Stormwater Management Report

Proposed Housing Development

55 Nye Road
Glastonbury, CT

PREPARED FOR
Town of Glastonbury
2283-2389 Main Street
Glastonbury, CT 06033

October 2023
Revised November 2023

benesch

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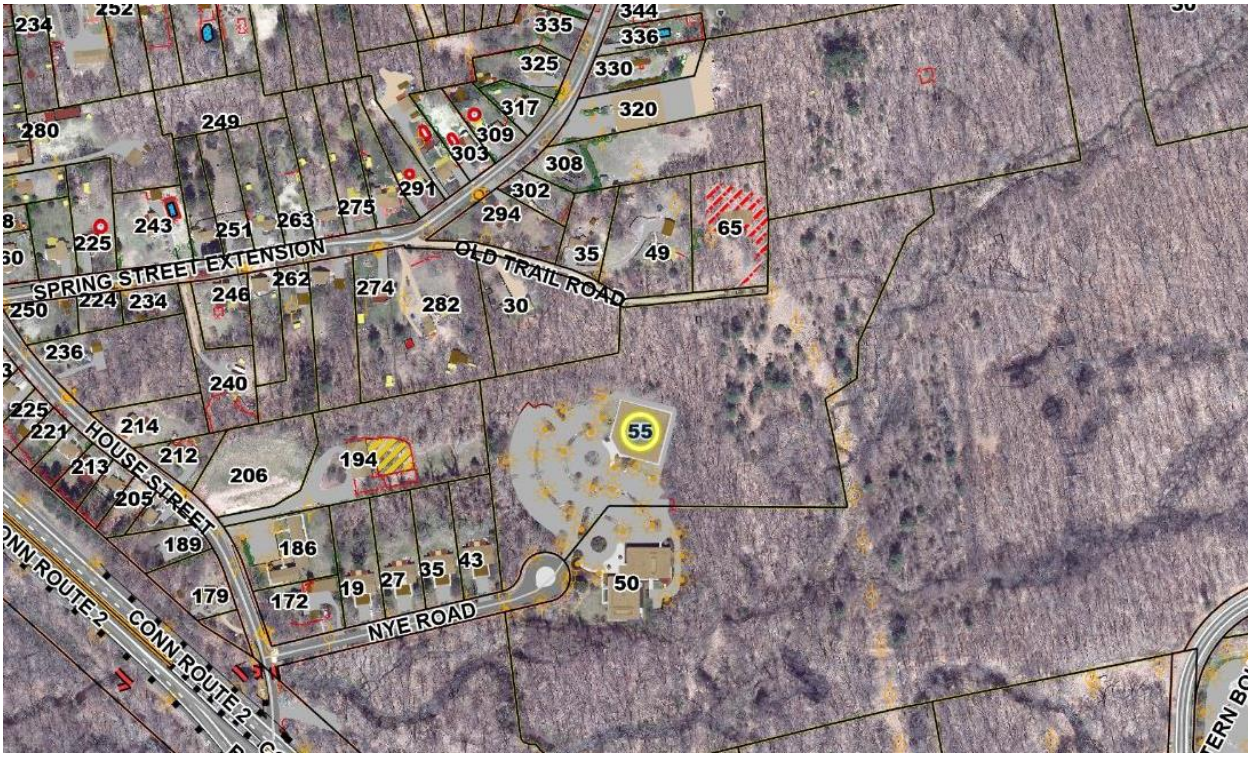
SECTION 1 - INTRODUCTION

The property is situated at 55 Nye Road in Glastonbury, Connecticut. Originally combined with 53 Nye Road as a commercial property it was recently subdivided from 53 Nye Road. Approximately 11.3 acres, it is currently occupied by a medical office building in the Planned Employment PE zoning district. The project proposes a zone change to Residence A with a Planned Area Development PAD overlay and proposed housing units of varying one, two and three bedroom mixes within multiple buildings and one community building. New private roads and parking will be installed to access the units and provide ample parking for the prospective tenants. The site is bordered to the north by Old Trail Road, to the east by wetlands, residents to the west, and Nye Road to the south.



The project was designed using the Connecticut Department of Transportation Drainage Manual, the Connecticut Department of Energy and Environmental Protection (CTDEEP) 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, and the 2023 CT DEEP Water Quality Manual.

SECTION 2 – HYDROLOGY

Flow from the site drain to several locations but ultimately all runoff discharges into Salmon Brook. The northeastern portion of the property flows overland to the wetlands located in the eastern portion of the property. The central portion of the property drains to the southwest and is intercepted into a traditional stormwater system and then piped via an 18" RCP to the south and discharges at grade and flows overland to Salmon Brook. The western portion of the property flows overland and enters into the Nye Road ROW and enters into the storm drainage system located within that ROW and ultimately ends up in Salmon Brook. The project site is comprised of hydrologic soil groups "A, B, & D" per NRCS Soil Mapping.

Methodology

The analysis to determine peak flows generated from the sub-watershed encompassing the site was prepared using TR-55 procedures for calculating peak rates of runoff resulting from precipitation events and procedures for developing runoff hydrographs. HydroCAD software was utilized to perform hydrologic computations. NOAA Rainfall Frequency Estimates for precipitation frequency, based on data from the weather station in Glastonbury, were utilized to generate the flows. Per the recently issued CT DEEP Stormwater Quality Manual, a NOAA Type D rainfall distribution was used. The peak flows from the existing and proposed conditions were then used in the hydraulic model (Section 3) to determine if the proposed drainage network can accommodate the flows from the site for a 10-year storm. Furthermore, the existing site is comprised of about 22% imperviousness. Therefore, the proposed stormwater design accounts for retaining a volume of stormwater equal to 100% of the proposed water quality volume.

Existing Conditions

Topography slopes from the northern portion of the site at elevation 90 to the south and east portion of the site at elevation 50 and the wetlands. The site was modelled as HSG "A, B & D." Drainage from the site flows to three (2) existing subwatersheds:

- Subwatershed E1: This consists of the central portion of the property which drains to the southwest and is intercepted into a traditional stormwater system and then piped via an 18" RCP to the south and discharges at grade and flows overland to Salmon Brook and a small portion of the site that flows overland into Nye Road.
- Subwatershed E2: This consists of a portion of the site which sheet flows southeast towards the wetlands.

Existing Watershed Data (Existing Conditions Cover Characteristics and Existing Watershed Area Map) have been included as Appendix A.

Proposed Conditions

The topography and sub-watersheds mimic those under existing conditions in that the analysis points remain the same (for each subwatershed). The proposed system was analyzed with permeable pavers, and an aboveground stormwater pond incorporated to attenuate peak flows and provide stormwater runoff volume retention. Proposed drainage from the site is split into the following subwatersheds:

- Subwatershed P1-1: This consists of the central portion of the site which is collected and piped into the existing stormwater system that was located on site and discharges via the existing 18" RCP on grade to the south and ultimately flows overland to Salmon Brook.
- Subwatershed P2-1: This consists of the northeast portion of the site and is collected via a stormwater system and routed through a hydrodynamic separator and then into the proposed stormwater pond. The recharge pond has an outlet control structure and a high level overflow (weir) both of which discharge offsite to the southeast. The pond has been sized to accommodate some runoff from offsite sources.
- Subwatershed P2-2: This consists of the easterly portion of the site which bypasses the proposed pond and flows overland directly into the wetlands located on the eastern portion of the site.

The stormwater pond has been designed to attenuate peak flows produced from the 2, 10, 25, and 100-year design storm events. Furthermore, the permeable pavers and pond volume below the lowest outlet have been size to provide stormwater storage volume equal to 100% of the proposed water quality volume. Although the soils are modelled as HSG "A. B & D," we have assumed a small infiltration rate of 0.52"/hour in the permeable pavers and 5" / hour in the stormwater pond.

Proposed Watershed Data (Proposed Conditions Cover Characteristics and Proposed Watershed Area Map) have been included as Appendix B. Water quality volume computations have been included as Appendix D.

Peak Flow Comparison

Peak flows at the off-site analysis points are as follows:

Drainage Summary Glastonbury Housing Authority Nye Road, Glastonbury CT Project # 70896.00			
Peak Flow Comparison			
Watershed	**Storm Event**	**Existing Peak Flow (cfs)**	**Proposed Peak Flow (cfs)**
1 (NYE ROAD)	**2-year**	4.45	4.24
	10-year	9.82	9.14
	25-year	13.39	12.39
	100-year	19.01	17.46
2 (OFFSITE SOUTHEAST)	**2-year**	0.13	0.13
	10-year	2.14	1.90
	25-year	4.44	4.10
	100-year	8.73	7.04
TOTAL SITE	**2-year**	4.45	4.27
	10-year	11.35	10.00
	25-year	17.03	14.65
	100-year	26.58	23.27

It can be seen that peak flows will be reduced under proposed conditions for all design storms.

SECTION 3 – HYDRAULICS

The intent of the hydraulic analysis is to ensure that new on-site drainage facilities could accommodate and safely convey the 10-year, 24-hour design storm while maintaining the hydraulic grade line a minimum of 1 foot below grate or rim elevations.

Methodology

The storm drain system was analyzed using the Rational Method for estimating runoff for a 10-year design storm. The software "Hydraflow Stormsewers" was used to model pipe flow through the pipe network. Outlet protection was designed per the CT DOT Drainage manual.

Proposed Conditions

The site has been designed with a series of drainage facilities, including catch basins, manholes, area drains and piping designed to remove stormwater from paved and pervious surfaces, and convey it to wetlands discharge areas.

The drainage systems have been designed to safely convey storm flows from the 10-Year Design Storm, with all pipes designed with sufficient capacity and the hydraulic grade lines through the entire systems sufficiently below grade. A portion of the existing downstream network from Watershed 1 was analyzed to ensure it's capacity is sufficient for the proposed flow.

Detailed calculations (Catchment Map and computations) for the on-site stormwater system hydraulics are included in Appendix C.

SECTION 4 – STORMWATER QUALITY

The project has been designed to address both short-term and long-term stormwater quality. Short term (during construction) treatment has been provided in the form of erosion control measures and long-term (post construction) treatment has been provided through the use of stormwater quality Best Management Practices (BMPs). Erosion control has been designed per the 2002 Connecticut Erosion Control Guidelines. Long-term stormwater quality has been designed to meet the stormwater quality standards set forth in the Town of Glastonbury Stormwater Management Plan and the 2004 CT DEP Stormwater Quality Manual.

Short Term Erosion Control

The proposed erosion and sedimentation controls consider the specific characteristics of the site and the anticipated construction activities, and have been designed in accordance with the 2002 Guidelines.

Construction Entrances

Construction entrances will be utilized to remove sediment from construction vehicle tires and prevent it from being tracked onto adjoining paved roadway areas.

Erosion Control Barriers

Prior to any construction activity, hay bales, silt fence, or combination hay bale/silt fence barriers will be placed at the downgradient limits of construction, adjacent Beaver Pond. These barriers will be inspected once every seven calendar days and within 24 hours after every rainfall generating a discharge and replaced as necessary. Collected silt will be removed when one-half the barrier height is reached.

Temporary Seeding

Temporary Seeding will be utilized on portions where the phasing and sequencing require an initial disturbance followed by an extended period of inactivity that is greater than 30 days but less than 1 year. Temporary seeding will be conducted within 7 days after the suspension of grading work in disturbed areas where the suspension of work is expected to be more than 30 days but less than 1 year.

Soil Stabilization- Mulches

Structural (non-living) soil stabilization will be utilized to protect the soil surface on a temporary basis without the intention of promoting plant growth. When grading of the disturbed area will be suspended for a period of 30 or more consecutive days, but less than 5 months, disturbed areas will be stabilized within 7 days of the suspension of grading through the use of mulch, non-bituminous tackifiers, erosion control netting, or other approved materials appropriate for use as a temporary soil protector. For surfaces that are not to be reworked within 5 months but will be reworked within 1 year, use temporary seeding, seeding-type mulch (hay, straw, or cellulose fiber) or when slopes are less than 3:1, wood chips, bark chips or shredded bark.

Temporary Filter Inserts

Temporary Filter Inserts will be placed in each existing catch basin and yard drains prior to the start of construction, and in each new catch basin or yard drain during construction. These devices will be removed upon final site stabilization. Filter inserts will be inspected once every seven (7) calendar days and within 24 hours after every rainfall generating a discharge. Replacement of the inserts will be as often as necessary to maintain function of the drainage structure and prevent excessive ponding due to clogged fabric. Ripped or otherwise damaged inserts will be replaced immediately.

Stockpile Management

The topsoil stockpiles which will be idle for at least 30 days will be stabilized with temporary seed and mulch no later than 7 days from the last use. Small stockpiles may be covered with impervious tarps or erosion control matting in lieu of seeding and mulching.

A geotextile silt fence or hay bale barrier will be installed around the stockpile area approximately 10 feet from the proposed toe of the slope.

Long Term Stormwater Quality

The project was designed with guidance and direction from the Town of Glastonbury Stormwater Management Plan, the Glastonbury Plan of Conservation and Development (POCD), and the CT DEEP 2023 Connecticut Stormwater Quality Manual (2004 Manual).

The Glastonbury Stormwater Management Plan (Glastonbury Plan) was developed to protect water quality and reduce the discharge of pollutants from the municipality's storm sewer system to the maximum extent practical and addresses the requirements established by the DEEP MS4 Permit. Since the site is currently developed with less than 40% impervious, the proposed project has been designed to retain 100% of the water quality volume on-site through the incorporation of permeable pavers and an above ground pond with infiltration capabilities. The intent of the Glastonbury Plan is also to prevent or reduce thermal impacts to streams.

The POCD goals for stormwater treatment include the following:

- Utilize stormwater renovation through best management practices that include the use of bioretention areas.
- Utilize stormwater temperature mitigation techniques.

The design intent of the Connecticut Stormwater Quality Manual is to provide a "stormwater treatment train," where stormwater quality is achieved through a series of treatment measures. Harmful pollutants, such as sediment, pathogens, organic material, hydrocarbons, metals, synthetic organic chemicals and deicing compounds, are carried by the low-flow storms. Many of these pollutants are associated with vehicular exhaust, engine leaks and deicing, therefore key areas of on-site treatment include parking lots and access drives. Additionally, rooftops are a concern as a result of atmospheric ambient accumulation. Since pollutants typically attach themselves to solid particles, treatment practices are designed to remove suspended solids.

The treatment train for this site includes:

- Parking lot sweeping
- Hydrodynamic Separators
- Recharge Pond

Test pits will be performed in the general location of the recharge pond and permeable paver areas. At the time of the test pits, percolation testing will be performed to confirm infiltration rates we have utilized within our report.

It is expected that, after storm events, the recharge areas will be wet for up to 24 hours. They will be planted with native grasses specifically chosen to be resistant to sustained inundation and salt tolerant. Runoff to the recharge, that is not percolated, will eventually drain to the wetlands. The

In addition to the above best management practices, the site will incorporate permeable pavers as the surface for parking within the site development.

The aggregate volume provided by the recharge areas is greater than the required water quality volume. Computations can be viewed in Appendix D.

Maintenance and Operation

Operation and maintenance shall be the responsibility of the owner.

During Construction

- Dust Control: Moisten disturbed soil areas with water periodically, or use a non-asphaltic soil tacifier to minimize dust.
- Temporary Soil Protection: Inspect seeded areas weekly and within 24 hours after a storm generating a discharge.
- Catch Basin Filter Inserts: Inspect the fabric at least once a week and within 24 hours after the end of a storm generating a discharge. Check the fabric for structural soundness (i.e. tears), proper anchoring/alignment within the grate and ability to drain runoff (i.e. percent of clogging by sediment). Remove the sediment every week, or sooner if ponding is excessive. Each time the sediment is removed, replace the section of fabric removed with a new section. Do not remove the sediment and reuse the same section of fabric.
- Hay Bale/ Silt Fence Barrier: Inspect the barrier at least once a week and within 24 hours after the end of a storm generating a discharge. For dewatering operations, inspect frequently before, during and after pumping operations. Remove the sediment deposits when the depth reaches one half the barrier heights. Repair or replace a barrier within 24 hours of observed failure. Maintain the barrier until the contributing disturbed area is stabilized.
- Construction Entrance/Exit Pad: Maintain the pad in a condition that will prevent tracking and washing of sediment onto paved surfaces. Place additional clean gravel on top of gravel that has become silted, or remove the silted gravel and replace the gravel to the depth removed with clean gravel, as conditions warrant. Remove immediately all sediment spilled, dropped, washed or tracked onto paved surfaces. Roads adjacent to the construction site shall be cleaned at the end of each day by hand sweeping or sweeper truck.
- Dewatering Settling Basin (if used): Inspect the basin at least every two hours during periods of use. Remove accumulated sediments when the volume equals one half the provided storage volume.
- Existing Catch Basins and Sumps: Inspect the filter baskets as specified above. After final removal of the filter baskets at the end of construction, clean the sump of all silt and debris.
- New Catch Basins and Sumps: As new catch basins are constructed, a sediment trap shall be installed in the unit and a sediment barrier installed around the grate. Inspect the trap and barrier weekly and within 24 hours after a storm generating a discharge. After stabilization of the drainage area entering the catch basin, remove the trap and barrier and clean the basin sump of all silt and debris.
- Temporary Stockpiles: Inspect temporary stockpiles at the end of each workday to ensure that tarps are in place and secured. Temporary stockpiles that are expected to be inactive for more than 30 days should be temporarily seeded (see above).

After Construction

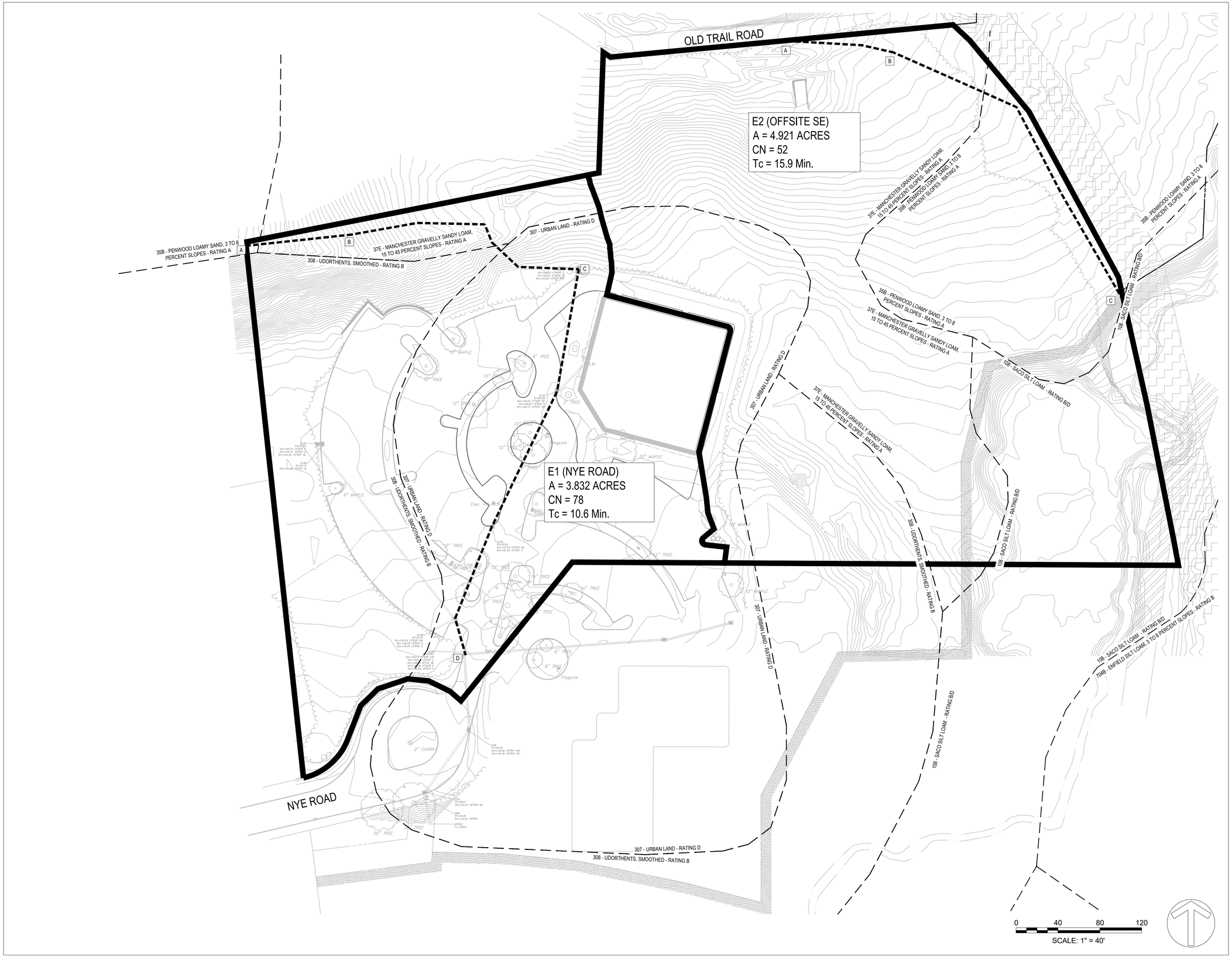
- Recharge Pond: Inspect several times during the first few months to ensure that grass cover is established. Inspect semi-annually and after major rain events for the first year. Inspect

annually after the first year. Trash should be removed as accumulated. Sediment build-up should be removed when its depth is greater than four (4) inches. Grass should be reseeded if the side or bottom slopes exhibit erosion. Grass should be mowed once per month and should be cut to leave at least two (2) inches of height. Mowing should not occur when the ground is soft, to avoid ruts.

- Parking Lot and Site Cleanup: Inspect on a regular basis not to exceed weekly for litter and debris.
- Parking Lot and Driveway Sweeping: At least twice a year, with the first occurring as soon as possible after snowmelt and the second not less than 90 days following the first.
- Catch Basins and Sumps: Maintenance includes removal of trash from the grate and the sump, as well as sediment from the sump. They shall be inspected semi-annually and cleaned when the sump is one half full of sediment. One of the inspections shall be after the snow and ice removal season is over, and prior to the spring rainfall events. If the sumps is filled more than half-filled with sediment at the semi-annual inspections, they shall be inspected quarterly.
- Permeable Pavers: Shall be inspected regularly and cleared of tracked mud or sediment and leaves, to ensure the cracks between the pavers do not become clogged and therefore become impermeable.
- Landscaped Areas: Inspect semi-annually for erosion or dying vegetation. Repair and stabilize any bare or eroded areas and replace vegetation as soon as possible.

APPENDIX A

EXISTING WATERSHED DATA



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PROJECT DESCRIPTION:

Glastonbury Housing Authority Nye Road

Glastonbury, CT

Revisions: 11/01/23 IWWC RESUBMIT

Issue Dates: OCTOBER 13, 2023

WETLANDS & ZONING SUBMISSION
OCTOBER 13, 2023

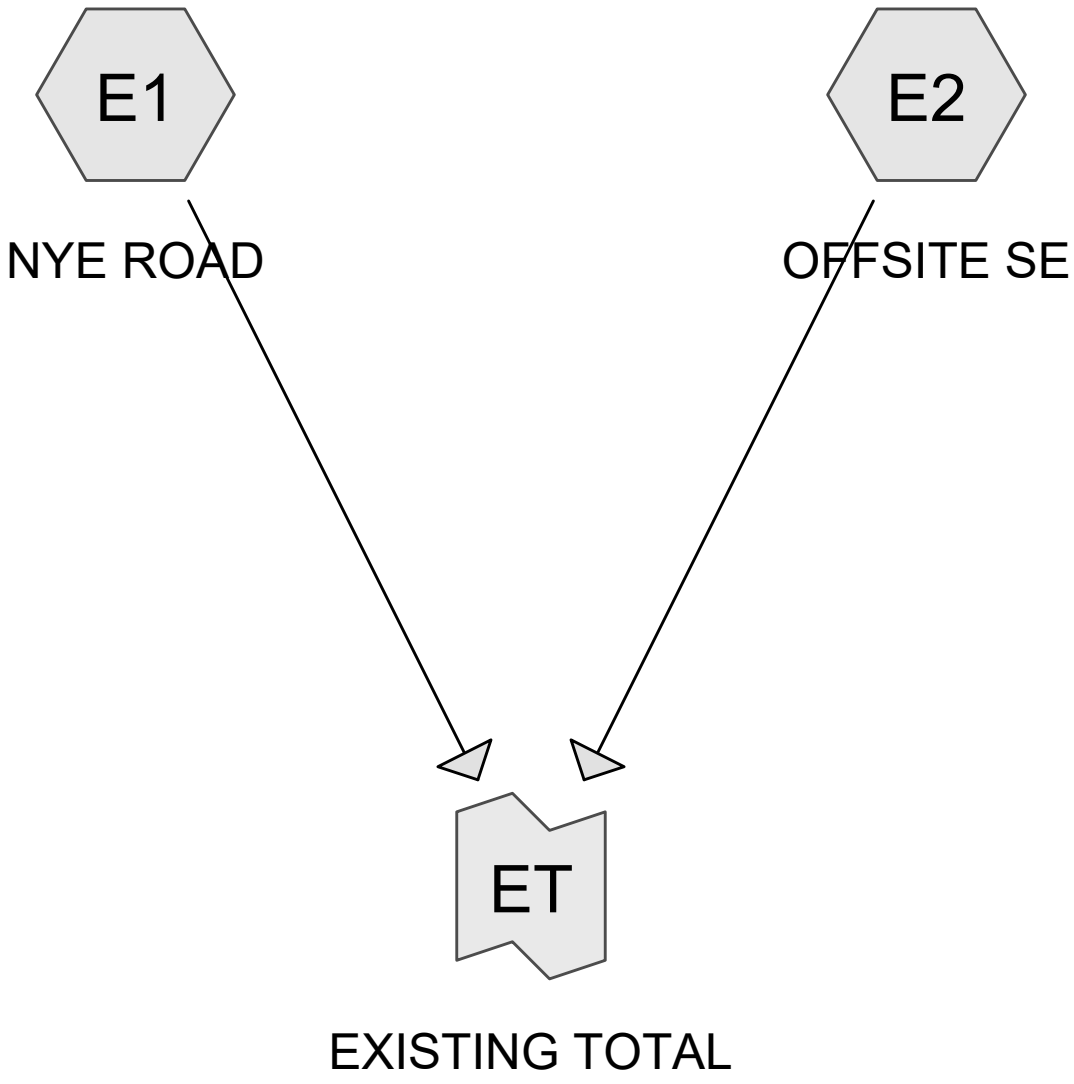
EXISTING WATERSHED AREA MAP

EWAM

Watershed Cover Characteristics
Glastonbury Housing Authority
Nye Road, Glastonbury CT
Project # 70896.00

Exisiting:

Watershed	Description	Total Area (ac)	Woods A	Grass A	Woods B	Grass B	Woods D	Grass D	Impervious	Pavers	CN	Tc (min)
E1	NYE ROAD	3.832	0.289	0.000	0.883	0.172	0.186	0.471	1.832	0.000	78	10.6
E2	OFFSITE SOUTHEAST	4.921	2.891	0.268	0.495	0.000	1.159	0.018	0.090	0.000	52	15.9
TOTAL	Total Site	8.754	3.180	0.268	1.378	0.172	1.345	0.489	1.922	0.000	-	-



Subcat Reach Pond Link

Routing Diagram for 70896 HydroCAD - Existing
Prepared by Alfred Benesch & Company, Printed 10/31/2023

Summary for Subcatchment E1: NYE ROAD

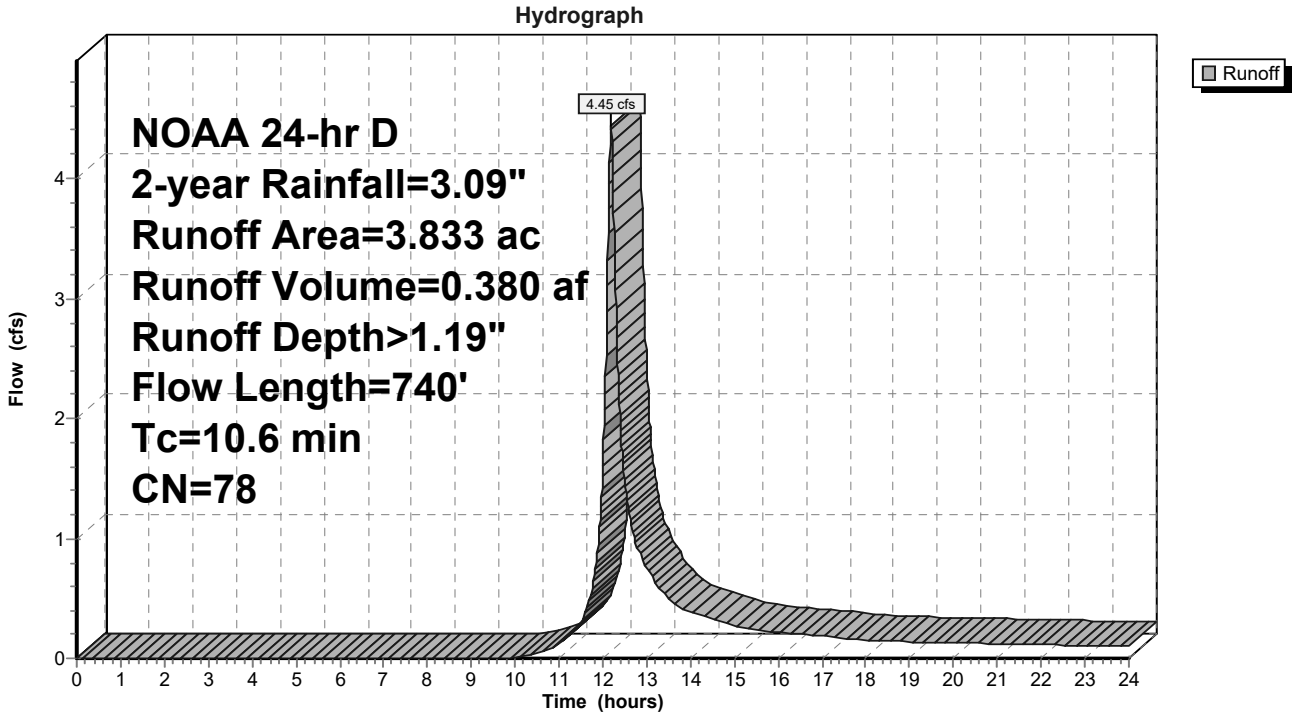
Runoff = 4.45 cfs @ 12.19 hrs, Volume= 0.380 af, Depth> 1.19"
Routed to Link ET : EXISTING TOTAL

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-year Rainfall=3.09"

Area (ac)	CN	Description
0.289	30	Woods, Good, HSG A
0.883	55	Woods, Good, HSG B
0.186	77	Woods, Good, HSG D
0.172	61	>75% Grass cover, Good, HSG B
0.471	80	>75% Grass cover, Good, HSG D
1.832	98	Paved parking, HSG D
3.833	78	Weighted Average
2.001		52.20% Pervious Area
1.832		47.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2000	0.19		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.6	240	0.2000	7.20		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
1.3	400	0.0100	5.26	6.46	**Pipe Channel, RCP_Round 15"** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
10.6	740	Total			

Subcatchment E1: NYE ROAD



Summary for Subcatchment E2: OFFSITE SE

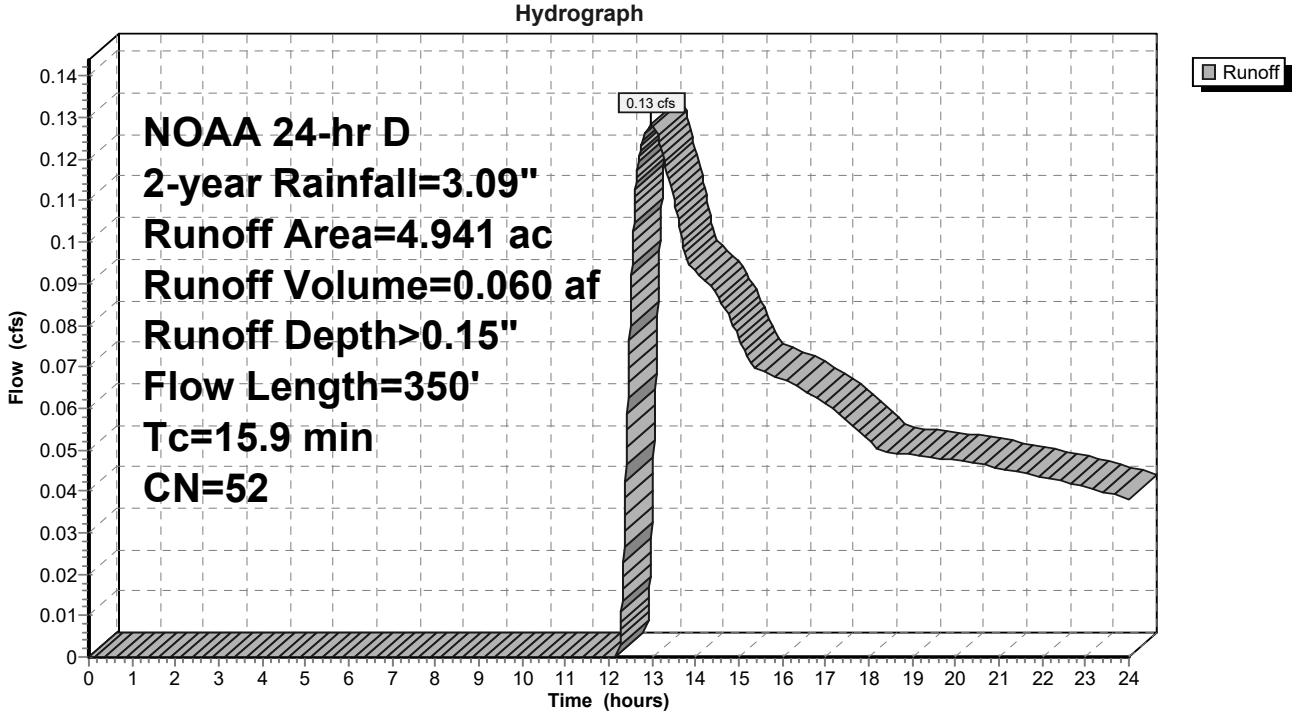
Runoff = 0.13 cfs @ 12.99 hrs, Volume= 0.060 af, Depth> 0.15"
Routed to Link ET : EXISTING TOTAL

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-year Rainfall=3.09"

Area (ac)	CN	Description
2.911	36	Woods, Fair, HSG A
0.495	60	Woods, Fair, HSG B
1.159	79	Woods, Fair, HSG D
0.268	68	<50% Grass cover, Poor, HSG A
0.018	89	<50% Grass cover, Poor, HSG D
0.090	98	Paved parking, HSG D
4.941	52	Weighted Average
4.851		98.18% Pervious Area
0.090		1.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0500	0.11		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.8	250	0.1000	5.09		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
15.9	350	Total			

Subcatchment E2: OFFSITE SE

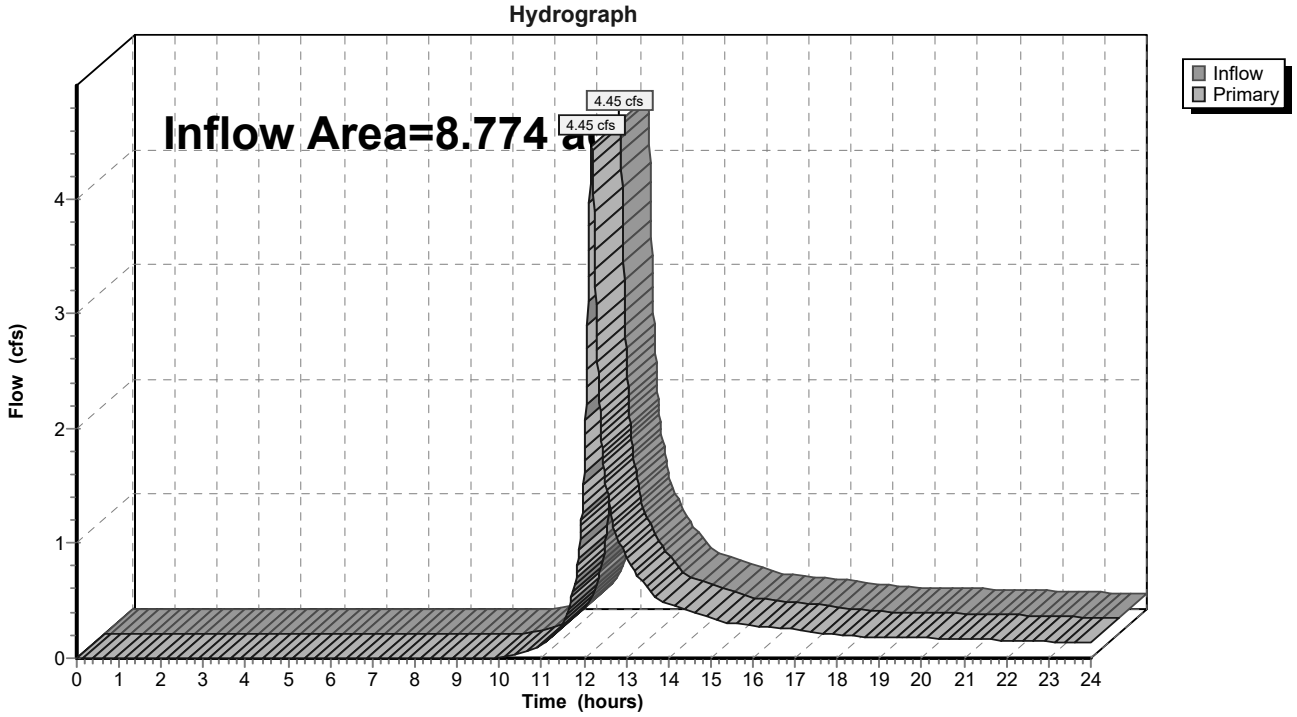


Summary for Link ET: EXISTING TOTAL

Inflow Area = 8.774 ac, 21.91% Impervious, Inflow Depth > 0.60" for 2-year event
Inflow = 4.45 cfs @ 12.19 hrs, Volume= 0.440 af
Primary = 4.45 cfs @ 12.19 hrs, Volume= 0.440 af, Atten= 0%, Lag= 0.0 min

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

Link ET: EXISTING TOTAL



Summary for Subcatchment E1: NYE ROAD

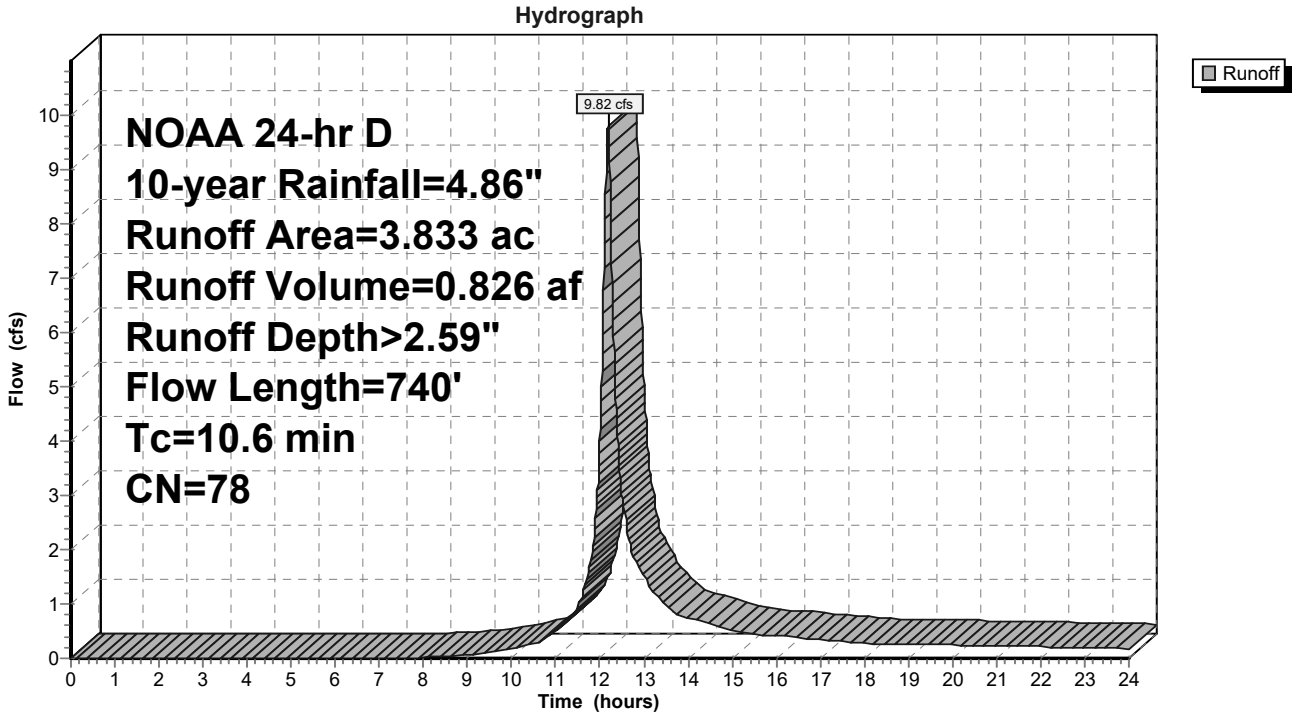
Runoff = 9.82 cfs @ 12.18 hrs, Volume= 0.826 af, Depth> 2.59"
Routed to Link ET : EXISTING TOTAL

