TECHNICAL REPORT

FOR THE

MULTI-FAMILY RESIDENTIAL DEVELOPMENT

LOCATED AT

27.5 & 29 CLARKS ROAD

AMESBURY MASSACHUSETTS

October 20, 2025

SUBMITTED TO:

CITY OF AMESBURY
PLANNING BOARD
AMESBURY CITY HALL
62 FRIEND STREET
AMESBURY, MA 01913

APPLICANT:

EAGLES CROSSING, LLC
231 SUTTON STREET; SUITE 1B
NORTH ANDOVER, MA 01845

PREPARED BY:

THE MORIN-CAMERON GROUP, INC.
66 ELM STREET
DANVERS, MA 01923

DRAINAGE REPORT NARRATIVE

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DRAINAGE REPORT
27.5 & 29 Clarks Road Multi-Family Site Development

I. Executive Summary

Eagles Crossing LLC, the applicant/owner, proposes to redevelop the properties located at 27.5 & 29 Clarks Road in Amesbury, Massachusetts (the "site"). The project includes constructing two three-unit residential buildings and a multi-family residential building that will include 152 residential units total between the three buildings along with surface and underground parking facilities, landscaping improvements, amenity areas, stormwater management systems, new utility infrastructure and a trail system to connect Clarks Road to the existing City Parcel located off Point Shore Drive. The subject parcels are shown on the City of Amesbury Assessor's Map 80 as Lots 21 and 22 which are situated in the Residence (R20) Zoning District. Additionally, the site is also located within the East End Smart Growth Overlay District (EE-SGOD) and portions of the property are located within the 2-3 FAM (Two-Three Family), MF-1 (Multi-Family) and FOS-1 (Future Open Space) Subdistricts.

The project will require Site Plan Approval through the Amesbury Planning Board and a Notice of Intent issued by the Conservation Commission. As part of the project permitting, the proponent must demonstrate compliance with applicable stormwater best management practices and regulations. The following drainage report contains a description of existing and proposed site conditions, stormwater management design methodology and results summaries and other supplemental information in support of the stormwater best management system design.

II. Existing Site Description

The site consists of a total land area of 476,958 square feet (10.87± acres) and is currently developed with two existing residential dwellings with associated asphalt driveways, sheds, and utility infrastructure. The property is currently only used for residential use with approximately 350' from the Clarks Road frontage property line being developed. Within the undeveloped woodland East/Southeast of the existing residential dwellings is an existing dirt path. Southeast/South of the existing residential buildings is approximately 2.4± acres of Bordering Vegetated Wetland (BVW) that separates the northern developed area from 4.4± acres of undeveloped woodland South. The eastern curved property line borders Interstate 95 (Exit 88 on/off ramp), while the remaining abutters are within the Residence (R-20) Zoning District and have a residential use or are vacant land. The site contains one curb cut on Clarks Road for each of the two existing residential buildings. There is no known existing drainage infrastructure on the site. Refer to Figure 1: Ortho Map and Figure 2: USGS Locus Map for illustrations of the site and surrounding features.

Grades on the developed portion of the site are relatively flat with slopes generally less than 3%, while the portion of undeveloped woodlands becomes steeper with slopes as much as 50% going down to the BVW. The site has high points along the frontage of Clarks Road with the highest elevation being at approximately 57.5 and low elevation of approximately 22.0 (BVW). The BVW was delineated by LEC Environmental Consultants, Inc, and the limit of the wetland was approved by the Amesbury Conservation Commission by an Order of Resource Area Delineation under MASS DEP File #002-1338. A portion of the stormwater from the 29 Clarks Road (portion of driveway, dwelling, shed and yard) flows to the abutter located Northeast at 31 Clarks Road, while

the remaining stormwater on the site flows to the BVW. The existing watershed delineation is depicted on Figure 5: Existing Site Development Watershed Plan.

Soils on site are Deerfield loamy fine sand, 0-3% slopes, Hydrologic Soil Group (HSG) A (256A); Carver loamy coarse sand, o to 3% slopes, Hydrologic Soil Group (HSG) A (259A); Windsor loamy sand, 15-25% slopes, Hydrologic Soil Group (HSG) A (255D); and Maybid Silt Loam, 0 to 3% slopes, Hydrologic Soil Group (HSG) C/D (12A). See Figure 3: SCS Soils Map for an illustration of the soil types. In-situ soil testing was conducted by The Morin-Cameron Group, Inc. in September 2025 to very soil textures and determine estimated seasonal high groundwater elevations. The entire site is shown to be located in a Zone X: area of minimal flood hazard above 100-year flood level as illustrated on the FEMA Federal Insurance Rate Map (FIRM) #25009C0106F, with an effective date of July 8, 2025 (See Figure 4: FEMA Flood Map).

III. Proposed Site Description

The applicant proposes to construct two three-unit residential buildings and a 146 unit multi-family residential building (MFRB) with associated aboveground and underground parking, amenity areas, landscaping, stormwater management system and new utility connections. Each three (3) unit building has a footprint area of approximately 1,903± square feet and the MFRB has a total footprint area of approximately 41,732± square feet. The MFRB is split into two sections: the Western section and the Eastern section, which are connected via pedestrian bridge in the middle. The proposed MFRB, which is situated closest to the Western property line of the site, will have an underground garage with an uncovered ramp entrance on the northern side of the building located where the pedestrian bridge connects the Western to the Eastern section of building.

The proposed project includes a single curb cut located on Clarks Road, with the two three-unit residential buildings located along the frontage on each side of the new drive aisle and the multi-family residential building located to the southeast behind the two three-unit buildings. The two proposed three-unit residential buildings have a front setback of 10 feet, while the MFRB has a front setback of approximately 101 feet. The drive aisle provides access to several aboveground parking facilities totaling 97 spaces, a loading zone, to the uncovered ramp down to the underground parking facility with 106 parking spaces and ends with a cul-de-sac turnaround designed to accommodate fire access and located in front of the proposed entrances to the Eastern section of the MFRB. South of the cul-de-sac is a proposed amenity area with a Nature Play Area with wood fiber playground surfacing and South/downgradient of the Nature Play Area is a proposed Dog Run with rice stone surfacing. Additional amenity areas are located on the north side and west side of the MFRB.

A 5 foot wide stone dust trail is proposed that begins at the sidewalk of 27.5 Clarks Road and runs along Southern side of the MFRB to the Southern entrance/amenity area, continues around the MFRB to the Dog Run/Nature Play Area and ends at the cul-de-sac sidewalk.

An offshoot of the path starts nearby the southwestern most point of the MFRB's footprint and switchbacks down to a proposed wooden boardwalk that crosses the existing BVW. The boardwalk is proposed to be slightly elevated to limit tree removal and disturbance to the BVW. At the end of the boardwalk on the Southern side of the BVW a 5 foot wide wood chip path is proposed to continue Southeast to connect to the existing trail system located on the City Parcel

located of Point Shore Road (See Trail Plan on Sheet C-10). It should be noted that this stormwater analysis does not include the boardwalk and wood chip path on the Southern side of the BVW, instead ending the area of analysis at the Northern limit of BVW. The boardwalk and path do not require treatment and will have no measurable impacts to the existing sub catchment.

Infrastructure associated with the development of the site will include the removal of all existing utility connections and installation of a new water main to service all proposed structures, new electrical services, new sewer services, new communications services, new natural gas services and construction of stormwater management infrastructure, communications and fiber optic services. Existing utility poles relocations will be coordinated with the electric service provider.

The proposed stormwater management system for the project will consist of various Best Management Practices ("BMP's") in both mitigating and renovating stormwater runoff. The entire stormwater system was designed in accordance with the City of Amesbury's Stormwater Management and Erosion Control Regulations and the Massachusetts Stormwater Management Handbook ("Handbook"), which the City of Amesbury references in its regulations. The measures to be implemented at the site includes two subsurface stone infiltration systems utilizing, water quality units, and an infiltration basin. Refer to the Grading & Drainage Plan and associated details for more information. The existing watershed characteristics, flow paths and drainage patterns were matched to the extent practicable in the proposed condition to demonstrate that there are no adverse impacts to adjacent properties or resource areas (i.e. design points).

IV. Stormwater Management

A. Existing Watershed Characteristics

Stormwater runoff exits the site in the existing condition at two (2) distinct locations. The location where stormwater runoff leaves the site boundary is called the design point ("DP"). DP1 is the abutting property to the Northeast located at 31 Clarks Road. DP2 is the Bordering Vegetated Wetland (BVW) located South of the proposed MFRB. The design points and the tributary watersheds (or subcatchments) are illustrated on Figure 5: Existing Site Development Watershed Plan. The table below lists the total area associated with each subcatchment area.

Summary of Existing Subcatchments

Existing Drainage Area (E)	Total Area (SF)	% Impervious	Composite Curve Number
E-1	41,122	7.99%	41
E-2	135,363	5.33%	39
Total	**176,485 (4.05 acres)**	**5.95%**	39

Description of Existing Subcatchments

The subcatchments analyzed in the existing condition can be described as follows:

- **Subcatchment E1:** A portion of 29 Clarks Road (including a section of the paved driveway, the roof, a shed and the remaining grass yard/woodland.
- **Subcatchment E2:** All of 27.5 Clarks Road (paved driveway, roof and shed) and the remaining area at 29 Clarks Road (Woodland and dirt path).

B. Proposed Watershed Characteristics

The proposed development of the site will maintain the design points identified in the existing watershed analysis. In order to understand and analyze the proposed development, smaller subcatchments were delineated to analyze stormwater impacts on a more detailed scale. The table below provides the total drainage area and the percentage that will be impervious in the post-development condition. The design points and the tributary watersheds (or subcatchments) are illustrated on Figure 6: Proposed Site Development Watershed Plan. The table below lists the total area associated with each subcatchment area.

Summary of Proposed Subcatchments

Proposed Drainage Area	Total Area (SF)	% Impervious	Composite Curve Number
P-1	57,572	83.08%	88
P-2	57,476	85.92%	90
P-3	12,318	16.57%	47
P-4	42,983	2.13%	37
P-GR	2,065	100%	98
P-N	4,071	0%	39
TOTALS	**176,485 (4.05 acres)**	**57.93%**	**72**

Description of Proposed Subcatchments

- **Subcatchment P-1:** Includes most of the upper site closest to Clarks Road (Roofs of the two three-unit residential buildings, the West section of the MFRB, the upper parking lot and associated sidewalks and landscaping areas. This area is captured and directed to Stone Infiltration System #1 (P1).
- **Subcatchment P-2:** Includes the middle and lower parking on site, the remaining roof of the East MFRB and associated sidewalks and landscaping areas. This area is captured and directed to the Stone Infiltration System #2 (P2).
- **Subcatchment P-3:** Includes the Nature Play Area, Dog Play Area, path connecting the two areas and the remaining area is landscaping/infiltration basin area.
- **Subcatchment P-4:** Includes the area downgradient of P-3, the path wrapping around the building and the amenity area at the South entrance to the MFRB.
- **Subcatchment P-GR:** Includes the uncovered pavement ramp from the Middle parking area down to the underground parking garage.
- **Subcatchment P-N:** Includes all landscape areas North of the proposed parking area.

C. Hydrologic Analysis:

The purpose of the stormwater analysis is to demonstrate that the proposed development will not adversely impact the land or surrounding land. The industry standard for stormwater management design in Massachusetts is governed by the Massachusetts Stormwater Management Handbook ("Handbook") published by the Mass Department of Environmental Protection, January 2008. The City of Amesbury Stormwater Management Ordinance provide additional requirements including analyzing the 2, 10, 25 and 100-year storm events.

The Handbook lists 10 standards covering both mitigation and renovation of stormwater runoff. A full discussion on compliance with the standards can be found at the end of this

report. However, the following section will summarize the projects compliance with the mitigation standards 1 and 2 of the Handbook relating to reducing peak rates of runoff and creating no adverse down gradient impacts.

In order to demonstrate that there will be no downstream impacts as a result of the proposed project, a stormwater analysis was performed using the U.S. Soil Conservation Service (S.C.S) method of analysis contained in Technical Release #20 (TR-20) published by the U.S. Conservation Service, along with the extreme precipitation values published by the Northeast Regional Climate Center. The software application HydroCAD was used to analyze the existing and proposed development watershed conditions. This application is widely used in the civil engineering industry and is an accepted means of performing a TR-20 analysis. It is a computer aided design program for analyzing the hydrology and hydraulics of storm water runoff. It utilizes the latest techniques of both fields to accurately predict the consequences of any given storm event. This analysis allows the engineer to verify that a given drainage system is adequate for the area under consideration and further allows the engineer to predict where flooding or erosion are most likely to occur. This model was used to analyze the storm drainage system designed for the development to demonstrate that the drainage system is in compliance with the City's Stormwater Management Standards.

The HydroCAD analysis was performed by examining the two design points that were previously referenced. The storm events used were taken from NRCS2-Rain Event Lookup table for Amesbury, MA available online (based on NOAA Atlas 14 Volume 10 - Point Precipitation Frequency Estimates then the upper confidence interval multiplied by 90%.) The following is a listing of the total existing and proposed development rates of stormwater runoff for the proposed development for the 2, 10, 25 and 100-year rainfall events:

Amesbury 24-hour rainfall data

STORM EVENT (AMESBURY, MA)	
Years	***Depth/24 hrs***
2	3.24
10	5.12
25	6.30
100	8.11

DP1 Peak Discharge Rates (CFS)				
Storm Event		Existing Conditions	Proposed Conditions	Change in Peak
2-yr	Outflow	0.0	0.0	NO CHANGE
10-yr	Outflow	0.0	0.0	NO CHANGE
25-yr	Outflow	0.4	0.0	NO CHANGE
100-yr	Outflow	1.3	0.1	-1.2

DP2 Peak Discharge Rates (CFS)				
Storm Event		Existing Conditions	Proposed Conditions	Change in Peak
2-yr	Outflow	0.0	0.0	NO CHANGE
10-yr	Outflow	0.1	0.0	-0.1
25-yr	Outflow	0.5	0.4	-0.1
100-yr	Outflow	2.6	2.4	-0.2

DP1 Volume Discharge (CF)				
Storm Event		Existing Conditions	Proposed Conditions	Change in Volume
2-yr	Outflow	30	0	-30
10-yr	Outflow	1,036	76	-960
25-yr	Outflow	2,253	181	-2,072
100-yr	Outflow	4,780	408	-4,372

DP2 Volume Discharge (CF)				
Storm Event		Existing Conditions	Proposed Conditions	Change in Volume
2-yr	Outflow	9	0	-9
10-yr	Outflow	2,538	564	-1,974
25-yr	Outflow	6,032	2,666	-3,366
100-yr	Outflow	13,575	8,264	-5,311

Based on the analysis of the 2, 10, 25 and 100-year storm events, our proposed design reduces or maintains the peak discharge rates and volumes directed to Design Point 1 & 2.

D. Review of Stormwater Management Standards

The proposed development project is comprised of a mix of new development and redevelopment. The drainage system has been designed to attenuate peak rates of stormwater for all storm events up to and including the 100-year event. Measures will also be implemented to provide the required total suspended solids (TSS) removal, to ensure the stormwater runoff is renovated prior to discharge.

1. No stormwater conveyance system discharges untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. The project includes a variety of BMPs to provide treatment of runoff prior to discharge.
   The proposed development meets this standard.
2. The stormwater management system has been designed such that proposed peak rates of runoff and volumes do not exceed existing rates or volumes for the 2-year, 10-year, 25-year and 100-year storm events.
   The proposed development meets this standard.
3. Loss of annual recharge to groundwater has been eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance.
   The proposed development meets this standard. (See Stormwater Management Calculations Section)
4. The proposed stormwater management system has been designed to remove a minimum of 90% of the average annual post-construction load of Total Suspended Solids (TSS). The best management practices treatment train utilizes water quality units, two underground stone infiltration bed systems and an infiltration basin to achieve TSS removal. The proposed area draining to DP1 does not utilize any stormwater best management practices since there will be a reduction in impervious area resulting in decreased runoff and TSS.
   The proposed development meets this standard. (See Stormwater Management Calculations Section)
5. Land Uses with Higher Potential Pollutant Load.
   This standard does not apply.
6. Discharges to critical areas.
   This standard does not apply.
7. Redevelopment Projects: the project consists of a mix of new development and redevelopment.
   The project includes a mix of new development and redevelopment. All standards are fully met as described above.
8. A Construction Phase Operation and Maintenance Plan in included herewith. A Stormwater Pollution Prevention Plan following the EPA guidelines under the National Pollutant Discharge Elimination System will be prepared prior to construction.
   The proposed development meets this standard.

9. A long-term operation and maintenance plan: A long-term O&M has been prepared to provide guidance for current and future owners to inspect and maintain the stormwater management systems in perpetuity. A copy of this O&M plan is included herein.
   The proposed development meets this standard.

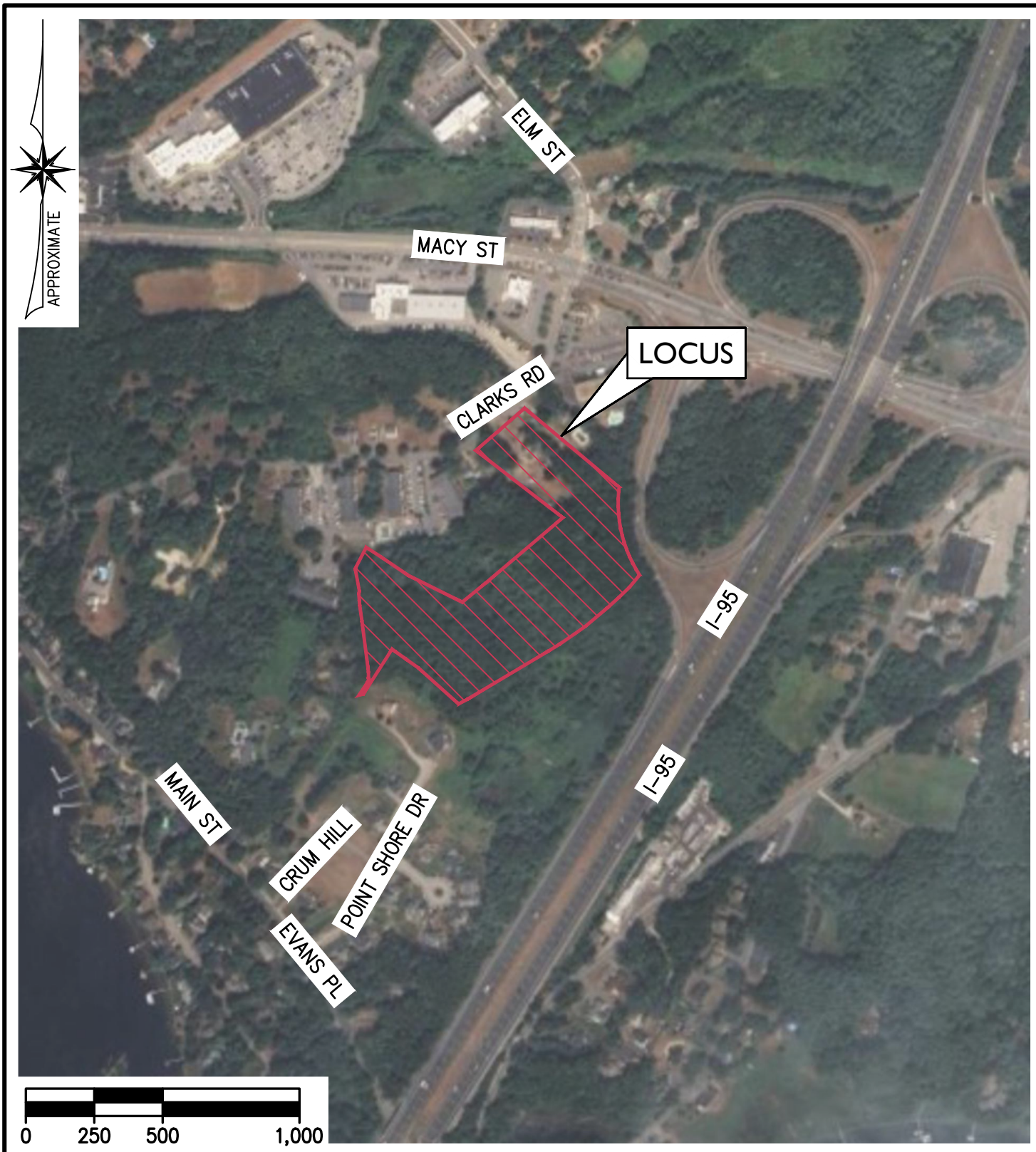
10. Illicit discharges: To the best of our knowledge and belief there are no illicit discharges to the stormwater management system on this site. A certification is included herein.
    The proposed development meets this standard.

V. Conclusion

The project at 27.5 & 29 Clarks Road, as proposed, is in compliance with the MassDEP Stormwater Management Handbook and the Amesbury Stormwater Management Rules and Regulations, which reference the MA Stormwater Standards.

For questions regarding this Drainage Report, please contact The Morin-Cameron Group, Inc. between the hours of 8:30am to 4:30pm at (978) 373-0310.

FIGURES



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ORTHO MAP

AT

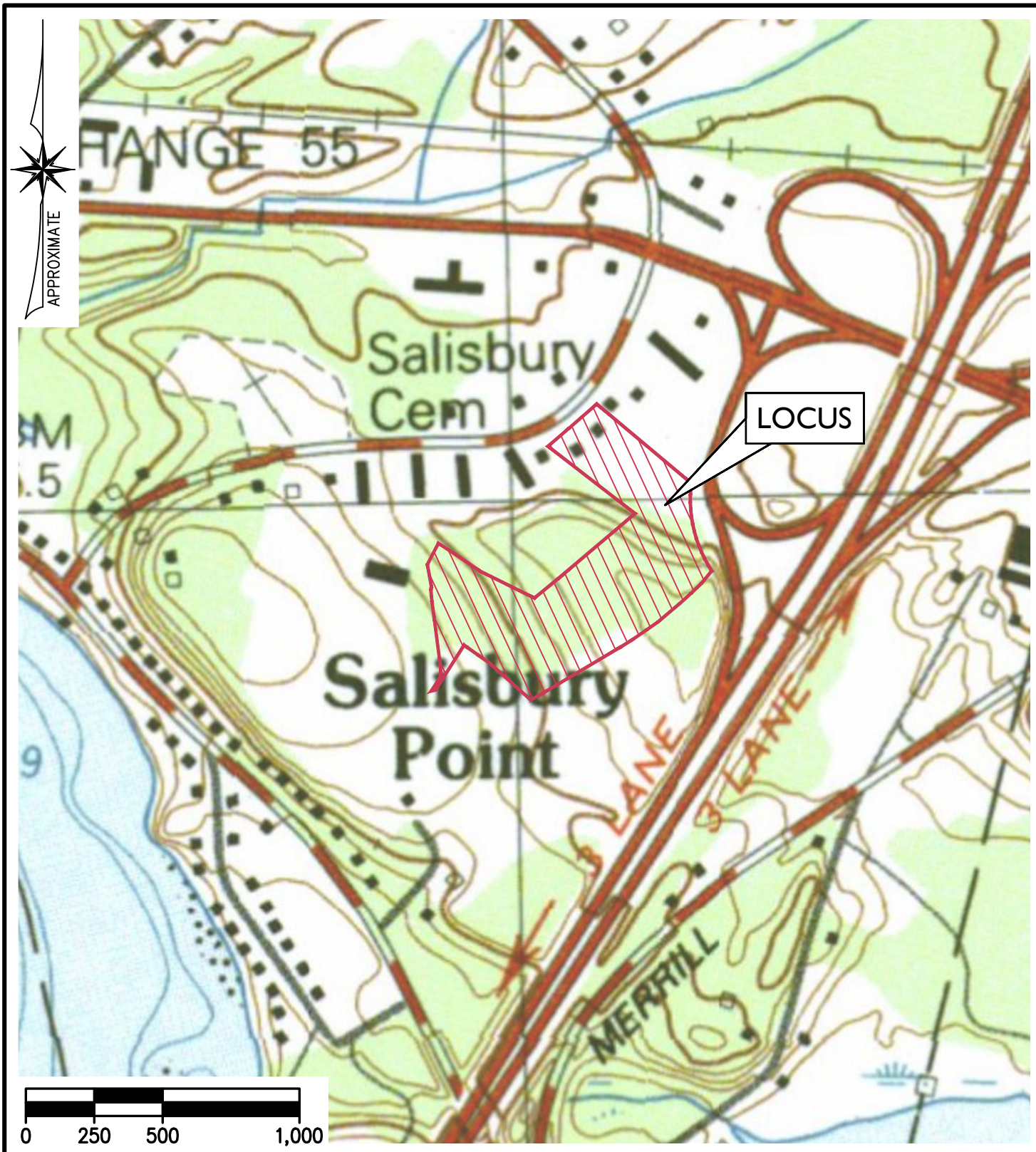
27.5 & 29 CLARKS RD
AMESBURY, MASSACHUSETTS

DATE: OCTOBER 20, 2025

SCALE: 1" = 500'

FIGURE 1: ORTHO MAP

PROJ. 3962



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USGS LOCUS MAP

AT

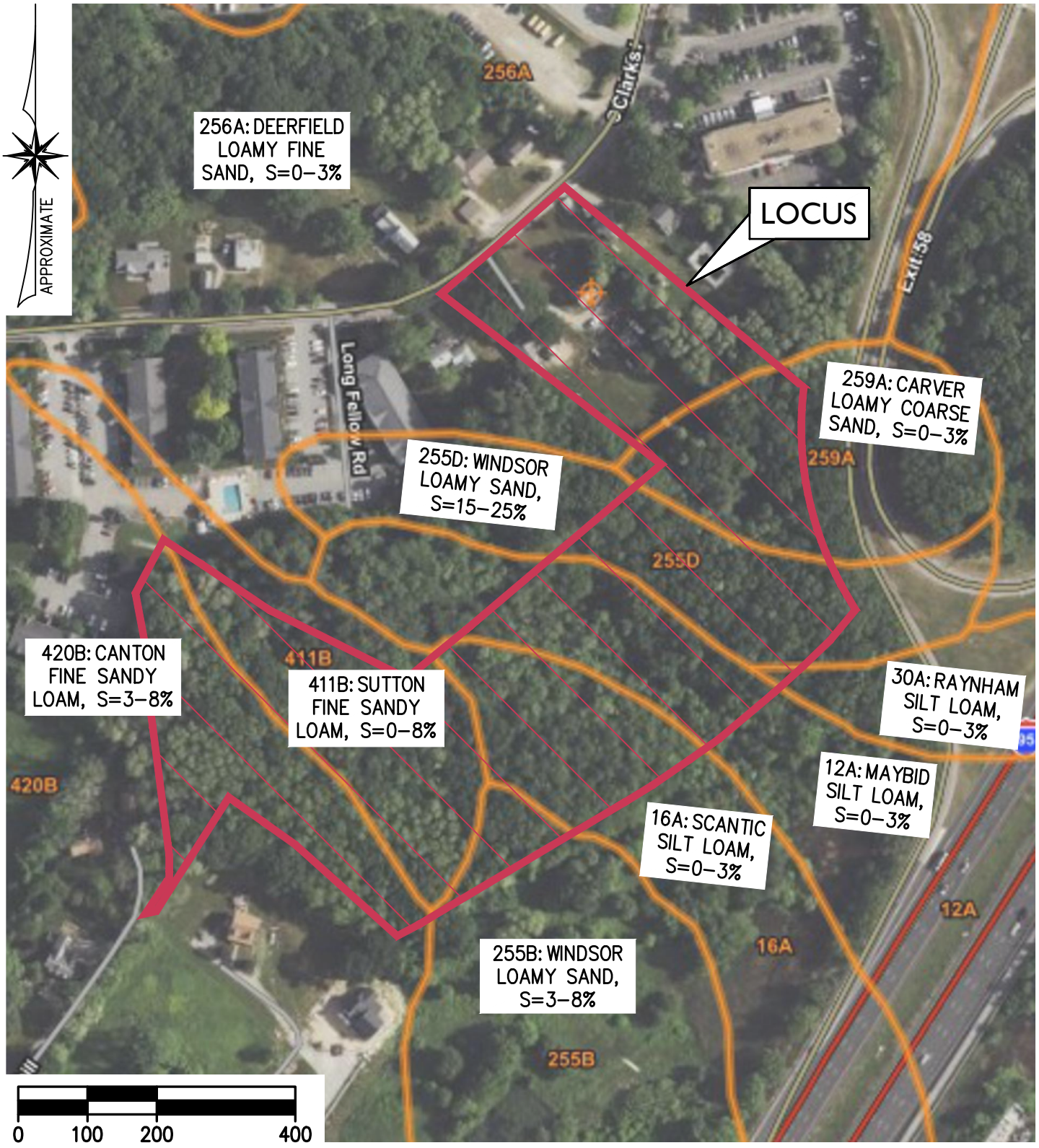
27.5 & 29 CLARKS RD
AMESBURY, MASSACHUSETTS

DATE: OCTOBER 20, 2025

SCALE: 1" = 500'

FIGURE 2: USGS LOCUS MAP

PROJ. 3962



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SCS SOIL MAP

AT

27.5 & 29 CLARKS RD

AMESBURY, MASSACHUSETTS

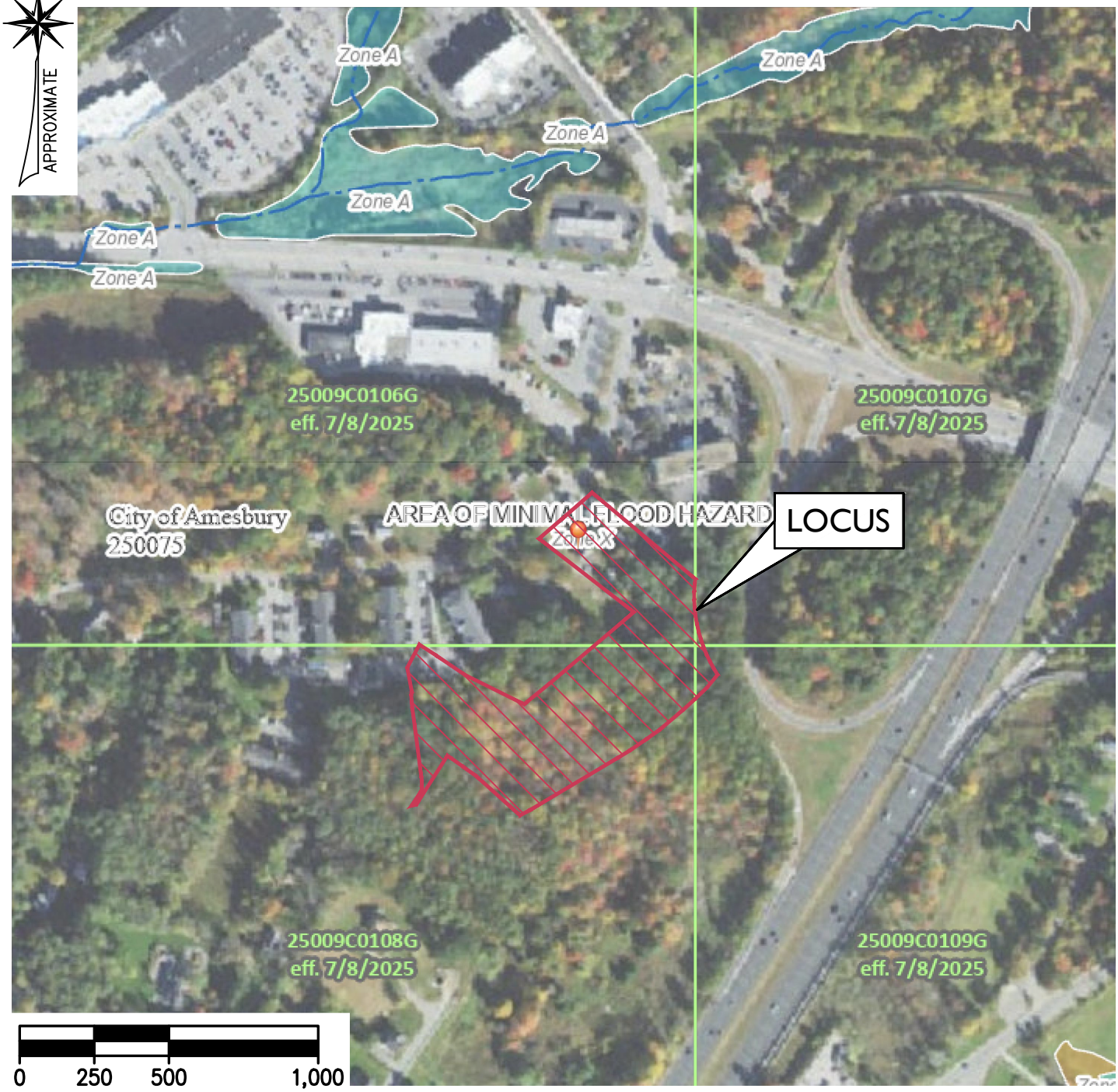
DATE: OCTOBER 20, 2025

SCALE: 1" = 200'

FIGURE 3: SCS SOILS MAP

PROJ. 3962

REFERENCE: FEMA MAP PANEL 25009C0–107G
(EFFECTIVE DATE: JULY 8, 2025).



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FEMA FLOOD MAP

AT

27.5 & 29 CLARKS RD
AMESBURY, MASSACHUSETTS

DATE: OCTOBER 20, 2025

SCALE: 1" = 500'

FIGURE 4: FEMA FLOOD MAP

PROJ. 3962

APPENDIX A:

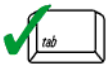
MASSDEP STORMWATER MANAGEMENT REPORT CHECKLIST

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

[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.

B. Stormwater Checklist and Certification

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

Checklist for Stormwater Report

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

10/20/2025
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 (continued)

Checklist for Stormwater Report

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): Proprietary stormwater treatment devices

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist (continued)

Checklist for Stormwater Report

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist (continued)

Checklist for Stormwater Report

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 (continued)

Checklist for Stormwater Report

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist (continued)

Checklist for Stormwater Report

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

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

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

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

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

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

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

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

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

Checklist (continued)

Checklist for Stormwater Report

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

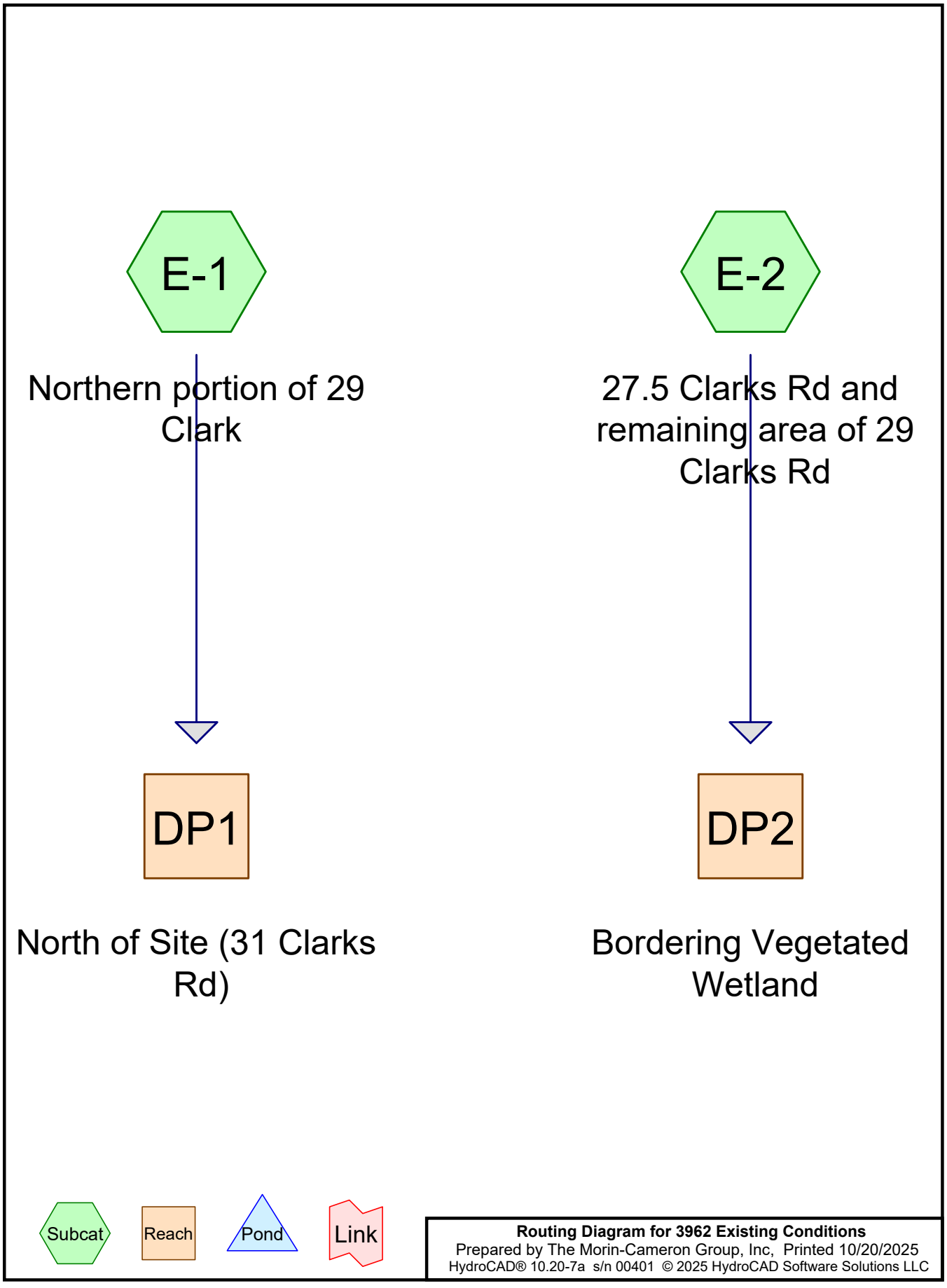
☒ An Illicit Discharge Compliance Statement is attached;

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

APPENDIX B:

EXISTING CONDITIONS

HYDROLOGIC ANALYSIS REPORT



Routing Diagram for 3962 Existing Conditions
Prepared by The Morin-Cameron Group, Inc, Printed 10/20/2025

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NOAA10 24-hr	D	Default	24.00	1	3.24	2
2	10-Year	NOAA10 24-hr	D	Default	24.00	1	5.12	2
3	25-Year	NOAA10 24-hr	D	Default	24.00	1	6.30	2
4	100-Year	NOAA10 24-hr	D	Default	24.00	1	8.11	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
65,376	39	>75% Grass cover, Good, HSG A (E-1, E-2)
6,006	98	Paved parking, HSG A (E-1, E-2)
4,494	98	Roofs, HSG A (E-1, E-2)
5,664	72	Woods roads, HSG A (E-2)
93,283	30	Woods, Good, HSG A (E-1, E-2)
1,662	77	Woods, Good, HSG D (E-2)
176,485	**39**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
174,823	HSG A	E-1, E-2
0	HSG B	
0	HSG C	
1,662	HSG D	E-2
0	Other	
176,485		**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	Su Nu
65,376	0	0	0	0	65,376	>75% Grass cover, Good	
6,006	0	0	0	0	6,006	Paved parking	
4,494	0	0	0	0	4,494	Roofs	
5,664	0	0	0	0	5,664	Woods roads	
93,283	0	0	1,662	0	94,945	Woods, Good	
174,823	**0**	**0**	**1,662**	**0**	**176,485**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Northern portion of 29 Runoff Area=41,122 sf 7.99% Impervious Runoff Depth=0.01"
Flow Length=144' Tc=6.9 min CN=41 Runoff=0.0 cfs 30 cf

Subcatchment E-2: 27.5 Clarks Rd and Runoff Area=135,363 sf 5.33% Impervious Runoff Depth=0.00"
Flow Length=492' Tc=10.6 min CN=39 Runoff=0.0 cfs 9 cf

Reach DP1: North of Site (31 Clarks Rd) Inflow=0.0 cfs 30 cf
Outflow=0.0 cfs 30 cf

Reach DP2: Bordering Vegetated Wetland Inflow=0.0 cfs 9 cf
Outflow=0.0 cfs 9 cf

Total Runoff Area = 176,485 sf Runoff Volume = 39 cf Average Runoff Depth = 0.00"
94.05% Pervious = 165,985 sf 5.95% Impervious = 10,500 sf

Summary for Subcatchment E-1: Northern portion of 29 Clark

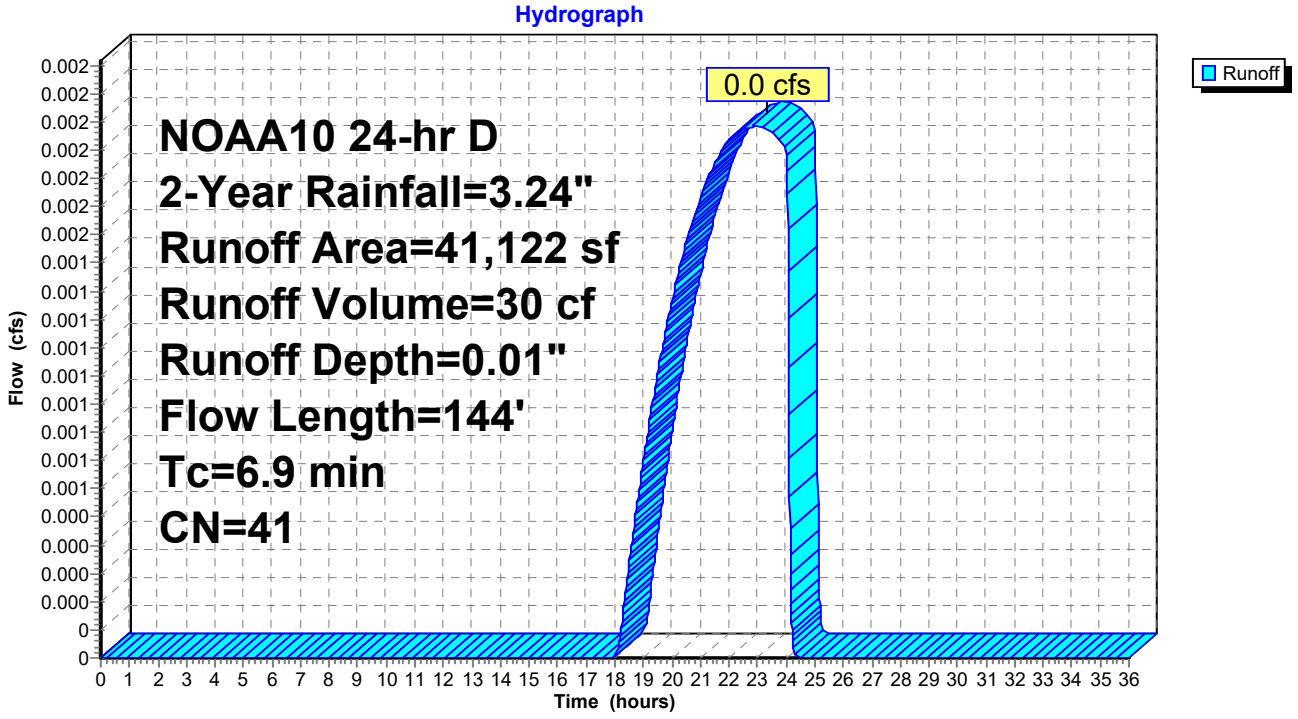
Runoff = 0.0 cfs @ 22.84 hrs, Volume= 30 cf, Depth= 0.01"
Routed to Reach DP1 : North of Site (31 Clarks Rd)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 2-Year Rainfall=3.24"

Area (sf)	CN	Description
13,178	30	Woods, Good, HSG A
1,335	98	Paved parking, HSG A
1,950	98	Roofs, HSG A
24,659	39	>75% Grass cover, Good, HSG A
41,122	41	Weighted Average
37,837		92.01% Pervious Area
3,285		7.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0180	0.14		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
0.9	94	0.0130	1.84		**Shallow Concentrated Flow, Woodland** Unpaved Kv= 16.1 fps
6.9	144	Total			

Subcatchment E-1: Northern portion of 29 Clark



Summary for Subcatchment E-2: 27.5 Clarks Rd and remaining area of 29 Clarks Rd

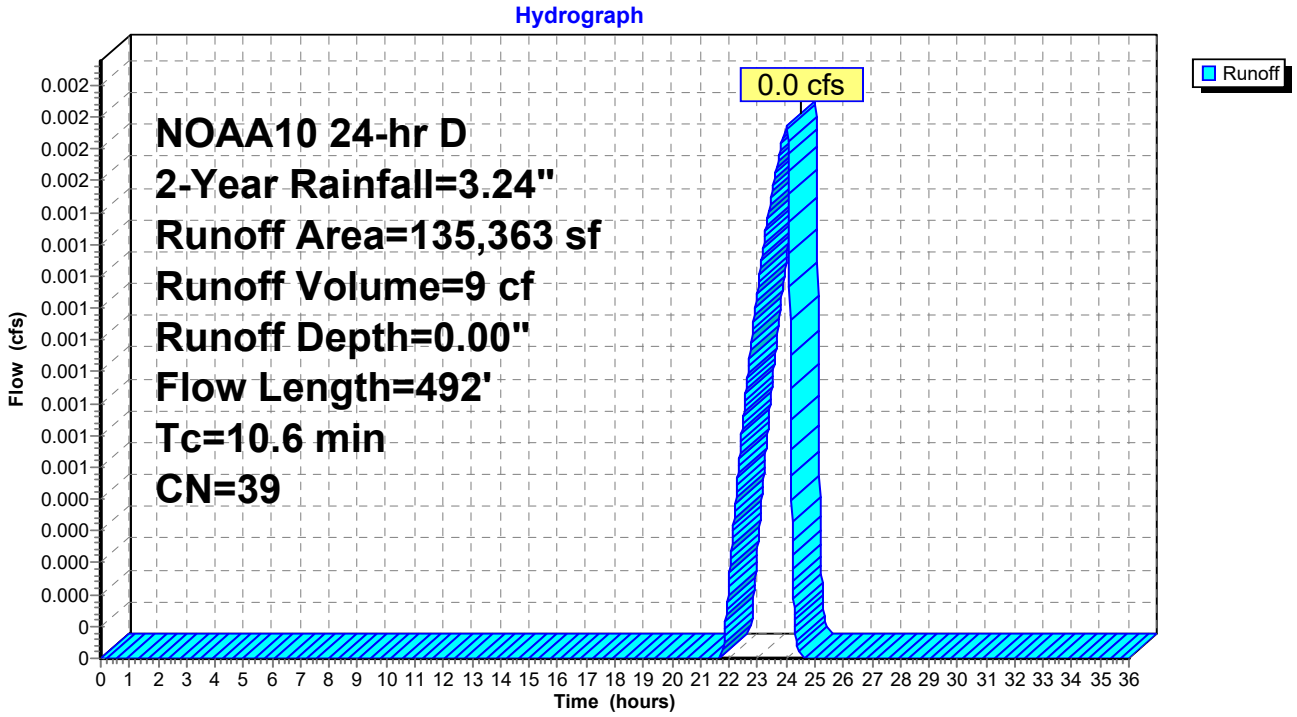
Runoff = 0.0 cfs @ 24.02 hrs, Volume= 9 cf, Depth= 0.00"
Routed to Reach DP2 : Bordering Vegetated Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 2-Year Rainfall=3.24"

