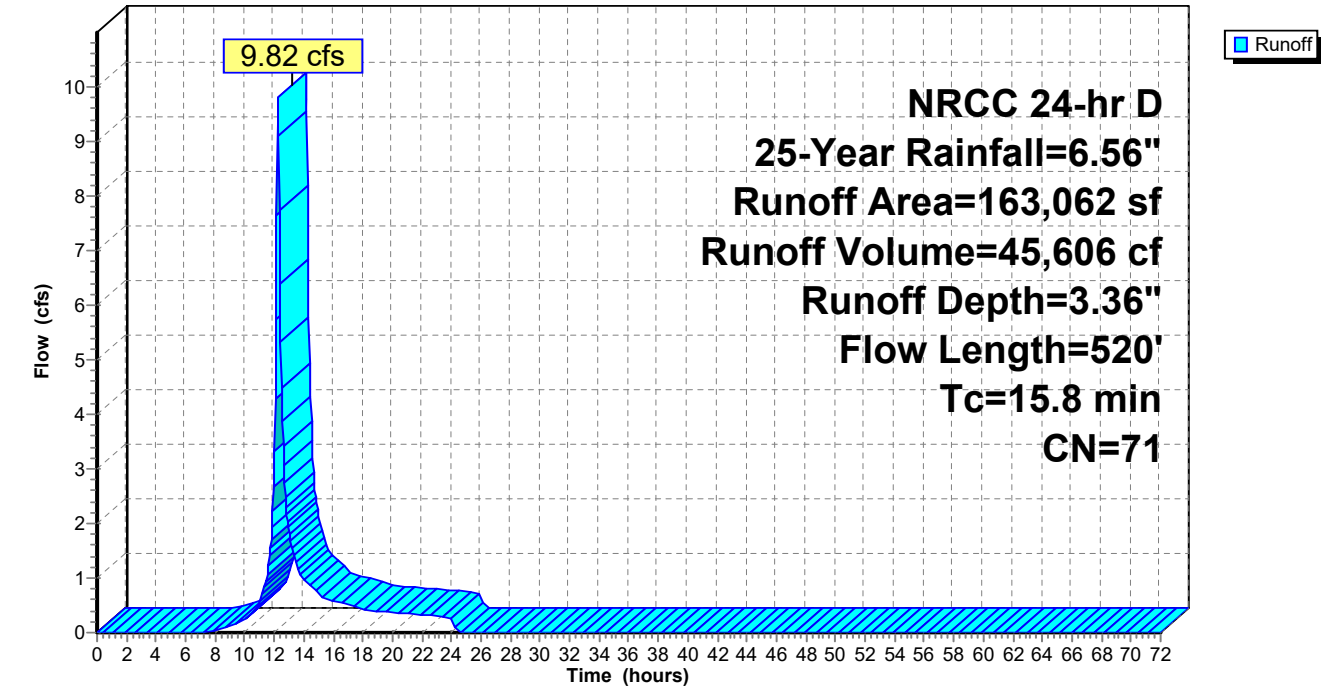
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
592	74	>75% Grass cover, Good, HSG C
3,038	87	Dirt roads, HSG C
165	98	Paved parking, HSG C
1,729	98	Roofs, HSG C
157,539	70	Woods, Good, HSG C
163,062	71	Weighted Average
161,169		98.84% Pervious Area
1,893		1.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.2100	0.10		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.37"
7.6	470	0.0420	1.02		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
15.8	520	Total			

Subcatchment E-2: Subcat E-2

Hydrograph



Summary for Subcatchment E-3: Subcat E-3

Runoff = 1.96 cfs @ 12.26 hrs, Volume= 9,376 cf, Depth= 3.66"
Routed to Link SP3 : STUDY POINT #3

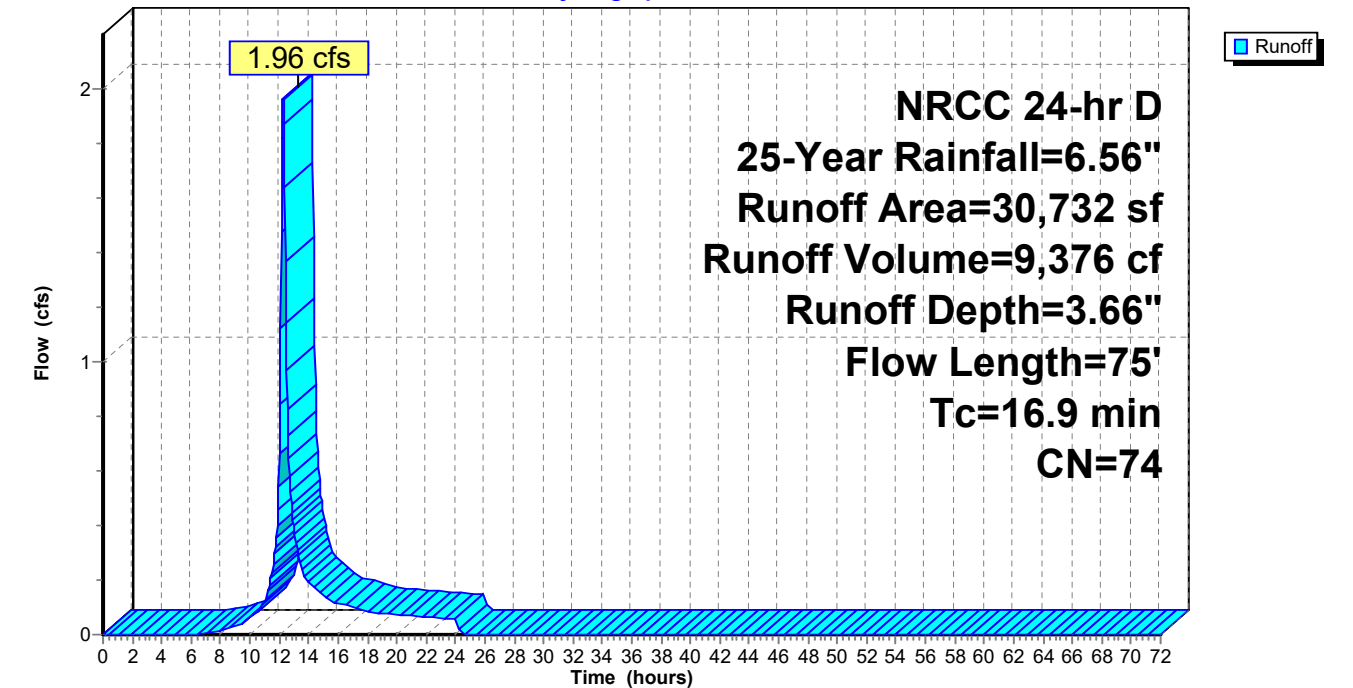
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
807	87	Dirt roads, HSG C
4,417	98	Water Surface, HSG C
25,508	70	Woods, Good, HSG C
30,732	74	Weighted Average
26,315		85.63% Pervious Area
4,417		14.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.7	50	0.0350	0.05		Sheet Flow, A-B
					Woods: Dense underbrush n= 0.800 P2= 3.37"
0.2	25	0.2200	2.35		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
16.9	75	Total			

Subcatchment E-3: Subcat E-3

Hydrograph



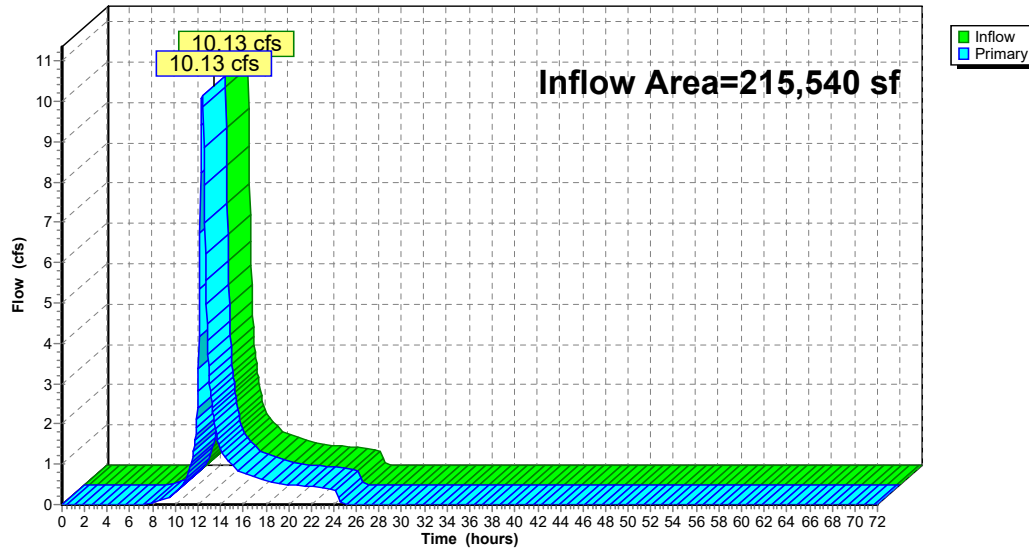
Summary for Link SP1: STUDY POINT #1

Inflow Area = 215,540 sf, 0.86% Impervious, Inflow Depth = 3.36" for 25-Year event
 Inflow = 10.13 cfs @ 12.38 hrs, Volume= 60,283 cf
 Primary = 10.13 cfs @ 12.38 hrs, Volume= 60,283 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP1: STUDY POINT #1

Hydrograph



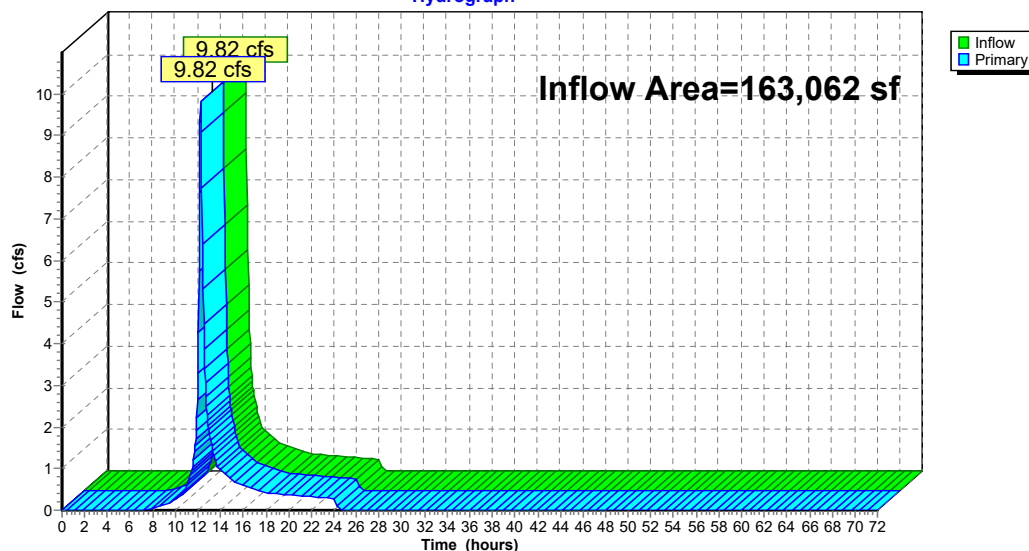
Summary for Link SP2: STUDY POINT #2

Inflow Area = 163,062 sf, 1.16% Impervious, Inflow Depth = 3.36" for 25-Year event
 Inflow = 9.82 cfs @ 12.25 hrs, Volume= 45,606 cf
 Primary = 9.82 cfs @ 12.25 hrs, Volume= 45,606 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP2: STUDY POINT #2

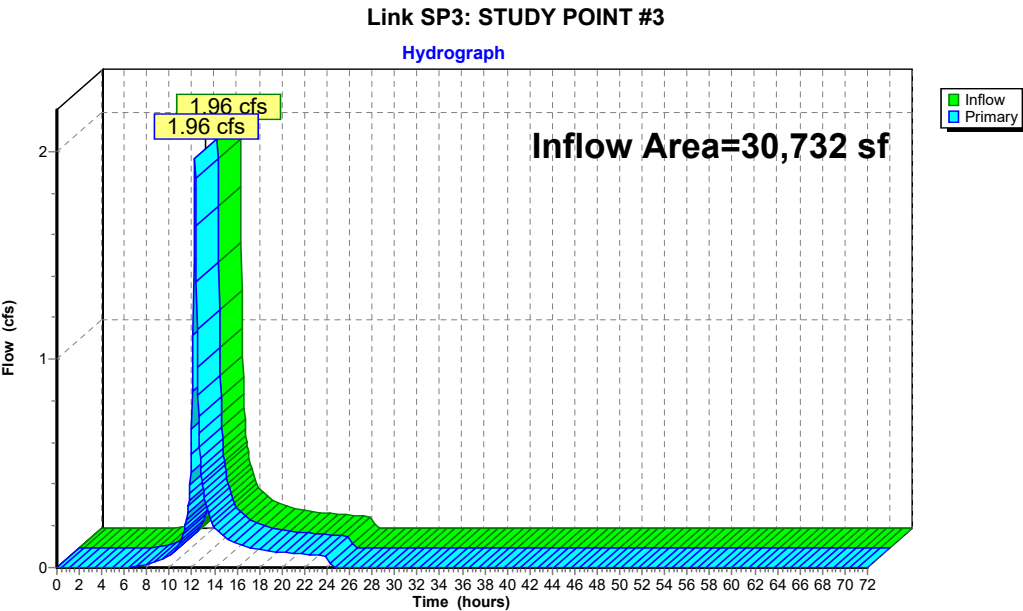
Hydrograph



Summary for Link SP3: STUDY POINT #3

Inflow Area = 30,732 sf, 14.37% Impervious, Inflow Depth = 3.66" for 25-Year event
Inflow = 1.96 cfs @ 12.26 hrs, Volume= 9,376 cf
Primary = 1.96 cfs @ 12.26 hrs, Volume= 9,376 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 E-1: Subcat E-1	Runoff Area=215,540 sf 0.86% Impervious Runoff Depth=4.97" Flow Length=530' Tc=26.5 min CN=71 Runoff=15.05 cfs 89,312 cf
Subcatchment E-2: Subcat E-2	Runoff Area=163,062 sf 1.16% Impervious Runoff Depth=4.97" Flow Length=520' Tc=15.8 min CN=71 Runoff=14.52 cfs 67,567 cf
Subcatchment E-3: Subcat E-3	Runoff Area=30,732 sf 14.37% Impervious Runoff Depth=5.33" Flow Length=75' Tc=16.9 min CN=74 Runoff=2.84 cfs 13,650 cf
Link SP1: STUDY POINT #1	Inflow=15.05 cfs 89,312 cf Primary=15.05 cfs 89,312 cf
Link SP2: STUDY POINT #2	Inflow=14.52 cfs 67,567 cf Primary=14.52 cfs 67,567 cf
Link SP3: STUDY POINT #3	Inflow=2.84 cfs 13,650 cf Primary=2.84 cfs 13,650 cf

Total Runoff Area = 409,335 sf Runoff Volume = 170,530 cf Average Runoff Depth = 5.00"
98.01% Pervious = 401,171 sf 1.99% Impervious = 8,164 sf

Summary for Subcatchment E-1: Subcat E-1

Runoff = 15.05 cfs @ 12.37 hrs, Volume= 89,312 cf, Depth= 4.97"
Routed to Link SP1 : STUDY POINT #1

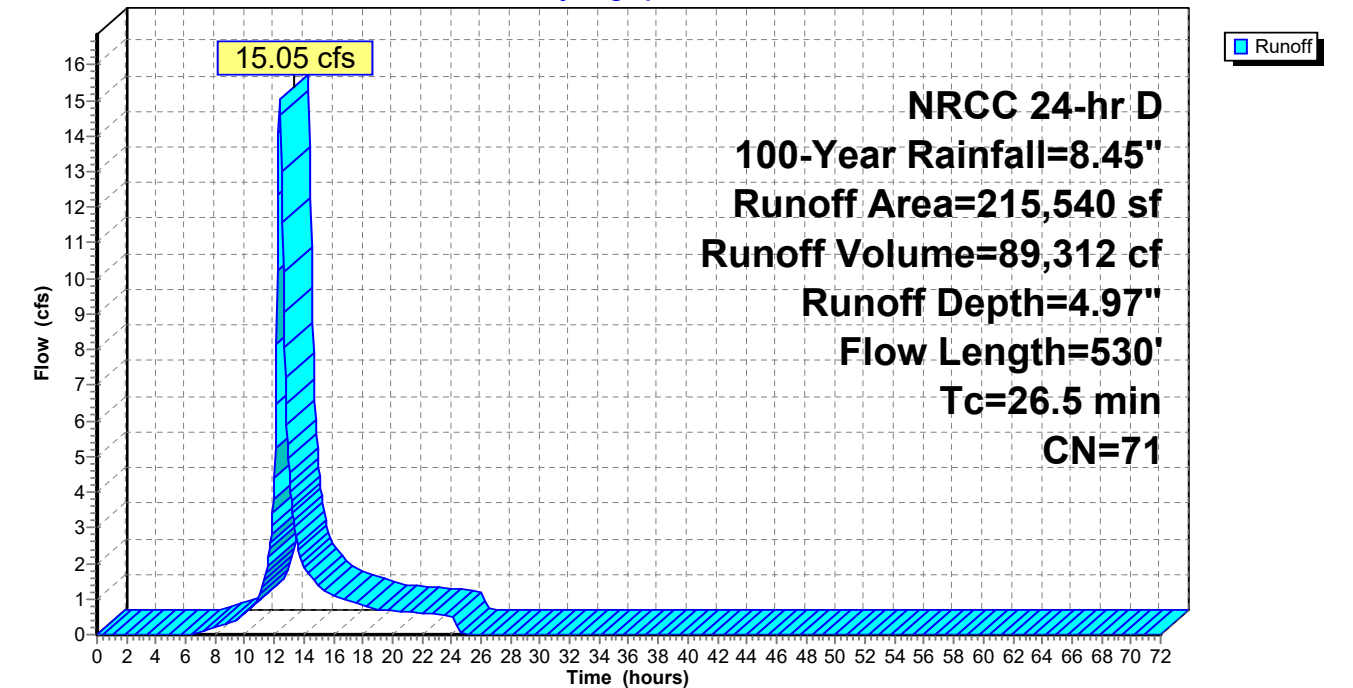
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
16,069	74	>75% Grass cover, Good, HSG C
7,940	89	Gravel roads, HSG C
545	98	Paved parking, HSG C
1,308	98	Roofs, HSG C
189,678	70	Woods, Good, HSG C
215,540	71	Weighted Average
213,687		99.14% Pervious Area
1,854		0.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	50	0.0230	0.04		Sheet Flow, A-B
					Woods: Dense underbrush n= 0.800 P2= 3.37"
6.7	480	0.0570	1.19		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
26.5	530	Total			

Subcatchment E-1: Subcat E-1

Hydrograph



Summary for Subcatchment E-2: Subcat E-2

Runoff = 14.52 cfs @ 12.24 hrs, Volume= 67,567 cf, Depth= 4.97"
Routed to Link SP2 : STUDY POINT #2

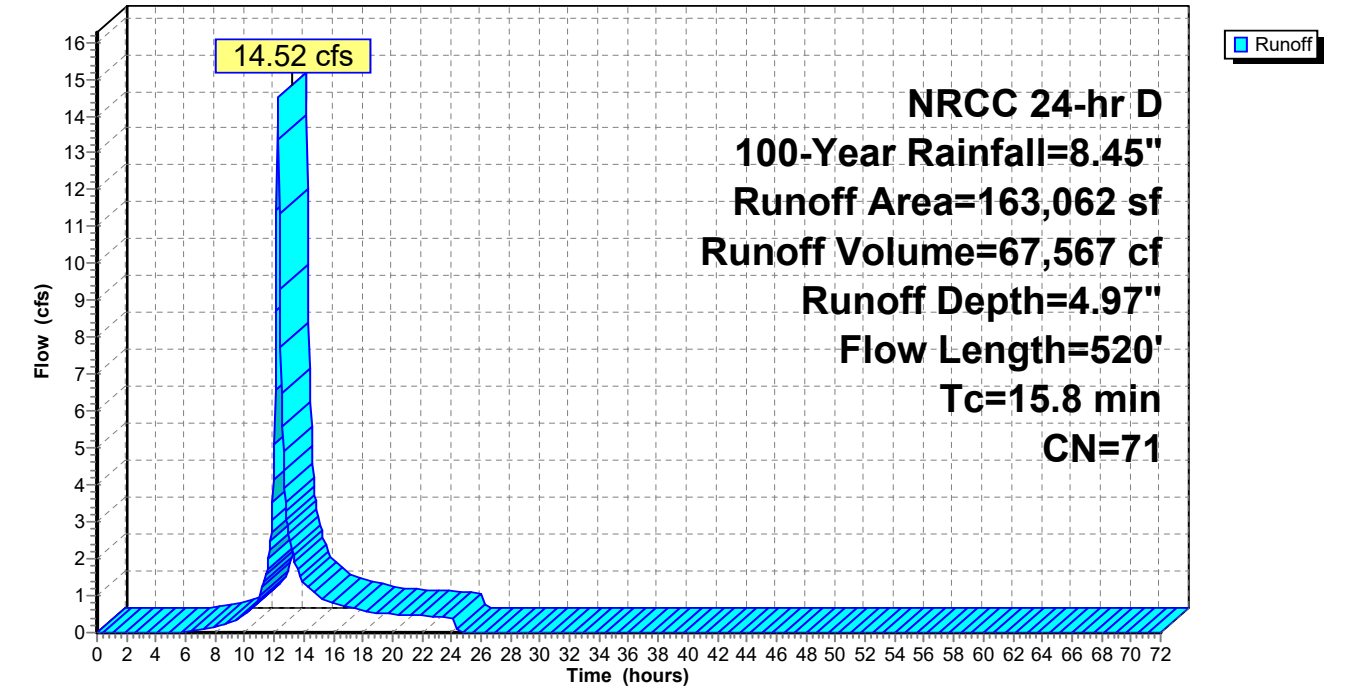
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
592	74	>75% Grass cover, Good, HSG C
3,038	87	Dirt roads, HSG C
165	98	Paved parking, HSG C
1,729	98	Roofs, HSG C
157,539	70	Woods, Good, HSG C
163,062	71	Weighted Average
161,169		98.84% Pervious Area
1,893		1.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.2100	0.10		Sheet Flow, A-B
					Woods: Dense underbrush n= 0.800 P2= 3.37"
7.6	470	0.0420	1.02		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
15.8	520	Total			

Subcatchment E-2: Subcat E-2

Hydrograph



Summary for Subcatchment E-3: Subcat E-3

Runoff = 2.84 cfs @ 12.25 hrs, Volume= 13,650 cf, Depth= 5.33"
Routed to Link SP3 : STUDY POINT #3

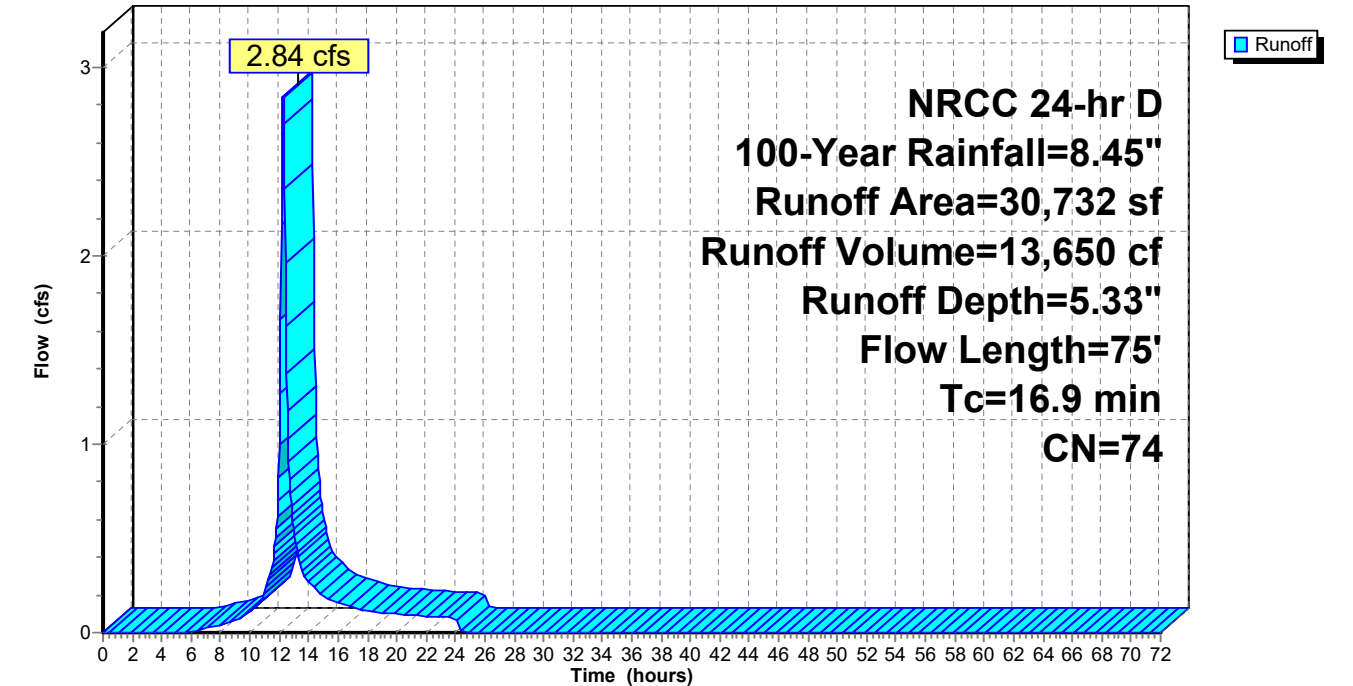
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
807	87	Dirt roads, HSG C
4,417	98	Water Surface, HSG C
25,508	70	Woods, Good, HSG C
30,732	74	Weighted Average
26,315		85.63% Pervious Area
4,417		14.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.7	50	0.0350	0.05		Sheet Flow, A-B
					Woods: Dense underbrush n= 0.800 P2= 3.37"
0.2	25	0.2200	2.35		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
16.9	75	Total			

Subcatchment E-3: Subcat E-3

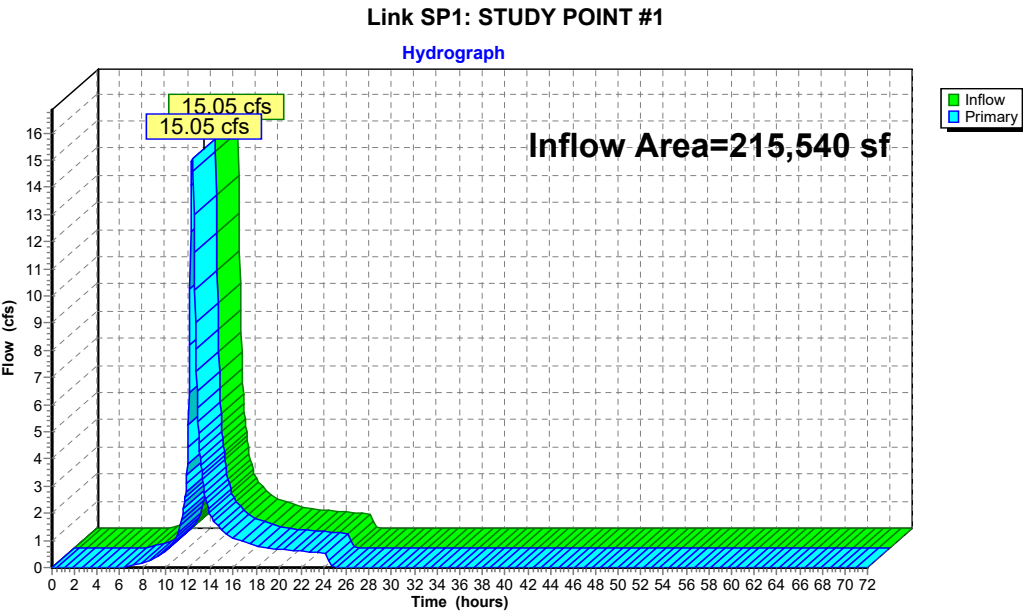
Hydrograph



Summary for Link SP1: STUDY POINT #1

Inflow Area = 215,540 sf, 0.86% Impervious, Inflow Depth = 4.97" for 100-Year event
Inflow = 15.05 cfs @ 12.37 hrs, Volume= 89,312 cf
Primary = 15.05 cfs @ 12.37 hrs, Volume= 89,312 cf, Atten= 0%, Lag= 0.0 min

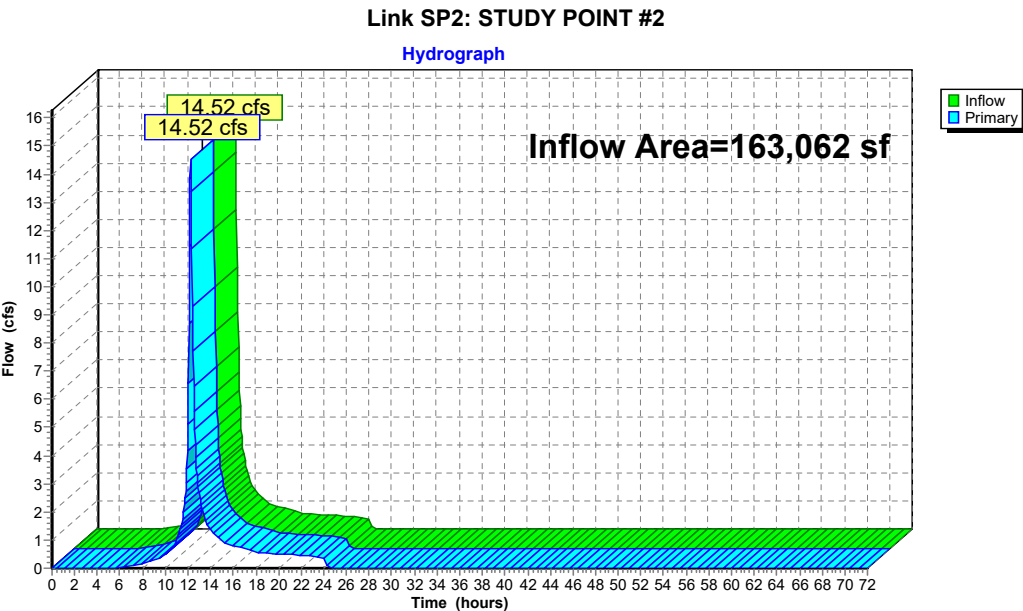
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



Summary for Link SP2: STUDY POINT #2

Inflow Area = 163,062 sf, 1.16% Impervious, Inflow Depth = 4.97" for 100-Year event
Inflow = 14.52 cfs @ 12.24 hrs, Volume= 67,567 cf
Primary = 14.52 cfs @ 12.24 hrs, Volume= 67,567 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

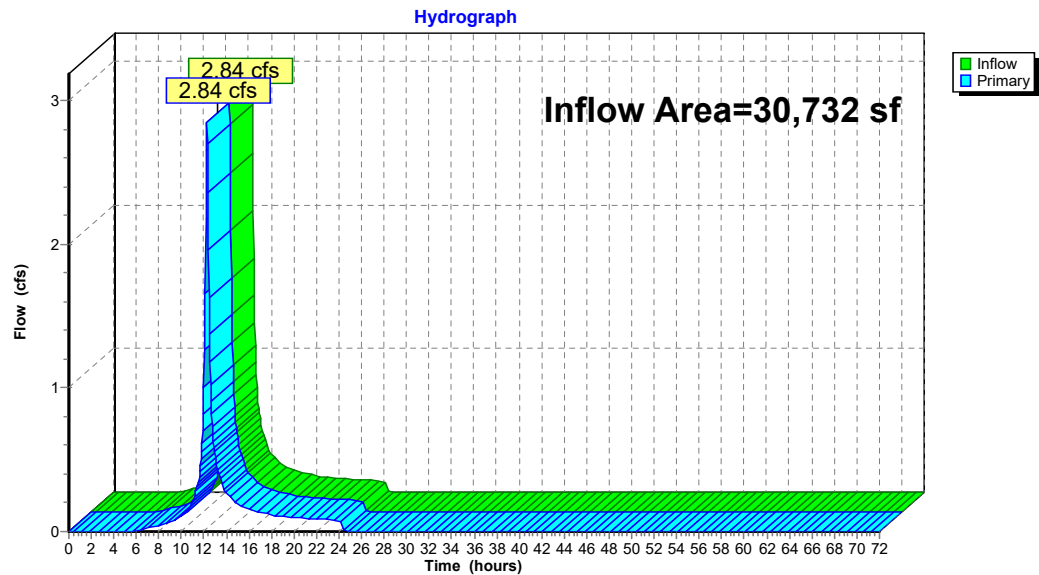


Summary for Link SP3: STUDY POINT #3

Inflow Area = 30,732 sf, 14.37% Impervious, Inflow Depth = 5.33" for 100-Year event
Inflow = 2.84 cfs @ 12.25 hrs, Volume= 13,650 cf
Primary = 2.84 cfs @ 12.25 hrs, Volume= 13,650 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP3: STUDY POINT #3



Events for Subcatchment E-1: Subcat E-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	2.74	17,639	0.98
10-Year	5.33	7.09	42,552	2.37
25-Year	6.56	10.13	60,283	3.36
100-Year	8.45	15.05	89,312	4.97

3410-03 - Existing HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 47

Events for Subcatchment E-2: Subcat E-2

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	2.68	13,344	0.98
10-Year	5.33	6.88	32,192	2.37
25-Year	6.56	9.82	45,606	3.36
100-Year	8.45	14.52	67,567	4.97

3410-03 - Existing HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 48

Events for Subcatchment E-3: Subcat E-3

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.59	2,948	1.15
10-Year	5.33	1.41	6,736	2.63
25-Year	6.56	1.96	9,376	3.66
100-Year	8.45	2.84	13,650	5.33

3410-03 - Existing HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 49

Events for Link SP1: STUDY POINT #1

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-Year	2.74	2.74	0.00
10-Year	7.09	7.09	0.00
25-Year	10.13	10.13	0.00
100-Year	15.05	15.05	0.00

3410-03 - Existing HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 50

Events for Link SP2: STUDY POINT #2

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-Year	2.68	2.68	0.00
10-Year	6.88	6.88	0.00
25-Year	9.82	9.82	0.00
100-Year	14.52	14.52	0.00

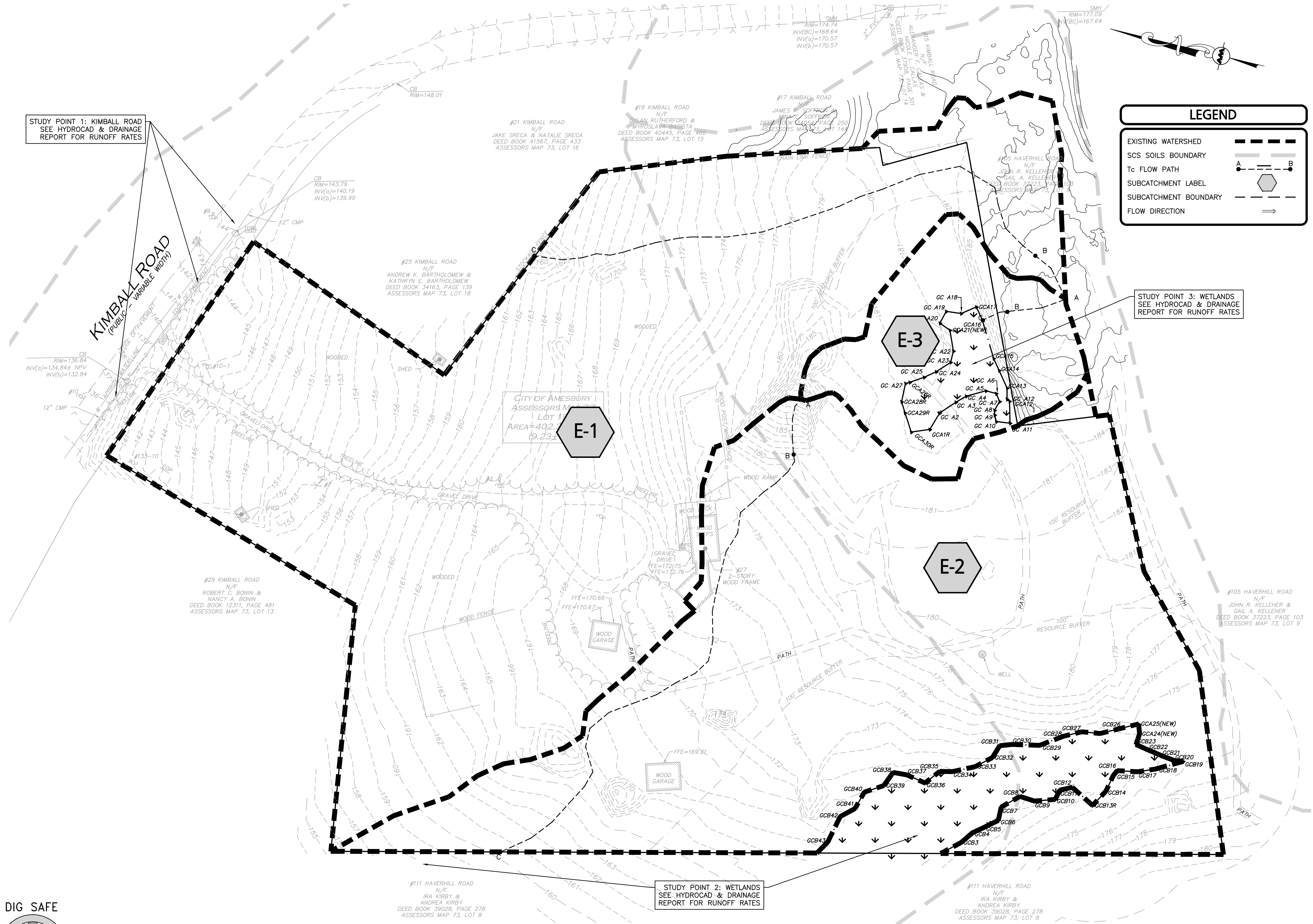
3410-03 - Existing HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Events for Link SP3: STUDY POINT #3

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-Year	0.59	0.59	0.00
10-Year	1.41	1.41	0.00
25-Year	1.96	1.96	0.00
100-Year	2.84	2.84	0.00

N:\PROJECTS\3410-03\CIVIL\DRAWINGS\CURRENT\C-3410-03_WATERSHED-EXISTING.DWG



PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION
1	06/01/26	VARIOUS REVISION

APPLICANT:
MP PROPERTIES IV, LLC
201 WASHINGTON STREET, SUITE 2100
BOSTON, MA 02108

PROJECT:
27 KIMBALL ROAD
AMESBURY, MA

PROJECT NO.	3410-03	DATE:	01-26-2026
SCALE:	1" = 40'	DWG. NAME:	C-3410-03
DESIGNED BY:	BDP/CB	CHECKED BY:	CMQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering • land surveying
environmental consulting • landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOUBURN MA 01801
TEL: (781) 935-6889
FAX: (781) 935-2896

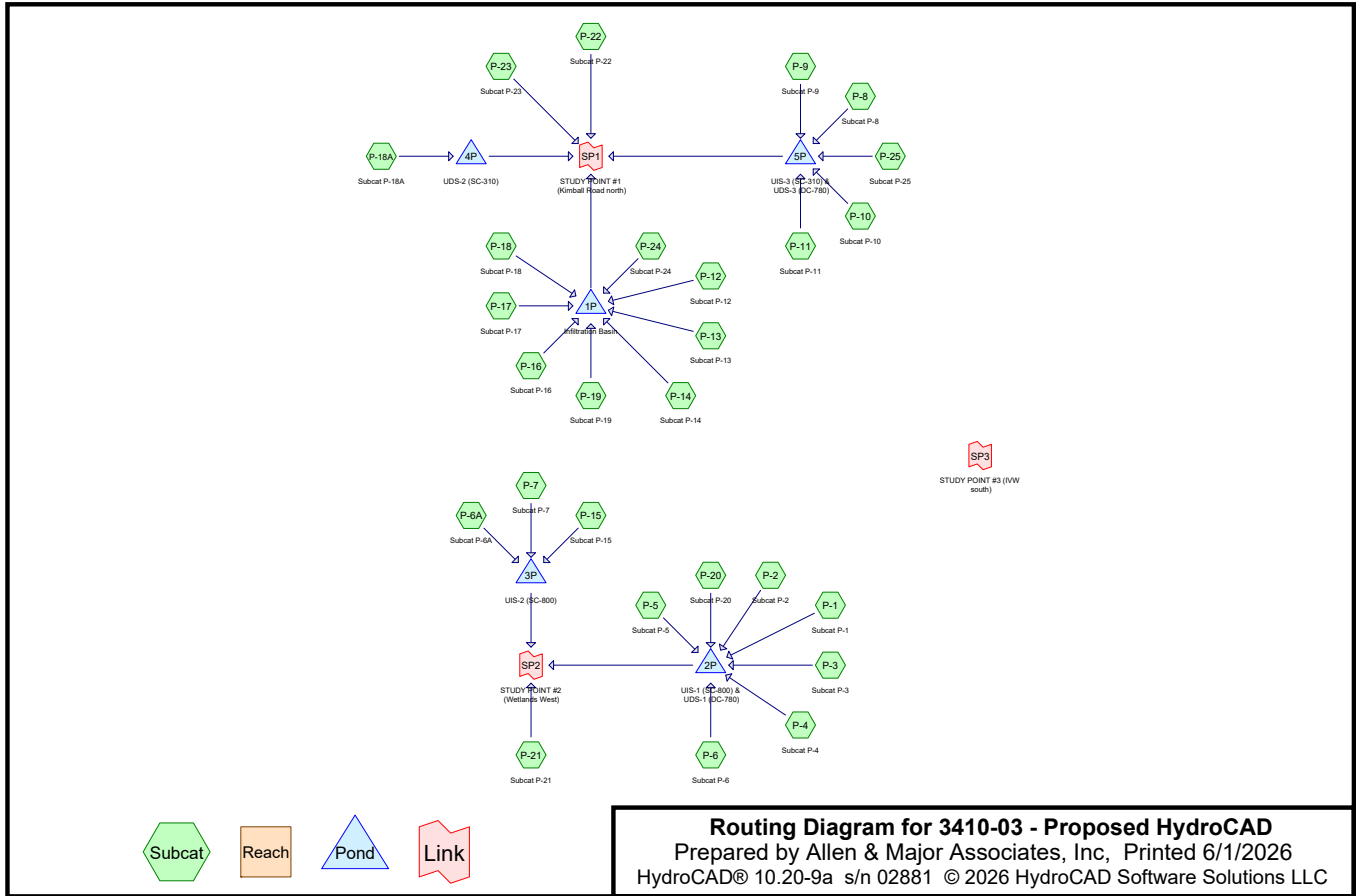
THIS DRAWING HAS BEEN PREPARED IN DIGITAL FORMAT. CLIENT/CUSTOMER'S REPRESENTATIVE OR CONSULTANTS MAY BE PROVIDED COPIES OF DRAWINGS AND SPECIFICATIONS FOR HIS/HER INFORMATION AND/OR SPECIFIC USE ON THIS PROJECT. DUE TO THE POTENTIAL THAT THE PROVIDED INFORMATION MAY BE MODIFIED UNINTENTIONALLY OR OTHERWISE, ALLEN & MAJOR ASSOCIATES, INC. MAY REMOVE ALL INDICATION OF THE DOCUMENT'S AUTHORSHIP ON THE DIGITAL MEDIA. PRINTED REPRESENTATIONS OR PORTABLE DOCUMENT FORMAT OF THE DRAWINGS AND SPECIFICATIONS ISSUED SHALL BE THE ONLY RECORD COPIES OF ALLEN & MAJOR ASSOCIATES, INC.'S WORK PRODUCT.

DRAWING TITLE:	SHEET No.
EXISTING WATERSHED PLAN	EWS

Copyright © 2026 Allen & Major Associates, Inc.
All Rights Reserved



**SECTION 5.0 -
PROPOSED DRAINAGE
ANALYSIS**



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Printed 6/1/2026

Page 2

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NRCC 24-hr	D	Default	24.00	1	3.37	2
2	10-Year	NRCC 24-hr	D	Default	24.00	1	5.33	2
3	25-Year	NRCC 24-hr	D	Default	24.00	1	6.56	2
4	100-Year	NRCC 24-hr	D	Default	24.00	1	8.45	2

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Printed 6/1/2026

Page 3

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
148,527	74	>75% Grass cover, Good, HSG C (P-1, P-10, P-11, P-12, P-13, P-14, P-15, P-16, P-17, P-18, P-18A, P-19, P-2, P-20, P-21, P-22, P-23, P-24, P-25, P-3, P-4, P-5, P-6, P-6A, P-7, P-8, P-9)
105,753	98	Paved parking, HSG C (P-1, P-10, P-11, P-12, P-13, P-14, P-15, P-16, P-17, P-18, P-18A, P-19, P-2, P-20, P-22, P-25, P-3, P-4, P-5, P-6, P-6A, P-7, P-8, P-9)
68,229	98	Roofs, HSG C (P-1, P-10, P-11, P-12, P-13, P-15, P-16, P-17, P-19, P-2, P-20, P-21, P-22, P-25, P-3, P-6, P-6A, P-7, P-8, P-9)
7,291	98	Water Surface, HSG C (P-24)
79,535	70	Woods, Good, HSG C (P-21, P-22, P-23, P-25)
409,335	84	TOTAL AREA

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Printed 6/1/2026

Page 4

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
409,335	HSG C	P-1, P-10, P-11, P-12, P-13, P-14, P-15, P-16, P-17, P-18, P-18A, P-19, P-2, P-20, P-21, P-22, P-23, P-24, P-25, P-3, P-4, P-5, P-6, P-6A, P-7, P-8, P-9
0	HSG D	
0	Other	
409,335		TOTAL AREA

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Printed 6/1/2026

Page 5

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
0	0	148,527	0	0	148,527	>75% Grass cover, Good	P-1, P-10, P-11, P-12, P-13, P-14, P-15, P-16, P-17, P-18, P-18A, P-19, P-2, P-20, P-21, P-22, P-23, P-24, P-25, P-3, P-4, P-5, P-6, P-6A, P-7, P-8, P-9
0	0	105,753	0	0	105,753	Paved parking	P-1, P-10, P-11, P-12, P-13, P-14, P-15, P-16, P-17, P-18, P-18A, P-19, P-2, P-20, P-22, P-25, P-3, P-4, P-5, P-6, P-6A, P-7, P-8, P-9
0	0	68,229	0	0	68,229	Roofs	P-1, P-10, P-11, P-12, P-13, P-15, P-16, P-17, P-19, P-2, P-20, P-21, P-22, P-25, P-3, P-6, P-6A, P-7, P-8, P-9
0	0	7,291	0	0	7,291	Water Surface	P-24
0	0	79,535	0	0	79,535	Woods, Good	P-21, P-22, P-23, P-25
0	0	409,335	0	0	409,335	TOTAL AREA	

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Printed 6/1/2026

Page 6

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	1P	142.50	141.33	17.8	0.0657	0.013	0.0	12.0	0.0	Infiltration Basin
2	2P	168.00	161.60	124.0	0.0516	0.013	0.0	12.0	0.0	UIS-1 (SC-800) & UDS-1 (DC-780)
3	3P	161.25	161.00	9.0	0.0278	0.013	0.0	12.0	0.0	UIS-2 (SC-800)
4	4P	133.50	132.84	33.0	0.0200	0.013	0.0	12.0	0.0	UDS-2 (SC-310)
5	5P	164.00	160.32	92.0	0.0400	0.013	0.0	12.0	0.0	UIS-3 (SC-310) & UDS-3 (DC-780)

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 7

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 P-1: Subcat P-1	Runoff Area=14,876 sf 72.61% Impervious Runoff Depth=2.42" Tc=6.0 min CN=91 Runoff=0.86 cfs 2,998 cf
Subcatchment P-10: Subcat P-10	Runoff Area=8,341 sf 78.96% Impervious Runoff Depth=2.61" Tc=6.0 min CN=93 Runoff=0.51 cfs 1,814 cf
Subcatchment P-11: Subcat P-11	Runoff Area=8,941 sf 76.40% Impervious Runoff Depth=2.51" Tc=6.0 min CN=92 Runoff=0.53 cfs 1,872 cf
Subcatchment P-12: Subcat P-12	Runoff Area=19,709 sf 57.44% Impervious Runoff Depth=2.15" Tc=6.0 min CN=88 Runoff=1.03 cfs 3,532 cf
Subcatchment P-13: Subcat P-13	Runoff Area=10,271 sf 79.93% Impervious Runoff Depth=2.61" Tc=6.0 min CN=93 Runoff=0.63 cfs 2,233 cf
Subcatchment P-14: Subcat P-14	Runoff Area=7,633 sf 64.61% Impervious Runoff Depth=2.33" Tc=6.0 min CN=90 Runoff=0.43 cfs 1,480 cf
Subcatchment P-15: Subcat P-15	Runoff Area=14,623 sf 52.15% Impervious Runoff Depth=2.07" Tc=6.0 min CN=87 Runoff=0.74 cfs 2,518 cf
Subcatchment P-16: Subcat P-16	Runoff Area=13,061 sf 79.56% Impervious Runoff Depth=2.61" Tc=6.0 min CN=93 Runoff=0.80 cfs 2,840 cf
Subcatchment P-17: Subcat P-17	Runoff Area=10,295 sf 68.44% Impervious Runoff Depth=2.33" Tc=6.0 min CN=90 Runoff=0.58 cfs 1,996 cf
Subcatchment P-18: Subcat P-18	Runoff Area=6,252 sf 71.75% Impervious Runoff Depth=2.42" Tc=6.0 min CN=91 Runoff=0.36 cfs 1,260 cf
Subcatchment P-18A: Subcat P-18A	Runoff Area=7,417 sf 51.89% Impervious Runoff Depth=1.98" Tc=6.0 min CN=86 Runoff=0.36 cfs 1,226 cf

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 8

Subcatchment P-19: Subcat P-19	Runoff Area=21,732 sf 51.13% Impervious Runoff Depth=1.98" Tc=6.0 min CN=86 Runoff=1.06 cfs 3,593 cf
Subcatchment P-2: Subcat P-2	Runoff Area=8,672 sf 75.35% Impervious Runoff Depth=2.51" Tc=6.0 min CN=92 Runoff=0.52 cfs 1,816 cf
Subcatchment P-20: Subcat P-20	Runoff Area=41,652 sf 45.57% Impervious Runoff Depth=1.90" Tc=6.0 min CN=85 Runoff=1.95 cfs 6,608 cf
Subcatchment P-21: Subcat P-21	Runoff Area=56,094 sf 0.01% Impervious Runoff Depth=0.98" Tc=6.0 min CN=71 Runoff=1.30 cfs 4,591 cf
Subcatchment P-22: Subcat P-22	Runoff Area=31,338 sf 0.00% Impervious Runoff Depth=1.04" Tc=6.0 min CN=72 Runoff=0.78 cfs 2,708 cf
Subcatchment P-23: Subcat P-23	Runoff Area=14,063 sf 0.00% Impervious Runoff Depth=1.04" Tc=6.0 min CN=72 Runoff=0.35 cfs 1,215 cf
Subcatchment P-24: Subcat P-24	Runoff Area=21,686 sf 33.62% Impervious Runoff Depth=1.68" Tc=6.0 min CN=82 Runoff=0.90 cfs 3,029 cf
Subcatchment P-25: Subcat P-25	Runoff Area=19,846 sf 0.02% Impervious Runoff Depth=0.98" Tc=6.0 min CN=71 Runoff=0.46 cfs 1,624 cf
Subcatchment P-3: Subcat P-3	Runoff Area=10,249 sf 79.91% Impervious Runoff Depth=2.61" Tc=6.0 min CN=93 Runoff=0.63 cfs 2,229 cf
Subcatchment P-4: Subcat P-4	Runoff Area=12,573 sf 84.83% Impervious Runoff Depth=2.71" Tc=6.0 min CN=94 Runoff=0.79 cfs 2,838 cf
Subcatchment P-5: Subcat P-5	Runoff Area=5,504 sf 81.03% Impervious Runoff Depth=2.61" Tc=6.0 min CN=93 Runoff=0.34 cfs 1,197 cf
Subcatchment P-6: Subcat P-6	Runoff Area=9,128 sf 59.53% Impervious Runoff Depth=2.15" Tc=6.0 min CN=88 Runoff=0.48 cfs 1,636 cf

Subcatchment P-6A: Subcat P-6A	Runoff Area=8,474 sf 69.12% Impervious Runoff Depth=2.42" Tc=6.0 min CN=91 Runoff=0.49 cfs 1,708 cf
Subcatchment P-7: Subcat P-7	Runoff Area=9,413 sf 77.70% Impervious Runoff Depth=2.61" Tc=6.0 min CN=93 Runoff=0.58 cfs 2,047 cf
Subcatchment P-8: Subcat P-8	Runoff Area=9,310 sf 71.77% Impervious Runoff Depth=2.42" Tc=6.0 min CN=91 Runoff=0.54 cfs 1,876 cf
Subcatchment P-9: Subcat P-9	Runoff Area=8,180 sf 81.46% Impervious Runoff Depth=2.71" Tc=6.0 min CN=94 Runoff=0.51 cfs 1,847 cf
Pond 1P: Infiltration Basin	Peak Elev=144.24' Storage=10,827 cf Inflow=5.78 cfs 19,962 cf Discarded=0.12 cfs 16,247 cf Primary=0.24 cfs 3,715 cf Outflow=0.36 cfs 19,962 cf
Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)	Peak Elev=168.00' Storage=10,933 cf Inflow=5.56 cfs 19,321 cf Discarded=0.15 cfs 19,321 cf Primary=0.00 cfs 0 cf Outflow=0.15 cfs 19,321 cf
Pond 3P: UIS-2 (SC-800)	Peak Elev=161.53' Storage=2,292 cf Inflow=1.80 cfs 6,272 cf Discarded=0.06 cfs 4,728 cf Primary=0.25 cfs 1,544 cf Outflow=0.31 cfs 6,272 cf
Pond 4P: UDS-2 (SC-310)	Peak Elev=133.94' Storage=66 cf Inflow=0.36 cfs 1,226 cf Outflow=0.32 cfs 1,226 cf
Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)	Peak Elev=165.06' Storage=3,576 cf Inflow=2.55 cfs 9,033 cf Discarded=0.06 cfs 6,206 cf Primary=0.25 cfs 2,827 cf Outflow=0.31 cfs 9,033 cf
Link SP1: STUDY POINT #1 (Kimball Road north)	Inflow=1.43 cfs 11,691 cf Primary=1.43 cfs 11,691 cf
Link SP2: STUDY POINT #2 (Wetlands West)	Inflow=1.30 cfs 6,134 cf Primary=1.30 cfs 6,134 cf
Link SP3: STUDY POINT #3 (IVW south)	Primary=0.00 cfs 0 cf

Total Runoff Area = 409,335 sf Runoff Volume = 64,327 cf Average Runoff Depth = 1.89"
55.72% Pervious = 228,062 sf 44.28% Impervious = 181,273 sf

Summary for Subcatchment P-1: Subcat P-1

Runoff = 0.86 cfs @ 12.13 hrs, Volume= 2,998 cf, Depth= 2.42"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

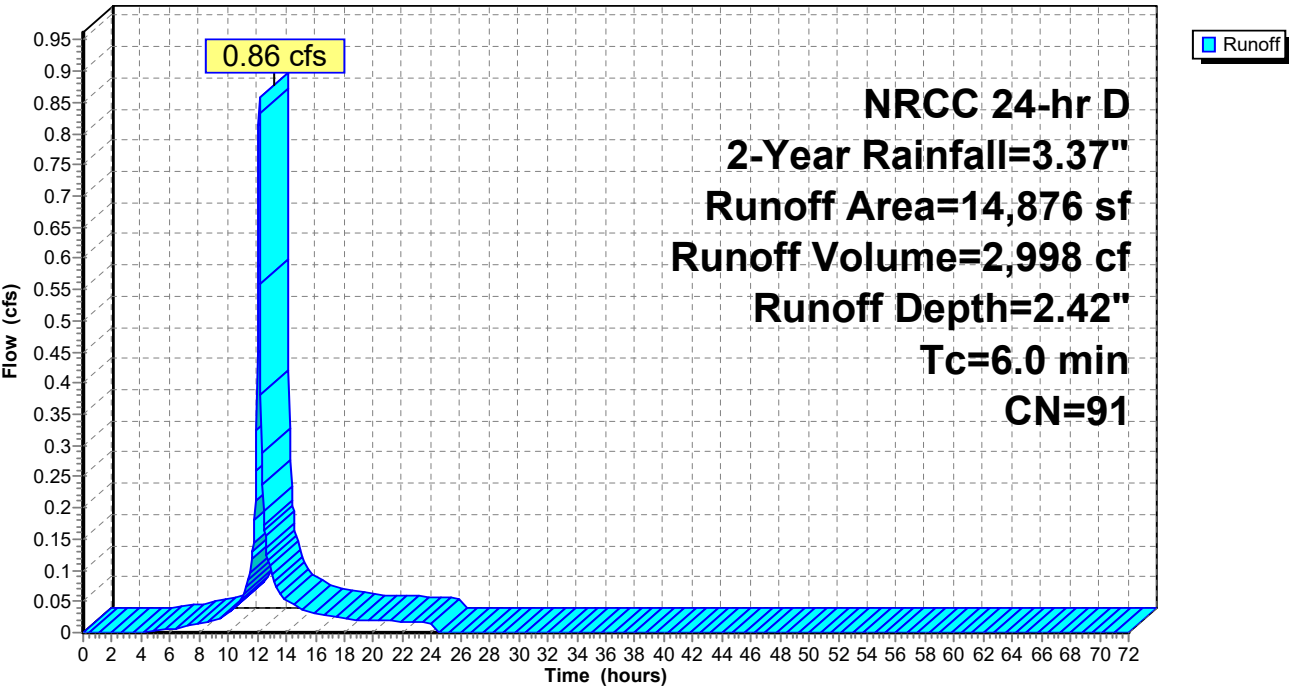
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
4,074	74	>75% Grass cover, Good, HSG C
1,784	98	Paved parking, HSG C
9,018	98	Roofs, HSG C
14,876	91	Weighted Average
4,074		27.39% Pervious Area
10,801		72.61% Impervious Area

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

Subcatchment P-1: Subcat P-1

Hydrograph



Summary for Subcatchment P-10: Subcat P-10

Runoff = 0.51 cfs @ 12.13 hrs, Volume= 1,814 cf, Depth= 2.61"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

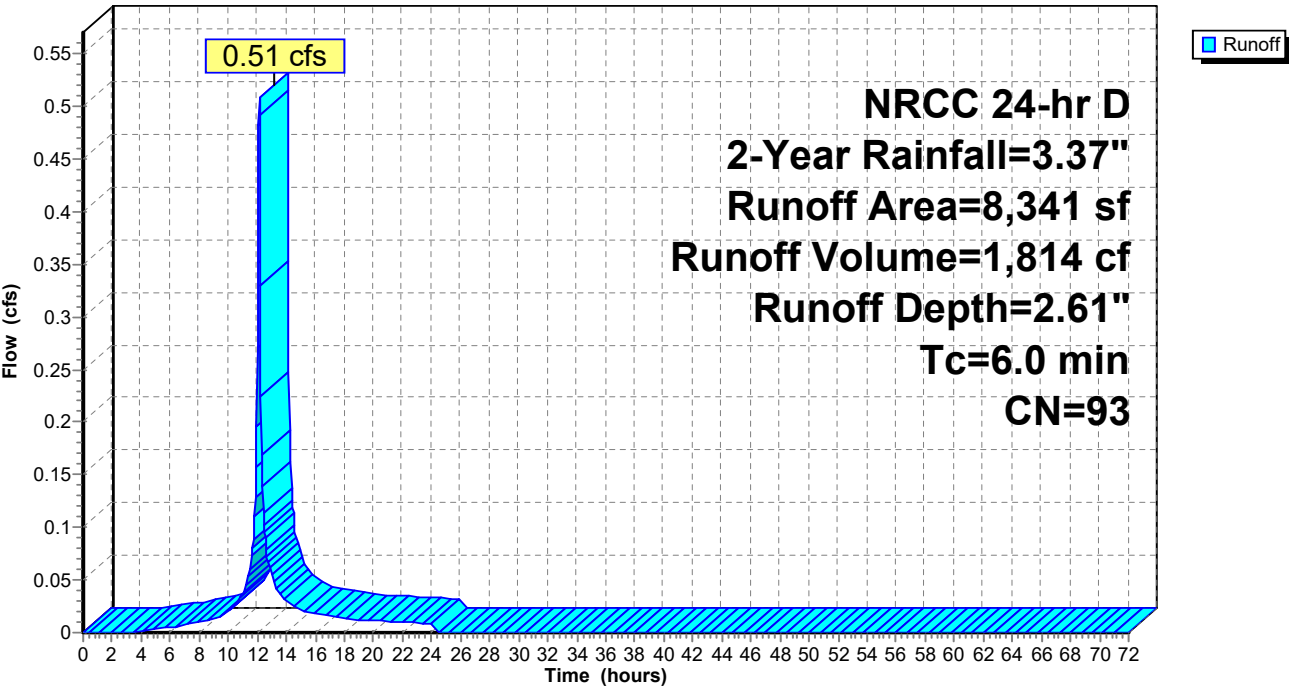
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
1,755	74	>75% Grass cover, Good, HSG C
6,446	98	Paved parking, HSG C
139	98	Roofs, HSG C
8,341	93	Weighted Average
1,755		21.04% Pervious Area
6,586		78.96% Impervious Area

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

Subcatchment P-10: Subcat P-10

Hydrograph



Summary for Subcatchment P-11: Subcat P-11

Runoff = 0.53 cfs @ 12.13 hrs, Volume= 1,872 cf, Depth= 2.51"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

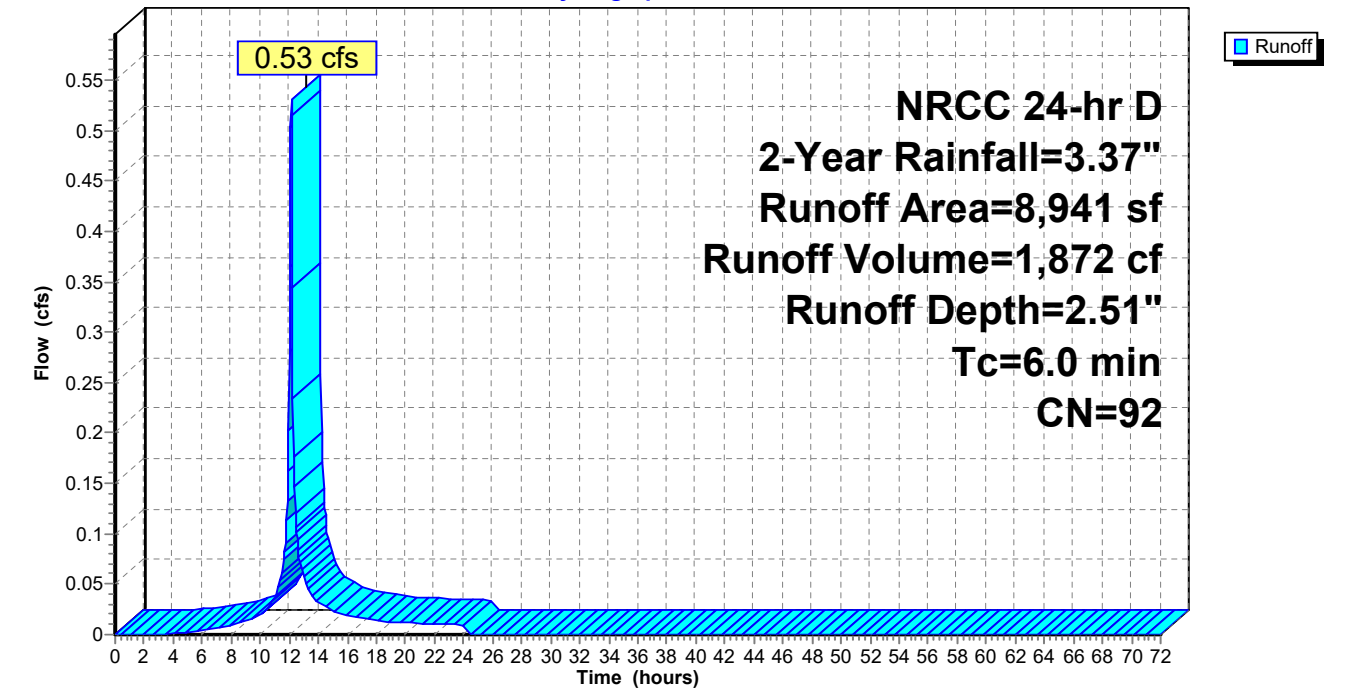
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
2,110	74	>75% Grass cover, Good, HSG C
6,825	98	Paved parking, HSG C
6	98	Roofs, HSG C
8,941	92	Weighted Average
2,110		23.60% Pervious Area
6,831		76.40% Impervious Area

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

Subcatchment P-11: Subcat P-11

Hydrograph



Summary for Subcatchment P-12: Subcat P-12

Runoff = 1.03 cfs @ 12.13 hrs, Volume= 3,532 cf, Depth= 2.15"
Routed to Pond 1P : Infiltration Basin

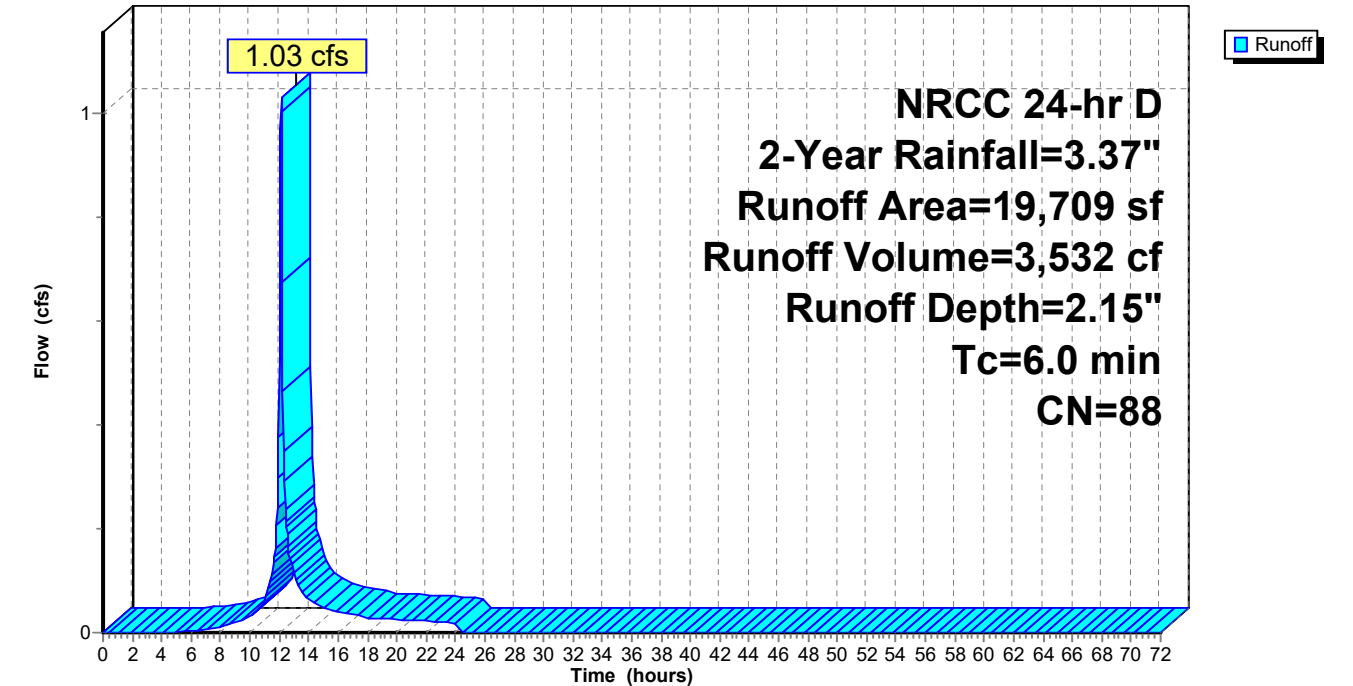
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
8,387	74	>75% Grass cover, Good, HSG C
1,531	98	Paved parking, HSG C
9,791	98	Roofs, HSG C
19,709	88	Weighted Average
8,387		42.56% Pervious Area
11,322		57.44% Impervious Area

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

Subcatchment P-12: Subcat P-12

Hydrograph



Summary for Subcatchment P-13: Subcat P-13

Runoff = 0.63 cfs @ 12.13 hrs, Volume= 2,233 cf, Depth= 2.61"
Routed to Pond 1P : Infiltration Basin

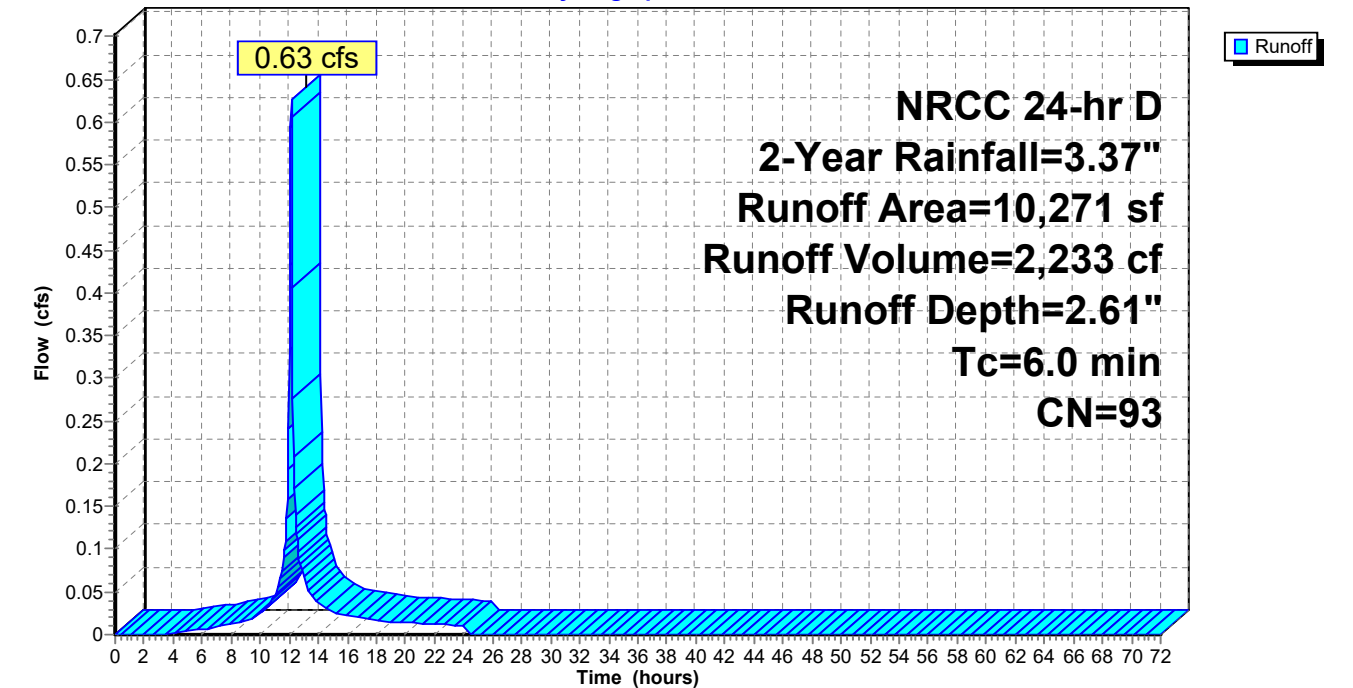
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
2,062	74	>75% Grass cover, Good, HSG C
8,209	98	Paved parking, HSG C
0	98	Roofs, HSG C
10,271	93	Weighted Average
2,062		20.07% Pervious Area
8,209		79.93% Impervious Area

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

Subcatchment P-13: Subcat P-13

Hydrograph



Summary for Subcatchment P-14: Subcat P-14

Runoff = 0.43 cfs @ 12.13 hrs, Volume= 1,480 cf, Depth= 2.33"
Routed to Pond 1P : Infiltration Basin

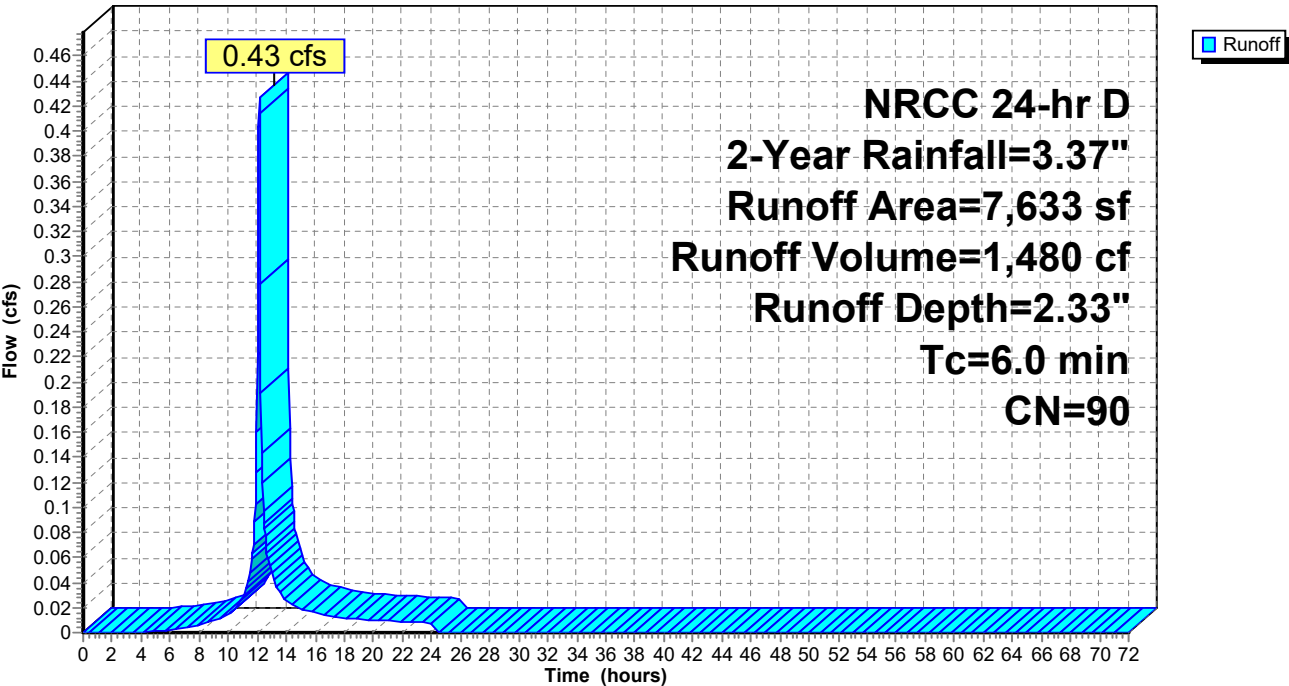
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
2,702	74	>75% Grass cover, Good, HSG C
4,931	98	Paved parking, HSG C
7,633	90	Weighted Average
2,702		35.39% Pervious Area
4,931		64.61% Impervious Area

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

Subcatchment P-14: Subcat P-14

Hydrograph



Summary for Subcatchment P-15: Subcat P-15

Runoff = 0.74 cfs @ 12.13 hrs, Volume= 2,518 cf, Depth= 2.07"
Routed to Pond 3P : UIS-2 (SC-800)

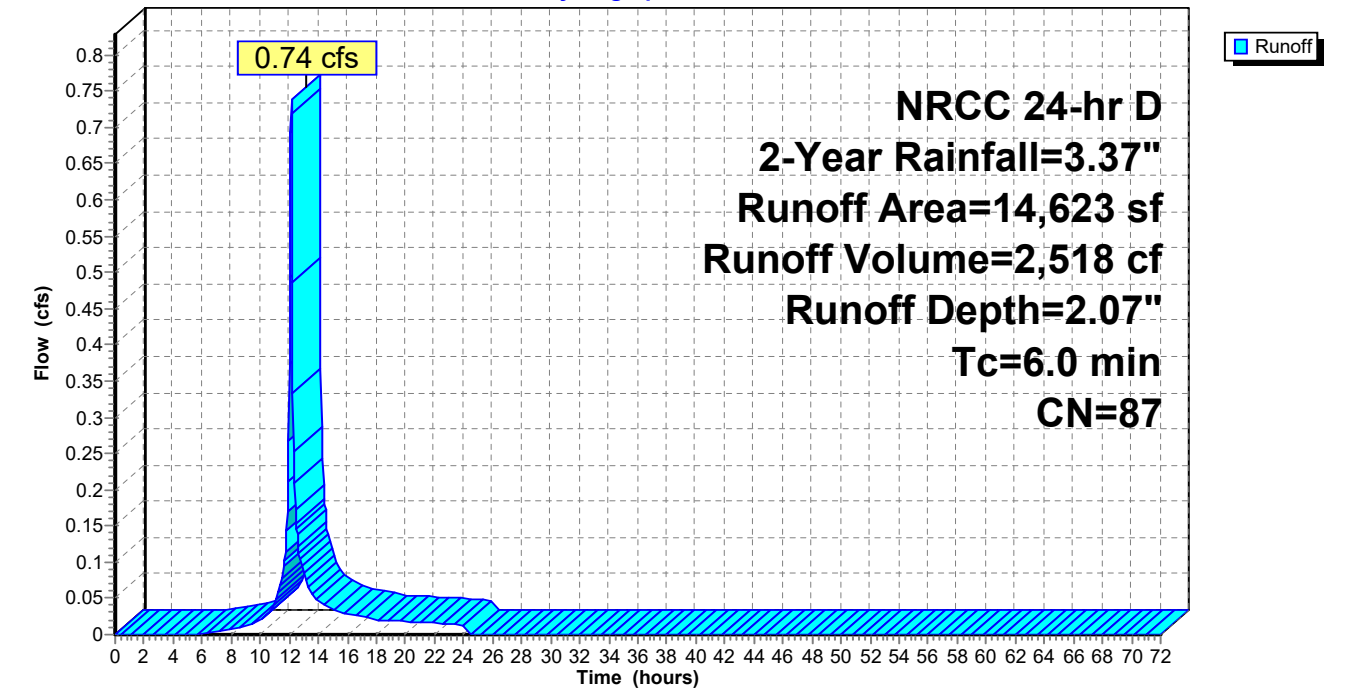
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
6,997	74	>75% Grass cover, Good, HSG C
917	98	Paved parking, HSG C
6,709	98	Roofs, HSG C
14,623	87	Weighted Average
6,997		47.85% Pervious Area
7,626		52.15% Impervious Area

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

Subcatchment P-15: Subcat P-15

Hydrograph



Summary for Subcatchment P-16: Subcat P-16

Runoff = 0.80 cfs @ 12.13 hrs, Volume= 2,840 cf, Depth= 2.61"
Routed to Pond 1P : Infiltration Basin

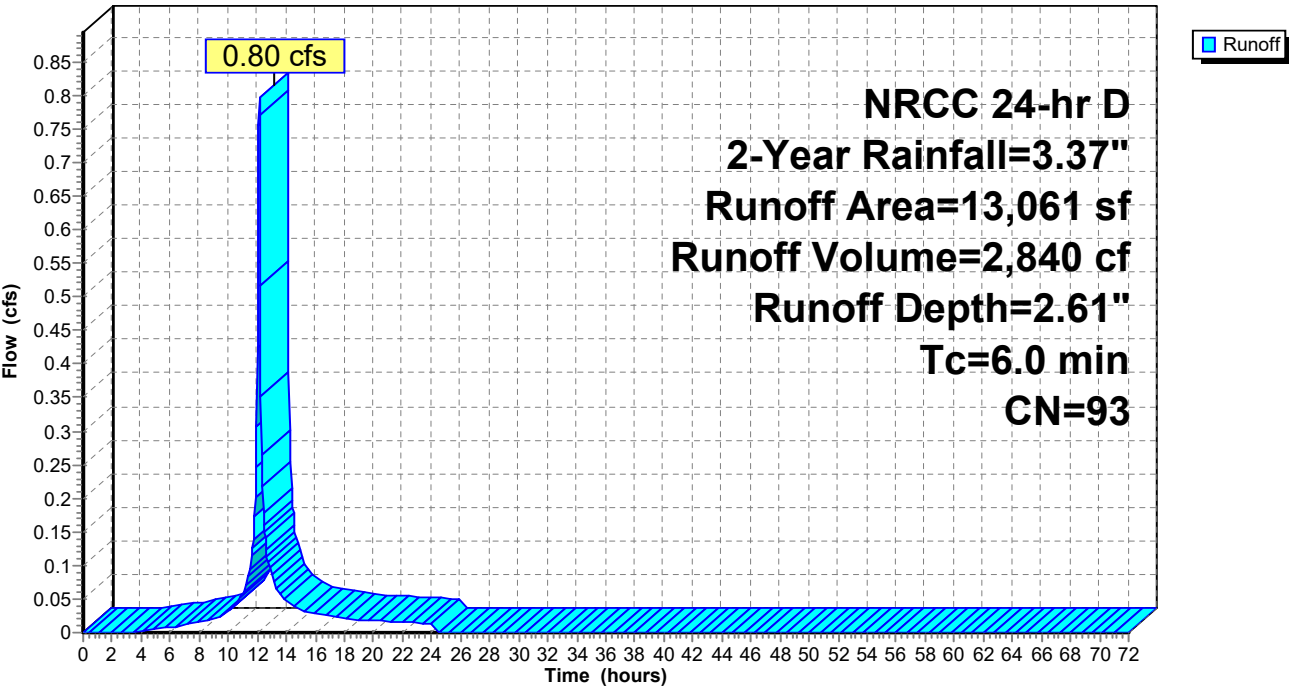
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
2,670	74	>75% Grass cover, Good, HSG C
10,111	98	Paved parking, HSG C
280	98	Roofs, HSG C
13,061	93	Weighted Average
2,670		20.44% Pervious Area
10,391		79.56% Impervious Area

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

Subcatchment P-16: Subcat P-16

Hydrograph



Summary for Subcatchment P-17: Subcat P-17

Runoff = 0.58 cfs @ 12.13 hrs, Volume= 1,996 cf, Depth= 2.33"
Routed to Pond 1P : Infiltration Basin

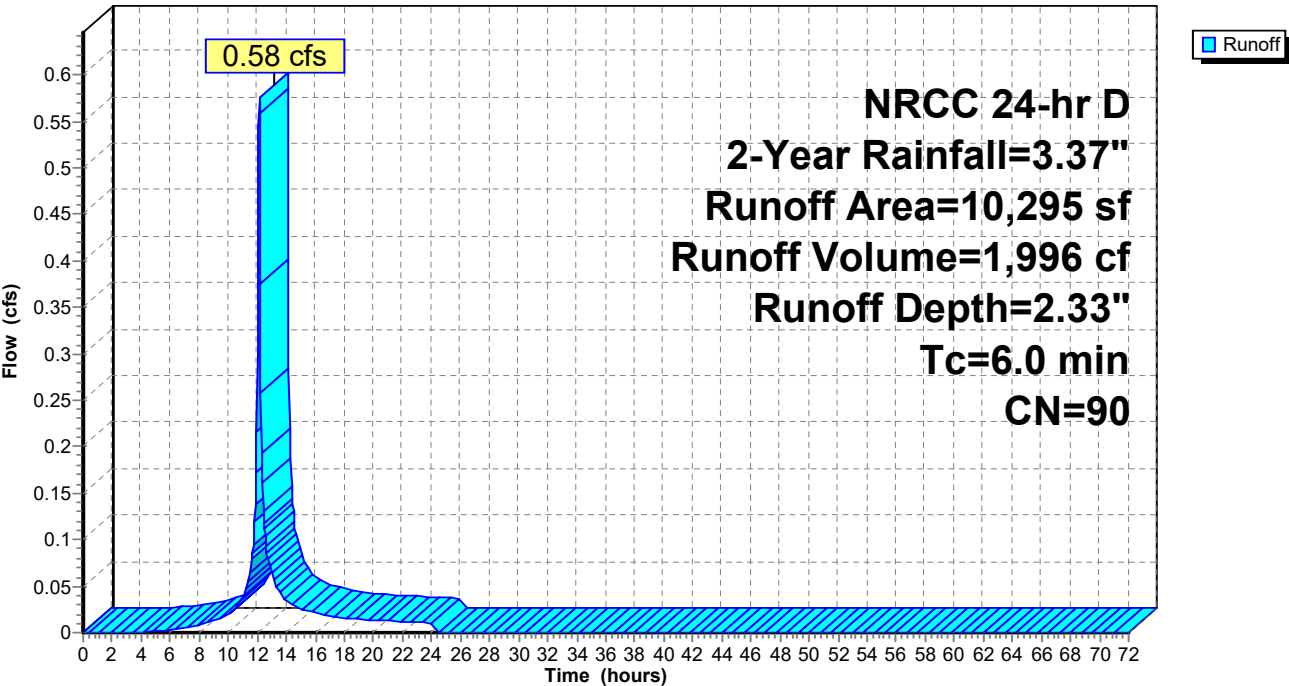
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
3,249	74	>75% Grass cover, Good, HSG C
6,446	98	Paved parking, HSG C
600	98	Roofs, HSG C
10,295	90	Weighted Average
3,249		31.56% Pervious Area
7,046		68.44% Impervious Area

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

Subcatchment P-17: Subcat P-17

Hydrograph



Summary for Subcatchment P-18: Subcat P-18

Runoff = 0.36 cfs @ 12.13 hrs, Volume= 1,260 cf, Depth= 2.42"
Routed to Pond 1P : Infiltration Basin

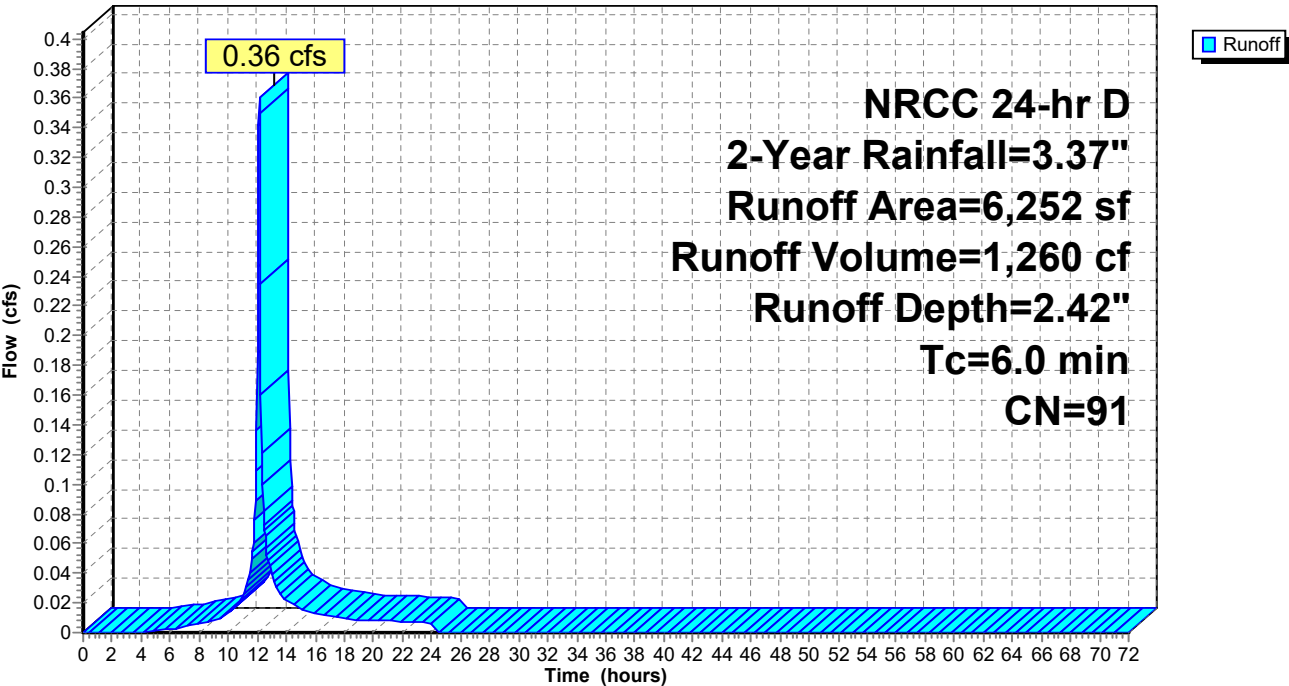
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
1,766	74	>75% Grass cover, Good, HSG C
4,486	98	Paved parking, HSG C
6,252	91	Weighted Average
1,766		28.25% Pervious Area
4,486		71.75% Impervious Area

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

Subcatchment P-18: Subcat P-18

Hydrograph



Summary for Subcatchment P-18A: Subcat P-18A

Runoff = 0.36 cfs @ 12.13 hrs, Volume= 1,226 cf, Depth= 1.98"
Routed to Pond 4P : UDS-2 (SC-310)

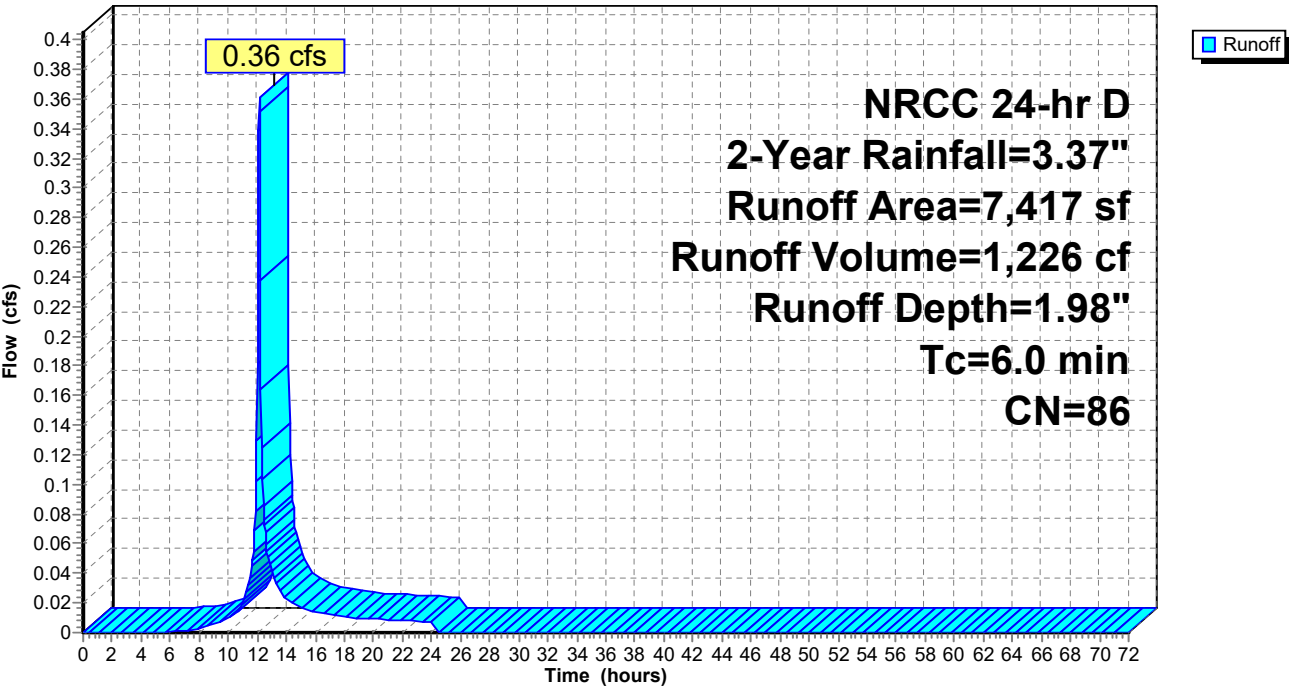
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
3,568	74	>75% Grass cover, Good, HSG C
3,849	98	Paved parking, HSG C
7,417	86	Weighted Average
3,568		48.11% Pervious Area
3,849		51.89% Impervious Area

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

Subcatchment P-18A: Subcat P-18A

Hydrograph



Summary for Subcatchment P-19: Subcat P-19

Runoff = 1.06 cfs @ 12.13 hrs, Volume= 3,593 cf, Depth= 1.98"
Routed to Pond 1P : Infiltration Basin

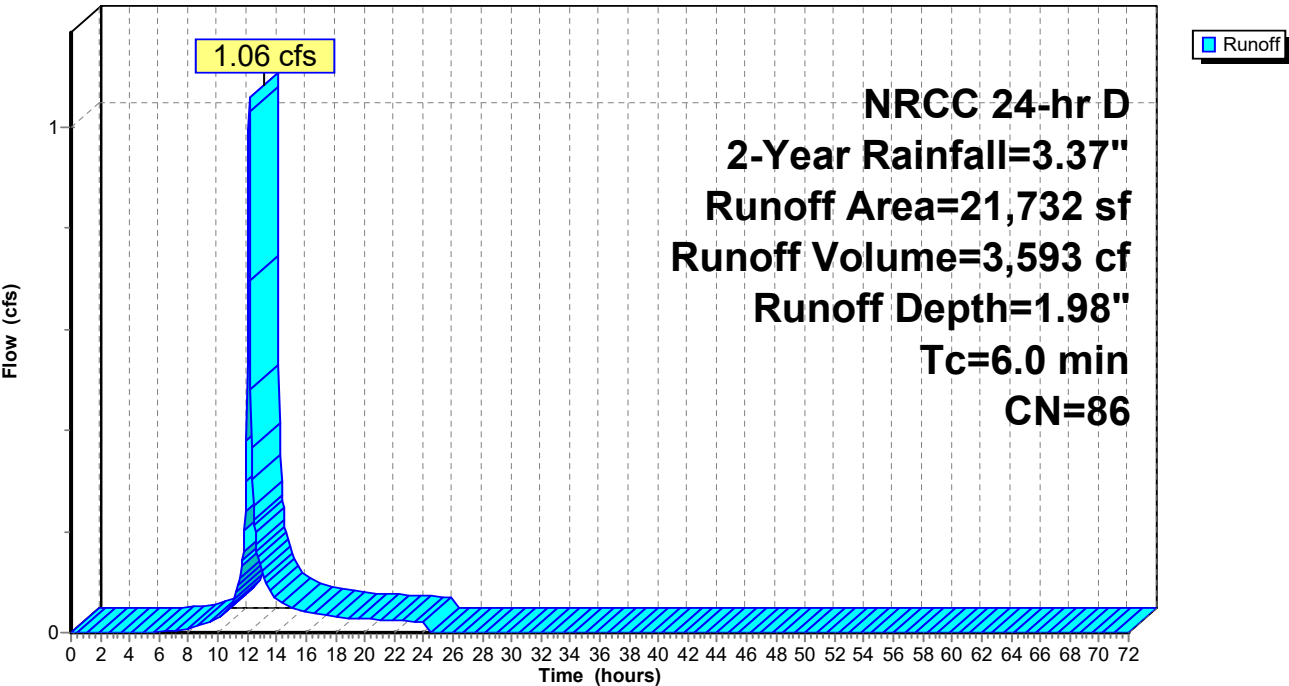
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
10,621	74	>75% Grass cover, Good, HSG C
1,800	98	Paved parking, HSG C
9,311	98	Roofs, HSG C
21,732	86	Weighted Average
10,621		48.87% Pervious Area
11,112		51.13% Impervious Area

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

Subcatchment P-19: Subcat P-19

Hydrograph



Summary for Subcatchment P-2: Subcat P-2

Runoff = 0.52 cfs @ 12.13 hrs, Volume= 1,816 cf, Depth= 2.51"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

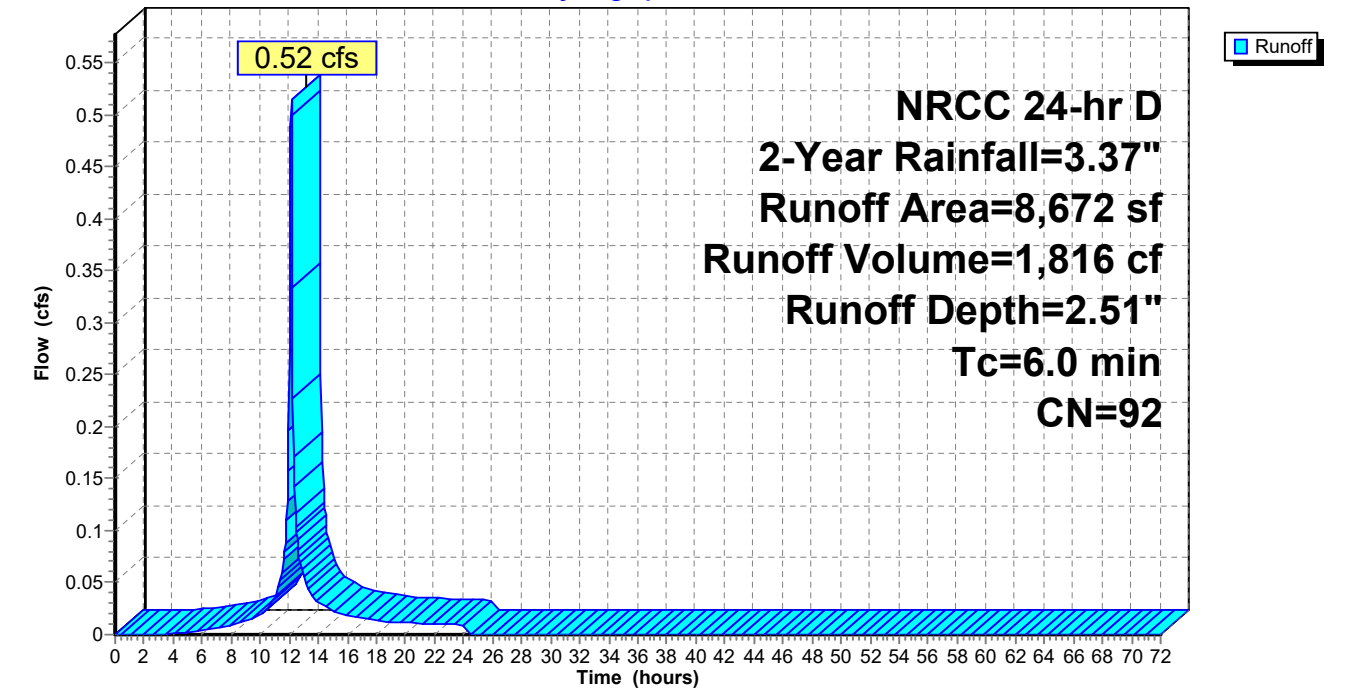
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
2,138	74	>75% Grass cover, Good, HSG C
6,408	98	Paved parking, HSG C
126	98	Roofs, HSG C
8,672	92	Weighted Average
2,138		24.65% Pervious Area
6,534		75.35% Impervious Area