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-year Rainfall=4.86"

Area (ac)	CN	Description
0.289	30	Woods, Good, HSG A
0.883	55	Woods, Good, HSG B
0.186	77	Woods, Good, HSG D
0.172	61	>75% Grass cover, Good, HSG B
0.471	80	>75% Grass cover, Good, HSG D
1.832	98	Paved parking, HSG D
3.833	78	Weighted Average
2.001		52.20% Pervious Area
1.832		47.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2000	0.19		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.6	240	0.2000	7.20		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
1.3	400	0.0100	5.26	6.46	**Pipe Channel, RCP_Round 15"** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
10.6	740	Total			

Subcatchment E1: NYE ROAD



Summary for Subcatchment E2: OFFSITE SE

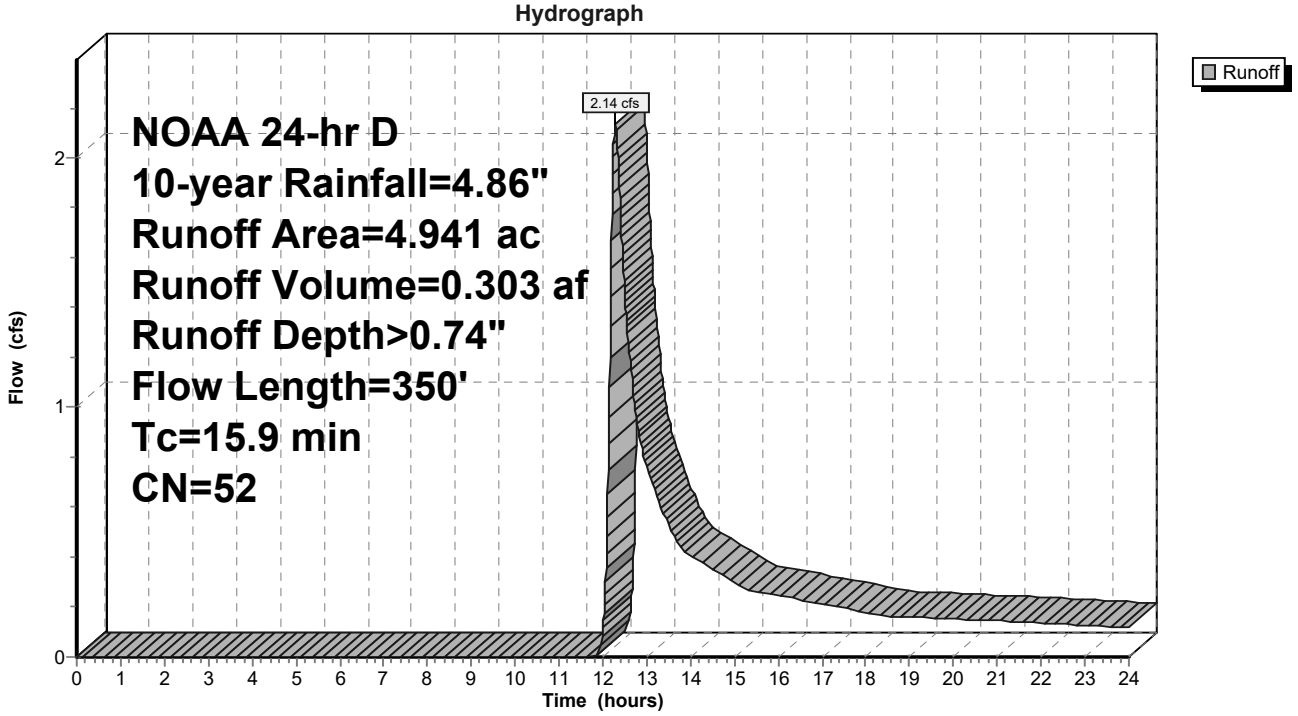
Runoff = 2.14 cfs @ 12.29 hrs, Volume= 0.303 af, Depth> 0.74"
Routed to Link ET : EXISTING TOTAL

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-year Rainfall=4.86"

Area (ac)	CN	Description
2.911	36	Woods, Fair, HSG A
0.495	60	Woods, Fair, HSG B
1.159	79	Woods, Fair, HSG D
0.268	68	<50% Grass cover, Poor, HSG A
0.018	89	<50% Grass cover, Poor, HSG D
0.090	98	Paved parking, HSG D
4.941	52	Weighted Average
4.851		98.18% Pervious Area
0.090		1.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0500	0.11		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.8	250	0.1000	5.09		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
15.9	350	Total			

Subcatchment E2: OFFSITE SE

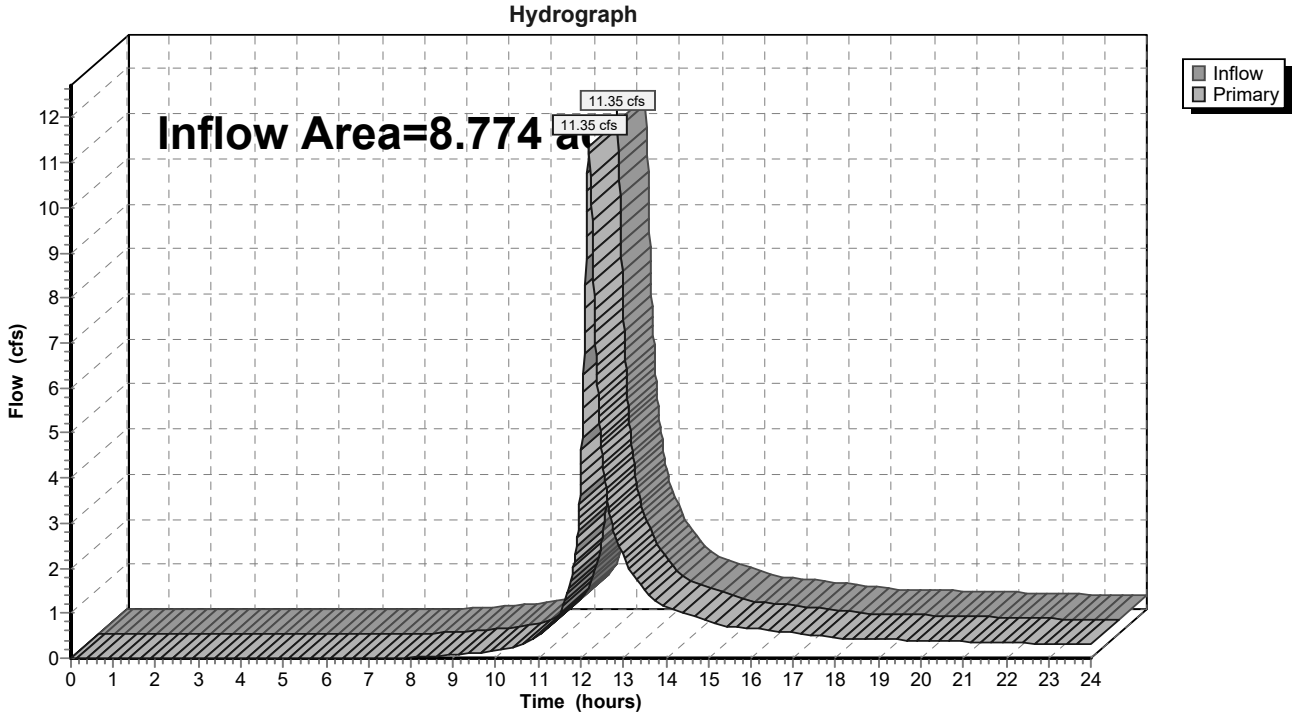


Summary for Link ET: EXISTING TOTAL

Inflow Area = 8.774 ac, 21.91% Impervious, Inflow Depth > 1.54" for 10-year event
Inflow = 11.35 cfs @ 12.19 hrs, Volume= 1.129 af
Primary = 11.35 cfs @ 12.19 hrs, Volume= 1.129 af, Atten= 0%, Lag= 0.0 min

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

Link ET: EXISTING TOTAL



Summary for Subcatchment E1: NYE ROAD

Runoff = 13.39 cfs @ 12.18 hrs, Volume= 1.132 af, Depth> 3.54"
Routed to Link ET : EXISTING TOTAL

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-year Rainfall=5.97"

Area (ac)	CN	Description
0.289	30	Woods, Good, HSG A
0.883	55	Woods, Good, HSG B
0.186	77	Woods, Good, HSG D
0.172	61	>75% Grass cover, Good, HSG B
0.471	80	>75% Grass cover, Good, HSG D
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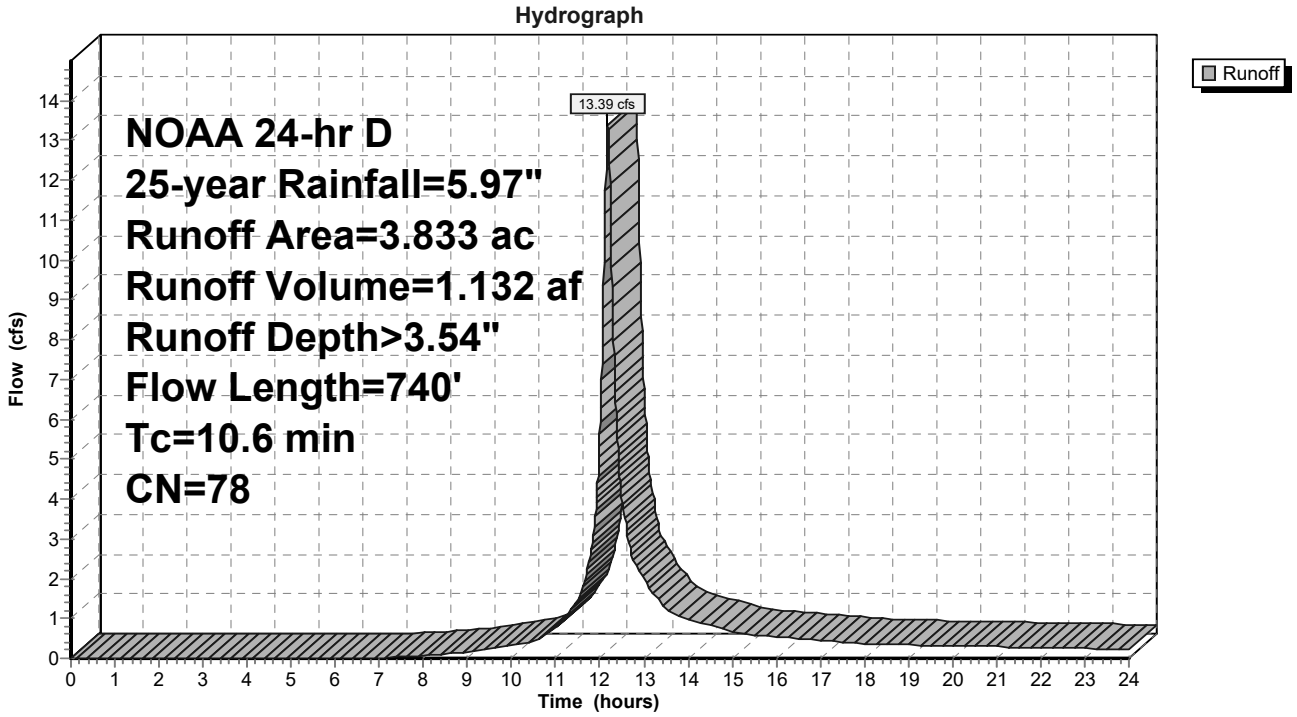
2.001		52.20% Pervious Area
1.832		47.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2000	0.19		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.6	240	0.2000	7.20		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
1.3	400	0.0100	5.26	6.46	**Pipe Channel, RCP_Round 15"** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
10.6	740	Total			

Subcatchment E1: NYE ROAD



Summary for Subcatchment E2: OFFSITE SE

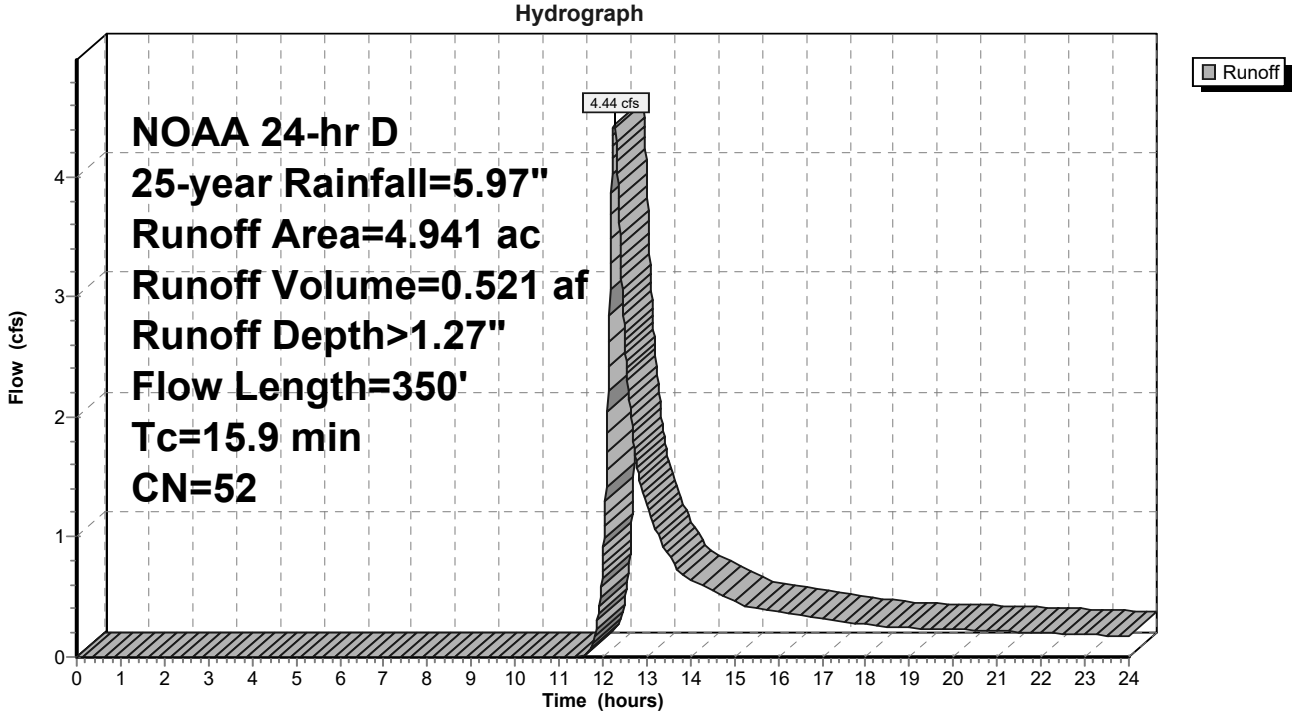
Runoff = 4.44 cfs @ 12.27 hrs, Volume= 0.521 af, Depth> 1.27"
Routed to Link ET : EXISTING TOTAL

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-year Rainfall=5.97"

Area (ac)	CN	Description
2.911	36	Woods, Fair, HSG A
0.495	60	Woods, Fair, HSG B
1.159	79	Woods, Fair, HSG D
0.268	68	<50% Grass cover, Poor, HSG A
0.018	89	<50% Grass cover, Poor, HSG D
0.090	98	Paved parking, HSG D
4.941	52	Weighted Average
4.851		98.18% Pervious Area
0.090		1.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0500	0.11		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.8	250	0.1000	5.09		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
15.9	350	Total			

Subcatchment E2: OFFSITE SE

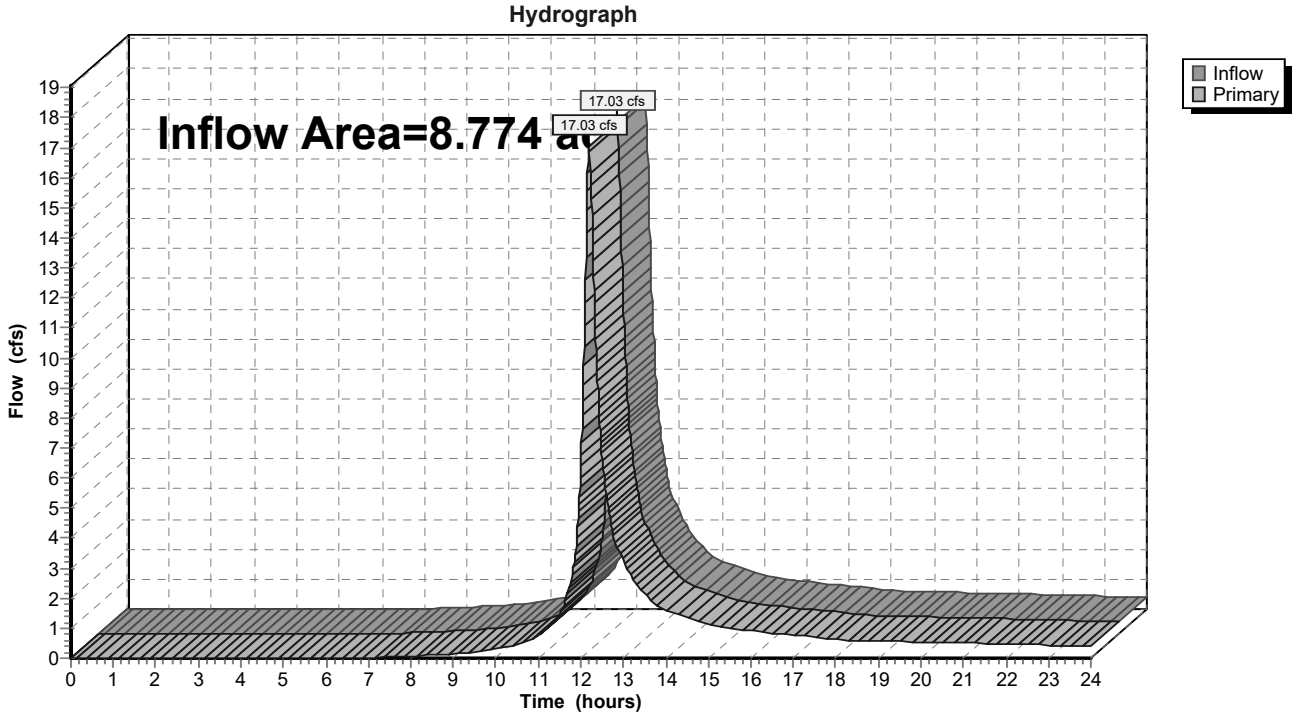


Summary for Link ET: EXISTING TOTAL

Inflow Area = 8.774 ac, 21.91% Impervious, Inflow Depth > 2.26" for 25-year event
Inflow = 17.03 cfs @ 12.19 hrs, Volume= 1.653 af
Primary = 17.03 cfs @ 12.19 hrs, Volume= 1.653 af, Atten= 0%, Lag= 0.0 min

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

Link ET: EXISTING TOTAL



Summary for Subcatchment E1: NYE ROAD

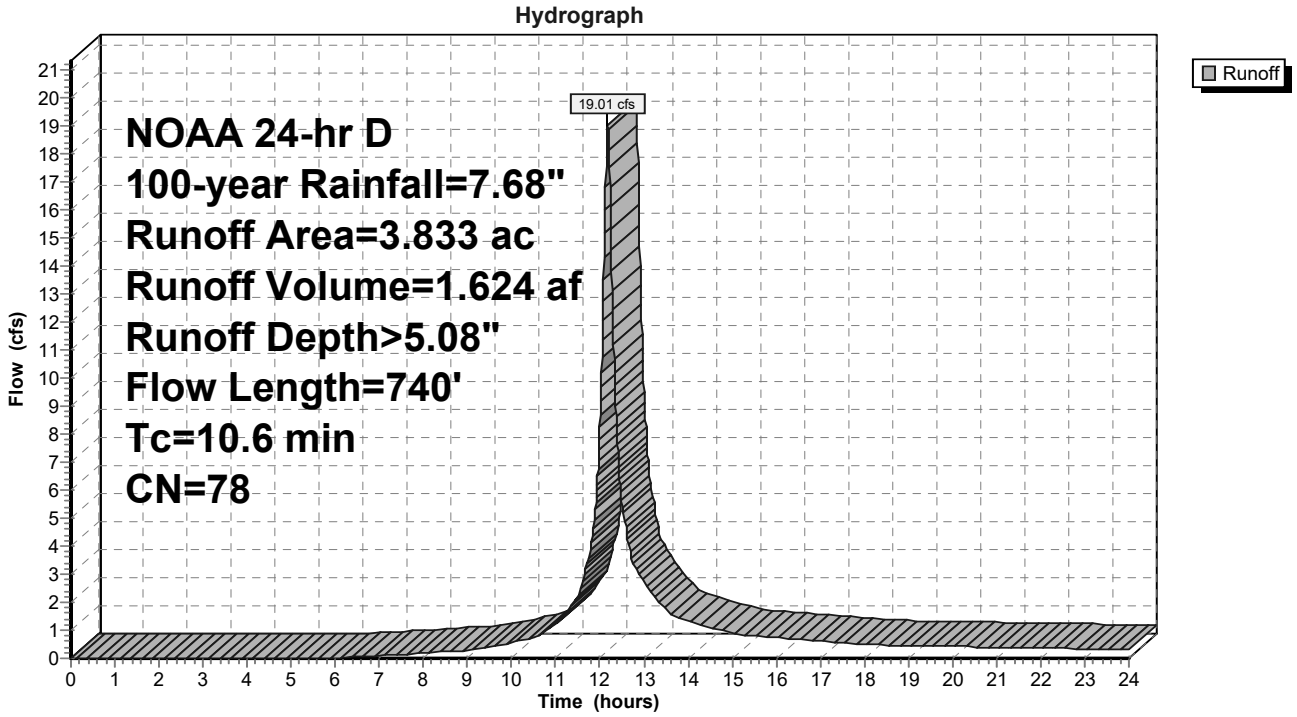
Runoff = 19.01 cfs @ 12.18 hrs, Volume= 1.624 af, Depth> 5.08"
Routed to Link ET : EXISTING TOTAL

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-year Rainfall=7.68"

Area (ac)	CN	Description
0.289	30	Woods, Good, HSG A
0.883	55	Woods, Good, HSG B
0.186	77	Woods, Good, HSG D
0.172	61	>75% Grass cover, Good, HSG B
0.471	80	>75% Grass cover, Good, HSG D
1.832	98	Paved parking, HSG D
3.833	78	Weighted Average
2.001		52.20% Pervious Area
1.832		47.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2000	0.19		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.6	240	0.2000	7.20		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
1.3	400	0.0100	5.26	6.46	**Pipe Channel, RCP_Round 15"** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
10.6	740	Total			

Subcatchment E1: NYE ROAD



Summary for Subcatchment E2: OFFSITE SE

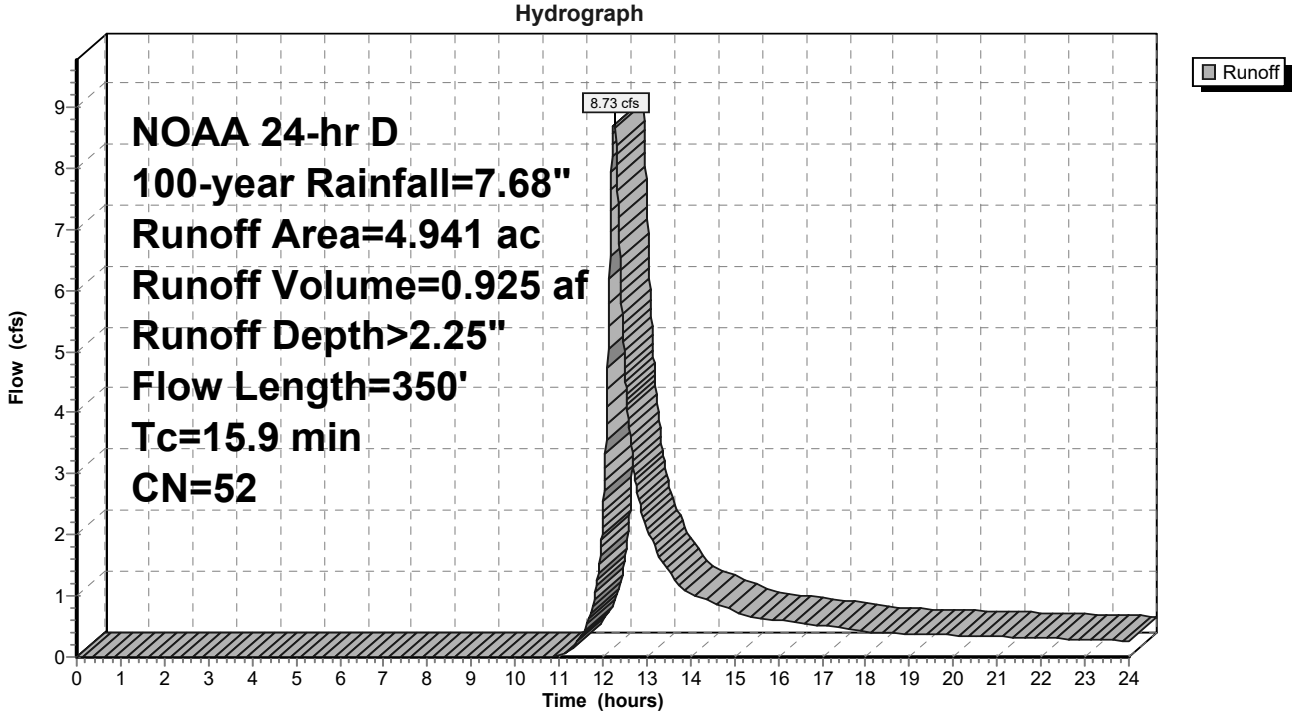
Runoff = 8.73 cfs @ 12.26 hrs, Volume= 0.925 af, Depth> 2.25"
Routed to Link ET : EXISTING TOTAL

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-year Rainfall=7.68"

Area (ac)	CN	Description
2.911	36	Woods, Fair, HSG A
0.495	60	Woods, Fair, HSG B
1.159	79	Woods, Fair, HSG D
0.268	68	<50% Grass cover, Poor, HSG A
0.018	89	<50% Grass cover, Poor, HSG D
0.090	98	Paved parking, HSG D
4.941	52	Weighted Average
4.851		98.18% Pervious Area
0.090		1.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0500	0.11		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.8	250	0.1000	5.09		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
15.9	350	Total			

Subcatchment E2: OFFSITE SE

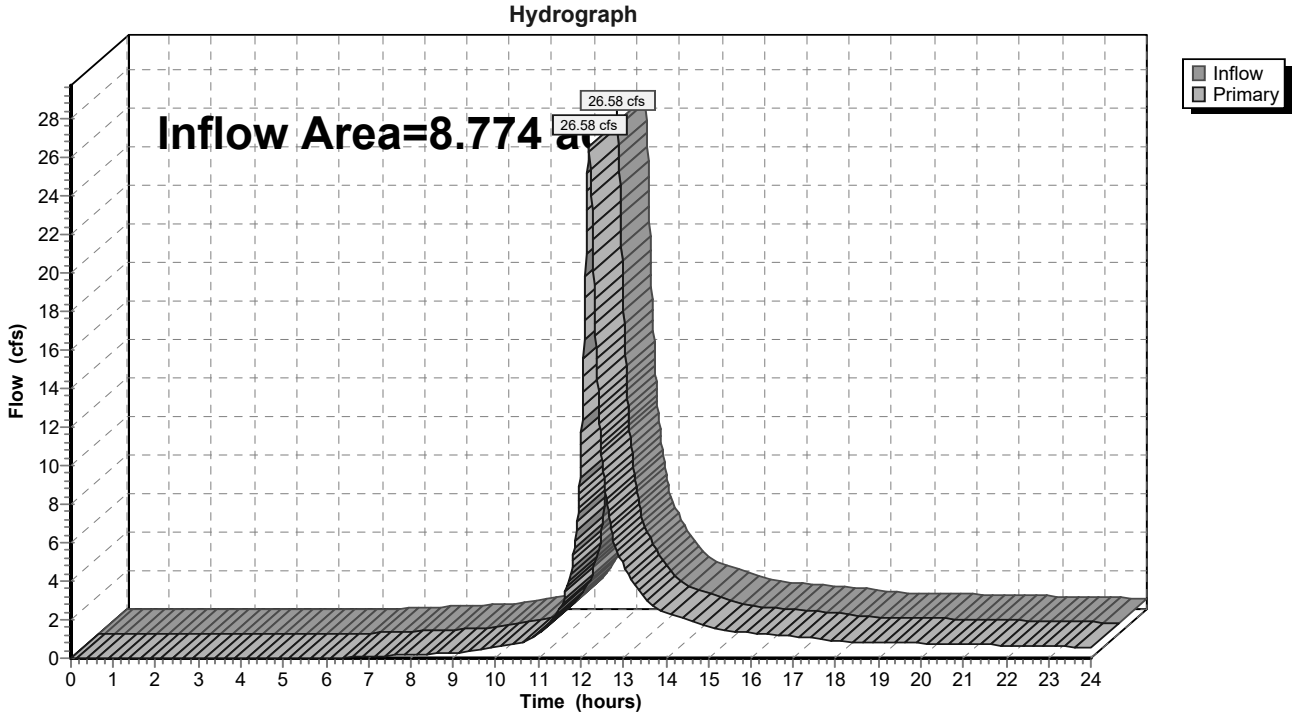


Summary for Link ET: EXISTING TOTAL

Inflow Area = 8.774 ac, 21.91% Impervious, Inflow Depth > 3.49" for 100-year event
Inflow = 26.58 cfs @ 12.19 hrs, Volume= 2.549 af
Primary = 26.58 cfs @ 12.19 hrs, Volume= 2.549 af, Atten= 0%, Lag= 0.0 min

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

Link ET: EXISTING TOTAL



APPENDIX B

PROPOSED WATERSHED DATA

QA+M architecture
QuirsenberryArcariMalik
195 Scott Swamp Road
Farmington, CT 06032
qamarch.com

benesch
Alfred Benesch & Company
120 Hebron Avenue, 2nd Floor
Glastonbury, Connecticut 06033
860-633-8341

PROJECT DESCRIPTION:

Glastonbury Housing Authority Nye Road

Glastonbury, CT

Revisions: 11/01/23 IWWC RESUBMIT

Issue Dates: OCTOBER 13, 2023

N

WETLANDS & ZONING SUBMISSION
OCTOBER 13, 2023

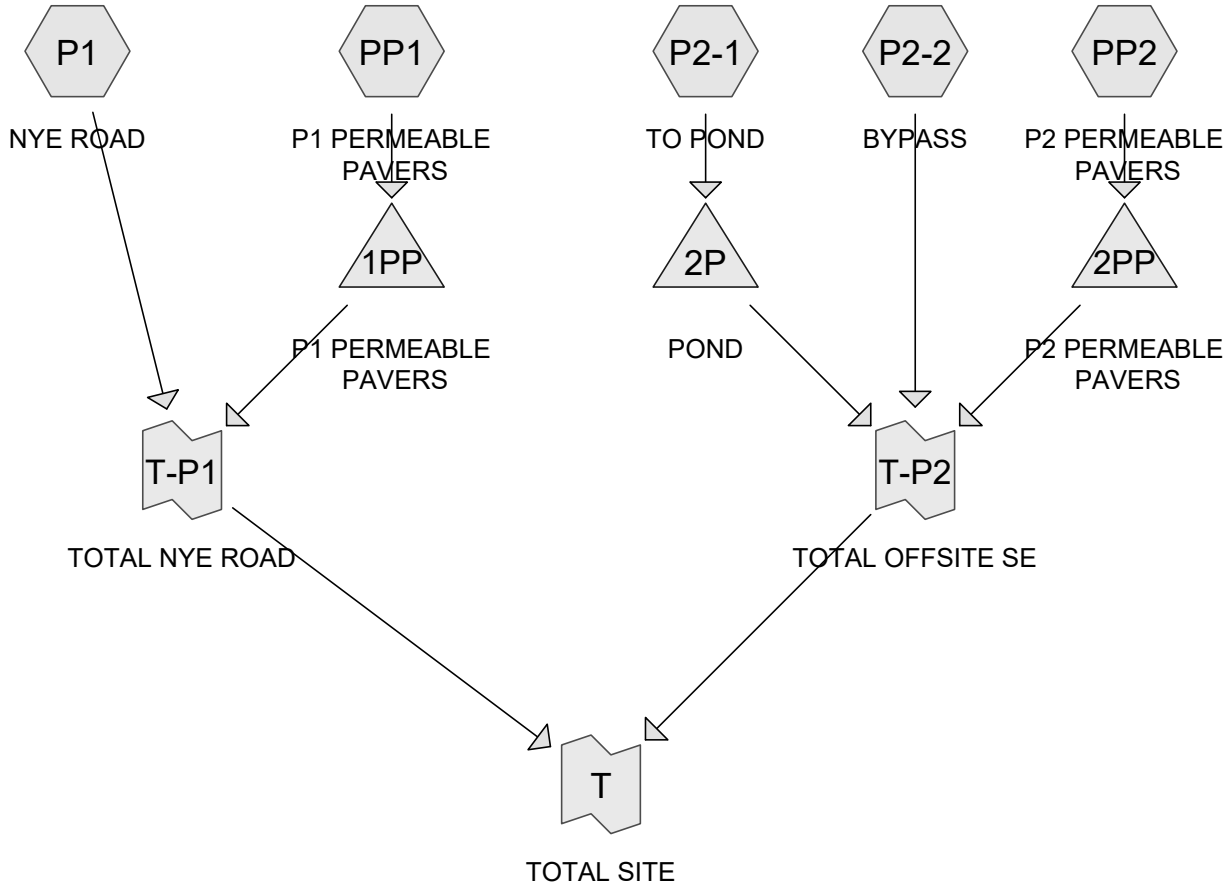
PROPOSED WATERSHED AREA MAP

PWAM

Watershed Cover Characteristics
Glastonbury Housing Authority
Nye Road, Glastonbury CT
Project # 70896.00

Proposed:

Watershed	Description	Total Area (ac)	Woods A	Grass A	Woods B	Grass B	Woods D	Grass D	Impervious	Pavers	CN	Tc (min)
P1-1	NYE ROAD	3.455	0.153	0.088	0.101	0.854	0.000	0.701	1.558		79	10.6
PP1	P1 POROUS PAVERS	0.324								0.324	98	5
P2-1	POND	3.013	0.301	1.164	0.000	0.056	0.000	0.308	1.185		66	15.4
P2-2	BYPASS	1.619	0.383	0.351	0.000	0.156	0.705	0.000	0.025		56	15.9
PP2	P2 POROUS PAVERS	0.438								0.438	98	5
TOTAL	Total Site	8.849	0.836	1.602	0.101	1.066	0.705	1.008	2.768	0.762		



Subcat Reach Pond Link

Routing Diagram for 70896 HydroCAD - Proposed
Prepared by Alfred Benesch & Company, Printed 11/1/2023

Summary for Subcatchment P1: NYE ROAD

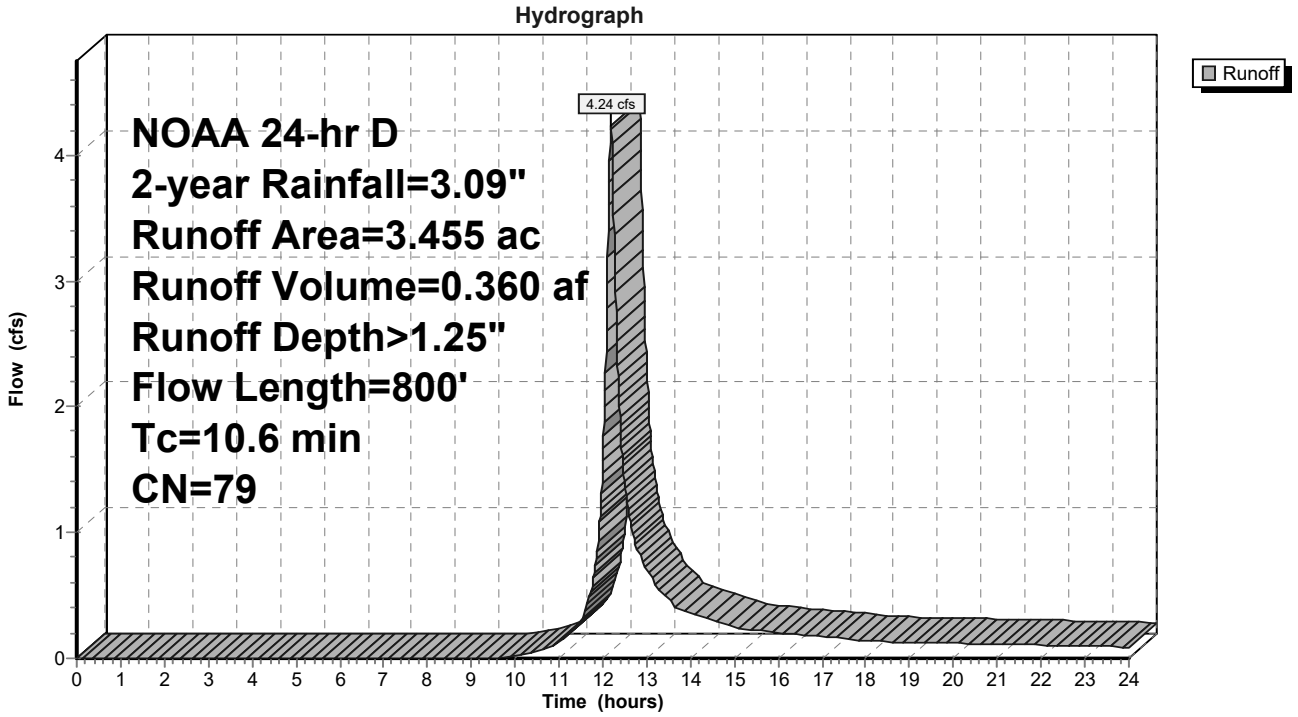
Runoff = 4.24 cfs @ 12.19 hrs, Volume= 0.360 af, Depth> 1.25"
Routed to Link T-P1 : TOTAL NYE ROAD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-year Rainfall=3.09"

Area (ac)	CN	Description
0.153	30	Woods, Good, HSG A
0.088	39	>75% Grass cover, Good, HSG A
0.101	55	Woods, Good, HSG B
0.854	61	>75% Grass cover, Good, HSG B
0.701	80	>75% Grass cover, Good, HSG D
1.558	98	Paved parking, HSG D
3.455	79	Weighted Average
1.897		54.91% Pervious Area
1.558		45.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2000	0.19		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.4	180	0.2000	7.20		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
0.3	60	0.0200	2.87		**Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps
1.2	460	0.0160	6.22	4.88	**Pipe Channel, 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
10.6	800	Total			

