STORMWATER IMPACT REPORT

FOR

The Lawrenceville School
Campus Drive West

BLOCK 5801 TAX LOTS 1.02
TOWNSHIP OF LAWRENCE
MERCER COUNTY, NEW JERSEY

Prepared For:

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I INTRODUCTION

The 'Campus Drive West' is the latest project by the Lawrenceville School to construct the westerly section of the perimeter loop road to further reduce vehicular traffic through the center of the campus. The loop road along the easterly corridor is under construction and anticipated to be completed in 2024. A portion of the existing paved driveway between the Tsai Dining and Athletic Center (TDAC) and Woods Drive provides connection between easterly and westerly perimeter loop road. Upon completion of this project, the campus loop road system and associated perimeter parking will promote pedestrian circulation and diminish vehicular traffic to the center of the campus. The property is known as Tax Lots 1.02 and 30.01 Block 5801 located at 2500 Main Street (Route 206) in the Township of Lawrence, Mercer County. The campus is bordered by Route 206 along the northwest corridor, Lewisville Road along the south corridor and a solar field at the eastern section.

The 'west' loop road will utilize the existing driveway connection on Route 206 that is located across Titus Ave. There will be no improvements within the DOT right-of-way. These improvements are consistent with The Lawrenceville School Master Plan.

The project area is currently developed consisting of paved roads, paved and gravel parking areas and maintained lawn areas adjacent to existing sports fields. There are no existing stormwater detention systems within the project's limits of disturbance. Existing drainage collection systems will remain and outfalls from the proposed stormwater facilities will utilize existing outfalls for discharge. The existing storm systems and infrastructure were approved and constructed under prior design requirements.

The stormwater runoff within the project limits is tributary to the onsite streams known as "FEMA Tributary B" to the Shipetaukin Creek that runs from west to east across the property along the southerly section of the campus. Proposed site disturbance and improvements will not encroach into the current NJDEP FHA limits (FEMA 100-yr flood plus 3 feet). Since noted, existing storm outfalls will be utilized and the project does not impact a FHA or wetlands area, no NJDEP permits are required.

As reviewed with the Township and D and R Canal Commission, the proposed stormwater design will be designed using the current rainfall data.

The on-site soils map based on the USDA-NRCS Web Soil Survey for Mercer County consists of Matapeake loam series (MbpA, MbpB and MbpC2 - HSG B), Mattapex and Bertie loams (MBYB - HSG C) and Udorthents bedrock/clayey substratum (UdbB – HSG D).

Soil explorations and permeability testing was conducted by GZA GeoEnvironmental, Inc., see Appendix F for the soil logs and permeability testing results.

The total project area is approx.5.0 acres, footprint of disturbance which includes the 'banked parking areas and walkways. The project will add a net impervious increase of 1.48 acres to the site. The project incorporates small scale and green infrastructure (GI) BMP for stormwater compliance with the Township of Lawrence and the Delaware and Raritan Canal Commission regulations.

II GREEN INFRASTRUCTURES

The proposed stormwater facilities for this project are designed in compliance with the current Township requirements as well as the D&R Canal Commission standards for stormwater quality, quantity, and groundwater recharge.

INFILTRATION BASIN #1

The infiltration basin consists of a 6" sand layer bottom and earthen embankment.

Drainage area: 2.14 acres < 2.5 acres (2.58 including BMP area & basin #3)
Section of existing campus road/driveway connection to Route 206 and proposed loop road.

This facility receives outflow from Porous Asphalt #3 and Subsurface Infiltration Basin #3; drainage area is 0.47 acres.

POROUS ASPHALT #1 & #2 AND SUBSURFACE INFILTRATION BASIN #2

The two (2) GI systems consists of the following:

- Porous asphalt systems #1A , #1B, #1C & #2 provide pre-treatment with 80% TSS removal rate. These pervious paving systems are designed with and without underdrains.
- Subsurface infiltration basin #2 consists of perforated 30" HDPE pipes and stone bed. 'Beehive' type grates will be installed on lawn inlets receiving surface runoff from pockets of landscaped areas/open space areas. Additionally, runoff from landscaped areas above the subsurface basin will drain into access risers fitted with small grate openings to function as leaf screens.

Drainage area: 0.65 acres < 2.5 acres (1.27 acres including BMP areas)
Proposed parking area (expansion, across Arts Center).
Porous asphalt pavement provides 80% TSS removal.

POROUS ASPHALT #3 AND SUBSURFACE INFILTRATION BASIN #3

The two (2) GI systems consists of the following:

- Porous asphalt systems #3A and #3B provide pre-treatment with 80% TSS removal rate. These systems are designed without underdrains.
- Subsurface infiltration basin #3 consists of perforated 24" HDPE pipes and stone bed.

Drainage area: 0.47 acres < 2.5 acres (0.63 acres including BMP areas)
Proposed parking area (expansion, across Arts Center).
Porous asphalt pavement provides 80% TSS removal.

MANUFACTURED TREATMENT DEVICE (MTD 1A & 1B)

The two (2) MTDs provide 80% TSS removal rate prior to discharge into existing stormwater outfalls. These MTDs enhance stormwater quality discharge from the campus.

Drainage area: MTD 1A 0.67 acre < 2.5 acres
Proposed loop road

Drainage area: MTD 1B 0.28 acre < 2.5 acres
Proposed loop road and existing road to remain.

III STORMWATER IMPACT ANALYSIS

A. STORMWATER QUANTITY

The project area is fully developed consisting of buildings, a paved roadway system and parking, maintained lawn and sports fields except for the wooded area south of the existing parking lot across the Kirby Science building. A utility survey was performed by The Reynolds Group to map the existing drainage infrastructures and verify drainage outfalls into the stream on site.

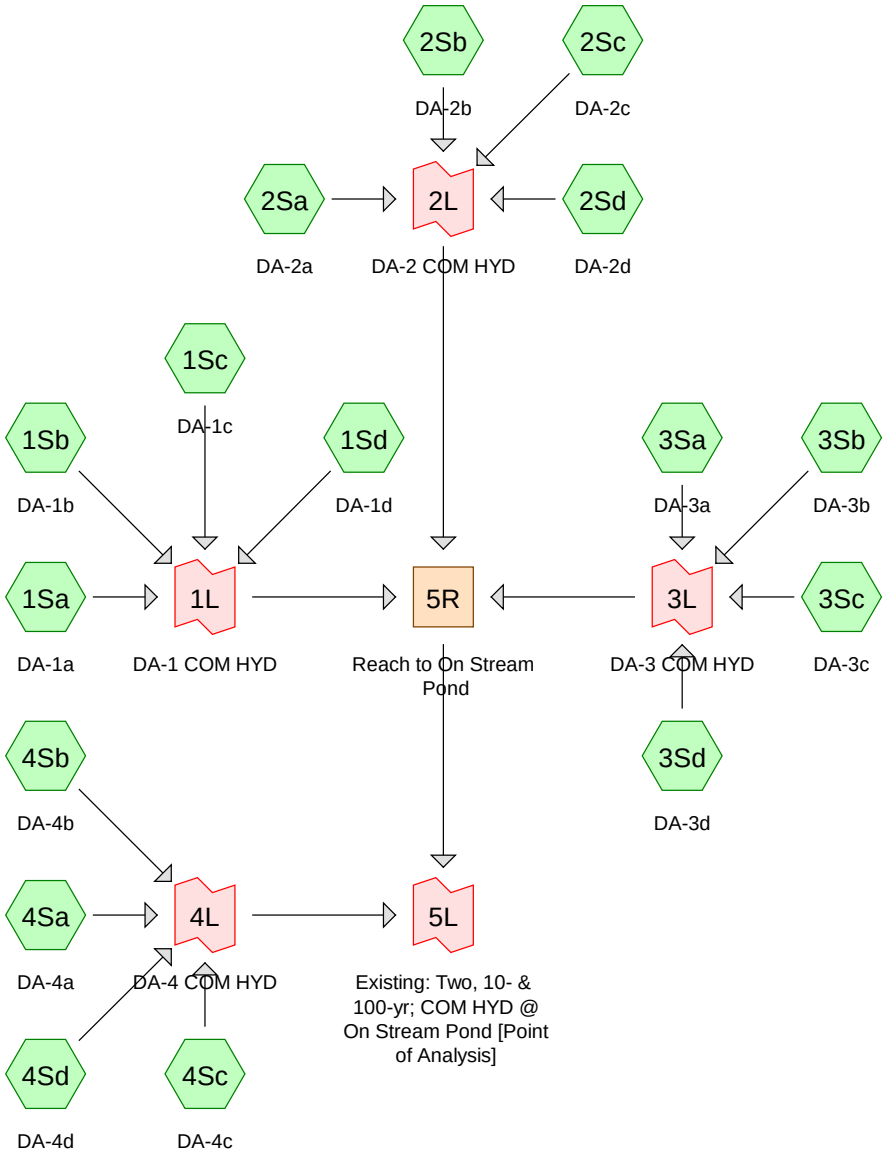
Under existing conditions, the project area drains to Shipetaukin Creek, Tributary 'B' located onsite. There are two drainage areas considered in this report for analysis. First is the large portion of the project site located south and west of the campus that drains to the stream via existing drainage systems or overland. The second drainage area accounts for the surrounding areas around the Juliet Lyell Staunton Clark Music Center and portion of the existing road. Runoff from this area drains to existing drainage systems across the campus and discharges into the existing/in-stream pond. Travel time along the onsite stream was included in the routing {node 5R} to account for the delay in peak flow for the larger section of the project's drainage study. Based upon the project's drainage patterns, the point of the stormwater analysis will be taken at the in-stream pond.

EXISTING PEAK FLOW RATES:

Drainage Area | Storm Event	2-yr	10-yr	100-yr
DA-1a	*2.3 cfs*	*7.0 cfs*	*18.5 cfs*
DA-1b	*0.5 cfs*	*0.7 cfs*	*1.3 cfs*
DA-1c*	*1.2 cfs*	*4.3 cfs*	*12.6 cfs*
DA-1d*	*0.7 cfs*	*1.0 cfs*	*1.8 cfs*
Combined Hydrographs {1L}	***4.0** cfs*	***12.2** cfs*	***32.8** cfs*
DA-2a	*0.6 cfs*	*2.4 cfs*	*7.3 cfs*
DA-2b	*8.0 cfs*	*12.3 cfs*	*20.7 cfs*
DA-2c*	*0.1cfs*	*0.2 cfs*	*0.6 cfs*
DA-2d*	*0.5 cfs*	*0.8 cfs*	*1.3 cfs*
Combined Hydrographs {2L}	***8.8** cfs*	***14.8** cfs*	***28.0** cfs*
DA-3a	*1.1 cfs*	*3.3 cfs*	*8.5 cfs*
DA-3b	*4.1 cfs*	*6.2 cfs*	*10.5 cfs*
DA-3c*	*0.0 cfs*	*0.1 cfs*	*0.3 cfs*
DA-3d*	*0.0 cfs*	*0.1 cfs*	*0.1 cfs*
Combined Hydrographs {3L}	***4.6** cfs*	***8.2** cfs*	***16.3** cfs*
Reach {5R} – 1L, 2L & 3L	*11.4 cfs*	*24.5 cfs*	*57.8 cfs*
DA-4a	*0.1 cfs*	*0.4 cfs*	*1.3 cfs*
DA-4b	*0.6 cfs*	*1.0 cfs*	*1.6 cfs*

EXISTING PEAK FLOW RATES (CONTINUED)			
Drainage Area | Storm Event	2-yr	10-yr	100-yr
DA-4c*	*0 cfs*	*0 cfs*	*0.1 cfs*
DA-4d*	*0 cfs*	*0 cfs*	*0 cfs*
Combined Hydrographs {4L}	***0.7**cfs*	***1.3** cfs*	***75.1** cfs*
Existing Peak Flow Rates Combined Hydrographs {5L}	***11.7** cfs*	***25.2** cfs*	***59.4** cfs*

*Peak Flow Rate Reduction Applied, see Allowable Peak Flow Rate Table on next page.



HYDROCAD MODEL: EXISTING CONDITIONS & ALLOWABLE

ALLOWABLE PEAK FLOW RATES:

Drainage Area | Storm Event	2-yr	10-yr	100-yr
Combined Hydrographs {1Lr} DA-1c** & DA-1d**	*0.7 cfs*	*3.6 cfs*	*10.87 cfs*
Combined Hydrographs {1L} 1Lr, DA-1a & DA-1b	*3.3 cfs*	*11.0 cfs*	*30.1 cfs*
Combined Hydrographs {2Lr} DA-2c** & DA-2d**	*0.3 cfs*	*0.7 cfs*	*1.43 cfs*
Combined Hydrographs {2L} 2Lr, DA-2a & DA-2b	*8.5 cfs*	*14.6 cfs*	*27.7 cfs*
Combined Hydrographs {3Lr} DA-3c** & DA-3d**	*0.02 cfs*	*0.1 cfs*	*0.3 cfs*
Combined Hydrographs {3L} 3Lr, DA-3a & DA-3b	*4.6 cfs*	*8.2 cfs*	*16.21 cfs*
Reach {5R} – 1L, 2L & 3L	*10.8 cfs*	*23.5 cfs*	*55.4 cfs*
Combined Hydrographs {4Lr} DA-4c** & DA-4d**	*0.01 cfs*	*1.3 cfs*	*0.05 cfs*
Combined Hydrographs {4L} 4Lr, DA-4a & DA-4b	*0.7 cfs*	*0.02 cfs*	*2.7 cfs*
Allowable Peak Flow Rates Combined Hydrographs {5L}	***11.1** cfs*	***24.2** cfs*	***57.1** cfs*

** Two-yr @50%, 10-yr @ 75% and 100-yr @ 80% of existing peak flow rate

The allowable site peak flow rates are calculated by applying the 2-, 10- and 100-yr reduction factors to all pervious areas to be disturbed. The peak flow reduction factors do not apply to open space and wooded areas to remain undisturbed. Also, peak flow reductions do not apply to impervious surfaces to be removed, resurfaced(mill and overlay) and /or to remain.

DRAINAGE DATA: Existing | Allowable Flow

DA-1a — 247,625 SF or 5.68 acres
Woods & Open Space, 100% Pervious, *CN 65*
Time of Concentration (Tc) 25.4 minutes

DA-1b — 5,469 SF or 0.13 acres
100% Impervious surfaces, *CN 97*
Time of Concentration (Tc) 13.1 minutes

DA-1c — 190,217 SF or 4.37 acres, Footprint of Disturbance
Woods & Open Space, 100% Pervious, *CN 61*
Time of Concentration (Tc) 25.4 minutes

DA-1d — 10,664 SF or 0.24 acres, Footprint of Disturbance
100% Impervious surfaces, *CN 98*
Time of Concentration (Tc) 13.1 minutes

DA-2a	16,278 SF or 0.37 acres Woods & Open Space, 100% Pervious, *CN 60* Time of Concentration (Tc) 14.9 minutes
DA-2b	103,884 SF or 2.38 acres 100% Impervious surfaces, *CN 98* Time of Concentration (Tc) 7.0 minutes
DA-2c	7,627 SF or 0.18 acres, Footprint of Disturbance Woods & Open Space, 100% Pervious, *CN 61* Time of Concentration (Tc) 14.9 minutes
DA-2d	6,490 SF or 0.15 acres, Footprint of Disturbance 100% Impervious surfaces, *CN 98* Time of Concentration (Tc) 7.0 minutes
DA-3a	81,824 SF or 1.88 acres Woods & Open Space, 100% Pervious, CN 65 Time of Concentration (Tc) 12.0 minutes
DA-3b	45,109 SF or 1.04 acres 100% Impervious surfaces, *CN 98* Time of Concentration (Tc) 2.5 minutes
DA-3c	3,130 SF or 0.07 acres, Footprint of Disturbance Woods & Open Space, 100% Pervious, *CN 59* Time of Concentration (Tc) 12.0 minutes
DA-3d	501 SF or 0.01 acres, Footprint of Disturbance 100% Impervious surfaces, *CN 98* Time of Concentration (Tc) 2.5 minutes
DA-4a	17,562 SF or 0.40 acres Woods & Open Space, 100% Pervious, *CN 59* Time of Concentration (Tc) 16.6 minutes
DA-4b	8,286 SF or 0.19 acres 100% Impervious surfaces, *CN 98* Time of Concentration (Tc) 7.7 minutes
DA-4c	604 SF or 0.01 acres, Footprint of Disturbance Woods & Open Space, 100% Pervious, *CN 98* Time of Concentration (Tc) 16.6 minutes
DA-4d	140 SF or 0.003 acres, Footprint of Disturbance 100% Impervious surfaces, *CN 98* Time of Concentration (Tc) 7.7 minutes

Under the proposed conditions, the onsite stormwater infrastructure consists of three (3) stormwater facilities to meet the stormwater quantity requirements. These stormwater basins have been designed to temporarily store post development runoff volumes and attenuate the peak flow discharge rates for the 2-, 10- and 100-yr. Inflow to subsurface infiltration basins #1 and #2 receive 80% TSS removal from porous asphalt BMPs, refer to stormwater water quality section in this report. The proposed facilities designed for stormwater quantity are as follows:

Infiltration Basin #1: Conveys post-development runoff from existing campus drive connection at Route 206 and a portion of the new loop road (campus drive west).

Subsurface Infil. Basin #2: Conveys post-development runoff from existing parking area south of Kirby Arts building and 'banked' parking lot.

Subsurface Infil. Basin #3: Conveys post-development runoff from 'banked' parking lot located near Route 206.

PROPOSED PEAK FLOW RATES:

Drainage Area | Storm Event	2-yr	10-yr	100-yr
DA-10	2.8 cfs	7.9 cfs	20.5 cfs
DA-11a	0.1 cfs	0.2 cfs	0.7 cfs
DA-11b	1.9 cfs	2.9 cfs	4.8 cfs
Subsurface Infiltration Basin #3 Inflow	1.9 cfs	3.0 cfs	5.3 cfs
Stage	*107.80'*	*108.43'*	*109.96'*
Outflow	0.16 cfs	0.24 cfs	0.6 cfs
DA-12a	0.4 cfs	1.8 cfs	5.4 cfs
DA-12b	1.3 cfs	2.3 cfs	4.0 cfs
Subsurface Infiltration Basin #1, Inflow + Basin #3, BMP in series	1.6 cfs	3.5 cfs	8.2 cfs
Stage	*103.54'*	*103.90'*	*104.68'*
Outflow	0.5 cfs	1.4 cfs	3.5 cfs
DA-13a	0.4 cfs	1.6 cfs	4.6 cfs
DA-13b	1.7 cfs	2.5 cfs	4.3 cfs
Combined Hydrographs {13L}	1.9 cfs	3.9 cfs	8.4 cfs
DA-14a	0.2 cfs	0.7 cfs	1.8 cfs
DA-14b	3.4 cfs	5.1 cfs	8.7 cfs
Subsurface Infiltration Basin #2 Inflow	3.4 cfs	5.6 cfs	10.0 cfs
Stage	*98.13'*	*99.06'*	*100.26'*
Outflow	0.14 cfs	0.21 cfs	3.1 cfs

PROPOSED PEAK FLOW RATES (CONTINUED)			
DA-15a	0.04 cfs	0.1 cfs	0.4 cfs
DA-15b	1.21 cfs	1.9 cfs	3.1 cfs
Combined Hydrographs {15L}	1.24 cfs	2.0 cfs	3.4 cfs
DA-16a	0.6 cfs	2.5 cfs	7.5 cfs
DA-16b	6.3 cfs	9.6 cfs	16.2 cfs
Combined Hydrographs {16L}	6.5 cfs	11.3 cfs	21.9 cfs
DA-17a	1.2 cfs	3.4 cfs	9.0 cfs
DA-17b	4.0 cfs	6.1 cfs	10.3 cfs
Combined Hydrographs {17L}	4.6 cfs	8.4 cfs	16.7 cfs
Reach {19R} – 10S, 12P, 13L, 14P, 15L, 16L & 17L	*10.7 cfs*	*23.3 cfs*	*56.3 cfs*
DA-18a	0.01 cfs	0.02 cfs	0.1 cfs
DA-18b	0.52 cfs	0.80 cfs	1.4 cfs
Combined Hydrographs {17L}	0.53 cfs	0.82 cfs	1.4 cfs
Combined Hydrograph {1&2L}	**11.0** cfs	**23.7** cfs	**57.0** cfs
Allowable	***11.1** cfs*	***24.2** cfs*	***57.1** cfs*

Travel time along the onsite stream {node 19R} was included in the prost development routing to account for the delay in peak flow for the larger section of the project's drainage study using same input under existing conditions to the point of analysis. As shown, the proposed peak runoff rates for the two, ten and 100-yr storm events are less than the allowable peak runoff rates; therefore, the project meets the stormwater quantity requirements.

DRAINAGE DATA: Proposed Conditions

DA-10 261,211 SF or 6.00 acres
98.24% Woods & Open Space, Pervious, *CN 66*
1.76 % Impervious, non-vehicular, disconnected ('banked' sidewalk)
Time of Concentration (Tc) 24.4 minutes

DA-11a 6,399 SF or 0.15 acres
Open Space, *CN 61*
Time of Concentration (Tc) 9.5 minutes

DA-11b 20,908 SF or 0.48 acres
100% Impervious, *CN 98*
Time of Concentration (Tc) 0.8 minute

DA-12a 65,962 SF or 1.61 acres
Open Space & Woods, *CN 59*
Time of Concentration (Tc) 13.8 minutes

DA-12b 19,134 SF or 0.44 acres
100% Impervious, *CN 98*
Time of Concentration (Tc) 4.3 minutes

DA-13a 46,483 SF or 1.07 acres
Woods & Open Space, *CN 61*
Time of Concentration (Tc) 10.2 minutes

DA-13b 20,026 SF or 0.46 acres
100% Impervious, *CN 98*
Time of Concentration (Tc) 5.6 minutes

DA-14a 17,616 SF or 0.40 acres
Open Space, *CN 62*
Time of Concentration (Tc) 9.9 minutes

DA-14b 37,529 SF or 0.86 acres
100% Impervious, *CN 98*
Time of Concentration (Tc) 0.9 minutes

DA-15a 3,981 SF or 0.09 acres
Open Space, *CN 61*
Time of Concentration (Tc) 10.6 minutes

DA-15b 14,314 SF or 0.33 acres
100% Impervious, *CN 98*
Time of Concentration (Tc) 4.9 minutes

DA-16a 91,062 SF or 2.09 acres
Open Space, *CN 60*
Time of Concentration (Tc) 14.9 minutes

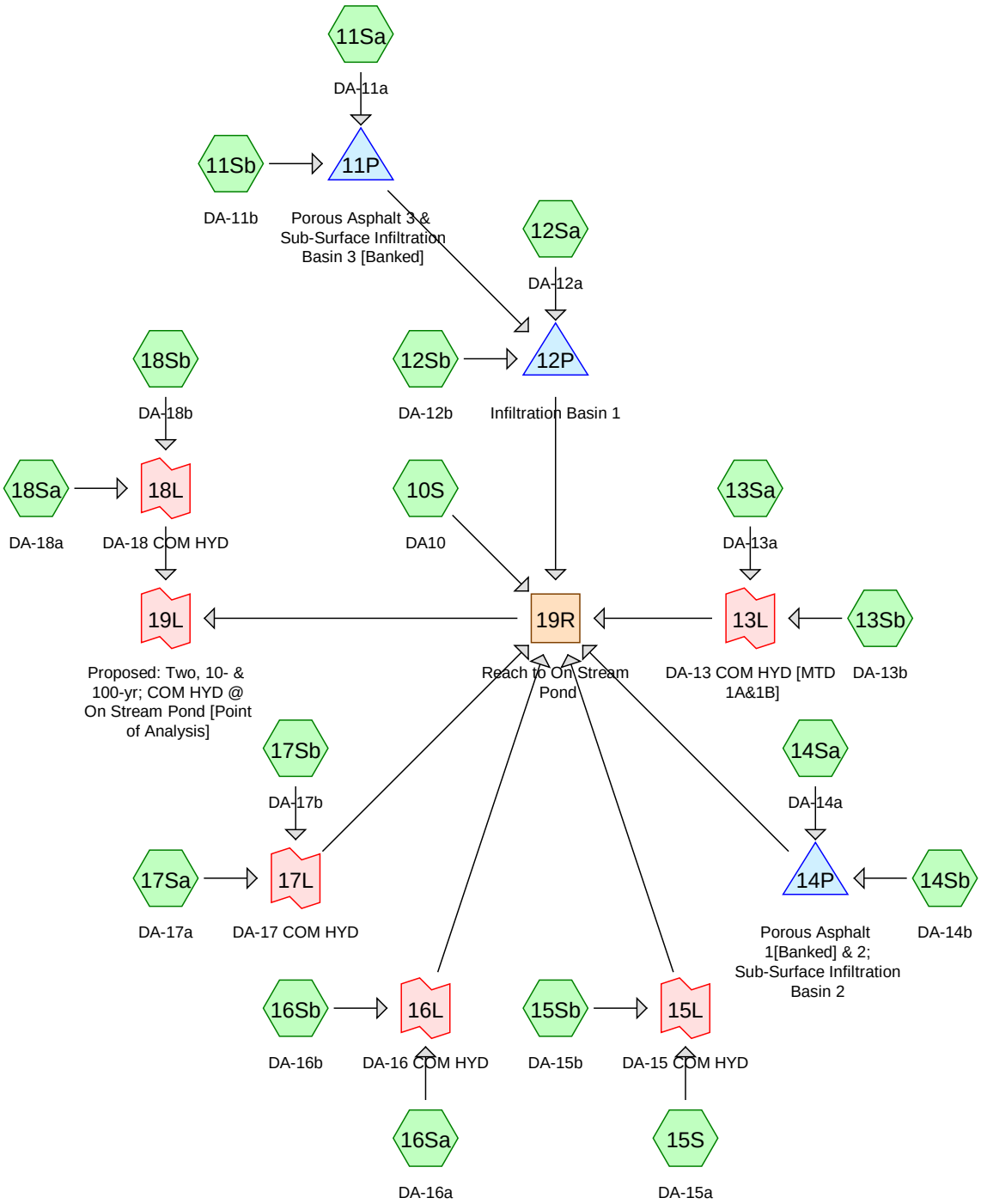
DA-16b 79,517 SF or 1.83 acres
100% Impervious, *CN 98*
Time of Concentration (Tc) 6.9 minutes

DA-17a 84,864 SF or 1.95 acres
Woods & Open Space, *CN 65*
Time of Concentration (Tc) 11.8 minutes

DA-17b 44,668 SF or 1.03 acres
100% Impervious, *CN 98*
Time of Concentration (Tc) 2.3 minutes

DA-18a 659 SF or 0.015 acres
Open Space, *CN 61*
Time of Concentration (Tc) 9.9 minutes

DA-18b 6,448 SF or 0.15 acres
100% Impervious, *CN 98*
Time of Concentration (Tc) 6.1 minutes

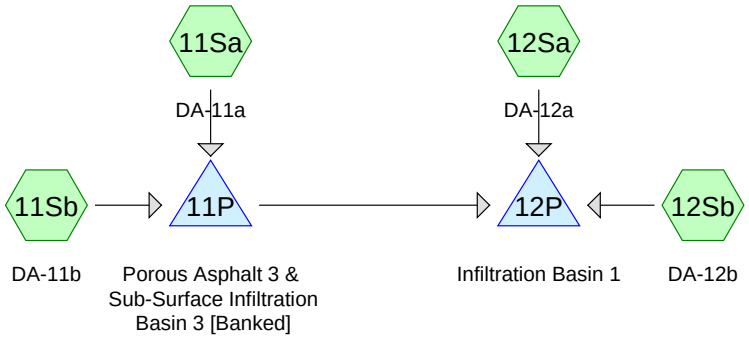


EMERGENCY SPILLWAY DESIGN

The design criteria for an emergency spillway assumes that the outlet control structure at infiltration basin #1 is completely blocked.

Description	$Q_{100\ in}$ (cfs)	$Q_{100\ out}$ (cfs)	W.S.E. (ft.)	Crest Elev. (ft.)	Depth (ft.)	Vel.[1] (fps)	Length (ft.)	Berm Elev. (ft.)
Basin #1	8.2	6.3	104.91	104.75	0.16	0.98	40	105.5

[1] Matapeake loam series); Allowable Velocity per SESC Table 12-1 is 3.0 fps; Spillway design velocity is < 3.0 fps; use grass lined spillway.



HYDROCAD MODEL: EMERGENCY SPILLWAY DESIGN

CURRENT 24-HR RAINFALL DEPTHS

Description	Local NOAA Data	Mercer County Current Precipitation Adjustment Factors	Design
2-yr	3.31”	1.01	3.34
10-yr	4.99”	1.02	5.09”
100-yr	8.22”	1.04	8.55”

The runoff parameters were computed using the methodologies outlined in the Natural Resource Conservation Service’s Technical Release No. 55. The HydroCAD modeling software was used to compute the existing and developed runoff hydrographs utilizing the Lawrence Township 24-hr rainfall depths, Storm Curve ‘C’ and multiplied by the Mercer County rainfall factors to determine current condition 24-hr depths for the 2-, 10- and 100-yr storm events as shown above. All input and the HydroCAD output data are provided in Appendix B.

B. WATER QUALITY

The design of Campus Drive West Under includes the utilization of existing paved roads and driveways. The intent of the project is to connect the easterly loop road (under construction, previously approved) to the westerly section that will complete the loop road with both entrances on Route 206. A large section of the existing road and driveway will remain and will be resurfaced (mill and overlay). A new loop road will be constructed to tie-in into the existing road located southwest of Kirby Art Center. Existing parking areas near or in front of these buildings will be removed.

A small-scale infiltration basin, porous asphalt systems and manufactured treatment devices (MTD) are proposed to meet the stormwater quality requirements. The facilities are described below:

- Small-Scale Infiltration Basin #1
  The proposed infiltration basin with a 6" thick sand layer bottom will receive runoff from existing road between Rout 206 and the Juliet Lyell Staunton Clark Music Center, a portion of the new loop road and surrounding open space and wooded areas. The entire water quality storm volume will be infiltrated.

- Porous Asphalt #1
  This area consists of 75 banked parking spaces including parking aisles located south of Kirby Arts Center. The proposed porous asphalt systems are divided into subareas #1A, #1B and #1C to meet design requirements. The (3) facilities include underdrain systems. The underdrain systems will tie-in to the proposed subsurface infiltration basin #2.

BMP	Porous Asphalt (sf)	Additional Area (sf)	Total Area (sf)	Ratio (3 max.)	BMP Depth (in)
#1A	2,981	7,858	10,839	2.64	11
#2B	2,922	8,259	11,181	2.83	11
#1C	1,302	3,566	4,868	2.74	12

(See additional design data on Appendix C)

- Porous Asphalt #2
  The existing parking stalls (23 spaces) located south of the Kirby Arts Center will be reconstructed and replaced with porous asphalt systems designed to infiltrate the water quality storm. A section of proposed subsurface basin #2 consisting of perforated 30-inch HDPE pipes are below the porous asphalt system. The entire water quality storm volume including discharge from Porous Asphalt #1 will be infiltrated.

BMP	Porous Asphalt (sf)	Additional Area (sf)	Total Area (sf)	Ratio (3 max.)	BMP Depth (in)
#2	3,850	10,187	14,037	2.65	11

(See additional design data on Appendix C)

- Porous Asphalt #3
  This area consists of 68 banked parking spaces including parking aisles south of the McPherson building and located near Route 206. The proposed porous asphalt systems are divided into subareas #3A and #3B to meet design requirements. Both systems are designed to infiltrate the entire water quality storm volume through the proposed subsurface basin #3 below the porous asphalt systems.

BMP	Porous Asphalt (sf)	Additional Area (sf)	Total Area (sf)	Ratio (3 max.)	BMP Depth (in)
#3A	5,033	15,091	20,124	3.0	10
#3B	1,798	5,385	7,183	2.99	12

(See additional design data on Appendix C)

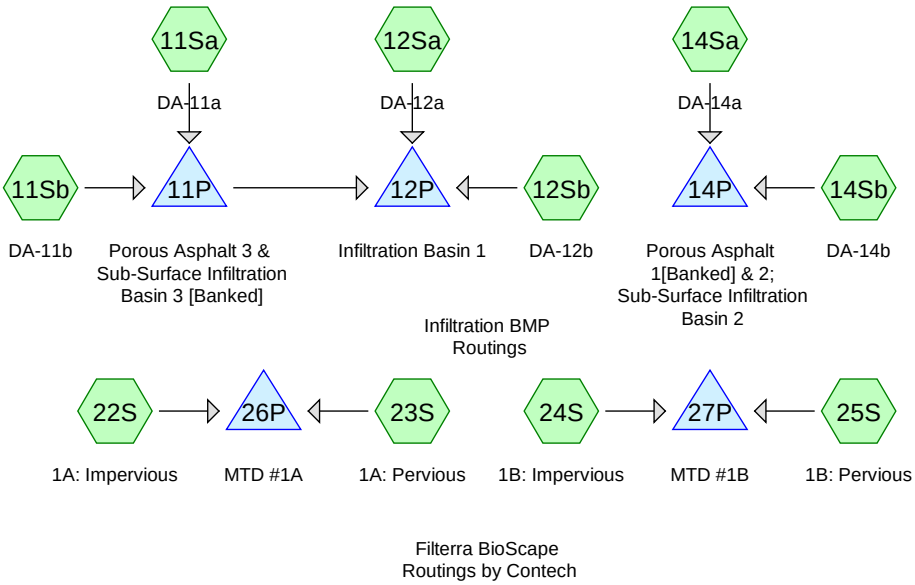
- MTD 1A – Filterra BioScape
  Surface runoff from the new loop road (connector) behind the Hogate building will be conveyed to Filterra MTD #1A to provide 80% TSS removal prior to discharge. This drainage tributary will directly discharge into the stream without detention.

- MTD 1B – Filterra BioScape
  For MTD #1B, surface runoff from the reconstructed road and a portion of the new loop road between Kirby Arts Center and Hogate buildings will be conveyed to Filterra MTD #2A to provide 80% TSS removal prior to discharge. This drainage tributary will directly discharge into the stream without detention.

Water Quality Data:

Stormwater Facility	W.Q.		Stage Elev. (ft)	Bottom Elev. (ft)	BMP Area (sf)	Lowest Outlet Elev. (ft)	W.Q. Depth (ft)	TSS Removal Rate
	Inflow (cfs)	Outflow (cfs)						
Infiltration Basin #1 {12P}	0.68	0	103.24	103.10	5,155	103.24	0.14	80%
Subsurface Infiltration Basin #2 & Porous Asphalt #2 {14P}	2.93	0	97.29	96.30	8,359	97.29	0.99[1]	80%
Subsurface Infiltration Basin #3 & Porous Asphalt #3 {14P}	1.48	0	107.24	106.50	5,782	107.24	0.74[2]	80%

[1] WQ Volume= 3,236 cu. ft.; equivalent depth w/ 100% voids = 0.39 ft or 4.65 inches
[2] WQ Volume= 1,802 cu. ft.; equivalent depth w/ 100% voids = 0.31 ft or 3.74 inches



SUMMARY OF MOTOR VEHICLE IMPERVIOUS AREAS:

Existing Conditions:
Total Motor Vehicle Impervious surface: 75,003 SF
Without TSS removal

Proposed Conditions:
New/Reconstructed/Existing Pavement:

Infiltration Basin #1	14,517 SF
Porous Asphalt #1 & #2	34,989 SF
Porous Asphalt #3	20,908 SF
MTD #1A & #1B	15,772 SF
	86,186 SF, Total @ 80% TSS removal
Mill/Overlay and/or to remain	40,942 SF < 75,003 without TSS removal

Total Motor Vehicle Impervious surface: 127,128 SF

Based on the above data, the project will reduce untreated motor vehicle surface runoff that drains directly into the stream by approximately 34,061 SF, or a 45.4% reduction prior to development. All input and HydroCAD output data for the W.Q. design storm is provided in Appendix C. The W.Q. storm drain time calculation is provided in Appendix D.

C. GROUNDWATER RECHARGE

The proposed site improvements would result in a reduction in the amount of groundwater currently recharged on site. In order to restore the lost recharge, existing and developed/impervious runoff from the site will be conveyed to the proposed infiltration basin #1 and subsurface infiltration basins #2 & #3.

In accordance to N.J.A.C. 7:8-5.4 Method 1 for groundwater recharge requirement, "demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100% of the average annual pre-construction groundwater recharge volume for the site".

Pre-Development Annual Recharge:	654,123 cu. ft.
Post-Development Annual Recharge:	583,721 cu. ft.
Post-Development Annual Recharge Deficit:	70,402 cu. ft.
Max. Annual Recharge from BMPs (see table):	134,190 cu. ft. > Deficit

Groundwater Recharge Data

Surface (#1) & Subsurface (#2 & #3) Infiltration BMPs	BMP Area {ABMP}	BMP Effective Depth {dBMP}	Target Impervious Area {Aimp}	Annual BMP Recharge Volume	BMP Design Depth
Basin #1	5,155 SF	1.7"	19,134 SF	15,250 CF	1.68"
Basin #2	8,359 SF	4.6"	37,529 SF	75,590 CF	4.65"
Basin #3	5,782 SF	3.7"	20,908 SF	43,350 CF	3.74"
Total Post-Development Annual Recharge @ BMPs				134,190 CF	

Per post-development groundwater recharge data shown on page 14, the project meets the requirements. See Appendix D for NJ Groundwater Recharge Spreadsheet and time to drain calculations.

Drain Time Data:

Surface and subsurface Infiltration BMP	Drain Time	Design Permeability Rate
Basin #1	1.29 hrs	1.30 in/hr, soil replacement to elev. 92.5; TP#4
Basin #2	3.20 hrs	3.20 in/hr, soil replacement to elev. 94.2; TP#11
Basin #3	2.77 hrs	1.35 in/hr, TP#22

The estimated drain time for Basins 1 and 2 are less than 72 hours, therefore, the proposed bioretention basins meet the BMP requirements. The Drain Time calculations are provided in Appendix D.

The proposed infiltration basins are also designed to provide a minimum 2-ft separation from seasonal high-water table (SHWT) below the 6" thick sand layer (surface) or blow the stone bed (subsurface). Two (2) permeability tests were performed for each basin. Refer to Appendix F for permeability rates and soil logs.

D. MOUNDING ANALYSIS

The Hantush spreadsheet was used to determine transient mounding that builds up in the unsaturated zone below each proposed GI stormwater BMP facility. As shown in the table below, the mounding elevations for all (3) proposed facilities are below the bottom of each BMP. See results on Appendix D.

MOUNDING ANALYSIS DESIGN DATA:

Facility	BMP Bottom Elev. (ft)	SHWT (ft)	Separation (2 ft min.)	Design Permeability Rate (in/hr)	Drain Time (hrs)	Mounding[2] (ft)
Infiltration Basin #1	103.10	100.60	2.0'	1.3[1]	1.29	0.932 (Elev. 101.53)
Subsurface Infiltration Basin #2	96.30	93.70	2.6'	1.45[1]	2.01	2.578 (Elev. 96.28)
Subsurface Infiltration Basin #3	106.5	104.5	2.0'	1.35	2.77	1.933' (Elev. 106.43)

[1] Refer to drain time data on this page for soil replacement requirements.
[2] Mounding results both 'x' and 'y' directions yielded identical result.

IV STORM SEWER DESIGN

The on-site storm sewer collection system has been designed to capture and convey the 25- and 100-yr storm into the proposed stormwater basins. Discharge pipes from the proposed basins will tie-in to existing stormwater outfalls.

The design of the proposed stormwater management basins is in accordance to New Jersey Standards for Soil Erosion and Sediment Control. The conduit outlet protection (COP) required at the infiltration basin inflow pipes and outlet are provided in the report.

Calculations for pipe sizing and design of conduit outlet protections are located in Appendix E. (See post-development inlet drainage area map located in the map pocket at the end of this report.)

V NON STRUCTURAL STOMWATER MANAGEMENT STRATEGIES

The stormwater design for the project meets the standards in N.J.A.C. 7:8-5.4 and 5.5 to the maximum extent practicable by incorporating nonstructural stormwater management strategies at N.J.A.C. 7:8-5.3 into the design.

The following are the nonstructural stormwater management strategies incorporated into site design:

1. Areas that provide water quality benefits, i.e., stream corridor, and areas particularly susceptible to erosion and sediment loss will be protected.
2. The increase in impervious surfaces has been minimized to the maximum extent practicable. The proposed road alignment of the Campus West Drive will utilize existing roads. The proposed road (loop/connector) and parking aisles are 24-ft wide maximum to allow two-way vehicular traffic, including emergency vehicle access. The loop road will be constructed without curbs, except at intersections, to provide break-up or disconnection of pavement runoff.
3. Existing onsite natural swales and vegetation will be protected. The proposed site improvements have been designed to minimize impact to these natural features.
4. Roadside swales have been incorporated in the design to minimize decrease in the "time of concentration" from pre-construction to post-construction. Also, the most distant point for each sub-drainage area will remain undisturbed and/or land cover and slopes will match existing to the maximum extent practicable.
5. The proposed land disturbance has been minimized to the extent practicable. Proposed road grades have been designed to match existing ground and where feasible. Existing parking areas will be removed and reconstructed using permeable paving systems (porous asphalt). The project’s disturbance is primarily located within previously disturbed areas, maintained grass areas (sports field).
6. Earth moving equipment with rubber tires will be utilized to the maximum extent practicable to minimize soil compaction. In addition, the proposal complies with the NJ State Soil Conservation Committee requirements for soil compaction and restoration.
7. Low maintenance landscaping and planting of native vegetation are proposed along the stream corridor where existing impervious pavement and parking will

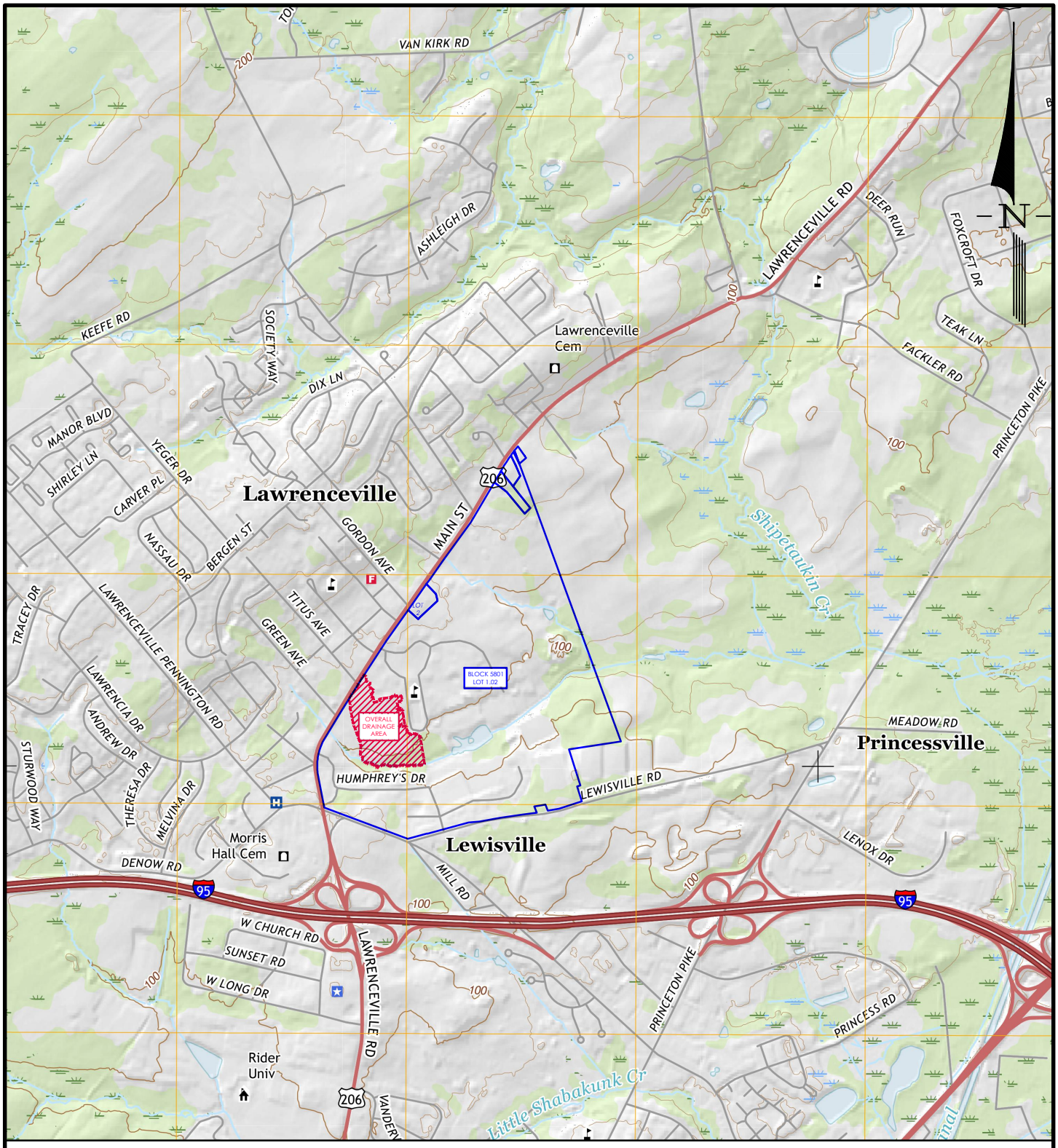
be removed. The use of fertilizers and pesticides will be minimized as noted in stormwater maintenance manual.

8. Roadside swales have been incorporated into the design to provide vegetated open-channel conveyance to the maximum extent practicable. Proposed swales will discharge into lawn inlets to minimize concentrated flows and control erosive velocities; and
9. The proposed stormwater systems include other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:
    i. The proposed campus improvements include installations of trash receptacles that help to prevent accumulation of trash and debris in drainage systems.
    ii. Proposed and existing inlets (reconstructed) will be fitted with 'N' Eco type grates. Trash racks will be installed on outlet structures that will help prevent discharge of trash and debris from drainage systems;
    iii. The project does not involve handling of commercial or industrial handling chemicals and/or fuel, therefore, a containment spill structure is not warranted.
    iv. When establishing vegetation after land disturbance (temporary/permanent), the rate of fertilizer application will be in accordance with the NJ Soil Erosion and Sediment Control Standards.

(b) The project does not require additional non-structural stormwater management measure to meet the performance standards in N.J.A.C. 7:8-5.4 and 5.5. The proposed stormwater facilities are adequate to meet the requirements. These facilities will be maintained by The Lawrenceville School.

APPENDIX A

MAP FIGURES



U.S.G.S. PRINCETON QUAD.

0 2000 4000

SCALE IN FEET

The Reynolds Group, Inc.

State of New Jersey
Certificate of Authorization
Number 24GA27969200
21MH00004300

Engineers
Landscape Architects
Land Surveyors
Planners

575 Route 28, Suite 110
Raritan, N.J. 08869
Tele 908-722-1500
Fax 908-722-7035

F. Mitchel Ardman, P.E., P.P.
Jeffrey D. Reynolds, P.L.A.

SCALE: 1"=2000'	TRG Job No.: 22-019	Date: OCT. 2023

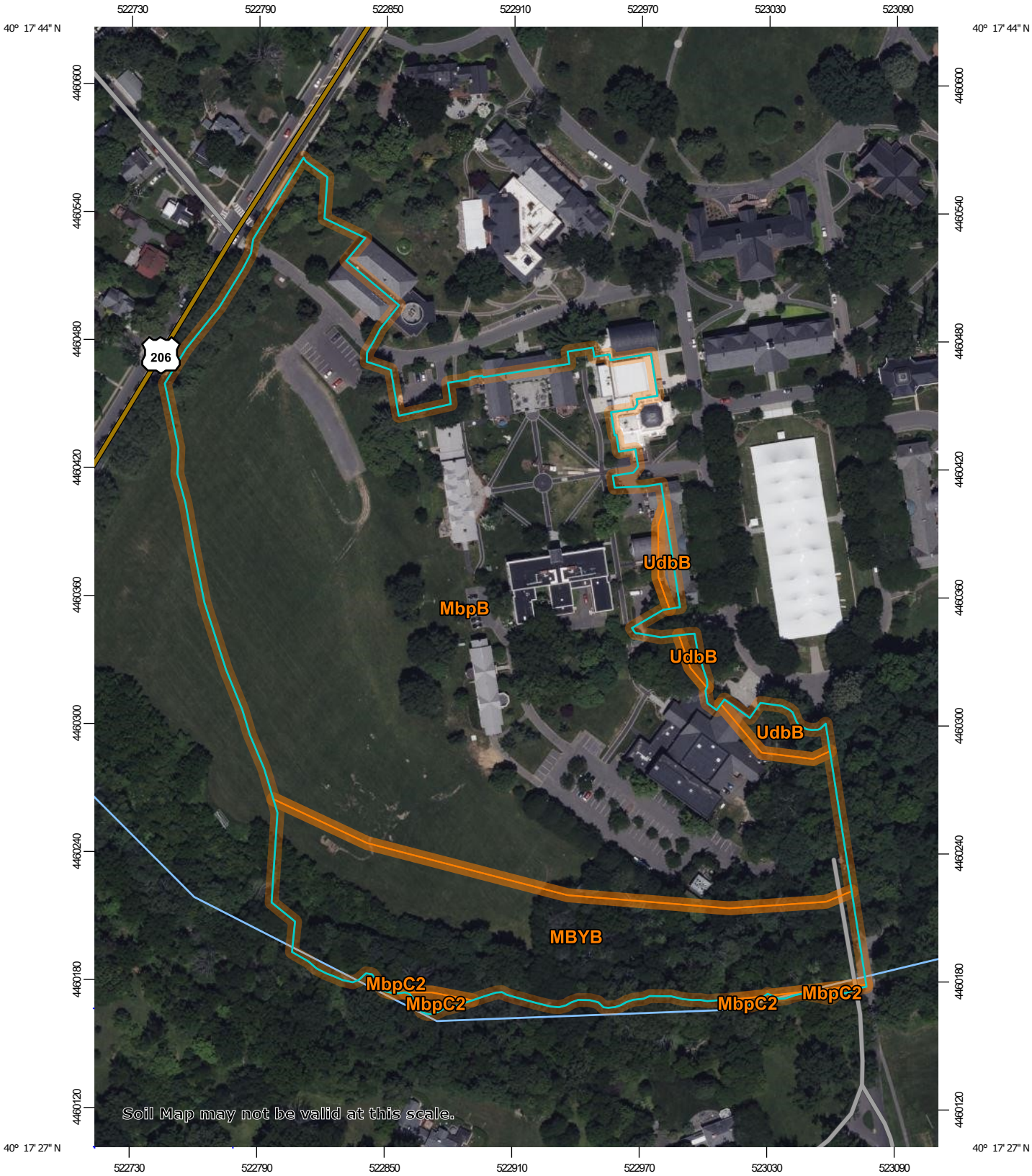
Project:

THE LAWRENCEVILLE SCHOOL
BLOCK 5801 LOT 1.02
TOWNSHIP OF LAWRENCE
MERCER COUNTY, NEW JERSEY

FIGURE No.

1

Soil Map—Mercer County, New Jersey
(The Lawrenceville School, Campus Drive West)



Map Scale: 1:2,560 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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

Figure 2

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Mercer County, New Jersey
Survey Area Data: Version 19, Aug 29, 2023

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

Date(s) aerial images were photographed: Jun 4, 2022—Jul 22, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
MbpB	Matapeake loam, 2 to 5 percent slopes	14.9	79.0%
MbpC2	Matapeake loam, 5 to 10 percent slopes, eroded	0.1	0.4%
MBYB	Mattapex and Bertie loams, 0 to 5 percent slopes	3.6	19.1%
UdbB	Udorthents, bedrock substratum, 0 to 8 percent slopes	0.3	1.5%
Totals for Area of Interest		**18.8**	**100.0%**

Figure 2

APPENDIX B

CALCULATIONS FOR STORMWATER ANALYSIS

HydroCAD® Routing for Two, 10 and 100-yr storm events
Existing, Allowable and Proposed Conditions
Emergency Spillway Design

EXISTING CONDITIONS

NOAA Atlas 14, Volume 2, Version 3
Location name: Lawrence Township, New Jersey, USA*
Latitude: 40.2932°, Longitude: -74.7308°
Elevation: 105 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

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	**0.340** (0.308-0.375)	**0.405** (0.368-0.448)	**0.482** (0.436-0.532)	**0.538** (0.486-0.593)	**0.607** (0.545-0.669)	**0.658** (0.588-0.725)	**0.708** (0.629-0.782)	**0.754** (0.667-0.836)	**0.813** (0.712-0.906)	**0.858** (0.745-0.962)
10-min	**0.543** (0.492-0.600)	**0.648** (0.589-0.716)	**0.772** (0.698-0.852)	**0.861** (0.777-0.949)	**0.968** (0.868-1.07)	**1.05** (0.936-1.15)	**1.12** (1.00-1.24)	**1.20** (1.06-1.32)	**1.29** (1.13-1.43)	**1.35** (1.17-1.51)
15-min	**0.679** (0.615-0.749)	**0.815** (0.740-0.900)	**0.977** (0.883-1.08)	**1.09** (0.983-1.20)	**1.23** (1.10-1.35)	**1.33** (1.18-1.46)	**1.42** (1.26-1.57)	**1.51** (1.33-1.67)	**1.62** (1.42-1.80)	**1.70** (1.47-1.90)
30-min	**0.930** (0.844-1.03)	**1.12** (1.02-1.24)	**1.39** (1.26-1.53)	**1.58** (1.42-1.74)	**1.82** (1.63-2.00)	**2.00** (1.78-2.20)	**2.18** (1.94-2.40)	**2.35** (2.08-2.60)	**2.58** (2.26-2.87)	**2.75** (2.38-3.08)
60-min	**1.16** (1.05-1.28)	**1.41** (1.28-1.56)	**1.78** (1.61-1.96)	**2.05** (1.85-2.26)	**2.42** (2.17-2.67)	**2.71** (2.42-2.98)	**3.00** (2.67-3.31)	**3.29** (2.91-3.65)	**3.70** (3.24-4.12)	**4.01** (3.48-4.49)
2-hr	**1.41** (1.27-1.56)	**1.71** (1.55-1.90)	**2.17** (1.96-2.40)	**2.52** (2.27-2.78)	**3.01** (2.69-3.31)	**3.40** (3.03-3.75)	**3.80** (3.37-4.20)	**4.22** (3.71-4.67)	**4.80** (4.17-5.35)	**5.26** (4.52-5.89)
3-hr	**1.55** (1.39-1.72)	**1.88** (1.70-2.10)	**2.39** (2.15-2.66)	**2.78** (2.50-3.10)	**3.34** (2.98-3.71)	**3.78** (3.36-4.21)	**4.26** (3.74-4.74)	**4.75** (4.14-5.30)	**5.43** (4.67-6.09)	**5.99** (5.08-6.74)
6-hr	**1.96** (1.76-2.19)	**2.38** (2.14-2.66)	**3.01** (2.70-3.36)	**3.52** (3.15-3.92)	**4.26** (3.78-4.75)	**4.88** (4.30-5.44)	**5.55** (4.83-6.19)	**6.27** (5.40-6.99)	**7.31** (6.19-8.20)	**8.17** (6.83-9.23)
12-hr	**2.37** (2.14-2.67)	**2.88** (2.59-3.24)	**3.66** (3.28-4.11)	**4.33** (3.87-4.85)	**5.32** (4.71-5.95)	**6.19** (5.42-6.92)	**7.14** (6.17-7.98)	**8.19** (6.97-9.19)	**9.76** (8.15-11.0)	**11.1** (9.11-12.6)
24-hr	**2.74** (2.52-3.00)	**3.31** (3.05-3.62)	**4.22** (3.88-4.61)	**4.99** (4.57-5.44)	**6.14** (5.58-6.69)	**7.13** (6.42-7.75)	**8.22** (7.34-8.94)	**9.42** (8.33-10.3)	**11.2** (9.76-12.3)	**12.8** (10.9-14.0)
2-day	**3.18** (2.92-3.48)	**3.84** (3.53-4.21)	**4.90** (4.49-5.36)	**5.78** (5.27-6.32)	**7.06** (6.40-7.70)	**8.14** (7.34-8.88)	**9.33** (8.34-10.2)	**10.6** (9.39-11.6)	**12.5** (10.9-13.7)	**14.1** (12.2-15.6)
3-day	**3.37** (3.10-3.68)	**4.07** (3.75-4.45)	**5.16** (4.74-5.63)	**6.05** (5.54-6.60)	**7.35** (6.70-8.00)	**8.44** (7.64-9.18)	**9.62** (8.64-10.5)	**10.9** (9.70-11.9)	**12.7** (11.2-13.9)	**14.3** (12.4-15.7)
4-day	**3.56** (3.28-3.87)	**4.30** (3.96-4.68)	**5.41** (4.99-5.90)	**6.33** (5.82-6.88)	**7.65** (6.99-8.30)	**8.74** (7.94-9.48)	**9.91** (8.95-10.8)	**11.2** (10.0-12.1)	**13.0** (11.5-14.1)	**14.5** (12.7-15.8)
7-day	**4.17** (3.85-4.55)	**5.00** (4.62-5.46)	**6.21** (5.72-6.78)	**7.21** (6.63-7.86)	**8.65** (7.90-9.41)	**9.84** (8.95-10.7)	**11.1** (10.0-12.1)	**12.5** (11.2-13.6)	**14.4** (12.8-15.7)	**16.0** (14.1-17.5)
10-day	**4.75** (4.41-5.14)	**5.68** (5.27-6.15)	**6.95** (6.44-7.51)	**7.98** (7.38-8.63)	**9.42** (8.68-10.2)	**10.6** (9.73-11.5)	**11.8** (10.8-12.8)	**13.1** (11.9-14.2)	**15.0** (13.4-16.2)	**16.4** (14.6-17.9)
20-day	**6.41** (6.02-6.84)	**7.61** (7.14-8.12)	**9.10** (8.53-9.71)	**10.3** (9.61-11.0)	**11.9** (11.1-12.6)	**13.1** (12.2-14.0)	**14.4** (13.3-15.3)	**15.6** (14.4-16.7)	**17.4** (15.9-18.6)	**18.7** (17.0-20.0)
30-day	**7.99** (7.56-8.45)	**9.43** (8.91-9.97)	**11.0** (10.4-11.7)	**12.3** (11.6-13.0)	**13.9** (13.1-14.7)	**15.1** (14.2-16.0)	**16.4** (15.3-17.3)	**17.6** (16.4-18.6)	**19.1** (17.7-20.3)	**20.3** (18.7-21.6)
45-day	**10.2** (9.66-10.7)	**12.0** (11.4-12.6)	**13.8** (13.1-14.5)	**15.2** (14.4-16.0)	**17.0** (16.0-17.8)	**18.3** (17.2-19.2)	**19.5** (18.4-20.6)	**20.7** (19.5-21.9)	**22.2** (20.8-23.5)	**23.3** (21.8-24.7)
60-day	**12.2** (11.6-12.8)	**14.3** (13.6-15.0)	**16.3** (15.6-17.2)	**17.9** (17.0-18.7)	**19.8** (18.8-20.8)	**21.2** (20.1-22.2)	**22.5** (21.3-23.6)	**23.7** (22.4-24.9)	**25.2** (23.7-26.5)	**26.2** (24.6-27.7)

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

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

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

Mercer County Precipitation Adjustment Factors - Current:
2-yr 1.01 = **3.34**"
10-yr 1.02 = **5.09**"
100-yr 1.04 = **8.55**"

22-019 Existing R0 (10-24-23)
Prepared by The Reynolds Group, Inc
HydroCAD® 10.20-2g s/n 03506 © 2022 HydroCAD Software Solutions LLC

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74 Link 2L: DA-2 COM HYD
75 Link 3L: DA-3 COM HYD
76 Link 4L: DA-4 COM HYD
77 Link 5L: Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

100-Year Current TLS, Mercer Event
78 Node Listing
80 Subcat 1Sa: DA-1a
82 Subcat 1Sb: DA-1b
84 Subcat 1Sc: DA-1c
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88 Subcat 2Sa: DA-2a
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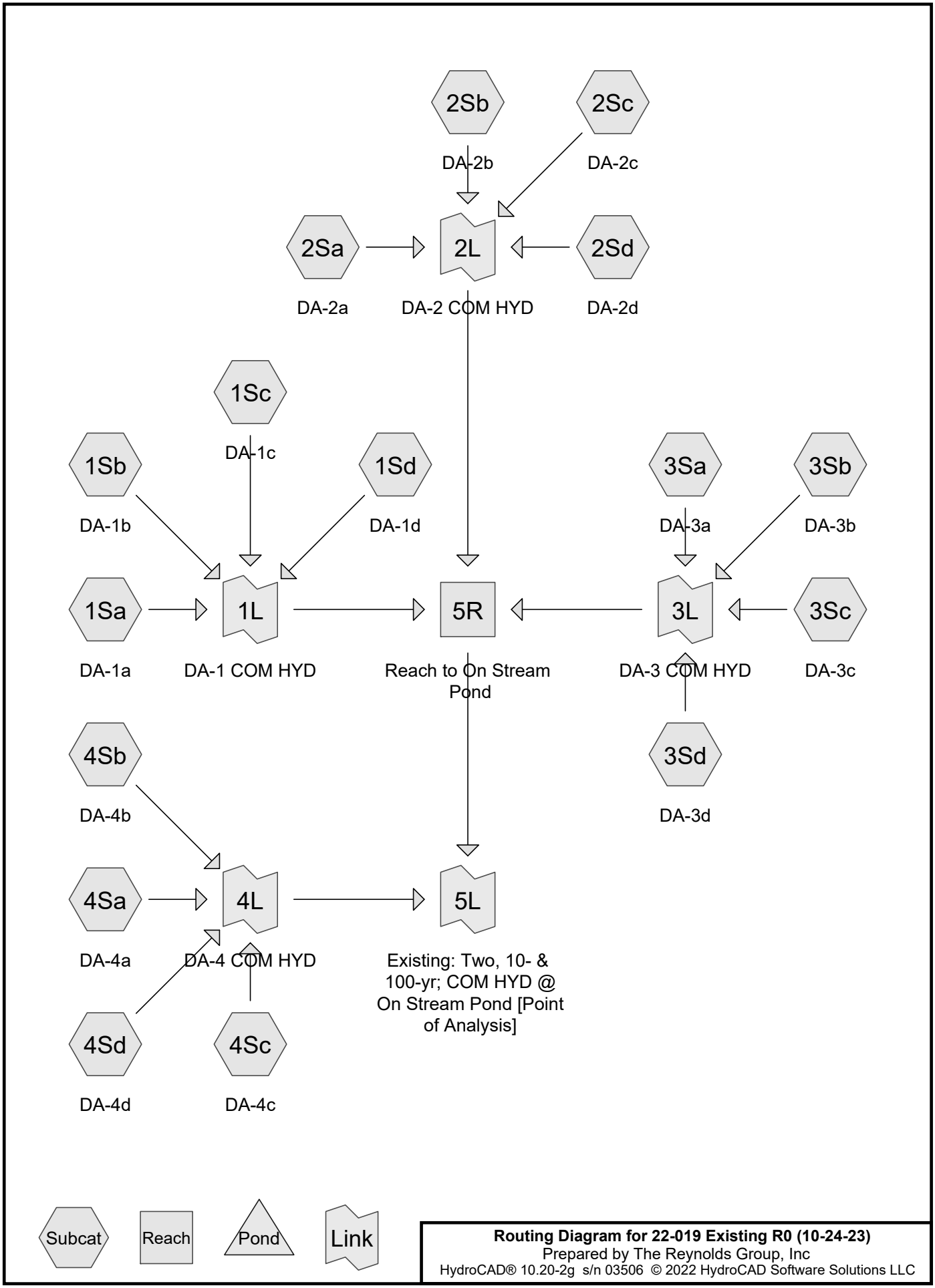
110 Reach 5R: Reach to On Stream Pond
111 Link 1L: DA-1 COM HYD
112 Link 2L: DA-2 COM HYD
113 Link 3L: DA-3 COM HYD
114 Link 4L: DA-4 COM HYD
115 Link 5L: Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]



Routing Diagram for 22-019 Existing R0 (10-24-23)
Prepared by The Reynolds Group, Inc
HydroCAD® 10.20-2g s/n 03506 © 2022 HydroCAD Software Solutions LLC

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1Sa: DA-1a Runoff Area=247,625 sf 0.00% Impervious Runoff Depth=0.67"
Flow Length=2,005' Tc=25.4 min CN=65 Runoff=2.34 cfs 0.317 af

Subcatchment 1Sb: DA-1b Runoff Area=7,638 sf 71.60% Impervious Runoff Depth=3.00"
Flow Length=1,562' Tc=13.1 min CN=97 Runoff=0.48 cfs 0.044 af

Subcatchment 1Sc: DA-1c Runoff Area=190,217 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=2,005' Tc=25.4 min CN=61 Runoff=1.15 cfs 0.183 af

Subcatchment 1Sd: DA-1d Runoff Area=10,664 sf 44.05% Impervious Runoff Depth=3.00"
Flow Length=1,562' Tc=13.1 min CN=97 Runoff=0.67 cfs 0.061 af

Subcatchment 2Sa: DA-2a Runoff Area=89,480 sf 0.00% Impervious Runoff Depth=0.46"
Flow Length=1,193' Tc=14.9 min CN=60 Runoff=0.60 cfs 0.079 af

Subcatchment 2Sb: DA-2b Runoff Area=103,884 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=1,344' Tc=7.0 min CN=98 Runoff=8.00 cfs 0.617 af

Subcatchment 2Sc: DA-2c Runoff Area=7,627 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=1,193' Tc=14.9 min CN=61 Runoff=0.06 cfs 0.007 af

Subcatchment 2Sd: DA-2d Runoff Area=6,490 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=1,344' Tc=7.0 min CN=98 Runoff=0.50 cfs 0.039 af

Subcatchment 3Sa: DA-3a Runoff Area=81,824 sf 0.00% Impervious Runoff Depth=0.67"
Flow Length=479' Tc=12.0 min CN=65 Runoff=1.10 cfs 0.105 af

Subcatchment 3Sb: DA-3b Runoff Area=45,109 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=380' Tc=2.5 min CN=98 Runoff=4.05 cfs 0.268 af

Subcatchment 3Sc: DA-3c Runoff Area=3,130 sf 0.00% Impervious Runoff Depth=0.43"
Flow Length=479' Tc=12.0 min CN=59 Runoff=0.02 cfs 0.003 af

Subcatchment 3Sd: DA-3d Runoff Area=501 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=380' Tc=2.5 min CN=98 Runoff=0.04 cfs 0.003 af

Subcatchment 4Sa: DA-4a Runoff Area=17,562 sf 0.00% Impervious Runoff Depth=0.43"
Flow Length=1,952' Tc=16.6 min CN=59 Runoff=0.10 cfs 0.014 af

Subcatchment 4Sb: DA-4b Runoff Area=8,286 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=1,876' Tc=7.7 min CN=98 Runoff=0.63 cfs 0.049 af

Subcatchment 4Sc: DA-4c Runoff Area=604 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=1,952' Tc=16.6 min CN=61 Runoff=0.00 cfs 0.001 af

Subcatchment 4Sd: DA-4d Runoff Area=140 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=1,876' Tc=7.7 min CN=98 Runoff=0.01 cfs 0.001 af

Reach 5R: Reach to On Stream Pond Avg. Flow Depth=0.73' Max Vel=1.02 fps Inflow=13.94 cfs 1.726 af
n=0.045 L=526.0' S=0.0025 '/' Capacity=1,446.01 cfs Outflow=11.43 cfs 1.726 af

Link 1L: DA-1 COM HYD Inflow=4.02 cfs 0.605 af
Primary=4.02 cfs 0.605 af

Link 2L: DA-2 COM HYD Inflow=8.78 cfs 0.743 af
Primary=8.78 cfs 0.743 af

Link 3L: DA-3 COM HYD Inflow=4.58 cfs 0.378 af
Primary=4.58 cfs 0.378 af

Link 4L: DA-4 COM HYD Inflow=0.67 cfs 0.065 af
Primary=0.67 cfs 0.065 af

Link 5L: Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Inflow=11.73 cfs 1.791 af
Primary=11.73 cfs 1.791 af

Total Runoff Area = 18.843 ac Runoff Volume = 1.791 af Average Runoff Depth = 1.14"
78.73% Pervious = 14.835 ac 21.27% Impervious = 4.008 ac

Summary for Subcatchment 1Sa: DA-1a

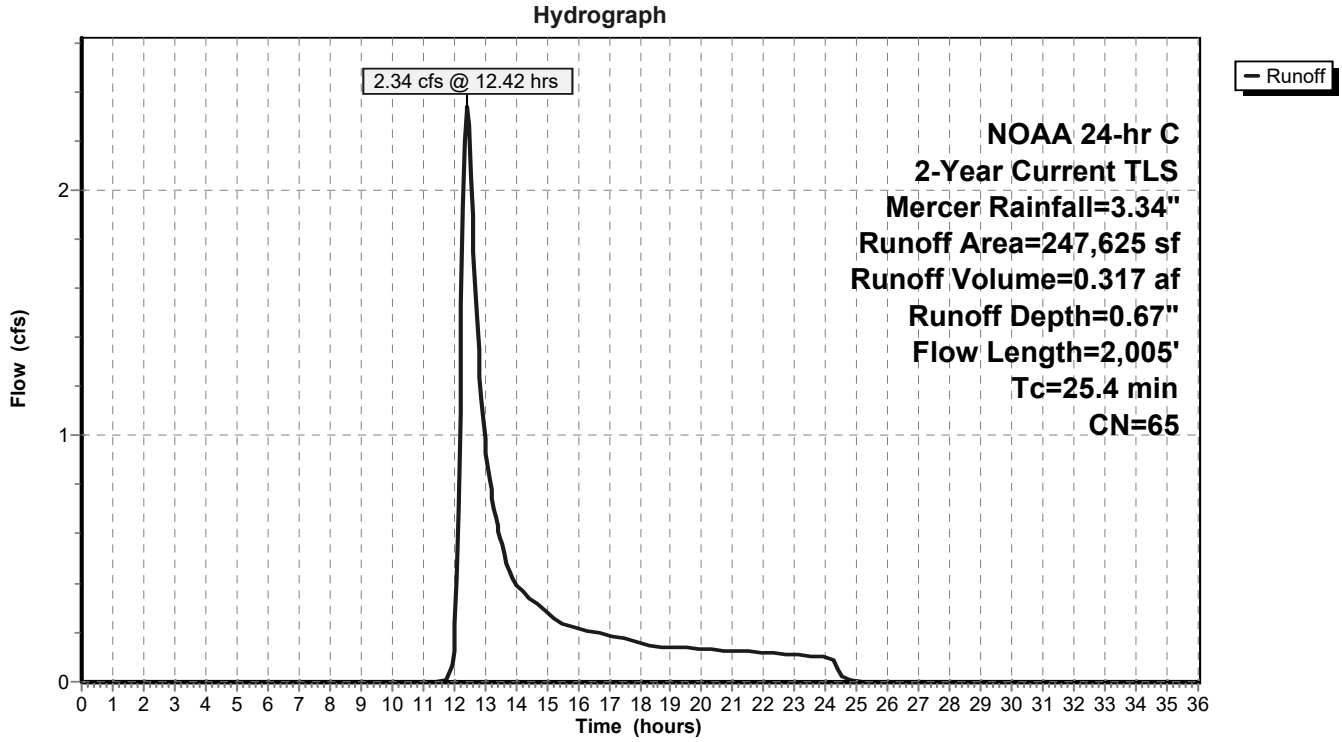
Runoff = 2.34 cfs @ 12.42 hrs, Volume= 0.317 af, Depth= 0.67"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
19,250	55	Woods, Good, HSG B
80,094	70	Woods, Good, HSG C
116,446	61	>75% Grass cover, Good, HSG B
31,835	74	>75% Grass cover, Good, HSG C
247,625	65	Weighted Average
247,625		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	56	0.0180	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
8.2	906	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.5	377	0.0030	1.81	65.11	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
25.4	2,005	Total			

Subcatchment 1Sa: DA-1a



Summary for Subcatchment 1Sb: DA-1b

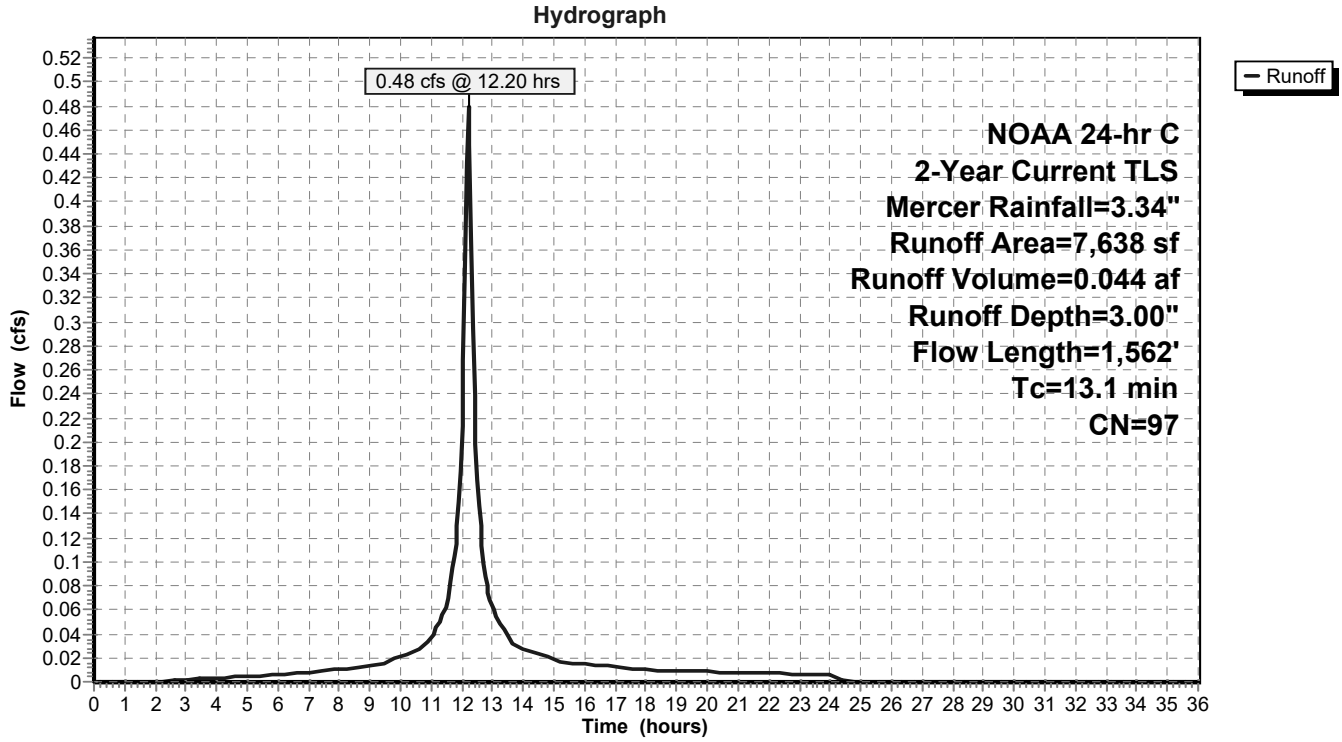
Runoff = 0.48 cfs @ 12.20 hrs, Volume= 0.044 af, Depth= 3.00"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	5,469	98	Paved parking, HSG B (Vehicular)
*	2,169	96	Gravel surface, HSG B (Vehicular)
	7,638	97	Weighted Average
	2,169		28.40% Pervious Area
	5,469		71.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.22		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
6.9	733	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	243	0.0320	3.65	21.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
13.1	1,562	Total			

Subcatchment 1Sb: DA-1b



Summary for Subcatchment 1Sc: DA-1c

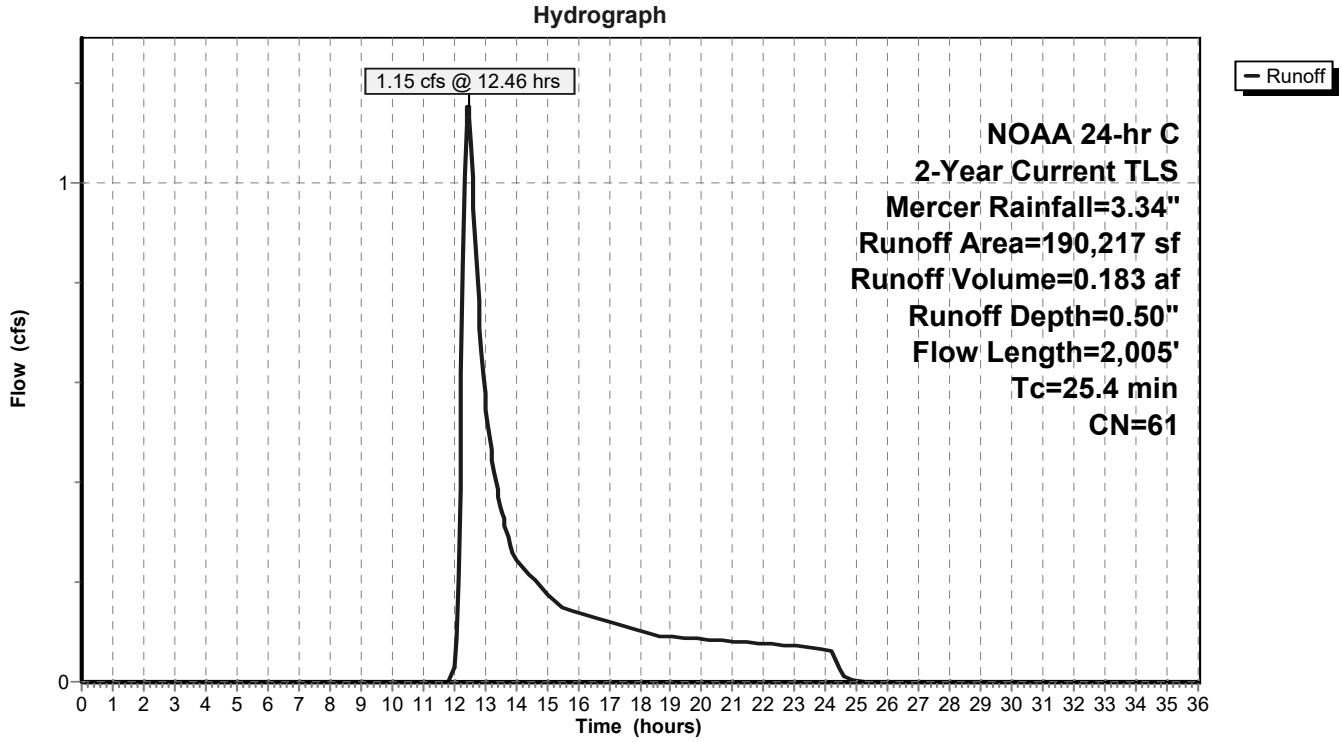
Runoff = 1.15 cfs @ 12.46 hrs, Volume= 0.183 af, Depth= 0.50"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
10,383	55	Woods, Good, HSG B
1,167	70	Woods, Good, HSG C
171,409	61	>75% Grass cover, Good, HSG B
7,258	74	>75% Grass cover, Good, HSG C
190,217	61	Weighted Average
190,217		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	56	0.0180	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34"
8.2	906	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.5	377	0.0030	1.81	65.11	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
25.4	2,005	Total			

Subcatchment 1Sc: DA-1c



Summary for Subcatchment 1Sd: DA-1d

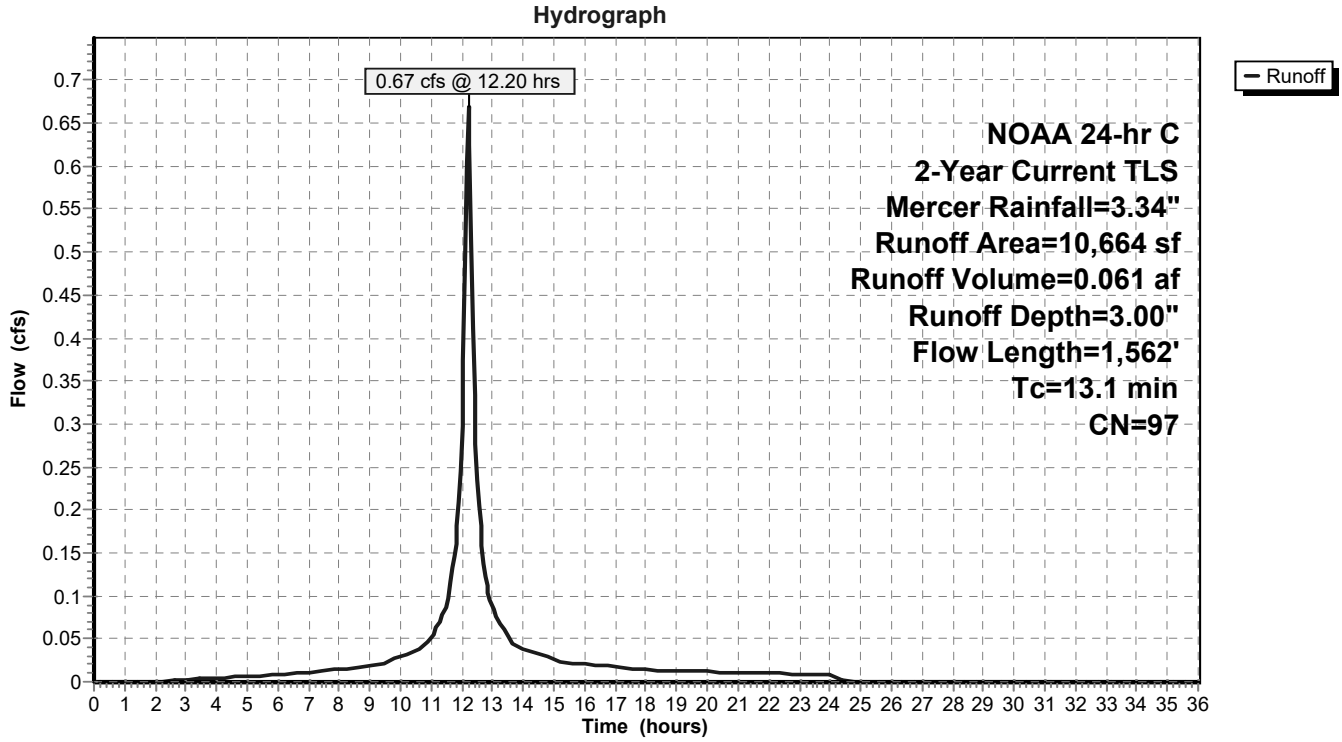
Runoff = 0.67 cfs @ 12.20 hrs, Volume= 0.061 af, Depth= 3.00"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	4,698	98	Paved parking, HSG B (Vehicular)
*	5,966	96	Gravel surface, HSG B (Vehicular)
	10,664	97	Weighted Average
	5,966		55.95% Pervious Area
	4,698		44.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.22		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
6.9	733	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	243	0.0320	3.65	21.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
13.1	1,562	Total			

Subcatchment 1Sd: DA-1d



Summary for Subcatchment 2Sa: DA-2a

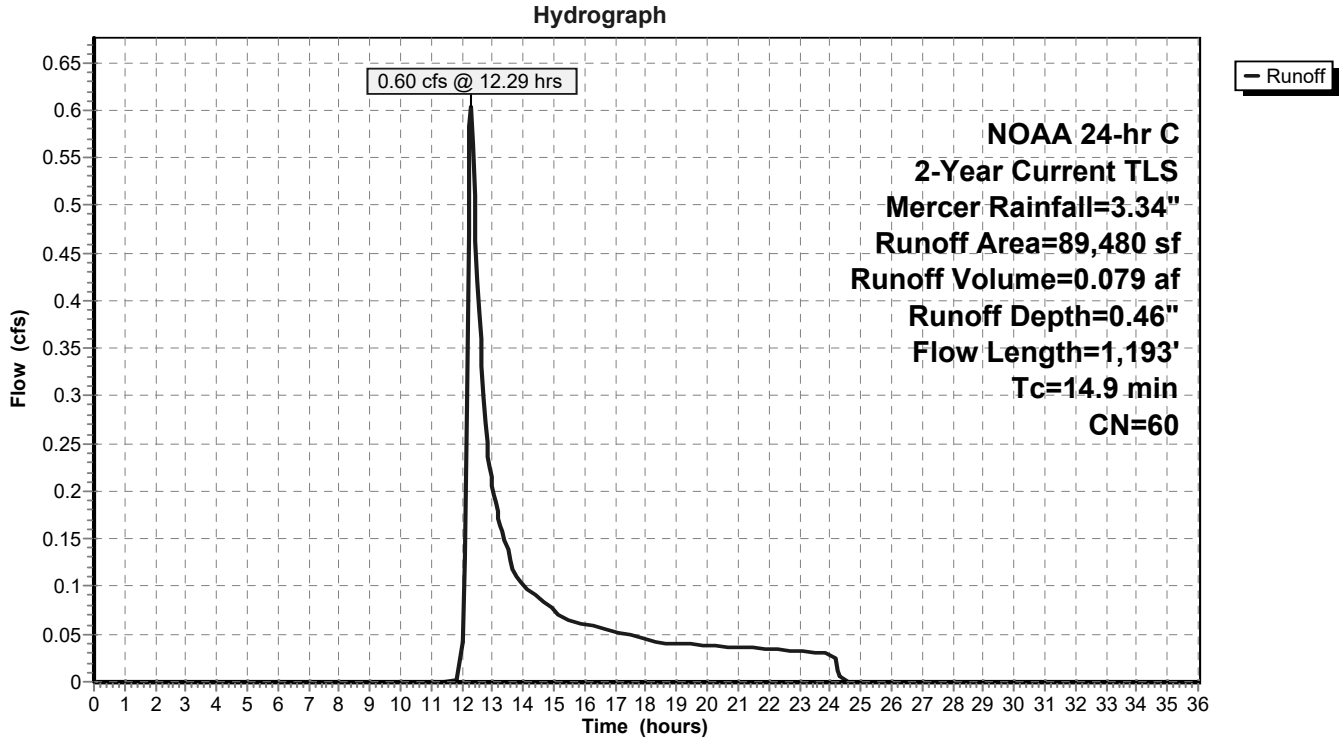
Runoff = 0.60 cfs @ 12.29 hrs, Volume= 0.079 af, Depth= 0.46"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
16,278	55	Woods, Good, HSG B
73,005	61	>75% Grass cover, Good, HSG B
197	80	>75% Grass cover, Good, HSG D
89,480	60	Weighted Average
89,480		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
0.3	29	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,193	Total			

Subcatchment 2Sa: DA-2a



Summary for Subcatchment 2Sb: DA-2b

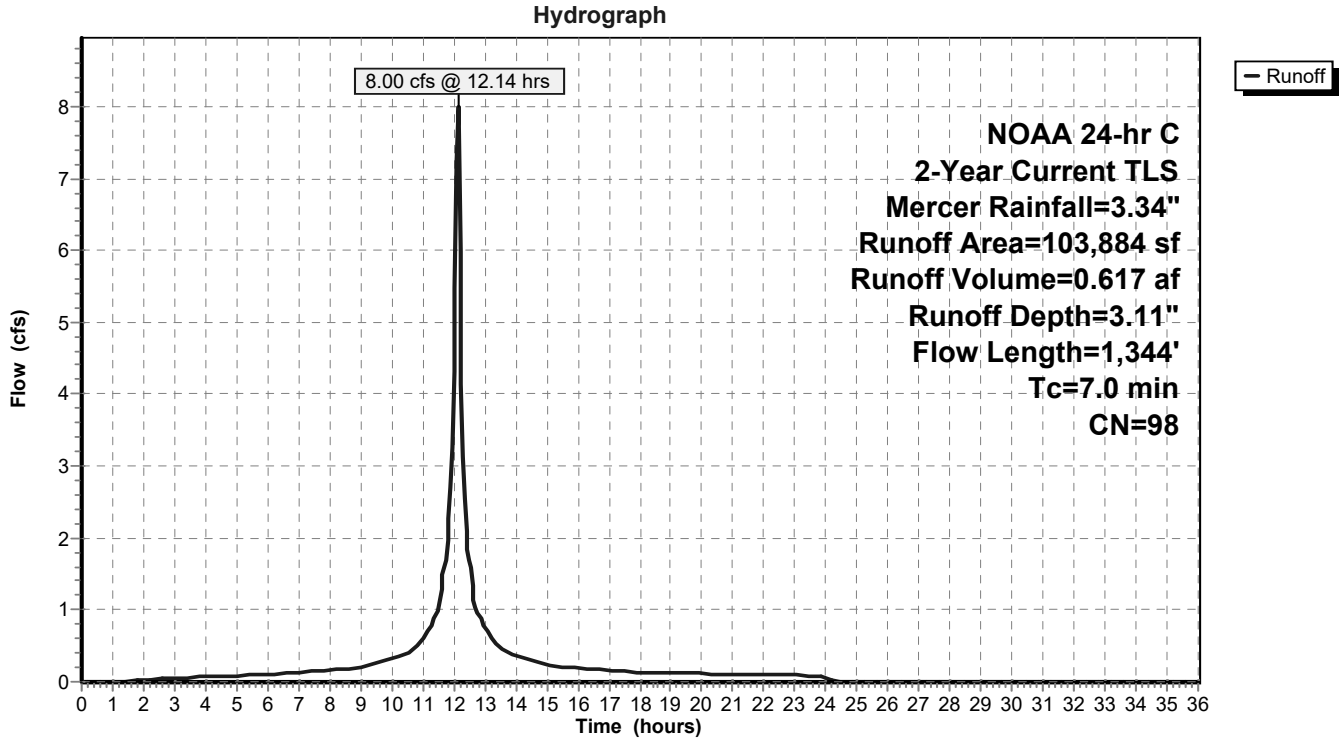
Runoff = 8.00 cfs @ 12.14 hrs, Volume= 0.617 af, Depth= 3.11"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	39,492	98	Paved parking, HSG B (Vehicular)
*	61,715	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	2,677	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	103,884	98	Weighted Average
	103,884		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
7.0	1,344	Total			

Subcatchment 2Sb: DA-2b



Summary for Subcatchment 2Sc: DA-2c

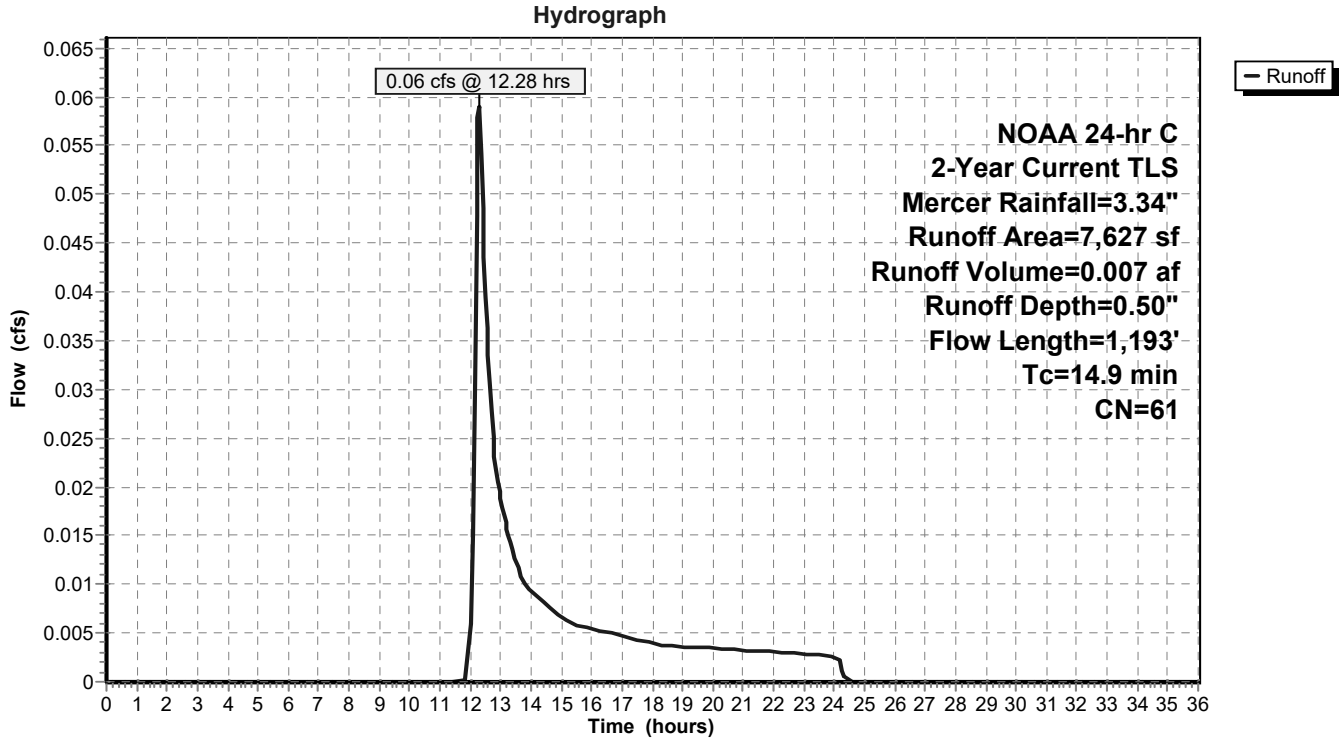
Runoff = 0.06 cfs @ 12.28 hrs, Volume= 0.007 af, Depth= 0.50"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
7,627	61	>75% Grass cover, Good, HSG B
7,627		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
0.3	29	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,193	Total			

Subcatchment 2Sc: DA-2c



Summary for Subcatchment 2Sd: DA-2d

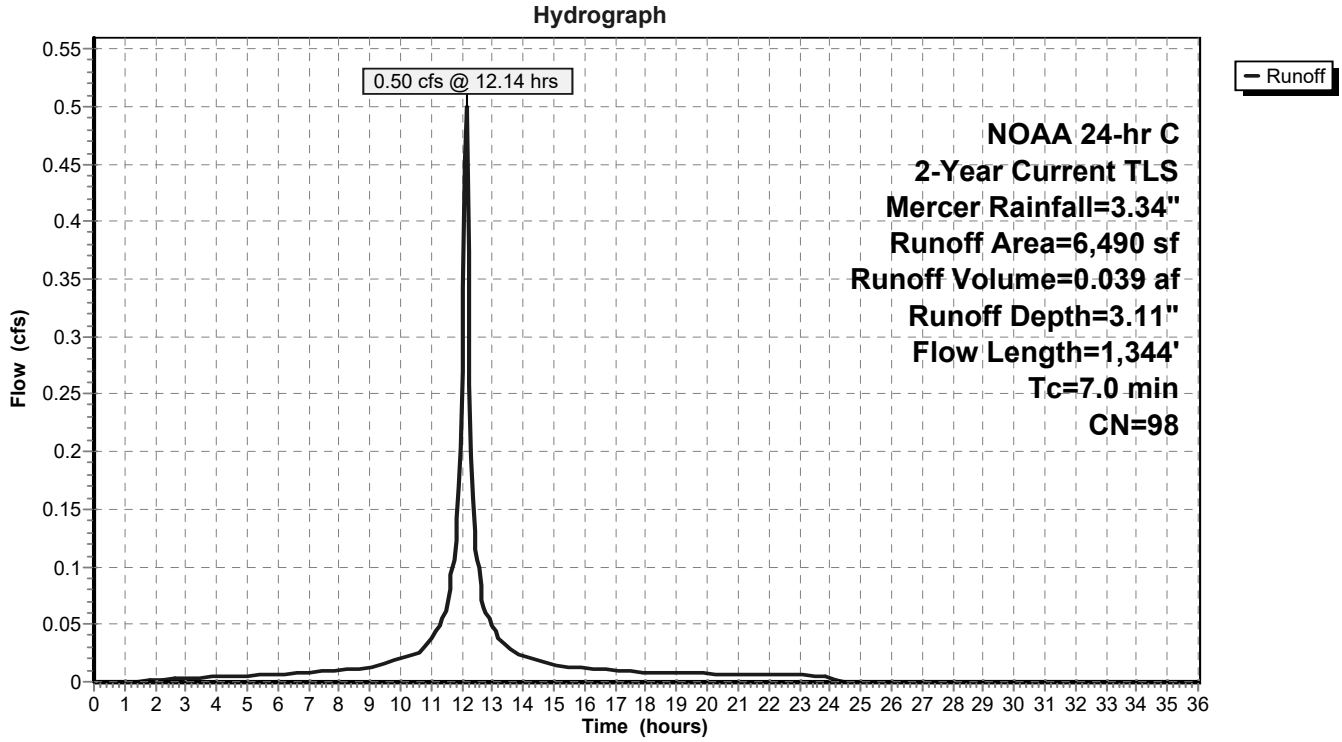
Runoff = 0.50 cfs @ 12.14 hrs, Volume= 0.039 af, Depth= 3.11"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	6,291	98	Paved parking, HSG B (Vehicular)
*	199	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	6,490	98	Weighted Average
	6,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
7.0	1,344	Total			

Subcatchment 2Sd: DA-2d



Summary for Subcatchment 3Sa: DA-3a

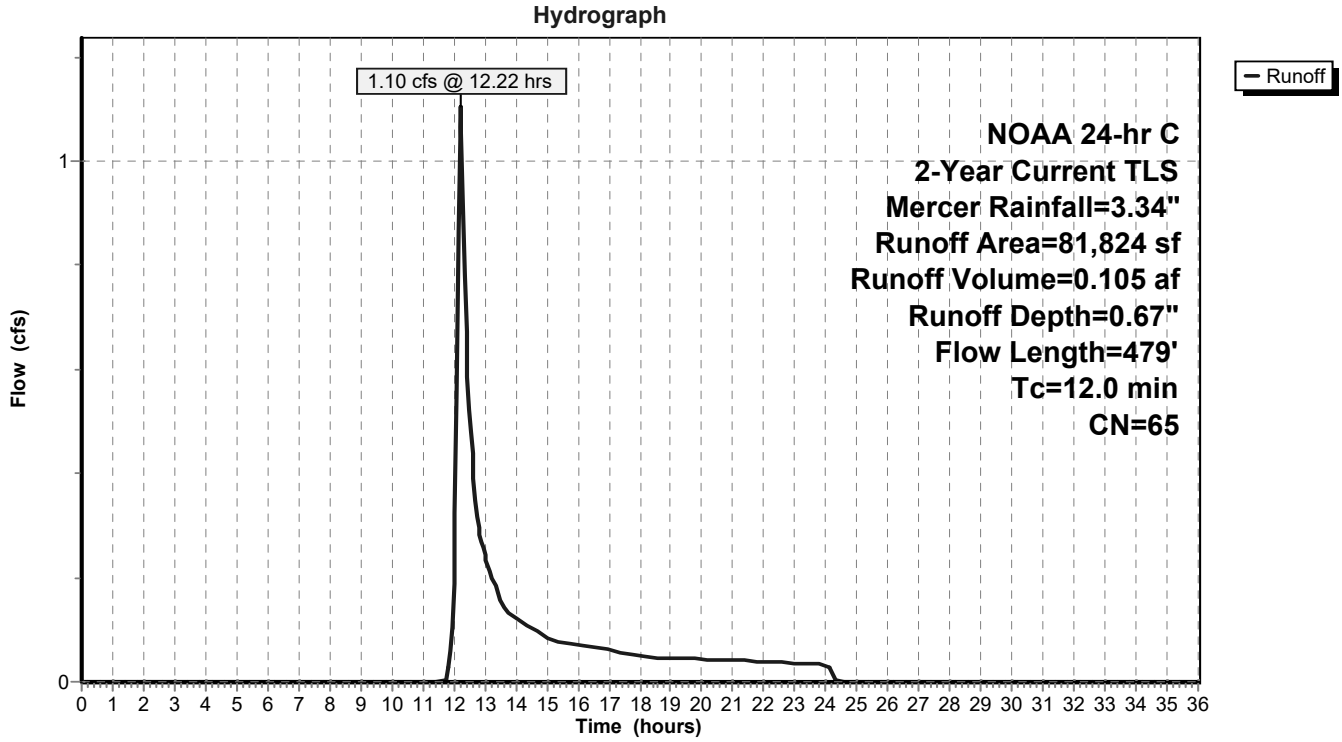
Runoff = 1.10 cfs @ 12.22 hrs, Volume= 0.105 af, Depth= 0.67"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
21,739	55	Woods, Good, HSG B
31,307	70	Woods, Good, HSG C
1,317	77	Woods, Good, HSG D
18,394	61	>75% Grass cover, Good, HSG B
3,641	74	>75% Grass cover, Good, HSG C
5,426	80	>75% Grass cover, Good, HSG D
81,824	65	Weighted Average
81,824		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.8	179	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
12.0	479	Total			

Subcatchment 3Sa: DA-3a



Summary for Subcatchment 3Sb: DA-3b

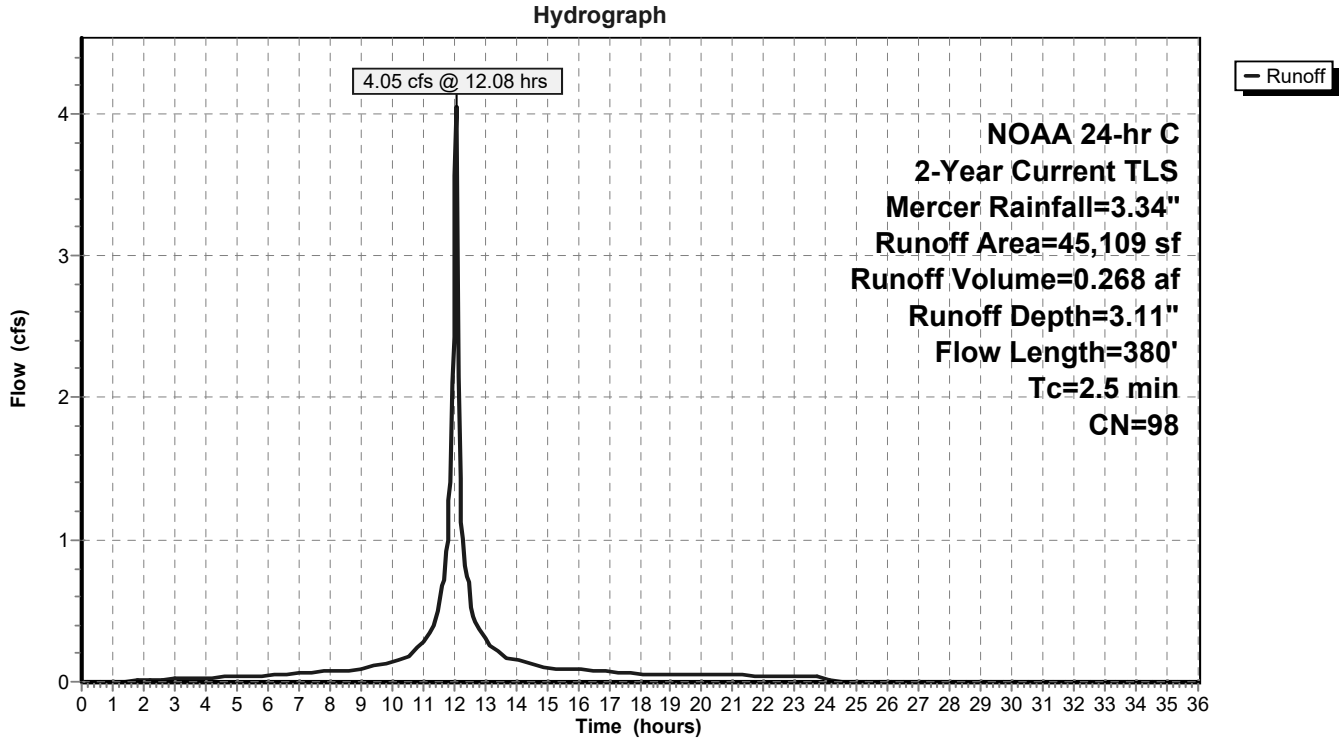
Runoff = 4.05 cfs @ 12.08 hrs, Volume= 0.268 af, Depth= 3.11"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	14,685	98	Paved parking, HSG B (Vehicular)
*	26,070	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	1,571	98	Paved parking, HSG C (Vehicular)
*	425	98	Paved parking, HSG D (Vehicular)
*	2,358	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	45,109	98	Weighted Average
	45,109		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.32		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
0.2	39	0.0410	3.04		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
2.5	380	Total			

Subcatchment 3Sb: DA-3b



Summary for Subcatchment 3Sc: DA-3c

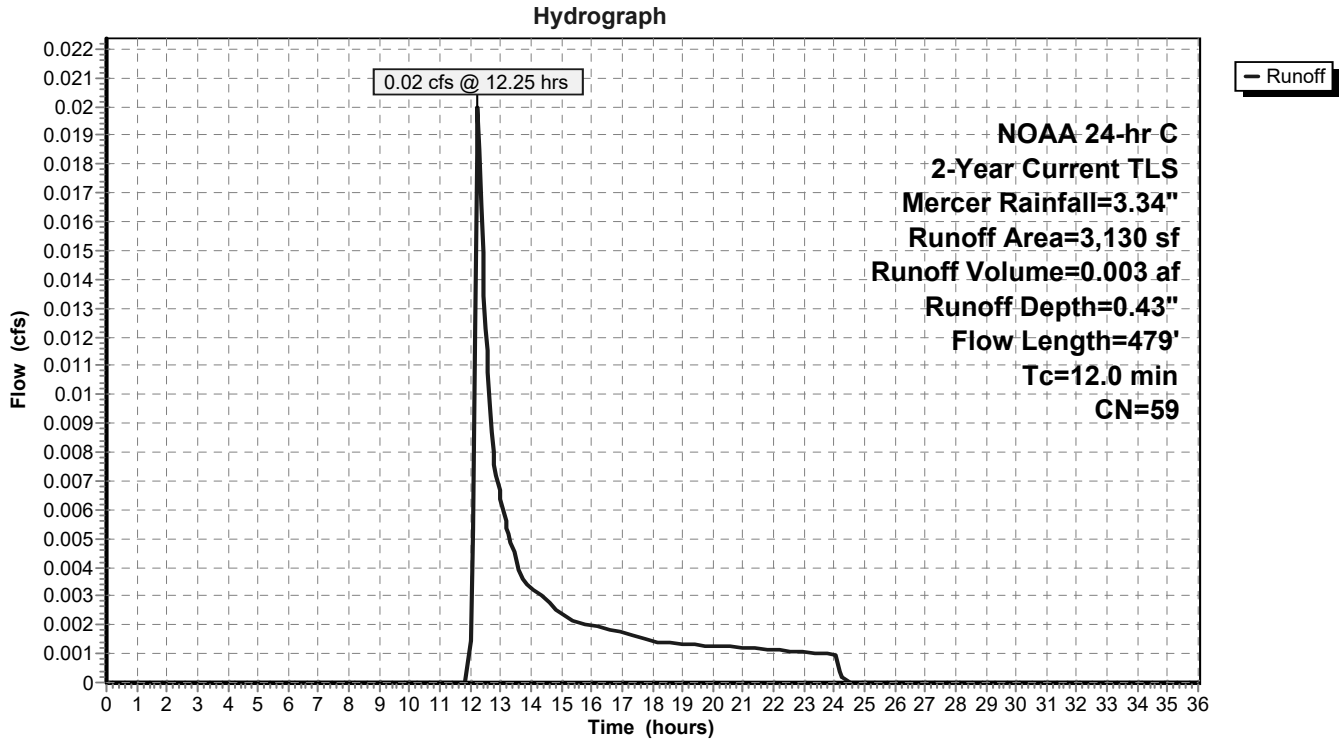
Runoff = 0.02 cfs @ 12.25 hrs, Volume= 0.003 af, Depth= 0.43"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
1,286	55	Woods, Good, HSG B
1,844	61	>75% Grass cover, Good, HSG B
3,130	59	Weighted Average
3,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.8	179	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
12.0	479	Total			

Subcatchment 3Sc: DA-3c



Summary for Subcatchment 3Sd: DA-3d

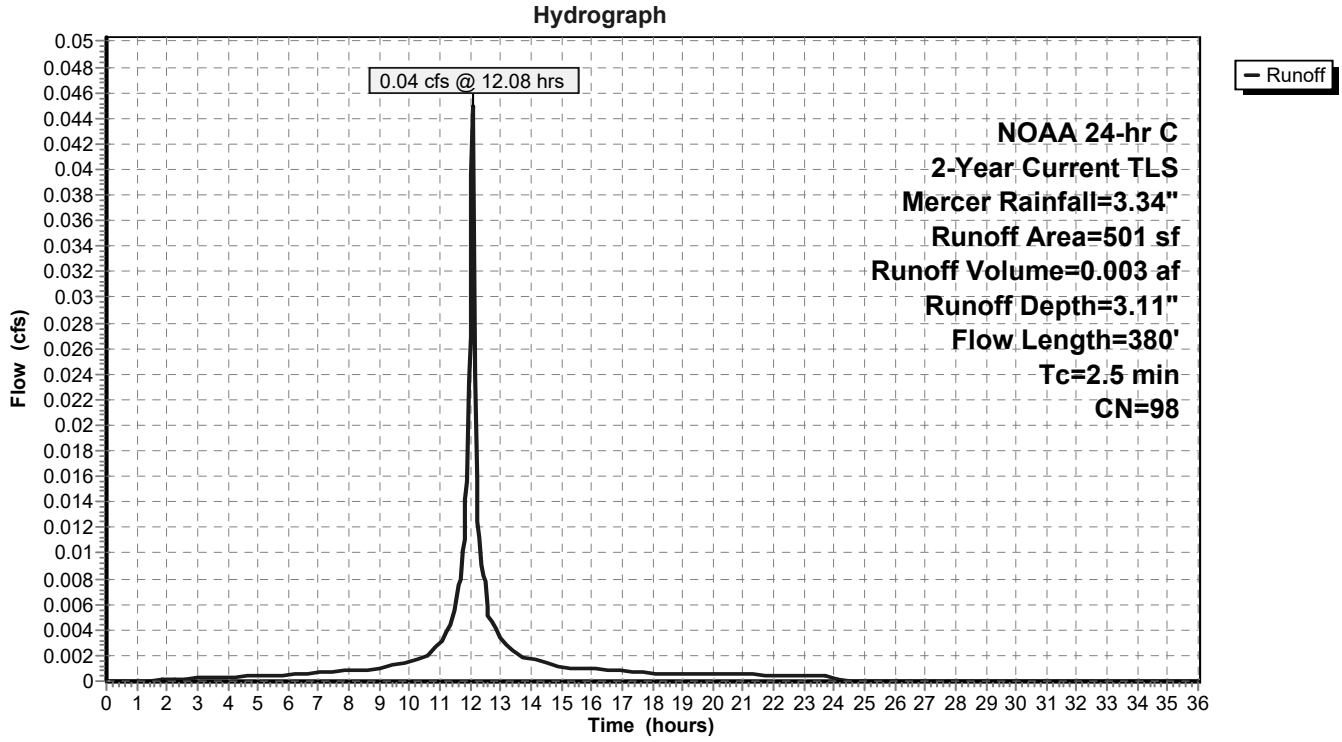
Runoff = 0.04 cfs @ 12.08 hrs, Volume= 0.003 af, Depth= 3.11"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	501	98	Paved parking, HSG B (Vehicular)
	501		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.32		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
0.2	39	0.0410	3.04		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	4.19	25.13	**Channel Flow,** Area= 6.0 sf Perim= 16.0' r= 0.38' n= 0.035
2.5	380	Total			

Subcatchment 3Sd: DA-3d



Summary for Subcatchment 4Sa: DA-4a

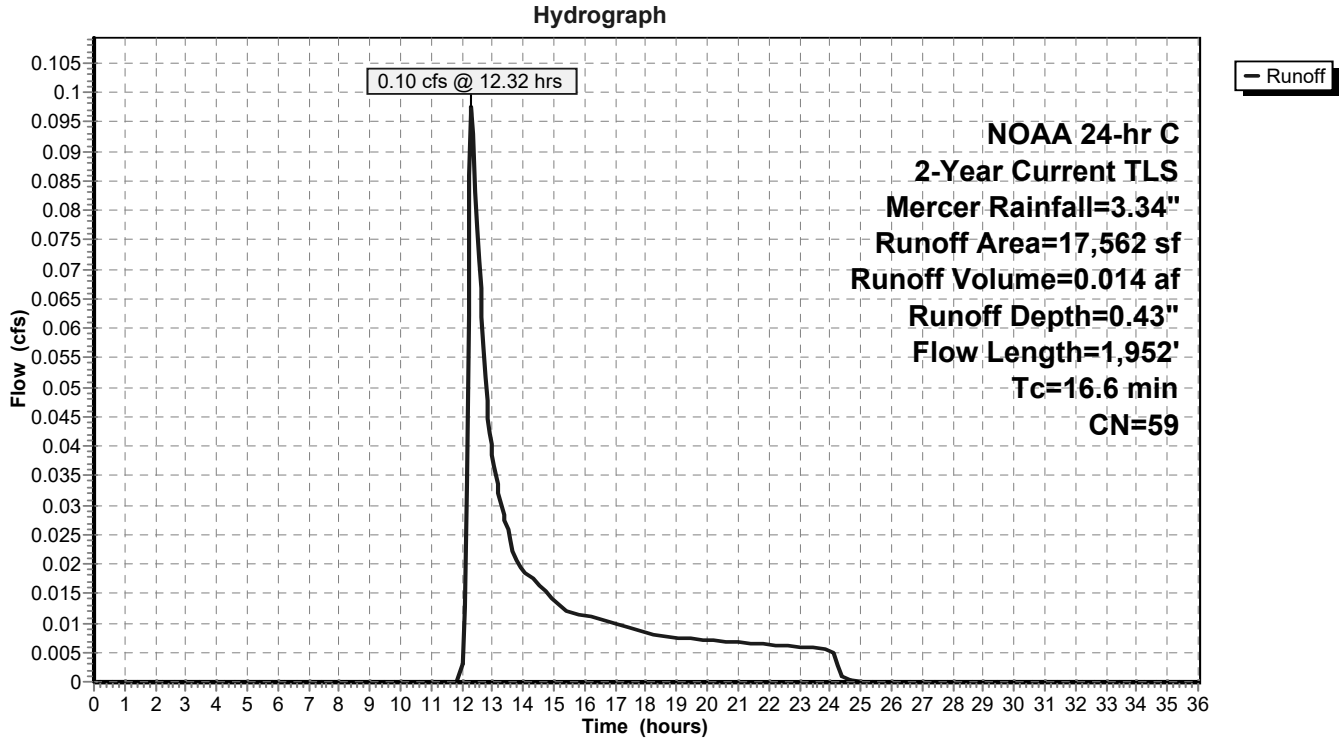
Runoff = 0.10 cfs @ 12.32 hrs, Volume= 0.014 af, Depth= 0.43"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
6,085	55	Woods, Good, HSG B
11,477	61	>75% Grass cover, Good, HSG B
17,562	59	Weighted Average
17,562		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	42	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.0	123	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
16.6	1,952	Total			

Subcatchment 4Sa: DA-4a



Summary for Subcatchment 4Sb: DA-4b

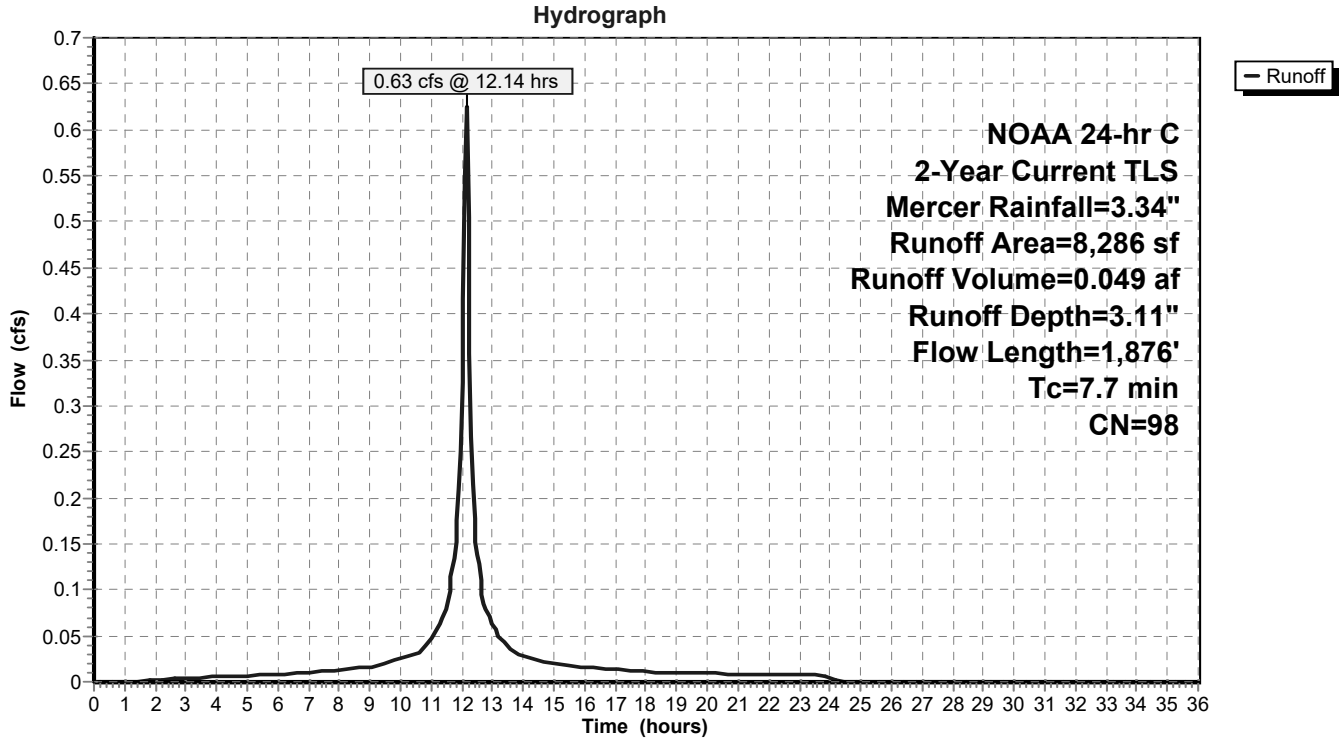
Runoff = 0.63 cfs @ 12.14 hrs, Volume= 0.049 af, Depth= 3.11"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	3,147	98	Paved parking, HSG B (Vehicular)
*	5,139	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	8,286	98	Weighted Average
	8,286		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.16		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
7.7	1,876	Total			

Subcatchment 4Sb: DA-4b



Summary for Subcatchment 4Sc: DA-4c

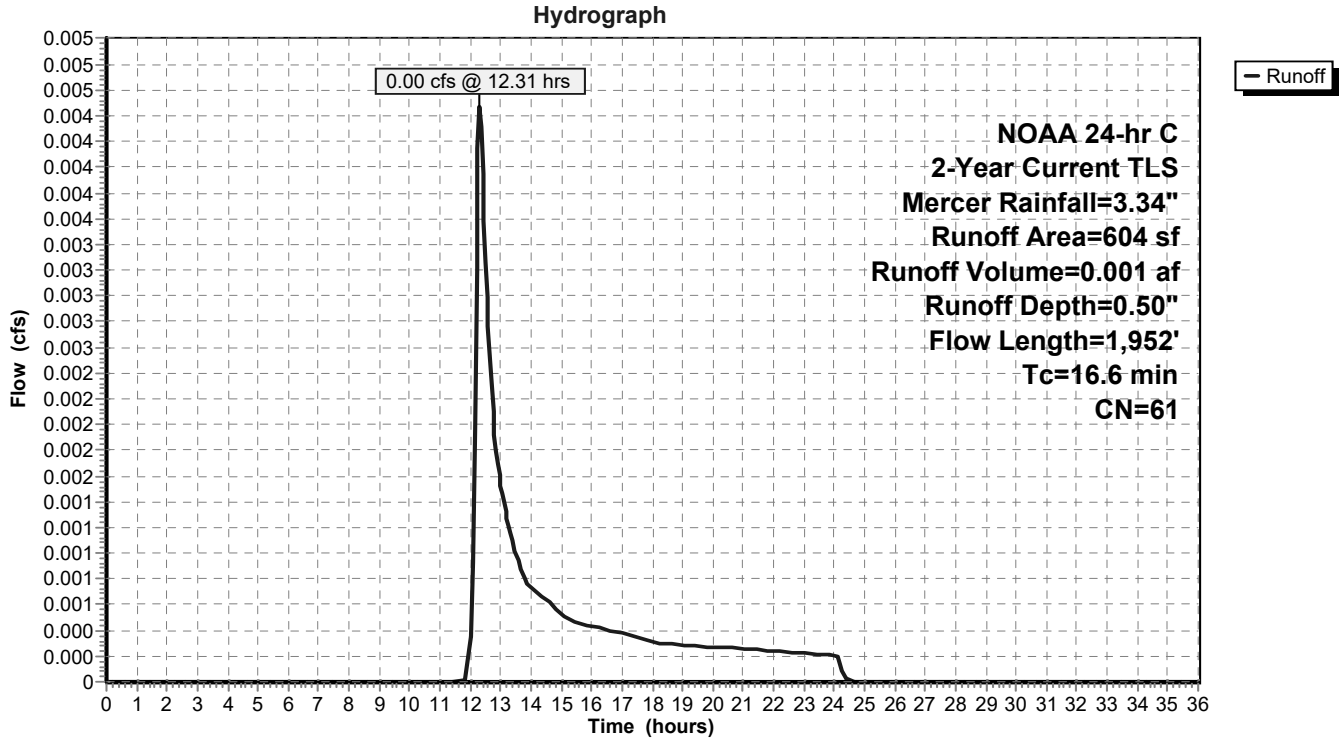
Runoff = 0.00 cfs @ 12.31 hrs, Volume= 0.001 af, Depth= 0.50"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
604	61	>75% Grass cover, Good, HSG B
604		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	42	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.0	123	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
16.6	1,952	Total			

