STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

Storage Rentals of America Expansion
City of Waterbury, CT 06705

May 19, 2022

Prepared for:

STORAGE RENTALS OF AMERICA
395 EDDIE DOWLING HIGHWAY
NORTH SMITHFIELD, RHODE ISLAND 06705

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1. Introduction

This SWPPP to be prepared by the Owner/Operator as required under Rhode Island Pollutant Discharge Elimination System (RIPDES) Stormwater Discharge Associated with Construction Activity provided all the eligibility provisions of this permit are met:

- All new and existing stormwater discharges associated with construction, including, but not limited to, clearing, grading, excavation, and filling, where total land disturbance is equal to or greater than one (1) acre including construction activities involving soil disturbances of less than one (1) acre of disturbance if that construction is part of a larger common plan of development or sale that would disturb one (1) or more acre, and the discharge is composed entirely of stormwater.

2. Project Information

2.1 – Narrative Description

The subject site is located at 395 Eddie Dowling Highway (Lots 103 and 104) in the City of North Smithfield. **Figure 1** shows the exact location of the project site.

The existing site consists of two lots – Lot 103 and Lot 104. Lot 103 consists of 3.802 acres of mainly grassed pervious area, with one 2-story building, one 1-story building and various containers. Lot 104 consists of 10.104 acres of land containing three 1-story buildings. The area surrounding the buildings is paved asphalt, and the remainder of the lot is grassed pervious area. The total of Lots 103 and 104 is 13.906 acres.

The scope of work proposes to remove the existing structures on Lot 103 and construct one 3-story, approximately 61,200 SF self-storage building with associated site improvements, including parking, landscaping, utilities, lighting, and stormwater management practices. Land disturbance will be approximately 1.149 acres of the 13.906-acre project site. The site is accessed via Eddie Dowling Highway which is under RIDOT jurisdiction.

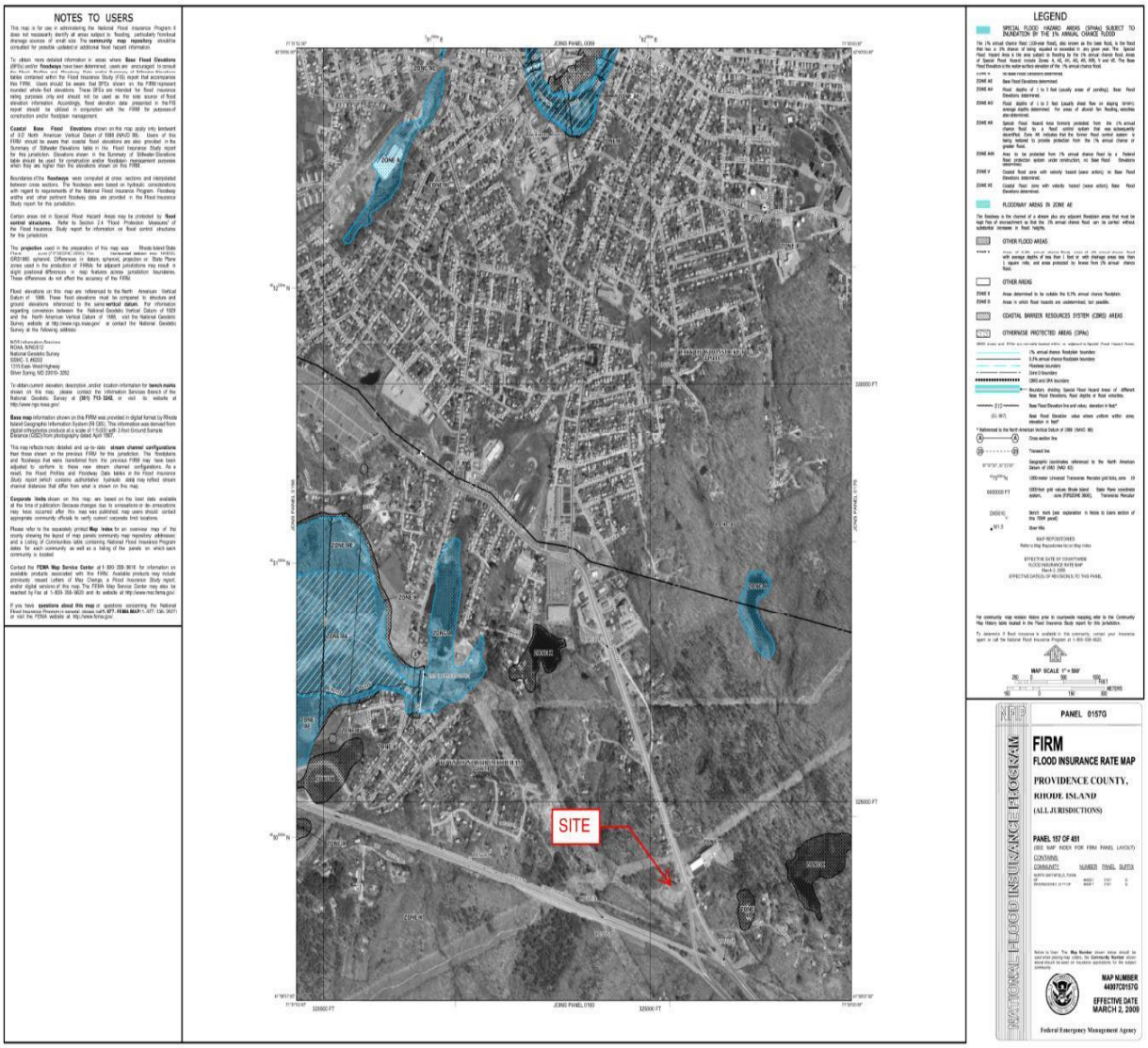
The excess stormwater runoff from the proposed improvements drains into the 8,210 CF infiltration basin on the western side of the site. Any overflow spills into the swamp wetland further west. The remaining stormwater runoff flows into the existing stormwater network, which includes catch basins on Lot 104 and on Eddie Dowling Highway.

Based on Federal Emergency Management Agency Flood Insurance Rate Maps (FIRM Panel No: 44007C0157G) as shown in **Figure 2**, the project site is not located within the 100-year floodplain limit. The site is classified as Zone X, Area of Minimal Flood Hazard.

Figure 1 – General Location Map

Include a topographic map that shows the general location of the facility and receiving waters within 1 mile.

Figure 2 – Flood Map



2.2 – Soils

Soil characteristics including soil types and hydrological soil group classification of the studied drainage area was obtained online from the Web Soil Survey (WSS) operated by the USDA Natural Resources Conservation Service (NRCS). Appendix C provides the reports generated from the WSS and the below table summarizes as follows:

Symbol	Description	Hydrological Soil Group
CeC	Canton and Charlton fine sandy loams	B

Within the studied drainage area, 100% of the soil is considered as Canton and Charlton. Therefore, it is considered as hydrology soil group B.

3. Stormwater

3.1 – Rainfall Event and Sizing Criteria

Rainfall event data was obtained through the *Rhode Island Stormwater Design and Installation Standards Manual, amended March 2015.* The following data provides the 24-hour rainfall for the following storm events for a 24-Hour (Type III) distribution, located in Providence County, Rhode Island:

Storm Event	24-Hour Rainfall (in)
1-Year	2.7
10-Year	4.9
100-Year	8.7

The channel protection volume (CPv) is the 24-hour extended detention of the post development runoff volume from the 1-year, 24-hour Type III design storm event. If a stormwater discharge is proposed within 200 feet of streams and any contiguous natural or vegetated wetlands in watersheds draining to cold-water fisheries, surface detention practices are prohibited (underground detention or infiltration practices will be required). CPv criteria will be demonstrated by providing the infiltration of the 1-year, 24-hour Type III design storm event.

The overbank flood control (Qp) or peak flow attenuation is required for the 10-year and 100-year, 24-hour Type III design storm events. The primary purpose of this sizing criterion is to prevent an increase in the frequency and magnitude of out-of-bank flooding (i.e., flow events that exceed the bank full capacity of the channel, and therefore, must spill over to the floodplain). One of the key objectives of an out-of-bank flooding requirement is to protect downstream structures from increased flows and velocities from upstream development. The intent of this criterion is to prevent increased flood damage from infrequent but very large storm events, maintain the boundaries of the predevelopment floodplain, and protect the physical integrity of a stormwater management practice itself. Qp criteria will be demonstrated by attenuating the Type III 10-year storm and discharging the 100-year overflow to the adjacent wetland.

Town of North Smithfield requires the overall reduction of peak flows from preexisting conditions to post conditions which is accomplished by reducing the post-drainage areas and using an infiltration basin.

Study Point

Study points shows where the majority of the stormwater runoff from drainage areas drain to and is used for drainage analysis. The existing and proposed conditions are analyzed with the same study points so that a comparison can be made. The following study points have been determined for the project:

- Study Point 1 – located at northeast area of the limit of disturbance at the edge of woods and adjacent to the swamp wetland. This study point drains toward the swamp wetland.
- Study Point 2 – located southeast area of the limit of disturbance. This study point drains toward the existing southeast inlet.
- Study Point 3 – located southwest area of the limit of disturbance. This study point drains toward the existing southwest inlet.
- Study Point 4 – located northeast area of the limit of disturbance. This study point drains toward the existing inlet on Eddie Dowling Highway

Refer to the Appendix D – Existing and Proposed Drainage Area Exhibits for Study Point locations.

Existing Drainage Area Conditions

Existing drainage area is modeled in what HydroCAD defines as sub-catchment areas. The existing drainage area described in detail below.
Refer to Appendix D – Existing and Proposed Drainage Area Exhibits and to Appendix B for detailed design calculations.

- **Existing Drainage Area (EX-1)**

  The existing drainage area is comprised of 0.227 acres of the site. It consists of approximately 0.030 acres of impervious area and 0.197 acres of grass area.

  Runoff from this drainage area travels to Study Point 1 via the following ways:
  - overland by sheet flow
  - overland by shallow concentrated flow

  Minimum times of concentration of 6 minutes is applied.

- **Existing Drainage Area (EX-2)**

  The existing drainage area is comprised of 0.581 acres of the site. It consists of approximately 0.105 acres of impervious area and 0.476 acres of grass area.

  Runoff from this drainage area travels to Study Point 2 via the following ways:

- overland by sheet flow
- overland by shallow concentrated flow

Minimum times of concentration of 6 minutes is applied.

- **Existing Drainage Area (EX-3)**

  The existing drainage area is comprised of 0.344 acres of the site. It consists of approximately 0.100 acres of impervious area and 0.244 acres of grass area.

  Runoff from this drainage area travels to Study Point 3 via the following ways:
  - overland by sheet flow
  - overland by shallow concentrated flow

  Minimum times of concentration of 6 minutes is applied.

- **Existing Drainage Area (EX-4)**

  The existing drainage area is comprised of 0.115 acres of the site. It consists of all grass area.

  Runoff from this drainage area travels to Study Point 4 via the following ways:
  - overland by sheet flow
  - overland by shallow concentrated flow

  Minimum times of concentration of 6 minutes is applied.

Proposed Drainage Area Conditions

Proposed drainage areas are modeled in what HydroCAD defines as sub-catchment areas. The proposed drainage areas described in detail below.

Refer to Appendix D – Existing and Proposed Drainage Area Exhibits and to Appendix B for detailed design calculations.

- **Proposed Drainage Area (PR-1)**

  The proposed drainage area is comprised of 0.924 acres of the site. It consists of approximately 0.724 acres of impervious area and 0.200 acres of grass area.

  Runoff from this drainage area travels to Study Point 1 via the following ways:
  - overland by sheet flow

- overland by shallow concentrated flow
- overflow from the infiltration basin's spillway weir

Minimum times of concentration of 6 minutes is applied.

- **Proposed Drainage Area (PR-2)**

  The proposed drainage area is comprised of 0.052 acres of the site. It consists of entirely impervious area.

  Runoff from this drainage area travels to Study Point 2 via the following ways:
  - overland by sheet flow
  - overland by shallow concentrated flow

  Minimum times of concentration of 6 minutes is applied.

- **Proposed Drainage Area (PR-3)**

  The proposed drainage area is comprised of 0.165 acres of the site. It consists of approximately 0.144 acres of impervious area and 0.021 acres of grass area.

  Runoff from this drainage area travels to Study Point 3 via the following ways:
  - overland by sheet flow
  - overland by shallow concentrated flow

  Minimum times of concentration of 6 minutes is applied.

- **Proposed Drainage Area (PR-4)**

  The proposed drainage area is comprised of 0.109 acres of the site. It consists of all grass area.

  Runoff from this drainage area travels to Study Point 4 via the following ways:
  - overland by sheet flow
  - overland by shallow concentrated flow

  Minimum times of concentration of 6 minutes is applied.

Hydrologic Analysis

From the HydroCAD analysis, yield the existing and proposed conditions peak flows at Study Point A for storms from the 1-year to the 100-year design frequencies.

Refer to Appendix B for supporting calculations for the hydrologic analysis (HydroCAD) for both existing and proposed conditions.

Summary Tables #1 and #2 below show the comparison of flows produced under existing and developed conditions for Study Point A.

Table 1 – Existing Conditions Peak Flows

Study Point	Area (ac)	Peak Discharges (cfs) of Various Storm Frequency			
		1-yr		10-yr	100-yr
1	0.227	0.09		0.45	1.28
2	0.581	0.28	Total:	1.28	3.43
3	0.344	0.25	0.53	0.89	2.22
4	0.115	0.02		0.17	0.56

Table 2 – Proposed Conditions Peak Flows

Study Point	Area (ac)	Peak Discharges (cfs) of Various Storm Frequency			
		1-yr		10-yr	100-yr
1	0.924	0.00		0.00	1.14
2	0.052	0.14	Total:	0.25	0.45
3	0.165	0.38	0.52	0.76	1.40
4	0.109	0.02		0.17	0.53

Study points 2 and 3 ultimately drain to the existing stormwater basin to the south of the site, therefore, there is a decrease in peak discharge for the all-storm events under the proposed conditions.

3.2 – Water Quality

An infiltration basin is proposed on site to attenuate the 1, 10, and 100-year storms as well as to infiltrate the required groundwater recharge volume (Rev) and water quality volume (WQv). Based on on-site soil testing, the average ground water level is approximately 7 feet below the existing ground elevation. The ground water elevation for the proposed infiltration basins is, at minimum, 1' above groundwater elevation at the bottom of the system at their respective locations. The proposed spillway weir of the infiltration basin is at elevations 281.3'. The geotechnical report is provided in Appendix E. The entire project site will ultimately discharge into the adjacent wetland swamp (per Wetlands Report by Avizinis Environmental Services, dated August 12, 2021).

The required water quality volume (WQ_V) for the site is 0.187 ac-ft (8,146 ft^3). The required groundwater recharge (Rev) volume is 0.28 ac-ft. An infiltration basin was designed to provide the WQ_V and Rev as calculated in accordance with the Rhode Island Stormwater Design and Installations Standards Manual. The total treatment and recharge volume provided is 0.22 ac-ft (9,737 ft^3).

4 – Erosion and Sediment Control

The purposes of providing erosion and sediment control is to minimize temporary impacts to downgradient open water during any construction activities by controlling runoff and retaining sediment as much as possible within the site. Refer to site plan for proposed erosion control practices and details. The erosion and sediment control practices shall base on the guidelines from the latest Rhode Island Soil Erosion and Sediment Control Handbook (Updated 2016).

Erosion and sediment control practices includes, but not limiting to, providing the following activities by the owner/operator:

A) Silt Fence

A temporary barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from drainage area of disturbed soil by temporary ponding the sediment laden runoff allowing settling to occur.

B) Straw Bale

A temporary barrier of straw used to intercept sediment laden runoff from drainage area of disturbed soil to reduce runoff velocity and effect deposition of the transported sediment load.

C) Inlet Protection

A temporary barrier with low permeability, installed around inlets in the form of fence, berm or excavation around an opening, detaining water and thereby reducing the sediment content of sediment laden water by settling thus preventing heavily sediment laden water from entering a storm drainage system.

D) Dust Control

Water shall be strayed from water truck during construction activity to prevent dust from forming and minimize sediment transport that may cause off-site damage, health hazards or traffic safety problem.

E) Pavement Sweeping

Pavement sweeping will remove sediments from the paved surfaces directly thus preventing sediment from stormwater runoff.

F) Catch Basin Cleaning

Sediments that are not removed by pavement sweeping or inlet protection practices will be drained by stormwater runoff into the site's catch basin system. Catch basin shall be cleaned on a regular basis to make sure the catch basin system function as intended.

G) Stabilized Construction Entrance

A stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, or parking area. The purpose of stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public right-of way or streets.

H) Mulching

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control.

I) Concrete Truck Washout

A temporary excavated or above ground lined constructed pit where concrete truck mixers and equipment can be washed after their loads have been discharged, to prevent highly alkaline runoff from entering the storm drainage systems or leaching into soil.

J) Land Grading

Reshaping of the existing land surface by grading in accordance with an engineering topographic plan and specification to provide for erosion control and vegetative establishment on disturbed, reshaped areas.

K) Seeding

Providing temporary erosion control protection to disturbed areas and/or localized critical areas for an interim period by covering all bare ground that exists because of construction activities or natural event. Critical areas may include but not limited to steep excavated cut or fill slopes and any disturbed, denuded natural slopes subject to erosion.

5 – General Construction Phases

Site development in general will occur in three generalized phases:

1. Site preparation and erosion control
2. Construction, removal of sediment and final stabilization

1) Site Preparation and Erosion Control

Prior to any construction activities, erosion control measures shall be implemented to minimize or control erosion on site. These include but not limited to silt fence, straw bale, inlet protection, stabilized construction entrance, concrete truck wash-out area, and stockpile area. Fencing shall be placed around trees to be protected.

2) Construction, Removal of Sediment and Final Stabilization

After proper site preparation and erosion control installation, the onsite construction will begin. This phase includes construction of the proposed onsite utility, grading, pavement, stormwater management system, building, and landscape.

After construction, all temporary control measures shall be removed once the site has been stabilized and all sediment has been removed. Additionally, all litter shall be removed from site.

Erosion control measures shall not be removed until the qualified engineer has performed a site visit and has deemed that the site's permanent stabilization is satisfactory.

6 – Impact Avoidance and Minimization Statements

Wetland impact avoidance and minimization has been considered throughout the planning and design process in accordance with the Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetland Acts, Rule 250-RICR-150-15-1 and as outlined in Section 1.9 B, 1.d. (1) & (2) of the Regulations.

5.1 Impact Avoidance (Rule 1.9 B, d (1))

AA) Proposed construction activities are not water dependent and do not require access to freshwater wetlands as a central element of its primary purpose. The project is proposing to disturb up to the edge of woods east of the wetland.

BB) There are no other areas within the property or other properties owned by the applicant that could be used to achieve the same project purpose. The layout of the site as proposed will avoid the wetland area to the west to the greatest extent possible and will not alter the natural character of the freshwater wetland.

CC) There are currently no other properties reasonably available that could match the minimal cost to this owner for development of this site development.

DD) The proposed layout is the minimum design possible that will provide the desired build out without permanently encroaching within the wetland edge.

EE) The proposed project will provide no disturbance along the wetland edge and limits disturbance to within the 50 FT buffer.

FF) There are no other alternatives that would result in less impact to wetland features while still obtaining project goals. No direct impact to the forested wetland edge is proposed and will have no adverse effect on the public health safety and welfare along with the environment.

5.2 Impact Minimization (Rule 1.9 B, d (2))

AA) The proposed project has been minimized to the maximum extent possible to avoid impacts to the wetland while still addressing the needs of the applicant for the proposed self-storage facility.

BB) Based on the existing conditions, there is no alternative location available which could be used to achieve the same primary project purpose while resulting in less impact.

CC) There are no other alternative designs, layouts, or technologies that are feasible, and which would result in less impact to the wetland and still achieve the project purpose.

Soil Erosion and Sedimentation Control Practices have been employed to avoid and minimize impacts to adjacent wetland resources. Detailed notes have been included in the plans to ensure effective implementation of erosion and sedimentation controls. The soil

erosion and sedimentation control measures will be installed prior to the initiation of construction activities and maintained throughout construction. Silt fence and straw waddles are proposed between the reservoir buffer and the limits of disturbance. Once established, these measures will be monitored daily until construction activities are complete. The silt fence line will serve as the strict limits of disturbance for the project within or adjacent to regulated freshwater wetland areas. No alterations, including vegetative clearing or surface disturbance, will occur beyond this silt fence line. The limits of clearing, grading, and disturbance will be kept to a minimum within the proposed area of construction. All areas outside of these limits, as depicted on the project site plans, will be totally undisturbed, to remain in a completely natural condition. All referenced soil erosion and sedimentation controls including materials used and the installation procedures will be performed per the “Rhode Island Soil Erosion and Sediment Control Handbook”, Issued 1989 (Updated 2016).

DD) The reduction in the scale or the relocation of the proposed project to minimize the impact to the wetland will not result in adverse consequences to public health, safety or the environment. However, the project as proposed will not adversely impact the forested wetland. The disturbance areas proposed are for construction activities outside the wetland areas and within the limit of disturbance of the project.

7 – Appendices

APPENDIX A – RIDEM STORMWATER MANAGEMENT CHECKLIST

APPENDIX A: STORMWATER MANAGEMENT PLAN CHECKLIST AND LID PLANNING REPORT – STORMWATER DESIGN SUMMARY

PROJECT NAME **Storage Rentals of America**	**(RIDEM USE ONLY)** **STW/WQC File #:** **Date Received:**
TOWN **North Smithfield**	
BRIEF PROJECT DESCRIPTION: The redevelopment project includes the construction of a self-storage building on Lot 103 to expand the existing self-storage facility on Lot 104. The scope of work includes the demolition of existing structures on Lot 103 and the construction of a 3-story, approximately 61,200 SF self-storage building with associated site improvements.	

Stormwater Management Plan (SMP) Elements – Minimum Standards

Submit four separately bound documents: Appendix A Checklist; Stormwater Site Planning, Analysis and Design Report with Plan Set/Drawings; Soil Erosion and Sediment Control (SESC) Plan, and Post Construction Operations and Maintenance (O&M) Plan. Please refer to Suggestions to Promote Brevity.

Note: **All stormwater construction projects must submit a Stormwater Management Plan (SMP). However, not every element listed below is required per the RIDEM Stormwater Rules and the RIPDES Construction General Permit (CGP). This checklist will help identify the required elements to be submitted with an Application for Stormwater Construction Permit & Water Quality Certification.**

PART 1. PROJECT AND SITE INFORMATION

PROJECT TYPE (Check all that apply)

☐ Residential	☐ Commercial	☐ Federal	☐ Retrofit	☐ Restoration
☐ Road	☐ Utility	☐ Fill	☐ Dredge	☐ Mine
☒ Other (specify): Industrial (Self-Storage facility)				

SITE INFORMATION

☒ Vicinity Map – see SWMP

INITIAL DISCHARGE LOCATION(S): The WQv discharges to: (You may choose more than one answer if several discharge points are associated with the project.) See Guidance to identify receiving waters.

☐ **Groundwater**	☒ **Surface Water**	☐ **MS4**
☐ GAA	☒ Isolated Wetland	☐ RIDOT
☐ GA	☐ Named Waterbody	☐ RIDOT Alteration Permit is Approved
☐ GB	☐ Unnamed Waterbody Connected to Named Waterbody	☐ Town
		☐ Other (specify):

ULTIMATE RECEIVING WATERBODY LOCATION(S): Include pertinent information that applies to both WQ_v and flow from larger storm events including overflows. Choose all that apply, and repeat table for each waterbody.

☒ Groundwater or Disconnected Wetland	☐ SRWP (N/A)		
☐ Waterbody Name: (N/A)	☐ Coldwater (N/A)	☐ Warmwater (N/A)	☐ Unassessed (N/A)
☐ Waterbody ID: (N/A)	☐ 4th order stream of pond 50 acres or more (N/A)		
☐ TMDL for: (N/A)	☐ Watershed of flood prone river (e.g., Pocasset River) (N/A)		
☐ Contributes to a priority outfall listed in the TMDL (N/A)	☐ Contributes stormwater to a public beach (N/A)		
☐ 303(d) list – Impairment(s) for: (N/A)	☐ Contributes to shellfishing grounds (N/A)		

PROJECT HISTORY		
☐ RIDEM Pre- Application Meeting (N/A)	Meeting Date: (N/A)	☐ Minutes Attached
☐ Municipal Master Plan Approval (N/A)	Approval Date: (N/A)	☐ Minutes Attached
☐ Subdivision Suitability Required (N/A)	Approval #: (N/A)	(N/A)
☐ Previous Enforcement Action has been taken on the property (N/A)	Enforcement #: (N/A)	(N/A)

FLOODPLAIN & FLOODWAY See Guidance Pertaining to Floodplain and Floodways	
☐ Riverine 100-year floodplain: **FEMA FLOODPLAIN FIRMETTE** has been reviewed and the 100-year floodplain is on site (N/A)	
☒ Delineated from FEMA Maps (N/A) – see Drainage Report	
NOTE: Per Rule 250-RICR-150-10-8-1.1(B)(5)(d)(3), provide volumetric floodplain compensation calculations for cut and fill/displacement calculated by qualified professional	
☐ Calculated by Professional Engineer (N/A)	
☐ Calculations are provided for cut vs. fill/displacement volumes proposed within the 100-year floodplain	Amount of Fill (CY): (N/A) Amount of Cut (CY): (N/A)
☐ Restrictions or modifications are proposed to the flow path or velocities in a floodway (N/A)	
☐ Floodplain storage capacity is impacted (N/A)	
☒ Project area is not within 100-year floodplain as defined by RIDEM	

CRMC JURISDICTION – N/A
☐ CRMC Assent required (N/A)
☐ Property subject to a Special Area Management Plan (SAMP). If so, specify which SAMP: (N/A)
☐ Sea level rise mitigation has been designed into this project (N/A)

LUHPPL IDENTIFICATION - MINIMUM STANDARD 8: N/A			
1. OFFICE OF WASTE MANAGEMENT (OWM)			
(N/A)	☐ Known or suspected releases of HAZARDOUS MATERIAL are present at the site (Hazardous Material is defined in Rule 1.4(A)(33) of 250-140-30-1 of the RIDEM Rules and Regulations for Investigation and Remediation of Hazardous Materials (the Remediation Regulations))		**RIDEM CONTACT:**
(N/A)	☐ Known or suspected releases of PETROLEUM PRODUCT are present at the site (Petroleum Product as defined in Rule 1.5(A)(84) of 250-140-25-1 of the RIDEM Rules and Regulations for Underground Storage Facilities Used for Regulated Substances and Hazardous Materials)		
(N/A)	☐ This site is identified on the RIDEM Environmental Resources Map as one of the following regulated facilities		**SITE ID#**:
(N/A)		☐ CERCLIS/Superfund (NPL)	
(N/A)		☐ State Hazardous Waste Site (SHWS)	
(N/A)		☐ Environmental Land Usage Restriction (ELUR)	
(N/A)		☐ Leaking Underground Storage Tank (LUST)	
(N/A)		☐ Closed Landfill	
Note: If any boxes in 1 above are checked, the applicant must contact the RIDEM OWM Project Manager associated with the Site to determine if subsurface infiltration of stormwater is allowable for the project. Indicate if the infiltration corresponds to "Red," "Yellow" or "Green" as described in Section 3.2.8 of the RISDISM Guidance (Subsurface Contamination Guidance). Also, note and reference approval in PART 3, Minimum Standard 2: Groundwater Recharge/Infiltration**.**			
2. PER MINIMUM STANDARD 8 of RICR 8.14.C.1-6 "LUHPPLS," THE SITE IS/HAS:			
(N/A)	☐ Industrial Site with RIPDES MSGP, except where No Exposure Certification exists. http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/status.php		
(N/A)	☐ Auto Fueling Facility (e.g., gas station)		
(N/A)	☐ Exterior Vehicles Service, Maintenance, or Equipment Cleaning Area		

(N/A)	☐ Road Salt Storage and Loading Areas (exposed to rainwater)	
(N/A)	☐ Outdoor Storage and Loading/Unloading of Hazardous Substances	
3.	**STORMWATER INDUSTRIAL PERMITTING**	
(N/A)	☐ The site is associated with existing or proposed activities that are considered Land Uses with Higher Potential Pollutant Loads (LUHPPLS) (see RICR 8.14.C)	Activities: Sector:
(N/A)	☐ Construction is proposed on a site that is subject to THE MULTI-SECTOR GENERAL PERMIT (MSGP) UNDER RULE 31(B)15 OF THE RIPDES REGULATIONS.	MSGP permit #
(N/A)	☐ Additional stormwater treatment is required by the MSGP Explain:	

REDEVELOPMENT STANDARD – MINIMUM STANDARD 6		
☒ Pre Construction Impervious Area		
0.236 AC	☐ Total Pre-Construction Impervious Area (**TIA**) – only drainage areas analyzed included	
13.906 AC	☐ Total Site Area (**TSA**) (Lot's 103 and 104 combined)	
	☐ Jurisdictional Wetlands (**JW**)	
	☐ Conservation Land (**CL**)	
☐ Calculate the Site Size (defined as contiguous properties under same ownership)		
	☐ Site Size (**SS**) = (**TSA**) – (**JW**) – (**CL**)	
	☐ (**TIA**) / (**SS**) =	☐ (**TIA**) / (**SS**) >**0.4**?
☒ YES, Redevelopment		

PART 2. SUMMARY OF REMAINING STANDARDS

GROUNDWATER RECHARGE – MINIMUM STANDARD 2		
YES	**NO**	
☒	☐	The project has been designed to meet the groundwater recharge standard.
☐	☐	If "No," the justification for groundwater recharge criterion waiver has been explained in the Narrative (e.g., threat of groundwater contamination or physical limitation), if applicable (see RICR 8.8.D);
☐	☐	Your waiver request has been explained in the Narrative, if applicable.
☐	☒	Is this site identified as a Regulated Facility in Part 1, Minimum Standard 8: LUHPPL Identification?
☐	☐	If "Yes," has approval for infiltration by the Office of Waste Management Site Project Manager, per Part 1, Minimum Standard 8, been requested?

TABLE 2-1: Summary of Recharge (see RISDISM Section 3.3.2)
(Add or Subtract Rows as Necessary)

Design Point	**Impervious Area Treated (sq ft)**	**Total Re_v Required (cu ft)**	**LID Stormwater Credits (see RISDISM Section 4.6.1)**	**Recharge Required by Remaining BMPs (cu ft)**	**Recharge Provided by BMPs (cu ft)**
			Portion of Re_v directed to a QPA (cu ft)		
DP-1: Infiltration Basin	41,382	1,207	1,207		9,737
DP-2:					
DP-3:					

DP-4:					
TOTALS:					

Notes:

1. Only BMPs listed in RISDISM Table 3-5 "List of BMPs Acceptable for Recharge" may be used to meet the recharge requirement.
2. Recharge requirement must be satisfied for each waterbody ID.

☐ Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.):

WATER QUALITY – MINIMUM STANDARD 3		
YES	**NO**	
☒	☐	Does this project meet or exceed the required water quality volume WQv (see RICR 8.9.E-I)?
☒	☐	Is the proposed final impervious cover greater than 20% of the disturbed area (see RICR 8.9.E-I)?
☐	☐	If "Yes," either the Modified Curve Number Method or the Split Pervious/Impervious method in Hydro-CAD was used to calculate WQv; or,
☒	☐	If "Yes," either TR-55 or TR-20 was used to calculate WQv; and,
☐	☐	If "No," the project meets the minimum WQv of 0.2 watershed inches over the entire disturbed area.
☐	☐	Not Applicable
☐	☐	Does this project meet or exceed the ability to treat required water quality flow WQf (see RICR 8.9.I.1-3)?
☐	☐	Does this project propose an increase of impervious cover to a receiving water body with impairments? If "Yes," please indicate below the method that was used to address the water quality requirements of no further degradation to a low-quality water.
☐	☒	RICR 8.36. A Pollutant Loading Analysis is needed and has been completed.
☐	☐	The Water Quality Guidance Document (Water Quality Goals and Pollutant Loading Analysis Guidance for Discharges to Impaired Waters) has been followed as applicable.
☐	☐	BMPs are proposed that are on the approved technology list . If "Yes," please provide all required worksheets from the manufacturer.
☐	☐	Additional pollutant-specific requirements and/or pollutant removal efficiencies are applicable to the site as the result of a TMDL, SAMP, or other watershed-specific requirements. If "Yes," please describe:

TABLE 3-1: Summary of Water Quality (see RICR 8.9)

Design Point and WB ID	Impervious area treated (sq ft)	Total WQ_v Required (cu ft)	LID Stormwater Credits (see RICR 8.18) WQv directed to a QPA (cu ft)	Water Quality Treatment Remaining (cu ft)	Water Quality Provided by BMPs (cu ft)
DP-1: Infiltration Basin	41,382	3,449	9,737	0	9,737
DP-2:					
DP-3:					
DP-4:					
TOTALS:					

Notes:
1. Only BMPs listed in RICR 8.20 and 8.25 or the Approved Technologies List of BMPs is Acceptable for Water Quality treatment.
2. For each Design Point, the Water Quality Volume Standard must be met for each Waterbody ID.

☐ YES ☐ NO	This project has met the setback requirements for each BMP. If "No," please explain:

☒ Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.):
Drainage report – Section 3 Stormwater

CONVEYANCE AND NATURAL CHANNEL PROTECTION (RICR 8.10) – MINIMUM STANDARD 4			
YES	**NO**		
☒	☐	Is this standard waived? If "Yes," please indicate one or more of the reasons below:	
		☐	The project directs discharge to a large river (i.e., 4th-order stream or larger. See RISDISM Appendix I for State-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.
		☒	The project directs is a small facility with impervious cover of less than or equal to 1 acre.
		☐	The project has a post-development peak discharge rate from the facility that is less than 2 cfs for the 1-year, 24-hour Type III design storm event (prior to any attenuation). (Note: LID design strategies can greatly reduce the peak discharge rate).
☐	☒	Conveyance and natural channel protection for the site have been met. If "No,' explain why: The site is a small facility with impervious cover less than or equal to 1 acre	

OVERBANK FLOOD PROTECTION (RICR 8.11) AND OTHER POTENTIAL HIGH FLOWS – MINIMUM STANDARD 5			
YES	**NO**		
☐	☒	Is this standard waived? If yes, please indicate one or more of the reasons below:	
		☐	The project directs discharge to a large river (i.e., 4th-order stream or larger. See Appendix I for state-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.
		☐	A Downstream Analysis (see RICR 8.11.D and E) indicates that peak discharge control would not be beneficial or would exacerbate peak flows in a downstream tributary of a particular site (e.g., through coincident peaks).
☐	☒	Does the project flow to an MS4 system or subject to other stormwater requirements? If "Yes," indicate as follows:	
		☐	RIDOT
		☐	Other (specify):
Note: The project could be approved by RIDEM but not meet RIDOT or Town standards. RIDOT's regulations indicate that post-volumes must be **less** than pre-volumes for the 10-yr storm at the design point entering the RIDOT system. If you have not already received approval for the discharge to an MS4, please explain below your strategy to comply with RIDEM and the MS4.			
		Indicate below which model was used for your analysis. ☐ TR-55 ☐ TR-20 ☒ HydroCAD ☐ Bentley/Haestad ☐ Intellisolve ☐ Other (Specify):	
YES	**NO**		
☒	☐	Does the drainage design demonstrate that flows from the 100-year storm event through a BMP will safely manage and convey the 100-year storm? If "No," please explain briefly below and reference where in the application further documentation can be found (i.e., name of report/document, page numbers, appendices, etc.):	
☒	☐	Do off-site areas contribute to the sub-watersheds and design points? If "Yes,"	
☐	☒	Are the areas modeled as "present condition" for both pre- and post-development analysis?	
☐	☒	Are the off-site areas shown on the subwatershed maps?	
☒	☐	Does the drainage design confirm safe passage of the 100-year flow through the site for off-site runoff?	
☐	☒	Is a Downstream Analysis required (see RICR 8.11.E.1)?	
☒	☐	Calculate the following:	
		☒	Area of disturbance within the sub-watershed (areas) – 1.149 acres
		☒	Impervious cover (%) – 83.1% (0.934 acres)

☐	☒	Is a dam breach analysis required (earthen embankments over six (6) feet in height, or a capacity of 15 acre-feet or more, and contributes to a significant or high hazard dam)?
☒	☐	Does this project meet the overbank flood protection standard?