Subcatchment P1: NYE ROAD



Summary for Subcatchment P2-1: TO POND

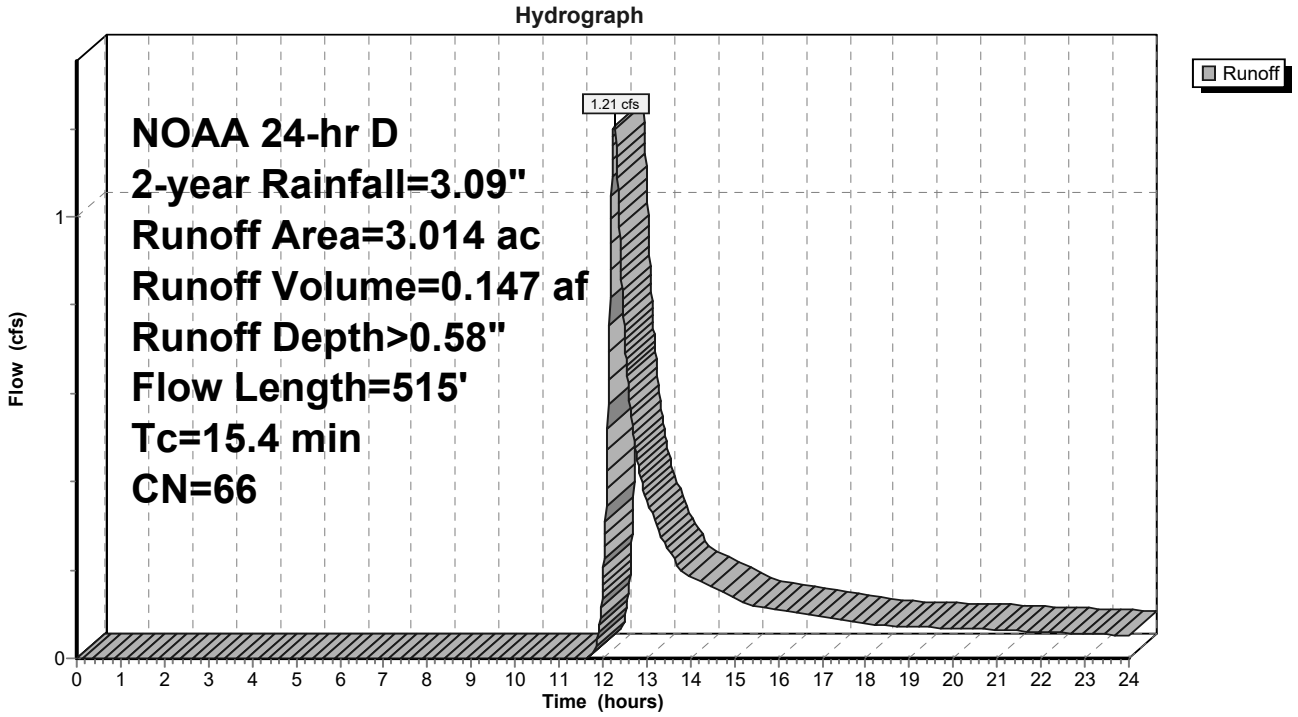
Runoff = 1.21 cfs @ 12.27 hrs, Volume= 0.147 af, Depth> 0.58"
Routed to Pond 2P : POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-year Rainfall=3.09"

Area (ac)	CN	Description
0.301	30	Woods, Good, HSG A
1.164	39	>75% Grass cover, Good, HSG A
0.056	61	>75% Grass cover, Good, HSG B
0.308	80	>75% Grass cover, Good, HSG D
1.185	98	Paved parking, HSG D
3.014	66	Weighted Average
1.829		60.68% Pervious Area
1.185		39.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2000	0.19		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.7	100	0.0200	2.28		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
0.5	85	0.0200	2.87		**Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps
5.5	230	0.0200	0.69	0.55	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.120
15.4	515	Total			

Subcatchment P2-1: TO POND



Summary for Subcatchment P2-2: BYPASS

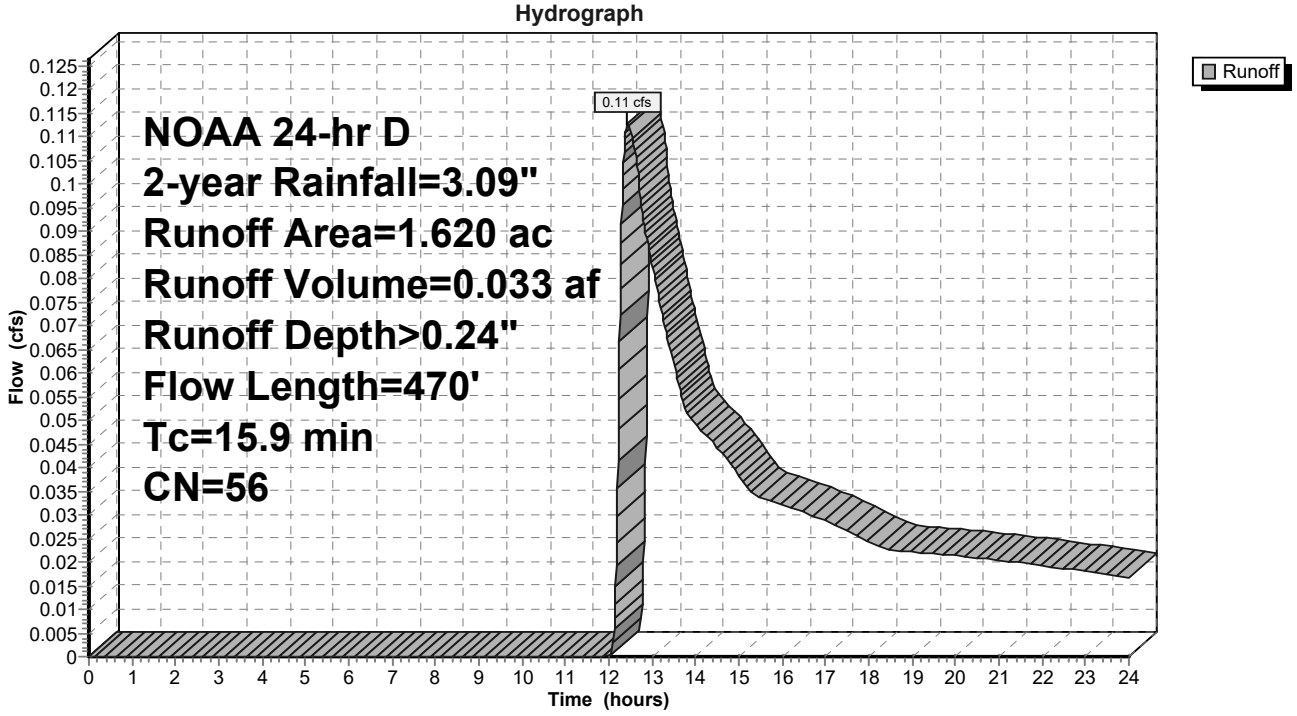
Runoff = 0.11 cfs @ 12.43 hrs, Volume= 0.033 af, Depth> 0.24"
Routed to Link T-P2 : TOTAL OFFSITE SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-year Rainfall=3.09"

Area (ac)	CN	Description
0.383	30	Woods, Good, HSG A
0.351	39	>75% Grass cover, Good, HSG A
0.156	61	>75% Grass cover, Good, HSG B
0.705	77	Woods, Good, HSG D
0.025	98	Paved parking, HSG D
1.620	56	Weighted Average
1.595		98.46% Pervious Area
0.025		1.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0700	0.13		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
2.7	370	0.0200	2.28		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
15.9	470	Total			

Subcatchment P2-2: BYPASS



Summary for Subcatchment PP1: P1 PERMEABLE PAVERS

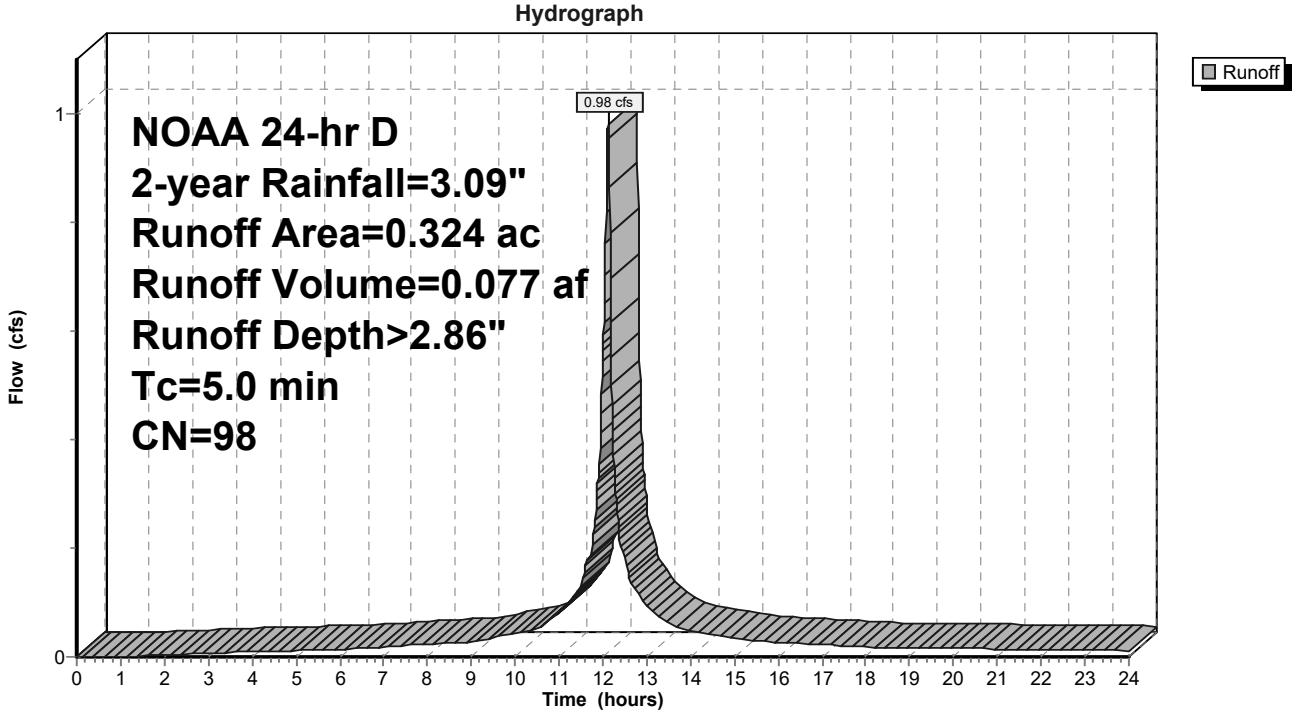
Runoff = 0.98 cfs @ 12.12 hrs, Volume= 0.077 af, Depth> 2.86"
Routed to Pond 1PP : P1 PERMEABLE PAVERS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-year Rainfall=3.09"

Area (ac)	CN	Description
0.324	98	Paved parking, HSG D
0.324		100.00% Impervious Area

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

Subcatchment PP1: P1 PERMEABLE PAVERS



Summary for Subcatchment PP2: P2 PERMEABLE PAVERS

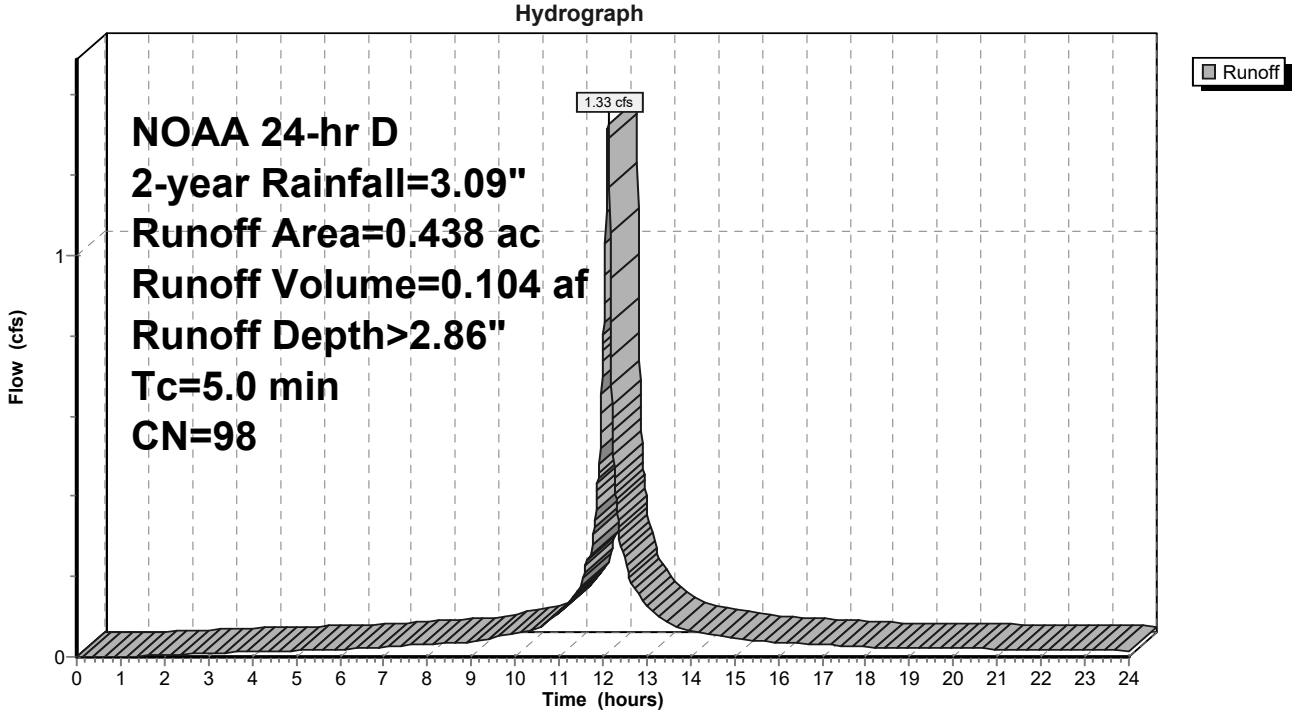
Runoff = 1.33 cfs @ 12.12 hrs, Volume= 0.104 af, Depth> 2.86"
Routed to Pond 2PP : P2 PERMEABLE PAVERS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-year Rainfall=3.09"

Area (ac)	CN	Description
0.438	98	Paved parking, HSG D
0.438		100.00% Impervious Area

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

Subcatchment PP2: P2 PERMEABLE PAVERS



Summary for Pond 1PP: P1 PERMEABLE PAVERS

Inflow Area = 0.324 ac,100.00% Impervious, Inflow Depth > 2.86" for 2-year event
Inflow = 0.98 cfs @ 12.12 hrs, Volume= 0.077 af
Outflow = 0.17 cfs @ 12.55 hrs, Volume= 0.077 af, Atten= 83%, Lag= 25.8 min
Discarded = 0.17 cfs @ 12.55 hrs, Volume= 0.077 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 50.13' @ 12.55 hrs Surf.Area= 0.324 ac Storage= 0.017 af

Plug-Flow detention time= 23.6 min calculated for 0.077 af (100% of inflow)
Center-of-Mass det. time= 23.1 min (780.7 - 757.6)

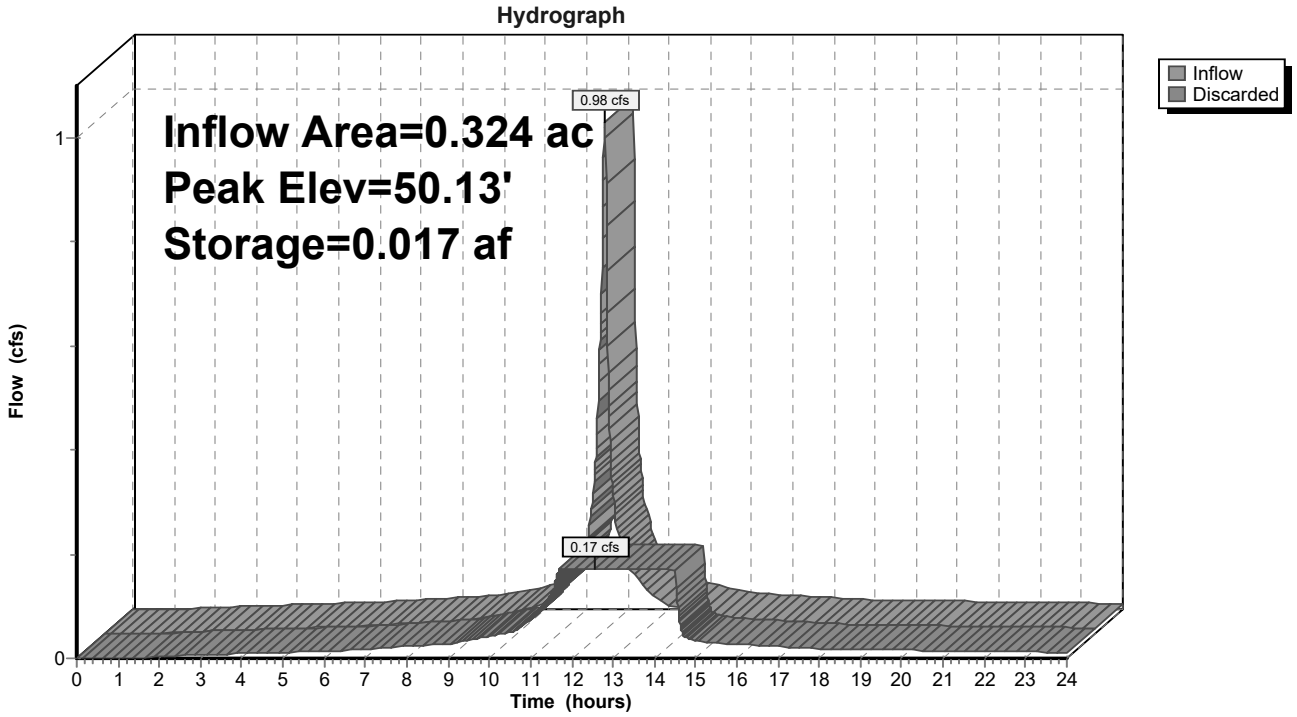
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	0.087 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
50.00	0.324	0.0	0.000	0.000
50.67	0.324	40.0	0.087	0.087

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.00'	**0.520 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 20.00'

Discarded OutFlow Max=0.17 cfs @ 12.55 hrs HW=50.13' (Free Discharge)
↑**1=Exfiltration** (Controls 0.17 cfs)

Pond 1PP: P1 PERMEABLE PAVERS



Summary for Pond 2P: POND

Inflow Area = 3.014 ac, 39.32% Impervious, Inflow Depth > 0.58" for 2-year event
Inflow = 1.21 cfs @ 12.27 hrs, Volume= 0.147 af
Outflow = 0.10 cfs @ 16.48 hrs, Volume= 0.061 af, Atten= 91%, Lag= 252.5 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.10 cfs @ 16.48 hrs, Volume= 0.061 af
Routed to Link T-P2 : TOTAL OFFSITE SE

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 54.45' @ 16.48 hrs Surf.Area= 3,795 sf Storage= 3,916 cf

Plug-Flow detention time= 383.4 min calculated for 0.061 af (41% of inflow)
Center-of-Mass det. time= 217.4 min (1,133.1 - 915.7)

Volume	Invert	Avail.Storage	Storage Description
#1	53.00'	21,118 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

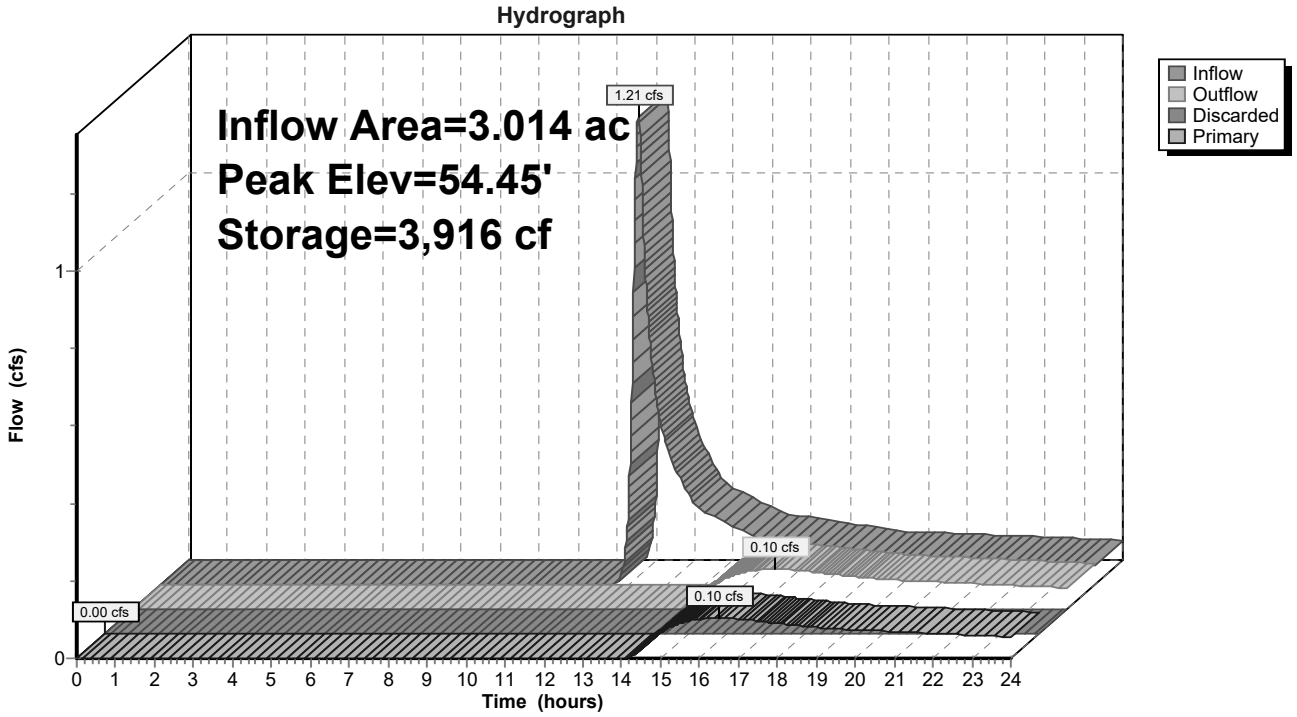
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
53.00	1,657	0	0	1,657
54.00	3,118	2,349	2,349	3,128
55.00	4,698	3,881	6,230	4,723
56.00	6,376	5,516	11,746	6,422
57.00	8,155	7,247	18,993	8,226
57.25	8,847	2,125	21,118	8,923

Device	Routing	Invert	Outlet Devices
#1	Discarded	53.00'	**5.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 20.00'
#2	Device 1	50.00'	**15.0" Round Culvert** L= 50.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 50.00' / 49.50' S= 0.0100 '/' Cc= 0.900 n= 0.120, Flow Area= 1.23 sf
#3	Primary	54.30'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	56.25'	**12.0' long + 0.2 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=53.00' (Free Discharge)
└**1=Exfiltration** (Passes 0.00 cfs of 0.19 cfs potential flow)
└**2=Culvert** (Controls 0.00 cfs)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Primary OutFlow Max=0.10 cfs @ 16.48 hrs HW=54.45' (Free Discharge)
└**3=Orifice/Grate** (Orifice Controls 0.10 cfs @ 1.34 fps)

Pond 2P: POND


Hydrograph
Inflow Area=3.014 ac
Peak Elev=54.45'
Storage=3,916 cf
1.21 cfs
0.10 cfs
0.10 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Pond 2PP: P2 PERMEABLE PAVERS

Inflow Area = 0.438 ac,100.00% Impervious, Inflow Depth > 2.86" for 2-year event
Inflow = 1.33 cfs @ 12.12 hrs, Volume= 0.104 af
Outflow = 0.23 cfs @ 12.55 hrs, Volume= 0.104 af, Atten= 83%, Lag= 25.8 min
Discarded = 0.23 cfs @ 12.55 hrs, Volume= 0.104 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 50.13' @ 12.55 hrs Surf.Area= 0.438 ac Storage= 0.023 af

Plug-Flow detention time= 23.6 min calculated for 0.104 af (100% of inflow)
Center-of-Mass det. time= 23.1 min (780.7 - 757.6)

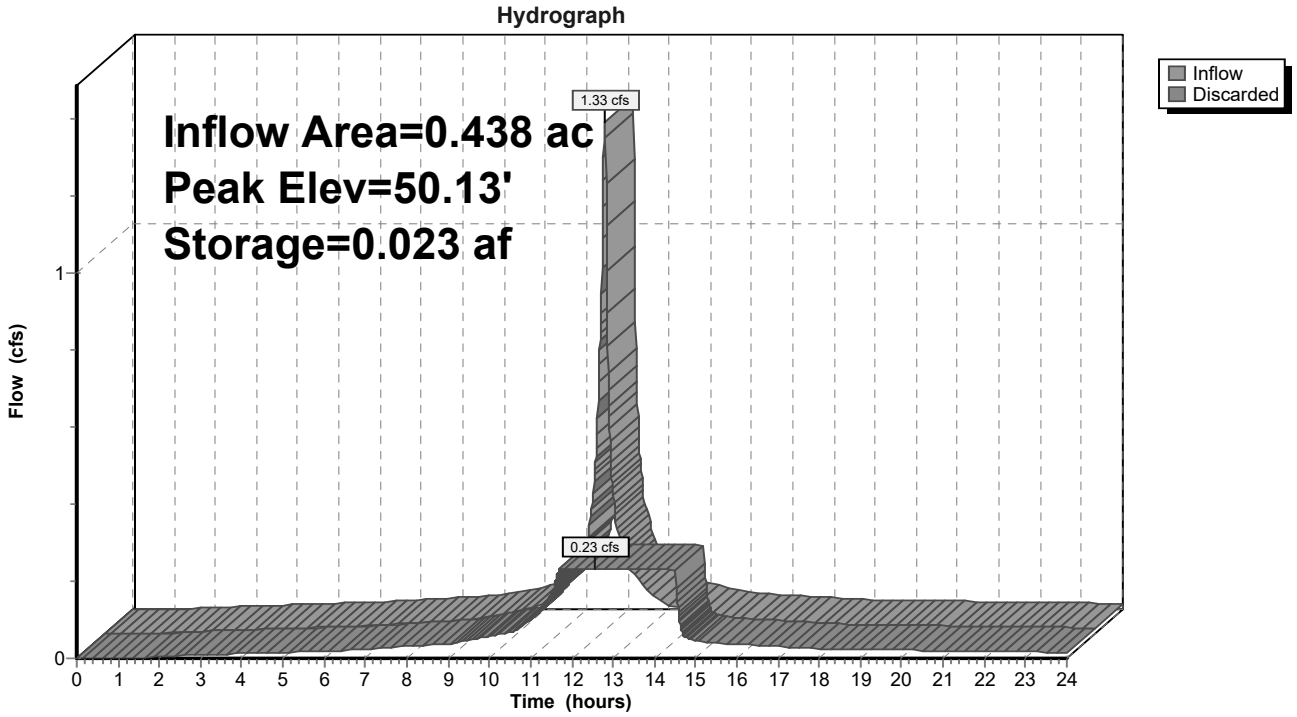
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	0.117 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
50.00	0.438	0.0	0.000	0.000
50.67	0.438	40.0	0.117	0.117

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.00'	**0.520 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 20.00'

Discarded OutFlow Max=0.23 cfs @ 12.55 hrs HW=50.13' (Free Discharge)
↑**1=Exfiltration** (Controls 0.23 cfs)

Pond 2PP: P2 PERMEABLE PAVERS

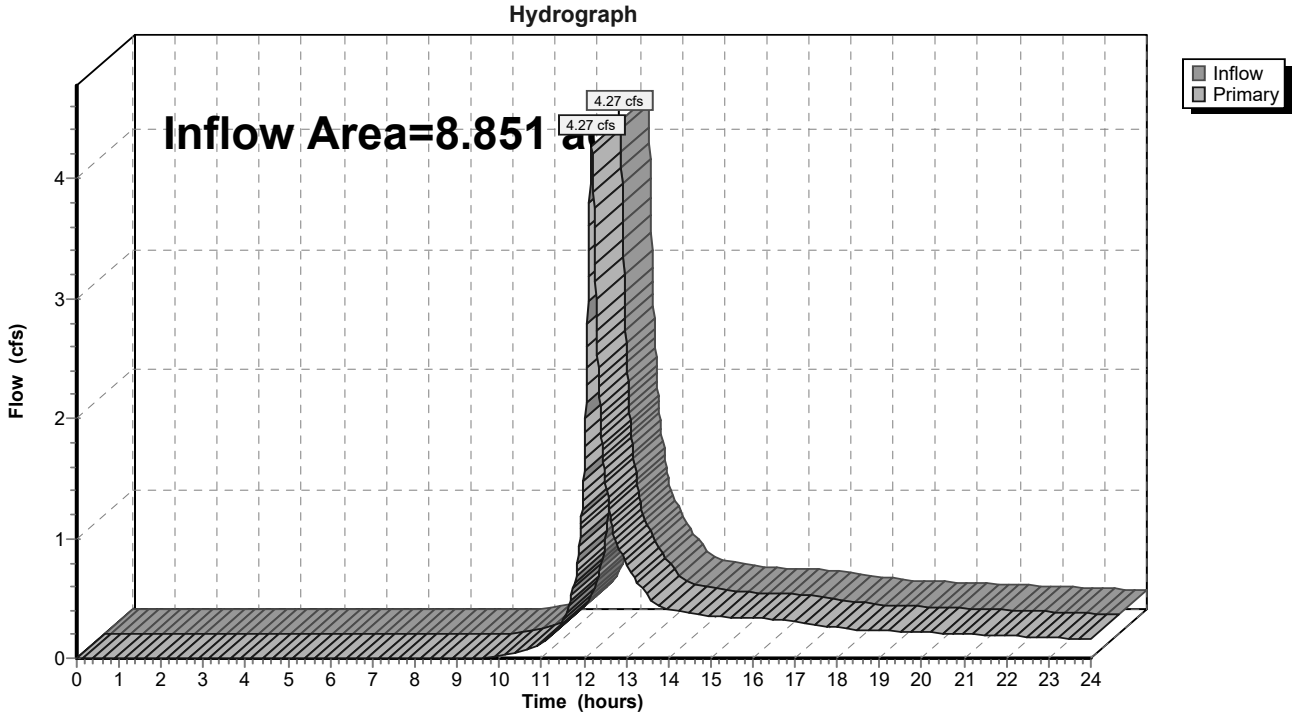


Summary for Link T: TOTAL SITE

Inflow Area = 8.851 ac, 39.88% Impervious, Inflow Depth > 0.61" for 2-year event
Inflow = 4.27 cfs @ 12.19 hrs, Volume= 0.454 af
Primary = 4.27 cfs @ 12.19 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min

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

Link T: TOTAL SITE

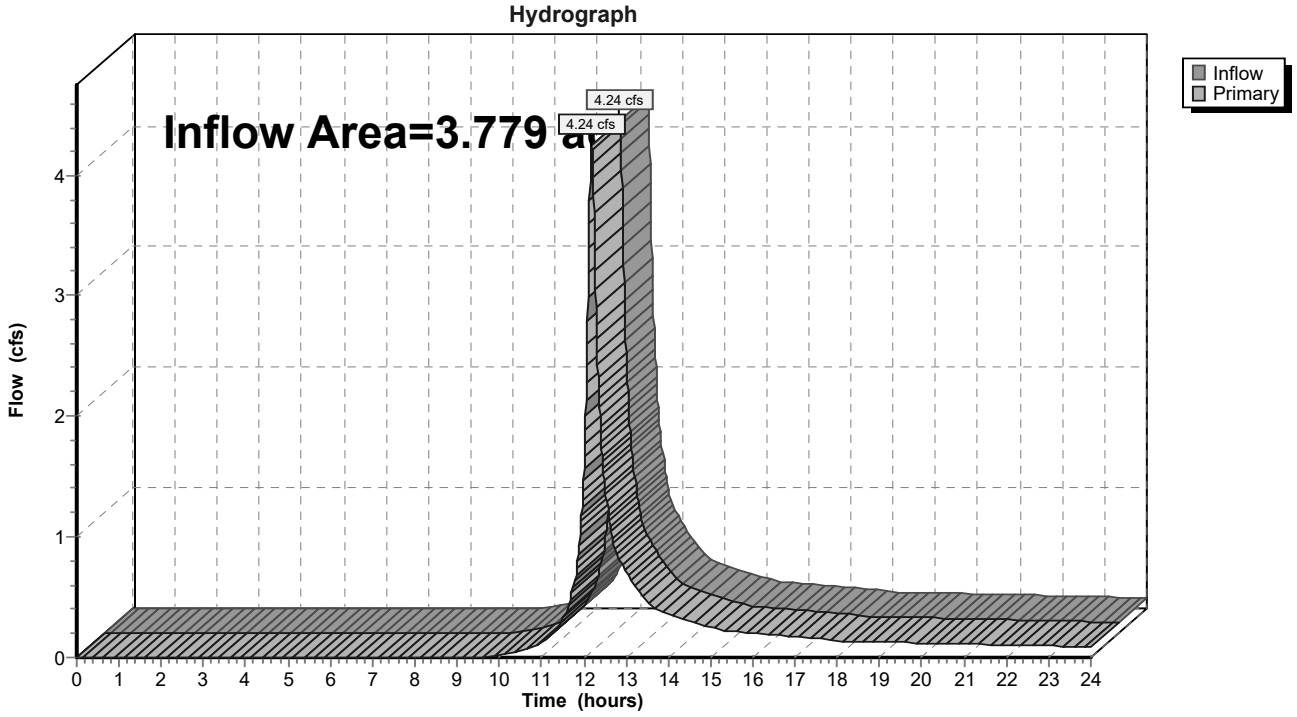


Summary for Link T-P1: TOTAL NYE ROAD

Inflow Area = 3.779 ac, 49.80% Impervious, Inflow Depth > 1.14" for 2-year event
Inflow = 4.24 cfs @ 12.19 hrs, Volume= 0.360 af
Primary = 4.24 cfs @ 12.19 hrs, Volume= 0.360 af, Atten= 0%, Lag= 0.0 min
Routed to Link T : TOTAL SITE

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

Link T-P1: TOTAL NYE ROAD

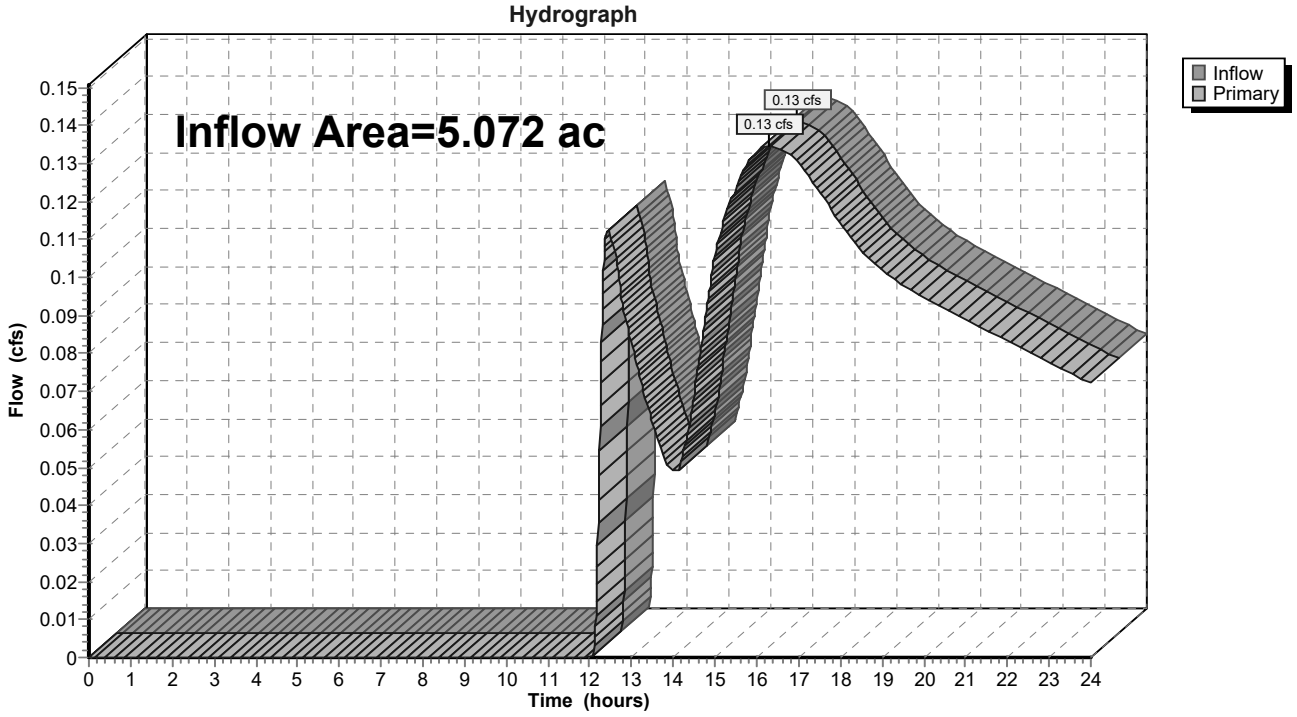


Summary for Link T-P2: TOTAL OFFSITE SE

Inflow Area = 5.072 ac, 32.49% Impervious, Inflow Depth > 0.22" for 2-year event
Inflow = 0.13 cfs @ 16.31 hrs, Volume= 0.093 af
Primary = 0.13 cfs @ 16.31 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min
Routed to Link T : TOTAL SITE

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

Link T-P2: TOTAL OFFSITE SE



Summary for Subcatchment P1: NYE ROAD

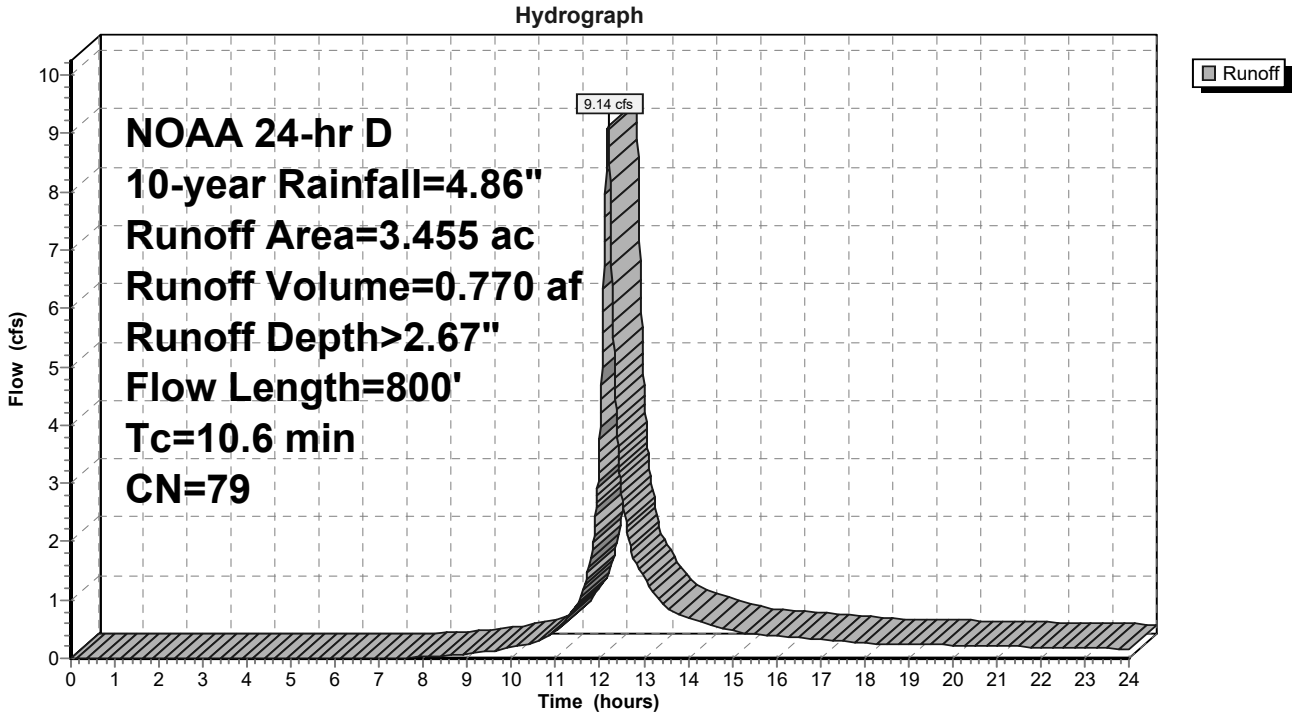
Runoff = 9.14 cfs @ 12.18 hrs, Volume= 0.770 af, Depth> 2.67"
Routed to Link T-P1 : TOTAL NYE ROAD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-year Rainfall=4.86"

Area (ac)	CN	Description
0.153	30	Woods, Good, HSG A
0.088	39	>75% Grass cover, Good, HSG A
0.101	55	Woods, Good, HSG B
0.854	61	>75% Grass cover, Good, HSG B
0.701	80	>75% Grass cover, Good, HSG D
1.558	98	Paved parking, HSG D
3.455	79	Weighted Average
1.897		54.91% Pervious Area
1.558		45.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2000	0.19		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.4	180	0.2000	7.20		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
0.3	60	0.0200	2.87		**Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps
1.2	460	0.0160	6.22	4.88	**Pipe Channel, 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
10.6	800	Total			

