Project Address:	41 North Main Street Sherborn, MA 01770
Date Prepared:	December 6, 2024
Date Revised:	January 28, 2025
Project Number:	23048
Prepared for:	Barsky Estate Realty Trust 23 Hunting Lane Sherborn, MA 01770
Prepared by:	**Highpoint Engineering Inc.** Dedham Executive Center 980 Washington Street, Suite 216 Dedham, MA 02026 www.highpointeng.com

INTRODUCTION

This analysis summarizes pre- and post-development stormwater impacts associated with the construction of a new multi-family residential development (the Project) located at 41 North Main Street and 6 Powderhouse Lane (the Subject Property) in Sherborn, Massachusetts. The Subject Property is shown on the Town of Sherborn Assessors' Map 11 as Parcel 0-41 and Map 11 as Parcel 0-43.

The land area of the Subject Property is approximately 7.24± acres. The Subject Property is located within Residence A (RA) and Business G (BG) Zoning Districts. The Subject Property is bounded by Hunting Lane to the north, North Main Street to the east, and abutting residential properties to the south and west. The Subject Property is currently accessed via four curb cuts, two off North Main Street, one off Hunting Lane, and one off Powderhouse Lane.

The Subject Property currently supports two dwellings, a barn, and a garage with a small parking lot and associated utilities.

Runoff from ground surfaces of the developed portion of the Subject Property flows in a predominantly westerly direction over land off property to an existing culvert that runs underneath Hunting Lane. Stormwater also flows in an east direction towards North Main Street where it enters the municipal drainage system. There are Bordering Vegetative Wetland areas located to the west of the site (offsite).

Work associated with the Project includes:

- Construction of (5) five duplex homes and (6) six triplex homes.
- Construction of landscape and hardscape improvements.
- Construction of stormwater management improvements, including catch basins, drain manholes, water quality units, surface infiltration basin, sediment forebays, and an underground detention system.
- Construction of utility infrastructure improvements, including new domestic water, new fire service, sewer, electrical/telecommunications to all proposed dwellings.

Disclaimer: This is a limited design and analysis intended solely to address state stormwater regulations related to functionality and compliance. The information provided is sufficient to evaluate the viability of the project's stormwater management design intent and strategy. We acknowledge that additional design and analysis will be required before final approval.

Massachusetts Stormwater Standards

STANDARD 1:

No New Untreated Discharges

All existing discharge points are maintained, and mitigation is proposed to treat discharge impacts at existing points as feasible.

STANDARD 2:

Peak Rate Attenuation

The increase in impervious areas due to the new development is mitigated via the implementation of a subsurface detention system, (3) three forebays, and a surface infiltration basin. Supplemental data can be seen below explaining how this is accomplished. The hydrologic model, analysis, and proposed mitigation measures have been developed using, Hydrologic modeling techniques and methods established in NRCS - Technical Releases No. 20 and No. 55 (TR-20 and TR-55) using proprietary HydroCAD stormwater modeling software and Massachusetts Department of Environmental Protection – Stormwater Handbook Volumes #1, #2, and #3 (as amended).

Rainfall Data

Peak stormwater discharge discharges rates have been determined for total rainfall estimated for the 2, 10, 25, and 100-year storm event recurrence intervals. For this analysis, the values used for the 24-year rainfall calculations were taken from the latest NOAA Atlas 14, Volume 10, Version 3 data for the subject property, and are outlined in Table 1 below.

Table 1. – Summary of Rainfall Data

Reference	Rainfall Recurrence Interval	24 Hour Rainfall Depth
NOAA Atlas 14 Volume 10 Version 3	2-Year Storm	3.35 inches
	10-Year Storm	5.24 inches
	25-Year Storm	6.42 inches
	100-Year Storm	8.23 inches

Table 2. – Summary of USDA Soil Classification

Soil Classification	Hydrologic Soil Group (HSG)
103D – Charlton-Hollis-Rock Outcrop Complex, 15 to 25 percent slopes	HSG A/D (Assumed B)
307B – Paxton Fine Sandy Loam, 0 to 8 percent slopes	HSG C
260B – Sudbury Fine Sandy Loam, 3 to 8 percent slopes	HSG B
626B – Merrimac-Urban Land Complex, 0 to 8 percent slopes	HSG A/D (Assumed A)
254A – Merrimac Fine Sandy Loam, 0 to 3 percent slopes	HSG A

Subsurface investigations comprising of 6 test pits were conducted within the proposed subsurface and both surface infiltration/detention basin and underground detention system by Highpoint Engineering, Inc. on November 20th, 2024. An infiltration rate of 1.02 is used based on test pit results.

Groundwater was only observed in 4 of the 6 test pits that were conducted. Groundwater depth ranges from 6.67’ to 9’ below existing grade. The proposed stormwater management systems intended for infiltration are designed with bottom depths at least 4 feet above the seasonal high groundwater (SHGW).

Table 3. – Summary of Pre- and Post-Development Peak Rates of Runoff

Design Storm	**POA 1: Hunting Lane**		
	Pre-Dev	**Post-Dev**	**Change**
2 Year	2.60 cfs	1.29 cfs	-1.31 cfs
10 Year	7.86 cfs	2.96 cfs	-4.93 cfs
25 Year	11.72 cfs	7.88 cfs	-3.84 cfs
100 Year	18.09 cfs	17.07 cfs	-1.02 cfs
Design Storm	**POA 2: North Main Street**		
	Pre-Dev	**Post-Dev**	**Change**
2 Year	1.22 cfs	0.75 cfs	-0.47 cfs
10 Year	3.23 cfs	1.79 cfs	-1.44 cfs
25 Year	4.64 cfs	2.50 cfs	-2.14 cfs
100 Year	6.92 cfs	3.63 cfs	-3.29 cfs
Design Storm	**POA 3: 33 North Main Steet**		
	Pre-Dev	**Post-Dev**	**Change**
2 Year	0.25 cfs	0.03 cfs	-0.22 cfs
10 Year	0.97 cfs	0.37 cfs	-0.60 cfs
25 Year	1.50 cfs	0.71 cfs	-0.79 cfs
100 Year	2.41 cfs	1.32 cfs	-1.09 cfs

STANDARD 3:

Recharge

The required recharge volume for "B" soils is provided within the detention/infiltration basin below the lowest outlet invert elevation. Recharge volume calculations can be seen below.

The surface infiltration/detention system is proposed to completely drain within 72 hours. These calculations can be seen below.

Groundwater Recharge Calculations:

Review of the United States Department of Agricultural (USDA) Natural Resources Conservation Service (NRCS) indicates that the parent soils within the limit of Watersheds comprise of Hydrologic Soil Group A, B & C.

The Massachusetts Stormwater Handbook determines the required recharge volume using a calculation of 0.60 inches of runoff for "A" soils, 0.35 inches of runoff for "B" soils, and 0.25 inches of runoff for "C" soils multiplied by the total contributing impervious cover of the watersheds. Watershed PR WS-1A comprises of landscape/lawn areas, rooftop and pavement. Runoff from the watersheds flow to the surface infiltration/detention basin (IB-1) prior to discharging off-site.

A design infiltration rate of 1.02 inches per hour was conservatively used for the analysis based on the results of on-site soil testing performed on November 20th, 2024.

Mass DEP Requirement

Required Recharge Volume = 0.60 inches x Total Impervious Area for "A" soils
= 0.60 inches x 13,516ft² x (1/12 in/ft) = 676 ft³

Required Recharge Volume = 0.35 inches x Total Impervious Area for "B" soils
= 0.35 inches x 70,935 ft² x (1/12 in/ft) = 2,069 ft³

Required Recharge Volume = 0.25 inches x Total Impervious Area for "C" soils
= 0.25 inches x 33,300 ft² x (1/12 in/ft) = 694 ft³

Total Required Recharge Volume for Overall Project = 3,439 ft³

Recharge to Groundwater Provided

Volume Provided in IB-1 (Below elevation 173.00 ft) =9,794 ft³

Percent of Impervious Area Captured by Infiltration Basin (IB-1) = 74.3%

74.3% is equal to or greater than the required 65% min. target per SWMP

The total recharge volume provided exceeds the minimum recharge requirement for all soils.

Total Recharge Volume Provided **9,794 ft³ > 3,439 ft³**

Drawdown Calculations:

Drawdown Time:		T	= V / (K*A)
	where	T	= drawdown time (hours)
		V	= volume below lowest outlet (ft^3)
		K	= hydraulic conductivity (ft/hr)
			= ([1.02 in/hr) * (1 ft/12 in)
			= 0.085 ft/hr
		A	= bottom area of infiltration system (ft^2)
[Surface Infiltration Basin IB-1]:		V	= 9,794 ft^3
		K	= 0.085 ft/hr
		A	= 1,749 ft^2
		T	= (9,794 ft^3) / (0.201 ft/hr) (1,749 ft^2)
			= 65.9 **hours** < 72 hours

STANDARD 4:

Water Quality

A Long-Term Pollution Prevention Plan is attached and submitted with these documents, but a final revision will be made for full stormwater design once a site plan review application is submitted.

Contech CDS proprietary hydrodynamic separator and infiltration BMP treatment trains have been sized to treat the full water quality and are designed to achieve 80% overall TSS removal. The 0.5" water quality volume is being used. Water quality calculations below can be seen below.

Water Quality Volume Calculations:

This analysis is to evaluate water quality volume criteria according to "Volume 1 Chapter 1: Stormwater Management Standards." The Project comprises of a surface infiltration basin to provide water quality for the new development.

Water Quality Volume Required:

(Watershed 1A)

Paved Impervious Area	= 58,684 ft^2
Water Quality Volume Requirement	= 0.5 inch over total impervious area
	= 58,684 ft^2 x ([0.5]/12)
	= **[2,445]** ft^3

(Watershed 1B)

Paved Impervious Area	= 10,733 ft^2
Water Quality Volume Requirement	= 0.5 inch over total impervious area
	= 10,733 ft^2 x ([0.5]/12)
	= **[447]** ft^3

(Watershed 1C)

Paved Impervious Area	= 3,231 ft^2
Water Quality Volume Requirement	= 0.5 inch over total impervious area
	= 3,231 ft^2 x ([0.5]/12)
	= **[135]** ft^3

(Watershed 1D)

Paved Impervious Area	= 28,796 ft^2
Water Quality Volume Requirement	= 0.5 inch over total impervious area
	= 28,796 ft^2 x ([0.5]/12)
	= **[1,200]** ft^3

(Watershed 1E)

Paved Impervious Area	= 14,680 ft^2
Water Quality Volume Requirement	= 0.5 inch over total impervious area
	= 14,680 ft^2 x ([0.5]/12)
	= **[612]** ft^3

Water Quality Volume Provided in Infiltration BMPs:
(Watershed 1A, 1B, 1C, 1D, 1E)

[IB-1]: [Surface Infiltration Basin]

= Volume below elevation [173.00]'
= [9,794] ft^3 [FROM HYDROCAD]

Total Volume Provided in Infiltration Basin (IB-1) = [9,794] ft^3

= **[9,794] ft^3 > [4,839] ft^3**

TSS Removal:

Treatment Train 1

Location: Drainage Run 1

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Sediment Forebay	0.25	1.00	0.25	0.75
Sediment Forebay	0.25	0.75	0.19	0.56
	0.00	0.56	0.00	0.56
	0.00	0.56	0.00	0.56
	0.00	0.56	0.00	0.56

Total TSS Removal = 44%

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

Project: 41 North Main Street
Prepared By: Danell Baptiste
Date: 1/23/2025

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

Treatment Train 2

Location: Drainage Run 2

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Infiltration Basin	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

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

Project: 41 North Main Street
Prepared By: Danell Baptiste
Date: 1/23/2025

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

Treatment Train 3

TSS Removal Calculation Worksheet

Location: Drainage Run 3

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Infiltration Basin	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

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

Project: 41 North Main Street
Prepared By: Danell Baptiste
Date: 1/23/2025

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

Treatment Train 4

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

Version 1, Automated: Mar. 4, 2008

TSS Removal Calculation Worksheet

Location: Drainage Run 4

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Proprietary Treatment Practice	0.91	0.75	0.68	0.07
	0.00	0.07	0.00	0.07
	0.00	0.07	0.00	0.07
	0.00	0.07	0.00	0.07

Total TSS Removal = 93%

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

Project: 41 North Main Street
Prepared By: Danell Baptiste
Date: 1/23/2025

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

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

Mass. Dept. of Environmental Protection

Adjusted TSS Removal Efficiency Table

POA-1				
Watershed #	Impervious Area	Treatment Train #	Removal Eff.	Weighted TSS Removal Area
WS-1A	58,684 SF	2	85.00%	49,881 SF
WS-1B	10,733 SF	1	44.00%	4,723 SF
WS-1D	28,796 SF	3	85.00%	24,477 SF
WS-1E	14,680 SF	4	93.00%	13,652 SF
Total Area	112,893 SF	-	-	92,733 SF
TSS Weighted Avg.	**82.1%**	-	-	-

Note:
Watershed WS-1C was not added to this calculation due to the fact there are no hardscape features requiring treatment.

STANDARD 5:

Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

The proposed project is not a listed activity associated with a LUHPPL defined in the Handbook.

STANDARD 6:

Critical Areas

The site is assumed to not discharge to a Critical Area.

STANDARD 7:

Redevelopments and Other Projects Subject to the Standards only to the Maximum Extent Practicable

The proposed project is considered a new development. Stormwater management facilities and BMP designs are completed in full compliance with the Massachusetts Stormwater Management Standards in accordance with DEP guidance.

STANDARD 8:

Construction Period Pollution Prevention and Erosion and Sedimentation Control

This project will be covered by a NPDES Construction General Permit and a SWPPP, but will be submitted with the final stormwater report and a hard copy shall be left on site throughout the duration of construction.

STANDARD 9:

Operation and Maintenance Plan

A Post Construction Operation and Maintenance Plan is attached and submitted with these documents, and a finalized version will be provided once a site plan review application is submitted.

STANDARD 10:

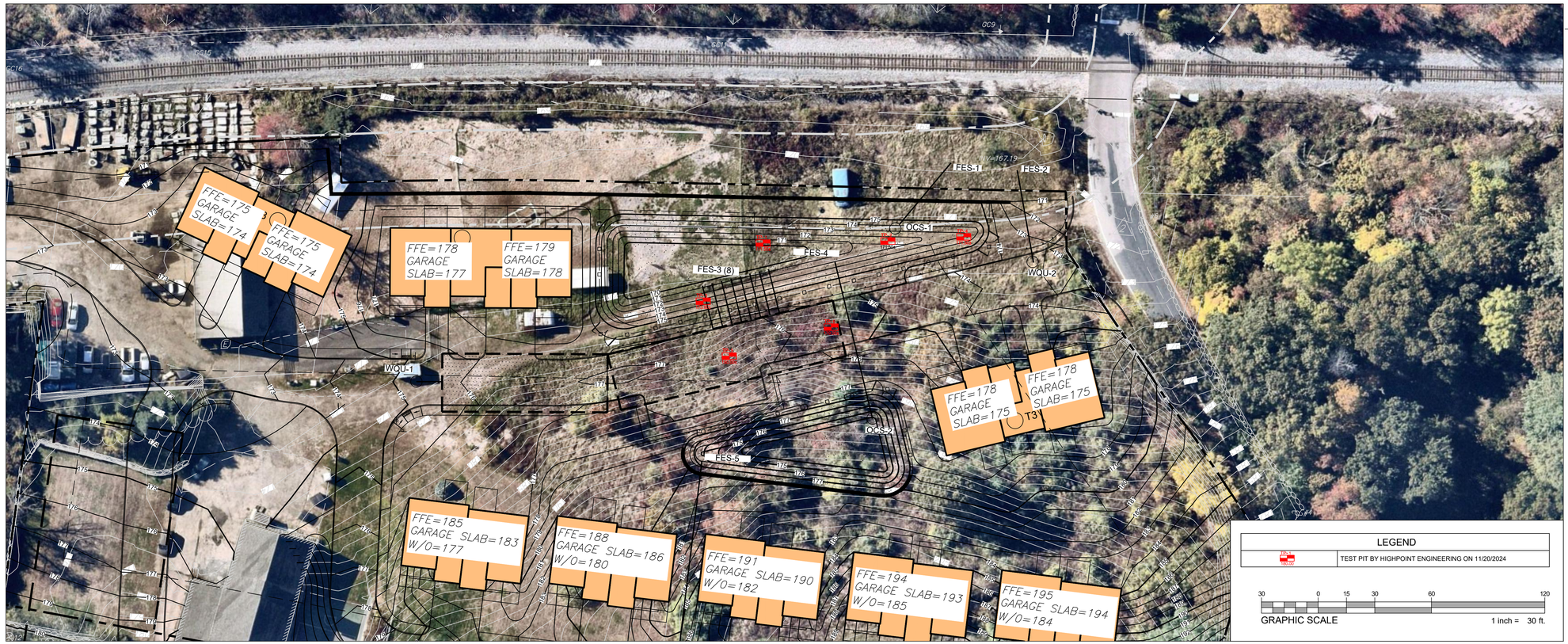
Prohibition of Illicit Discharges

An illicit discharge compliance state is attached and submitted with these documents, and a finalized version will be provided once a site plan review application is submitted.

CONCLUSION

The proposed residential development meets the minimum standards outlined in MassDEP stormwater requirements. Post-construction stormwater flows have been strategically designed to ensure that offsite discharge flow rates do not exceed preconstruction flow rates. The proposed stormwater management system addresses water quality, stormwater recharge, and flow attenuation through the implementation of infiltration/detention infrastructure and proprietary water quality units. These systems are designed to treat all impervious areas while reducing the overall volume of uncontrolled stormwater discharged offsite.

TEST PITS MAP



DEEP OBSERVATION HOLE LOG

DEEP OBSERVATION HOLE NUMBER:					TP-1	GROUND ELEVATION:					171.50±
Depth (in)	Horizon/ Layer	Matrix: Color-Moist	Redoximorphic Features			Texture (USDA)	Coarse Fragments (Percent by Volume)		Structure	Consistence (Moist)	Other
			Depth (in)	Color	Percent		Gravel	Cobbles & Stones			
0-15	Ap	10YR 3/2	N/A	N/A	N/A	SANDY LOAM	0	10-15	MASSIVE	FRIABLE	(1)
15-40	Bw	10YR 4/6	N/A	N/A	N/A	FINE SANE	0	0	SINGLE GRAIN	LOOSE	N/A
40-98	C	10YR 5/4	98	5YR 5/8 MAN	>25	SANDY LOAM	20-30	20-30	MASSIVE	FRIABLE	(2)

NOTES:
1. LARGE ROCKS EMBEDDED AT SURFACE.
2. REDOX FEATURES OBSERVED AT BOTTOM OF EXCAVATION. EL.= 163.3±.
3. SOIL EVALUATED BY JOSEPH PECCIA (SE14774) ON NOVEMBER 21, 2024

DEEP OBSERVATION HOLE LOG

DEEP OBSERVATION HOLE NUMBER:					TP-2	GROUND ELEVATION:					171.50±
Depth (in)	Horizon/ Layer	Matrix: Color-Moist	Redoximorphic Features			Texture (USDA)	Coarse Fragments (Percent by Volume)		Structure	Consistence (Moist)	Other
			Depth (in)	Color	Percent		Gravel	Cobbles & Stones			
0-24	Ap	10YR 3/2	N/A	N/A	N/A	SANDY LOAM	0	0-5	MASSIVE	FRIABLE	(1)
24-53	Bw	FILL	N/A	N/A	N/A	FILL	N/A	N/A	FILL	FILL	(2)
53-80	C	10 YR 4/6	80	5YR 5/8 MAN	>25	SANDY LOAM	0-5	0-5	MASSIVE	FRIABLE	(3)

NOTES:
1. ROOTS FOUND WITHIN SURFACE.
2. FILL MATERIAL INCLUDED GLASS PIECES, BRICKS ETC.
3. REDOX FEATURES OBSERVED AT BOTTOM OF EXCAVATION. EL.= 164.8±.
4. SOIL EVALUATED BY JOSEPH PECCIA (SE14774) ON NOVEMBER 21, 2024

DEEP OBSERVATION HOLE LOG

DEEP OBSERVATION HOLE NUMBER:					TP-3	GROUND ELEVATION:					173.00±
Depth (in)	Horizon/ Layer	Matrix: Color-Moist	Redoximorphic Features			Texture (USDA)	Coarse Fragments (Percent by Volume)		Structure	Consistence (Moist)	Other
			Depth (in)	Color	Percent		Gravel	Cobbles & Stones			
0-24	FILL	FILL	N/A	N/A	N/A	FILL	N/A	N/A	FILL	FILL	(1)
24-44	B	10YR 4/4	N/A	N/A	N/A	SANDY LOAM	5-10	10-20	MASSIVE	FRIABLE	N/A
44-108	C	10YR 4/3	108	5YR 5/8 MAN	>25	SANDY LOAM	5-10	10-20	MASSIVE	FRIABLE	(2)

NOTES:
1. COMPACTED FILL MATERIAL USED FOR VEHICLE ACCESS.
2. REDOX FEATURES OBSERVED AT BOTTOM OF EXCAVATION. EL.= 164.0±.
3. SOIL EVALUATED BY JOSEPH PECCIA (SE14774) ON NOVEMBER 21, 2024

DEEP OBSERVATION HOLE LOG

DEEP OBSERVATION HOLE NUMBER:					TP-4	GROUND ELEVATION:					171.50±
Depth (in)	Horizon/ Layer	Matrix: Color-Moist	Redoximorphic Features			Texture (USDA)	Coarse Fragments (Percent by Volume)		Structure	Consistence (Moist)	Other
			Depth (in)	Color	Percent		Gravel	Cobbles & Stones			
0-26	FILL	FILL	N/A	N/A	N/A	FILL	N/A	N/A	FILL	FILL	(1)
26-45	B	10YR 4/3	N/A	N/A	N/A	SANDY LOAM	10-30	10-15	MASSIVE	FRIABLE	(2)
45-84	C	10 YR 5/3	84	5YR 4/6	>25	SANDY LOAM	5-10	10-20	MASSIVE	FRIABLE	(3)

NOTES:
1. COMPACTED FILL MATERIAL USED FOR VEHICLE ACCESS.
2. LARGE ROCKS WITHIN LAYER (5%).
3. GREY MATERIAL AT BOTTOM OF EXCAVATION MOIST UPON TOUCH INDICATING REDOX. EL. = 164.5±
4. SOIL EVALUATED BY JOSEPH PECCIA (SE14774) ON NOVEMBER 21, 2024

DEEP OBSERVATION HOLE LOG

DEEP OBSERVATION HOLE NUMBER:					TP-5	GROUND ELEVATION:					179.00±
Depth (in)	Horizon/ Layer	Matrix: Color-Moist	Redoximorphic Features			Texture (USDA)	Coarse Fragments (Percent by Volume)		Structure	Consistence (Moist)	Other
			Depth (in)	Color	Percent		Gravel	Cobbles & Stones			
0-10	Ap	10YR 3/2	N/A	N/A	N/A	SANDY LOAM	10-20	10-20	MASSIVE	FRIABLE	(1)
10-44	Bw	10YR 4/4	N/A	N/A	N/A	SANDY LOAM	10-20	30-40	MASSIVE	FRIABLE	(2)
44-78	C	10YR 4/3	N/A	N/A	N/A	SANDY LOAM	5-10	10-20	MASSIVE	FRIABLE	(3)

NOTES:
1. ROOTS AND BOULDERS EMBEDDED IN SURFACE.
2. LAYER EXTREMELY ROCKY.
3. REFUSAL DUE TO LARGE BOULDERS WITHIN EXCAVATION (20-30%). EL.=173.5±.
4. SOIL EVALUATED BY JOSEPH PECCIA (SE14774) ON NOVEMBER 21, 2024

DEEP OBSERVATION HOLE LOG

DEEP OBSERVATION HOLE NUMBER:					TP-6	GROUND ELEVATION:					180.00±
Depth (in)	Horizon/ Layer	Matrix: Color-Moist	Redoximorphic Features			Texture (USDA)	Coarse Fragments (Percent by Volume)		Structure	Consistence (Moist)	Other
			Depth (in)	Color	Percent		Gravel	Cobbles & Stones			
0-12	Ap	10YR 3/2	N/A	N/A	N/A	SANDY LOAM	10-20	10-20	MASSIVE	FRIABLE	(1)
12-44	Bw	10YR 4/4	N/A	N/A	N/A	SANDY LOAM	10-20	30-40	MASSIVE	FRIABLE	(2)
44-82	C	10YR 4/3	N/A	N/A	N/A	SANDY LOAM	5-10	10-20	MASSIVE	FRIABLE	(3)

NOTES:
1. ROOTS AND BOULDERS EMBEDDED IN SURFACE.
2. LAYER EXTREMELY ROCKY.
3. REFUSAL DUE TO LARGE BOULDERS WITHIN EXCAVATION (20-30%). EL.=173.2±.
4. SOIL EVALUATED BY JOSEPH PECCIA (SE14774) ON NOVEMBER 21, 2024

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CLIENT:
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23 HUNTING LANE
SHERBORN, MA 01770
C/O GARY LYBARSKY

CONSULTANT:

SEAL

PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT

41 NORTH MAIN STREET
SHERBORN, MA. 01770

OWNER/APPLICANT: BARKSY ESTATE REALTY TRUST

REV	DATE	DESCRIPTION
2	01/24/2025	PER STORMWATER COMMENTS
1	12/06/2024	PER ZBA COMMENTS

ISSUE TYPE:
ISSUED TO ZBA

ISSUE DATE:
09/27/2024

PROJECT NUMBER:
23048

DRAWN BY: DTB/MJH

CHECKED BY: DTB

SHEET TITLE:
TEST PIT PLAN

SHEET NUMBER:
TEST PIT

ISSUED FOR: **ZBA**

WATERSHED MAPS

POINT OF ANALYSIS SUMMARY

POA 1 — POA-1
HUNTING LANE (OFF-SITE)

POA 2 — POA-2
NORTH MAIN STRET (OFF-SITE)

POA 3 — POA-3
33 NORTH MAIN STREET (OFF-SITE)

SOIL SUMMARY

103D CHARLTON-HOLLIS-ROCK OUTCROP COMPLEX, 15 TO 25 PERCENT SLOPES (HSG A/D, ASSUMED "B")

307B PAXTON FINE SANDY LOAM , 0 TO 8 PERCENT SLOPES, EXTREMELY STONY (HSG C)

260B SUDBURY FINE SANDY LOAM , 3 TO 8 PERCENT SLOPES (HSG B)

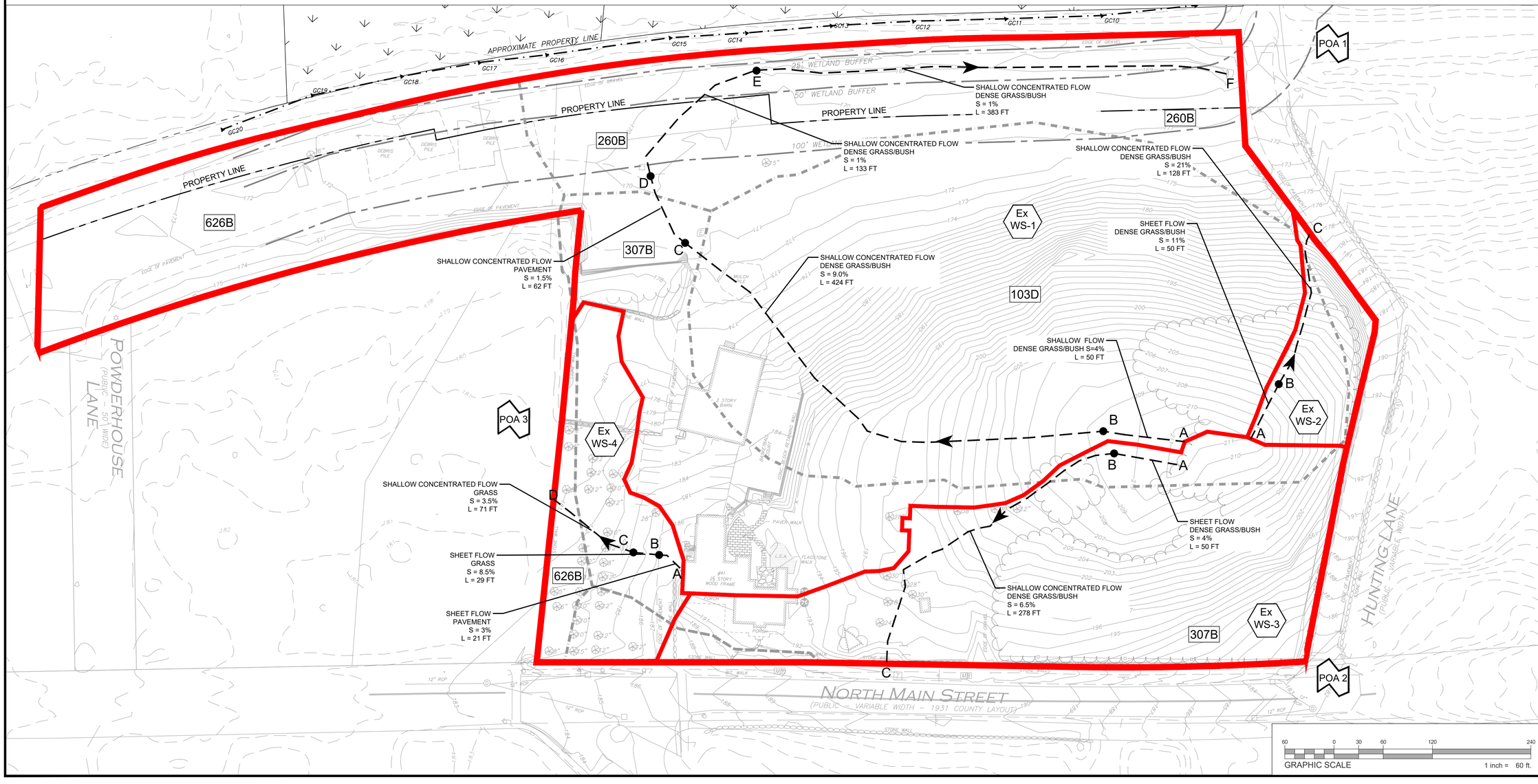
626B MERRIMAC-URBAN LAND COMPLEX, 0 TO 8 PERCENT SLOPES (HSG A/D, ASSUMED "A")

254A MERRIMAC FINE SANDY LOAM, 0 TO 3 PERCENT SLOPES (HSG A)

SYMBOL LEGEND

	OVERALL WATERSHED BOUNDARY
	TIME OF CONCENTRATION
	TIME OF CONCENTRATION FLOW PATH
POA 1	POINT OF ANALYSIS DESIGNATION
Ex WS-1	WATERSHED DESIGNATION
Ex DEP	POND DESIGNATION
	SOIL BOUNDARY
	SUB WATERSHED BOUNDARY

* CONTOURS OUTSIDE OF THE LOT BOUNDARIES WERE OBTAINED FROM NOAA ELEVATION/LIDAR DATA



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SHERBORN, MA 01770
C/O GARY LYBARSKY

CONSULTANT:

SEAL

PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT

41 NORTH MAIN STREET
SHERBORN, MA, 01770

OWNER/APPLICANT: BARKSY ESTATE REALTY TRUST

REV	DATE	DESCRIPTION
2	01/24/2025	PER STORMWATER COMMENTS
1	12/06/2024	PER ZBA COMMENTS

ISSUE TYPE:
ISSUED TO ZBA

ISSUE DATE:
09/27/2024

PROJECT NUMBER:
23048

DRAWN BY: DTB

CHECKED BY: DTB

SHEET TITLE:
PRE-DEVELOPMENT WATERSHED MAP

SHEET NUMBER:
PRE

ISSUED FOR: **ZBA**

POINT OF ANALYSIS SUMMARY

POA 1 — POA-1
HUNTING LANE (OFF-SITE)

POA 2 — POA-2
NORTH MAIN STRET (OFF-SITE)

POA 3 — POA-3
33 NORTH MAIN STREET (OFF-SITE)

SOIL SUMMARY

103D CHARLTON-HOLLIS-ROCK OUTCROP COMPLEX, 15 TO 25 PERCENT SLOPES (HSG A/D, ASSUMED "B")

307B PAXTON FINE SANDY LOAM , 0 TO 8 PERCENT SLOPES, EXTREMELY STONY (HSG C)

260B SUDBURY FINE SANDY LOAM , 3 TO 8 PERCENT SLOPES (HSG B)

626B MERRIMAC-URBAN LAND COMPLEX, 0 TO 8 PERCENT SLOPES (HSG A/D, ASSUMED "A")

254A MERRIMAC FINE SANDY LOAM, 0 TO 3 PERCENT SLOPES (HSG A)

SYMBOL LEGEND

	OVERALL WATERSHED BOUNDARY
	TIME OF CONCENTRATION
	TIME OF CONCENTRATION FLOW PATH
POA 1	POINT OF ANALYSIS DESIGNATION
Pr WS-1	WATERSHED DESIGNATION
IB-1	POND DESIGNATION
	SOIL BOUNDARY
	SUB WATERSHED BOUNDARY

* CONTOURS OUTSIDE OF THE LOT BOUNDARIES WERE OBTAINED FROM NOAA ELEVATION/LIDAR DATA

* NOTE: ALL TC LINES THAT ARE NOT SHOWN ARE ASSUMED TO BE 6 MIN.

SHEET FLOW GRASS
S = 1%
L = 50 FT

SHALLOW CONCENTRATED FLOW
DENSE GRASS/BUSH
S = 0.65%
L = 920 FT

SHALLOW CONCENTRATED FLOW
GRASS
S = 5.2%
L = 145 FT

SHEET FLOW
GRASS
S = 7.0%
L = 50 FT

TOWN OF SHERBORN
ASSESSORS MAP 11, LOT 42
AREA=114,563± S.F.
(2.63± Ac.)

POWDERHOUSE LANE
(PUBLIC - 50' WIDE)

HUNTING LANE
(PUBLIC - VARIABLE WIDTH)

NORTH MAIN STREET
(PUBLIC - VARIABLE WIDTH - 1931 COUNTY LAYOUT)

GRAPHIC SCALE
60 0 30 60 120 240
1 inch = 60 ft.

HIGHPOINT ENGINEERING, INC.
LAND PLANNING
PERMIT EXPEDITING
CIVIL ENGINEERING
CONSULTING
180 WASHINGTON STREET
SUITE 216
DEDHAM, MA 02026
www.HighpointEng.com

CLIENT:
BARKSY ESTATE REALTY TRUST
23 HUNTING LANE
SHERBORN, MA 01770
C/O GARY LYBARSKY

CONSULTANT:

SEAL

PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT

41 NORTH MAIN STREET
SHERBORN, MA, 01770

OWNER/APPLICANT: BARKSY ESTATE REALTY TRUST

REV	DATE	DESCRIPTION
2	01/24/2025	PER STORMWATER COMMENTS
1	12/06/2024	PER ZBA COMMENTS

ISSUE TYPE:
ISSUED TO ZBA

ISSUE DATE:
09/27/2024

PROJECT NUMBER:
23048

DRAWN BY: MJH/DTB

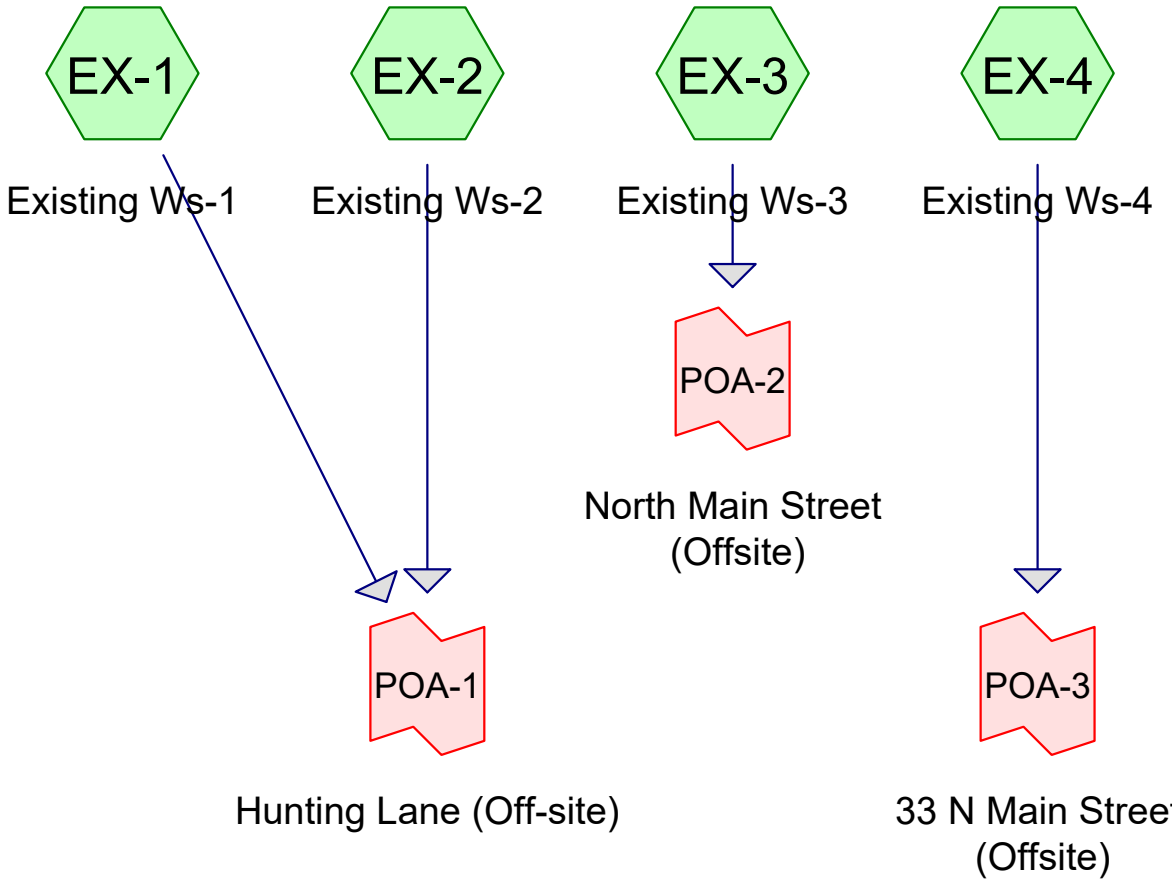
CHECKED BY: DTB/DJH

SHEET TITLE:
POST-DEVELOPMENT WATERSHED MAP

SHEET NUMBER:
POST

ISSUED FOR: **ZBA**

APPENDIX A – PRE AND POST HYDROLOGIC CALCULATIONS



Subcat Reach Pond Link

Routing Diagram for 23048_Pre-Dev
Prepared by Highpoint Engineering, Inc, Printed 1/22/2025

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-YR	Type III 24-hr		Default	24.00	1	3.35	2
2	10-YR	Type III 24-hr		Default	24.00	1	5.24	2
3	25-YR	Type III 24-hr		Default	24.00	1	6.42	2
4	100-YR	Type III 24-hr		Default	24.00	1	8.23	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
48,181	39	>75% Grass cover, Good, HSG A (EX-1, EX-3, EX-4)
61,350	61	>75% Grass cover, Good, HSG B (EX-1)
37,439	74	>75% Grass cover, Good, HSG C (EX-1, EX-3, EX-4)
15,249	82	Dirt roads, HSG B (EX-1)
2,900	85	Gravel roads, HSG B (EX-1)
46,663	79	Pasture/grassland/range, Poor, HSG B (EX-1)
1,534	98	Paved parking, HSG B (EX-4)
13,335	98	Paved parking, HSG C (EX-1, EX-3)
11,229	98	Roofs, HSG C (EX-1, EX-3)
19,411	55	Woods, Good, HSG B (EX-1, EX-2, EX-3)
32,724	70	Woods, Good, HSG C (EX-2, EX-3)
45,490	58	Woods/grass comb., Good, HSG B (EX-1, EX-3)
22,420	72	Woods/grass comb., Good, HSG C (EX-3)
357,925	**66**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
48,181	HSG A	EX-1, EX-3, EX-4
192,597	HSG B	EX-1, EX-2, EX-3, EX-4
117,147	HSG C	EX-1, EX-2, EX-3, EX-4
0	HSG D	
0	Other	
357,925		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
48,181	61,350	37,439	0	0	146,970	>75% Grass cover, Good
0	15,249	0	0	0	15,249	Dirt roads
0	2,900	0	0	0	2,900	Gravel roads
0	46,663	0	0	0	46,663	Pasture/grassland/range, Poor
0	1,534	13,335	0	0	14,869	Paved parking
0	0	11,229	0	0	11,229	Roofs
0	19,411	32,724	0	0	52,135	Woods, Good
0	45,490	22,420	0	0	67,910	Woods/grass comb., Good
48,181	**192,597**	**117,147**	**0**	**0**	**357,925**	**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Existing Ws-1 Runoff Area=258,222 sf 8.34% Impervious Runoff Depth>0.64"
Flow Length=1,052' Tc=25.4 min CN=66 Runoff=2.55 cfs 13,723 cf

Subcatchment EX-2: Existing Ws-2 Runoff Area=10,044 sf 0.00% Impervious Runoff Depth>0.41"
Flow Length=178' Tc=6.9 min CN=60 Runoff=0.08 cfs 343 cf

Subcatchment EX-3: Existing Ws-3 Runoff Area=67,363 sf 4.50% Impervious Runoff Depth>0.83"
Flow Length=328' Tc=11.9 min CN=70 Runoff=1.22 cfs 4,645 cf

Subcatchment EX-4: Existing Ws-4 Runoff Area=22,296 sf 6.88% Impervious Runoff Depth>0.48"
Flow Length=121' Tc=3.2 min CN=62 Runoff=0.25 cfs 898 cf

Link POA-1: Hunting Lane (Off-site) Inflow=2.60 cfs 14,065 cf
Primary=2.60 cfs 14,065 cf

Link POA-2: North Main Street (Offsite) Inflow=1.22 cfs 4,645 cf
Primary=1.22 cfs 4,645 cf

Link POA-3: 33 N Main Street (Offsite) Inflow=0.25 cfs 898 cf
Primary=0.25 cfs 898 cf

Total Runoff Area = 357,925 sf Runoff Volume = 19,608 cf Average Runoff Depth = 0.66"
92.71% Pervious = 331,827 sf 7.29% Impervious = 26,098 sf

Summary for Subcatchment EX-1: Existing Ws-1

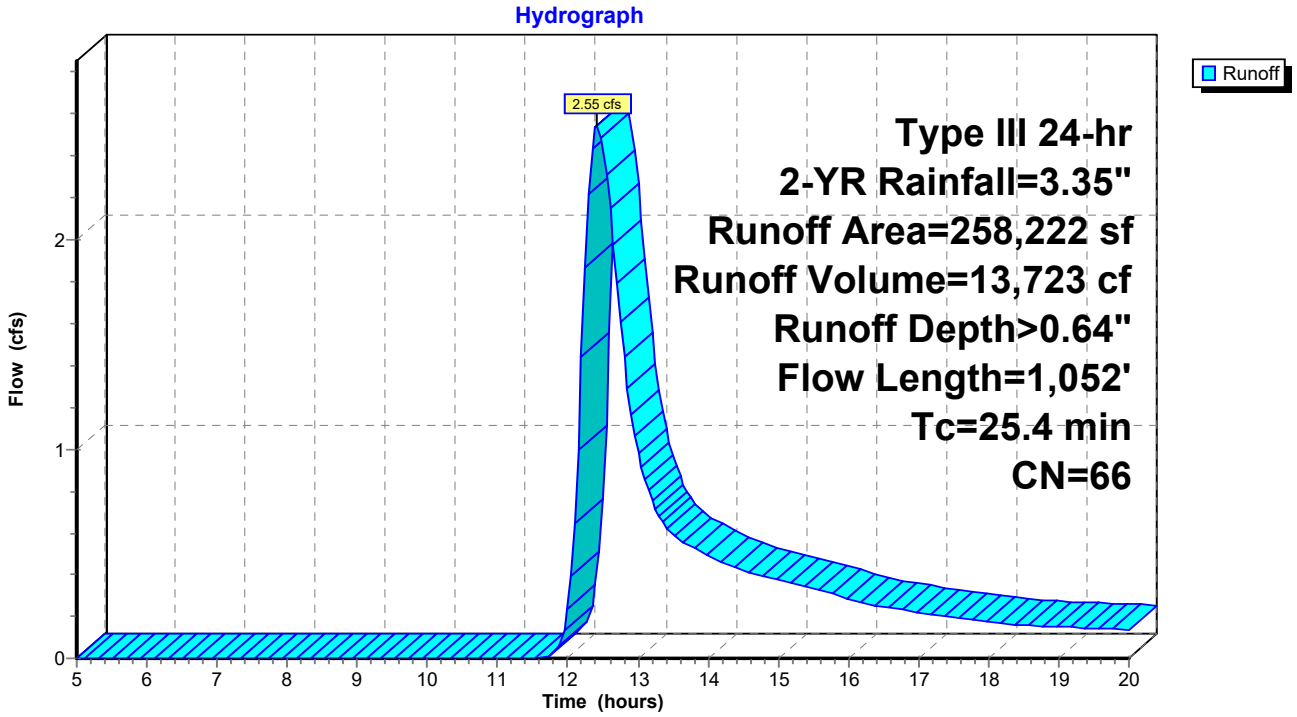
Runoff = 2.55 cfs @ 12.42 hrs, Volume= 13,723 cf, Depth> 0.64"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.35"

Area (sf)	CN	Description
37,653	39	>75% Grass cover, Good, HSG A
61,350	61	>75% Grass cover, Good, HSG B
21,649	74	>75% Grass cover, Good, HSG C
43,026	58	Woods/grass comb., Good, HSG B
8,196	55	Woods, Good, HSG B
15,249	82	Dirt roads, HSG B
46,663	79	Pasture/grassland/range, Poor, HSG B
2,900	85	Gravel roads, HSG B
8,520	98	Roofs, HSG C
13,016	98	Paved parking, HSG C
258,222	66	Weighted Average
236,686		91.66% Pervious Area
21,536		8.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.35"
3.4	424	0.0900	2.10		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	62	0.0150	2.49		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
3.2	133	0.0100	0.70		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
9.1	383	0.0100	0.70		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
25.4	1,052	Total			

Subcatchment EX-1: Existing Ws-1



Summary for Subcatchment EX-2: Existing Ws-2

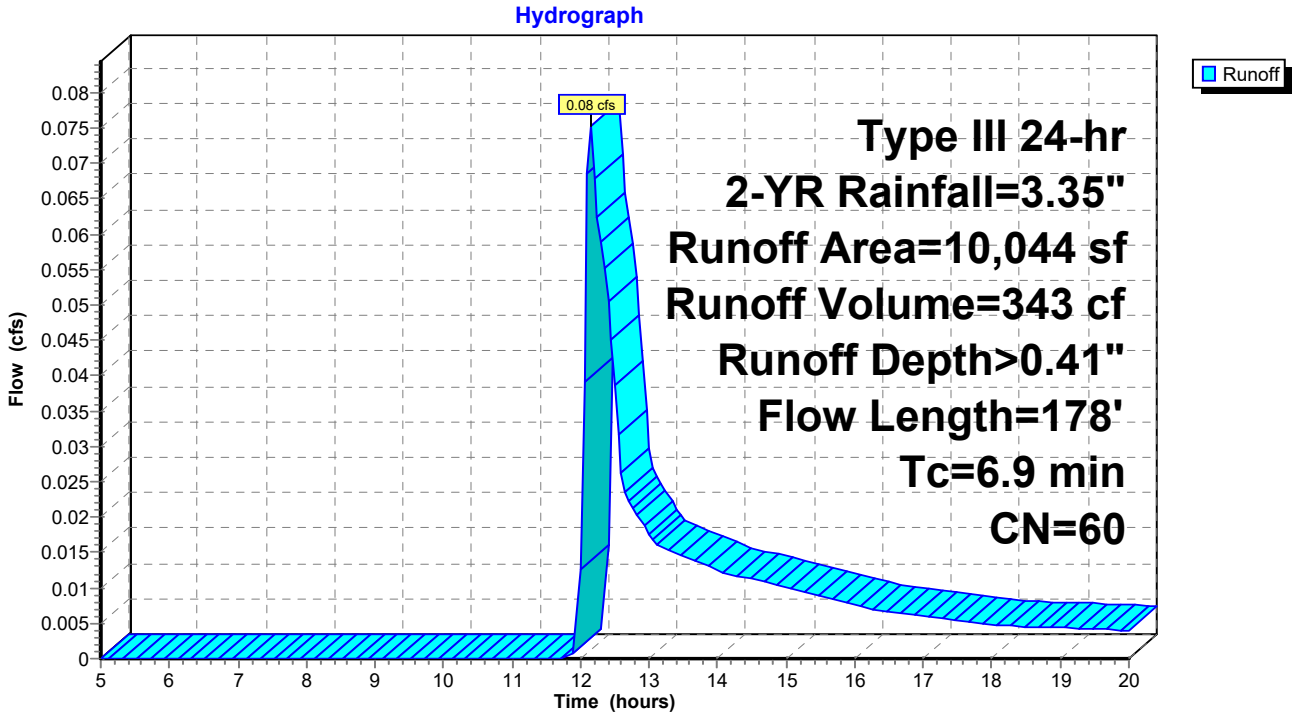
Runoff = 0.08 cfs @ 12.15 hrs, Volume= 343 cf, Depth> 0.41"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.35"

Area (sf)	CN	Description
6,768	55	Woods, Good, HSG B
3,276	70	Woods, Good, HSG C
10,044	60	Weighted Average
10,044		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.1100	0.13		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.35"
0.7	128	0.2100	3.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
6.9	178	Total			

Subcatchment EX-2: Existing Ws-2



Summary for Subcatchment EX-3: Existing Ws-3

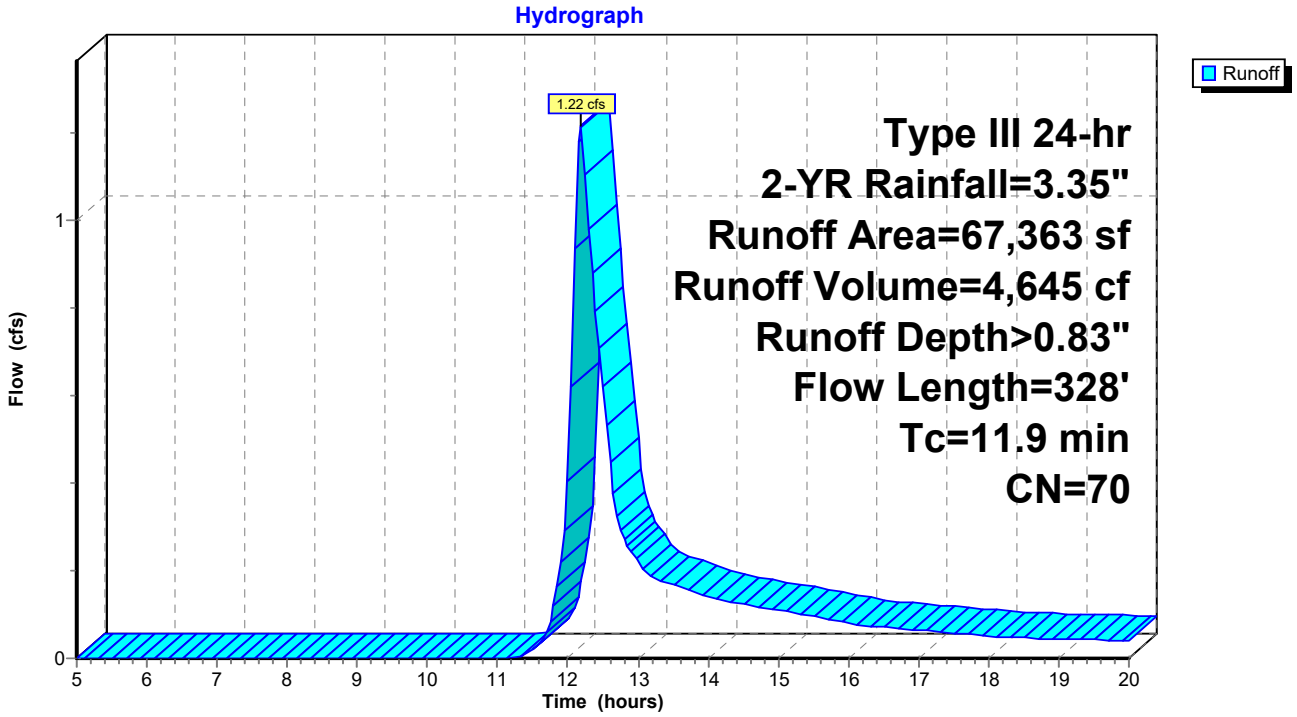
Runoff = 1.22 cfs @ 12.19 hrs, Volume= 4,645 cf, Depth> 0.83"
Routed to Link POA-2 : North Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.35"

Area (sf)	CN	Description
1,623	39	>75% Grass cover, Good, HSG A
3,933	74	>75% Grass cover, Good, HSG C
2,464	58	Woods/grass comb., Good, HSG B
22,420	72	Woods/grass comb., Good, HSG C
4,447	55	Woods, Good, HSG B
29,448	70	Woods, Good, HSG C
2,709	98	Roofs, HSG C
319	98	Paved parking, HSG C
67,363	70	Weighted Average
64,335		95.50% Pervious Area
3,028		4.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.35"
2.6	278	0.0650	1.78		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
11.9	328	Total			

Subcatchment EX-3: Existing Ws-3



Summary for Subcatchment EX-4: Existing Ws-4

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

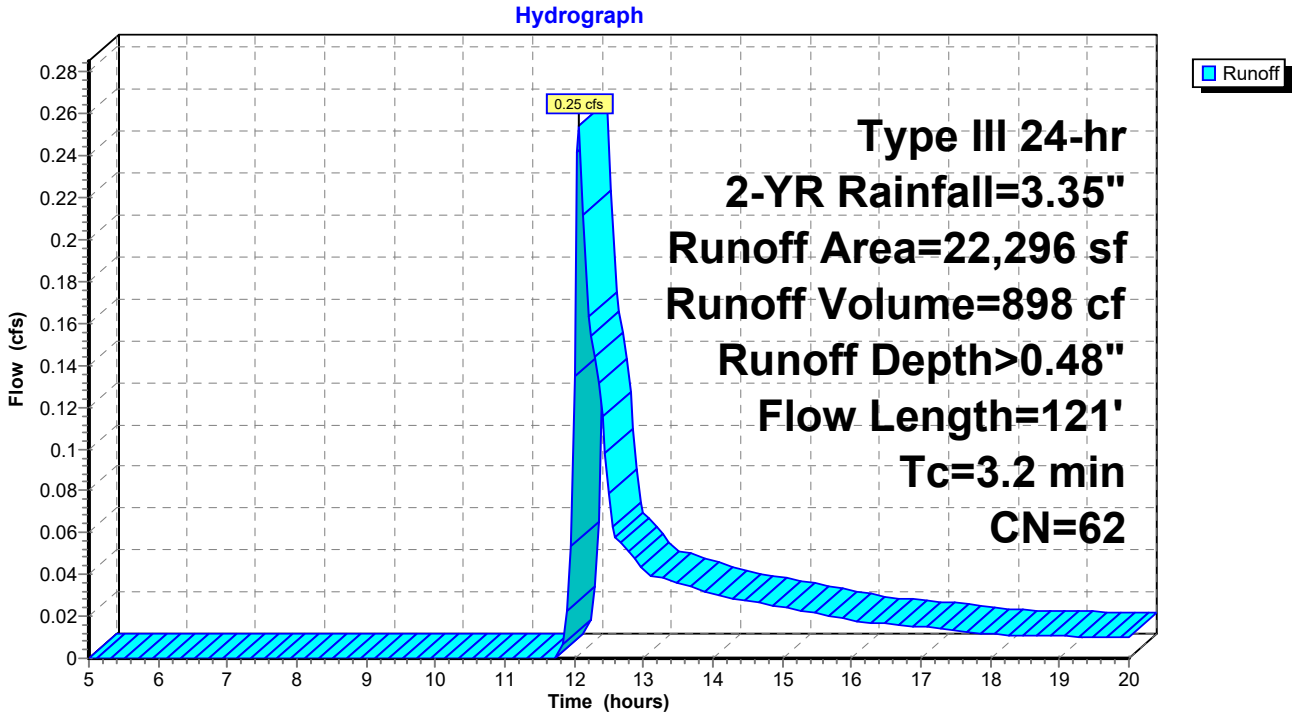
Runoff = 0.25 cfs @ 12.07 hrs, Volume= 898 cf, Depth> 0.48"
Routed to Link POA-3 : 33 N Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.35"

Area (sf)	CN	Description
8,905	39	>75% Grass cover, Good, HSG A
11,857	74	>75% Grass cover, Good, HSG C
1,534	98	Paved parking, HSG B
22,296	62	Weighted Average
20,762		93.12% Pervious Area
1,534		6.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	21	0.0300	1.21		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.35"
2.0	29	0.0850	0.24		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.35"
0.9	71	0.0350	1.31		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
3.2	121	Total			

Subcatchment EX-4: Existing Ws-4

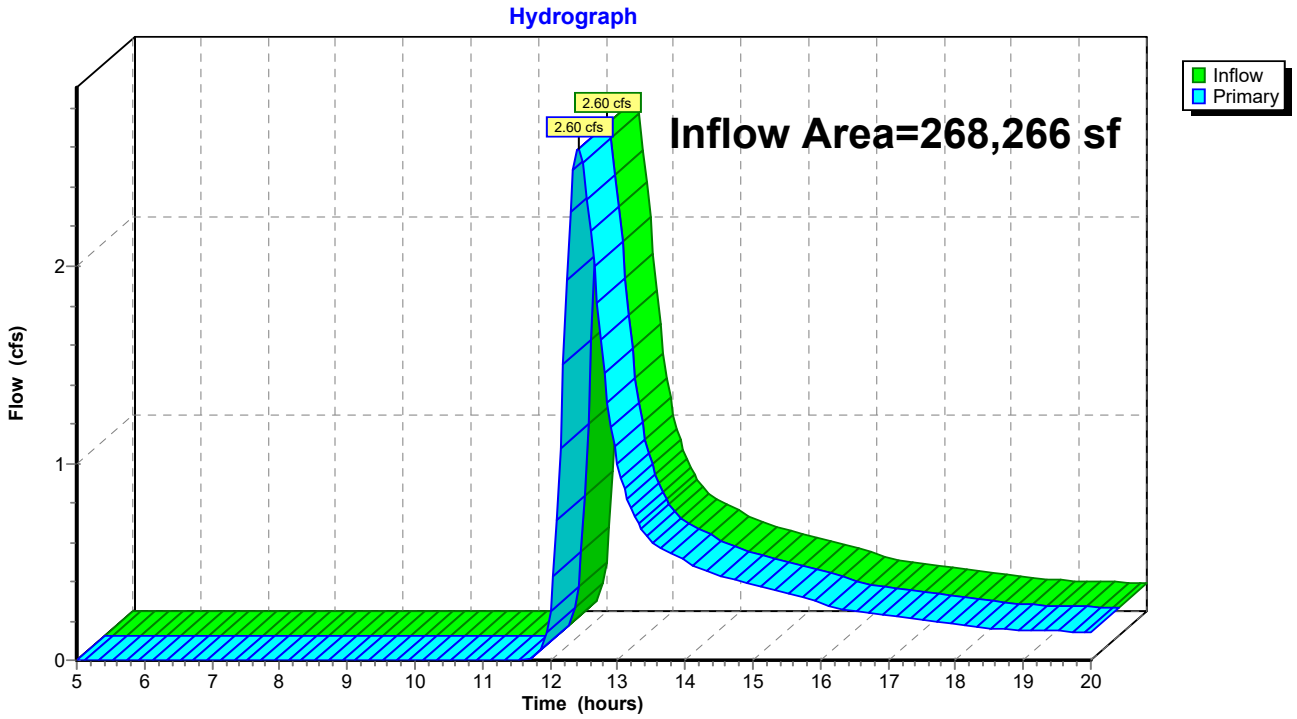


Summary for Link POA-1: Hunting Lane (Off-site)

Inflow Area = 268,266 sf, 8.03% Impervious, Inflow Depth > 0.63" for 2-YR event
Inflow = 2.60 cfs @ 12.42 hrs, Volume= 14,065 cf
Primary = 2.60 cfs @ 12.42 hrs, Volume= 14,065 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link POA-1: Hunting Lane (Off-site)