APPENDIX B – DRAINAGE CALCULATIONS

Kimley Horn of New York, P.C.
1 N Lexington Avenue, Suite 505
White Plains, New York 10601

Overall Existing and Proposed Impervious Area Breakdown

Total Impervious Area under Proposed Conditions = 0.95 ac

Compute Groundwater Recharge Volume (Rev)

F 0.35 Recharge Factor (See Table 3-4)

Table 3-4 Recharge Factors Based on Hydrologic Soil Group (HSG)

HSG	Recharge Factor (F)
A	0.60
B	0.35
C	0.25
D	0.10

Rev **0.028** = Req'd Min. Runoff Reduction Volume (in ac-ft)

$$= \frac{(1")(F)(I)}{12}$$

Required Rev =	**0.028**	**ac-ft**

Pollutant Reduction (Water Quality Volume WQv)

WQv **0.079** = Req'd Water Quality WQv (in ac-ft)

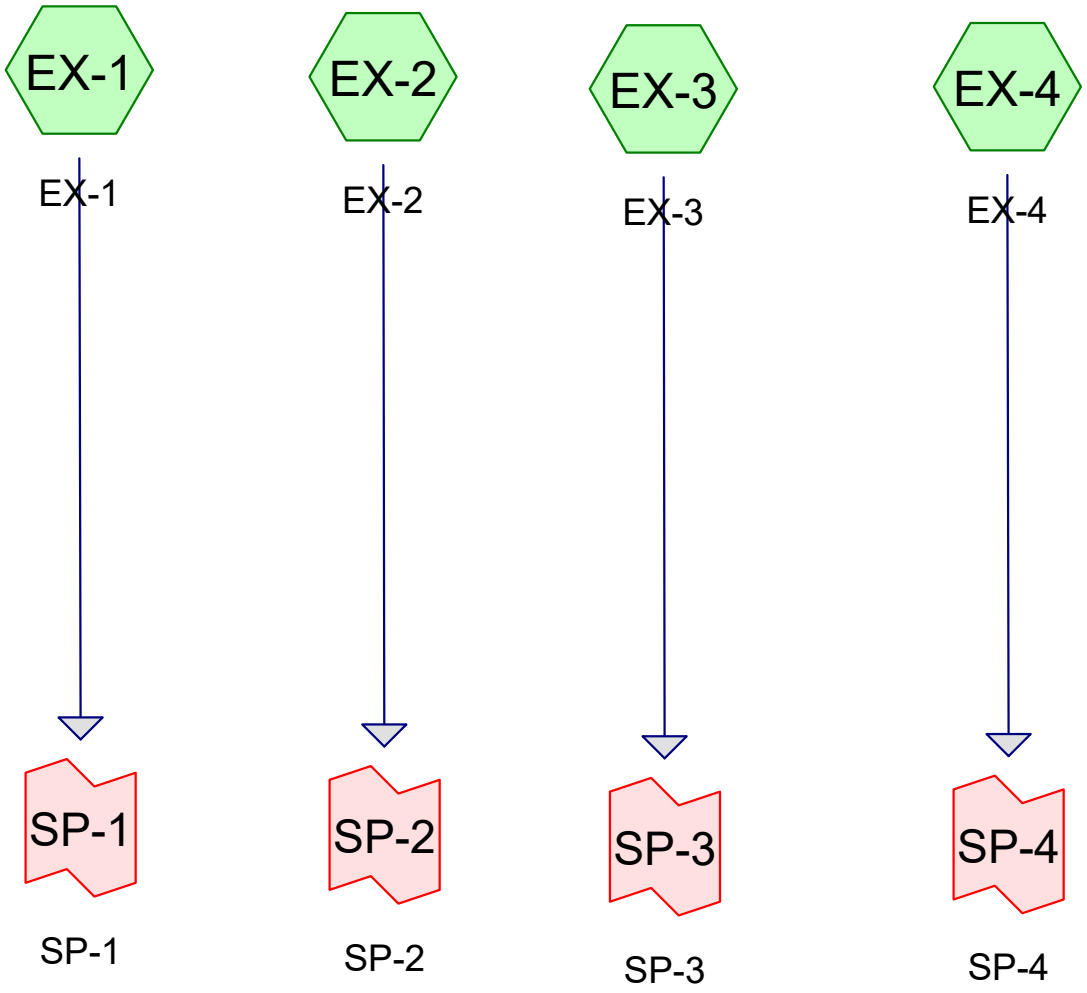
$$= \frac{(1")(I)}{12}$$

Area of Disturbance = 1.1 Acres (AoD)

Min WQv **0.019** = Req'd Water Quality WQv (in ac-ft)

$$= \frac{(0.2")(AoD)}{12}$$

Required WQv =	**3449**	**ft^3**
Provided WQv =	**9737**	**ft^3**



Subcat Reach Pond Link

Routing Diagram for SROA North Smithfield RI -Existing Conditions
Prepared by Kimely-Horn, Printed 5/19/2022

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	1.032	0.000	0.000	0.000	1.032	>75% Grass cover, Good	EX-1, EX-2, EX-3, EX-4
0.000	0.235	0.000	0.000	0.000	0.235	Paved parking	EX-1, EX-2, EX-3
0.000	**1.267**	**0.000**	**0.000**	**0.000**	**1.267**	**TOTAL AREA**	

Summary for Subcatchment EX-1: EX-1

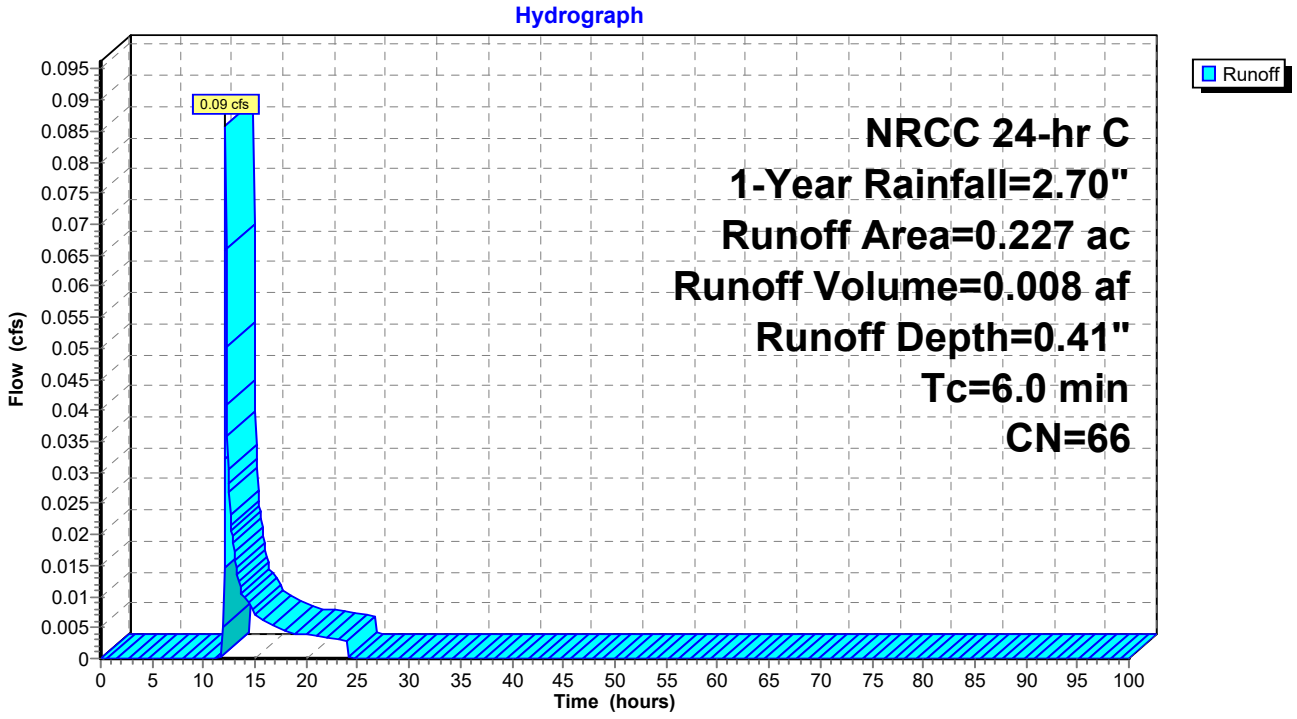
Runoff = 0.09 cfs @ 12.15 hrs, Volume= 0.008 af, Depth= 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.70"

Area (ac)	CN	Description
0.030	98	Paved parking, HSG B
0.197	61	>75% Grass cover, Good, HSG B
0.227	66	Weighted Average
0.197		86.78% Pervious Area
0.030		13.22% Impervious Area

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

Subcatchment EX-1: EX-1



Summary for Subcatchment EX-2: EX-2

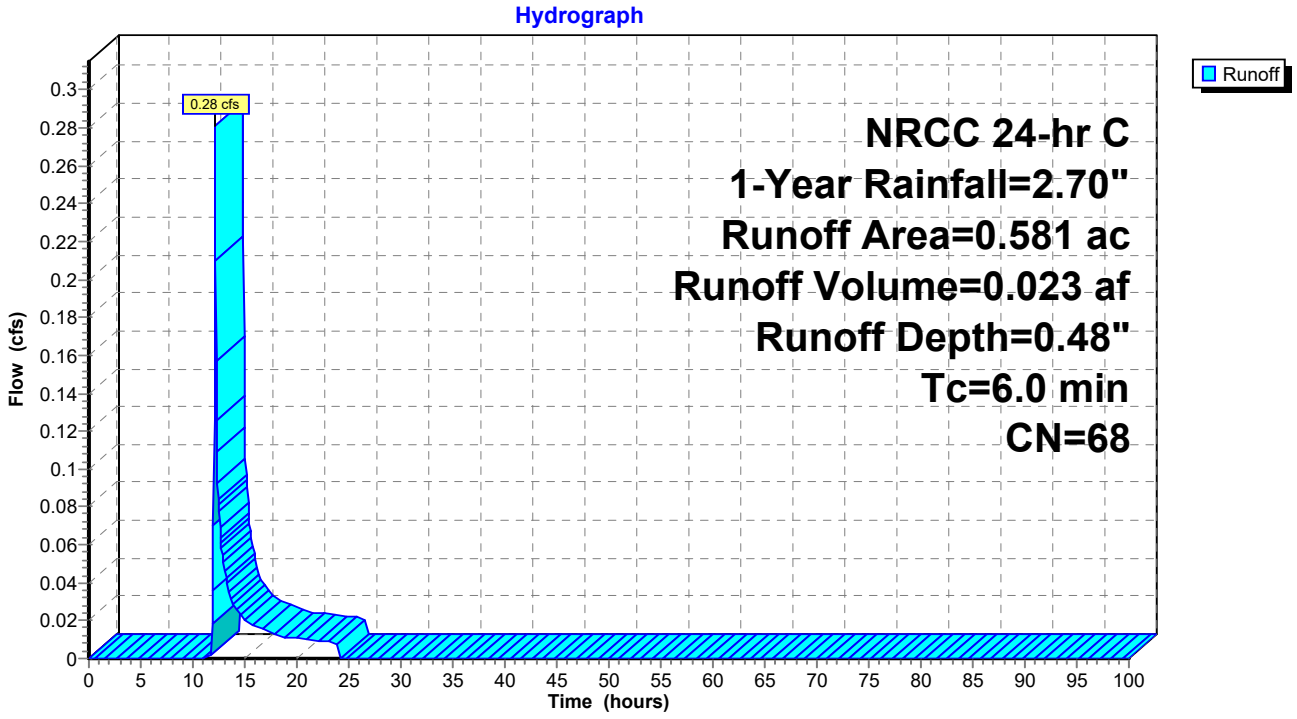
Runoff = 0.28 cfs @ 12.15 hrs, Volume= 0.023 af, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.70"

Area (ac)	CN	Description
0.105	98	Paved parking, HSG B
0.476	61	>75% Grass cover, Good, HSG B
0.581	68	Weighted Average
0.476		81.93% Pervious Area
0.105		18.07% Impervious Area

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

Subcatchment EX-2: EX-2



Summary for Subcatchment EX-3: EX-3

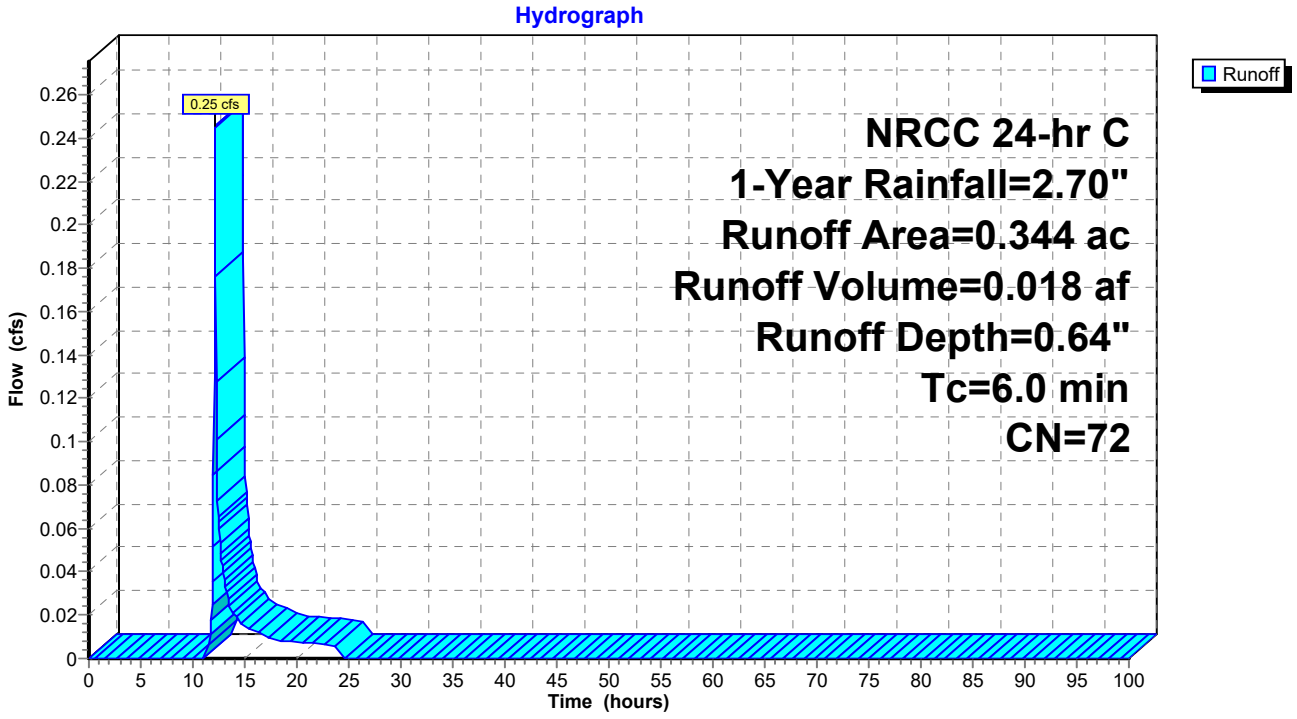
Runoff = 0.25 cfs @ 12.14 hrs, Volume= 0.018 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.70"

Area (ac)	CN	Description
0.100	98	Paved parking, HSG B
0.244	61	>75% Grass cover, Good, HSG B
0.344	72	Weighted Average
0.244		70.93% Pervious Area
0.100		29.07% Impervious Area

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

Subcatchment EX-3: EX-3



Summary for Subcatchment EX-4: EX-4

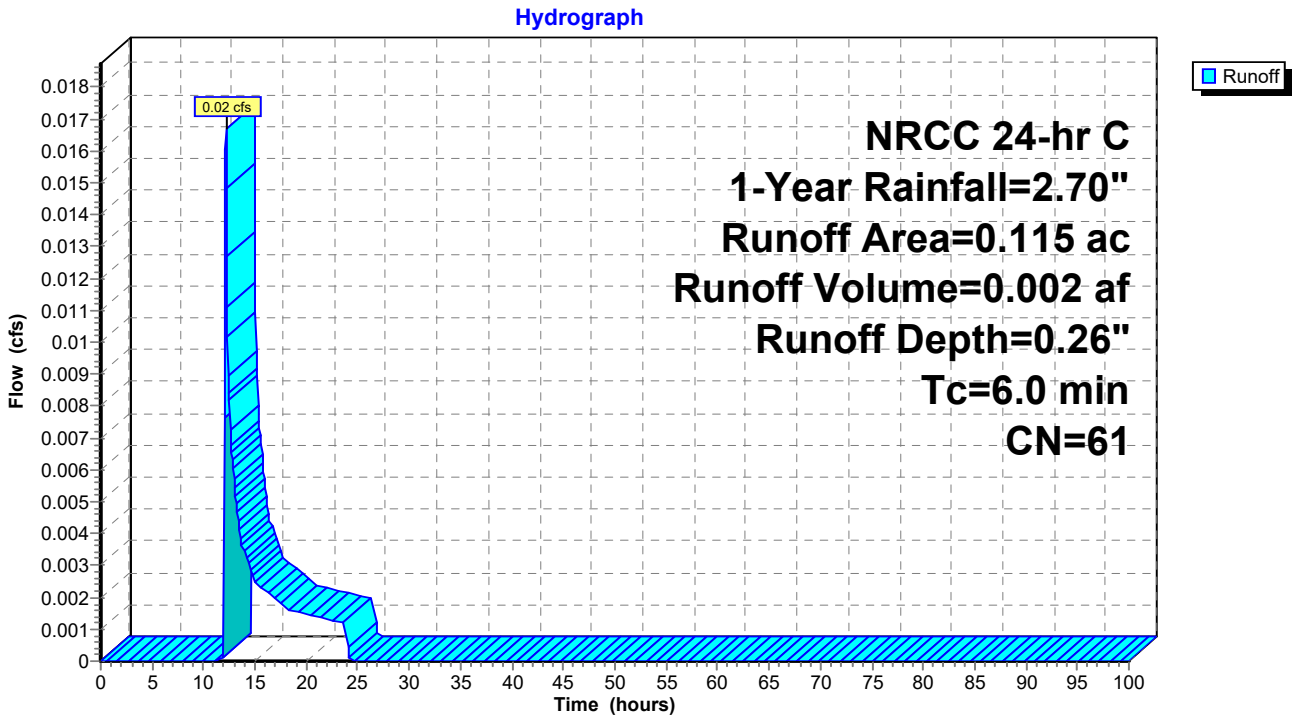
Runoff = 0.02 cfs @ 12.17 hrs, Volume= 0.002 af, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.70"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG B
0.115	61	>75% Grass cover, Good, HSG B
0.115	61	Weighted Average
0.115		100.00% Pervious Area

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

Subcatchment EX-4: EX-4

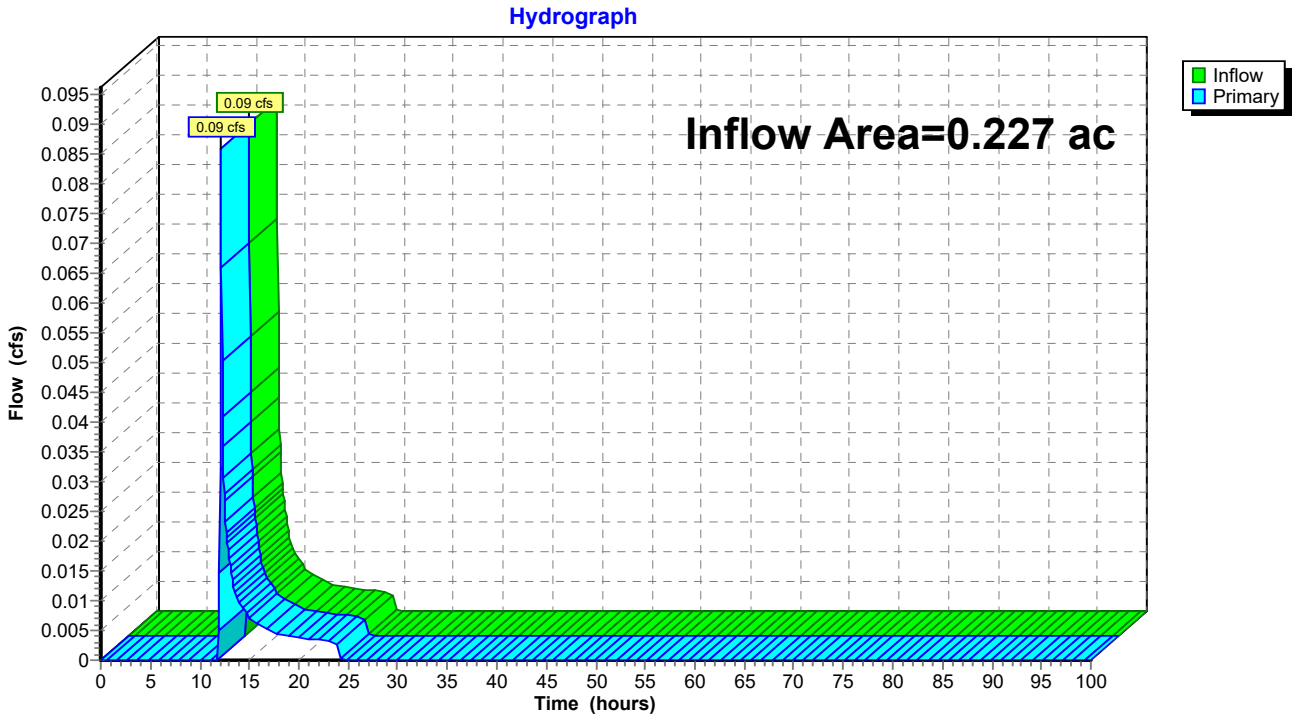


Summary for Link SP-1: SP-1

Inflow Area = 0.227 ac, 13.22% Impervious, Inflow Depth = 0.41" for 1-Year event
Inflow = 0.09 cfs @ 12.15 hrs, Volume= 0.008 af
Primary = 0.09 cfs @ 12.15 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-1: SP-1

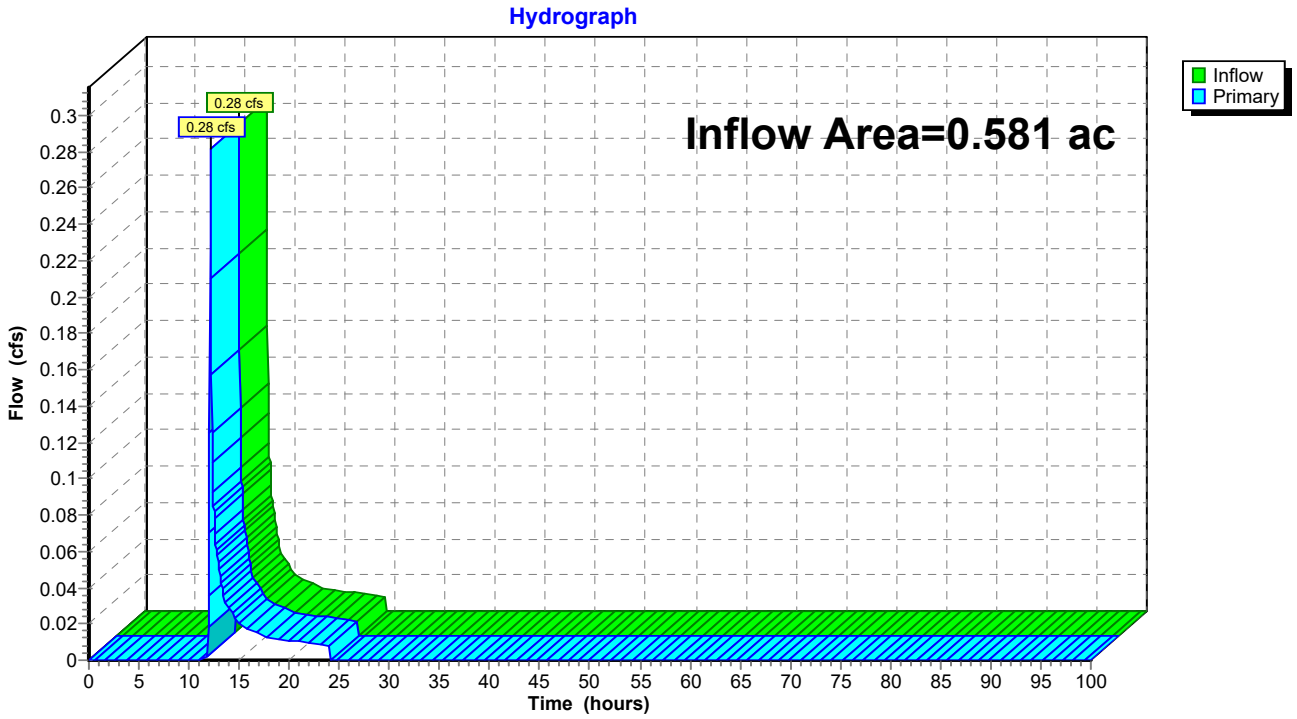


Summary for Link SP-2: SP-2

Inflow Area = 0.581 ac, 18.07% Impervious, Inflow Depth = 0.48" for 1-Year event
Inflow = 0.28 cfs @ 12.15 hrs, Volume= 0.023 af
Primary = 0.28 cfs @ 12.15 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-2: SP-2

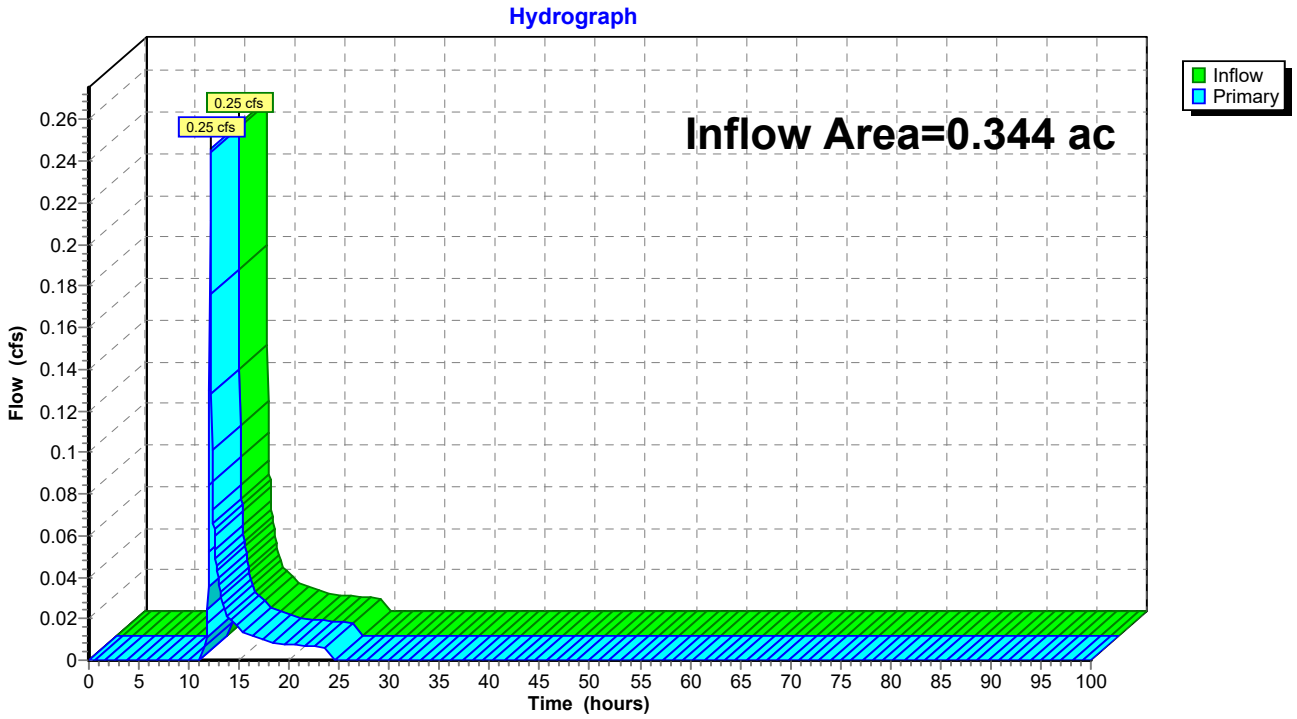


Summary for Link SP-3: SP-3

Inflow Area = 0.344 ac, 29.07% Impervious, Inflow Depth = 0.64" for 1-Year event
Inflow = 0.25 cfs @ 12.14 hrs, Volume= 0.018 af
Primary = 0.25 cfs @ 12.14 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-3: SP-3

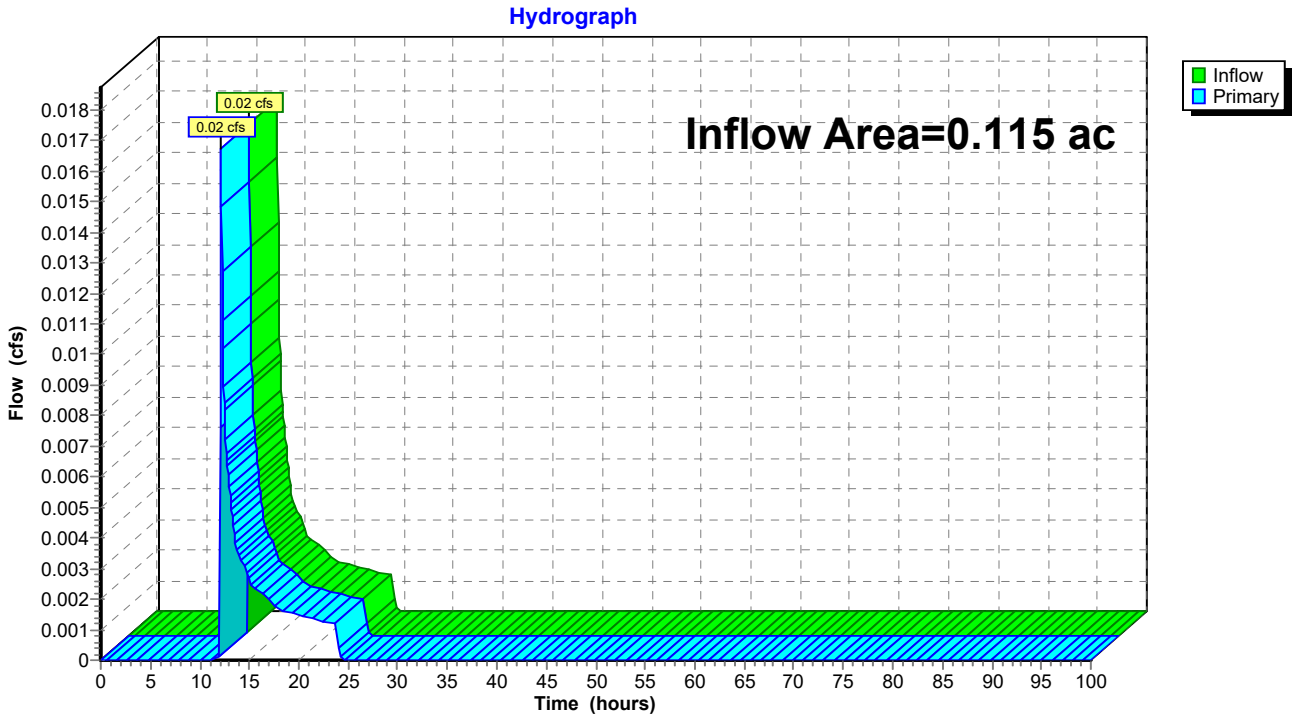


Summary for Link SP-4: SP-4

Inflow Area = 0.115 ac, 0.00% Impervious, Inflow Depth = 0.26" for 1-Year event
Inflow = 0.02 cfs @ 12.17 hrs, Volume= 0.002 af
Primary = 0.02 cfs @ 12.17 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-4: SP-4



Summary for Subcatchment EX-1: EX-1

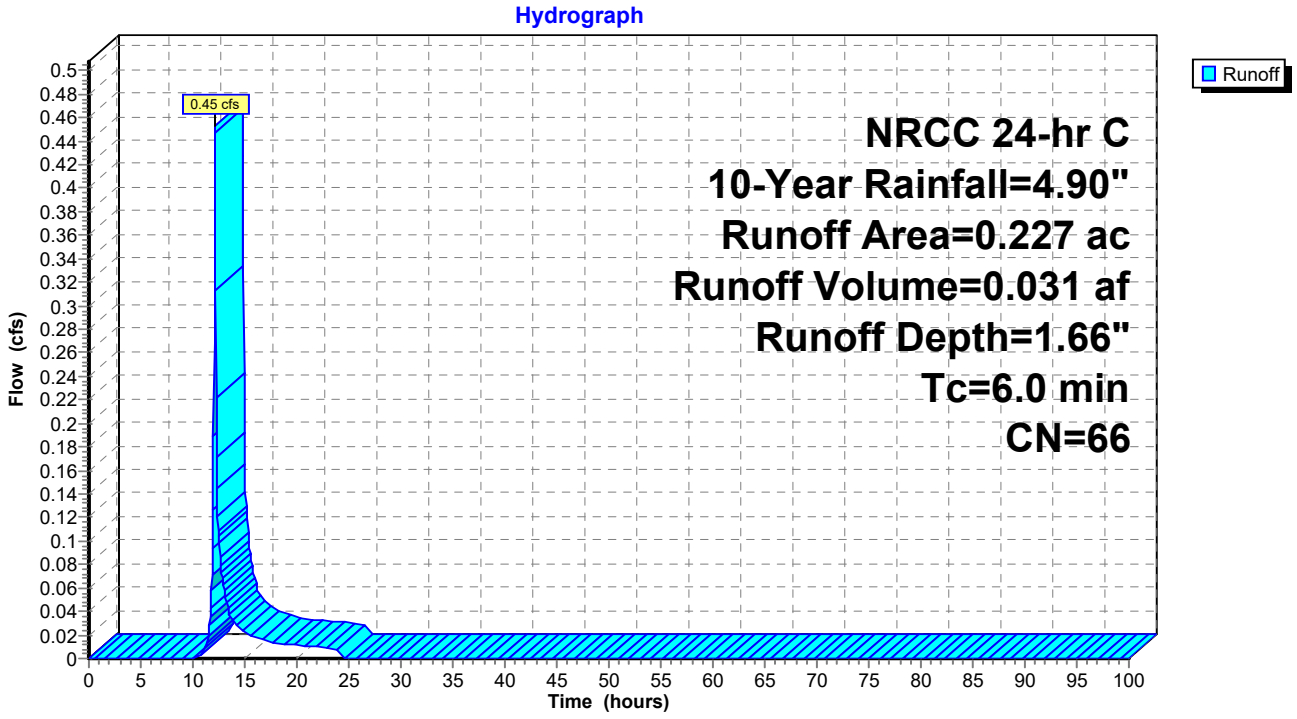
Runoff = 0.45 cfs @ 12.14 hrs, Volume= 0.031 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.90"

Area (ac)	CN	Description
0.030	98	Paved parking, HSG B
0.197	61	>75% Grass cover, Good, HSG B
0.227	66	Weighted Average
0.197		86.78% Pervious Area
0.030		13.22% Impervious Area

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

Subcatchment EX-1: EX-1



Summary for Subcatchment EX-2: EX-2

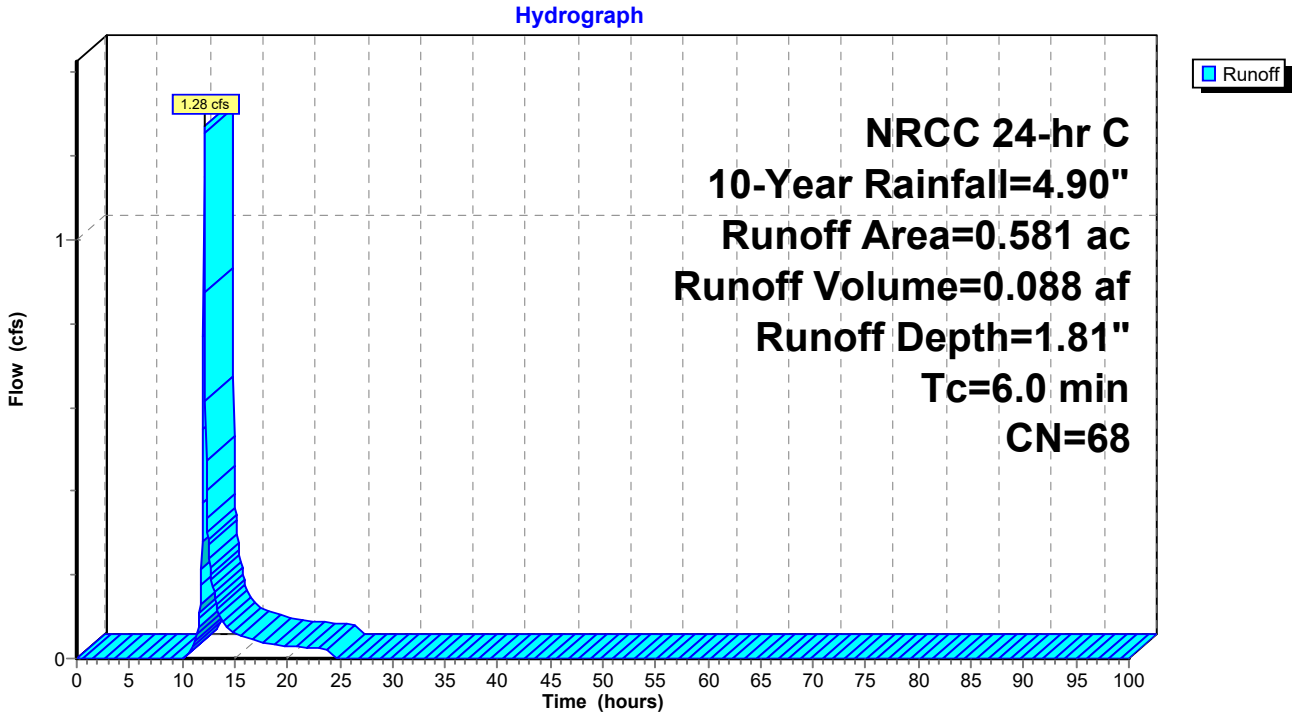
Runoff = 1.28 cfs @ 12.14 hrs, Volume= 0.088 af, Depth= 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.90"

Area (ac)	CN	Description
0.105	98	Paved parking, HSG B
0.476	61	>75% Grass cover, Good, HSG B
0.581	68	Weighted Average
0.476		81.93% Pervious Area
0.105		18.07% Impervious Area

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

Subcatchment EX-2: EX-2



Summary for Subcatchment EX-3: EX-3

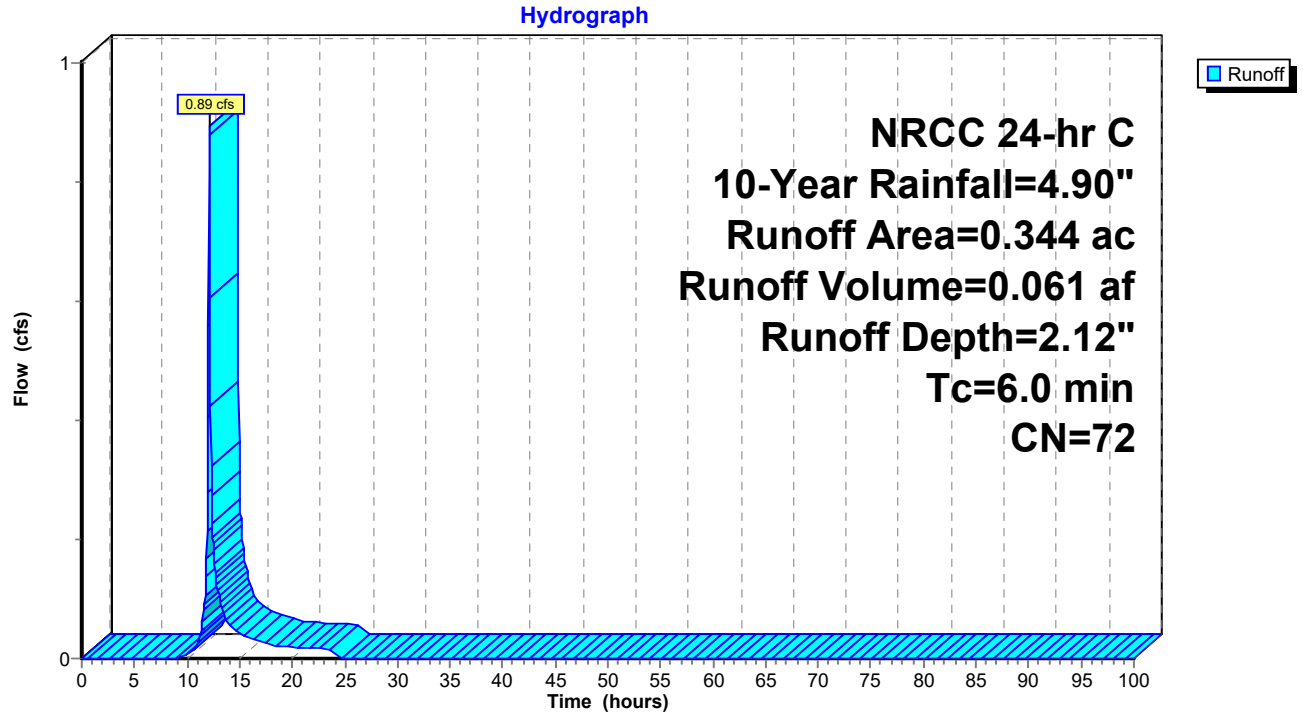
Runoff = 0.89 cfs @ 12.13 hrs, Volume= 0.061 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.90"

Area (ac)	CN	Description
0.100	98	Paved parking, HSG B
0.244	61	>75% Grass cover, Good, HSG B
0.344	72	Weighted Average
0.244		70.93% Pervious Area
0.100		29.07% Impervious Area

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

Subcatchment EX-3: EX-3



Summary for Subcatchment EX-4: EX-4

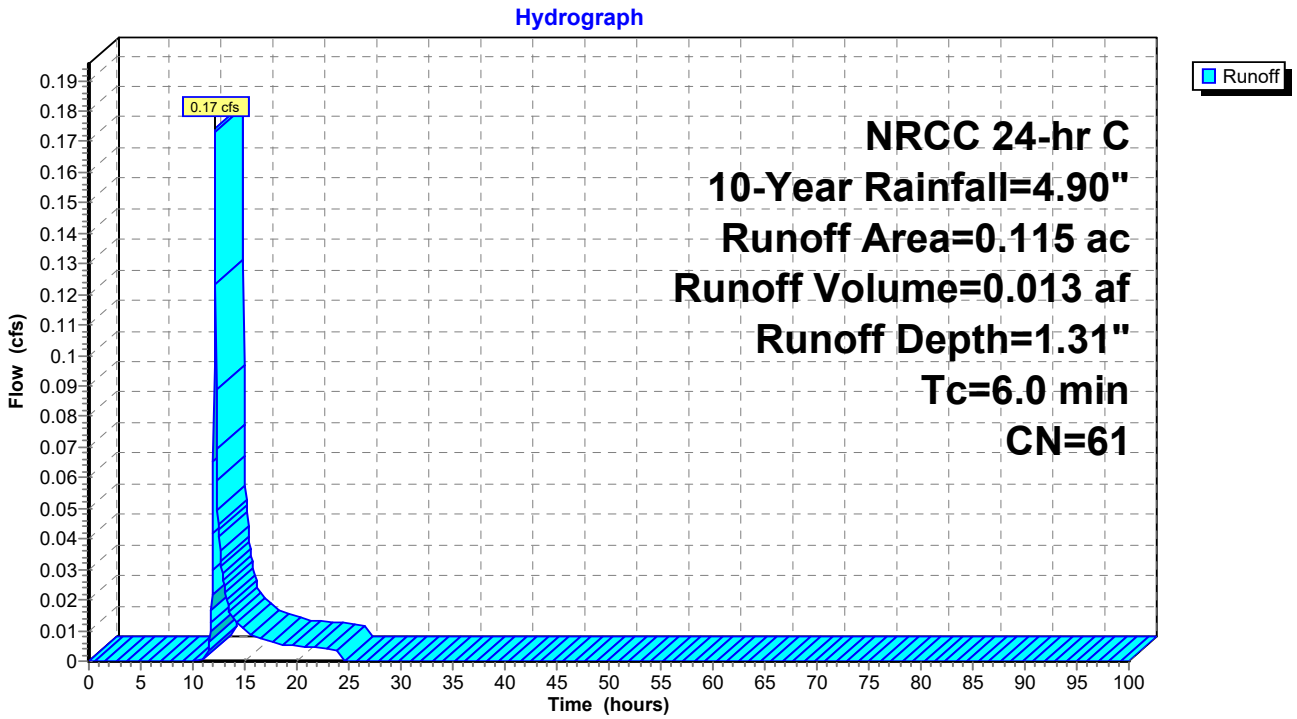
Runoff = 0.17 cfs @ 12.14 hrs, Volume= 0.013 af, Depth= 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.90"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG B
0.115	61	>75% Grass cover, Good, HSG B
0.115	61	Weighted Average
0.115		100.00% Pervious Area