Subcatchment 4Sc: DA-4c



Summary for Subcatchment 4Sd: DA-4d

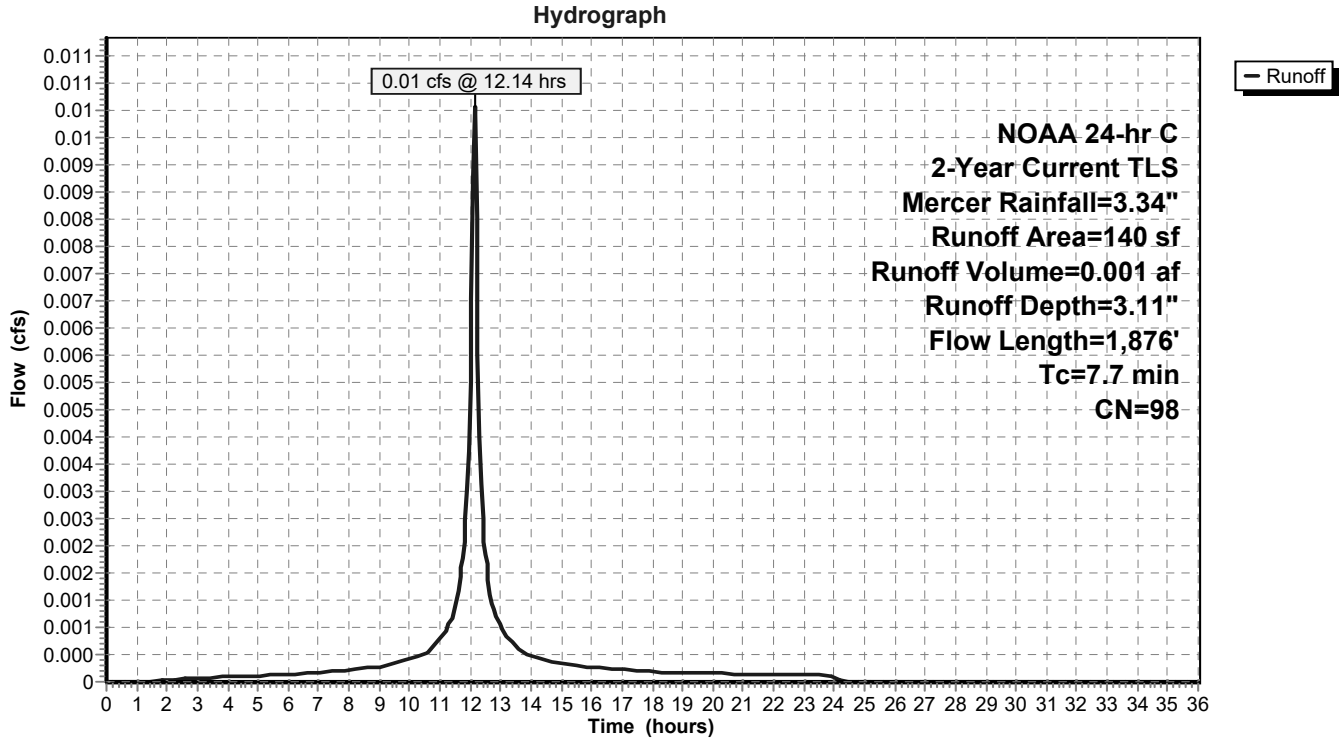
Runoff = 0.01 cfs @ 12.14 hrs, Volume= 0.001 af, Depth= 3.11"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	140	98	Paved parking, HSG B (Vehicular)
	140		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.16		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
7.7	1,876	Total			

Subcatchment 4Sd: DA-4d



Summary for Reach 5R: Reach to On Stream Pond

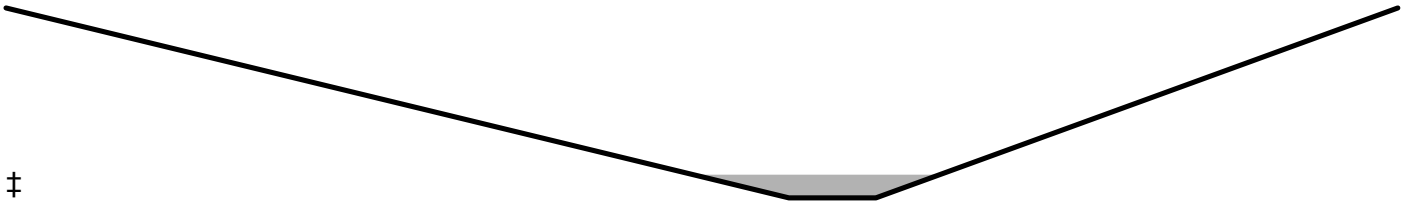
Stream Tributary 'B' to Shipetaukin Creek

Inflow Area = 18.232 ac, 20.92% Impervious, Inflow Depth = 1.14" for 2-Year Current TLS, Mercer event
Inflow = 13.94 cfs @ 12.13 hrs, Volume= 1.726 af
Outflow = 11.43 cfs @ 12.37 hrs, Volume= 1.726 af, Atten= 18%, Lag= 14.6 min
Routed to Link 5L : Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.02 fps, Min. Travel Time= 8.6 min
Avg. Velocity = 0.38 fps, Avg. Travel Time= 23.3 min

Peak Storage= 5,887 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.73' , Surface Width= 22.62'
Bank-Full Depth= 6.00' Flow Area= 408.0 sf, Capacity= 1,446.01 cfs

8.00' x 6.00' deep channel, n= 0.045
Side Slope Z-value= 12.0 8.0 '/' Top Width= 128.00'
Length= 526.0' Slope= 0.0025 '/'
Inlet Invert= 91.30', Outlet Invert= 90.00'



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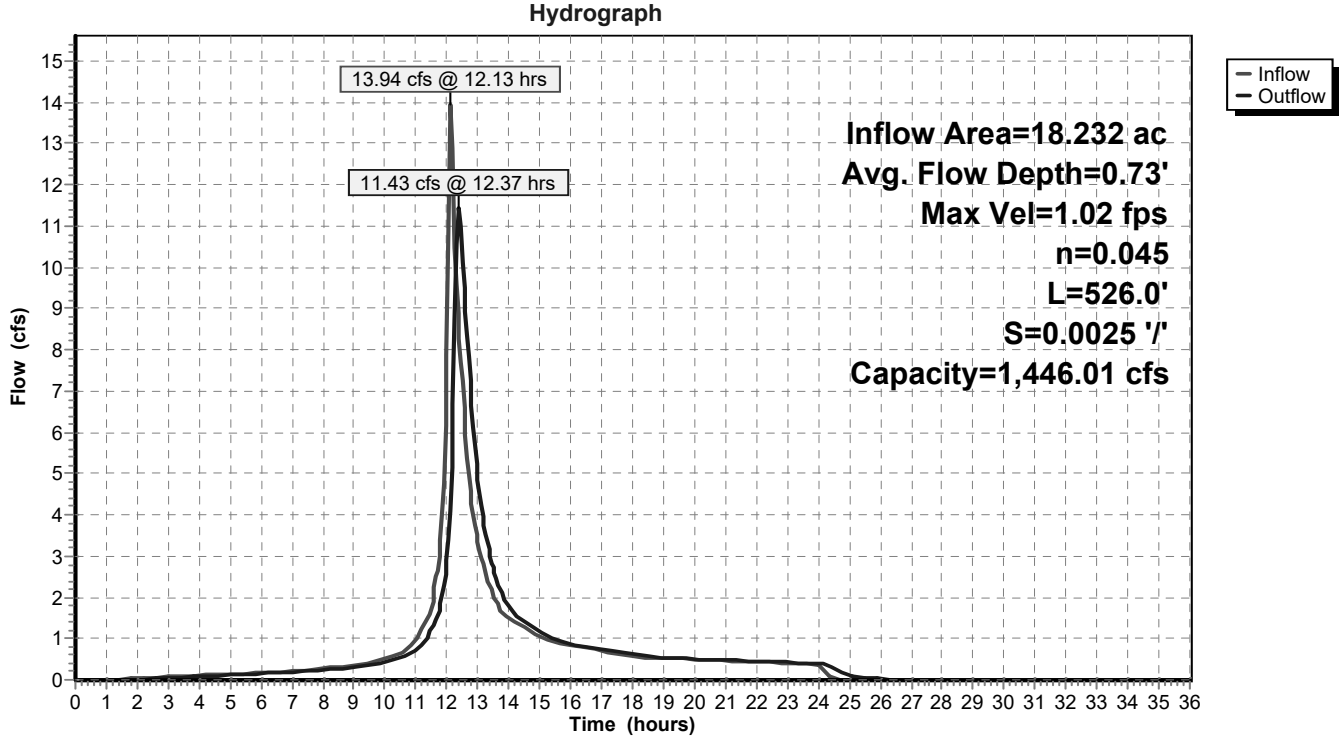
Reach 5R: Reach to On Stream Pond

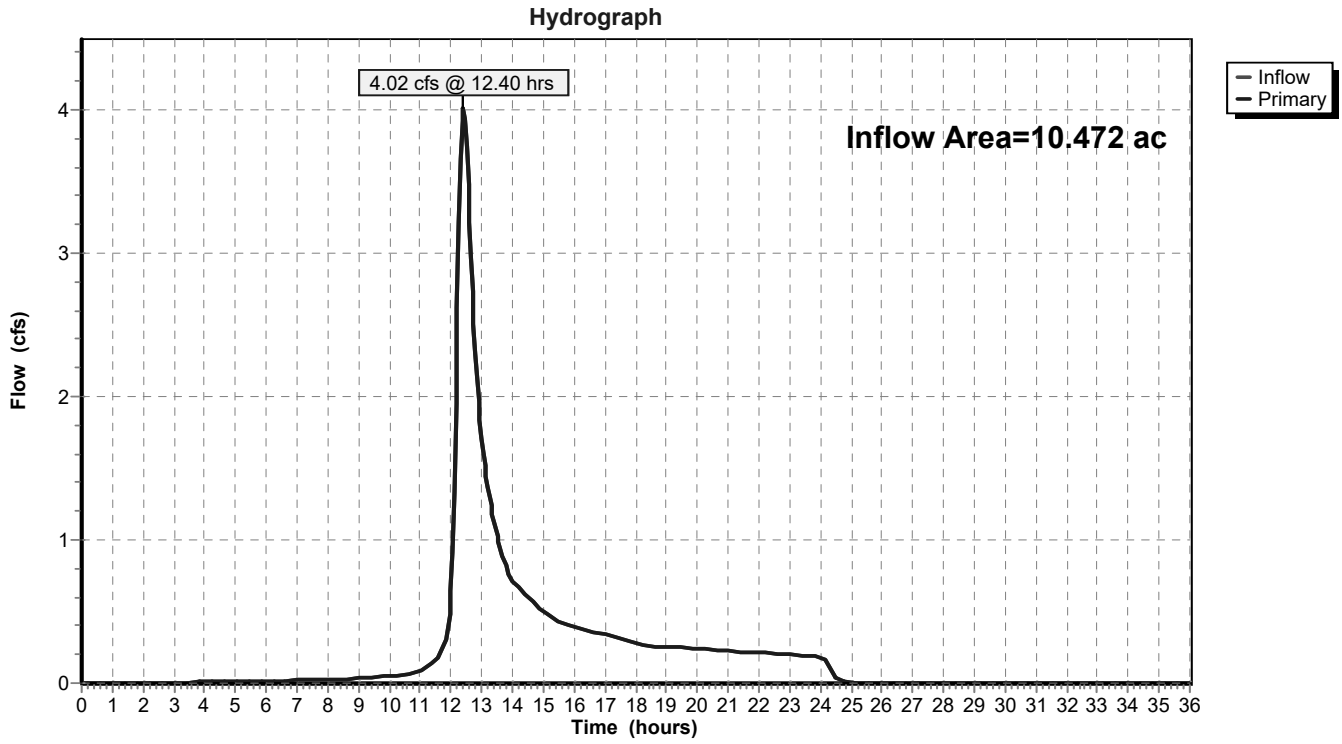


Summary for Link 1L: DA-1 COM HYD

Inflow Area = 10.472 ac, 2.23% Impervious, Inflow Depth = 0.69" for 2-Year Current TLS, Mercer event
Inflow = 4.02 cfs @ 12.40 hrs, Volume= 0.605 af
Primary = 4.02 cfs @ 12.40 hrs, Volume= 0.605 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1L: DA-1 COM HYD

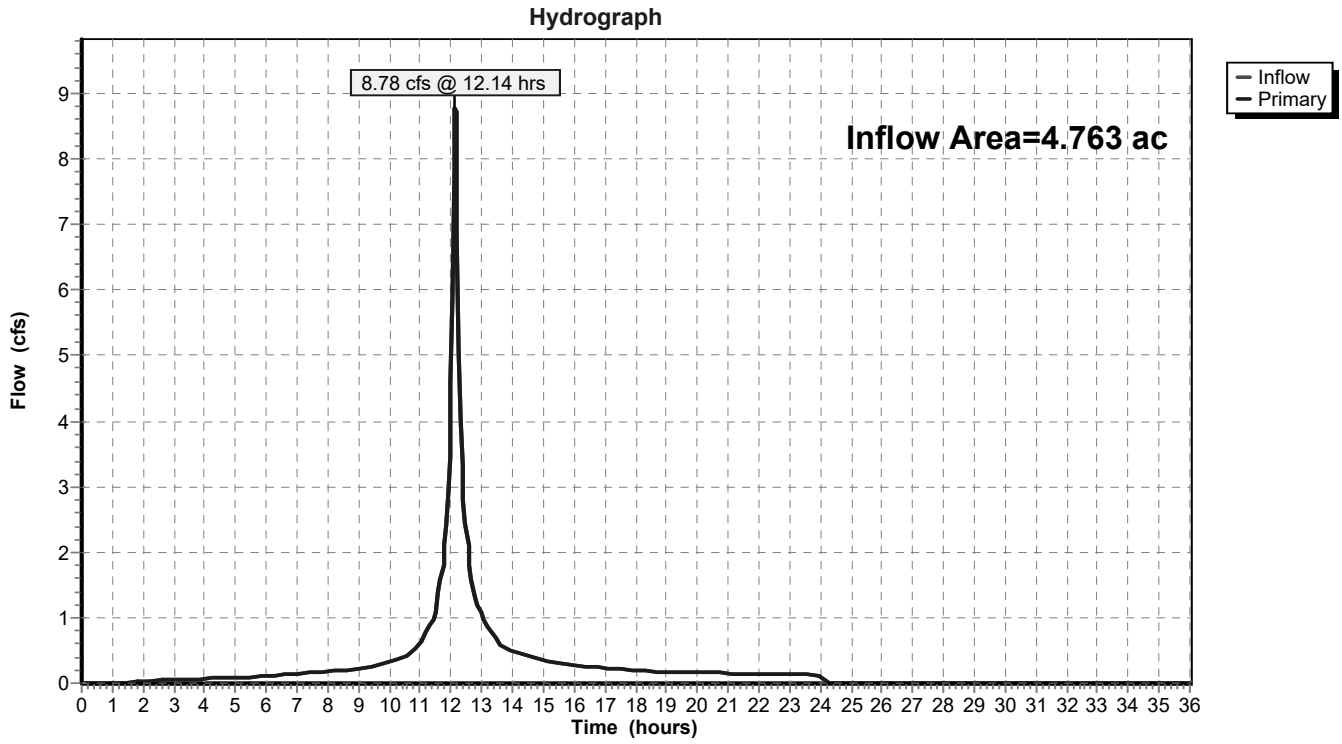


Summary for Link 2L: DA-2 COM HYD

Inflow Area = 4.763 ac, 53.20% Impervious, Inflow Depth = 1.87" for 2-Year Current TLS, Mercer event
Inflow = 8.78 cfs @ 12.14 hrs, Volume= 0.743 af
Primary = 8.78 cfs @ 12.14 hrs, Volume= 0.743 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: DA-2 COM HYD

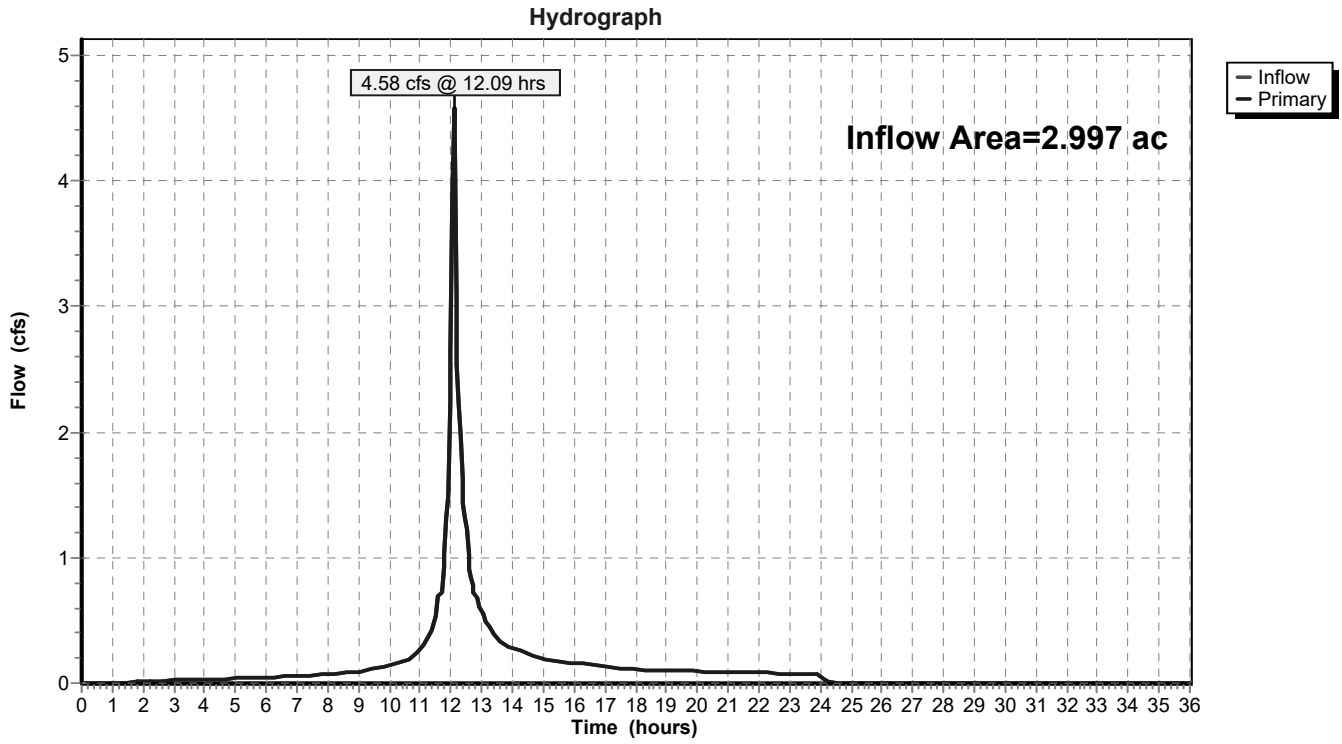


Summary for Link 3L: DA-3 COM HYD

Inflow Area = 2.997 ac, 34.93% Impervious, Inflow Depth = 1.52" for 2-Year Current TLS, Mercer event
Inflow = 4.58 cfs @ 12.09 hrs, Volume= 0.378 af
Primary = 4.58 cfs @ 12.09 hrs, Volume= 0.378 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 3L: DA-3 COM HYD

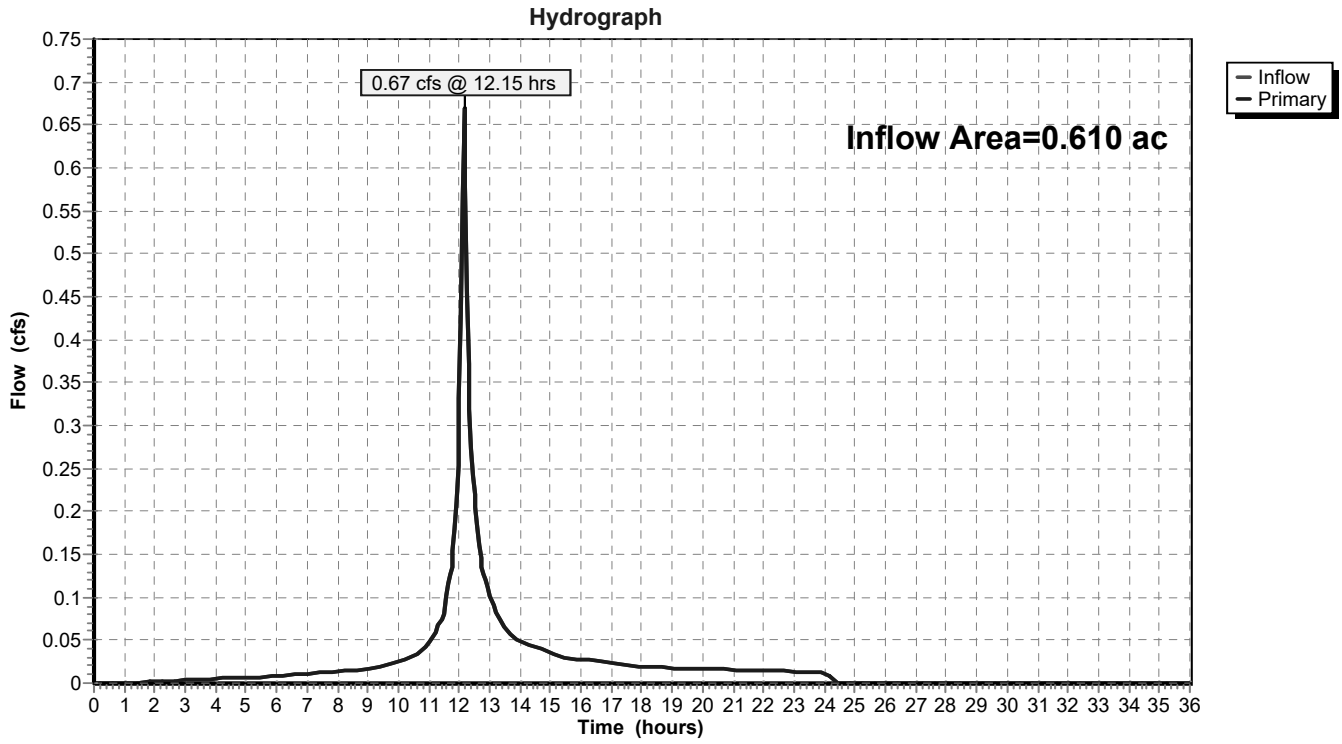


Summary for Link 4L: DA-4 COM HYD

Inflow Area = 0.610 ac, 31.69% Impervious, Inflow Depth = 1.28" for 2-Year Current TLS, Mercer event
Inflow = 0.67 cfs @ 12.15 hrs, Volume= 0.065 af
Primary = 0.67 cfs @ 12.15 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min
Routed to Link 5L : Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 4L: DA-4 COM HYD

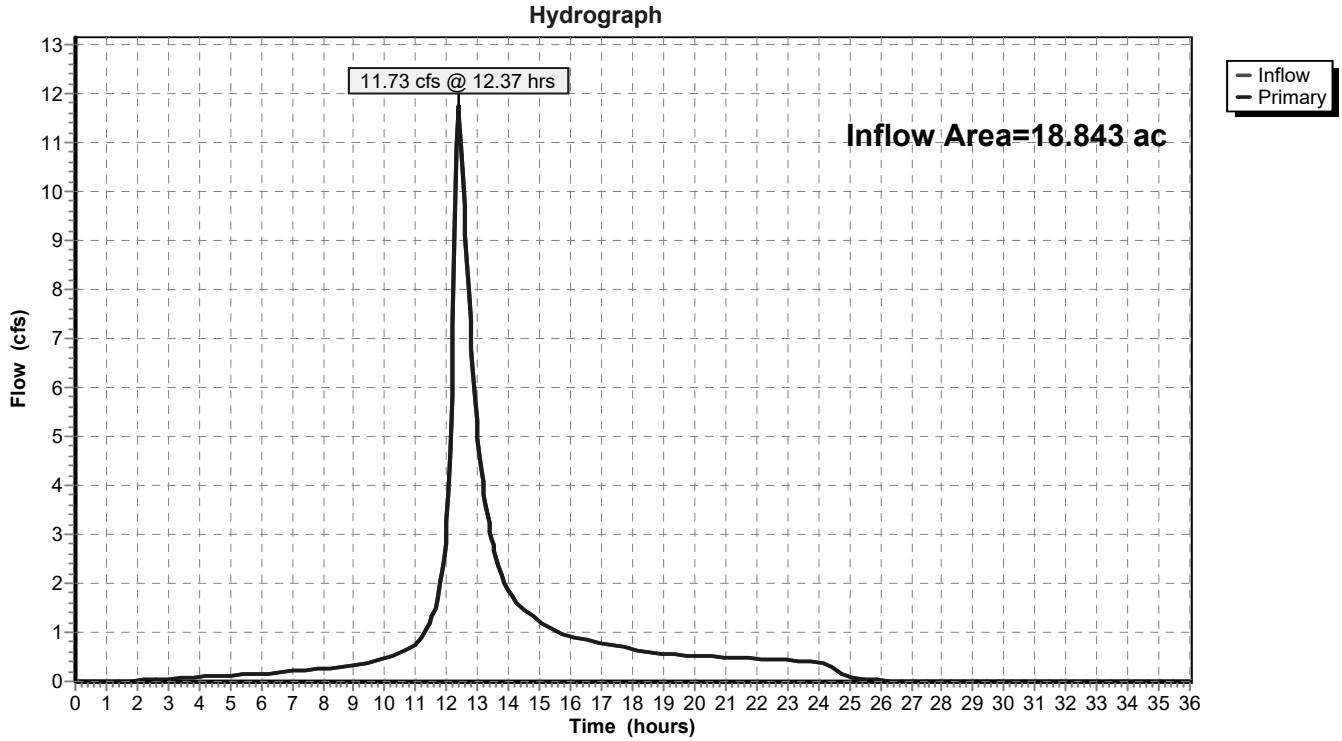


Summary for Link 5L: Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis

Inflow Area = 18.843 ac, 21.27% Impervious, Inflow Depth = 1.14" for 2-Year Current TLS, Mercer event
Inflow = 11.73 cfs @ 12.37 hrs, Volume= 1.791 af
Primary = 11.73 cfs @ 12.37 hrs, Volume= 1.791 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 5L: Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1Sa: DA-1a Runoff Area=247,625 sf 0.00% Impervious Runoff Depth=1.71"
Flow Length=2,005' Tc=25.4 min CN=65 Runoff=6.98 cfs 0.812 af

Subcatchment 1Sb: DA-1b Runoff Area=7,638 sf 71.60% Impervious Runoff Depth=4.74"
Flow Length=1,562' Tc=13.1 min CN=97 Runoff=0.74 cfs 0.069 af

Subcatchment 1Sc: DA-1c Runoff Area=190,217 sf 0.00% Impervious Runoff Depth=1.42"
Flow Length=2,005' Tc=25.4 min CN=61 Runoff=4.28 cfs 0.518 af

Subcatchment 1Sd: DA-1d Runoff Area=10,664 sf 44.05% Impervious Runoff Depth=4.74"
Flow Length=1,562' Tc=13.1 min CN=97 Runoff=1.03 cfs 0.097 af

Subcatchment 2Sa: DA-2a Runoff Area=89,480 sf 0.00% Impervious Runoff Depth=1.35"
Flow Length=1,193' Tc=14.9 min CN=60 Runoff=2.44 cfs 0.232 af

Subcatchment 2Sb: DA-2b Runoff Area=103,884 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=1,344' Tc=7.0 min CN=98 Runoff=12.27 cfs 0.964 af

Subcatchment 2Sc: DA-2c Runoff Area=7,627 sf 0.00% Impervious Runoff Depth=1.42"
Flow Length=1,193' Tc=14.9 min CN=61 Runoff=0.22 cfs 0.021 af

Subcatchment 2Sd: DA-2d Runoff Area=6,490 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=1,344' Tc=7.0 min CN=98 Runoff=0.77 cfs 0.060 af

Subcatchment 3Sa: DA-3a Runoff Area=81,824 sf 0.00% Impervious Runoff Depth=1.71"
Flow Length=479' Tc=12.0 min CN=65 Runoff=3.26 cfs 0.268 af

Subcatchment 3Sb: DA-3b Runoff Area=45,109 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=380' Tc=2.5 min CN=98 Runoff=6.21 cfs 0.419 af

Subcatchment 3Sc: DA-3c Runoff Area=3,130 sf 0.00% Impervious Runoff Depth=1.29"
Flow Length=479' Tc=12.0 min CN=59 Runoff=0.09 cfs 0.008 af

Subcatchment 3Sd: DA-3d Runoff Area=501 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=380' Tc=2.5 min CN=98 Runoff=0.07 cfs 0.005 af

Subcatchment 4Sa: DA-4a Runoff Area=17,562 sf 0.00% Impervious Runoff Depth=1.29"
Flow Length=1,952' Tc=16.6 min CN=59 Runoff=0.43 cfs 0.043 af

Subcatchment 4Sb: DA-4b Runoff Area=8,286 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=1,876' Tc=7.7 min CN=98 Runoff=0.96 cfs 0.077 af

Subcatchment 4Sc: DA-4c Runoff Area=604 sf 0.00% Impervious Runoff Depth=1.42"
Flow Length=1,952' Tc=16.6 min CN=61 Runoff=0.02 cfs 0.002 af

Subcatchment 4Sd: DA-4d Runoff Area=140 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=1,876' Tc=7.7 min CN=98 Runoff=0.02 cfs 0.001 af

Reach 5R: Reach to On Stream Pond Avg. Flow Depth=1.05' Max Vel=1.26 fps Inflow=27.66 cfs 3.472 af
n=0.045 L=526.0' S=0.0025 '/' Capacity=1,446.01 cfs Outflow=24.46 cfs 3.472 af

Link 1L: DA-1 COM HYD Inflow=12.21 cfs 1.496 af
Primary=12.21 cfs 1.496 af

Link 2L: DA-2 COM HYD Inflow=14.83 cfs 1.277 af
Primary=14.83 cfs 1.277 af

Link 3L: DA-3 COM HYD Inflow=8.20 cfs 0.699 af
Primary=8.20 cfs 0.699 af

Link 4L: DA-4 COM HYD Inflow=1.26 cfs 0.123 af
Primary=1.26 cfs 0.123 af

Link 5L: Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Inflow=25.21 cfs 3.595 af
Primary=25.21 cfs 3.595 af

Total Runoff Area = 18.843 ac Runoff Volume = 3.595 af Average Runoff Depth = 2.29"
78.73% Pervious = 14.835 ac 21.27% Impervious = 4.008 ac

Summary for Subcatchment 1Sa: DA-1a

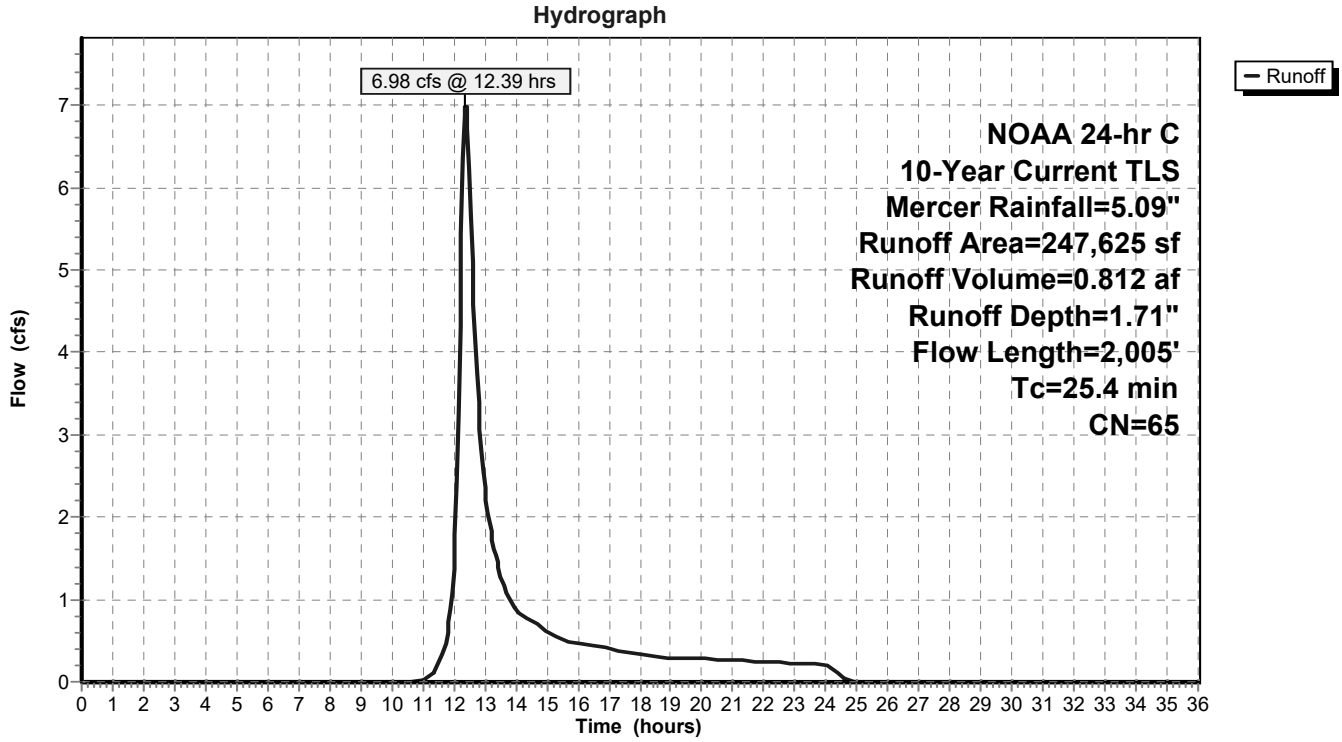
Runoff = 6.98 cfs @ 12.39 hrs, Volume= 0.812 af, Depth= 1.71"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
19,250	55	Woods, Good, HSG B
80,094	70	Woods, Good, HSG C
116,446	61	>75% Grass cover, Good, HSG B
31,835	74	>75% Grass cover, Good, HSG C
247,625	65	Weighted Average
247,625		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	56	0.0180	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
8.2	906	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.5	377	0.0030	1.81	65.11	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
25.4	2,005	Total			

Subcatchment 1Sa: DA-1a



Summary for Subcatchment 1Sb: DA-1b

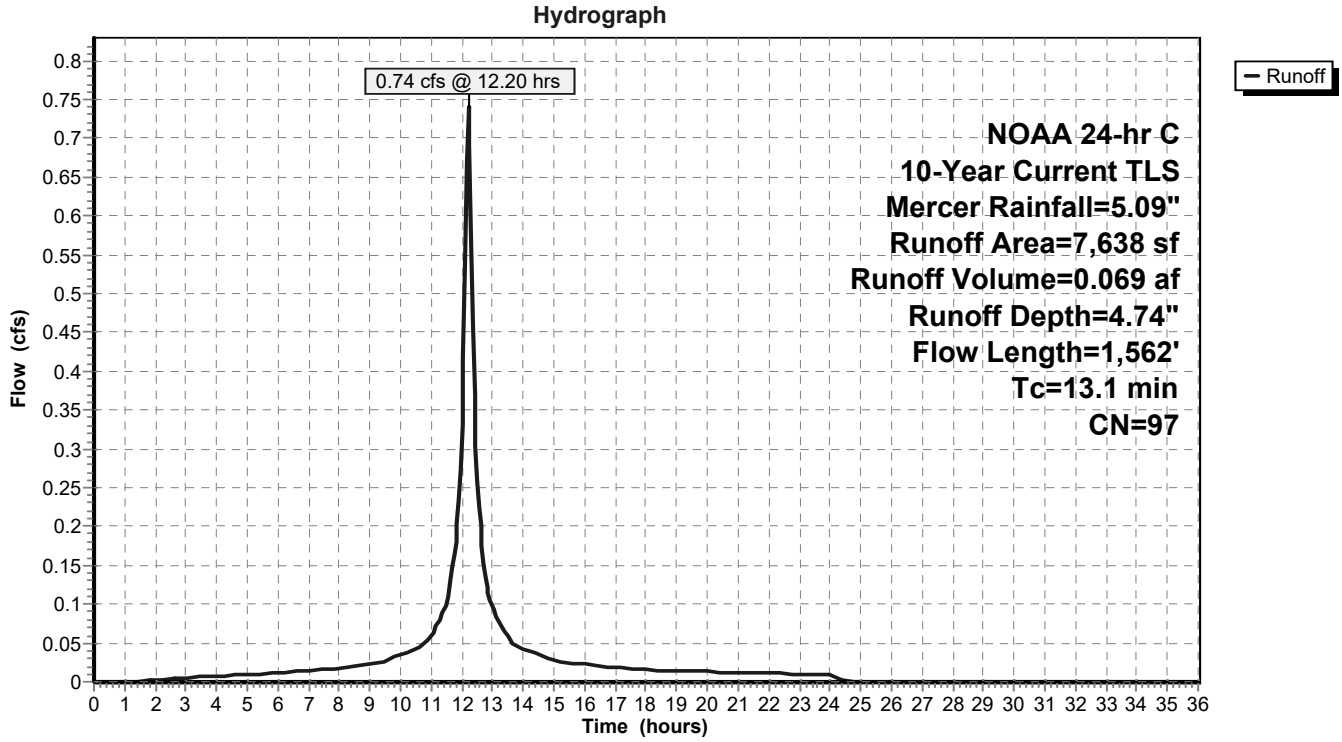
Runoff = 0.74 cfs @ 12.20 hrs, Volume= 0.069 af, Depth= 4.74"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	5,469	98	Paved parking, HSG B (Vehicular)
*	2,169	96	Gravel surface, HSG B (Vehicular)
	7,638	97	Weighted Average
	2,169		28.40% Pervious Area
	5,469		71.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.22		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
6.9	733	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	243	0.0320	3.65	21.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
13.1	1,562	Total			

Subcatchment 1Sb: DA-1b



Summary for Subcatchment 1Sc: DA-1c

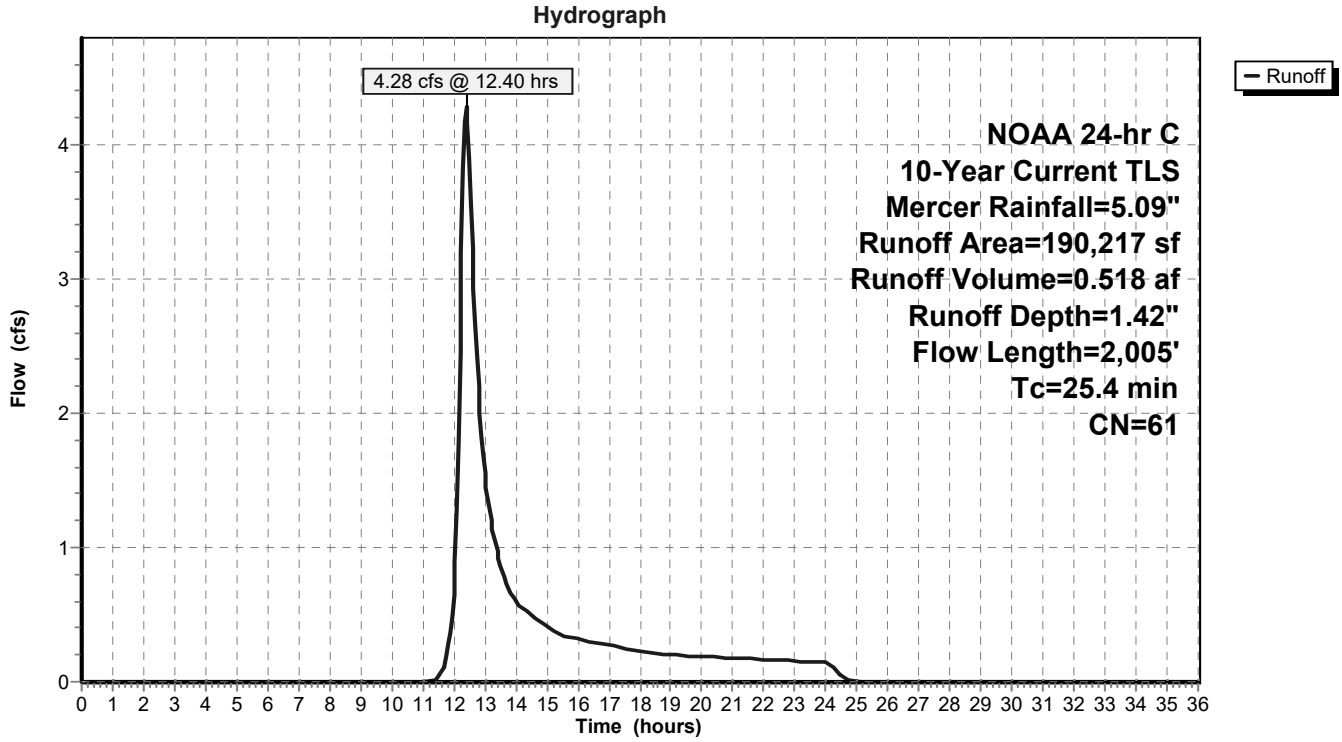
Runoff = 4.28 cfs @ 12.40 hrs, Volume= 0.518 af, Depth= 1.42"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
10,383	55	Woods, Good, HSG B
1,167	70	Woods, Good, HSG C
171,409	61	>75% Grass cover, Good, HSG B
7,258	74	>75% Grass cover, Good, HSG C
190,217	61	Weighted Average
190,217		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	56	0.0180	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34"
8.2	906	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.5	377	0.0030	1.81	65.11	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
25.4	2,005	Total			

Subcatchment 1Sc: DA-1c



Summary for Subcatchment 1Sd: DA-1d

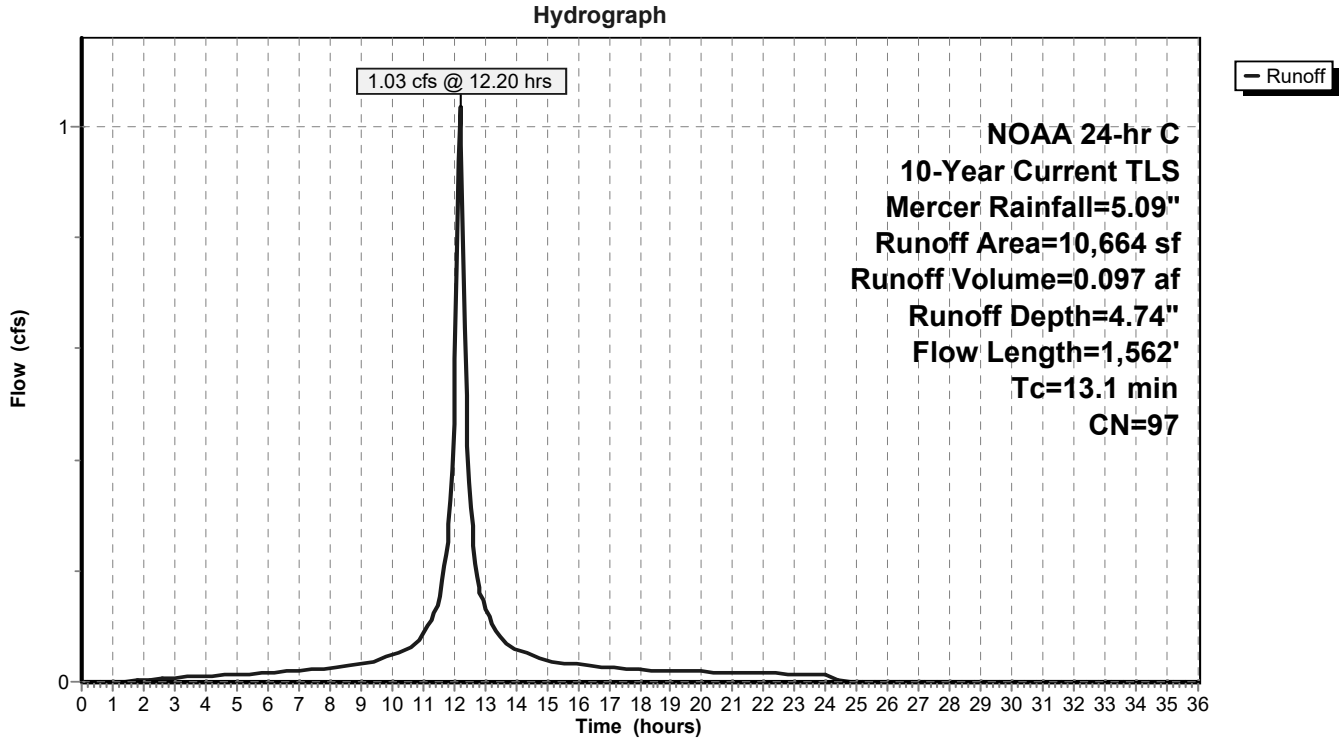
Runoff = 1.03 cfs @ 12.20 hrs, Volume= 0.097 af, Depth= 4.74"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	4,698	98	Paved parking, HSG B (Vehicular)
*	5,966	96	Gravel surface, HSG B (Vehicular)
	10,664	97	Weighted Average
	5,966		55.95% Pervious Area
	4,698		44.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.22		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
6.9	733	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	243	0.0320	3.65	21.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
13.1	1,562	Total			

Subcatchment 1Sd: DA-1d



Summary for Subcatchment 2Sa: DA-2a

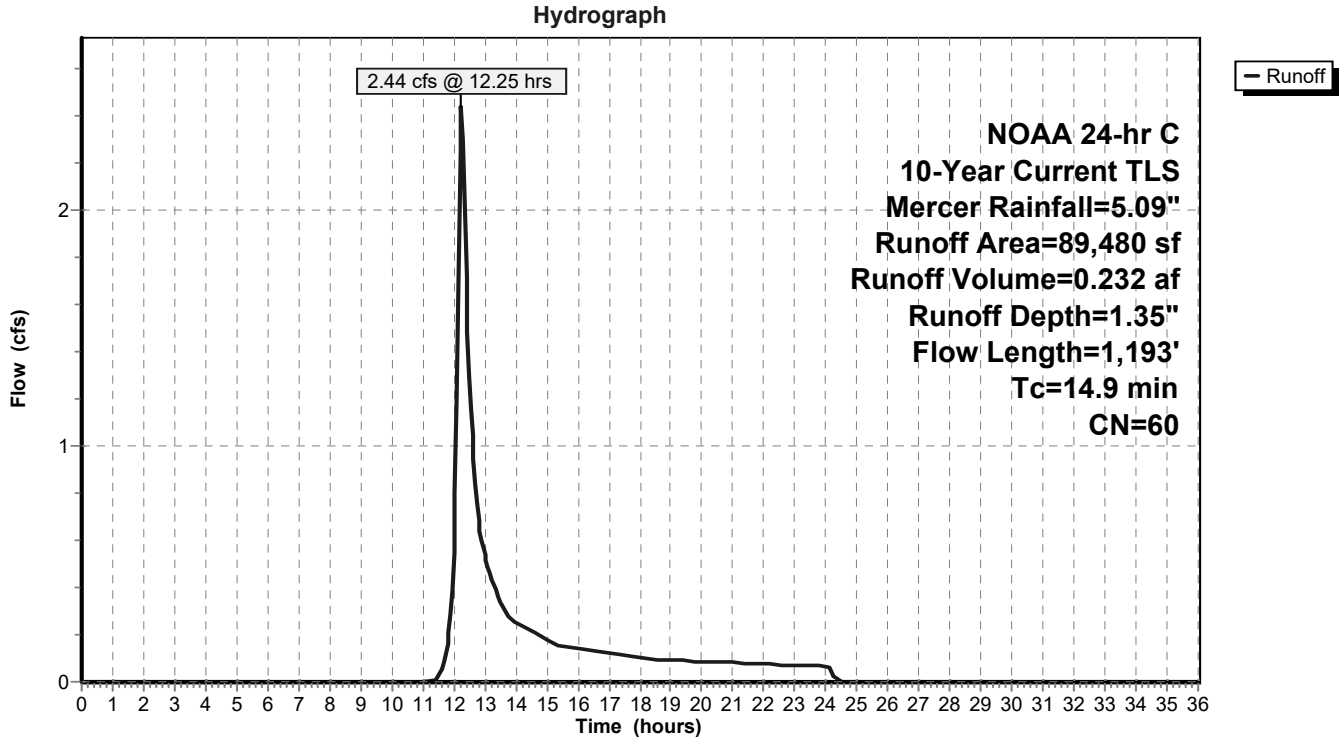
Runoff = 2.44 cfs @ 12.25 hrs, Volume= 0.232 af, Depth= 1.35"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
16,278	55	Woods, Good, HSG B
73,005	61	>75% Grass cover, Good, HSG B
197	80	>75% Grass cover, Good, HSG D
89,480	60	Weighted Average
89,480		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
0.3	29	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,193	Total			

Subcatchment 2Sa: DA-2a



Summary for Subcatchment 2Sb: DA-2b

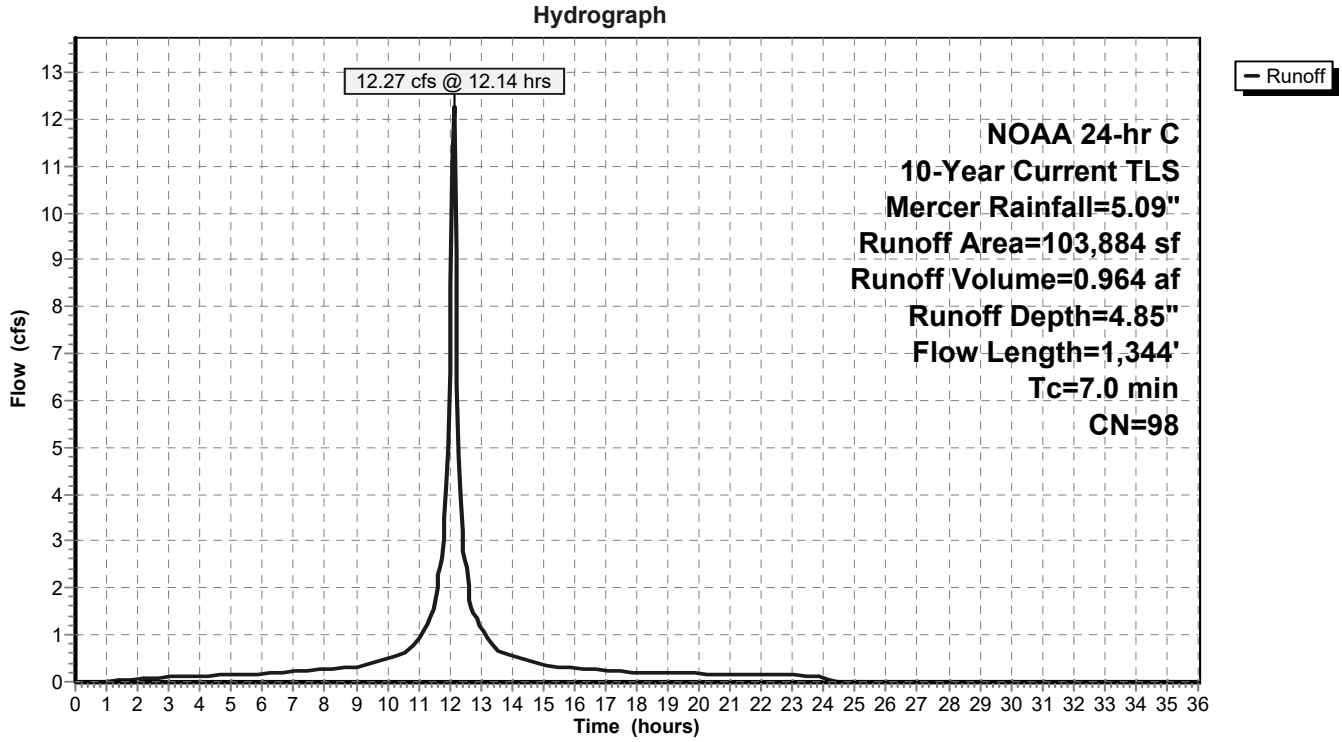
Runoff = 12.27 cfs @ 12.14 hrs, Volume= 0.964 af, Depth= 4.85"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	39,492	98	Paved parking, HSG B (Vehicular)
*	61,715	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	2,677	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	103,884	98	Weighted Average
	103,884		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
7.0	1,344	Total			

Subcatchment 2Sb: DA-2b



Summary for Subcatchment 2Sc: DA-2c

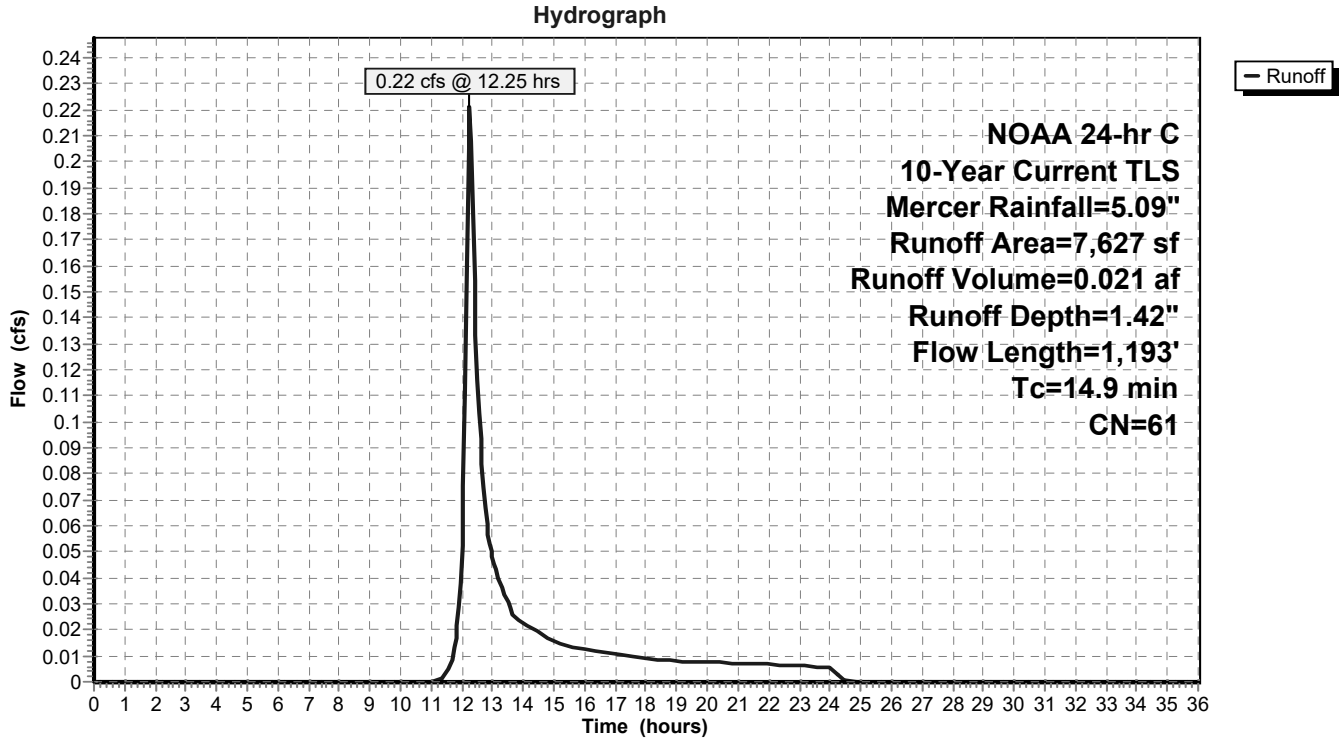
Runoff = 0.22 cfs @ 12.25 hrs, Volume= 0.021 af, Depth= 1.42"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
7,627	61	>75% Grass cover, Good, HSG B
7,627		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
0.3	29	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,193	Total			

Subcatchment 2Sc: DA-2c



Summary for Subcatchment 2Sd: DA-2d

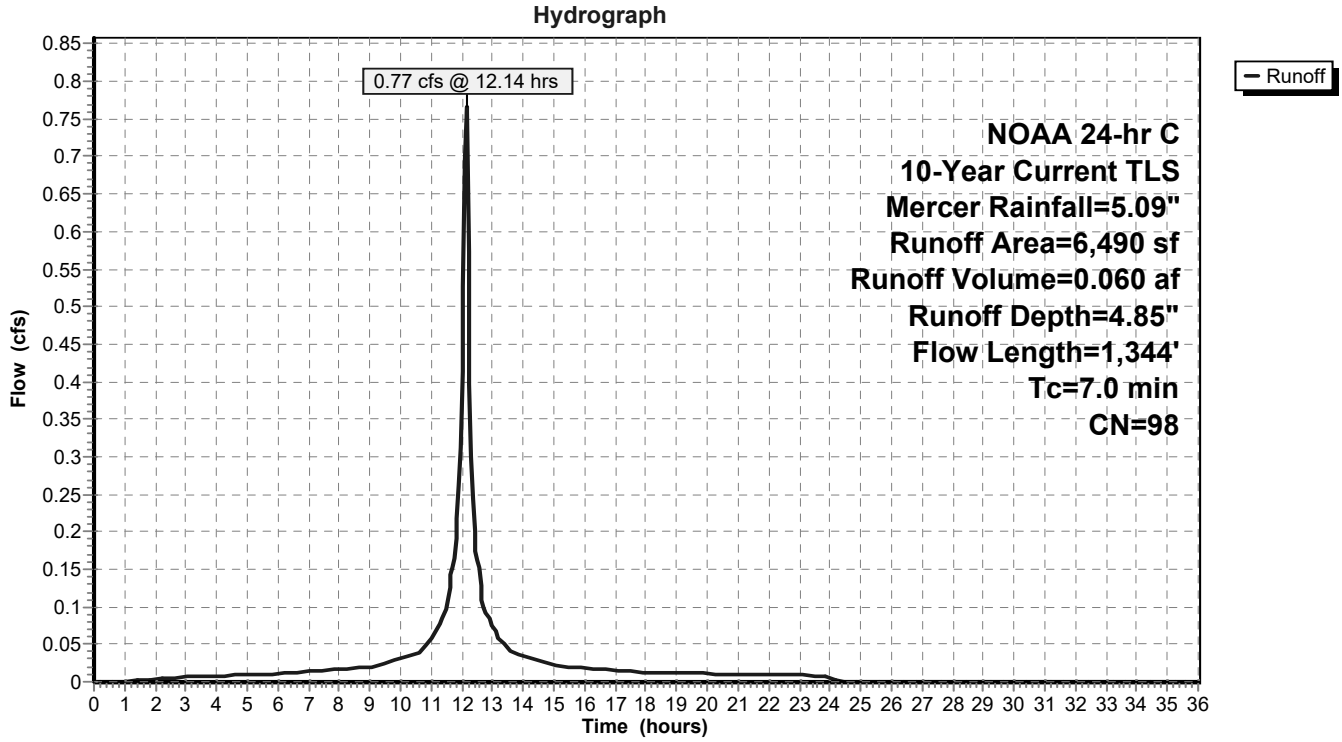
Runoff = 0.77 cfs @ 12.14 hrs, Volume= 0.060 af, Depth= 4.85"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	6,291	98	Paved parking, HSG B (Vehicular)
*	199	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	6,490	98	Weighted Average
	6,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
7.0	1,344	Total			

Subcatchment 2Sd: DA-2d



Summary for Subcatchment 3Sa: DA-3a

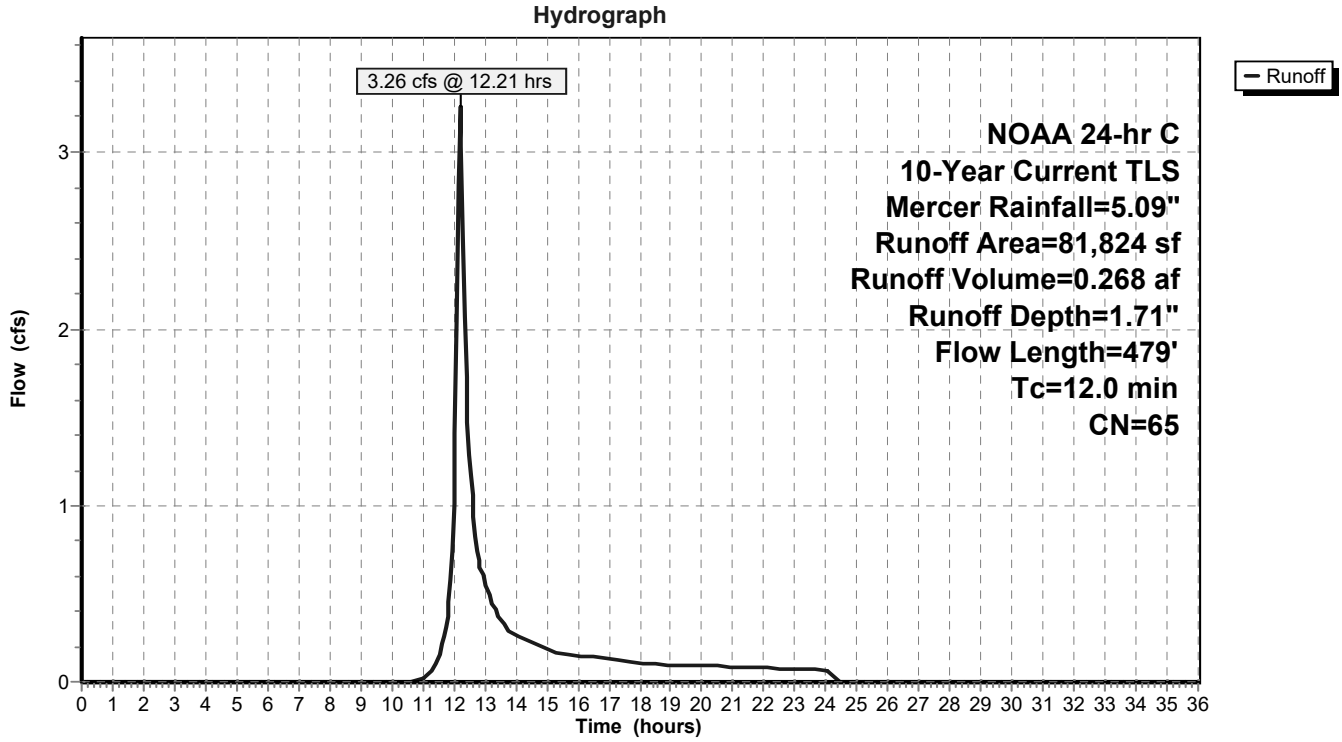
Runoff = 3.26 cfs @ 12.21 hrs, Volume= 0.268 af, Depth= 1.71"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
21,739	55	Woods, Good, HSG B
31,307	70	Woods, Good, HSG C
1,317	77	Woods, Good, HSG D
18,394	61	>75% Grass cover, Good, HSG B
3,641	74	>75% Grass cover, Good, HSG C
5,426	80	>75% Grass cover, Good, HSG D
81,824	65	Weighted Average
81,824		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.8	179	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
12.0	479	Total			

Subcatchment 3Sa: DA-3a



Summary for Subcatchment 3Sb: DA-3b

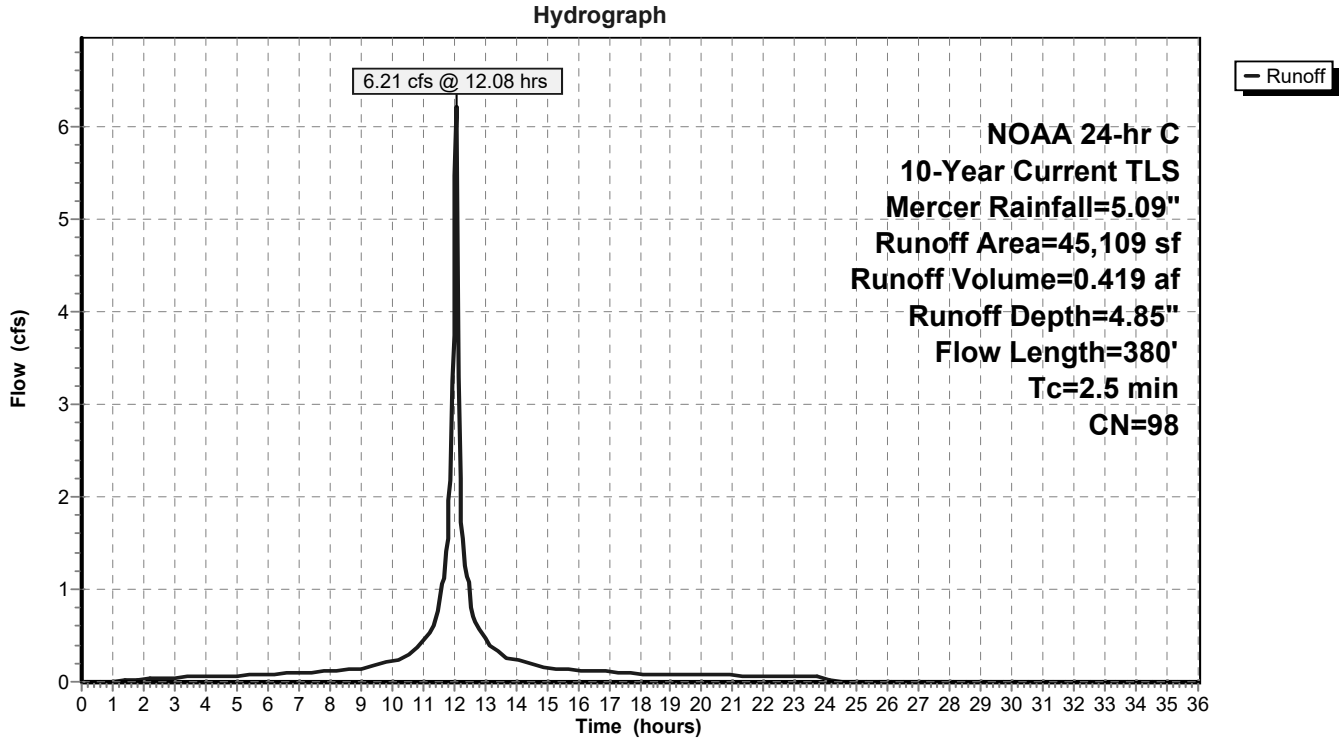
Runoff = 6.21 cfs @ 12.08 hrs, Volume= 0.419 af, Depth= 4.85"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	14,685	98	Paved parking, HSG B (Vehicular)
*	26,070	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	1,571	98	Paved parking, HSG C (Vehicular)
*	425	98	Paved parking, HSG D (Vehicular)
*	2,358	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	45,109	98	Weighted Average
	45,109		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.32		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
0.2	39	0.0410	3.04		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
2.5	380	Total			

Subcatchment 3Sb: DA-3b



Summary for Subcatchment 3Sc: DA-3c

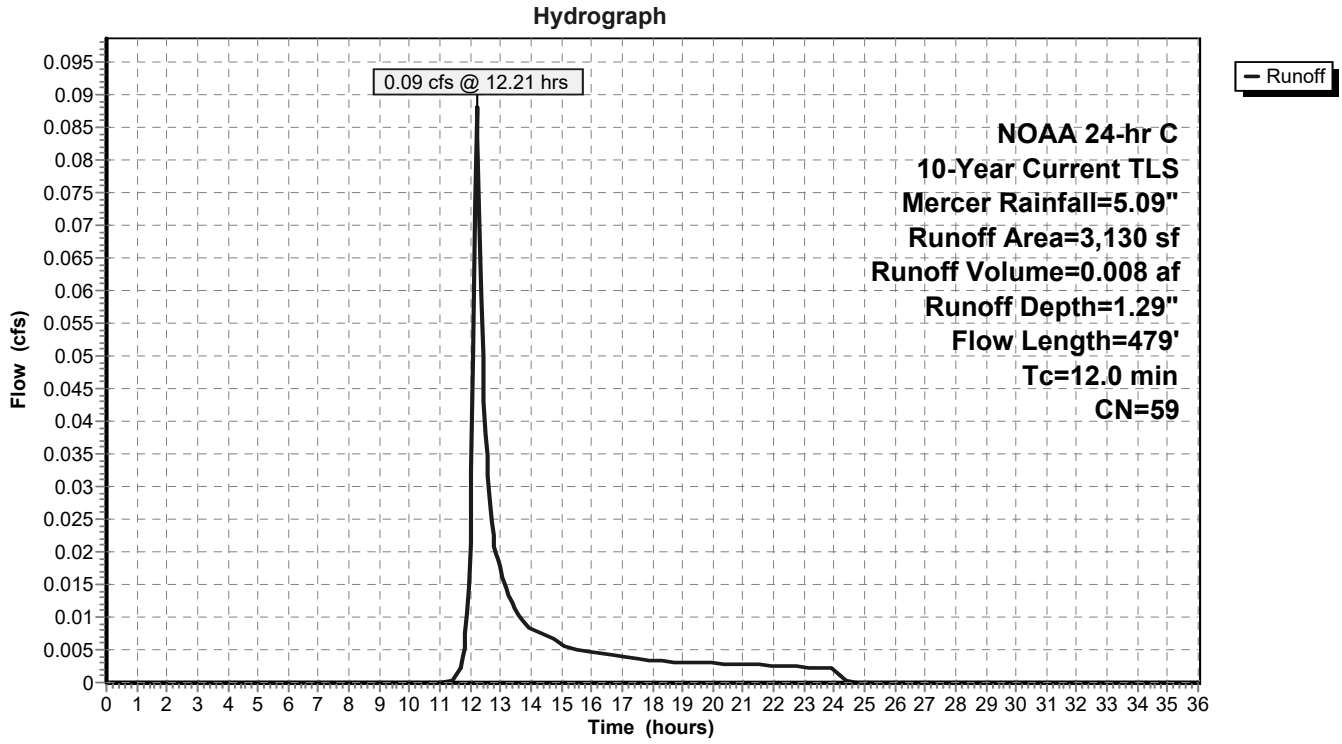
Runoff = 0.09 cfs @ 12.21 hrs, Volume= 0.008 af, Depth= 1.29"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
1,286	55	Woods, Good, HSG B
1,844	61	>75% Grass cover, Good, HSG B
3,130	59	Weighted Average
3,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.8	179	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
12.0	479	Total			

Subcatchment 3Sc: DA-3c



Summary for Subcatchment 3Sd: DA-3d

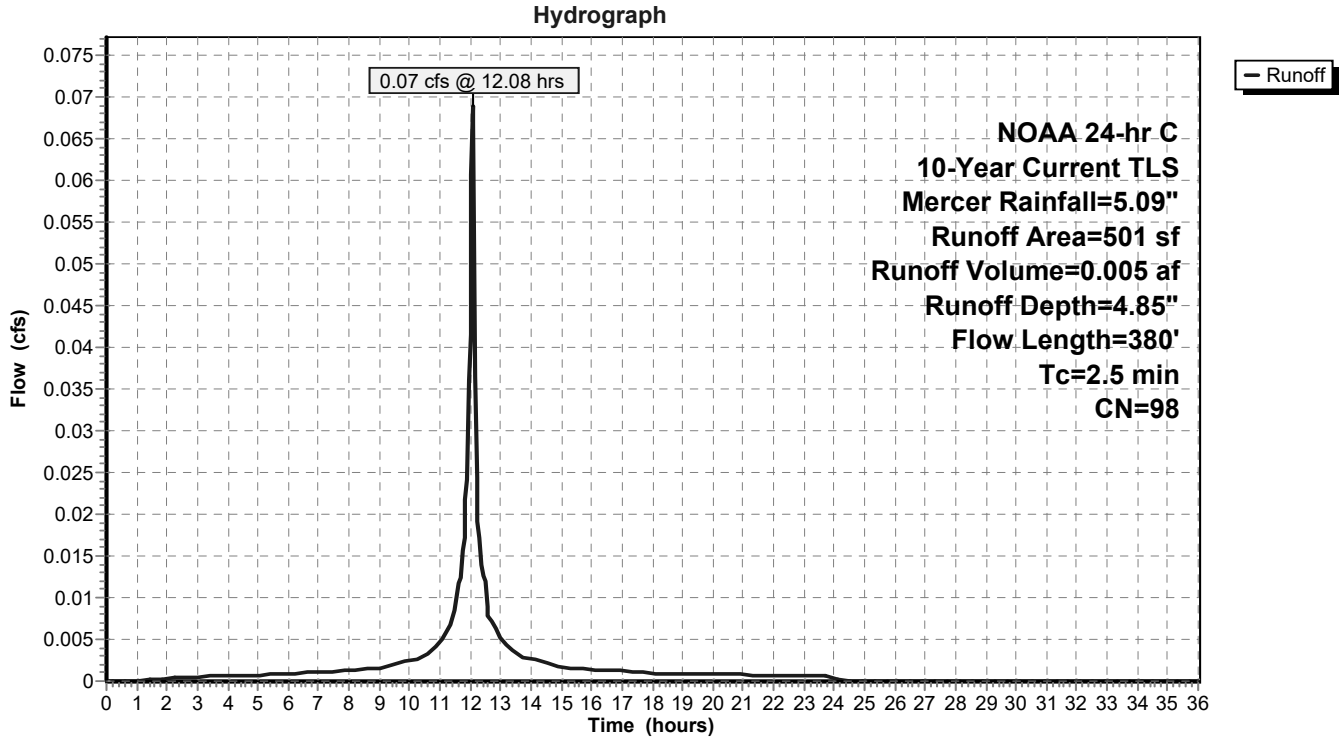
Runoff = 0.07 cfs @ 12.08 hrs, Volume= 0.005 af, Depth= 4.85"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	501	98	Paved parking, HSG B (Vehicular)
	501		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.32		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
0.2	39	0.0410	3.04		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	4.19	25.13	**Channel Flow,** Area= 6.0 sf Perim= 16.0' r= 0.38' n= 0.035
2.5	380	Total			

Subcatchment 3Sd: DA-3d



Summary for Subcatchment 4Sa: DA-4a

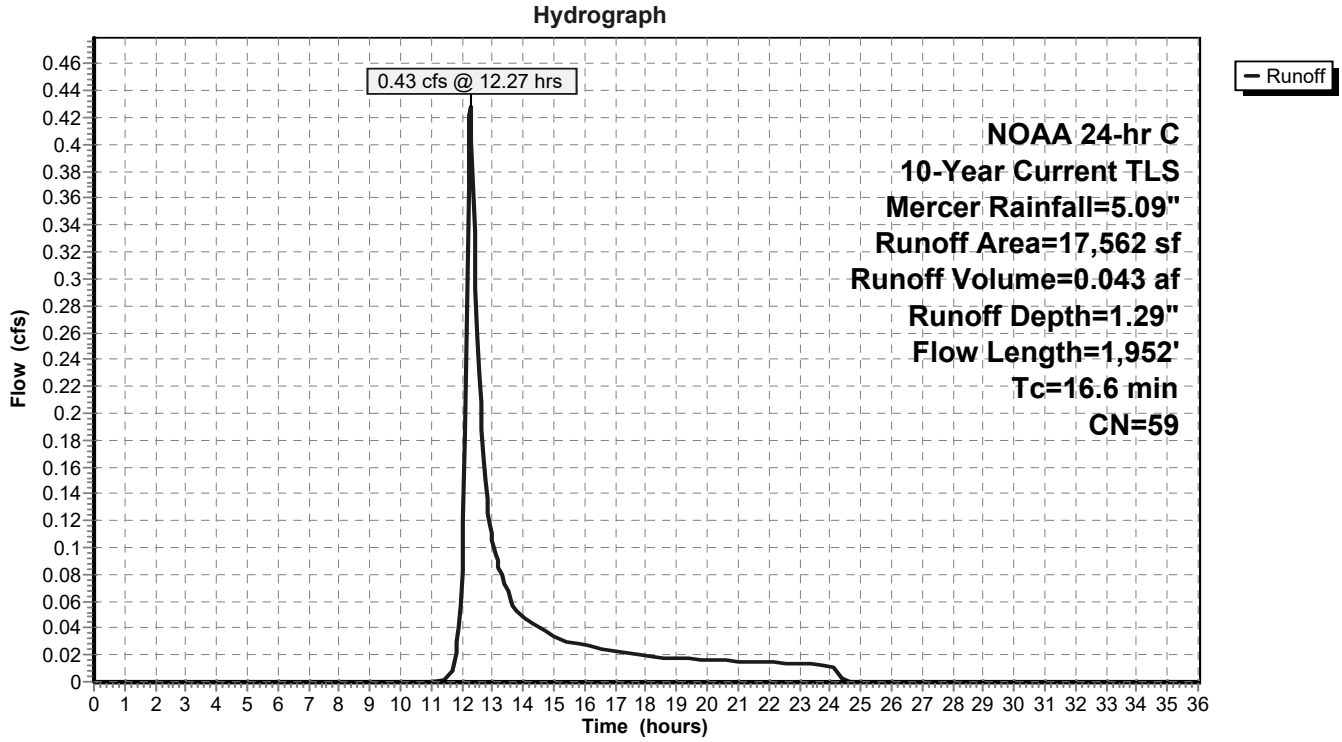
Runoff = 0.43 cfs @ 12.27 hrs, Volume= 0.043 af, Depth= 1.29"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
6,085	55	Woods, Good, HSG B
11,477	61	>75% Grass cover, Good, HSG B
17,562	59	Weighted Average
17,562		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	42	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.0	123	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
16.6	1,952	Total			

Subcatchment 4Sa: DA-4a



Summary for Subcatchment 4Sb: DA-4b

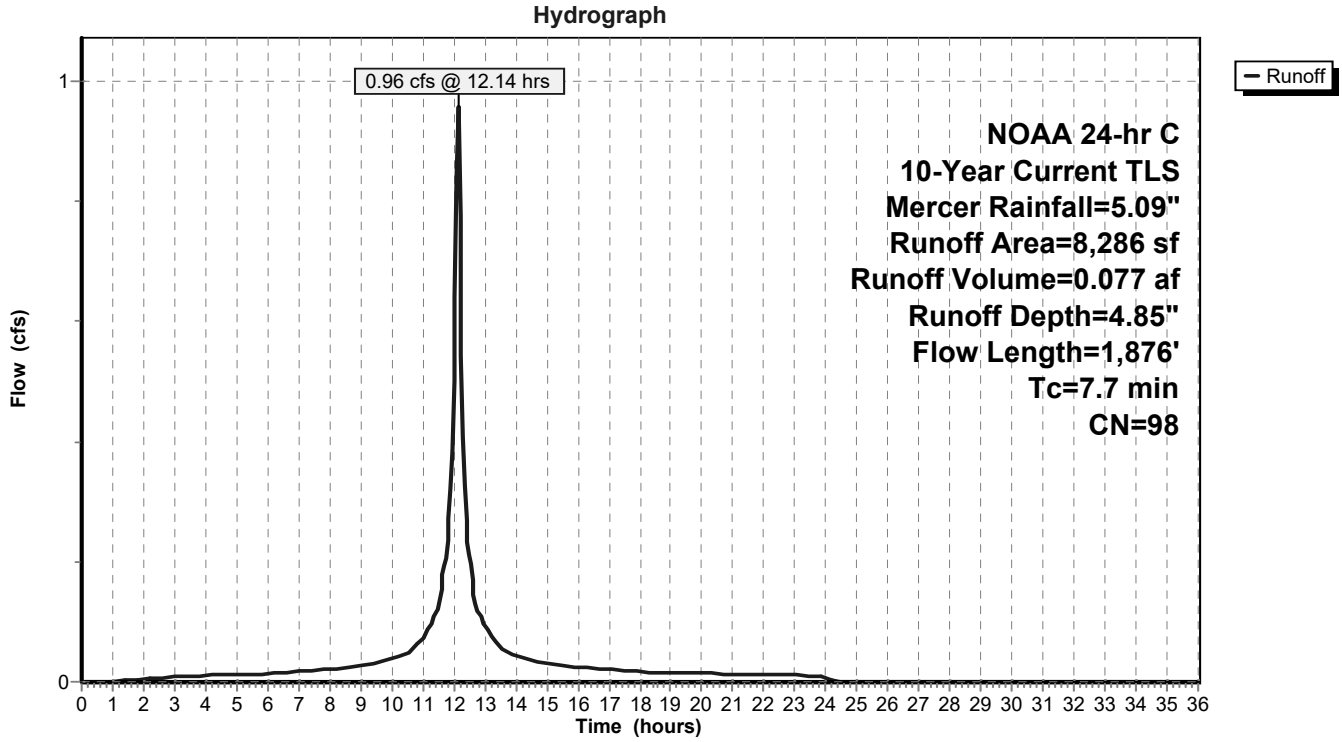
Runoff = 0.96 cfs @ 12.14 hrs, Volume= 0.077 af, Depth= 4.85"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	3,147	98	Paved parking, HSG B (Vehicular)
*	5,139	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	8,286	98	Weighted Average
	8,286		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.16		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
7.7	1,876	Total			

Subcatchment 4Sb: DA-4b



Summary for Subcatchment 4Sc: DA-4c

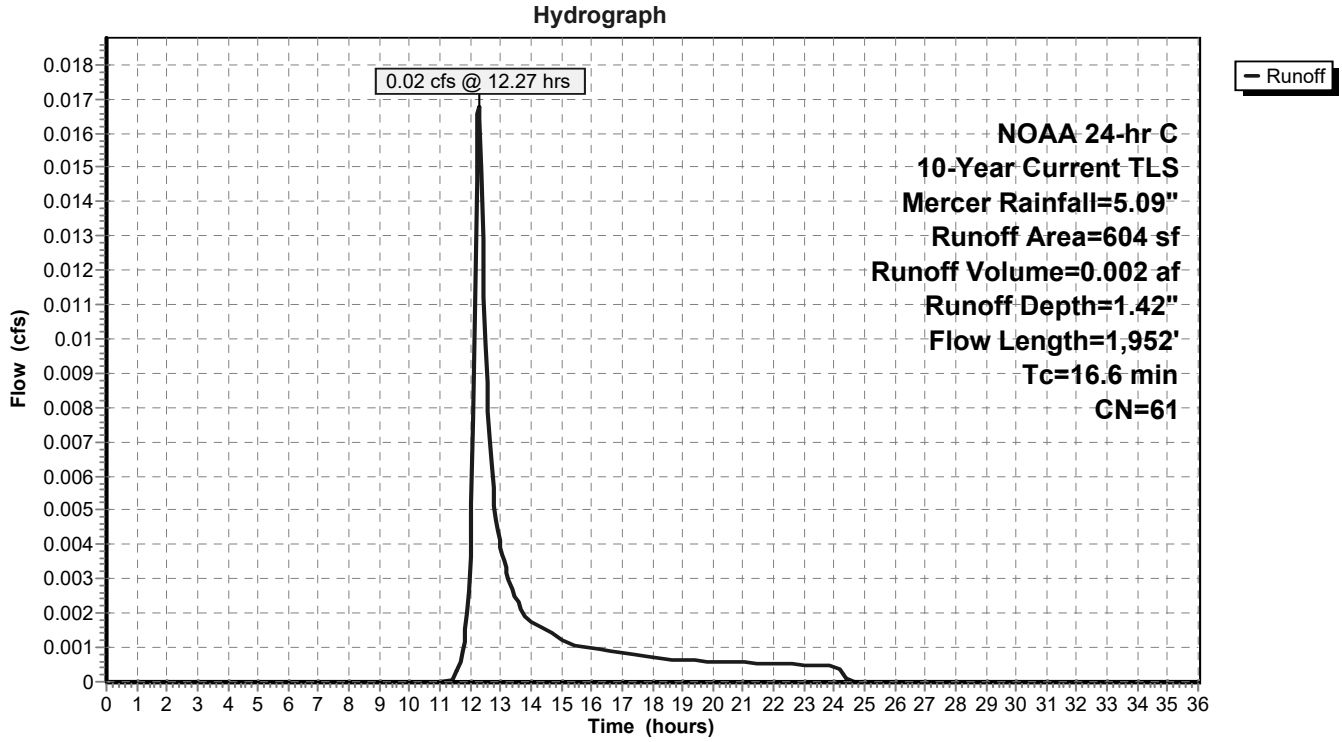
Runoff = 0.02 cfs @ 12.27 hrs, Volume= 0.002 af, Depth= 1.42"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
604	61	>75% Grass cover, Good, HSG B
604		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	42	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.0	123	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
16.6	1,952	Total			

Subcatchment 4Sc: DA-4c



Summary for Subcatchment 4Sd: DA-4d

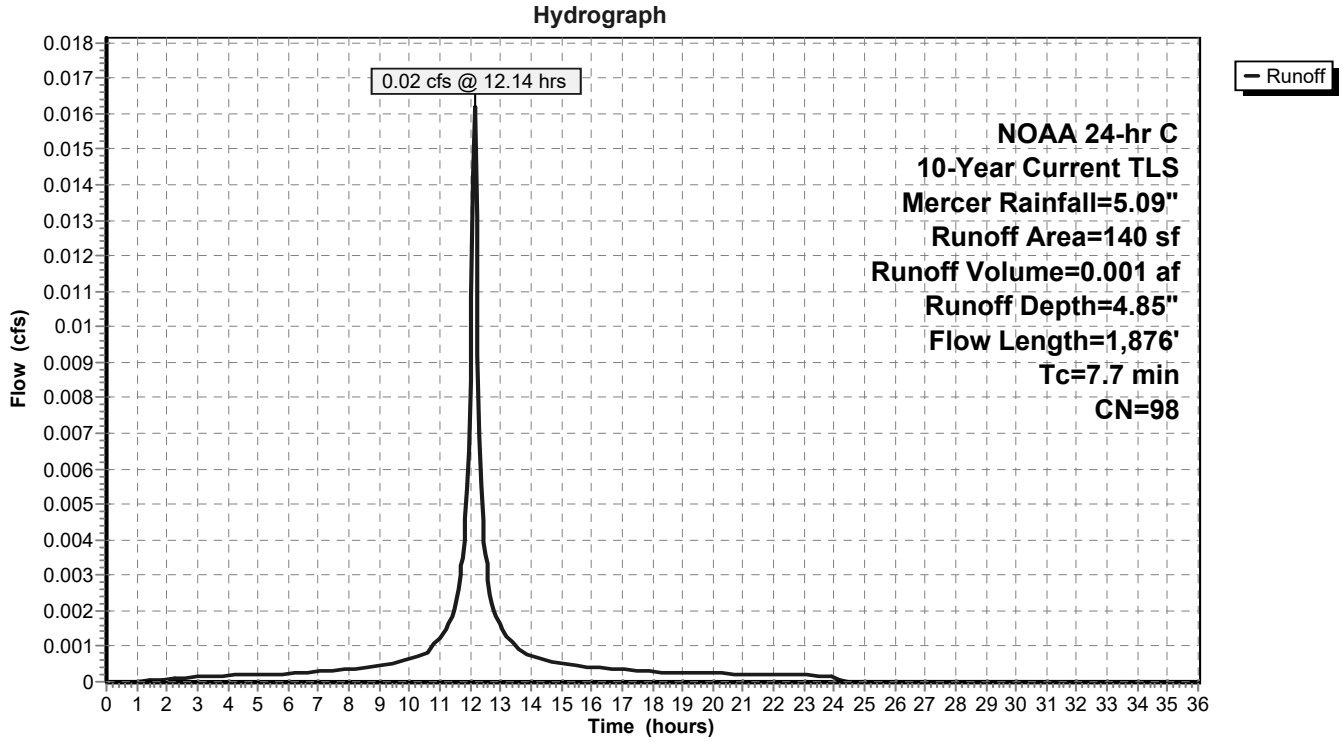
Runoff = 0.02 cfs @ 12.14 hrs, Volume= 0.001 af, Depth= 4.85"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	140	98	Paved parking, HSG B (Vehicular)
	140		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.16		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
7.7	1,876	Total			

Subcatchment 4Sd: DA-4d



Summary for Reach 5R: Reach to On Stream Pond

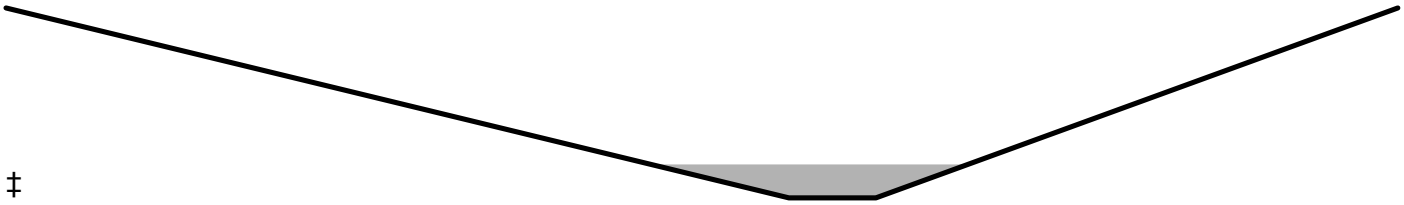
Stream Tributary 'B' to Shipetaukin Creek

Inflow Area = 18.232 ac, 20.92% Impervious, Inflow Depth = 2.29" for 10-Year Current TLS, Mercer event
Inflow = 27.66 cfs @ 12.15 hrs, Volume= 3.472 af
Outflow = 24.46 cfs @ 12.38 hrs, Volume= 3.472 af, Atten= 12%, Lag= 13.5 min
Routed to Link 5L : Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.26 fps, Min. Travel Time= 7.0 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 19.8 min

Peak Storage= 10,293 cf @ 12.26 hrs
Average Depth at Peak Storage= 1.05' , Surface Width= 29.09'
Bank-Full Depth= 6.00' Flow Area= 408.0 sf, Capacity= 1,446.01 cfs

8.00' x 6.00' deep channel, n= 0.045
Side Slope Z-value= 12.0 8.0 '/' Top Width= 128.00'
Length= 526.0' Slope= 0.0025 '/'
Inlet Invert= 91.30', Outlet Invert= 90.00'



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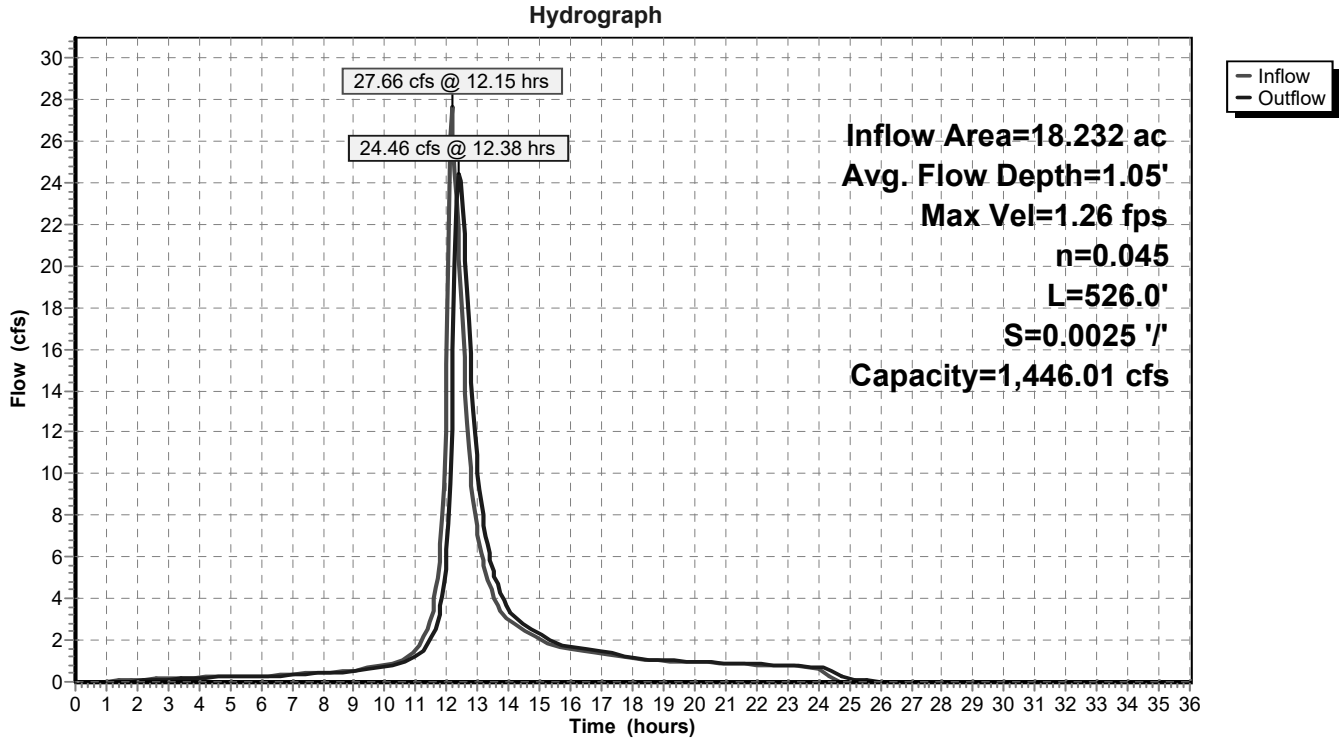
Reach 5R: Reach to On Stream Pond

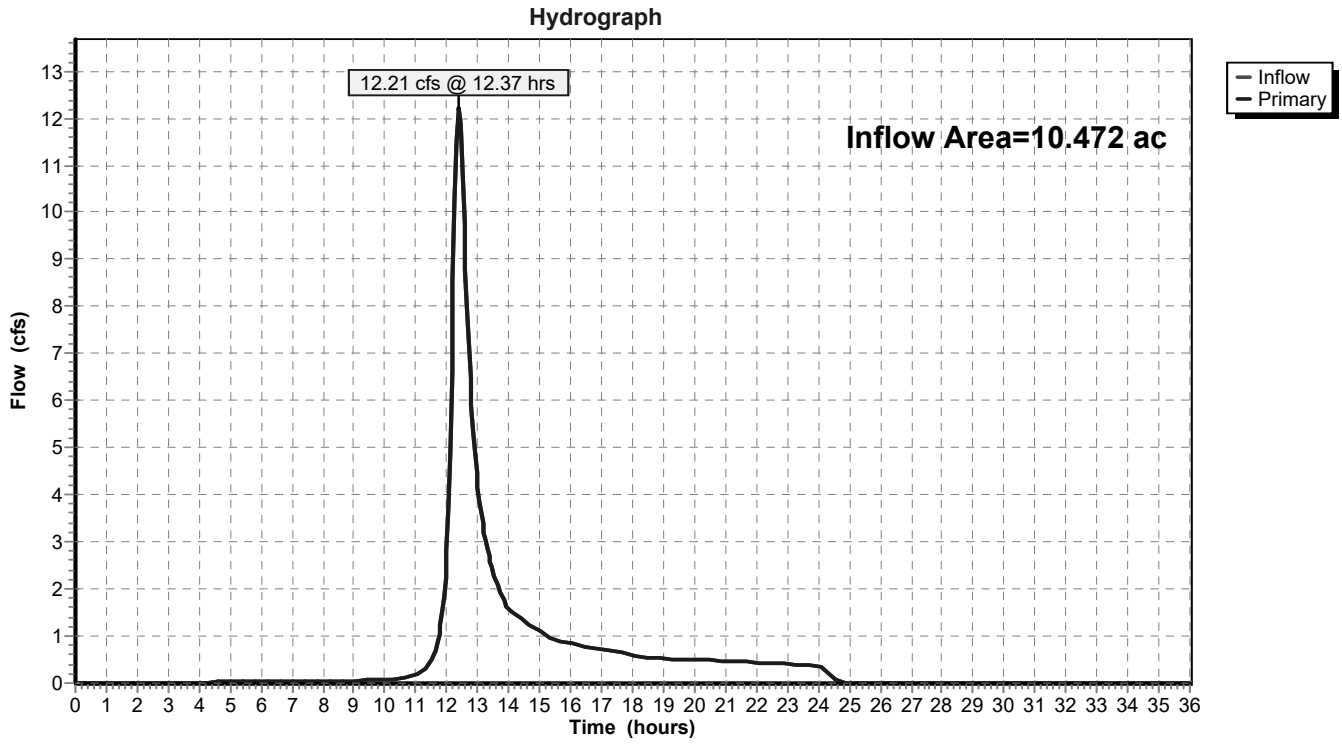


Summary for Link 1L: DA-1 COM HYD

Inflow Area = 10.472 ac, 2.23% Impervious, Inflow Depth = 1.71" for 10-Year Current TLS, Mercer event
Inflow = 12.21 cfs @ 12.37 hrs, Volume= 1.496 af
Primary = 12.21 cfs @ 12.37 hrs, Volume= 1.496 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1L: DA-1 COM HYD

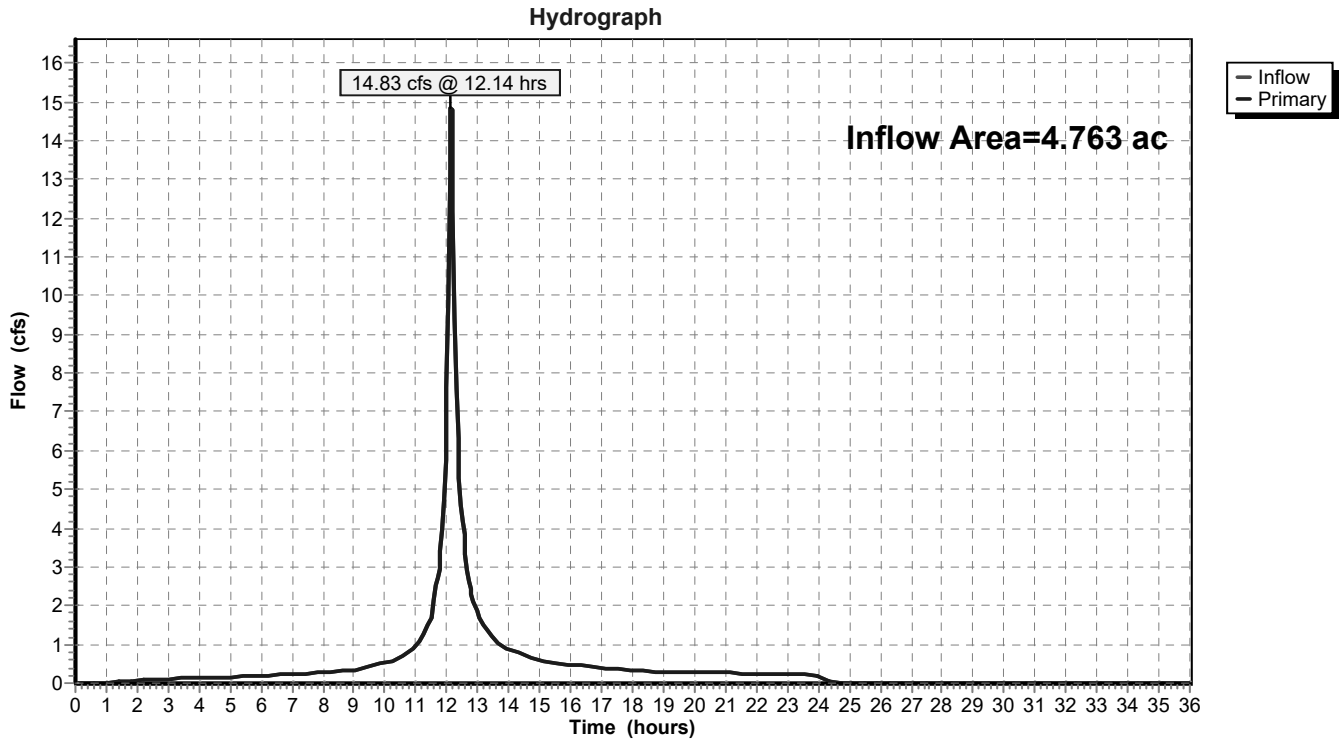


Summary for Link 2L: DA-2 COM HYD

Inflow Area = 4.763 ac, 53.20% Impervious, Inflow Depth = 3.22" for 10-Year Current TLS, Mercer event
Inflow = 14.83 cfs @ 12.14 hrs, Volume= 1.277 af
Primary = 14.83 cfs @ 12.14 hrs, Volume= 1.277 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: DA-2 COM HYD

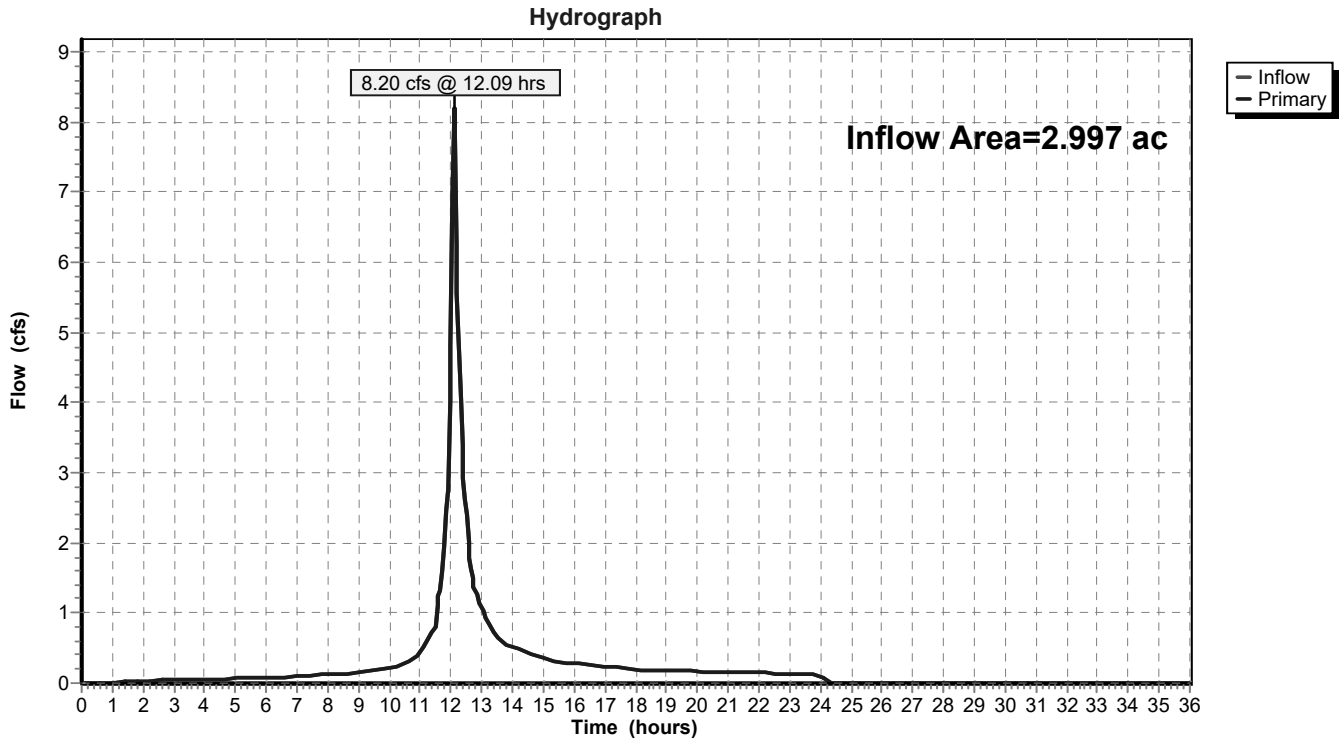


Summary for Link 3L: DA-3 COM HYD

Inflow Area = 2.997 ac, 34.93% Impervious, Inflow Depth = 2.80" for 10-Year Current TLS, Mercer event
Inflow = 8.20 cfs @ 12.09 hrs, Volume= 0.699 af
Primary = 8.20 cfs @ 12.09 hrs, Volume= 0.699 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 3L: DA-3 COM HYD

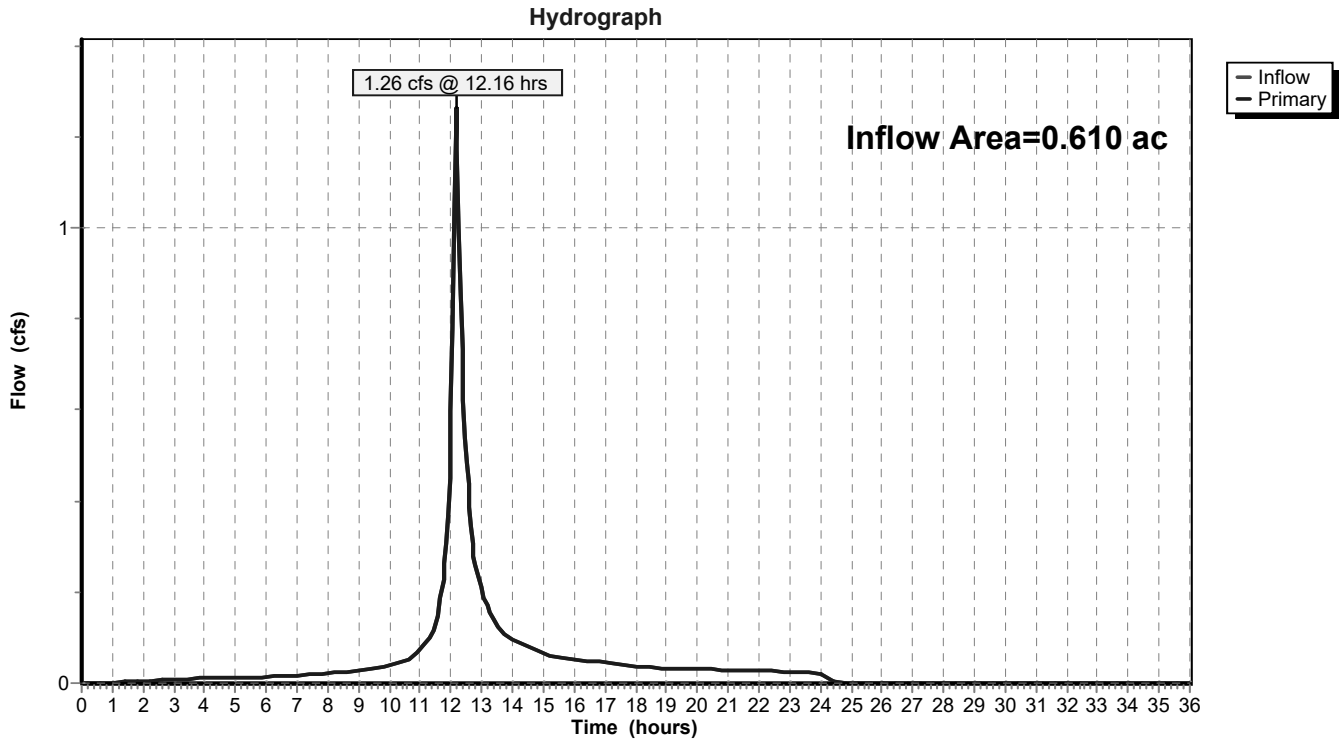


Summary for Link 4L: DA-4 COM HYD

Inflow Area = 0.610 ac, 31.69% Impervious, Inflow Depth = 2.42" for 10-Year Current TLS, Mercer event
Inflow = 1.26 cfs @ 12.16 hrs, Volume= 0.123 af
Primary = 1.26 cfs @ 12.16 hrs, Volume= 0.123 af, Atten= 0%, Lag= 0.0 min
Routed to Link 5L : Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 4L: DA-4 COM HYD

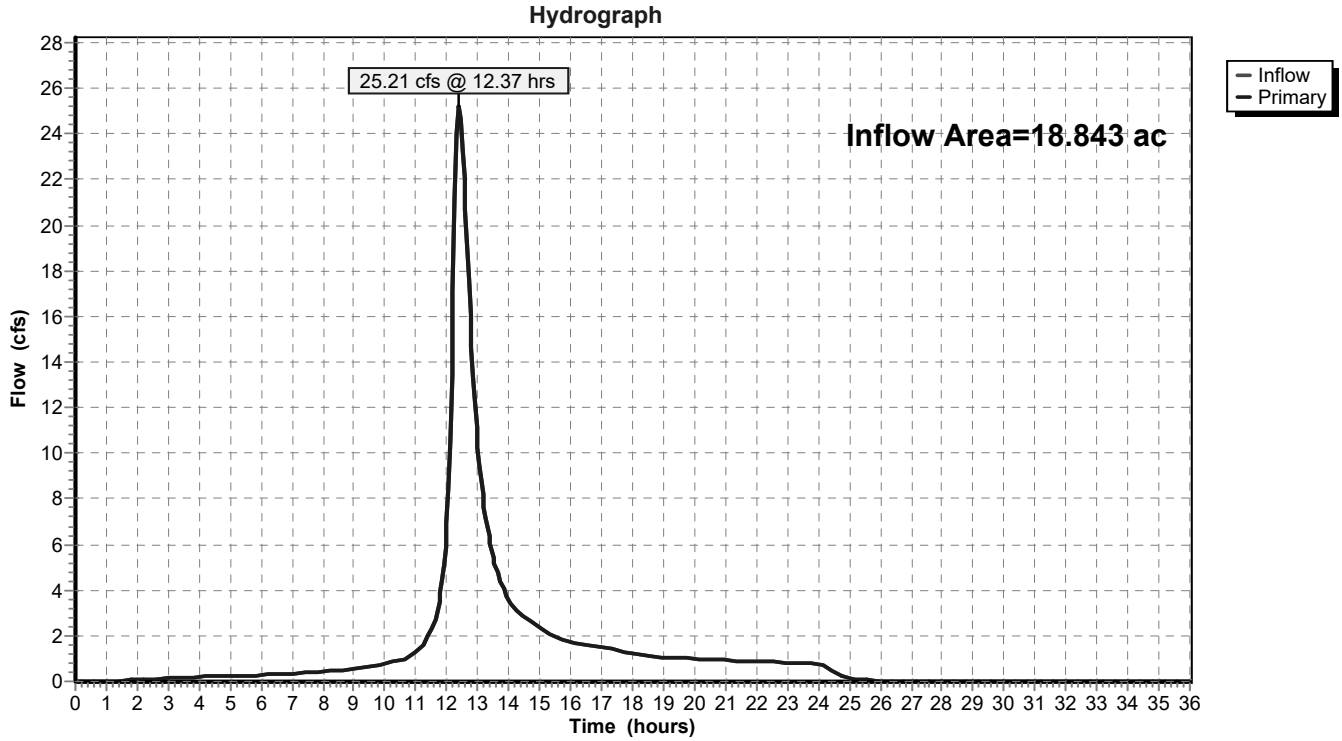


Summary for Link 5L: Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis

Inflow Area = 18.843 ac, 21.27% Impervious, Inflow Depth = 2.29" for 10-Year Current TLS, Mercer event
Inflow = 25.21 cfs @ 12.37 hrs, Volume= 3.595 af
Primary = 25.21 cfs @ 12.37 hrs, Volume= 3.595 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 5L: Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1Sa: DA-1a Runoff Area=247,625 sf 0.00% Impervious Runoff Depth=4.34"
Flow Length=2,005' Tc=25.4 min CN=65 Runoff=18.53 cfs 2.058 af

Subcatchment 1Sb: DA-1b Runoff Area=7,638 sf 71.60% Impervious Runoff Depth=8.19"
Flow Length=1,562' Tc=13.1 min CN=97 Runoff=1.25 cfs 0.120 af

Subcatchment 1Sc: DA-1c Runoff Area=190,217 sf 0.00% Impervious Runoff Depth=3.87"
Flow Length=2,005' Tc=25.4 min CN=61 Runoff=12.59 cfs 1.408 af

Subcatchment 1Sd: DA-1d Runoff Area=10,664 sf 44.05% Impervious Runoff Depth=8.19"
Flow Length=1,562' Tc=13.1 min CN=97 Runoff=1.75 cfs 0.167 af

Subcatchment 2Sa: DA-2a Runoff Area=89,480 sf 0.00% Impervious Runoff Depth=3.75"
Flow Length=1,193' Tc=14.9 min CN=60 Runoff=7.31 cfs 0.642 af

Subcatchment 2Sb: DA-2b Runoff Area=103,884 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=1,344' Tc=7.0 min CN=98 Runoff=20.67 cfs 1.651 af

Subcatchment 2Sc: DA-2c Runoff Area=7,627 sf 0.00% Impervious Runoff Depth=3.87"
Flow Length=1,193' Tc=14.9 min CN=61 Runoff=0.64 cfs 0.056 af

Subcatchment 2Sd: DA-2d Runoff Area=6,490 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=1,344' Tc=7.0 min CN=98 Runoff=1.29 cfs 0.103 af

Subcatchment 3Sa: DA-3a Runoff Area=81,824 sf 0.00% Impervious Runoff Depth=4.34"
Flow Length=479' Tc=12.0 min CN=65 Runoff=8.54 cfs 0.680 af

Subcatchment 3Sb: DA-3b Runoff Area=45,109 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=380' Tc=2.5 min CN=98 Runoff=10.46 cfs 0.717 af

Subcatchment 3Sc: DA-3c Runoff Area=3,130 sf 0.00% Impervious Runoff Depth=3.63"
Flow Length=479' Tc=12.0 min CN=59 Runoff=0.27 cfs 0.022 af

Subcatchment 3Sd: DA-3d Runoff Area=501 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=380' Tc=2.5 min CN=98 Runoff=0.12 cfs 0.008 af

Subcatchment 4Sa: DA-4a Runoff Area=17,562 sf 0.00% Impervious Runoff Depth=3.63"
Flow Length=1,952' Tc=16.6 min CN=59 Runoff=1.33 cfs 0.122 af

Subcatchment 4Sb: DA-4b Runoff Area=8,286 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=1,876' Tc=7.7 min CN=98 Runoff=1.62 cfs 0.132 af

Subcatchment 4Sc: DA-4c Runoff Area=604 sf 0.00% Impervious Runoff Depth=3.87"
Flow Length=1,952' Tc=16.6 min CN=61 Runoff=0.05 cfs 0.004 af

Subcatchment 4Sd: DA-4d Runoff Area=140 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=1,876' Tc=7.7 min CN=98 Runoff=0.03 cfs 0.002 af

Reach 5R: Reach to On Stream Pond Avg. Flow Depth=1.56' Max Vel=1.57 fps Inflow=61.37 cfs 7.632 af
n=0.045 L=526.0' S=0.0025 '/' Capacity=1,446.01 cfs Outflow=57.79 cfs 7.632 af

Link 1L: DA-1 COM HYD Inflow=32.83 cfs 3.752 af
Primary=32.83 cfs 3.752 af

Link 2L: DA-2 COM HYD Inflow=28.04 cfs 2.453 af
Primary=28.04 cfs 2.453 af

Link 3L: DA-3 COM HYD Inflow=16.26 cfs 1.427 af
Primary=16.26 cfs 1.427 af

Link 4L: DA-4 COM HYD Inflow=2.68 cfs 0.261 af
Primary=2.68 cfs 0.261 af

Link 5L: Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Inflow=59.43 cfs 7.893 af
Primary=59.43 cfs 7.893 af

Total Runoff Area = 18.843 ac Runoff Volume = 7.893 af Average Runoff Depth = 5.03"
78.73% Pervious = 14.835 ac 21.27% Impervious = 4.008 ac

Summary for Subcatchment 1Sa: DA-1a

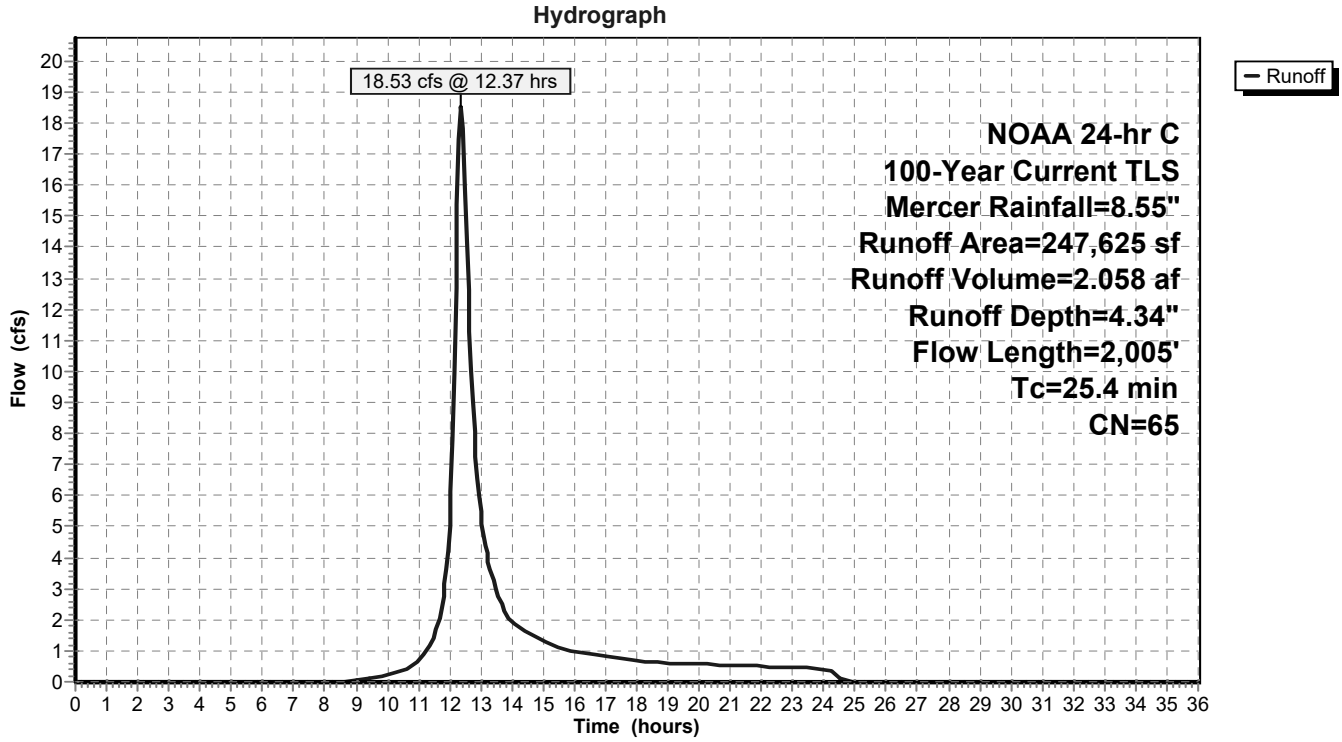
Runoff = 18.53 cfs @ 12.37 hrs, Volume= 2.058 af, Depth= 4.34"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
19,250	55	Woods, Good, HSG B
80,094	70	Woods, Good, HSG C
116,446	61	>75% Grass cover, Good, HSG B
31,835	74	>75% Grass cover, Good, HSG C
247,625	65	Weighted Average
247,625		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	56	0.0180	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
8.2	906	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.5	377	0.0030	1.81	65.11	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
25.4	2,005	Total			

Subcatchment 1Sa: DA-1a



Summary for Subcatchment 1Sb: DA-1b

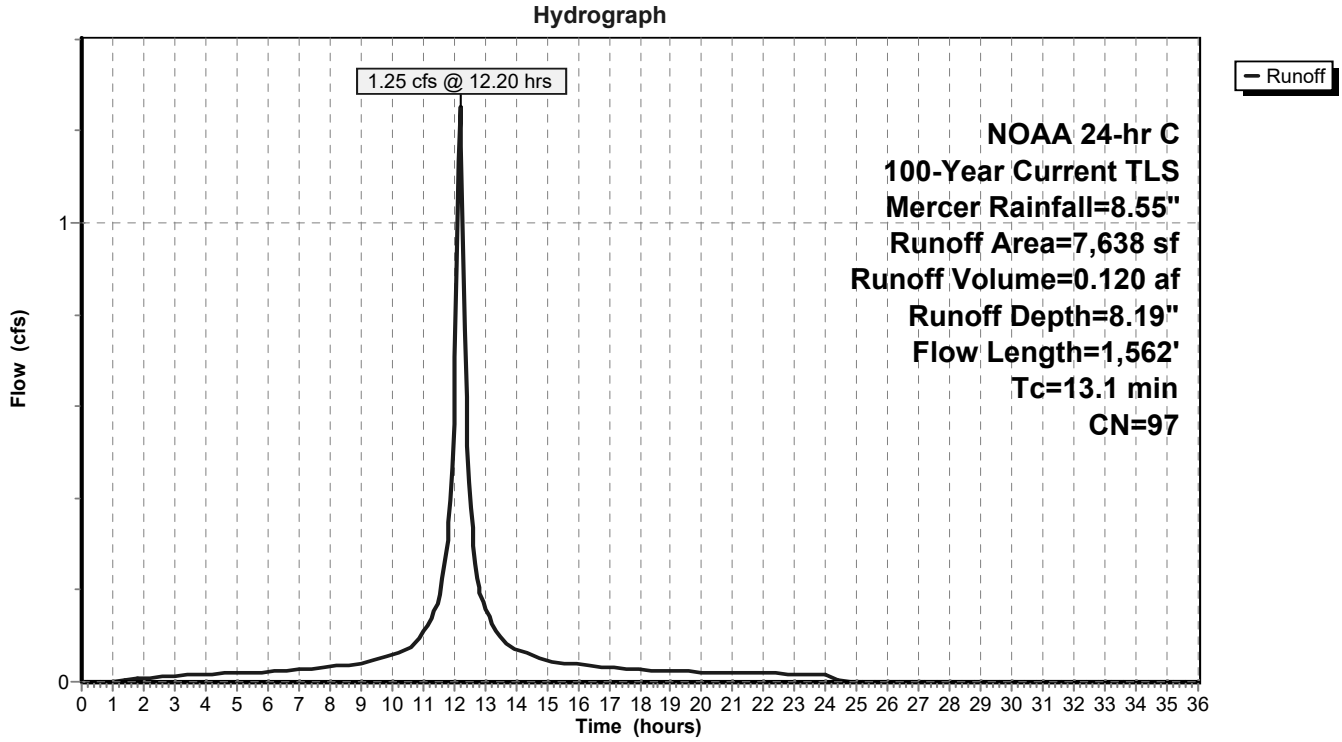
Runoff = 1.25 cfs @ 12.20 hrs, Volume= 0.120 af, Depth= 8.19"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	5,469	98	Paved parking, HSG B (Vehicular)
*	2,169	96	Gravel surface, HSG B (Vehicular)
	7,638	97	Weighted Average
	2,169		28.40% Pervious Area
	5,469		71.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.22		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
6.9	733	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	243	0.0320	3.65	21.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
13.1	1,562	Total			

Subcatchment 1Sb: DA-1b



Summary for Subcatchment 1Sc: DA-1c

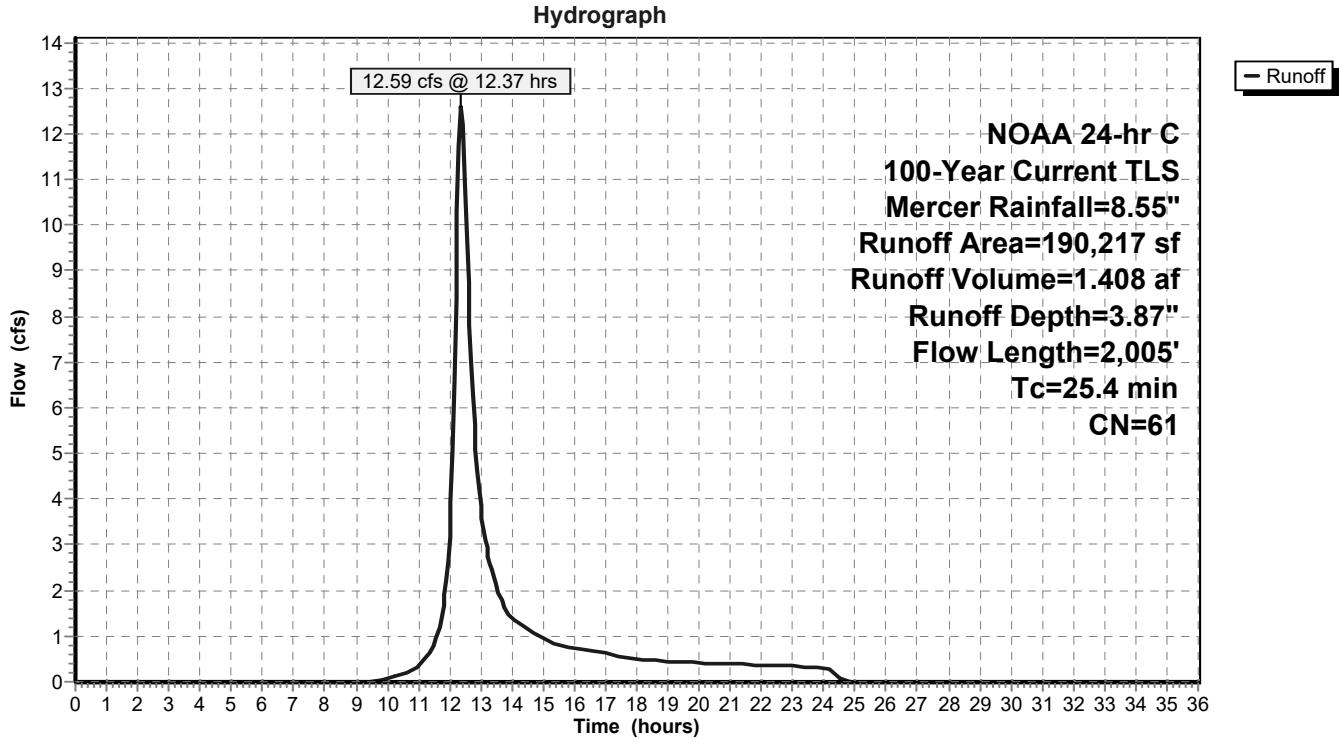
Runoff = 12.59 cfs @ 12.37 hrs, Volume= 1.408 af, Depth= 3.87"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
10,383	55	Woods, Good, HSG B
1,167	70	Woods, Good, HSG C
171,409	61	>75% Grass cover, Good, HSG B
7,258	74	>75% Grass cover, Good, HSG C
190,217	61	Weighted Average
190,217		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	56	0.0180	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34"
8.2	906	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.5	377	0.0030	1.81	65.11	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
25.4	2,005	Total			