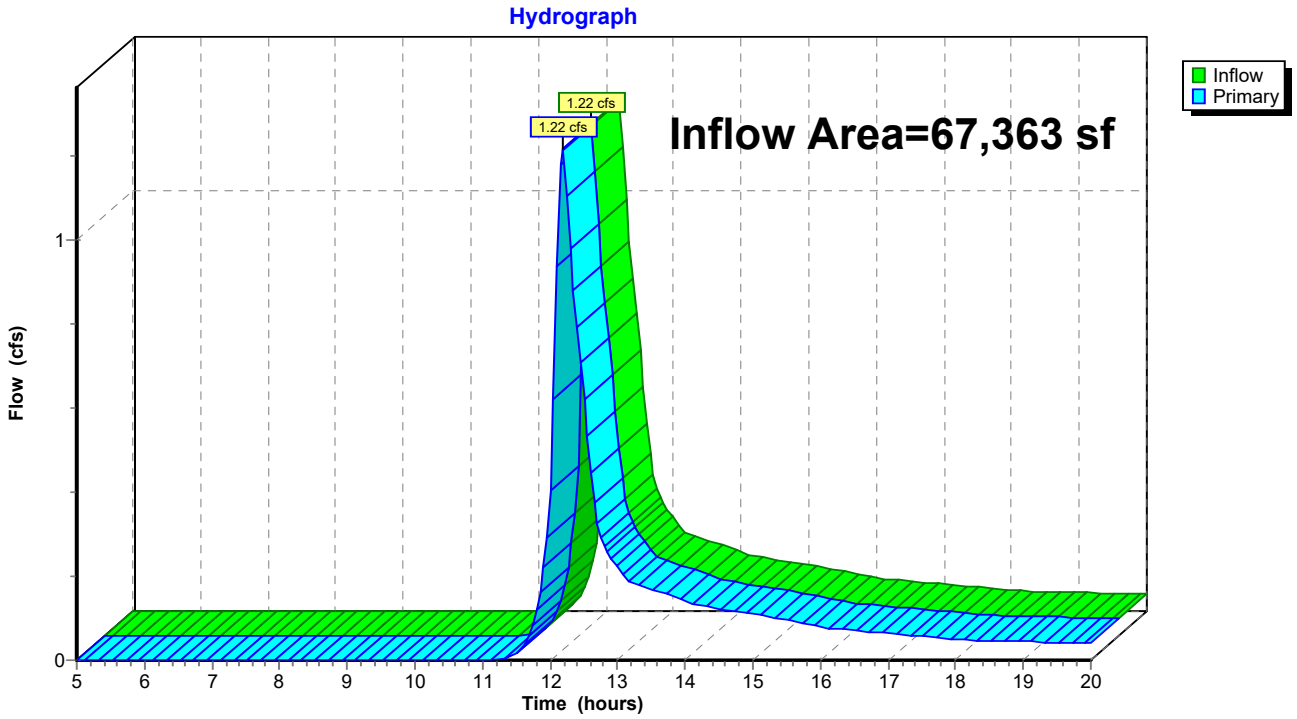


Summary for Link POA-2: North Main Street (Offsite)

Inflow Area = 67,363 sf, 4.50% Impervious, Inflow Depth > 0.83" for 2-YR event
Inflow = 1.22 cfs @ 12.19 hrs, Volume= 4,645 cf
Primary = 1.22 cfs @ 12.19 hrs, Volume= 4,645 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link POA-2: North Main Street (Offsite)

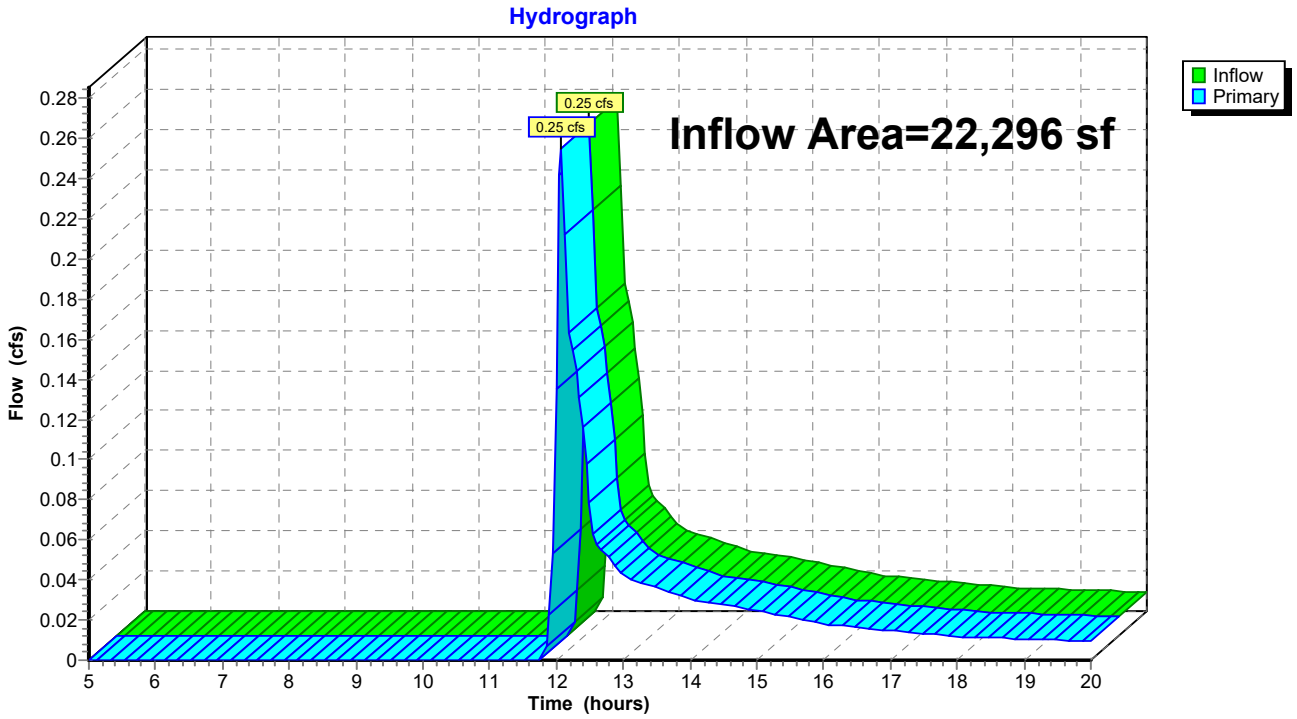


Summary for Link POA-3: 33 N Main Street (Offsite)

Inflow Area = 22,296 sf, 6.88% Impervious, Inflow Depth > 0.48" for 2-YR event
Inflow = 0.25 cfs @ 12.07 hrs, Volume= 898 cf
Primary = 0.25 cfs @ 12.07 hrs, Volume= 898 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link POA-3: 33 N Main Street (Offsite)



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Existing Ws-1 Runoff Area=258,222 sf 8.34% Impervious Runoff Depth>1.72"
Flow Length=1,052' Tc=25.4 min CN=66 Runoff=7.69 cfs 37,016 cf

Subcatchment EX-2: Existing Ws-2 Runoff Area=10,044 sf 0.00% Impervious Runoff Depth>1.31"
Flow Length=178' Tc=6.9 min CN=60 Runoff=0.34 cfs 1,093 cf

Subcatchment EX-3: Existing Ws-3 Runoff Area=67,363 sf 4.50% Impervious Runoff Depth>2.04"
Flow Length=328' Tc=11.9 min CN=70 Runoff=3.23 cfs 11,447 cf

Subcatchment EX-4: Existing Ws-4 Runoff Area=22,296 sf 6.88% Impervious Runoff Depth>1.45"
Flow Length=121' Tc=3.2 min CN=62 Runoff=0.97 cfs 2,687 cf

Link POA-1: Hunting Lane (Off-site) Inflow=7.86 cfs 38,109 cf
Primary=7.86 cfs 38,109 cf

Link POA-2: North Main Street (Offsite) Inflow=3.23 cfs 11,447 cf
Primary=3.23 cfs 11,447 cf

Link POA-3: 33 N Main Street (Offsite) Inflow=0.97 cfs 2,687 cf
Primary=0.97 cfs 2,687 cf

Total Runoff Area = 357,925 sf Runoff Volume = 52,243 cf Average Runoff Depth = 1.75"
92.71% Pervious = 331,827 sf 7.29% Impervious = 26,098 sf

Summary for Subcatchment EX-1: Existing Ws-1

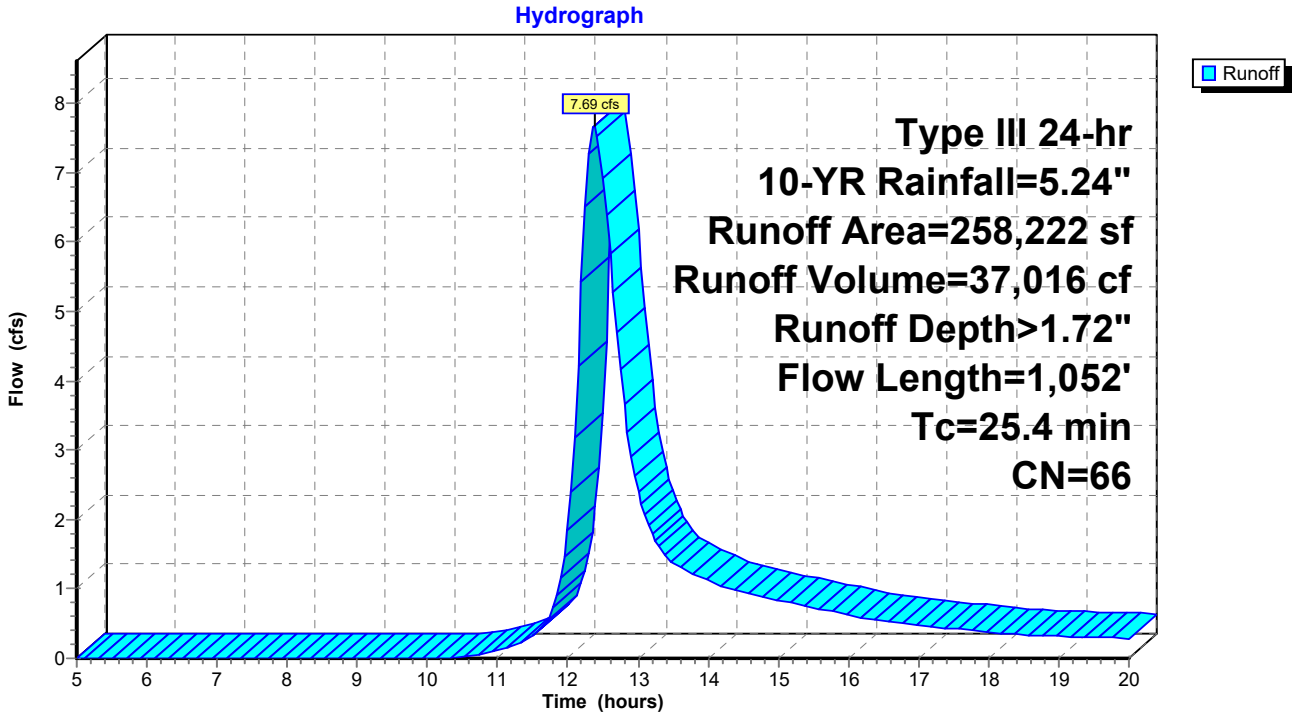
Runoff = 7.69 cfs @ 12.38 hrs, Volume= 37,016 cf, Depth> 1.72"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.24"

Area (sf)	CN	Description
37,653	39	>75% Grass cover, Good, HSG A
61,350	61	>75% Grass cover, Good, HSG B
21,649	74	>75% Grass cover, Good, HSG C
43,026	58	Woods/grass comb., Good, HSG B
8,196	55	Woods, Good, HSG B
15,249	82	Dirt roads, HSG B
46,663	79	Pasture/grassland/range, Poor, HSG B
2,900	85	Gravel roads, HSG B
8,520	98	Roofs, HSG C
13,016	98	Paved parking, HSG C
258,222	66	Weighted Average
236,686		91.66% Pervious Area
21,536		8.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.35"
3.4	424	0.0900	2.10		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	62	0.0150	2.49		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
3.2	133	0.0100	0.70		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
9.1	383	0.0100	0.70		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
25.4	1,052	Total			

Subcatchment EX-1: Existing Ws-1



Summary for Subcatchment EX-2: Existing Ws-2

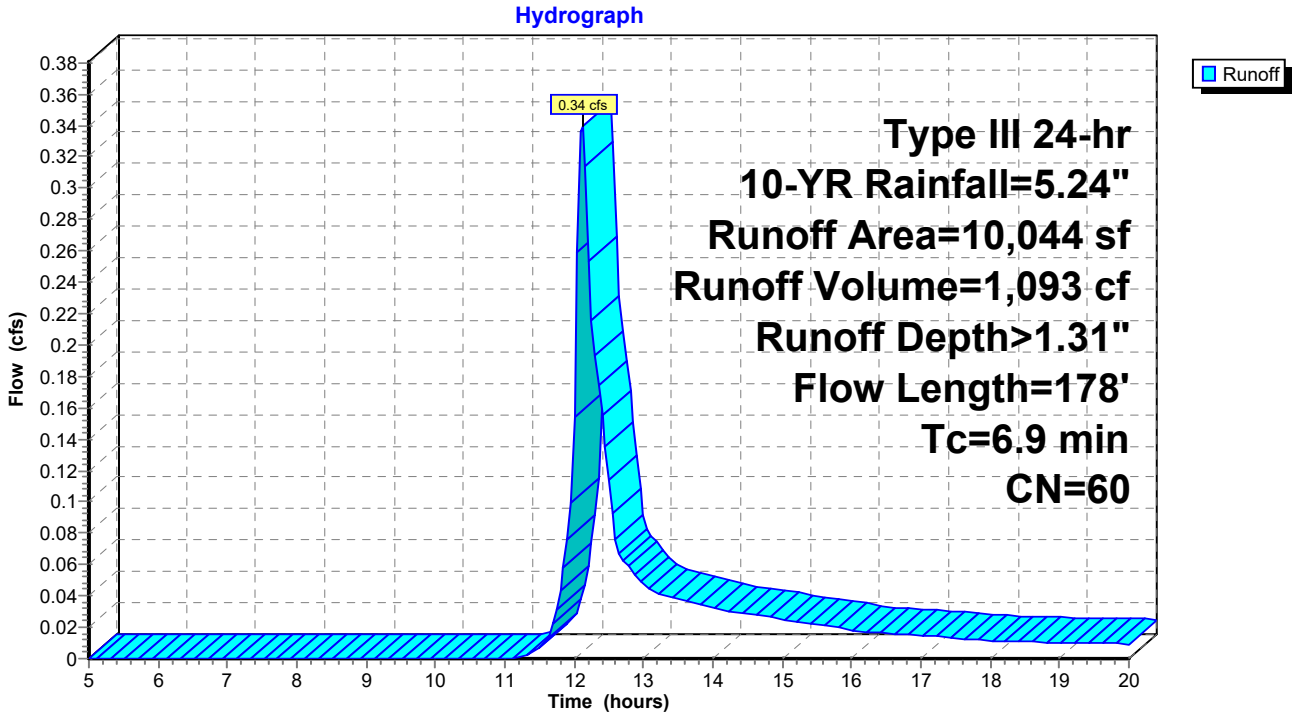
Runoff = 0.34 cfs @ 12.11 hrs, Volume= 1,093 cf, Depth> 1.31"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.24"

Area (sf)	CN	Description
6,768	55	Woods, Good, HSG B
3,276	70	Woods, Good, HSG C
10,044	60	Weighted Average
10,044		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.1100	0.13		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.35"
0.7	128	0.2100	3.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
6.9	178	Total			

Subcatchment EX-2: Existing Ws-2



Summary for Subcatchment EX-3: Existing Ws-3

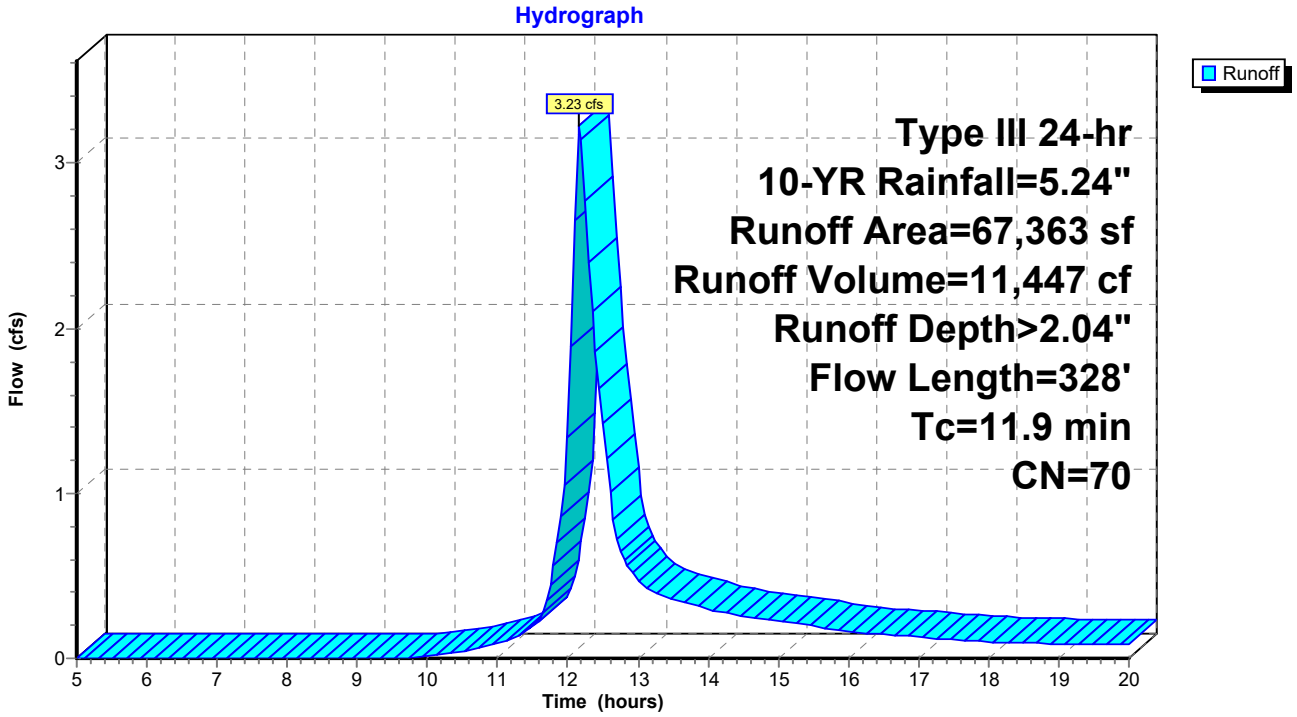
Runoff = 3.23 cfs @ 12.17 hrs, Volume= 11,447 cf, Depth> 2.04"
Routed to Link POA-2 : North Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.24"

Area (sf)	CN	Description
1,623	39	>75% Grass cover, Good, HSG A
3,933	74	>75% Grass cover, Good, HSG C
2,464	58	Woods/grass comb., Good, HSG B
22,420	72	Woods/grass comb., Good, HSG C
4,447	55	Woods, Good, HSG B
29,448	70	Woods, Good, HSG C
2,709	98	Roofs, HSG C
319	98	Paved parking, HSG C
67,363	70	Weighted Average
64,335		95.50% Pervious Area
3,028		4.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.35"
2.6	278	0.0650	1.78		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
11.9	328	Total			

Subcatchment EX-3: Existing Ws-3



Summary for Subcatchment EX-4: Existing Ws-4

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

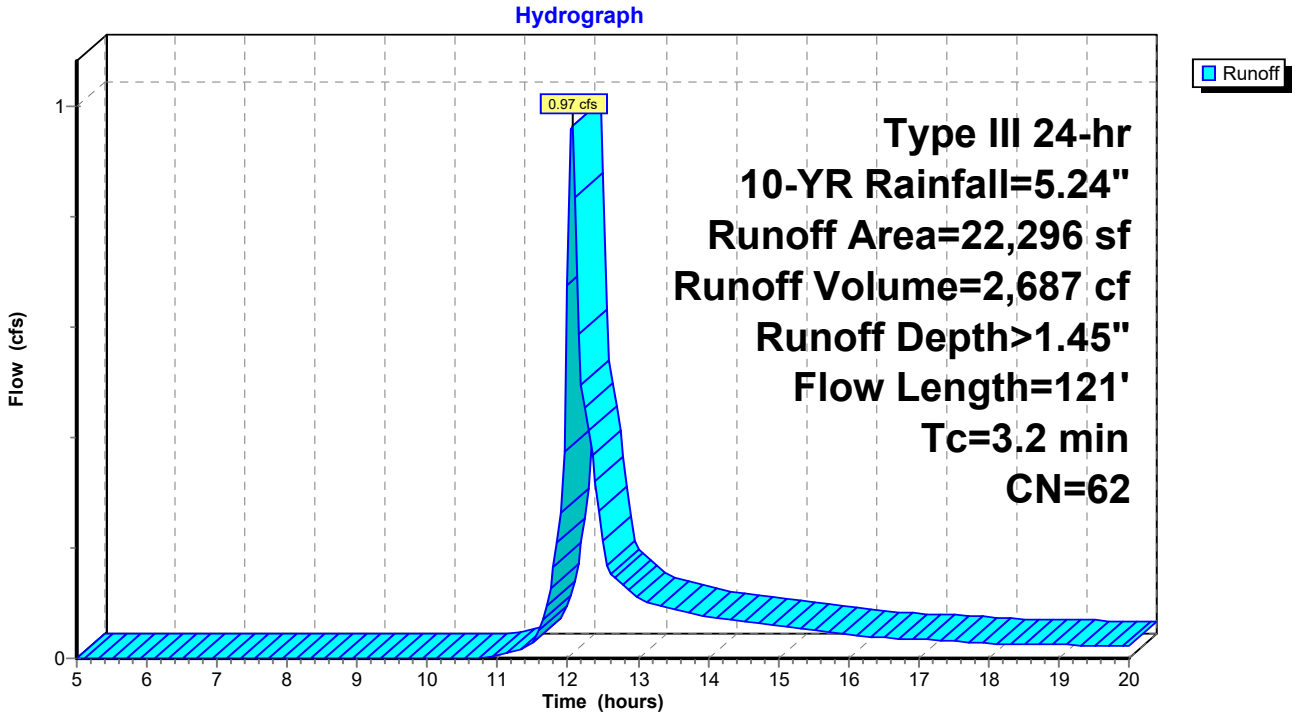
Runoff = 0.97 cfs @ 12.06 hrs, Volume= 2,687 cf, Depth> 1.45"
Routed to Link POA-3 : 33 N Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.24"

Area (sf)	CN	Description
8,905	39	>75% Grass cover, Good, HSG A
11,857	74	>75% Grass cover, Good, HSG C
1,534	98	Paved parking, HSG B
22,296	62	Weighted Average
20,762		93.12% Pervious Area
1,534		6.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	21	0.0300	1.21		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.35"
2.0	29	0.0850	0.24		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.35"
0.9	71	0.0350	1.31		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
3.2	121	Total			

Subcatchment EX-4: Existing Ws-4

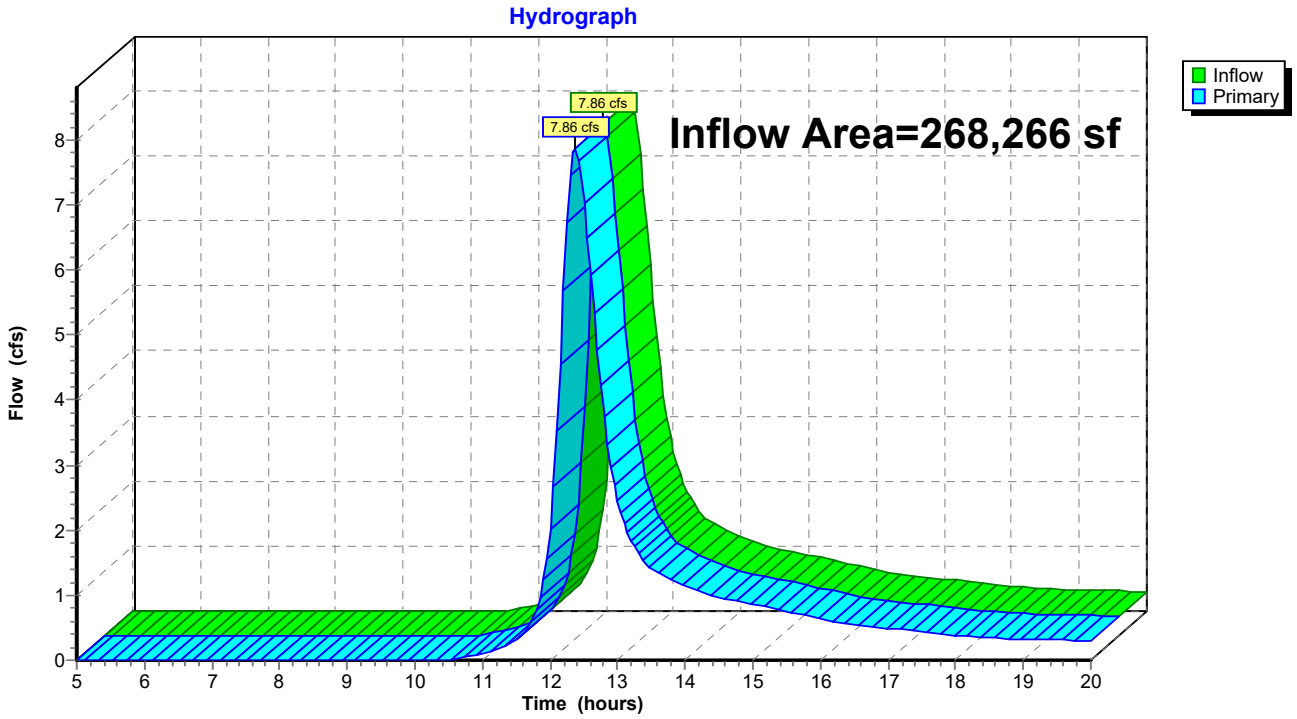


Summary for Link POA-1: Hunting Lane (Off-site)

Inflow Area = 268,266 sf, 8.03% Impervious, Inflow Depth > 1.70" for 10-YR event
Inflow = 7.86 cfs @ 12.37 hrs, Volume= 38,109 cf
Primary = 7.86 cfs @ 12.37 hrs, Volume= 38,109 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link POA-1: Hunting Lane (Off-site)

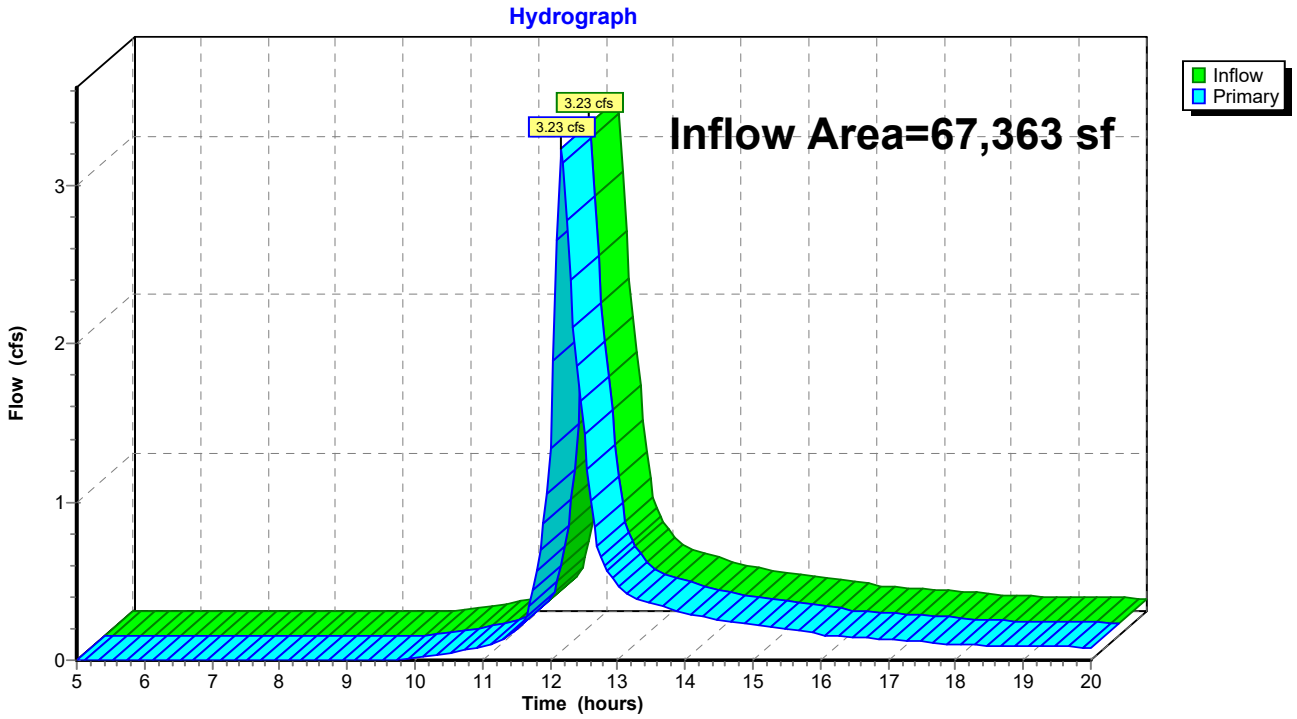


Summary for Link POA-2: North Main Street (Offsite)

Inflow Area = 67,363 sf, 4.50% Impervious, Inflow Depth > 2.04" for 10-YR event
Inflow = 3.23 cfs @ 12.17 hrs, Volume= 11,447 cf
Primary = 3.23 cfs @ 12.17 hrs, Volume= 11,447 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link POA-2: North Main Street (Offsite)

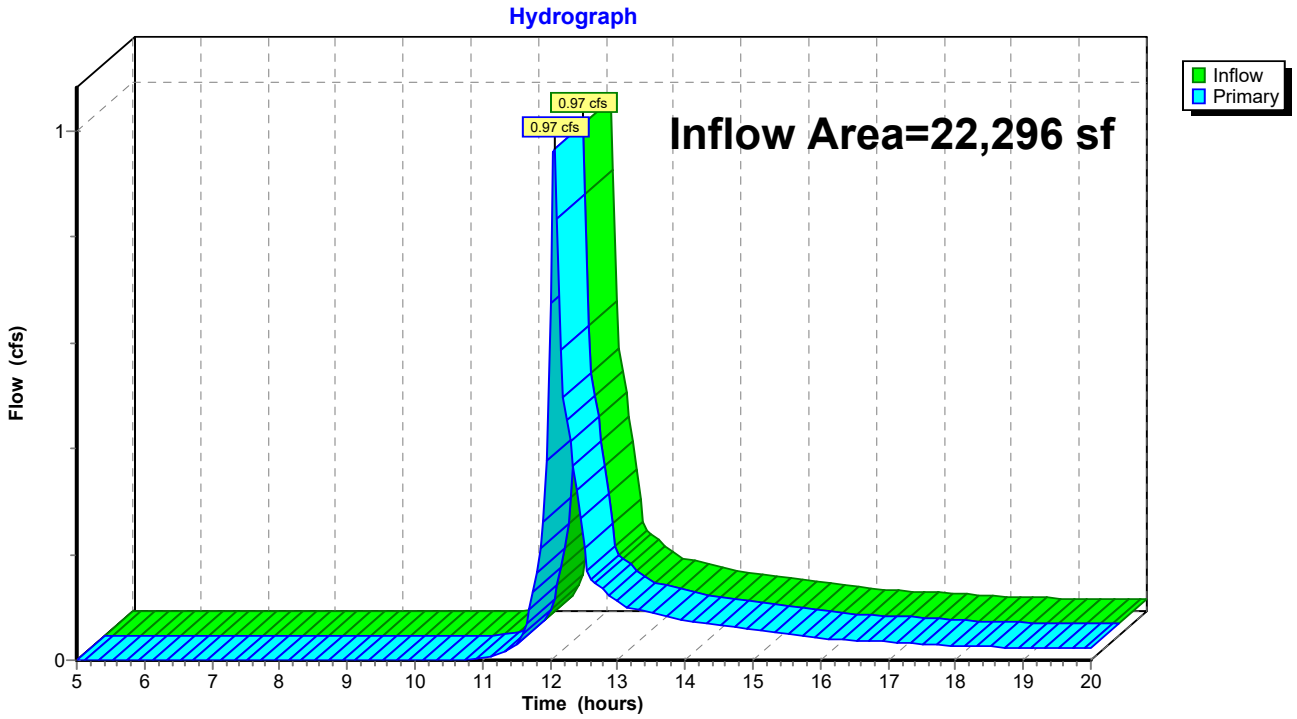


Summary for Link POA-3: 33 N Main Street (Offsite)

Inflow Area = 22,296 sf, 6.88% Impervious, Inflow Depth > 1.45" for 10-YR event
Inflow = 0.97 cfs @ 12.06 hrs, Volume= 2,687 cf
Primary = 0.97 cfs @ 12.06 hrs, Volume= 2,687 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link POA-3: 33 N Main Street (Offsite)



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Existing Ws-1 Runoff Area=258,222 sf 8.34% Impervious Runoff Depth>2.52"
Flow Length=1,052' Tc=25.4 min CN=66 Runoff=11.47 cfs 54,309 cf

Subcatchment EX-2: Existing Ws-2 Runoff Area=10,044 sf 0.00% Impervious Runoff Depth>2.01"
Flow Length=178' Tc=6.9 min CN=60 Runoff=0.55 cfs 1,684 cf

Subcatchment EX-3: Existing Ws-3 Runoff Area=67,363 sf 4.50% Impervious Runoff Depth>2.91"
Flow Length=328' Tc=11.9 min CN=70 Runoff=4.64 cfs 16,331 cf

Subcatchment EX-4: Existing Ws-4 Runoff Area=22,296 sf 6.88% Impervious Runoff Depth>2.19"
Flow Length=121' Tc=3.2 min CN=62 Runoff=1.50 cfs 4,066 cf

Link POA-1: Hunting Lane (Off-site) Inflow=11.72 cfs 55,993 cf
Primary=11.72 cfs 55,993 cf

Link POA-2: North Main Street (Offsite) Inflow=4.64 cfs 16,331 cf
Primary=4.64 cfs 16,331 cf

Link POA-3: 33 N Main Street (Offsite) Inflow=1.50 cfs 4,066 cf
Primary=1.50 cfs 4,066 cf

Total Runoff Area = 357,925 sf Runoff Volume = 76,389 cf Average Runoff Depth = 2.56"
92.71% Pervious = 331,827 sf 7.29% Impervious = 26,098 sf

Summary for Subcatchment EX-1: Existing Ws-1

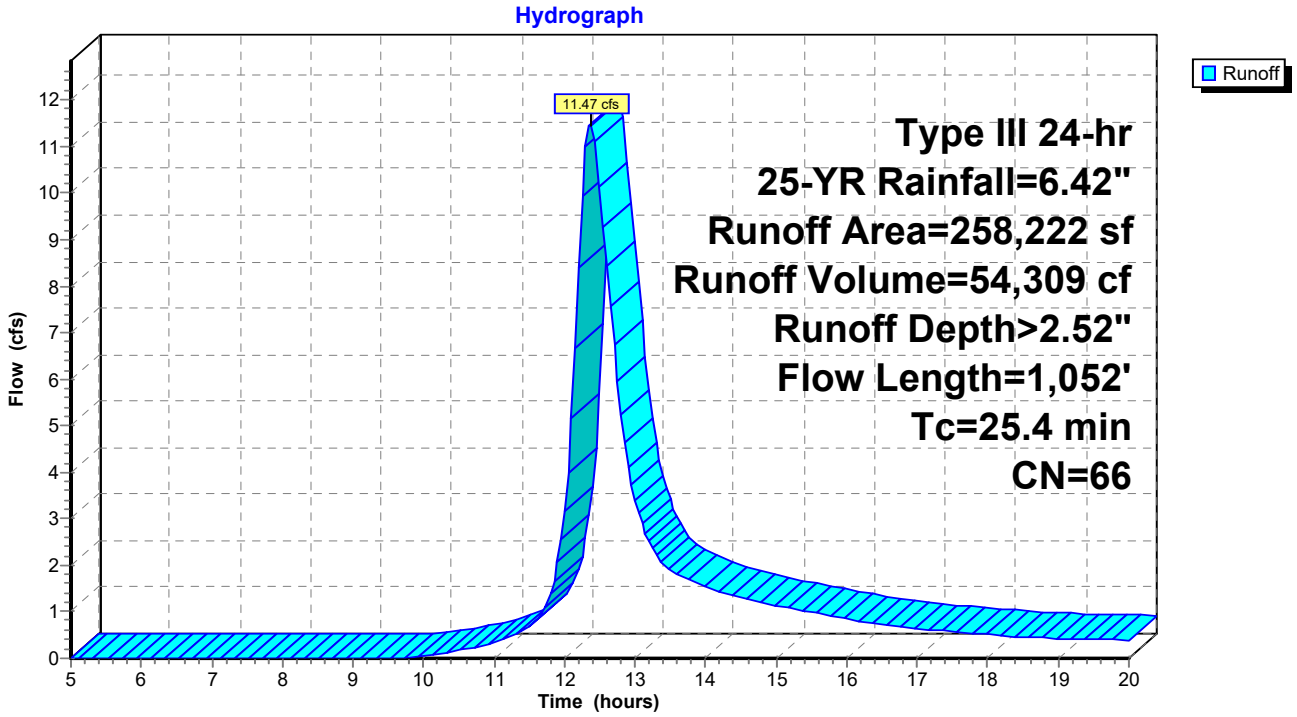
Runoff = 11.47 cfs @ 12.37 hrs, Volume= 54,309 cf, Depth> 2.52"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.42"

Area (sf)	CN	Description
37,653	39	>75% Grass cover, Good, HSG A
61,350	61	>75% Grass cover, Good, HSG B
21,649	74	>75% Grass cover, Good, HSG C
43,026	58	Woods/grass comb., Good, HSG B
8,196	55	Woods, Good, HSG B
15,249	82	Dirt roads, HSG B
46,663	79	Pasture/grassland/range, Poor, HSG B
2,900	85	Gravel roads, HSG B
8,520	98	Roofs, HSG C
13,016	98	Paved parking, HSG C
258,222	66	Weighted Average
236,686		91.66% Pervious Area
21,536		8.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.35"
3.4	424	0.0900	2.10		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	62	0.0150	2.49		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
3.2	133	0.0100	0.70		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
9.1	383	0.0100	0.70		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
25.4	1,052	Total			

Subcatchment EX-1: Existing Ws-1



Summary for Subcatchment EX-2: Existing Ws-2

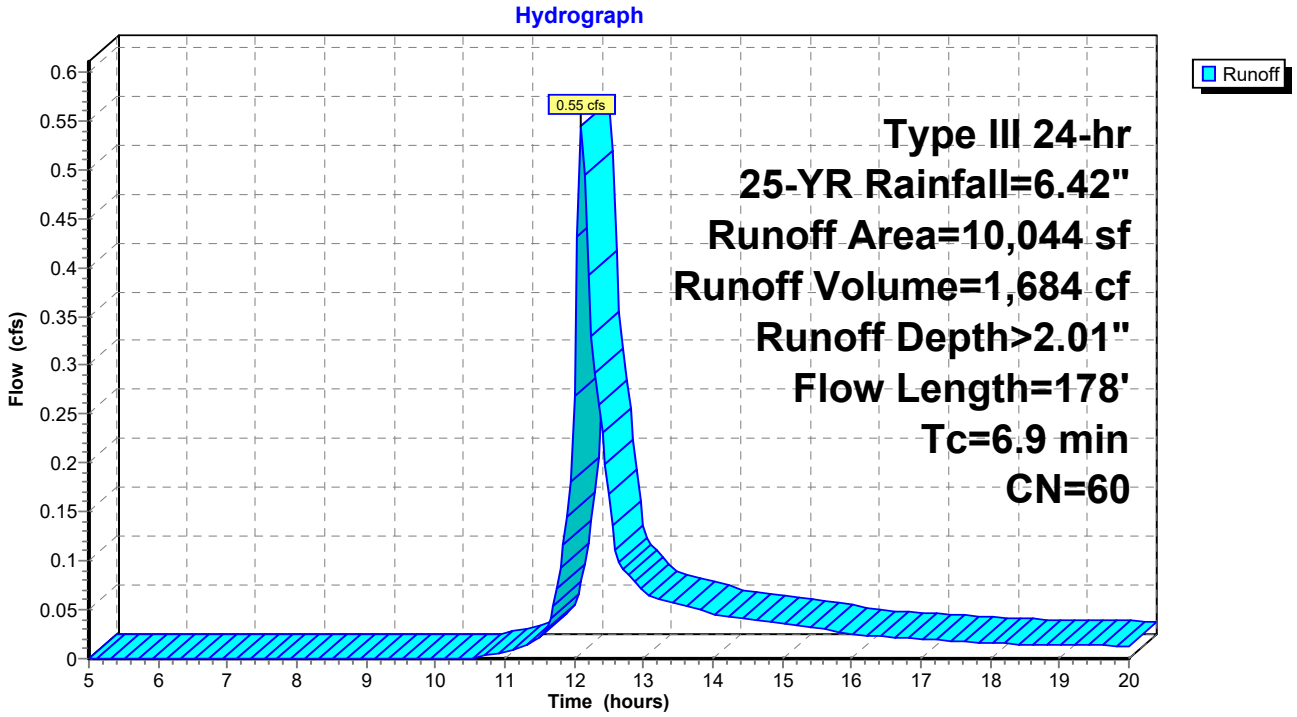
Runoff = 0.55 cfs @ 12.11 hrs, Volume= 1,684 cf, Depth> 2.01"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.42"

Area (sf)	CN	Description
6,768	55	Woods, Good, HSG B
3,276	70	Woods, Good, HSG C
10,044	60	Weighted Average
10,044		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.1100	0.13		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.35"
0.7	128	0.2100	3.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
6.9	178	Total			

Subcatchment EX-2: Existing Ws-2



Summary for Subcatchment EX-3: Existing Ws-3

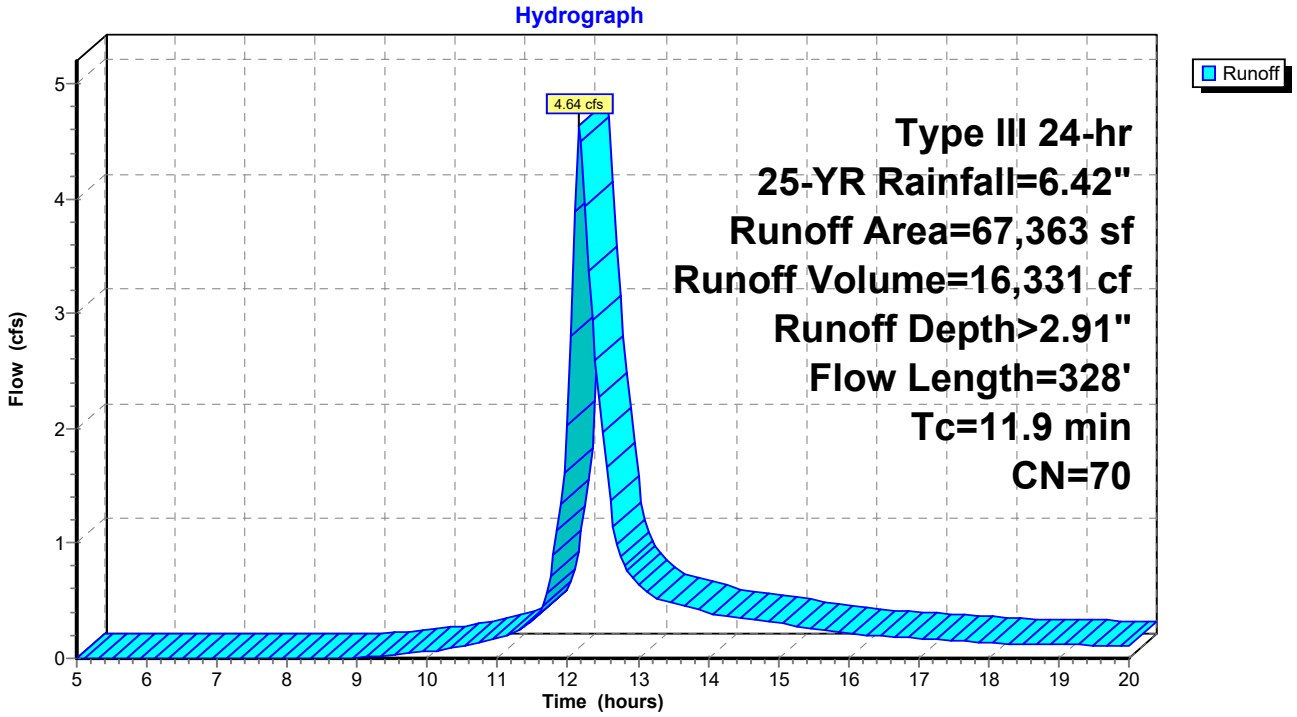
Runoff = 4.64 cfs @ 12.17 hrs, Volume= 16,331 cf, Depth> 2.91"
Routed to Link POA-2 : North Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.42"

Area (sf)	CN	Description
1,623	39	>75% Grass cover, Good, HSG A
3,933	74	>75% Grass cover, Good, HSG C
2,464	58	Woods/grass comb., Good, HSG B
22,420	72	Woods/grass comb., Good, HSG C
4,447	55	Woods, Good, HSG B
29,448	70	Woods, Good, HSG C
2,709	98	Roofs, HSG C
319	98	Paved parking, HSG C
67,363	70	Weighted Average
64,335		95.50% Pervious Area
3,028		4.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.35"
2.6	278	0.0650	1.78		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
11.9	328	Total			

Subcatchment EX-3: Existing Ws-3



Summary for Subcatchment EX-4: Existing Ws-4

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

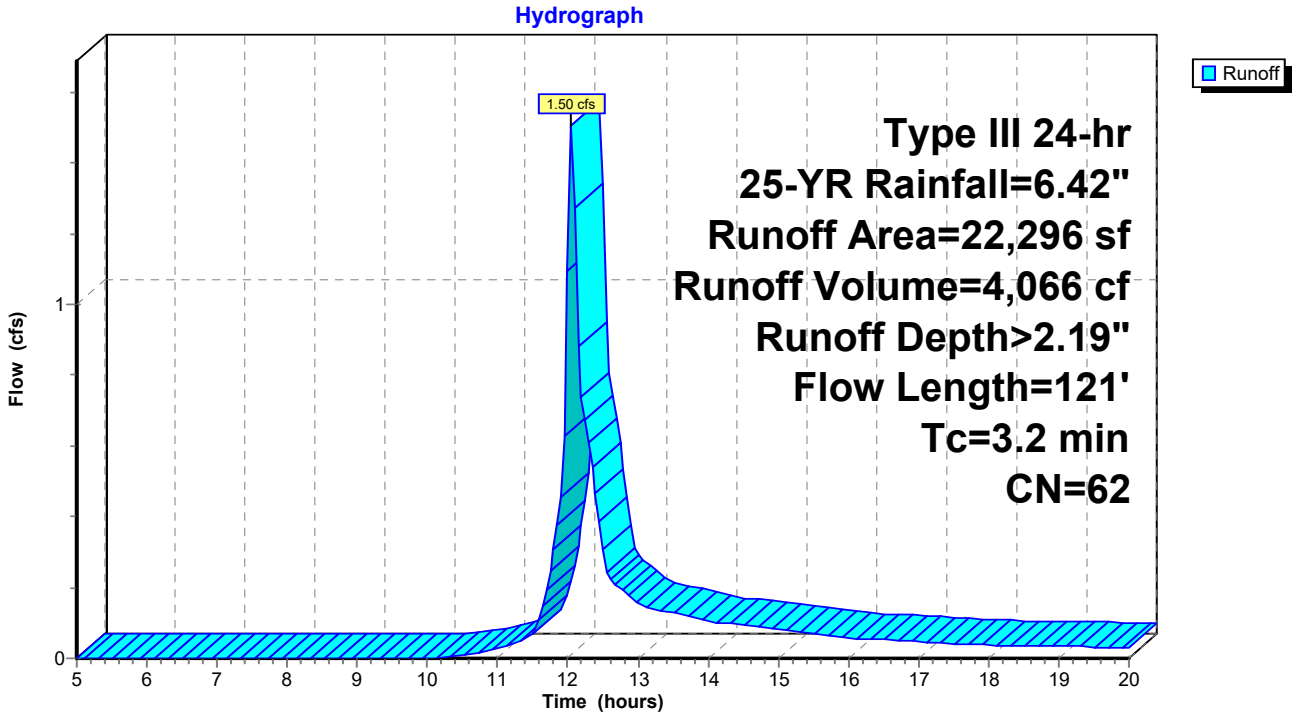
Runoff = 1.50 cfs @ 12.06 hrs, Volume= 4,066 cf, Depth> 2.19"
Routed to Link POA-3 : 33 N Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.42"

Area (sf)	CN	Description
8,905	39	>75% Grass cover, Good, HSG A
11,857	74	>75% Grass cover, Good, HSG C
1,534	98	Paved parking, HSG B
22,296	62	Weighted Average
20,762		93.12% Pervious Area
1,534		6.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	21	0.0300	1.21		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.35"
2.0	29	0.0850	0.24		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.35"
0.9	71	0.0350	1.31		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
3.2	121	Total			

Subcatchment EX-4: Existing Ws-4

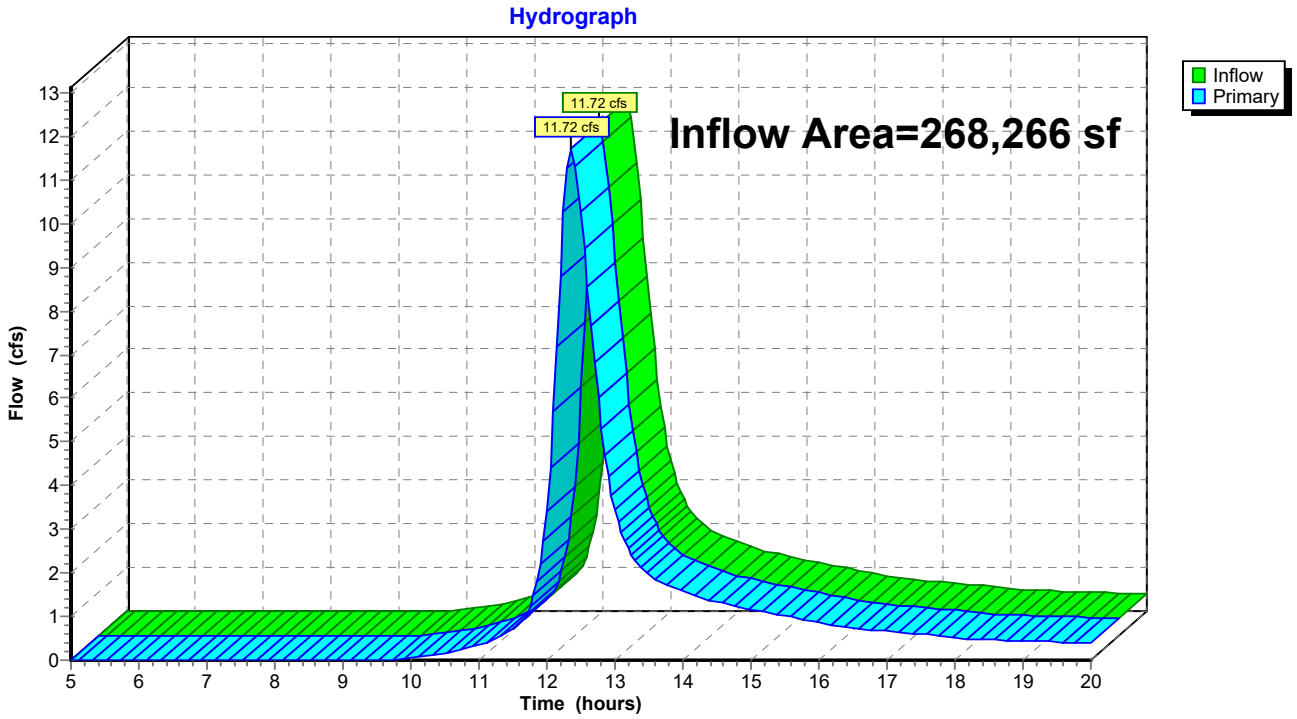


Summary for Link POA-1: Hunting Lane (Off-site)

Inflow Area = 268,266 sf, 8.03% Impervious, Inflow Depth > 2.50" for 25-YR event
Inflow = 11.72 cfs @ 12.36 hrs, Volume= 55,993 cf
Primary = 11.72 cfs @ 12.36 hrs, Volume= 55,993 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link POA-1: Hunting Lane (Off-site)

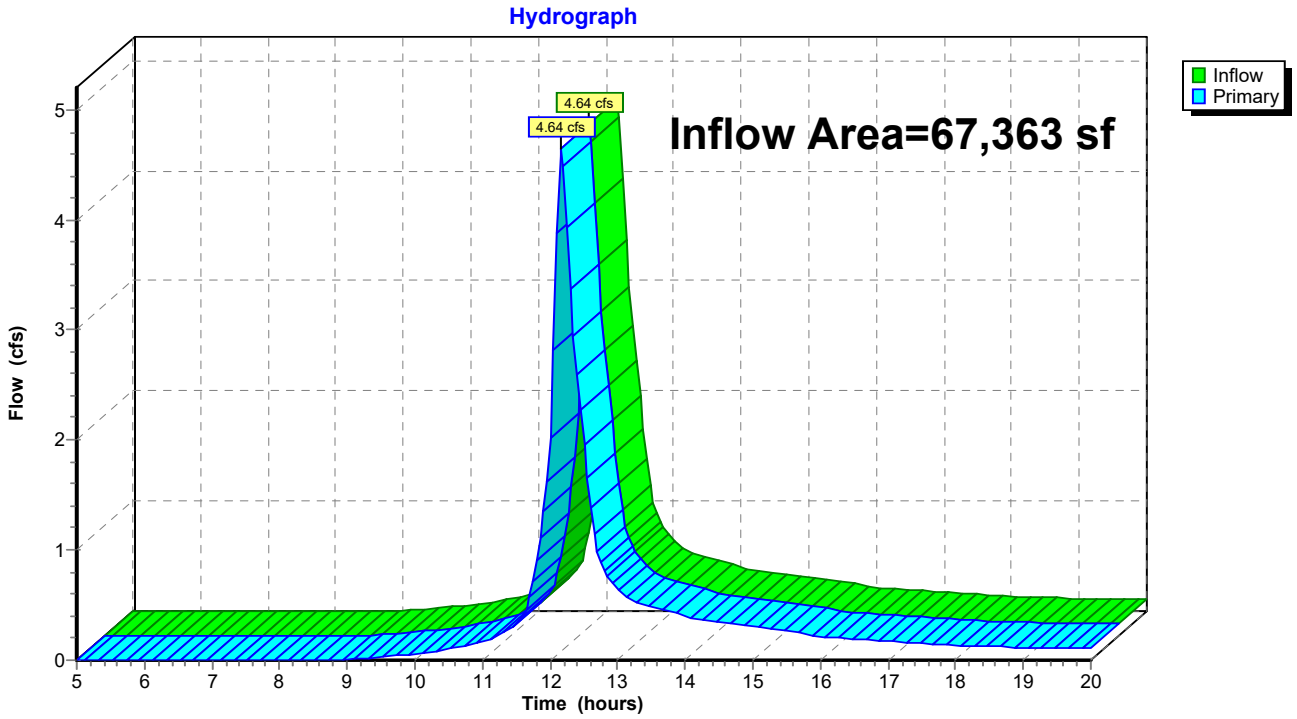


Summary for Link POA-2: North Main Street (Offsite)

Inflow Area = 67,363 sf, 4.50% Impervious, Inflow Depth > 2.91" for 25-YR event
Inflow = 4.64 cfs @ 12.17 hrs, Volume= 16,331 cf
Primary = 4.64 cfs @ 12.17 hrs, Volume= 16,331 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link POA-2: North Main Street (Offsite)

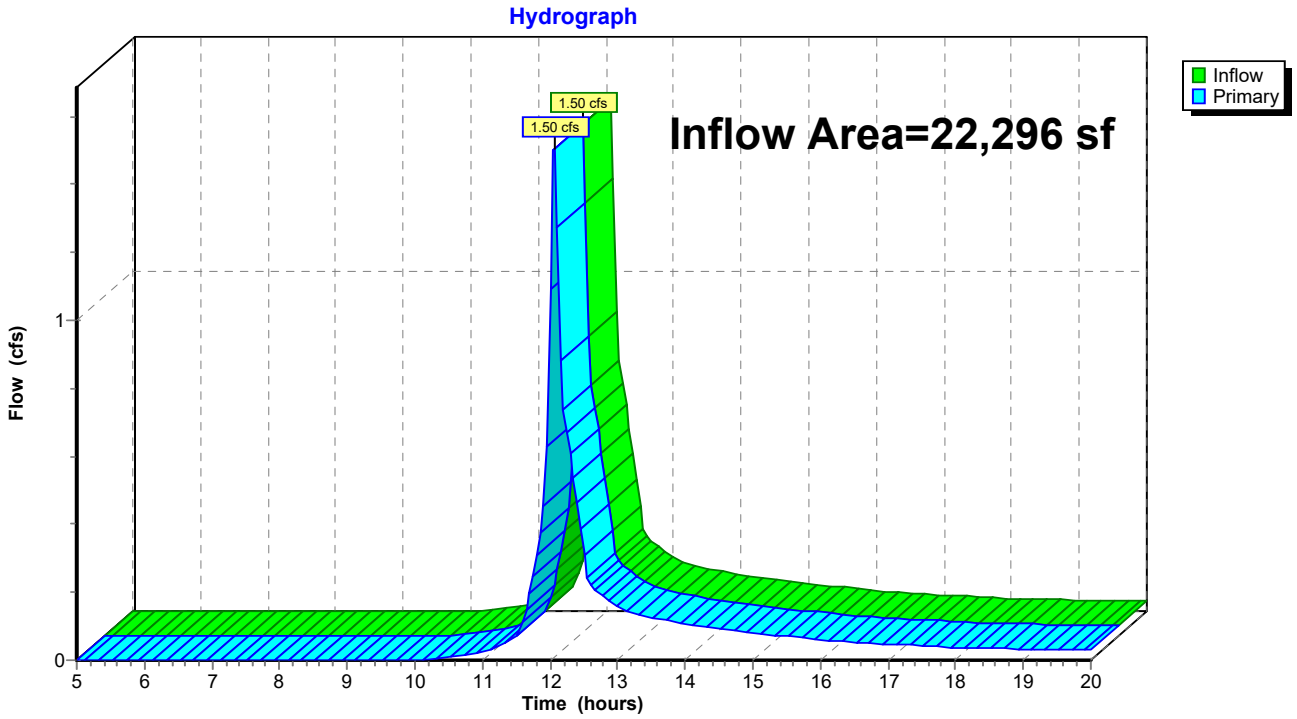


Summary for Link POA-3: 33 N Main Street (Offsite)

Inflow Area = 22,296 sf, 6.88% Impervious, Inflow Depth > 2.19" for 25-YR event
Inflow = 1.50 cfs @ 12.06 hrs, Volume= 4,066 cf
Primary = 1.50 cfs @ 12.06 hrs, Volume= 4,066 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link POA-3: 33 N Main Street (Offsite)



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Existing Ws-1 Runoff Area=258,222 sf 8.34% Impervious Runoff Depth>3.87"
Flow Length=1,052' Tc=25.4 min CN=66 Runoff=17.69 cfs 83,350 cf

Subcatchment EX-2: Existing Ws-2 Runoff Area=10,044 sf 0.00% Impervious Runoff Depth>3.23"
Flow Length=178' Tc=6.9 min CN=60 Runoff=0.90 cfs 2,707 cf

Subcatchment EX-3: Existing Ws-3 Runoff Area=67,363 sf 4.50% Impervious Runoff Depth>4.34"
Flow Length=328' Tc=11.9 min CN=70 Runoff=6.92 cfs 24,381 cf

Subcatchment EX-4: Existing Ws-4 Runoff Area=22,296 sf 6.88% Impervious Runoff Depth>3.46"
Flow Length=121' Tc=3.2 min CN=62 Runoff=2.41 cfs 6,426 cf

Link POA-1: Hunting Lane (Off-site) Inflow=18.09 cfs 86,057 cf
Primary=18.09 cfs 86,057 cf

Link POA-2: North Main Street (Offsite) Inflow=6.92 cfs 24,381 cf
Primary=6.92 cfs 24,381 cf

Link POA-3: 33 N Main Street (Offsite) Inflow=2.41 cfs 6,426 cf
Primary=2.41 cfs 6,426 cf

Total Runoff Area = 357,925 sf Runoff Volume = 116,864 cf Average Runoff Depth = 3.92"
92.71% Pervious = 331,827 sf 7.29% Impervious = 26,098 sf

Summary for Subcatchment EX-1: Existing Ws-1

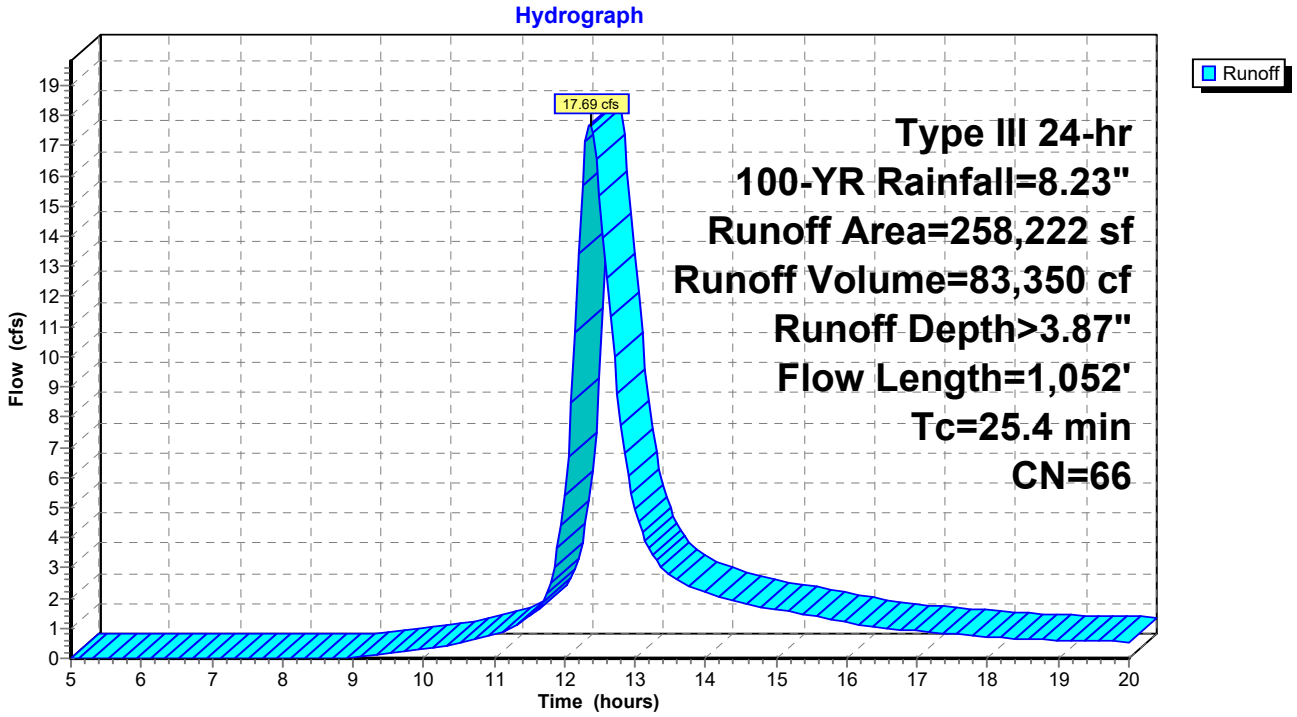
Runoff = 17.69 cfs @ 12.36 hrs, Volume= 83,350 cf, Depth> 3.87"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=8.23"