	Area (sf)	CN	Description
	80,105	30	Woods, Good, HSG A
	1,662	77	Woods, Good, HSG D
	4,671	98	Paved parking, HSG A
	2,544	98	Roofs, HSG A
	40,717	39	>75% Grass cover, Good, HSG A
*	5,664	72	Woods roads, HSG A
	135,363	39	Weighted Average
	128,148		94.67% Pervious Area
	7,215		5.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
4.2	338	0.0070	1.35		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.7	104	0.2230	2.36		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	492	Total			

Subcatchment E-2: 27.5 Clarks Rd and remaining area of 29 Clarks Rd

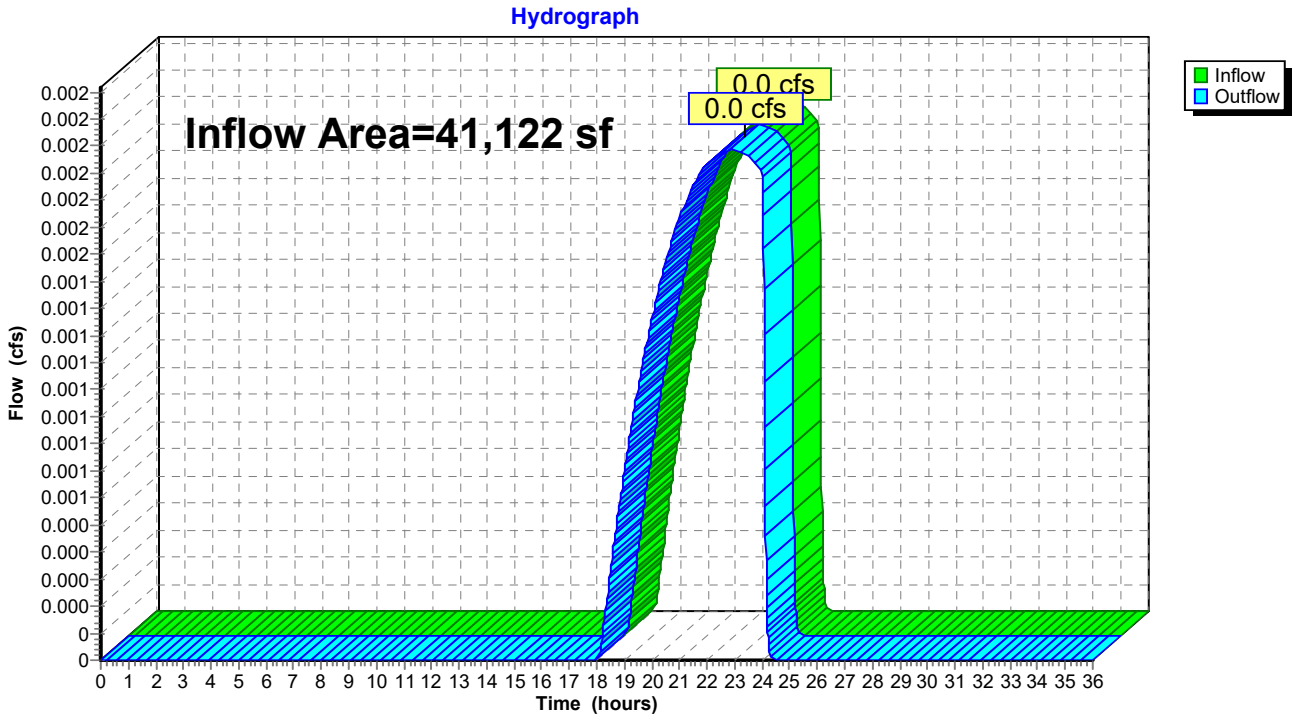


Summary for Reach DP1: North of Site (31 Clarks Rd)

Inflow Area = 41,122 sf, 7.99% Impervious, Inflow Depth = 0.01" for 2-Year event
Inflow = 0.0 cfs @ 22.84 hrs, Volume= 30 cf
Outflow = 0.0 cfs @ 22.84 hrs, Volume= 30 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach DP1: North of Site (31 Clarks Rd)

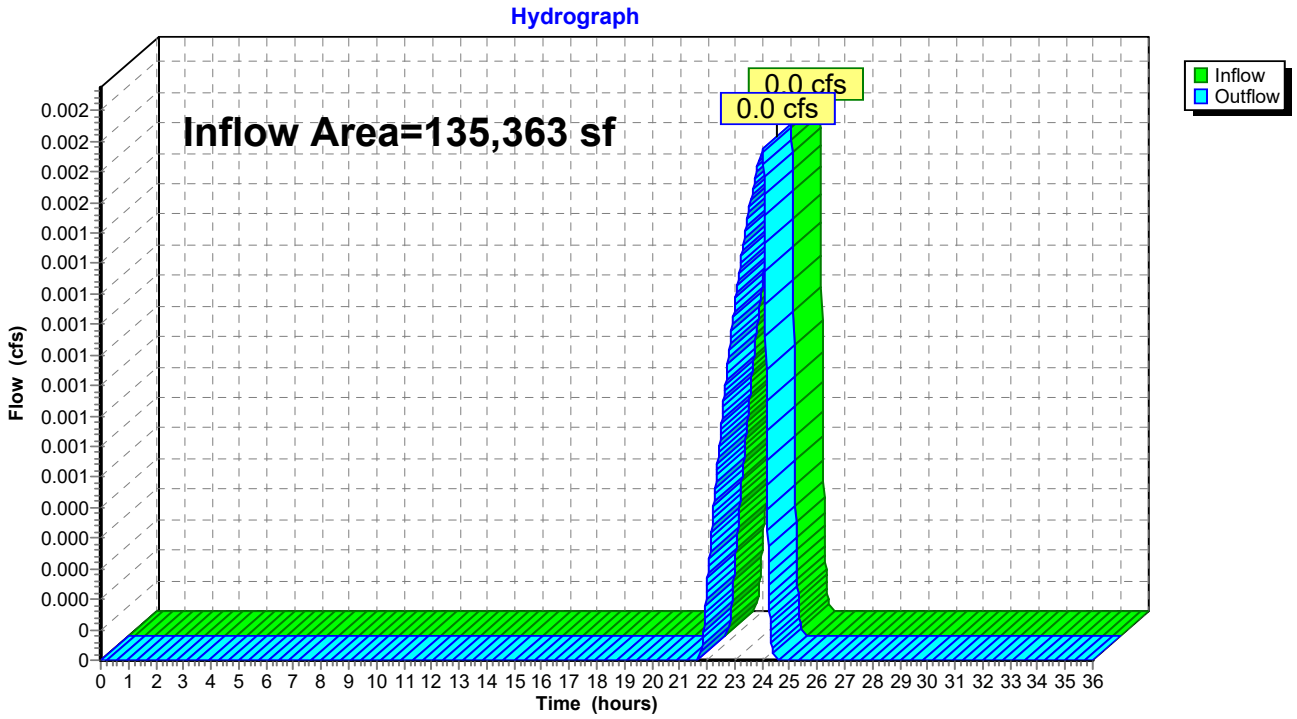


Summary for Reach DP2: Bordering Vegetated Wetland

Inflow Area = 135,363 sf, 5.33% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.0 cfs @ 24.02 hrs, Volume= 9 cf
Outflow = 0.0 cfs @ 24.02 hrs, Volume= 9 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach DP2: Bordering Vegetated Wetland



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Northern portion of 29 Runoff Area=41,122 sf 7.99% Impervious Runoff Depth=0.30"
Flow Length=144' Tc=6.9 min CN=41 Runoff=0.0 cfs 1,036 cf

Subcatchment E-2: 27.5 Clarks Rd and Runoff Area=135,363 sf 5.33% Impervious Runoff Depth=0.22"
Flow Length=492' Tc=10.6 min CN=39 Runoff=0.1 cfs 2,538 cf

Reach DP1: North of Site (31 Clarks Rd) Inflow=0.0 cfs 1,036 cf
Outflow=0.0 cfs 1,036 cf

Reach DP2: Bordering Vegetated Wetland Inflow=0.1 cfs 2,538 cf
Outflow=0.1 cfs 2,538 cf

Total Runoff Area = 176,485 sf Runoff Volume = 3,574 cf Average Runoff Depth = 0.24"
94.05% Pervious = 165,985 sf 5.95% Impervious = 10,500 sf

Summary for Subcatchment E-1: Northern portion of 29 Clark

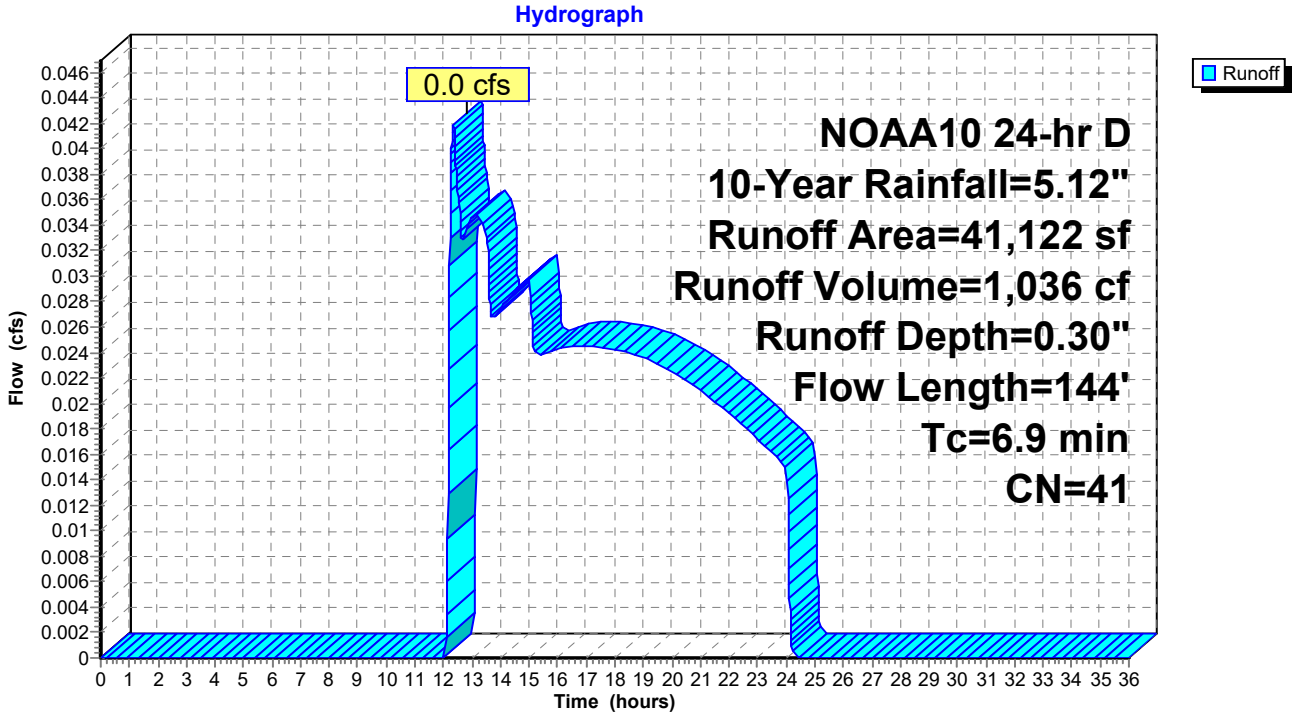
Runoff = 0.0 cfs @ 12.35 hrs, Volume= 1,036 cf, Depth= 0.30"
Routed to Reach DP1 : North of Site (31 Clarks Rd)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 10-Year Rainfall=5.12"

Area (sf)	CN	Description
13,178	30	Woods, Good, HSG A
1,335	98	Paved parking, HSG A
1,950	98	Roofs, HSG A
24,659	39	>75% Grass cover, Good, HSG A
41,122	41	Weighted Average
37,837		92.01% Pervious Area
3,285		7.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0180	0.14		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
0.9	94	0.0130	1.84		**Shallow Concentrated Flow, Woodland** Unpaved Kv= 16.1 fps
6.9	144	Total			

Subcatchment E-1: Northern portion of 29 Clark



Summary for Subcatchment E-2: 27.5 Clarks Rd and remaining area of 29 Clarks Rd

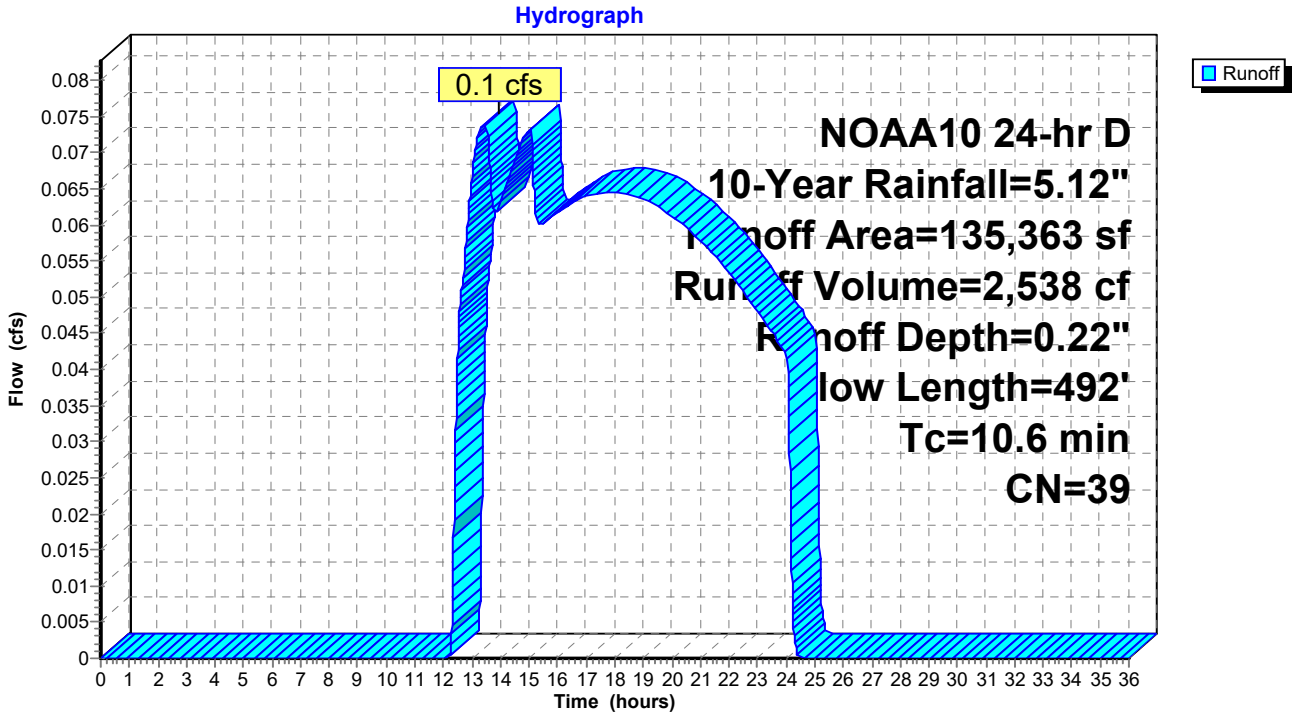
Runoff = 0.1 cfs @ 13.44 hrs, Volume= 2,538 cf, Depth= 0.22"
Routed to Reach DP2 : Bordering Vegetated Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 10-Year Rainfall=5.12"

	Area (sf)	CN	Description
	80,105	30	Woods, Good, HSG A
	1,662	77	Woods, Good, HSG D
	4,671	98	Paved parking, HSG A
	2,544	98	Roofs, HSG A
	40,717	39	>75% Grass cover, Good, HSG A
*	5,664	72	Woods roads, HSG A
	135,363	39	Weighted Average
	128,148		94.67% Pervious Area
	7,215		5.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
4.2	338	0.0070	1.35		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.7	104	0.2230	2.36		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	492	Total			

Subcatchment E-2: 27.5 Clarks Rd and remaining area of 29 Clarks Rd

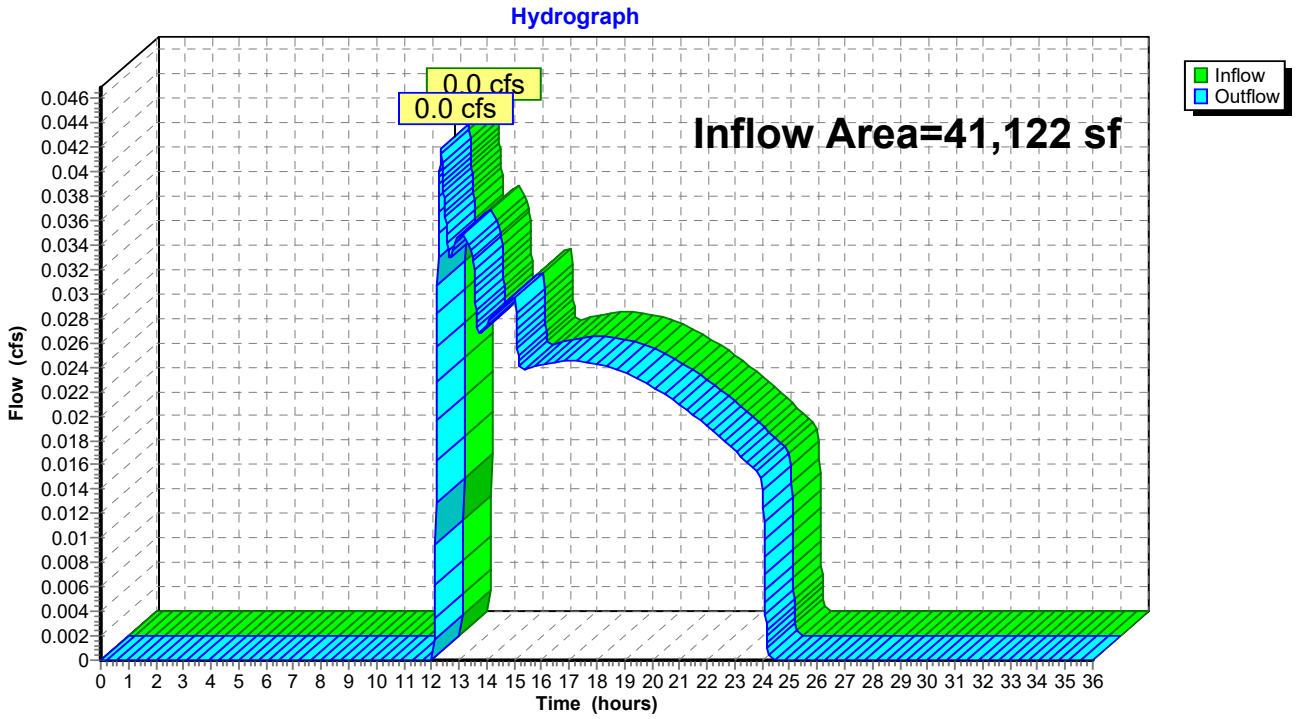


Summary for Reach DP1: North of Site (31 Clarks Rd)

Inflow Area = 41,122 sf, 7.99% Impervious, Inflow Depth = 0.30" for 10-Year event
Inflow = 0.0 cfs @ 12.35 hrs, Volume= 1,036 cf
Outflow = 0.0 cfs @ 12.35 hrs, Volume= 1,036 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach DP1: North of Site (31 Clarks Rd)

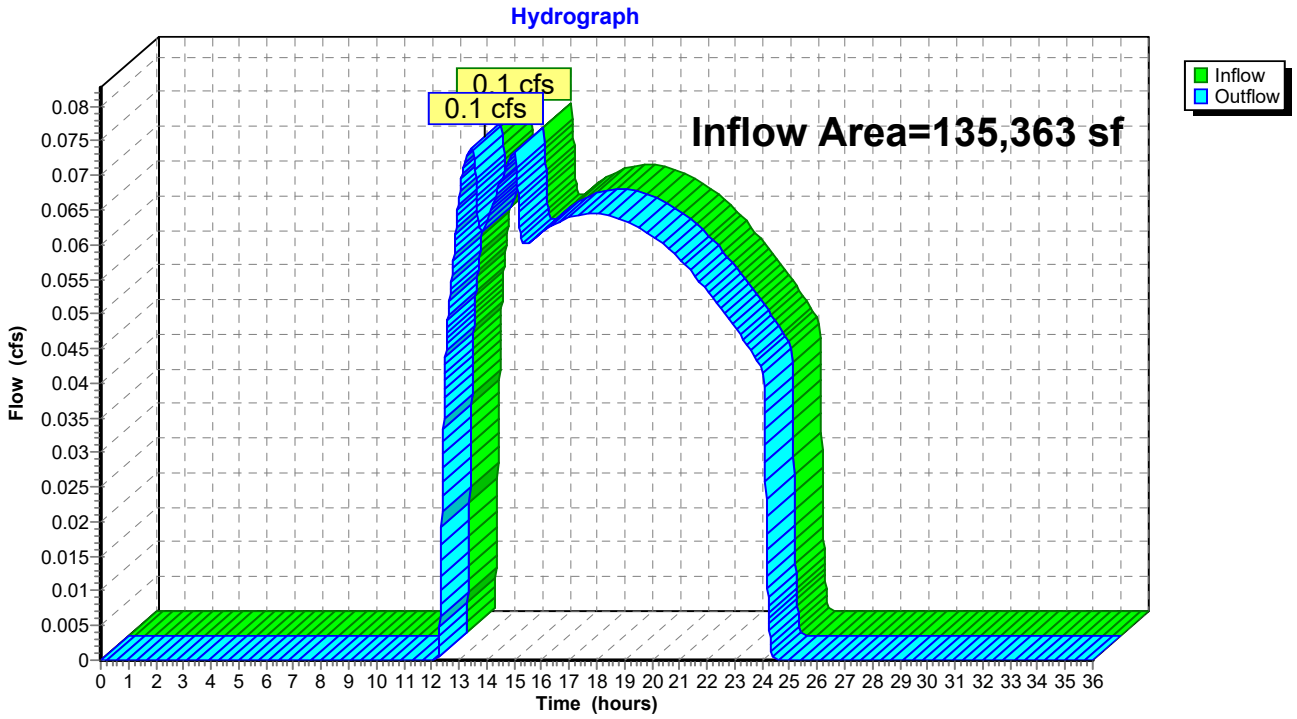


Summary for Reach DP2: Bordering Vegetated Wetland

Inflow Area = 135,363 sf, 5.33% Impervious, Inflow Depth = 0.22" for 10-Year event
Inflow = 0.1 cfs @ 13.44 hrs, Volume= 2,538 cf
Outflow = 0.1 cfs @ 13.44 hrs, Volume= 2,538 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach DP2: Bordering Vegetated Wetland



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Northern portion of 29 Runoff Area=41,122 sf 7.99% Impervious Runoff Depth=0.66"
Flow Length=144' Tc=6.9 min CN=41 Runoff=0.4 cfs 2,253 cf

Subcatchment E-2: 27.5 Clarks Rd and Runoff Area=135,363 sf 5.33% Impervious Runoff Depth=0.53"
Flow Length=492' Tc=10.6 min CN=39 Runoff=0.5 cfs 6,032 cf

Reach DP1: North of Site (31 Clarks Rd) Inflow=0.4 cfs 2,253 cf
Outflow=0.4 cfs 2,253 cf

Reach DP2: Bordering Vegetated Wetland Inflow=0.5 cfs 6,032 cf
Outflow=0.5 cfs 6,032 cf

Total Runoff Area = 176,485 sf Runoff Volume = 8,285 cf Average Runoff Depth = 0.56"
94.05% Pervious = 165,985 sf 5.95% Impervious = 10,500 sf

Summary for Subcatchment E-1: Northern portion of 29 Clark

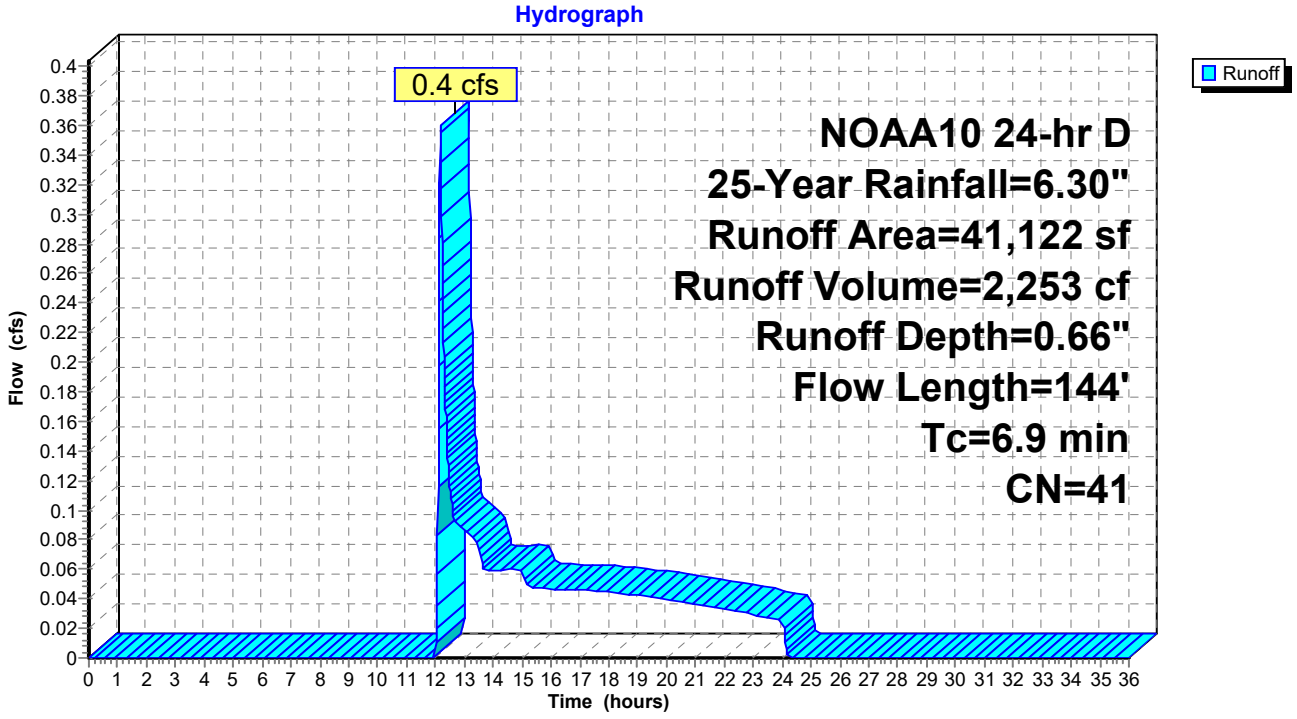
Runoff = 0.4 cfs @ 12.17 hrs, Volume= 2,253 cf, Depth= 0.66"
Routed to Reach DP1 : North of Site (31 Clarks Rd)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 25-Year Rainfall=6.30"

Area (sf)	CN	Description
13,178	30	Woods, Good, HSG A
1,335	98	Paved parking, HSG A
1,950	98	Roofs, HSG A
24,659	39	>75% Grass cover, Good, HSG A
41,122	41	Weighted Average
37,837		92.01% Pervious Area
3,285		7.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0180	0.14		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
0.9	94	0.0130	1.84		**Shallow Concentrated Flow, Woodland** Unpaved Kv= 16.1 fps
6.9	144	Total			

Subcatchment E-1: Northern portion of 29 Clark



Summary for Subcatchment E-2: 27.5 Clarks Rd and remaining area of 29 Clarks Rd

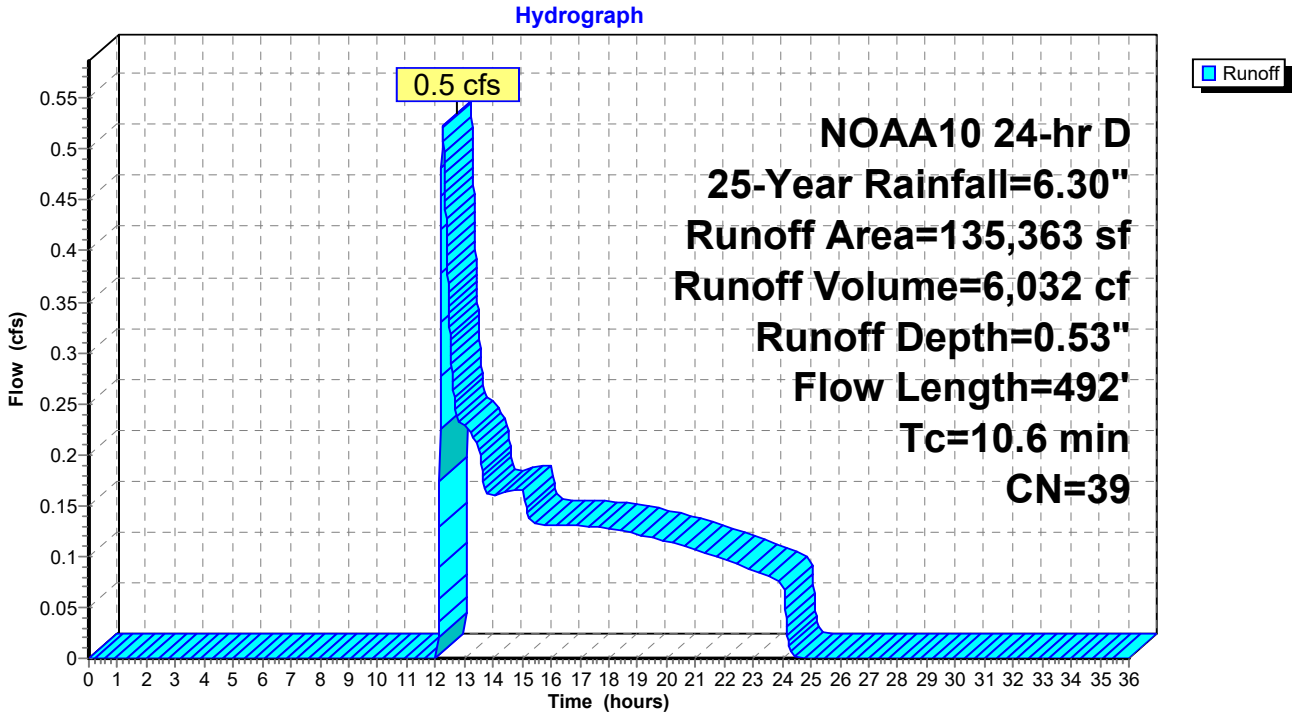
Runoff = 0.5 cfs @ 12.25 hrs, Volume= 6,032 cf, Depth= 0.53"
Routed to Reach DP2 : Bordering Vegetated Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 25-Year Rainfall=6.30"

	Area (sf)	CN	Description
	80,105	30	Woods, Good, HSG A
	1,662	77	Woods, Good, HSG D
	4,671	98	Paved parking, HSG A
	2,544	98	Roofs, HSG A
	40,717	39	>75% Grass cover, Good, HSG A
*	5,664	72	Woods roads, HSG A
	135,363	39	Weighted Average
	128,148		94.67% Pervious Area
	7,215		5.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
4.2	338	0.0070	1.35		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.7	104	0.2230	2.36		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	492	Total			

Subcatchment E-2: 27.5 Clarks Rd and remaining area of 29 Clarks Rd

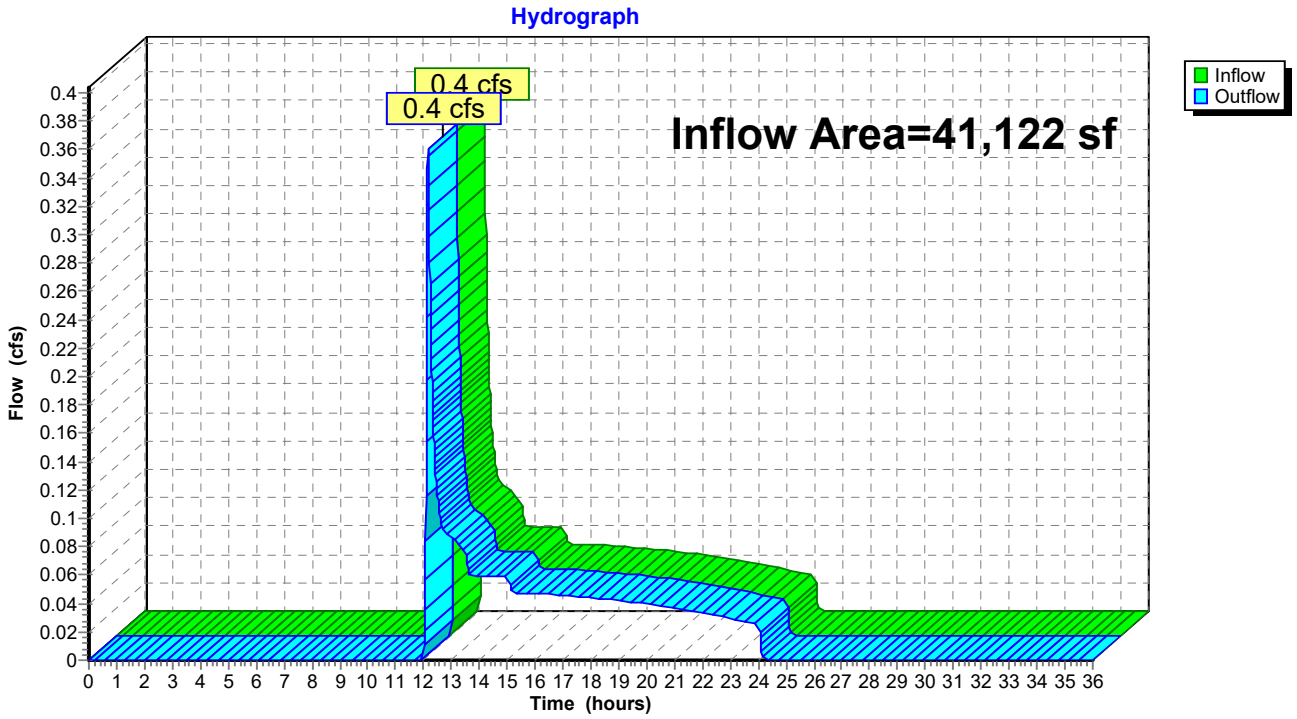


Summary for Reach DP1: North of Site (31 Clarks Rd)

Inflow Area = 41,122 sf, 7.99% Impervious, Inflow Depth = 0.66" for 25-Year event
Inflow = 0.4 cfs @ 12.17 hrs, Volume= 2,253 cf
Outflow = 0.4 cfs @ 12.17 hrs, Volume= 2,253 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach DP1: North of Site (31 Clarks Rd)

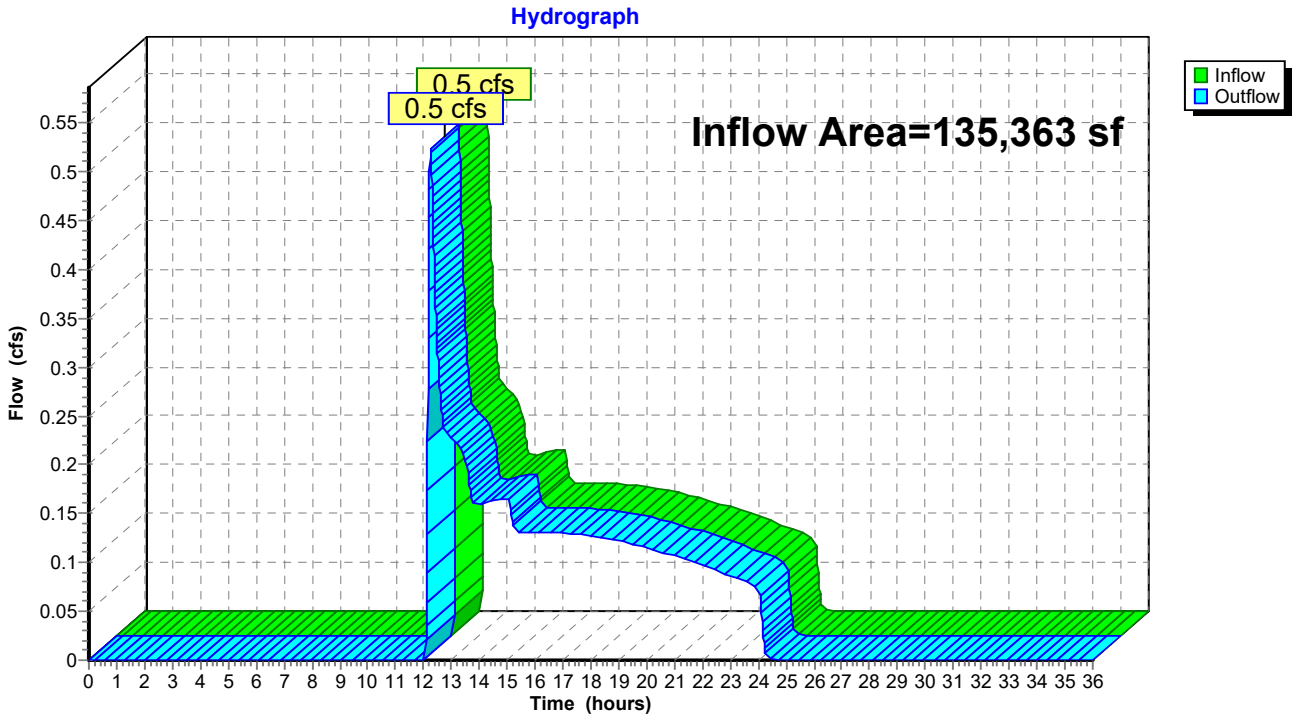


Summary for Reach DP2: Bordering Vegetated Wetland

Inflow Area = 135,363 sf, 5.33% Impervious, Inflow Depth = 0.53" for 25-Year event
Inflow = 0.5 cfs @ 12.25 hrs, Volume= 6,032 cf
Outflow = 0.5 cfs @ 12.25 hrs, Volume= 6,032 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach DP2: Bordering Vegetated Wetland



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Northern portion of 29 Runoff Area=41,122 sf 7.99% Impervious Runoff Depth=1.40"
Flow Length=144' Tc=6.9 min CN=41 Runoff=1.3 cfs 4,780 cf

Subcatchment E-2: 27.5 Clarks Rd and Runoff Area=135,363 sf 5.33% Impervious Runoff Depth=1.20"
Flow Length=492' Tc=10.6 min CN=39 Runoff=2.6 cfs 13,575 cf

Reach DP1: North of Site (31 Clarks Rd) Inflow=1.3 cfs 4,780 cf
Outflow=1.3 cfs 4,780 cf

Reach DP2: Bordering Vegetated Wetland Inflow=2.6 cfs 13,575 cf
Outflow=2.6 cfs 13,575 cf

Total Runoff Area = 176,485 sf Runoff Volume = 18,356 cf Average Runoff Depth = 1.25"
94.05% Pervious = 165,985 sf 5.95% Impervious = 10,500 sf

Summary for Subcatchment E-1: Northern portion of 29 Clark

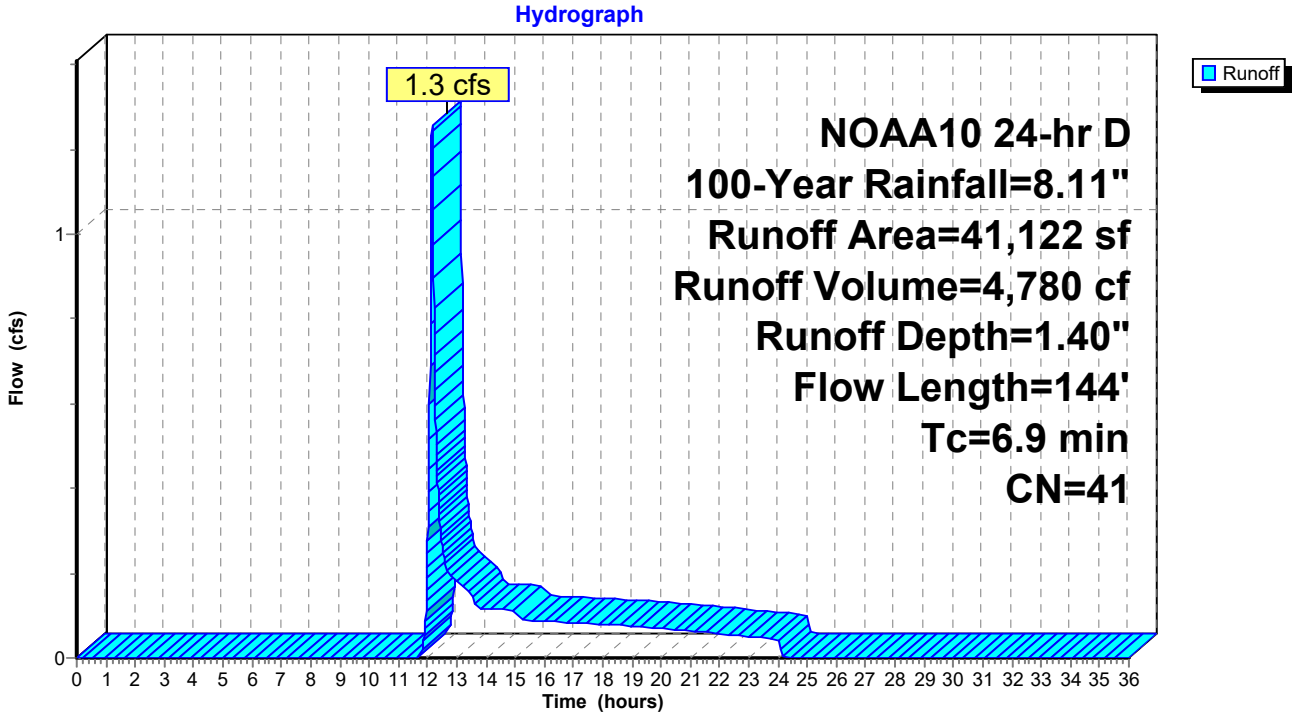
Runoff = 1.3 cfs @ 12.15 hrs, Volume= 4,780 cf, Depth= 1.40"
Routed to Reach DP1 : North of Site (31 Clarks Rd)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 100-Year Rainfall=8.11"

Area (sf)	CN	Description
13,178	30	Woods, Good, HSG A
1,335	98	Paved parking, HSG A
1,950	98	Roofs, HSG A
24,659	39	>75% Grass cover, Good, HSG A
41,122	41	Weighted Average
37,837		92.01% Pervious Area
3,285		7.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0180	0.14		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
0.9	94	0.0130	1.84		**Shallow Concentrated Flow, Woodland** Unpaved Kv= 16.1 fps
6.9	144	Total			

Subcatchment E-1: Northern portion of 29 Clark



Summary for Subcatchment E-2: 27.5 Clarks Rd and remaining area of 29 Clarks Rd

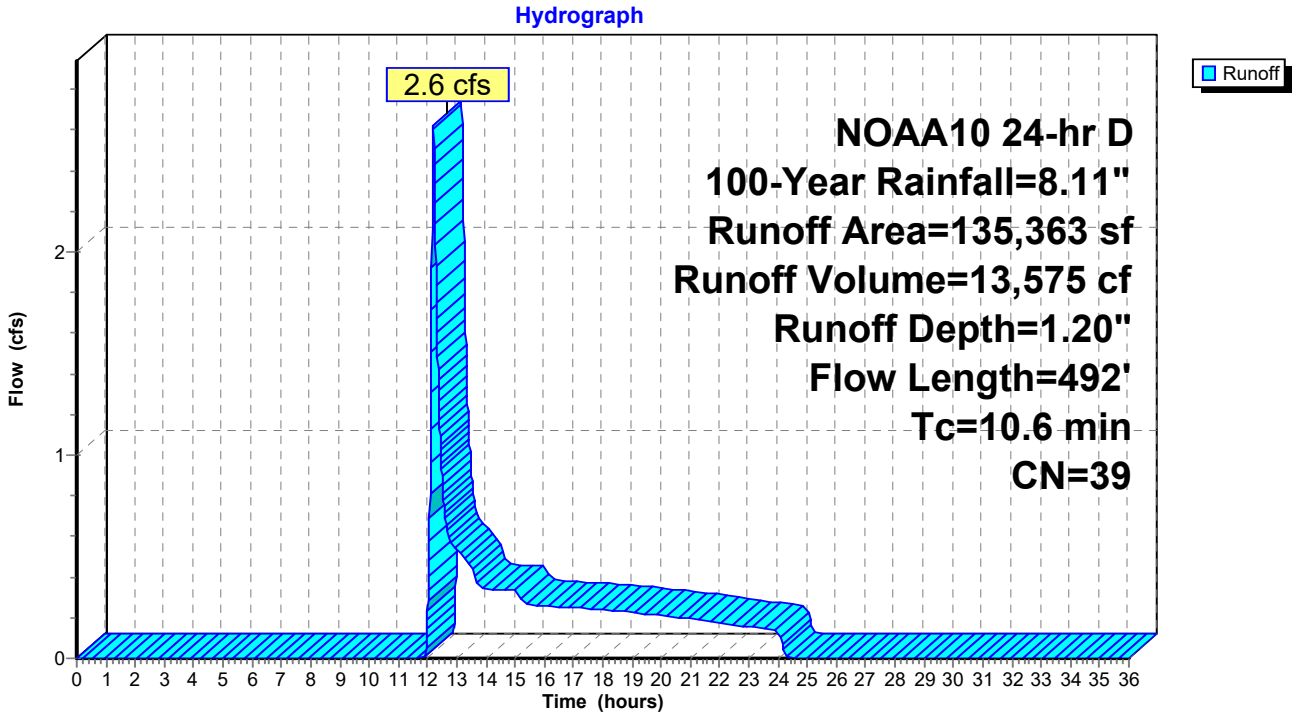
Runoff = 2.6 cfs @ 12.20 hrs, Volume= 13,575 cf, Depth= 1.20"
Routed to Reach DP2 : Bordering Vegetated Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 100-Year Rainfall=8.11"

	Area (sf)	CN	Description
	80,105	30	Woods, Good, HSG A
	1,662	77	Woods, Good, HSG D
	4,671	98	Paved parking, HSG A
	2,544	98	Roofs, HSG A
	40,717	39	>75% Grass cover, Good, HSG A
*	5,664	72	Woods roads, HSG A
	135,363	39	Weighted Average
	128,148		94.67% Pervious Area
	7,215		5.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
4.2	338	0.0070	1.35		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.7	104	0.2230	2.36		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	492	Total			