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

Subcatchment P-2: Subcat P-2

Hydrograph



Summary for Subcatchment P-20: Subcat P-20

Runoff = 1.95 cfs @ 12.13 hrs, Volume= 6,608 cf, Depth= 1.90"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

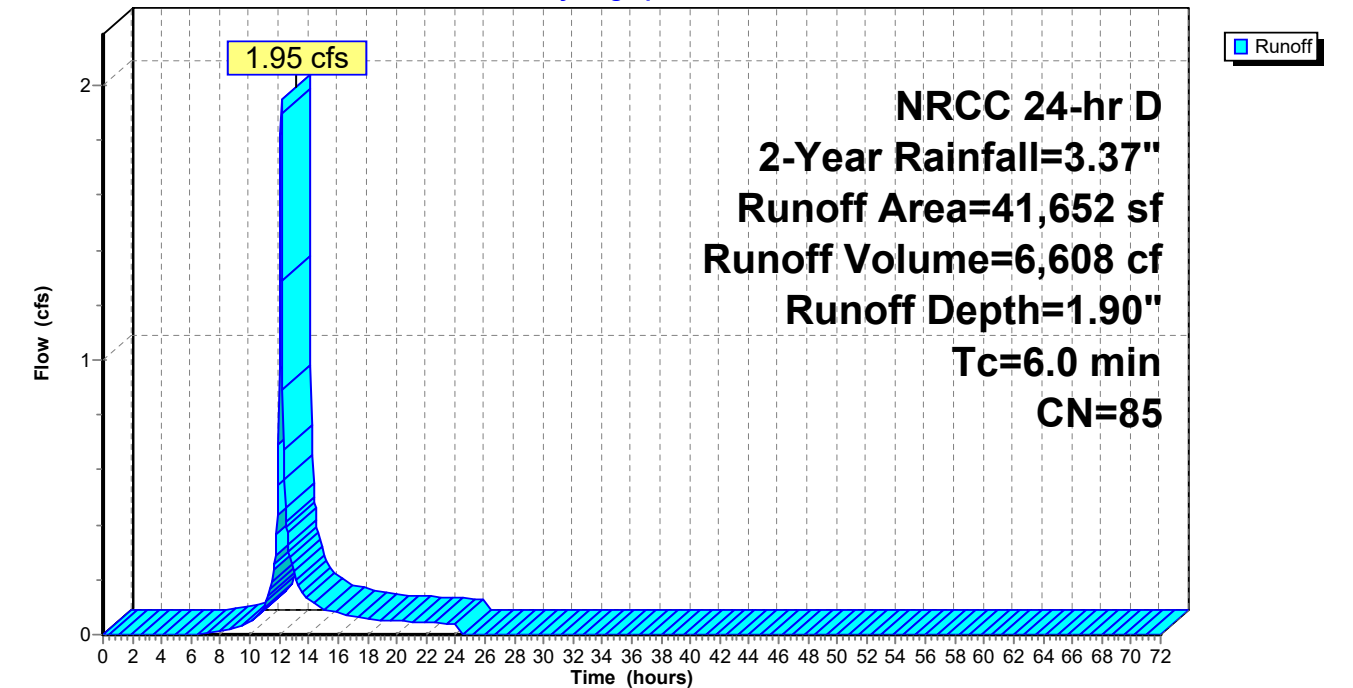
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
22,671	74	>75% Grass cover, Good, HSG C
3,948	98	Paved parking, HSG C
15,034	98	Roofs, HSG C
41,652	85	Weighted Average
22,671		54.43% Pervious Area
18,982		45.57% Impervious Area

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

Subcatchment P-20: Subcat P-20

Hydrograph



Summary for Subcatchment P-21: Subcat P-21

Runoff = 1.30 cfs @ 12.14 hrs, Volume= 4,591 cf, Depth= 0.98"
Routed to Link SP2 : STUDY POINT #2 (Wetlands West)

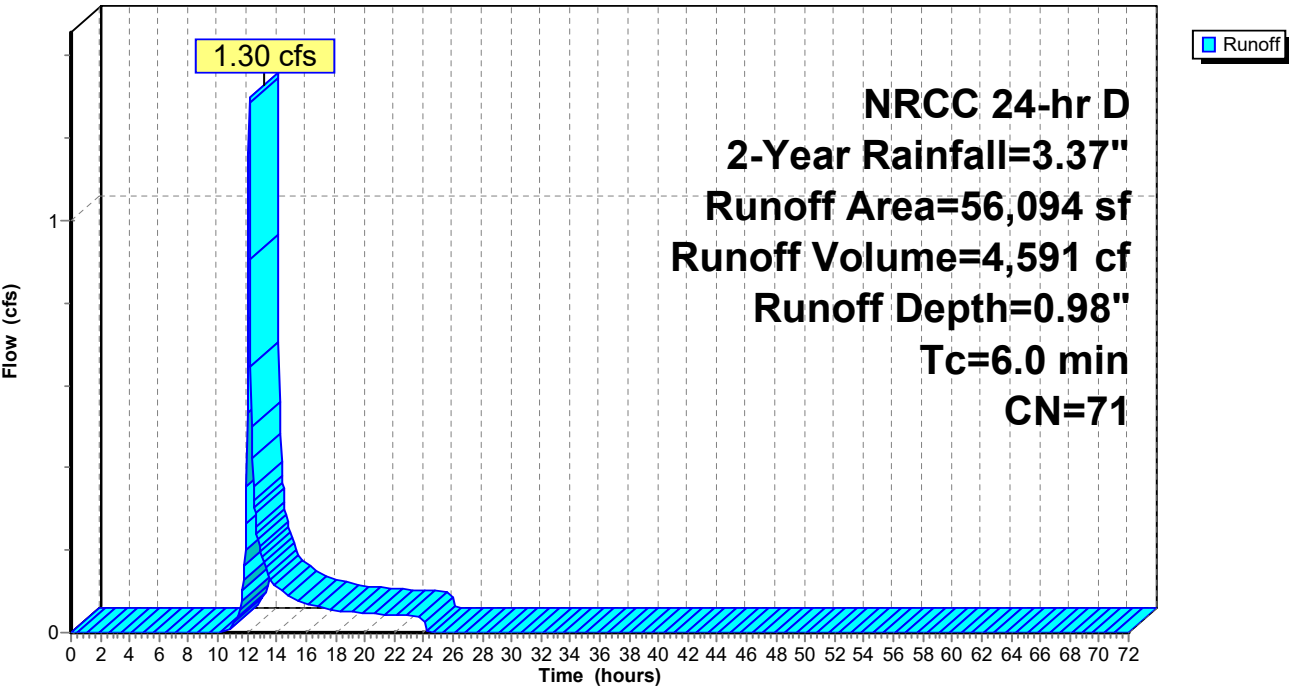
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
17,315	74	>75% Grass cover, Good, HSG C
4	98	Roofs, HSG C
38,775	70	Woods, Good, HSG C
56,094	71	Weighted Average
56,091		99.99% Pervious Area
4		0.01% Impervious Area

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

Subcatchment P-21: Subcat P-21

Hydrograph



Summary for Subcatchment P-22: Subcat P-22

Runoff = 0.78 cfs @ 12.14 hrs, Volume= 2,708 cf, Depth= 1.04"
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

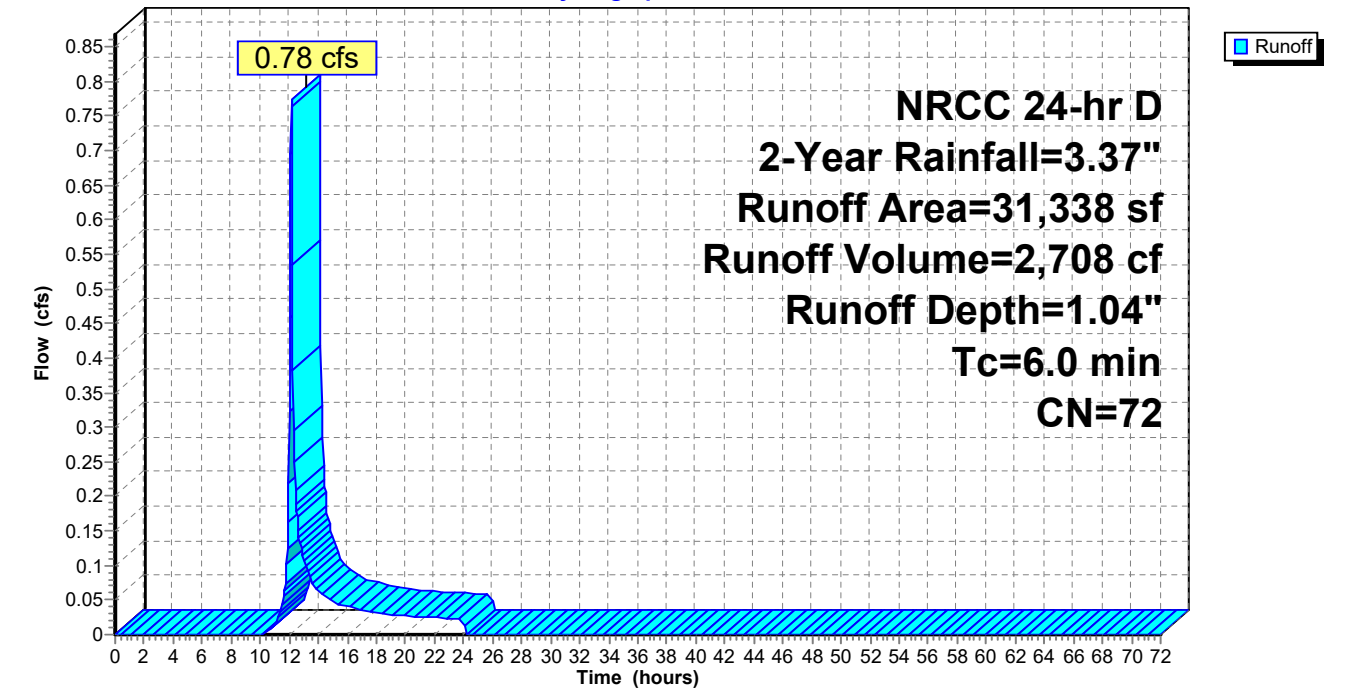
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
12,793	74	>75% Grass cover, Good, HSG C
1	98	Paved parking, HSG C
1	98	Roofs, HSG C
18,544	70	Woods, Good, HSG C
31,338	72	Weighted Average
31,337		100.00% Pervious Area
2		0.00% Impervious Area

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

Subcatchment P-22: Subcat P-22

Hydrograph



Summary for Subcatchment P-23: Subcat P-23

Runoff = 0.35 cfs @ 12.14 hrs, Volume= 1,215 cf, Depth= 1.04"
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

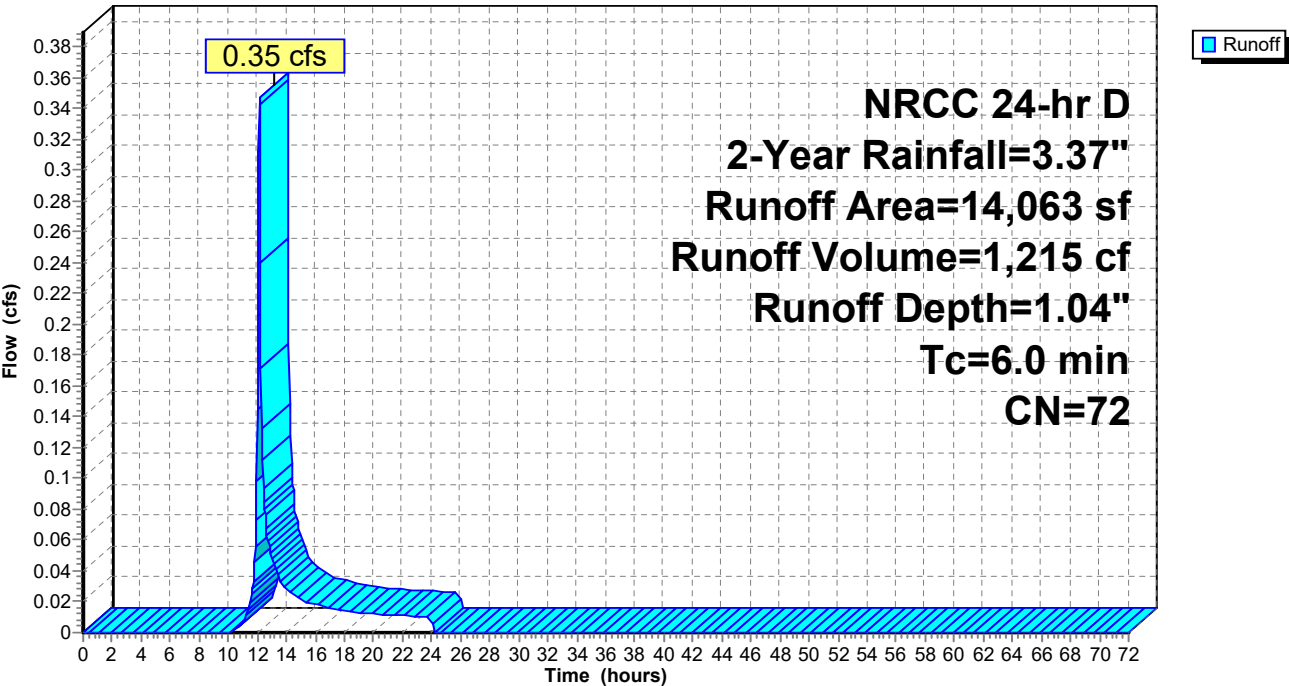
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
6,718	74	>75% Grass cover, Good, HSG C
7,345	70	Woods, Good, HSG C
14,063	72	Weighted Average
14,063		100.00% Pervious Area

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

Subcatchment P-23: Subcat P-23

Hydrograph



Summary for Subcatchment P-24: Subcat P-24

Runoff = 0.90 cfs @ 12.13 hrs, Volume= 3,029 cf, Depth= 1.68"
Routed to Pond 1P : Infiltration Basin

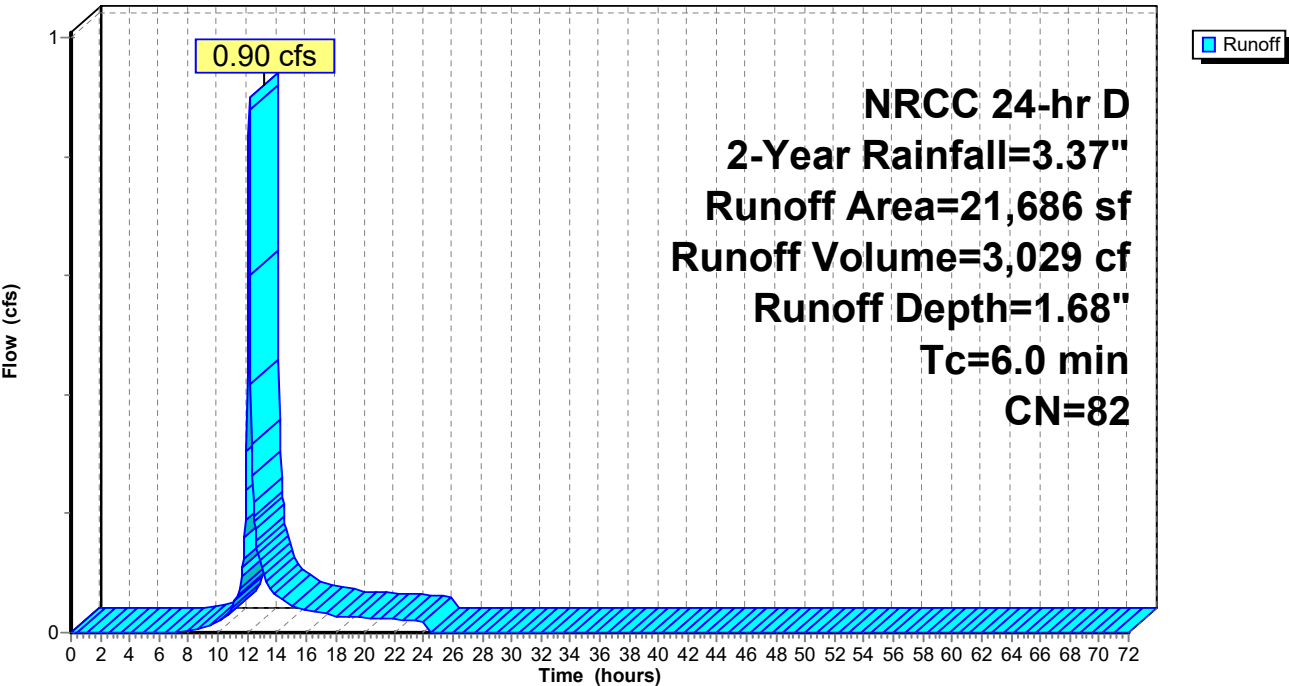
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
14,395	74	>75% Grass cover, Good, HSG C
7,291	98	Water Surface, HSG C
21,686	82	Weighted Average
14,395		66.38% Pervious Area
7,291		33.62% Impervious Area

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

Subcatchment P-24: Subcat P-24

Hydrograph



Summary for Subcatchment P-25: Subcat P-25

Runoff = 0.46 cfs @ 12.14 hrs, Volume= 1,624 cf, Depth= 0.98"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

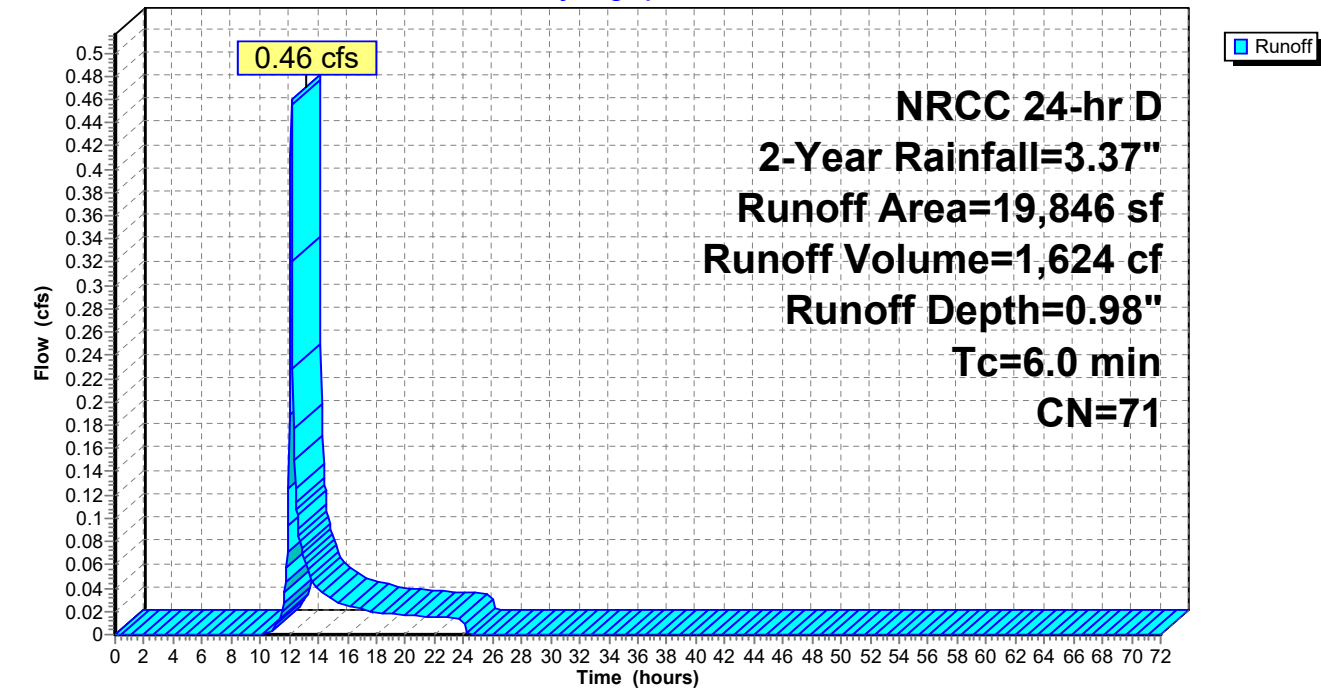
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
4,972	74	>75% Grass cover, Good, HSG C
3	98	Paved parking, HSG C
1	98	Roofs, HSG C
14,870	70	Woods, Good, HSG C
19,846	71	Weighted Average
19,842		99.98% Pervious Area
4		0.02% Impervious Area

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

Subcatchment P-25: Subcat P-25

Hydrograph



Summary for Subcatchment P-3: Subcat P-3

Runoff = 0.63 cfs @ 12.13 hrs, Volume= 2,229 cf, Depth= 2.61"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

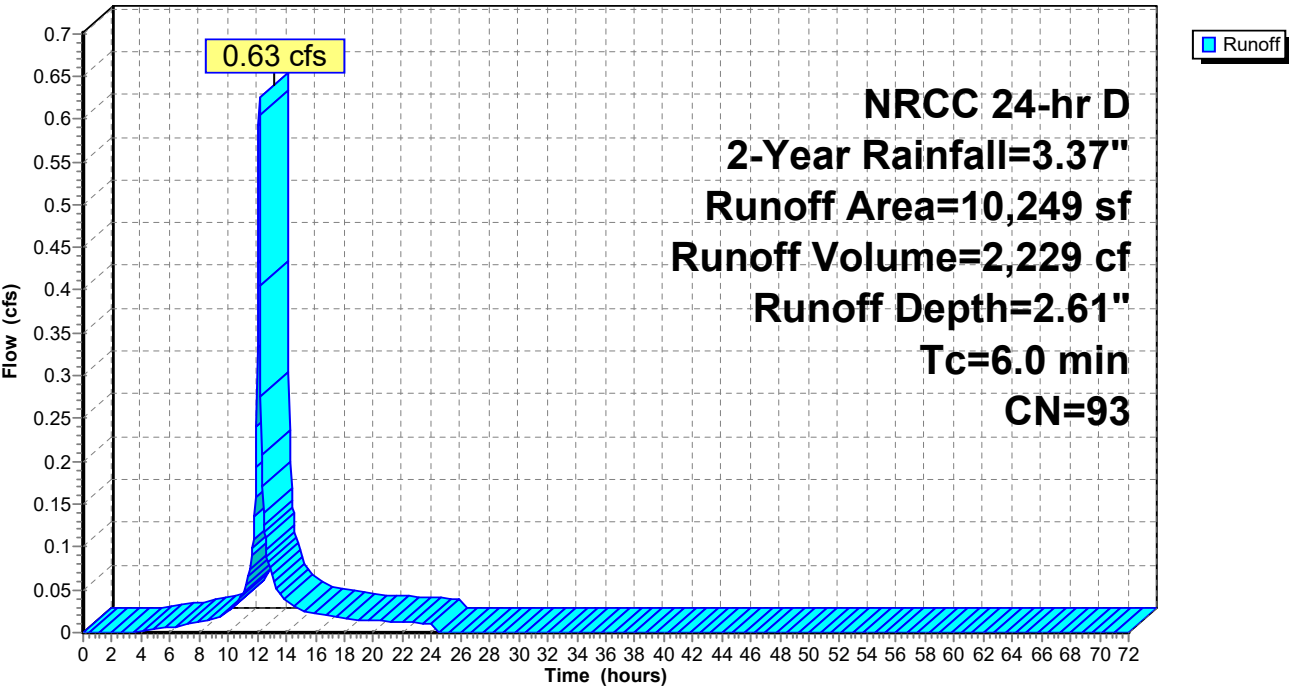
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
2,059	74	>75% Grass cover, Good, HSG C
8,187	98	Paved parking, HSG C
3	98	Roofs, HSG C
10,249	93	Weighted Average
2,059		20.09% Pervious Area
8,190		79.91% Impervious Area

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

Subcatchment P-3: Subcat P-3

Hydrograph



Summary for Subcatchment P-4: Subcat P-4

Runoff = 0.79 cfs @ 12.13 hrs, Volume= 2,838 cf, Depth= 2.71"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

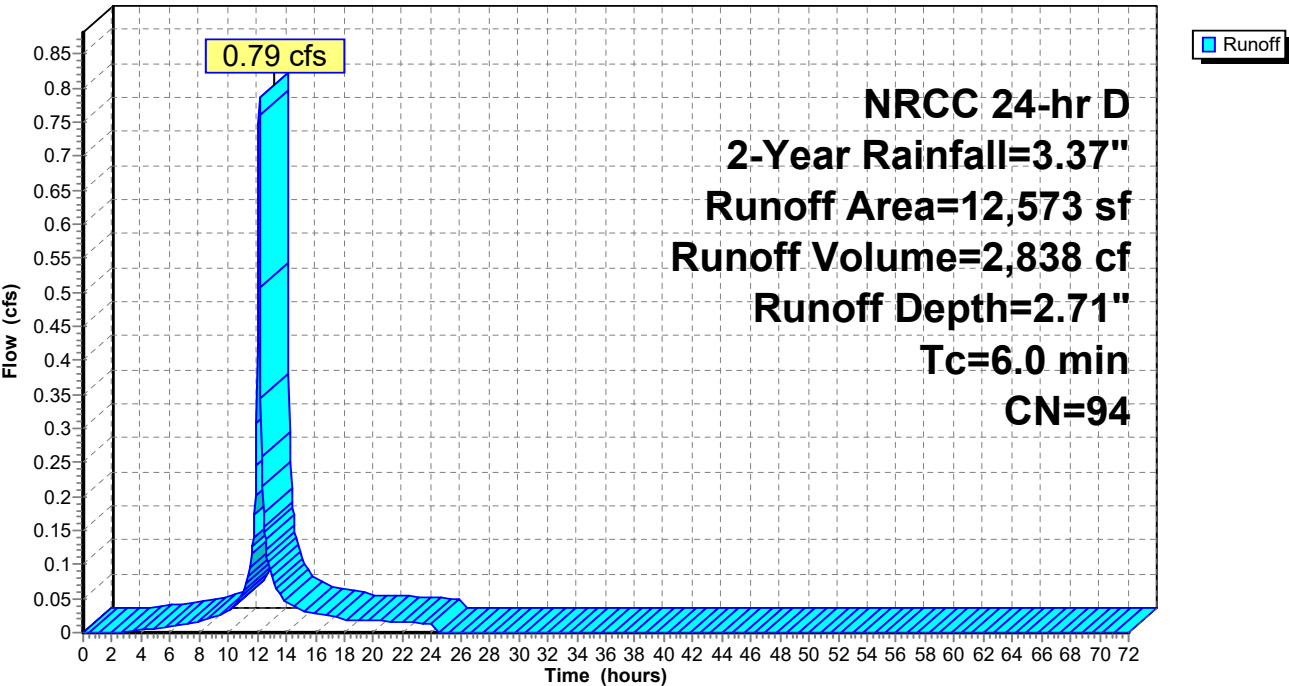
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
1,907	74	>75% Grass cover, Good, HSG C
10,666	98	Paved parking, HSG C
12,573	94	Weighted Average
1,907		15.17% Pervious Area
10,666		84.83% Impervious Area

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

Subcatchment P-4: Subcat P-4

Hydrograph



Summary for Subcatchment P-5: Subcat P-5

Runoff = 0.34 cfs @ 12.13 hrs, Volume= 1,197 cf, Depth= 2.61"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

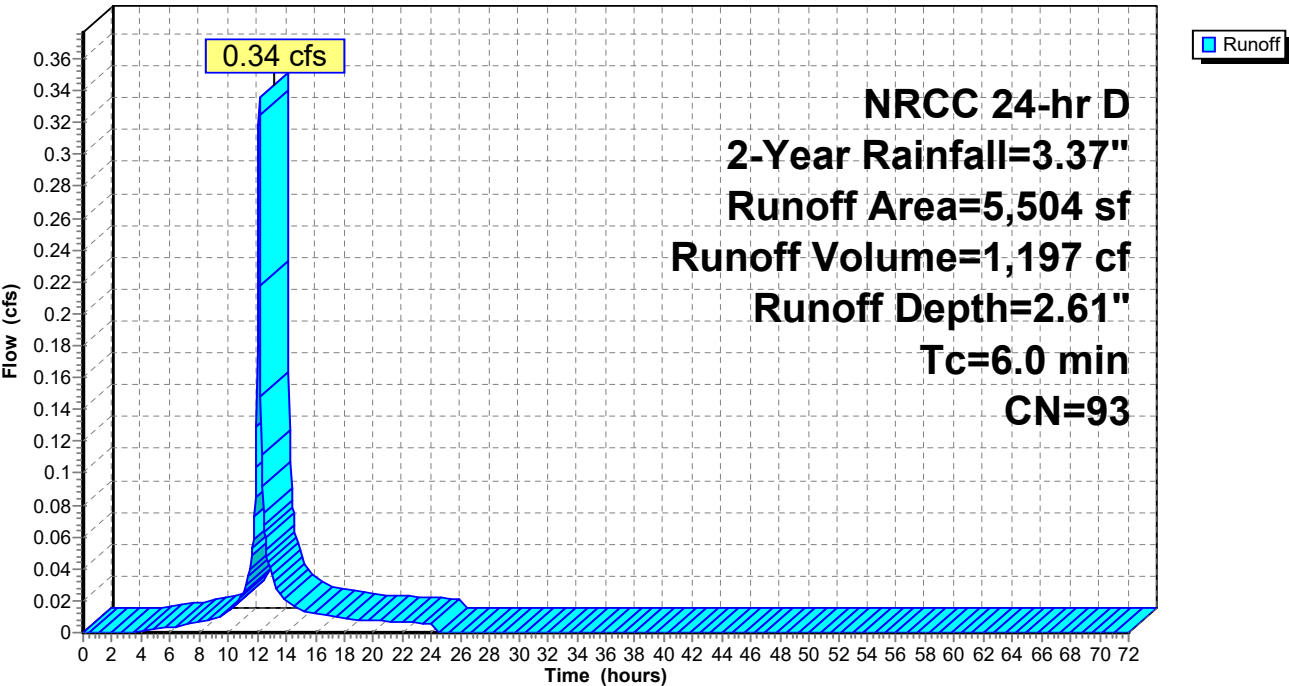
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
1,044	74	>75% Grass cover, Good, HSG C
4,460	98	Paved parking, HSG C
5,504	93	Weighted Average
1,044		18.97% Pervious Area
4,460		81.03% Impervious Area

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

Subcatchment P-5: Subcat P-5

Hydrograph



Summary for Subcatchment P-6: Subcat P-6

Runoff = 0.48 cfs @ 12.13 hrs, Volume= 1,636 cf, Depth= 2.15"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

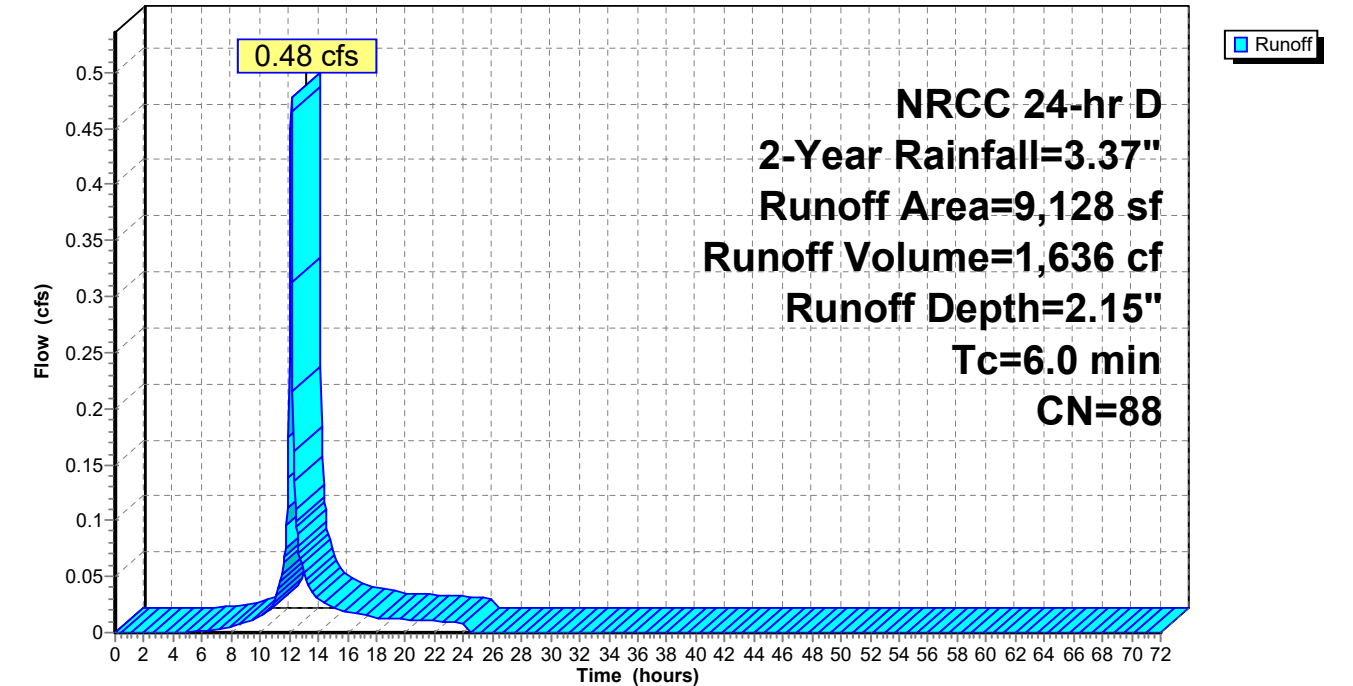
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
3,695	74	>75% Grass cover, Good, HSG C
586	98	Paved parking, HSG C
4,848	98	Roofs, HSG C
9,128	88	Weighted Average
3,695		40.47% Pervious Area
5,434		59.53% Impervious Area

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

Subcatchment P-6: Subcat P-6

Hydrograph



Summary for Subcatchment P-6A: Subcat P-6A

Runoff = 0.49 cfs @ 12.13 hrs, Volume= 1,708 cf, Depth= 2.42"
Routed to Pond 3P : UIS-2 (SC-800)

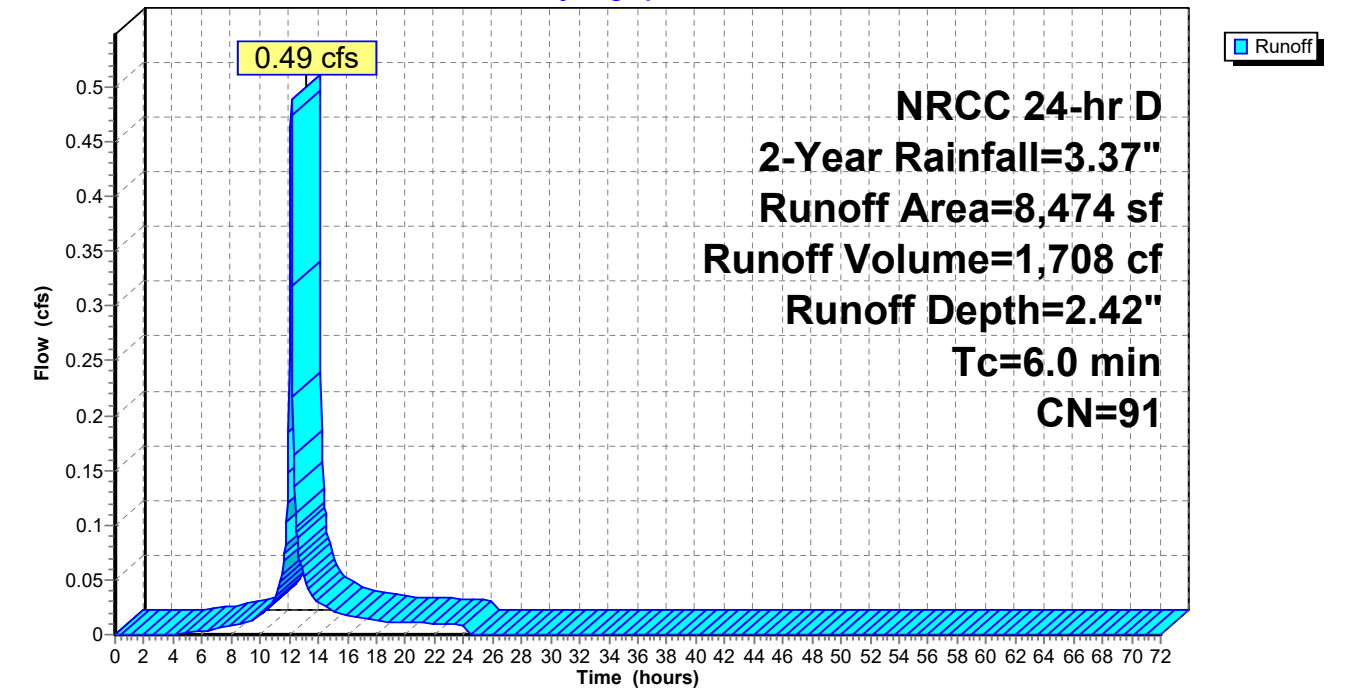
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
2,617	74	>75% Grass cover, Good, HSG C
715	98	Paved parking, HSG C
5,142	98	Roofs, HSG C
8,474	91	Weighted Average
2,617		30.88% Pervious Area
5,857		69.12% Impervious Area

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

Subcatchment P-6A: Subcat P-6A

Hydrograph



Summary for Subcatchment P-7: Subcat P-7

Runoff = 0.58 cfs @ 12.13 hrs, Volume= 2,047 cf, Depth= 2.61"
Routed to Pond 3P : UIS-2 (SC-800)

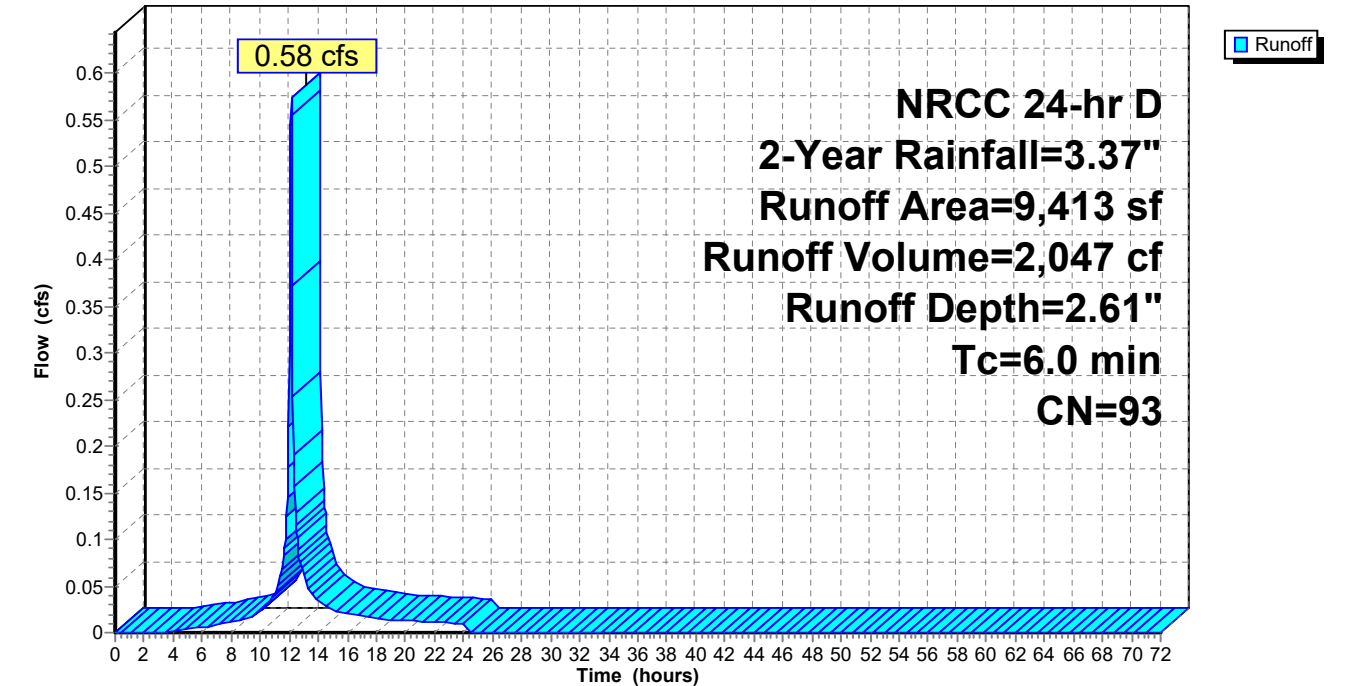
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
2,099	74	>75% Grass cover, Good, HSG C
5,872	98	Paved parking, HSG C
1,442	98	Roofs, HSG C
9,413	93	Weighted Average
2,099		22.30% Pervious Area
7,314		77.70% Impervious Area

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

Subcatchment P-7: Subcat P-7

Hydrograph



Summary for Subcatchment P-8: Subcat P-8

Runoff = 0.54 cfs @ 12.13 hrs, Volume= 1,876 cf, Depth= 2.42"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

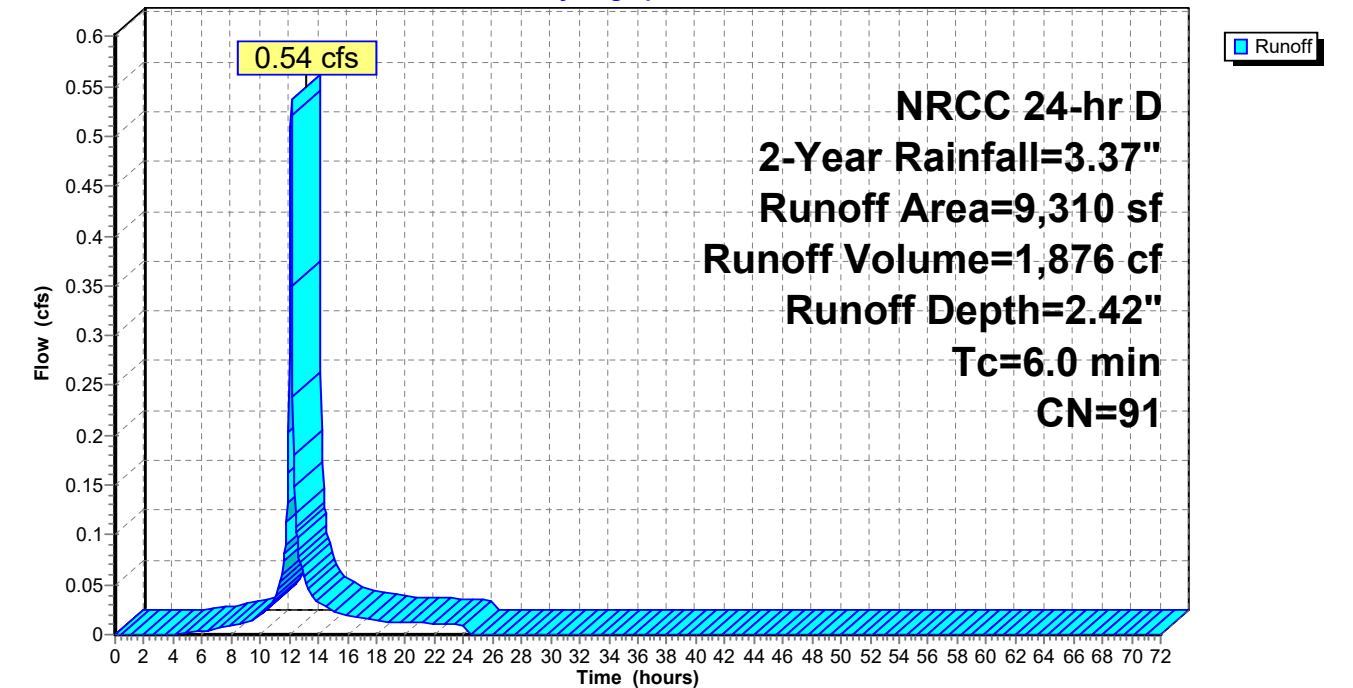
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
2,628	74	>75% Grass cover, Good, HSG C
924	98	Paved parking, HSG C
5,759	98	Roofs, HSG C
9,310	91	Weighted Average
2,628		28.23% Pervious Area
6,682		71.77% Impervious Area

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

Subcatchment P-8: Subcat P-8

Hydrograph



Summary for Subcatchment P-9: Subcat P-9

Runoff = 0.51 cfs @ 12.13 hrs, Volume= 1,847 cf, Depth= 2.71"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

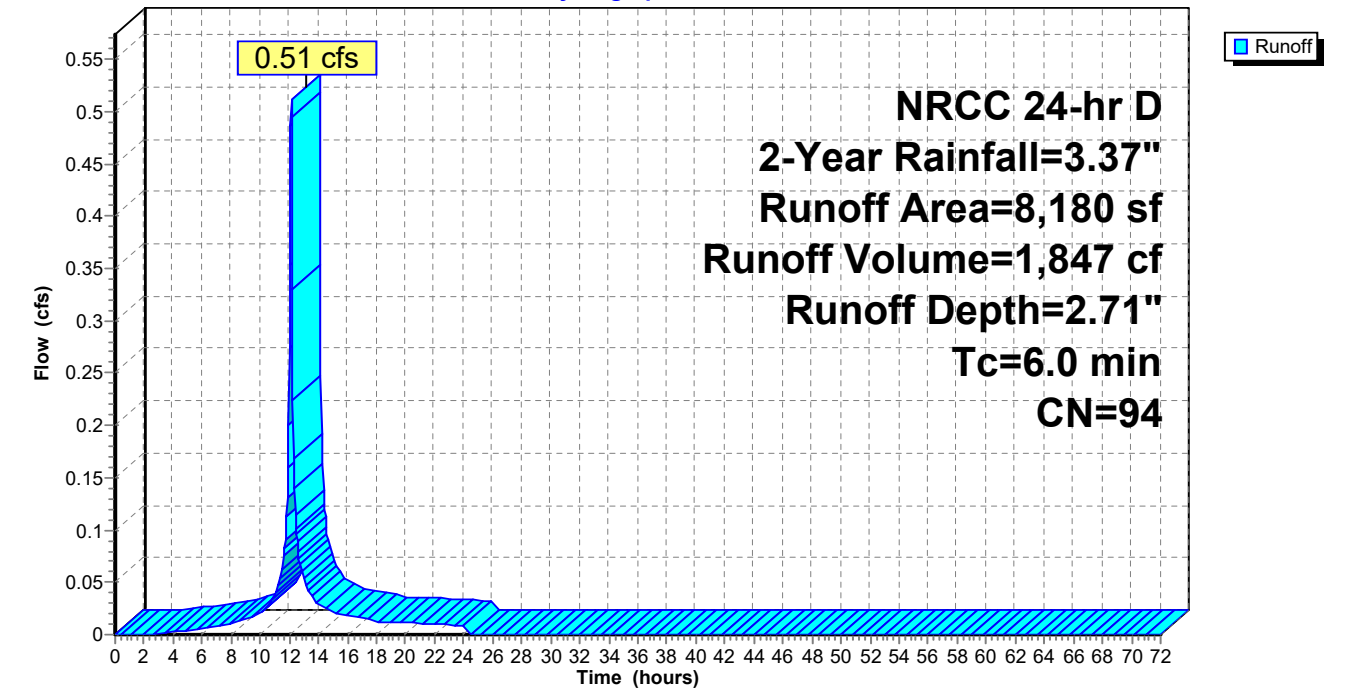
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.37"

Area (sf)	CN	Description
1,516	74	>75% Grass cover, Good, HSG C
6,649	98	Paved parking, HSG C
15	98	Roofs, HSG C
8,180	94	Weighted Average
1,516		18.54% Pervious Area
6,664		81.46% Impervious Area

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

Subcatchment P-9: Subcat P-9

Hydrograph



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 65

Summary for Pond 1P: Infiltration Basin

Inflow Area = 110,639 sf, 58.56% Impervious, Inflow Depth = 2.17" for 2-Year event
Inflow = 5.78 cfs @ 12.13 hrs, Volume= 19,962 cf
Outflow = 0.36 cfs @ 14.08 hrs, Volume= 19,962 cf, Atten= 94%, Lag= 116.9 min
Discarded = 0.12 cfs @ 14.08 hrs, Volume= 16,247 cf
Primary = 0.24 cfs @ 14.08 hrs, Volume= 3,715 cf
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 144.24' @ 14.08 hrs Surf.Area= 4,942 sf Storage= 10,827 cf
Flood Elev= 146.90' Surf.Area= 7,524 sf Storage= 27,045 cf

Plug-Flow detention time= 791.1 min calculated for 19,948 cf (100% of inflow)
Center-of-Mass det. time= 791.8 min (1,619.6 - 827.8)

Volume	Invert	Avail.Storage	Storage Description		
#1	141.50'	27,804 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
141.50	3,040	206.0	0	0	3,040
142.00	3,356	215.0	1,598	1,598	3,359
143.00	4,030	234.0	3,688	5,286	4,074
144.00	4,760	253.0	4,390	9,676	4,850
145.00	5,548	272.0	5,149	14,825	5,686
146.00	6,391	291.0	5,965	20,790	6,583
147.00	7,656	348.0	7,014	27,804	9,499

Device	Routing	Invert	Outlet Devices
#1	Discarded	141.50'	1.020 in/hr Exfiltration over Surface area
#2	Primary	142.50'	12.0" Round Culvert L= 17.8' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.50' / 141.33' S= 0.0657 ' S Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	144.00'	12.0" Vert. Orifice C= 0.600 Limited to weir flow at low heads

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

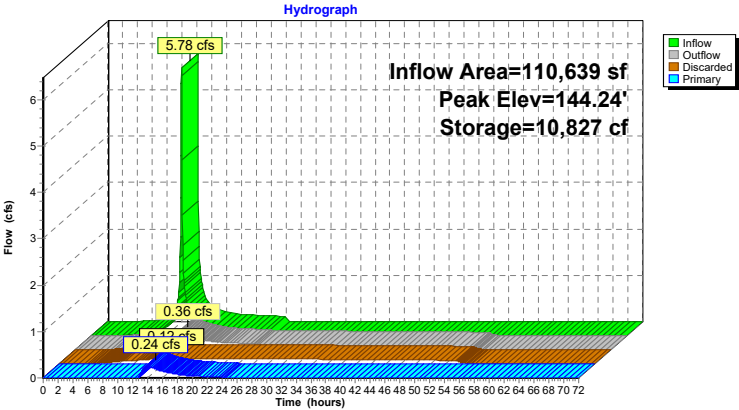
Page 66

#4 Device 2 146.00' 4.0' long x 0.5' breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00
Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5 Primary 146.90' 20.0' long x 18.0' breadth Overflow Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.12 cfs @ 14.08 hrs HW=144.24' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.24 cfs @ 14.08 hrs HW=144.24' (Free Discharge)
2=Culvert (Passes 0.24 cfs of 3.32 cfs potential flow)
3=Orifice (Orifice Controls 0.24 cfs @ 1.66 fps)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
5=Overflow Weir (Controls 0.00 cfs)

Pond 1P: Infiltration Basin



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 67

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

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
141.50	3,040	0	145.00	5,548	14,825
141.60	3,102	307	145.10	5,630	15,384
141.70	3,165	620	145.20	5,712	15,951
141.80	3,228	940	145.30	5,795	16,526
141.90	3,292	1,266	145.40	5,878	17,110
142.00	3,356	1,598	145.50	5,962	17,702
142.10	3,421	1,937	145.60	6,047	18,302
142.20	3,486	2,282	145.70	6,132	18,911
142.30	3,552	2,634	145.80	6,218	19,529
142.40	3,618	2,993	145.90	6,304	20,155
142.50	3,685	3,358	146.00	6,391	20,790
142.60	3,753	3,730	146.10	6,512	21,435
142.70	3,821	4,109	146.20	6,635	22,092
142.80	3,890	4,494	146.30	6,759	22,762
142.90	3,960	4,887	146.40	6,883	23,444
143.00	4,030	5,286	146.50	7,009	24,139
143.10	4,100	5,693	146.60	7,136	24,846
143.20	4,171	6,106	146.70	7,265	25,566
143.30	4,243	6,527	146.80	7,394	26,299
143.40	4,315	6,955	146.90	7,524	27,045
143.50	4,387	7,390	147.00	7,656	27,804
143.60	4,461	7,832			
143.70	4,535	8,282			
143.80	4,609	8,739			
143.90	4,684	9,204			
144.00	4,760	9,676			
144.10	4,836	10,156			
144.20	4,913	10,643			
144.30	4,990	11,139			
144.40	5,068	11,641			
144.50	5,146	12,152			
144.60	5,226	12,671			
144.70	5,305	13,197			
144.80	5,386	13,732			
144.90	5,466	14,274			

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 68

Summary for Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)

Inflow Area = 102,654 sf, 63.38% Impervious, Inflow Depth = 2.26" for 2-Year event
 Inflow = 5.56 cfs @ 12.13 hrs, Volume= 19,321 cf
 Outflow = 0.15 cfs @ 9.90 hrs, Volume= 19,321 cf, Atten= 97%, Lag= 0.0 min
 Discarded = 0.15 cfs @ 9.90 hrs, Volume= 19,321 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link SP2 : STUDY POINT #2 (Wetlands West)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 168.00' @ 17.89 hrs Surf.Area= 6,514 sf Storage= 10,933 cf
 Flood Elev= 170.25' Surf.Area= 6,514 sf Storage= 25,924 cf

Plug-Flow detention time= 690.6 min calculated for 19,307 cf (100% of inflow)
 Center-of-Mass det. time= 691.0 min (1,513.0 - 822.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	166.50'	5,927 cf	33.25'W x 195.92'L x 3.75'H Field A 24,428 cf Overall - 9,610 cf Embedded = 14,819 cf x 40.0% Voids
#2A	167.00'	9,610 cf	ADS_StormTech SC-800 +Cap x 189 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 189 Chambers in 7 Rows Cap Storage= 3.4 cf x 2 x 7 rows = 47.9 cf
#3B	166.50'	4,524 cf	34.75'W x 131.78'L x 3.75'H Field B -Impervious 17,172 cf Overall - 5,863 cf Embedded = 11,309 cf x 40.0% Voids
#4B	167.25'	5,863 cf	ADS_StormTech DC-780 b +Cap x 126 Inside #3 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 126 Chambers in 7 Rows Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf
		25,924 cf	Total Available Storage

Storage Group A created with Chamber Wizard
 Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	166.50'	1.020 in/hr Exfiltration over Surface area
#2	Primary	168.00'	
			12.0" Round Culvert L= 124.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 168.00' / 161.60' S= 0.0516 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	169.75'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	168.00'	9.0" Vert. Orifice C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.15 cfs @ 9.90 hrs HW=166.54' (Free Discharge)
↳ **1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=166.50' (Free Discharge)
↳ **2=Culvert** (Controls 0.00 cfs)
↳ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
↳ **4=Orifice** (Controls 0.00 cfs)

Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-800 +Cap (ADS StormTech®SC-800 with cap volume)
Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf
Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap
Cap Storage= 3.4 cf x 2 x 7 rows = 47.9 cf

51.0" Wide + 3.0" Spacing = 54.0" C-C Row Spacing

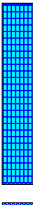
27 Chambers/Row x 7.12' Long +0.88' Cap Length x 2 = 193.92' Row Length +12.0" End Stone x 2 = 195.92' Base Length
7 Rows x 51.0" Wide + 3.0" Spacing x 6 + 12.0" Side Stone x 2 = 33.25' Base Width
6.0" Stone Base + 33.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

189 Chambers x 50.6 cf + 3.4 cf Cap Volume x 2 x 7 Rows = 9,609.8 cf Chamber Storage

24,428.4 cf Field - 9,609.8 cf Chambers = 14,818.5 cf Stone x 40.0% Voids = 5,927.4 cf Stone Storage

Chamber Storage + Stone Storage = 15,537.2 cf = 0.357 af
Overall Storage Efficiency = 63.6%
Overall System Size = 195.92' x 33.25' x 3.75'

189 Chambers
904.8 cy Field
548.8 cy Stone



Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780) - Chamber Wizard Field B

Chamber Model = ADS_StormTechDC-780 b +Cap (ADS StormTech®DC-780 with cap storage)

Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length

7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width

9.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

126 Chambers x 46.2 cf + 2.7 cf Cap Volume x 2 x 7 Rows = 5,863.3 cf Chamber Storage

17,172.1 cf Field - 5,863.3 cf Chambers = 11,308.9 cf Stone x 40.0% Voids = 4,523.5 cf Stone Storage

Chamber Storage + Stone Storage = 10,386.8 cf = 0.238 af

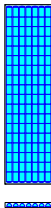
Overall Storage Efficiency = 60.5%

Overall System Size = 131.78' x 34.75' x 3.75'

126 Chambers

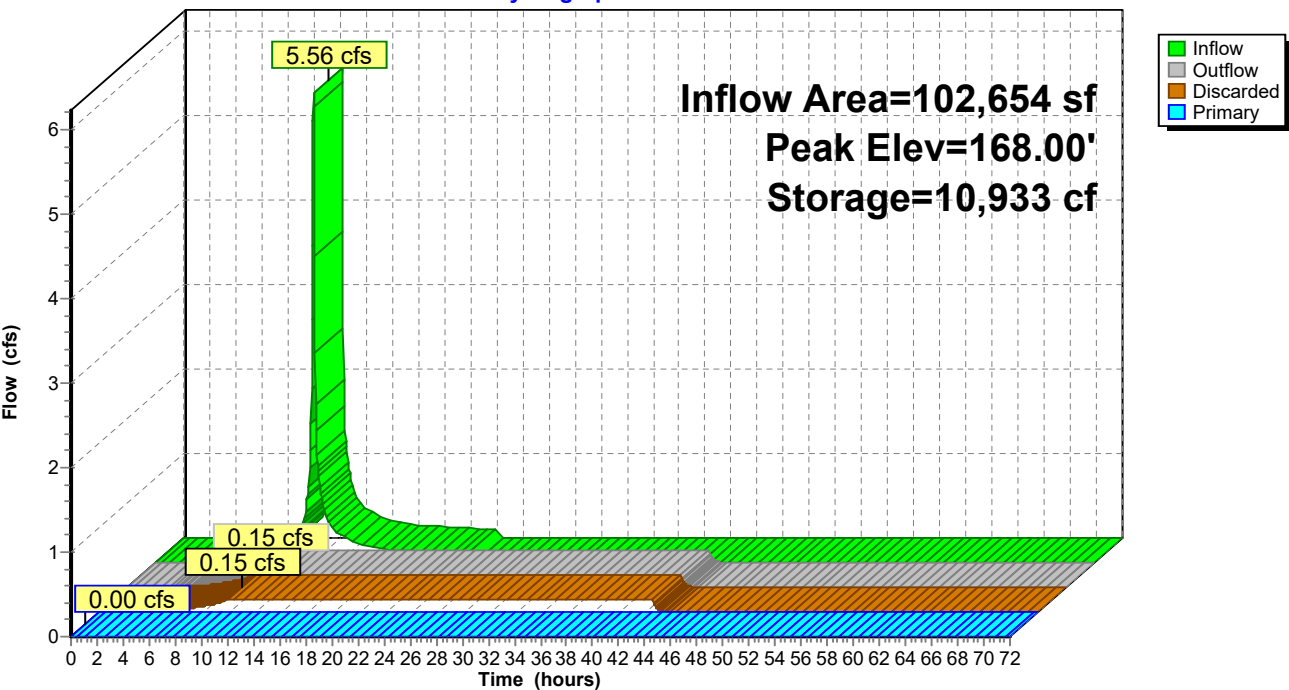
636.0 cy Field

418.8 cy Stone



Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)

Hydrograph



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 73

Stage-Area-Storage for Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
166.50	6,514	0	168.25	6,514	13,162	170.00	6,514	24,815
166.55	6,514	222	168.30	6,514	13,590	170.05	6,514	25,037
166.60	6,514	444	168.35	6,514	14,016	170.10	6,514	25,258
166.65	6,514	666	168.40	6,514	14,438	170.15	6,514	25,480
166.70	6,514	887	168.45	6,514	14,858	170.20	6,514	25,702
166.75	6,514	1,109	168.50	6,514	15,273	170.25	6,514	25,924
166.80	6,514	1,331	168.55	6,514	15,685			
166.85	6,514	1,553	168.60	6,514	16,093			
166.90	6,514	1,775	168.65	6,514	16,497			
166.95	6,514	1,997	168.70	6,514	16,897			
167.00	6,514	2,219	168.75	6,514	17,293			
167.05	6,514	2,592	168.80	6,514	17,685			
167.10	6,514	2,965	168.85	6,514	18,071			
167.15	6,514	3,338	168.90	6,514	18,453			
167.20	6,514	3,709	168.95	6,514	18,830			
167.25	6,514	4,080	169.00	6,514	19,200			
167.30	6,514	4,552	169.05	6,514	19,565			
167.35	6,514	5,023	169.10	6,514	19,924			
167.40	6,514	5,492	169.15	6,514	20,276			
167.45	6,514	5,959	169.20	6,514	20,622			
167.50	6,514	6,425	169.25	6,514	20,959			
167.55	6,514	6,889	169.30	6,514	21,288			
167.60	6,514	7,351	169.35	6,514	21,608			
167.65	6,514	7,812	169.40	6,514	21,916			
167.70	6,514	8,270	169.45	6,514	22,210			
167.75	6,514	8,727	169.50	6,514	22,487			
167.80	6,514	9,181	169.55	6,514	22,750			
167.85	6,514	9,633	169.60	6,514	23,001			
167.90	6,514	10,083	169.65	6,514	23,244			
167.95	6,514	10,531	169.70	6,514	23,478			
168.00	6,514	10,976	169.75	6,514	23,705			
168.05	6,514	11,419	169.80	6,514	23,927			
168.10	6,514	11,859	169.85	6,514	24,149			
168.15	6,514	12,296	169.90	6,514	24,371			
168.20	6,514	12,730	169.95	6,514	24,593			

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 74

Summary for Pond 3P: UIS-2 (SC-800)

Inflow Area = 32,510 sf, 63.97% Impervious, Inflow Depth = 2.32" for 2-Year event
 Inflow = 1.80 cfs @ 12.13 hrs, Volume= 6,272 cf
 Outflow = 0.31 cfs @ 12.57 hrs, Volume= 6,272 cf, Atten= 83%, Lag= 26.7 min
 Discarded = 0.06 cfs @ 9.95 hrs, Volume= 4,728 cf
 Primary = 0.25 cfs @ 12.57 hrs, Volume= 1,544 cf
 Routed to Link SP2 : STUDY POINT #2 (Wetlands West)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 161.53' @ 12.57 hrs Surf.Area= 2,359 sf Storage= 2,292 cf
 Flood Elev= 163.85' Surf.Area= 2,359 sf Storage= 5,566 cf

Plug-Flow detention time= 268.5 min calculated for 6,272 cf (100% of inflow)
 Center-of-Mass det. time= 268.4 min (1,088.8 - 820.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	160.10'	2,186 cf	28.75'W x 82.05'L x 3.75'H Field A 8,846 cf Overall - 3,380 cf Embedded = 5,466 cf x 40.0% Voids
#2A	160.60'	3,380 cf	ADS_StormTech SC-800 +Cap x 66 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 66 Chambers in 6 Rows Cap Storage= 3.4 cf x 2 x 6 rows = 41.0 cf
		5,566 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	160.10'	1.020 in/hr Exfiltration over Surface area
#2	Primary	161.25'	12.0" Round Culvert L= 9.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.25' / 161.00' S= 0.0278 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	163.60'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 75

Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4 Device 2 161.25' **8.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 9.95 hrs HW=160.14' (Free Discharge)
↑ **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.25 cfs @ 12.57 hrs HW=161.53' (Free Discharge)
↑ **2=Culvert** (Passes 0.25 cfs of 0.26 cfs potential flow)
↑ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
↑ **4=Orifice** (Orifice Controls 0.25 cfs @ 1.81 fps)

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 76

Pond 3P: UIS-2 (SC-800) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-800 +Cap (ADS StormTech®SC-800 with cap volume)

Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf

Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap

Cap Storage= 3.4 cf x 2 x 6 rows = 41.0 cf

51.0" Wide + 3.0" Spacing = 54.0" C-C Row Spacing

11 Chambers/Row x 7.12' Long +0.88' Cap Length x 2 = 80.05' Row Length +12.0" End Stone x 2 = 82.05' Base Length

6 Rows x 51.0" Wide + 3.0" Spacing x 5 + 12.0" Side Stone x 2 = 28.75' Base Width

6.0" Stone Base + 33.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

66 Chambers x 50.6 cf + 3.4 cf Cap Volume x 2 x 6 Rows = 3,380.1 cf Chamber Storage

8,846.0 cf Field - 3,380.1 cf Chambers = 5,465.9 cf Stone x 40.0% Voids = 2,186.4 cf Stone Storage

Chamber Storage + Stone Storage = 5,566.5 cf = 0.128 af

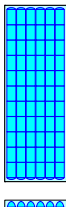
Overall Storage Efficiency = 62.9%

Overall System Size = 82.05' x 28.75' x 3.75'

66 Chambers

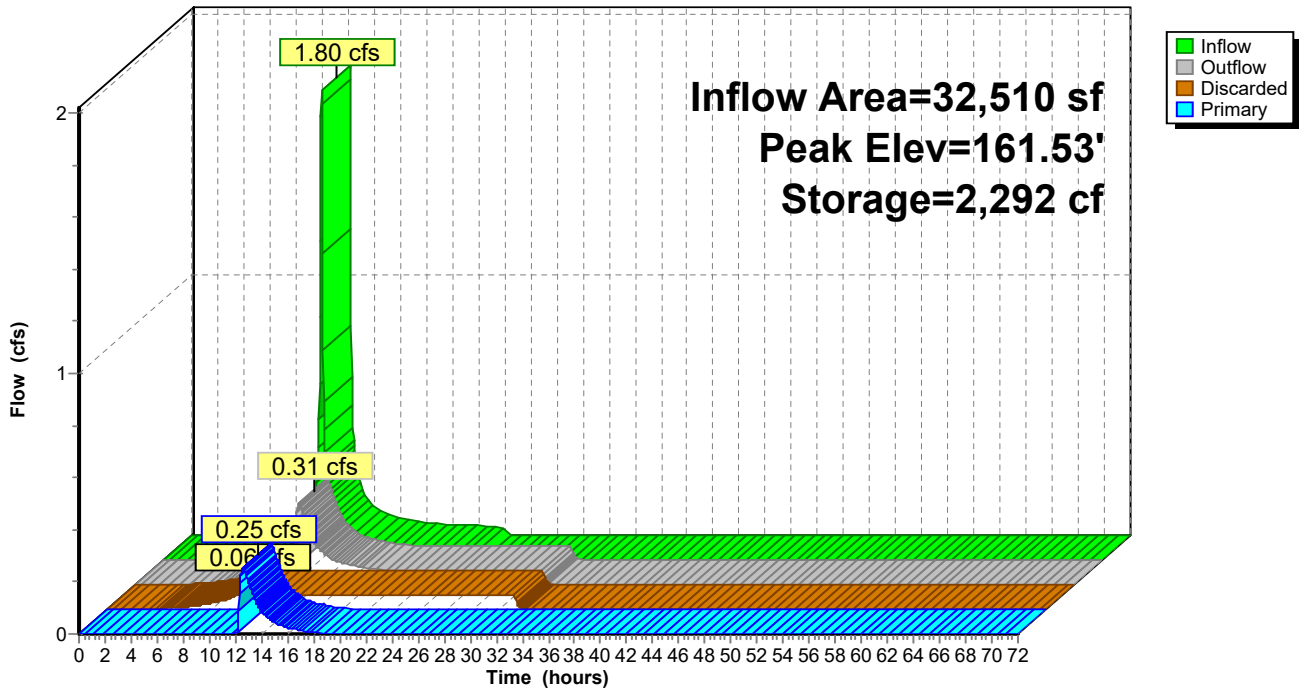
327.6 cy Field

202.4 cy Stone



Pond 3P: UIS-2 (SC-800)

Hydrograph



Stage-Area-Storage for Pond 3P: UIS-2 (SC-800)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
160.10	2,359	0	161.85	2,359	2,878	163.60	2,359	5,331
160.15	2,359	47	161.90	2,359	2,968	163.65	2,359	5,378
160.20	2,359	94	161.95	2,359	3,057	163.70	2,359	5,425
160.25	2,359	142	162.00	2,359	3,146	163.75	2,359	5,472
160.30	2,359	189	162.05	2,359	3,234	163.80	2,359	5,519
160.35	2,359	236	162.10	2,359	3,321	163.85	2,359	5,566
160.40	2,359	283	162.15	2,359	3,407			
160.45	2,359	330	162.20	2,359	3,493			
160.50	2,359	377	162.25	2,359	3,578			
160.55	2,359	425	162.30	2,359	3,662			
160.60	2,359	472	162.35	2,359	3,745			
160.65	2,359	520	162.40	2,359	3,827			
160.70	2,359	567	162.45	2,359	3,908			
160.75	2,359	614	162.50	2,359	3,988			
160.80	2,359	661	162.55	2,359	4,067			
160.85	2,359	708	162.60	2,359	4,145			
160.90	2,359	755	162.65	2,359	4,222			
160.95	2,359	802	162.70	2,359	4,297			
161.00	2,359	849	162.75	2,359	4,371			
161.05	2,359	896	162.80	2,359	4,444			
161.10	2,359	943	162.85	2,359	4,515			
161.15	2,359	990	162.90	2,359	4,584			
161.20	2,359	1,037	162.95	2,359	4,651			
161.25	2,359	1,084	163.00	2,359	4,716			
161.30	2,359	1,131	163.05	2,359	4,777			
161.35	2,359	1,178	163.10	2,359	4,836			
161.40	2,359	1,225	163.15	2,359	4,891			
161.45	2,359	1,272	163.20	2,359	4,944			
161.50	2,359	1,319	163.25	2,359	4,996			
161.55	2,359	1,366	163.30	2,359	5,046			
161.60	2,359	1,413	163.35	2,359	5,095			
161.65	2,359	1,460	163.40	2,359	5,142			
161.70	2,359	1,507	163.45	2,359	5,189			
161.75	2,359	1,554	163.50	2,359	5,236			
161.80	2,359	1,601	163.55	2,359	5,283			

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 79

Summary for Pond 4P: UDS-2 (SC-310)

Inflow Area = 7,417 sf, 51.89% Impervious, Inflow Depth = 1.98" for 2-Year event
Inflow = 0.36 cfs @ 12.13 hrs, Volume= 1,226 cf
Outflow = 0.32 cfs @ 12.17 hrs, Volume= 1,226 cf, Atten= 12%, Lag= 2.1 min
Primary = 0.32 cfs @ 12.17 hrs, Volume= 1,226 cf
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 133.94' @ 12.17 hrs Surf.Area= 375 sf Storage= 66 cf
Flood Elev= 135.83' Surf.Area= 375 sf Storage= 456 cf

Plug-Flow detention time= 9.3 min calculated for 1,225 cf (100% of inflow)
Center-of-Mass det. time= 9.4 min (851.1 - 841.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	133.50'	279 cf	8.17'W x 45.92'L x 2.33'H Field A 875 cf Overall - 177 cf Embedded = 698 cf x 40.0% Voids
#2A	134.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
		456 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	133.50'	12.0" Round Culvert L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 133.50' / 132.84' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	135.40'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	133.50'	5.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 80

Primary OutFlow Max=0.31 cfs @ 12.17 hrs HW=133.93' (Free Discharge)

- 1=Culvert (Passes 0.31 cfs of 0.57 cfs potential flow)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 3=Orifice/Grate (Orifice Controls 0.31 cfs @ 2.28 fps)

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 81

Pond 4P: UDS-2 (SC-310) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

875.0 cf Field - 176.9 cf Chambers = 698.1 cf Stone x 40.0% Voids = 279.3 cf Stone Storage

Chamber Storage + Stone Storage = 456.2 cf = 0.010 af

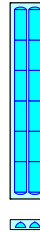
Overall Storage Efficiency = 52.1%

Overall System Size = 45.92' x 8.17' x 2.33'

12 Chambers

32.4 cy Field

25.9 cy Stone

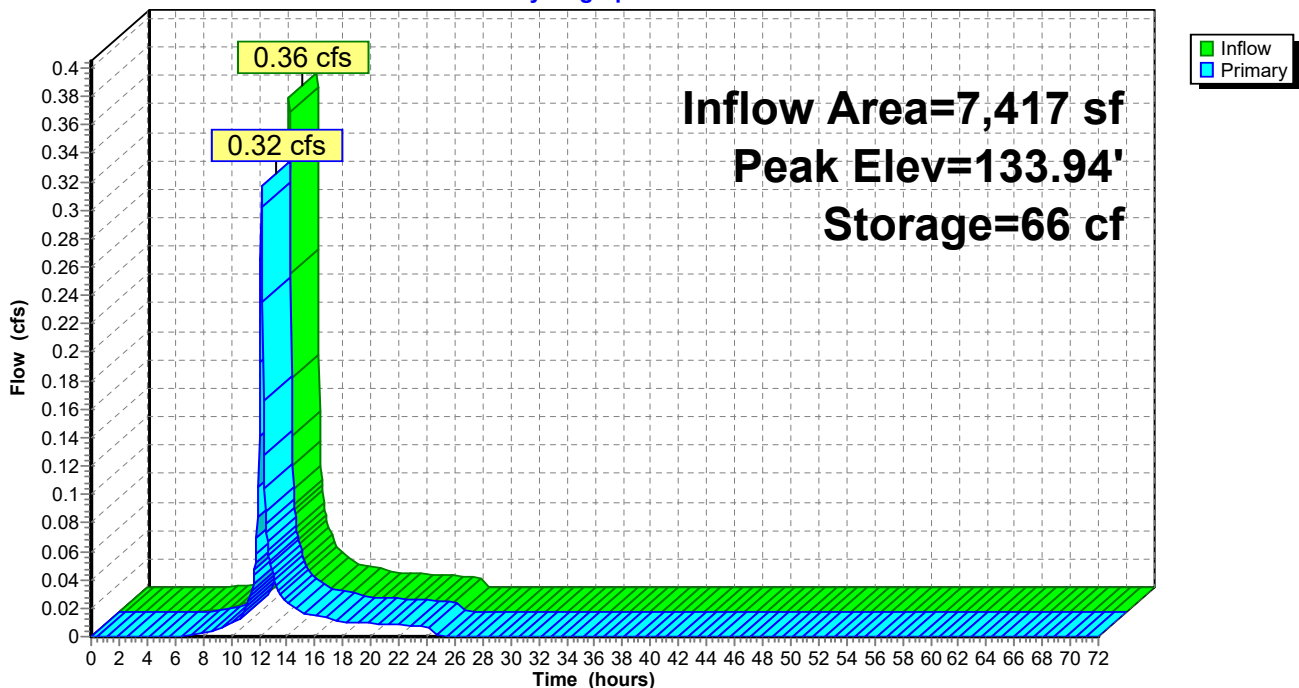
**3410-03 - Proposed HydroCAD**

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 82

Pond 4P: UDS-2 (SC-310)**Hydrograph**

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 83

Stage-Area-Storage for Pond 4P: UDS-2 (SC-310)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
133.50	0	134.20	129	134.90	303	135.60	421
133.52	3	134.22	135	134.92	307	135.62	424
133.54	6	134.24	140	134.94	311	135.64	427
133.56	9	134.26	145	134.96	315	135.66	430
133.58	12	134.28	151	134.98	320	135.68	433
133.60	15	134.30	156	135.00	324	135.70	436
133.62	18	134.32	161	135.02	328	135.72	439
133.64	21	134.34	166	135.04	332	135.74	442
133.66	24	134.36	172	135.06	336	135.76	445
133.68	27	134.38	177	135.08	339	135.78	448
133.70	30	134.40	182	135.10	343	135.80	451
133.72	33	134.42	187	135.12	347	135.82	454
133.74	36	134.44	192	135.14	350		
133.76	39	134.46	197	135.16	353		
133.78	42	134.48	203	135.18	357		
133.80	45	134.50	208	135.20	360		
133.82	48	134.52	213	135.22	363		
133.84	51	134.54	218	135.24	367		
133.86	54	134.56	223	135.26	370		
133.88	57	134.58	228	135.28	373		
133.90	60	134.60	233	135.30	376		
133.92	63	134.62	237	135.32	379		
133.94	66	134.64	242	135.34	382		
133.96	69	134.66	247	135.36	385		
133.98	72	134.68	252	135.38	388		
134.00	75	134.70	257	135.40	391		
134.02	80	134.72	262	135.42	394		
134.04	86	134.74	266	135.44	397		
134.06	91	134.76	271	135.46	400		
134.08	97	134.78	276	135.48	403		
134.10	102	134.80	280	135.50	406		
134.12	108	134.82	285	135.52	409		
134.14	113	134.84	289	135.54	412		
134.16	119	134.86	294	135.56	415		
134.18	124	134.88	298	135.58	418		

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 2-Year Rainfall=3.37"

Printed 6/1/2026

Page 84

Summary for Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)

Inflow Area = 54,619 sf, 49.01% Impervious, Inflow Depth = 1.98" for 2-Year event
 Inflow = 2.55 cfs @ 12.13 hrs, Volume= 9,033 cf
 Outflow = 0.31 cfs @ 12.91 hrs, Volume= 9,033 cf, Atten= 88%, Lag= 46.7 min
 Discarded = 0.06 cfs @ 9.75 hrs, Volume= 6,206 cf
 Primary = 0.25 cfs @ 12.91 hrs, Volume= 2,827 cf
 Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 165.06' @ 12.91 hrs Surf.Area= 2,656 sf Storage= 3,576 cf
 Flood Elev= 166.33' Surf.Area= 2,656 sf Storage= 8,598 cf

Plug-Flow detention time= 321.8 min calculated for 9,027 cf (100% of inflow)
 Center-of-Mass det. time= 322.1 min (1,146.0 - 823.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	164.00'	1,830 cf	32.58'W x 81.52'L x 2.33'H Field A 6,198 cf Overall - 1,622 cf Embedded = 4,576 cf x 40.0% Voids
#2A	164.50'	1,622 cf	ADS_StormTech SC-310 +Cap x 110 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 110 Chambers in 10 Rows
#3B	164.00'	3,315 cf	34.75'W x 96.18'L x 3.75'H Field B -Impervious 12,533 cf Overall - 4,245 cf Embedded = 8,288 cf x 40.0% Voids
#4B	164.75'	4,245 cf	ADS_StormTech DC-780 b +Cap x 91 Inside #3 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 7 Rows Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf
		11,012 cf	Total Available Storage

Storage Group A created with Chamber Wizard
 Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	164.00'	1.020 in/hr Exfiltration over Surface area
#2	Primary	164.00'	
			12.0" Round Culvert L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.00' / 160.32' S= 0.0400 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	165.75'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	164.80'	10.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 9.75 hrs HW=164.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.25 cfs @ 12.91 hrs HW=165.06' (Free Discharge)
2=Culvert (Passes 0.25 cfs of 2.23 cfs potential flow)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
4=Orifice/Grate (Orifice Controls 0.25 cfs @ 1.73 fps)

Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 3.0" Spacing = 37.0" C-C Row Spacing

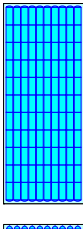
11 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 79.52' Row Length +12.0" End Stone x 2 = 81.52' Base Length
10 Rows x 34.0" Wide + 3.0" Spacing x 9 + 12.0" Side Stone x 2 = 32.58' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

110 Chambers x 14.7 cf = 1,621.6 cf Chamber Storage

6,197.8 cf Field - 1,621.6 cf Chambers = 4,576.2 cf Stone x 40.0% Voids = 1,830.5 cf Stone Storage

Chamber Storage + Stone Storage = 3,452.1 cf = 0.079 af
Overall Storage Efficiency = 55.7%
Overall System Size = 81.52' x 32.58' x 2.33'

110 Chambers
229.5 cy Field
169.5 cy Stone



Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780) - Chamber Wizard Field B

Chamber Model = ADS_StormTechDC-780 b +Cap (ADS StormTech®DC-780 with cap storage)
Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

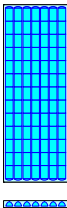
13 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 94.18' Row Length +12.0" End Stone x 2 = 96.18' Base Length
7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width
9.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

91 Chambers x 46.2 cf + 2.7 cf Cap Volume x 2 x 7 Rows = 4,244.9 cf Chamber Storage

12,533.0 cf Field - 4,244.9 cf Chambers = 8,288.1 cf Stone x 40.0% Voids = 3,315.2 cf Stone Storage

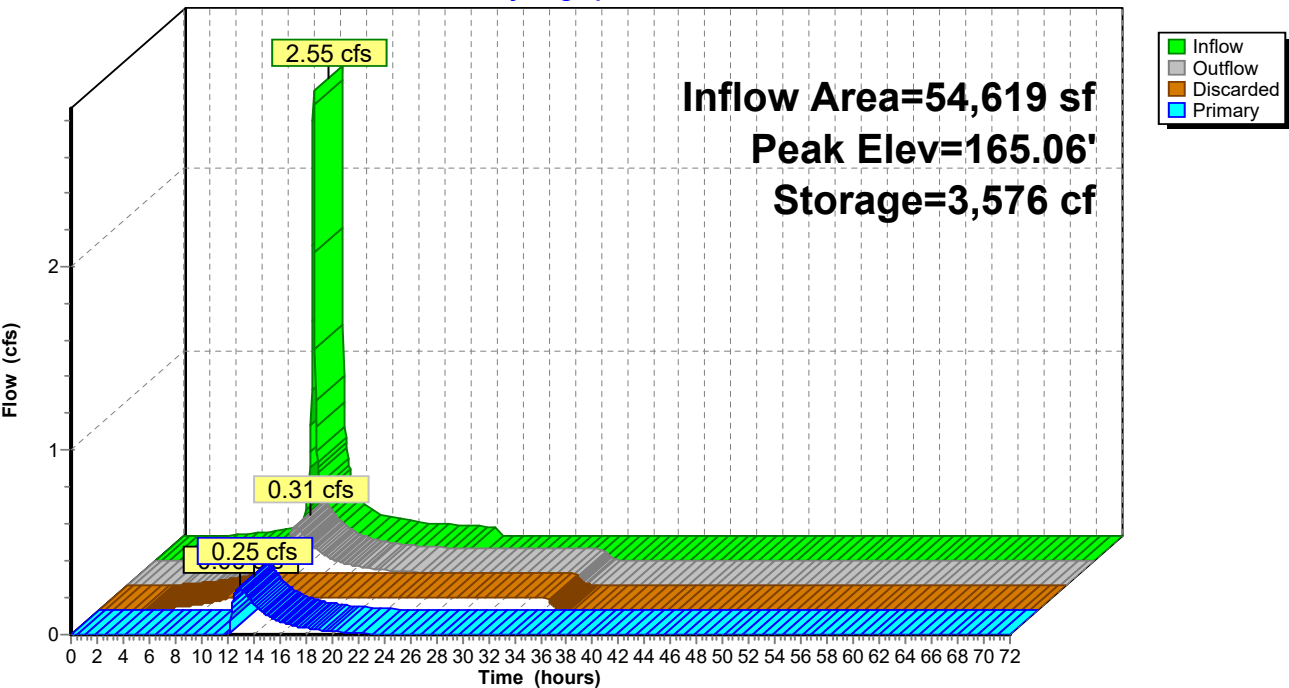
Chamber Storage + Stone Storage = 7,560.2 cf = 0.174 af
Overall Storage Efficiency = 60.3%
Overall System Size = 96.18' x 34.75' x 3.75'

91 Chambers
464.2 cy Field
307.0 cy Stone



Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)

Hydrograph



Stage-Area-Storage for Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)

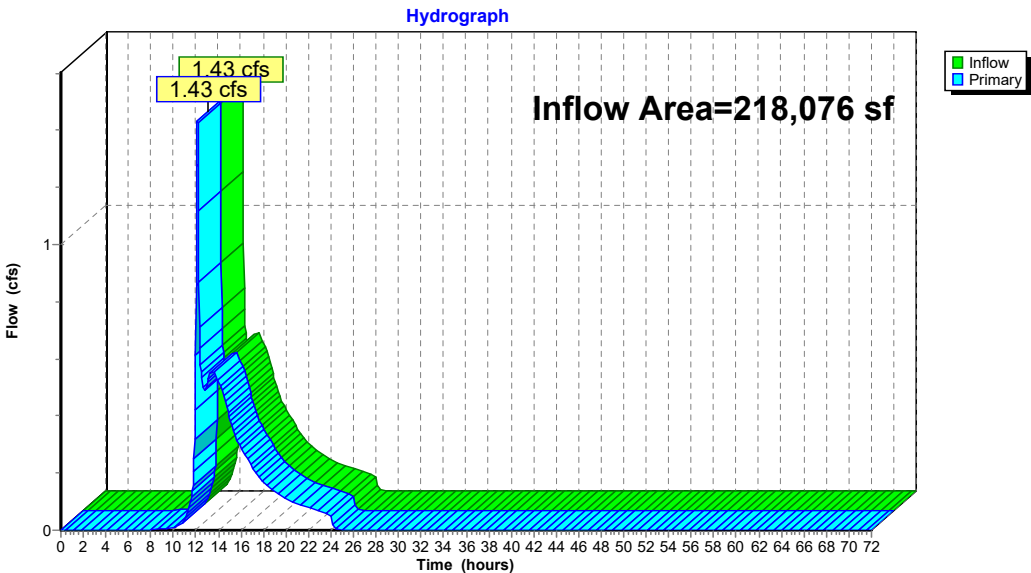
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
164.00	2,656	0	165.75	2,656	6,550	167.50	2,656	10,678
164.05	2,656	120	165.80	2,656	6,735	167.55	2,656	10,745
164.10	2,656	240	165.85	2,656	6,916	167.60	2,656	10,812
164.15	2,656	360	165.90	2,656	7,096	167.65	2,656	10,879
164.20	2,656	480	165.95	2,656	7,275	167.70	2,656	10,945
164.25	2,656	600	166.00	2,656	7,453	167.75	2,656	11,012
164.30	2,656	720	166.05	2,656	7,630			
164.35	2,656	840	166.10	2,656	7,805			
164.40	2,656	960	166.15	2,656	7,980			
164.45	2,656	1,080	166.20	2,656	8,153			
164.50	2,656	1,200	166.25	2,656	8,325			
164.55	2,656	1,376	166.30	2,656	8,496			
164.60	2,656	1,552	166.35	2,656	8,648			
164.65	2,656	1,728	166.40	2,656	8,762			
164.70	2,656	1,902	166.45	2,656	8,875			
164.75	2,656	2,076	166.50	2,656	8,987			
164.80	2,656	2,323	166.55	2,656	9,096			
164.85	2,656	2,568	166.60	2,656	9,204			
164.90	2,656	2,812	166.65	2,656	9,310			
164.95	2,656	3,054	166.70	2,656	9,414			
165.00	2,656	3,294	166.75	2,656	9,516			
165.05	2,656	3,532	166.80	2,656	9,615			
165.10	2,656	3,768	166.85	2,656	9,712			
165.15	2,656	4,002	166.90	2,656	9,805			
165.20	2,656	4,234	166.95	2,656	9,894			
165.25	2,656	4,464	167.00	2,656	9,979			
165.30	2,656	4,690	167.05	2,656	10,058			
165.35	2,656	4,914	167.10	2,656	10,133			
165.40	2,656	5,134	167.15	2,656	10,206			
165.45	2,656	5,351	167.20	2,656	10,276			
165.50	2,656	5,564	167.25	2,656	10,344			
165.55	2,656	5,772	167.30	2,656	10,411			
165.60	2,656	5,974	167.35	2,656	10,478			
165.65	2,656	6,171	167.40	2,656	10,544			
165.70	2,656	6,362	167.45	2,656	10,611			

Summary for Link SP1: STUDY POINT #1 (Kimball Road north)

Inflow Area = 218,076 sf, 43.75% Impervious, Inflow Depth = 0.64" for 2-Year event
Inflow = 1.43 cfs @ 12.14 hrs, Volume= 11,691 cf
Primary = 1.43 cfs @ 12.14 hrs, Volume= 11,691 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP1: STUDY POINT #1 (Kimball Road north)

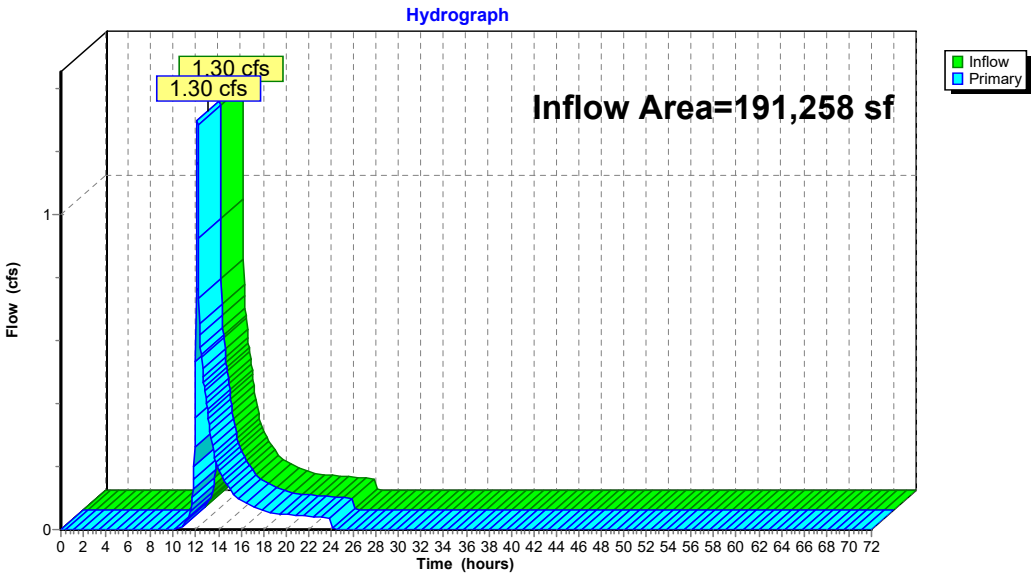


Summary for Link SP2: STUDY POINT #2 (Wetlands West)

Inflow Area = 191,258 sf, 44.90% Impervious, Inflow Depth = 0.38" for 2-Year event
Inflow = 1.30 cfs @ 12.14 hrs, Volume= 6,134 cf
Primary = 1.30 cfs @ 12.14 hrs, Volume= 6,134 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP2: STUDY POINT #2 (Wetlands West)



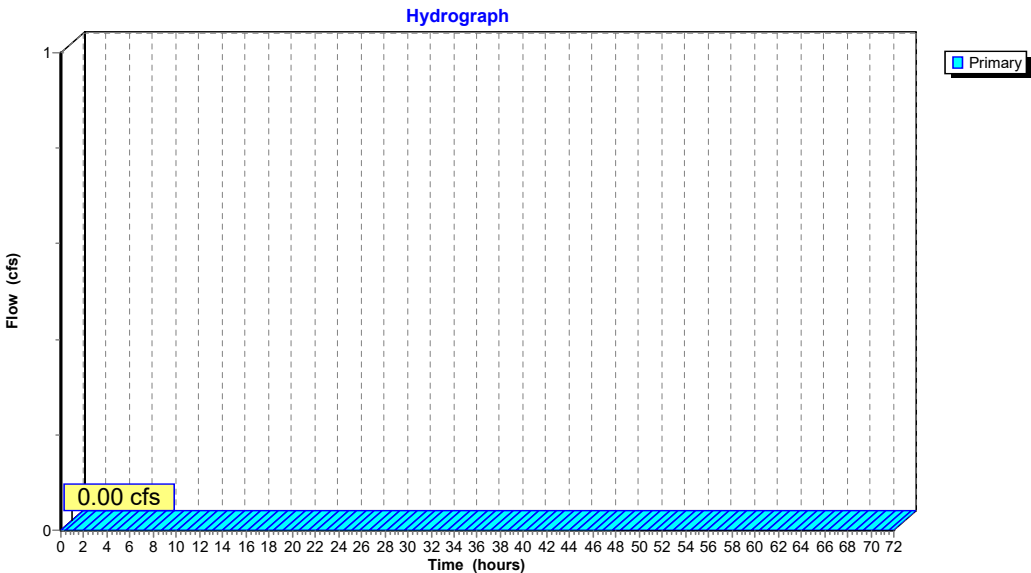
Summary for Link SP3: STUDY POINT #3 (IVW south)

[43] Hint: Has no inflow (Outflow=Zero)

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP3: STUDY POINT #3 (IVW south)



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 93

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 P-1: Subcat P-1	Runoff Area=14,876 sf 72.61% Impervious Runoff Depth=4.30" Tc=6.0 min CN=91 Runoff=1.48 cfs 5,334 cf
Subcatchment P-10: Subcat P-10	Runoff Area=8,341 sf 78.96% Impervious Runoff Depth=4.52" Tc=6.0 min CN=93 Runoff=0.85 cfs 3,144 cf
Subcatchment P-11: Subcat P-11	Runoff Area=8,941 sf 76.40% Impervious Runoff Depth=4.41" Tc=6.0 min CN=92 Runoff=0.90 cfs 3,287 cf
Subcatchment P-12: Subcat P-12	Runoff Area=19,709 sf 57.44% Impervious Runoff Depth=3.98" Tc=6.0 min CN=88 Runoff=1.86 cfs 6,542 cf
Subcatchment P-13: Subcat P-13	Runoff Area=10,271 sf 79.93% Impervious Runoff Depth=4.52" Tc=6.0 min CN=93 Runoff=1.05 cfs 3,871 cf
Subcatchment P-14: Subcat P-14	Runoff Area=7,633 sf 64.61% Impervious Runoff Depth=4.20" Tc=6.0 min CN=90 Runoff=0.75 cfs 2,668 cf
Subcatchment P-15: Subcat P-15	Runoff Area=14,623 sf 52.15% Impervious Runoff Depth=3.88" Tc=6.0 min CN=87 Runoff=1.35 cfs 4,727 cf
Subcatchment P-16: Subcat P-16	Runoff Area=13,061 sf 79.56% Impervious Runoff Depth=4.52" Tc=6.0 min CN=93 Runoff=1.34 cfs 4,922 cf
Subcatchment P-17: Subcat P-17	Runoff Area=10,295 sf 68.44% Impervious Runoff Depth=4.20" Tc=6.0 min CN=90 Runoff=1.01 cfs 3,599 cf
Subcatchment P-18: Subcat P-18	Runoff Area=6,252 sf 71.75% Impervious Runoff Depth=4.30" Tc=6.0 min CN=91 Runoff=0.62 cfs 2,242 cf
Subcatchment P-18A: Subcat P-18A	Runoff Area=7,417 sf 51.89% Impervious Runoff Depth=3.78" Tc=6.0 min CN=86 Runoff=0.67 cfs 2,334 cf

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 94

Subcatchment P-19: Subcat P-19	Runoff Area=21,732 sf 51.13% Impervious Runoff Depth=3.78" Tc=6.0 min CN=86 Runoff=1.97 cfs 6,839 cf
Subcatchment P-2: Subcat P-2	Runoff Area=8,672 sf 75.35% Impervious Runoff Depth=4.41" Tc=6.0 min CN=92 Runoff=0.87 cfs 3,188 cf
Subcatchment P-20: Subcat P-20	Runoff Area=41,652 sf 45.57% Impervious Runoff Depth=3.67" Tc=6.0 min CN=85 Runoff=3.69 cfs 12,754 cf
Subcatchment P-21: Subcat P-21	Runoff Area=56,094 sf 0.01% Impervious Runoff Depth=2.37" Tc=6.0 min CN=71 Runoff=3.28 cfs 11,074 cf
Subcatchment P-22: Subcat P-22	Runoff Area=31,338 sf 0.00% Impervious Runoff Depth=2.45" Tc=6.0 min CN=72 Runoff=1.90 cfs 6,411 cf
Subcatchment P-23: Subcat P-23	Runoff Area=14,063 sf 0.00% Impervious Runoff Depth=2.45" Tc=6.0 min CN=72 Runoff=0.85 cfs 2,877 cf
Subcatchment P-24: Subcat P-24	Runoff Area=21,686 sf 33.62% Impervious Runoff Depth=3.38" Tc=6.0 min CN=82 Runoff=1.79 cfs 6,101 cf
Subcatchment P-25: Subcat P-25	Runoff Area=19,846 sf 0.02% Impervious Runoff Depth=2.37" Tc=6.0 min CN=71 Runoff=1.16 cfs 3,918 cf
Subcatchment P-3: Subcat P-3	Runoff Area=10,249 sf 79.91% Impervious Runoff Depth=4.52" Tc=6.0 min CN=93 Runoff=1.05 cfs 3,862 cf
Subcatchment P-4: Subcat P-4	Runoff Area=12,573 sf 84.83% Impervious Runoff Depth=4.63" Tc=6.0 min CN=94 Runoff=1.30 cfs 4,855 cf
Subcatchment P-5: Subcat P-5	Runoff Area=5,504 sf 81.03% Impervious Runoff Depth=4.52" Tc=6.0 min CN=93 Runoff=0.56 cfs 2,074 cf
Subcatchment P-6: Subcat P-6	Runoff Area=9,128 sf 59.53% Impervious Runoff Depth=3.98" Tc=6.0 min CN=88 Runoff=0.86 cfs 3,030 cf

Subcatchment P-6A: Subcat P-6A	Runoff Area=8,474 sf 69.12% Impervious Runoff Depth=4.30" Tc=6.0 min CN=91 Runoff=0.84 cfs 3,038 cf
Subcatchment P-7: Subcat P-7	Runoff Area=9,413 sf 77.70% Impervious Runoff Depth=4.52" Tc=6.0 min CN=93 Runoff=0.96 cfs 3,547 cf
Subcatchment P-8: Subcat P-8	Runoff Area=9,310 sf 71.77% Impervious Runoff Depth=4.30" Tc=6.0 min CN=91 Runoff=0.92 cfs 3,338 cf
Subcatchment P-9: Subcat P-9	Runoff Area=8,180 sf 81.46% Impervious Runoff Depth=4.63" Tc=6.0 min CN=94 Runoff=0.85 cfs 3,159 cf
Pond 1P: Infiltration Basin	Peak Elev=145.06' Storage=15,147 cf Inflow=10.37 cfs 36,784 cf Discarded=0.13 cfs 17,440 cf Primary=2.82 cfs 19,344 cf Outflow=2.96 cfs 36,784 cf
Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)	Peak Elev=168.59' Storage=15,985 cf Inflow=9.81 cfs 35,098 cf Discarded=0.15 cfs 22,283 cf Primary=0.97 cfs 12,815 cf Outflow=1.12 cfs 35,098 cf
Pond 3P: UIS-2 (SC-800)	Peak Elev=162.22' Storage=3,524 cf Inflow=3.15 cfs 11,313 cf Discarded=0.06 cfs 5,553 cf Primary=1.34 cfs 5,760 cf Outflow=1.39 cfs 11,313 cf
Pond 4P: UDS-2 (SC-310)	Peak Elev=134.28' Storage=149 cf Inflow=0.67 cfs 2,334 cf Outflow=0.49 cfs 2,334 cf
Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)	Peak Elev=165.56' Storage=5,799 cf Inflow=4.69 cfs 16,846 cf Discarded=0.06 cfs 7,027 cf Primary=1.54 cfs 9,819 cf Outflow=1.60 cfs 16,846 cf
Link SP1: STUDY POINT #1 (Kimball Road north)	Inflow=6.20 cfs 40,785 cf Primary=6.20 cfs 40,785 cf
Link SP2: STUDY POINT #2 (Wetlands West)	Inflow=4.39 cfs 29,649 cf Primary=4.39 cfs 29,649 cf
Link SP3: STUDY POINT #3 (IVW south)	Primary=0.00 cfs 0 cf