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

Subcatchment EX-4: EX-4

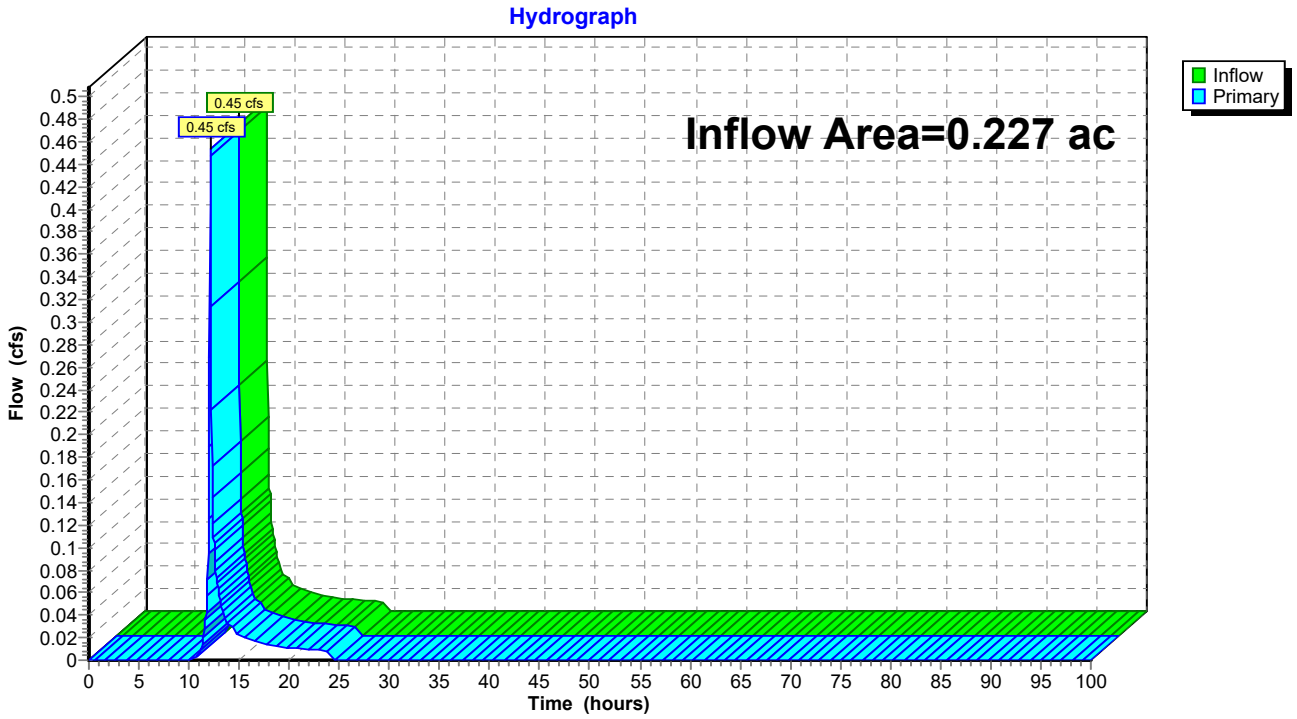


Summary for Link SP-1: SP-1

Inflow Area = 0.227 ac, 13.22% Impervious, Inflow Depth = 1.66" for 10-Year event
Inflow = 0.45 cfs @ 12.14 hrs, Volume= 0.031 af
Primary = 0.45 cfs @ 12.14 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-1: SP-1

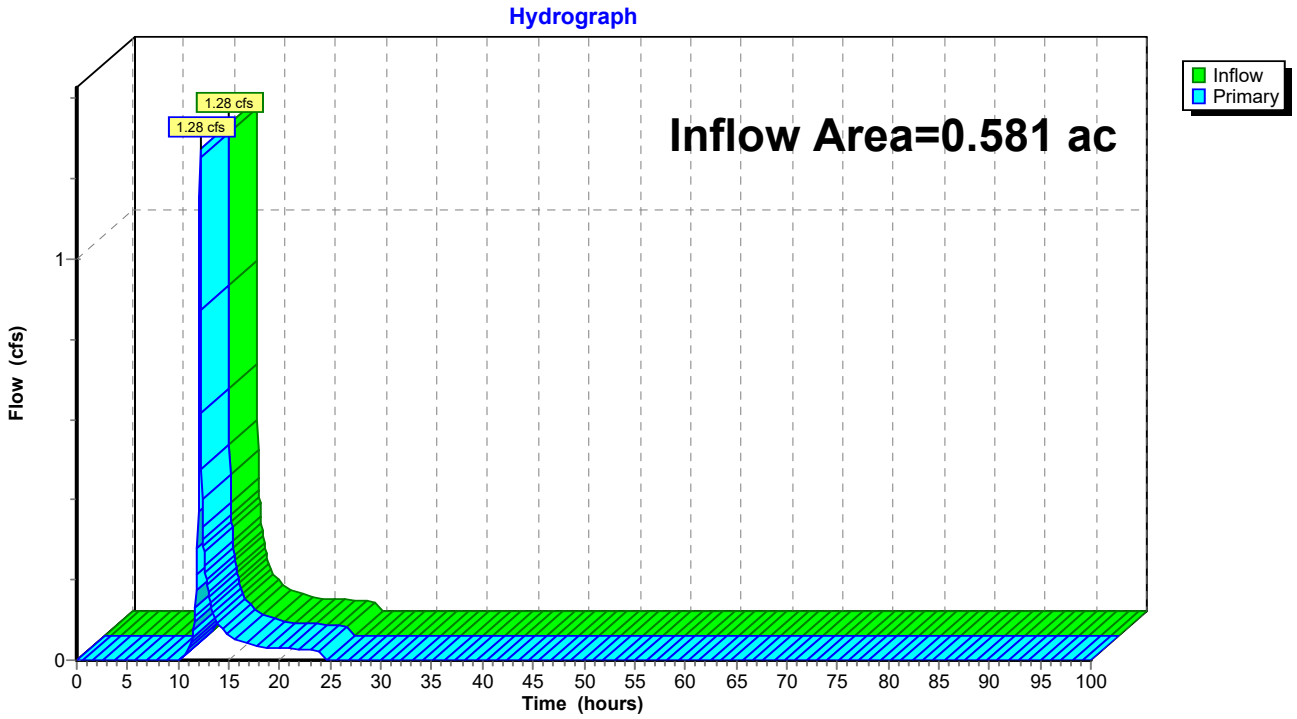


Summary for Link SP-2: SP-2

Inflow Area = 0.581 ac, 18.07% Impervious, Inflow Depth = 1.81" for 10-Year event
Inflow = 1.28 cfs @ 12.14 hrs, Volume= 0.088 af
Primary = 1.28 cfs @ 12.14 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-2: SP-2

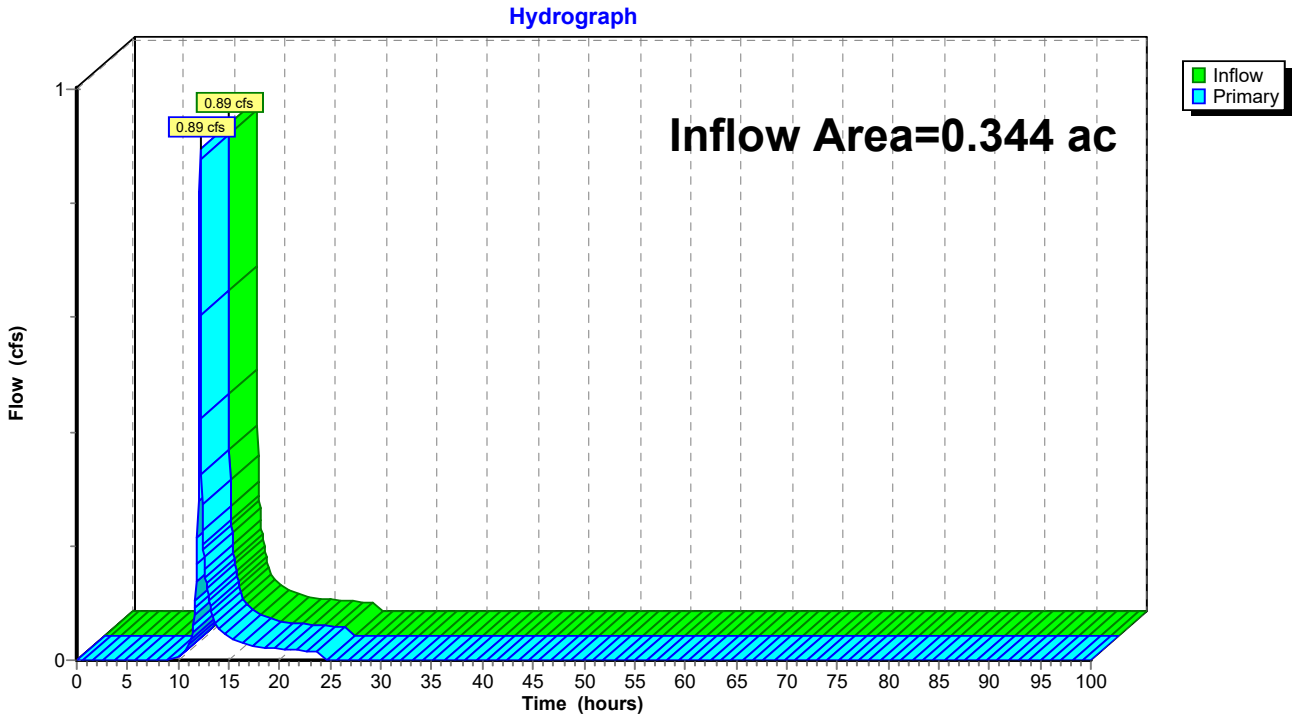


Summary for Link SP-3: SP-3

Inflow Area = 0.344 ac, 29.07% Impervious, Inflow Depth = 2.12" for 10-Year event
Inflow = 0.89 cfs @ 12.13 hrs, Volume= 0.061 af
Primary = 0.89 cfs @ 12.13 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-3: SP-3

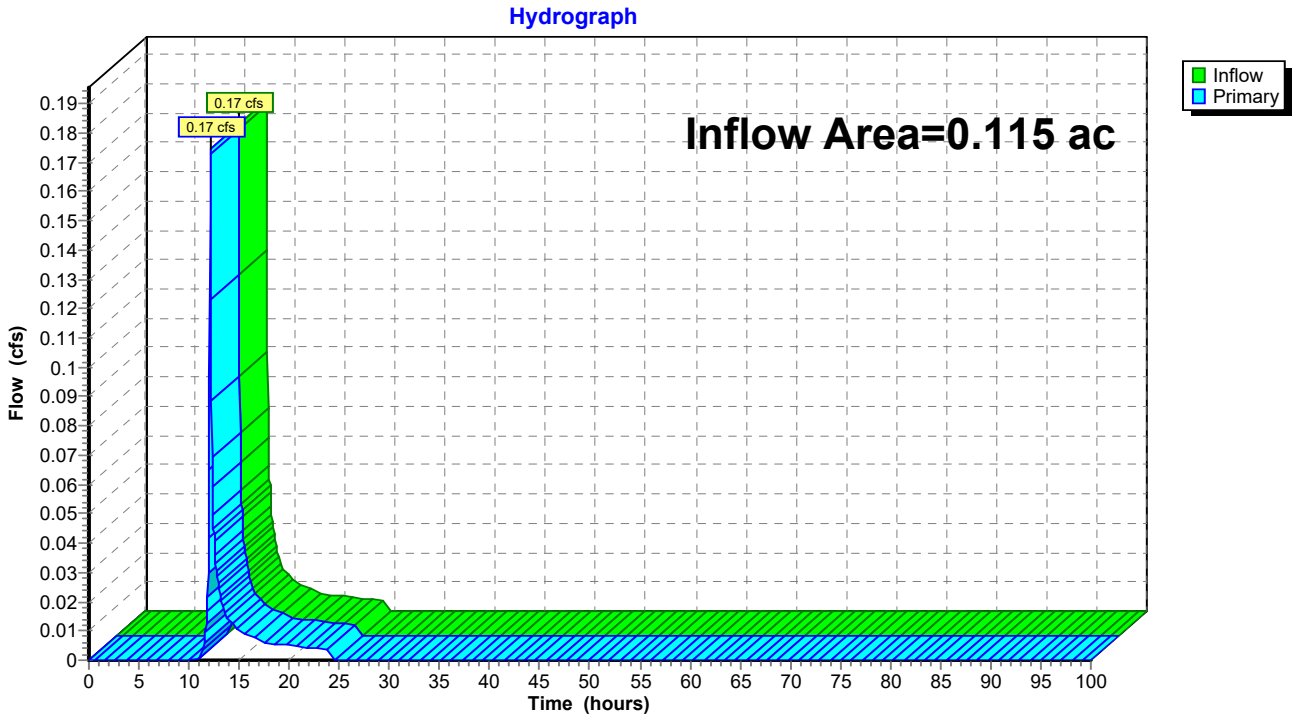


Summary for Link SP-4: SP-4

Inflow Area = 0.115 ac, 0.00% Impervious, Inflow Depth = 1.31" for 10-Year event
Inflow = 0.17 cfs @ 12.14 hrs, Volume= 0.013 af
Primary = 0.17 cfs @ 12.14 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-4: SP-4



Summary for Subcatchment EX-1: EX-1

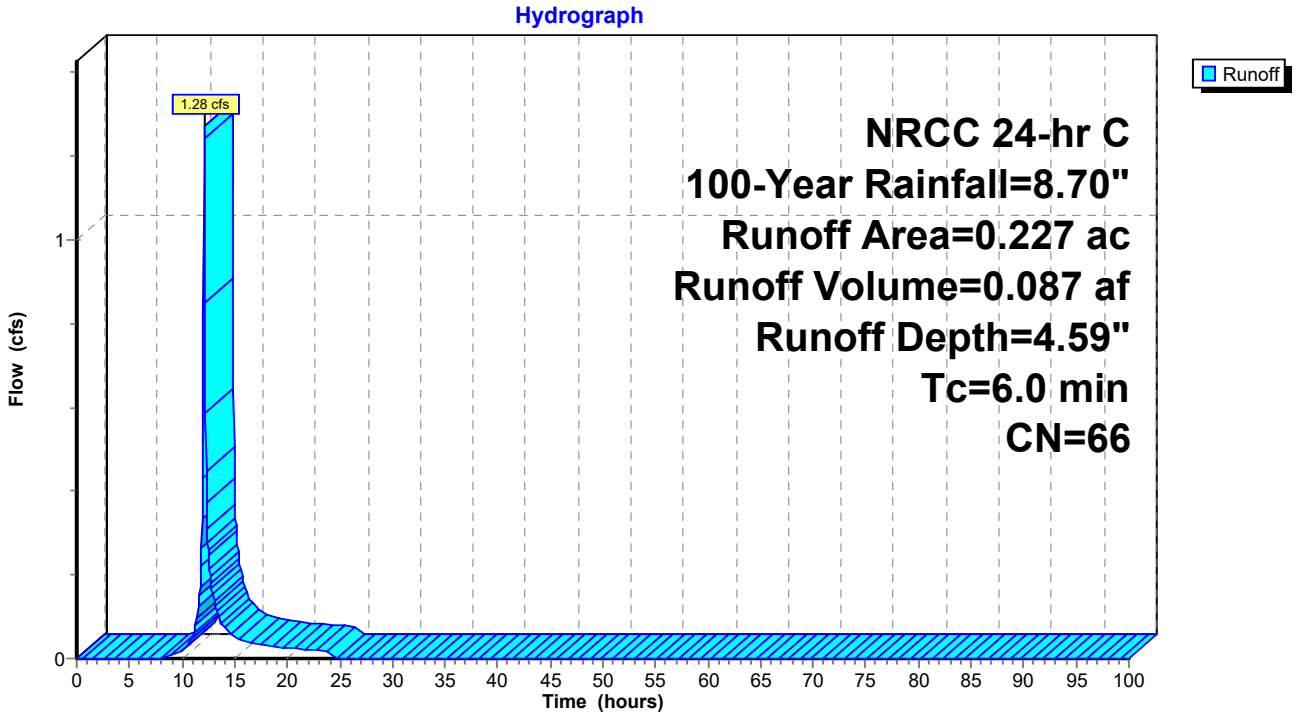
Runoff = 1.28 cfs @ 12.13 hrs, Volume= 0.087 af, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.030	98	Paved parking, HSG B
0.197	61	>75% Grass cover, Good, HSG B
0.227	66	Weighted Average
0.197		86.78% Pervious Area
0.030		13.22% Impervious Area

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

Subcatchment EX-1: EX-1



Summary for Subcatchment EX-2: EX-2

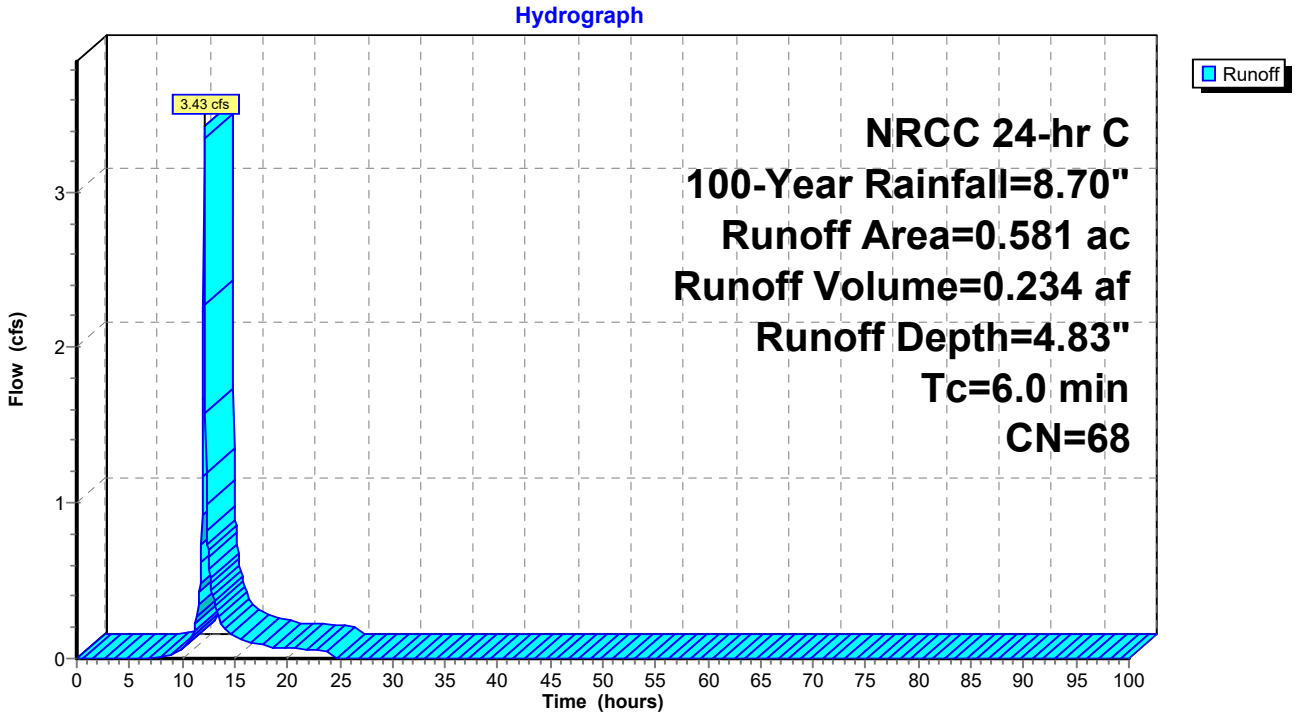
Runoff = 3.43 cfs @ 12.13 hrs, Volume= 0.234 af, Depth= 4.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.105	98	Paved parking, HSG B
0.476	61	>75% Grass cover, Good, HSG B
0.581	68	Weighted Average
0.476		81.93% Pervious Area
0.105		18.07% Impervious Area

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

Subcatchment EX-2: EX-2



Summary for Subcatchment EX-3: EX-3

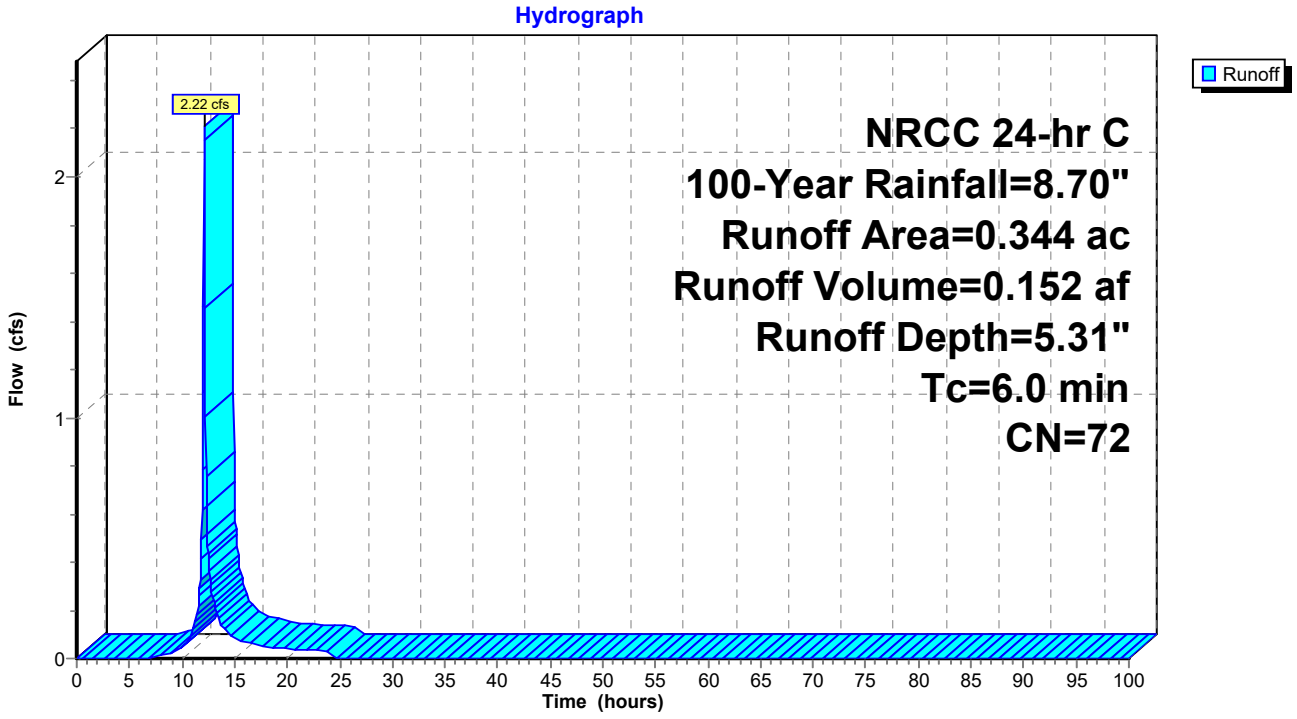
Runoff = 2.22 cfs @ 12.13 hrs, Volume= 0.152 af, Depth= 5.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.100	98	Paved parking, HSG B
0.244	61	>75% Grass cover, Good, HSG B
0.344	72	Weighted Average
0.244		70.93% Pervious Area
0.100		29.07% Impervious Area

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

Subcatchment EX-3: EX-3



Summary for Subcatchment EX-4: EX-4

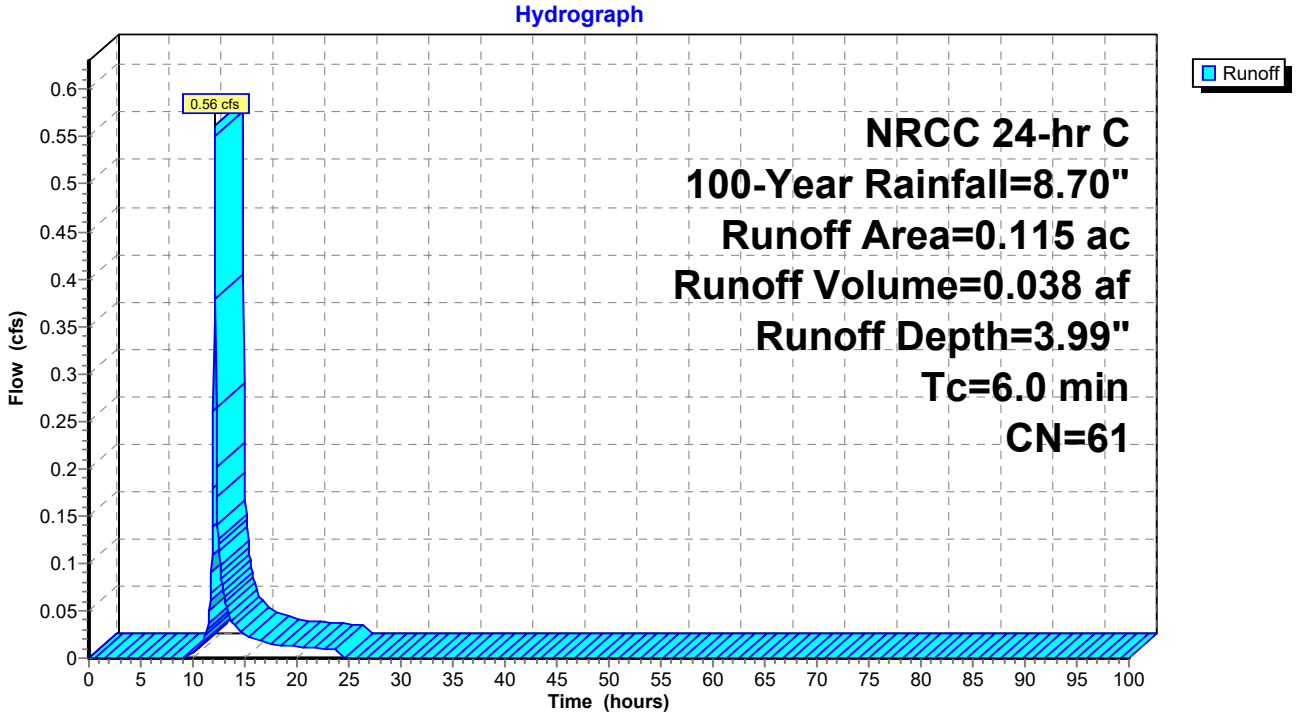
Runoff = 0.56 cfs @ 12.13 hrs, Volume= 0.038 af, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG B
0.115	61	>75% Grass cover, Good, HSG B
0.115	61	Weighted Average
0.115		100.00% Pervious Area

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

Subcatchment EX-4: EX-4

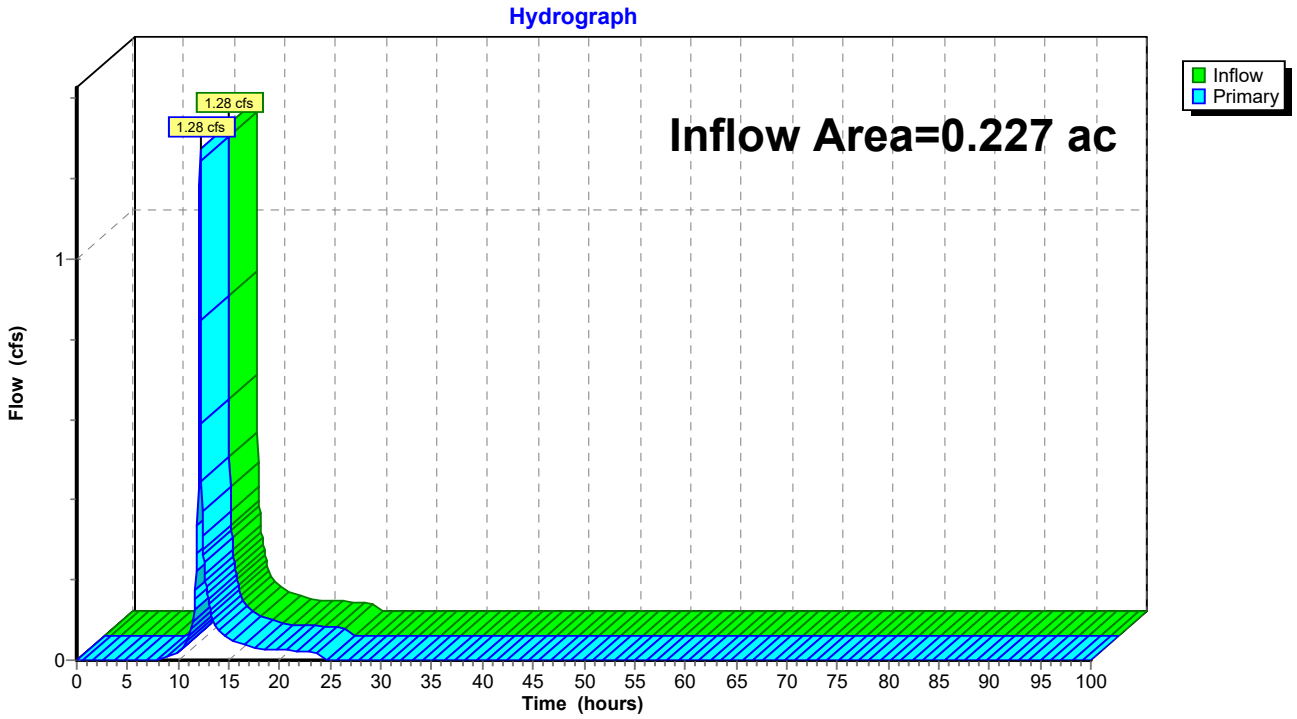


Summary for Link SP-1: SP-1

Inflow Area = 0.227 ac, 13.22% Impervious, Inflow Depth = 4.59" for 100-Year event
Inflow = 1.28 cfs @ 12.13 hrs, Volume= 0.087 af
Primary = 1.28 cfs @ 12.13 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-1: SP-1

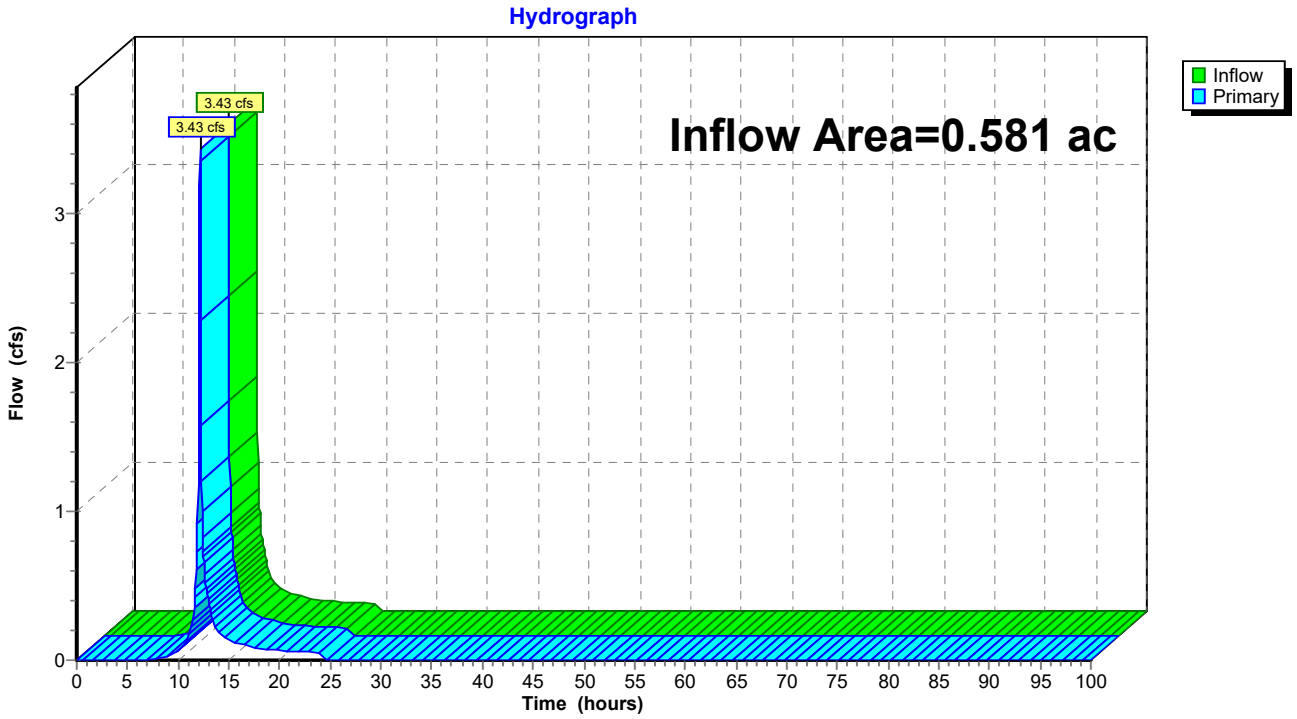


Summary for Link SP-2: SP-2

Inflow Area = 0.581 ac, 18.07% Impervious, Inflow Depth = 4.83" for 100-Year event
Inflow = 3.43 cfs @ 12.13 hrs, Volume= 0.234 af
Primary = 3.43 cfs @ 12.13 hrs, Volume= 0.234 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-2: SP-2

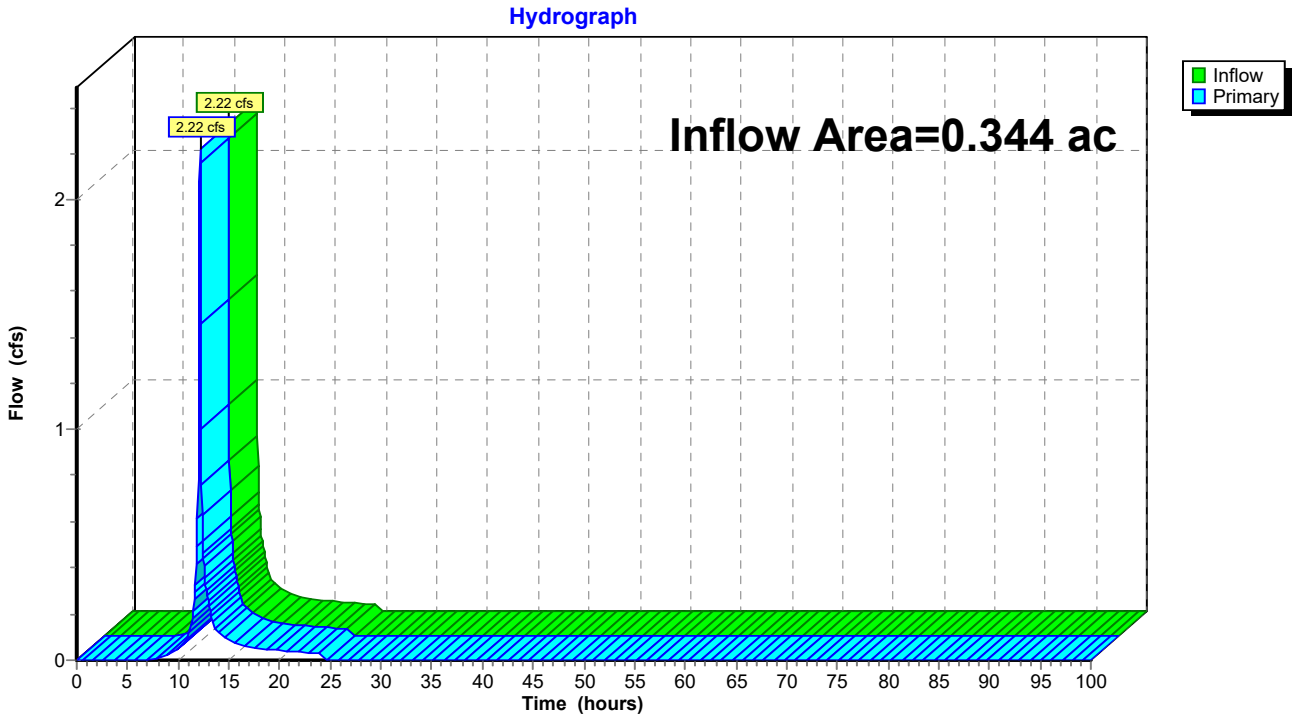


Summary for Link SP-3: SP-3

Inflow Area = 0.344 ac, 29.07% Impervious, Inflow Depth = 5.31" for 100-Year event
Inflow = 2.22 cfs @ 12.13 hrs, Volume= 0.152 af
Primary = 2.22 cfs @ 12.13 hrs, Volume= 0.152 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-3: SP-3