Subcatchment P1: NYE ROAD



Summary for Subcatchment P2-1: TO POND

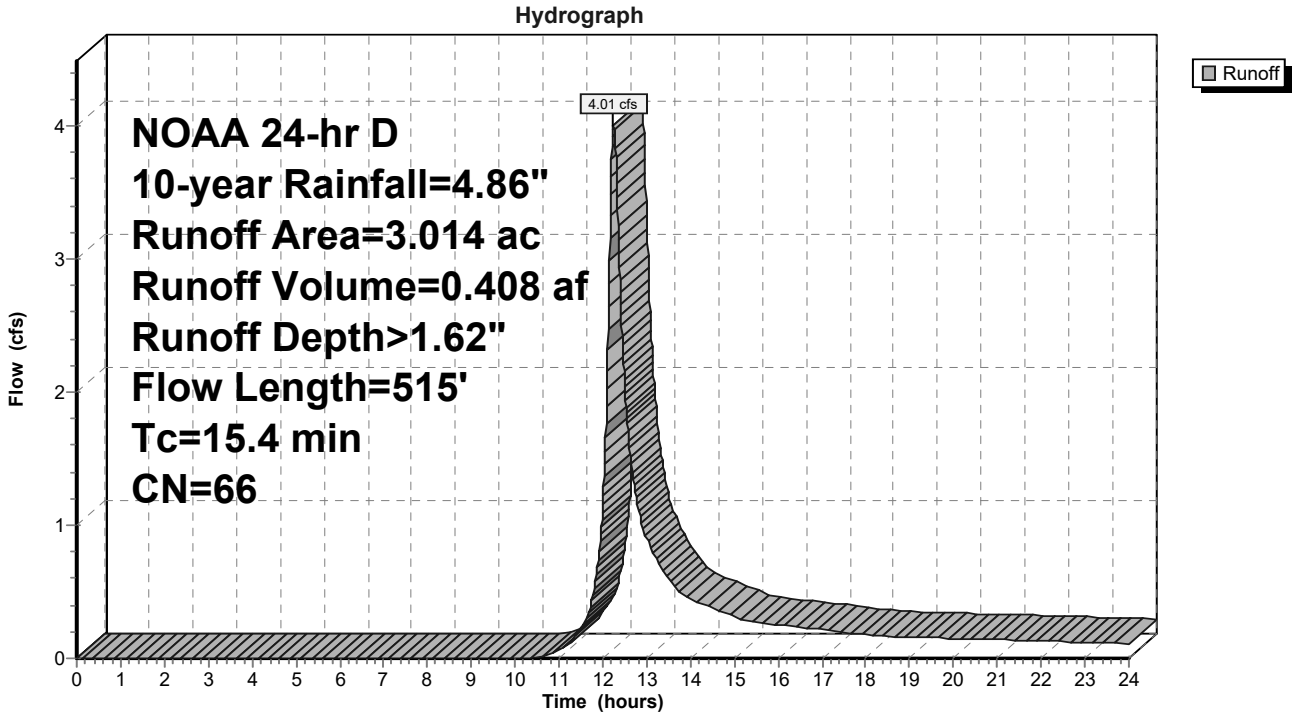
Runoff = 4.01 cfs @ 12.25 hrs, Volume= 0.408 af, Depth> 1.62"
Routed to Pond 2P : POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-year Rainfall=4.86"

Area (ac)	CN	Description
0.301	30	Woods, Good, HSG A
1.164	39	>75% Grass cover, Good, HSG A
0.056	61	>75% Grass cover, Good, HSG B
0.308	80	>75% Grass cover, Good, HSG D
1.185	98	Paved parking, HSG D
3.014	66	Weighted Average
1.829		60.68% Pervious Area
1.185		39.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2000	0.19		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.7	100	0.0200	2.28		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
0.5	85	0.0200	2.87		**Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps
5.5	230	0.0200	0.69	0.55	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.120
15.4	515	Total			

Subcatchment P2-1: TO POND



Summary for Subcatchment P2-2: BYPASS

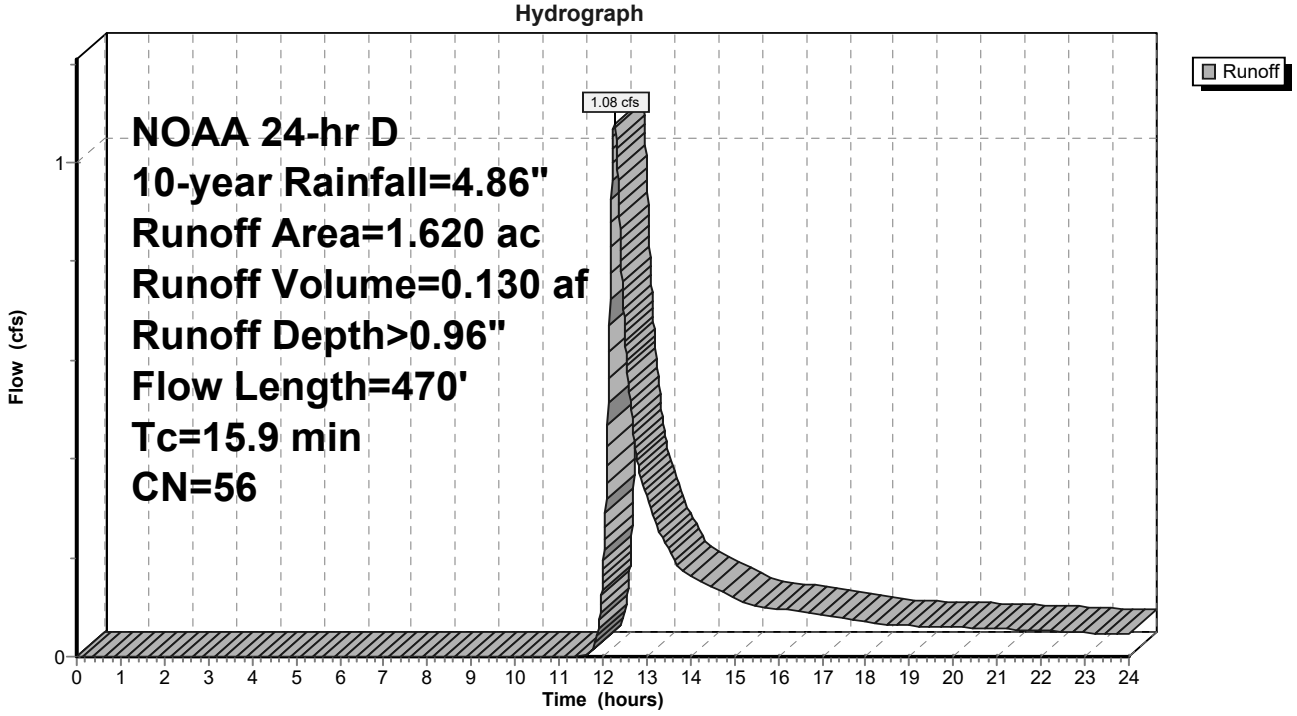
Runoff = 1.08 cfs @ 12.28 hrs, Volume= 0.130 af, Depth> 0.96"
Routed to Link T-P2 : TOTAL OFFSITE SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-year Rainfall=4.86"

Area (ac)	CN	Description
0.383	30	Woods, Good, HSG A
0.351	39	>75% Grass cover, Good, HSG A
0.156	61	>75% Grass cover, Good, HSG B
0.705	77	Woods, Good, HSG D
0.025	98	Paved parking, HSG D
1.620	56	Weighted Average
1.595		98.46% Pervious Area
0.025		1.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0700	0.13		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
2.7	370	0.0200	2.28		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
15.9	470	Total			

Subcatchment P2-2: BYPASS



Summary for Subcatchment PP1: P1 PERMEABLE PAVERS

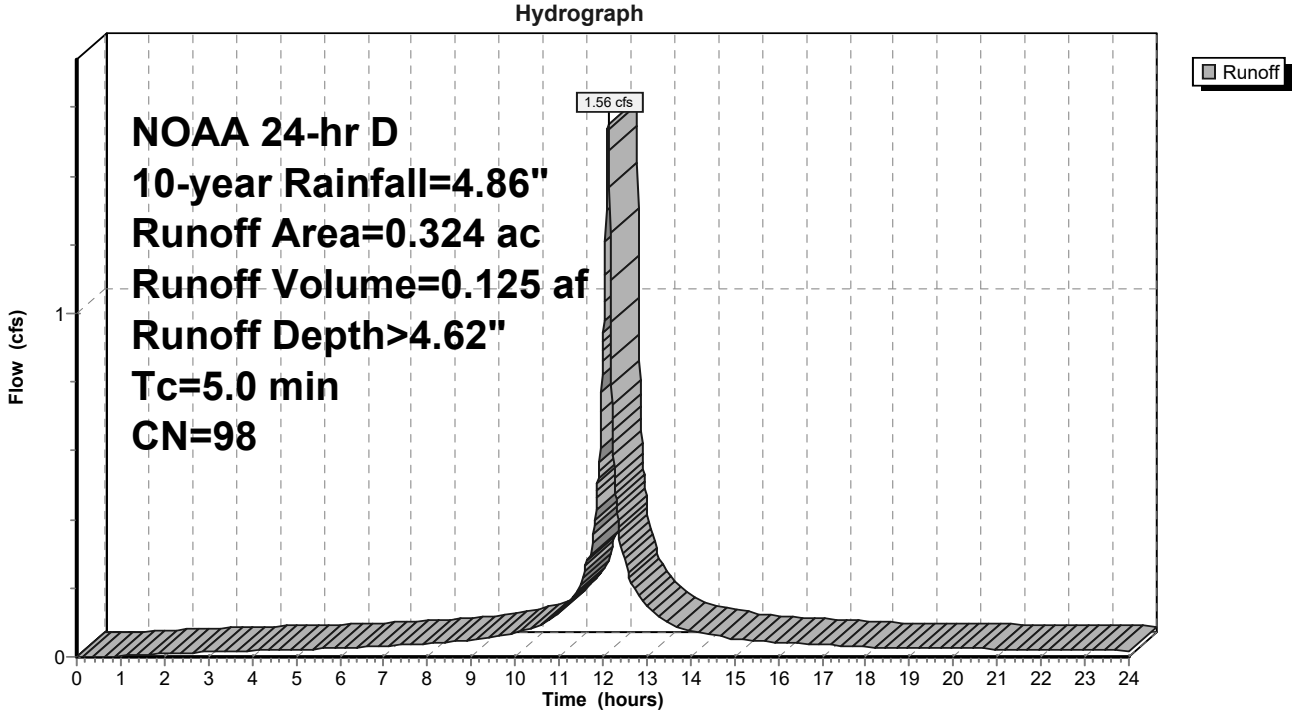
Runoff = 1.56 cfs @ 12.12 hrs, Volume= 0.125 af, Depth> 4.62"
Routed to Pond 1PP : P1 PERMEABLE PAVERS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-year Rainfall=4.86"

Area (ac)	CN	Description
0.324	98	Paved parking, HSG D
0.324		100.00% Impervious Area

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

Subcatchment PP1: P1 PERMEABLE PAVERS



Summary for Subcatchment PP2: P2 PERMEABLE PAVERS

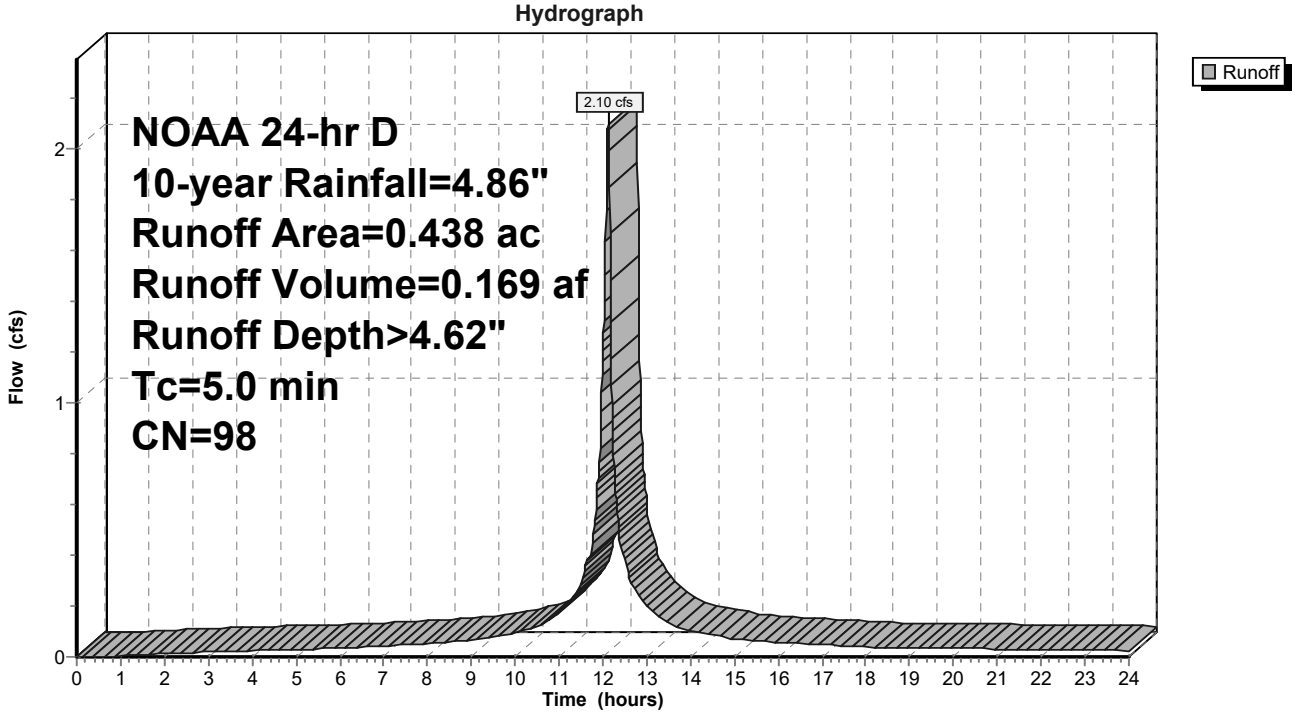
Runoff = 2.10 cfs @ 12.12 hrs, Volume= 0.169 af, Depth> 4.62"
Routed to Pond 2PP : P2 PERMEABLE PAVERS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-year Rainfall=4.86"

Area (ac)	CN	Description
0.438	98	Paved parking, HSG D
0.438		100.00% Impervious Area

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

Subcatchment PP2: P2 PERMEABLE PAVERS



Summary for Pond 1PP: P1 PERMEABLE PAVERS

Inflow Area = 0.324 ac,100.00% Impervious, Inflow Depth > 4.62" for 10-year event
Inflow = 1.56 cfs @ 12.12 hrs, Volume= 0.125 af
Outflow = 0.17 cfs @ 12.88 hrs, Volume= 0.125 af, Atten= 89%, Lag= 45.5 min
Discarded = 0.17 cfs @ 12.88 hrs, Volume= 0.125 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 50.27' @ 12.88 hrs Surf.Area= 0.324 ac Storage= 0.036 af

Plug-Flow detention time= 56.1 min calculated for 0.125 af (100% of inflow)
Center-of-Mass det. time= 55.5 min (803.8 - 748.3)

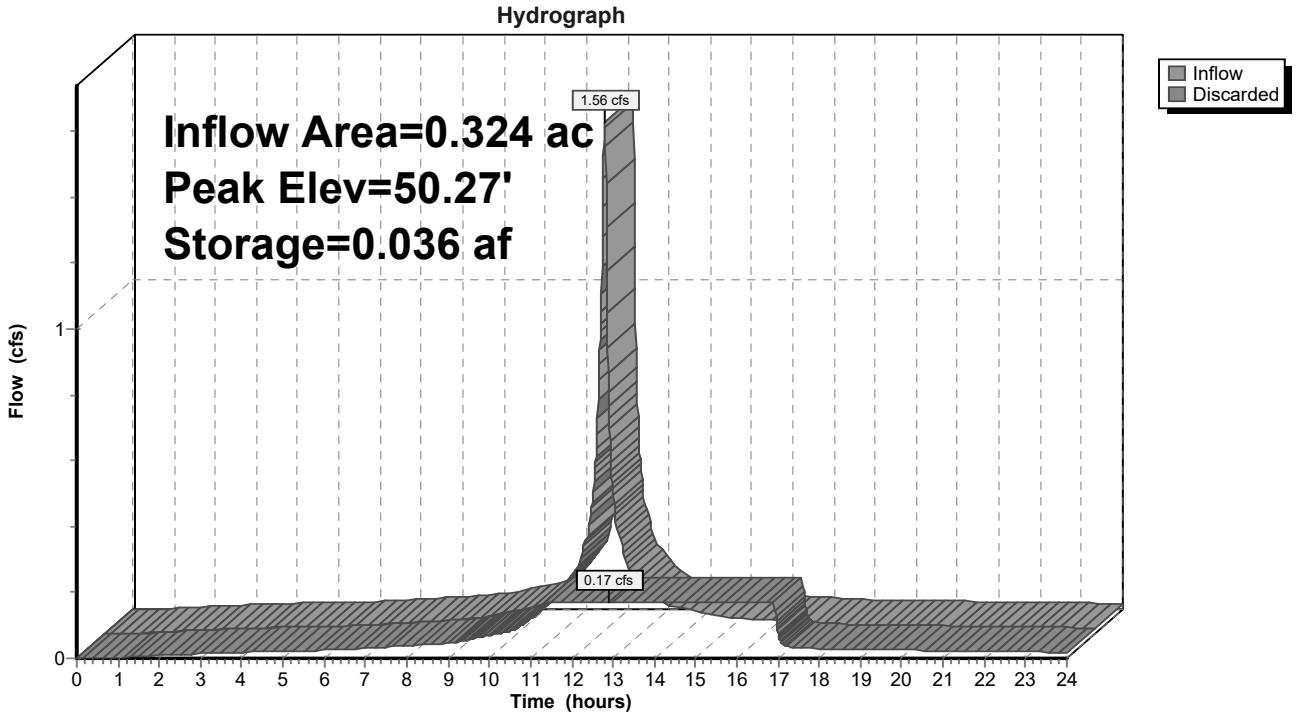
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	0.087 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
50.00	0.324	0.0	0.000	0.000
50.67	0.324	40.0	0.087	0.087

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.00'	**0.520 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 20.00'

Discarded OutFlow Max=0.17 cfs @ 12.88 hrs HW=50.27' (Free Discharge)
1=Exfiltration (Controls 0.17 cfs)

Pond 1PP: P1 PERMEABLE PAVERS



Summary for Pond 2P: POND

Inflow Area = 3.014 ac, 39.32% Impervious, Inflow Depth > 1.62" for 10-year event
Inflow = 4.01 cfs @ 12.25 hrs, Volume= 0.408 af
Outflow = 1.39 cfs @ 12.68 hrs, Volume= 0.317 af, Atten= 65%, Lag= 26.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 1.39 cfs @ 12.68 hrs, Volume= 0.317 af
Routed to Link T-P2 : TOTAL OFFSITE SE

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 54.93' @ 12.68 hrs Surf.Area= 4,570 sf Storage= 5,887 cf

Plug-Flow detention time= 156.5 min calculated for 0.317 af (78% of inflow)
Center-of-Mass det. time= 64.9 min (943.4 - 878.5)

Volume	Invert	Avail.Storage	Storage Description
#1	53.00'	21,118 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

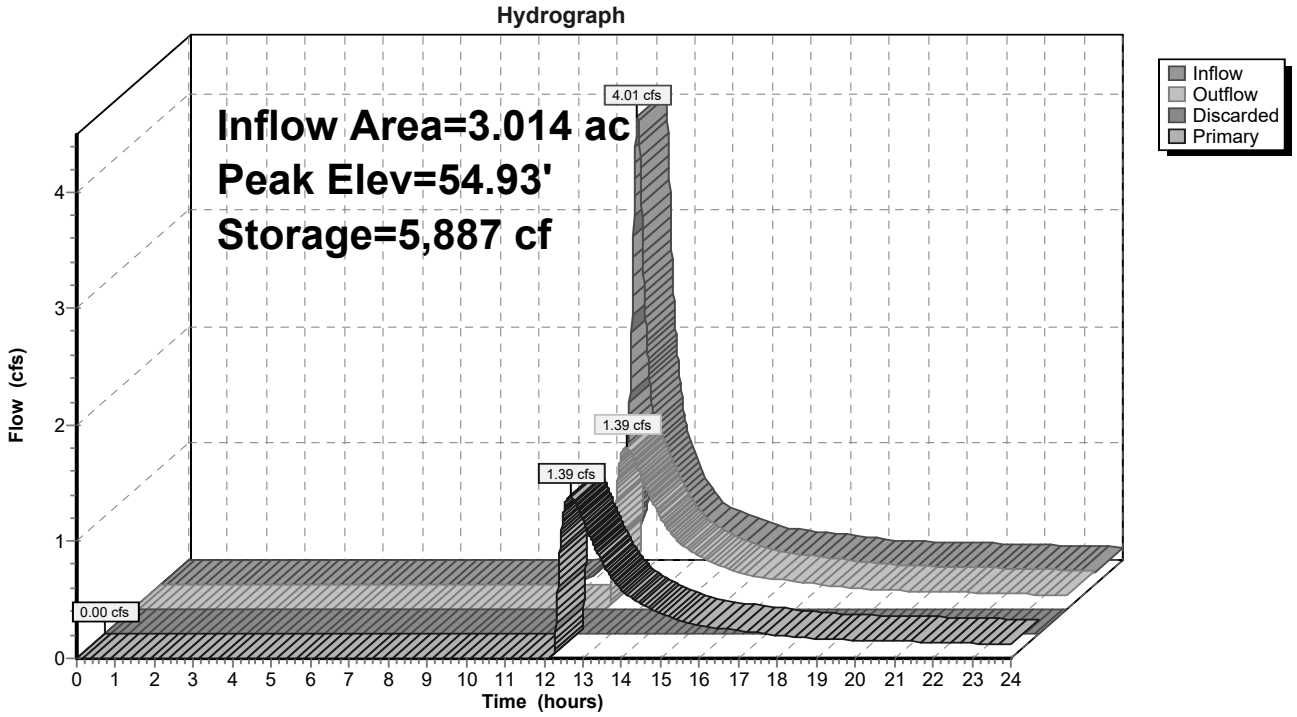
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
53.00	1,657	0	0	1,657
54.00	3,118	2,349	2,349	3,128
55.00	4,698	3,881	6,230	4,723
56.00	6,376	5,516	11,746	6,422
57.00	8,155	7,247	18,993	8,226
57.25	8,847	2,125	21,118	8,923

Device	Routing	Invert	Outlet Devices
#1	Discarded	53.00'	**5.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 20.00'
#2	Device 1	50.00'	**15.0" Round Culvert** L= 50.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 50.00' / 49.50' S= 0.0100 '/' Cc= 0.900 n= 0.120, Flow Area= 1.23 sf
#3	Primary	54.30'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	56.25'	**12.0' long + 0.2 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=53.00' (Free Discharge)
↑**1=Exfiltration** (Passes 0.00 cfs of 0.19 cfs potential flow)
↑**2=Culvert** (Controls 0.00 cfs)
↑**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Primary OutFlow Max=1.39 cfs @ 12.68 hrs HW=54.93' (Free Discharge)
↑**3=Orifice/Grate** (Orifice Controls 1.39 cfs @ 2.69 fps)

Pond 2P: POND


Hydrograph
Inflow Area=3.014 ac
Peak Elev=54.93'
Storage=5,887 cf
4.01 cfs
1.39 cfs
1.39 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond 2PP: P2 PERMEABLE PAVERS

Inflow Area = 0.438 ac,100.00% Impervious, Inflow Depth > 4.62" for 10-year event
Inflow = 2.10 cfs @ 12.12 hrs, Volume= 0.169 af
Outflow = 0.23 cfs @ 12.88 hrs, Volume= 0.168 af, Atten= 89%, Lag= 45.5 min
Discarded = 0.23 cfs @ 12.88 hrs, Volume= 0.168 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 50.27' @ 12.88 hrs Surf.Area= 0.438 ac Storage= 0.048 af

Plug-Flow detention time= 56.1 min calculated for 0.168 af (100% of inflow)
Center-of-Mass det. time= 55.5 min (803.8 - 748.3)

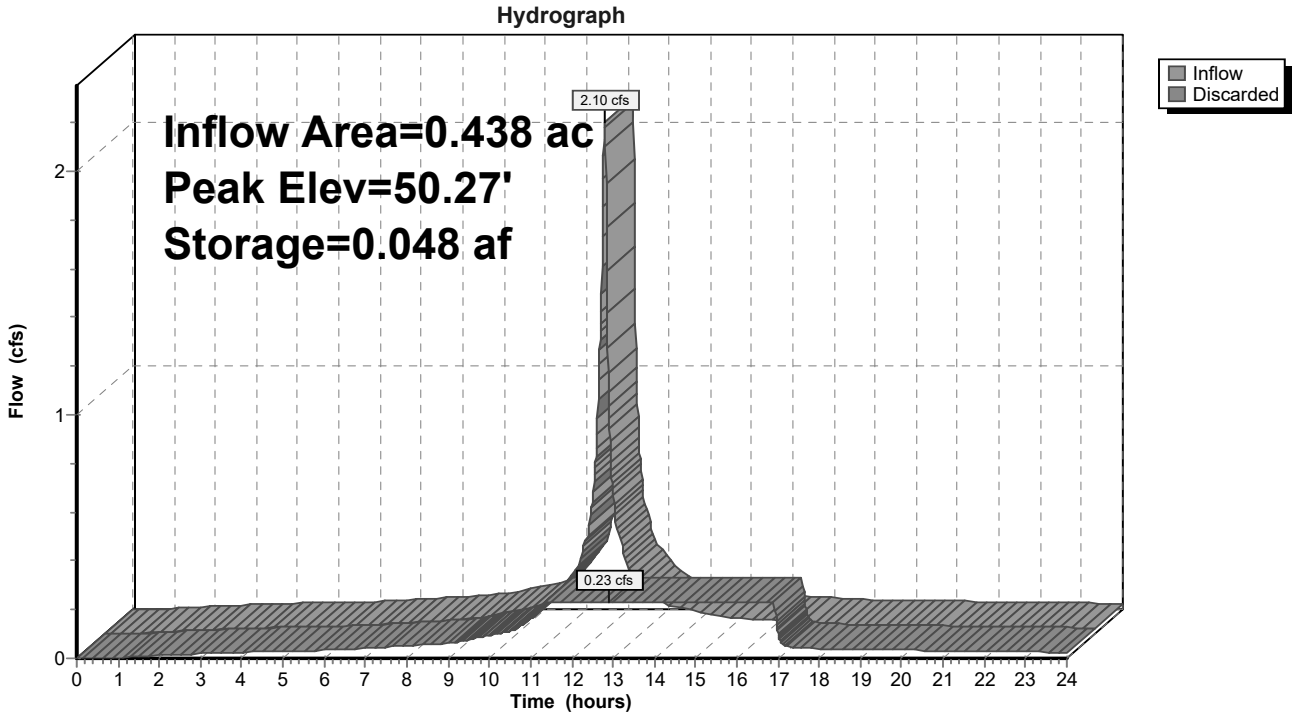
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	0.117 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
50.00	0.438	0.0	0.000	0.000
50.67	0.438	40.0	0.117	0.117

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.00'	**0.520 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 20.00'

Discarded OutFlow Max=0.23 cfs @ 12.88 hrs HW=50.27' (Free Discharge)
1=Exfiltration (Controls 0.23 cfs)

Pond 2PP: P2 PERMEABLE PAVERS

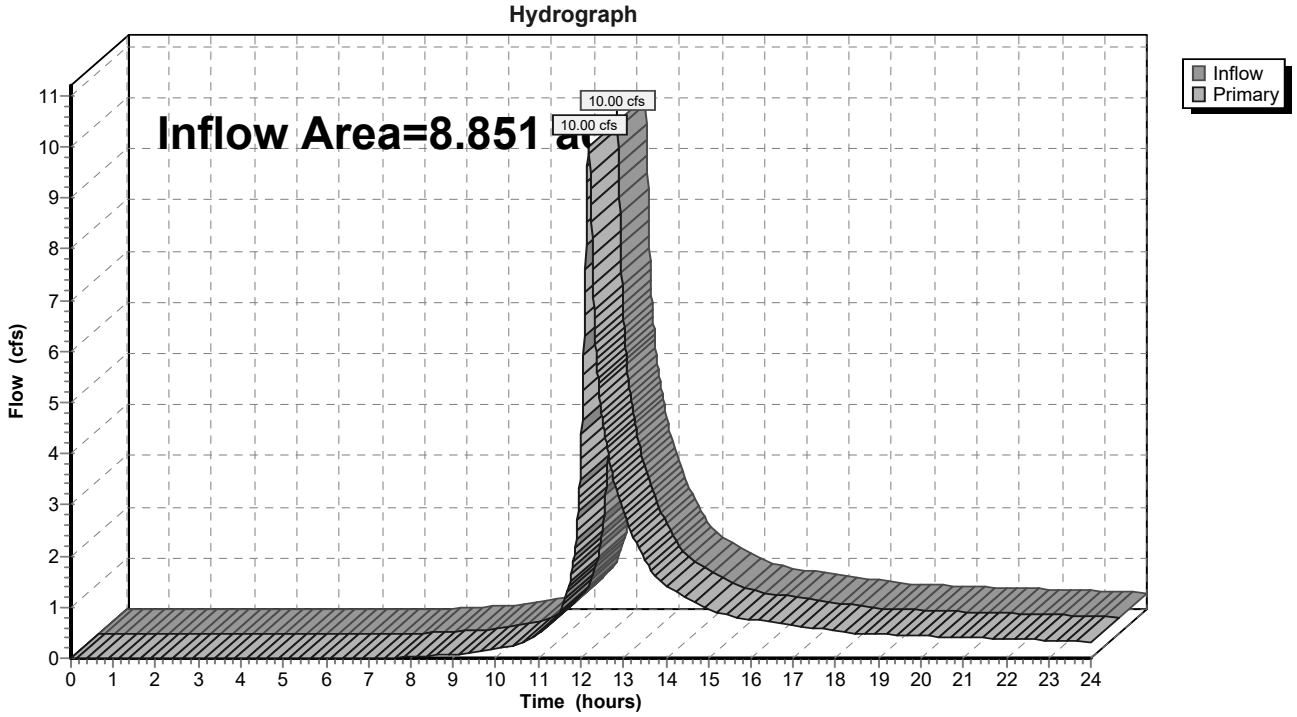


Summary for Link T: TOTAL SITE

Inflow Area = 8.851 ac, 39.88% Impervious, Inflow Depth > 1.65" for 10-year event
Inflow = 10.00 cfs @ 12.19 hrs, Volume= 1.217 af
Primary = 10.00 cfs @ 12.19 hrs, Volume= 1.217 af, Atten= 0%, Lag= 0.0 min

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

Link T: TOTAL SITE

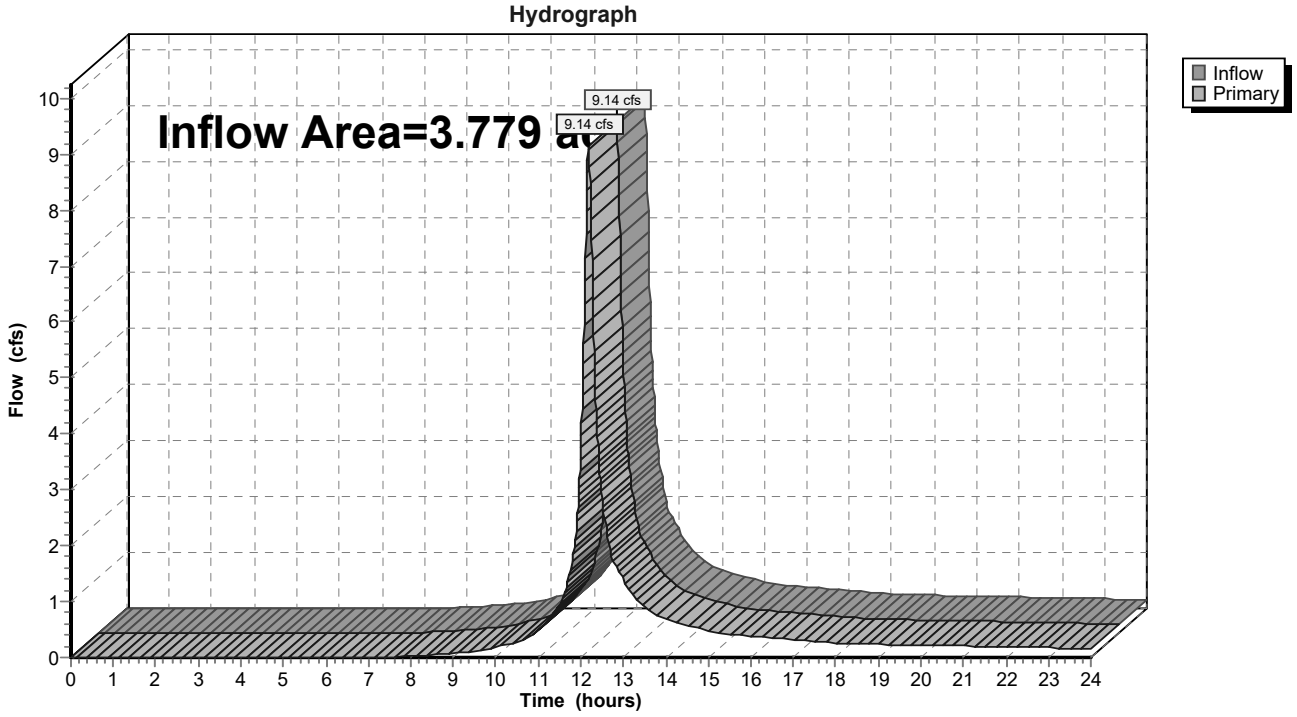


Summary for Link T-P1: TOTAL NYE ROAD

Inflow Area = 3.779 ac, 49.80% Impervious, Inflow Depth > 2.44" for 10-year event
Inflow = 9.14 cfs @ 12.18 hrs, Volume= 0.770 af
Primary = 9.14 cfs @ 12.18 hrs, Volume= 0.770 af, Atten= 0%, Lag= 0.0 min
Routed to Link T : TOTAL SITE

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

Link T-P1: TOTAL NYE ROAD

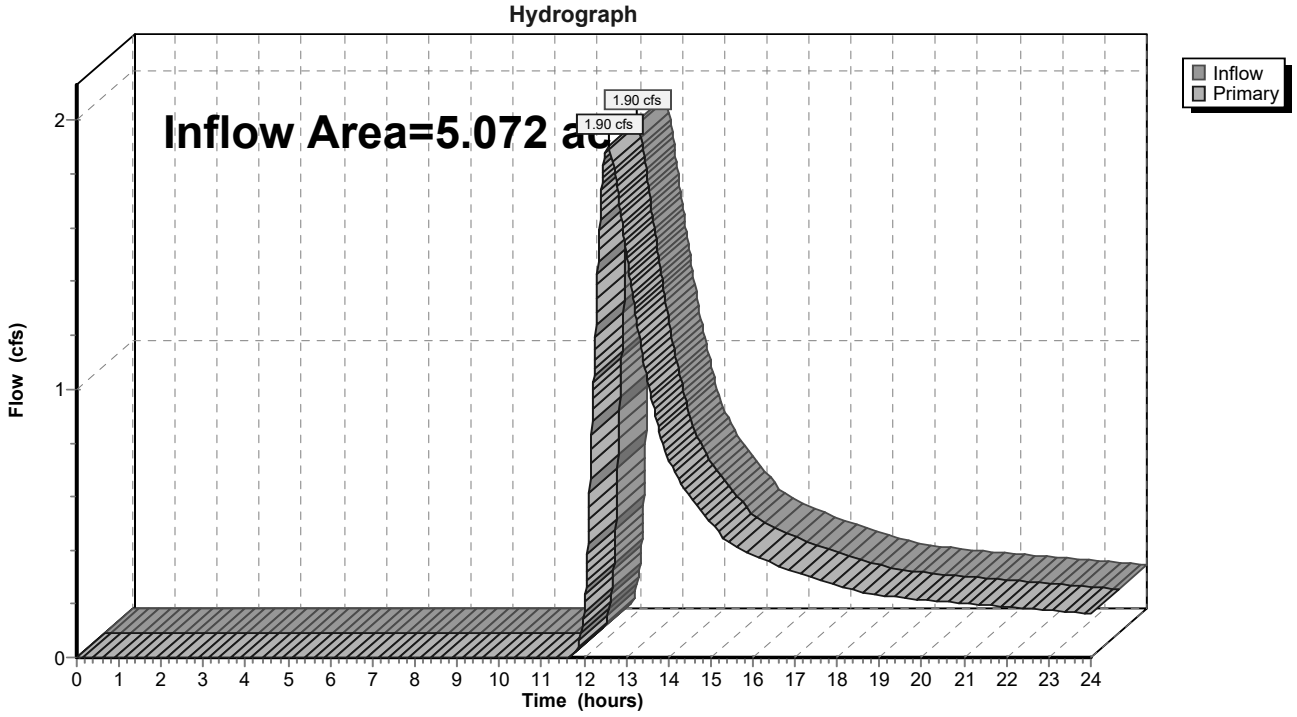


Summary for Link T-P2: TOTAL OFFSITE SE

Inflow Area = 5.072 ac, 32.49% Impervious, Inflow Depth > 1.06" for 10-year event
Inflow = 1.90 cfs @ 12.59 hrs, Volume= 0.447 af
Primary = 1.90 cfs @ 12.59 hrs, Volume= 0.447 af, Atten= 0%, Lag= 0.0 min
Routed to Link T : TOTAL SITE

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

Link T-P2: TOTAL OFFSITE SE



Summary for Subcatchment P1: NYE ROAD

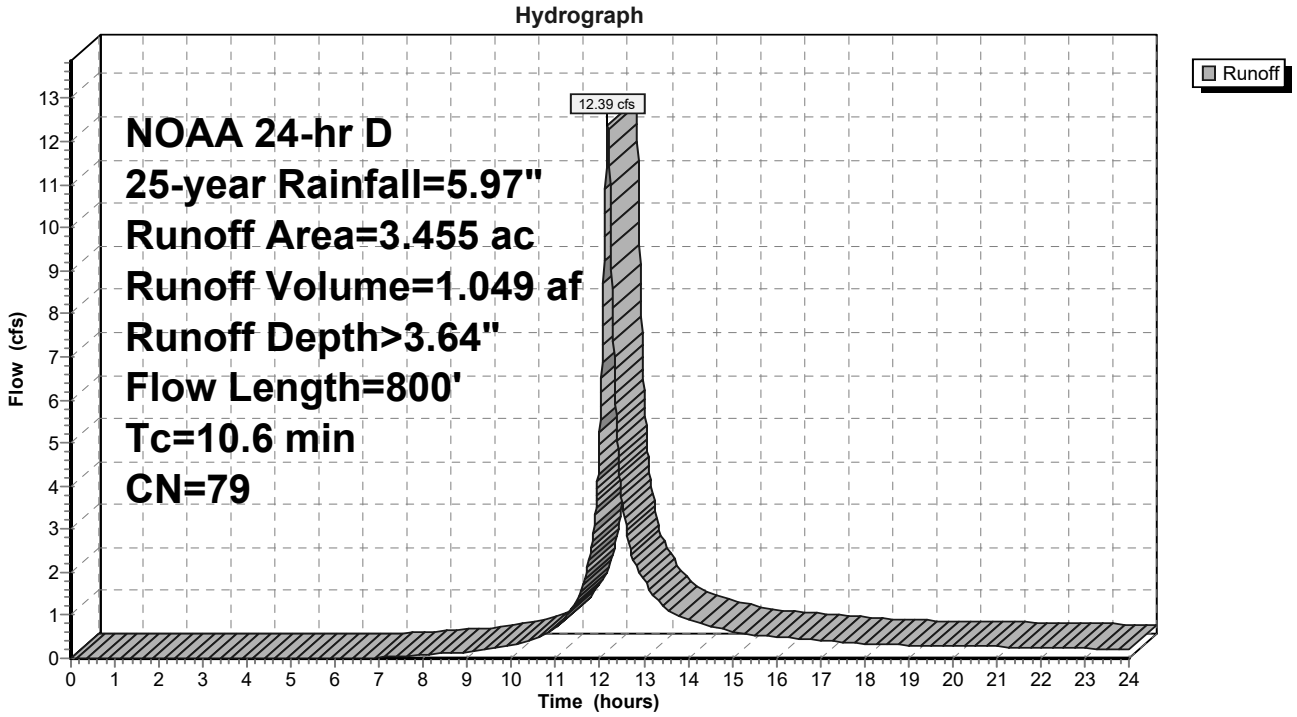
Runoff = 12.39 cfs @ 12.18 hrs, Volume= 1.049 af, Depth> 3.64"
Routed to Link T-P1 : TOTAL NYE ROAD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-year Rainfall=5.97"