Area (sf)	CN	Description
37,653	39	>75% Grass cover, Good, HSG A
61,350	61	>75% Grass cover, Good, HSG B
21,649	74	>75% Grass cover, Good, HSG C
43,026	58	Woods/grass comb., Good, HSG B
8,196	55	Woods, Good, HSG B
15,249	82	Dirt roads, HSG B
46,663	79	Pasture/grassland/range, Poor, HSG B
2,900	85	Gravel roads, HSG B
8,520	98	Roofs, HSG C
13,016	98	Paved parking, HSG C
258,222	66	Weighted Average
236,686		91.66% Pervious Area
21,536		8.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.35"
3.4	424	0.0900	2.10		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	62	0.0150	2.49		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
3.2	133	0.0100	0.70		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
9.1	383	0.0100	0.70		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
25.4	1,052	Total			

Subcatchment EX-1: Existing Ws-1



Summary for Subcatchment EX-2: Existing Ws-2

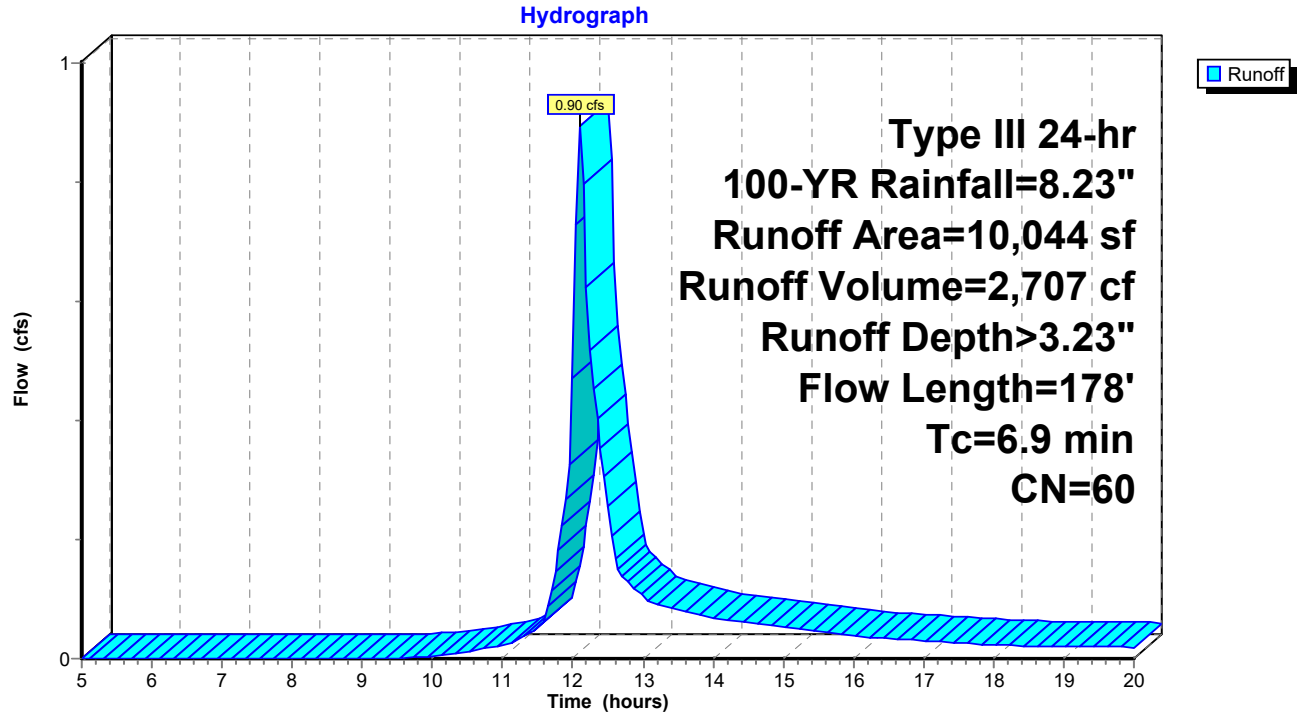
Runoff = 0.90 cfs @ 12.11 hrs, Volume= 2,707 cf, Depth> 3.23"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=8.23"

Area (sf)	CN	Description
6,768	55	Woods, Good, HSG B
3,276	70	Woods, Good, HSG C
10,044	60	Weighted Average
10,044		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.1100	0.13		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.35"
0.7	128	0.2100	3.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
6.9	178	Total			

Subcatchment EX-2: Existing Ws-2



Summary for Subcatchment EX-3: Existing Ws-3

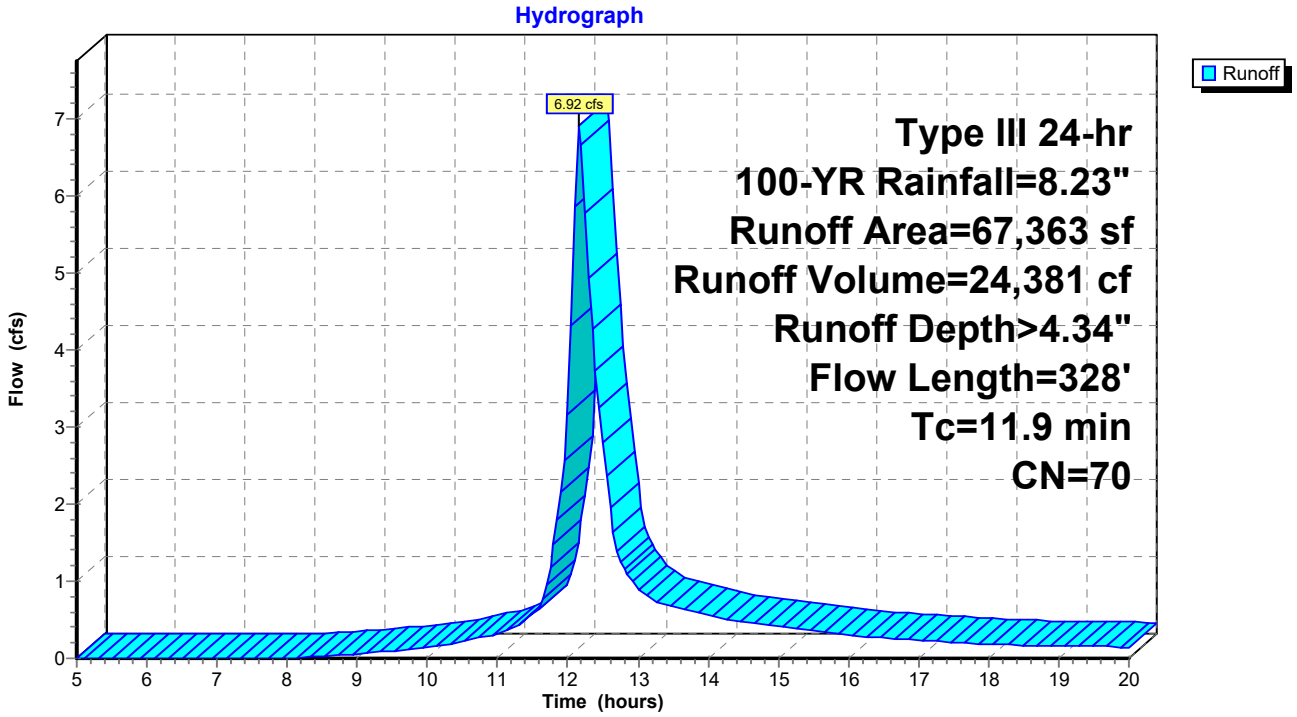
Runoff = 6.92 cfs @ 12.17 hrs, Volume= 24,381 cf, Depth> 4.34"
Routed to Link POA-2 : North Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=8.23"

Area (sf)	CN	Description
1,623	39	>75% Grass cover, Good, HSG A
3,933	74	>75% Grass cover, Good, HSG C
2,464	58	Woods/grass comb., Good, HSG B
22,420	72	Woods/grass comb., Good, HSG C
4,447	55	Woods, Good, HSG B
29,448	70	Woods, Good, HSG C
2,709	98	Roofs, HSG C
319	98	Paved parking, HSG C
67,363	70	Weighted Average
64,335		95.50% Pervious Area
3,028		4.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.35"
2.6	278	0.0650	1.78		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
11.9	328	Total			

Subcatchment EX-3: Existing Ws-3



Summary for Subcatchment EX-4: Existing Ws-4

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

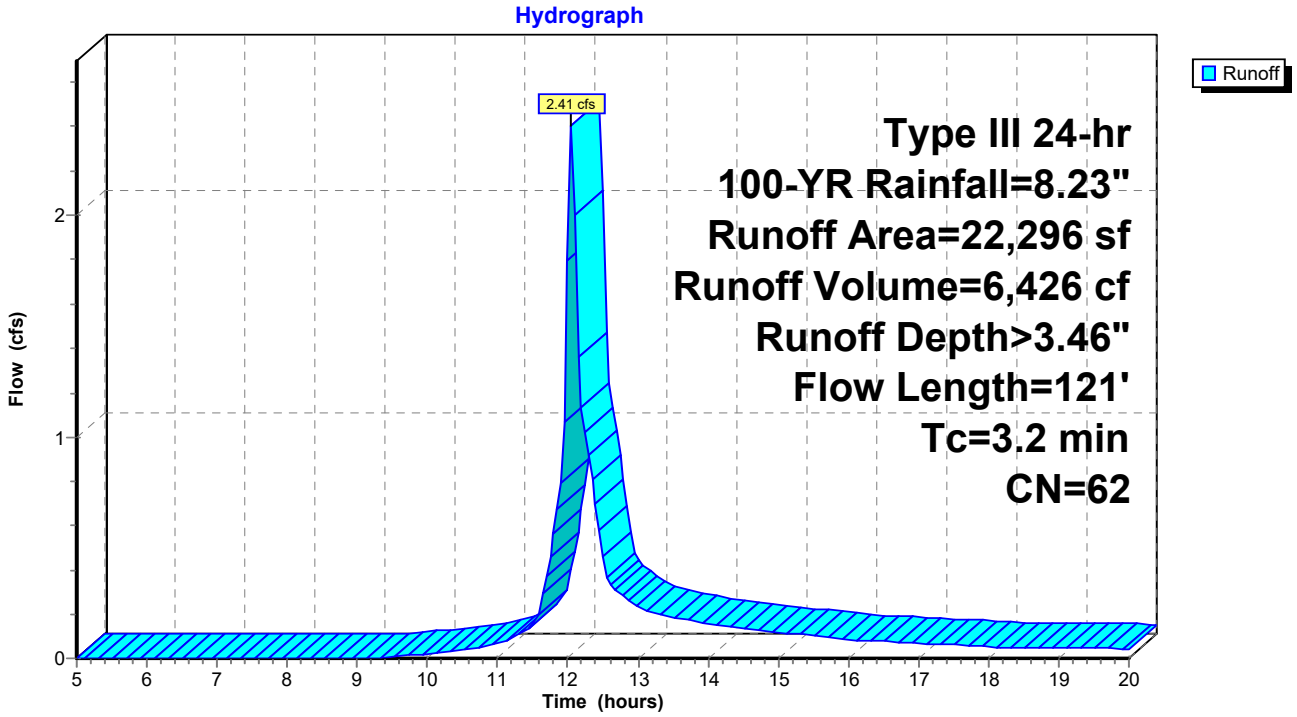
Runoff = 2.41 cfs @ 12.05 hrs, Volume= 6,426 cf, Depth> 3.46"
Routed to Link POA-3 : 33 N Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=8.23"

Area (sf)	CN	Description
8,905	39	>75% Grass cover, Good, HSG A
11,857	74	>75% Grass cover, Good, HSG C
1,534	98	Paved parking, HSG B
22,296	62	Weighted Average
20,762		93.12% Pervious Area
1,534		6.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	21	0.0300	1.21		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.35"
2.0	29	0.0850	0.24		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.35"
0.9	71	0.0350	1.31		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
3.2	121	Total			

Subcatchment EX-4: Existing Ws-4

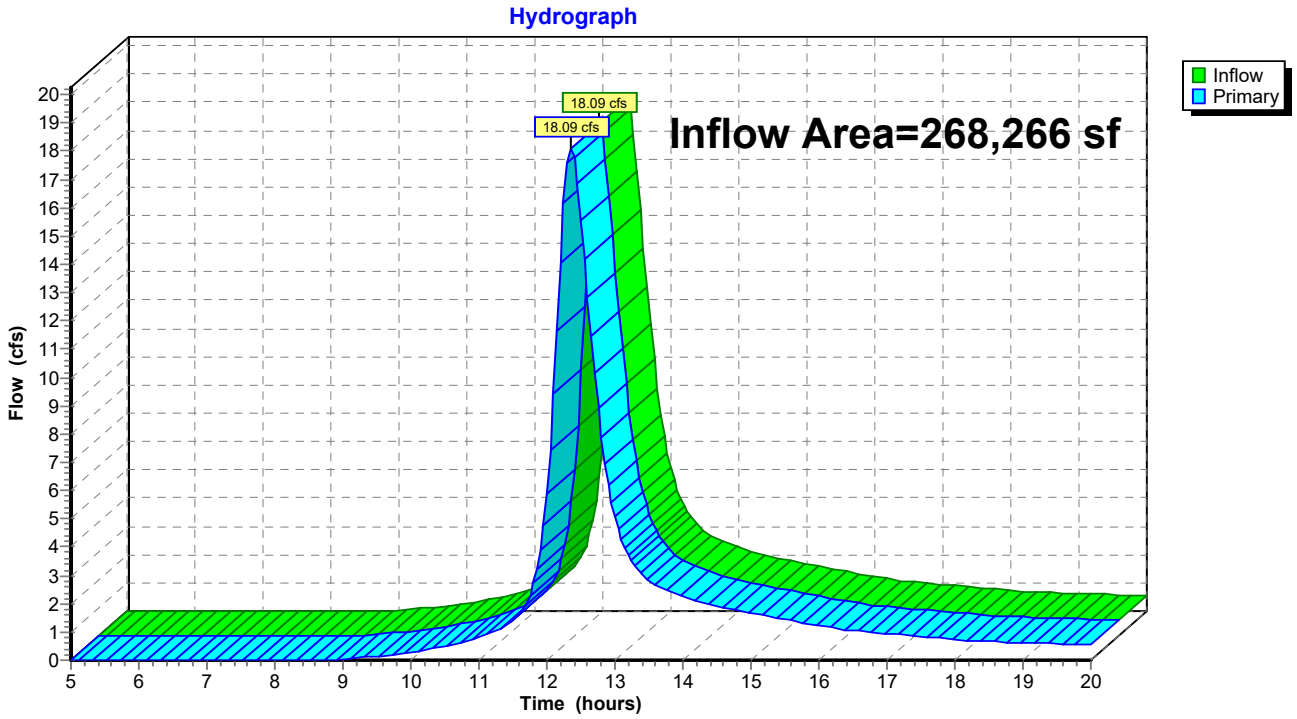


Summary for Link POA-1: Hunting Lane (Off-site)

Inflow Area = 268,266 sf, 8.03% Impervious, Inflow Depth > 3.85" for 100-YR event
Inflow = 18.09 cfs @ 12.36 hrs, Volume= 86,057 cf
Primary = 18.09 cfs @ 12.36 hrs, Volume= 86,057 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link POA-1: Hunting Lane (Off-site)

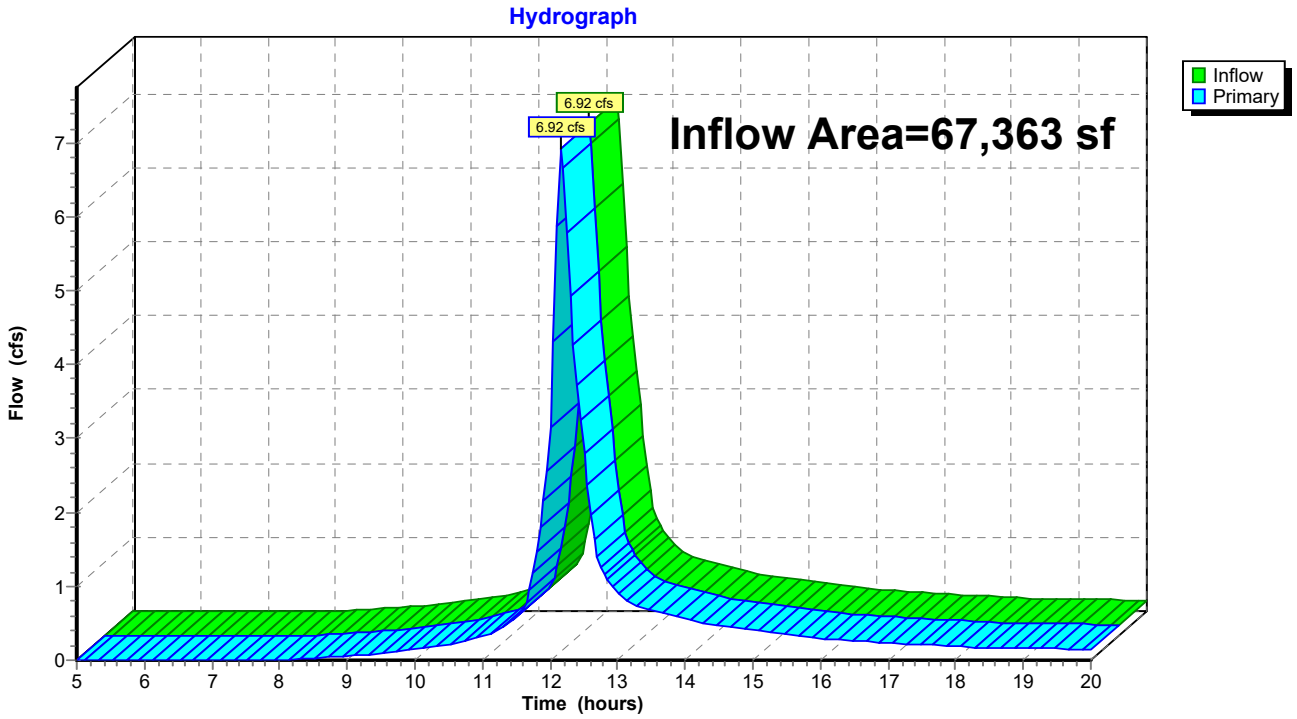


Summary for Link POA-2: North Main Street (Offsite)

Inflow Area = 67,363 sf, 4.50% Impervious, Inflow Depth > 4.34" for 100-YR event
Inflow = 6.92 cfs @ 12.17 hrs, Volume= 24,381 cf
Primary = 6.92 cfs @ 12.17 hrs, Volume= 24,381 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link POA-2: North Main Street (Offsite)

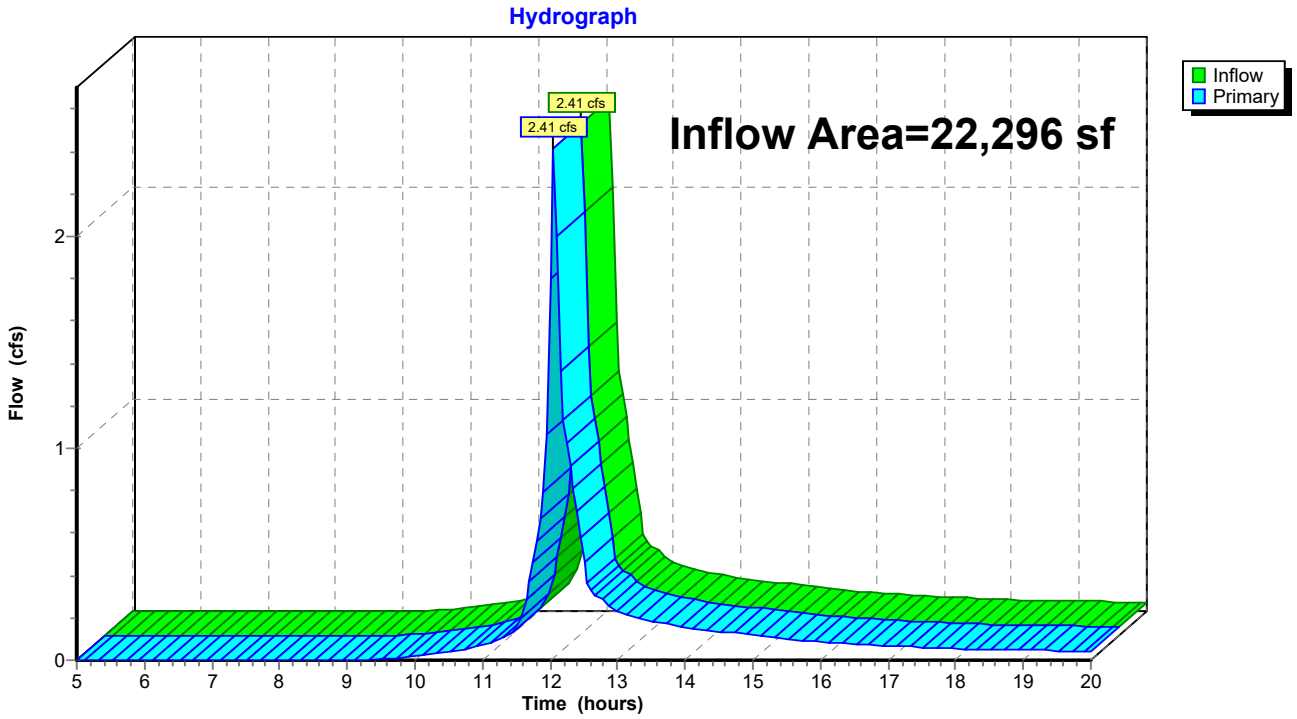


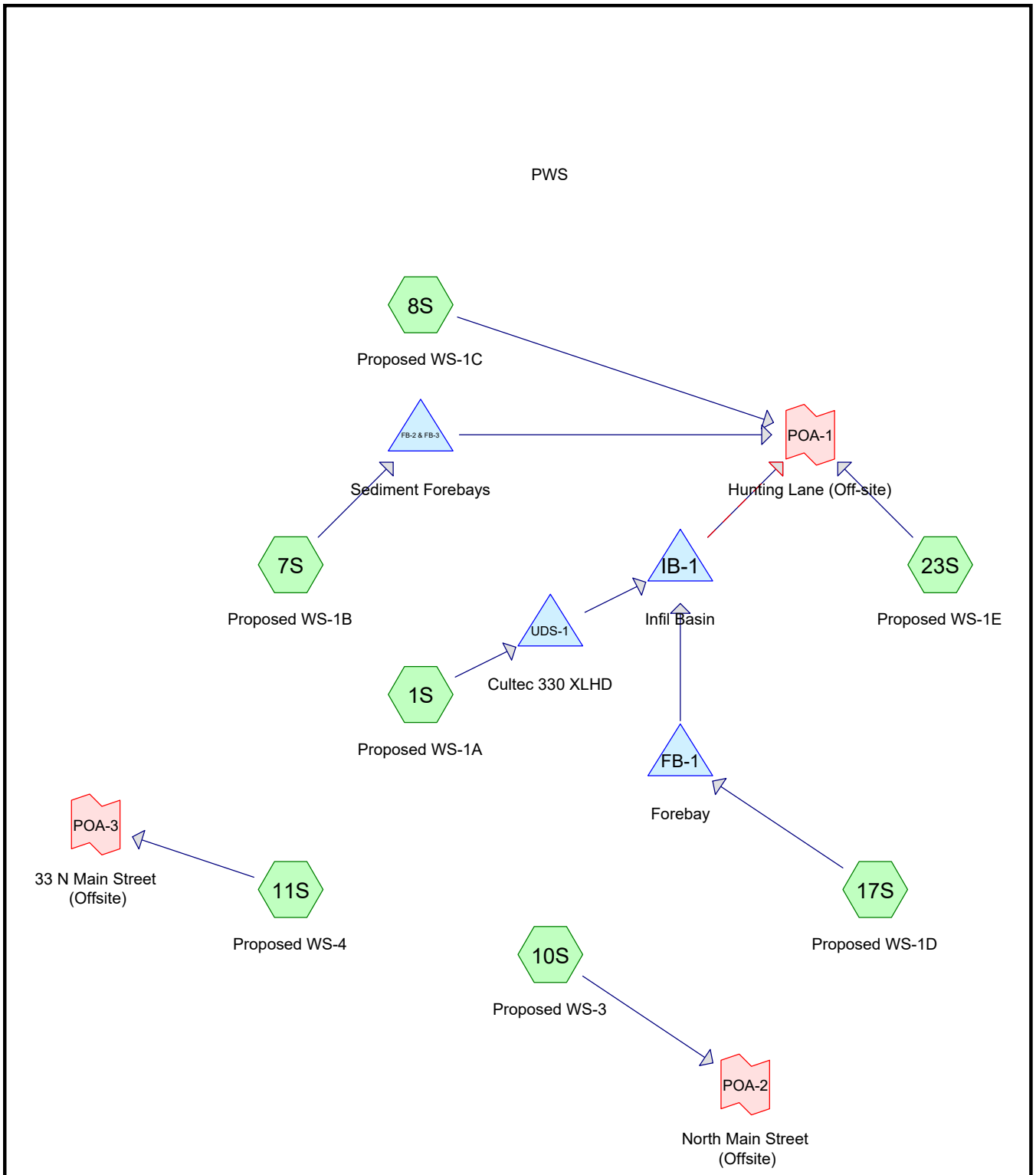
Summary for Link POA-3: 33 N Main Street (Offsite)

Inflow Area = 22,296 sf, 6.88% Impervious, Inflow Depth > 3.46" for 100-YR event
Inflow = 2.41 cfs @ 12.05 hrs, Volume= 6,426 cf
Primary = 2.41 cfs @ 12.05 hrs, Volume= 6,426 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link POA-3: 33 N Main Street (Offsite)





Routing Diagram for 23048_Post-Dev
Prepared by Highpoint Engineering, Inc, Printed 1/23/2025

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-YR	Type III 24-hr		Default	24.00	1	3.35	2
2	10-YR	Type III 24-hr		Default	24.00	1	5.24	2
3	25-YR	Type III 24-hr		Default	24.00	1	6.42	2
4	100-YR	Type III 24-hr		Default	24.00	1	8.23	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
44,552	39	>75% Grass cover, Good, HSG A (1S, 7S, 8S, 10S, 11S)
129,567	61	>75% Grass cover, Good, HSG B (1S, 8S, 11S, 17S, 23S)
66,042	74	>75% Grass cover, Good, HSG C (1S, 10S, 17S, 23S)
13,516	98	Unconnected pavement, HSG A (1S, 7S, 10S)
70,935	98	Unconnected pavement, HSG B (1S, 8S, 10S, 17S, 23S)
33,300	98	Unconnected pavement, HSG C (1S, 17S)
357,912	**73**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
58,068	HSG A	1S, 7S, 8S, 10S, 11S
200,502	HSG B	1S, 8S, 10S, 11S, 17S, 23S
99,342	HSG C	1S, 10S, 17S, 23S
0	HSG D	
0	Other	
357,912		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
44,552	129,567	66,042	0	0	240,161	>75% Grass cover, Good	
13,516	70,935	33,300	0	0	117,751	Unconnected pavement	
58,068	**200,502**	**99,342**	**0**	**0**	**357,912**	**TOTAL AREA**	

Time span=5.00-96.00 hrs, dt=0.01 hrs, 9101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Proposed WS-1A Runoff Area=127,763 sf 45.93% Impervious Runoff Depth=1.52"
Tc=6.0 min CN=80 Runoff=5.18 cfs 16,164 cf

Subcatchment7S: Proposed WS-1B Runoff Area=25,142 sf 42.69% Impervious Runoff Depth=0.63"
Tc=6.0 min CN=64 Runoff=0.33 cfs 1,321 cf

Subcatchment8S: Proposed WS-1C Runoff Area=62,999 sf 5.13% Impervious Runoff Depth=0.30"
Flow Length=970' Tc=37.8 min UI Adjusted CN=55 Runoff=0.13 cfs 1,558 cf

Subcatchment10S: Proposed WS-3 Runoff Area=27,552 sf 5.91% Impervious Runoff Depth=1.08"
Tc=6.0 min UI Adjusted CN=73 Runoff=0.76 cfs 2,480 cf

Subcatchment11S: Proposed WS-4 Runoff Area=20,492 sf 0.00% Impervious Runoff Depth=0.21"
Flow Length=195' Tc=6.4 min CN=52 Runoff=0.03 cfs 360 cf

Subcatchment17S: Proposed WS-1D Runoff Area=54,797 sf 52.55% Impervious Runoff Depth=1.73"
Tc=6.0 min CN=83 Runoff=2.56 cfs 7,914 cf

Subcatchment23S: Proposed WS-1E Runoff Area=39,167 sf 37.48% Impervious Runoff Depth=1.26"
Tc=6.0 min CN=76 Runoff=1.29 cfs 4,105 cf

Pond FB-1: Forebay Peak Elev=176.46' Storage=3,552 cf Inflow=2.56 cfs 7,914 cf
Outflow=0.27 cfs 7,908 cf

Pond FB-2 & FB-3: Sediment Forebays Peak Elev=171.59' Storage=1,321 cf Inflow=0.33 cfs 1,321 cf
Outflow=0.00 cfs 0 cf

Pond IB-1: Infil Basin Peak Elev=172.75' Storage=8,569 cf Inflow=3.87 cfs 23,987 cf
Discarded=0.11 cfs 23,987 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.11 cfs 23,987 cf

Pond UDS-1: Cultec 330 XLHD Peak Elev=172.75' Storage=0.243 af Inflow=5.18 cfs 16,164 cf
15.0" Round Culvert x 8.00 n=0.012 L=15.0' S=0.0000 '/' Outflow=3.64 cfs 16,079 cf

Link POA-1: Hunting Lane (Off-site) Inflow=1.29 cfs 5,663 cf
Primary=1.29 cfs 5,663 cf

Link POA-2: North Main Street (Offsite) Inflow=0.76 cfs 2,480 cf
Primary=0.76 cfs 2,480 cf

Link POA-3: 33 N Main Street (Offsite) Inflow=0.03 cfs 360 cf
Primary=0.03 cfs 360 cf

Total Runoff Area = 357,912 sf Runoff Volume = 33,902 cf Average Runoff Depth = 1.14"
67.10% Pervious = 240,161 sf 32.90% Impervious = 117,751 sf

Summary for Subcatchment 1S: Proposed WS-1A

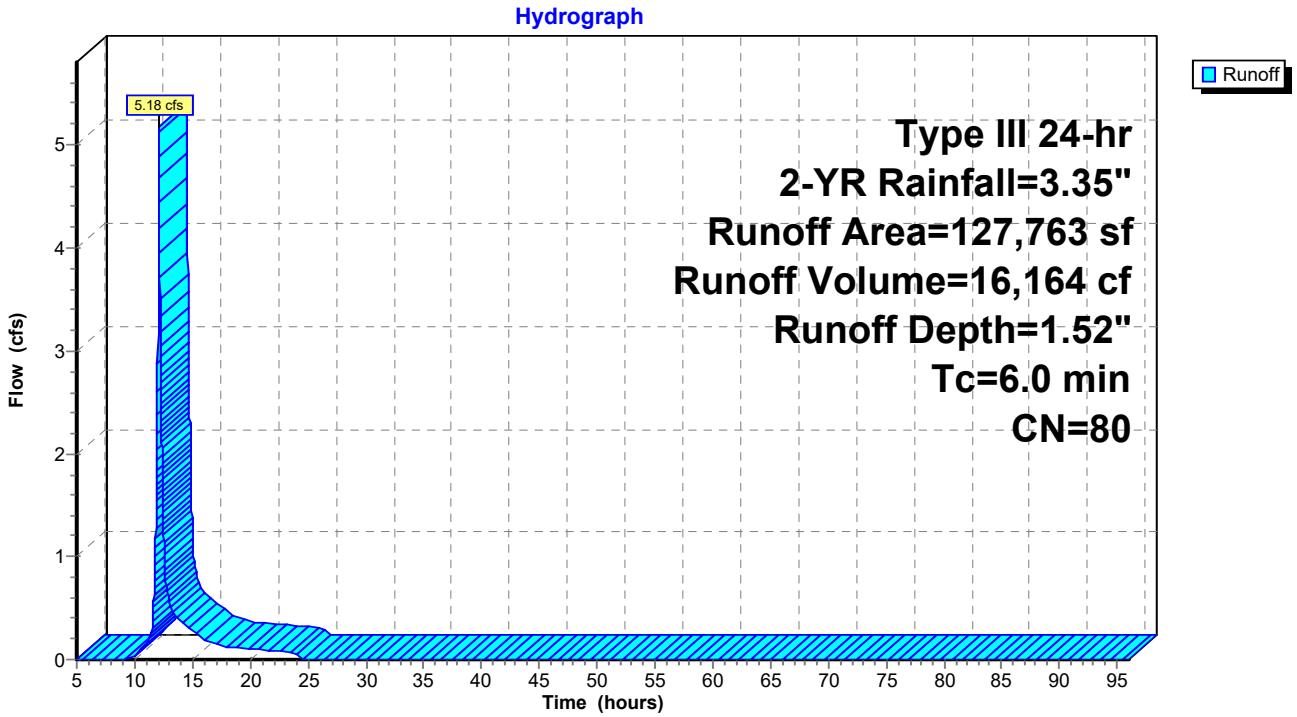
Runoff = 5.18 cfs @ 12.09 hrs, Volume= 16,164 cf, Depth= 1.52"
Routed to Pond UDS-1 : Cultec 330 XLHD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.35"

Area (sf)	CN	Description
2,745	98	Unconnected pavement, HSG A
33,953	98	Unconnected pavement, HSG B
21,986	98	Unconnected pavement, HSG C
1,946	39	>75% Grass cover, Good, HSG A
41,046	61	>75% Grass cover, Good, HSG B
26,087	74	>75% Grass cover, Good, HSG C
127,763	80	Weighted Average
69,079		54.07% Pervious Area
58,684		45.93% Impervious Area
58,684		100.00% Unconnected

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

Subcatchment 1S: Proposed WS-1A



Summary for Subcatchment 7S: Proposed WS-1B

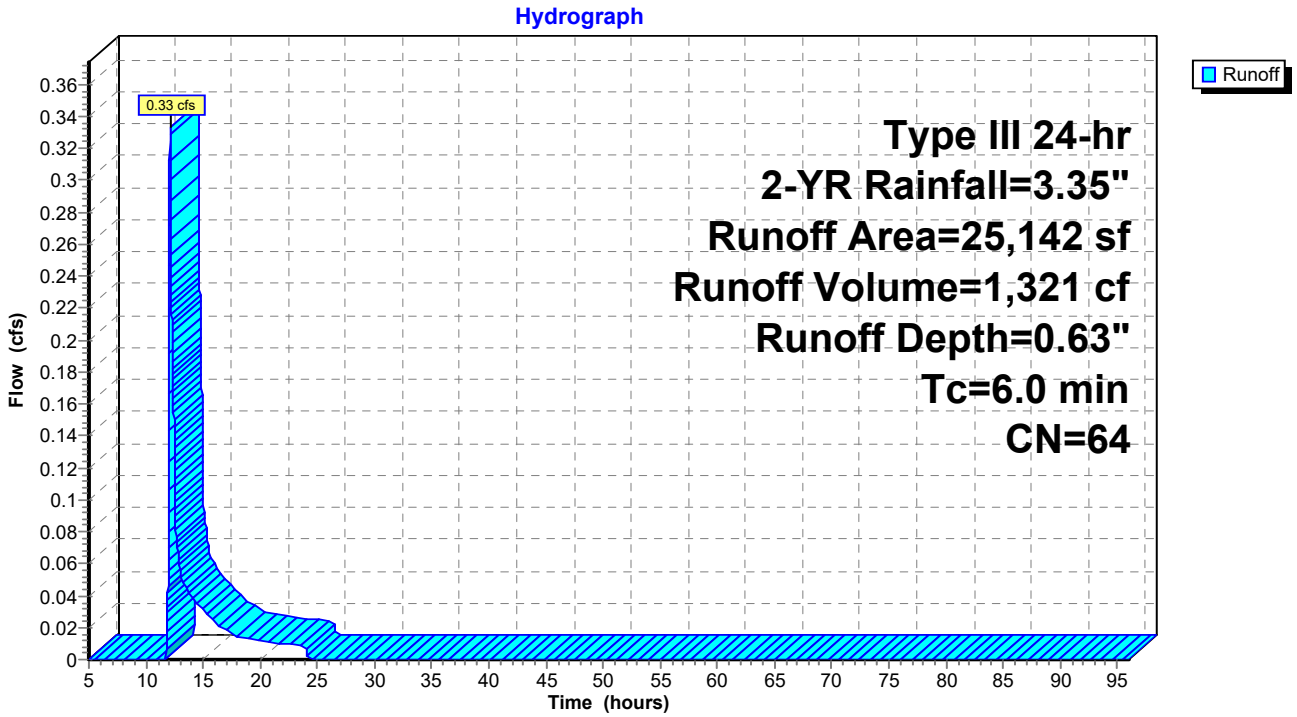
Runoff = 0.33 cfs @ 12.11 hrs, Volume= 1,321 cf, Depth= 0.63"
Routed to Pond FB-2 & FB-3 : Sediment Forebays

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.35"

Area (sf)	CN	Description
10,733	98	Unconnected pavement, HSG A
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG C
14,409	39	>75% Grass cover, Good, HSG A
0	61	>75% Grass cover, Good, HSG B
0	74	>75% Grass cover, Good, HSG C
25,142	64	Weighted Average
14,409		57.31% Pervious Area
10,733		42.69% Impervious Area
10,733		100.00% Unconnected

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

Subcatchment 7S: Proposed WS-1B



Summary for Subcatchment 8S: Proposed WS-1C

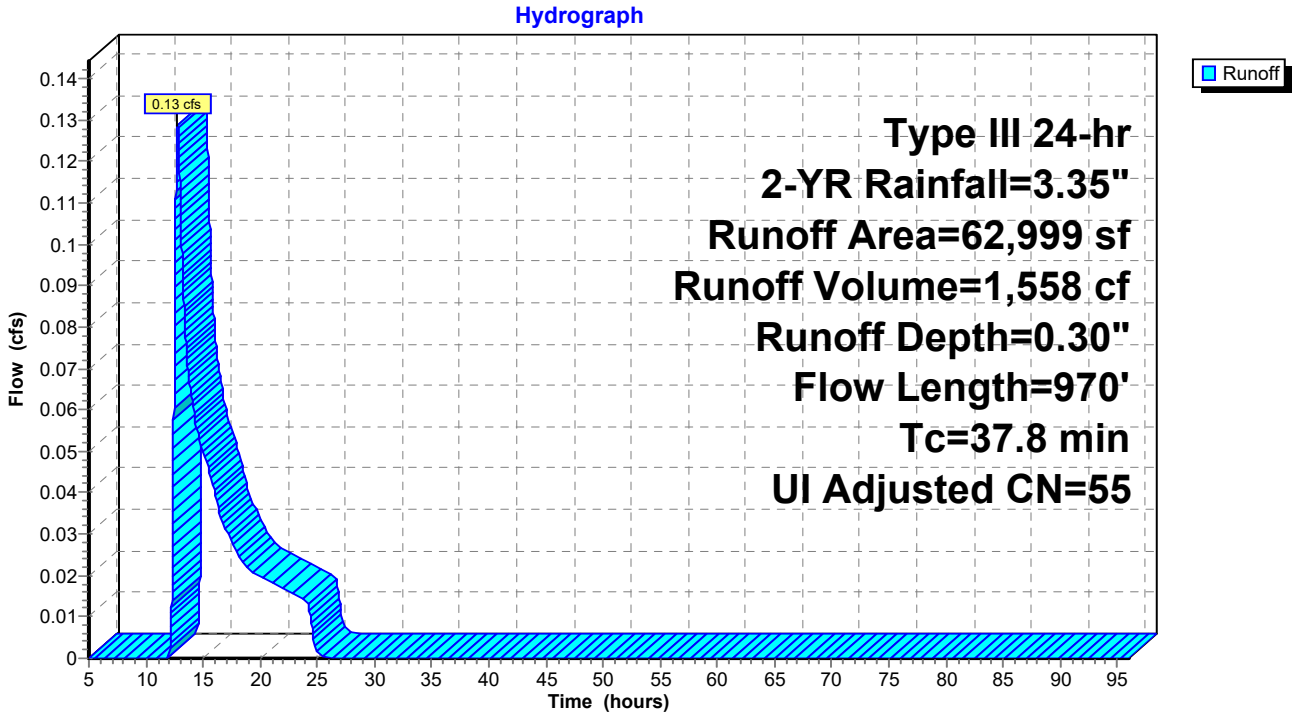
Runoff = 0.13 cfs @ 12.77 hrs, Volume= 1,558 cf, Depth= 0.30"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.35"

Area (sf)	CN	Adj	Description
0	98		Unconnected pavement, HSG A
3,231	98		Unconnected pavement, HSG B
0	98		Unconnected pavement, HSG C
18,478	39		>75% Grass cover, Good, HSG A
41,290	61		>75% Grass cover, Good, HSG B
0	74		>75% Grass cover, Good, HSG C
62,999	56	55	Weighted Average, UI Adjusted
59,768			94.87% Pervious Area
3,231			5.13% Impervious Area
3,231			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	50	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.35"
27.2	920	0.0065	0.56		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
37.8	970	Total			

Subcatchment 8S: Proposed WS-1C



Summary for Subcatchment 10S: Proposed WS-3

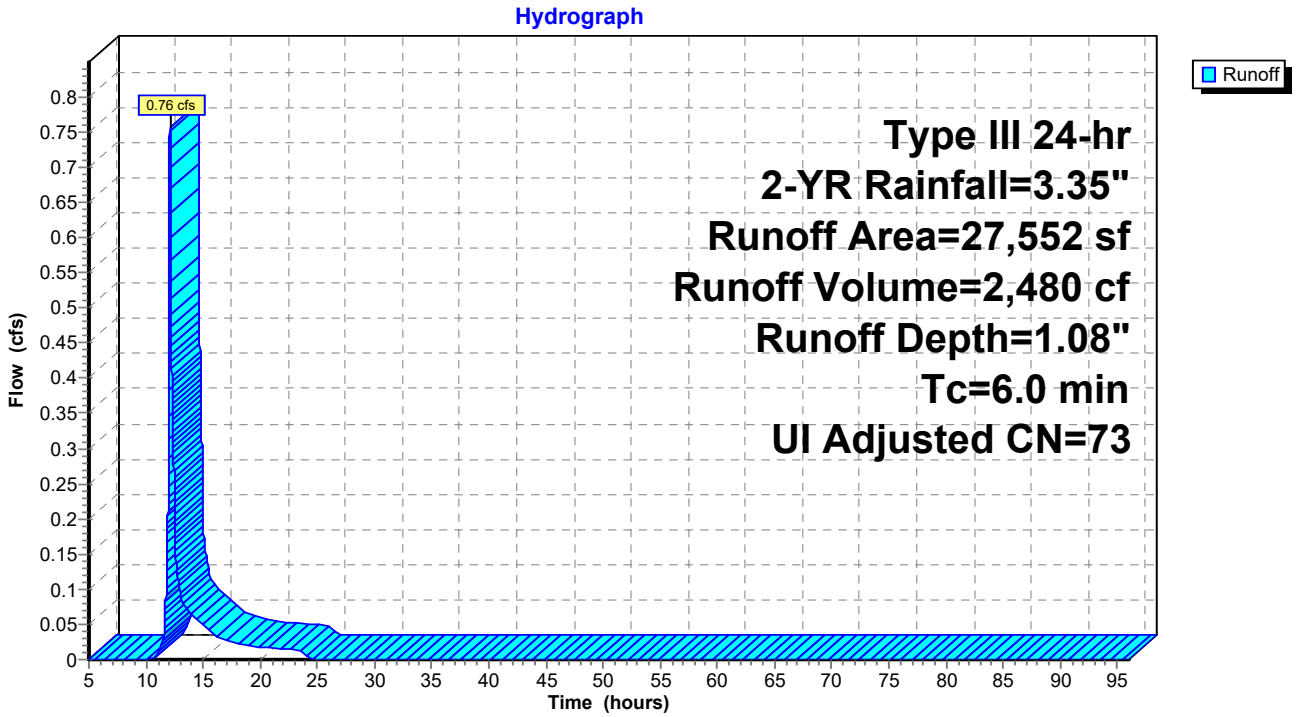
Runoff = 0.76 cfs @ 12.10 hrs, Volume= 2,480 cf, Depth= 1.08"
Routed to Link POA-2 : North Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.35"

Area (sf)	CN	Adj	Description
38	98		Unconnected pavement, HSG A
1,589	98		Unconnected pavement, HSG B
0	98		Unconnected pavement, HSG C
1,223	39		>75% Grass cover, Good, HSG A
0	61		>75% Grass cover, Good, HSG B
24,702	74		>75% Grass cover, Good, HSG C
27,552	74	73	Weighted Average, UI Adjusted
25,925			94.09% Pervious Area
1,627			5.91% Impervious Area
1,627			100.00% Unconnected

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

Subcatchment 10S: Proposed WS-3



Summary for Subcatchment 11S: Proposed WS-4

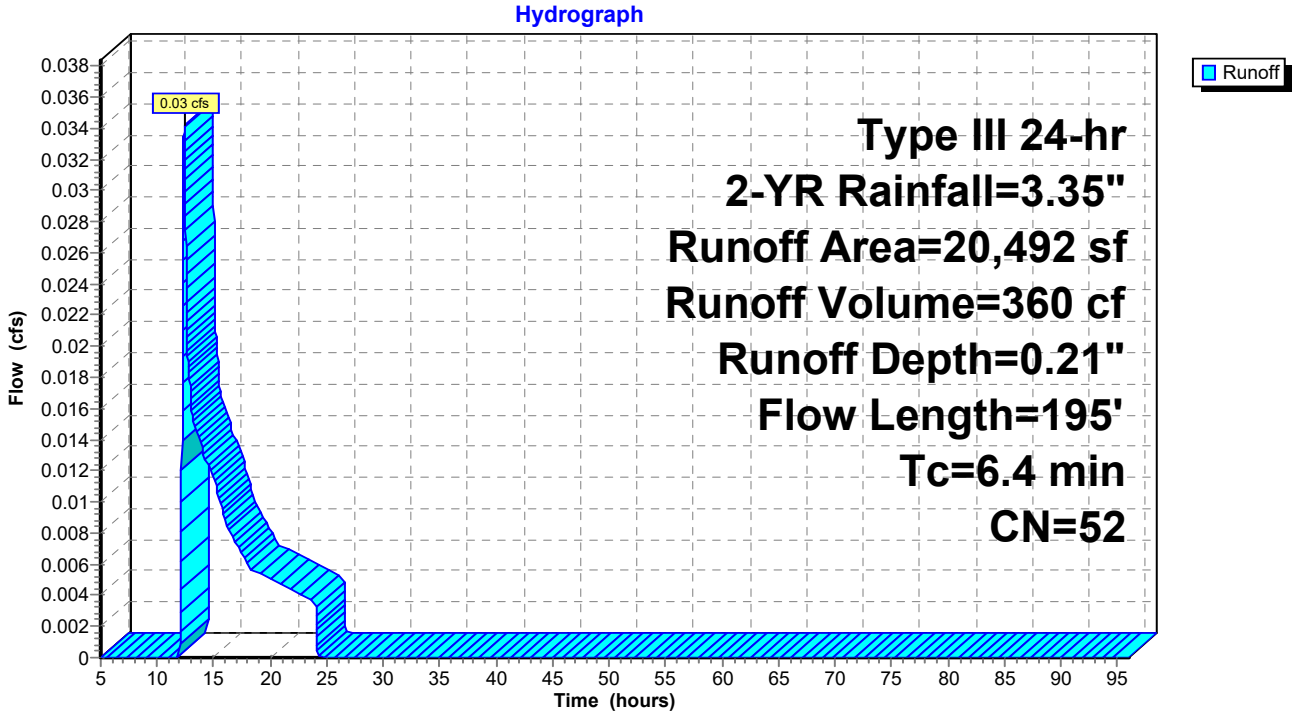
Runoff = 0.03 cfs @ 12.38 hrs, Volume= 360 cf, Depth= 0.21"
Routed to Link POA-3 : 33 N Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.35"

Area (sf)	CN	Description
0	98	Unconnected pavement, HSG A
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG C
8,496	39	>75% Grass cover, Good, HSG A
11,996	61	>75% Grass cover, Good, HSG B
0	74	>75% Grass cover, Good, HSG C
20,492	52	Weighted Average
20,492		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0700	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.35"
1.5	145	0.0520	1.60		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.4	195	Total			

Subcatchment 11S: Proposed WS-4



Summary for Subcatchment 17S: Proposed WS-1D

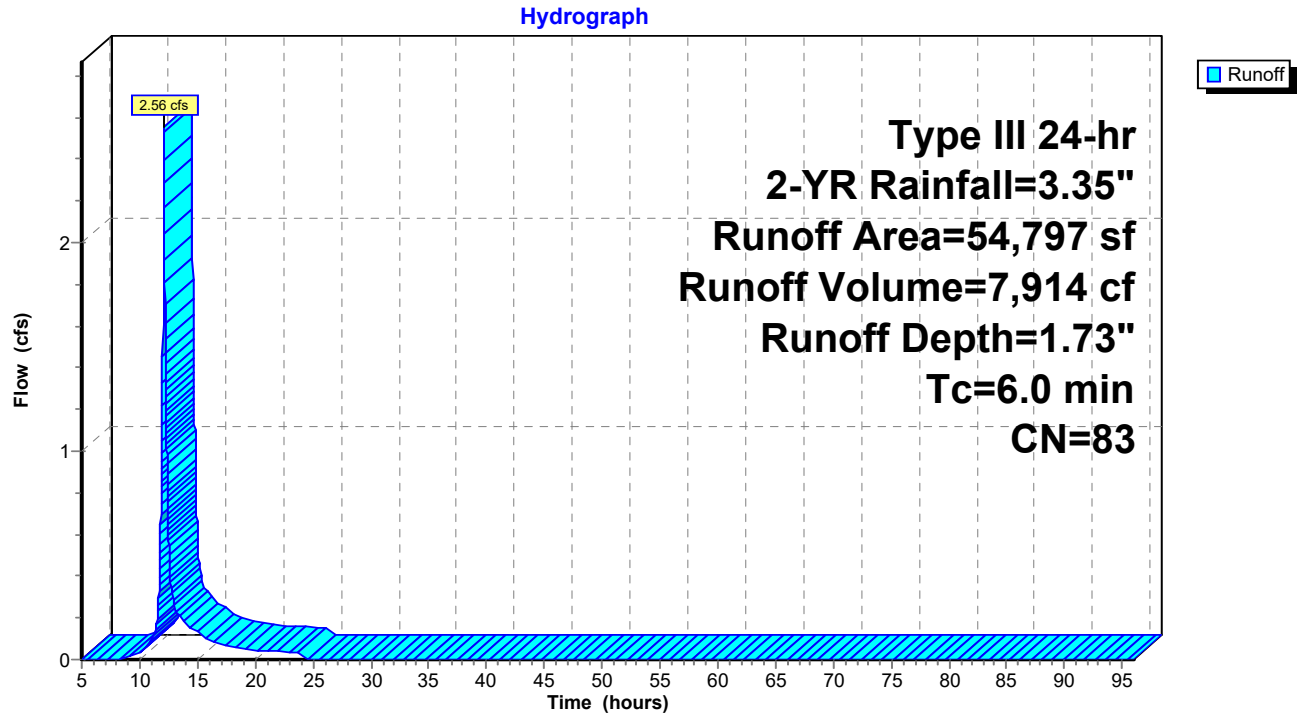
Runoff = 2.56 cfs @ 12.09 hrs, Volume= 7,914 cf, Depth= 1.73"
Routed to Pond FB-1 : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.35"

Area (sf)	CN	Description
0	98	Unconnected pavement, HSG A
17,482	98	Unconnected pavement, HSG B
11,314	98	Unconnected pavement, HSG C
0	39	>75% Grass cover, Good, HSG A
13,949	61	>75% Grass cover, Good, HSG B
12,052	74	>75% Grass cover, Good, HSG C
54,797	83	Weighted Average
26,001		47.45% Pervious Area
28,796		52.55% Impervious Area
28,796		100.00% Unconnected

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

Subcatchment 17S: Proposed WS-1D



Summary for Subcatchment 23S: Proposed WS-1E

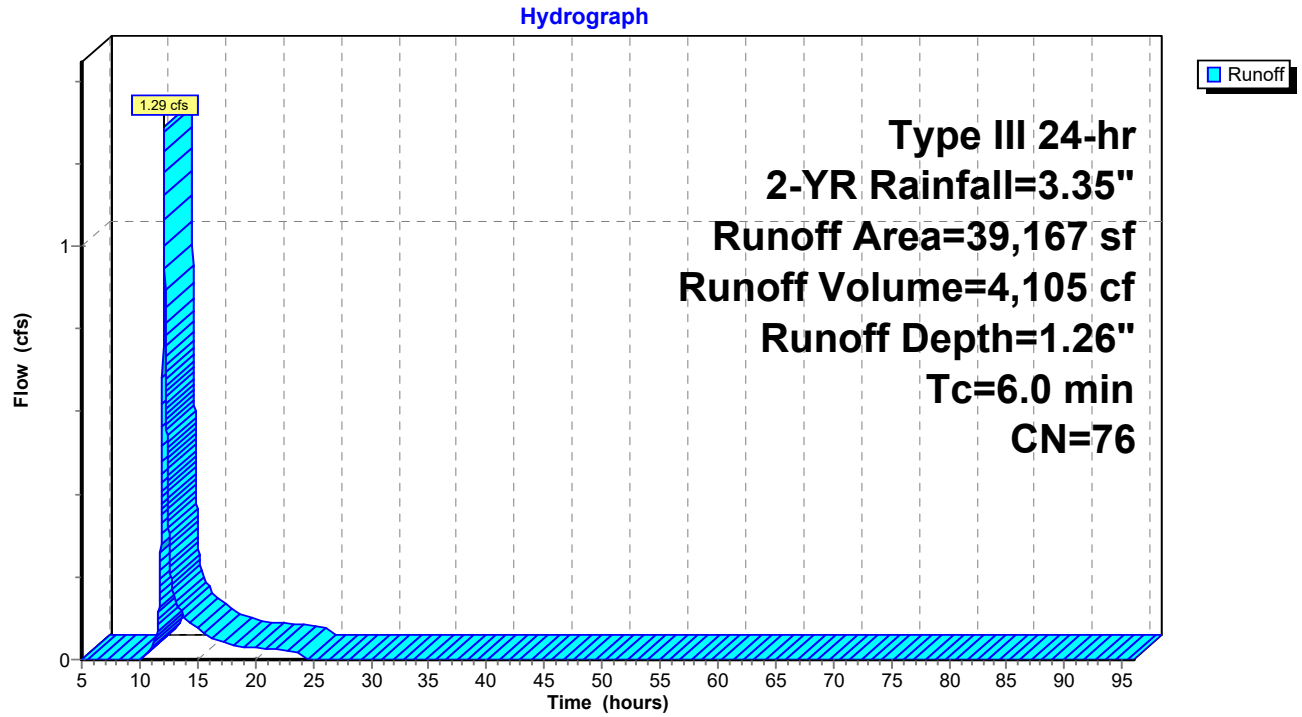
Runoff = 1.29 cfs @ 12.09 hrs, Volume= 4,105 cf, Depth= 1.26"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.35"

Area (sf)	CN	Description
0	98	Unconnected pavement, HSG A
14,680	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG C
0	39	>75% Grass cover, Good, HSG A
21,286	61	>75% Grass cover, Good, HSG B
3,201	74	>75% Grass cover, Good, HSG C
39,167	76	Weighted Average
24,487		62.52% Pervious Area
14,680		37.48% Impervious Area
14,680		100.00% Unconnected

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

Subcatchment 23S: Proposed WS-1E



Summary for Pond FB-1: Forebay

Inflow Area = 54,797 sf, 52.55% Impervious, Inflow Depth = 1.73" for 2-YR event
Inflow = 2.56 cfs @ 12.09 hrs, Volume= 7,914 cf
Outflow = 0.27 cfs @ 12.96 hrs, Volume= 7,908 cf, Atten= 89%, Lag= 52.1 min
Primary = 0.27 cfs @ 12.96 hrs, Volume= 7,908 cf
Routed to Pond IB-1 : Infil Basin

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 176.46' @ 12.96 hrs Surf.Area= 2,988 sf Storage= 3,552 cf
Flood Elev= 178.00' Surf.Area= 4,254 sf Storage= 9,123 cf

Plug-Flow detention time= 170.3 min calculated for 7,907 cf (100% of inflow)
Center-of-Mass det. time= 170.2 min (1,001.0 - 830.8)

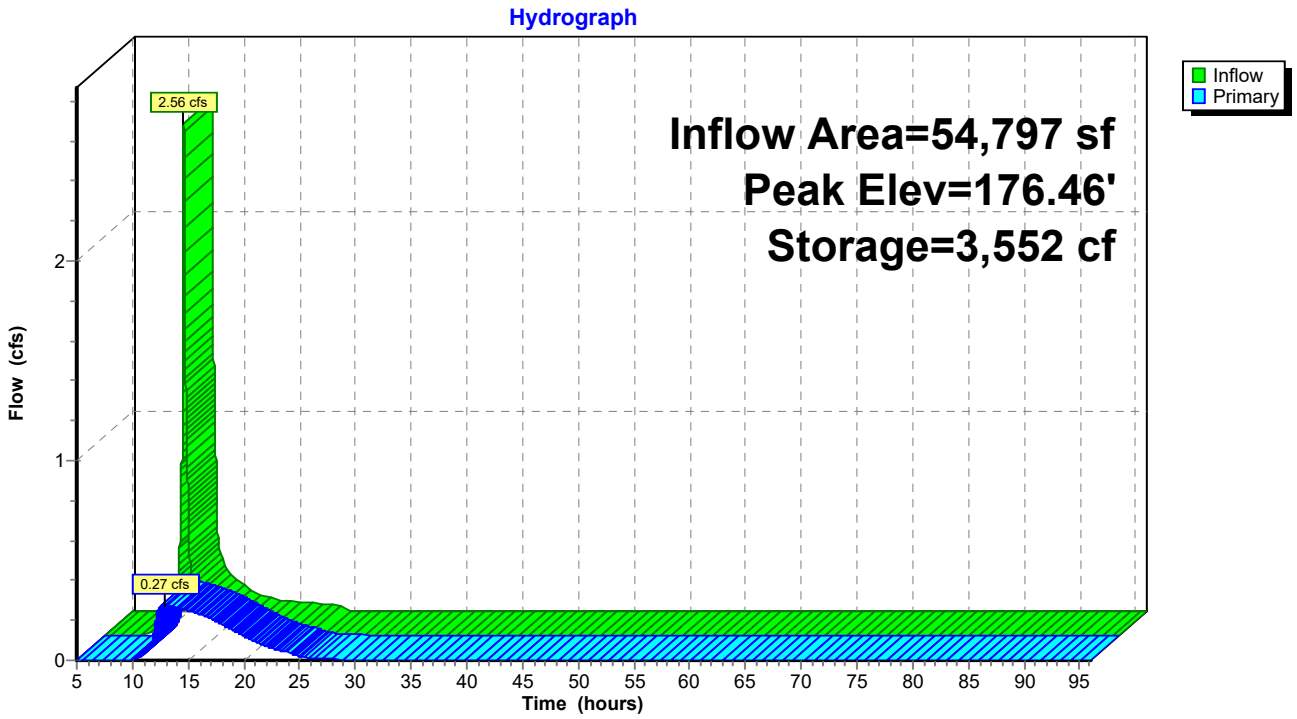
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	9,123 cf	**Basin A (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	1,904	0	0
176.00	2,630	2,267	2,267
177.00	3,414	3,022	5,289
178.00	4,254	3,834	9,123

Device	Routing	Invert	Outlet Devices
#1	Device 3	177.00'	**2.0" x 2.0" Horiz. 12" x 24" grate X 10.00 columns** X 5 rows C= 0.600 in 24.0" x 12.0" Grate (69% open area)
#2	Device 3	176.50'	**6.0" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#3	Primary	174.65'	**12.0" Round HDPE Culvert** L= 118.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 174.65' / 171.11' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	175.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.27 cfs @ 12.96 hrs HW=176.46' TW=171.83' (Dynamic Tailwater)
└─**3=HDPE Culvert** (Passes 0.27 cfs of 3.41 cfs potential flow)
  ├─**1=12" x 24" grate** (Controls 0.00 cfs)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 0.27 cfs @ 5.56 fps)