Subcatchment E-2: 27.5 Clarks Rd and remaining area of 29 Clarks Rd

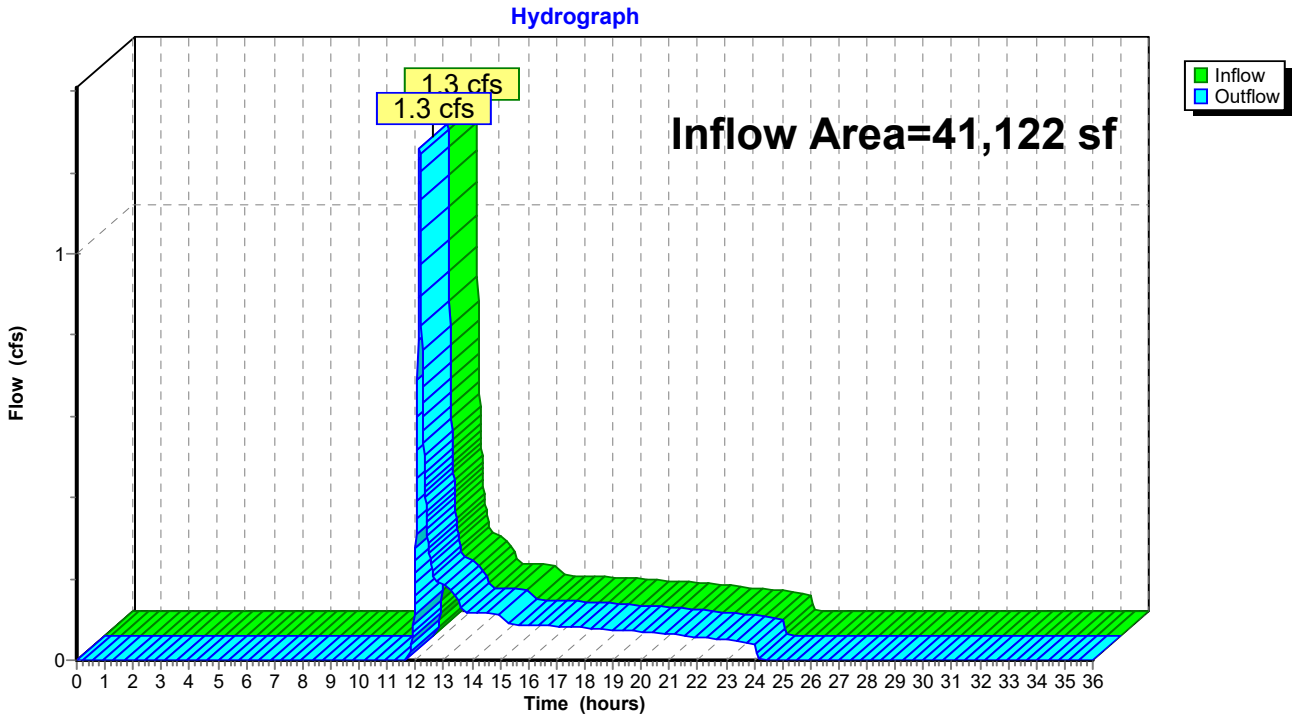


Summary for Reach DP1: North of Site (31 Clarks Rd)

Inflow Area = 41,122 sf, 7.99% Impervious, Inflow Depth = 1.40" for 100-Year event
Inflow = 1.3 cfs @ 12.15 hrs, Volume= 4,780 cf
Outflow = 1.3 cfs @ 12.15 hrs, Volume= 4,780 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach DP1: North of Site (31 Clarks Rd)

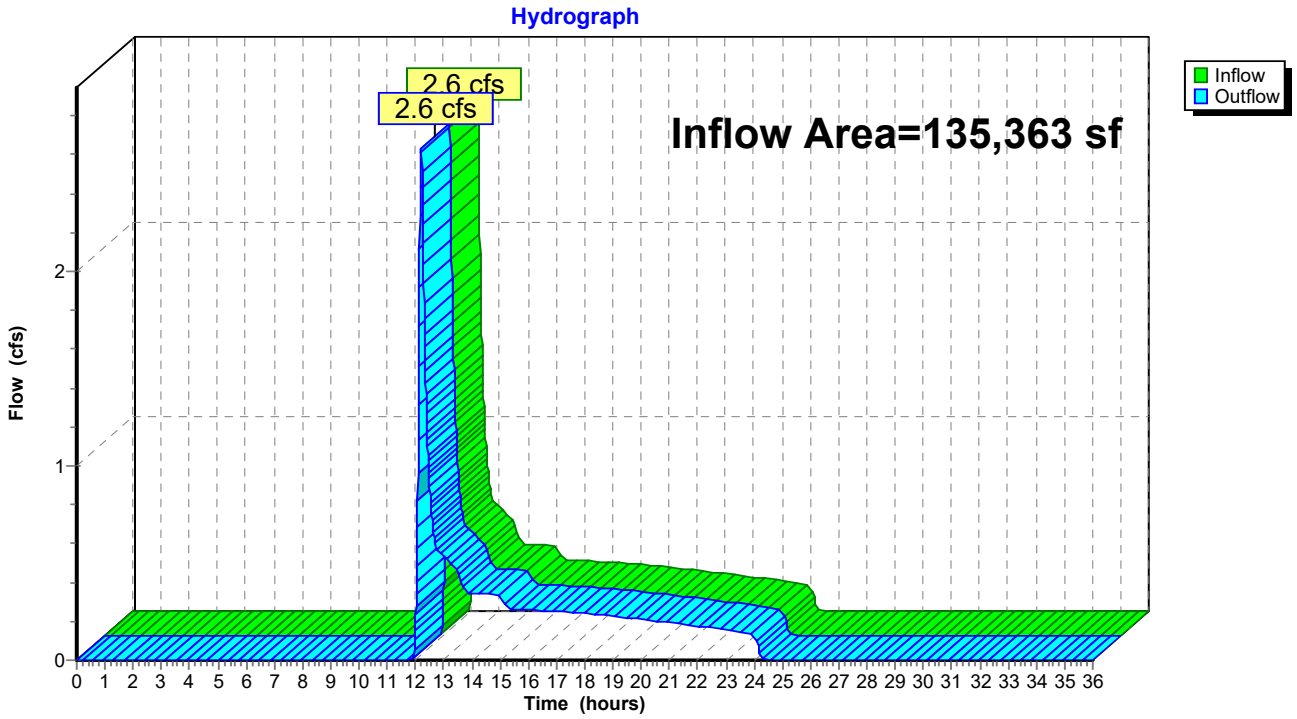


Summary for Reach DP2: Bordering Vegetated Wetland

Inflow Area = 135,363 sf, 5.33% Impervious, Inflow Depth = 1.20" for 100-Year event
Inflow = 2.6 cfs @ 12.20 hrs, Volume= 13,575 cf
Outflow = 2.6 cfs @ 12.20 hrs, Volume= 13,575 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

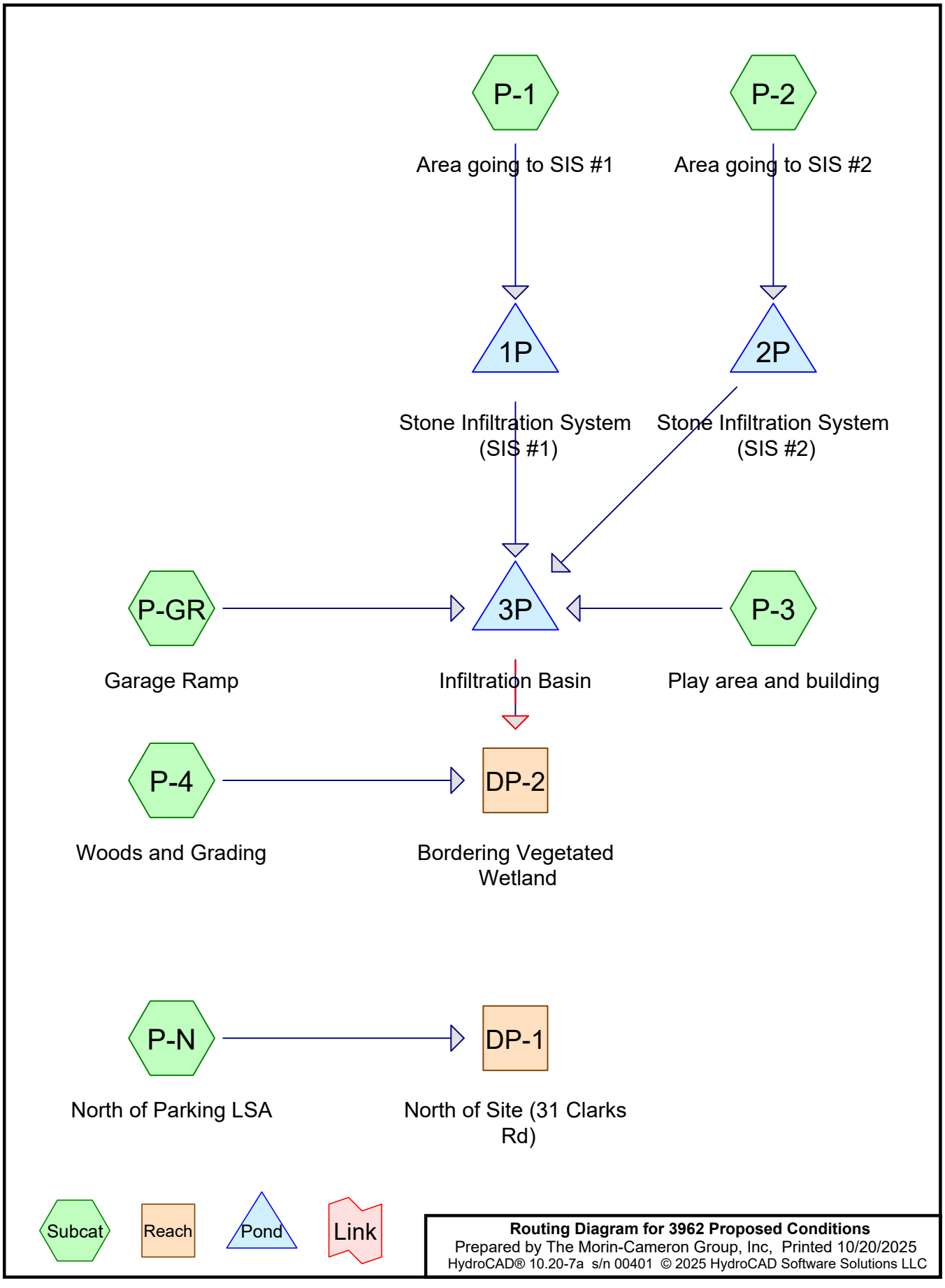
Reach DP2: Bordering Vegetated Wetland



APPENDIX C:

PROPOSED CONDITIONS

HYDROLOGIC ANALYSIS REPORT



Routing Diagram for 3962 Proposed Conditions
Prepared by The Morin-Cameron Group, Inc, Printed 10/20/2025

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NOAA10 24-hr	D	Default	24.00	1	3.24	2
2	10-Year	NOAA10 24-hr	D	Default	24.00	1	5.12	2
3	25-Year	NOAA10 24-hr	D	Default	24.00	1	6.30	2
4	100-Year	NOAA10 24-hr	D	Default	24.00	1	8.11	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
45,802	39	>75% Grass cover, Good, HSG A (P-1, P-2, P-3, P-4, P-N)
916	98	Concrete Patio, HSG A (P-4)
12,239	98	Concrete, HSG A (P-1, P-2)
1,058	39	Gravel Play Area, Good, HSG A (P-3)
2,041	98	Nature Play Area, HSG A (P-3)
7,934	32	Path, Good, HSG A (P-1, P-3, P-4)
41,499	98	Paved parking, HSG A (P-1, P-2, P-GR)
45,538	98	Roofs, HSG A (P-1, P-2)
17,796	30	Woods, Good, HSG A (P-1, P-3, P-4)
1,662	77	Woods, Good, HSG D (P-4)
176,485	**72**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
174,823	HSG A	P-1, P-2, P-3, P-4, P-GR, P-N
0	HSG B	
0	HSG C	
1,662	HSG D	P-4
0	Other	
176,485		**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	Su Nu
45,802	0	0	0	0	45,802	>75% Grass cover, Good	
12,239	0	0	0	0	12,239	Concrete	
916	0	0	0	0	916	Concrete Patio	
1,058	0	0	0	0	1,058	Gravel Play Area, Good	
2,041	0	0	0	0	2,041	Nature Play Area	
7,934	0	0	0	0	7,934	Path, Good	
41,499	0	0	0	0	41,499	Paved parking	
45,538	0	0	0	0	45,538	Roofs	
17,796	0	0	1,662	0	19,458	Woods, Good	
174,823	**0**	**0**	**1,662**	**0**	**176,485**	**TOTAL AREA**	

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	51.90	51.90	5.0	0.0000	0.012	0.0	12.0	0.0	
2	2P	48.30	48.30	5.0	0.0000	0.012	0.0	12.0	0.0	
3	3P	32.00	26.50	43.0	0.1279	0.012	0.0	12.0	0.0	

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1: Area going to SIS #1 Runoff Area=57,572 sf 83.08% Impervious Runoff Depth=2.03"
Flow Length=162' Slope=0.0200 '/' Tc=10.8 min CN=88 Runoff=2.7 cfs 9,754 cf

Subcatchment P-2: Area going to SIS #2 Runoff Area=57,476 sf 85.92% Impervious Runoff Depth=2.21"
Tc=6.0 min CN=90 Runoff=3.6 cfs 10,564 cf

Subcatchment P-3: Play area and building Runoff Area=12,318 sf 16.57% Impervious Runoff Depth=0.08"
Flow Length=165' Tc=7.8 min CN=47 Runoff=0.0 cfs 81 cf

Subcatchment P-4: Woods and Grading Runoff Area=42,983 sf 2.13% Impervious Runoff Depth=0.00"
Flow Length=400' Tc=16.6 min CN=37 Runoff=0.0 cfs 0 cf

Subcatchment P-GR: Garage Ramp Runoff Area=2,065 sf 100.00% Impervious Runoff Depth=3.01"
Tc=6.0 min CN=98 Runoff=0.2 cfs 518 cf

Subcatchment P-N: North of Parking LSA Runoff Area=4,071 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39 Runoff=0.0 cfs 0 cf

Reach DP-1: North of Site (31 Clarks Rd) Inflow=0.0 cfs 0 cf
Outflow=0.0 cfs 0 cf

Reach DP-2: Bordering Vegetated Wetland Inflow=0.0 cfs 0 cf
Outflow=0.0 cfs 0 cf

Pond 1P: Stone Infiltration System (SIS #1) Peak Elev=51.28' Storage=932 cf Inflow=2.7 cfs 9,754 cf
Discarded=1.2 cfs 9,754 cf Primary=0.0 cfs 0 cf Outflow=1.2 cfs 9,754 cf

Pond 2P: Stone Infiltration System (SIS #2) Peak Elev=48.95' Storage=1,394 cf Inflow=3.6 cfs 10,564 cf
Discarded=1.0 cfs 10,564 cf Primary=0.0 cfs 0 cf Outflow=1.0 cfs 10,564 cf

Pond 3P: Infiltration Basin Peak Elev=32.05' Storage=24 cf Inflow=0.2 cfs 599 cf
Discarded=0.1 cfs 599 cf Primary=0.0 cfs 0 cf Secondary=0.0 cfs 0 cf Outflow=0.1 cfs 599 cf

Total Runoff Area = 176,485 sf Runoff Volume = 20,917 cf Average Runoff Depth = 1.42"
42.07% Pervious = 74,252 sf 57.93% Impervious = 102,233 sf

Summary for Subcatchment P-1: Area going to SIS #1

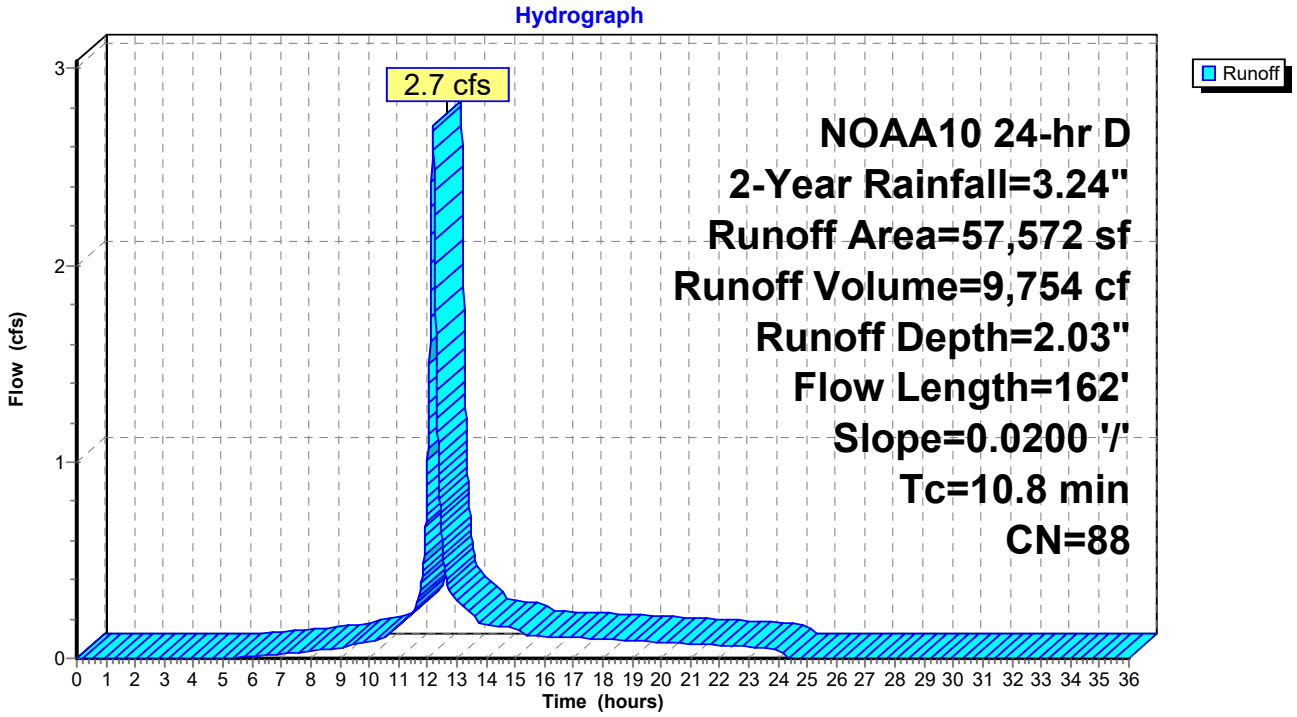
Runoff = 2.7 cfs @ 12.18 hrs, Volume= 9,754 cf, Depth= 2.03"
Routed to Pond 1P : Stone Infiltration System (SIS #1)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 2-Year Rainfall=3.24"

	Area (sf)	CN	Description
*	23,783	98	Roofs, HSG A
*	18,600	98	Paved parking, HSG A
	9,127	39	>75% Grass cover, Good, HSG A
*	5,447	98	Concrete, HSG A
*	487	32	Path, Good, HSG A
*	128	30	Woods, Good, HSG A
	57,572	88	Weighted Average
	9,742		16.92% Pervious Area
	47,830		83.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.0200	0.08		**Sheet Flow, LSA** Grass: Short n= 0.150 P2= 1.00"
0.6	87	0.0200	2.28		**Shallow Concentrated Flow, LSA** Unpaved Kv= 16.1 fps
0.1	25	0.0200	2.87		**Shallow Concentrated Flow, Parking lot to CB** Paved Kv= 20.3 fps
10.8	162	Total			

Subcatchment P-1: Area going to SIS #1



Summary for Subcatchment P-2: Area going to SIS #2

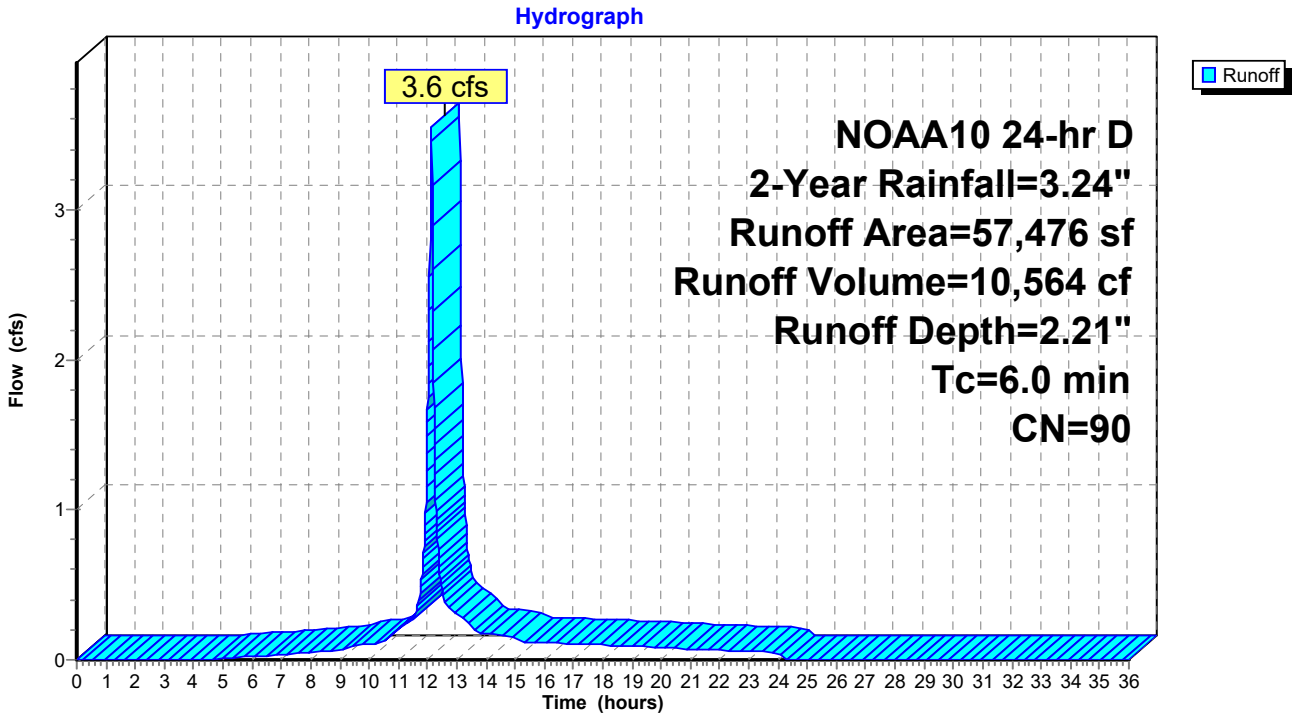
Runoff = 3.6 cfs @ 12.13 hrs, Volume= 10,564 cf, Depth= 2.21"
Routed to Pond 2P : Stone Infiltration System (SIS #2)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 2-Year Rainfall=3.24"

	Area (sf)	CN	Description
	20,834	98	Paved parking, HSG A
	8,095	39	>75% Grass cover, Good, HSG A
*	6,792	98	Concrete, HSG A
*	21,755	98	Roofs, HSG A
	57,476	90	Weighted Average
	8,095		14.08% Pervious Area
	49,381		85.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 0.1 hr TC Minimum**

Subcatchment P-2: Area going to SIS #2



Summary for Subcatchment P-3: Play area and building

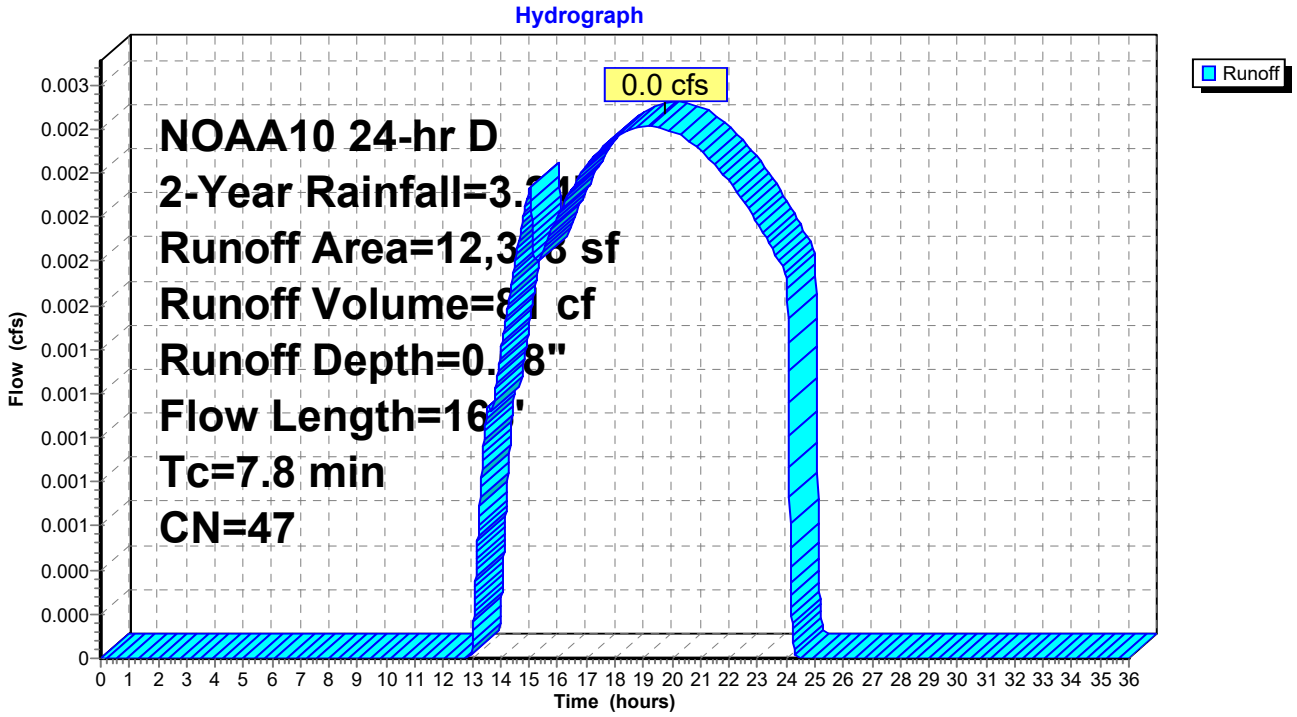
Runoff = 0.0 cfs @ 19.25 hrs, Volume= 81 cf, Depth= 0.08"
Routed to Pond 3P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 2-Year Rainfall=3.24"

	Area (sf)	CN	Description
	138	30	Woods, Good, HSG A
*	1,058	39	Gravel Play Area, Good, HSG A
*	2,041	98	Nature Play Area, HSG A
	5,491	39	>75% Grass cover, Good, HSG A
*	3,590	32	Path, Good, HSG A
	12,318	47	Weighted Average
	10,277		83.43% Pervious Area
	2,041		16.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	30	0.0200	0.07		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.00"
0.6	20	0.0200	0.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.00"
0.1	40	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	75	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.8	165	Total			

Subcatchment P-3: Play area and building



Summary for Subcatchment P-4: Woods and Grading

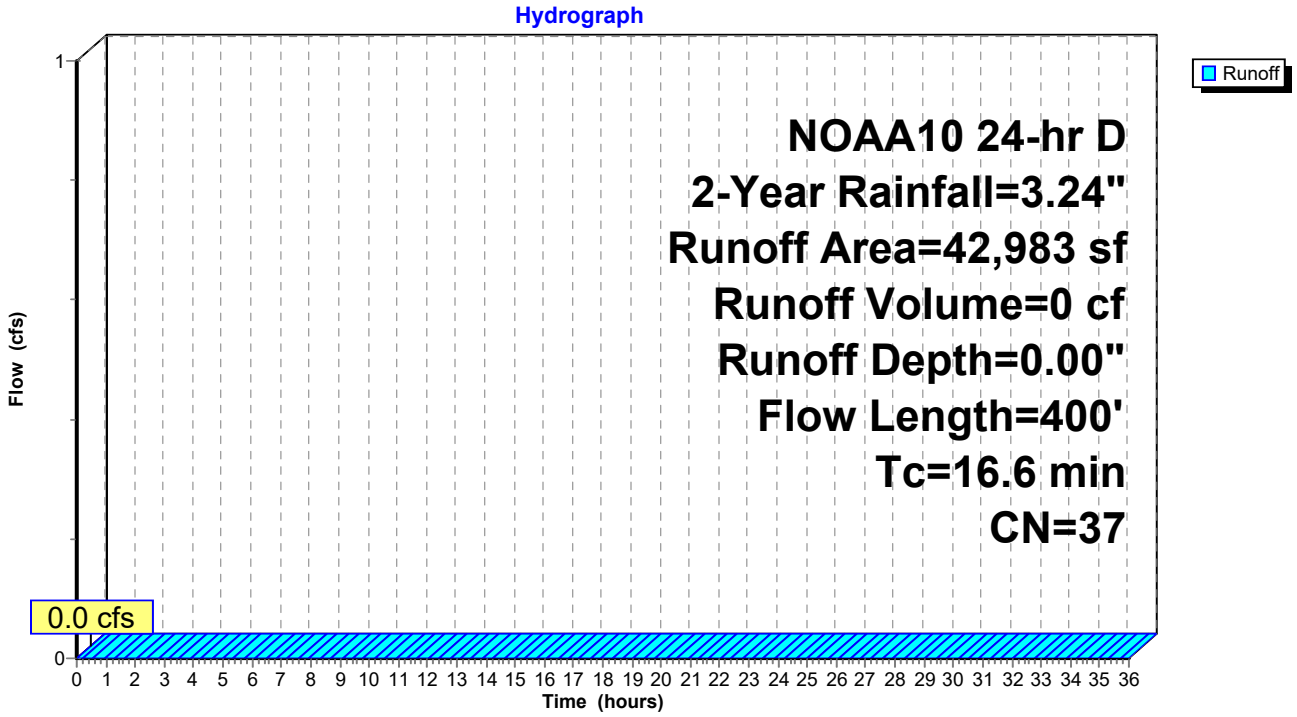
Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Reach DP-2 : Bordering Vegetated Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 2-Year Rainfall=3.24"

	Area (sf)	CN	Description
	17,530	30	Woods, Good, HSG A
	19,018	39	>75% Grass cover, Good, HSG A
*	3,857	32	Path, Good, HSG A
	1,662	77	Woods, Good, HSG D
*	916	98	Concrete Patio, HSG A
	42,983	37	Weighted Average
	42,067		97.87% Pervious Area
	916		2.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	50	0.0100	0.06		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.00"
2.5	243	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	107	0.2230	2.36		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.6	400	Total			

Subcatchment P-4: Woods and Grading



Summary for Subcatchment P-GR: Garage Ramp

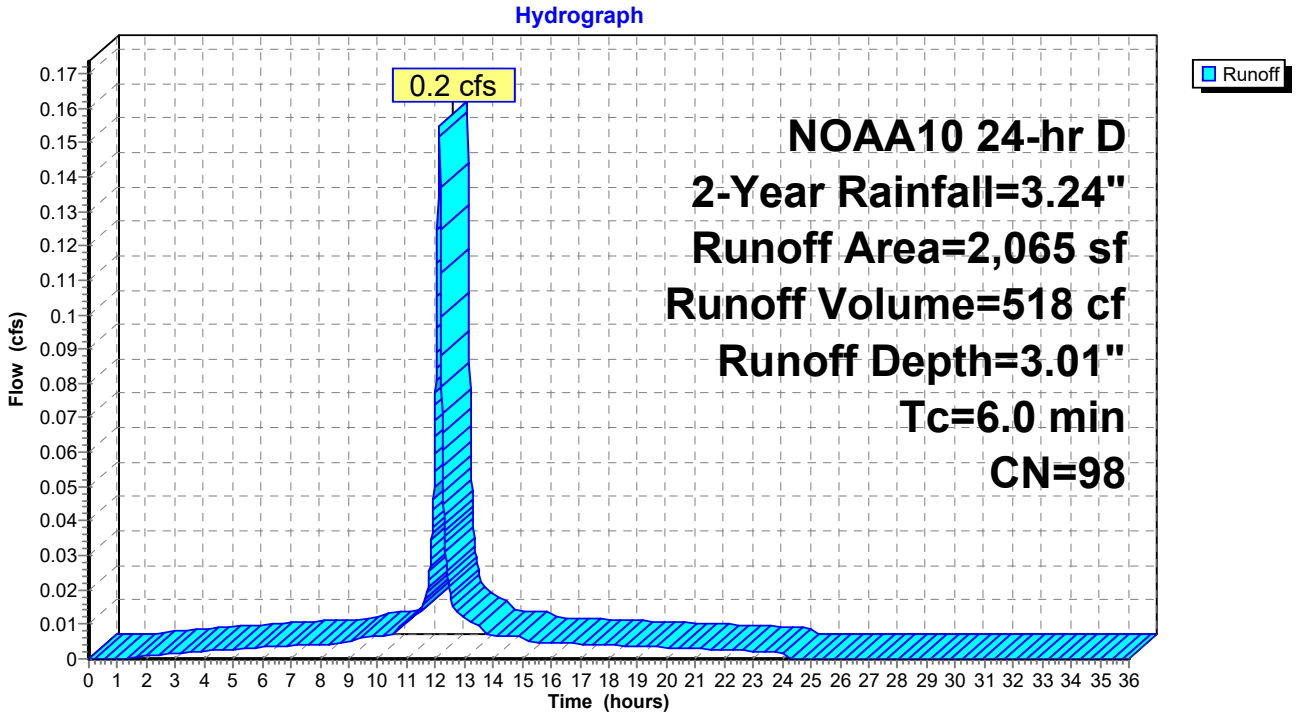
Runoff = 0.2 cfs @ 12.13 hrs, Volume= 518 cf, Depth= 3.01"
Routed to Pond 3P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 2-Year Rainfall=3.24"

Area (sf)	CN	Description
2,065	98	Paved parking, HSG A
2,065		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 0.1 hr TC Minimum**

Subcatchment P-GR: Garage Ramp



Summary for Subcatchment P-N: North of Parking LSA

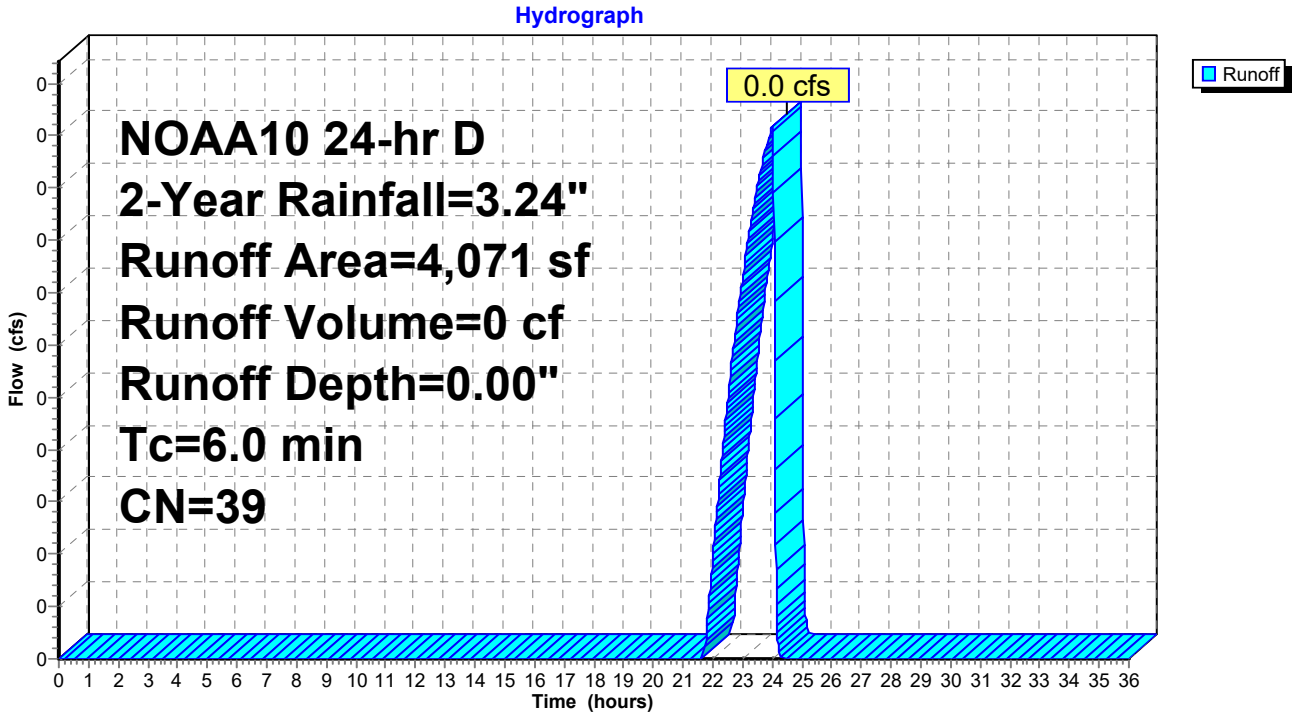
Runoff = 0.0 cfs @ 24.01 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Reach DP-1 : North of Site (31 Clarks Rd)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 2-Year Rainfall=3.24"

Area (sf)	CN	Description
4,071	39	>75% Grass cover, Good, HSG A
4,071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 0.1 hr TC Minimum**

Subcatchment P-N: North of Parking LSA

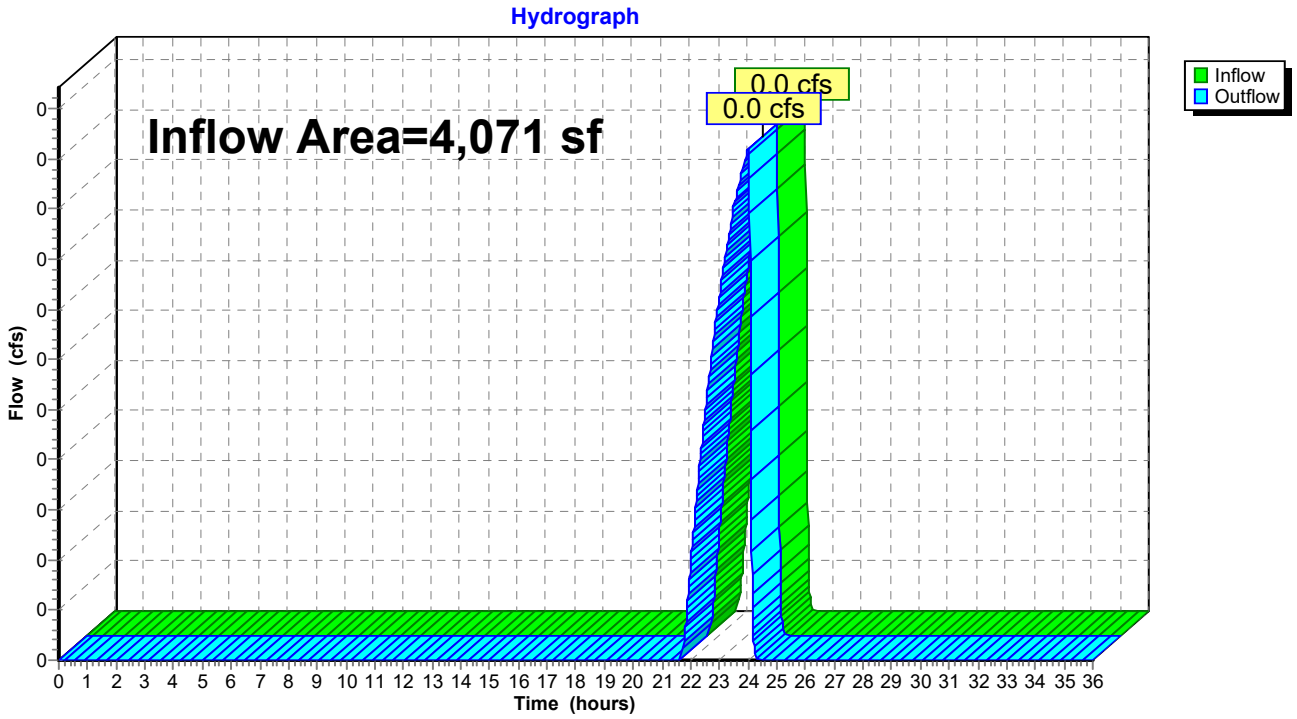


Summary for Reach DP-1: North of Site (31 Clarks Rd)

Inflow Area = 4,071 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.0 cfs @ 24.01 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 24.01 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2

Reach DP-1: North of Site (31 Clarks Rd)

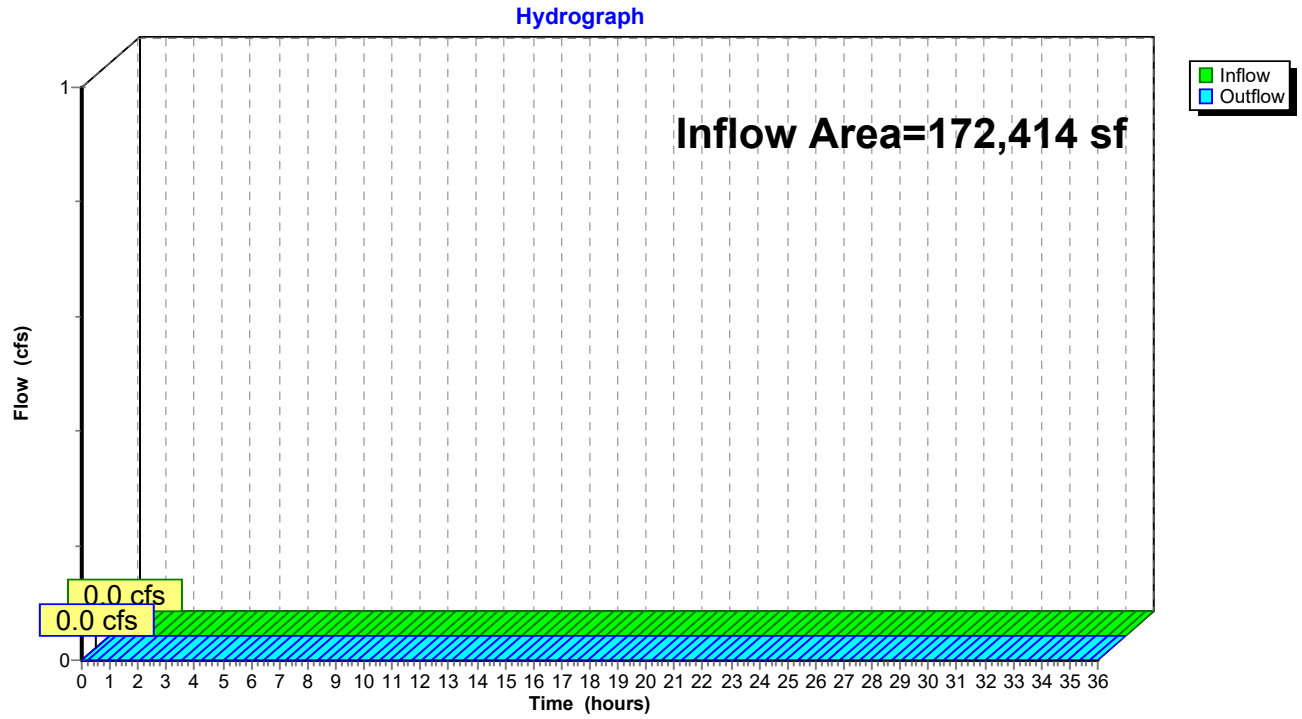


Summary for Reach DP-2: Bordering Vegetated Wetland

Inflow Area = 172,414 sf, 59.30% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2

Reach DP-2: Bordering Vegetated Wetland



Summary for Pond 1P: Stone Infiltration System (SIS #1)

Inflow Area = 57,572 sf, 83.08% Impervious, Inflow Depth = 2.03" for 2-Year event
Inflow = 2.7 cfs @ 12.18 hrs, Volume= 9,754 cf
Outflow = 1.2 cfs @ 12.09 hrs, Volume= 9,754 cf, Atten= 57%, Lag= 0.0 min
Discarded = 1.2 cfs @ 12.09 hrs, Volume= 9,754 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond 3P : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 51.28' @ 12.35 hrs Surf.Area= 6,101 sf Storage= 932 cf

Plug-Flow detention time= 2.7 min calculated for 9,751 cf (100% of inflow)
Center-of-Mass det. time= 2.7 min (845.2 - 842.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	50.90'	6,111 cf	**41.67'W x 146.42'L x 2.71'H Field A** 16,528 cf Overall - 1,251 cf Embedded = 15,277 cf x 40.0% Voids
#2A	51.90'	968 cf	**ADS N-12 12"** x 56 Inside #1 Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf 56 Chambers in 8 Rows 37.67' Header x 0.81 sf x 2 = 61.0 cf Inside
		7,079 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.90'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	51.90'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.90' / 51.90' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	52.10'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	53.50'	**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

Discarded OutFlow Max=1.2 cfs @ 12.09 hrs HW=50.93' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 1.2 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=50.90' TW=32.00' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.0 cfs)
  └**3=Orifice/Grate** (Controls 0.0 cfs)
  └**4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 1P: Stone Infiltration System (SIS #1) - Chamber Wizard Field A

Chamber Model = ADS N-12 12" (ADS N-12® Pipe)
Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf
Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf

14.5" Wide + 48.0" Spacing = 62.5" C-C Row Spacing

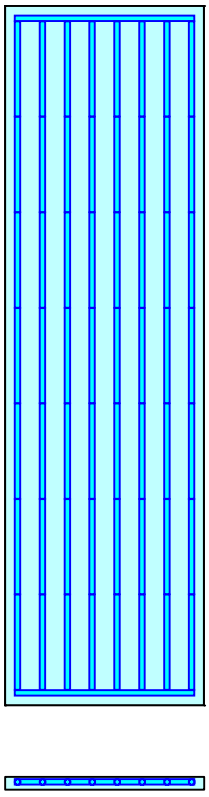
7 Chambers/Row x 20.00' Long +1.21' Header x 2 = 142.42' Row Length +24.0" End Stone x 2 = 146.42' Base Length
8 Rows x 14.5" Wide + 48.0" Spacing x 7 + 24.0" Side Stone x 2 = 41.67' Base Width
12.0" Stone Base + 14.5" Chamber Height + 6.0" Stone Cover = 2.71' Field Height

56 Chambers x 16.2 cf + 37.67' Header x 0.81 sf x 2 = 968.2 cf Chamber Storage
56 Chambers x 20.9 cf + 37.67' Header x 1.05 sf x 2 = 1,250.7 cf Displacement