Total Runoff Area = 409,335 sf Runoff Volume = 122,737 cf Average Runoff Depth = 3.60"
55.72% Pervious = 228,062 sf 44.28% Impervious = 181,273 sf

Summary for Subcatchment P-1: Subcat P-1

Runoff = 1.48 cfs @ 12.13 hrs, Volume= 5,334 cf, Depth= 4.30"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

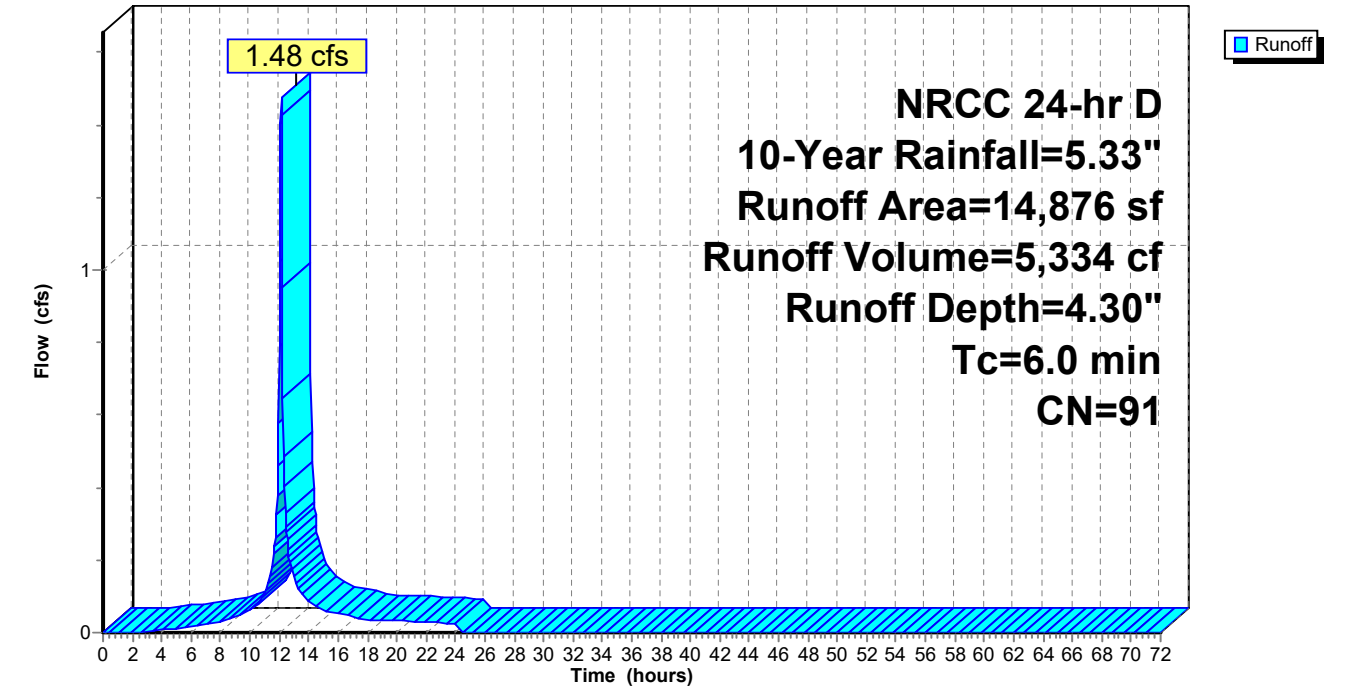
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
4,074	74	>75% Grass cover, Good, HSG C
1,784	98	Paved parking, HSG C
9,018	98	Roofs, HSG C
14,876	91	Weighted Average
4,074		27.39% Pervious Area
10,801		72.61% Impervious Area

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

Subcatchment P-1: Subcat P-1

Hydrograph



Summary for Subcatchment P-10: Subcat P-10

Runoff = 0.85 cfs @ 12.13 hrs, Volume= 3,144 cf, Depth= 4.52"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

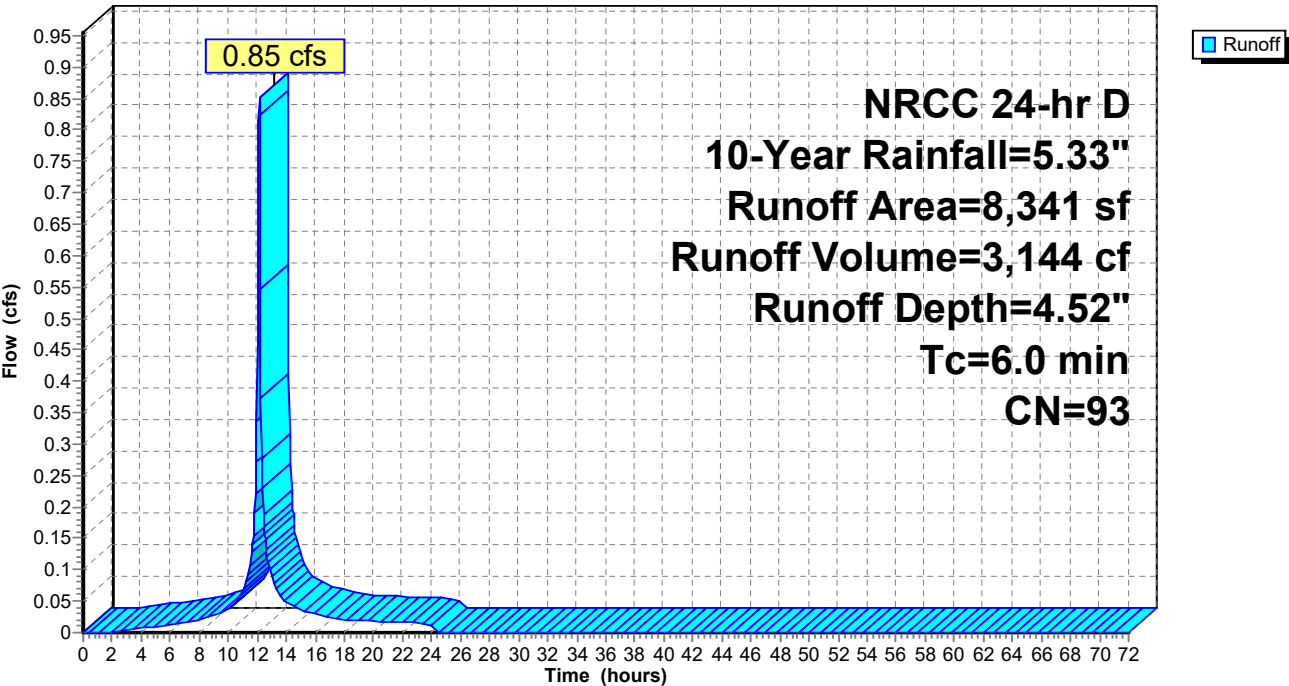
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
1,755	74	>75% Grass cover, Good, HSG C
6,446	98	Paved parking, HSG C
139	98	Roofs, HSG C
8,341	93	Weighted Average
1,755		21.04% Pervious Area
6,586		78.96% Impervious Area

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

Subcatchment P-10: Subcat P-10

Hydrograph



Summary for Subcatchment P-11: Subcat P-11

Runoff = 0.90 cfs @ 12.13 hrs, Volume= 3,287 cf, Depth= 4.41"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

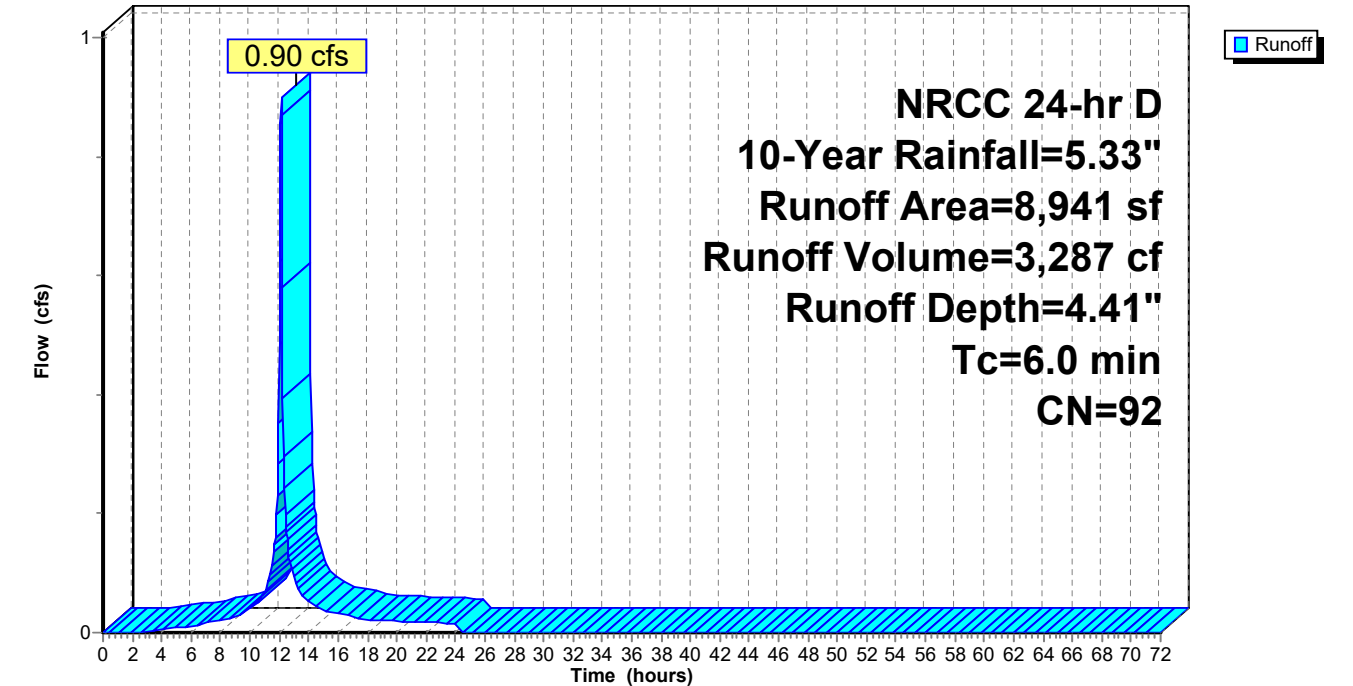
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
2,110	74	>75% Grass cover, Good, HSG C
6,825	98	Paved parking, HSG C
6	98	Roofs, HSG C
8,941	92	Weighted Average
2,110		23.60% Pervious Area
6,831		76.40% Impervious Area

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

Subcatchment P-11: Subcat P-11

Hydrograph



Summary for Subcatchment P-12: Subcat P-12

Runoff = 1.86 cfs @ 12.13 hrs, Volume= 6,542 cf, Depth= 3.98"
Routed to Pond 1P : Infiltration Basin

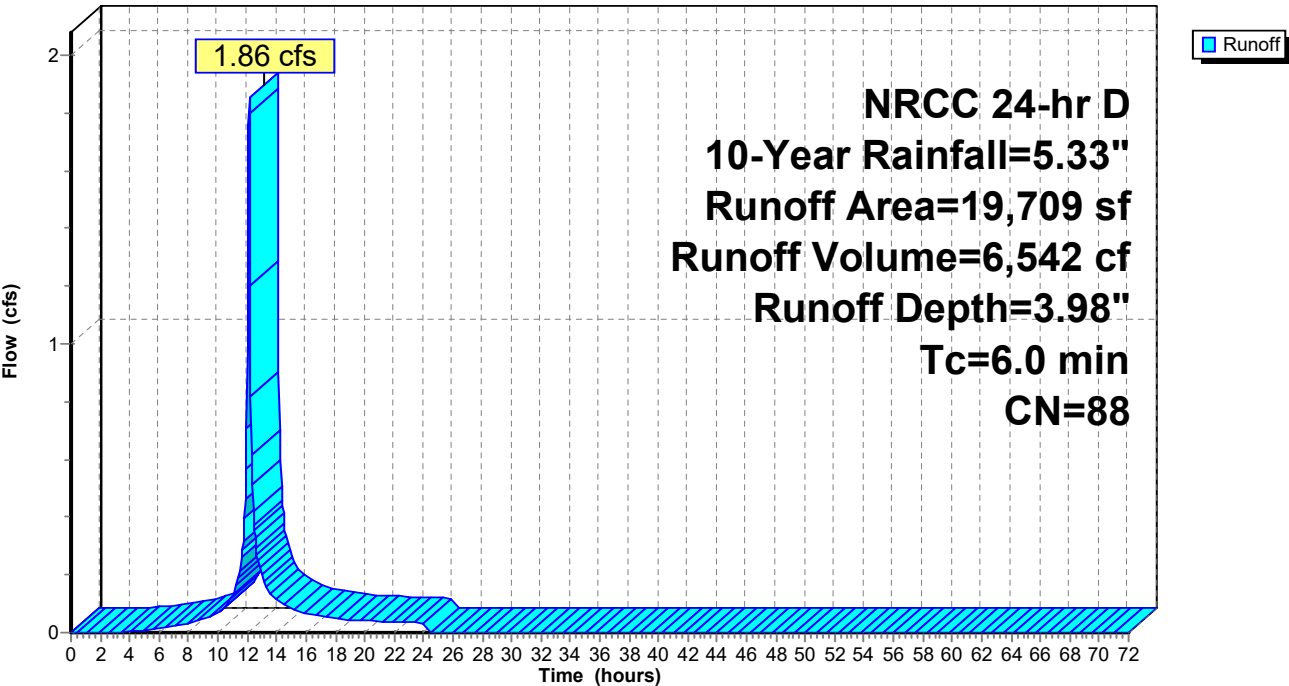
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
8,387	74	>75% Grass cover, Good, HSG C
1,531	98	Paved parking, HSG C
9,791	98	Roofs, HSG C
19,709	88	Weighted Average
8,387		42.56% Pervious Area
11,322		57.44% Impervious Area

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

Subcatchment P-12: Subcat P-12

Hydrograph



Summary for Subcatchment P-13: Subcat P-13

Runoff = 1.05 cfs @ 12.13 hrs, Volume= 3,871 cf, Depth= 4.52"
Routed to Pond 1P : Infiltration Basin

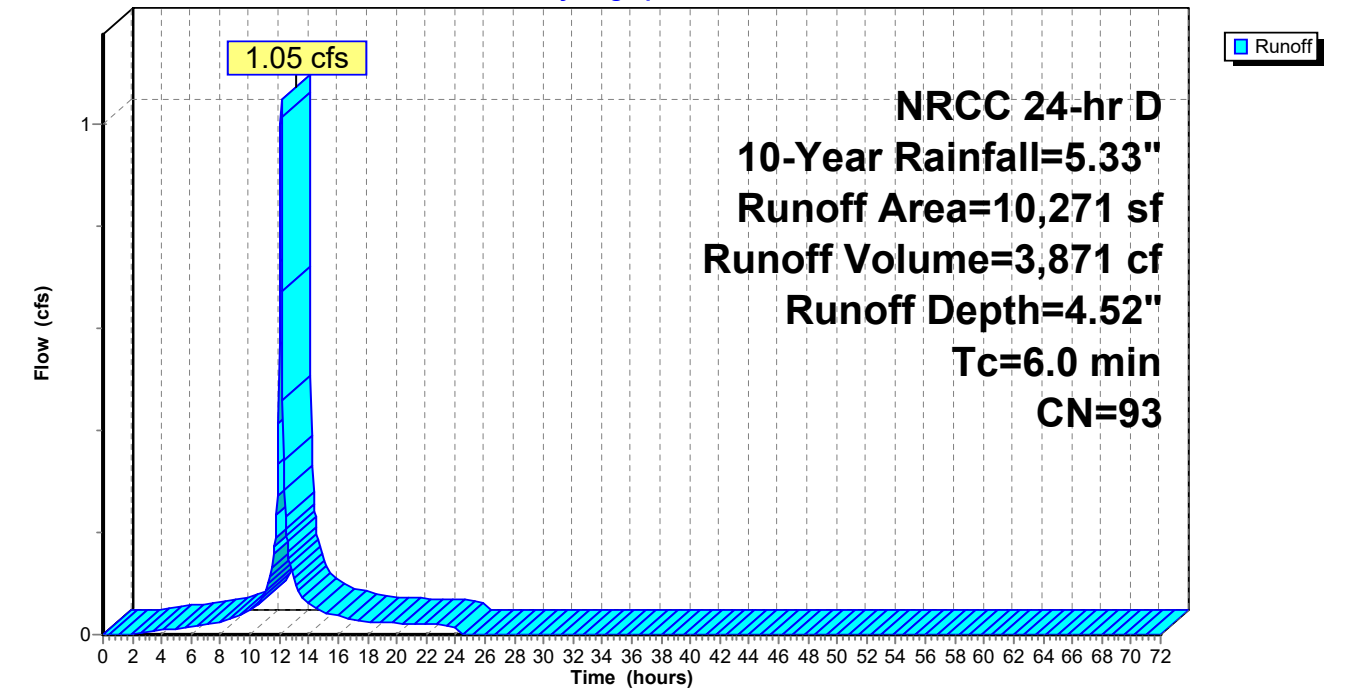
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
2,062	74	>75% Grass cover, Good, HSG C
8,209	98	Paved parking, HSG C
0	98	Roofs, HSG C
10,271	93	Weighted Average
2,062		20.07% Pervious Area
8,209		79.93% Impervious Area

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

Subcatchment P-13: Subcat P-13

Hydrograph



Summary for Subcatchment P-14: Subcat P-14

Runoff = 0.75 cfs @ 12.13 hrs, Volume= 2,668 cf, Depth= 4.20"
Routed to Pond 1P : Infiltration Basin

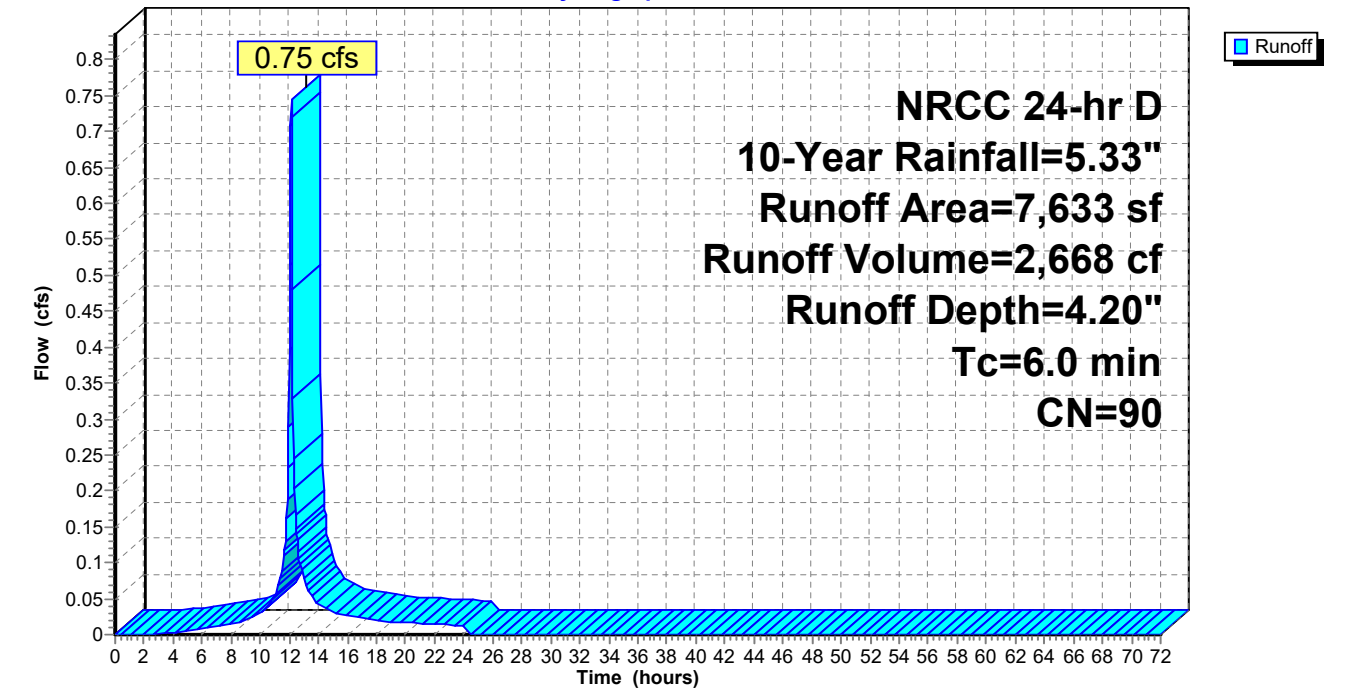
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
2,702	74	>75% Grass cover, Good, HSG C
4,931	98	Paved parking, HSG C
7,633	90	Weighted Average
2,702		35.39% Pervious Area
4,931		64.61% Impervious Area

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

Subcatchment P-14: Subcat P-14

Hydrograph



Summary for Subcatchment P-15: Subcat P-15

Runoff = 1.35 cfs @ 12.13 hrs, Volume= 4,727 cf, Depth= 3.88"
Routed to Pond 3P : UIS-2 (SC-800)

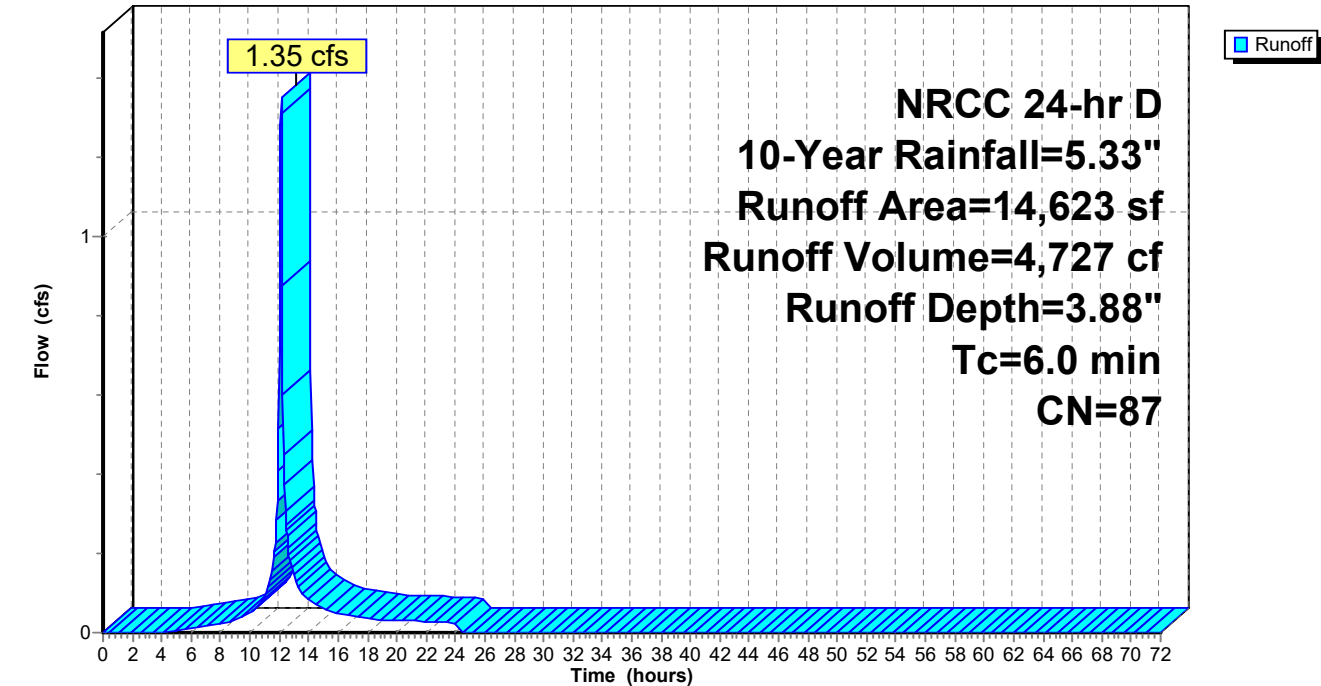
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
6,997	74	>75% Grass cover, Good, HSG C
917	98	Paved parking, HSG C
6,709	98	Roofs, HSG C
14,623	87	Weighted Average
6,997		47.85% Pervious Area
7,626		52.15% Impervious Area

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

Subcatchment P-15: Subcat P-15

Hydrograph



Summary for Subcatchment P-16: Subcat P-16

Runoff = 1.34 cfs @ 12.13 hrs, Volume= 4,922 cf, Depth= 4.52"
Routed to Pond 1P : Infiltration Basin

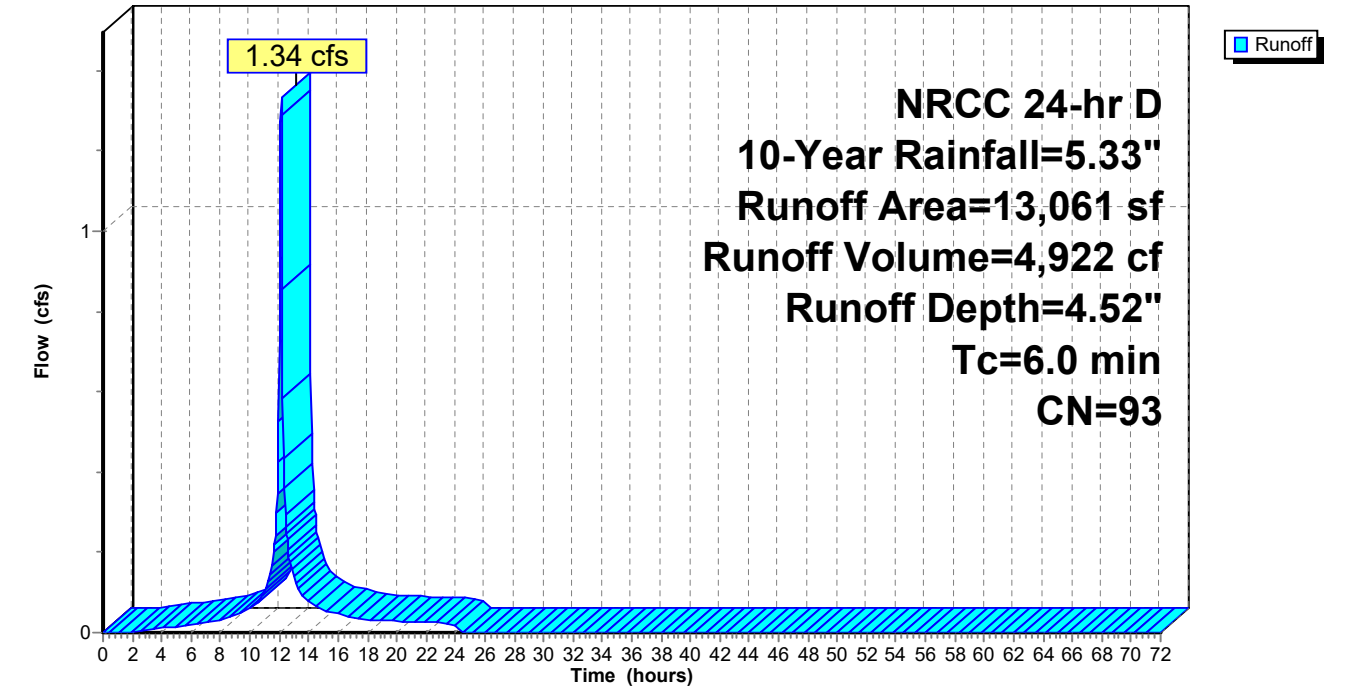
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
2,670	74	>75% Grass cover, Good, HSG C
10,111	98	Paved parking, HSG C
280	98	Roofs, HSG C
13,061	93	Weighted Average
2,670		20.44% Pervious Area
10,391		79.56% Impervious Area

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

Subcatchment P-16: Subcat P-16

Hydrograph



Summary for Subcatchment P-17: Subcat P-17

Runoff = 1.01 cfs @ 12.13 hrs, Volume= 3,599 cf, Depth= 4.20"
Routed to Pond 1P : Infiltration Basin

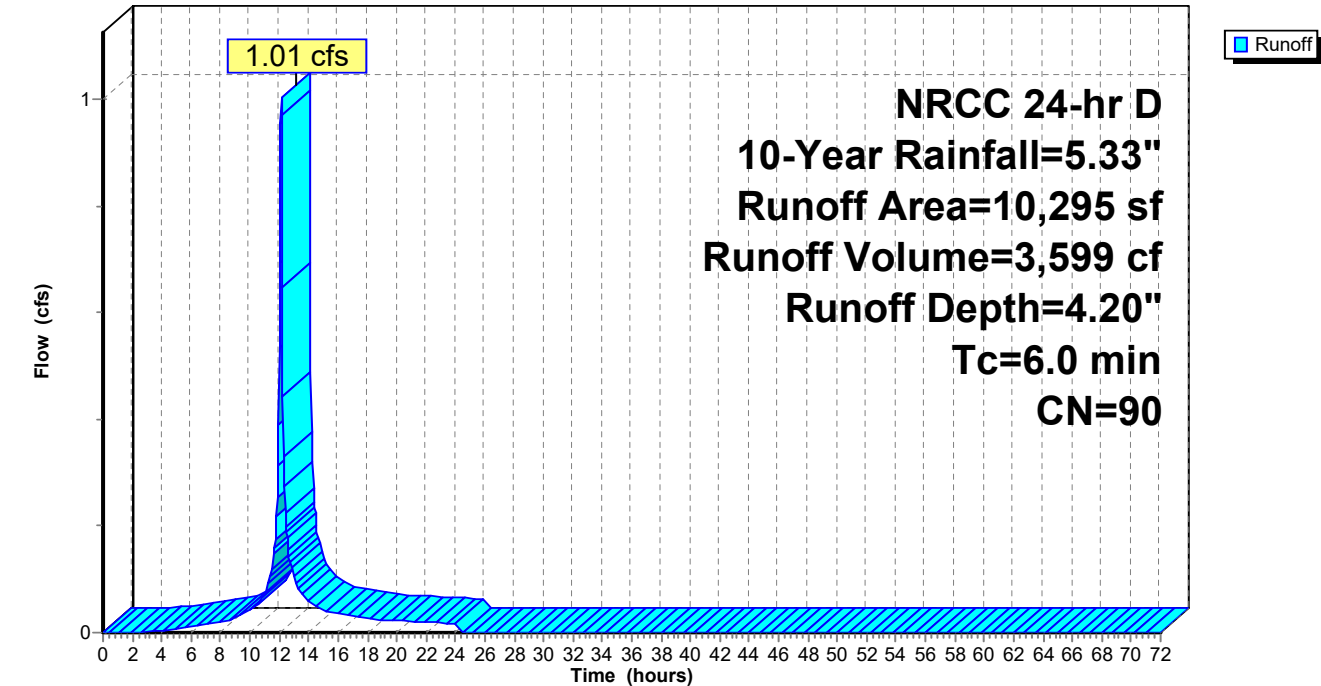
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
3,249	74	>75% Grass cover, Good, HSG C
6,446	98	Paved parking, HSG C
600	98	Roofs, HSG C
10,295	90	Weighted Average
3,249		31.56% Pervious Area
7,046		68.44% Impervious Area

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

Subcatchment P-17: Subcat P-17

Hydrograph



Summary for Subcatchment P-18: Subcat P-18

Runoff = 0.62 cfs @ 12.13 hrs, Volume= 2,242 cf, Depth= 4.30"
Routed to Pond 1P : Infiltration Basin

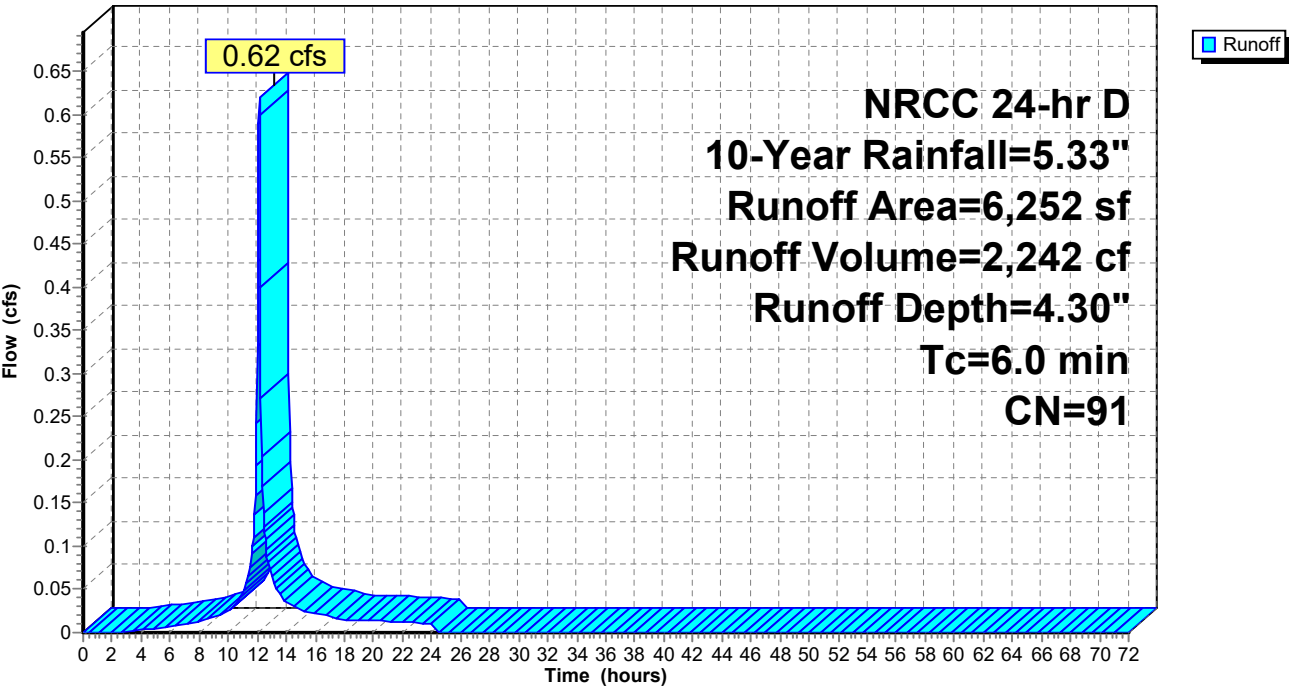
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
1,766	74	>75% Grass cover, Good, HSG C
4,486	98	Paved parking, HSG C
6,252	91	Weighted Average
1,766		28.25% Pervious Area
4,486		71.75% Impervious Area

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

Subcatchment P-18: Subcat P-18

Hydrograph



Summary for Subcatchment P-18A: Subcat P-18A

Runoff = 0.67 cfs @ 12.13 hrs, Volume= 2,334 cf, Depth= 3.78"
Routed to Pond 4P : UDS-2 (SC-310)

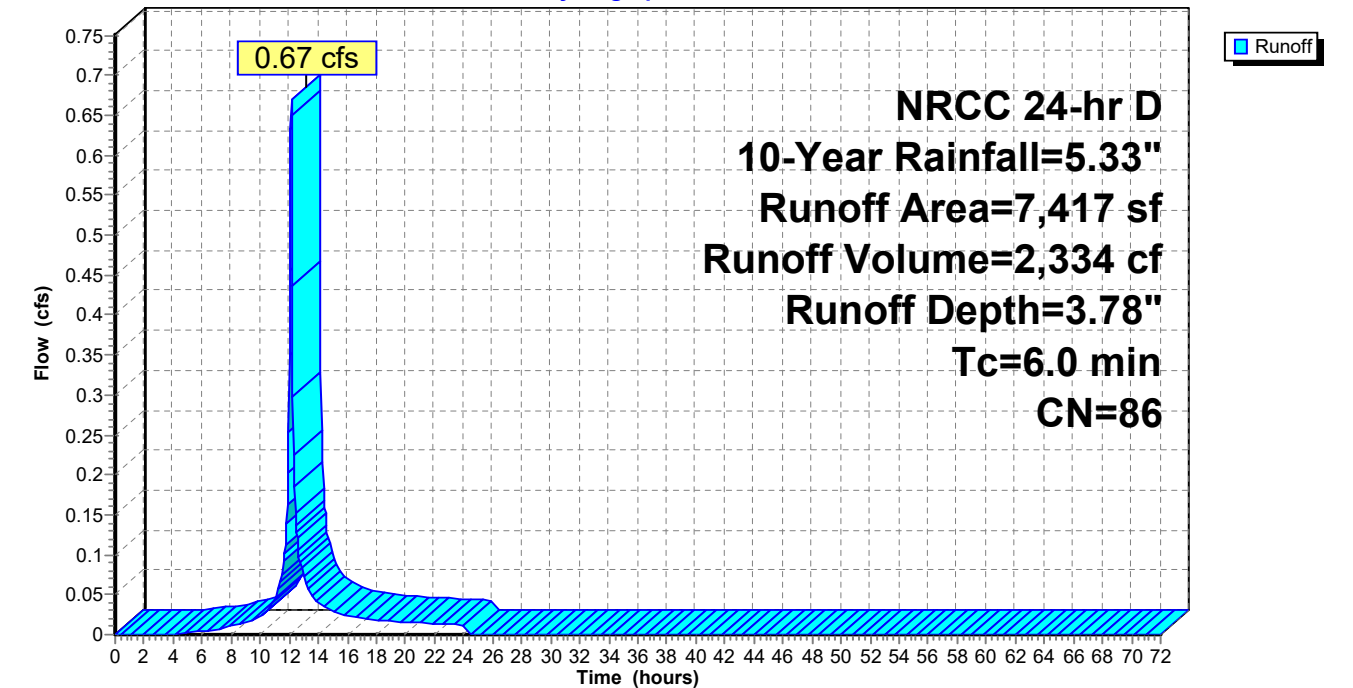
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
3,568	74	>75% Grass cover, Good, HSG C
3,849	98	Paved parking, HSG C
7,417	86	Weighted Average
3,568		48.11% Pervious Area
3,849		51.89% Impervious Area

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

Subcatchment P-18A: Subcat P-18A

Hydrograph



Summary for Subcatchment P-19: Subcat P-19

Runoff = 1.97 cfs @ 12.13 hrs, Volume= 6,839 cf, Depth= 3.78"
Routed to Pond 1P : Infiltration Basin

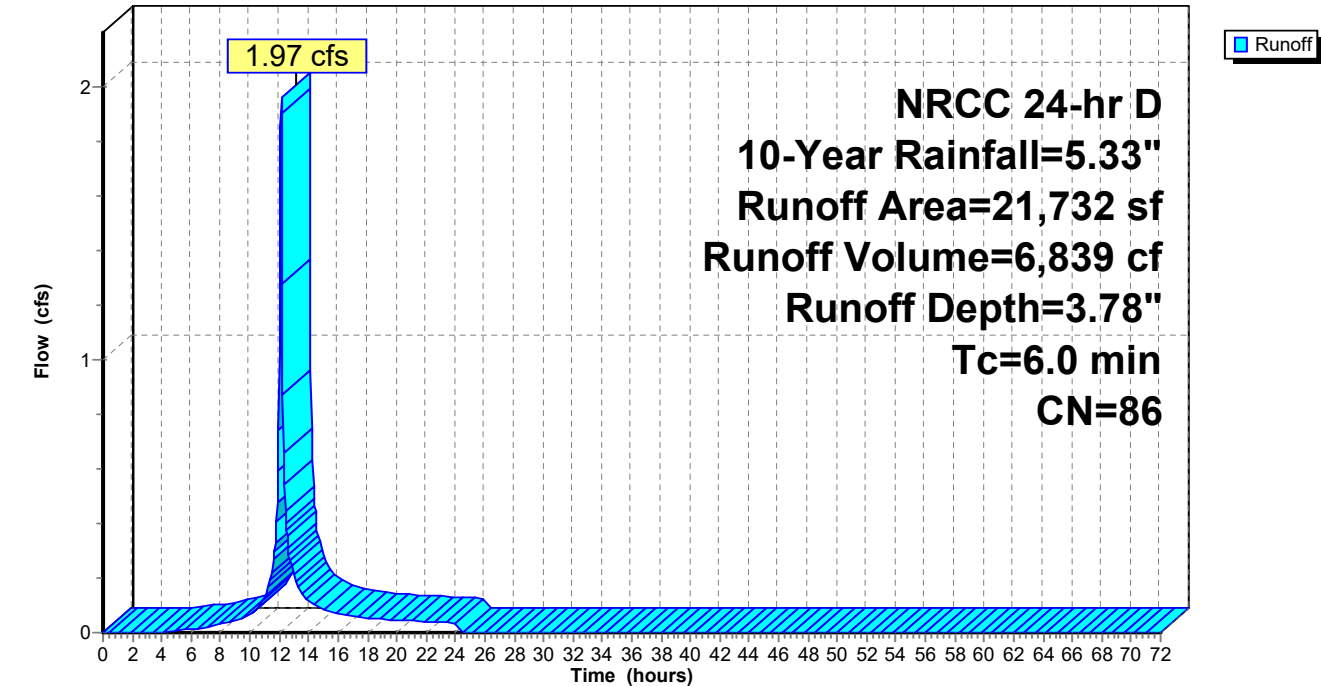
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
10,621	74	>75% Grass cover, Good, HSG C
1,800	98	Paved parking, HSG C
9,311	98	Roofs, HSG C
21,732	86	Weighted Average
10,621		48.87% Pervious Area
11,112		51.13% Impervious Area

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

Subcatchment P-19: Subcat P-19

Hydrograph



Summary for Subcatchment P-2: Subcat P-2

Runoff = 0.87 cfs @ 12.13 hrs, Volume= 3,188 cf, Depth= 4.41"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

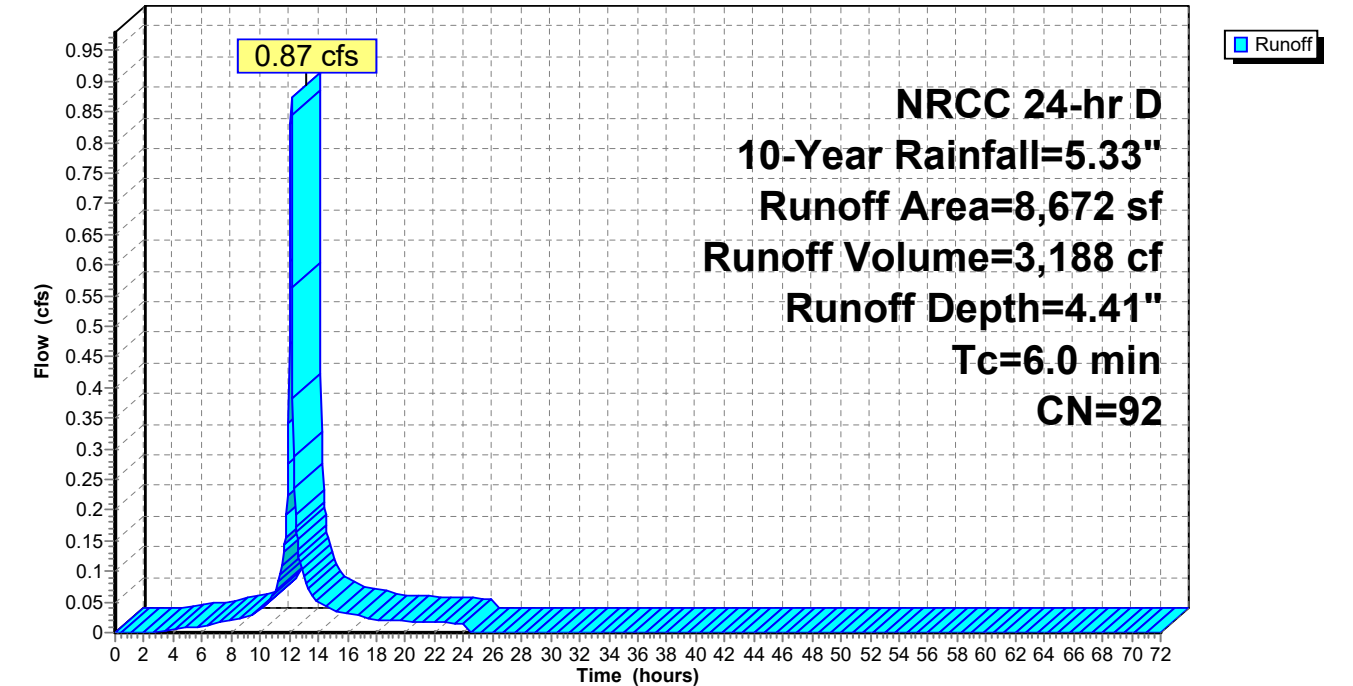
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
2,138	74	>75% Grass cover, Good, HSG C
6,408	98	Paved parking, HSG C
126	98	Roofs, HSG C
8,672	92	Weighted Average
2,138		24.65% Pervious Area
6,534		75.35% Impervious Area

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

Subcatchment P-2: Subcat P-2

Hydrograph



Summary for Subcatchment P-20: Subcat P-20

Runoff = 3.69 cfs @ 12.13 hrs, Volume= 12,754 cf, Depth= 3.67"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

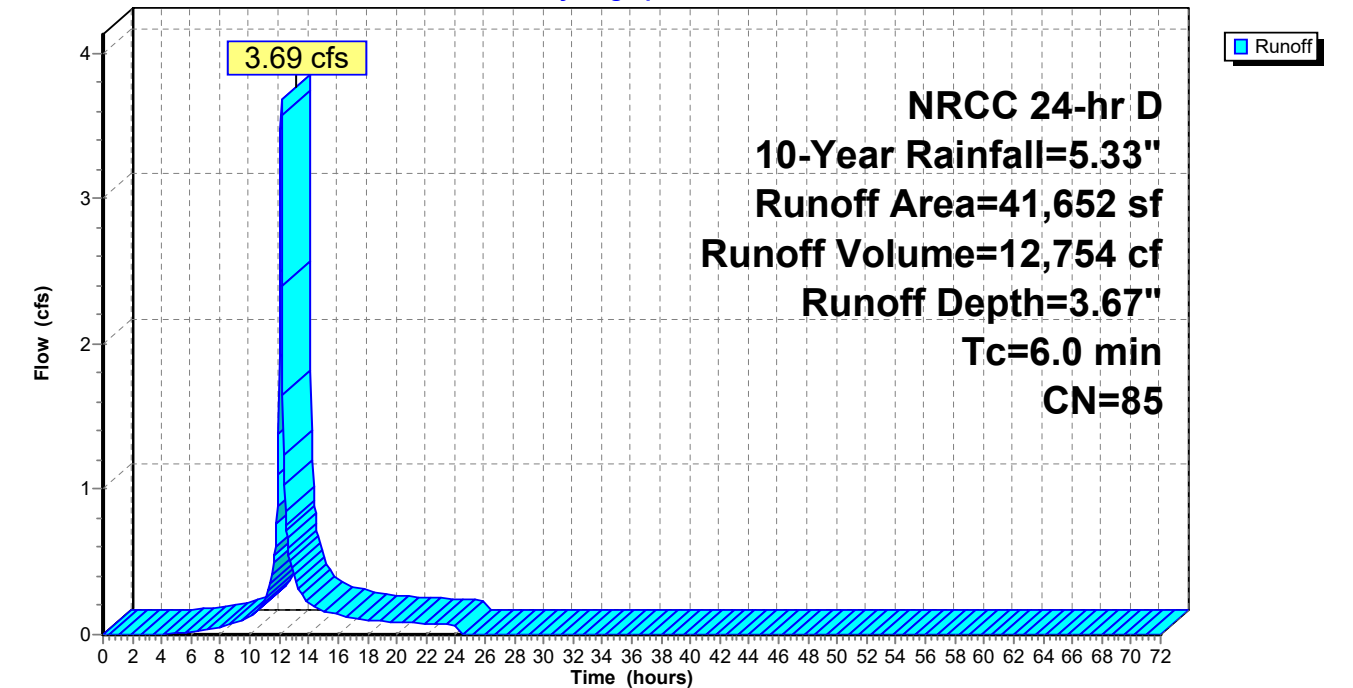
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
22,671	74	>75% Grass cover, Good, HSG C
3,948	98	Paved parking, HSG C
15,034	98	Roofs, HSG C
41,652	85	Weighted Average
22,671		54.43% Pervious Area
18,982		45.57% Impervious Area

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

Subcatchment P-20: Subcat P-20

Hydrograph



Summary for Subcatchment P-21: Subcat P-21

Runoff = 3.28 cfs @ 12.13 hrs, Volume= 11,074 cf, Depth= 2.37"
Routed to Link SP2 : STUDY POINT #2 (Wetlands West)

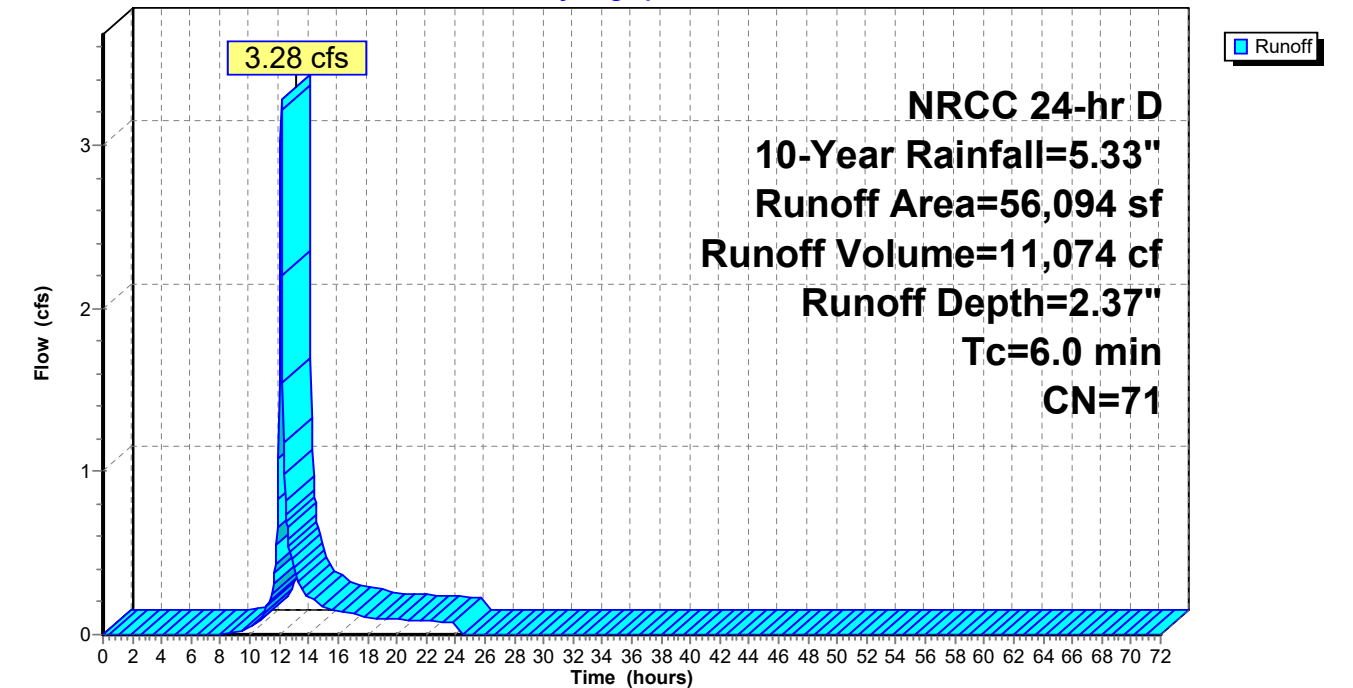
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
17,315	74	>75% Grass cover, Good, HSG C
4	98	Roofs, HSG C
38,775	70	Woods, Good, HSG C
56,094	71	Weighted Average
56,091		99.99% Pervious Area
4		0.01% Impervious Area

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

Subcatchment P-21: Subcat P-21

Hydrograph



Summary for Subcatchment P-22: Subcat P-22

Runoff = 1.90 cfs @ 12.13 hrs, Volume= 6,411 cf, Depth= 2.45"
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

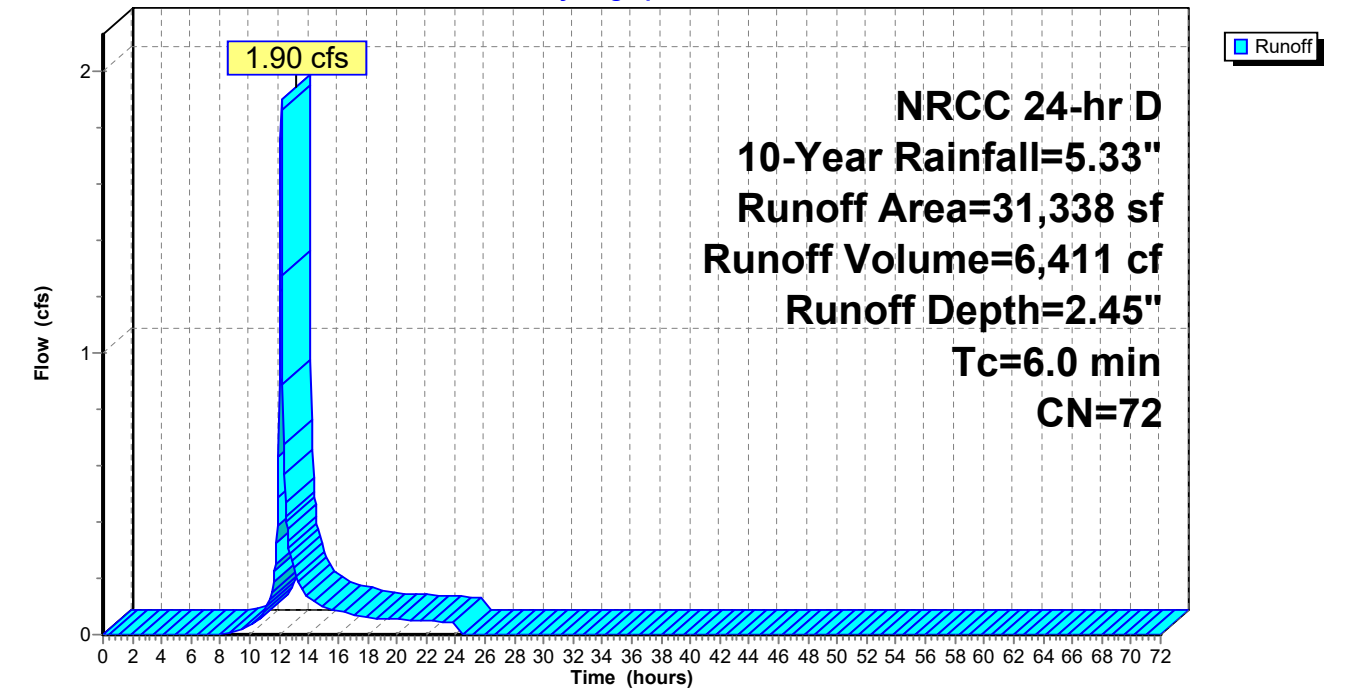
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
12,793	74	>75% Grass cover, Good, HSG C
1	98	Paved parking, HSG C
1	98	Roofs, HSG C
18,544	70	Woods, Good, HSG C
31,338	72	Weighted Average
31,337		100.00% Pervious Area
2		0.00% Impervious Area

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

Subcatchment P-22: Subcat P-22

Hydrograph



Summary for Subcatchment P-23: Subcat P-23

Runoff = 0.85 cfs @ 12.13 hrs, Volume= 2,877 cf, Depth= 2.45"
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

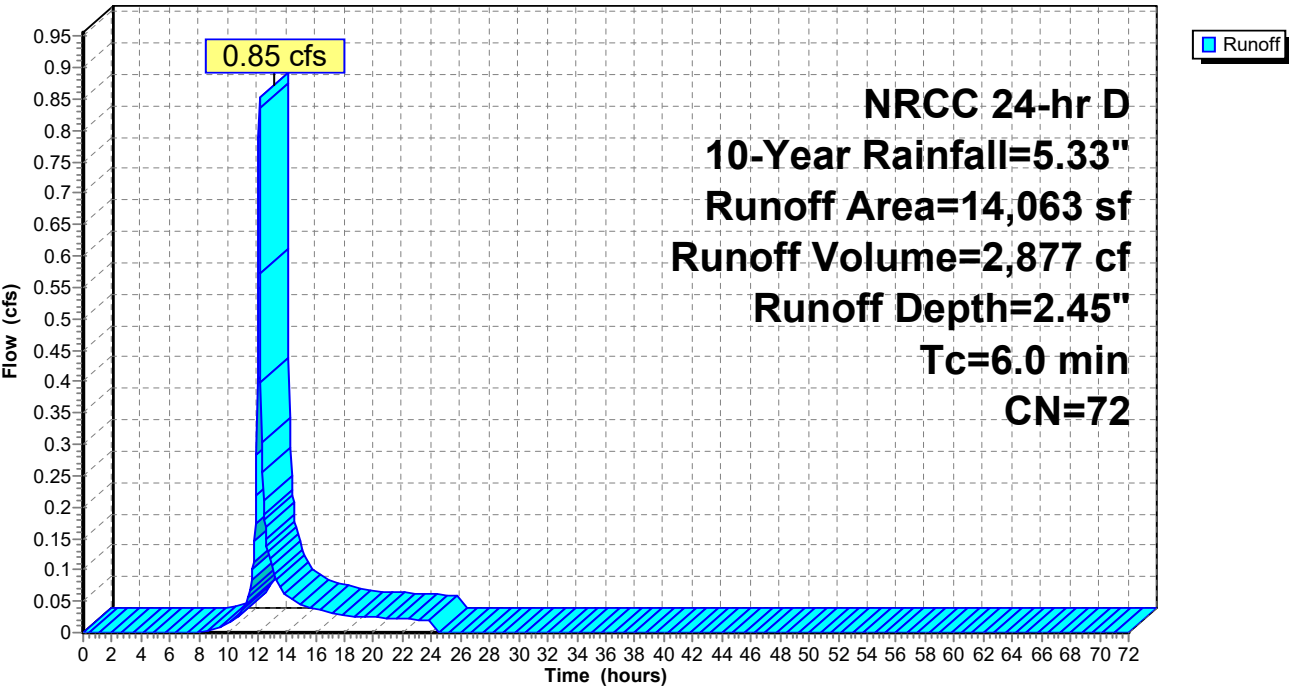
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
6,718	74	>75% Grass cover, Good, HSG C
7,345	70	Woods, Good, HSG C
14,063	72	Weighted Average
14,063		100.00% Pervious Area

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

Subcatchment P-23: Subcat P-23

Hydrograph



Summary for Subcatchment P-24: Subcat P-24

Runoff = 1.79 cfs @ 12.13 hrs, Volume= 6,101 cf, Depth= 3.38"
Routed to Pond 1P : Infiltration Basin

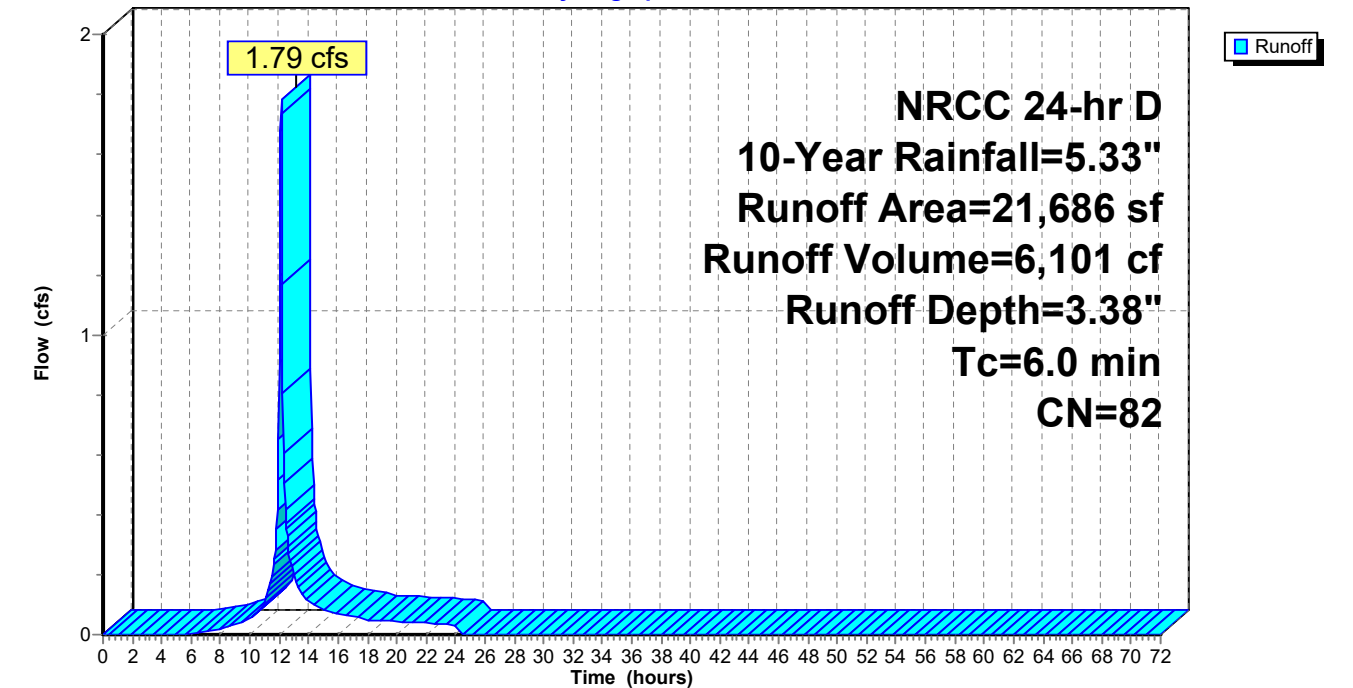
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
14,395	74	>75% Grass cover, Good, HSG C
7,291	98	Water Surface, HSG C
21,686	82	Weighted Average
14,395		66.38% Pervious Area
7,291		33.62% Impervious Area

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

Subcatchment P-24: Subcat P-24

Hydrograph



Summary for Subcatchment P-25: Subcat P-25

Runoff = 1.16 cfs @ 12.13 hrs, Volume= 3,918 cf, Depth= 2.37"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

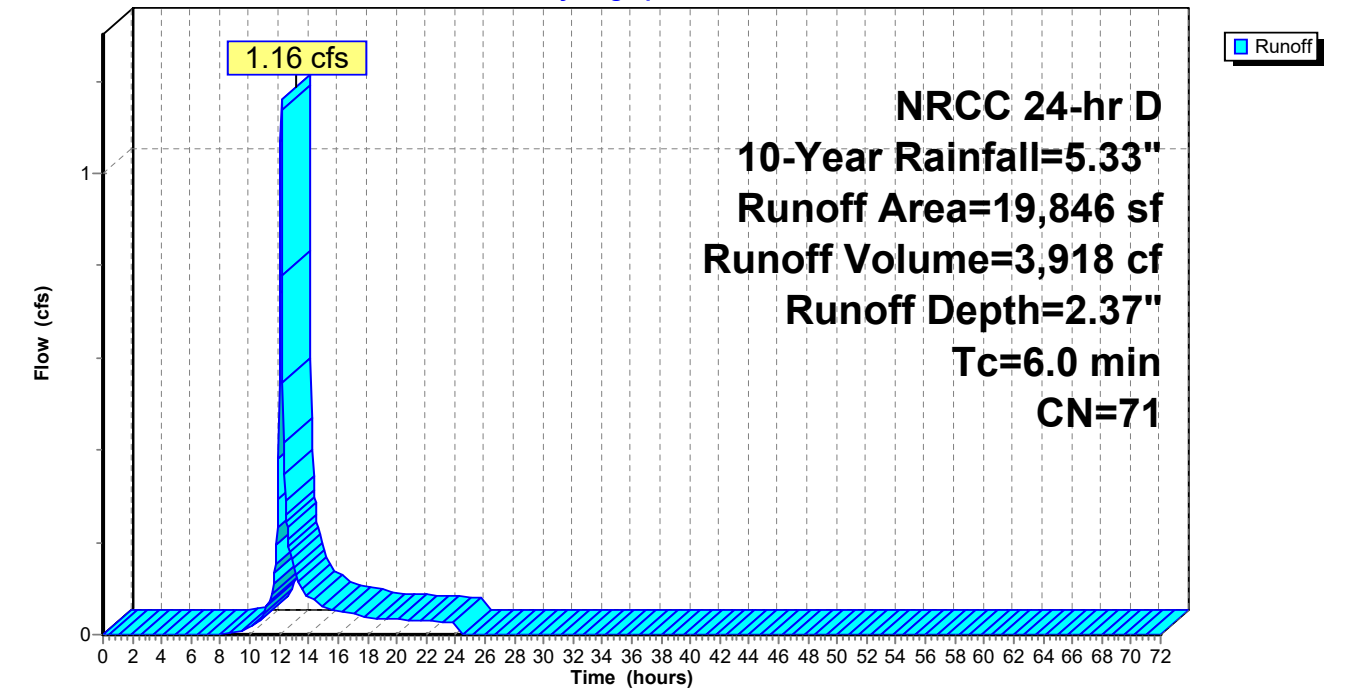
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
4,972	74	>75% Grass cover, Good, HSG C
3	98	Paved parking, HSG C
1	98	Roofs, HSG C
14,870	70	Woods, Good, HSG C
19,846	71	Weighted Average
19,842		99.98% Pervious Area
4		0.02% Impervious Area

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

Subcatchment P-25: Subcat P-25

Hydrograph



Summary for Subcatchment P-3: Subcat P-3

Runoff = 1.05 cfs @ 12.13 hrs, Volume= 3,862 cf, Depth= 4.52"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

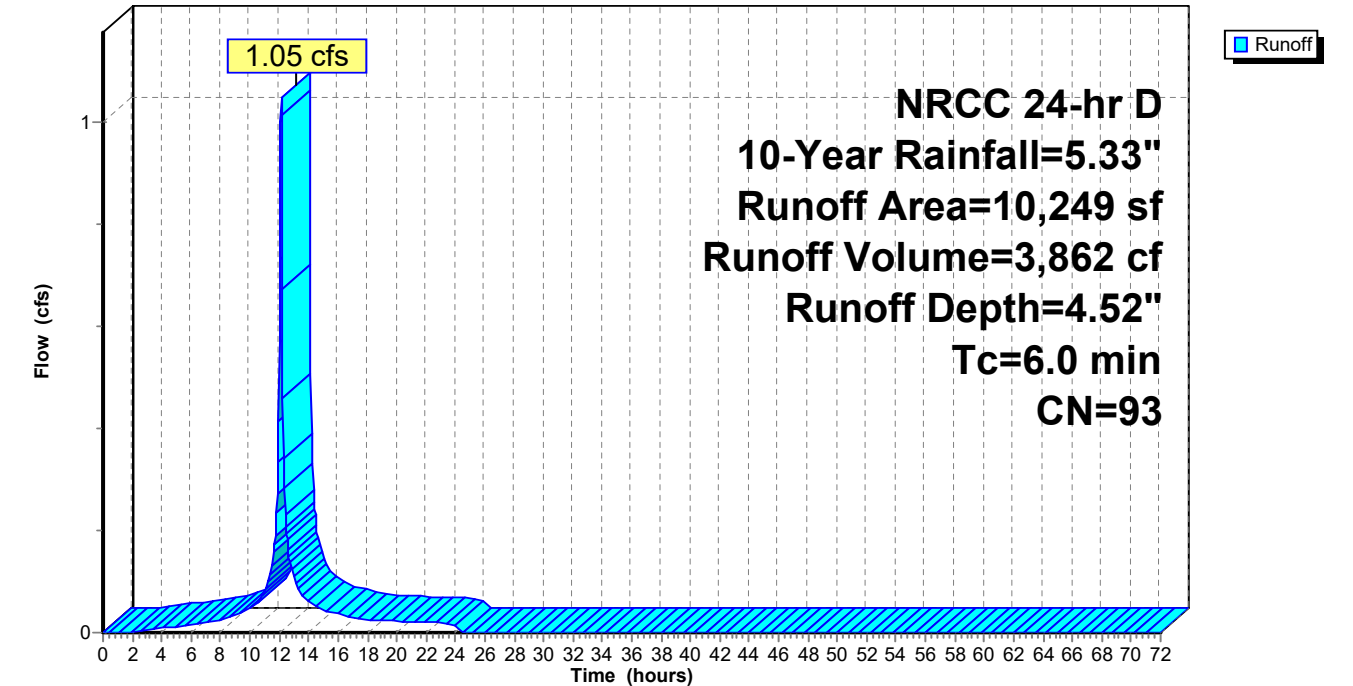
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
2,059	74	>75% Grass cover, Good, HSG C
8,187	98	Paved parking, HSG C
3	98	Roofs, HSG C
10,249	93	Weighted Average
2,059		20.09% Pervious Area
8,190		79.91% Impervious Area

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

Subcatchment P-3: Subcat P-3

Hydrograph



Summary for Subcatchment P-4: Subcat P-4

Runoff = 1.30 cfs @ 12.13 hrs, Volume= 4,855 cf, Depth= 4.63"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

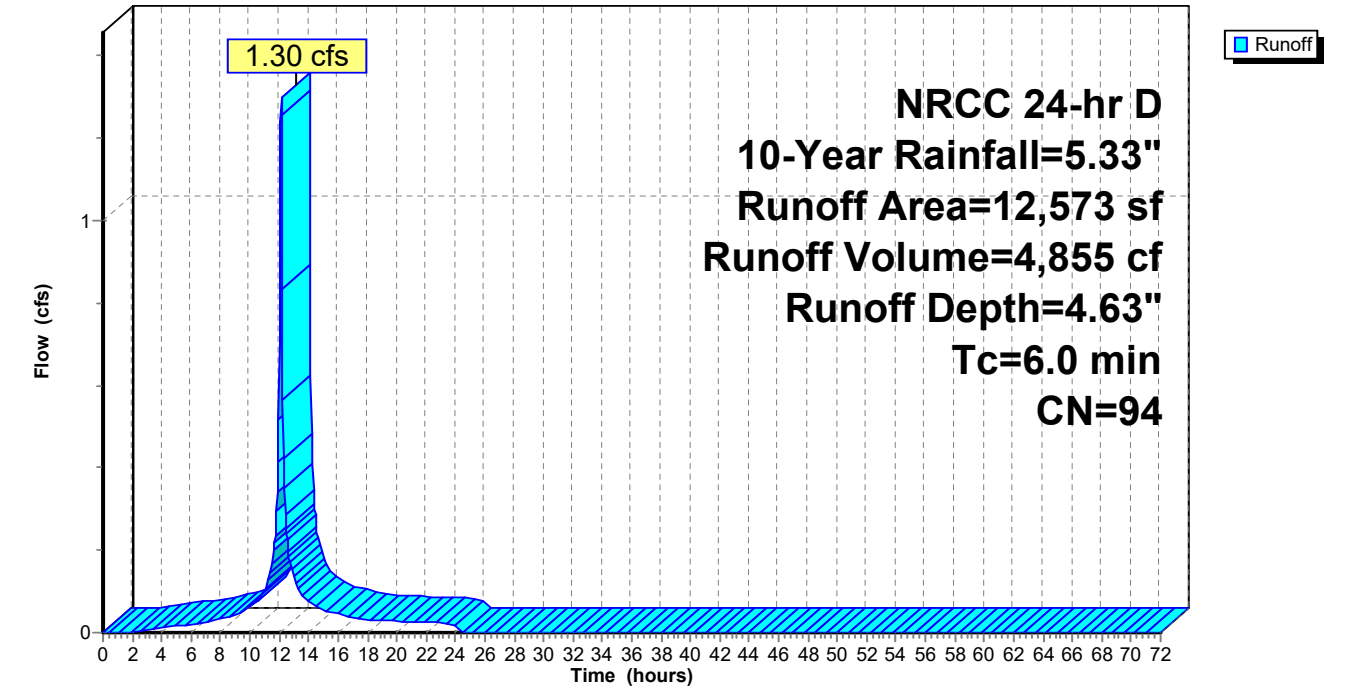
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
1,907	74	>75% Grass cover, Good, HSG C
10,666	98	Paved parking, HSG C
12,573	94	Weighted Average
1,907		15.17% Pervious Area
10,666		84.83% Impervious Area

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

Subcatchment P-4: Subcat P-4

Hydrograph



Summary for Subcatchment P-5: Subcat P-5

Runoff = 0.56 cfs @ 12.13 hrs, Volume= 2,074 cf, Depth= 4.52"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

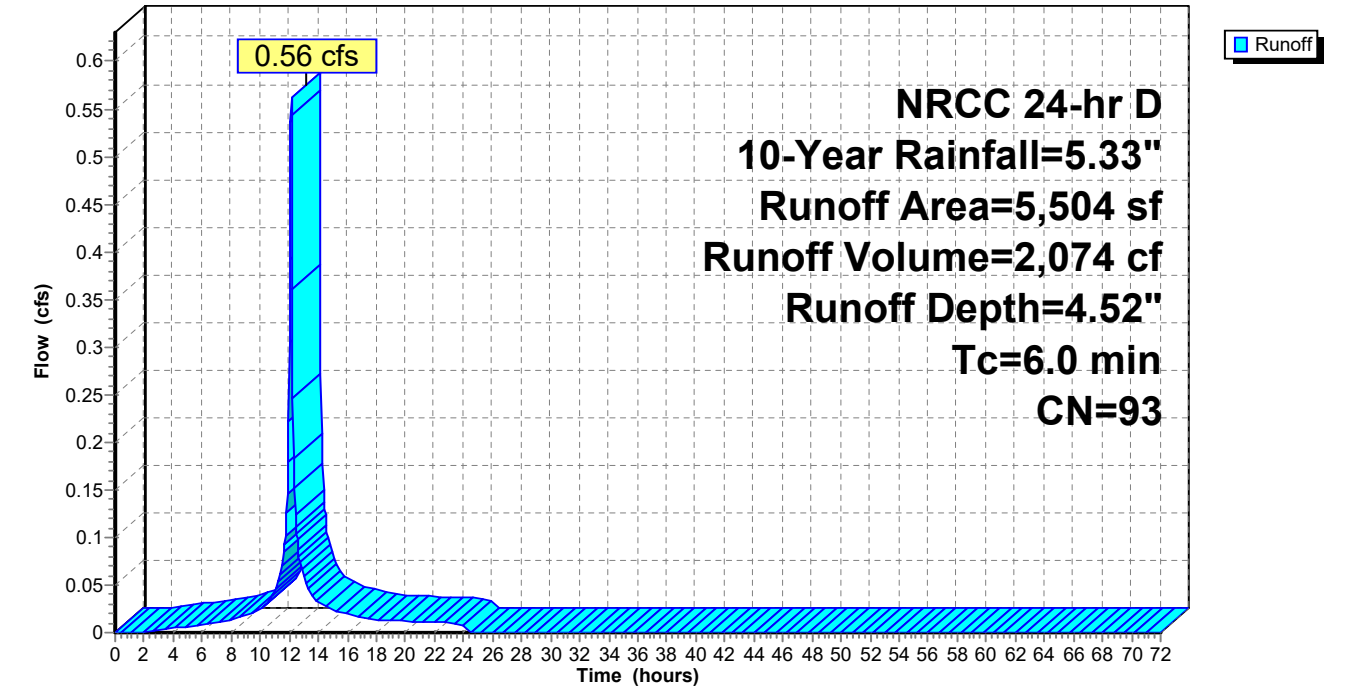
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
1,044	74	>75% Grass cover, Good, HSG C
4,460	98	Paved parking, HSG C
5,504	93	Weighted Average
1,044		18.97% Pervious Area
4,460		81.03% Impervious Area

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

Subcatchment P-5: Subcat P-5

Hydrograph



Summary for Subcatchment P-6: Subcat P-6

Runoff = 0.86 cfs @ 12.13 hrs, Volume= 3,030 cf, Depth= 3.98"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

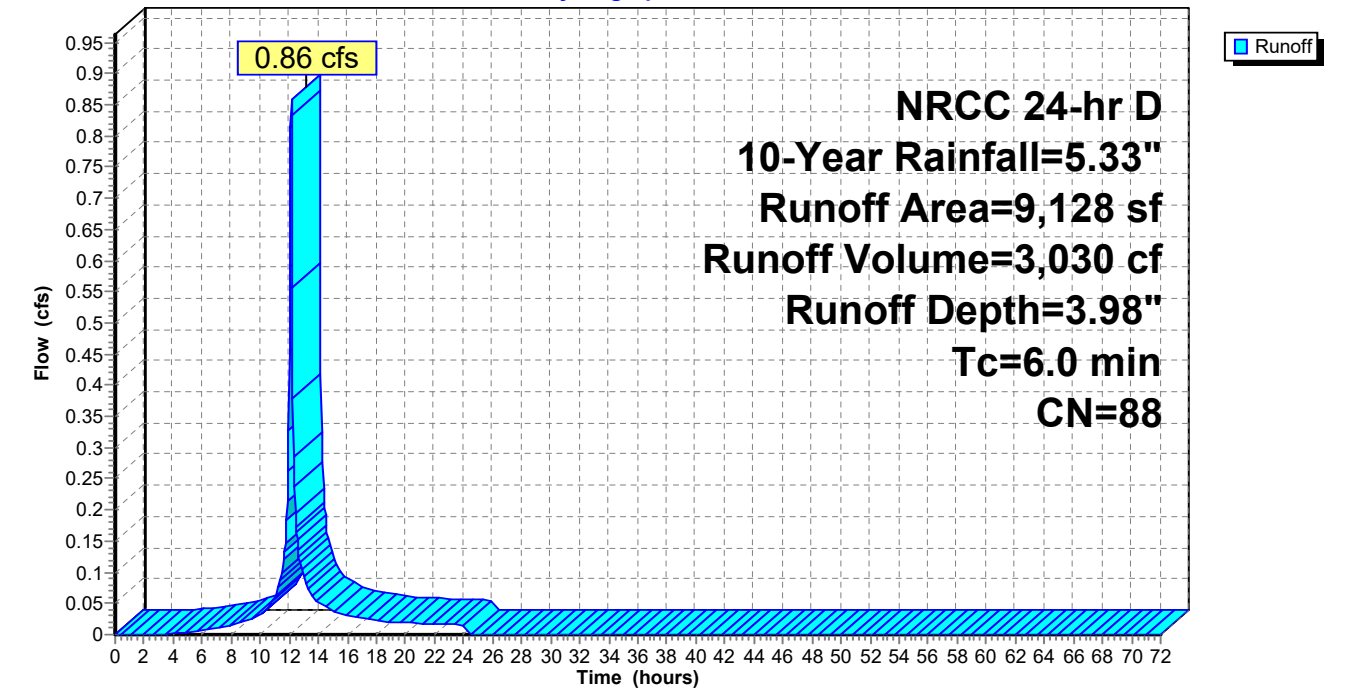
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
3,695	74	>75% Grass cover, Good, HSG C
586	98	Paved parking, HSG C
4,848	98	Roofs, HSG C
9,128	88	Weighted Average
3,695		40.47% Pervious Area
5,434		59.53% Impervious Area

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

Subcatchment P-6: Subcat P-6

Hydrograph



Summary for Subcatchment P-6A: Subcat P-6A

Runoff = 0.84 cfs @ 12.13 hrs, Volume= 3,038 cf, Depth= 4.30"
Routed to Pond 3P : UIS-2 (SC-800)

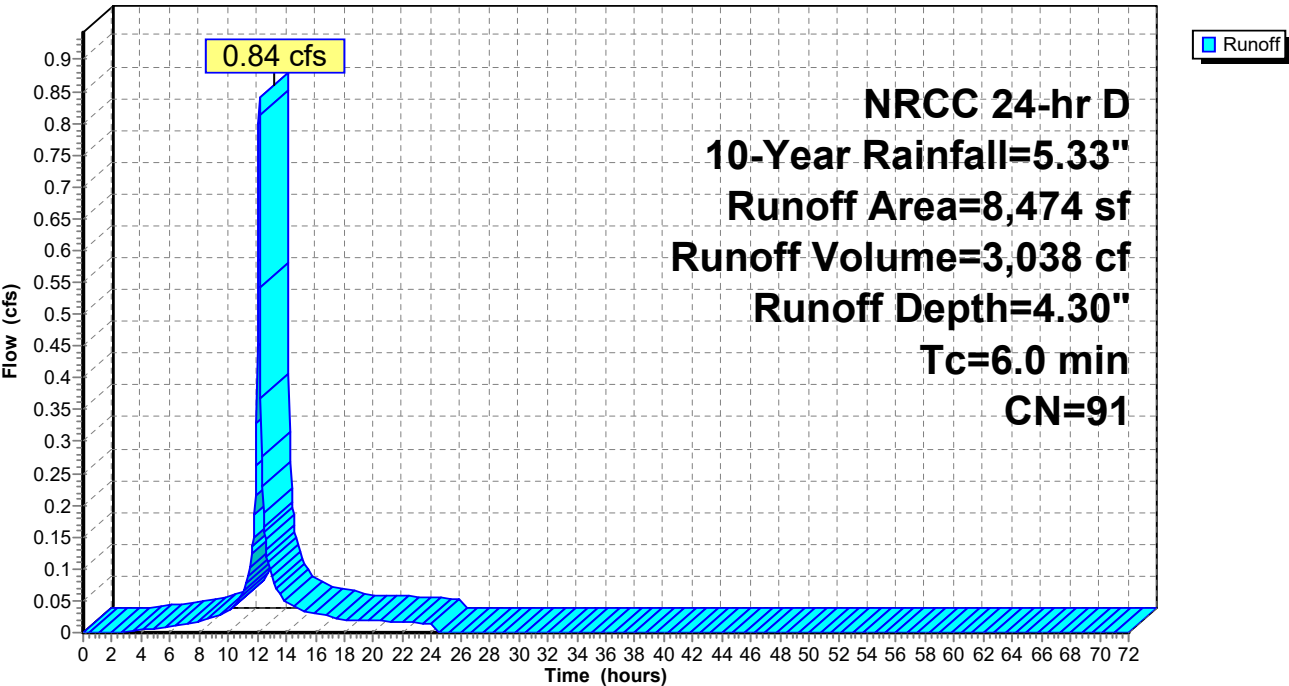
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
2,617	74	>75% Grass cover, Good, HSG C
715	98	Paved parking, HSG C
5,142	98	Roofs, HSG C
8,474	91	Weighted Average
2,617		30.88% Pervious Area
5,857		69.12% Impervious Area

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

Subcatchment P-6A: Subcat P-6A

Hydrograph



Summary for Subcatchment P-7: Subcat P-7

Runoff = 0.96 cfs @ 12.13 hrs, Volume= 3,547 cf, Depth= 4.52"
Routed to Pond 3P : UIS-2 (SC-800)

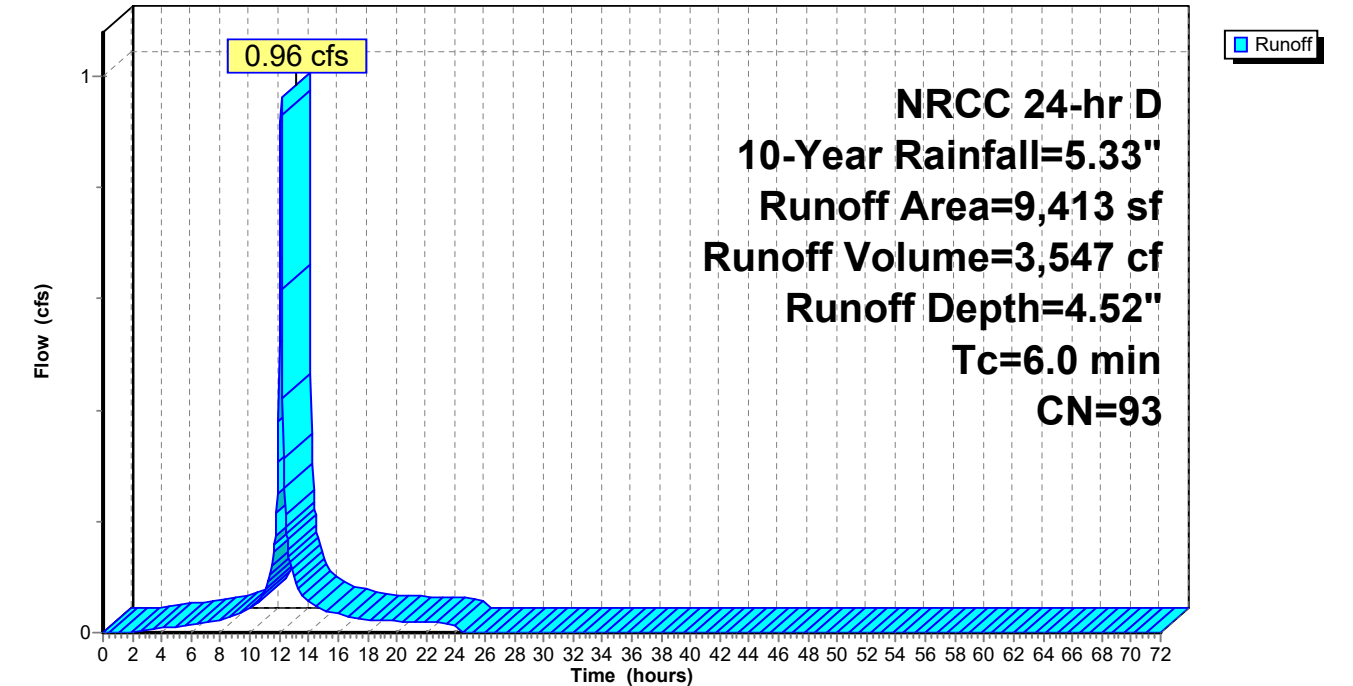
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
2,099	74	>75% Grass cover, Good, HSG C
5,872	98	Paved parking, HSG C
1,442	98	Roofs, HSG C
9,413	93	Weighted Average
2,099		22.30% Pervious Area
7,314		77.70% Impervious Area

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

Subcatchment P-7: Subcat P-7

Hydrograph



Summary for Subcatchment P-8: Subcat P-8

Runoff = 0.92 cfs @ 12.13 hrs, Volume= 3,338 cf, Depth= 4.30"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

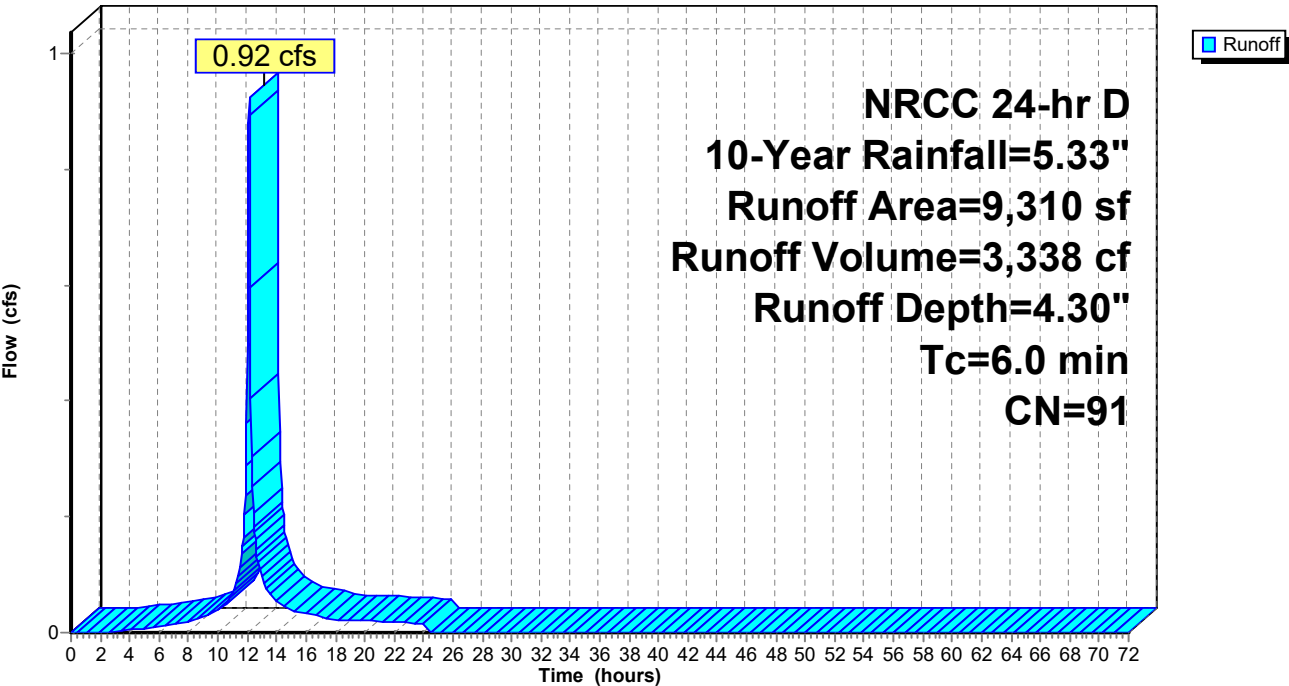
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
2,628	74	>75% Grass cover, Good, HSG C
924	98	Paved parking, HSG C
5,759	98	Roofs, HSG C
9,310	91	Weighted Average
2,628		28.23% Pervious Area
6,682		71.77% Impervious Area

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

Subcatchment P-8: Subcat P-8

Hydrograph



Summary for Subcatchment P-9: Subcat P-9

Runoff = 0.85 cfs @ 12.13 hrs, Volume= 3,159 cf, Depth= 4.63"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

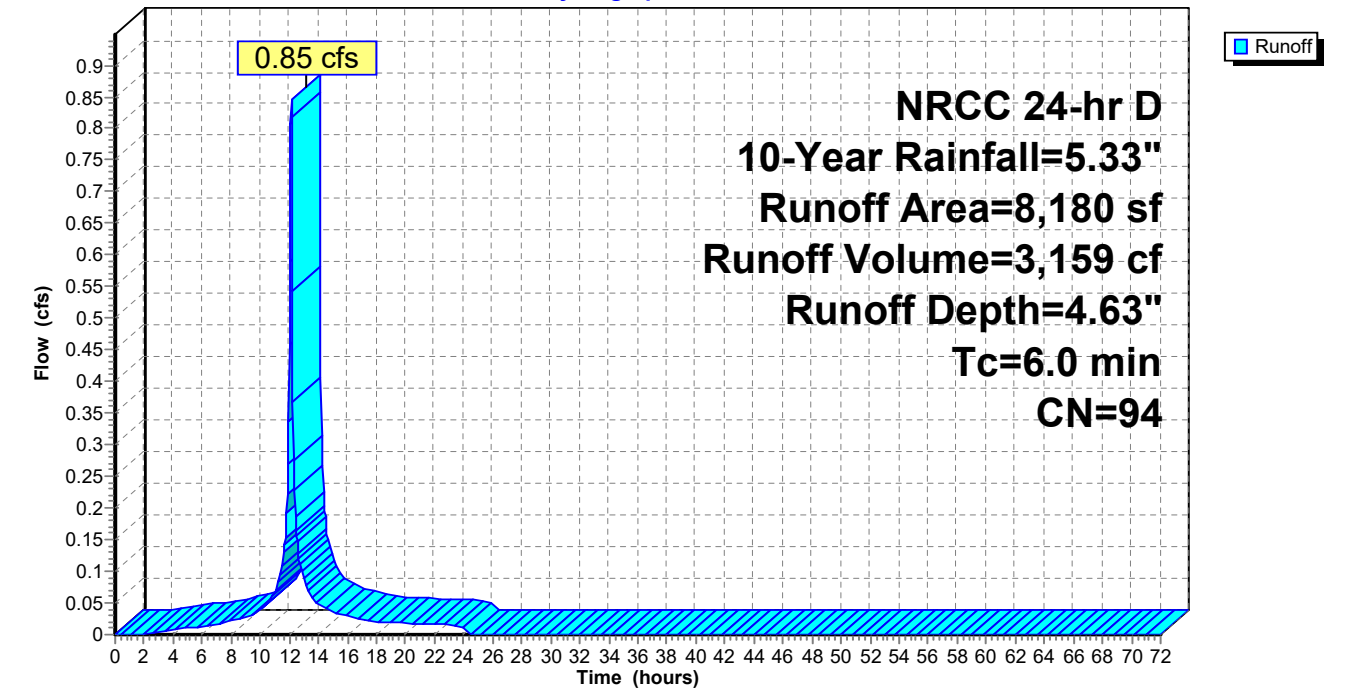
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.33"

Area (sf)	CN	Description
1,516	74	>75% Grass cover, Good, HSG C
6,649	98	Paved parking, HSG C
15	98	Roofs, HSG C
8,180	94	Weighted Average
1,516		18.54% Pervious Area
6,664		81.46% Impervious Area

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

Subcatchment P-9: Subcat P-9

Hydrograph



Summary for Pond 1P: Infiltration Basin

Inflow Area = 110,639 sf, 58.56% Impervious, Inflow Depth = 3.99" for 10-Year event
Inflow = 10.37 cfs @ 12.13 hrs, Volume= 36,784 cf
Outflow = 2.96 cfs @ 12.34 hrs, Volume= 36,784 cf, Atten= 71%, Lag= 12.9 min
Discarded = 0.13 cfs @ 12.34 hrs, Volume= 17,440 cf
Primary = 2.82 cfs @ 12.34 hrs, Volume= 19,344 cf
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 145.06' @ 12.34 hrs Surf.Area= 5,595 sf Storage= 15,147 cf
Flood Elev= 146.90' Surf.Area= 7,524 sf Storage= 27,045 cf

Plug-Flow detention time= 473.4 min calculated for 36,758 cf (100% of inflow)
Center-of-Mass det. time= 474.4 min (1,281.2 - 806.8)

Volume	Invert	Avail.Storage	Storage Description
#1	141.50'	27,804 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
141.50	3,040	206.0	0	0	3,040
142.00	3,356	215.0	1,598	1,598	3,359
143.00	4,030	234.0	3,688	5,286	4,074
144.00	4,760	253.0	4,390	9,676	4,850
145.00	5,548	272.0	5,149	14,825	5,686
146.00	6,391	291.0	5,965	20,790	6,583
147.00	7,656	348.0	7,014	27,804	9,499

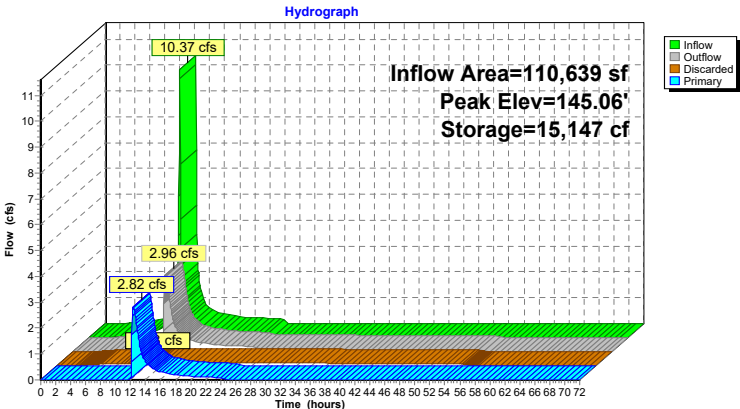
Device	Routing	Invert	Outlet Devices
#1	Discarded	141.50'	1.020 in/hr Exfiltration over Surface area
#2	Primary	142.50'	12.0" Round Culvert L= 17.8' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.50' / 141.33' S= 0.0657 ' S= 0.0657 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	144.00'	12.0" Vert. Orifice C= 0.600 Limited to weir flow at low heads

#4	Device 2	146.00'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5	Primary	146.90'	20.0' long x 18.0' breadth Overflow Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.13 cfs @ 12.34 hrs HW=145.06' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=2.82 cfs @ 12.34 hrs HW=145.06' (Free Discharge)
2=Culvert (Passes 2.82 cfs of 4.28 cfs potential flow)
3=Orifice (Orifice Controls 2.82 cfs @ 3.59 fps)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
5=Overflow Weir (Controls 0.00 cfs)

Pond 1P: Infiltration Basin



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 153

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

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
141.50	3,040	0	145.00	5,548	14,825
141.60	3,102	307	145.10	5,630	15,384
141.70	3,165	620	145.20	5,712	15,951
141.80	3,228	940	145.30	5,795	16,526
141.90	3,292	1,266	145.40	5,878	17,110
142.00	3,356	1,598	145.50	5,962	17,702
142.10	3,421	1,937	145.60	6,047	18,302
142.20	3,486	2,282	145.70	6,132	18,911
142.30	3,552	2,634	145.80	6,218	19,529
142.40	3,618	2,993	145.90	6,304	20,155
142.50	3,685	3,358	146.00	6,391	20,790
142.60	3,753	3,730	146.10	6,512	21,435
142.70	3,821	4,109	146.20	6,635	22,092
142.80	3,890	4,494	146.30	6,759	22,762
142.90	3,960	4,887	146.40	6,883	23,444
143.00	4,030	5,286	146.50	7,009	24,139
143.10	4,100	5,693	146.60	7,136	24,846
143.20	4,171	6,106	146.70	7,265	25,566
143.30	4,243	6,527	146.80	7,394	26,299
143.40	4,315	6,955	146.90	7,524	27,045
143.50	4,387	7,390	147.00	7,656	27,804
143.60	4,461	7,832			
143.70	4,535	8,282			
143.80	4,609	8,739			
143.90	4,684	9,204			
144.00	4,760	9,676			
144.10	4,836	10,156			
144.20	4,913	10,643			
144.30	4,990	11,139			
144.40	5,068	11,641			
144.50	5,146	12,152			
144.60	5,226	12,671			
144.70	5,305	13,197			
144.80	5,386	13,732			
144.90	5,466	14,274			

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 154

Summary for Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)

Inflow Area = 102,654 sf, 63.38% Impervious, Inflow Depth = 4.10" for 10-Year event
 Inflow = 9.81 cfs @ 12.13 hrs, Volume= 35,098 cf
 Outflow = 1.12 cfs @ 12.93 hrs, Volume= 35,098 cf, Atten= 89%, Lag= 47.9 min
 Discarded = 0.15 cfs @ 7.55 hrs, Volume= 22,283 cf
 Primary = 0.97 cfs @ 12.93 hrs, Volume= 12,815 cf
 Routed to Link SP2 : STUDY POINT #2 (Wetlands West)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 168.59' @ 12.93 hrs Surf.Area= 6,514 sf Storage= 15,985 cf
 Flood Elev= 170.25' Surf.Area= 6,514 sf Storage= 25,924 cf