Subcatchment 1Sc: DA-1c



Summary for Subcatchment 1Sd: DA-1d

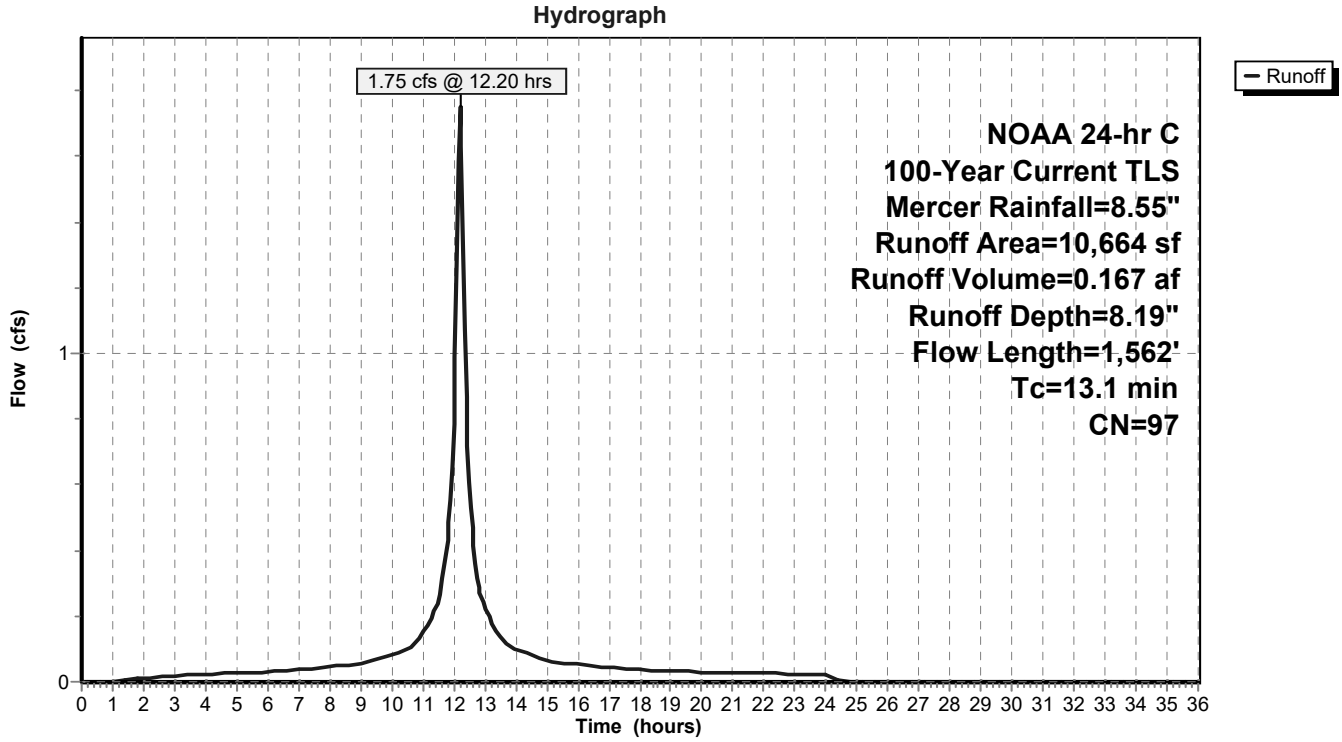
Runoff = 1.75 cfs @ 12.20 hrs, Volume= 0.167 af, Depth= 8.19"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	4,698	98	Paved parking, HSG B (Vehicular)
*	5,966	96	Gravel surface, HSG B (Vehicular)
	10,664	97	Weighted Average
	5,966		55.95% Pervious Area
	4,698		44.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.22		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
6.9	733	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	243	0.0320	3.65	21.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
13.1	1,562	Total			

Subcatchment 1Sd: DA-1d



Summary for Subcatchment 2Sa: DA-2a

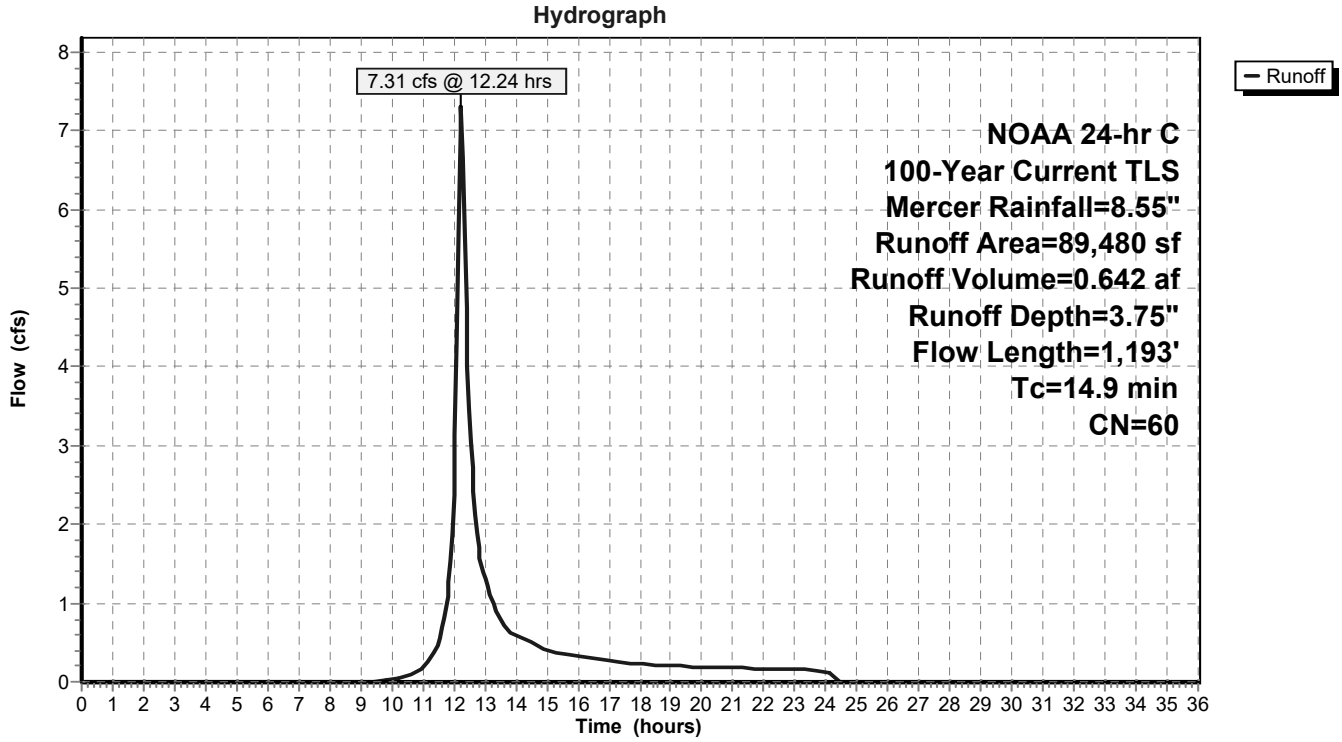
Runoff = 7.31 cfs @ 12.24 hrs, Volume= 0.642 af, Depth= 3.75"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
16,278	55	Woods, Good, HSG B
73,005	61	>75% Grass cover, Good, HSG B
197	80	>75% Grass cover, Good, HSG D
89,480	60	Weighted Average
89,480		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
0.3	29	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,193	Total			

Subcatchment 2Sa: DA-2a



Summary for Subcatchment 2Sb: DA-2b

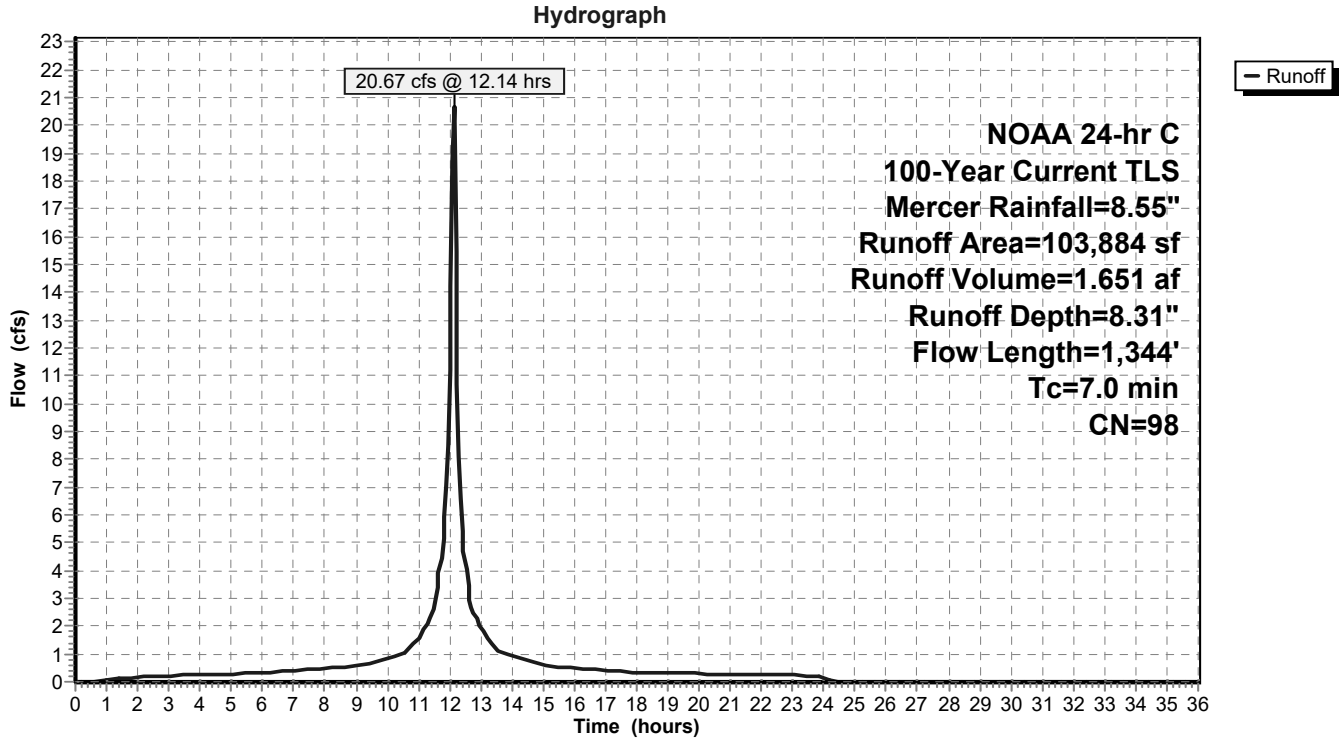
Runoff = 20.67 cfs @ 12.14 hrs, Volume= 1.651 af, Depth= 8.31"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	39,492	98	Paved parking, HSG B (Vehicular)
*	61,715	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	2,677	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	103,884	98	Weighted Average
	103,884		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
7.0	1,344	Total			

Subcatchment 2Sb: DA-2b



Summary for Subcatchment 2Sc: DA-2c

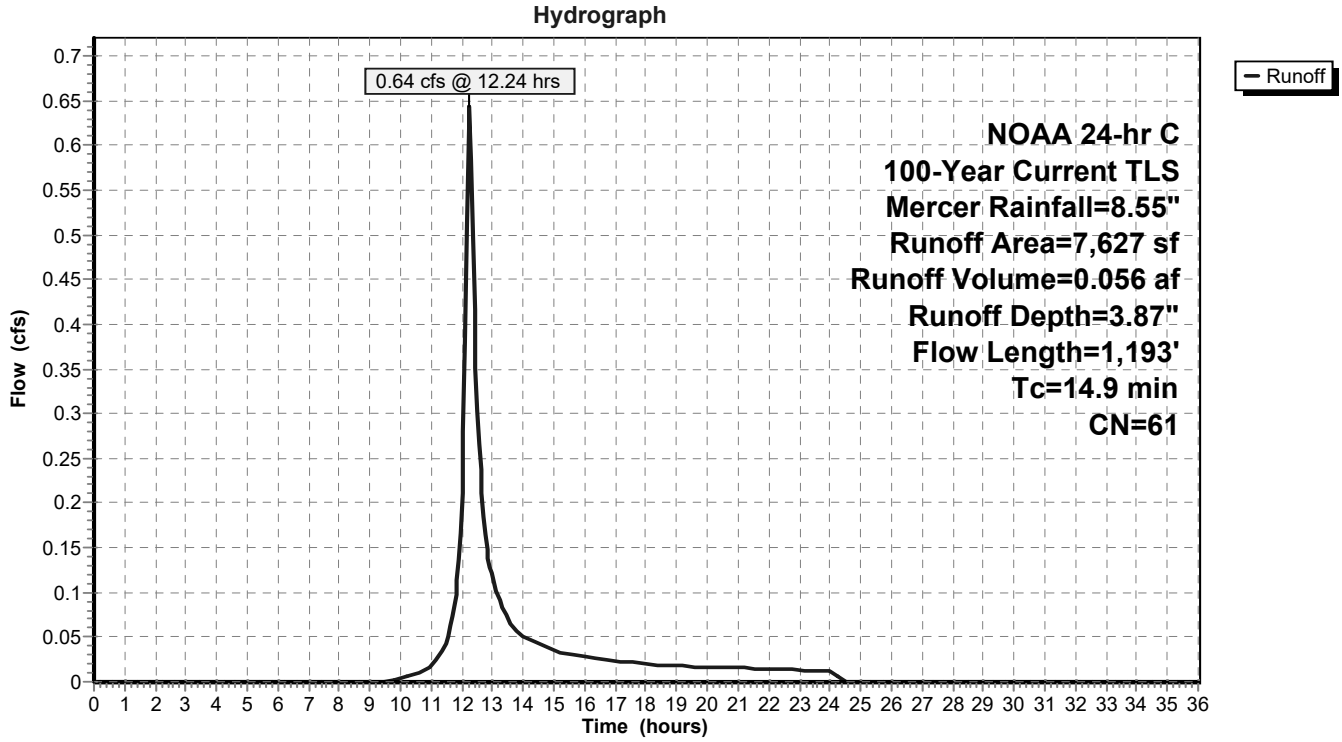
Runoff = 0.64 cfs @ 12.24 hrs, Volume= 0.056 af, Depth= 3.87"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
7,627	61	>75% Grass cover, Good, HSG B
7,627		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
0.3	29	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,193	Total			

Subcatchment 2Sc: DA-2c



Summary for Subcatchment 2Sd: DA-2d

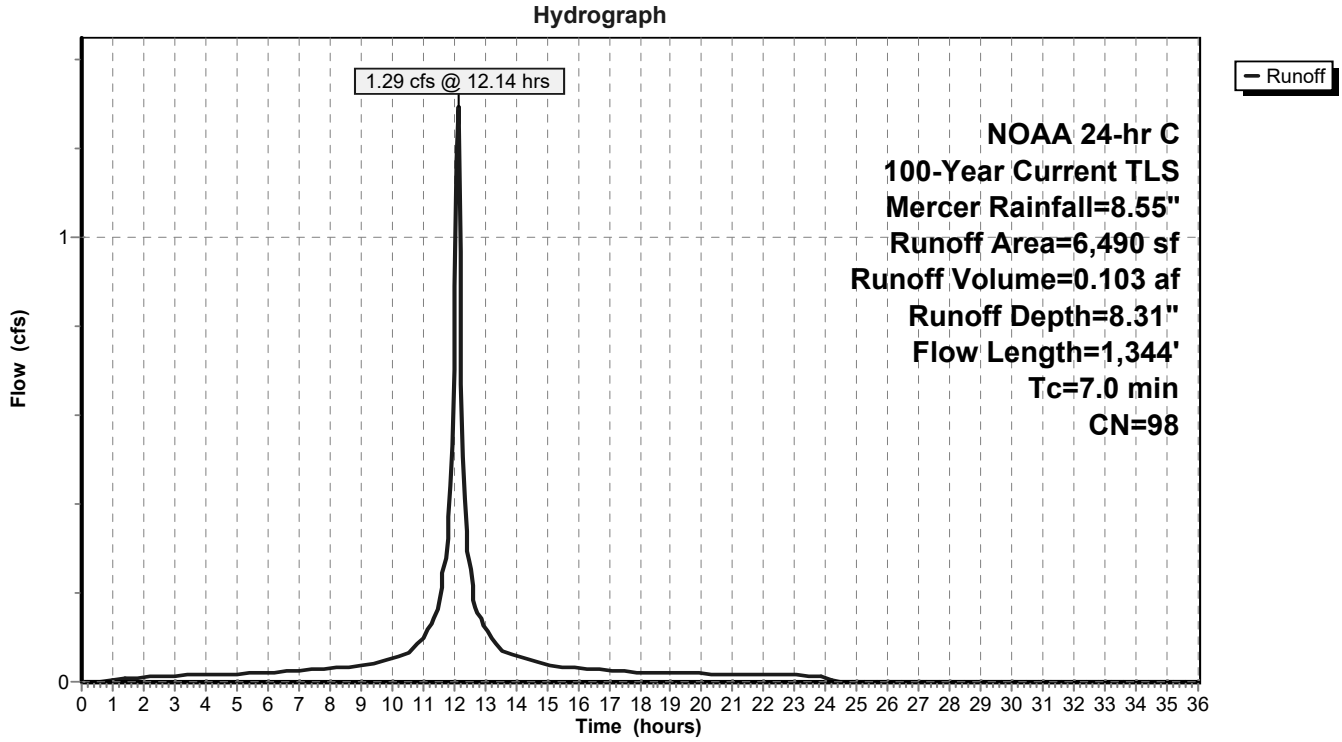
Runoff = 1.29 cfs @ 12.14 hrs, Volume= 0.103 af, Depth= 8.31"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	6,291	98	Paved parking, HSG B (Vehicular)
*	199	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	6,490	98	Weighted Average
	6,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
7.0	1,344	Total			

Subcatchment 2Sd: DA-2d



Summary for Subcatchment 3Sa: DA-3a

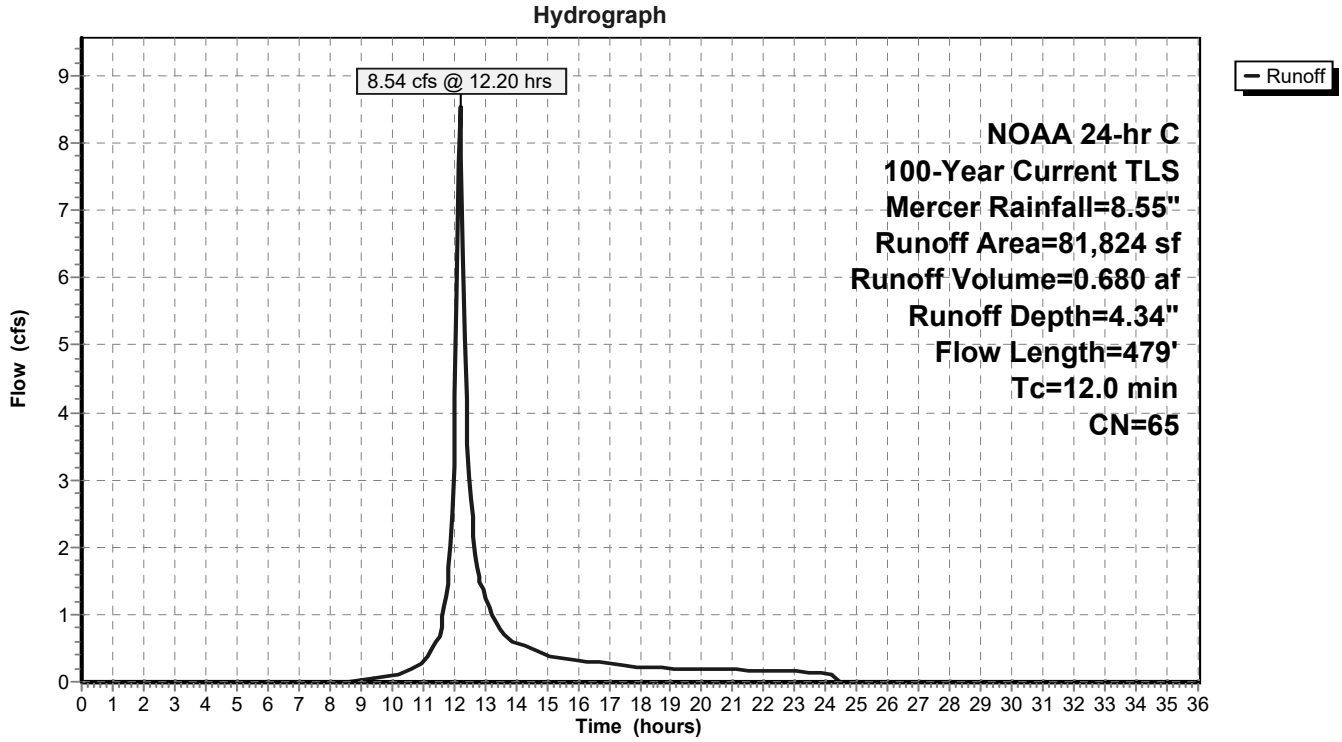
Runoff = 8.54 cfs @ 12.20 hrs, Volume= 0.680 af, Depth= 4.34"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
21,739	55	Woods, Good, HSG B
31,307	70	Woods, Good, HSG C
1,317	77	Woods, Good, HSG D
18,394	61	>75% Grass cover, Good, HSG B
3,641	74	>75% Grass cover, Good, HSG C
5,426	80	>75% Grass cover, Good, HSG D
81,824	65	Weighted Average
81,824		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.8	179	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
12.0	479	Total			

Subcatchment 3Sa: DA-3a



Summary for Subcatchment 3Sb: DA-3b

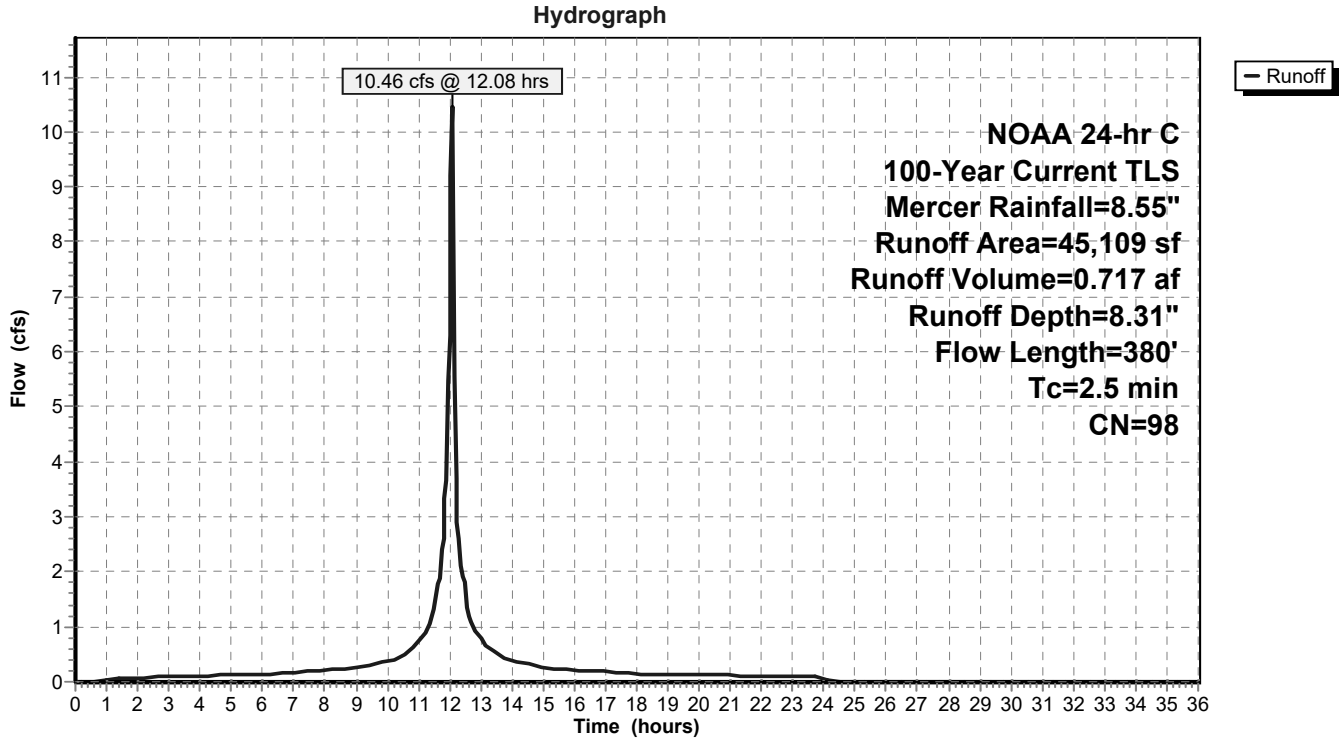
Runoff = 10.46 cfs @ 12.08 hrs, Volume= 0.717 af, Depth= 8.31"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	14,685	98	Paved parking, HSG B (Vehicular)
*	26,070	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	1,571	98	Paved parking, HSG C (Vehicular)
*	425	98	Paved parking, HSG D (Vehicular)
*	2,358	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	45,109	98	Weighted Average
	45,109		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.32		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
0.2	39	0.0410	3.04		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
2.5	380	Total			

Subcatchment 3Sb: DA-3b



Summary for Subcatchment 3Sc: DA-3c

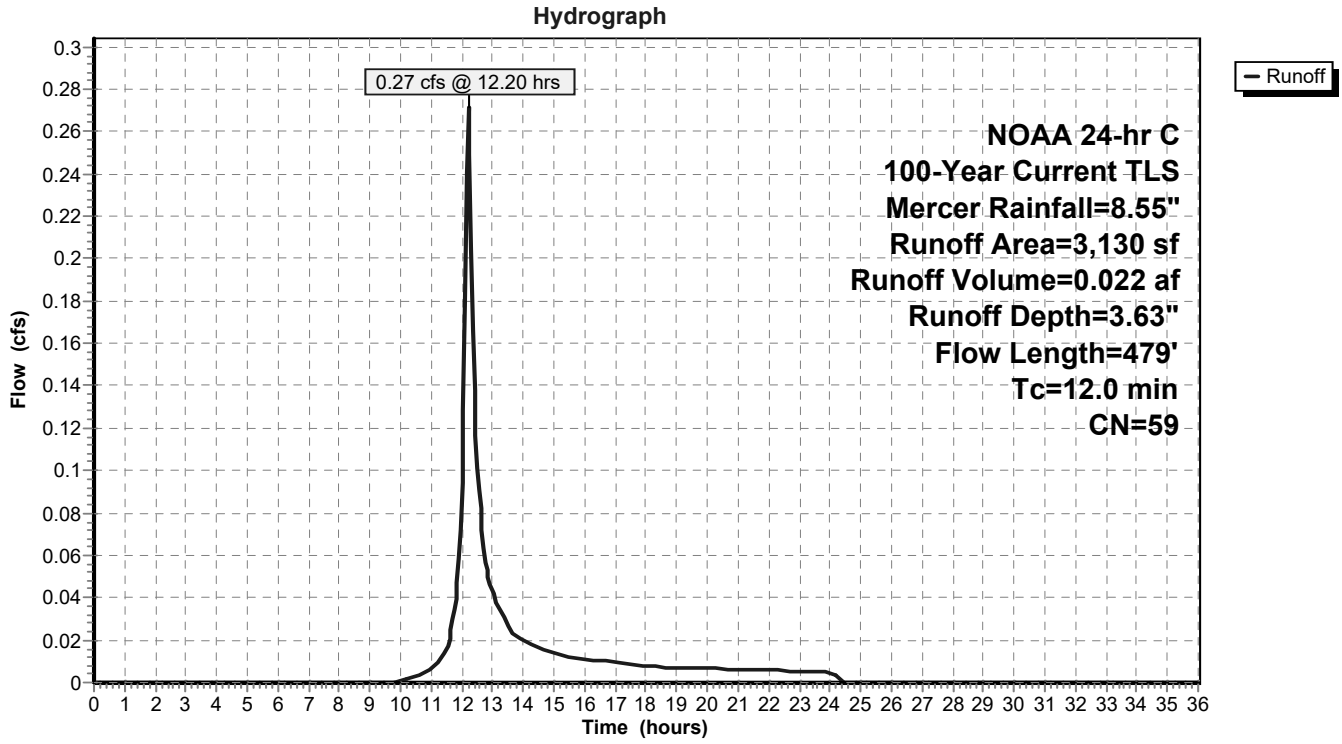
Runoff = 0.27 cfs @ 12.20 hrs, Volume= 0.022 af, Depth= 3.63"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
1,286	55	Woods, Good, HSG B
1,844	61	>75% Grass cover, Good, HSG B
3,130	59	Weighted Average
3,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.8	179	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
12.0	479	Total			

Subcatchment 3Sc: DA-3c



Summary for Subcatchment 3Sd: DA-3d

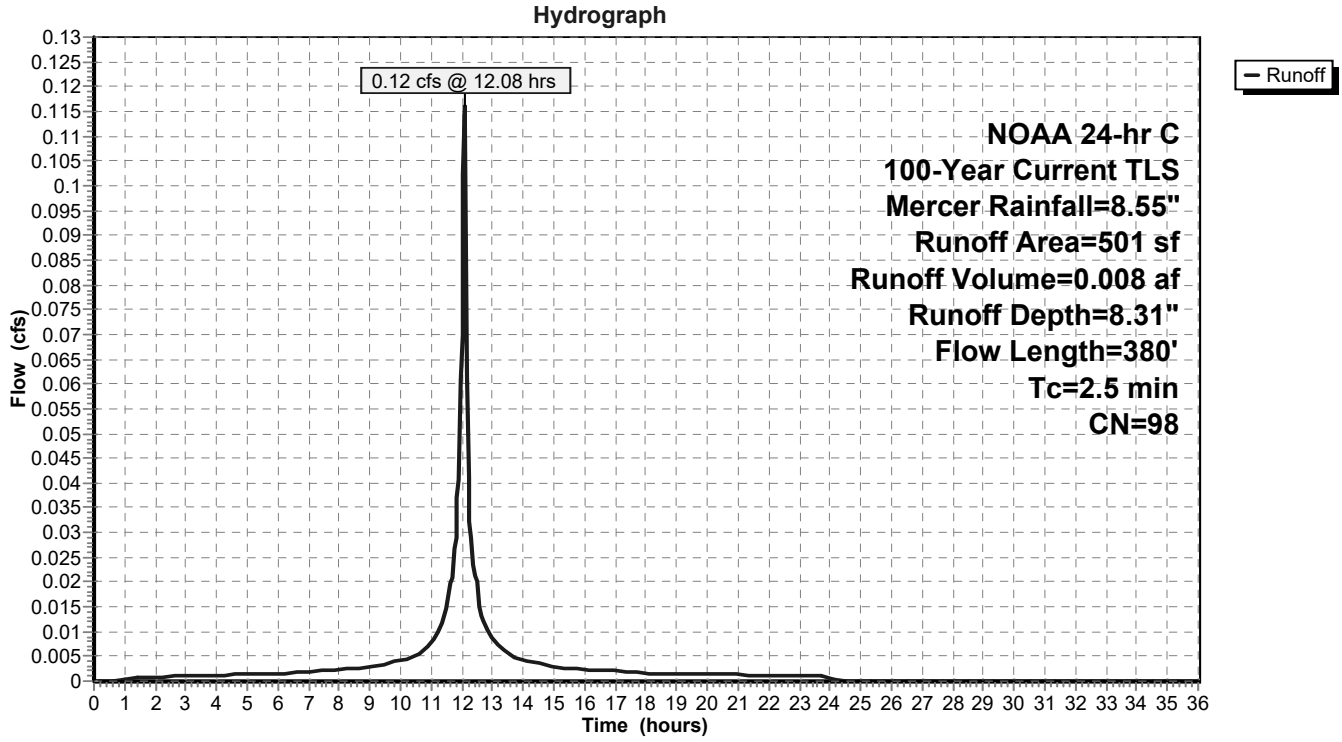
Runoff = 0.12 cfs @ 12.08 hrs, Volume= 0.008 af, Depth= 8.31"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	501	98	Paved parking, HSG B (Vehicular)
	501		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.32		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
0.2	39	0.0410	3.04		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	4.19	25.13	**Channel Flow,** Area= 6.0 sf Perim= 16.0' r= 0.38' n= 0.035
2.5	380	Total			

Subcatchment 3Sd: DA-3d



Summary for Subcatchment 4Sa: DA-4a

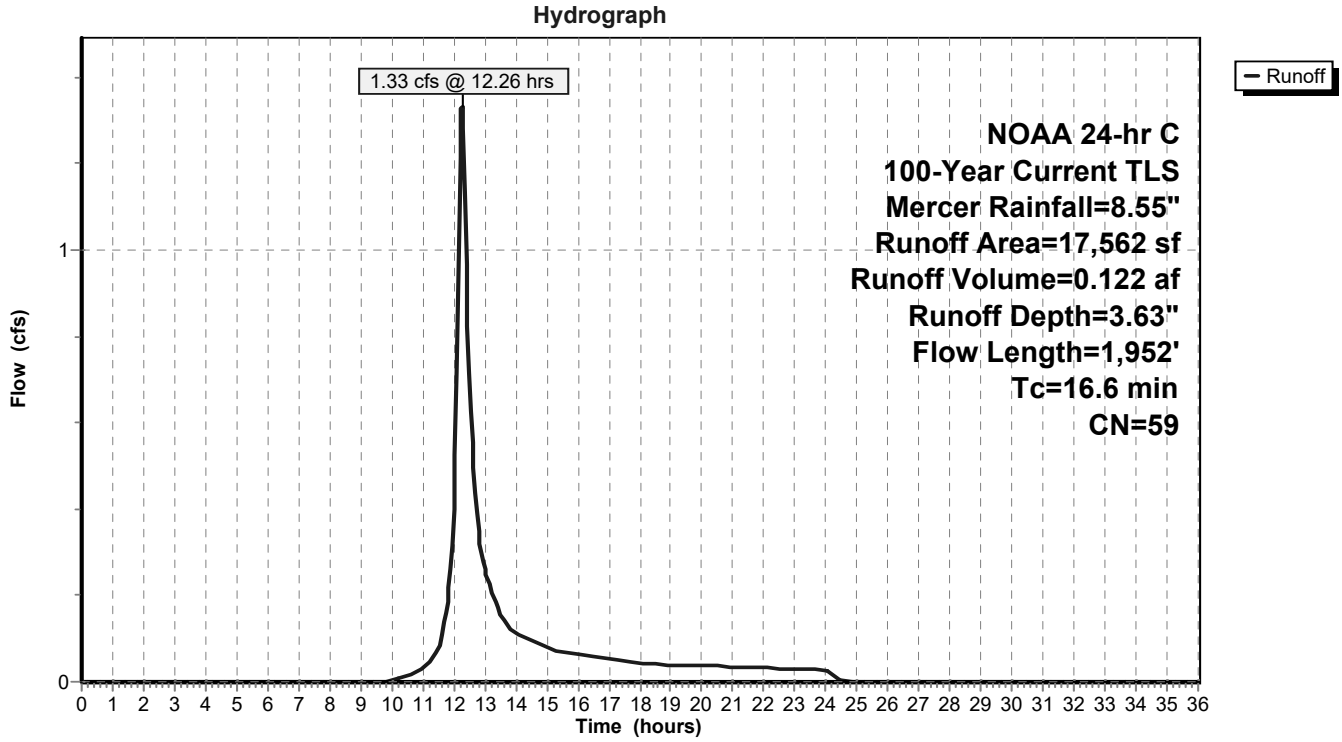
Runoff = 1.33 cfs @ 12.26 hrs, Volume= 0.122 af, Depth= 3.63"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
6,085	55	Woods, Good, HSG B
11,477	61	>75% Grass cover, Good, HSG B
17,562	59	Weighted Average
17,562		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	42	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.0	123	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
16.6	1,952	Total			

Subcatchment 4Sa: DA-4a



Summary for Subcatchment 4Sb: DA-4b

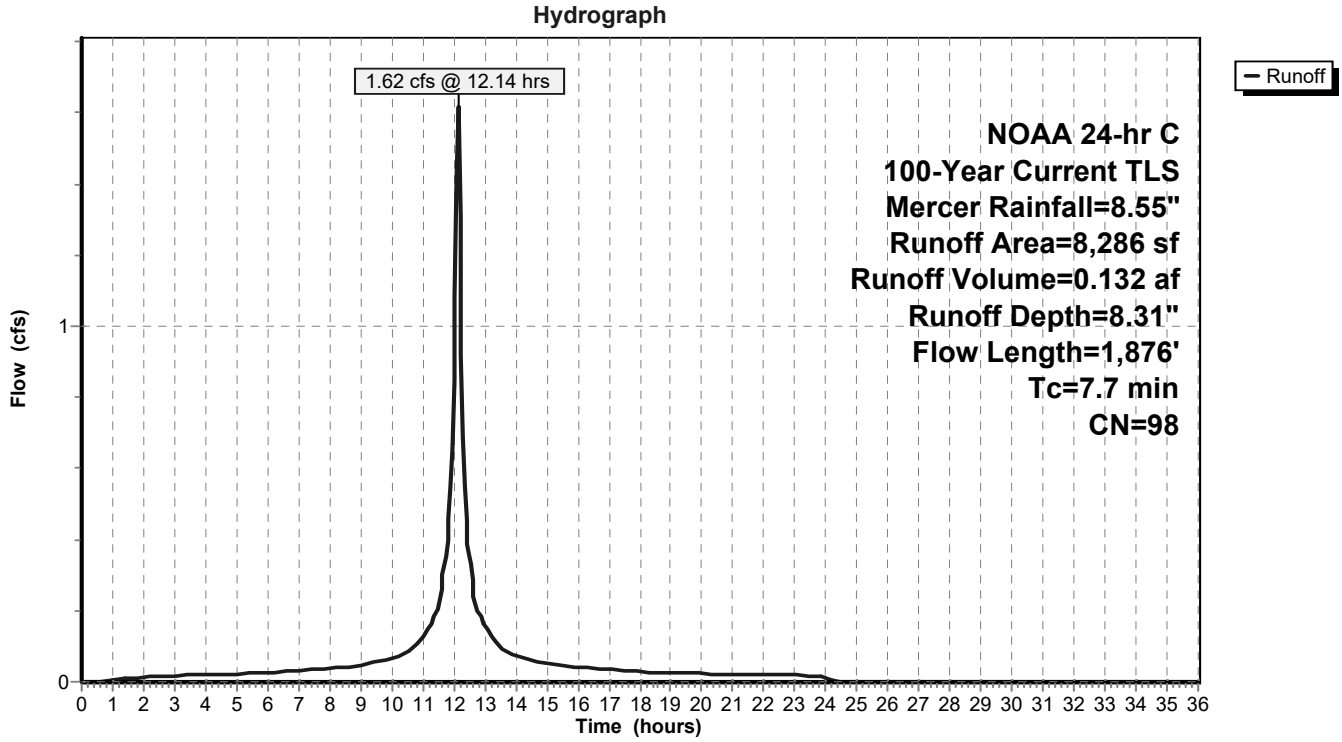
Runoff = 1.62 cfs @ 12.14 hrs, Volume= 0.132 af, Depth= 8.31"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	3,147	98	Paved parking, HSG B (Vehicular)
*	5,139	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	8,286	98	Weighted Average
	8,286		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.16		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
7.7	1,876	Total			

Subcatchment 4Sb: DA-4b



Summary for Subcatchment 4Sc: DA-4c

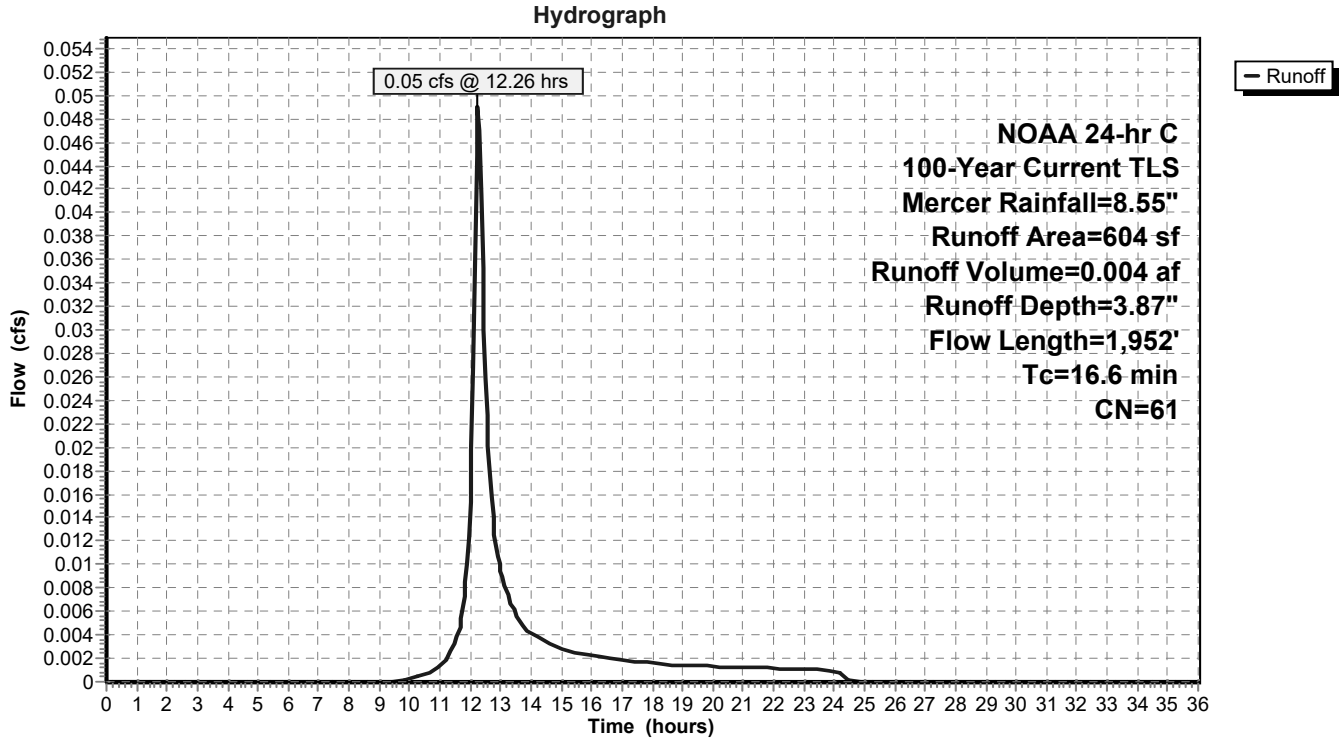
Runoff = 0.05 cfs @ 12.26 hrs, Volume= 0.004 af, Depth= 3.87"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
604	61	>75% Grass cover, Good, HSG B
604		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	42	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.0	123	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
16.6	1,952	Total			

Subcatchment 4Sc: DA-4c



Summary for Subcatchment 4Sd: DA-4d

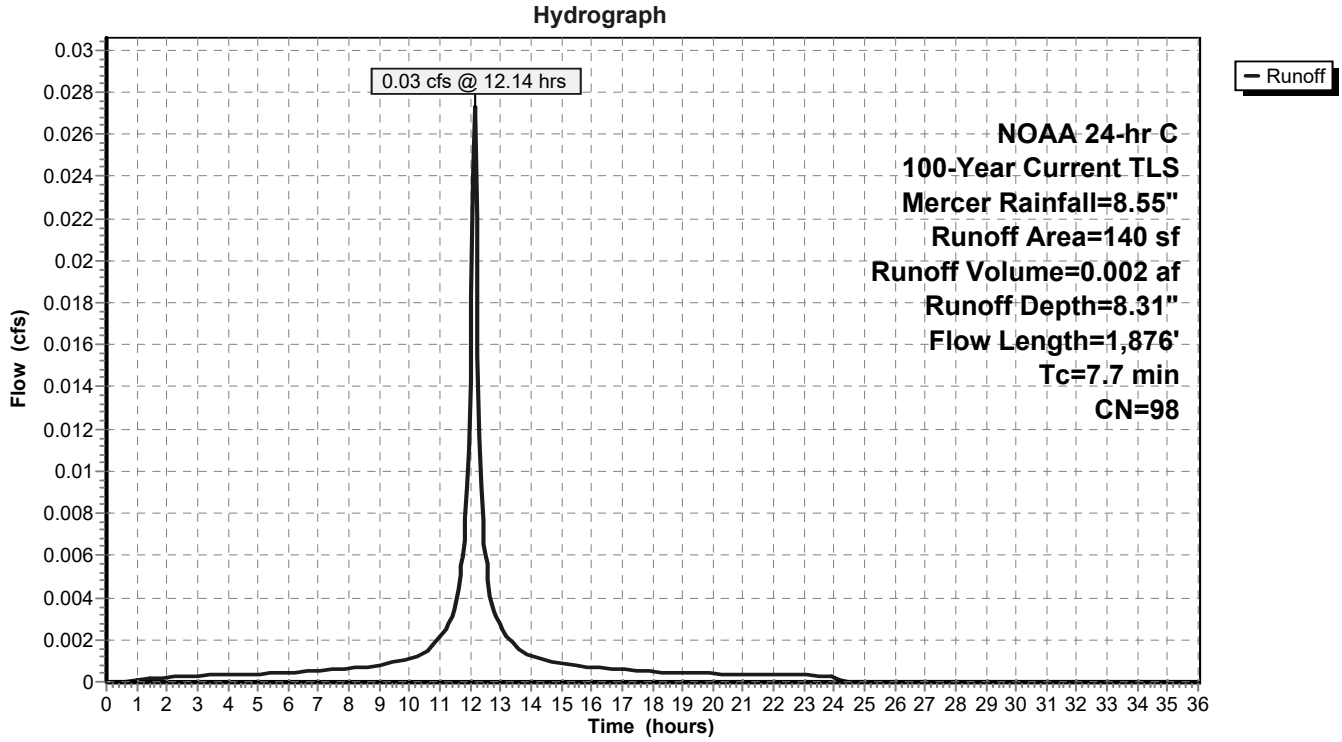
Runoff = 0.03 cfs @ 12.14 hrs, Volume= 0.002 af, Depth= 8.31"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	140	98	Paved parking, HSG B (Vehicular)
	140		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.16		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
7.7	1,876	Total			

Subcatchment 4Sd: DA-4d



Summary for Reach 5R: Reach to On Stream Pond

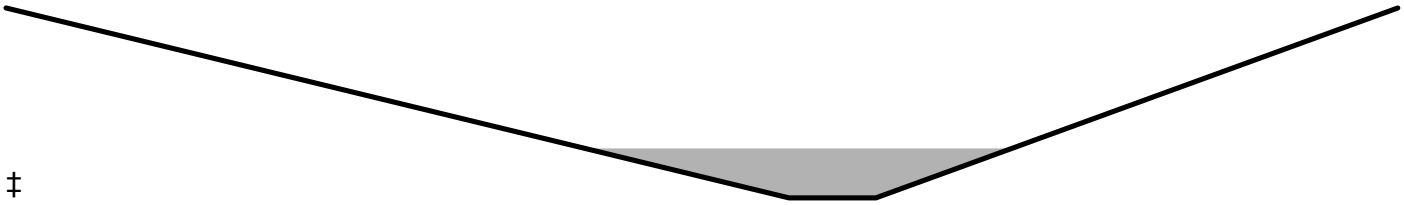
Stream Tributary 'B' to Shipetaukin Creek

Inflow Area = 18.232 ac, 20.92% Impervious, Inflow Depth = 5.02" for 100-Year Current TLS, Mercer event
Inflow = 61.37 cfs @ 12.17 hrs, Volume= 7.632 af
Outflow = 57.79 cfs @ 12.37 hrs, Volume= 7.632 af, Atten= 6%, Lag= 11.8 min
Routed to Link 5L : Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.57 fps, Min. Travel Time= 5.6 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 16.4 min

Peak Storage= 19,388 cf @ 12.27 hrs
Average Depth at Peak Storage= 1.56' , Surface Width= 39.22'
Bank-Full Depth= 6.00' Flow Area= 408.0 sf, Capacity= 1,446.01 cfs

8.00' x 6.00' deep channel, n= 0.045
Side Slope Z-value= 12.0 8.0 '/' Top Width= 128.00'
Length= 526.0' Slope= 0.0025 '/'
Inlet Invert= 91.30', Outlet Invert= 90.00'



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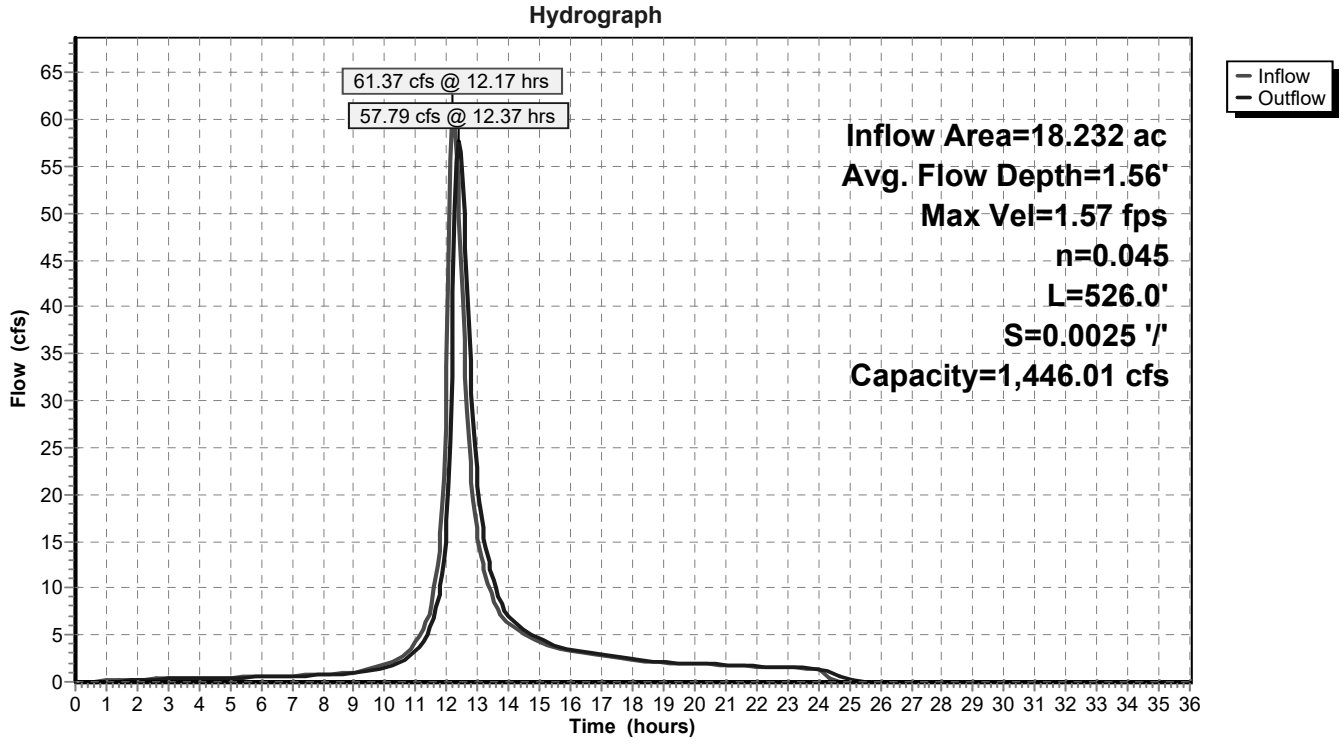
Reach 5R: Reach to On Stream Pond

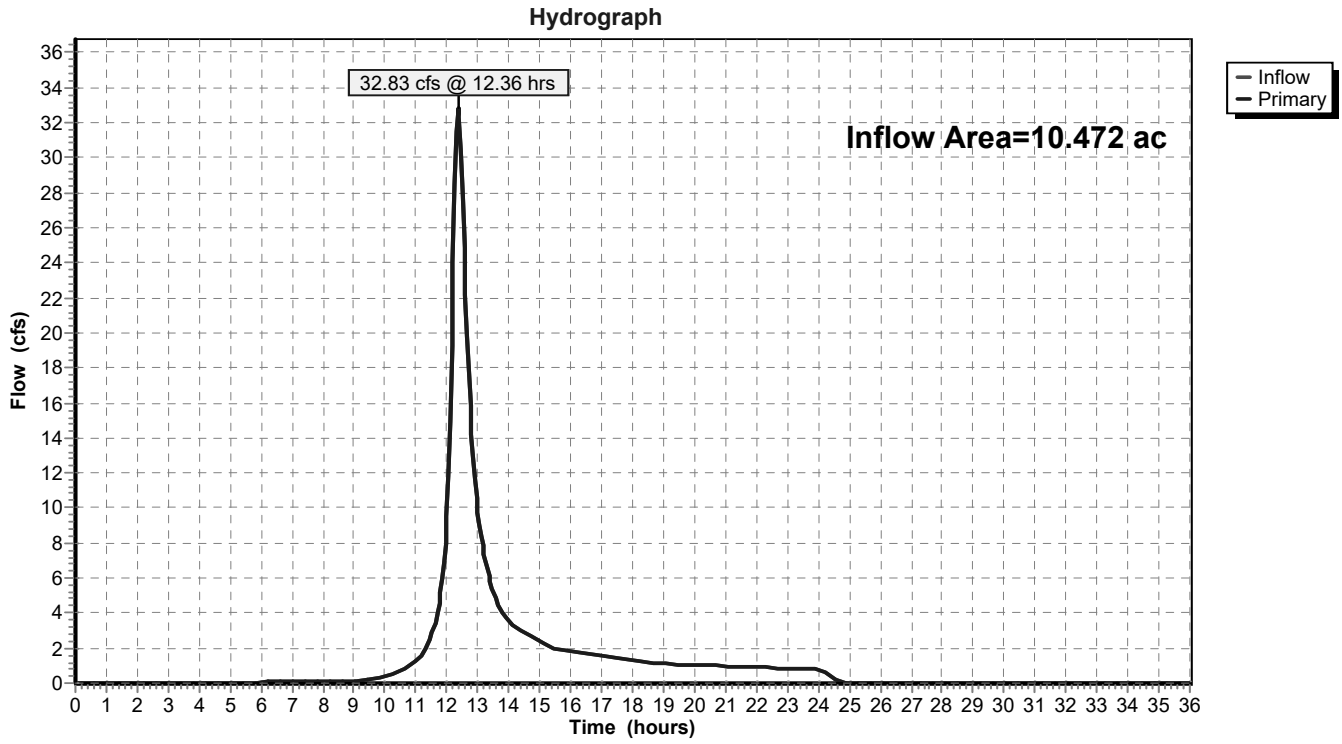


Summary for Link 1L: DA-1 COM HYD

Inflow Area = 10.472 ac, 2.23% Impervious, Inflow Depth = 4.30" for 100-Year Current TLS, Mercer event
Inflow = 32.83 cfs @ 12.36 hrs, Volume= 3.752 af
Primary = 32.83 cfs @ 12.36 hrs, Volume= 3.752 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1L: DA-1 COM HYD

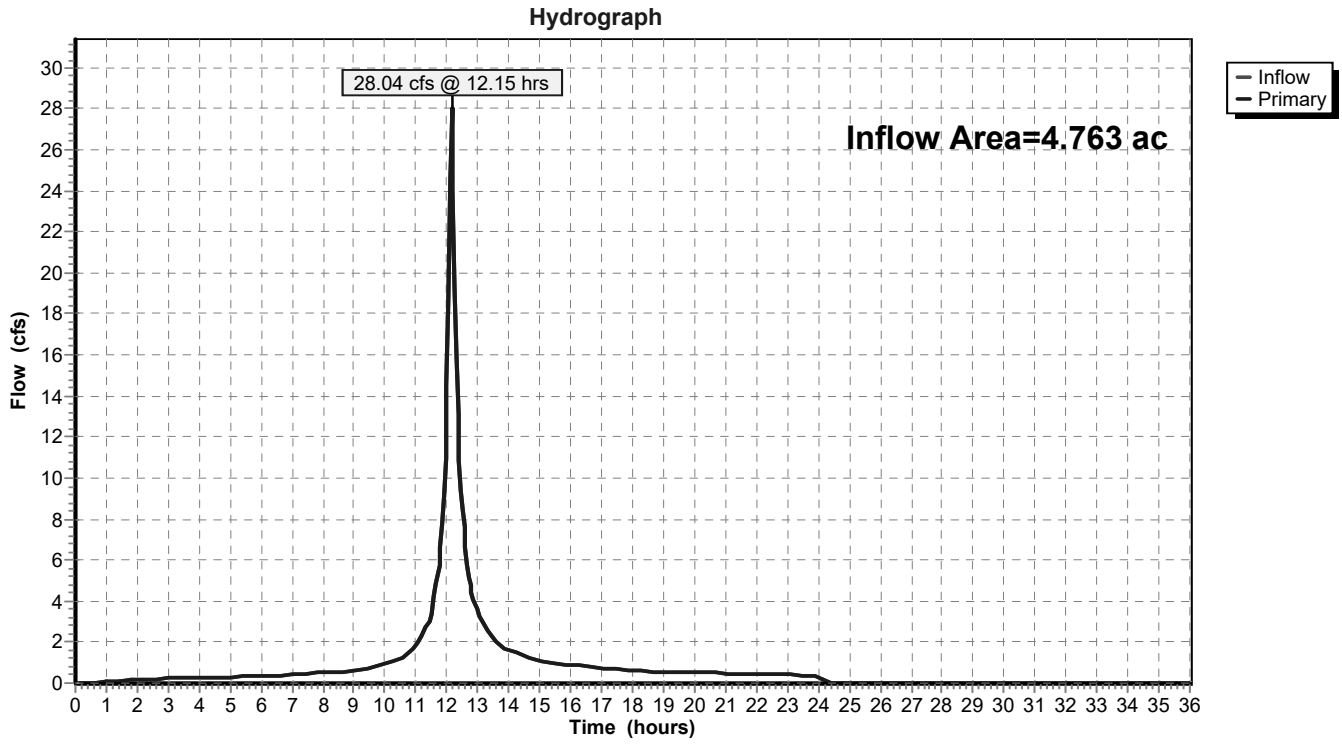


Summary for Link 2L: DA-2 COM HYD

Inflow Area = 4.763 ac, 53.20% Impervious, Inflow Depth = 6.18" for 100-Year Current TLS, Mercer event
Inflow = 28.04 cfs @ 12.15 hrs, Volume= 2.453 af
Primary = 28.04 cfs @ 12.15 hrs, Volume= 2.453 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: DA-2 COM HYD

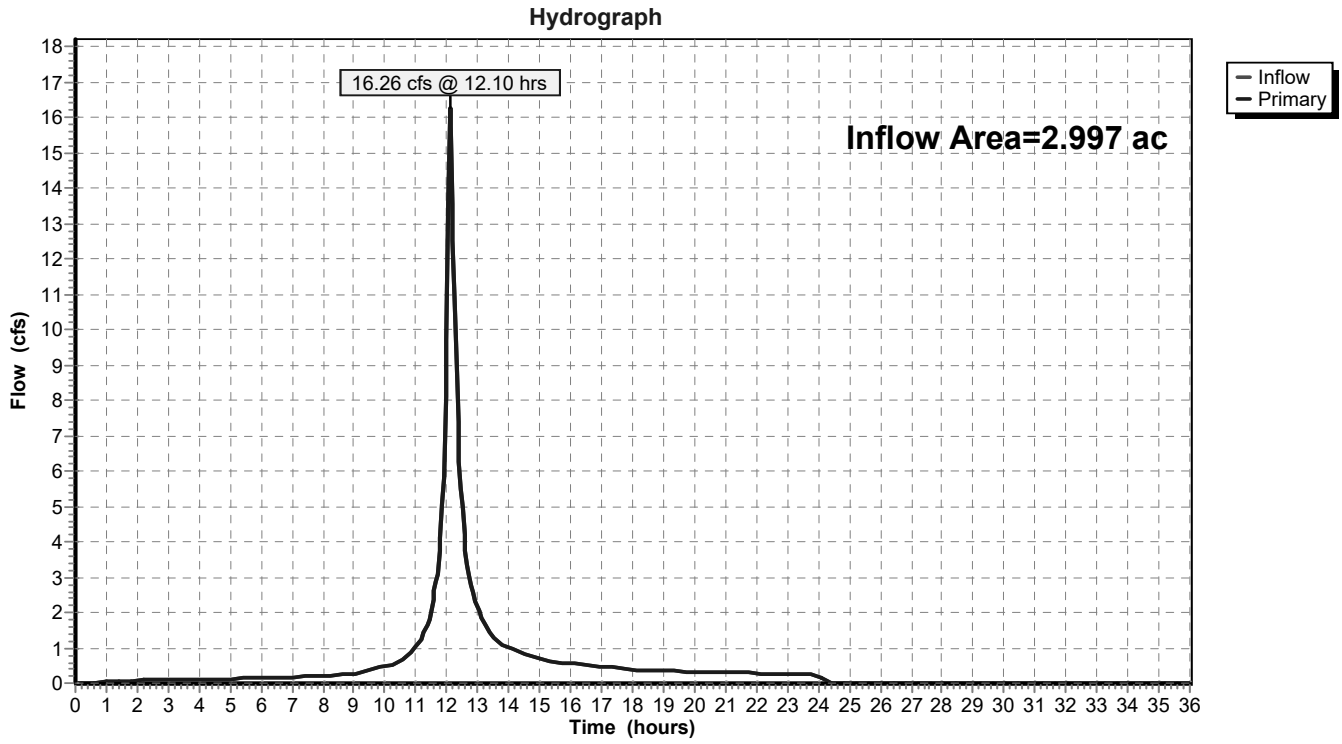


Summary for Link 3L: DA-3 COM HYD

Inflow Area = 2.997 ac, 34.93% Impervious, Inflow Depth = 5.71" for 100-Year Current TLS, Mercer event
Inflow = 16.26 cfs @ 12.10 hrs, Volume= 1.427 af
Primary = 16.26 cfs @ 12.10 hrs, Volume= 1.427 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 3L: DA-3 COM HYD

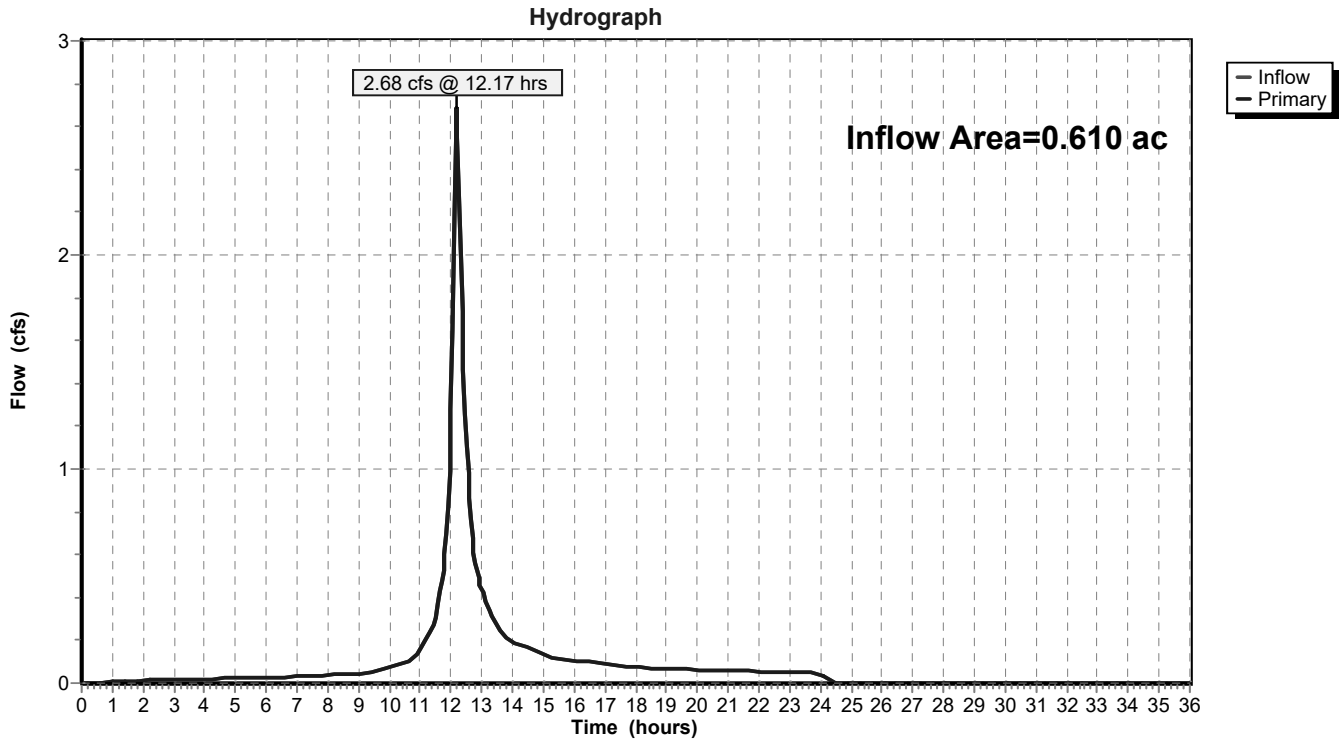


Summary for Link 4L: DA-4 COM HYD

Inflow Area = 0.610 ac, 31.69% Impervious, Inflow Depth = 5.12" for 100-Year Current TLS, Mercer event
Inflow = 2.68 cfs @ 12.17 hrs, Volume= 0.261 af
Primary = 2.68 cfs @ 12.17 hrs, Volume= 0.261 af, Atten= 0%, Lag= 0.0 min
Routed to Link 5L : Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 4L: DA-4 COM HYD

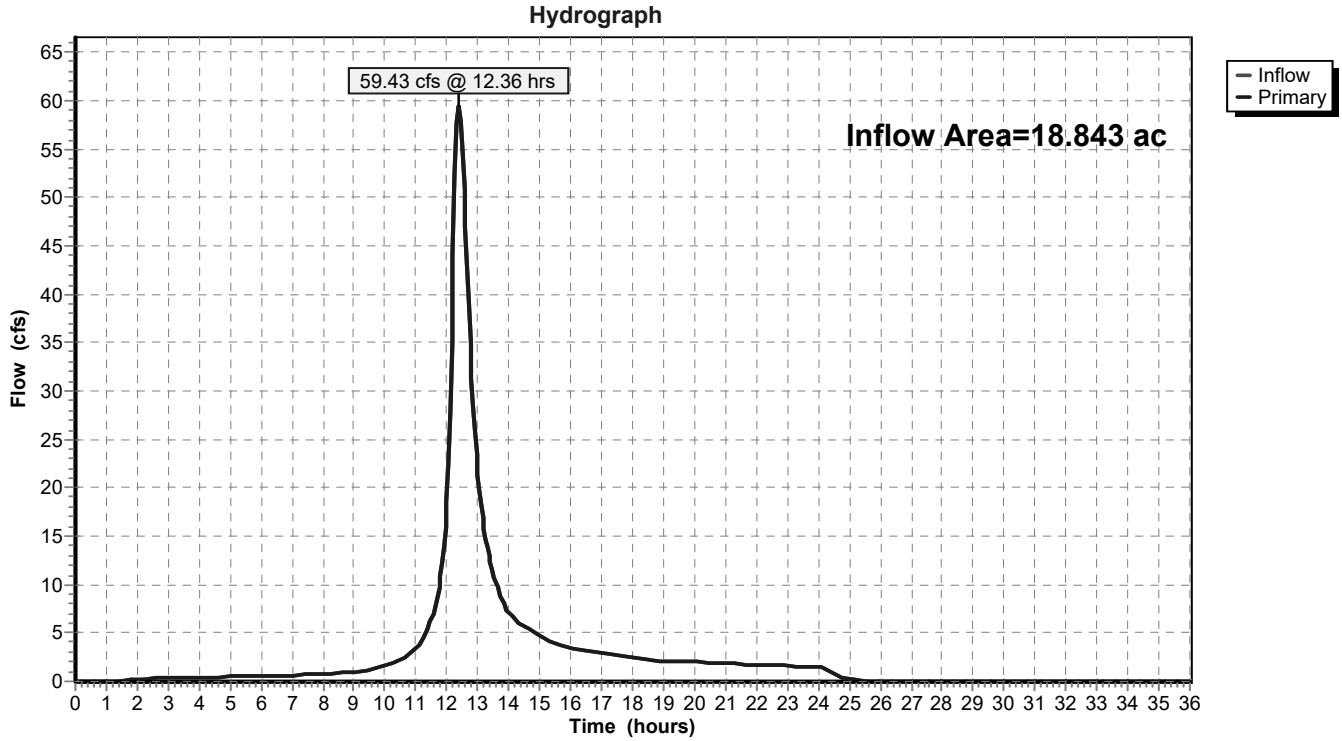


Summary for Link 5L: Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis

Inflow Area = 18.843 ac, 21.27% Impervious, Inflow Depth = 5.03" for 100-Year Current TLS, Mercer event
Inflow = 59.43 cfs @ 12.36 hrs, Volume= 7.893 af
Primary = 59.43 cfs @ 12.36 hrs, Volume= 7.893 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 5L: Existing: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]



ALLOWABLE FLOWS

22-019 Allowable R0 (10-24-23)
Prepared by The Reynolds Group, Inc
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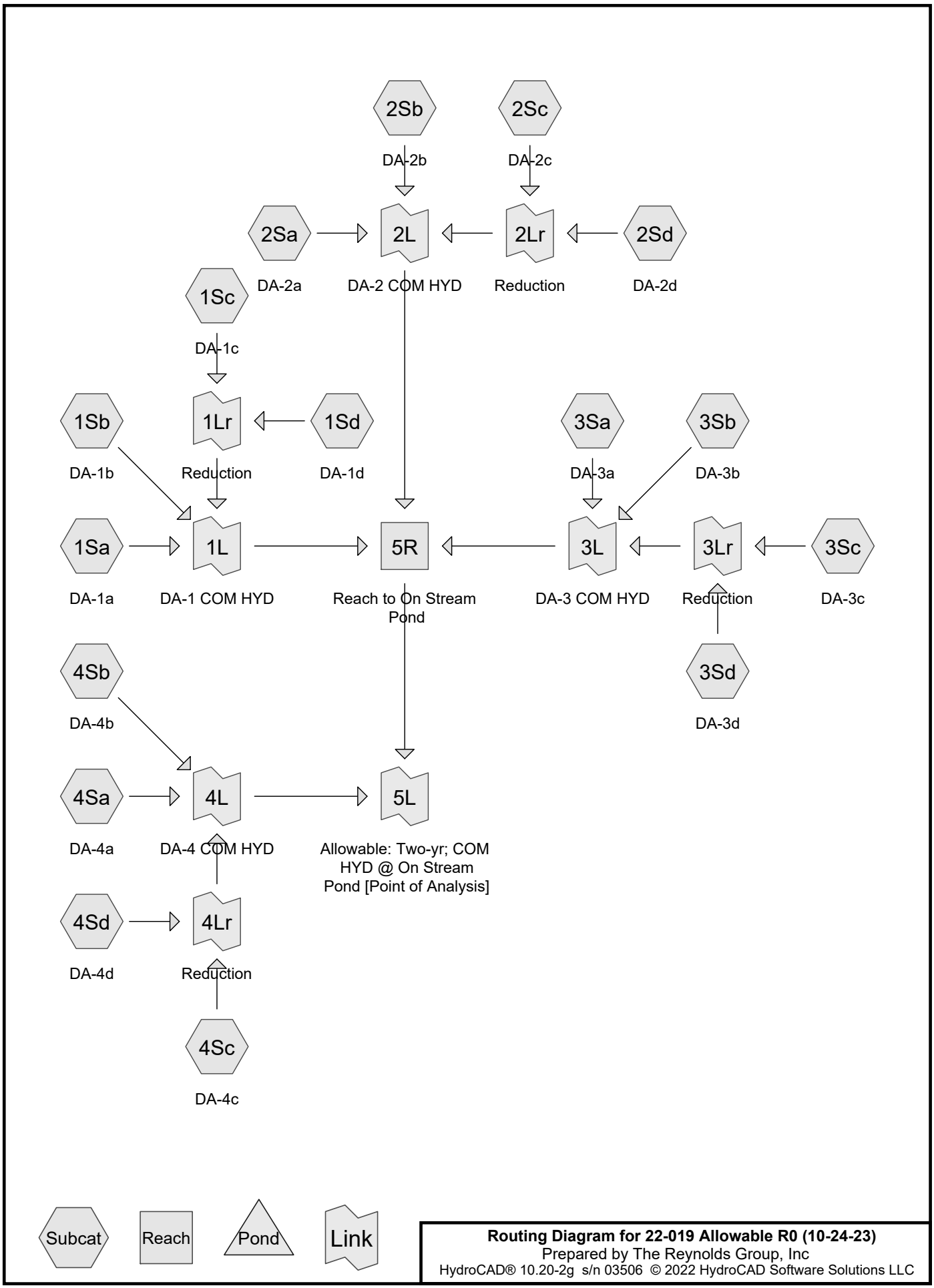


Routing Diagram for 22-019 Allowable R0 (10-24-23)
Prepared by The Reynolds Group, Inc
HydroCAD® 10.20-2g s/n 03506 © 2022 HydroCAD Software Solutions LLC

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1Sa: DA-1a Runoff Area=247,625 sf 0.00% Impervious Runoff Depth=0.67"
Flow Length=2,005' Tc=25.4 min CN=65 Runoff=2.34 cfs 0.317 af

Subcatchment 1Sb: DA-1b Runoff Area=7,638 sf 71.60% Impervious Runoff Depth=3.00"
Flow Length=1,562' Tc=13.1 min CN=97 Runoff=0.48 cfs 0.044 af

Subcatchment 1Sc: DA-1c Runoff Area=190,217 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=2,005' Tc=25.4 min CN=61 Runoff=1.15 cfs 0.183 af

Subcatchment 1Sd: DA-1d Runoff Area=10,664 sf 44.05% Impervious Runoff Depth=3.00"
Flow Length=1,562' Tc=13.1 min CN=97 Runoff=0.67 cfs 0.061 af

Subcatchment 2Sa: DA-2a Runoff Area=89,480 sf 0.00% Impervious Runoff Depth=0.46"
Flow Length=1,193' Tc=14.9 min CN=60 Runoff=0.60 cfs 0.079 af

Subcatchment 2Sb: DA-2b Runoff Area=103,884 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=1,344' Tc=7.0 min CN=98 Runoff=8.00 cfs 0.617 af

Subcatchment 2Sc: DA-2c Runoff Area=7,627 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=1,193' Tc=14.9 min CN=61 Runoff=0.06 cfs 0.007 af

Subcatchment 2Sd: DA-2d Runoff Area=6,490 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=1,344' Tc=7.0 min CN=98 Runoff=0.50 cfs 0.039 af

Subcatchment 3Sa: DA-3a Runoff Area=81,824 sf 0.00% Impervious Runoff Depth=0.67"
Flow Length=479' Tc=12.0 min CN=65 Runoff=1.10 cfs 0.105 af

Subcatchment 3Sb: DA-3b Runoff Area=45,109 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=380' Tc=2.5 min CN=98 Runoff=4.05 cfs 0.268 af

Subcatchment 3Sc: DA-3c Runoff Area=3,130 sf 0.00% Impervious Runoff Depth=0.43"
Flow Length=479' Tc=12.0 min CN=59 Runoff=0.02 cfs 0.003 af

Subcatchment 3Sd: DA-3d Runoff Area=501 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=380' Tc=2.5 min CN=98 Runoff=0.04 cfs 0.003 af

Subcatchment 4Sa: DA-4a Runoff Area=17,562 sf 0.00% Impervious Runoff Depth=0.43"
Flow Length=1,952' Tc=16.6 min CN=59 Runoff=0.10 cfs 0.014 af

Subcatchment 4Sb: DA-4b Runoff Area=8,286 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=1,876' Tc=7.7 min CN=98 Runoff=0.63 cfs 0.049 af

Subcatchment 4Sc: DA-4c Runoff Area=604 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=1,952' Tc=16.6 min CN=61 Runoff=0.00 cfs 0.001 af

Subcatchment 4Sd: DA-4d Runoff Area=140 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=1,876' Tc=7.7 min CN=98 Runoff=0.01 cfs 0.001 af

Reach 5R: Reach to On Stream Pond Avg. Flow Depth=0.71' Max Vel=1.01 fps Inflow=13.48 cfs 1.579 af
n=0.045 L=526.0' S=0.0025 '/' Capacity=1,446.01 cfs Outflow=10.83 cfs 1.579 af

Link 1L: DA-1 COM HYD Inflow=3.29 cfs 0.483 af
Primary=3.29 cfs 0.483 af

Link 1Lr: Reduction x 0.50 Inflow=1.45 cfs 0.244 af
Primary=0.73 cfs 0.122 af Secondary=0.73 cfs 0.122 af

Link 2L: DA-2 COM HYD Inflow=8.51 cfs 0.720 af
Primary=8.51 cfs 0.720 af

Link 2Lr: Reduction x 0.50 Inflow=0.53 cfs 0.046 af
Primary=0.26 cfs 0.023 af Secondary=0.26 cfs 0.023 af

Link 3L: DA-3 COM HYD Inflow=4.55 cfs 0.376 af
Primary=4.55 cfs 0.376 af

Link 3Lr: Reduction x 0.50 Inflow=0.05 cfs 0.006 af
Primary=0.02 cfs 0.003 af Secondary=0.02 cfs 0.003 af

Link 4L: DA-4 COM HYD Inflow=0.66 cfs 0.064 af
Primary=0.66 cfs 0.064 af

Link 4Lr: Reduction x 0.50 Inflow=0.01 cfs 0.001 af
Primary=0.01 cfs 0.001 af Secondary=0.01 cfs 0.001 af

Link 5L: Allowable: Two-yr; COM HYD @ On Stream Pond [Point of Analysis] Inflow=11.13 cfs 1.643 af
Primary=11.13 cfs 1.643 af

Total Runoff Area = 18.843 ac Runoff Volume = 1.791 af Average Runoff Depth = 1.14"
78.73% Pervious = 14.835 ac 21.27% Impervious = 4.008 ac

Summary for Subcatchment 1Sa: DA-1a

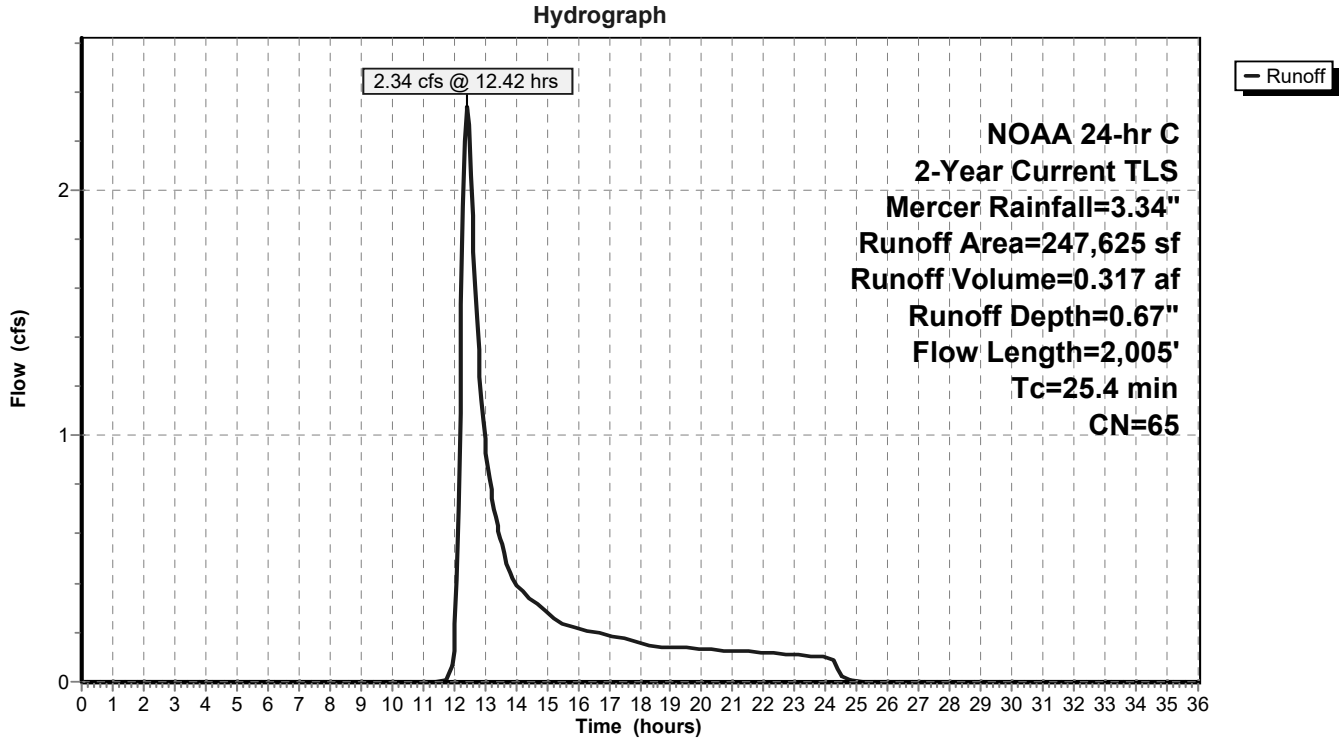
Runoff = 2.34 cfs @ 12.42 hrs, Volume= 0.317 af, Depth= 0.67"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
19,250	55	Woods, Good, HSG B
80,094	70	Woods, Good, HSG C
116,446	61	>75% Grass cover, Good, HSG B
31,835	74	>75% Grass cover, Good, HSG C
247,625	65	Weighted Average
247,625		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	56	0.0180	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
8.2	906	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.5	377	0.0030	1.81	65.11	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
25.4	2,005	Total			

Subcatchment 1Sa: DA-1a



Summary for Subcatchment 1Sb: DA-1b

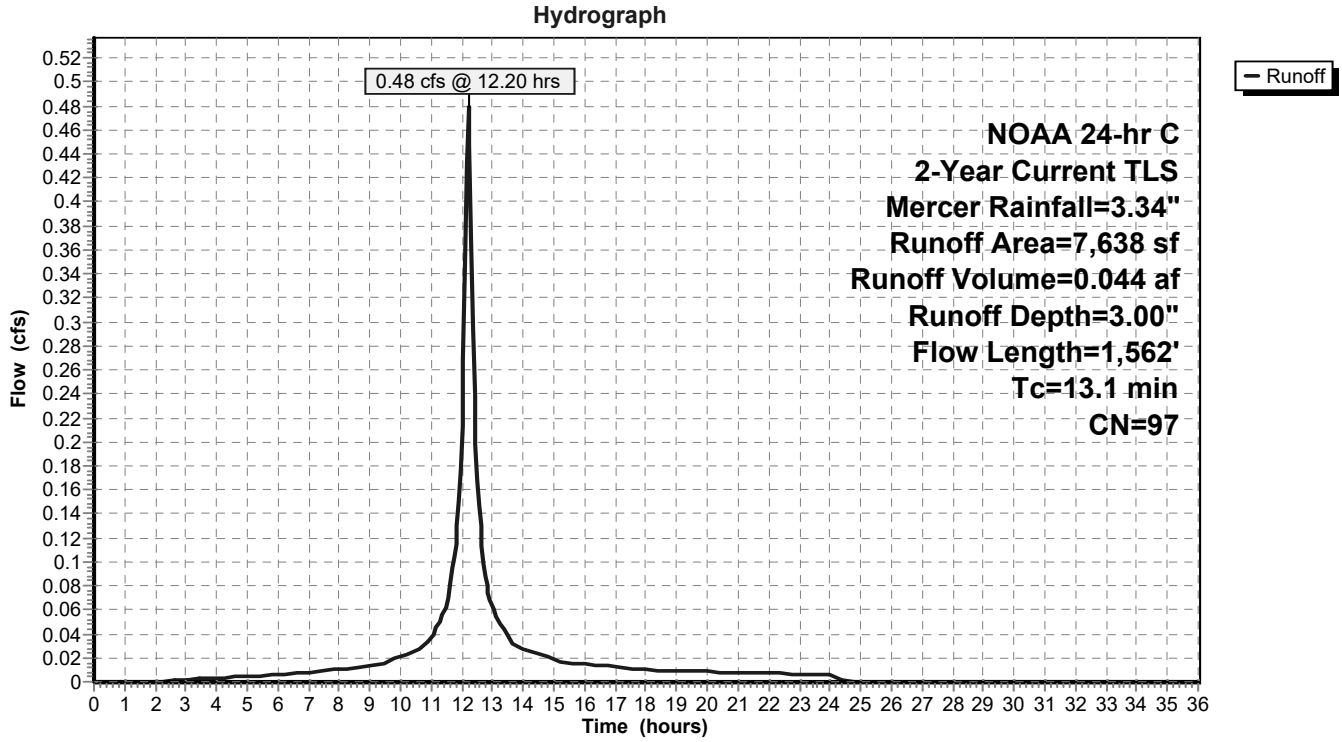
Runoff = 0.48 cfs @ 12.20 hrs, Volume= 0.044 af, Depth= 3.00"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	5,469	98	Paved parking, HSG B (Vehicular)
*	2,169	96	Gravel surface, HSG B (Vehicular)
	7,638	97	Weighted Average
	2,169		28.40% Pervious Area
	5,469		71.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.22		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
6.9	733	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	243	0.0320	3.65	21.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
13.1	1,562	Total			

Subcatchment 1Sb: DA-1b



Summary for Subcatchment 1Sc: DA-1c

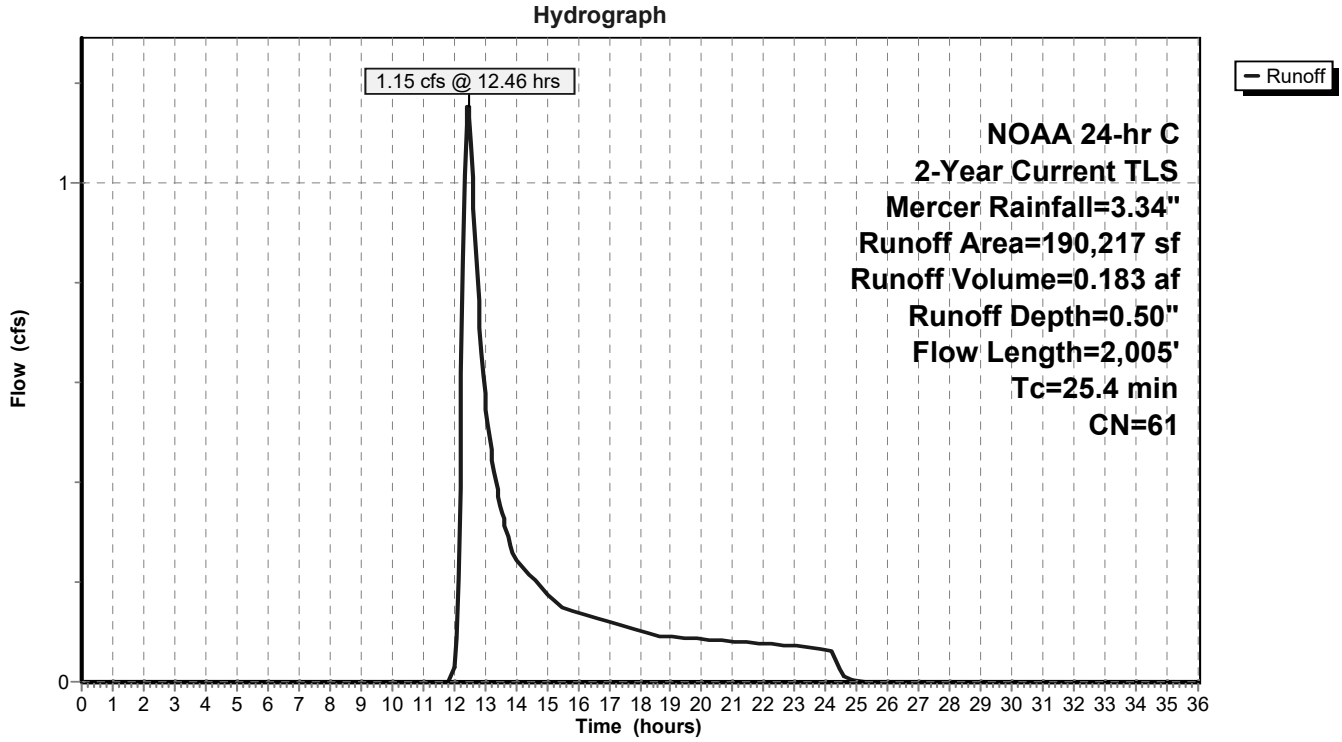
Runoff = 1.15 cfs @ 12.46 hrs, Volume= 0.183 af, Depth= 0.50"
Routed to Link 1Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
10,383	55	Woods, Good, HSG B
1,167	70	Woods, Good, HSG C
171,409	61	>75% Grass cover, Good, HSG B
7,258	74	>75% Grass cover, Good, HSG C
190,217	61	Weighted Average
190,217		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	56	0.0180	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34"
8.2	906	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.5	377	0.0030	1.81	65.11	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
25.4	2,005	Total			

Subcatchment 1Sc: DA-1c



Summary for Subcatchment 1Sd: DA-1d

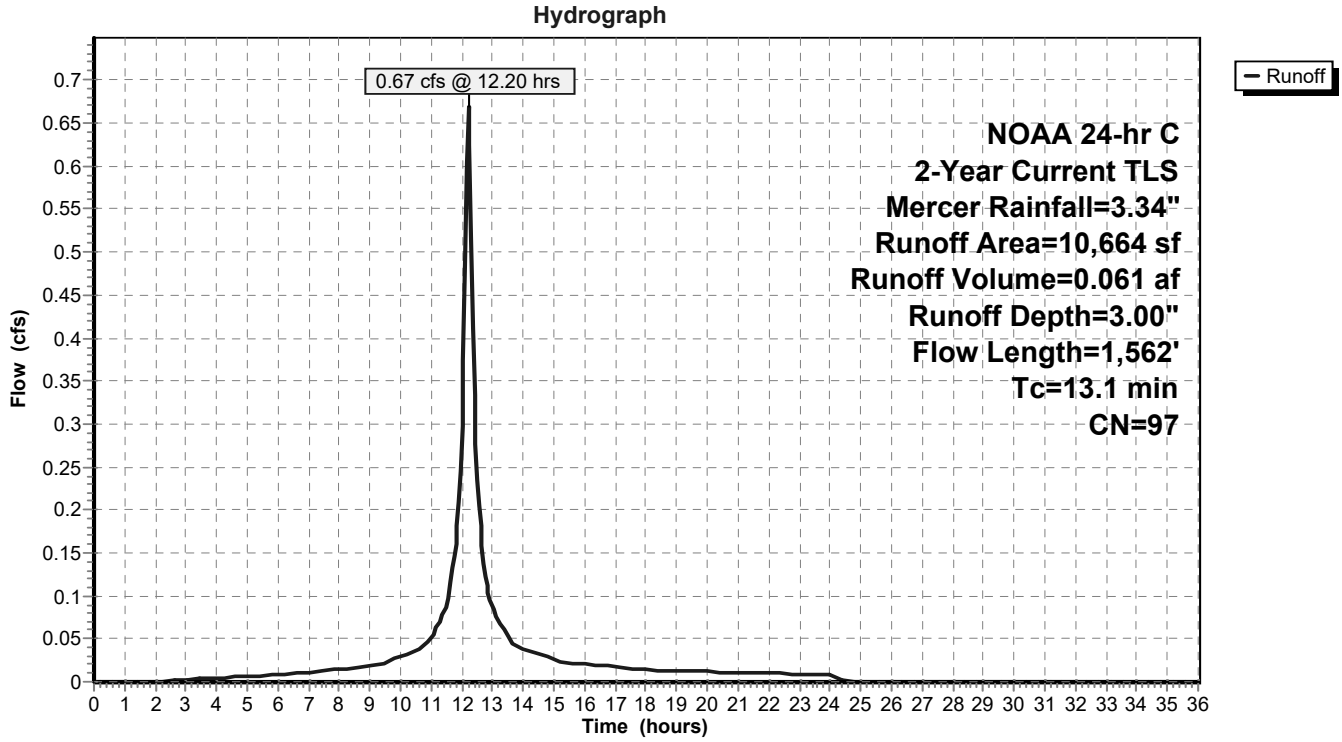
Runoff = 0.67 cfs @ 12.20 hrs, Volume= 0.061 af, Depth= 3.00"
Routed to Link 1Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	4,698	98	Paved parking, HSG B (Vehicular)
*	5,966	96	Gravel surface, HSG B (Vehicular)
	10,664	97	Weighted Average
	5,966		55.95% Pervious Area
	4,698		44.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.22		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
6.9	733	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	243	0.0320	3.65	21.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
13.1	1,562	Total			

Subcatchment 1Sd: DA-1d



Summary for Subcatchment 2Sa: DA-2a

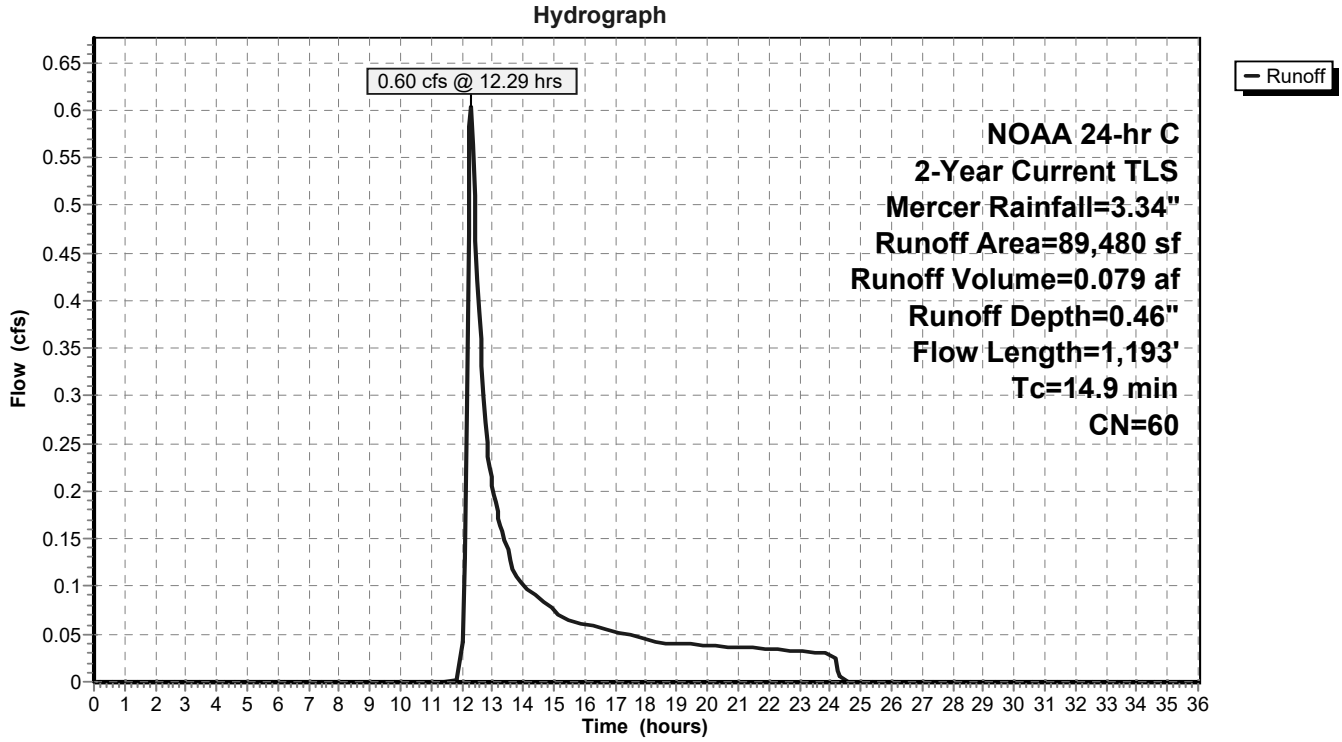
Runoff = 0.60 cfs @ 12.29 hrs, Volume= 0.079 af, Depth= 0.46"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
16,278	55	Woods, Good, HSG B
73,005	61	>75% Grass cover, Good, HSG B
197	80	>75% Grass cover, Good, HSG D
89,480	60	Weighted Average
89,480		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
0.3	29	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,193	Total			

Subcatchment 2Sa: DA-2a



Summary for Subcatchment 2Sb: DA-2b

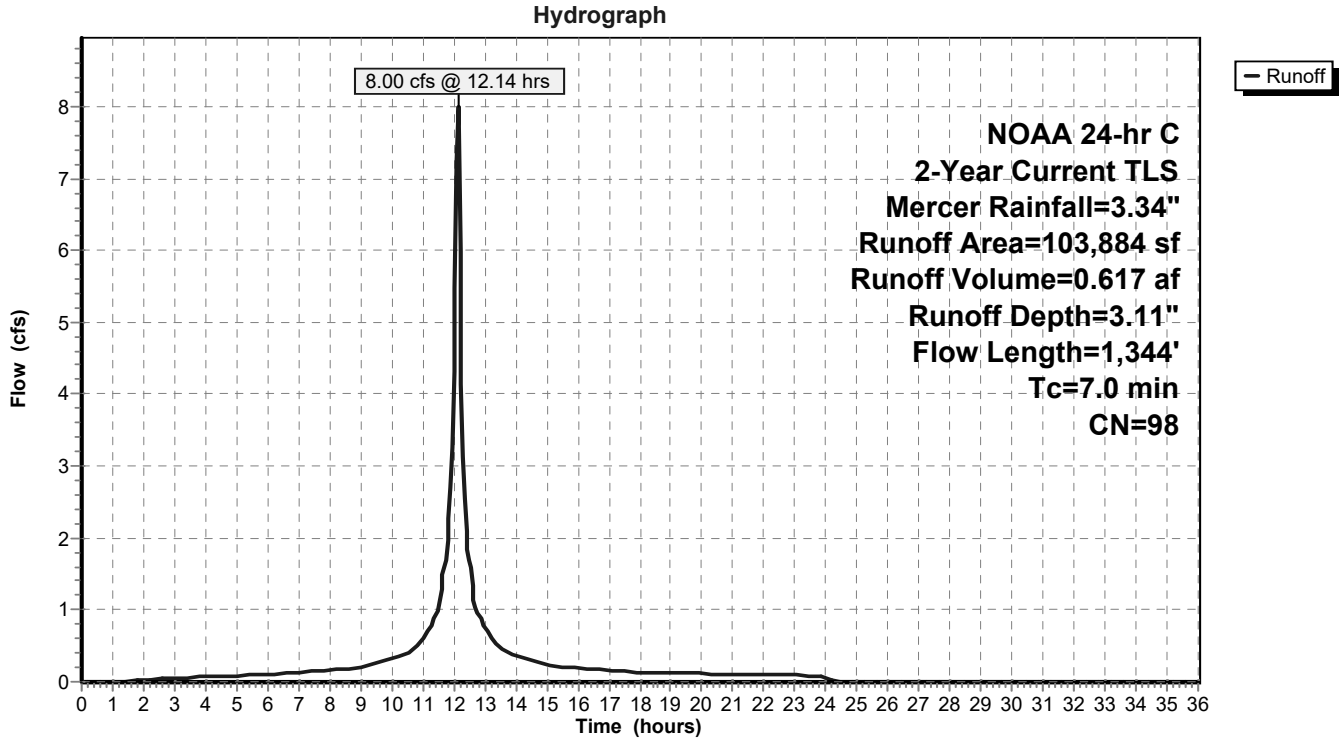
Runoff = 8.00 cfs @ 12.14 hrs, Volume= 0.617 af, Depth= 3.11"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	39,492	98	Paved parking, HSG B (Vehicular)
*	61,715	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	2,677	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	103,884	98	Weighted Average
	103,884		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
7.0	1,344	Total			

Subcatchment 2Sb: DA-2b



Summary for Subcatchment 2Sc: DA-2c

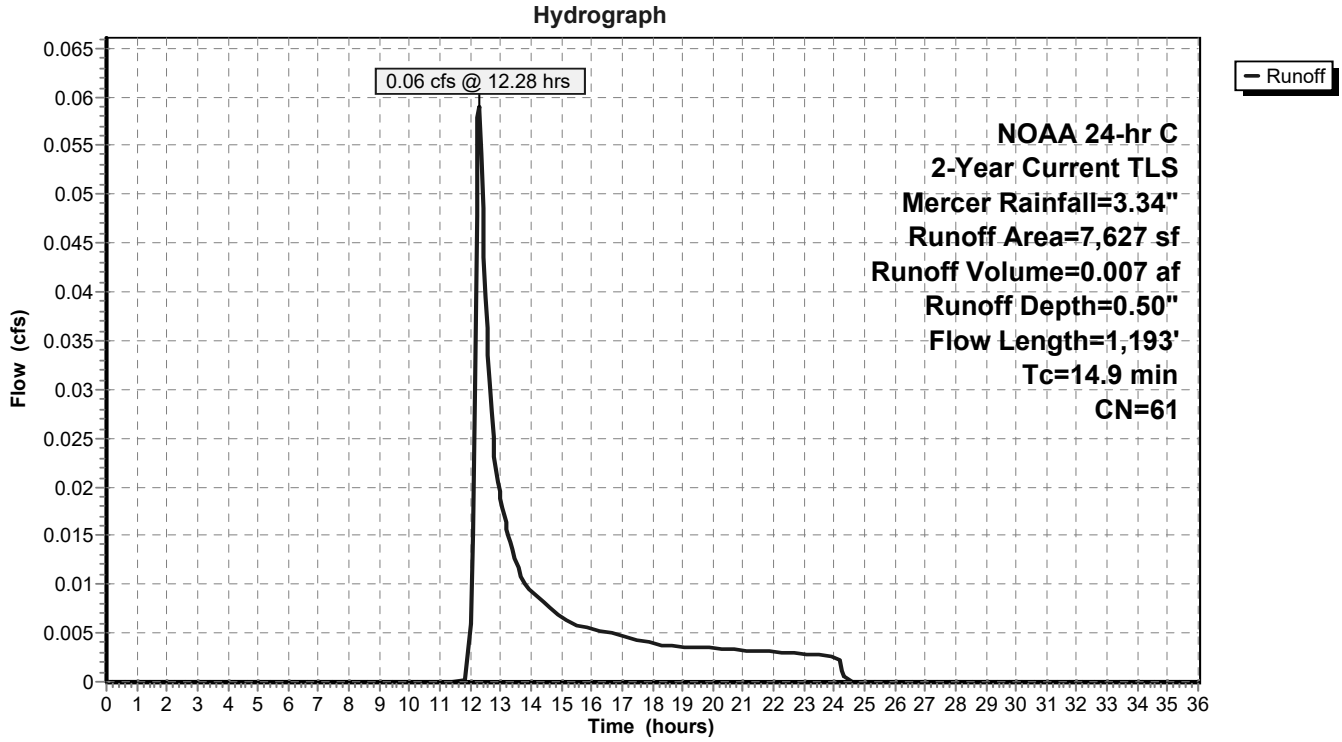
Runoff = 0.06 cfs @ 12.28 hrs, Volume= 0.007 af, Depth= 0.50"
Routed to Link 2Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
7,627	61	>75% Grass cover, Good, HSG B
7,627		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
0.3	29	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,193	Total			

Subcatchment 2Sc: DA-2c



Summary for Subcatchment 2Sd: DA-2d

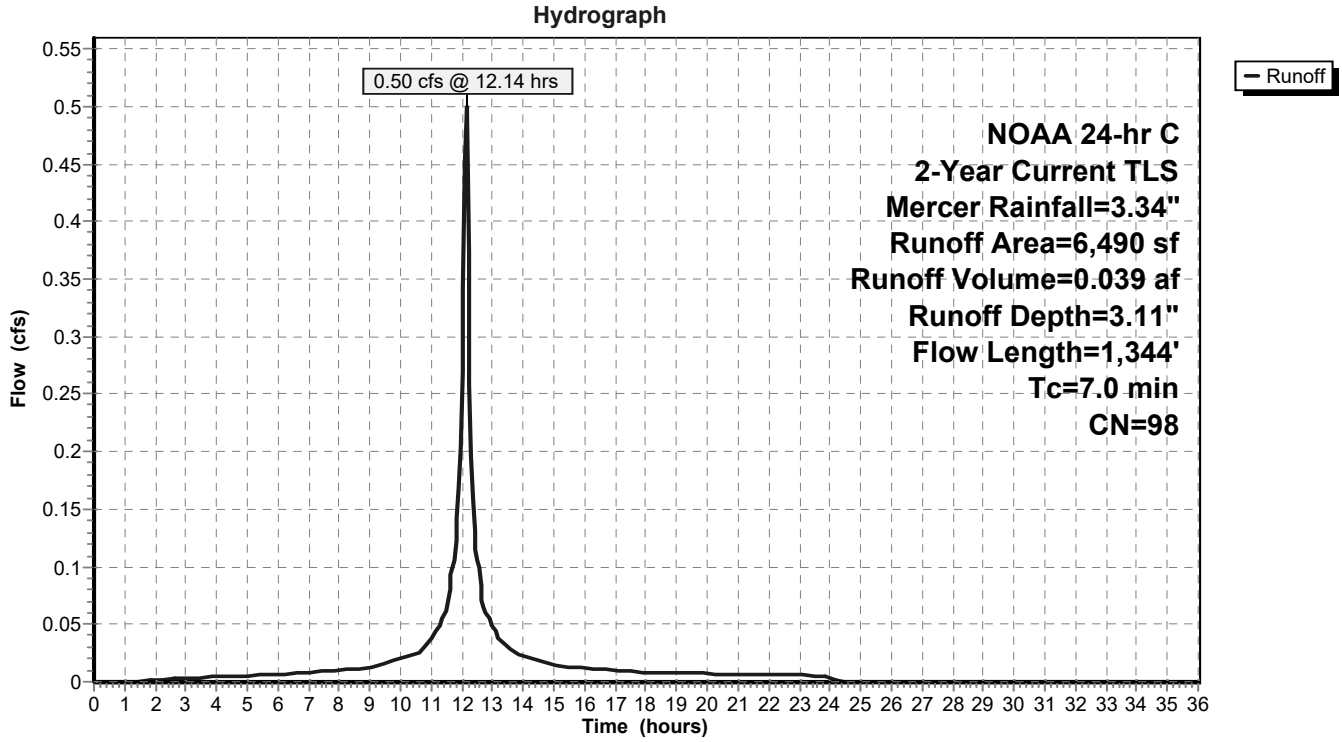
Runoff = 0.50 cfs @ 12.14 hrs, Volume= 0.039 af, Depth= 3.11"
Routed to Link 2Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	6,291	98	Paved parking, HSG B (Vehicular)
*	199	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	6,490	98	Weighted Average
	6,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
7.0	1,344	Total			

Subcatchment 2Sd: DA-2d



Summary for Subcatchment 3Sa: DA-3a

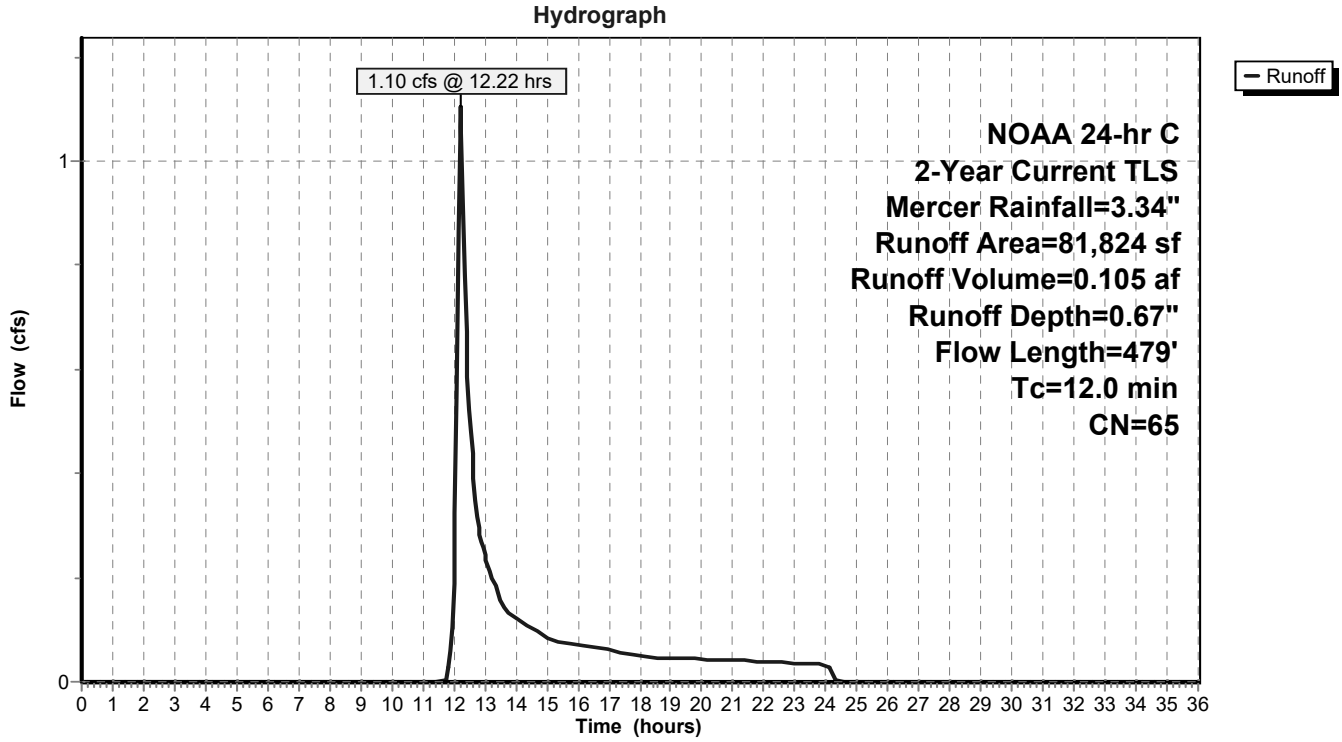
Runoff = 1.10 cfs @ 12.22 hrs, Volume= 0.105 af, Depth= 0.67"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
21,739	55	Woods, Good, HSG B
31,307	70	Woods, Good, HSG C
1,317	77	Woods, Good, HSG D
18,394	61	>75% Grass cover, Good, HSG B
3,641	74	>75% Grass cover, Good, HSG C
5,426	80	>75% Grass cover, Good, HSG D
81,824	65	Weighted Average
81,824		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.8	179	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
12.0	479	Total			

Subcatchment 3Sa: DA-3a



Summary for Subcatchment 3Sb: DA-3b

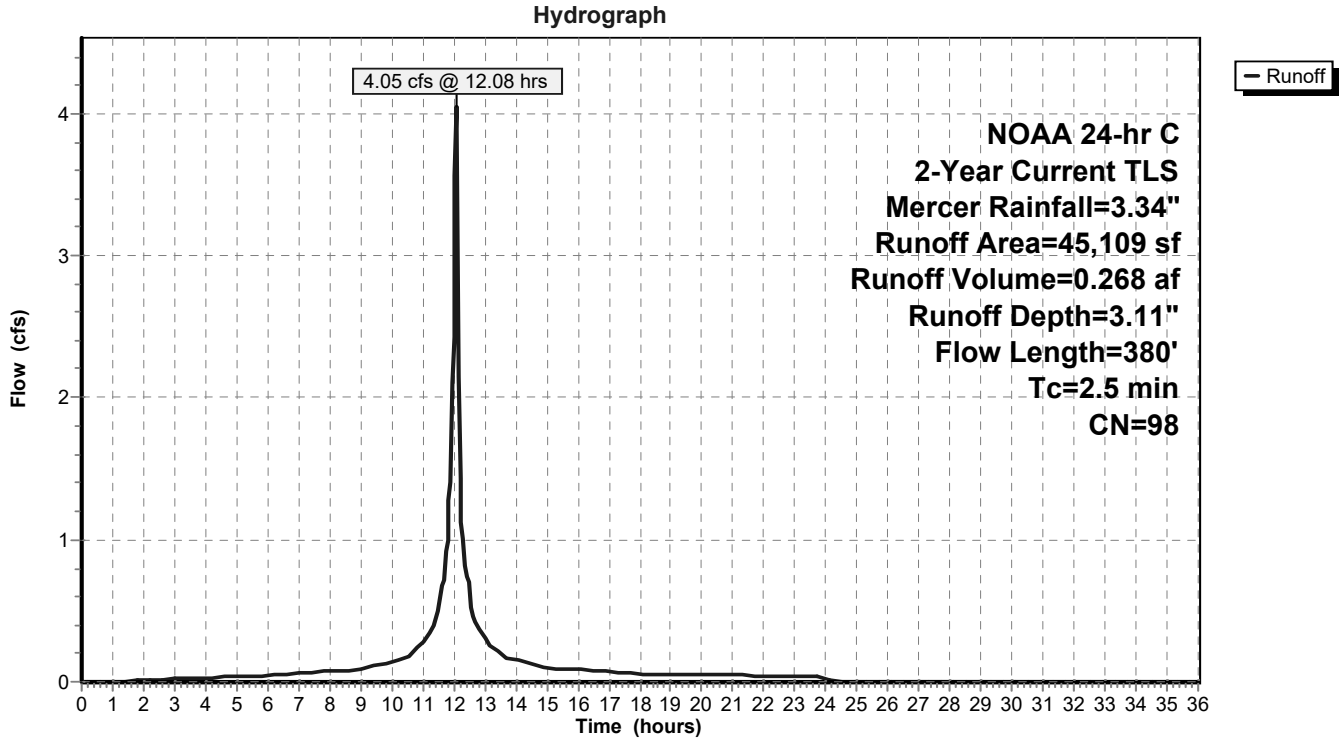
Runoff = 4.05 cfs @ 12.08 hrs, Volume= 0.268 af, Depth= 3.11"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	14,685	98	Paved parking, HSG B (Vehicular)
*	26,070	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	1,571	98	Paved parking, HSG C (Vehicular)
*	425	98	Paved parking, HSG D (Vehicular)
*	2,358	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	45,109	98	Weighted Average
	45,109		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.32		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
0.2	39	0.0410	3.04		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
2.5	380	Total			

Subcatchment 3Sb: DA-3b



Summary for Subcatchment 3Sc: DA-3c

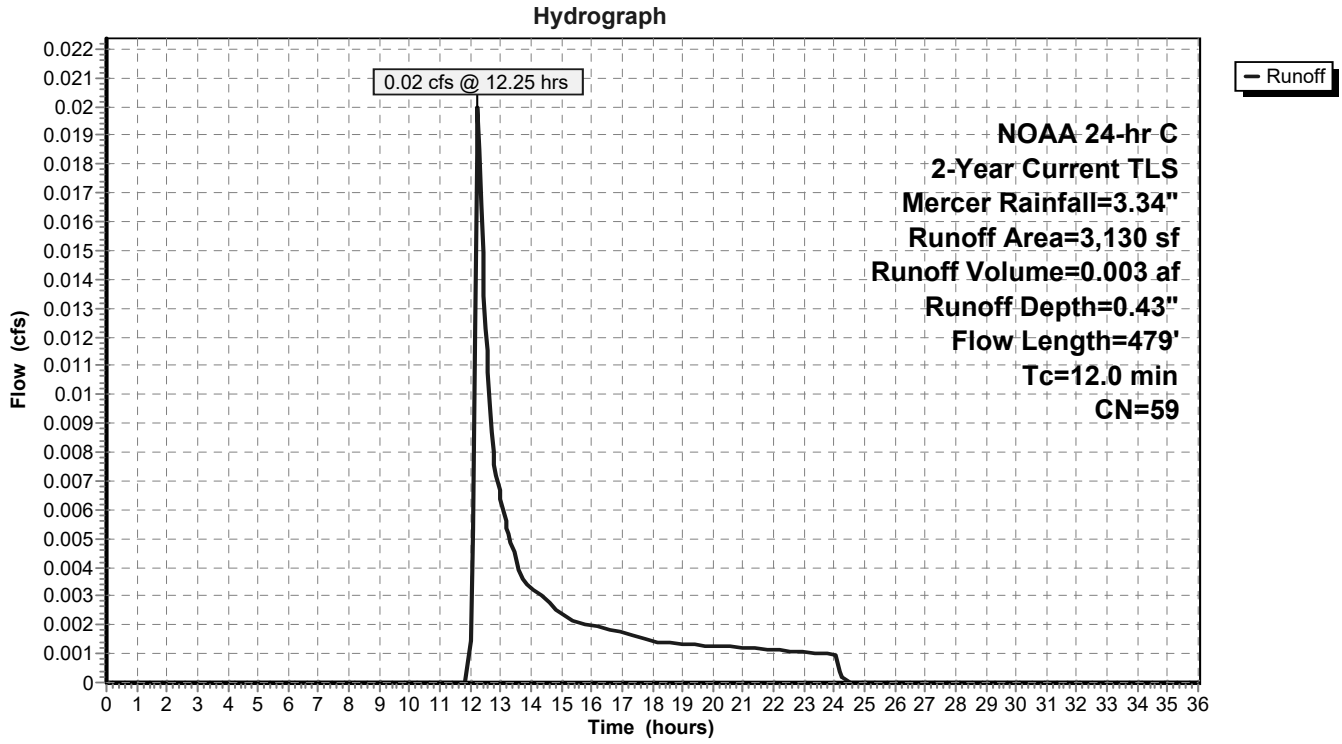
Runoff = 0.02 cfs @ 12.25 hrs, Volume= 0.003 af, Depth= 0.43"
Routed to Link 3Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
1,286	55	Woods, Good, HSG B
1,844	61	>75% Grass cover, Good, HSG B
3,130	59	Weighted Average
3,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.8	179	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
12.0	479	Total			

Subcatchment 3Sc: DA-3c



Summary for Subcatchment 3Sd: DA-3d

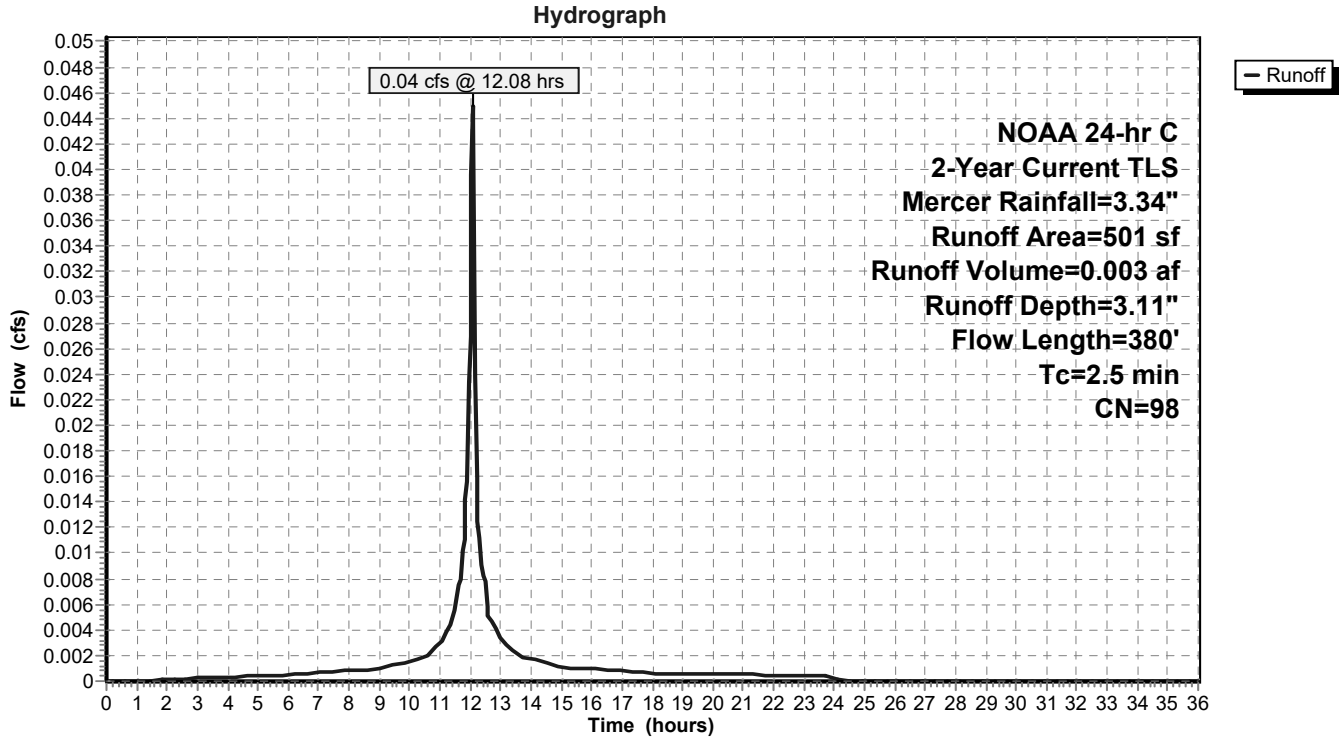
Runoff = 0.04 cfs @ 12.08 hrs, Volume= 0.003 af, Depth= 3.11"
Routed to Link 3Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	501	98	Paved parking, HSG B (Vehicular)
	501		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.32		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
0.2	39	0.0410	3.04		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	4.19	25.13	**Channel Flow,** Area= 6.0 sf Perim= 16.0' r= 0.38' n= 0.035
2.5	380	Total			

Subcatchment 3Sd: DA-3d



Summary for Subcatchment 4Sa: DA-4a

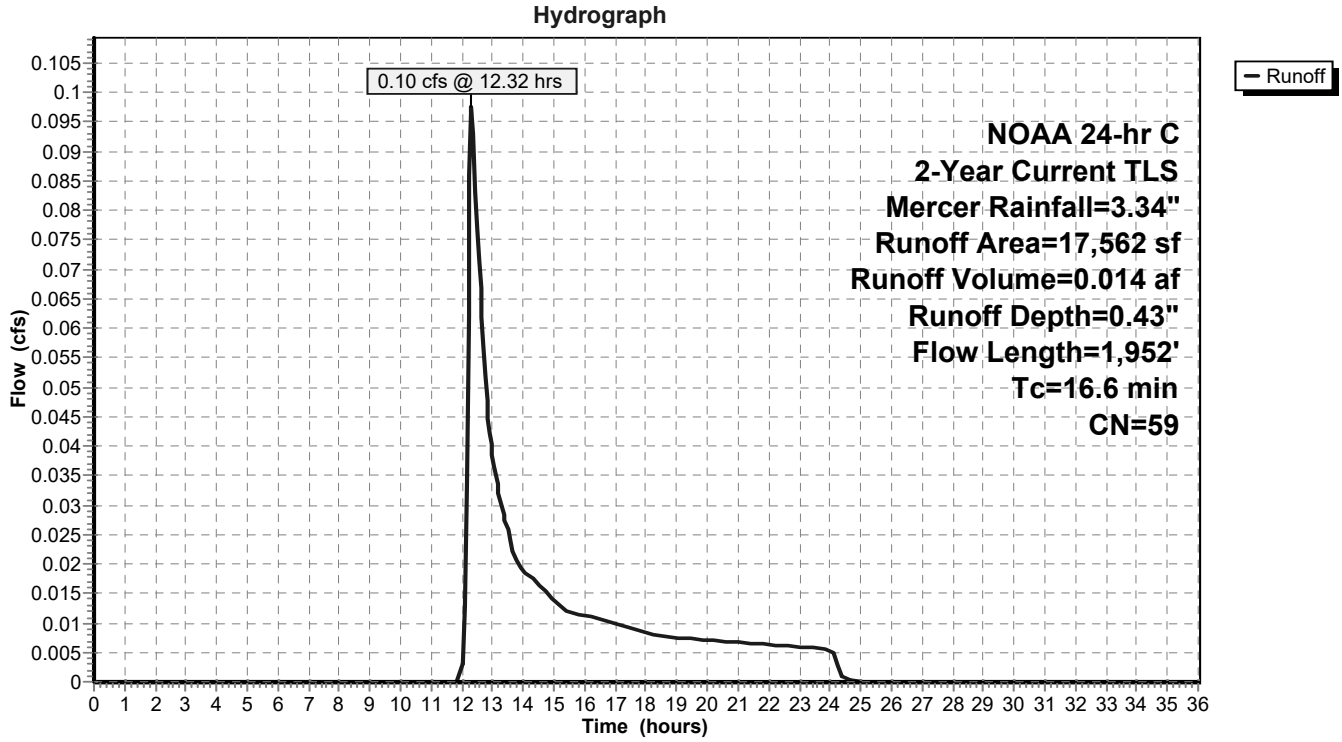
Runoff = 0.10 cfs @ 12.32 hrs, Volume= 0.014 af, Depth= 0.43"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
6,085	55	Woods, Good, HSG B
11,477	61	>75% Grass cover, Good, HSG B
17,562	59	Weighted Average
17,562		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	42	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.0	123	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
16.6	1,952	Total			