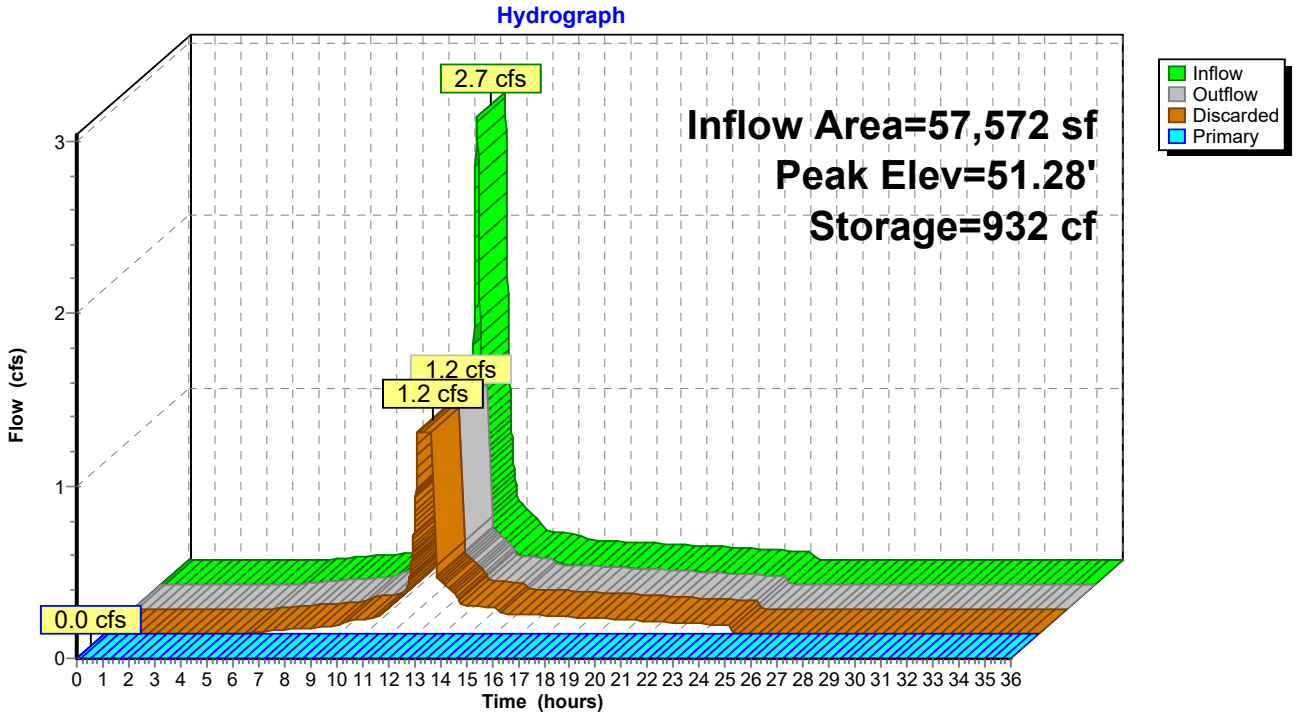
16,527.9 cf Field - 1,250.7 cf Chambers = 15,277.2 cf Stone x 40.0% Voids = 6,110.9 cf Stone Storage

Chamber Storage + Stone Storage = 7,079.1 cf = 0.163 af
Overall Storage Efficiency = 42.8%
Overall System Size = 146.42' x 41.67' x 2.71'

56 Chambers
612.1 cy Field
565.8 cy Stone



Pond 1P: Stone Infiltration System (SIS #1)



Summary for Pond 2P: Stone Infiltration System (SIS #2)

Inflow Area = 57,476 sf, 85.92% Impervious, Inflow Depth = 2.21" for 2-Year event
Inflow = 3.6 cfs @ 12.13 hrs, Volume= 10,564 cf
Outflow = 1.0 cfs @ 12.00 hrs, Volume= 10,564 cf, Atten= 71%, Lag= 0.0 min
Discarded = 1.0 cfs @ 12.00 hrs, Volume= 10,564 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond 3P : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 48.95' @ 12.29 hrs Surf.Area= 5,339 sf Storage= 1,394 cf

Plug-Flow detention time= 4.7 min calculated for 10,564 cf (100% of inflow)
Center-of-Mass det. time= 4.7 min (831.5 - 826.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	48.30'	5,347 cf	**36.46'W x 146.42'L x 2.71'H Field A** 14,462 cf Overall - 1,094 cf Embedded = 13,368 cf x 40.0% Voids
#2A	49.30'	846 cf	**ADS N-12 12"** x 49 Inside #1 Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf 49 Chambers in 7 Rows 32.46' Header x 0.81 sf x 2 = 52.6 cf Inside
		6,194 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	48.30'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	48.30'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 48.30' / 48.30' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	49.90'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	50.50'	**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

Discarded OutFlow Max=1.0 cfs @ 12.00 hrs HW=48.34' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 1.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=48.30' TW=32.00' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.0 cfs)
  ├**3=Orifice/Grate** (Controls 0.0 cfs)
  └**4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 2P: Stone Infiltration System (SIS #2) - Chamber Wizard Field A

Chamber Model = ADS N-12 12" (ADS N-12® Pipe)
Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf
Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf

14.5" Wide + 48.0" Spacing = 62.5" C-C Row Spacing

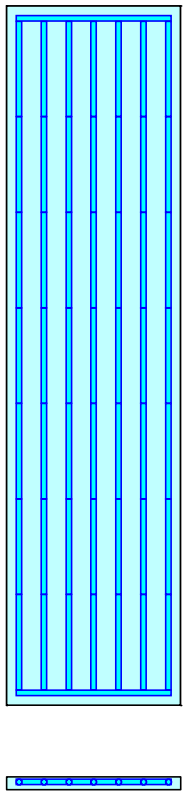
7 Chambers/Row x 20.00' Long +1.21' Header x 2 = 142.42' Row Length +24.0" End Stone x 2 = 146.42' Base Length
7 Rows x 14.5" Wide + 48.0" Spacing x 6 + 24.0" Side Stone x 2 = 36.46' Base Width
12.0" Stone Base + 14.5" Chamber Height + 6.0" Stone Cover = 2.71' Field Height

49 Chambers x 16.2 cf + 32.46' Header x 0.81 sf x 2 = 846.4 cf Chamber Storage
49 Chambers x 20.9 cf + 32.46' Header x 1.05 sf x 2 = 1,093.3 cf Displacement

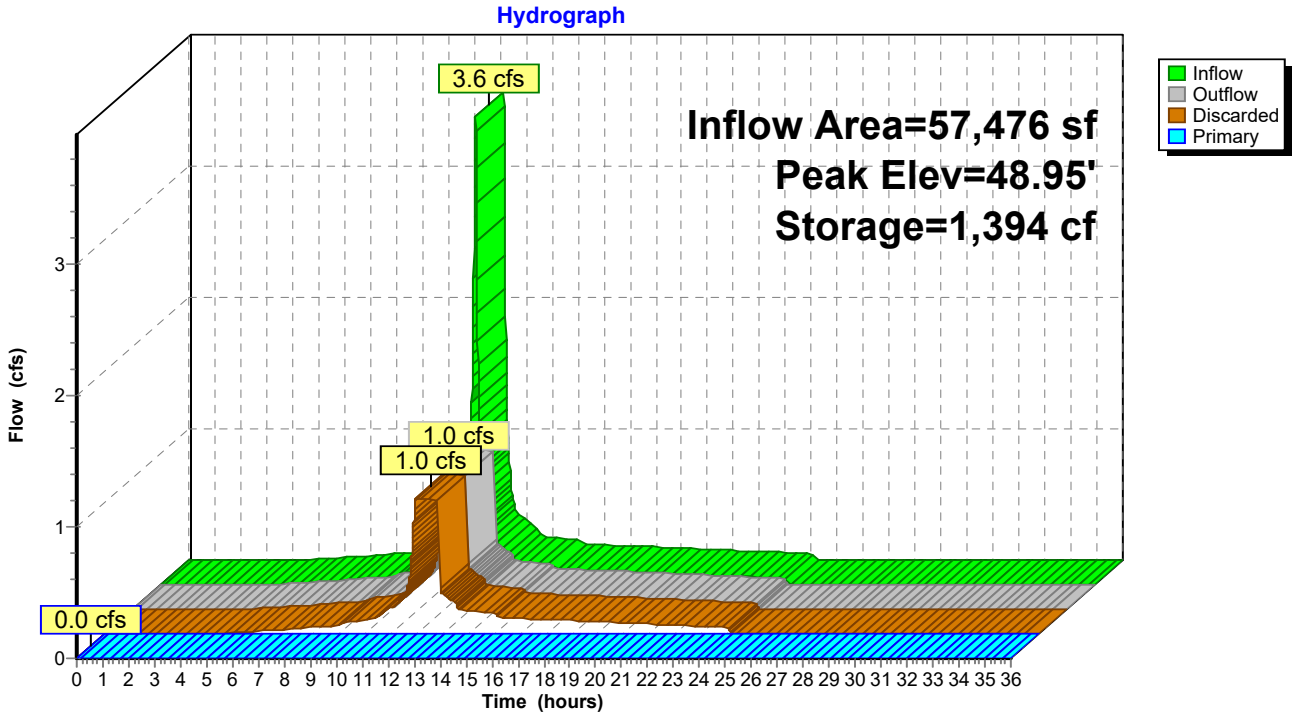
14,461.9 cf Field - 1,093.3 cf Chambers = 13,368.6 cf Stone x 40.0% Voids = 5,347.4 cf Stone Storage

Chamber Storage + Stone Storage = 6,193.8 cf = 0.142 af
Overall Storage Efficiency = 42.8%
Overall System Size = 146.42' x 36.46' x 2.71'

49 Chambers
535.6 cy Field
495.1 cy Stone



Pond 2P: Stone Infiltration System (SIS #2)



Summary for Pond 3P: Infiltration Basin

Inflow Area = 129,431 sf, 78.28% Impervious, Inflow Depth = 0.06" for 2-Year event
Inflow = 0.2 cfs @ 12.13 hrs, Volume= 599 cf
Outflow = 0.1 cfs @ 12.19 hrs, Volume= 599 cf, Atten= 38%, Lag= 3.9 min
Discarded = 0.1 cfs @ 12.19 hrs, Volume= 599 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach DP-2 : Bordering Vegetated Wetland
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach DP-2 : Bordering Vegetated Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 32.05' @ 12.19 hrs Surf.Area= 499 sf Storage= 24 cf

Plug-Flow detention time= 1.2 min calculated for 599 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (812.1 - 811.0)

Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	4,855 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.00	468	0	0
33.00	1,085	777	777
34.00	2,143	1,614	2,391
35.00	2,785	2,464	4,855

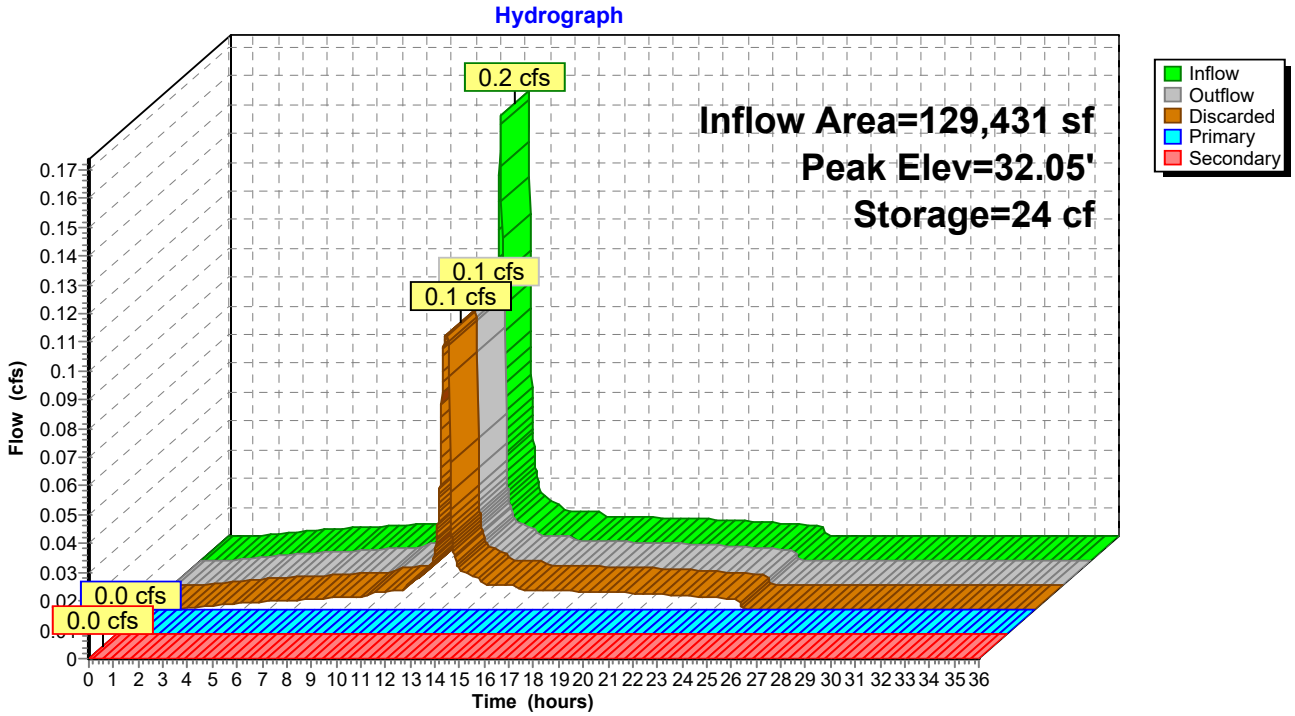
Device	Routing	Invert	Outlet Devices
#1	Discarded	32.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	32.00'	**12.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 32.00' / 26.50' S= 0.1279 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	32.20'	**3.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	33.60'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	33.90'	**15.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.1 cfs @ 12.19 hrs HW=32.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=32.00' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.0 cfs)
  └**3=Orifice/Grate** (Controls 0.0 cfs)
  └**4=Orifice/Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=32.00' TW=0.00' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir**(Controls 0.0 cfs)

Pond 3P: Infiltration Basin



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1: Area going to SIS #1 Runoff Area=57,572 sf 83.08% Impervious Runoff Depth=3.78"
Flow Length=162' Slope=0.0200 '/' Tc=10.8 min CN=88 Runoff=4.9 cfs 18,150 cf

Subcatchment P-2: Area going to SIS #2 Runoff Area=57,476 sf 85.92% Impervious Runoff Depth=3.99"
Tc=6.0 min CN=90 Runoff=6.2 cfs 19,121 cf

Subcatchment P-3: Play area and building Runoff Area=12,318 sf 16.57% Impervious Runoff Depth=0.58"
Flow Length=165' Tc=7.8 min CN=47 Runoff=0.1 cfs 596 cf

Subcatchment P-4: Woods and Grading Runoff Area=42,983 sf 2.13% Impervious Runoff Depth=0.16"
Flow Length=400' Tc=16.6 min CN=37 Runoff=0.0 cfs 562 cf

Subcatchment P-GR: Garage Ramp Runoff Area=2,065 sf 100.00% Impervious Runoff Depth=4.88"
Tc=6.0 min CN=98 Runoff=0.2 cfs 840 cf

Subcatchment P-N: North of Parking LSA Runoff Area=4,071 sf 0.00% Impervious Runoff Depth=0.22"
Tc=6.0 min CN=39 Runoff=0.0 cfs 76 cf

Reach DP-1: North of Site (31 Clarks Rd) Inflow=0.0 cfs 76 cf
Outflow=0.0 cfs 76 cf

Reach DP-2: Bordering Vegetated Wetland Inflow=0.0 cfs 564 cf
Outflow=0.0 cfs 564 cf

Pond 1P: Stone Infiltration System (SIS #1) Peak Elev=52.16' Storage=3,097 cf Inflow=4.9 cfs 18,150 cf
Discarded=1.2 cfs 18,145 cf Primary=0.0 cfs 4 cf Outflow=1.2 cfs 18,150 cf

Pond 2P: Stone Infiltration System (SIS #2) Peak Elev=49.93' Storage=3,700 cf Inflow=6.2 cfs 19,121 cf
Discarded=1.0 cfs 19,119 cf Primary=0.0 cfs 2 cf Outflow=1.0 cfs 19,121 cf

Pond 3P: Infiltration Basin Peak Elev=32.23' Storage=123 cf Inflow=0.3 cfs 1,442 cf
Discarded=0.1 cfs 1,440 cf Primary=0.0 cfs 2 cf Secondary=0.0 cfs 0 cf Outflow=0.1 cfs 1,442 cf

Total Runoff Area = 176,485 sf Runoff Volume = 39,345 cf Average Runoff Depth = 2.68"
42.07% Pervious = 74,252 sf 57.93% Impervious = 102,233 sf

Summary for Subcatchment P-1: Area going to SIS #1

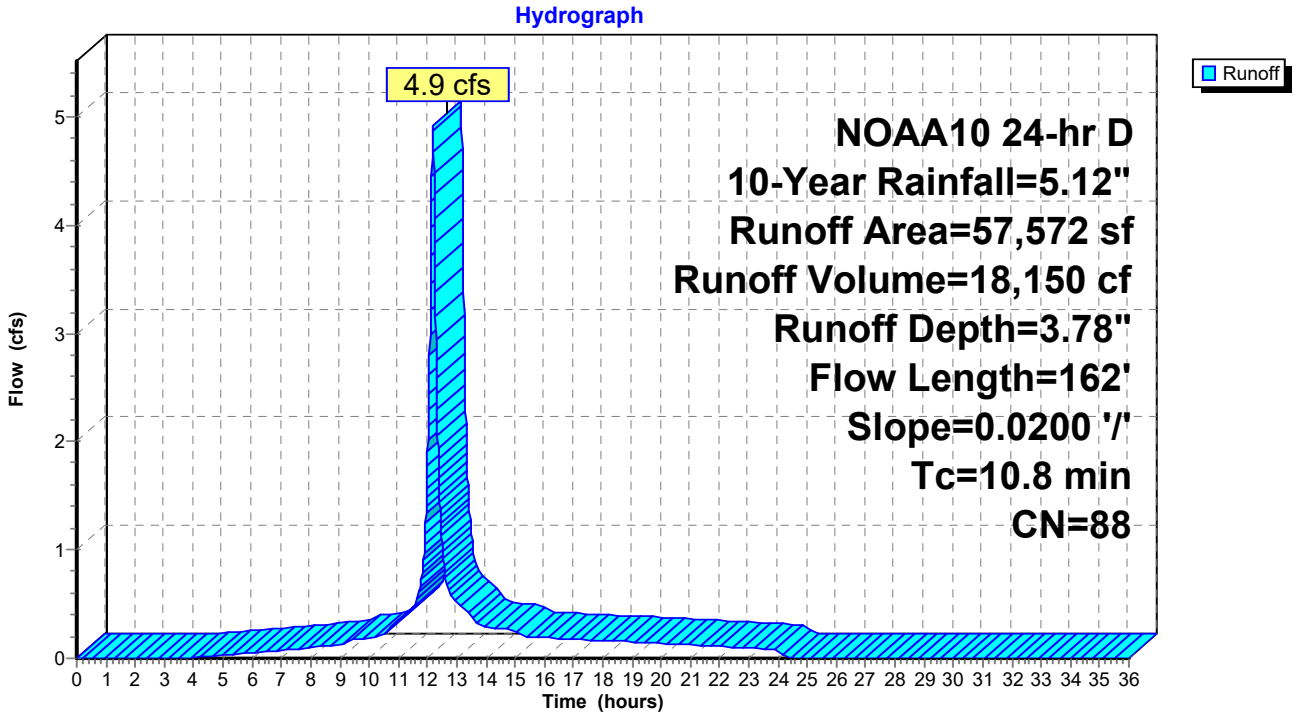
Runoff = 4.9 cfs @ 12.18 hrs, Volume= 18,150 cf, Depth= 3.78"
Routed to Pond 1P : Stone Infiltration System (SIS #1)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 10-Year Rainfall=5.12"

	Area (sf)	CN	Description
*	23,783	98	Roofs, HSG A
*	18,600	98	Paved parking, HSG A
	9,127	39	>75% Grass cover, Good, HSG A
*	5,447	98	Concrete, HSG A
*	487	32	Path, Good, HSG A
*	128	30	Woods, Good, HSG A
	57,572	88	Weighted Average
	9,742		16.92% Pervious Area
	47,830		83.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.0200	0.08		**Sheet Flow, LSA** Grass: Short n= 0.150 P2= 1.00"
0.6	87	0.0200	2.28		**Shallow Concentrated Flow, LSA** Unpaved Kv= 16.1 fps
0.1	25	0.0200	2.87		**Shallow Concentrated Flow, Parking lot to CB** Paved Kv= 20.3 fps
10.8	162	Total			

Subcatchment P-1: Area going to SIS #1



Summary for Subcatchment P-2: Area going to SIS #2

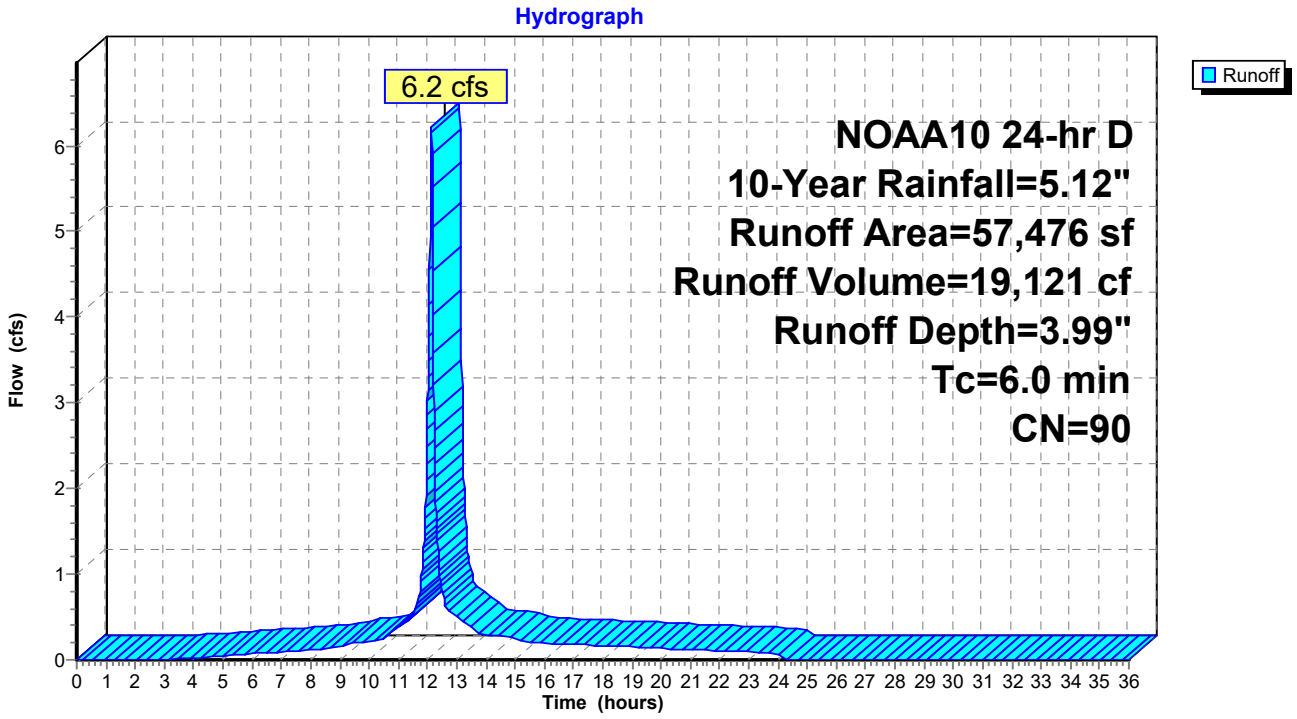
Runoff = 6.2 cfs @ 12.13 hrs, Volume= 19,121 cf, Depth= 3.99"
Routed to Pond 2P : Stone Infiltration System (SIS #2)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 10-Year Rainfall=5.12"

	Area (sf)	CN	Description
	20,834	98	Paved parking, HSG A
	8,095	39	>75% Grass cover, Good, HSG A
*	6,792	98	Concrete, HSG A
*	21,755	98	Roofs, HSG A
	57,476	90	Weighted Average
	8,095		14.08% Pervious Area
	49,381		85.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 0.1 hr TC Minimum**

Subcatchment P-2: Area going to SIS #2



Summary for Subcatchment P-3: Play area and building

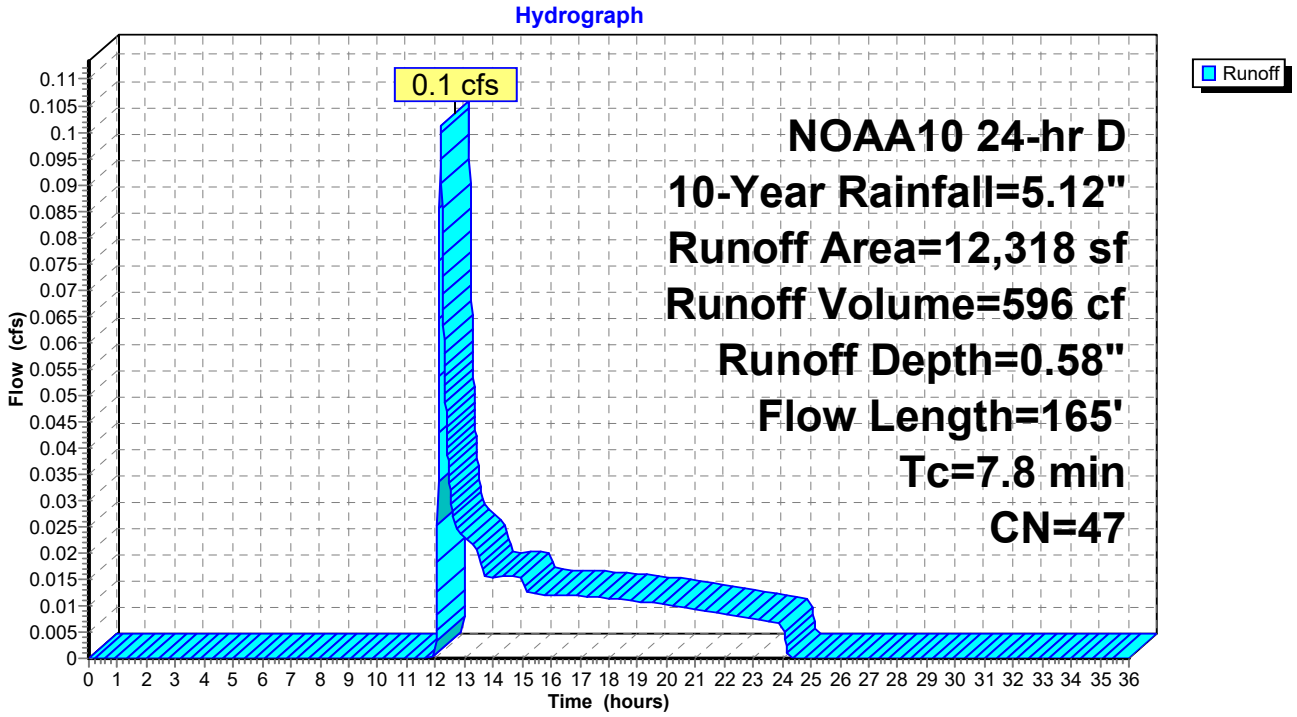
Runoff = 0.1 cfs @ 12.17 hrs, Volume= 596 cf, Depth= 0.58"
Routed to Pond 3P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 10-Year Rainfall=5.12"

	Area (sf)	CN	Description
	138	30	Woods, Good, HSG A
*	1,058	39	Gravel Play Area, Good, HSG A
*	2,041	98	Nature Play Area, HSG A
	5,491	39	>75% Grass cover, Good, HSG A
*	3,590	32	Path, Good, HSG A
	12,318	47	Weighted Average
	10,277		83.43% Pervious Area
	2,041		16.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	30	0.0200	0.07		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.00"
0.6	20	0.0200	0.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.00"
0.1	40	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	75	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.8	165	Total			

Subcatchment P-3: Play area and building



Summary for Subcatchment P-4: Woods and Grading

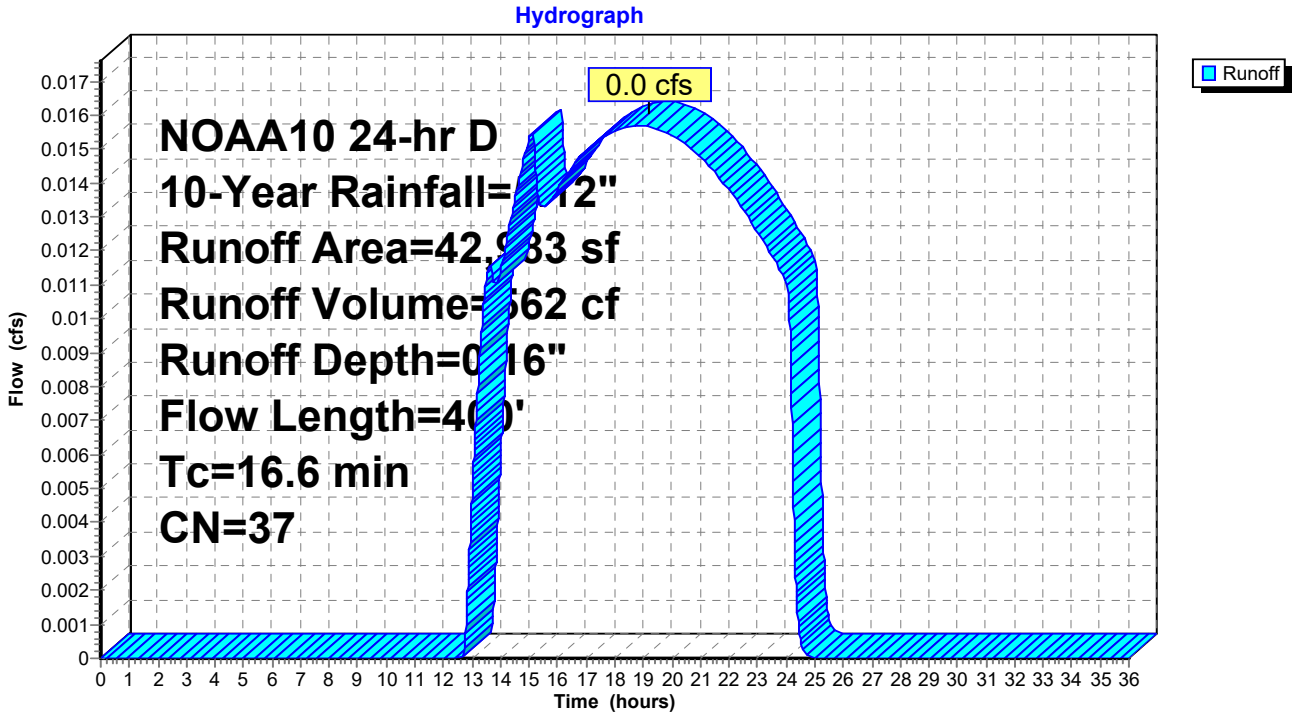
Runoff = 0.0 cfs @ 18.72 hrs, Volume= 562 cf, Depth= 0.16"
Routed to Reach DP-2 : Bordering Vegetated Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 10-Year Rainfall=5.12"

	Area (sf)	CN	Description
	17,530	30	Woods, Good, HSG A
	19,018	39	>75% Grass cover, Good, HSG A
*	3,857	32	Path, Good, HSG A
	1,662	77	Woods, Good, HSG D
*	916	98	Concrete Patio, HSG A
	42,983	37	Weighted Average
	42,067		97.87% Pervious Area
	916		2.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	50	0.0100	0.06		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.00"
2.5	243	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	107	0.2230	2.36		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.6	400	Total			

Subcatchment P-4: Woods and Grading



Summary for Subcatchment P-GR: Garage Ramp

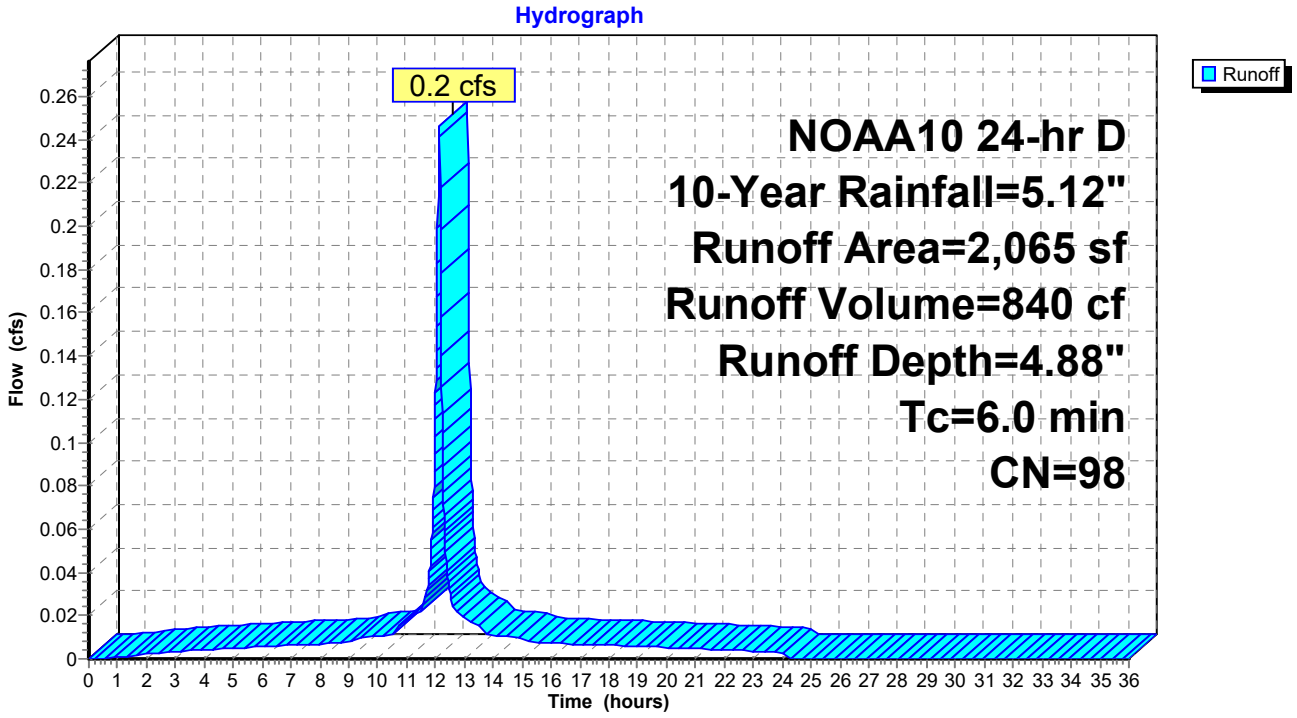
Runoff = 0.2 cfs @ 12.13 hrs, Volume= 840 cf, Depth= 4.88"
Routed to Pond 3P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 10-Year Rainfall=5.12"

Area (sf)	CN	Description
2,065	98	Paved parking, HSG A
2,065		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 0.1 hr TC Minimum**

Subcatchment P-GR: Garage Ramp



Summary for Subcatchment P-N: North of Parking LSA

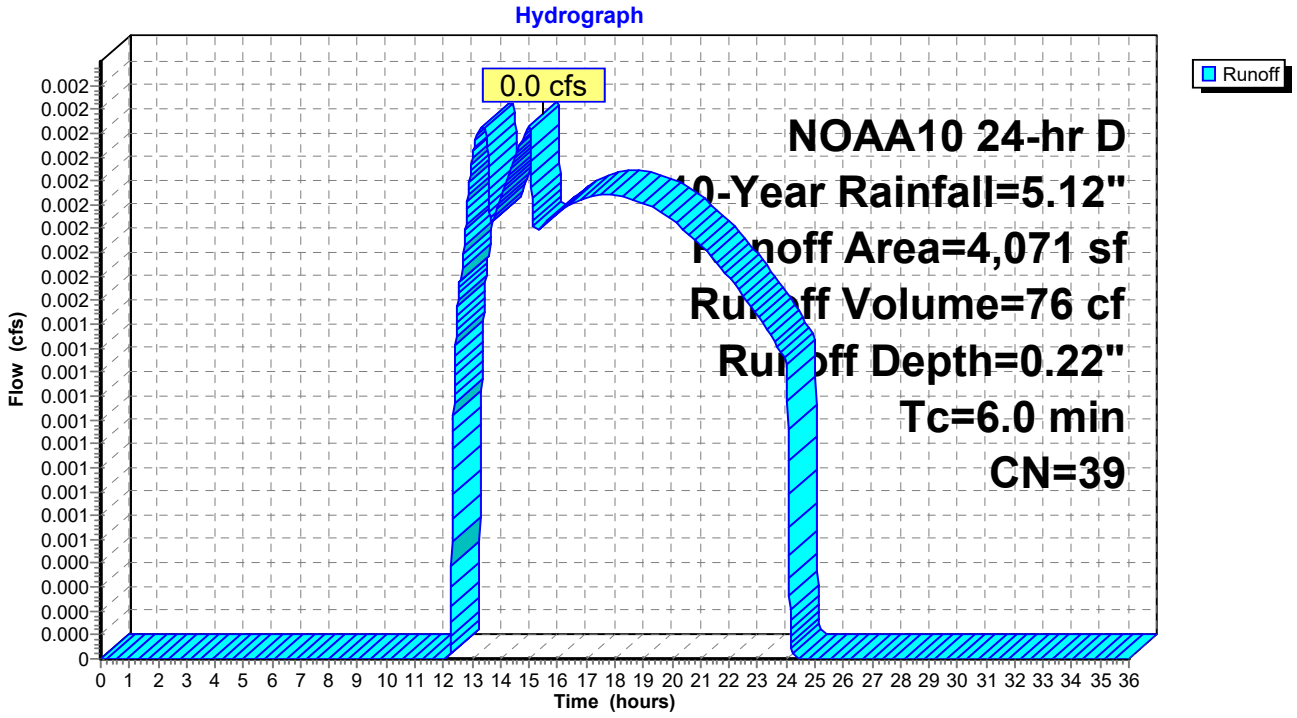
Runoff = 0.0 cfs @ 15.02 hrs, Volume= 76 cf, Depth= 0.22"
Routed to Reach DP-1 : North of Site (31 Clarks Rd)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 10-Year Rainfall=5.12"

Area (sf)	CN	Description
4,071	39	>75% Grass cover, Good, HSG A
4,071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 0.1 hr TC Minimum**

Subcatchment P-N: North of Parking LSA

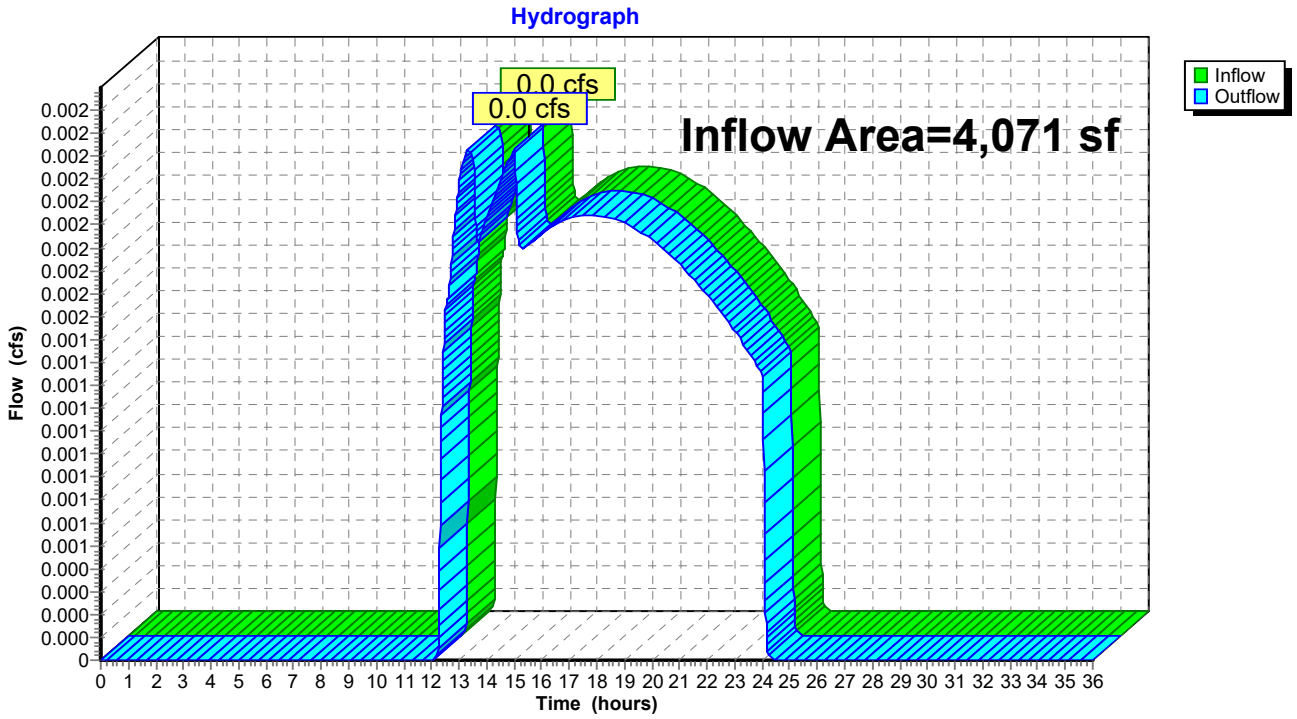


Summary for Reach DP-1: North of Site (31 Clarks Rd)

Inflow Area = 4,071 sf, 0.00% Impervious, Inflow Depth = 0.22" for 10-Year event
Inflow = 0.0 cfs @ 15.02 hrs, Volume= 76 cf
Outflow = 0.0 cfs @ 15.02 hrs, Volume= 76 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2

Reach DP-1: North of Site (31 Clarks Rd)

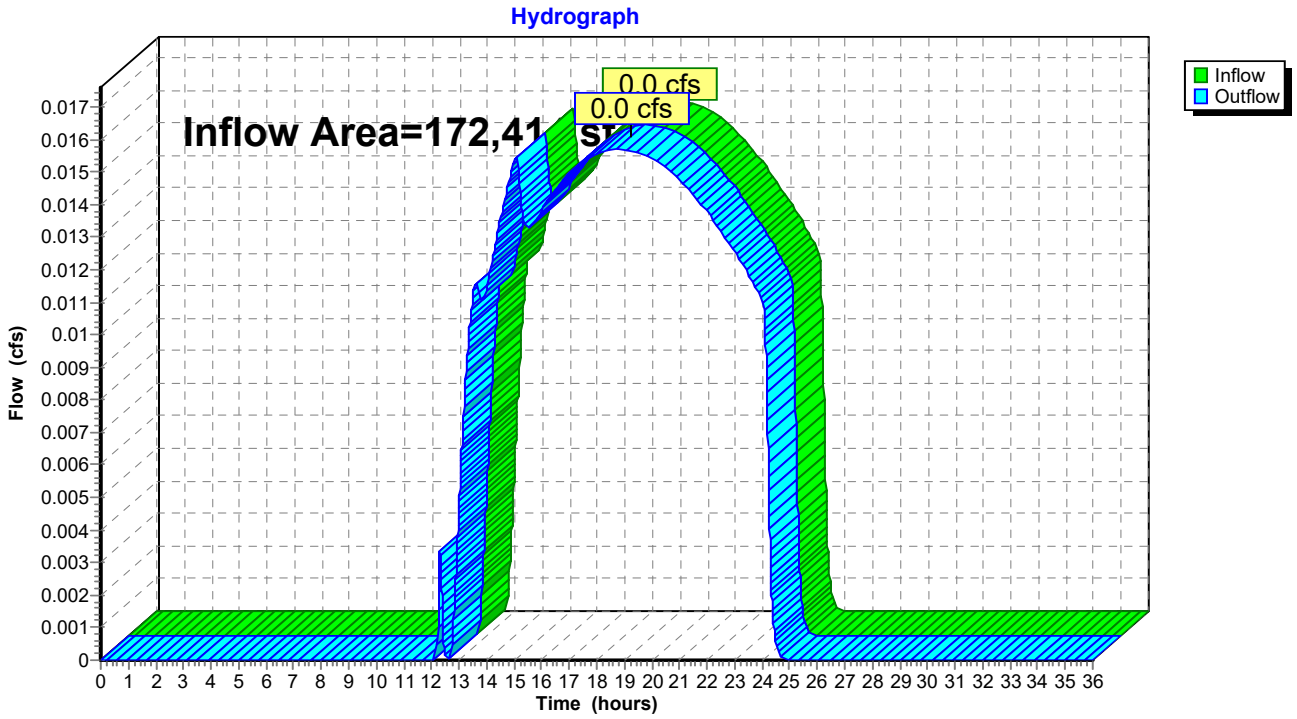


Summary for Reach DP-2: Bordering Vegetated Wetland

Inflow Area = 172,414 sf, 59.30% Impervious, Inflow Depth = 0.04" for 10-Year event
Inflow = 0.0 cfs @ 18.72 hrs, Volume= 564 cf
Outflow = 0.0 cfs @ 18.72 hrs, Volume= 564 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2

Reach DP-2: Bordering Vegetated Wetland



Summary for Pond 1P: Stone Infiltration System (SIS #1)

Inflow Area = 57,572 sf, 83.08% Impervious, Inflow Depth = 3.78" for 10-Year event
Inflow = 4.9 cfs @ 12.18 hrs, Volume= 18,150 cf
Outflow = 1.2 cfs @ 12.47 hrs, Volume= 18,150 cf, Atten= 76%, Lag= 17.1 min
Discarded = 1.2 cfs @ 11.99 hrs, Volume= 18,145 cf
Primary = 0.0 cfs @ 12.47 hrs, Volume= 4 cf
Routed to Pond 3P : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 52.16' @ 12.47 hrs Surf.Area= 6,101 sf Storage= 3,097 cf

Plug-Flow detention time= 10.9 min calculated for 18,150 cf (100% of inflow)
Center-of-Mass det. time= 10.9 min (829.2 - 818.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	50.90'	6,111 cf	**41.67'W x 146.42'L x 2.71'H Field A** 16,528 cf Overall - 1,251 cf Embedded = 15,277 cf x 40.0% Voids
#2A	51.90'	968 cf	**ADS N-12 12"** x 56 Inside #1 Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf 56 Chambers in 8 Rows 37.67' Header x 0.81 sf x 2 = 61.0 cf Inside
		7,079 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.90'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	51.90'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.90' / 51.90' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	52.10'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	53.50'	**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

Discarded OutFlow Max=1.2 cfs @ 11.99 hrs HW=50.93' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 1.2 cfs)