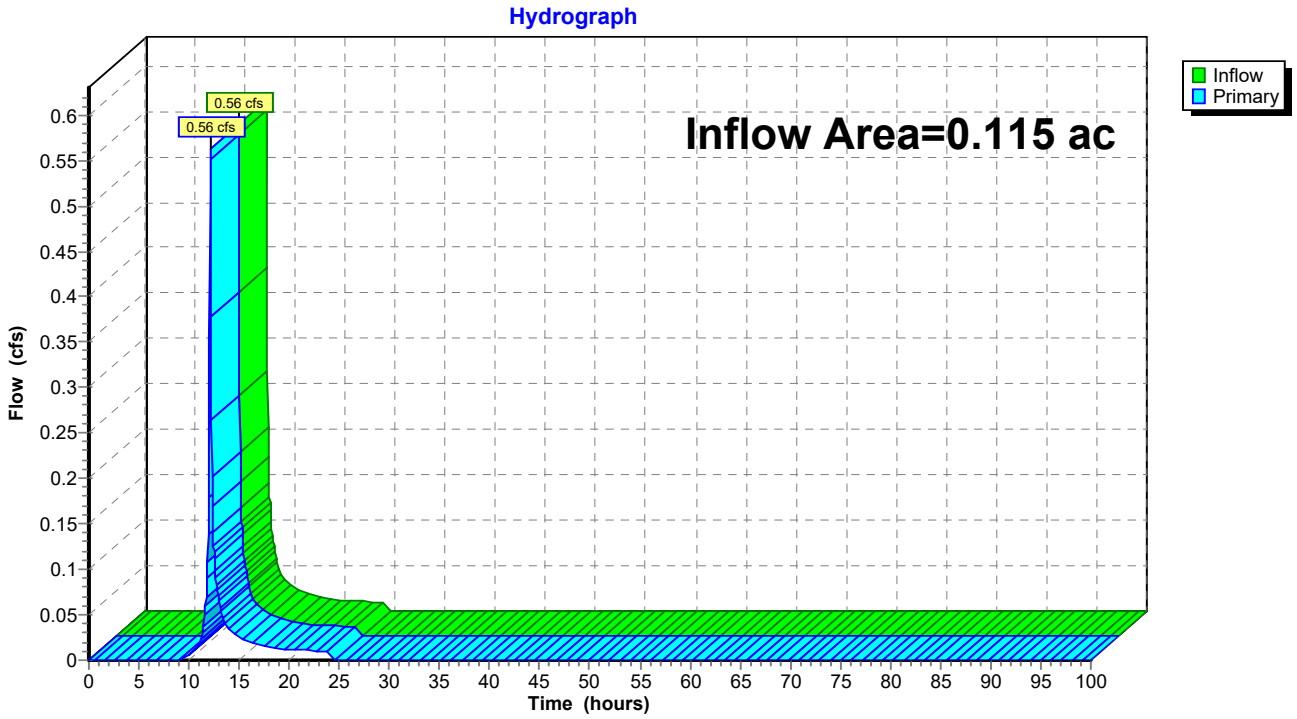


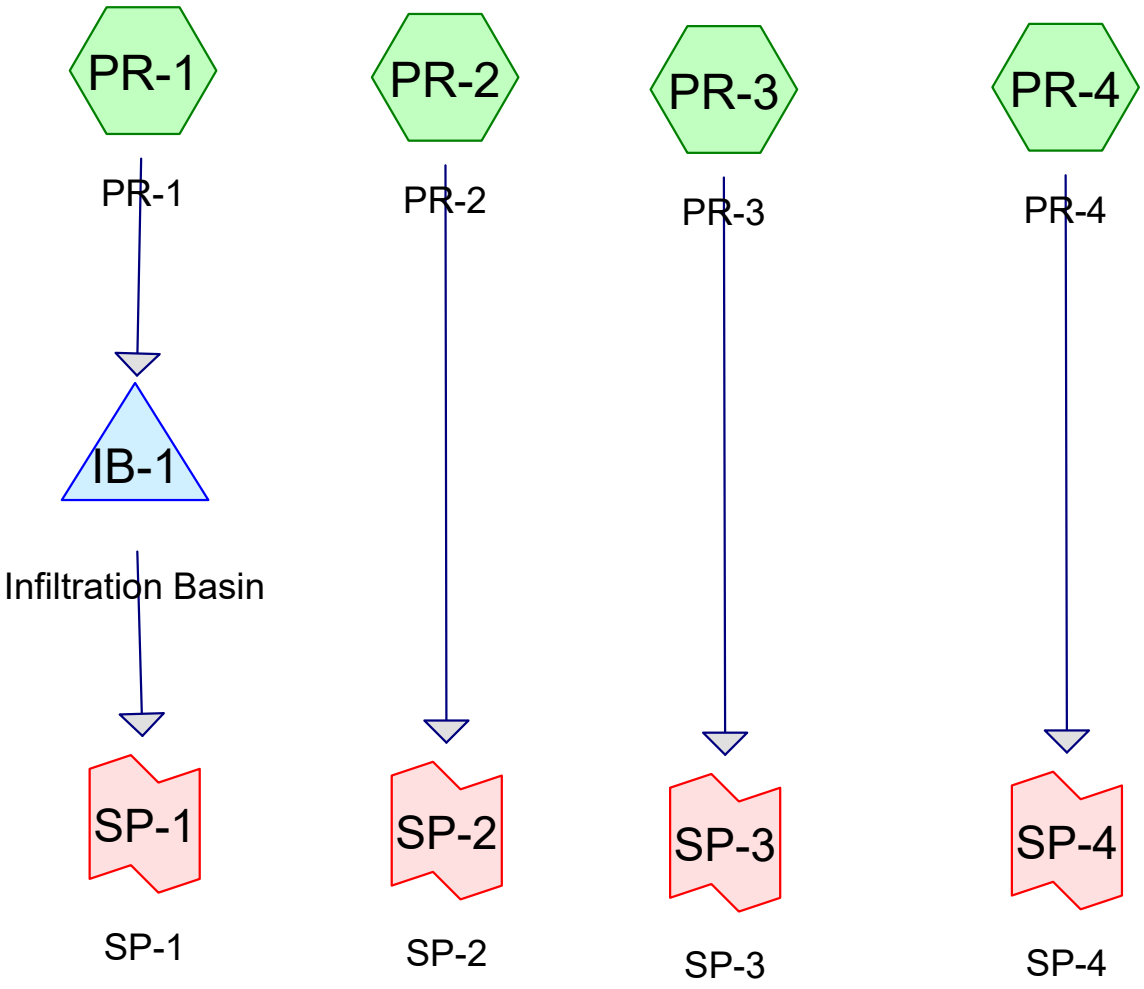
Summary for Link SP-4: SP-4

Inflow Area = 0.115 ac, 0.00% Impervious, Inflow Depth = 3.99" for 100-Year event
Inflow = 0.56 cfs @ 12.13 hrs, Volume= 0.038 af
Primary = 0.56 cfs @ 12.13 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-4: SP-4





Subcat Reach Pond Link

Routing Diagram for SROA North Smithfield RI -Proposed Conditions

Prepared by Kimely-Horn, Printed 5/19/2022

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.330	0.000	0.000	0.000	0.330	>75% Grass cover, Good	PR-1, PR-3, PR-4
0.000	0.920	0.000	0.000	0.000	0.920	Paved parking	PR-1, PR-2, PR-3
0.000	**1.250**	**0.000**	**0.000**	**0.000**	**1.250**	**TOTAL AREA**	

Summary for Subcatchment PR-1: PR-1

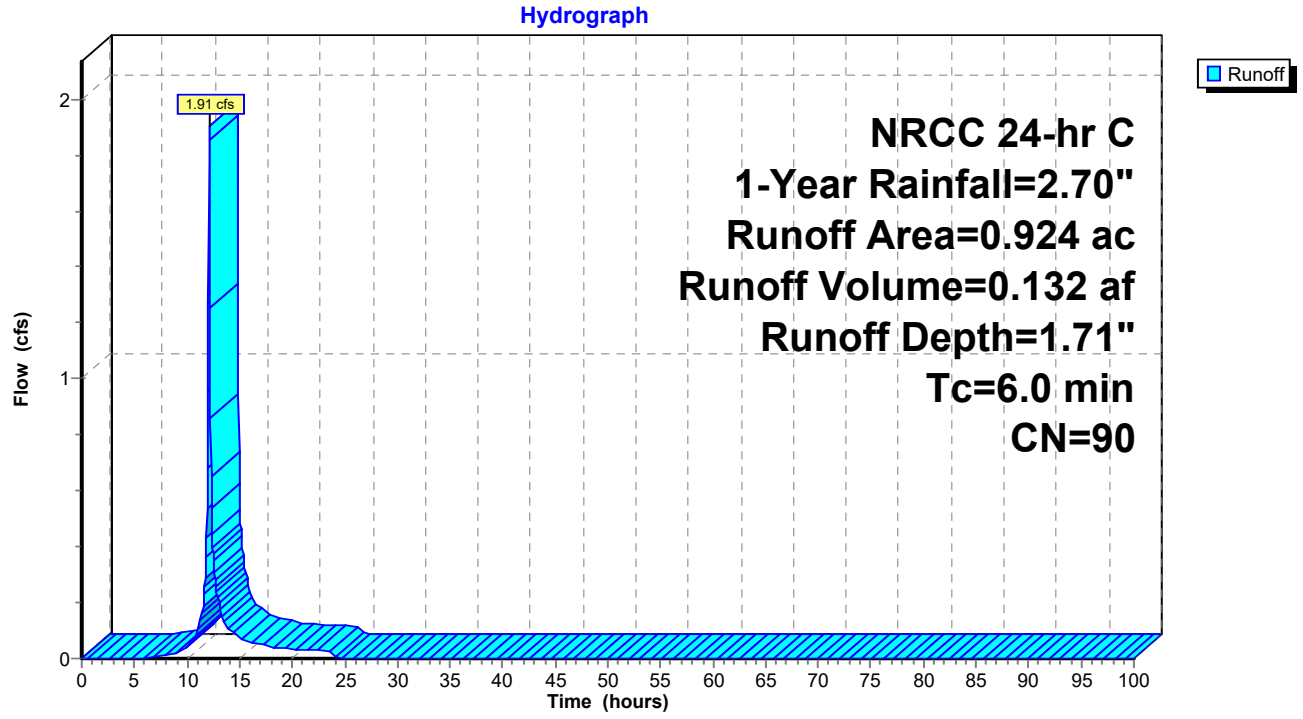
Runoff = 1.91 cfs @ 12.13 hrs, Volume= 0.132 af, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.70"

Area (ac)	CN	Description
0.724	98	Paved parking, HSG B
0.200	61	>75% Grass cover, Good, HSG B
0.924	90	Weighted Average
0.200		21.65% Pervious Area
0.724		78.35% Impervious Area

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

Subcatchment PR-1: PR-1



Summary for Subcatchment PR-2: PR-2

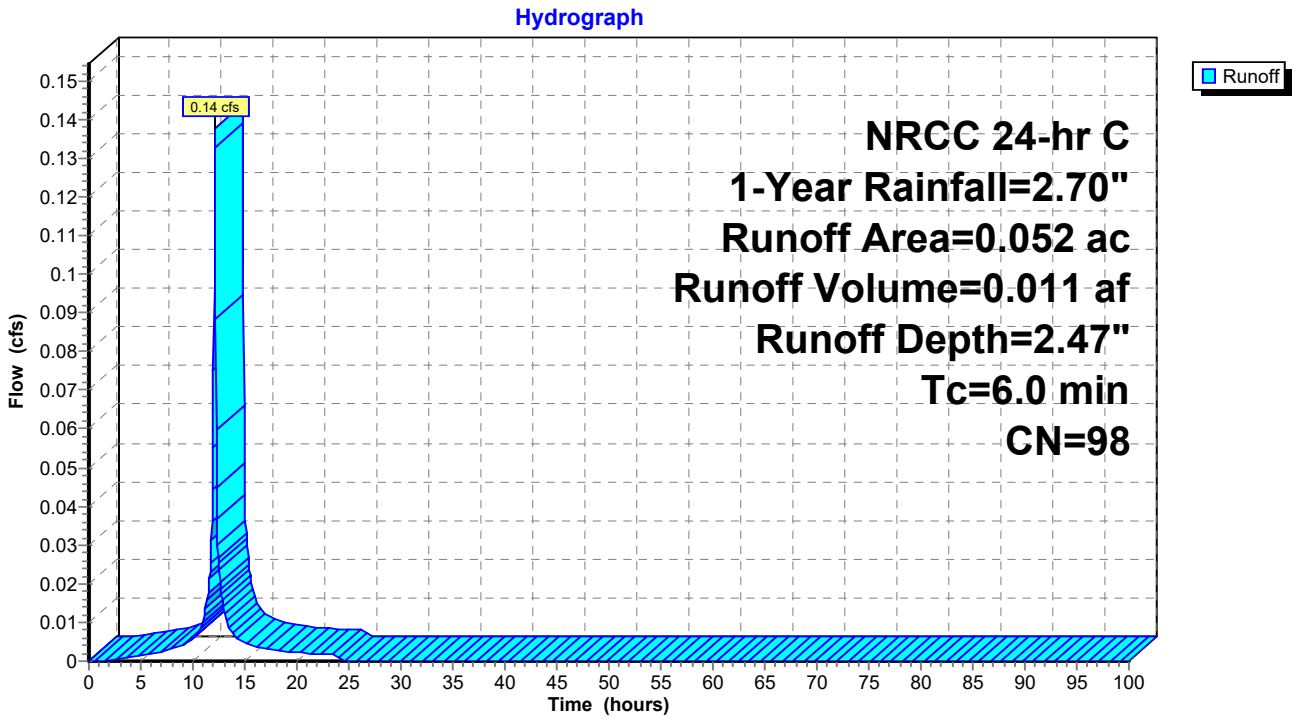
Runoff = 0.14 cfs @ 12.13 hrs, Volume= 0.011 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.70"

Area (ac)	CN	Description
0.052	98	Paved parking, HSG B
0.000	61	>75% Grass cover, Good, HSG B
0.052	98	Weighted Average
0.052		100.00% Impervious Area

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

Subcatchment PR-2: PR-2



Summary for Subcatchment PR-3: PR-3

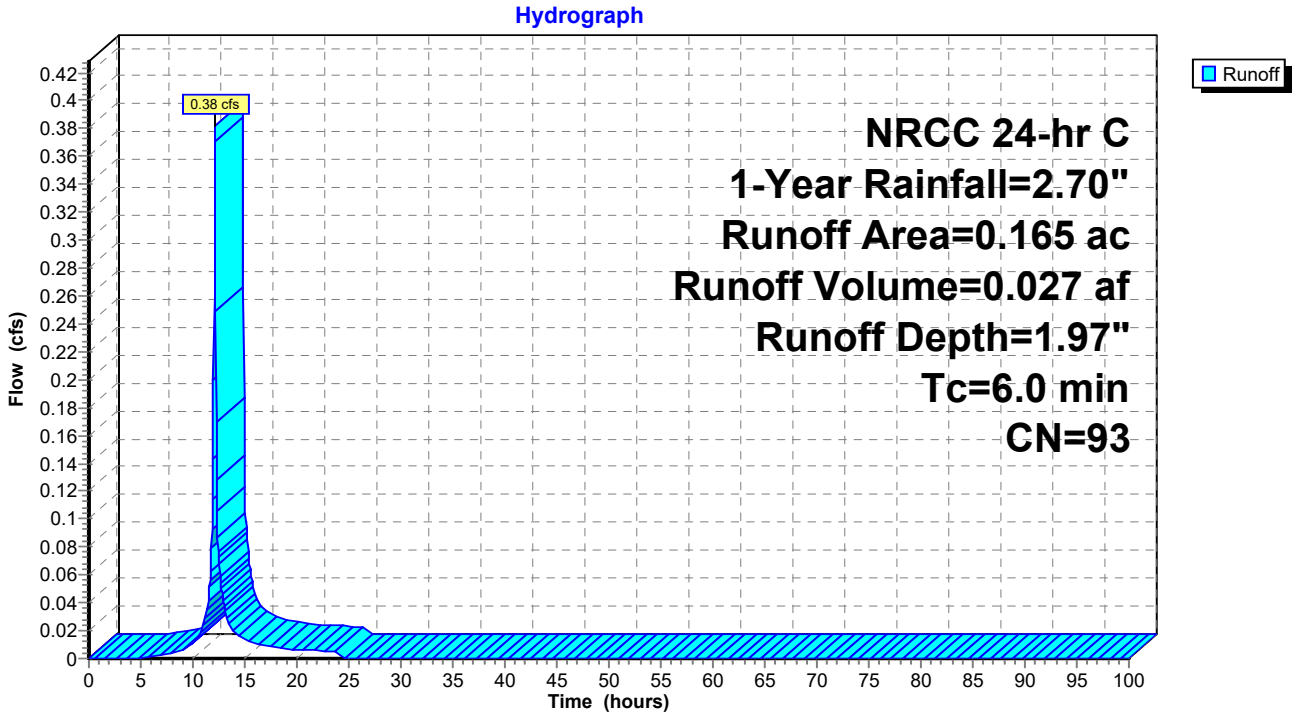
Runoff = 0.38 cfs @ 12.13 hrs, Volume= 0.027 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.70"

Area (ac)	CN	Description
0.144	98	Paved parking, HSG B
0.021	61	>75% Grass cover, Good, HSG B
0.165	93	Weighted Average
0.021		12.73% Pervious Area
0.144		87.27% Impervious Area

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

Subcatchment PR-3: PR-3



Summary for Subcatchment PR-4: PR-4

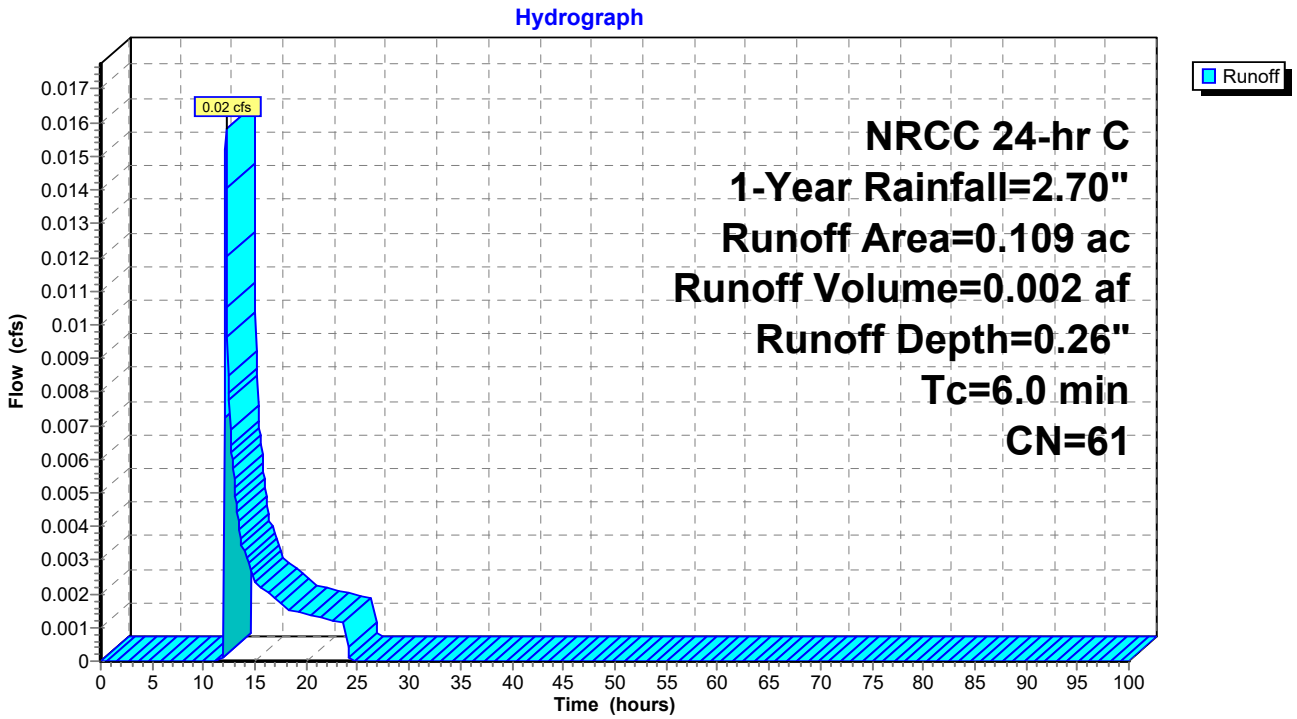
Runoff = 0.02 cfs @ 12.17 hrs, Volume= 0.002 af, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.70"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG B
0.109	61	>75% Grass cover, Good, HSG B
0.109	61	Weighted Average
0.109		100.00% Pervious Area

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

Subcatchment PR-4: PR-4



Summary for Pond IB-1: Infiltration Basin

Inflow Area = 0.924 ac, 78.35% Impervious, Inflow Depth = 1.71" for 1-Year event
Inflow = 1.91 cfs @ 12.13 hrs, Volume= 0.132 af
Outflow = 0.29 cfs @ 12.63 hrs, Volume= 0.132 af, Atten= 85%, Lag= 30.2 min
Discarded = 0.29 cfs @ 12.63 hrs, Volume= 0.132 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 278.76' @ 12.63 hrs Surf.Area= 0.040 ac Storage= 0.040 af

Plug-Flow detention time= 49.7 min calculated for 0.132 af (100% of inflow)
Center-of-Mass det. time= 49.7 min (871.5 - 821.8)

Volume	Invert	Avail.Storage	Storage Description
#1	277.50'	0.224 af	**Infiltration Basin (Conic)** Listed below (Recalc)

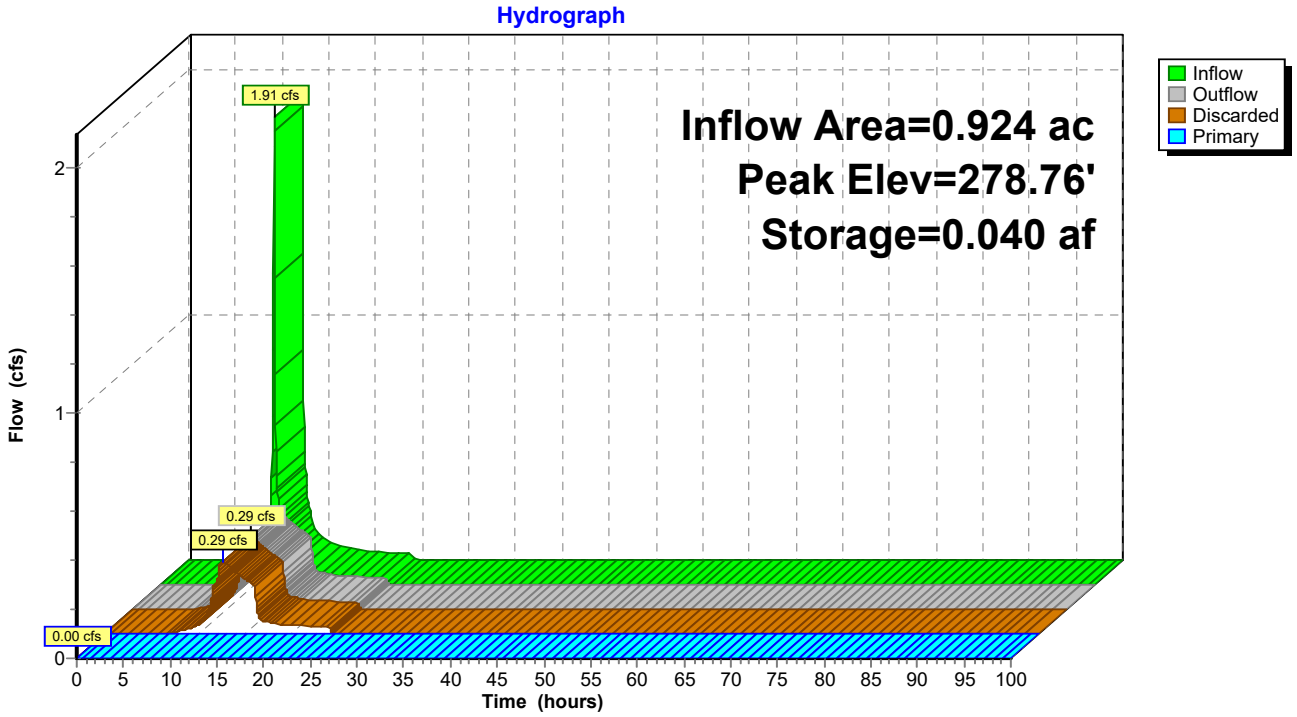
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
277.50	0.026	0.000	0.000	0.026
278.50	0.035	0.030	0.030	0.035
279.50	0.055	0.045	0.075	0.056
280.50	0.074	0.064	0.139	0.075
281.50	0.096	0.085	0.224	0.098

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.50'	**7.155 in/hr Exfiltration over Wetted area** Phase-In= 0.10'
#2	Primary	281.30'	**10.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

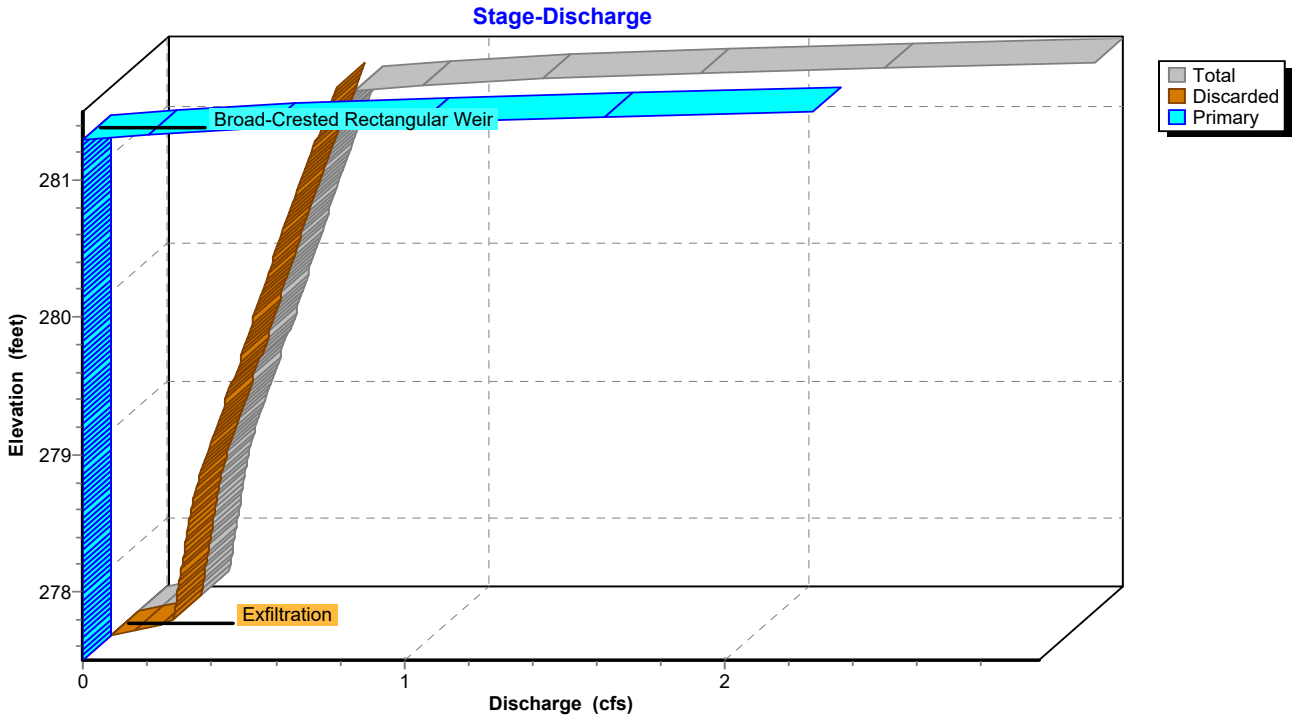
Discarded OutFlow Max=0.29 cfs @ 12.63 hrs HW=278.76' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=277.50' TW=0.00' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

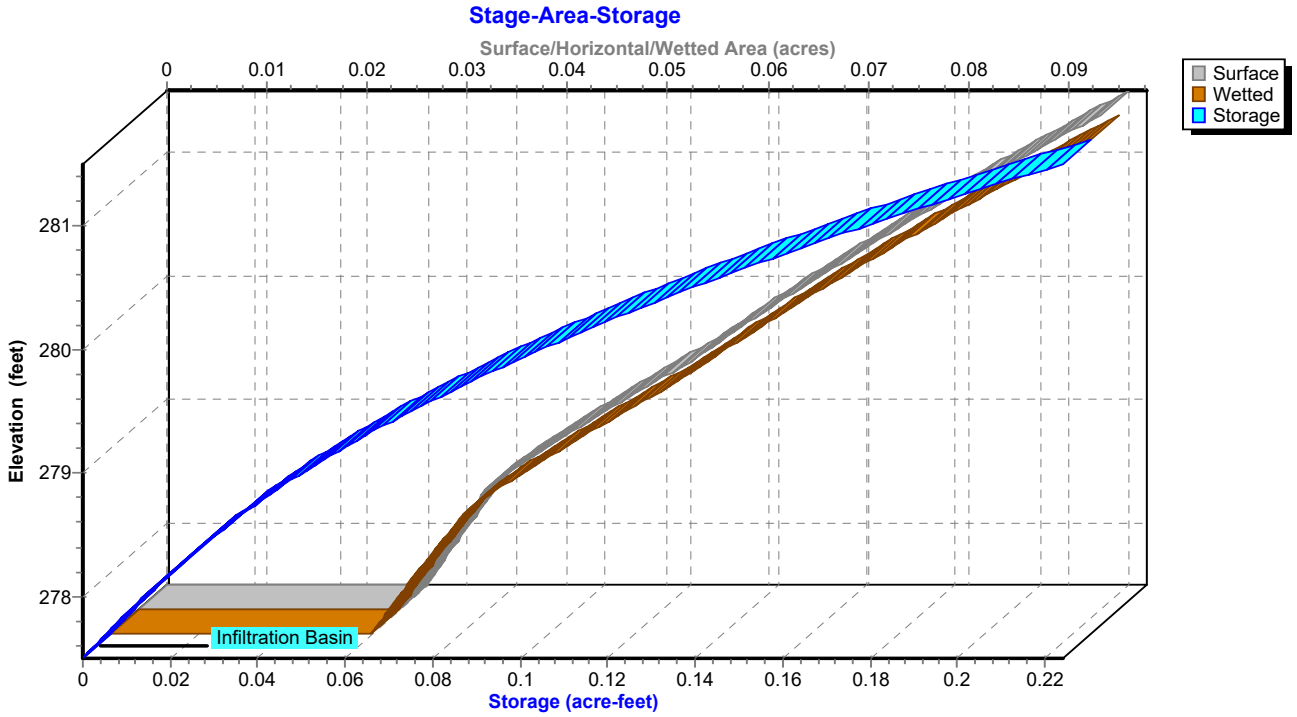
Pond IB-1: Infiltration Basin



Pond IB-1: Infiltration Basin



Pond IB-1: Infiltration Basin

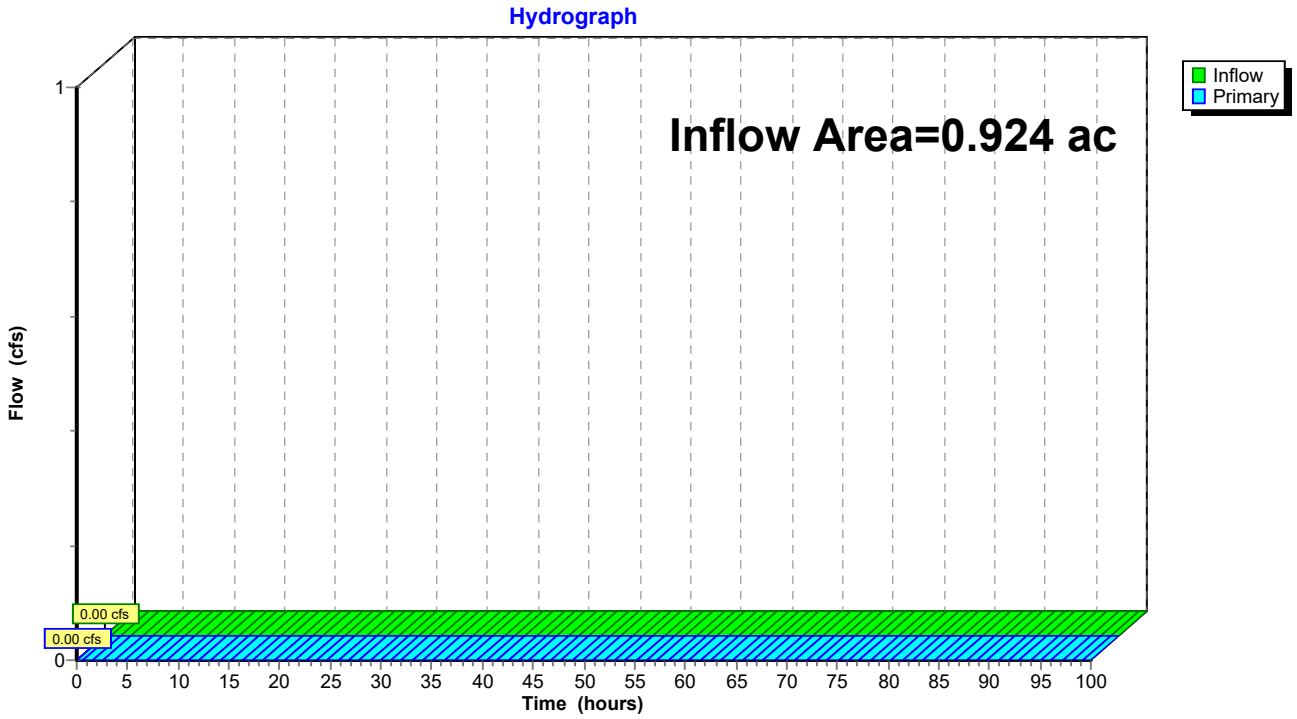


Summary for Link SP-1: SP-1

Inflow Area = 0.924 ac, 78.35% Impervious, Inflow Depth = 0.00" for 1-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-1: SP-1

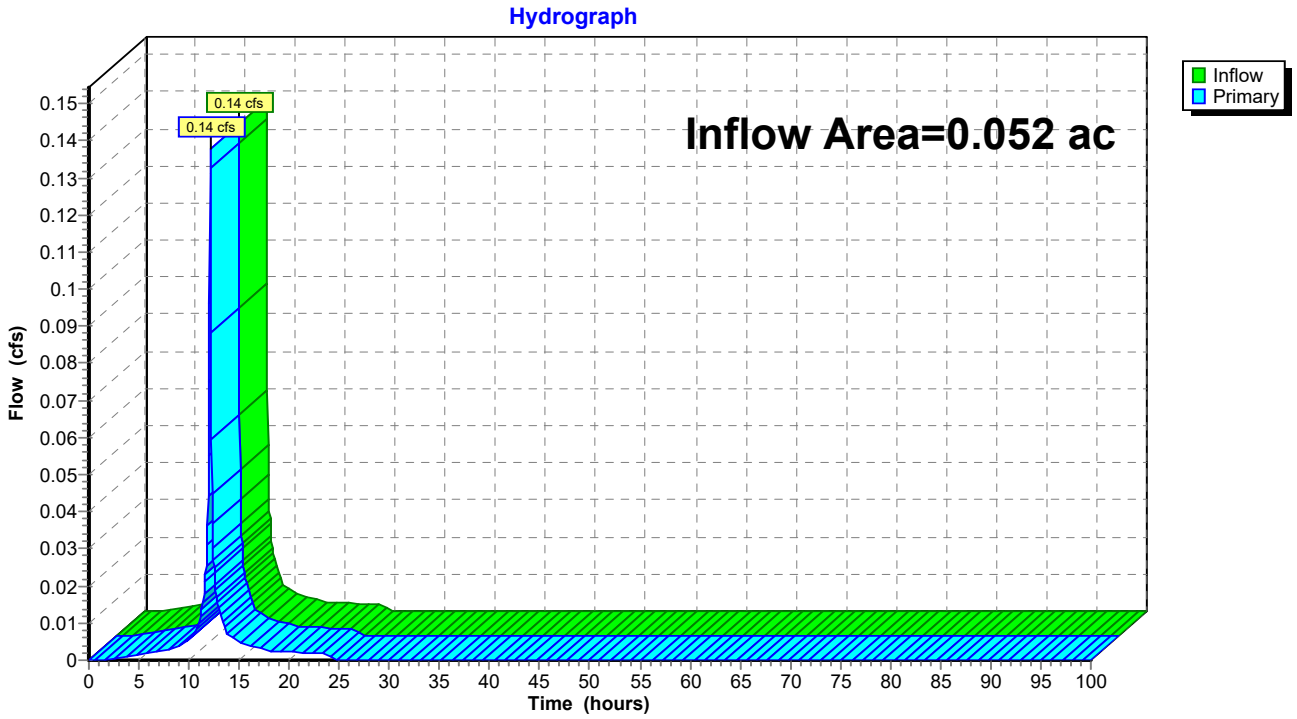


Summary for Link SP-2: SP-2

Inflow Area = 0.052 ac,100.00% Impervious, Inflow Depth = 2.47" for 1-Year event
Inflow = 0.14 cfs @ 12.13 hrs, Volume= 0.011 af
Primary = 0.14 cfs @ 12.13 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-2: SP-2

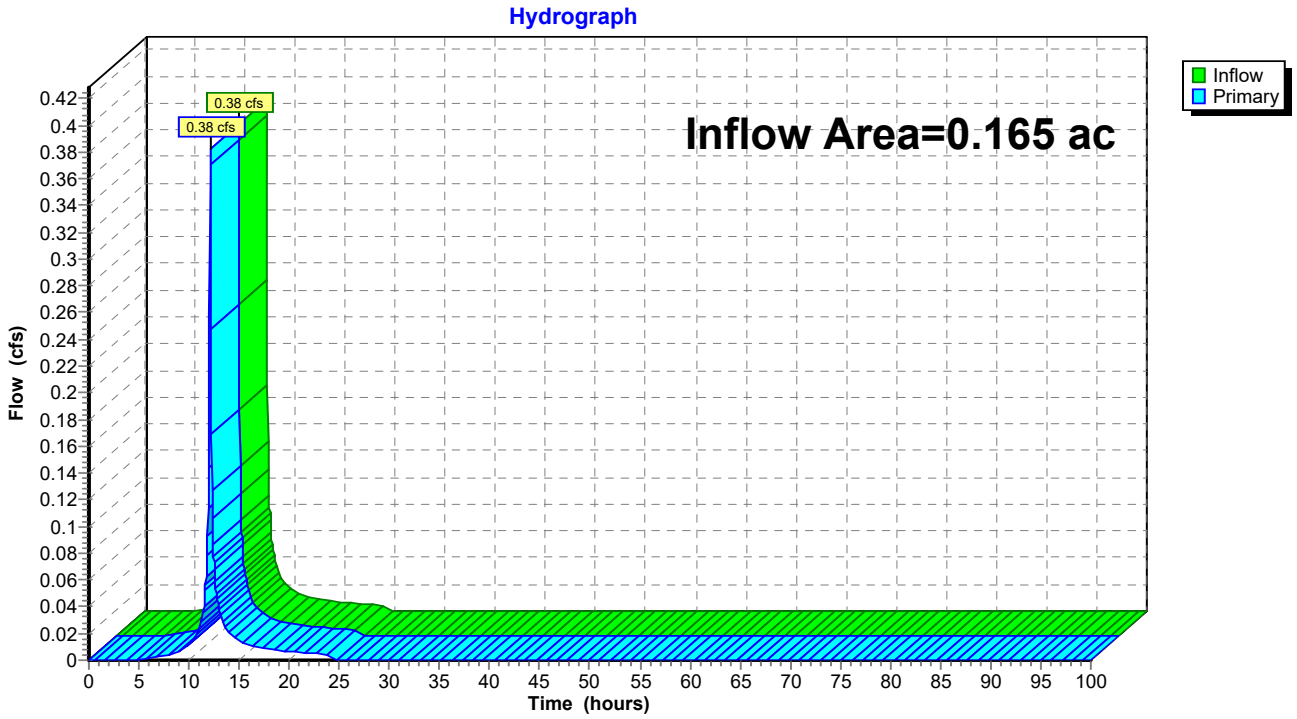


Summary for Link SP-3: SP-3

Inflow Area = 0.165 ac, 87.27% Impervious, Inflow Depth = 1.97" for 1-Year event
Inflow = 0.38 cfs @ 12.13 hrs, Volume= 0.027 af
Primary = 0.38 cfs @ 12.13 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-3: SP-3

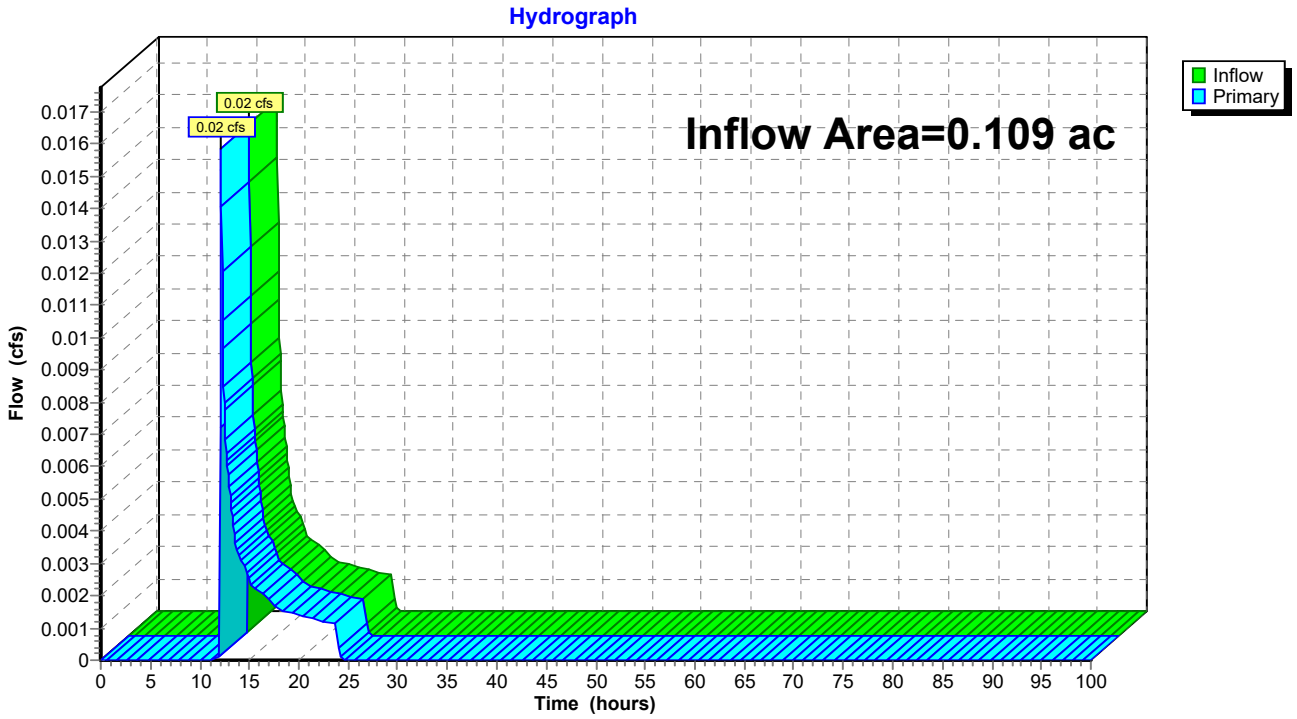


Summary for Link SP-4: SP-4

Inflow Area = 0.109 ac, 0.00% Impervious, Inflow Depth = 0.26" for 1-Year event
Inflow = 0.02 cfs @ 12.17 hrs, Volume= 0.002 af
Primary = 0.02 cfs @ 12.17 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-4: SP-4