Subcatchment 4Sa: DA-4a



Summary for Subcatchment 4Sb: DA-4b

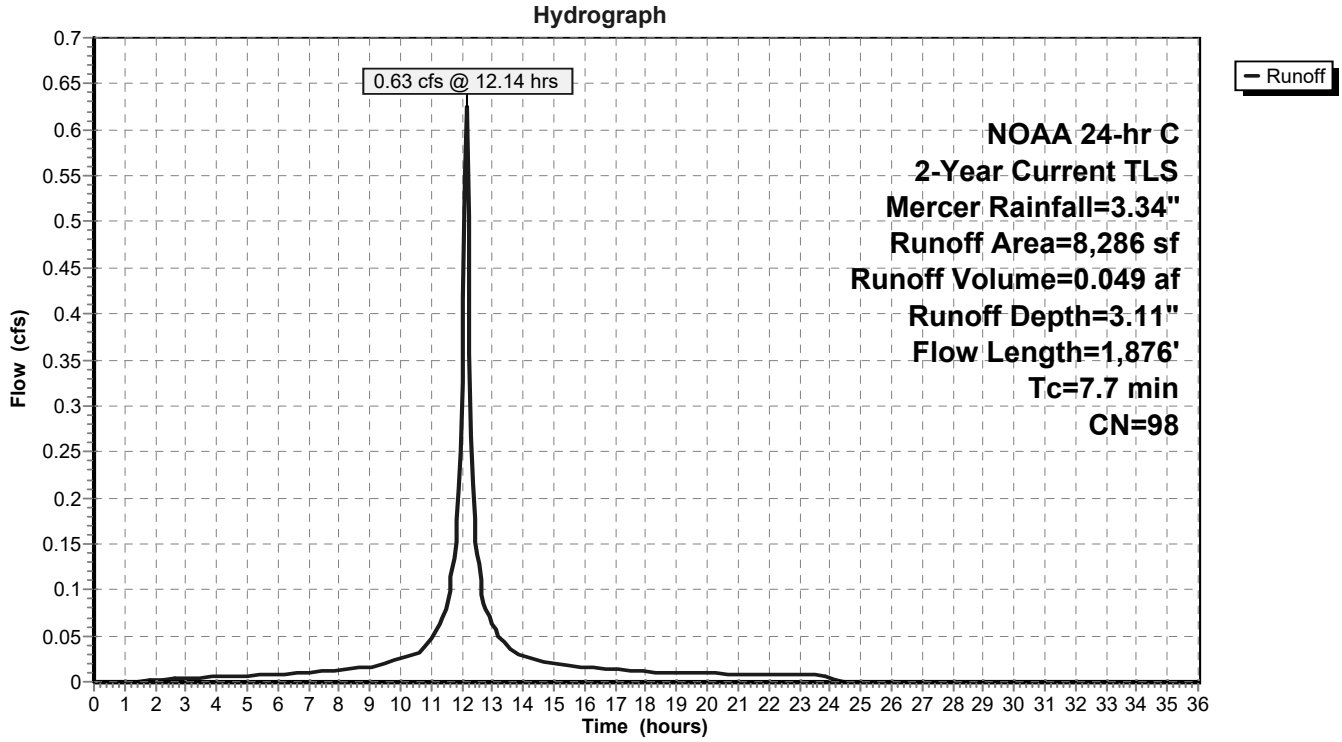
Runoff = 0.63 cfs @ 12.14 hrs, Volume= 0.049 af, Depth= 3.11"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	3,147	98	Paved parking, HSG B (Vehicular)
*	5,139	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	8,286	98	Weighted Average
	8,286		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.16		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
7.7	1,876	Total			

Subcatchment 4Sb: DA-4b



Summary for Subcatchment 4Sc: DA-4c

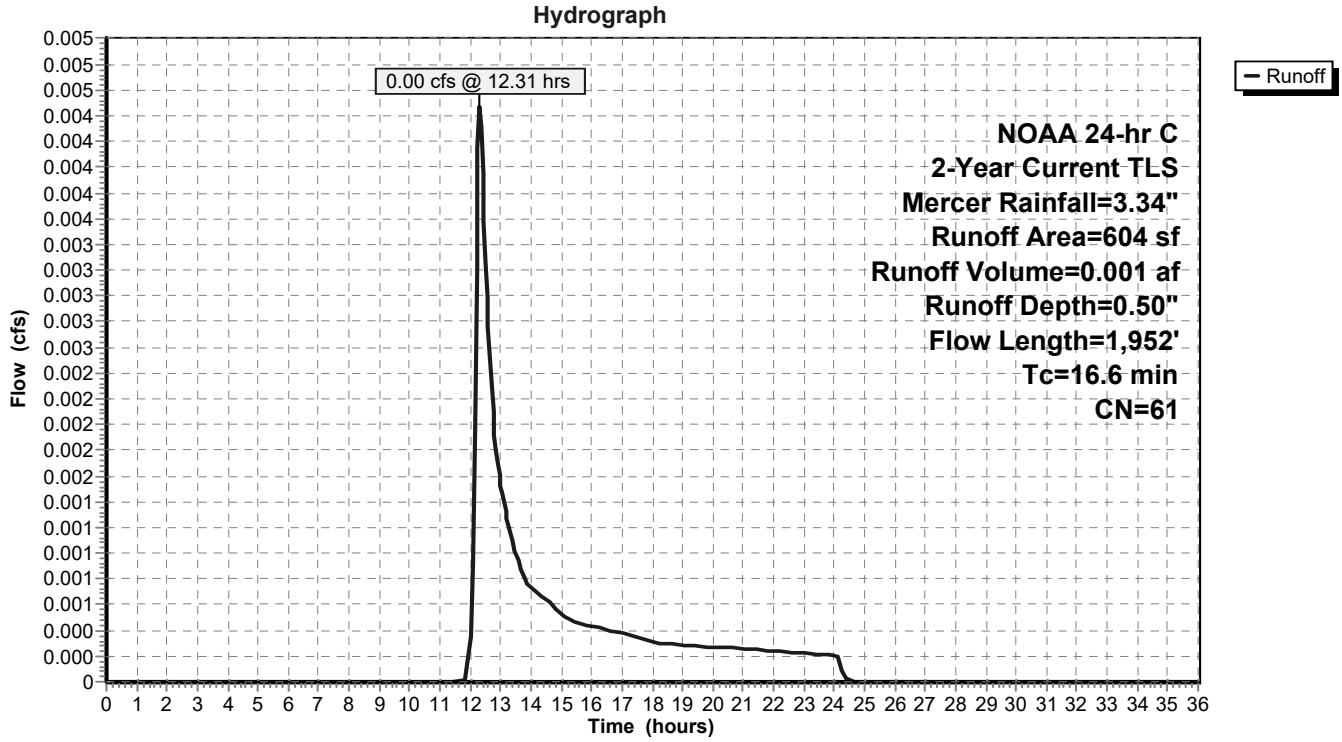
Runoff = 0.00 cfs @ 12.31 hrs, Volume= 0.001 af, Depth= 0.50"
Routed to Link 4Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
604	61	>75% Grass cover, Good, HSG B
604		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	42	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.0	123	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
16.6	1,952	Total			

Subcatchment 4Sc: DA-4c



Summary for Subcatchment 4Sd: DA-4d

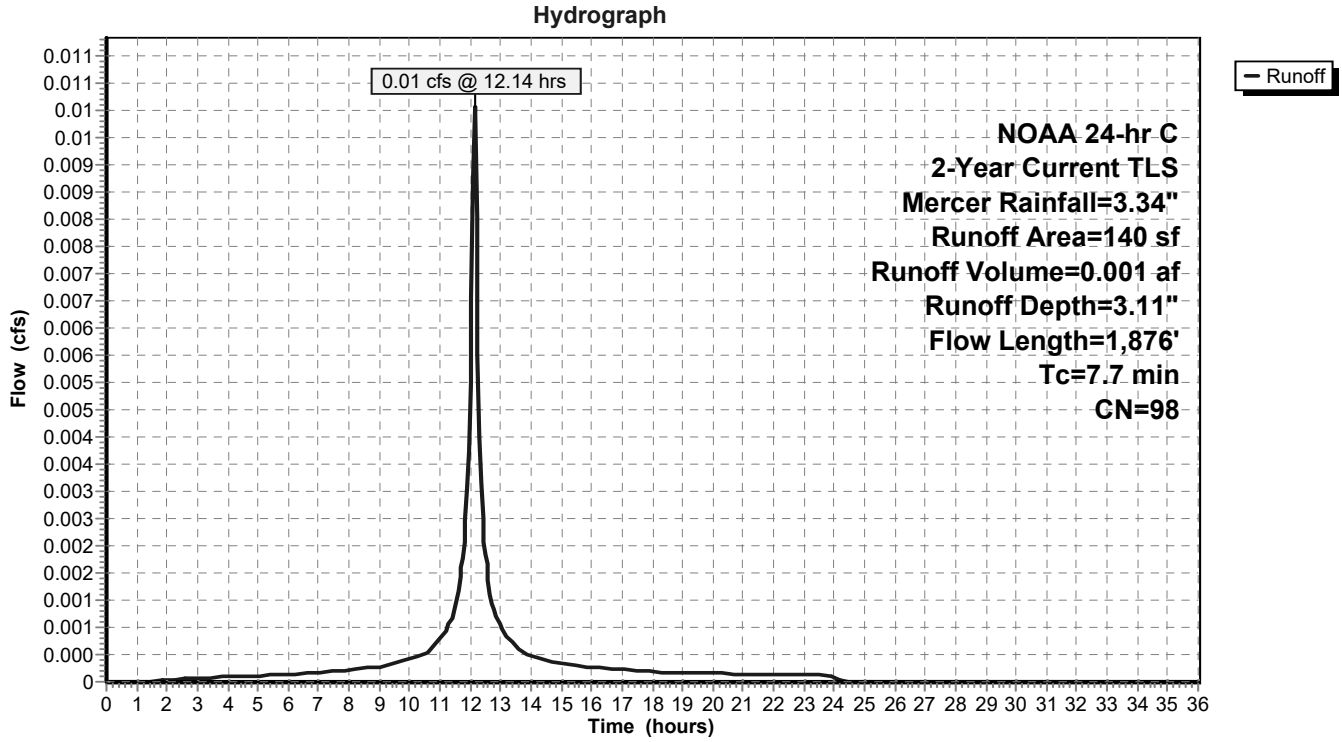
Runoff = 0.01 cfs @ 12.14 hrs, Volume= 0.001 af, Depth= 3.11"
Routed to Link 4Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	140	98	Paved parking, HSG B (Vehicular)
	140		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.16		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
7.7	1,876	Total			

Subcatchment 4Sd: DA-4d



Summary for Reach 5R: Reach to On Stream Pond

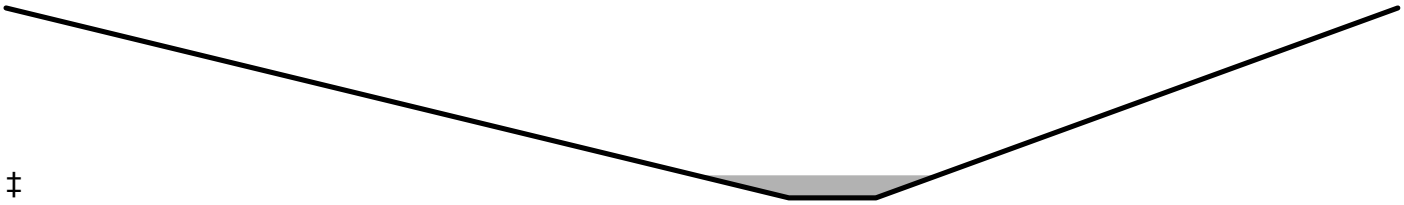
Stream Tributary 'B' to Shipetaukin Creek

Inflow Area = 18.232 ac, 20.92% Impervious, Inflow Depth = 1.04" for 2-Year Current TLS, Mercer event
Inflow = 13.48 cfs @ 12.12 hrs, Volume= 1.579 af
Outflow = 10.83 cfs @ 12.37 hrs, Volume= 1.579 af, Atten= 20%, Lag= 14.6 min
Routed to Link 5L : Allowable: Two-yr; COM HYD @ On Stream Pond [Point of Analysis]

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.01 fps, Min. Travel Time= 8.7 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 23.9 min

Peak Storage= 5,656 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.71' , Surface Width= 22.22'
Bank-Full Depth= 6.00' Flow Area= 408.0 sf, Capacity= 1,446.01 cfs

8.00' x 6.00' deep channel, n= 0.045
Side Slope Z-value= 12.0 8.0 '/' Top Width= 128.00'
Length= 526.0' Slope= 0.0025 '/'
Inlet Invert= 91.30', Outlet Invert= 90.00'



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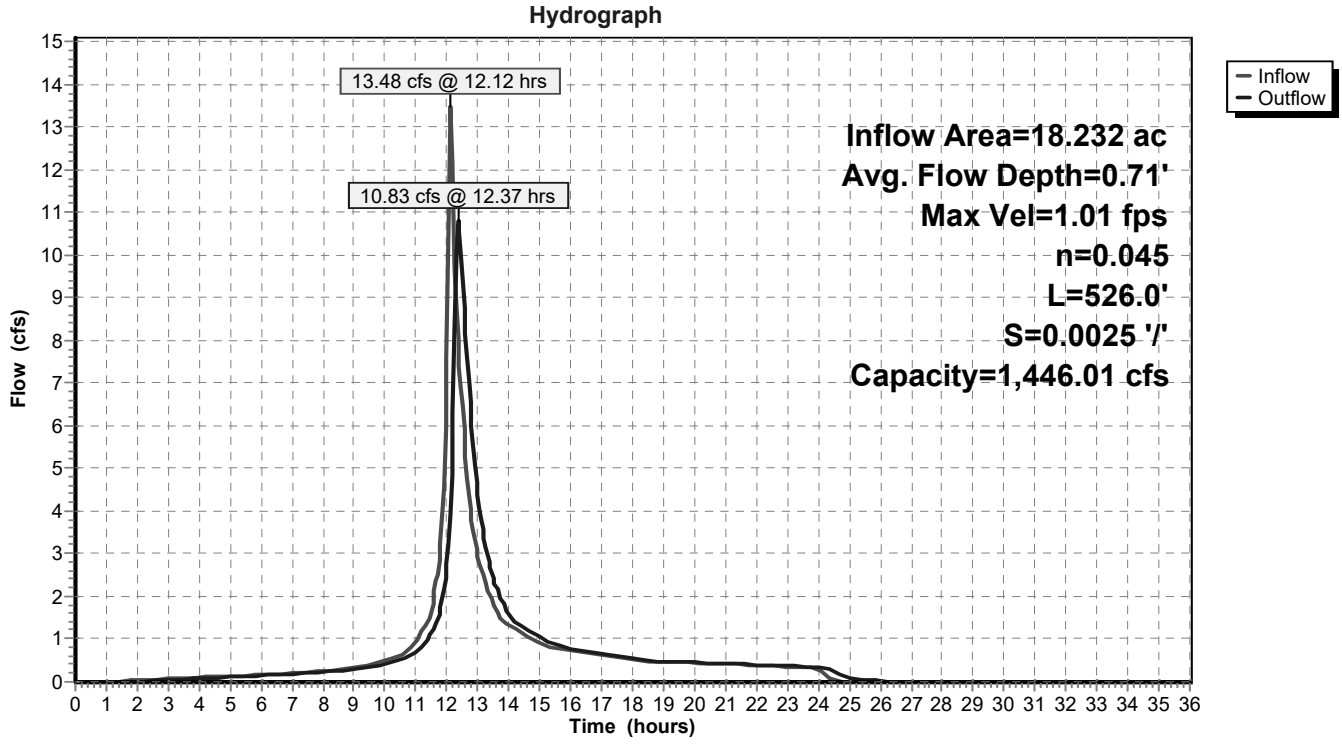
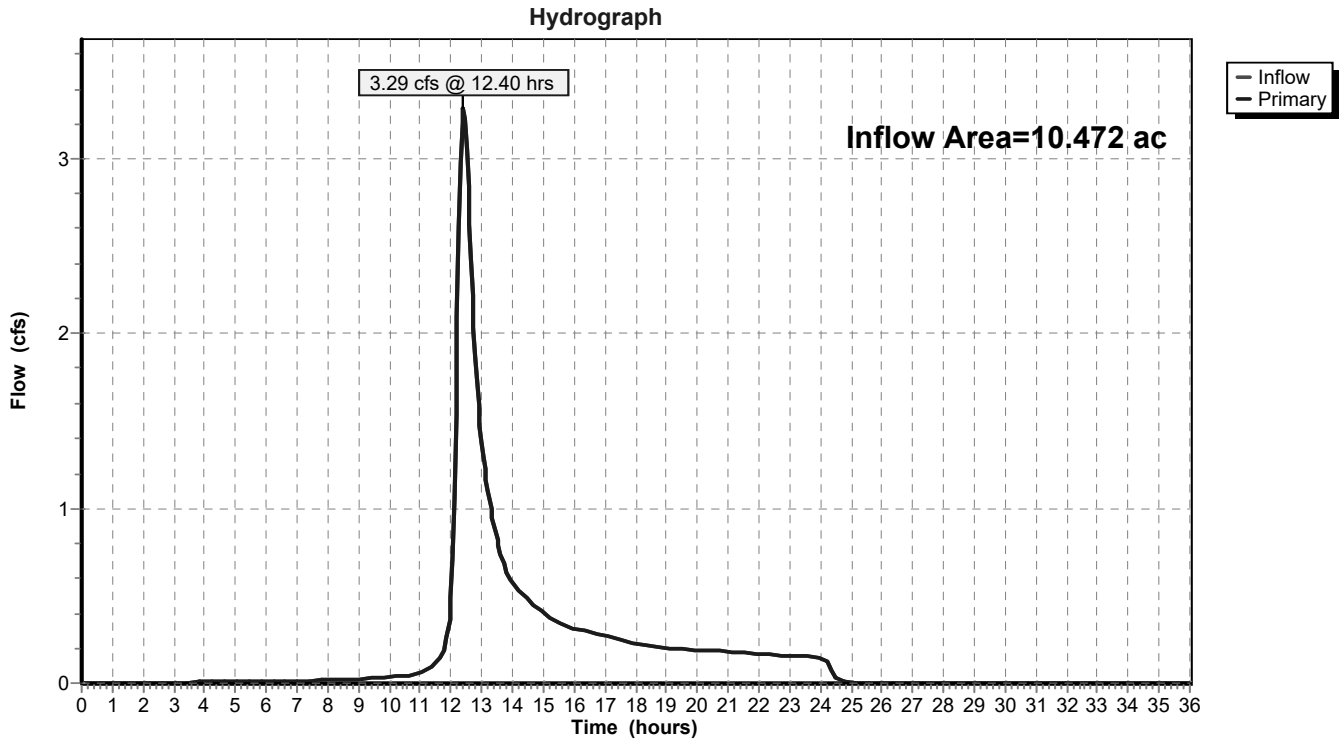


Summary for Link 1L: DA-1 COM HYD

Inflow Area = 10.472 ac, 2.23% Impervious, Inflow Depth = 0.55" for 2-Year Current TLS, Mercer event
Inflow = 3.29 cfs @ 12.40 hrs, Volume= 0.483 af
Primary = 3.29 cfs @ 12.40 hrs, Volume= 0.483 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1L: DA-1 COM HYD

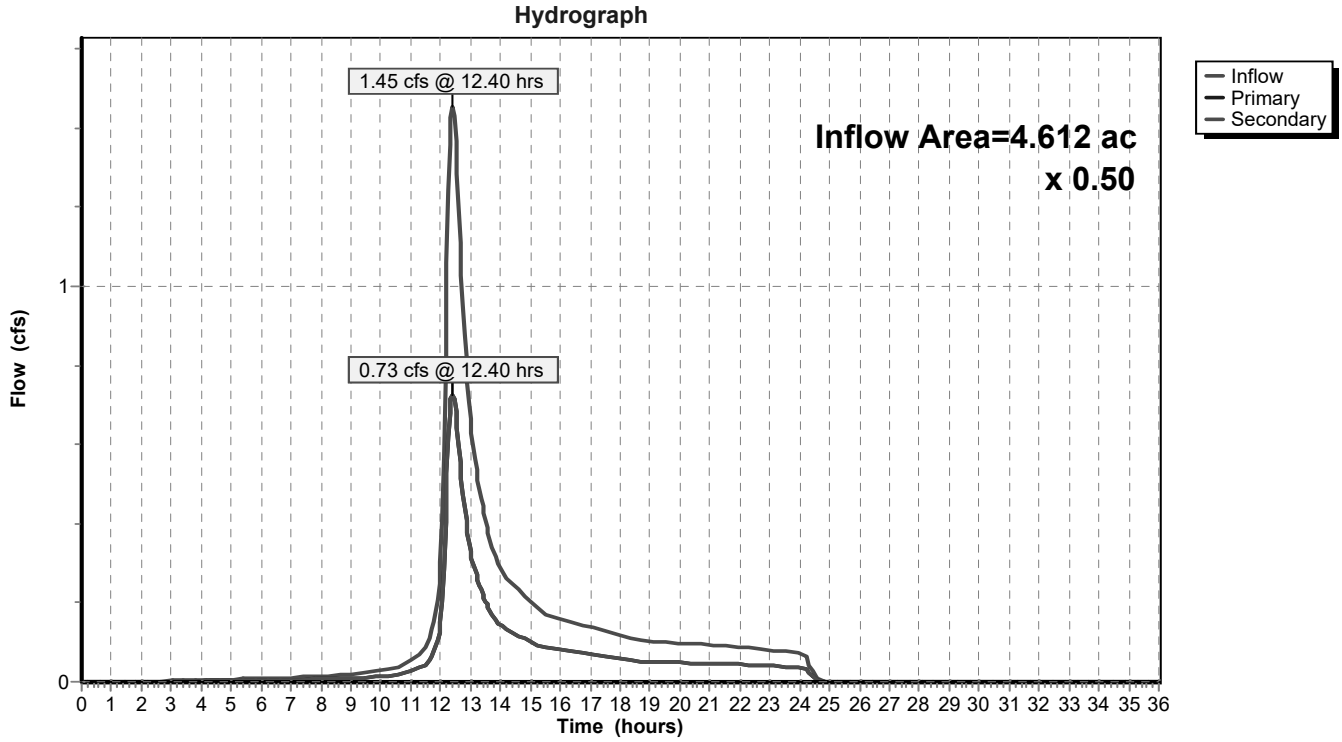


Summary for Link 1Lr: Reduction

Inflow Area = 4.612 ac, 2.34% Impervious, Inflow Depth = 0.63" for 2-Year Current TLS, Mercer event
Inflow = 1.45 cfs @ 12.40 hrs, Volume= 0.244 af
Primary = 0.73 cfs @ 12.40 hrs, Volume= 0.122 af, Atten= 50%, Lag= 0.0 min
Routed to Link 1L : DA-1 COM HYD
Secondary = 0.73 cfs @ 12.40 hrs, Volume= 0.122 af

Primary outflow = Inflow x 0.50, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1Lr: Reduction

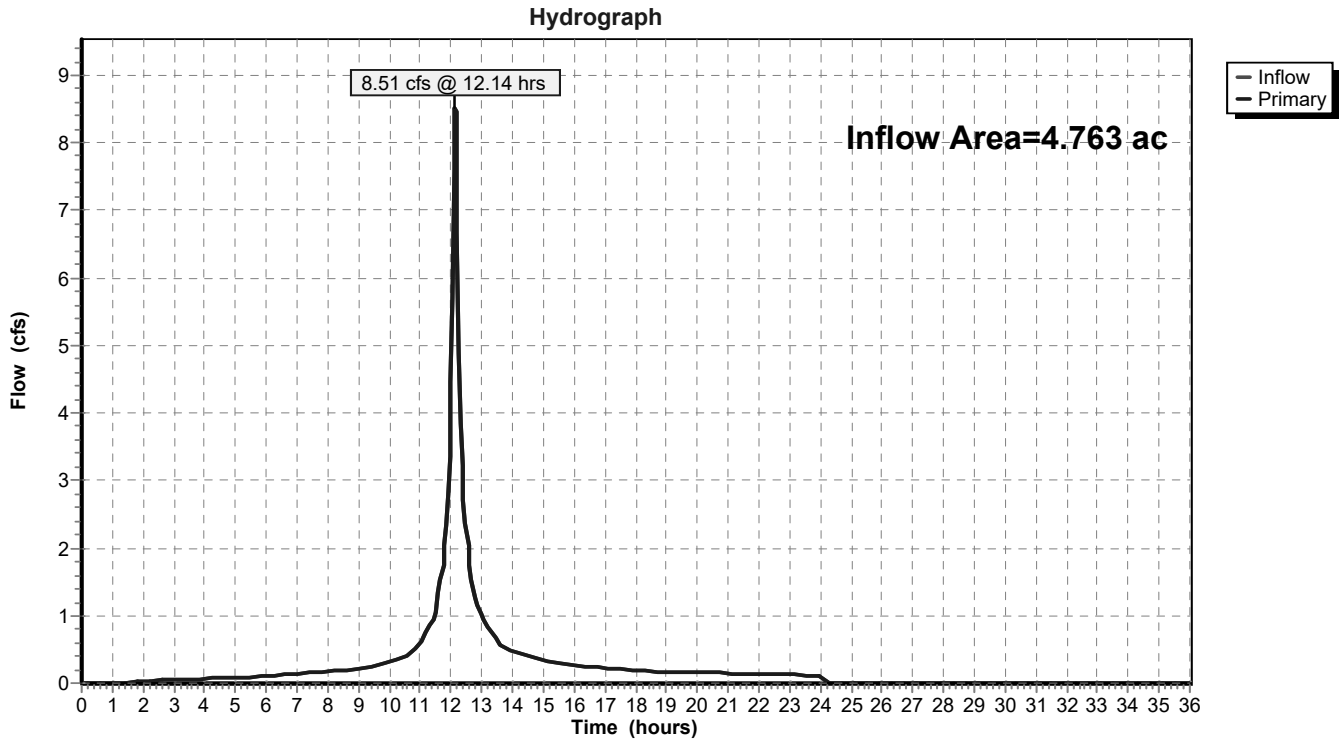


Summary for Link 2L: DA-2 COM HYD

Inflow Area = 4.763 ac, 53.20% Impervious, Inflow Depth = 1.81" for 2-Year Current TLS, Mercer event
Inflow = 8.51 cfs @ 12.14 hrs, Volume= 0.720 af
Primary = 8.51 cfs @ 12.14 hrs, Volume= 0.720 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: DA-2 COM HYD

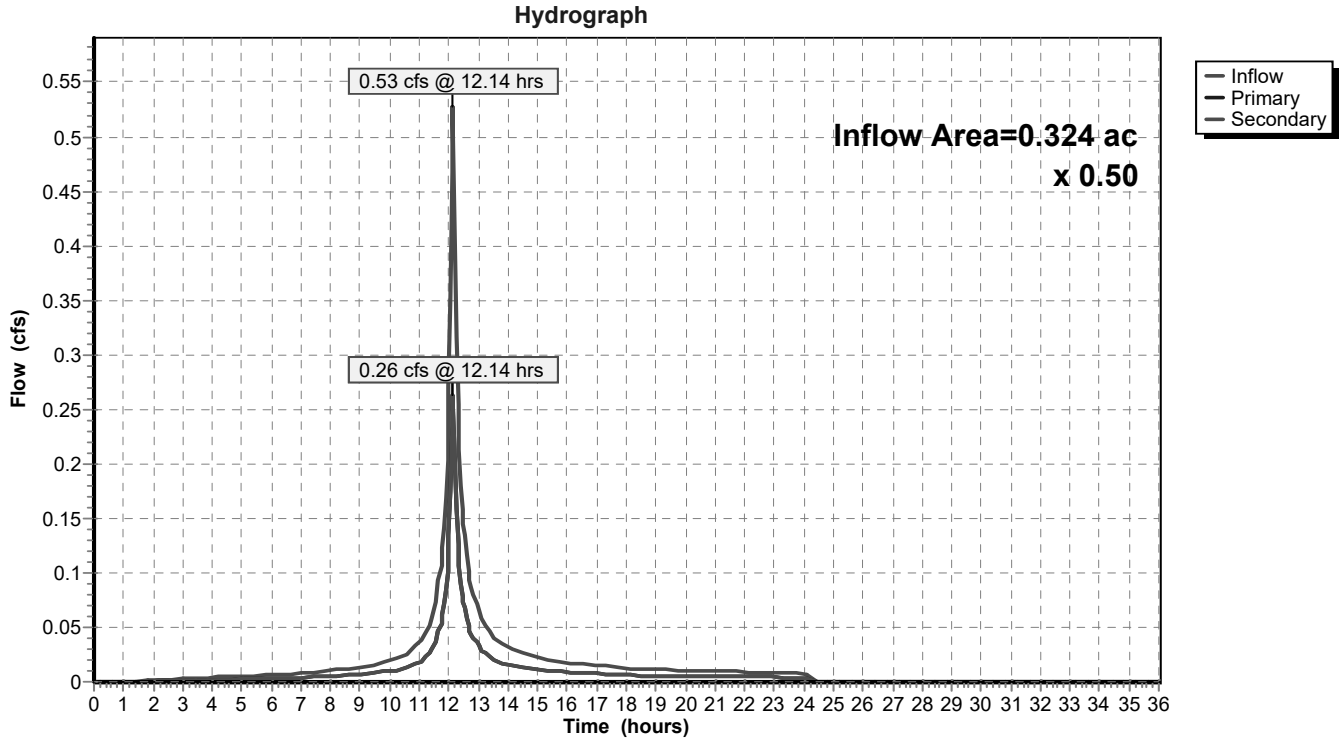


Summary for Link 2Lr: Reduction

Inflow Area = 0.324 ac, 45.97% Impervious, Inflow Depth = 1.70" for 2-Year Current TLS, Mercer event
Inflow = 0.53 cfs @ 12.14 hrs, Volume= 0.046 af
Primary = 0.26 cfs @ 12.14 hrs, Volume= 0.023 af, Atten= 50%, Lag= 0.0 min
Routed to Link 2L : DA-2 COM HYD
Secondary = 0.26 cfs @ 12.14 hrs, Volume= 0.023 af

Primary outflow = Inflow x 0.50, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2Lr: Reduction

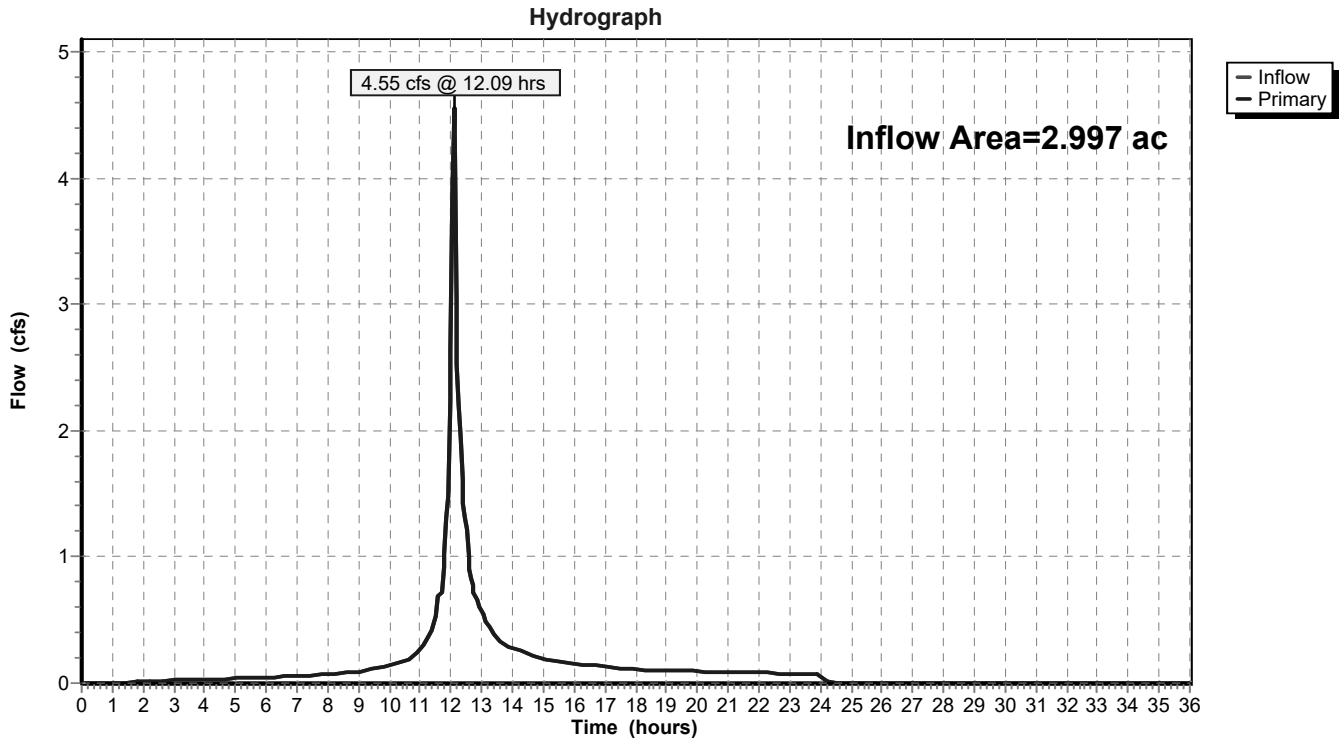


Summary for Link 3L: DA-3 COM HYD

Inflow Area = 2.997 ac, 34.93% Impervious, Inflow Depth = 1.50" for 2-Year Current TLS, Mercer event
Inflow = 4.55 cfs @ 12.09 hrs, Volume= 0.376 af
Primary = 4.55 cfs @ 12.09 hrs, Volume= 0.376 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 3L: DA-3 COM HYD

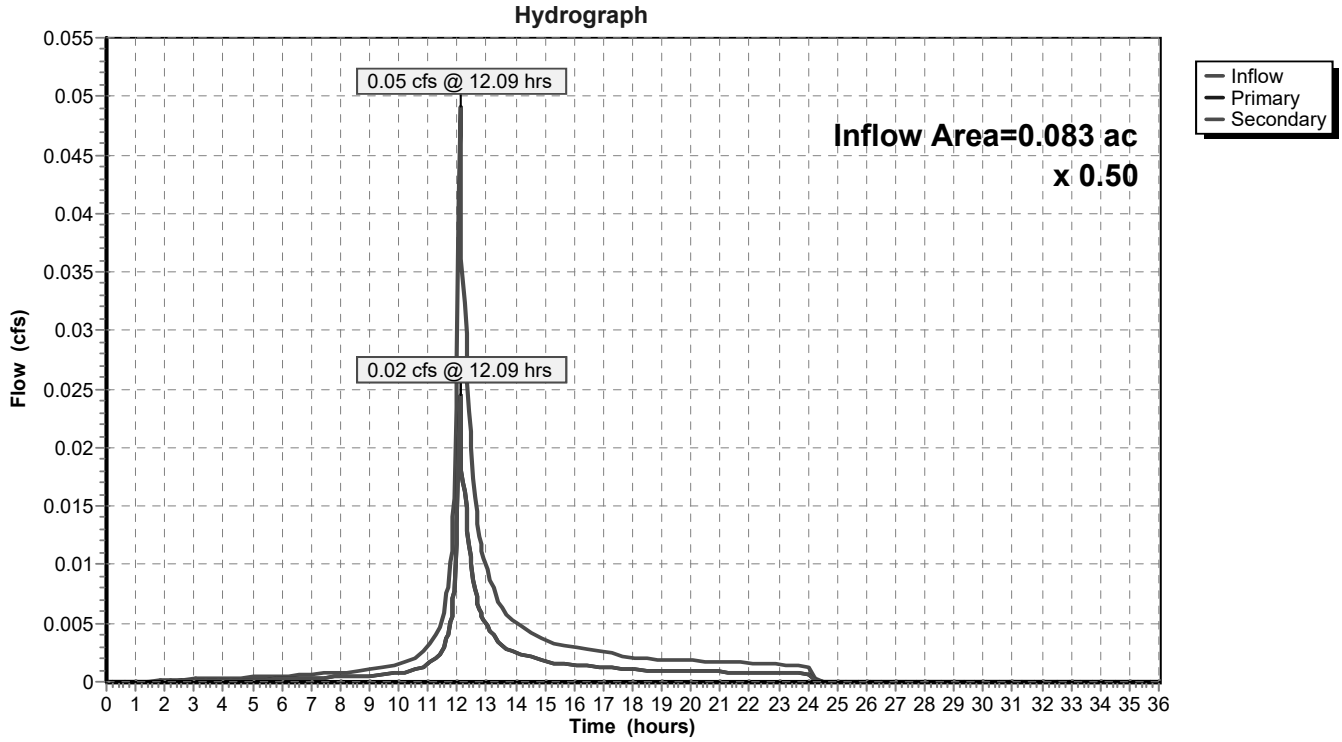


Summary for Link 3Lr: Reduction

Inflow Area = 0.083 ac, 13.80% Impervious, Inflow Depth = 0.80" for 2-Year Current TLS, Mercer event
Inflow = 0.05 cfs @ 12.09 hrs, Volume= 0.006 af
Primary = 0.02 cfs @ 12.09 hrs, Volume= 0.003 af, Atten= 50%, Lag= 0.0 min
Routed to Link 3L : DA-3 COM HYD
Secondary = 0.02 cfs @ 12.09 hrs, Volume= 0.003 af

Primary outflow = Inflow x 0.50, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 3Lr: Reduction

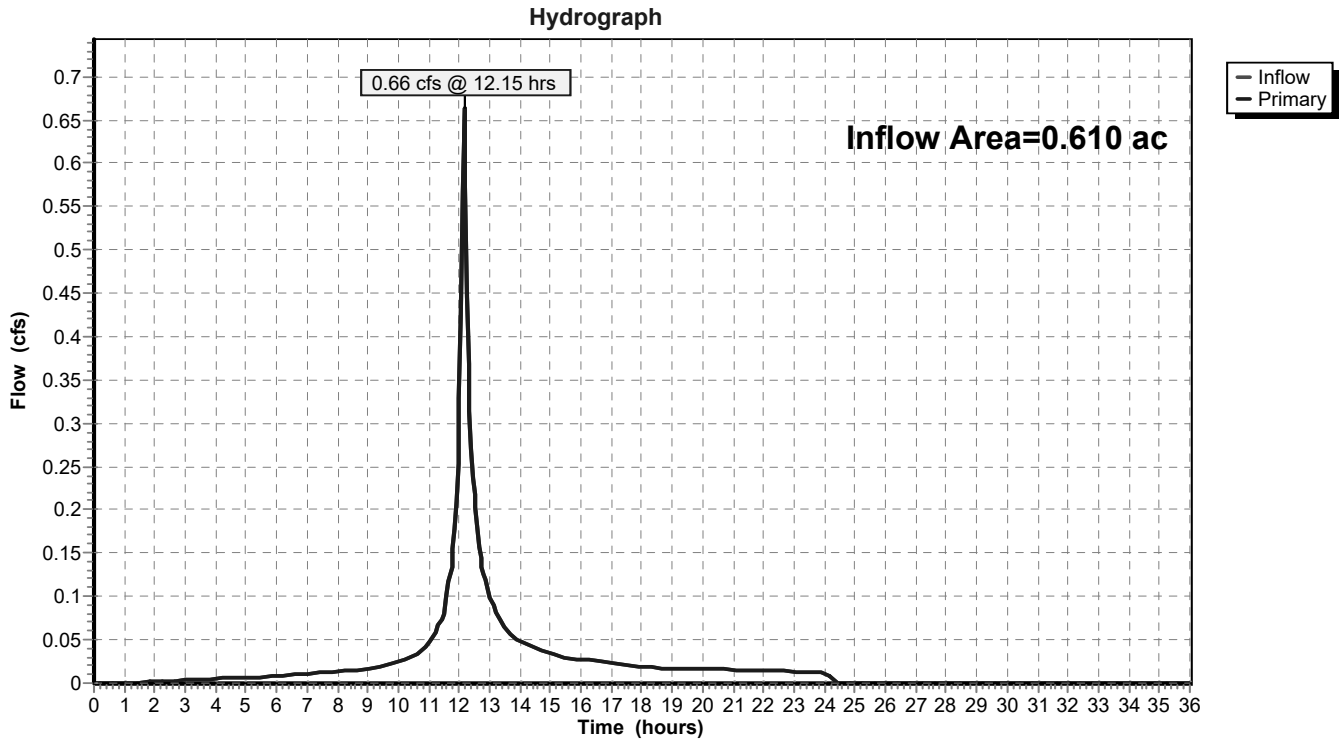


Summary for Link 4L: DA-4 COM HYD

Inflow Area = 0.610 ac, 31.69% Impervious, Inflow Depth = 1.26" for 2-Year Current TLS, Mercer event
Inflow = 0.66 cfs @ 12.15 hrs, Volume= 0.064 af
Primary = 0.66 cfs @ 12.15 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min
Routed to Link 5L : Allowable: Two-yr; COM HYD @ On Stream Pond [Point of Analysis]

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 4L: DA-4 COM HYD

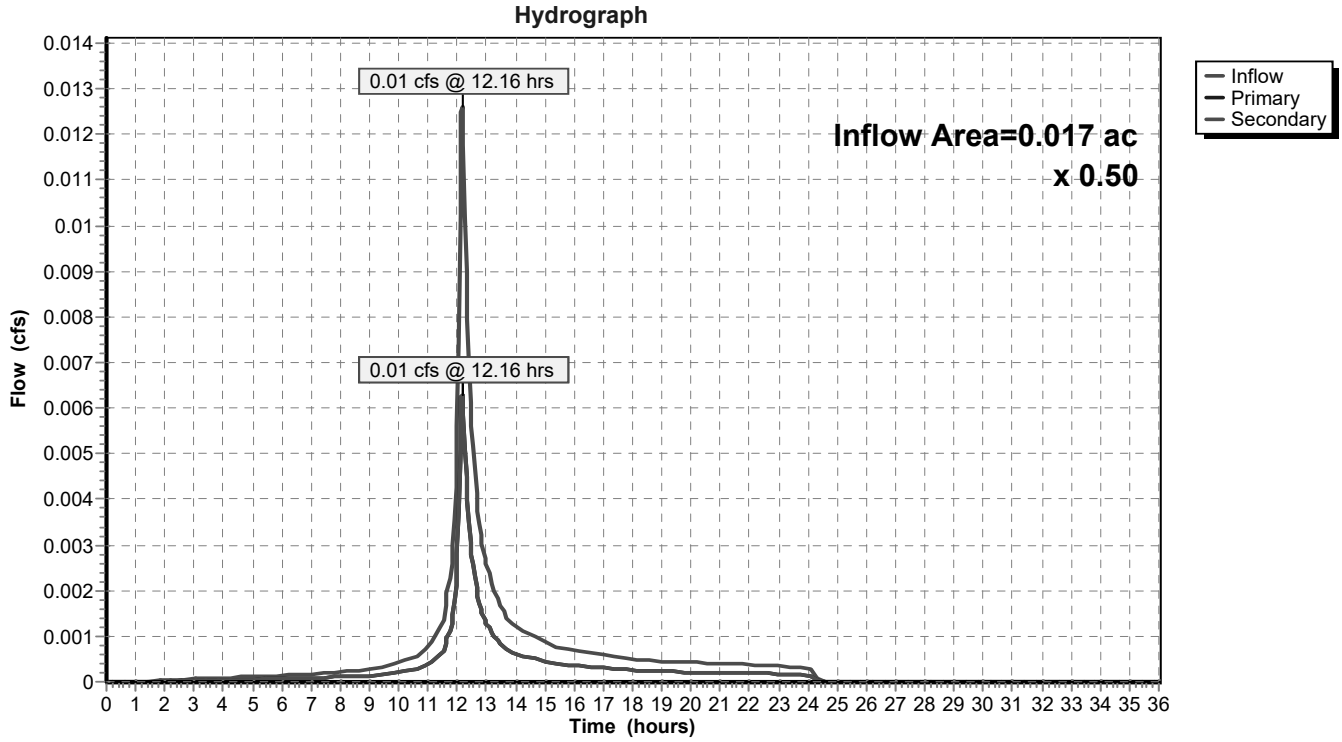


Summary for Link 4Lr: Reduction

Inflow Area = 0.017 ac, 18.82% Impervious, Inflow Depth = 0.99" for 2-Year Current TLS, Mercer event
Inflow = 0.01 cfs @ 12.16 hrs, Volume= 0.001 af
Primary = 0.01 cfs @ 12.16 hrs, Volume= 0.001 af, Atten= 50%, Lag= 0.0 min
Routed to Link 4L : DA-4 COM HYD
Secondary = 0.01 cfs @ 12.16 hrs, Volume= 0.001 af

Primary outflow = Inflow x 0.50, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 4Lr: Reduction

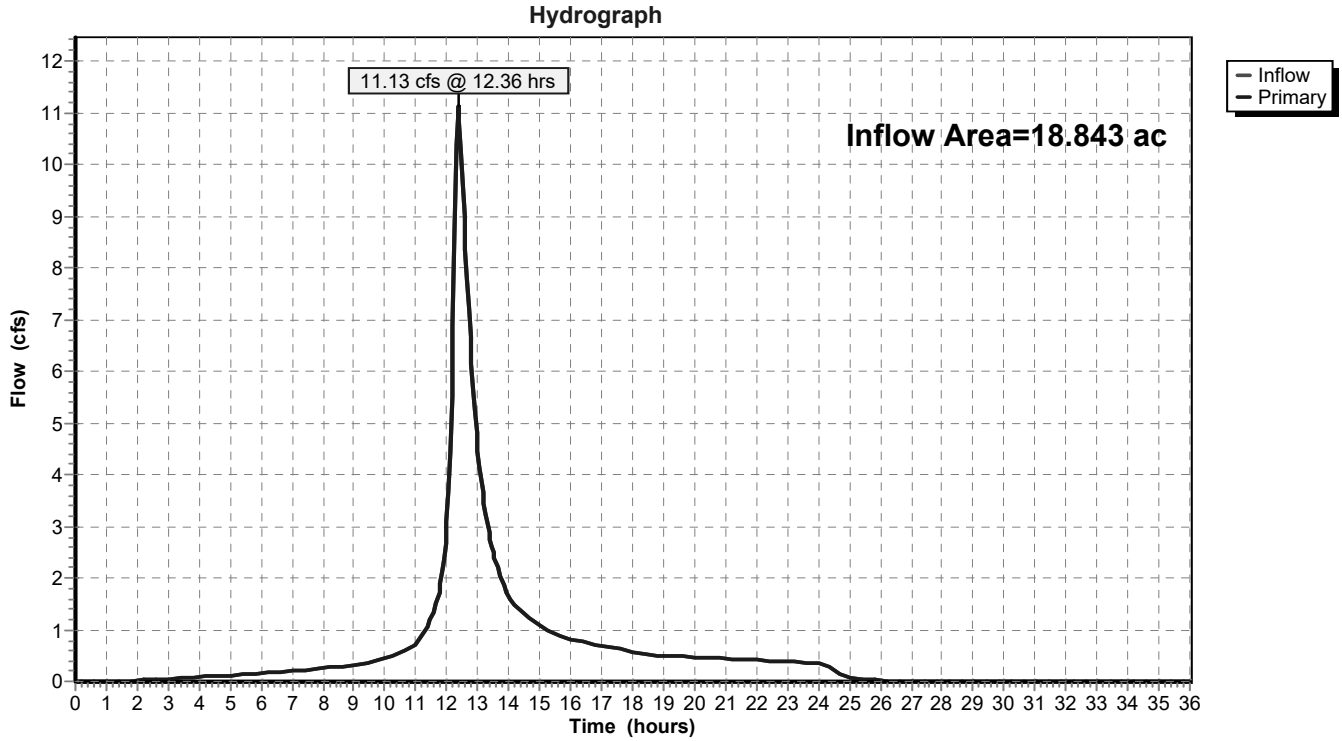


Summary for Link 5L: Allowable: Two-yr; COM HYD @ On Stream Pond [Point of Analysis]

Inflow Area = 18.843 ac, 21.27% Impervious, Inflow Depth = 1.05" for 2-Year Current TLS, Mercer event
Inflow = 11.13 cfs @ 12.36 hrs, Volume= 1.643 af
Primary = 11.13 cfs @ 12.36 hrs, Volume= 1.643 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 5L: Allowable: Two-yr; COM HYD @ On Stream Pond [Point of Analysis]



22-019 Allowable R0 (10-24-23)
Prepared by The Reynolds Group, Inc
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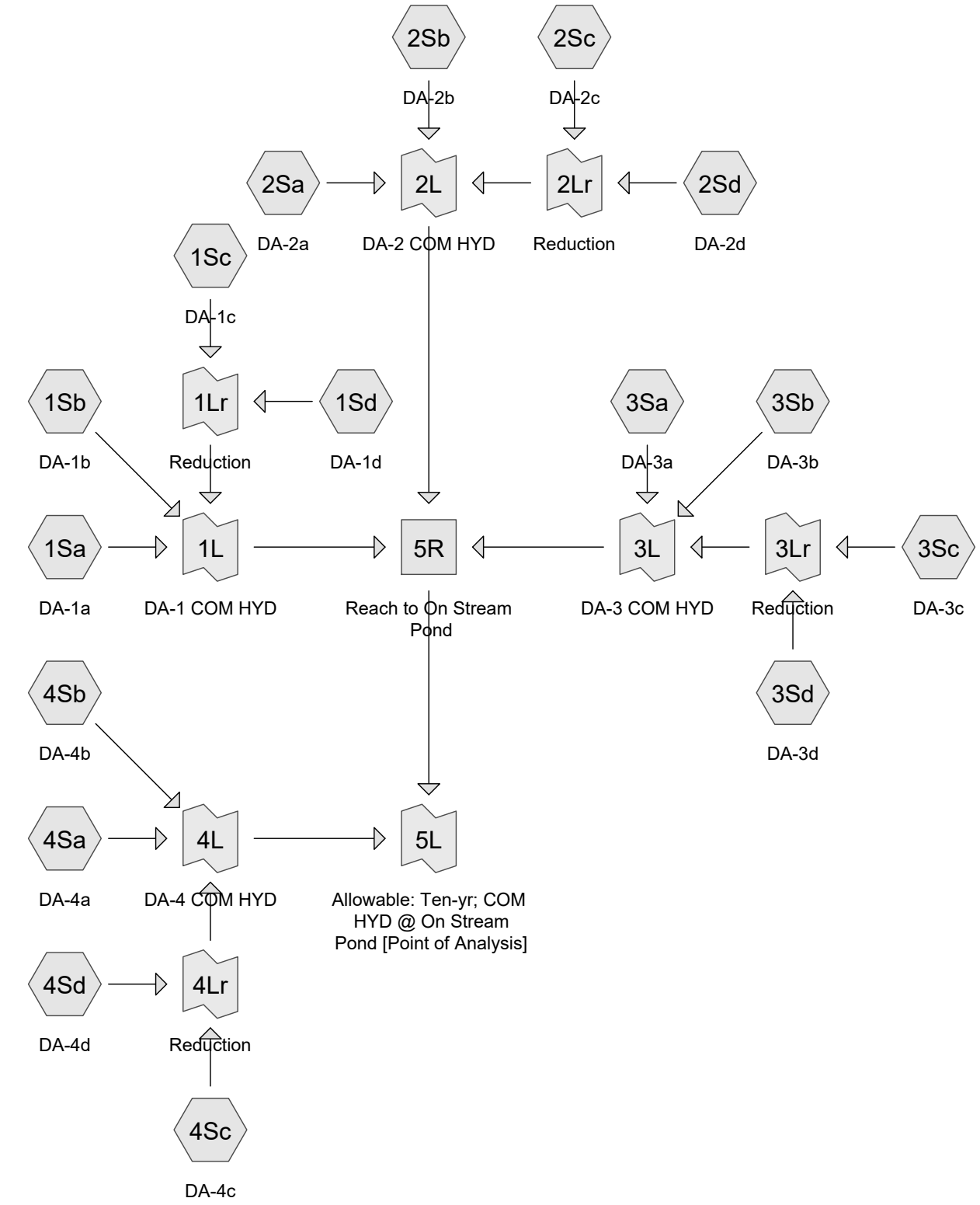

Subcat Reach Pond Link

Routing Diagram for 22-019 Allowable R0 (10-24-23)
Prepared by The Reynolds Group, Inc
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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1Sa: DA-1a Runoff Area=247,625 sf 0.00% Impervious Runoff Depth=1.71"
Flow Length=2,005' Tc=25.4 min CN=65 Runoff=6.98 cfs 0.812 af

Subcatchment 1Sb: DA-1b Runoff Area=7,638 sf 71.60% Impervious Runoff Depth=4.74"
Flow Length=1,562' Tc=13.1 min CN=97 Runoff=0.74 cfs 0.069 af

Subcatchment 1Sc: DA-1c Runoff Area=190,217 sf 0.00% Impervious Runoff Depth=1.42"
Flow Length=2,005' Tc=25.4 min CN=61 Runoff=4.28 cfs 0.518 af

Subcatchment 1Sd: DA-1d Runoff Area=10,664 sf 44.05% Impervious Runoff Depth=4.74"
Flow Length=1,562' Tc=13.1 min CN=97 Runoff=1.03 cfs 0.097 af

Subcatchment 2Sa: DA-2a Runoff Area=89,480 sf 0.00% Impervious Runoff Depth=1.35"
Flow Length=1,193' Tc=14.9 min CN=60 Runoff=2.44 cfs 0.232 af

Subcatchment 2Sb: DA-2b Runoff Area=103,884 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=1,344' Tc=7.0 min CN=98 Runoff=12.27 cfs 0.964 af

Subcatchment 2Sc: DA-2c Runoff Area=7,627 sf 0.00% Impervious Runoff Depth=1.42"
Flow Length=1,193' Tc=14.9 min CN=61 Runoff=0.22 cfs 0.021 af

Subcatchment 2Sd: DA-2d Runoff Area=6,490 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=1,344' Tc=7.0 min CN=98 Runoff=0.77 cfs 0.060 af

Subcatchment 3Sa: DA-3a Runoff Area=81,824 sf 0.00% Impervious Runoff Depth=1.71"
Flow Length=479' Tc=12.0 min CN=65 Runoff=3.26 cfs 0.268 af

Subcatchment 3Sb: DA-3b Runoff Area=45,109 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=380' Tc=2.5 min CN=98 Runoff=6.21 cfs 0.419 af

Subcatchment 3Sc: DA-3c Runoff Area=3,130 sf 0.00% Impervious Runoff Depth=1.29"
Flow Length=479' Tc=12.0 min CN=59 Runoff=0.09 cfs 0.008 af

Subcatchment 3Sd: DA-3d Runoff Area=501 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=380' Tc=2.5 min CN=98 Runoff=0.07 cfs 0.005 af

Subcatchment 4Sa: DA-4a Runoff Area=17,562 sf 0.00% Impervious Runoff Depth=1.29"
Flow Length=1,952' Tc=16.6 min CN=59 Runoff=0.43 cfs 0.043 af

Subcatchment 4Sb: DA-4b Runoff Area=8,286 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=1,876' Tc=7.7 min CN=98 Runoff=0.96 cfs 0.077 af

Subcatchment 4Sc: DA-4c Runoff Area=604 sf 0.00% Impervious Runoff Depth=1.42"
Flow Length=1,952' Tc=16.6 min CN=61 Runoff=0.02 cfs 0.002 af

Subcatchment 4Sd: DA-4d Runoff Area=140 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=1,876' Tc=7.7 min CN=98 Runoff=0.02 cfs 0.001 af

Reach 5R: Reach to On Stream Pond Avg. Flow Depth=1.03' Max Vel=1.24 fps Inflow=26.72 cfs 3.295 af
n=0.045 L=526.0' S=0.0025 '/' Capacity=1,446.01 cfs Outflow=23.53 cfs 3.295 af

Link 1L: DA-1 COM HYD Inflow=11.01 cfs 1.342 af
Primary=11.01 cfs 1.342 af

Link 1Lr: Reduction x 0.75 Inflow=4.83 cfs 0.615 af
Primary=3.62 cfs 0.461 af Secondary=1.21 cfs 0.154 af

Link 2L: DA-2 COM HYD Inflow=14.61 cfs 1.257 af
Primary=14.61 cfs 1.257 af

Link 2Lr: Reduction x 0.75 Inflow=0.92 cfs 0.081 af
Primary=0.69 cfs 0.061 af Secondary=0.23 cfs 0.020 af

Link 3L: DA-3 COM HYD Inflow=8.17 cfs 0.696 af
Primary=8.17 cfs 0.696 af

Link 3Lr: Reduction x 0.75 Inflow=0.12 cfs 0.012 af
Primary=0.09 cfs 0.009 af Secondary=0.03 cfs 0.003 af

Link 4L: DA-4 COM HYD Inflow=1.26 cfs 0.122 af
Primary=1.26 cfs 0.122 af

Link 4Lr: Reduction x 0.75 Inflow=0.03 cfs 0.003 af
Primary=0.02 cfs 0.002 af Secondary=0.01 cfs 0.001 af

Link 5L: Allowable: Ten-yr; COM HYD @ On Stream Pond [Point of Analysis] Inflow=24.21 cfs 3.418 af
Primary=24.21 cfs 3.418 af

Total Runoff Area = 18.843 ac Runoff Volume = 3.595 af Average Runoff Depth = 2.29"
78.73% Pervious = 14.835 ac 21.27% Impervious = 4.008 ac

Summary for Subcatchment 1Sa: DA-1a

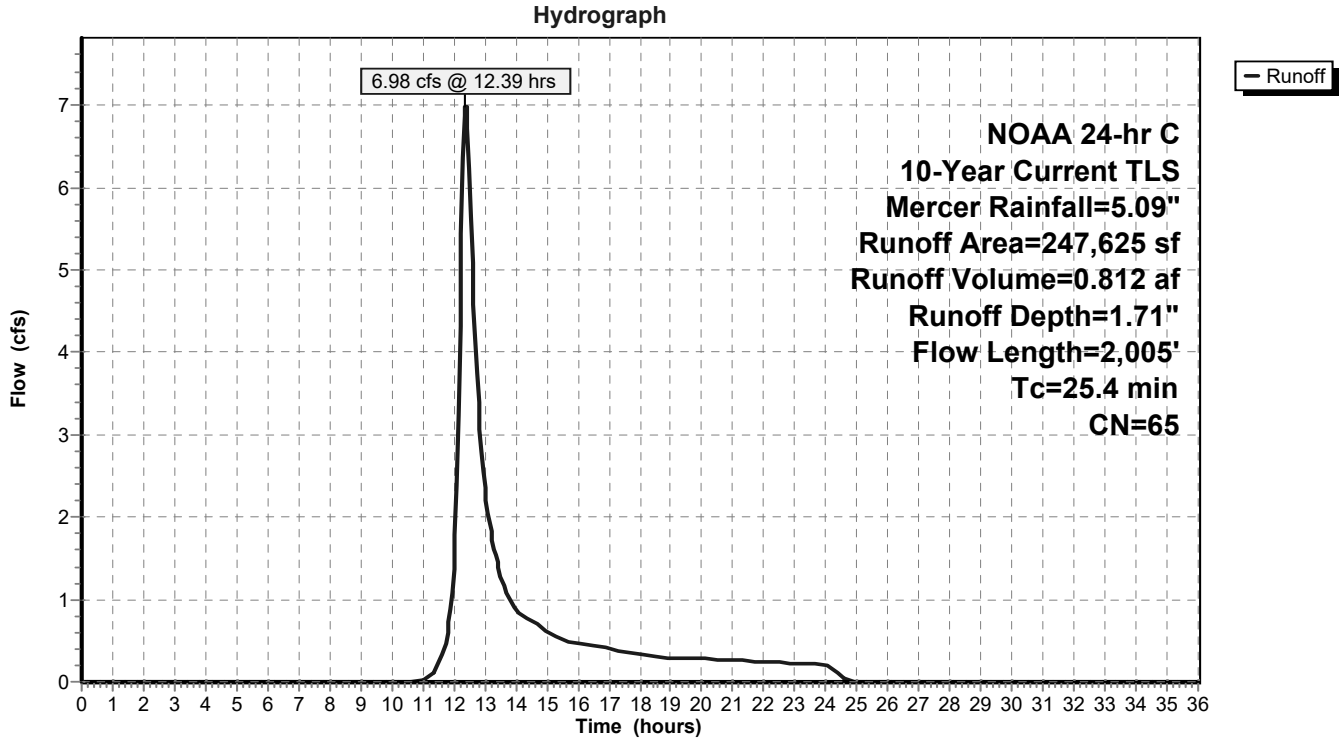
Runoff = 6.98 cfs @ 12.39 hrs, Volume= 0.812 af, Depth= 1.71"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
19,250	55	Woods, Good, HSG B
80,094	70	Woods, Good, HSG C
116,446	61	>75% Grass cover, Good, HSG B
31,835	74	>75% Grass cover, Good, HSG C
247,625	65	Weighted Average
247,625		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	56	0.0180	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
8.2	906	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.5	377	0.0030	1.81	65.11	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
25.4	2,005	Total			

Subcatchment 1Sa: DA-1a



Summary for Subcatchment 1Sb: DA-1b

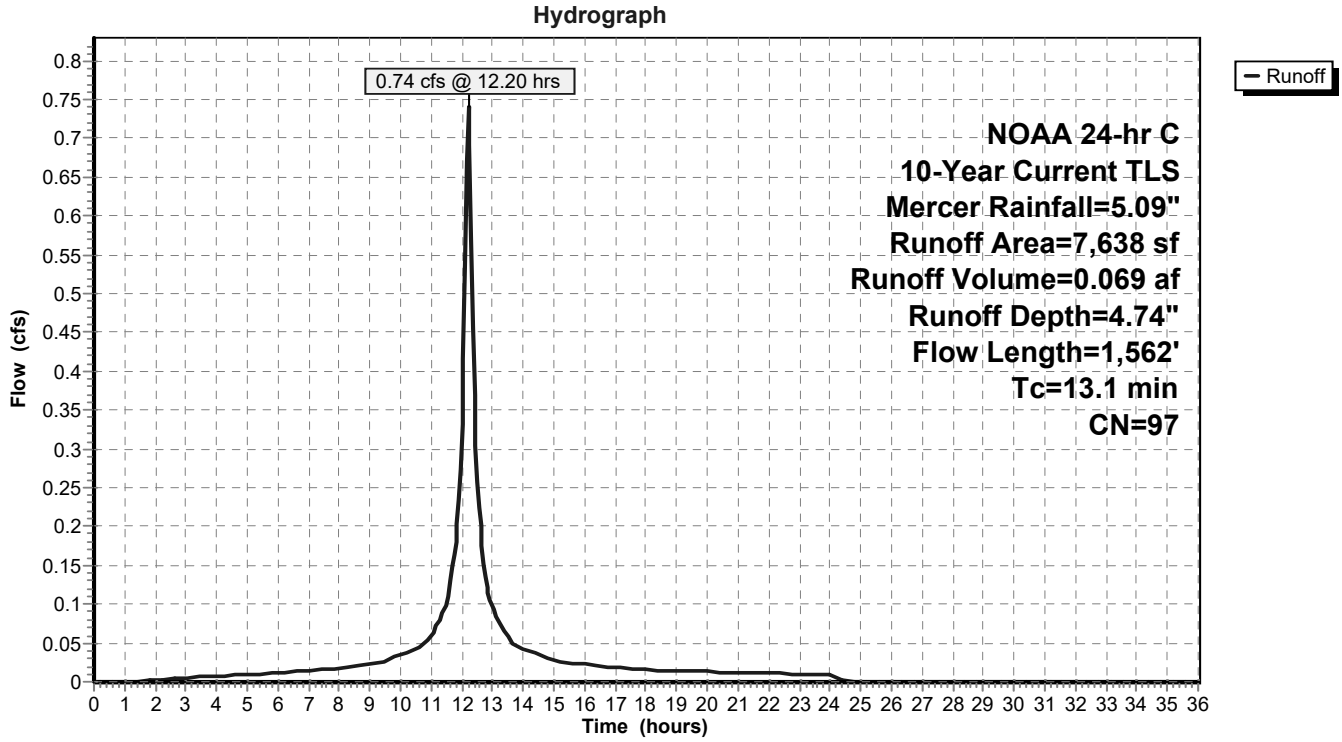
Runoff = 0.74 cfs @ 12.20 hrs, Volume= 0.069 af, Depth= 4.74"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	5,469	98	Paved parking, HSG B (Vehicular)
*	2,169	96	Gravel surface, HSG B (Vehicular)
	7,638	97	Weighted Average
	2,169		28.40% Pervious Area
	5,469		71.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.22		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
6.9	733	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	243	0.0320	3.65	21.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
13.1	1,562	Total			

Subcatchment 1Sb: DA-1b



Summary for Subcatchment 1Sc: DA-1c

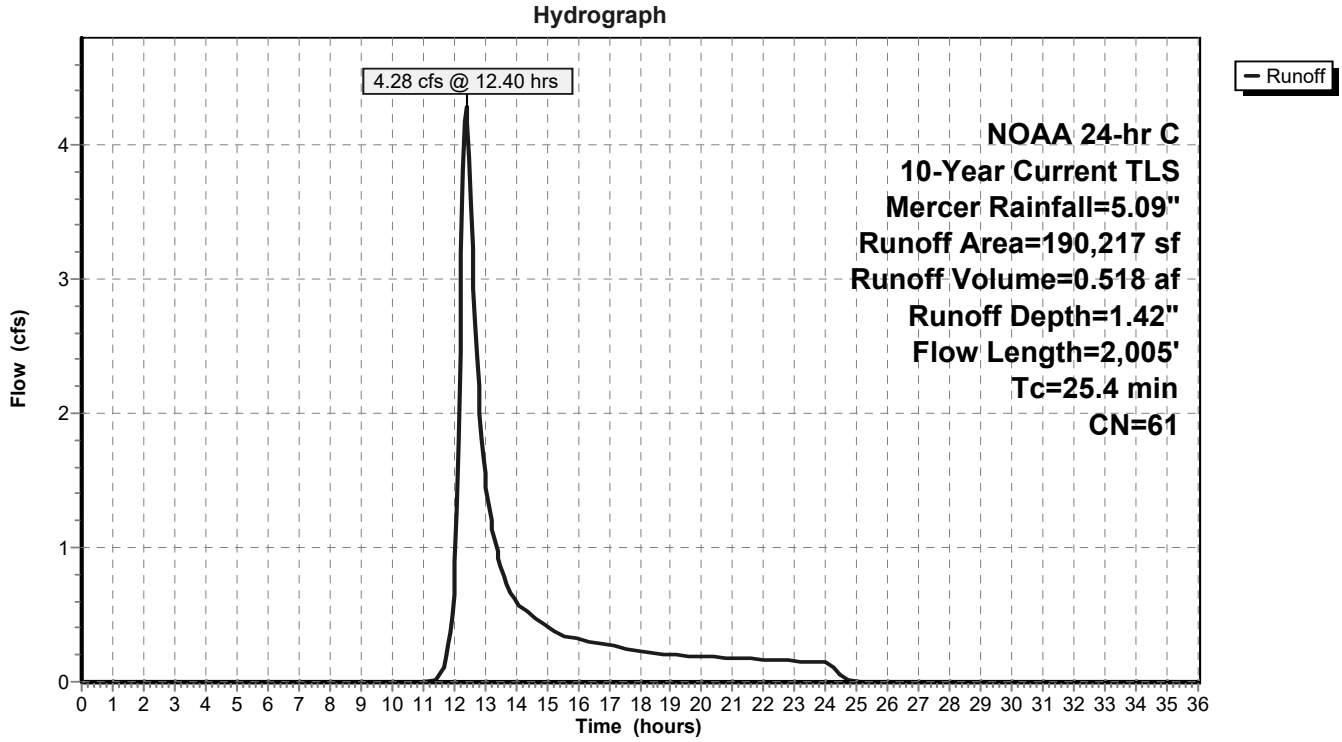
Runoff = 4.28 cfs @ 12.40 hrs, Volume= 0.518 af, Depth= 1.42"
Routed to Link 1Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
10,383	55	Woods, Good, HSG B
1,167	70	Woods, Good, HSG C
171,409	61	>75% Grass cover, Good, HSG B
7,258	74	>75% Grass cover, Good, HSG C
190,217	61	Weighted Average
190,217		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	56	0.0180	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34"
8.2	906	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.5	377	0.0030	1.81	65.11	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
25.4	2,005	Total			

Subcatchment 1Sc: DA-1c



Summary for Subcatchment 1Sd: DA-1d

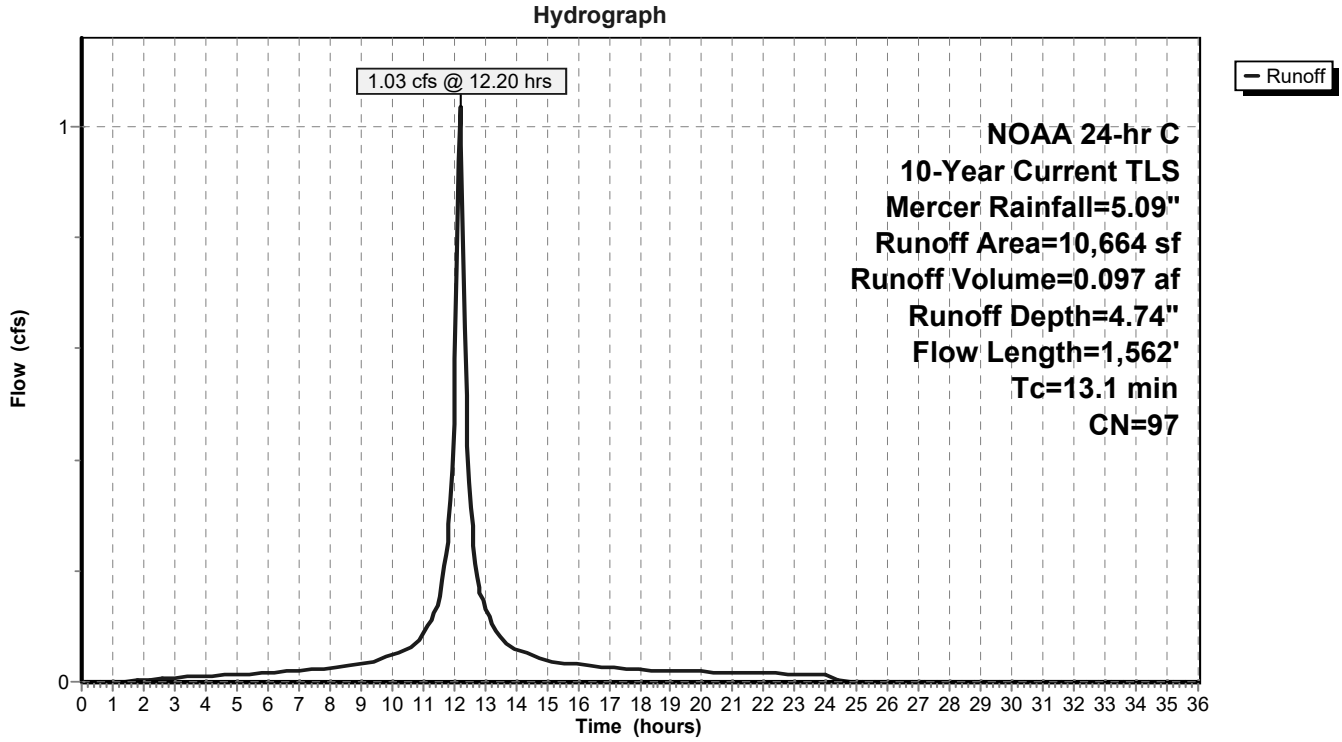
Runoff = 1.03 cfs @ 12.20 hrs, Volume= 0.097 af, Depth= 4.74"
Routed to Link 1Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	4,698	98	Paved parking, HSG B (Vehicular)
*	5,966	96	Gravel surface, HSG B (Vehicular)
	10,664	97	Weighted Average
	5,966		55.95% Pervious Area
	4,698		44.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.22		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
6.9	733	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	243	0.0320	3.65	21.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
13.1	1,562	Total			

Subcatchment 1Sd: DA-1d



Summary for Subcatchment 2Sa: DA-2a

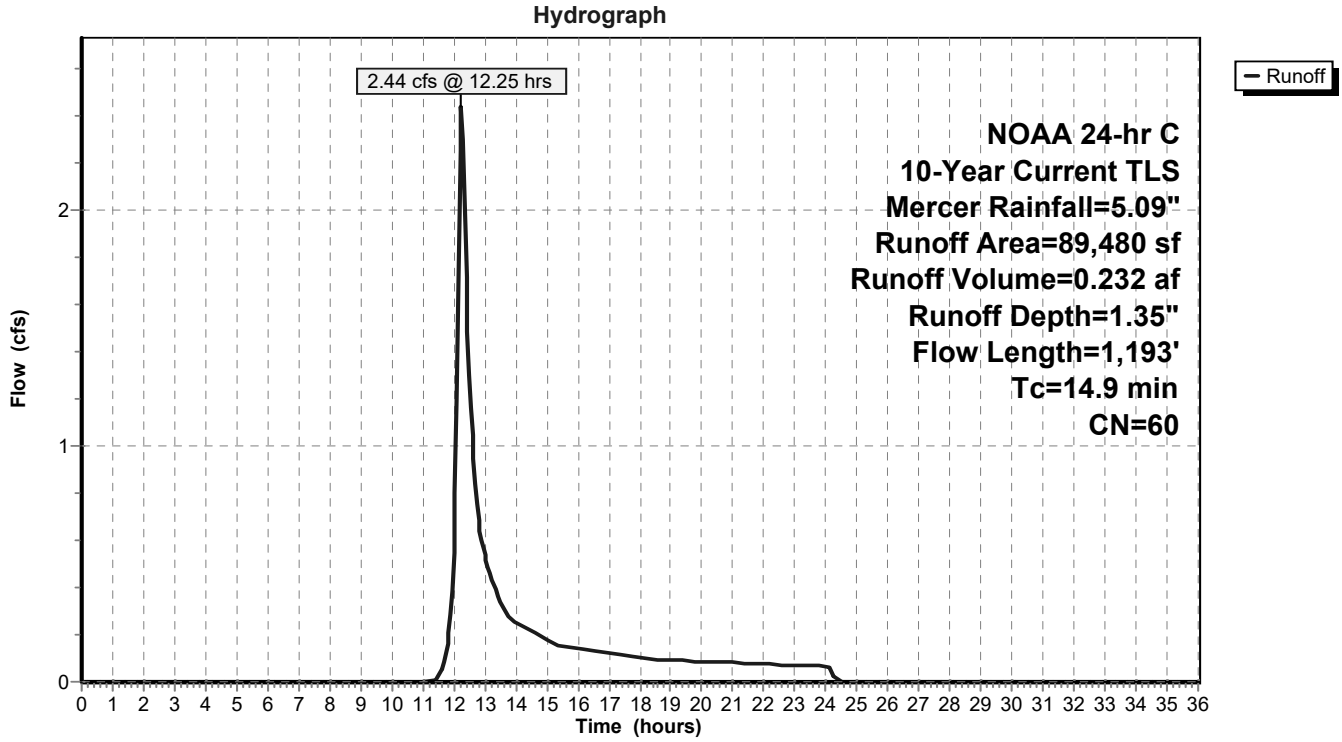
Runoff = 2.44 cfs @ 12.25 hrs, Volume= 0.232 af, Depth= 1.35"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
16,278	55	Woods, Good, HSG B
73,005	61	>75% Grass cover, Good, HSG B
197	80	>75% Grass cover, Good, HSG D
89,480	60	Weighted Average
89,480		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
0.3	29	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,193	Total			

Subcatchment 2Sa: DA-2a



Summary for Subcatchment 2Sb: DA-2b

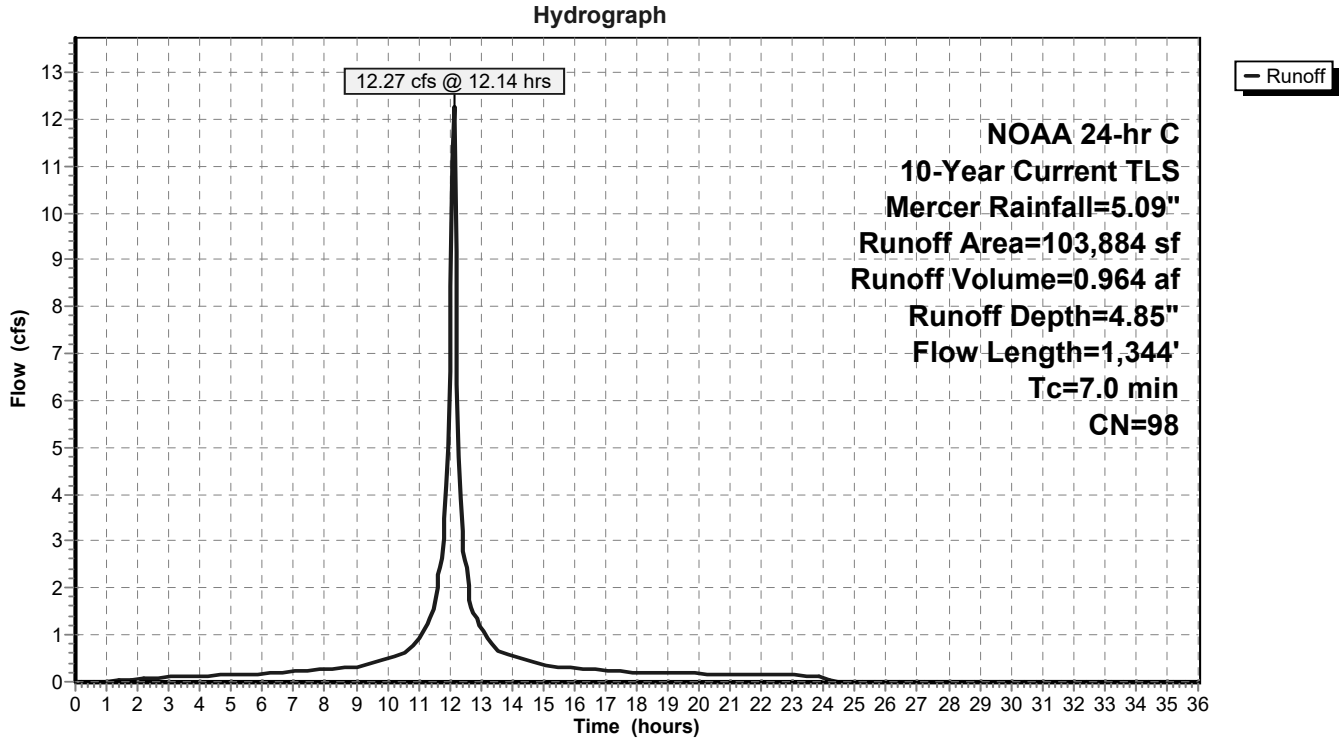
Runoff = 12.27 cfs @ 12.14 hrs, Volume= 0.964 af, Depth= 4.85"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	39,492	98	Paved parking, HSG B (Vehicular)
*	61,715	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	2,677	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	103,884	98	Weighted Average
	103,884		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
7.0	1,344	Total			

Subcatchment 2Sb: DA-2b



Summary for Subcatchment 2Sc: DA-2c

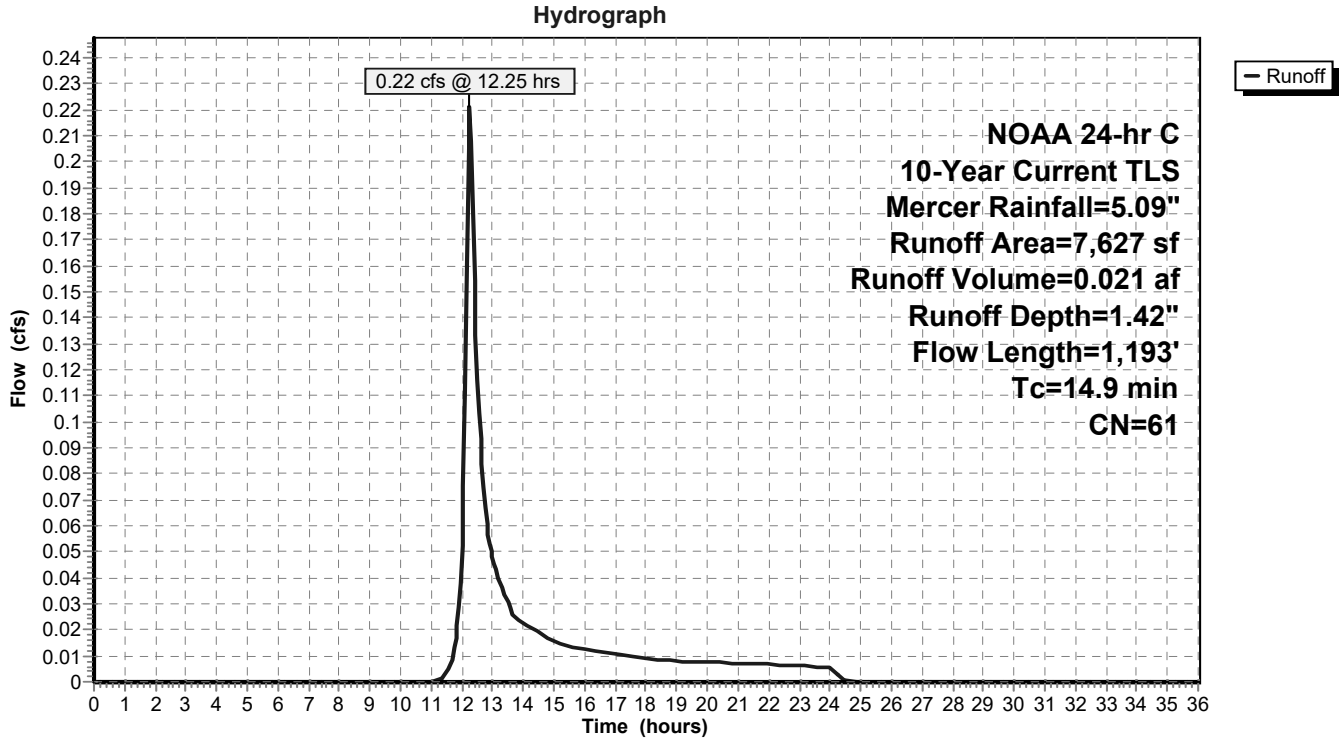
Runoff = 0.22 cfs @ 12.25 hrs, Volume= 0.021 af, Depth= 1.42"
Routed to Link 2Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
7,627	61	>75% Grass cover, Good, HSG B
7,627		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
0.3	29	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,193	Total			

Subcatchment 2Sc: DA-2c



Summary for Subcatchment 2Sd: DA-2d

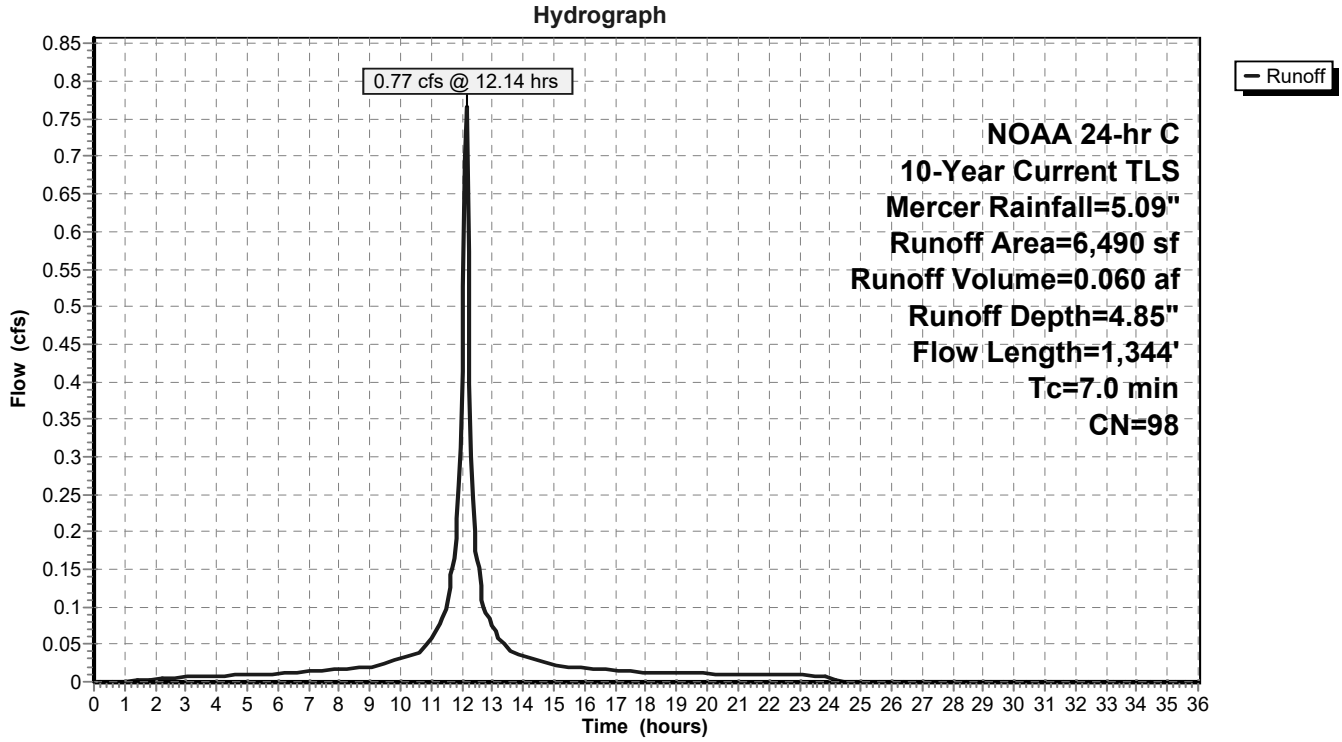
Runoff = 0.77 cfs @ 12.14 hrs, Volume= 0.060 af, Depth= 4.85"
Routed to Link 2Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	6,291	98	Paved parking, HSG B (Vehicular)
*	199	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	6,490	98	Weighted Average
	6,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
7.0	1,344	Total			

Subcatchment 2Sd: DA-2d



Summary for Subcatchment 3Sa: DA-3a

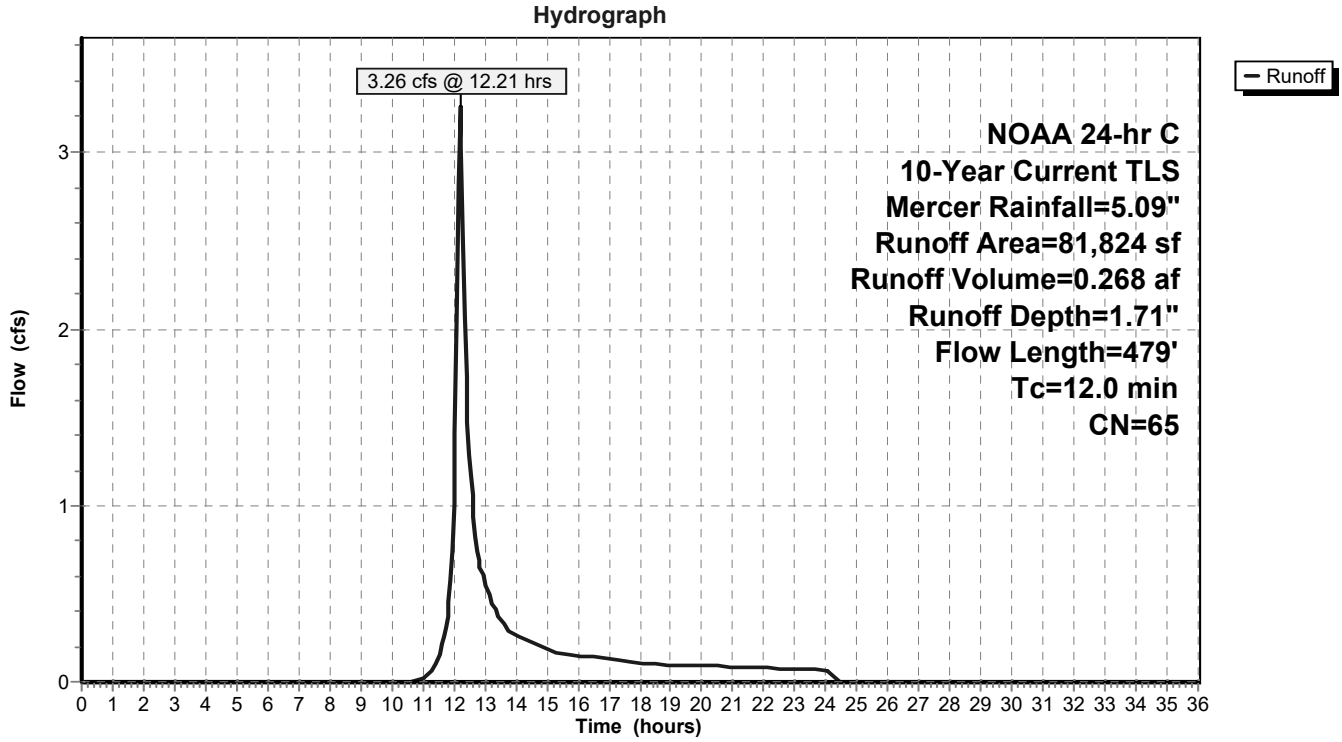
Runoff = 3.26 cfs @ 12.21 hrs, Volume= 0.268 af, Depth= 1.71"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
21,739	55	Woods, Good, HSG B
31,307	70	Woods, Good, HSG C
1,317	77	Woods, Good, HSG D
18,394	61	>75% Grass cover, Good, HSG B
3,641	74	>75% Grass cover, Good, HSG C
5,426	80	>75% Grass cover, Good, HSG D
81,824	65	Weighted Average
81,824		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.8	179	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
12.0	479	Total			

Subcatchment 3Sa: DA-3a



Summary for Subcatchment 3Sb: DA-3b

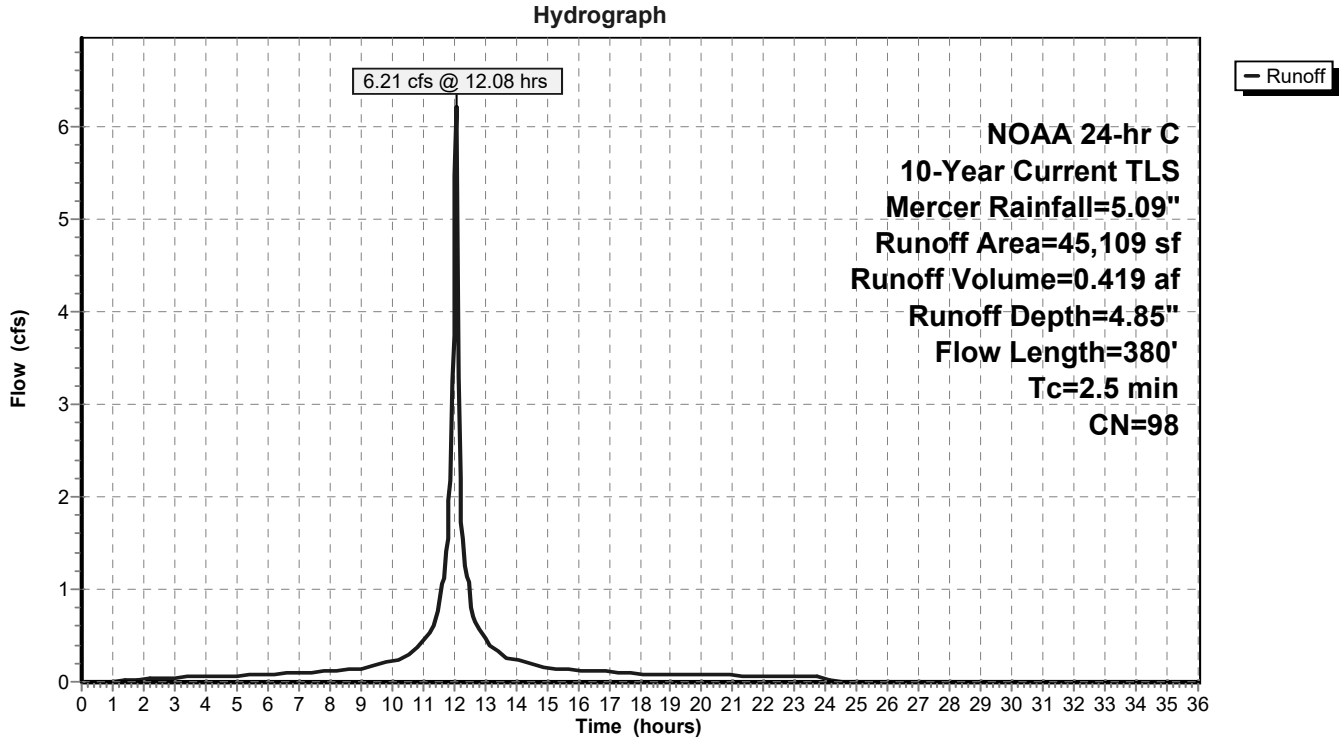
Runoff = 6.21 cfs @ 12.08 hrs, Volume= 0.419 af, Depth= 4.85"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	14,685	98	Paved parking, HSG B (Vehicular)
*	26,070	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	1,571	98	Paved parking, HSG C (Vehicular)
*	425	98	Paved parking, HSG D (Vehicular)
*	2,358	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	45,109	98	Weighted Average
	45,109		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.32		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
0.2	39	0.0410	3.04		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
2.5	380	Total			

Subcatchment 3Sb: DA-3b



Summary for Subcatchment 3Sc: DA-3c

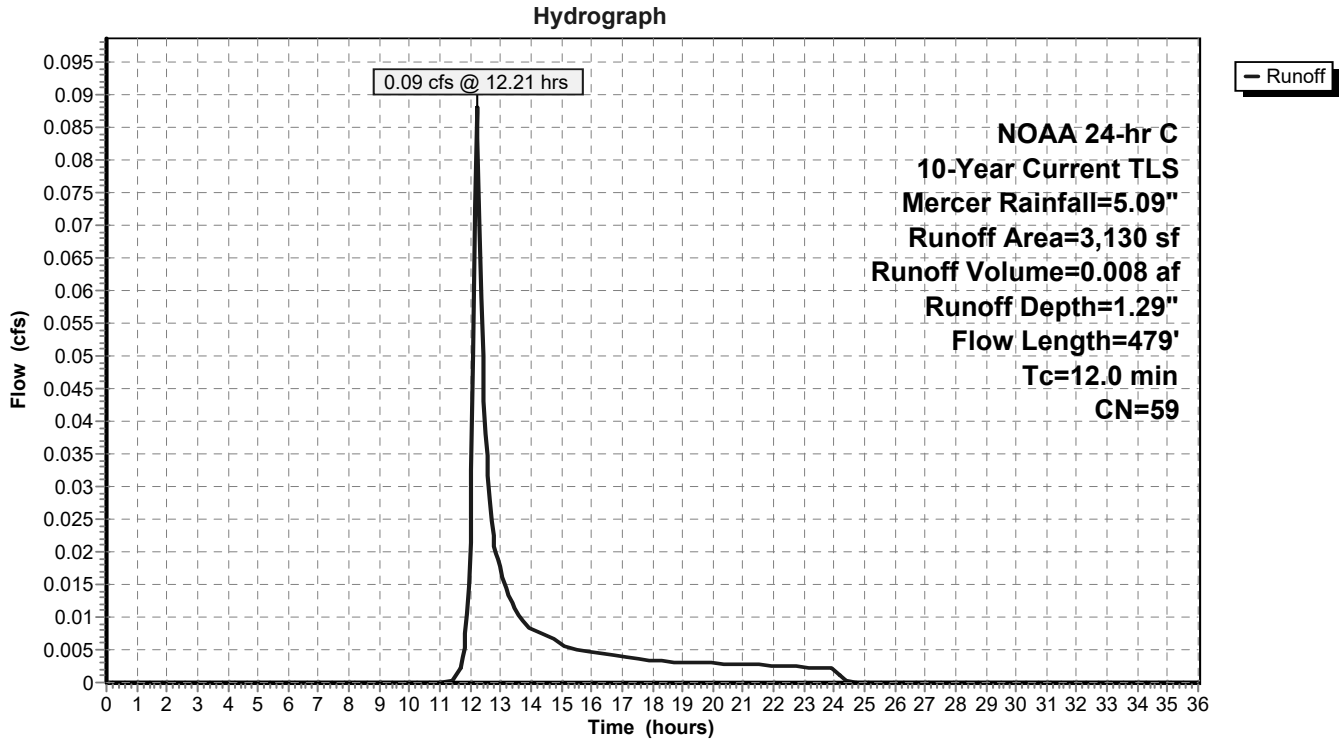
Runoff = 0.09 cfs @ 12.21 hrs, Volume= 0.008 af, Depth= 1.29"
Routed to Link 3Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
1,286	55	Woods, Good, HSG B
1,844	61	>75% Grass cover, Good, HSG B
3,130	59	Weighted Average
3,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.8	179	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
12.0	479	Total			

Subcatchment 3Sc: DA-3c



Summary for Subcatchment 3Sd: DA-3d

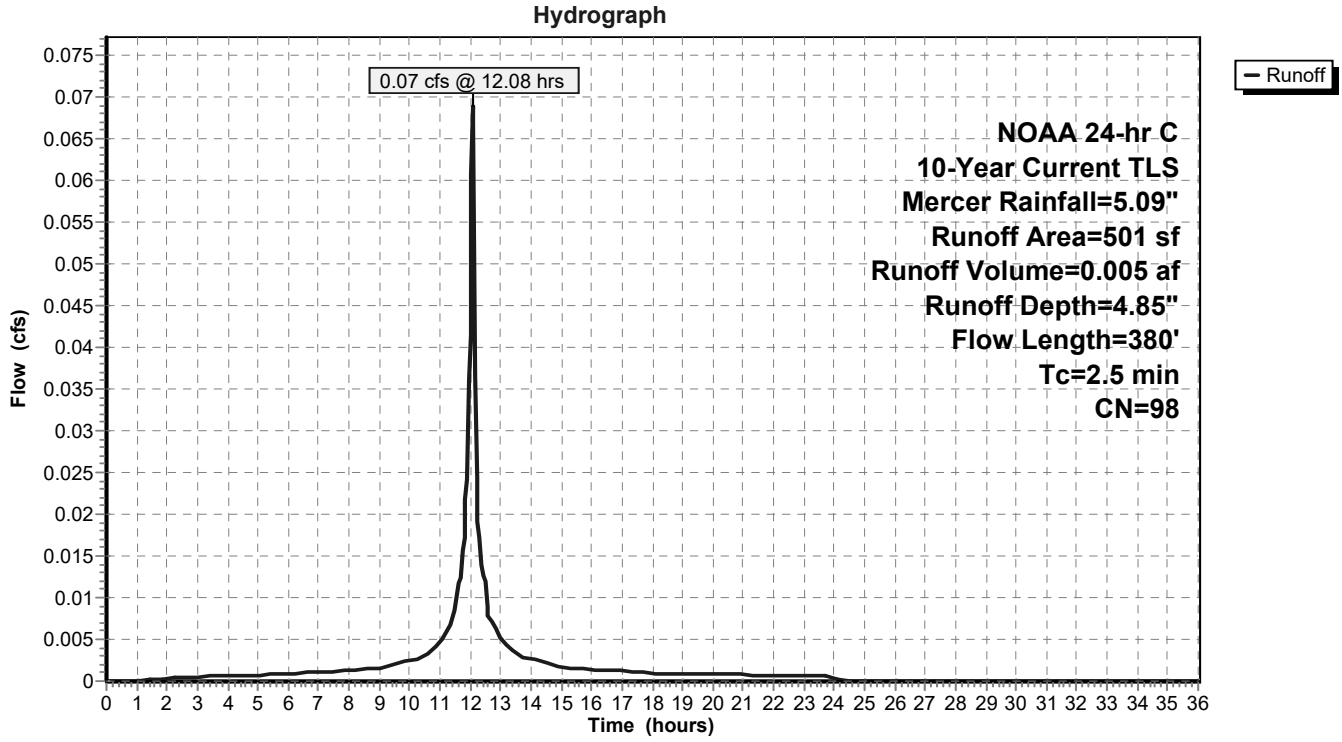
Runoff = 0.07 cfs @ 12.08 hrs, Volume= 0.005 af, Depth= 4.85"
Routed to Link 3Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	501	98	Paved parking, HSG B (Vehicular)
	501		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.32		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
0.2	39	0.0410	3.04		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	4.19	25.13	**Channel Flow,** Area= 6.0 sf Perim= 16.0' r= 0.38' n= 0.035
2.5	380	Total			

Subcatchment 3Sd: DA-3d



Summary for Subcatchment 4Sa: DA-4a

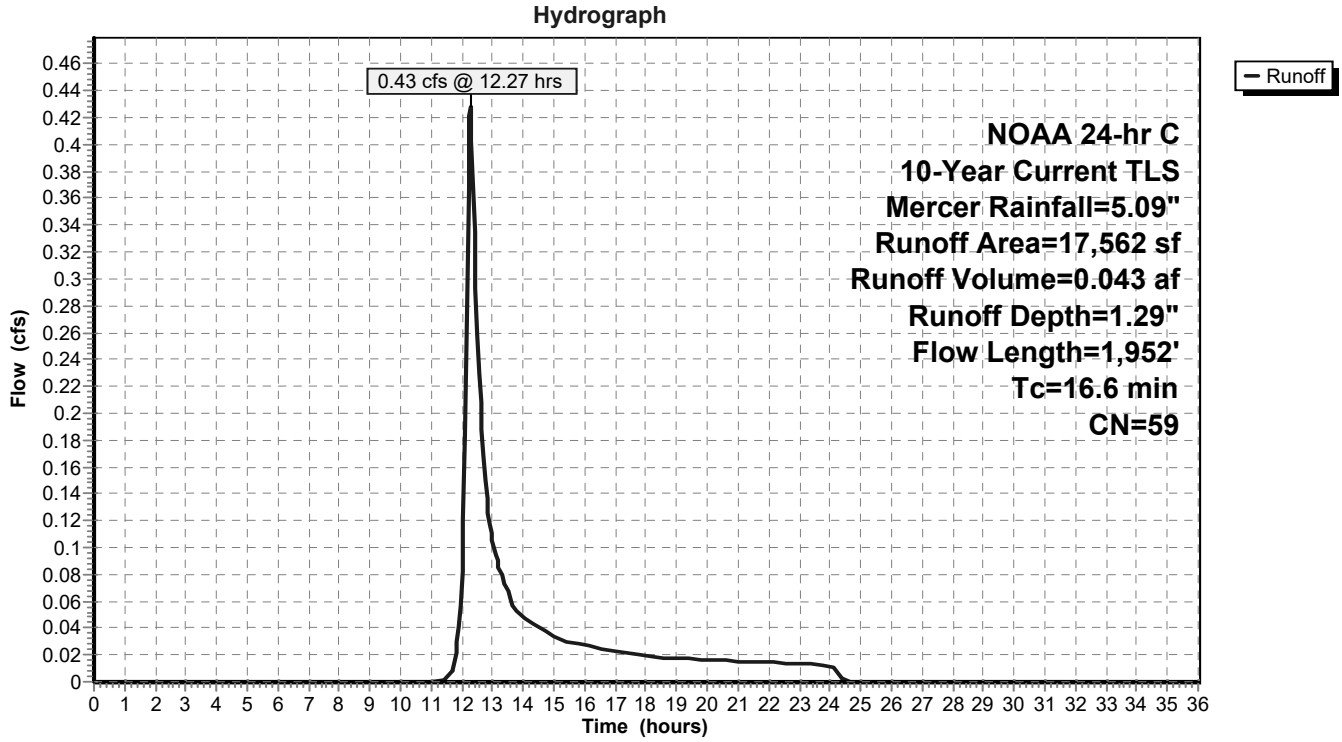
Runoff = 0.43 cfs @ 12.27 hrs, Volume= 0.043 af, Depth= 1.29"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
6,085	55	Woods, Good, HSG B
11,477	61	>75% Grass cover, Good, HSG B
17,562	59	Weighted Average
17,562		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	42	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.0	123	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
16.6	1,952	Total			

Subcatchment 4Sa: DA-4a



Summary for Subcatchment 4Sb: DA-4b

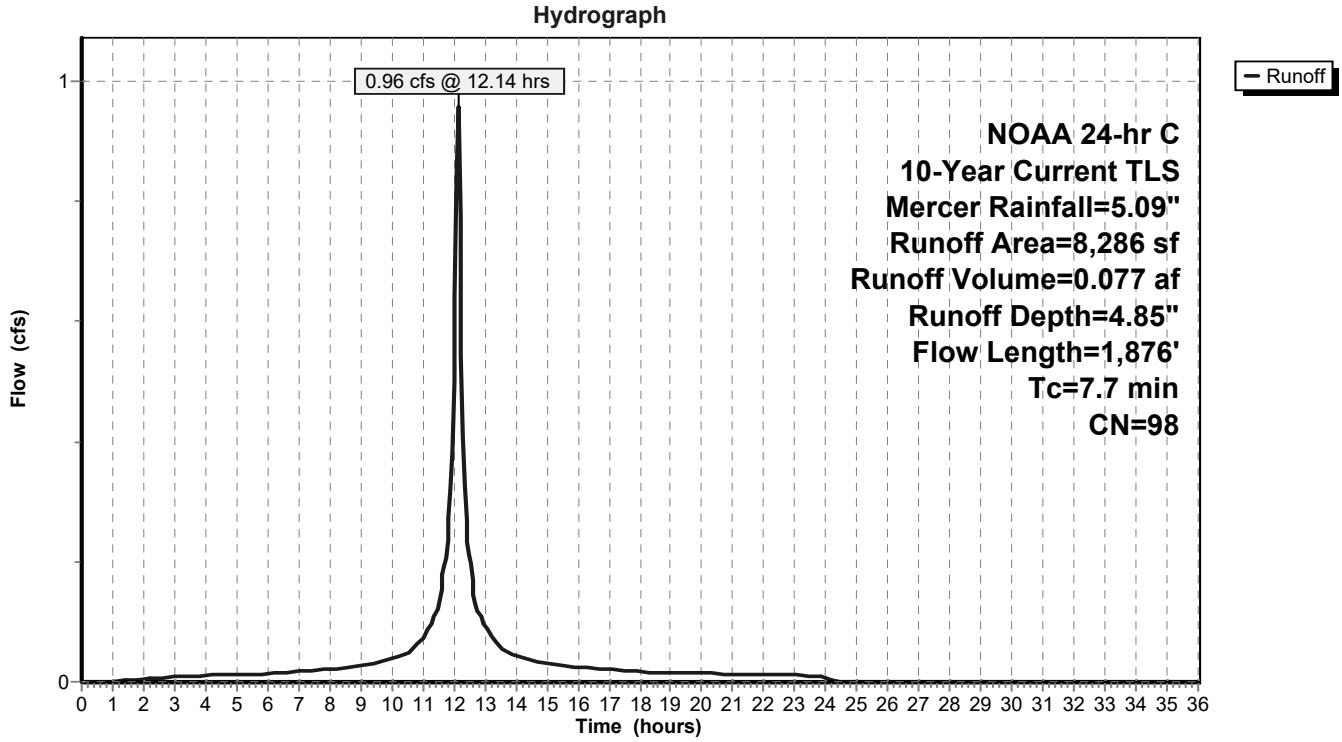
Runoff = 0.96 cfs @ 12.14 hrs, Volume= 0.077 af, Depth= 4.85"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	3,147	98	Paved parking, HSG B (Vehicular)
*	5,139	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	8,286	98	Weighted Average
	8,286		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.16		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
7.7	1,876	Total			

Subcatchment 4Sb: DA-4b



Summary for Subcatchment 4Sc: DA-4c

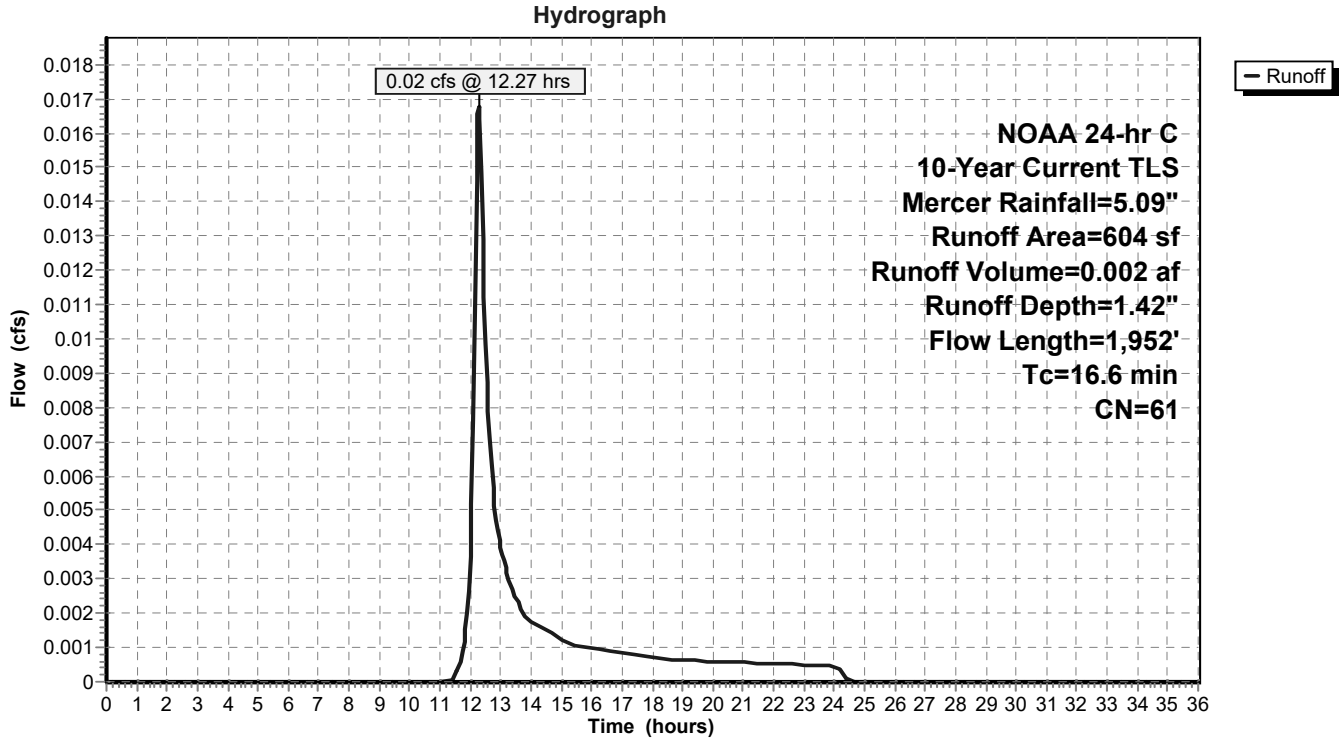
Runoff = 0.02 cfs @ 12.27 hrs, Volume= 0.002 af, Depth= 1.42"
Routed to Link 4Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
604	61	>75% Grass cover, Good, HSG B
604		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	42	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.0	123	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
16.6	1,952	Total			

Subcatchment 4Sc: DA-4c



Summary for Subcatchment 4Sd: DA-4d

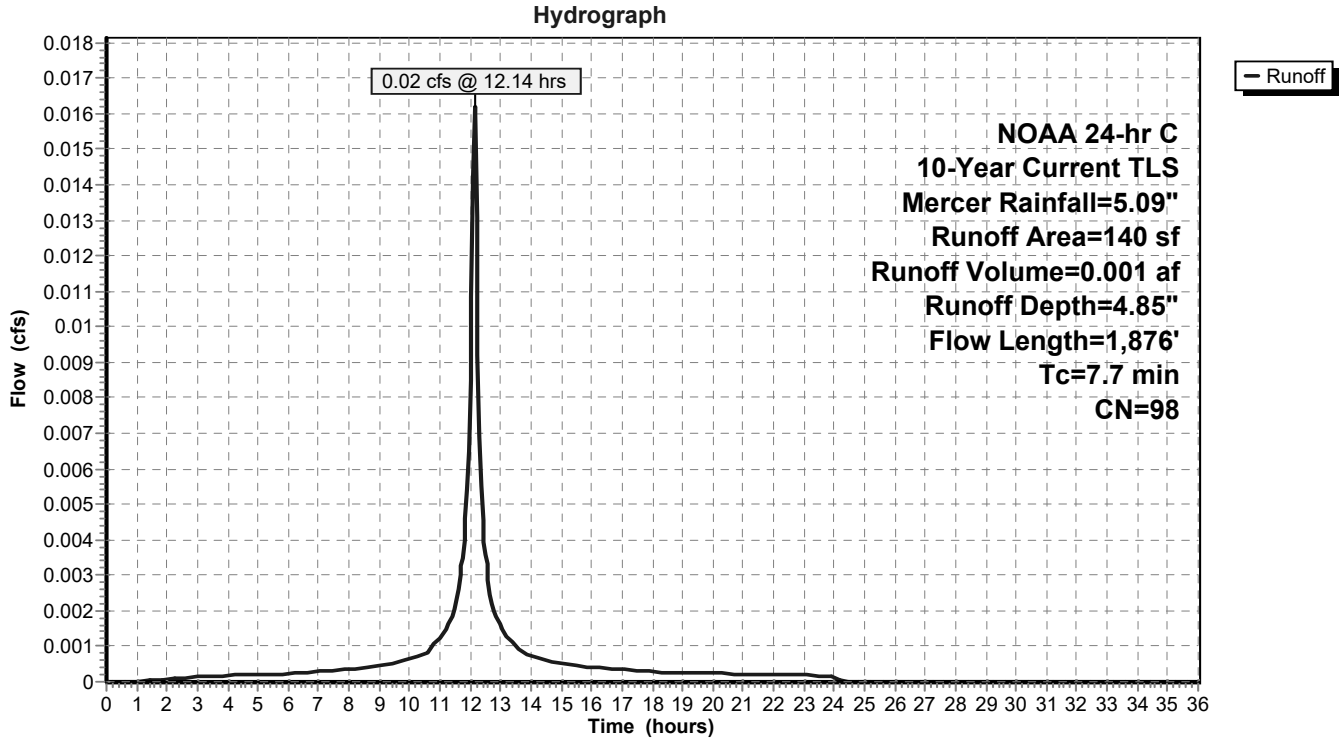
Runoff = 0.02 cfs @ 12.14 hrs, Volume= 0.001 af, Depth= 4.85"
Routed to Link 4Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	140	98	Paved parking, HSG B (Vehicular)
	140		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.16		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
7.7	1,876	Total			

Subcatchment 4Sd: DA-4d



Summary for Reach 5R: Reach to On Stream Pond

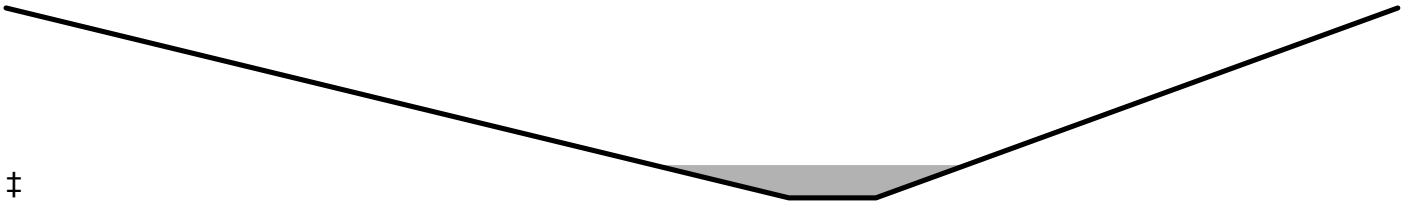
Stream Tributary 'B' to Shipetaukin Creek

Inflow Area = 18.232 ac, 20.92% Impervious, Inflow Depth = 2.17" for 10-Year Current TLS, Mercer event
Inflow = 26.72 cfs @ 12.15 hrs, Volume= 3.295 af
Outflow = 23.53 cfs @ 12.37 hrs, Volume= 3.295 af, Atten= 12%, Lag= 13.4 min
Routed to Link 5L : Allowable: Ten-yr; COM HYD @ On Stream Pond [Point of Analysis]

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.24 fps, Min. Travel Time= 7.0 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 20.1 min

Peak Storage= 9,983 cf @ 12.25 hrs
Average Depth at Peak Storage= 1.03' , Surface Width= 28.69'
Bank-Full Depth= 6.00' Flow Area= 408.0 sf, Capacity= 1,446.01 cfs

8.00' x 6.00' deep channel, n= 0.045
Side Slope Z-value= 12.0 8.0 '/' Top Width= 128.00'
Length= 526.0' Slope= 0.0025 '/'
Inlet Invert= 91.30', Outlet Invert= 90.00'



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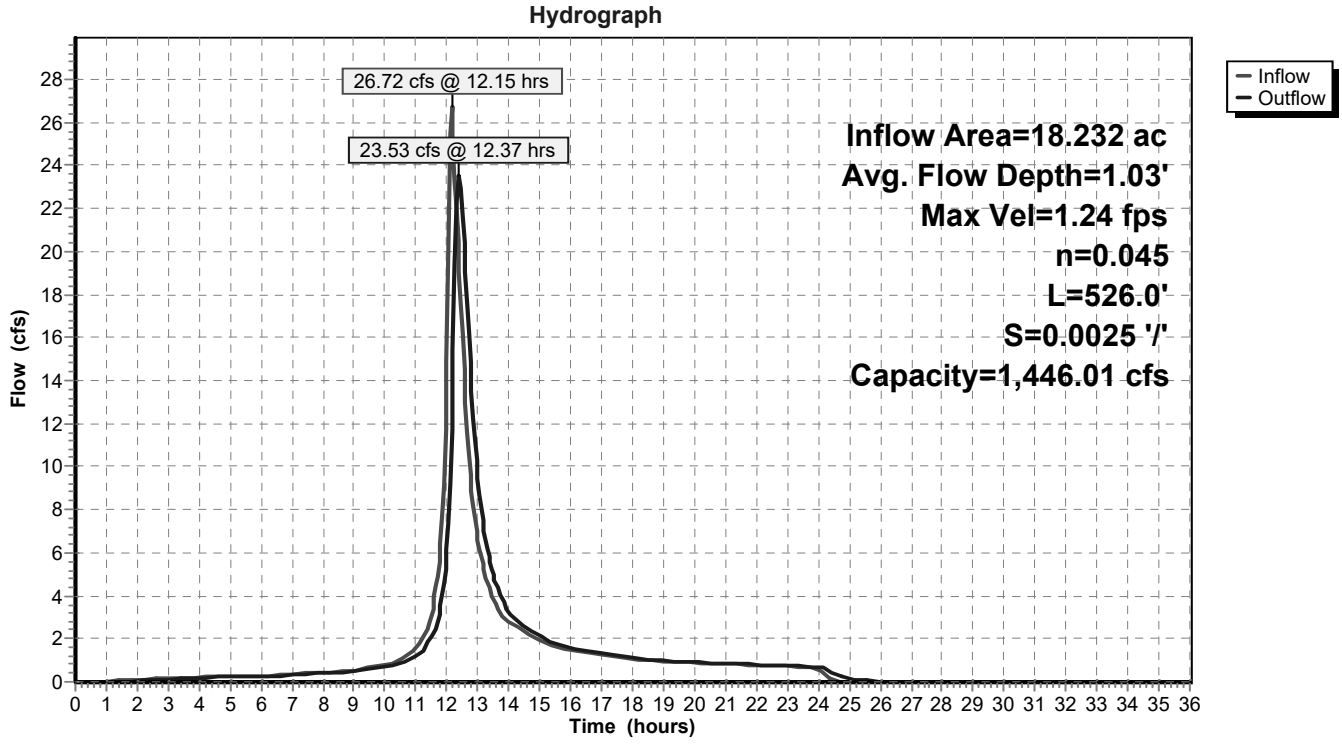
Reach 5R: Reach to On Stream Pond

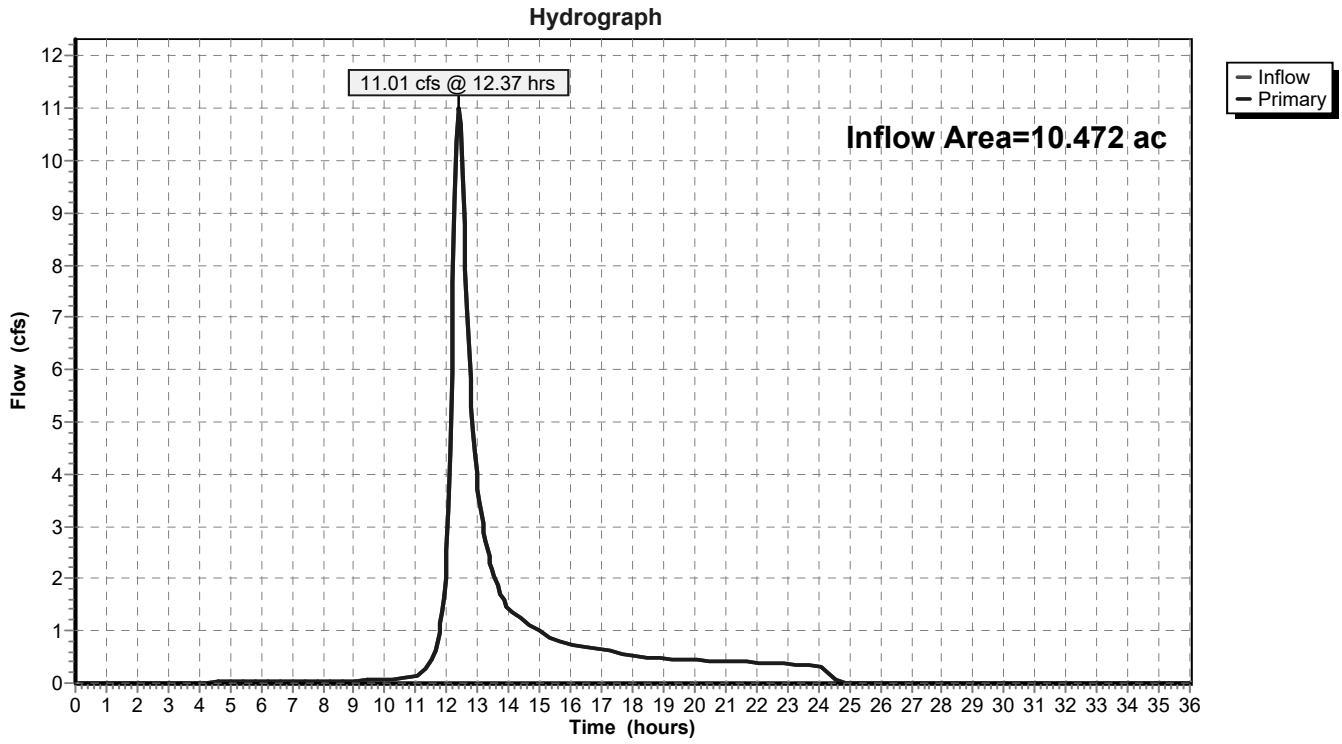


Summary for Link 1L: DA-1 COM HYD

Inflow Area = 10.472 ac, 2.23% Impervious, Inflow Depth = 1.54" for 10-Year Current TLS, Mercer event
Inflow = 11.01 cfs @ 12.37 hrs, Volume= 1.342 af
Primary = 11.01 cfs @ 12.37 hrs, Volume= 1.342 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1L: DA-1 COM HYD