Primary OutFlow Max=0.0 cfs @ 12.47 hrs HW=52.16' TW=32.21' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.0 cfs of 0.1 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 0.83 fps)
  └**4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 1P: Stone Infiltration System (SIS #1) - Chamber Wizard Field A

Chamber Model = ADS N-12 12" (ADS N-12® Pipe)
Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf
Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf

14.5" Wide + 48.0" Spacing = 62.5" C-C Row Spacing

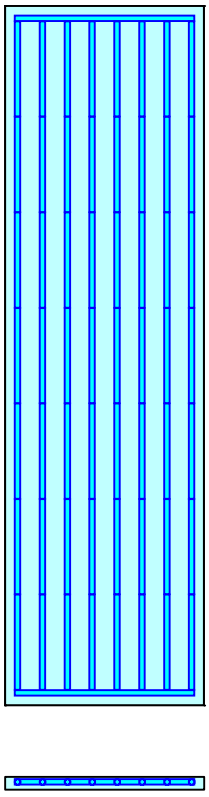
7 Chambers/Row x 20.00' Long +1.21' Header x 2 = 142.42' Row Length +24.0" End Stone x 2 = 146.42' Base Length
8 Rows x 14.5" Wide + 48.0" Spacing x 7 + 24.0" Side Stone x 2 = 41.67' Base Width
12.0" Stone Base + 14.5" Chamber Height + 6.0" Stone Cover = 2.71' Field Height

56 Chambers x 16.2 cf + 37.67' Header x 0.81 sf x 2 = 968.2 cf Chamber Storage
56 Chambers x 20.9 cf + 37.67' Header x 1.05 sf x 2 = 1,250.7 cf Displacement

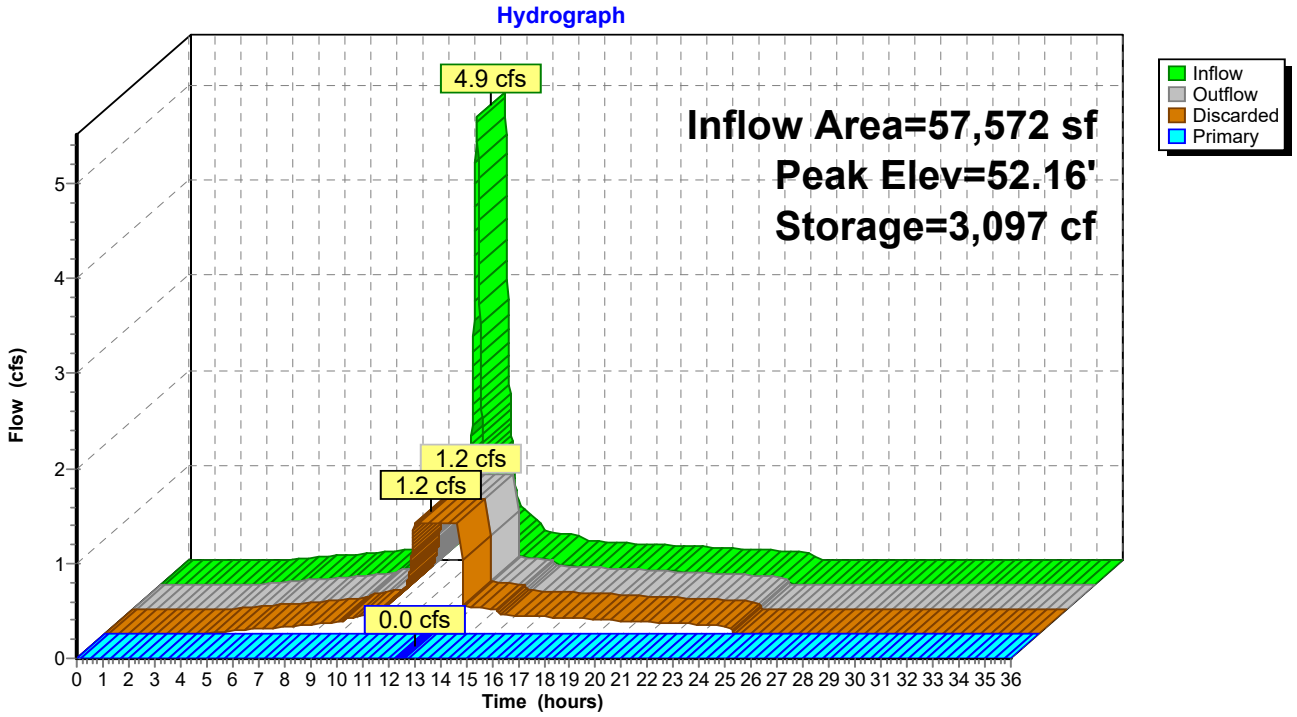
16,527.9 cf Field - 1,250.7 cf Chambers = 15,277.2 cf Stone x 40.0% Voids = 6,110.9 cf Stone Storage

Chamber Storage + Stone Storage = 7,079.1 cf = 0.163 af
Overall Storage Efficiency = 42.8%
Overall System Size = 146.42' x 41.67' x 2.71'

56 Chambers
612.1 cy Field
565.8 cy Stone



Pond 1P: Stone Infiltration System (SIS #1)



Summary for Pond 2P: Stone Infiltration System (SIS #2)

Inflow Area = 57,476 sf, 85.92% Impervious, Inflow Depth = 3.99" for 10-Year event
Inflow = 6.2 cfs @ 12.13 hrs, Volume= 19,121 cf
Outflow = 1.0 cfs @ 12.40 hrs, Volume= 19,121 cf, Atten= 84%, Lag= 16.3 min
Discarded = 1.0 cfs @ 11.88 hrs, Volume= 19,119 cf
Primary = 0.0 cfs @ 12.40 hrs, Volume= 2 cf
Routed to Pond 3P : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 49.93' @ 12.40 hrs Surf.Area= 5,339 sf Storage= 3,700 cf

Plug-Flow detention time= 15.8 min calculated for 19,116 cf (100% of inflow)
Center-of-Mass det. time= 15.8 min (820.0 - 804.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	48.30'	5,347 cf	**36.46'W x 146.42'L x 2.71'H Field A** 14,462 cf Overall - 1,094 cf Embedded = 13,368 cf x 40.0% Voids
#2A	49.30'	846 cf	**ADS N-12 12"** x 49 Inside #1 Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf 49 Chambers in 7 Rows 32.46' Header x 0.81 sf x 2 = 52.6 cf Inside
		6,194 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	48.30'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	48.30'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 48.30' / 48.30' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	49.90'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	50.50'	**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

Discarded OutFlow Max=1.0 cfs @ 11.88 hrs HW=48.33' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 1.0 cfs)

Primary OutFlow Max=0.0 cfs @ 12.40 hrs HW=49.93' TW=32.22' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.0 cfs of 3.2 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 0.59 fps)
  └**4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 2P: Stone Infiltration System (SIS #2) - Chamber Wizard Field A

Chamber Model = ADS N-12 12" (ADS N-12® Pipe)
Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf
Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf

14.5" Wide + 48.0" Spacing = 62.5" C-C Row Spacing

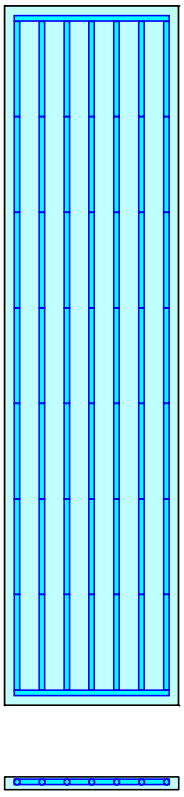
7 Chambers/Row x 20.00' Long +1.21' Header x 2 = 142.42' Row Length +24.0" End Stone x 2 = 146.42' Base Length
7 Rows x 14.5" Wide + 48.0" Spacing x 6 + 24.0" Side Stone x 2 = 36.46' Base Width
12.0" Stone Base + 14.5" Chamber Height + 6.0" Stone Cover = 2.71' Field Height

49 Chambers x 16.2 cf + 32.46' Header x 0.81 sf x 2 = 846.4 cf Chamber Storage
49 Chambers x 20.9 cf + 32.46' Header x 1.05 sf x 2 = 1,093.3 cf Displacement

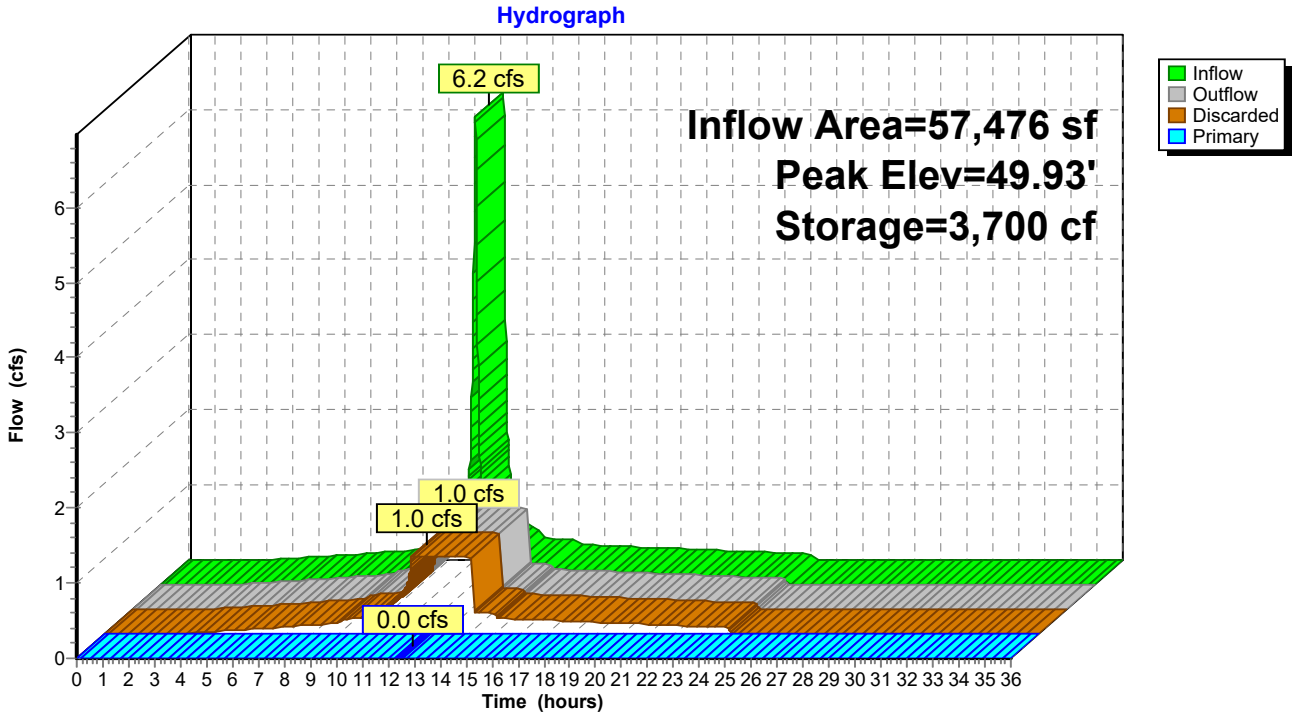
14,461.9 cf Field - 1,093.3 cf Chambers = 13,368.6 cf Stone x 40.0% Voids = 5,347.4 cf Stone Storage

Chamber Storage + Stone Storage = 6,193.8 cf = 0.142 af
Overall Storage Efficiency = 42.8%
Overall System Size = 146.42' x 36.46' x 2.71'

49 Chambers
535.6 cy Field
495.1 cy Stone



Pond 2P: Stone Infiltration System (SIS #2)



Summary for Pond 3P: Infiltration Basin

Inflow Area = 129,431 sf, 78.28% Impervious, Inflow Depth = 0.13" for 10-Year event
Inflow = 0.3 cfs @ 12.14 hrs, Volume= 1,442 cf
Outflow = 0.1 cfs @ 12.30 hrs, Volume= 1,442 cf, Atten= 64%, Lag= 9.5 min
Discarded = 0.1 cfs @ 12.30 hrs, Volume= 1,440 cf
Primary = 0.0 cfs @ 12.30 hrs, Volume= 2 cf
Routed to Reach DP-2 : Bordering Vegetated Wetland
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach DP-2 : Bordering Vegetated Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 32.23' @ 12.30 hrs Surf.Area= 609 sf Storage= 123 cf

Plug-Flow detention time= 3.6 min calculated for 1,442 cf (100% of inflow)
Center-of-Mass det. time= 3.6 min (851.9 - 848.3)

Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	4,855 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.00	468	0	0
33.00	1,085	777	777
34.00	2,143	1,614	2,391
35.00	2,785	2,464	4,855

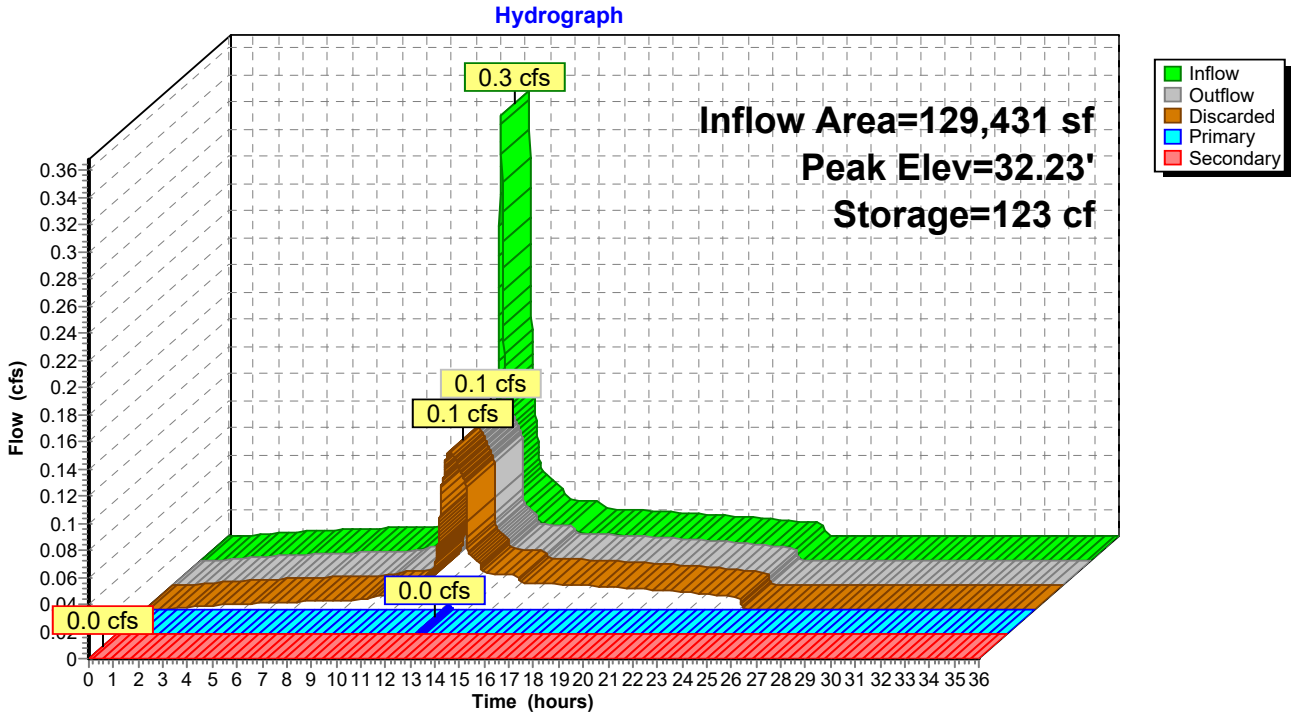
Device	Routing	Invert	Outlet Devices
#1	Discarded	32.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	32.00'	**12.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 32.00' / 26.50' S= 0.1279 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	32.20'	**3.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	33.60'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	33.90'	**15.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.1 cfs @ 12.30 hrs HW=32.23' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 12.30 hrs HW=32.23' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.0 cfs of 0.2 cfs potential flow)
  └**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 0.57 fps)
  └**4=Orifice/Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=32.00' TW=0.00' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 3P: Infiltration Basin



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1: Area going to SIS #1 Runoff Area=57,572 sf 83.08% Impervious Runoff Depth=4.92"
Flow Length=162' Slope=0.0200 '/' Tc=10.8 min CN=88 Runoff=6.3 cfs 23,582 cf

Subcatchment P-2: Area going to SIS #2 Runoff Area=57,476 sf 85.92% Impervious Runoff Depth=5.14"
Tc=6.0 min CN=90 Runoff=7.9 cfs 24,611 cf

Subcatchment P-3: Play area and building Runoff Area=12,318 sf 16.57% Impervious Runoff Depth=1.07"
Flow Length=165' Tc=7.8 min CN=47 Runoff=0.3 cfs 1,096 cf

Subcatchment P-4: Woods and Grading Runoff Area=42,983 sf 2.13% Impervious Runoff Depth=0.42"
Flow Length=400' Tc=16.6 min CN=37 Runoff=0.1 cfs 1,506 cf

Subcatchment P-GR: Garage Ramp Runoff Area=2,065 sf 100.00% Impervious Runoff Depth=6.06"
Tc=6.0 min CN=98 Runoff=0.3 cfs 1,043 cf

Subcatchment P-N: North of Parking LSA Runoff Area=4,071 sf 0.00% Impervious Runoff Depth=0.53"
Tc=6.0 min CN=39 Runoff=0.0 cfs 181 cf

Reach DP-1: North of Site (31 Clarks Rd) Inflow=0.0 cfs 181 cf
Outflow=0.0 cfs 181 cf

Reach DP-2: Bordering Vegetated Wetland Inflow=0.4 cfs 2,666 cf
Outflow=0.4 cfs 2,666 cf

Pond 1P: Stone Infiltration System (SIS #1) Peak Elev=52.64' Storage=4,567 cf Inflow=6.3 cfs 23,582 cf
Discarded=1.2 cfs 23,180 cf Primary=0.2 cfs 401 cf Outflow=1.3 cfs 23,582 cf

Pond 2P: Stone Infiltration System (SIS #2) Peak Elev=50.44' Storage=4,984 cf Inflow=7.9 cfs 24,611 cf
Discarded=1.0 cfs 23,622 cf Primary=0.5 cfs 989 cf Outflow=1.5 cfs 24,611 cf

Pond 3P: Infiltration Basin Peak Elev=32.89' Storage=658 cf Inflow=0.8 cfs 3,529 cf
Discarded=0.2 cfs 2,370 cf Primary=0.4 cfs 1,160 cf Secondary=0.0 cfs 0 cf Outflow=0.5 cfs 3,529 cf

Total Runoff Area = 176,485 sf Runoff Volume = 52,020 cf Average Runoff Depth = 3.54"
42.07% Pervious = 74,252 sf 57.93% Impervious = 102,233 sf

Summary for Subcatchment P-1: Area going to SIS #1

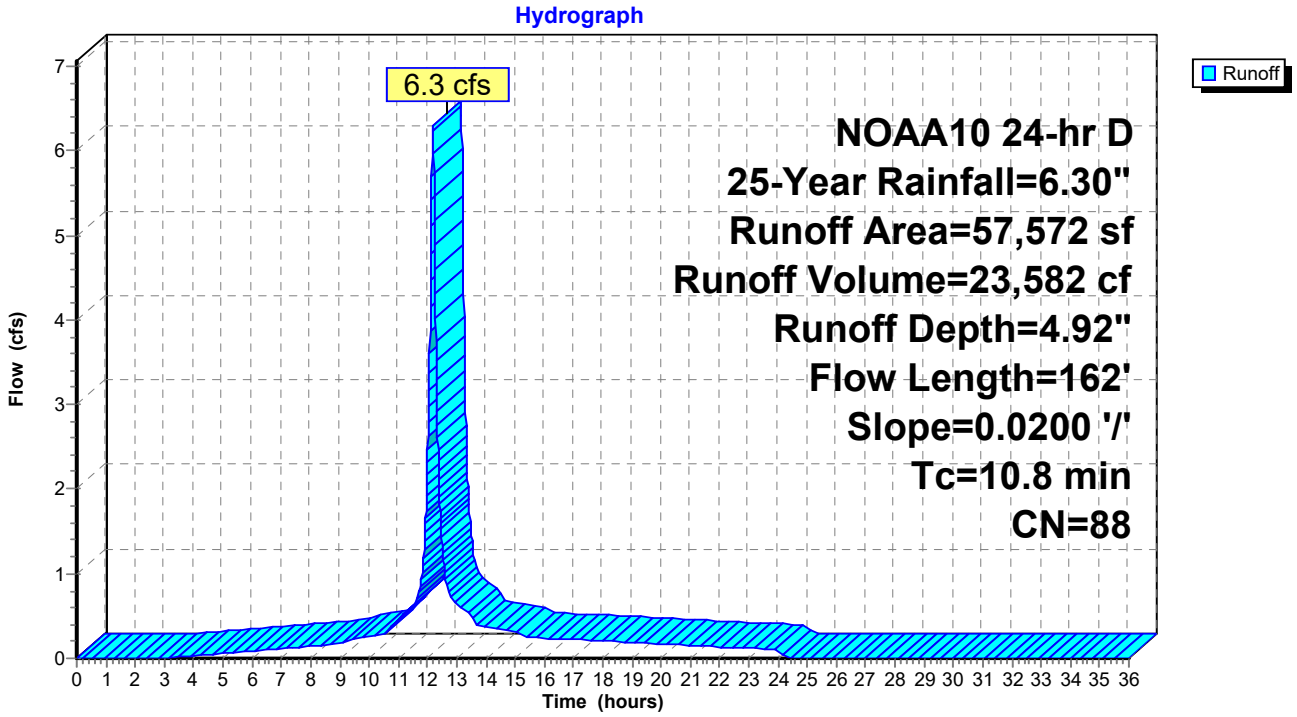
Runoff = 6.3 cfs @ 12.18 hrs, Volume= 23,582 cf, Depth= 4.92"
Routed to Pond 1P : Stone Infiltration System (SIS #1)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 25-Year Rainfall=6.30"

	Area (sf)	CN	Description
*	23,783	98	Roofs, HSG A
*	18,600	98	Paved parking, HSG A
	9,127	39	>75% Grass cover, Good, HSG A
*	5,447	98	Concrete, HSG A
*	487	32	Path, Good, HSG A
*	128	30	Woods, Good, HSG A
	57,572	88	Weighted Average
	9,742		16.92% Pervious Area
	47,830		83.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.0200	0.08		**Sheet Flow, LSA** Grass: Short n= 0.150 P2= 1.00"
0.6	87	0.0200	2.28		**Shallow Concentrated Flow, LSA** Unpaved Kv= 16.1 fps
0.1	25	0.0200	2.87		**Shallow Concentrated Flow, Parking lot to CB** Paved Kv= 20.3 fps
10.8	162	Total			

Subcatchment P-1: Area going to SIS #1



Summary for Subcatchment P-2: Area going to SIS #2

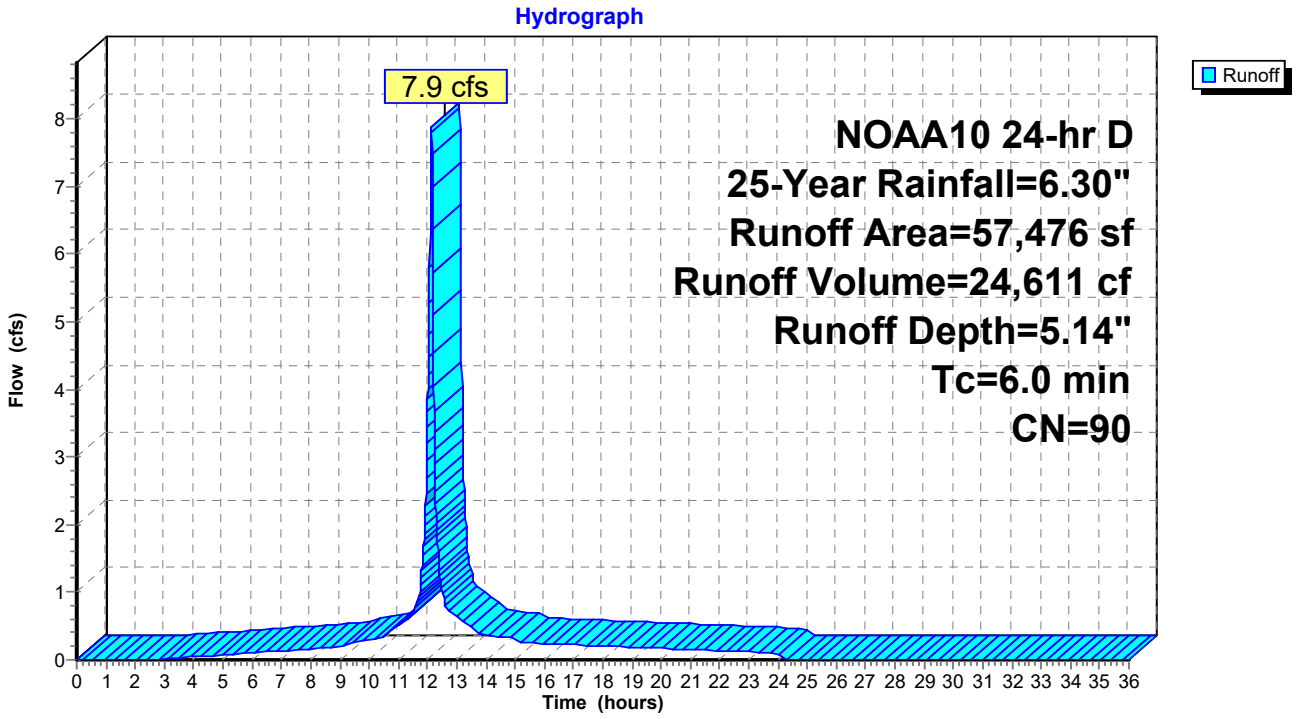
Runoff = 7.9 cfs @ 12.13 hrs, Volume= 24,611 cf, Depth= 5.14"
Routed to Pond 2P : Stone Infiltration System (SIS #2)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 25-Year Rainfall=6.30"

	Area (sf)	CN	Description
	20,834	98	Paved parking, HSG A
	8,095	39	>75% Grass cover, Good, HSG A
*	6,792	98	Concrete, HSG A
*	21,755	98	Roofs, HSG A
	57,476	90	Weighted Average
	8,095		14.08% Pervious Area
	49,381		85.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 0.1 hr TC Minimum**

Subcatchment P-2: Area going to SIS #2



Summary for Subcatchment P-3: Play area and building

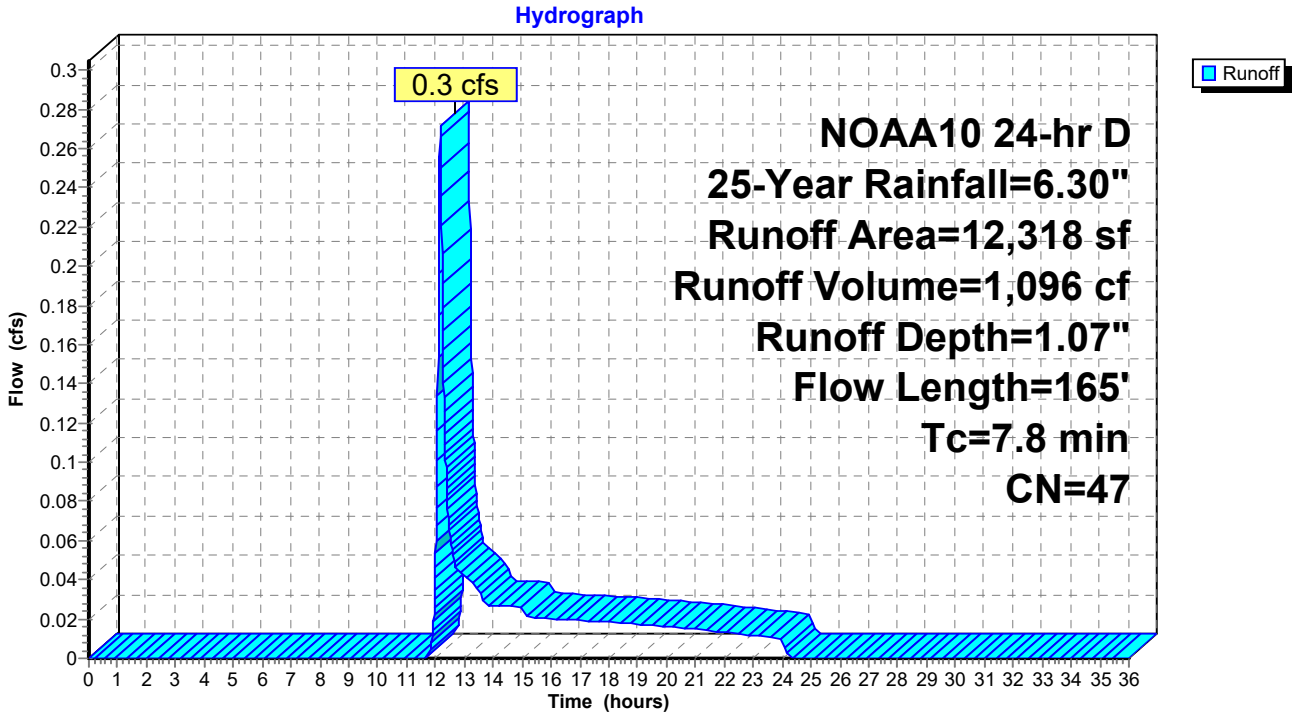
Runoff = 0.3 cfs @ 12.16 hrs, Volume= 1,096 cf, Depth= 1.07"
Routed to Pond 3P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 25-Year Rainfall=6.30"

	Area (sf)	CN	Description
	138	30	Woods, Good, HSG A
*	1,058	39	Gravel Play Area, Good, HSG A
*	2,041	98	Nature Play Area, HSG A
	5,491	39	>75% Grass cover, Good, HSG A
*	3,590	32	Path, Good, HSG A
	12,318	47	Weighted Average
	10,277		83.43% Pervious Area
	2,041		16.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	30	0.0200	0.07		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.00"
0.6	20	0.0200	0.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.00"
0.1	40	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	75	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.8	165	Total			

Subcatchment P-3: Play area and building



Summary for Subcatchment P-4: Woods and Grading

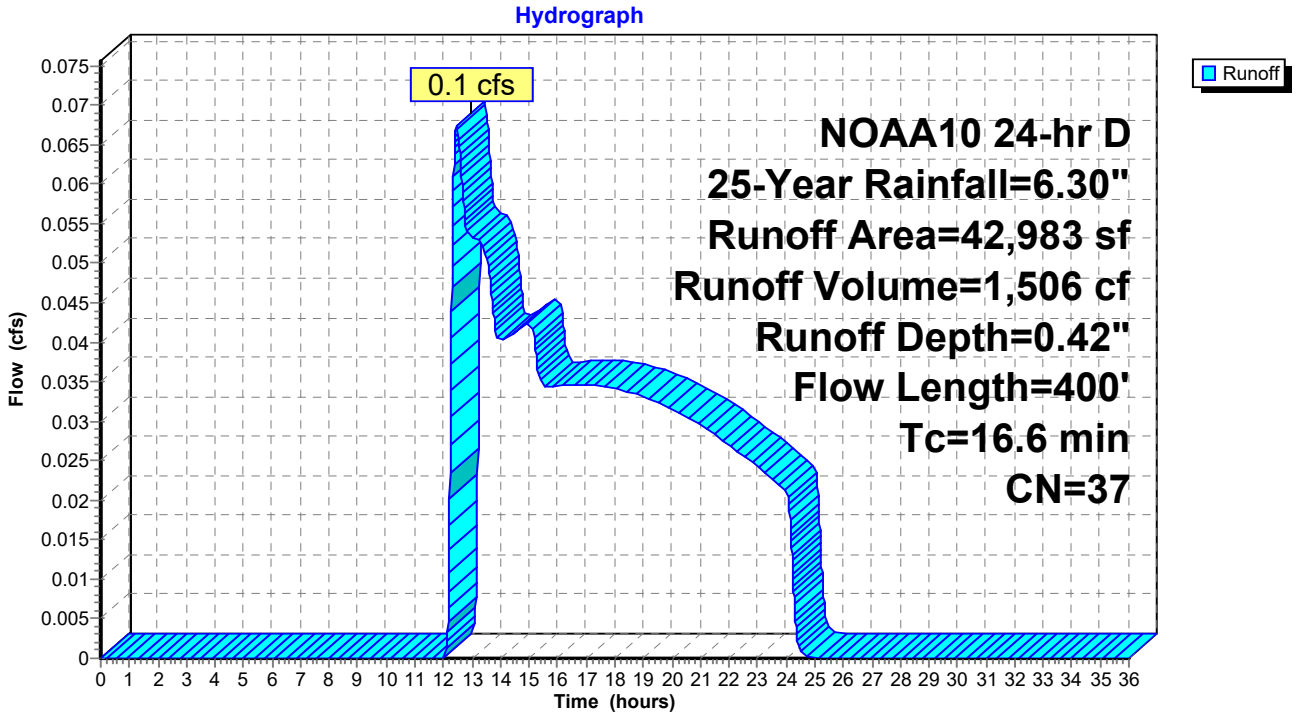
Runoff = 0.1 cfs @ 12.45 hrs, Volume= 1,506 cf, Depth= 0.42"
Routed to Reach DP-2 : Bordering Vegetated Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 25-Year Rainfall=6.30"

	Area (sf)	CN	Description
	17,530	30	Woods, Good, HSG A
	19,018	39	>75% Grass cover, Good, HSG A
*	3,857	32	Path, Good, HSG A
	1,662	77	Woods, Good, HSG D
*	916	98	Concrete Patio, HSG A
	42,983	37	Weighted Average
	42,067		97.87% Pervious Area
	916		2.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	50	0.0100	0.06		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.00"
2.5	243	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	107	0.2230	2.36		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.6	400	Total			

Subcatchment P-4: Woods and Grading



Summary for Subcatchment P-GR: Garage Ramp

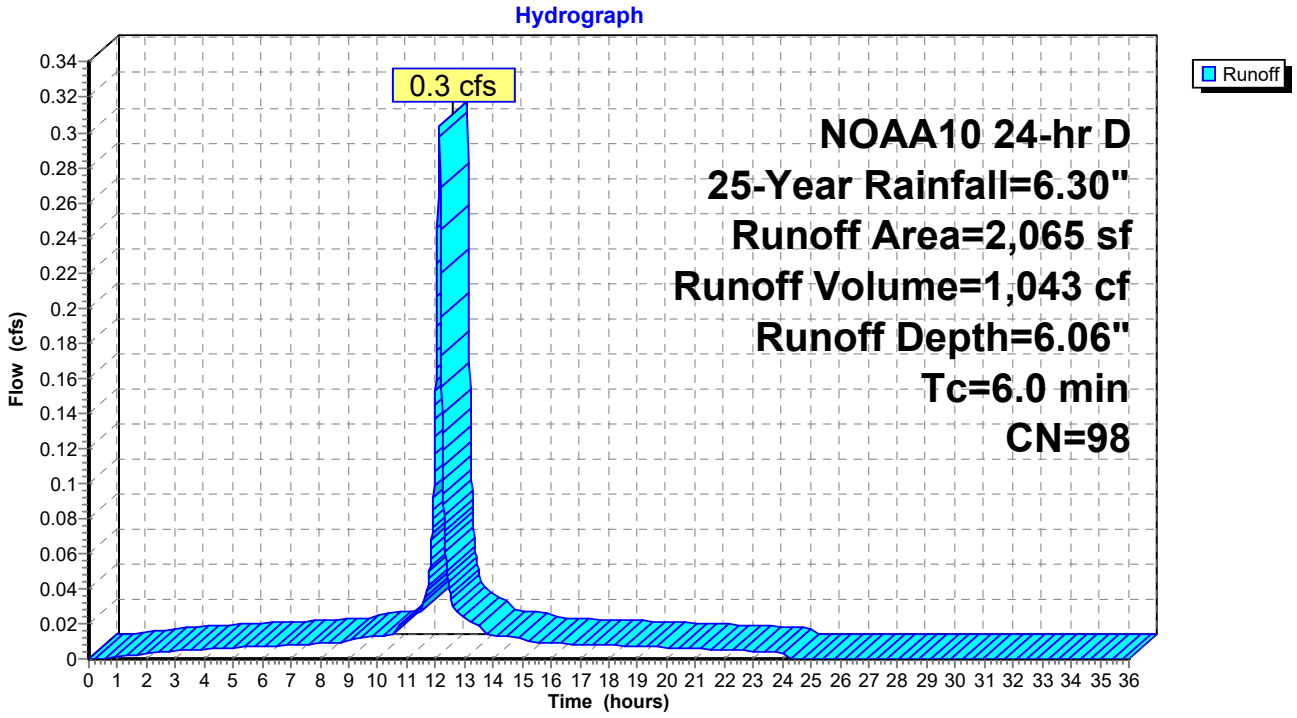
Runoff = 0.3 cfs @ 12.13 hrs, Volume= 1,043 cf, Depth= 6.06"
Routed to Pond 3P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 25-Year Rainfall=6.30"

Area (sf)	CN	Description
2,065	98	Paved parking, HSG A
2,065		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 0.1 hr TC Minimum**

Subcatchment P-GR: Garage Ramp



Summary for Subcatchment P-N: North of Parking LSA

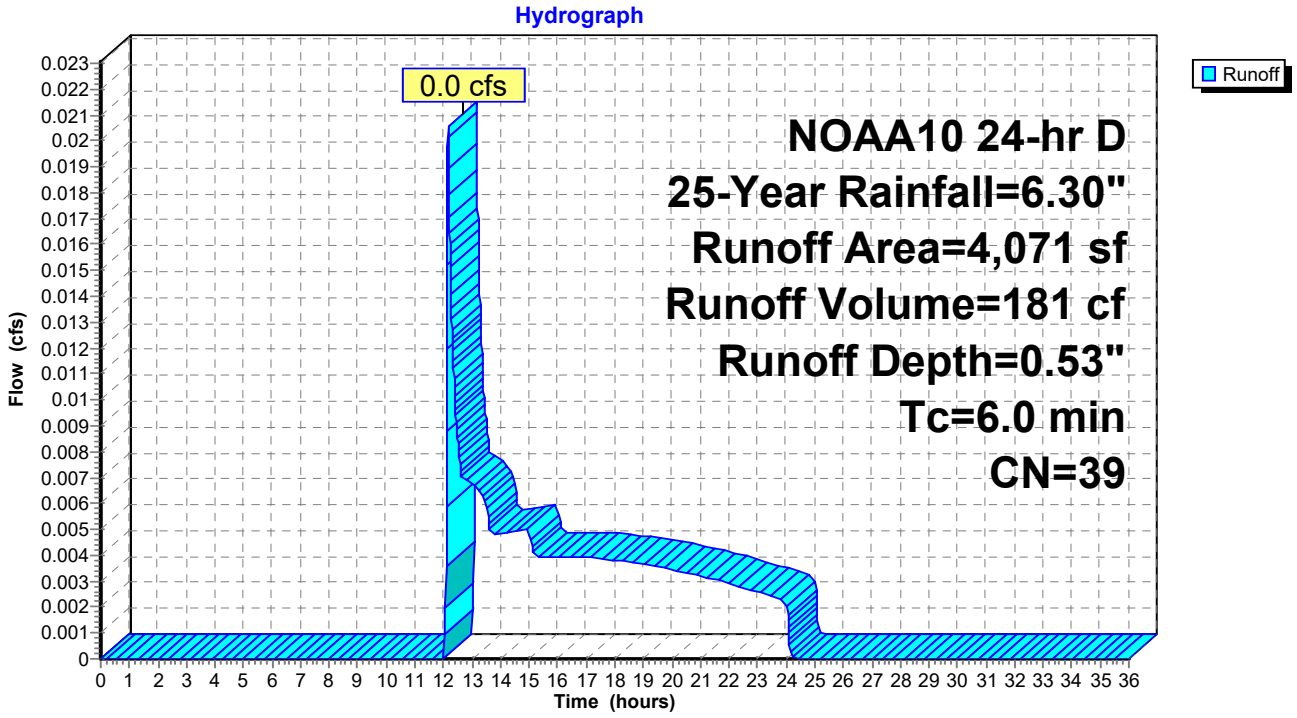
Runoff = 0.0 cfs @ 12.16 hrs, Volume= 181 cf, Depth= 0.53"
Routed to Reach DP-1 : North of Site (31 Clarks Rd)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 25-Year Rainfall=6.30"

Area (sf)	CN	Description
4,071	39	>75% Grass cover, Good, HSG A
4,071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 0.1 hr TC Minimum**

Subcatchment P-N: North of Parking LSA

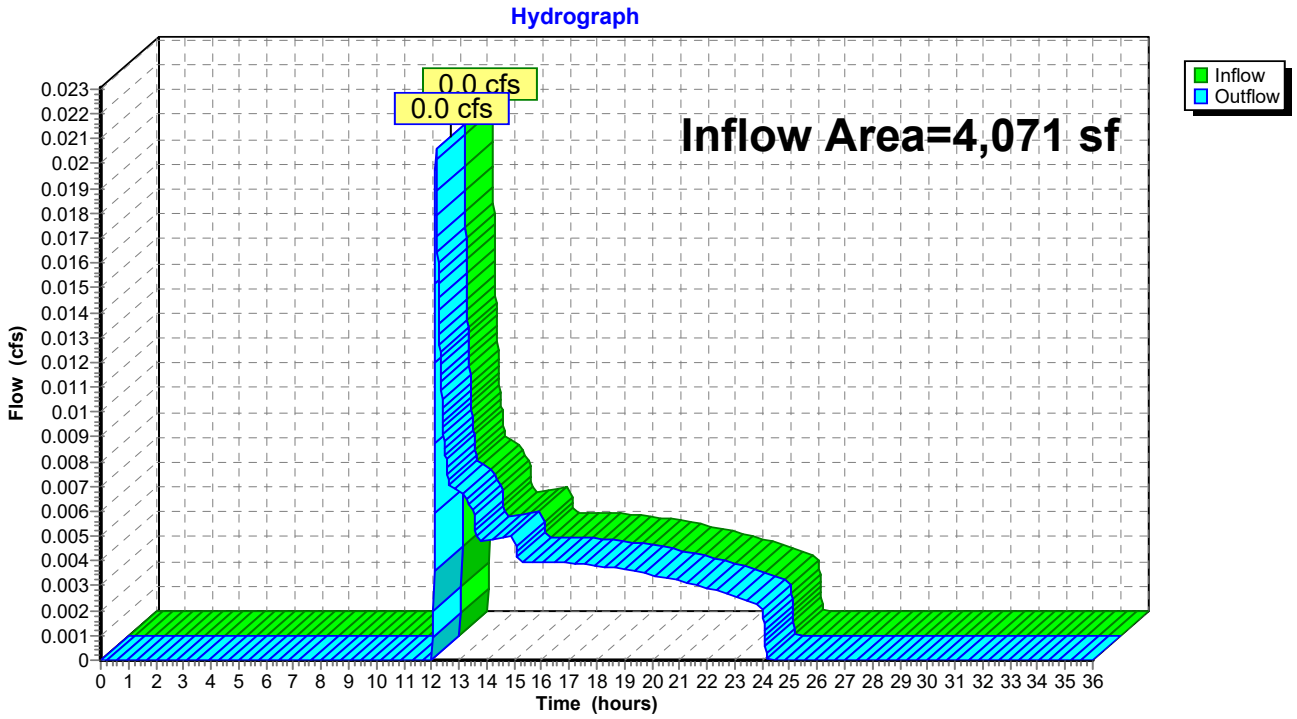


Summary for Reach DP-1: North of Site (31 Clarks Rd)

Inflow Area = 4,071 sf, 0.00% Impervious, Inflow Depth = 0.53" for 25-Year event
Inflow = 0.0 cfs @ 12.16 hrs, Volume= 181 cf
Outflow = 0.0 cfs @ 12.16 hrs, Volume= 181 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2

Reach DP-1: North of Site (31 Clarks Rd)

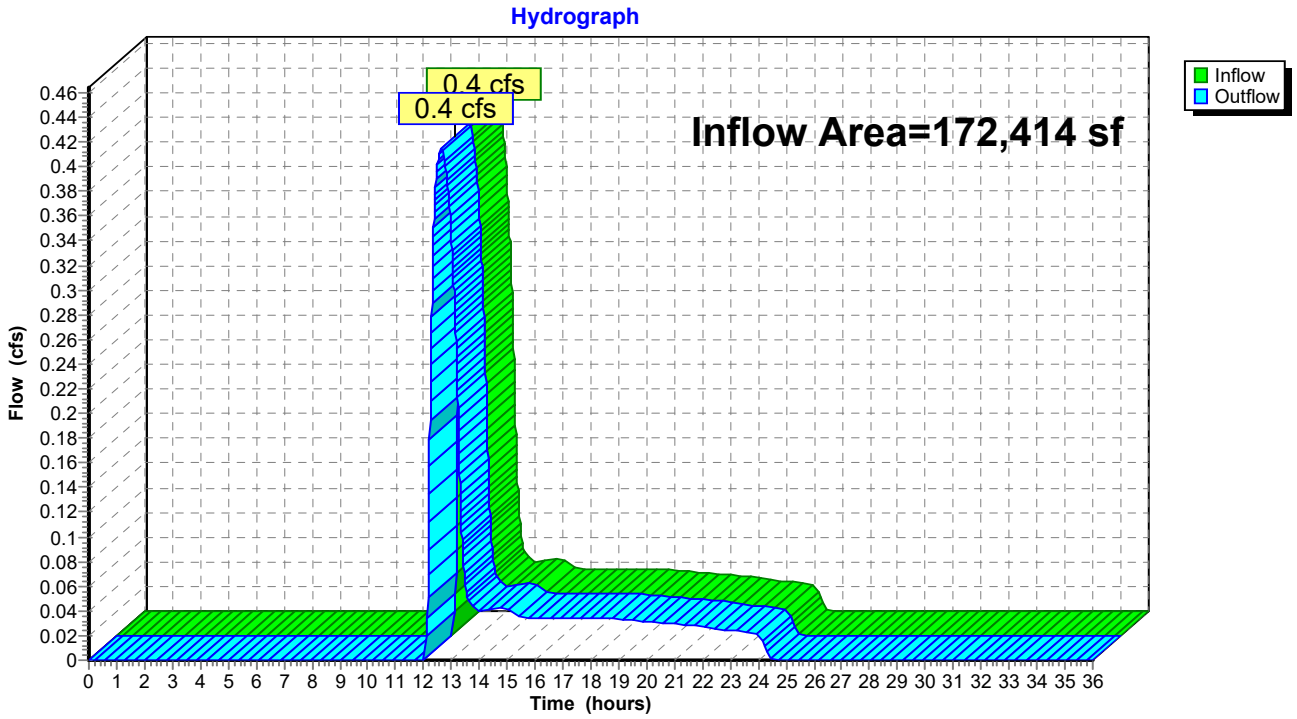


Summary for Reach DP-2: Bordering Vegetated Wetland

Inflow Area = 172,414 sf, 59.30% Impervious, Inflow Depth = 0.19" for 25-Year event
Inflow = 0.4 cfs @ 12.63 hrs, Volume= 2,666 cf
Outflow = 0.4 cfs @ 12.63 hrs, Volume= 2,666 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2