Pond FB-1: Forebay



Summary for Pond FB-2 & FB-3: Sediment Forebays

Inflow Area = 25,142 sf, 42.69% Impervious, Inflow Depth = 0.63" for 2-YR event
Inflow = 0.33 cfs @ 12.11 hrs, Volume= 1,321 cf
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Routed to Link POA-1 : Hunting Lane (Off-site)

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 171.59' @ 24.34 hrs Surf.Area= 2,615 sf Storage= 1,321 cf

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

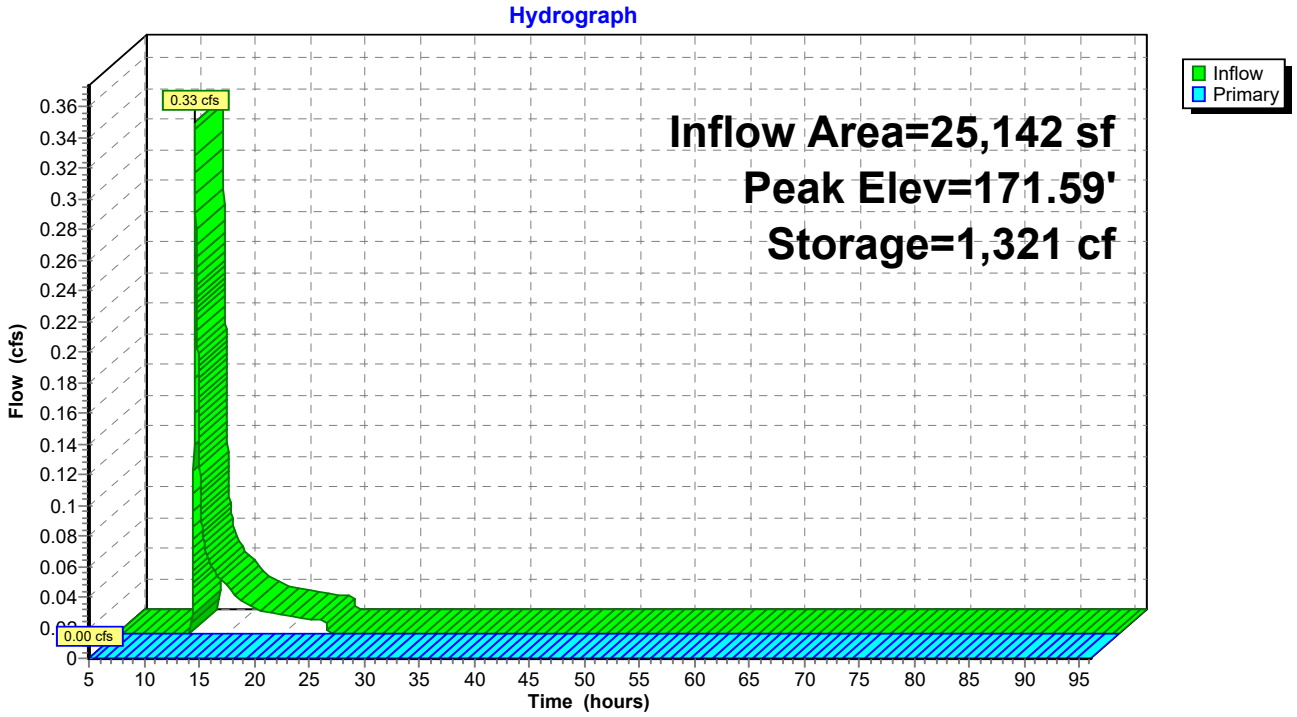
Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	4,257 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
171.00	1,856	0	0
172.00	3,140	2,498	2,498
172.50	3,897	1,759	4,257

Device	Routing	Invert	Outlet Devices
#1	Primary	172.25'	**30.0' long x 3.0' 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 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=171.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond FB-2 & FB-3: Sediment Forebays



Summary for Pond IB-1: Infil Basin

[80] Warning: Exceeded Pond UDS-1 by 0.01' @ 12.25 hrs (1.16 cfs 72,272 cf)

Inflow Area = 182,560 sf, 47.92% Impervious, Inflow Depth > 1.58" for 2-YR event
Inflow = 3.87 cfs @ 12.18 hrs, Volume= 23,987 cf
Outflow = 0.11 cfs @ 23.82 hrs, Volume= 23,987 cf, Atten= 97%, Lag= 698.7 min
Discarded = 0.11 cfs @ 23.82 hrs, Volume= 23,987 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Routed to Link POA-1 : Hunting Lane (Off-site)
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Routed to Link POA-1 : Hunting Lane (Off-site)

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 172.75' @ 23.82 hrs Surf.Area= 4,689 sf Storage= 8,569 cf
Flood Elev= 175.00' Surf.Area= 7,711 sf Storage= 22,476 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 936.6 min (2,805.2 - 1,868.7)

Volume	Invert	Avail.Storage	Storage Description
#1	170.00'	22,476 cf	**Basin A (Prismatic)**Listed below (Recalc)

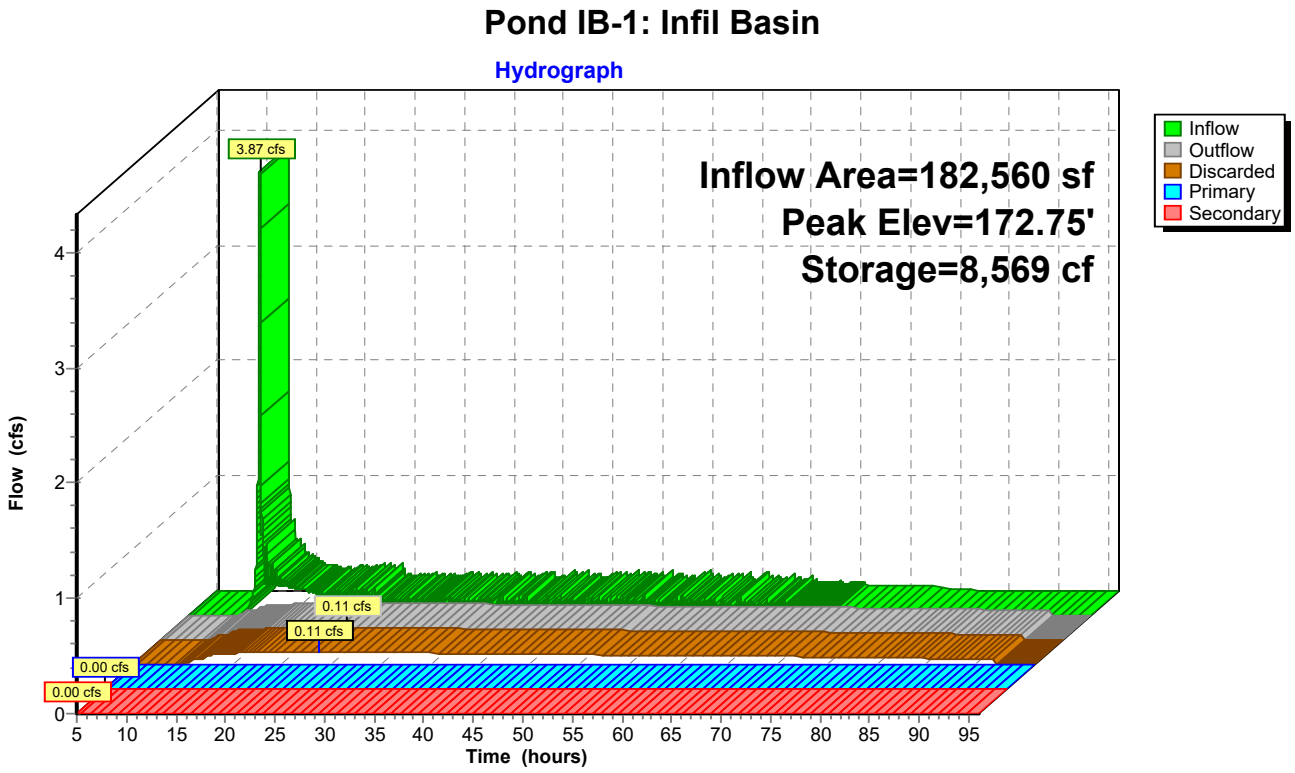
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
170.00	1,749	0	0
171.00	2,649	2,199	2,199
172.00	3,770	3,210	5,409
173.00	5,000	4,385	9,794
174.00	6,327	5,664	15,457
175.00	7,711	7,019	22,476

Device	Routing	Invert	Outlet Devices
#1	Discarded	170.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	170.00'	**18.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 170.00' / 169.10' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#3	Device 2	173.75'	**2.0" x 2.0" Horiz. Orifice/Grate X 20.00 columns** X 10 rows C= 0.600 in 48.0" x 24.0" Grate (69% open area)
#4	Device 2	173.00'	**48.0" W x 10.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	174.00'	**10.0' long x 3.0' 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 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.11 cfs @ 23.82 hrs HW=172.75' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=170.00' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=170.00' TW=0.00' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)



Summary for Pond UDS-1: Cultec 330 XLHD

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1804)

Inflow Area = 127,763 sf, 45.93% Impervious, Inflow Depth = 1.52" for 2-YR event
Inflow = 5.18 cfs @ 12.09 hrs, Volume= 16,164 cf
Outflow = 3.64 cfs @ 12.17 hrs, Volume= 16,079 cf, Atten= 30%, Lag= 5.0 min
Primary = 3.64 cfs @ 12.17 hrs, Volume= 16,079 cf
Routed to Pond IB-1 : Infil Basin

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 172.75' @ 23.80 hrs Surf.Area= 0.170 ac Storage= 0.243 af
Flood Elev= 174.00' Surf.Area= 0.170 ac Storage= 0.352 af

Plug-Flow detention time= 1,458.1 min calculated for 16,079 cf (99% of inflow)
Center-of-Mass det. time= 1,455.0 min (2,295.4 - 840.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	171.00'	0.063 af	**35.33'W x 122.50'L x 3.04'H Field A** 0.302 af Overall - 0.144 af Embedded = 0.158 af x 40.0% Voids
#2A	171.00'	0.144 af	**Cultec R-330XLHD** x 119 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 7 rows
#3B	171.00'	0.045 af	**35.33'W x 87.50'L x 3.04'H Field B** 0.216 af Overall - 0.102 af Embedded = 0.114 af x 40.0% Voids
#4B	171.00'	0.102 af	**Cultec R-330XLHD** x 84 Inside #3 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 7 rows
		0.355 af	Total Available Storage

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

Device	Routing	Invert	Outlet Devices
#1	Primary	171.00'	**15.0" Round Culvert X 8.00** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 171.00' / 171.00' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.64 cfs @ 12.17 hrs HW=171.45' TW=171.19' (Dynamic Tailwater)
1=Culvert (Barrel Controls 3.64 cfs @ 1.71 fps)

Pond UDS-1: Cultec 330 XLHD - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (For residential use only)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 7 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

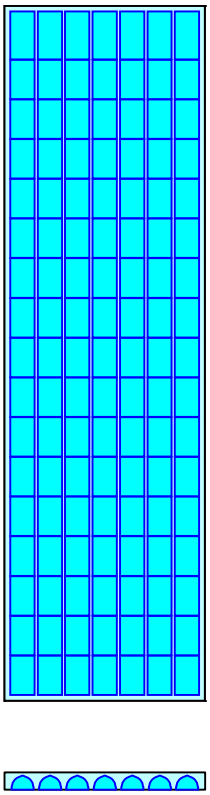
17 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 120.50' Row Length +12.0" End Stone x 2 = 122.50' Base Length
7 Rows x 52.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 35.33' Base Width
30.5" Chamber Height + 6.0" Stone Cover = 3.04' Field Height

119 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 7 Rows = 6,284.9 cf Chamber Storage

13,165.3 cf Field - 6,284.9 cf Chambers = 6,880.4 cf Stone x 40.0% Voids = 2,752.2 cf Stone Storage

Chamber Storage + Stone Storage = 9,037.1 cf = 0.207 af
Overall Storage Efficiency = 68.6%
Overall System Size = 122.50' x 35.33' x 3.04'

119 Chambers
487.6 cy Field
254.8 cy Stone



Pond UDS-1: Cultec 330 XLHD - Chamber Wizard Field B

Chamber Model = Cultec R-330XLHD (For residential use only)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 7 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

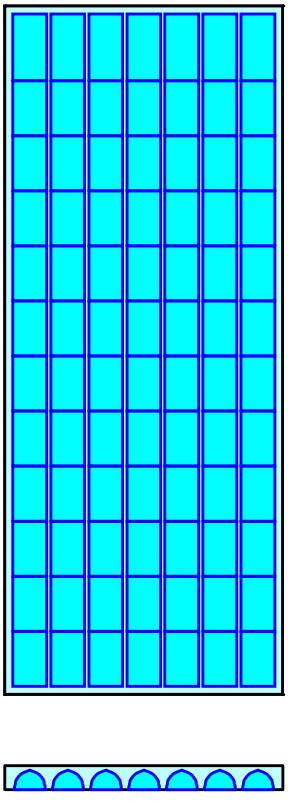
12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length
7 Rows x 52.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 35.33' Base Width
30.5" Chamber Height + 6.0" Stone Cover = 3.04' Field Height

84 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 7 Rows = 4,459.4 cf Chamber Storage

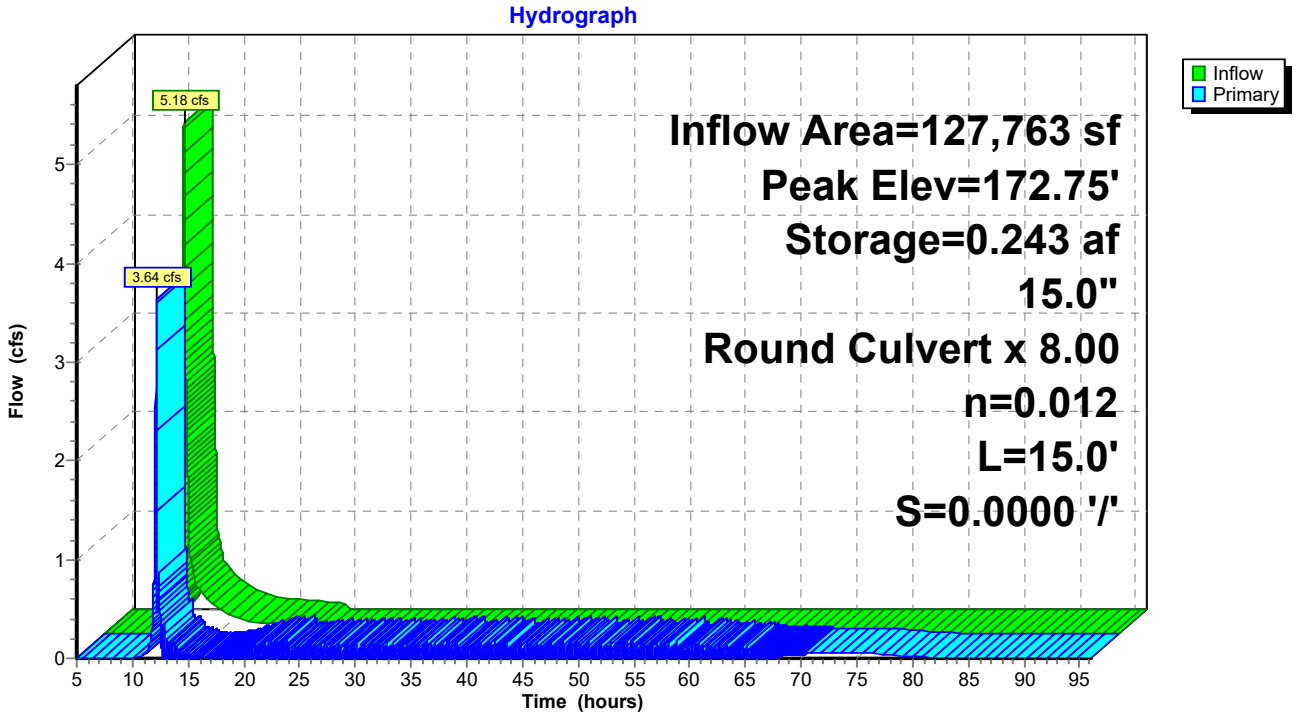
9,403.8 cf Field - 4,459.4 cf Chambers = 4,944.4 cf Stone x 40.0% Voids = 1,977.8 cf Stone Storage

Chamber Storage + Stone Storage = 6,437.2 cf = 0.148 af
Overall Storage Efficiency = 68.5%
Overall System Size = 87.50' x 35.33' x 3.04'

84 Chambers
348.3 cy Field
183.1 cy Stone



Pond UDS-1: Cultec 330 XLHD

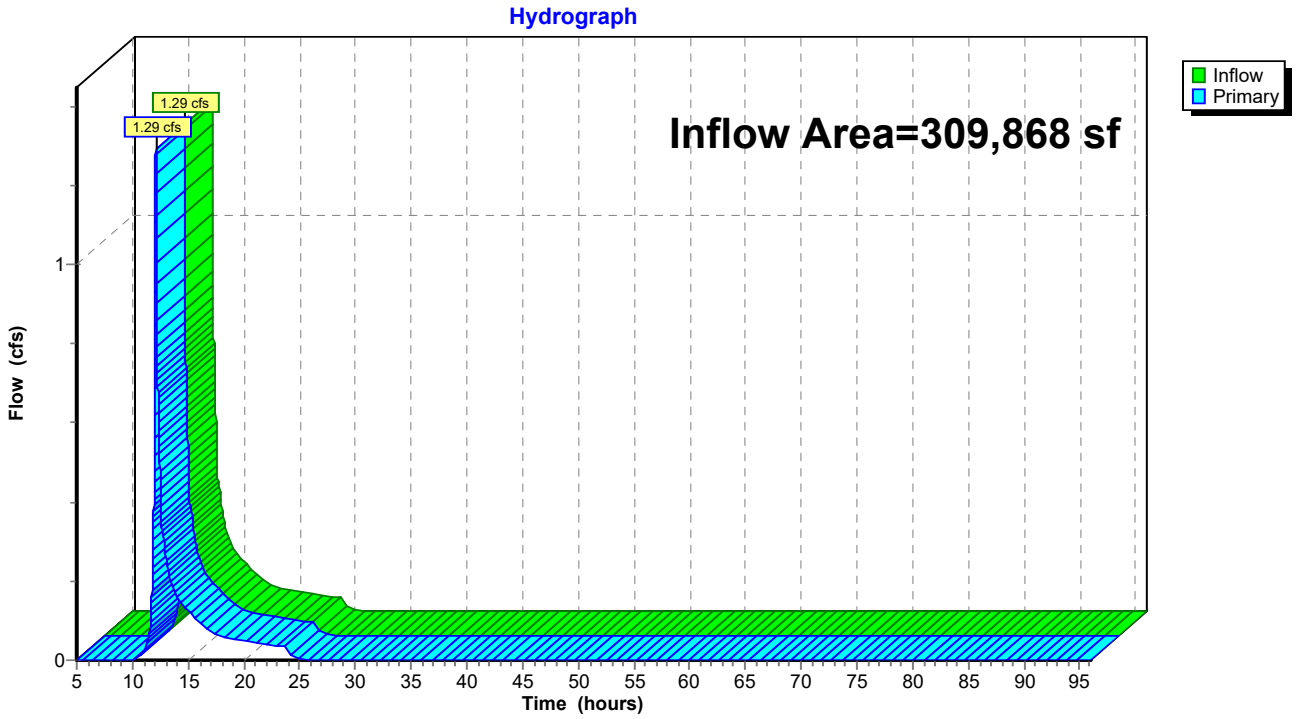


Summary for Link POA-1: Hunting Lane (Off-site)

Inflow Area = 309,868 sf, 37.48% Impervious, Inflow Depth = 0.22" for 2-YR event
Inflow = 1.29 cfs @ 12.09 hrs, Volume= 5,663 cf
Primary = 1.29 cfs @ 12.09 hrs, Volume= 5,663 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs

Link POA-1: Hunting Lane (Off-site)

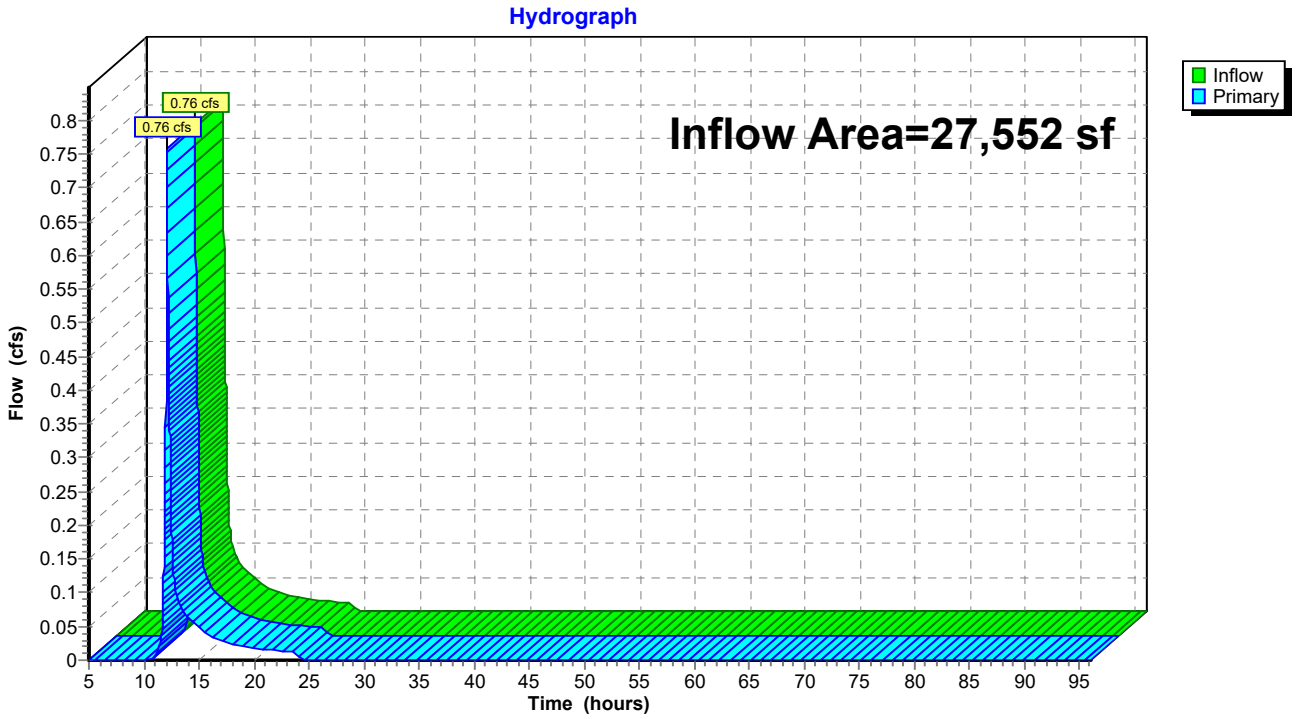


Summary for Link POA-2: North Main Street (Offsite)

Inflow Area = 27,552 sf, 5.91% Impervious, Inflow Depth = 1.08" for 2-YR event
Inflow = 0.76 cfs @ 12.10 hrs, Volume= 2,480 cf
Primary = 0.76 cfs @ 12.10 hrs, Volume= 2,480 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs

Link POA-2: North Main Street (Offsite)

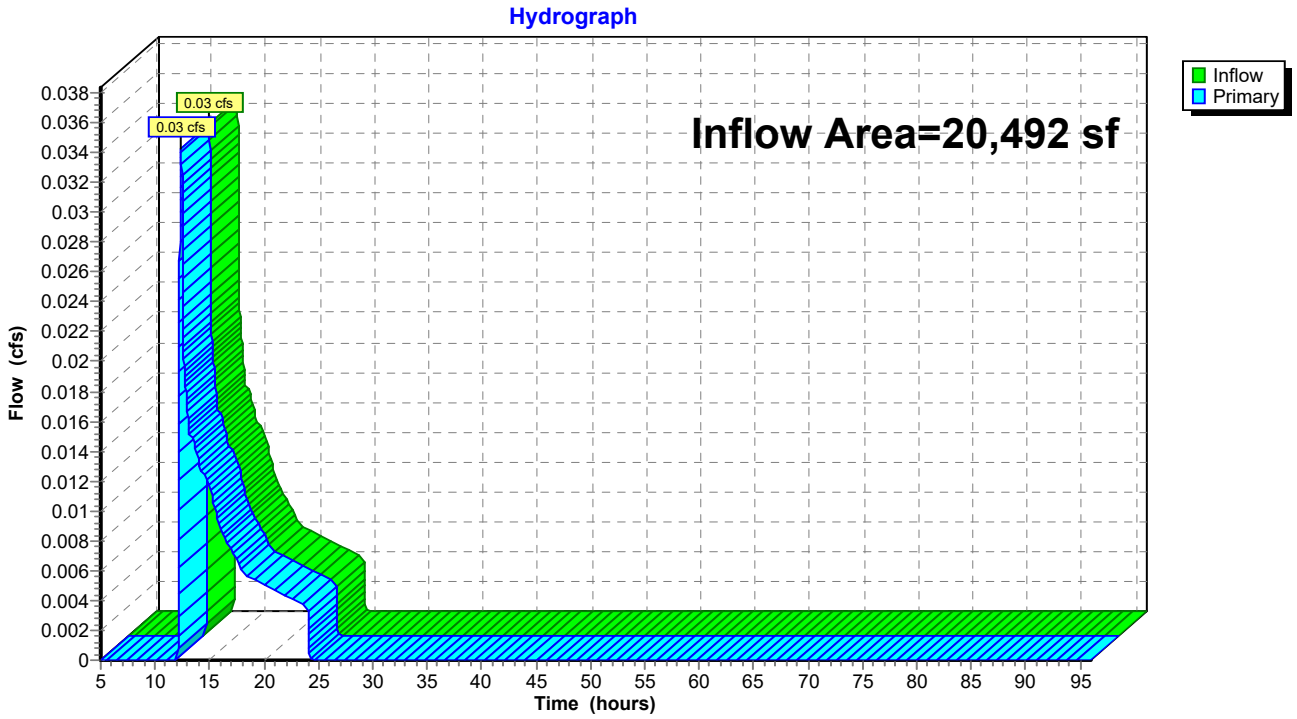


Summary for Link POA-3: 33 N Main Street (Offsite)

Inflow Area = 20,492 sf, 0.00% Impervious, Inflow Depth = 0.21" for 2-YR event
Inflow = 0.03 cfs @ 12.38 hrs, Volume= 360 cf
Primary = 0.03 cfs @ 12.38 hrs, Volume= 360 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs

Link POA-3: 33 N Main Street (Offsite)



Time span=5.00-96.00 hrs, dt=0.01 hrs, 9101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Proposed WS-1A Runoff Area=127,763 sf 45.93% Impervious Runoff Depth=3.10"
Tc=6.0 min CN=80 Runoff=10.67 cfs 33,040 cf

Subcatchment7S: Proposed WS-1B Runoff Area=25,142 sf 42.69% Impervious Runoff Depth=1.74"
Tc=6.0 min CN=64 Runoff=1.12 cfs 3,642 cf

Subcatchment8S: Proposed WS-1C Runoff Area=62,999 sf 5.13% Impervious Runoff Depth=1.10"
Flow Length=970' Tc=37.8 min UI Adjusted CN=55 Runoff=0.79 cfs 5,785 cf

Subcatchment10S: Proposed WS-3 Runoff Area=27,552 sf 5.91% Impervious Runoff Depth=2.47"
Tc=6.0 min UI Adjusted CN=73 Runoff=1.82 cfs 5,671 cf

Subcatchment11S: Proposed WS-4 Runoff Area=20,492 sf 0.00% Impervious Runoff Depth=0.91"
Flow Length=195' Tc=6.4 min CN=52 Runoff=0.37 cfs 1,558 cf

Subcatchment17S: Proposed WS-1D Runoff Area=54,797 sf 52.55% Impervious Runoff Depth=3.39"
Tc=6.0 min CN=83 Runoff=4.97 cfs 15,490 cf

Subcatchment23S: Proposed WS-1E Runoff Area=39,167 sf 37.48% Impervious Runoff Depth=2.73"
Tc=6.0 min CN=76 Runoff=2.88 cfs 8,925 cf

Pond FB-1: Forebay Peak Elev=177.01' Storage=5,319 cf Inflow=4.97 cfs 15,490 cf
Outflow=2.40 cfs 15,483 cf

Pond FB-2 & FB-3: Sediment Forebays Peak Elev=172.25' Storage=3,347 cf Inflow=1.12 cfs 3,642 cf
Outflow=0.02 cfs 312 cf

Pond IB-1: Infil Basin Peak Elev=173.24' Storage=11,011 cf Inflow=4.46 cfs 48,408 cf
Discarded=0.13 cfs 27,647 cf Primary=1.47 cfs 20,233 cf Secondary=0.00 cfs 0 cf Outflow=1.60 cfs 47,881 cf

Pond UDS-1: Cultec 330 XLHD Peak Elev=173.24' Storage=0.297 af Inflow=10.67 cfs 33,040 cf
15.0" Round Culvert x 8.00 n=0.012 L=15.0' S=0.0000 '/' Outflow=3.97 cfs 32,925 cf

Link POA-1: Hunting Lane (Off-site) Inflow=2.96 cfs 35,256 cf
Primary=2.96 cfs 35,256 cf

Link POA-2: North Main Street (Offsite) Inflow=1.82 cfs 5,671 cf
Primary=1.82 cfs 5,671 cf

Link POA-3: 33 N Main Street (Offsite) Inflow=0.37 cfs 1,558 cf
Primary=0.37 cfs 1,558 cf

Total Runoff Area = 357,912 sf Runoff Volume = 74,112 cf Average Runoff Depth = 2.48"
67.10% Pervious = 240,161 sf 32.90% Impervious = 117,751 sf

Summary for Subcatchment 1S: Proposed WS-1A

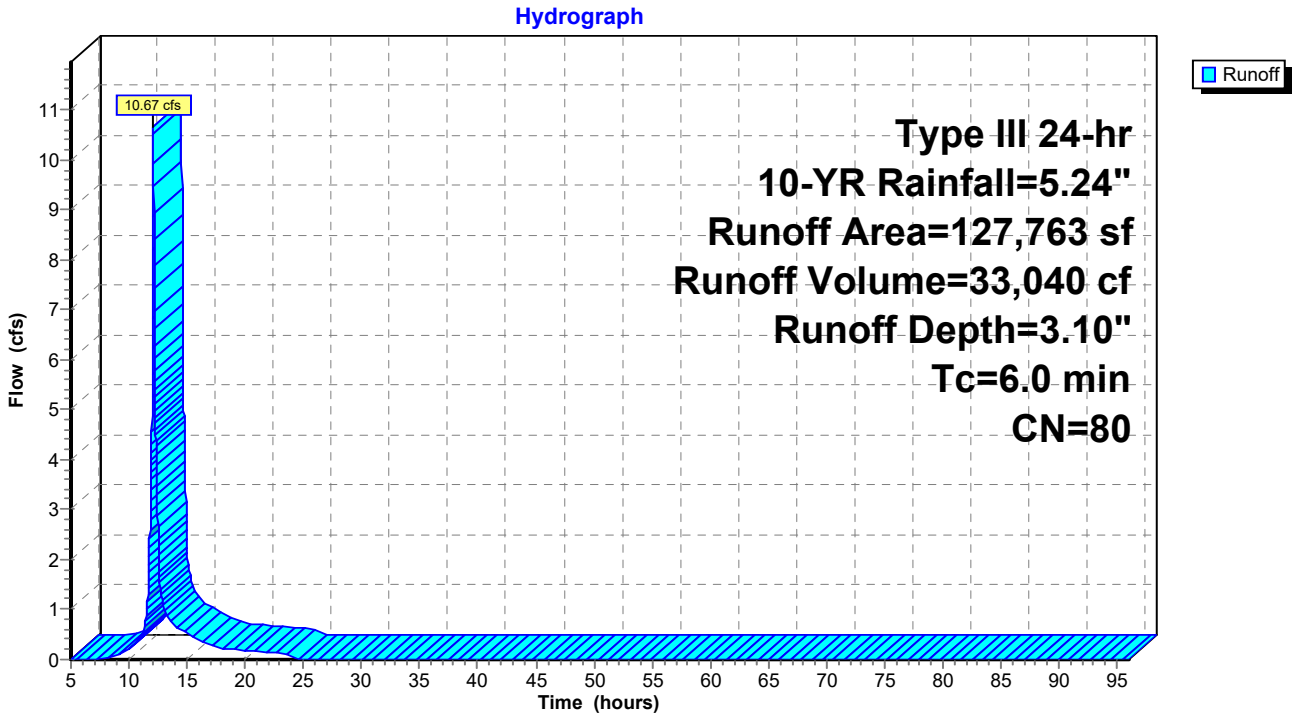
Runoff = 10.67 cfs @ 12.09 hrs, Volume= 33,040 cf, Depth= 3.10"
Routed to Pond UDS-1 : Cultec 330 XLHD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.24"

Area (sf)	CN	Description
2,745	98	Unconnected pavement, HSG A
33,953	98	Unconnected pavement, HSG B
21,986	98	Unconnected pavement, HSG C
1,946	39	>75% Grass cover, Good, HSG A
41,046	61	>75% Grass cover, Good, HSG B
26,087	74	>75% Grass cover, Good, HSG C
127,763	80	Weighted Average
69,079		54.07% Pervious Area
58,684		45.93% Impervious Area
58,684		100.00% Unconnected

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

Subcatchment 1S: Proposed WS-1A



Summary for Subcatchment 7S: Proposed WS-1B

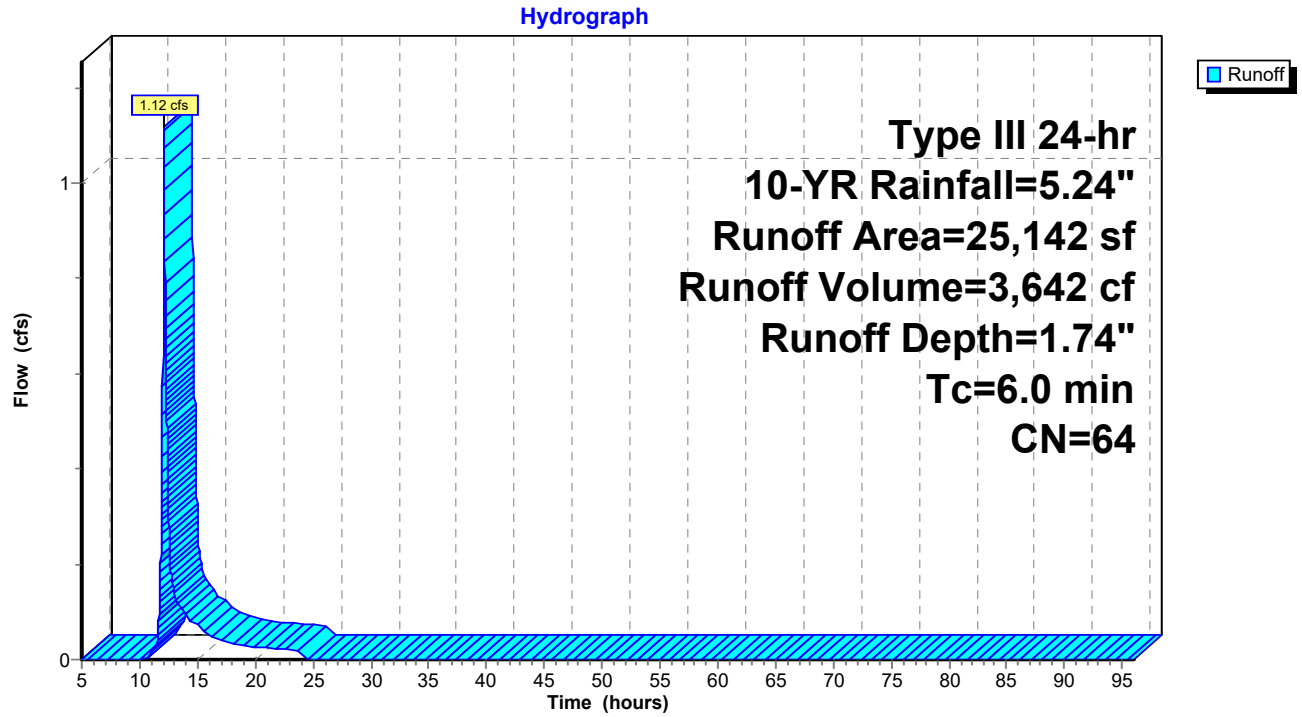
Runoff = 1.12 cfs @ 12.10 hrs, Volume= 3,642 cf, Depth= 1.74"
Routed to Pond FB-2 & FB-3 : Sediment Forebays

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.24"

Area (sf)	CN	Description
10,733	98	Unconnected pavement, HSG A
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG C
14,409	39	>75% Grass cover, Good, HSG A
0	61	>75% Grass cover, Good, HSG B
0	74	>75% Grass cover, Good, HSG C
25,142	64	Weighted Average
14,409		57.31% Pervious Area
10,733		42.69% Impervious Area
10,733		100.00% Unconnected

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

Subcatchment 7S: Proposed WS-1B



Summary for Subcatchment 8S: Proposed WS-1C

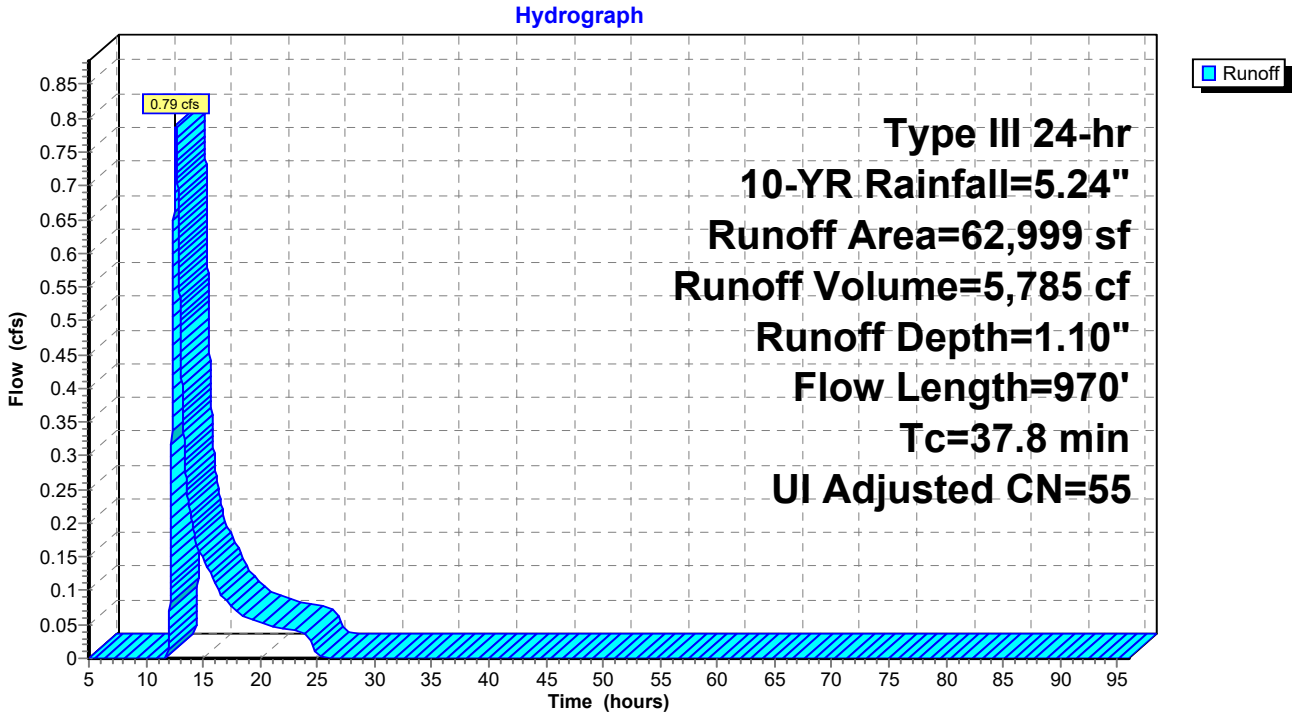
Runoff = 0.79 cfs @ 12.61 hrs, Volume= 5,785 cf, Depth= 1.10"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.24"

Area (sf)	CN	Adj	Description
0	98		Unconnected pavement, HSG A
3,231	98		Unconnected pavement, HSG B
0	98		Unconnected pavement, HSG C
18,478	39		>75% Grass cover, Good, HSG A
41,290	61		>75% Grass cover, Good, HSG B
0	74		>75% Grass cover, Good, HSG C
62,999	56	55	Weighted Average, UI Adjusted
59,768			94.87% Pervious Area
3,231			5.13% Impervious Area
3,231			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	50	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.35"
27.2	920	0.0065	0.56		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
37.8	970	Total			

Subcatchment 8S: Proposed WS-1C



Summary for Subcatchment 10S: Proposed WS-3

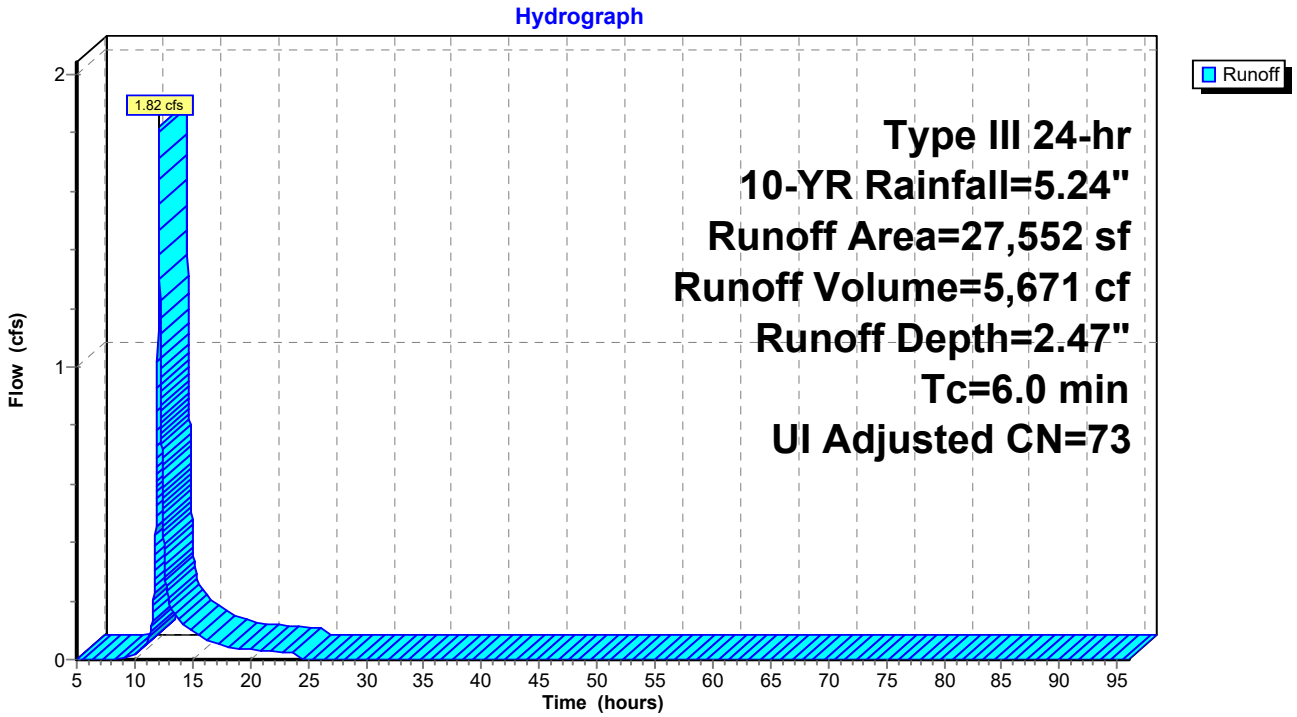
Runoff = 1.82 cfs @ 12.09 hrs, Volume= 5,671 cf, Depth= 2.47"
Routed to Link POA-2 : North Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.24"

Area (sf)	CN	Adj	Description
38	98		Unconnected pavement, HSG A
1,589	98		Unconnected pavement, HSG B
0	98		Unconnected pavement, HSG C
1,223	39		>75% Grass cover, Good, HSG A
0	61		>75% Grass cover, Good, HSG B
24,702	74		>75% Grass cover, Good, HSG C
27,552	74	73	Weighted Average, UI Adjusted
25,925			94.09% Pervious Area
1,627			5.91% Impervious Area
1,627			100.00% Unconnected

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

Subcatchment 10S: Proposed WS-3



Summary for Subcatchment 11S: Proposed WS-4

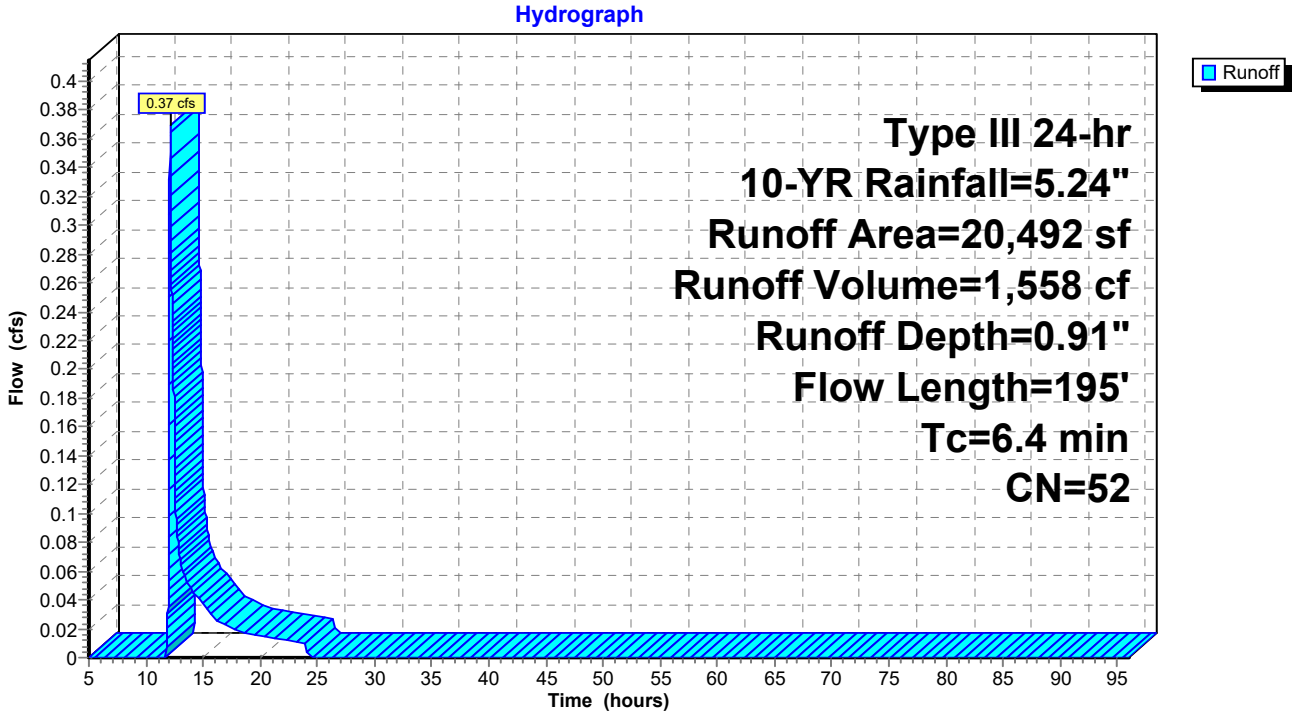
Runoff = 0.37 cfs @ 12.12 hrs, Volume= 1,558 cf, Depth= 0.91"
Routed to Link POA-3 : 33 N Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.24"

Area (sf)	CN	Description
0	98	Unconnected pavement, HSG A
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG C
8,496	39	>75% Grass cover, Good, HSG A
11,996	61	>75% Grass cover, Good, HSG B
0	74	>75% Grass cover, Good, HSG C
20,492	52	Weighted Average
20,492		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0700	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.35"
1.5	145	0.0520	1.60		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.4	195	Total			

Subcatchment 11S: Proposed WS-4



Summary for Subcatchment 17S: Proposed WS-1D

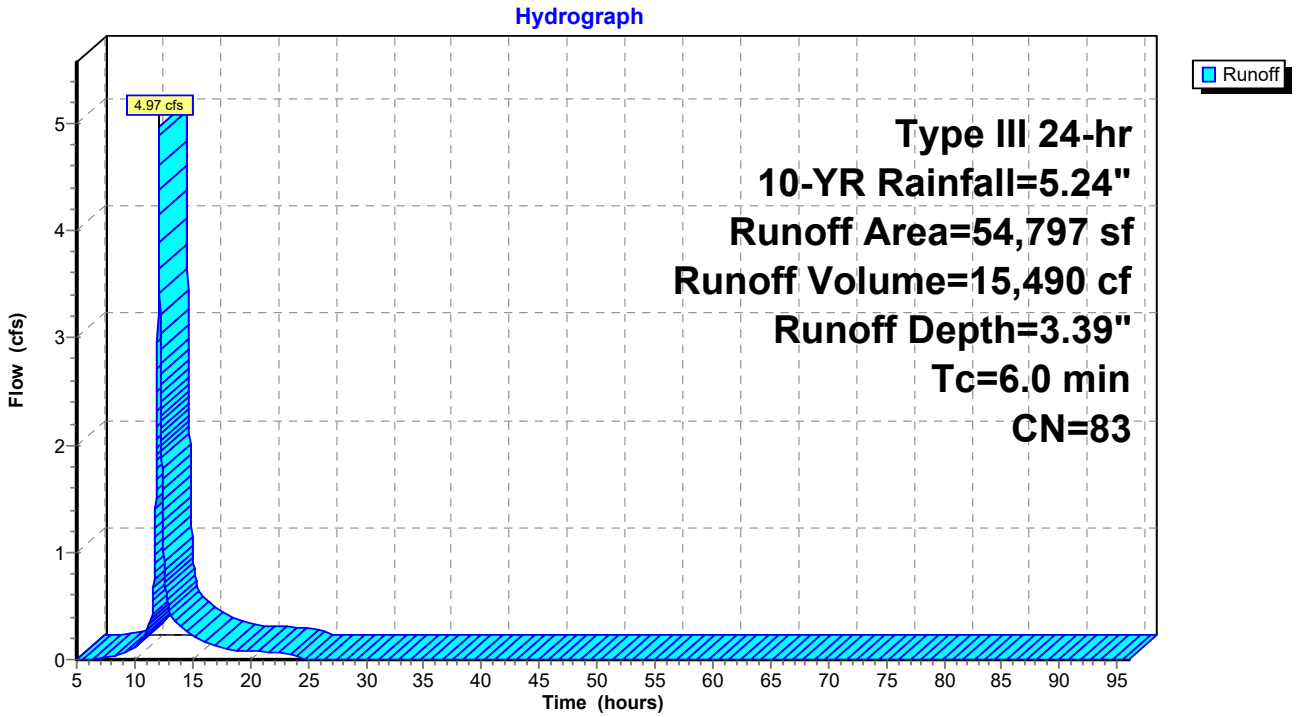
Runoff = 4.97 cfs @ 12.09 hrs, Volume= 15,490 cf, Depth= 3.39"
Routed to Pond FB-1 : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.24"

Area (sf)	CN	Description
0	98	Unconnected pavement, HSG A
17,482	98	Unconnected pavement, HSG B
11,314	98	Unconnected pavement, HSG C
0	39	>75% Grass cover, Good, HSG A
13,949	61	>75% Grass cover, Good, HSG B
12,052	74	>75% Grass cover, Good, HSG C
54,797	83	Weighted Average
26,001		47.45% Pervious Area
28,796		52.55% Impervious Area
28,796		100.00% Unconnected

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

Subcatchment 17S: Proposed WS-1D



Summary for Subcatchment 23S: Proposed WS-1E

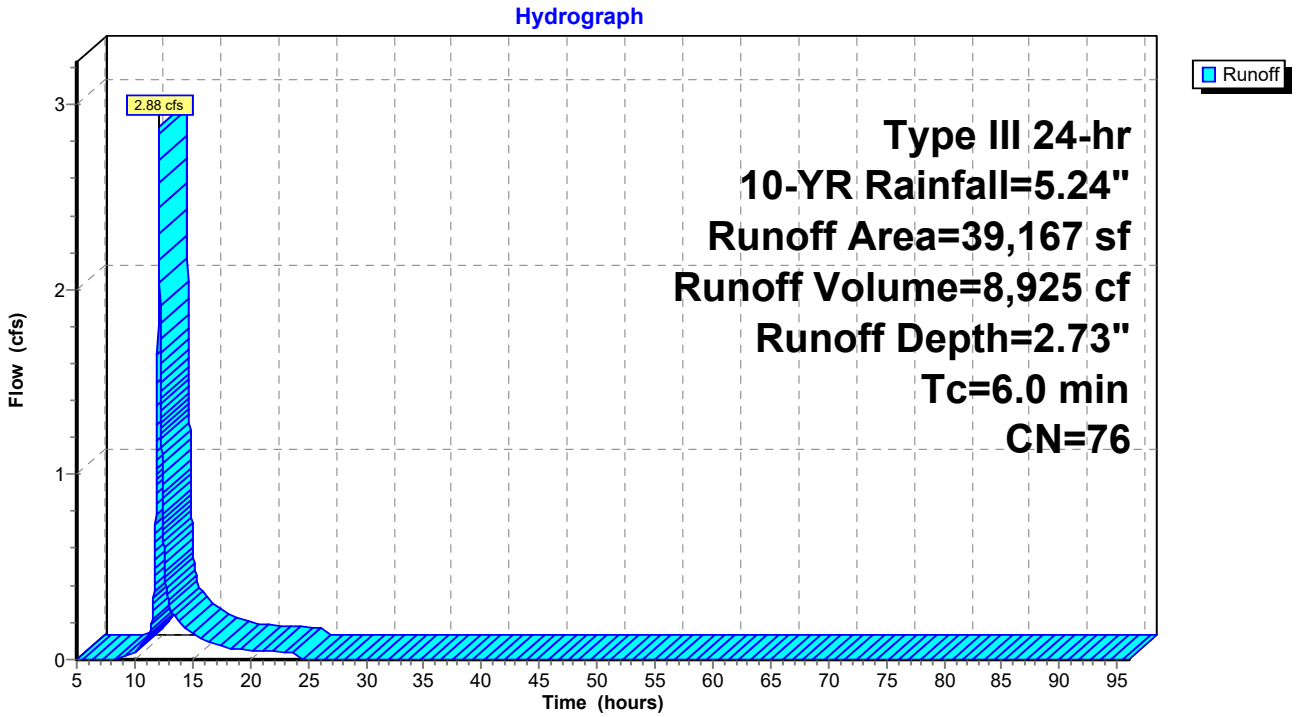
Runoff = 2.88 cfs @ 12.09 hrs, Volume= 8,925 cf, Depth= 2.73"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.24"

Area (sf)	CN	Description
0	98	Unconnected pavement, HSG A
14,680	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG C
0	39	>75% Grass cover, Good, HSG A
21,286	61	>75% Grass cover, Good, HSG B
3,201	74	>75% Grass cover, Good, HSG C
39,167	76	Weighted Average
24,487		62.52% Pervious Area
14,680		37.48% Impervious Area
14,680		100.00% Unconnected

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

Subcatchment 23S: Proposed WS-1E



Summary for Pond FB-1: Forebay

Inflow Area = 54,797 sf, 52.55% Impervious, Inflow Depth = 3.39" for 10-YR event
Inflow = 4.97 cfs @ 12.09 hrs, Volume= 15,490 cf
Outflow = 2.40 cfs @ 12.25 hrs, Volume= 15,483 cf, Atten= 52%, Lag= 9.9 min
Primary = 2.40 cfs @ 12.25 hrs, Volume= 15,483 cf
Routed to Pond IB-1 : Infil Basin

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 177.01' @ 12.25 hrs Surf.Area= 3,421 sf Storage= 5,319 cf
Flood Elev= 178.00' Surf.Area= 4,254 sf Storage= 9,123 cf

Plug-Flow detention time= 135.1 min calculated for 15,483 cf (100% of inflow)
Center-of-Mass det. time= 134.8 min (946.4 - 811.6)

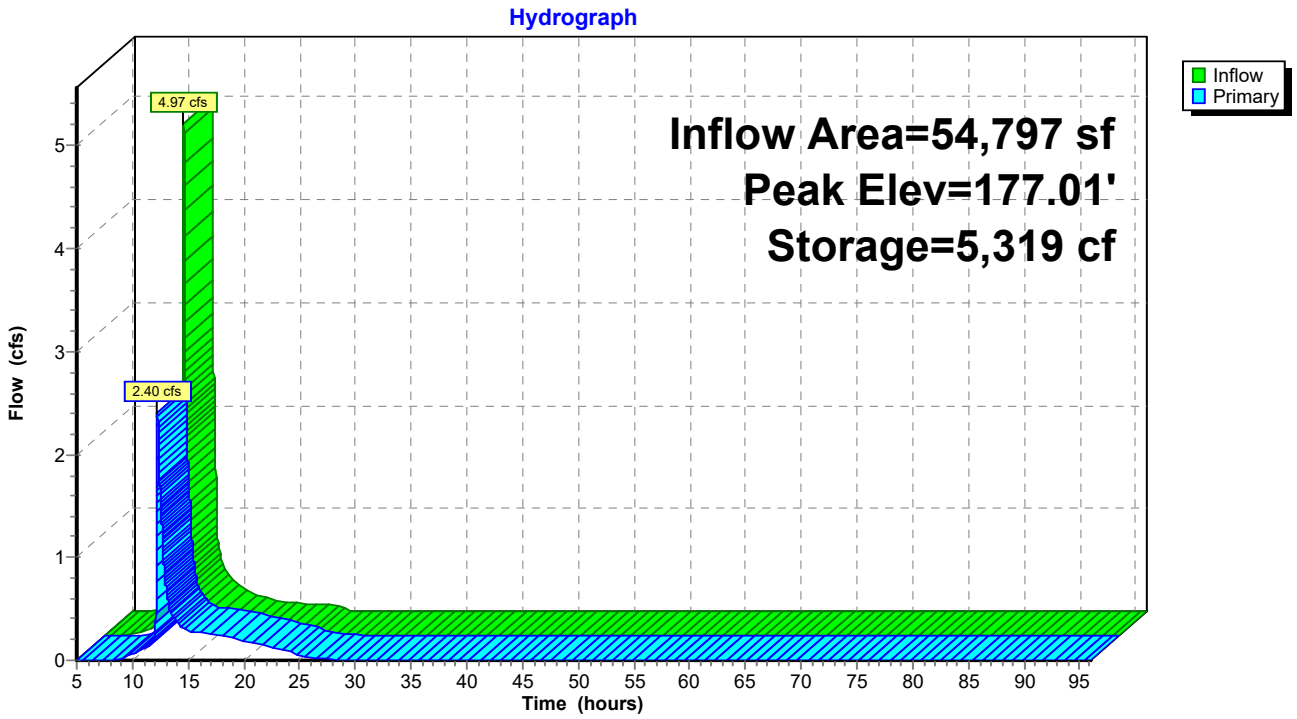
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	9,123 cf	**Basin A (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	1,904	0	0
176.00	2,630	2,267	2,267
177.00	3,414	3,022	5,289
178.00	4,254	3,834	9,123

Device	Routing	Invert	Outlet Devices
#1	Device 3	177.00'	**2.0" x 2.0" Horiz. 12" x 24" grate X 10.00 columns** X 5 rows C= 0.600 in 24.0" x 12.0" Grate (69% open area)
#2	Device 3	176.50'	**6.0" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#3	Primary	174.65'	**12.0" Round HDPE Culvert** L= 118.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 174.65' / 171.11' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	175.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.39 cfs @ 12.25 hrs HW=177.01' TW=172.47' (Dynamic Tailwater)
└─**3=HDPE Culvert** (Passes 2.39 cfs of 4.07 cfs potential flow)
  ├─**1=12" x 24" grate** (Orifice Controls 0.63 cfs @ 0.45 fps)
  ├─**2=Orifice/Grate** (Orifice Controls 1.44 cfs @ 2.45 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.32 cfs @ 6.61 fps)

Pond FB-1: Forebay



Summary for Pond FB-2 & FB-3: Sediment Forebays

Inflow Area = 25,142 sf, 42.69% Impervious, Inflow Depth = 1.74" for 10-YR event
Inflow = 1.12 cfs @ 12.10 hrs, Volume= 3,642 cf
Outflow = 0.02 cfs @ 20.75 hrs, Volume= 312 cf, Atten= 98%, Lag= 519.5 min
Primary = 0.02 cfs @ 20.75 hrs, Volume= 312 cf
Routed to Link POA-1 : Hunting Lane (Off-site)

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 172.25' @ 20.75 hrs Surf.Area= 3,526 sf Storage= 3,347 cf

Plug-Flow detention time= 626.6 min calculated for 312 cf (9% of inflow)
Center-of-Mass det. time= 469.2 min (1,329.9 - 860.7)