Summary for Subcatchment PR-1: PR-1

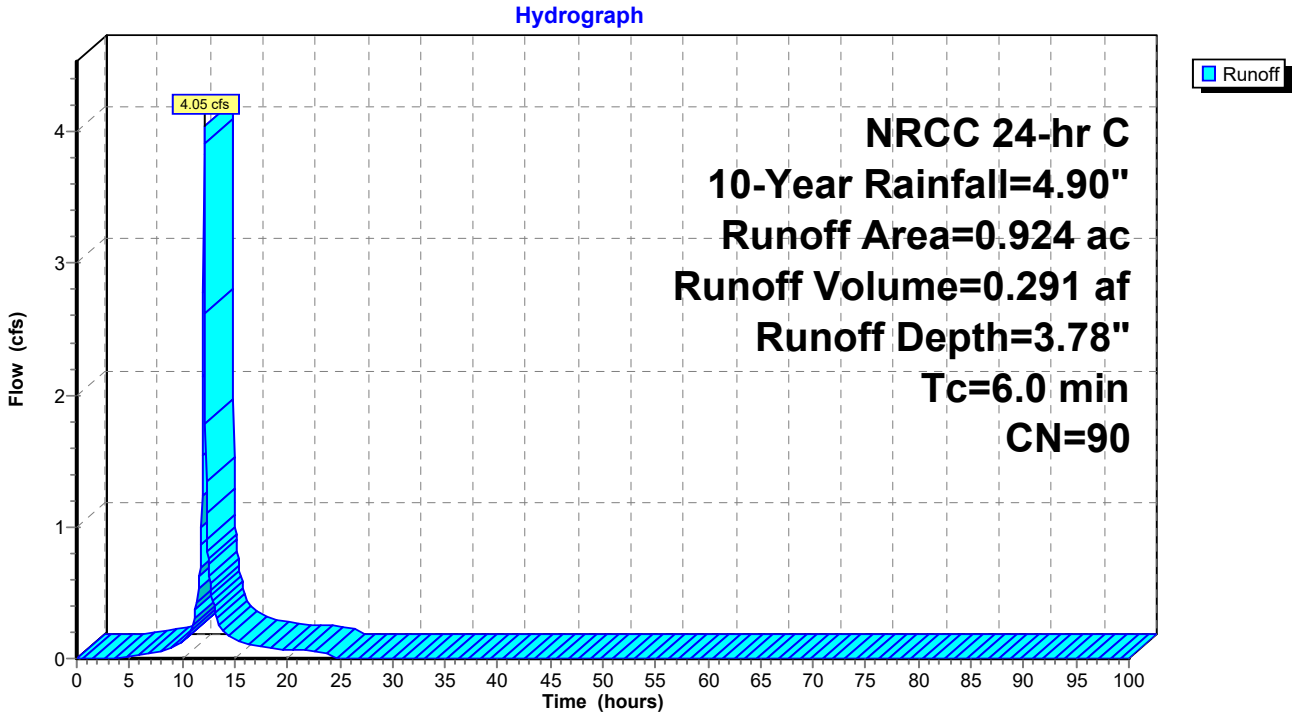
Runoff = 4.05 cfs @ 12.13 hrs, Volume= 0.291 af, Depth= 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.90"

Area (ac)	CN	Description
0.724	98	Paved parking, HSG B
0.200	61	>75% Grass cover, Good, HSG B
0.924	90	Weighted Average
0.200		21.65% Pervious Area
0.724		78.35% Impervious Area

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

Subcatchment PR-1: PR-1



Summary for Subcatchment PR-2: PR-2

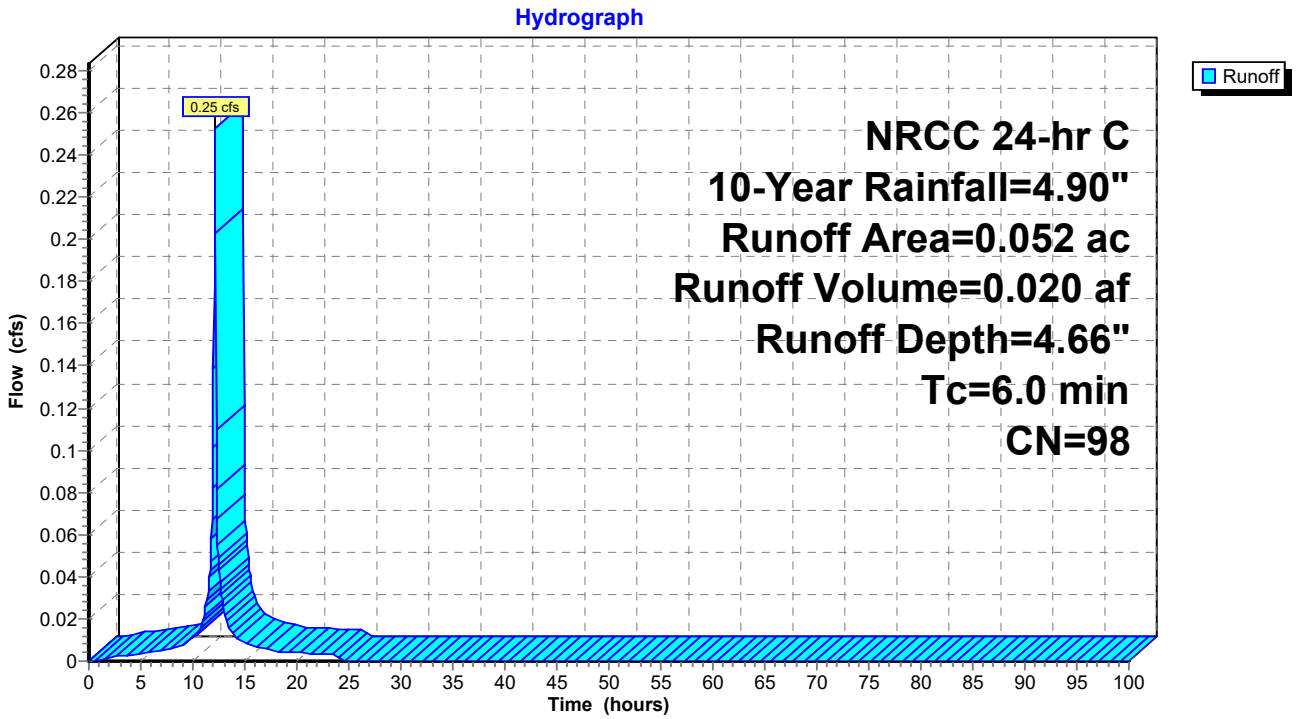
Runoff = 0.25 cfs @ 12.13 hrs, Volume= 0.020 af, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.90"

Area (ac)	CN	Description
0.052	98	Paved parking, HSG B
0.000	61	>75% Grass cover, Good, HSG B
0.052	98	Weighted Average
0.052		100.00% Impervious Area

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

Subcatchment PR-2: PR-2



Summary for Subcatchment PR-3: PR-3

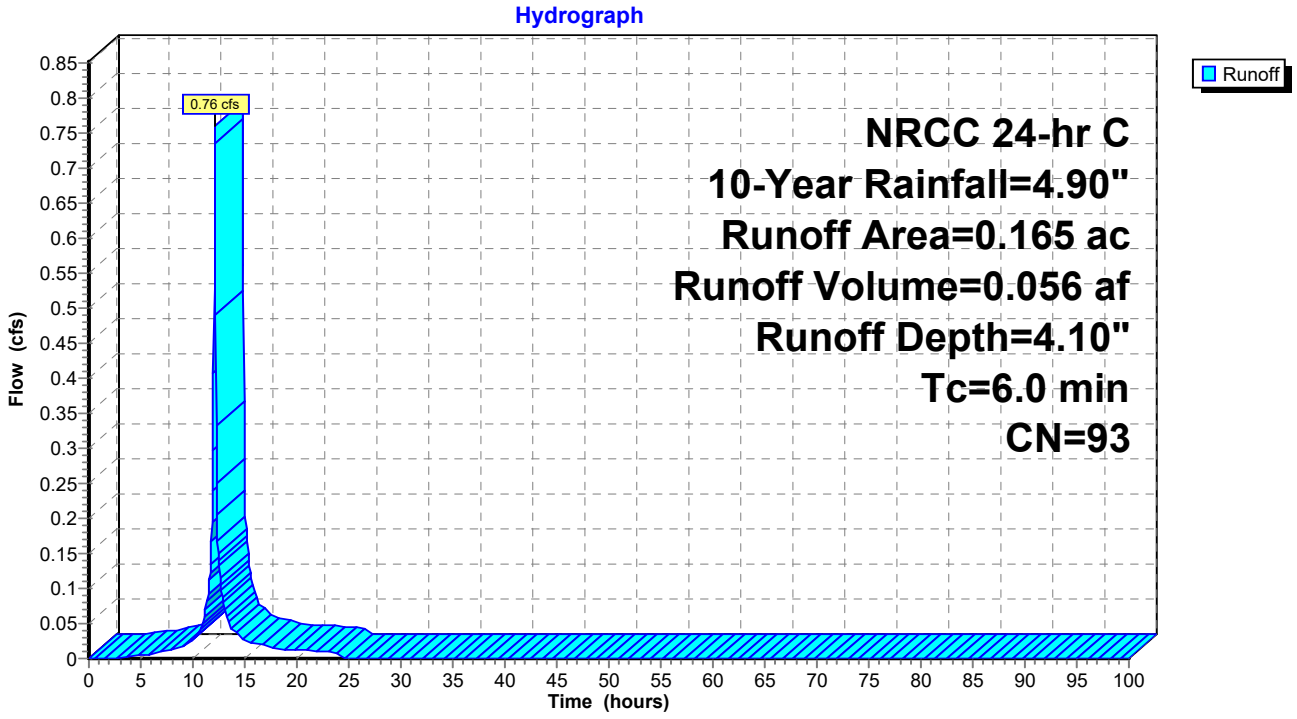
Runoff = 0.76 cfs @ 12.13 hrs, Volume= 0.056 af, Depth= 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.90"

Area (ac)	CN	Description
0.144	98	Paved parking, HSG B
0.021	61	>75% Grass cover, Good, HSG B
0.165	93	Weighted Average
0.021		12.73% Pervious Area
0.144		87.27% Impervious Area

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

Subcatchment PR-3: PR-3



Summary for Subcatchment PR-4: PR-4

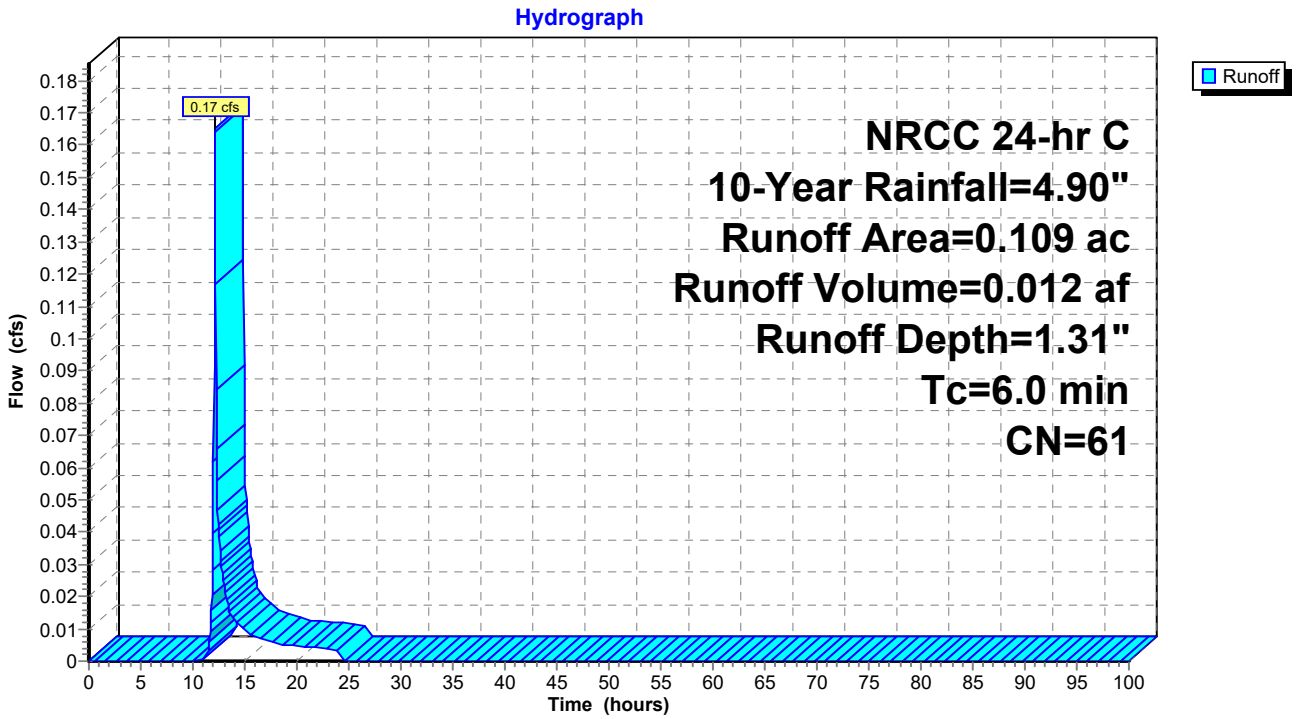
Runoff = 0.17 cfs @ 12.14 hrs, Volume= 0.012 af, Depth= 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=4.90"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG B
0.109	61	>75% Grass cover, Good, HSG B
0.109	61	Weighted Average
0.109		100.00% Pervious Area

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

Subcatchment PR-4: PR-4



Summary for Pond IB-1: Infiltration Basin

Inflow Area = 0.924 ac, 78.35% Impervious, Inflow Depth = 3.78" for 10-Year event
Inflow = 4.05 cfs @ 12.13 hrs, Volume= 0.291 af
Outflow = 0.48 cfs @ 12.83 hrs, Volume= 0.291 af, Atten= 88%, Lag= 42.2 min
Discarded = 0.48 cfs @ 12.83 hrs, Volume= 0.291 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 280.05' @ 12.83 hrs Surf.Area= 0.065 ac Storage= 0.108 af

Plug-Flow detention time= 93.9 min calculated for 0.291 af (100% of inflow)
Center-of-Mass det. time= 93.8 min (890.9 - 797.1)

Volume	Invert	Avail.Storage	Storage Description
#1	277.50'	0.224 af	**Infiltration Basin (Conic)** Listed below (Recalc)

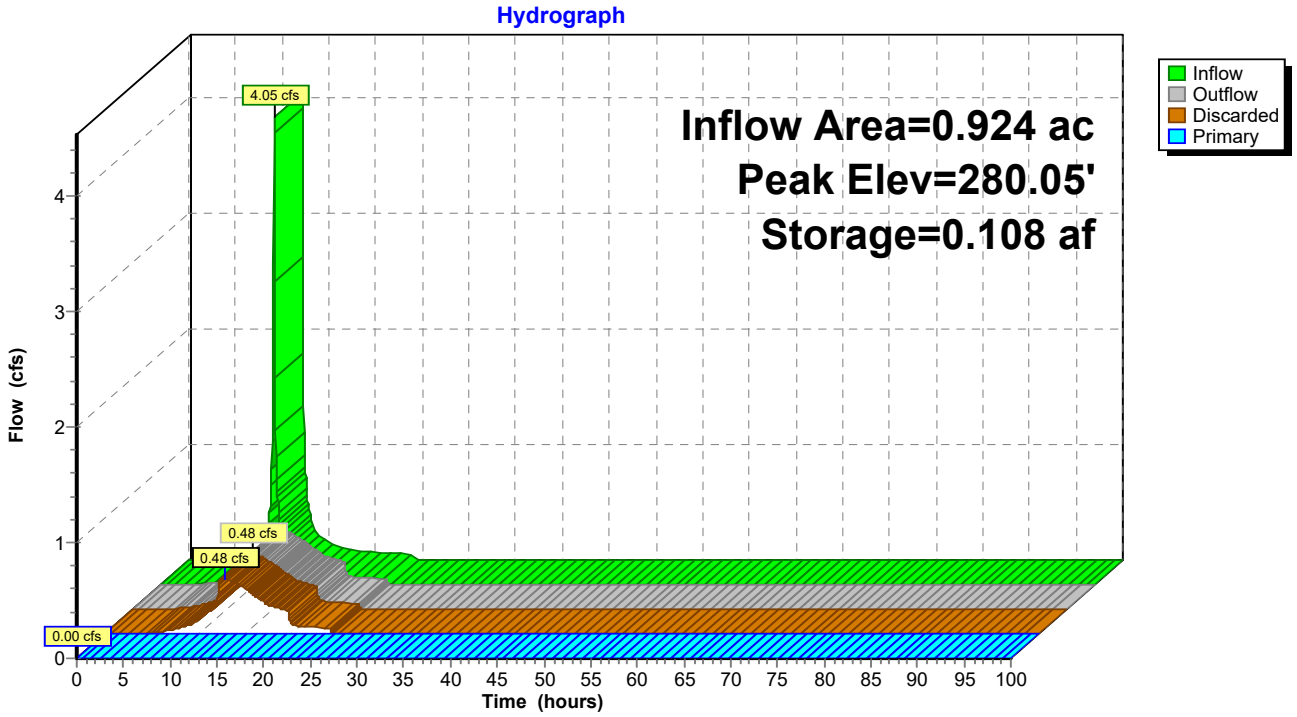
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
277.50	0.026	0.000	0.000	0.026
278.50	0.035	0.030	0.030	0.035
279.50	0.055	0.045	0.075	0.056
280.50	0.074	0.064	0.139	0.075
281.50	0.096	0.085	0.224	0.098

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.50'	**7.155 in/hr Exfiltration over Wetted area** Phase-In= 0.10'
#2	Primary	281.30'	**10.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

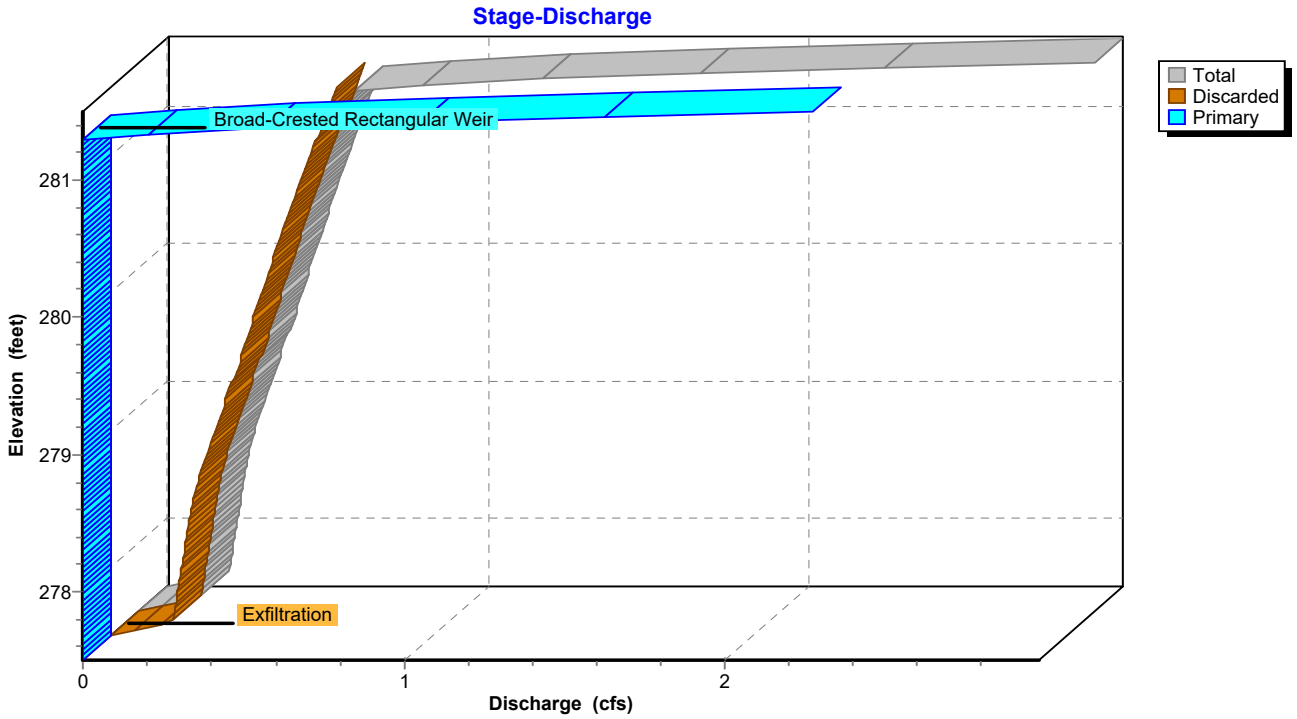
Discarded OutFlow Max=0.48 cfs @ 12.83 hrs HW=280.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.48 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=277.50' TW=0.00' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

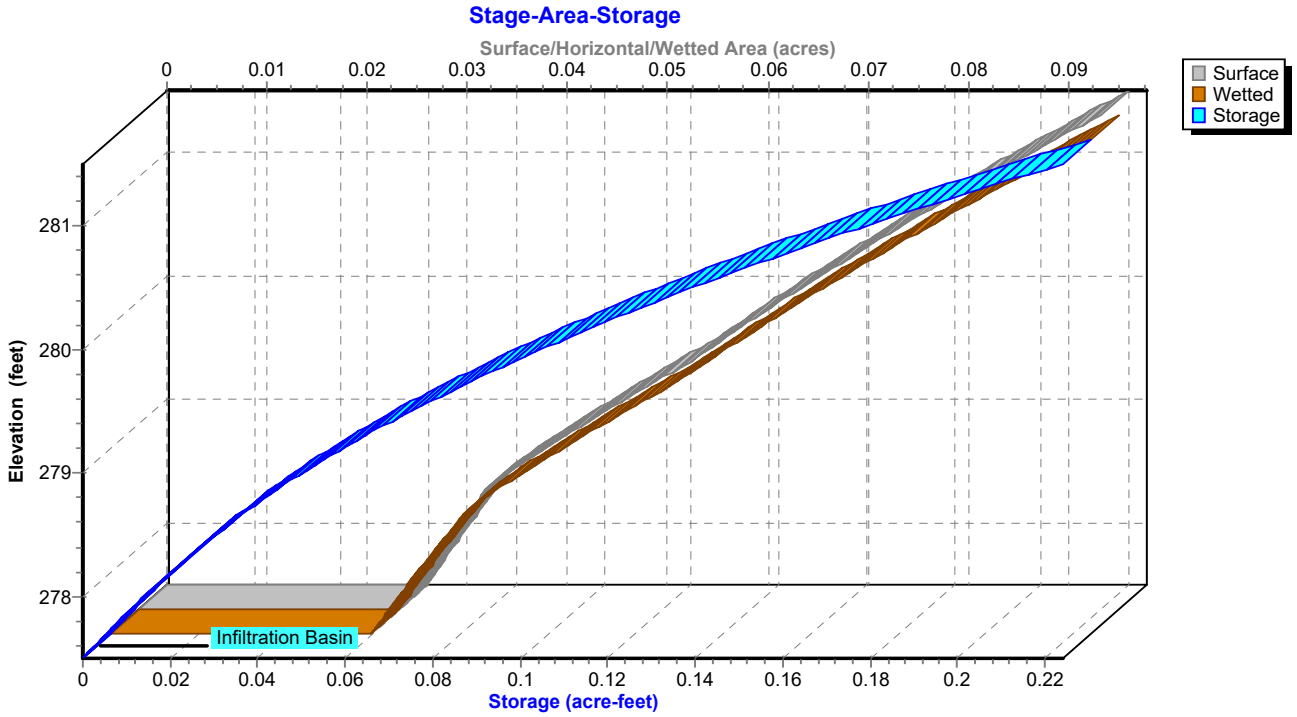
Pond IB-1: Infiltration Basin



Pond IB-1: Infiltration Basin



Pond IB-1: Infiltration Basin

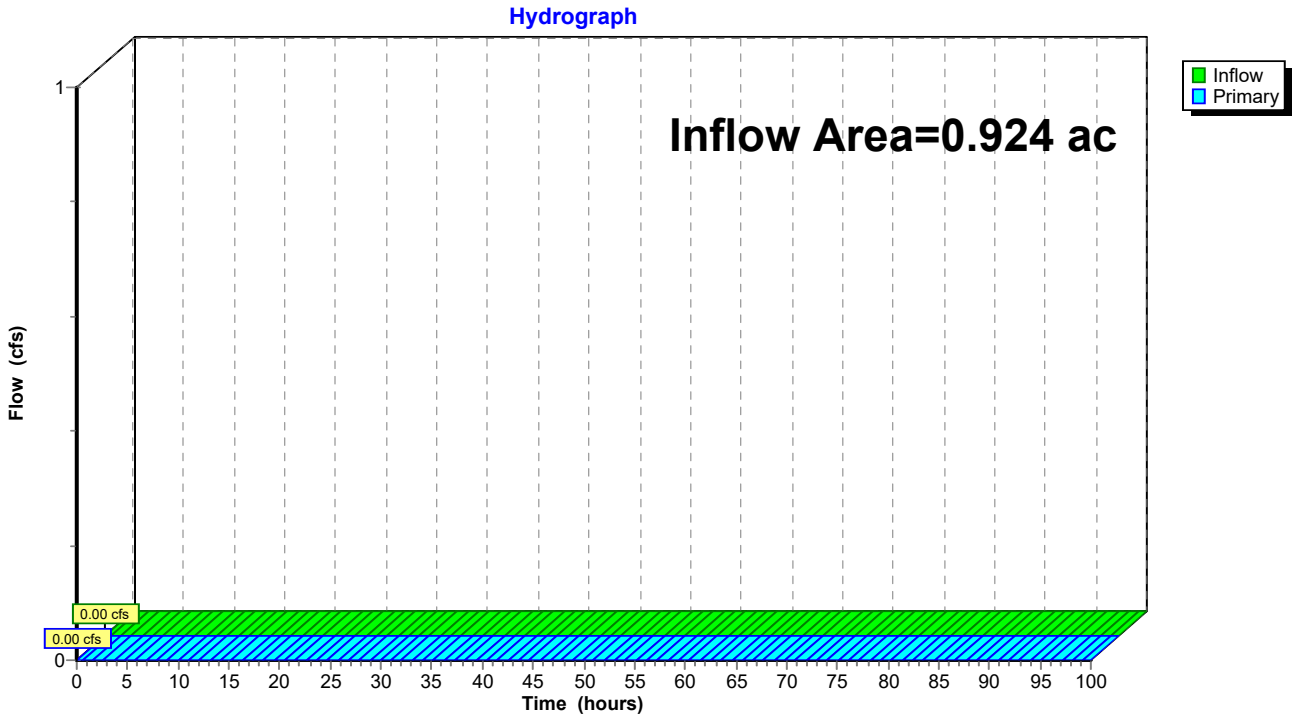


Summary for Link SP-1: SP-1

Inflow Area = 0.924 ac, 78.35% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-1: SP-1

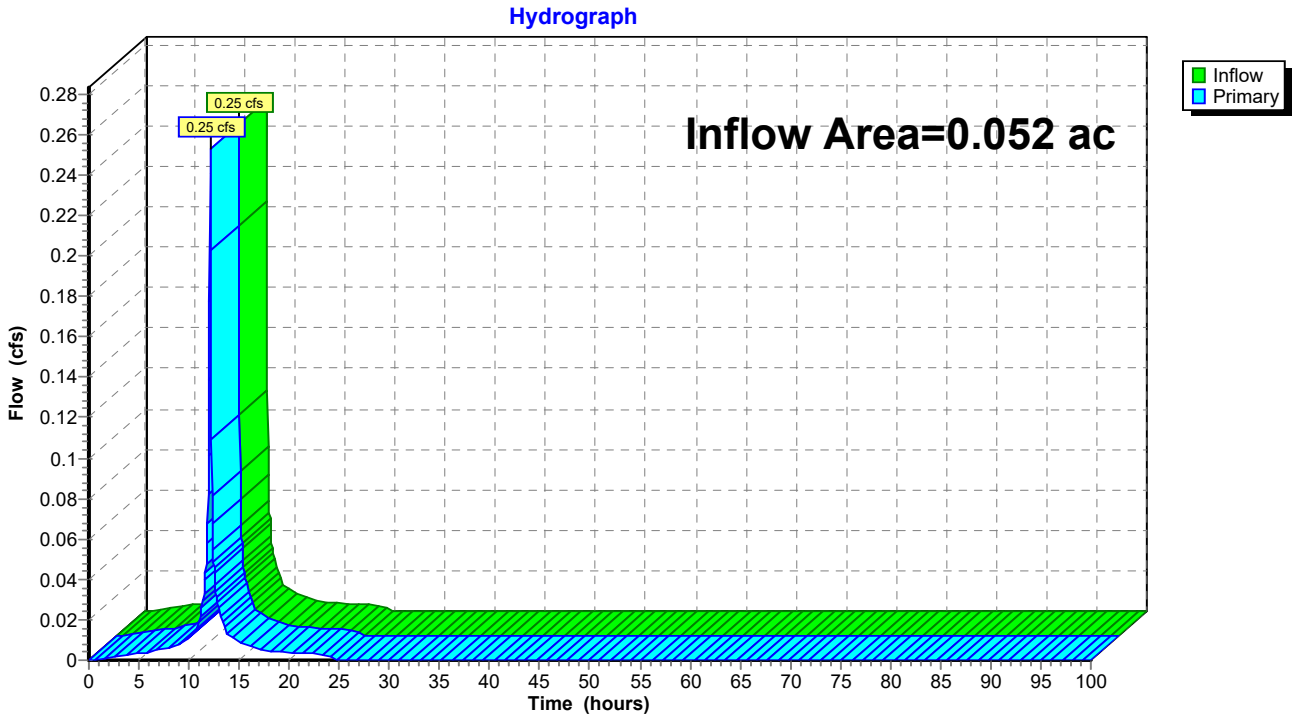


Summary for Link SP-2: SP-2

Inflow Area = 0.052 ac,100.00% Impervious, Inflow Depth = 4.66" for 10-Year event
Inflow = 0.25 cfs @ 12.13 hrs, Volume= 0.020 af
Primary = 0.25 cfs @ 12.13 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-2: SP-2

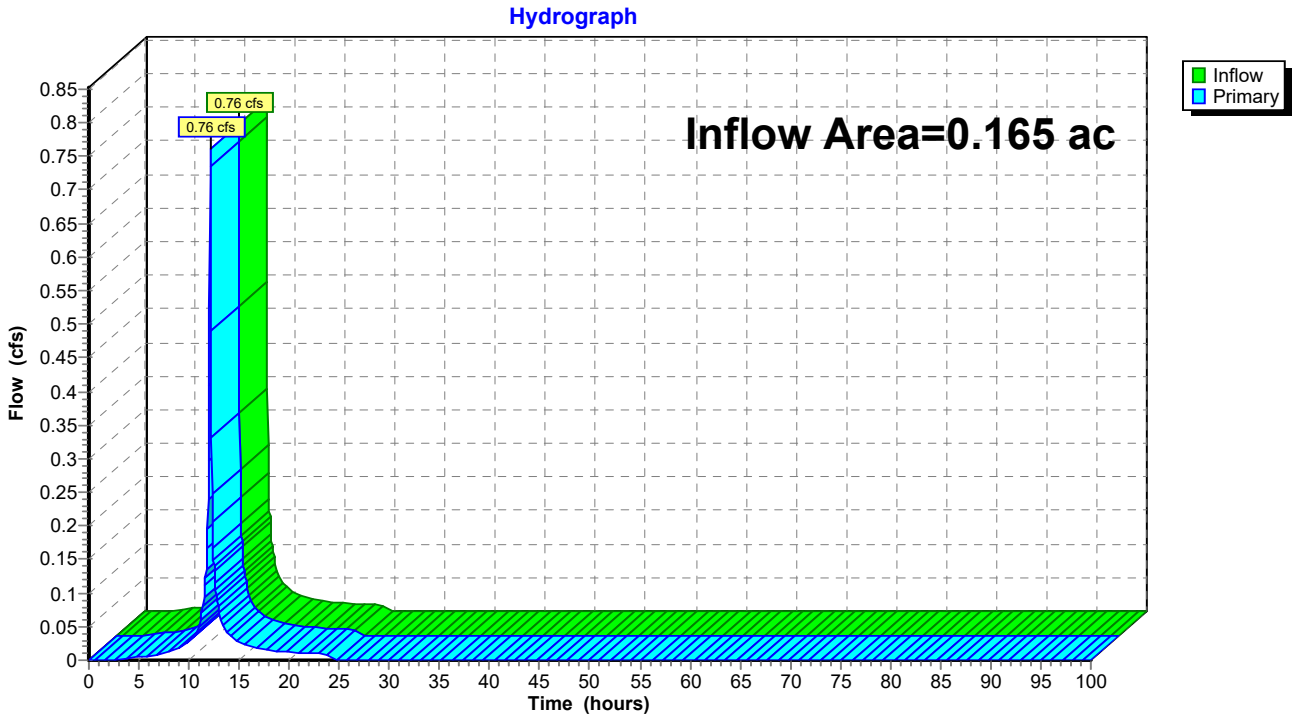


Summary for Link SP-3: SP-3

Inflow Area = 0.165 ac, 87.27% Impervious, Inflow Depth = 4.10" for 10-Year event
Inflow = 0.76 cfs @ 12.13 hrs, Volume= 0.056 af
Primary = 0.76 cfs @ 12.13 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-3: SP-3

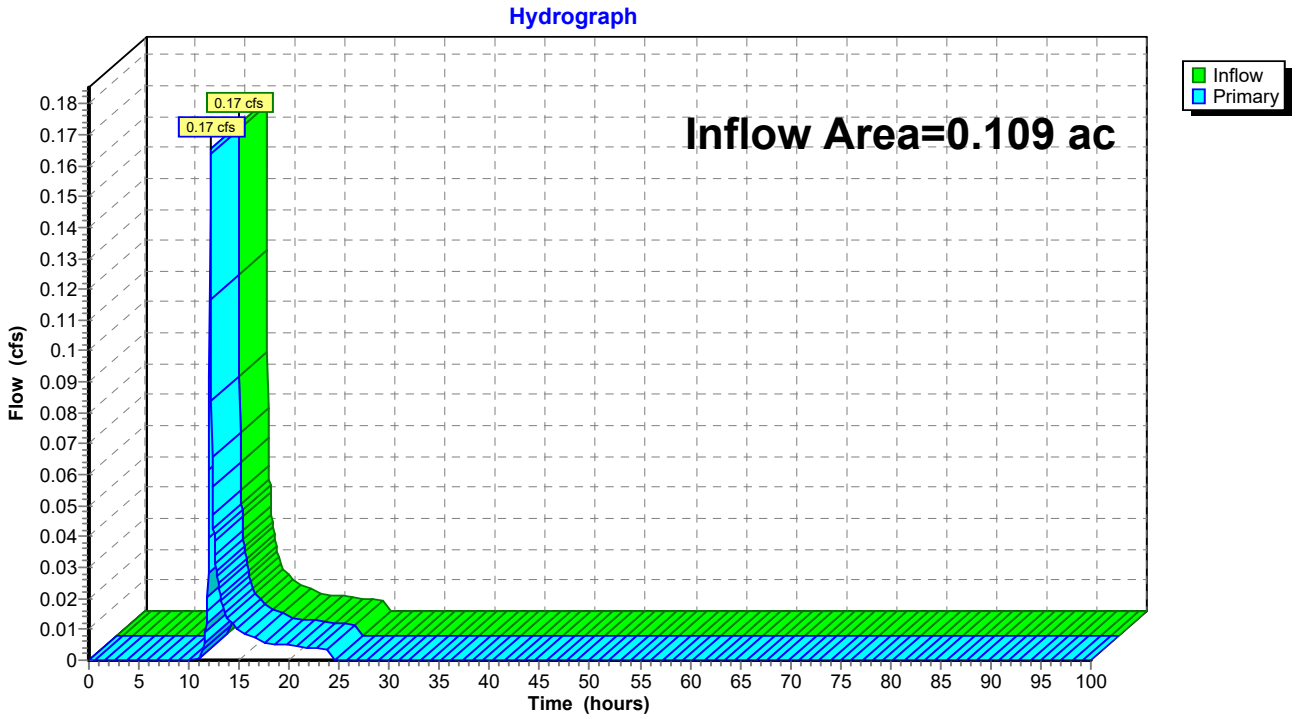


Summary for Link SP-4: SP-4

Inflow Area = 0.109 ac, 0.00% Impervious, Inflow Depth = 1.31" for 10-Year event
Inflow = 0.17 cfs @ 12.14 hrs, Volume= 0.012 af
Primary = 0.17 cfs @ 12.14 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-4: SP-4



Summary for Subcatchment PR-1: PR-1

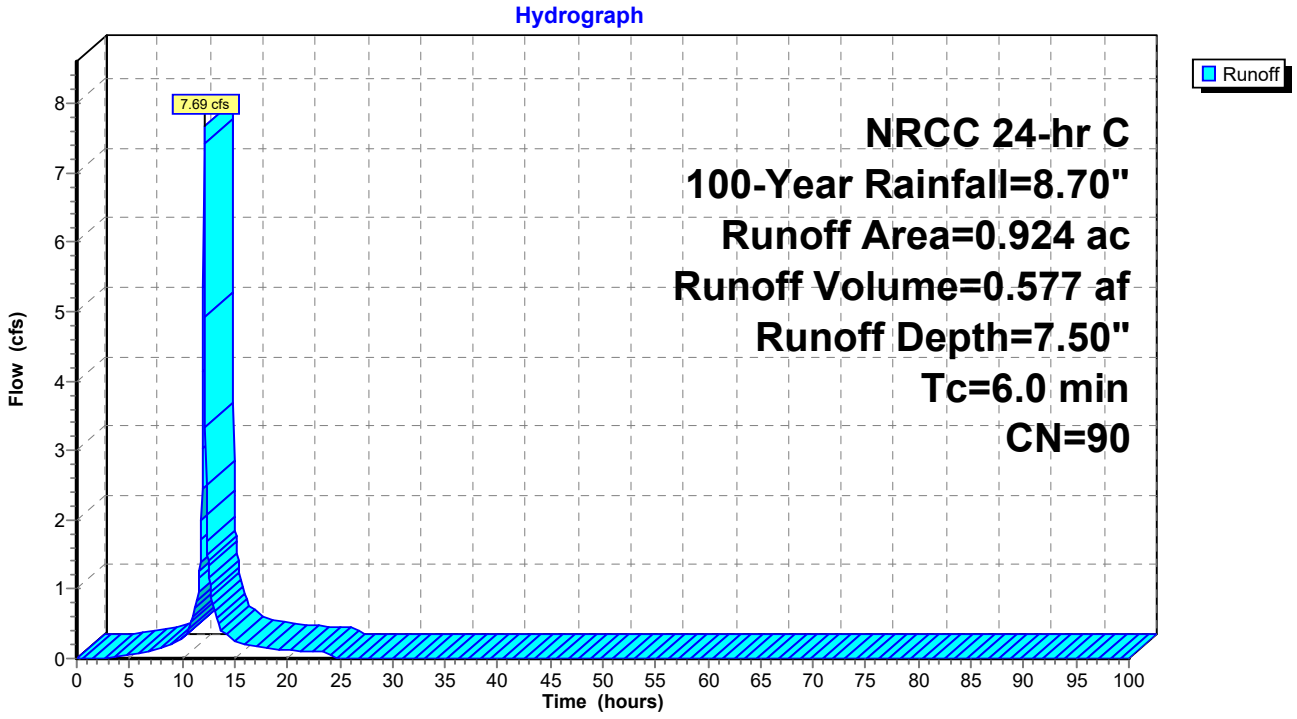
Runoff = 7.69 cfs @ 12.13 hrs, Volume= 0.577 af, Depth= 7.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.724	98	Paved parking, HSG B
0.200	61	>75% Grass cover, Good, HSG B
0.924	90	Weighted Average
0.200		21.65% Pervious Area
0.724		78.35% Impervious Area