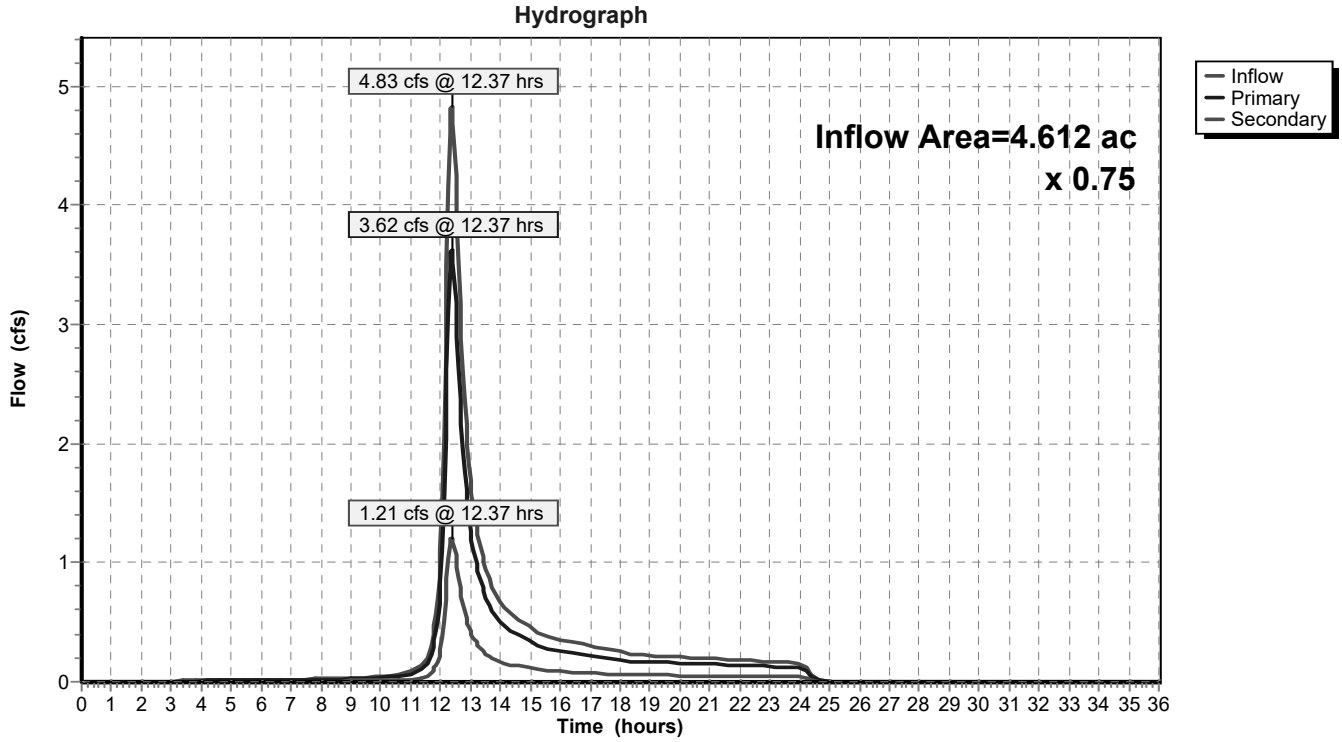


Summary for Link 1Lr: Reduction

Inflow Area = 4.612 ac, 2.34% Impervious, Inflow Depth = 1.60" for 10-Year Current TLS, Mercer event
Inflow = 4.83 cfs @ 12.37 hrs, Volume= 0.615 af
Primary = 3.62 cfs @ 12.37 hrs, Volume= 0.461 af, Atten= 25%, Lag= 0.0 min
Routed to Link 1L : DA-1 COM HYD
Secondary = 1.21 cfs @ 12.37 hrs, Volume= 0.154 af

Primary outflow = Inflow x 0.75, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1Lr: Reduction

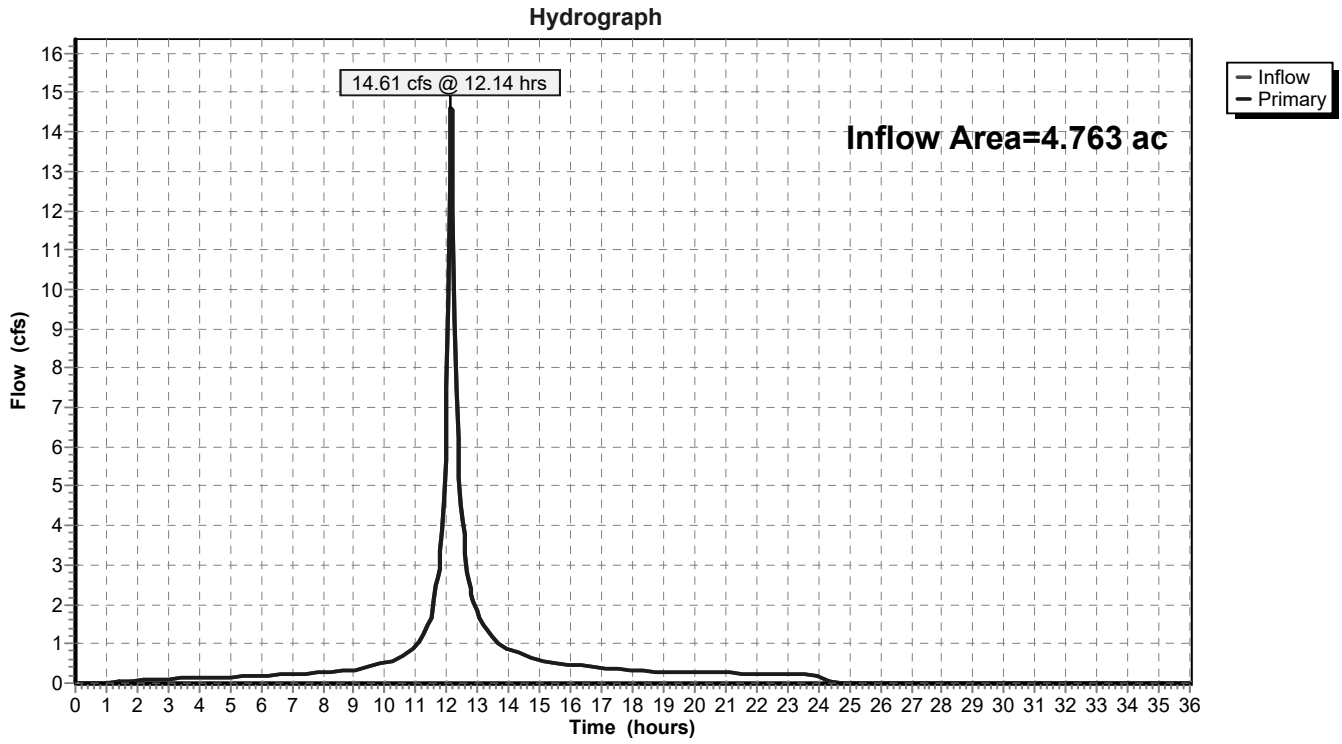


Summary for Link 2L: DA-2 COM HYD

Inflow Area = 4.763 ac, 53.20% Impervious, Inflow Depth = 3.17" for 10-Year Current TLS, Mercer event
Inflow = 14.61 cfs @ 12.14 hrs, Volume= 1.257 af
Primary = 14.61 cfs @ 12.14 hrs, Volume= 1.257 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: DA-2 COM HYD

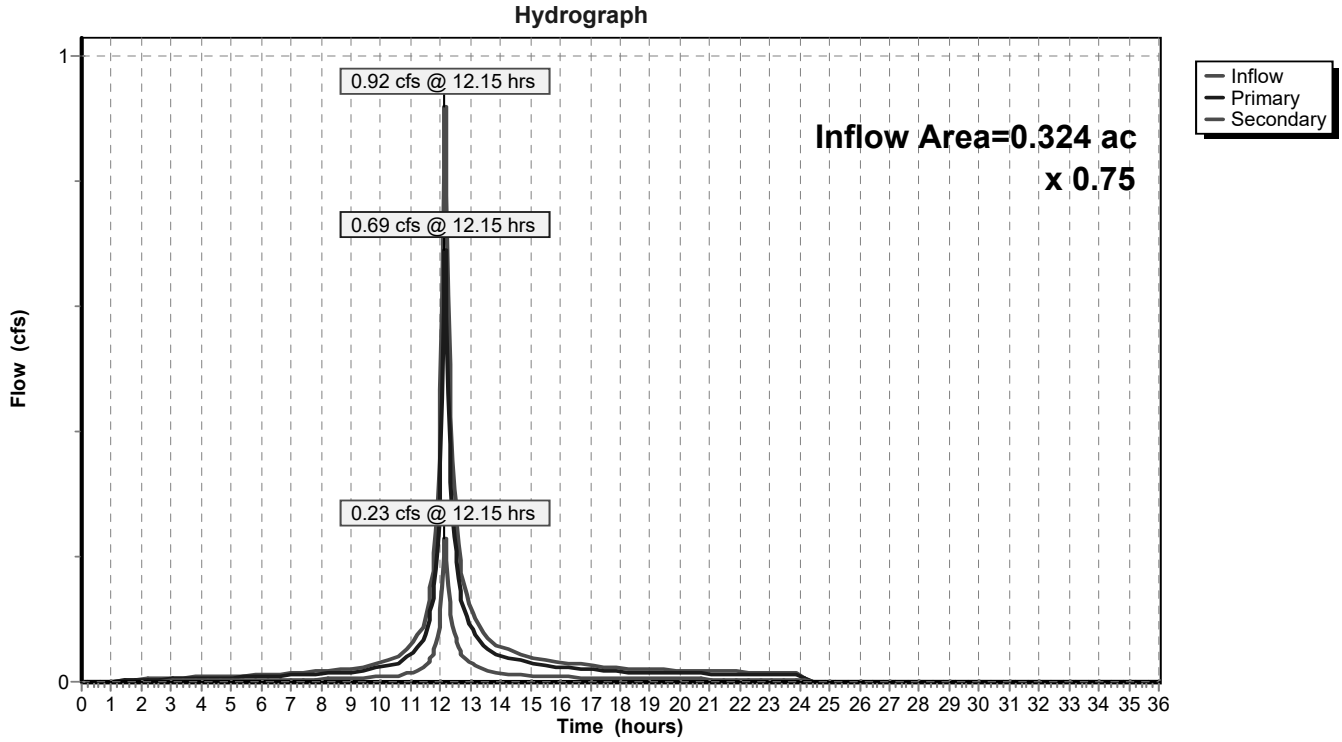


Summary for Link 2Lr: Reduction

Inflow Area = 0.324 ac, 45.97% Impervious, Inflow Depth = 3.00" for 10-Year Current TLS, Mercer event
Inflow = 0.92 cfs @ 12.15 hrs, Volume= 0.081 af
Primary = 0.69 cfs @ 12.15 hrs, Volume= 0.061 af, Atten= 25%, Lag= 0.0 min
Routed to Link 2L : DA-2 COM HYD
Secondary = 0.23 cfs @ 12.15 hrs, Volume= 0.020 af

Primary outflow = Inflow x 0.75, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2Lr: Reduction

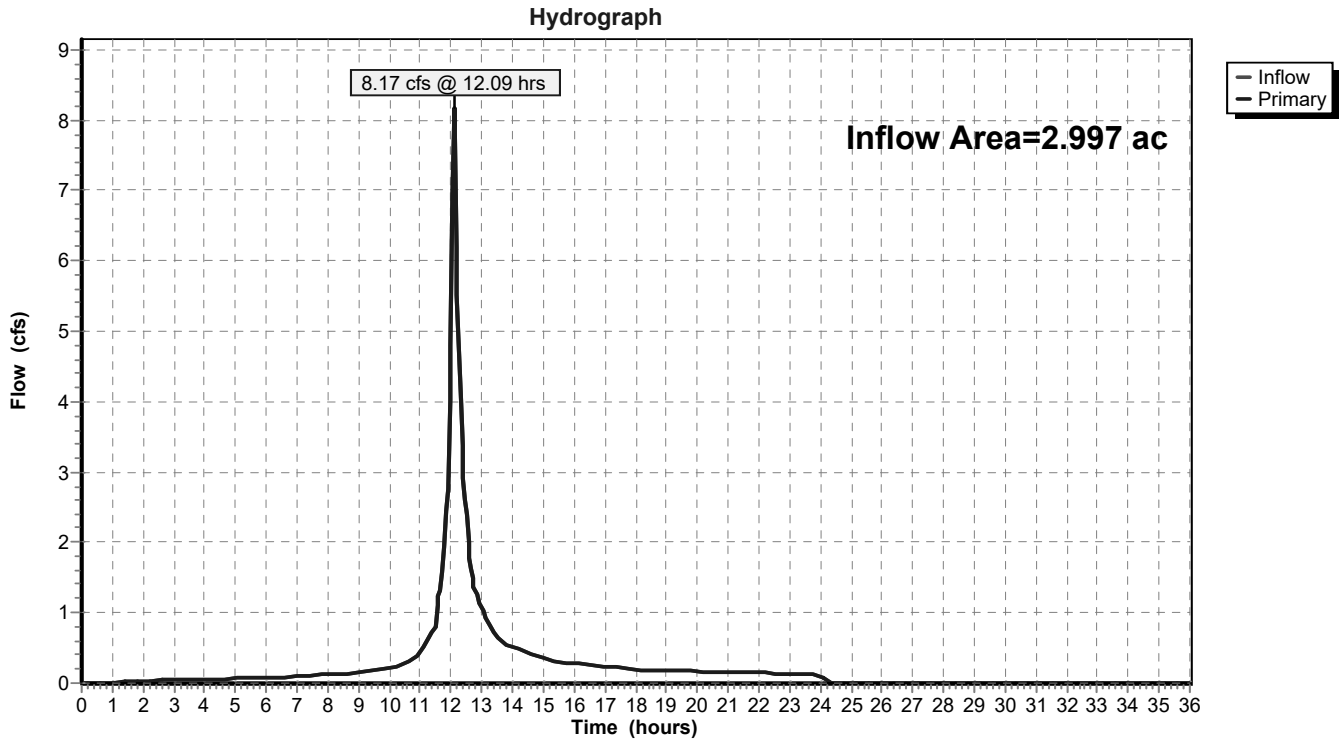


Summary for Link 3L: DA-3 COM HYD

Inflow Area = 2.997 ac, 34.93% Impervious, Inflow Depth = 2.79" for 10-Year Current TLS, Mercer event
Inflow = 8.17 cfs @ 12.09 hrs, Volume= 0.696 af
Primary = 8.17 cfs @ 12.09 hrs, Volume= 0.696 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 3L: DA-3 COM HYD

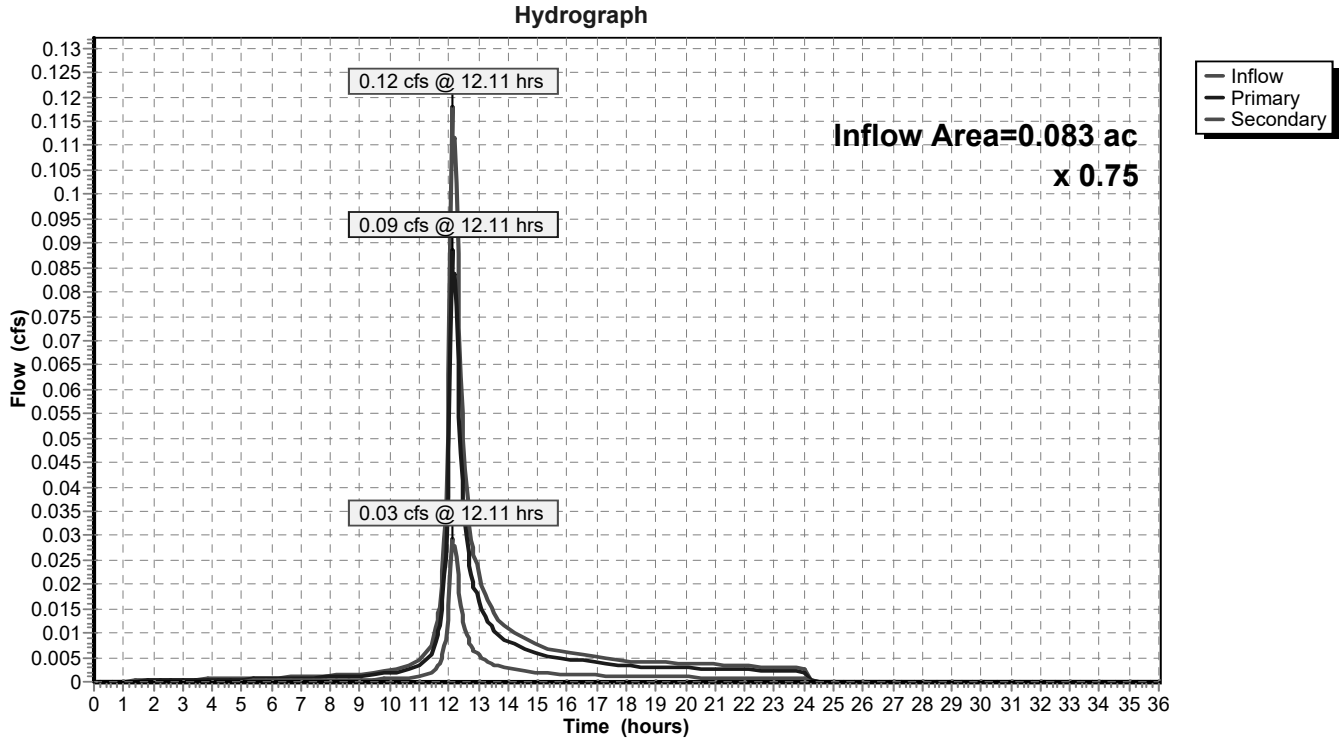


Summary for Link 3Lr: Reduction

Inflow Area = 0.083 ac, 13.80% Impervious, Inflow Depth = 1.78" for 10-Year Current TLS, Mercer event
Inflow = 0.12 cfs @ 12.11 hrs, Volume= 0.012 af
Primary = 0.09 cfs @ 12.11 hrs, Volume= 0.009 af, Atten= 25%, Lag= 0.0 min
Routed to Link 3L : DA-3 COM HYD
Secondary = 0.03 cfs @ 12.11 hrs, Volume= 0.003 af

Primary outflow = Inflow x 0.75, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 3Lr: Reduction

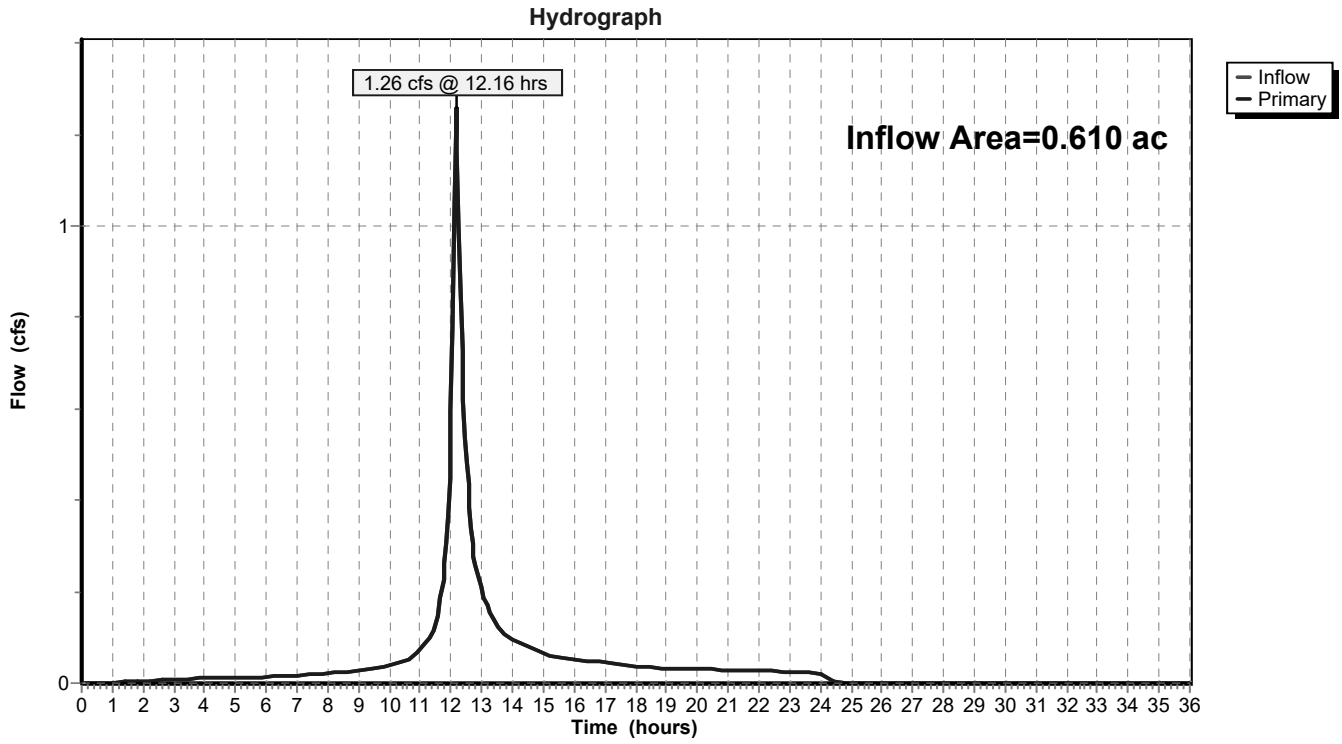


Summary for Link 4L: DA-4 COM HYD

Inflow Area = 0.610 ac, 31.69% Impervious, Inflow Depth = 2.40" for 10-Year Current TLS, Mercer event
Inflow = 1.26 cfs @ 12.16 hrs, Volume= 0.122 af
Primary = 1.26 cfs @ 12.16 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min
Routed to Link 5L : Allowable: Ten-yr; COM HYD @ On Stream Pond [Point of Analysis]

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 4L: DA-4 COM HYD

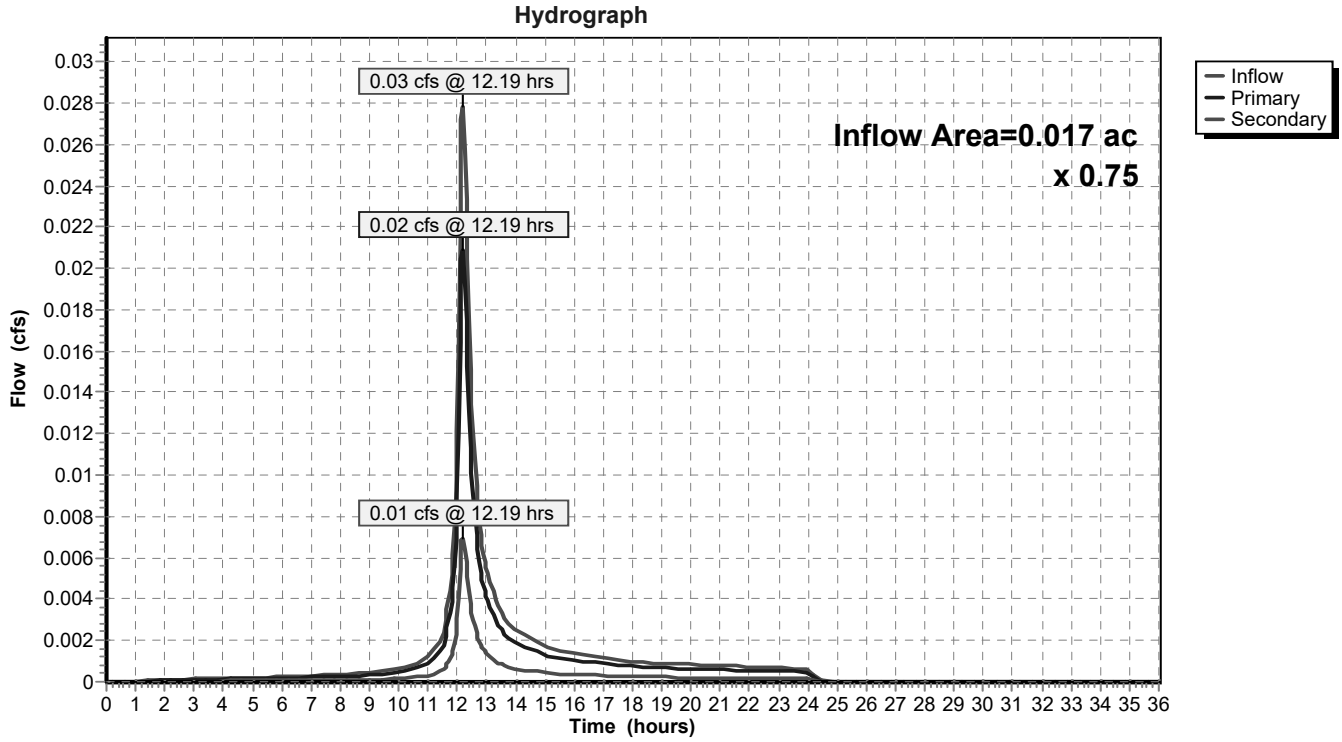


Summary for Link 4Lr: Reduction

Inflow Area = 0.017 ac, 18.82% Impervious, Inflow Depth = 2.07" for 10-Year Current TLS, Mercer event
Inflow = 0.03 cfs @ 12.19 hrs, Volume= 0.003 af
Primary = 0.02 cfs @ 12.19 hrs, Volume= 0.002 af, Atten= 25%, Lag= 0.0 min
Routed to Link 4L : DA-4 COM HYD
Secondary = 0.01 cfs @ 12.19 hrs, Volume= 0.001 af

Primary outflow = Inflow x 0.75, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 4Lr: Reduction

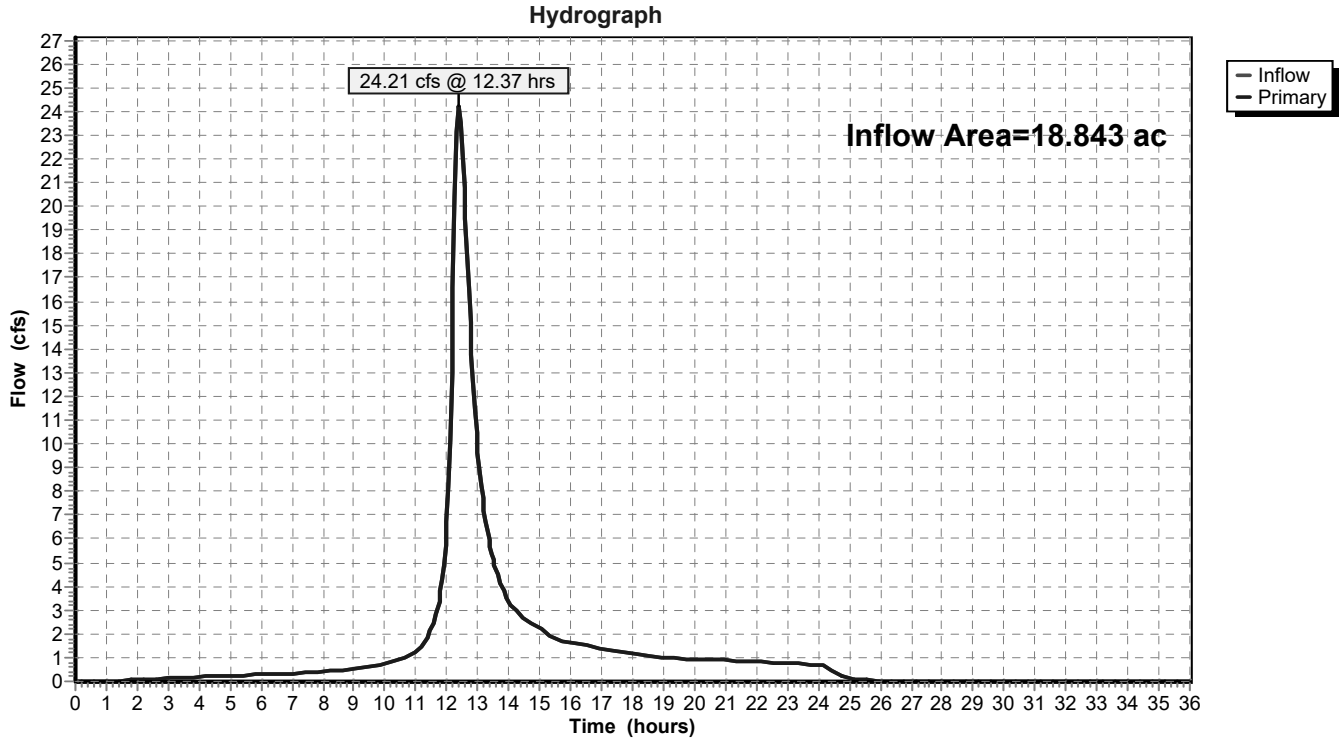


Summary for Link 5L: Allowable: Ten-yr; COM HYD @ On Stream Pond [Point of Analysis]

Inflow Area = 18.843 ac, 21.27% Impervious, Inflow Depth = 2.18" for 10-Year Current TLS, Mercer event
Inflow = 24.21 cfs @ 12.37 hrs, Volume= 3.418 af
Primary = 24.21 cfs @ 12.37 hrs, Volume= 3.418 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 5L: Allowable: Ten-yr; COM HYD @ On Stream Pond [Point of Analysis]



22-019 Allowable R0 (10-24-23)
Prepared by The Reynolds Group, Inc
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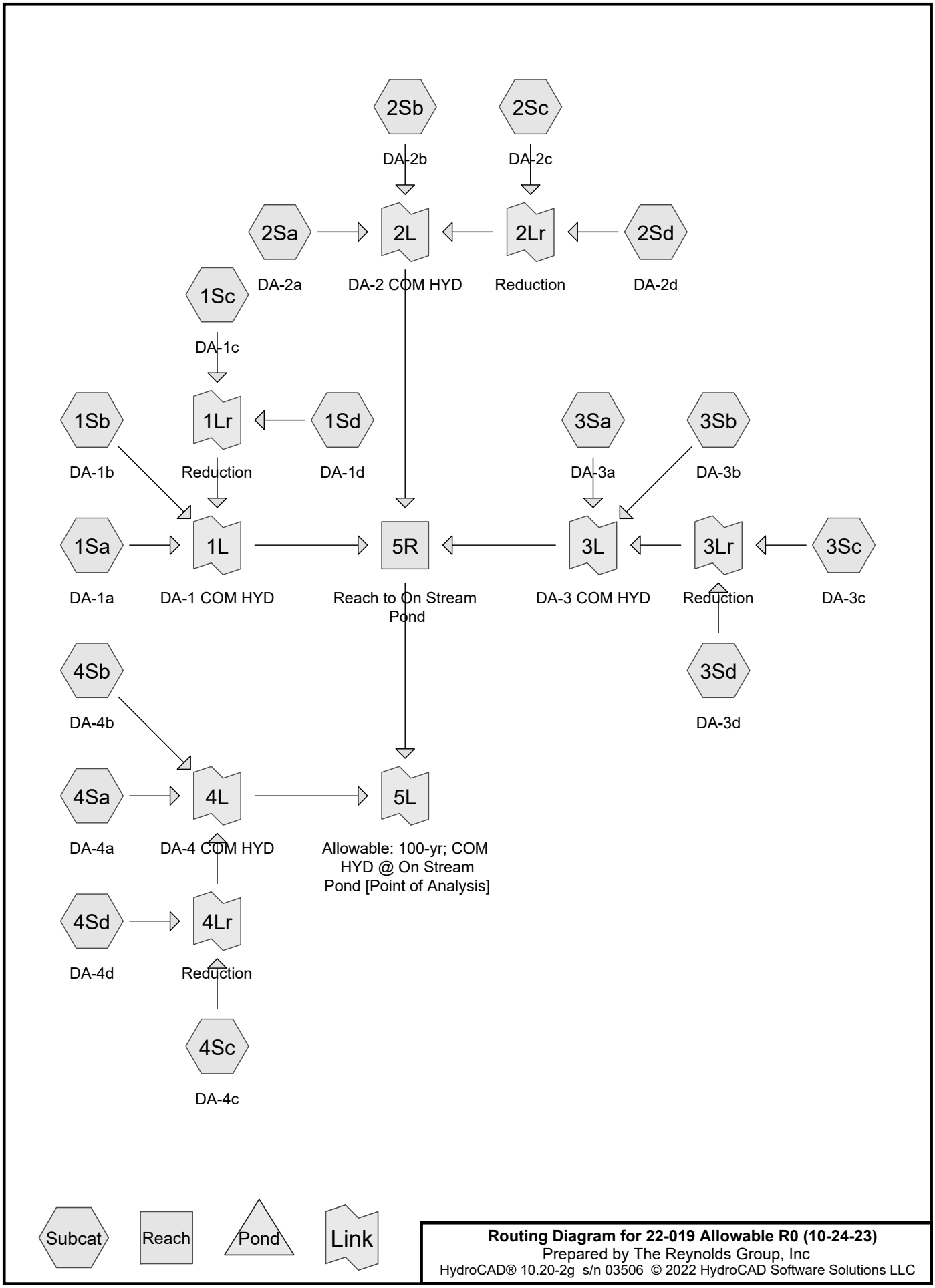

Routing Diagram for 22-019 Allowable R0 (10-24-23)
Prepared by The Reynolds Group, Inc
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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1Sa: DA-1a Runoff Area=247,625 sf 0.00% Impervious Runoff Depth=4.34"
Flow Length=2,005' Tc=25.4 min CN=65 Runoff=18.53 cfs 2.058 af

Subcatchment 1Sb: DA-1b Runoff Area=7,638 sf 71.60% Impervious Runoff Depth=8.19"
Flow Length=1,562' Tc=13.1 min CN=97 Runoff=1.25 cfs 0.120 af

Subcatchment 1Sc: DA-1c Runoff Area=190,217 sf 0.00% Impervious Runoff Depth=3.87"
Flow Length=2,005' Tc=25.4 min CN=61 Runoff=12.59 cfs 1.408 af

Subcatchment 1Sd: DA-1d Runoff Area=10,664 sf 44.05% Impervious Runoff Depth=8.19"
Flow Length=1,562' Tc=13.1 min CN=97 Runoff=1.75 cfs 0.167 af

Subcatchment 2Sa: DA-2a Runoff Area=89,480 sf 0.00% Impervious Runoff Depth=3.75"
Flow Length=1,193' Tc=14.9 min CN=60 Runoff=7.31 cfs 0.642 af

Subcatchment 2Sb: DA-2b Runoff Area=103,884 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=1,344' Tc=7.0 min CN=98 Runoff=20.67 cfs 1.651 af

Subcatchment 2Sc: DA-2c Runoff Area=7,627 sf 0.00% Impervious Runoff Depth=3.87"
Flow Length=1,193' Tc=14.9 min CN=61 Runoff=0.64 cfs 0.056 af

Subcatchment 2Sd: DA-2d Runoff Area=6,490 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=1,344' Tc=7.0 min CN=98 Runoff=1.29 cfs 0.103 af

Subcatchment 3Sa: DA-3a Runoff Area=81,824 sf 0.00% Impervious Runoff Depth=4.34"
Flow Length=479' Tc=12.0 min CN=65 Runoff=8.54 cfs 0.680 af

Subcatchment 3Sb: DA-3b Runoff Area=45,109 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=380' Tc=2.5 min CN=98 Runoff=10.46 cfs 0.717 af

Subcatchment 3Sc: DA-3c Runoff Area=3,130 sf 0.00% Impervious Runoff Depth=3.63"
Flow Length=479' Tc=12.0 min CN=59 Runoff=0.27 cfs 0.022 af

Subcatchment 3Sd: DA-3d Runoff Area=501 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=380' Tc=2.5 min CN=98 Runoff=0.12 cfs 0.008 af

Subcatchment 4Sa: DA-4a Runoff Area=17,562 sf 0.00% Impervious Runoff Depth=3.63"
Flow Length=1,952' Tc=16.6 min CN=59 Runoff=1.33 cfs 0.122 af

Subcatchment 4Sb: DA-4b Runoff Area=8,286 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=1,876' Tc=7.7 min CN=98 Runoff=1.62 cfs 0.132 af

Subcatchment 4Sc: DA-4c Runoff Area=604 sf 0.00% Impervious Runoff Depth=3.87"
Flow Length=1,952' Tc=16.6 min CN=61 Runoff=0.05 cfs 0.004 af

Subcatchment 4Sd: DA-4d Runoff Area=140 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=1,876' Tc=7.7 min CN=98 Runoff=0.03 cfs 0.002 af

Reach 5R: Reach to On Stream Pond Avg. Flow Depth=1.53' Max Vel=1.55 fps Inflow=59.16 cfs 7.279 af
n=0.045 L=526.0' S=0.0025 '/' Capacity=1,446.01 cfs Outflow=55.39 cfs 7.279 af

Link 1L: DA-1 COM HYD Inflow=30.11 cfs 3.437 af
Primary=30.11 cfs 3.437 af

Link 1Lr: Reduction x 0.80 Inflow=13.59 cfs 1.575 af
Primary=10.87 cfs 1.260 af Secondary=2.72 cfs 0.315 af

Link 2L: DA-2 COM HYD Inflow=27.68 cfs 2.421 af
Primary=27.68 cfs 2.421 af

Link 2Lr: Reduction x 0.80 Inflow=1.79 cfs 0.160 af
Primary=1.43 cfs 0.128 af Secondary=0.36 cfs 0.032 af

Link 3L: DA-3 COM HYD Inflow=16.21 cfs 1.421 af
Primary=16.21 cfs 1.421 af

Link 3Lr: Reduction x 0.80 Inflow=0.31 cfs 0.030 af
Primary=0.25 cfs 0.024 af Secondary=0.06 cfs 0.006 af

Link 4L: DA-4 COM HYD Inflow=2.67 cfs 0.259 af
Primary=2.67 cfs 0.259 af

Link 4Lr: Reduction x 0.80 Inflow=0.07 cfs 0.007 af
Primary=0.05 cfs 0.005 af Secondary=0.01 cfs 0.001 af

Link 5L: Allowable: 100-yr; COM HYD @ On Stream Pond [Point of Analysis] Inflow=57.06 cfs 7.539 af
Primary=57.06 cfs 7.539 af

Total Runoff Area = 18.843 ac Runoff Volume = 7.893 af Average Runoff Depth = 5.03"
78.73% Pervious = 14.835 ac 21.27% Impervious = 4.008 ac

Summary for Subcatchment 1Sa: DA-1a

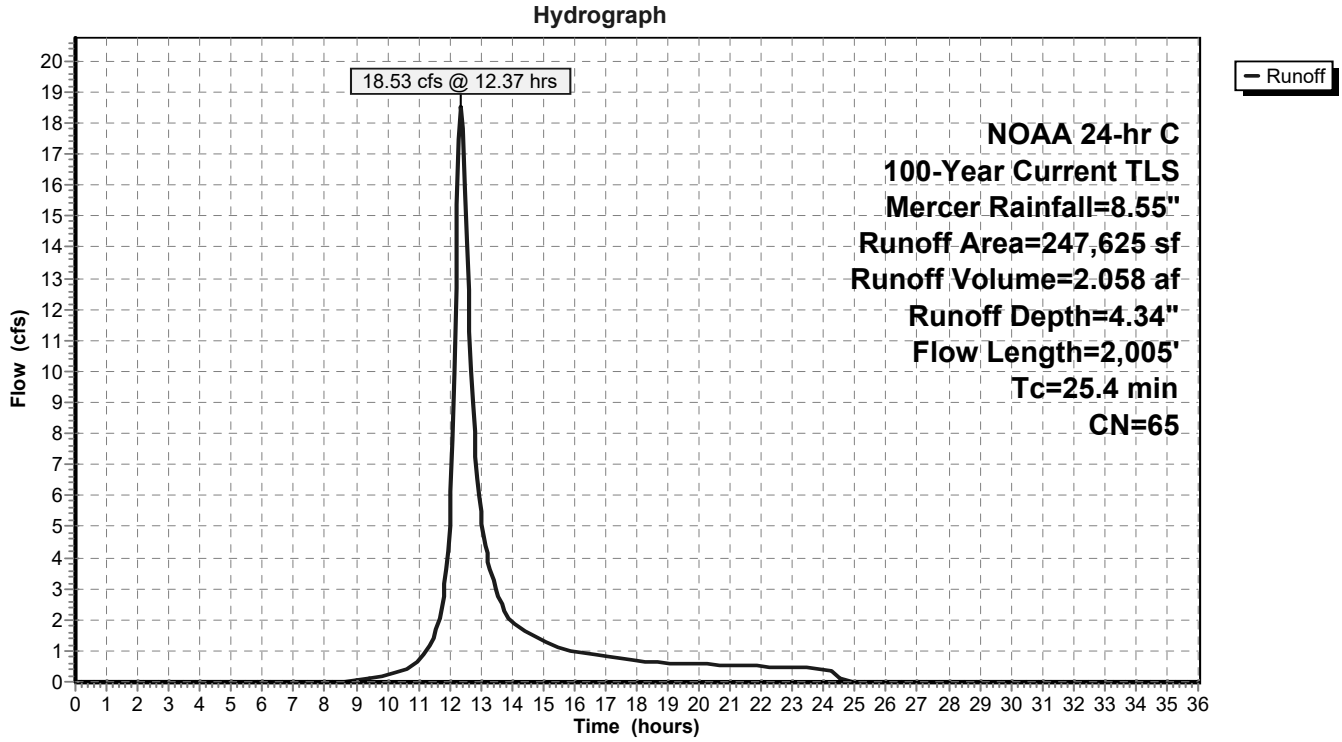
Runoff = 18.53 cfs @ 12.37 hrs, Volume= 2.058 af, Depth= 4.34"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
19,250	55	Woods, Good, HSG B
80,094	70	Woods, Good, HSG C
116,446	61	>75% Grass cover, Good, HSG B
31,835	74	>75% Grass cover, Good, HSG C
247,625	65	Weighted Average
247,625		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	56	0.0180	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
8.2	906	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.5	377	0.0030	1.81	65.11	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
25.4	2,005	Total			

Subcatchment 1Sa: DA-1a



Summary for Subcatchment 1Sb: DA-1b

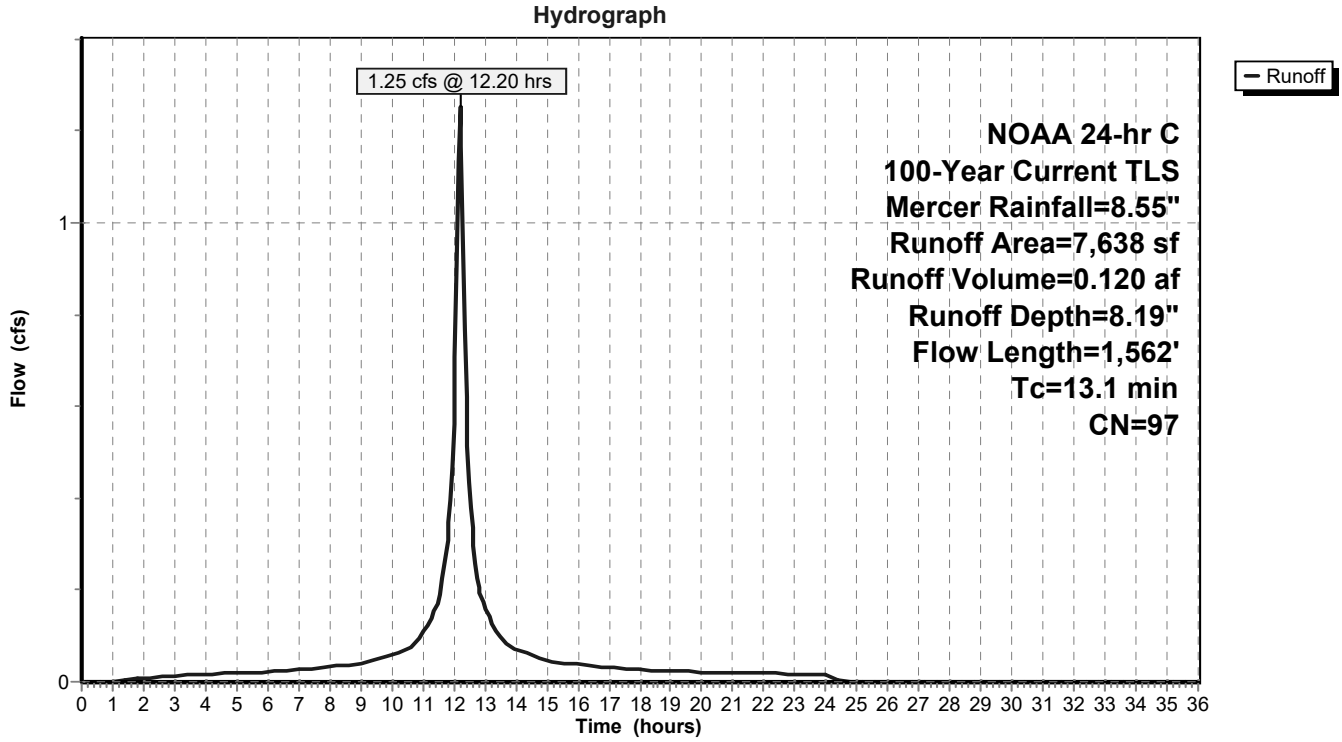
Runoff = 1.25 cfs @ 12.20 hrs, Volume= 0.120 af, Depth= 8.19"
Routed to Link 1L : DA-1 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	5,469	98	Paved parking, HSG B (Vehicular)
*	2,169	96	Gravel surface, HSG B (Vehicular)
	7,638	97	Weighted Average
	2,169		28.40% Pervious Area
	5,469		71.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.22		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
6.9	733	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	243	0.0320	3.65	21.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
13.1	1,562	Total			

Subcatchment 1Sb: DA-1b



Summary for Subcatchment 1Sc: DA-1c

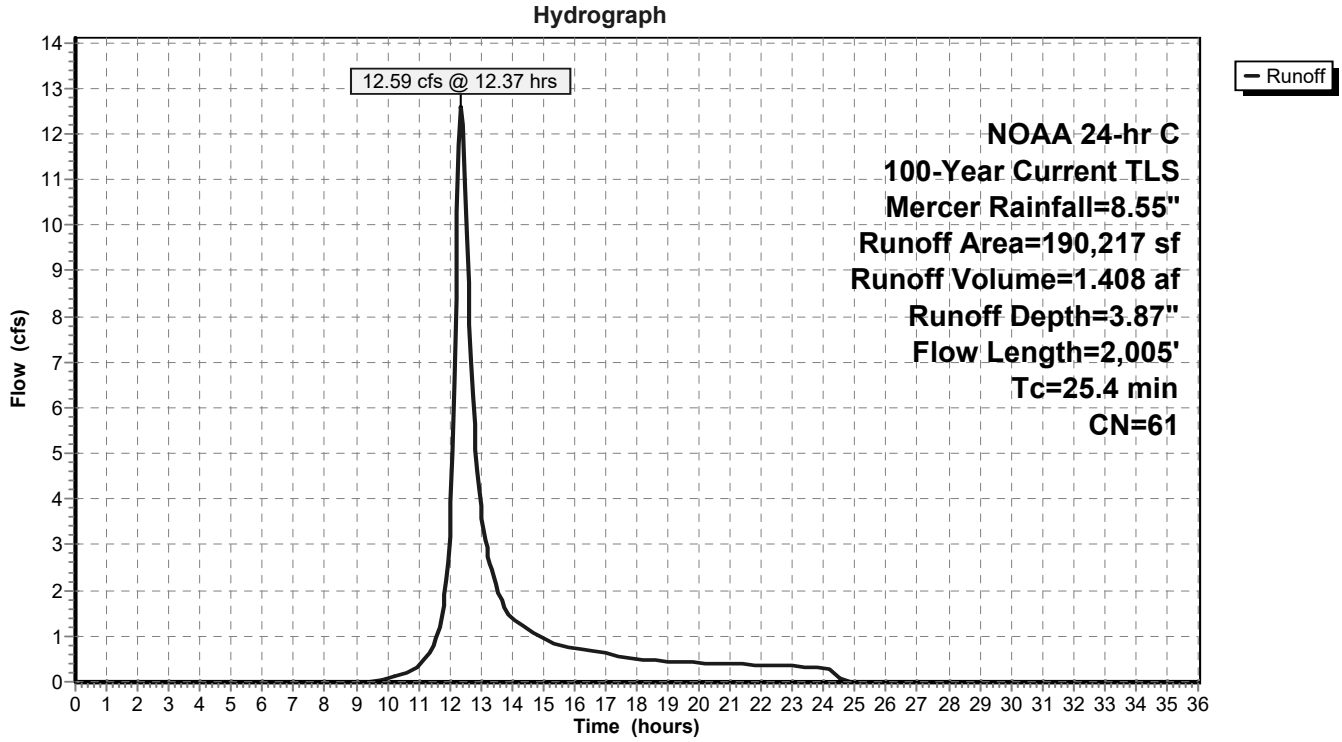
Runoff = 12.59 cfs @ 12.37 hrs, Volume= 1.408 af, Depth= 3.87"
Routed to Link 1Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
10,383	55	Woods, Good, HSG B
1,167	70	Woods, Good, HSG C
171,409	61	>75% Grass cover, Good, HSG B
7,258	74	>75% Grass cover, Good, HSG C
190,217	61	Weighted Average
190,217		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	56	0.0180	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34"
8.2	906	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.5	377	0.0030	1.81	65.11	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
25.4	2,005	Total			

Subcatchment 1Sc: DA-1c



Summary for Subcatchment 1Sd: DA-1d

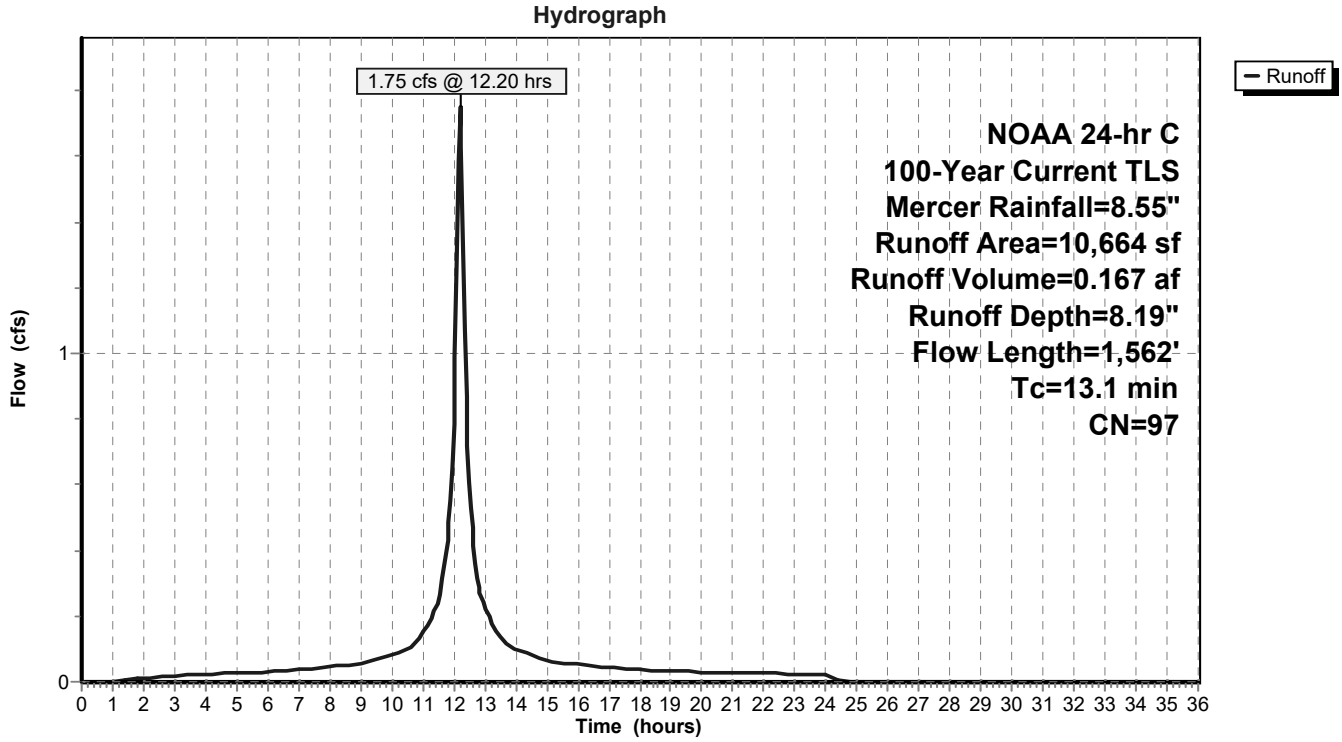
Runoff = 1.75 cfs @ 12.20 hrs, Volume= 0.167 af, Depth= 8.19"
Routed to Link 1Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	4,698	98	Paved parking, HSG B (Vehicular)
*	5,966	96	Gravel surface, HSG B (Vehicular)
	10,664	97	Weighted Average
	5,966		55.95% Pervious Area
	4,698		44.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.22		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
6.9	733	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	243	0.0320	3.65	21.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
3.2	445	0.0050	2.34	84.06	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
13.1	1,562	Total			

Subcatchment 1Sd: DA-1d



Summary for Subcatchment 2Sa: DA-2a

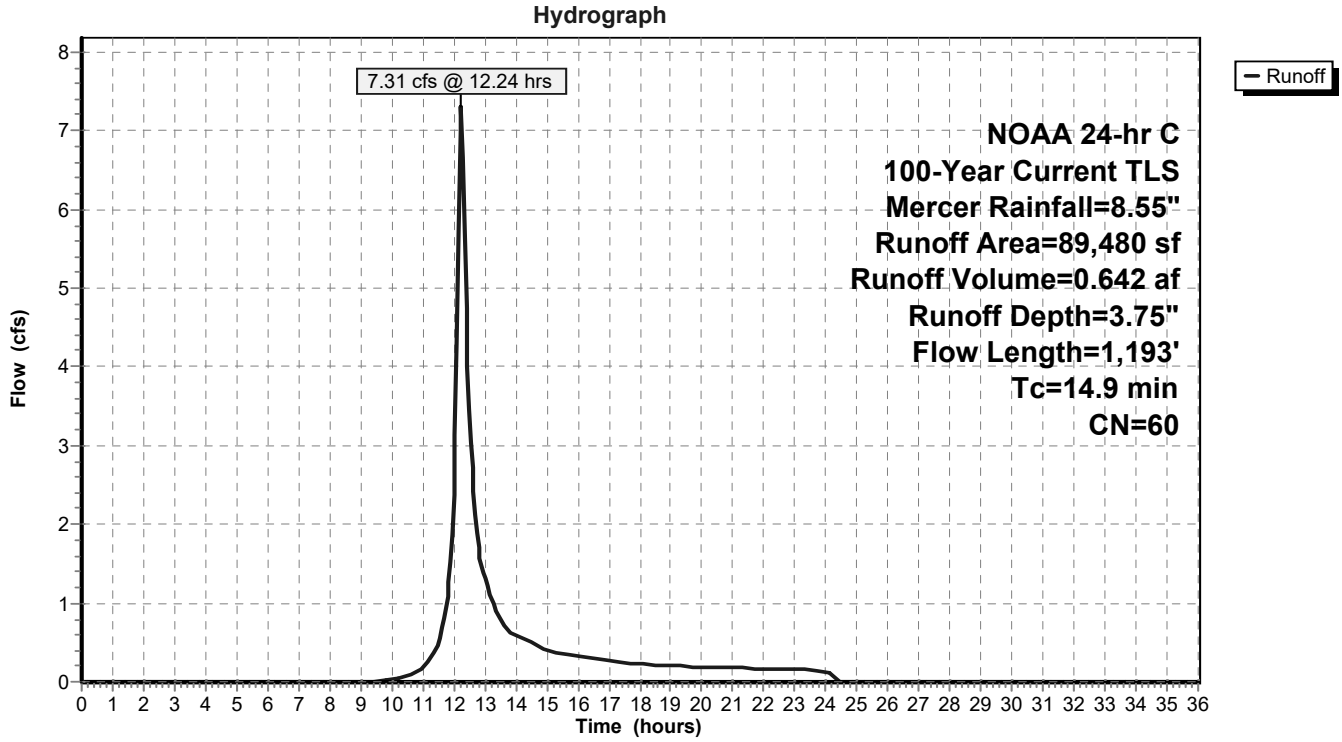
Runoff = 7.31 cfs @ 12.24 hrs, Volume= 0.642 af, Depth= 3.75"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
16,278	55	Woods, Good, HSG B
73,005	61	>75% Grass cover, Good, HSG B
197	80	>75% Grass cover, Good, HSG D
89,480	60	Weighted Average
89,480		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
0.3	29	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,193	Total			

Subcatchment 2Sa: DA-2a



Summary for Subcatchment 2Sb: DA-2b

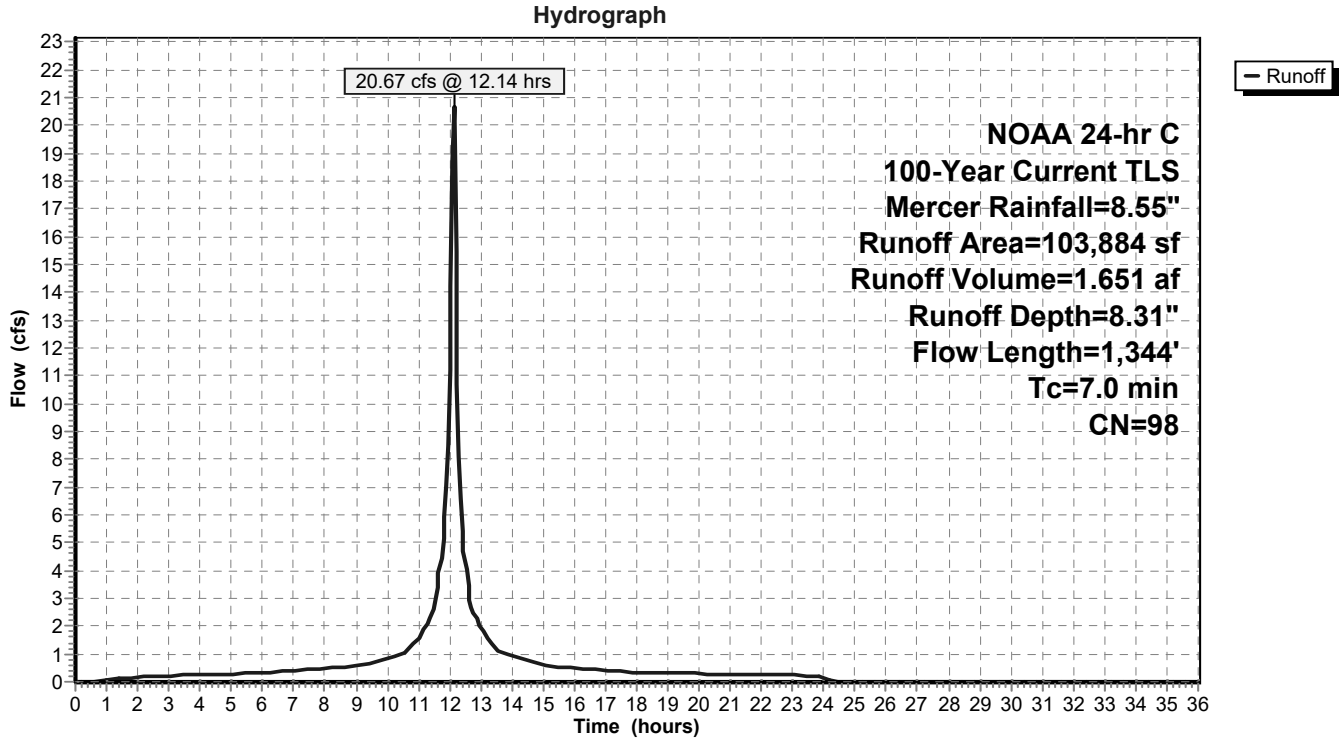
Runoff = 20.67 cfs @ 12.14 hrs, Volume= 1.651 af, Depth= 8.31"
Routed to Link 2L : DA-2 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	39,492	98	Paved parking, HSG B (Vehicular)
*	61,715	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	2,677	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	103,884	98	Weighted Average
	103,884		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
7.0	1,344	Total			

Subcatchment 2Sb: DA-2b



Summary for Subcatchment 2Sc: DA-2c

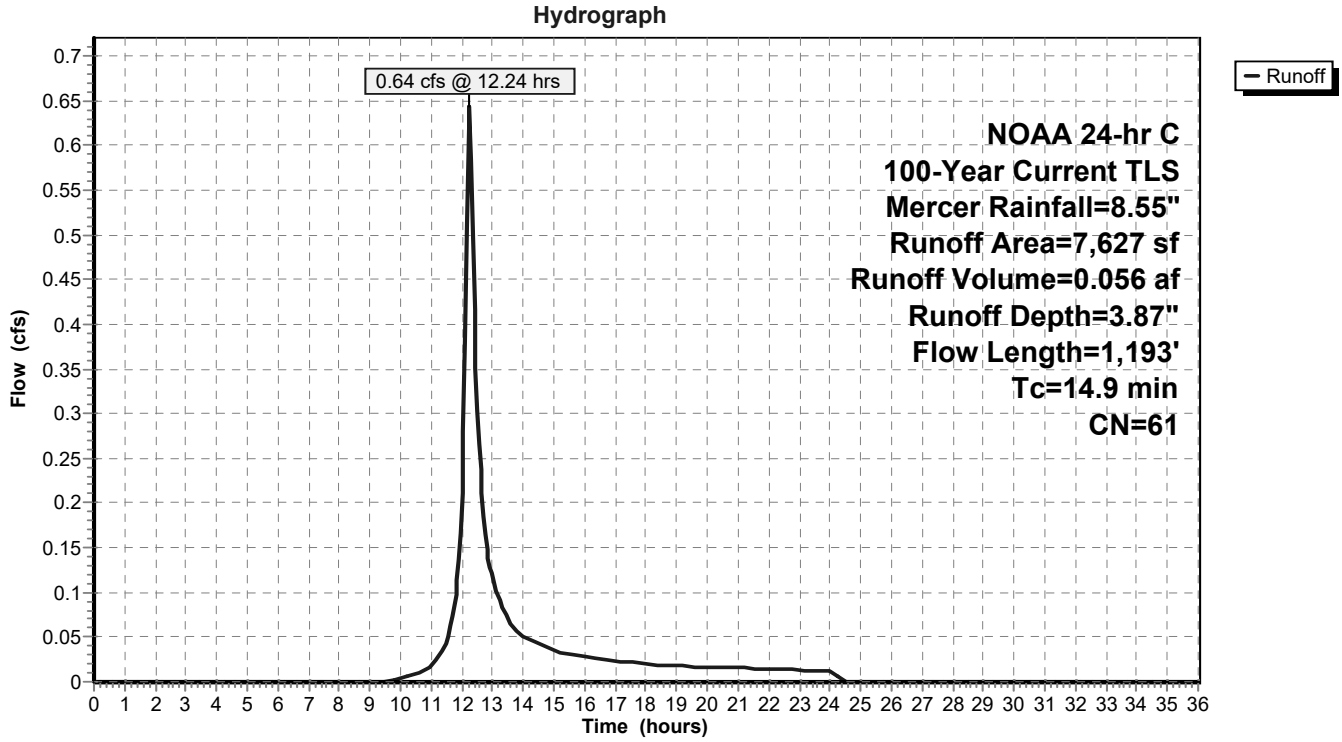
Runoff = 0.64 cfs @ 12.24 hrs, Volume= 0.056 af, Depth= 3.87"
Routed to Link 2Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
7,627	61	>75% Grass cover, Good, HSG B
7,627		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
0.3	29	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,193	Total			

Subcatchment 2Sc: DA-2c



Summary for Subcatchment 2Sd: DA-2d

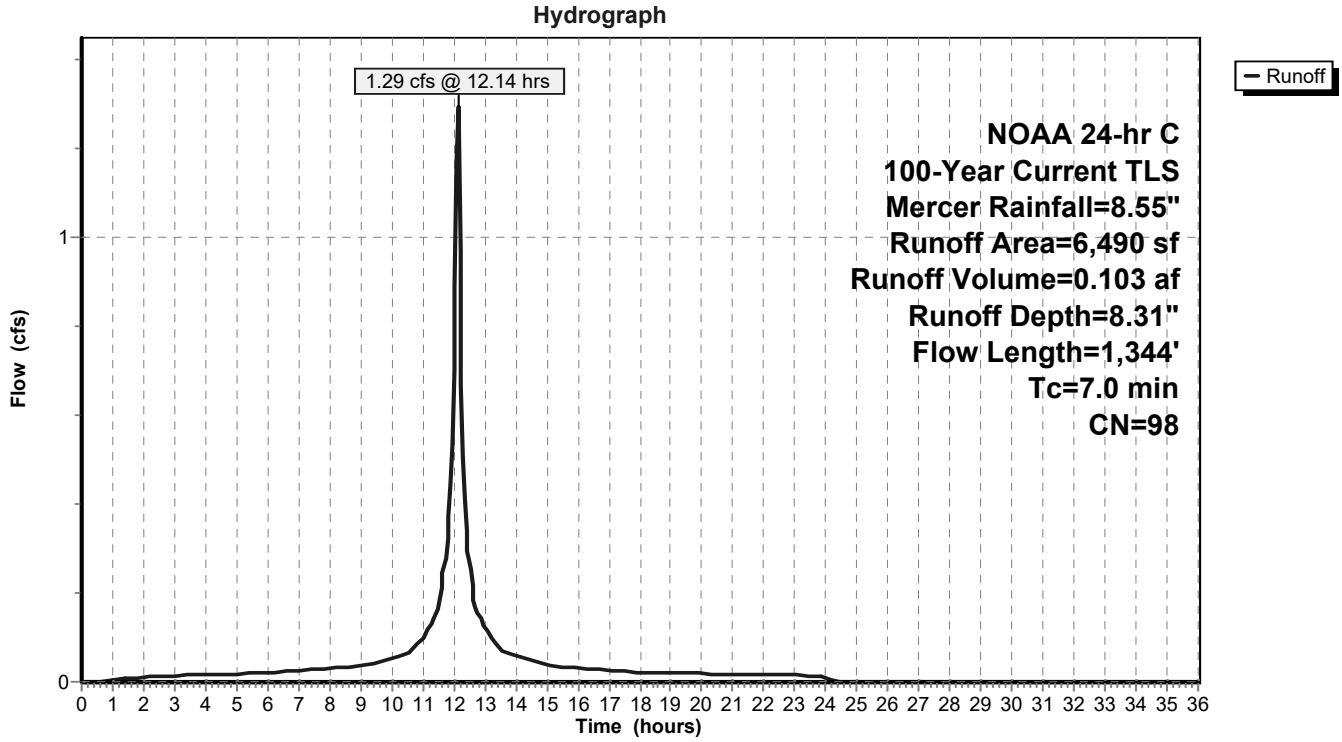
Runoff = 1.29 cfs @ 12.14 hrs, Volume= 0.103 af, Depth= 8.31"
Routed to Link 2Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	6,291	98	Paved parking, HSG B (Vehicular)
*	199	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	6,490	98	Weighted Average
	6,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.85		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.4	341	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
7.0	1,344	Total			

Subcatchment 2Sd: DA-2d



Summary for Subcatchment 3Sa: DA-3a

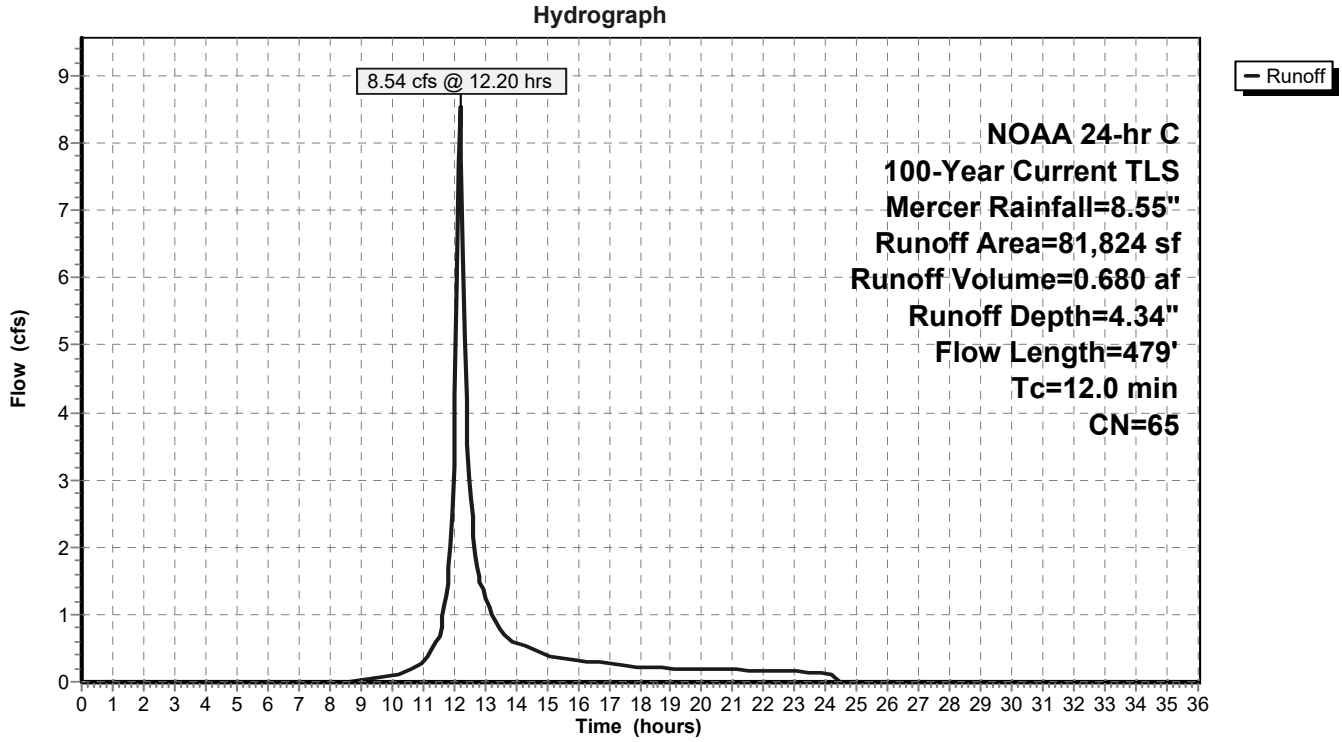
Runoff = 8.54 cfs @ 12.20 hrs, Volume= 0.680 af, Depth= 4.34"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
21,739	55	Woods, Good, HSG B
31,307	70	Woods, Good, HSG C
1,317	77	Woods, Good, HSG D
18,394	61	>75% Grass cover, Good, HSG B
3,641	74	>75% Grass cover, Good, HSG C
5,426	80	>75% Grass cover, Good, HSG D
81,824	65	Weighted Average
81,824		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.8	179	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
12.0	479	Total			

Subcatchment 3Sa: DA-3a



Summary for Subcatchment 3Sb: DA-3b

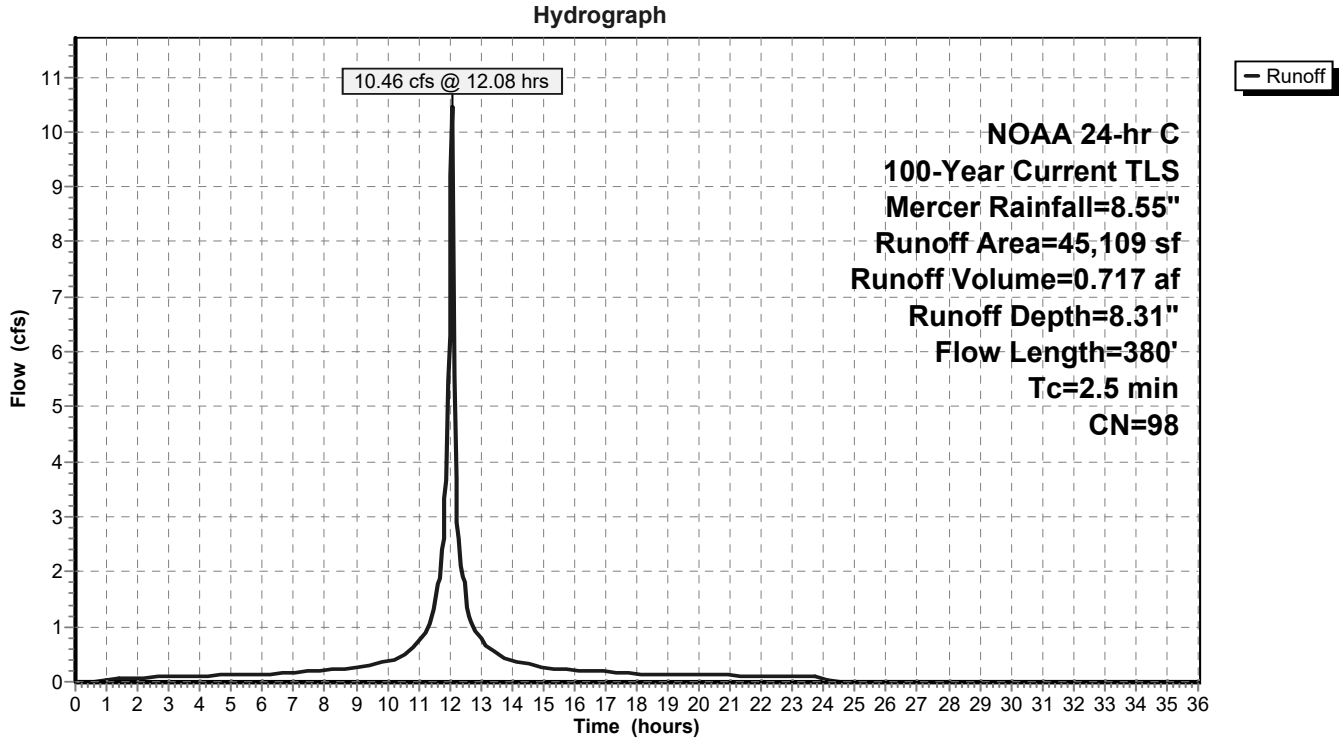
Runoff = 10.46 cfs @ 12.08 hrs, Volume= 0.717 af, Depth= 8.31"
Routed to Link 3L : DA-3 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	14,685	98	Paved parking, HSG B (Vehicular)
*	26,070	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	1,571	98	Paved parking, HSG C (Vehicular)
*	425	98	Paved parking, HSG D (Vehicular)
*	2,358	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	45,109	98	Weighted Average
	45,109		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.32		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
0.2	39	0.0410	3.04		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
2.5	380	Total			

Subcatchment 3Sb: DA-3b



Summary for Subcatchment 3Sc: DA-3c

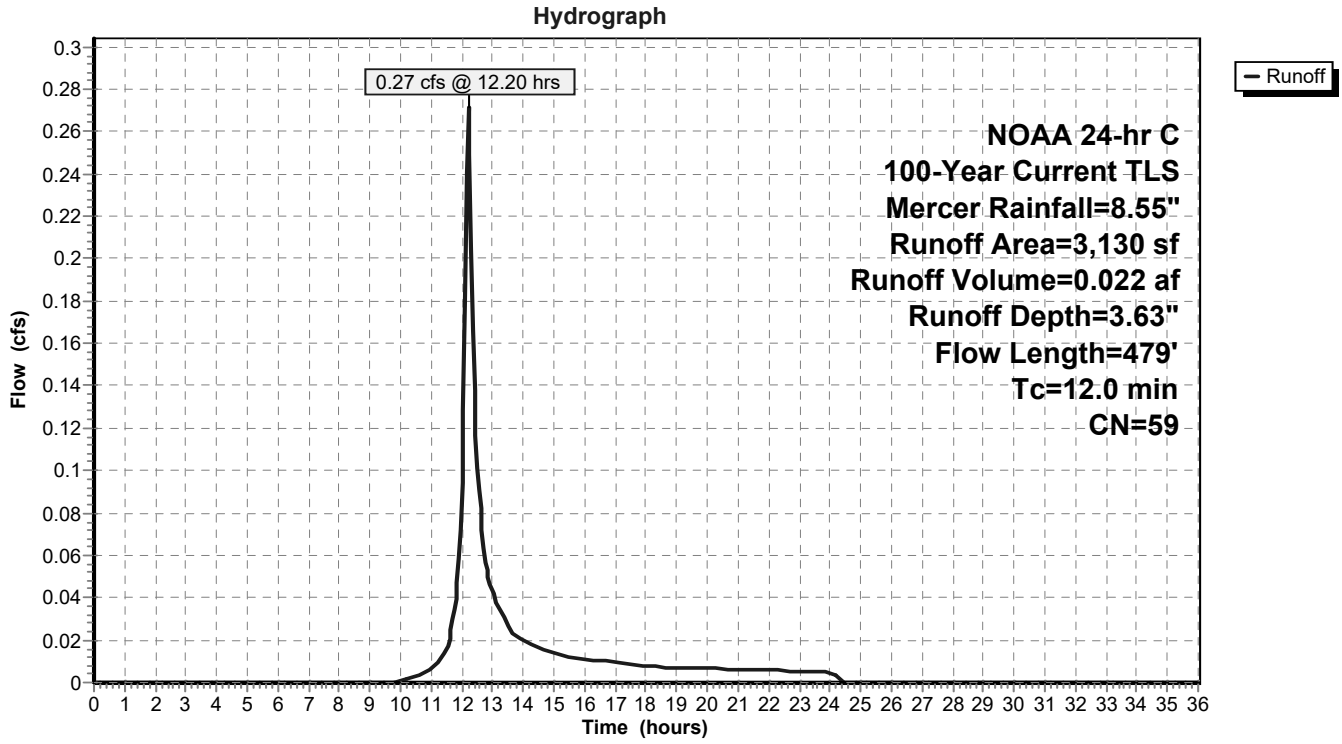
Runoff = 0.27 cfs @ 12.20 hrs, Volume= 0.022 af, Depth= 3.63"
Routed to Link 3Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
1,286	55	Woods, Good, HSG B
1,844	61	>75% Grass cover, Good, HSG B
3,130	59	Weighted Average
3,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.8	179	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
12.0	479	Total			

Subcatchment 3Sc: DA-3c



Summary for Subcatchment 3Sd: DA-3d

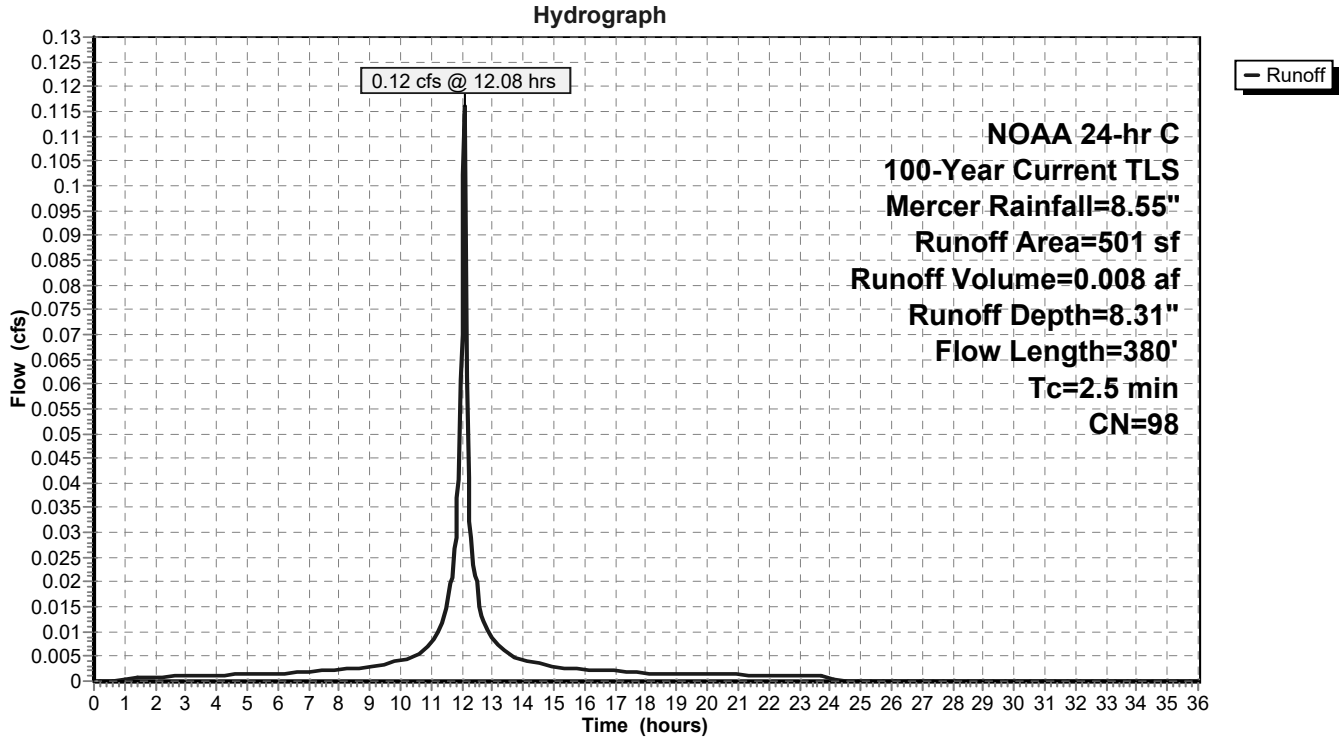
Runoff = 0.12 cfs @ 12.08 hrs, Volume= 0.008 af, Depth= 8.31"
Routed to Link 3Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	501	98	Paved parking, HSG B (Vehicular)
	501		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.32		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
0.2	39	0.0410	3.04		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	46	0.0070	4.40	5.40	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	4.19	25.13	**Channel Flow,** Area= 6.0 sf Perim= 16.0' r= 0.38' n= 0.035
2.5	380	Total			

Subcatchment 3Sd: DA-3d



Summary for Subcatchment 4Sa: DA-4a

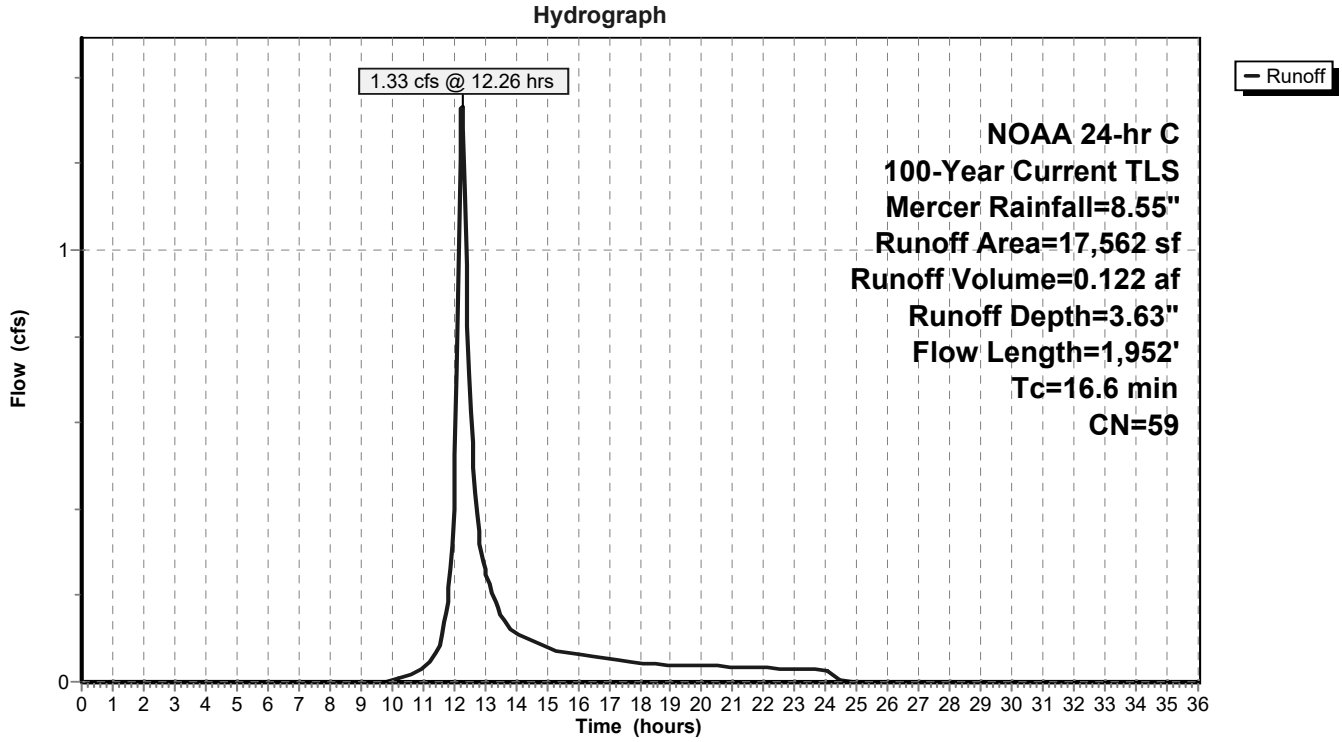
Runoff = 1.33 cfs @ 12.26 hrs, Volume= 0.122 af, Depth= 3.63"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
6,085	55	Woods, Good, HSG B
11,477	61	>75% Grass cover, Good, HSG B
17,562	59	Weighted Average
17,562		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	42	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.0	123	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
16.6	1,952	Total			

Subcatchment 4Sa: DA-4a



Summary for Subcatchment 4Sb: DA-4b

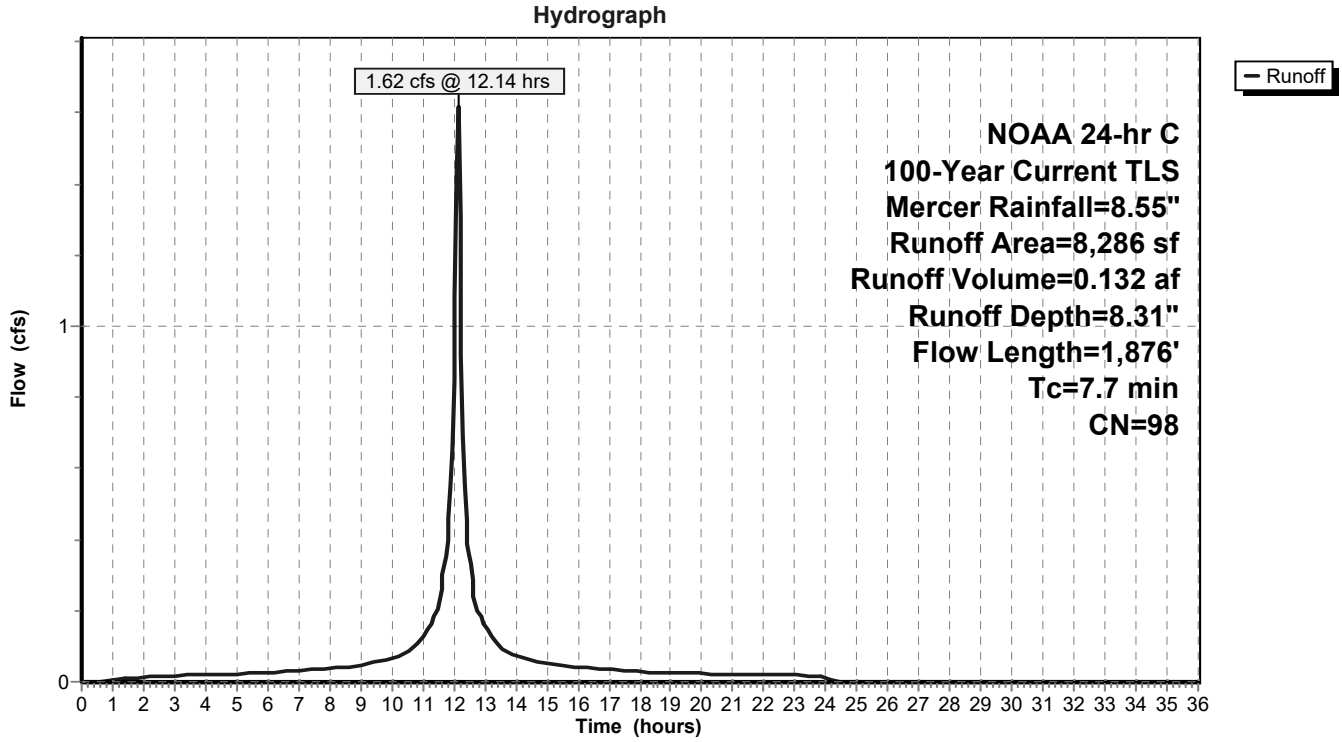
Runoff = 1.62 cfs @ 12.14 hrs, Volume= 0.132 af, Depth= 8.31"
Routed to Link 4L : DA-4 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	3,147	98	Paved parking, HSG B (Vehicular)
*	5,139	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	8,286	98	Weighted Average
	8,286		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.16		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
7.7	1,876	Total			

Subcatchment 4Sb: DA-4b



Summary for Subcatchment 4Sc: DA-4c

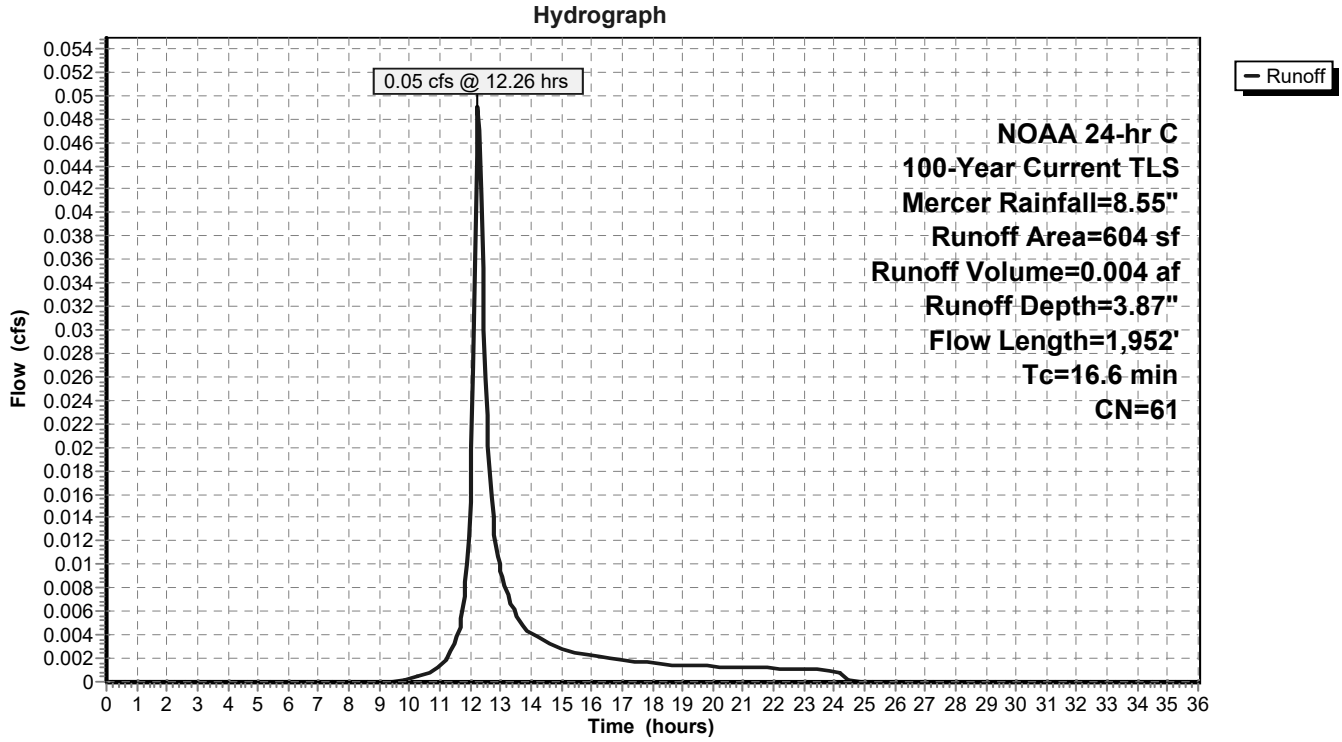
Runoff = 0.05 cfs @ 12.26 hrs, Volume= 0.004 af, Depth= 3.87"
Routed to Link 4Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
604	61	>75% Grass cover, Good, HSG B
604		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	42	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34" Using McCuen-Spiess flow length
1.0	123	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
16.6	1,952	Total			

Subcatchment 4Sc: DA-4c



Summary for Subcatchment 4Sd: DA-4d

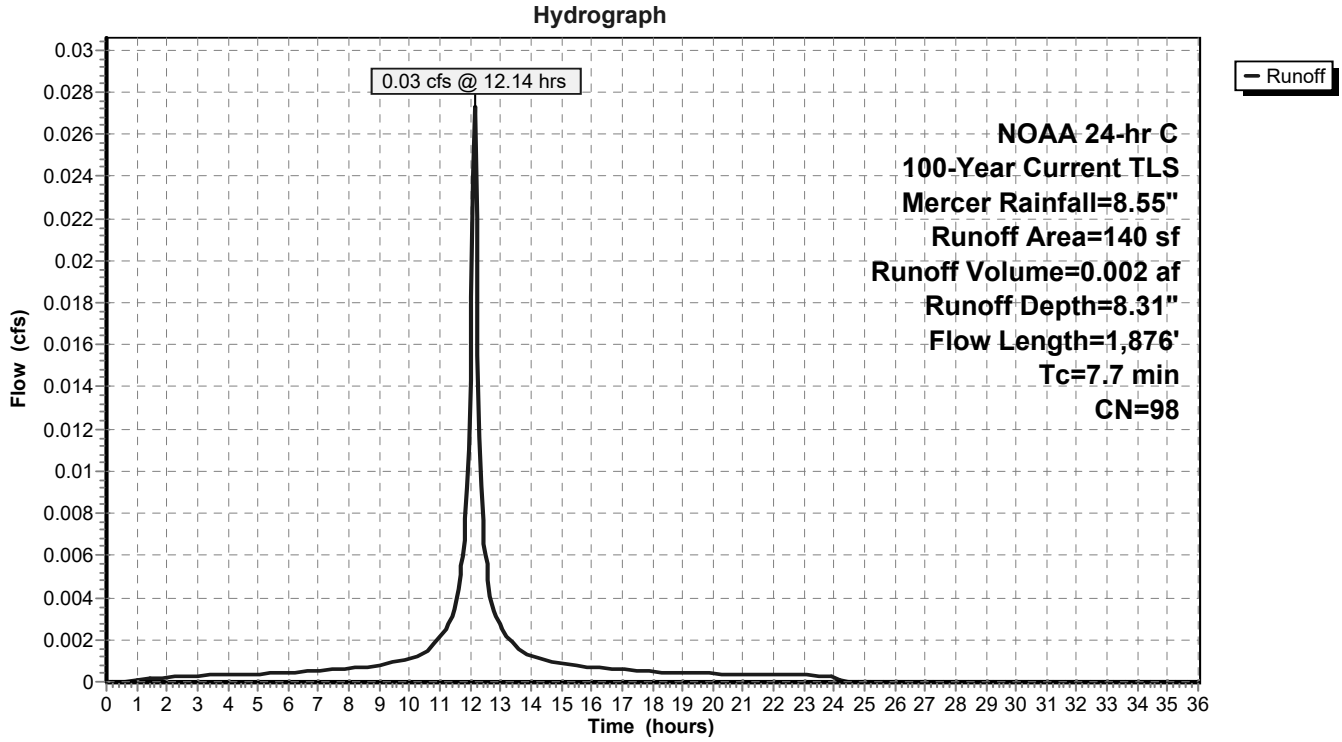
Runoff = 0.03 cfs @ 12.14 hrs, Volume= 0.002 af, Depth= 8.31"
Routed to Link 4Lr : Reduction

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	140	98	Paved parking, HSG B (Vehicular)
	140		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.16		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.34"
2.4	276	0.0090	1.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
7.7	1,876	Total			

Subcatchment 4Sd: DA-4d



Summary for Reach 5R: Reach to On Stream Pond

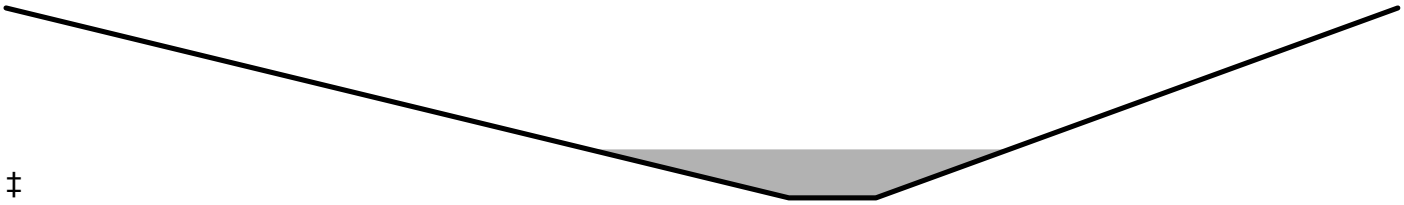
Stream Tributary 'B' to Shipetaukin Creek

Inflow Area = 18.232 ac, 20.92% Impervious, Inflow Depth = 4.79" for 100-Year Current TLS, Mercer event
Inflow = 59.16 cfs @ 12.17 hrs, Volume= 7.279 af
Outflow = 55.39 cfs @ 12.36 hrs, Volume= 7.279 af, Atten= 6%, Lag= 11.7 min
Routed to Link 5L : Allowable: 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.55 fps, Min. Travel Time= 5.6 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 16.6 min

Peak Storage= 18,784 cf @ 12.27 hrs
Average Depth at Peak Storage= 1.53' , Surface Width= 38.63'
Bank-Full Depth= 6.00' Flow Area= 408.0 sf, Capacity= 1,446.01 cfs

8.00' x 6.00' deep channel, n= 0.045
Side Slope Z-value= 12.0 8.0 '/' Top Width= 128.00'
Length= 526.0' Slope= 0.0025 '/'
Inlet Invert= 91.30', Outlet Invert= 90.00'



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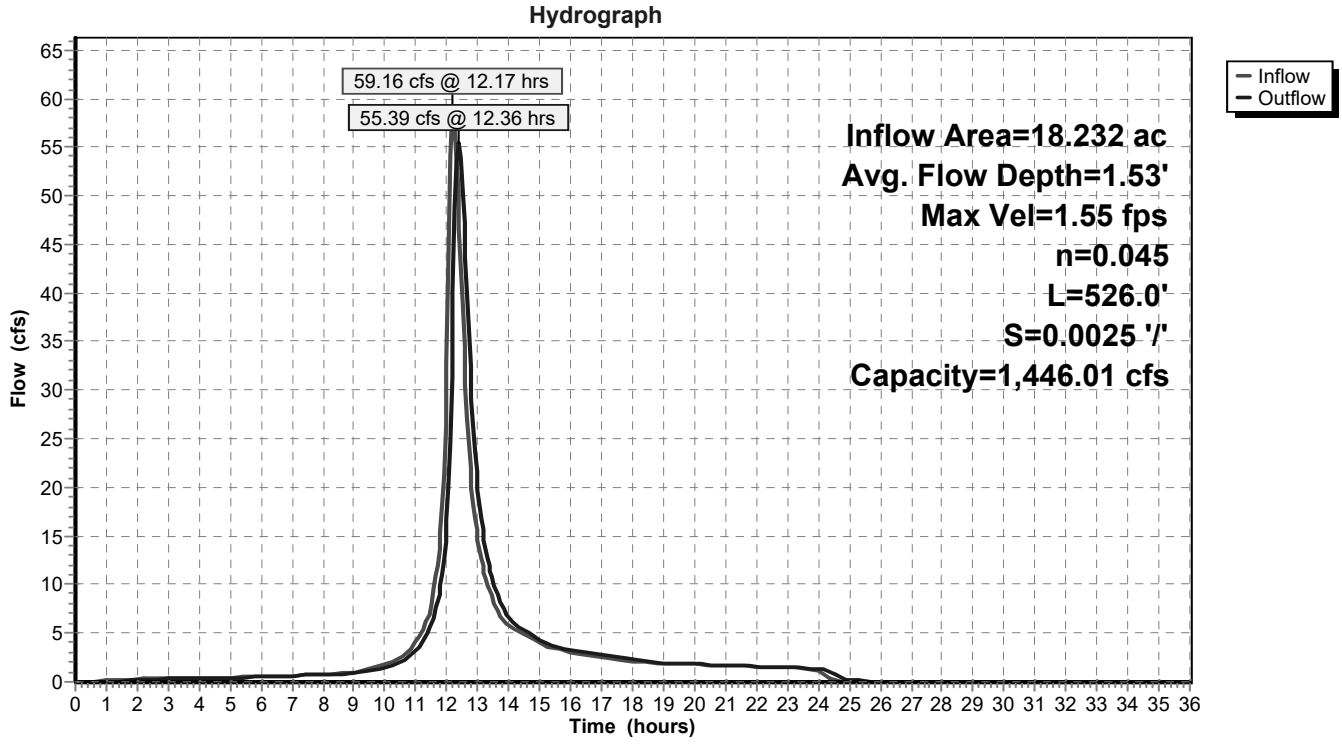
Reach 5R: Reach to On Stream Pond

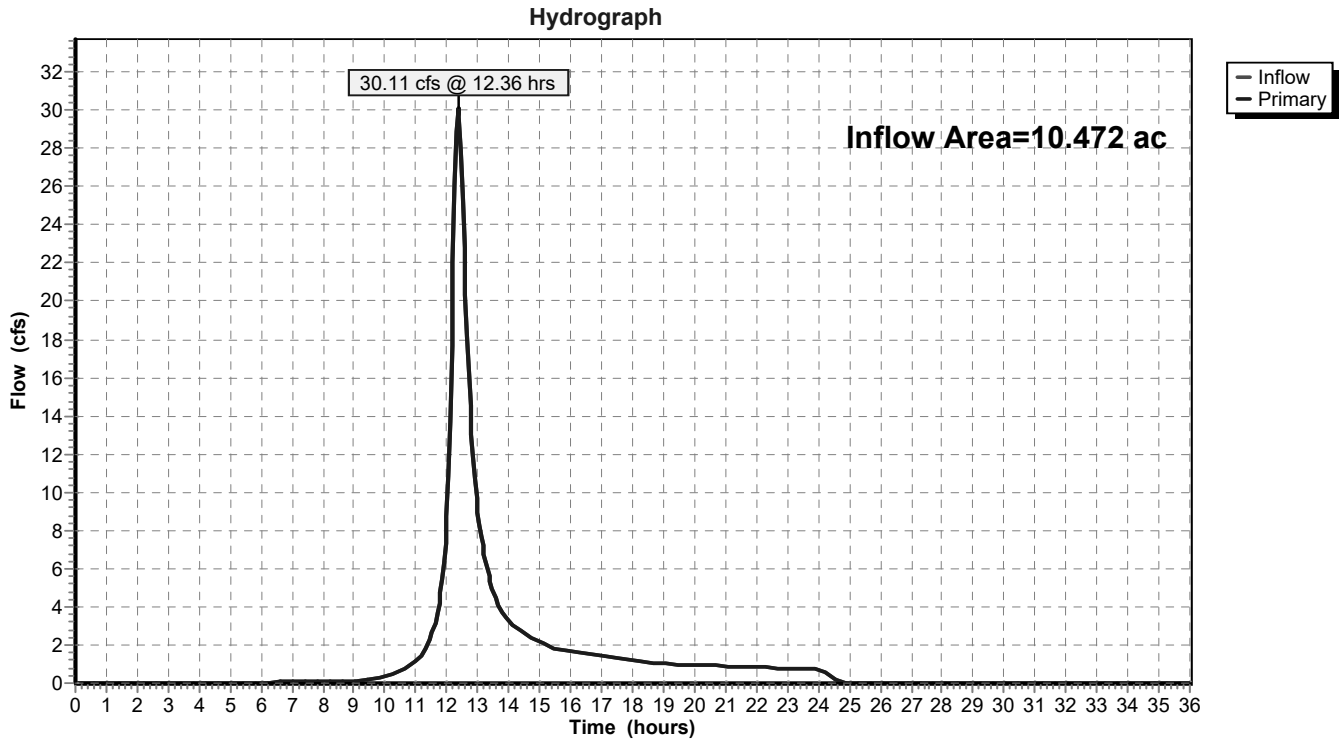


Summary for Link 1L: DA-1 COM HYD

Inflow Area = 10.472 ac, 2.23% Impervious, Inflow Depth = 3.94" for 100-Year Current TLS, Mercer event
Inflow = 30.11 cfs @ 12.36 hrs, Volume= 3.437 af
Primary = 30.11 cfs @ 12.36 hrs, Volume= 3.437 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1L: DA-1 COM HYD

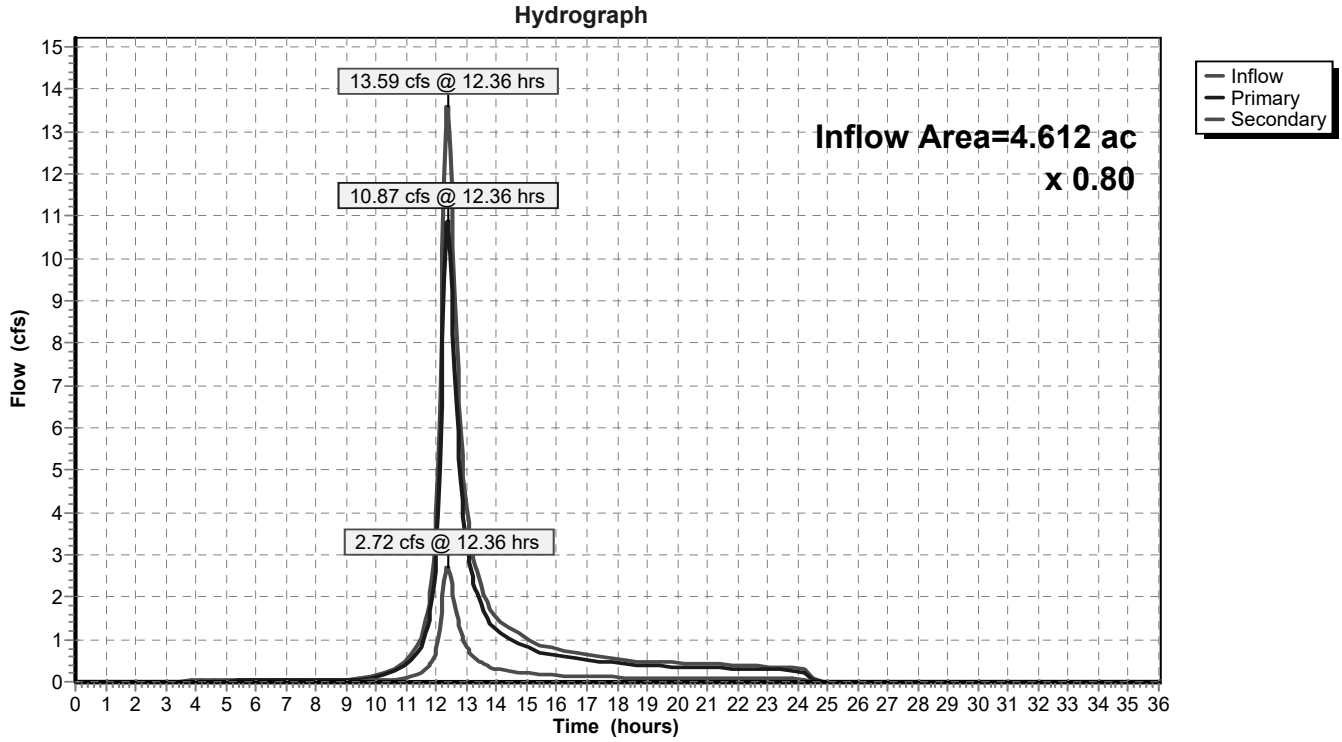


Summary for Link 1Lr: Reduction

Inflow Area = 4.612 ac, 2.34% Impervious, Inflow Depth = 4.10" for 100-Year Current TLS, Mercer event
Inflow = 13.59 cfs @ 12.36 hrs, Volume= 1.575 af
Primary = 10.87 cfs @ 12.36 hrs, Volume= 1.260 af, Atten= 20%, Lag= 0.0 min
Routed to Link 1L : DA-1 COM HYD
Secondary = 2.72 cfs @ 12.36 hrs, Volume= 0.315 af

Primary outflow = Inflow x 0.80, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 1Lr: Reduction

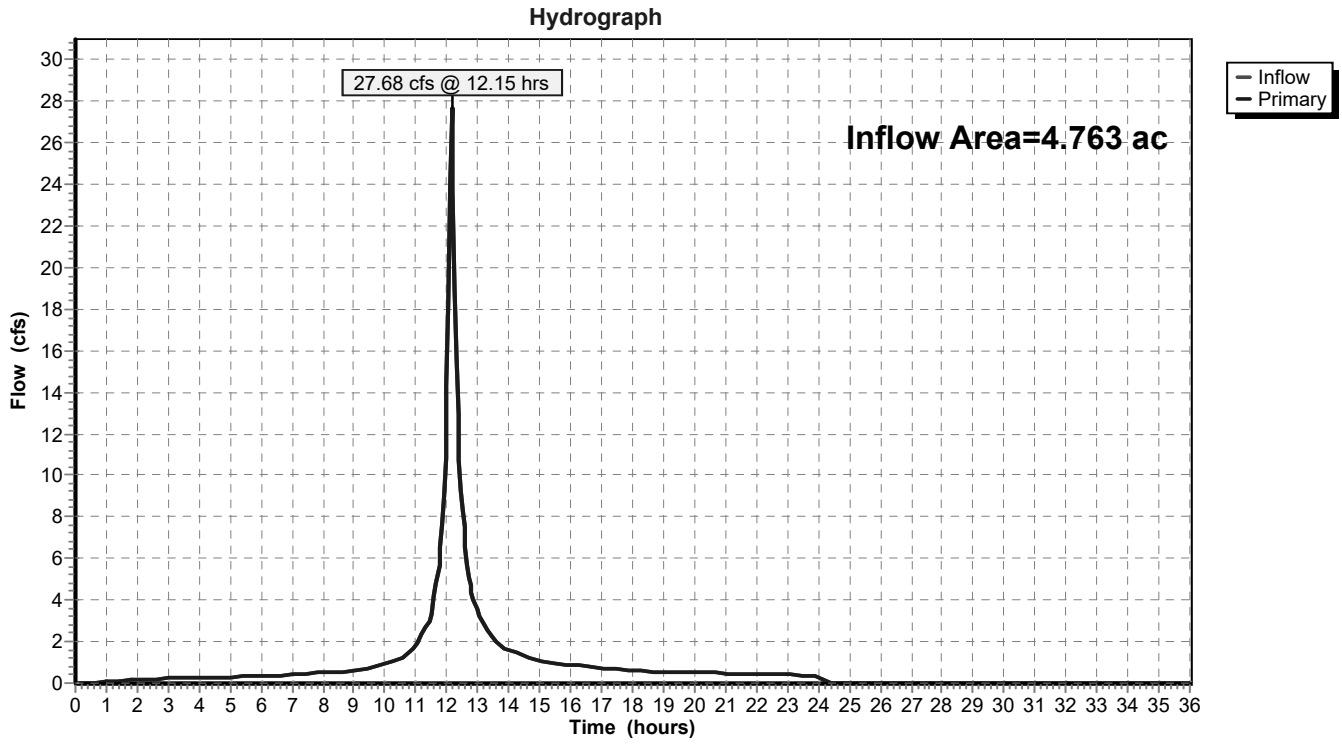


Summary for Link 2L: DA-2 COM HYD

Inflow Area = 4.763 ac, 53.20% Impervious, Inflow Depth = 6.10" for 100-Year Current TLS, Mercer event
Inflow = 27.68 cfs @ 12.15 hrs, Volume= 2.421 af
Primary = 27.68 cfs @ 12.15 hrs, Volume= 2.421 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2L: DA-2 COM HYD

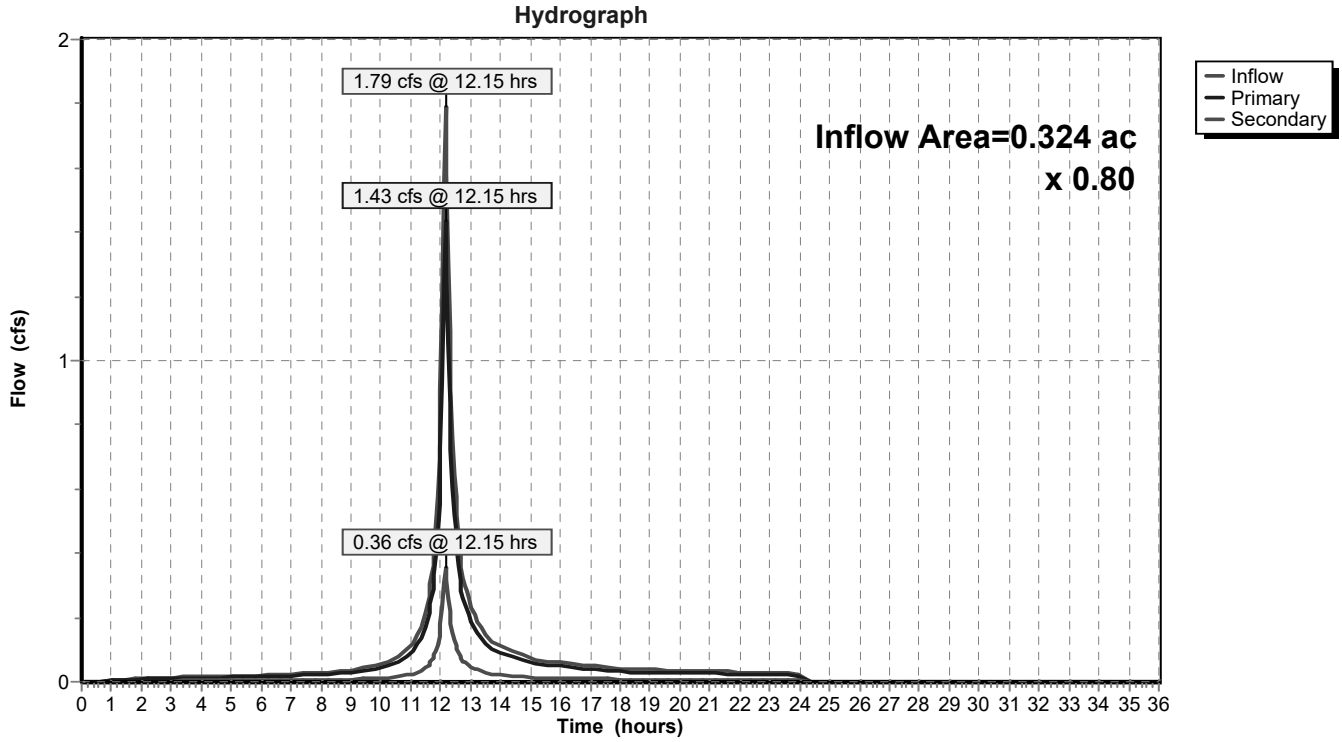


Summary for Link 2Lr: Reduction

Inflow Area = 0.324 ac, 45.97% Impervious, Inflow Depth = 5.91" for 100-Year Current TLS, Mercer event
Inflow = 1.79 cfs @ 12.15 hrs, Volume= 0.160 af
Primary = 1.43 cfs @ 12.15 hrs, Volume= 0.128 af, Atten= 20%, Lag= 0.0 min
Routed to Link 2L : DA-2 COM HYD
Secondary = 0.36 cfs @ 12.15 hrs, Volume= 0.032 af

Primary outflow = Inflow x 0.80, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 2Lr: Reduction

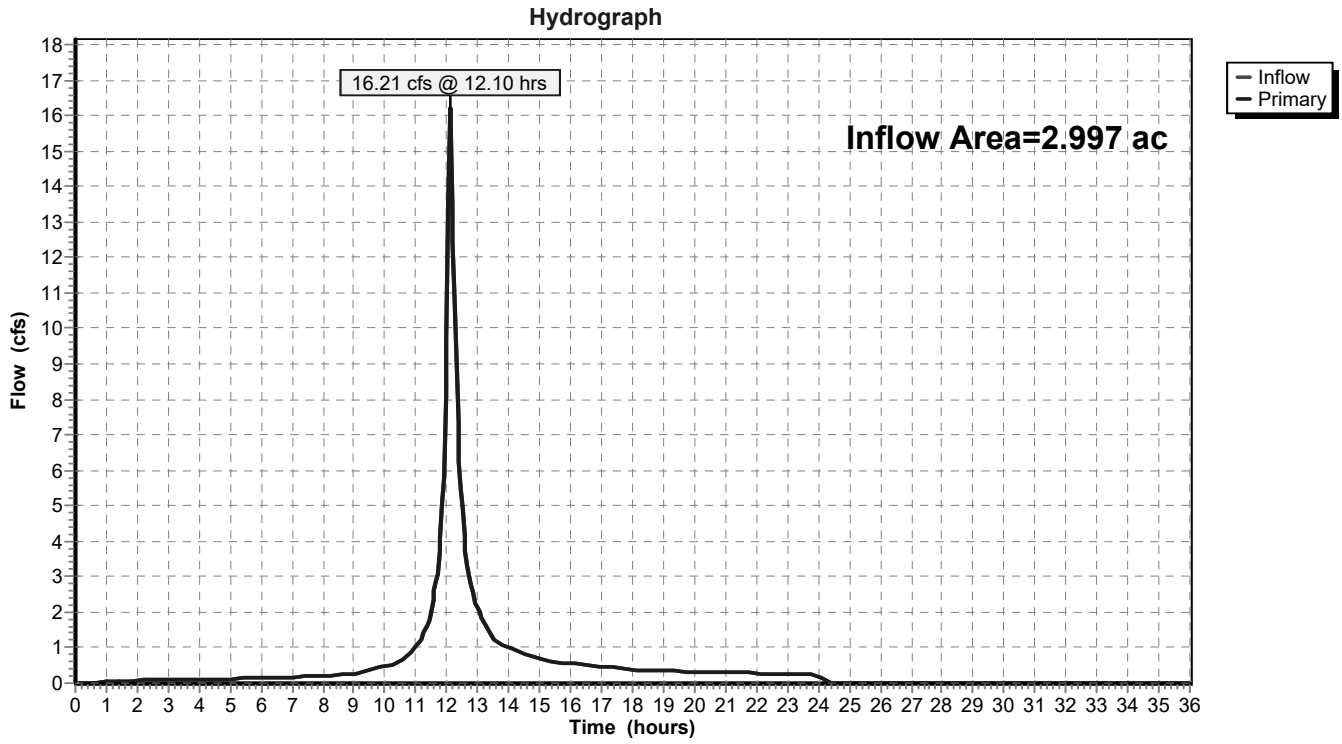


Summary for Link 3L: DA-3 COM HYD

Inflow Area = 2.997 ac, 34.93% Impervious, Inflow Depth = 5.69" for 100-Year Current TLS, Mercer event
Inflow = 16.21 cfs @ 12.10 hrs, Volume= 1.421 af
Primary = 16.21 cfs @ 12.10 hrs, Volume= 1.421 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 5R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 3L: DA-3 COM HYD

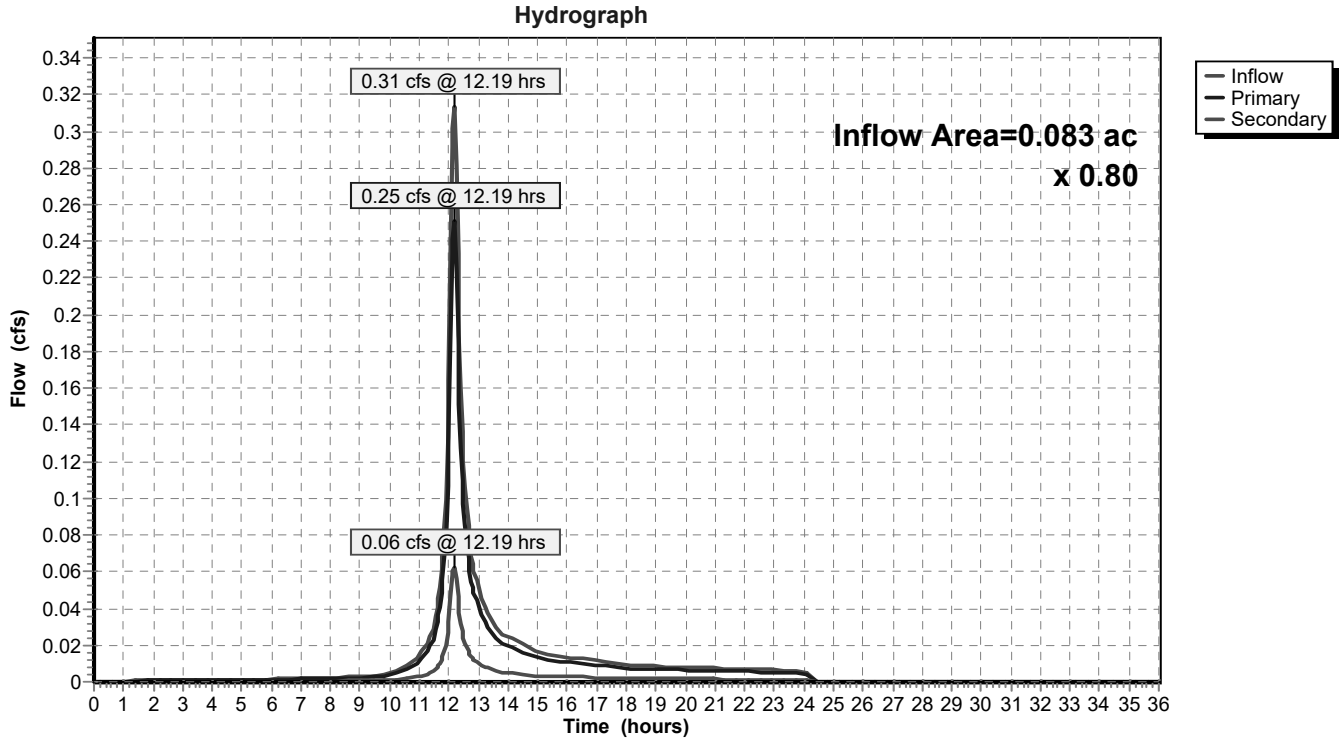


Summary for Link 3Lr: Reduction

Inflow Area = 0.083 ac, 13.80% Impervious, Inflow Depth = 4.28" for 100-Year Current TLS, Mercer event
Inflow = 0.31 cfs @ 12.19 hrs, Volume= 0.030 af
Primary = 0.25 cfs @ 12.19 hrs, Volume= 0.024 af, Atten= 20%, Lag= 0.0 min
Routed to Link 3L : DA-3 COM HYD
Secondary = 0.06 cfs @ 12.19 hrs, Volume= 0.006 af