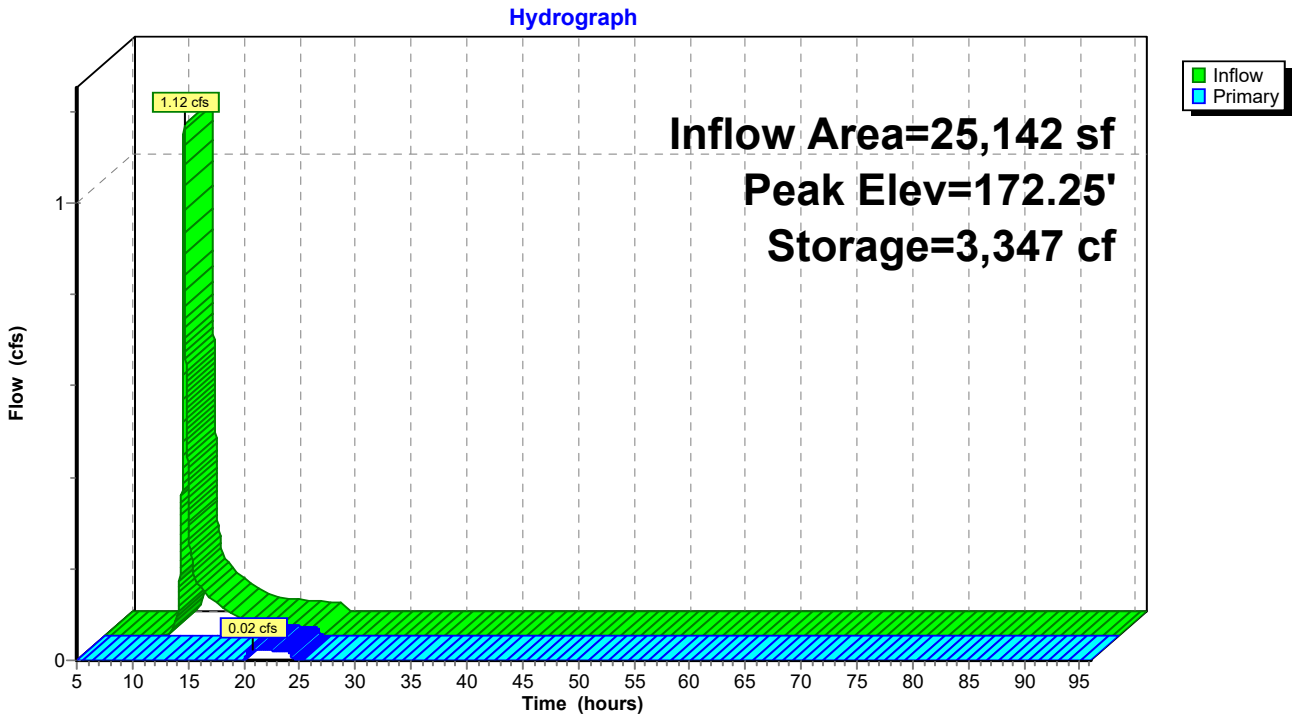
Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	4,257 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
171.00	1,856	0	0
172.00	3,140	2,498	2,498
172.50	3,897	1,759	4,257

Device	Routing	Invert	Outlet Devices
#1	Primary	172.25'	**30.0' long x 3.0' 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 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.02 cfs @ 20.75 hrs HW=172.25' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.02 cfs @ 0.17 fps)

Pond FB-2 & FB-3: Sediment Forebays



Summary for Pond IB-1: Infil Basin

[80] Warning: Exceeded Pond UDS-1 by 0.03' @ 12.14 hrs (6.21 cfs 42,735 cf)

Inflow Area = 182,560 sf, 47.92% Impervious, Inflow Depth > 3.18" for 10-YR event
Inflow = 4.46 cfs @ 12.10 hrs, Volume= 48,408 cf
Outflow = 1.60 cfs @ 13.07 hrs, Volume= 47,881 cf, Atten= 64%, Lag= 58.2 min
Discarded = 0.13 cfs @ 13.07 hrs, Volume= 27,647 cf
Primary = 1.47 cfs @ 13.07 hrs, Volume= 20,233 cf
Routed to Link POA-1 : Hunting Lane (Off-site)
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Routed to Link POA-1 : Hunting Lane (Off-site)

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 173.24' @ 13.07 hrs Surf.Area= 5,313 sf Storage= 11,011 cf
Flood Elev= 175.00' Surf.Area= 7,711 sf Storage= 22,476 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 555.6 min (2,052.7 - 1,497.1)

Volume	Invert	Avail.Storage	Storage Description
#1	170.00'	22,476 cf	**Basin A (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
170.00	1,749	0	0
171.00	2,649	2,199	2,199
172.00	3,770	3,210	5,409
173.00	5,000	4,385	9,794
174.00	6,327	5,664	15,457
175.00	7,711	7,019	22,476

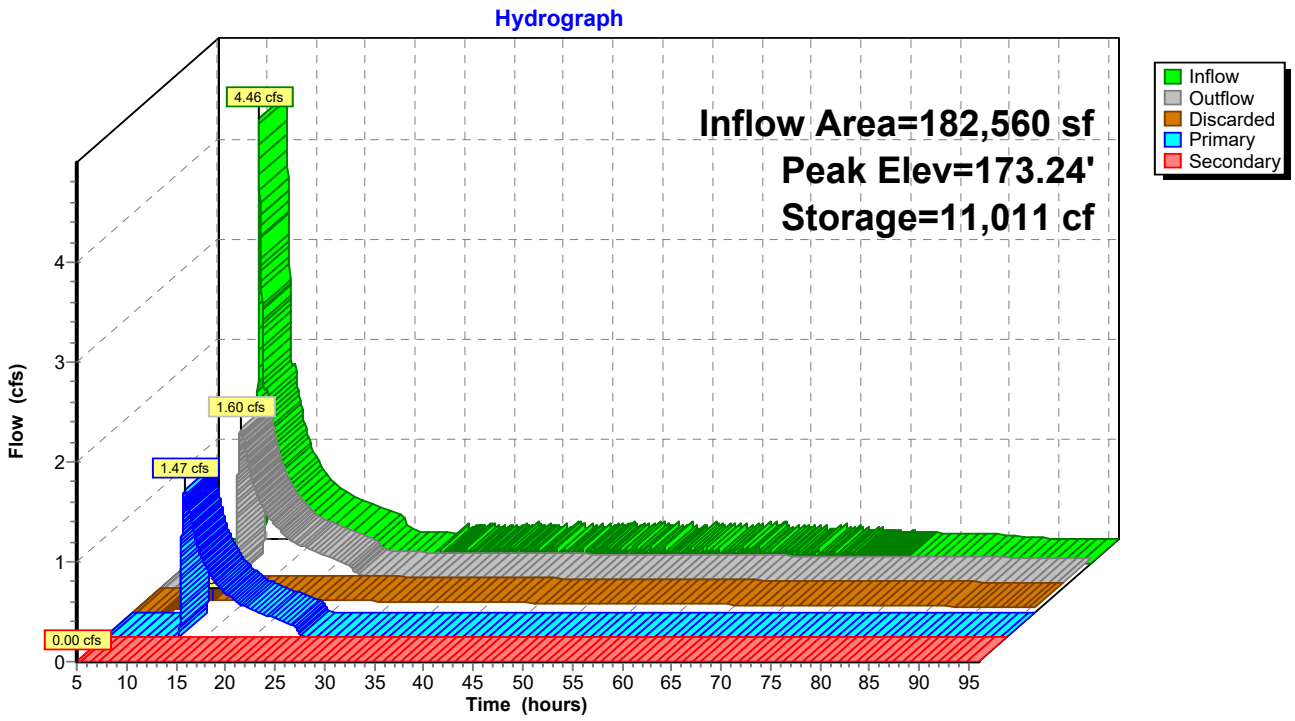
Device	Routing	Invert	Outlet Devices
#1	Discarded	170.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	170.00'	**18.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 170.00' / 169.10' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#3	Device 2	173.75'	**2.0" x 2.0" Horiz. Orifice/Grate X 20.00 columns** X 10 rows C= 0.600 in 48.0" x 24.0" Grate (69% open area)
#4	Device 2	173.00'	**48.0" W x 10.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	174.00'	**10.0' long x 3.0' 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 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.13 cfs @ 13.07 hrs HW=173.24' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=1.47 cfs @ 13.07 hrs HW=173.24' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 1.47 cfs of 10.59 cfs potential flow)
  └**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 1.47 cfs @ 1.56 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=170.00' TW=0.00' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond IB-1: Infil Basin



Summary for Pond UDS-1: Cultec 330 XLHD

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1522)

Inflow Area = 127,763 sf, 45.93% Impervious, Inflow Depth = 3.10" for 10-YR event
Inflow = 10.67 cfs @ 12.09 hrs, Volume= 33,040 cf
Outflow = 3.97 cfs @ 12.09 hrs, Volume= 32,925 cf, Atten= 63%, Lag= 0.0 min
Primary = 3.97 cfs @ 12.09 hrs, Volume= 32,925 cf
Routed to Pond IB-1 : Infil Basin

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 173.24' @ 13.08 hrs Surf.Area= 0.170 ac Storage= 0.297 af
Flood Elev= 174.00' Surf.Area= 0.170 ac Storage= 0.352 af

Plug-Flow detention time= 938.1 min calculated for 32,921 cf (100% of inflow)
Center-of-Mass det. time= 936.3 min (1,756.1 - 819.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	171.00'	0.063 af	**35.33'W x 122.50'L x 3.04'H Field A** 0.302 af Overall - 0.144 af Embedded = 0.158 af x 40.0% Voids
#2A	171.00'	0.144 af	**Cultec R-330XLHD** x 119 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 7 rows
#3B	171.00'	0.045 af	**35.33'W x 87.50'L x 3.04'H Field B** 0.216 af Overall - 0.102 af Embedded = 0.114 af x 40.0% Voids
#4B	171.00'	0.102 af	**Cultec R-330XLHD** x 84 Inside #3 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 7 rows
		0.355 af	Total Available Storage

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

Device	Routing	Invert	Outlet Devices
#1	Primary	171.00'	**15.0" Round Culvert X 8.00** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 171.00' / 171.00' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=171.89' TW=171.92' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond UDS-1: Cultec 330 XLHD - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (For residential use only)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 7 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

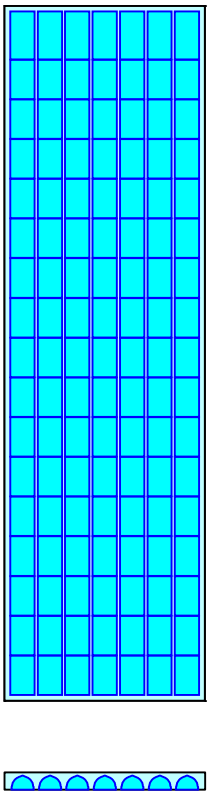
17 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 120.50' Row Length +12.0" End Stone x 2 = 122.50' Base Length
7 Rows x 52.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 35.33' Base Width
30.5" Chamber Height + 6.0" Stone Cover = 3.04' Field Height

119 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 7 Rows = 6,284.9 cf Chamber Storage

13,165.3 cf Field - 6,284.9 cf Chambers = 6,880.4 cf Stone x 40.0% Voids = 2,752.2 cf Stone Storage

Chamber Storage + Stone Storage = 9,037.1 cf = 0.207 af
Overall Storage Efficiency = 68.6%
Overall System Size = 122.50' x 35.33' x 3.04'

119 Chambers
487.6 cy Field
254.8 cy Stone



Pond UDS-1: Cultec 330 XLHD - Chamber Wizard Field B

Chamber Model = Cultec R-330XLHD (For residential use only)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 7 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

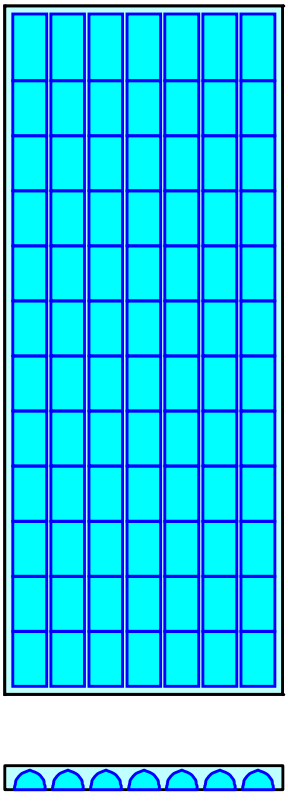
12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length
7 Rows x 52.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 35.33' Base Width
30.5" Chamber Height + 6.0" Stone Cover = 3.04' Field Height

84 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 7 Rows = 4,459.4 cf Chamber Storage

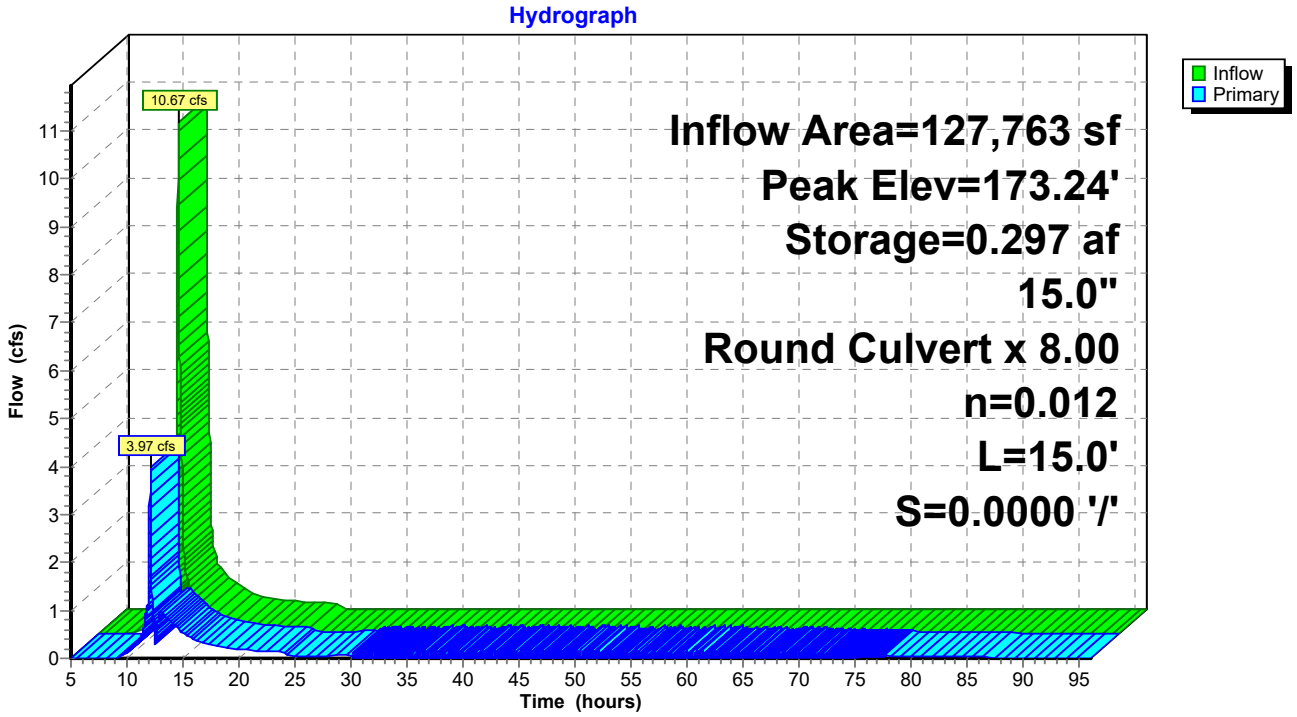
9,403.8 cf Field - 4,459.4 cf Chambers = 4,944.4 cf Stone x 40.0% Voids = 1,977.8 cf Stone Storage

Chamber Storage + Stone Storage = 6,437.2 cf = 0.148 af
Overall Storage Efficiency = 68.5%
Overall System Size = 87.50' x 35.33' x 3.04'

84 Chambers
348.3 cy Field
183.1 cy Stone



Pond UDS-1: Cultec 330 XLHD

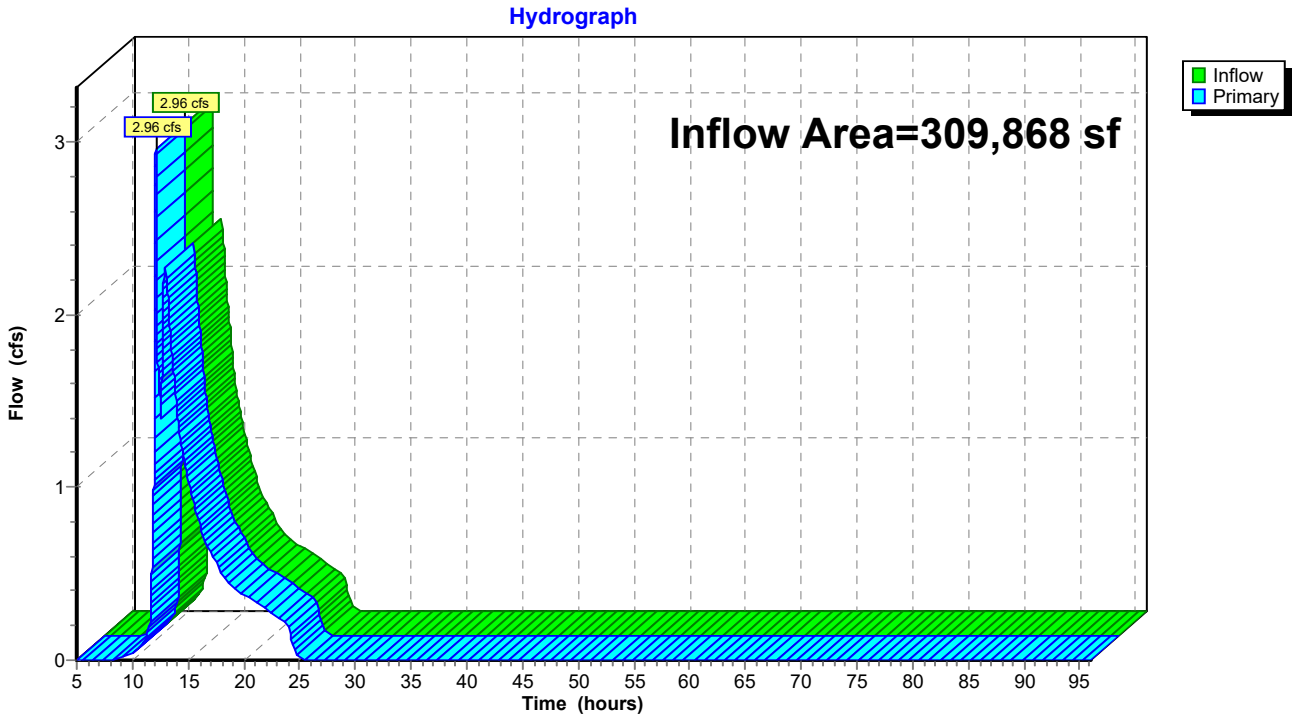


Summary for Link POA-1: Hunting Lane (Off-site)

Inflow Area = 309,868 sf, 37.48% Impervious, Inflow Depth = 1.37" for 10-YR event
Inflow = 2.96 cfs @ 12.09 hrs, Volume= 35,256 cf
Primary = 2.96 cfs @ 12.09 hrs, Volume= 35,256 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs

Link POA-1: Hunting Lane (Off-site)

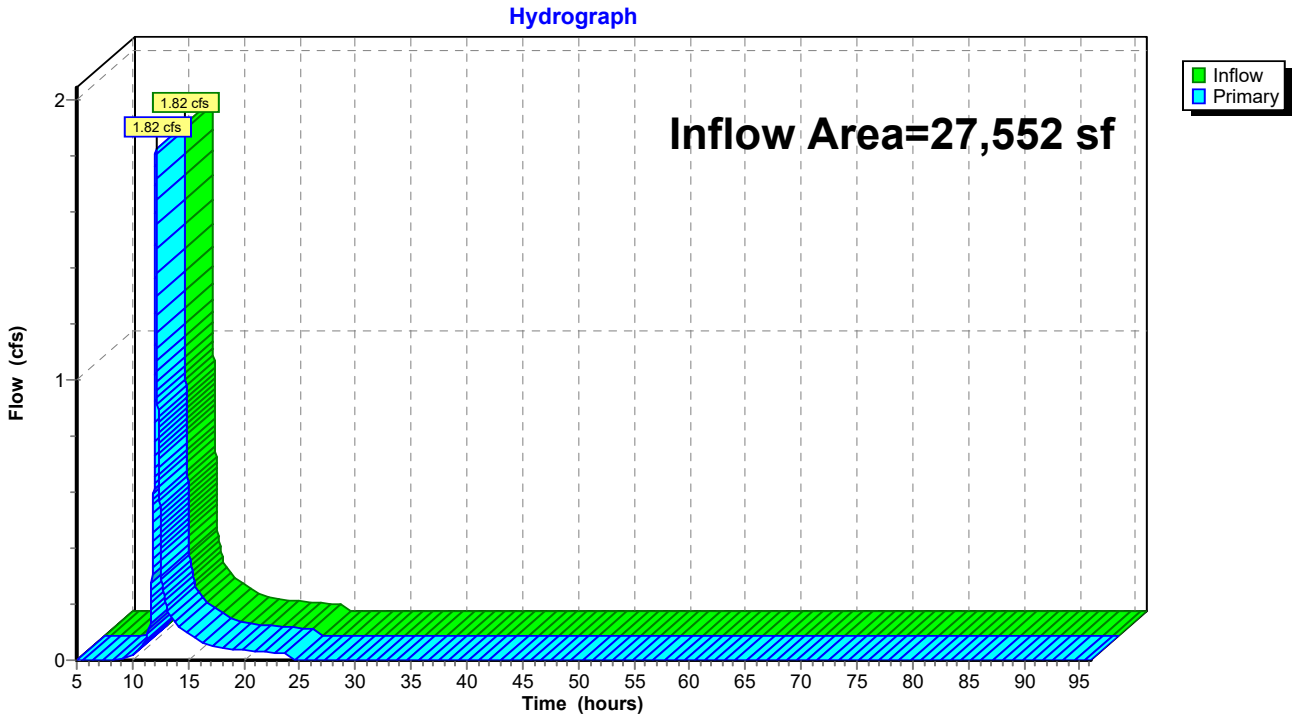


Summary for Link POA-2: North Main Street (Offsite)

Inflow Area = 27,552 sf, 5.91% Impervious, Inflow Depth = 2.47" for 10-YR event
Inflow = 1.82 cfs @ 12.09 hrs, Volume= 5,671 cf
Primary = 1.82 cfs @ 12.09 hrs, Volume= 5,671 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs

Link POA-2: North Main Street (Offsite)

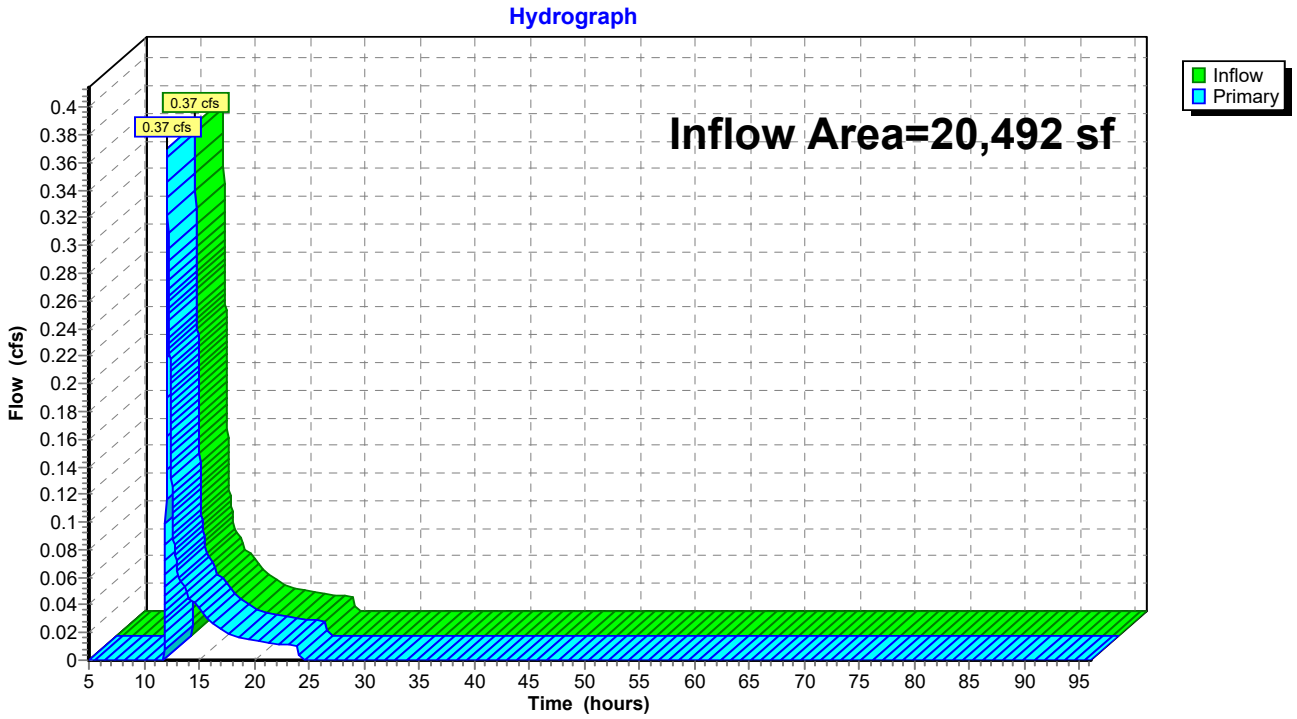


Summary for Link POA-3: 33 N Main Street (Offsite)

Inflow Area = 20,492 sf, 0.00% Impervious, Inflow Depth = 0.91" for 10-YR event
Inflow = 0.37 cfs @ 12.12 hrs, Volume= 1,558 cf
Primary = 0.37 cfs @ 12.12 hrs, Volume= 1,558 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs

Link POA-3: 33 N Main Street (Offsite)



Time span=5.00-96.00 hrs, dt=0.01 hrs, 9101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Proposed WS-1A Runoff Area=127,763 sf 45.93% Impervious Runoff Depth=4.16"
Tc=6.0 min CN=80 Runoff=14.23 cfs 44,315 cf

Subcatchment7S: Proposed WS-1B Runoff Area=25,142 sf 42.69% Impervious Runoff Depth=2.57"
Tc=6.0 min CN=64 Runoff=1.70 cfs 5,379 cf

Subcatchment8S: Proposed WS-1C Runoff Area=62,999 sf 5.13% Impervious Runoff Depth=1.76"
Flow Length=970' Tc=37.8 min UI Adjusted CN=55 Runoff=1.38 cfs 9,266 cf

Subcatchment10S: Proposed WS-3 Runoff Area=27,552 sf 5.91% Impervious Runoff Depth=3.44"
Tc=6.0 min UI Adjusted CN=73 Runoff=2.55 cfs 7,899 cf

Subcatchment11S: Proposed WS-4 Runoff Area=20,492 sf 0.00% Impervious Runoff Depth=1.52"
Flow Length=195' Tc=6.4 min CN=52 Runoff=0.71 cfs 2,588 cf

Subcatchment17S: Proposed WS-1D Runoff Area=54,797 sf 52.55% Impervious Runoff Depth=4.48"
Tc=6.0 min CN=83 Runoff=6.51 cfs 20,470 cf

Subcatchment23S: Proposed WS-1E Runoff Area=39,167 sf 37.48% Impervious Runoff Depth=3.75"
Tc=6.0 min CN=76 Runoff=3.95 cfs 12,224 cf

Pond FB-1: Forebay Peak Elev=177.17' Storage=5,887 cf Inflow=6.51 cfs 20,470 cf
Outflow=4.24 cfs 20,464 cf

Pond FB-2 & FB-3: Sediment Forebays Peak Elev=172.26' Storage=3,383 cf Inflow=1.70 cfs 5,379 cf
Outflow=0.13 cfs 2,049 cf

Pond IB-1: Infil Basin Peak Elev=173.57' Storage=12,846 cf Inflow=8.29 cfs 64,661 cf
Discarded=0.14 cfs 28,070 cf Primary=5.49 cfs 35,976 cf Secondary=0.00 cfs 0 cf Outflow=5.63 cfs 64,046 cf

Pond UDS-1: Cultec 330 XLHD Peak Elev=173.58' Storage=0.324 af Inflow=14.23 cfs 44,315 cf
15.0" Round Culvert x 8.00 n=0.012 L=15.0' S=0.0000 '/' Outflow=5.10 cfs 44,197 cf

Link POA-1: Hunting Lane (Off-site) Inflow=7.88 cfs 59,515 cf
Primary=7.88 cfs 59,515 cf

Link POA-2: North Main Street (Offsite) Inflow=2.55 cfs 7,899 cf
Primary=2.55 cfs 7,899 cf

Link POA-3: 33 N Main Street (Offsite) Inflow=0.71 cfs 2,588 cf
Primary=0.71 cfs 2,588 cf

Total Runoff Area = 357,912 sf Runoff Volume = 102,141 cf Average Runoff Depth = 3.42"
67.10% Pervious = 240,161 sf 32.90% Impervious = 117,751 sf

Summary for Subcatchment 1S: Proposed WS-1A

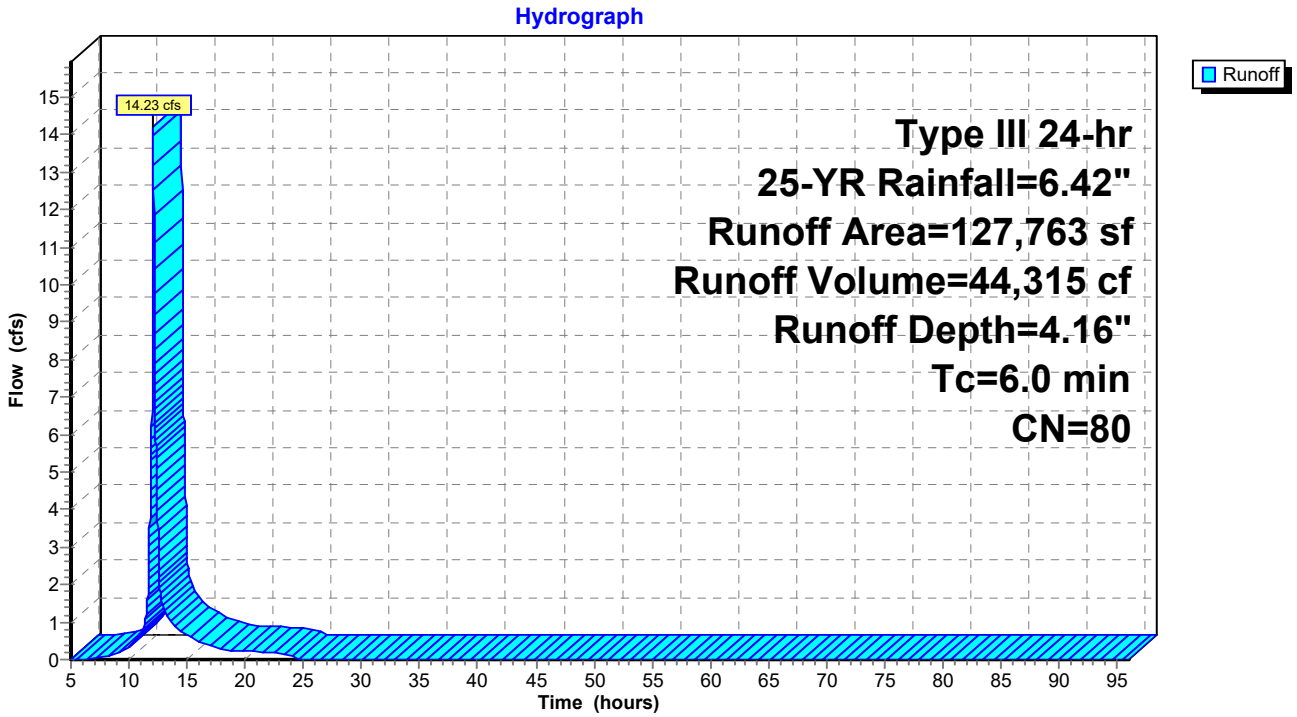
Runoff = 14.23 cfs @ 12.09 hrs, Volume= 44,315 cf, Depth= 4.16"
Routed to Pond UDS-1 : Cultec 330 XLHD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.42"

Area (sf)	CN	Description
2,745	98	Unconnected pavement, HSG A
33,953	98	Unconnected pavement, HSG B
21,986	98	Unconnected pavement, HSG C
1,946	39	>75% Grass cover, Good, HSG A
41,046	61	>75% Grass cover, Good, HSG B
26,087	74	>75% Grass cover, Good, HSG C
127,763	80	Weighted Average
69,079		54.07% Pervious Area
58,684		45.93% Impervious Area
58,684		100.00% Unconnected

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

Subcatchment 1S: Proposed WS-1A



Summary for Subcatchment 7S: Proposed WS-1B

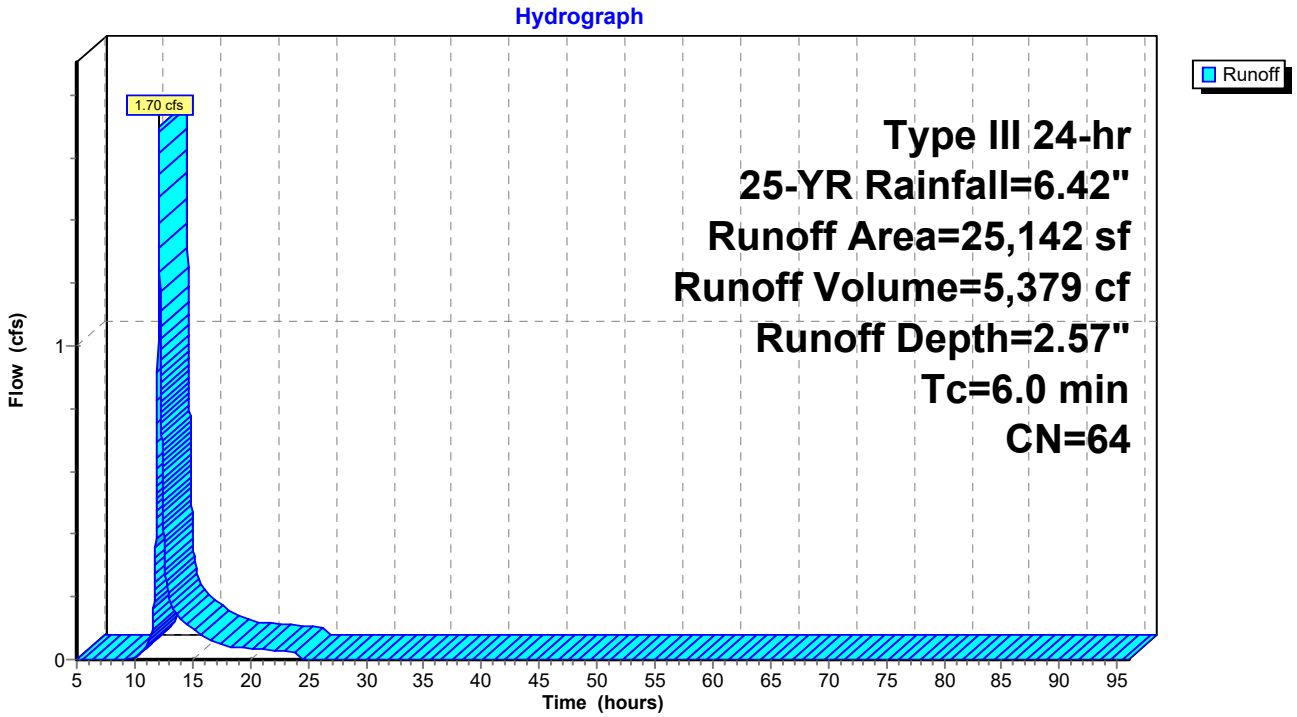
Runoff = 1.70 cfs @ 12.09 hrs, Volume= 5,379 cf, Depth= 2.57"
Routed to Pond FB-2 & FB-3 : Sediment Forebays

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.42"

Area (sf)	CN	Description
10,733	98	Unconnected pavement, HSG A
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG C
14,409	39	>75% Grass cover, Good, HSG A
0	61	>75% Grass cover, Good, HSG B
0	74	>75% Grass cover, Good, HSG C
25,142	64	Weighted Average
14,409		57.31% Pervious Area
10,733		42.69% Impervious Area
10,733		100.00% Unconnected

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

Subcatchment 7S: Proposed WS-1B



Summary for Subcatchment 8S: Proposed WS-1C

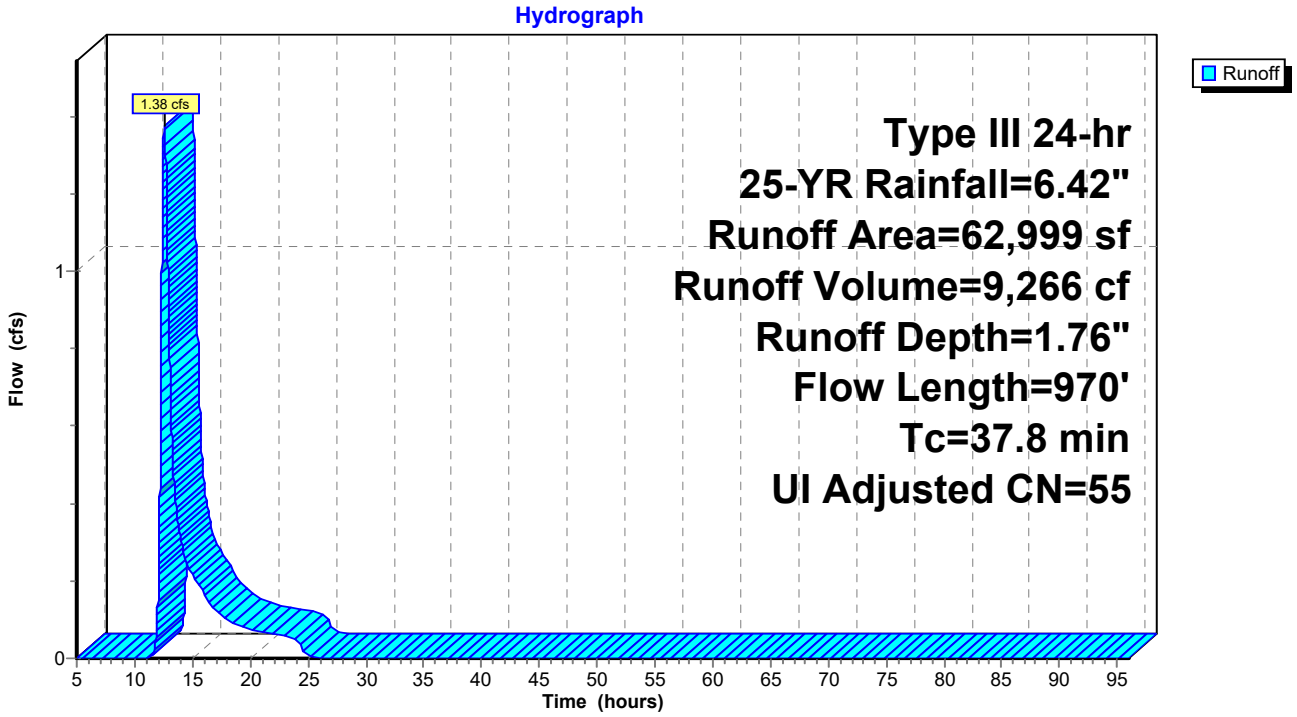
Runoff = 1.38 cfs @ 12.57 hrs, Volume= 9,266 cf, Depth= 1.76"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.42"

Area (sf)	CN	Adj	Description
0	98		Unconnected pavement, HSG A
3,231	98		Unconnected pavement, HSG B
0	98		Unconnected pavement, HSG C
18,478	39		>75% Grass cover, Good, HSG A
41,290	61		>75% Grass cover, Good, HSG B
0	74		>75% Grass cover, Good, HSG C
62,999	56	55	Weighted Average, UI Adjusted
59,768			94.87% Pervious Area
3,231			5.13% Impervious Area
3,231			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	50	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.35"
27.2	920	0.0065	0.56		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
37.8	970	Total			

Subcatchment 8S: Proposed WS-1C



Summary for Subcatchment 10S: Proposed WS-3

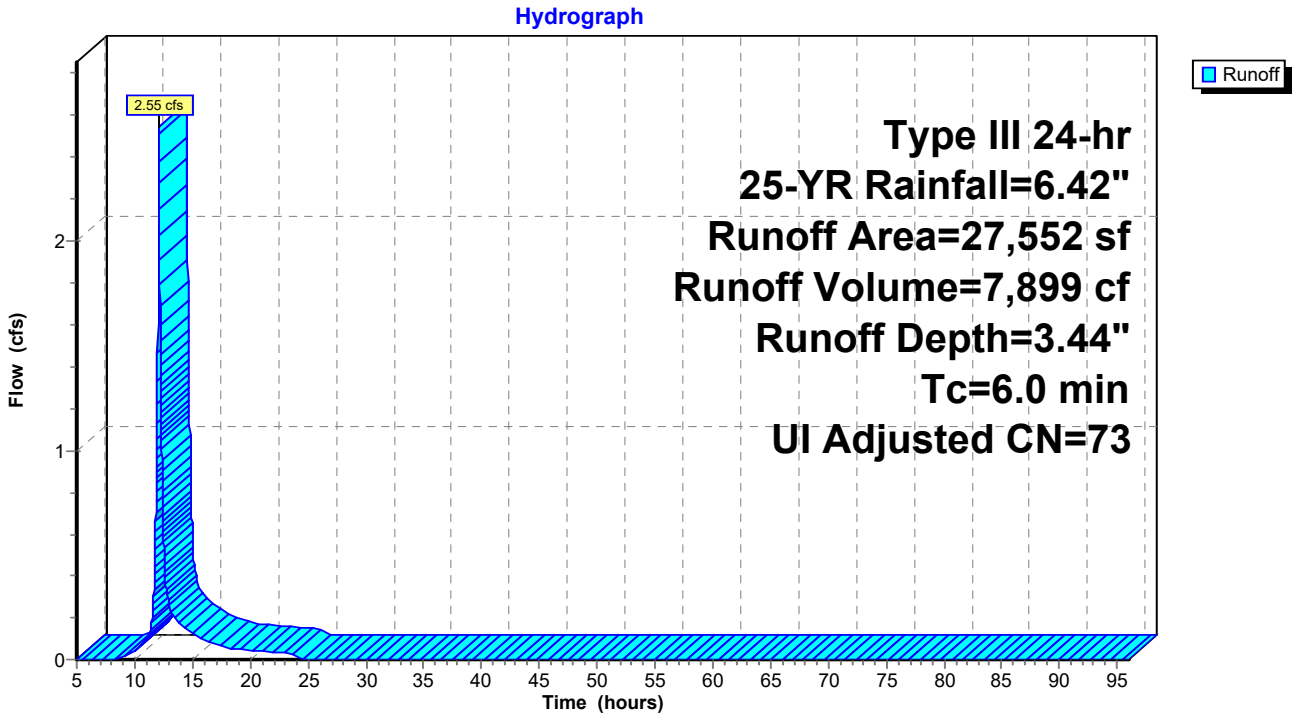
Runoff = 2.55 cfs @ 12.09 hrs, Volume= 7,899 cf, Depth= 3.44"
Routed to Link POA-2 : North Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.42"

Area (sf)	CN	Adj	Description
38	98		Unconnected pavement, HSG A
1,589	98		Unconnected pavement, HSG B
0	98		Unconnected pavement, HSG C
1,223	39		>75% Grass cover, Good, HSG A
0	61		>75% Grass cover, Good, HSG B
24,702	74		>75% Grass cover, Good, HSG C
27,552	74	73	Weighted Average, UI Adjusted
25,925			94.09% Pervious Area
1,627			5.91% Impervious Area
1,627			100.00% Unconnected

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

Subcatchment 10S: Proposed WS-3



Summary for Subcatchment 11S: Proposed WS-4

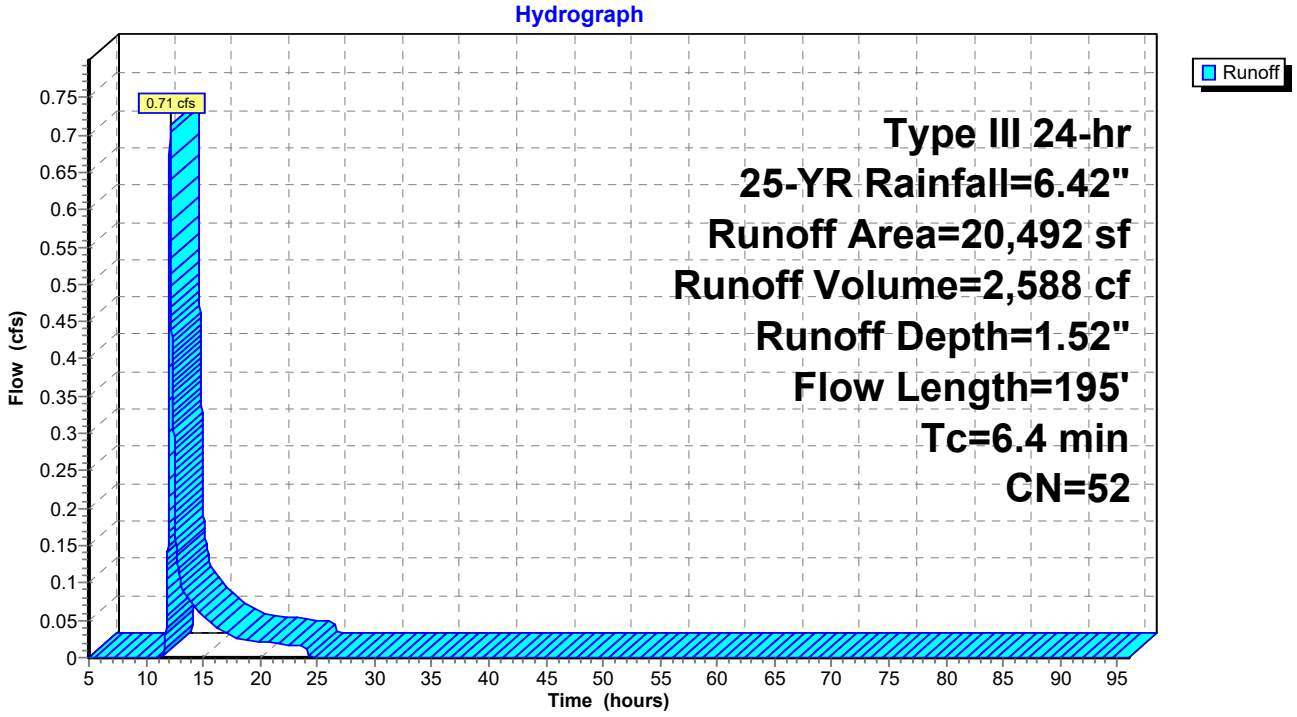
Runoff = 0.71 cfs @ 12.11 hrs, Volume= 2,588 cf, Depth= 1.52"
Routed to Link POA-3 : 33 N Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.42"

Area (sf)	CN	Description
0	98	Unconnected pavement, HSG A
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG C
8,496	39	>75% Grass cover, Good, HSG A
11,996	61	>75% Grass cover, Good, HSG B
0	74	>75% Grass cover, Good, HSG C
20,492	52	Weighted Average
20,492		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0700	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.35"
1.5	145	0.0520	1.60		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.4	195	Total			

Subcatchment 11S: Proposed WS-4



Summary for Subcatchment 17S: Proposed WS-1D

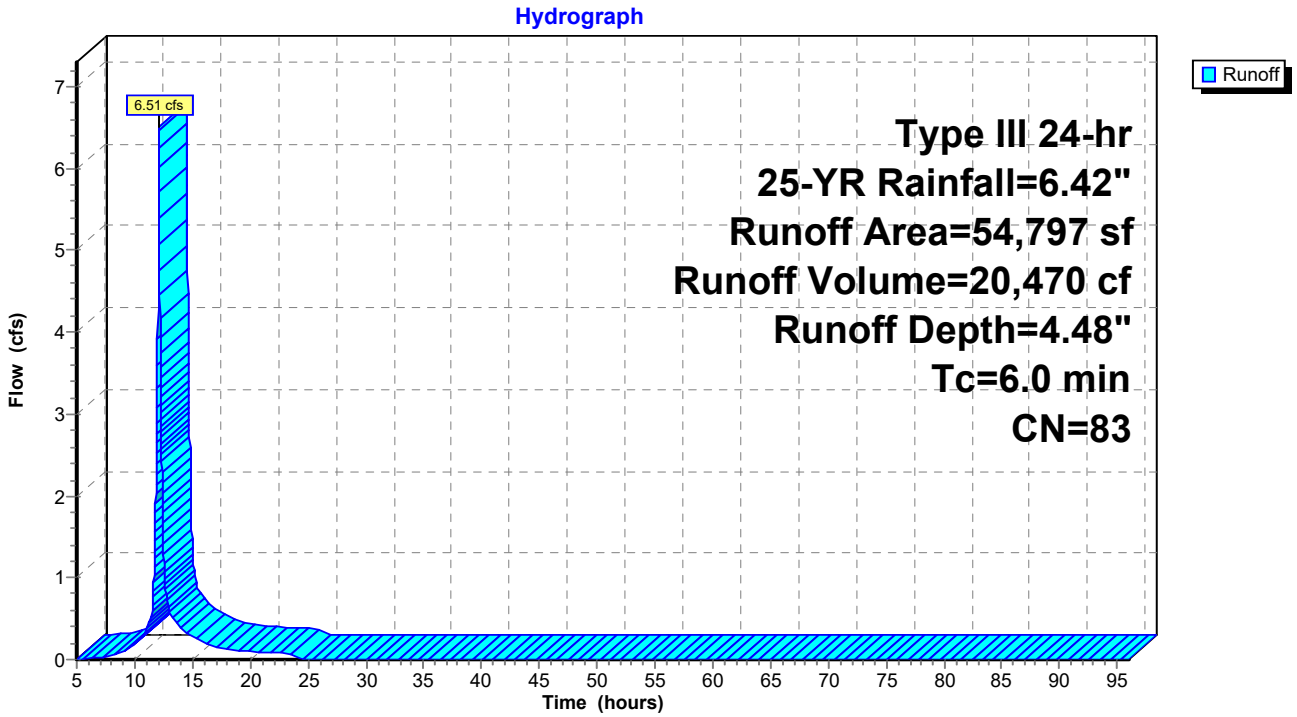
Runoff = 6.51 cfs @ 12.09 hrs, Volume= 20,470 cf, Depth= 4.48"
Routed to Pond FB-1 : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.42"

Area (sf)	CN	Description
0	98	Unconnected pavement, HSG A
17,482	98	Unconnected pavement, HSG B
11,314	98	Unconnected pavement, HSG C
0	39	>75% Grass cover, Good, HSG A
13,949	61	>75% Grass cover, Good, HSG B
12,052	74	>75% Grass cover, Good, HSG C
54,797	83	Weighted Average
26,001		47.45% Pervious Area
28,796		52.55% Impervious Area
28,796		100.00% Unconnected

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

Subcatchment 17S: Proposed WS-1D



Summary for Subcatchment 23S: Proposed WS-1E

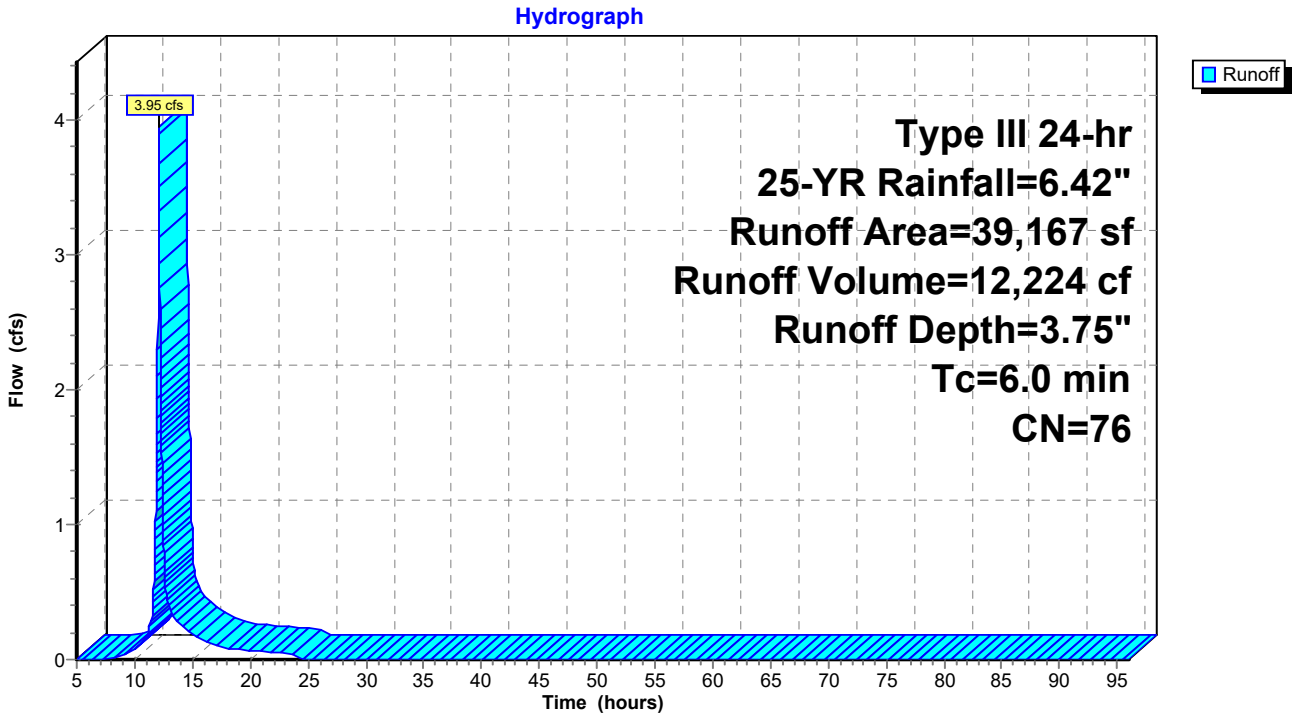
Runoff = 3.95 cfs @ 12.09 hrs, Volume= 12,224 cf, Depth= 3.75"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.42"

Area (sf)	CN	Description
0	98	Unconnected pavement, HSG A
14,680	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG C
0	39	>75% Grass cover, Good, HSG A
21,286	61	>75% Grass cover, Good, HSG B
3,201	74	>75% Grass cover, Good, HSG C
39,167	76	Weighted Average
24,487		62.52% Pervious Area
14,680		37.48% Impervious Area
14,680		100.00% Unconnected

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

Subcatchment 23S: Proposed WS-1E



Summary for Pond FB-1: Forebay

Inflow Area = 54,797 sf, 52.55% Impervious, Inflow Depth = 4.48" for 25-YR event
Inflow = 6.51 cfs @ 12.09 hrs, Volume= 20,470 cf
Outflow = 4.24 cfs @ 12.18 hrs, Volume= 20,464 cf, Atten= 35%, Lag= 5.5 min
Primary = 4.24 cfs @ 12.18 hrs, Volume= 20,464 cf
Routed to Pond IB-1 : Infil Basin

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 177.17' @ 12.18 hrs Surf.Area= 3,558 sf Storage= 5,887 cf
Flood Elev= 178.00' Surf.Area= 4,254 sf Storage= 9,123 cf

Plug-Flow detention time= 118.1 min calculated for 20,464 cf (100% of inflow)
Center-of-Mass det. time= 117.9 min (921.5 - 803.7)

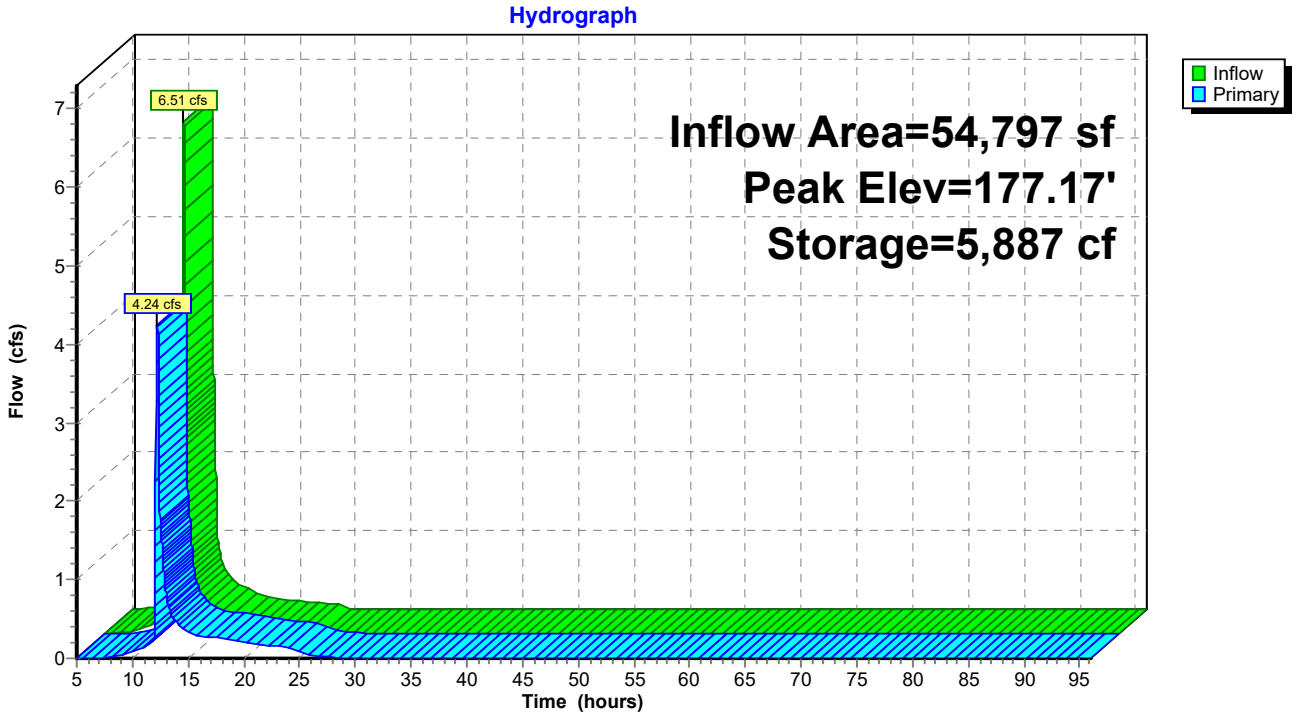
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	9,123 cf	**Basin A (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	1,904	0	0
176.00	2,630	2,267	2,267
177.00	3,414	3,022	5,289
178.00	4,254	3,834	9,123

Device	Routing	Invert	Outlet Devices
#1	Device 3	177.00'	**2.0" x 2.0" Horiz. 12" x 24" grate X 10.00 columns** X 5 rows C= 0.600 in 24.0" x 12.0" Grate (69% open area)
#2	Device 3	176.50'	**6.0" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#3	Primary	174.65'	**12.0" Round HDPE Culvert** L= 118.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 174.65' / 171.11' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	175.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.24 cfs @ 12.18 hrs HW=177.17' TW=172.98' (Dynamic Tailwater)
└─**3=HDPE Culvert** (Inlet Controls 4.24 cfs @ 5.40 fps)
  ├─**1=12" x 24" grate** (Passes < 2.77 cfs potential flow)
  ├─**2=Orifice/Grate** (Passes < 1.84 cfs potential flow)
  └─**4=Orifice/Grate** (Passes < 0.34 cfs potential flow)

Pond FB-1: Forebay



Summary for Pond FB-2 & FB-3: Sediment Forebays

Inflow Area = 25,142 sf, 42.69% Impervious, Inflow Depth = 2.57" for 25-YR event
Inflow = 1.70 cfs @ 12.09 hrs, Volume= 5,379 cf
Outflow = 0.13 cfs @ 13.86 hrs, Volume= 2,049 cf, Atten= 92%, Lag= 106.3 min
Primary = 0.13 cfs @ 13.86 hrs, Volume= 2,049 cf
Routed to Link POA-1 : Hunting Lane (Off-site)

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 172.26' @ 13.86 hrs Surf.Area= 3,541 sf Storage= 3,383 cf

Plug-Flow detention time= 324.3 min calculated for 2,049 cf (38% of inflow)
Center-of-Mass det. time= 193.1 min (1,041.9 - 848.8)

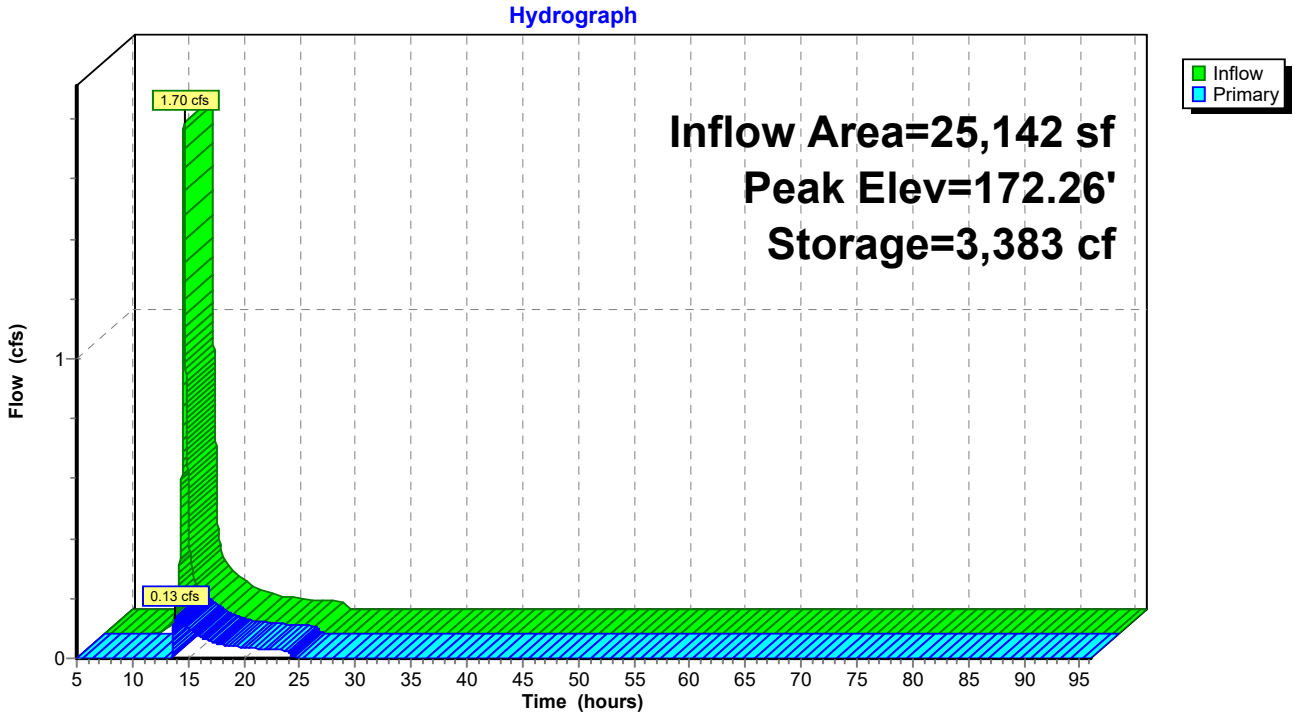
Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	4,257 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
171.00	1,856	0	0
172.00	3,140	2,498	2,498
172.50	3,897	1,759	4,257