Reach DP-2: Bordering Vegetated Wetland



Summary for Pond 1P: Stone Infiltration System (SIS #1)

Inflow Area = 57,572 sf, 83.08% Impervious, Inflow Depth = 4.92" for 25-Year event
Inflow = 6.3 cfs @ 12.18 hrs, Volume= 23,582 cf
Outflow = 1.3 cfs @ 12.50 hrs, Volume= 23,582 cf, Atten= 79%, Lag= 19.0 min
Discarded = 1.2 cfs @ 11.93 hrs, Volume= 23,180 cf
Primary = 0.2 cfs @ 12.50 hrs, Volume= 401 cf
Routed to Pond 3P : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 52.64' @ 12.50 hrs Surf.Area= 6,101 sf Storage= 4,567 cf

Plug-Flow detention time= 16.5 min calculated for 23,575 cf (100% of inflow)
Center-of-Mass det. time= 16.5 min (825.0 - 808.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	50.90'	6,111 cf	**41.67'W x 146.42'L x 2.71'H Field A** 16,528 cf Overall - 1,251 cf Embedded = 15,277 cf x 40.0% Voids
#2A	51.90'	968 cf	**ADS N-12 12"** x 56 Inside #1 Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf 56 Chambers in 8 Rows 37.67' Header x 0.81 sf x 2 = 61.0 cf Inside
		7,079 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.90'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	51.90'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.90' / 51.90' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	52.10'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	53.50'	**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

Discarded OutFlow Max=1.2 cfs @ 11.93 hrs HW=50.93' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 1.2 cfs)

Primary OutFlow Max=0.2 cfs @ 12.50 hrs HW=52.64' TW=32.83' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.2 cfs of 1.1 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 0.2 cfs @ 3.10 fps)
  └**4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 1P: Stone Infiltration System (SIS #1) - Chamber Wizard Field A

Chamber Model = ADS N-12 12" (ADS N-12® Pipe)
Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf
Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf

14.5" Wide + 48.0" Spacing = 62.5" C-C Row Spacing

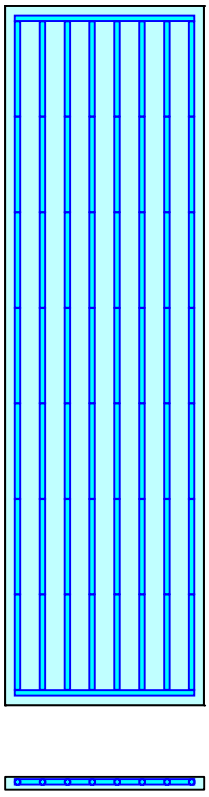
7 Chambers/Row x 20.00' Long +1.21' Header x 2 = 142.42' Row Length +24.0" End Stone x 2 = 146.42' Base Length
8 Rows x 14.5" Wide + 48.0" Spacing x 7 + 24.0" Side Stone x 2 = 41.67' Base Width
12.0" Stone Base + 14.5" Chamber Height + 6.0" Stone Cover = 2.71' Field Height

56 Chambers x 16.2 cf + 37.67' Header x 0.81 sf x 2 = 968.2 cf Chamber Storage
56 Chambers x 20.9 cf + 37.67' Header x 1.05 sf x 2 = 1,250.7 cf Displacement

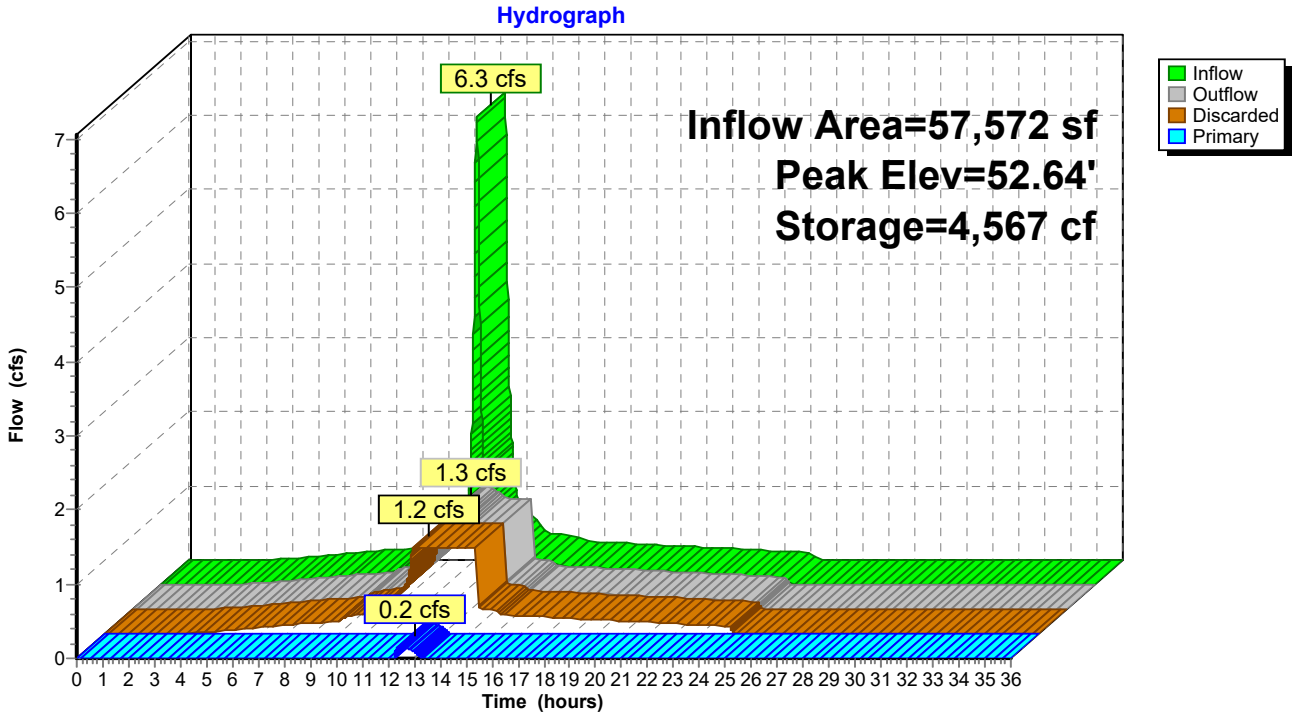
16,527.9 cf Field - 1,250.7 cf Chambers = 15,277.2 cf Stone x 40.0% Voids = 6,110.9 cf Stone Storage

Chamber Storage + Stone Storage = 7,079.1 cf = 0.163 af
Overall Storage Efficiency = 42.8%
Overall System Size = 146.42' x 41.67' x 2.71'

56 Chambers
612.1 cy Field
565.8 cy Stone



Pond 1P: Stone Infiltration System (SIS #1)



Summary for Pond 2P: Stone Infiltration System (SIS #2)

Inflow Area = 57,476 sf, 85.92% Impervious, Inflow Depth = 5.14" for 25-Year event
Inflow = 7.9 cfs @ 12.13 hrs, Volume= 24,611 cf
Outflow = 1.5 cfs @ 12.36 hrs, Volume= 24,611 cf, Atten= 81%, Lag= 14.0 min
Discarded = 1.0 cfs @ 11.81 hrs, Volume= 23,622 cf
Primary = 0.5 cfs @ 12.36 hrs, Volume= 989 cf
Routed to Pond 3P : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 50.44' @ 12.36 hrs Surf.Area= 5,339 sf Storage= 4,984 cf

Plug-Flow detention time= 19.5 min calculated for 24,611 cf (100% of inflow)
Center-of-Mass det. time= 19.5 min (814.7 - 795.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	48.30'	5,347 cf	**36.46'W x 146.42'L x 2.71'H Field A** 14,462 cf Overall - 1,094 cf Embedded = 13,368 cf x 40.0% Voids
#2A	49.30'	846 cf	**ADS N-12 12"** x 49 Inside #1 Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf 49 Chambers in 7 Rows 32.46' Header x 0.81 sf x 2 = 52.6 cf Inside
		6,194 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	48.30'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	48.30'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 48.30' / 48.30' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	49.90'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	50.50'	**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

Discarded OutFlow Max=1.0 cfs @ 11.81 hrs HW=48.33' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 1.0 cfs)

Primary OutFlow Max=0.5 cfs @ 12.36 hrs HW=50.44' TW=32.69' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.5 cfs of 3.8 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 0.5 cfs @ 2.93 fps)
  └**4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 2P: Stone Infiltration System (SIS #2) - Chamber Wizard Field A

Chamber Model = ADS N-12 12" (ADS N-12® Pipe)
Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf
Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf

14.5" Wide + 48.0" Spacing = 62.5" C-C Row Spacing

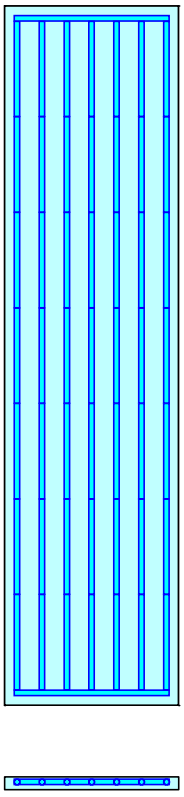
7 Chambers/Row x 20.00' Long +1.21' Header x 2 = 142.42' Row Length +24.0" End Stone x 2 = 146.42' Base Length
7 Rows x 14.5" Wide + 48.0" Spacing x 6 + 24.0" Side Stone x 2 = 36.46' Base Width
12.0" Stone Base + 14.5" Chamber Height + 6.0" Stone Cover = 2.71' Field Height

49 Chambers x 16.2 cf + 32.46' Header x 0.81 sf x 2 = 846.4 cf Chamber Storage
49 Chambers x 20.9 cf + 32.46' Header x 1.05 sf x 2 = 1,093.3 cf Displacement

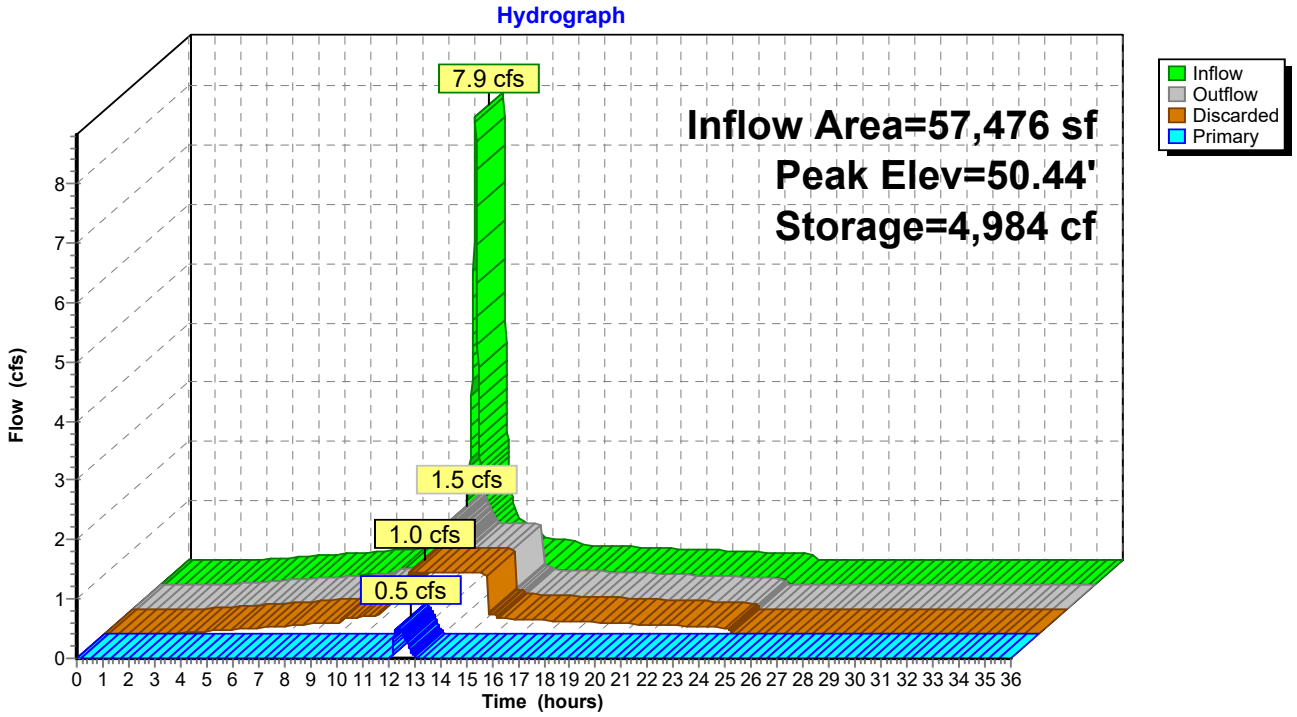
14,461.9 cf Field - 1,093.3 cf Chambers = 13,368.6 cf Stone x 40.0% Voids = 5,347.4 cf Stone Storage

Chamber Storage + Stone Storage = 6,193.8 cf = 0.142 af
Overall Storage Efficiency = 42.8%
Overall System Size = 146.42' x 36.46' x 2.71'

49 Chambers
535.6 cy Field
495.1 cy Stone



Pond 2P: Stone Infiltration System (SIS #2)



Summary for Pond 3P: Infiltration Basin

Inflow Area = 129,431 sf, 78.28% Impervious, Inflow Depth = 0.33" for 25-Year event
Inflow = 0.8 cfs @ 12.33 hrs, Volume= 3,529 cf
Outflow = 0.5 cfs @ 12.67 hrs, Volume= 3,529 cf, Atten= 32%, Lag= 20.5 min
Discarded = 0.2 cfs @ 12.67 hrs, Volume= 2,370 cf
Primary = 0.4 cfs @ 12.67 hrs, Volume= 1,160 cf
Routed to Reach DP-2 : Bordering Vegetated Wetland
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach DP-2 : Bordering Vegetated Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 32.89' @ 12.67 hrs Surf.Area= 1,015 sf Storage= 658 cf

Plug-Flow detention time= 11.0 min calculated for 3,529 cf (100% of inflow)
Center-of-Mass det. time= 11.0 min (824.8 - 813.8)

Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	4,855 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.00	468	0	0
33.00	1,085	777	777
34.00	2,143	1,614	2,391
35.00	2,785	2,464	4,855

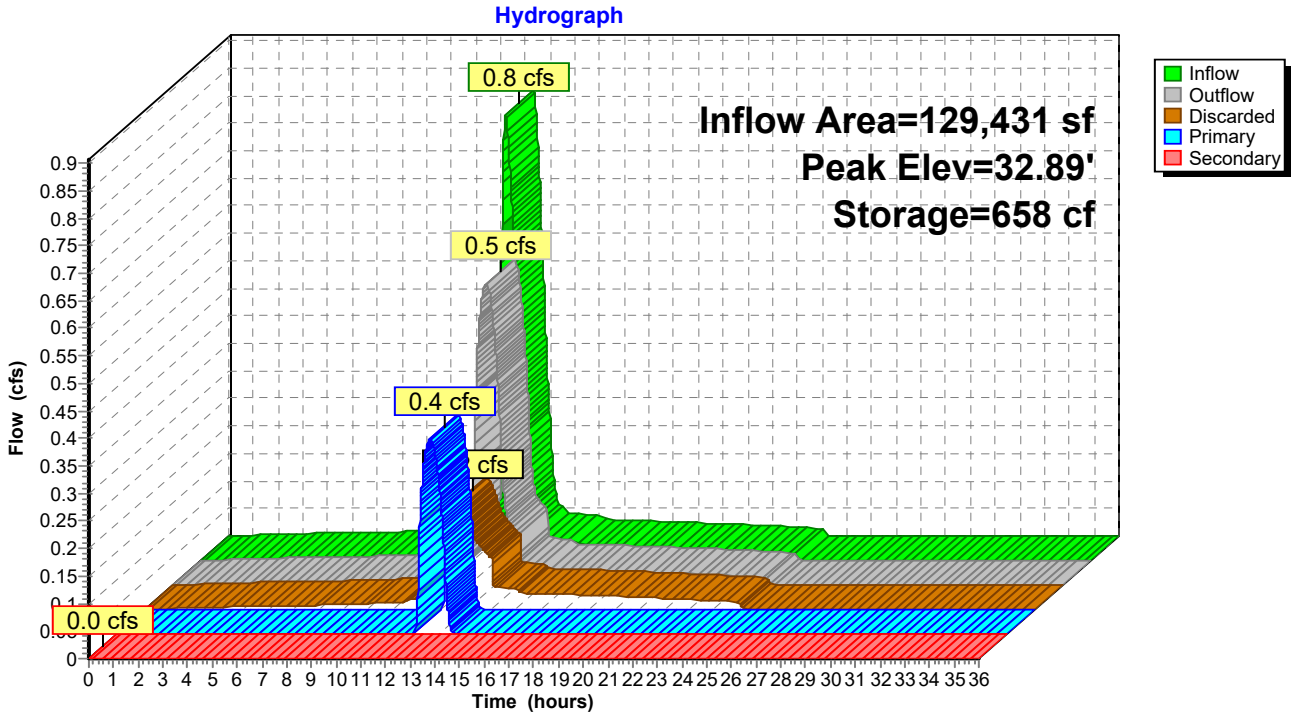
Device	Routing	Invert	Outlet Devices
#1	Discarded	32.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	32.00'	**12.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 32.00' / 26.50' S= 0.1279 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	32.20'	**3.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	33.60'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	33.90'	**15.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.2 cfs @ 12.67 hrs HW=32.89' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.2 cfs)

Primary OutFlow Max=0.4 cfs @ 12.67 hrs HW=32.89' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.4 cfs of 1.9 cfs potential flow)
  └**3=Orifice/Grate** (Orifice Controls 0.4 cfs @ 3.61 fps)
  └**4=Orifice/Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=32.00' TW=0.00' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir**(Controls 0.0 cfs)

Pond 3P: Infiltration Basin



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1: Area going to SIS #1 Runoff Area=57,572 sf 83.08% Impervious Runoff Depth=6.68"
Flow Length=162' Slope=0.0200 '/' Tc=10.8 min CN=88 Runoff=8.4 cfs 32,028 cf

Subcatchment P-2: Area going to SIS #2 Runoff Area=57,476 sf 85.92% Impervious Runoff Depth=6.91"
Tc=6.0 min CN=90 Runoff=10.4 cfs 33,115 cf

Subcatchment P-3: Play area and building Runoff Area=12,318 sf 16.57% Impervious Runoff Depth=2.00"
Flow Length=165' Tc=7.8 min CN=47 Runoff=0.6 cfs 2,054 cf

Subcatchment P-4: Woods and Grading Runoff Area=42,983 sf 2.13% Impervious Runoff Depth=1.02"
Flow Length=400' Tc=16.6 min CN=37 Runoff=0.5 cfs 3,648 cf

Subcatchment P-GR: Garage Ramp Runoff Area=2,065 sf 100.00% Impervious Runoff Depth=7.87"
Tc=6.0 min CN=98 Runoff=0.4 cfs 1,354 cf

Subcatchment P-N: North of Parking LSA Runoff Area=4,071 sf 0.00% Impervious Runoff Depth=1.20"
Tc=6.0 min CN=39 Runoff=0.1 cfs 408 cf

Reach DP-1: North of Site (31 Clarks Rd) Inflow=0.1 cfs 408 cf
Outflow=0.1 cfs 408 cf

Reach DP-2: Bordering Vegetated Wetland Inflow=2.4 cfs 8,264 cf
Outflow=2.4 cfs 8,264 cf

Pond 1P: Stone Infiltration System (SIS #1) Peak Elev=53.56' Storage=6,962 cf Inflow=8.4 cfs 32,028 cf
Discarded=1.2 cfs 30,508 cf Primary=0.4 cfs 1,520 cf Outflow=1.6 cfs 32,028 cf

Pond 2P: Stone Infiltration System (SIS #2) Peak Elev=50.92' Storage=6,006 cf Inflow=10.4 cfs 33,115 cf
Discarded=1.0 cfs 29,278 cf Primary=4.0 cfs 3,837 cf Outflow=5.0 cfs 33,115 cf

Pond 3P: Infiltration Basin Peak Elev=33.87' Storage=2,114 cf Inflow=4.8 cfs 8,765 cf
Discarded=0.4 cfs 4,149 cf Primary=2.0 cfs 4,616 cf Secondary=0.0 cfs 0 cf Outflow=2.4 cfs 8,765 cf

Total Runoff Area = 176,485 sf Runoff Volume = 72,608 cf Average Runoff Depth = 4.94"
42.07% Pervious = 74,252 sf 57.93% Impervious = 102,233 sf

Summary for Subcatchment P-1: Area going to SIS #1

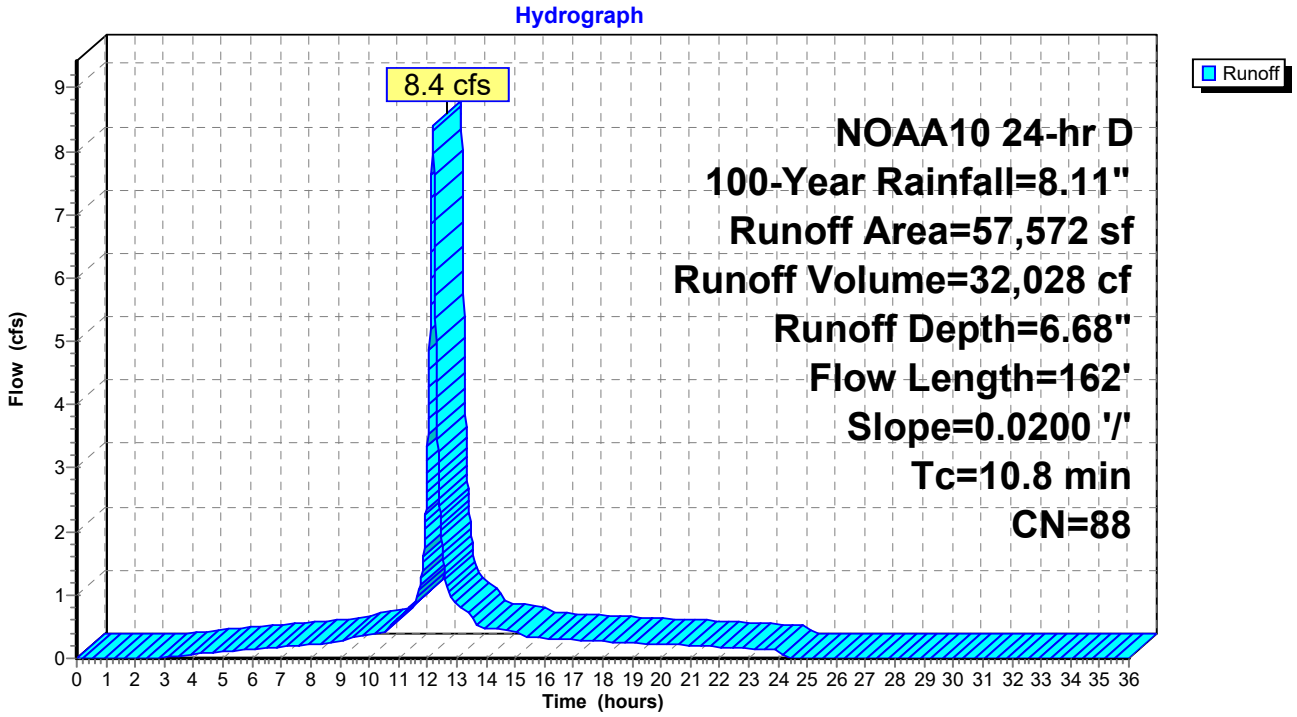
Runoff = 8.4 cfs @ 12.18 hrs, Volume= 32,028 cf, Depth= 6.68"
Routed to Pond 1P : Stone Infiltration System (SIS #1)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 100-Year Rainfall=8.11"

	Area (sf)	CN	Description
*	23,783	98	Roofs, HSG A
*	18,600	98	Paved parking, HSG A
	9,127	39	>75% Grass cover, Good, HSG A
*	5,447	98	Concrete, HSG A
*	487	32	Path, Good, HSG A
*	128	30	Woods, Good, HSG A
	57,572	88	Weighted Average
	9,742		16.92% Pervious Area
	47,830		83.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.0200	0.08		**Sheet Flow, LSA** Grass: Short n= 0.150 P2= 1.00"
0.6	87	0.0200	2.28		**Shallow Concentrated Flow, LSA** Unpaved Kv= 16.1 fps
0.1	25	0.0200	2.87		**Shallow Concentrated Flow, Parking lot to CB** Paved Kv= 20.3 fps
10.8	162	Total			

Subcatchment P-1: Area going to SIS #1



Summary for Subcatchment P-2: Area going to SIS #2

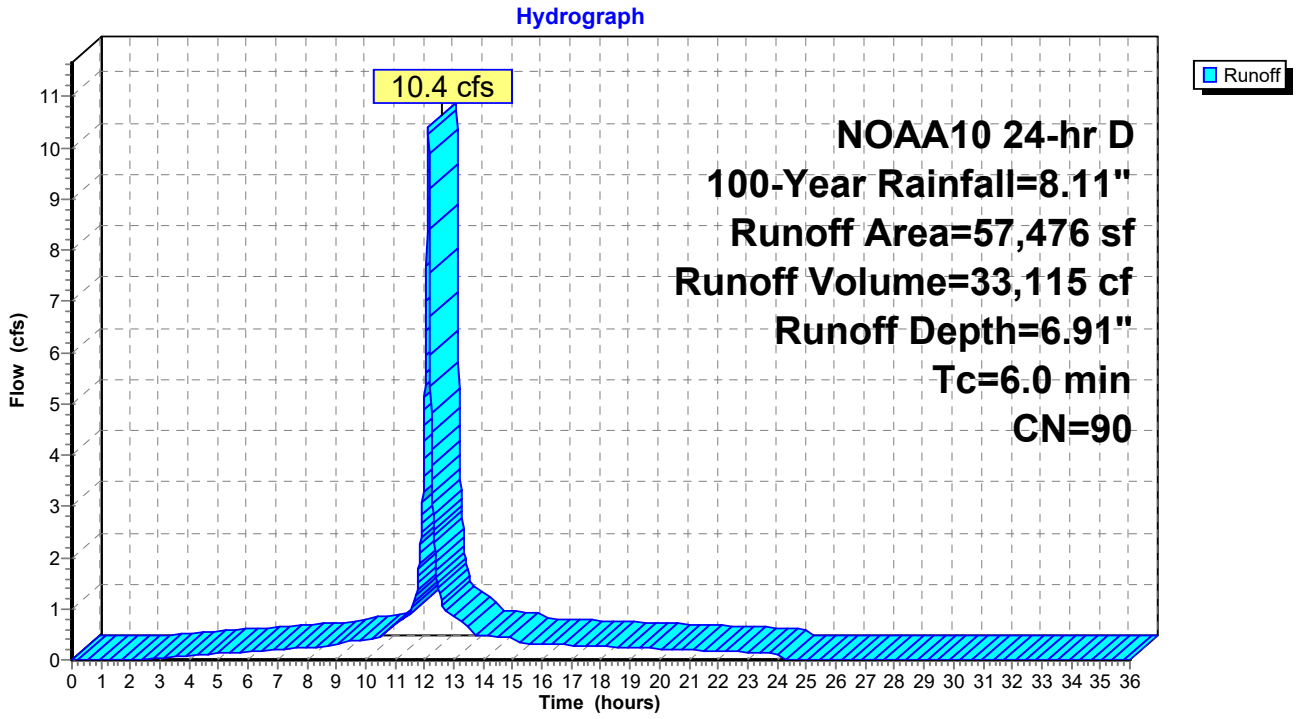
Runoff = 10.4 cfs @ 12.13 hrs, Volume= 33,115 cf, Depth= 6.91"
Routed to Pond 2P : Stone Infiltration System (SIS #2)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 100-Year Rainfall=8.11"

	Area (sf)	CN	Description
	20,834	98	Paved parking, HSG A
	8,095	39	>75% Grass cover, Good, HSG A
*	6,792	98	Concrete, HSG A
*	21,755	98	Roofs, HSG A
	57,476	90	Weighted Average
	8,095		14.08% Pervious Area
	49,381		85.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 0.1 hr TC Minimum**

Subcatchment P-2: Area going to SIS #2



Summary for Subcatchment P-3: Play area and building

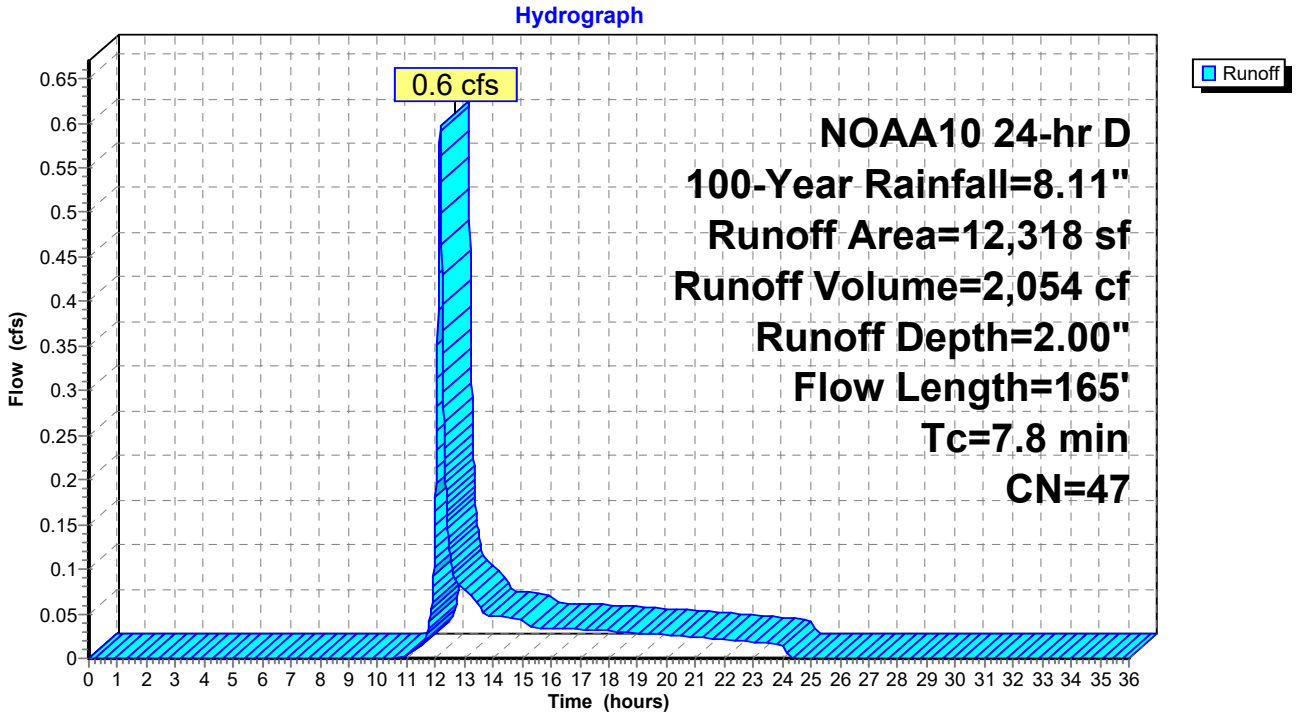
Runoff = 0.6 cfs @ 12.16 hrs, Volume= 2,054 cf, Depth= 2.00"
Routed to Pond 3P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 100-Year Rainfall=8.11"

	Area (sf)	CN	Description
	138	30	Woods, Good, HSG A
*	1,058	39	Gravel Play Area, Good, HSG A
*	2,041	98	Nature Play Area, HSG A
	5,491	39	>75% Grass cover, Good, HSG A
*	3,590	32	Path, Good, HSG A
	12,318	47	Weighted Average
	10,277		83.43% Pervious Area
	2,041		16.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	30	0.0200	0.07		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.00"
0.6	20	0.0200	0.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.00"
0.1	40	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	75	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.8	165	Total			

Subcatchment P-3: Play area and building



Summary for Subcatchment P-4: Woods and Grading

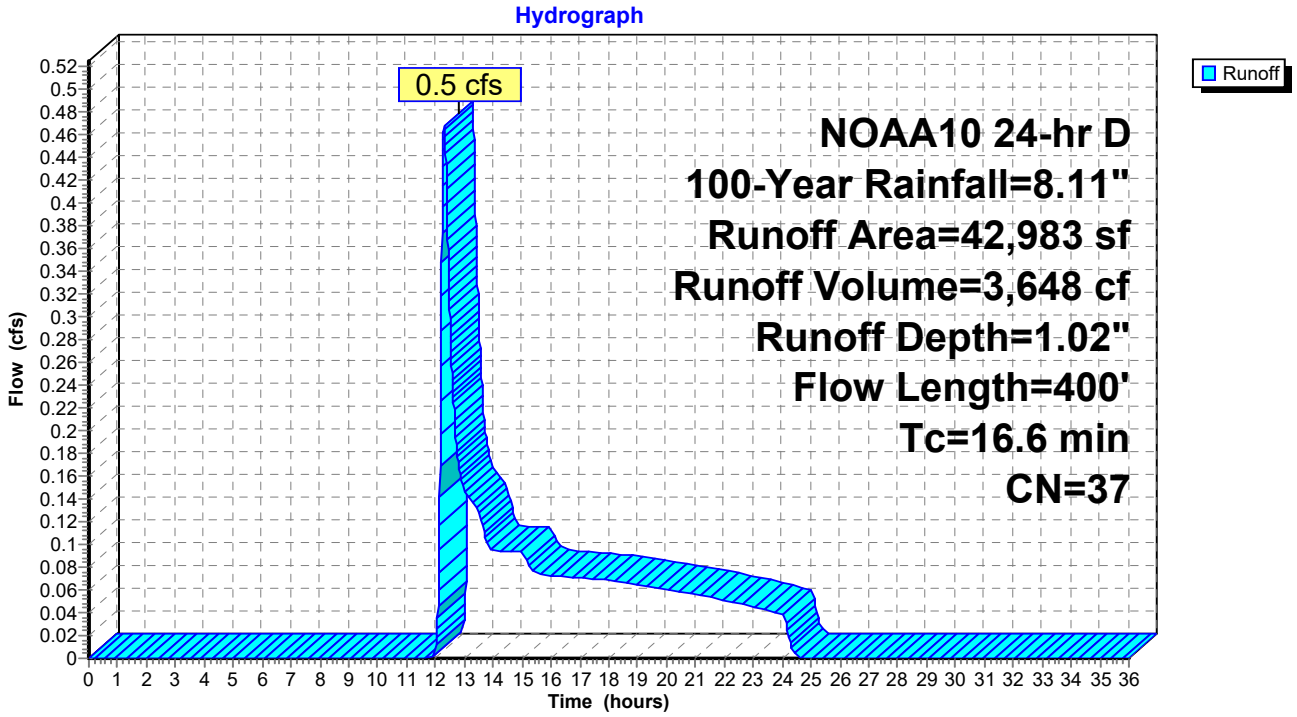
Runoff = 0.5 cfs @ 12.30 hrs, Volume= 3,648 cf, Depth= 1.02"
Routed to Reach DP-2 : Bordering Vegetated Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 100-Year Rainfall=8.11"

	Area (sf)	CN	Description
	17,530	30	Woods, Good, HSG A
	19,018	39	>75% Grass cover, Good, HSG A
*	3,857	32	Path, Good, HSG A
	1,662	77	Woods, Good, HSG D
*	916	98	Concrete Patio, HSG A
	42,983	37	Weighted Average
	42,067		97.87% Pervious Area
	916		2.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	50	0.0100	0.06		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.00"
2.5	243	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	107	0.2230	2.36		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.6	400	Total			

Subcatchment P-4: Woods and Grading



Summary for Subcatchment P-GR: Garage Ramp

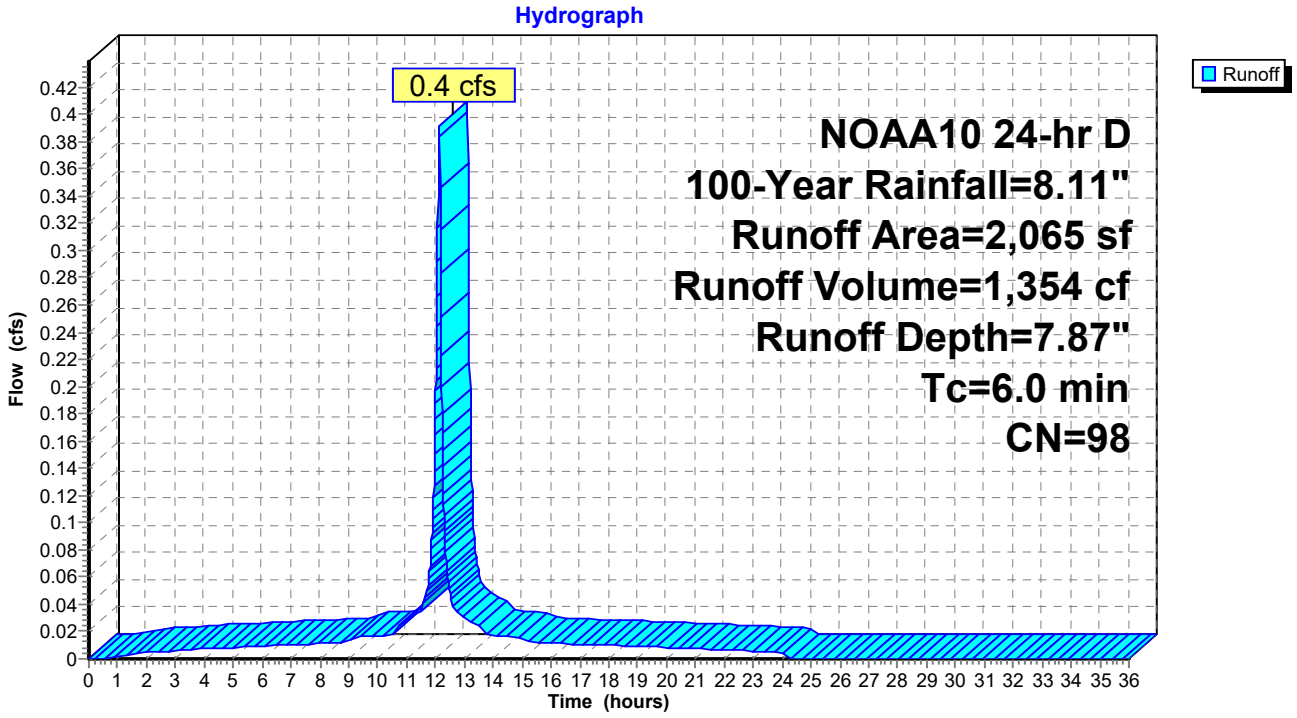
Runoff = 0.4 cfs @ 12.13 hrs, Volume= 1,354 cf, Depth= 7.87"
Routed to Pond 3P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 100-Year Rainfall=8.11"

Area (sf)	CN	Description
2,065	98	Paved parking, HSG A
2,065		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 0.1 hr TC Minimum**

Subcatchment P-GR: Garage Ramp



Summary for Subcatchment P-N: North of Parking LSA

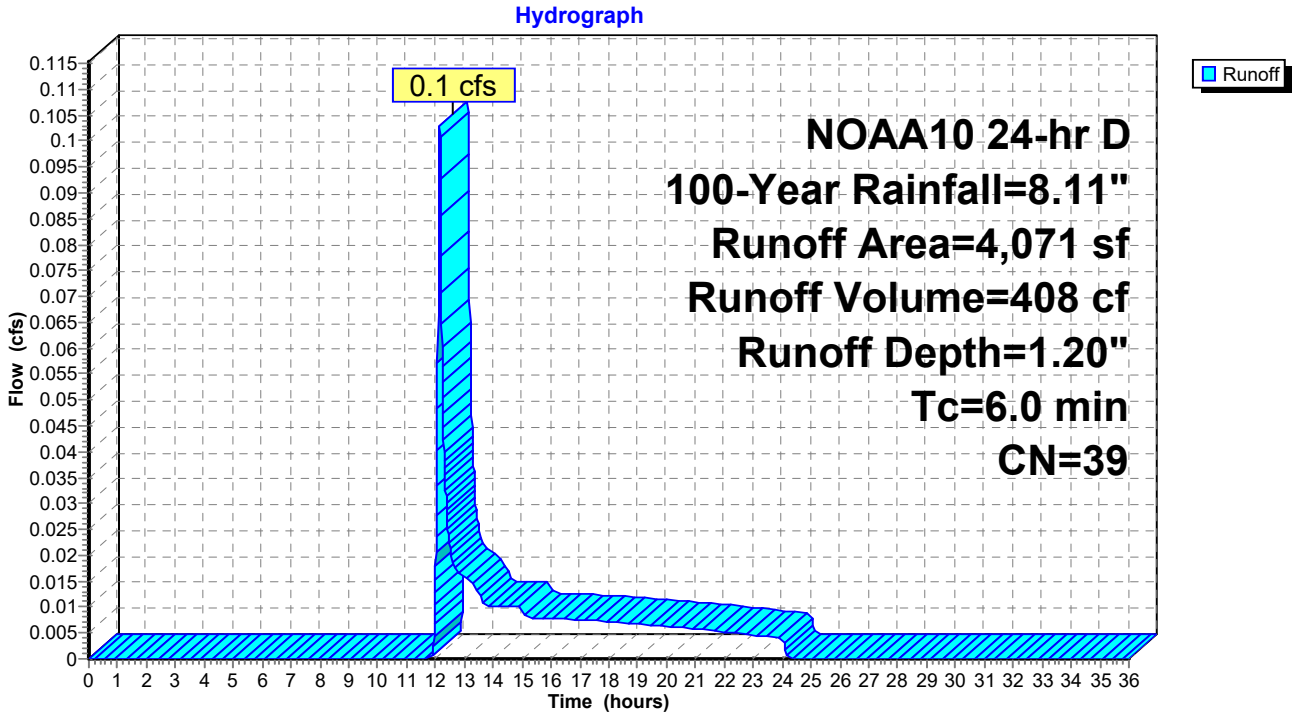
Runoff = 0.1 cfs @ 12.14 hrs, Volume= 408 cf, Depth= 1.20"
Routed to Reach DP-1 : North of Site (31 Clarks Rd)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA10 24-hr D 100-Year Rainfall=8.11"

Area (sf)	CN	Description
4,071	39	>75% Grass cover, Good, HSG A
4,071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 0.1 hr TC Minimum**

Subcatchment P-N: North of Parking LSA

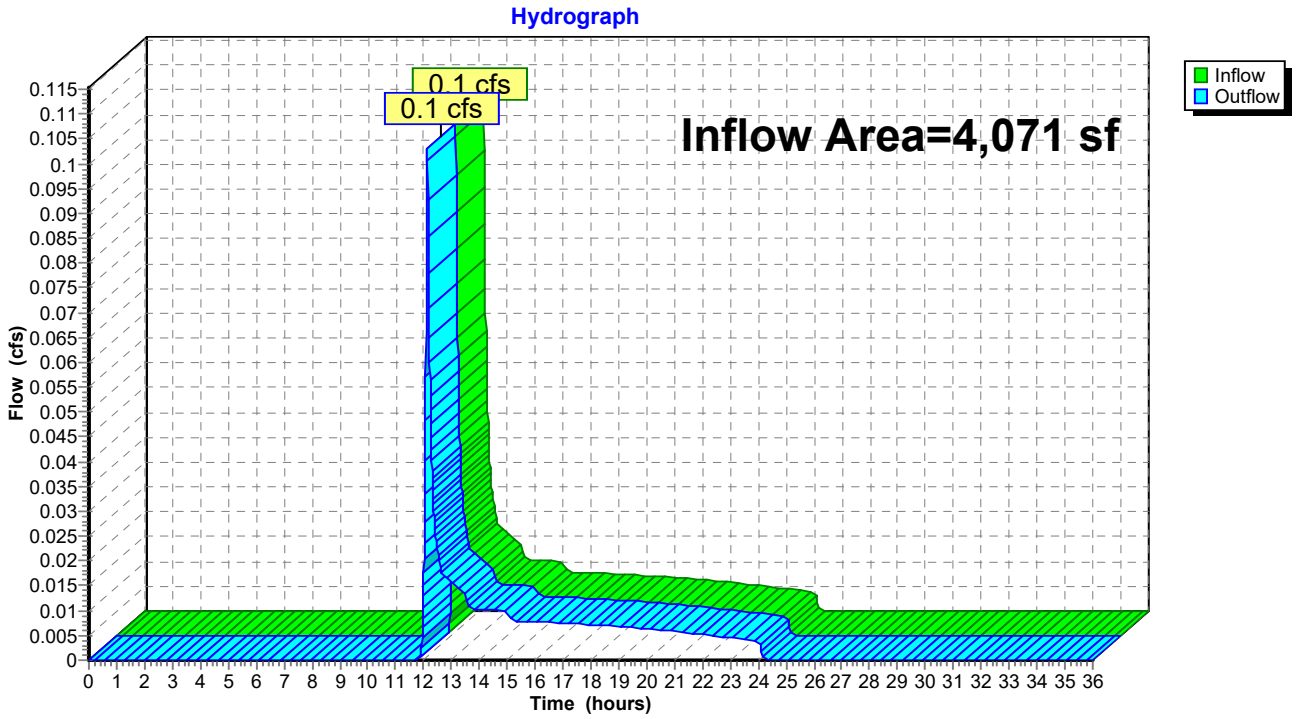


Summary for Reach DP-1: North of Site (31 Clarks Rd)

Inflow Area = 4,071 sf, 0.00% Impervious, Inflow Depth = 1.20" for 100-Year event
Inflow = 0.1 cfs @ 12.14 hrs, Volume= 408 cf
Outflow = 0.1 cfs @ 12.14 hrs, Volume= 408 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2

Reach DP-1: North of Site (31 Clarks Rd)