Area (ac)	CN	Description
0.153	30	Woods, Good, HSG A
0.088	39	>75% Grass cover, Good, HSG A
0.101	55	Woods, Good, HSG B
0.854	61	>75% Grass cover, Good, HSG B
0.701	80	>75% Grass cover, Good, HSG D
1.558	98	Paved parking, HSG D
3.455	79	Weighted Average
1.897		54.91% Pervious Area
1.558		45.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2000	0.19		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.4	180	0.2000	7.20		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
0.3	60	0.0200	2.87		**Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps
1.2	460	0.0160	6.22	4.88	**Pipe Channel, 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
10.6	800	Total			

Subcatchment P1: NYE ROAD



Summary for Subcatchment P2-1: TO POND

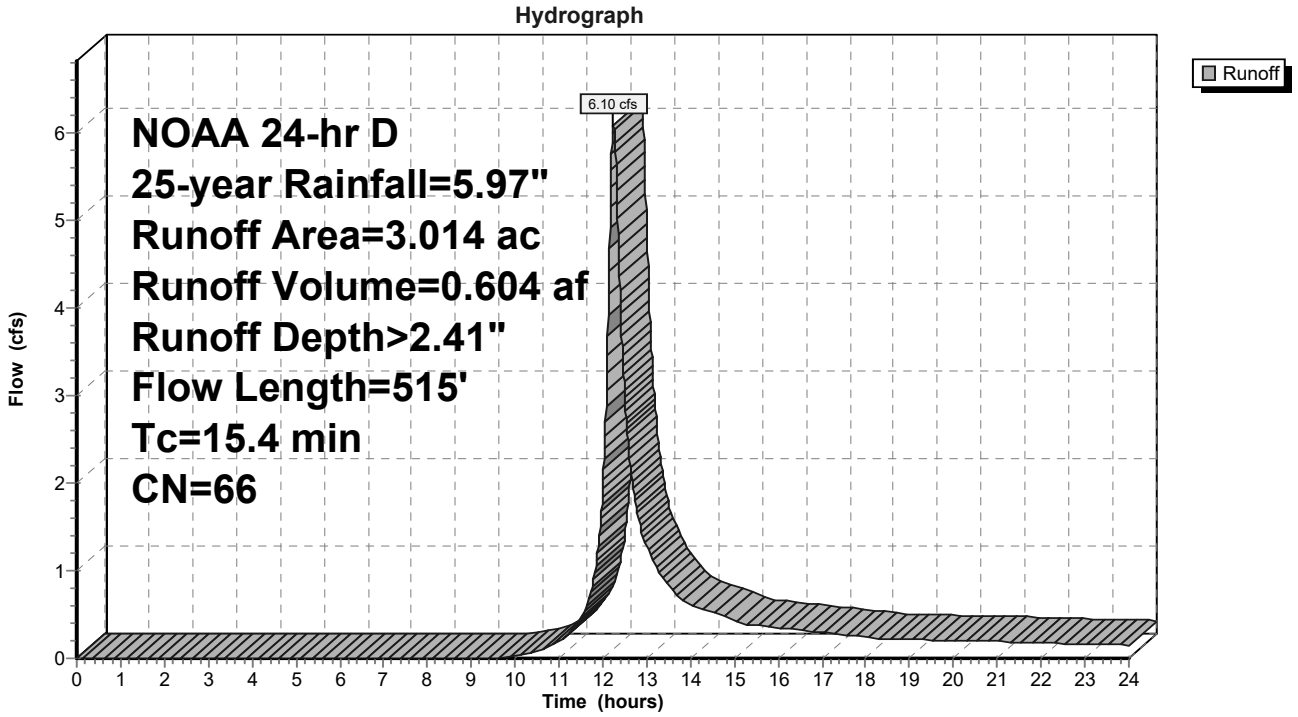
Runoff = 6.10 cfs @ 12.24 hrs, Volume= 0.604 af, Depth> 2.41"
Routed to Pond 2P : POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-year Rainfall=5.97"

Area (ac)	CN	Description
0.301	30	Woods, Good, HSG A
1.164	39	>75% Grass cover, Good, HSG A
0.056	61	>75% Grass cover, Good, HSG B
0.308	80	>75% Grass cover, Good, HSG D
1.185	98	Paved parking, HSG D
3.014	66	Weighted Average
1.829		60.68% Pervious Area
1.185		39.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2000	0.19		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.7	100	0.0200	2.28		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
0.5	85	0.0200	2.87		**Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps
5.5	230	0.0200	0.69	0.55	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.120
15.4	515	Total			

Subcatchment P2-1: TO POND



Summary for Subcatchment P2-2: BYPASS

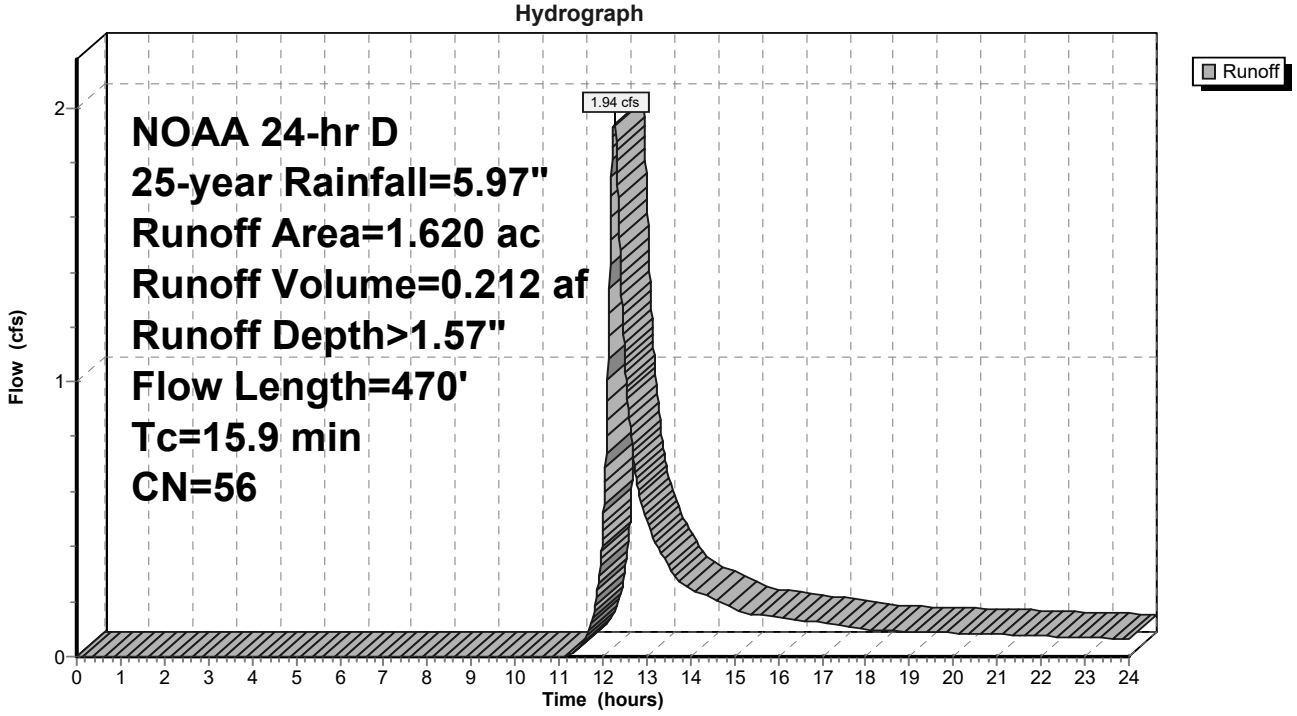
Runoff = 1.94 cfs @ 12.26 hrs, Volume= 0.212 af, Depth> 1.57"
Routed to Link T-P2 : TOTAL OFFSITE SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-year Rainfall=5.97"

Area (ac)	CN	Description
0.383	30	Woods, Good, HSG A
0.351	39	>75% Grass cover, Good, HSG A
0.156	61	>75% Grass cover, Good, HSG B
0.705	77	Woods, Good, HSG D
0.025	98	Paved parking, HSG D
1.620	56	Weighted Average
1.595		98.46% Pervious Area
0.025		1.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0700	0.13		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
2.7	370	0.0200	2.28		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
15.9	470	Total			

Subcatchment P2-2: BYPASS



Summary for Subcatchment PP1: P1 PERMEABLE PAVERS

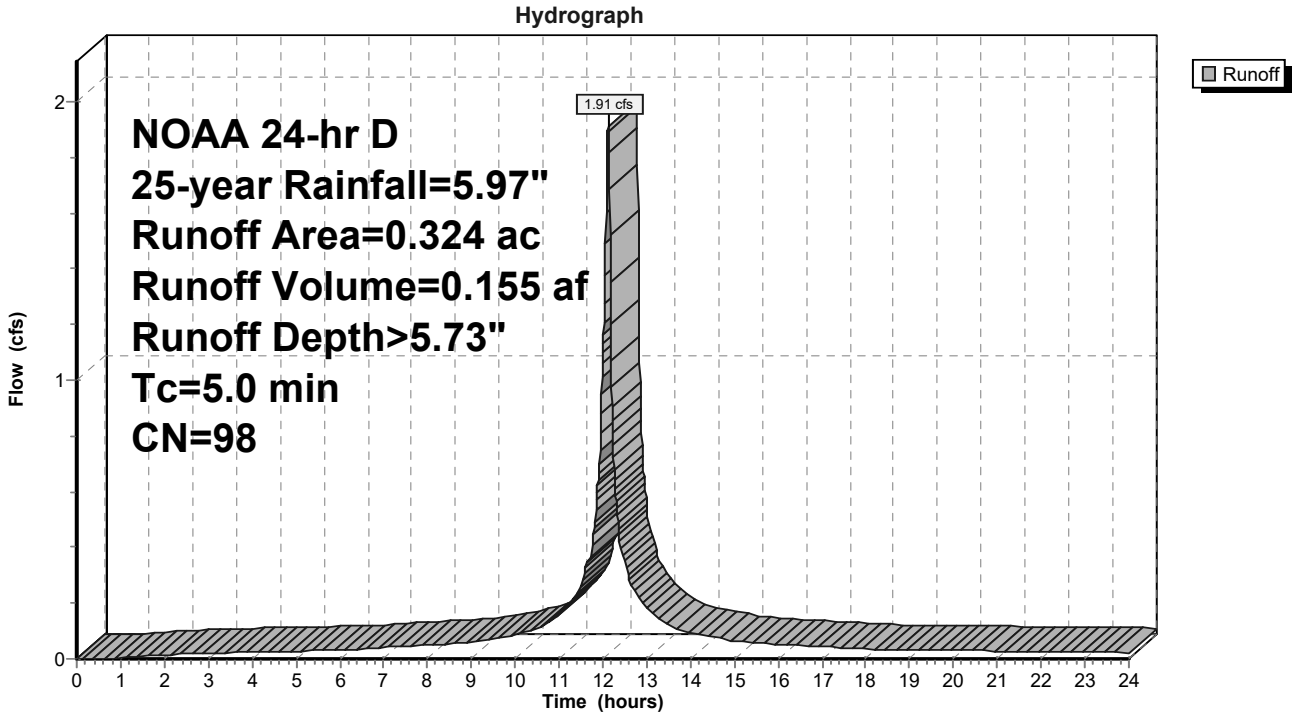
Runoff = 1.91 cfs @ 12.12 hrs, Volume= 0.155 af, Depth> 5.73"
Routed to Pond 1PP : P1 PERMEABLE PAVERS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-year Rainfall=5.97"

Area (ac)	CN	Description
0.324	98	Paved parking, HSG D
0.324		100.00% Impervious Area

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

Subcatchment PP1: P1 PERMEABLE PAVERS



Summary for Subcatchment PP2: P2 PERMEABLE PAVERS

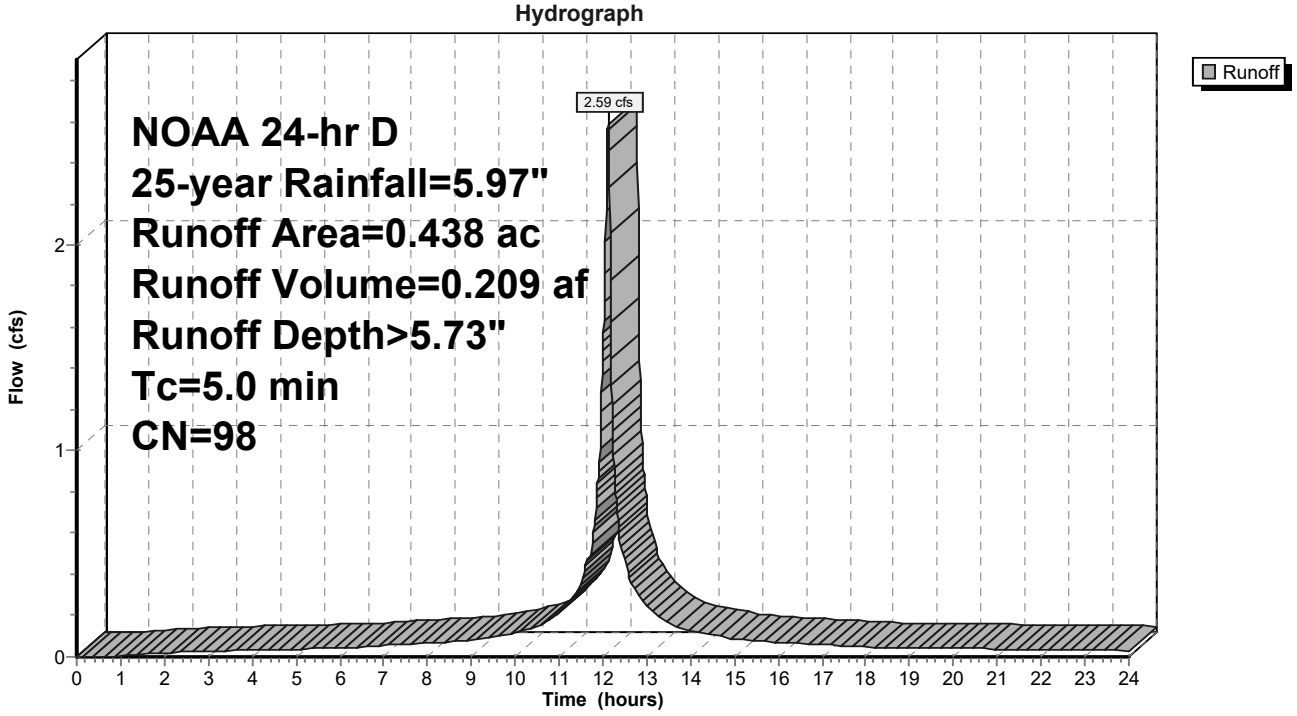
Runoff = 2.59 cfs @ 12.12 hrs, Volume= 0.209 af, Depth> 5.73"
Routed to Pond 2PP : P2 PERMEABLE PAVERS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-year Rainfall=5.97"

Area (ac)	CN	Description
0.438	98	Paved parking, HSG D
0.438		100.00% Impervious Area

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

Subcatchment PP2: P2 PERMEABLE PAVERS



Summary for Pond 1PP: P1 PERMEABLE PAVERS

Inflow Area = 0.324 ac,100.00% Impervious, Inflow Depth > 5.73" for 25-year event
Inflow = 1.91 cfs @ 12.12 hrs, Volume= 0.155 af
Outflow = 0.17 cfs @ 13.07 hrs, Volume= 0.155 af, Atten= 91%, Lag= 57.3 min
Discarded = 0.17 cfs @ 13.07 hrs, Volume= 0.155 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 50.38' @ 13.07 hrs Surf.Area= 0.324 ac Storage= 0.050 af

Plug-Flow detention time= 82.5 min calculated for 0.154 af (100% of inflow)
Center-of-Mass det. time= 82.0 min (826.8 - 744.8)

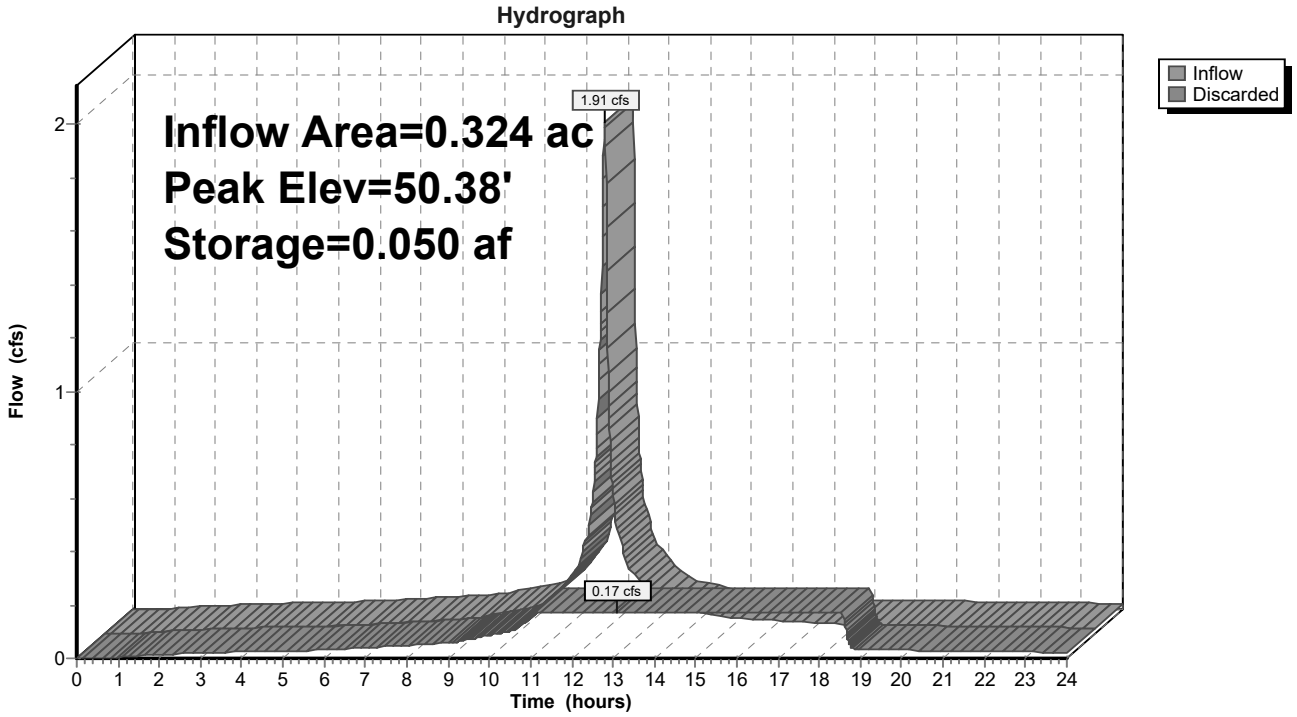
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	0.087 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
50.00	0.324	0.0	0.000	0.000
50.67	0.324	40.0	0.087	0.087

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.00'	**0.520 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 20.00'

Discarded OutFlow Max=0.17 cfs @ 13.07 hrs HW=50.38' (Free Discharge)
↑**1=Exfiltration** (Controls 0.17 cfs)

Pond 1PP: P1 PERMEABLE PAVERS



Summary for Pond 2P: POND

Inflow Area = 3.014 ac, 39.32% Impervious, Inflow Depth > 2.41" for 25-year event
Inflow = 6.10 cfs @ 12.24 hrs, Volume= 0.604 af
Outflow = 2.76 cfs @ 12.53 hrs, Volume= 0.511 af, Atten= 55%, Lag= 17.2 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 2.76 cfs @ 12.53 hrs, Volume= 0.511 af
Routed to Link T-P2 : TOTAL OFFSITE SE

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 55.33' @ 12.53 hrs Surf.Area= 5,226 sf Storage= 7,875 cf

Plug-Flow detention time= 118.1 min calculated for 0.511 af (85% of inflow)
Center-of-Mass det. time= 48.2 min (913.9 - 865.7)

Volume	Invert	Avail.Storage	Storage Description
#1	53.00'	21,118 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

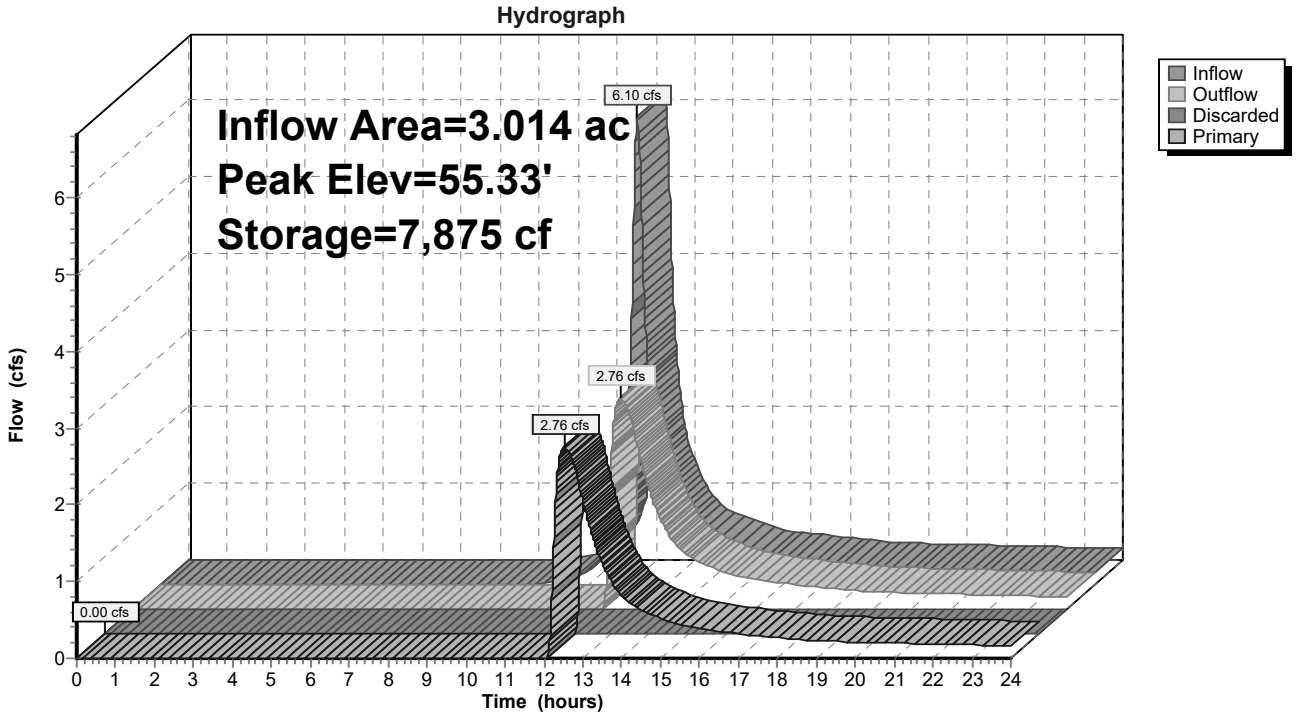
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
53.00	1,657	0	0	1,657
54.00	3,118	2,349	2,349	3,128
55.00	4,698	3,881	6,230	4,723
56.00	6,376	5,516	11,746	6,422
57.00	8,155	7,247	18,993	8,226
57.25	8,847	2,125	21,118	8,923

Device	Routing	Invert	Outlet Devices
#1	Discarded	53.00'	**5.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 20.00'
#2	Device 1	50.00'	**15.0" Round Culvert** L= 50.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 50.00' / 49.50' S= 0.0100 '/' Cc= 0.900 n= 0.120, Flow Area= 1.23 sf
#3	Primary	54.30'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	56.25'	**12.0' long + 0.2 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=53.00' (Free Discharge)
└**1=Exfiltration** (Passes 0.00 cfs of 0.19 cfs potential flow)
└**2=Culvert** (Controls 0.00 cfs)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Primary OutFlow Max=2.76 cfs @ 12.53 hrs HW=55.33' (Free Discharge)
└**3=Orifice/Grate** (Orifice Controls 2.76 cfs @ 3.51 fps)

Pond 2P: POND


Hydrograph
Inflow Area=3.014 ac
Peak Elev=55.33'
Storage=7,875 cf
6.10 cfs
2.76 cfs
2.76 cfs
0.00 cfs
Flow (cfs)
Time (hours)
Inflow
Outflow
Discarded
Primary

Summary for Pond 2PP: P2 PERMEABLE PAVERS

Inflow Area = 0.438 ac,100.00% Impervious, Inflow Depth > 5.73" for 25-year event
Inflow = 2.59 cfs @ 12.12 hrs, Volume= 0.209 af
Outflow = 0.23 cfs @ 13.07 hrs, Volume= 0.209 af, Atten= 91%, Lag= 57.3 min
Discarded = 0.23 cfs @ 13.07 hrs, Volume= 0.209 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 50.38' @ 13.07 hrs Surf.Area= 0.438 ac Storage= 0.067 af

Plug-Flow detention time= 82.5 min calculated for 0.209 af (100% of inflow)
Center-of-Mass det. time= 82.0 min (826.8 - 744.8)

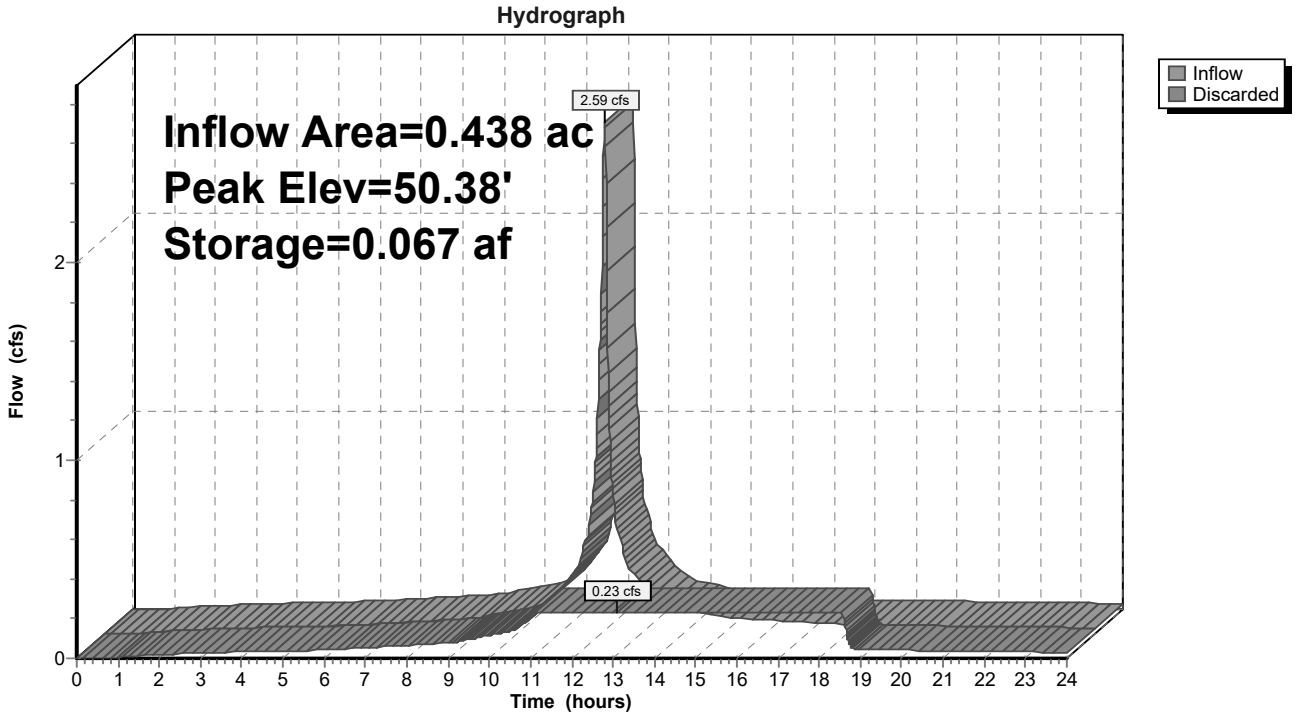
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	0.117 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
50.00	0.438	0.0	0.000	0.000
50.67	0.438	40.0	0.117	0.117

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.00'	**0.520 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 20.00'

Discarded OutFlow Max=0.23 cfs @ 13.07 hrs HW=50.38' (Free Discharge)
1=Exfiltration (Controls 0.23 cfs)

Pond 2PP: P2 PERMEABLE PAVERS

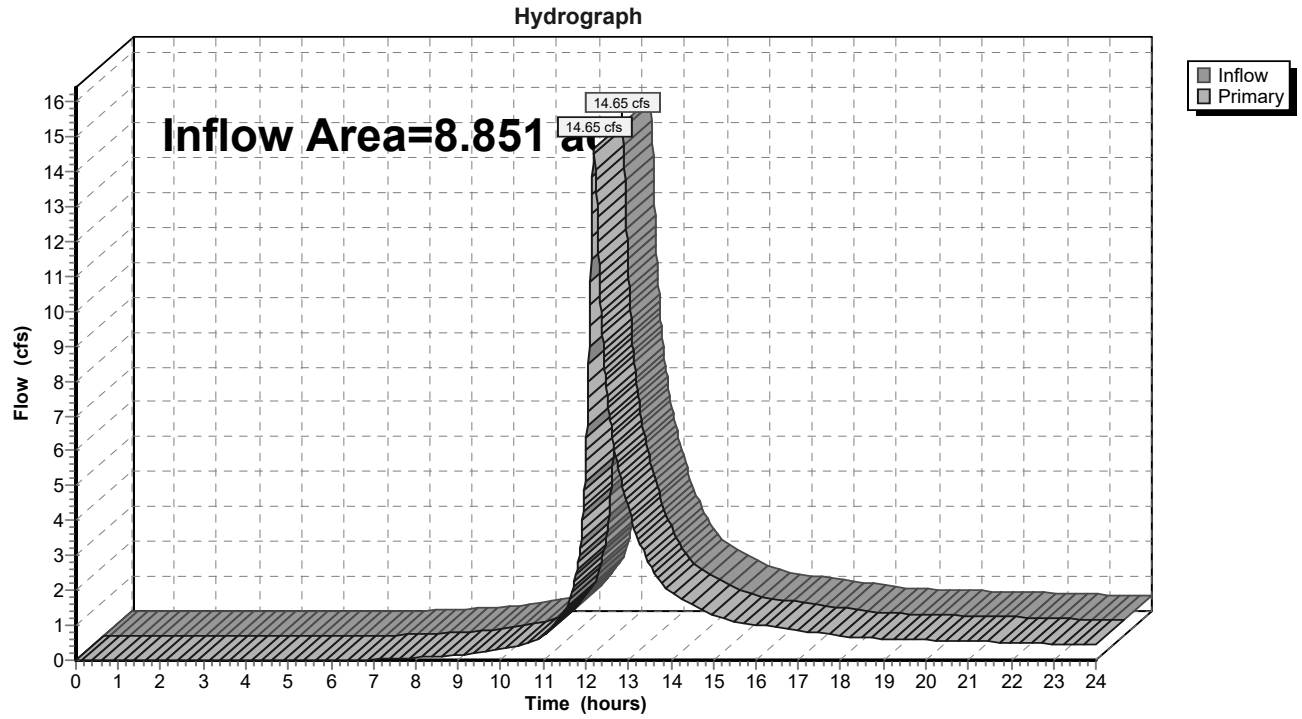


Summary for Link T: TOTAL SITE

Inflow Area = 8.851 ac, 39.88% Impervious, Inflow Depth > 2.40" for 25-year event
Inflow = 14.65 cfs @ 12.19 hrs, Volume= 1.772 af
Primary = 14.65 cfs @ 12.19 hrs, Volume= 1.772 af, Atten= 0%, Lag= 0.0 min

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

Link T: TOTAL SITE

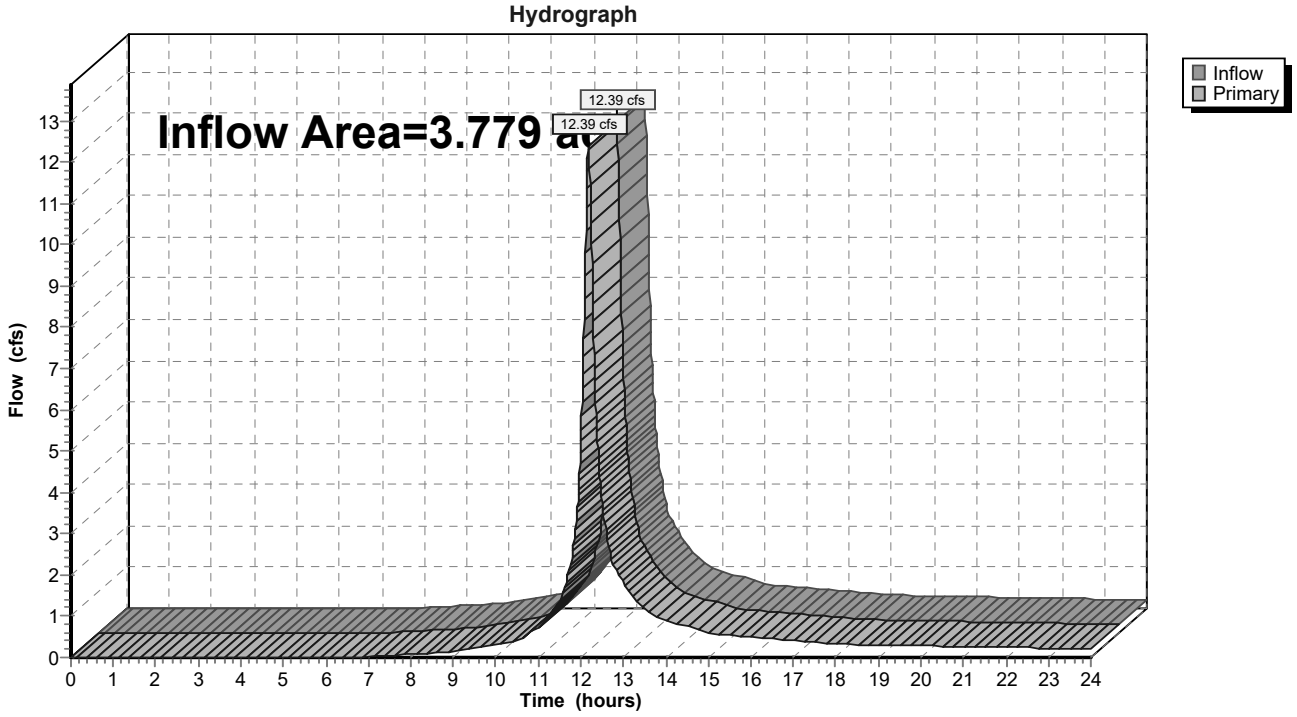


Summary for Link T-P1: TOTAL NYE ROAD

Inflow Area = 3.779 ac, 49.80% Impervious, Inflow Depth > 3.33" for 25-year event
Inflow = 12.39 cfs @ 12.18 hrs, Volume= 1.049 af
Primary = 12.39 cfs @ 12.18 hrs, Volume= 1.049 af, Atten= 0%, Lag= 0.0 min
Routed to Link T : TOTAL SITE

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

Link T-P1: TOTAL NYE ROAD

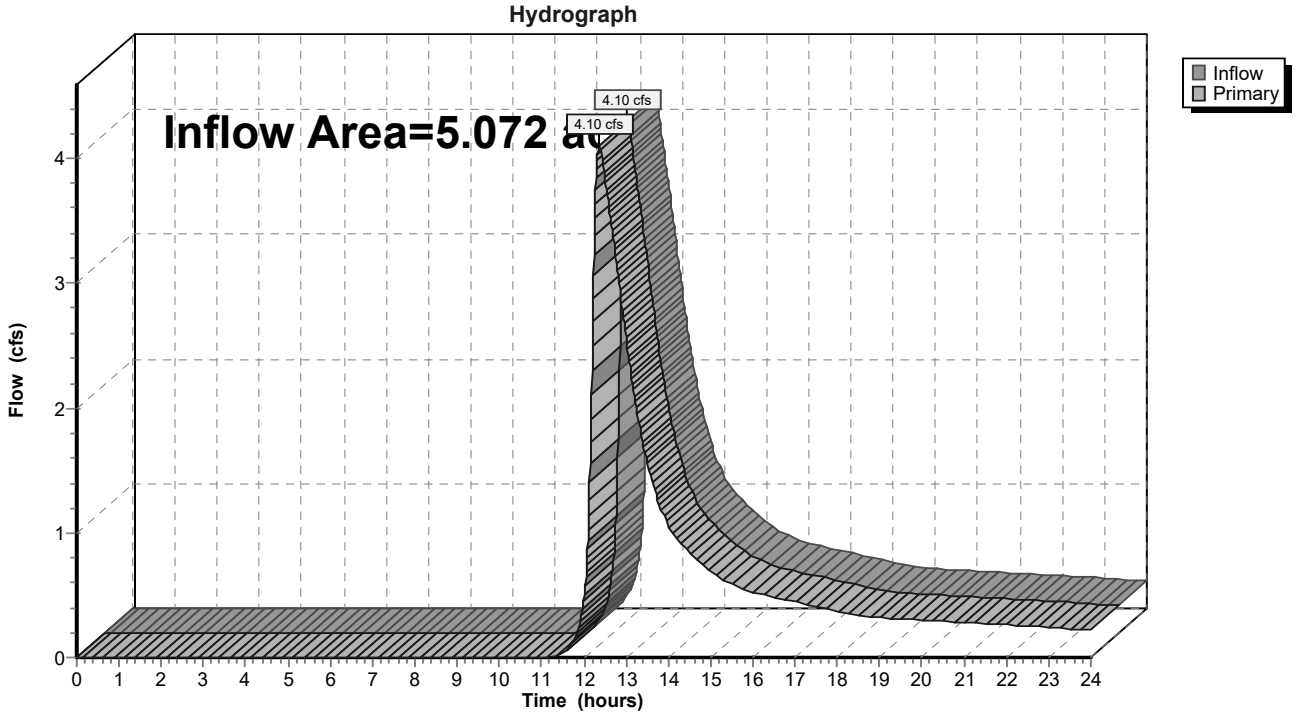


Summary for Link T-P2: TOTAL OFFSITE SE

Inflow Area = 5.072 ac, 32.49% Impervious, Inflow Depth > 1.71" for 25-year event
Inflow = 4.10 cfs @ 12.36 hrs, Volume= 0.723 af
Primary = 4.10 cfs @ 12.36 hrs, Volume= 0.723 af, Atten= 0%, Lag= 0.0 min
Routed to Link T : TOTAL SITE

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

Link T-P2: TOTAL OFFSITE SE



Summary for Subcatchment P1: NYE ROAD

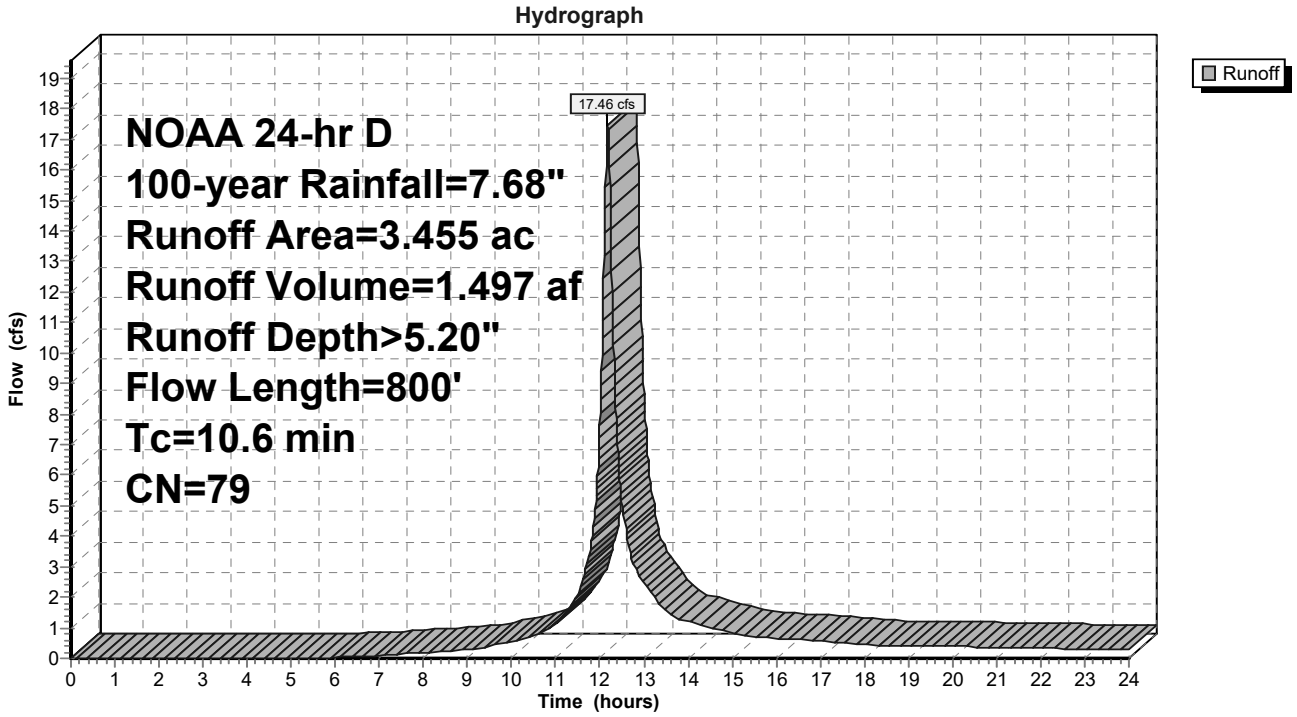
Runoff = 17.46 cfs @ 12.18 hrs, Volume= 1.497 af, Depth> 5.20"
Routed to Link T-P1 : TOTAL NYE ROAD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-year Rainfall=7.68"