Device	Routing	Invert	Outlet Devices
#1	Primary	172.25'	**30.0' long x 3.0' 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 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.13 cfs @ 13.86 hrs HW=172.26' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.13 cfs @ 0.30 fps)

Pond FB-2 & FB-3: Sediment Forebays



Summary for Pond IB-1: Infil Basin

[80] Warning: Exceeded Pond UDS-1 by 0.05' @ 12.11 hrs (8.62 cfs 39,340 cf)

Inflow Area = 182,560 sf, 47.92% Impervious, Inflow Depth > 4.25" for 25-YR event
Inflow = 8.29 cfs @ 12.09 hrs, Volume= 64,661 cf
Outflow = 5.63 cfs @ 12.45 hrs, Volume= 64,046 cf, Atten= 32%, Lag= 21.5 min
Discarded = 0.14 cfs @ 12.45 hrs, Volume= 28,070 cf
Primary = 5.49 cfs @ 12.45 hrs, Volume= 35,976 cf
Routed to Link POA-1 : Hunting Lane (Off-site)
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Routed to Link POA-1 : Hunting Lane (Off-site)

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 173.57' @ 12.45 hrs Surf.Area= 5,753 sf Storage= 12,846 cf
Flood Elev= 175.00' Surf.Area= 7,711 sf Storage= 22,476 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 418.3 min (1,751.7 - 1,333.4)

Volume	Invert	Avail.Storage	Storage Description
#1	170.00'	22,476 cf	**Basin A (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
170.00	1,749	0	0
171.00	2,649	2,199	2,199
172.00	3,770	3,210	5,409
173.00	5,000	4,385	9,794
174.00	6,327	5,664	15,457
175.00	7,711	7,019	22,476

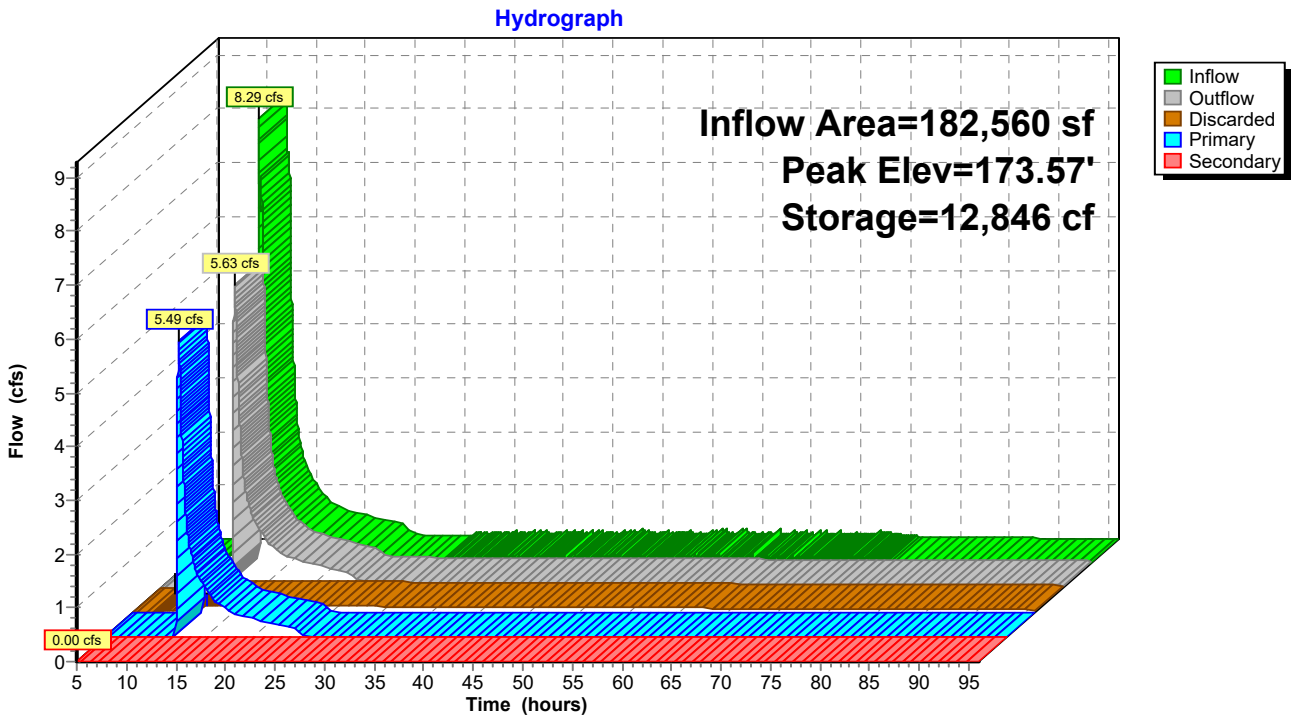
Device	Routing	Invert	Outlet Devices
#1	Discarded	170.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	170.00'	**18.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 170.00' / 169.10' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#3	Device 2	173.75'	**2.0" x 2.0" Horiz. Orifice/Grate X 20.00 columns** X 10 rows C= 0.600 in 48.0" x 24.0" Grate (69% open area)
#4	Device 2	173.00'	**48.0" W x 10.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	174.00'	**10.0' long x 3.0' 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 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.14 cfs @ 12.45 hrs HW=173.57' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=5.49 cfs @ 12.45 hrs HW=173.57' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 5.49 cfs of 11.28 cfs potential flow)
  └**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 5.49 cfs @ 2.42 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=170.00' TW=0.00' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond IB-1: Infil Basin



Summary for Pond UDS-1: Cultec 330 XLHD

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1507)

Inflow Area = 127,763 sf, 45.93% Impervious, Inflow Depth = 4.16" for 25-YR event
Inflow = 14.23 cfs @ 12.09 hrs, Volume= 44,315 cf
Outflow = 5.10 cfs @ 12.08 hrs, Volume= 44,197 cf, Atten= 64%, Lag= 0.0 min
Primary = 5.10 cfs @ 12.08 hrs, Volume= 44,197 cf
Routed to Pond IB-1 : Infil Basin

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 173.58' @ 12.46 hrs Surf.Area= 0.170 ac Storage= 0.324 af
Flood Elev= 174.00' Surf.Area= 0.170 ac Storage= 0.352 af

Plug-Flow detention time= 714.0 min calculated for 44,192 cf (100% of inflow)
Center-of-Mass det. time= 712.7 min (1,524.1 - 811.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	171.00'	0.063 af	**35.33'W x 122.50'L x 3.04'H Field A** 0.302 af Overall - 0.144 af Embedded = 0.158 af x 40.0% Voids
#2A	171.00'	0.144 af	**Cultec R-330XLHD** x 119 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 7 rows
#3B	171.00'	0.045 af	**35.33'W x 87.50'L x 3.04'H Field B** 0.216 af Overall - 0.102 af Embedded = 0.114 af x 40.0% Voids
#4B	171.00'	0.102 af	**Cultec R-330XLHD** x 84 Inside #3 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 7 rows
		0.355 af	Total Available Storage

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

Device	Routing	Invert	Outlet Devices
#1	Primary	171.00'	**15.0" Round Culvert X 8.00** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 171.00' / 171.00' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.00 cfs @ 12.08 hrs HW=172.36' TW=172.40' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond UDS-1: Cultec 330 XLHD - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (For residential use only)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 7 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

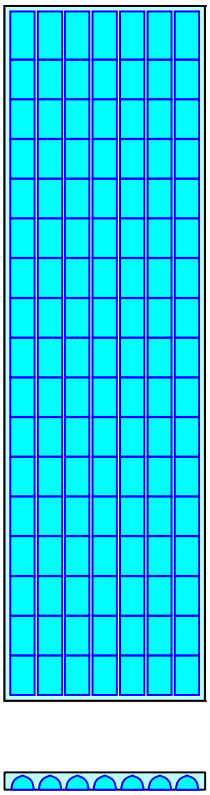
17 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 120.50' Row Length +12.0" End Stone x 2 = 122.50' Base Length
7 Rows x 52.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 35.33' Base Width
30.5" Chamber Height + 6.0" Stone Cover = 3.04' Field Height

119 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 7 Rows = 6,284.9 cf Chamber Storage

13,165.3 cf Field - 6,284.9 cf Chambers = 6,880.4 cf Stone x 40.0% Voids = 2,752.2 cf Stone Storage

Chamber Storage + Stone Storage = 9,037.1 cf = 0.207 af
Overall Storage Efficiency = 68.6%
Overall System Size = 122.50' x 35.33' x 3.04'

119 Chambers
487.6 cy Field
254.8 cy Stone



Pond UDS-1: Cultec 330 XLHD - Chamber Wizard Field B

Chamber Model = Cultec R-330XLHD (For residential use only)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 7 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

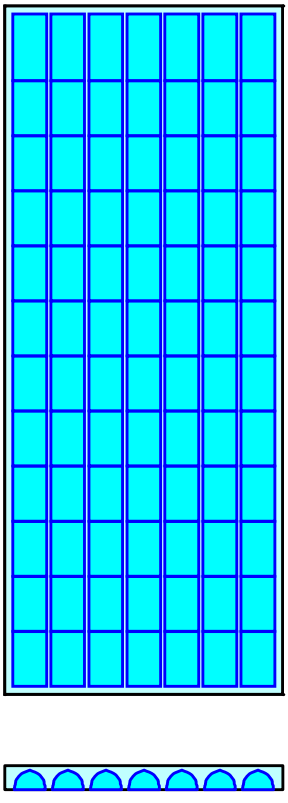
12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length
7 Rows x 52.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 35.33' Base Width
30.5" Chamber Height + 6.0" Stone Cover = 3.04' Field Height

84 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 7 Rows = 4,459.4 cf Chamber Storage

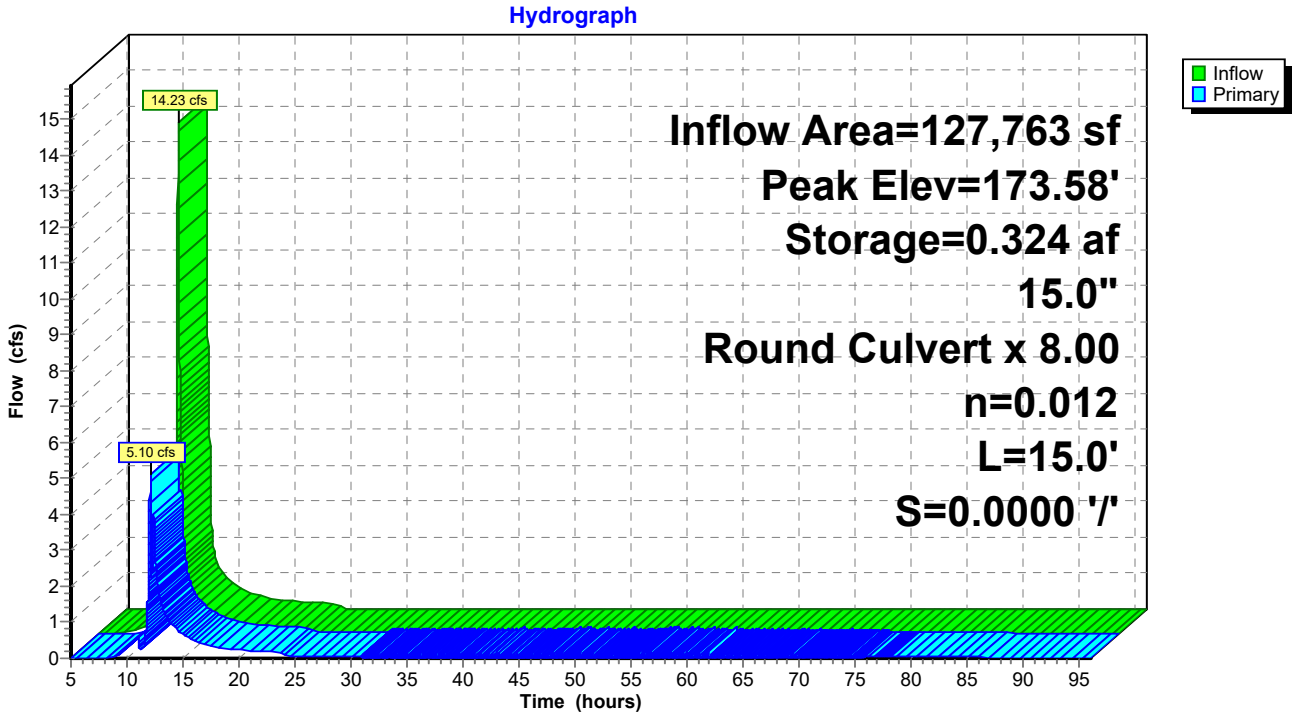
9,403.8 cf Field - 4,459.4 cf Chambers = 4,944.4 cf Stone x 40.0% Voids = 1,977.8 cf Stone Storage

Chamber Storage + Stone Storage = 6,437.2 cf = 0.148 af
Overall Storage Efficiency = 68.5%
Overall System Size = 87.50' x 35.33' x 3.04'

84 Chambers
348.3 cy Field
183.1 cy Stone



Pond UDS-1: Cultec 330 XLHD

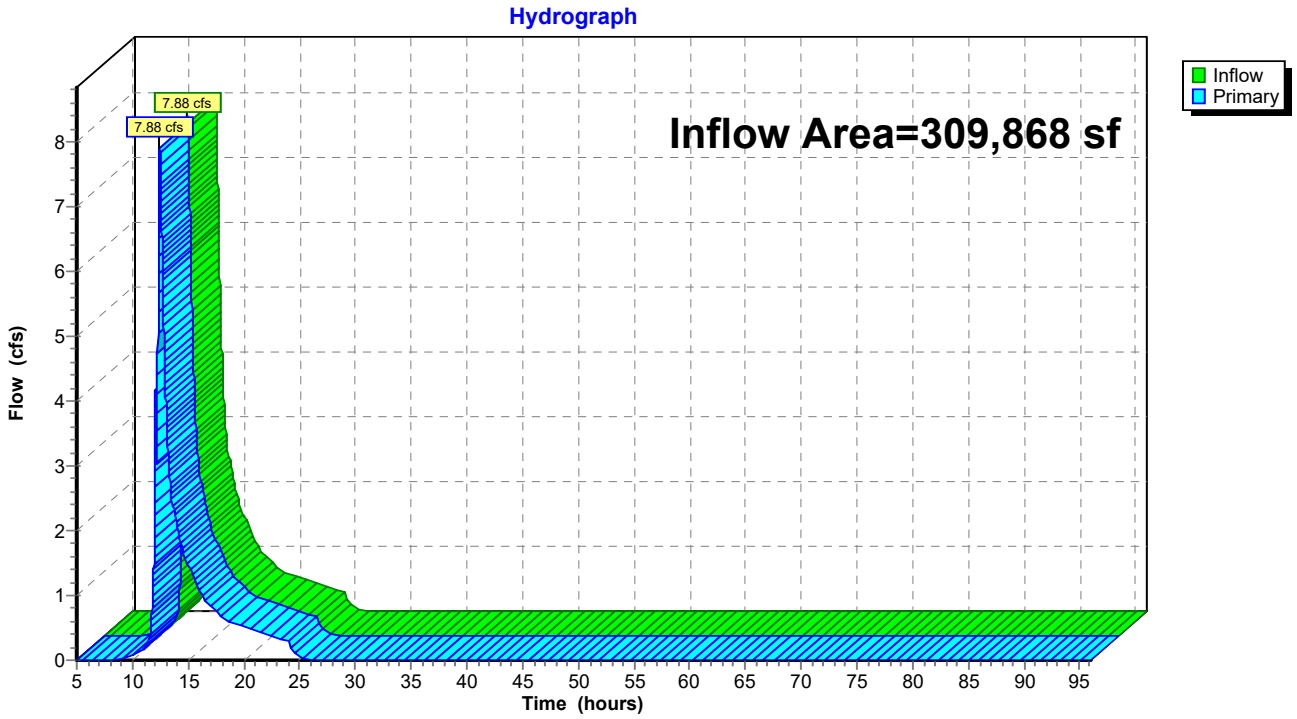


Summary for Link POA-1: Hunting Lane (Off-site)

Inflow Area = 309,868 sf, 37.48% Impervious, Inflow Depth = 2.30" for 25-YR event
Inflow = 7.88 cfs @ 12.44 hrs, Volume= 59,515 cf
Primary = 7.88 cfs @ 12.44 hrs, Volume= 59,515 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs

Link POA-1: Hunting Lane (Off-site)

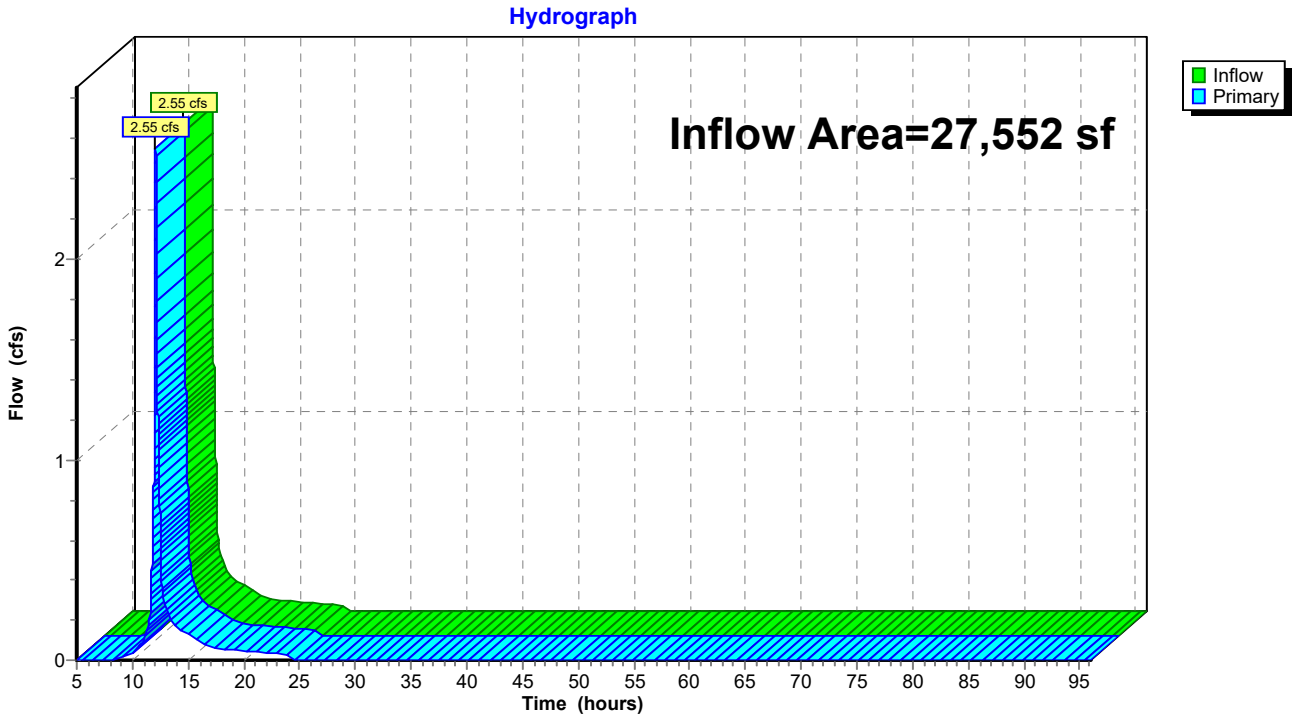


Summary for Link POA-2: North Main Street (Offsite)

Inflow Area = 27,552 sf, 5.91% Impervious, Inflow Depth = 3.44" for 25-YR event
Inflow = 2.55 cfs @ 12.09 hrs, Volume= 7,899 cf
Primary = 2.55 cfs @ 12.09 hrs, Volume= 7,899 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs

Link POA-2: North Main Street (Offsite)

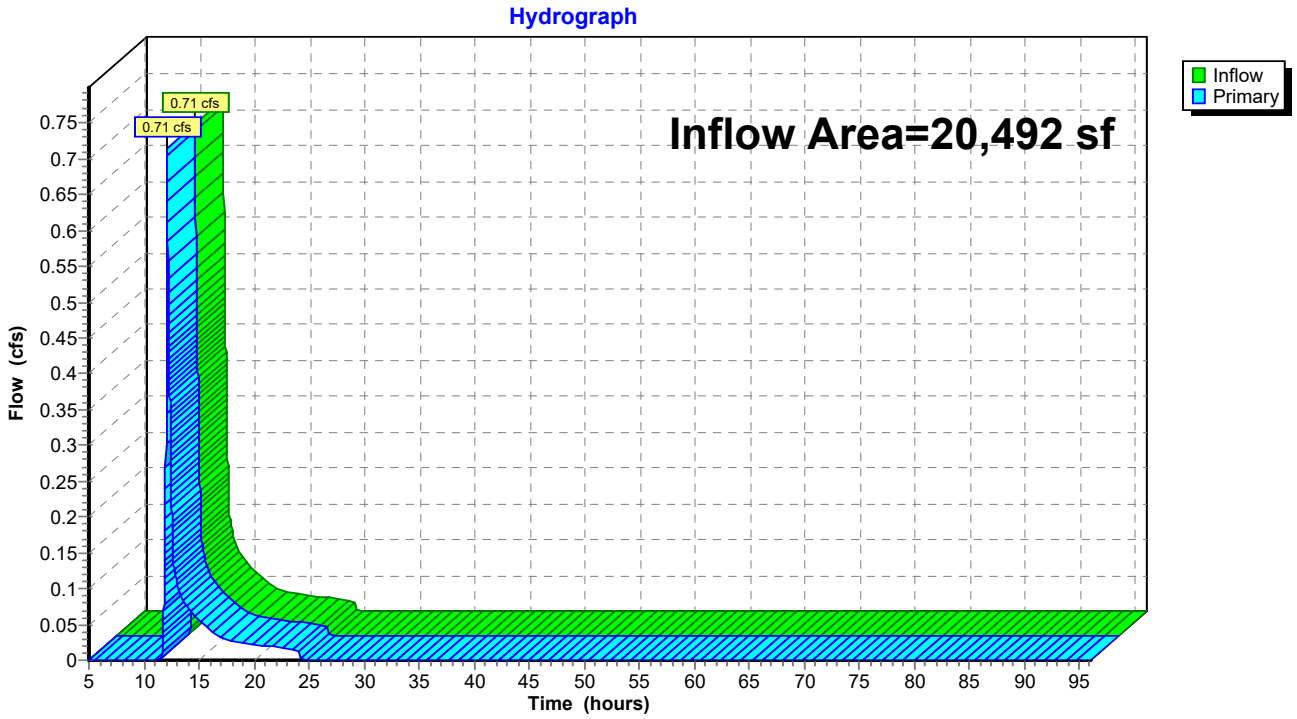


Summary for Link POA-3: 33 N Main Street (Offsite)

Inflow Area = 20,492 sf, 0.00% Impervious, Inflow Depth = 1.52" for 25-YR event
Inflow = 0.71 cfs @ 12.11 hrs, Volume= 2,588 cf
Primary = 0.71 cfs @ 12.11 hrs, Volume= 2,588 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs

Link POA-3: 33 N Main Street (Offsite)



Time span=5.00-96.00 hrs, dt=0.01 hrs, 9101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Proposed WS-1A Runoff Area=127,763 sf 45.93% Impervious Runoff Depth=5.84"
Tc=6.0 min CN=80 Runoff=19.74 cfs 62,188 cf

Subcatchment7S: Proposed WS-1B Runoff Area=25,142 sf 42.69% Impervious Runoff Depth=3.97"
Tc=6.0 min CN=64 Runoff=2.68 cfs 8,308 cf

Subcatchment8S: Proposed WS-1C Runoff Area=62,999 sf 5.13% Impervious Runoff Depth=2.94"
Flow Length=970' Tc=37.8 min UI Adjusted CN=55 Runoff=2.43 cfs 15,448 cf

Subcatchment10S: Proposed WS-3 Runoff Area=27,552 sf 5.91% Impervious Runoff Depth=5.01"
Tc=6.0 min UI Adjusted CN=73 Runoff=3.71 cfs 11,513 cf

Subcatchment11S: Proposed WS-4 Runoff Area=20,492 sf 0.00% Impervious Runoff Depth=2.61"
Flow Length=195' Tc=6.4 min CN=52 Runoff=1.34 cfs 4,457 cf

Subcatchment17S: Proposed WS-1D Runoff Area=54,797 sf 52.55% Impervious Runoff Depth>6.20"
Tc=6.0 min CN=83 Runoff=8.88 cfs 28,295 cf

Subcatchment23S: Proposed WS-1E Runoff Area=39,167 sf 37.48% Impervious Runoff Depth=5.37"
Tc=6.0 min CN=76 Runoff=5.62 cfs 17,520 cf

Pond FB-1: Forebay Peak Elev=177.62' Storage=7,562 cf Inflow=8.88 cfs 28,295 cf
Outflow=4.69 cfs 28,288 cf

Pond FB-2 & FB-3: Sediment Forebays Peak Elev=172.31' Storage=3,537 cf Inflow=2.68 cfs 8,308 cf
Outflow=1.02 cfs 4,978 cf

Pond IB-1: Infil Basin Peak Elev=173.99' Storage=15,395 cf Inflow=17.03 cfs 90,353 cf
Discarded=0.15 cfs 28,633 cf Primary=12.09 cfs 60,982 cf Secondary=0.00 cfs 0 cf Outflow=12.24 cfs 89,614 cf

Pond UDS-1: Cultec 330 XLHD Peak Elev=174.03' Storage=0.355 af Inflow=19.74 cfs 62,188 cf
15.0" Round Culvert x 8.00 n=0.012 L=15.0' S=0.0000 '/' Outflow=12.49 cfs 62,065 cf

Link POA-1: Hunting Lane (Off-site) Inflow=17.07 cfs 98,927 cf
Primary=17.07 cfs 98,927 cf

Link POA-2: North Main Street (Offsite) Inflow=3.71 cfs 11,513 cf
Primary=3.71 cfs 11,513 cf

Link POA-3: 33 N Main Street (Offsite) Inflow=1.34 cfs 4,457 cf
Primary=1.34 cfs 4,457 cf

Total Runoff Area = 357,912 sf Runoff Volume = 147,728 cf Average Runoff Depth = 4.95"
67.10% Pervious = 240,161 sf 32.90% Impervious = 117,751 sf

Summary for Subcatchment 1S: Proposed WS-1A

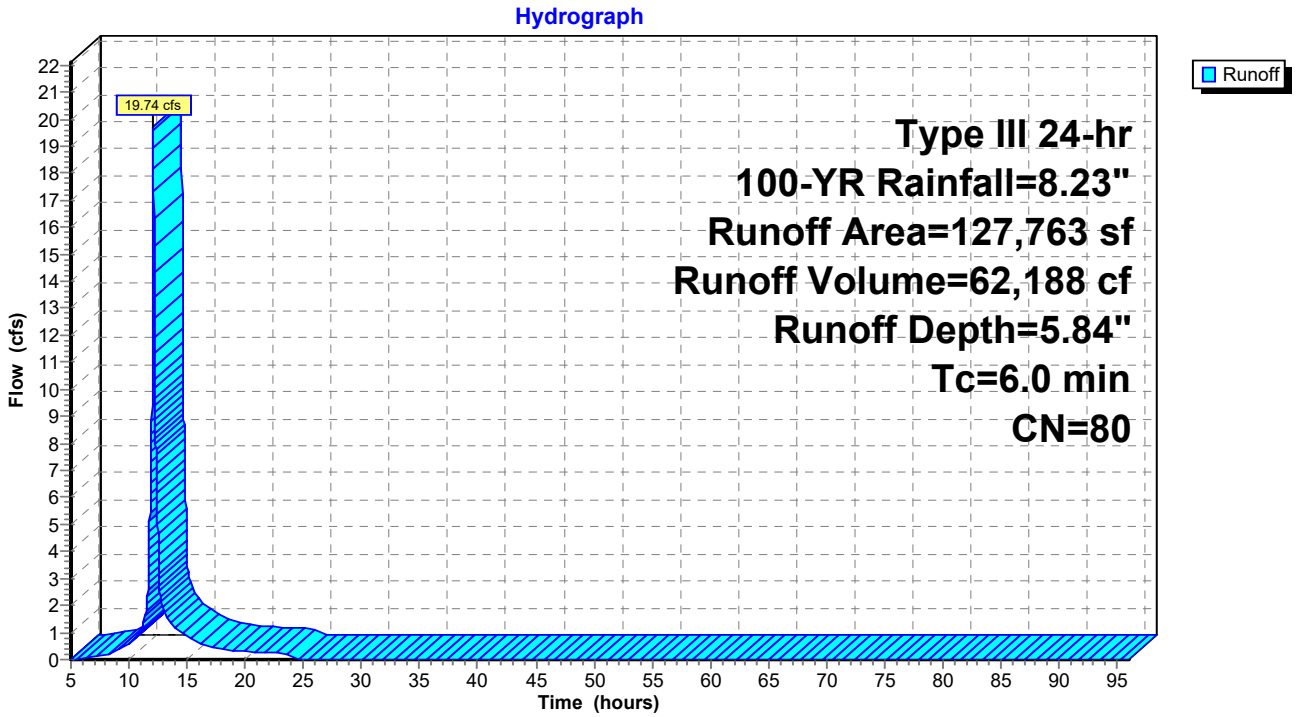
Runoff = 19.74 cfs @ 12.09 hrs, Volume= 62,188 cf, Depth= 5.84"
Routed to Pond UDS-1 : Cultec 330 XLHD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.23"

Area (sf)	CN	Description
2,745	98	Unconnected pavement, HSG A
33,953	98	Unconnected pavement, HSG B
21,986	98	Unconnected pavement, HSG C
1,946	39	>75% Grass cover, Good, HSG A
41,046	61	>75% Grass cover, Good, HSG B
26,087	74	>75% Grass cover, Good, HSG C
127,763	80	Weighted Average
69,079		54.07% Pervious Area
58,684		45.93% Impervious Area
58,684		100.00% Unconnected

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

Subcatchment 1S: Proposed WS-1A



Summary for Subcatchment 7S: Proposed WS-1B

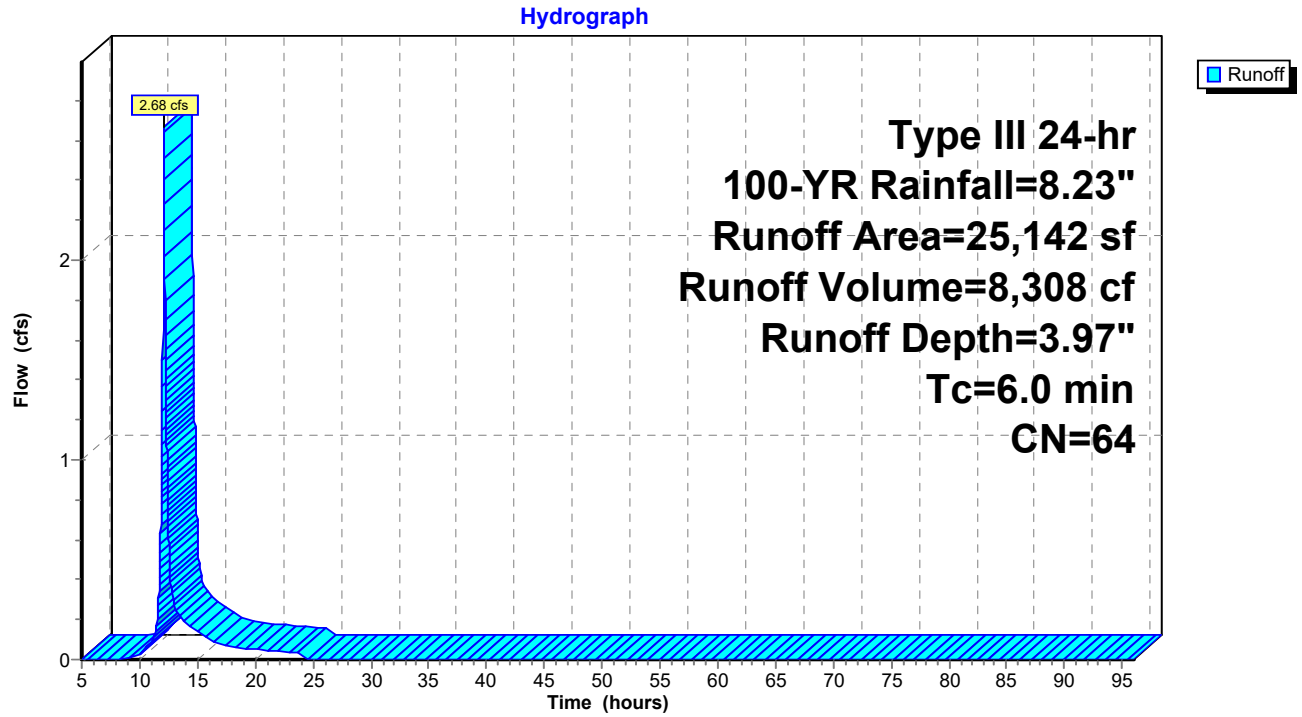
Runoff = 2.68 cfs @ 12.09 hrs, Volume= 8,308 cf, Depth= 3.97"
Routed to Pond FB-2 & FB-3 : Sediment Forebays

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.23"

Area (sf)	CN	Description
10,733	98	Unconnected pavement, HSG A
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG C
14,409	39	>75% Grass cover, Good, HSG A
0	61	>75% Grass cover, Good, HSG B
0	74	>75% Grass cover, Good, HSG C
25,142	64	Weighted Average
14,409		57.31% Pervious Area
10,733		42.69% Impervious Area
10,733		100.00% Unconnected

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

Subcatchment 7S: Proposed WS-1B



Summary for Subcatchment 8S: Proposed WS-1C

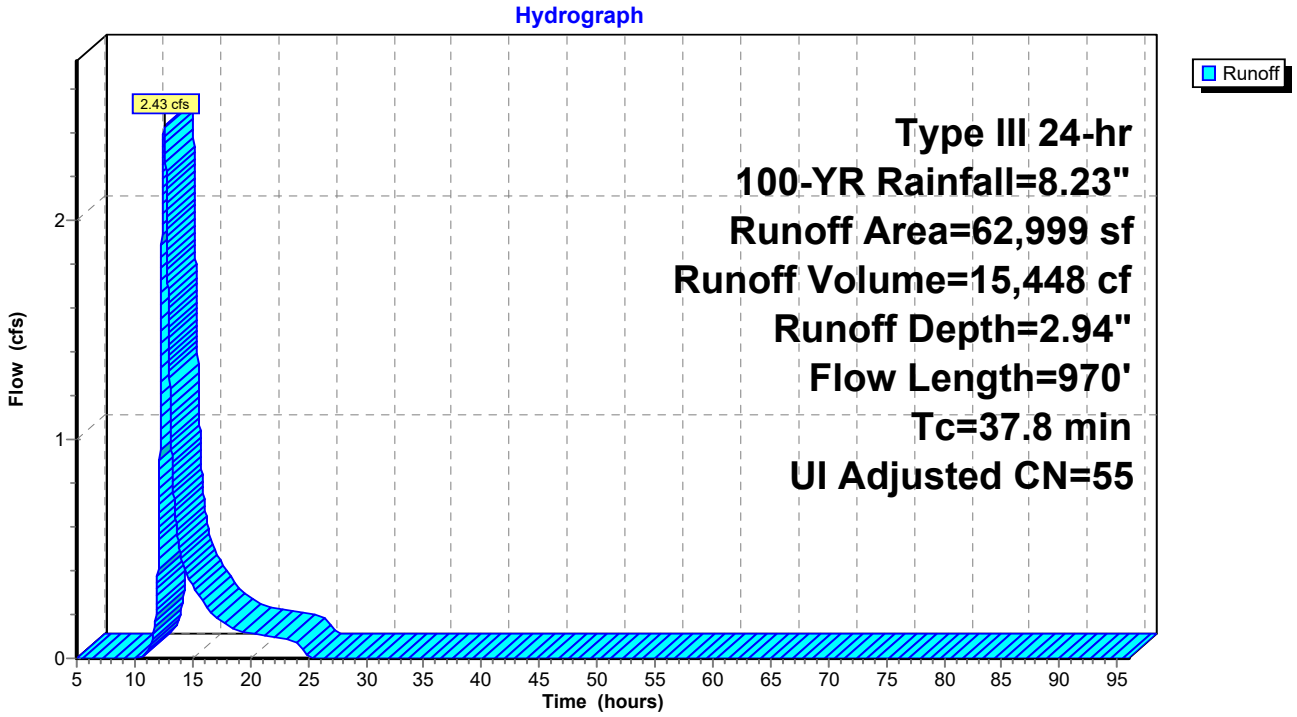
Runoff = 2.43 cfs @ 12.56 hrs, Volume= 15,448 cf, Depth= 2.94"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.23"

Area (sf)	CN	Adj	Description
0	98		Unconnected pavement, HSG A
3,231	98		Unconnected pavement, HSG B
0	98		Unconnected pavement, HSG C
18,478	39		>75% Grass cover, Good, HSG A
41,290	61		>75% Grass cover, Good, HSG B
0	74		>75% Grass cover, Good, HSG C
62,999	56	55	Weighted Average, UI Adjusted
59,768			94.87% Pervious Area
3,231			5.13% Impervious Area
3,231			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	50	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.35"
27.2	920	0.0065	0.56		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
37.8	970	Total			

Subcatchment 8S: Proposed WS-1C



Summary for Subcatchment 10S: Proposed WS-3

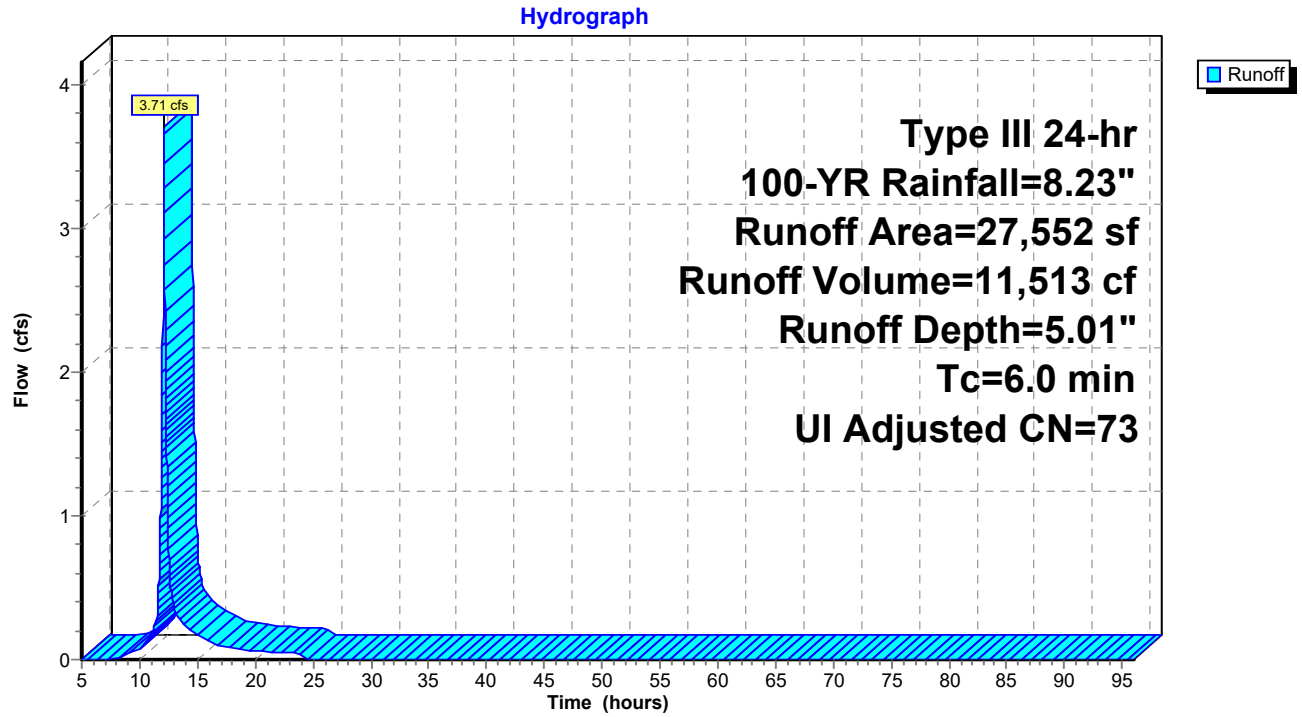
Runoff = 3.71 cfs @ 12.09 hrs, Volume= 11,513 cf, Depth= 5.01"
Routed to Link POA-2 : North Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.23"

Area (sf)	CN	Adj	Description
38	98		Unconnected pavement, HSG A
1,589	98		Unconnected pavement, HSG B
0	98		Unconnected pavement, HSG C
1,223	39		>75% Grass cover, Good, HSG A
0	61		>75% Grass cover, Good, HSG B
24,702	74		>75% Grass cover, Good, HSG C
27,552	74	73	Weighted Average, UI Adjusted
25,925			94.09% Pervious Area
1,627			5.91% Impervious Area
1,627			100.00% Unconnected

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

Subcatchment 10S: Proposed WS-3



Summary for Subcatchment 11S: Proposed WS-4

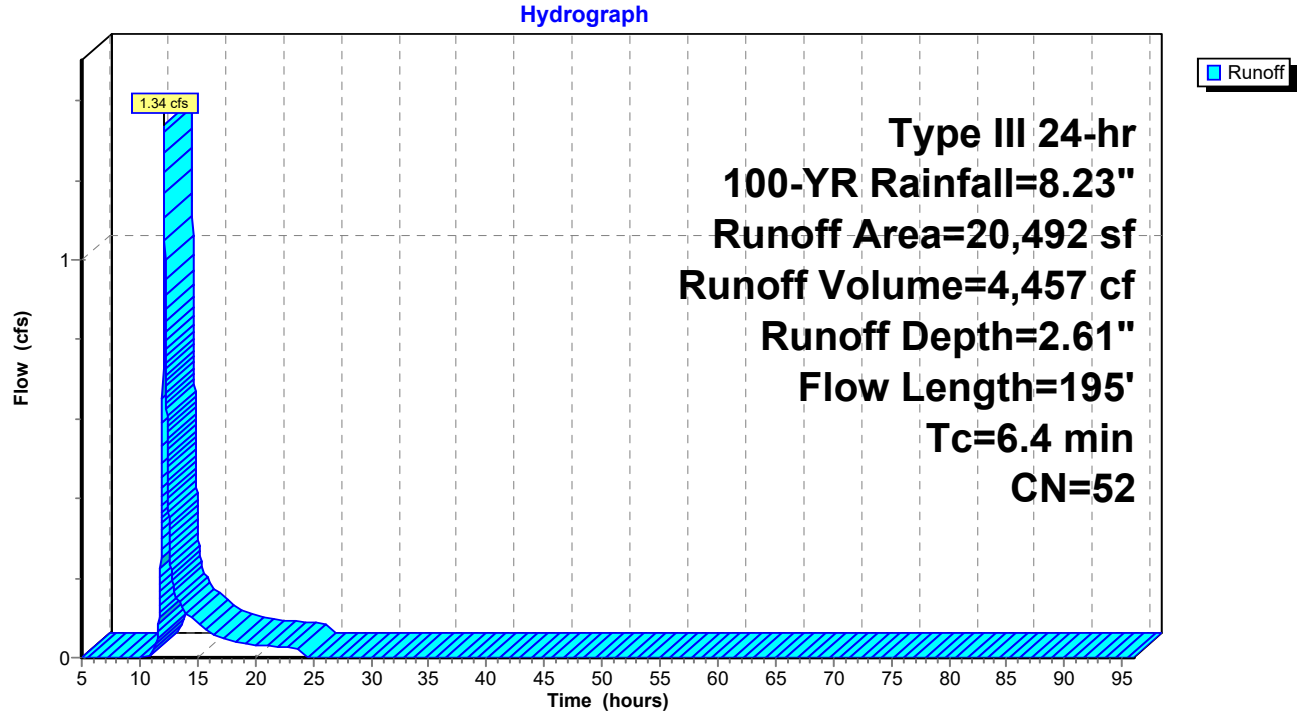
Runoff = 1.34 cfs @ 12.10 hrs, Volume= 4,457 cf, Depth= 2.61"
Routed to Link POA-3 : 33 N Main Street (Offsite)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.23"

Area (sf)	CN	Description
0	98	Unconnected pavement, HSG A
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG C
8,496	39	>75% Grass cover, Good, HSG A
11,996	61	>75% Grass cover, Good, HSG B
0	74	>75% Grass cover, Good, HSG C
20,492	52	Weighted Average
20,492		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0700	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.35"
1.5	145	0.0520	1.60		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.4	195	Total			

Subcatchment 11S: Proposed WS-4



Summary for Subcatchment 17S: Proposed WS-1D

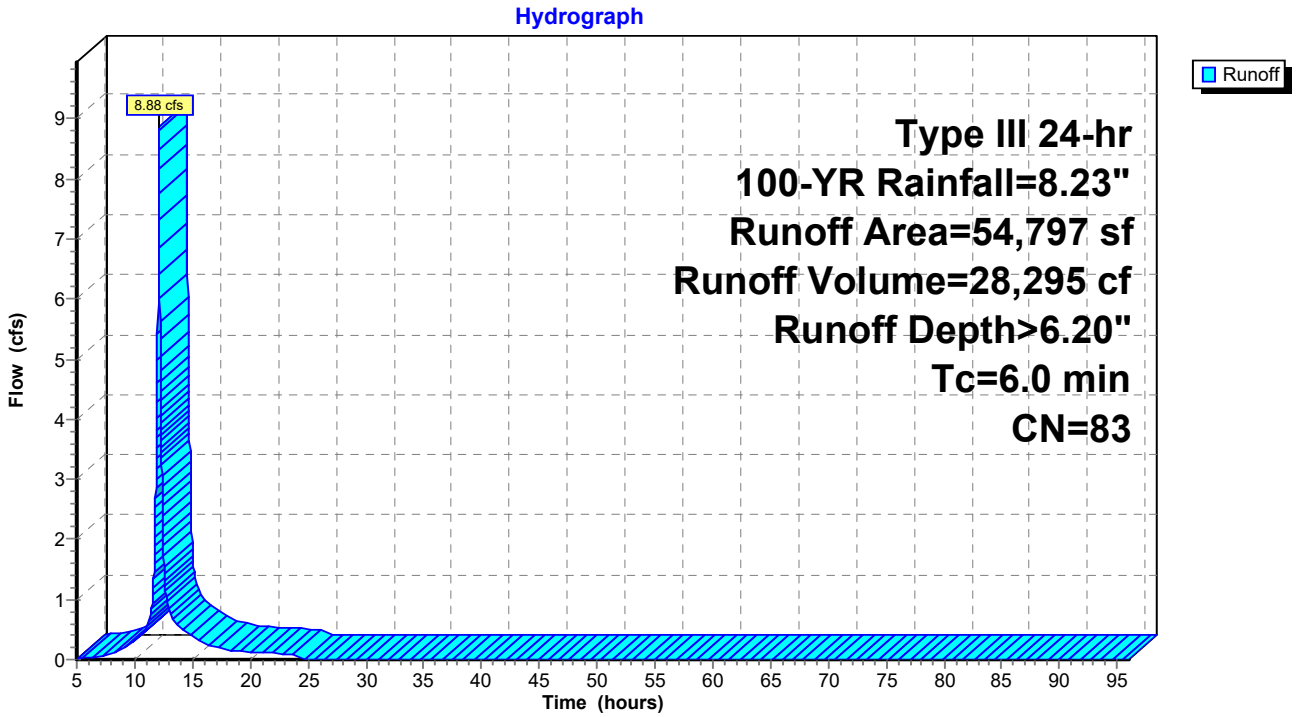
Runoff = 8.88 cfs @ 12.09 hrs, Volume= 28,295 cf, Depth> 6.20"
Routed to Pond FB-1 : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.23"

Area (sf)	CN	Description
0	98	Unconnected pavement, HSG A
17,482	98	Unconnected pavement, HSG B
11,314	98	Unconnected pavement, HSG C
0	39	>75% Grass cover, Good, HSG A
13,949	61	>75% Grass cover, Good, HSG B
12,052	74	>75% Grass cover, Good, HSG C
54,797	83	Weighted Average
26,001		47.45% Pervious Area
28,796		52.55% Impervious Area
28,796		100.00% Unconnected

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

Subcatchment 17S: Proposed WS-1D



Summary for Subcatchment 23S: Proposed WS-1E

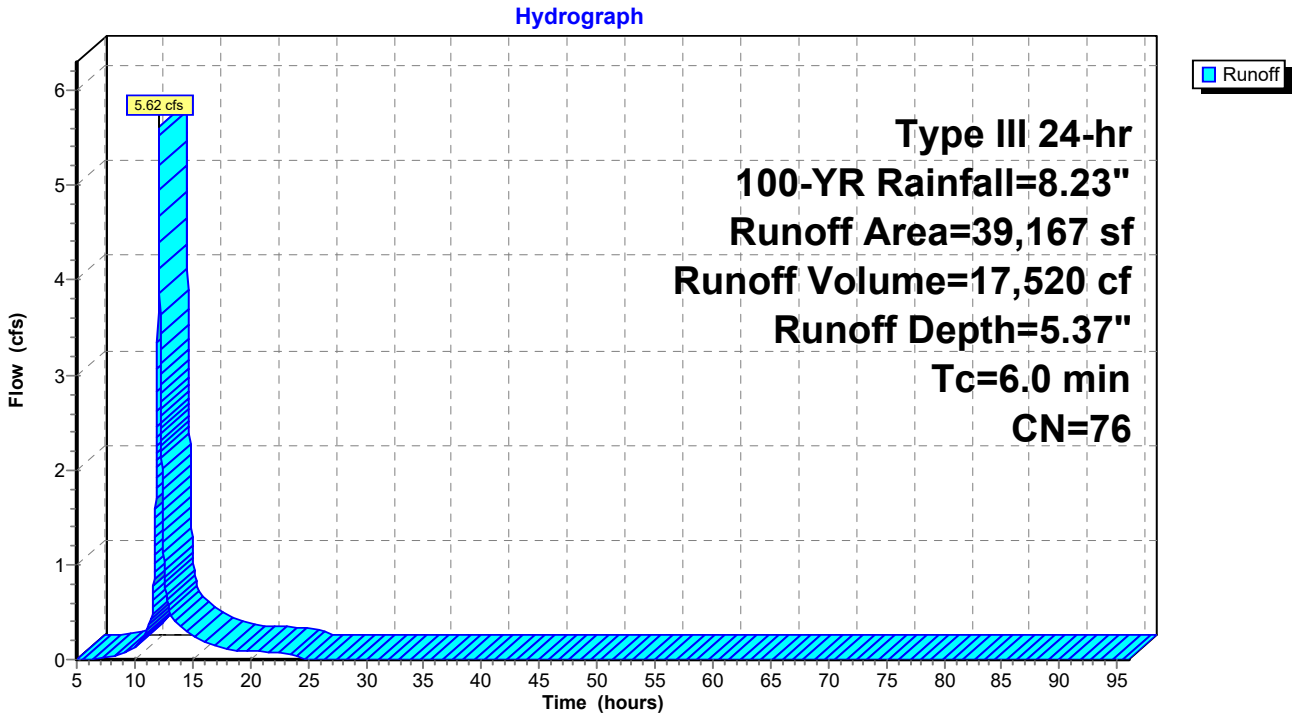
Runoff = 5.62 cfs @ 12.09 hrs, Volume= 17,520 cf, Depth= 5.37"
Routed to Link POA-1 : Hunting Lane (Off-site)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.23"

Area (sf)	CN	Description
0	98	Unconnected pavement, HSG A
14,680	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG C
0	39	>75% Grass cover, Good, HSG A
21,286	61	>75% Grass cover, Good, HSG B
3,201	74	>75% Grass cover, Good, HSG C
39,167	76	Weighted Average
24,487		62.52% Pervious Area
14,680		37.48% Impervious Area
14,680		100.00% Unconnected

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

Subcatchment 23S: Proposed WS-1E



Summary for Pond FB-1: Forebay

Inflow Area = 54,797 sf, 52.55% Impervious, Inflow Depth > 6.20" for 100-YR event
Inflow = 8.88 cfs @ 12.09 hrs, Volume= 28,295 cf
Outflow = 4.69 cfs @ 12.22 hrs, Volume= 28,288 cf, Atten= 47%, Lag= 7.9 min
Primary = 4.69 cfs @ 12.22 hrs, Volume= 28,288 cf
Routed to Pond IB-1 : Infil Basin

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 177.62' @ 12.22 hrs Surf.Area= 3,934 sf Storage= 7,562 cf
Flood Elev= 178.00' Surf.Area= 4,254 sf Storage= 9,123 cf

Plug-Flow detention time= 102.5 min calculated for 28,285 cf (100% of inflow)
Center-of-Mass det. time= 102.7 min (897.4 - 794.7)

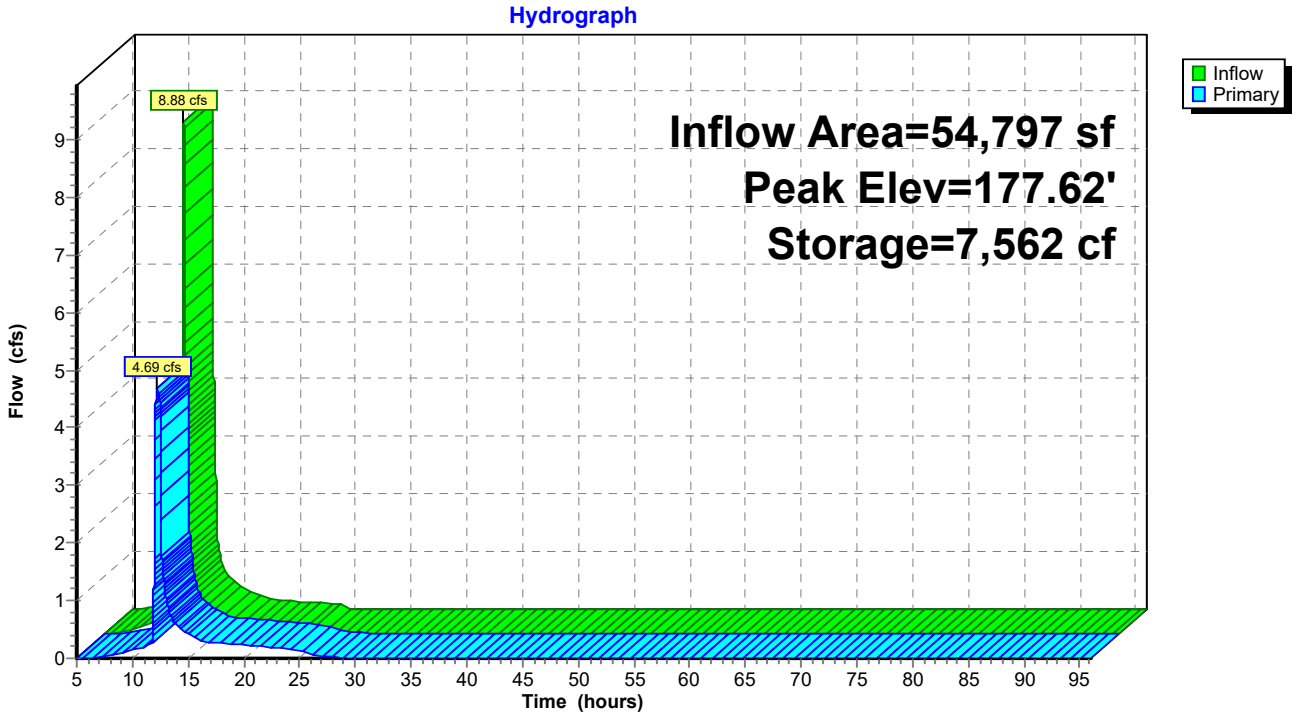
Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	9,123 cf	**Basin A (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	1,904	0	0
176.00	2,630	2,267	2,267
177.00	3,414	3,022	5,289
178.00	4,254	3,834	9,123

Device	Routing	Invert	Outlet Devices
#1	Device 3	177.00'	**2.0" x 2.0" Horiz. 12" x 24" grate X 10.00 columns** X 5 rows C= 0.600 in 24.0" x 12.0" Grate (69% open area)
#2	Device 3	176.50'	**6.0" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#3	Primary	174.65'	**12.0" Round HDPE Culvert** L= 118.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 174.65' / 171.11' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	175.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.69 cfs @ 12.22 hrs HW=177.62' TW=173.93' (Dynamic Tailwater)
└─**3=HDPE Culvert** (Inlet Controls 4.69 cfs @ 5.97 fps)
  ├─**1=12" x 24" grate** (Passes < 5.26 cfs potential flow)
  ├─**2=Orifice/Grate** (Passes < 2.64 cfs potential flow)
  └─**4=Orifice/Grate** (Passes < 0.37 cfs potential flow)

Pond FB-1: Forebay



Summary for Pond FB-2 & FB-3: Sediment Forebays

Inflow Area = 25,142 sf, 42.69% Impervious, Inflow Depth = 3.97" for 100-YR event
Inflow = 2.68 cfs @ 12.09 hrs, Volume= 8,308 cf
Outflow = 1.02 cfs @ 12.37 hrs, Volume= 4,978 cf, Atten= 62%, Lag= 16.7 min
Primary = 1.02 cfs @ 12.37 hrs, Volume= 4,978 cf
Routed to Link POA-1 : Hunting Lane (Off-site)

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 172.31' @ 12.37 hrs Surf.Area= 3,606 sf Storage= 3,537 cf

Plug-Flow detention time= 201.6 min calculated for 4,978 cf (60% of inflow)
Center-of-Mass det. time= 90.1 min (926.2 - 836.1)

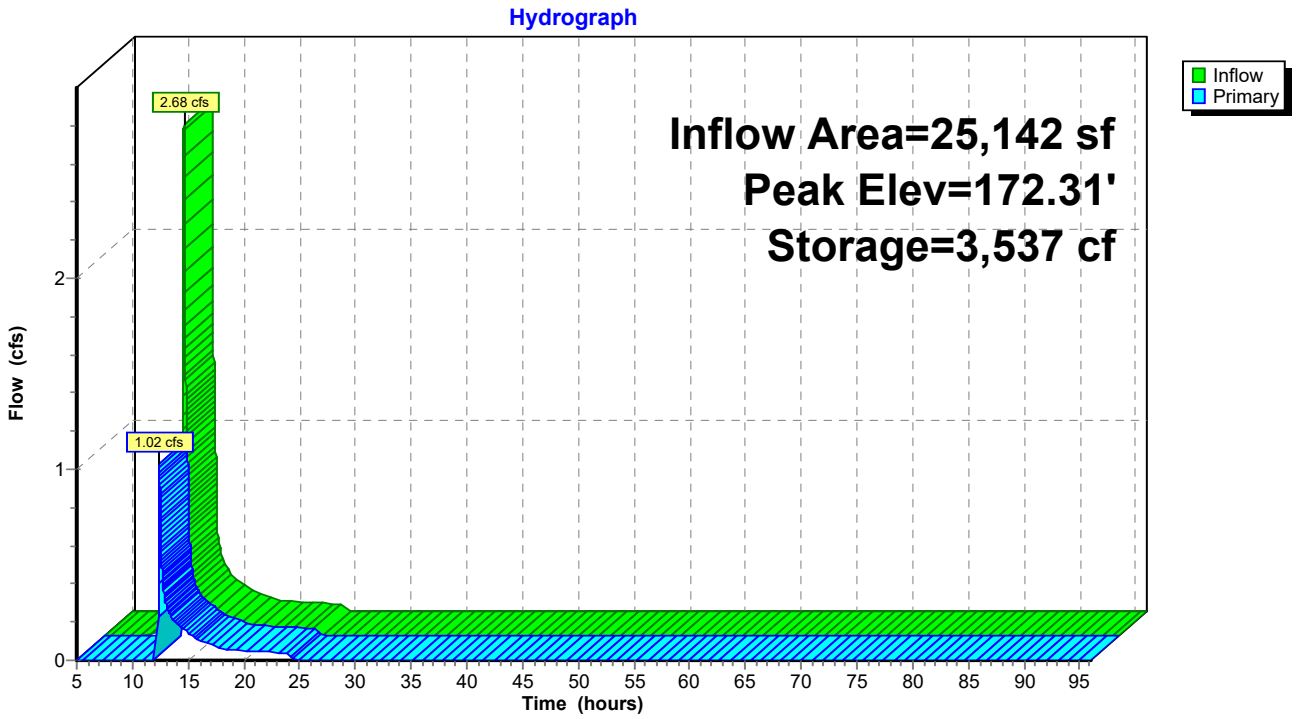
Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	4,257 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
171.00	1,856	0	0
172.00	3,140	2,498	2,498
172.50	3,897	1,759	4,257