Plug-Flow detention time= 508.0 min calculated for 35,098 cf (100% of inflow)
 Center-of-Mass det. time= 507.9 min (1,309.7 - 801.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	166.50'	5,927 cf	33.25'W x 195.92'L x 3.75'H Field A 24,428 cf Overall - 9,610 cf Embedded = 14,819 cf x 40.0% Voids
#2A	167.00'	9,610 cf	ADS_StormTech SC-800 +Cap x 189 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 189 Chambers in 7 Rows Cap Storage= 3.4 cf x 2 x 7 rows = 47.9 cf
#3B	166.50'	4,524 cf	34.75'W x 131.78'L x 3.75'H Field B -Impervious 17,172 cf Overall - 5,863 cf Embedded = 11,309 cf x 40.0% Voids
#4B	167.25'	5,863 cf	ADS_StormTech DC-780 b +Cap x 126 Inside #3 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 126 Chambers in 7 Rows Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf
		25,924 cf	Total Available Storage

Storage Group A created with Chamber Wizard
 Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	166.50'	1.020 in/hr Exfiltration over Surface area
#2	Primary	168.00'	
			12.0" Round Culvert L= 124.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 168.00' / 161.60' S= 0.0516 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	169.75'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	168.00'	9.0" Vert. Orifice C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.15 cfs @ 7.55 hrs HW=166.54' (Free Discharge)
↳ **1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.97 cfs @ 12.93 hrs HW=168.59' (Free Discharge)
↳ **2=Culvert** (Passes 0.97 cfs of 0.99 cfs potential flow)
↳ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
↳ **4=Orifice** (Orifice Controls 0.97 cfs @ 2.61 fps)

Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-800 +Cap (ADS StormTech®SC-800 with cap volume)
Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf
Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap
Cap Storage= 3.4 cf x 2 x 7 rows = 47.9 cf

51.0" Wide + 3.0" Spacing = 54.0" C-C Row Spacing

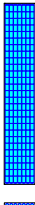
27 Chambers/Row x 7.12' Long +0.88' Cap Length x 2 = 193.92' Row Length +12.0" End Stone x 2 = 195.92' Base Length
7 Rows x 51.0" Wide + 3.0" Spacing x 6 + 12.0" Side Stone x 2 = 33.25' Base Width
6.0" Stone Base + 33.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

189 Chambers x 50.6 cf + 3.4 cf Cap Volume x 2 x 7 Rows = 9,609.8 cf Chamber Storage

24,428.4 cf Field - 9,609.8 cf Chambers = 14,818.5 cf Stone x 40.0% Voids = 5,927.4 cf Stone Storage

Chamber Storage + Stone Storage = 15,537.2 cf = 0.357 af
Overall Storage Efficiency = 63.6%
Overall System Size = 195.92' x 33.25' x 3.75'

189 Chambers
904.8 cy Field
548.8 cy Stone



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 157

Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780) - Chamber Wizard Field B

Chamber Model = ADS_StormTechDC-780 b +Cap (ADS StormTech®DC-780 with cap storage)

Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length

7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width

9.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

126 Chambers x 46.2 cf + 2.7 cf Cap Volume x 2 x 7 Rows = 5,863.3 cf Chamber Storage

17,172.1 cf Field - 5,863.3 cf Chambers = 11,308.9 cf Stone x 40.0% Voids = 4,523.5 cf Stone Storage

Chamber Storage + Stone Storage = 10,386.8 cf = 0.238 af

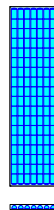
Overall Storage Efficiency = 60.5%

Overall System Size = 131.78' x 34.75' x 3.75'

126 Chambers

636.0 cy Field

418.8 cy Stone

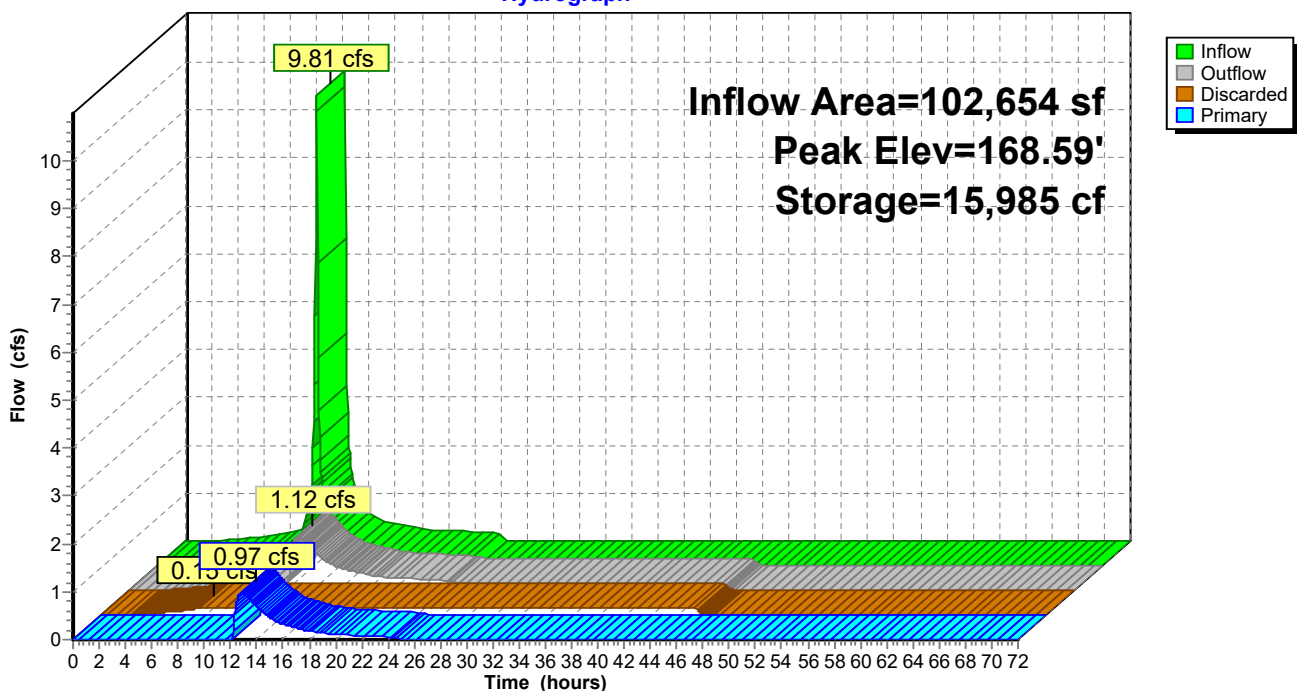
**3410-03 - Proposed HydroCAD**

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 158

Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)**Hydrograph**

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 159

Stage-Area-Storage for Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
166.50	6,514	0	168.25	6,514	13,162	170.00	6,514	24,815
166.55	6,514	222	168.30	6,514	13,590	170.05	6,514	25,037
166.60	6,514	444	168.35	6,514	14,016	170.10	6,514	25,258
166.65	6,514	666	168.40	6,514	14,438	170.15	6,514	25,480
166.70	6,514	887	168.45	6,514	14,858	170.20	6,514	25,702
166.75	6,514	1,109	168.50	6,514	15,273	170.25	6,514	25,924
166.80	6,514	1,331	168.55	6,514	15,685			
166.85	6,514	1,553	168.60	6,514	16,093			
166.90	6,514	1,775	168.65	6,514	16,497			
166.95	6,514	1,997	168.70	6,514	16,897			
167.00	6,514	2,219	168.75	6,514	17,293			
167.05	6,514	2,592	168.80	6,514	17,685			
167.10	6,514	2,965	168.85	6,514	18,071			
167.15	6,514	3,338	168.90	6,514	18,453			
167.20	6,514	3,709	168.95	6,514	18,830			
167.25	6,514	4,080	169.00	6,514	19,200			
167.30	6,514	4,552	169.05	6,514	19,565			
167.35	6,514	5,023	169.10	6,514	19,924			
167.40	6,514	5,492	169.15	6,514	20,276			
167.45	6,514	5,959	169.20	6,514	20,622			
167.50	6,514	6,425	169.25	6,514	20,959			
167.55	6,514	6,889	169.30	6,514	21,288			
167.60	6,514	7,351	169.35	6,514	21,608			
167.65	6,514	7,812	169.40	6,514	21,916			
167.70	6,514	8,270	169.45	6,514	22,210			
167.75	6,514	8,727	169.50	6,514	22,487			
167.80	6,514	9,181	169.55	6,514	22,750			
167.85	6,514	9,633	169.60	6,514	23,001			
167.90	6,514	10,083	169.65	6,514	23,244			
167.95	6,514	10,531	169.70	6,514	23,478			
168.00	6,514	10,976	169.75	6,514	23,705			
168.05	6,514	11,419	169.80	6,514	23,927			
168.10	6,514	11,859	169.85	6,514	24,149			
168.15	6,514	12,296	169.90	6,514	24,371			
168.20	6,514	12,730	169.95	6,514	24,593			

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 160

Summary for Pond 3P: UIS-2 (SC-800)

Inflow Area = 32,510 sf, 63.97% Impervious, Inflow Depth = 4.18" for 10-Year event
 Inflow = 3.15 cfs @ 12.13 hrs, Volume= 11,313 cf
 Outflow = 1.39 cfs @ 12.26 hrs, Volume= 11,313 cf, Atten= 56%, Lag= 7.8 min
 Discarded = 0.06 cfs @ 7.70 hrs, Volume= 5,553 cf
 Primary = 1.34 cfs @ 12.26 hrs, Volume= 5,760 cf
 Routed to Link SP2 : STUDY POINT #2 (Wetlands West)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 162.22' @ 12.26 hrs Surf.Area= 2,359 sf Storage= 3,524 cf
 Flood Elev= 163.85' Surf.Area= 2,359 sf Storage= 5,566 cf

Plug-Flow detention time= 186.8 min calculated for 11,313 cf (100% of inflow)
 Center-of-Mass det. time= 186.7 min (986.6 - 799.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	160.10'	2,186 cf	28.75'W x 82.05'L x 3.75'H Field A 8,846 cf Overall - 3,380 cf Embedded = 5,466 cf x 40.0% Voids
#2A	160.60'	3,380 cf	ADS_StormTech SC-800 +Cap x 66 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 66 Chambers in 6 Rows Cap Storage= 3.4 cf x 2 x 6 rows = 41.0 cf
		5,566 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	160.10'	1.020 in/hr Exfiltration over Surface area
#2	Primary	161.25'	12.0" Round Culvert L= 9.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.25' / 161.00' S= 0.0278 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	163.60'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00

Coef. (English) 2.80 2.92 3.08 3.30 3.32

#4 Device 2 161.25' **8.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 7.70 hrs HW=160.14' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=1.34 cfs @ 12.26 hrs HW=162.21' (Free Discharge)

2=Culvert (Passes 1.34 cfs of 2.05 cfs potential flow)

3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

4=Orifice (Orifice Controls 1.34 cfs @ 3.82 fps)

Pond 3P: UIS-2 (SC-800) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-800 +Cap (ADS StormTech®SC-800 with cap volume)

Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf

Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap

Cap Storage= 3.4 cf x 2 x 6 rows = 41.0 cf

51.0" Wide + 3.0" Spacing = 54.0" C-C Row Spacing

11 Chambers/Row x 7.12' Long +0.88' Cap Length x 2 = 80.05' Row Length +12.0" End Stone x 2 = 82.05' Base Length

6 Rows x 51.0" Wide + 3.0" Spacing x 5 + 12.0" Side Stone x 2 = 28.75' Base Width

6.0" Stone Base + 33.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

66 Chambers x 50.6 cf + 3.4 cf Cap Volume x 2 x 6 Rows = 3,380.1 cf Chamber Storage

8,846.0 cf Field - 3,380.1 cf Chambers = 5,465.9 cf Stone x 40.0% Voids = 2,186.4 cf Stone Storage

Chamber Storage + Stone Storage = 5,566.5 cf = 0.128 af

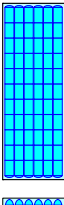
Overall Storage Efficiency = 62.9%

Overall System Size = 82.05' x 28.75' x 3.75'

66 Chambers

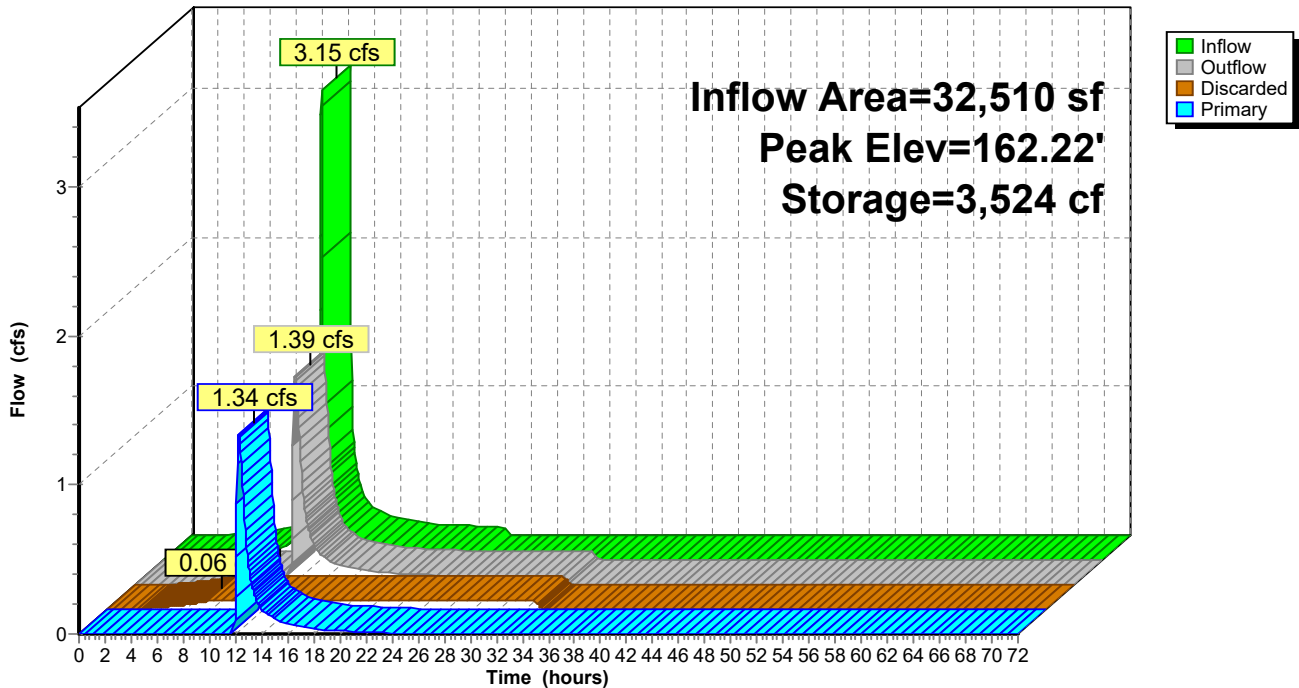
327.6 cy Field

202.4 cy Stone



Pond 3P: UIS-2 (SC-800)

Hydrograph



Stage-Area-Storage for Pond 3P: UIS-2 (SC-800)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
160.10	2,359	0	161.85	2,359	2,878	163.60	2,359	5,331
160.15	2,359	47	161.90	2,359	2,968	163.65	2,359	5,378
160.20	2,359	94	161.95	2,359	3,057	163.70	2,359	5,425
160.25	2,359	142	162.00	2,359	3,146	163.75	2,359	5,472
160.30	2,359	189	162.05	2,359	3,234	163.80	2,359	5,519
160.35	2,359	236	162.10	2,359	3,321	163.85	2,359	5,566
160.40	2,359	283	162.15	2,359	3,407			
160.45	2,359	330	162.20	2,359	3,493			
160.50	2,359	377	162.25	2,359	3,578			
160.55	2,359	425	162.30	2,359	3,662			
160.60	2,359	472	162.35	2,359	3,745			
160.65	2,359	520	162.40	2,359	3,827			
160.70	2,359	567	162.45	2,359	3,908			
160.75	2,359	614	162.50	2,359	3,988			
160.80	2,359	661	162.55	2,359	4,067			
160.85	2,359	708	162.60	2,359	4,145			
160.90	2,359	755	162.65	2,359	4,222			
160.95	2,359	802	162.70	2,359	4,297			
161.00	2,359	849	162.75	2,359	4,371			
161.05	2,359	896	162.80	2,359	4,444			
161.10	2,359	943	162.85	2,359	4,515			
161.15	2,359	990	162.90	2,359	4,584			
161.20	2,359	1,037	162.95	2,359	4,651			
161.25	2,359	1,084	163.00	2,359	4,716			
161.30	2,359	1,131	163.05	2,359	4,777			
161.35	2,359	1,178	163.10	2,359	4,836			
161.40	2,359	1,225	163.15	2,359	4,891			
161.45	2,359	1,272	163.20	2,359	4,944			
161.50	2,359	1,319	163.25	2,359	4,996			
161.55	2,359	1,366	163.30	2,359	5,046			
161.60	2,359	1,413	163.35	2,359	5,095			
161.65	2,359	1,460	163.40	2,359	5,142			
161.70	2,359	1,507	163.45	2,359	5,189			
161.75	2,359	1,554	163.50	2,359	5,236			
161.80	2,359	1,601	163.55	2,359	5,283			

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 165

Summary for Pond 4P: UDS-2 (SC-310)

Inflow Area = 7,417 sf, 51.89% Impervious, Inflow Depth = 3.78" for 10-Year event
Inflow = 0.67 cfs @ 12.13 hrs, Volume= 2,334 cf
Outflow = 0.49 cfs @ 12.19 hrs, Volume= 2,334 cf, Atten= 26%, Lag= 3.8 min
Primary = 0.49 cfs @ 12.19 hrs, Volume= 2,334 cf
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 134.28' @ 12.19 hrs Surf.Area= 375 sf Storage= 149 cf
Flood Elev= 135.83' Surf.Area= 375 sf Storage= 456 cf

Plug-Flow detention time= 7.5 min calculated for 2,332 cf (100% of inflow)
Center-of-Mass det. time= 7.6 min (825.5 - 817.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	133.50'	279 cf	8.17'W x 45.92'L x 2.33'H Field A 875 cf Overall - 177 cf Embedded = 698 cf x 40.0% Voids
#2A	134.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
		456 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	133.50'	12.0" Round Culvert L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 133.50' / 132.84' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	135.40'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	133.50'	5.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 166

Primary OutFlow Max=0.49 cfs @ 12.19 hrs HW=134.27' (Free Discharge)

- 1=Culvert (Passes 0.49 cfs of 1.52 cfs potential flow)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 3=Orifice/Grate (Orifice Controls 0.49 cfs @ 3.60 fps)

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 167

Pond 4P: UDS-2 (SC-310) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

875.0 cf Field - 176.9 cf Chambers = 698.1 cf Stone x 40.0% Voids = 279.3 cf Stone Storage

Chamber Storage + Stone Storage = 456.2 cf = 0.010 af

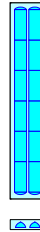
Overall Storage Efficiency = 52.1%

Overall System Size = 45.92' x 8.17' x 2.33'

12 Chambers

32.4 cy Field

25.9 cy Stone

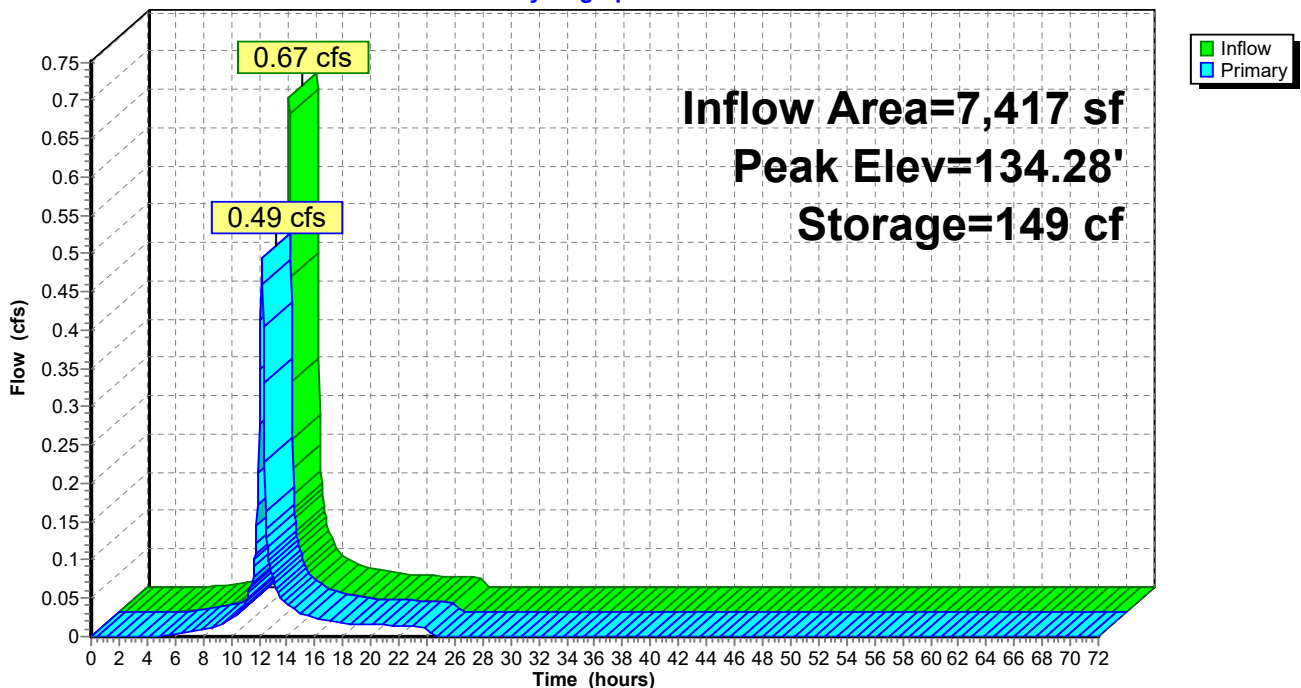
**3410-03 - Proposed HydroCAD**

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 168

Pond 4P: UDS-2 (SC-310)**Hydrograph**

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 169

Stage-Area-Storage for Pond 4P: UDS-2 (SC-310)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
133.50	0	134.20	129	134.90	303	135.60	421
133.52	3	134.22	135	134.92	307	135.62	424
133.54	6	134.24	140	134.94	311	135.64	427
133.56	9	134.26	145	134.96	315	135.66	430
133.58	12	134.28	151	134.98	320	135.68	433
133.60	15	134.30	156	135.00	324	135.70	436
133.62	18	134.32	161	135.02	328	135.72	439
133.64	21	134.34	166	135.04	332	135.74	442
133.66	24	134.36	172	135.06	336	135.76	445
133.68	27	134.38	177	135.08	339	135.78	448
133.70	30	134.40	182	135.10	343	135.80	451
133.72	33	134.42	187	135.12	347	135.82	454
133.74	36	134.44	192	135.14	350		
133.76	39	134.46	197	135.16	353		
133.78	42	134.48	203	135.18	357		
133.80	45	134.50	208	135.20	360		
133.82	48	134.52	213	135.22	363		
133.84	51	134.54	218	135.24	367		
133.86	54	134.56	223	135.26	370		
133.88	57	134.58	228	135.28	373		
133.90	60	134.60	233	135.30	376		
133.92	63	134.62	237	135.32	379		
133.94	66	134.64	242	135.34	382		
133.96	69	134.66	247	135.36	385		
133.98	72	134.68	252	135.38	388		
134.00	75	134.70	257	135.40	391		
134.02	80	134.72	262	135.42	394		
134.04	86	134.74	266	135.44	397		
134.06	91	134.76	271	135.46	400		
134.08	97	134.78	276	135.48	403		
134.10	102	134.80	280	135.50	406		
134.12	108	134.82	285	135.52	409		
134.14	113	134.84	289	135.54	412		
134.16	119	134.86	294	135.56	415		
134.18	124	134.88	298	135.58	418		

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 10-Year Rainfall=5.33"

Printed 6/1/2026

Page 170

Summary for Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)

Inflow Area = 54,619 sf, 49.01% Impervious, Inflow Depth = 3.70" for 10-Year event
 Inflow = 4.69 cfs @ 12.13 hrs, Volume= 16,846 cf
 Outflow = 1.60 cfs @ 12.30 hrs, Volume= 16,846 cf, Atten= 66%, Lag= 10.6 min
 Discarded = 0.06 cfs @ 7.35 hrs, Volume= 7,027 cf
 Primary = 1.54 cfs @ 12.30 hrs, Volume= 9,819 cf
 Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 165.56' @ 12.30 hrs Surf.Area= 2,656 sf Storage= 5,799 cf
 Flood Elev= 166.33' Surf.Area= 2,656 sf Storage= 8,598 cf

Plug-Flow detention time= 213.7 min calculated for 16,835 cf (100% of inflow)
 Center-of-Mass det. time= 214.1 min (1,020.8 - 806.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	164.00'	1,830 cf	32.58'W x 81.52'L x 2.33'H Field A 6,198 cf Overall - 1,622 cf Embedded = 4,576 cf x 40.0% Voids
#2A	164.50'	1,622 cf	ADS_StormTech SC-310 +Cap x 110 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 110 Chambers in 10 Rows
#3B	164.00'	3,315 cf	34.75'W x 96.18'L x 3.75'H Field B -Impervious 12,533 cf Overall - 4,245 cf Embedded = 8,288 cf x 40.0% Voids
#4B	164.75'	4,245 cf	ADS_StormTech DC-780 b +Cap x 91 Inside #3 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 7 Rows Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf
		11,012 cf	Total Available Storage

Storage Group A created with Chamber Wizard
 Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	164.00'	1.020 in/hr Exfiltration over Surface area
#2	Primary	164.00'	
			12.0" Round Culvert L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.00' / 160.32' S= 0.0400 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	165.75'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	164.80'	10.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 7.35 hrs HW=164.04' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=1.54 cfs @ 12.30 hrs HW=165.56' (Free Discharge)

2=Culvert (Passes 1.54 cfs of 3.07 cfs potential flow)

3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

4=Orifice/Grate (Orifice Controls 1.54 cfs @ 2.96 fps)

Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 3.0" Spacing = 37.0" C-C Row Spacing

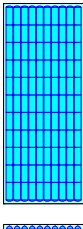
11 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 79.52' Row Length +12.0" End Stone x 2 = 81.52' Base Length
10 Rows x 34.0" Wide + 3.0" Spacing x 9 + 12.0" Side Stone x 2 = 32.58' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

110 Chambers x 14.7 cf = 1,621.6 cf Chamber Storage

6,197.8 cf Field - 1,621.6 cf Chambers = 4,576.2 cf Stone x 40.0% Voids = 1,830.5 cf Stone Storage

Chamber Storage + Stone Storage = 3,452.1 cf = 0.079 af
Overall Storage Efficiency = 55.7%
Overall System Size = 81.52' x 32.58' x 2.33'

110 Chambers
229.5 cy Field
169.5 cy Stone



Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780) - Chamber Wizard Field B

Chamber Model = ADS_StormTechDC-780 b +Cap (ADS StormTech®DC-780 with cap storage)
Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

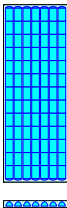
13 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 94.18' Row Length +12.0" End Stone x 2 = 96.18' Base Length
7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width
9.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

91 Chambers x 46.2 cf + 2.7 cf Cap Volume x 2 x 7 Rows = 4,244.9 cf Chamber Storage

12,533.0 cf Field - 4,244.9 cf Chambers = 8,288.1 cf Stone x 40.0% Voids = 3,315.2 cf Stone Storage

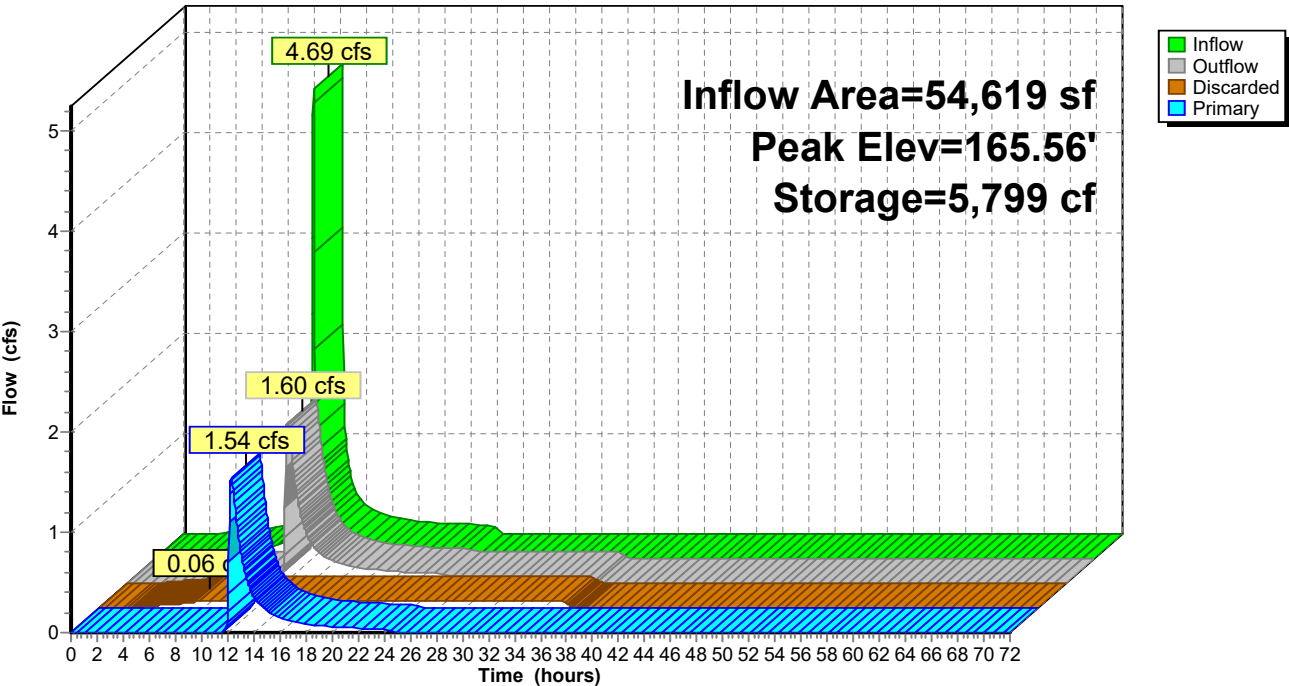
Chamber Storage + Stone Storage = 7,560.2 cf = 0.174 af
Overall Storage Efficiency = 60.3%
Overall System Size = 96.18' x 34.75' x 3.75'

91 Chambers
464.2 cy Field
307.0 cy Stone



Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)

Hydrograph



Stage-Area-Storage for Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)

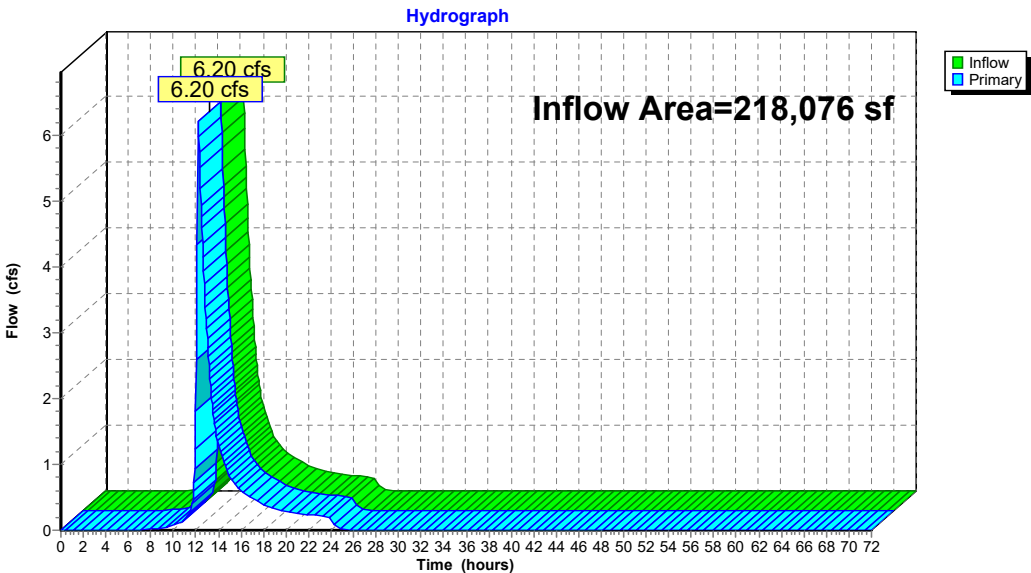
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
164.00	2,656	0	165.75	2,656	6,550	167.50	2,656	10,678
164.05	2,656	120	165.80	2,656	6,735	167.55	2,656	10,745
164.10	2,656	240	165.85	2,656	6,916	167.60	2,656	10,812
164.15	2,656	360	165.90	2,656	7,096	167.65	2,656	10,879
164.20	2,656	480	165.95	2,656	7,275	167.70	2,656	10,945
164.25	2,656	600	166.00	2,656	7,453	167.75	2,656	11,012
164.30	2,656	720	166.05	2,656	7,630			
164.35	2,656	840	166.10	2,656	7,805			
164.40	2,656	960	166.15	2,656	7,980			
164.45	2,656	1,080	166.20	2,656	8,153			
164.50	2,656	1,200	166.25	2,656	8,325			
164.55	2,656	1,376	166.30	2,656	8,496			
164.60	2,656	1,552	166.35	2,656	8,648			
164.65	2,656	1,728	166.40	2,656	8,762			
164.70	2,656	1,902	166.45	2,656	8,875			
164.75	2,656	2,076	166.50	2,656	8,987			
164.80	2,656	2,323	166.55	2,656	9,096			
164.85	2,656	2,568	166.60	2,656	9,204			
164.90	2,656	2,812	166.65	2,656	9,310			
164.95	2,656	3,054	166.70	2,656	9,414			
165.00	2,656	3,294	166.75	2,656	9,516			
165.05	2,656	3,532	166.80	2,656	9,615			
165.10	2,656	3,768	166.85	2,656	9,712			
165.15	2,656	4,002	166.90	2,656	9,805			
165.20	2,656	4,234	166.95	2,656	9,894			
165.25	2,656	4,464	167.00	2,656	9,979			
165.30	2,656	4,690	167.05	2,656	10,058			
165.35	2,656	4,914	167.10	2,656	10,133			
165.40	2,656	5,134	167.15	2,656	10,206			
165.45	2,656	5,351	167.20	2,656	10,276			
165.50	2,656	5,564	167.25	2,656	10,344			
165.55	2,656	5,772	167.30	2,656	10,411			
165.60	2,656	5,974	167.35	2,656	10,478			
165.65	2,656	6,171	167.40	2,656	10,544			
165.70	2,656	6,362	167.45	2,656	10,611			

Summary for Link SP1: STUDY POINT #1 (Kimball Road north)

Inflow Area = 218,076 sf, 43.75% Impervious, Inflow Depth = 2.24" for 10-Year event
Inflow = 6.20 cfs @ 12.20 hrs, Volume= 40,785 cf
Primary = 6.20 cfs @ 12.20 hrs, Volume= 40,785 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP1: STUDY POINT #1 (Kimball Road north)

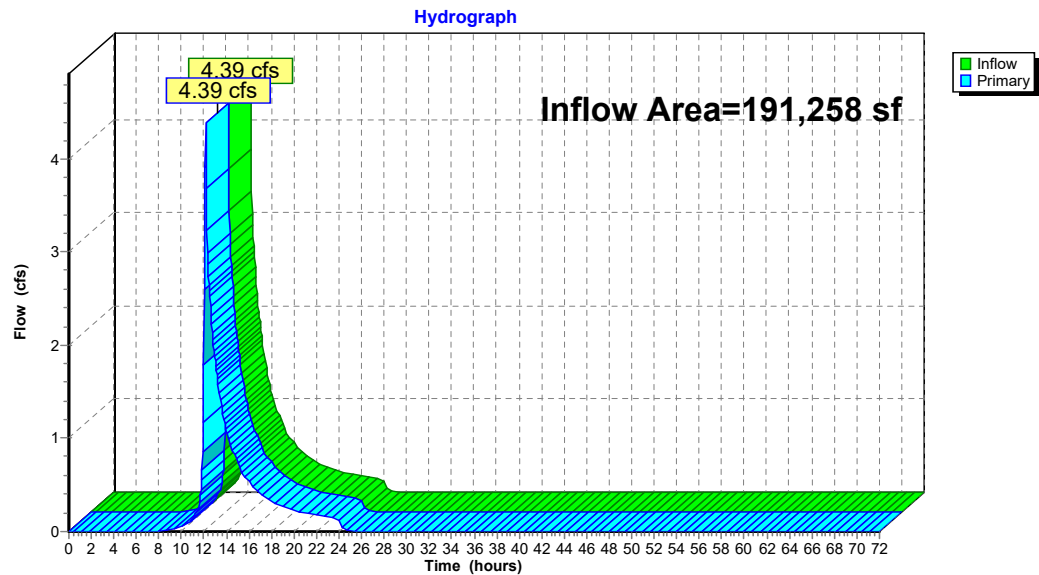


Summary for Link SP2: STUDY POINT #2 (Wetlands West)

Inflow Area = 191,258 sf, 44.90% Impervious, Inflow Depth = 1.86" for 10-Year event
Inflow = 4.39 cfs @ 12.15 hrs, Volume= 29,649 cf
Primary = 4.39 cfs @ 12.15 hrs, Volume= 29,649 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP2: STUDY POINT #2 (Wetlands West)



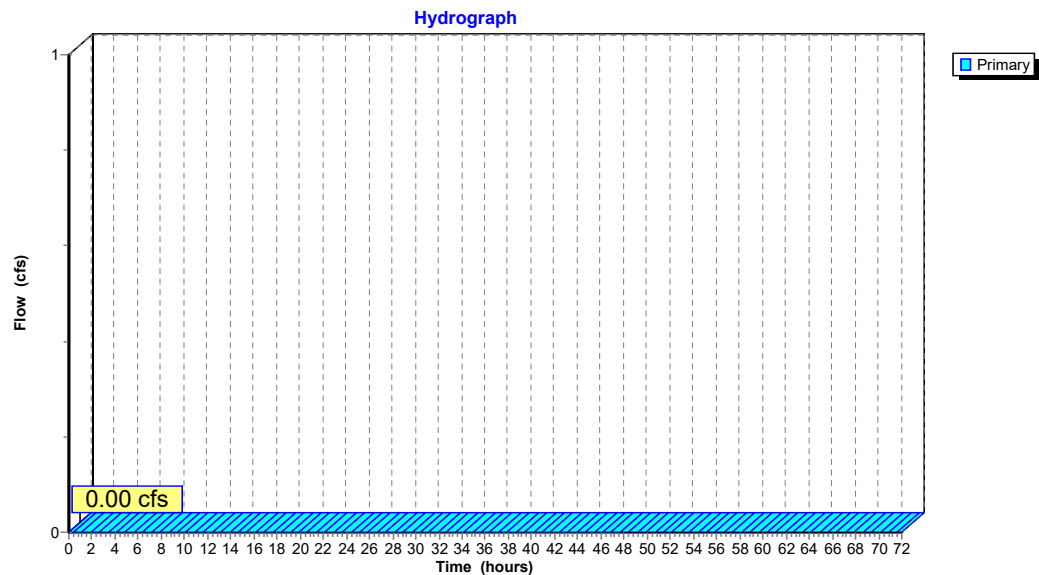
Summary for Link SP3: STUDY POINT #3 (IVW south)

[43] Hint: Has no inflow (Outflow=Zero)

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP3: STUDY POINT #3 (IVW south)



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 25-Year Rainfall=6.56"

Printed 6/1/2026

Page 179

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 P-1: Subcat P-1	Runoff Area=14,876 sf 72.61% Impervious Runoff Depth=5.51" Tc=6.0 min CN=91 Runoff=1.86 cfs 6,826 cf
Subcatchment P-10: Subcat P-10	Runoff Area=8,341 sf 78.96% Impervious Runoff Depth=5.74" Tc=6.0 min CN=93 Runoff=1.07 cfs 3,987 cf
Subcatchment P-11: Subcat P-11	Runoff Area=8,941 sf 76.40% Impervious Runoff Depth=5.62" Tc=6.0 min CN=92 Runoff=1.13 cfs 4,188 cf
Subcatchment P-12: Subcat P-12	Runoff Area=19,709 sf 57.44% Impervious Runoff Depth=5.17" Tc=6.0 min CN=88 Runoff=2.37 cfs 8,486 cf
Subcatchment P-13: Subcat P-13	Runoff Area=10,271 sf 79.93% Impervious Runoff Depth=5.74" Tc=6.0 min CN=93 Runoff=1.31 cfs 4,909 cf
Subcatchment P-14: Subcat P-14	Runoff Area=7,633 sf 64.61% Impervious Runoff Depth=5.39" Tc=6.0 min CN=90 Runoff=0.94 cfs 3,430 cf
Subcatchment P-15: Subcat P-15	Runoff Area=14,623 sf 52.15% Impervious Runoff Depth=5.05" Tc=6.0 min CN=87 Runoff=1.73 cfs 6,160 cf
Subcatchment P-16: Subcat P-16	Runoff Area=13,061 sf 79.56% Impervious Runoff Depth=5.74" Tc=6.0 min CN=93 Runoff=1.67 cfs 6,243 cf
Subcatchment P-17: Subcat P-17	Runoff Area=10,295 sf 68.44% Impervious Runoff Depth=5.39" Tc=6.0 min CN=90 Runoff=1.27 cfs 4,626 cf
Subcatchment P-18: Subcat P-18	Runoff Area=6,252 sf 71.75% Impervious Runoff Depth=5.51" Tc=6.0 min CN=91 Runoff=0.78 cfs 2,869 cf
Subcatchment P-18A: Subcat P-18A	Runoff Area=7,417 sf 51.89% Impervious Runoff Depth=4.94" Tc=6.0 min CN=86 Runoff=0.87 cfs 3,055 cf

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 25-Year Rainfall=6.56"

Printed 6/1/2026

Page 180

Subcatchment P-19: Subcat P-19	Runoff Area=21,732 sf 51.13% Impervious Runoff Depth=4.94" Tc=6.0 min CN=86 Runoff=2.54 cfs 8,953 cf
Subcatchment P-2: Subcat P-2	Runoff Area=8,672 sf 75.35% Impervious Runoff Depth=5.62" Tc=6.0 min CN=92 Runoff=1.10 cfs 4,062 cf
Subcatchment P-20: Subcat P-20	Runoff Area=41,652 sf 45.57% Impervious Runoff Depth=4.83" Tc=6.0 min CN=85 Runoff=4.78 cfs 16,776 cf
Subcatchment P-21: Subcat P-21	Runoff Area=56,094 sf 0.01% Impervious Runoff Depth=3.36" Tc=6.0 min CN=71 Runoff=4.66 cfs 15,689 cf
Subcatchment P-22: Subcat P-22	Runoff Area=31,338 sf 0.00% Impervious Runoff Depth=3.46" Tc=6.0 min CN=72 Runoff=2.68 cfs 9,028 cf
Subcatchment P-23: Subcat P-23	Runoff Area=14,063 sf 0.00% Impervious Runoff Depth=3.46" Tc=6.0 min CN=72 Runoff=1.20 cfs 4,052 cf
Subcatchment P-24: Subcat P-24	Runoff Area=21,686 sf 33.62% Impervious Runoff Depth=4.51" Tc=6.0 min CN=82 Runoff=2.35 cfs 8,142 cf
Subcatchment P-25: Subcat P-25	Runoff Area=19,846 sf 0.02% Impervious Runoff Depth=3.36" Tc=6.0 min CN=71 Runoff=1.65 cfs 5,551 cf
Subcatchment P-3: Subcat P-3	Runoff Area=10,249 sf 79.91% Impervious Runoff Depth=5.74" Tc=6.0 min CN=93 Runoff=1.31 cfs 4,899 cf
Subcatchment P-4: Subcat P-4	Runoff Area=12,573 sf 84.83% Impervious Runoff Depth=5.85" Tc=6.0 min CN=94 Runoff=1.62 cfs 6,131 cf
Subcatchment P-5: Subcat P-5	Runoff Area=5,504 sf 81.03% Impervious Runoff Depth=5.74" Tc=6.0 min CN=93 Runoff=0.70 cfs 2,631 cf
Subcatchment P-6: Subcat P-6	Runoff Area=9,128 sf 59.53% Impervious Runoff Depth=5.17" Tc=6.0 min CN=88 Runoff=1.10 cfs 3,930 cf

Subcatchment P-6A: Subcat P-6A	Runoff Area=8,474 sf 69.12% Impervious Runoff Depth=5.51" Tc=6.0 min CN=91 Runoff=1.06 cfs 3,888 cf
Subcatchment P-7: Subcat P-7	Runoff Area=9,413 sf 77.70% Impervious Runoff Depth=5.74" Tc=6.0 min CN=93 Runoff=1.20 cfs 4,499 cf
Subcatchment P-8: Subcat P-8	Runoff Area=9,310 sf 71.77% Impervious Runoff Depth=5.51" Tc=6.0 min CN=91 Runoff=1.16 cfs 4,272 cf
Subcatchment P-9: Subcat P-9	Runoff Area=8,180 sf 81.46% Impervious Runoff Depth=5.85" Tc=6.0 min CN=94 Runoff=1.06 cfs 3,989 cf
Pond 1P: Infiltration Basin	Peak Elev=145.70' Storage=18,892 cf Inflow=13.24 cfs 47,658 cf Discarded=0.14 cfs 17,947 cf Primary=4.14 cfs 29,711 cf Outflow=4.28 cfs 47,658 cf
Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)	Peak Elev=169.09' Storage=19,855 cf Inflow=12.47 cfs 45,254 cf Discarded=0.15 cfs 23,122 cf Primary=1.80 cfs 22,132 cf Outflow=1.95 cfs 45,254 cf
Pond 3P: UIS-2 (SC-800)	Peak Elev=162.67' Storage=4,255 cf Inflow=4.00 cfs 14,547 cf Discarded=0.06 cfs 5,818 cf Primary=1.75 cfs 8,729 cf Outflow=1.81 cfs 14,547 cf
Pond 4P: UDS-2 (SC-310)	Peak Elev=134.55' Storage=220 cf Inflow=0.87 cfs 3,055 cf Outflow=0.60 cfs 3,055 cf
Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)	Peak Elev=165.89' Storage=7,075 cf Inflow=6.06 cfs 21,987 cf Discarded=0.06 cfs 7,339 cf Primary=2.78 cfs 14,648 cf Outflow=2.84 cfs 21,987 cf
Link SP1: STUDY POINT #1 (Kimball Road north)	Inflow=9.91 cfs 60,494 cf Primary=9.91 cfs 60,494 cf
Link SP2: STUDY POINT #2 (Wetlands West)	Inflow=7.08 cfs 46,550 cf Primary=7.08 cfs 46,550 cf
Link SP3: STUDY POINT #3 (IVW south)	Primary=0.00 cfs 0 cf

Total Runoff Area = 409,335 sf Runoff Volume = 161,270 cf Average Runoff Depth = 4.73"
55.72% Pervious = 228,062 sf 44.28% Impervious = 181,273 sf

Summary for Subcatchment P-1: Subcat P-1

Runoff = 1.86 cfs @ 12.13 hrs, Volume= 6,826 cf, Depth= 5.51"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

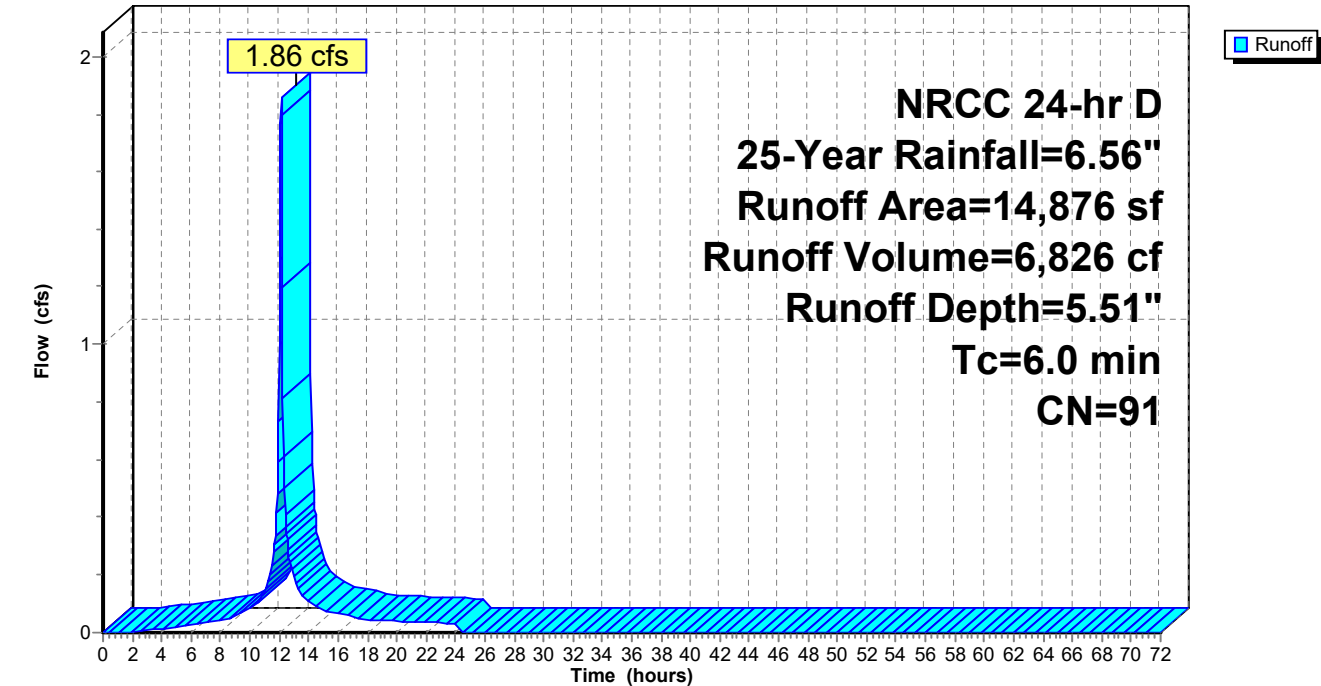
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
4,074	74	>75% Grass cover, Good, HSG C
1,784	98	Paved parking, HSG C
9,018	98	Roofs, HSG C
14,876	91	Weighted Average
4,074		27.39% Pervious Area
10,801		72.61% Impervious Area

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

Subcatchment P-1: Subcat P-1

Hydrograph



Summary for Subcatchment P-10: Subcat P-10

Runoff = 1.07 cfs @ 12.13 hrs, Volume= 3,987 cf, Depth= 5.74"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

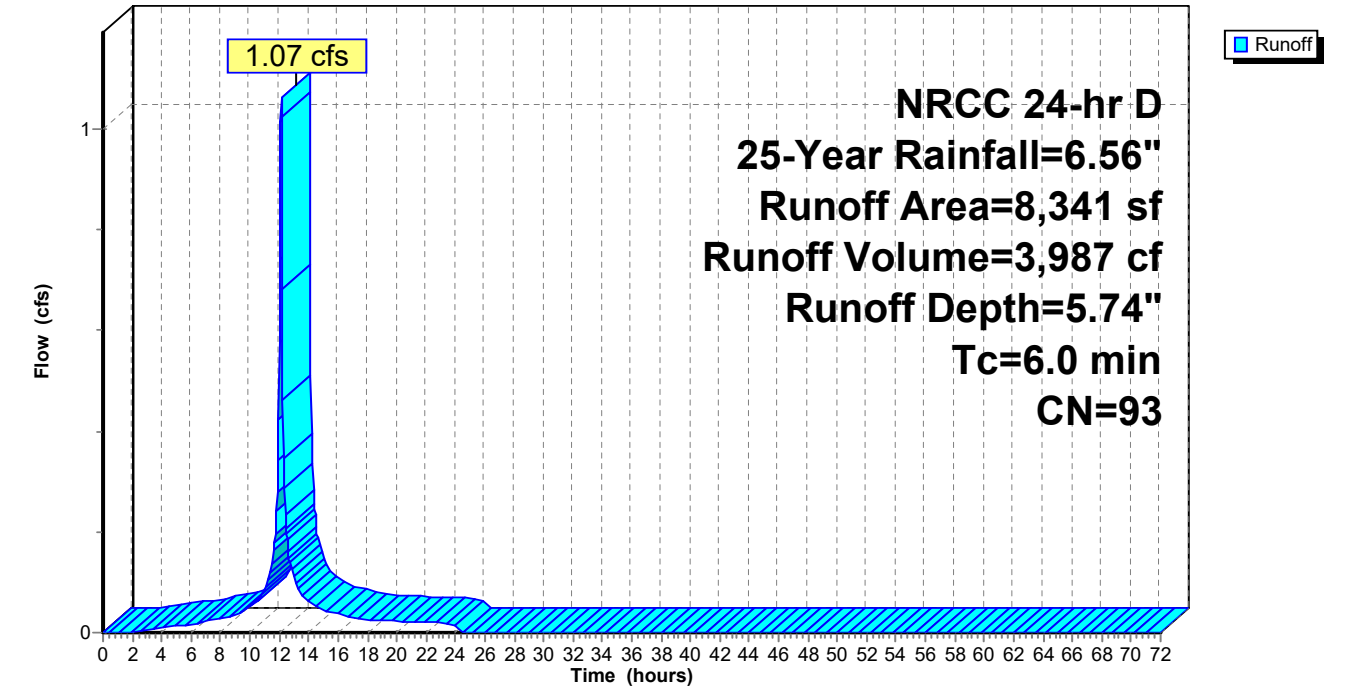
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
1,755	74	>75% Grass cover, Good, HSG C
6,446	98	Paved parking, HSG C
139	98	Roofs, HSG C
8,341	93	Weighted Average
1,755		21.04% Pervious Area
6,586		78.96% Impervious Area

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

Subcatchment P-10: Subcat P-10

Hydrograph



Summary for Subcatchment P-11: Subcat P-11

Runoff = 1.13 cfs @ 12.13 hrs, Volume= 4,188 cf, Depth= 5.62"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

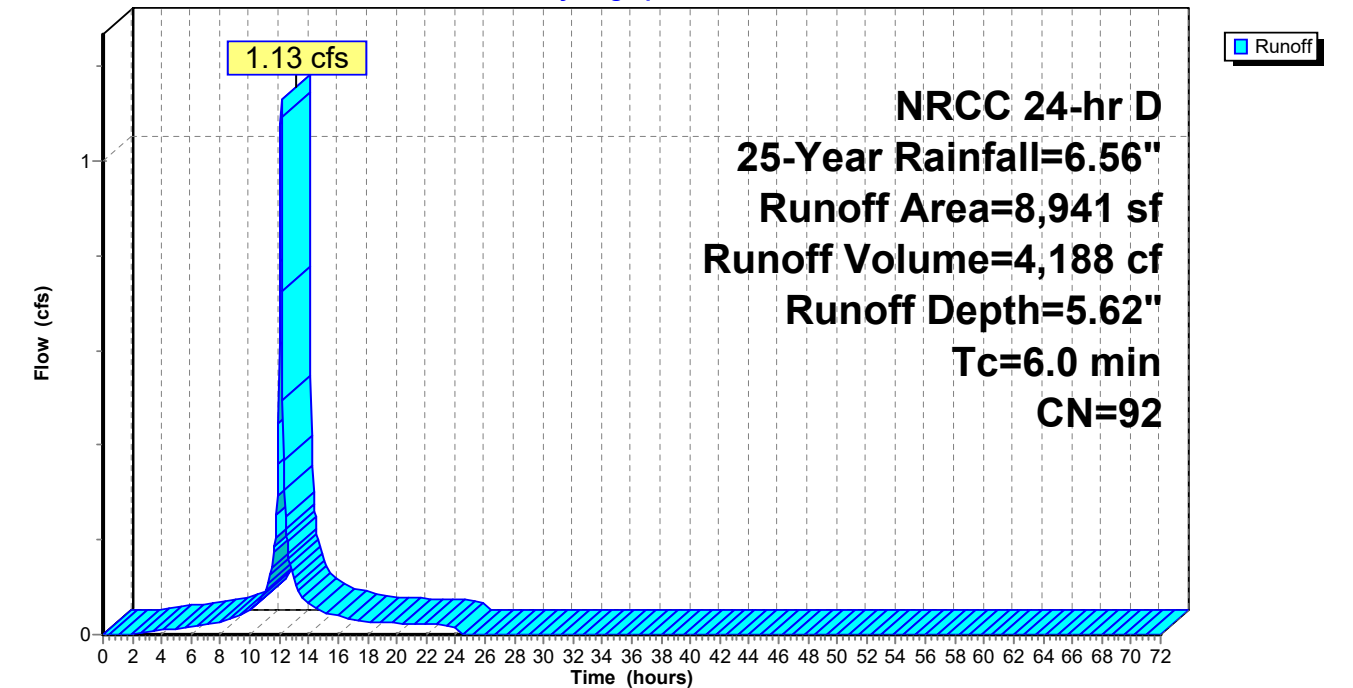
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
2,110	74	>75% Grass cover, Good, HSG C
6,825	98	Paved parking, HSG C
6	98	Roofs, HSG C
8,941	92	Weighted Average
2,110		23.60% Pervious Area
6,831		76.40% Impervious Area

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

Subcatchment P-11: Subcat P-11

Hydrograph



Summary for Subcatchment P-12: Subcat P-12

Runoff = 2.37 cfs @ 12.13 hrs, Volume= 8,486 cf, Depth= 5.17"
Routed to Pond 1P : Infiltration Basin

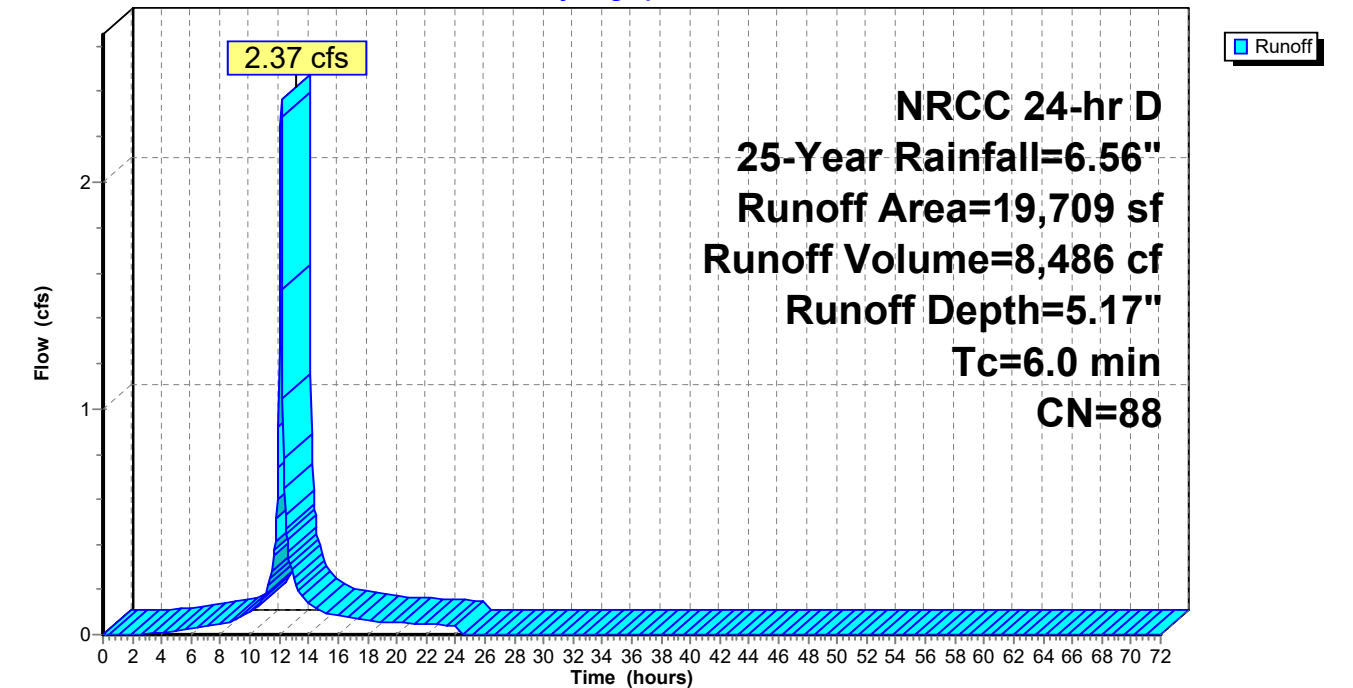
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
8,387	74	>75% Grass cover, Good, HSG C
1,531	98	Paved parking, HSG C
9,791	98	Roofs, HSG C
19,709	88	Weighted Average
8,387		42.56% Pervious Area
11,322		57.44% Impervious Area

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

Subcatchment P-12: Subcat P-12

Hydrograph



Summary for Subcatchment P-13: Subcat P-13

Runoff = 1.31 cfs @ 12.13 hrs, Volume= 4,909 cf, Depth= 5.74"
Routed to Pond 1P : Infiltration Basin

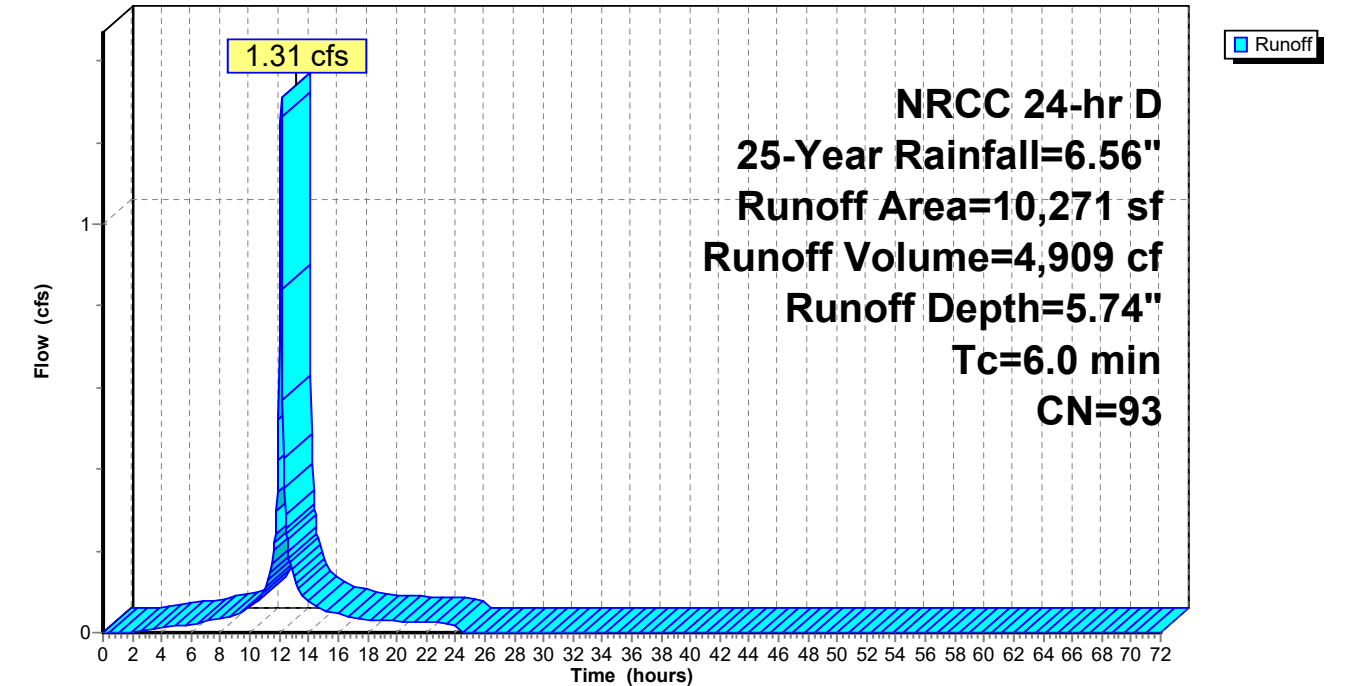
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
2,062	74	>75% Grass cover, Good, HSG C
8,209	98	Paved parking, HSG C
0	98	Roofs, HSG C
10,271	93	Weighted Average
2,062		20.07% Pervious Area
8,209		79.93% Impervious Area

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

Subcatchment P-13: Subcat P-13

Hydrograph



Summary for Subcatchment P-14: Subcat P-14

Runoff = 0.94 cfs @ 12.13 hrs, Volume= 3,430 cf, Depth= 5.39"
Routed to Pond 1P : Infiltration Basin

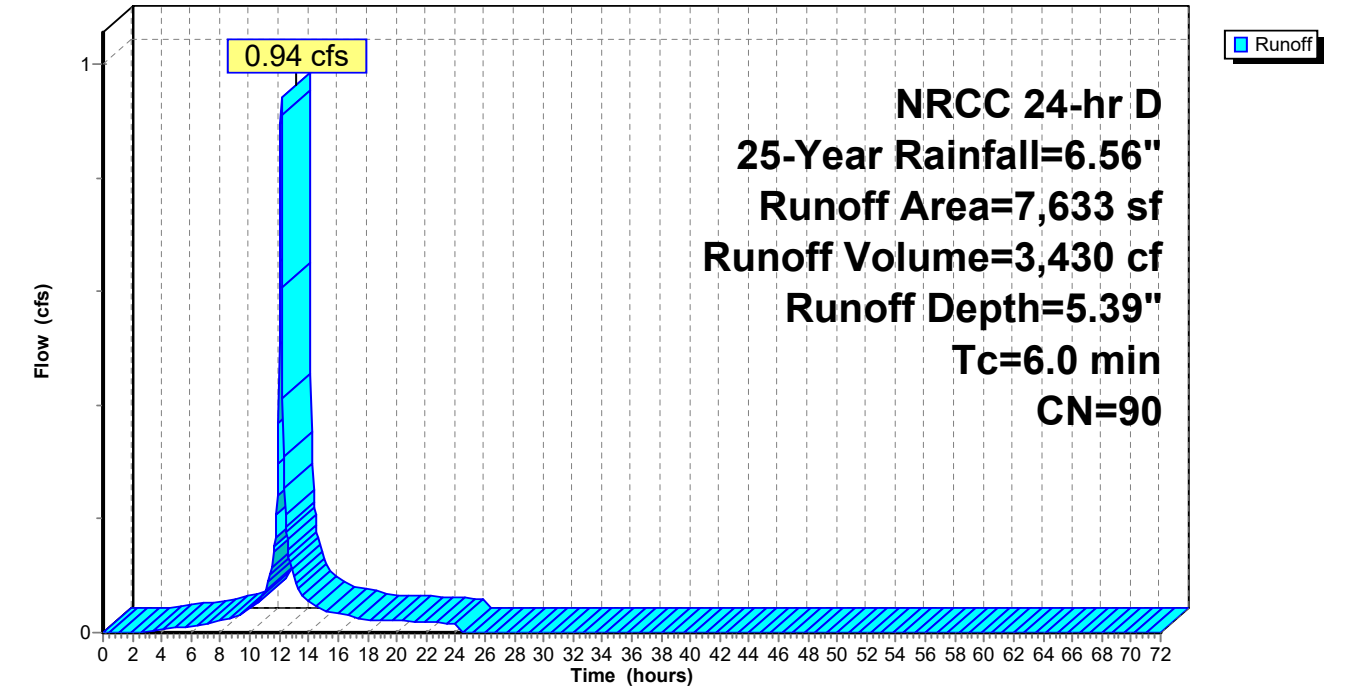
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
2,702	74	>75% Grass cover, Good, HSG C
4,931	98	Paved parking, HSG C
7,633	90	Weighted Average
2,702		35.39% Pervious Area
4,931		64.61% Impervious Area

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

Subcatchment P-14: Subcat P-14

Hydrograph



Summary for Subcatchment P-15: Subcat P-15

Runoff = 1.73 cfs @ 12.13 hrs, Volume= 6,160 cf, Depth= 5.05"
Routed to Pond 3P : UIS-2 (SC-800)

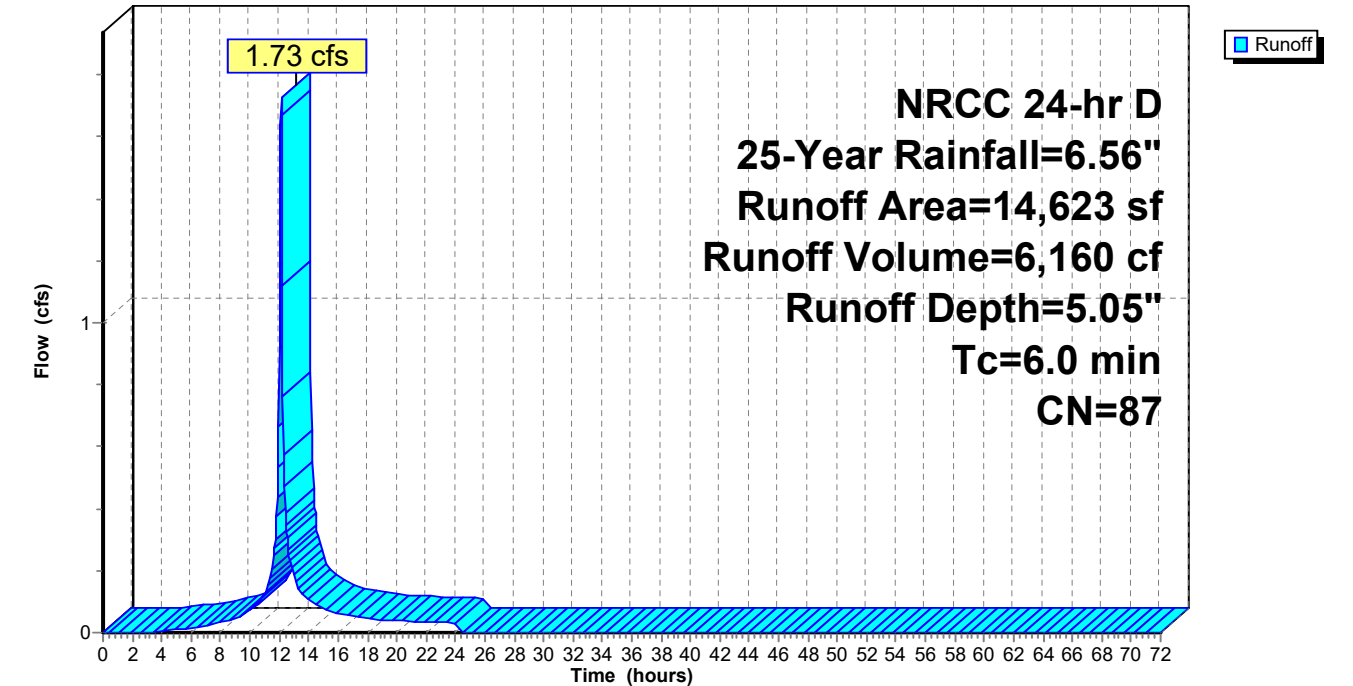
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
6,997	74	>75% Grass cover, Good, HSG C
917	98	Paved parking, HSG C
6,709	98	Roofs, HSG C
14,623	87	Weighted Average
6,997		47.85% Pervious Area
7,626		52.15% Impervious Area

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

Subcatchment P-15: Subcat P-15

Hydrograph



Summary for Subcatchment P-16: Subcat P-16

Runoff = 1.67 cfs @ 12.13 hrs, Volume= 6,243 cf, Depth= 5.74"
Routed to Pond 1P : Infiltration Basin

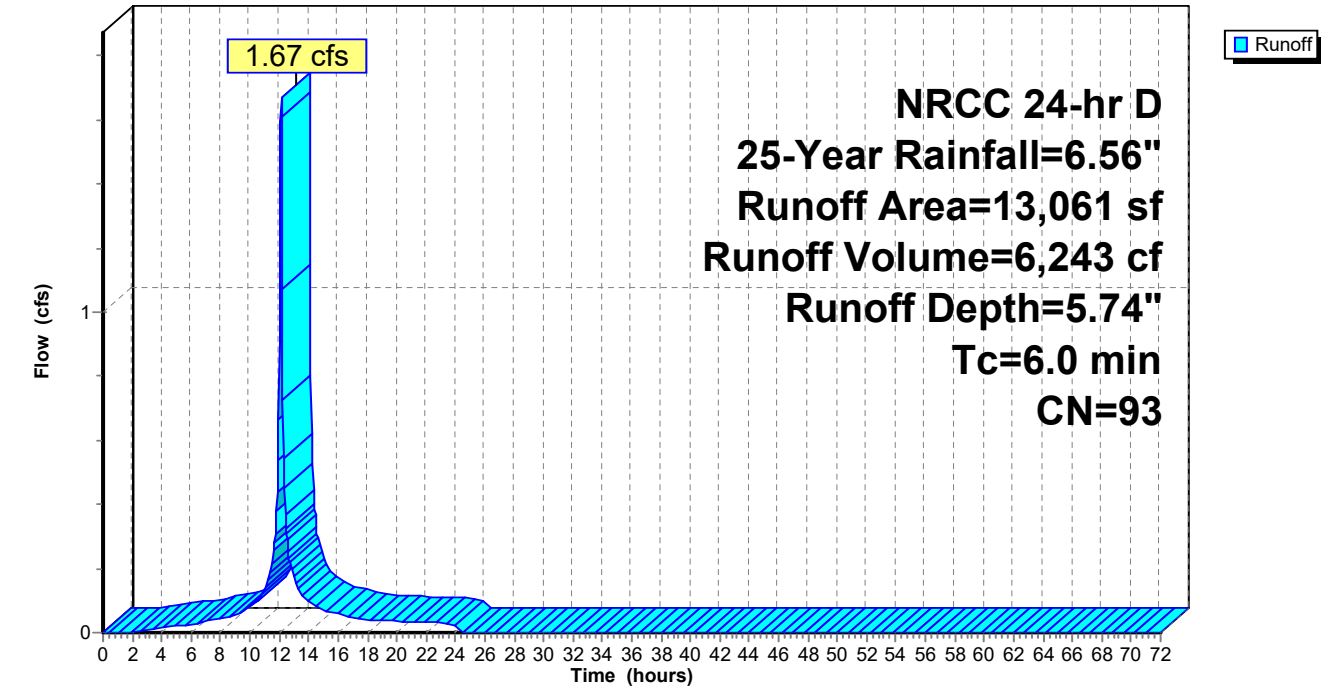
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
2,670	74	>75% Grass cover, Good, HSG C
10,111	98	Paved parking, HSG C
280	98	Roofs, HSG C
13,061	93	Weighted Average
2,670		20.44% Pervious Area
10,391		79.56% Impervious Area

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

Subcatchment P-16: Subcat P-16

Hydrograph



Summary for Subcatchment P-17: Subcat P-17

Runoff = 1.27 cfs @ 12.13 hrs, Volume= 4,626 cf, Depth= 5.39"
Routed to Pond 1P : Infiltration Basin

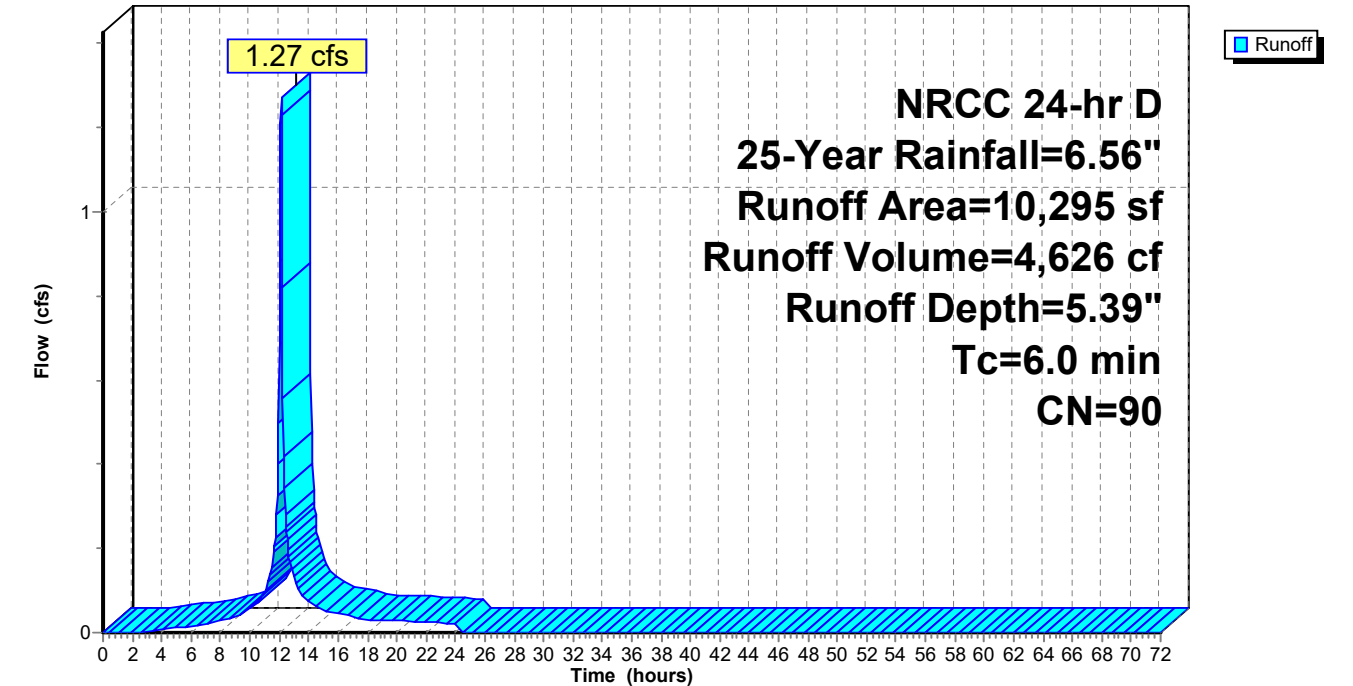
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
3,249	74	>75% Grass cover, Good, HSG C
6,446	98	Paved parking, HSG C
600	98	Roofs, HSG C
10,295	90	Weighted Average
3,249		31.56% Pervious Area
7,046		68.44% Impervious Area

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

Subcatchment P-17: Subcat P-17

Hydrograph



Summary for Subcatchment P-18: Subcat P-18

Runoff = 0.78 cfs @ 12.13 hrs, Volume= 2,869 cf, Depth= 5.51"
Routed to Pond 1P : Infiltration Basin

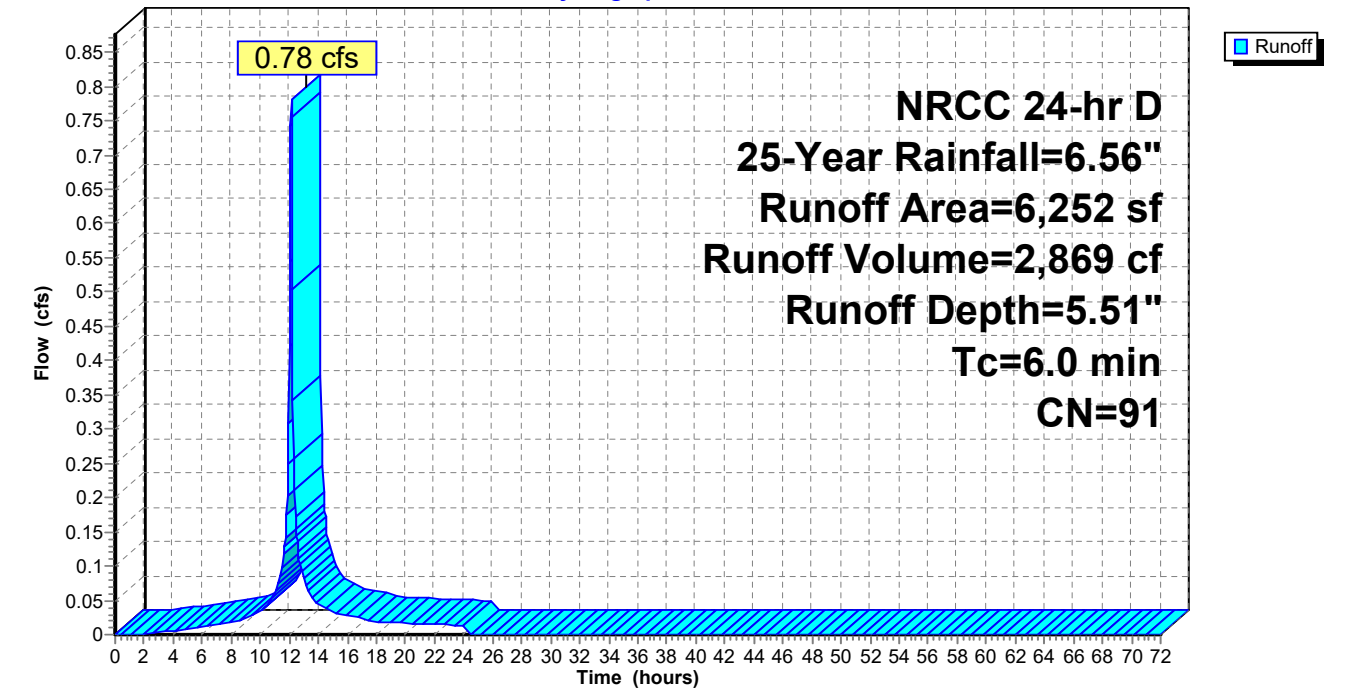
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
1,766	74	>75% Grass cover, Good, HSG C
4,486	98	Paved parking, HSG C
6,252	91	Weighted Average
1,766		28.25% Pervious Area
4,486		71.75% Impervious Area

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

Subcatchment P-18: Subcat P-18

Hydrograph



Summary for Subcatchment P-18A: Subcat P-18A

Runoff = 0.87 cfs @ 12.13 hrs, Volume= 3,055 cf, Depth= 4.94"
Routed to Pond 4P : UDS-2 (SC-310)

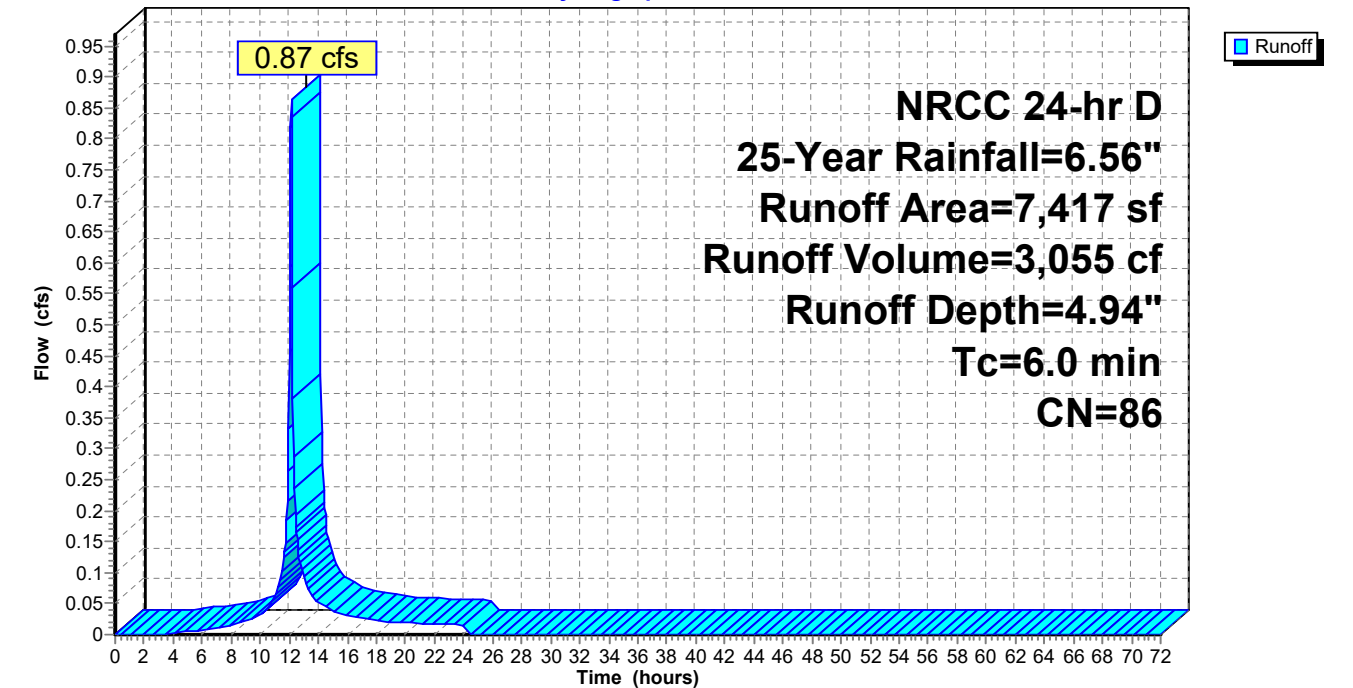
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
3,568	74	>75% Grass cover, Good, HSG C
3,849	98	Paved parking, HSG C
7,417	86	Weighted Average
3,568		48.11% Pervious Area
3,849		51.89% Impervious Area

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

Subcatchment P-18A: Subcat P-18A

Hydrograph



Summary for Subcatchment P-19: Subcat P-19

Runoff = 2.54 cfs @ 12.13 hrs, Volume= 8,953 cf, Depth= 4.94"
Routed to Pond 1P : Infiltration Basin

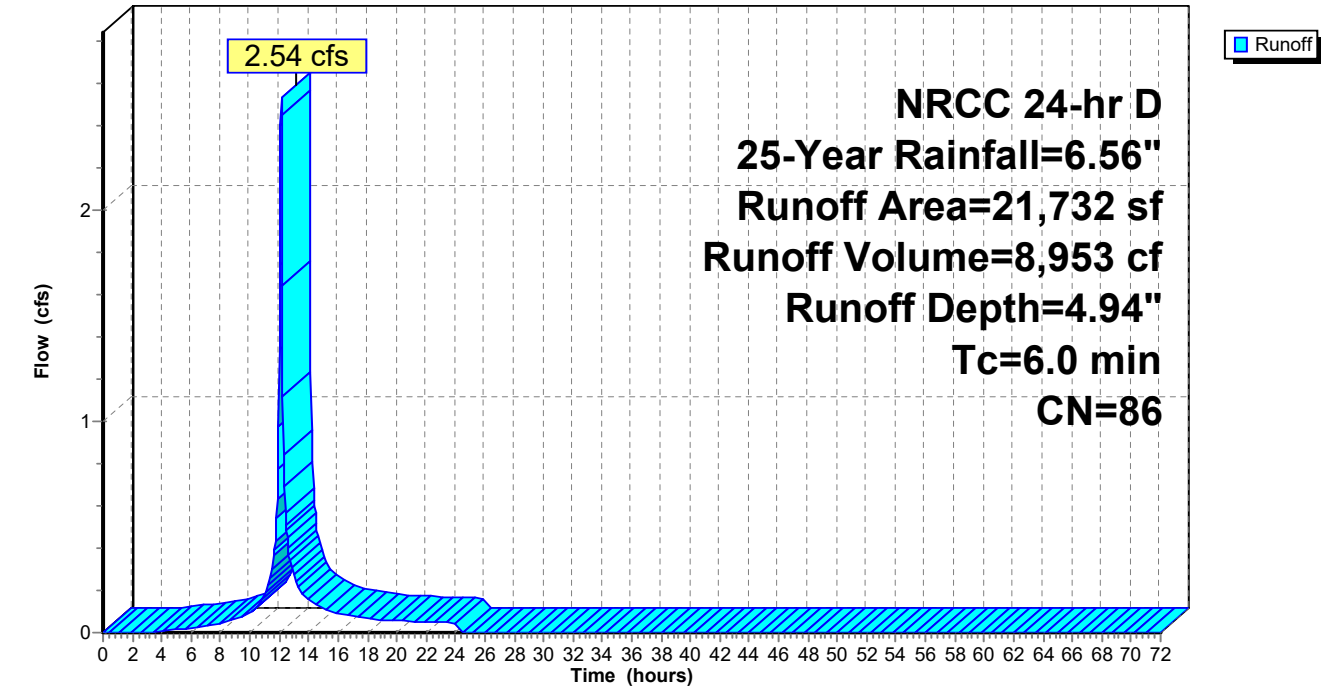
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
10,621	74	>75% Grass cover, Good, HSG C
1,800	98	Paved parking, HSG C
9,311	98	Roofs, HSG C
21,732	86	Weighted Average
10,621		48.87% Pervious Area
11,112		51.13% Impervious Area

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

Subcatchment P-19: Subcat P-19

Hydrograph



Summary for Subcatchment P-2: Subcat P-2

Runoff = 1.10 cfs @ 12.13 hrs, Volume= 4,062 cf, Depth= 5.62"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

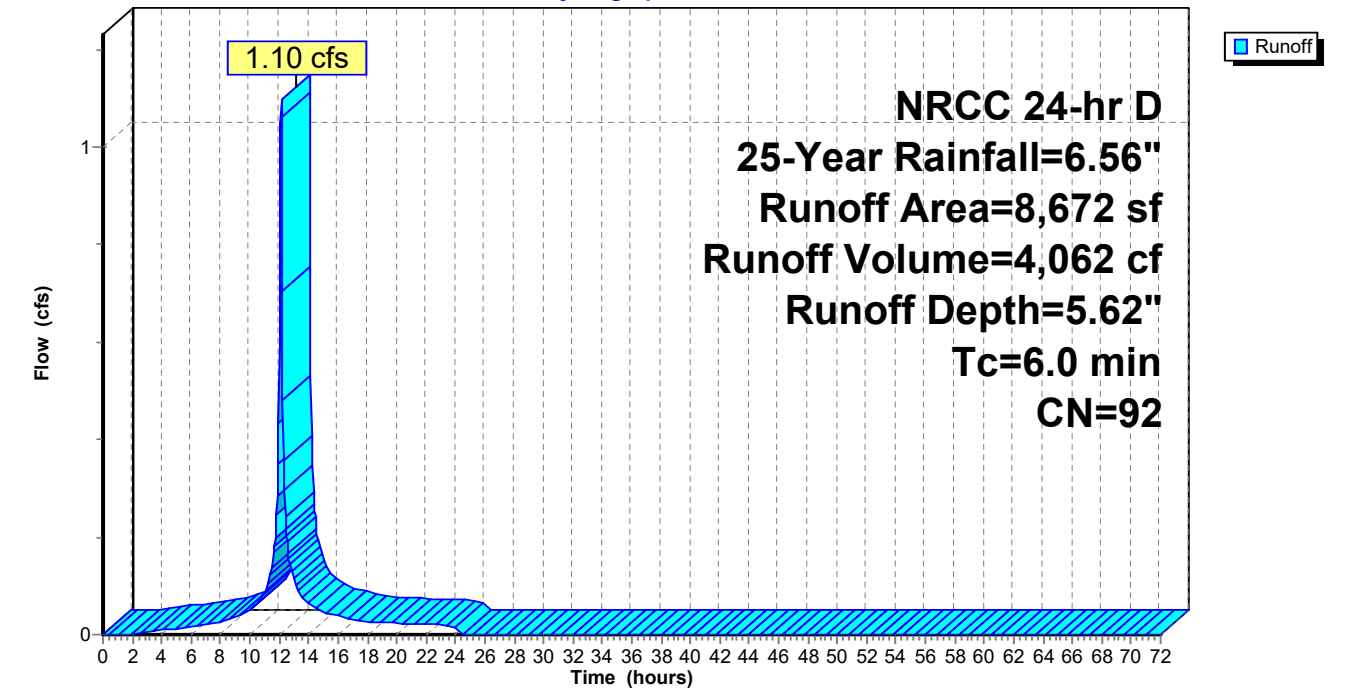
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
2,138	74	>75% Grass cover, Good, HSG C
6,408	98	Paved parking, HSG C
126	98	Roofs, HSG C
8,672	92	Weighted Average
2,138		24.65% Pervious Area
6,534		75.35% Impervious Area

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

Subcatchment P-2: Subcat P-2

Hydrograph



Summary for Subcatchment P-20: Subcat P-20

Runoff = 4.78 cfs @ 12.13 hrs, Volume= 16,776 cf, Depth= 4.83"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

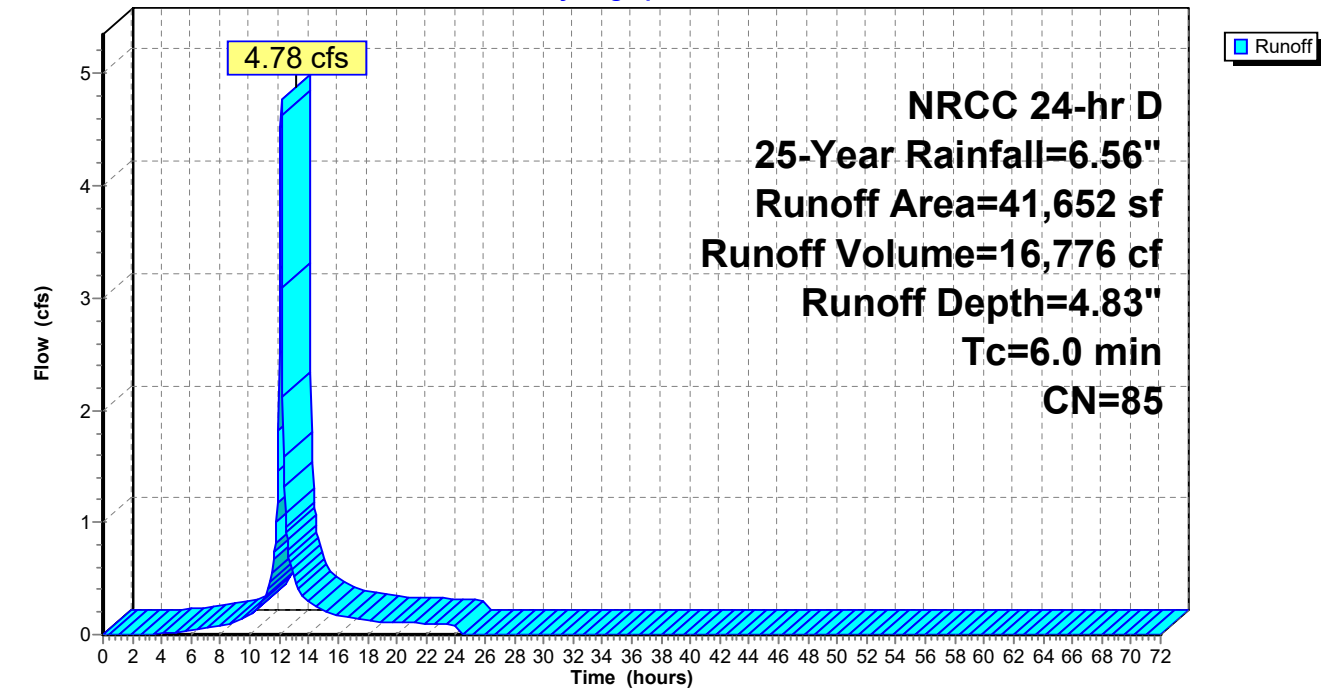
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
22,671	74	>75% Grass cover, Good, HSG C
3,948	98	Paved parking, HSG C
15,034	98	Roofs, HSG C
41,652	85	Weighted Average
22,671		54.43% Pervious Area
18,982		45.57% Impervious Area

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

Subcatchment P-20: Subcat P-20

Hydrograph



Summary for Subcatchment P-21: Subcat P-21

Runoff = 4.66 cfs @ 12.13 hrs, Volume= 15,689 cf, Depth= 3.36"
Routed to Link SP2 : STUDY POINT #2 (Wetlands West)

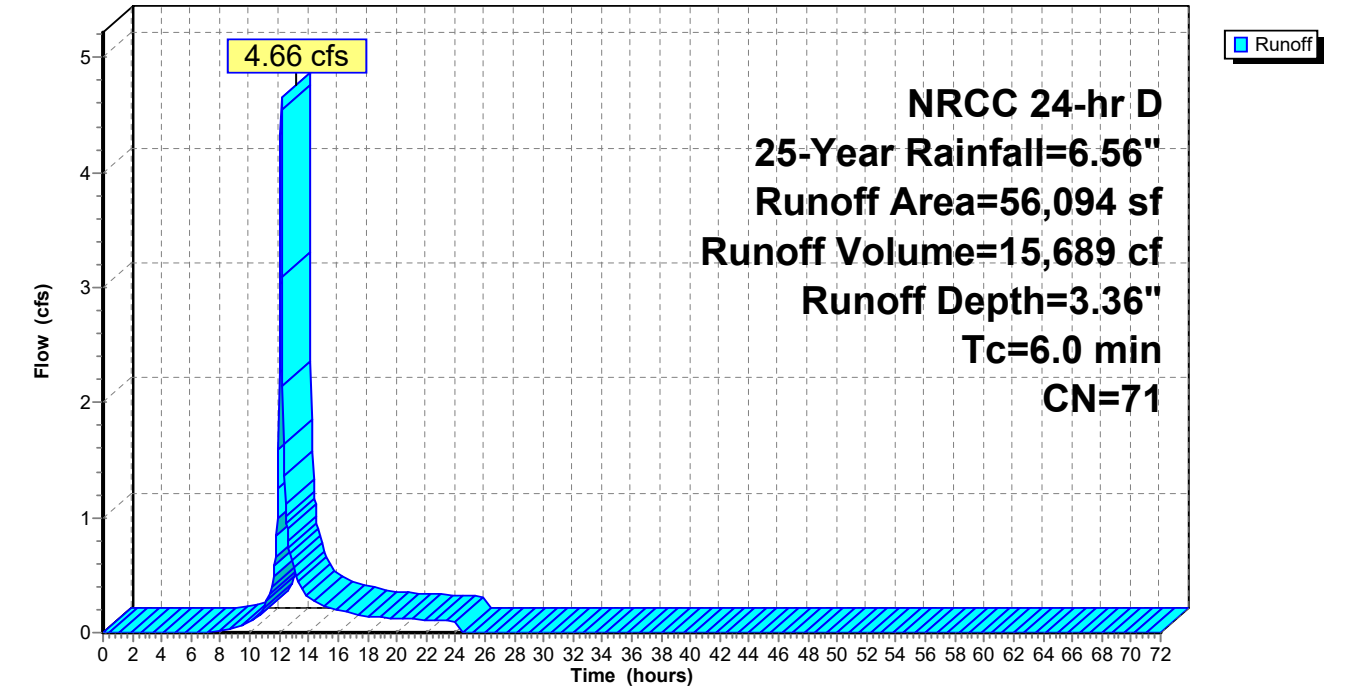
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
17,315	74	>75% Grass cover, Good, HSG C
4	98	Roofs, HSG C
38,775	70	Woods, Good, HSG C
56,094	71	Weighted Average
56,091		99.99% Pervious Area
4		0.01% Impervious Area

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

Subcatchment P-21: Subcat P-21

Hydrograph



Summary for Subcatchment P-22: Subcat P-22

Runoff = 2.68 cfs @ 12.13 hrs, Volume= 9,028 cf, Depth= 3.46"
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