Area (ac)	CN	Description
0.153	30	Woods, Good, HSG A
0.088	39	>75% Grass cover, Good, HSG A
0.101	55	Woods, Good, HSG B
0.854	61	>75% Grass cover, Good, HSG B
0.701	80	>75% Grass cover, Good, HSG D
1.558	98	Paved parking, HSG D
3.455	79	Weighted Average
1.897		54.91% Pervious Area
1.558		45.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2000	0.19		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.4	180	0.2000	7.20		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
0.3	60	0.0200	2.87		**Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps
1.2	460	0.0160	6.22	4.88	**Pipe Channel, 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
10.6	800	Total			

Subcatchment P1: NYE ROAD



Summary for Subcatchment P2-1: TO POND

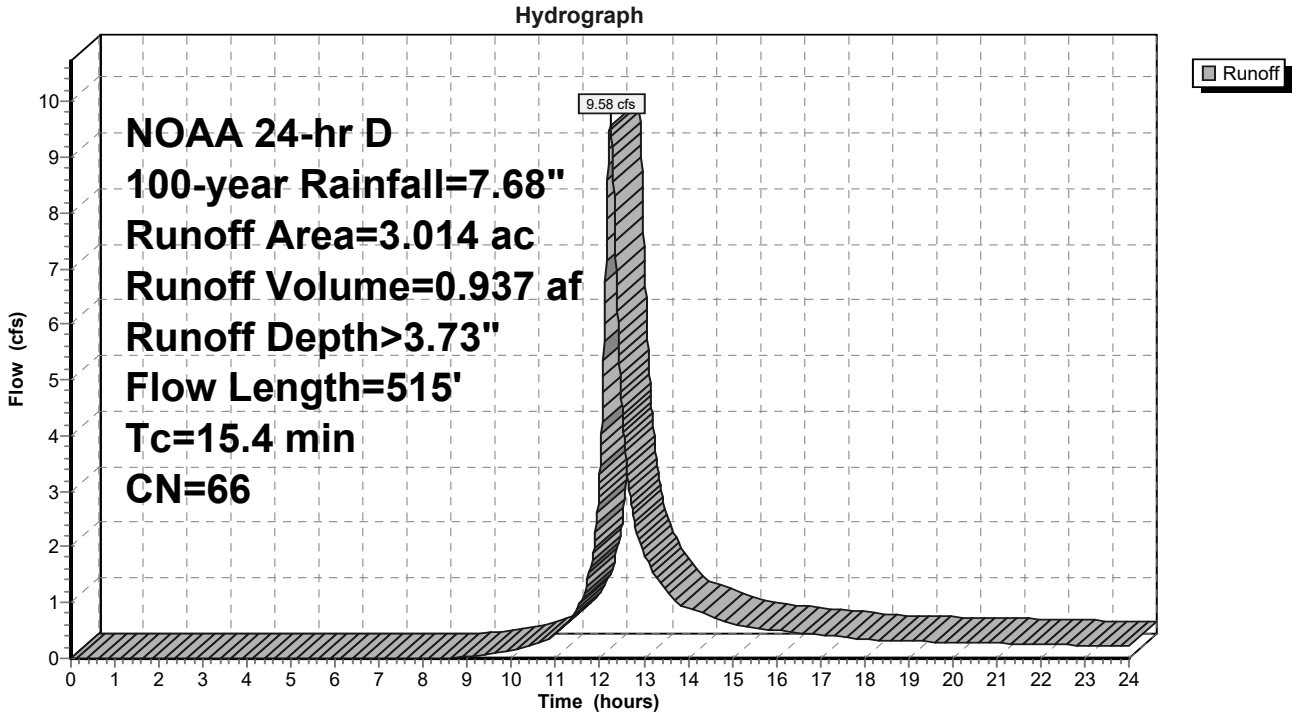
Runoff = 9.58 cfs @ 12.24 hrs, Volume= 0.937 af, Depth> 3.73"
Routed to Pond 2P : POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-year Rainfall=7.68"

Area (ac)	CN	Description
0.301	30	Woods, Good, HSG A
1.164	39	>75% Grass cover, Good, HSG A
0.056	61	>75% Grass cover, Good, HSG B
0.308	80	>75% Grass cover, Good, HSG D
1.185	98	Paved parking, HSG D
3.014	66	Weighted Average
1.829		60.68% Pervious Area
1.185		39.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2000	0.19		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.7	100	0.0200	2.28		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
0.5	85	0.0200	2.87		**Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps
5.5	230	0.0200	0.69	0.55	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.120
15.4	515	Total			

Subcatchment P2-1: TO POND



Summary for Subcatchment P2-2: BYPASS

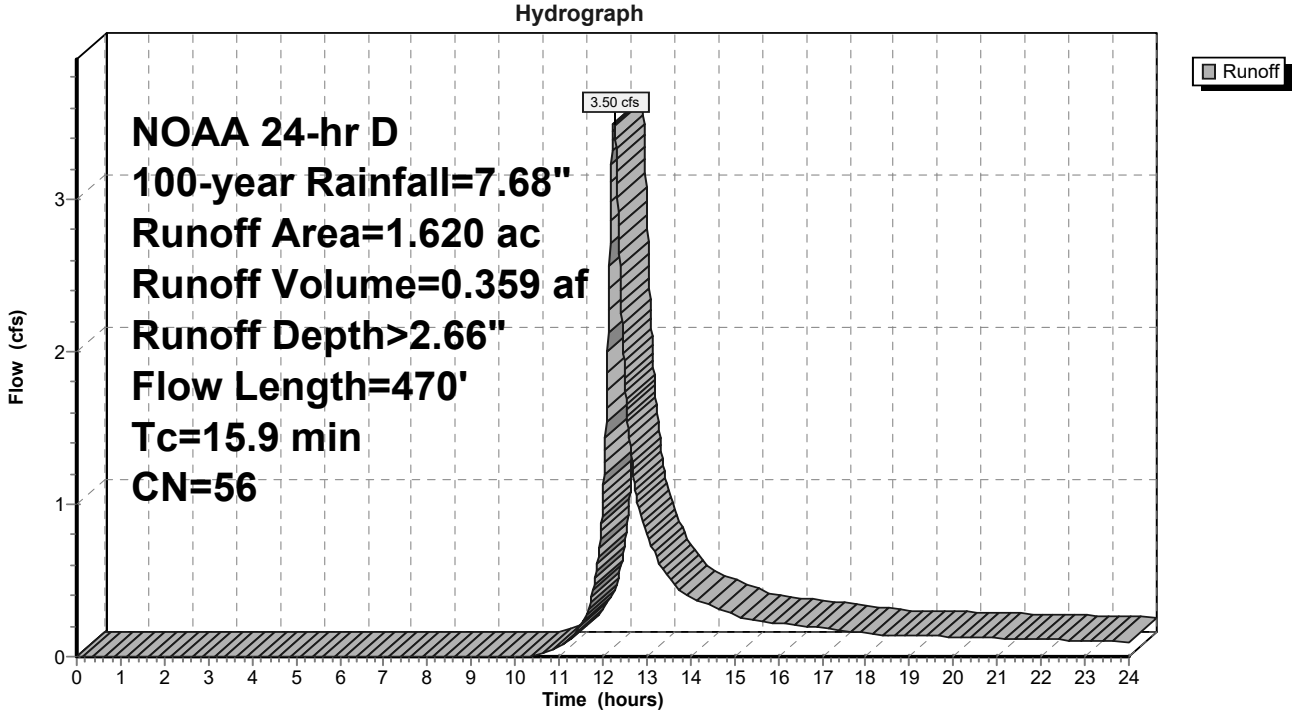
Runoff = 3.50 cfs @ 12.25 hrs, Volume= 0.359 af, Depth> 2.66"
Routed to Link T-P2 : TOTAL OFFSITE SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-year Rainfall=7.68"

Area (ac)	CN	Description
0.383	30	Woods, Good, HSG A
0.351	39	>75% Grass cover, Good, HSG A
0.156	61	>75% Grass cover, Good, HSG B
0.705	77	Woods, Good, HSG D
0.025	98	Paved parking, HSG D
1.620	56	Weighted Average
1.595		98.46% Pervious Area
0.025		1.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0700	0.13		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.09"
2.7	370	0.0200	2.28		**Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps
15.9	470	Total			

Subcatchment P2-2: BYPASS



Summary for Subcatchment PP1: P1 PERMEABLE PAVERS

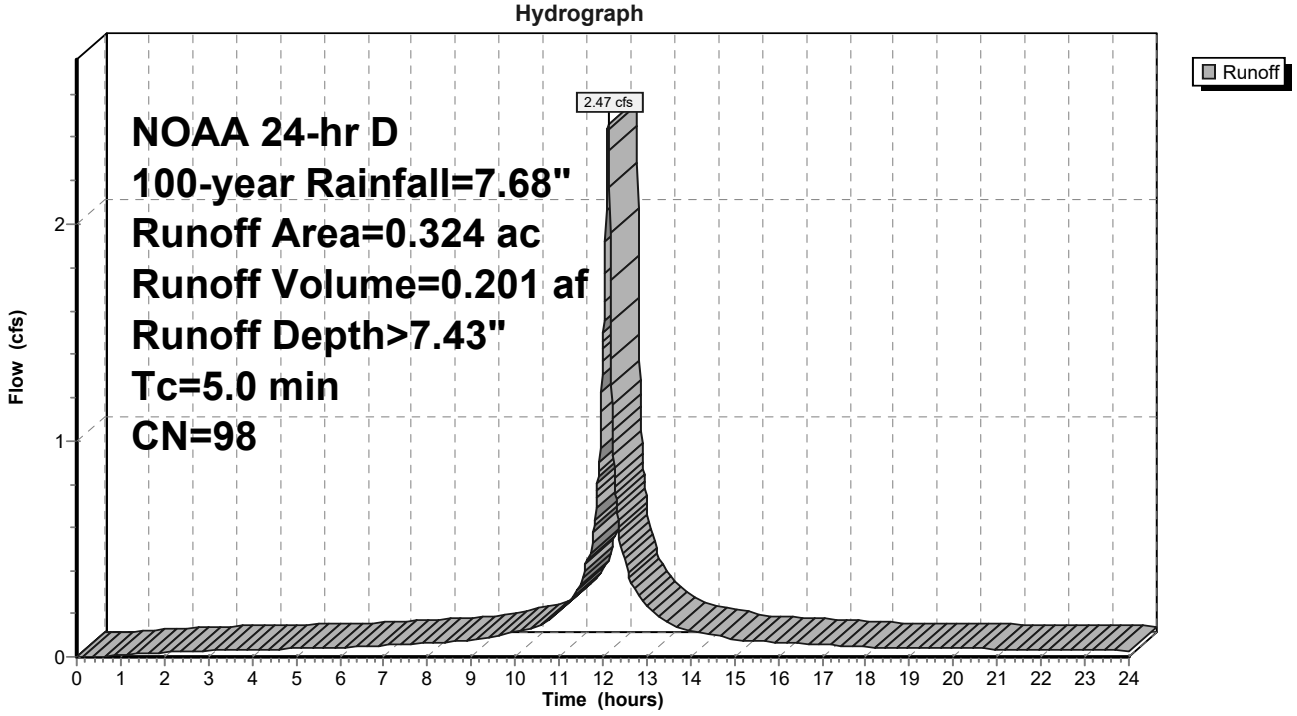
Runoff = 2.47 cfs @ 12.12 hrs, Volume= 0.201 af, Depth> 7.43"
Routed to Pond 1PP : P1 PERMEABLE PAVERS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-year Rainfall=7.68"

Area (ac)	CN	Description
0.324	98	Paved parking, HSG D
0.324		100.00% Impervious Area

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

Subcatchment PP1: P1 PERMEABLE PAVERS



Summary for Subcatchment PP2: P2 PERMEABLE PAVERS

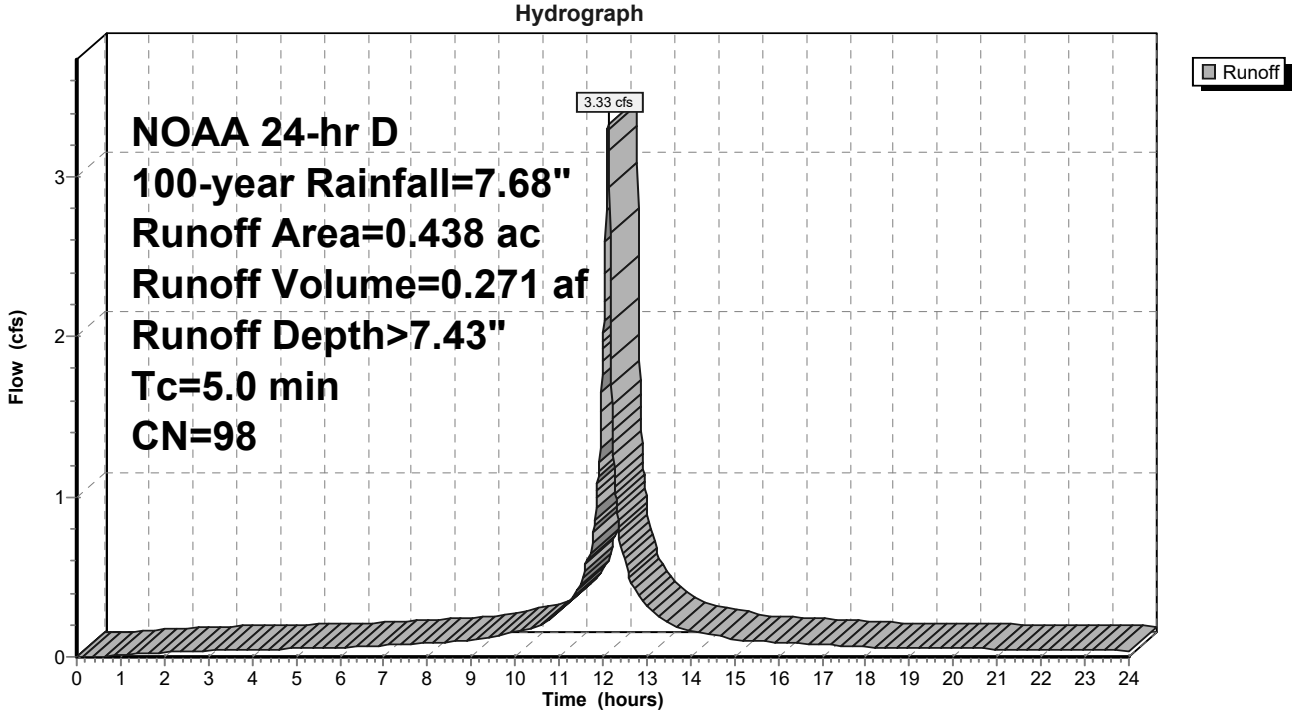
Runoff = 3.33 cfs @ 12.12 hrs, Volume= 0.271 af, Depth> 7.43"
Routed to Pond 2PP : P2 PERMEABLE PAVERS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-year Rainfall=7.68"

Area (ac)	CN	Description
0.438	98	Paved parking, HSG D
0.438		100.00% Impervious Area

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

Subcatchment PP2: P2 PERMEABLE PAVERS



Summary for Pond 1PP: P1 PERMEABLE PAVERS

Inflow Area = 0.324 ac,100.00% Impervious, Inflow Depth > 7.43" for 100-year event
Inflow = 2.47 cfs @ 12.12 hrs, Volume= 0.201 af
Outflow = 0.17 cfs @ 13.37 hrs, Volume= 0.201 af, Atten= 93%, Lag= 75.2 min
Discarded = 0.17 cfs @ 13.37 hrs, Volume= 0.201 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 50.56' @ 13.37 hrs Surf.Area= 0.324 ac Storage= 0.073 af

Plug-Flow detention time= 130.4 min calculated for 0.201 af (100% of inflow)
Center-of-Mass det. time= 129.9 min (871.0 - 741.1)

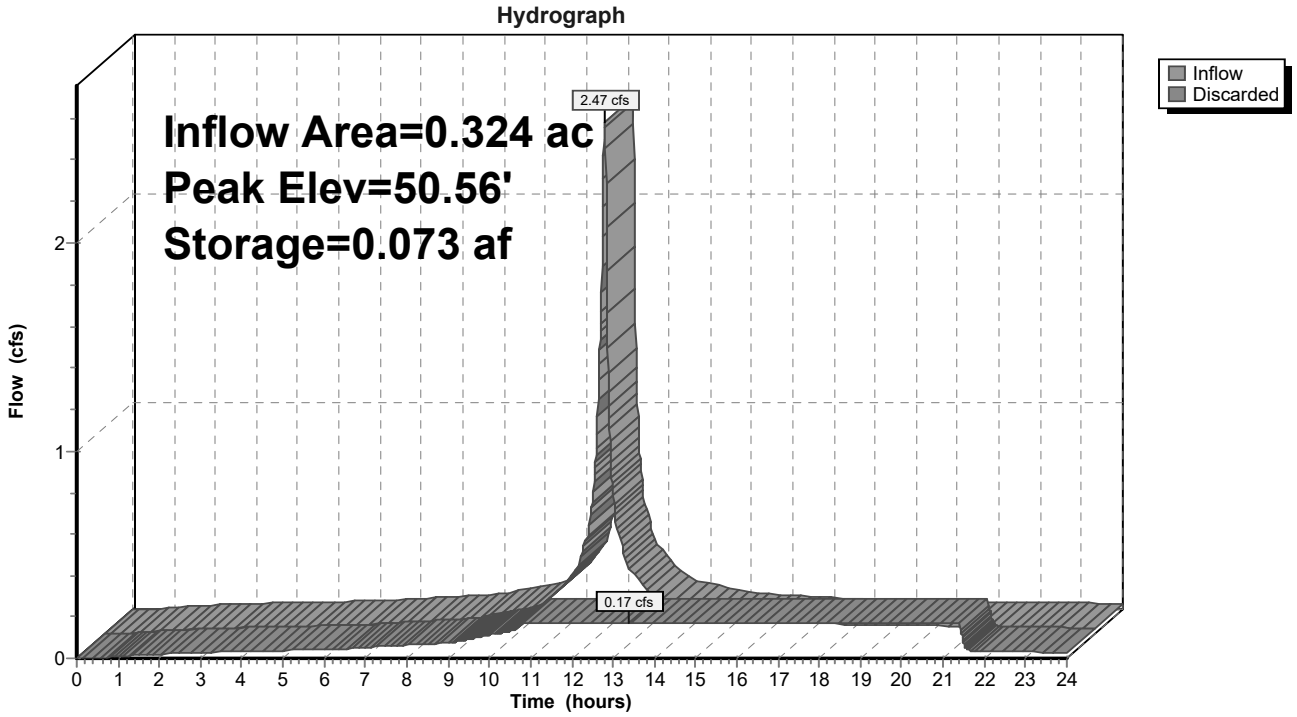
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	0.087 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
50.00	0.324	0.0	0.000	0.000
50.67	0.324	40.0	0.087	0.087

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.00'	**0.520 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 20.00'

Discarded OutFlow Max=0.17 cfs @ 13.37 hrs HW=50.56' (Free Discharge)
1=Exfiltration (Controls 0.17 cfs)

Pond 1PP: P1 PERMEABLE PAVERS



Summary for Pond 2P: POND

Inflow Area = 3.014 ac, 39.32% Impervious, Inflow Depth > 3.73" for 100-year event
Inflow = 9.58 cfs @ 12.24 hrs, Volume= 0.937 af
Outflow = 4.21 cfs @ 12.52 hrs, Volume= 0.841 af, Atten= 56%, Lag= 17.2 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 4.21 cfs @ 12.52 hrs, Volume= 0.841 af
Routed to Link T-P2 : TOTAL OFFSITE SE

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 56.04' @ 12.52 hrs Surf.Area= 6,443 sf Storage= 12,002 cf

Plug-Flow detention time= 92.3 min calculated for 0.841 af (90% of inflow)
Center-of-Mass det. time= 41.4 min (893.2 - 851.8)

Volume	Invert	Avail.Storage	Storage Description
#1	53.00'	21,118 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

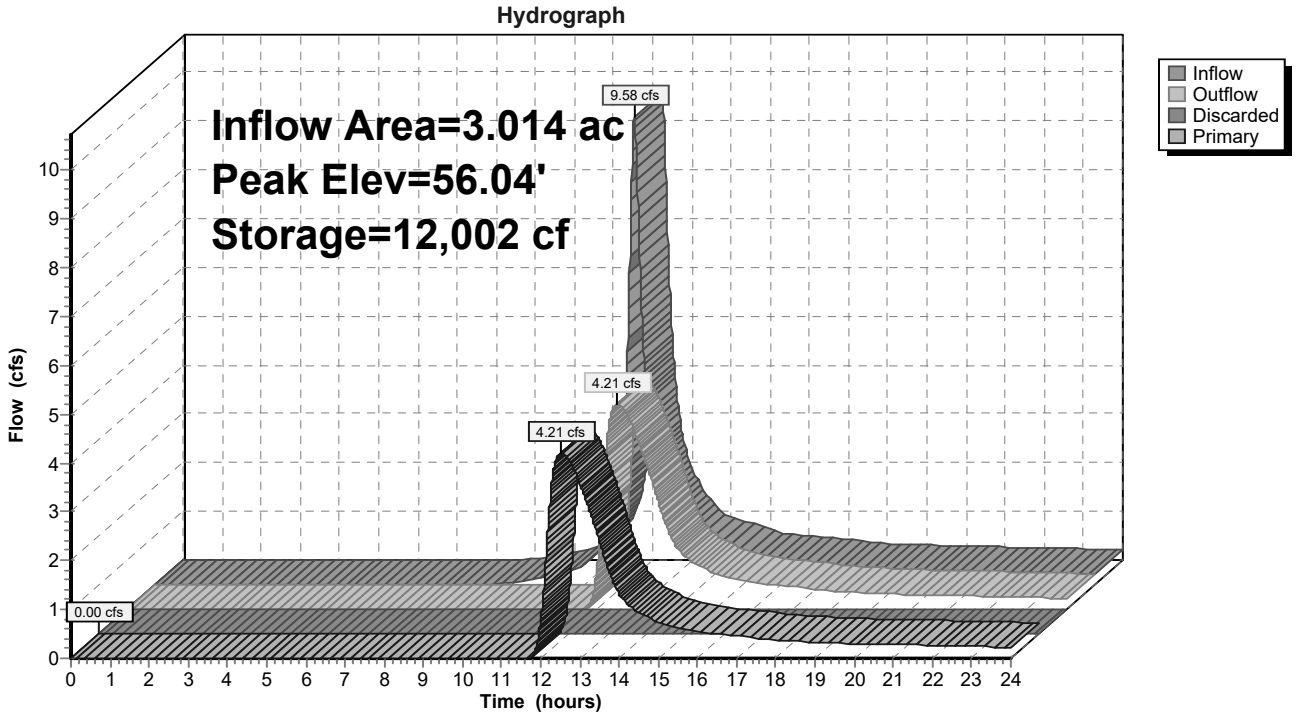
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
53.00	1,657	0	0	1,657
54.00	3,118	2,349	2,349	3,128
55.00	4,698	3,881	6,230	4,723
56.00	6,376	5,516	11,746	6,422
57.00	8,155	7,247	18,993	8,226
57.25	8,847	2,125	21,118	8,923

Device	Routing	Invert	Outlet Devices
#1	Discarded	53.00'	**5.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 20.00'
#2	Device 1	50.00'	**15.0" Round Culvert** L= 50.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 50.00' / 49.50' S= 0.0100 '/' Cc= 0.900 n= 0.120, Flow Area= 1.23 sf
#3	Primary	54.30'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	56.25'	**12.0' long + 0.2 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=53.00' (Free Discharge)
└**1=Exfiltration** (Passes 0.00 cfs of 0.19 cfs potential flow)
└**2=Culvert** (Controls 0.00 cfs)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Primary OutFlow Max=4.21 cfs @ 12.52 hrs HW=56.04' (Free Discharge)
└**3=Orifice/Grate** (Orifice Controls 4.21 cfs @ 5.36 fps)

Pond 2P: POND


Hydrograph
Inflow Area=3.014 ac
Peak Elev=56.04'
Storage=12,002 cf
9.58 cfs
4.21 cfs
4.21 cfs
0.00 cfs
Flow (cfs)
Time (hours)
Inflow
Outflow
Discarded
Primary

Summary for Pond 2PP: P2 PERMEABLE PAVERS

Inflow Area = 0.438 ac,100.00% Impervious, Inflow Depth > 7.43" for 100-year event
Inflow = 3.33 cfs @ 12.12 hrs, Volume= 0.271 af
Outflow = 0.23 cfs @ 13.37 hrs, Volume= 0.271 af, Atten= 93%, Lag= 75.2 min
Discarded = 0.23 cfs @ 13.37 hrs, Volume= 0.271 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 50.56' @ 13.37 hrs Surf.Area= 0.438 ac Storage= 0.098 af

Plug-Flow detention time= 130.4 min calculated for 0.271 af (100% of inflow)
Center-of-Mass det. time= 129.9 min (871.0 - 741.1)

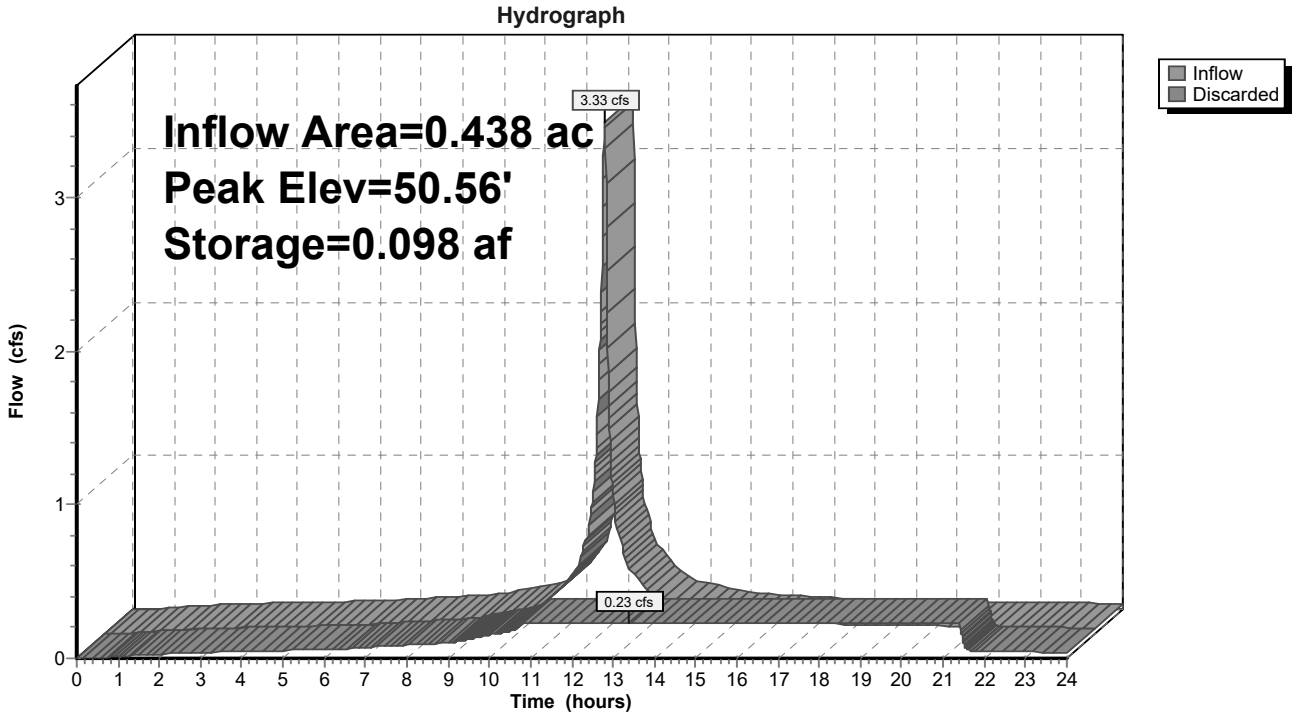
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	0.117 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
50.00	0.438	0.0	0.000	0.000
50.67	0.438	40.0	0.117	0.117

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.00'	**0.520 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 20.00'

Discarded OutFlow Max=0.23 cfs @ 13.37 hrs HW=50.56' (Free Discharge)
1=Exfiltration (Controls 0.23 cfs)

Pond 2PP: P2 PERMEABLE PAVERS

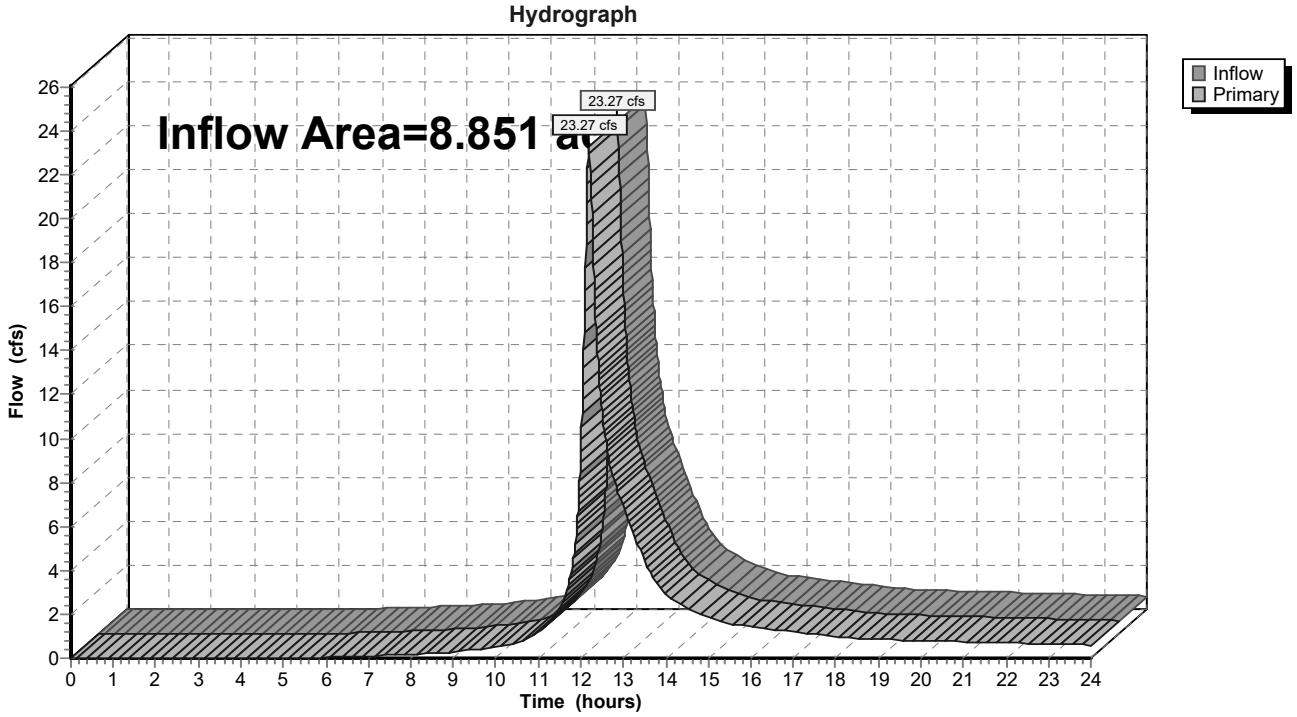


Summary for Link T: TOTAL SITE

Inflow Area = 8.851 ac, 39.88% Impervious, Inflow Depth > 3.66" for 100-year event
Inflow = 23.27 cfs @ 12.19 hrs, Volume= 2.696 af
Primary = 23.27 cfs @ 12.19 hrs, Volume= 2.696 af, Atten= 0%, Lag= 0.0 min

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

Link T: TOTAL SITE

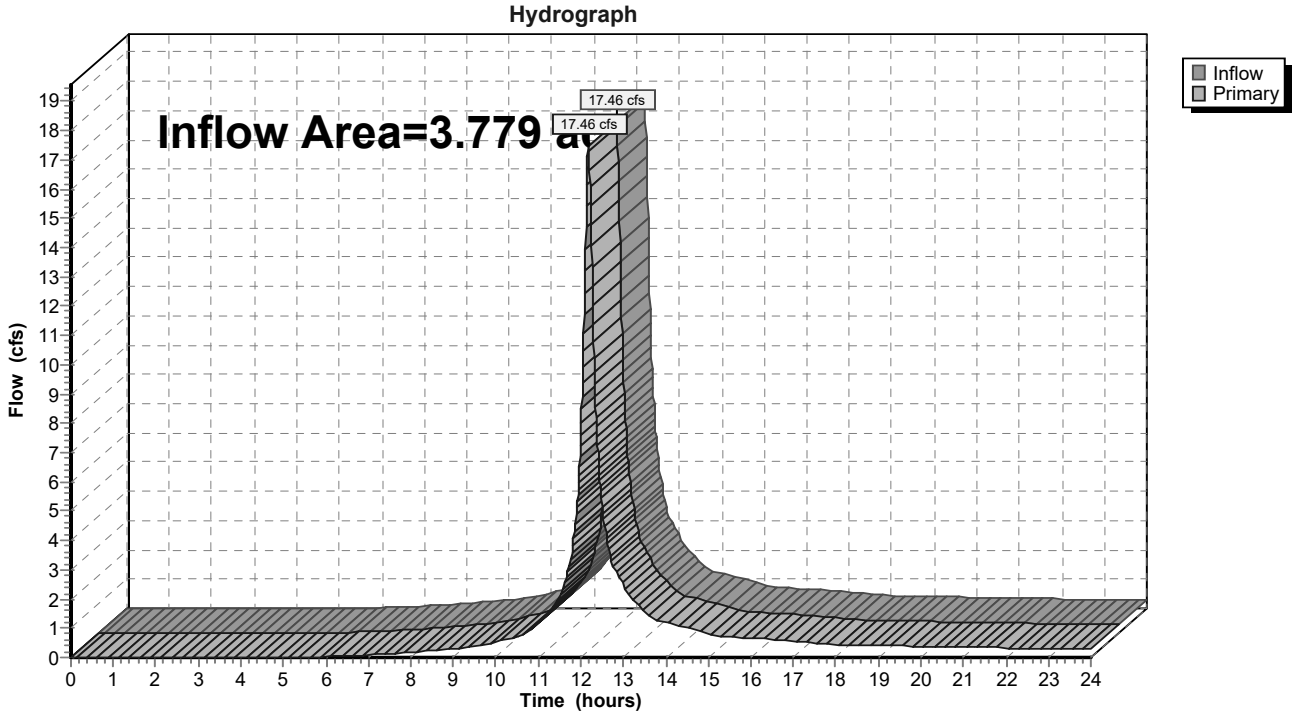


Summary for Link T-P1: TOTAL NYE ROAD

Inflow Area = 3.779 ac, 49.80% Impervious, Inflow Depth > 4.75" for 100-year event
Inflow = 17.46 cfs @ 12.18 hrs, Volume= 1.497 af
Primary = 17.46 cfs @ 12.18 hrs, Volume= 1.497 af, Atten= 0%, Lag= 0.0 min
Routed to Link T : TOTAL SITE

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

Link T-P1: TOTAL NYE ROAD

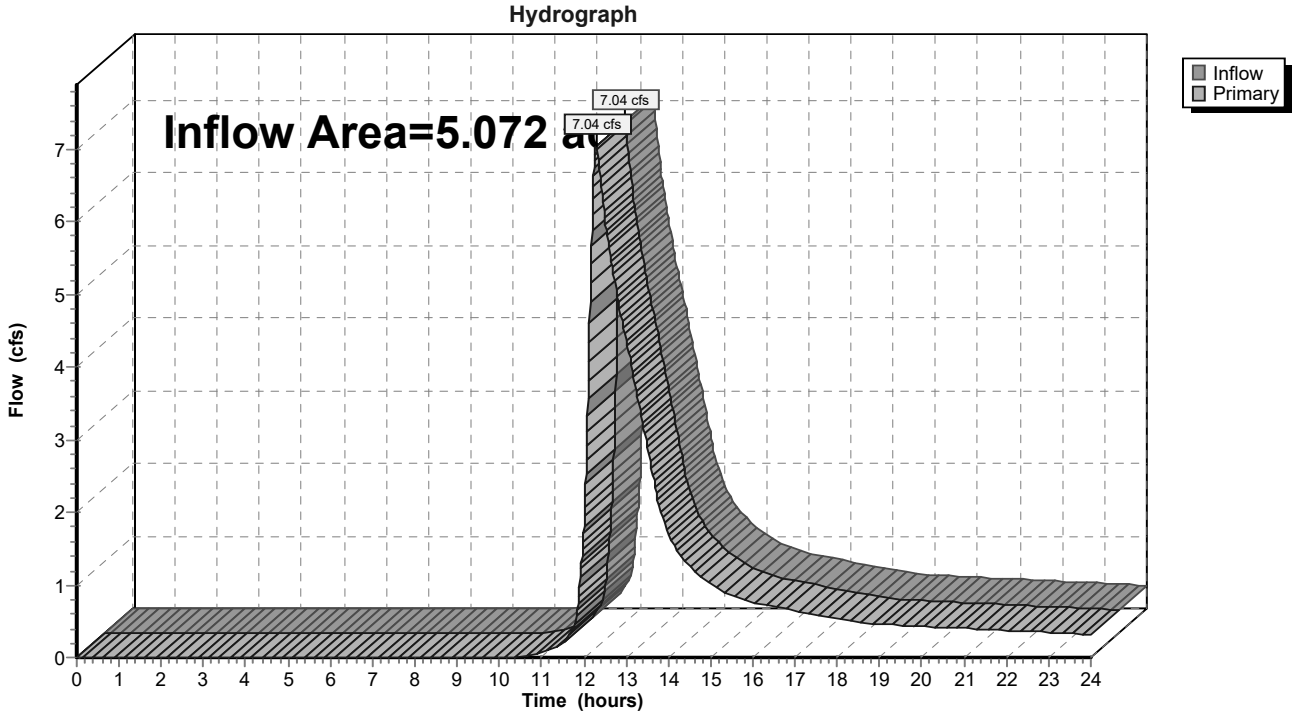


Summary for Link T-P2: TOTAL OFFSITE SE

Inflow Area = 5.072 ac, 32.49% Impervious, Inflow Depth > 2.84" for 100-year event
Inflow = 7.04 cfs @ 12.30 hrs, Volume= 1.199 af
Primary = 7.04 cfs @ 12.30 hrs, Volume= 1.199 af, Atten= 0%, Lag= 0.0 min
Routed to Link T : TOTAL SITE

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

Link T-P2: TOTAL OFFSITE SE



APPENDIX C

HYDRAULIC COMPUTATIONS

QA+M architecture
QuisenberryArcariMalik
195 Scott Swamp Road
Farmington, CT 06032
qamarch.com

benesch
Alfred Benesch & Company
120 Hebron Avenue, 2nd Floor
Glastonbury, Connecticut 06033
860-633-8341

PROJECT DESCRIPTION:

Glastonbury Housing Authority Nye Road

Glastonbury, CT

Revisions: 11/01/23 IWWC RESUBMIT

Issue Dates: OCTOBER 13, 2023

WETLANDS & ZONING SUBMISSION OCTOBER 13, 2023

CATCHMENT AREA PLAN

CAP

bury Housing Authority

benesch

11/2/2023

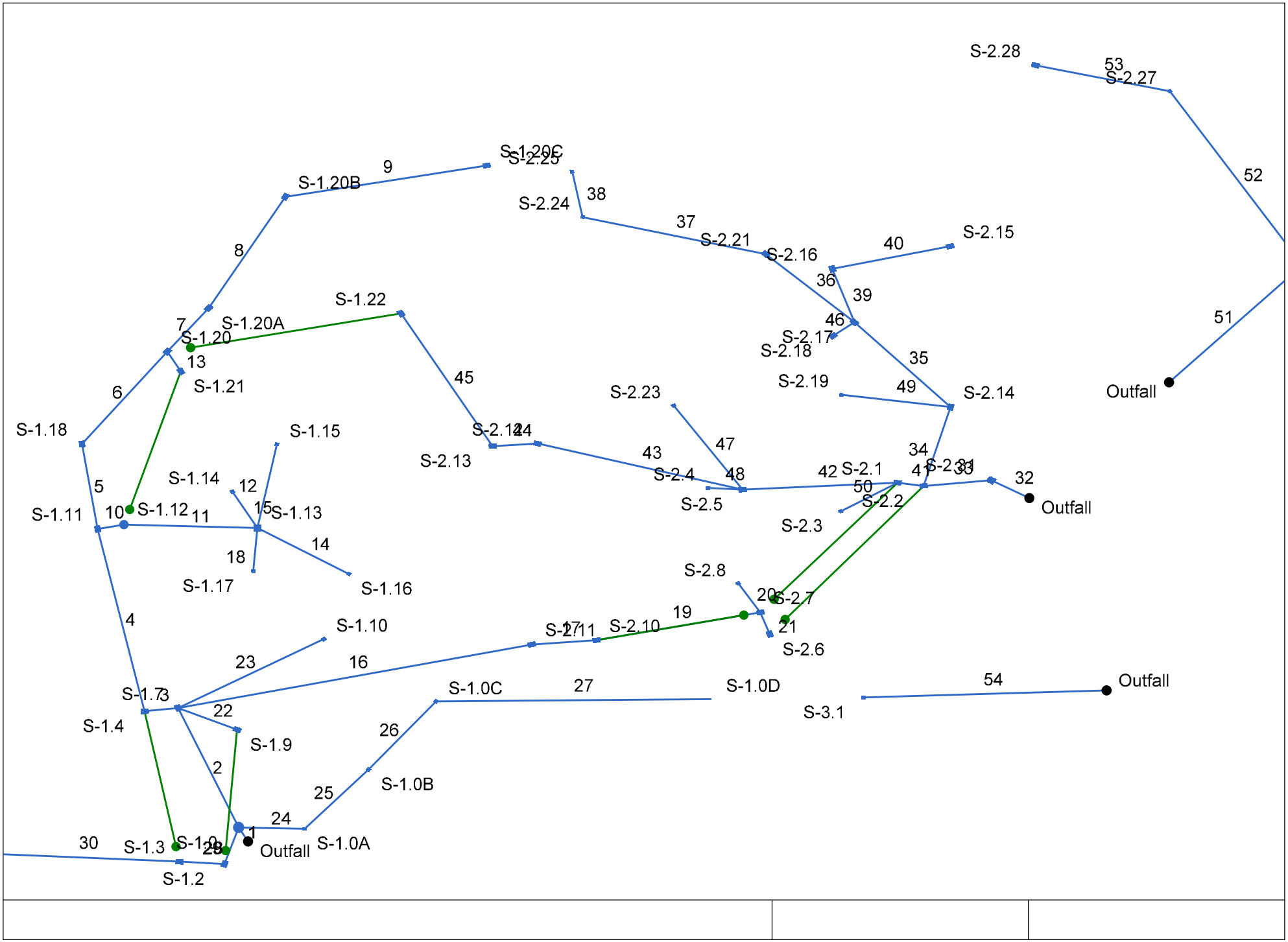
Job Number: 70896.00 **KS**

ainage Areas

BASIN	TOTAL (FT.)	TOTAL (AC.)	IMPERVIOUS (FT.)	IMPERVIOUS (AC.)	GRAVEL (FT.)	GRAVEL (AC.)	PERVIOUS (FT.)	PERVIOUS (AC.)	C-Value	Tc (Min.)
S1.0A	1,872.0	0.04	286.0	0.01	0.0	0.00	1,586.0	0.04	0.39	5
S1.0B	1,125.0	0.03	218.0	0.01	0.0	0.00	907.0	0.02	0.42	5
S1.0C	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.00	5
S1.0D	4,225.0	0.10	0.0	0.00	0.0	0.00	4,225.0	0.10	0.30	5
S1.2	5,358.0	0.12	2,389.0	0.05	0.0	0.00	2,969.0	0.07	0.57	5
S1.3	5,706.0	0.13	2,186.0	0.05	857.0	0.02	2,663.0	0.06	0.57	5
S1.3A	6,112.0	0.14	0.0	0.00	0.0	0.00	6,112.0	0.14	0.30	5
S1.3B	14,644.0	0.34	293.0	0.01	0.0	0.00	14,351.0	0.33	0.31	10
S1.4	11,242.0	0.26	8,649.0	0.20	943.0	0.02	1,650.0	0.04	0.79	5
S1.7	14,173.0	0.33	8,024.0	0.18	2,526.0	0.06	3,623.0	0.08	0.69	5
S1.9	2,622.0	0.06	2,622.0	0.06	0.0	0.00	0.0	0.00	0.90	5
S1.10	818.0	0.02	185.0	0.00	0.0	0.00	633.0	0.01	0.44	5
S1.11	6,012.0	0.14	4,026.0	0.09	1,101.0	0.03	885.0	0.02	0.76	5
S1.12	6,583.0	0.15	5,078.0	0.12	181.0	0.00	1,324.0	0.03	0.77	5
S1.14	1,412.0	0.03	461.0	0.01	0.0	0.00	951.0	0.02	0.50	5
S1.15	3,677.0	0.08	3,315.0	0.08	0.0	0.00	362.0	0.01	0.84	5
S1.16	6,421.0	0.15	4,186.0	0.10	0.0	0.00	2,235.0	0.05	0.69	5
S1.17	4,648.0	0.11	1,326.0	0.03	0.0	0.00	3,322.0	0.08	0.47	5
S1.18	9,798.0	0.22	1,530.0	0.04	0.0	0.00	8,268.0	0.19	0.39	5
S1.20	4,517.0	0.10	1,490.0	0.03	0.0	0.00	3,027.0	0.07	0.50	5
S1.20A	23,436.0	0.54	3,225.0	0.07	0.0	0.00	20,211.0	0.46	0.38	10
S1.20B	101,630.0	2.33	3,117.0	0.07	9,026.0	0.21	89,487.0	2.05	0.35	10
S1.20C	4,870.0	0.11	0.0	0.00	551.0	0.01	4,319.0	0.10	0.33	5
S1.21	5,110.0	0.12	2,287.0	0.05	1,555.0	0.04	1,268.0	0.03	0.66	5
S1.22	8,700.0	0.20	5,110.0	0.12	634.0	0.01	2,956.0	0.07	0.67	5
S2.1	3,901.0	0.09	2,986.0	0.07	682.0	0.02	233.0	0.01	0.81	5
S2.2	3,746.0	0.09	2,144.0	0.05	1,184.0	0.03	418.0	0.01	0.74	5
S2.3	2,858.0	0.07	1,884.0	0.04	0.0	0.00	974.0	0.02	0.70	5
S2.4	5,824.0	0.13	683.0	0.02	0.0	0.00	5,141.0	0.12	0.37	5
S2.5	1,095.0	0.03	572.0	0.01	0.0	0.00	523.0	0.01	0.61	5
S2.6	9,872.0	0.23	8,275.0	0.19	675.0	0.02	922.0	0.02	0.82	5
S2.7	6,040.0	0.14	3,069.0	0.07	1,364.0	0.03	1,607.0	0.04	0.67	5
S2.8	1,597.0	0.04	370.0	0.01	0.0	0.00	1,227.0	0.03	0.44	5
S2.10	7,495.0	0.17	3,691.0	0.08	1,948.0	0.04	1,856.0	0.04	0.67	5
S2.11	5,898.0	0.14	2,126.0	0.05	2,042.0	0.05	1,730.0	0.04	0.62	5
S2.12	4,141.0	0.10	1,121.0	0.03	2,079.0	0.05	941.0	0.02	0.61	5
S2.13	2,836.0	0.07	459.0	0.01	2,043.0	0.05	334.0	0.01	0.61	5
S2.14	11,213.0	0.26	5,157.0	0.12	4,503.0	0.10	1,553.0	0.04	0.70	5
S2.15	19,005.0	0.44	11,760.0	0.27	3,220.0	0.07	4,025.0	0.09	0.72	5
S2.16	2,807.0	0.06	311.0	0.01	0.0	0.00	2,496.0	0.06	0.37	5
S2.17	5,948.0	0.14	3,591.0	0.08	1,260.0	0.03	1,097.0	0.03	0.73	5
S2.18	4,883.0	0.11	3,169.0	0.07	1,232.0	0.03	482.0	0.01	0.77	5
S2.19	1,662.0	0.04	562.0	0.01	0.0	0.00	1,100.0	0.03	0.50	5
S2.21	9,103.0	0.21	4,704.0	0.11	2,252.0	0.05	2,147.0	0.05	0.68	5
S2.23	2,826.0	0.06	1,535.0	0.04	0.0	0.00	1,291.0	0.03	0.63	5
S2.24	2,655.0	0.06	0.0	0.00	0.0	0.00	2,655.0	0.06	0.30	5
S2.25	17,204.0	0.39	0.0	0.00	1,308.0	0.03	15,896.0	0.36	0.32	10
S2.26	7,624.0	0.18	1,033.0	0.02	0.0	0.00	6,591.0	0.15	0.38	10
S2.27	13,880.0	0.32	661.0	0.02	1,090.0	0.03	12,129.0	0.28	0.35	10
S2.28	6,338.0	0.15	0.0	0.00	339.0	0.01	5,999.0	0.14	0.32	10
S3.1	2,250.0	0.05	0.0	0.00	213.0	0.00	2,037.0	0.05	0.33	5
EX CB*	33,640.0	0.77	33,640.0	0.77	0.0	0.00	0.0	0.00	0.90	5
EX CB1	2,250.0	0.05	1,700.0	0.04	0.0	0.00	550.0	0.01	0.75	5
EX CB2	1,988.0	0.05	1,885.0	0.04	0.0	0.00	103.0	0.00	0.87	5

*ASSUMES 50% OF PROPOSED IMPERVIOUS AREA ON CONCEPT PLAN ENTERS EXISTING CATCH BASIN WITH NO PEAK FLOW ATTENTUATION

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	10.572	0.00	6.43	0.00	0.00	3.15	0.0	12.2	4.8	15.20	19.79	10.56	18	3.03	46.93	47.25	47.92	48.66	52.27	53.37	EX CB-S1.0
2	1	85.835	0.33	5.53	0.69	0.23	2.80	5.0	11.8	4.9	13.78	18.21	8.69	18	3.01	47.48	50.06	48.66	51.43	53.37	53.50	S1.0-S1.7
3	2	18.029	0.26	4.40	0.79	0.21	2.01	5.0	11.7	4.9	9.91	18.17	6.16	18	3.00	50.06	50.60	51.43	51.81	53.50	53.80	S1.7-S1.4
4	3	123.980	0.17	4.14	0.76	0.13	1.80	5.0	11.4	5.0	9.01	9.53	7.51	15	1.86	50.60	52.90	51.81	54.06	53.80	55.90	S1.4-S1.11
5	4	57.310	0.22	3.42	0.39	0.09	1.27	5.0	11.3	5.0	6.41	10.54	5.69	15	2.27	52.90	54.20	54.06	55.22	55.90	57.24	S1.11-S1.18
6	5	76.562	0.10	3.20	0.50	0.05	1.19	5.0	11.0	5.1	6.04	9.46	5.71	15	1.83	54.20	55.60	55.22	56.59	57.24	58.90	S1.18-S1.20
7	6	36.260	0.54	2.98	0.38	0.21	1.06	10.0	11.0	5.1	5.40	10.91	8.19	12	8.00	55.90	58.80	56.59	59.73	58.90	62.00	S1.20-S1.20A
8	7	84.738	2.33	2.44	0.35	0.82	0.85	10.0	10.8	5.2	4.40	10.91	6.56	12	8.00	59.00	65.78	59.73	66.66	62.00	73.00	S1.20A-S1.20B
9	8	109.411	0.11	0.11	0.33	0.04	0.04	10.0	10.0	5.4	0.19	1.31	2.43	8	1.00	67.91	69.00	68.08	69.20	73.00	72.00	S1.20B-S1.20C
10	4	14.313	0.15	0.55	0.77	0.12	0.40	5.0	5.6	7.1	2.86	5.49	3.70	12	2.03	52.90	53.19	54.06	54.11	55.90	55.90	S1.11-S1.12
11	10	71.111	0.00	0.40	0.00	0.00	0.29	0.0	5.3	7.3	2.10	5.45	3.39	12	2.00	53.19	54.61	54.22	55.23	55.90	59.84	S1.12-S1.13
12	11	56.669	0.08	0.08	0.84	0.07	0.07	5.0	5.0	7.4	0.50	1.82	3.67	8	1.94	56.30	57.40	56.54	57.73	59.84	60.10	S1.13-S1.15
13	6	15.065	0.12	0.12	0.66	0.08	0.08	5.0	5.0	7.4	0.59	4.45	1.74	12	1.33	55.60	55.80	56.59	56.12	58.90	58.80	S1.20-S1.21
14	11	57.585	0.15	0.15	0.69	0.10	0.10	5.0	5.0	7.4	0.77	1.31	3.64	8	1.01	54.92	55.50	55.29	55.91	59.84	58.50	S1.13-S1.16
15	11	27.717	0.03	0.03	0.50	0.02	0.02	5.0	5.0	7.4	0.11	0.61	2.17	6	1.01	55.22	55.50	55.36	55.67	59.84	58.50	S1.13-S1.14
16	2	193.221	0.14	0.72	0.62	0.09	0.50	5.0	6.0	6.9	3.45	4.07	4.84	12	1.11	50.50	52.65	51.43	53.44	53.50	58.20	S1.7-S2.11
17	16	34.460	0.17	0.58	0.67	0.11	0.41	5.0	5.9	7.0	2.88	4.74	4.51	12	1.51	52.65	53.17	53.44	53.90	58.20	58.20	S2.11-S2.10
18	11	28.735	0.14	0.14	0.73	0.10	0.10	5.0	5.0	7.4	0.76	0.61	3.87	6	1.01	54.61	54.90	55.23	55.68	59.84	57.50	S1.13-S1.17
19	17	89.357	0.14	0.41	0.67	0.09	0.30	5.0	5.5	7.2	2.15	2.74	3.76	12	0.50	53.17	53.62	53.90	54.27	58.20	56.70	S2.10-S2.7
20	19	22.461	0.04	0.04	0.44	0.02	0.02	5.0	5.0	7.4	0.13	0.99	0.81	6	2.67	53.90	54.50	54.83	54.83	56.70	57.70	S2.7-S2.8
21	19	15.465	0.23	0.23	0.82	0.19	0.19	5.0	5.0	7.4	1.40	2.77	1.79	12	0.52	53.62	53.70	54.83	54.85	56.70	56.70	S2.7-S2.6
22	2	34.524	0.06	0.06	0.90	0.05	0.05	5.0	5.0	7.4	0.40	4.64	1.49	12	1.45	50.50	51.00	51.43	51.26	53.50	54.00	S1.7-S1.9

Project File: Storm.stm

Number of lines: 54

Run Date: 11/1/2023

NOTES:Intensity = 37.58 / (Inlet time + 4.00) ^ 0.74; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	2	90.356	0.02	0.02	0.44	0.01	0.01	5.0	5.0	7.4	0.07	1.11	1.01	6	3.32	50.50	53.50	51.43	53.63	53.50	56.90	S1.7-S1.10
24	1	35.199	0.04	0.17	0.39	0.02	0.06	5.0	7.1	6.4	0.37	1.30	2.92	8	0.99	49.36	49.71	49.60	49.99	53.37	52.50	S1.0-S1.0A
25	24	52.095	0.03	0.13	0.42	0.01	0.04	5.0	6.7	6.5	0.28	0.43	2.32	6	0.50	49.71	49.97	50.00	50.26	52.50	54.50	S1.0A-S1.0B
26	25	57.954	0.00	0.10	0.00	0.00	0.03	5.0	6.2	6.8	0.20	0.43	1.90	6	0.50	49.97	50.26	50.31	50.49	54.50	57.50	S1.0B-S1.0C
27	26	147.901	0.10	0.10	0.30	0.03	0.03	5.0	5.0	7.4	0.22	0.43	2.02	6	0.50	50.26	51.00	50.59	51.24	57.50	53.50	S1.0C-S1.0D
28	1	25.530	0.12	0.73	0.57	0.07	0.29	5.0	11.9	4.9	1.41	2.75	1.80	12	0.51	47.25	47.38	48.66	48.69	53.37	50.50	S1.7-S1.2
29	28	24.013	0.13	0.61	0.57	0.07	0.22	5.0	11.6	4.9	1.10	2.73	1.40	12	0.50	47.38	47.50	48.77	48.79	50.50	50.50	S1.2-S1.3
30	29	107.469	0.14	0.48	0.30	0.04	0.15	5.0	11.0	5.1	0.75	1.78	2.75	8	1.86	47.70	49.70	48.80	50.11	50.50	52.50	S1.3-S1.3A
31	30	163.974	0.34	0.34	0.31	0.11	0.11	10.0	10.0	5.4	0.57	1.97	2.77	8	2.26	49.70	53.40	50.11	53.75	52.50	56.10	S1.3A-S1.3B
32	End	23.556	0.00	2.55	0.00	0.00	1.54	0.0	11.7	4.9	7.60	7.87	6.98	15	1.49	54.61	54.96	55.60	56.05	56.13	59.55	FES-S2.31
33	32	36.244	0.09	2.55	0.74	0.07	1.54	5.0	11.7	4.9	7.63	7.88	6.70	15	1.49	54.96	55.50	56.05	56.60	59.55	58.70	S2.31-S2.2
34	33	54.603	0.26	1.71	0.70	0.18	1.01	5.0	11.5	5.0	5.06	9.96	4.85	15	2.38	55.50	56.80	56.60	57.71	58.70	59.90	S2.2-S2.14
35	34	76.316	0.14	1.41	0.73	0.10	0.81	5.0	11.2	5.0	4.09	6.40	5.59	12	2.75	56.80	58.90	57.71	59.75	59.90	61.90	S2.14-S2.17
36	35	65.501	0.21	0.66	0.68	0.14	0.29	5.0	10.9	5.1	1.47	6.89	2.84	12	3.19	58.90	60.99	59.75	61.50	61.90	64.20	S2.17-S2.21
37	36	100.652	0.06	0.45	0.30	0.02	0.14	5.0	10.2	5.3	0.76	2.75	2.41	12	0.51	60.99	61.50	61.50	61.86	64.20	64.50	S2.21-S2.24
38	37	30.955	0.39	0.39	0.32	0.12	0.12	10.0	10.0	5.4	0.67	2.93	3.32	8	5.01	61.50	63.05	61.86	63.44	64.50	73.50	S2.24-S2.25
39	35	37.495	0.06	0.50	0.37	0.02	0.34	5.0	5.3	7.3	2.47	4.88	3.93	12	1.60	58.90	59.50	59.75	60.17	61.90	62.50	S2.17-2.16
40	39	64.645	0.44	0.44	0.72	0.32	0.32	5.0	5.0	7.4	2.36	5.88	4.25	12	2.32	59.50	61.00	60.17	61.66	62.50	64.00	S2.16-S2.15
41	33	13.987	0.09	0.75	0.81	0.07	0.46	5.0	6.9	6.5	3.00	3.86	3.84	12	1.00	55.56	55.70	56.60	56.67	58.70	58.70	S2.2-S2.1
42	41	82.732	0.03	0.59	0.61	0.02	0.34	5.0	6.5	6.7	2.27	3.79	3.50	12	0.97	55.70	56.50	56.91	57.16	58.70	59.50	S2.1-S2.5
43	42	113.455	0.10	0.37	0.61	0.06	0.24	5.0	5.8	7.0	1.66	4.97	2.94	12	1.66	56.50	58.38	57.59	58.93	59.50	61.20	S2.5-S2.12
44	43	24.173	0.07	0.27	0.61	0.04	0.18	5.0	5.7	7.0	1.24	2.72	3.12	12	0.50	58.38	58.50	58.93	58.97	61.20	61.30	S2.12-S2.13

Project File: Storm.stm | Number of lines: 54 | Run Date: 11/1/2023

NOTES:Intensity = 37.58 / (Inlet time + 4.00) ^ 0.74; Return period =Yrs. 10 ; c = cir e = ellip b = box

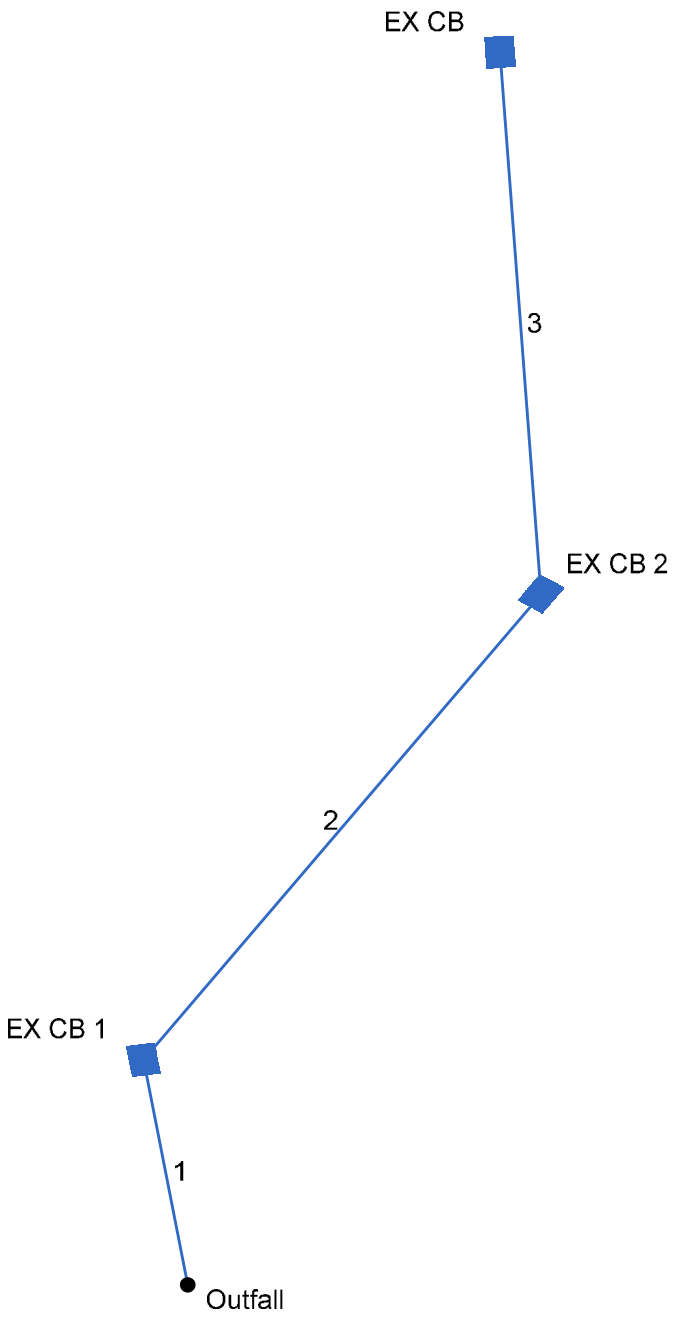
Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
45	44	101.100	0.20	0.20	0.67	0.13	0.13	5.0	5.0	7.4	1.00	4.02	2.42	12	1.09	58.50	59.60	59.22	60.02	61.30	62.60	S2.13-S1.22
46	35	14.454	0.11	0.11	0.77	0.08	0.08	5.0	5.0	7.4	0.63	2.68	1.81	12	0.48	58.83	58.90	59.75	59.23	61.90	61.90	S2.17-S2.18
47	42	66.971	0.06	0.06	0.63	0.04	0.04	5.0	5.0	7.4	0.28	2.58	1.61	8	3.88	56.50	59.10	57.59	59.34	59.50	62.10	S2.5-S2.23
48	42	18.618	0.13	0.13	0.37	0.05	0.05	5.0	5.0	7.4	0.36	0.42	1.82	6	0.48	57.00	57.09	57.59	57.65	59.50	59.80	S2.5-S2.4
49	34	58.672	0.04	0.04	0.50	0.02	0.02	5.0	5.0	7.4	0.15	1.78	1.22	8	1.86	56.80	57.89	57.71	58.07	59.90	60.80	S2.14-S2.19
50	41	35.781	0.07	0.07	0.70	0.05	0.05	5.0	5.0	7.4	0.36	0.93	1.04	8	0.50	55.87	56.05	56.91	56.94	58.70	58.80	S2.1-S2.3
51	End	105.625	0.18	0.65	0.38	0.07	0.23	10.0	11.5	5.0	1.14	0.93	3.62	8	0.50	56.00	56.53	56.51	57.45	56.80	59.50	FES-S2.26
52	51	135.803	0.32	0.47	0.35	0.11	0.16	10.0	10.7	5.2	0.83	2.15	2.92	8	2.70	56.53	60.20	57.69	60.63	59.50	63.20	S2.26-S2.27
53	52	73.654	0.15	0.15	0.32	0.05	0.05	10.0	10.0	5.4	0.26	2.92	1.72	8	5.00	60.20	63.88	60.63	64.11	63.20	74.50	S2.27-S2.28
54	End	129.871	0.05	0.05	0.33	0.02	0.02	5.0	5.0	7.4	0.12	0.43	1.89	6	0.50	47.50	48.15	47.68	48.34	48.58	50.61	FES-S3.1

Project File: Storm.stm | Number of lines: 54 | Run Date: 11/1/2023

NOTES:Intensity = 37.58 / (Inlet time + 4.00) ^ 0.74; Return period =Yrs. 10 ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: Ex Storm.stm	Number of lines: 3	Date: 11/1/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	29.901	0.77	0.87	0.90	0.69	0.77	5.0	5.3	7.3	20.83	47.27	18.86	18	20.27	38.01	44.07	38.71	45.54	40.00	48.27	FES-EX CB1
2	1	73.945	0.05	0.10	0.75	0.04	0.08	5.0	5.1	7.4	15.80	14.40	8.94	18	1.88	44.07	45.46	45.57	47.24	48.27	49.46	EX CB1-EX CB2
3	2	71.282	0.05	0.05	0.87	0.04	0.04	5.0	5.0	7.4	15.52	10.55	8.79	18	1.01	45.56	46.28	48.49	50.04	49.46	52.27	EX CB 2-EX CB

Project File: Ex Storm.stm

Number of lines: 3

Run Date: 11/1/2023

NOTES:Intensity = 37.58 / (Inlet time + 4.00) ^ 0.74; Return period =Yrs. 10 ; c = cir e = ellip b = box

Project	NYE ROAD HOUSING AUTHORITY		**By**	JJD	**Date** 11/1/2023
Location	Glastonbury, CT		**Checked**	KMS	**Date** 11/1/2023

Outlet ID: **POND**

Outlet Protection Design - 2002 ConnDOT Drainage Manual

Table 11.11 Allowable Outlet Velocities for Type A and B Riprap Aprons

Outlet Velocity	Riprap Specification
0-8 FT/S	Modified
8-10 FT/S	Intermediate
10-14 FT/S	Standard

11.13.4 Tailwater Depth

TW < 0.5 Rp	Type A Riprap Apron
TW ≥ 0.5 Rp	Type B Riprap Apron
Well-Defined Channel	Type C Riprap Apron

Outlet Pipe Interior Diameter	Sp	15	in
Discharge at Outlet		1.39	cfs
Use Preformed Scour Hole		No	

Type A or B Riprap Apron - Tables 11.12.1 & 11.13.1 and Figure 11-13

Type of Apron Selected

Length of Apron	La	10.0	ft	Type A Riprap Apron - use Table 11.12.1, Type B or C Riprap Apron - use Table 11.13.1
Inlet Width of Apron	W1	3.8	ft	Type A: W1 = 3 Sp, Type B: W1 = 3 Sp
Outlet Width of Apron	W2	10.8	ft	Type A: W2 =3 Sp + 0.7 La, Type B: W2 = 3 Sp + 0.7 La
Type of Riprap		Modified		
Depth of Riprap	d	12	in	12" Modified, 18" Intermediate, or 36" Standard Riprap

Project	NYE ROAD HOUSING AUTHORITY		**By**	JJD	**Date** 11/1/2023
Location	Glastonbury, CT		**Checked**	KMS	**Date** 11/1/2023

Outlet ID: **S3.2**

Outlet Protection Design - 2002 ConnDOT Drainage Manual

Table 11.11 Allowable Outlet Velocities for Type A and B Riprap Aprons

Outlet Velocity	Riprap Specification
0-8 FT/S	Modified
8-10 FT/S	Intermediate
10-14 FT/S	Standard

11.13.4 Tailwater Depth	Type A Riprap Apron
TW < 0.5 Rp	Type B Riprap Apron
TW ≥ 0.5 Rp	Type C Riprap Apron
Well-Defined Channel	

	Sp	12	in	
Outlet Pipe Interior Diameter		0.12	cfs	
Discharge at Outlet		No		
Use Preformed Scour Hole				

Type A or B Riprap Apron - Tables 11.12.1 & 11.13.1 and Figure 11-13

Type of Apron Selected	La	10	ft	Type A Riprap Apron - use Table 11.12.1, Type B or C Riprap Apron - use Table 11.13.1
Length of Apron	W1	3	ft	Type A: W1 = 3 Sp, Type B: W1 = 3 Sp
Inlet Width of Apron	W2	10	ft	Type A: W2 =3 Sp + 0.7 La, Type B: W2 = 3 Sp + 0.7 La
Outlet Width of Apron		Modified		
Type of Riprap	d	12	in	12" Modified, 18" Intermediate, or 36" Standard Riprap
Depth of Riprap				

Project	NYE ROAD HOUSING AUTHORITY		**By**	JJD	**Date** 11/1/2023
Location	Glastonbury, CT		**Checked**	KMS	**Date** 11/1/2023

Outlet ID: **S2.26A**

Outlet Protection Design - 2002 ConnDOT Drainage Manual

Table 11.11 Allowable Outlet Velocities for Type A and B Riprap Aprons

Outlet Velocity	Riprap Specification
0-8 FT/S	Modified
8-10 FT/S	Intermediate
10-14 FT/S	Standard

11.13.4 Tailwater Depth

TW < 0.5 Rp	Type A Riprap Apron
TW ≥ 0.5 Rp	Type B Riprap Apron
Well-Defined Channel	Type C Riprap Apron

Outlet Pipe Interior Diameter	Sp	12	in
Discharge at Outlet		1.14	cfs
Use Preformed Scour Hole		No	

Type A or B Riprap Apron - Tables 11.12.1 & 11.13.1 and Figure 11-13

Type of Apron Selected

Length of Apron	La	10	ft	Type A Riprap Apron - use Table 11.12.1, Type B or C Riprap Apron - use Table 11.13.1
Inlet Width of Apron	W1	3	ft	Type A: W1 = 3 Sp, Type B: W1 = 3 Sp
Outlet Width of Apron	W2	10	ft	Type A: W2 =3 Sp + 0.7 La, Type B: W2 = 3 Sp + 0.7 La
Type of Riprap		Modified		
Depth of Riprap	d	12	in	12" Modified, 18" Intermediate, or 36" Standard Riprap

Project	NYE ROAD HOUSING AUTHORITY		**By**	JJD	**Date** 11/1/2023
Location	Glastonbury, CT		**Checked**	KMS	**Date** 11/1/2023

Outlet ID: **S2.31A**

Outlet Protection Design - 2002 ConnDOT Drainage Manual

Table 11.11 Allowable Outlet Velocities for Type A and B Riprap Aprons

Outlet Velocity	Riprap Specification
0-8 FT/S	Modified
8-10 FT/S	Intermediate
10-14 FT/S	Standard

11.13.4 Tailwater Depth

TW < 0.5 Rp	Type A Riprap Apron
TW ≥ 0.5 Rp	Type B Riprap Apron
Well-Defined Channel	Type C Riprap Apron

Outlet Pipe Interior Diameter	Sp	15	in
Discharge at Outlet		7.6	cfs
Use Preformed Scour Hole		Yes	

Scour Hole - Table 11.14.1 and Figure 11-15

Outlet Pipe Interior Diameter	Rp	15	in	
Depression of Scour Hole	F	7.5	in	Type 1: F = 0.5 Rp, Type 2: F= Rp
Length of Scour Hole	C	90	in	3 Sp + 6F
Inlet/Outlet Width of Scour Ho	B	75	in	2 Sp + 6F
Type of Riprap				
Depth of Riprap	d	12	in	12" Modified, 18" Intermediate, or 36" Standard Riprap

APPENDIX D

WATER QUALITY CALCULATIONS

Water Quality Computations
Glastonbury Housing Authority
Project # 70896.00

ID	Total Drainage Area (ac)	Directly Connected Impervious Area (ac)	Percent Impervious Cover, I	P (1.3" for water quality storm, in)	Volumetric Runoff Coefficient, R	Water Quality Volume, WQV (acre-ft)	Water Quality Volume, WQV (cubic-ft)	Provided WQV* (cubic-ft)
TOTAL SITE	8.85	2.77	31.28%	1.3	0.332	0.318	13,844	18,833
S1.0*	6.27	1.67	26.58%	1.3	0.289	0.197	8,564	n/a
S2.31*	3.01	1.19	39.33%	1.3	0.404	0.132	5,744	n/a

ID	P (1.3" for water quality storm, in)	NRCS Runoff Curve Number	Ia, (in, Table 4-1, TR-55)	Ia/P	Tc, (hr)	Peak unit discharge, qu, (csm/in, Exhibit 4-III, TR-55	Runoff Depth, Q (watershed inches)	Total WQF (cfs)	Treatment Unit	Provided WQF (cfs)
S1.0*	1.3	71	0.817	0.628	0.343	225	0.43	1.3	CDS 3020-6-C	2.0
S2.31*	1.3	66	1.030	0.792	0.265	200	0.53	0.5	CDS 2015-4-C	0.7

*CALCULATIONS INCLUDE OFFSITE CONTRIBUTING AREA. OFFSITE LAND COVER DETERMINED PER TOWN GIS.

***Provided Water Quality Volume Calculations**

Permeable Pavers

Surface Area [cf]	Base Reservoir Course Thickness [in]	Subbase Reservoir Course Thickness [in]	Stone Porosity	Storage Provided [cf]
33,177	6	8	40%	15,483

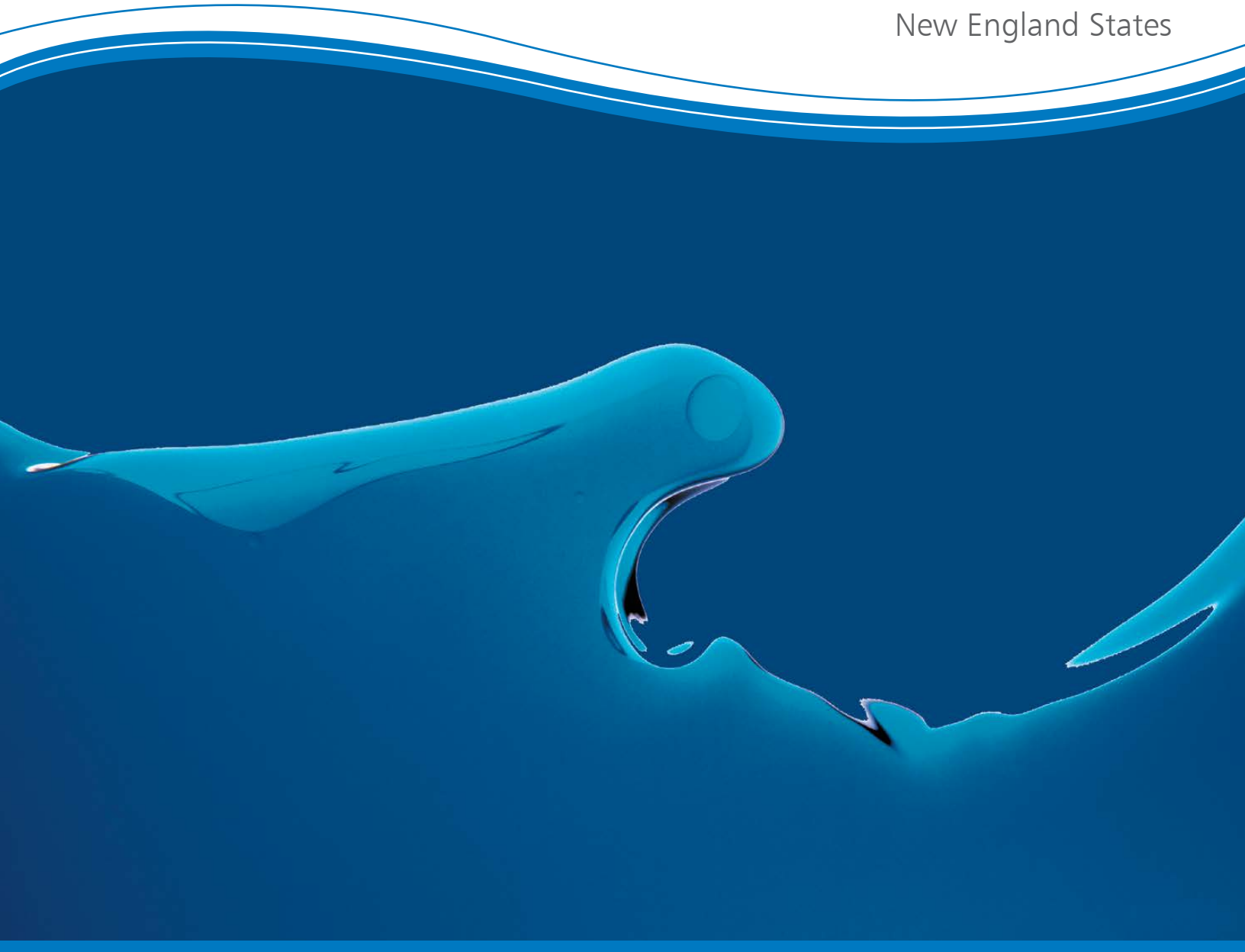
Stormwater Pond

Lowest Invert Elevation	Storage Provided [cf]
54.3	3,350

CONTECH®
ENGINEERED SOLUTIONS

Hydrodynamic Separation Products Overview

New England States



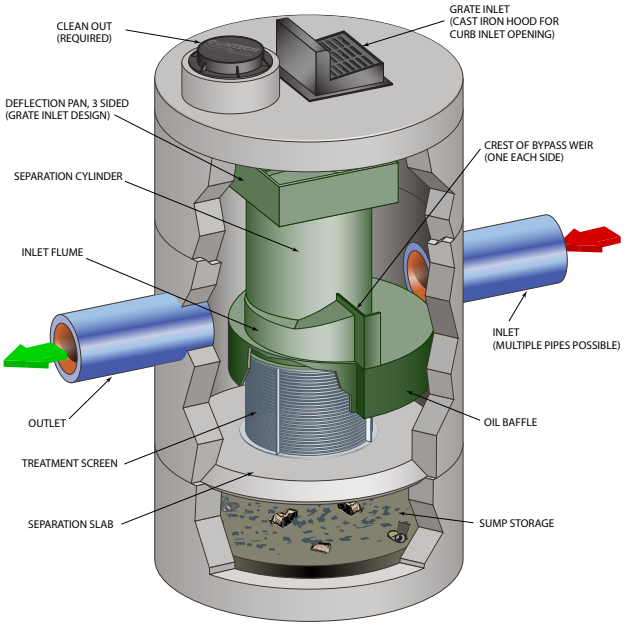
CDS®

Vortechs®

VortSentry® HS

Patented continuous deflection separation (CDS) technology

Using continuous deflective separation technology, the CDS system screens, separates and traps sediment, debris, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, and minimize the re-suspension and release of previously trapped pollutants. Available in precast or cast-in-place. Offline units can treat flows from 30 to 8500 L/s (1 to 300 cfs). Inline units can treat up to 170 L/s (7.5 cfs), and internally bypass larger flows in excess of 1420 L/s (50 cfs). The pollutant removal capability of the CDS system has been proven in the lab and field.