Device	Routing	Invert	Outlet Devices
#1	Primary	172.25'	**30.0' long x 3.0' 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 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=1.02 cfs @ 12.37 hrs HW=172.31' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.02 cfs @ 0.59 fps)

Pond FB-2 & FB-3: Sediment Forebays



Summary for Pond IB-1: Infil Basin

[80] Warning: Exceeded Pond UDS-1 by 0.05' @ 12.03 hrs (8.02 cfs 40,838 cf)

Inflow Area = 182,560 sf, 47.92% Impervious, Inflow Depth > 5.94" for 100-YR event
Inflow = 17.03 cfs @ 12.12 hrs, Volume= 90,353 cf
Outflow = 12.24 cfs @ 12.33 hrs, Volume= 89,614 cf, Atten= 28%, Lag= 12.7 min
Discarded = 0.15 cfs @ 12.33 hrs, Volume= 28,633 cf
Primary = 12.09 cfs @ 12.33 hrs, Volume= 60,982 cf
Routed to Link POA-1 : Hunting Lane (Off-site)
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Routed to Link POA-1 : Hunting Lane (Off-site)

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 173.99' @ 12.33 hrs Surf.Area= 6,314 sf Storage= 15,395 cf
Flood Elev= 175.00' Surf.Area= 7,711 sf Storage= 22,476 cf

Plug-Flow detention time= 334.8 min calculated for 89,614 cf (99% of inflow)
Center-of-Mass det. time= 301.6 min (1,492.4 - 1,190.8)

Volume	Invert	Avail.Storage	Storage Description
#1	170.00'	22,476 cf	**Basin A (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
170.00	1,749	0	0
171.00	2,649	2,199	2,199
172.00	3,770	3,210	5,409
173.00	5,000	4,385	9,794
174.00	6,327	5,664	15,457
175.00	7,711	7,019	22,476

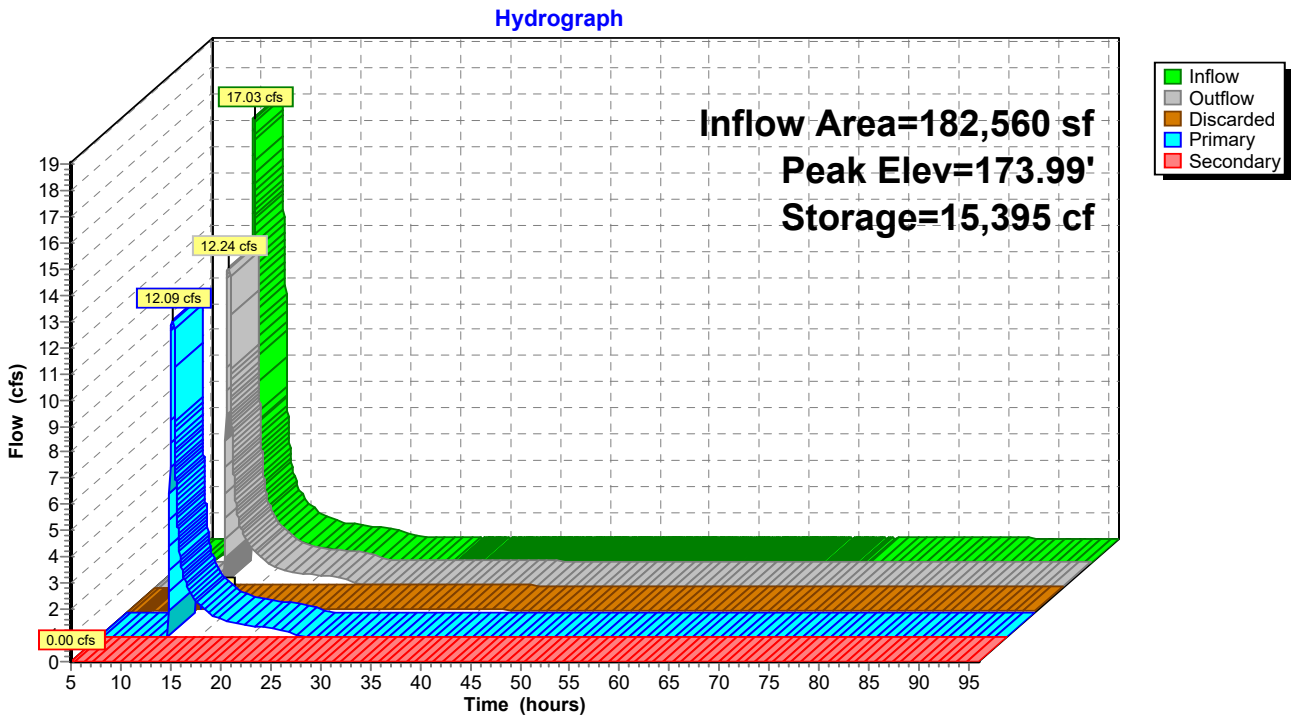
Device	Routing	Invert	Outlet Devices
#1	Discarded	170.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	170.00'	**18.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 170.00' / 169.10' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#3	Device 2	173.75'	**2.0" x 2.0" Horiz. Orifice/Grate X 20.00 columns** X 10 rows C= 0.600 in 48.0" x 24.0" Grate (69% open area)
#4	Device 2	173.00'	**48.0" W x 10.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	174.00'	**10.0' long x 3.0' 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 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.15 cfs @ 12.33 hrs HW=173.99' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=12.09 cfs @ 12.33 hrs HW=173.99' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 12.09 cfs @ 6.84 fps)
  └**3=Orifice/Grate** (Passes < 13.11 cfs potential flow)
  └**4=Orifice/Grate** (Passes < 11.85 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=170.00' TW=0.00' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond IB-1: Infil Basin



Summary for Pond UDS-1: Cultec 330 XLHD

[58] Hint: Peaked 0.03' above defined flood level
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1436)

Inflow Area = 127,763 sf, 45.93% Impervious, Inflow Depth = 5.84" for 100-YR event
Inflow = 19.74 cfs @ 12.09 hrs, Volume= 62,188 cf
Outflow = 12.49 cfs @ 12.12 hrs, Volume= 62,065 cf, Atten= 37%, Lag= 1.8 min
Primary = 12.49 cfs @ 12.12 hrs, Volume= 62,065 cf
Routed to Pond IB-1 : Infil Basin

Routing by Dyn-Stor-Ind method, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 174.03' @ 12.32 hrs Surf.Area= 0.170 ac Storage= 0.355 af
Flood Elev= 174.00' Surf.Area= 0.170 ac Storage= 0.352 af

Plug-Flow detention time= 523.9 min calculated for 62,065 cf (100% of inflow)
Center-of-Mass det. time= 522.6 min (1,324.5 - 801.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	171.00'	0.063 af	**35.33'W x 122.50'L x 3.04'H Field A** 0.302 af Overall - 0.144 af Embedded = 0.158 af x 40.0% Voids
#2A	171.00'	0.144 af	**Cultec R-330XLHD** x 119 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 7 rows
#3B	171.00'	0.045 af	**35.33'W x 87.50'L x 3.04'H Field B** 0.216 af Overall - 0.102 af Embedded = 0.114 af x 40.0% Voids
#4B	171.00'	0.102 af	**Cultec R-330XLHD** x 84 Inside #3 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 7 rows
		0.355 af	Total Available Storage

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

Device	Routing	Invert	Outlet Devices
#1	Primary	171.00'	**15.0" Round Culvert X 8.00** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 171.00' / 171.00' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=7.64 cfs @ 12.12 hrs HW=173.65' TW=173.61' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 7.64 cfs @ 0.78 fps)

Pond UDS-1: Cultec 330 XLHD - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (For residential use only)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 7 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

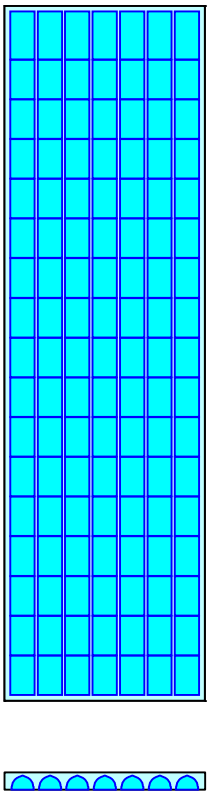
17 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 120.50' Row Length +12.0" End Stone x 2 = 122.50' Base Length
7 Rows x 52.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 35.33' Base Width
30.5" Chamber Height + 6.0" Stone Cover = 3.04' Field Height

119 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 7 Rows = 6,284.9 cf Chamber Storage

13,165.3 cf Field - 6,284.9 cf Chambers = 6,880.4 cf Stone x 40.0% Voids = 2,752.2 cf Stone Storage

Chamber Storage + Stone Storage = 9,037.1 cf = 0.207 af
Overall Storage Efficiency = 68.6%
Overall System Size = 122.50' x 35.33' x 3.04'

119 Chambers
487.6 cy Field
254.8 cy Stone



Pond UDS-1: Cultec 330 XLHD - Chamber Wizard Field B

Chamber Model = Cultec R-330XLHD (For residential use only)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 7 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

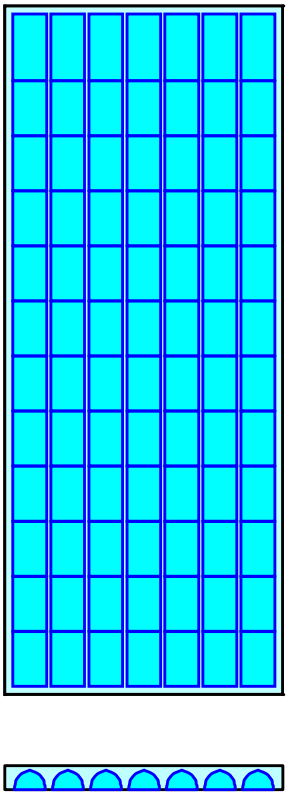
12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length
7 Rows x 52.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 35.33' Base Width
30.5" Chamber Height + 6.0" Stone Cover = 3.04' Field Height

84 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 7 Rows = 4,459.4 cf Chamber Storage

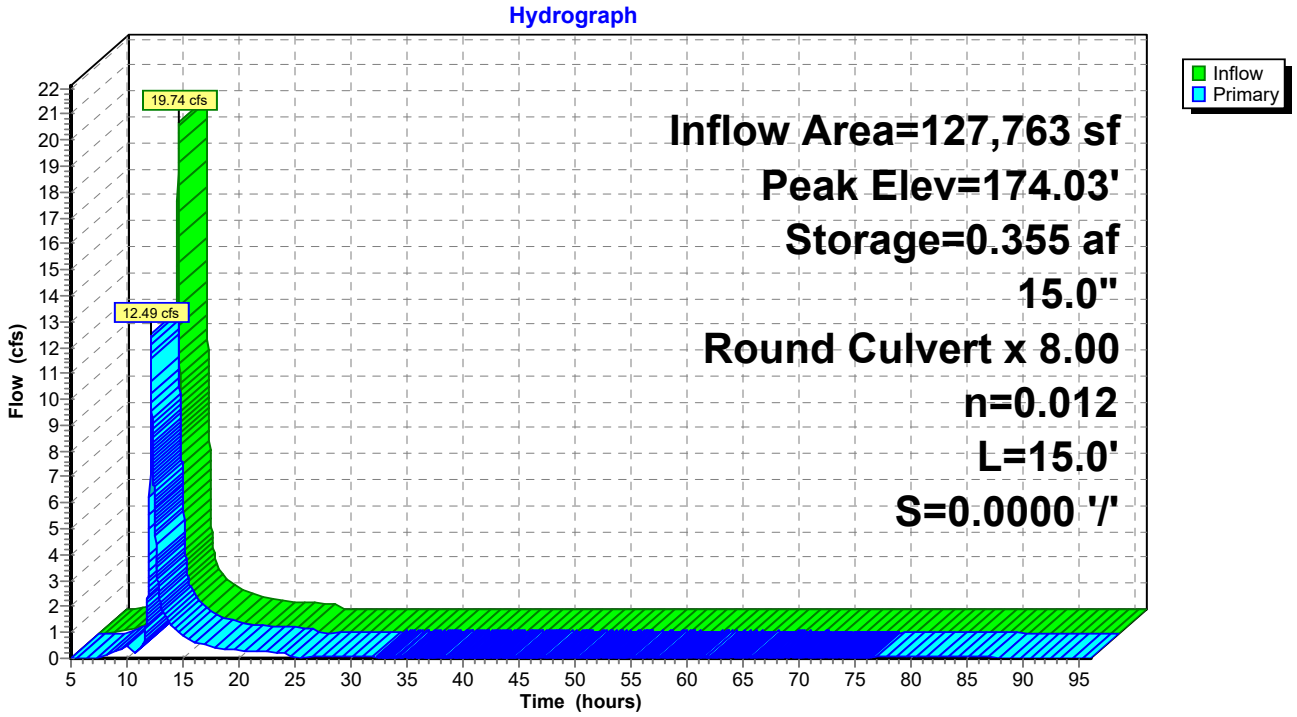
9,403.8 cf Field - 4,459.4 cf Chambers = 4,944.4 cf Stone x 40.0% Voids = 1,977.8 cf Stone Storage

Chamber Storage + Stone Storage = 6,437.2 cf = 0.148 af
Overall Storage Efficiency = 68.5%
Overall System Size = 87.50' x 35.33' x 3.04'

84 Chambers
348.3 cy Field
183.1 cy Stone



Pond UDS-1: Cultec 330 XLHD

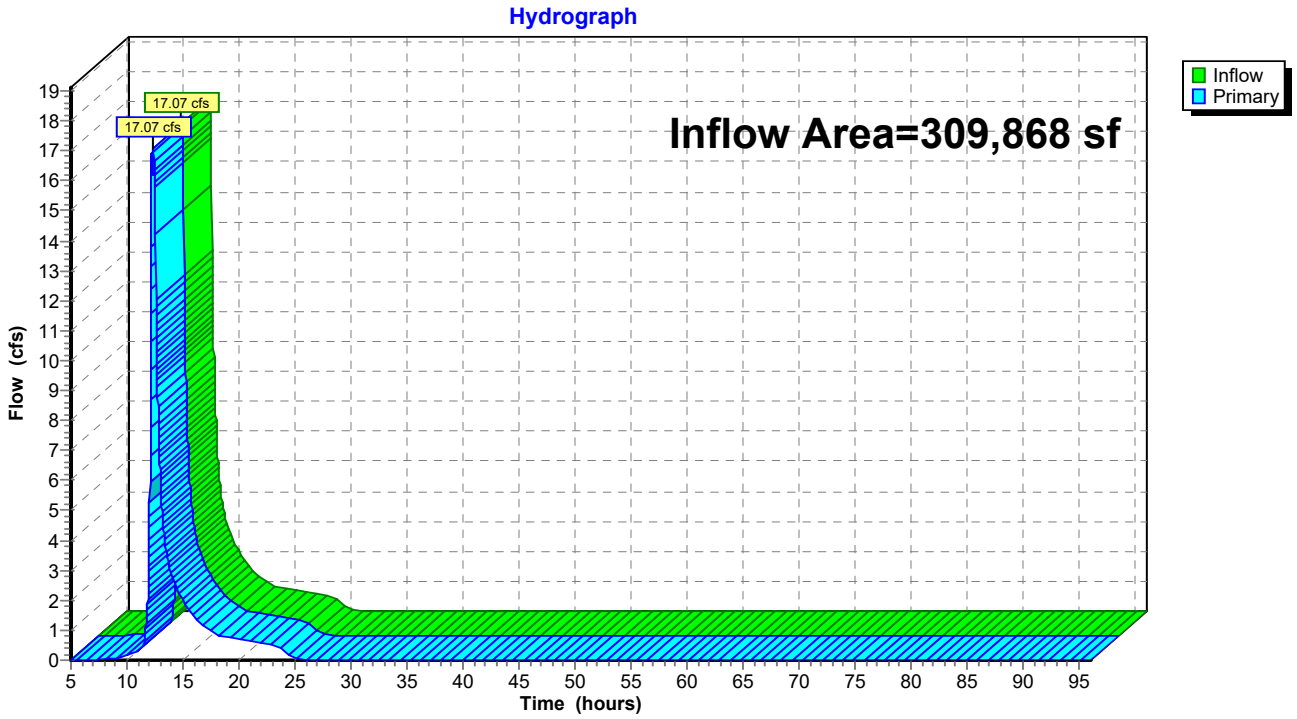


Summary for Link POA-1: Hunting Lane (Off-site)

Inflow Area = 309,868 sf, 37.48% Impervious, Inflow Depth = 3.83" for 100-YR event
Inflow = 17.07 cfs @ 12.36 hrs, Volume= 98,927 cf
Primary = 17.07 cfs @ 12.36 hrs, Volume= 98,927 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs

Link POA-1: Hunting Lane (Off-site)

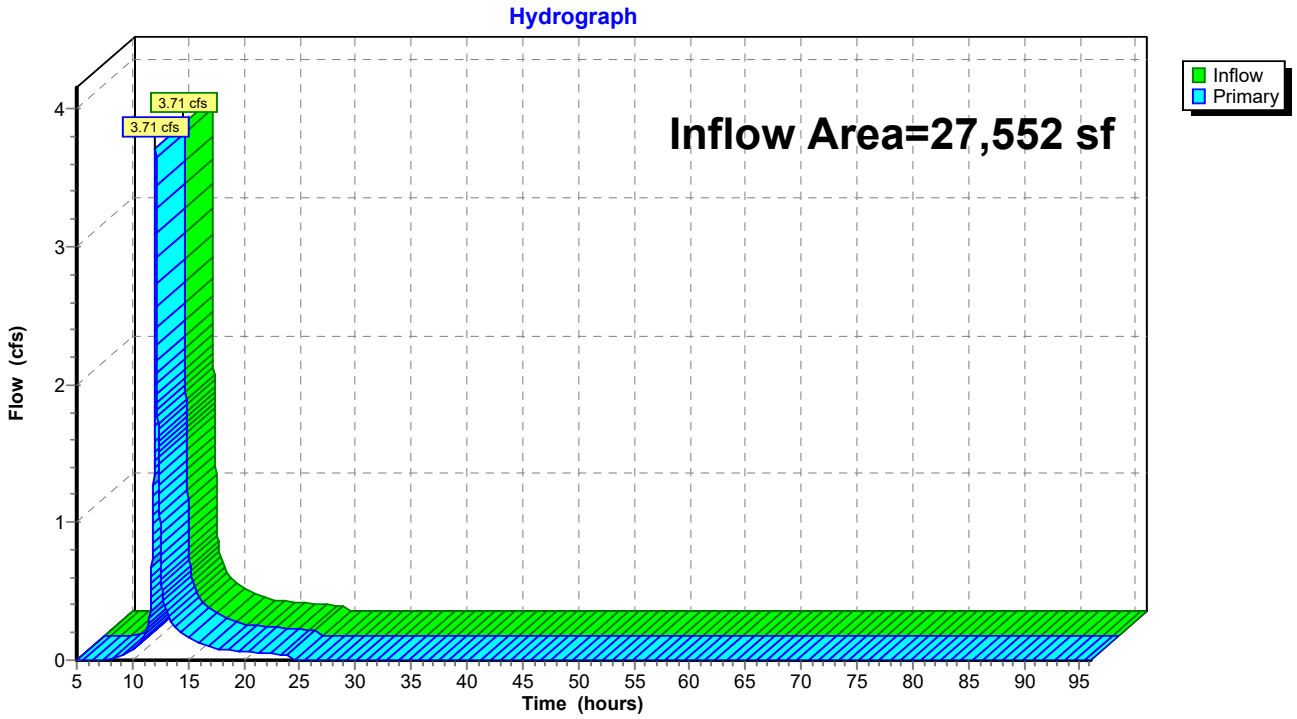


Summary for Link POA-2: North Main Street (Offsite)

Inflow Area = 27,552 sf, 5.91% Impervious, Inflow Depth = 5.01" for 100-YR event
Inflow = 3.71 cfs @ 12.09 hrs, Volume= 11,513 cf
Primary = 3.71 cfs @ 12.09 hrs, Volume= 11,513 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs

Link POA-2: North Main Street (Offsite)

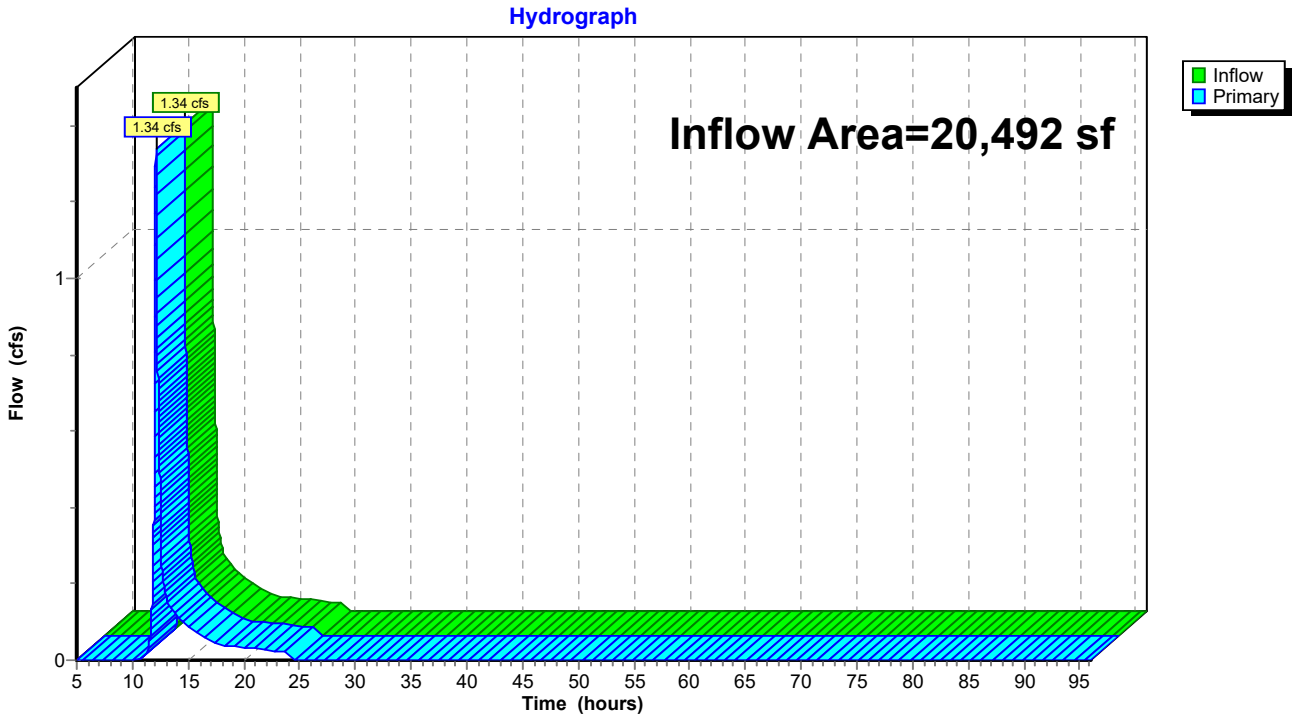


Summary for Link POA-3: 33 N Main Street (Offsite)

Inflow Area = 20,492 sf, 0.00% Impervious, Inflow Depth = 2.61" for 100-YR event
Inflow = 1.34 cfs @ 12.10 hrs, Volume= 4,457 cf
Primary = 1.34 cfs @ 12.10 hrs, Volume= 4,457 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-96.00 hrs, dt= 0.01 hrs

Link POA-3: 33 N Main Street (Offsite)



SUPPORTING INFORMATION

Project: 41 North Manin St
Location: Sherborn, MA
Prepared For: Highpoint Engineering / Danell Baptisite

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

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

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

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

where:

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

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
WQU-2	0.34	0.0005313	5.0	0.083	1.00	795.00	0.42
WQU-1	1.35	0.0021094	5.0	0.083	1.00	795.00	1.68

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

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

41 NORTH MANIN ST
SHERBORN, MA

Area	**0.34 ac**	Unit Site Designation	**WQU-2**
Weighted C	**0.9**	Rainfall Station #	**68**
t_c	**5 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.01	0.01	9.3
0.04	9.5%	18.8%	0.01	0.01	9.5
0.06	8.7%	27.5%	0.02	0.02	8.7
0.08	10.1%	37.6%	0.02	0.02	10.1
0.10	7.2%	44.8%	0.03	0.03	7.2
0.12	6.0%	50.8%	0.04	0.04	6.0
0.14	6.3%	57.1%	0.04	0.04	6.3
0.16	5.6%	62.7%	0.05	0.05	5.5
0.18	4.7%	67.4%	0.06	0.06	4.6
0.20	3.6%	71.0%	0.06	0.06	3.6
0.25	8.2%	79.1%	0.08	0.08	8.0
0.50	14.9%	94.0%	0.15	0.15	14.0
0.75	3.2%	97.3%	0.23	0.23	2.9
1.00	1.2%	98.5%	0.31	0.31	1.1
1.50	0.7%	99.2%	0.46	0.46	0.6
2.00	0.8%	100.0%	0.61	0.61	0.6
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					97.9
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**91.4%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Estimated Net Annual Solids Load Reduction
Based on the Rational Rainfall Method

CONTECH ENGINEERED SOLUTIONS

CASCADE separator™

41 North Main St

Sherborn, MA

CES 836176

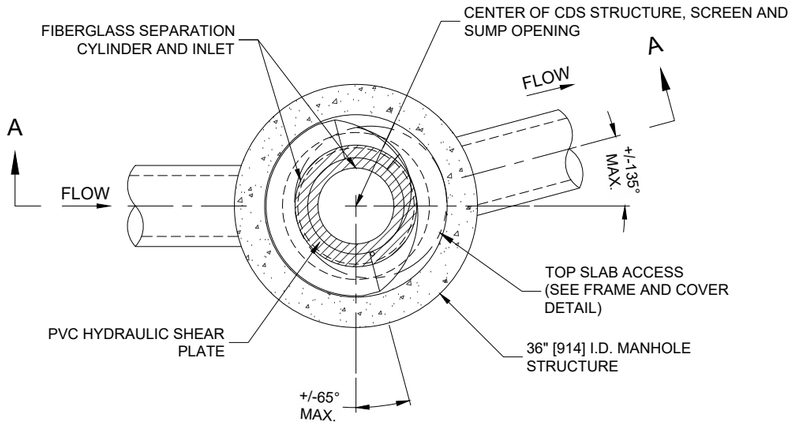
WQU-1

AREA	1.35	acres	**CASCADE MODEL**	CS-4
WEIGHTED C	0.95			
TC	5.00	minutes	**RAINFALL STATION**	68

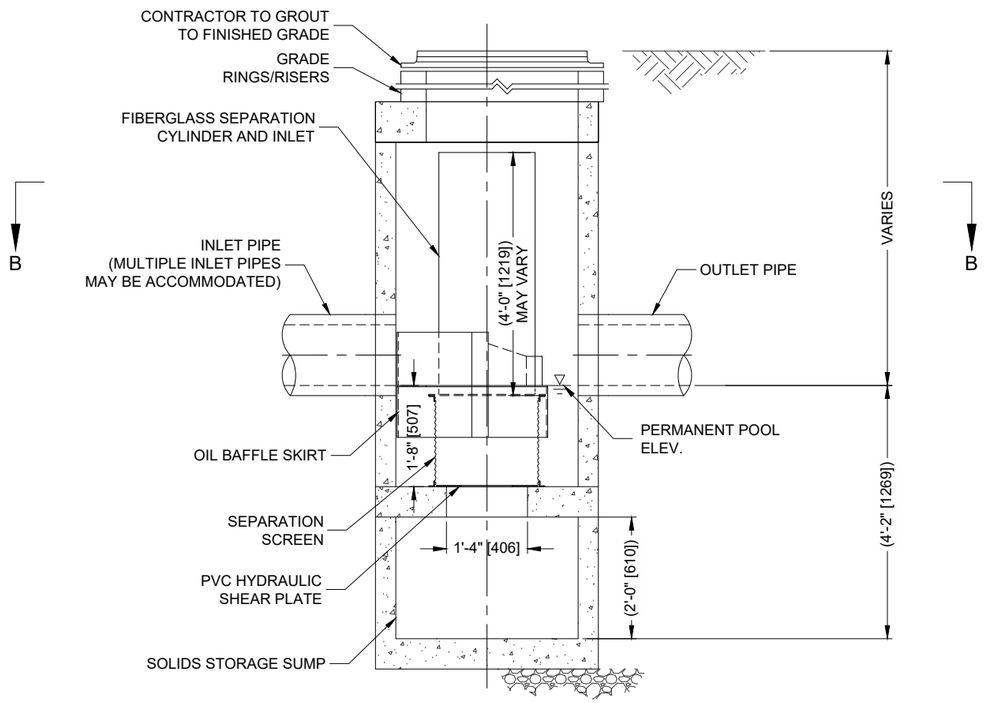
Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Hydraulic Loading Rate (gpm/ft2)	Removal Efficiency (%)	Incremental Removal (%)
0.02	9.3%	0.92	100.0	9.3
0.04	9.5%	1.83	100.0	9.5
0.06	8.7%	2.75	100.0	8.7
0.08	10.1%	3.66	100.0	10.1
0.10	7.2%	4.58	100.0	7.2
0.12	6.0%	5.50	100.0	6.0
0.14	6.3%	6.41	100.0	6.3
0.16	5.6%	7.33	100.0	5.6
0.18	4.7%	8.25	100.0	4.7
0.20	3.6%	9.16	100.0	3.6
0.25	8.2%	11.45	100.0	8.2
0.50	14.9%	22.90	90.4	13.5
0.75	3.2%	34.36	79.6	2.6
1.00	1.2%	45.81	68.8	0.9
1.50	0.7%	68.71	47.3	0.3
2.00	0.8%	76.08	33.5	0.3
				96.6
			Removal Efficiency Adjustment[2] =	6.5%
			Predicted % Annual Rainfall Treated =	93.4%
			Predicted Net Annual Load Removal Efficiency =	**90.2%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA

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



PLAN VIEW B-B
N.T.S.

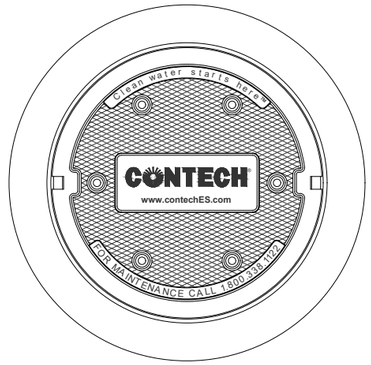


ELEVATION A-A
N.T.S.

CDS1515-3-C DESIGN NOTES

CDS1515-3-C RATED TREATMENT CAPACITY IS 1.0 CFS, OR PER LOCAL REGULATIONS.

THE STANDARD CDS1515-3-C CONFIGURATION IS SHOWN.



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)			*
PEAK FLOW RATE (CFS OR L/s)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
SCREEN APERTURE (2400 OR 4700)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*

NOTES/SPECIAL REQUIREMENTS:

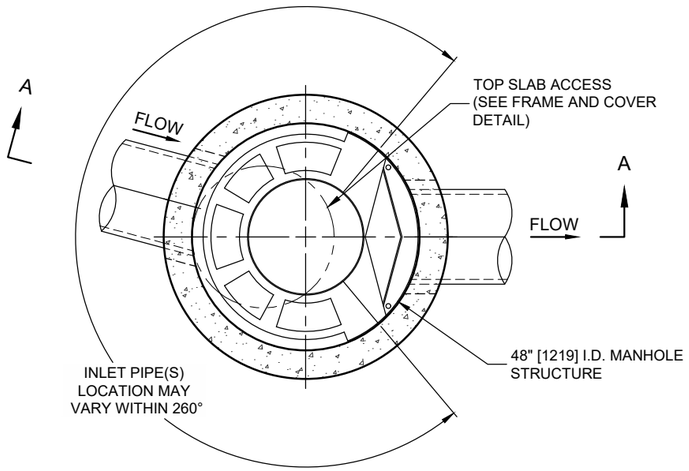
* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO..
5. IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.
6. CDS STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

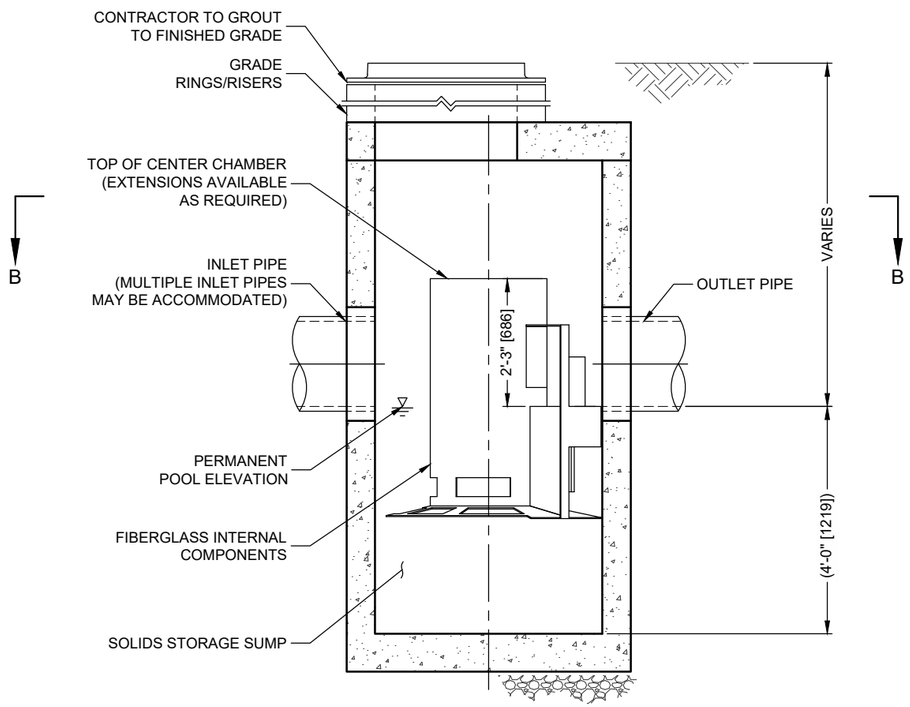
INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CDS1515-3-C
ONLINE CDS
STANDARD DETAIL



PLAN VIEW B-B
NOT TO SCALE



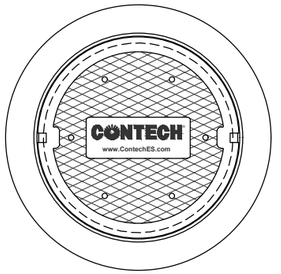
ELEVATION A-A
NOT TO SCALE

CASCADE
separator™

CASCADE SEPARATOR DESIGN NOTES

CS-4 RATED TREATMENT CAPACITY IS 2.0 CFS, OR PER LOCAL REGULATIONS.
THE STANDARD CS-4 CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES



FRAME AND COVER
(DIAMETER VARIES)
NOT TO SCALE

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (cfs [L/s])			
PEAK FLOW RATE (cfs [L/s])			
RETURN PERIOD OF PEAK FLOW (yrs)			
RIM ELEVATION			
PIPE DATA:	INVERT	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			

NOTES / SPECIAL REQUIREMENTS:

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. CASCADE SEPARATOR WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. CASCADE SEPARATOR STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2' [610], AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. CASCADE SEPARATOR STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C478 AND AASHTO LOAD FACTOR DESIGN METHOD.
6. ALTERNATE UNITS ARE SHOWN IN MILLIMETERS [mm].

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CASCADE SEPARATOR MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

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CS-4
CASCADE SEPARATOR
STANDARD DETAIL

NOAA Atlas 14, Volume 10, Version 3
Location name: Sherborn, Massachusetts, USA*
Latitude: 42.248°, Longitude: -71.3777°
Elevation: 314 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	**0.327** (0.258-0.409)	**0.395** (0.311-0.495)	**0.507** (0.398-0.638)	**0.599** (0.468-0.760)	**0.727** (0.548-0.968)	**0.823** (0.608-1.12)	**0.923** (0.661-1.31)	**1.04** (0.701-1.52)	**1.20** (0.780-1.83)	**1.34** (0.847-2.08)
10-min	**0.463** (0.365-0.580)	**0.560** (0.441-0.702)	**0.718** (0.564-0.903)	**0.849** (0.663-1.08)	**1.03** (0.776-1.37)	**1.16** (0.860-1.59)	**1.31** (0.936-1.86)	**1.47** (0.992-2.15)	**1.70** (1.10-2.59)	**1.90** (1.20-2.95)
15-min	**0.545** (0.430-0.682)	**0.658** (0.519-0.825)	**0.844** (0.663-1.06)	**0.998** (0.778-1.26)	**1.21** (0.913-1.61)	**1.37** (1.01-1.87)	**1.54** (1.10-2.19)	**1.73** (1.17-2.52)	**2.00** (1.30-3.05)	**2.23** (1.41-3.47)
30-min	**0.746** (0.589-0.934)	**0.902** (0.711-1.13)	**1.16** (0.908-1.46)	**1.37** (1.07-1.73)	**1.66** (1.25-2.21)	**1.88** (1.39-2.56)	**2.11** (1.51-3.00)	**2.37** (1.60-3.46)	**2.74** (1.78-4.17)	**3.05** (1.93-4.75)
60-min	**0.947** (0.748-1.19)	**1.14** (0.903-1.44)	**1.47** (1.15-1.85)	**1.74** (1.36-2.20)	**2.11** (1.59-2.81)	**2.38** (1.76-3.26)	**2.68** (1.92-3.81)	**3.01** (2.03-4.40)	**3.48** (2.26-5.30)	**3.88** (2.45-6.03)
2-hr	**1.21** (0.965-1.51)	**1.48** (1.17-1.84)	**1.91** (1.51-2.38)	**2.26** (1.78-2.84)	**2.75** (2.09-3.65)	**3.11** (2.32-4.25)	**3.50** (2.54-5.01)	**3.98** (2.70-5.78)	**4.69** (3.05-7.09)	**5.30** (3.37-8.20)
3-hr	**1.40** (1.12-1.74)	**1.71** (1.36-2.12)	**2.21** (1.76-2.76)	**2.63** (2.07-3.30)	**3.20** (2.45-4.24)	**3.62** (2.72-4.94)	**4.08** (2.98-5.84)	**4.65** (3.16-6.74)	**5.53** (3.60-8.33)	**6.29** (4.00-9.68)
6-hr	**1.80** (1.45-2.22)	**2.20** (1.76-2.71)	**2.85** (2.28-3.52)	**3.38** (2.69-4.21)	**4.12** (3.17-5.44)	**4.67** (3.52-6.32)	**5.26** (3.87-7.49)	**6.01** (4.10-8.65)	**7.17** (4.69-10.7)	**8.18** (5.22-12.5)
12-hr	**2.28** (1.85-2.79)	**2.79** (2.25-3.41)	**3.61** (2.90-4.44)	**4.29** (3.43-5.31)	**5.23** (4.05-6.85)	**5.92** (4.49-7.97)	**6.68** (4.92-9.42)	**7.62** (5.22-10.9)	**9.06** (5.95-13.5)	**10.3** (6.60-15.7)
24-hr	**2.72** (2.21-3.30)	**3.35** (2.72-4.07)	**4.38** (3.55-5.34)	**5.24** (4.22-6.43)	**6.42** (5.00-8.35)	**7.28** (5.56-9.74)	**8.23** (6.11-11.6)	**9.42** (6.47-13.4)	**11.3** (7.42-16.6)	**12.9** (8.27-19.4)
2-day	**3.04** (2.49-3.66)	**3.80** (3.12-4.59)	**5.06** (4.13-6.13)	**6.10** (4.94-7.44)	**7.53** (5.91-9.76)	**8.57** (6.59-11.4)	**9.73** (7.30-13.7)	**11.2** (7.74-15.8)	**13.6** (8.98-20.0)	**15.7** (10.1-23.5)
3-day	**3.30** (2.72-3.96)	**4.12** (3.39-4.95)	**5.46** (4.47-6.59)	**6.57** (5.35-7.98)	**8.10** (6.38-10.5)	**9.22** (7.12-12.3)	**10.5** (7.87-14.6)	**12.1** (8.34-17.0)	**14.6** (9.69-21.4)	**16.9** (10.9-25.2)
4-day	**3.55** (2.93-4.25)	**4.40** (3.63-5.27)	**5.78** (4.75-6.96)	**6.93** (5.66-8.40)	**8.51** (6.72-11.0)	**9.67** (7.48-12.8)	**11.0** (8.25-15.3)	**12.6** (8.73-17.7)	**15.3** (10.1-22.2)	**17.6** (11.4-26.2)
7-day	**4.26** (3.54-5.07)	**5.15** (4.27-6.14)	**6.60** (5.46-7.90)	**7.81** (6.41-9.41)	**9.47** (7.51-12.1)	**10.7** (8.29-14.0)	**12.0** (9.07-16.6)	**13.7** (9.55-19.1)	**16.4** (10.9-23.7)	**18.7** (12.1-27.7)
10-day	**4.94** (4.12-5.86)	**5.86** (4.88-6.96)	**7.36** (6.10-8.77)	**8.60** (7.09-10.3)	**10.3** (8.20-13.1)	**11.6** (8.99-15.1)	**13.0** (9.74-17.7)	**14.6** (10.2-20.3)	**17.2** (11.5-24.9)	**19.5** (12.6-28.7)
20-day	**6.97** (5.86-8.21)	**7.96** (6.68-9.38)	**9.57** (8.00-11.3)	**10.9** (9.05-13.0)	**12.8** (10.2-15.9)	**14.1** (11.0-18.1)	**15.6** (11.7-20.8)	**17.2** (12.1-23.7)	**19.5** (13.1-27.9)	**21.4** (13.9-31.4)
30-day	**8.65** (7.30-10.1)	**9.69** (8.16-11.4)	**11.4** (9.55-13.4)	**12.8** (10.7-15.2)	**14.7** (11.8-18.2)	**16.2** (12.6-20.5)	**17.7** (13.2-23.3)	**19.3** (13.6-26.3)	**21.4** (14.4-30.4)	**23.0** (15.0-33.5)
45-day	**10.7** (9.10-12.5)	**11.8** (10.0-13.8)	**13.6** (11.5-16.0)	**15.1** (12.6-17.8)	**17.1** (13.7-21.0)	**18.7** (14.5-23.5)	**20.2** (15.0-26.3)	**21.7** (15.4-29.5)	**23.6** (15.9-33.4)	**24.9** (16.2-36.1)
60-day	**12.5** (10.6-14.5)	**13.6** (11.6-15.9)	**15.4** (13.1-18.1)	**17.0** (14.2-20.0)	**19.1** (15.3-23.3)	**20.7** (16.2-25.9)	**22.3** (16.6-28.8)	**23.7** (16.8-32.1)	**25.4** (17.2-35.8)	**26.5** (17.3-38.4)

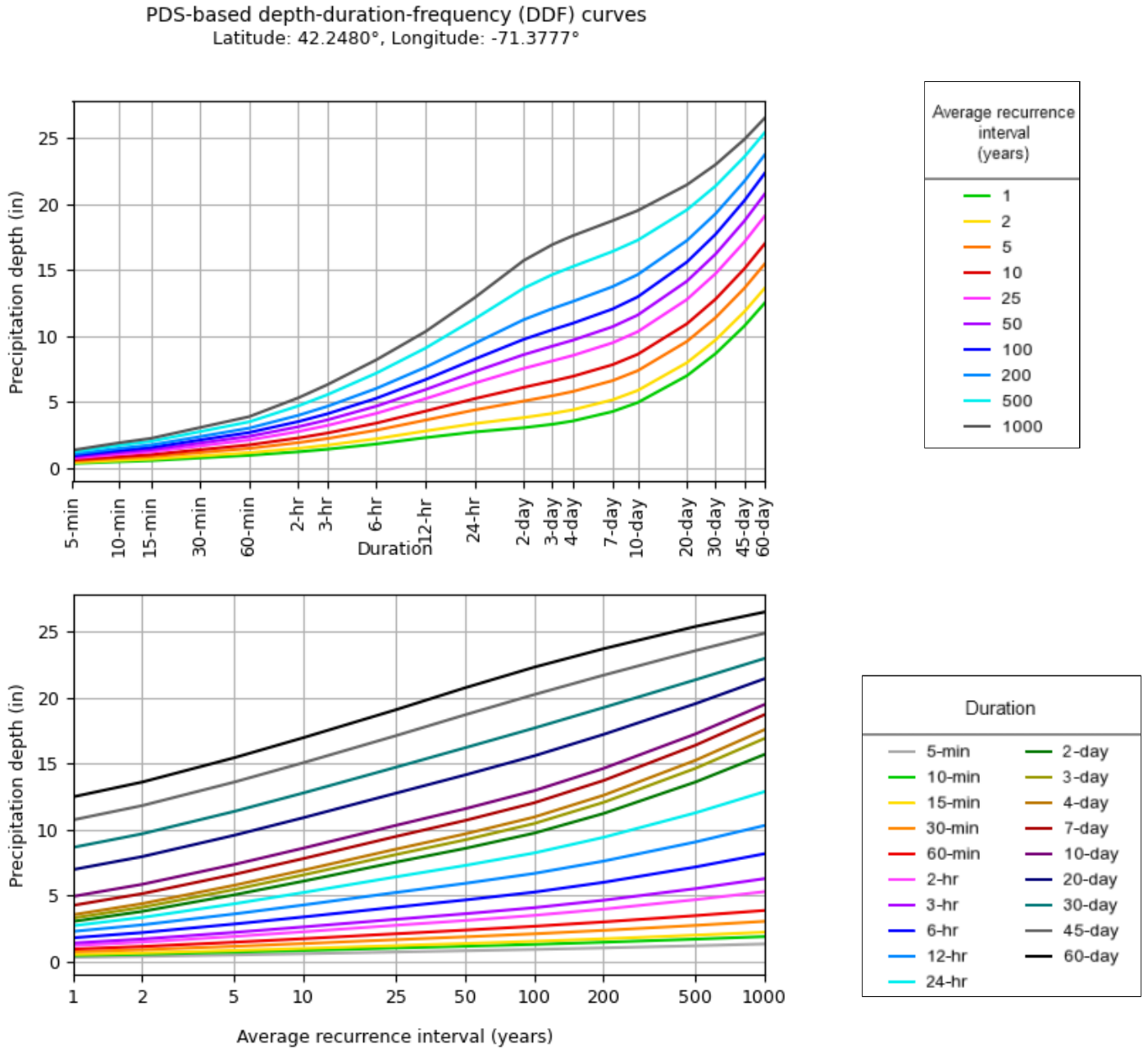
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



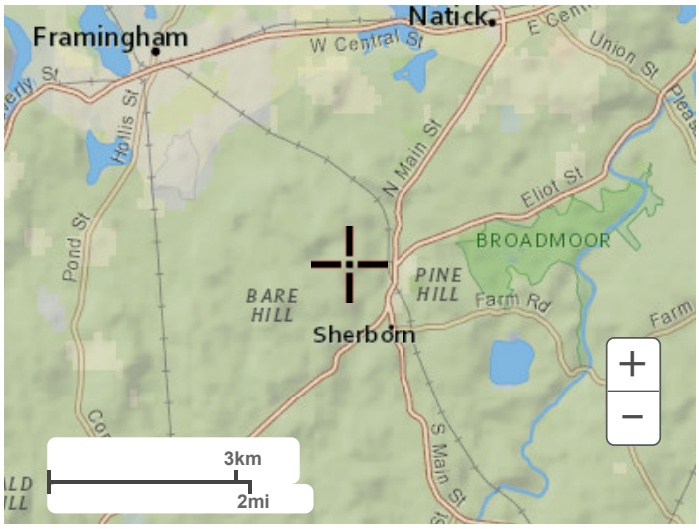
NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Fri Oct 20 14:28:13 2023

Back to Top

Maps & aerials

Small scale terrain



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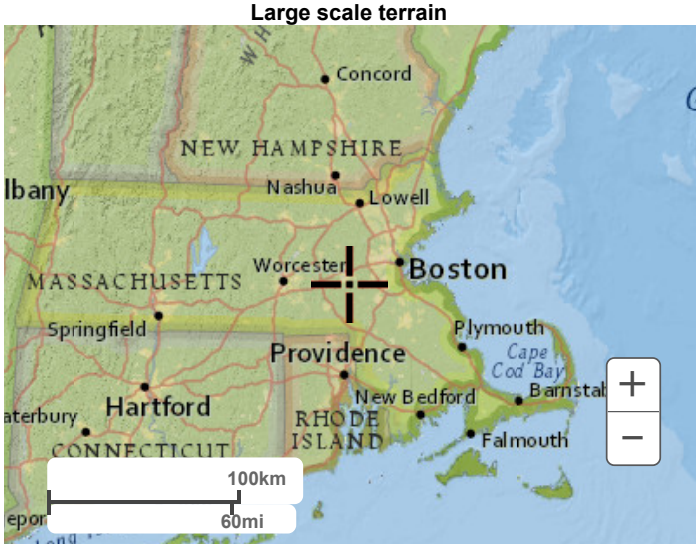
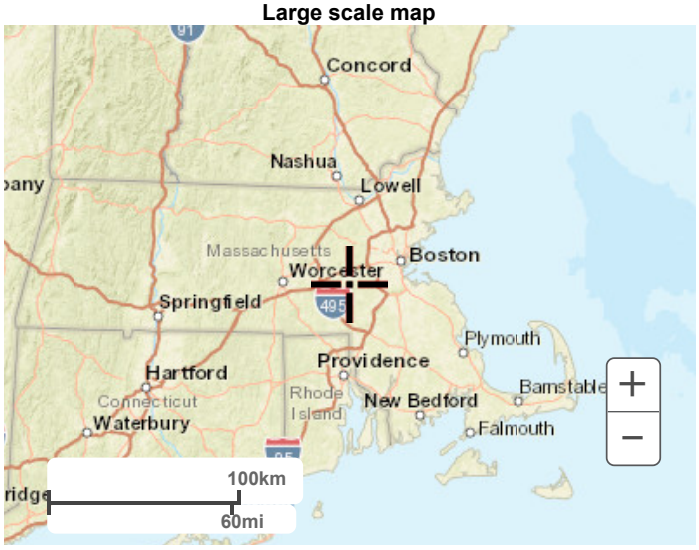
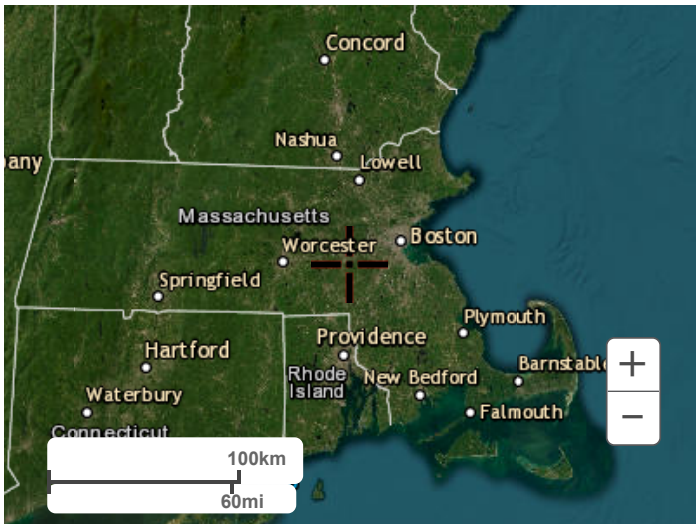


Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

ILLICIT DISCHARGE COMPLIANCE STATEMENT

By: Barsky Estate Realty Trust
Project Site: 41 North Main Street, Sherborn, MA 01770

Illicit discharges to the stormwater management system are discharges that do not entirely comprise stormwater. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing, and water used to clean residential buildings without detergents.

The Project was designed to eliminate potential illicit discharges to the stormwater management system in accordance with Standard 10 of the Massachusetts Stormwater Handbook. In accordance with Standard 10, to the best of my knowledge, information, and belief the stormwater management system as designed does not receive, nor contribute, any illicit discharges to regulated environmental resource areas or the municipal stormwater collection system.

The Long-Term Stormwater Operation and Maintenance Plan outlines measures to prevent future illicit discharges.

_____

(signature) (date)

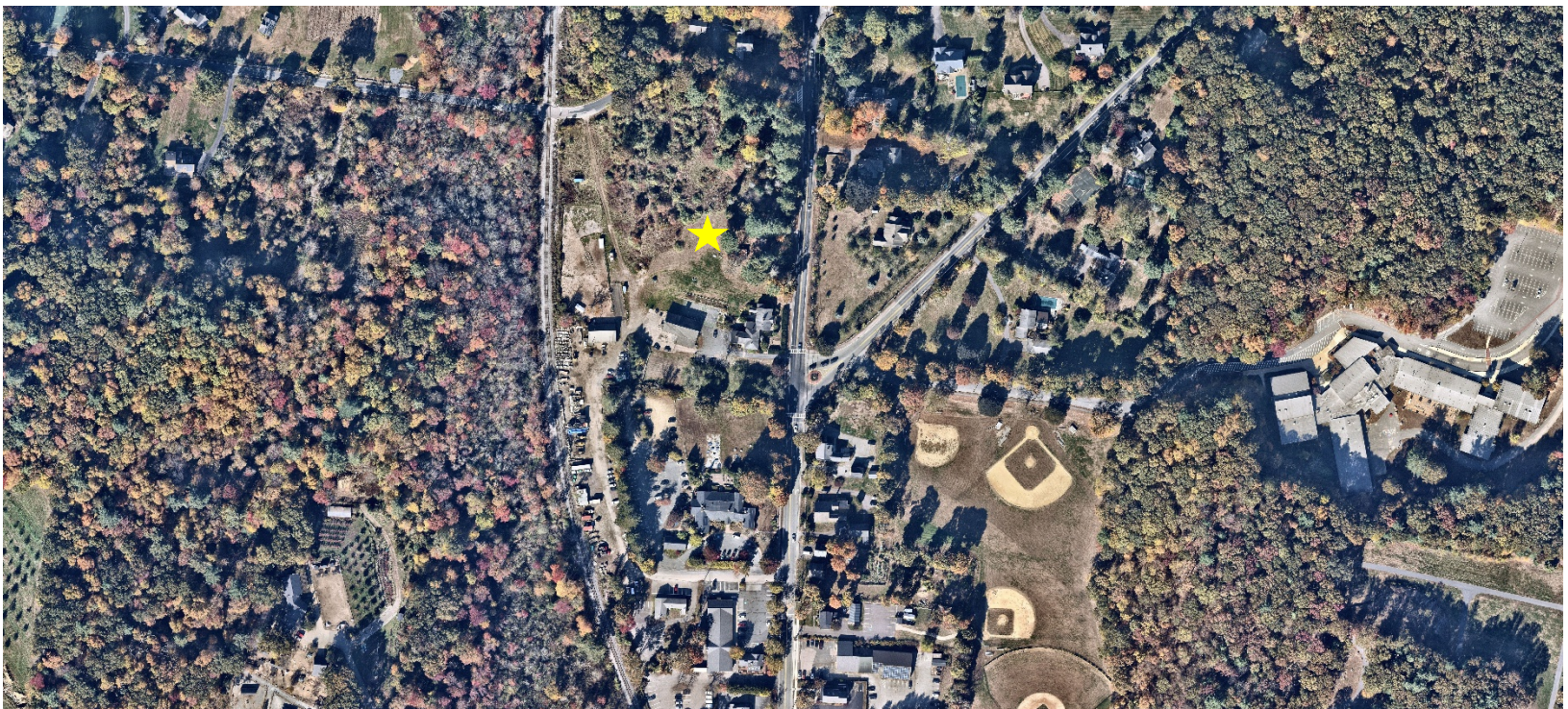
Barsky Estate Realty Trust
23 Hunting Lane
Sherborn, MA 01770

OPERATION AND MAINTENANCE INFORMATION

CONSTRUCTION-PHASE OPERATION & MAINTENANCE PLAN

Multi-Family Residential Development | 41 North Main Street | Sherborn, MA

Project Address:	41 North Main Street Sherborn, MA 01770
Date Prepared:	January 24, 2025
Project Number:	23048
Prepared for:	Barsky Estate Realty Trust 23 Hunting Lane Sherborn, MA 01770
Prepared by:	**Highpoint Engineering Inc.** Dedham Executive Center 980 Washington Street, Suite 216 Dedham, MA 02026 www.highpointeng.com



Date: January 24, 2025

I. OWNER:

Barsky Estate Realty Trust
23 Hunting Lane
Sherborn, MA 01770

II. RESPONSIBLE PARTY:

Barsky Estate Realty Trust
23 Hunting Lane
Sherborn, MA 01770

III. PROJECT OVERVIEW:

Prevention of offsite flooding and improvements to existing runoff, water quality, and groundwater recharge characteristics are the main priorities of the project with respect to the drainage design. The project will improve existing stormwater management within the property with respect to the current site condition, which includes no existing stormwater management facilities, by installing a new stormwater management system comprising various Best Management Practices (BMPs) to mitigate runoff and water quality impacts associated with the proposed site development. Water quality BMPs to mitigate the runoff generated by the site improvements during construction include compost filter sock sedimentation control barriers, temporary Siltsack® drainage inlet inserts (or similar product) in adjacent street drainage and new on-site catch basins (as installed), and a construction entrance with anti-tracking pad, temporary sediment basins at the most down gradient limits of work, and periodic street sweeping along the site frontage.

It is the intent of the stormwater management design to achieve an 80% Total Suspended Solids (TSS) removal efficiency or 44% removal efficiency prior to discharge as outlined in the DEP Stormwater Management Standards.

The construction-phase BMPs used in this design were chosen for their effectiveness and ease of maintenance. Providing for maintenance requirements that are practical is essential to achieve the desired result of improved stormwater quality and peak attenuation. This plan will be provided to the property owner, property manager, and general contractor to educate them on the recommendations of this plan and the DEP Stormwater Management Guidelines.

IV. CONSTRUCTION PERIOD – BEST MANAGEMENT PRACTICES:

a) MONITORING

During construction operations, the stormwater management system will be inspected at least once every seven (7) calendar days, or once every fourteen (14) calendar days and within twenty-four (24) hours after a storm event of one quarter inch (0.25") or greater. Sediment accumulation shall be removed once a depth of one-third the height of perimeter sedimentation control devices is achieved unless stated otherwise. Damaged or underperforming sedimentation controls shall be replaced, modified, or otherwise supplemented immediately.

b) WASTE AND RECYCLING DISPOSAL

Metal dumpster type waste and recycling disposal receptacles will be located on-site and kept covered when not in active use. The project site will be policed daily by a person appointed by the general contractor to be kept the project site free of construction debris.

c) DUST MONITORING PLAN

A dust monitoring plan will be established prior to the start of construction and kept on site at all times. This will reduce the particulate levels in the air and reduce impacts to surrounding areas. Recommended methods for controlling dust include:

- Provide vegetative cover to disturbed areas at the end of earth disturbing activities as soon as practical, but no longer than 14 days.
- Apply a mulch layer to disturbed areas at the end of earth disturbing activities as soon as practical, but no longer than 14 days.
- Cover stockpiles unused for a maximum of 7 days with poly sheeting or tarps.
- Water surface materials and soil stockpiles.
- Use covered trucks.
- Minimize spoils stockpiled on site.
- Monitor construction practices to minimize unnecessary disturbance/ transfer of soils.
- Conduct periodic street cleaning along the site frontage during excavation activities.
- Pave driveways and parking surfaces as early as possible (where applicable and feasible).
- Assign personnel to remove windblown debris daily.
- Limit the idling of engines or stopped vehicles (except asphalt and cement concrete mixing trucks and equipment) to five minutes.

d) SPILL PREVENTION, CONTAINMENT, AND CLEANUP

Construction activities for this project will necessitate the use of equipment fuels, engine fluids, paints, and adhesives on the construction site and must be considered in the spill prevention and response practices for the project.

The general contractor will ensure areas where potential pollutants can occur are well protected with erosion control barriers and clean up equipment to prevent discharge of wastewater, fuels, and oil from vehicles and any other toxic or hazardous spills from the project site.

Spill kits comprising equipment necessary to attend to spills or leaks shall be stored on site in equipment sheds or similar covered enclosures and shall consist of the following:

- Safety goggles.
- Chemically resistant gloves and overshoe boots.
- Water and chemical fire extinguishers.
- Shovels.
- Absorbent materials.
- Containers suitable for storage of site-specific materials.
- First aid kits.

Spills and leaks shall be treated according to the type, volume, and location of the released material. Generally, mitigation shall consist of the following:

- Prevention of additional material storage.
- Containment of spilled material.
- Safe, thorough, and environmentally sound removal of spilled material.
- Remediation of environmental damage.

In the event of a spill, all materials used for containment and cleanup shall be replaced in kind in the spill kits immediately. The following describes specific preventative methods to be employed for materials used on site.

Fuels, Antifreeze, and Coolant for Construction Equipment and Generators:

In the case of a fuel spill on a pervious surface, the spill shall be contained and treated with absorbent polymer material immediately and the affected soil shall be excavated and stored in an impervious, bermed area, and the Licensed Site Professional shall be contacted to coordinate next steps regarding soil management. In the case of a fuel spill on an impervious surface, the spill shall be contained to prevent runoff and treated with absorbent material.

Adhesives and Paints:

Adhesive and paint materials shall be transferred to the site on an as needed basis. Any containers to be stored on site shall be clearly labeled and stored in non-flammable lockers. Wash water from paints shall be containerized; washing of paints into storm drainage systems shall be prohibited. Water-based and latex paints shall either be recycled or dried up and thrown out with the regular household trash, and oil-based paints and thinners shall be removed from the site by a local professional hazardous material removal company.

Town of Sherborn Emergency Contacts are as Follows:

- Emergency Management: (888) 304-1133 (MassDEP 24-Hour Spill Reporting)
- Police Department: 911
- Fire Department: (508) 653-3270

For spills of less than five (5) gallons of material, mitigation shall consist of source control, containment, and clean-up with absorbent materials, unless an imminent hazard necessitates that a local professional hazardous material removal company become involved to mitigate the spill.