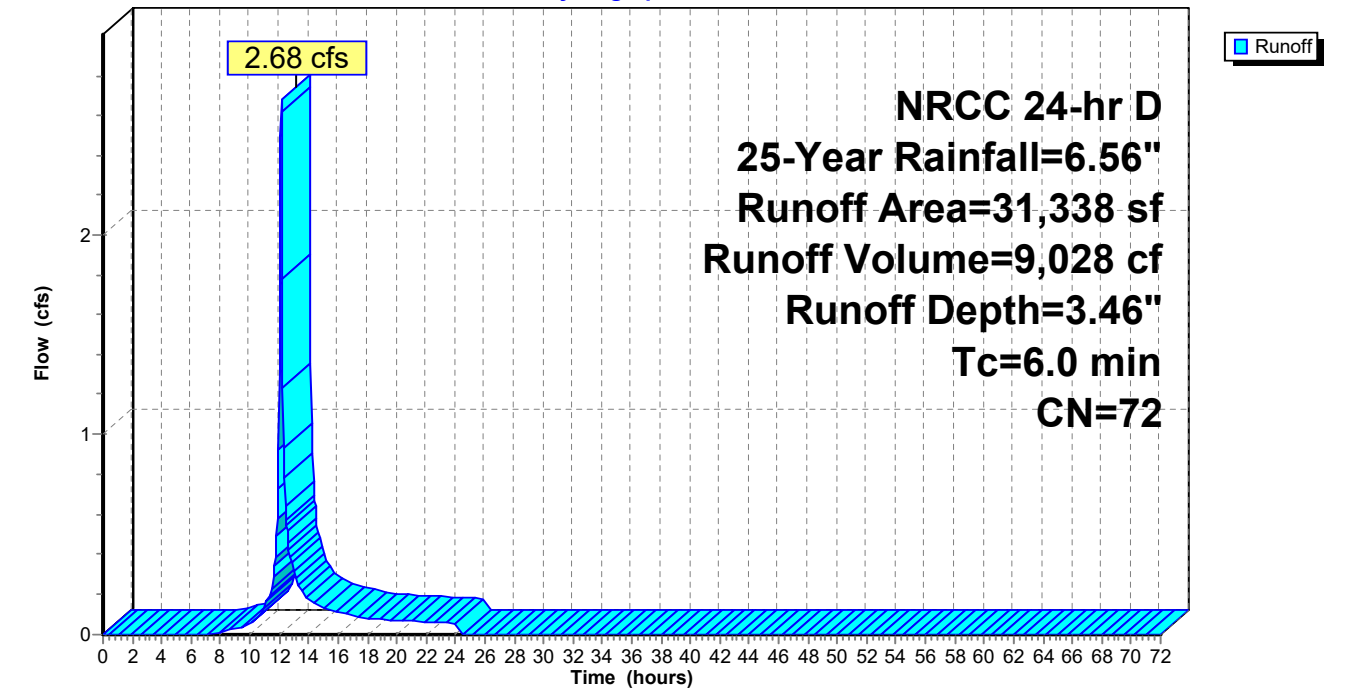
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
12,793	74	>75% Grass cover, Good, HSG C
1	98	Paved parking, HSG C
1	98	Roofs, HSG C
18,544	70	Woods, Good, HSG C
31,338	72	Weighted Average
31,337		100.00% Pervious Area
2		0.00% Impervious Area

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

Subcatchment P-22: Subcat P-22

Hydrograph



Summary for Subcatchment P-23: Subcat P-23

Runoff = 1.20 cfs @ 12.13 hrs, Volume= 4,052 cf, Depth= 3.46"
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

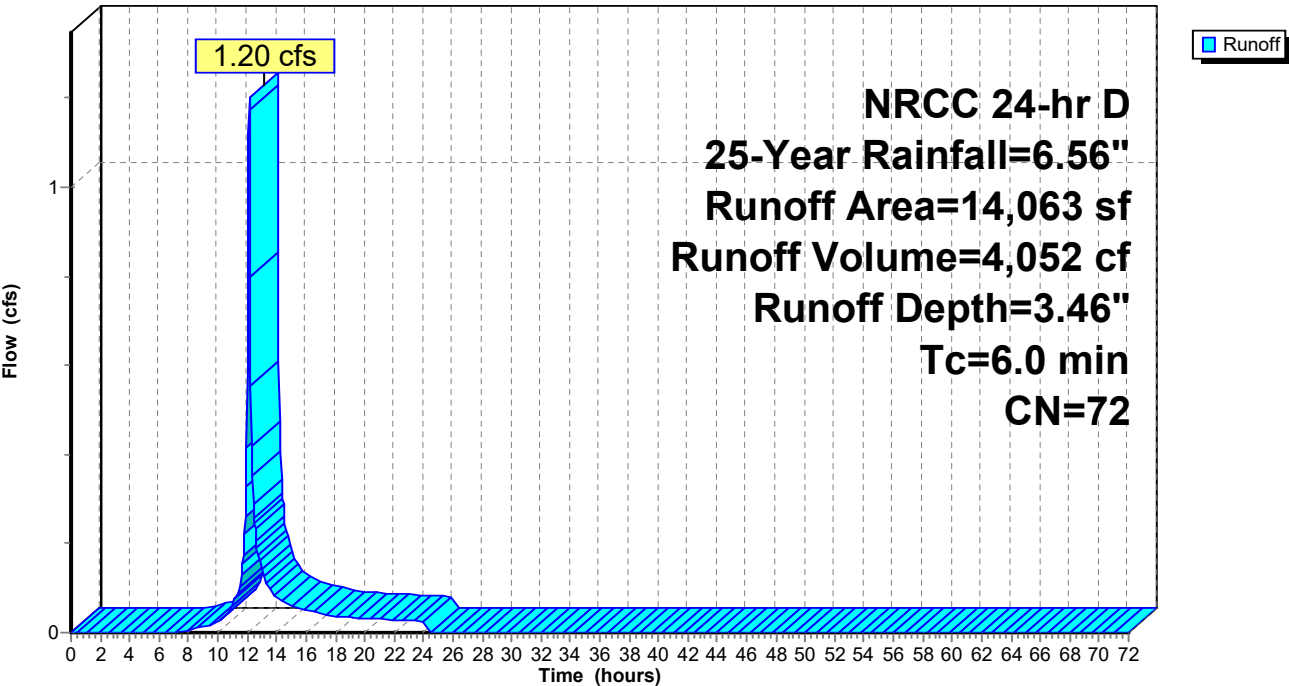
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
6,718	74	>75% Grass cover, Good, HSG C
7,345	70	Woods, Good, HSG C
14,063	72	Weighted Average
14,063		100.00% Pervious Area

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

Subcatchment P-23: Subcat P-23

Hydrograph



Summary for Subcatchment P-24: Subcat P-24

Runoff = 2.35 cfs @ 12.13 hrs, Volume= 8,142 cf, Depth= 4.51"
Routed to Pond 1P : Infiltration Basin

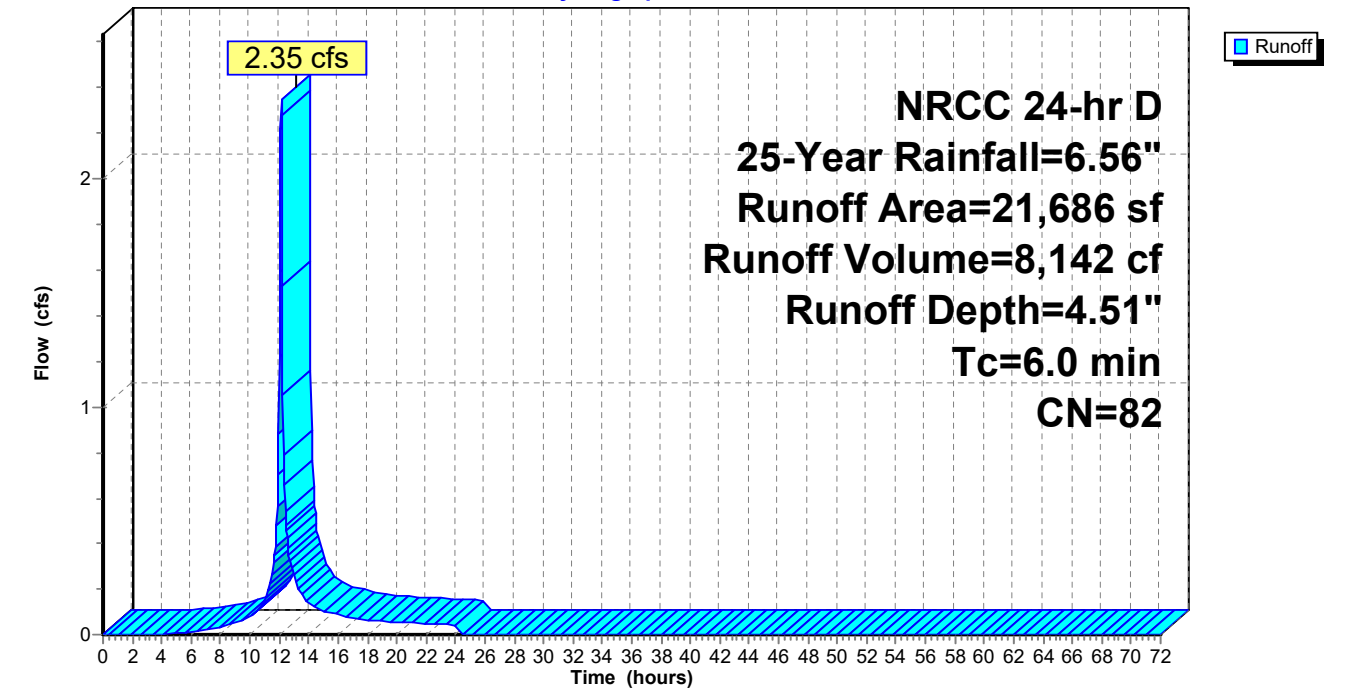
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
14,395	74	>75% Grass cover, Good, HSG C
7,291	98	Water Surface, HSG C
21,686	82	Weighted Average
14,395		66.38% Pervious Area
7,291		33.62% Impervious Area

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

Subcatchment P-24: Subcat P-24

Hydrograph



Summary for Subcatchment P-25: Subcat P-25

Runoff = 1.65 cfs @ 12.13 hrs, Volume= 5,551 cf, Depth= 3.36"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

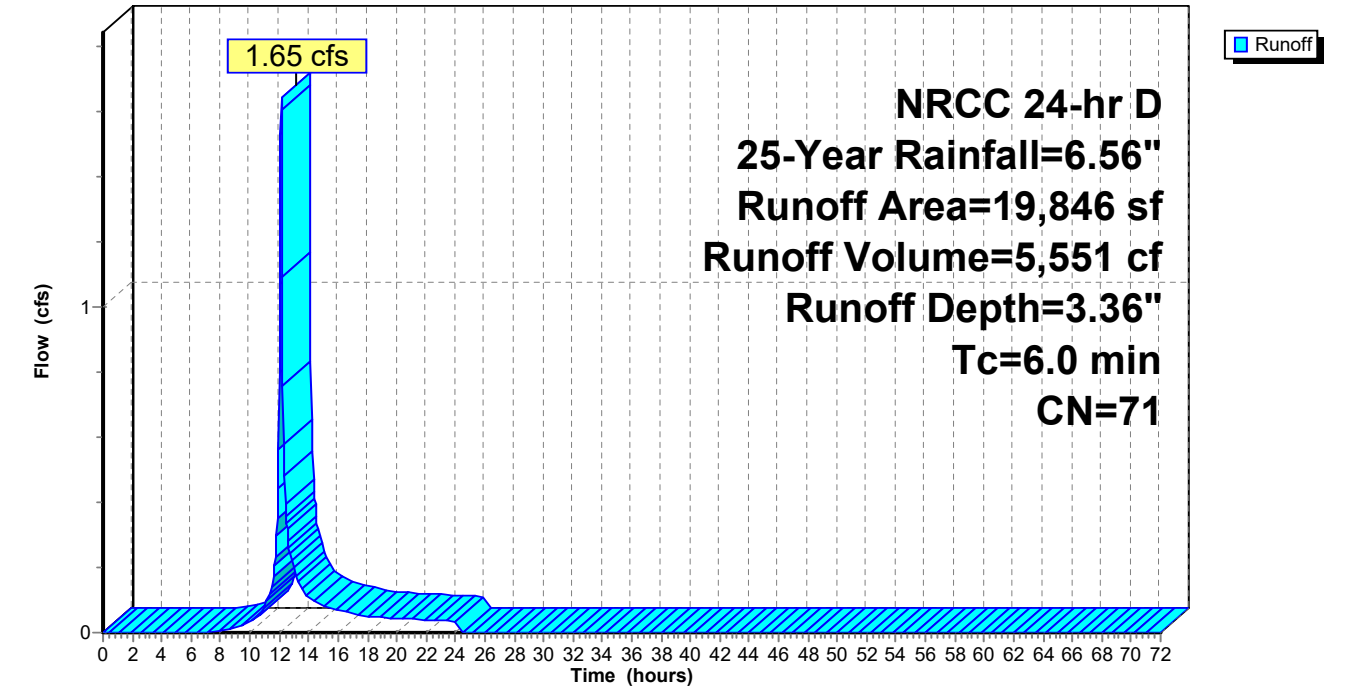
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
4,972	74	>75% Grass cover, Good, HSG C
3	98	Paved parking, HSG C
1	98	Roofs, HSG C
14,870	70	Woods, Good, HSG C
19,846	71	Weighted Average
19,842		99.98% Pervious Area
4		0.02% Impervious Area

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

Subcatchment P-25: Subcat P-25

Hydrograph



Summary for Subcatchment P-3: Subcat P-3

Runoff = 1.31 cfs @ 12.13 hrs, Volume= 4,899 cf, Depth= 5.74"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

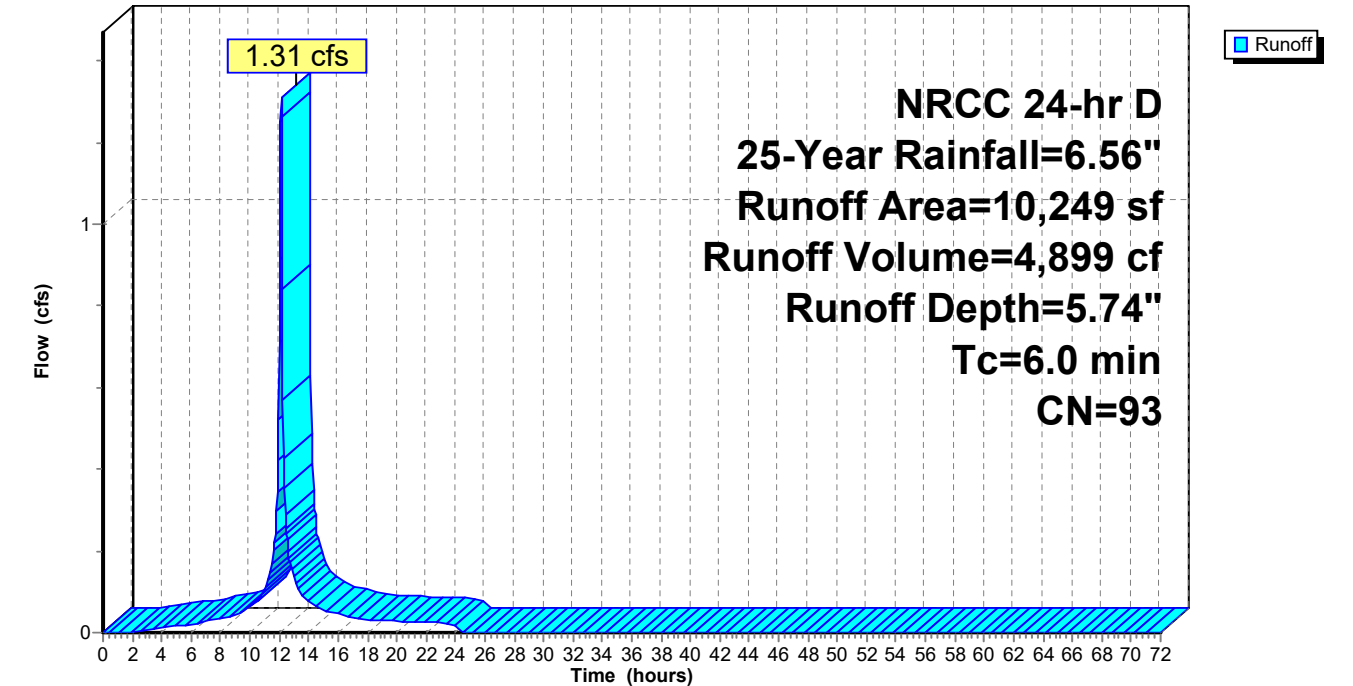
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
2,059	74	>75% Grass cover, Good, HSG C
8,187	98	Paved parking, HSG C
3	98	Roofs, HSG C
10,249	93	Weighted Average
2,059		20.09% Pervious Area
8,190		79.91% Impervious Area

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

Subcatchment P-3: Subcat P-3

Hydrograph



Summary for Subcatchment P-4: Subcat P-4

Runoff = 1.62 cfs @ 12.13 hrs, Volume= 6,131 cf, Depth= 5.85"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

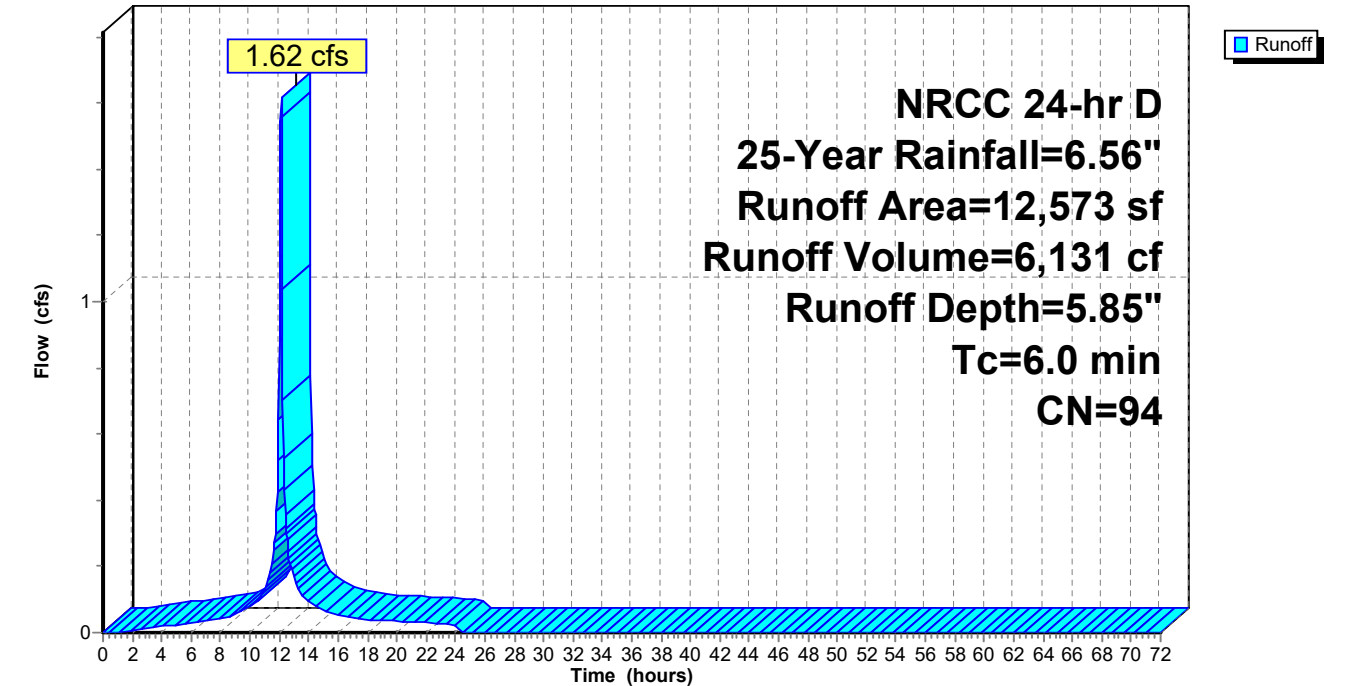
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
1,907	74	>75% Grass cover, Good, HSG C
10,666	98	Paved parking, HSG C
12,573	94	Weighted Average
1,907		15.17% Pervious Area
10,666		84.83% Impervious Area

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

Subcatchment P-4: Subcat P-4

Hydrograph



Summary for Subcatchment P-5: Subcat P-5

Runoff = 0.70 cfs @ 12.13 hrs, Volume= 2,631 cf, Depth= 5.74"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

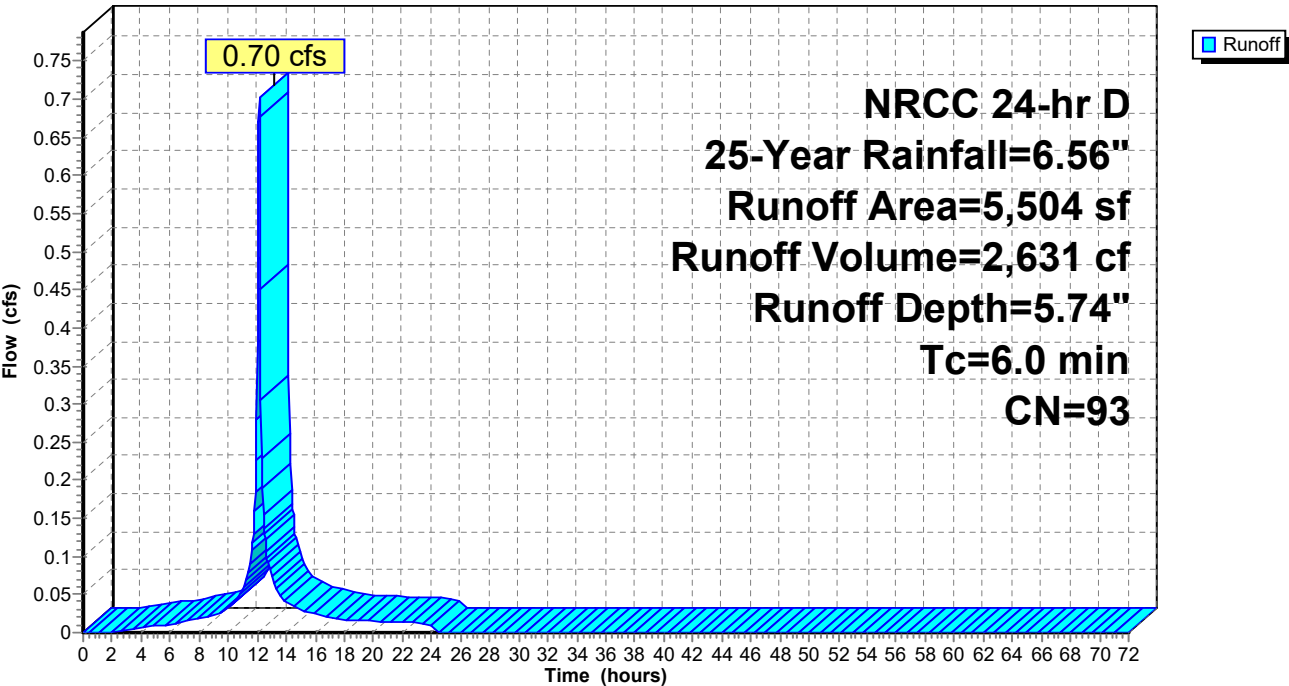
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
1,044	74	>75% Grass cover, Good, HSG C
4,460	98	Paved parking, HSG C
5,504	93	Weighted Average
1,044		18.97% Pervious Area
4,460		81.03% Impervious Area

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

Subcatchment P-5: Subcat P-5

Hydrograph



Summary for Subcatchment P-6: Subcat P-6

Runoff = 1.10 cfs @ 12.13 hrs, Volume= 3,930 cf, Depth= 5.17"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

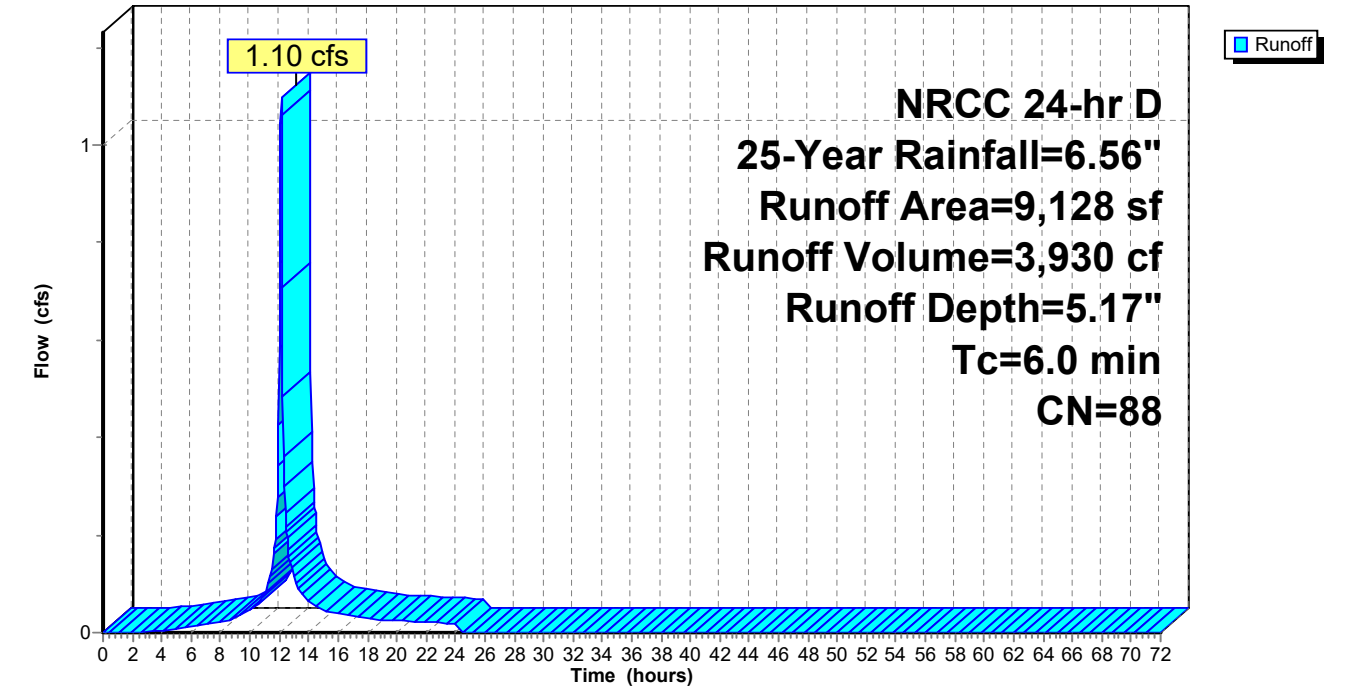
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
3,695	74	>75% Grass cover, Good, HSG C
586	98	Paved parking, HSG C
4,848	98	Roofs, HSG C
9,128	88	Weighted Average
3,695		40.47% Pervious Area
5,434		59.53% Impervious Area

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

Subcatchment P-6: Subcat P-6

Hydrograph



Summary for Subcatchment P-6A: Subcat P-6A

Runoff = 1.06 cfs @ 12.13 hrs, Volume= 3,888 cf, Depth= 5.51"
Routed to Pond 3P : UIS-2 (SC-800)

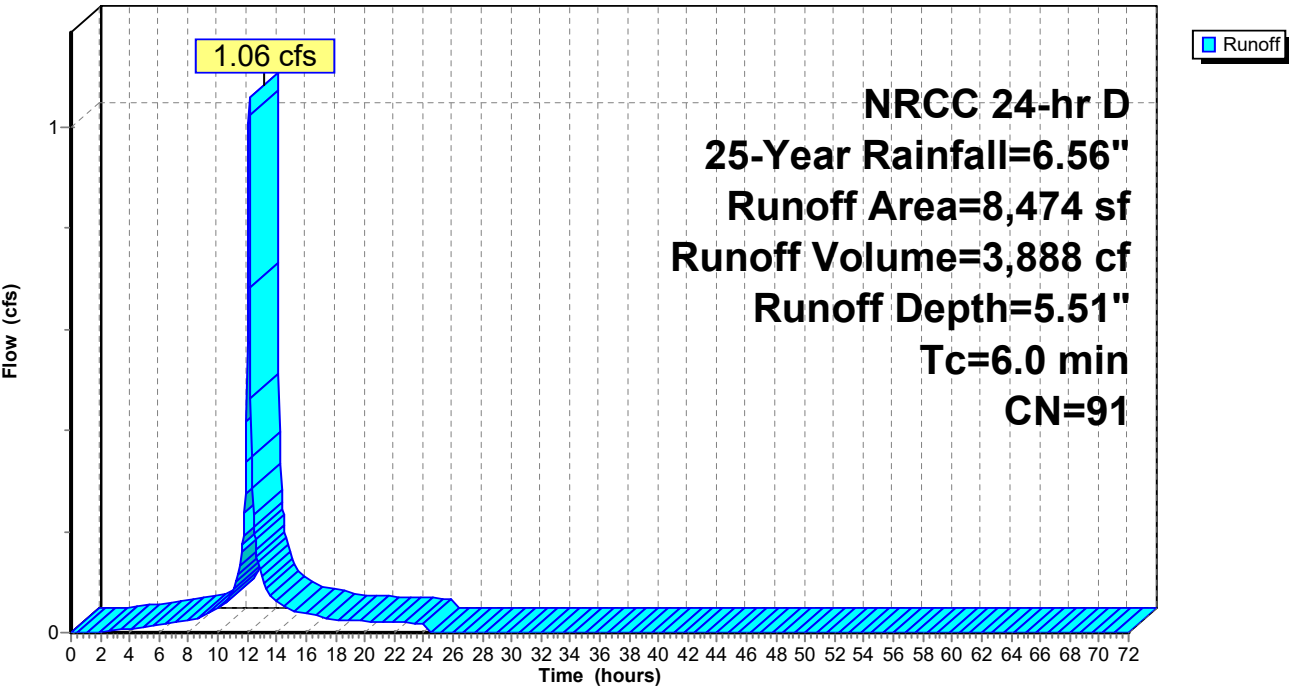
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
2,617	74	>75% Grass cover, Good, HSG C
715	98	Paved parking, HSG C
5,142	98	Roofs, HSG C
8,474	91	Weighted Average
2,617		30.88% Pervious Area
5,857		69.12% Impervious Area

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

Subcatchment P-6A: Subcat P-6A

Hydrograph



Summary for Subcatchment P-7: Subcat P-7

Runoff = 1.20 cfs @ 12.13 hrs, Volume= 4,499 cf, Depth= 5.74"
Routed to Pond 3P : UIS-2 (SC-800)

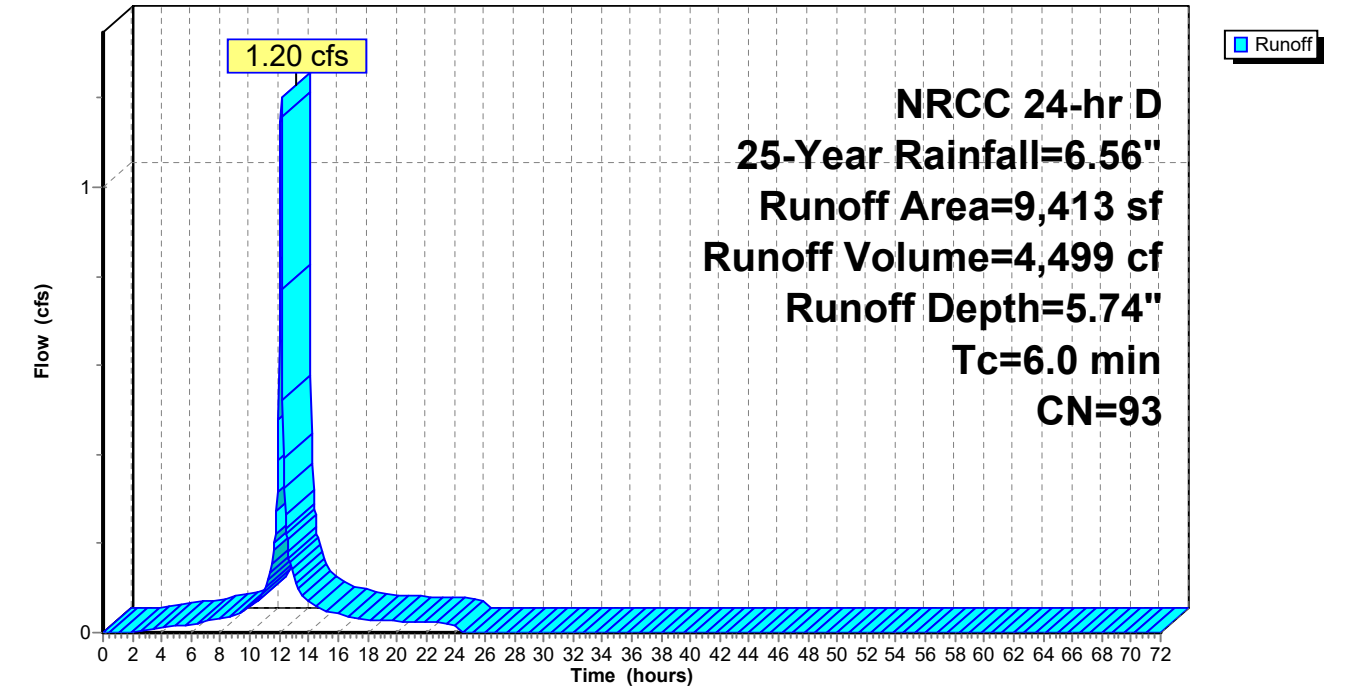
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
2,099	74	>75% Grass cover, Good, HSG C
5,872	98	Paved parking, HSG C
1,442	98	Roofs, HSG C
9,413	93	Weighted Average
2,099		22.30% Pervious Area
7,314		77.70% Impervious Area

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

Subcatchment P-7: Subcat P-7

Hydrograph



Summary for Subcatchment P-8: Subcat P-8

Runoff = 1.16 cfs @ 12.13 hrs, Volume= 4,272 cf, Depth= 5.51"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

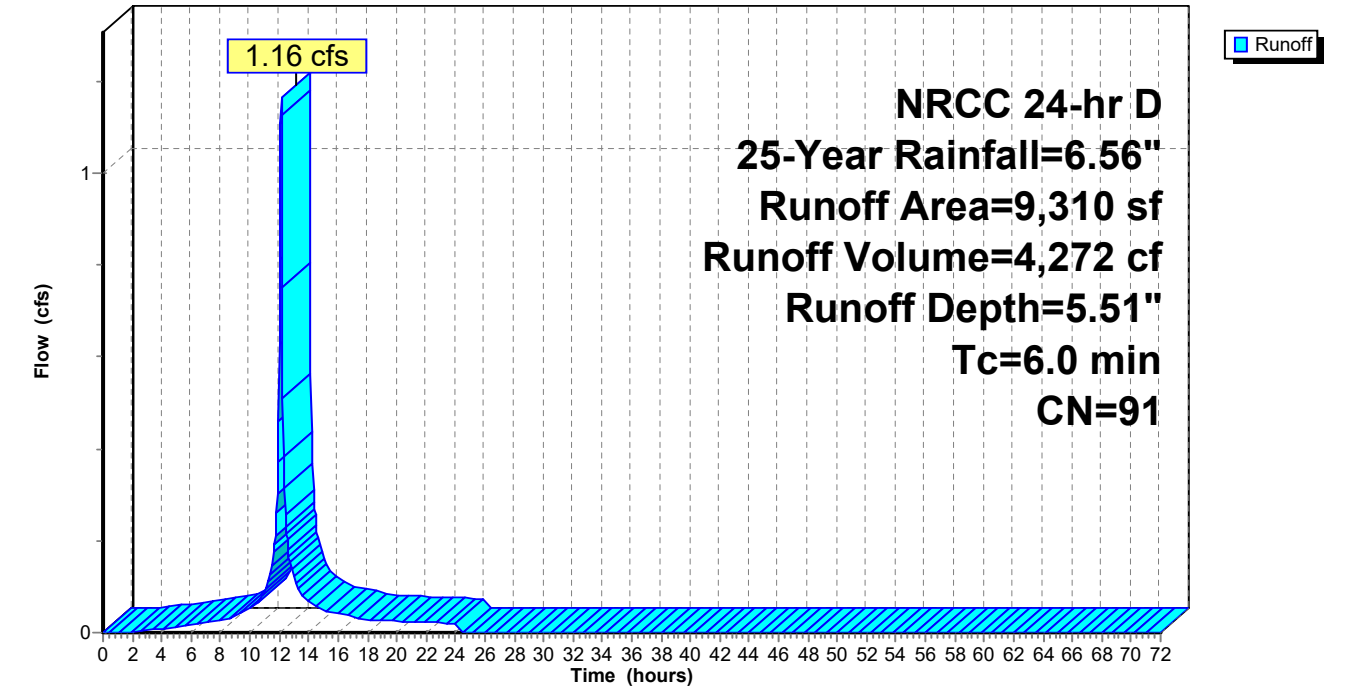
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
2,628	74	>75% Grass cover, Good, HSG C
924	98	Paved parking, HSG C
5,759	98	Roofs, HSG C
9,310	91	Weighted Average
2,628		28.23% Pervious Area
6,682		71.77% Impervious Area

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

Subcatchment P-8: Subcat P-8

Hydrograph



Summary for Subcatchment P-9: Subcat P-9

Runoff = 1.06 cfs @ 12.13 hrs, Volume= 3,989 cf, Depth= 5.85"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

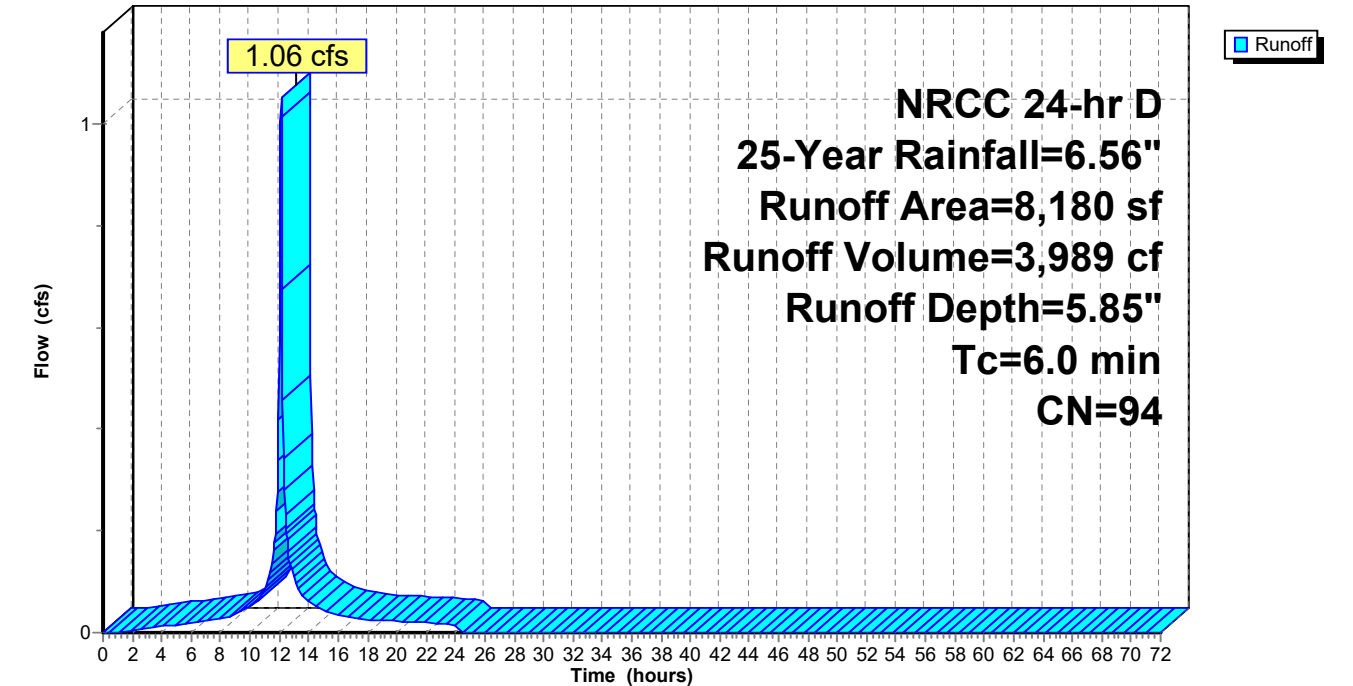
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.56"

Area (sf)	CN	Description
1,516	74	>75% Grass cover, Good, HSG C
6,649	98	Paved parking, HSG C
15	98	Roofs, HSG C
8,180	94	Weighted Average
1,516		18.54% Pervious Area
6,664		81.46% Impervious Area

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

Subcatchment P-9: Subcat P-9

Hydrograph



Summary for Pond 1P: Infiltration Basin

Inflow Area = 110,639 sf, 58.56% Impervious, Inflow Depth = 5.17" for 25-Year event
Inflow = 13.24 cfs @ 12.13 hrs, Volume= 47,658 cf
Outflow = 4.28 cfs @ 12.31 hrs, Volume= 47,658 cf, Atten= 68%, Lag= 11.1 min
Discarded = 0.14 cfs @ 12.31 hrs, Volume= 17,947 cf
Primary = 4.14 cfs @ 12.31 hrs, Volume= 29,711 cf
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 145.70' @ 12.31 hrs Surf.Area= 6,129 sf Storage= 18,892 cf
Flood Elev= 146.90' Surf.Area= 7,524 sf Storage= 27,045 cf

Plug-Flow detention time= 384.9 min calculated for 47,625 cf (100% of inflow)
Center-of-Mass det. time= 386.0 min (1,184.1 - 798.1)

Volume	Invert	Avail.Storage	Storage Description
#1	141.50'	27,804 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
141.50	3,040	206.0	0	0	3,040
142.00	3,356	215.0	1,598	1,598	3,359
143.00	4,030	234.0	3,688	5,286	4,074
144.00	4,760	253.0	4,390	9,676	4,850
145.00	5,548	272.0	5,149	14,825	5,686
146.00	6,391	291.0	5,965	20,790	6,583
147.00	7,656	348.0	7,014	27,804	9,499

Device	Routing	Invert	Outlet Devices
#1	Discarded	141.50'	1.020 in/hr Exfiltration over Surface area
#2	Primary	142.50'	12.0" Round Culvert L= 17.8' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.50' / 141.33' S= 0.0657 ' S= 0.0657 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	144.00'	12.0" Vert. Orifice C= 0.600 Limited to weir flow at low heads

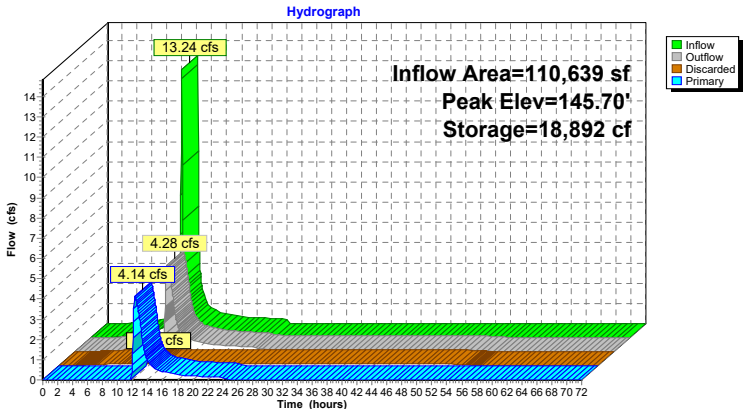
#4 Device 2 146.00' 4.0' long x 0.5' breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00
Coef. (English) 2.80 2.92 3.08 3.30 3.32

#5 Primary 146.90' 20.0' long x 18.0' breadth Overflow Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.14 cfs @ 12.31 hrs HW=145.69' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=4.13 cfs @ 12.31 hrs HW=145.69' (Free Discharge)
2=Culvert (Passes 4.13 cfs of 4.90 cfs potential flow)
3=Orifice (Orifice Controls 4.13 cfs @ 5.26 fps)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
5=Overflow Weir (Controls 0.00 cfs)

Pond 1P: Infiltration Basin



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 25-Year Rainfall=6.56"

Printed 6/1/2026

Page 239

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

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
141.50	3,040	0	145.00	5,548	14,825
141.60	3,102	307	145.10	5,630	15,384
141.70	3,165	620	145.20	5,712	15,951
141.80	3,228	940	145.30	5,795	16,526
141.90	3,292	1,266	145.40	5,878	17,110
142.00	3,356	1,598	145.50	5,962	17,702
142.10	3,421	1,937	145.60	6,047	18,302
142.20	3,486	2,282	145.70	6,132	18,911
142.30	3,552	2,634	145.80	6,218	19,529
142.40	3,618	2,993	145.90	6,304	20,155
142.50	3,685	3,358	146.00	6,391	20,790
142.60	3,753	3,730	146.10	6,512	21,435
142.70	3,821	4,109	146.20	6,635	22,092
142.80	3,890	4,494	146.30	6,759	22,762
142.90	3,960	4,887	146.40	6,883	23,444
143.00	4,030	5,286	146.50	7,009	24,139
143.10	4,100	5,693	146.60	7,136	24,846
143.20	4,171	6,106	146.70	7,265	25,566
143.30	4,243	6,527	146.80	7,394	26,299
143.40	4,315	6,955	146.90	7,524	27,045
143.50	4,387	7,390	147.00	7,656	27,804
143.60	4,461	7,832			
143.70	4,535	8,282			
143.80	4,609	8,739			
143.90	4,684	9,204			
144.00	4,760	9,676			
144.10	4,836	10,156			
144.20	4,913	10,643			
144.30	4,990	11,139			
144.40	5,068	11,641			
144.50	5,146	12,152			
144.60	5,226	12,671			
144.70	5,305	13,197			
144.80	5,386	13,732			
144.90	5,466	14,274			

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 25-Year Rainfall=6.56"

Printed 6/1/2026

Page 240

Summary for Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)

Inflow Area = 102,654 sf, 63.38% Impervious, Inflow Depth = 5.29" for 25-Year event
 Inflow = 12.47 cfs @ 12.13 hrs, Volume= 45,254 cf
 Outflow = 1.95 cfs @ 12.60 hrs, Volume= 45,254 cf, Atten= 84%, Lag= 28.4 min
 Discarded = 0.15 cfs @ 6.45 hrs, Volume= 23,122 cf
 Primary = 1.80 cfs @ 12.60 hrs, Volume= 22,132 cf
 Routed to Link SP2 : STUDY POINT #2 (Wetlands West)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 169.09' @ 12.60 hrs Surf.Area= 6,514 sf Storage= 19,855 cf
 Flood Elev= 170.25' Surf.Area= 6,514 sf Storage= 25,924 cf

Plug-Flow detention time= 424.3 min calculated for 45,254 cf (100% of inflow)
 Center-of-Mass det. time= 424.1 min (1,217.7 - 793.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	166.50'	5,927 cf	33.25'W x 195.92'L x 3.75'H Field A 24,428 cf Overall - 9,610 cf Embedded = 14,819 cf x 40.0% Voids
#2A	167.00'	9,610 cf	ADS_StormTech SC-800 +Cap x 189 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 189 Chambers in 7 Rows Cap Storage= 3.4 cf x 2 x 7 rows = 47.9 cf
#3B	166.50'	4,524 cf	34.75'W x 131.78'L x 3.75'H Field B -Impervious 17,172 cf Overall - 5,863 cf Embedded = 11,309 cf x 40.0% Voids
#4B	167.25'	5,863 cf	ADS_StormTech DC-780 b +Cap x 126 Inside #3 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 126 Chambers in 7 Rows Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf
		25,924 cf	Total Available Storage

Storage Group A created with Chamber Wizard
 Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	166.50'	1.020 in/hr Exfiltration over Surface area
#2	Primary	168.00'	
			12.0" Round Culvert L= 124.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 168.00' / 161.60' S= 0.0516 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	169.75'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	168.00'	9.0" Vert. Orifice C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.15 cfs @ 6.45 hrs HW=166.54' (Free Discharge)
↳ **1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=1.80 cfs @ 12.60 hrs HW=169.09' (Free Discharge)
↳ **2=Culvert** (Passes 1.80 cfs of 2.29 cfs potential flow)
↳ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
↳ **4=Orifice** (Orifice Controls 1.80 cfs @ 4.07 fps)

Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-800 +Cap (ADS StormTech®SC-800 with cap volume)
Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf
Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap
Cap Storage= 3.4 cf x 2 x 7 rows = 47.9 cf

51.0" Wide + 3.0" Spacing = 54.0" C-C Row Spacing

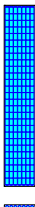
27 Chambers/Row x 7.12' Long +0.88' Cap Length x 2 = 193.92' Row Length +12.0" End Stone x 2 = 195.92' Base Length
7 Rows x 51.0" Wide + 3.0" Spacing x 6 + 12.0" Side Stone x 2 = 33.25' Base Width
6.0" Stone Base + 33.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

189 Chambers x 50.6 cf + 3.4 cf Cap Volume x 2 x 7 Rows = 9,609.8 cf Chamber Storage

24,428.4 cf Field - 9,609.8 cf Chambers = 14,818.5 cf Stone x 40.0% Voids = 5,927.4 cf Stone Storage

Chamber Storage + Stone Storage = 15,537.2 cf = 0.357 af
Overall Storage Efficiency = 63.6%
Overall System Size = 195.92' x 33.25' x 3.75'

189 Chambers
904.8 cy Field
548.8 cy Stone



Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780) - Chamber Wizard Field B

Chamber Model = ADS_StormTechDC-780 b +Cap (ADS StormTech®DC-780 with cap storage)

Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length

7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width

9.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

126 Chambers x 46.2 cf + 2.7 cf Cap Volume x 2 x 7 Rows = 5,863.3 cf Chamber Storage

17,172.1 cf Field - 5,863.3 cf Chambers = 11,308.9 cf Stone x 40.0% Voids = 4,523.5 cf Stone Storage

Chamber Storage + Stone Storage = 10,386.8 cf = 0.238 af

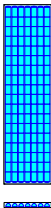
Overall Storage Efficiency = 60.5%

Overall System Size = 131.78' x 34.75' x 3.75'

126 Chambers

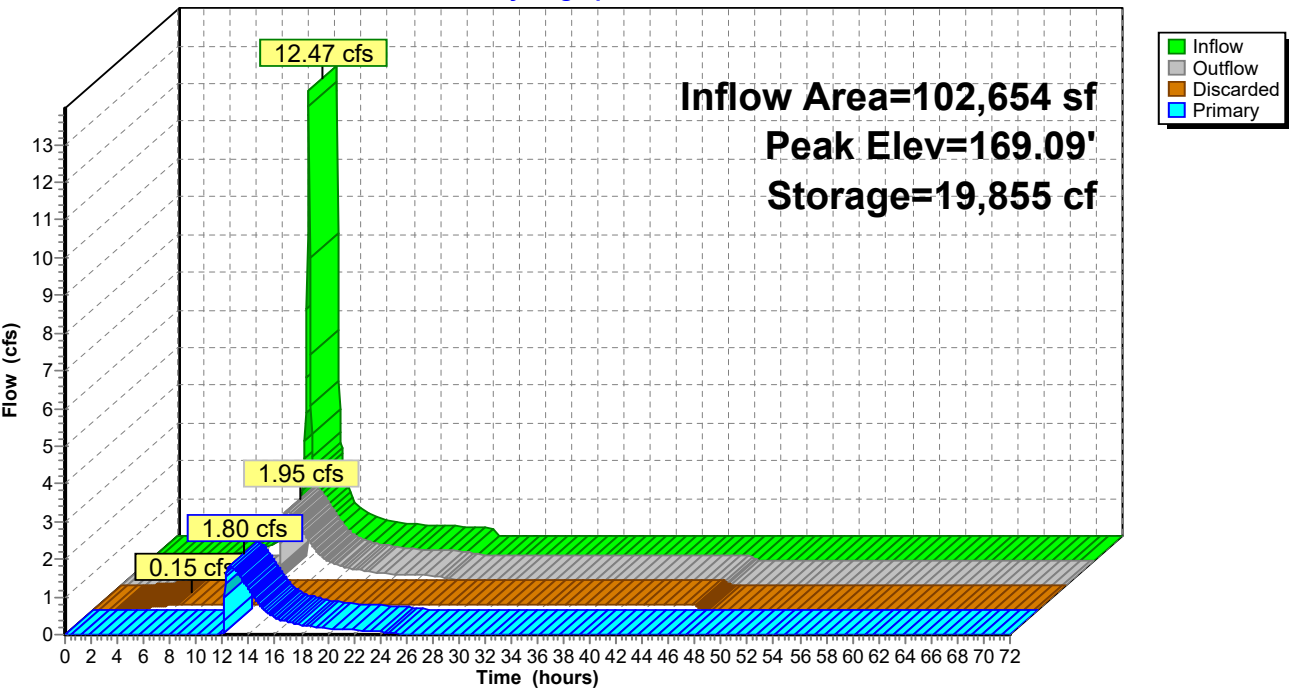
636.0 cy Field

418.8 cy Stone



Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)

Hydrograph



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 25-Year Rainfall=6.56"

Printed 6/1/2026

Page 245

Stage-Area-Storage for Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
166.50	6,514	0	168.25	6,514	13,162	170.00	6,514	24,815
166.55	6,514	222	168.30	6,514	13,590	170.05	6,514	25,037
166.60	6,514	444	168.35	6,514	14,016	170.10	6,514	25,258
166.65	6,514	666	168.40	6,514	14,438	170.15	6,514	25,480
166.70	6,514	887	168.45	6,514	14,858	170.20	6,514	25,702
166.75	6,514	1,109	168.50	6,514	15,273	170.25	6,514	25,924
166.80	6,514	1,331	168.55	6,514	15,685			
166.85	6,514	1,553	168.60	6,514	16,093			
166.90	6,514	1,775	168.65	6,514	16,497			
166.95	6,514	1,997	168.70	6,514	16,897			
167.00	6,514	2,219	168.75	6,514	17,293			
167.05	6,514	2,592	168.80	6,514	17,685			
167.10	6,514	2,965	168.85	6,514	18,071			
167.15	6,514	3,338	168.90	6,514	18,453			
167.20	6,514	3,709	168.95	6,514	18,830			
167.25	6,514	4,080	169.00	6,514	19,200			
167.30	6,514	4,552	169.05	6,514	19,565			
167.35	6,514	5,023	169.10	6,514	19,924			
167.40	6,514	5,492	169.15	6,514	20,276			
167.45	6,514	5,959	169.20	6,514	20,622			
167.50	6,514	6,425	169.25	6,514	20,959			
167.55	6,514	6,889	169.30	6,514	21,288			
167.60	6,514	7,351	169.35	6,514	21,608			
167.65	6,514	7,812	169.40	6,514	21,916			
167.70	6,514	8,270	169.45	6,514	22,210			
167.75	6,514	8,727	169.50	6,514	22,487			
167.80	6,514	9,181	169.55	6,514	22,750			
167.85	6,514	9,633	169.60	6,514	23,001			
167.90	6,514	10,083	169.65	6,514	23,244			
167.95	6,514	10,531	169.70	6,514	23,478			
168.00	6,514	10,976	169.75	6,514	23,705			
168.05	6,514	11,419	169.80	6,514	23,927			
168.10	6,514	11,859	169.85	6,514	24,149			
168.15	6,514	12,296	169.90	6,514	24,371			
168.20	6,514	12,730	169.95	6,514	24,593			

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 25-Year Rainfall=6.56"

Printed 6/1/2026

Page 246

Summary for Pond 3P: UIS-2 (SC-800)

Inflow Area = 32,510 sf, 63.97% Impervious, Inflow Depth = 5.37" for 25-Year event
 Inflow = 4.00 cfs @ 12.13 hrs, Volume= 14,547 cf
 Outflow = 1.81 cfs @ 12.25 hrs, Volume= 14,547 cf, Atten= 55%, Lag= 7.6 min
 Discarded = 0.06 cfs @ 6.60 hrs, Volume= 5,818 cf
 Primary = 1.75 cfs @ 12.25 hrs, Volume= 8,729 cf
 Routed to Link SP2 : STUDY POINT #2 (Wetlands West)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 162.67' @ 12.25 hrs Surf.Area= 2,359 sf Storage= 4,255 cf
 Flood Elev= 163.85' Surf.Area= 2,359 sf Storage= 5,566 cf

Plug-Flow detention time= 158.5 min calculated for 14,547 cf (100% of inflow)
 Center-of-Mass det. time= 158.5 min (950.1 - 791.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	160.10'	2,186 cf	28.75'W x 82.05'L x 3.75'H Field A 8,846 cf Overall - 3,380 cf Embedded = 5,466 cf x 40.0% Voids
#2A	160.60'	3,380 cf	ADS_StormTech SC-800 +Cap x 66 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 66 Chambers in 6 Rows Cap Storage= 3.4 cf x 2 x 6 rows = 41.0 cf
		5,566 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	160.10'	1.020 in/hr Exfiltration over Surface area
#2	Primary	161.25'	12.0" Round Culvert L= 9.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.25' / 161.00' S= 0.0278 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	163.60'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00

Coef. (English) 2.80 2.92 3.08 3.30 3.32

#4 Device 2 161.25' **8.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 6.60 hrs HW=160.14' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=1.75 cfs @ 12.25 hrs HW=162.67' (Free Discharge)

2=Culvert (Passes 1.75 cfs of 2.86 cfs potential flow)

3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

4=Orifice (Orifice Controls 1.75 cfs @ 5.02 fps)

Pond 3P: UIS-2 (SC-800) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-800 +Cap (ADS StormTech®SC-800 with cap volume)
Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf
Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap
Cap Storage= 3.4 cf x 2 x 6 rows = 41.0 cf

51.0" Wide + 3.0" Spacing = 54.0" C-C Row Spacing

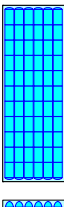
11 Chambers/Row x 7.12' Long +0.88' Cap Length x 2 = 80.05' Row Length +12.0" End Stone x 2 = 82.05' Base Length
6 Rows x 51.0" Wide + 3.0" Spacing x 5 + 12.0" Side Stone x 2 = 28.75' Base Width
6.0" Stone Base + 33.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

66 Chambers x 50.6 cf + 3.4 cf Cap Volume x 2 x 6 Rows = 3,380.1 cf Chamber Storage

8,846.0 cf Field - 3,380.1 cf Chambers = 5,465.9 cf Stone x 40.0% Voids = 2,186.4 cf Stone Storage

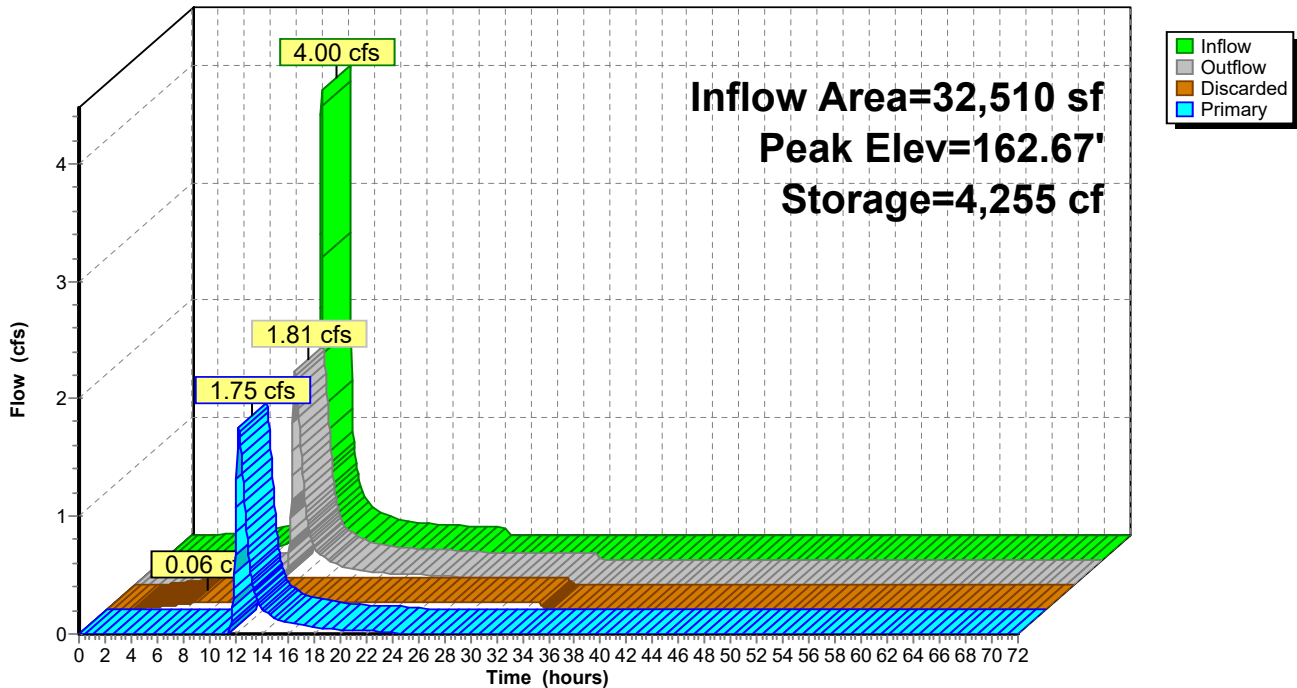
Chamber Storage + Stone Storage = 5,566.5 cf = 0.128 af
Overall Storage Efficiency = 62.9%
Overall System Size = 82.05' x 28.75' x 3.75'

66 Chambers
327.6 cy Field
202.4 cy Stone



Pond 3P: UIS-2 (SC-800)

Hydrograph



Stage-Area-Storage for Pond 3P: UIS-2 (SC-800)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
160.10	2,359	0	161.85	2,359	2,878	163.60	2,359	5,331
160.15	2,359	47	161.90	2,359	2,968	163.65	2,359	5,378
160.20	2,359	94	161.95	2,359	3,057	163.70	2,359	5,425
160.25	2,359	142	162.00	2,359	3,146	163.75	2,359	5,472
160.30	2,359	189	162.05	2,359	3,234	163.80	2,359	5,519
160.35	2,359	236	162.10	2,359	3,321	163.85	2,359	5,566
160.40	2,359	283	162.15	2,359	3,407			
160.45	2,359	330	162.20	2,359	3,493			
160.50	2,359	377	162.25	2,359	3,578			
160.55	2,359	425	162.30	2,359	3,662			
160.60	2,359	472	162.35	2,359	3,745			
160.65	2,359	520	162.40	2,359	3,827			
160.70	2,359	567	162.45	2,359	3,908			
160.75	2,359	614	162.50	2,359	3,988			
160.80	2,359	661	162.55	2,359	4,067			
160.85	2,359	708	162.60	2,359	4,145			
160.90	2,359	755	162.65	2,359	4,222			
160.95	2,359	802	162.70	2,359	4,297			
161.00	2,359	849	162.75	2,359	4,371			
161.05	2,359	896	162.80	2,359	4,444			
161.10	2,359	943	162.85	2,359	4,515			
161.15	2,359	990	162.90	2,359	4,584			
161.20	2,359	1,037	162.95	2,359	4,651			
161.25	2,359	1,084	163.00	2,359	4,716			
161.30	2,359	1,131	163.05	2,359	4,777			
161.35	2,359	1,178	163.10	2,359	4,836			
161.40	2,359	1,225	163.15	2,359	4,891			
161.45	2,359	1,272	163.20	2,359	4,944			
161.50	2,359	1,319	163.25	2,359	4,996			
161.55	2,359	1,366	163.30	2,359	5,046			
161.60	2,359	1,413	163.35	2,359	5,095			
161.65	2,359	1,460	163.40	2,359	5,142			
161.70	2,359	1,507	163.45	2,359	5,189			
161.75	2,359	1,554	163.50	2,359	5,236			
161.80	2,359	1,601	163.55	2,359	5,283			

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 25-Year Rainfall=6.56"

Printed 6/1/2026

Page 251

Summary for Pond 4P: UDS-2 (SC-310)

Inflow Area = 7,417 sf, 51.89% Impervious, Inflow Depth = 4.94" for 25-Year event
Inflow = 0.87 cfs @ 12.13 hrs, Volume= 3,055 cf
Outflow = 0.60 cfs @ 12.20 hrs, Volume= 3,055 cf, Atten= 30%, Lag= 4.3 min
Primary = 0.60 cfs @ 12.20 hrs, Volume= 3,055 cf
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 134.55' @ 12.20 hrs Surf.Area= 375 sf Storage= 220 cf
Flood Elev= 135.83' Surf.Area= 375 sf Storage= 456 cf

Plug-Flow detention time= 7.4 min calculated for 3,055 cf (100% of inflow)
Center-of-Mass det. time= 7.1 min (815.4 - 808.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	133.50'	279 cf	8.17'W x 45.92'L x 2.33'H Field A 875 cf Overall - 177 cf Embedded = 698 cf x 40.0% Voids
#2A	134.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
		456 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	133.50'	12.0" Round Culvert L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 133.50' / 132.84' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	135.40'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	133.50'	5.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 25-Year Rainfall=6.56"

Printed 6/1/2026

Page 252

Primary OutFlow Max=0.60 cfs @ 12.20 hrs HW=134.55' (Free Discharge)

- 1=Culvert (Passes 0.60 cfs of 2.21 cfs potential flow)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 3=Orifice/Grate (Orifice Controls 0.60 cfs @ 4.41 fps)

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 25-Year Rainfall=6.56"

Printed 6/1/2026

Page 253

Pond 4P: UDS-2 (SC-310) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

875.0 cf Field - 176.9 cf Chambers = 698.1 cf Stone x 40.0% Voids = 279.3 cf Stone Storage

Chamber Storage + Stone Storage = 456.2 cf = 0.010 af

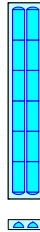
Overall Storage Efficiency = 52.1%

Overall System Size = 45.92' x 8.17' x 2.33'

12 Chambers

32.4 cy Field

25.9 cy Stone

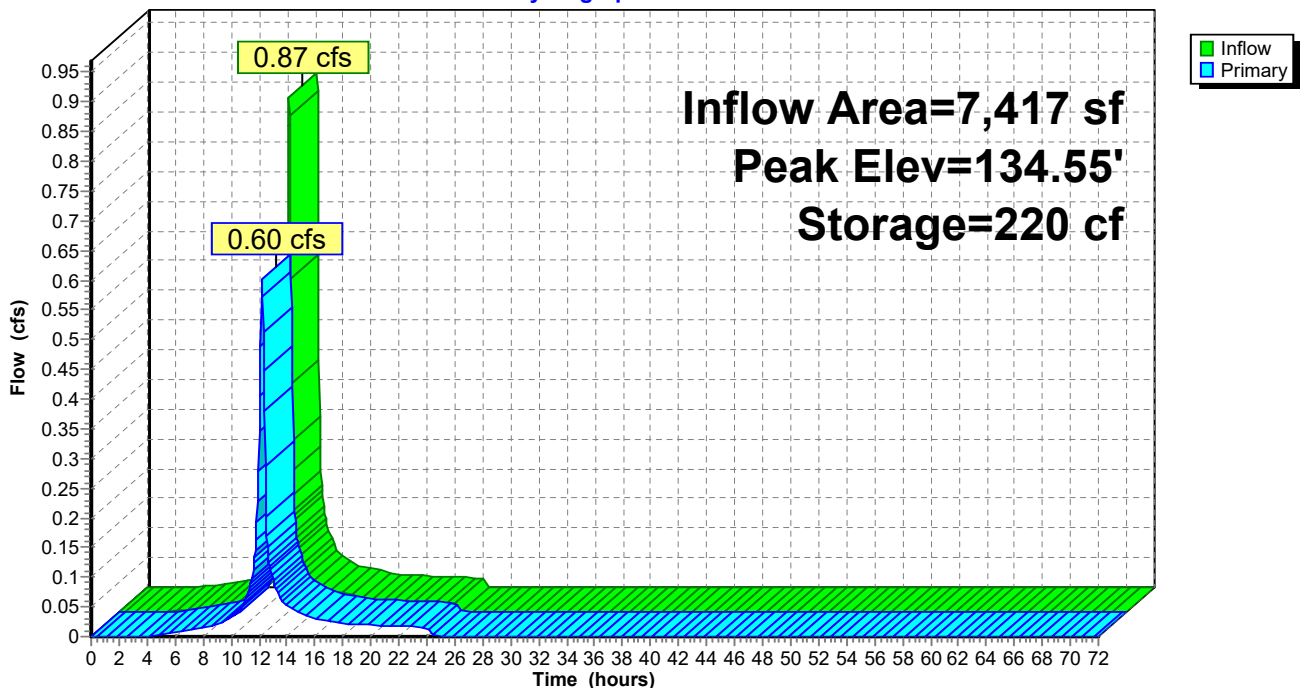
**3410-03 - Proposed HydroCAD**

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 25-Year Rainfall=6.56"

Printed 6/1/2026

Page 254

Pond 4P: UDS-2 (SC-310)**Hydrograph**

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 25-Year Rainfall=6.56"

Printed 6/1/2026

Page 255

Stage-Area-Storage for Pond 4P: UDS-2 (SC-310)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
133.50	0	134.20	129	134.90	303	135.60	421
133.52	3	134.22	135	134.92	307	135.62	424
133.54	6	134.24	140	134.94	311	135.64	427
133.56	9	134.26	145	134.96	315	135.66	430
133.58	12	134.28	151	134.98	320	135.68	433
133.60	15	134.30	156	135.00	324	135.70	436
133.62	18	134.32	161	135.02	328	135.72	439
133.64	21	134.34	166	135.04	332	135.74	442
133.66	24	134.36	172	135.06	336	135.76	445
133.68	27	134.38	177	135.08	339	135.78	448
133.70	30	134.40	182	135.10	343	135.80	451
133.72	33	134.42	187	135.12	347	135.82	454
133.74	36	134.44	192	135.14	350		
133.76	39	134.46	197	135.16	353		
133.78	42	134.48	203	135.18	357		
133.80	45	134.50	208	135.20	360		
133.82	48	134.52	213	135.22	363		
133.84	51	134.54	218	135.24	367		
133.86	54	134.56	223	135.26	370		
133.88	57	134.58	228	135.28	373		
133.90	60	134.60	233	135.30	376		
133.92	63	134.62	237	135.32	379		
133.94	66	134.64	242	135.34	382		
133.96	69	134.66	247	135.36	385		
133.98	72	134.68	252	135.38	388		
134.00	75	134.70	257	135.40	391		
134.02	80	134.72	262	135.42	394		
134.04	86	134.74	266	135.44	397		
134.06	91	134.76	271	135.46	400		
134.08	97	134.78	276	135.48	403		
134.10	102	134.80	280	135.50	406		
134.12	108	134.82	285	135.52	409		
134.14	113	134.84	289	135.54	412		
134.16	119	134.86	294	135.56	415		
134.18	124	134.88	298	135.58	418		

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 25-Year Rainfall=6.56"

Printed 6/1/2026

Page 256

Summary for Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)

Inflow Area = 54,619 sf, 49.01% Impervious, Inflow Depth = 4.83" for 25-Year event
 Inflow = 6.06 cfs @ 12.13 hrs, Volume= 21,987 cf
 Outflow = 2.84 cfs @ 12.25 hrs, Volume= 21,987 cf, Atten= 53%, Lag= 7.5 min
 Discarded = 0.06 cfs @ 6.15 hrs, Volume= 7,339 cf
 Primary = 2.78 cfs @ 12.25 hrs, Volume= 14,648 cf
 Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 165.89' @ 12.25 hrs Surf.Area= 2,656 sf Storage= 7,075 cf
 Flood Elev= 166.33' Surf.Area= 2,656 sf Storage= 8,598 cf

Plug-Flow detention time= 180.5 min calculated for 21,972 cf (100% of inflow)
 Center-of-Mass det. time= 180.9 min (980.4 - 799.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	164.00'	1,830 cf	32.58'W x 81.52'L x 2.33'H Field A 6,198 cf Overall - 1,622 cf Embedded = 4,576 cf x 40.0% Voids
#2A	164.50'	1,622 cf	ADS_StormTech SC-310 +Cap x 110 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 110 Chambers in 10 Rows
#3B	164.00'	3,315 cf	34.75'W x 96.18'L x 3.75'H Field B-Impervious 12,533 cf Overall - 4,245 cf Embedded = 8,288 cf x 40.0% Voids
#4B	164.75'	4,245 cf	ADS_StormTech DC-780 b +Cap x 91 Inside #3 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 7 Rows Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf
		11,012 cf	Total Available Storage

Storage Group A created with Chamber Wizard
 Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	164.00'	1.020 in/hr Exfiltration over Surface area
#2	Primary	164.00'	
			12.0" Round Culvert L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.00' / 160.32' S= 0.0400 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	165.75'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	164.80'	10.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 6.15 hrs HW=164.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=2.76 cfs @ 12.25 hrs HW=165.89' (Free Discharge)
2=Culvert (Passes 2.76 cfs of 3.52 cfs potential flow)
3=Broad-Crested Rectangular Weir (Weir Controls 0.60 cfs @ 1.06 fps)
4=Orifice/Grate (Orifice Controls 2.16 cfs @ 3.96 fps)

Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 3.0" Spacing = 37.0" C-C Row Spacing

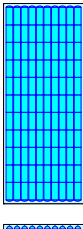
11 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 79.52' Row Length +12.0" End Stone x 2 = 81.52' Base Length
10 Rows x 34.0" Wide + 3.0" Spacing x 9 + 12.0" Side Stone x 2 = 32.58' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

110 Chambers x 14.7 cf = 1,621.6 cf Chamber Storage

6,197.8 cf Field - 1,621.6 cf Chambers = 4,576.2 cf Stone x 40.0% Voids = 1,830.5 cf Stone Storage

Chamber Storage + Stone Storage = 3,452.1 cf = 0.079 af
Overall Storage Efficiency = 55.7%
Overall System Size = 81.52' x 32.58' x 2.33'

110 Chambers
229.5 cy Field
169.5 cy Stone



Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780) - Chamber Wizard Field B

Chamber Model = ADS_StormTechDC-780 b +Cap (ADS StormTech®DC-780 with cap storage)
Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

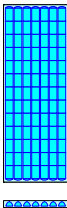
13 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 94.18' Row Length +12.0" End Stone x 2 = 96.18' Base Length
7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width
9.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

91 Chambers x 46.2 cf + 2.7 cf Cap Volume x 2 x 7 Rows = 4,244.9 cf Chamber Storage

12,533.0 cf Field - 4,244.9 cf Chambers = 8,288.1 cf Stone x 40.0% Voids = 3,315.2 cf Stone Storage

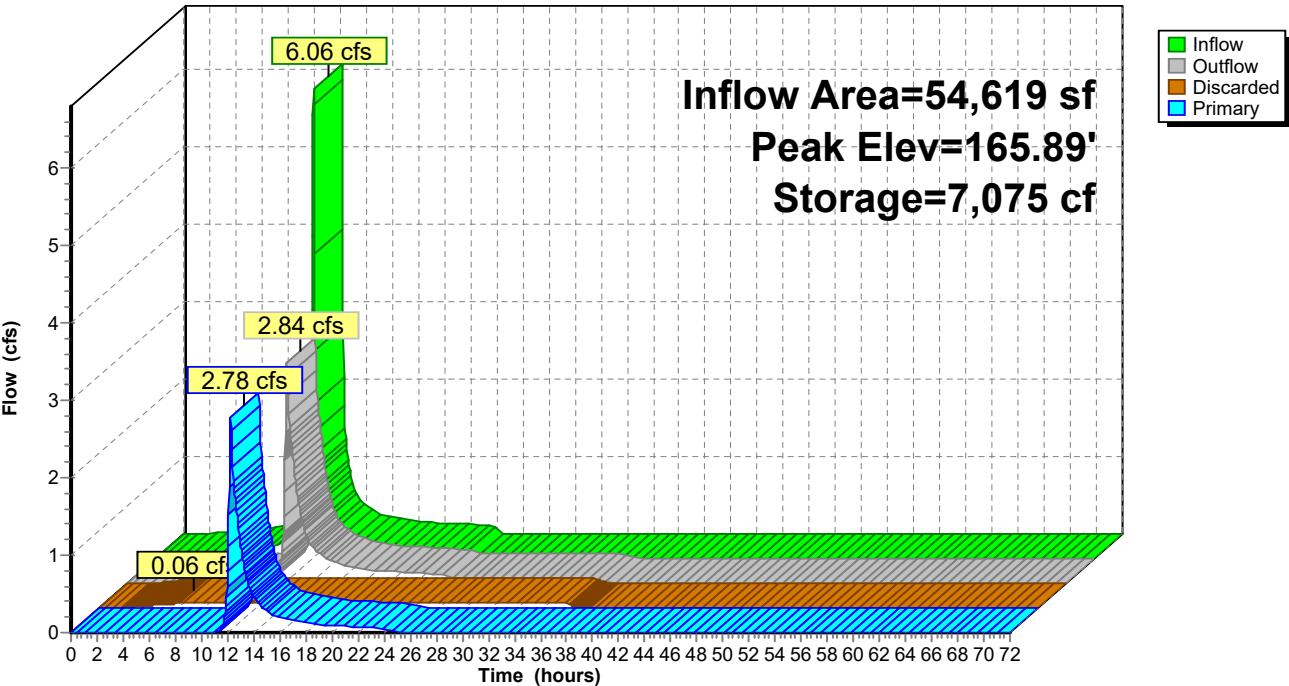
Chamber Storage + Stone Storage = 7,560.2 cf = 0.174 af
Overall Storage Efficiency = 60.3%
Overall System Size = 96.18' x 34.75' x 3.75'

91 Chambers
464.2 cy Field
307.0 cy Stone



Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)

Hydrograph



Stage-Area-Storage for Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)

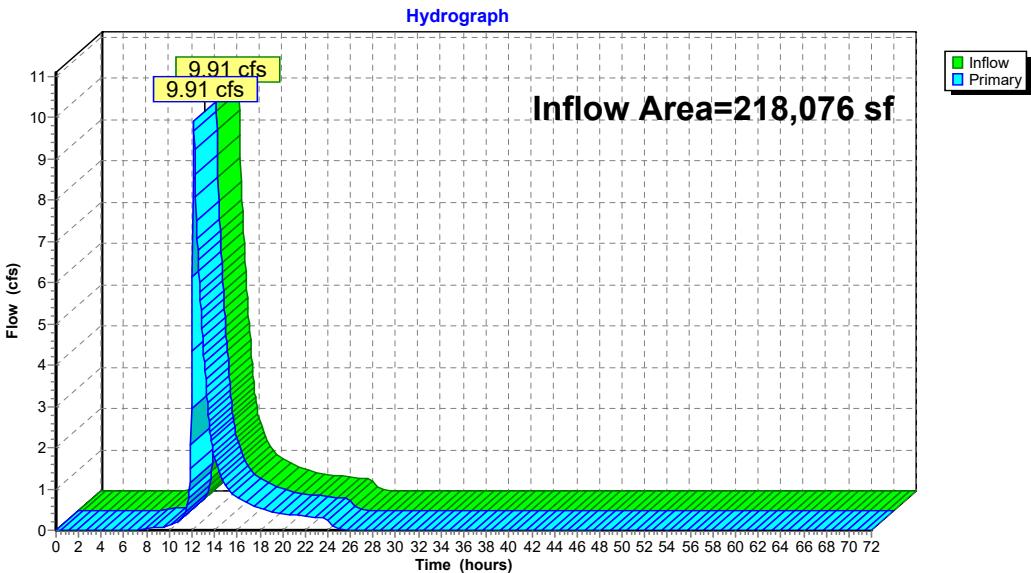
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
164.00	2,656	0	165.75	2,656	6,550	167.50	2,656	10,678
164.05	2,656	120	165.80	2,656	6,735	167.55	2,656	10,745
164.10	2,656	240	165.85	2,656	6,916	167.60	2,656	10,812
164.15	2,656	360	165.90	2,656	7,096	167.65	2,656	10,879
164.20	2,656	480	165.95	2,656	7,275	167.70	2,656	10,945
164.25	2,656	600	166.00	2,656	7,453	167.75	2,656	11,012
164.30	2,656	720	166.05	2,656	7,630			
164.35	2,656	840	166.10	2,656	7,805			
164.40	2,656	960	166.15	2,656	7,980			
164.45	2,656	1,080	166.20	2,656	8,153			
164.50	2,656	1,200	166.25	2,656	8,325			
164.55	2,656	1,376	166.30	2,656	8,496			
164.60	2,656	1,552	166.35	2,656	8,648			
164.65	2,656	1,728	166.40	2,656	8,762			
164.70	2,656	1,902	166.45	2,656	8,875			
164.75	2,656	2,076	166.50	2,656	8,987			
164.80	2,656	2,323	166.55	2,656	9,096			
164.85	2,656	2,568	166.60	2,656	9,204			
164.90	2,656	2,812	166.65	2,656	9,310			
164.95	2,656	3,054	166.70	2,656	9,414			
165.00	2,656	3,294	166.75	2,656	9,516			
165.05	2,656	3,532	166.80	2,656	9,615			
165.10	2,656	3,768	166.85	2,656	9,712			
165.15	2,656	4,002	166.90	2,656	9,805			
165.20	2,656	4,234	166.95	2,656	9,894			
165.25	2,656	4,464	167.00	2,656	9,979			
165.30	2,656	4,690	167.05	2,656	10,058			
165.35	2,656	4,914	167.10	2,656	10,133			
165.40	2,656	5,134	167.15	2,656	10,206			
165.45	2,656	5,351	167.20	2,656	10,276			
165.50	2,656	5,564	167.25	2,656	10,344			
165.55	2,656	5,772	167.30	2,656	10,411			
165.60	2,656	5,974	167.35	2,656	10,478			
165.65	2,656	6,171	167.40	2,656	10,544			
165.70	2,656	6,362	167.45	2,656	10,611			

Summary for Link SP1: STUDY POINT #1 (Kimball Road north)

Inflow Area = 218,076 sf, 43.75% Impervious, Inflow Depth = 3.33" for 25-Year event
Inflow = 9.91 cfs @ 12.17 hrs, Volume= 60,494 cf
Primary = 9.91 cfs @ 12.17 hrs, Volume= 60,494 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP1: STUDY POINT #1 (Kimball Road north)

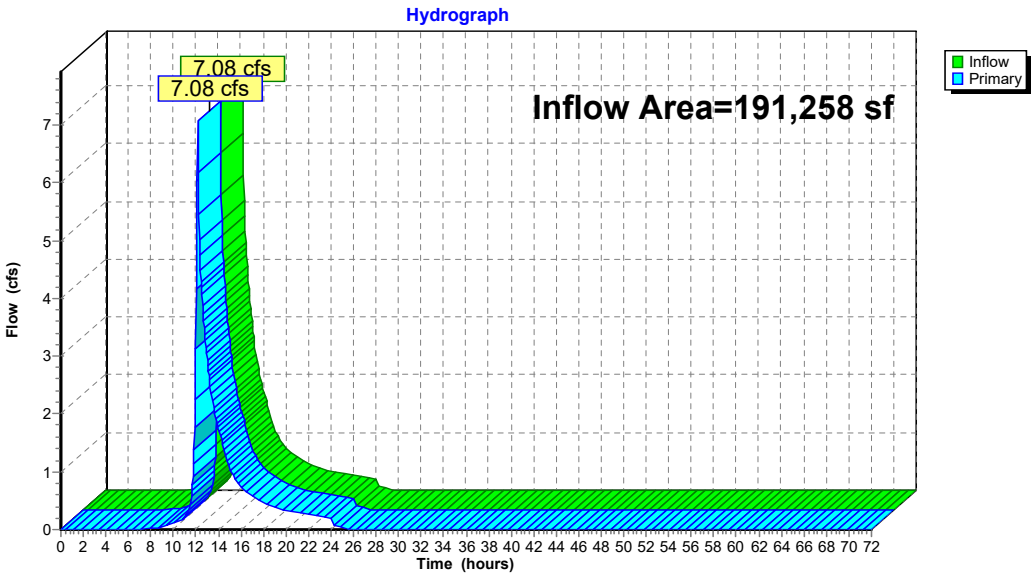


Summary for Link SP2: STUDY POINT #2 (Wetlands West)

Inflow Area = 191,258 sf, 44.90% Impervious, Inflow Depth = 2.92" for 25-Year event
Inflow = 7.08 cfs @ 12.15 hrs, Volume= 46,550 cf
Primary = 7.08 cfs @ 12.15 hrs, Volume= 46,550 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP2: STUDY POINT #2 (Wetlands West)



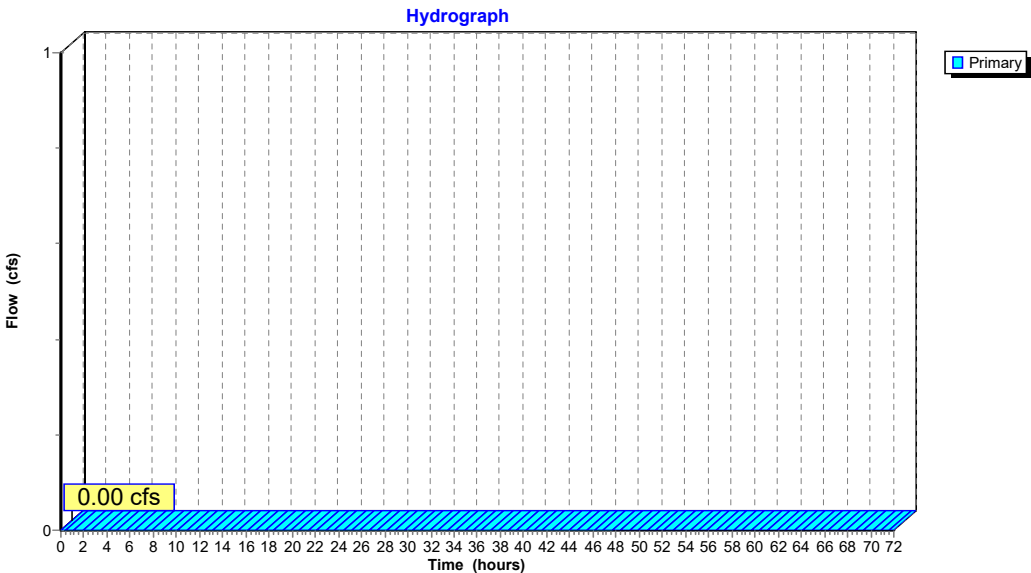
Summary for Link SP3: STUDY POINT #3 (IVW south)

[43] Hint: Has no inflow (Outflow=Zero)

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP3: STUDY POINT #3 (IVW south)



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 265

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 P-1: Subcat P-1	Runoff Area=14,876 sf 72.61% Impervious Runoff Depth=7.37" Tc=6.0 min CN=91 Runoff=2.45 cfs 9,135 cf
Subcatchment P-10: Subcat P-10	Runoff Area=8,341 sf 78.96% Impervious Runoff Depth=7.61" Tc=6.0 min CN=93 Runoff=1.39 cfs 5,289 cf
Subcatchment P-11: Subcat P-11	Runoff Area=8,941 sf 76.40% Impervious Runoff Depth=7.49" Tc=6.0 min CN=92 Runoff=1.48 cfs 5,580 cf
Subcatchment P-12: Subcat P-12	Runoff Area=19,709 sf 57.44% Impervious Runoff Depth=7.01" Tc=6.0 min CN=88 Runoff=3.15 cfs 11,511 cf
Subcatchment P-13: Subcat P-13	Runoff Area=10,271 sf 79.93% Impervious Runoff Depth=7.61" Tc=6.0 min CN=93 Runoff=1.71 cfs 6,513 cf
Subcatchment P-14: Subcat P-14	Runoff Area=7,633 sf 64.61% Impervious Runoff Depth=7.25" Tc=6.0 min CN=90 Runoff=1.24 cfs 4,611 cf
Subcatchment P-15: Subcat P-15	Runoff Area=14,623 sf 52.15% Impervious Runoff Depth=6.89" Tc=6.0 min CN=87 Runoff=2.32 cfs 8,394 cf
Subcatchment P-16: Subcat P-16	Runoff Area=13,061 sf 79.56% Impervious Runoff Depth=7.61" Tc=6.0 min CN=93 Runoff=2.18 cfs 8,282 cf
Subcatchment P-17: Subcat P-17	Runoff Area=10,295 sf 68.44% Impervious Runoff Depth=7.25" Tc=6.0 min CN=90 Runoff=1.68 cfs 6,219 cf
Subcatchment P-18: Subcat P-18	Runoff Area=6,252 sf 71.75% Impervious Runoff Depth=7.37" Tc=6.0 min CN=91 Runoff=1.03 cfs 3,839 cf
Subcatchment P-18A: Subcat P-18A	Runoff Area=7,417 sf 51.89% Impervious Runoff Depth=6.77" Tc=6.0 min CN=86 Runoff=1.16 cfs 4,183 cf

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 266

Subcatchment P-19: Subcat P-19	Runoff Area=21,732 sf 51.13% Impervious Runoff Depth=6.77" Tc=6.0 min CN=86 Runoff=3.41 cfs 12,258 cf
Subcatchment P-2: Subcat P-2	Runoff Area=8,672 sf 75.35% Impervious Runoff Depth=7.49" Tc=6.0 min CN=92 Runoff=1.44 cfs 5,412 cf
Subcatchment P-20: Subcat P-20	Runoff Area=41,652 sf 45.57% Impervious Runoff Depth=6.65" Tc=6.0 min CN=85 Runoff=6.45 cfs 23,076 cf
Subcatchment P-21: Subcat P-21	Runoff Area=56,094 sf 0.01% Impervious Runoff Depth=4.97" Tc=6.0 min CN=71 Runoff=6.85 cfs 23,243 cf
Subcatchment P-22: Subcat P-22	Runoff Area=31,338 sf 0.00% Impervious Runoff Depth=5.09" Tc=6.0 min CN=72 Runoff=3.91 cfs 13,296 cf
Subcatchment P-23: Subcat P-23	Runoff Area=14,063 sf 0.00% Impervious Runoff Depth=5.09" Tc=6.0 min CN=72 Runoff=1.76 cfs 5,967 cf
Subcatchment P-24: Subcat P-24	Runoff Area=21,686 sf 33.62% Impervious Runoff Depth=6.29" Tc=6.0 min CN=82 Runoff=3.23 cfs 11,363 cf
Subcatchment P-25: Subcat P-25	Runoff Area=19,846 sf 0.02% Impervious Runoff Depth=4.97" Tc=6.0 min CN=71 Runoff=2.43 cfs 8,224 cf
Subcatchment P-3: Subcat P-3	Runoff Area=10,249 sf 79.91% Impervious Runoff Depth=7.61" Tc=6.0 min CN=93 Runoff=1.71 cfs 6,499 cf
Subcatchment P-4: Subcat P-4	Runoff Area=12,573 sf 84.83% Impervious Runoff Depth=7.73" Tc=6.0 min CN=94 Runoff=2.11 cfs 8,098 cf
Subcatchment P-5: Subcat P-5	Runoff Area=5,504 sf 81.03% Impervious Runoff Depth=7.61" Tc=6.0 min CN=93 Runoff=0.92 cfs 3,490 cf
Subcatchment P-6: Subcat P-6	Runoff Area=9,128 sf 59.53% Impervious Runoff Depth=7.01" Tc=6.0 min CN=88 Runoff=1.46 cfs 5,331 cf

Subcatchment P-6A: Subcat P-6A	Runoff Area=8,474 sf 69.12% Impervious Runoff Depth=7.37" Tc=6.0 min CN=91 Runoff=1.39 cfs 5,203 cf
Subcatchment P-7: Subcat P-7	Runoff Area=9,413 sf 77.70% Impervious Runoff Depth=7.61" Tc=6.0 min CN=93 Runoff=1.57 cfs 5,969 cf
Subcatchment P-8: Subcat P-8	Runoff Area=9,310 sf 71.77% Impervious Runoff Depth=7.37" Tc=6.0 min CN=91 Runoff=1.53 cfs 5,717 cf
Subcatchment P-9: Subcat P-9	Runoff Area=8,180 sf 81.46% Impervious Runoff Depth=7.73" Tc=6.0 min CN=94 Runoff=1.37 cfs 5,269 cf
Pond 1P: Infiltration Basin	Peak Elev=146.44' Storage=23,724 cf Inflow=17.63 cfs 64,596 cf Discarded=0.16 cfs 18,566 cf Primary=5.54 cfs 46,030 cf Outflow=5.70 cfs 64,596 cf
Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)	Peak Elev=170.22' Storage=25,810 cf Inflow=16.53 cfs 61,042 cf Discarded=0.15 cfs 24,000 cf Primary=3.92 cfs 37,042 cf Outflow=4.07 cfs 61,042 cf
Pond 3P: UIS-2 (SC-800)	Peak Elev=163.45' Storage=5,187 cf Inflow=5.28 cfs 19,566 cf Discarded=0.06 cfs 6,099 cf Primary=2.30 cfs 13,468 cf Outflow=2.35 cfs 19,566 cf
Pond 4P: UDS-2 (SC-310)	Peak Elev=135.08' Storage=339 cf Inflow=1.16 cfs 4,183 cf Outflow=0.77 cfs 4,183 cf
Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)	Peak Elev=166.30' Storage=8,501 cf Inflow=8.20 cfs 30,080 cf Discarded=0.06 cfs 7,648 cf Primary=4.01 cfs 22,432 cf Outflow=4.07 cfs 30,080 cf
Link SP1: STUDY POINT #1 (Kimball Road north)	Inflow=15.03 cfs 91,908 cf Primary=15.03 cfs 91,908 cf
Link SP2: STUDY POINT #2 (Wetlands West)	Inflow=10.90 cfs 73,753 cf Primary=10.90 cfs 73,753 cf
Link SP3: STUDY POINT #3 (IVW south)	Primary=0.00 cfs 0 cf

Total Runoff Area = 409,335 sf Runoff Volume = 221,974 cf Average Runoff Depth = 6.51"
55.72% Pervious = 228,062 sf 44.28% Impervious = 181,273 sf

Summary for Subcatchment P-1: Subcat P-1

Runoff = 2.45 cfs @ 12.13 hrs, Volume= 9,135 cf, Depth= 7.37"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

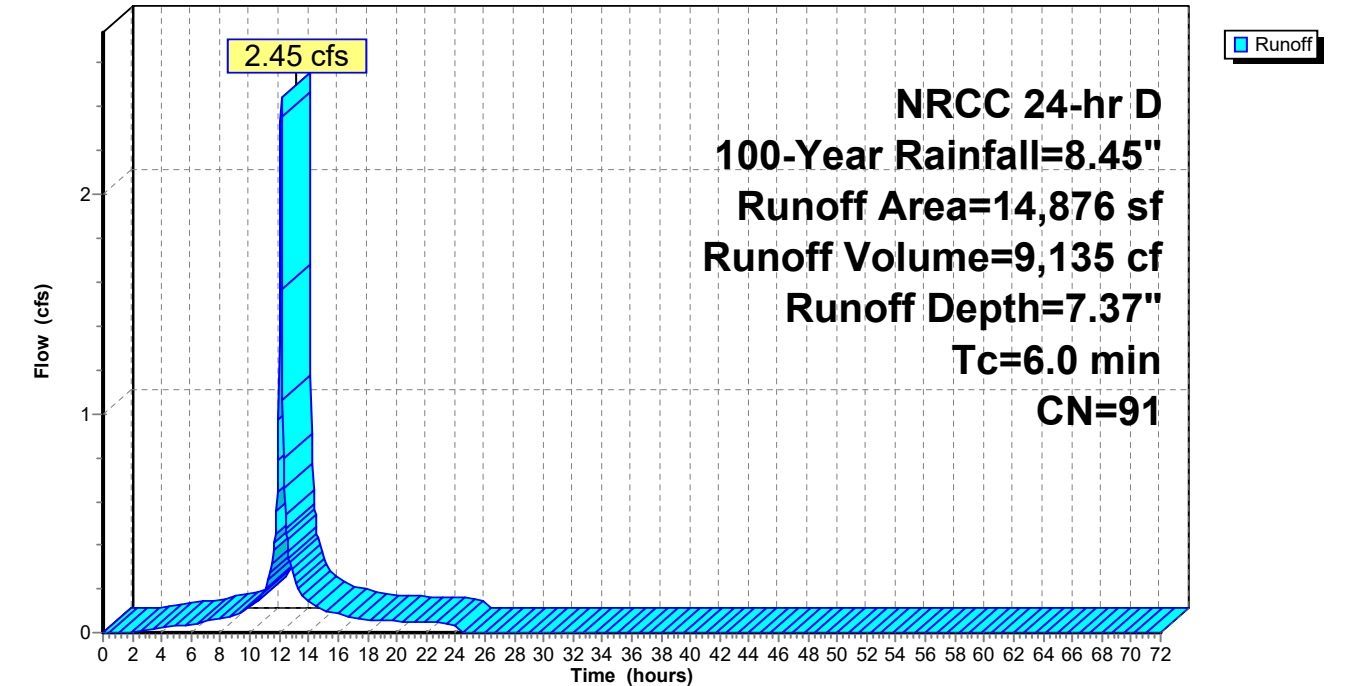
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
4,074	74	>75% Grass cover, Good, HSG C
1,784	98	Paved parking, HSG C
9,018	98	Roofs, HSG C
14,876	91	Weighted Average
4,074		27.39% Pervious Area
10,801		72.61% Impervious Area

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

Subcatchment P-1: Subcat P-1

Hydrograph



Summary for Subcatchment P-10: Subcat P-10

Runoff = 1.39 cfs @ 12.13 hrs, Volume= 5,289 cf, Depth= 7.61"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

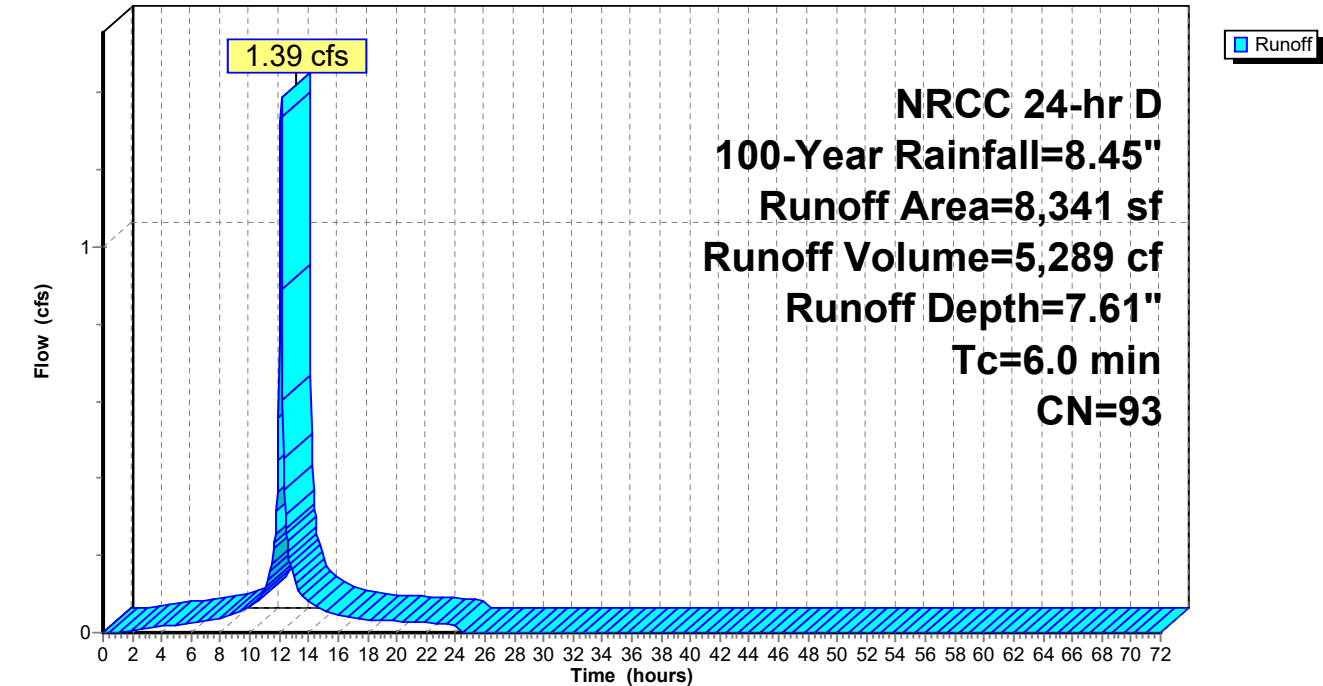
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
1,755	74	>75% Grass cover, Good, HSG C
6,446	98	Paved parking, HSG C
139	98	Roofs, HSG C
8,341	93	Weighted Average
1,755		21.04% Pervious Area
6,586		78.96% Impervious Area