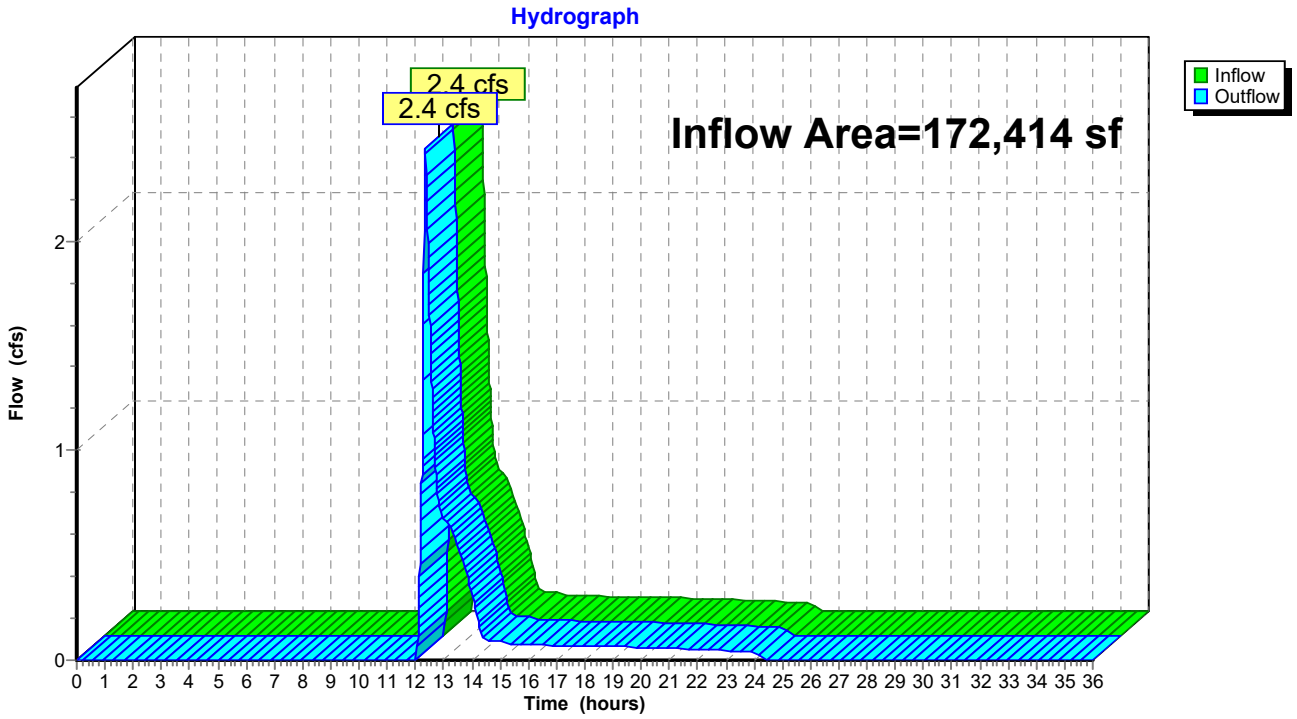


Summary for Reach DP-2: Bordering Vegetated Wetland

Inflow Area = 172,414 sf, 59.30% Impervious, Inflow Depth = 0.58" for 100-Year event
Inflow = 2.4 cfs @ 12.35 hrs, Volume= 8,264 cf
Outflow = 2.4 cfs @ 12.35 hrs, Volume= 8,264 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2

Reach DP-2: Bordering Vegetated Wetland



Summary for Pond 1P: Stone Infiltration System (SIS #1)

Inflow Area = 57,572 sf, 83.08% Impervious, Inflow Depth = 6.68" for 100-Year event
Inflow = 8.4 cfs @ 12.18 hrs, Volume= 32,028 cf
Outflow = 1.6 cfs @ 12.52 hrs, Volume= 32,028 cf, Atten= 81%, Lag= 20.5 min
Discarded = 1.2 cfs @ 11.83 hrs, Volume= 30,508 cf
Primary = 0.4 cfs @ 12.52 hrs, Volume= 1,520 cf
Routed to Pond 3P : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 53.56' @ 12.52 hrs Surf.Area= 6,101 sf Storage= 6,962 cf

Plug-Flow detention time= 25.3 min calculated for 32,019 cf (100% of inflow)
Center-of-Mass det. time= 25.3 min (822.9 - 797.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	50.90'	6,111 cf	**41.67'W x 146.42'L x 2.71'H Field A** 16,528 cf Overall - 1,251 cf Embedded = 15,277 cf x 40.0% Voids
#2A	51.90'	968 cf	**ADS N-12 12"** x 56 Inside #1 Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf 56 Chambers in 8 Rows 37.67' Header x 0.81 sf x 2 = 61.0 cf Inside
		7,079 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.90'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	51.90'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.90' / 51.90' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	52.10'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	53.50'	**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

Discarded OutFlow Max=1.2 cfs @ 11.83 hrs HW=50.93' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 1.2 cfs)

Primary OutFlow Max=0.4 cfs @ 12.52 hrs HW=53.56' TW=33.77' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.4 cfs of 3.2 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 0.3 cfs @ 5.57 fps)
  └**4=Broad-Crested Rectangular Weir** (Weir Controls 0.2 cfs @ 0.69 fps)

Pond 1P: Stone Infiltration System (SIS #1) - Chamber Wizard Field A

Chamber Model = ADS N-12 12" (ADS N-12® Pipe)
Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf
Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf

14.5" Wide + 48.0" Spacing = 62.5" C-C Row Spacing

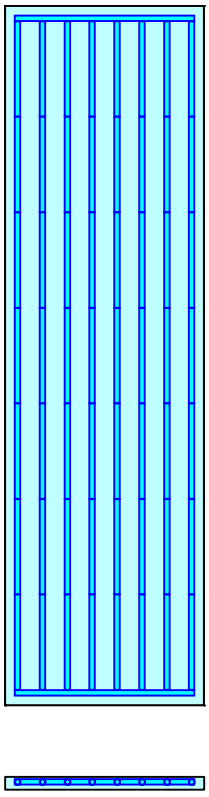
7 Chambers/Row x 20.00' Long +1.21' Header x 2 = 142.42' Row Length +24.0" End Stone x 2 = 146.42' Base Length
8 Rows x 14.5" Wide + 48.0" Spacing x 7 + 24.0" Side Stone x 2 = 41.67' Base Width
12.0" Stone Base + 14.5" Chamber Height + 6.0" Stone Cover = 2.71' Field Height

56 Chambers x 16.2 cf + 37.67' Header x 0.81 sf x 2 = 968.2 cf Chamber Storage
56 Chambers x 20.9 cf + 37.67' Header x 1.05 sf x 2 = 1,250.7 cf Displacement

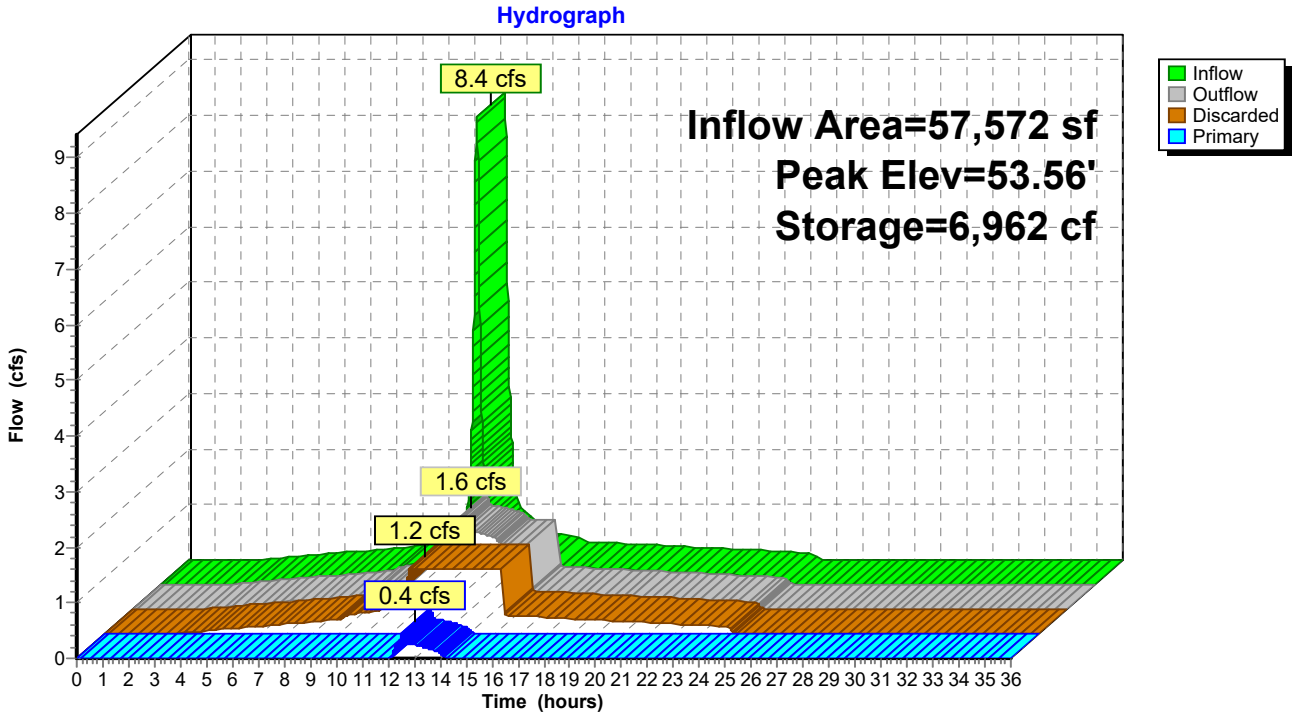
16,527.9 cf Field - 1,250.7 cf Chambers = 15,277.2 cf Stone x 40.0% Voids = 6,110.9 cf Stone Storage

Chamber Storage + Stone Storage = 7,079.1 cf = 0.163 af
Overall Storage Efficiency = 42.8%
Overall System Size = 146.42' x 41.67' x 2.71'

56 Chambers
612.1 cy Field
565.8 cy Stone



Pond 1P: Stone Infiltration System (SIS #1)



Summary for Pond 2P: Stone Infiltration System (SIS #2)

Inflow Area = 57,476 sf, 85.92% Impervious, Inflow Depth = 6.91" for 100-Year event
Inflow = 10.4 cfs @ 12.13 hrs, Volume= 33,115 cf
Outflow = 5.0 cfs @ 12.22 hrs, Volume= 33,115 cf, Atten= 52%, Lag= 5.3 min
Discarded = 1.0 cfs @ 11.69 hrs, Volume= 29,278 cf
Primary = 4.0 cfs @ 12.22 hrs, Volume= 3,837 cf
Routed to Pond 3P : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 50.92' @ 12.22 hrs Surf.Area= 5,339 sf Storage= 6,006 cf

Plug-Flow detention time= 19.0 min calculated for 33,115 cf (100% of inflow)
Center-of-Mass det. time= 19.0 min (804.1 - 785.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	48.30'	5,347 cf	**36.46'W x 146.42'L x 2.71'H Field A** 14,462 cf Overall - 1,094 cf Embedded = 13,368 cf x 40.0% Voids
#2A	49.30'	846 cf	**ADS N-12 12"** x 49 Inside #1 Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf 49 Chambers in 7 Rows 32.46' Header x 0.81 sf x 2 = 52.6 cf Inside
		6,194 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	48.30'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	48.30'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 48.30' / 48.30' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	49.90'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	50.50'	**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

Discarded OutFlow Max=1.0 cfs @ 11.69 hrs HW=48.33' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 1.0 cfs)

Primary OutFlow Max=4.0 cfs @ 12.22 hrs HW=50.92' TW=33.28' (Dynamic Tailwater)
└**2=Culvert** (Passes 4.0 cfs of 4.3 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 0.8 cfs @ 4.45 fps)
  └**4=Broad-Crested Rectangular Weir** (Weir Controls 3.2 cfs @ 1.90 fps)

Pond 2P: Stone Infiltration System (SIS #2) - Chamber Wizard Field A

Chamber Model = ADS N-12 12" (ADS N-12® Pipe)
Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf
Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf

14.5" Wide + 48.0" Spacing = 62.5" C-C Row Spacing

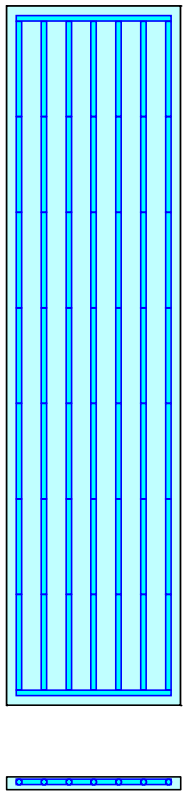
7 Chambers/Row x 20.00' Long +1.21' Header x 2 = 142.42' Row Length +24.0" End Stone x 2 = 146.42' Base Length
7 Rows x 14.5" Wide + 48.0" Spacing x 6 + 24.0" Side Stone x 2 = 36.46' Base Width
12.0" Stone Base + 14.5" Chamber Height + 6.0" Stone Cover = 2.71' Field Height

49 Chambers x 16.2 cf + 32.46' Header x 0.81 sf x 2 = 846.4 cf Chamber Storage
49 Chambers x 20.9 cf + 32.46' Header x 1.05 sf x 2 = 1,093.3 cf Displacement

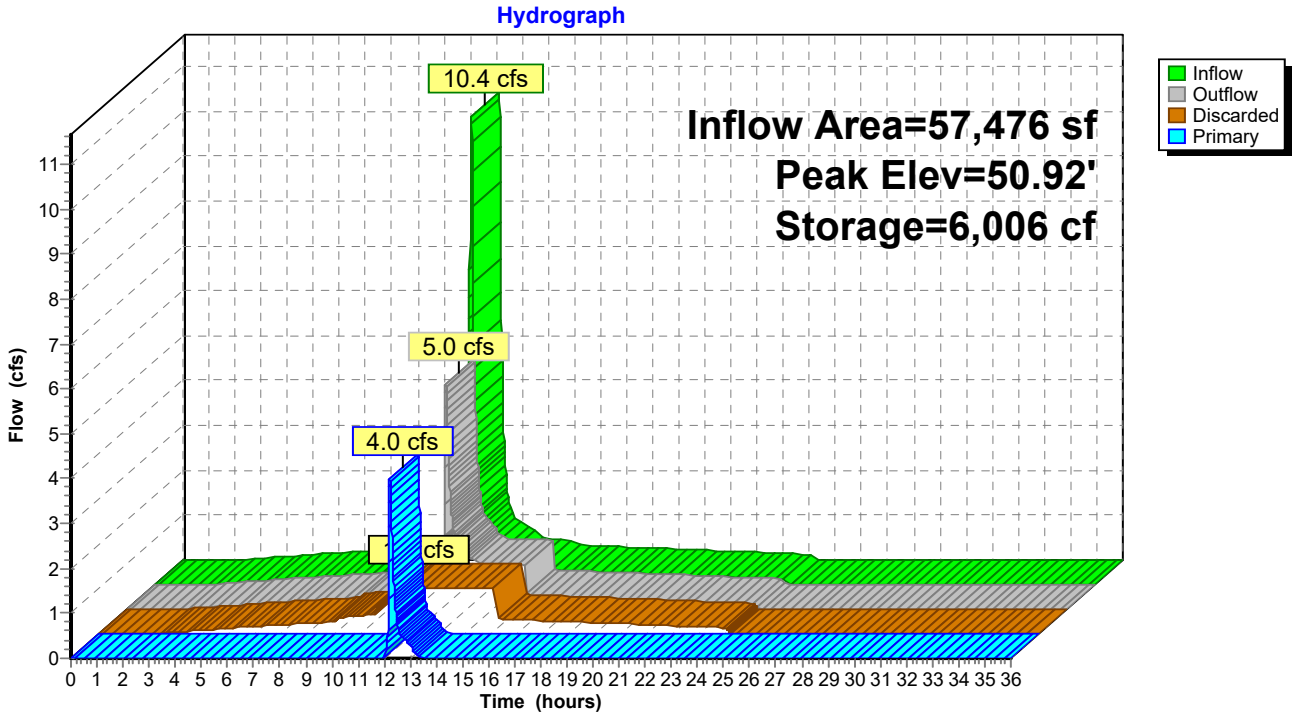
14,461.9 cf Field - 1,093.3 cf Chambers = 13,368.6 cf Stone x 40.0% Voids = 5,347.4 cf Stone Storage

Chamber Storage + Stone Storage = 6,193.8 cf = 0.142 af
Overall Storage Efficiency = 42.8%
Overall System Size = 146.42' x 36.46' x 2.71'

49 Chambers
535.6 cy Field
495.1 cy Stone



Pond 2P: Stone Infiltration System (SIS #2)



Summary for Pond 3P: Infiltration Basin

Inflow Area = 129,431 sf, 78.28% Impervious, Inflow Depth = 0.81" for 100-Year event
Inflow = 4.8 cfs @ 12.21 hrs, Volume= 8,765 cf
Outflow = 2.4 cfs @ 12.36 hrs, Volume= 8,765 cf, Atten= 50%, Lag= 8.6 min
Discarded = 0.4 cfs @ 12.36 hrs, Volume= 4,149 cf
Primary = 2.0 cfs @ 12.36 hrs, Volume= 4,616 cf
Routed to Reach DP-2 : Bordering Vegetated Wetland
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach DP-2 : Bordering Vegetated Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 33.87' @ 12.36 hrs Surf.Area= 2,002 sf Storage= 2,114 cf

Plug-Flow detention time= 17.8 min calculated for 8,765 cf (100% of inflow)
Center-of-Mass det. time= 17.8 min (810.8 - 793.0)

Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	4,855 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.00	468	0	0
33.00	1,085	777	777
34.00	2,143	1,614	2,391
35.00	2,785	2,464	4,855

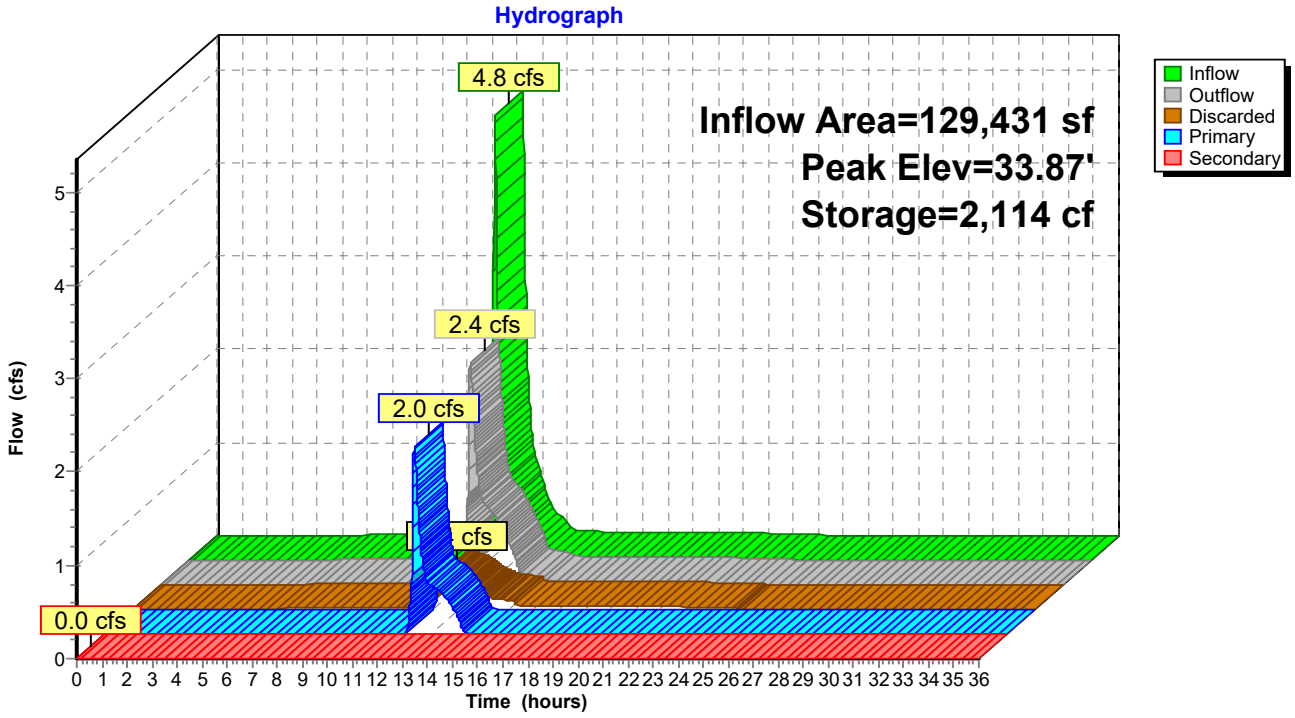
Device	Routing	Invert	Outlet Devices
#1	Discarded	32.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	32.00'	**12.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 32.00' / 26.50' S= 0.1279 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	32.20'	**3.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	33.60'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	33.90'	**15.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.4 cfs @ 12.36 hrs HW=33.87' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.4 cfs)

Primary OutFlow Max=2.0 cfs @ 12.36 hrs HW=33.87' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 2.0 cfs of 3.5 cfs potential flow)
  └**3=Orifice/Grate** (Orifice Controls 0.6 cfs @ 5.98 fps)
  └**4=Orifice/Grate** (Weir Controls 1.4 cfs @ 1.69 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=32.00' TW=0.00' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir**(Controls 0.0 cfs)

Pond 3P: Infiltration Basin



APPENDIX D:

CONSTRUCTION PHASE

BEST MANAGEMENT PRACTICES PLAN

Construction Phase Best Management Practices (BMP's)

Erosion and Sedimentation will be controlled at the site by utilizing structural practices, stabilization practices, and dust control. These practices correspond with the site development plans entitled "Site Development Plan In Amesbury, Massachusetts, 27.5 & 29 Clarks Road" prepared by The Morin-Cameron Group, Inc. dated September 29, 2025 as revised and approved by the Amesbury Planning Board, hereinafter referred to as the Site Plans.

Responsible Party Contact Information:

Stormwater Management System Owner:	Eagles Crossing, LLC 231 Sutton Street, Suite 1B North Andover, MA 01845 P: (978) 688-5422
General Contractor:	TBD
Site Contractor:	TBD

Town Contact Information:

Amesbury Public Works (Engineering Division):	Department of Public Works 39 S Hunt Road Amesbury, MA 01913 P: (978) 388-8116
Amesbury Planning Board:	Planning Board Amesbury City Hall 62 Friend Street Amesbury, MA 01913 P: (978) 388-8111
Site Design Engineer Information:	The Morin-Cameron Group, Inc. 66 Elm St Danvers, MA 01923 Phone: (978) 777-8586

Structural Practices:

1) **Silt Fence** – Siltation fence shall be installed in accordance with the approved plans where high rates of stormwater runoff are anticipated.
   a) Installation Schedule: Prior to Start of land disturbance.

   b) Maintenance and Inspection: The site supervisor shall inspect the silt fence at least once per week and shall repair any damaged or affected areas of the fence at the time they are noted.

2) **Mulch Sock** – Mulch sock shall be installed in accordance with the approved plans where high rates of stormwater runoff are anticipated.
   c) Installation Schedule: Prior to Start of land disturbance.

   d) Maintenance and Inspection: The site supervisor shall inspect the mulch sock at least once per week and shall repair any damaged or affected areas of the sock at the time they are noted.

3) **Hay-Bales/Silt Fence** – Hay-bales and siltation fence shall be installed in accordance with the approved plans where high rates of stormwater runoff are anticipated.
   e) Installation Schedule: Prior to Start of land disturbance.

   f) Maintenance and Inspection: The site supervisor shall inspect the silt fence at least once per week and shall repair any damaged or affected areas of the fence at the time they are noted.

4) **Inlet Protection** – Inlet Protection will be utilized around the catch basin grates in the street layout along the frontage of the property. The inlet protection will allow the storm drain inlets to be used before final stabilization. This structural practice will allow early use of the drainage system. Siltsack or equivalent will be utilized for the inlet protection. Siltsack is manufactured by ACF Environmental. The telephone number is 800-448-3636. Regular flow siltsack will be utilized, and if it does not allow enough storm water flow, hi-flow siltsack will be utilized.

Silt Sack (or equivalent) Inlet Protection Inspection/Maintenance Requirements *

a) The silt sack trapping device and the catch basin should be inspected after every rain storm and repairs made as necessary.

b) Sediment should be removed from the silt sack after the sediment has reached a maximum depth of one-half the depth of the trap.

c) Sediment should be disposed of in a suitable area and protected from erosion by either structural or vegetative means. Sediment material removed shall be disposed of in accordance with all applicable local, state, and federal regulations.

d) The silt sack must be replaced if it is ripped or torn in any way.

e) Temporary traps should be removed and the area repaired as soon as the contributing drainage area to the inlet has been completely stabilized.

5) <u>Sediment Track-Out</u>: Stabilized Construction Exit: Prior to the commencement of site work, crushed stone anti-tracking pads will be installed at the entrance to the site. This will prevent trucks from tracking material onto the road from the construction site. If, at any point during the project, the tracking pad becomes ineffective due to accumulation of soil, the crushed stone shall be replaced. Details for construction of the stabilized entrance can be found in the Erosion Control Details sheet that is part of the comprehensive permit plan set associated with the project. The site supervisor will inspect the tracking pads weekly to ensure that they are properly limiting the tracking of soil onto the road. If tracking onto the roadway is noted, it shall be removed immediately via a mechanical street sweeper.

<u>Stabilization Practices</u>:

Stabilization measures shall be implemented as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased, with the following exceptions.

- Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.

- Where construction activity will resume on a portion of the site within 21 days from when activities ceased, (e.g. the total time period that construction activity is temporarily ceased is less than 21 days) then stabilization measures do not have to be initiated on that portion of the site by the 14th day after construction activity temporarily ceased.

1) **<u>Temporary Seeding</u>** – Temporary seeding will allow a short-term vegetative cover on disturbed site areas that may be in danger of erosion. Temporary seeding will be done at stock piles and disturbed portions of the site where construction activity will temporarily cease for at least 21 days. The temporary seeding will stabilize cleared and unvegetated areas that will not be brought into final grade for several weeks or months.

   <u>Temporary Seeding Planting Procedures *</u>

   a) Planting should preferably be done between April 1st and June 30th, and September 1st through September 31st. If planting is done in the months of July and August, irrigation may be required. If planting is done between October 1st and March 31st, mulching should be applied immediately after planting. If seeding is done during the summer months, irrigation of some sort will probably be necessary.

b) Before seeding, install structural practice controls. Utilize Amoco supergro or equivalent.

c) Select the appropriate seed species for temporary cover from the following table.

Species	Seeding Rate (lbs./1,000 sq.)	Seeding Rate (lbs./acre)	Recommended Seeding Dates	Seed Cover required
Annual Ryegrass	1	40	April 1st to June 1st August 15th to Sept. 15th	¼ inch
Foxtail Millet	0.7	30	May 1st to June 30th	½ to ¾ inch
Oats	2	80	April 1st to July 1st August 15th to Sept. 15th	1 to 1-½ inch
Winter Rye	3	120	August 15th to Oct. 15th	1 to 1-½ inch

Apply the seed uniformly by hydroseeding, broadcasting, or by hand.

d) Use effective mulch, such as clean grain straw; tacked and/or tied with netting to protect seedbed and encourage plant growth.

Temporary Seeding Inspection/Maintenance *

a) Inspect within 6 weeks of planting to see if stands are adequate. Check for damage within 24 hours of the end to a heavy rainfall, defined as a 2-year storm event (i.e., 3.2 inches of rainfall within a twenty-four-hour period). Stands should be uniform and dense. Reseed and mulch damaged and sparse areas immediately. Tack or tie down mulch as necessary.

b) Seeds should be supplied with adequate moisture. Furnish water as needed, especially in abnormally hot or dry weather. Water application rates should be controlled to prevent runoff.

2) **Geotextiles** - Geotextiles such as jute netting will be used in combination with other practices such as mulching to stabilize slopes. The following geotextile materials or equivalent are to be utilized for structural and nonstructural controls as shown in the following table.

Practice	Manufacturer	Product	Remarks
Sediment Fence	Amoco	Woven polypropylene 1198 or equivalent	0.425 mm opening
Construction Entrance	Amoco	Woven polypropylene 2002 or equivalent	0.300 mm opening
Outlet Protection	Amoco	Nonwoven polypropylene 4551 or equivalent	0.150 mm opening
Erosion Control (slope stability)	Amoco	Supergro or equivalent	Erosion control revegetation mix, open polypropylene fiber on degradable

			polypropylene net scrim

Amoco may be reached at (800) 445-7732

Geotextile Installation

a) Netting and matting require firm, continuous contact between the materials and the soil. If there is no contact, the material will not hold the soil and erosion will occur underneath the material.

Geotextile Inspection/Maintenance *

a) In the field, regular inspections should be made to check for cracks, tears, or breaches in the fabric. The appropriate repairs should be made.

3) **Mulching and Netting** – Mulching will provide immediate protection to exposed soils during the period of short construction delays, or over winter months through the application of plant residues, or other suitable materials, to exposed soil areas. In areas, which have been seeded either for temporary or permanent cover, mulching should immediately follow seeding. On steep slopes, mulch must be supplemented with netting. The preferred mulching material is straw.

Mulch (Hay or Straw) Materials and Installation

a) Straw has been found to be one of the most effective organic mulch materials. The specifications for straw are described below, but other material may be appropriate. The straw should be air-dried; free of undesirable seeds & coarse materials. The application rate per 1,000 sq. is 90-100 lbs. (2-3 bales) and the application rate per acre is 2 tons (100-120 bales). The application should cover about 90% of the surface. The use of straw mulch is appropriate where mulch is maintained for more than three months. Straw mulch is subject to wind blowing unless anchored, is the most commonly used mulching material, and has the best microenvironment for germinating seeds.

Mulch Maintenance *

a) Inspect after rainstorms to check for movement of mulch or erosion. If washout, breakage, or erosion occurs, repair surface, reseed, remulch, and install new netting.

b) Straw or grass mulches that blow or wash away should be repaired promptly.

c) If plastic netting is used to anchor mulch, care should be taken during initial mowing to keep the mower height high. Otherwise, the netting can wrap up on the mower blade shafts. After a period of time, the netting degrades and becomes less of a problem.

d) Continue inspections until vegetation is well established.

4) **Land Grading** – Grading on fill slopes, cut slopes, and stockpile areas will be done with full siltation controls in place.

Land Grading Design/Installation Requirements

a) Areas to be graded should be cleared and grubbed of all timber, logs, brush, rubbish, and vegetated matter that will interfere with the grading operation. Topsoil should be stripped and stockpiled for use on critical disturbed areas for establishment of vegetation. Cut slopes to be topsoiled should be thoroughly scarified to a minimum depth of 3-inches prior to placement of topsoil.

b) Fill materials should be generally free of brush, rubbish, rocks, and stumps. Frozen materials or soft and easily compressible materials should not be used in fills intended to support buildings, parking lots, roads, conduits, or other structures.

c) Earth fill intended to support structural measures should be compacted to a minimum of 90 percent of Standard Proctor Test density with proper moisture control, or as otherwise specified by the engineer responsible for the design. Compaction of other fills should be to the density required to control sloughing, erosion or excessive moisture content. Maximum thickness of fill layers prior to compaction should not exceed 9 inches.

d) The uppermost one foot of fill slopes should be compacted to at least 85 percent of the maximum unit weight (based on the modified AASHTO compaction test). This is usually accomplished by running heavy equipment over the fill.

e) Fill should consist of material from borrow areas and excess cut will be stockpiled in areas shown on the Site Plans. All disturbed areas should be free draining, left with a neat and finished appearance, and should be protected from erosion.

Land Grading Stabilization Inspection/Maintenance *

a) All slopes should be checked periodically to see that vegetation is in good condition. Any rills or damage from erosion and animal burrowing should be repaired immediately to avoid further damage.

b) If seeps develop on the slopes, the area should be evaluated to determine if the seep will cause an unstable condition. Subsurface drains or a gravel mulch may be required to solve seep problems. However, no seeps are anticipated.

c) Areas requiring revegetation should be repaired immediately. Control undesirable vegetation such as weeds and woody growth to avoid bank stability problems in the future.

5) **Topsoiling *** – Topsoiling will help establish vegetation on all disturbed areas throughout the site during the seeding process. The soil texture of the topsoil to be used will be a sandy loam to a silt loam texture with 15% to 20% organic content.

Topsoiling Placement

a) Topsoil should not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed seeding.

b) Do not place topsoil on slopes steeper than 2.5:1, as it will tend to erode.

c) If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method is to actually work the topsoil into the layer below for a depth of at least 6 inches.

6) **Permanent Seeding** – Permanent Seeding should be done immediately after the final design grades are achieved. Native species of plants should be used to establish perennial vegetative cover on disturbed areas. The revegetation should be done early enough in the fall so that a good cover is established before cold weather comes and growth stops until the spring. A good cover is defined as vegetation covering 75 percent or more of the ground surface.

Permanent Seeding Seedbed Preparation

a) In infertile or coarse-textured subsoil, it is best to stockpile topsoil and re-spread it over the finished slope at a minimum 2 to 6-inch depth and roll it to provide a firm seedbed. The topsoil must have a sandy loam to silt loam texture with 15% to 20% organic content. If construction fill operations have left soil exposed with a loose, rough, or irregular surface, smooth with blade and roll.

b) Loosen the soil to a depth of 3-5 inches with suitable agricultural or construction equipment.

c) Areas not to receive topsoil shall be treated to firm the seedbed after incorporation of the lime and fertilizer so that it is depressed no more than ½ - 1 inch when stepped on with a shoe. Areas to receive topsoil shall not be firmed until after topsoiling and lime and fertilizer is applied and incorporated, at which time it shall be treated to firm the seedbed as described above.

Permanent Seeding Grass Selection/Application

a) Select an appropriate cool or warm season grass based on site conditions and seeding date. Apply the seed uniformly by hydro-seeding, broadcasting, or by hand. Uniform seed distribution is essential. On steep slopes, hydroseeding may be the most effective seeding method. Surface roughening is particularly important when preparing slopes for hydroseeding.

b) Lime and fertilize. Organic fertilizer shall be utilized in areas within the 100-foot buffer zone to a wetland resource area.

c) Mulch the seedings with straw applied at the rate of ½ tons per acre. Anchor the mulch with erosion control netting or fabric on sloping areas. Amoco supergro or equivalent should be utilized.

Permanent Seeding Inspection/Maintenance *

a) Frequently inspect seeded areas for failure and make necessary repairs and reseed immediately. Conduct or follow-up survey after one year and replace failed plants where necessary.

b) If vegetative cover is inadequate to prevent rill erosion, overseed and fertilize in accordance with soil test results.

c) If a stand has less than 40% cover, reevaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand following seedbed preparation and seeding recommendations, omitting lime and fertilizer in the absence of soil test results. If the season prevents resowing, mulch or jute netting is an effective temporary cover.

d) Seeded areas should be fertilized during the second growing season. Lime and fertilize thereafter at periodic intervals, as needed. Organic fertilizer shall be utilized in areas within the 100-foot buffer zone to a wetland resource area.

Dust Control:

Dust control will be utilized throughout the entire construction process of the site. For example, keeping disturbed surfaces moist during windy periods will be an effective control measure, especially for construction access roads. The use of dust control will prevent the movement of soil to offsite areas. However, care must be taken to not create runoff from excessive use of water to control dust. The following are methods of Dust Control that may be used on-site:

- Vegetative Cover – The most practical method for disturbed areas not subject to traffic.
- Calcium Chloride – Calcium chloride may be applied by mechanical spreader as loose, dry granules or flakes at a rate that keeps the surface moist but not so high as to cause water pollution or plant damage.
- Sprinkling – The site may be sprinkled until the surface is wet. Sprinkling will be effective for dust control on haul roads and other traffic routes.
- Stone – Stone will be used to stabilize construction roads; will also be effective for dust control.

The general contractor shall employ an on-site water vehicle for the control of dust as necessary.

Non-Stormwater Discharges:

The construction de-watering and all non-stormwater discharges will be directed into a sediment dirt bag (or equivalent inlet protection) or a sediment basin. Sediment

material removed shall be disposed of in accordance with all applicable local, state, and federal regulations.

The developer and site general contractor will comply with the E.P.A.'s Final General Permit for Construction De-watering Discharges, (N.P.D.E.S., Section 402 and 40 C.F.R. 122.26(b) (14) (x).

Inspection/Maintenance:

Operator personnel must inspect the construction site at least once every 14 calendar days and within 24 hours of a storm event of ½-inch or greater. The applicant shall be responsible to secure the services of a design professional or similar professional (inspector) on an on-going basis throughout all phases of the project. Refer to the Inspection/Maintenance Requirements presented earlier in the "Structural and Stabilization Practices." The inspector should review the erosion and sediment controls with respect to the following:

- Whether or not the measure was installed/performed correctly.
- Whether or not there has been damage to the measure since it was installed or performed.
- What should be done to correct any problems with the measure.

The inspector should complete a Stormwater Management Construction Phase BMP Inspection Schedule and Evaluation Checklist for documenting the findings and should request the required maintenance or repair for the pollution prevention measures when the inspector finds that it is necessary for the measure to be effective. The inspector should notify the appropriate person to make the changes and submit copies of the form to the Amesbury Planning Board or Amesbury Public Works Engineering Division.

It is essential that the inspector document the inspection of the pollution prevention measures. These records will be used to request maintenance and repair and to prove that the inspection and maintenance were performed. The forms list each of the measures to be inspected on the site, the inspector's name, the date of the inspection, the condition of the measure/area inspected, maintenance or repair performed and any changes which should be made to the Operation and Maintenance Plan to control or eliminate unforeseen pollution of storm water.

APPENDIX E:

LONG TERM BEST MANAGEMENT PRACTICES O&M PLAN

Long Term Stormwater Best Management Practices
Operation and Maintenance Plan
for
27.5 & 29 Clarks Road
Amesbury, Massachusetts
October 20, 2025

The following operation and maintenance plan has been provided to satisfy the requirements of Standard 9 of the Mass DEP Stormwater Management Handbook associated with development of the site and associated infrastructure. The success of the Stormwater Management Plan depends on the proper implementation, operation and maintenance of several management components. The following procedures shall be implemented to ensure success of the Stormwater Management Plan:

1. The contractor shall comply with the details of construction of the site as shown on the approved plans.
2. The vegetated stormwater management areas, detention pond, subsurface stone infiltration systems and water quality units shall be inspected and maintained as indicated below.
3. Effective erosion control measurers during and after construction shall be maintained until a stable turf is established on all altered areas.

Basic Information

Stormwater Management System Owner:	Eagles Crossing, LLC 231 Sutton Street, Suite 1B North Andover, MA 01845 P: (978) 688-5422
Amesbury Public Works (Engineering Division):	Department of Public Works 39 S Hunt Road Amesbury, MA 01913 P: (978) 388-8116
Amesbury Planning Board:	Planning Board Amesbury City Hall 62 Friend Street Amesbury, MA 01913 P: (978) 388-8111
Site Design Engineer Information:	The Morin-Cameron Group, Inc. 66 Elm St Danvers, MA 01923 Phone: (978) 777-8586

Erosion and Sedimentation Controls during Construction:

The site and drainage construction contractor shall be responsible for maintaining the stormwater system during construction. Routine maintenance of all items shall be performed to ensure adequate runoff and pollution control during construction.

A proposed silt fence will be placed downgradient of the work area prior to the commencement of any clearing, grubbing, and earth removal or construction activity. The integrity of the erosion control barrier will be maintained by periodic inspection and replacement as necessary. The erosion control barrier will remain in place until the first course of pavement has been placed and all side slopes have been loamed and seeded and vegetation has been established. A silt sack will also be placed over the new catch basins once constructed.

Operations and maintenance plans for the Stormwater Management construction phase and long term operation of the system have been attached to this report.

General Conditions

1. The developer shall be responsible for scheduling regular inspections and maintenance of the stormwater BMP's. The BMP maintenance shall be conducted as detailed in the following long-term pollution prevention plan and illustrated on the approved design plans:
   "Site Development Plan In Amesbury, Massachusetts, 27.5 & 29 Clarks Road" prepared by The Morin-Cameron Group, Inc. dated September 29, 2025 as revised and approved by the Amesbury Planning Board.
2. All Stormwater BMP's shall be operated and maintained in accordance with the design plans and the following Long-Term Pollution Prevention Plan.
3. The owner shall:
   a. Maintain an Operation and Maintenance Log for the last three years. The Log shall include all BMP inspections, repairs, replacement activities and disposal activities (disposal material and disposal location shall be included in the Log);
   b. Make the log available to the Amesbury Public Works (Engineering Division) and Planning Board upon request;
   c. Allow members and agents of the Amesbury Public Works (Engineering Division) and Planning Board to enter the premises and ensure that the Owner has complied with the Operation and Maintenance Plan requirements for each BMP.
4. A recommended inspection and maintenance schedule is outlined below based on statewide averages. This inspection and maintenance schedule shall be adhered to at a minimum for the first year of service of all BMP's referenced in this document. At the commencement of the first year of service, a more accurate inspection/maintenance schedule shall be determined based on the level of service for this site.

Long-Term Pollution Prevention Plan (LTPPP)

Vegetated Areas:

Immediately after construction, monitoring of the erosion control systems shall occur until establishment of natural vegetation. Afterwards, vegetated areas shall be maintained as such. Vegetation shall be replaced as necessary to ensure proper stabilization of the site.

Cost: Included with annual landscaping budget. Consult with local landscape contractors.

Paved Areas:

Sweepers shall sweep paved areas periodically during dry weather to remove excess sediments and to reduce the amount of sediments that the drainage system shall have to remove from the runoff. The sweeping shall be conducted primarily between March 15th and November 15th. Special attention should be made to sweeping paved surfaces in March and April before spring rains wash residual sand into the drainage system.

Cost: $100 - $150 per sweeping

Salt used for de-icing on the driveway during winter months shall be limited as much as possible as this will reduce the need for removal and treatment. Sand containing the minimum amount of calcium chloride (or approved equivalent) needed for handling may be applied as part of the routine winter maintenance activities.

Proprietary Water Quality Units (CDS and STC):

The CDS and STC water quality pretreatment unit shall be inspected monthly during a routine SWPPP inspection. The unit shall be cleaned per manufacturer instructions included in the approved OMP.

Level Spreader Rip-Rap Outfalls:

The rip-rap outfalls shall be checked for debris accumulation during regular SWPPP inspections. Trash, leaves, branches, etc. shall be removed from outfall. Silt, sand and sediment, if significant accumulation occurs, shall be removed as required by means of mechanical excavation. Material removed shall be disposed of in accordance with all applicable local, state, and federal regulations. The outfall shall be kept free of woody vegetation and removal of woody vegetation shall be conducted between October 15th and April 15th. Any slope erosion within the outfall shall be stabilized and repaired immediately and additional rip-rap added as required.

Deep Sump Hooded Catch Basins:

The catch basin grates shall be checked quarterly and following heavy rainfalls to verify that the inlet openings are not clogged by debris. Debris shall be removed from the grates and disposed of properly. Deep sump catch basins shall be inspected four times per year and cleaned as needed when accumulated sediments exceeds 2' from the bottom of the sump (approximately 1/2 of the sump capacity). Catch basins shall be inspected annually to check oil build-up and outlet obstructions. Material shall be removed from catch basins and disposed of in accordance with all applicable regulations

Cost: Estimated $50 - $100 per cleaning per catch basin as needed. The Owner shall consult local vacuum cleaning contractors for detailed cost estimates.

Public Safety Concerns: Catch basins shall not be left open and unattended at any time during inspection, cleaning or otherwise. Broken or missing grates or frames shall be replaced immediately. At no time shall any person enter the basin structure unless measures have been taken to ensure safe access in accordance with OSHA enclosed space regulations.

Trench Drains:
The trench drain grates shall be checked quarterly and following heavy rainfalls to verify that the inlet openings or the debris strainer is not clogged by debris. Debris shall be removed and disposed of properly. Trench drains shall be inspected four times per year and cleaned to remove accumulated sediment. Trench drain shall be inspected annually to check outlet obstructions. Material shall be removed from trench drain and disposed of in accordance with all applicable regulations.

Cost: Estimated $50 - $100 per cleaning per trench drain as needed. The Owner shall consult local vacuum cleaning contractors for detailed cost estimates.

Public Safety Concerns: Trench drains shall not be left open and unattended at any time during inspection, cleaning or otherwise. Broken or missing grates or frames shall be replaced immediately. At no time shall any person enter the structure unless measures have been taken to ensure safe access in accordance with OSHA enclosed space regulations.

Subsurface Stone Infiltration Systems:
The subsurface stone infiltration system shall be monitored annually to ensure that it is draining properly. The outlet structure shall be checked for debris accumulation twice per year, in the spring and fall. In the case that water remains in the infiltration system for greater than three (3) days after a storm event, an inspection is warranted and necessary maintenance or repairs should be addressed as necessary.

Additional inspections should be scheduled during the first few months to make sure that the system is functioning as intended. Trash, leaves, branches, etc. shall be removed from facility. Silt, sand and sediment, if significant accumulation occurs, shall be removed annually. Material removed from the system shall be disposed of in accordance with all applicable local, state, and federal regulations. In the case that water remains in the infiltration facilities for greater than three (3) days after a storm event, an inspection is warranted and necessary maintenance or repairs should be addressed as necessary. The inspections shall be conducted by qualified personnel.

Cost: $500-$2,500 per cleaning depending on the volume of material/liquids that need to be removed.

Public Safety Concerns: The manhole covers shall not be left open and unattended at any time during inspection, cleaning or otherwise. Broken covers or frames shall be replaced immediately. At no time shall any person enter the subsurface structure unless measures have been taken to ensure safe access in accordance with OSHA enclosed space regulations.

Infiltration Basin:
The infiltration basin shall be inspected after every major storm event for the first 3 months after construction; a major storm event is 3.24 inches of rainfall in a 24 hour period (2 year storm). Thereafter, the basin shall be inspected twice per year, typically in the spring and fall. If erosion or loss of vegetation is observed in the basin, it shall be repaired immediately and new vegetation shall be established. Trash, leaves, branches, etc. shall be removed from facility.

The infiltration basin shall be monitored annually to ensure that it is draining properly. The outlet structure shall be checked for debris accumulation twice per year, in the spring and fall. In the case that water remains in the infiltration system for greater than three (3) days after a storm event, an inspection is warranted and necessary maintenance or repairs should be addressed as necessary. The inspections shall be conducted by qualified personnel.

Cost: Consult with local landscaping companies for associated costs if necessary.

Overall Site Grading and Stormwater Management:
After construction, and during the initial vegetation establishment period, the site should be inspected after every rainfall. Mowing, litter removal, and spot vegetation repair should be performed on a regular basis.

Debris & Litter:
All debris and litter shall be removed from the driveway/parking area as necessary to prevent migration into the drainage system.

Pesticides, Herbicides, and Fertilizers:
Pesticides and herbicides shall be used sparingly. Fertilizers shall be restricted to the use of organic, slow release nitrogen fertilizers only. All fertilizers, herbicides, pesticides, sand and salt for deicing and the like shall be stored in dry area that is protected from weather.

Cost: Included in the routine landscaping maintenance schedule. The Owner shall consult local landscaping contractors for details.

Public Safety Concerns: Chemicals shall be stored in a secure area to prevent children from obtaining access to them. Any major spills shall be reported to municipal officials.