Primary outflow = Inflow x 0.80, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 3Lr: Reduction

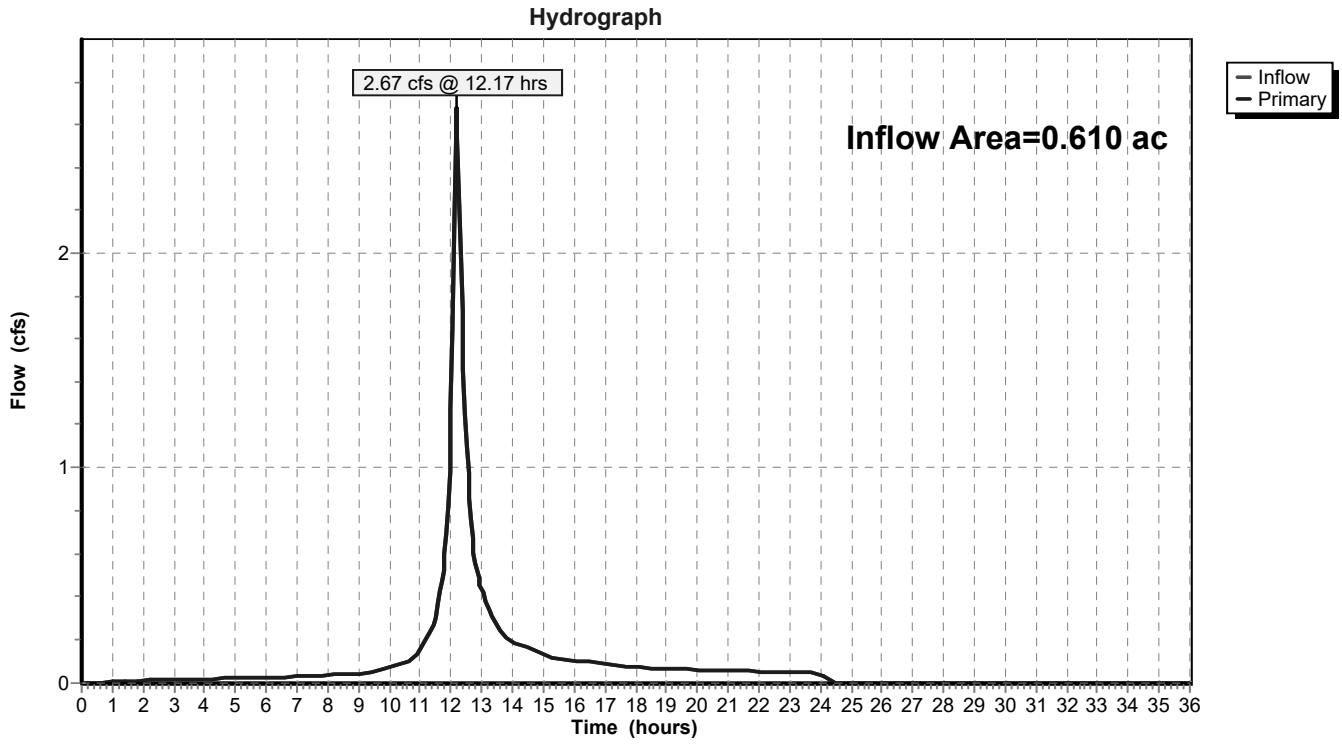


Summary for Link 4L: DA-4 COM HYD

Inflow Area = 0.610 ac, 31.69% Impervious, Inflow Depth = 5.09" for 100-Year Current TLS, Mercer event
Inflow = 2.67 cfs @ 12.17 hrs, Volume= 0.259 af
Primary = 2.67 cfs @ 12.17 hrs, Volume= 0.259 af, Atten= 0%, Lag= 0.0 min
Routed to Link 5L : Allowable: 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 4L: DA-4 COM HYD

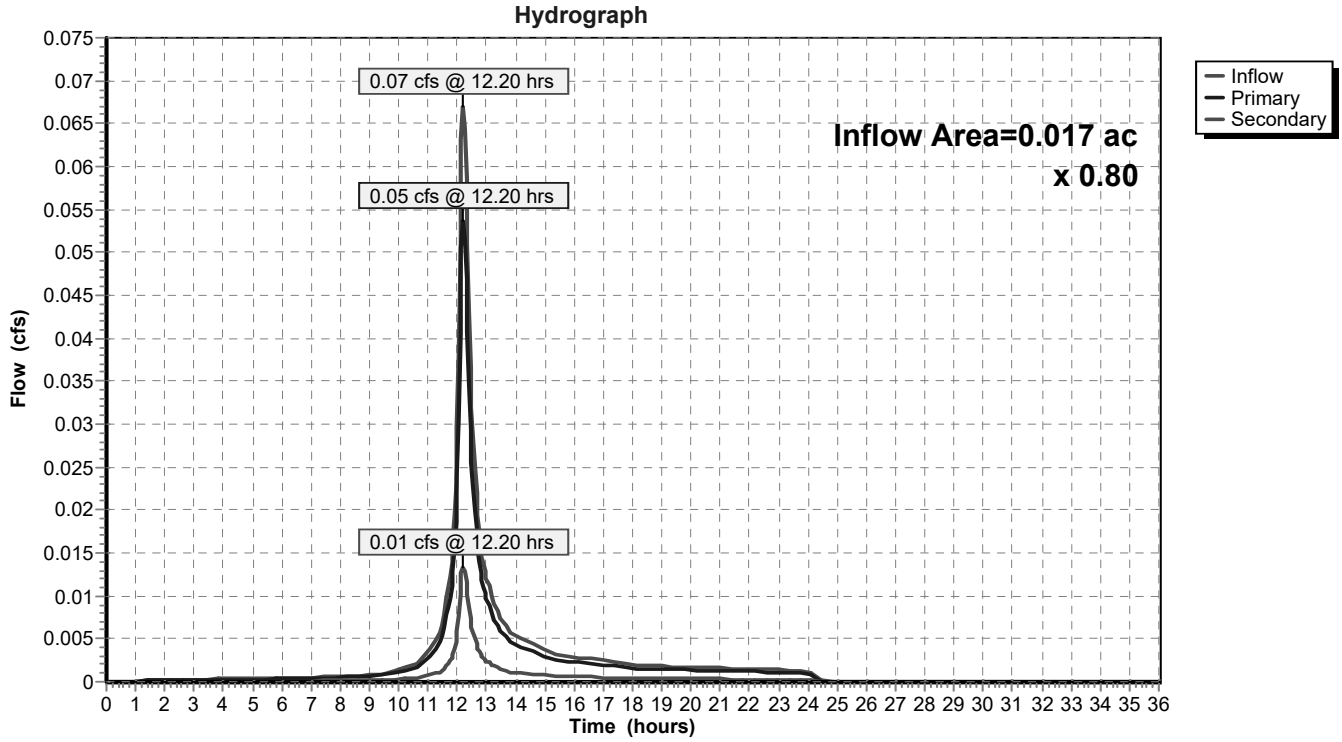


Summary for Link 4Lr: Reduction

Inflow Area = 0.017 ac, 18.82% Impervious, Inflow Depth = 4.70" for 100-Year Current TLS, Mercer event
Inflow = 0.07 cfs @ 12.20 hrs, Volume= 0.007 af
Primary = 0.05 cfs @ 12.20 hrs, Volume= 0.005 af, Atten= 20%, Lag= 0.0 min
Routed to Link 4L : DA-4 COM HYD
Secondary = 0.01 cfs @ 12.20 hrs, Volume= 0.001 af

Primary outflow = Inflow x 0.80, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 4Lr: Reduction

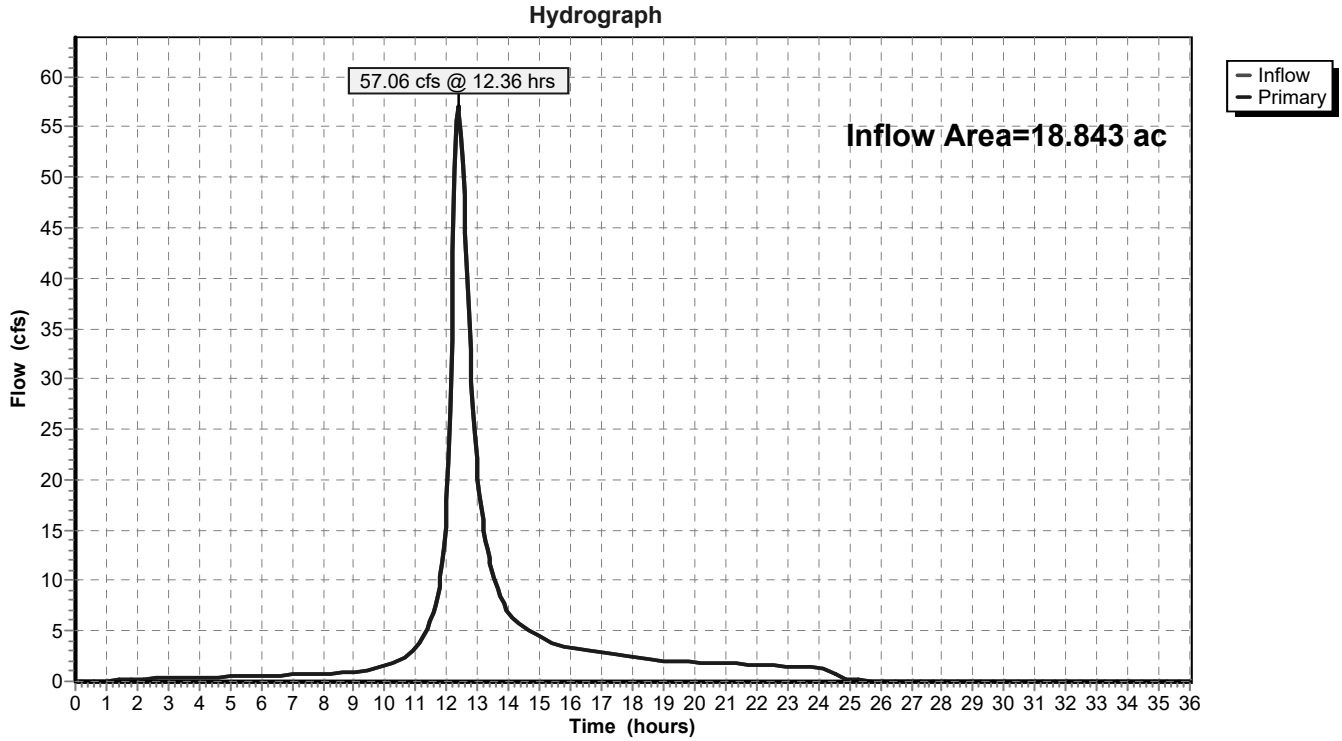


Summary for Link 5L: Allowable: 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Inflow Area = 18.843 ac, 21.27% Impervious, Inflow Depth = 4.80" for 100-Year Current TLS, Mercer event
Inflow = 57.06 cfs @ 12.36 hrs, Volume= 7.539 af
Primary = 57.06 cfs @ 12.36 hrs, Volume= 7.539 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link 5L: Allowable: 100-yr; COM HYD @ On Stream Pond [Point of Analysis]



PROPOSED CONDITIONS

22-019 Proposed R0 (10-24-23)
Prepared by The Reynolds Group, Inc
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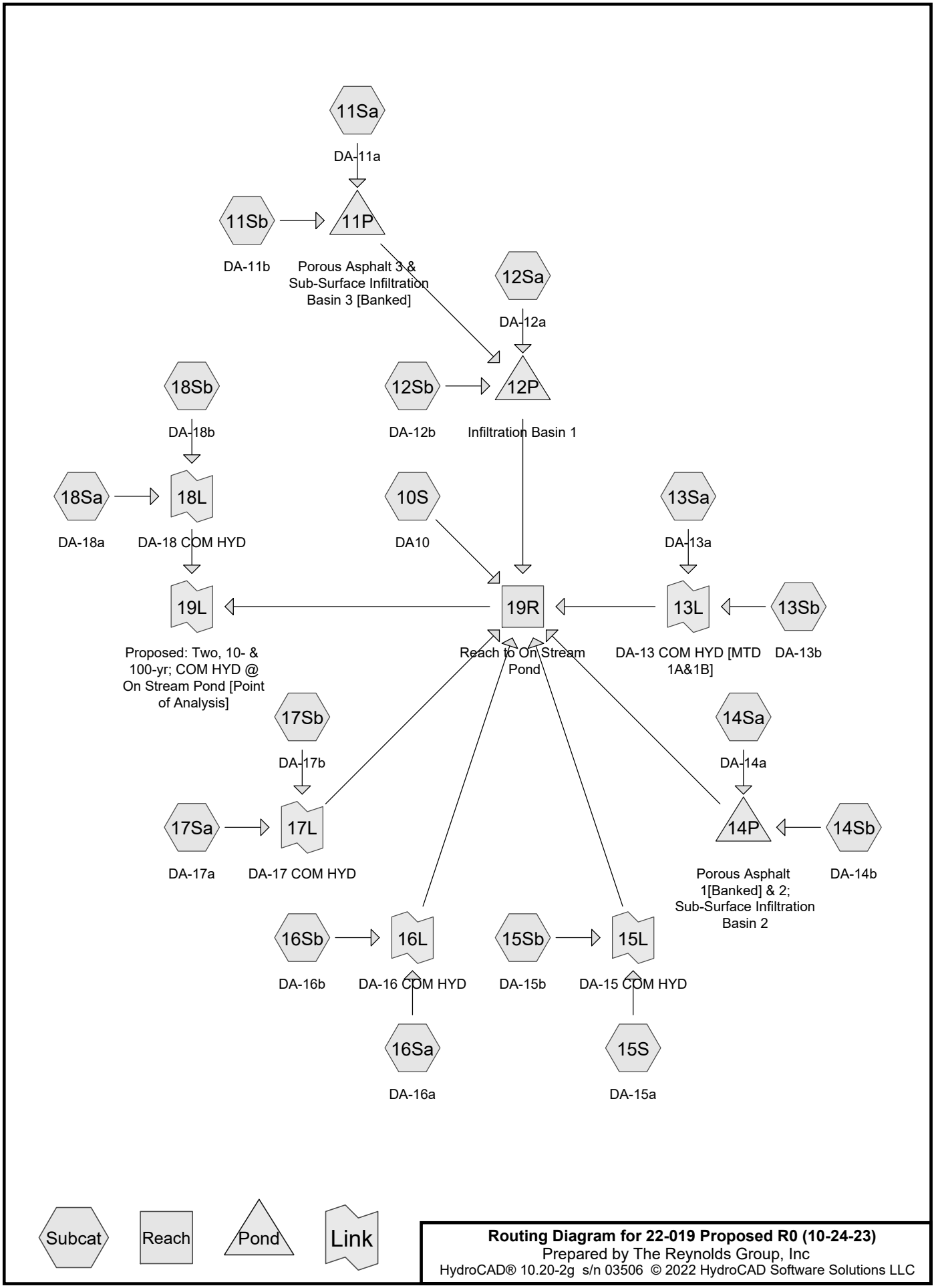

Routing Diagram for 22-019 Proposed R0 (10-24-23)
Prepared by The Reynolds Group, Inc
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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment10S: DA10 Runoff Area=261,211 sf 1.76% Impervious Runoff Depth=0.71"
Flow Length=1,909' Tc=24.4 min CN=66 Runoff=2.77 cfs 0.357 af

Subcatchment11Sa: DA-11a Runoff Area=6,399 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=71' Slope=0.0130 '/' Tc=9.5 min CN=61 Runoff=0.06 cfs 0.006 af

Subcatchment11Sb: DA-11b Runoff Area=20,908 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=52' Slope=0.0150 '/' Tc=0.8 min CN=98 Runoff=1.87 cfs 0.124 af

Subcatchment12Sa: DA-12a Runoff Area=65,962 sf 0.00% Impervious Runoff Depth=0.43"
Flow Length=913' Tc=13.8 min CN=59 Runoff=0.40 cfs 0.054 af

Subcatchment12Sb: DA-12b Runoff Area=19,134 sf 75.87% Impervious Runoff Depth=2.21"
Flow Length=797' Tc=4.3 min CN=89 Runoff=1.33 cfs 0.081 af

Subcatchment13Sa: DA-13a Runoff Area=46,483 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=1,145' Tc=10.2 min CN=61 Runoff=0.43 cfs 0.045 af

Subcatchment13Sb: DA-13b Runoff Area=20,026 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=1,113' Tc=5.6 min CN=98 Runoff=1.65 cfs 0.119 af

Subcatchment14Sa: DA-14a Runoff Area=17,616 sf 0.00% Impervious Runoff Depth=0.54"
Flow Length=164' Tc=9.9 min CN=62 Runoff=0.19 cfs 0.018 af

Subcatchment14Sb: DA-14b Runoff Area=37,529 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=60' Slope=0.0150 '/' Tc=0.9 min CN=98 Runoff=3.35 cfs 0.223 af

Subcatchment15S: DA-15a Runoff Area=3,981 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=583' Tc=10.6 min CN=61 Runoff=0.04 cfs 0.004 af

Subcatchment15Sb: DA-15b Runoff Area=14,314 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=618' Tc=4.9 min CN=98 Runoff=1.21 cfs 0.085 af

Subcatchment16Sa: DA-16a Runoff Area=91,062 sf 0.00% Impervious Runoff Depth=0.46"
Flow Length=1,192' Tc=14.9 min CN=60 Runoff=0.62 cfs 0.081 af

Subcatchment16Sb: DA-16b Runoff Area=79,517 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=1,343' Tc=6.9 min CN=98 Runoff=6.28 cfs 0.473 af

Subcatchment17Sa: DA-17a Runoff Area=84,864 sf 0.00% Impervious Runoff Depth=0.67"
Flow Length=480' Tc=11.8 min CN=65 Runoff=1.16 cfs 0.109 af

Subcatchment17Sb: DA-17b Runoff Area=44,668 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=380' Tc=2.3 min CN=98 Runoff=3.98 cfs 0.266 af

Subcatchment18Sa: DA-18a Runoff Area=659 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=1,668' Tc=9.9 min CN=61 Runoff=0.01 cfs 0.001 af

Subcatchment18Sb: DA-18b Runoff Area=6,448 sf 100.00% Impervious Runoff Depth=3.11"
Flow Length=1,715' Tc=6.1 min CN=98 Runoff=0.52 cfs 0.038 af

Reach 19R: Reach to On Stream Pond Avg. Flow Depth=0.61' Max Vel=0.86 fps Inflow=14.67 cfs 1.903 af
n=0.045 L=526.0' S=0.0025 '/' Capacity=2,676.51 cfs Outflow=10.72 cfs 1.903 af

Pond 11P: Porous Asphalt 3 & Sub-Surface Peak Elev=107.80' Storage=3,598 cf Inflow=1.89 cfs 0.130 af
Outflow=0.16 cfs 0.088 af

Pond 12P: Infiltration Basin 1 Peak Elev=103.54' Storage=2,445 cf Inflow=1.57 cfs 0.222 af
Outflow=0.45 cfs 0.205 af

Pond 14P: Porous Asphalt 1[Banked] & 2; Peak Elev=98.13' Storage=7,293 cf Inflow=3.44 cfs 0.241 af
Outflow=0.14 cfs 0.161 af

Link 13L: DA-13 COM HYD [MTD 1A&1B] Inflow=1.94 cfs 0.164 af
Primary=1.94 cfs 0.164 af

Link 15L: DA-15 COM HYD Inflow=1.23 cfs 0.089 af
Primary=1.23 cfs 0.089 af

Link 16L: DA-16 COM HYD Inflow=6.53 cfs 0.554 af
Primary=6.53 cfs 0.554 af

Link 17L: DA-17 COM HYD Inflow=4.61 cfs 0.374 af
Primary=4.61 cfs 0.374 af

Link 18L: DA-18 COM HYD Inflow=0.53 cfs 0.039 af
Primary=0.53 cfs 0.039 af

Link 19L: Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Inflow=11.02 cfs 1.942 af
Primary=11.02 cfs 1.942 af

Total Runoff Area = 18.843 ac Runoff Volume = 2.083 af Average Runoff Depth = 1.33"
70.45% Pervious = 13.275 ac 29.55% Impervious = 5.568 ac

Summary for Subcatchment 10S: DA10

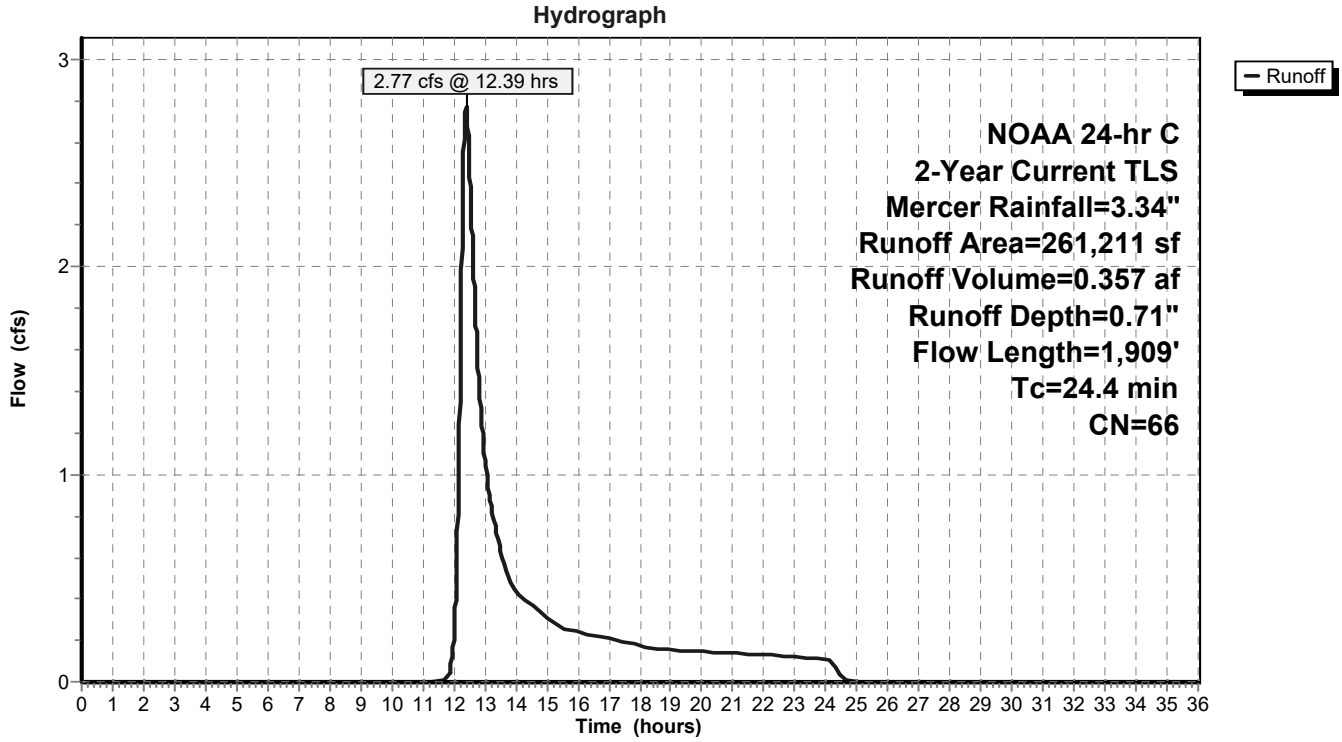
Runoff = 2.77 cfs @ 12.39 hrs, Volume= 0.357 af, Depth= 0.71"
Routed to Reach 19R : Reach to On Stream Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
	4,943	55	Woods, Good, HSG B
	80,094	70	Woods, Good, HSG C
	135,305	61	>75% Grass cover, Good, HSG B
	36,275	74	>75% Grass cover, Good, HSG C
*	4,594	98	Unconnected pavement, HSG B (Non Vehicular)
	261,211	66	Weighted Average
	256,617		98.24% Pervious Area
	4,594		1.76% Impervious Area
	4,594		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
7.3	808	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
6.6	821	0.0040	2.09	75.19	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
24.4	1,909	Total			

Subcatchment 10S: DA10



Summary for Subcatchment 11Sa: DA-11a

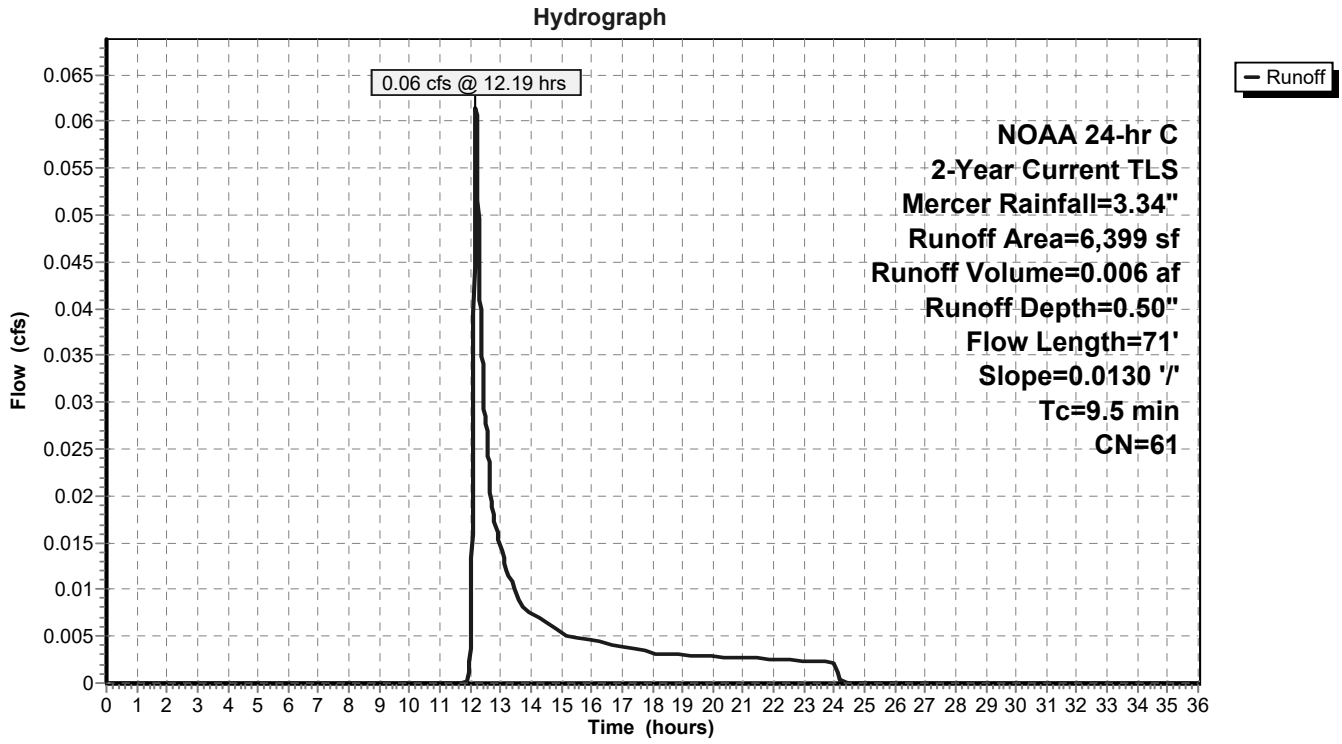
Runoff = 0.06 cfs @ 12.19 hrs, Volume= 0.006 af, Depth= 0.50"
Routed to Pond 11P : Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
6,399	61	>75% Grass cover, Good, HSG B
6,399		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
0.2	23	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.5	71	Total			

Subcatchment 11Sa: DA-11a



Summary for Subcatchment 11Sb: DA-11b

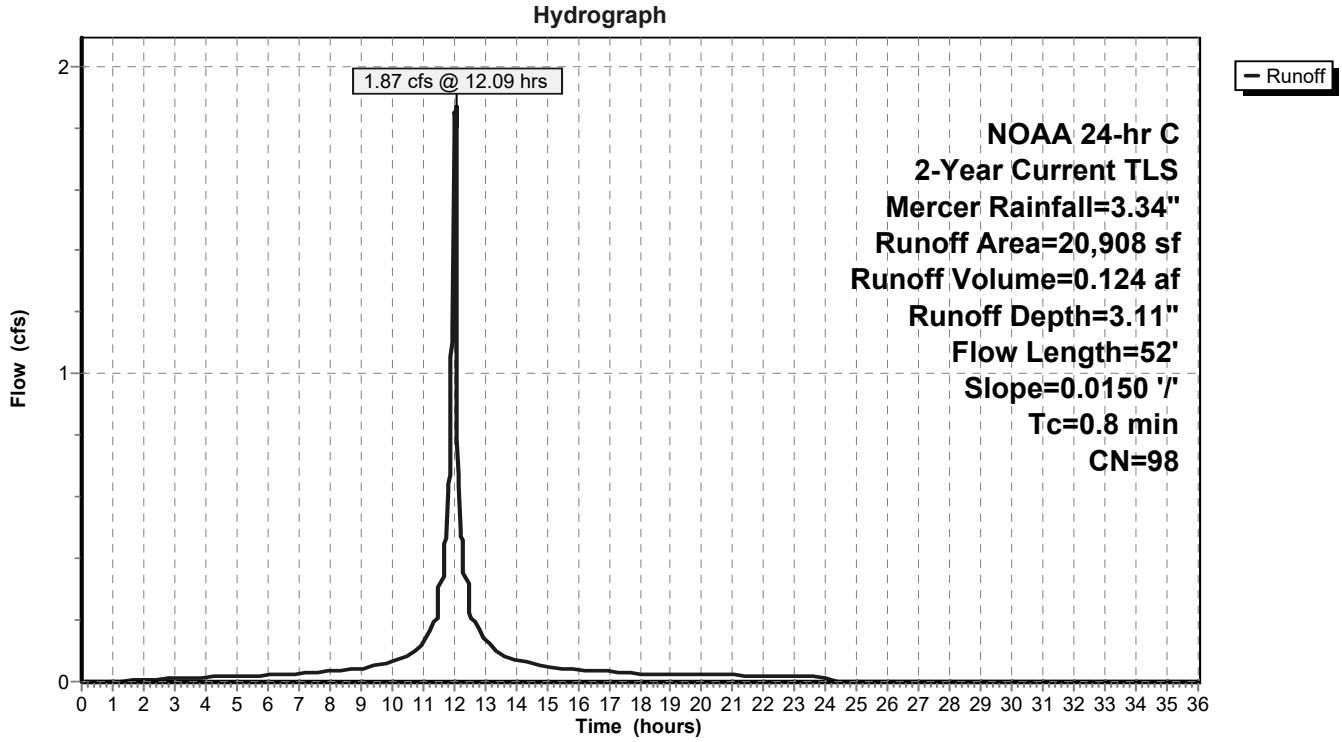
Runoff = 1.87 cfs @ 12.09 hrs, Volume= 0.124 af, Depth= 3.11"
Routed to Pond 11P : Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	20,908	98	Paved parking, HSG B (Vehicular)
	20,908		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	52	0.0150	1.09		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"

Subcatchment 11Sb: DA-11b



Summary for Subcatchment 12Sa: DA-12a

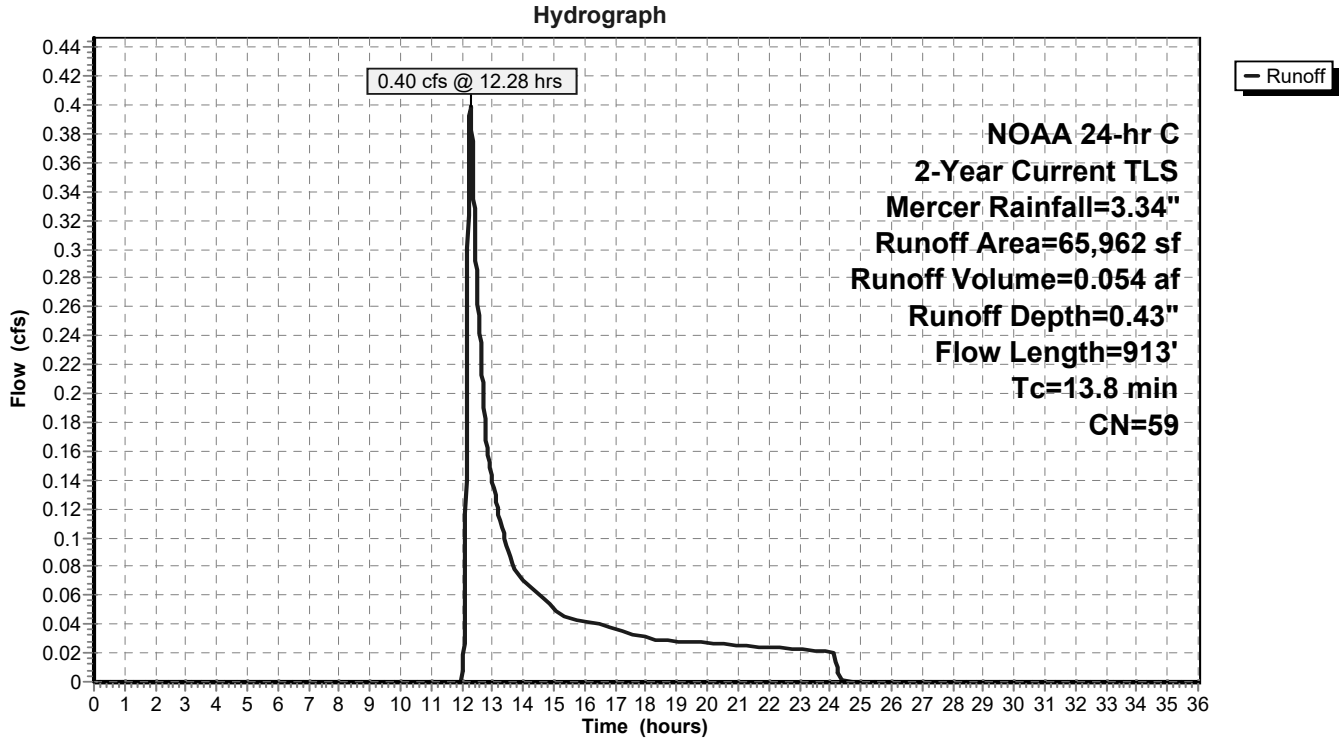
Runoff = 0.40 cfs @ 12.28 hrs, Volume= 0.054 af, Depth= 0.43"
Routed to Pond 12P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
16,889	55	Woods, Good, HSG B
49,073	61	>75% Grass cover, Good, HSG B
65,962	59	Weighted Average
65,962		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	25	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.31" Using McCuen-Spiess flow length
1.3	141	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	143	0.0080	1.82		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	159	0.0050	4.03	4.95	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	445	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
13.8	913	Total			

Subcatchment 12Sa: DA-12a



Summary for Subcatchment 12Sb: DA-12b

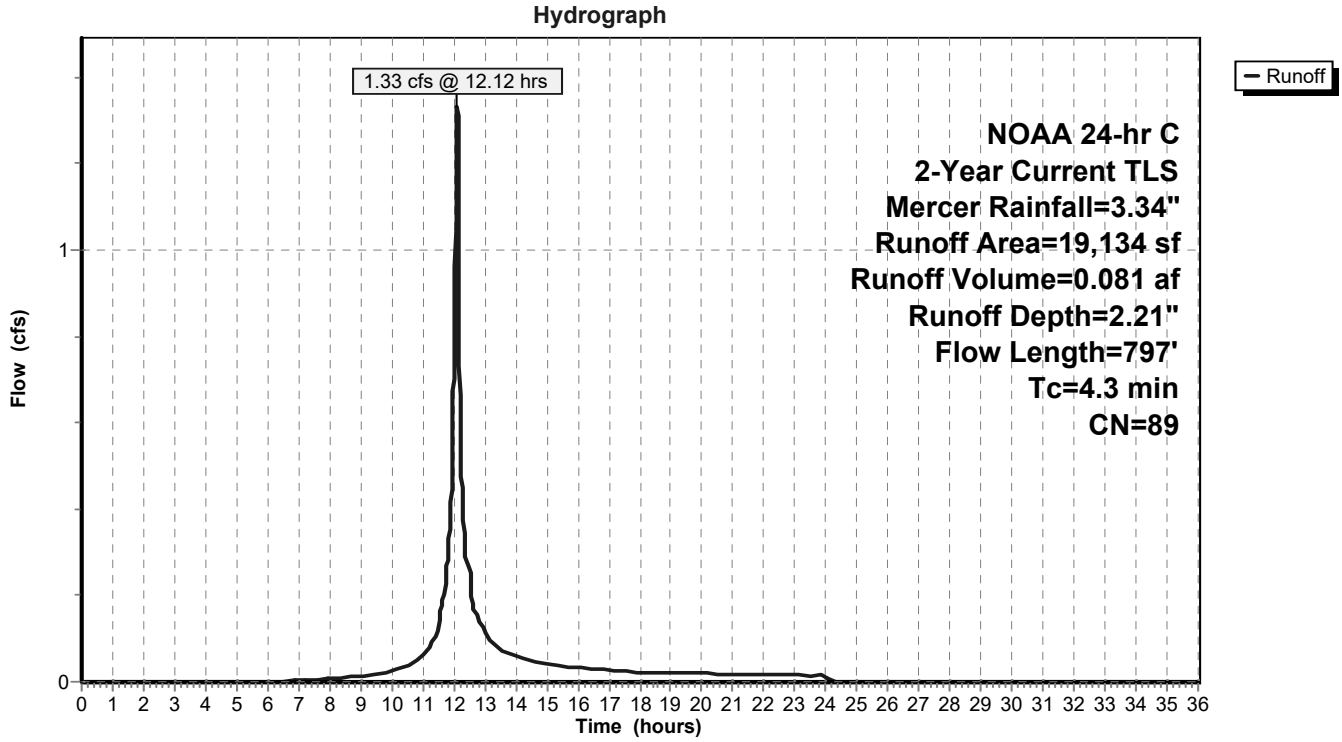
Runoff = 1.33 cfs @ 12.12 hrs, Volume= 0.081 af, Depth= 2.21"
Routed to Pond 12P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	14,517	98	Paved parking, HSG B (Vehicular)
*	4,617	61	Sidewalks, HSG B (Non Vehicular)
	19,134	89	Weighted Average
	4,617		24.13% Pervious Area
	14,517		75.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.15		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.0	104	0.0070	1.70		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	159	0.0050	4.03	4.95	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	445	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
4.3	797	Total			

Subcatchment 12Sb: DA-12b



Summary for Subcatchment 13Sa: DA-13a

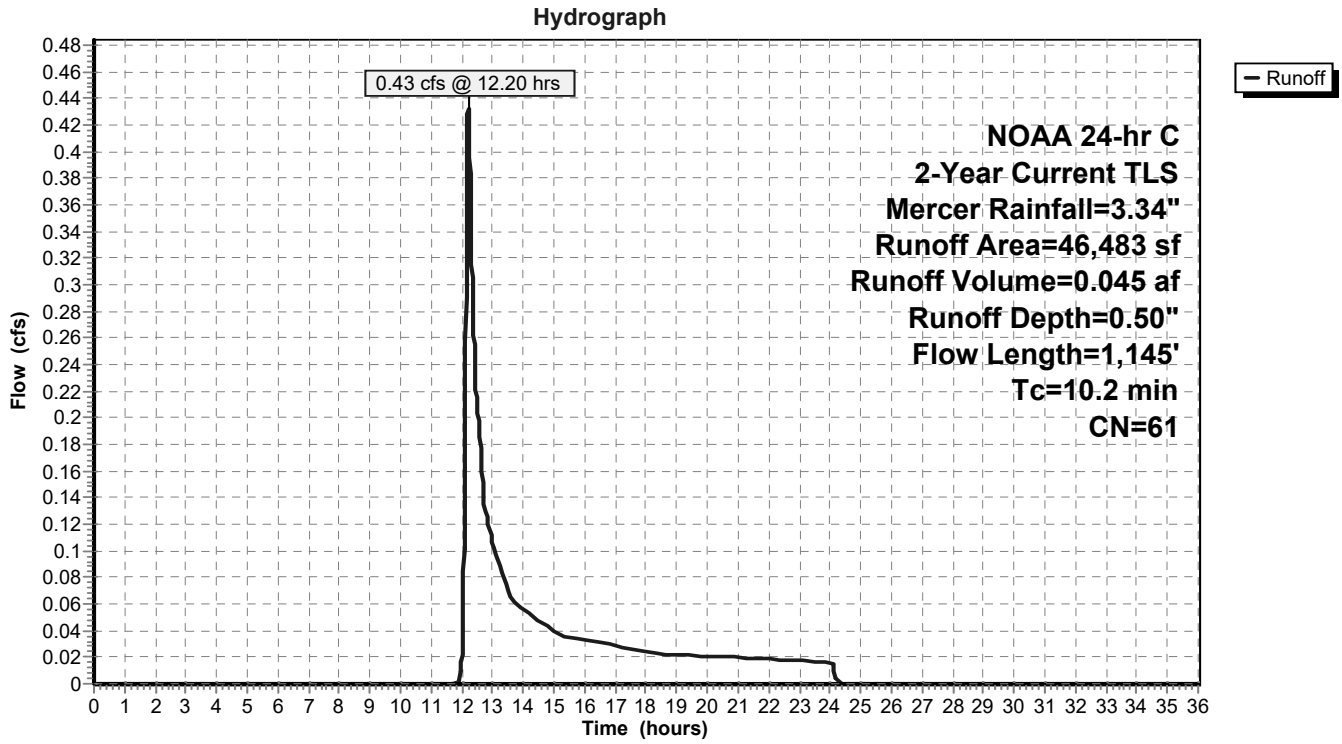
Runoff = 0.43 cfs @ 12.20 hrs, Volume= 0.045 af, Depth= 0.50"
Routed to Link 13L : DA-13 COM HYD [MTD 1A&1B]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
1,164	55	Woods, Good, HSG B
45,319	61	>75% Grass cover, Good, HSG B
46,483	61	Weighted Average
46,483		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	35	0.0310	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31"
0.4	69	0.0220	3.01		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.8	314	0.0200	2.89	11.55	**Channel Flow,** Area= 4.0 sf Perim= 12.0' r= 0.33' n= 0.035
0.2	62	0.0100	5.70	7.00	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	424	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
10.2	1,145	Total			

Subcatchment 13Sa: DA-13a



Summary for Subcatchment 13Sb: DA-13b

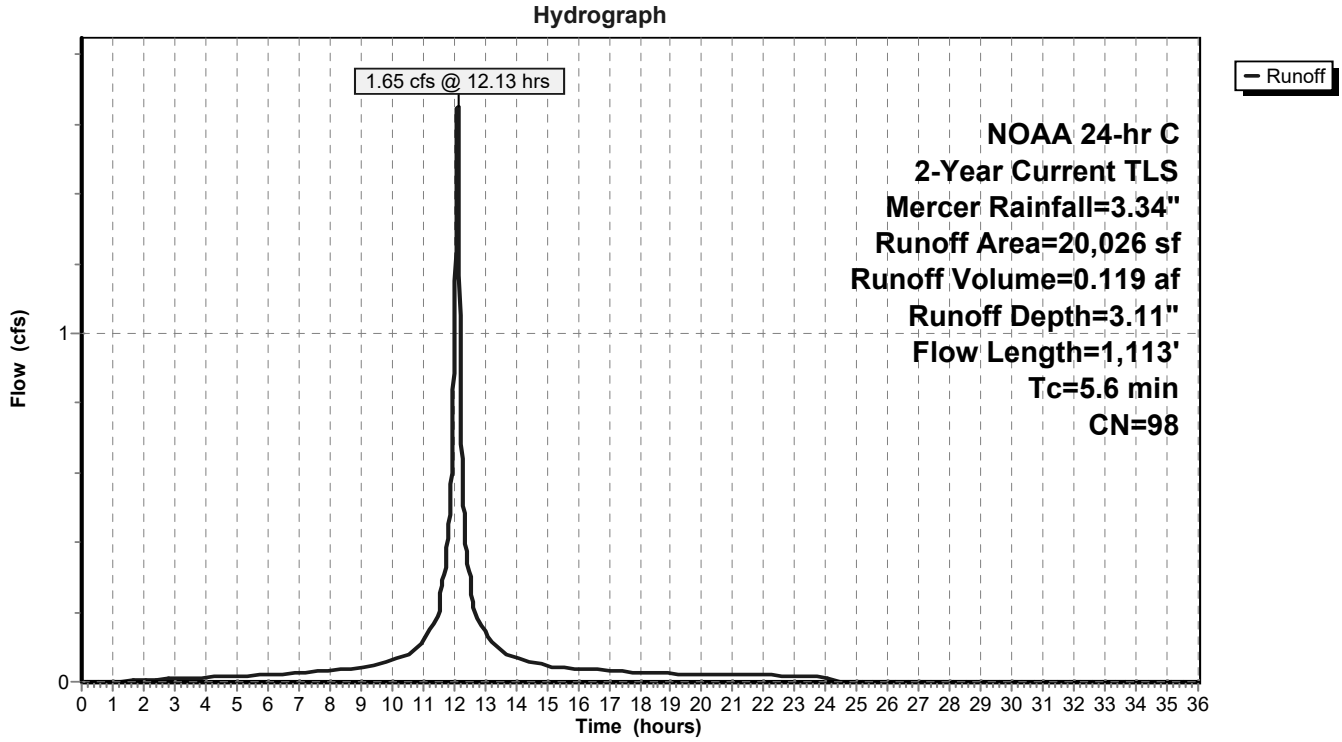
Runoff = 1.65 cfs @ 12.13 hrs, Volume= 0.119 af, Depth= 3.11"
Routed to Link 13L : DA-13 COM HYD [MTD 1A&1B]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
	15,772	98	Paved roads w/curbs & sewers, HSG B
*	4,254	98	Sidewalks, HSG B (Non Vehicular)
	20,026	98	Weighted Average
	20,026		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	69	0.0220	1.35		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.8	314	0.0200	2.89	11.55	**Channel Flow,** Area= 4.0 sf Perim= 12.0' r= 0.33' n= 0.035
0.2	65	0.0100	5.70	7.00	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	424	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
5.6	1,113	Total			

Subcatchment 13Sb: DA-13b



Summary for Subcatchment 14Sa: DA-14a

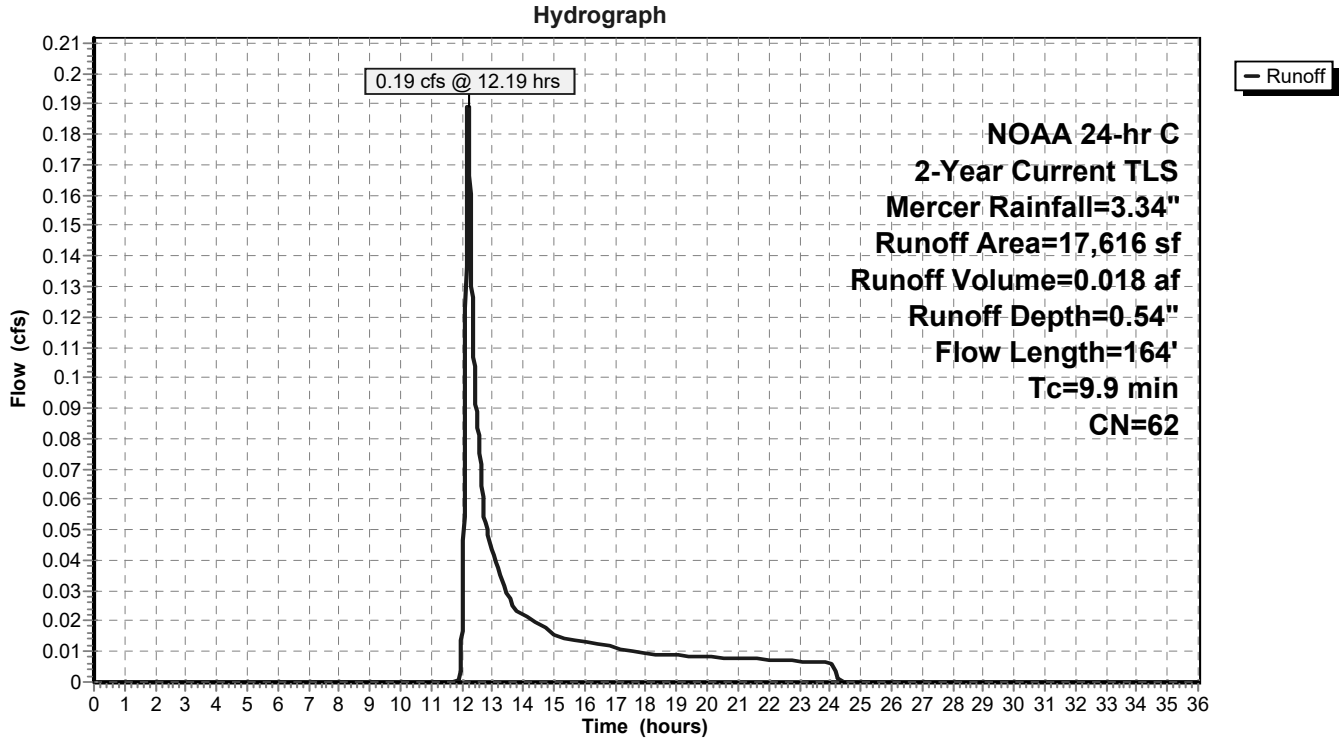
Runoff = 0.19 cfs @ 12.19 hrs, Volume= 0.018 af, Depth= 0.54"
Routed to Pond 14P : Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
16,171	61	>75% Grass cover, Good, HSG B
1,445	74	>75% Grass cover, Good, HSG C
17,616	62	Weighted Average
17,616		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	46	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
0.5	50	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	68	0.0100	4.91	3.86	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
9.9	164	Total			

Subcatchment 14Sa: DA-14a



Summary for Subcatchment 14Sb: DA-14b

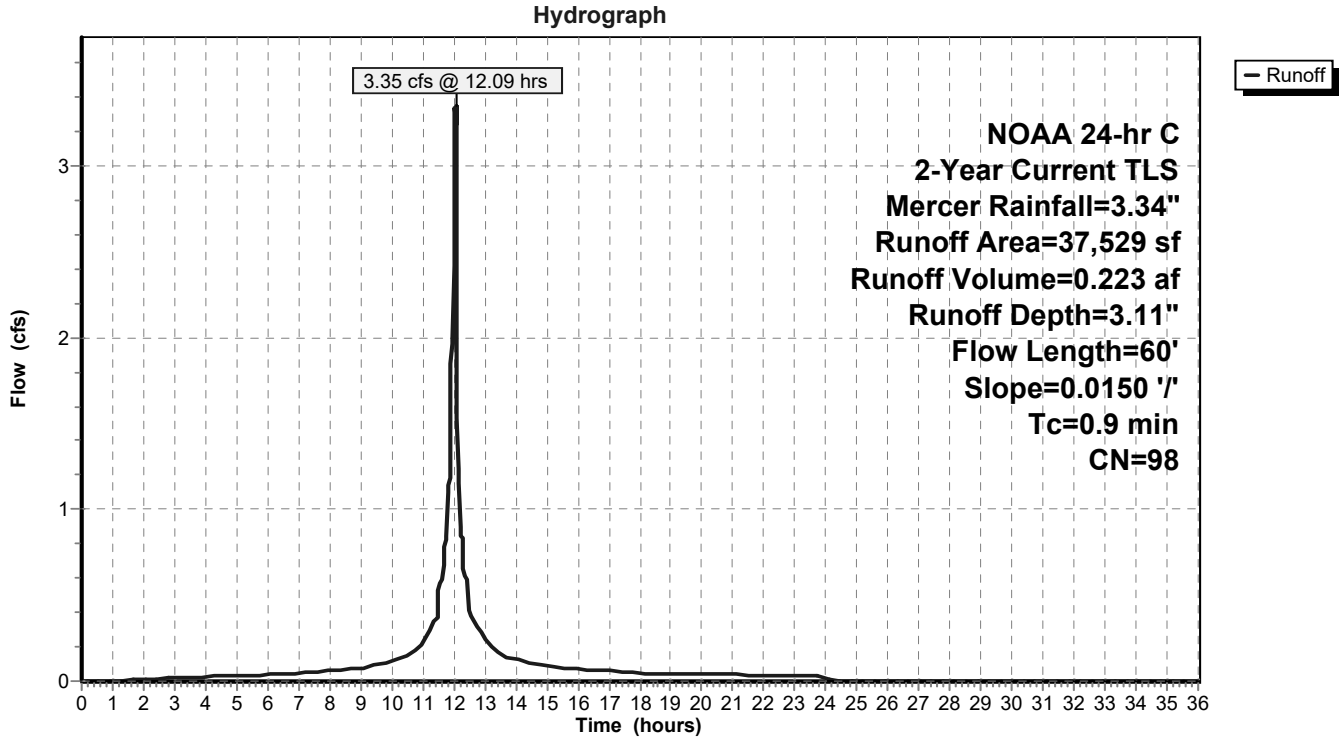
Runoff = 3.35 cfs @ 12.09 hrs, Volume= 0.223 af, Depth= 3.11"
Routed to Pond 14P : Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	34,989	98	Paved parking, HSG B (Vehicular)
*	2,540	98	Paved parking, HSG C (Vehicular)
	37,529	98	Weighted Average
	37,529		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	60	0.0150	1.13		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"

Subcatchment 14Sb: DA-14b



Summary for Subcatchment 15S: DA-15a

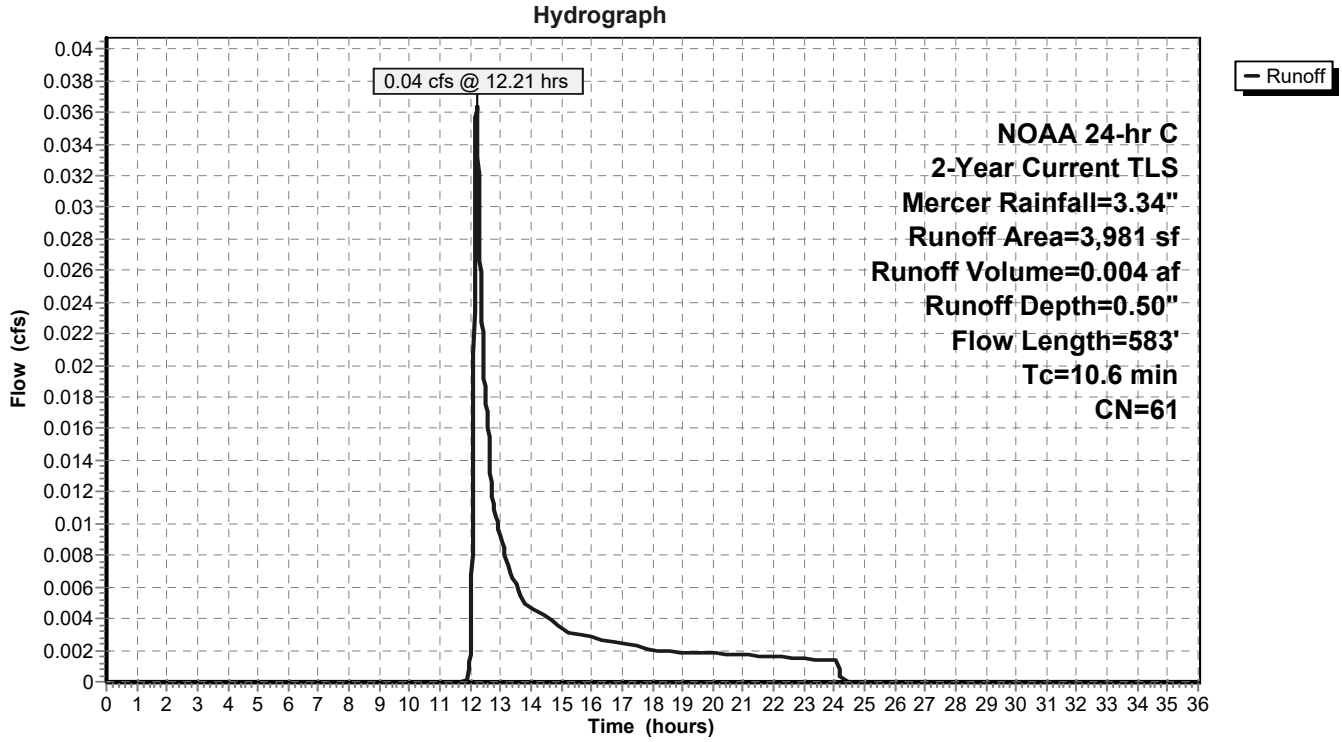
Runoff = 0.04 cfs @ 12.21 hrs, Volume= 0.004 af, Depth= 0.50"
Routed to Link 15L : DA-15 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
3,981	61	>75% Grass cover, Good, HSG B
3,981		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	24	0.0150	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31"
1.9	203	0.0080	1.82		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	39	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.3	76	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
2.7	200	0.0036	1.22	7.35	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
10.6	583	Total			

Subcatchment 15S: DA-15a



Summary for Subcatchment 15Sb: DA-15b

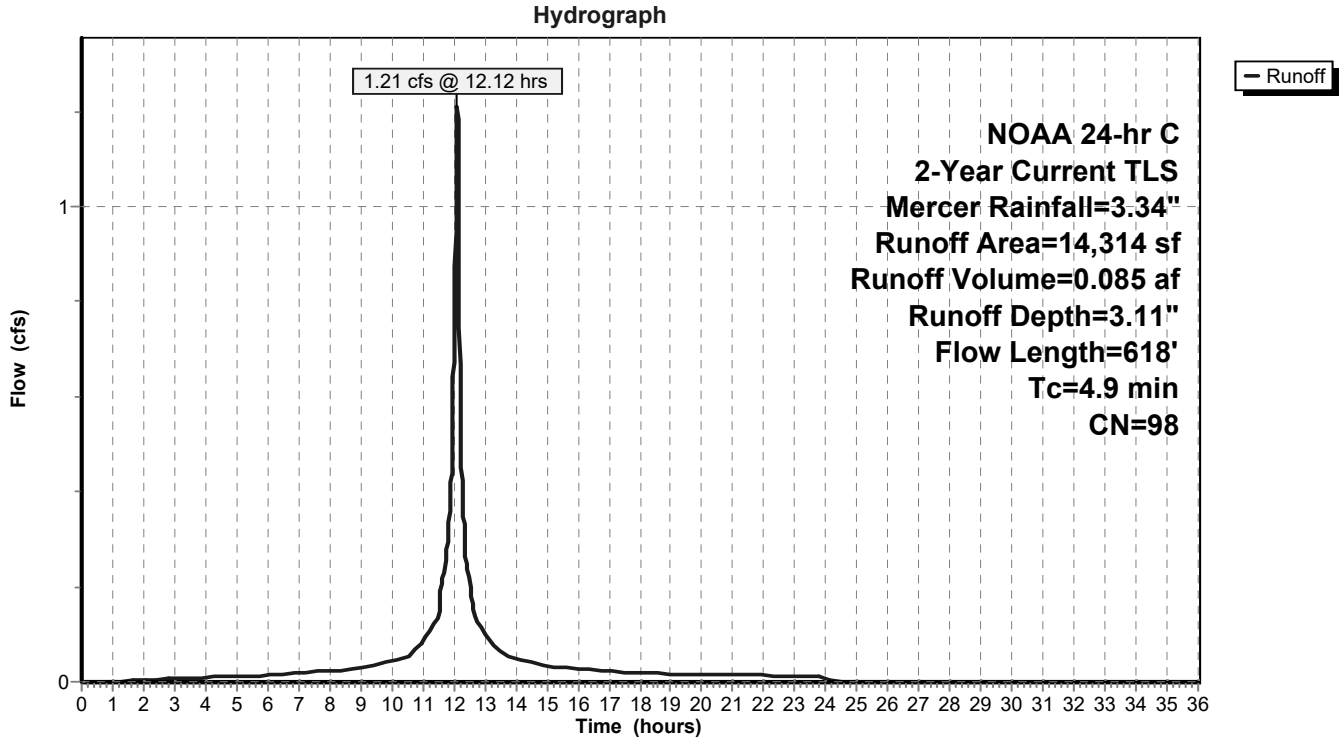
Runoff = 1.21 cfs @ 12.12 hrs, Volume= 0.085 af, Depth= 3.11"
Routed to Link 15L : DA-15 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	13,074	98	Paved parking, HSG B (Vehicular)
*	1,240	98	Sidewalks, HSG B (Non Vehicular)
	14,314	98	Weighted Average
	14,314		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	59	0.0090	0.91		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.9	203	0.0080	1.82		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	39	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.3	76	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
4.9	618	Total			

Subcatchment 15Sb: DA-15b



Summary for Subcatchment 16Sa: DA-16a

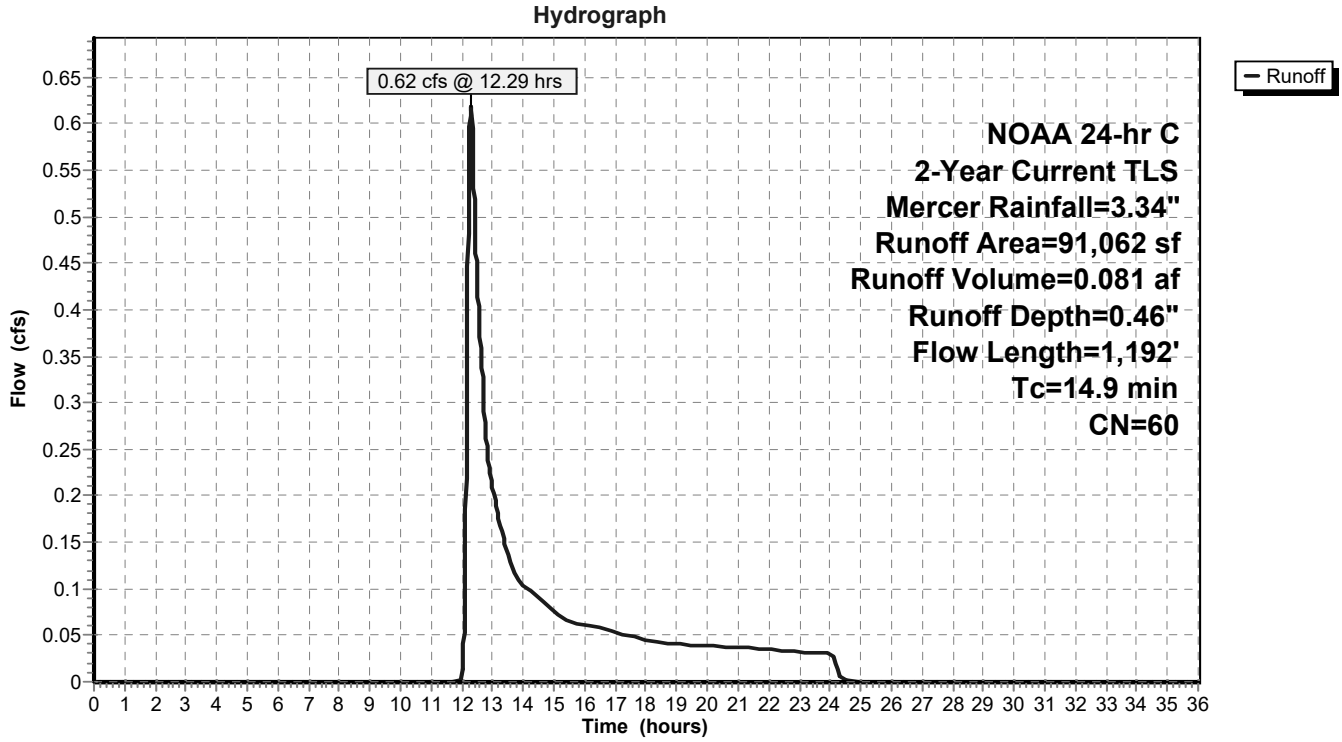
Runoff = 0.62 cfs @ 12.29 hrs, Volume= 0.081 af, Depth= 0.46"
Routed to Link 16L : DA-16 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
15,718	55	Woods, Good, HSG B
75,147	61	>75% Grass cover, Good, HSG B
197	80	>75% Grass cover, Good, HSG D
91,062	60	Weighted Average
91,062		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
0.3	29	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	340	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,192	Total			

Subcatchment 16Sa: DA-16a



Summary for Subcatchment 16Sb: DA-16b

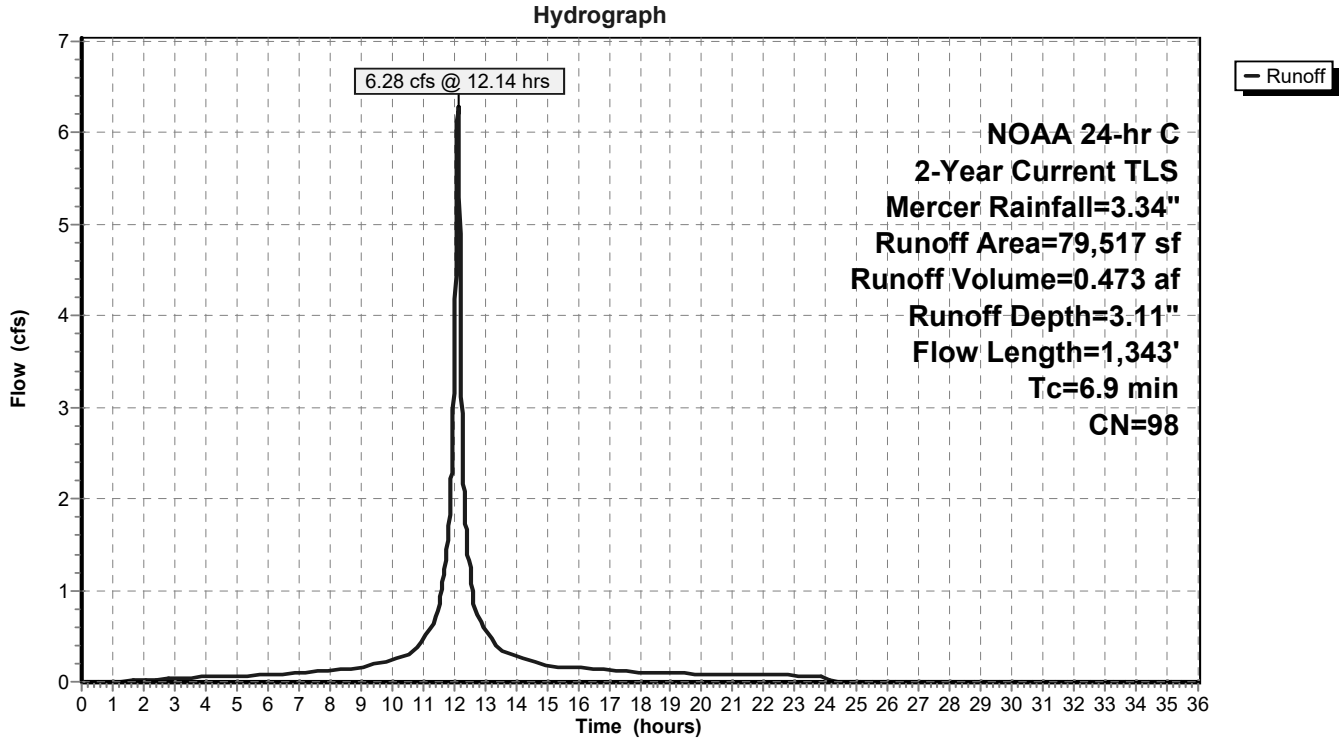
Runoff = 6.28 cfs @ 12.14 hrs, Volume= 0.473 af, Depth= 3.11"
Routed to Link 16L : DA-16 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	13,840	98	Paved parking, HSG B (Vehicular)
*	63,000	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	2,677	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	79,517	98	Weighted Average
	79,517		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.84		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	340	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
6.9	1,343	Total			

Subcatchment 16Sb: DA-16b



Summary for Subcatchment 17Sa: DA-17a

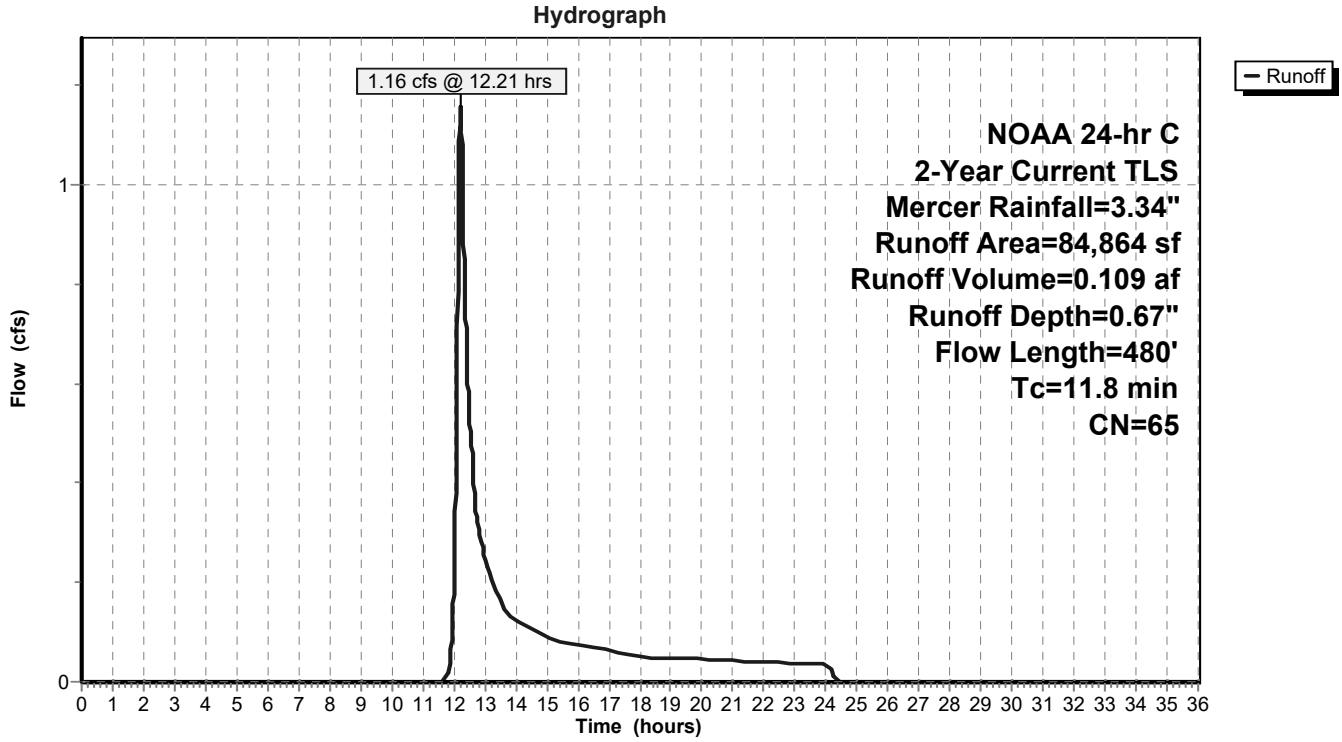
Runoff = 1.16 cfs @ 12.21 hrs, Volume= 0.109 af, Depth= 0.67"
Routed to Link 17L : DA-17 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
21,515	55	Woods, Good, HSG B
31,307	70	Woods, Good, HSG C
1,317	77	Woods, Good, HSG D
21,658	61	>75% Grass cover, Good, HSG B
3,641	74	>75% Grass cover, Good, HSG C
5,426	80	>75% Grass cover, Good, HSG D
84,864	65	Weighted Average
84,864		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
1.7	173	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	53	0.0130	6.00	7.37	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
11.8	480	Total			

Subcatchment 17Sa: DA-17a



Summary for Subcatchment 17Sb: DA-17b

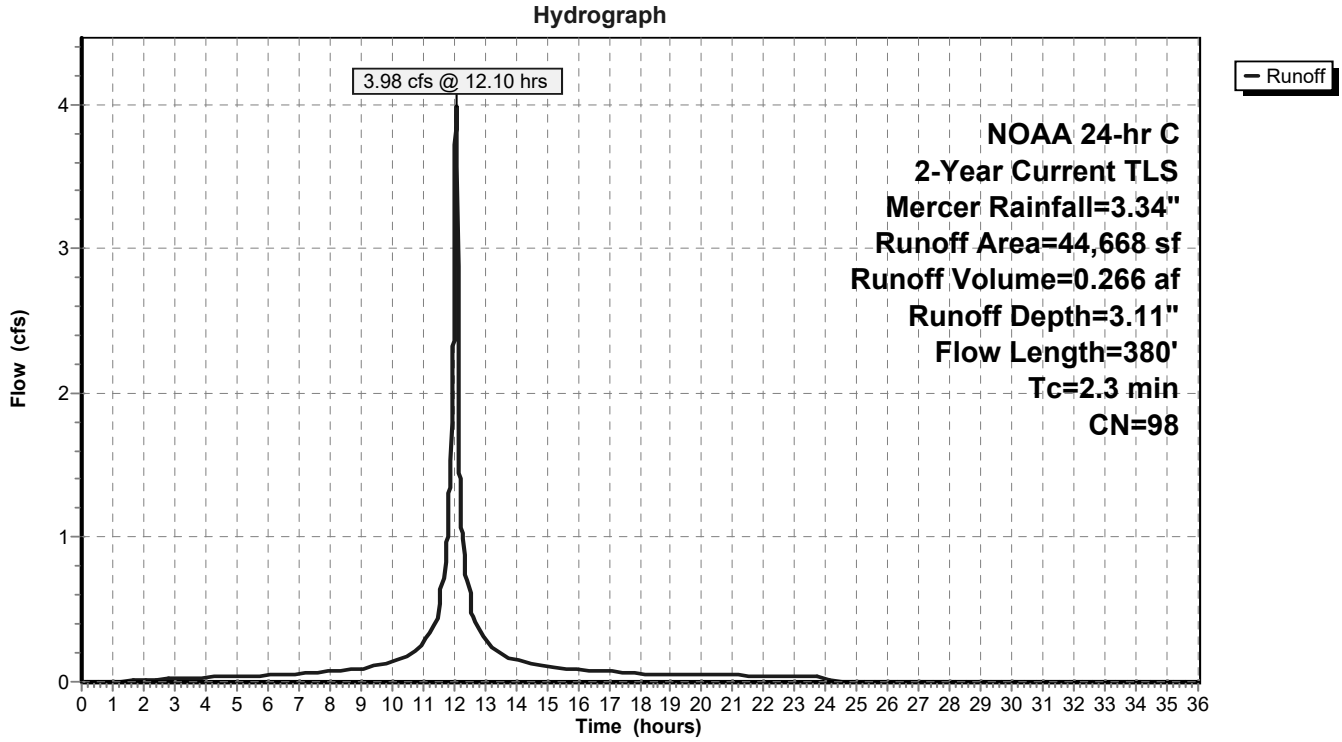
Runoff = 3.98 cfs @ 12.10 hrs, Volume= 0.266 af, Depth= 3.11"
Routed to Link 17L : DA-17 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	12,920	98	Paved parking, HSG B (Vehicular)
*	27,394	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	1,571	98	Paved parking, HSG C (Vehicular)
*	425	98	Paved parking, HSG D (Vehicular)
*	2,358	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	44,668	98	Weighted Average
	44,668		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.31		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
0.1	32	0.0590	3.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	53	0.0130	6.00	7.37	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
2.3	380	Total			

Subcatchment 17Sb: DA-17b



Summary for Subcatchment 18Sa: DA-18a

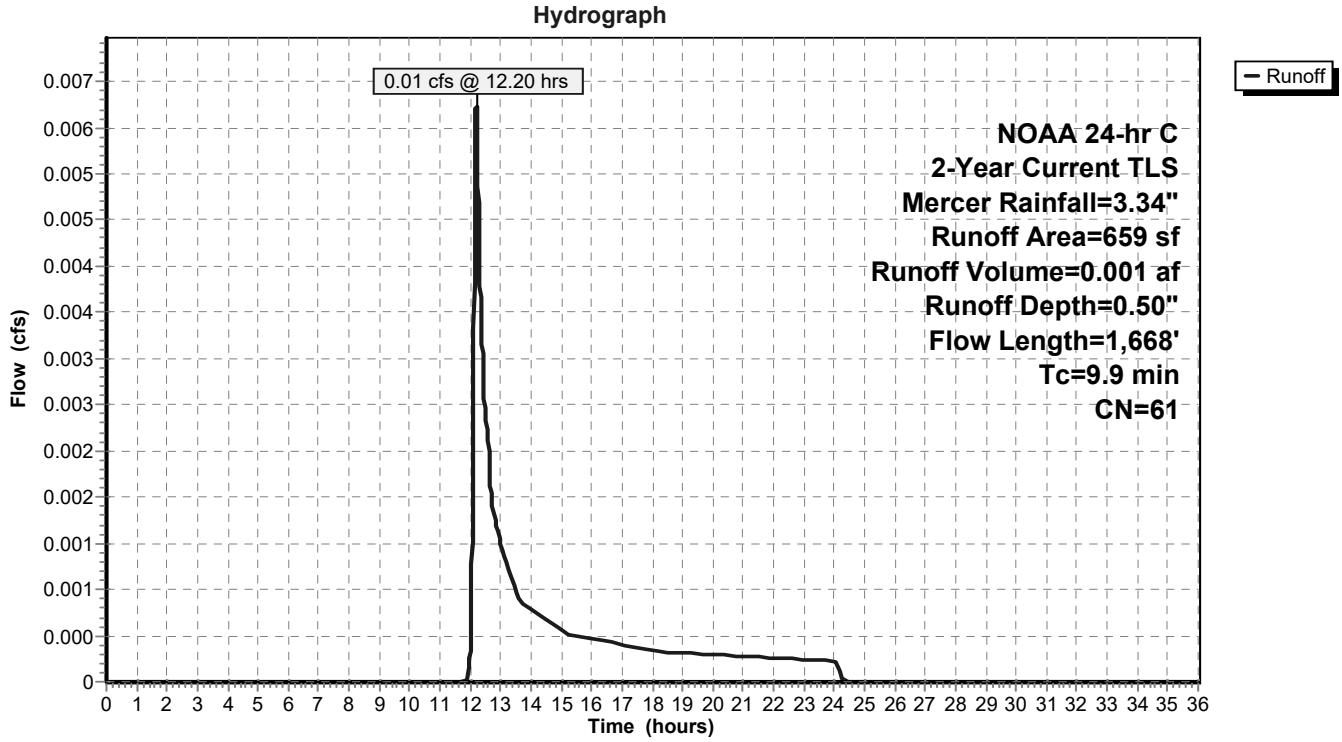
Runoff = 0.01 cfs @ 12.20 hrs, Volume= 0.001 af, Depth= 0.50"
Routed to Link 18L : DA-18 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

Area (sf)	CN	Description
659	61	>75% Grass cover, Good, HSG B
659		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	24	0.0200	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31"
1.4	133	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
9.9	1,668	Total			

Subcatchment 18Sa: DA-18a



Summary for Subcatchment 18Sb: DA-18b

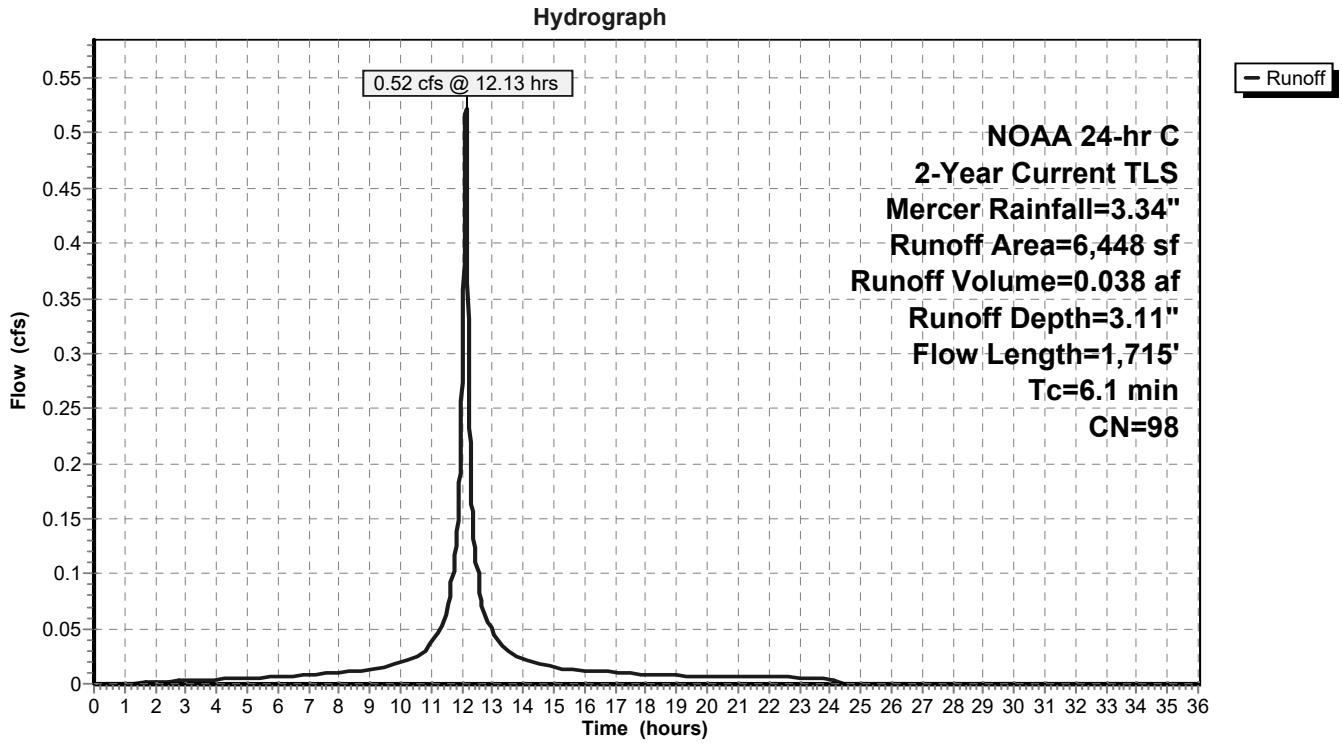
Runoff = 0.52 cfs @ 12.13 hrs, Volume= 0.038 af, Depth= 3.11"
Routed to Link 18L : DA-18 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Current TLS, Mercer Rainfall=3.34"

	Area (sf)	CN	Description
*	1,155	98	Paved parking, HSG B (Vehicular)
*	5,293	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	6,448	98	Weighted Average
	6,448		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	52	0.0100	0.93		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.1	133	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	201	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
6.1	1,715	Total			

Subcatchment 18Sb: DA-18b



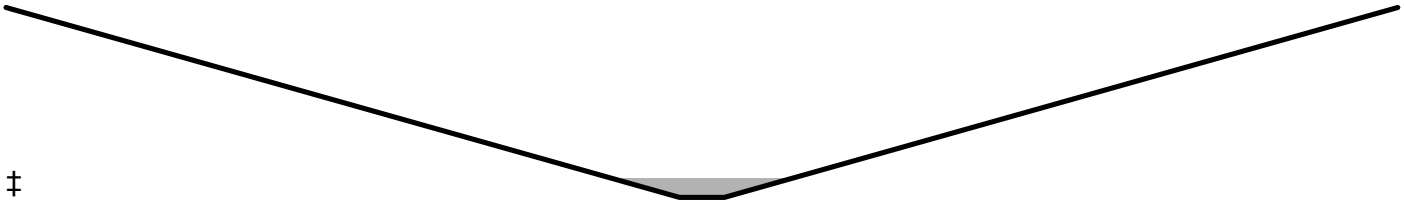
Summary for Reach 19R: Reach to On Stream Pond

Inflow Area = 18.679 ac, 29.01% Impervious, Inflow Depth > 1.22" for 2-Year Current TLS, Mercer event
Inflow = 14.67 cfs @ 12.12 hrs, Volume= 1.903 af
Outflow = 10.72 cfs @ 12.22 hrs, Volume= 1.903 af, Atten= 27%, Lag= 6.0 min
Routed to Link 19L : Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.86 fps, Min. Travel Time= 10.1 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 26.2 min

Peak Storage= 6,527 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.61' , Surface Width= 32.49'
Bank-Full Depth= 6.00' Flow Area= 768.0 sf, Capacity= 2,676.51 cfs

8.00' x 6.00' deep channel, n= 0.045
Side Slope Z-value= 20.0 '/' Top Width= 248.00'
Length= 526.0' Slope= 0.0025 '/'
Inlet Invert= 91.30', Outlet Invert= 90.00'



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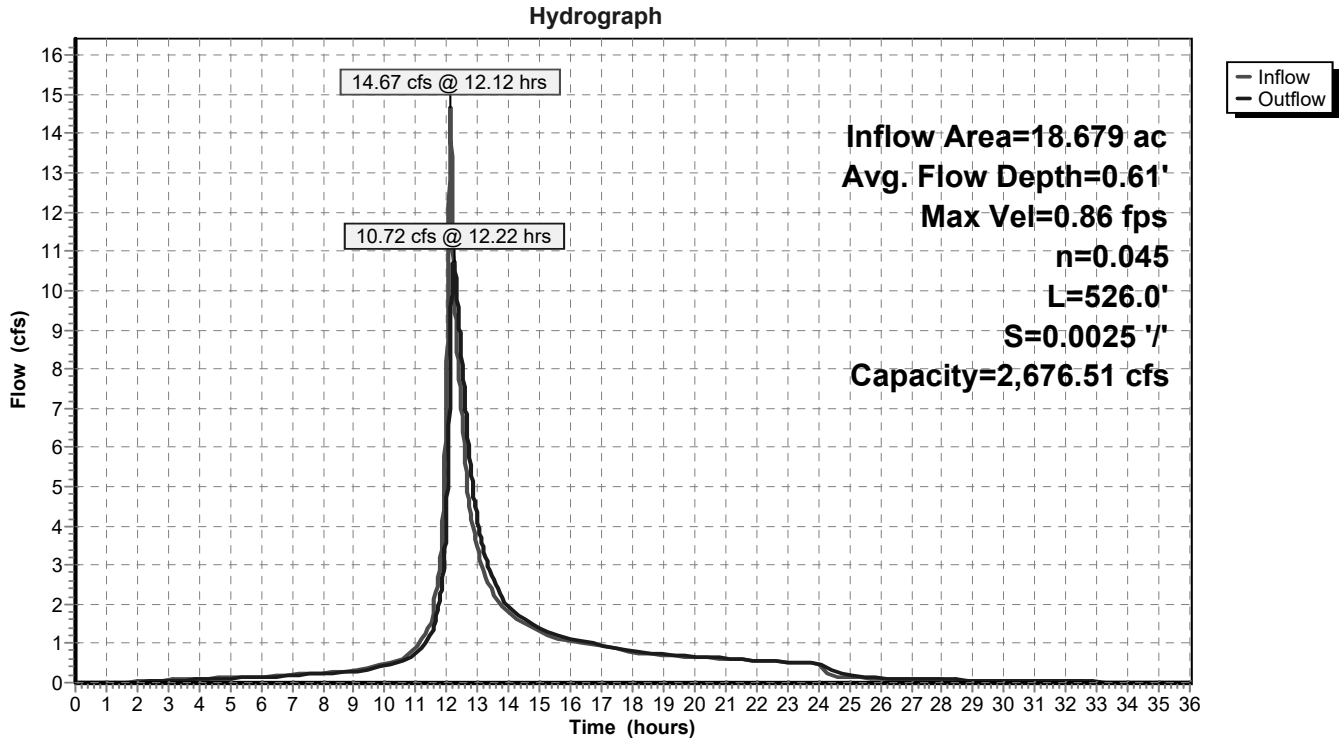
Reach 19R: Reach to On Stream Pond



Summary for Pond 11P: Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Inflow Area = 0.627 ac, 76.57% Impervious, Inflow Depth = 2.50" for 2-Year Current TLS, Mercer event
Inflow = 1.89 cfs @ 12.09 hrs, Volume= 0.130 af
Outflow = 0.16 cfs @ 13.00 hrs, Volume= 0.088 af, Atten= 92%, Lag= 54.8 min
Primary = 0.16 cfs @ 13.00 hrs, Volume= 0.088 af
Routed to Pond 12P : Infiltration Basin 1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 107.80' @ 13.00 hrs Surf.Area= 5,782 sf Storage= 3,598 cf

Plug-Flow detention time= 357.2 min calculated for 0.088 af (67% of inflow)
Center-of-Mass det. time= 253.7 min (1,013.3 - 759.6)

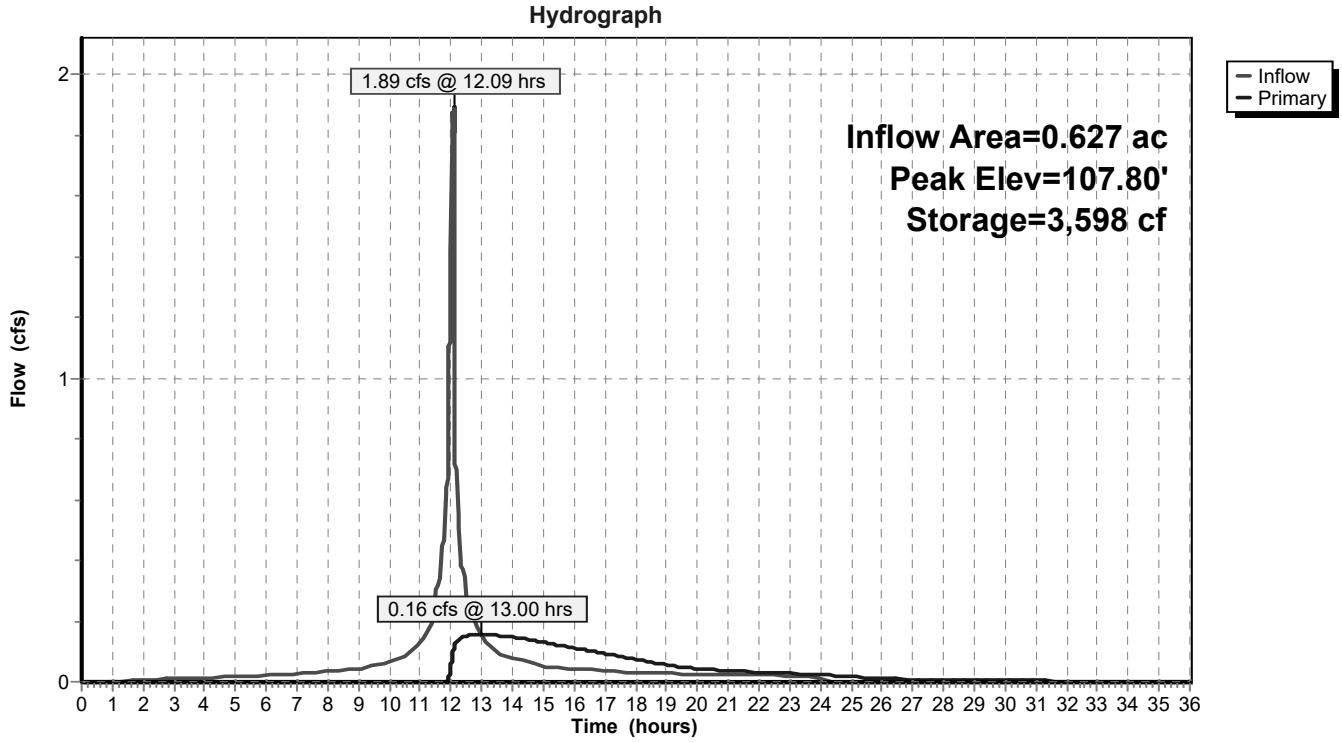
Volume	Invert	Avail.Storage	Storage Description
#1	106.50'	6,813 cf	**Stone Bed (Prismatic)**Listed below (Recalc) 20,237 cf Overall - 3,205 cf Embedded = 17,032 cf x 40.0% Voids
#2	107.00'	942 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 100.0' 1,283 cf Overall - 2.0" Wall Thickness = 942 cf
#3	107.00'	622 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 66.0'
#4	107.00'	377 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 40.0'
#5	107.00'	462 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 49.0'
#6	107.00'	462 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 49.0'
		9,678 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.50	5,782	0	0
110.00	5,782	20,237	20,237

Device	Routing	Invert	Outlet Devices
#1	Primary	107.24'	**3.0" Vert. Lower Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	109.75'	**12.0" Vert. Upper Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.16 cfs @ 13.00 hrs HW=107.80' (Free Discharge)
1=Lower Orifice (Orifice Controls 0.16 cfs @ 3.19 fps)
2=Upper Orifice (Controls 0.00 cfs)

Pond 11P: Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]



Summary for Pond 12P: Infiltration Basin 1

Inflow Area = 2.580 ac, 31.52% Impervious, Inflow Depth > 1.03" for 2-Year Current TLS, Mercer event
Inflow = 1.57 cfs @ 12.12 hrs, Volume= 0.222 af
Outflow = 0.45 cfs @ 12.86 hrs, Volume= 0.205 af, Atten= 71%, Lag= 44.1 min
Primary = 0.45 cfs @ 12.86 hrs, Volume= 0.205 af
Routed to Reach 19R : Reach to On Stream Pond

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 103.54' @ 12.86 hrs Surf.Area= 5,974 sf Storage= 2,445 cf

Plug-Flow detention time= 148.2 min calculated for 0.205 af (92% of inflow)
Center-of-Mass det. time= 100.4 min (1,020.5 - 920.1)

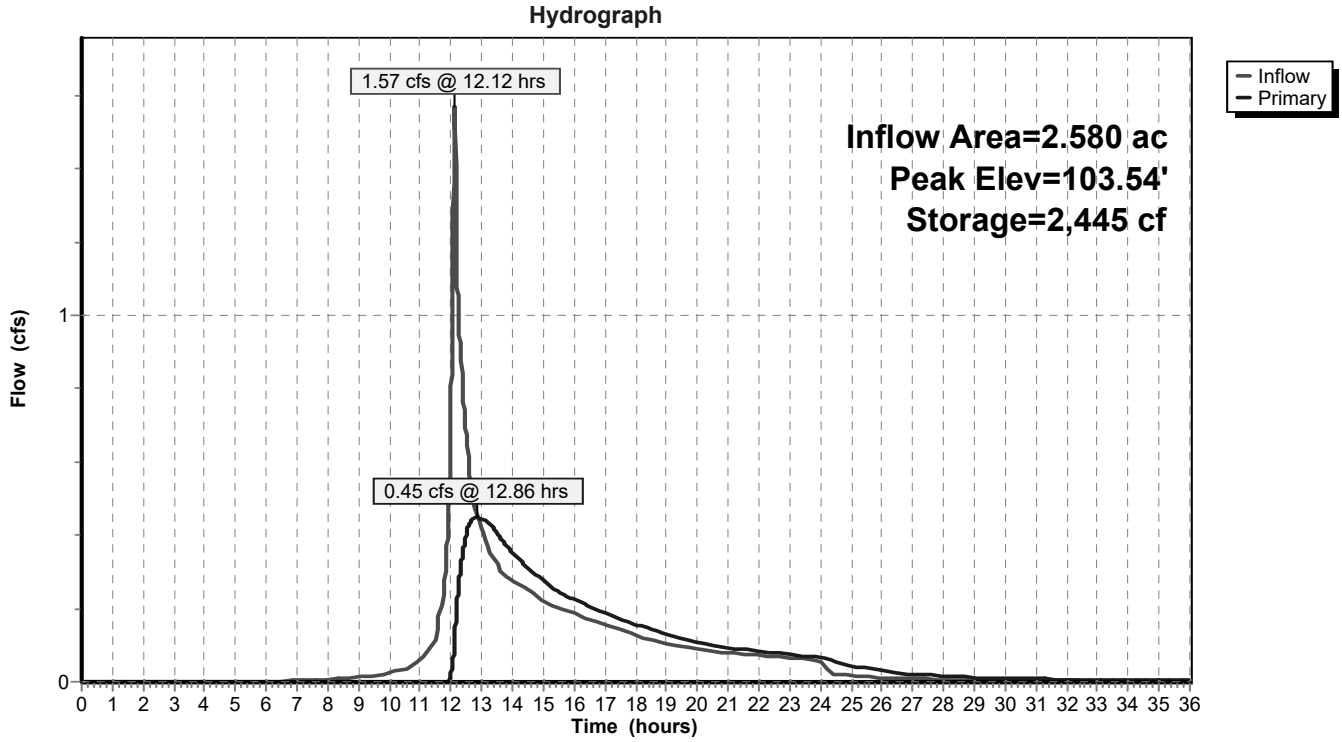
Volume	Invert	Avail.Storage	Storage Description
#1	103.10'	17,202 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.10	5,155	0	0
104.00	6,832	5,394	5,394
105.00	8,725	7,779	13,173
105.43	10,016	4,029	17,202

Device	Routing	Invert	Outlet Devices
#1	Primary	103.24'	**0.9' long Rectangular Weir** 2 End Contraction(s)
#2	Primary	104.75'	**40.0' long + 8.0 '/' SideZ x 10.0' breadth Emergency Spillway**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.45 cfs @ 12.86 hrs HW=103.54' (Free Discharge)
1=Rectangular Weir (Weir Controls 0.45 cfs @ 1.79 fps)
2=Emergency Spillway (Controls 0.00 cfs)

Pond 12P: Infiltration Basin 1



Summary for Pond 14P: Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

Inflow Area = 1.266 ac, 68.06% Impervious, Inflow Depth = 2.29" for 2-Year Current TLS, Mercer event
Inflow = 3.44 cfs @ 12.10 hrs, Volume= 0.241 af
Outflow = 0.14 cfs @ 14.20 hrs, Volume= 0.161 af, Atten= 96%, Lag= 126.1 min
Primary = 0.14 cfs @ 14.20 hrs, Volume= 0.161 af
Routed to Reach 19R : Reach to On Stream Pond

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 98.13' @ 14.20 hrs Surf.Area= 8,359 sf Storage= 7,293 cf

Plug-Flow detention time= 549.2 min calculated for 0.161 af (67% of inflow)
Center-of-Mass det. time= 443.4 min (1,207.5 - 764.1)

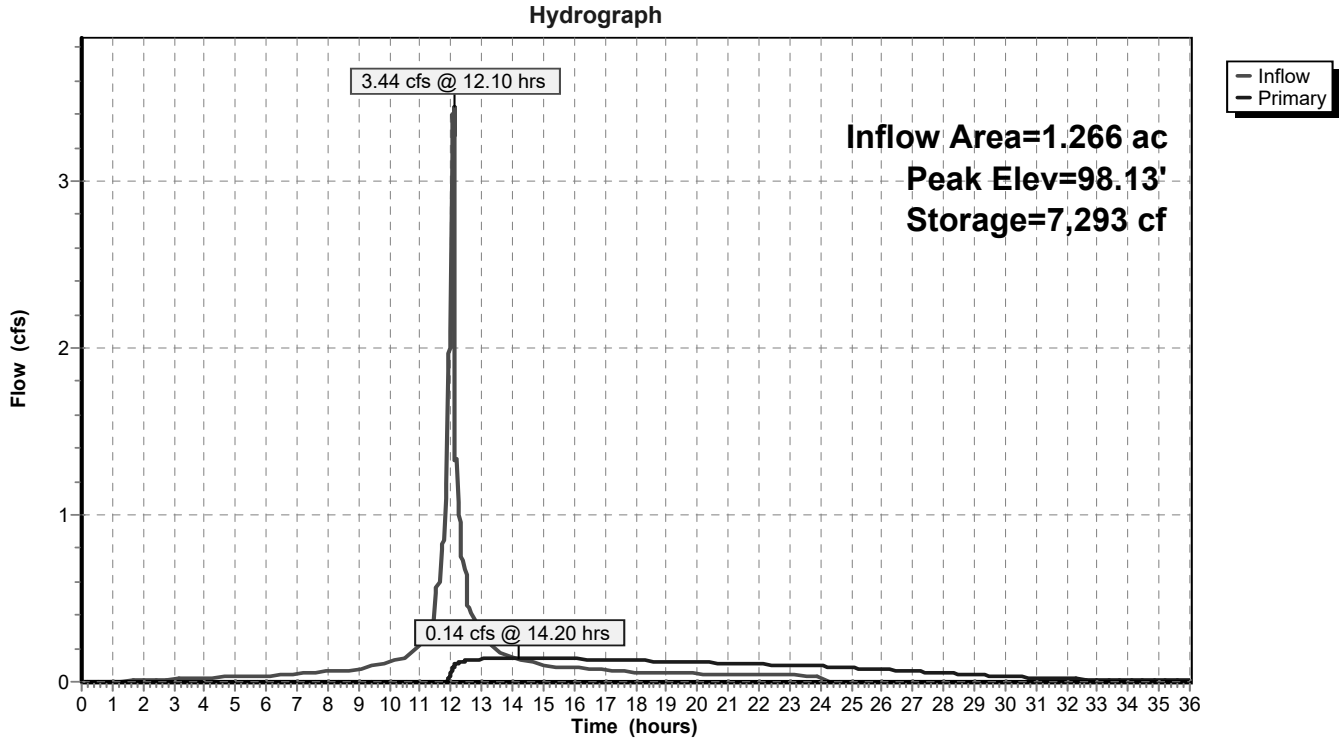
Volume	Invert	Avail.Storage	Storage Description
#1	96.30'	9,272 cf	**Lower Section Stone Bed-Perforated Pipes (Prismatic)** Listed below (Reca 33,436 cf Overall - 10,257 cf Embedded = 23,179 cf x 40.0% Voids
#2	97.05'	2,916 cf	**30.0" Round Perforated Pipes** x 6 Inside #1 L= 99.0' 4,199 cf Overall - 3.0" Wall Thickness = 2,916 cf
#3	97.05'	1,149 cf	**30.0" Round Perforated Pipes** x 3 Inside #1 L= 78.0' 1,654 cf Overall - 3.0" Wall Thickness = 1,149 cf
#4	97.05'	928 cf	**30.0" Round Perforated Pipes** x 3 Inside #1 L= 63.0' 1,336 cf Overall - 3.0" Wall Thickness = 928 cf
#5	97.05'	2,130 cf	**30.0" Round Perforated Pipes** Inside #1 L= 434.0' 3,068 cf Overall - 3.0" Wall Thickness = 2,130 cf
		16,394 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
96.30	8,359	0	0
100.30	8,359	33,436	33,436

Device	Routing	Invert	Outlet Devices
#1	Primary	97.29'	**2.5" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	99.30'	**1.1' long Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.14 cfs @ 14.20 hrs HW=98.13' (Free Discharge)
1=Orifice (Orifice Controls 0.14 cfs @ 4.12 fps)
2=Rectangular Weir (Controls 0.00 cfs)

Pond 14P: Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

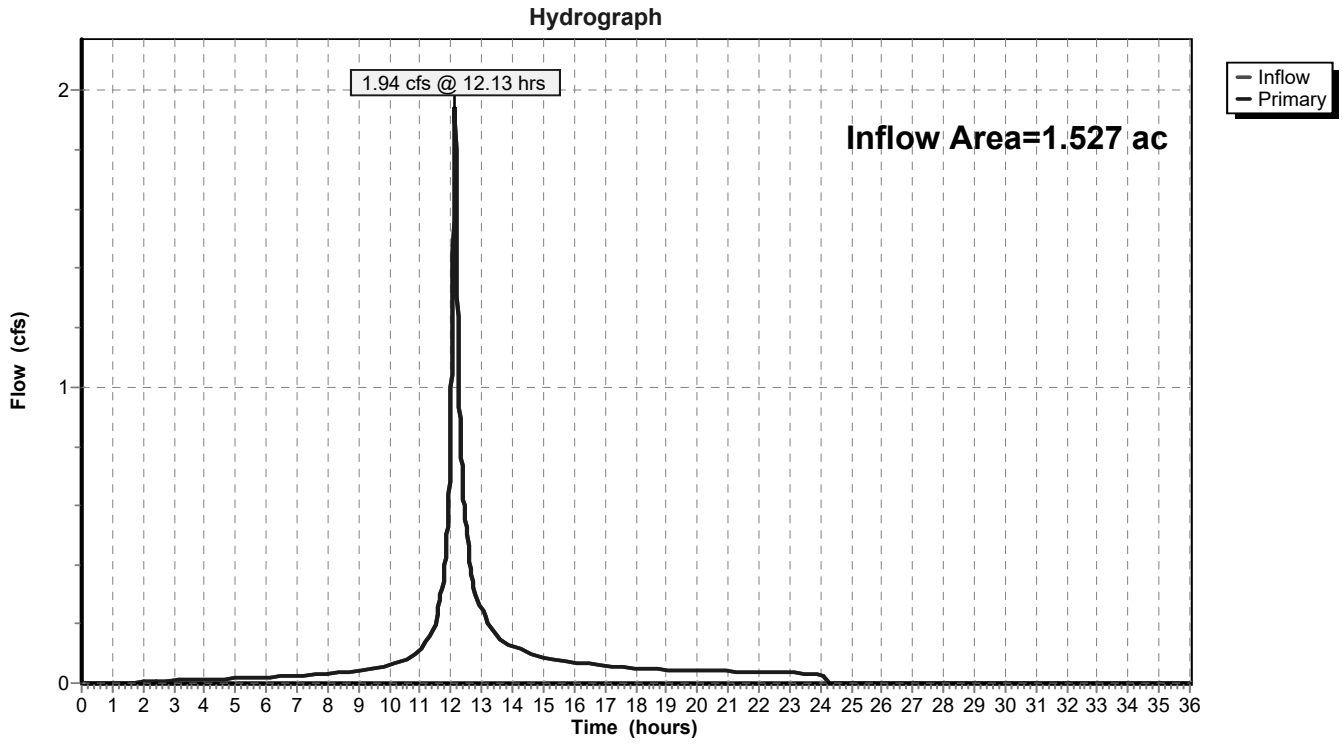


Summary for Link 13L: DA-13 COM HYD [MTD 1A&1B]

Inflow Area = 1.527 ac, 30.11% Impervious, Inflow Depth = 1.29" for 2-Year Current TLS, Mercer event
Inflow = 1.94 cfs @ 12.13 hrs, Volume= 0.164 af
Primary = 1.94 cfs @ 12.13 hrs, Volume= 0.164 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 19R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 13L: DA-13 COM HYD [MTD 1A&1B]

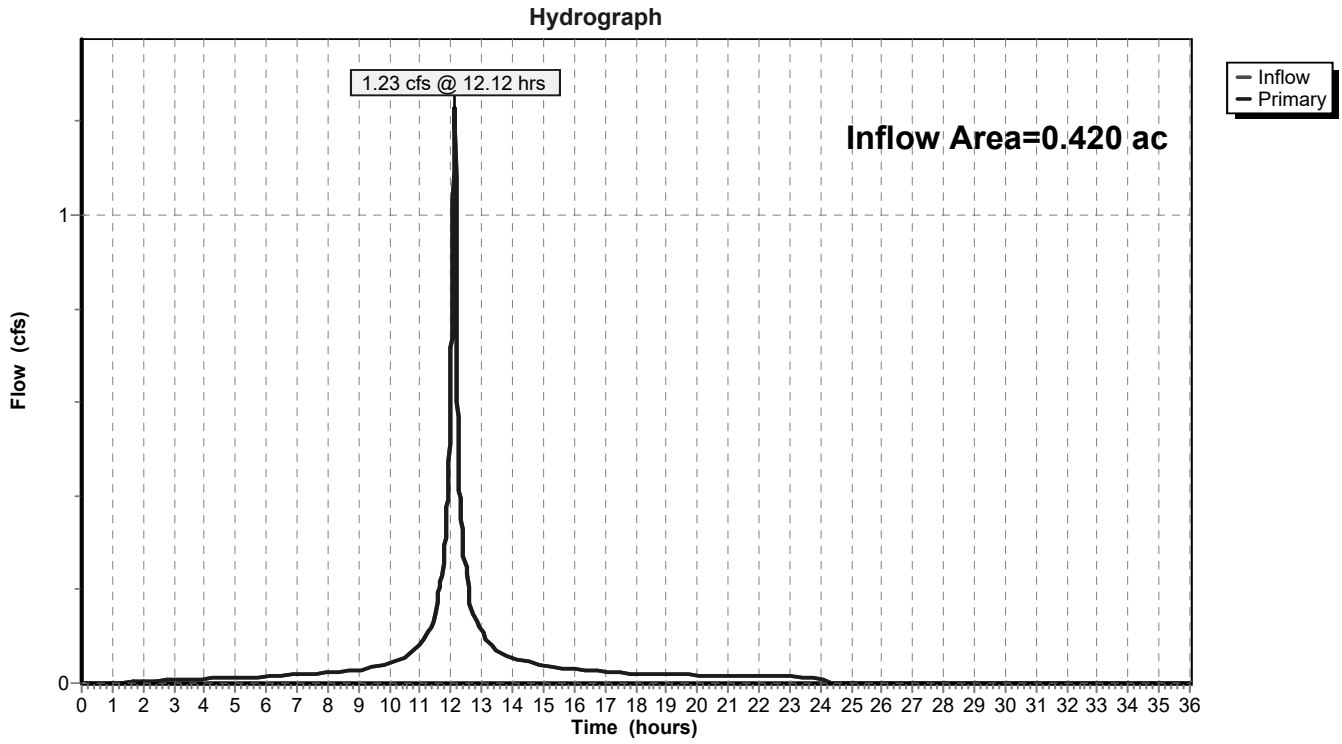


Summary for Link 15L: DA-15 COM HYD

Inflow Area = 0.420 ac, 78.24% Impervious, Inflow Depth = 2.54" for 2-Year Current TLS, Mercer event
Inflow = 1.23 cfs @ 12.12 hrs, Volume= 0.089 af
Primary = 1.23 cfs @ 12.12 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 19R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 15L: DA-15 COM HYD

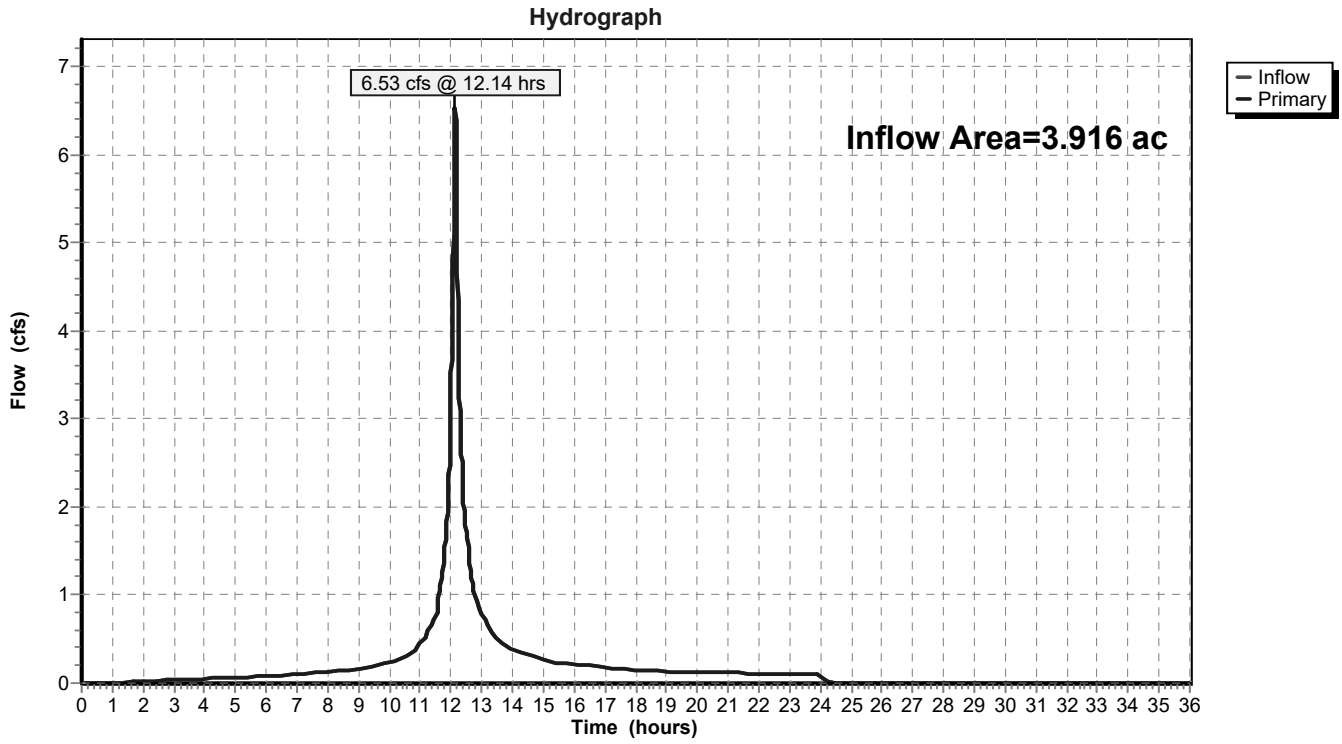


Summary for Link 16L: DA-16 COM HYD

Inflow Area = 3.916 ac, 46.62% Impervious, Inflow Depth = 1.70" for 2-Year Current TLS, Mercer event
Inflow = 6.53 cfs @ 12.14 hrs, Volume= 0.554 af
Primary = 6.53 cfs @ 12.14 hrs, Volume= 0.554 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 19R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 16L: DA-16 COM HYD

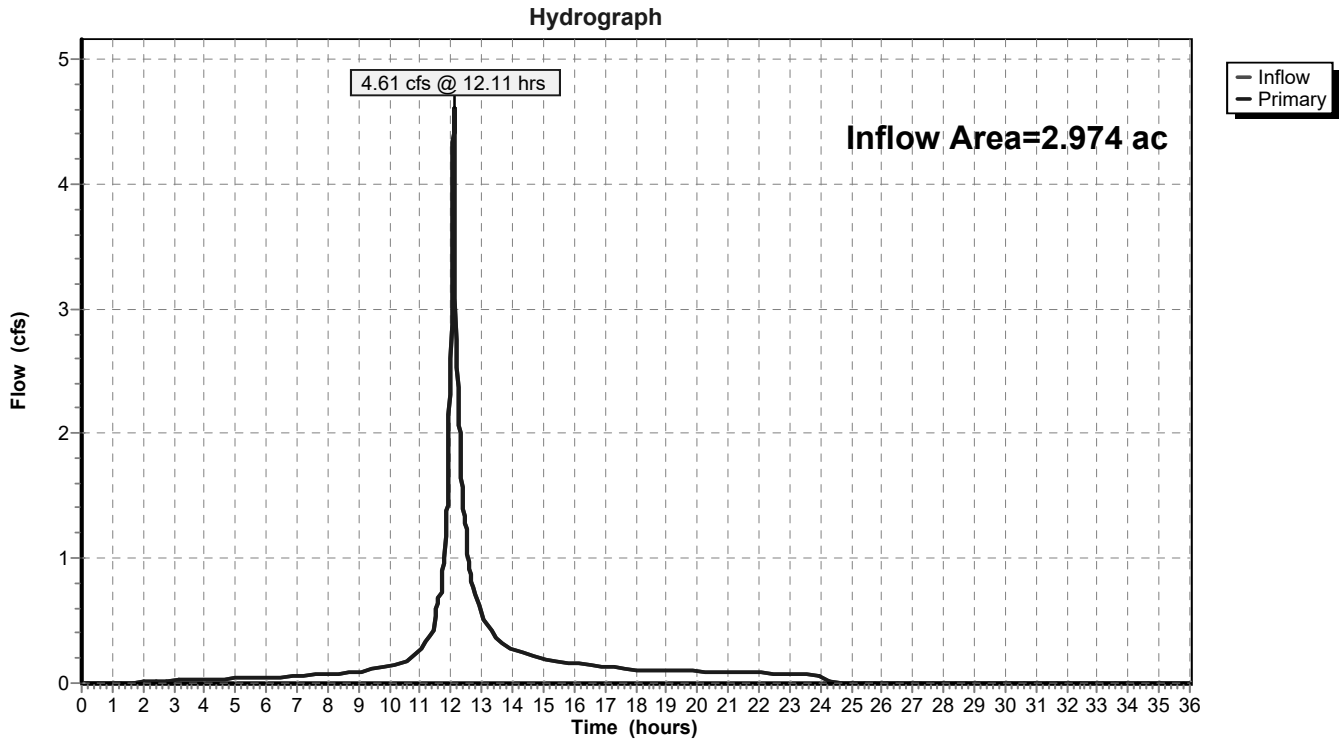


Summary for Link 17L: DA-17 COM HYD

Inflow Area = 2.974 ac, 34.48% Impervious, Inflow Depth = 1.51" for 2-Year Current TLS, Mercer event
Inflow = 4.61 cfs @ 12.11 hrs, Volume= 0.374 af
Primary = 4.61 cfs @ 12.11 hrs, Volume= 0.374 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 19R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 17L: DA-17 COM HYD

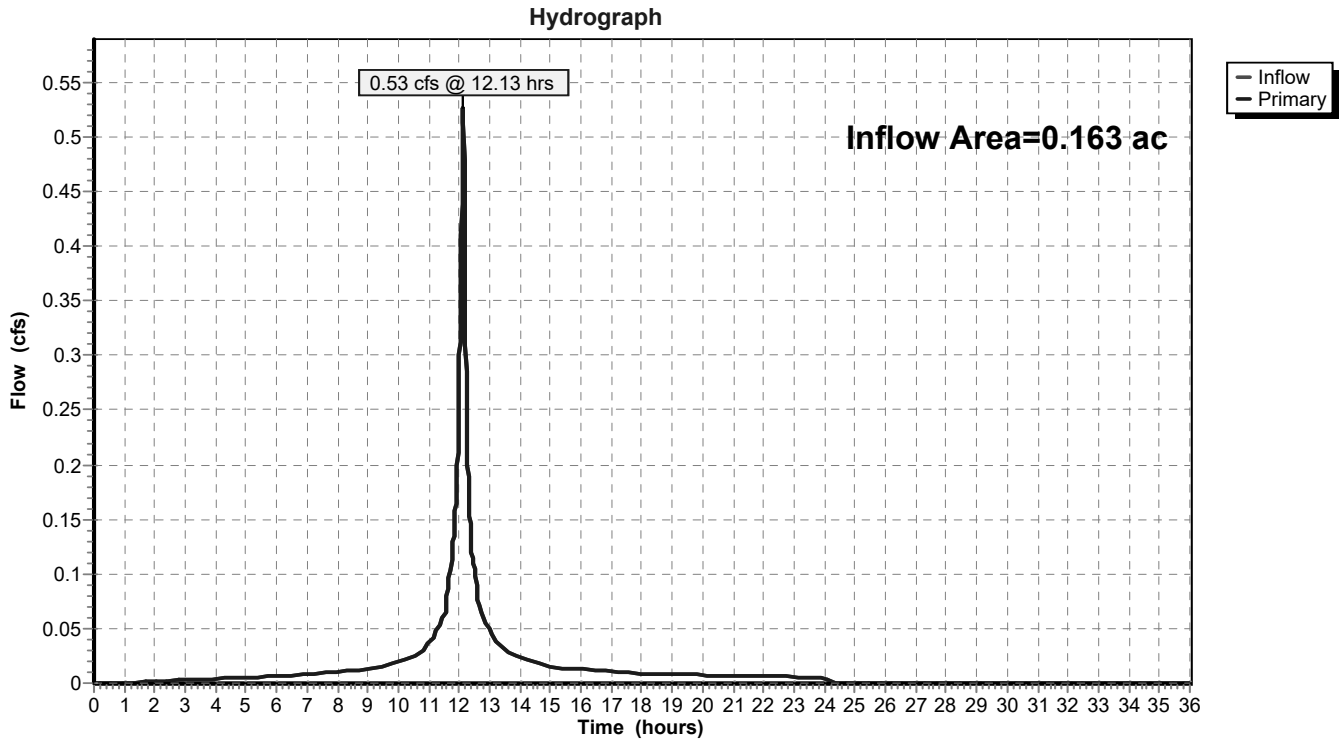


Summary for Link 18L: DA-18 COM HYD

Inflow Area = 0.163 ac, 90.73% Impervious, Inflow Depth = 2.87" for 2-Year Current TLS, Mercer event
Inflow = 0.53 cfs @ 12.13 hrs, Volume= 0.039 af
Primary = 0.53 cfs @ 12.13 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min
Routed to Link 19L : Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 18L: DA-18 COM HYD

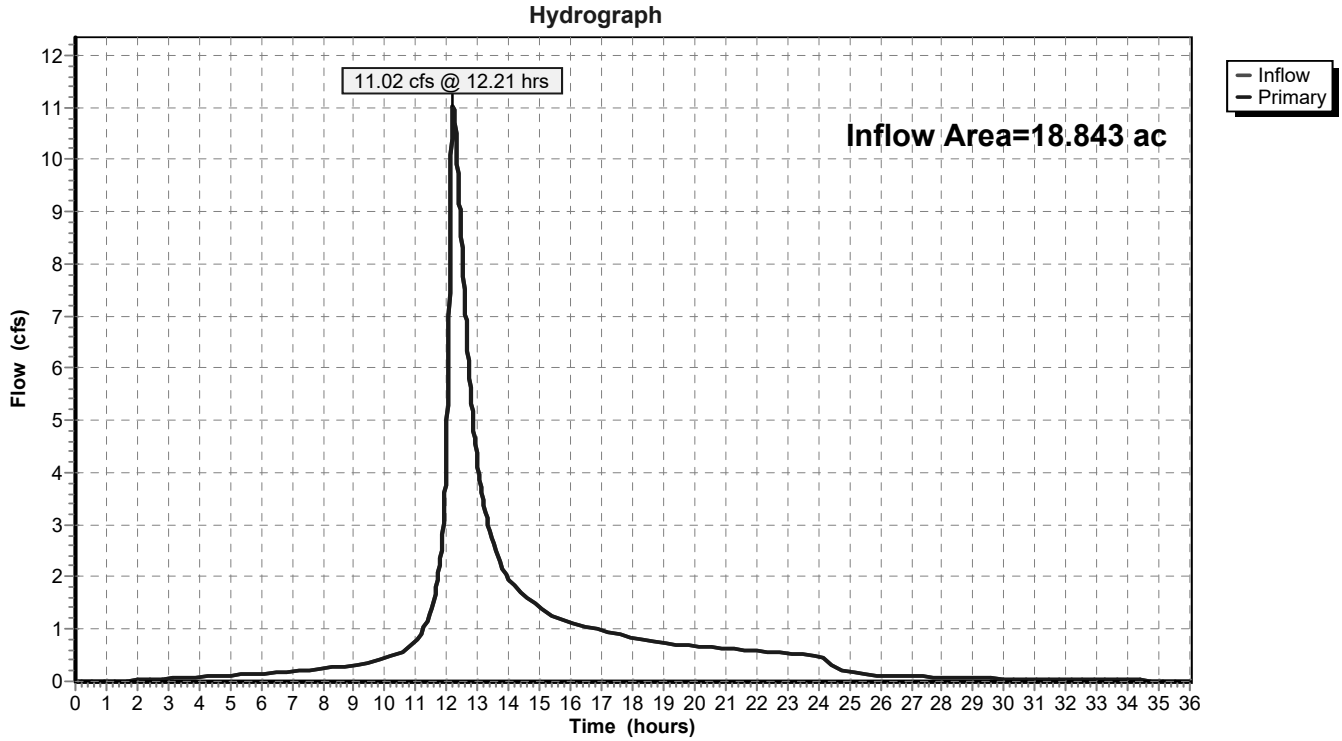


Summary for Link 19L: Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysi

Inflow Area = 18.843 ac, 29.55% Impervious, Inflow Depth > 1.24" for 2-Year Current TLS, Mercer event
Inflow = 11.02 cfs @ 12.21 hrs, Volume= 1.942 af
Primary = 11.02 cfs @ 12.21 hrs, Volume= 1.942 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 19L: Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]