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

Subcatchment P-10: Subcat P-10

Hydrograph



Summary for Subcatchment P-11: Subcat P-11

Runoff = 1.48 cfs @ 12.13 hrs, Volume= 5,580 cf, Depth= 7.49"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

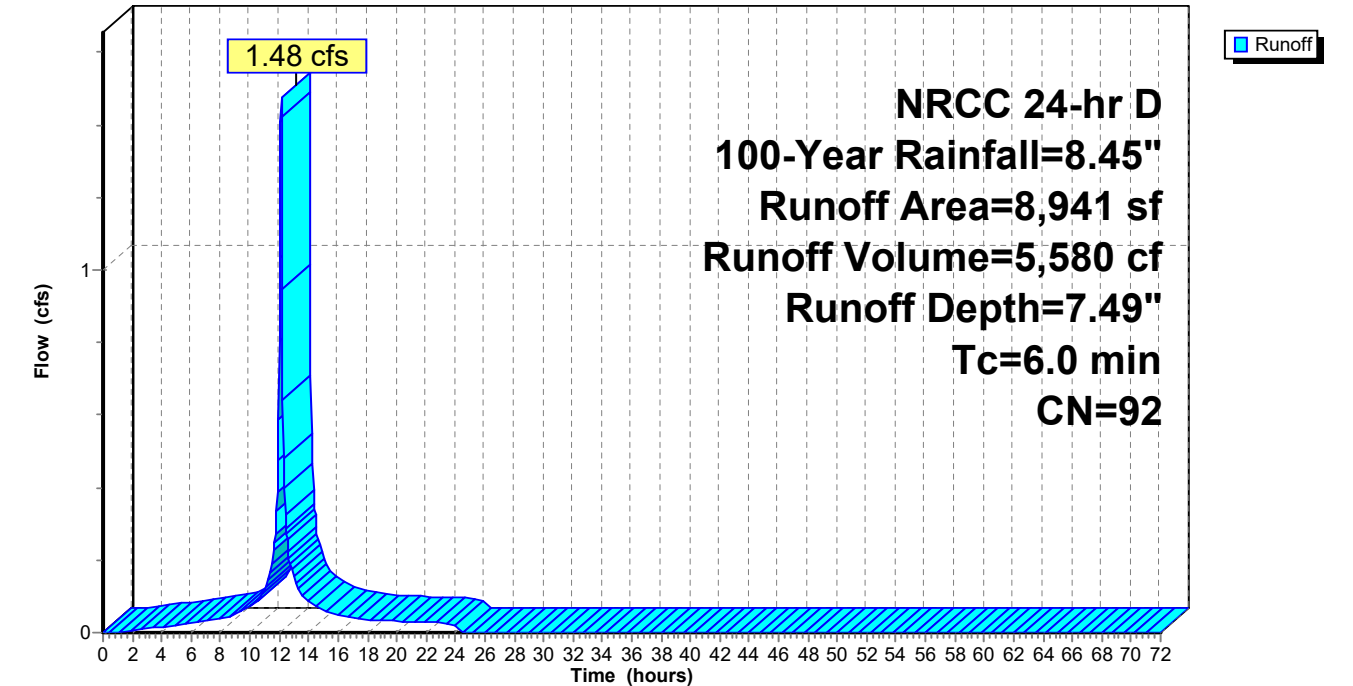
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
2,110	74	>75% Grass cover, Good, HSG C
6,825	98	Paved parking, HSG C
6	98	Roofs, HSG C
8,941	92	Weighted Average
2,110		23.60% Pervious Area
6,831		76.40% Impervious Area

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

Subcatchment P-11: Subcat P-11

Hydrograph



Summary for Subcatchment P-12: Subcat P-12

Runoff = 3.15 cfs @ 12.13 hrs, Volume= 11,511 cf, Depth= 7.01"
Routed to Pond 1P : Infiltration Basin

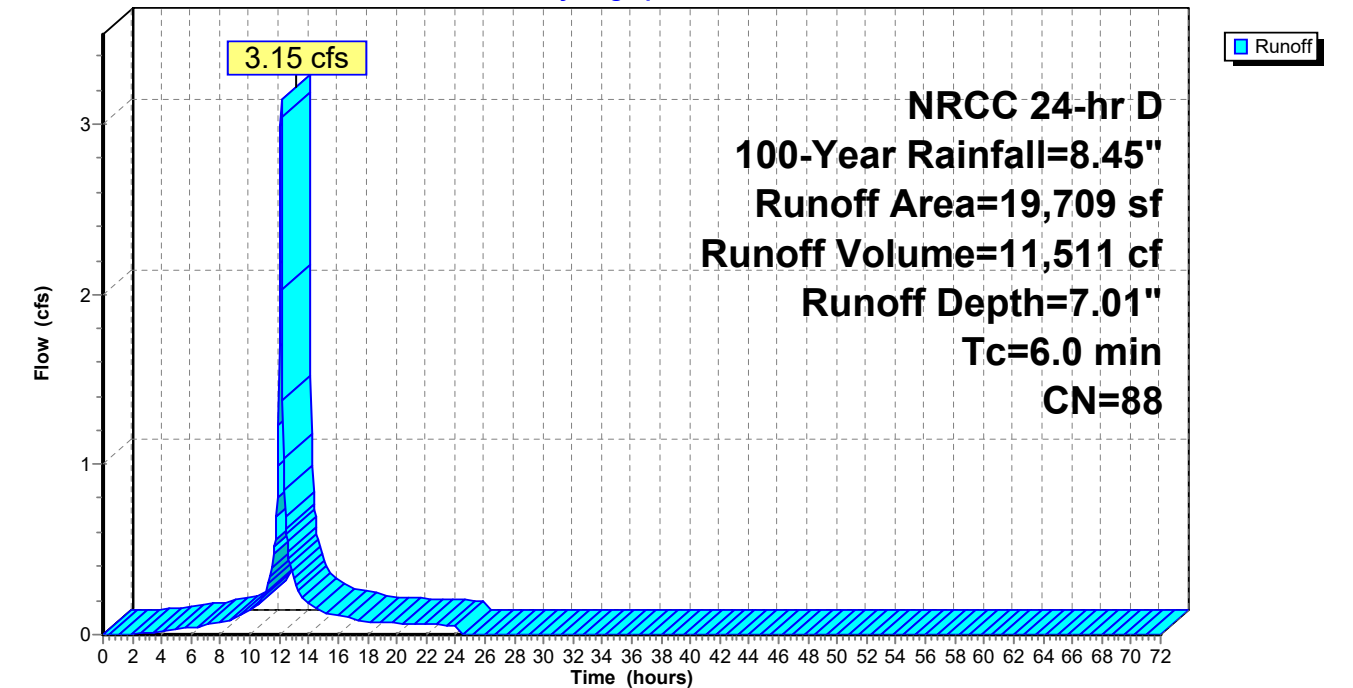
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
8,387	74	>75% Grass cover, Good, HSG C
1,531	98	Paved parking, HSG C
9,791	98	Roofs, HSG C
19,709	88	Weighted Average
8,387		42.56% Pervious Area
11,322		57.44% Impervious Area

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

Subcatchment P-12: Subcat P-12

Hydrograph



Summary for Subcatchment P-13: Subcat P-13

Runoff = 1.71 cfs @ 12.13 hrs, Volume= 6,513 cf, Depth= 7.61"
Routed to Pond 1P : Infiltration Basin

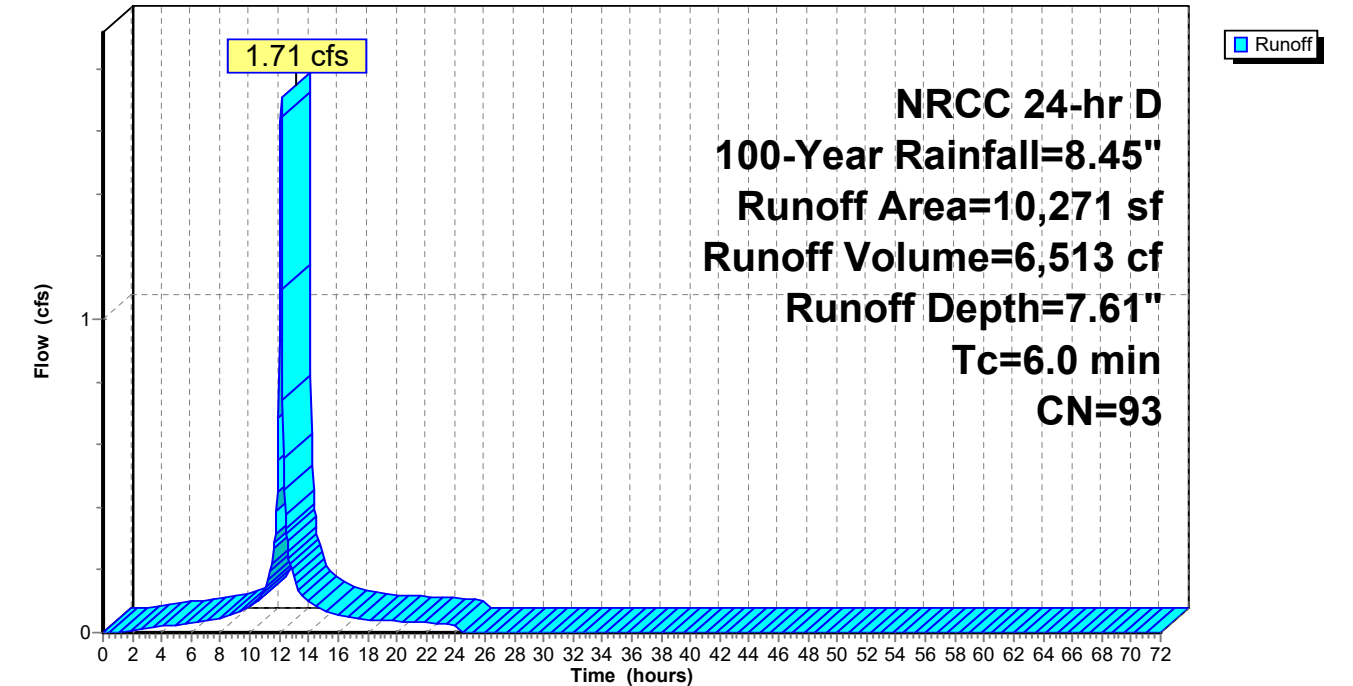
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
2,062	74	>75% Grass cover, Good, HSG C
8,209	98	Paved parking, HSG C
0	98	Roofs, HSG C
10,271	93	Weighted Average
2,062		20.07% Pervious Area
8,209		79.93% Impervious Area

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

Subcatchment P-13: Subcat P-13

Hydrograph



Summary for Subcatchment P-14: Subcat P-14

Runoff = 1.24 cfs @ 12.13 hrs, Volume= 4,611 cf, Depth= 7.25"
Routed to Pond 1P : Infiltration Basin

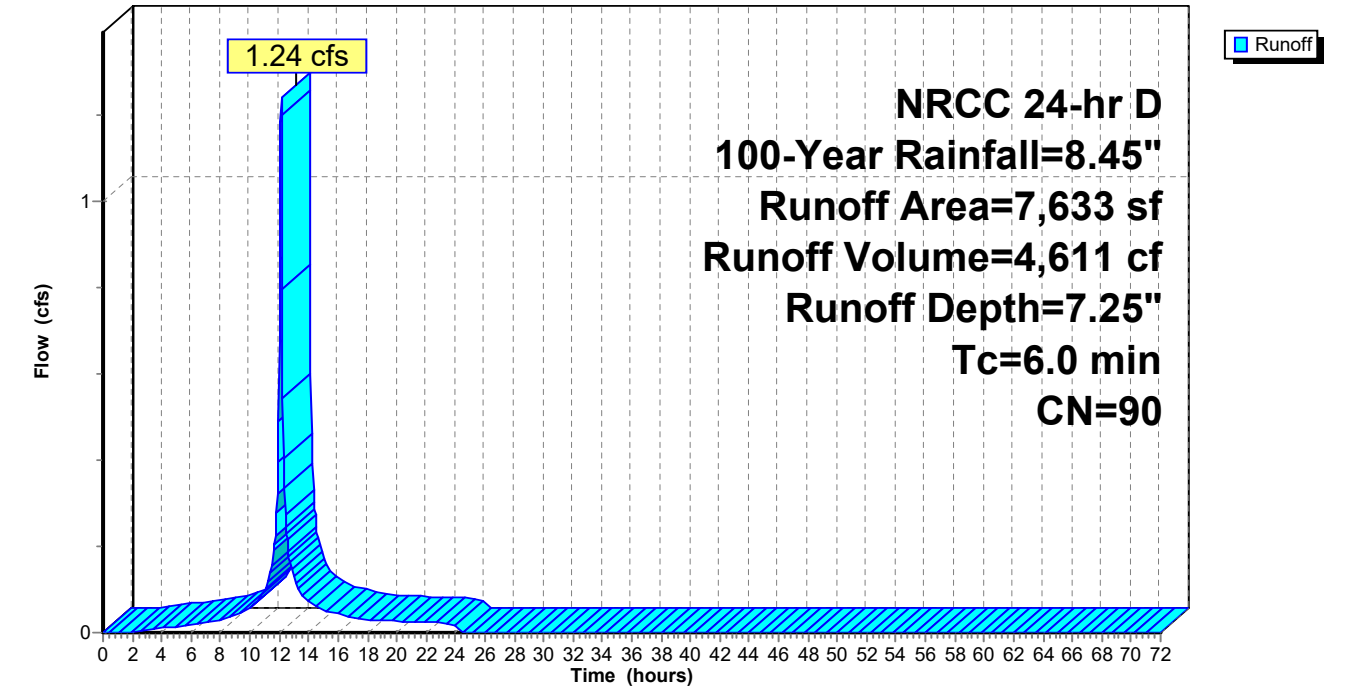
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
2,702	74	>75% Grass cover, Good, HSG C
4,931	98	Paved parking, HSG C
7,633	90	Weighted Average
2,702		35.39% Pervious Area
4,931		64.61% Impervious Area

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

Subcatchment P-14: Subcat P-14

Hydrograph



Summary for Subcatchment P-15: Subcat P-15

Runoff = 2.32 cfs @ 12.13 hrs, Volume= 8,394 cf, Depth= 6.89"
Routed to Pond 3P : UIS-2 (SC-800)

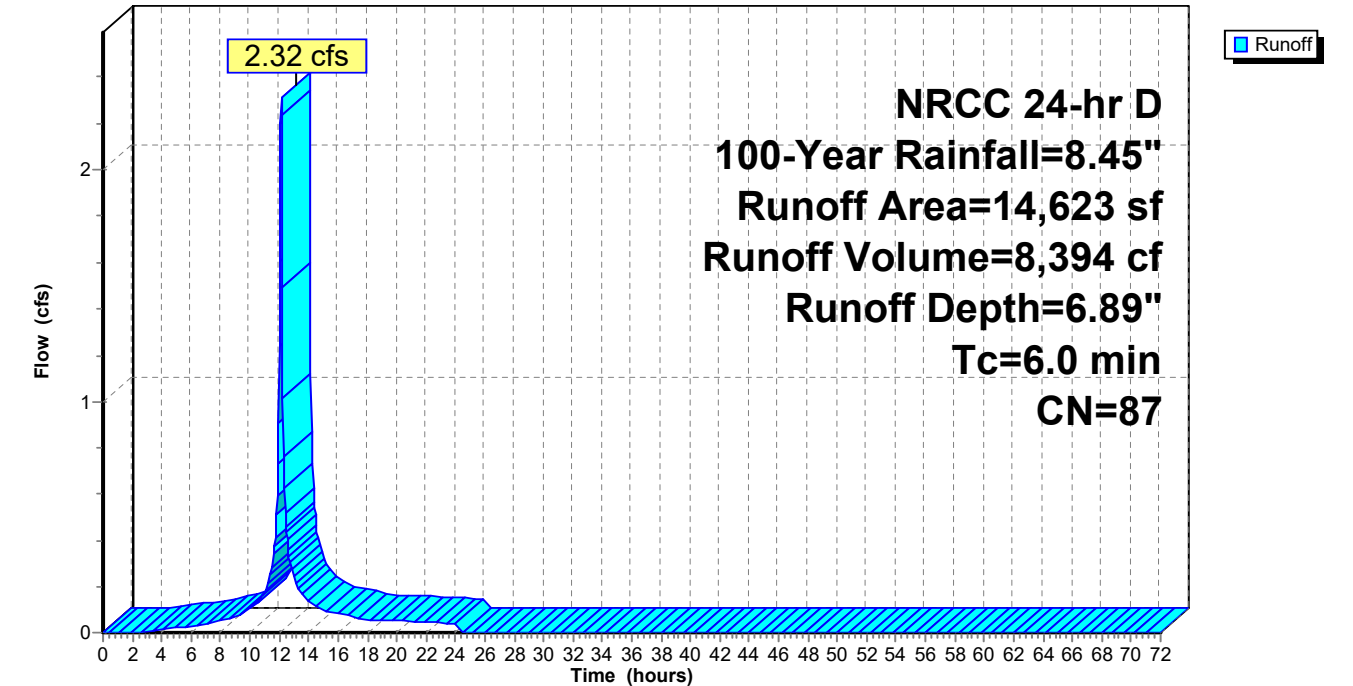
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
6,997	74	>75% Grass cover, Good, HSG C
917	98	Paved parking, HSG C
6,709	98	Roofs, HSG C
14,623	87	Weighted Average
6,997		47.85% Pervious Area
7,626		52.15% Impervious Area

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

Subcatchment P-15: Subcat P-15

Hydrograph



Summary for Subcatchment P-16: Subcat P-16

Runoff = 2.18 cfs @ 12.13 hrs, Volume= 8,282 cf, Depth= 7.61"
Routed to Pond 1P : Infiltration Basin

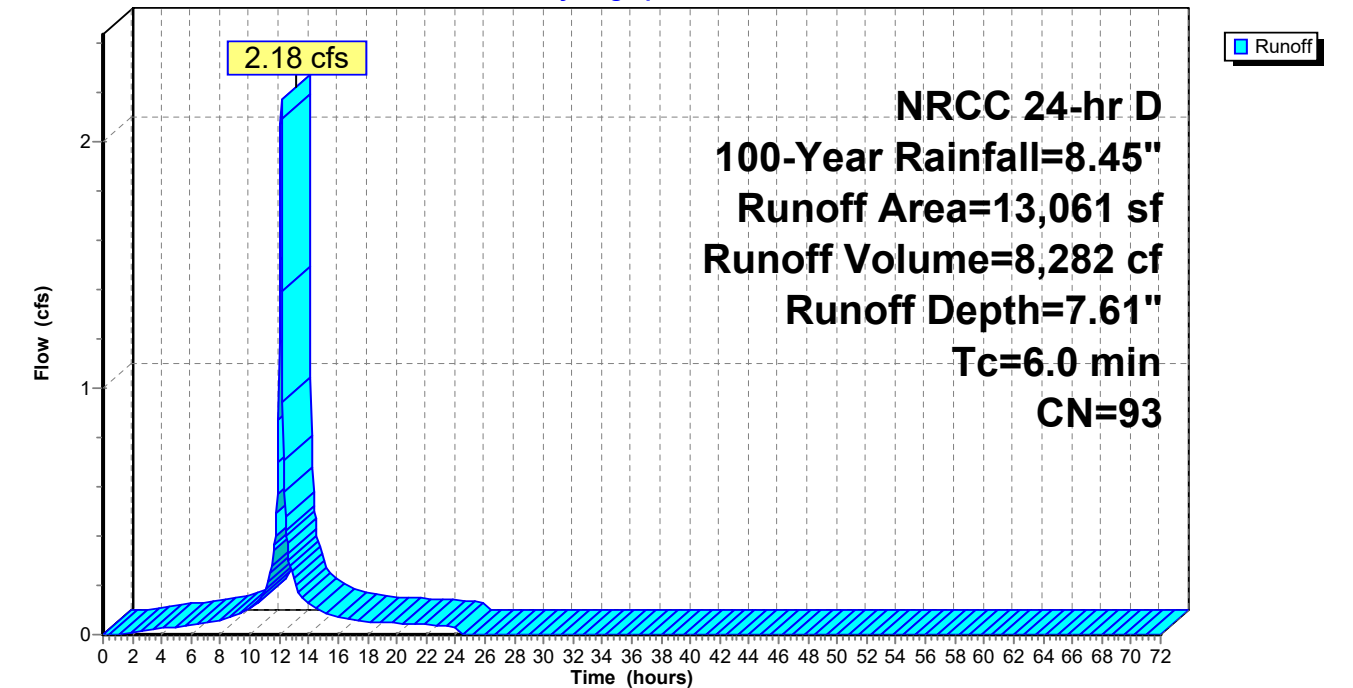
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
2,670	74	>75% Grass cover, Good, HSG C
10,111	98	Paved parking, HSG C
280	98	Roofs, HSG C
13,061	93	Weighted Average
2,670		20.44% Pervious Area
10,391		79.56% Impervious Area

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

Subcatchment P-16: Subcat P-16

Hydrograph



Summary for Subcatchment P-17: Subcat P-17

Runoff = 1.68 cfs @ 12.13 hrs, Volume= 6,219 cf, Depth= 7.25"
Routed to Pond 1P : Infiltration Basin

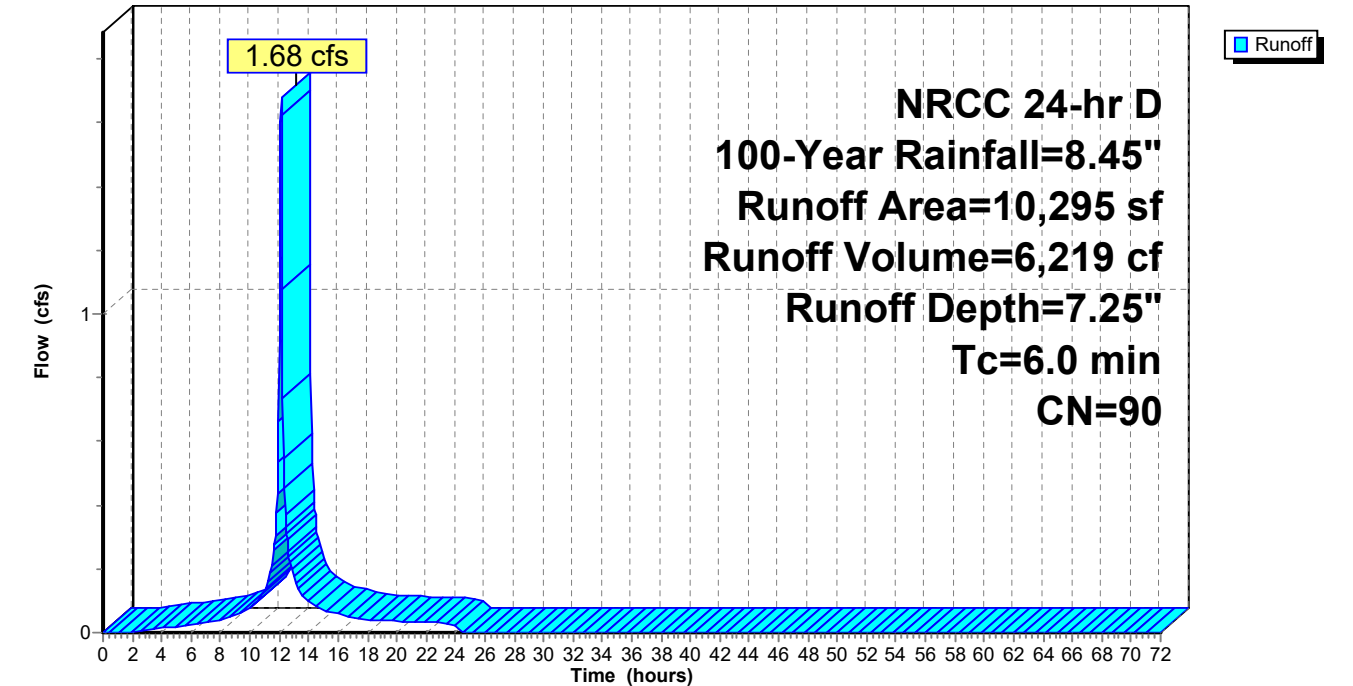
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
3,249	74	>75% Grass cover, Good, HSG C
6,446	98	Paved parking, HSG C
600	98	Roofs, HSG C
10,295	90	Weighted Average
3,249		31.56% Pervious Area
7,046		68.44% Impervious Area

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

Subcatchment P-17: Subcat P-17

Hydrograph



Summary for Subcatchment P-18: Subcat P-18

Runoff = 1.03 cfs @ 12.13 hrs, Volume= 3,839 cf, Depth= 7.37"
Routed to Pond 1P : Infiltration Basin

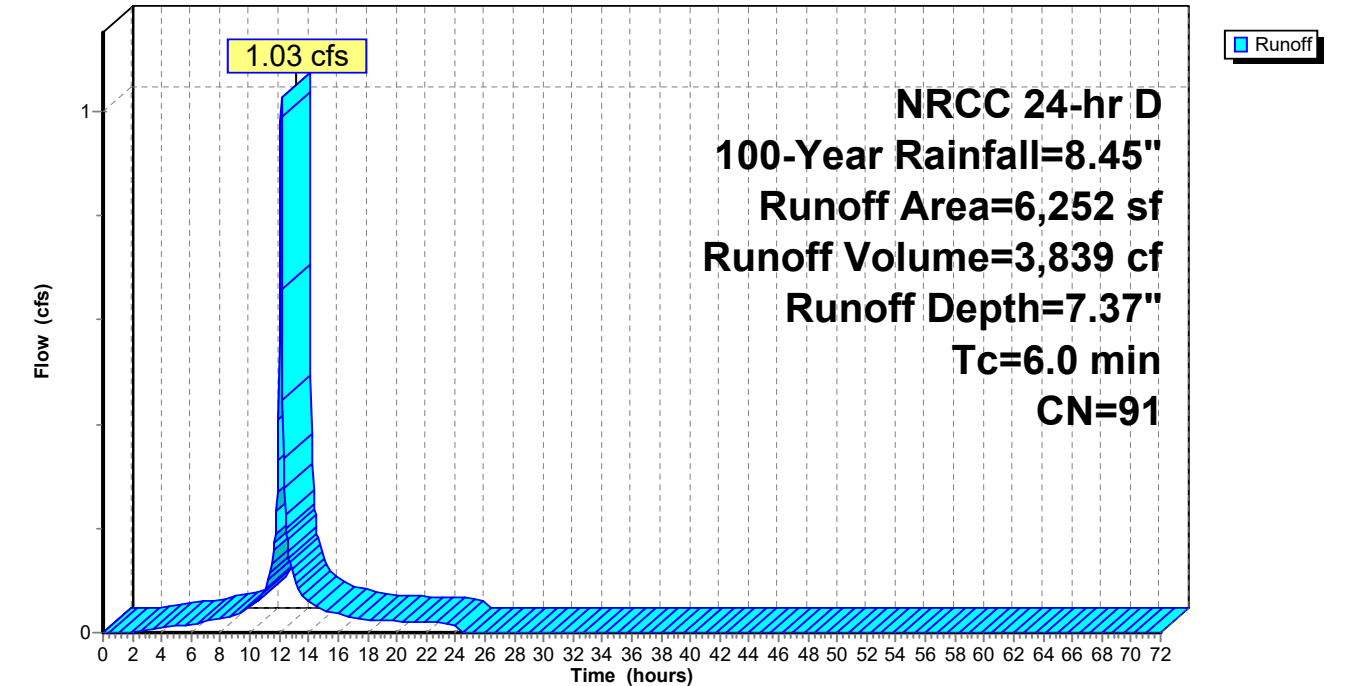
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
1,766	74	>75% Grass cover, Good, HSG C
4,486	98	Paved parking, HSG C
6,252	91	Weighted Average
1,766		28.25% Pervious Area
4,486		71.75% Impervious Area

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

Subcatchment P-18: Subcat P-18

Hydrograph



Summary for Subcatchment P-18A: Subcat P-18A

Runoff = 1.16 cfs @ 12.13 hrs, Volume= 4,183 cf, Depth= 6.77"
Routed to Pond 4P : UDS-2 (SC-310)

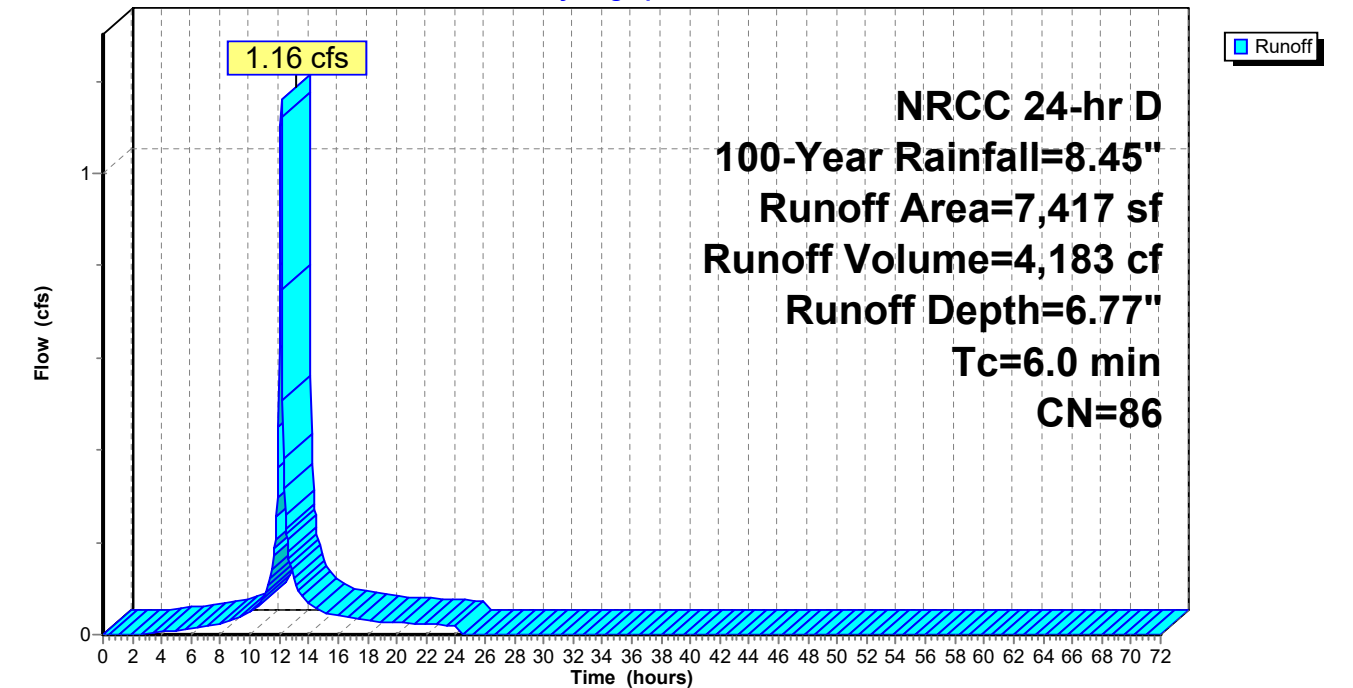
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
3,568	74	>75% Grass cover, Good, HSG C
3,849	98	Paved parking, HSG C
7,417	86	Weighted Average
3,568		48.11% Pervious Area
3,849		51.89% Impervious Area

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

Subcatchment P-18A: Subcat P-18A

Hydrograph



Summary for Subcatchment P-19: Subcat P-19

Runoff = 3.41 cfs @ 12.13 hrs, Volume= 12,258 cf, Depth= 6.77"
Routed to Pond 1P : Infiltration Basin

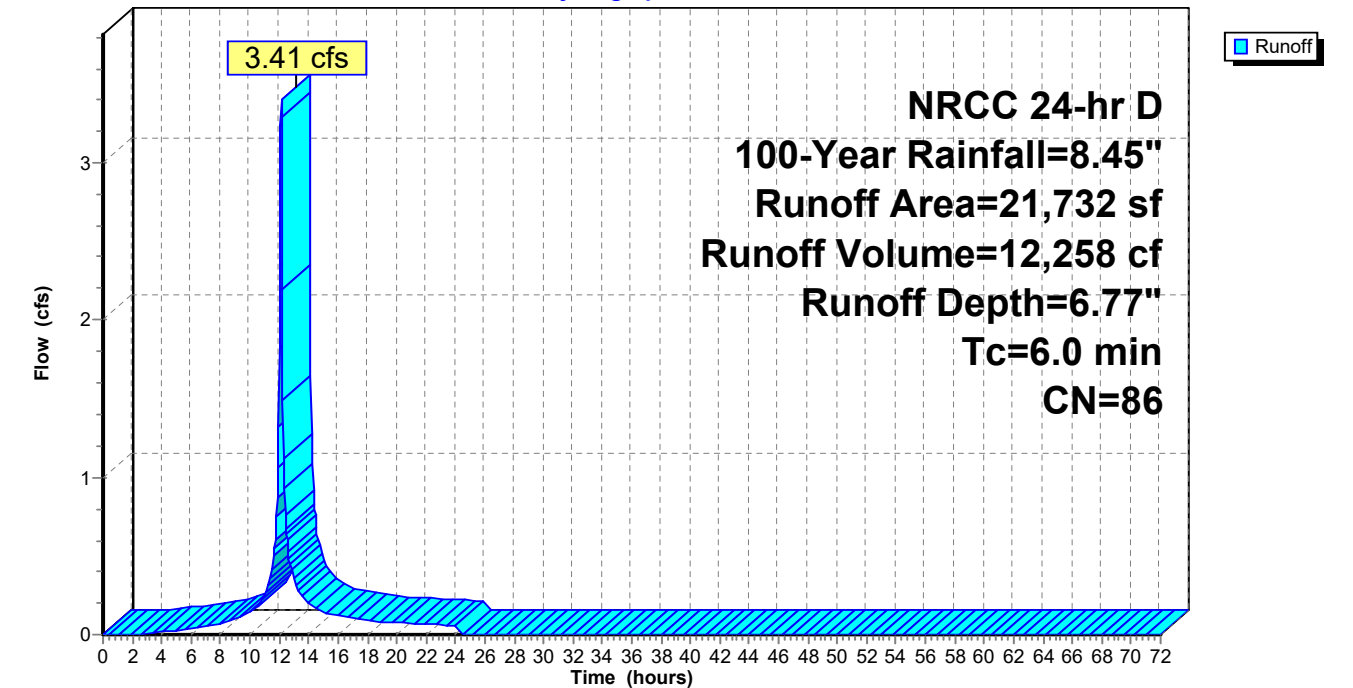
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
10,621	74	>75% Grass cover, Good, HSG C
1,800	98	Paved parking, HSG C
9,311	98	Roofs, HSG C
21,732	86	Weighted Average
10,621		48.87% Pervious Area
11,112		51.13% Impervious Area

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

Subcatchment P-19: Subcat P-19

Hydrograph



Summary for Subcatchment P-2: Subcat P-2

Runoff = 1.44 cfs @ 12.13 hrs, Volume= 5,412 cf, Depth= 7.49"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

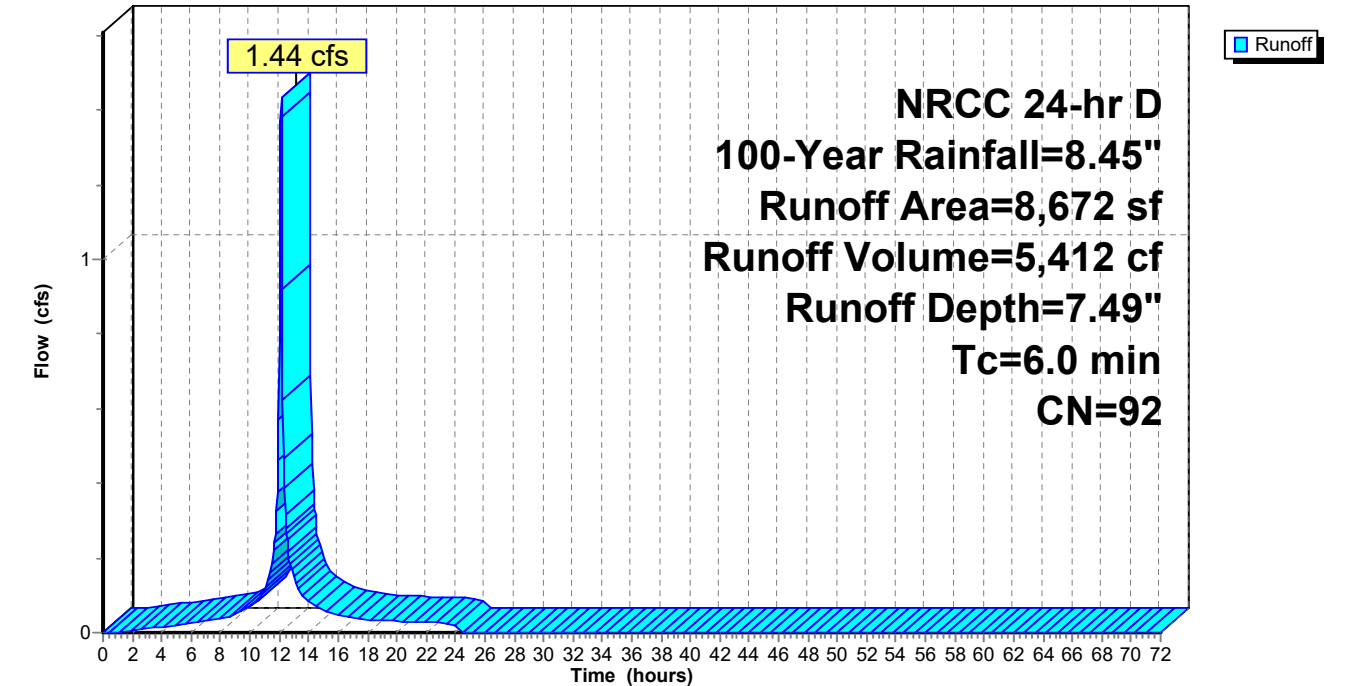
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
2,138	74	>75% Grass cover, Good, HSG C
6,408	98	Paved parking, HSG C
126	98	Roofs, HSG C
8,672	92	Weighted Average
2,138		24.65% Pervious Area
6,534		75.35% Impervious Area

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

Subcatchment P-2: Subcat P-2

Hydrograph



Summary for Subcatchment P-20: Subcat P-20

Runoff = 6.45 cfs @ 12.13 hrs, Volume= 23,076 cf, Depth= 6.65"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

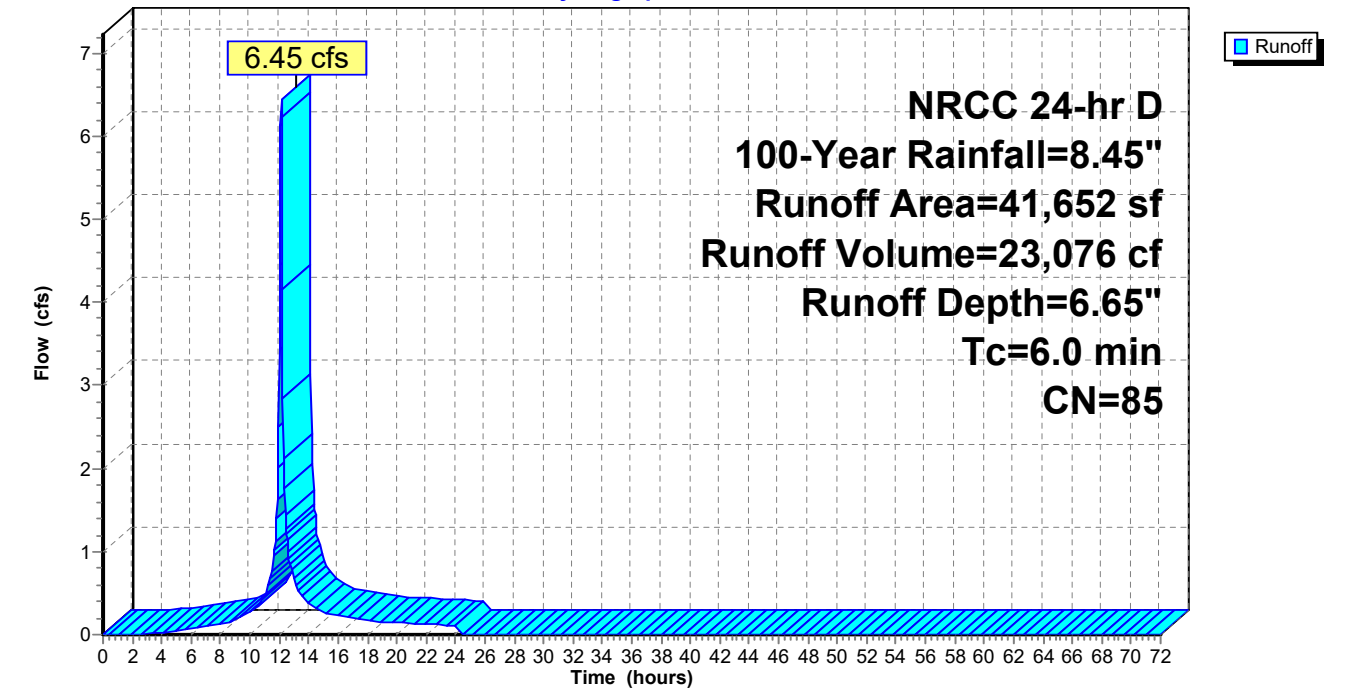
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
22,671	74	>75% Grass cover, Good, HSG C
3,948	98	Paved parking, HSG C
15,034	98	Roofs, HSG C
41,652	85	Weighted Average
22,671		54.43% Pervious Area
18,982		45.57% Impervious Area

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

Subcatchment P-20: Subcat P-20

Hydrograph



Summary for Subcatchment P-21: Subcat P-21

Runoff = 6.85 cfs @ 12.13 hrs, Volume= 23,243 cf, Depth= 4.97"
Routed to Link SP2 : STUDY POINT #2 (Wetlands West)

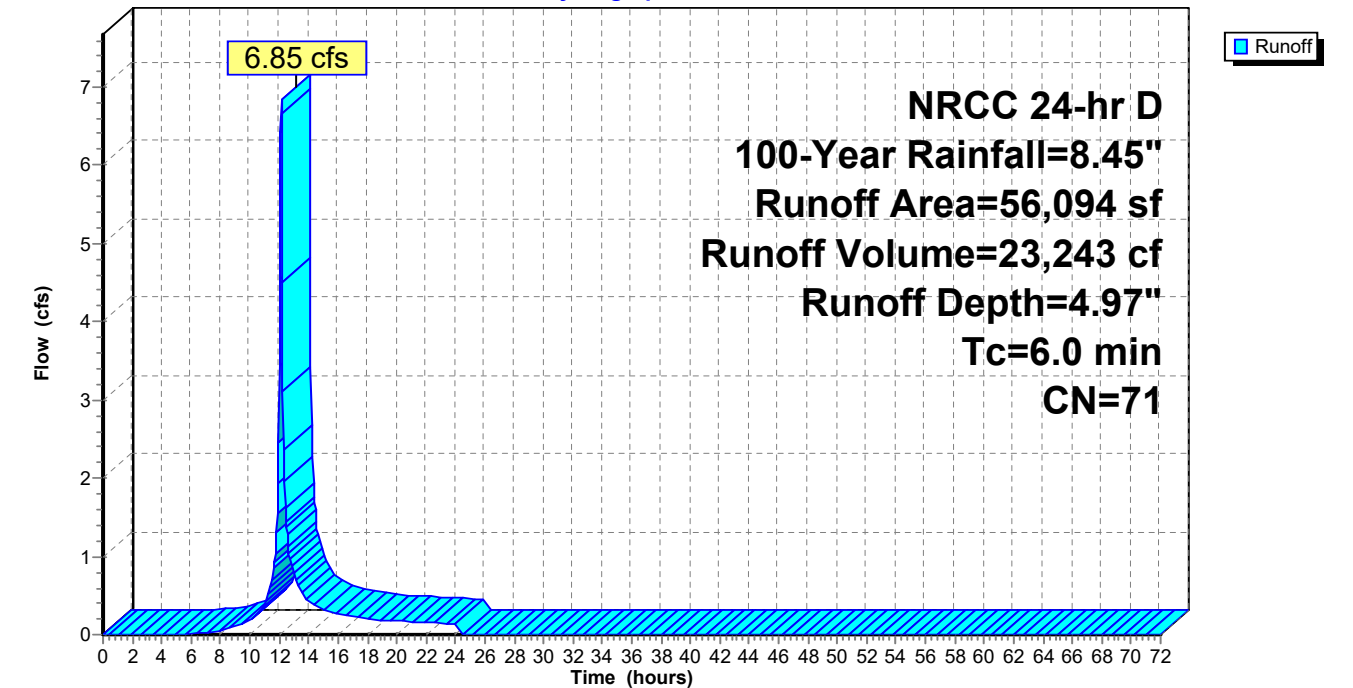
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
17,315	74	>75% Grass cover, Good, HSG C
4	98	Roofs, HSG C
38,775	70	Woods, Good, HSG C
56,094	71	Weighted Average
56,091		99.99% Pervious Area
4		0.01% Impervious Area

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

Subcatchment P-21: Subcat P-21

Hydrograph



Summary for Subcatchment P-22: Subcat P-22

Runoff = 3.91 cfs @ 12.13 hrs, Volume= 13,296 cf, Depth= 5.09"
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

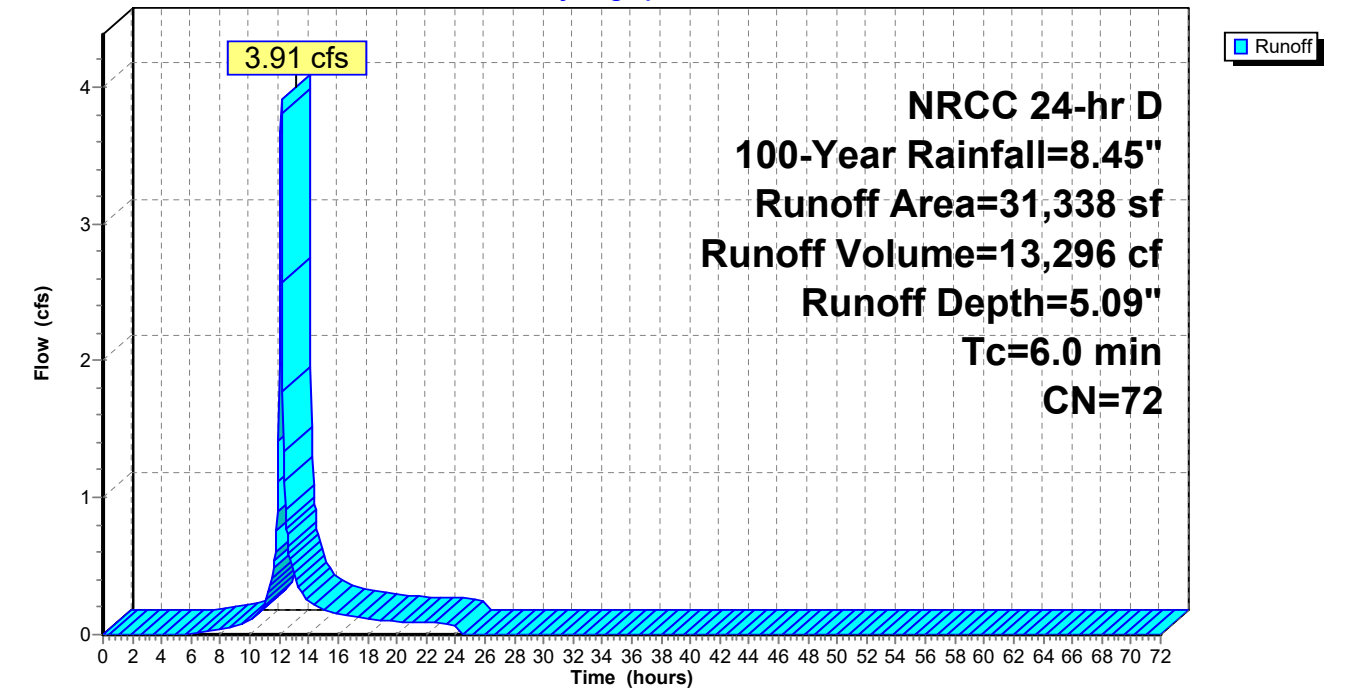
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
12,793	74	>75% Grass cover, Good, HSG C
1	98	Paved parking, HSG C
1	98	Roofs, HSG C
18,544	70	Woods, Good, HSG C
31,338	72	Weighted Average
31,337		100.00% Pervious Area
2		0.00% Impervious Area

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

Subcatchment P-22: Subcat P-22

Hydrograph



Summary for Subcatchment P-23: Subcat P-23

Runoff = 1.76 cfs @ 12.13 hrs, Volume= 5,967 cf, Depth= 5.09"
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

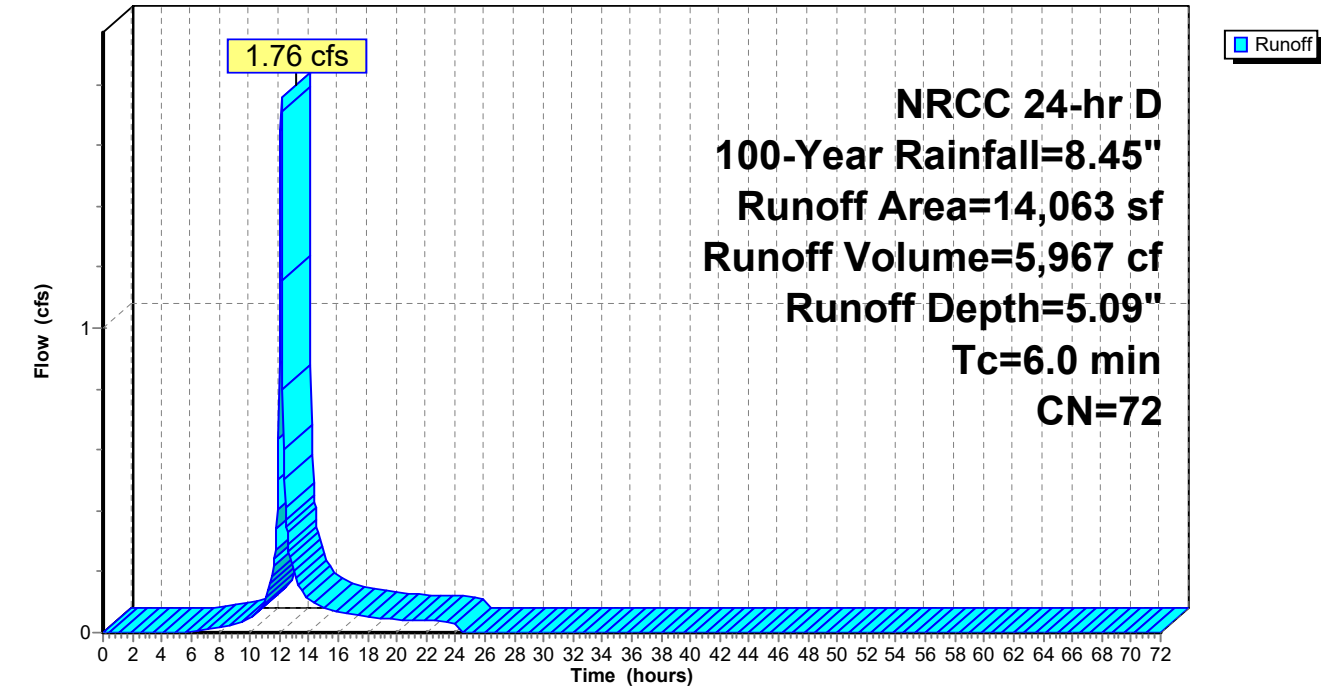
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
6,718	74	>75% Grass cover, Good, HSG C
7,345	70	Woods, Good, HSG C
14,063	72	Weighted Average
14,063		100.00% Pervious Area

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

Subcatchment P-23: Subcat P-23

Hydrograph



Summary for Subcatchment P-24: Subcat P-24

Runoff = 3.23 cfs @ 12.13 hrs, Volume= 11,363 cf, Depth= 6.29"
Routed to Pond 1P : Infiltration Basin

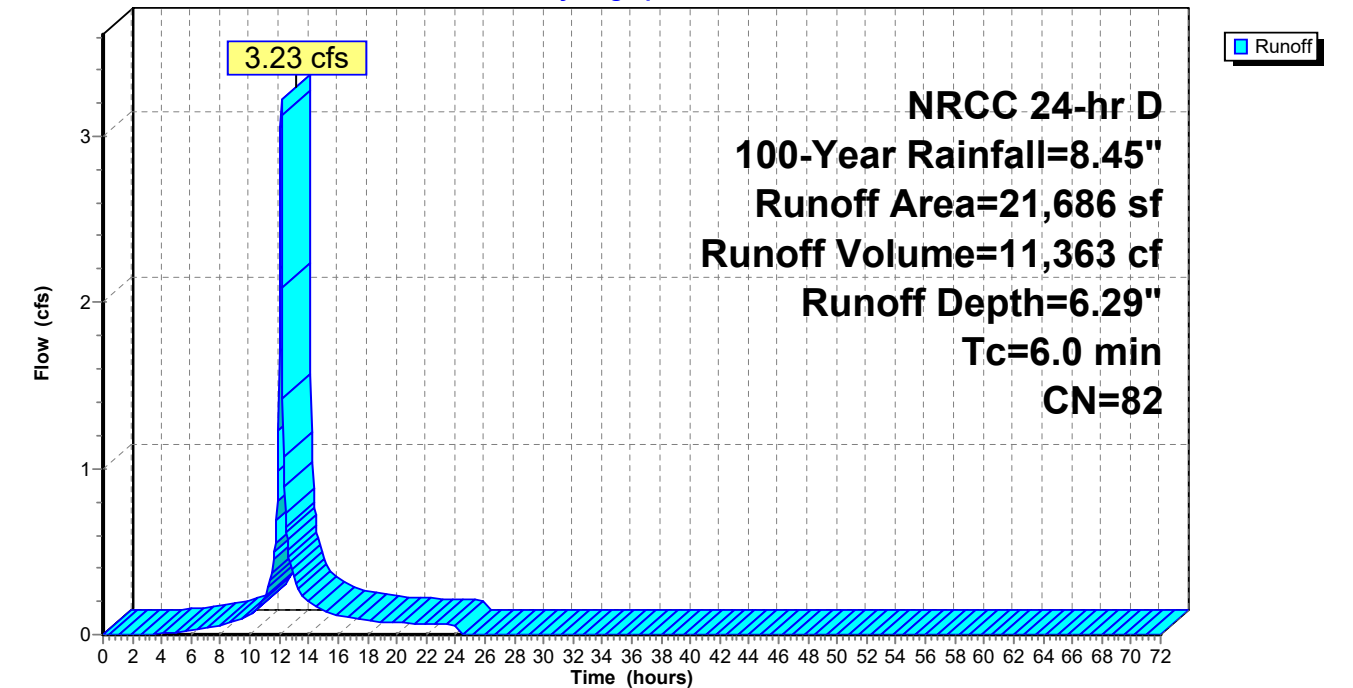
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
14,395	74	>75% Grass cover, Good, HSG C
7,291	98	Water Surface, HSG C
21,686	82	Weighted Average
14,395		66.38% Pervious Area
7,291		33.62% Impervious Area

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

Subcatchment P-24: Subcat P-24

Hydrograph



Summary for Subcatchment P-25: Subcat P-25

Runoff = 2.43 cfs @ 12.13 hrs, Volume= 8,224 cf, Depth= 4.97"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

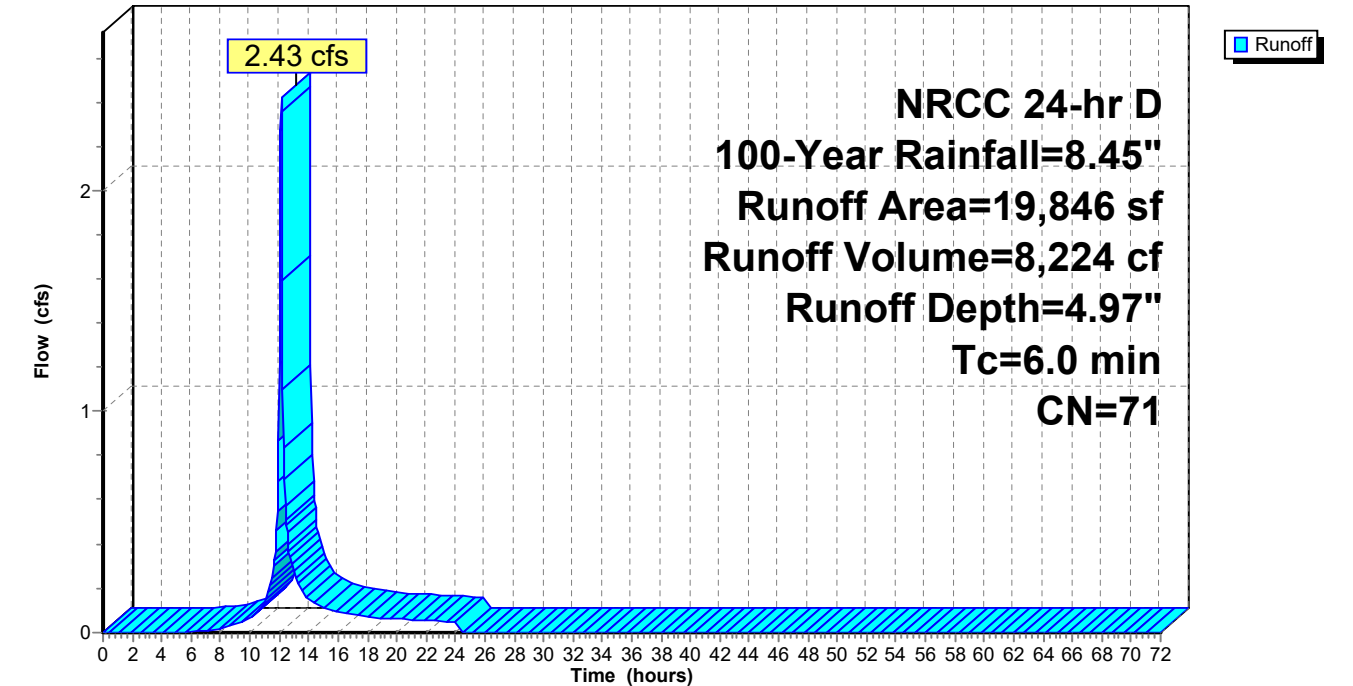
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
4,972	74	>75% Grass cover, Good, HSG C
3	98	Paved parking, HSG C
1	98	Roofs, HSG C
14,870	70	Woods, Good, HSG C
19,846	71	Weighted Average
19,842		99.98% Pervious Area
4		0.02% Impervious Area

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

Subcatchment P-25: Subcat P-25

Hydrograph



Summary for Subcatchment P-3: Subcat P-3

Runoff = 1.71 cfs @ 12.13 hrs, Volume= 6,499 cf, Depth= 7.61"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

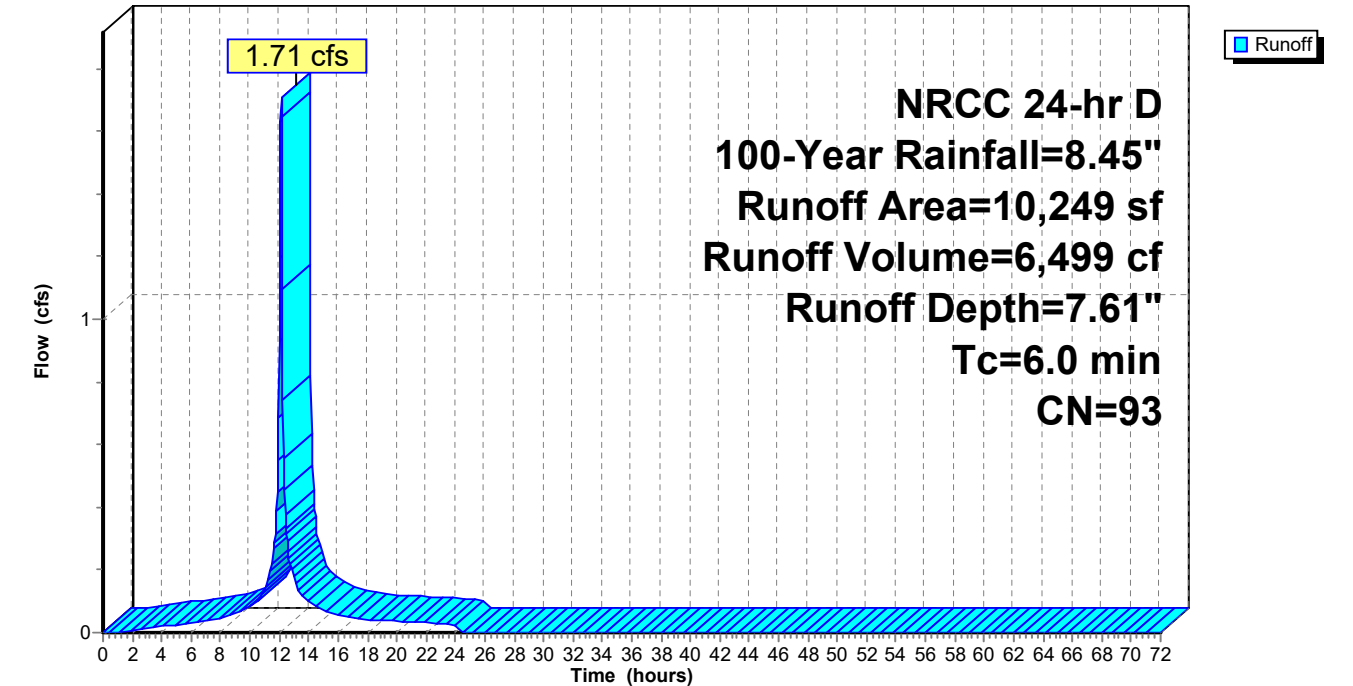
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
2,059	74	>75% Grass cover, Good, HSG C
8,187	98	Paved parking, HSG C
3	98	Roofs, HSG C
10,249	93	Weighted Average
2,059		20.09% Pervious Area
8,190		79.91% Impervious Area

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

Subcatchment P-3: Subcat P-3

Hydrograph



Summary for Subcatchment P-4: Subcat P-4

Runoff = 2.11 cfs @ 12.13 hrs, Volume= 8,098 cf, Depth= 7.73"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

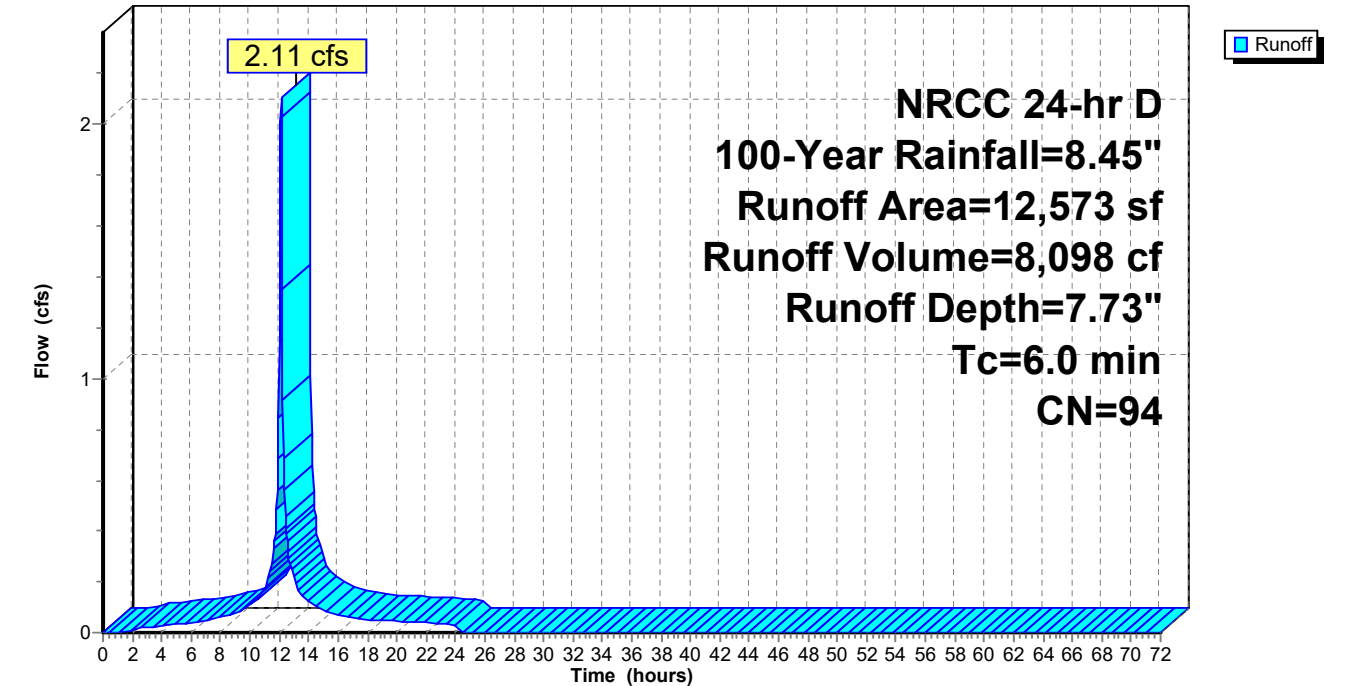
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
1,907	74	>75% Grass cover, Good, HSG C
10,666	98	Paved parking, HSG C
12,573	94	Weighted Average
1,907		15.17% Pervious Area
10,666		84.83% Impervious Area

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

Subcatchment P-4: Subcat P-4

Hydrograph



Summary for Subcatchment P-5: Subcat P-5

Runoff = 0.92 cfs @ 12.13 hrs, Volume= 3,490 cf, Depth= 7.61"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

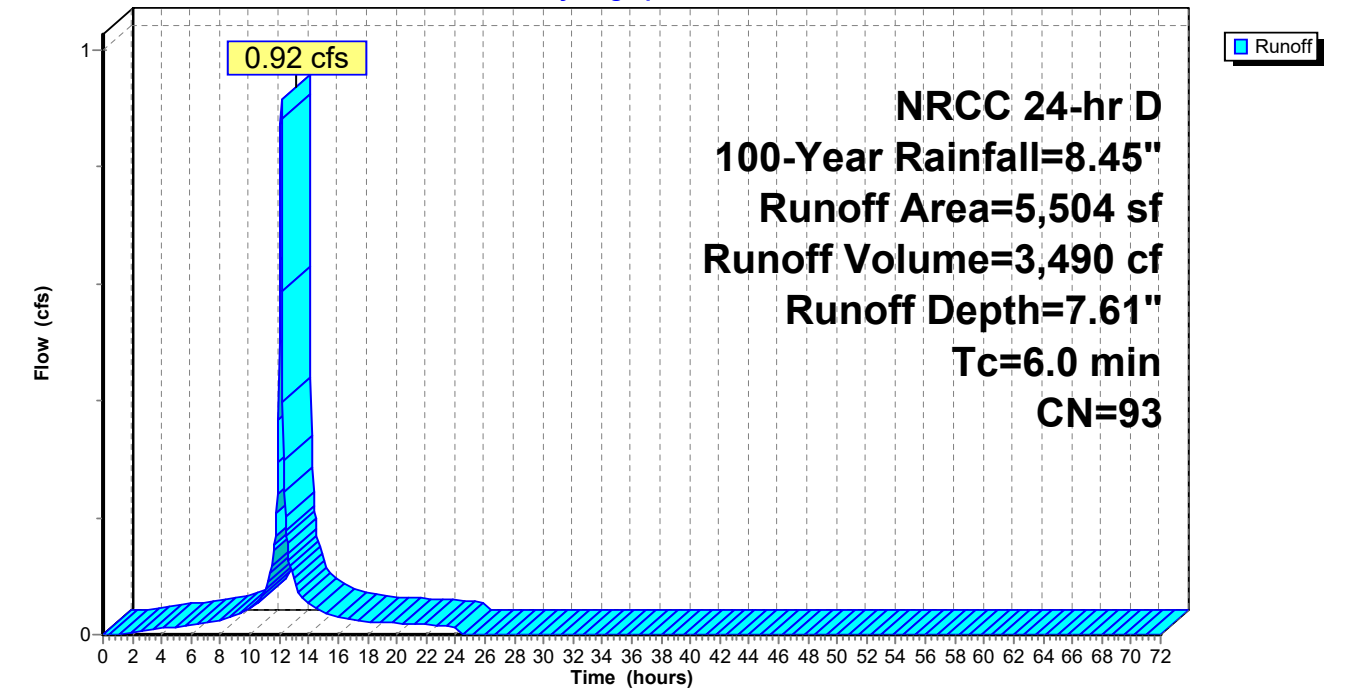
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
1,044	74	>75% Grass cover, Good, HSG C
4,460	98	Paved parking, HSG C
5,504	93	Weighted Average
1,044		18.97% Pervious Area
4,460		81.03% Impervious Area

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

Subcatchment P-5: Subcat P-5

Hydrograph



Summary for Subcatchment P-6: Subcat P-6

Runoff = 1.46 cfs @ 12.13 hrs, Volume= 5,331 cf, Depth= 7.01"
Routed to Pond 2P : UIS-1 (SC-800) & UDS-1 (DC-780)

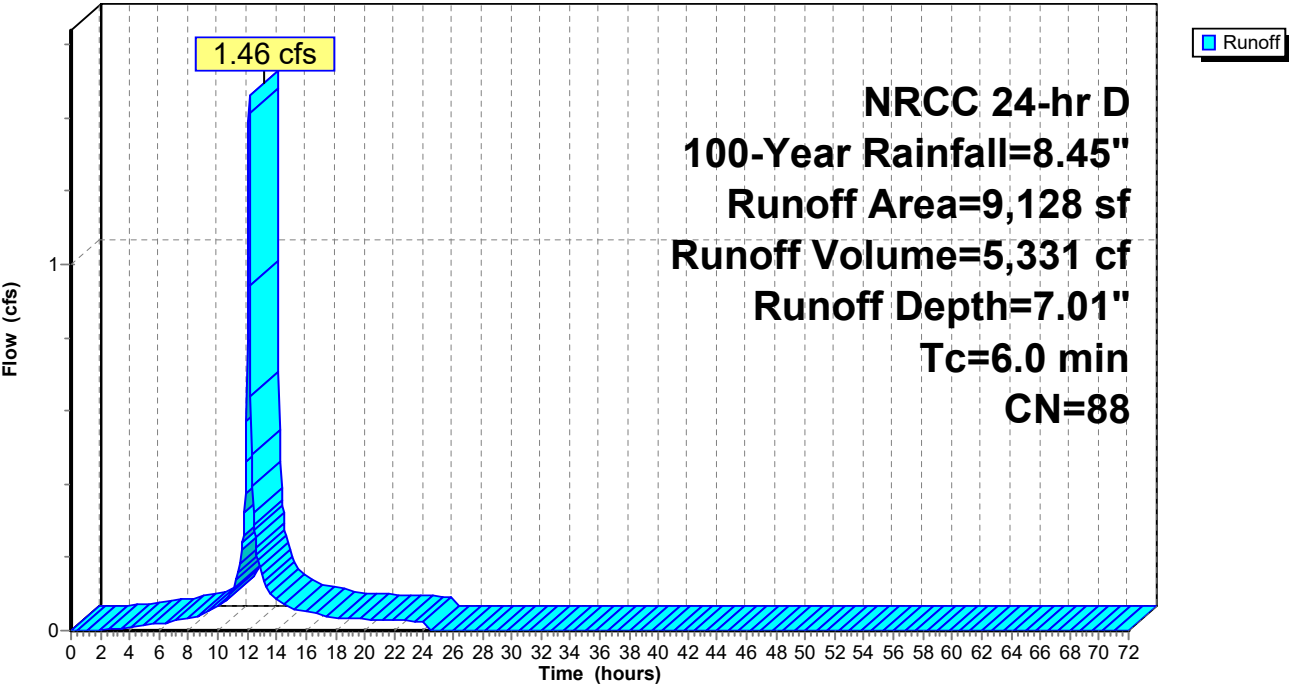
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
3,695	74	>75% Grass cover, Good, HSG C
586	98	Paved parking, HSG C
4,848	98	Roofs, HSG C
9,128	88	Weighted Average
3,695		40.47% Pervious Area
5,434		59.53% Impervious Area

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

Subcatchment P-6: Subcat P-6

Hydrograph



Summary for Subcatchment P-6A: Subcat P-6A

Runoff = 1.39 cfs @ 12.13 hrs, Volume= 5,203 cf, Depth= 7.37"
Routed to Pond 3P : UIS-2 (SC-800)

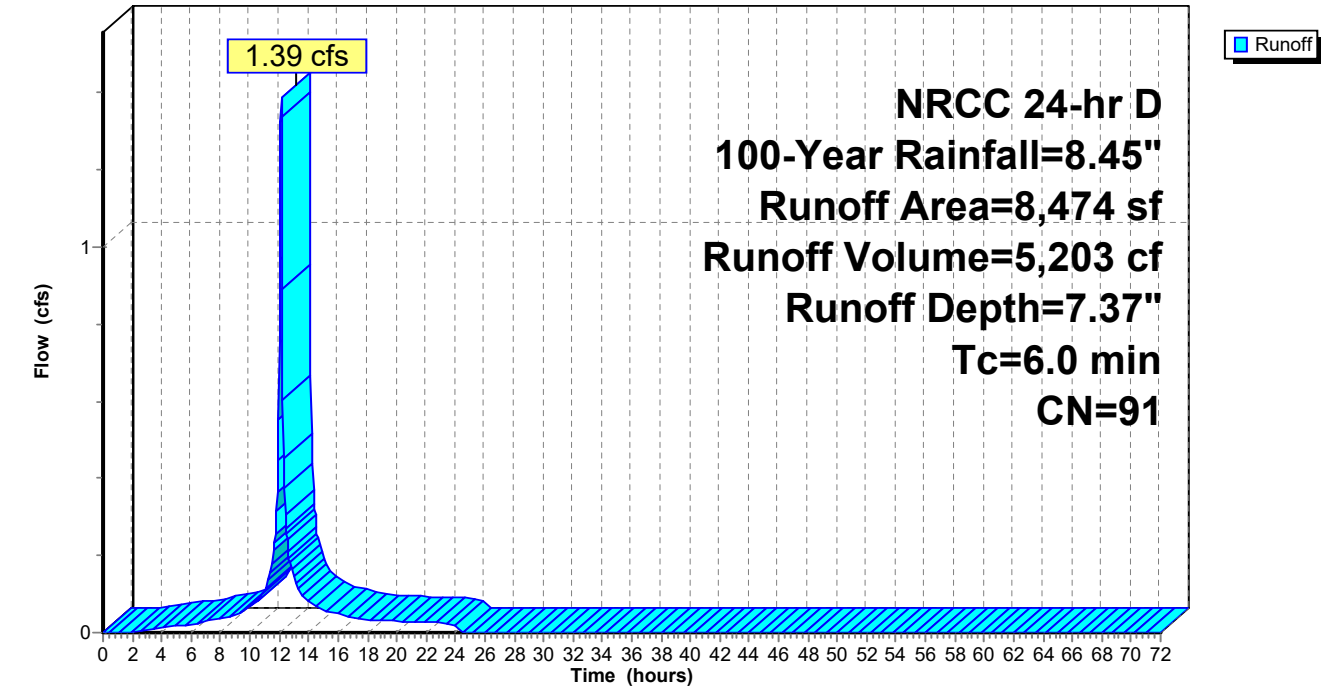
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
2,617	74	>75% Grass cover, Good, HSG C
715	98	Paved parking, HSG C
5,142	98	Roofs, HSG C
8,474	91	Weighted Average
2,617		30.88% Pervious Area
5,857		69.12% Impervious Area

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

Subcatchment P-6A: Subcat P-6A

Hydrograph



Summary for Subcatchment P-7: Subcat P-7

Runoff = 1.57 cfs @ 12.13 hrs, Volume= 5,969 cf, Depth= 7.61"
Routed to Pond 3P : UIS-2 (SC-800)

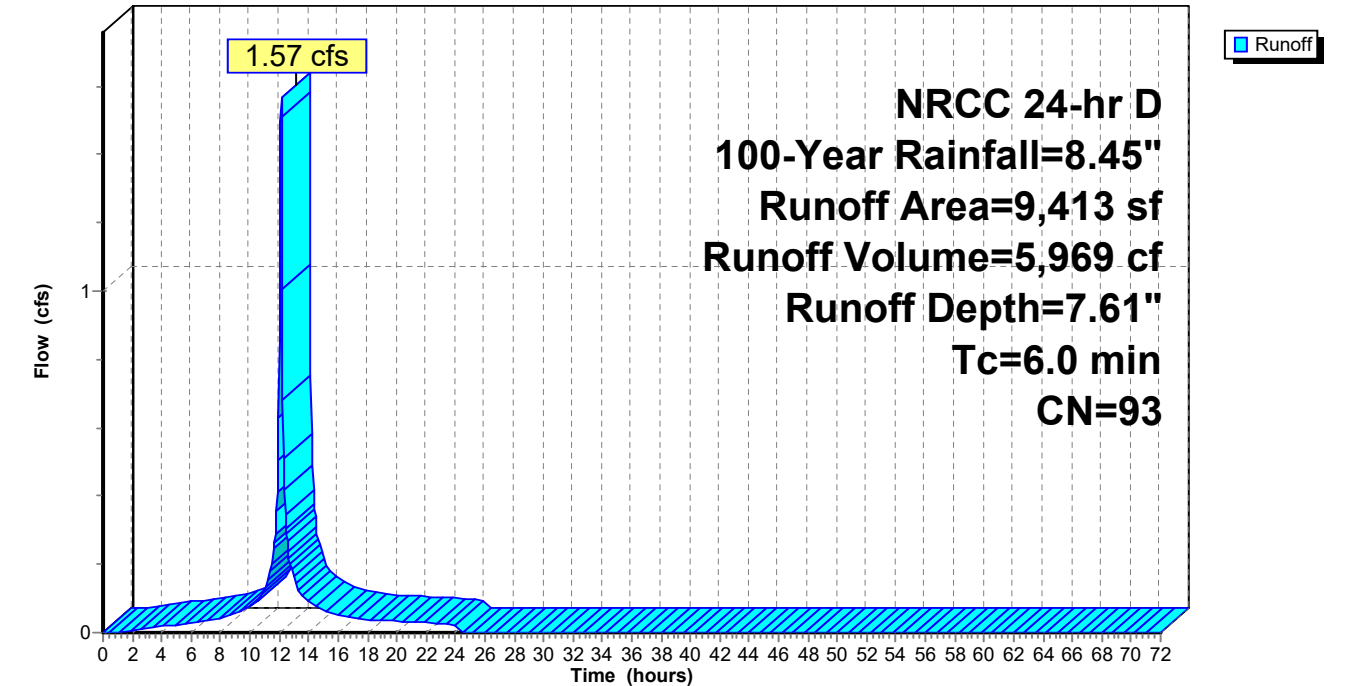
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
2,099	74	>75% Grass cover, Good, HSG C
5,872	98	Paved parking, HSG C
1,442	98	Roofs, HSG C
9,413	93	Weighted Average
2,099		22.30% Pervious Area
7,314		77.70% Impervious Area

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

Subcatchment P-7: Subcat P-7

Hydrograph



Summary for Subcatchment P-8: Subcat P-8

Runoff = 1.53 cfs @ 12.13 hrs, Volume= 5,717 cf, Depth= 7.37"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

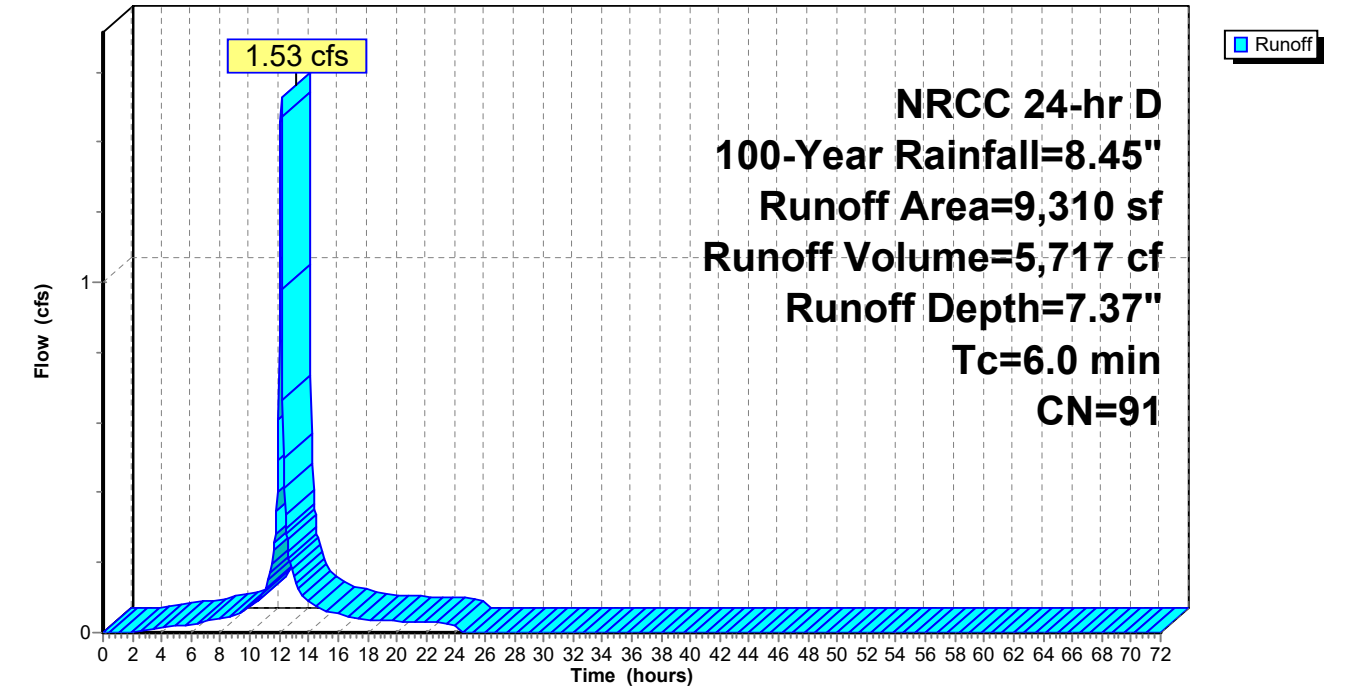
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
2,628	74	>75% Grass cover, Good, HSG C
924	98	Paved parking, HSG C
5,759	98	Roofs, HSG C
9,310	91	Weighted Average
2,628		28.23% Pervious Area
6,682		71.77% Impervious Area

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

Subcatchment P-8: Subcat P-8

Hydrograph



Summary for Subcatchment P-9: Subcat P-9

Runoff = 1.37 cfs @ 12.13 hrs, Volume= 5,269 cf, Depth= 7.73"
Routed to Pond 5P : UIS-3 (SC-310) & UDS-3 (DC-780)

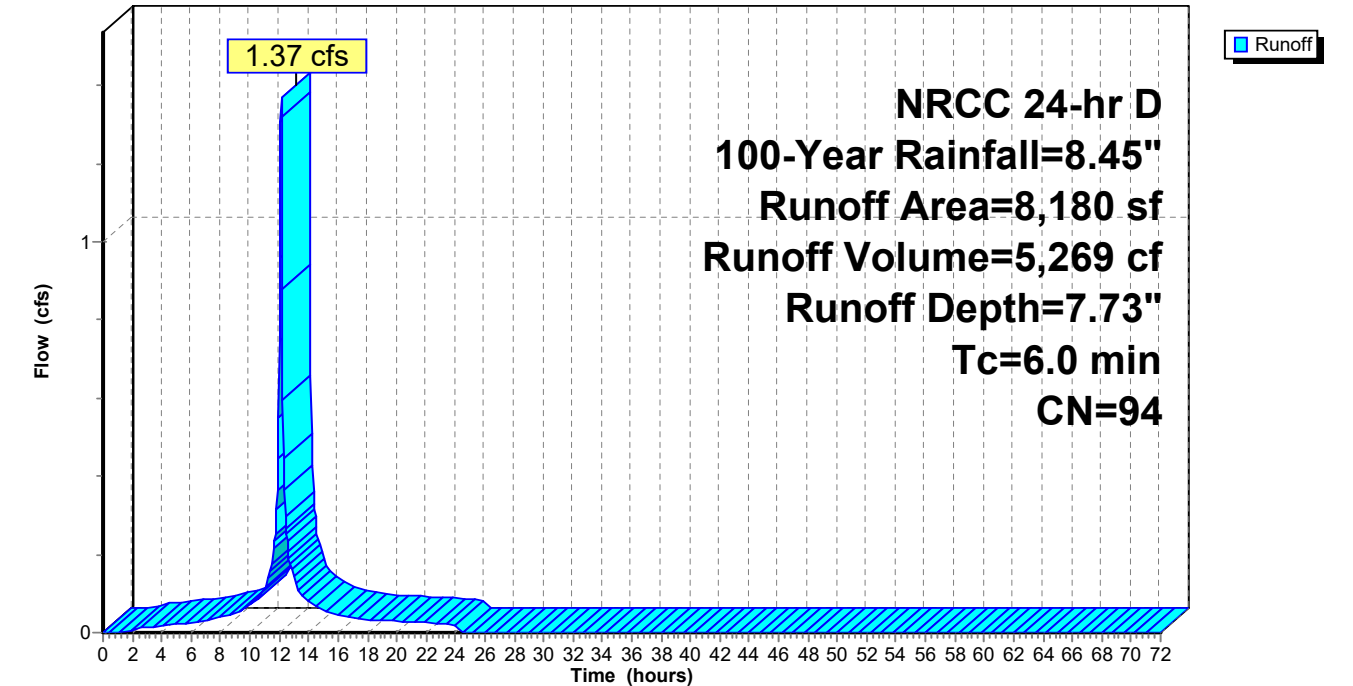
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.45"

Area (sf)	CN	Description
1,516	74	>75% Grass cover, Good, HSG C
6,649	98	Paved parking, HSG C
15	98	Roofs, HSG C
8,180	94	Weighted Average
1,516		18.54% Pervious Area
6,664		81.46% Impervious Area

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

Subcatchment P-9: Subcat P-9

Hydrograph



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 323

Summary for Pond 1P: Infiltration Basin

Inflow Area = 110,639 sf, 58.56% Impervious, Inflow Depth = 7.01" for 100-Year event
Inflow = 17.63 cfs @ 12.13 hrs, Volume= 64,596 cf
Outflow = 5.70 cfs @ 12.31 hrs, Volume= 64,596 cf, Atten= 68%, Lag= 11.0 min
Discarded = 0.16 cfs @ 12.31 hrs, Volume= 18,566 cf
Primary = 5.54 cfs @ 12.31 hrs, Volume= 46,030 cf
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 146.44' @ 12.31 hrs Surf.Area= 6,934 sf Storage= 23,724 cf
Flood Elev= 146.90' Surf.Area= 7,524 sf Storage= 27,045 cf

Plug-Flow detention time= 306.1 min calculated for 64,551 cf (100% of inflow)
Center-of-Mass det. time= 307.3 min (1,095.6 - 788.4)

Volume	Invert	Avail.Storage	Storage Description		
#1	141.50'	27,804 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
141.50	3,040	206.0	0	0	3,040
142.00	3,356	215.0	1,598	1,598	3,359
143.00	4,030	234.0	3,688	5,286	4,074
144.00	4,760	253.0	4,390	9,676	4,850
145.00	5,548	272.0	5,149	14,825	5,686
146.00	6,391	291.0	5,965	20,790	6,583
147.00	7,656	348.0	7,014	27,804	9,499

Device	Routing	Invert	Outlet Devices
#1	Discarded	141.50'	1.020 in/hr Exfiltration over Surface area
#2	Primary	142.50'	12.0" Round Culvert L= 17.8' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.50' / 141.33' S= 0.0657 ' S= 0.0657 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	144.00'	12.0" Vert. Orifice C= 0.600 Limited to weir flow at low heads

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

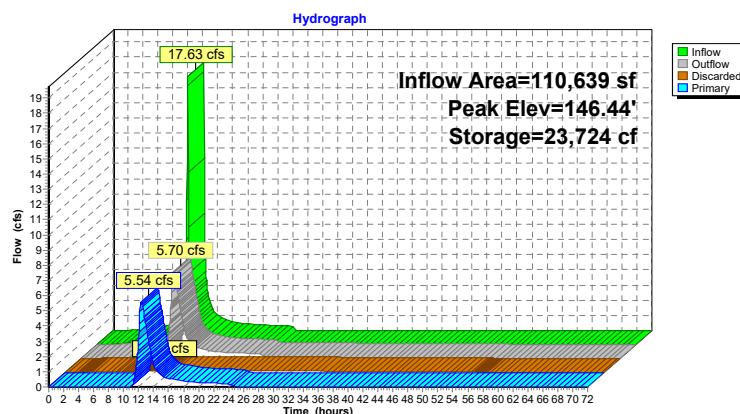
Page 324

#4 Device 2 146.00' **4.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00
Coef. (English) 2.80 2.92 3.08 3.30 3.32

#5 Primary 146.90' **20.0' long x 18.0' breadth Overflow Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.16 cfs @ 12.31 hrs HW=146.44' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=5.54 cfs @ 12.31 hrs HW=146.44' (Free Discharge)
2=Culvert (Inlet Controls 5.54 cfs @ 7.05 fps)
3=Orifice (Passes < 5.26 cfs potential flow)
4=Broad-Crested Rectangular Weir (Passes < 3.41 cfs potential flow)
5=Overflow Weir (Controls 0.00 cfs)

Pond 1P: Infiltration Basin

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 325

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

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
141.50	3,040	0	145.00	5,548	14,825
141.60	3,102	307	145.10	5,630	15,384
141.70	3,165	620	145.20	5,712	15,951
141.80	3,228	940	145.30	5,795	16,526
141.90	3,292	1,266	145.40	5,878	17,110
142.00	3,356	1,598	145.50	5,962	17,702
142.10	3,421	1,937	145.60	6,047	18,302
142.20	3,486	2,282	145.70	6,132	18,911
142.30	3,552	2,634	145.80	6,218	19,529
142.40	3,618	2,993	145.90	6,304	20,155
142.50	3,685	3,358	146.00	6,391	20,790
142.60	3,753	3,730	146.10	6,512	21,435
142.70	3,821	4,109	146.20	6,635	22,092
142.80	3,890	4,494	146.30	6,759	22,762
142.90	3,960	4,887	146.40	6,883	23,444
143.00	4,030	5,286	146.50	7,009	24,139
143.10	4,100	5,693	146.60	7,136	24,846
143.20	4,171	6,106	146.70	7,265	25,566
143.30	4,243	6,527	146.80	7,394	26,299
143.40	4,315	6,955	146.90	7,524	27,045
143.50	4,387	7,390	147.00	7,656	27,804
143.60	4,461	7,832			
143.70	4,535	8,282			
143.80	4,609	8,739			
143.90	4,684	9,204			
144.00	4,760	9,676			
144.10	4,836	10,156			
144.20	4,913	10,643			
144.30	4,990	11,139			
144.40	5,068	11,641			
144.50	5,146	12,152			
144.60	5,226	12,671			
144.70	5,305	13,197			
144.80	5,386	13,732			
144.90	5,466	14,274			

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 326

Summary for Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)

Inflow Area = 102,654 sf, 63.38% Impervious, Inflow Depth = 7.14" for 100-Year event
 Inflow = 16.53 cfs @ 12.13 hrs, Volume= 61,042 cf
 Outflow = 4.07 cfs @ 12.37 hrs, Volume= 61,042 cf, Atten= 75%, Lag= 14.8 min
 Discarded = 0.15 cfs @ 4.75 hrs, Volume= 24,000 cf
 Primary = 3.92 cfs @ 12.37 hrs, Volume= 37,042 cf
 Routed to Link SP2 : STUDY POINT #2 (Wetlands West)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 170.22' @ 12.37 hrs Surf.Area= 6,514 sf Storage= 25,810 cf
 Flood Elev= 170.25' Surf.Area= 6,514 sf Storage= 25,924 cf

Plug-Flow detention time= 346.6 min calculated for 61,000 cf (100% of inflow)
 Center-of-Mass det. time= 347.3 min (1,131.5 - 784.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	166.50'	5,927 cf	33.25'W x 195.92'L x 3.75'H Field A 24,428 cf Overall - 9,610 cf Embedded = 14,819 cf x 40.0% Voids
#2A	167.00'	9,610 cf	ADS_StormTech SC-800 +Cap x 189 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 189 Chambers in 7 Rows Cap Storage= 3.4 cf x 2 x 7 rows = 47.9 cf
#3B	166.50'	4,524 cf	34.75'W x 131.78'L x 3.75'H Field B -Impervious 17,172 cf Overall - 5,863 cf Embedded = 11,309 cf x 40.0% Voids
#4B	167.25'	5,863 cf	ADS_StormTech DC-780 b +Cap x 126 Inside #3 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 126 Chambers in 7 Rows Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf
		25,924 cf	Total Available Storage

Storage Group A created with Chamber Wizard
 Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	166.50'	1.020 in/hr Exfiltration over Surface area
#2	Primary	168.00'	
			12.0" Round Culvert L= 124.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 168.00' / 161.60' S= 0.0516 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	169.75'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	168.00'	9.0" Vert. Orifice C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.15 cfs @ 4.75 hrs HW=166.54' (Free Discharge)
↳ **1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=3.92 cfs @ 12.37 hrs HW=170.22' (Free Discharge)
↳ **2=Culvert** (Inlet Controls 3.92 cfs @ 4.98 fps)
↳ **3=Broad-Crested Rectangular Weir** (Passes < 3.83 cfs potential flow)
↳ **4=Orifice** (Passes < 2.89 cfs potential flow)

Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-800 +Cap (ADS StormTech®SC-800 with cap volume)
Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf
Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap
Cap Storage= 3.4 cf x 2 x 7 rows = 47.9 cf

51.0" Wide + 3.0" Spacing = 54.0" C-C Row Spacing

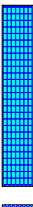
27 Chambers/Row x 7.12' Long +0.88' Cap Length x 2 = 193.92' Row Length +12.0" End Stone x 2 = 195.92' Base Length
7 Rows x 51.0" Wide + 3.0" Spacing x 6 + 12.0" Side Stone x 2 = 33.25' Base Width
6.0" Stone Base + 33.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

189 Chambers x 50.6 cf + 3.4 cf Cap Volume x 2 x 7 Rows = 9,609.8 cf Chamber Storage

24,428.4 cf Field - 9,609.8 cf Chambers = 14,818.5 cf Stone x 40.0% Voids = 5,927.4 cf Stone Storage

Chamber Storage + Stone Storage = 15,537.2 cf = 0.357 af
Overall Storage Efficiency = 63.6%
Overall System Size = 195.92' x 33.25' x 3.75'

189 Chambers
904.8 cy Field
548.8 cy Stone



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 329

Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780) - Chamber Wizard Field B

Chamber Model = ADS_StormTechDC-780 b +Cap (ADS StormTech®DC-780 with cap storage)

Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length

7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width

9.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

126 Chambers x 46.2 cf + 2.7 cf Cap Volume x 2 x 7 Rows = 5,863.3 cf Chamber Storage

17,172.1 cf Field - 5,863.3 cf Chambers = 11,308.9 cf Stone x 40.0% Voids = 4,523.5 cf Stone Storage

Chamber Storage + Stone Storage = 10,386.8 cf = 0.238 af

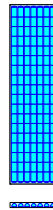
Overall Storage Efficiency = 60.5%

Overall System Size = 131.78' x 34.75' x 3.75'