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

Subcatchment PR-1: PR-1



Summary for Subcatchment PR-2: PR-2

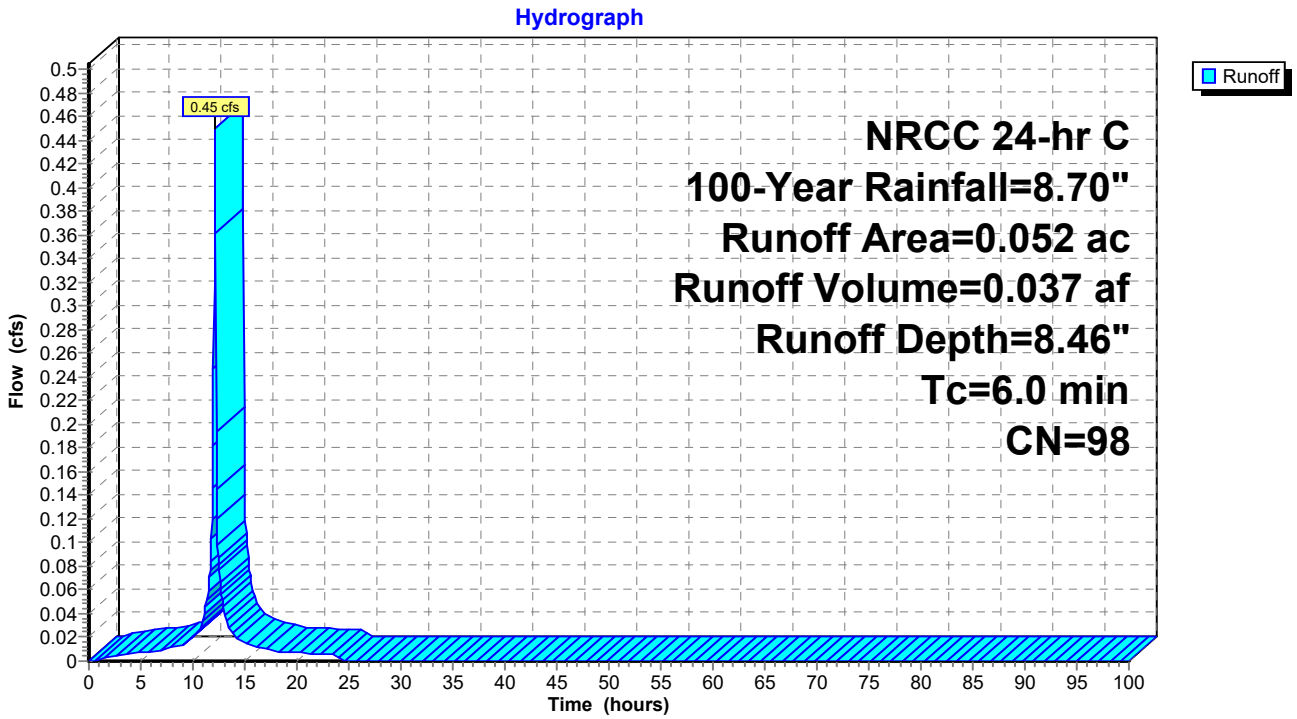
Runoff = 0.45 cfs @ 12.13 hrs, Volume= 0.037 af, Depth= 8.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.052	98	Paved parking, HSG B
0.000	61	>75% Grass cover, Good, HSG B
0.052	98	Weighted Average
0.052		100.00% Impervious Area

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

Subcatchment PR-2: PR-2



Summary for Subcatchment PR-3: PR-3

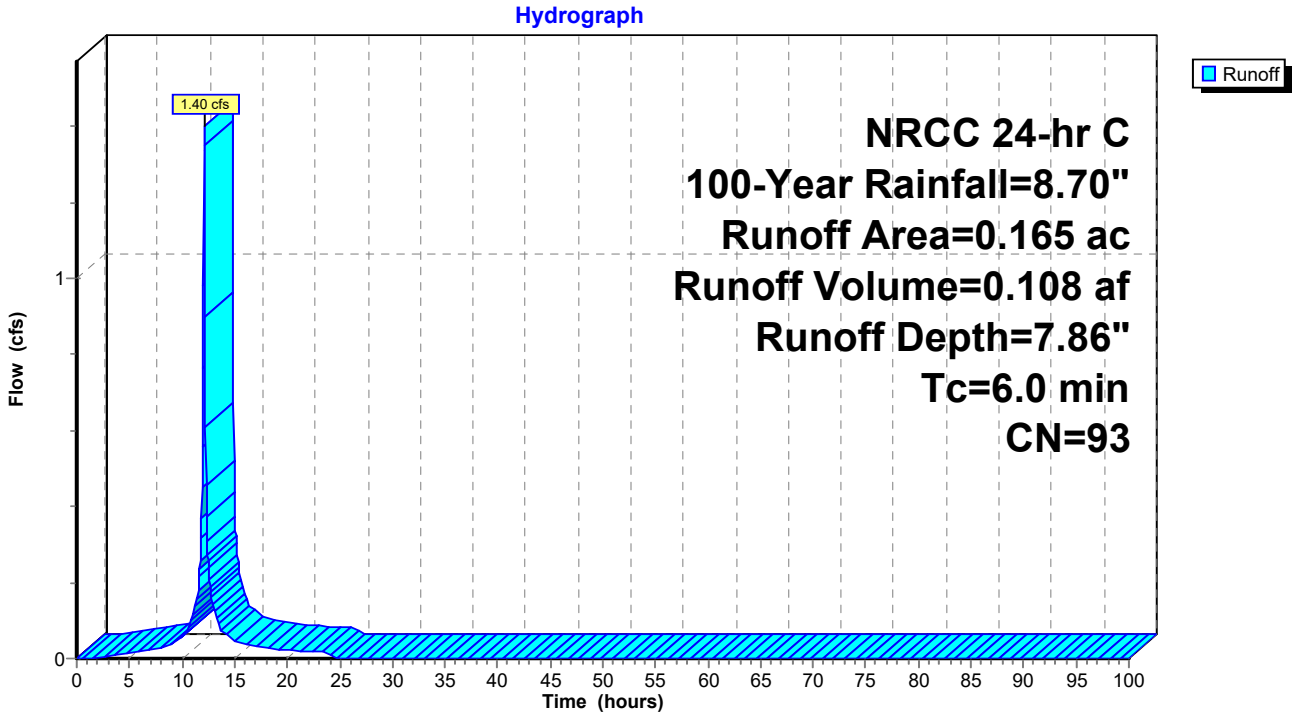
Runoff = 1.40 cfs @ 12.13 hrs, Volume= 0.108 af, Depth= 7.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.144	98	Paved parking, HSG B
0.021	61	>75% Grass cover, Good, HSG B
0.165	93	Weighted Average
0.021		12.73% Pervious Area
0.144		87.27% Impervious Area

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

Subcatchment PR-3: PR-3



Summary for Subcatchment PR-4: PR-4

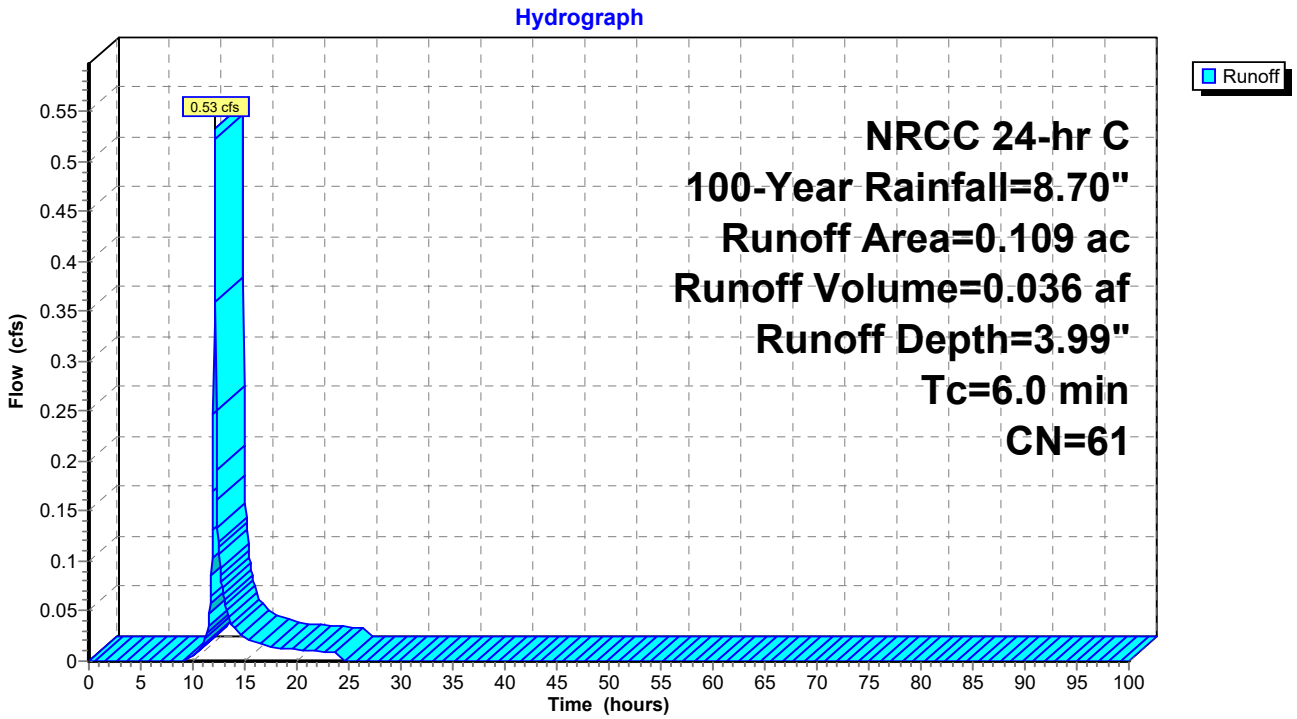
Runoff = 0.53 cfs @ 12.13 hrs, Volume= 0.036 af, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG B
0.109	61	>75% Grass cover, Good, HSG B
0.109	61	Weighted Average
0.109		100.00% Pervious Area

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

Subcatchment PR-4: PR-4



Summary for Pond IB-1: Infiltration Basin

Inflow Area = 0.924 ac, 78.35% Impervious, Inflow Depth = 7.50" for 100-Year event
Inflow = 7.69 cfs @ 12.13 hrs, Volume= 0.577 af
Outflow = 1.83 cfs @ 12.39 hrs, Volume= 0.577 af, Atten= 76%, Lag= 15.7 min
Discarded = 0.69 cfs @ 12.39 hrs, Volume= 0.537 af
Primary = 1.14 cfs @ 12.39 hrs, Volume= 0.040 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 281.43' @ 12.39 hrs Surf.Area= 0.094 ac Storage= 0.217 af

Plug-Flow detention time= 131.1 min calculated for 0.577 af (100% of inflow)
Center-of-Mass det. time= 131.1 min (908.3 - 777.2)

Volume	Invert	Avail.Storage	Storage Description
#1	277.50'	0.224 af	**Infiltration Basin (Conic)** Listed below (Recalc)

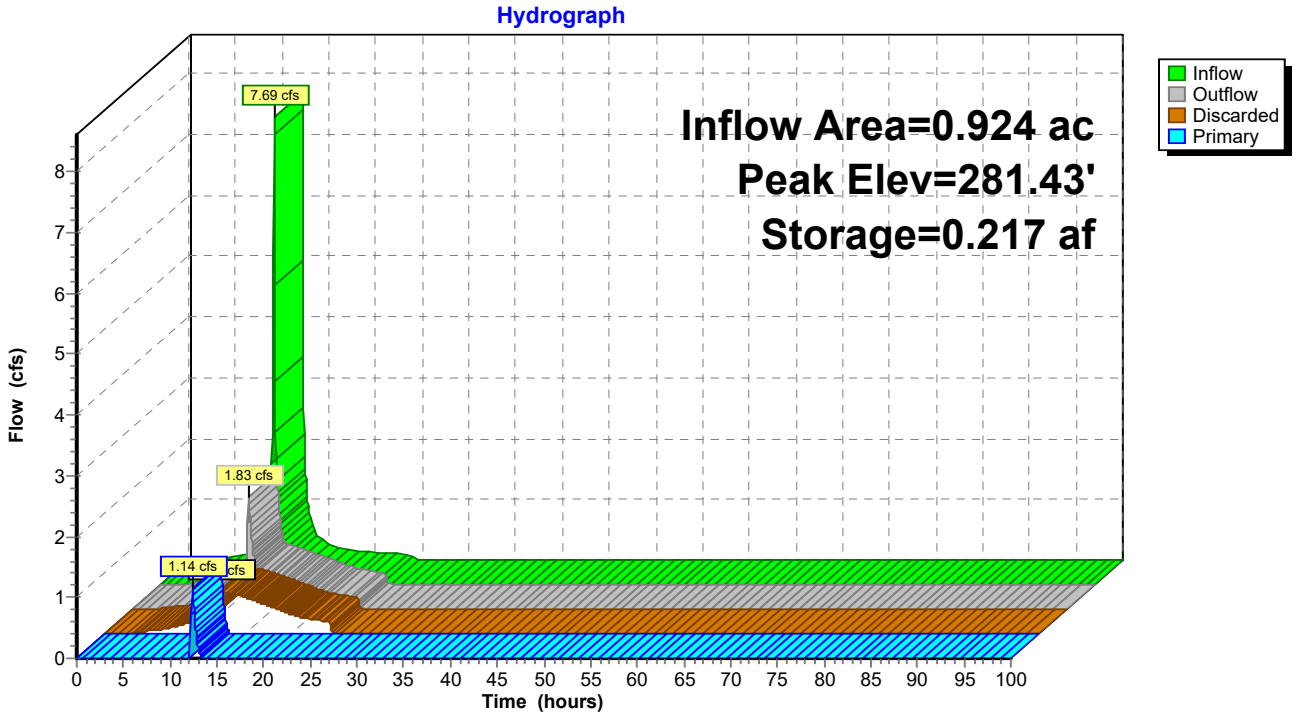
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
277.50	0.026	0.000	0.000	0.026
278.50	0.035	0.030	0.030	0.035
279.50	0.055	0.045	0.075	0.056
280.50	0.074	0.064	0.139	0.075
281.50	0.096	0.085	0.224	0.098

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.50'	**7.155 in/hr Exfiltration over Wetted area** Phase-In= 0.10'
#2	Primary	281.30'	**10.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

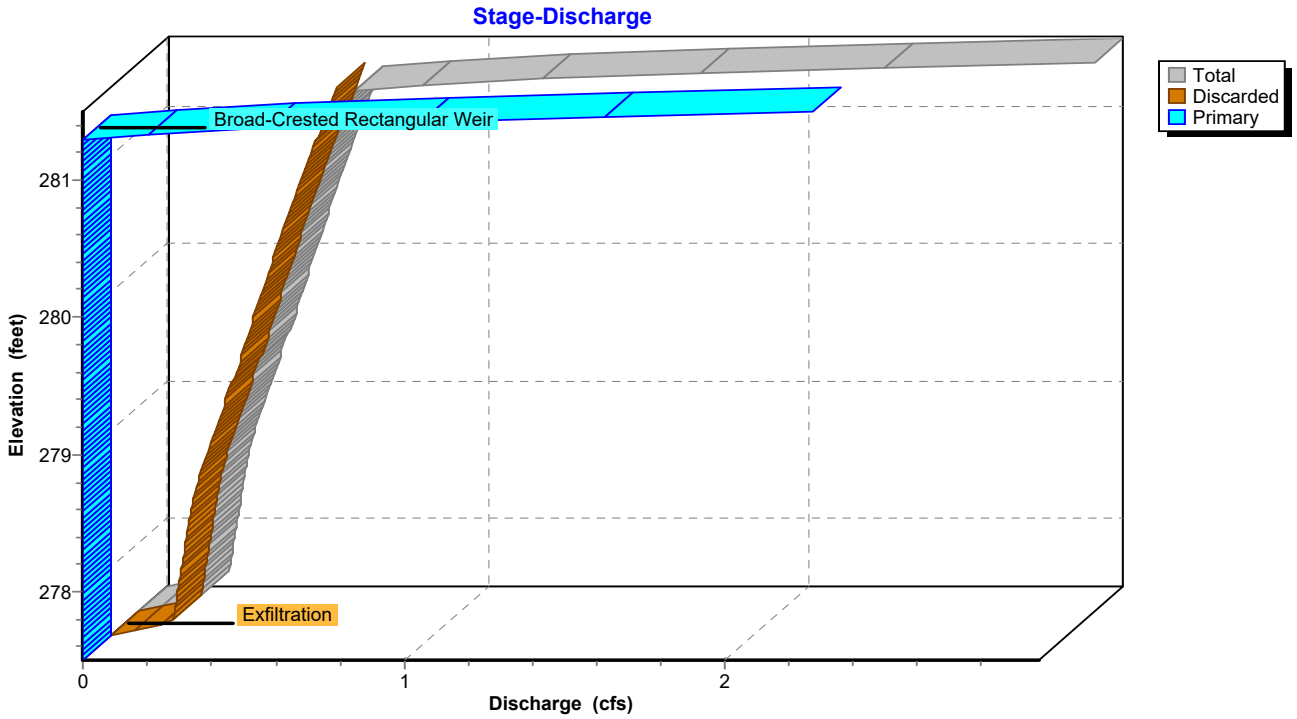
Discarded OutFlow Max=0.69 cfs @ 12.39 hrs HW=281.43' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.69 cfs)

Primary OutFlow Max=1.13 cfs @ 12.39 hrs HW=281.43' TW=0.00' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 1.13 cfs @ 0.90 fps)

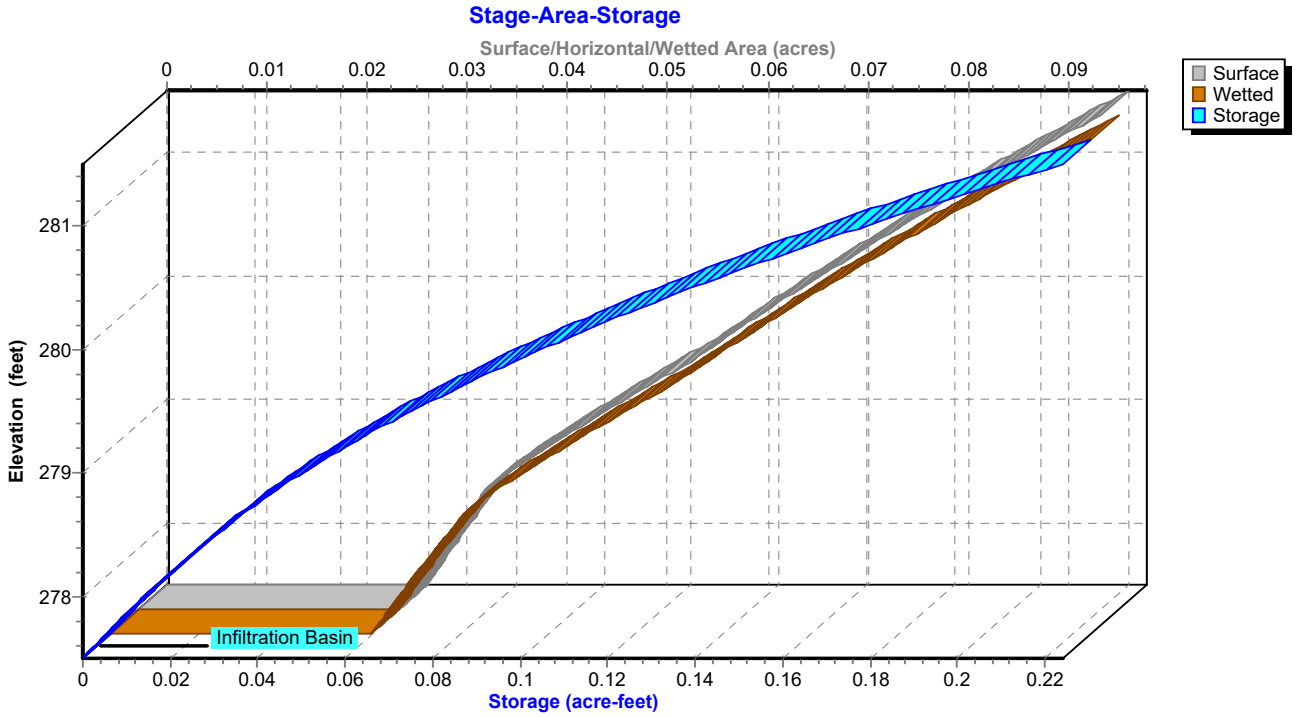
Pond IB-1: Infiltration Basin



Pond IB-1: Infiltration Basin



Pond IB-1: Infiltration Basin

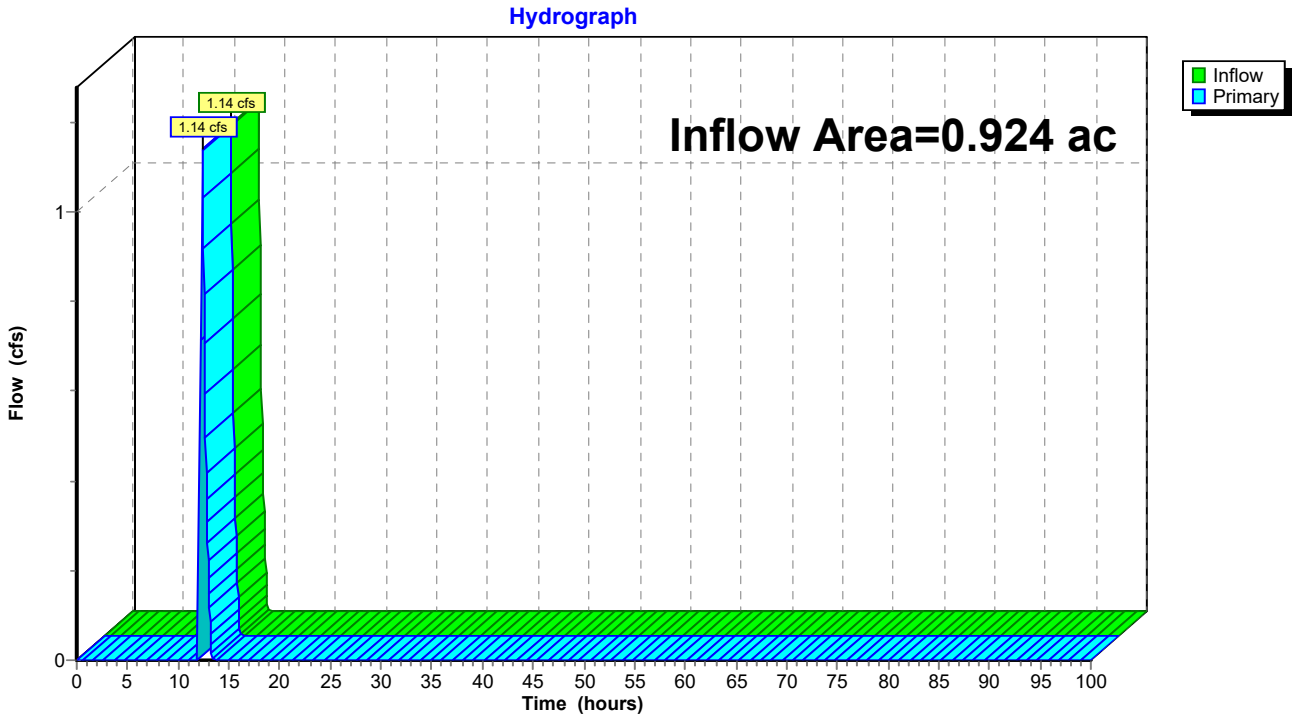


Summary for Link SP-1: SP-1

Inflow Area = 0.924 ac, 78.35% Impervious, Inflow Depth = 0.52" for 100-Year event
Inflow = 1.14 cfs @ 12.39 hrs, Volume= 0.040 af
Primary = 1.14 cfs @ 12.39 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-1: SP-1

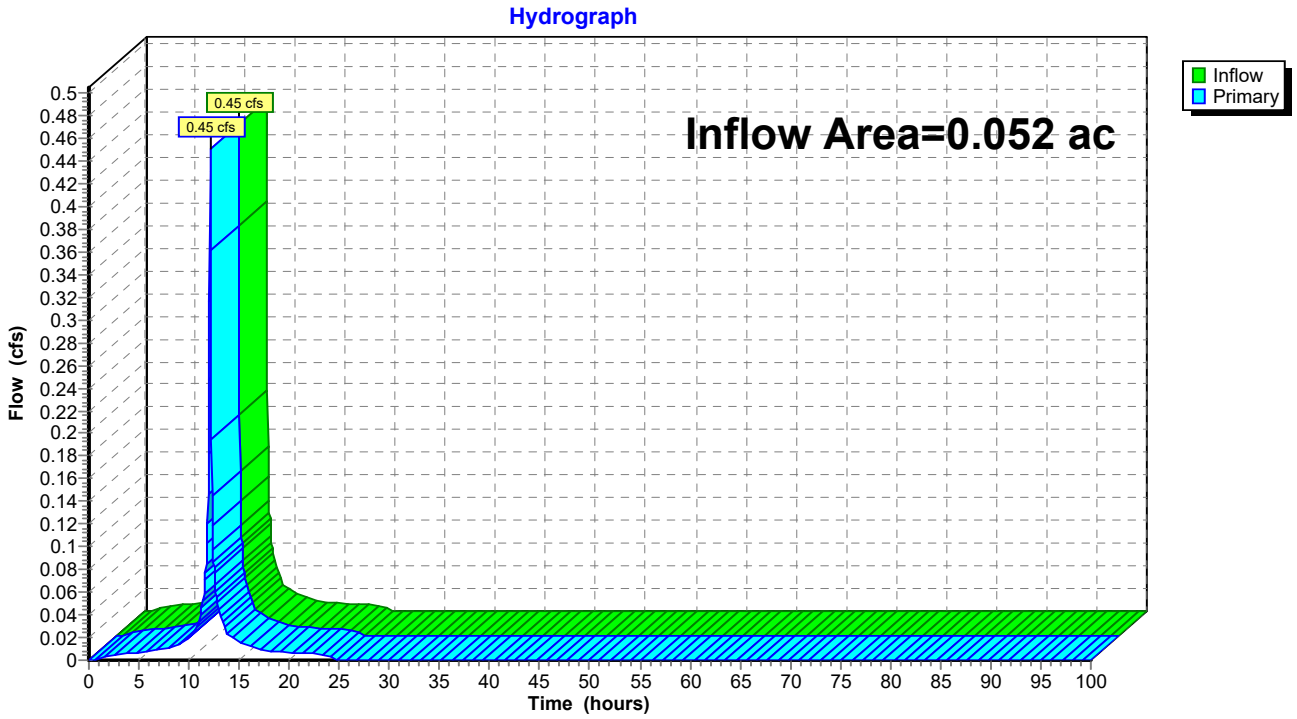


Summary for Link SP-2: SP-2

Inflow Area = 0.052 ac,100.00% Impervious, Inflow Depth = 8.46" for 100-Year event
Inflow = 0.45 cfs @ 12.13 hrs, Volume= 0.037 af
Primary = 0.45 cfs @ 12.13 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-2: SP-2

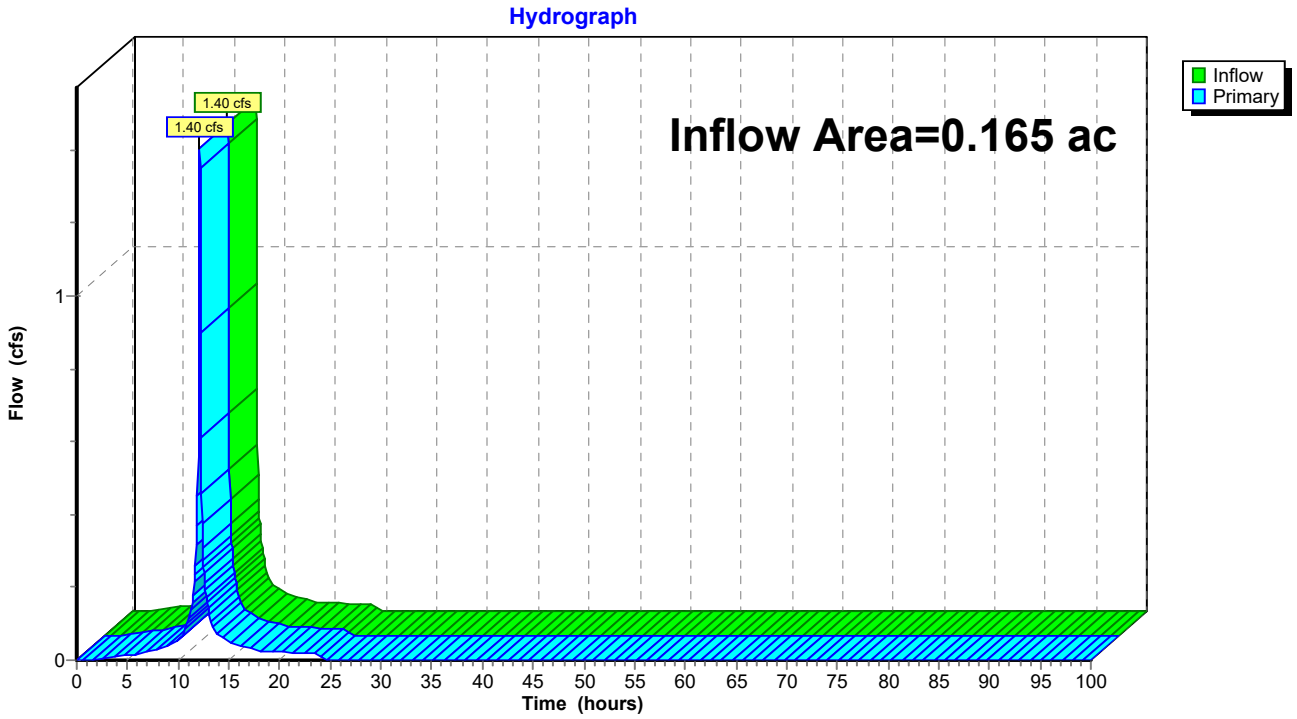


Summary for Link SP-3: SP-3

Inflow Area = 0.165 ac, 87.27% Impervious, Inflow Depth = 7.86" for 100-Year event
Inflow = 1.40 cfs @ 12.13 hrs, Volume= 0.108 af
Primary = 1.40 cfs @ 12.13 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-3: SP-3

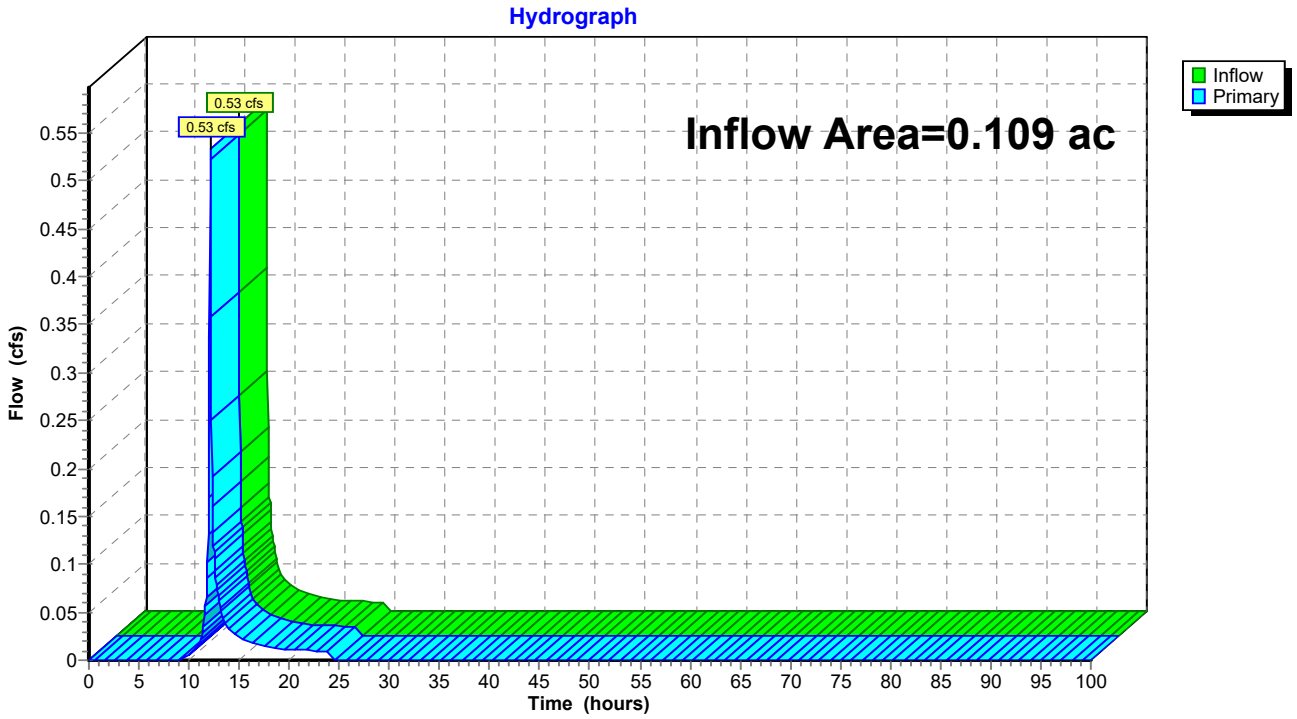


Summary for Link SP-4: SP-4

Inflow Area = 0.109 ac, 0.00% Impervious, Inflow Depth = 3.99" for 100-Year event
Inflow = 0.53 cfs @ 12.13 hrs, Volume= 0.036 af
Primary = 0.53 cfs @ 12.13 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link SP-4: SP-4



APPENDIX C – NRCS SOIL MAPS

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 State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties

March 1, 2022

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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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,700 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

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 1:12,000.

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

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

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

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

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

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

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties
Survey Area Data: Version 21, Sep 3, 2021

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

Date(s) aerial images were photographed: May 24, 2020—Jul 18, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

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
CeC	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, very rocky	10.2	58.9%
Rf	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	4.9	28.2%
UD	Udorthents-Urban land complex	2.3	13.0%
Totals for Area of Interest		**17.4**	**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.