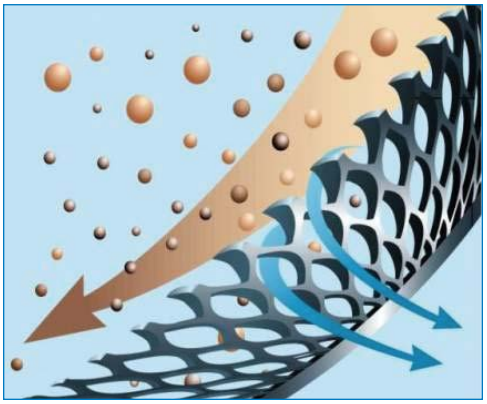
How does it work?

Stormwater enters the CDS unit's diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed. All flows up to the system's treatment design capacity enter the separation chamber.

Swirl concentration and screen deflection forces floatables and solids to the center of the separation chamber where 100% of floatables and neutrally buoyant debris larger than the screen apertures are trapped.

Stormwater then moves through the separation screen, under the oil baffle and exits the system. The separation screen remains clog free due to continuous deflection.

During flow events exceeding the design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants will not wash out.



CDS

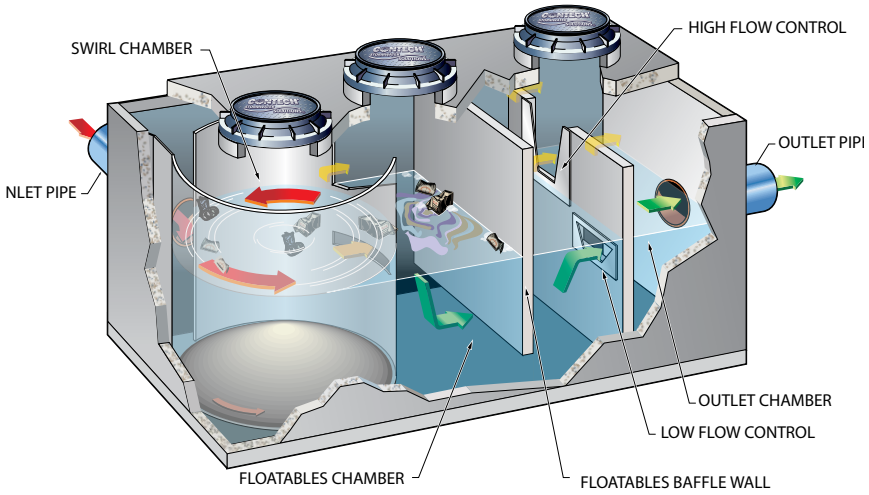
- Removes sediment, trash and free oil and grease
- Patented screening technology captures and retains 100% of floatables, including neutrally buoyant and all other material larger than the screen aperture
- Operation independent of flow
- Performance verified through lab and field testing
- Unobstructed maintenance access
- Customizable/flexible design and multiple configurations available
- Separates and confines pollutants from outlet flow
- Inline, offline, grate inlet and drop inlet configurations available
- Multiple screen aperture sizes available
- Allows for multiple inlet pipes

Vortechs®

High performance hydrodynamic separation

The Vortechs system is a high-performance hydrodynamic separator that effectively removes finer sediment, oil and grease, and floating and sinking debris. Its swirl concentrator and flow controls work together to minimize turbulence and provide stable storage of captured pollutants. The design also allows for easy inspection and unobstructed maintenance access. With comprehensive lab and field testing, the system delivers proven results and site-specific solutions.

Precast models can treat peak design flows up to 25 cfs; cast-in-place models handle even greater flows. A typical system is sized to provide an 80% load reduction based on laboratory-verified removal efficiencies for varying particle size distributions such as 50-micron sediment particles.



How does it work?

Water enters the swirl chamber at a tangent, inducing a gentle swirling flow pattern and enhancing gravitational separation. Sinking pollutants stay in the swirl chamber while floating pollutants are stopped at the baffle wall. Typically Vortechs systems are sized such that 80% or more of runoff through the system will be controlled exclusively by the low flow control. This orifice effectively reduces inflow velocity and turbulence by inducing a slight backwater appropriate to the site.

During larger storms, the water level rises above the low flow control and begins to flow through the high flow control. The layer of floating pollutants is elevated above the influent pipe, preventing re-entrainment. Swirling action increases in relation to the storm intensity, which helps prevent re-suspension. When the storm drain is flowing at peak capacity, the water surface in the system approaches the top of the high flow control. The Vortechs system will be sized large enough so that previously captured pollutants are retained in the system even during these infrequent events.

As a storm subsides, treated runoff decants out of the Vortechs system at a controlled rate, restoring the water level to a dry-weather level equal to the invert of the inlet and outlet pipes. The low water level facilitates easier inspection and cleaning, and significantly reduces maintenance costs by reducing pump-out volume.

Vortechs

- Proven performance speeds approval process
- Treats peak flows without bypassing
- Flow controls reduce inflow velocity and increase residence time
- Unobstructed access simplifies maintenance
- Shallow system profile makes installation easier and less expensive
- Very low headloss
- Flexible design fits multiple site constraints

Vortechs®

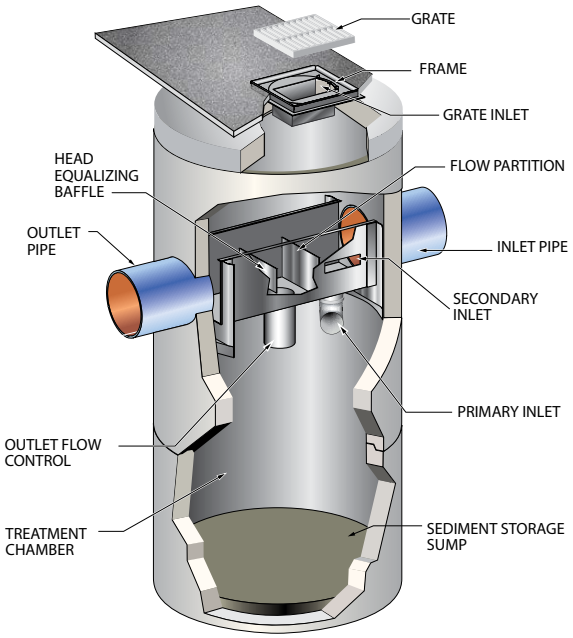
VortSentry® HS

Engineered performance and installation simplicity

The VortSentry HS system employs a helical flow pattern that enhances trapping and containment of pollutants and provides effective removal of settleable solids and floating contaminants from urban runoff.

With the ability to accept a wide range of pipe sizes, the VortSentry HS can treat and convey flows from small to large sites. A unique internal bypass design means higher flows can be diverted without the use of external bypass structures. The design of the VortSentry HS minimizes adverse velocities or turbulence in the treatment chamber. This helps to prevent the washout of previously captured pollutants even during peak conditions.

The VortSentry HS is also available in a grate inlet configuration, which is ideal for retrofits.



How does it work?

Flows from low intensity storms, which are most frequent, are directed into the treatment chamber through the primary inlet. The tangentially oriented downward pipe induces a swirling motion in the treatment chamber that increases capture and containment abilities. Moderate storm flows are directed into the treatment chamber through the secondary inlet, which allows for capture of floating trash and debris. The secondary inlet also provides for treatment of higher flows without significantly increasing the velocity or turbulence in the treatment chamber. This allows for a more quiescent separation environment. Settleable solids and floating pollutants are captured and contained in the treatment chamber.

Flow exits the treatment chamber through the outlet flow control, which manages the amount of flow that is treated and helps maintain the helical flow patterns developed within the treatment chamber.

Flows exceeding the system's rated treatment flow are diverted away from the treatment chamber by the flow partition. Internal diversion of high flows eliminates the need for external bypass structures. During bypass, the head equalizing baffle applies head on the outlet flow control to limit the flow through the treatment chamber. This helps prevent re-suspension of previously captured pollutants.

VortSentry HS

- Helical flow pattern enhances trapping and containment of pollutants
- High treatment and bypass capacities
- Compact footprint ideal for congested sites
- Lightweight design easy to install
- Available in both inline and grate inlet configurations
- Quick manufacturing turnaround time

Available Models

CDS Model	Treatment Capacity[3] (cfs)	Maximum Sediment Storage Capacity (CF)
1515	1.0	26
w/ 1' added sump	1.0	33
w/ 2' added sump	1.0	40
w/ 3' added sump	1.0	47
2015_4	1.4	50
w/ 1' added sump	1.4	63
w/ 2' added sump	1.4	75
w/ 3' added sump	1.4	88
2015	1.4	79
w/ 1' added sump	1.4	98
w/ 2' added sump	1.4	118
2020	2.2	90
w/ 1' added sump	2.2	110
w/ 2' added sump	2.2	129
2025	3.2	97
w/ 1' added sump	3.2	117
w/ 2' added sump	3.2	136
3020	3.9	134
w/ 1' added sump	3.9	163
w/ 2' added sump	3.9	191
3030	6.1	157
w/ 1' added sump	6.1	185
w/ 2' added sump	6.1	213
4030	7.9	329
w/ 1' added sump	7.9	379
w/ 2' added sump	7.9	429
4040	12.4	381
w/ 1' added sump	12.4	431
w/ 2' added sump	12.4	482

1. Structure diameter represents the typical inside dimension of the concrete structure. Offline systems will require additional concrete diversion components
2. Depth below pipe can vary to accommodate site specific design. Depth below pipe invert represents the depth from the pipe invert to the inside bottom of concrete structure.
3. Treatment Capacity is based on laboratory testing using OK-110 (average d50 particle size of approximately 100 microns) and a 2400 micron screen.

Sediment Depths Indicating Required Servicing*			
CDS Model	Standard Sediment Depth (in.)	w/ 1' added Sump Sediment Depth (in.)	w/ 2' added Sump Sediment Depth (in.)
1515	18	27	36
2015_4	18	30	42
2015	18	30	42
2020	18	30	42
2025	18	30	42
3020	18	30	42
3030	18	39	42
4030	27	39	51
4040	27	39	51

* Based on 75% capacity of isolated sump.

Available Models

Vortechs Model	Swirl Chamber Diameter		Internal Length		Peak Treatment Flow[1]		Sediment Storage[2]	
	ft	m	ft	m	cfs	L/s	yd3	m3
1000	3	0.9	9	2.7	1.6	45.3	0.7	0.5
2000	4	1.2	10	3	2.8	79.3	1.2	0.9
3000	5	1.5	11	3.4	4.5	127.4	1.8	1.4
4000	6	1.8	12	3.7	6	169.9	2.4	1.8
5000	7	2.1	13	4	8.5	240.7	3.2	2.4
7000	8	2.4	14	4.3	11	311.5	4	3.1
9000	9	2.7	15	4.6	14	396.4	4.8	3.7
11000	10	3	16	4.9	17.5	495.5	5.6	4.3
16000	12	3.7	18	5.5	25	707.9	7.1	5.4

1. Peak Treatment Flow is maximum flow treated for each unit listed. This flow represents an infrequent storm event such as a 10 or 25 yr storm. Standard Vortechs System depth below invert is 3' for all precast models. Cast-in-place system are available to treat higher flows. Check with your local representatives for specifications.
2. Maintenance recommended when sediment depth has accumulated to within 12-18 inches of the dry weather water surface elevation.

VortSentry HS Model	Treatment Capacity (cfs)[1]	Maximum Sediment Storage Capacity (CF)
VortSentry HS36*	0.55	39
w/ 1' added sump	0.55	47
w/ 2' added sump	0.55	54
w/ 3' added sump	0.55	61
w/ 4' added sump	0.55	68
w/ 5' added sump	0.55	75
VortSentry HS48**	1.2	85
w/ 1' added sump	1.2	97
w/ 2' added sump	1.2	110
w/ 3' added sump	1.2	123
w/ 4' added sump	1.2	135
VortSentry HS60***	2.2	156
w/ 1' added sump	2.2	176
w/ 2' added sump	2.2	196
w/ 3' added sump	2.2	215
VortSentry HS96*****	8.10	578

* Maintenance recommended when sediment reaches a height of 3'-7" below water surface elevation in sump.
** Maintenance recommended when sediment reaches a height of 4'-9" below water surface elevation in sump.
*** Maintenance recommended when sediment reaches a height of 6.0' below water surface elevation in sump.

Customer Support

Installation

Contech products are some of the easiest to install in the industry. We provide comprehensive installation drawings, details and instructions, as well as full technical support on every project.

Maintenance

Maintenance of Contech Stormwater Solutions products is cost effective, straightforward and efficient. We offer a complete range of engineering planning, design and drawing, and construction services that can be tailored to your specific site needs.

Inspection

Contech has created a network of Certified Maintenance Providers (CCMP's) to provide maintenance on your stormwater BMP's.

CCMP's agree to:

- Inspect and maintain systems in accordance to the manufacturer's specifications
- Provide maintenance only when necessary to avoid undue costs to system owners
- Utilize only OEM replacement cartridges
- Provide quality reports to system owners
- Allow Contech to audit maintenance events to ensure quality
- Maintain the highest level of service standards

Support

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our professional engineering staff engineers.

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800.338.1122
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Contech Engineered Solutions provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other Contech division offerings, visit ContechES.com or call 800.338.1122.

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

OPERATIONS AND MAINTENANCE GUIDELINES

CDS Stormwater Treatment Unit

INTRODUCTION

The CDS unit is an important and effective component of your storm water management program and proper operation and maintenance of the unit are essential to demonstrate your compliance with local, state and federal water pollution control requirements.

The CDS technology features a patented non-blocking, indirect screening technique developed in Australia to treat water runoff. The unit is highly effective in the capture of suspended solids, fine sands and larger particles. Because of its non-blocking screening capacity, the CDS unit is un-matched in its ability to capture and retain gross pollutants such as trash and debris. In short, CDS units capture a very wide range of organic and in-organic solids and pollutants that typically result in tons of captured solids each year such as: Total suspended solids (TSS) and other sedimentitious materials, oil and greases, trash, and other debris (including floatables, neutrally buoyant, and negatively buoyant debris). These pollutants will be captured even under very high flow rate conditions.

CDS units are equipped with conventional oil baffles to capture and retain oil and grease. Laboratory evaluations show that the CDS units are capable of capturing up to 70% of the free oil and grease from storm water. CDS units can also accommodate the addition of oil sorbents within their separation chambers. The addition of the oil sorbents can ensure the permanent removal of 80% to 90% of the free oil and grease from the storm water runoff.

OPERATIONS

The CDS unit is a non-mechanical self-operating system and will function any time there is flow in the storm drainage system. The unit will continue to effectively capture pollutants in flows up to the design capacity even during extreme rainfall events when the design capacity may be exceeded. Pollutants captured in the CDS unit's separation chamber and sump will be retained even when the units design capacity is exceeded.

CDS UNIT INSPECTION

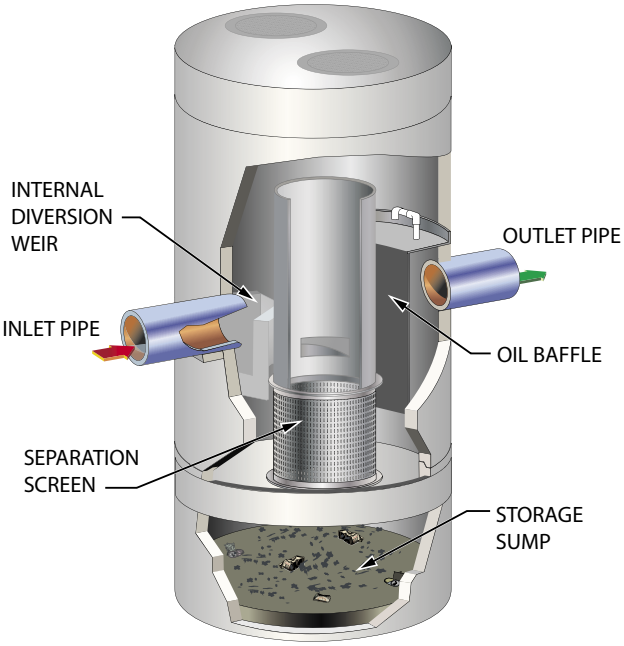
Access to the CDS unit is typically achieved through two manhole access covers – one allows inspection (and cleanout) of the separation chamber (screen/cylinder) & sump and another allows inspection (and cleanout) of sediment captured and retained behind the screen.

The unit should be periodically inspected to determine the amount of accumulated pollutants and to ensure that the cleanout frequency is adequate to handle the predicted pollutant load being processed by the CDS unit. The unit should be periodically inspected for indications of vector infestation, as well. The recommended cleanout of

CDS®

Patented continuous deflection separation (CDS) technology

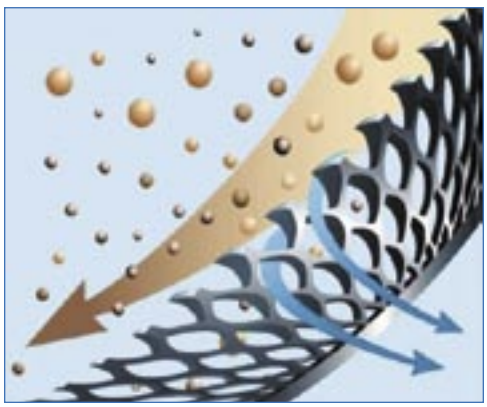
Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, and minimize the re-suspension and release of previously trapped pollutants. Available precast or cast-in-place, offline units can treat flows from 1 to 300 cfs. Inline units can treat up to 6 cfs, and internally bypass flows in excess of 50 cfs. The pollutant removal capability of the CDS system has been proven in the lab and field.



How does it work?

Stormwater enters the CDS unit's diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed. All flows up to the system's treatment design capacity enter the separation chamber.

Swirl concentration and screen deflection forces floatables and solids to the center of the separation chamber where 100% of floatables and neutrally buoyant debris larger than the screen apertures are trapped.



Stormwater then moves through the separation screen, under the oil baffle and exits the system. The separation screen remains clog free due to continuous deflection.

During flow events exceeding the design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants will not wash out.

CDS

- Removes sediment, trash, and free oil and grease
- Patented screening technology captures and retains 100% of floatables, including neutrally buoyant and all other material greater than the screen aperture
- Operation independent of flow
- Performance verified through lab and field testing
- Unobstructed maintenance access
- Customizable/flexible design and multiple configurations available
- Separates and confines pollutants from outlet flow
- Grate inlet available
- Multiple screen aperture sizes available

Available Models

Refer to the following tables for our standard models, sizes, and treatment capacities. Drawings and specifications are available at contechstormwater.com.

We encourage you to contact your local stormwater consultant for site-specific design assistance. In many cases our products can be customized to fit your particular project's needs.

Local regulations may impact design requirements.

	CDS Model	Structure Diameter[1]		Typical Depth Below Invert		Water Quality Flow[2] 125 μm		Screen Diameter/Height		Sump Storage	
		ft	m	ft	m	cfs	L/s	ft	m	yd^3	m^3
Inline	PMIU20_15	4	1.2	3.7	1.1	0.7	19.8	2.0/1.5	0.6/0.5	0.5	0.4
	PMIU20_15_4	4	1.2	3.5	1.1	0.7	19.8	2.0/1.5	0.6/0.5	0.5	0.4
	PMSU20_15	5	1.5	4.4	1.3	0.7	19.8	2.0/1.5	0.6/0.5	1.1	0.8
	PMSU20_20	5	1.5	5.0	1.5	1.1	31.1	2.0/2.0	0.6/0.6	1.1	0.8
	PMSU20_25	5	1.5	5.3	1.6	1.6	45.3	2.0/2.5	0.6/0.8	1.1	0.8
	PMSU30_20	6	1.8	5.5	1.7	2.0	56.6	3.0/2.0	0.9/0.6	2.1	1.6
	PMSU30_30	6	1.8	6.5	2.0	3.0	85.0	3.0/3.0	0.9/0.9	2.1	1.6
	PMSU40_30	8	2.4	7.8	2.4	4.5	127.4	4.0/3.0	1.2/0.9	5.6	4.3
	PMSU40_40	8	2.4	8.8	2.7	6.0	169.9	4.0/4.0	1.2/1.2	5.6	4.3
Offline	PSWC30_20	6	1.8	5.3	1.6	2.0	56.6	3.0/2.0	0.9/0.6	1.9	1.5
	PSW30_30	varies	varies	6.3	1.9	3.0	85.0	3.0/3.0	0.9/0.9	5.8	4.4
	PSWC30_30	6	1.8	6.3	1.9	3.0	85.0	3.0/3.0	0.9/0.9	2.1	1.6
	PSWC40_30	7	2.1	7.7	2.3	4.5	127.4	4.0/3.0	1.2/0.9	1.9	1.5
	PSWC40_40	7	2.1	8.8	2.7	6.0	169.9	4.0/4.0	1.2/1.2	1.9	1.5
	PSW50_42	varies	varies	8.8	2.7	9.0	254.9	5.0/4.2	1.5/1.3	1.9	1.5
	PSWC56_40	8	2.4	8.8	2.7	9.0	254.9	5.6/4.0	1.7/1.2	1.9	1.5
	PSW50_50	varies	varies	9.5	2.9	11.0	311.5	5.0/5.0	1.5/1.5	1.9	1.5
	PSWC56_53	8	2.4	10.1	3.1	14.0	396.4	5.6/5.3	1.7/1.6	1.9	1.5
	PSWC56_68	8	2.4	11.8	3.6	19.0	538.0	5.6/6.8	1.7/2.1	1.9	1.5
	PSWC56_78	8	2.4	12.8	3.9	25.0	707.9	5.6/7.8	1.7/2.4	1.9	1.5
	PSW70_70	varies	varies	13.0	4.0	26.0	736.2	7.0/7.0	2.1/2.1	3.9	3.0
	PSW100_60	varies	varies	11.0	3.4	30.0	849.5	10.0/6.0	3.0/1.8	6.9	5.3
	PSW100_80	varies	varies	13.0	4.0	50.0	1415.8	10.0/8.0	3.0/2.4	6.9	5.3
	PSW100_100	varies	varies	15.0	4.6	64.0	1812.3	10.0/10.0	3.0/3.0	6.9	5.3

1. Structure diameter represents the standard inside dimension of the concrete structure. Offline systems will require additional concrete diversion components.
2. Water Quality Flow is based on 80% removal of a particle size distribution with an average particle size of 125 microns. This flow also represents the maximum flow prior to which bypass occurs. Test results are based on use of a 2400 micron screen.

Cast-in-place system are available to treat higher flows. Check with your local representatives for specifications.

Notes:

Systems can be sized based on a water quality flow (e.g. 1 inch storm) or on a net annual basis depending on the local regulatory requirement.

When sizing based on a water quality storm, the required flow to be treated should be equal to or less than the listed water quality flow for the selected system. Systems sized based on a water quality storm are generally more conservatively sized.

Additional particle size distributions are available for sizing purposes upon request.

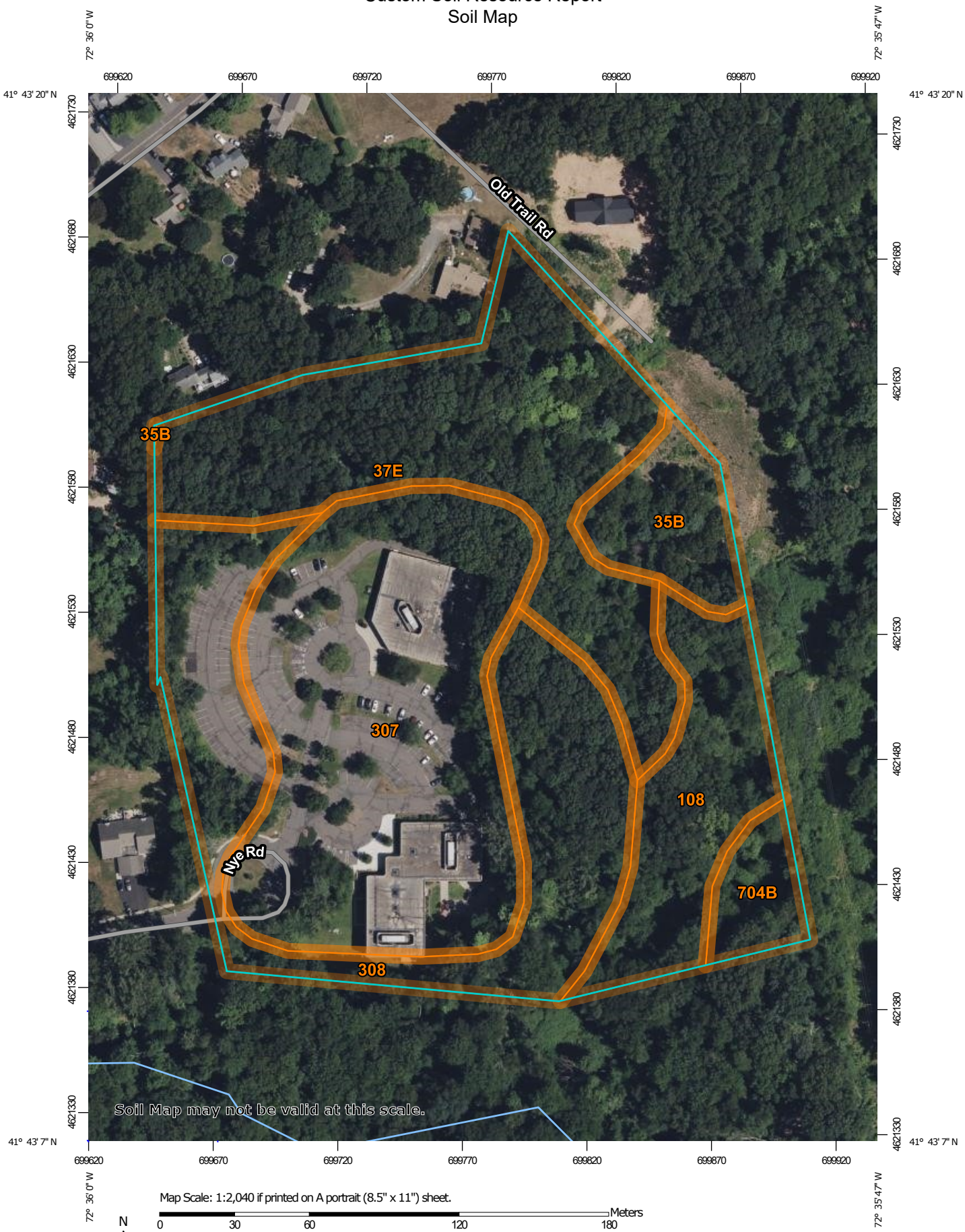
Depth below invert is measured to the inside bottom of the system. This depth can be adjusted to meet specific storage or maintenance requirements.

Contact our support staff for the most cost effective sizing for your area.

APPENDIX E

NRCS SOIL MAP

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,040 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

APPENDIX F

NOAA RAINFALL DATA

NOAA Atlas 14, Volume 10, Version 3
Location name: Glastonbury, Connecticut, USA*
Latitude: 41.7199°, Longitude: -72.599°
Elevation: 54 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.331** (0.263-0.415)	**0.404** (0.320-0.507)	**0.523** (0.413-0.658)	**0.621** (0.488-0.788)	**0.757** (0.573-1.01)	**0.859** (0.636-1.17)	**0.966** (0.693-1.37)	**1.09** (0.735-1.57)	**1.26** (0.817-1.90)	**1.40** (0.886-2.15)
10-min	**0.469** (0.372-0.588)	**0.572** (0.454-0.718)	**0.741** (0.585-0.932)	**0.881** (0.691-1.12)	**1.07** (0.812-1.42)	**1.22** (0.901-1.65)	**1.37** (0.982-1.94)	**1.54** (1.04-2.23)	**1.78** (1.16-2.68)	**1.98** (1.26-3.05)
15-min	**0.552** (0.438-0.691)	**0.673** (0.534-0.844)	**0.871** (0.688-1.10)	**1.04** (0.813-1.31)	**1.26** (0.956-1.68)	**1.43** (1.06-1.95)	**1.61** (1.16-2.28)	**1.81** (1.23-2.63)	**2.10** (1.36-3.16)	**2.33** (1.48-3.59)
30-min	**0.742** (0.589-0.930)	**0.905** (0.717-1.14)	**1.17** (0.925-1.47)	**1.39** (1.09-1.76)	**1.70** (1.28-2.25)	**1.93** (1.43-2.62)	**2.17** (1.55-3.06)	**2.44** (1.65-3.53)	**2.82** (1.83-4.24)	**3.14** (1.98-4.82)
60-min	**0.932** (0.740-1.17)	**1.14** (0.901-1.43)	**1.47** (1.16-1.85)	**1.75** (1.37-2.22)	**2.13** (1.62-2.83)	**2.42** (1.79-3.29)	**2.72** (1.95-3.85)	**3.06** (2.07-4.44)	**3.54** (2.30-5.33)	**3.94** (2.49-6.06)
2-hr	**1.22** (0.973-1.52)	**1.48** (1.18-1.84)	**1.90** (1.51-2.38)	**2.25** (1.78-2.83)	**2.73** (2.08-3.61)	**3.09** (2.31-4.19)	**3.47** (2.52-4.91)	**3.93** (2.67-5.66)	**4.60** (2.99-6.88)	**5.16** (3.28-7.89)
3-hr	**1.41** (1.13-1.75)	**1.70** (1.36-2.12)	**2.19** (1.74-2.73)	**2.59** (2.05-3.24)	**3.14** (2.41-4.14)	**3.55** (2.66-4.80)	**3.99** (2.91-5.64)	**4.52** (3.08-6.49)	**5.32** (3.47-7.93)	**6.00** (3.82-9.13)
6-hr	**1.76** (1.42-2.17)	**2.14** (1.72-2.63)	**2.74** (2.20-3.40)	**3.25** (2.59-4.05)	**3.95** (3.05-5.18)	**4.46** (3.37-6.01)	**5.02** (3.69-7.07)	**5.71** (3.90-8.14)	**6.75** (4.42-9.99)	**7.65** (4.88-11.6)
12-hr	**2.14** (1.74-2.62)	**2.61** (2.12-3.20)	**3.38** (2.73-4.16)	**4.02** (3.23-4.98)	**4.90** (3.80-6.40)	**5.55** (4.22-7.43)	**6.26** (4.62-8.76)	**7.13** (4.89-10.1)	**8.46** (5.56-12.4)	**9.62** (6.15-14.4)
24-hr	**2.49** (2.04-3.03)	**3.09** (2.52-3.76)	**4.06** (3.30-4.96)	**4.86** (3.93-5.98)	**5.97** (4.67-7.76)	**6.79** (5.19-9.06)	**7.68** (5.72-10.8)	**8.81** (6.06-12.4)	**10.6** (6.98-15.5)	**12.2** (7.80-18.1)
2-day	**2.84** (2.33-3.43)	**3.57** (2.93-4.32)	**4.76** (3.90-5.79)	**5.76** (4.68-7.03)	**7.12** (5.61-9.24)	**8.12** (6.27-10.8)	**9.23** (6.96-13.0)	**10.7** (7.38-15.0)	**13.1** (8.65-19.0)	**15.3** (9.82-22.6)
3-day	**3.09** (2.55-3.72)	**3.89** (3.21-4.69)	**5.21** (4.28-6.30)	**6.30** (5.14-7.67)	**7.80** (6.17-10.1)	**8.89** (6.90-11.8)	**10.1** (7.67-14.2)	**11.8** (8.13-16.4)	**14.5** (9.57-20.9)	**16.9** (10.9-24.9)
4-day	**3.30** (2.74-3.96)	**4.16** (3.44-5.00)	**5.55** (4.58-6.70)	**6.71** (5.49-8.15)	**8.31** (6.59-10.7)	**9.46** (7.36-12.6)	**10.8** (8.18-15.1)	**12.5** (8.66-17.4)	**15.4** (10.2-22.2)	**18.0** (11.6-26.4)
7-day	**3.88** (3.23-4.63)	**4.82** (4.01-5.77)	**6.37** (5.28-7.65)	**7.66** (6.30-9.25)	**9.43** (7.50-12.1)	**10.7** (8.36-14.1)	**12.2** (9.24-16.8)	**14.1** (9.77-19.4)	**17.1** (11.4-24.6)	**19.9** (12.9-29.0)
10-day	**4.47** (3.74-5.32)	**5.46** (4.56-6.51)	**7.09** (5.90-8.48)	**8.45** (6.97-10.2)	**10.3** (8.22-13.1)	**11.7** (9.10-15.2)	**13.2** (9.99-18.1)	**15.1** (10.5-20.8)	**18.2** (12.1-26.0)	**20.9** (13.6-30.5)
20-day	**6.42** (5.40-7.59)	**7.47** (6.28-8.85)	**9.20** (7.70-10.9)	**10.6** (8.83-12.7)	**12.6** (10.1-15.8)	**14.1** (11.0-18.1)	**15.6** (11.8-20.9)	**17.5** (12.3-23.9)	**20.3** (13.6-28.7)	**22.7** (14.8-32.8)
30-day	**8.10** (6.85-9.54)	**9.19** (7.75-10.8)	**11.0** (9.21-13.0)	**12.4** (10.4-14.8)	**14.5** (11.6-18.0)	**16.0** (12.5-20.3)	**17.6** (13.2-23.2)	**19.3** (13.6-26.2)	**21.9** (14.7-30.8)	**23.9** (15.6-34.4)
45-day	**10.2** (8.67-12.0)	**11.3** (9.61-13.3)	**13.2** (11.1-15.5)	**14.7** (12.3-17.4)	**16.8** (13.5-20.7)	**18.4** (14.4-23.2)	**20.0** (15.0-26.1)	**21.7** (15.4-29.3)	**23.9** (16.1-33.4)	**25.5** (16.7-36.6)
60-day	**12.0** (10.2-14.0)	**13.2** (11.2-15.4)	**15.1** (12.8-17.7)	**16.7** (14.0-19.7)	**18.8** (15.1-23.1)	**20.5** (16.0-25.7)	**22.2** (16.5-28.6)	**23.8** (16.9-31.9)	**25.7** (17.4-35.9)	**27.1** (17.7-38.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

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NOAA Atlas 14, Volume 10, Version 3
Location name: Glastonbury, Connecticut, USA*
Latitude: 41.7199°, Longitude: -72.599°
Elevation: 54 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	3.97 (3.16-4.98)	4.85 (3.84-6.08)	6.28 (4.96-7.90)	7.45 (5.86-9.46)	9.08 (6.88-12.1)	10.3 (7.63-14.0)	11.6 (8.32-16.4)	13.0 (8.82-18.9)	15.1 (9.80-22.7)	16.8 (10.6-25.8)
10-min	2.81 (2.23-3.53)	3.43 (2.72-4.31)	4.45 (3.51-5.59)	5.29 (4.15-6.70)	6.44 (4.87-8.55)	7.31 (5.41-9.92)	8.21 (5.89-11.6)	9.23 (6.25-13.4)	10.7 (6.94-16.1)	11.9 (7.53-18.3)
15-min	2.21 (1.75-2.76)	2.69 (2.14-3.38)	3.48 (2.75-4.39)	4.14 (3.25-5.24)	5.05 (3.82-6.70)	5.73 (4.24-7.79)	6.44 (4.62-9.11)	7.24 (4.90-10.5)	8.39 (5.45-12.6)	9.33 (5.90-14.3)
30-min	1.48 (1.18-1.86)	1.81 (1.43-2.27)	2.34 (1.85-2.95)	2.79 (2.19-3.53)	3.39 (2.57-4.51)	3.85 (2.85-5.24)	4.33 (3.11-6.12)	4.87 (3.30-7.06)	5.64 (3.66-8.49)	6.27 (3.97-9.65)
60-min	0.932 (0.740-1.17)	1.14 (0.901-1.43)	1.47 (1.16-1.85)	1.75 (1.37-2.22)	2.13 (1.62-2.83)	2.42 (1.79-3.29)	2.72 (1.95-3.85)	3.06 (2.07-4.44)	3.54 (2.30-5.33)	3.94 (2.49-6.06)
2-hr	0.609 (0.486-0.758)	0.738 (0.589-0.920)	0.949 (0.754-1.19)	1.12 (0.888-1.42)	1.36 (1.04-1.81)	1.54 (1.15-2.09)	1.74 (1.26-2.46)	1.96 (1.33-2.83)	2.30 (1.50-3.44)	2.58 (1.64-3.94)
3-hr	0.468 (0.375-0.581)	0.567 (0.454-0.704)	0.728 (0.581-0.908)	0.861 (0.683-1.08)	1.04 (0.801-1.38)	1.18 (0.886-1.60)	1.33 (0.968-1.88)	1.50 (1.02-2.16)	1.77 (1.16-2.64)	2.00 (1.27-3.04)
6-hr	0.294 (0.237-0.362)	0.356 (0.287-0.439)	0.458 (0.367-0.567)	0.543 (0.433-0.676)	0.659 (0.508-0.865)	0.745 (0.563-1.00)	0.839 (0.615-1.18)	0.953 (0.650-1.36)	1.13 (0.737-1.67)	1.28 (0.815-1.93)
12-hr	0.177 (0.144-0.217)	0.216 (0.175-0.265)	0.280 (0.226-0.345)	0.333 (0.267-0.412)	0.406 (0.315-0.530)	0.460 (0.349-0.616)	0.519 (0.383-0.727)	0.591 (0.405-0.838)	0.702 (0.461-1.03)	0.798 (0.510-1.20)
24-hr	0.103 (0.084-0.126)	0.128 (0.105-0.156)	0.169 (0.137-0.206)	0.202 (0.163-0.249)	0.248 (0.194-0.323)	0.282 (0.216-0.377)	0.320 (0.238-0.447)	0.367 (0.252-0.517)	0.441 (0.290-0.644)	0.506 (0.324-0.754)
2-day	0.059 (0.048-0.071)	0.074 (0.061-0.089)	0.099 (0.081-0.120)	0.119 (0.097-0.146)	0.148 (0.116-0.192)	0.169 (0.130-0.225)	0.192 (0.144-0.269)	0.222 (0.153-0.312)	0.273 (0.180-0.396)	0.317 (0.204-0.470)
3-day	0.042 (0.035-0.051)	0.054 (0.044-0.065)	0.072 (0.059-0.087)	0.087 (0.071-0.106)	0.108 (0.085-0.140)	0.123 (0.095-0.164)	0.140 (0.106-0.197)	0.163 (0.112-0.227)	0.201 (0.132-0.290)	0.234 (0.151-0.345)
4-day	0.034 (0.028-0.041)	0.043 (0.035-0.052)	0.057 (0.047-0.069)	0.069 (0.057-0.084)	0.086 (0.068-0.111)	0.098 (0.076-0.130)	0.112 (0.085-0.156)	0.130 (0.090-0.181)	0.160 (0.106-0.231)	0.187 (0.120-0.275)
7-day	0.023 (0.019-0.027)	0.028 (0.023-0.034)	0.037 (0.031-0.045)	0.045 (0.037-0.055)	0.056 (0.044-0.071)	0.063 (0.049-0.083)	0.072 (0.054-0.100)	0.083 (0.058-0.115)	0.102 (0.067-0.146)	0.118 (0.076-0.172)
10-day	0.018 (0.015-0.022)	0.022 (0.019-0.027)	0.029 (0.024-0.035)	0.035 (0.029-0.042)	0.042 (0.034-0.054)	0.048 (0.037-0.063)	0.054 (0.041-0.075)	0.062 (0.043-0.086)	0.075 (0.050-0.108)	0.087 (0.056-0.126)
20-day	0.013 (0.011-0.015)	0.015 (0.013-0.018)	0.019 (0.016-0.022)	0.022 (0.018-0.026)	0.026 (0.020-0.032)	0.029 (0.022-0.037)	0.032 (0.024-0.043)	0.036 (0.025-0.049)	0.042 (0.028-0.059)	0.047 (0.030-0.068)
30-day	0.011 (0.009-0.013)	0.012 (0.010-0.015)	0.015 (0.012-0.018)	0.017 (0.014-0.020)	0.020 (0.016-0.024)	0.022 (0.017-0.028)	0.024 (0.018-0.032)	0.026 (0.018-0.036)	0.030 (0.020-0.042)	0.033 (0.021-0.047)
45-day	0.009 (0.008-0.011)	0.010 (0.008-0.012)	0.012 (0.010-0.014)	0.013 (0.011-0.016)	0.015 (0.012-0.019)	0.017 (0.013-0.021)	0.018 (0.013-0.024)	0.020 (0.014-0.027)	0.022 (0.014-0.030)	0.023 (0.015-0.033)
60-day	0.008 (0.007-0.009)	0.009 (0.007-0.010)	0.010 (0.008-0.012)	0.011 (0.009-0.013)	0.013 (0.010-0.016)	0.014 (0.011-0.017)	0.015 (0.011-0.019)	0.016 (0.011-0.022)	0.017 (0.012-0.024)	0.018 (0.012-0.026)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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