For spills greater than five (5) gallons of material, the incident shall be reported immediately to the MassDEP Hazardous Waste Incident Response Group at (617)-792-7653 and a professional emergency response contractor. Information that shall be provided to the said contractor is as follows:

- Type of material spilled.
- Quantity of material spilled.
- Location of the spill.
- Time of the spill.

The contractor shall then employ measures to prevent further spillage, contain and/or clean up the spill.

If a Reportable Quantity (RQ) of material is spilled during construction, the National Response Center (NRC) shall be notified immediately at (800) 424-8802. Reportable Quantities of hazardous material are available in 310 CMR 40: Massachusetts Contingency Plan Subpart P: Massachusetts Oil and Hazardous Material List. Within 14 days a report shall be submitted to the EPA New England Regional Office describing the following:

- Type of material released.
- Date and circumstances of the release.
- Measures taken to prevent future releases.

The report shall be submitted to the EPA New England Regional Office at the following address:

EPA New England, Region 1
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Frequent inspections of areas where potential spill could occur is key to prevention. Inspection shall take place, at a minimum of once every calendar days, or once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches or greater or the occurrence of runoff from snowmelt sufficient to cause a discharge.

An inspection report shall be completed within 24 hours of completing any site inspection. Each inspection report must include, at minimum, the following:

- The inspection date and time.
- The weather and temperature.
- Names and titles of personnel making the inspection.
- A summary of inspection findings, covering at a minimum the observations made in accordance with Part 4.6 of the 2022 Construction General Permit, including any necessary maintenance or corrective actions.
- If inspecting because of rainfall measuring 0.25 inches or greater, include the applicable rain gauge or weather station readings that triggered the inspection.
- If determined that it is unsafe to inspect a portion of the site, describe the reason found to be unsafe and specify the locations to which the conditions apply.

e) STATE & LOCAL SANITARY LAWS

Portable sanitary units will be placed on-site during construction and will be serviced weekly.

f) SNOW STORAGE

There will be (5) five designated snow storage areas on site. Barsky Estate Realty Trust will be responsible for hauling and disposal operations of accumulated snow to an approved offsite location once snow storage areas have been filled. In the event that hauling and disposal operations are temporarily unavailable or delayed, snow shall be stored onsite in an area outside the 100-foot buffer to the Bordering Vegetated Wetland.

V. CONSTRUCTION PERIOD - STRUCTURAL BEST MANAGEMENT PRACTICES

Structural BMPs are those physical facilities that are designed to manage both stormwater quantity and quality. Proper maintenance of the proposed structural BMPs will ensure design performance, promote longevity, and decrease operator maintenance costs. The structural BMPs selected for the proposed site development include compost filter sock sedimentation control barriers, temporary Siltsack® drainage inlet inserts in adjacent existing street drainage and new on-site catch basins (as installed), a construction entrance with anti-tracking pad, and temporary sedimentation basins at the most down gradient limits of work.

a) COMPOST FILTER SOCK

Compost Filter Sock sedimentation control barriers shall be installed as specified on the site plans prior to commencing construction activities. The filter sock shall be inspected daily and maintained throughout construction. Accumulated sediment shall be removed before it has accumulated to one-third of the above ground height of the compost filter sock. Any breach in the barriers shall be repaired within 24 hours or before next rainfall, whichever is sooner.

Compost Filter Sock shall remain in place for the duration of construction and may be supplemented and/or modified at any time. The general contractor shall maintain a stockpile of surplus compost filter sock materials equivalent to 10 percent of the overall sedimentation control barrier length as depicted on the site plans.

b) **SILTSACK® DRAINAGE INLET INSERTS FOR EXISTING AND PROPOSED CATCH BASINS**

The existing catch basins located on-site and outside of the limit of work, as well as all new catch basins upon installation, shall be equipped with Siltsacks® as shown on the site plans.

Siltsacks® shall be regular flow units installed below grate castings and be equipped with internal emergency bypass devices. Siltsacks® are to remain in place until the end of the construction and the site is stabilized. During construction, all catch basins and Siltsacks® shall be inspected every fourteen (14) calendar days and after a storm of a quarter inch (0.25") or greater. Sediment accumulation shall be removed once sediment accumulates above the expansion restraint within the bag. Damaged Siltsacks® shall be replaced immediately. The contractor shall keep a minimum of two (2) extra Siltsacks® on site in case damaged units need to be replaced. Disposal of accumulated sediment and trash is to be in accordance with applicable local, state, and federal guidelines and regulations. Upon completion of the work, contractor is responsible for inspection and cleaning of units to ensure delivery of clean units to owner prior to completion of project.

c) **CONSTRUCTION ENTRANCE ANTI-TRACKING PAD**

A construction entrance anti-tracking pad shall be installed at the existing driveway entrances as shown on the site plans to minimize the track-out of sediment onto the street and sidewalk surfaces from vehicles leaving the construction site. The sub-base for the pad will be compacted and covered with a filter cloth. Crushed stone ranging in aggregate size from 1.5 to 3 inches will be placed on top of the filter cloth at a minimum thickness of 6 inches. The anti-tracking pad will remain in place and maintained until parking and loading areas receive an asphalt binder course or concrete slab-on-grade, depending on location.

The anti-tracking pad shall be installed prior to material and heavy equipment hauling commences. Maintenance requirements include:

- Construction vehicles will be restricted to using only the designated entrance/exit armored with the tracking pad until the site has been stabilized with asphalt binder course. The removed stone and sediment from the pad will be hauled off site and disposed in accordance with all applicable local, state, and federal regulations.

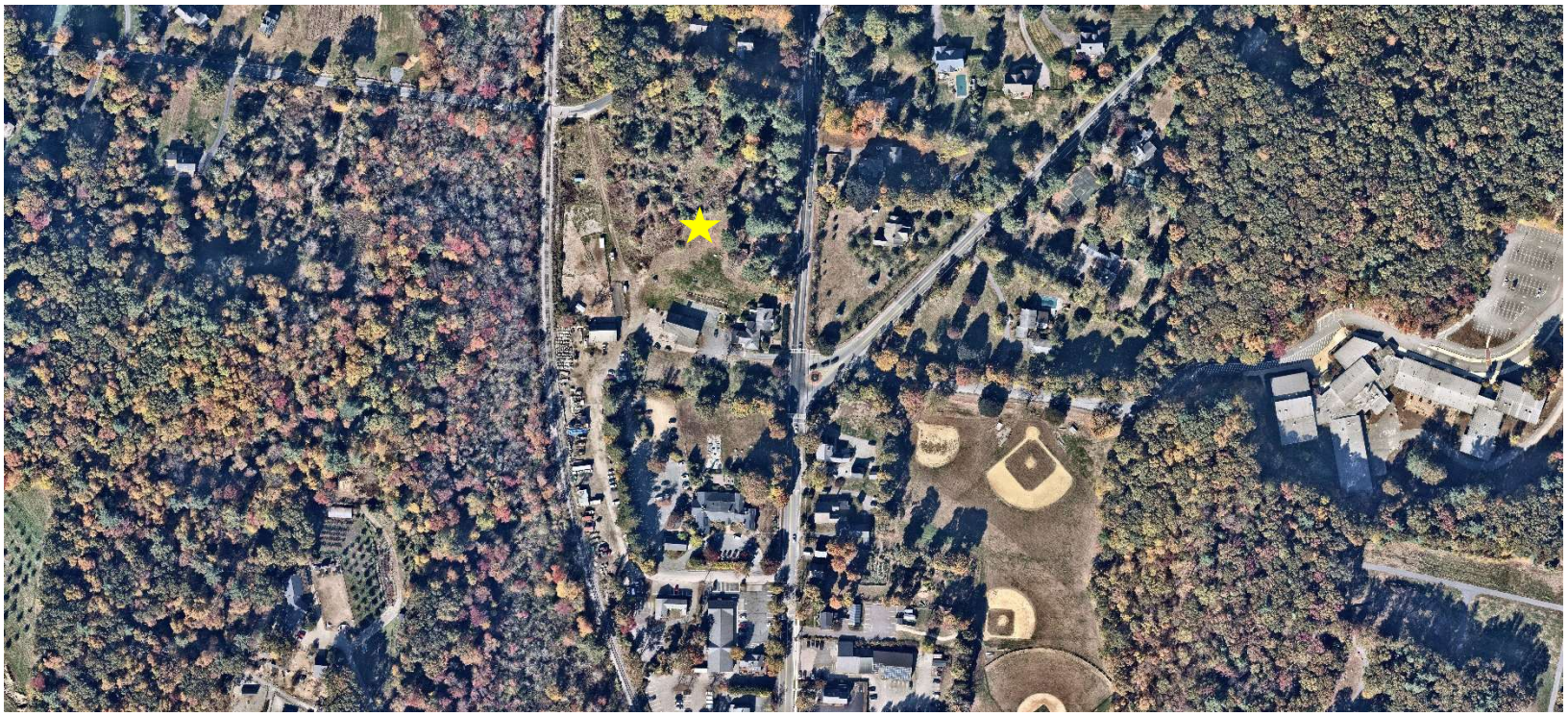
- The exit will be maintained in a condition that will prevent tracking or flowing of sediment off-site. This could require additional crushed stone to be placed within the exit. Sediment shall be swept form the anti-tracking pads at least weekly, or more often if necessary. If excess sediment has clogged the pads, they shall be top dressed using new

crushed stone and re-leveled. Replacement of the entire pad may be necessary if it becomes completely inundated with sediment. The pad will be reshaped as needed for drainage and runoff control depending on site conditions.

- Where sediment has been tracked into the public right of way from the construction site, the deposited sediment shall be removed by the end of the same workday. Sediment shall be removed by sweeping, shoveling, or vacuuming of these surfaces. Hosing or sweeping tracked-out sediment into a public or private stormwater system is prohibited.

- The exit will be inspected once every seven (7) calendar days and within 24 hours of storm events of 0.25 inches or greater, or the occurrence of runoff from snowmelt sufficient to cause a discharge.

Project Address:	41 North Main Street Sherborn, MA 01770
Date Prepared:	January 24, 2025
Project Number:	23048
Prepared for:	Barsky Estate Realty Trust 23 Hunting Lane Sherborn, MA 01770
Prepared by:	**Highpoint Engineering Inc.** Dedham Executive Center 980 Washington Street, Suite 216 Dedham, MA 02026 www.highpointeng.com



SECTION 1 TABLE OF CONTENTS

APPENDIX

Proprietary BMP Information

- Contech Water Quality Units
- Subsurface Cultec Chamber Detention System

Date: January 24, 2025

I. OWNER:

Barsky Estate Realty Trust
23 Hunting Lane
Sherborn, MA 01770

II. RESPONSIBLE PARTY:

Barsky Estate Realty Trust
23 Hunting Lane
Sherborn, MA 01770

PROJECT OVERVIEW

Prevention of offsite flooding and implementation of stormwater runoff, water quality, and groundwater recharge improvements where none currently exist on-site are the main priorities of the project with respect to drainage design. The project will improve existing stormwater management within the property with respect to the existing site condition, which currently includes no such improvements, by installing a stormwater management system comprising various Best Management Practices (BMPs). Long-term water quality BMPs to mitigate the runoff generated by the site improvements include one (1) subsurface detention system, one (1) surface infiltration basin, three (3) sediment forebays, two (2) Contech water quality units, and outlet control structures, and periodic mechanical sweeping to remove sand and sediment from paved surfaces.

It is the intent of the stormwater management design to achieve an 80% Total Suspended Solids (TSS) removal efficiency or 44% removal efficiency prior to discharge as outlined in the DEP Stormwater Management Standards.

The permanent BMPs used in this design were chosen for their effectiveness and ease of maintenance. Providing for maintenance requirements that are practical is essential to achieve the desired result of improved stormwater quality, and peak attenuation. This plan will be provided to the property owner, property manager, and general contractor to educate them on the recommendations of this plan and the DEP Stormwater Management Guidelines.

POST-CONSTRUCTION BEST MANAGEMENT PRACTICES

a) NON-STRUCTURAL BEST MANAGEMENT PRACTICES

Implementing source controls can aid in reducing the types and concentrations of contaminants in stormwater runoff. This principle for pollution prevention and non-structural controls, or BMPs, is to minimize the volume of runoff and to minimize contact of stormwater with potential pollutants. Measures such as street sweeping, managing snow removal, and educating the owner/operator of good maintenance practices are examples of non-structural BMPs.

i. PUBLIC AWARENESS

The responsible party shall issue periodic reminders to the building tenants to avoid dumping or releasing pollutants into the storm drains and onto the ground.

ii. STREET SWEEPING

Parking lot, driveway, and loading area sweeping is an integral part of the stormwater management plan as a fundamental component of source reduction efforts. Sweeping activities shall begin on or around April 1. However, sweeping may be done after winter thaw and the onset of early spring. It is critical to remove the accumulated sediment in the parking, loading, and driveway areas from the winter months as soon as possible before spring precipitation.

Sweeping activities should be performed a minimum of two times annually (April 1 and September 1).

iii. SNOW AND SNOWMELT MANAGEMENT

The removal contractor shall avoid stockpiling snow directly on top of catch basin grates and avoid stockpiled snow within the paved parking lot to allow normal vehicular maneuverability.

It is suggested that during snowfall events, the snow be stockpiled in designated snow storage areas throughout the site. These can be seen on the proposed site plans. During significant snow fall event, six (6) inches or greater, accumulated snow shall be stockpiled in areas coordinated by the property owner and snow removal contractor and/or removed from the site by a snow removal contractor. It is the responsibility of the owner to make sure the snow removal contractor utilizes previously approved areas. The owner shall remove sediment from snow storage areas every spring.

It is suggested that no de-icing compounds such as calcium chloride ($CaCl_2$), calcium magnesium acetate (CMA) or the like be used on the site. The snow removal contractor shall store all sand off-site. No quantities of sand compounds shall be stored on site.

iv. PUBLIC SAFETY FEATURES

The project has been designed with consideration for public safety and does not require any specific features as part of the stormwater management system.

b) STRUCTURAL BEST MANAGEMENT PRACTICES:

Structural BMPs are those physical facilities that are designed to manage both stormwater quantity and quality. Proper maintenance of the proposed structural BMPs will ensure design performance and promote longevity of the structure and may decrease operator maintenance costs.

i. DEEP-SUMP/HOODED CATCH BASINS

All proposed catch basins shall be a minimum of four feet in diameter and equipped with four-foot-deep sumps to trap sediments and any debris/trash. The pipe outlets shall be hooded to prevent floating debris and oils from entering the subsurface drainage conveyance system. The actual removal of sediments, trash, and associated pollutants only occurs when the deep sumps are cleaned out; therefore, frequent maintenance is required. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged downstream. In addition, frequent cleaning also results in more volume available for future storms and enhances overall performance.

The recommended inspection frequency of the deep sumps is every three months, and cleaning two to three times per year, if necessary, post-construction. Disposal of accumulated sediment and trash is to be in accordance with all applicable local, state, and federal guidelines and regulations.

ii. CONTECH WATER QUALITY UNITS

Two (2) water quality units are proposed to prevent sediments and oils from entering the underground detention system and basins that capture the proposed parking lot runoff. The actual removal of sediments, trash, and associated pollutants only occurs when the structures are cleaned out; therefore, frequent maintenance is required. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged. In addition, frequent cleaning also results in more volume available for future storms and enhances overall performance. Contech CDS structures are an approved means of BMP for storm water management. See the TSS Removal Calculation Worksheet included in the Appendix C for the specific TSS removals rate of the Contech© unit for this project.

Post-construction, the units shall be inspected every six months for the first year of operation to determine the oil and sediment accumulation rate. After the first year, inspections can be based on the first-year observations or local requirements. Cleaning, by

full pump out, is recommended on an annual basis or when 15% of the units' storage capacity is filled with solids. Inspect the units immediately after an oil, fuel, or chemical spill. Maintenance shall be performed by conventional vacuum truck. Disposal of accumulated sediment, trash, and hydrocarbons shall be in accordance to all applicable local, state, and federal guidelines and regulations. Refer to product brochure in the Appendix for more information.

iii. UNDERGROUND DETENTION SYSTEM

An underground detention system (UDS-1) consisting of Cultec Recharger 330XLHD chambers is proposed to provide detention volume for landscaping and hardscape for the proposed development. UDS-1 is proposed beneath the roadway, as shown on the site plans for exact subsurface system locations. The detention system is sized to mitigate peak runoff increases associated with the proposed project for all storm events up to and including the 100-year storm. The system is designed to drain completely within 72 hours.

The system shall be inspected twice per year, at the beginning of July and late October/ early November, to determine if any loss of capacity has occurred. The system shall also be inspected 24 hours after a rainstorm of over 0.25 inches in a 24-hour period to ensure that the system is free of extraneous debris and fines and is draining adequately. If inspections indicate accumulation of sediment within the system or the outlets, cleaning shall be conducted via vacuum truck through the at-grade inspection ports.

Removed materials shall be hauled off site and disposed of in compliance with all local, state, and federal guidelines and regulations. Refer to product brochure in the Appendix for more information.

iv. SURFACE INFILTRATION BASIN

One (1) infiltration basin (IB-1) is proposed to the west of the proposed development. The basin is equipped with an emergency spillway to allow controlled downstream discharge. The infiltration basin is equipped with an upstream water quality unit, which provides water quality pre-treatment of surface runoff from proposed landscaping and hardscaped areas. The basin is sized to mitigate peak runoff increases associated with the proposed project for all storm events up to and including the 100-year storm. The basin is designed to drain completely within 72 hours.

The infiltration basin shall be inspected twice a year at minimum and cleaned as needed. Check for erosion and cracking on side slopes. Check for undesirable vegetative growth (i.e., trees) and differential settlement on side slopes and basin floors. Confirm outlet control structures are clear of trash, sediment, debris, organics, or other obstructions. Clogged surfaces shall be broken up by way of deep tilling and re-vegetated immediately. Light machinery shall be used for all maintenance to avoid compaction of underlying soil.

Mowing shall be performed in conjunction with overall site mowing schedule; clippings shall be removed from the basin.

Disposal of accumulated sediment and trash is to be in accordance with applicable local, state, and federal guidelines and regulations.

v. SEDIMENT FOREBAY

Three (3) sediment forebays (FB-1 – FB-3) is proposed to the east of the proposed infiltration basin and in the southwest corner of the site. The sediment forebays are equipped with an emergency spillway to allow controlled downstream discharge. The sediment forebays are sized to mitigate peak runoff increases associated with the proposed project for all storm events up to and including the 100-year storm. The sediment forebays are designed to drain completely within 72 hours.

The sediment forebays shall be inspected twice a year at minimum and cleaned as needed. Check for erosion and cracking on side slopes. Check for undesirable vegetative growth (i.e., trees) and differential settlement on side slopes and basin floors. Confirm outlet control structures are clear of trash, sediment, debris, organics, or other obstructions. Clogged surfaces shall be broken up by way of deep tilling and re-vegetated immediately. Light machinery shall be used for all maintenance to avoid compaction of underlying soil. Mowing shall be performed in conjunction with the overall site mowing schedule; clippings shall be removed from the basin.

Disposal of accumulated sediment and trash is to be in accordance with applicable local, state, and federal guidelines and regulations.

SITE FURNISHINGS BEST MANAGEMENT PRACTICES

Site furnishings, as they pertain to this Operation and Maintenance Plan, comprise driveways and parking lots; walkways and hardscape areas; fences, walls, and guardrails; and landscape areas

i. DRIVEWAYS AND PARKING LOTS

All driveways, parking lots, and emergency access ways shall be inspected twice annually (early Spring and Fall) to assess damage, cracking, differential settlement, and fading of pavement markings. Deteriorated asphalt and damaged curbs and signage shall be repaired as needed based on observation. Faded striping shall be re-painted in kind as needed.

Landscape vegetation around site shall be inspected for overgrowth twice annually (early Spring and Summer) and pruned as needed based on inspection.

ii. WALKWAYS AND HARDSCAPE AREAS

All concrete walkways, landings, pads, and driveways shall be inspected annually for spalling, cracking, and heaving. Cracked or spalled concrete shall be patched and repaired with cement or grout as needed based on inspection. In the case of widespread structural damage to concrete surfaces, slabs shall be demolished and reconstructed in kind and sub-base shall be inspected for settlement or heaving and corrected and/or re-compacted as needed.

iii. FENCES, WALLS, AND GUARDRAILS

All chain link fences, retaining walls and guardrails, shall be inspected annually.

iv. LANDSCAPE AREAS

Spring clean-up shall be conducted twice annually in the months of March and April. Spring clean-up comprises removal of winter wraps from trees, lawn raking/ leaf blowing and weeding, as needed. Landscape edges shall also be inspected and re-established as needed during Spring clean-up activities.

Mulch areas shall be inspected once annually during the month of April. New mulch shall be added to planting beds as needed and washed-out mulch shall be removed from adjacent areas. Subgrade in washout areas shall be checked for erosion and re-graded as needed prior to replacement of mulch. Pre-emergent weed control shall be applied to planting beds concurrently with inspection activities.

No mowing or fertilizers will be allowed as directed by the Town of Sherborn Conservation Commission. See site plans for more details.

SPILL PREVENTION, CONTAINMENT, AND COUNTERMEASURE PLAN

Landscape maintenance and parking operations which occur on site necessitate the use of various materials and must be considered in the spill prevention and response practices. The following is a summary of pollutants and the respective property use and maintenance activities generating each:

Pollutant-Generating Activity	**Pollutants or Pollutant Constituents** (that could be discharged if exposed to stormwater)	**Location on Site**
Landscaping Maintenance Operations	No mowing or fertilizers allowed	Lawn and landscape areas throughout site
Parking and Loading Operations	Hydraulic oil/fluid, Antifreeze, diesel/gasoline (all from automobiles)	Driveway, parking, and loading areas throughout site

The Owner/Responsible Party shall be responsible for coordinating necessary containment and cleanup efforts in the event of a spill at any location on site. Should a spill occur, equipment necessary to attend to spills or leaks shall be stored on site in a designated storage area within the building and shall consist, at minimum, of the following:

- Safety goggles.
- Chemically resistant gloves and overshoe boots.
- Water and chemical fire extinguishers.
- Shovels.
- Absorbent materials.
- Proprietary compact spill containment berms.
- Containers suitable for storage of site-specific materials.
- First aid kits.

Spills and leaks shall be treated according to the type, volume, and location of the released material. Generally, mitigation shall consist of the following:

- Prevention of additional material storage.
- Containment of spilled material.
- Safe, thorough, and environmentally sound removal of spilled material.
- Remediation of environmental damage.

The following describes specific preventative methods to be employed for materials to be used on site.

SPILLS FROM VEHICLES ACCESSING PARKING AND LOADING AREAS

Spills due to vehicular operations are not anticipated on pervious surfaces. In the case of a spill in the driveway, parking or loading areas, the spill shall be contained using spill berms and/or adhesive drain seals at all vulnerable catch basin inlets to prevent entering the subsurface drainage system, and the spill shall then be treated with absorbent material.

SPILLS FROM LANDSCAPE AND LAWN MAINTENANCE EQUIPMENT

In the case of a spill on a pervious surface, the spill shall be contained and treated with absorbent polymer material immediately and the affected soil, mulch, and/or planted vegetation shall be excavated and stored in a proprietary spill containment berm (by Ultratech or the like) for removal by a professional hazardous material removal company.

Town of Sherborn Emergency Contacts are as follows:

- Emergency Management: (888) 304-1133 (MassDEP 24-Hour Spill Reporting)
- Police Department: 911
- Fire Department: (508) 653-3270

For spills of less than five (5) gallons of material, mitigation shall consist of source control, containment, and clean-up with absorbent materials, unless an imminent hazard necessitates that a local professional hazardous material removal company become involved to mitigate the spill.

For spills greater than five (5) gallons of material, the incident shall be reported immediately to the MassDEP Hazardous Waste Incident Response Group at (617) 792-7653 and a professional emergency response contractor (ERC). Information that shall be provided to the said ERC is as follows:

- Type of material spilled.
- Quantity of material spilled.
- Location of the spill.
- Time of the spill.

The Owner/Responsible Party shall then employ measures to prevent further spillage, contain and/or clean up the spill.

If a Reportable Quantity (RQ) of material is spilled during site maintenance and access activities, the National Response Center (NRC) shall be notified immediately at (800) 424-8802. Reportable Quantities of hazardous material are available in 310 CMR 40: Massachusetts Contingency Plan Subpart P: Massachusetts Oil and Hazardous Material List. Within 14 days a report shall be submitted to the EPA New England Regional Office describing the following:

- Type of material released.

- Date and circumstances of the release.
- Measures taken to prevent future releases.

This Spill Prevention Plan shall then be updated to document any such preventive measures implemented. The report shall then be submitted to the EPA New England Regional Office at the following address:

EPA New England, Region 1
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Any inspection reports generated in accordance with a RQ spill shall be completed within 24 hours of completing any site inspection. A hard or electronic copy of the report must be retained on site for at least three (3) years from the date of reporting at the Responsible Party's office.

MAINTENANCE AGREEMENT

I, the undersigned, hereby certify that we understand and accept the terms specified in the Sherborn Wetlands Bylaw and acknowledge the following:

1. I am responsible for the maintenance of permanent BMPs on this Site.
2. During a transfer of ownership, I am responsible for informing prospective new owner(s) of the requirements of the Long-Term Operation and Maintenance Plan and of the requirement to amend the Maintenance Agreement with the Town Stormwater Authority (Sherborn Conservation Commission or its authorized Agent).
3. I am responsible for allocating and making funds available to perform the required operation and maintenance functions on site.
4. The Town Stormwater Authority may conduct inspections whenever deemed necessary to enforce any provision of the Town of Sherborn Stormwater Management Bylaw and Regulations to determine compliance therewith.

I understand that failure to comply with the requirements of the approved Long-Term Operation and Maintenance Plan may result in fines and penalties in accordance with the Town of Sherborn Stormwater Management Bylaw and Regulations.

Owner

(signature) (date)

Barsky Estate Realty Trust
23 Hunting Lane
Sherborn, MA 01770

Responsible Party

(signature) (date)

Barsky Estate Realty Trust
23 Hunting Lane
Sherborn, MA 01770

SECTION 2: INSPECTION AND MAINTENANCE LOGS

APPENDIX

Logs and Checklists

- BMP Maintenance Log
- Inspection Form: Deep Sump/ Hooded Catch Basin
- Inspection Form: Water Quality Unit (WQU-1)
- Inspection Form: Water Quality Unit (WQU-2)
- Inspection Form: Water Quality Unit (WQU-3)
- Inspection Form: Underground Detention System (UDS-1)
- Inspection Form: Surface Infiltration Basin (IB-1)
- Inspection Form: Surface Detention Basin (DB-1)
- Inspection Form: Precast Outlet Control Structure 1 (OCS-1)
- Inspection Form: Precast Outlet Control Structure 2 (OCS-2)

BMP MAINTENANCE LOG

DATE	NAME OF MAINTENANCE PERSONNEL/COMPANY	TYPE OF MAINTENANCE PERFORMED	ISSUES/NEED FOR FOLLOW-UP	WORK ORDER PROVIDED?

DATE	NAME OF MAINTENANCE PERSONNEL/COMPANY	TYPE OF MAINTENANCE PERFORMED	ISSUES/NEED FOR FOLLOW-UP	WORK ORDER PROVIDED?

Reproduce log sheets as necessary over the life of this Operation and Maintenance Plan.

INSPECTION FORM: DEEP SUMP/ HOODED CATCH BASIN _____

Unit Number: CB _____ (Refer to Site Grading and Drainage Plan)

Inspector Name:

Date/Time:

Weather:

TYPE OF INSPECTION (CHECK ONE)	
	Routine (Every Three Months)
	Annual
	Post-Storm (Rainfall Depth =_____inches)
	Post-Spill (Time/Date of Spill:_____)

INSPECTION CHECKLIST (CHECK ALL THAT APPLY)	
	Check sediment depth (Sediment Depth =_____inches)
	Check for settlement/ cracking of pavement around frame and grate
	Remove floating trash and sediment
	Confirm water level in sump is at invert elevation
	Confirm oil/gas hood is secure and functioning
CORRECTIVE ACTION REQUIRED	
ADDITIONAL NOTES/OBSERVATIONS	

INSPECTION FORM: UNDERGROUND DETENTION SYSTEM (UDS-1)

Inspector Name:

Date/Time:

Weather:

TYPE OF INSPECTION (CHECK ONE)	
	Routine (Every Six Months)
	Annual
	Post-Storm (Depth =_____inches; Storm Duration =_____hrs; Storm End Date =_____)
	Post-Spill (Time/Date of Spill:_____)

INSPECTION CHECKLIST (CHECK ALL THAT APPLY)	
	Check for settlement/ cracking of pavement
	Check for ground settlement at inspection port locations
	Check for sediment accumulation at inlets/outlet via inspection ports
	Confirm dry condition within system
	Clean out Isolator Row using the JetVac Process (refer to proprietary O&M manual)
	Inspect and clean catch basins and manholes upstream of the system
CORRECTIVE ACTION REQUIRED	
ADDITIONALNOTES/OBSERVATIONS	

INSPECTION FORM: SURFACE INFILTRATION BASIN (IB-1)

Inspector Name:

Date/Time:

Weather:

TYPE OF INSPECTION (CHECK ONE)	
	Routine (Every Six Months)
	Annual
	Post-Storm (Depth =_____inches; Storm Duration =_____hrs; Storm End Date =_____)
	Post-Spill (Time/Date of Spill:_____)

INSPECTION CHECKLIST (CHECK ALL THAT APPLY)	
	Sediment Forebay/ Precast Outlet Control Structure inspections and forms also completed?
	Check for erosion and cracking on side slopes
	Check for tree growth on side slopes and at basin floor
	Check for differential settlement at basin floor
	Confirm outlet control structure is clear of debris, organics
	Mow side slopes and basin floor; remove clippings
	Remove accumulated trash, sediment, organics
CORRECTIVE ACTION REQUIRED	
ADDITIONALNOTES/OBSERVATIONS	

INSPECTION FORM: SURFACE DETENTION BASIN (DB-1)

Inspector Name:

Date/Time:

Weather:

TYPE OF INSPECTION (CHECK ONE)	
	Routine (Every Six Months)
	Annual
	Post-Storm (Depth =_____inches; Storm Duration =_____hrs; Storm End Date =_____)
	Post-Spill (Time/Date of Spill:_____)

INSPECTION CHECKLIST (CHECK ALL THAT APPLY)	
	Sediment Forebay/ Precast Outlet Control Structure inspections and forms also completed?
	Check for erosion and cracking on side slopes
	Check for tree growth on side slopes and at basin floor
	Check for differential settlement at basin floor
	Confirm outlet control structure is clear of debris, organics
	Mow side slopes and basin floor; remove clippings
	Remove accumulated trash, sediment, organics
CORRECTIVE ACTION REQUIRED	
ADDITIONALNOTES/OBSERVATIONS	

INSPECTION FORM: CONTECH CDS WATER QUALITY UNIT _____

Unit Number: CDS _____ (Refer to Site Grading and Drainage Plan)

Inspector Name:

Date/Time:

Weather:

TYPE OF INSPECTION (CHECK ONE)	
	Routine (Monthly)
	Annual
	Post-Storm (Rainfall Depth =_____inches)
	Post-Spill (Time/Date of Spill:_____)

INSPECTION CHECKLIST (CHECK ALL THAT APPLY)	
	Clear down pipe and riser pipe of debris and/or trash (as needed)
	Remove accumulated sediment from settling chamber (if >15% full of sediment)
	Remove floatables, oil, and hydrocarbons
	Ensure watertightness of structure
	Securely seat manhole cover after inspection
CORRECTIVE ACTION REQUIRED	
ADDITIONAL NOTES/OBSERVATIONS	

INSPECTION FORM: PRECAST OUTLET CONTROL STRUCTURE _____

Unit Number: OCS _____ (Refer to Site Grading and Drainage Plan)

Inspector Name:

Date/Time:

Weather:

	TYPE OF INSPECTION (CHECK ONE)
	Routine (Every Six Months)
	Annual
	Post-Storm (Depth =_____inches; Storm Duration =_____hrs; Storm End Date =_____)
	Post-Spill (Time/Date of Spill:_____)

	INSPECTION CHECKLIST (CHECK ALL THAT APPLY)
	Infiltration Basin or Sand Filter inspection and form also completed?
	Check for ground settlement/ rilling at and around structure
	Confirm dry condition within structure
	Check for weeping/ cracking in inner wall or baffle wall
	Check for obstructions (sediment, trash, debris) at outlet invert and baffle orifices
	Check sediment depth at inlet and outlet (Sediment Depth =_____inches)
	CORRECTIVE ACTION REQUIRED
	ADDITIONALNOTES/OBSERVATIONS

O&M UPDATE FORM

DATE OF UPDATE	DATE OF LAST UPDATE TO O&M PLAN

SECTIONS OUT OF DATE / REQUIRED UPDATES

MAINTENANCE LOG REVIEW

BMP	INSPECTION AND MAINTENANCE FREQUENCY		ACTION REQ'D?* (CIRCLE ONE)
	REQUIRED	ACTUAL	
CONTECH CDS WATER QUALITY UNITS			Y N
DEEP SUMP/ HOODED CATCH BASINS			Y N
UNDERGROUND DETENTION SYSTEM			Y N
SURFACE INFILTRATION BASIN			Y N
SURFACE DETENTION BASIN			Y N
PRECAST OUTLET CONTROL STRUCTURES			Y N

*See next page for corrective action and training requirement updates (if applicable)

CORRECTIVE ACTION TO SCHEDULE(S) REQUIRED (IF YES TO ANY OF ABOVE)
EMPLOYEE AND CONTRACTOR TRAINING UPDATES (ATTACH BROCHURES AS NEEDED)

ANNUAL SITE INSPECTION AND UPDATE

OVERALL SITE CONDITION

_____
_____
_____
_____
_____

INSPECTION RESULTS

_____
_____
_____
_____
_____

EXCEPTIONAL CIRCUMSTANCES OBSERVED? _____

IF YES, DESCRIBE CIRCUMSTANCES AND CORRECTIVE ACTIONS NEEDED.

_____
_____
_____
_____
_____

OVERALL O&M PLAN EFFECTIVENESS (DESCRIBE)

_____
_____
_____
_____
_____

Reproduce update forms as necessary over the life of this Operation and Maintenance Plan.

SECTION 1 APPENDIX - PROPRIETARY BMP IMFORMATION

CONTECH®
ENGINEERED SOLUTIONS

CDS®
Hydrodynamic Separator

The experts you need to solve your stormwater management challenges

Contech is the leader in stormwater management solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.

With our responsive team of stormwater experts, local regulatory expertise and flexible solutions, Contech is the trusted partner you can count on for stormwater management solutions.

Your Contech Team

STORMWATER CONSULTANT

It's my job to recommend the best solution to meet permitting requirements.

STORMWATER DESIGN ENGINEER

I work with consultants to design the best approved solution to meet your project's needs.

REGULATORY MANAGER

I understand the local stormwater regulations and what solutions will be approved.

SALES ENGINEER

I make sure our solutions meet the needs of the contractor during construction.

Contech is your partner in stormwater management solutions

Unique screening technology for stormwater runoff – CDS®

The CDS hydrodynamic separator uses swirl concentration and continuous deflective separation to screen, separate and trap trash, debris, sediment, and hydrocarbons from stormwater runoff.

At the heart of the CDS system is a unique screening technology used to capture and retain trash and debris. The screen face is louvered so that it is smooth in the downstream direction. The effect created is called "Continuous Deflective Separation." The power of the incoming flow is harnessed to continually shear debris off the screen and to direct trash and sediment toward the center of the separation cylinder. This results in a screen that is self-cleaning and provides 100% removal of floatables and neutrally buoyant material debris 4.7 mm or larger, without blinding.

CDS is used to meet trash Total Maximum Daily Load (TMDL) requirements, for stormwater quality control, inlet and outlet pollution control, and as pretreatment for filtration, detention/infiltration, bioretention, rainwater harvesting systems, and a variety of green infrastructure practices.

CDS® Features and Benefits

FEATURE	BENEFIT
Captures and retains 100% of floatables and neutrally buoyant debris 4.7mm or larger	Superior pollutant removal
Self-cleaning screen	Ease of maintenance
Isolated storage sump eliminates scour potential	Excellent pollutant retention
Internal bypass	Eliminates the need for additional structures
Multiple pipe inlets and 90-180º angles	Design flexibility
Clear access to sump and stored pollutants	Fast, easy maintenance

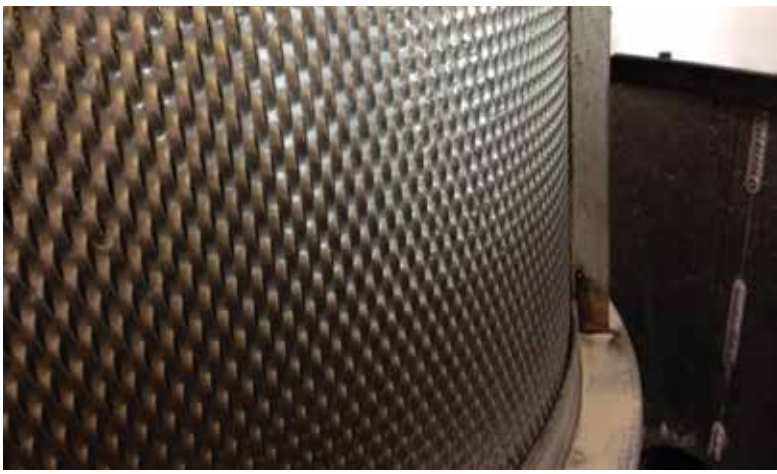
APPLICATION TIPS

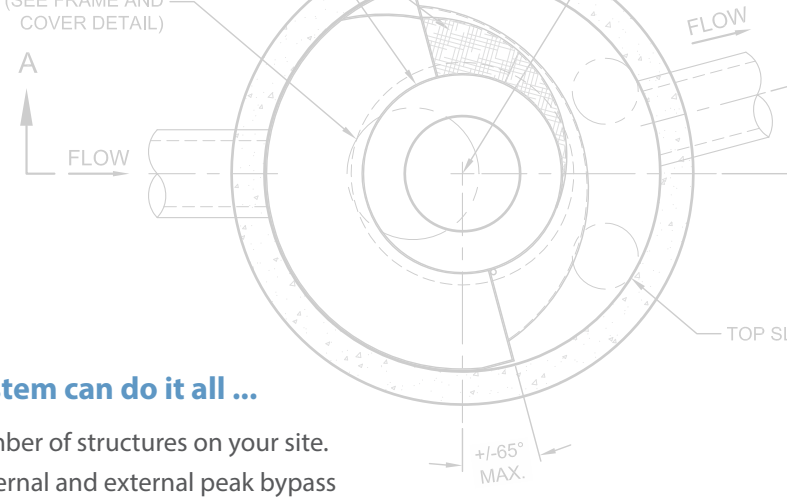
- Because of its internal peak bypass weirs, CDS systems can provide cost savings by eliminating the need for additional structures.
- Pretreating detention, infiltration, and green infrastructure practices with CDS can protect downstream structures and provide for easy maintenance.
- The CDS an ideal solution for retrofit applications due to its compact footprint and configuration flexibility.

The CDS® Screen

A fundamentally different approach to trash control ...

Traditional approaches to trash control typically involve "direct screening" that can easily become clogged, as trash is pinned to the screen as water passes through. Clogged screens can lead to flooding as water backs up. The design of the CDS screen is fundamentally different. Flow is introduced to the screen face which is louvered so that it is smooth in the downstream direction. The effect created is called "Continuous Deflective Separation." The power of the incoming flow is harnessed to continually shear debris off the screen and to direct trash and sediment toward the center of the separation cylinder.

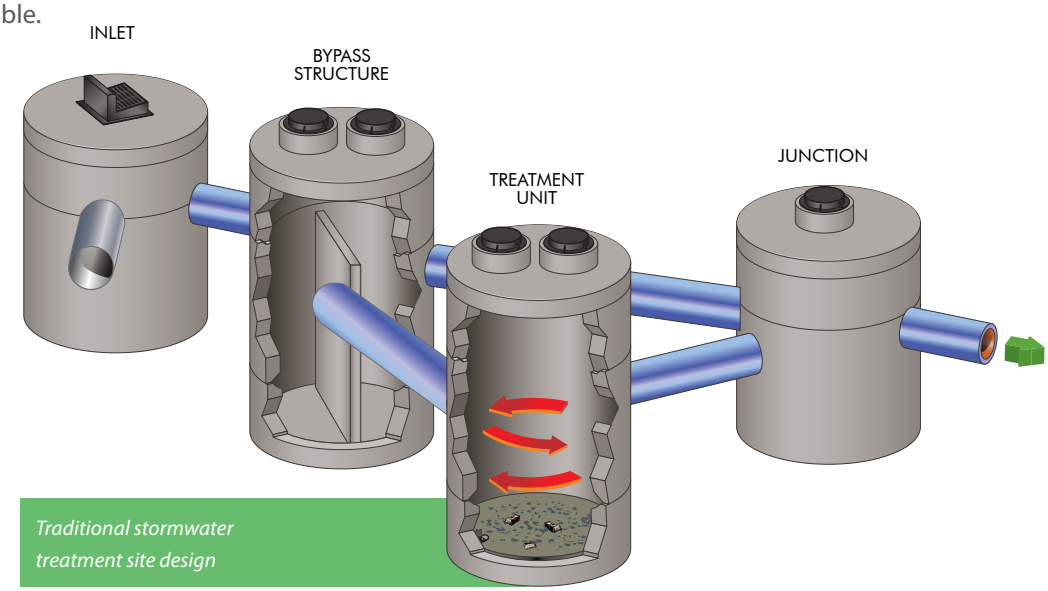




CDS® Design Configuration

Why use traditional stormwater design when ONE system can do it all ...

The CDS effectively treats stormwater runoff while reducing the number of structures on your site. Inline, offline, grate inlet, and drop inlet configurations available. Internal and external peak bypass options also available.

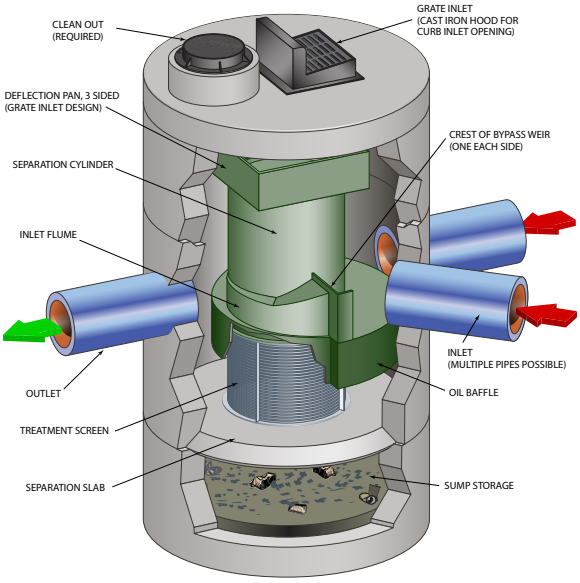


Traditional stormwater treatment site design

A Traditional Stormwater Treatment Site Design would require several structures on your site. With CDS, one system can do it all!

CDS® Advantages

- Grate inlet option available
- Internal bypass weir
- Accepts multiple inlets at a variety of angles
- Advanced hydrodynamic separator
- Captures and retains 100% of floatables and neutrally buoyant debris 4.7 mm or larger
- Indirect screening capability keeps screen from clogging
- Retention of all captured pollutants, even at high flows
- Performance verified by NJCAT, WA Ecology, and ETV Canada



Learn More:
www.ContechES.com/cds

CDS® Applications

CDS is commonly used in the following stormwater applications:

- Stormwater quality control – trash, debris, sediment, and hydrocarbon removal
- Urban retrofit and redevelopment
- Inlet and outlet protection
- Pretreatment for filtration, detention/infiltration, bioretention, rainwater harvesting systems, and Low Impact Development designs

CDS® provides trash control

CDS® pretreats a bioswale

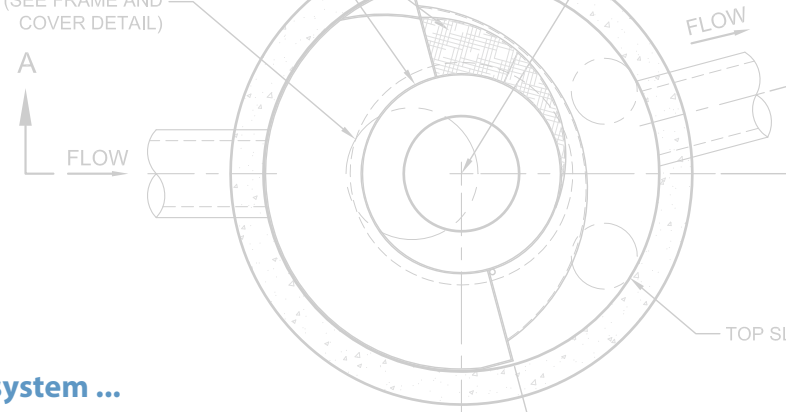
Select CDS® Certifications and Verifications

CDS has been verified by some of the most stringent stormwater technology evaluation organizations in North America, including:

- Washington State Department of Ecology (GULD) - Pretreatment
- Canadian Environmental Technology Verification (ETV)
- California Statewide Trash Amendments Full Capture System Certified*

**The CDS System has been certified by the California State Water Resources Control Board as a Full Capture System provided that it is sized to treat the peak flow rate from the region specific 1-year, 1-hour design storm, or the peak flow capacity of the corresponding storm drain, whichever is less.*

Save time, space and money with CDS



CDS® Maintenance

Select a cost-effective and easy-to-access treatment system ...

Systems vary in their maintenance needs, and the selection of a cost-effective and easy-to-access treatment system can mean a huge difference in maintenance expenses for years to come.

A CDS unit is designed to minimize maintenance and make it as easy and inexpensive as possible to keep our systems working properly.

Most CDS® units can easily be cleaned within thirty minutes.

INSPECTION

Inspection is the key to effective maintenance. Pollutant deposition and transport may vary from year to year and site to site. Semi-annual inspections will help ensure that the system is cleaned out at the appropriate time. Inspections should be performed more frequently where site conditions may cause rapid accumulation of pollutants.

RECOMMENDATIONS FOR CDS MAINTENANCE

The recommended cleanout of solids within the CDS unit's sump should occur at 75% of the sump capacity. Access to the CDS unit is typically achieved through two manhole access covers – one allows inspection and cleanout of the separation chamber and sump, and another allows inspection and cleanout of sediment captured and retained behind the screen. A vacuum truck is recommended for cleanout of the CDS unit and can be easily accomplished in less than 30 minutes for most installations.

Hydrodynamic Separator Selection & Sizing Tool

Quickly prepare designs for estimates and project meetings ...

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CDS Guide
Operation, Design, Performance and Maintenance

CDS®

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. Inline units can treat up to 6 cfs, and internally bypass flows in excess of 50 cfs (1416 L/s). Available precast or cast-in-place, offline units can treat flows from 1 to 300 cfs (28.3 to 8495 L/s). The pollutant removal capacity of the CDS system has been proven in lab and field testing.

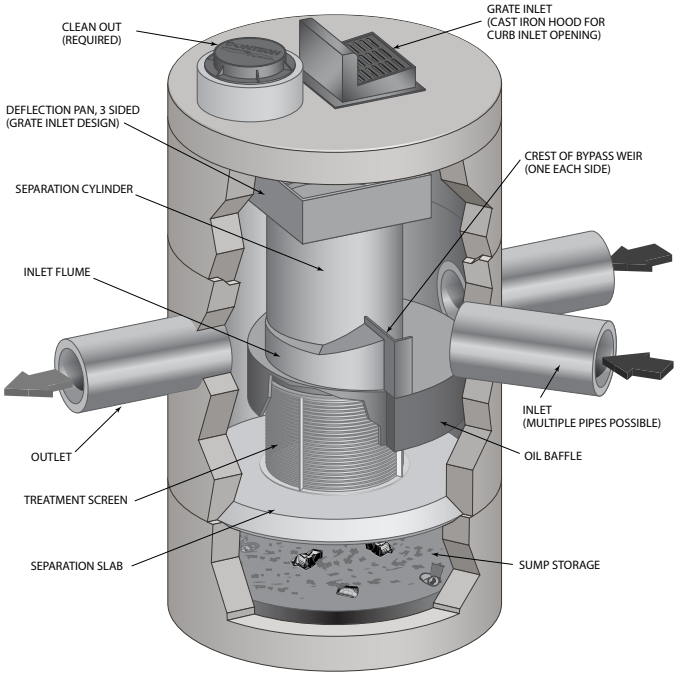
Operation Overview

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

Swirl concentration and screen deflection force 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 the flow events exceeding the treatment design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants are retained in the separation cylinder.



Design Basics

There are three primary methods of sizing a CDS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow rate for a defined particle size. The Rational Rainfall Method™ or the and Probabilistic Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically in the Unites States, CDS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a gradation with an average particle size (d50) of 125 microns (μm). For some regulatory environments, CDS systems can also be designed to achieve an 80% annual solids load reduction based on an average particle size (d50) of 75 microns (μm) or 50 microns (μm).

Water Quality Flow Rate Method

In some cases, regulations require that a specific treatment rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval, e.g. the six-month storm, or a water quality depth, e.g. 1/2-inch (13 mm) of rainfall.

The CDS is designed to treat all flows up to the WQQ. At influent rates higher than the WQQ, the diversion weir will direct most flow exceeding the WQQ around the separation chamber. This allows removal efficiency to remain relatively constant in the separation chamber and eliminates the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the CDS will remove a specific gradation of sediment at a specific removal efficiency. Therefore the treatment flow rate is variable, based on the gradation and removal efficiency specified by the design engineer.

Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. It is important to take these factors into consideration when estimating the long-term performance of any stormwater treatment system. The Rational Rainfall Method combines site-specific information with laboratory generated performance data, and local historical precipitation records to estimate removal efficiencies as accurately as possible.

Short duration rain gauge records from across the United States and Canada were analyzed to determine the percent of the total annual rainfall that fell at a range of intensities. US stations' depths were totaled every 15 minutes, or hourly, and recorded in 0.01-inch increments. Depths were recorded hourly with 1-mm resolution at Canadian stations. One trend was consistent at all sites; the vast majority of precipitation fell at low intensities and high intensity storms contributed relatively little to the total annual depth.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Rainfall Method. Since most sites are relatively small and highly impervious, the Rational Rainfall Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS system are

determined. Performance efficiency curve determined from full scale laboratory tests on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Probabilistic Rational Method

The Probabilistic Rational Method is a sizing program Contech developed to estimate a net annual sediment load reduction for a particular CDS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics.

The Probabilistic Method is an extension of the Rational Method used to estimate peak discharge rates generated by storm events of varying statistical return frequencies (e.g. 2-year storm event). Under the Rational Method, an adjustment factor is used to adjust the runoff coefficient estimated for the 10-year event, correlating a known hydrologic parameter with the target storm event. The rainfall intensities vary depending on the return frequency of the storm event under consideration. In general, these two frequency dependent parameters (rainfall intensity and runoff coefficient) increase as the return frequency increases while the drainage area remains constant.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Method. Since most sites are relatively small and highly impervious, the Rational Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS are determined. Performance efficiency curve on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Treatment Flow Rate

The inlet throat area is sized to ensure that the WQQ passes through the separation chamber at a water surface elevation equal to the crest of the diversion weir. The diversion weir bypasses excessive flows around the separation chamber, thus preventing re-suspension or re-entrainment of previously captured particles.

Hydraulic Capacity

The hydraulic capacity of a CDS system is determined by the length and height of the diversion weir and by the maximum allowable head in the system. Typical configurations allow hydraulic capacities of up to ten times the treatment flow rate. The crest of the diversion weir may be lowered and the inlet throat may be widened to increase the capacity of the system at a given water surface elevation. The unit is designed to meet project specific hydraulic requirements.

Performance

Full-Scale Laboratory Test Results

A full-scale CDS system (Model CDS2020-5B) was tested at the facility of University of Florida, Gainesville, FL. This CDS unit was evaluated under controlled laboratory conditions of influent flow rate and addition of sediment.

Two different gradations of silica sand material (UF Sediment & OK-110) were used in the CDS performance evaluation. The particle size distributions (PSDs) of the test materials were analyzed using standard method "Gradation ASTM D-422 "Standard Test Method for Particle-Size Analysis of Soils" by a certified laboratory.

UF Sediment is a mixture of three different products produced by the U.S. Silica Company: "Sil-Co-Sil 106", "#1 DRY" and "20/40 Oil Frac". Particle size distribution analysis shows that the UF Sediment has a very fine gradation (d50 = 20 to 30 μm) covering a wide size range (Coefficient of Uniformity, C averaged at 10.6). In comparison with the hypothetical TSS gradation specified in the NJDEP (New Jersey Department of Environmental Protection) and NJCAT (New Jersey Corporation for Advanced Technology) protocol for lab testing, the UF Sediment covers a similar range of particle size but with a finer d50 (d50 for NJDEP is approximately 50 μm) (NJDEP, 2003).

The OK-110 silica sand is a commercial product of U.S. Silica Sand. The particle size distribution analysis of this material, also included in Figure 1, shows that 99.9% of the OK-110 sand is finer than 250 microns, with a mean particle size (d50) of 106 microns. The PSDs for the test material are shown in Figure 1.

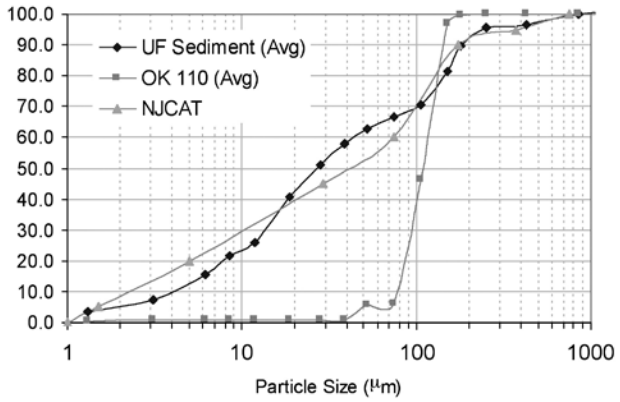


Figure 1. Particle size distributions

Tests were conducted to quantify the performance of a specific CDS unit (1.1 cfs (31.3-L/s) design capacity) at various flow rates, ranging from 1% up to 125% of the treatment design capacity of the unit, using the 2400 micron screen. All tests were conducted with controlled influent concentrations of approximately 200 mg/L. Effluent samples were taken at equal time intervals across the entire duration of each test run. These samples were then processed with a Dekaport Cone sample splitter to obtain representative sub-samples for Suspended Sediment Concentration (SSC) testing using ASTM D3977-97 "Standard Test Methods for Determining Sediment Concentration in Water Samples", and particle size distribution analysis.

Results and Modeling

Based on the data from the University of Florida, a performance model was developed for the CDS system. A regression analysis was used to develop a fitting curve representative of the scattered data points at various design flow rates. This model, which demonstrated good agreement with the laboratory data, can then be used to predict CDS system performance with respect

to SSC removal for any particle size gradation, assuming the particles are inorganic sandy-silt. Figure 2 shows CDS predictive performance for two typical particle size gradations (NJCAT gradation and OK-110 sand) as a function of operating rate.

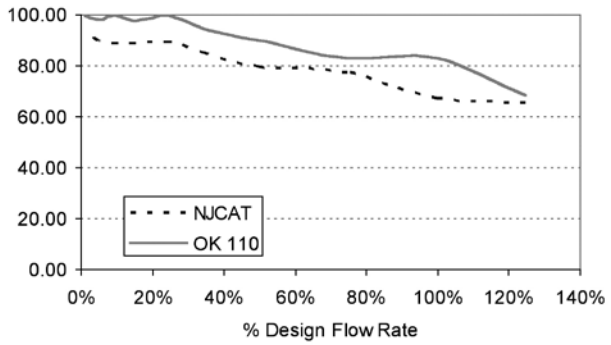


Figure 2. CDS stormwater treatment predictive performance for various particle gradations as a function of operating rate.

Many regulatory jurisdictions set a performance standard for hydrodynamic devices by stating that the devices shall be capable of achieving an 80% removal efficiency for particles having a mean particle size (d50) of 125 microns (e.g. Washington State Department of Ecology — WASDOE - 2008). The model can be used to calculate the expected performance of such a PSD (shown in Figure 3). The model indicates (Figure 4) that the CDS system with 2400 micron screen achieves approximately 80% removal at the design (100%) flow rate, for this particle size distribution (d50 = 125 μm).

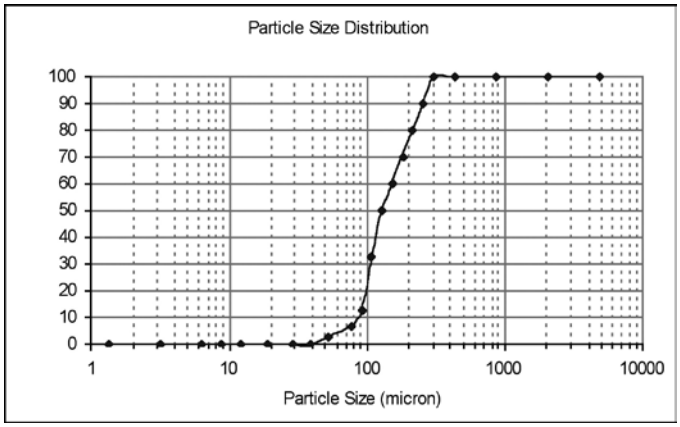


Figure 3. WASDOE PSD

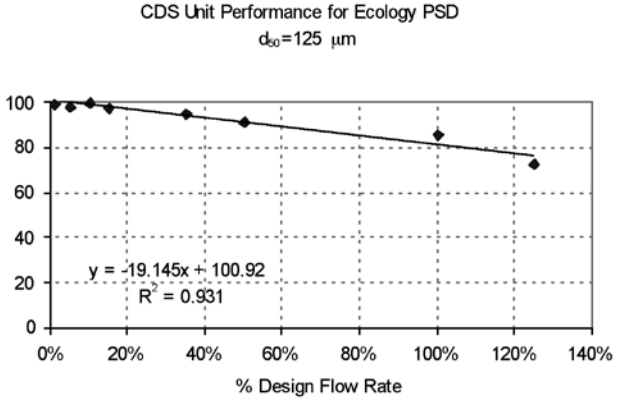


Figure 4. Modeled performance for WASDOE PSD.

Maintenance

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

Inspection

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

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified

during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

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

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

Cleaning

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

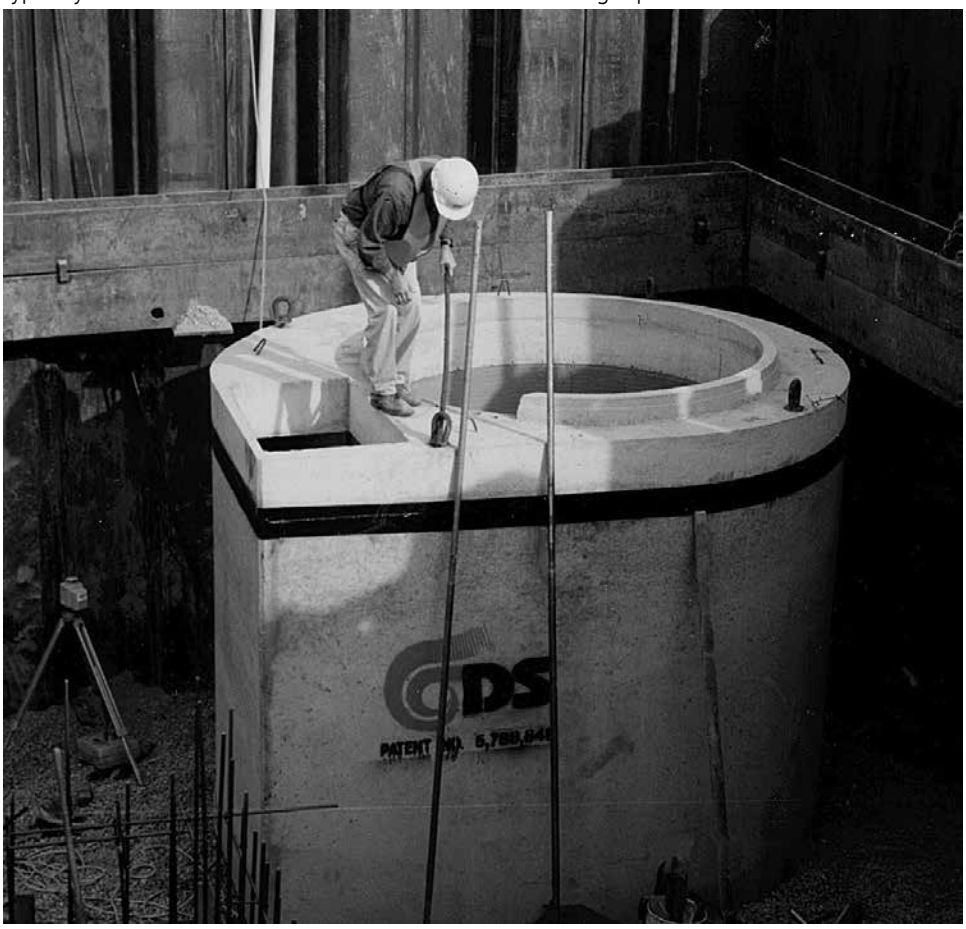
In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should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

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

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Note: To avoid underestimating the volume of sediment in the chamber, carefully lower the measuring device to the top of the sediment pile. Finer silty particles at the top of the pile may be more difficult to feel with a measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.



CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile**.

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

SUPPORT

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

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