State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties

CeC—Canton and Charlton fine sandy loams, 3 to 15 percent slopes, very rocky

Map Unit Setting

National map unit symbol: 2w81y
Elevation: 0 to 820 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: Not prime farmland

Map Unit Composition

Canton, very stony, and similar soils: 55 percent
Charlton, very stony, and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Very Stony

Setting

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

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton, Very Stony

Setting

Landform: Ridges, ground moraines, hills
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

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

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 5 percent
Landform: Ridges, hills
Hydric soil rating: Unranked

Sutton, very stony

Percent of map unit: 4 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear

Hydric soil rating: No

Gloucester, very stony

Percent of map unit: 4 percent
Landform: Ridges, moraines, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Chatfield, very stony

Percent of map unit: 2 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Rf—Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2t2qt
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, extremely stony, and similar soils: 40 percent
Leicester, extremely stony, and similar soils: 35 percent
Whitman, extremely stony, and similar soils: 17 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

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

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 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 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Description of Leicester, Extremely Stony

Setting

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

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 7 inches: fine sandy loam
Bg - 7 to 18 inches: fine sandy loam
BC - 18 to 24 inches: fine sandy loam
C1 - 24 to 39 inches: gravelly fine sandy loam
C2 - 39 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches

Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B/D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Description of Whitman, Extremely Stony

Setting

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

Typical profile

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

Properties and qualities

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

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Woodbridge, extremely stony

Percent of map unit: 6 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest

Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Swansea
Percent of map unit: 2 percent
Landform: Bogs, swamps
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

UD—Udorthents-Urban land complex

Map Unit Setting
National map unit symbol: 9lxj
Elevation: 0 to 670 feet
Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 211 days
Farmland classification: Not prime farmland

Map Unit Composition
Udorthents and similar soils: 70 percent
Urban land: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Human transported material

Typical profile
A - 0 to 12 inches: sandy loam
C1 - 12 to 25 inches: sandy loam
C2 - 25 to 60 inches: stratified sand to very gravelly coarse sand

Properties and qualities
Slope: 0 to 15 percent
Depth to restrictive feature: More than 80 inches
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 42 to 54 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Description of Urban Land

Setting

Parent material: Human transported material

Typical profile

R - 0 to 6 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Terraces, outwash plains, kames
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Quonset

Percent of map unit: 5 percent
Landform: Outwash plains, terraces, outwash terraces, eskers
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

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APPENDIX D – EXISTING AND PROPOSED DRAINAGE AREA EXHIBITS

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Saved Monday, May 16, 2022 10:01:59 AM TIM.ZHANG Plotted Thursday, May 19, 2022 3:36:42 PM Zhang, Tim

LEGEND

- LOT LINE
- EXISTING CONTOUR
- PROPOSED CONTOUR
- PRE-DEVELOPMENT DRAINAGE AREA
- POST-DEVELOPMENT DRAINAGE AREA
- SP-1 STUDY POINT

EX-1
IMPERVIOUS AREA: 1,311 SF (0.030 AC)
PERVIOUS AREA: 8,596 SF (0.197 AC)
TOTAL DRAINAGE AREA: 9,907 SF (0.227 AC)
CN: 66
TC: 6 MIN

EX-2
IMPERVIOUS AREA: 4,568 SF (0.105 AC)
PERVIOUS AREA: 20,743 SF (0.476 AC)
TOTAL DRAINAGE AREA: 25,311 SF (0.581 AC)
CN: 68
TC: 6 MIN

EX-3
IMPERVIOUS AREA: 4,365 SF (0.100 AC)
PERVIOUS AREA: 10,644 SF (0.244 AC)
TOTAL DRAINAGE AREA: 15,009 SF (0.344 AC)
CN: 72
TC: 6 MIN

EX-4
IMPERVIOUS AREA: NEGLIGABLE
PERVIOUS AREA: 5,016 SF (0.115 AC)
TOTAL DRAINAGE AREA: 5,016 SF (0.115 AC)
CN: 61
TC: 6 MIN

TBM-A
MAG NAIL
EL.=308.62

MAP 13
LOT 145
N/F LANDS OF
NARRAGANSETT ELEC CO
(PER GIS)
#FF EDDIE DOWLING HIGHWAY

MAP 13
LOT 103
N/F LANDS OF
395 EDDIE, LLC
BK. 713, PG. 207
#395 EDDIE DOWLING HIGHWAY

MAP 13
LOT 104
N/F LANDS OF
STORAGE PROS NORTH
SMITHFIELD LLC
BK. 707, PG. 25
#415 EDDIE DOWLING HIGHWAY

EDDIE DOWLING HIGHWAY
(A.K.A. LOUISQUISSET PIKE - ROUTE 146A)
(VARIABLE WIDTH, R.O.W.)
(ASPHALT ROADWAY)
(TWO WAY TRAFFIC)

N78°58'22"E
951.05' (M)

S73°08'23"W
1079.96' (M)

S57°28'47"W
54.24' (M)

S24°01'41"E
29.51' (M)

S35°45'47"E
23.13' (M)

R=1918.60'
Δ=00°20'05"
L=44.69'
CHB=S19° 22' 02"E
CHD=44.69'

R=1918.60'
Δ=00°39'37"
L=223.03'
CHB=S23° 21' 53"E
CHD=222.90'

R=1918.60'
Δ=00°39'37"
L=223.03'
CHB=S23° 21' 53"E
CHD=222.90'

1 STORY
FRAME BUILDING
"STORAGE RENTALS OF AMERICA"
BFFA=7,861± S.F.

1 STORY
FRAME BUILDING
"STORAGE RENTALS OF AMERICA"
BFFA=8,380± S.F.

2 STORY
FRAME BUILDING
BFFA=916± S.F.

1 STORY
FRAME BUILDING
BFFA=902± S.F.

GRAPHIC SCALE IN FEET
0 10 20 40

NORTH

NOT FOR CONSTRUCTION

NO.	REVISIONS	DATE	BY

Kimley»Horn
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1 NORTH LEXINGTON AVENUE, SUITE 505
WHITE PLAINS, NEW YORK 10601
PHONE: 914-368-9200
WWW.KIMLEY-HORN.COM

STORAGE Rentals of America

MICHAEL W. JUNGHANS
No. 7070
REGISTERED PROFESSIONAL ENGINEER

KHA PROJECT	112573000
DATE	5/19/2022
SCALE:	AS SHOWN
DESIGNED BY:	TZ
DRAWN BY:	TZ
CHECKED BY:	KCE

DRAINAGE AREA EXHIBIT (PRE-CONDITION)

STORAGE RENTALS OF AMERICA
395 EDDIE DOWLING HIGHWAY
NORTH SMITHFIELD, RI 06705
MAP 13, LOTS 103 AND 104
TOWN OF NORTH SMITHFIELD RHODE ISLAND

SHEET NUMBER
D-1

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Saved Monday, May 16, 2022 10:01:59 AM TM.ZHANG Plotted Thursday, May 19, 2022 3:36:50 PM Zhang, Tim

LEGEND

- LOT LINE
- EXISTING CONTOUR
- PROPOSED CONTOUR
- PRE-DEVELOPMENT DRAINAGE AREA
- POST-DEVELOPMENT DRAINAGE AREA
- SP-1 STUDY POINT

PR-1
IMPERVIOUS AREA: 31,522 SF (0.724 AC)
PERVIOUS AREA: 9,413 SF (0.200 AC)
TOTAL DRAINAGE AREA: 40,935 SF (0.940 AC)
CN: 90
TC: 6 MIN

PR-2
IMPERVIOUS AREA: 2,640 SF (0.052 AC)
PERVIOUS AREA: N/A
TOTAL DRAINAGE AREA: 2,640 SF (0.052 AC)
CN: 98
TC: 6 MIN

PR-3
IMPERVIOUS AREA: 6,274 SF (0.144 AC)
PERVIOUS AREA: 903 SF (0.021 AC)
TOTAL DRAINAGE AREA: 7,177 SF (0.165 AC)
CN: 93
TC: 6 MIN

PR-4
IMPERVIOUS AREA: N/A
PERVIOUS AREA: 4,769 SF (0.109 AC)
TOTAL DRAINAGE AREA: 4,769 SF (0.109 AC)
CN: 61
TC: 6 MIN

PROPOSED 3-STORY SELF STORAGE BUILDING
20,400 SF FOOTPRINT
(SPRINKLERED)
61,200 GSF
FFE: 284.00

MAP 13
LOT 145
N/F LANDS OF
NARRAGANSETT ELEC CO
(PER GIS)
OFF EDDIE DOWLING HIGHWAY

MAP 13
LOT 104
N/F LANDS OF
STORAGE PROS NORTH SMITHFIELD LLC
BK. 707, PG. 25
#415 EDDIE DOWLING HIGHWAY

EDDIE DOWLING HIGHWAY
(A.K.A. LOUISQUISSET PIKE - ROUTE 146A)
(VARIABLE WIDTH, R.O.W.)
(ASPHALT ROADWAY)
(TWO WAY TRAFFIC)

TBM-A
MAG NAIL
EL.=308.62

N78°55'22"E
954.08' (M)

S73°08'23"W
1079.96' (M)

S57°28'47"W
54.24' (M)

S24°01'54"E
29.51' (M)

R=1918.60'
Δ=00°20'05"
L=44.69'
CHB=S19° 22' 02"E
CHD=44.69'

R=1918.60'
Δ=006°39'37"
L=223.03'
CHB=S23° 21' 53"E
CHD=222.90'

15' SIDE YARD SETBACK
25' FRONT YARD SETBACK
80' SETBACK

ME 281.59
ME 281.37
ME 281.36

RIDGE
EDGE OF WOODS
WOODED AREA
OVERGROWN AREA
ASPHALT PAVEMENT
GRAVEL AREA
GRASS AREA
BOULDER
STONE WALL
UTILITY BOX
"LEFT LANE END"
"ONE WAY"
"ENTER ONLY"
BOLLARD (TYP.)
STORAGE UNITS
BRICK PAVERS
OVERHANG
CONDANER (TYP.)
1 STORY FRAME BUILDING "STORAGE RENTALS OF AMERICA" BFFA=7,861± S.F.
1 STORY FRAME BUILDING "STORAGE RENTALS OF AMERICA" BFFA=8,380± S.F.
APPROX LOC OF DELINEATION LINE (PER REF #10)
APPROX LOC OF UG TELE LINE (PER UTILITY MARKOUT) (SEE NOTE #3) (PER REF #11)
APPROX LOC OF UG SEWER LINE (PER UTILITY MARKOUT) (SEE NOTE #3) (PER REF #11)
APPROX LOC OF UG ELEC LINE (PER UTILITY MARKOUT) (SEE NOTE #3) (PER REF #11)
APPROX LOC OF UG WATER LINE (PER UTILITY MARKOUT) (SEE NOTE #3) (PER REF #11)
GRT=280.18 INV(A)=278.9 INV(B)=277.5
GRT=280.19 INV(A)=278.7 INV(B)=276.7
GRT=280.20 INV(A)=278.4 INV(B)=277.1
GRT=280.04 INV(A)=278.3 INV(B)=276.7
RIM=280.73 (UTIL)
RIM=280.94
RIM=280.65 (UTIL)
RIM=281.45
RIM=280.51 INV(A)=276.4 INV(B)=276.3
RIM=280.69 (UTIL)

GRAPHIC SCALE IN FEET
0 10 20 40

NORTH

NO.	REVISIONS	DATE	BY

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STORAGE Rentals of America

MICHAEL W. JUNGHANS
No. 17070
REGISTERED PROFESSIONAL ENGINEER

KHA PROJECT	112573000
DATE	5/19/2022
SCALE:	AS SHOWN
DESIGNED BY:	TZ
DRAWN BY:	TZ
CHECKED BY:	KCE

DRAINAGE AREA EXHIBIT (POST-CONDITION)

STORAGE RENTALS OF AMERICA
395 EDDIE DOWLING HIGHWAY
NORTH SMITHFIELD, RI 06705
MAP 13, LOTS 103 AND 104
TOWN OF NORTH SMITHFIELD RHODE ISLAND

SHEET NUMBER
D-2

APPENDIX E – GEOTECHNICAL REPORT

JOE CASALI ENGINEERING, INC.

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August 12, 2021

Mr. Sean Dewhurst
Storage Rentals of America
324 Datura Street, Suite 338
West Palm Beach, FL 33401

Re: Storage Rentals of America - Facility Expansion
435 Eddie Dowling Highway, North Smithfield, Rhode Island
Geotechnical Site Investigations and Recommendations

Dear Mr. Dewhurst:

This letter presents our geotechnical recommendations for the potential construction of additional self-storage buildings for Storage Rentals of America located at 435 Eddie Dowling Highway in North Smithfield, Rhode Island. The purpose of this geotechnical exploration program and report is to assess the suitability of the subject site for a potential expansion of Storage Rentals of America.

PROJECT AND SITE DESCRIPTION

The subject property, identified as Tax Assessors Plat Map (AP) 13, Lots 103 and 104 has a physical address of 435 Eddie Dowling Highway in the Town of North Smithfield, Rhode Island. The two parcels combined are approximately 3.13 acres of land; Lot 104 is home to Storage Rentals of America; a self-storage facility and Lot 103 contains an abandoned residential home and accessory structures. Numerous ledge outcrops were observed around both Lots 103 and 104. Refer to Figure 1 - Locus Map for additional site location details.

USDA Soil Classification

According to the Soil Survey of Rhode Island, prepared by the US Department of Agriculture, Soil Conservation Service, the soils on the site consist of Udorthents-Urban land complex (UD), Canton and Charlton fine sandy loams, 3 to 15 percent slopes (CeC) and Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony (Rf). The above-mentioned soils are generally defined as the following:

> *Udorthents-Urban land complex (UD), consists of human transported material (fill) requiring site specific study for assessment of use.*
>
> *Canton and Charlton fine sandy loams, 3 to 15 percent slopes (CeC), consist of coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist. These soils are well drained.*
>
> *Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony (Rf), consist of coarse-loamy lodgment till derived from gneiss, granite, and/or schist. These soils are poorly drained.*

Geologic Setting

The existing USGS Surficial Geology Map for the Georgiaville and Pawtucket Quadrangles, prepared in the late 1940's and early 1950's, indicates that the surficial geology of the subject site consists of gray, sandy, friable upper till and areas of unusually abundant boulders on the surface of morainal deposits. The existing USGS Bedrock Geology Map for the Georgiaville and Pawtucket Quadrangle, prepared in late 1940's and early 1950's, indicates that the site is further underlain by Feldspathic quartz-epidote schist of the Blackstone series. The USGS Surficial Geology Maps and USGS Bedrock Geology Map with the approximate project site overlaid are shown on Figures 2 and 3, respectively.

GEOTECHNICAL BORINGS

JCE engaged Crawford Drilling Service, Inc. (CDS) to drill the borings for the potential self-storage building(s). CDS drilled eight (8) borings within the site (B-1 through B-8) between Wednesday, July 28 and Friday, July 30, 2021, using both hollow stem auger and drive and wash with casing drilling techniques. A JCE engineer was on-site full time to coordinate and document the explorations and to collect soil samples. Exploration locations are shown on Figure 4 and were located by taping from existing site features.

A JCE field engineer visually classified soil samples in the field using ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). A Rhode Island Registered Professional Engineer later checked field classifications at JCE's office. Standard Penetration Tests (SPTs) were performed at standard 5-foot intervals for all borings until the proposed termination depth or refusal was encountered, whichever was shallower. Where applicable, approximately 5-ft of rock was cored to confirm bedrock was encountered. Boring logs are included in Appendix A. A summary of the exploration program performed by JCE for the site is provided in Table 1.

Table 1: Subsurface Exploration Summary

Exploration ID	Latitude[(1)]	Longitude[(1)]	Ground Surface El.[(2)]	Termination Depth (ft)	Termination El.[(2)]
B-1	41.972677	-71.510731	282.0	12.5	269.5
B-2	41.972924	-71.509754	284.0	2.5	281.5
B-3	41.973251	-71.510242	296.0	15.0	281.0
B-4	41.972884	-71.510483	285.0	19.0	266.0
B-5	41.973119	-71.510194	292.0	9.5	282.5
B-6	41.972429	-71.510441	281.0	21.5	259.5
B-7	41.972992	-71.509877	292.0	10.0	282.0
B-8	41.972964	-71.510881	285.0	12.5	272.5

1. Horizontal datum is NAD83, State Plane Coordinate System (RI Zone 3800).
2. Vertical datum is North American Vertical Datum of 1988 (NAVD88).

All soil samples collected as a result of our explorations are being stored at our office in Warwick, Rhode Island. The soil samples will be held for six (6) months after the issuance of this report. We will discard the samples after the six (6) months has elapsed unless other arrangements are made.

Generalized Subsurface Conditions

Subsurface conditions were generally consistent between all borings performed. The subsurface conditions are only known at the boring locations; conditions elsewhere may vary significantly. A description of the major soil layers encountered in the borings is presented below.

Undocumented Fill – A layer of undocumented fill was encountered in B-1, B-2 and B-6. In general, the undocumented fill layer ranged in thickness from 1.3-ft to 7-ft and consisted of about 60 percent sand, 20 percent nonplastic fines (silt) and 20 percent gravel. Standard penetration test (SPT) blow counts taken in the undocumented fill ranged from 7 blows per foot (bpf) to 75 bpf, with a median value of 34 bpf indicating a medium dense to dense soil.

Glacial Deposits – A layer of glacial deposits was encountered below the undocumented fill in B-1, B-2 and B-6 and from the ground surface in the remainder of the explorations. In general, the glacial deposits layer ranged in thickness from 3- to 13-ft and consisted of about 65 percent sand, 20 percent nonplastic fines (silt) and 15 percent gravel. SPT blow counts taken in the glacial deposits layer ranged from 1 bpf to 100 bpf, with a median value of 47 bpf indicating a dense soil.

Bedrock – Bedrock was encountered in all borings. B-1, B-2, and B-6 were terminated at refusal on ledge. Rock was cored at B-3, B-4, B-5, B-7 and B-8 to confirm the presence of ledge.

Groundwater

We measured the groundwater level in the open boreholes at the completion of drilling. Based on our measurements, the groundwater level varied somewhat between all borings, ranging from 7-ft to 13.5-feet below the existing ground surface; and not being encountered in several of the borings. For design purposes, we recommend using a groundwater table of 7-feet below the existing ground surface.

Table 2: Groundwater Observations

Exploration ID	Ground Surface El.(1)	Groundwater Depth (ft)	Groundwater Elevation(1)
B-1	282.0’	NE	NE
B-2	284.0’	NE	NE
B-3	296.0’	13.5	282.5
B-4	285.0’	7.0	278.0
B-5	292.0’	NE	NE
B-6	281.0’	NM	NM
B-7	292.0’	NE	NE
B-8	285.0’	7.0	278.0

1. Vertical datum is North American Vertical Datum of 1988 (NAVD88).
2. NE = Not Encountered; NA = Not Measured.

Laboratory Testing

Laboratory testing was performed on representative soil samples to confirm field identifications, to establish engineering characteristics for use in design, and to assess suitability for reuse. Laboratory testing was performed by Thielsch Engineering Inc.’s soils laboratory in Cranston, Rhode Island and included six (6) grain

size analyses in accordance with ASTM D422. Results of the laboratory testing program have been incorporated into the boring logs and are provided in Appendix B.

GEOTECHNICAL RECOMMENDATIONS

Foundation Design

We recommend that any proposed building be supported on spread or strip footings that bear on natural glacial deposits, structural fill extending down to natural glacial deposits, or on sound ledge. The footings should be designed for the following net allowable bearing pressures:

Table 3: Bearing Capacity Recommendations

Bearing Stratum	Net Allowable Bearing Pressure (psf)
Natural Glacial Deposits	5,000 psf
Structural Fill Extending to Natural Glacial Deposits	5,000 psf
Sound Ledge	10,000 psf

All footings should be at least 3 feet wide. Exterior footings should be founded at least 4'-6" below the exterior ground surface for frost protection. Interior footings should be founded at least 18-inches below the bottom of the floor slab. The tops of all footings should be at least 6 inches below the bottom of the overlying floor slab.

We estimate that total spread or strip footing settlements will be about ½-inch, and differential settlements between adjacent footings will be about ¼-inch maximum. Most of the settlement is expected to occur during or immediately after construction. These estimates assume that the foundation and subgrades are designed and constructed according to the recommendations in this report.

Any boulders encountered within excavations for foundations should be removed to a depth of at least 12-inches below the bottom of footings. Voids from these excavations should be filled with compacted Structural Fill, or crushed stone if below the water table or if subgrade is wet. Subgrade preparation requirements for foundations on soil and ledge are presented below.

Floor Slab Design

The floor slab of the proposed building may be designed as a slab-on-grade that bears on compacted Structural Fill or compacted ¾-inch crushed stone. All topsoil and unsuitable material should be removed and replaced with compacted Structural Fill. The floor slab should not rest directly on bedrock or boulders. Any sharp protrusions of boulders or cobbles should be excavated as needed to allow for a minimum 12-inch-thick layer compacted Structural Fill or compacted ¾-inch crushed stone to be placed below the slab.

We recommend that a vapor barrier be installed below the floor slab to limit moisture infiltration. The vapor barrier should be sealed at all walls and penetrations. We also recommend that contraction joints be incorporated between the slab-on-grade and the columns and perimeter walls of the proposed building.

To design slabs on soil subgrades described above, we recommend using Westergaard's modulus of subgrade reaction k = 100 pounds per cubic inch (pci) where the Structural Fill or crushed stone thickness is less than or equal to 12 inches or k = 200 pci where structural fill or crushed stone thickness is greater than 12 inches. These recommendations are based on design criteria provided in "Slab Thickness Design for Industrial Concrete Floors on Grade" by the Portland Cement Association.

Seismic Design

We recommend using Site Class C for seismic design of foundation elements in accordance with Section 1613 of the International Building Code (IBC 2012) (adopted as Rhode Island State Building Code, Effective July 1, 2013). Foundation elements should be designed to resist earthquake lateral forces as described in Section 1613 of IBC 2012. According to Table 1608.1 in the Rhode Island Amendments to the IBC 2012 (SBC-1 State Building Code), the following seismic coefficients should be used for seismic design:

- S_S = 0.176g
- S_1 = 0.063g
- S_{DS} = 0.186g
- S_{D1} = 0.070g
- PGA_M = 0.108g

Peak ground acceleration (PGA_M) corresponds to the PGA value corrected for site effects (as indicated in ASCE 7-10). It is our opinion that earthquake induced liquefaction is not a concern at the site.

Pavement Recommendations

We recommend that the areas of proposed pavement adhere to the following minimum requirements:

Table 4: Pavement Recommendations

Pavement Type	Bituminous Surface Course	Bituminous Base Course	Aggregate Base Course
Standard Duty	1.5" Class 9.5 HMA	2.5" Class 12.5 HMA	8" Gravel Borrow
Heavy Duty	2.0" Class 9.5 HMA	3.0" Class 12.5 HMA	12" Gravel Borrow

Note: HMA = Hot Mix Asphalt

All materials should be in accordance with the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction. Standard Duty pavement can be defined as pavement for areas subject primarily to general traffic, such as parking lots. Heavy Duty pavement can be defined as pavement for areas subject to heavy traffic and truck traffic, such as roadways, truck circulations routes around the warehouse, and trailer storage areas.

CONSTRUCTION RECOMMENDATIONS

Earthwork

Excavations for any proposed building foundations should at no time remove lateral support from the existing Storage of America building's foundation. The existing building's foundation should be protected at all times from settlement and/or lateral translation.

Any fill placed within the proposed building footprint and within a 5-foot radius of the proposed building footprint should meet the gradation and compaction requirements for Structural Fill shown in Table 5. We recommend that any fill placed within 5 feet of foundation walls be compacted with a hand-operated compactor. Backfill placed outside of the area described above should meet the gradation and compaction requirements for Common Borrow shown in Table 6.

The ground immediately adjacent to the proposed building footprint and foundation should be sloped away from the building at a slope not less than 5 percent for a minimum distance of 10 feet. Impervious surfaces adjacent to the proposed building footprint and foundation may be sloped a minimum of 2 percent for a minimum distance of 10 feet. Where the proposed building is located adjacent to an ascending slope, the building face should be located no closer than half the height of the adjacent slope or 15-feet, the lesser of the two. All excavations should be made in accordance with OSHA regulations. We recommend that a JCE engineer perform continuous observation and documentation of backfilling and compaction during construction.

Table 5: Requirements for Structural Fill

Sieve Size	Percent Passing by Weight
3-inches	100
1/2-inch	50-100
No. 4	30-85
No. 16	15-65
No. 50	5-40
No. 200	0-8

1. Structural fill shall consist of well-graded, natural sand and gravel free of excessive clay, silt, organic matter, and other deleterious materials.
2. Material passing the No. 200 sieve should be non-plastic.
3. Structural fill shall be compacted in loose lifts no more than 9-inches-thick. Compaction shall be to 95 percent of the maximum dry density in accordance with ASTM D1557.

Table 6: Requirements for Common Borrow

Sieve Size	Percent Passing by Weight
6-inches	100
3-inches	80-100
1-inch	60-100
No. 4	20-85
No. 200	0-17

1. Common borrow shall be in accordance with Section M.01 of the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, 2004 Edition with latest addenda and shall consist of well-graded, natural sand and gravel free of excessive clay, silt, organic matter, and other deleterious materials.
2. Material passing the No. 200 sieve should be non-plastic.
3. Common Borrow shall be compacted in loose lifts no more than 12-inches-thick. Compaction shall be to 92 percent of the maximum dry density in accordance with ASTM D1557.

Blasting

Blasting may be required over portions of the site for bedrock removal. Blasting should be performed in accordance with the RI State Fire Code Requirements and will need to be permitted through the State Fire Marshal's office. Blasting should be completed such that excessive fracture of the bedrock bearing surface is avoided, and to limit vibration levels to the maximum extent practicable. A pre- and post-blast survey of all buildings within 250-ft of a blast should be completed.

Subgrade Preparation

Footings may bear on natural glacial deposits, compacted structural fill extending down to natural glacial deposits, or sound ledge. All loose or disturbed soils and otherwise unsuitable material should be removed from the bottom of, and below, all footing excavations. The subgrade of the open excavation should be proof-compacted with at least 4 passes of a vibratory compactor weighing at least 200 pounds, imparting a load of at least 2.5 tons. Any observed areas of loose or otherwise unsuitable material should be over-excavated and backfilled with compacted structural fill as directed by the engineer of record. Any areas requiring placement of Structural Fill should be backfilled in maximum 9-inch-thick loose lifts, compacted to 95% maximum dry density (ASTM D1557).

Any exiting utility lines, underground drain lines, etc. within the building footprint should be excavated and removed or filled with flowable fill; any excavations should be backfilled with compacted Structural Fill. Concrete for footings may be poured directly on the soil subgrade. Alternatively, a 6-inch-thick layer of crushed stone may be placed to protect approved subgrades. Bearing surfaces should be free of standing water, frost, and loose material prior to placement of reinforcing steel and concrete.

Subgrade Preparation - Rock

Bedrock below footings should be level and sound. Sloped or unlevel surfaces should be hammered to an approximately level surface; minor irregularities in the rock can be filled with crushed stone or lean concrete as necessary to provide a level surface. If encountered, any weathered or loose, fragmented rock must be removed. In general, if an excavator bucket cannot rip rock, it is suitable for foundations.

Dewatering

Depending on the season within which construction occurs, groundwater or perched groundwater may be encountered during excavation for footings. Filtered sumps that discharge into onsite recharge pits should be adequate to control groundwater. Footing excavations should be sloped slightly towards the sump. Sumps should be located outside of the limits of the footings and should extend at least 2 feet below the bottom of the subgrade. Construction specifications should require the contractor to maintain a groundwater level of at least 2 feet below the bottom of the excavation.

Freezing Conditions

Soils at the site are susceptible to frost. All subgrades should be free of frost before placement of concrete. If construction is performed during freezing weather, special precautions to protect the subgrade from freezing may be required. Any frozen soil should be removed and replaced with compacted Structural Fill.

Reuse of On-Site Soils

Based on the results of the subsurface exploration program, most soils subject to excavation consisted of sandy silt and silty sand. Based on the results of our laboratory testing program, the fines content in this material

will likely range from 16 to 63 percent. Therefore, we do not recommend excavated materials be re-used during construction.

RECOMMENDATIONS FOR FUTURE WORK

We recommend that JCE be engaged during construction to review and assist in responding to contractor submittals; to provide construction observation to confirm that footings and slabs-on-grade are bearing on the appropriate soils and to observe subgrade preparation activities; and to provide laboratory and field-testing to check that all imported fill materials meet the recommended gradation and compaction requirements.

LIMITATIONS

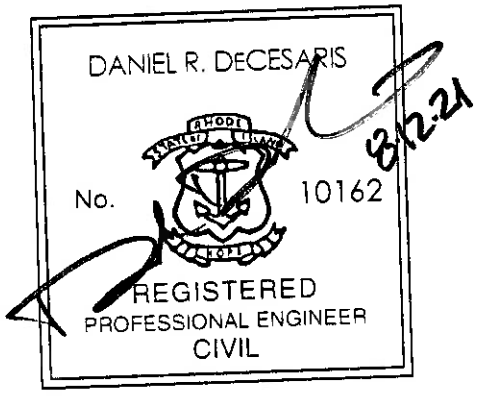
This report was prepared for the use of Storage of America, exclusively. The recommendations presented in this report are based on project information provided to us at the time of this report. These recommendations may require modification if there are any changes in the design or location of proposed structures. We will not accept responsibility for design based on our recommendations unless we are engaged to review final plans and specifications to determine whether our recommendations have been properly implemented in the design.

The recommendations in this report are based on the data obtained from the subsurface explorations. If variations in the subsurface conditions exist, they will likely not become evident until construction. Variations in subsurface conditions may require revisions to our recommendations. The data and recommendations presented in this report were collected and analyzed using generally accepted industry methods and practices. No other warranty, express or implied is made.

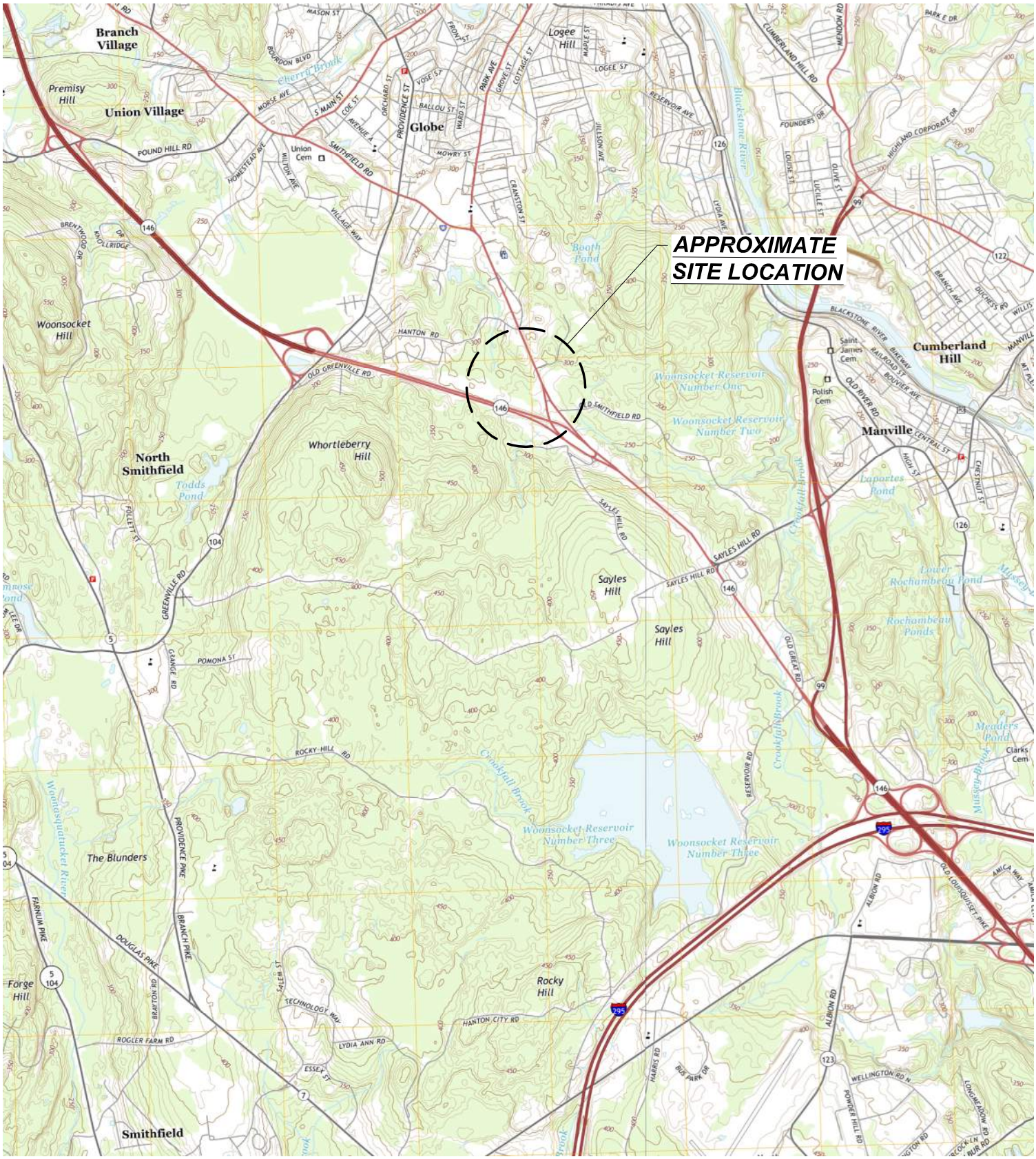
We thank you for the opportunity to prepare this report. If you need any clarification or would like to discuss the content of this letter report, please call myself or Joseph A. Casali, PE, MBA at 401-944-1300.

Sincerely,
JOE CASALI ENGINEERING, INC.

Daniel R. DeCesaris, PE
Project Manager



Enclosures: Figure 1 – Locus Map
Figure 2 – Surficial Geology Map
Figure 3 – Bedrock Geology Map
Figure 4 – Subsurface Exploration Location Plan
Attachment A – Boring Logs
Attachment B – Laboratory Testing Results



NOTE:
LOCUS MAP REFERENCES USGS US TOPO 7.5-MINUTE MAP FOR GEORGIAVILLE, RI (2015) & PAWTUCKET RI-MA (2015).

LOCUS MAP
NOT TO SCALE

REVISIONS:	
NO.	DATE. DESCRIPTION

DESIGNED BY:	DRD
DRAWN BY:	JAS
CHECKED BY:	DRD
DATE:	AUGUST 2021
PROJECT NO:	20-59

LOCUS MAP

FIGURE 1

STORAGE RENTALS OF AMERICA

435 EDDIE DOWLING HIGHWAY
NORTH SMITHFIELD, RHODE ISLAND

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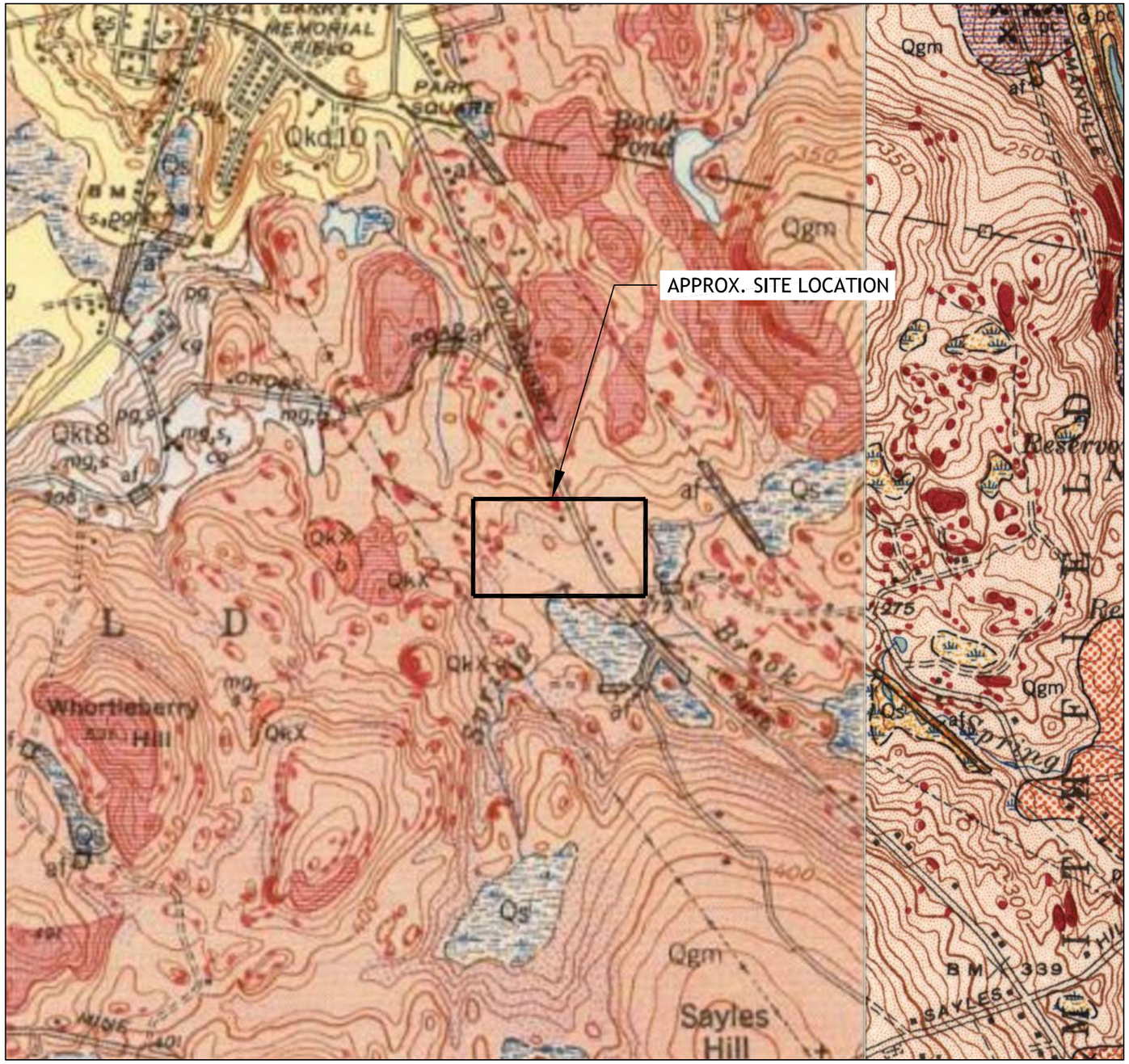

SURFICIAL GEOLOGY MAP
NOT TO SCALE

MAP REFERENCE:

GERALD M. RICHMOND, 1953 , SURFICIAL GEOLOGY MAP OF THE GEORGIAVILLE QUADRANGLE, RHODE ISLAND: U.S. GEOLOGICAL SURVEY, SCALE 1:31,680.

NEWTON E. CHUTE, 1949 , SURFICIAL GEOLOGY MAP OF THE PAWTUCKET QUADRANGLE, RHODE ISLAND: U.S. GEOLOGICAL SURVEY, SCALE 1:31,680.

LEGEND:

Qgm

Ground moraine deposits

Gray, sandy, friable upper till. Areas of unusually abundant boulders on the surface of the morainal deposits are shown by dotted overprint.

Bedrock outcrops

The small areas of solid color represent individual outcrops. The ruled area indicates relatively thin surficial deposits with numerous closely spaced outcrops of bedrock

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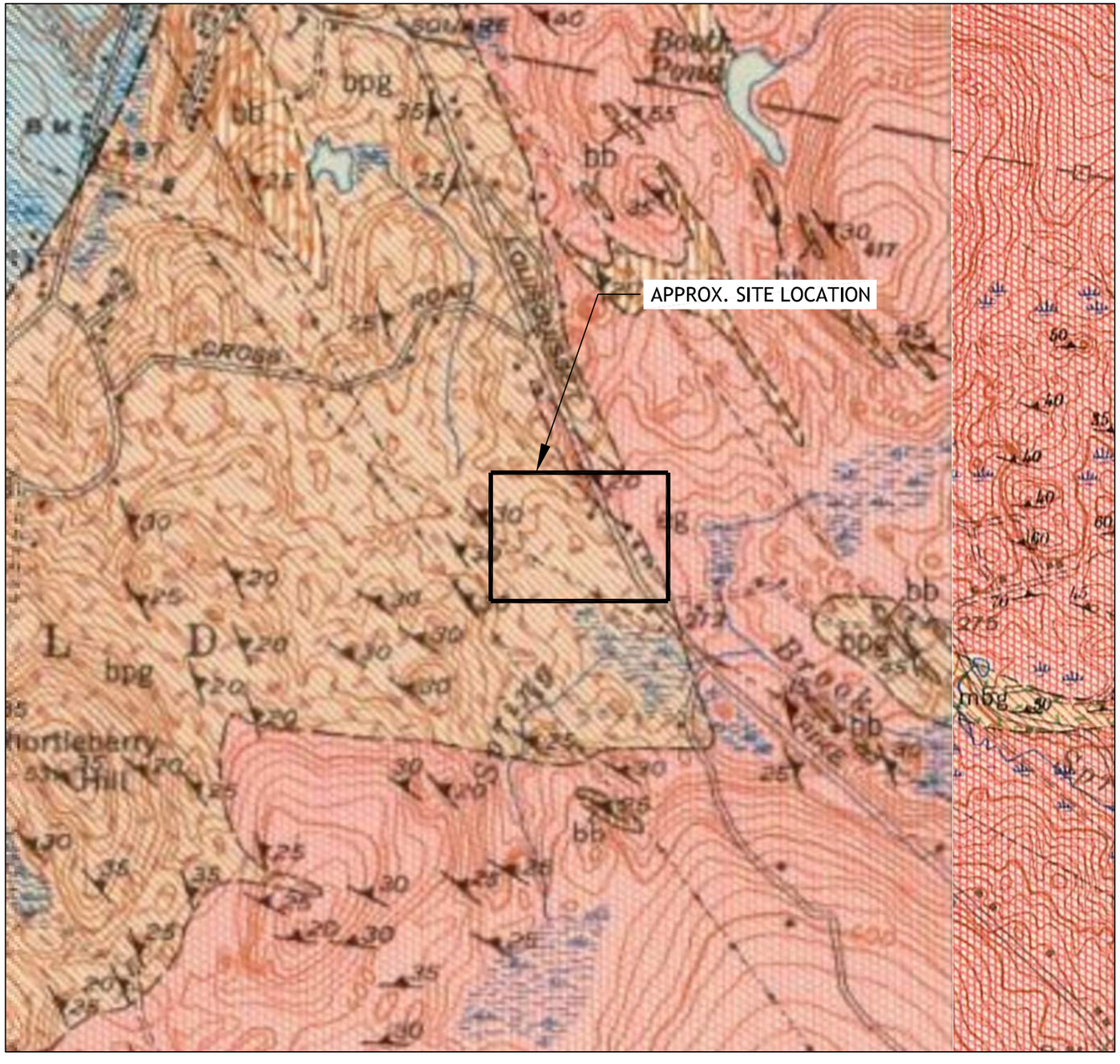
REVISIONS:		
NO.	DATE.	DESCRIPTION

DESIGNED BY:	DRD
DRAWN BY:	JAS
CHECKED BY:	DRD
DATE:	AUGUST 2021
PROJECT NO.	21-16

GEOTECHNICAL REPORT

SURFICIAL GEOLOGY MAP

FIGURE 2



BEDROCK GEOLOGY MAP
NOT TO SCALE

MAP REFERENCE:

GERALD M. RICHMOND, 1952, BEDROCK GEOLOGIC MAP OF THE GEORGIAVILLE QUDRANGLE, RHODE ISLAND: U.S. GEOLOGICAL SURVEY, SCALE 1:31,680.

ALONZO W. QUINN, R.G. RAY & W.L. SEYMOUR, 1949, BEDROCK GEOLOGIC MAP OF THE PAWTUCKET QUDRANGLE, RHODE ISLAND: U.S. GEOLOGICAL SURVEY, SCALE 1:31.680.

Blackstone series

Feldspathic quartz-epidote schist (bqe), *light gray, fine- to medium-grained, composed of quartz (40 to 50 percent), albite (15 to 25 percent), epidote (10 to 15 percent), biotite (5 to 15 percent), muscovite (5 to 10 percent), chlorite (2 to 10 percent), and traces of garnet, apatite, and magnetite. Quartzite* (bq), *light gray, medium-grained, locally cross-bedded, composed of quartz (70 to 80 percent), albite (20 to 30 percent), and traces of muscovite, magnetite, and zircon. Amphibole schist* (bb), *dark gray or gray green, fine-grained, locally amygdaloidal, composed of green amphibole (20 to 40 percent), quartz (10 to 35 percent), albite (15 to 25 percent), epidote (10 to 15 percent), biotite (5 to 15 percent), muscovite (5 to 10 percent), and traces of chlorite, garnet, and magnetite. Quartz-biotite schist* (bb), *gray, fine- to medium-grained, composed of quartz (50 to 60 percent), biotite (15 to 20 percent), albite (10 to 15 percent), epidote (5 to 10 percent), and traces of chlorite, garnet, and magnetite. Porphyroblastic albite gneiss* (bpg), *gray, coarse-grained, composed of granular quartz (35 to 40 percent), albite (30 to 40 percent), microperthite (15 to 20 percent), biotite (5 to 10 percent), muscovite and phlogopite (5 to 10 percent), and traces of epidote, apatite, garnet, rutile, and magnetite. The porphyroblasts are of albite and microperthite. This rock is equivalent to Quinn's quartz-feldspar gneiss* (mbg) *of the Pawtucket quadrangle, 1949.*

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NORTH SMITHFIELD, RHODE ISLAND

REVISIONS:

NO.	DATE.	DESCRIPTION

DESIGNED BY:	DRD
DRAWN BY:	JAS
CHECKED BY:	DRD
DATE:	AUGUST 2021
PROJECT NO.	21-16

GEOTECHNICAL REPORT

BEDROCK GEOLOGY MAP

FIGURE 3

Q:\21-16 Storage Rentals of America\Geotech\ACAD\F4.Subsurface Exploration Location Plan.dwg Aug. 10, 2021 3:55pm

SUBSURFACE EXPLORATION LOCATION PLAN

FIGURE 4

GEOTECHNICAL REPORT

DESIGNED BY: DRD
DRAWN BY: JAS
CHECKED BY: DRD
DATE: AUGUST 2021
PROJECT NO. 21-16

REVISIONS:
NO. DATE DESCRIPTION

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Attachment A

Geotechnical Boring Logs

BORING INFORMATION

LOCATION See Subsurface Exploration Location Plan

GROUND SURFACE EL. (ft): 282.0 **DATE START/END:** 07/28/2021

VERTICAL DATUM: NAVD88 **DRILLING COMPANY:** Crawford Drilling Services

TOTAL DEPTH (ft): 12.5' **DRILLER NAME:** Joe, Eric & Nate

LOGGED BY: Justen St.Onge **RIG TYPE:** Truck Mount Rig

BORING

B-1

DRILLING INFORMATION

HAMMER TYPE: Automatic Hammer **CASING I.D./O.D.:** N/A **CORE BARREL TYPE:** N/A

AUGER I.D./O.D.: 4" I.D. / 6" O.D. **DRILL ROD O.D.:** 2.0" O.D. **CORE BARREL I.D./O.D.:** N/A

DRILLING METHOD: Hollow stem auger, standard sampling.