126 Chambers

636.0 cy Field

418.8 cy Stone

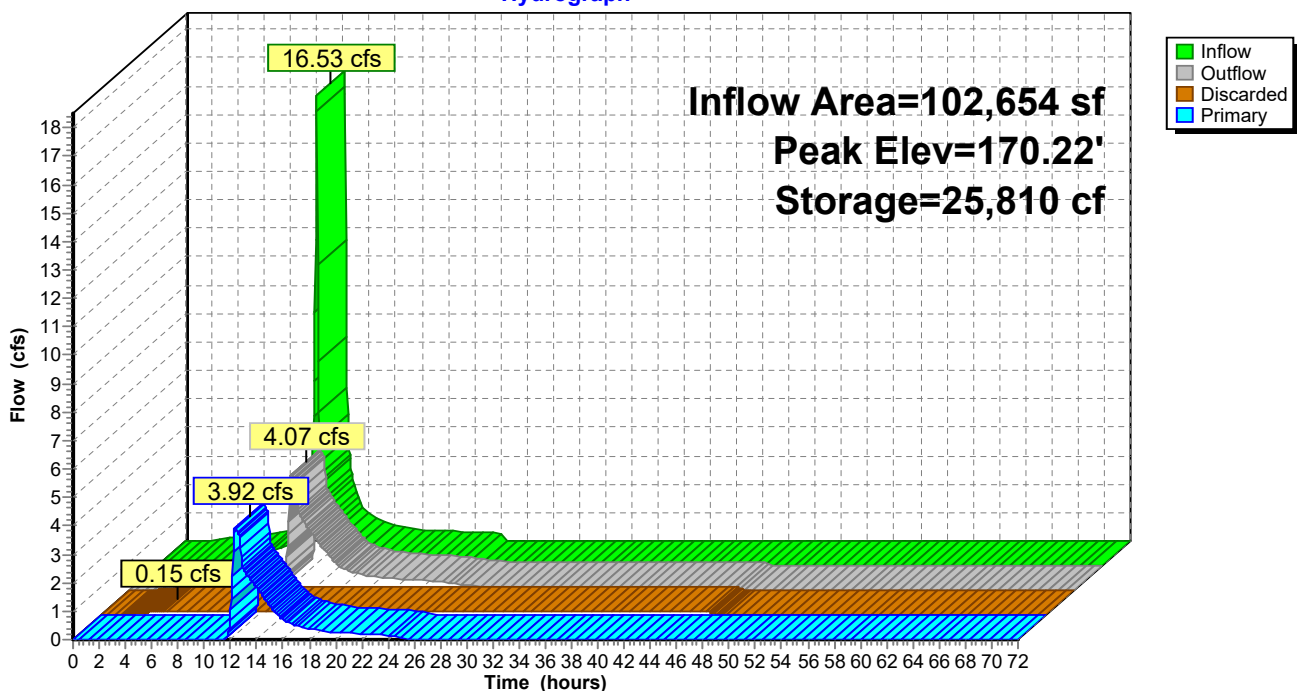
**3410-03 - Proposed HydroCAD**

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 330

Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)**Hydrograph**

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 331

Stage-Area-Storage for Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
166.50	6,514	0	168.25	6,514	13,162	170.00	6,514	24,815
166.55	6,514	222	168.30	6,514	13,590	170.05	6,514	25,037
166.60	6,514	444	168.35	6,514	14,016	170.10	6,514	25,258
166.65	6,514	666	168.40	6,514	14,438	170.15	6,514	25,480
166.70	6,514	887	168.45	6,514	14,858	170.20	6,514	25,702
166.75	6,514	1,109	168.50	6,514	15,273	170.25	6,514	25,924
166.80	6,514	1,331	168.55	6,514	15,685			
166.85	6,514	1,553	168.60	6,514	16,093			
166.90	6,514	1,775	168.65	6,514	16,497			
166.95	6,514	1,997	168.70	6,514	16,897			
167.00	6,514	2,219	168.75	6,514	17,293			
167.05	6,514	2,592	168.80	6,514	17,685			
167.10	6,514	2,965	168.85	6,514	18,071			
167.15	6,514	3,338	168.90	6,514	18,453			
167.20	6,514	3,709	168.95	6,514	18,830			
167.25	6,514	4,080	169.00	6,514	19,200			
167.30	6,514	4,552	169.05	6,514	19,565			
167.35	6,514	5,023	169.10	6,514	19,924			
167.40	6,514	5,492	169.15	6,514	20,276			
167.45	6,514	5,959	169.20	6,514	20,622			
167.50	6,514	6,425	169.25	6,514	20,959			
167.55	6,514	6,889	169.30	6,514	21,288			
167.60	6,514	7,351	169.35	6,514	21,608			
167.65	6,514	7,812	169.40	6,514	21,916			
167.70	6,514	8,270	169.45	6,514	22,210			
167.75	6,514	8,727	169.50	6,514	22,487			
167.80	6,514	9,181	169.55	6,514	22,750			
167.85	6,514	9,633	169.60	6,514	23,001			
167.90	6,514	10,083	169.65	6,514	23,244			
167.95	6,514	10,531	169.70	6,514	23,478			
168.00	6,514	10,976	169.75	6,514	23,705			
168.05	6,514	11,419	169.80	6,514	23,927			
168.10	6,514	11,859	169.85	6,514	24,149			
168.15	6,514	12,296	169.90	6,514	24,371			
168.20	6,514	12,730	169.95	6,514	24,593			

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 332

Summary for Pond 3P: UIS-2 (SC-800)

Inflow Area = 32,510 sf, 63.97% Impervious, Inflow Depth = 7.22" for 100-Year event
 Inflow = 5.28 cfs @ 12.13 hrs, Volume= 19,566 cf
 Outflow = 2.35 cfs @ 12.26 hrs, Volume= 19,566 cf, Atten= 55%, Lag= 7.8 min
 Discarded = 0.06 cfs @ 4.85 hrs, Volume= 6,099 cf
 Primary = 2.30 cfs @ 12.26 hrs, Volume= 13,468 cf
 Routed to Link SP2 : STUDY POINT #2 (Wetlands West)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 163.45' @ 12.26 hrs Surf.Area= 2,359 sf Storage= 5,187 cf
 Flood Elev= 163.85' Surf.Area= 2,359 sf Storage= 5,566 cf

Plug-Flow detention time= 132.0 min calculated for 19,553 cf (100% of inflow)
 Center-of-Mass det. time= 132.3 min (914.6 - 782.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	160.10'	2,186 cf	28.75'W x 82.05'L x 3.75'H Field A 8,846 cf Overall - 3,380 cf Embedded = 5,466 cf x 40.0% Voids
#2A	160.60'	3,380 cf	ADS_StormTech SC-800 +Cap x 66 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 66 Chambers in 6 Rows Cap Storage= 3.4 cf x 2 x 6 rows = 41.0 cf
		5,566 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	160.10'	1.020 in/hr Exfiltration over Surface area
#2	Primary	161.25'	12.0" Round Culvert L= 9.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.25' / 161.00' S= 0.0278 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	163.60'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00

Coef. (English) 2.80 2.92 3.08 3.30 3.32

#4 Device 2 161.25' **8.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 4.85 hrs HW=160.14' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=2.29 cfs @ 12.26 hrs HW=163.44' (Free Discharge)

2=Culvert (Passes 2.29 cfs of 3.88 cfs potential flow)

3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

4=Orifice (Orifice Controls 2.29 cfs @ 6.56 fps)

Pond 3P: UIS-2 (SC-800) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-800 +Cap (ADS StormTech®SC-800 with cap volume)
Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf
Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap
Cap Storage= 3.4 cf x 2 x 6 rows = 41.0 cf

51.0" Wide + 3.0" Spacing = 54.0" C-C Row Spacing

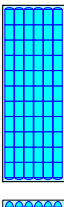
11 Chambers/Row x 7.12' Long +0.88' Cap Length x 2 = 80.05' Row Length +12.0" End Stone x 2 = 82.05' Base Length
6 Rows x 51.0" Wide + 3.0" Spacing x 5 + 12.0" Side Stone x 2 = 28.75' Base Width
6.0" Stone Base + 33.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

66 Chambers x 50.6 cf + 3.4 cf Cap Volume x 2 x 6 Rows = 3,380.1 cf Chamber Storage

8,846.0 cf Field - 3,380.1 cf Chambers = 5,465.9 cf Stone x 40.0% Voids = 2,186.4 cf Stone Storage

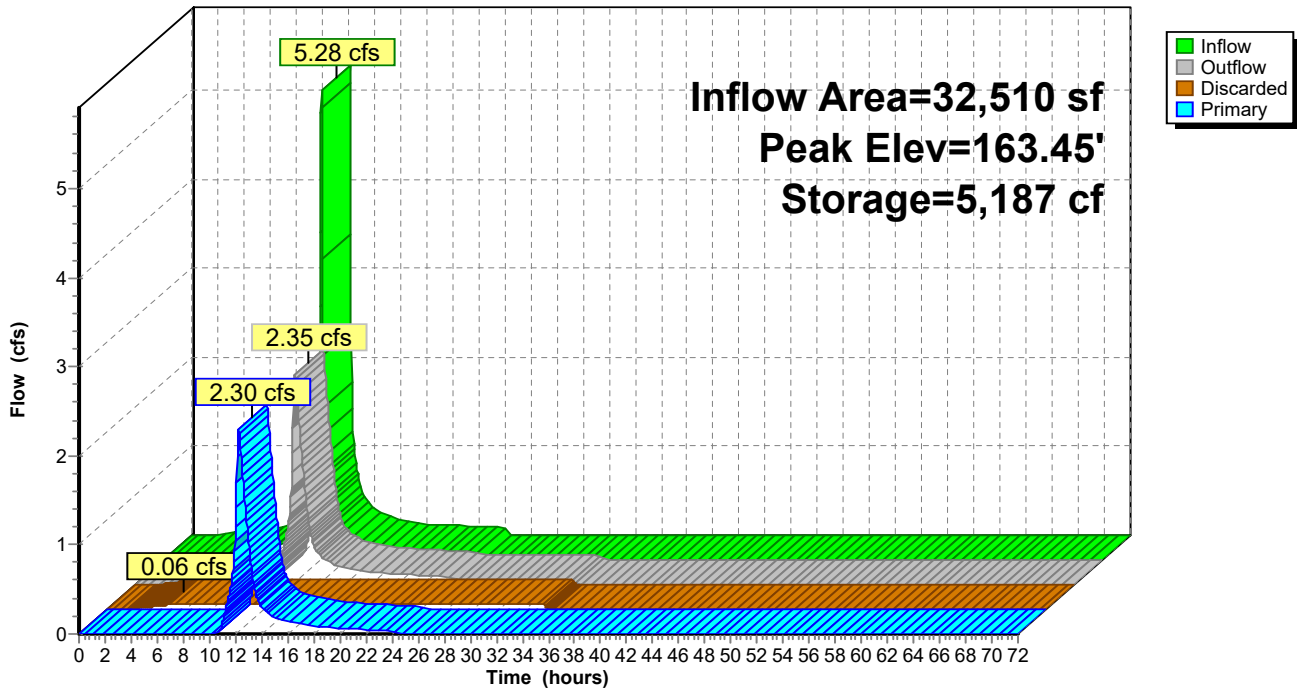
Chamber Storage + Stone Storage = 5,566.5 cf = 0.128 af
Overall Storage Efficiency = 62.9%
Overall System Size = 82.05' x 28.75' x 3.75'

66 Chambers
327.6 cy Field
202.4 cy Stone



Pond 3P: UIS-2 (SC-800)

Hydrograph



Stage-Area-Storage for Pond 3P: UIS-2 (SC-800)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
160.10	2,359	0	161.85	2,359	2,878	163.60	2,359	5,331
160.15	2,359	47	161.90	2,359	2,968	163.65	2,359	5,378
160.20	2,359	94	161.95	2,359	3,057	163.70	2,359	5,425
160.25	2,359	142	162.00	2,359	3,146	163.75	2,359	5,472
160.30	2,359	189	162.05	2,359	3,234	163.80	2,359	5,519
160.35	2,359	236	162.10	2,359	3,321	163.85	2,359	5,566
160.40	2,359	283	162.15	2,359	3,407			
160.45	2,359	330	162.20	2,359	3,493			
160.50	2,359	377	162.25	2,359	3,578			
160.55	2,359	425	162.30	2,359	3,662			
160.60	2,359	472	162.35	2,359	3,745			
160.65	2,359	520	162.40	2,359	3,827			
160.70	2,359	567	162.45	2,359	3,908			
160.75	2,359	614	162.50	2,359	3,988			
160.80	2,359	661	162.55	2,359	4,067			
160.85	2,359	708	162.60	2,359	4,145			
160.90	2,359	755	162.65	2,359	4,222			
160.95	2,359	802	162.70	2,359	4,297			
161.00	2,359	849	162.75	2,359	4,371			
161.05	2,359	896	162.80	2,359	4,444			
161.10	2,359	943	162.85	2,359	4,515			
161.15	2,359	990	162.90	2,359	4,584			
161.20	2,359	1,037	162.95	2,359	4,651			
161.25	2,359	1,084	163.00	2,359	4,716			
161.30	2,359	1,131	163.05	2,359	4,777			
161.35	2,359	1,178	163.10	2,359	4,836			
161.40	2,359	1,225	163.15	2,359	4,891			
161.45	2,359	1,272	163.20	2,359	4,944			
161.50	2,359	1,319	163.25	2,359	4,996			
161.55	2,359	1,366	163.30	2,359	5,046			
161.60	2,359	1,413	163.35	2,359	5,095			
161.65	2,359	1,460	163.40	2,359	5,142			
161.70	2,359	1,507	163.45	2,359	5,189			
161.75	2,359	1,554	163.50	2,359	5,236			
161.80	2,359	1,601	163.55	2,359	5,283			

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 337

Summary for Pond 4P: UDS-2 (SC-310)

Inflow Area = 7,417 sf, 51.89% Impervious, Inflow Depth = 6.77" for 100-Year event
Inflow = 1.16 cfs @ 12.13 hrs, Volume= 4,183 cf
Outflow = 0.77 cfs @ 12.21 hrs, Volume= 4,183 cf, Atten= 34%, Lag= 4.7 min
Primary = 0.77 cfs @ 12.21 hrs, Volume= 4,183 cf
Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 135.08' @ 12.21 hrs Surf.Area= 375 sf Storage= 339 cf
Flood Elev= 135.83' Surf.Area= 375 sf Storage= 456 cf

Plug-Flow detention time= 6.7 min calculated for 4,180 cf (100% of inflow)
Center-of-Mass det. time= 6.8 min (804.0 - 797.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	133.50'	279 cf	8.17'W x 45.92'L x 2.33'H Field A 875 cf Overall - 177 cf Embedded = 698 cf x 40.0% Voids
#2A	134.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
		456 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	133.50'	12.0" Round Culvert L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 133.50' / 132.84' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	135.40'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	133.50'	5.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 338

Primary OutFlow Max=0.76 cfs @ 12.21 hrs HW=135.06' (Free Discharge)

- 1=Culvert (Passes 0.76 cfs of 3.08 cfs potential flow)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 3=Orifice/Grate (Orifice Controls 0.76 cfs @ 5.60 fps)

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 339

Pond 4P: UDS-2 (SC-310) - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

875.0 cf Field - 176.9 cf Chambers = 698.1 cf Stone x 40.0% Voids = 279.3 cf Stone Storage

Chamber Storage + Stone Storage = 456.2 cf = 0.010 af

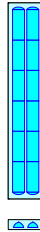
Overall Storage Efficiency = 52.1%

Overall System Size = 45.92' x 8.17' x 2.33'

12 Chambers

32.4 cy Field

25.9 cy Stone

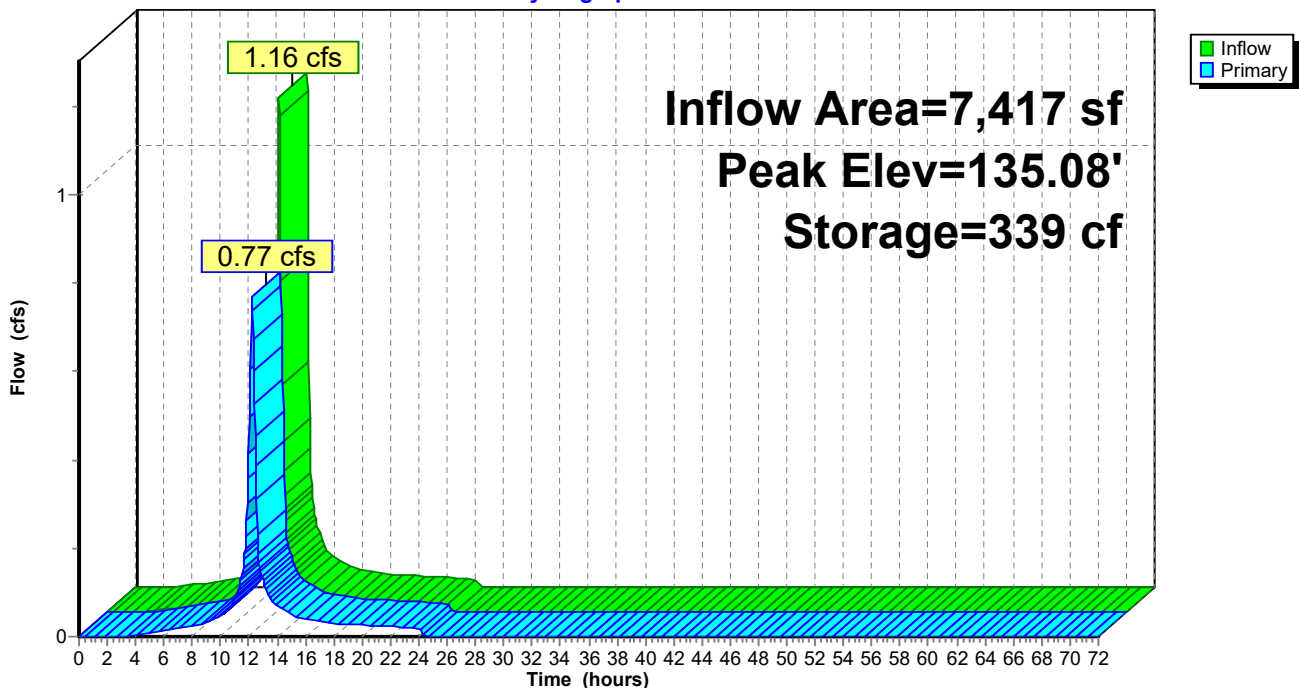
**3410-03 - Proposed HydroCAD**

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 340

Pond 4P: UDS-2 (SC-310)**Hydrograph**

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 341

Stage-Area-Storage for Pond 4P: UDS-2 (SC-310)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
133.50	0	134.20	129	134.90	303	135.60	421
133.52	3	134.22	135	134.92	307	135.62	424
133.54	6	134.24	140	134.94	311	135.64	427
133.56	9	134.26	145	134.96	315	135.66	430
133.58	12	134.28	151	134.98	320	135.68	433
133.60	15	134.30	156	135.00	324	135.70	436
133.62	18	134.32	161	135.02	328	135.72	439
133.64	21	134.34	166	135.04	332	135.74	442
133.66	24	134.36	172	135.06	336	135.76	445
133.68	27	134.38	177	135.08	339	135.78	448
133.70	30	134.40	182	135.10	343	135.80	451
133.72	33	134.42	187	135.12	347	135.82	454
133.74	36	134.44	192	135.14	350		
133.76	39	134.46	197	135.16	353		
133.78	42	134.48	203	135.18	357		
133.80	45	134.50	208	135.20	360		
133.82	48	134.52	213	135.22	363		
133.84	51	134.54	218	135.24	367		
133.86	54	134.56	223	135.26	370		
133.88	57	134.58	228	135.28	373		
133.90	60	134.60	233	135.30	376		
133.92	63	134.62	237	135.32	379		
133.94	66	134.64	242	135.34	382		
133.96	69	134.66	247	135.36	385		
133.98	72	134.68	252	135.38	388		
134.00	75	134.70	257	135.40	391		
134.02	80	134.72	262	135.42	394		
134.04	86	134.74	266	135.44	397		
134.06	91	134.76	271	135.46	400		
134.08	97	134.78	276	135.48	403		
134.10	102	134.80	280	135.50	406		
134.12	108	134.82	285	135.52	409		
134.14	113	134.84	289	135.54	412		
134.16	119	134.86	294	135.56	415		
134.18	124	134.88	298	135.58	418		

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc

HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 342

Summary for Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)

Inflow Area = 54,619 sf, 49.01% Impervious, Inflow Depth = 6.61" for 100-Year event
 Inflow = 8.20 cfs @ 12.13 hrs, Volume= 30,080 cf
 Outflow = 4.07 cfs @ 12.24 hrs, Volume= 30,080 cf, Atten= 50%, Lag= 6.8 min
 Discarded = 0.06 cfs @ 4.35 hrs, Volume= 7,648 cf
 Primary = 4.01 cfs @ 12.24 hrs, Volume= 22,432 cf
 Routed to Link SP1 : STUDY POINT #1 (Kimball Road north)

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 166.30' @ 12.24 hrs Surf.Area= 2,656 sf Storage= 8,501 cf
 Flood Elev= 166.33' Surf.Area= 2,656 sf Storage= 8,598 cf

Plug-Flow detention time= 149.9 min calculated for 30,080 cf (100% of inflow)
 Center-of-Mass det. time= 149.7 min (940.7 - 791.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	164.00'	1,830 cf	32.58'W x 81.52'L x 2.33'H Field A 6,198 cf Overall - 1,622 cf Embedded = 4,576 cf x 40.0% Voids
#2A	164.50'	1,622 cf	ADS_StormTech SC-310 +Cap x 110 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 110 Chambers in 10 Rows
#3B	164.00'	3,315 cf	34.75'W x 96.18'L x 3.75'H Field B-Impervious 12,533 cf Overall - 4,245 cf Embedded = 8,288 cf x 40.0% Voids
#4B	164.75'	4,245 cf	ADS_StormTech DC-780 b +Cap x 91 Inside #3 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 7 Rows Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf
		11,012 cf	Total Available Storage

Storage Group A created with Chamber Wizard
 Storage Group B created with Chamber Wizard

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 343

Device	Routing	Invert	Outlet Devices
#1	Discarded	164.00'	1.020 in/hr Exfiltration over Surface area
#2	Primary	164.00'	
			12.0" Round Culvert L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.00' / 160.32' S= 0.0400 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	165.75'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	164.80'	10.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 4.35 hrs HW=164.04' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=4.00 cfs @ 12.24 hrs HW=166.30' (Free Discharge)

2=Culvert (Inlet Controls 4.00 cfs @ 5.09 fps)

3=Broad-Crested Rectangular Weir (Passes < 4.90 cfs potential flow)

4=Orifice/Grate (Passes < 2.73 cfs potential flow)

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 344

Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780) - Chamber Wizard Field A**Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)**

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 3.0" Spacing = 37.0" C-C Row Spacing

11 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 79.52' Row Length +12.0" End Stone x 2 = 81.52' Base Length

10 Rows x 34.0" Wide + 3.0" Spacing x 9 + 12.0" Side Stone x 2 = 32.58' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

110 Chambers x 14.7 cf = 1,621.6 cf Chamber Storage

6,197.8 cf Field - 1,621.6 cf Chambers = 4,576.2 cf Stone x 40.0% Voids = 1,830.5 cf Stone Storage

Chamber Storage + Stone Storage = 3,452.1 cf = 0.079 af

Overall Storage Efficiency = 55.7%

Overall System Size = 81.52' x 32.58' x 2.33'

110 Chambers

229.5 cy Field

169.5 cy Stone



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 345

Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780) - Chamber Wizard Field B

Chamber Model = ADS_StormTechDC-780 b +Cap (ADS StormTech®DC-780 with cap storage)

Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 7 rows = 37.2 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

13 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 94.18' Row Length +12.0" End Stone x 2 = 96.18' Base Length

7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width

9.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

91 Chambers x 46.2 cf + 2.7 cf Cap Volume x 2 x 7 Rows = 4,244.9 cf Chamber Storage

12,533.0 cf Field - 4,244.9 cf Chambers = 8,288.1 cf Stone x 40.0% Voids = 3,315.2 cf Stone Storage

Chamber Storage + Stone Storage = 7,560.2 cf = 0.174 af

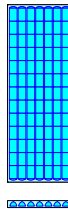
Overall Storage Efficiency = 60.3%

Overall System Size = 96.18' x 34.75' x 3.75'

91 Chambers

464.2 cy Field

307.0 cy Stone

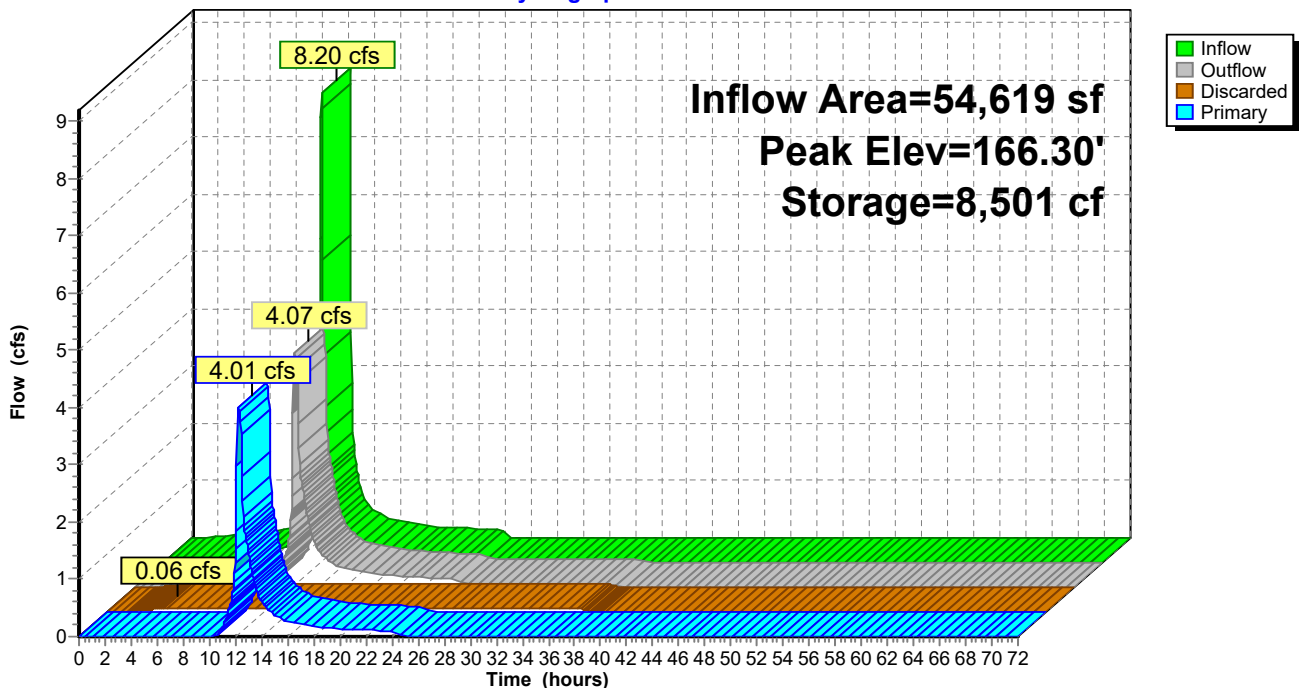
**3410-03 - Proposed HydroCAD**

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

NRCC 24-hr D 100-Year Rainfall=8.45"

Printed 6/1/2026

Page 346

Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)**Hydrograph**

Stage-Area-Storage for Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)

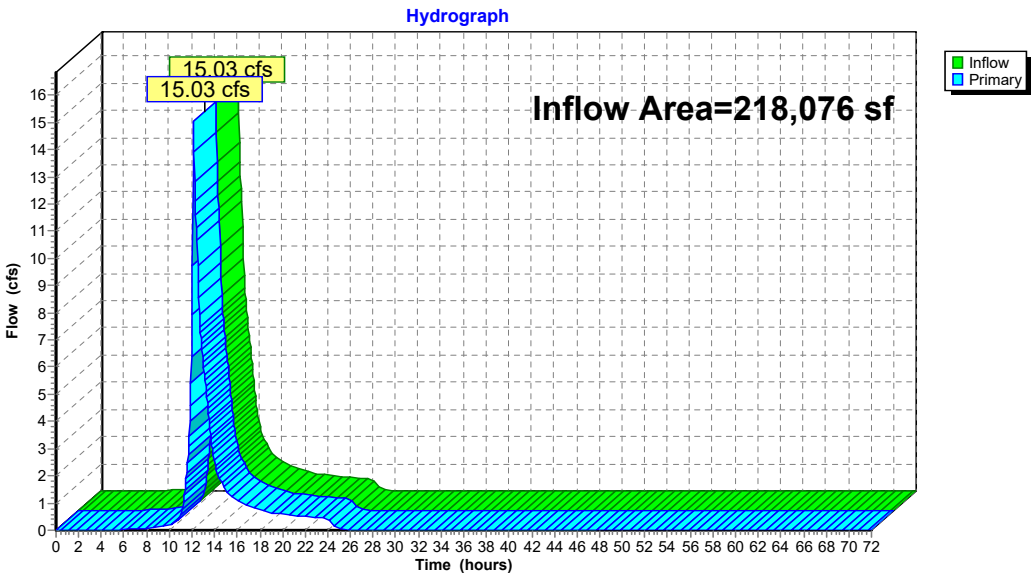
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
164.00	2,656	0	165.75	2,656	6,550	167.50	2,656	10,678
164.05	2,656	120	165.80	2,656	6,735	167.55	2,656	10,745
164.10	2,656	240	165.85	2,656	6,916	167.60	2,656	10,812
164.15	2,656	360	165.90	2,656	7,096	167.65	2,656	10,879
164.20	2,656	480	165.95	2,656	7,275	167.70	2,656	10,945
164.25	2,656	600	166.00	2,656	7,453	167.75	2,656	11,012
164.30	2,656	720	166.05	2,656	7,630			
164.35	2,656	840	166.10	2,656	7,805			
164.40	2,656	960	166.15	2,656	7,980			
164.45	2,656	1,080	166.20	2,656	8,153			
164.50	2,656	1,200	166.25	2,656	8,325			
164.55	2,656	1,376	166.30	2,656	8,496			
164.60	2,656	1,552	166.35	2,656	8,648			
164.65	2,656	1,728	166.40	2,656	8,762			
164.70	2,656	1,902	166.45	2,656	8,875			
164.75	2,656	2,076	166.50	2,656	8,987			
164.80	2,656	2,323	166.55	2,656	9,096			
164.85	2,656	2,568	166.60	2,656	9,204			
164.90	2,656	2,812	166.65	2,656	9,310			
164.95	2,656	3,054	166.70	2,656	9,414			
165.00	2,656	3,294	166.75	2,656	9,516			
165.05	2,656	3,532	166.80	2,656	9,615			
165.10	2,656	3,768	166.85	2,656	9,712			
165.15	2,656	4,002	166.90	2,656	9,805			
165.20	2,656	4,234	166.95	2,656	9,894			
165.25	2,656	4,464	167.00	2,656	9,979			
165.30	2,656	4,690	167.05	2,656	10,058			
165.35	2,656	4,914	167.10	2,656	10,133			
165.40	2,656	5,134	167.15	2,656	10,206			
165.45	2,656	5,351	167.20	2,656	10,276			
165.50	2,656	5,564	167.25	2,656	10,344			
165.55	2,656	5,772	167.30	2,656	10,411			
165.60	2,656	5,974	167.35	2,656	10,478			
165.65	2,656	6,171	167.40	2,656	10,544			
165.70	2,656	6,362	167.45	2,656	10,611			

Summary for Link SP1: STUDY POINT #1 (Kimball Road north)

Inflow Area = 218,076 sf, 43.75% Impervious, Inflow Depth = 5.06" for 100-Year event
Inflow = 15.03 cfs @ 12.16 hrs, Volume= 91,908 cf
Primary = 15.03 cfs @ 12.16 hrs, Volume= 91,908 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP1: STUDY POINT #1 (Kimball Road north)

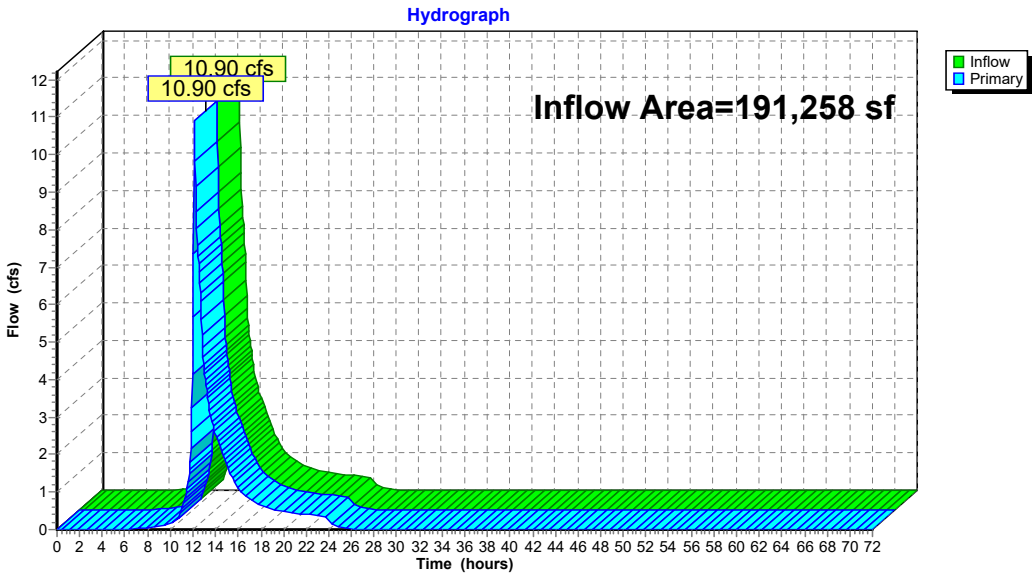


Summary for Link SP2: STUDY POINT #2 (Wetlands West)

Inflow Area = 191,258 sf, 44.90% Impervious, Inflow Depth = 4.63" for 100-Year event
Inflow = 10.90 cfs @ 12.15 hrs, Volume= 73,753 cf
Primary = 10.90 cfs @ 12.15 hrs, Volume= 73,753 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP2: STUDY POINT #2 (Wetlands West)



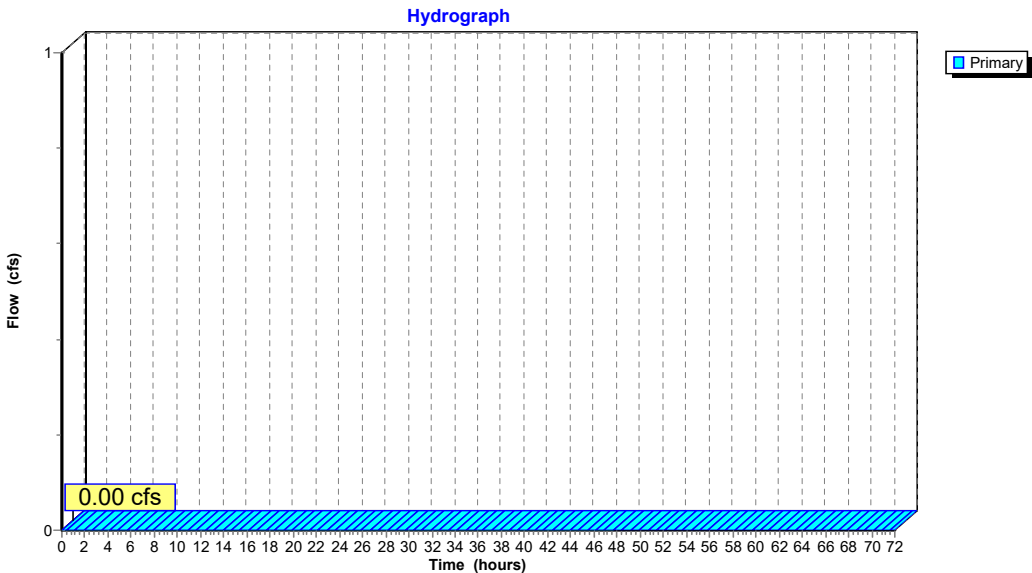
Summary for Link SP3: STUDY POINT #3 (IVW south)

[43] Hint: Has no inflow (Outflow=Zero)

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP3: STUDY POINT #3 (IVW south)



3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 351

Events for Subcatchment P-1: Subcat P-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.86	2,998	2.42
10-Year	5.33	1.48	5,334	4.30
25-Year	6.56	1.86	6,826	5.51
100-Year	8.45	2.45	9,135	7.37

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 352

Events for Subcatchment P-10: Subcat P-10

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.51	1,814	2.61
10-Year	5.33	0.85	3,144	4.52
25-Year	6.56	1.07	3,987	5.74
100-Year	8.45	1.39	5,289	7.61

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 353

Events for Subcatchment P-11: Subcat P-11

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.53	1,872	2.51
10-Year	5.33	0.90	3,287	4.41
25-Year	6.56	1.13	4,188	5.62
100-Year	8.45	1.48	5,580	7.49

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 354

Events for Subcatchment P-12: Subcat P-12

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	1.03	3,532	2.15
10-Year	5.33	1.86	6,542	3.98
25-Year	6.56	2.37	8,486	5.17
100-Year	8.45	3.15	11,511	7.01

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 355

Events for Subcatchment P-13: Subcat P-13

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.63	2,233	2.61
10-Year	5.33	1.05	3,871	4.52
25-Year	6.56	1.31	4,909	5.74
100-Year	8.45	1.71	6,513	7.61

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 356

Events for Subcatchment P-14: Subcat P-14

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.43	1,480	2.33
10-Year	5.33	0.75	2,668	4.20
25-Year	6.56	0.94	3,430	5.39
100-Year	8.45	1.24	4,611	7.25

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 357

Events for Subcatchment P-15: Subcat P-15

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.74	2,518	2.07
10-Year	5.33	1.35	4,727	3.88
25-Year	6.56	1.73	6,160	5.05
100-Year	8.45	2.32	8,394	6.89

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 358

Events for Subcatchment P-16: Subcat P-16

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.80	2,840	2.61
10-Year	5.33	1.34	4,922	4.52
25-Year	6.56	1.67	6,243	5.74
100-Year	8.45	2.18	8,282	7.61

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables
Printed 6/1/2026
Page 359

Events for Subcatchment P-17: Subcat P-17

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.58	1,996	2.33
10-Year	5.33	1.01	3,599	4.20
25-Year	6.56	1.27	4,626	5.39
100-Year	8.45	1.68	6,219	7.25

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables
Printed 6/1/2026
Page 360

Events for Subcatchment P-18: Subcat P-18

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.36	1,260	2.42
10-Year	5.33	0.62	2,242	4.30
25-Year	6.56	0.78	2,869	5.51
100-Year	8.45	1.03	3,839	7.37

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 361

Events for Subcatchment P-18A: Subcat P-18A

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.36	1,226	1.98
10-Year	5.33	0.67	2,334	3.78
25-Year	6.56	0.87	3,055	4.94
100-Year	8.45	1.16	4,183	6.77

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 362

Events for Subcatchment P-19: Subcat P-19

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	1.06	3,593	1.98
10-Year	5.33	1.97	6,839	3.78
25-Year	6.56	2.54	8,953	4.94
100-Year	8.45	3.41	12,258	6.77

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 363

Events for Subcatchment P-2: Subcat P-2

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.52	1,816	2.51
10-Year	5.33	0.87	3,188	4.41
25-Year	6.56	1.10	4,062	5.62
100-Year	8.45	1.44	5,412	7.49

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 364

Events for Subcatchment P-20: Subcat P-20

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	1.95	6,608	1.90
10-Year	5.33	3.69	12,754	3.67
25-Year	6.56	4.78	16,776	4.83
100-Year	8.45	6.45	23,076	6.65

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables
Printed 6/1/2026
Page 365

Events for Subcatchment P-21: Subcat P-21

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	1.30	4,591	0.98
10-Year	5.33	3.28	11,074	2.37
25-Year	6.56	4.66	15,689	3.36
100-Year	8.45	6.85	23,243	4.97

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables
Printed 6/1/2026
Page 366

Events for Subcatchment P-22: Subcat P-22

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.78	2,708	1.04
10-Year	5.33	1.90	6,411	2.45
25-Year	6.56	2.68	9,028	3.46
100-Year	8.45	3.91	13,296	5.09

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 367

Events for Subcatchment P-23: Subcat P-23

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.35	1,215	1.04
10-Year	5.33	0.85	2,877	2.45
25-Year	6.56	1.20	4,052	3.46
100-Year	8.45	1.76	5,967	5.09

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 368

Events for Subcatchment P-24: Subcat P-24

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.90	3,029	1.68
10-Year	5.33	1.79	6,101	3.38
25-Year	6.56	2.35	8,142	4.51
100-Year	8.45	3.23	11,363	6.29

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 369

Events for Subcatchment P-25: Subcat P-25

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.46	1,624	0.98
10-Year	5.33	1.16	3,918	2.37
25-Year	6.56	1.65	5,551	3.36
100-Year	8.45	2.43	8,224	4.97

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 370

Events for Subcatchment P-3: Subcat P-3

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.63	2,229	2.61
10-Year	5.33	1.05	3,862	4.52
25-Year	6.56	1.31	4,899	5.74
100-Year	8.45	1.71	6,499	7.61

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 371

Events for Subcatchment P-4: Subcat P-4

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.79	2,838	2.71
10-Year	5.33	1.30	4,855	4.63
25-Year	6.56	1.62	6,131	5.85
100-Year	8.45	2.11	8,098	7.73

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 372

Events for Subcatchment P-5: Subcat P-5

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.34	1,197	2.61
10-Year	5.33	0.56	2,074	4.52
25-Year	6.56	0.70	2,631	5.74
100-Year	8.45	0.92	3,490	7.61

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 373

Events for Subcatchment P-6: Subcat P-6

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.48	1,636	2.15
10-Year	5.33	0.86	3,030	3.98
25-Year	6.56	1.10	3,930	5.17
100-Year	8.45	1.46	5,331	7.01

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 374

Events for Subcatchment P-6A: Subcat P-6A

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.49	1,708	2.42
10-Year	5.33	0.84	3,038	4.30
25-Year	6.56	1.06	3,888	5.51
100-Year	8.45	1.39	5,203	7.37

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 375

Events for Subcatchment P-7: Subcat P-7

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.58	2,047	2.61
10-Year	5.33	0.96	3,547	4.52
25-Year	6.56	1.20	4,499	5.74
100-Year	8.45	1.57	5,969	7.61

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 376

Events for Subcatchment P-8: Subcat P-8

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.54	1,876	2.42
10-Year	5.33	0.92	3,338	4.30
25-Year	6.56	1.16	4,272	5.51
100-Year	8.45	1.53	5,717	7.37

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 377

Events for Subcatchment P-9: Subcat P-9

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.37	0.51	1,847	2.71
10-Year	5.33	0.85	3,159	4.63
25-Year	6.56	1.06	3,989	5.85
100-Year	8.45	1.37	5,269	7.73

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 378

Events for Pond 1P: Infiltration Basin

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	5.78	0.36	0.12	0.24	144.24	10,827
10-Year	10.37	2.96	0.13	2.82	145.06	15,147
25-Year	13.24	4.28	0.14	4.14	145.70	18,892
100-Year	17.63	5.70	0.16	5.54	146.44	23,724

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables
Printed 6/1/2026
Page 379

Events for Pond 2P: UIS-1 (SC-800) & UDS-1 (DC-780)

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	5.56	0.15	0.15	0.00	168.00	10,933
10-Year	9.81	1.12	0.15	0.97	168.59	15,985
25-Year	12.47	1.95	0.15	1.80	169.09	19,855
100-Year	16.53	4.07	0.15	3.92	170.22	25,810

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables
Printed 6/1/2026
Page 380

Events for Pond 3P: UIS-2 (SC-800)

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	1.80	0.31	0.06	0.25	161.53	2,292
10-Year	3.15	1.39	0.06	1.34	162.22	3,524
25-Year	4.00	1.81	0.06	1.75	162.67	4,255
100-Year	5.28	2.35	0.06	2.30	163.45	5,187

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables
Printed 6/1/2026
Page 381

Events for Pond 4P: UDS-2 (SC-310)

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.36	0.32	133.94	66
10-Year	0.67	0.49	134.28	149
25-Year	0.87	0.60	134.55	220
100-Year	1.16	0.77	135.08	339

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables
Printed 6/1/2026
Page 382

Events for Pond 5P: UIS-3 (SC-310) & UDS-3 (DC-780)

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	2.55	0.31	0.06	0.25	165.06	3,576
10-Year	4.69	1.60	0.06	1.54	165.56	5,799
25-Year	6.06	2.84	0.06	2.78	165.89	7,075
100-Year	8.20	4.07	0.06	4.01	166.30	8,501

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 383

Events for Link SP1: STUDY POINT #1 (Kimball Road north)

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-Year	1.43	1.43	0.00
10-Year	6.20	6.20	0.00
25-Year	9.91	9.91	0.00
100-Year	15.03	15.03	0.00

3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Multi-Event Tables

Printed 6/1/2026

Page 384

Events for Link SP2: STUDY POINT #2 (Wetlands West)

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-Year	1.30	1.30	0.00
10-Year	4.39	4.39	0.00
25-Year	7.08	7.08	0.00
100-Year	10.90	10.90	0.00

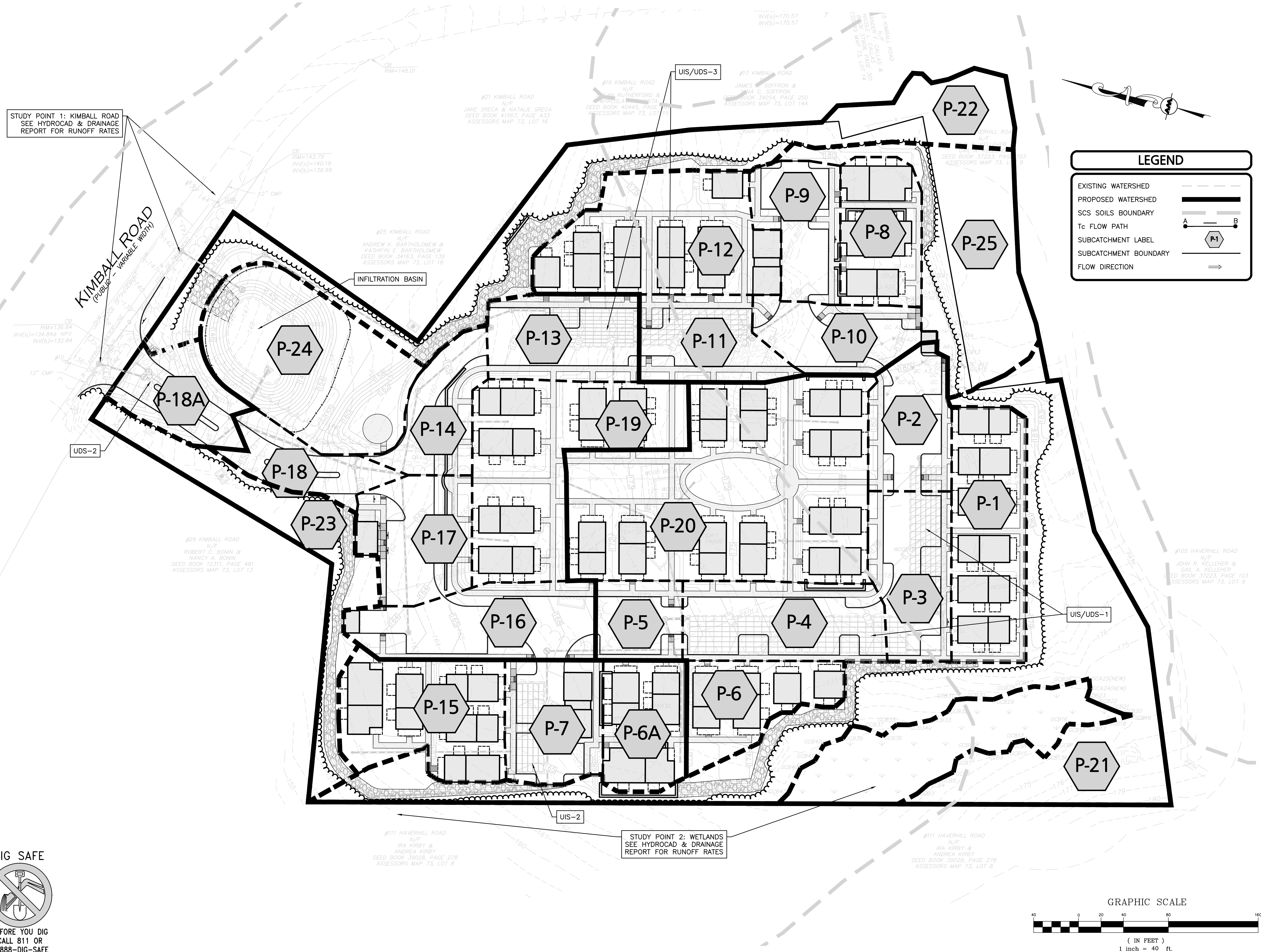
3410-03 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc
HydroCAD® 10.20-9a s/n 02881 © 2026 HydroCAD Software Solutions LLC

Events for Link SP3: STUDY POINT #3 (IVW south)

Event	Primary	Elevation
	(cfs)	(feet)
2-Year	0.00	0.00
10-Year	0.00	0.00
25-Year	0.00	0.00
100-Year	0.00	0.00

N:\PROJECTS\3410-03\CIVIL\DRAWINGS\CURRENT\C-3410-03_WATERSHED-PROPOSED.DWG



PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION
1	06/01/26	VARIOUS REVISION

APPLICANT:
MP PROPERTIES IV, LLC
201 WASHINGTON STREET, SUITE 2100
BOSTON, MA 02108

PROJECT:
27 KIMBALL ROAD
AMESBURY, MA

PROJECT NO. 3410-03 DATE: 01-26-2026

SCALE: 1" = 40' DWG. NAME: C-3410-03

DESIGNED BY: BDP/CB CHECKED BY: CMQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering • land surveying
environmental consulting • landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801
TEL: (781) 935-6889
FAX: (781) 935-2896

WOBURN, MA • LAKEVILLE, MA • MANCHESTER, NH

THIS DRAWING HAS BEEN PREPARED IN DIGITAL FORMAT. CLIENT/CUSTOMER REPRESENTATIVE OR CONSULTANTS MAY BE PROVIDED COPIES OF DRAWINGS AND SPECIFICATIONS FOR HIS/HER INFORMATION AND/OR SPECIFIC USE ON THIS PROJECT. DUE TO THE POTENTIAL THAT THE PROVIDED INFORMATION MAY BE MODIFIED UNINTENTIONALLY OR OTHERWISE, ALLEN & MAJOR ASSOCIATES, INC. MAY REMOVE ALL INDICATION OF THE DOCUMENT'S AUTHORSHIP ON THE DIGITAL MEDIA. PRINTED REPRESENTATIONS OR PORTABLE DOCUMENT FORMAT OF THE DRAWINGS AND SPECIFICATIONS ISSUED SHALL BE THE ONLY RECORD COPIES OF ALLEN & MAJOR ASSOCIATES, INC.'S WORK PRODUCT.

DRAWING TITLE:	SHEET No.
PROPOSED WATERSHED PLAN	PWS

Copyright © 2026 Allen & Major Associates, Inc.
All Rights Reserved



SECTION 6.0 - APPENDIX



NOAA Atlas 14, Volume 10, Version 3
Location name: Amesbury, Massachusetts, USA*
Latitude: 42.846°, Longitude: -70.9613°
Elevation: 171 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point 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	0.315 (0.251-0.396)	0.377 (0.300-0.474)	0.478 (0.379-0.603)	0.562 (0.443-0.712)	0.678 (0.515-0.894)	0.765 (0.568-1.03)	0.856 (0.614-1.19)	0.957 (0.649-1.36)	1.10 (0.715-1.62)	1.22 (0.771-1.82)
10-min	0.447 (0.356-0.561)	0.534 (0.425-0.671)	0.677 (0.536-0.853)	0.796 (0.628-1.01)	0.960 (0.729-1.27)	1.08 (0.804-1.46)	1.21 (0.870-1.69)	1.36 (0.919-1.93)	1.56 (1.01-2.29)	1.72 (1.09-2.58)
15-min	0.525 (0.419-0.659)	0.629 (0.500-0.790)	0.798 (0.633-1.01)	0.938 (0.739-1.19)	1.13 (0.858-1.49)	1.28 (0.947-1.72)	1.43 (1.02-1.98)	1.59 (1.08-2.27)	1.83 (1.19-2.69)	2.03 (1.28-3.04)
30-min	0.721 (0.574-0.904)	0.862 (0.686-1.08)	1.09 (0.866-1.38)	1.29 (1.01-1.63)	1.55 (1.18-2.04)	1.75 (1.30-2.35)	1.96 (1.40-2.72)	2.19 (1.48-3.11)	2.52 (1.64-3.70)	2.78 (1.76-4.16)
60-min	0.916 (0.730-1.15)	1.10 (0.872-1.38)	1.39 (1.10-1.75)	1.63 (1.29-2.07)	1.97 (1.50-2.60)	2.22 (1.65-2.99)	2.49 (1.79-3.46)	2.78 (1.89-3.95)	3.20 (2.08-4.69)	3.54 (2.24-5.29)
2-hr	1.20 (0.962-1.50)	1.44 (1.16-1.80)	1.84 (1.47-2.30)	2.17 (1.72-2.73)	2.62 (2.01-3.45)	2.96 (2.22-3.98)	3.32 (2.42-4.64)	3.75 (2.55-5.30)	4.40 (2.86-6.42)	4.94 (3.14-7.35)
3-hr	1.40 (1.13-1.74)	1.69 (1.36-2.10)	2.16 (1.73-2.70)	2.55 (2.03-3.20)	3.09 (2.38-4.06)	3.49 (2.63-4.69)	3.93 (2.87-5.48)	4.45 (3.03-6.27)	5.26 (3.43-7.65)	5.95 (3.78-8.81)
6-hr	1.81 (1.47-2.23)	2.20 (1.78-2.71)	2.82 (2.28-3.50)	3.35 (2.68-4.17)	4.07 (3.15-5.31)	4.60 (3.49-6.14)	5.18 (3.81-7.20)	5.89 (4.03-8.25)	6.99 (4.58-10.1)	7.94 (5.07-11.7)
12-hr	2.29 (1.87-2.81)	2.80 (2.28-3.43)	3.62 (2.94-4.46)	4.31 (3.48-5.34)	5.26 (4.10-6.82)	5.96 (4.54-7.90)	6.72 (4.97-9.28)	7.65 (5.25-10.6)	9.08 (5.96-13.0)	10.3 (6.60-15.1)
24-hr	2.71 (2.23-3.30)	3.37 (2.77-4.11)	4.44 (3.64-5.44)	5.33 (4.33-6.56)	6.56 (5.15-8.47)	7.46 (5.73-9.86)	8.45 (6.31-11.7)	9.69 (6.68-13.4)	11.6 (7.66-16.6)	13.3 (8.55-19.3)
2-day	3.03 (2.51-3.67)	3.85 (3.18-4.66)	5.18 (4.27-6.30)	6.29 (5.15-7.69)	7.82 (6.19-10.1)	8.93 (6.92-11.8)	10.2 (7.68-14.1)	11.8 (8.15-16.2)	14.4 (9.51-20.4)	16.7 (10.8-24.1)
3-day	3.30 (2.75-3.98)	4.18 (3.47-5.04)	5.61 (4.64-6.80)	6.80 (5.59-8.28)	8.44 (6.71-10.8)	9.63 (7.50-12.7)	11.0 (8.32-15.1)	12.7 (8.81-17.4)	15.6 (10.3-22.0)	18.1 (11.7-26.0)
4-day	3.57 (2.98-4.29)	4.47 (3.73-5.38)	5.95 (4.94-7.18)	7.18 (5.91-8.71)	8.86 (7.06-11.3)	10.1 (7.87-13.2)	11.5 (8.71-15.8)	13.3 (9.21-18.1)	16.2 (10.8-22.9)	18.9 (12.2-27.0)
7-day	4.33 (3.63-5.17)	5.26 (4.41-6.30)	6.78 (5.66-8.15)	8.05 (6.67-9.72)	9.80 (7.84-12.4)	11.1 (8.66-14.4)	12.5 (9.51-17.0)	14.3 (10.0-19.5)	17.4 (11.6-24.3)	20.1 (13.0-28.6)
10-day	5.02 (4.23-5.99)	5.98 (5.03-7.14)	7.55 (6.32-9.03)	8.85 (7.36-10.6)	10.6 (8.53-13.4)	11.9 (9.36-15.4)	13.4 (10.2-18.1)	15.3 (10.7-20.6)	18.2 (12.2-25.5)	20.9 (13.5-29.6)
20-day	7.02 (5.96-8.32)	8.08 (6.84-9.57)	9.80 (8.27-11.6)	11.2 (9.40-13.4)	13.2 (10.6-16.4)	14.7 (11.5-18.6)	16.2 (12.2-21.4)	18.0 (12.7-24.2)	20.7 (13.9-28.7)	22.9 (14.9-32.4)
30-day	8.69 (7.40-10.2)	9.82 (8.36-11.6)	11.7 (9.89-13.8)	13.2 (11.1-15.7)	15.3 (12.3-18.9)	16.9 (13.3-21.3)	18.6 (13.9-24.1)	20.4 (14.4-27.1)	22.8 (15.3-31.4)	24.7 (16.1-34.7)
45-day	10.8 (9.24-12.7)	12.0 (10.3-14.1)	14.0 (11.9-16.5)	15.7 (13.2-18.6)	18.0 (14.5-22.0)	19.7 (15.5-24.6)	21.5 (16.1-27.5)	23.2 (16.5-30.8)	25.4 (17.2-34.8)	27.1 (17.7-37.9)
60-day	12.6 (10.8-14.7)	13.9 (11.9-16.3)	16.0 (13.6-18.8)	17.7 (15.0-21.0)	20.1 (16.3-24.5)	22.0 (17.3-27.3)	23.8 (17.8-30.3)	25.6 (18.2-33.8)	27.7 (18.7-37.8)	29.2 (19.1-40.7)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

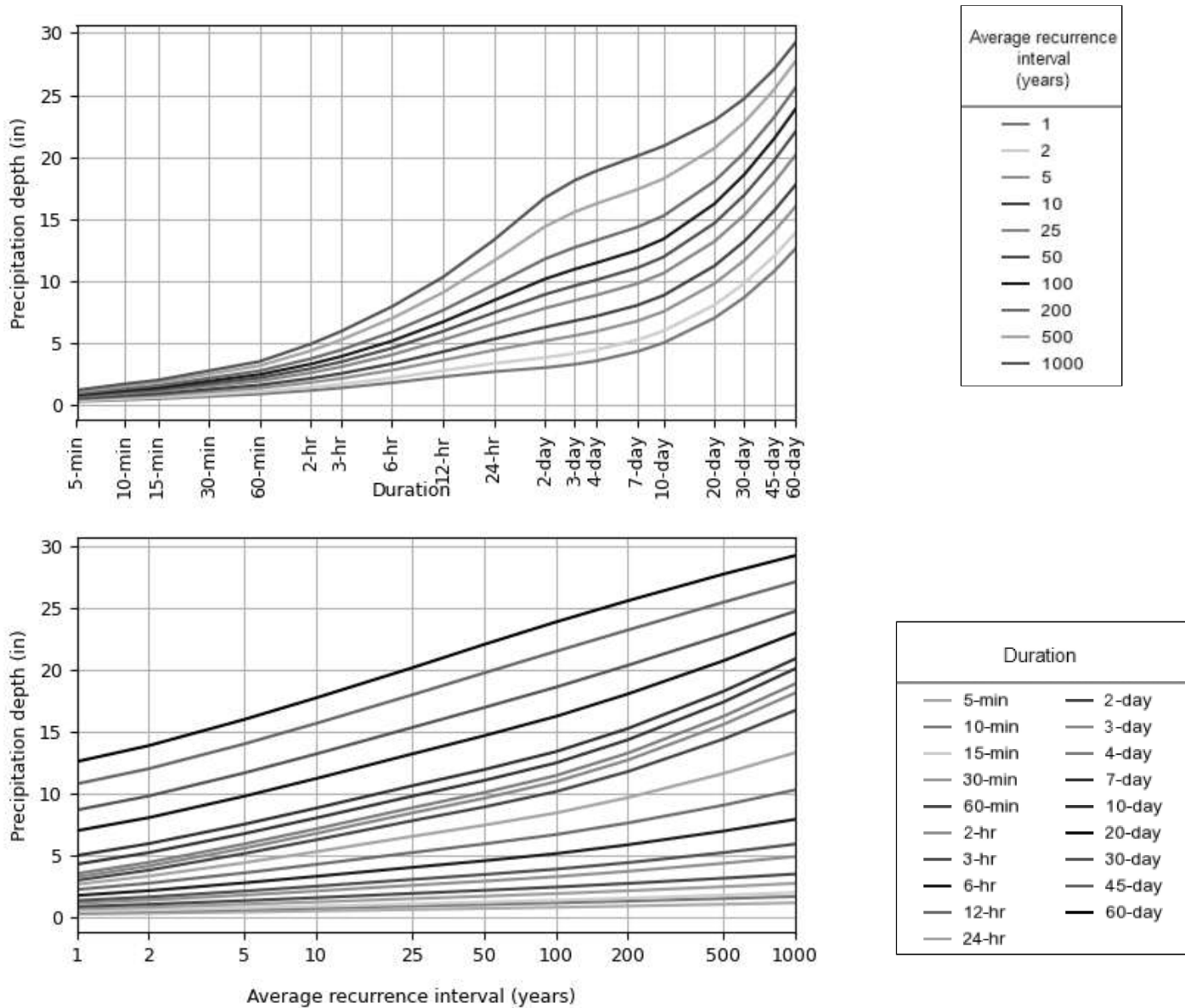
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

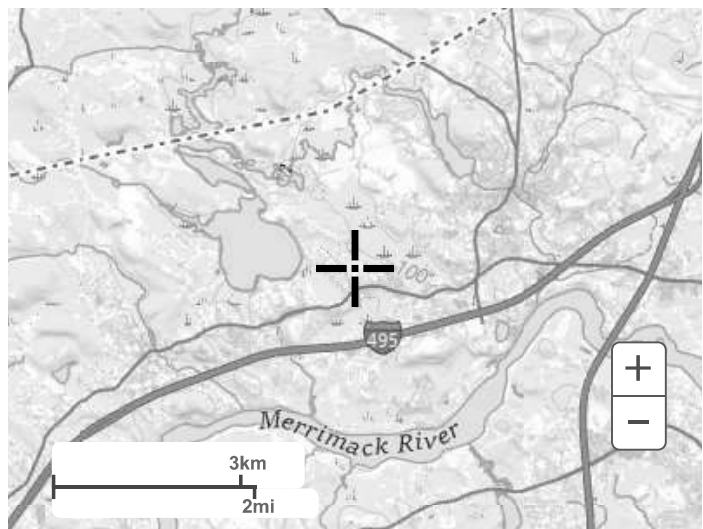
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 42.8460°, Longitude: -70.9613°



Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



[Back to Top](#)

[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

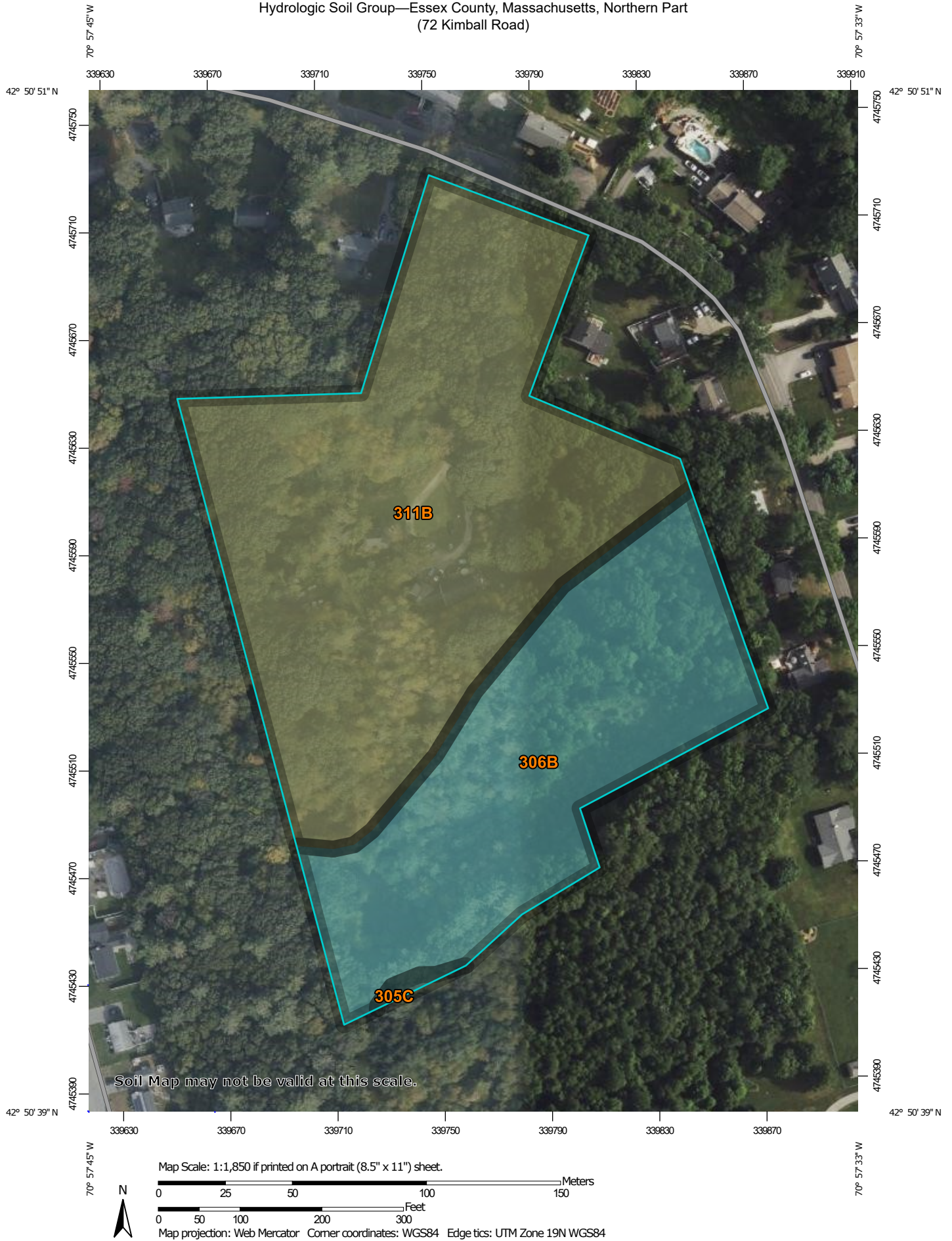
[Disclaimer](#)

Manning's Roughness Coefficients ("n")

Conduit	Manning's Coefficients
Closed Conduits	
Asbestos-Cement Pipe	0.011 to 0.015
Brick	0.013 to 0.017
Cast Iron Pipe	
Cement-lined and seal-coated	0.011 to 0.015
Concrete (Monolithic)	
Smooth forms	0.012 to 0.014
Rough forms	0.015 to 0.017
Concrete Pipe	0.011 to 0.015
Corrugated-Metal Pipe (1/2 - STUL 34470 2 1/2-inch corrgrtn.)	
Plain	0.022 to 0.026
Paved invert	0.018 to 0.022
Spun asphalt-lined	0.011 to 0.015
Plastic Pipe (Smooth)	0.011 to 0.015
Vitrified Clay	
Pipes	0.011 to 0.015
Liner channels	0.013 to 0.017
Open Channels	
Lined Channels	
Asphalt	0.013 to 0.017
Brick	0.012 to 0.018
Concrete	0.011 to 0.020
Rubble or riprap	0.020 to 0.035
Vegetal	0.030 to 0.040
Excavated or Dredged	
Earth, straight and uniform	0.020 to 0.030
Earth, winding, fairly uniform	0.025 to 0.040
Rock	0.030 to 0.045
Unmaintained	0.050 to 0.140
Natural Channels (minor streams, top width at flood state < 100 feet)	
Fairly regular section	0.030 to 0.070
Irregular section with pools	0.040 to 0.100

Source: Design and Construction of Sanitary and Storm Sewers, American Society of Civil Engineers and the Water Pollution Control Federation, 1969.

Hydrologic Soil Group—Essex County, Massachusetts, Northern Part
(72 Kimball Road)



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 21, Sep 5, 2025

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

Date(s) aerial images were photographed: May 22, 2022—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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
305C	Paxton fine sandy loam, 8 to 15 percent slopes	C	0.0	0.3%
306B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	C	3.4	37.3%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	C/D	5.7	62.4%
Totals for Area of Interest			9.2	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Essex County, Massachusetts, Northern Part

311B—Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2t2qr

Elevation: 0 to 1,440 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Woodbridge, very stony, and similar soils: 82 percent

Minor components: 18 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Very Stony

Setting

Landform: Ground moraines, drumlins, hills

Landform position (two-dimensional): Summit, backslope, footslope

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Linear

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

A - 2 to 9 inches: fine sandy loam

Bw1 - 9 to 20 inches: fine sandy loam

Bw2 - 20 to 32 inches: fine sandy loam

Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent

Surface area covered with cobbles, stones or boulders: 1.6 percent

Depth to restrictive feature: 20 to 43 inches to densic material

Drainage class: Moderately well drained

Runoff class: Medium

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 19 to 27 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C/D

Ecological site: F144AY037MA - Moist Dense Till Uplands

Hydric soil rating: No

Minor Components

Paxton, very stony

Percent of map unit: 10 percent

Landform: Ground moraines, drumlins, hills

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Linear, convex

Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 8 percent

Landform: Drainageways, depressions, ground moraines, drumlins,
hills

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Head slope, base slope

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Essex County, Massachusetts, Northern Part

Survey Area Data: Version 21, Sep 5, 2025



HALEY & ALDRICH, INC.
465 Medford St.
Suite 2200
Boston, MA 02129
617.886.7400

TECHNICAL MEMORANDUM

22 December 2025
File No. 0213708-001

TO: MP Properties IV, LLC
Andrew Mackin

C: Allen & Major Associates, Inc.
Carlton Quinn, Chirs Broyles

FROM: Haley & Aldrich, Inc.
Youhanna Bebawy, Staff Civil Engineer
Mark H. Balfe, Principal

SUBJECT: Subsurface Data Memorandum
Proposed Development
27 Kimball Road
Amesbury, Massachusetts

The purpose of this memorandum is to summarize the results of recent subsurface exploration program, in-situ field infiltration testing, and geotechnical lab testing conducted to aid in the evaluation and design of a stormwater infiltration system for the proposed development at 27 Kimball Rd, Amesbury, Massachusetts. The investigations and testing included herein were performed in accordance with our proposal dated 17 November 2025 and your subsequent authorization. The lab and field data included herein is intended to aid the civil engineer in the design of stormwater infiltration systems in accordance with the best management practices included in the Massachusetts Stormwater Handbook.

PROPOSED DEVELOPMENT

We understand that MP Properties IV, LLC is considering development of the 9.4-acre property at 27 Kimball Rd, Amesbury into 91 residential units. The development will be supported by municipal water and sewer and will include stormwater management and infiltration. Refer to Figure 1 – Project Locus for the location of the project site.

EXISTING SITE CONDITIONS

The Site is currently developed with an approximately 1,832 square foot (ft), single family home constructed in approximately 1982, with two detached garages and a shed. The house is reportedly heated by oil and likely has an above- or below-ground storage tank. The majority of the property is

undeveloped and wooded, with cleared areas surrounding and south of the residence, with grades rising to the southeast and a wetland to the southwest.

The property fronts on Kimball Road to the northeast, with a combination of residential properties and wooded lots to the north, east, west, and south. A Christmas tree farm is located along Haverhill Road to the South, with industrial properties further south beyond Haverhill Road/Route 110.

SUBSURFACE EXPLORATION PROGRAMS

A subsurface exploration program was recently conducted at the site in November 2025. The program consisted of fifteen (15) test pits (designated HA23-TP1 through HA23-TP15). The test pits were advanced to depths ranging from 6 to 8.8 feet below ground surface (ft bgs) by LDR Excavation from 21 to 25 November 2025 and were observed by Haley & Aldrich.

Generally, test pits were terminated when the limit of the excavator's reach was accomplished; however, test pit HA25-TP13 was terminated at 6 ft bgs when several large boulders were encountered and unable to be excavated. Boulders were also encountered in the Glacial Till soil at HA25-TP3, HA25-TP4, HA25-TP7, HA25-TP10, HA25-TP11, HA25-TP12, HA25-TP14, but did not interfere with test pit excavation.

Refer to Figure 2 – Site and Subsurface Exploration Location Plan for the designation and approximate location of test pit explorations. Logs of the test pits explorations are included in Appendix A – Exploration Logs. Approximate ground surface elevations were collected using a handheld, global navigation satellite system (GNSS) receiver.

SUBSURFACE SOIL CONDITIONS

The subsurface conditions encountered at the site generally consist of Topsoil overlying Loess and Glacial Till soils. A fill layer consisting of reworked Loess soils was encountered between two layers of Topsoil in two test pit locations, HA25-TP6 and HA25-TP8.

Soil Gradation Testing

Soil samples collected during the subsurface exploration program were submitted to GeoTesting Express of Acton, Massachusetts for laboratory testing.

Fifteen (15) grain size distribution analyses were done through both separation by mechanical sieve and timed sedimentation testing, hydrometer analysis, (ASTM D6913/ASTM D7928). The timed sedimentation testing quantifies the constitutive clay and silt fractions of a soil used in textural classification. A mechanical sieve test combines the constitutive silt and clay fractions as a percentage of total fines (fines passing the #200 sieve material). A summary of the samples submitted for grain size testing are included below Table 1: Summary of Laboratory Testing and the results are included in Appendix B – Geotechnical Lab Testing Results.

Table 1: Summary of Laboratory Testing Depths	
Exploration Designation	Sample Depth (ft)
HA22-TP1	3.0 – 6.3
HA22-TP2	3.0 – 7.0
HA22-TP3	3.0 – 7.0
HA22-TP4	3.0 – 7.5
HA22-TP5	4.3 – 4.8
HA22-TP6	3.0 – 8.0
HA22-TP7	3.0 – 7.0
HA22-TP8	5.5 – 6.0
HA22-TP9	4.0 – 5.0
HA22-TP10	3.0 – 7.0
HA22-TP11	3.0 – 8.0
HA22-TP12	3.0 – 8.0
HA23-TP13	3.0 – 6.0
HA23-TP14	3.0 – 6.5
HA23-TP15	3.0 – 8.0

Soil Texture

To assist stormwater design for the project, laboratory grain-size results were gravel corrected values for sand, silt, and clay, in accordance with U.S. Department of Agriculture (USDA) soil physical analyses and plotted on the National Resource Conservation Service (NRCS) soil textural triangle. Refer to Figure 3 – NCRS Soil Texture Triangle for the gravel corrected values. The soil fractions are classified as sandy loam and loamy sand.

Test Pit Groundwater Conditions

The only observable indicator of groundwater conditions encountered in the test pits were redoximorphic features (including mottling and oxidation). No water levels, seepage, or standing water were observed during test pit excavation.

Redoximorphic features, commonly referred to as soil mottling and oxidation of soil, indicate evidence of past groundwater levels, were observed in three of the completed test pits as indicated on the attached logs. Discontinuous and weak redoximorphic features were encountered in HA25-TP10 at 5 ft bgs (approx. El. 162.2¹), in HA25-TP11 at 4.5 ft bgs (approx. El. 176.8), and in HA25-TP14 at 6.0 ft bgs (approx. El. 150.4).

In-Situ Permeability Testing

Five Guelph permeameter tests were performed by Haley & Aldrich at test pits HA25-TP1, HA25-TP5, HA25-TP8, HA25-TP12, and HA25-TP15 to determine in-situ hydraulic conductivity rates. The Guelph Permeameter test simulates a wetting front moving through the soil and provides measurement of field saturated hydraulic conductivity. This test is one of the acceptable test methods identified in the

¹ Elevations are in feet and referenced to the National Vertical Datum of 1988 (NAVD88).

Massachusetts Stormwater Handbook. Each test was run until steady state of recharge was established by the Guelph Permeameter at two different heads (5 cm and 10 cm of water within the test hole). The results of the infiltration testing are provided below in Table 2: Summary of Field Infiltration Testing.

This testing provides an order of magnitude estimate of hydraulic conductivity at the discrete test pit location and at the discrete elevation range tested. Hydraulic conductivity will vary, both laterally and vertically according to changes in density, grain size, and gradation. Infiltration rates will decline if soils become saturated above groundwater levels. In addition, infiltration rates in the area of storm water infiltration system may result in a reduction of hydraulic conductivity due to siltation caused by suspended solids in the infiltrating storm water, piping of fines by infiltrating precipitation, or a combination of these factors.

Table 2: Summary of Field Infiltration Testing					
Test Pit ID	Approx. Ground Surface Elevation (ft, NAVD88)	Depth Range of Test (ft)	Elevation Range of Test (ft)	Tested Soil Stratum	Calculated Field Saturated Hydraulic Conductivity ¹ (in./hr)
HA25-TP1	155.4	4.5 – 5	150.4 – 150.9	Glacial Till	21.33
HA25-TP5	178.9	4.3 – 4.8	174.1 – 174.6	Glacial Till	0.22
HA25-TP8	186.7	5.5 – 6	180.7 – 181.2	Glacial Till	1.95
HA25-TP12	183.4	5.5 – 6	177.4 – 177.9	Glacial Till	0.82
HA25-TP15	153.2	4.1 – 4.6	148.6 – 149.1	Glacial Till	0.41
<i>Note:</i> 1) Hydraulic conductivity values indicated are the measured field values and have not been reduced for stormwater design calculations, as detailed in the Massachusetts Stormwater Handbook.					

GEOTECHNICAL GUIDANCE

We understand that the proposed redevelopment will include lightly loaded single story units. Based on the subsurface conditions observed, following removal of the vegetation, Topsoil/Loess. and any man-made structures, for planning purposes you should assume the new units can be supported on conventional reinforced concrete footings with an allowable bearing pressure of 4 kips per square foot (ksf). Footings should bear a minimum of 4 ft below grade (frost protection) or insulated to an equivalent R-value of 4 ft of soil. Ground floor slabs should be designed as conventional slab-on-grade.

We note that the fines content of the on-site materials is generally between 40 to 50 percent, which makes reuse (placement and compaction) challenging, especially during periods of inclement weather (rain/snow) or extended cold temperatures (Nov to Apr). Additionally, soil subgrades for foundations, utilities, driveways, etc. will need to be effectively managed (protected, covered, or other means) to prevent disturbance due to moisture or equipment during construction.

LIMITATIONS

This memorandum was prepared in accordance with our proposal dated 17 November 2025 and your subsequent authorization. This memorandum has been prepared for specific application to the proposed 27 Kimball Rd development in Amesbury, Massachusetts as described herein.

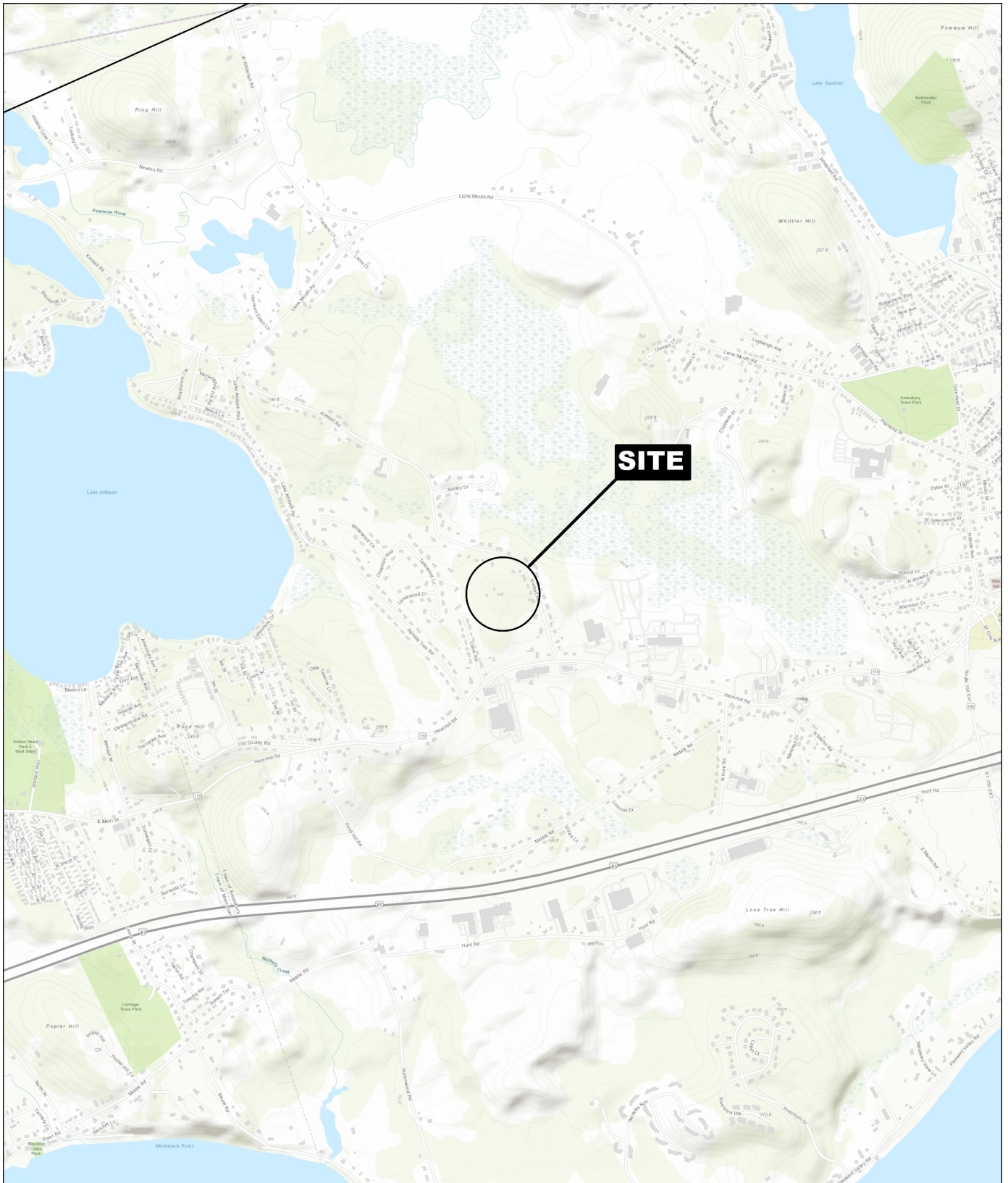
We appreciate the opportunity to provide services for this project and look forward to our continued association with you and the project team through completion of design and construction. Please contact us with any questions.

Attachments:

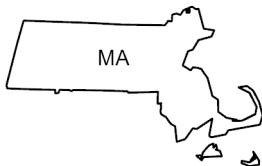
Figure 1	Project Locus
Figure 2	Site and Subsurface Exploration Plan
Figure 3	NCRS Soil Texture Triangle
Appendix A	Exploration Logs
Appendix B	Geotechnical Lab Test Results

<https://haleyaldrich.sharepoint.com/sites/MarcusPartners/Shared Documents/0213708.27 Kimball Rd Amesbury/Deliverables/Infiltration TP Memo/2024-1222-HAI-27 Kimball Rd-Infiltration Subsurface Data Memo-F.docx>

FIGURES



SITE COORDINATES: 42°50'45"N, 70°57'39"W



MAP SOURCE: USGS

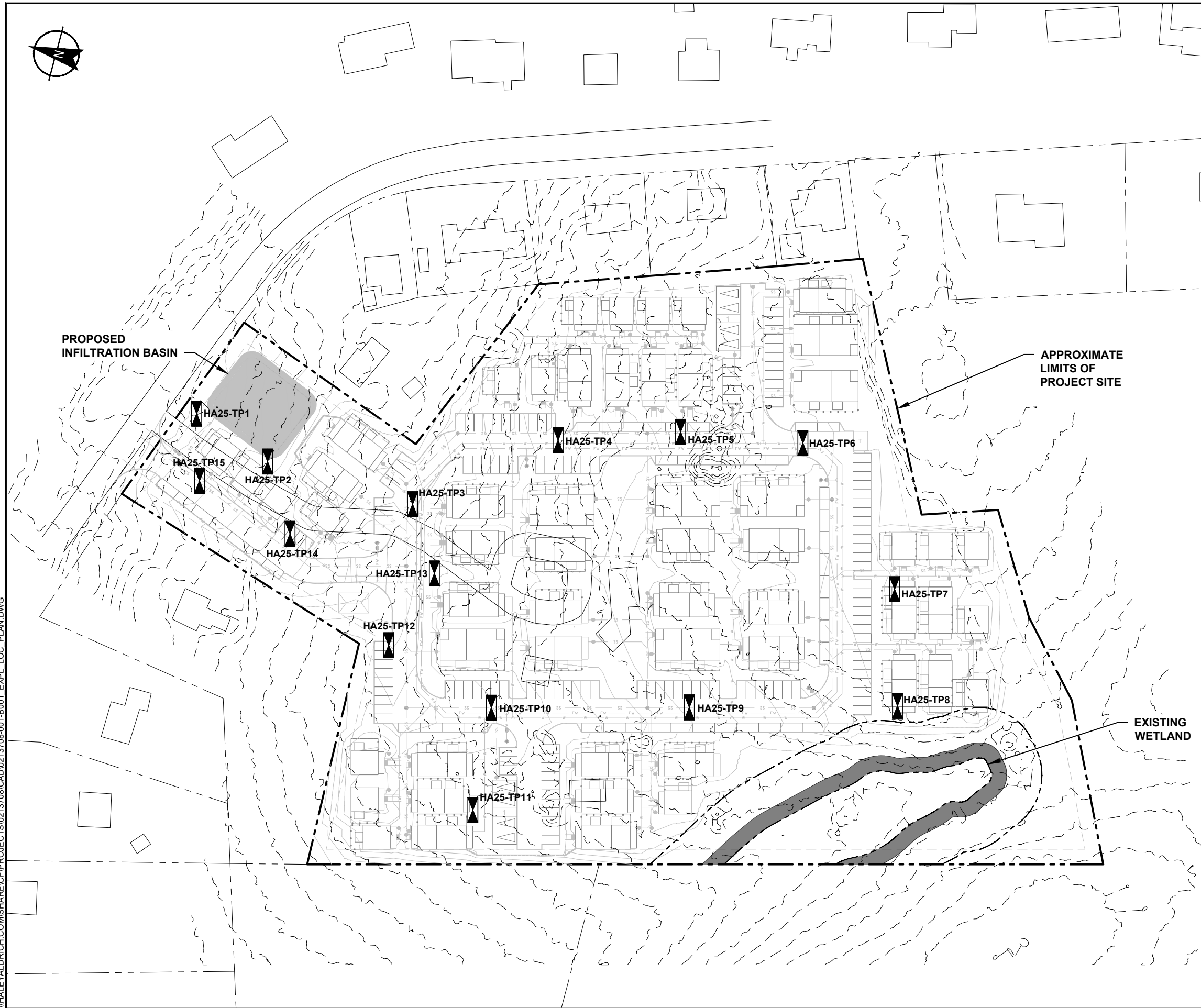
**HALEY
ALDRICH**

27 KIMBALL RD
27 KIMBALL ROAD
AMESBURY, MASSACHUSETTS

PROJECT LOCUS

APPROXIMATE SCALE: 1 INCH = 2,000 FEET
DECEMBER 2025

FIGURE 1



LEGEND

HA25-TP1  DESIGNATION AND APPROXIMATE LOCATION OF TEST PIT CONDUCTED BY LDR EXCAVATION BETWEEN 21 AND 25 NOVEMBER 2025 AND MONITORED BY HALEY & ALDRICH, INC.

NOTE

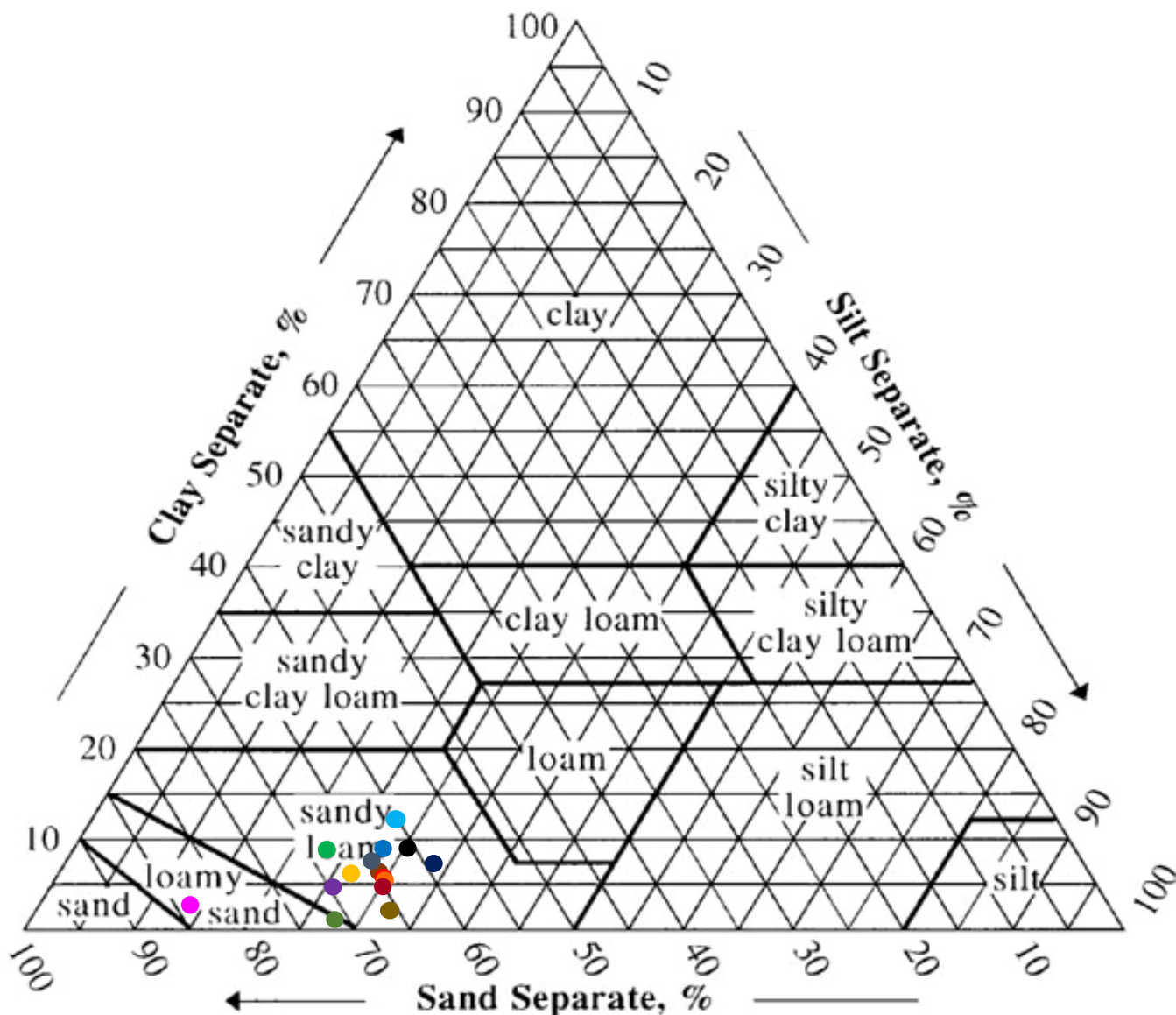
1. BASE PLAN CREATED FROM ELECTRONIC FILE TITLED "27 Kimball Rad-X-Site (3).dwg" PROVIDED BY MARCUS PARTNERS, LLC ON 12 NOVEMBER 2025.

HALEY ALDRICH PROPOSED DEVELOPMENT
27 KIMBALL ROAD
AMESBURY, MASSACHUSETTS

**SITE AND SUBSURFACE
EXPLORATION LOCATION PLAN**

SCALE: AS SHOWN
DECEMBER 2025

FIGURE 2



Sample Legend	Sample I.D.	NCRS Classification
●	HA25-TP1_3.0-6.3	Sandy Loam
●	HA25-TP2_3.0-7.0	Sandy Loam
●	HA25-TP3_3.0-7.0	Sandy Loam
●	HA25-TP4_3.0-7.5	Sandy Loam
●	HA25-TP5_4.3-4.8	Sandy Loam
●	HA25-TP6_3.0-8.0	Sandy Loam
●	HA25-TP7_3.0-7.0	Sandy Loam
●	HA25-TP8_5.5-6.0	Loamy Sand

Sample Legend	Sample I.D.	NCRS Classification
●	HA25-TP9_4.0-5.0	Loamy Sand
●	HA25-TP10_3.0-7.0	Sandy Loam
●	HA25-TP11_3.0-8.0	Sandy Loam
●	HA25-TP12_3.0-8.0	Sandy Loam
●	HA25-TP13_3.0-6.0	Sandy Loam
●	HA25-TP14_3.0-6.5	Sandy Loam
●	HA25-TP15_3.0-8.0	Sandy Loam

Notes:

- Guidance Document: USDA, 2022 National Soil Survey Handbook, Section 618.87 (Texture Class, Texture Modifier, and Terms Used in Lieu of Texture.)
- Composite sample depth range detailed in "Sample I.D."



Proposed Development
27 Kimball Rd
Amesbury, Massachusetts

**FIGURE 3
NCRS SOIL TEXTURE TRIANGLE**

UNDERGROUND ENGINEERING &
ENVIRONMENTAL SOLUTIONS

FILE NO. 0213708-001

December 2025

APPENDIX A
Exploration Logs

J:\GRAPHICS\TEMP\MCELENEY-T\FIELD SERVICES\SUBSURFACE EXPLORATION LOG KEY\HA-SUBSURFACE EXPLORATION KEY2016-0804.DWG

IDENTIFICATION AND DESCRIPTION OF SUBSURFACE MATERIALS

SOIL

Soil description on logs of subsurface explorations are based on Standard Penetration Test results, visual-manual examination of exposed soil and soil samples, and the results of laboratory tests on selected samples. The criteria, descriptive terms and definitions are as follows:

DENSITY OR CONSISTENCY

Density of Cohesionless Soils	Penetration Resistance (Blows per ft.)	Consistency of Cohesive Soils	Penetration Resistance (Blows per ft.)
Very Loose	0-4	Very Soft	0-2
Loose	5-10	Soft	3-4
Medium	11-30	Medium	5-8
Dense	31-50	Stiff	9-15
Very Dense	over 50	Very Stiff	16-30
		Hard	over 30

PENETRATION RESISTANCE

Standard Penetration Test (ASTM D-1586) - Number of blows required to drive a standard 2 in. O.D. split spoon sampler 1 ft. with a 140 lb. weight falling freely through 30 in.

COLOR: Basic colors and combinations: black, brown, gray, yellow-brown, etc.

SUPPLEMENTAL SOIL TERMINOLOGY:

Laminae	- 0 to 1/16 in. thick (cohesive)
Parting	- 0 to 1/16 in. thick (granular)
Seam	- 1/16 to 1/2 in. thick
Layer	- 1/2 to 12 in. thick
Stratum	- > 12 in. thick
Pocket	- Small, erratic deposit less than 12 in. size
Lens	- Lenticular deposit larger than a pocket
Occasional	- One or less per 12 in. of thickness
Frequent	- More than one per 12 in. of thickness
Interbedded	- Alternating soil layers of differing composition
Varved	- Alternating thin seams of silt and clay
Mottled	- Variation of color

GEOLOGIC INTERPRETATION

Deposit type - GLACIAL TILL, ALLUVIUM, FILL.....

The natural soils are identified by criteria of Unified Soil Classification System (USCS), with appropriate group symbol in parenthesis for each soil description. Fill materials may not be classified by USCS criteria.

ROCK

Rock descriptions noted on logs of subsurface explorations are based on visual-manual examination of exposed rock outcrops and core samples. The criteria, descriptive terms and definitions used are as follows:

FIELD HARDNESS:

A measure of resistance to scratching.

Very Hard	Cannot be scratched with a knife point or sharp pick.
Hard	Can be scratched with a knife point or sharp pick, only with difficulty.
Moderately Hard	Can be readily scratched with a knife point or pick.
Medium Hard	Can be grooved or gouged 1/16 in. deep with firm pressure on a knife point or sharp pick.
Soft	Can be grooved or gouged easily with a knife point or pick.
Very Soft	Can be carved with a knife and excavated with a pick point.

WEATHERING:

The action of organic and inorganic and chemical and physical processes resulting in alteration of color, texture and composition.

Fresh-FR	No visible sign of alteration, except perhaps slight discoloration on major discontinuity surfaces.
Slight-SL	Discoloration of rock material and discontinuity surfaces. All rock may be discolored and/or somewhat weaker than in its fresh condition.
Moderate-MOD	Less than half the rock material is decomposed and/or disintegrated to a soil. Some fresh or discolored rock is present as either a continuous framework or as corestones.
High-HIGH	More than half the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present as either a discontinuous framework or as corestones.
Complete-COMP	All rock material is decomposed and/or disintegrated to soil. The original mass structure is largely intact.
Residual Soil	All rock material is converted to soil. The mass structure and material fabric are destroyed. There has been a large change of volume, but the material has not been significantly transported.

COLOR: Basic colors and combinations: gray, light gray, brown, red-brown.

TEXTURE: Size, shape and arrangements of constituents.

Term	Size	
	Igneous	Sedimentary
Coarse-grained	> 5 mm	> 2 mm
Medium-grained	1 - 5 mm	0.625 - 2 mm
Fine-grained	< 1 mm	< 0.625 mm
Aphanitic	Individual grains invisible to the unaided eye.	

LITHOLOGY: Rock classification and modifiers; accepted formation names.

DISCONTINUITIES:

Type	Definition
Joint	A natural fracture along which no displacement has occurred. May occur in parallel groups called sets.
Shear	A natural fracture along which displacement has occurred. Surface may be slickensided or striated.
Fault	A natural fracture along which displacement has occurred. Usually lined with gouge and slickensides.
Shear or Fault Zone	Zone of fractured rock and gouge bordering the displacement plane.

ORIENTATION/ATTITUDE:

Term	Angle (degrees)
Horizontal	0-5
Low Angle	6-35
Moderately Dipping	36-55
High Angle	56-85
Vertical	86-100

SPACING:

Discontinuity Term	Bedding Term	Inches
Extremely Close	Extremely Thin	< 3/4
Very Close	Very Thin	3/4 - 2.5
Close	Thin	2.5 - 8
Moderate	Medium	8 - 24
Wide	Thick	24 - 80
Very Wide	Very Thick	80 - 240
Extremely Wide	Extremely Thick	> 240

PERSISTENCE/CONTINUITY:

Term	Feet	Term	Distance
Very Low	0-3	Very Tight	< 0.1mm
Low	3-10	Tight	0.1mm-0.25mm
Medium	10-35	Partly Open	0.25mm-0.5mm
High	35-65	Open	0.5mm-2.5mm
Very High	> 65	Moderately Wide	2.5mm-1cm
		Wide	> 1cm
		Very Wide	1cm-10cm
		Extremely Wide	10cm-1m
		Cavernous	> 1m

APERTURE/GAP:

POROSITY:

Type
Primary:
Pre-depositional and depositional inter- and intra- granular, particle, or crystalline pores.

Secondary:
Solution features including pits, vugs, caverns, molds, and channels.
Fracture features including joints, shears, faults, shrinkage and breccia fabrics.

Term	Size
Micro	< 0.0625 mm
Meso	0.0625-4.0 mm
Mega	4.0-256 mm

HALEY
ALDRICH

SUBSURFACE EXPLORATION KEY

GENERAL NOTES

1. Logs of subsurface explorations depict soil, rock and groundwater conditions only at the locations specified on the dates indicated. Subsurface conditions may vary at other locations and at other times.
2. Water levels noted on the logs were measured at the times and under the conditions indicated. During test borings, these water levels could have been affected by the introduction of water into the borehole, extraction of tools on other procedures and thus may not reflect actual groundwater level at the test boring location. Groundwater level fluctuations may also occur as a result of variations in precipitation, temperature, season, tides, adjacent construction activities and pumping of water supply wells and construction dewatering systems.