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

Subcatchment 10S: DA10 Runoff Area=261,211 sf 1.76% Impervious Runoff Depth=1.79"
Flow Length=1,909' Tc=24.4 min CN=66 Runoff=7.92 cfs 0.894 af

Subcatchment 11Sa: DA-11a Runoff Area=6,399 sf 0.00% Impervious Runoff Depth=1.42"
Flow Length=71' Slope=0.0130 '/' Tc=9.5 min CN=61 Runoff=0.23 cfs 0.017 af

Subcatchment 11Sb: DA-11b Runoff Area=20,908 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=52' Slope=0.0150 '/' Tc=0.8 min CN=98 Runoff=2.86 cfs 0.194 af

Subcatchment 12Sa: DA-12a Runoff Area=65,962 sf 0.00% Impervious Runoff Depth=1.29"
Flow Length=913' Tc=13.8 min CN=59 Runoff=1.75 cfs 0.162 af

Subcatchment 12Sb: DA-12b Runoff Area=19,134 sf 75.87% Impervious Runoff Depth=3.86"
Flow Length=797' Tc=4.3 min CN=89 Runoff=2.25 cfs 0.141 af

Subcatchment 13Sa: DA-13a Runoff Area=46,483 sf 0.00% Impervious Runoff Depth=1.42"
Flow Length=1,145' Tc=10.2 min CN=61 Runoff=1.60 cfs 0.127 af

Subcatchment 13Sb: DA-13b Runoff Area=20,026 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=1,113' Tc=5.6 min CN=98 Runoff=2.53 cfs 0.186 af

Subcatchment 14Sa: DA-14a Runoff Area=17,616 sf 0.00% Impervious Runoff Depth=1.49"
Flow Length=164' Tc=9.9 min CN=62 Runoff=0.65 cfs 0.050 af

Subcatchment 14Sb: DA-14b Runoff Area=37,529 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=60' Slope=0.0150 '/' Tc=0.9 min CN=98 Runoff=5.14 cfs 0.348 af

Subcatchment 15S: DA-15a Runoff Area=3,981 sf 0.00% Impervious Runoff Depth=1.42"
Flow Length=583' Tc=10.6 min CN=61 Runoff=0.13 cfs 0.011 af

Subcatchment 15Sb: DA-15b Runoff Area=14,314 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=618' Tc=4.9 min CN=98 Runoff=1.85 cfs 0.133 af

Subcatchment 16Sa: DA-16a Runoff Area=91,062 sf 0.00% Impervious Runoff Depth=1.35"
Flow Length=1,192' Tc=14.9 min CN=60 Runoff=2.49 cfs 0.236 af

Subcatchment 16Sb: DA-16b Runoff Area=79,517 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=1,343' Tc=6.9 min CN=98 Runoff=9.63 cfs 0.738 af

Subcatchment 17Sa: DA-17a Runoff Area=84,864 sf 0.00% Impervious Runoff Depth=1.71"
Flow Length=480' Tc=11.8 min CN=65 Runoff=3.42 cfs 0.278 af

Subcatchment 17Sb: DA-17b Runoff Area=44,668 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=380' Tc=2.3 min CN=98 Runoff=6.10 cfs 0.415 af

Subcatchment 18Sa: DA-18a Runoff Area=659 sf 0.00% Impervious Runoff Depth=1.42"
Flow Length=1,668' Tc=9.9 min CN=61 Runoff=0.02 cfs 0.002 af

Subcatchment 18Sb: DA-18b Runoff Area=6,448 sf 100.00% Impervious Runoff Depth=4.85"
Flow Length=1,715' Tc=6.1 min CN=98 Runoff=0.80 cfs 0.060 af

Reach 19R: Reach to On Stream Pond Avg. Flow Depth=0.87' Max Vel=1.06 fps Inflow=28.49 cfs 3.776 af
n=0.045 L=526.0' S=0.0025 '/' Capacity=2,676.51 cfs Outflow=23.29 cfs 3.773 af

Pond 11P: Porous Asphalt 3 & Sub-Surface Peak Elev=108.43' Storage=5,694 cf Inflow=3.01 cfs 0.212 af
Outflow=0.24 cfs 0.169 af

Pond 12P: Infiltration Basin 1 Peak Elev=103.90' Storage=4,748 cf Inflow=3.52 cfs 0.472 af
Outflow=1.36 cfs 0.454 af

Pond 14P: Porous Asphalt 1[Banked] & 2; Peak Elev=99.06' Storage=12,062 cf Inflow=5.56 cfs 0.399 af
Outflow=0.21 cfs 0.305 af

Link 13L: DA-13 COM HYD [MTD 1A&1B] Inflow=3.87 cfs 0.313 af
Primary=3.87 cfs 0.313 af

Link 15L: DA-15 COM HYD Inflow=1.95 cfs 0.144 af
Primary=1.95 cfs 0.144 af

Link 16L: DA-16 COM HYD Inflow=11.30 cfs 0.974 af
Primary=11.30 cfs 0.974 af

Link 17L: DA-17 COM HYD Inflow=8.35 cfs 0.693 af
Primary=8.35 cfs 0.693 af

Link 18L: DA-18 COM HYD Inflow=0.82 cfs 0.062 af
Primary=0.82 cfs 0.062 af

Link 19L: Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Inflow=23.69 cfs 3.834 af
Primary=23.69 cfs 3.834 af

Total Runoff Area = 18.843 ac Runoff Volume = 3.993 af Average Runoff Depth = 2.54"
70.45% Pervious = 13.275 ac 29.55% Impervious = 5.568 ac

Summary for Subcatchment 10S: DA10

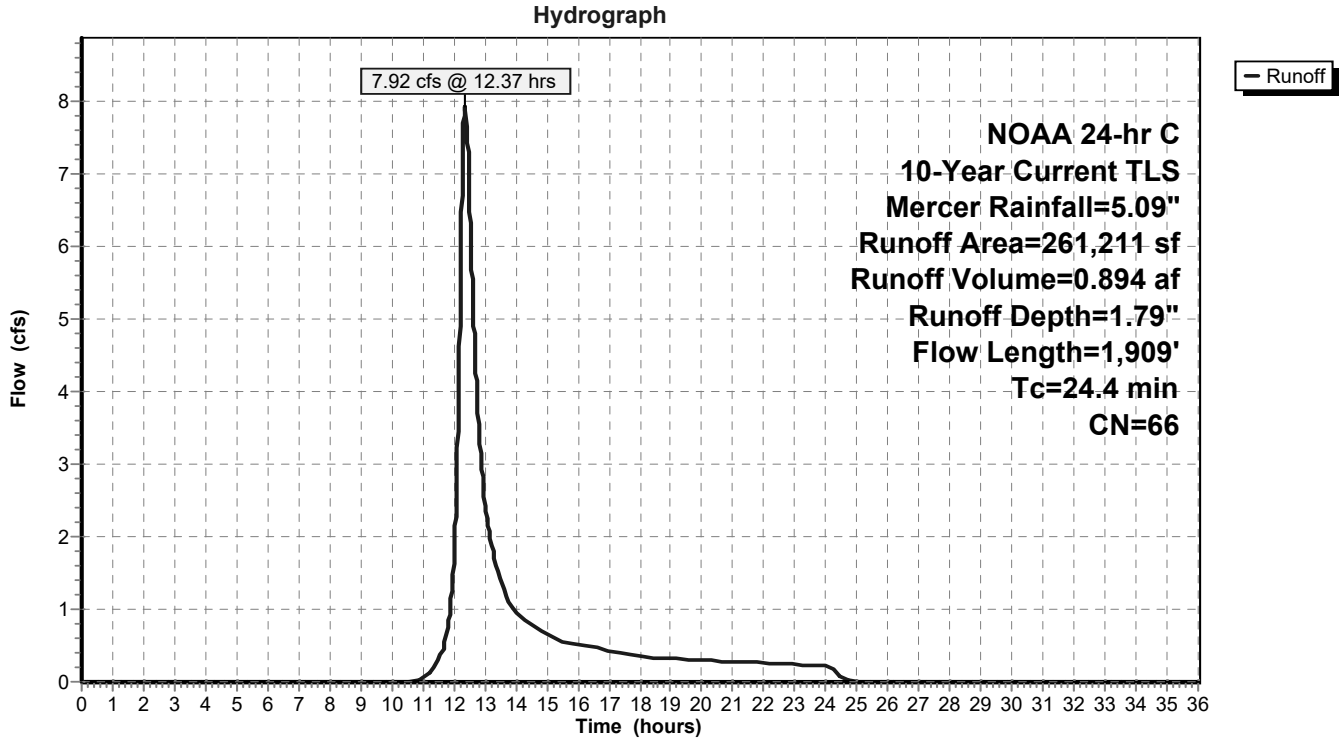
Runoff = 7.92 cfs @ 12.37 hrs, Volume= 0.894 af, Depth= 1.79"
Routed to Reach 19R : Reach to On Stream Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
	4,943	55	Woods, Good, HSG B
	80,094	70	Woods, Good, HSG C
	135,305	61	>75% Grass cover, Good, HSG B
	36,275	74	>75% Grass cover, Good, HSG C
*	4,594	98	Unconnected pavement, HSG B (Non Vehicular)
	261,211	66	Weighted Average
	256,617		98.24% Pervious Area
	4,594		1.76% Impervious Area
	4,594		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
7.3	808	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
6.6	821	0.0040	2.09	75.19	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
24.4	1,909	Total			

Subcatchment 10S: DA10



Summary for Subcatchment 11Sa: DA-11a

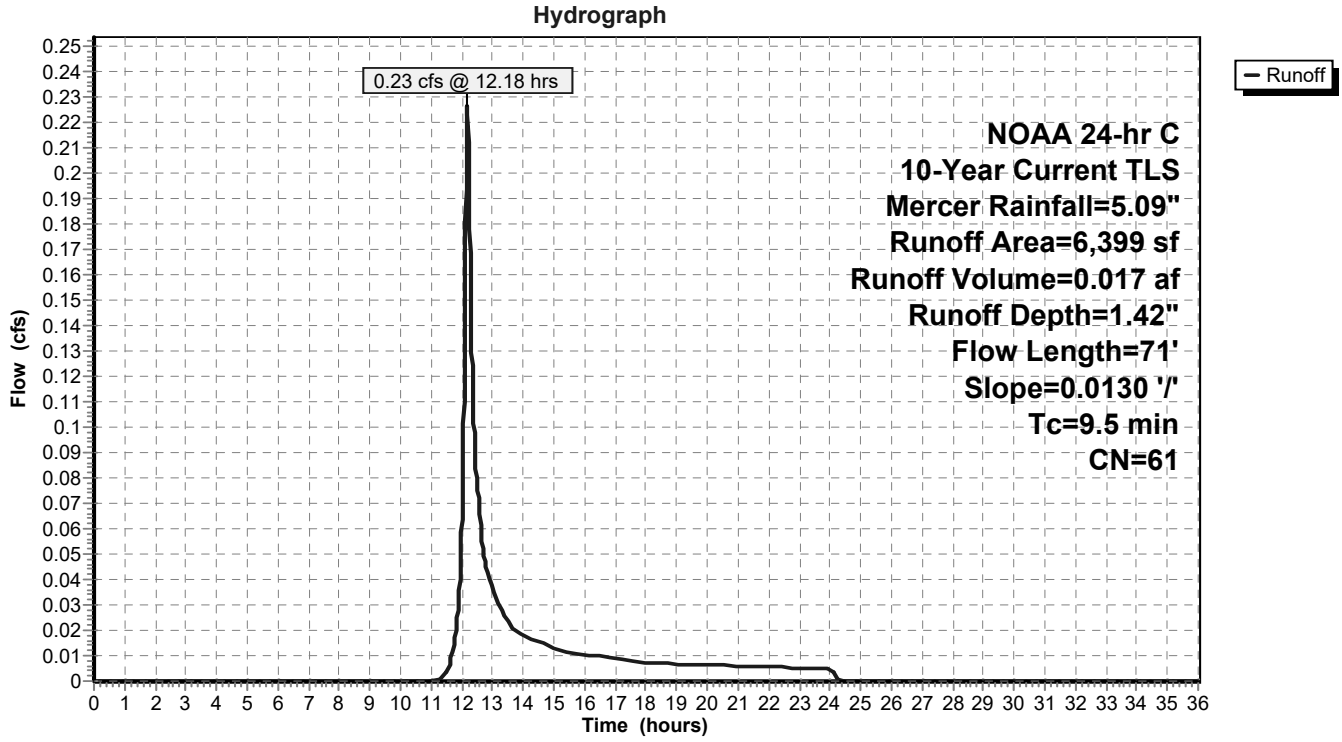
Runoff = 0.23 cfs @ 12.18 hrs, Volume= 0.017 af, Depth= 1.42"
Routed to Pond 11P : Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
6,399	61	>75% Grass cover, Good, HSG B
6,399		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
0.2	23	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.5	71	Total			

Subcatchment 11Sa: DA-11a



Summary for Subcatchment 11Sb: DA-11b

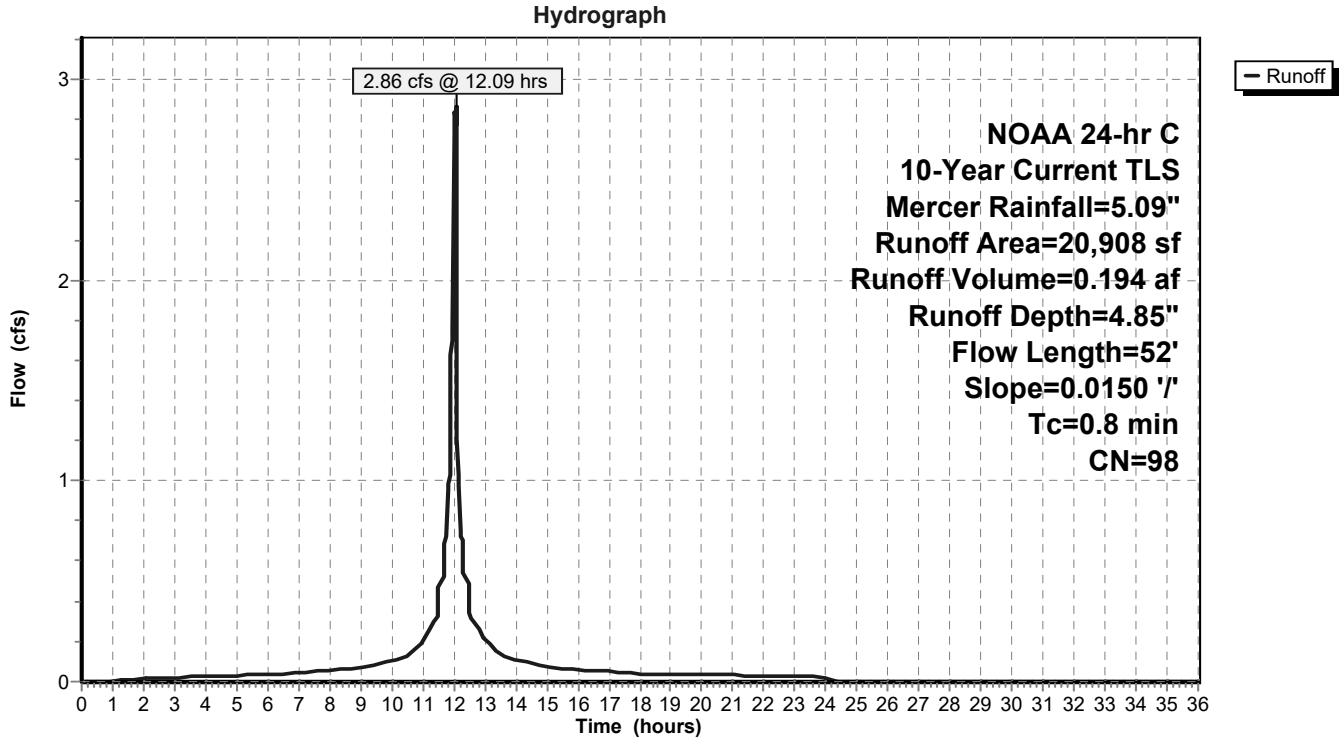
Runoff = 2.86 cfs @ 12.09 hrs, Volume= 0.194 af, Depth= 4.85"
Routed to Pond 11P : Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	20,908	98	Paved parking, HSG B (Vehicular)
	20,908		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	52	0.0150	1.09		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"

Subcatchment 11Sb: DA-11b



Summary for Subcatchment 12Sa: DA-12a

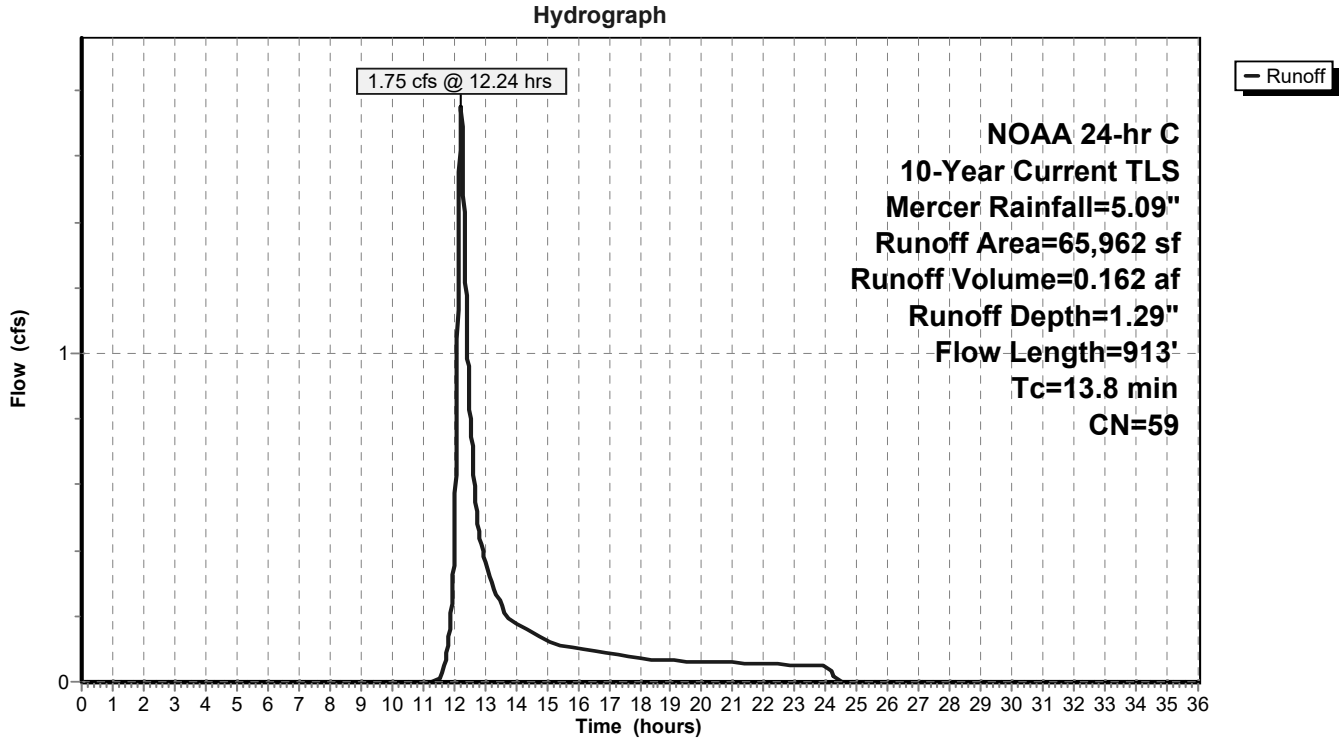
Runoff = 1.75 cfs @ 12.24 hrs, Volume= 0.162 af, Depth= 1.29"
Routed to Pond 12P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
16,889	55	Woods, Good, HSG B
49,073	61	>75% Grass cover, Good, HSG B
65,962	59	Weighted Average
65,962		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	25	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.31" Using McCuen-Spiess flow length
1.3	141	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	143	0.0080	1.82		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	159	0.0050	4.03	4.95	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	445	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
13.8	913	Total			

Subcatchment 12Sa: DA-12a



Summary for Subcatchment 12Sb: DA-12b

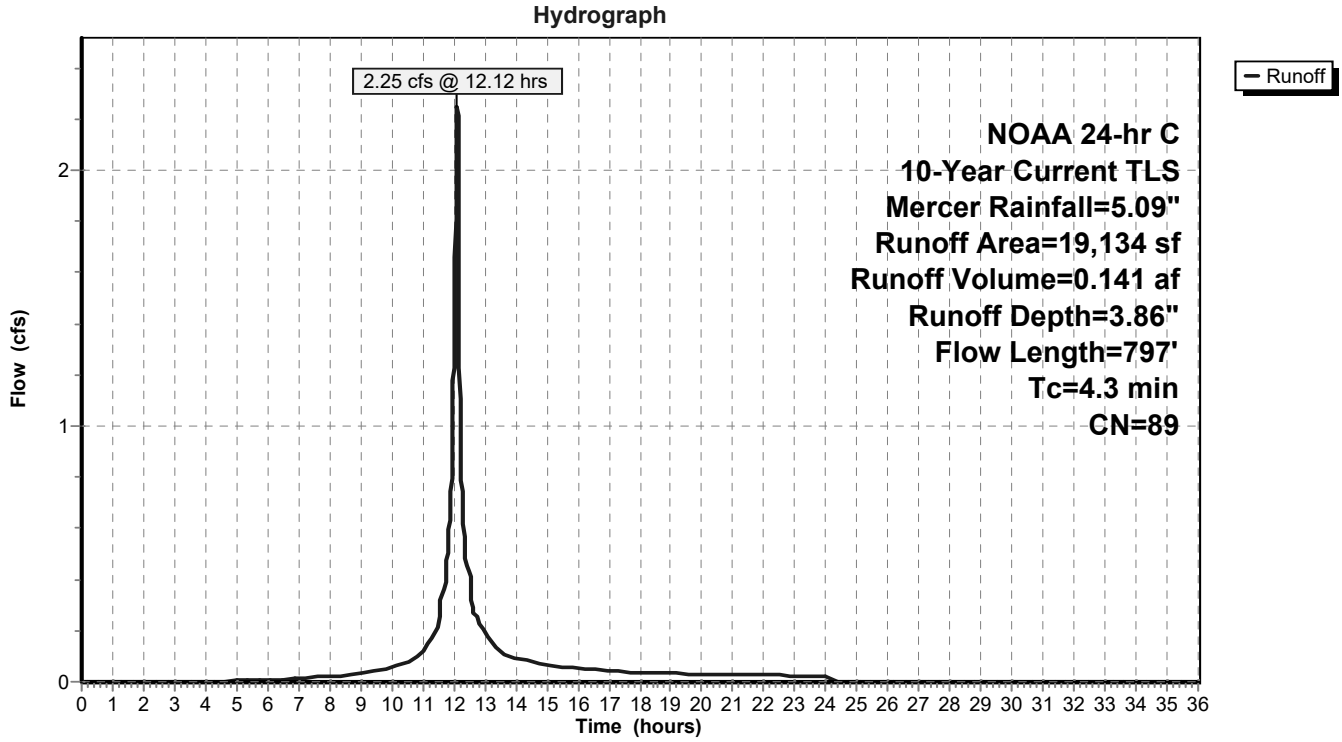
Runoff = 2.25 cfs @ 12.12 hrs, Volume= 0.141 af, Depth= 3.86"
Routed to Pond 12P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	14,517	98	Paved parking, HSG B (Vehicular)
*	4,617	61	Sidewalks, HSG B (Non Vehicular)
	19,134	89	Weighted Average
	4,617		24.13% Pervious Area
	14,517		75.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.15		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.0	104	0.0070	1.70		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	159	0.0050	4.03	4.95	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	445	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
4.3	797	Total			

Subcatchment 12Sb: DA-12b



Summary for Subcatchment 13Sa: DA-13a

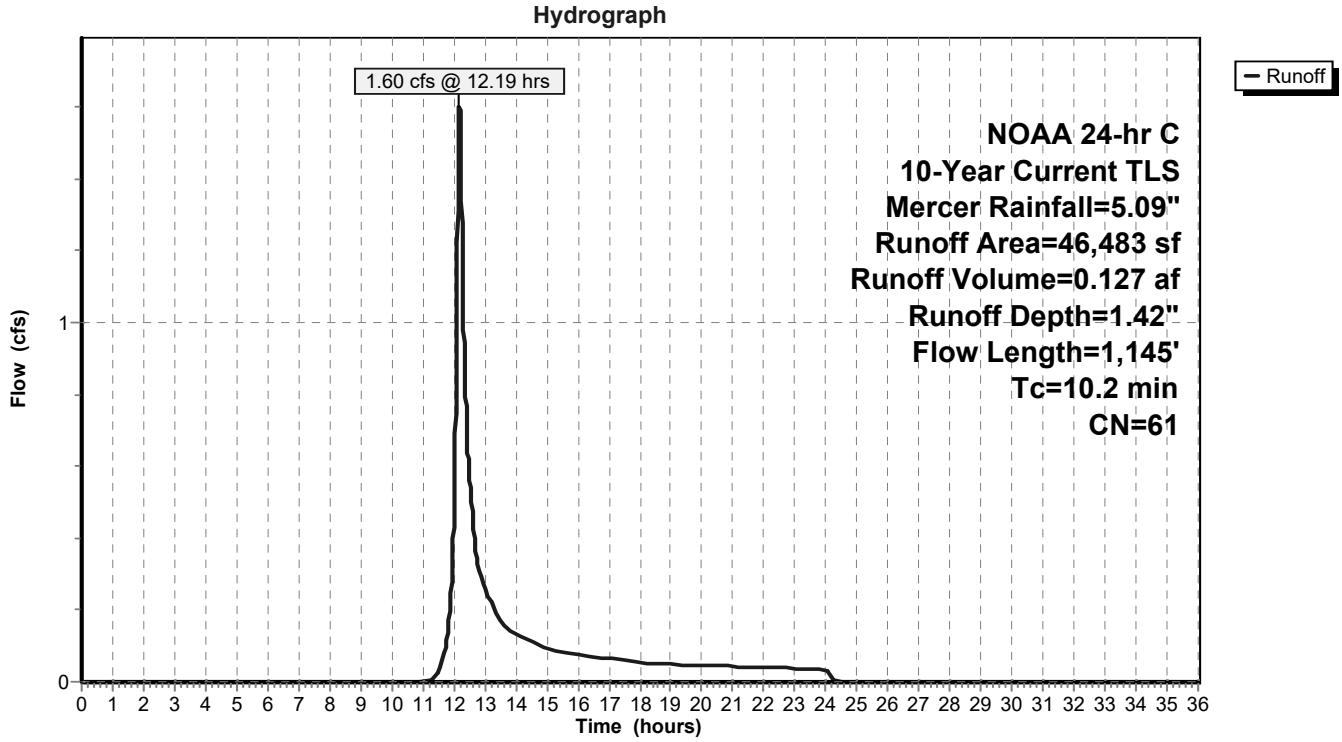
Runoff = 1.60 cfs @ 12.19 hrs, Volume= 0.127 af, Depth= 1.42"
Routed to Link 13L : DA-13 COM HYD [MTD 1A&1B]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
1,164	55	Woods, Good, HSG B
45,319	61	>75% Grass cover, Good, HSG B
46,483	61	Weighted Average
46,483		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	35	0.0310	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31"
0.4	69	0.0220	3.01		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.8	314	0.0200	2.89	11.55	**Channel Flow,** Area= 4.0 sf Perim= 12.0' r= 0.33' n= 0.035
0.2	62	0.0100	5.70	7.00	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	424	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
10.2	1,145	Total			

Subcatchment 13Sa: DA-13a



Summary for Subcatchment 13Sb: DA-13b

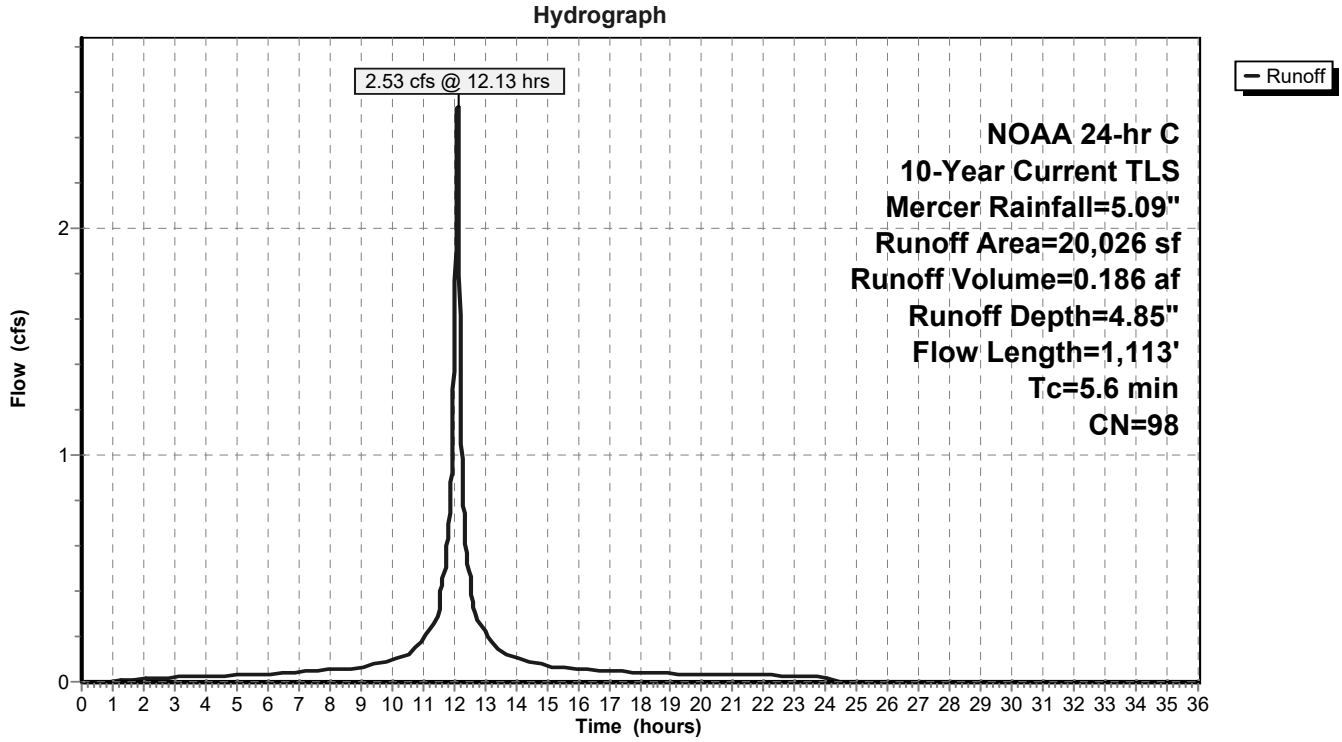
Runoff = 2.53 cfs @ 12.13 hrs, Volume= 0.186 af, Depth= 4.85"
Routed to Link 13L : DA-13 COM HYD [MTD 1A&1B]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
	15,772	98	Paved roads w/curbs & sewers, HSG B
*	4,254	98	Sidewalks, HSG B (Non Vehicular)
	20,026	98	Weighted Average
	20,026		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	69	0.0220	1.35		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.8	314	0.0200	2.89	11.55	**Channel Flow,** Area= 4.0 sf Perim= 12.0' r= 0.33' n= 0.035
0.2	65	0.0100	5.70	7.00	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	424	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
5.6	1,113	Total			

Subcatchment 13Sb: DA-13b



Summary for Subcatchment 14Sa: DA-14a

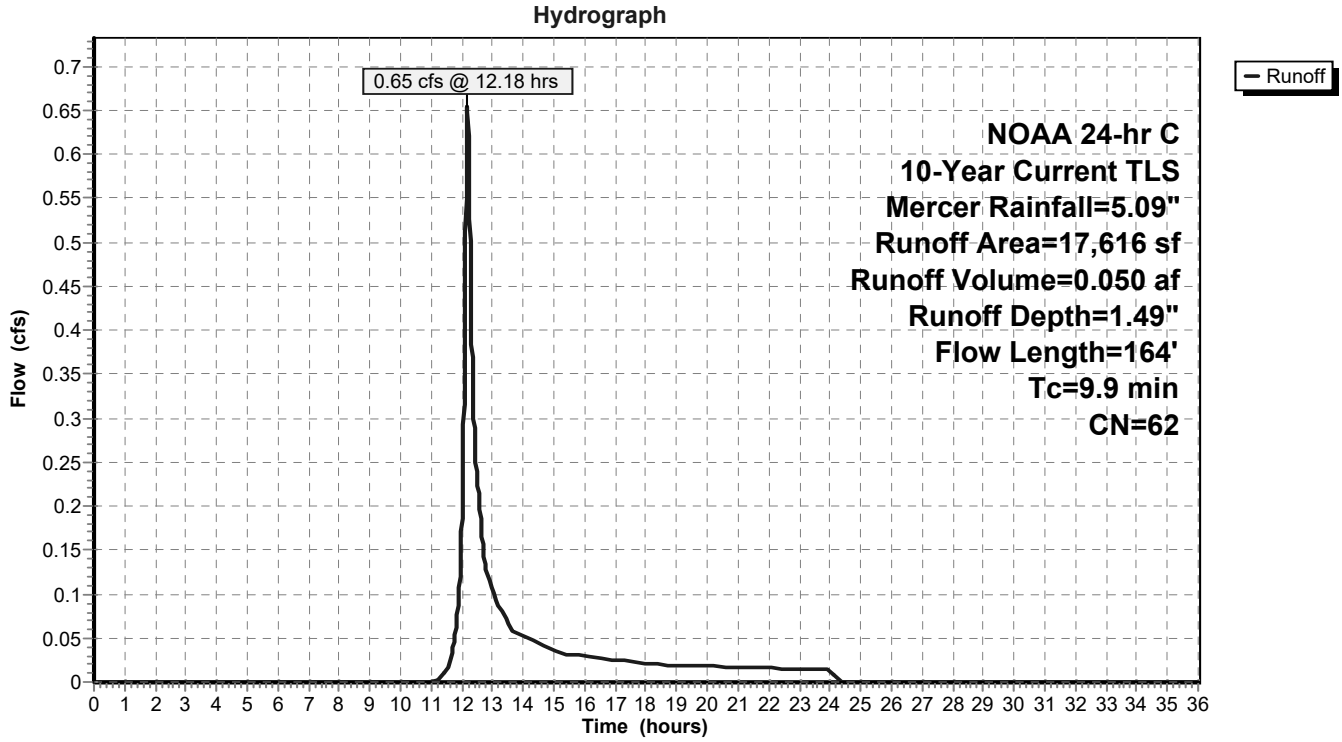
Runoff = 0.65 cfs @ 12.18 hrs, Volume= 0.050 af, Depth= 1.49"
Routed to Pond 14P : Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
16,171	61	>75% Grass cover, Good, HSG B
1,445	74	>75% Grass cover, Good, HSG C
17,616	62	Weighted Average
17,616		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	46	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
0.5	50	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	68	0.0100	4.91	3.86	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
9.9	164	Total			

Subcatchment 14Sa: DA-14a



Summary for Subcatchment 14Sb: DA-14b

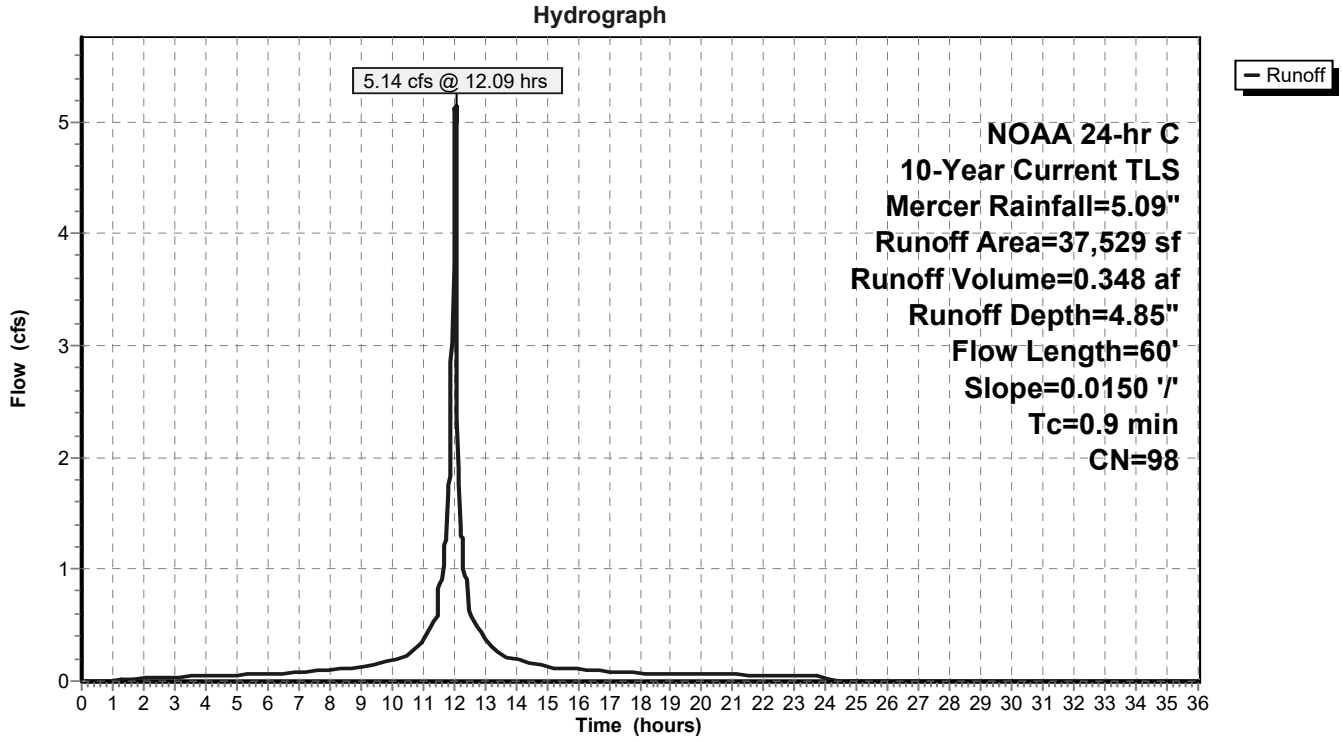
Runoff = 5.14 cfs @ 12.09 hrs, Volume= 0.348 af, Depth= 4.85"
Routed to Pond 14P : Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	34,989	98	Paved parking, HSG B (Vehicular)
*	2,540	98	Paved parking, HSG C (Vehicular)
	37,529	98	Weighted Average
	37,529		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	60	0.0150	1.13		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"

Subcatchment 14Sb: DA-14b



Summary for Subcatchment 15S: DA-15a

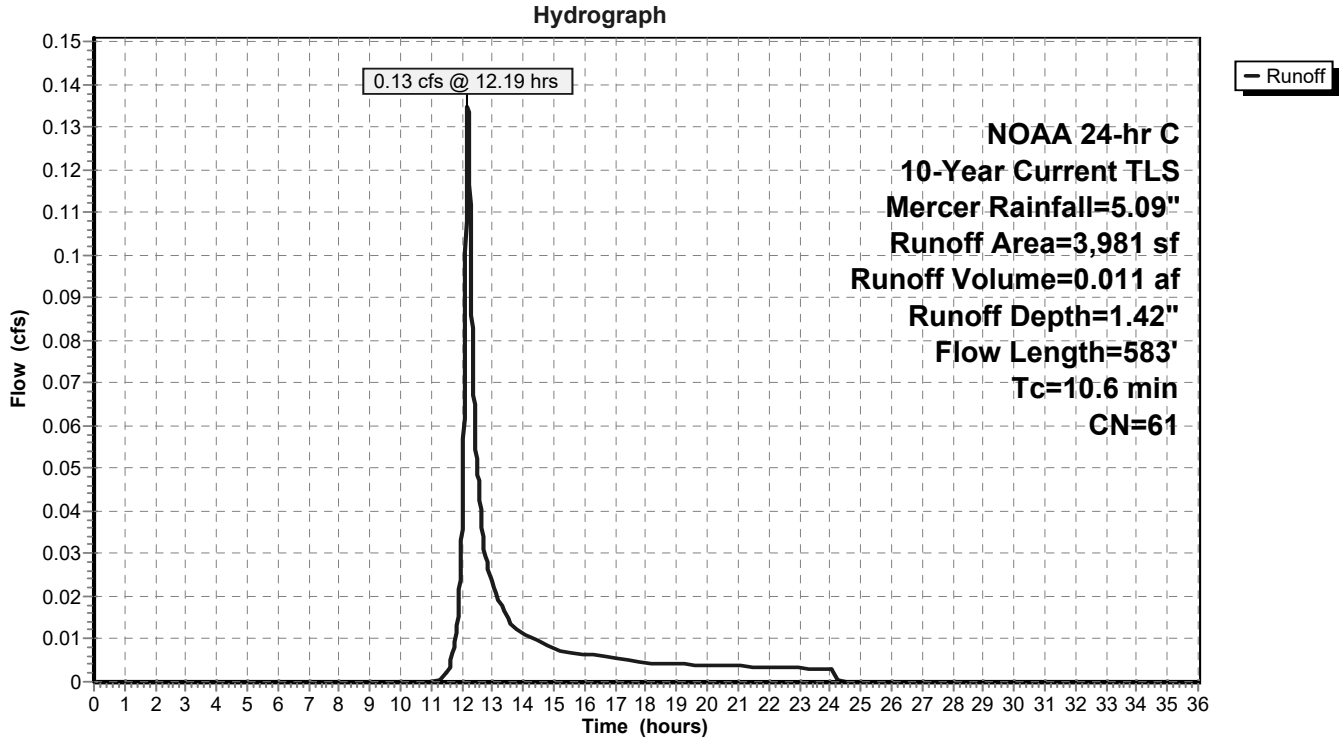
Runoff = 0.13 cfs @ 12.19 hrs, Volume= 0.011 af, Depth= 1.42"
Routed to Link 15L : DA-15 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
3,981	61	>75% Grass cover, Good, HSG B
3,981		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	24	0.0150	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31"
1.9	203	0.0080	1.82		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	39	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.3	76	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
2.7	200	0.0036	1.22	7.35	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
10.6	583	Total			

Subcatchment 15S: DA-15a



Summary for Subcatchment 15Sb: DA-15b

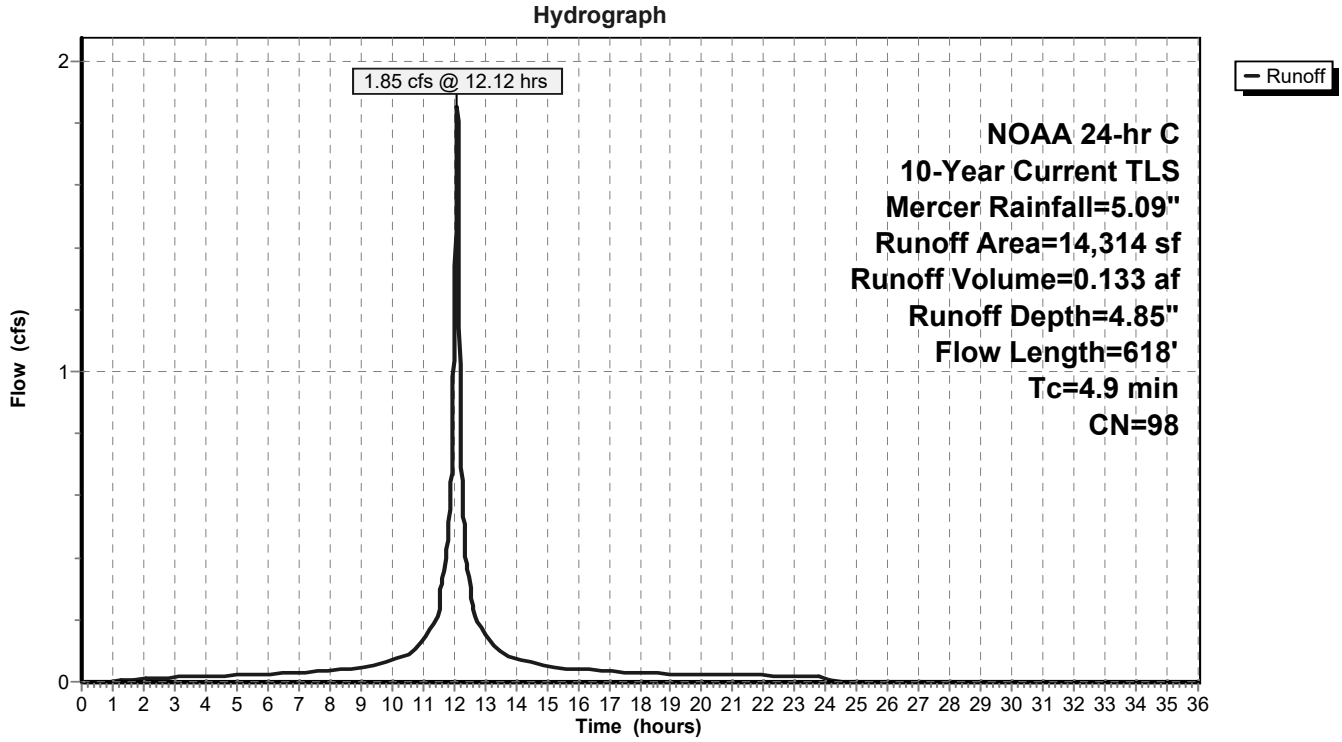
Runoff = 1.85 cfs @ 12.12 hrs, Volume= 0.133 af, Depth= 4.85"
Routed to Link 15L : DA-15 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	13,074	98	Paved parking, HSG B (Vehicular)
*	1,240	98	Sidewalks, HSG B (Non Vehicular)
	14,314	98	Weighted Average
	14,314		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	59	0.0090	0.91		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.9	203	0.0080	1.82		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	39	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.3	76	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
4.9	618	Total			

Subcatchment 15Sb: DA-15b



Summary for Subcatchment 16Sa: DA-16a

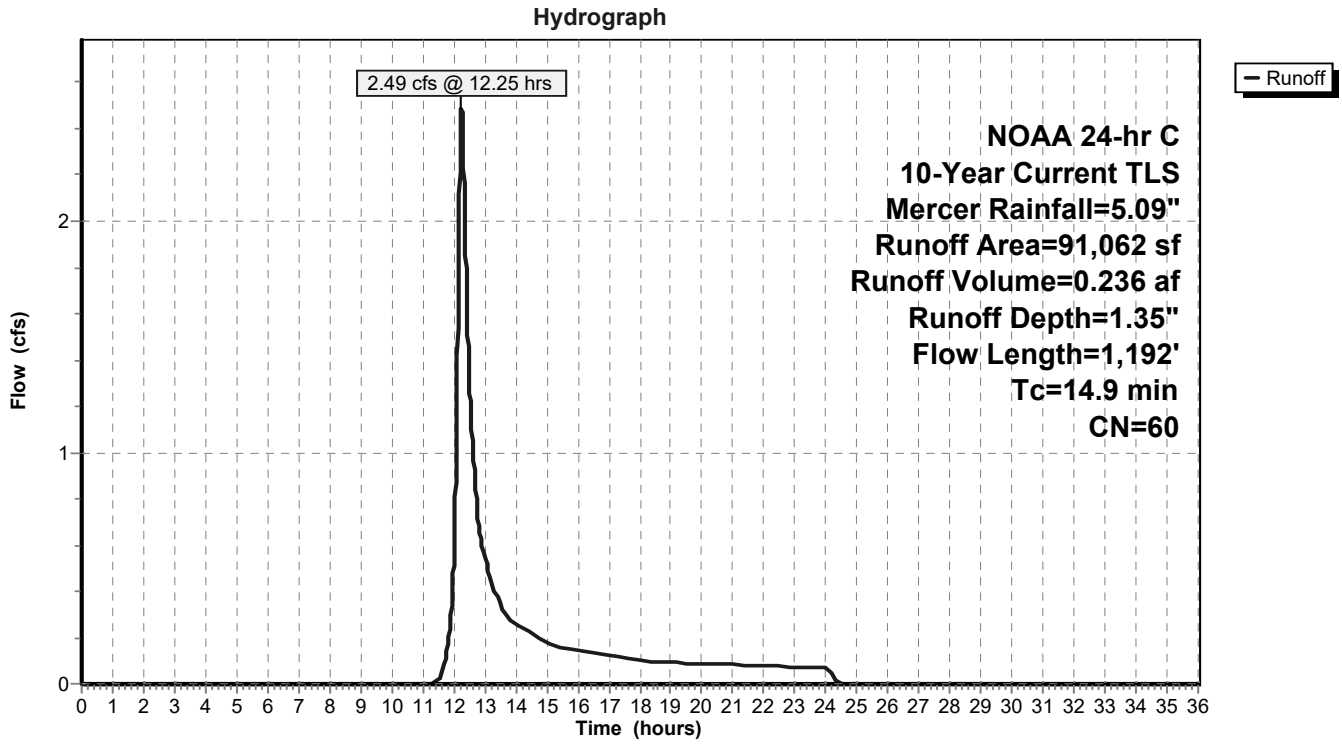
Runoff = 2.49 cfs @ 12.25 hrs, Volume= 0.236 af, Depth= 1.35"
Routed to Link 16L : DA-16 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
15,718	55	Woods, Good, HSG B
75,147	61	>75% Grass cover, Good, HSG B
197	80	>75% Grass cover, Good, HSG D
91,062	60	Weighted Average
91,062		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
0.3	29	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	340	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,192	Total			

Subcatchment 16Sa: DA-16a



Summary for Subcatchment 16Sb: DA-16b

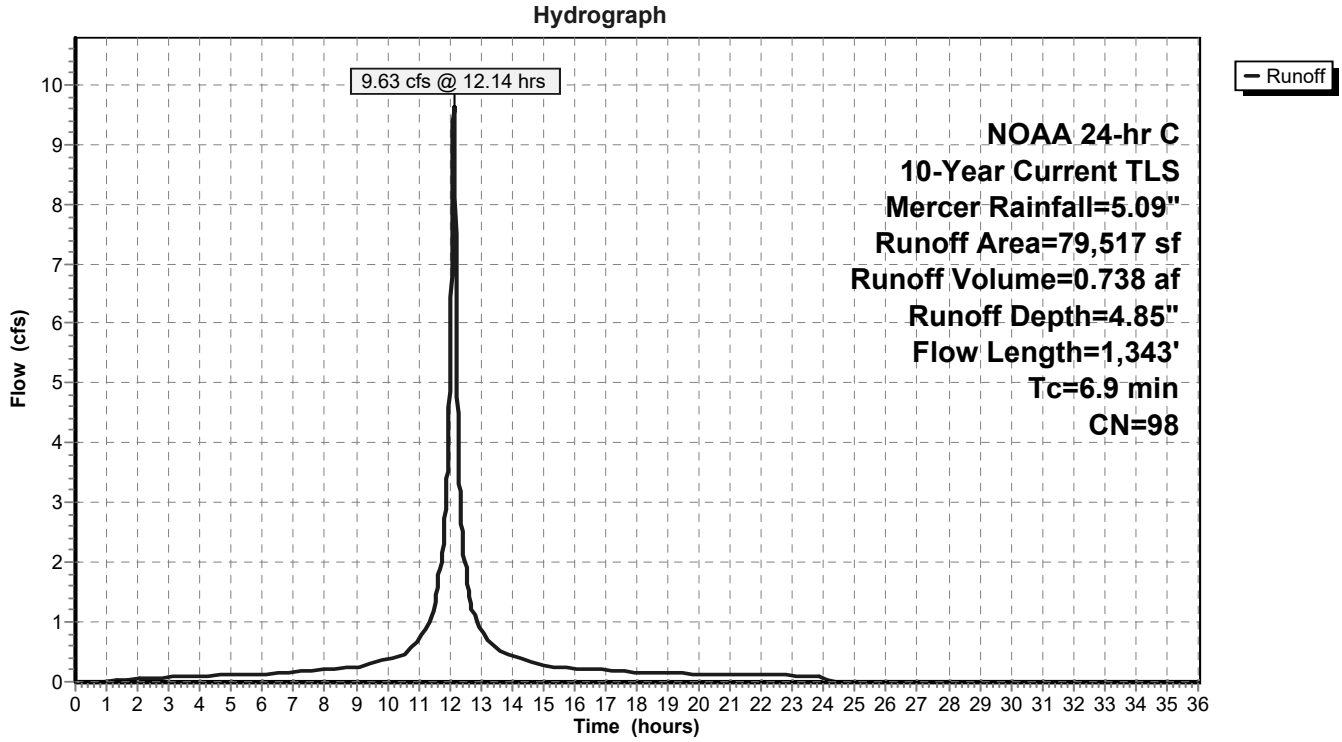
Runoff = 9.63 cfs @ 12.14 hrs, Volume= 0.738 af, Depth= 4.85"
Routed to Link 16L : DA-16 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	13,840	98	Paved parking, HSG B (Vehicular)
*	63,000	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	2,677	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	79,517	98	Weighted Average
	79,517		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.84		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	340	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
6.9	1,343	Total			

Subcatchment 16Sb: DA-16b



Summary for Subcatchment 17Sa: DA-17a

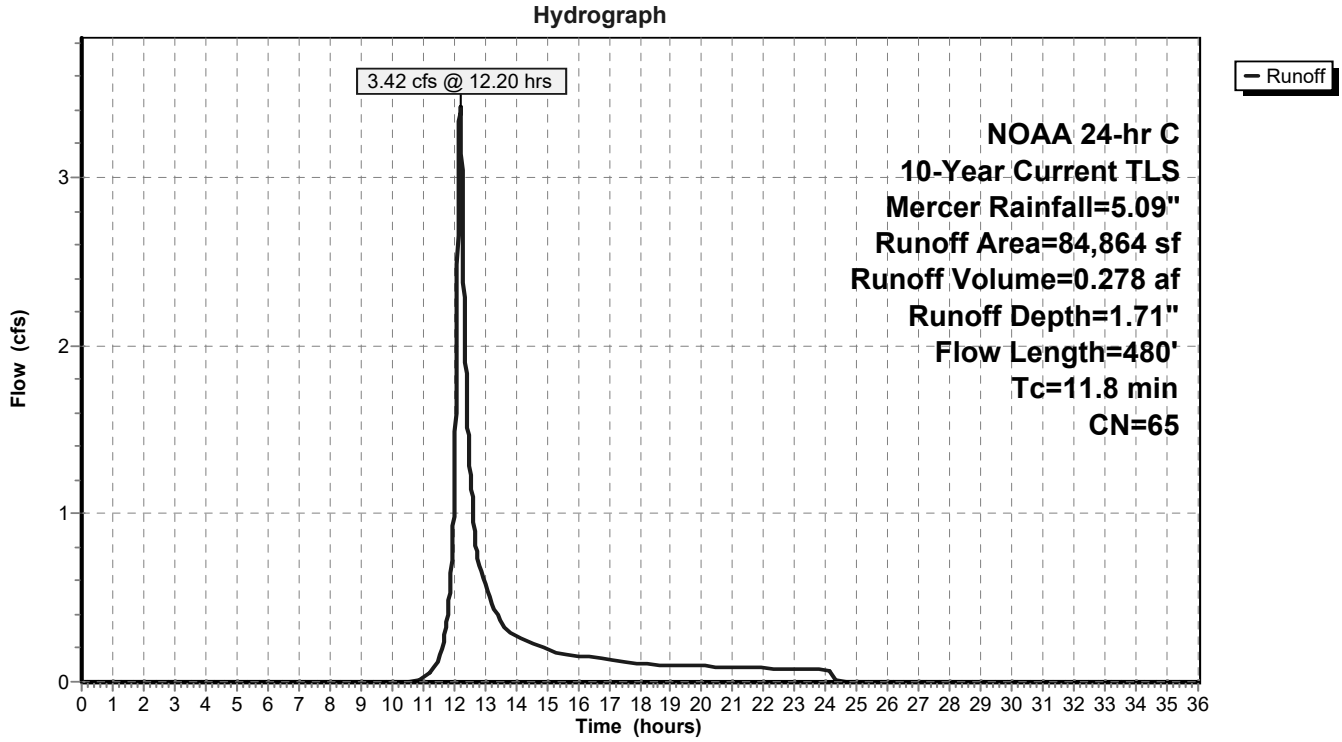
Runoff = 3.42 cfs @ 12.20 hrs, Volume= 0.278 af, Depth= 1.71"
Routed to Link 17L : DA-17 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
21,515	55	Woods, Good, HSG B
31,307	70	Woods, Good, HSG C
1,317	77	Woods, Good, HSG D
21,658	61	>75% Grass cover, Good, HSG B
3,641	74	>75% Grass cover, Good, HSG C
5,426	80	>75% Grass cover, Good, HSG D
84,864	65	Weighted Average
84,864		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
1.7	173	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	53	0.0130	6.00	7.37	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
11.8	480	Total			

Subcatchment 17Sa: DA-17a



Summary for Subcatchment 17Sb: DA-17b

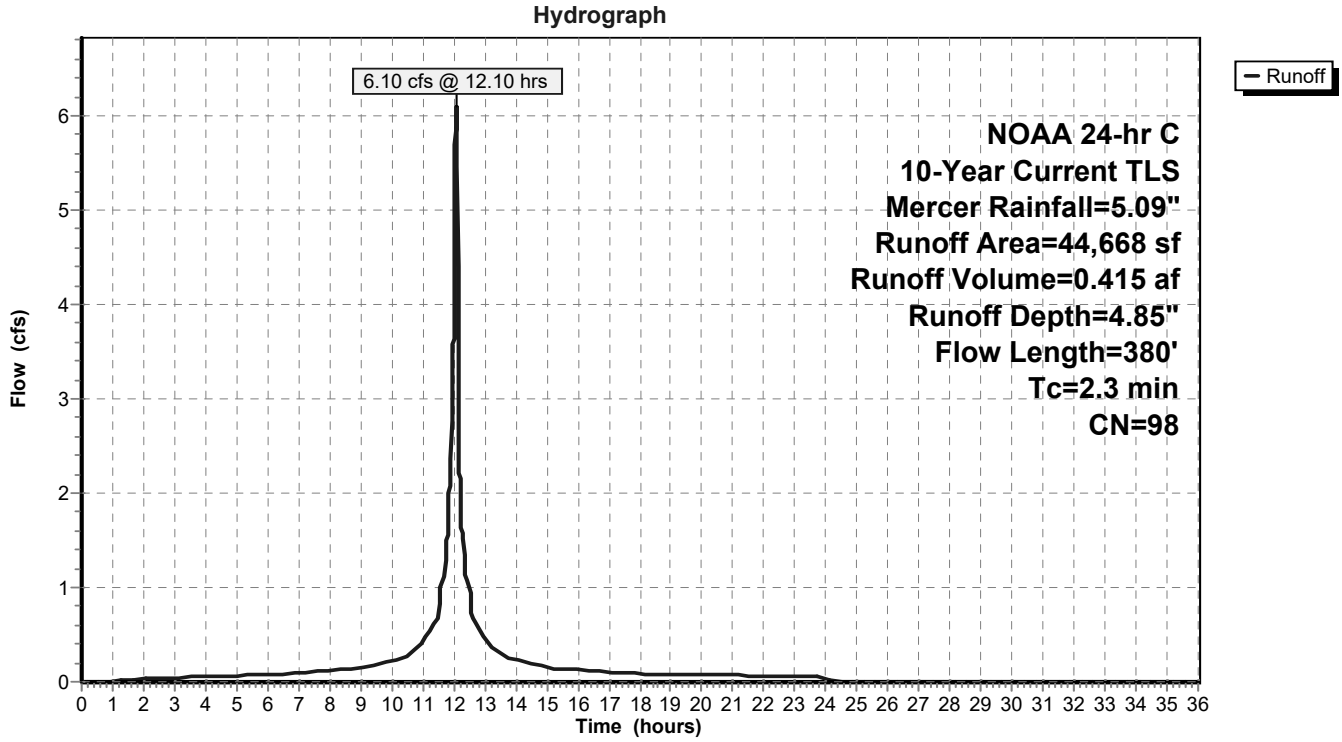
Runoff = 6.10 cfs @ 12.10 hrs, Volume= 0.415 af, Depth= 4.85"
Routed to Link 17L : DA-17 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	12,920	98	Paved parking, HSG B (Vehicular)
*	27,394	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	1,571	98	Paved parking, HSG C (Vehicular)
*	425	98	Paved parking, HSG D (Vehicular)
*	2,358	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	44,668	98	Weighted Average
	44,668		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.31		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
0.1	32	0.0590	3.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	53	0.0130	6.00	7.37	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
2.3	380	Total			

Subcatchment 17Sb: DA-17b



Summary for Subcatchment 18Sa: DA-18a

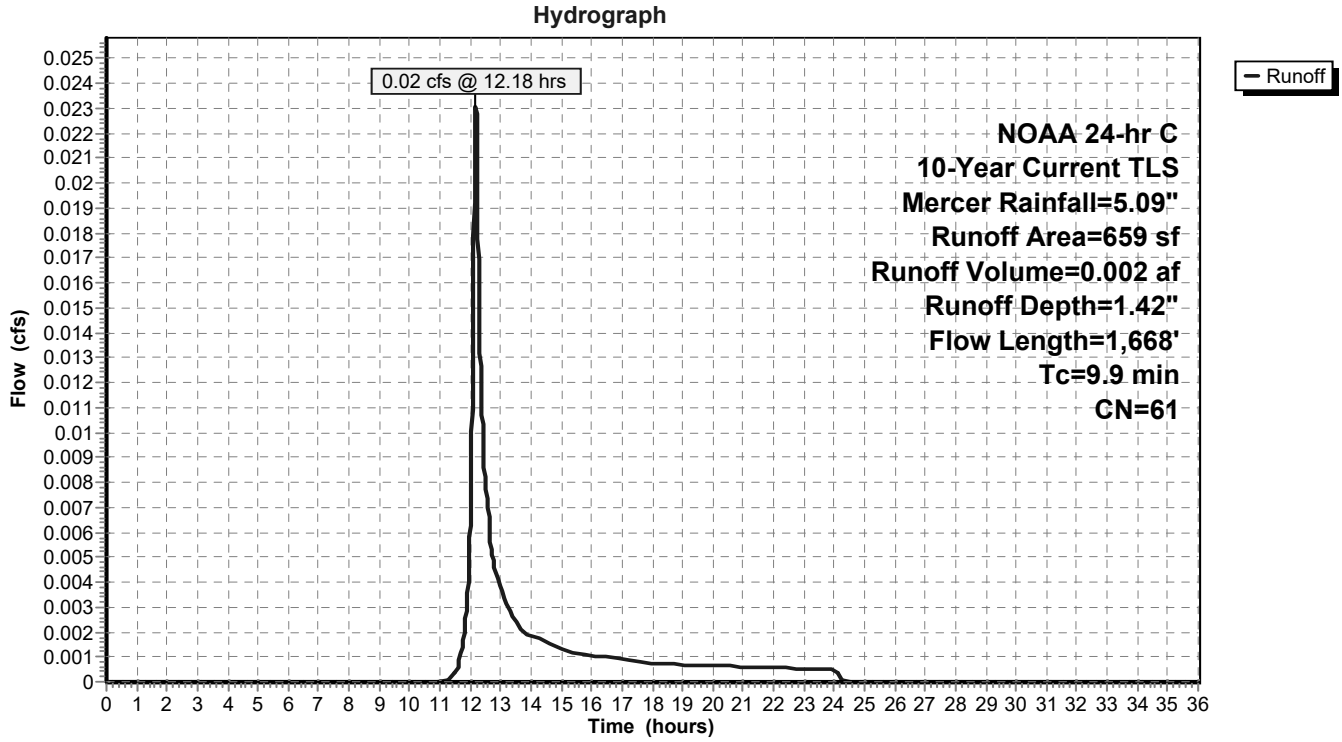
Runoff = 0.02 cfs @ 12.18 hrs, Volume= 0.002 af, Depth= 1.42"
Routed to Link 18L : DA-18 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

Area (sf)	CN	Description
659	61	>75% Grass cover, Good, HSG B
659		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	24	0.0200	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31"
1.4	133	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
9.9	1,668	Total			

Subcatchment 18Sa: DA-18a



Summary for Subcatchment 18Sb: DA-18b

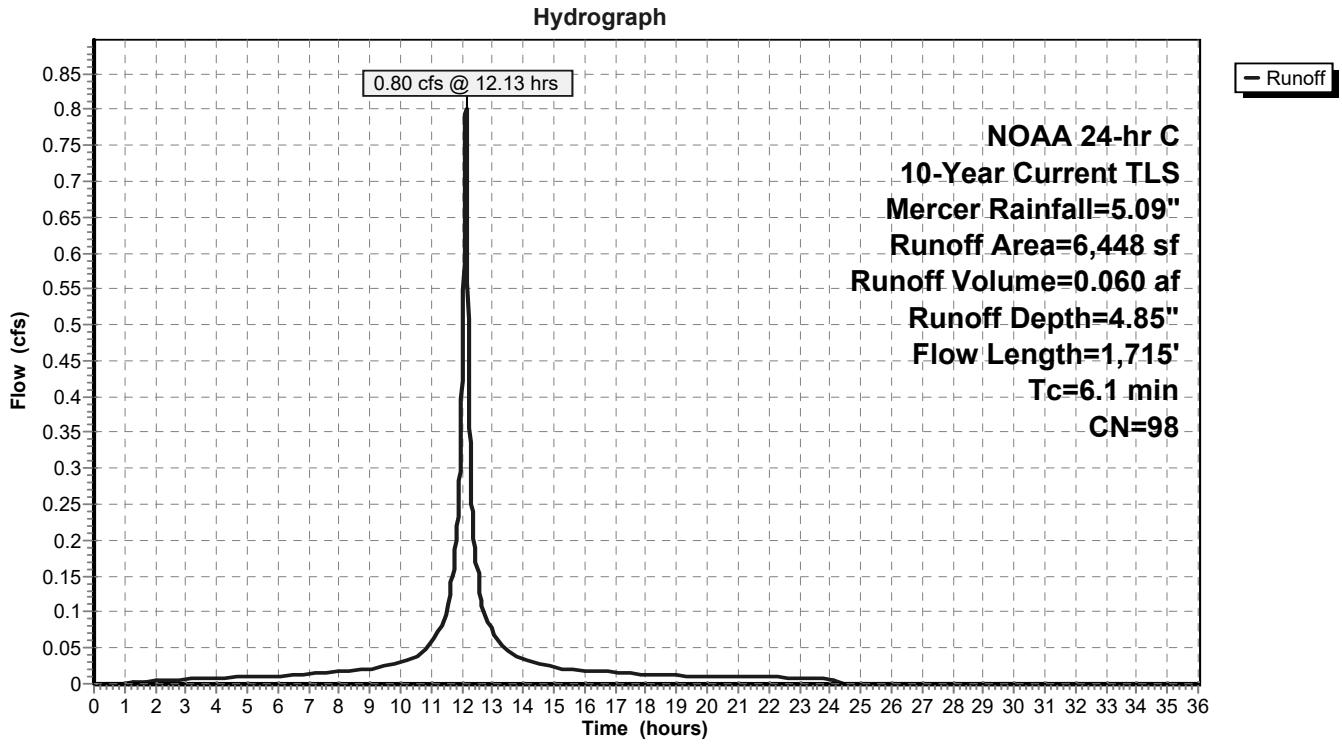
Runoff = 0.80 cfs @ 12.13 hrs, Volume= 0.060 af, Depth= 4.85"
Routed to Link 18L : DA-18 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Current TLS, Mercer Rainfall=5.09"

	Area (sf)	CN	Description
*	1,155	98	Paved parking, HSG B (Vehicular)
*	5,293	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	6,448	98	Weighted Average
	6,448		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	52	0.0100	0.93		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.1	133	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	201	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
6.1	1,715	Total			

Subcatchment 18Sb: DA-18b



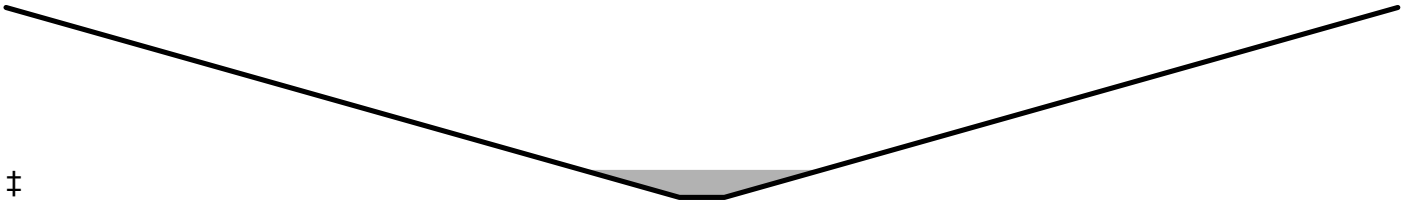
Summary for Reach 19R: Reach to On Stream Pond

Inflow Area = 18.679 ac, 29.01% Impervious, Inflow Depth > 2.43" for 10-Year Current TLS, Mercer event
Inflow = 28.49 cfs @ 12.12 hrs, Volume= 3.776 af
Outflow = 23.29 cfs @ 12.24 hrs, Volume= 3.773 af, Atten= 18%, Lag= 7.2 min
Routed to Link 19L : Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.06 fps, Min. Travel Time= 8.3 min
Avg. Velocity = 0.39 fps, Avg. Travel Time= 22.7 min

Peak Storage= 11,601 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.87' , Surface Width= 42.74'
Bank-Full Depth= 6.00' Flow Area= 768.0 sf, Capacity= 2,676.51 cfs

8.00' x 6.00' deep channel, n= 0.045
Side Slope Z-value= 20.0 '/' Top Width= 248.00'
Length= 526.0' Slope= 0.0025 '/'
Inlet Invert= 91.30', Outlet Invert= 90.00'



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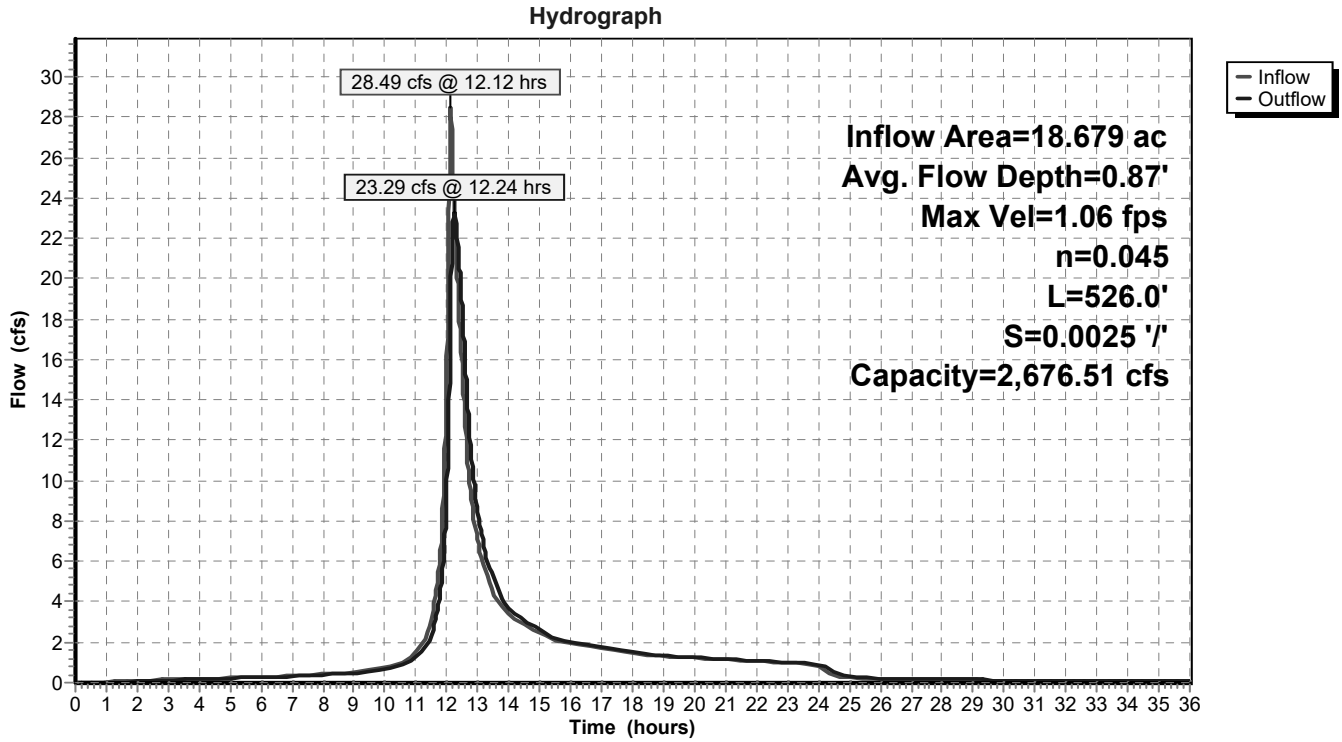
Reach 19R: Reach to On Stream Pond



Summary for Pond 11P: Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Inflow Area = 0.627 ac, 76.57% Impervious, Inflow Depth = 4.05" for 10-Year Current TLS, Mercer event
Inflow = 3.01 cfs @ 12.10 hrs, Volume= 0.212 af
Outflow = 0.24 cfs @ 13.01 hrs, Volume= 0.169 af, Atten= 92%, Lag= 54.7 min
Primary = 0.24 cfs @ 13.01 hrs, Volume= 0.169 af
Routed to Pond 12P : Infiltration Basin 1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 108.43' @ 13.01 hrs Surf.Area= 5,782 sf Storage= 5,694 cf

Plug-Flow detention time= 356.2 min calculated for 0.169 af (80% of inflow)
Center-of-Mass det. time= 273.3 min (1,028.1 - 754.8)

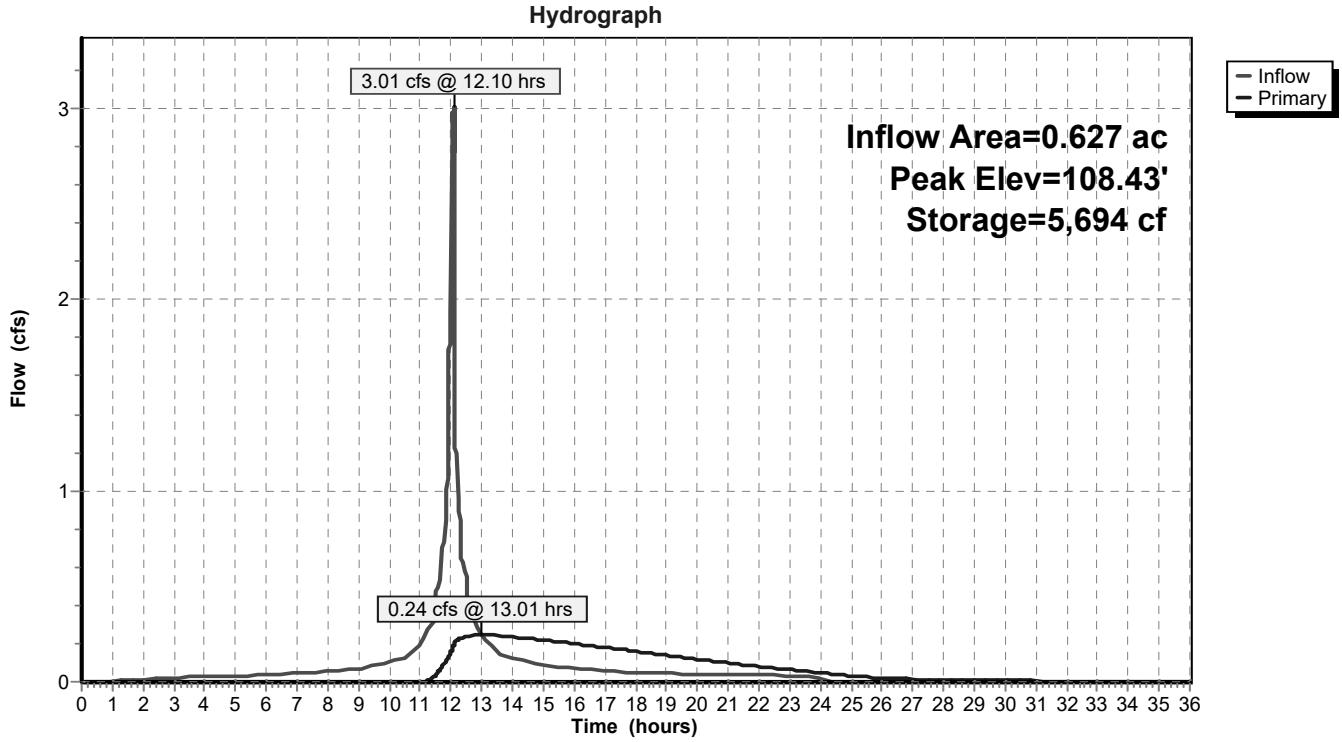
Volume	Invert	Avail.Storage	Storage Description
#1	106.50'	6,813 cf	**Stone Bed (Prismatic)**Listed below (Recalc) 20,237 cf Overall - 3,205 cf Embedded = 17,032 cf x 40.0% Voids
#2	107.00'	942 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 100.0' 1,283 cf Overall - 2.0" Wall Thickness = 942 cf
#3	107.00'	622 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 66.0'
#4	107.00'	377 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 40.0'
#5	107.00'	462 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 49.0'
#6	107.00'	462 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 49.0'
		9,678 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.50	5,782	0	0
110.00	5,782	20,237	20,237

Device	Routing	Invert	Outlet Devices
#1	Primary	107.24'	**3.0" Vert. Lower Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	109.75'	**12.0" Vert. Upper Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.24 cfs @ 13.01 hrs HW=108.43' (Free Discharge)
1=Lower Orifice (Orifice Controls 0.24 cfs @ 4.97 fps)
2=Upper Orifice (Controls 0.00 cfs)

Pond 11P: Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]



Summary for Pond 12P: Infiltration Basin 1

Inflow Area = 2.580 ac, 31.52% Impervious, Inflow Depth > 2.20" for 10-Year Current TLS, Mercer event
Inflow = 3.52 cfs @ 12.13 hrs, Volume= 0.472 af
Outflow = 1.36 cfs @ 12.56 hrs, Volume= 0.454 af, Atten= 61%, Lag= 25.8 min
Primary = 1.36 cfs @ 12.56 hrs, Volume= 0.454 af
Routed to Reach 19R : Reach to On Stream Pond

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 103.90' @ 12.56 hrs Surf.Area= 6,653 sf Storage= 4,748 cf

Plug-Flow detention time= 100.8 min calculated for 0.454 af (96% of inflow)
Center-of-Mass det. time= 76.0 min (986.2 - 910.3)

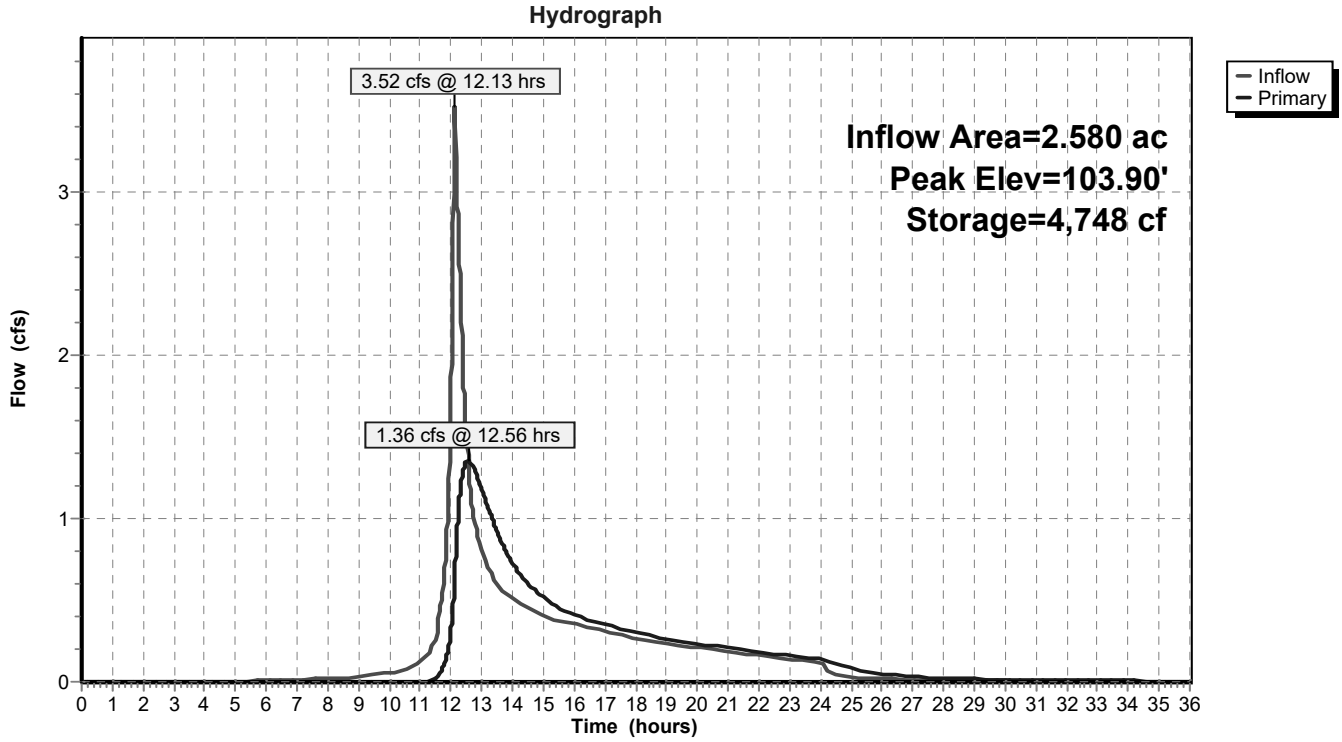
Volume	Invert	Avail.Storage	Storage Description
#1	103.10'	17,202 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.10	5,155	0	0
104.00	6,832	5,394	5,394
105.00	8,725	7,779	13,173
105.43	10,016	4,029	17,202

Device	Routing	Invert	Outlet Devices
#1	Primary	103.24'	**0.9' long Rectangular Weir** 2 End Contraction(s)
#2	Primary	104.75'	**40.0' long + 8.0 '/' SideZ x 10.0' breadth Emergency Spillway**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.36 cfs @ 12.56 hrs HW=103.90' (Free Discharge)
1=Rectangular Weir (Weir Controls 1.36 cfs @ 2.66 fps)
2=Emergency Spillway (Controls 0.00 cfs)

Pond 12P: Infiltration Basin 1



Summary for Pond 14P: Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

Inflow Area = 1.266 ac, 68.06% Impervious, Inflow Depth = 3.78" for 10-Year Current TLS, Mercer event
Inflow = 5.56 cfs @ 12.10 hrs, Volume= 0.399 af
Outflow = 0.21 cfs @ 14.41 hrs, Volume= 0.305 af, Atten= 96%, Lag= 138.8 min
Primary = 0.21 cfs @ 14.41 hrs, Volume= 0.305 af
Routed to Reach 19R : Reach to On Stream Pond

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 99.06' @ 14.41 hrs Surf.Area= 8,359 sf Storage= 12,062 cf

Plug-Flow detention time= 631.5 min calculated for 0.305 af (76% of inflow)
Center-of-Mass det. time= 541.1 min (1,301.5 - 760.4)

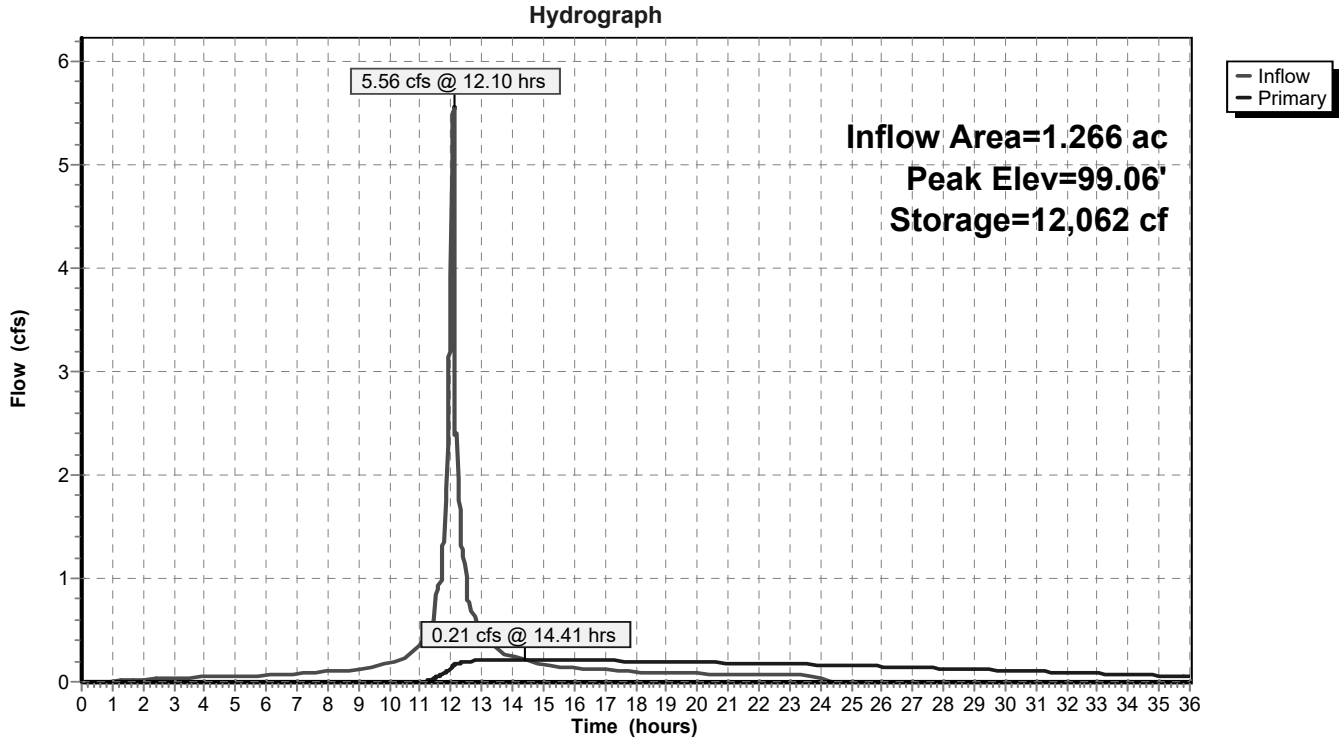
Volume	Invert	Avail.Storage	Storage Description
#1	96.30'	9,272 cf	**Lower Section Stone Bed-Perforated Pipes (Prismatic)** Listed below (Reca 33,436 cf Overall - 10,257 cf Embedded = 23,179 cf x 40.0% Voids
#2	97.05'	2,916 cf	**30.0" Round Perforated Pipes** x 6 Inside #1 L= 99.0' 4,199 cf Overall - 3.0" Wall Thickness = 2,916 cf
#3	97.05'	1,149 cf	**30.0" Round Perforated Pipes** x 3 Inside #1 L= 78.0' 1,654 cf Overall - 3.0" Wall Thickness = 1,149 cf
#4	97.05'	928 cf	**30.0" Round Perforated Pipes** x 3 Inside #1 L= 63.0' 1,336 cf Overall - 3.0" Wall Thickness = 928 cf
#5	97.05'	2,130 cf	**30.0" Round Perforated Pipes** Inside #1 L= 434.0' 3,068 cf Overall - 3.0" Wall Thickness = 2,130 cf
		16,394 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
96.30	8,359	0	0
100.30	8,359	33,436	33,436

Device	Routing	Invert	Outlet Devices
#1	Primary	97.29'	**2.5" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	99.30'	**1.1' long Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.21 cfs @ 14.41 hrs HW=99.06' (Free Discharge)
1=Orifice (Orifice Controls 0.21 cfs @ 6.22 fps)
2=Rectangular Weir (Controls 0.00 cfs)

Pond 14P: Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

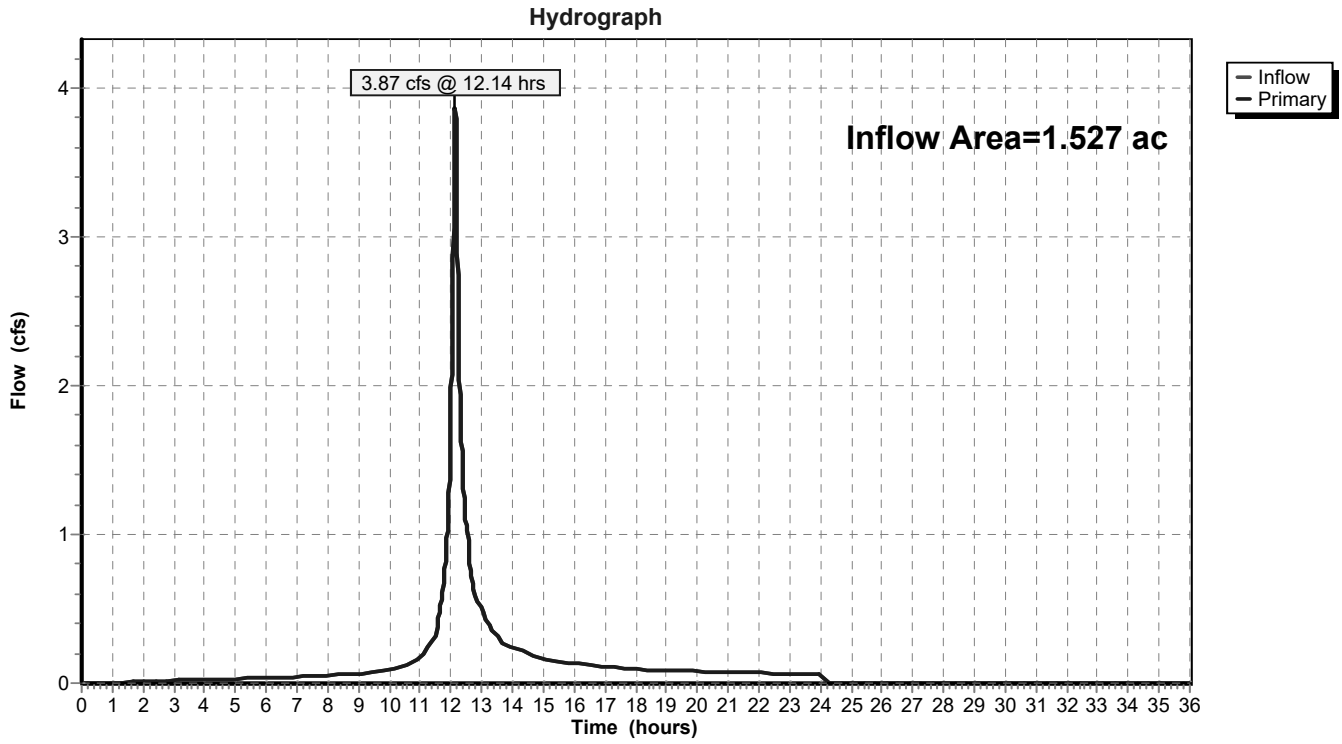


Summary for Link 13L: DA-13 COM HYD [MTD 1A&1B]

Inflow Area = 1.527 ac, 30.11% Impervious, Inflow Depth = 2.46" for 10-Year Current TLS, Mercer event
Inflow = 3.87 cfs @ 12.14 hrs, Volume= 0.313 af
Primary = 3.87 cfs @ 12.14 hrs, Volume= 0.313 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 19R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 13L: DA-13 COM HYD [MTD 1A&1B]

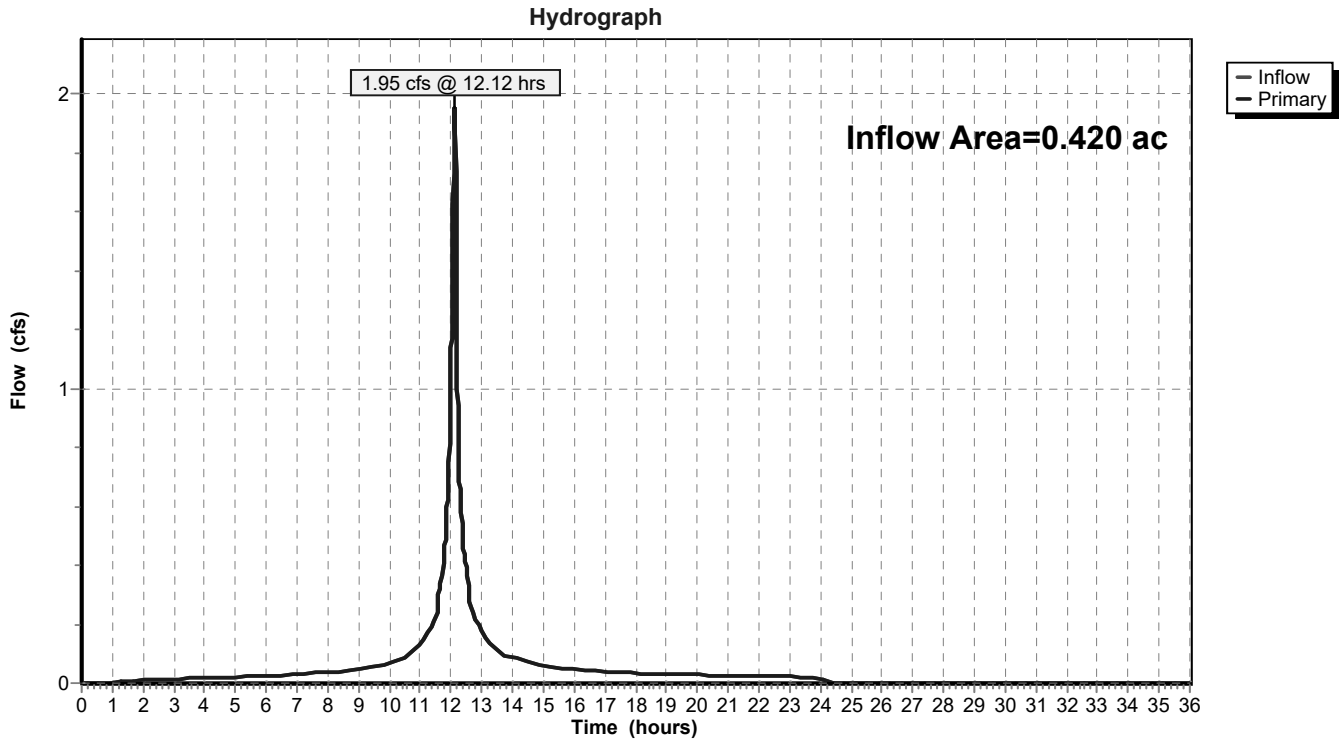


Summary for Link 15L: DA-15 COM HYD

Inflow Area = 0.420 ac, 78.24% Impervious, Inflow Depth = 4.11" for 10-Year Current TLS, Mercer event
Inflow = 1.95 cfs @ 12.12 hrs, Volume= 0.144 af
Primary = 1.95 cfs @ 12.12 hrs, Volume= 0.144 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 19R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 15L: DA-15 COM HYD

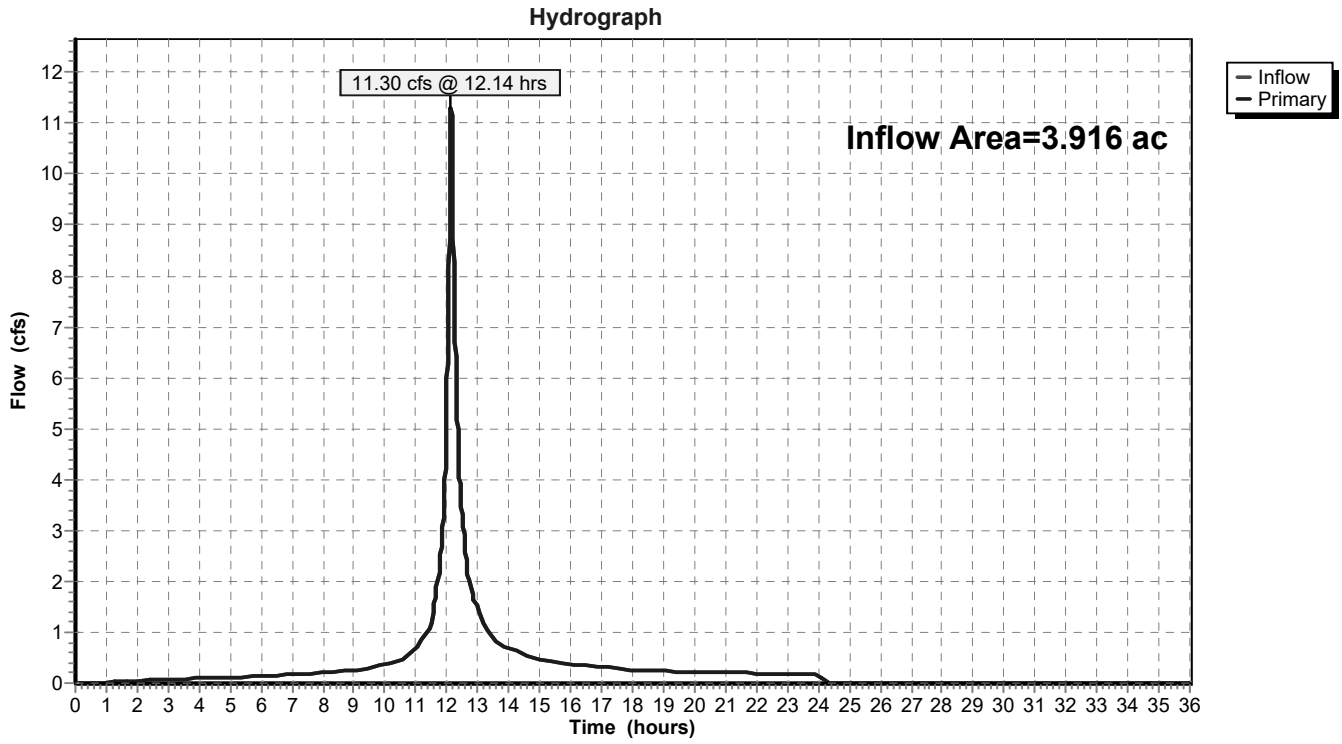


Summary for Link 16L: DA-16 COM HYD

Inflow Area = 3.916 ac, 46.62% Impervious, Inflow Depth = 2.99" for 10-Year Current TLS, Mercer event
Inflow = 11.30 cfs @ 12.14 hrs, Volume= 0.974 af
Primary = 11.30 cfs @ 12.14 hrs, Volume= 0.974 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 19R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 16L: DA-16 COM HYD

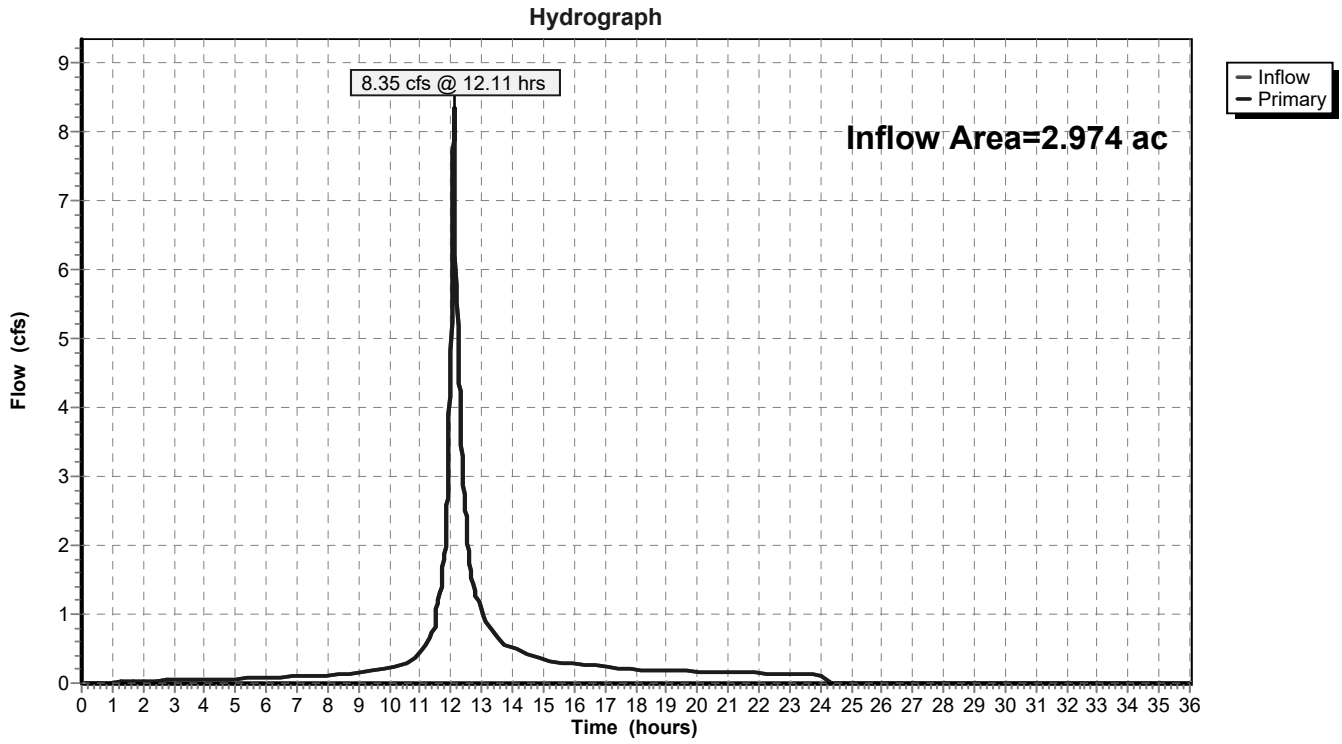


Summary for Link 17L: DA-17 COM HYD

Inflow Area = 2.974 ac, 34.48% Impervious, Inflow Depth = 2.80" for 10-Year Current TLS, Mercer event
Inflow = 8.35 cfs @ 12.11 hrs, Volume= 0.693 af
Primary = 8.35 cfs @ 12.11 hrs, Volume= 0.693 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 19R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 17L: DA-17 COM HYD

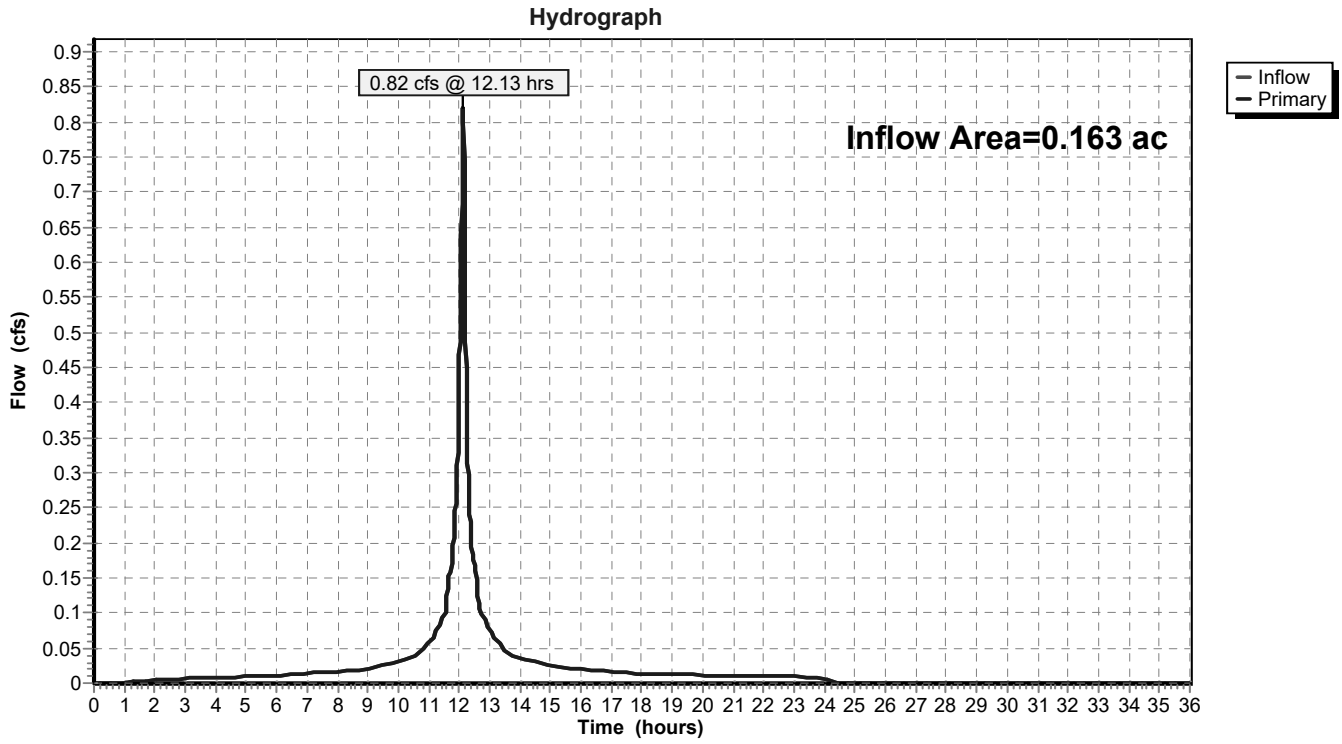


Summary for Link 18L: DA-18 COM HYD

Inflow Area = 0.163 ac, 90.73% Impervious, Inflow Depth = 4.54" for 10-Year Current TLS, Mercer event
Inflow = 0.82 cfs @ 12.13 hrs, Volume= 0.062 af
Primary = 0.82 cfs @ 12.13 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min
Routed to Link 19L : Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 18L: DA-18 COM HYD

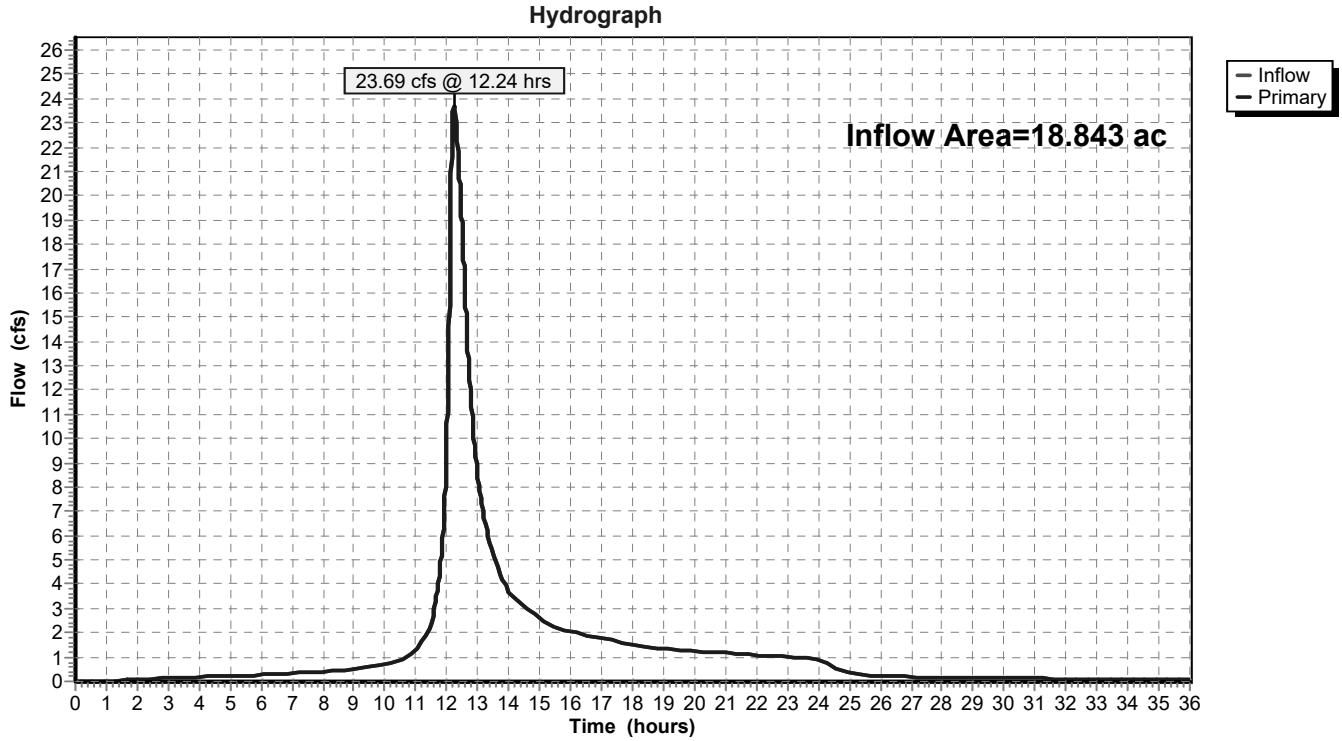


Summary for Link 19L: Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysi

Inflow Area = 18.843 ac, 29.55% Impervious, Inflow Depth > 2.44" for 10-Year Current TLS, Mercer event
Inflow = 23.69 cfs @ 12.24 hrs, Volume= 3.834 af
Primary = 23.69 cfs @ 12.24 hrs, Volume= 3.834 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 19L: Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]



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

Subcatchment 10S: DA10 Runoff Area=261,211 sf 1.76% Impervious Runoff Depth=4.46"
Flow Length=1,909' Tc=24.4 min CN=66 Runoff=20.54 cfs 2.230 af

Subcatchment 11Sa: DA-11a Runoff Area=6,399 sf 0.00% Impervious Runoff Depth=3.87"
Flow Length=71' Slope=0.0130 '/' Tc=9.5 min CN=61 Runoff=0.65 cfs 0.047 af

Subcatchment 11Sb: DA-11b Runoff Area=20,908 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=52' Slope=0.0150 '/' Tc=0.8 min CN=98 Runoff=4.82 cfs 0.332 af

Subcatchment 12Sa: DA-12a Runoff Area=65,962 sf 0.00% Impervious Runoff Depth=3.63"
Flow Length=913' Tc=13.8 min CN=59 Runoff=5.43 cfs 0.459 af

Subcatchment 12Sb: DA-12b Runoff Area=19,134 sf 75.87% Impervious Runoff Depth=7.23"
Flow Length=797' Tc=4.3 min CN=89 Runoff=4.04 cfs 0.265 af

Subcatchment 13Sa: DA-13a Runoff Area=46,483 sf 0.00% Impervious Runoff Depth=3.87"
Flow Length=1,145' Tc=10.2 min CN=61 Runoff=4.63 cfs 0.344 af

Subcatchment 13Sb: DA-13b Runoff Area=20,026 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=1,113' Tc=5.6 min CN=98 Runoff=4.27 cfs 0.318 af

Subcatchment 14Sa: DA-14a Runoff Area=17,616 sf 0.00% Impervious Runoff Depth=3.99"
Flow Length=164' Tc=9.9 min CN=62 Runoff=1.84 cfs 0.134 af

Subcatchment 14Sb: DA-14b Runoff Area=37,529 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=60' Slope=0.0150 '/' Tc=0.9 min CN=98 Runoff=8.65 cfs 0.597 af

Subcatchment 15S: DA-15a Runoff Area=3,981 sf 0.00% Impervious Runoff Depth=3.87"
Flow Length=583' Tc=10.6 min CN=61 Runoff=0.39 cfs 0.029 af

Subcatchment 15Sb: DA-15b Runoff Area=14,314 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=618' Tc=4.9 min CN=98 Runoff=3.12 cfs 0.228 af

Subcatchment 16Sa: DA-16a Runoff Area=91,062 sf 0.00% Impervious Runoff Depth=3.75"
Flow Length=1,192' Tc=14.9 min CN=60 Runoff=7.49 cfs 0.654 af

Subcatchment 16Sb: DA-16b Runoff Area=79,517 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=1,343' Tc=6.9 min CN=98 Runoff=16.22 cfs 1.264 af

Subcatchment 17Sa: DA-17a Runoff Area=84,864 sf 0.00% Impervious Runoff Depth=4.34"
Flow Length=480' Tc=11.8 min CN=65 Runoff=8.96 cfs 0.705 af

Subcatchment 17Sb: DA-17b Runoff Area=44,668 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=380' Tc=2.3 min CN=98 Runoff=10.28 cfs 0.710 af

Subcatchment 18Sa: DA-18a Runoff Area=659 sf 0.00% Impervious Runoff Depth=3.87"
Flow Length=1,668' Tc=9.9 min CN=61 Runoff=0.07 cfs 0.005 af

Subcatchment 18Sb: DA-18b Runoff Area=6,448 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=1,715' Tc=6.1 min CN=98 Runoff=1.35 cfs 0.103 af

Reach 19R: Reach to On Stream Pond Avg. Flow Depth=1.27' Max Vel=1.32 fps Inflow=62.48 cfs 8.138 af
n=0.045 L=526.0' S=0.0025 '/' Capacity=2,676.51 cfs Outflow=56.34 cfs 8.132 af

Pond 11P: Porous Asphalt 3 & Sub-Surface Peak Elev=109.96' Storage=9,592 cf Inflow=5.29 cfs 0.380 af
Outflow=0.57 cfs 0.336 af

Pond 12P: Infiltration Basin 1 Peak Elev=104.68' Storage=10,439 cf Inflow=8.21 cfs 1.059 af
Outflow=3.45 cfs 1.040 af

Pond 14P: Porous Asphalt 1[Banked] & 2; Peak Elev=100.26' Storage=16,250 cf Inflow=9.98 cfs 0.731 af
Outflow=3.06 cfs 0.615 af

Link 13L: DA-13 COM HYD [MTD 1A&1B] Inflow=8.38 cfs 0.662 af
Primary=8.38 cfs 0.662 af

Link 15L: DA-15 COM HYD Inflow=3.43 cfs 0.257 af
Primary=3.43 cfs 0.257 af

Link 16L: DA-16 COM HYD Inflow=21.89 cfs 1.918 af
Primary=21.89 cfs 1.918 af

Link 17L: DA-17 COM HYD Inflow=16.68 cfs 1.415 af
Primary=16.68 cfs 1.415 af

Link 18L: DA-18 COM HYD Inflow=1.41 cfs 0.107 af
Primary=1.41 cfs 0.107 af

Link 19L: Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Inflow=56.97 cfs 8.240 af
Primary=56.97 cfs 8.240 af

Total Runoff Area = 18.843 ac Runoff Volume = 8.424 af Average Runoff Depth = 5.36"
70.45% Pervious = 13.275 ac 29.55% Impervious = 5.568 ac

Summary for Subcatchment 10S: DA10

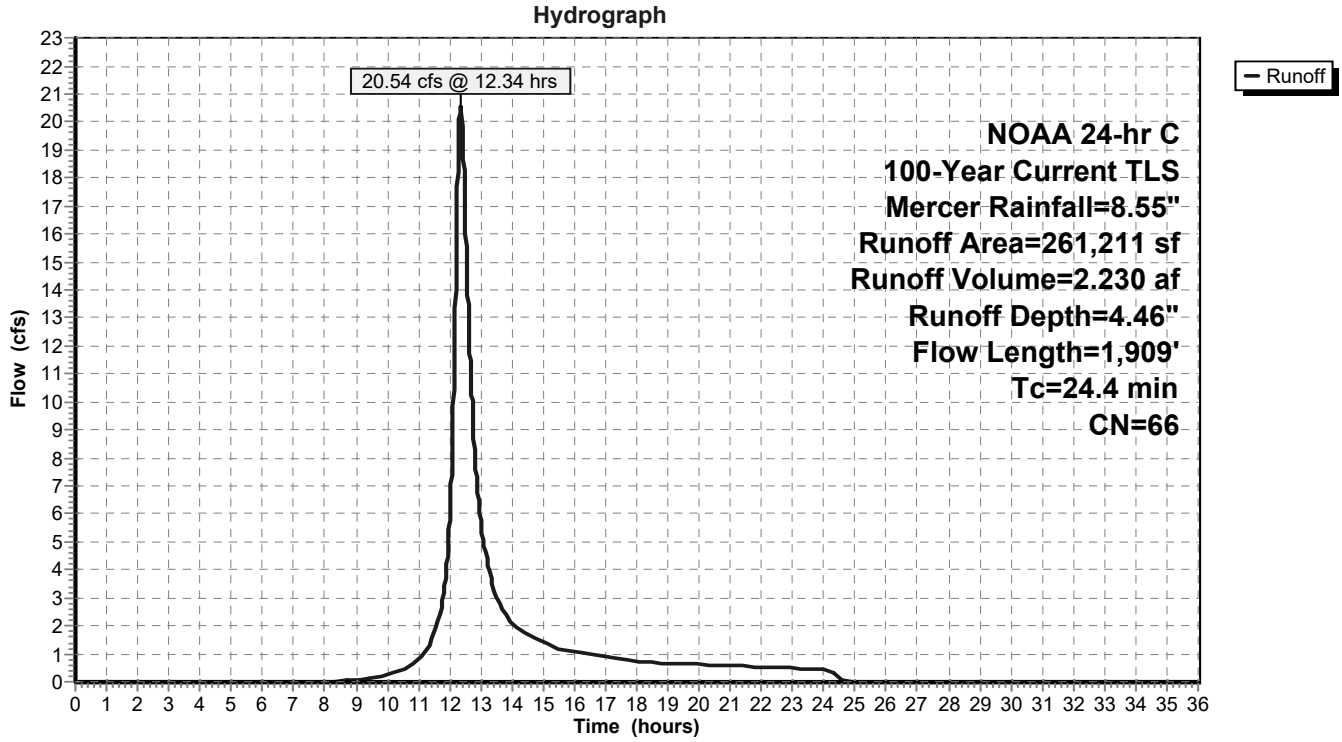
Runoff = 20.54 cfs @ 12.34 hrs, Volume= 2.230 af, Depth= 4.46"
Routed to Reach 19R : Reach to On Stream Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
	4,943	55	Woods, Good, HSG B
	80,094	70	Woods, Good, HSG C
	135,305	61	>75% Grass cover, Good, HSG B
	36,275	74	>75% Grass cover, Good, HSG C
*	4,594	98	Unconnected pavement, HSG B (Non Vehicular)
	261,211	66	Weighted Average
	256,617		98.24% Pervious Area
	4,594		1.76% Impervious Area
	4,594		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
7.3	808	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	180	0.0350	3.82	22.91	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
6.6	821	0.0040	2.09	75.19	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
24.4	1,909	Total			

Subcatchment 10S: DA10



Summary for Subcatchment 11Sa: DA-11a

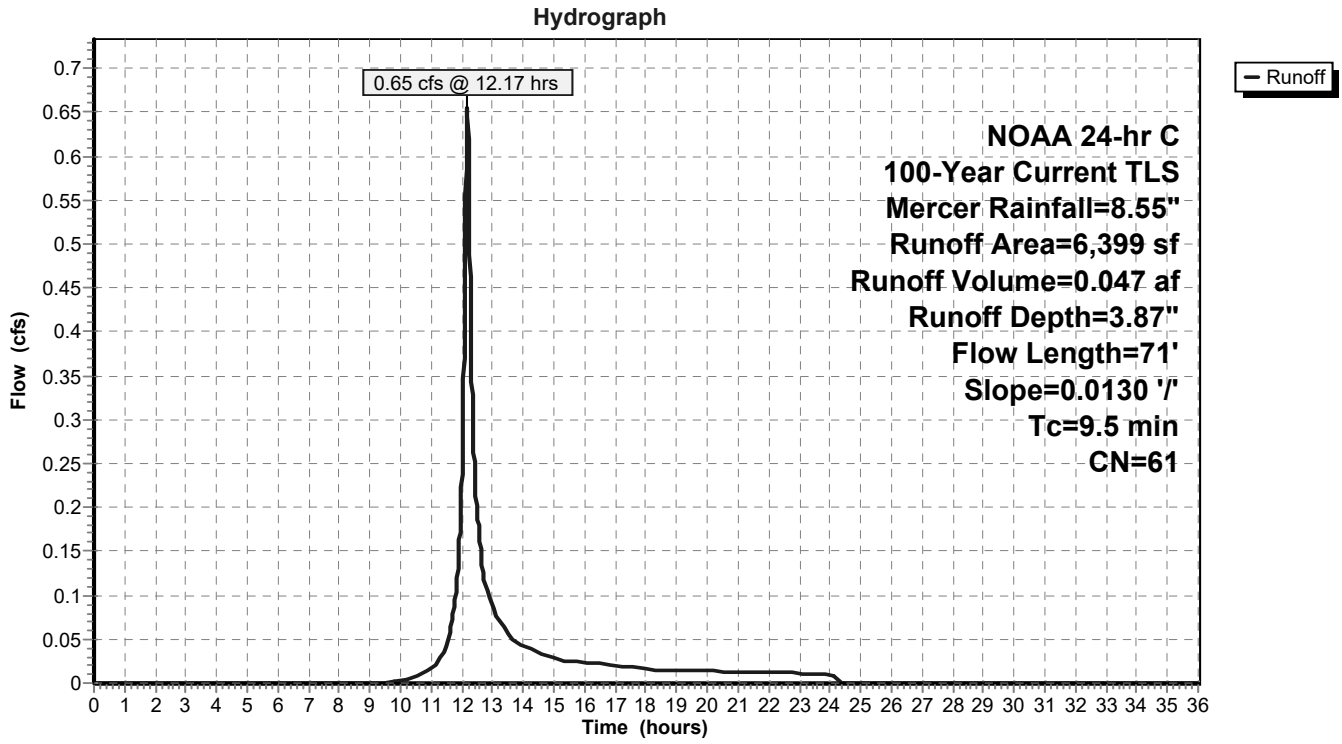
Runoff = 0.65 cfs @ 12.17 hrs, Volume= 0.047 af, Depth= 3.87"
Routed to Pond 11P : Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
6,399	61	>75% Grass cover, Good, HSG B
6,399		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
0.2	23	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.5	71	Total			

Subcatchment 11Sa: DA-11a



Summary for Subcatchment 11Sb: DA-11b

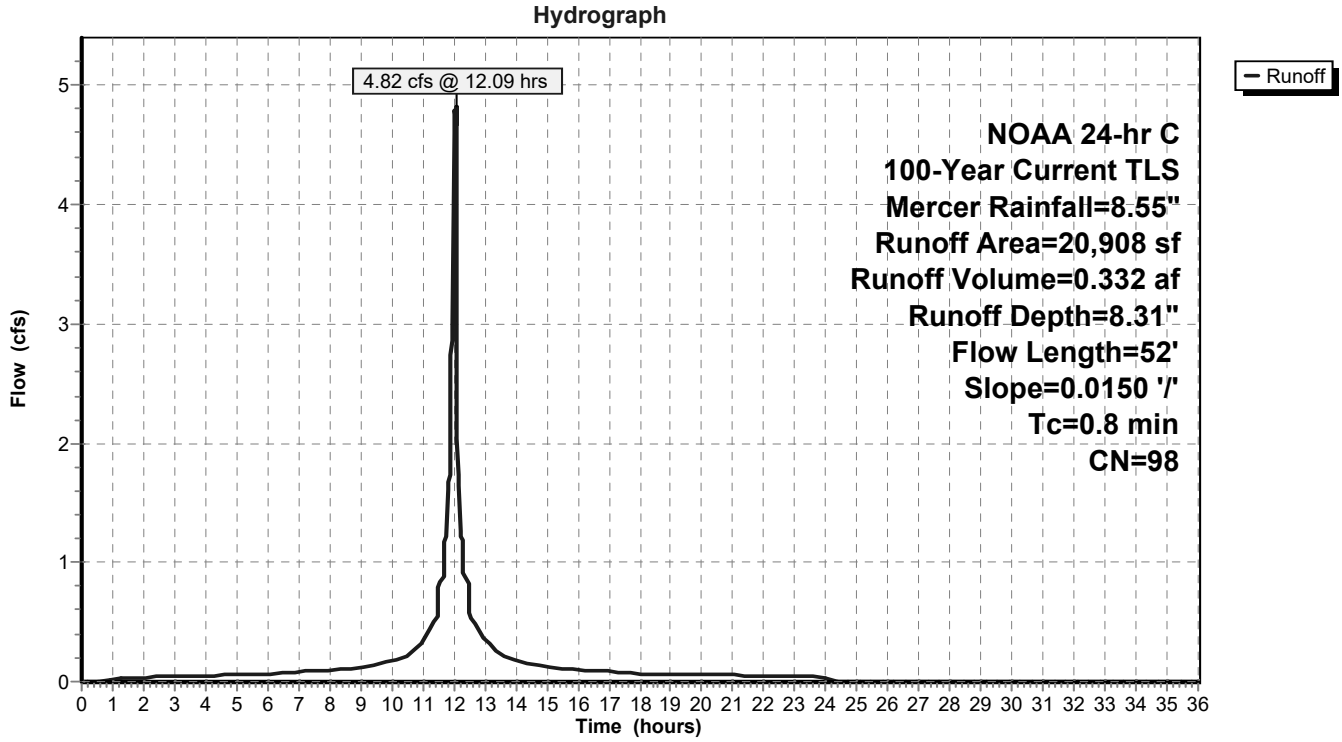
Runoff = 4.82 cfs @ 12.09 hrs, Volume= 0.332 af, Depth= 8.31"
Routed to Pond 11P : Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	20,908	98	Paved parking, HSG B (Vehicular)
	20,908		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	52	0.0150	1.09		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"