WATER LEVEL ELEVATIONS (ft): Not Determined.

ABBREVIATIONS:

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation
= Length ofSound Cores>4 in / Pen, %
WOR = Weight of Rods
WOH = Weight of Hammer

S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger

Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter

NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140 lb. hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Graphic Log	Soil and Rock Description
280	0	S1	0.0 to 2.0	24/13	6-6-27-25		FILL	S1: SILTY SAND WITH GRAVEL (SM); Dark brown, moist, 55% fine to coarse sand, 30% nonplastic fines, 15% fine to coarse gravel, asphalt fragments throughout.
276	4	S2	4.0 to 6.0	24/11	10-6-1-1		FILL	S2: SILT WITH SAND (ML); Dark brown, moist, 50% nonplastic fines, 45% fine to coarse sand, 5% fine to coarse gravel, asphalt fragments throughout.
272	8	S3	9.0 to 11.0	24/5	27-21-25-24	Rock fragement lodged in sampler tip.	GLACIAL DEPOSITS	S3: SILTY GRAVEL WITH SAND (GM); Brownish gray, wet, 50% fine to coarse gravel, 35% fine to medium sand, 15% nonplastic fines.
268	12							
264	16							
260	20							
256	24							Bottom of boring at 12.5'; refusal on possible bedrock. Borehole backfilled with cuttings upon completion.

PROJECT NAME: Storage Rentals of America

CITY/STATE: North Smithfield, Rhode Island

PROJECT NUMBER: 21-16

NOTES:

JCE
JOE CASALI ENGINEERING, INC.

BORING INFORMATION

LOCATION See Subsurface Exploration Location Plan

GROUND SURFACE EL. (ft): 284.0 **DATE START/END:** 07/28/2021

VERTICAL DATUM: NAVD88 **DRILLING COMPANY:** Crawford Drilling Services

TOTAL DEPTH (ft): 2.5' **DRILLER NAME:** Joe, Eric & Nate

LOGGED BY: Justen St.Onge **RIG TYPE:** Truck Mount Rig

BORING

B-2

DRILLING INFORMATION

HAMMER TYPE: Automatic Hammer **CASING I.D./O.D.:** N/A **CORE BARREL TYPE:** N/A

AUGER I.D./O.D.: 4" I.D. / 6" O.D. **DRILL ROD O.D.:** 2.0" O.D. **CORE BARREL I.D./O.D.:** N/A

DRILLING METHOD: Hollow stem auger, standard sampling.

WATER LEVEL ELEVATIONS (ft): Not encountered.

ABBREVIATIONS:

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation
= Length ofSound Cores>4 in / Pen, %
WOR = Weight of Rods
WOH = Weight of Hammer

S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger

Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter

NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140 lb. hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Graphic Log	Soil and Rock Description
284	0	S1	0.0 to 1.3	16/12	6-25-50/2"		FILL	S1 (0-8"): SILTY SAND WITH GRAVEL (SM); Dark brown, dry, 75% fine to coarse sand, 20% nonplastic fines, 5% fine to coarse gravel. S1 (8-12"): WELL GRADED SAND WITH GRAVEL (SW-SM); Light gray, dry, 85% fine to coarse sand, 15% fine to coarse gravel.
						Heavy rig chatter while drilling 1.3 to 2.5-feet.		Bottom of boring at 2.5'; refusal on possible bedrock. Borehole backfilled with cuttings upon completion.
280	4							
276	8							
272	12							
268	16							
264	20							
260	24							

PROJECT NAME: Storage Rentals of America

CITY/STATE: North Smithfield, Rhode Island

PROJECT NUMBER: 21-16

NOTES:

JCE
JOE CASALI ENGINEERING, INC.

BORING INFORMATION

LOCATION See Subsurface Exploration Location Plan

GROUND SURFACE EL. (ft): 296.0 **DATE START/END:** 07/29/2021

VERTICAL DATUM: NAVD88 **DRILLING COMPANY:** Crawford Drilling Services

TOTAL DEPTH (ft): 15' **DRILLER NAME:** Joe, Eric & Nate

LOGGED BY: Justen St.Onge **RIG TYPE:** Mobile Drill Rig

BORING

B-3

PAGE 1 of 1

DRILLING INFORMATION

HAMMER TYPE: Automatic Hammer **CASING I.D./O.D.:** 4.0" I.D. / 4.5" O.D. FJS **CORE BARREL TYPE:** NX

AUGER I.D./O.D.: N/A **DRILL ROD O.D.:** 2.0" O.D. **CORE BARREL I.D./O.D.:** 2.15" I.D. / 3.0" O.D.

DRILLING METHOD: Rotary wash with casing; standard sampling.

WATER LEVEL ELEVATIONS (ft): 13.5' (measured at the end of drilling)

ABBREVIATIONS:

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation
= Length ofSound Cores>4 in / Pen, %
WOR = Weight of Rods
WOH = Weight of Hammer

S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger

Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter

NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140 lb. hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Graphic Log	Soil and Rock Description
296	0	S1	0.0 to 2.0	24/16	6-25-50/2"		GLACIAL DEPOSITS	S1 (0-4"): SILTY SAND (SM); Brown, dry, 55% fine to medium sand, 35% nonplastic fines, 10% fine to medium gravel. S1 (4-12"): POORLY GRADED SAND WITH GRAVEL (SP); Light gray, dry, 60% fine to medium sand, 40% fine to coarse gravel. S1 (12-16"): SILTY SAND (SM); Orange/ brown, dry, 80% fine to medium sand, 20% nonplastic fines.
292	4	S2	4.0 to 5.2	14/7	17-59-50/ 2"	Rock fragment lodged in sampler tip.		S2: SILTY SAND WITH GRAVEL (SM); Light brown, moist, 51.3% fine to coarse sand, 25.7% nonplastic fines, 23.0% fine to coarse gravel.
288	8	S3	9.0 to 9.6	7/4	10-50/1"	Advanced roller bit to 10.0-feet.		S3: WELL GRADED GRAVEL WITH SAND (GM); Gray/brown, wet, 55% fine to coarse gravel, 40% fine to coarse sand, 5% nonplastic fines.
284	12	C1	10.0 to 15.0	60/58	95.0%		BEDROCK	C1: Gray-light gray, fine to medium grained quartz/schist. Average core time = 3 min/ft.
280	16							Bottom of boring at 15.0'. Borehole backfilled with cuttings upon completion.
276	20							
272	24							

PROJECT NAME: Storage Rentals of America

CITY/STATE: North Smithfield, Rhode Island

PROJECT NUMBER: 21-16

NOTES:

JCE
JOE CASALI ENGINEERING, INC.

BORING INFORMATION

LOCATION See Subsurface Exploration Location Plan

GROUND SURFACE EL. (ft): 285.0 **DATE START/END:** 07/30/2021

VERTICAL DATUM: NAVD88 **DRILLING COMPANY:** Crawford Drilling Services

TOTAL DEPTH (ft): 19' **DRILLER NAME:** Joe, Eric & Nate

LOGGED BY: Justen St.Onge **RIG TYPE:** Mobile Drill Rig

BORING

B-4

DRILLING INFORMATION

HAMMER TYPE: Automatic Hammer **CASING I.D./O.D.:** 4.0" I.D. / 4.5" O.D. FJS **CORE BARREL TYPE:** NX

AUGER I.D./O.D.: N/A **DRILL ROD O.D.:** 2.0" O.D. **CORE BARREL I.D./O.D.:** 2.15" I.D. / 3.0" O.D.

DRILLING METHOD: Rotary wash with casing; standard sampling.

WATER LEVEL ELEVATIONS (ft): 7.0' (measured at the end of drilling)

ABBREVIATIONS:

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation
= Length ofSound Cores>4 in / Pen, %
WOR = Weight of Rods
WOH = Weight of Hammer

S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger

Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter

NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140 lb. hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Graphic Log	Soil and Rock Description
284	0	S1	0.0 to 2.0	24/11	3-3-4-3		GLACIAL DEPOSITS	S1 (0-3"): SILTY SAND (SM); Brown, dry, 75% fine to medium sand, 20% nonplastic fines, 5% fine gravel. S1 (3-11"): POORLY GRADED SAND (SP); Light brown, dry, 95% fine to medium sand, 5% nonplastic fines.
280	4	S2	4.0 to 6.0	24/7	4-7-2-13			S2: WELL GRADED SAND (SW); Light brown, wet, 74.8% fine to coarse sand 13.3% fine to medium gravel, 11.9% nonplastic fines .
		C1	6.5 to 7.5	12/12	-	Advanced roller bit to 6. 5 feet.		C1: Approximate 12" diameter quartz/schist boulder.
276	8	S3	10.0 to 11.3	15/6	24-50/2"	Iron oxide staining observed throughout sample.		S2: SILTY SAND WITH GRAVEL (SM); Light brown/orange, wet, 60% fine to coarse sand, 25% fine to coarse gravel, 15% nonplastic fines.
272	12							
268	16	C2	14.0 to 19.0	60/48	85.4%		BEDROCK	C2: Gray-light gray, fine to medium grained quartz/schist. Average core time = 2 min/ft.
264	20							Bottom of boring at 19.0'. Borehole backfilled with cuttings upon completion.
260	24							

PROJECT NAME: Storage Rentals of America

CITY/STATE: North Smithfield, Rhode Island

PROJECT NUMBER: 21-16

NOTES:

JCE
JOE CASALI ENGINEERING, INC.

BORING INFORMATION

LOCATION See Subsurface Exploration Location Plan

GROUND SURFACE EL. (ft): 292.0 **DATE START/END:** 07/29/2021

VERTICAL DATUM: NAVD88 **DRILLING COMPANY:** Crawford Drilling Services

TOTAL DEPTH (ft): 9.5' **DRILLER NAME:** Joe, Eric & Nate

LOGGED BY: Justen St.Onge **RIG TYPE:** Mobile Drill Rig

BORING

B-5

DRILLING INFORMATION

HAMMER TYPE: Automatic Hammer **CASING I.D./O.D.:** 4.0" I.D. / 4.5" O.D. FJS **CORE BARREL TYPE:** NX

AUGER I.D./O.D.: N/A **DRILL ROD O.D.:** 2.0" O.D. **CORE BARREL I.D./O.D.:** 2.15" I.D. / 3.0" O.D.

DRILLING METHOD: Rotary wash with casing; standard sampling.

WATER LEVEL ELEVATIONS (ft): Not encountered.

ABBREVIATIONS:

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation
= Length ofSound Cores>4 in / Pen, %
WOR = Weight of Rods
WOH = Weight of Hammer

S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger

Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter

NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140 lb. hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Graphic Log	Soil and Rock Description
292	0	S1	0.0 to 2.0	24/13	4-4-5-16	Advanced roller bit to 3 feet.	G.D.	S1: SANDY SILT (ML); Orange/brown, dry, 62.5% nonplastic fines, 34.1% fine to medium sand, 3.4% fine gravel.
288	4	C1	3.0 to 8.0	60/42	38.3%	Sand seam from approximately 6 to 7 feet.	BEDROCK	C1: Gray-light gray, fine to medium grained quartz/schist. Average core time = 2 min/ft.
284	8	C2	8.0 to 9.5	18/13"	-			C2: Gray-light gray, fine to medium grained quartz/schist. Average core time = 2 min/ft.
280	12							Bottom of boring at 9.5'. Borehole backfilled with cuttings upon completion.
276	16							
272	20							
268	24							

PROJECT NAME: Storage Rentals of America

CITY/STATE: North Smithfield, Rhode Island

PROJECT NUMBER: 21-16

NOTES:

JCE
JOE CASALI ENGINEERING, INC.

BORING INFORMATION

LOCATION See Subsurface Exploration Location Plan

GROUND SURFACE EL. (ft): 281.0 **DATE START/END:** 07/28/2021

VERTICAL DATUM: NAVD88 **DRILLING COMPANY:** Crawford Drilling Services

TOTAL DEPTH (ft): 21.5' **DRILLER NAME:** Joe, Eric & Nate

LOGGED BY: Justen St.Onge **RIG TYPE:** Truck Mount Rig

BORING

B-6

DRILLING INFORMATION

HAMMER TYPE: Automatic Hammer **CASING I.D./O.D.:** N/A **CORE BARREL TYPE:** N/A

AUGER I.D./O.D.: 4" I.D. / 6" O.D. **DRILL ROD O.D.:** 2.0" O.D. **CORE BARREL I.D./O.D.:** N/A

DRILLING METHOD: Hollow stem auger, standard sampling.

WATER LEVEL ELEVATIONS (ft): Not Determined.

ABBREVIATIONS:

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation
= Length ofSound Cores>4 in / Pen, %
WOR = Weight of Rods
WOH = Weight of Hammer

S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger

Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter

NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140 lb. hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Graphic Log	Soil and Rock Description
280	0	S1	0.0 to 1.7	20/14	15-16-17-50/2"	Heavy rig chatter while drilling 1.7 to 4-ft.	FILL	S1: SILTY SAND WITH GRAVEL (SM); Dark gray, dry, 47.0% fine to coarse sand, 37.3% fine to coarse gravel, 15.7% nonplastic fines.
276	4	S2	4.0 to 6.0	24/12	11-16-18-21			S2: WELL GRADED GRAVEL WITH SAND (GM); Dark gray, dry, 50% fine to coarse gravel, 45% fine to coarse sand, 5% nonplastic fines.
272	8	S3	9.0 to 11.0	24/20	6-31-20-20		GLACIAL DEPOSITS	S3: SILTY SAND (SM); Light brown, dry, 58.8% fine sand, 33.3% nonplastic fines, 7.9% fine gravel.
268	12	S4	14.0 to 15.7	20/16	20-22-43-50/2"			S4: WELL GRADED SAND WITH SILT (SW-SM); Light brown/orange, wet, 85% fine to coarse sand, 10% nonplastic fines, 5% fine to coarse gravel.
264	16							
260	20	S5	19.0 to 21.0	24/18	8-38-9-3			S5: POORLY GRADED SAND (SP); Light brown, wet, 95% fine sand, 5% nonplastic fines.
256	24							Bottom of boring at 21.5'; refusal on possible bedrock . Borehole backfilled with cuttings upon completion. Asphalt patch placed at ground surface.

PROJECT NAME: Storage Rentals of America

CITY/STATE: North Smithfield, Rhode Island

PROJECT NUMBER: 21-16

NOTES:

JCE
JOE CASALI ENGINEERING, INC.

BORING INFORMATION

LOCATION See Subsurface Exploration Location Plan

GROUND SURFACE EL. (ft): 292.0 **DATE START/END:** 07/29/2021

VERTICAL DATUM: NAVD88 **DRILLING COMPANY:** Crawford Drilling Services

TOTAL DEPTH (ft): 10' **DRILLER NAME:** Joe, Eric & Nate

LOGGED BY: Justen St.Onge **RIG TYPE:** Mobile Drill Rig

BORING

B-7

DRILLING INFORMATION

HAMMER TYPE: Automatic Hammer **CASING I.D./O.D.:** 4.0" I.D. / 4.5" O.D. FJS **CORE BARREL TYPE:** NX

AUGER I.D./O.D.: N/A **DRILL ROD O.D.:** 2.0" O.D. **CORE BARREL I.D./O.D.:** 2.15" I.D. / 3.0" O.D.

DRILLING METHOD: Rotary wash with casing; standard sampling.

WATER LEVEL ELEVATIONS (ft): Not encountered.

ABBREVIATIONS:

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation = Length ofSound Cores>4 in / Pen, %
WOR = Weight of Rods
WOH = Weight of Hammer

S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger

Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter

NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140 lb. hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Graphic Log	Soil and Rock Description
292	0	S1	0.0 to 2.0	24/5	1-1-1-2		GLACIAL DEPOSITS	S1: SILTY SAND (SM); Brown, dry, 47.4% nonplastic fines, 37.7% fine to medium sand, 14.9% fine gravel.
288	4	S2	4.0 to 4.2	2/2	50/2"		GLACIAL DEPOSITS	S2: SILTY SAND (SM); Light brown, dry, 80% fine to coarse sand, 15% non plastic fines, 5% fine gravel.
		C1	5.0 to 10.0	60/50	53.3%		BEDROCK	C1: Gray-light gray, fine to medium grained quartz/schist. Average core time = 2 min/ft.
284	8							
280	12							Bottom of boring at 10.0'. Borehole backfilled with cuttings upon completion.
276	16							
272	20							
268	24							

PROJECT NAME: Storage Rentals of America

CITY/STATE: North Smithfield, Rhode Island

PROJECT NUMBER: 21-16

NOTES:

JCE
JOE CASALI ENGINEERING, INC.

BORING INFORMATION

LOCATION See Subsurface Exploration Location Plan

GROUND SURFACE EL. (ft): 288.0 **DATE START/END:** 07/29/2021

VERTICAL DATUM: NAVD88 **DRILLING COMPANY:** Crawford Drilling Services

TOTAL DEPTH (ft): 12.5' **DRILLER NAME:** Joe, Eric & Nate

LOGGED BY: Justen St.Onge **RIG TYPE:** Mobile Drill Rig

BORING

B-8

DRILLING INFORMATION

HAMMER TYPE: Automatic Hammer **CASING I.D./O.D.:** 4.0" I.D. / 4.5" O.D. FJS **CORE BARREL TYPE:** NX

AUGER I.D./O.D.: N/A **DRILL ROD O.D.:** 2.0" O.D. **CORE BARREL I.D./O.D.:** 2.15" I.D. / 3.0" O.D.

DRILLING METHOD: Rotary wash with casing; standard sampling.

WATER LEVEL ELEVATIONS (ft): 7.0' (measured at the end of drilling)

ABBREVIATIONS:

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation = Length ofSound Cores>4 in / Pen, %
WOR = Weight of Rods
WOH = Weight of Hammer

S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger

Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter

NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140 lb. hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Graphic Log	Soil and Rock Description
288	0	S1	0.0 to 2.0	24/11	7-8-7-14		GLACIAL DEPOSITS	S1: (0-7") SILTY SAND (SM); Light brown, dry, 80% fine to coarse sand, 15% non plastic fines, 5% fine to medium gravel. S1: (7-11") SILTY SAND (SM); Brown, dry, 70% fine to coarse sand, 25% non plastic fines, 5% fine to medium gravel.
284	4	S2	4.0 to 6.0	24/8	1-1-WOR-WOR			S2: SILTY SAND (SM); Gray/brown, moist, 65% fine to coarse sand, 25% non plastic fines, 10% fine to coarse gravel.
280	8	C1	8.0 to 12.5	54/53	71.6%	Advanced roller bit to 8-feet.	BEDROCK	C1: Gray-light gray, fine to medium grained quartz/schist. Average core time = 2 min/ft.
276	12							Bottom of boring at 12.5'. Borehole backfilled with cuttings upon completion.
272	16							
268	20							
264	24							

PROJECT NAME: Storage Rentals of America

CITY/STATE: North Smithfield, Rhode Island

PROJECT NUMBER: 21-16

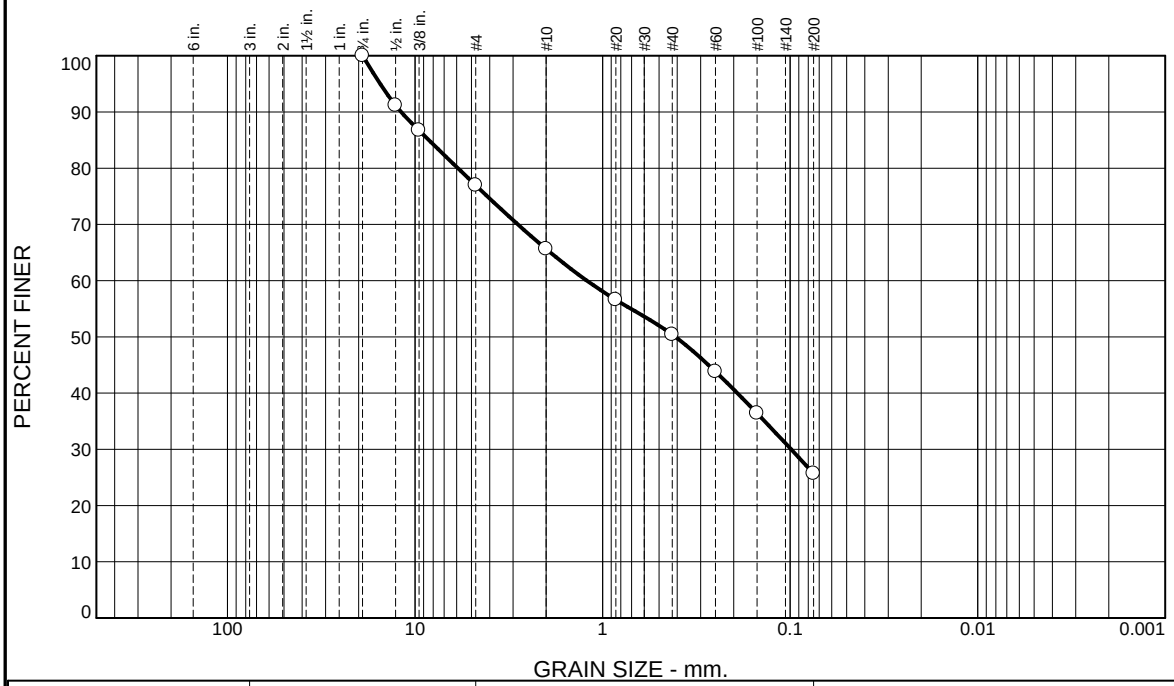
NOTES:

JCE
JOE CASALI ENGINEERING, INC.

Attachment B

Geotechnical Laboratory Testing Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	23.0	11.4	15.2	24.7	25.7	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	91.2		
0.375"	86.7		
#4	77.0		
#10	65.6		
#20	56.6		
#40	50.4		
#60	43.8		
#100	36.4		
#200	25.7		

* (no specification provided)

Material Description

Brown silty sand with gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 11.8691 D_{85}= 8.4317 D_{60}= 1.2120
D_{50}= 0.4091 D_{30}= 0.0988 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 8.2.21 **Date Tested:** 8.4.21

Tested By: AV / MS

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 4-6' **Date Sampled:**
Sample Number: B-3 / S2

Thielsch Engineering Inc.

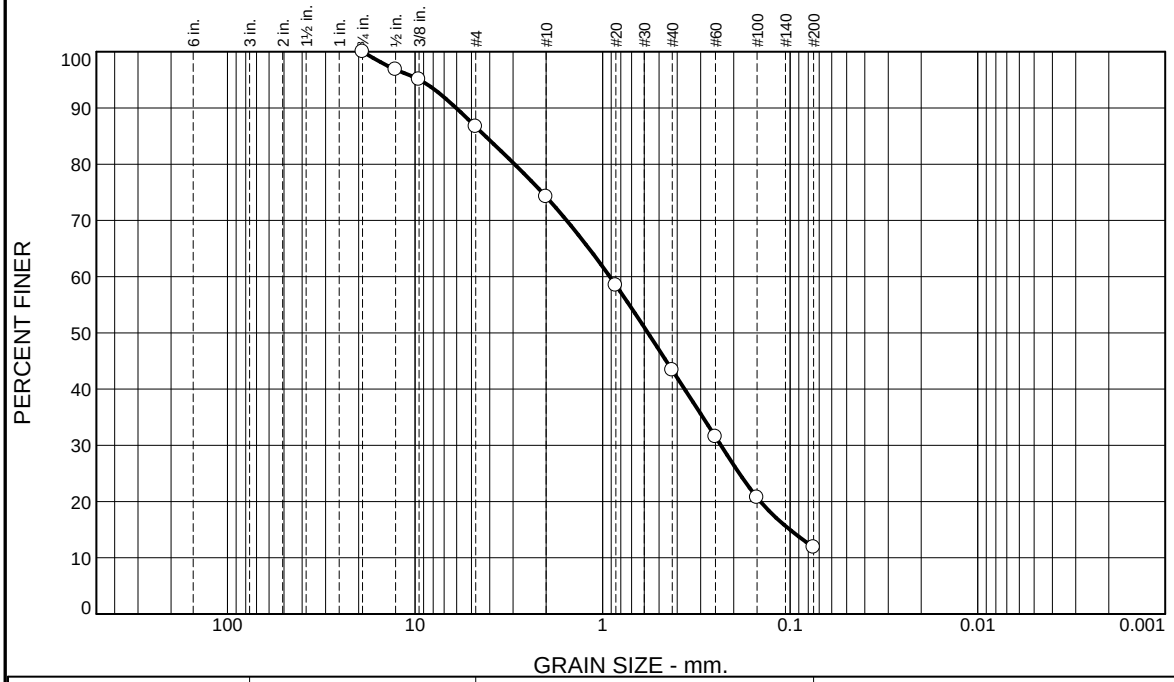
Cranston, RI

Client: Joe Casali Engineering

Project: (21-16) Storage Rentals of America
North Smithfield, RI

Project No: 74-21-0002.99 **Figure** 21-S-3118

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	13.3	12.5	30.8	31.5	11.9	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	96.8		
0.375"	95.1		
#4	86.7		
#10	74.2		
#20	58.5		
#40	43.4		
#60	31.5		
#100	20.7		
#200	11.9		

* (no specification provided)

Material Description

Brown poorly graded sand with silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 6.0353 D_{85}= 4.2160 D_{60}= 0.9157
D_{50}= 0.5730 D_{30}= 0.2338 D_{15}= 0.1003
D_{10}= C_u= C_c=

Remarks

Date Received: 8.2.21 **Date Tested:** 8.4.21

Tested By: AV / MS

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 4-6' **Date Sampled:**
Sample Number: B-4 / S2

Thielsch Engineering Inc.

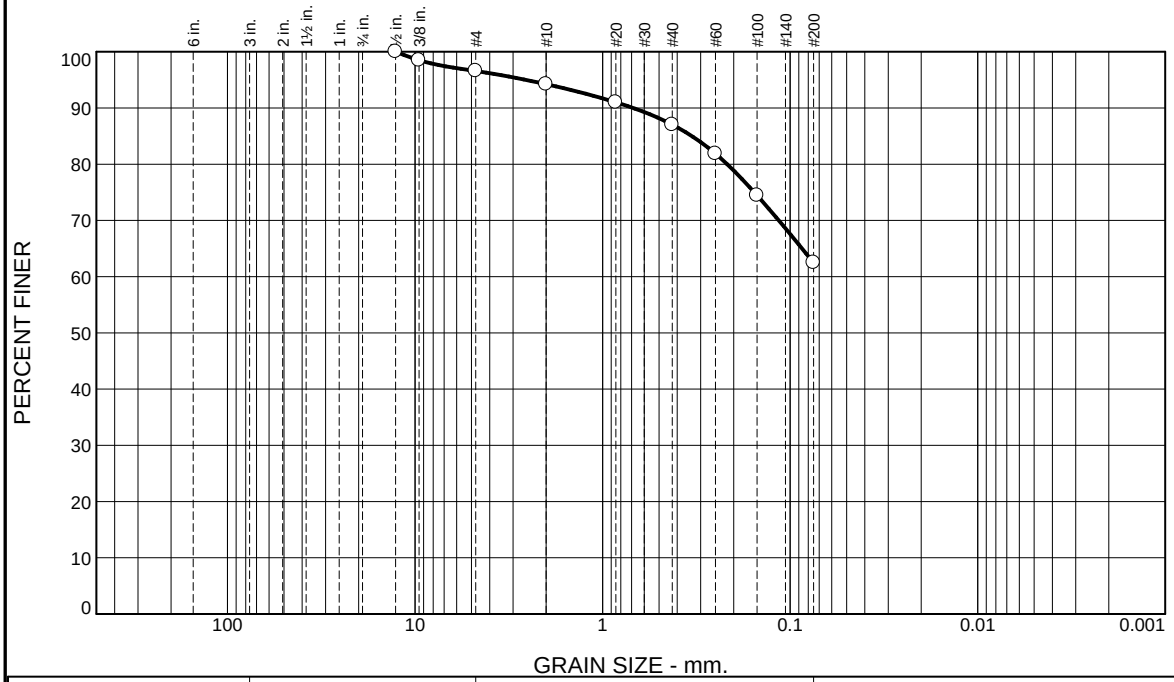
Cranston, RI

Client: Joe Casali Engineering

Project: (21-16) Storage Rentals of America
North Smithfield, RI

Project No: 74-21-0002.99 **Figure** 21-S-3119

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.4	2.4	7.2	24.5	62.5	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.5"	100.0		
0.375"	98.5		
#4	96.6		
#10	94.2		
#20	91.0		
#40	87.0		
#60	81.9		
#100	74.5		
#200	62.5		

* (no specification provided)

Material Description

Brown sandy silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.6869 D_{85}= 0.3341 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as non-plastic.

Date Received: 8.2.21 **Date Tested:** 8.4.21

Tested By: AV / MS

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 0-2' **Date Sampled:**
Sample Number: B-5 / S1

Thielsch Engineering Inc.

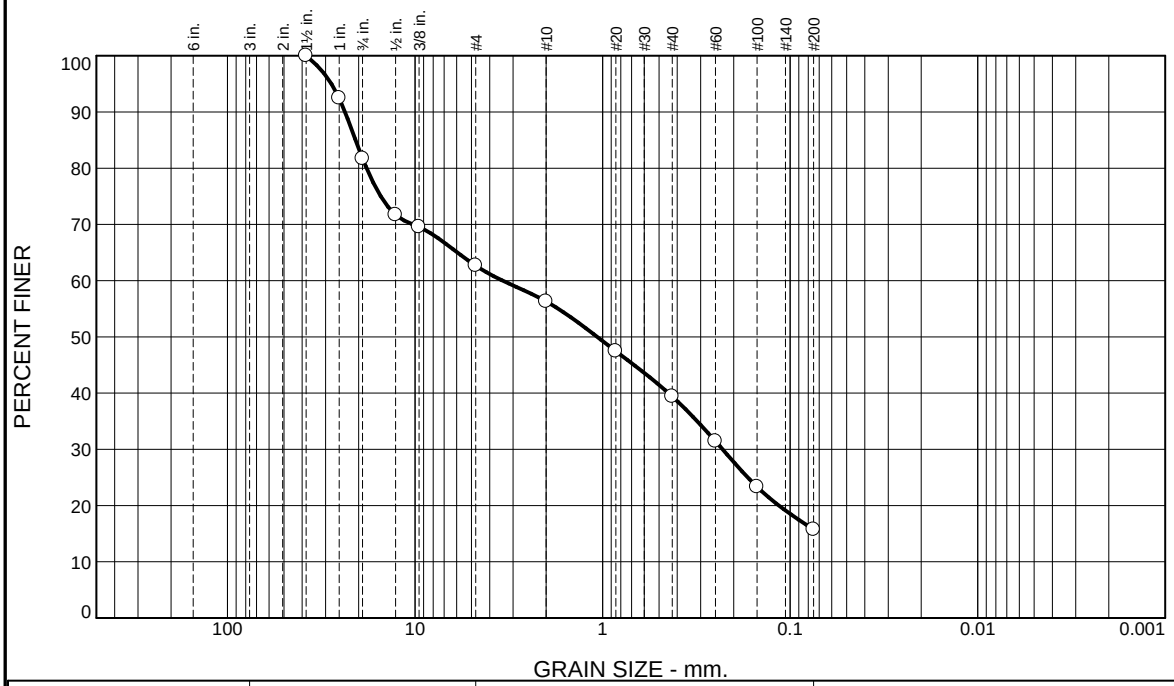
Cranston, RI

Client: Joe Casali Engineering

Project: (21-16) Storage Rentals of America
North Smithfield, RI

Project No: 74-21-0002.99 **Figure** 21-S-3120

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	18.3	19.0	6.4	16.9	23.7	15.7	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	92.5		
3/4"	81.7		
1/2"	71.7		
3/8"	69.6		
#4	62.7		
#10	56.3		
#20	47.5		
#40	39.4		
#60	31.4		
#100	23.3		
#200	15.7		

* (no specification provided)

Material Description

Brown silty sand with gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 23.6250 D_{85}= 20.7603 D_{60}= 3.4047
D_{50}= 1.0677 D_{30}= 0.2291 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 8.2.21 **Date Tested:** 8.4.21

Tested By: AV / MS

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 0-2' **Date Sampled:**
Sample Number: B-6 / S1

Thielsch Engineering Inc.

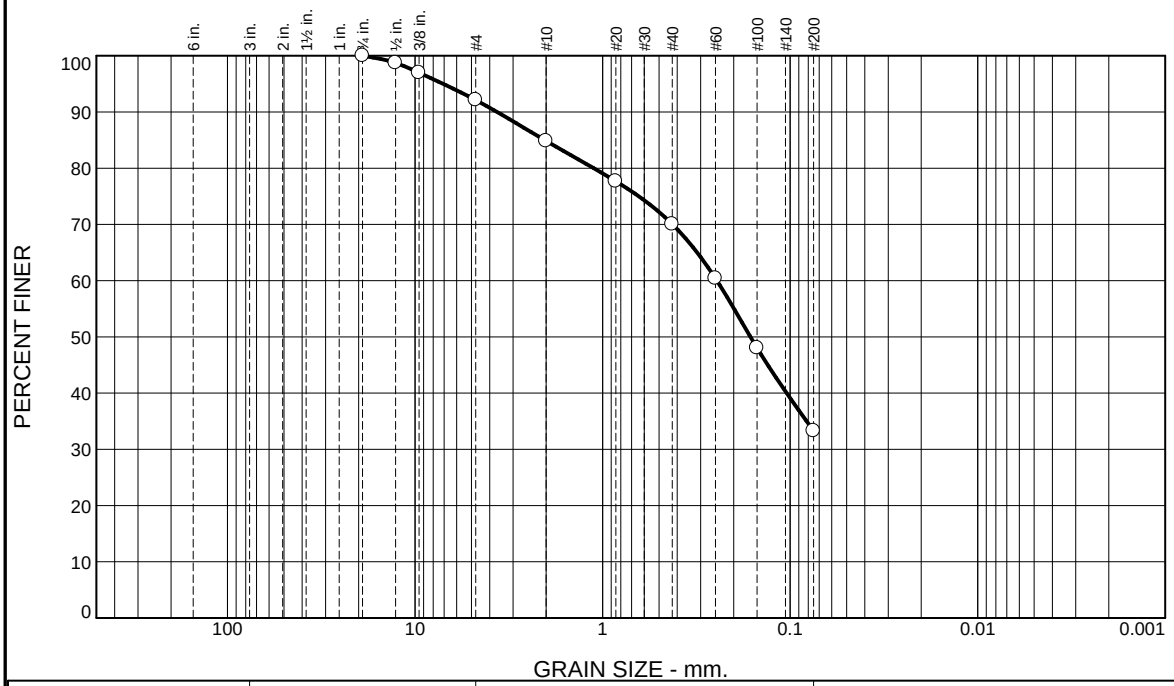
Cranston, RI

Client: Joe Casali Engineering

Project: (21-16) Storage Rentals of America
North Smithfield, RI

Project No: 74-21-0002.99 **Figure** 21-S-3121

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.9	7.3	14.8	36.7	33.3	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	98.7		
0.375"	97.0		
#4	92.1		
#10	84.8		
#20	77.7		
#40	70.0		
#60	60.4		
#100	48.0		
#200	33.3		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 3.6498 D_{85}= 2.0365 D_{60}= 0.2456
D_{50}= 0.1627 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as non-plastic.

Date Received: 8.2.21 **Date Tested:** 8.4.21

Tested By: AV / MS

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 9-11' **Date Sampled:**
Sample Number: B-6 / S3

Thielsch Engineering Inc.

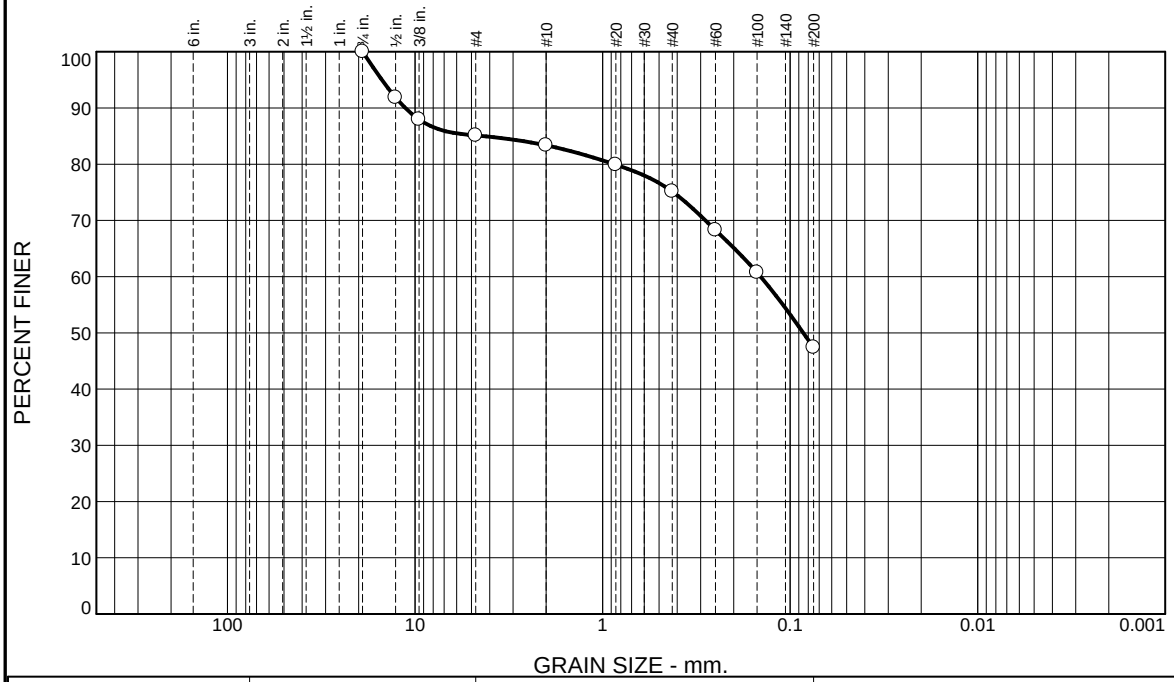
Cranston, RI

Client: Joe Casali Engineering

Project: (21-16) Storage Rentals of America
North Smithfield, RI

Project No: 74-21-0002.99 **Figure** 21-S-3122

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.9	1.7	8.3	27.7	47.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	91.9		
0.375"	88.0		
#4	85.1		
#10	83.4		
#20	79.9		
#40	75.1		
#60	68.3		
#100	60.7		
#200	47.4		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 11.2680 D_{85}= 4.3398 D_{60}= 0.1436
D_{50}= 0.0851 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as non-plastic.

Date Received: 8.2.21 **Date Tested:** 8.4.21

Tested By: MS

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 0-2' **Date Sampled:**
Sample Number: B-7 / S1

Thielsch Engineering Inc.

Cranston, RI

Client: Joe Casali Engineering

Project: (21-16) Storage Rentals of America
North Smithfield, RI

Project No: 74-21-0002.99 **Figure** 21-S-3123