HALEY ALDRICH										TEST PIT LOG										Test Pit No. HA25-TP1				
Project 27 KIMBALL RD										File No. 0213708-001														
Location AMESBURY, MA										H&A Rep A. Balogh														
Client MP PROPERTIES IV, LLC										Date 11/24/2025														
Contractor LDR EXCAVATION										Weather Cloudy, 30s-40s														
Equipment Used DEERE 35G TRACK-MOUNTED EXCAVATOR																								
Ground El.: 155.4					Location: See Plan					Groundwater depths/entry rates (in./min.): Not encountered														
El. Datum: NAVD88																								
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests														
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength										
0	0.0	154.9 0.5	OL/ OH	Brown sandy ORGANIC SOIL (OL/OH), organic odor, moist, 25% roots	0	5	10	15	35	35														
			SM	-TOPSOIL-																				
1	0.0	153.6 1.8		Loose light brown to brown silty SAND with gravel (SM), no odor, moist, 10% cobbles, 10% roots	10	5	10	10	40	25														
				-LOESS-																				
2		149.1 6.3	SM	Medium dense to dense tan to light brown silty SAND with gravel (SM), bonded, no odor, moist, 15% cobbles	10	5	10	15	45	15														
				-GLACIAL TILL-																				
3	0.0																							
4																								
5	0.0																							
6																								

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONEDRIVE - HALEYALDRICH.COM\MARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG										Test Pit No. HA25-TP2							
Project27 KIMBALL RD LocationAMESBURY, MA ClientMP PROPERTIES IV, LLC ContractorLDR EXCAVATION Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR										File No.0213708-001 H&A RepA. Balogh Date11/24/2025 WeatherCloudy, 30s-40s							
Ground El.: 166.2			Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered											
El. Datum: NAVD88																	
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests							
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength			
0	0.0	165.7 0.5	OL/ OH	Loose brown sandy ORGANIC SOIL (OL/OH), organic odor, moist, 25% roots -TOPSOIL-	0	5	10	15	35	35							
1	0.0		SM	Loose light brown to brown silty SAND with gravel (SM), no odor, moist, 10%, roots -LOESS-	10	5	10	10	40	25							
		2	0.0	164.7 1.5	SM	Medium dense to dense tan to light brown silty SAND with gravel (SM), bonded, no odor, moist, 15% cobbles -GLACIAL TILL-	10	5	10	10	50	15					
3	0.0																
4																	
5	0.0																
6																	
7	0.0	159.2 7.0		BOTTOM OF EXPLORATION AT 7.0 FT Note: Test pit backfilled with excavated soil.													
Obstructions: Not encountered			Remarks:				Field Tests										
							Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High										
Standing Water in Completed Pit				Boulders			Test Pit Dimensions (ft)										
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft) 8 x 2.5										
measured after hours elapsed				12 to 24 over 24 =			Pit Depth (ft) 7.0										
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.																	

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONEDRIVE - HALEYALDRICH.COM\MARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG										Test Pit No. HA25-TP3				
Project27 KIMBALL RD LocationAMESBURY, MA ClientMP PROPERTIES IV, LLC ContractorLDR EXCAVATION Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR										File No.0213708-001 H&A RepA. Balogh Date11/24/2025 WeatherCloudy, 30s-40s				
Ground El.: 169.9			Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered								
El. Datum: NAVD88														
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests				
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0	0.0	169.3 0.6 168.5 1.4	OL/ OH	Brown sandy ORGANIC SOIL (OL/OH), organic odor, moist, 25% roots -TOPSOIL-	0	5	10	15	35	35				
1	0.0		SM	Loose light brown to brown silty SAND with gravel (SM), no odor, moist, 10% cobbles, 10% roots -LOESS-	10	5	10	10	35	30				
2			SM	Medium dense tan to light brown silty SAND with gravel (SM), bonded, no odor, moist, 15% cobbles, trace cobbles -GLACIAL TILL-	10	5	10	15	40	20				
3	0.0		SM	Similar to above, except 10% cobbles, trace boulders, visible stratification on sidewalls of test pit	10	5	10	15	25	35				
4														
5	0.0													
6														
7		162.9 7.0		BOTTOM OF EXPLORATION AT 7.0 FT Note: Test pit backfilled with excavated soil.										
Obstructions: Not encountered			Remarks:			Field Tests								
						Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High								
Standing Water in Completed Pit				Boulders			Test Pit Dimensions (ft)							
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft) 8.5 x 2.5							
measured after hours elapsed				12 to 24 over 24 =			Pit Depth (ft) 7.0							
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.														

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONEDRIVE - HALEYALDRICH\COMMARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG										Test Pit No. HA25-TP4				
Project27 KIMBALL RD LocationAMESBURY, MA ClientMP PROPERTIES IV, LLC ContractorLDR EXCAVATION Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR File No.0213708-001 H&A RepA. Balogh Date11/24/2025 WeatherCloudy, 30s-40s														
Ground El.: 180.0			Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered								
El. Datum: NAVD88														
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests				
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0	0.0	179.4 0.6	OL/OH	Loose brown sandy ORGANIC SOIL (OL/OH), organic odor, moist, 25% roots -TOPSOIL-	5	5	10	15	35	30				
			SM	Loose light-brown to brown silty SAND with gravel (SM), no odor, moist, 15% cobbles, 10% roots -LOESS-	10	5	10	10	40	25				
2	0.0	178.0 2.0	SM	Medium dense yellow-brown to light-brown silty SAND with gravel (SM), bonded, no odor, moist, 15% cobbles -GLACIAL TILL-	15	10	10	10	35	20				
	0.0													
4	0.0		SM	Similar to above, except dense, trace boulders	15	10	10	10	30	25				
6	0.0													
		172.5 7.5												
				BOTTOM OF EXPLORATION AT 7.5 FT Note: Test pit backfilled with excavated soil.										
Obstructions: Not encountered			Remarks:				Field Tests							
							Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High							
Standing Water in Completed Pit				Boulders			Test Pit Dimensions (ft)							
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft) 3 x 10							
measured after hours elapsed				12 to 24 over 24 =			Pit Depth (ft) 7.5							
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.														

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONEDRIVE - HALEYALDRICH\COMMARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG Test Pit No. HA25-TP5														
Project27 KIMBALL RD LocationAMESBURY, MA ClientMP PROPERTIES IV, LLC ContractorLDR EXCAVATION Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR							File No.0213708-001 H&A RepM. Dodson Date11/21/2025 WeatherCloudy, 20s-40s							
Ground El.: 178.9		Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered									
El. Datum: NAVD88														
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests				
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0		178.3	OL/OH	Black to dark brown sandy ORGANIC SOIL (OL/OH), no structure, organic odor, moist, 35% roots	5	0	5	10	15	65				
	0.0	0.6	SM	-TOPSOIL- Yellow to yellow-brown silty SAND (SM), no structure, no odor, moist, 10% roots	0	5	5	5	40	45				
		177.4		-LOESS-										
2	0.0	1.5	SM	Yellow to light brown silty SAND (SM), no structure, no odor, moist, 5% cobbles, weakly to unbonded, variable silt content in weak layers, 15-30% silt content	5	5	10	10	45	25				
	0.0			-GLACIAL TILL-										
4	0.0		SM	Similar to above, except trace gravel, yellow to yellow-brown, moderately bonded, 20-40% silt content	5	5	5	5	50	30				
	0.0													
6	0.0													
	0.0													
8		170.1												
		8.8		BOTTOM OF EXPLORATION AT 8.8 FT Note: Test pit backfilled with excavated soil.										
Obstructions: Not encountered			Remarks: In-situ permeability test performed from 4.3 to 4.8 ft below ground surface.			Field Tests								
						Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High								
Standing Water in Completed Pit				Boulders			Test Pit Dimensions (ft)							
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft)							
measured after hours elapsed				12 to 24 over 24 =			Pit Depth (ft) 8.8							
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.														

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONEDRIVE - HALEY\ALDRICH\COMMARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG Test Pit No. HA25-TP6														
Project27 KIMBALL RD LocationAMESBURY, MA ClientMP PROPERTIES IV, LLC ContractorLDR EXCAVATION Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR File No.0213708-001 H&A RepM. Dodson Date11/21/2025 WeatherCloudy, 20s-40s														
Ground El.: 180.9			Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered								
El. Datum: NAVD88														
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests				
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0	0.0	180.5	OL/OH	Brown to light-brown sandy ORGANIC SOIL (OL/OH), no structure, organic odor, moist, 35% roots	5	0	5	10	15	65				
0.4		SM	-TOPSOIL-	5	5	10	10	45	25					
180.1		SM	Yellow-brown to brown silty SAND (SM), intermixed, no odor, moist, 10% pockets of former subsoil, likely reworked loess -FILL-	5	0	10	15	45	25					
		0.8		Yellow to tan silty SAND (SM), no structure, no odor, moist, 5% cobbles, no boulders, weakly to unbonded -GLACIAL TILL-										
2	0.0													
	0.0													
4	0.0													
	0.0		SM	Yellow to yellow-brown silty SAND with gravel (SM), no structure, no odor, moist, 15% cobbles, no boulders, moderately bonded	10	5	5	5	35	40				
6	0.0													
	0.0													
8		172.9												
		8.0												
BOTTOM OF EXPLORATION AT 8.0 FT Note: Test pit backfilled with excavated soil.														
Obstructions: Not encountered			Remarks:			Field Tests								
						Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High								
Standing Water in Completed Pit				Boulders			Test Pit Dimensions (ft)							
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft)							
measured after hours elapsed				12 to 24 over 24 =			Pit Depth (ft) 8.0							
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.														

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONE\DRIVE - HALEY\ALDRICH\COMMARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG										Test Pit No. HA25-TP7									
Project27 KIMBALL RD										File No.0213708-001									
LocationAMESBURY, MA										H&A RepA. Balogh									
ClientMP PROPERTIES IV, LLC										Date11/24/2025									
ContractorLDR EXCAVATION										WeatherCloudy, 30s-40s									
Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR																			
Ground El.: 179.8				Location: See Plan				Groundwater depths/entry rates (in./min.): Not encountered											
El. Datum: NAVD88																			
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests									
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength					
0			SM	Loose brown silty SAND (SM), organic odor, moist, 25% roots -TOPSOIL-	5	5	10	15	40	25									
1	0.0	179.2 0.6	SM	Loose light brown to brown silty SAND with gravel (SM), no odor, moist, 10% cobbles, 10% roots -LOESS-	10	5	10	10	40	25									
2	0.0	178.3 1.5	SM	Medium dense yellow-brown to light brown silty SAND with gravel (SM), bonded, no odor, moist, 15% cobbles -GLACIAL TILL-	10	5	10	10	45	20									
3	0.0																		
4	0.0		SM	Similar to above, except trace boulders and cobbles	15	10	10	10	40	15									
5																			
6	0.0																		
7		172.8 7.0		BOTTOM OF EXPLORATION AT 7.0 FT Note: Test pit backfilled with excavated soil.															
Obstructions: Not encountered			Remarks:				Field Tests												
							Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High												
Standing Water in Completed Pit				Boulders			Test Pit Dimensions (ft)												
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft) 2.5 x 9												
measured after hours elapsed				12 to 24 over 24 =			Pit Depth (ft) 7.0												
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.																			

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONE\DRIVE - HALEYALDRICH.COM\MARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG										Test Pit No. HA25-TP8				
Project27 KIMBALL RD LocationAMESBURY, MA ClientMP PROPERTIES IV, LLC ContractorLDR EXCAVATION Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR File No.0213708-001 H&A RepM. Dodson Date11/21/2025 WeatherCloudy, 20s-40s														
Ground El.: 186.7			Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered								
El. Datum: NAVD88														
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests				
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0		186.4 0.3	OL/OH SM	Dark brown sandy ORGANIC SOIL (OL/OH), no structure, organic odor, moist, 35% roots -TOPSOIL- Yellow-brown brown silty SAND (SM), intermixed, no odor, moist, contains lenses and layers of former topsoil and subsoil, likely reworked loess -FILL-	5	0	5	10	15	65				
	0.0				5	0	10	5	45	35				
2	0.0													
	0.0													
4	0.0	183.1 3.6	OL/OH	Black to dark brown sandy ORGANIC SOIL (OL/OH), no structure, organic odor, moist, 35% roots -TOPSOIL-	5	0	5	10	15	65				
	0.0	181.8 4.9	SM	Yellow to yellow-brown silty SAND (SM), no structure, no odor, moist, 10% roots -LOESS-	0	5	5	5	40	45				
6	0.0	181.3 5.4	SM	Yellow to yellow-brown silty SAND with gravel (SM), no structure, no odor, moist, slightly bonded -GLACIAL TILL-	10	10	10	5	40	25				
	0.0		SM	Similar to above, except moderately bonded	10	10	10	5	40	25				
8		178.4 8.3		BOTTOM OF EXPLORATION AT 8.3 FT Note: Test pit backfilled with excavated soil.										
Obstructions: Not encountered			Remarks: In-situ permeability test performed from 5.5 to 6.0 ft below ground surface.			Field Tests								
						Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High								
Standing Water in Completed Pit			Boulders			Test Pit Dimensions (ft)								
at depth Not encountered ft			Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft)								
measured after hours elapsed			12 to 24 over 24 =			Pit Depth (ft) 8.3								
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.														

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONEDRIVE - HALEYALDRICH\COMMARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG										Test Pit No. HA25-TP9				
Project27 KIMBALL RD										File No.0213708-001				
LocationAMESBURY, MA										H&A RepM. Dodson				
ClientMP PROPERTIES IV, LLC										Date11/21/2025				
ContractorLDR EXCAVATION										WeatherCloudy, 20s-40s				
Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR														
Ground El.: 179.5			Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered								
El. Datum: NAVD88														
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests				
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0		178.8	OL/OH	Black to dark brown sandy ORGANIC SOIL (OL/OH), no structure, organic odor, moist, 35% roots -TOPSOIL-	5	0	5	10	15	65				
	0.0	0.7	SM	Yellow to yellow-brown silty SAND (SM), no structure, no odor, moist, 10% roots -LOESS-	0	5	5	5	40	45				
		178.1	SM	Yellow to tan silty SAND (SM), no structure, no odor, moist, weakly to unbonded -GLACIAL TILL-	5	0	10	5	50	30				
2	0.0													
	0.0													
4	0.0													
	0.0		SM	Yellow to yellow-brown silty SAND with gravel (SM), no structure, no odor, moist, moderately bonded	10	10	10	5	40	25				
6	0.0													
	0.0													
8		170.7												
		8.8		BOTTOM OF EXPLORATION AT 8.8 FT Note: Test pit backfilled with excavated soil.										
Obstructions: Not encountered			Remarks:			Field Tests								
						Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High								
Standing Water in Completed Pit				Boulders			Test Pit Dimensions (ft)							
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft)							
measured after hours elapsed				12 to 24 over 24 =			Pit Depth (ft) 8.8							
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.														

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONEDRIVE - HALEY\ALDRICH\COMMARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG										Test Pit No. HA25-TP10				
Project27 KIMBALL RD LocationAMESBURY, MA ClientMP PROPERTIES IV, LLC ContractorLDR EXCAVATION Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR										File No.0213708-001 H&A RepA. Balogh Date11/25/2025 WeatherCloudy, 30s-40s				
Ground El.: 167.2			Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered								
El. Datum: NAVD88														
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests				
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0	0.0	166.5 0.7	OL/OH	Loose brown sandy ORGANIC SOIL (OL/OH), organic odor, moist, 25% roots -TOPSOIL-	0	5	10	15	45	25				
1	0.0		SM	Loose light-brown to brown silty SAND (SM), no structure, no odor, moist, 20% roots -LOESS-	5	5	10	10	40	30				
2			SM	Medium dense tan to light-brown silty SAND with gravel (SM), stratified, no odor, moist, 10% cobbles, visible stratification on pit sidewall -GLACIAL TILL-	5	10	10	15	35	25				
3	0.0	165.5 1.7												
4														
5	0.0		SM	Dense brown to light-brown mottled silty SAND (SM), bonded, no odor, moist, 15% cobbles, trace boulders Note: Mottling observed at 5.0 ft.	5	5	10	10	35	35				
6		160.2 7.0												
7	0.0			BOTTOM OF EXPLORATION AT 7.0 FT Note: Test pit backfilled with excavated soil.										
Obstructions: Not encountered			Remarks:				Field Tests							
							Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High							
Standing Water in Completed Pit				Boulders				Test Pit Dimensions (ft)						
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)				Pit Length x Width (ft) 3 x 9						
measured after hours elapsed				12 to 24 over 24 =				Pit Depth (ft) 7.0						
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.														

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONEDRIVE - HALEYALDRICH.COM\MARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG										Test Pit No. HA25-TP11				
Project27 KIMBALL RD										File No.0213708-001				
LocationAMESBURY, MA										H&A RepA. Balogh				
ClientMP PROPERTIES IV, LLC										Date11/25/2025				
ContractorLDR EXCAVATION										WeatherCloudy, 30s-40s				
Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR														
Ground El.: 184.3			Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered								
El. Datum: NAVD88														
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests				
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0	0.0	183.6 0.7 182.4 1.9	OL/OH	Loose brown sandy ORGANIC SOIL (OL/OH), organic odor, moist, 25% roots -TOPSOIL-	0	5	5	10	40	40				
	0.0		SM	Loose light-brown to brown silty SAND (SM), no structure, no odor, moist, 20% roots, trace cobbles -LOESS-	5	5	10	5	40	35				
2	0.0		SM	Medium dense to dense tan to light-brown silty SAND with gravel (SM), weakly to moderately bonded, no odor, moist, 15% cobbles, 5% boulders -GLACIAL TILL-	5	10	10	10	35	30				
4	0.0													
6	0.0													
8	0.0	176.3 8.0		Bottom of Exploration at 8.0 ft. Note: Mottling observed at 7.5 ft.										
				Bottom of Exploration at 8.0 FT Note: Test pit backfilled with excavated soil.										
Obstructions: Not encountered			Remarks:			Field Tests								
						Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High								
Standing Water in Completed Pit				Boulders			Test Pit Dimensions (ft)							
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft) 3 x 9							
measured after hours elapsed				12 to 24 over 24 =			Pit Depth (ft) 8.0							
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.														

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONEDRIVE - HALEYALDRICH\COMMARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG										Test Pit No. HA25-TP12				
Project27 KIMBALL RD LocationAMESBURY, MA ClientMP PROPERTIES IV, LLC ContractorLDR EXCAVATION Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR										File No.0213708-001 H&A RepA. Balogh Date11/25/2025 WeatherCloudy, 30s-40s				
Ground El.: 183.3			Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered								
El. Datum: NAVD88														
Depth (ft)	Sample Data/ PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests				
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0	0.0	182.3 1.0 181.6 1.7	OL/OH	Loose brown sandy ORGANIC SOIL (OL/OH), organic odor, moist, 25% roots -TOPSOIL-	0	5	10	15	35	35				
	0.0		SM	Loose light-brown to brown silty SAND (SM), no structure, no odor, moist, 20% roots -LOESS-	5	5	10	10	35	35				
2	0.0		SM	Medium dense tan to light-brown silty SAND with gravel (SM), bonded, no odor, moist, 15% cobbles, 5% boulders -GLACIAL TILL-	5	10	10	15	40	20				
4	0.0													
6	0.0													
8	0.0	175.3 8.0												
				BOTTOM OF EXPLORATION AT 8.0 FT Note: Test pit backfilled with excavated soil.										
Obstructions: Not encountered			Remarks: In-situ permeability test performed from 5.5 to 6.0 ft below ground surface.					Field Tests						
								Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High						
Standing Water in Completed Pit				Boulders			Test Pit Dimensions (ft)							
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft) 5 x 15							
measured after hours elapsed				12 to 24 over 24 =			Pit Depth (ft) 8.0							
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.														

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONE\DRIVE - HALEY\ALDRICH\COMMARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG										Test Pit No. HA25-TP13				
Project27 KIMBALL RD										File No.0213708-001				
LocationAMESBURY, MA										H&A RepA. Balogh				
ClientMP PROPERTIES IV, LLC										Date11/24/2025				
ContractorLDR EXCAVATION										WeatherCloudy, 30s-40s				
Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR														
Ground El.: 169.1			Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered								
El. Datum: NAVD88														
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests				
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0	0.0	168.7 0.4	SM	Loose brown silty SAND (SM), organic odor, moist, 25% roots -TOPSOIL-	0	5	10	15	35	35				
			SM	Loose light brown to brown silty SAND with gravel (SM), no structure, no odor, moist, 10% cobbles, 10% roots -LOESS-	10	5	10	10	35	30				
1	0.0	168.1 1.0	SM	Medium dense tan to light brown silty SAND with gravel (SM), bonded, no odor, moist, 15% cobbles -GLACIAL TILL-	5	10	5	15	35	30				
2														
3	0.0													
4			SM	Similar to above, except dense, brown to light brown, 10% cobbles, 20% boulders	10	5	10	10	30	35				
5	0.0			Note: Several large boulders at 6 ft. Unable to excavate further.										
6		163.1 6.0		BOTTOM OF EXPLORATION AT 6.0 FT Note: Test pit backfilled with excavated soil.										
Obstructions: Boulders encountered at 6 ft below ground surface.			Remarks:			Field Tests								
						Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High								
Standing Water in Completed Pit				Boulders			Test Pit Dimensions (ft)							
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft) 3 x 11							
measured after hours elapsed				12 to 24 over 24 =			Pit Depth (ft) 6.0							
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.														

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONEDRIVE - HALEYALDRICH.COM\MARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG										Test Pit No. HA25-TP14				
Project27 KIMBALL RD LocationAMESBURY, MA ClientMP PROPERTIES IV, LLC ContractorLDR EXCAVATION Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR File No.0213708-001 H&A RepA. Balogh Date11/24/2025 WeatherCloudy, 30s-40s														
Ground El.: 156.4			Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered								
El. Datum: NAVD88														
Depth (ft)	Sample Data PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests				
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0	0.0		SM	Loose brown silty SAND (SM), organic odor, moist, 25% roots -TOPSOIL-	0	5	10	15	35	35				
1	0.0	155.6 0.8	SM	Loose light brown to brown silty SAND with gravel (SM), no odor, moist, 10% cobbles, 10% roots -LOESS-	10	5	10	10	40	25				
2		154.5 1.9	SM	Medium dense tan to light brown silty SAND with gravel (SM), bonded, no odor, moist, 15% cobbles -GLACIAL TILL-	10	5	10	10	45	20				
3	0.0													
4			SM	Similar to above, except dense, brown to light brown, trace boulders	10	5	10	10	35	30				
5	0.0													
6				Note: Mottling observed at 6 ft.										
		149.9 6.5		BOTTOM OF EXPLORATION AT 6.5 FT Note: Test pit backfilled with excavated soil.										
Obstructions: Not encountered			Remarks:			Field Tests								
						Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High								
Standing Water in Completed Pit				Boulders			Test Pit Dimensions (ft)							
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft)							
measured after hours elapsed				12 to 24 over 24 =			Pit Depth (ft) 6.5							
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.														

HA TESTPIT-09-W/ PID PLOG-HA-LIB09-BOS STANDARD ONLY-MARCH 2024.GLB HA-TP09-FENCE.GDT C:\USERS\KUBELLONEDRIVE - HALEYALDRICH\COMMARCUS PARTNERS - GINT\0213708-001\0213708-001_GINT.GPJ Dec 16, 25

HALEYALDRICH TEST PIT LOG										Test Pit No. HA25-TP15				
Project27 KIMBALL RD LocationAMESBURY, MA ClientMP PROPERTIES IV, LLC ContractorLDR EXCAVATION Equipment UsedDEERE 35G TRACK-MOUNTED EXCAVATOR										File No.0213708-001 H&A RepA. Balogh Date11/24/2025 WeatherCloudy, 30s-40s				
Ground El.: 153.2			Location: See Plan			Groundwater depths/entry rates (in./min.): Not encountered								
El. Datum: NAVD88														
Depth (ft)	Sample Data/ PID Readings (ppm)	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (color, natural grain size and artificial component percentage estimates, maximum particle size, manual test properties, structure, odors, moisture, other descriptions and observations GEOLOGIC INTERPRETATION)	Gravel		Sand			Field Tests				
					% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0	0.0	152.2 1.0	SM	Brown silty SAND (SM), organic odor, moist, 25% roots -TOPSOIL-	0	5	10	15	35	35				
	0.0		SM	Light brown to brown silty SAND with gravel (SM), no odor, moist, 10% cobbles, 10% roots -LOESS-	10	5	10	10	40	25				
2	0.0		SM	Tan to light brown silty SAND with gravel (SM), bonded, no odor, moist, 15% cobbles, variable silt content -GLACIAL TILL-	10	5	10	15	35	25				
4	0.0	151.2 2.0	SM	Dense tan to light brown silty SAND (SM), bonded, no odor, moist, 15% cobbles	5	5	10	10	35	35				
6	0.0													
8	0.0	145.2 8.0		BOTTOM OF EXPLORATION AT 8.0 FT Note: Test pit backfilled with excavated soil.										
Obstructions: Not encountered			Remarks: In-situ permeability test performed from 4.1 to 4.6 ft below ground surface.				Field Tests							
							Dilatancy R - Rapid S - Slow N - None Toughness L - Low M - Medium H - High Plasticity N - Nonplastic L - Low M - Medium H - High Dry Strength N - None L - Low M - Medium H - High V - Very High							
Standing Water in Completed Pit				Boulders			Test Pit Dimensions (ft)							
at depth Not encountered ft				Diameter (in.) Number Approx. Vol. (cu.ft)			Pit Length x Width (ft)							
measured after hours elapsed				12 to 24 over 24 =			Pit Depth (ft) 8.0							
NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.														

APPENDIX B

Geotechnical Lab Test Results

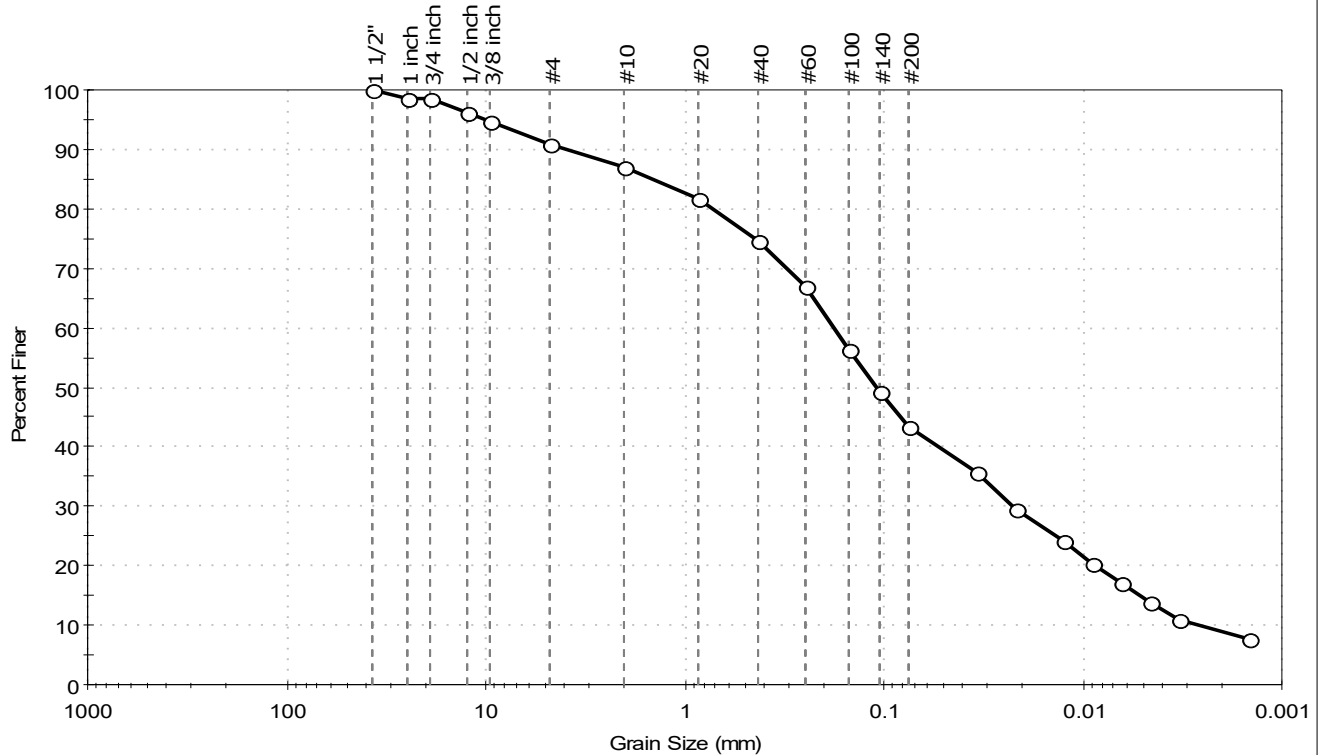
Client: Haley & Aldrich, Inc.
Project: 27 Kimball Rd
Location: Amesbury

Project No: GTX-322317

Boring ID: --- Sample Type: Bag Tested By: ajl
Sample ID: HA25-TP1_3.0-6.3 Test Date: 12/16/25 Checked By: ank
Depth: 3-6.3 Test Id: 847393

Test Comment: ---
Visual Description: Moist, yellowish brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	9.0	47.5	43.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 1/2"	37.50	100		
1 inch	25.00	98		
3/4 inch	19.00	98		
1/2 inch	12.50	96		
3/8 inch	9.50	95		
#4	4.75	91		
#10	2.00	87		
#20	0.85	82		
#40	0.42	75		
#60	0.25	67		
#100	0.15	56		
#140	0.11	49		
#200	0.075	43		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0339	36		
---	0.0216	30		
---	0.0127	24		
---	0.0091	20		
---	0.0065	17		
---	0.0046	14		
---	0.0033	11		
---	0.0015	8		

Coefficients

D₈₅ = 1.4433 mm D₃₀ = 0.0223 mm
D₆₀ = 0.1781 mm D₁₅ = 0.0052 mm
D₅₀ = 0.1096 mm D₁₀ = 0.0026 mm
C_u = 68.500 C_c = 1.074

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

Client: Haley & Aldrich, Inc.
Project: 27 Kimball Rd
Location: Amesbury

Project No: GTX-322317

Boring ID: ---

Sample Type: Bag

Tested By: ajl

Sample ID: HA25-TP2_3.0-7.0

Test Date: 12/15/25

Checked By: ank

Depth : 3-7

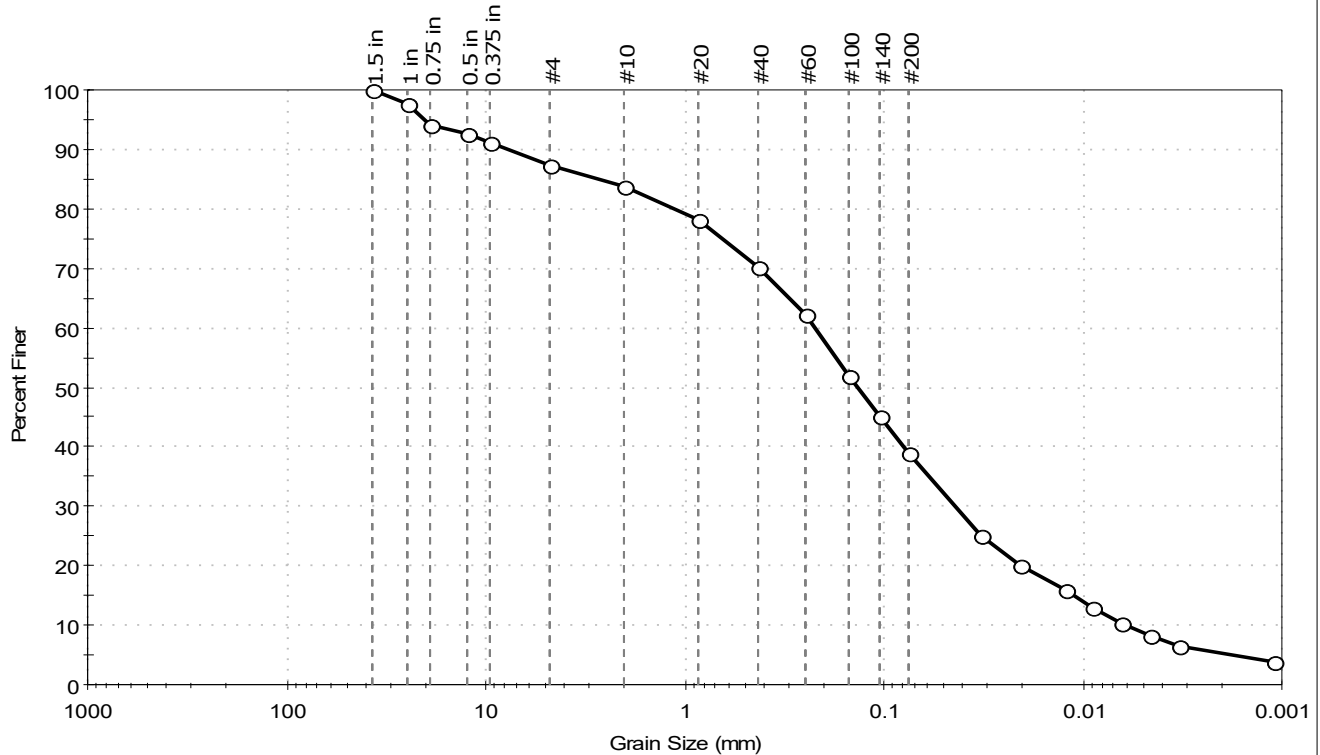
Test Id: 847392

Test Comment: ---

Visual Description: Moist, yellowish brown silty sand

Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	12.6	48.3	39.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	98		
0.75 in	19.00	94		
0.5 in	12.50	93		
0.375 in	9.50	91		
#4	4.75	87		
#10	2.00	84		
#20	0.85	78		
#40	0.42	70		
#60	0.25	62		
#100	0.15	52		
#140	0.11	45		
#200	0.075	39		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0325	25		
---	0.0207	20		
---	0.0124	16		
---	0.0089	13		
---	0.0064	10		
---	0.0046	8		
---	0.0033	7		
---	0.0011	4		

Coefficients

D₈₅ = 2.7293 mm D₃₀ = 0.0436 mm
D₆₀ = 0.2222 mm D₁₅ = 0.0113 mm
D₅₀ = 0.1354 mm D₁₀ = 0.0062 mm
C_u = 35.839 C_c = 1.380

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

Client: Haley & Aldrich, Inc.
Project: 27 Kimball Rd
Location: Amesbury

Project No: GTX-322317

Boring ID: ---

Sample Type: Bag

Tested By: ajl

Sample ID: HA25-TP3_3.0-7.0

Test Date: 12/16/25

Checked By: ank

Depth: 3-7

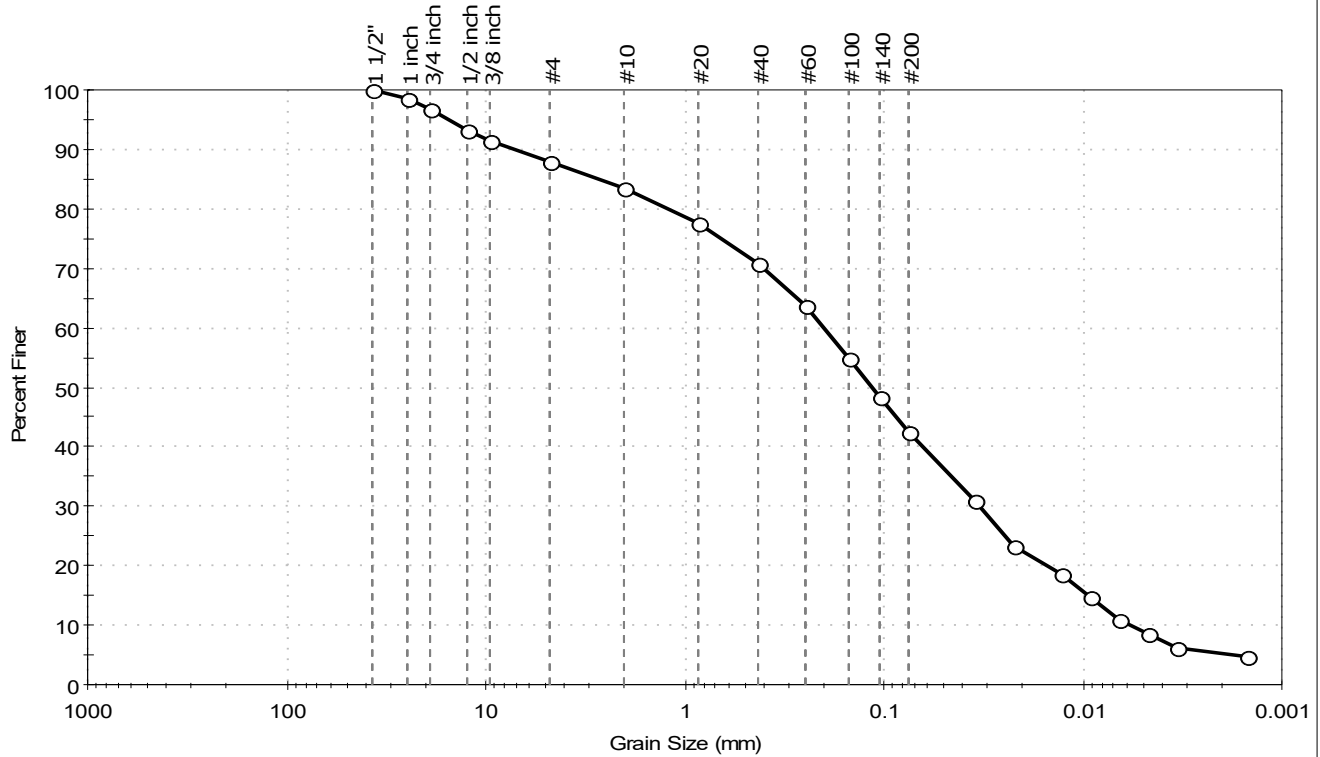
Test Id: 847391

Test Comment: ---

Visual Description: Moist, yellowish brown silty sand

Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	12.1	45.3	42.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 1/2"	37.50	100		
1 inch	25.00	98		
3/4 inch	19.00	97		
1/2 inch	12.50	93		
3/8 inch	9.50	91		
#4	4.75	88		
#10	2.00	84		
#20	0.85	78		
#40	0.42	71		
#60	0.25	64		
#100	0.15	55		
#140	0.11	48		
#200	0.075	43		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0348	31		
---	0.0221	23		
---	0.0129	19		
---	0.0093	15		
---	0.0066	11		
---	0.0047	9		
---	0.0034	6		
---	0.0015	5		

Coefficients

$D_{85} = 2.6681 \text{ mm}$ $D_{30} = 0.0329 \text{ mm}$
 $D_{60} = 0.2015 \text{ mm}$ $D_{15} = 0.0095 \text{ mm}$
 $D_{50} = 0.1154 \text{ mm}$ $D_{10} = 0.0059 \text{ mm}$
 $C_u = 34.153$ $C_c = 0.910$

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
 Sand/Gravel Hardness : HARD
 Dispersion Device : Apparatus A - Mech Mixer
 Dispersion Period : 1 minute
 Est. Specific Gravity : 2.65
 Separation of Sample: #200 Sieve

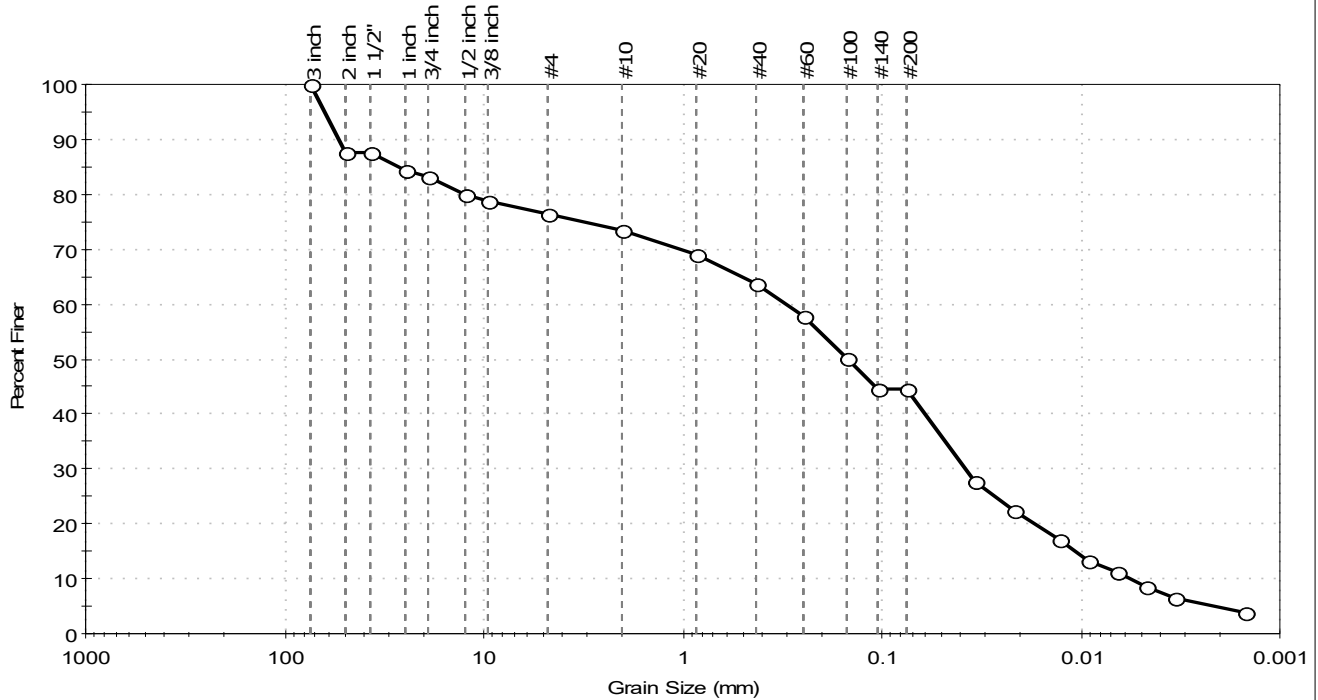
Client: Haley & Aldrich, Inc.
Project: 27 Kimball Rd
Location: Amesbury

Project No: GTX-322317

Boring ID: --- Sample Type: Bag Tested By: ajl
Sample ID: HA25-TP4_3.0-7.5 Test Date: 12/16/25 Checked By: ank
Depth: 3-7.5 Test Id: 847390

Test Comment: ---
Visual Description: Moist, yellowish brown silty sand with gravel
Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	23.7	31.8	44.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3 inch	75.00	100		
2 inch	50.00	88		
1 1/2"	37.50	88		
1 inch	25.00	85		
3/4 inch	19.00	83		
1/2 inch	12.50	80		
3/8 inch	9.50	79		
#4	4.75	76		
#10	2.00	73		
#20	0.85	69		
#40	0.42	64		
#60	0.25	58		
#100	0.15	50		
#140	0.11	45		
#200	0.075	44		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0344	28		
---	0.0216	22		
---	0.0128	17		
---	0.0092	13		
---	0.0066	11		
---	0.0047	9		
---	0.0033	7		
---	0.0015	4		

Coefficients

D₈₅ = 26.6927 mm D₃₀ = 0.0383 mm
D₆₀ = 0.3026 mm D₁₅ = 0.0107 mm
D₅₀ = 0.1486 mm D₁₀ = 0.0056 mm
C_u = 54.036 C_c = 0.866

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

Client: Haley & Aldrich, Inc.

Project: 27 Kimball Rd

Location: Amesbury

Project No: GTX-322317

Boring ID: ---

Sample Type: Bag

Tested By: ajl

Sample ID: HA25-TP5_4.3-4.8

Test Date: 12/15/25

Checked By: ank

Depth: 4.3-4.8

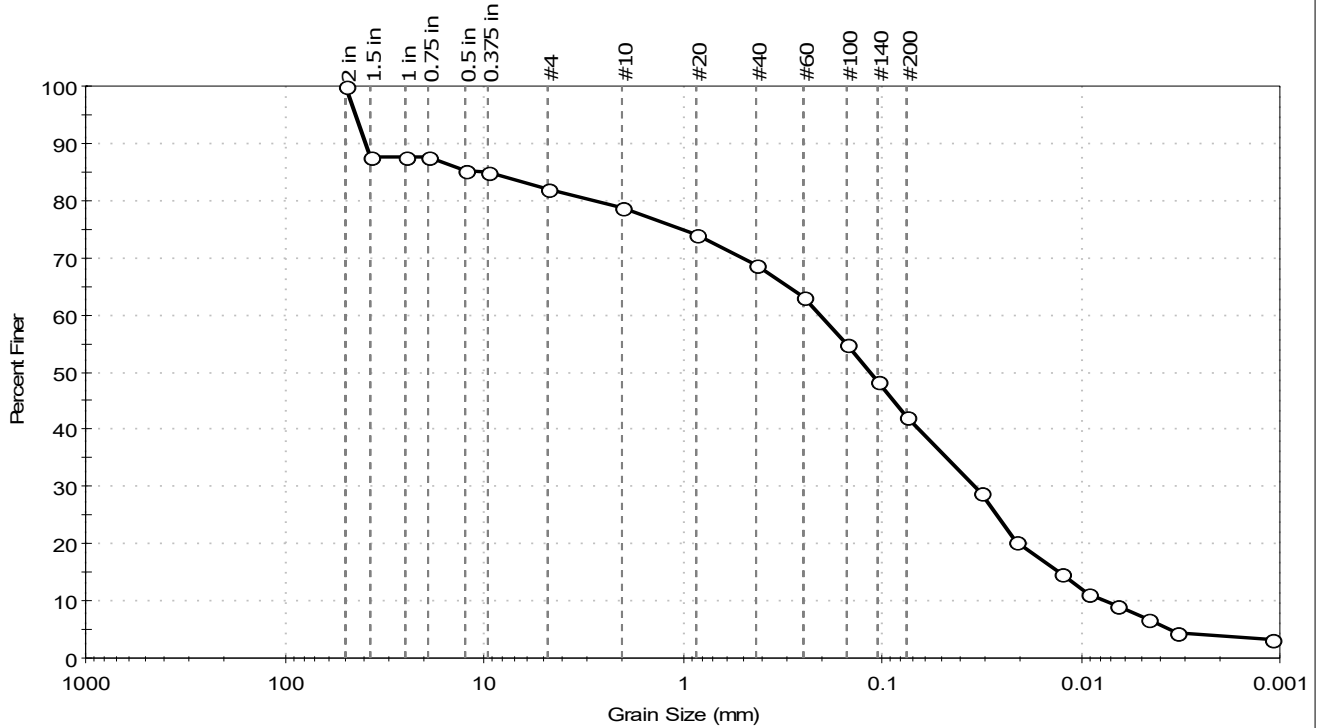
Test Id: 847389

Test Comment: ---

Visual Description: Moist, yellowish brown silty sand with gravel

Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	18.1	39.6	42.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 in	50.00	100		
1.5 in	37.50	88		
1 in	25.00	88		
0.75 in	19.00	88		
0.5 in	12.50	85		
0.375 in	9.50	85		
#4	4.75	82		
#10	2.00	79		
#20	0.85	74		
#40	0.42	69		
#60	0.25	63		
#100	0.15	55		
#140	0.11	48		
#200	0.075	42		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0321	29		
---	0.0214	20		
---	0.0127	15		
---	0.0091	11		
---	0.0065	9		
---	0.0047	7		
---	0.0033	5		
---	0.0011	3		

Coefficients

$D_{85} = 10.2275 \text{ mm}$ $D_{30} = 0.0346 \text{ mm}$
 $D_{60} = 0.2071 \text{ mm}$ $D_{15} = 0.0131 \text{ mm}$
 $D_{50} = 0.1164 \text{ mm}$ $D_{10} = 0.0075 \text{ mm}$
 $C_u = 27.613$ $C_c = 0.771$

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
 Sand/Gravel Hardness : HARD
 Dispersion Device : Apparatus A - Mech Mixer
 Dispersion Period : 1 minute
 Est. Specific Gravity : 2.65
 Separation of Sample: #200 Sieve

Client: Haley & Aldrich, Inc.

Project: 27 Kimball Rd

Location: Amesbury

Project No: GTX-322317

Boring ID: ---

Sample Type: Bag

Tested By: ajl

Sample ID: HA25-TP6_3.0-8.0

Test Date: 12/15/25

Checked By: ank

Depth : 3-8

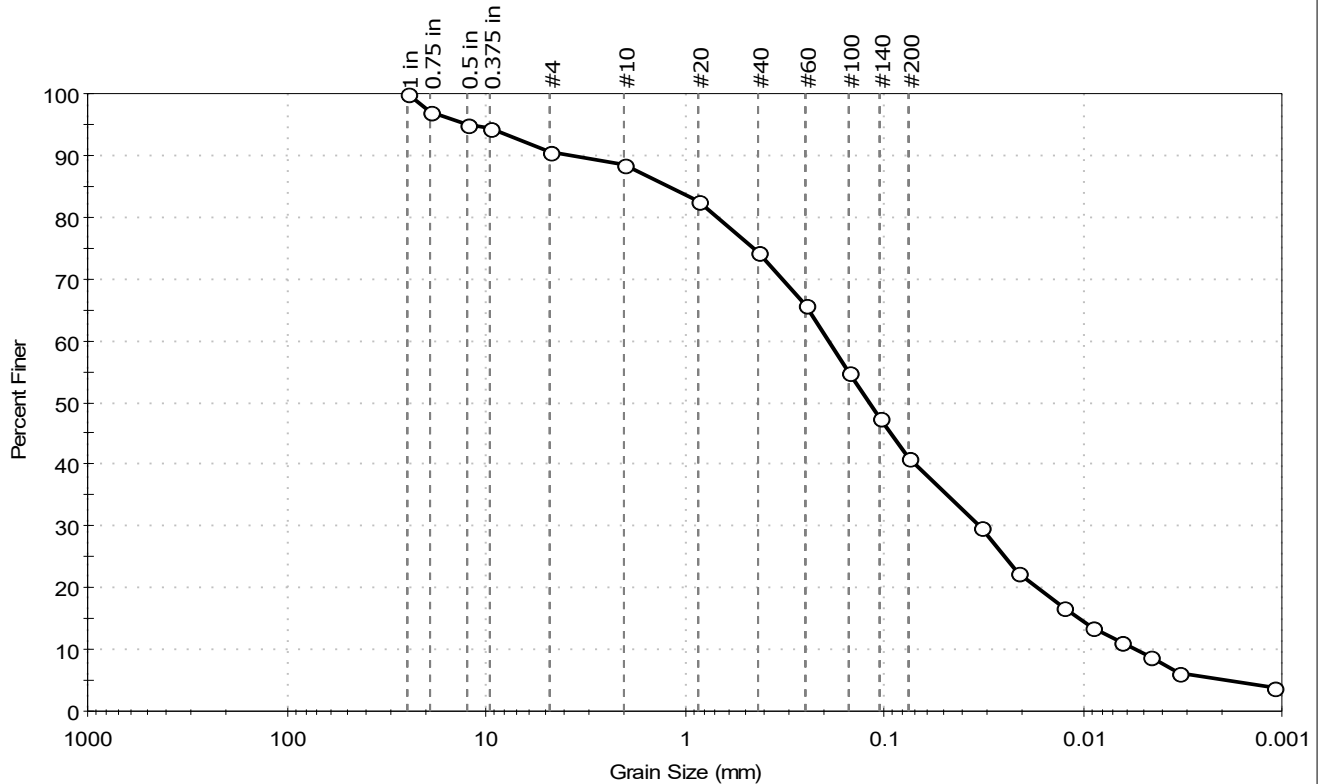
Test Id: 847388

Test Comment: ---

Visual Description: Moist, yellowish brown silty sand

Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	9.4	49.6	41.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	97		
0.5 in	12.50	95		
0.375 in	9.50	94		
#4	4.75	91		
#10	2.00	89		
#20	0.85	83		
#40	0.42	74		
#60	0.25	66		
#100	0.15	55		
#140	0.11	47		
#200	0.075	41		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0328	30		
---	0.0215	22		
---	0.0127	17		
---	0.0091	14		
---	0.0065	11		
---	0.0046	9		
---	0.0033	6		
---	0.0011	4		

Coefficients

D₈₅ = 1.2077 mm D₃₀ = 0.0331 mm

D₆₀ = 0.1902 mm D₁₅ = 0.0104 mm

D₅₀ = 0.1193 mm D₁₀ = 0.0055 mm

C_u = 34.582 C_c = 1.047

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

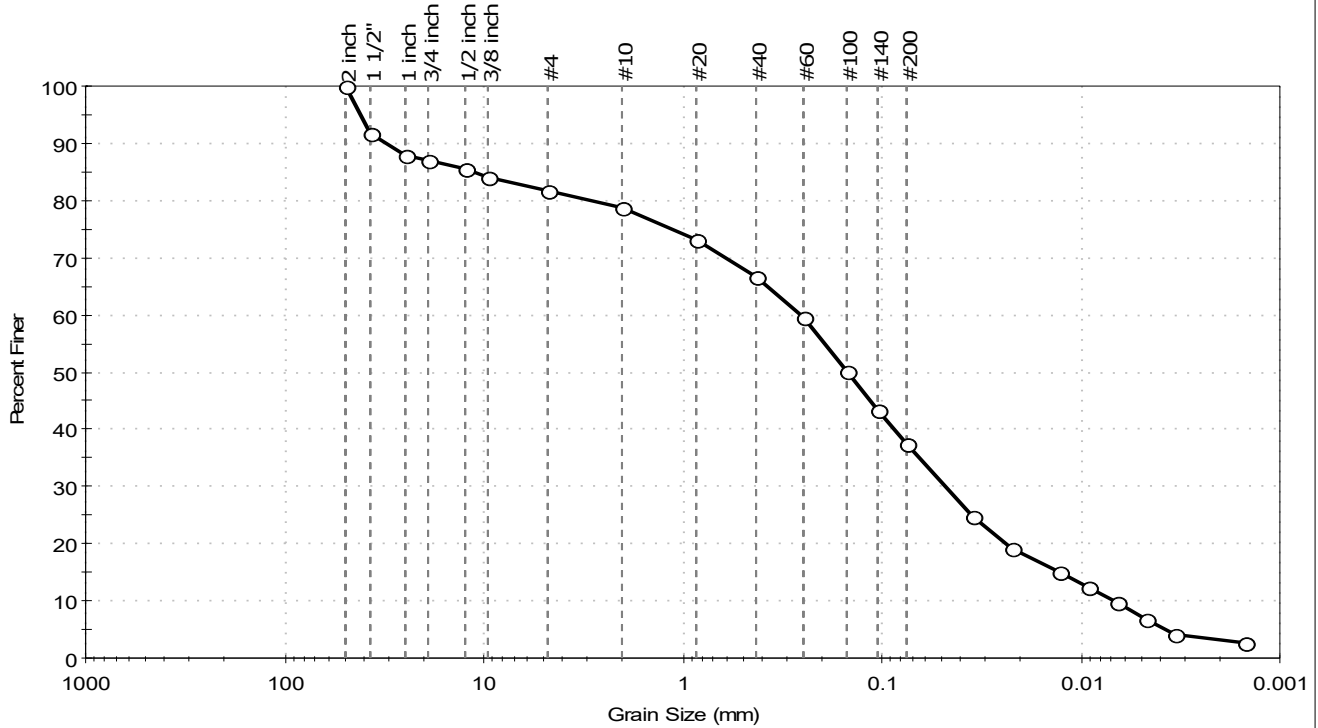
Client: Haley & Aldrich, Inc.
Project: 27 Kimball Rd
Location: Amesbury

Project No: GTX-322317

Boring ID: --- Sample Type: Bag Tested By: ajl
Sample ID: HA25-TP7_3.0-7.0 Test Date: 12/16/25 Checked By: ank
Depth: 3-7 Test Id: 847387

Test Comment: ---
Visual Description: Moist, yellowish brown silty sand with gravel
Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	18.2	44.3	37.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 inch	50.00	100		
1 1/2"	37.50	92		
1 inch	25.00	88		
3/4 inch	19.00	87		
1/2 inch	12.50	85		
3/8 inch	9.50	84		
#4	4.75	82		
#10	2.00	79		
#20	0.85	73		
#40	0.42	67		
#60	0.25	60		
#100	0.15	50		
#140	0.11	43		
#200	0.075	37		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0351	25		
---	0.0221	19		
---	0.0130	15		
---	0.0093	12		
---	0.0066	10		
---	0.0047	7		
---	0.0034	4		
---	0.0015	3		

Coefficients

D₈₅ = 11.3583 mm D₃₀ = 0.0480 mm
D₆₀ = 0.2587 mm D₁₅ = 0.0128 mm
D₅₀ = 0.1497 mm D₁₀ = 0.0069 mm
C_u = 37.493 C_c = 1.291

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

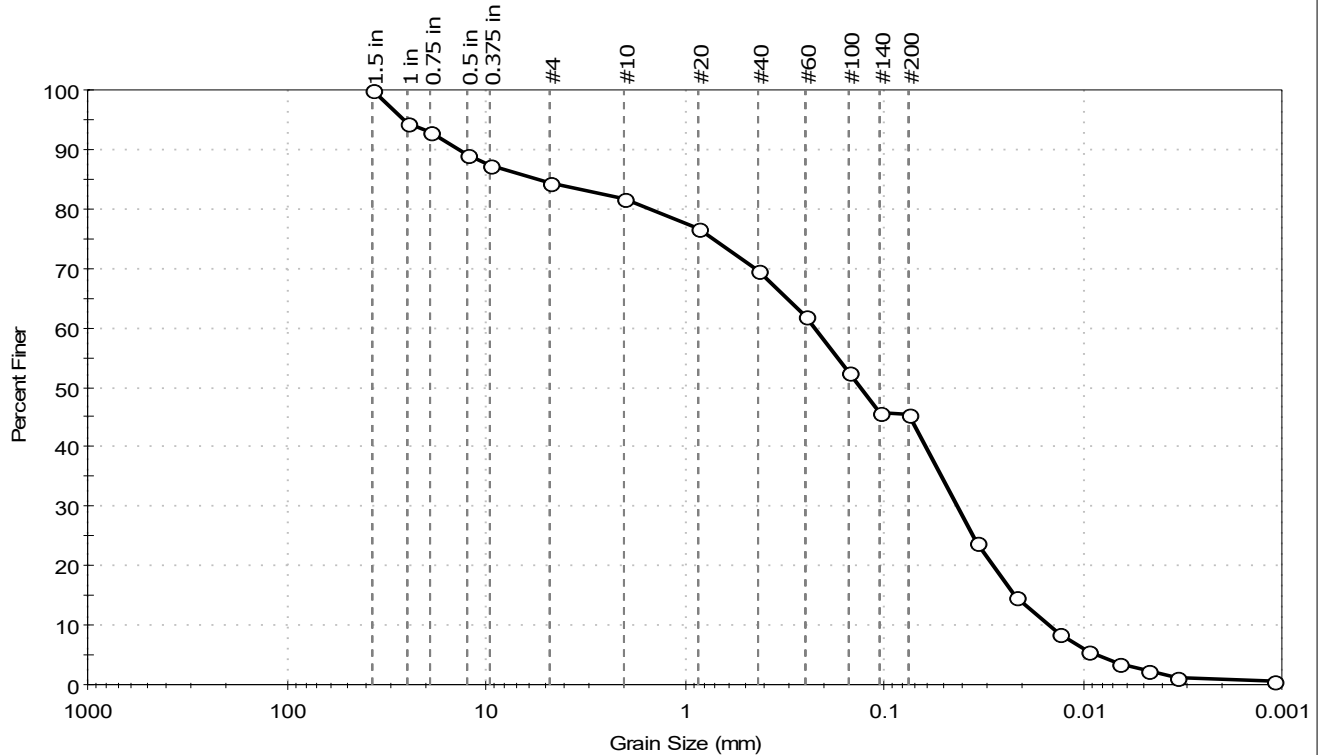
Client: Haley & Aldrich, Inc.
Project: 27 Kimball Rd
Location: Amesbury

Project No: GTX-322317

Boring ID: --- Sample Type: Bag Tested By: ajl
Sample ID: HA25-TP8_5.5-6.0 Test Date: 12/15/25 Checked By: ank
Depth: 5.5-6 Test Id: 847386

Test Comment: ---
Visual Description: Moist, yellowish brown silty sand with gravel
Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	15.5	39.1	45.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	95		
0.75 in	19.00	93		
0.5 in	12.50	89		
0.375 in	9.50	87		
#4	4.75	84		
#10	2.00	82		
#20	0.85	77		
#40	0.42	70		
#60	0.25	62		
#100	0.15	52		
#140	0.11	46		
#200	0.075	45		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0339	24		
---	0.020	15		
---	0.0131	9		
---	0.0094	6		
---	0.0067	3		
---	0.0048	2		
---	0.0034	1		
---	0.0011	1		

Coefficients

D₈₅ = 5.3595 mm D₃₀ = 0.0424 mm
D₆₀ = 0.2239 mm D₁₅ = 0.0221 mm
D₅₀ = 0.1321 mm D₁₀ = 0.0148 mm
C_u = 15.128 C_c = 0.543

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

Client: Haley & Aldrich, Inc.

Project: 27 Kimball Rd

Location: Amesbury

Project No: GTX-322317

Boring ID: ---

Sample Type: Bag

Tested By: ajl

Sample ID: HA25-TP9_4.0-5.0

Test Date: 12/16/25

Checked By: ank

Depth: 4-5

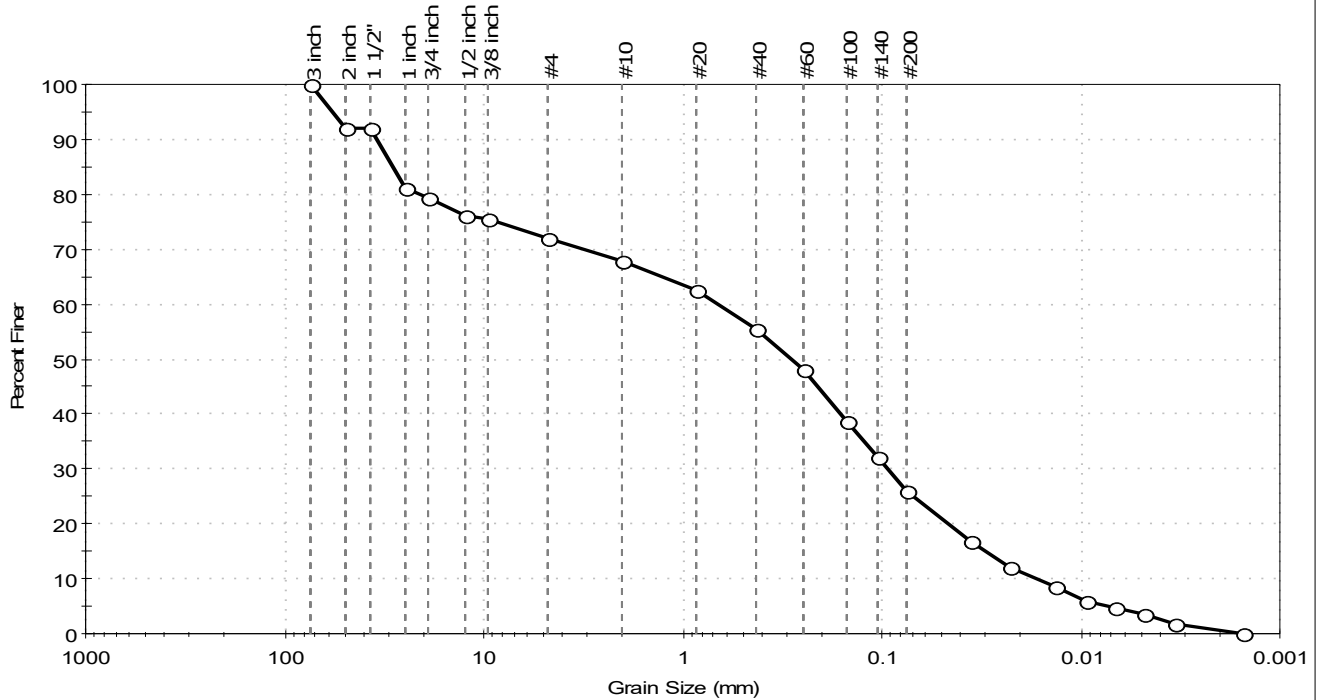
Test Id: 847385

Test Comment: ---

Visual Description: Moist, yellowish brown silty sand with gravel

Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	28.1	45.9	26.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3 inch	75.00	100		
2 inch	50.00	92		
1 1/2"	37.50	92		
1 inch	25.00	81		
3/4 inch	19.00	79		
1/2 inch	12.50	76		
3/8 inch	9.50	76		
#4	4.75	72		
#10	2.00	68		
#20	0.85	62		
#40	0.42	56		
#60	0.25	48		
#100	0.15	39		
#140	0.11	32		
#200	0.075	26		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0360	17		
---	0.0229	12		
---	0.0133	8		
---	0.0095	6		
---	0.0067	5		
---	0.0048	4		
---	0.0034	2		
---	0.0015	0		

Coefficients

D₈₅ = 28.8813 mm D₃₀ = 0.0935 mm

D₆₀ = 0.6672 mm D₁₅ = 0.0302 mm

D₅₀ = 0.2868 mm D₁₀ = 0.0168 mm

C_u = 39.714 C_c = 0.780

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client: Haley & Aldrich, Inc.
Project: 27 Kimball Rd
Location: Amesbury

Project No: GTX-322317

Boring ID: ---

Sample Type: Bag

Tested By: ajl

Sample ID: HA25-TP10_3.0-7.0

Test Date: 12/15/25

Checked By: ank

Depth: 3-7

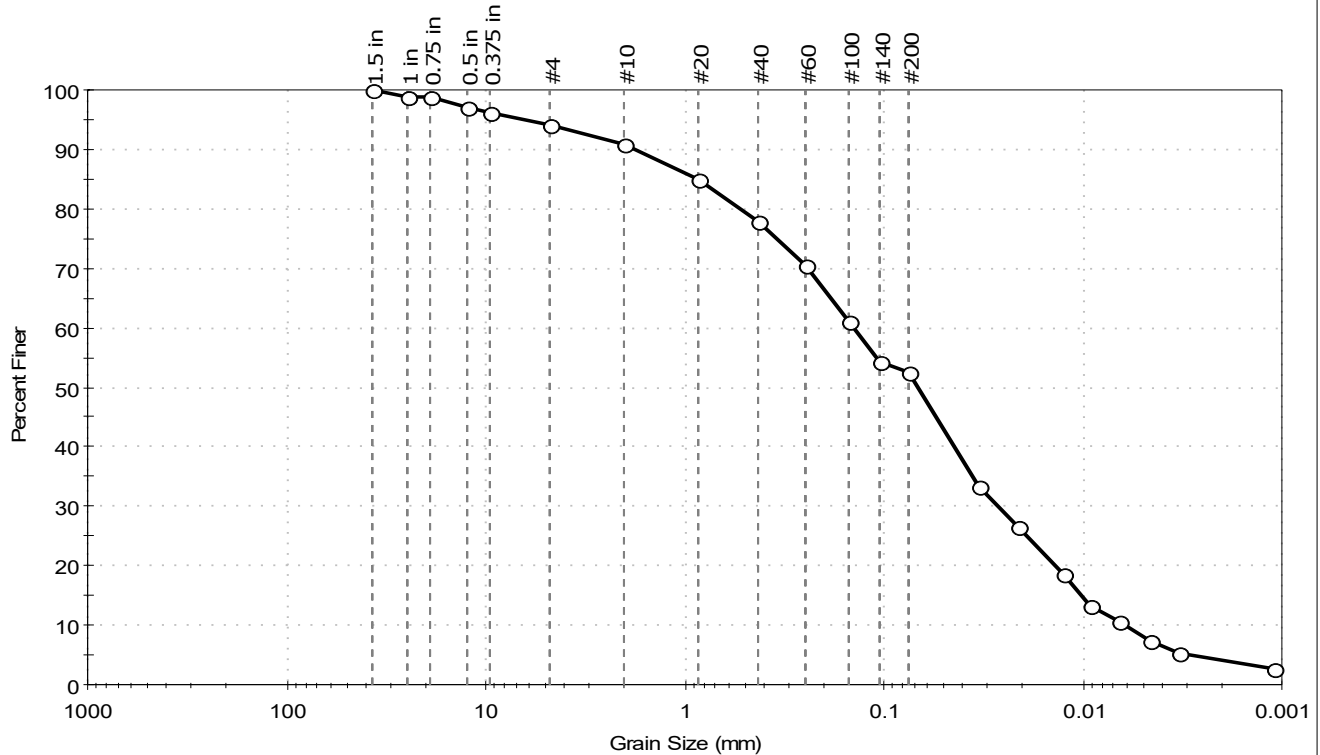
Test Id: 847384

Test Comment: ---

Visual Description: Moist, yellowish brown sandy silt

Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	5.9	41.7	52.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	99		
0.75 in	19.00	99		
0.5 in	12.50	97		
0.375 in	9.50	96		
#4	4.75	94		
#10	2.00	91		
#20	0.85	85		
#40	0.42	78		
#60	0.25	71		
#100	0.15	61		
#140	0.11	54		
#200	0.075	52		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.032	33		
---	0.0212	27		
---	0.0126	19		
---	0.0091	13		
---	0.0065	11		
---	0.0047	7		
---	0.0033	5		
---	0.0011	3		

Coefficients

D₈₅ = 0.8441 mm D₃₀ = 0.0267 mm
D₆₀ = 0.1416 mm D₁₅ = 0.0101 mm
D₅₀ = 0.0677 mm D₁₀ = 0.0061 mm
C_u = 23.213 C_c = 0.825

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

Client: Haley & Aldrich, Inc.
Project: 27 Kimball Rd
Location: Amesbury

Project No: GTX-322317

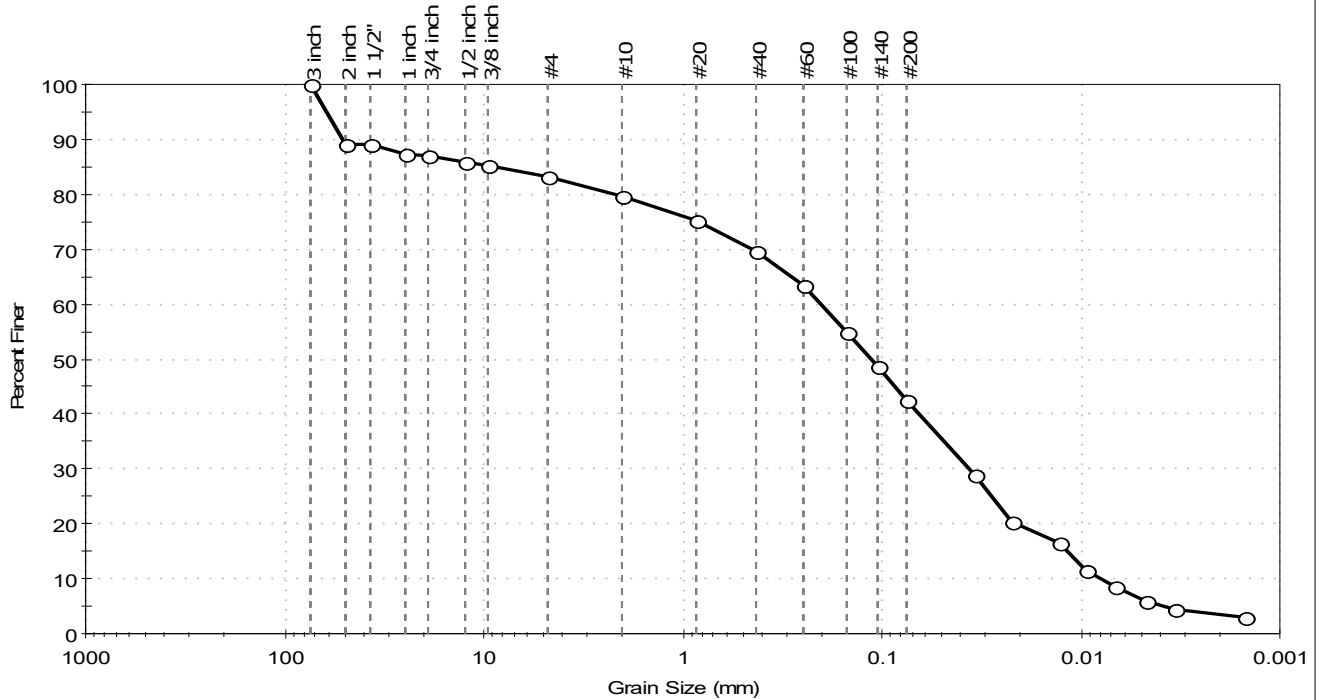
Boring ID: --- Sample Type: Bag Tested By: ajl
Sample ID: HA25-TP11_3.0-8.0 Test Date: 12/16/25 Checked By: ank
Depth: 3-8 Test Id: 847383

Test Comment: ---

Visual Description: Moist, yellowish brown silty sand with gravel

Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	16.9	40.6	42.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3 inch	75.00	100		
2 inch	50.00	89		
1 1/2"	37.50	89		
1 inch	25.00	87		
3/4 inch	19.00	87		
1/2 inch	12.50	86		
3/8 inch	9.50	85		
#4	4.75	83		
#10	2.00	80		
#20	0.85	75		
#40	0.42	70		
#60	0.25	63		
#100	0.15	55		
#140	0.11	49		
#200	0.075	43		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0345	29		
---	0.0223	20		
---	0.0130	17		
---	0.0093	12		
---	0.0067	9		
---	0.0048	6		
---	0.0034	4		
---	0.0015	3		

Coefficients

D₈₅ = 8.4388 mm D₃₀ = 0.0368 mm
D₆₀ = 0.2041 mm D₁₅ = 0.0117 mm
D₅₀ = 0.1133 mm D₁₀ = 0.0078 mm
C_u = 26.167 C_c = 0.851

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

Client: Haley & Aldrich, Inc.

Project: 27 Kimball Rd

Location: Amesbury

Project No: GTX-322317

Boring ID: ---

Sample Type: Bag

Tested By: ajl

Sample ID: HA25-TP12_3.0-8.0

Test Date: 12/16/25

Checked By: ank

Depth: 3-8

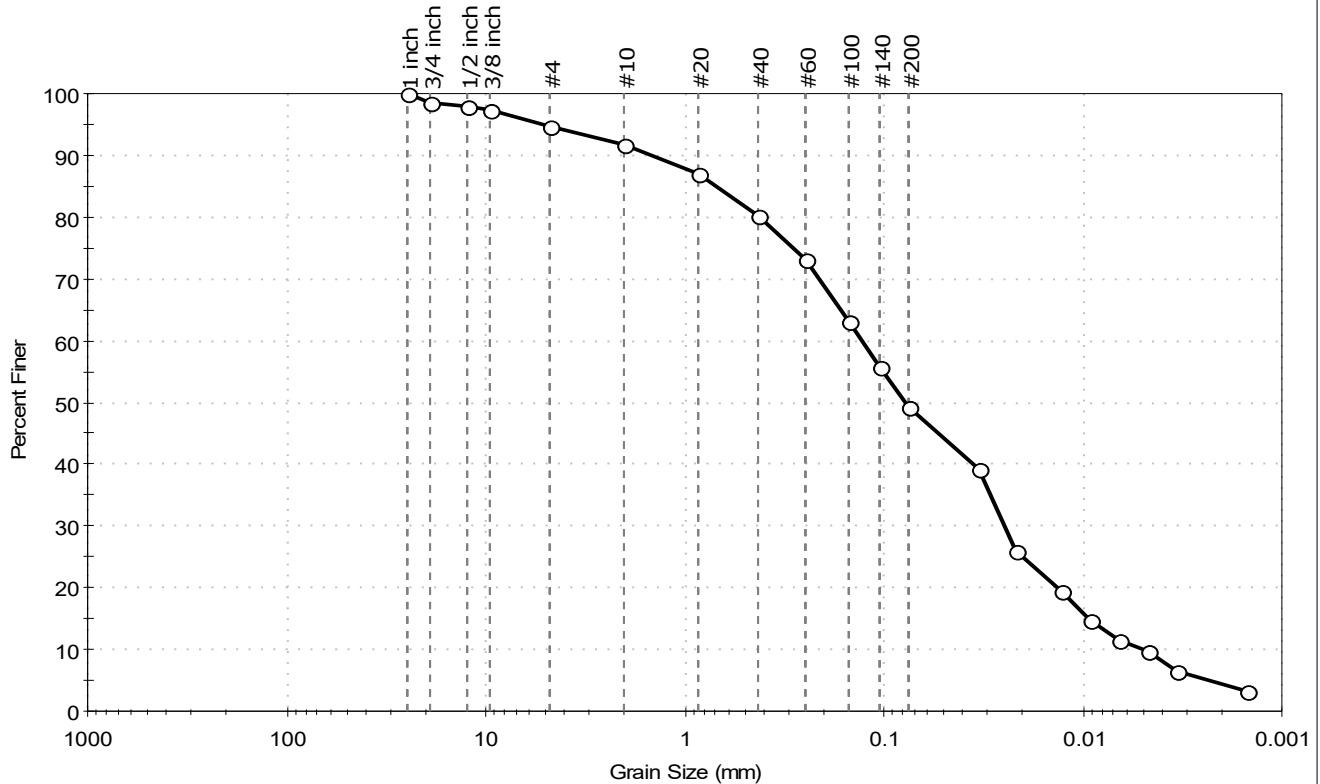
Test Id: 847382

Test Comment: ---

Visual Description: Moist, yellowish brown silty sand

Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	5.3	45.5	49.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 inch	25.00	100		
3/4 inch	19.00	99		
1/2 inch	12.50	98		
3/8 inch	9.50	97		
#4	4.75	95		
#10	2.00	92		
#20	0.85	87		
#40	0.42	80		
#60	0.25	73		
#100	0.15	63		
#140	0.11	56		
#200	0.075	49		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0332	39		
---	0.0218	26		
---	0.0129	20		
---	0.0093	15		
---	0.0066	11		
---	0.0047	10		
---	0.0034	7		
---	0.0015	3		

Coefficients

D₈₅ = 0.6966 mm D₃₀ = 0.0248 mm

D₆₀ = 0.1299 mm D₁₅ = 0.0095 mm

D₅₀ = 0.0783 mm D₁₀ = 0.0049 mm

C_u = 26.510 C_c = 0.966

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client: Haley & Aldrich, Inc.

Project: 27 Kimball Rd

Location: Amesbury

Project No: GTX-322317

Boring ID: ---

Sample Type: Bag

Tested By: ajl

Sample ID: HA25-TP13_3.0-6.0

Test Date: 12/12/25

Checked By: ank

Depth : 3-6

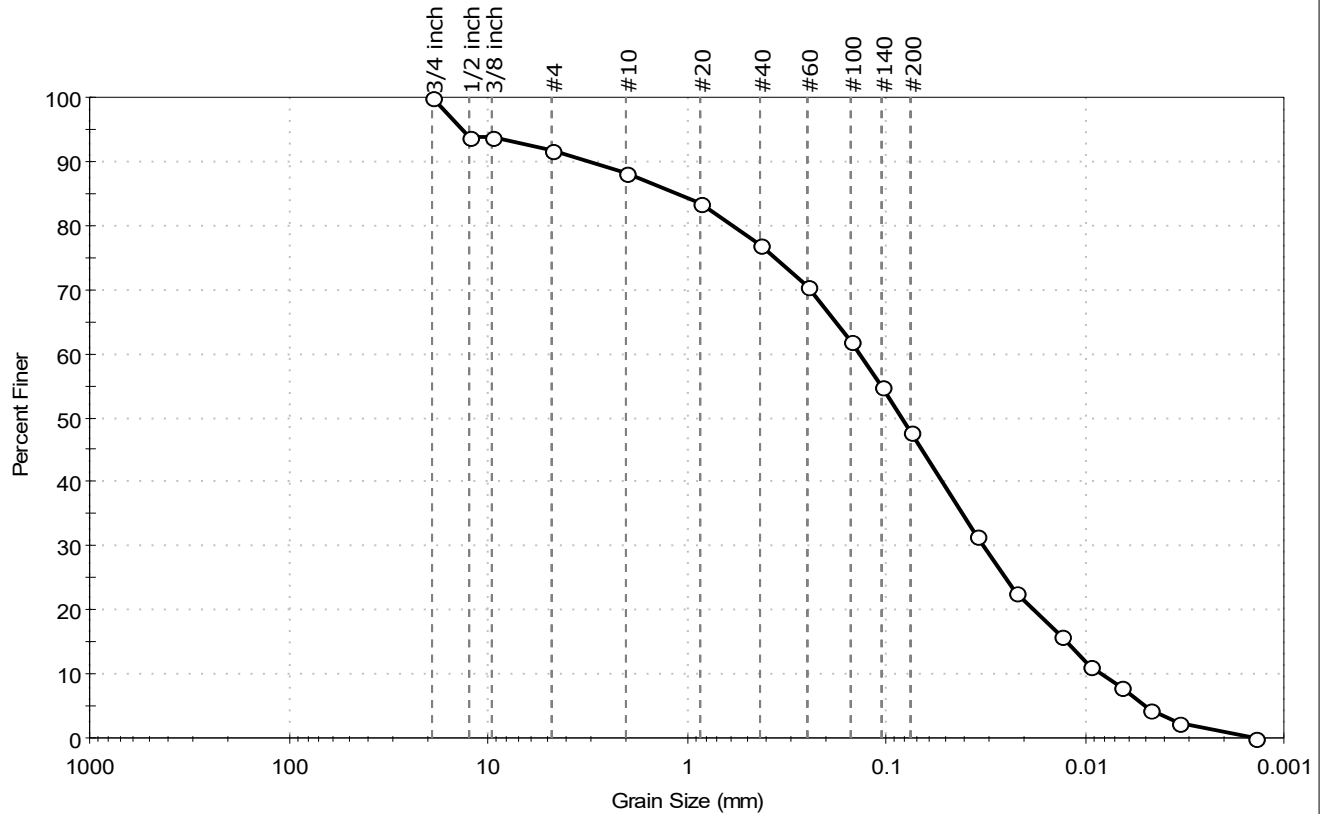
Test Id: 847381

Test Comment: ---

Visual Description: Moist, yellowish brown sandy silt

Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	8.1	44.0	47.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3/4 inch	19.00	100		
1/2 inch	12.50	94		
3/8 inch	9.50	94		
#4	4.75	92		
#10	2.00	88		
#20	0.85	83		
#40	0.42	77		
#60	0.25	70		
#100	0.15	62		
#140	0.11	55		
#200	0.075	48		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0349	32		
---	0.0224	23		
---	0.0131	16		
---	0.0093	11		
---	0.0066	8		
---	0.0047	5		
---	0.0034	2		
---	0.0014	0		

Coefficients

D₈₅ = 1.1312 mm D₃₀ = 0.0322 mm

D₆₀ = 0.1367 mm D₁₅ = 0.0123 mm

D₅₀ = 0.0831 mm D₁₀ = 0.0082 mm

C_u = 16.671 C_c = 0.925

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client: Haley & Aldrich, Inc.
Project: 27 Kimball Rd
Location: Amesbury

Project No: GTX-322317

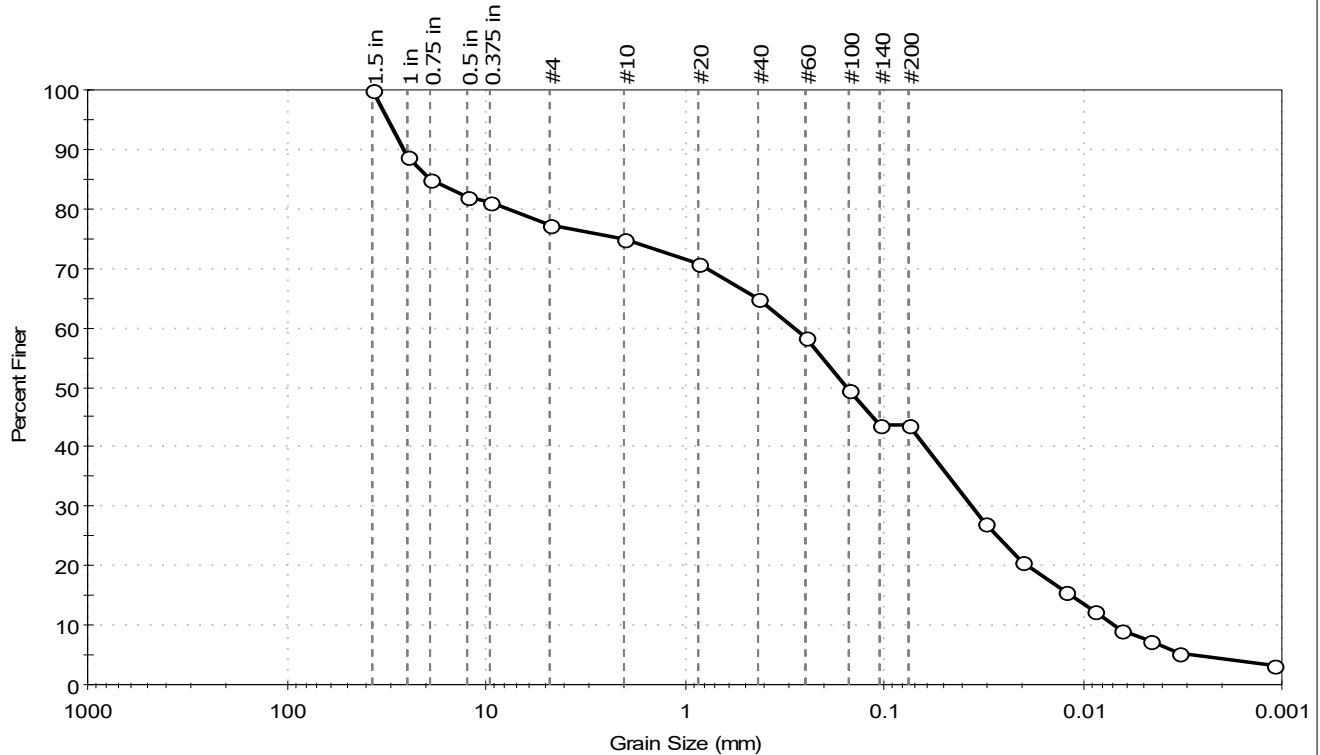
Boring ID: --- Sample Type: Bag Tested By: ajl
Sample ID: HA25-TP14_3.0-6.5 Test Date: 12/15/25 Checked By: ank
Depth: 3-6.5 Test Id: 847380

Test Comment: ---

Visual Description: Moist, dark yellowish brown silty sand with gravel

Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	22.6	33.7	43.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	89		
0.75 in	19.00	85		
0.5 in	12.50	82		
0.375 in	9.50	81		
#4	4.75	77		
#10	2.00	75		
#20	0.85	71		
#40	0.42	65		
#60	0.25	58		
#100	0.15	50		
#140	0.11	44		
#200	0.075	44		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0310	27		
---	0.0201	21		
---	0.0122	16		
---	0.0088	12		
---	0.0064	9		
---	0.0046	7		
---	0.0033	5		
---	0.0011	3		

Coefficients

D₈₅ = 19.1630 mm D₃₀ = 0.0362 mm
D₆₀ = 0.2829 mm D₁₅ = 0.0115 mm
D₅₀ = 0.1541 mm D₁₀ = 0.0070 mm
C_u = 40.414 C_c = 0.662

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

Client: Haley & Aldrich, Inc.
Project: 27 Kimball Rd
Location: Amesbury

Project No: GTX-322317

Boring ID: ---

Sample Type: Bag

Tested By: ajl

Sample ID: HA25-TP15_3.0-8.0

Test Date: 12/12/25

Checked By: ank

Depth: 3-8

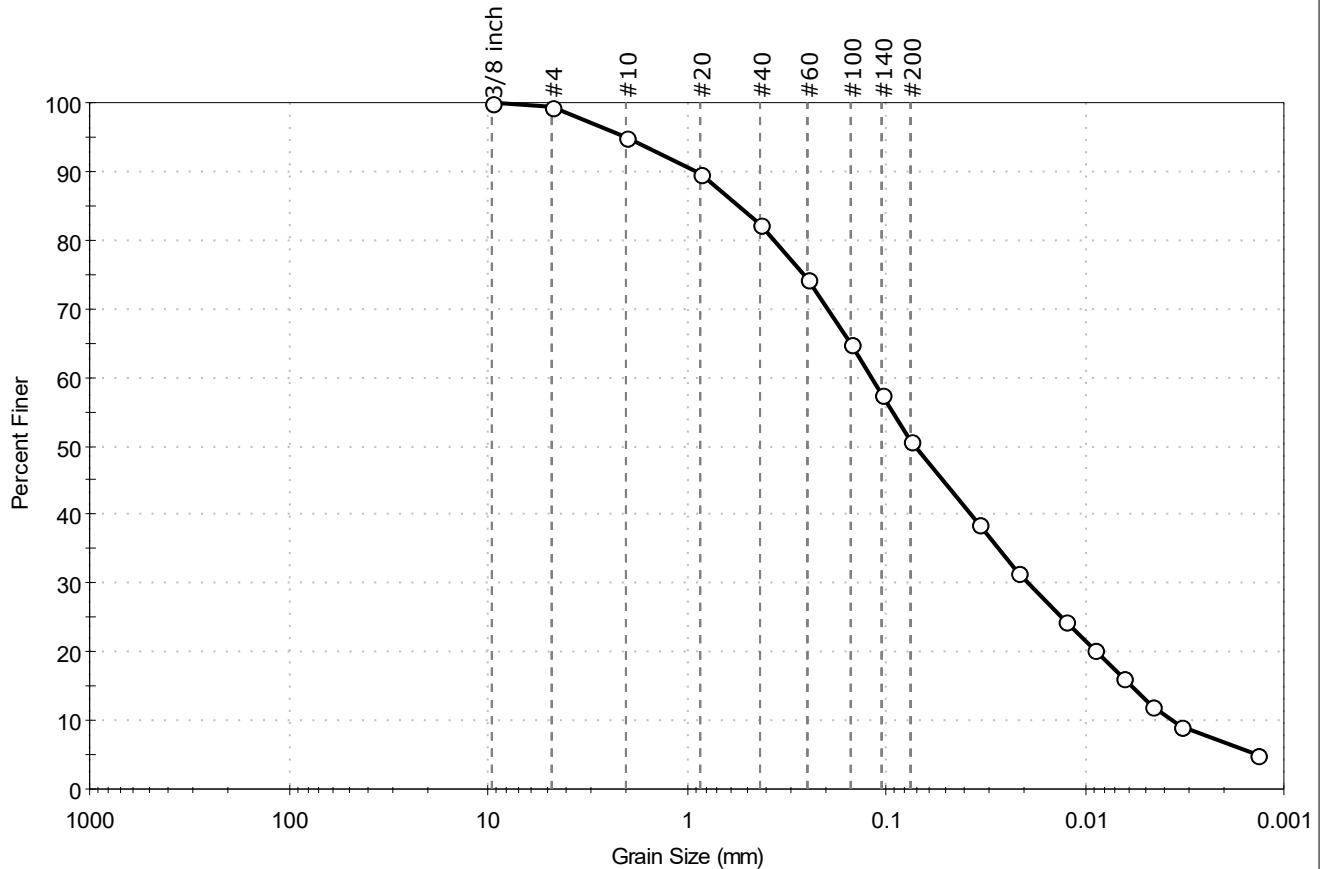
Test Id: 847379

Test Comment: ---

Visual Description: Moist, yellowish brown sandy silt

Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.6	48.5	50.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3/8 inch	9.50	100		
#4	4.75	99		
#10	2.00	95		
#20	0.85	90		
#40	0.42	82		
#60	0.25	74		
#100	0.15	65		
#140	0.11	58		
#200	0.075	51		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0341	39		
---	0.0215	32		
---	0.0127	24		
---	0.0091	20		
---	0.0065	16		
---	0.0046	12		
---	0.0033	9		
---	0.0014	5		

Coefficients

$D_{85} = 0.5450$ mm $D_{30} = 0.0192$ mm
 $D_{60} = 0.1188$ mm $D_{15} = 0.0058$ mm
 $D_{50} = 0.0710$ mm $D_{10} = 0.0036$ mm
 $C_u = 33.000$ $C_c = 0.862$

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape: ---

Sand/Gravel Hardness: ---

Dispersion Device: Apparatus A - Mech Mixer

Dispersion Period: 1 minute

Est. Specific Gravity: 2.65

Separation of Sample: #200 Sieve

Allen & Major Associates, Inc.				Computation Sheet	
Title	MA DEP Standard Calculations			By	BDP
Project	27 Kimball Road			Chk'd	CMQ
Location	27 Kimball Road, Amesbury, MA			Apprv'd	CMQ
Date	1/26/2026				
Revised	6/1/2026				

Stormwater Recharge/Water Quality Volume Table

$$R_v = F * \text{Impervious Area}$$

R_v = Required Recharge Volume, expressed in ft^3 , cubic yards or acre-feet

F = Target Depth Factor associated with each Hydraulic Soil Group

Impervious Area = pavement & rooftop area on site

A_{WQ} = Required Water Quality Treatment Volume, expressed in ft^3

D_{WQ} = Water Quality Depth

A_{IMP} = Impervious Area (excluding non-metal roofs)

Watershed	Area (Sq. Ft.)	Landscaped	Impervious Area (Square Feet)	Recharge Required			Water Quality Volume Required	
			HSG C (F=.25)	F Avg. (Inches)	Impervious Area (Feet)	R_v (ft^3)	D_{WQ} (Inch)	A_{WQ}
P-1	14,876	4,074	10,802	0.25	10,802	225	1.0	900
P-2	8,672	2,138	6,534	0.25	6,534	136	1.0	545
P-3	10,249	2,059	8,190	0.25	8,190	171	1.0	683
P-4	12,573	1,907	10,666	0.25	10,666	222	1.0	889
P-5	5,504	1,044	4,460	0.25	4,460	93	1.0	372
P-6	9,128	3,695	5,433	0.25	5,433	113	1.0	453
P-20	41,652	22,671	18,981	0.25	18,981	395	1.0	1,582
P-6A	8,474	2,617	5,857	0.25	5,857	122	1.0	488
P-7	9,413	2,099	7,314	0.25	7,314	152	1.0	610
P-15	14,623	6,997	7,626	0.25	7,626	159	1.0	636
P-8	9,310	2,628	6,682	0.25	6,682	139	1.0	557
P-9	8,180	1,516	6,664	0.25	6,664	139	1.0	555
P-10	8,341	1,755	6,586	0.25	6,586	137	1.0	549
P-11	8,941	2,110	6,831	0.25	6,831	142	1.0	569
P-25	19,846	19,842	4	0.25	4	0	1.0	0
P-12	19,709	8,387	11,322	0.25	11,322	236	1.0	944
P-13	10,271	2,062	8,209	0.25	8,209	171	1.0	684
P-14	7,633	2,702	4,931	0.25	4,931	103	1.0	411
P-16	13,061	2,670	10,391	0.25	10,391	216	1.0	866
P-17	10,295	3,729	6,566	0.25	6,566	137	1.0	547
P-18	6,252	1,766	4,486	0.25	4,486	93	1.0	374
P-19	21,732	10,621	11,111	0.25	11,111	231	1.0	926
P-24	21,686	14,395	7,291	0.25	7,291	152	1.0	608
P-18A	7,417	3,568	3,849	0.25	3,849	80	1.0	321
Total	307,838	127,052	180,786		180,786	3,766		15,066

Stormwater Recharge Summary

$$R_v = F * \text{Impervious Area}$$

R_v = Required Recharge Volume, expressed in ft^3 , cubic yards or acre-feet

F = Target Depth Factor associated with each Hydraulic Soil Group

Impervious Area = pavement & rooftop area on site

	Required (cf)	Provided (cf)	
AR_v =	1,356	10,976	UIS-1
AR_v =	433	1,756	UIS-2
AR_v =	558	2,323	UIS-3
AR_v =	1,340	9,676	Infiltration Basin
AR_v =	3,766	24,731	TOTAL

Water Quality Volume

A_{WQ} = Required Water Quality Treatment Volume, expressed in ft^3

D_{WQ} = Water Quality Depth

A_{IMP} = Impervious Area (excluding non-metal roofs)

	Required (cf)	Provided (cf)	
A_{WQ} =	5,422	10,976	UIS-1
A_{WQ} =	1,733	1,756	UIS-2
A_{WQ} =	2,231	2,323	UIS-3
A_{WQ} =	5,359	9,676	Infiltration Basin
A_{WQ} =	15,066	24,731	TOTAL

Allen & Major Associates, Inc.		Computation Sheet	
Title	MA DEP Standard Calculations	By	BDP
Project	27 Kimball Road	Chk'd	CMQ
Location	27 Kimball Road, Amesbury, MA	Apprv'd	CMQ
Date	1/26/2026		
Revised	6/1/2026		

Draindown Within 72 Hours

$Time_{drawdown} = (Rv) (1/Design \text{ Infiltration Rate in inches per hour}) (Conversion \text{ for inches to feet}) (1/bottom \text{ area in feet})$

Infiltration Basin (Sandy Loam)	
Infiltration Rate (in/Hr)=	1.02
Bottom Area (ft ²) =	3,040
Infiltration Volume (ft ³) =	9,676
$Time_{drawdown} \text{ (Hours)} =$	37.45

$Time_{drawdown} = (Rv) (1/Design \text{ Infiltration Rate in inches per hour}) (Conversion \text{ for inches to feet}) (1/bottom \text{ area in feet})$

UIS-1 (Sandy Loam)	
Infiltration Rate (in/Hr)=	1.02
Bottom Area (ft ²) =	6,514
Infiltration Volume (ft ³) =	10,976
$Time_{drawdown} \text{ (Hours)} =$	19.82

Only UIS1
UIS1+UDS1

$Time_{drawdown} = (Rv) (1/Design \text{ Infiltration Rate in inches per hour}) (Conversion \text{ for inches to feet}) (1/bottom \text{ area in feet})$

UIS-2 (Sandy Loam)	
Infiltration Rate (in/Hr)=	1.02
Bottom Area (ft ²) =	2,359
Infiltration Volume (ft ³) =	1,756
$Time_{drawdown} \text{ (Hours)} =$	8.76

$Time_{drawdown} = (Rv) (1/Design \text{ Infiltration Rate in inches per hour}) (Conversion \text{ for inches to feet}) (1/bottom \text{ area in feet})$

UIS-3 (Sandy Loam)	
Infiltration Rate (in/Hr)=	1.02
Bottom Area (ft ²) =	2,656
Infiltration Volume (ft ³) =	2,323
$Time_{drawdown} \text{ (Hours)} =$	10.29

Only UIS3
UIS3+UDS3

A BMP ¹	B TSS Removal Rate ¹	C Starting TSS Load*	D Amount Removed (C*D)	E Remaining Load (D-E)
Deep Sump Catch Basins	0.25	1.00	0.25	0.75
Water Quality Unit	0.50	0.75	0.38	0.38
Sub-Surface Infiltration System (or Infiltration Basin) w/ Outlet Control	0.80	0.38	0.30	0.08
Total TSS Removal =			0.93	