Snow Storage:
Snow storage shall be managed by the General Contractor. Care should be taken to avoid pushing snow into sensitive areas, blocking stormwater runoff or blocking pedestrian or emergency vehicle access to and through the construction site.

Prevention of Illicit Discharges:
Illicit discharges to the stormwater management system are not allowed. Illicit discharges are discharges that are not comprised entirely of stormwater. Pursuant to Mass DEP Stormwater Standards the following activities or facilities are not considered illicit discharges: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, DE chlorinated water from swimming pools, water used for street washing and water used to clean residential building without detergents.

To prevent illicit discharges to the stormwater management system the following policies should be implemented:

1. Provisions For Storing Materials And Waste Products Inside Or Under Cover
2. Vehicle Maintenance And Washing Controls
3. Requirements for Routine Inspections of the Stormwater Management System (i.e.: Infiltration basin, water quality units & subsurface stone infiltration systems.)
4. Spill Prevention and Response Plans.

APPENDIX F:

ILLICIT DISCHARGE

COMPLIANCE STATEMENT

Illicit Discharge Compliance Statement

I, William A. Schkuta, P.E., hereby notify the Amesbury Planning Board that I have not witnessed, nor am aware of any existing illicit discharges at the site known as 27.5 & 29 Clarks Road in Amesbury, Massachusetts. I also hereby certify that the development of said property as illustrated on the final plans entitled ""Site Development Plan In Amesbury, Massachusetts, 27.5 & 29 Clarks Road" prepared by The Morin-Cameron Group, Inc. dated September 29, 2025 and as revised and approved by the Amesbury Planning Board and maintenance thereof in accordance with the "Construction Phase Best Management Practices" and "Long-Term Stormwater Best Management Practices Operation and Maintenance Plan" prepared by The Morin-Cameron Group, Inc dated October 20, 2025 and as revised and approved by the Amesbury Planning Board will not create any new illicit discharges. There is no warranty implied regarding future illicit discharges that may occur as a result of improper construction or maintenance of the stormwater management system or unforeseen accidents.

Name: William A. Schkuta, P.E.

Company: The Morin-Cameron Group, Inc.

Title: Owner's Representative

Signature:

Date: 10/20/2025

APPENDIX G:

STORMWATER MANAGEMENT CALCULATIONS

October 20, 2025

Stormwater Management Calculations

STANDARD 3: Recharge To Groundwater: Static Method

1. Calculate Impervious Area *(From HydroCAD Model)*
   - Existing Impervious Area (HSG A) = 10,500 SF
   - Proposed Impervious Area (HSG A Soil) = 102,233 SF
   - Increase in Impervious area = 102,233 – 10,500 = 91,733 SF

2. Determine Rainfall Depth to be Recharged
   (MassDEP Stormwater Management Handbook: Table 2.3.2)

Hydrologic Soil Group	Recharge Rainfall Depth
A	0.60"

3. Calculate Recharge Volume (Rv)
   Soil HSG A '*Rv*' = [(0.60" x 91,733 SF) / 12 SF-In] = 4,587 CF

   Total '*Rv*' = 4,587 CF

4. Calculate Provided Recharge
   Proposed recharge provided in infiltration basins

HCAD System ID	Bottom of Infiltration	Lowest System Outlet	Total Recharge Volume Provided (CF)	10-YR STORM EVENT PEAK ELEVATION
1P	50.90	52.10	**2,926**	**52.16**
2P	48.30	49.90	**3,619**	**49.93**
3P	32.00	32.20	**106**	**32.23**
TOTAL			**6,948**	

Required Recharge Volume Summary

Total Volume Provided Below Outlets = 6,948 CF
Total Volume Required = 4,587 CF

6,948 CF provided > 4,587 CF required

- Capture Area Adjustment
  Schedule of Areas Tributary to Recharge Systems

HCAD System ID	Tributary Impervious Area
P-1	47,830 SF
P-2	49,381 SF
P-3	2,041 SF
P-GR	2,065 SF
Total:	**101,317 SF**

Total Impervious Area (entire site) = 102,233 SF

Capture Area Adjustment = 102,233 SF / 101,317 SF = 1.01
Required Recharge Volume ***'Rv'*** = 1.01 x Rv = 1.01 x 4,587 CF = **4,632 CF**

Verify Drawdown, Maximum 72-Hours: Static Method

HCAD System ID	Recharge Volume (CF)	Bottom Surface Area (SF)	Infiltration Rate Inches/Hour	Drawdown Time Rv / (K x A) (Hours)	Description
1P	2,926	6,101	8.27	0.6	Stone Infiltration System
2P	3,619	5,338	8.27	0.9	Stone Infiltration System
3P	106	468	8.27	0.03	Infiltration Basin

*****Design Complies with Recharge Volume Standard*****

STANDARD 4: Water Quality Volume

See proprietary hydrodynamic separator and TSS calculations sheets.
De minimis calculation for uncaptured pavement at site

Weighted Average TSS Removal rates (No roof runoff included):
P-1: [(Imp area of WQU-1)(WQU-1 TSS Removal Rate)+ (Imp area of WQU-2)(WQU-2 TSS Removal Rate)+ (Imp area of WQU-3)(WQU-3 TSS Removal Rate)]/(Total impervious area to 1P)
:[(8,492 SF)(0.98)+(2,450)(0.97)+(13,105 SF)(0.91)]/(24,047)= 0.94 or 94%

P-2: [(Imp area of WQU-4)(WQU-4 TSS Removal Rate)+ (Imp area of WQU-5)(WQU-5 TSS Removal Rate)/(Total impervious area to 2P)
:[(20,486 SF)(0.97)+(7,140)(0.99)/(27,626)= 0.975 or 97.5%

Sitewide TSS Removal Calculation (All ponds routed to DP-2):

System ID	New Tributary Paved Area	TSS Removal (%)	Weighted Average
P-1	24,047 SF	94	22,604
P-2	27,626 SF	97.5	26.935
P-3	2,041 SF	80	1,632
P-GR	2,065 SF	80	1,652
P-4	916 sf	0	0
Sum	**56,695 sf**	-	**52,823**

Weighted TSS Removal = (52,823 / 56,695) x 100 = **93.1%**

Phosphorus Removal Calculations

27.5 & 29 Clarks Road in Amesbury

Stone Infiltration Bed System #1 (1P)

ID	Land Use	Cover	Area (Ac)	PLER (lb/ac/yr)
1	Multi-Family	Impervious	1.10	2.32
2	Landscaped (A)	Pervious	0.23	0.03

BMP Load P = 1.10 x 2.32 + 0.23 x 0.03 = **2.56 lb/ac/yr**

Available BMP Storage Volume = 6,813 cf
BMP Volume $_{(IA\text{-}in)}$ = (6,813 cf / 1.10 ac) x (12 in/ft / 43,560 sf/ac) = 1.71" -> 0.5" depth

BMP Vol $_{(PA\text{-}in)}$ = (0.23 ac x 0.00") x 3,630 cf/ac-in = 0 cf

BMP Volume $_{(IA\text{-}cf)2}$ = 6,813 cf – 0 cf = 6,813 cf
BMP Volume $_{(IA\text{-}in)2}$ = (6,813 cf / 1.10 ac) x (12 in/ft / 43,560 sf/ac) = 1.71"
% Difference = [(1.71" – 1.71") / 1.71"] x 100% = 0% < 5% **OK**

IR = 8.27 in/hr -> Use Figure 3-6
BMP-Volume $_{Net\ IA\text{-}in}$ = 1.71"
BMP Reduction $_{\%\text{-}P}$ = 100% (Figure 3-10) -> **use 70% max per MassDEP SWMH**
BMP Reduction $_{lbs\text{-}P}$ = 2.56 lb/ac/yr x 0.70 = 1.79 lb/ac/year

Stone Infiltration Bed System #2 (2P)

ID	Land Use	Cover	Area (Ac)	PLER (lb/ac/yr)
1	Multi-Family	Impervious	1.14	2.32
2	Landscaped (A)	Pervious	0.19	0.03

BMP Load P = 1.14 x 2.32 + 0.19 x 0.03 = **2.65 lb/ac/yr**

Available BMP Storage Volume = 5,107 cf
BMP Volume $_{(IA\text{-}in)}$ = (5,107 cf / 1.14 ac) x (12 in/ft / 43,560 sf/ac) = 1.23" -> 0.5" depth

BMP Vol $_{(PA\text{-}in)}$ = (0.19 ac x 0.00") x 3,630 cf/ac-in = 0 cf

BMP Volume $_{(IA\text{-}cf)2}$ = 5,107 cf – 0 cf = 5,107 cf
BMP Volume $_{(IA\text{-}in)2}$ = (5,107 cf / 1.14 ac) x (12 in/ft / 43,560 sf/ac) = 1.23"
% Difference = [(1.23" – 1.23") / 1.23"] x 100% = 0% < 5% **OK**

IR = 8.27 in/hr -> Use Figure 3-6
BMP-Volume $_{Net\ IA\text{-}in}$ = 1.23"
BMP Reduction $_{\%\text{-}P}$ = 100% (Figure 3-10) -> **use 70% max per MassDEP SWMH**
BMP Reduction $_{lbs\text{-}P}$ = 2.65 lb/ac/yr x 0.70 = 1.86 lb/ac/year

Infiltration Basin #1 (3P)

ID	Land Use	Cover	Area (Ac)	PLER (lb/ac/yr)
1	Multi-Family	Impervious	0.10	2.32
2	Landscaped (A)	Pervious	0.24	0.03

BMP Load P = 0.10 x 2.32 + 0.24 x 0.03 = **0.24 lb/ac/yr**

Available BMP Storage Volume = 2,181 cf
BMP Volume $_{(IA\text{-}in)}$ = (2,181 cf / 0.10 ac) x (12 in/ft / 43,560 sf/ac) = 6.0" -> 0.5" depth

BMP Vol $_{(PA\text{-}in)}$ = (0.24 ac x 0.00") x 3,630 cf/ac-in = 0 cf

BMP Volume $_{(IA\text{-}cf)2}$ = 2,181 cf – 0 cf = 2,181 cf
BMP Volume $_{(IA\text{-}in)2}$ = (2,181 cf / 0.10 ac) x (12 in/ft / 43,560 sf/ac) = 6.0"
% Difference = [(6.0" – 6.0") / 6.0"] x 100% = 0% < 5% **OK**

IR = 8.27 in/hr -> Use Figure 3-12
BMP-Volume $_{Net\ IA\text{-}in}$ = 6.0"
BMP Reduction $_{\%\text{-}P}$ = 100% (Figure 3-10) -> **use 70% max per MassDEP SWMH**
BMP Reduction $_{lbs\text{-}P}$ = 0.24 lb/ac/yr x 0.70 = 0.17 lb/ac/year

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Standard 4: Total Suspended Solids Calculation for Subcatchment P-1 (WQU-1) (Pre-treatment)

Name: 27.5 & 29 Clarks Road
Location: 27.5 & 29 Clarks Road
Amesbury, MA
County: Essex County
Applicant: Eagles Crossing, LLC

Proj. No.: 3962
Date: 10/20/2025
Revised:
Computed by: Dan Sievers, P.E.
Checked by: William Schkuta, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Proprietary Treatment Practice	**0.98**	**0.75**	**0.74**	**0.02**
	0.00	**0.02**	**0.00**	**0.02**
	0.00	**0.02**	**0.00**	**0.02**
	0.00	**0.02**	**0.00**	**0.02**

Total TSS Removal = **99%**

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

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

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Standard 4: Total Suspended Solids Calculation for Subcatchment P-1 (WQU-2) (Pre-treatment)

Name: 27.5 & 29 Clarks Road
Location: 27.5 & 29 Clarks Road
Amesbury, MA
County: Essex County
Applicant: Eagles Crossing, LLC

Proj. No.: 3962
Date: 10/20/2025
Revised:
Computed by: Dan Sievers, P.E.
Checked by: William Schkuta, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Proprietary Treatment Practice	**0.97**	**1.00**	**0.97**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**

Total TSS Removal = **97%**

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

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

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Standard 4: Total Suspended Solids Calculation for Subcatchment P-1 (WQU-3) (Pre-treatment)

Name: 27.5 & 29 Clarks Road
Location: 27.5 & 29 Clarks Road
Amesbury, MA
County: Essex County
Applicant: Eagles Crossing, LLC

Proj. No.: 3962
Date: 10/20/2025
Revised:
Computed by: Dan Sievers, P.E.
Checked by: William Schkuta, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Proprietary Treatment Practice	**0.91**	**1.00**	**0.91**	**0.09**
	0.00	**0.09**	**0.00**	**0.09**
	0.00	**0.09**	**0.00**	**0.09**
	0.00	**0.09**	**0.00**	**0.09**
	0.00	**0.09**	**0.00**	**0.09**

Total TSS Removal = **91%**

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

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
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Standard 4: Total Suspended Solids Calculation for Subcatchment P-1 (WQU-1)

Name: 27.5 & 29 Clarks Road
Location: 27.5 & 29 Clarks Road
Amesbury, MA
County: Essex County
Applicant: Eagles Crossing, LLC

Proj. No.: 3962
Date: 10/20/2025
Revised:
Computed by: Dan Sievers, P.E.
Checked by: William Schkuta, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Subsurface Infiltration Structure	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**

Total TSS Removal = **80%**

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

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
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Standard 4: Total Suspended Solids Calculation for Subcatchment P-2 (WQU-4) (Pre-treatment)

Name: 27.5 & 29 Clarks Road
Location: 27.5 & 29 Clarks Road
Amesbury, MA
County: Essex County
Applicant: Eagles Crossing, LLC

Proj. No.: 3962
Date: 10/20/2025
Revised:
Computed by: Dan Sievers, P.E.
Checked by: William Schkuta, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Proprietary Treatment Practice	**0.96**	**0.75**	**0.72**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**

Total TSS Removal = **97%**

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

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

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Standard 4: Total Suspended Solids Calculation for Subcatchment P-1 (WQU-5) (Pre-treatment)

Name: 27.5 & 29 Clarks Road
Location: 27.5 & 29 Clarks Road
Amesbury, MA
County: Essex County
Applicant: Eagles Crossing, LLC

Proj. No.: 3962
Date: 10/20/2025
Revised:
Computed by: Dan Sievers, P.E.
Checked by: William Schkuta, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Proprietary Treatment Practice	**0.99**	**0.75**	**0.74**	**0.01**
	0.00	**0.01**	**0.00**	**0.01**
	0.00	**0.01**	**0.00**	**0.01**
	0.00	**0.01**	**0.00**	**0.01**

Total TSS Removal = **99%**

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

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

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Standard 4: Total Suspended Solids Calculation for Subcatchment P-1 (WQU-1)

Name: 27.5 & 29 Clarks Road
Location: 27.5 & 29 Clarks Road
Amesbury, MA
County: Essex County
Applicant: Eagles Crossing, LLC

Proj. No.: 3962
Date: 10/20/2025
Revised:
Computed by: Dan Sievers, P.E.
Checked by: William Schkuta, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Subsurface Infiltration Structure	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**

Total TSS Removal = **80%**

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

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

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Standard 4: Total Suspended Solids Calculation for Subcatchment P-3

Name: 27.5 & 29 Clarks Road
Location: 27.5 & 29 Clarks Road
Amesbury, MA
County: Essex County
Applicant: Eagles Crossing, LLC

Proj. No.: 3962
Date: 10/20/2025
Revised:
Computed by: Dan Sievers, P.E.
Checked by: William Schkuta, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Infiltration Basin	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**

Total TSS Removal = **80%**

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

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

Project: 27.5 & 29 Clarks Road
Location: Amesbury, MA
Prepared For: Morin-Cameron Group

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 3 or 4. Figure 4 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 3 or Table in Figure 4. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

$$Q = (qu)\ (A)\ (WQV)$$

where:

Q = flow rate associated with first 1" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
DMH 2 WQU 1	0.46	0.0007198	6.0	0.100	1.00	774.00	0.56
CB 6 WQU 2	0.06	0.0000879	6.0	0.100	1.00	774.00	0.07
CB 5 WQU 3	0.30	0.0004701	6.0	0.100	1.00	774.00	0.36
WQU 4	0.47	0.0007348	6.0	0.100	1.00	774.00	0.57
WQU 5	0.16	0.0002478	6.0	0.100	1.00	774.00	0.19

The WQf sizing calculation selects the minimum size CDS/Cascade/StormCeptor model capable of operating at the computed WQf peak flowrate prior to bypassing. It assumes free discharge of the WQf through the unit and ignores the routing effect of any upstream storm drain piping. As with all hydrodynamic separators, there will be some impact to the Hydraulic Gradient of the corresponding drainage system, and evaluation of this impact should be considered in the design.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

27.5 & 29 CLARKS ROAD
AMESBURY, MA

Area	**0.46 ac**	Unit Site Designation	**DMH 2 WQU 1**
Weighted C	**0.9**	Rainfall Station #	**67**
t_c	**6 min**		
CDS Model	**2015-4**	CDS Treatment Capacity	**1.4 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.08	41.0%	41.0%	0.03	0.03	41.0
0.16	23.9%	64.9%	0.07	0.07	23.7
0.24	11.5%	76.5%	0.10	0.10	11.3
0.32	7.4%	83.9%	0.13	0.13	7.2
0.40	4.4%	88.3%	0.17	0.17	4.3
0.48	2.9%	91.2%	0.20	0.20	2.7
0.56	1.8%	93.0%	0.23	0.23	1.7
0.64	1.2%	94.2%	0.26	0.26	1.1
0.72	1.6%	95.8%	0.30	0.30	1.5
0.80	0.8%	96.6%	0.33	0.33	0.7
1.00	0.6%	97.1%	0.41	0.41	0.5
1.40	1.4%	98.6%	0.58	0.58	1.2
1.80	0.9%	99.5%	0.75	0.75	0.7
2.20	0.5%	100.0%	0.91	0.91	0.4
					97.9
				Removal Efficiency Adjustment[2] =	0.0%
				Predicted % Annual Rainfall Treated =	100.0%
				Predicted Net Annual Load Removal Efficiency =	**97.9%**

1 - Based on 7 years of data from NCDC station #3276, Groveland, Essex County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Brief Stormceptor Sizing Report - CB 6 WQU 2

Project Information & Location			
Project Name	27.5 & 29 Clarks Road	**Project Number**	875059
City	Amesbury	**State/ Province**	Massachusetts
Country	United States of America	**Date**	10/13/2025
Designer Information		**EOR Information (optional)**	
Name	David Adams	**Name**	
Company	Contech Engineered Solutions	**Company**	Morin Cameron
Phone #	207-885-6191	**Phone #**	
Email	dadams@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	CB 6 WQU 2
Target TSS Removal (%)	80
TSS Removal (%) Provided	97
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	97
STC 900	99
STC 1200	99
STC 1800	99
STC 2400	99
STC 3600	99
STC 4800	100
STC 6000	100
STC 7200	100
STC 11000	100
STC 13000	100
STC 16000	100

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Sizing Details

Drainage Area	
Total Area (acres)	0.06
Imperviousness %	100.0

Rainfall	
Station Name	ROCKPORT 1 ESE
State/Province	Massachusetts
Station ID #	6977
Years of Records	36
Latitude	42°39'0"N
Longitude	70°36'0"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - CB 5

Project Information & Location			
Project Name	27.5 & 29 Clarks Road	**Project Number**	875059
City	Amesbury	**State/ Province**	Massachusetts
Country	United States of America	**Date**	10/13/2025
Designer Information		**EOR Information (optional)**	
Name	David Adams	**Name**	
Company	Contech Engineered Solutions	**Company**	Morin Cameron
Phone #	207-885-6191	**Phone #**	
Email	dadams@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	CB 5
Target TSS Removal (%)	80
TSS Removal (%) Provided	91
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	91
STC 900	95
STC 1200	95
STC 1800	96
STC 2400	97
STC 3600	97
STC 4800	98
STC 6000	98
STC 7200	99
STC 11000	99
STC 13000	99
STC 16000	99

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Sizing Details

Drainage Area	
Total Area (acres)	0.30
Imperviousness %	100.0

Rainfall	
Station Name	ROCKPORT 1 ESE
State/Province	Massachusetts
Station ID #	6977
Years of Records	36
Latitude	42°39'0"N
Longitude	70°36'0"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

27.5 & 29 CLARKS ROAD
AMESBURY, MA

Area	**0.47 ac**	Unit Site Designation	**WQU 4**
Weighted C	**0.9**	Rainfall Station #	**67**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.08	41.0%	41.0%	0.03	0.03	40.9
0.16	23.9%	64.9%	0.07	0.07	23.4
0.24	11.5%	76.5%	0.10	0.10	11.1
0.32	7.4%	83.9%	0.14	0.14	7.0
0.40	4.4%	88.3%	0.17	0.17	4.2
0.48	2.9%	91.2%	0.20	0.20	2.7
0.56	1.8%	93.0%	0.24	0.24	1.6
0.64	1.2%	94.2%	0.27	0.27	1.0
0.72	1.6%	95.8%	0.30	0.30	1.4
0.80	0.8%	96.6%	0.34	0.34	0.7
1.00	0.6%	97.1%	0.42	0.42	0.5
1.40	1.4%	98.6%	0.59	0.59	1.1
1.80	0.9%	99.5%	0.76	0.76	0.6
2.20	0.5%	100.0%	0.93	0.93	0.3
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					96.5

Removal Efficiency Adjustment[2] =	0.0%
Predicted % Annual Rainfall Treated =	100.0%
Predicted Net Annual Load Removal Efficiency =	**96.5%**

1 - Based on 7 years of data from NCDC station #3276, Groveland, Essex County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

27.5 & 29 CLARKS ROAD AMESBURY, MA

Area	**0.16 ac**	Unit Site Designation	**WQU 5**
Weighted C	**0.9**	Rainfall Station #	**67**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.08	41.0%	41.0%	0.01	0.01	41.0
0.16	23.9%	64.9%	0.02	0.02	23.9
0.24	11.5%	76.5%	0.03	0.03	11.5
0.32	7.4%	83.9%	0.05	0.05	7.4
0.40	4.4%	88.3%	0.06	0.06	4.4
0.48	2.9%	91.2%	0.07	0.07	2.8
0.56	1.8%	93.0%	0.08	0.08	1.7
0.64	1.2%	94.2%	0.09	0.09	1.1
0.72	1.6%	95.8%	0.10	0.10	1.5
0.80	0.8%	96.6%	0.11	0.11	0.8
1.00	0.6%	97.1%	0.14	0.14	0.5
1.40	1.4%	98.6%	0.20	0.20	1.3
1.80	0.9%	99.5%	0.26	0.26	0.8
2.20	0.5%	100.0%	0.31	0.31	0.4
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					99.3
				Removal Efficiency Adjustment[2] =	0.0%
				Predicted % Annual Rainfall Treated =	100.0%
				Predicted Net Annual Load Removal Efficiency =	**99.3%**

1 - Based on 7 years of data from NCDC station #3276, Groveland, Essex County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Stage-Area-Storage for Pond 1P: Stone Infiltration System (SIS #1)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
50.90	**6,101**	0
50.95	6,101	122
51.00	6,101	244
51.05	6,101	366
51.10	6,101	488
51.15	6,101	610
51.20	6,101	732
51.25	6,101	854
51.30	6,101	976
51.35	6,101	1,098
51.40	6,101	1,220
51.45	6,101	1,342
51.50	6,101	1,464
51.55	6,101	1,586
51.60	6,101	1,708
51.65	6,101	1,830
51.70	6,101	1,952
51.75	6,101	2,074
51.80	6,101	2,196
51.85	6,101	2,319
51.90	6,101	2,441
51.95	6,101	2,556
52.00	6,101	2,665
52.05	6,101	2,790
52.10	6,101	2,926
52.15	6,101	3,068
52.20	6,101	3,214
52.25	6,101	3,363
52.30	6,101	3,515
52.35	6,101	3,669
52.40	6,101	3,824
52.45	6,101	3,979
52.50	6,101	4,136
52.55	6,101	4,292
52.60	6,101	4,448
52.65	6,101	4,603
52.70	6,101	4,757
52.75	6,101	4,909
52.80	6,101	5,059
52.85	6,101	5,206
52.90	6,101	5,348
52.95	6,101	5,485
53.00	6,101	5,613
53.05	6,101	5,724
53.10	6,101	5,837
53.15	6,101	5,959
53.20	6,101	6,081
53.25	6,101	6,203
53.30	6,101	6,325
53.35	6,101	6,447
53.40	6,101	6,569
53.45	6,101	6,691
53.50	6,101	6,813
53.55	6,101	6,935
53.60	6,101	**7,057**

Lowest outlet @ 52.10

Stage-Area-Storage for Pond 2P: Stone Infiltration System (SIS #2)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
48.30	**5,339**	0
48.35	5,339	107
48.40	5,339	214
48.45	5,339	320
48.50	5,339	427
48.55	5,339	534
48.60	5,339	641
48.65	5,339	747
48.70	5,339	854
48.75	5,339	961
48.80	5,339	1,068
48.85	5,339	1,175
48.90	5,339	1,281
48.95	5,339	1,388
49.00	5,339	1,495
49.05	5,339	1,602
49.10	5,339	1,708
49.15	5,339	1,815
49.20	5,339	1,922
49.25	5,339	2,029
49.30	5,339	2,135
49.35	5,339	2,236
49.40	5,339	2,332
49.45	5,339	2,442
49.50	5,339	2,560
49.55	5,339	2,684
49.60	5,339	2,812
49.65	5,339	2,943
49.70	5,339	3,076
49.75	5,339	3,210
49.80	5,339	3,346
49.85	5,339	3,482
49.90	5,339	3,619
49.95	5,339	3,755
50.00	5,339	3,892
50.05	5,339	4,027
50.10	5,339	4,162
50.15	5,339	4,295
50.20	5,339	4,426
50.25	5,339	4,555
50.30	5,339	4,679
50.35	5,339	4,799
50.40	5,339	4,911
50.45	5,339	5,008
50.50	5,339	5,107
50.55	5,339	5,214
50.60	5,339	5,320
50.65	5,339	5,427
50.70	5,339	5,534
50.75	5,339	5,641
50.80	5,339	5,748
50.85	5,339	5,854
50.90	5,339	5,961
50.95	5,339	6,068
51.00	5,339	**6,175**

Lowest outlet @ 49.90

Stage-Area-Storage for Pond 3P: Infiltration Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
32.00	468	0
32.05	499	24
32.10	530	50
32.15	561	77
32.20	591	106
32.25	622	136
32.30	653	168
32.35	684	202
32.40	715	237
32.45	746	273
32.50	777	311
32.55	807	351
32.60	838	392
32.65	869	435
32.70	900	479
32.75	931	525
32.80	962	572
32.85	992	621
32.90	1,023	671
32.95	1,054	723
33.00	1,085	777
33.05	1,138	832
33.10	1,191	890
33.15	1,244	951
33.20	1,297	1,015
33.25	1,350	1,081
33.30	1,402	1,150
33.35	1,455	1,221
33.40	1,508	1,295
33.45	1,561	1,372
33.50	1,614	1,451
33.55	1,667	1,533
33.60	1,720	1,618
33.65	1,773	1,705
33.70	1,826	1,795
33.75	1,879	1,888
33.80	1,931	1,983
33.85	1,984	2,081
33.90	2,037	2,181
33.95	2,090	2,285
34.00	2,143	2,391
34.05	2,175	2,498
34.10	2,207	2,608
34.15	2,239	2,719
34.20	2,271	2,832
34.25	2,304	2,946
34.30	2,336	3,062
34.35	2,368	3,180
34.40	2,400	3,299
34.45	2,432	3,420
34.50	2,464	3,542
34.55	2,496	3,666
34.60	2,528	3,792
34.65	2,560	3,919
34.70	2,592	4,048
34.75	2,625	4,178
34.80	2,657	4,310
34.85	2,689	4,444
34.90	2,721	4,579
34.95	2,753	4,716
35.00	**2,785**	**4,855**

Lowest outlet @ 32.20

APPENDIX H:

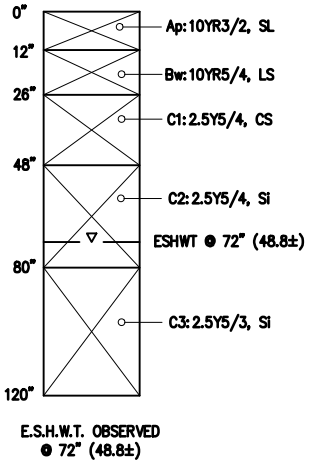
SOIL SUITABILITY

SOIL LOGS

DATE PERFORMED: SEPTEMBER 29, 2025
PERFORMED BY: SCOTT CAMERON, SE #3024

TP-1-25

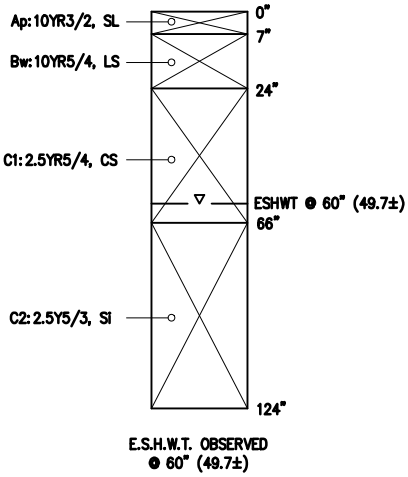
ELEV.=54.8±



E.S.H.W.T. OBSERVED
@ 72" (48.8±)

TP-2-25

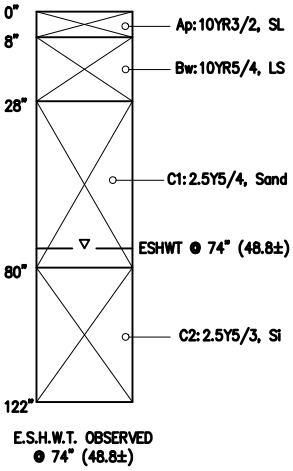
ELEV.=54.7±



E.S.H.W.T. OBSERVED
@ 60" (49.7±)

TP-3-25

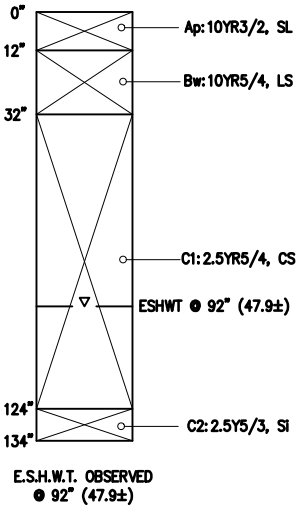
ELEV.=55.0±



E.S.H.W.T. OBSERVED
@ 74" (48.8±)

TP-4-25

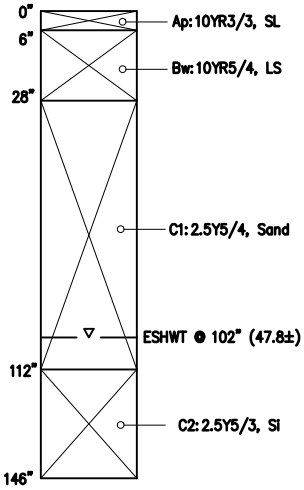
ELEV.=55.6±



E.S.H.W.T. OBSERVED
@ 92" (47.9±)

TP-5-25

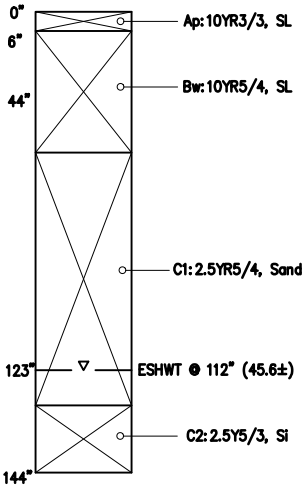
ELEV.=56.3±



E.S.H.W.T. OBSERVED
@ 102" (47.8±)

TP-6-25

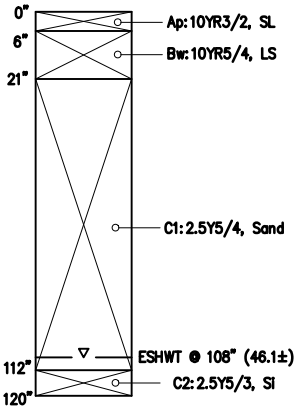
ELEV.=54.9±



E.S.H.W.T. OBSERVED
@ 112" (45.6±)

TP-7-25

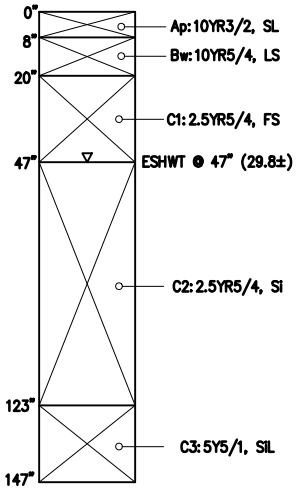
ELEV.=55.1±



E.S.H.W.T. OBSERVED
@ 108" (46.1±)

TP-8-25

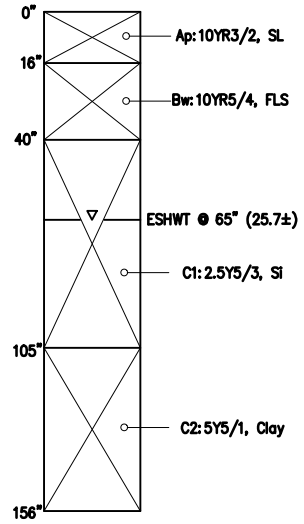
ELEV.=33.7±



E.S.H.W.T. OBSERVED
@ 47" (29.8±)

TP-9-25

ELEV.=31.1±



E.S.H.W.T. OBSERVED
@ 65" (25.7±)

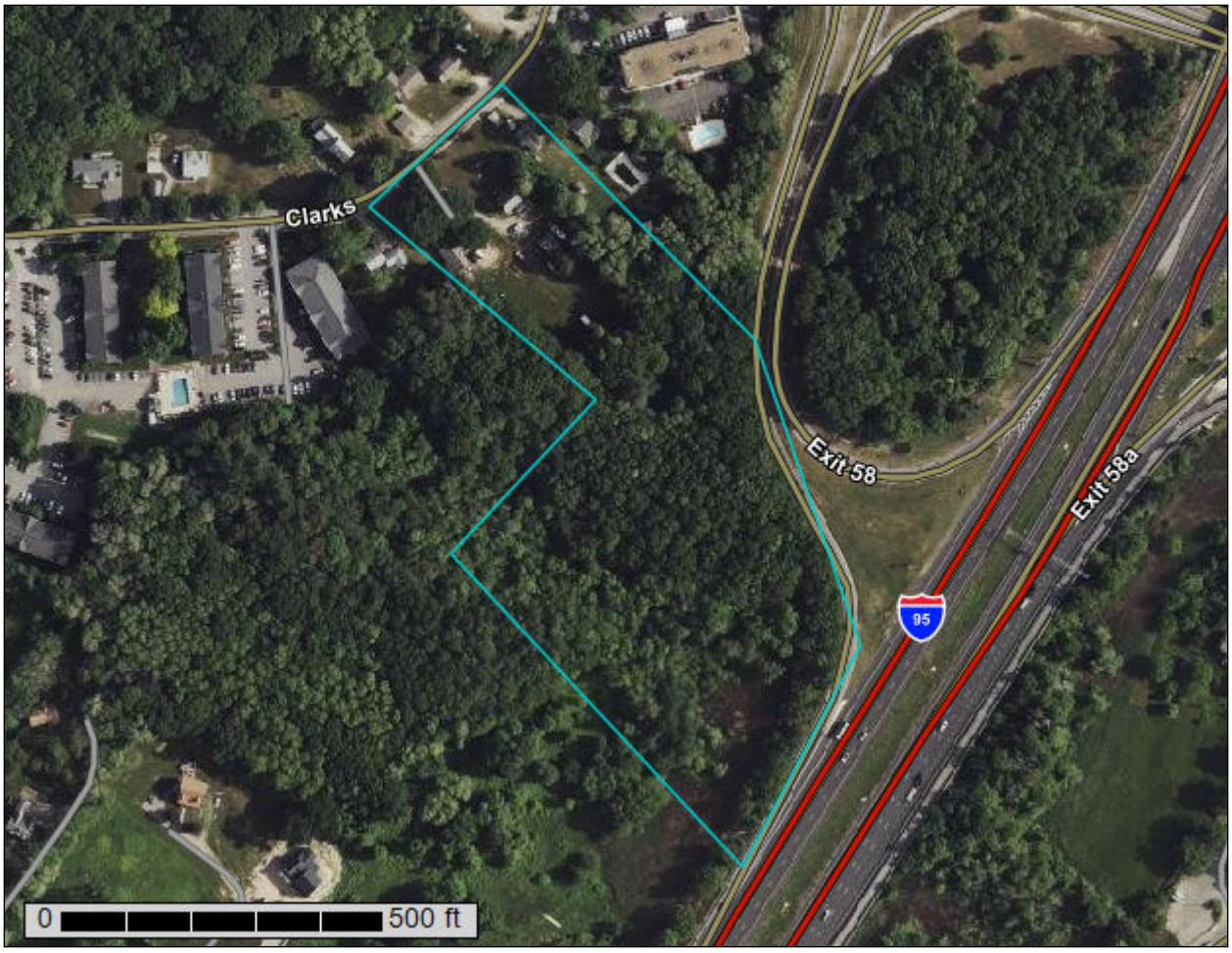
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Essex County, Massachusetts, Northern Part



October 20, 2025

Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

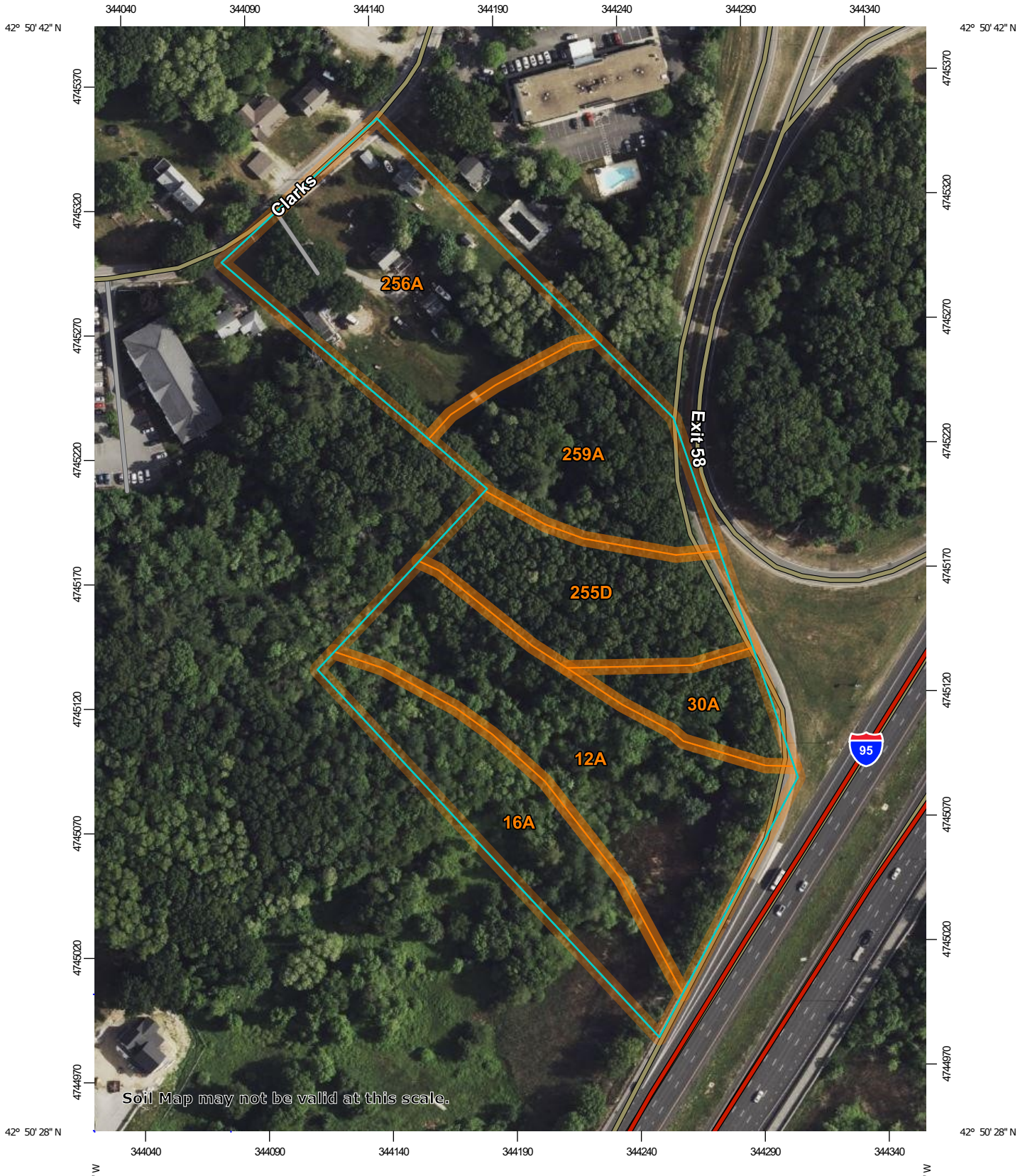
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,160 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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—Jun 5, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12A	Maybid silt loam, 0 to 3 percent slopes	2.4	25.6%
16A	Scantic silt loam, 0 to 3 percent slopes	1.4	14.9%
30A	Raynham silt loam, 0 to 3 percent slopes	0.5	5.7%
255D	Windsor loamy sand, 15 to 25 percent slopes	1.4	14.4%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	2.3	23.9%
259A	Carver loamy coarse sand, 0 to 3 percent slopes	1.5	15.5%
Totals for Area of Interest		**9.5**	**100.0%**

Map Unit Descriptions

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

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

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

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

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

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

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

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

Essex County, Massachusetts, Northern Part

12A—Maybid silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: vjhj
Elevation: 0 to 130 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Maybid

Setting

Landform: Depressions, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Soft silty and clayey glaciolacustrine deposits and/or firm silty marine deposits

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 19 inches: silty clay
H3 - 19 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Ecological site: F144AY020MA - Very Wet Coastal Lake Plain
Hydric soil rating: Yes

Minor Components

Scantic

Percent of map unit: 12 percent
Landform: Depressions

Hydric soil rating: Yes

Swansea

Percent of map unit: 3 percent
Landform: Bogs
Hydric soil rating: Yes

16A—Scantic silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: vjrl
Elevation: 10 to 900 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Scantic

Setting

Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Soft fine-silty glaciolacustrine deposits and/or soft fine-silty glaciomarine deposits over hard fine-silty glaciolacustrine deposits and/or hard fine-silty glaciomarine deposits

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 26 inches: silty clay loam
H3 - 26 to 60 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F144AY019NH - Wet Lake Plain
Hydric soil rating: Yes

Minor Components

Maybid

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Buxton

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

30A—Raynham silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: vjq9
Elevation: 50 to 500 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Raynham and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Raynham

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Soft coarse-silty lacustrine deposits

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 27 inches: very fine sandy loam
H3 - 27 to 60 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F144AY019NH - Wet Lake Plain
Hydric soil rating: Yes

Minor Components

Belgrade
Percent of map unit: 10 percent
Hydric soil rating: No

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

Walpole variant
Percent of map unit: 5 percent
Landform: Terraces
Hydric soil rating: Yes

Birdsall
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

255D—Windsor loamy sand, 15 to 25 percent slopes

Map Unit Setting
National map unit symbol: 2svlb
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Windsor and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor

Setting

Landform: Outwash plains, deltas, outwash terraces, dunes
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

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

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Eskers, outwash plains, moraines, kames, stream terraces, outwash terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Eskers, outwash plains, deltas, kames
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear

Hydric soil rating: No

256A—Deerfield loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2xfg8
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Deerfield

Setting

Landform: Outwash plains, outwash deltas, kame terraces, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy outwash derived from granite, gneiss, and/or quartzite

Typical profile

Ap - 0 to 9 inches: loamy fine sand
Bw - 9 to 25 inches: loamy fine sand
BC - 25 to 33 inches: fine sand
Cg - 33 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: About 15 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Ecological site: F144AY027MA - Moist Sandy Outwash

Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 7 percent
Landform: Outwash plains, outwash deltas, kame terraces, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Wareham

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sudbury

Percent of map unit: 2 percent
Landform: Outwash plains, outwash deltas, kame terraces, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Ninigret

Percent of map unit: 1 percent
Landform: Outwash plains, kame terraces, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear
Across-slope shape: Convex, concave
Hydric soil rating: No

259A—Carver loamy coarse sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2y07s
Elevation: 0 to 990 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Carver, loamy coarse sand, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Carver, Loamy Coarse Sand

Setting

Landform: Outwash plains, moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope, crest, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Sandy glaciofluvial deposits

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
Oe - 2 to 3 inches: moderately decomposed plant material
A - 3 to 7 inches: loamy coarse sand
E - 7 to 10 inches: coarse sand
Bw1 - 10 to 15 inches: coarse sand
Bw2 - 15 to 28 inches: coarse sand
BC - 28 to 32 inches: coarse sand
C - 32 to 67 inches: coarse sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F149BY005MA - Dry Outwash
Hydric soil rating: No

Minor Components

Deerfield

Percent of map unit: 10 percent
Landform: Outwash plains, outwash deltas, kame terraces, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Eskers, outwash plains, outwash deltas, moraines, kames, kame terraces, outwash terraces
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

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

Merrimac

Percent of map unit: 3 percent
Landform: Outwash deltas, kame terraces, outwash terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Mashpee

Percent of map unit: 2 percent
Landform: Drainageways, depressions, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

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APPENDIX G:

SWEPT PATH

ANALYSIS

Amesbury Ladder	
Overall Length	40.083ft
Overall Width	8.330ft
Overall Body Height	10.601ft
Min Body Ground Clearance	0.920ft
Track Width	8.330ft
Lock-to-lock time	5.00s
Curb to Curb Turning Radius	33.400ft

PLAN
SCALE: 1" = 30'
0 15 30 60

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SURVEY BY: MCG
DRAFTED BY: DTS
CHECKED BY: WAS
APPROVED BY: SPC
SCALE: AS NOTED
DATE: SEPTEMBER 29, 2025

REVISIONS

NO.	DESCRIPTION	DATE
1	STORMWATER DESIGN	10/13/2025

SITE DEVELOPMENT PLAN
IN
AMESBURY, MASSACHUSETTS
27.5 & 29 CLARKS ROAD
(ASSESSOR'S MAP 80, LOTS 21 & 22)
PREPARED FOR:
EAGLES CROSSING, LLC

SWEPT PATH ANALYSIS PLAN

DRAWING NO. SW-1

PROJ. #3962
DRAWING: 3962_SWEPT PATH with color.dwg