Subcatchment 11Sb: DA-11b



Summary for Subcatchment 12Sa: DA-12a

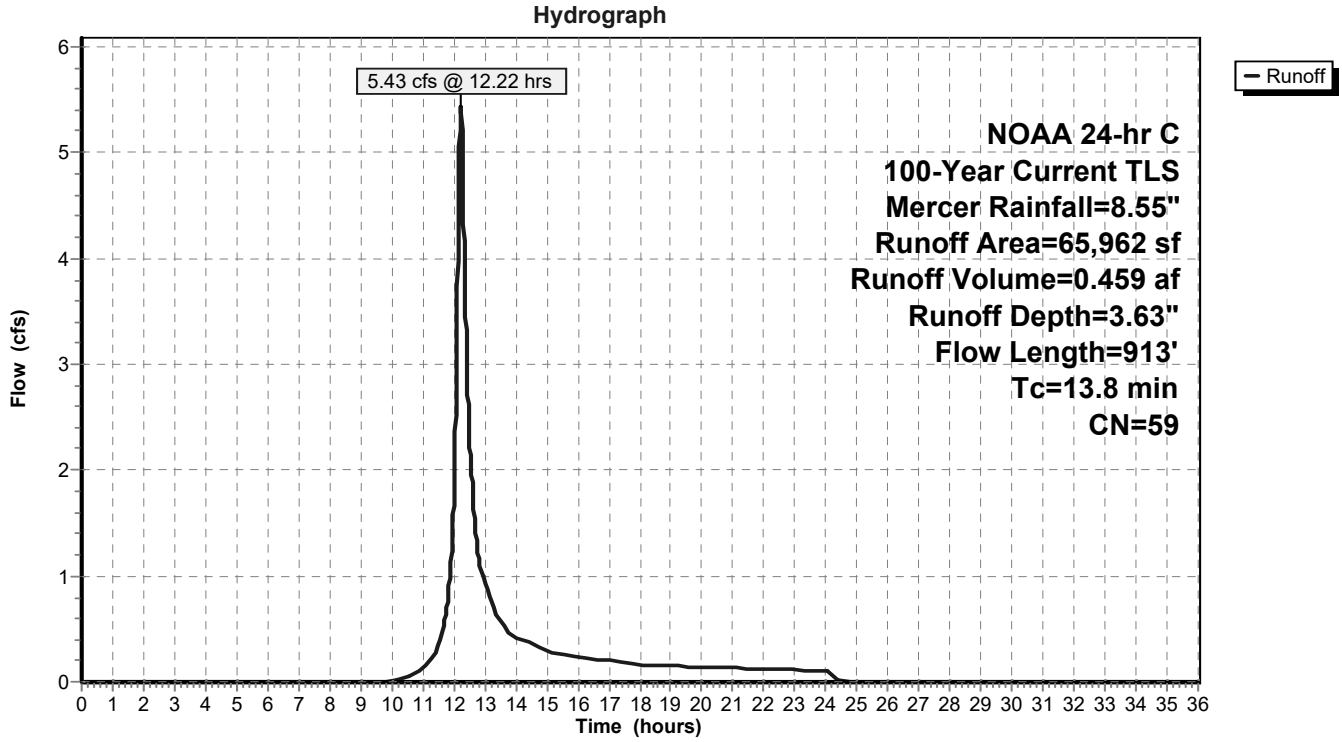
Runoff = 5.43 cfs @ 12.22 hrs, Volume= 0.459 af, Depth= 3.63"
Routed to Pond 12P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
16,889	55	Woods, Good, HSG B
49,073	61	>75% Grass cover, Good, HSG B
65,962	59	Weighted Average
65,962		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	25	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.31" Using McCuen-Spiess flow length
1.3	141	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	143	0.0080	1.82		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	159	0.0050	4.03	4.95	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	445	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
13.8	913	Total			

Subcatchment 12Sa: DA-12a



Summary for Subcatchment 12Sb: DA-12b

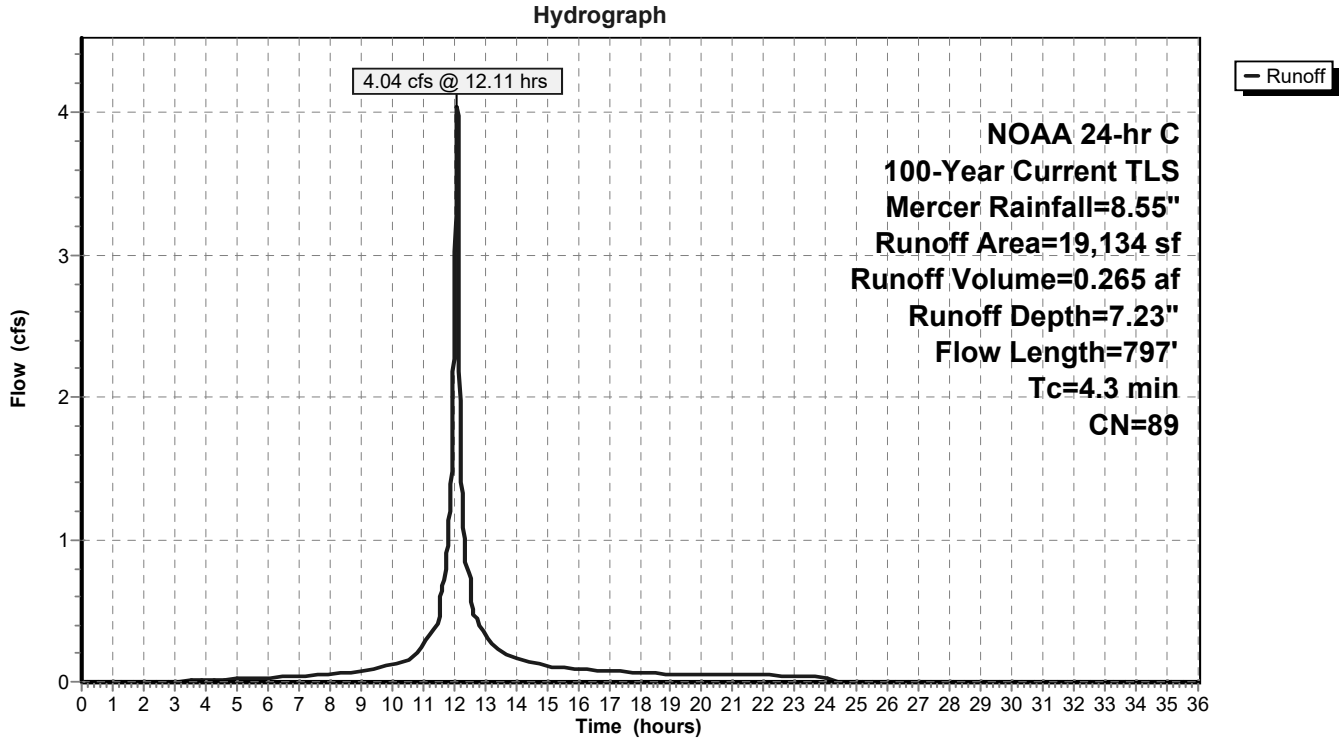
Runoff = 4.04 cfs @ 12.11 hrs, Volume= 0.265 af, Depth= 7.23"
Routed to Pond 12P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	14,517	98	Paved parking, HSG B (Vehicular)
*	4,617	61	Sidewalks, HSG B (Non Vehicular)
	19,134	89	Weighted Average
	4,617		24.13% Pervious Area
	14,517		75.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.15		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.0	104	0.0070	1.70		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	159	0.0050	4.03	4.95	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	445	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
4.3	797	Total			

Subcatchment 12Sb: DA-12b



Summary for Subcatchment 13Sa: DA-13a

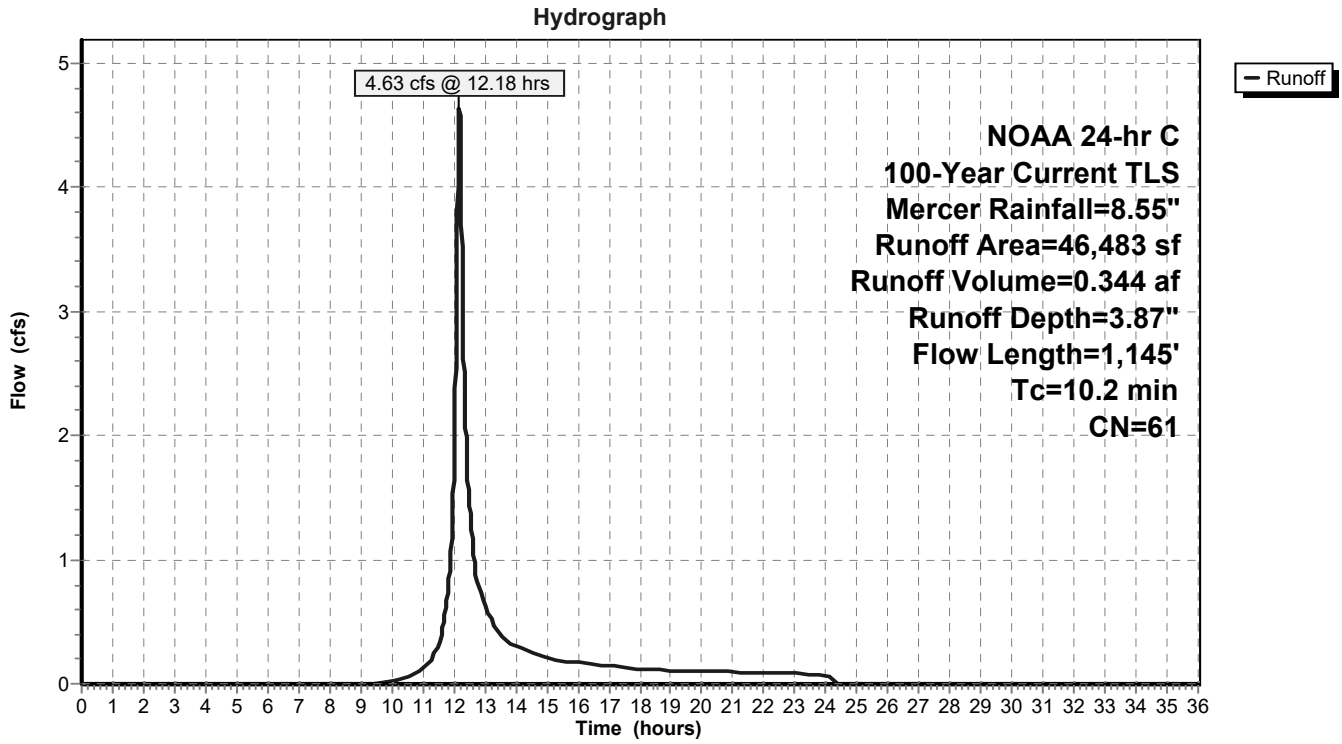
Runoff = 4.63 cfs @ 12.18 hrs, Volume= 0.344 af, Depth= 3.87"
Routed to Link 13L : DA-13 COM HYD [MTD 1A&1B]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
1,164	55	Woods, Good, HSG B
45,319	61	>75% Grass cover, Good, HSG B
46,483	61	Weighted Average
46,483		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	35	0.0310	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31"
0.4	69	0.0220	3.01		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.8	314	0.0200	2.89	11.55	**Channel Flow,** Area= 4.0 sf Perim= 12.0' r= 0.33' n= 0.035
0.2	62	0.0100	5.70	7.00	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	424	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
10.2	1,145	Total			

Subcatchment 13Sa: DA-13a



Summary for Subcatchment 13Sb: DA-13b

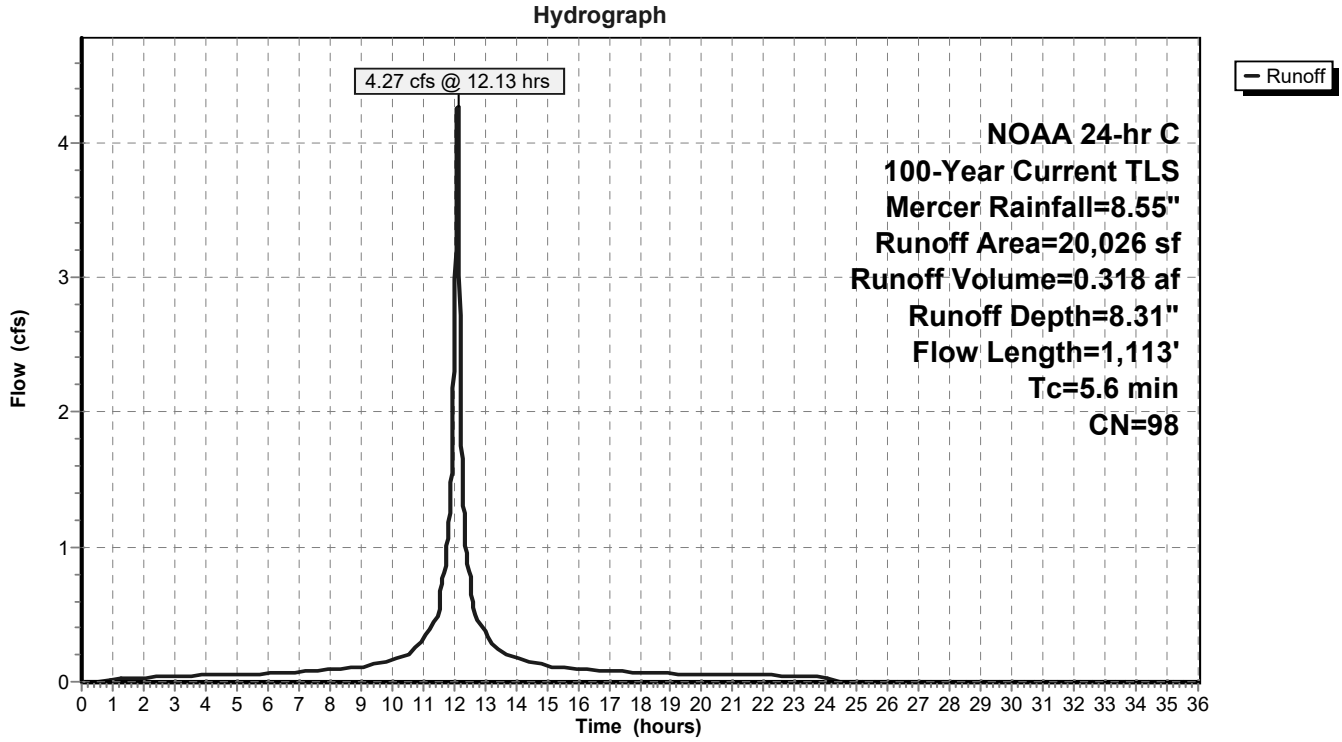
Runoff = 4.27 cfs @ 12.13 hrs, Volume= 0.318 af, Depth= 8.31"
Routed to Link 13L : DA-13 COM HYD [MTD 1A&1B]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
	15,772	98	Paved roads w/curbs & sewers, HSG B
*	4,254	98	Sidewalks, HSG B (Non Vehicular)
	20,026	98	Weighted Average
	20,026		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	69	0.0220	1.35		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.8	314	0.0200	2.89	11.55	**Channel Flow,** Area= 4.0 sf Perim= 12.0' r= 0.33' n= 0.035
0.2	65	0.0100	5.70	7.00	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	424	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
5.6	1,113	Total			

Subcatchment 13Sb: DA-13b



Summary for Subcatchment 14Sa: DA-14a

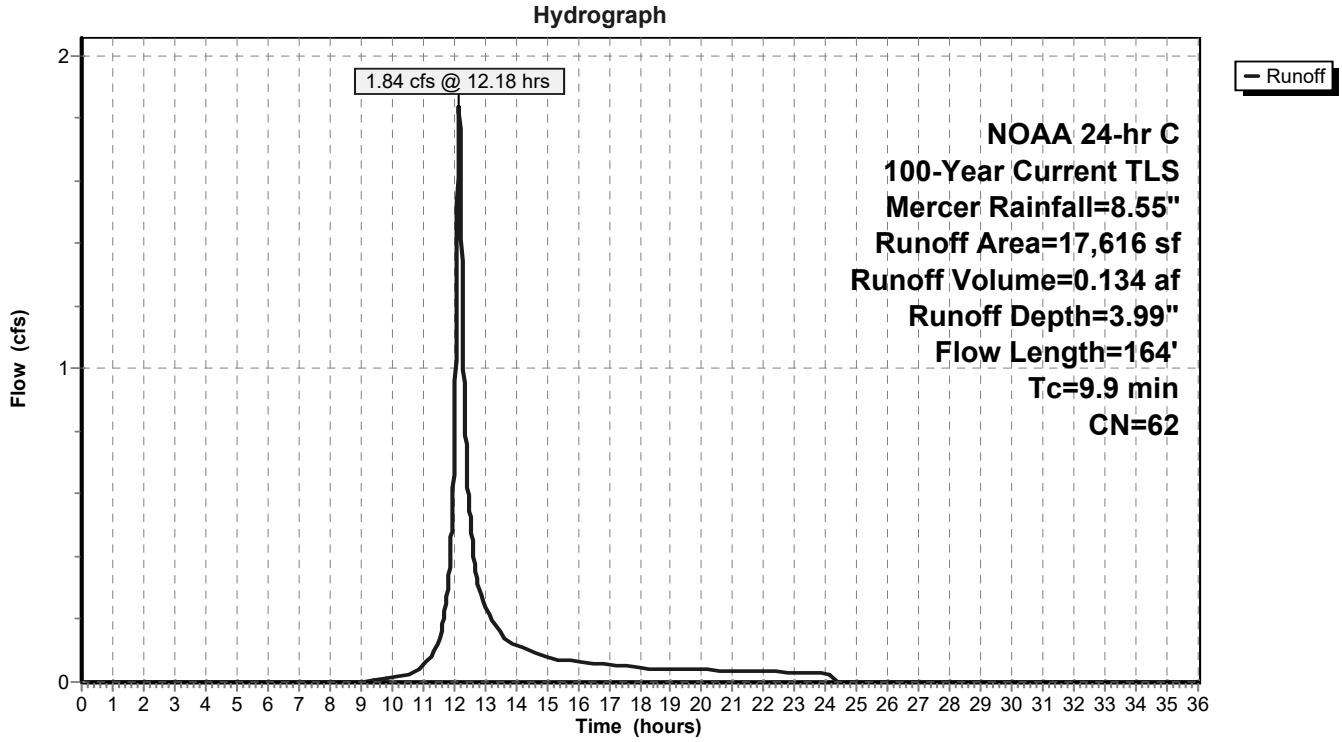
Runoff = 1.84 cfs @ 12.18 hrs, Volume= 0.134 af, Depth= 3.99"
Routed to Pond 14P : Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
16,171	61	>75% Grass cover, Good, HSG B
1,445	74	>75% Grass cover, Good, HSG C
17,616	62	Weighted Average
17,616		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	46	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
0.5	50	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	68	0.0100	4.91	3.86	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
9.9	164	Total			

Subcatchment 14Sa: DA-14a



Summary for Subcatchment 14Sb: DA-14b

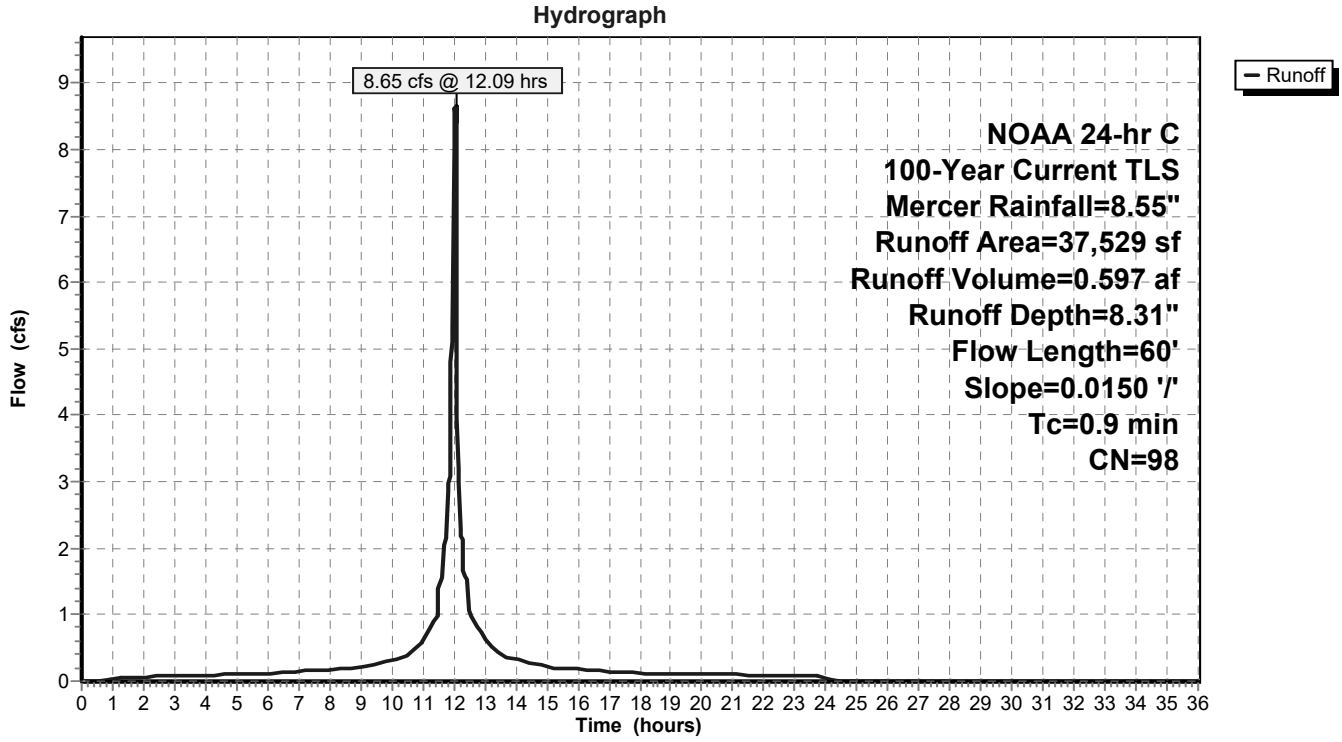
Runoff = 8.65 cfs @ 12.09 hrs, Volume= 0.597 af, Depth= 8.31"
Routed to Pond 14P : Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	34,989	98	Paved parking, HSG B (Vehicular)
*	2,540	98	Paved parking, HSG C (Vehicular)
	37,529	98	Weighted Average
	37,529		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	60	0.0150	1.13		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"

Subcatchment 14Sb: DA-14b



Summary for Subcatchment 15S: DA-15a

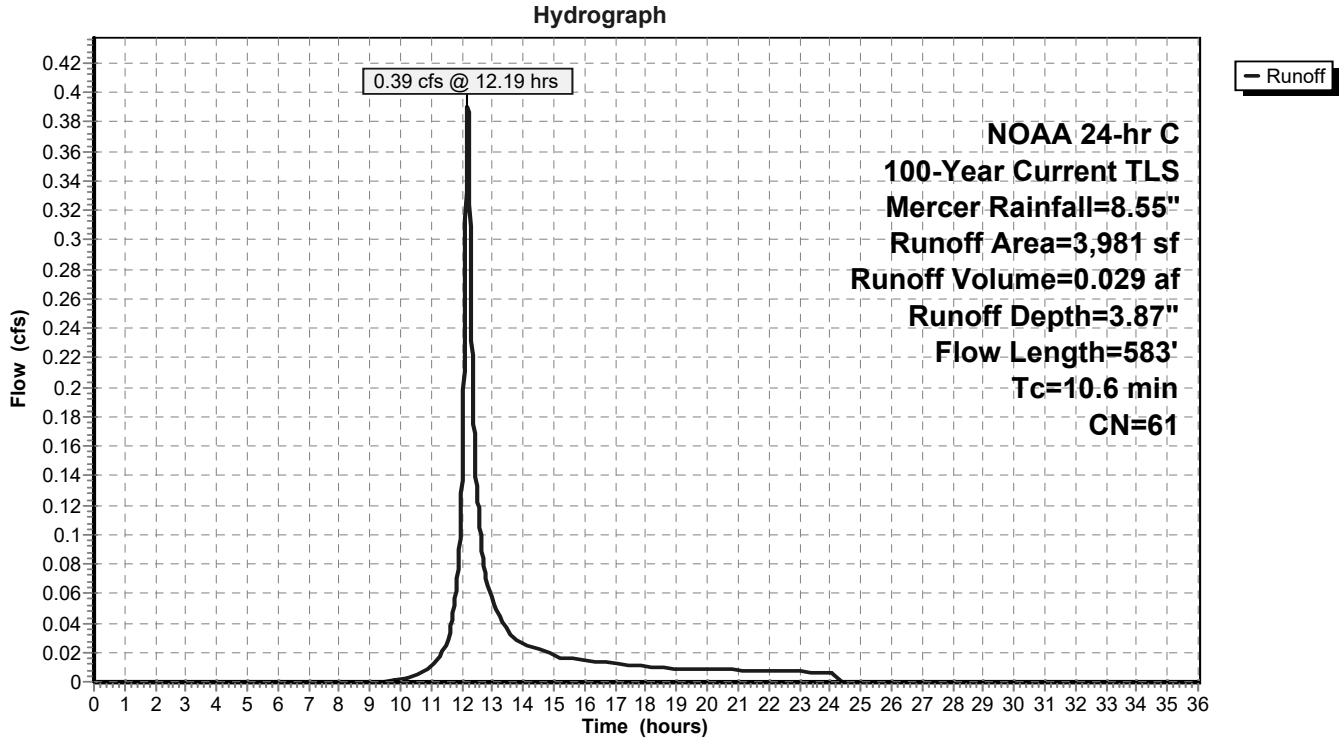
Runoff = 0.39 cfs @ 12.19 hrs, Volume= 0.029 af, Depth= 3.87"
Routed to Link 15L : DA-15 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
3,981	61	>75% Grass cover, Good, HSG B
3,981		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	24	0.0150	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31"
1.9	203	0.0080	1.82		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	39	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.3	76	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
2.7	200	0.0036	1.22	7.35	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
10.6	583	Total			

Subcatchment 15S: DA-15a



Summary for Subcatchment 15Sb: DA-15b

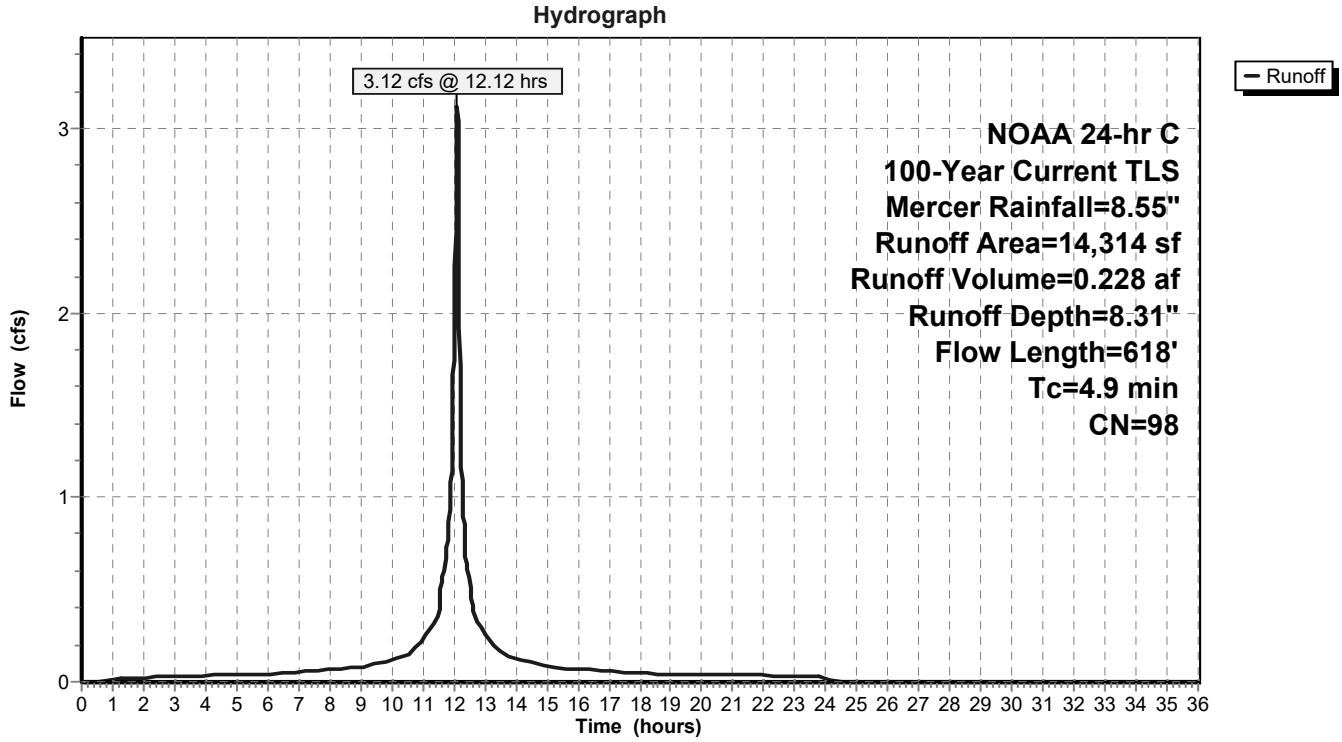
Runoff = 3.12 cfs @ 12.12 hrs, Volume= 0.228 af, Depth= 8.31"
Routed to Link 15L : DA-15 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	13,074	98	Paved parking, HSG B (Vehicular)
*	1,240	98	Sidewalks, HSG B (Non Vehicular)
	14,314	98	Weighted Average
	14,314		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	59	0.0090	0.91		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.9	203	0.0080	1.82		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	39	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.3	76	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
4.9	618	Total			

Subcatchment 15Sb: DA-15b



Summary for Subcatchment 16Sa: DA-16a

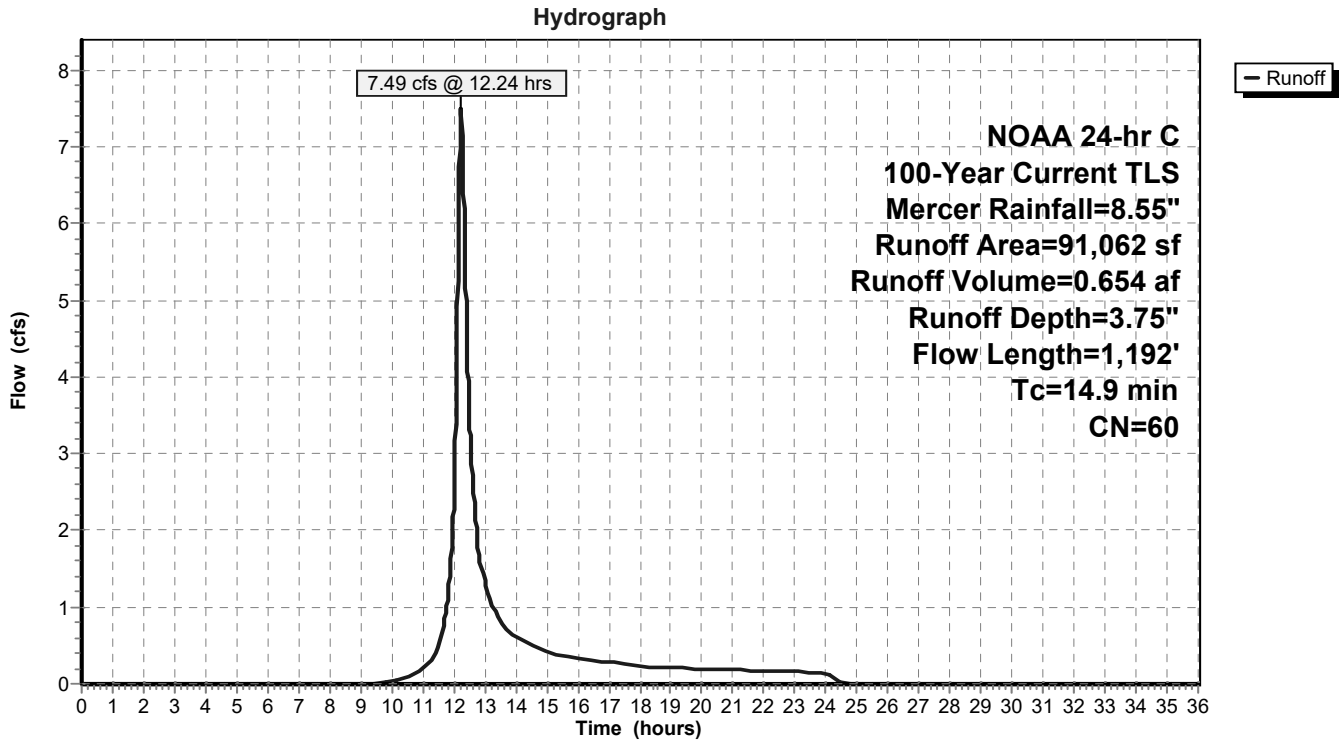
Runoff = 7.49 cfs @ 12.24 hrs, Volume= 0.654 af, Depth= 3.75"
Routed to Link 16L : DA-16 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
15,718	55	Woods, Good, HSG B
75,147	61	>75% Grass cover, Good, HSG B
197	80	>75% Grass cover, Good, HSG D
91,062	60	Weighted Average
91,062		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
0.3	29	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	340	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
14.9	1,192	Total			

Subcatchment 16Sa: DA-16a



Summary for Subcatchment 16Sb: DA-16b

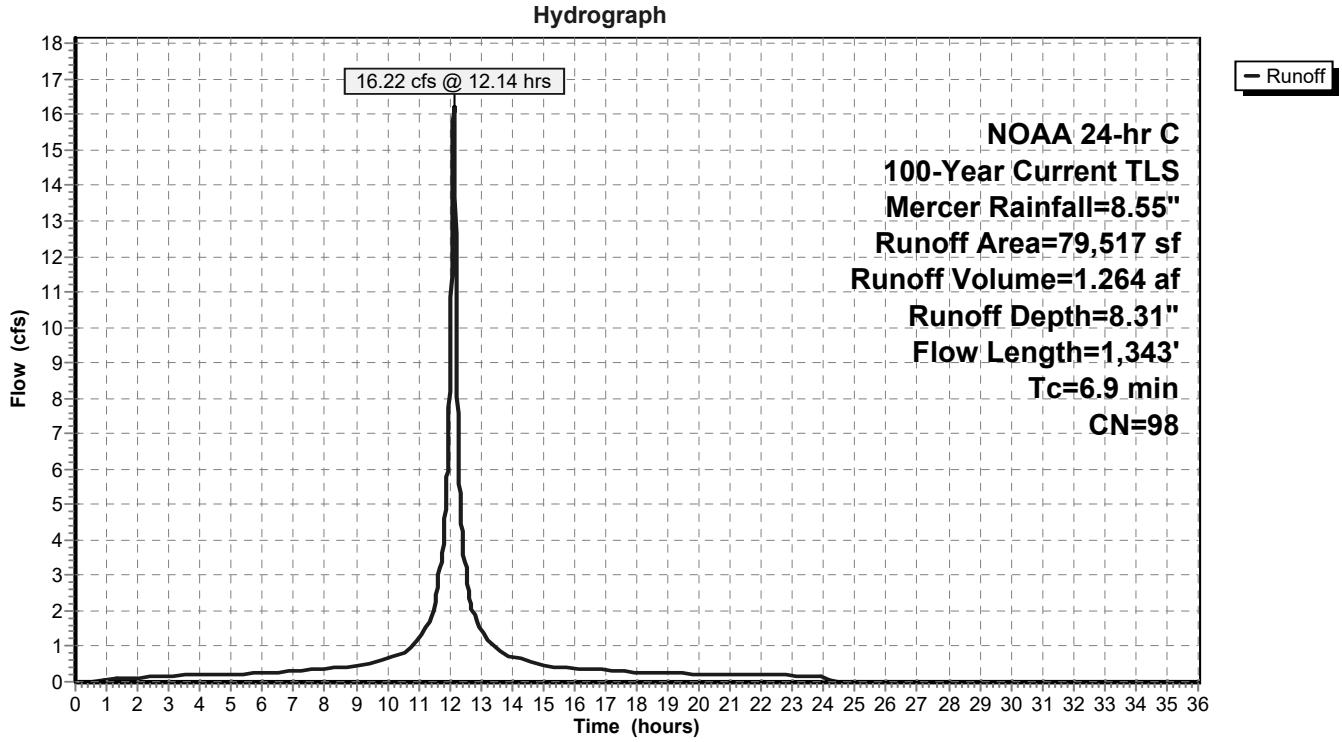
Runoff = 16.22 cfs @ 12.14 hrs, Volume= 1.264 af, Depth= 8.31"
Routed to Link 16L : DA-16 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	13,840	98	Paved parking, HSG B (Vehicular)
*	63,000	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	2,677	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	79,517	98	Weighted Average
	79,517		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	32	0.0100	0.84		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.0	196	0.0050	3.18	1.11	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010
1.4	275	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.2	259	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	340	0.0050	4.20	7.43	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
0.9	200	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
0.5	41	0.0020	1.48	53.16	**Channel Flow,** Area= 36.0 sf Perim= 36.0' r= 1.00' n= 0.045
6.9	1,343	Total			

Subcatchment 16Sb: DA-16b



Summary for Subcatchment 17Sa: DA-17a

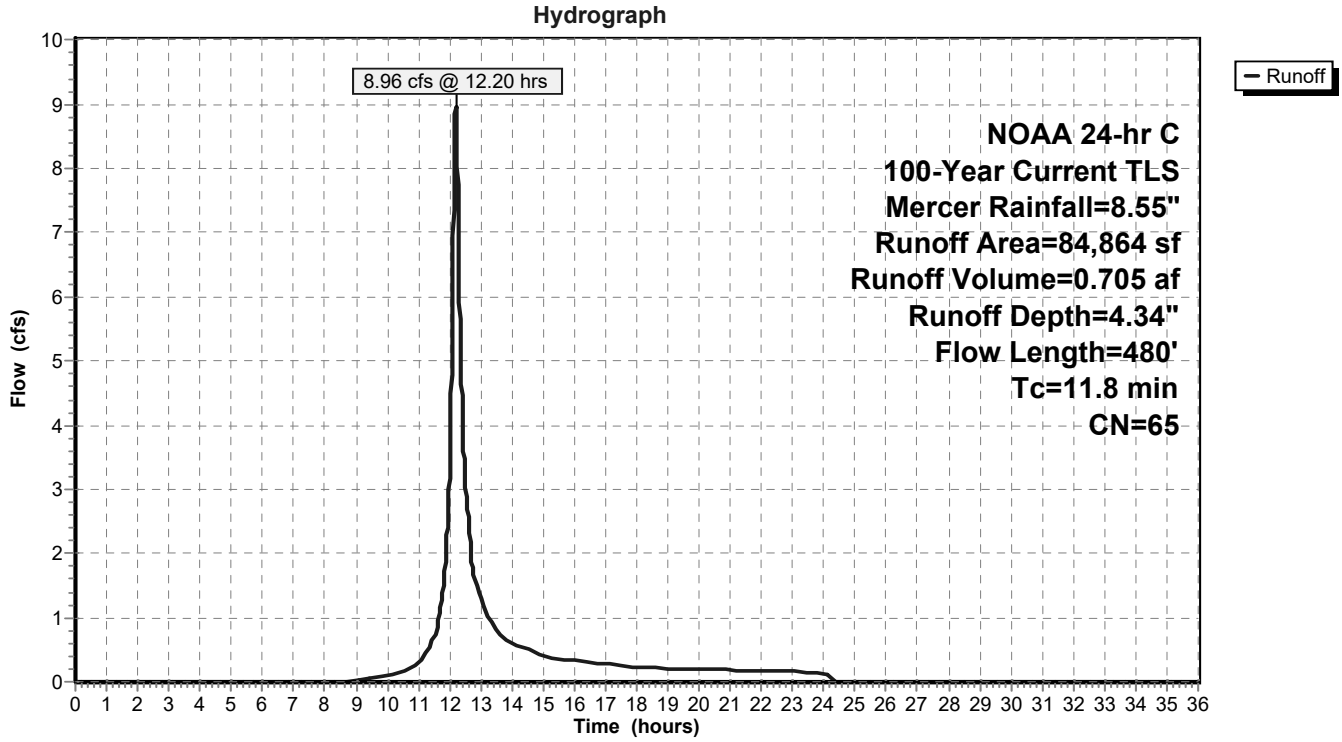
Runoff = 8.96 cfs @ 12.20 hrs, Volume= 0.705 af, Depth= 4.34"
Routed to Link 17L : DA-17 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
21,515	55	Woods, Good, HSG B
31,307	70	Woods, Good, HSG C
1,317	77	Woods, Good, HSG D
21,658	61	>75% Grass cover, Good, HSG B
3,641	74	>75% Grass cover, Good, HSG C
5,426	80	>75% Grass cover, Good, HSG D
84,864	65	Weighted Average
84,864		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	59	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
1.7	173	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	53	0.0130	6.00	7.37	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
11.8	480	Total			

Subcatchment 17Sa: DA-17a



Summary for Subcatchment 17Sb: DA-17b

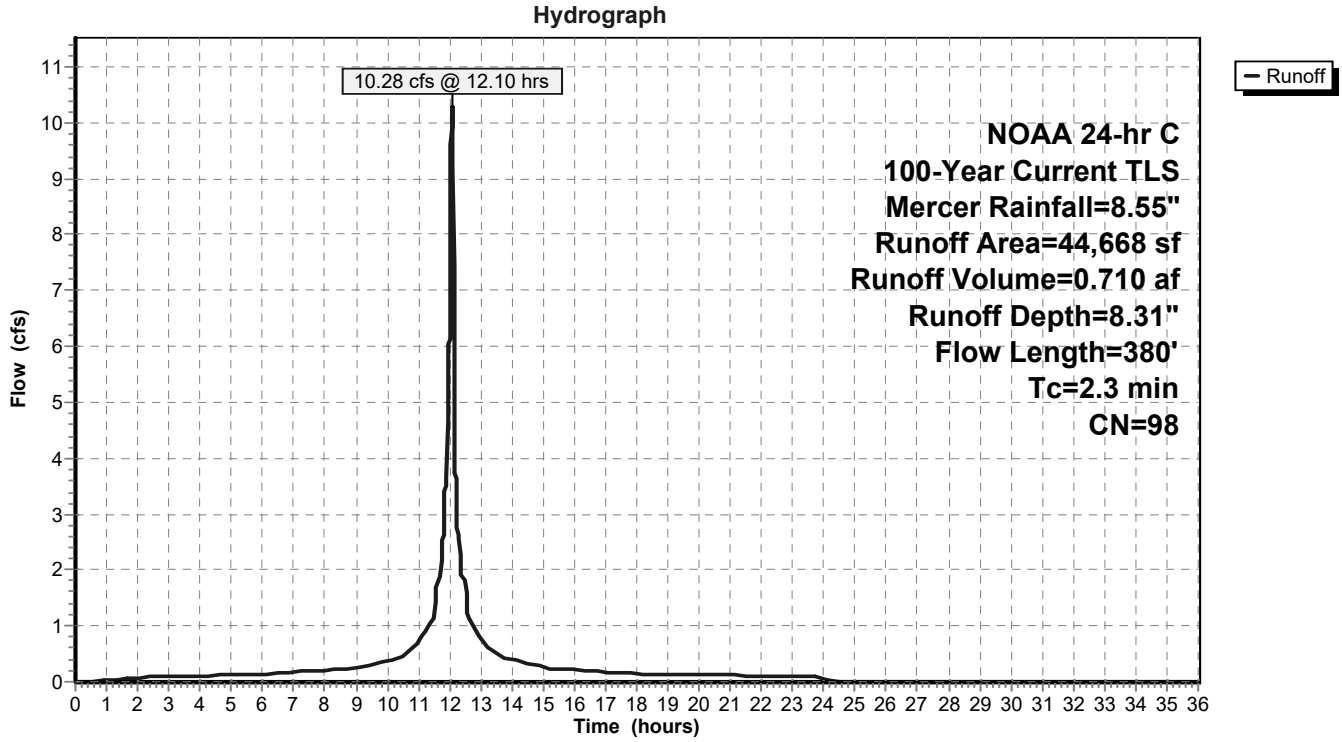
Runoff = 10.28 cfs @ 12.10 hrs, Volume= 0.710 af, Depth= 8.31"
Routed to Link 17L : DA-17 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	12,920	98	Paved parking, HSG B (Vehicular)
*	27,394	98	Roofs & Sidewalks, HSG B (Non Vehicular)
*	1,571	98	Paved parking, HSG C (Vehicular)
*	425	98	Paved parking, HSG D (Vehicular)
*	2,358	98	Roofs & Sidewalks, HSG D (Non Vehicular)
	44,668	98	Weighted Average
	44,668		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0170	1.31		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
0.1	32	0.0590	3.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	53	0.0130	6.00	7.37	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.8	195	0.0360	3.87	23.24	**Channel Flow,** Area= 6.0 sf Perim= 18.0' r= 0.33' n= 0.035
2.3	380	Total			

Subcatchment 17Sb: DA-17b



Summary for Subcatchment 18Sa: DA-18a

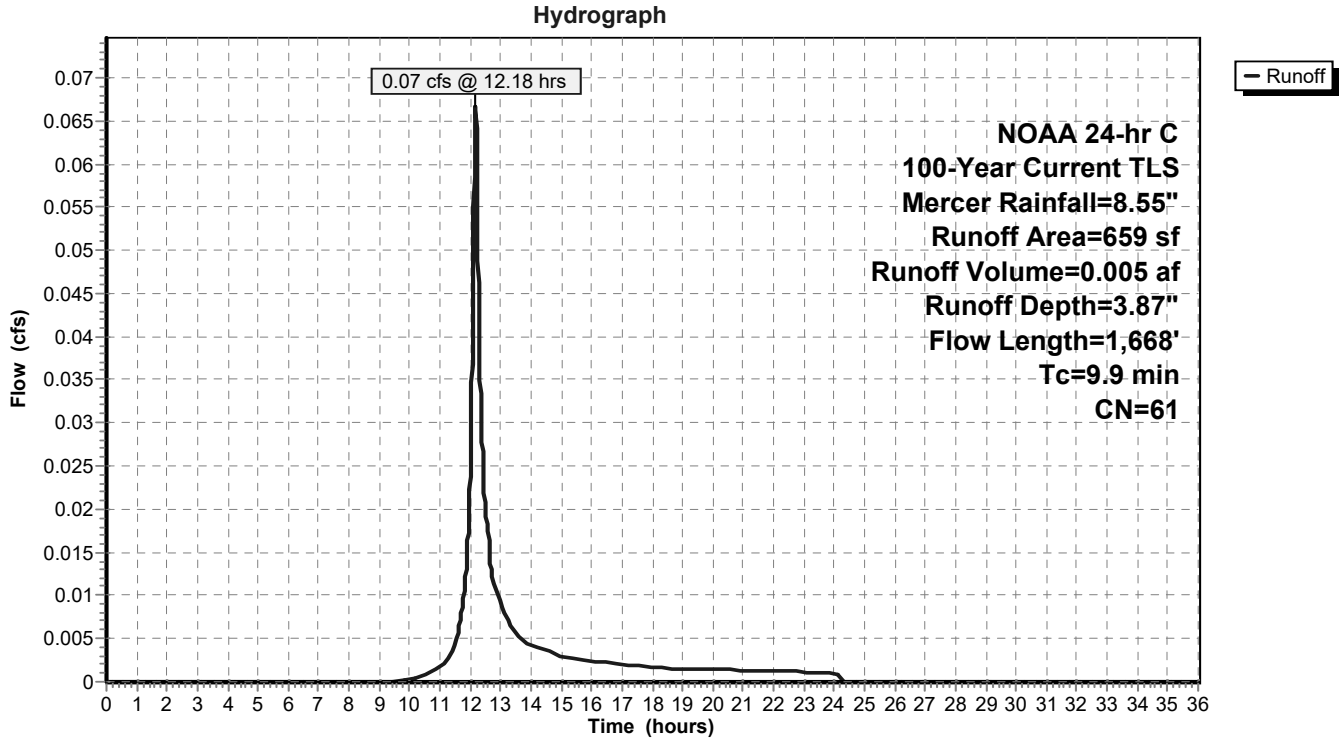
Runoff = 0.07 cfs @ 12.18 hrs, Volume= 0.005 af, Depth= 3.87"
Routed to Link 18L : DA-18 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
659	61	>75% Grass cover, Good, HSG B
659		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	24	0.0200	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31"
1.4	133	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	182	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
9.9	1,668	Total			

Subcatchment 18Sa: DA-18a



Summary for Subcatchment 18Sb: DA-18b

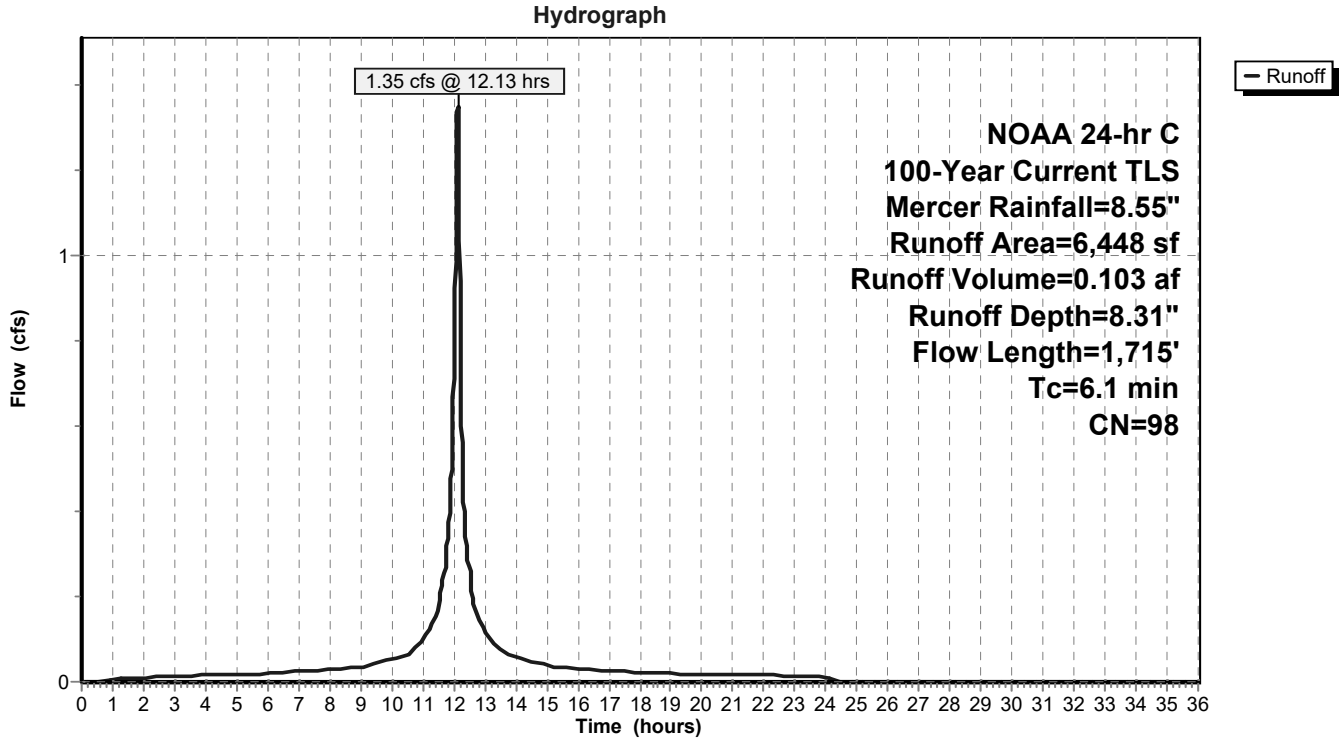
Runoff = 1.35 cfs @ 12.13 hrs, Volume= 0.103 af, Depth= 8.31"
Routed to Link 18L : DA-18 COM HYD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	1,155	98	Paved parking, HSG B (Vehicular)
*	5,293	98	Roofs & Sidewalks, HSG B (Non Vehicular)
	6,448	98	Weighted Average
	6,448		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	52	0.0100	0.93		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.1	133	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	201	0.0070	3.80	2.98	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	224	0.0050	3.72	4.57	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
1.3	729	0.0120	9.15	44.93	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.013
0.9	376	0.0060	7.31	51.66	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013
6.1	1,715	Total			

Subcatchment 18Sb: DA-18b



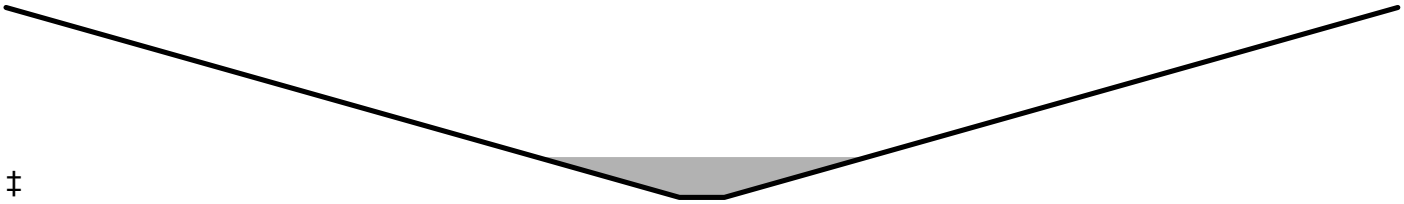
Summary for Reach 19R: Reach to On Stream Pond

Inflow Area = 18.679 ac, 29.01% Impervious, Inflow Depth > 5.23" for 100-Year Current TLS, Mercer event
Inflow = 62.48 cfs @ 12.13 hrs, Volume= 8.138 af
Outflow = 56.34 cfs @ 12.26 hrs, Volume= 8.132 af, Atten= 10%, Lag= 7.6 min
Routed to Link 19L : Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.32 fps, Min. Travel Time= 6.6 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 19.2 min

Peak Storage= 22,416 cf @ 12.26 hrs
Average Depth at Peak Storage= 1.27' , Surface Width= 58.93'
Bank-Full Depth= 6.00' Flow Area= 768.0 sf, Capacity= 2,676.51 cfs

8.00' x 6.00' deep channel, n= 0.045
Side Slope Z-value= 20.0 '/' Top Width= 248.00'
Length= 526.0' Slope= 0.0025 '/'
Inlet Invert= 91.30', Outlet Invert= 90.00'



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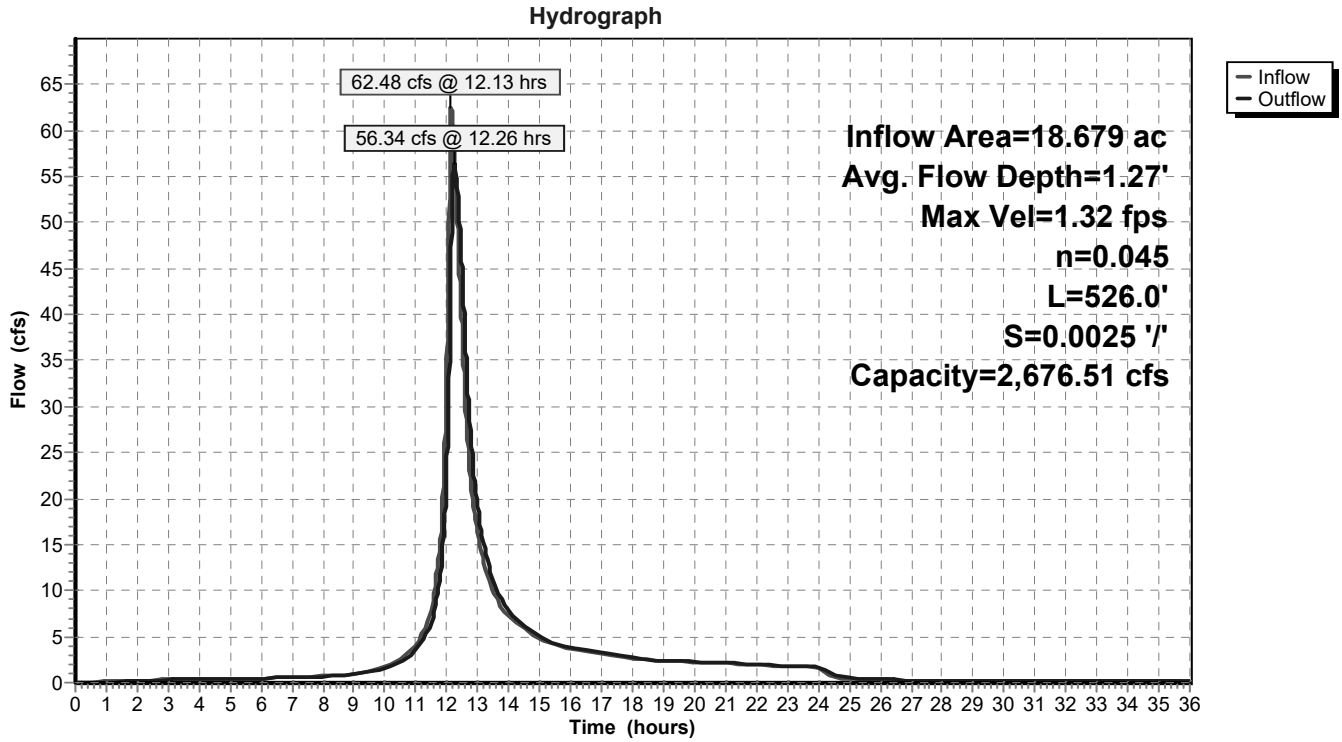
Reach 19R: Reach to On Stream Pond



Summary for Pond 11P: Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Inflow Area = 0.627 ac, 76.57% Impervious, Inflow Depth = 7.27" for 100-Year Current TLS, Mercer event
Inflow = 5.29 cfs @ 12.10 hrs, Volume= 0.380 af
Outflow = 0.57 cfs @ 12.74 hrs, Volume= 0.336 af, Atten= 89%, Lag= 38.5 min
Primary = 0.57 cfs @ 12.74 hrs, Volume= 0.336 af
Routed to Pond 12P : Infiltration Basin 1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 109.96' @ 12.74 hrs Surf.Area= 5,782 sf Storage= 9,592 cf

Plug-Flow detention time= 360.9 min calculated for 0.336 af (89% of inflow)
Center-of-Mass det. time= 302.6 min (1,052.5 - 750.0)

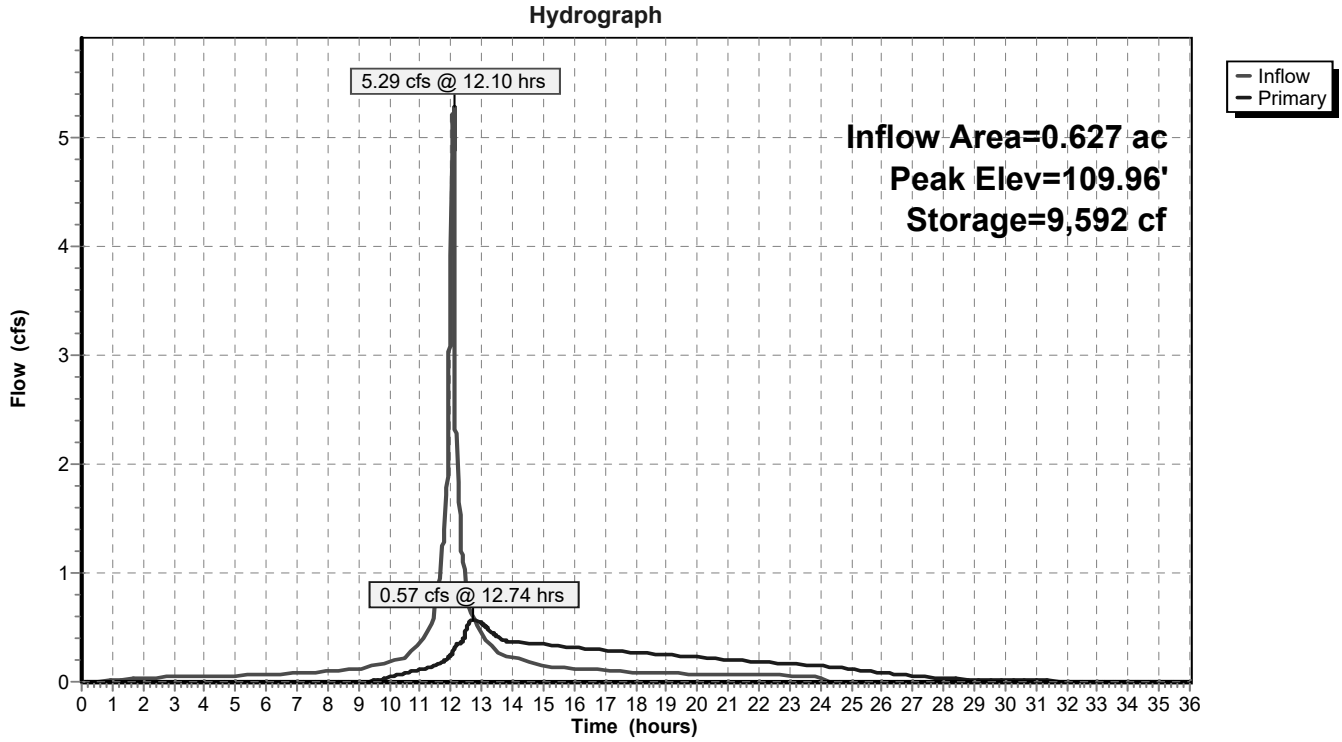
Volume	Invert	Avail.Storage	Storage Description
#1	106.50'	6,813 cf	**Stone Bed (Prismatic)**Listed below (Recalc) 20,237 cf Overall - 3,205 cf Embedded = 17,032 cf x 40.0% Voids
#2	107.00'	942 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 100.0' 1,283 cf Overall - 2.0" Wall Thickness = 942 cf
#3	107.00'	622 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 66.0'
#4	107.00'	377 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 40.0'
#5	107.00'	462 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 49.0'
#6	107.00'	462 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 49.0'
		9,678 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.50	5,782	0	0
110.00	5,782	20,237	20,237

Device	Routing	Invert	Outlet Devices
#1	Primary	107.24'	**3.0" Vert. Lower Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	109.75'	**12.0" Vert. Upper Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.57 cfs @ 12.74 hrs HW=109.96' (Free Discharge)
1=Lower Orifice (Orifice Controls 0.38 cfs @ 7.76 fps)
2=Upper Orifice (Orifice Controls 0.19 cfs @ 1.57 fps)

Pond 11P: Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]



Summary for Pond 12P: Infiltration Basin 1

Inflow Area = 2.580 ac, 31.52% Impervious, Inflow Depth > 4.93" for 100-Year Current TLS, Mercer event
Inflow = 8.21 cfs @ 12.13 hrs, Volume= 1.059 af
Outflow = 3.45 cfs @ 12.52 hrs, Volume= 1.040 af, Atten= 58%, Lag= 23.4 min
Primary = 3.45 cfs @ 12.52 hrs, Volume= 1.040 af
Routed to Reach 19R : Reach to On Stream Pond

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 104.68' @ 12.52 hrs Surf.Area= 8,110 sf Storage= 10,439 cf

Plug-Flow detention time= 75.7 min calculated for 1.040 af (98% of inflow)
Center-of-Mass det. time= 61.6 min (960.2 - 898.6)

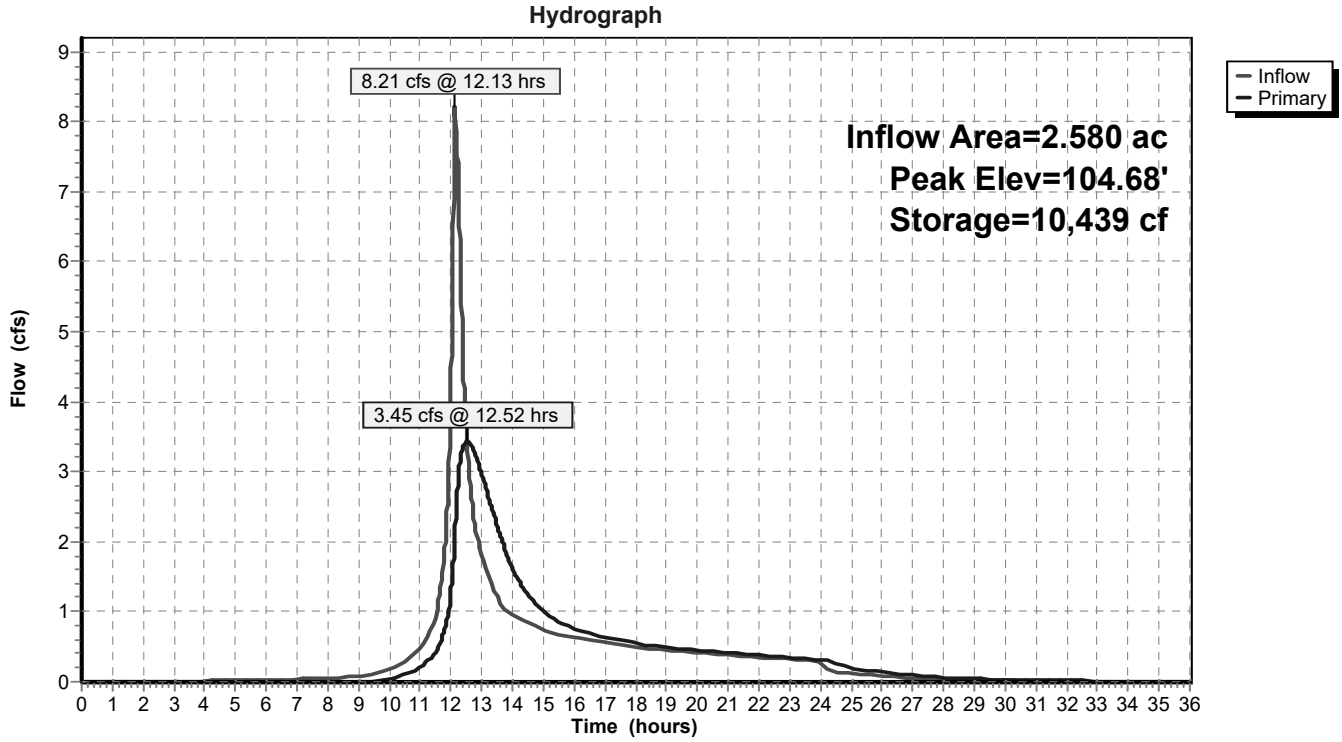
Volume	Invert	Avail.Storage	Storage Description
#1	103.10'	17,202 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.10	5,155	0	0
104.00	6,832	5,394	5,394
105.00	8,725	7,779	13,173
105.43	10,016	4,029	17,202

Device	Routing	Invert	Outlet Devices
#1	Primary	103.24'	**0.9' long Rectangular Weir** 2 End Contraction(s)
#2	Primary	104.75'	**40.0' long + 8.0 '/' SideZ x 10.0' breadth Emergency Spillway**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=3.45 cfs @ 12.52 hrs HW=104.68' (Free Discharge)
1=Rectangular Weir (Weir Controls 3.45 cfs @ 3.92 fps)
2=Emergency Spillway (Controls 0.00 cfs)

Pond 12P: Infiltration Basin 1



Summary for Pond 14P: Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

Inflow Area = 1.266 ac, 68.06% Impervious, Inflow Depth = 6.93" for 100-Year Current TLS, Mercer event
Inflow = 9.98 cfs @ 12.10 hrs, Volume= 0.731 af
Outflow = 3.06 cfs @ 12.31 hrs, Volume= 0.615 af, Atten= 69%, Lag= 12.5 min
Primary = 3.06 cfs @ 12.31 hrs, Volume= 0.615 af
Routed to Reach 19R : Reach to On Stream Pond

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 100.26' @ 12.31 hrs Surf.Area= 8,359 sf Storage= 16,250 cf

Plug-Flow detention time= 426.3 min calculated for 0.615 af (84% of inflow)
Center-of-Mass det. time= 353.8 min (1,110.1 - 756.3)

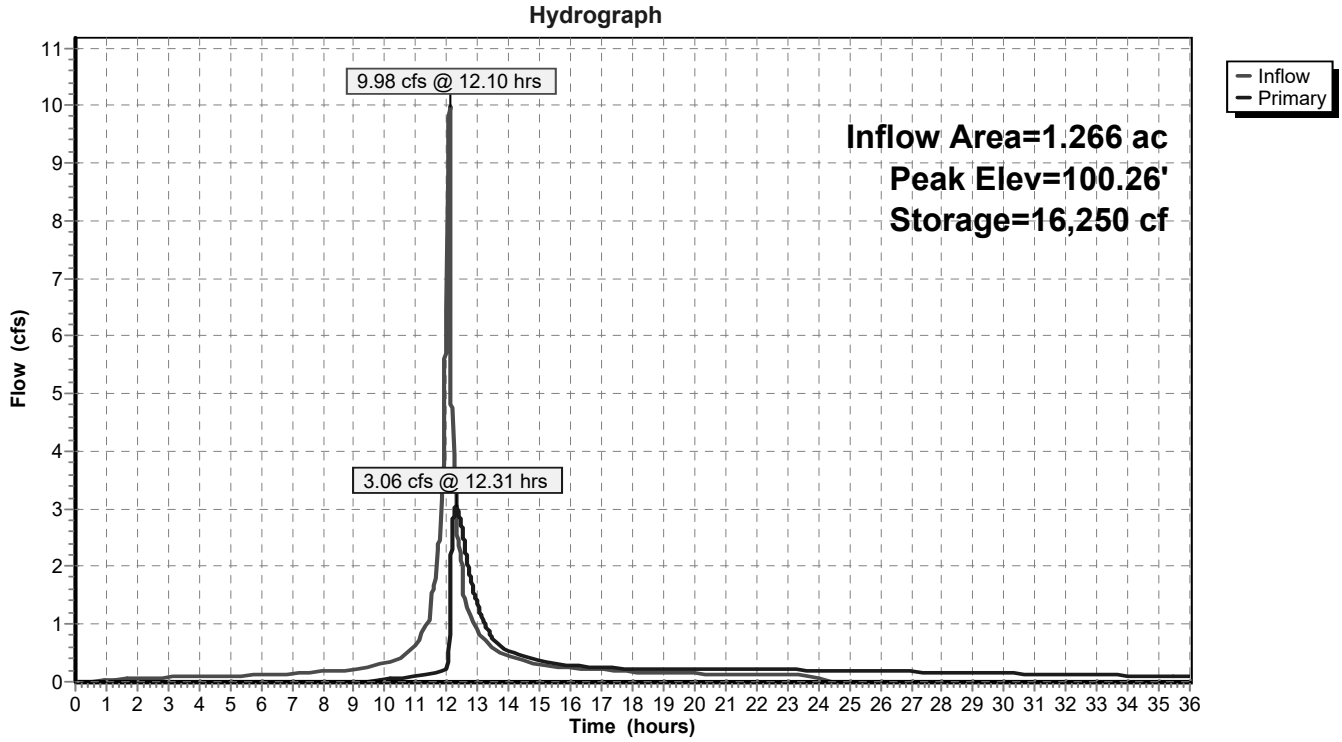
Volume	Invert	Avail.Storage	Storage Description
#1	96.30'	9,272 cf	**Lower Section Stone Bed-Perforated Pipes (Prismatic)** Listed below (Reca 33,436 cf Overall - 10,257 cf Embedded = 23,179 cf x 40.0% Voids
#2	97.05'	2,916 cf	**30.0" Round Perforated Pipes** x 6 Inside #1 L= 99.0' 4,199 cf Overall - 3.0" Wall Thickness = 2,916 cf
#3	97.05'	1,149 cf	**30.0" Round Perforated Pipes** x 3 Inside #1 L= 78.0' 1,654 cf Overall - 3.0" Wall Thickness = 1,149 cf
#4	97.05'	928 cf	**30.0" Round Perforated Pipes** x 3 Inside #1 L= 63.0' 1,336 cf Overall - 3.0" Wall Thickness = 928 cf
#5	97.05'	2,130 cf	**30.0" Round Perforated Pipes** Inside #1 L= 434.0' 3,068 cf Overall - 3.0" Wall Thickness = 2,130 cf
		16,394 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
96.30	8,359	0	0
100.30	8,359	33,436	33,436

Device	Routing	Invert	Outlet Devices
#1	Primary	97.29'	**2.5" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	99.30'	**1.1' long Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=3.06 cfs @ 12.31 hrs HW=100.26' (Free Discharge)
1=Orifice (Orifice Controls 0.28 cfs @ 8.15 fps)
2=Rectangular Weir (Weir Controls 2.78 cfs @ 3.20 fps)

Pond 14P: Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

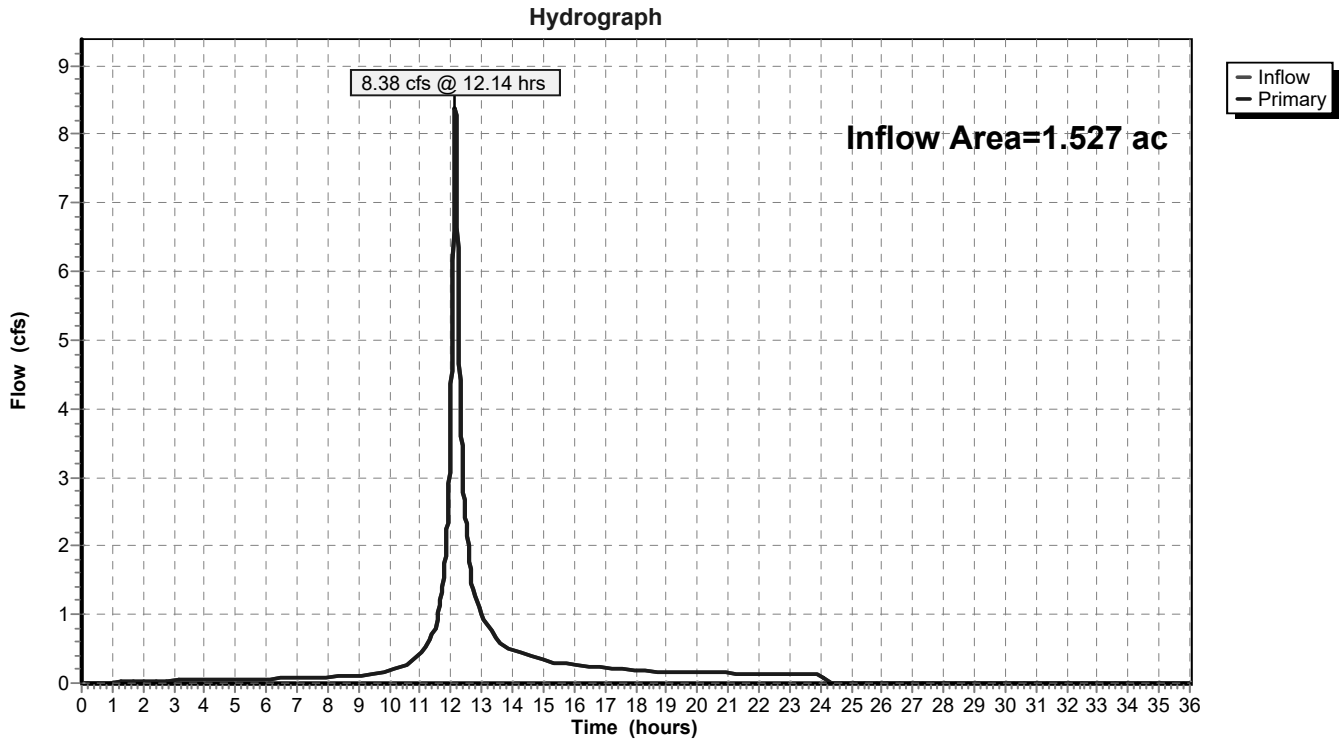


Summary for Link 13L: DA-13 COM HYD [MTD 1A&1B]

Inflow Area = 1.527 ac, 30.11% Impervious, Inflow Depth = 5.21" for 100-Year Current TLS, Mercer event
Inflow = 8.38 cfs @ 12.14 hrs, Volume= 0.662 af
Primary = 8.38 cfs @ 12.14 hrs, Volume= 0.662 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 19R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 13L: DA-13 COM HYD [MTD 1A&1B]

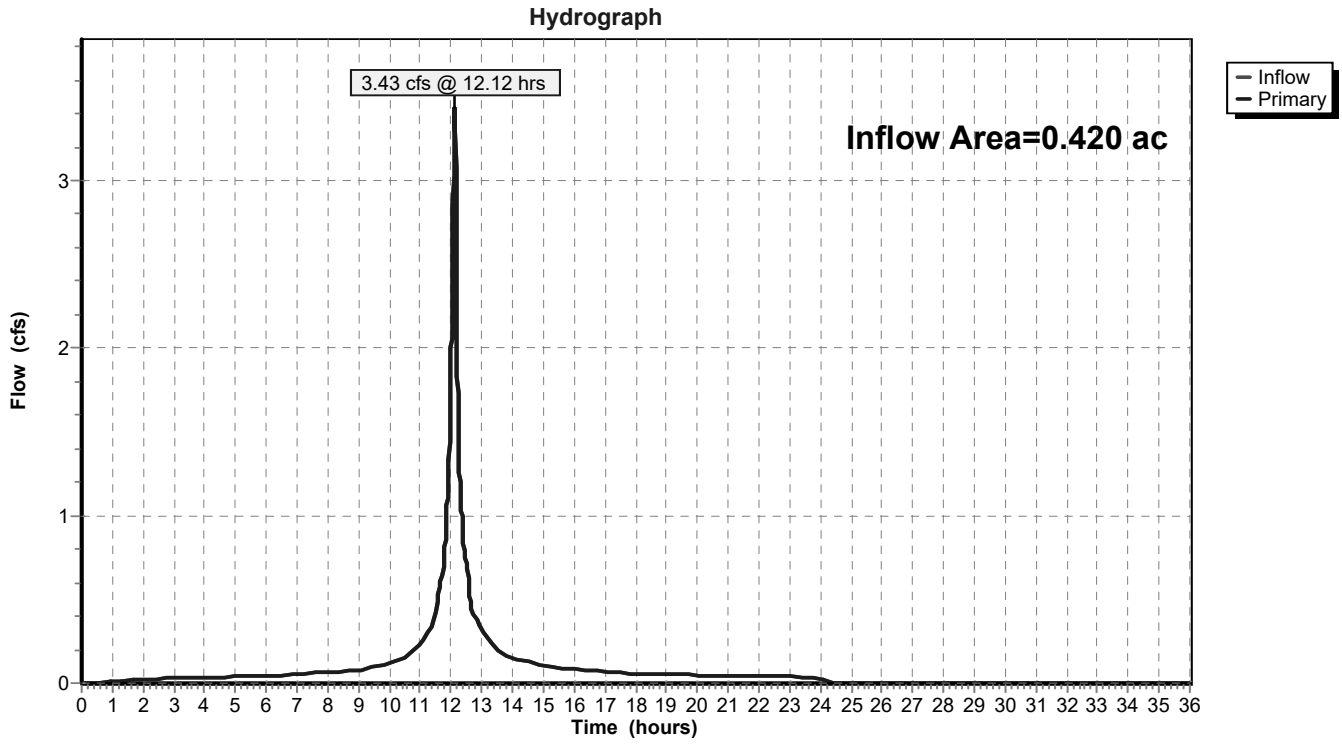


Summary for Link 15L: DA-15 COM HYD

Inflow Area = 0.420 ac, 78.24% Impervious, Inflow Depth = 7.34" for 100-Year Current TLS, Mercer event
Inflow = 3.43 cfs @ 12.12 hrs, Volume= 0.257 af
Primary = 3.43 cfs @ 12.12 hrs, Volume= 0.257 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 19R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 15L: DA-15 COM HYD

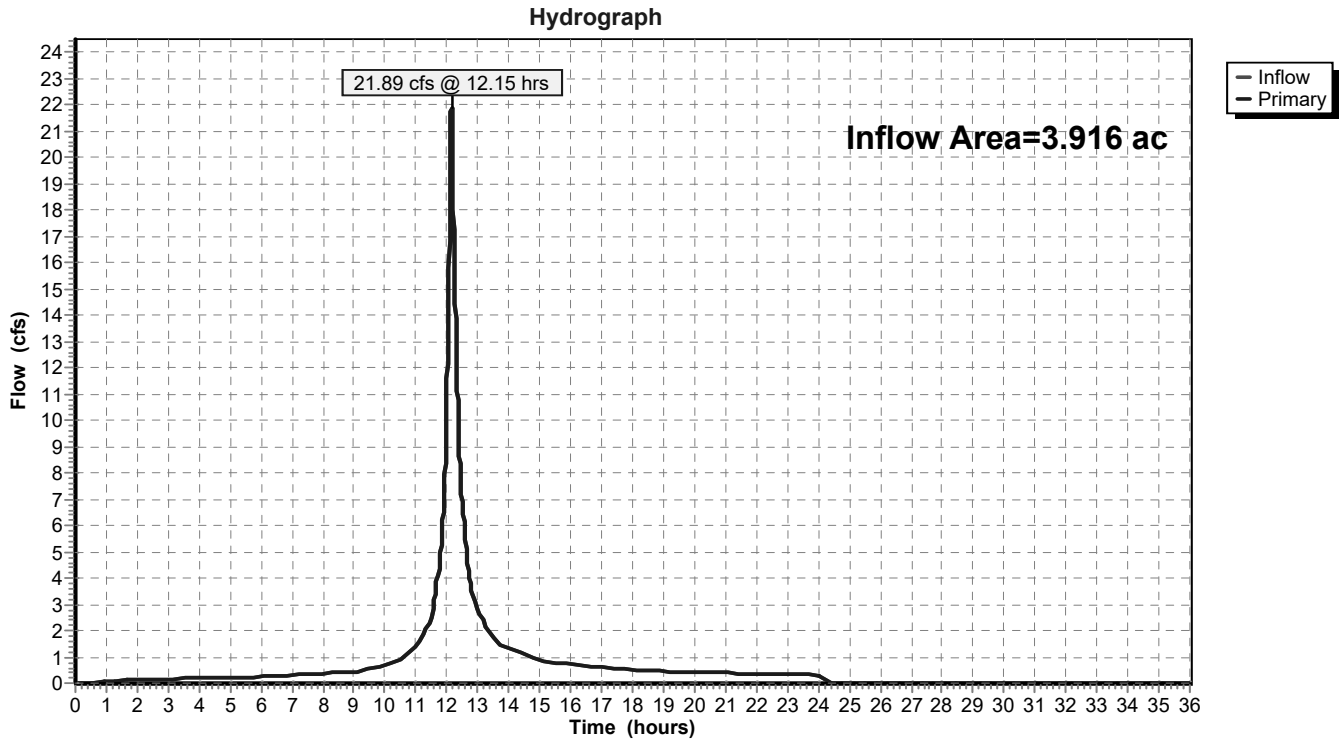


Summary for Link 16L: DA-16 COM HYD

Inflow Area = 3.916 ac, 46.62% Impervious, Inflow Depth = 5.88" for 100-Year Current TLS, Mercer event
Inflow = 21.89 cfs @ 12.15 hrs, Volume= 1.918 af
Primary = 21.89 cfs @ 12.15 hrs, Volume= 1.918 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 19R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 16L: DA-16 COM HYD

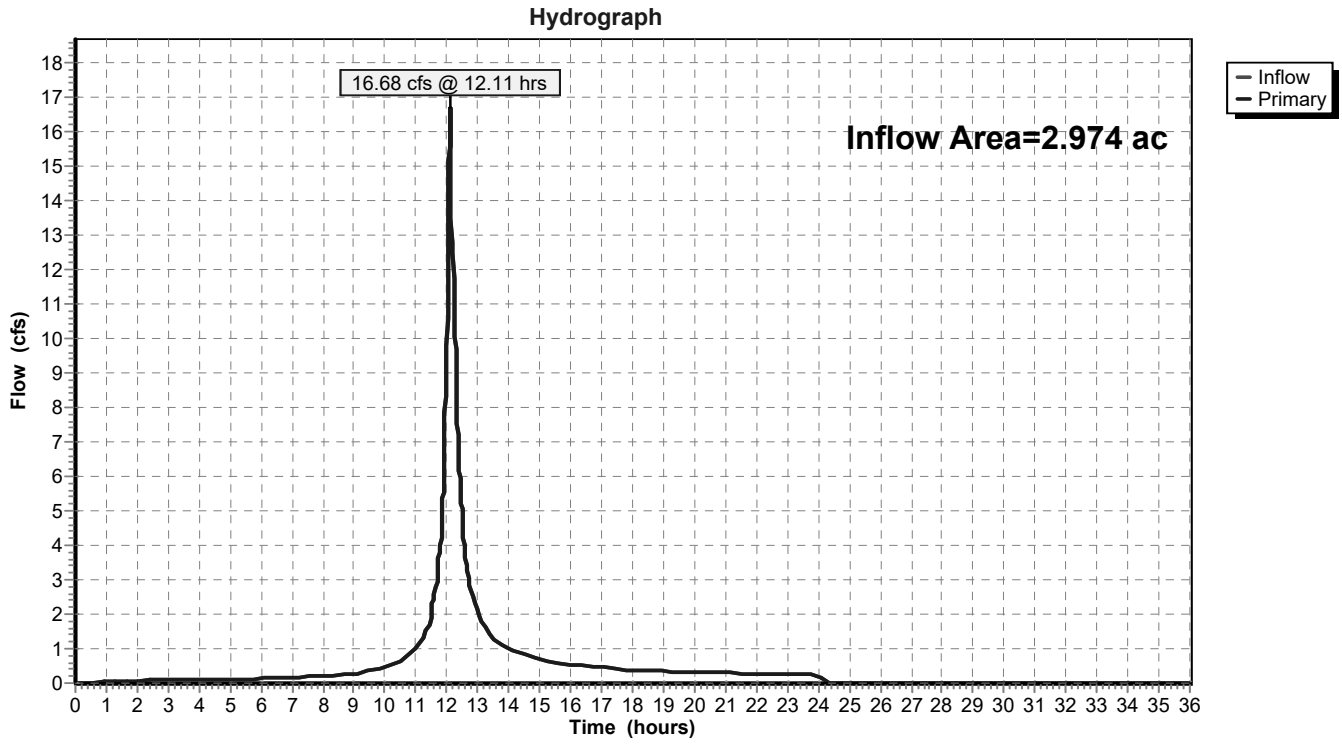


Summary for Link 17L: DA-17 COM HYD

Inflow Area = 2.974 ac, 34.48% Impervious, Inflow Depth = 5.71" for 100-Year Current TLS, Mercer event
Inflow = 16.68 cfs @ 12.11 hrs, Volume= 1.415 af
Primary = 16.68 cfs @ 12.11 hrs, Volume= 1.415 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 19R : Reach to On Stream Pond

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 17L: DA-17 COM HYD

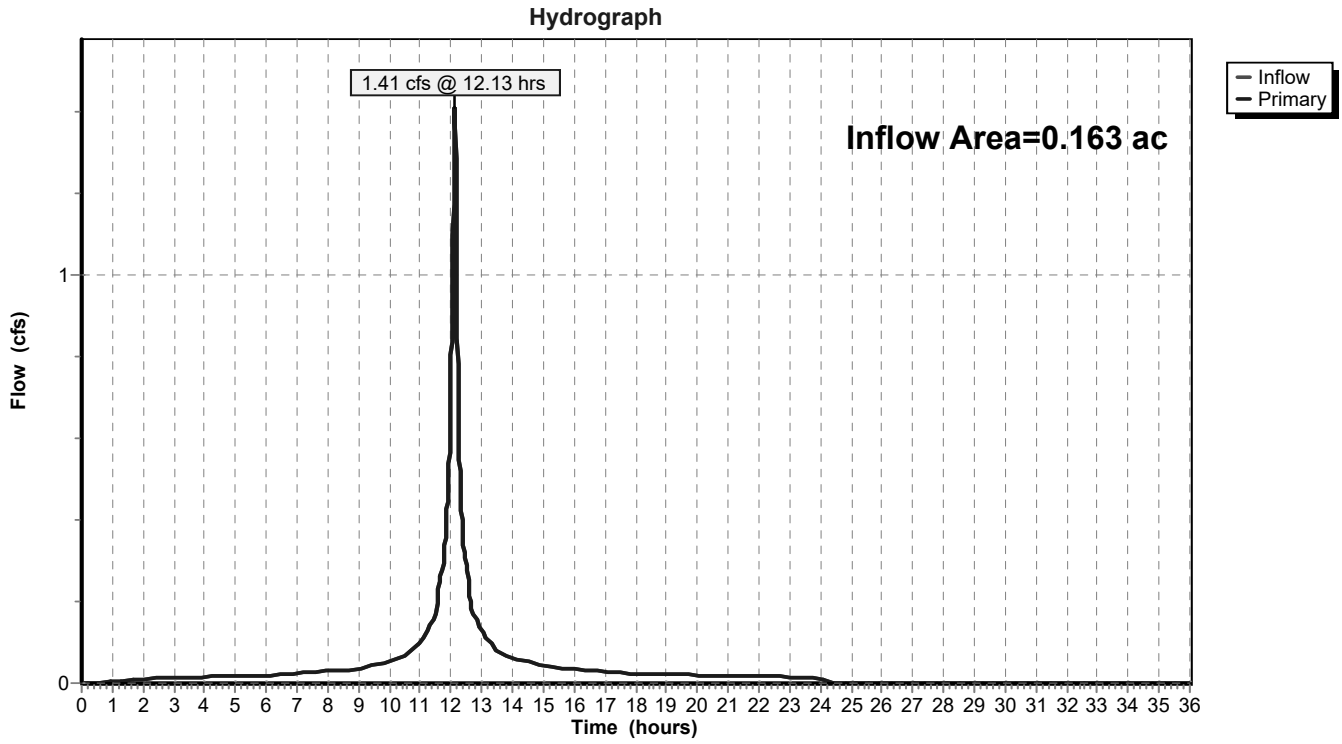


Summary for Link 18L: DA-18 COM HYD

Inflow Area = 0.163 ac, 90.73% Impervious, Inflow Depth = 7.90" for 100-Year Current TLS, Mercer event
Inflow = 1.41 cfs @ 12.13 hrs, Volume= 0.107 af
Primary = 1.41 cfs @ 12.13 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min
Routed to Link 19L : Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 18L: DA-18 COM HYD

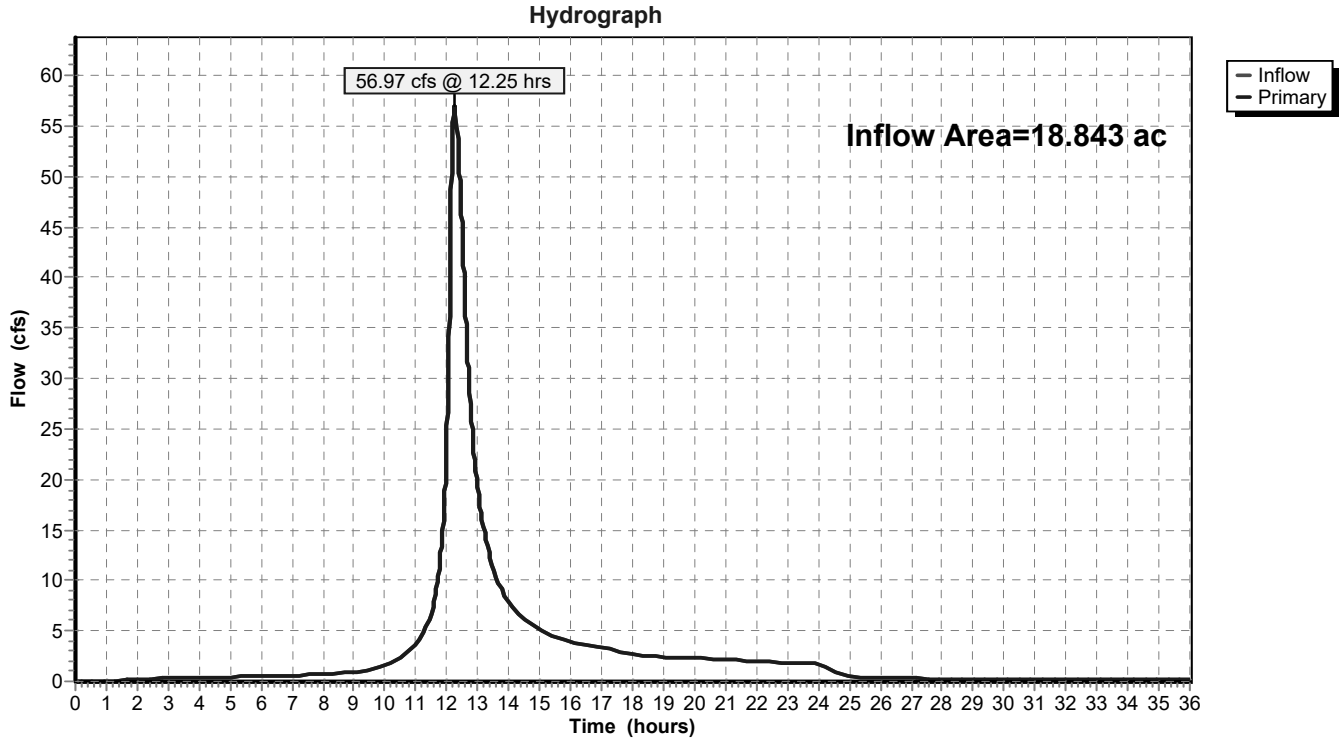


Summary for Link 19L: Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysi

Inflow Area = 18.843 ac, 29.55% Impervious, Inflow Depth > 5.25" for 100-Year Current TLS, Mercer event
Inflow = 56.97 cfs @ 12.25 hrs, Volume= 8.240 af
Primary = 56.97 cfs @ 12.25 hrs, Volume= 8.240 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 19L: Proposed: Two, 10- & 100-yr; COM HYD @ On Stream Pond [Point of Analysis]



EMERGENCY SPILLWAY

22-019 Spillway R0 (10-24-23)
Prepared by The Reynolds Group, Inc
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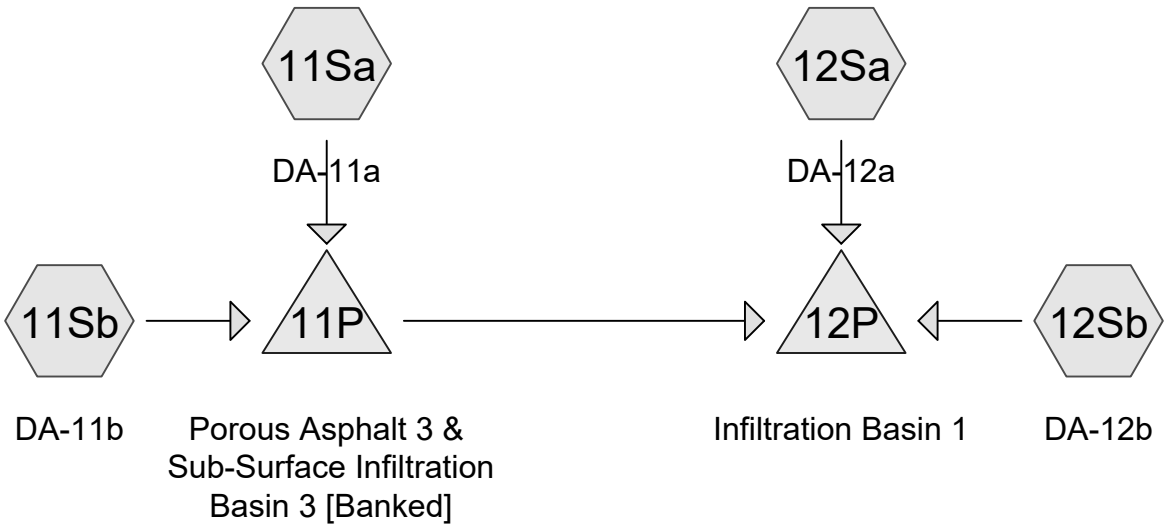


Subcat Reach Pond Link

Routing Diagram for 22-019 Spillway R0 (10-24-23)
Prepared by The Reynolds Group, Inc
HydroCAD® 10.20-2g s/n 03506 © 2022 HydroCAD Software Solutions LLC

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

Subcatchment 11Sa: DA-11a Runoff Area=6,399 sf 0.00% Impervious Runoff Depth=3.87"
Flow Length=71' Slope=0.0130 '/' Tc=9.5 min CN=61 Runoff=0.65 cfs 0.047 af

Subcatchment 11Sb: DA-11b Runoff Area=20,908 sf 100.00% Impervious Runoff Depth=8.31"
Flow Length=52' Slope=0.0150 '/' Tc=0.8 min CN=98 Runoff=4.82 cfs 0.332 af

Subcatchment 12Sa: DA-12a Runoff Area=65,962 sf 0.00% Impervious Runoff Depth=3.63"
Flow Length=913' Tc=13.8 min CN=59 Runoff=5.43 cfs 0.459 af

Subcatchment 12Sb: DA-12b Runoff Area=19,134 sf 75.87% Impervious Runoff Depth=7.23"
Flow Length=797' Tc=4.3 min CN=89 Runoff=4.04 cfs 0.265 af

Pond 11P: Porous Asphalt 3 & Sub-Surface Peak Elev=109.96' Storage=9,592 cf Inflow=5.29 cfs 0.380 af
Outflow=0.57 cfs 0.336 af

Pond 12P: Infiltration Basin 1 Peak Elev=104.91' Storage=12,360 cf Inflow=8.21 cfs 1.059 af
Outflow=6.30 cfs 0.806 af

Total Runoff Area = 2.580 ac Runoff Volume = 1.103 af Average Runoff Depth = 5.13"
68.48% Pervious = 1.767 ac 31.52% Impervious = 0.813 ac

Summary for Subcatchment 11Sa: DA-11a

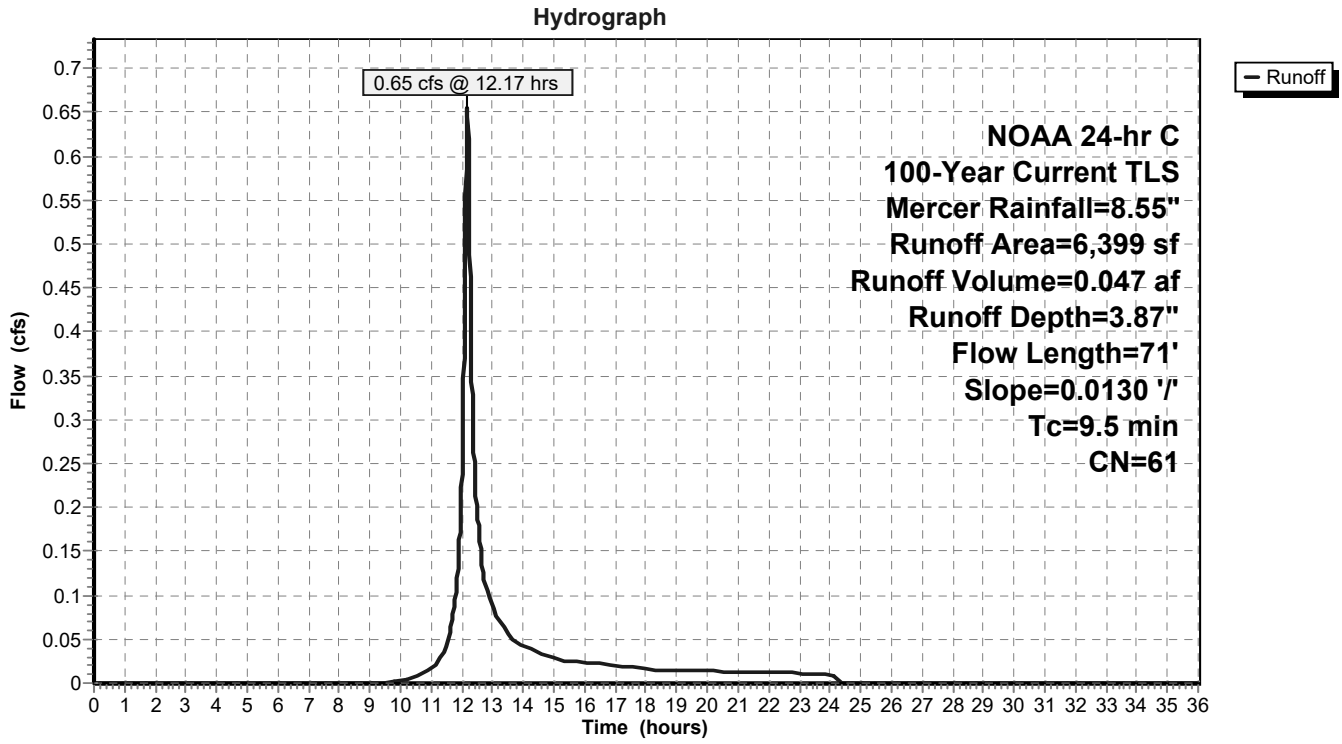
Runoff = 0.65 cfs @ 12.17 hrs, Volume= 0.047 af, Depth= 3.87"
Routed to Pond 11P : Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
6,399	61	>75% Grass cover, Good, HSG B
6,399		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
0.2	23	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.5	71	Total			

Subcatchment 11Sa: DA-11a



Summary for Subcatchment 11Sb: DA-11b

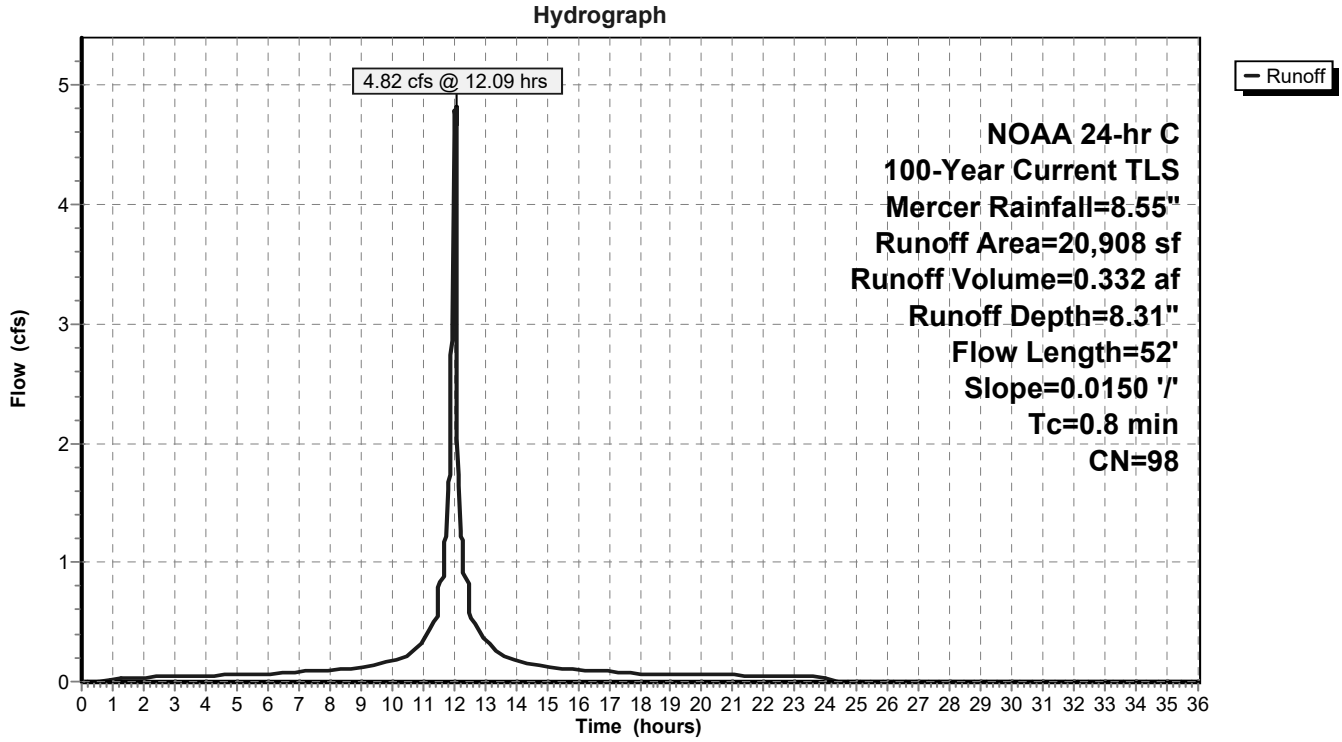
Runoff = 4.82 cfs @ 12.09 hrs, Volume= 0.332 af, Depth= 8.31"
Routed to Pond 11P : Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	20,908	98	Paved parking, HSG B (Vehicular)
	20,908		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	52	0.0150	1.09		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"

Subcatchment 11Sb: DA-11b



Summary for Subcatchment 12Sa: DA-12a

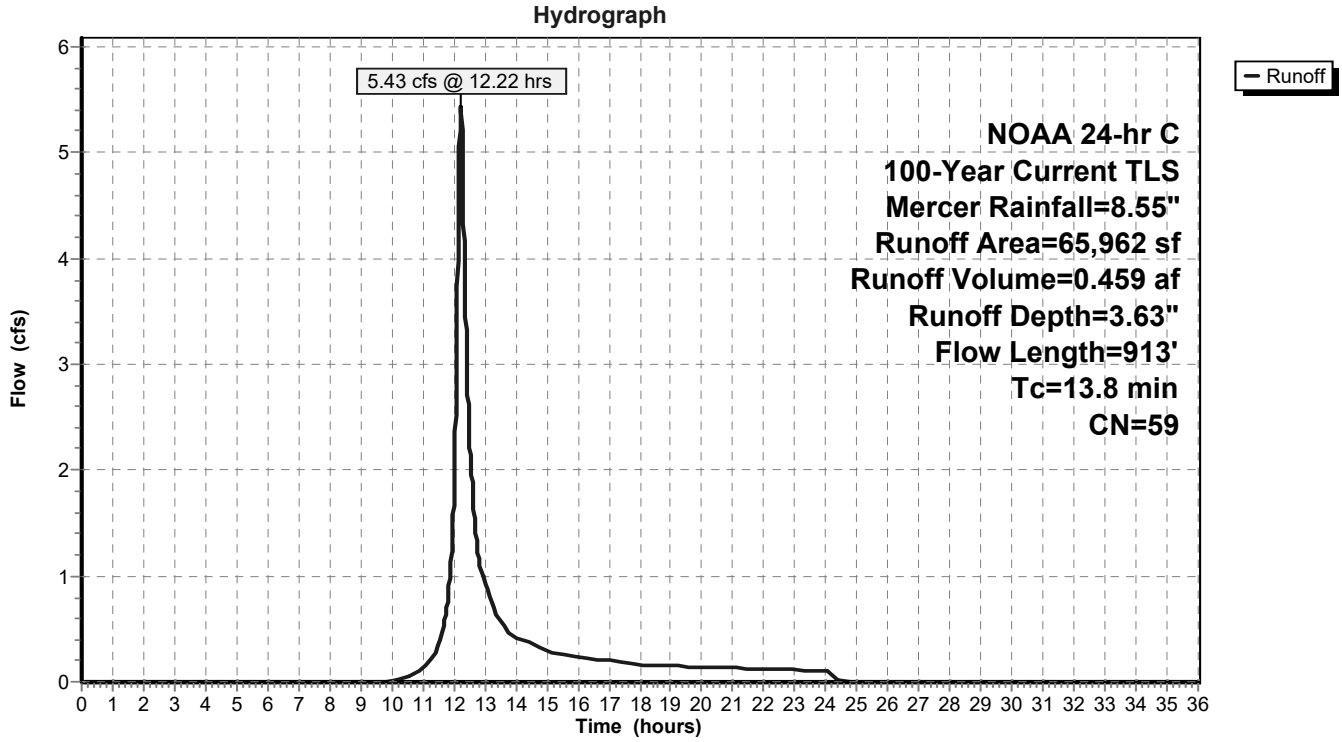
Runoff = 5.43 cfs @ 12.22 hrs, Volume= 0.459 af, Depth= 3.63"
Routed to Pond 12P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

Area (sf)	CN	Description
16,889	55	Woods, Good, HSG B
49,073	61	>75% Grass cover, Good, HSG B
65,962	59	Weighted Average
65,962		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	25	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.31" Using McCuen-Spiess flow length
1.3	141	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	143	0.0080	1.82		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	159	0.0050	4.03	4.95	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	445	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
13.8	913	Total			

Subcatchment 12Sa: DA-12a



Summary for Subcatchment 12Sb: DA-12b

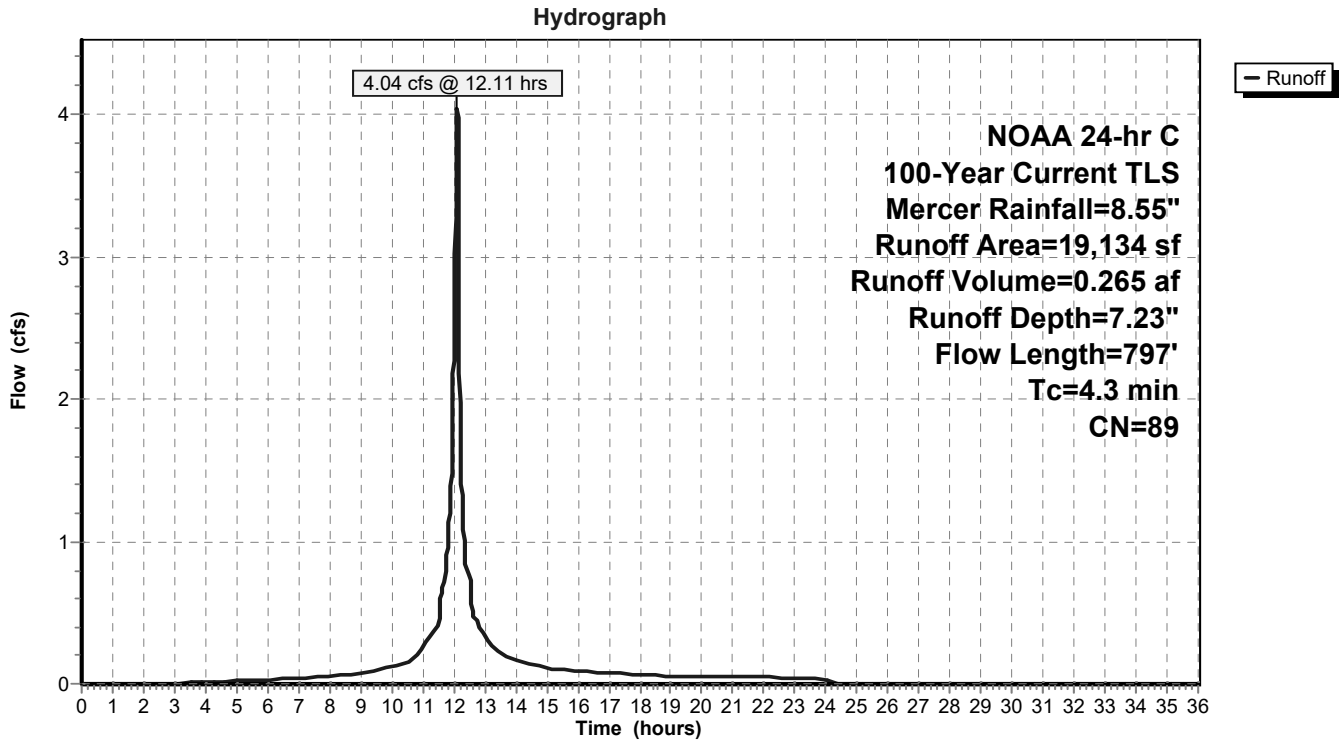
Runoff = 4.04 cfs @ 12.11 hrs, Volume= 0.265 af, Depth= 7.23"
Routed to Pond 12P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Current TLS, Mercer Rainfall=8.55"

	Area (sf)	CN	Description
*	14,517	98	Paved parking, HSG B (Vehicular)
*	4,617	61	Sidewalks, HSG B (Non Vehicular)
	19,134	89	Weighted Average
	4,617		24.13% Pervious Area
	14,517		75.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.15		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.0	104	0.0070	1.70		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	159	0.0050	4.03	4.95	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	445	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
4.3	797	Total			

Subcatchment 12Sb: DA-12b



Summary for Pond 11P: Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Inflow Area = 0.627 ac, 76.57% Impervious, Inflow Depth = 7.27" for 100-Year Current TLS, Mercer event
Inflow = 5.29 cfs @ 12.10 hrs, Volume= 0.380 af
Outflow = 0.57 cfs @ 12.74 hrs, Volume= 0.336 af, Atten= 89%, Lag= 38.5 min
Primary = 0.57 cfs @ 12.74 hrs, Volume= 0.336 af
Routed to Pond 12P : Infiltration Basin 1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 109.96' @ 12.74 hrs Surf.Area= 5,782 sf Storage= 9,592 cf

Plug-Flow detention time= 360.9 min calculated for 0.336 af (89% of inflow)
Center-of-Mass det. time= 302.6 min (1,052.5 - 750.0)

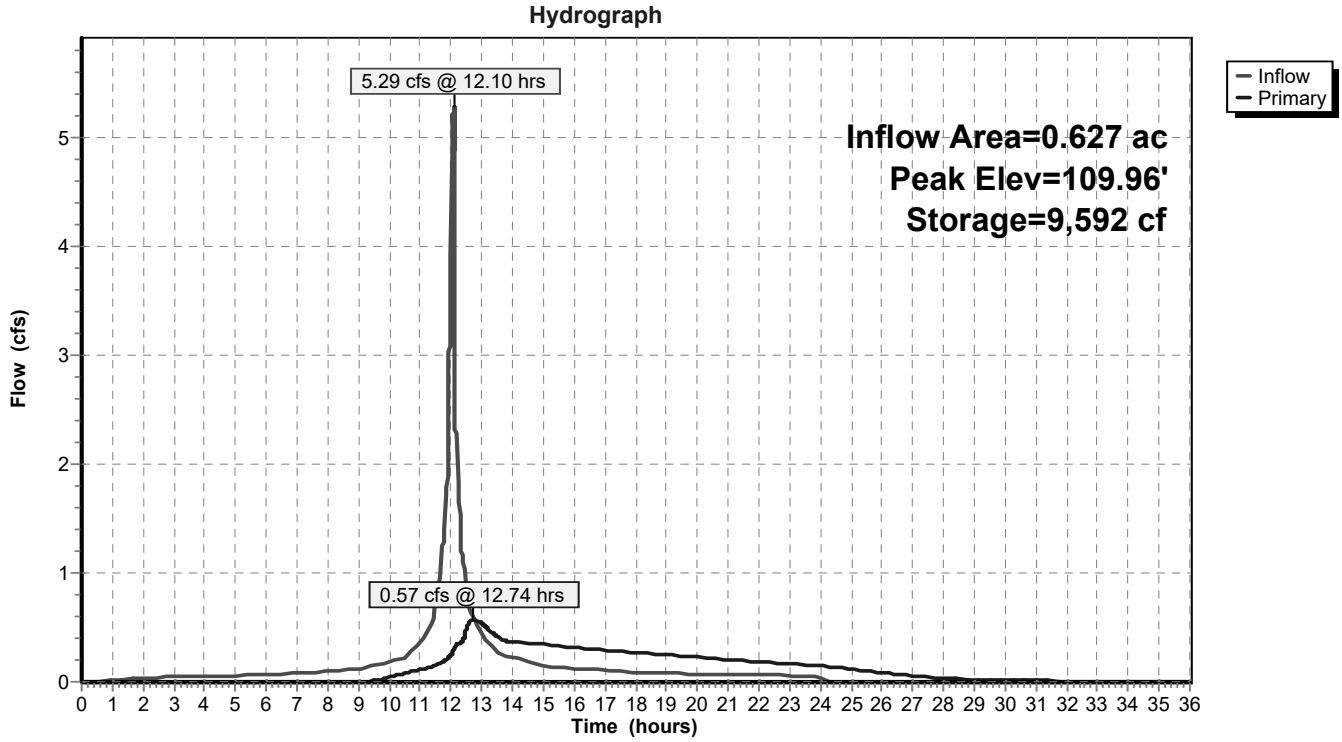
Volume	Invert	Avail.Storage	Storage Description
#1	106.50'	6,813 cf	**Stone Bed (Prismatic)**Listed below (Recalc) 20,237 cf Overall - 3,205 cf Embedded = 17,032 cf x 40.0% Voids
#2	107.00'	942 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 100.0' 1,283 cf Overall - 2.0" Wall Thickness = 942 cf
#3	107.00'	622 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 66.0'
#4	107.00'	377 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 40.0'
#5	107.00'	462 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 49.0'
#6	107.00'	462 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 49.0'
		9,678 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.50	5,782	0	0
110.00	5,782	20,237	20,237

Device	Routing	Invert	Outlet Devices
#1	Primary	107.24'	**3.0" Vert. Lower Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	109.75'	**12.0" Vert. Upper Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.57 cfs @ 12.74 hrs HW=109.96' (Free Discharge)
1=Lower Orifice (Orifice Controls 0.38 cfs @ 7.76 fps)
2=Upper Orifice (Orifice Controls 0.19 cfs @ 1.57 fps)

Pond 11P: Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]



Summary for Pond 12P: Infiltration Basin 1

Blocked Outlet Control Structure

Inflow Area = 2.580 ac, 31.52% Impervious, Inflow Depth > 4.93" for 100-Year Current TLS, Mercer event
Inflow = 8.21 cfs @ 12.13 hrs, Volume= 1.059 af
Outflow = 6.30 cfs @ 12.29 hrs, Volume= 0.806 af, Atten= 23%, Lag= 9.5 min
Primary = 6.30 cfs @ 12.29 hrs, Volume= 0.806 af
Routed to nonexistent node 19R

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 104.91' @ 12.29 hrs Surf.Area= 8,547 sf Storage= 12,360 cf

Plug-Flow detention time= 193.6 min calculated for 0.805 af (76% of inflow)
Center-of-Mass det. time= 75.0 min (973.5 - 898.6)

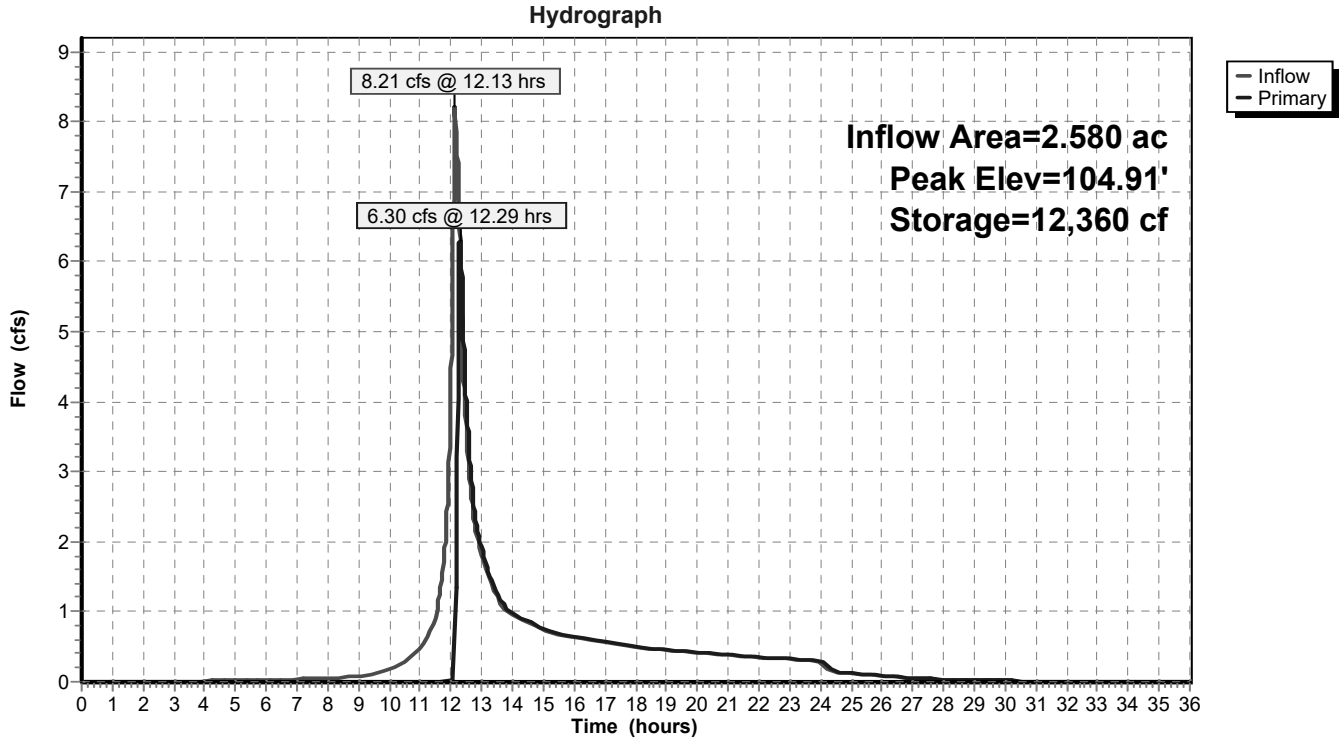
Volume	Invert	Avail.Storage	Storage Description
#1	103.10'	17,202 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.10	5,155	0	0
104.00	6,832	5,394	5,394
105.00	8,725	7,779	13,173
105.43	10,016	4,029	17,202

Device	Routing	Invert	Outlet Devices
#1	Primary	103.24'	**0.9' long Rectangular Weir X 0.00** 2 End Contraction(s)
#2	Primary	104.75'	**40.0' long + 8.0 '/' SideZ x 10.0' breadth Emergency Spillway**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=6.28 cfs @ 12.29 hrs HW=104.91' (Free Discharge)
1=Rectangular Weir (Controls 0.00 cfs)
2=Emergency Spillway (Weir Controls 6.28 cfs @ 0.98 fps)

Pond 12P: Infiltration Basin 1



APPENDIX C

WATER QUALITY DESIGN

HydroCAD® Routing for W.Q. Design Storm

Filterra BioScape Bioretention System Data (MTD 1A & 1B)

Porous Asphalt Design

22-019 Water Quality (10-24-23)
Prepared by The Reynolds Group, Inc
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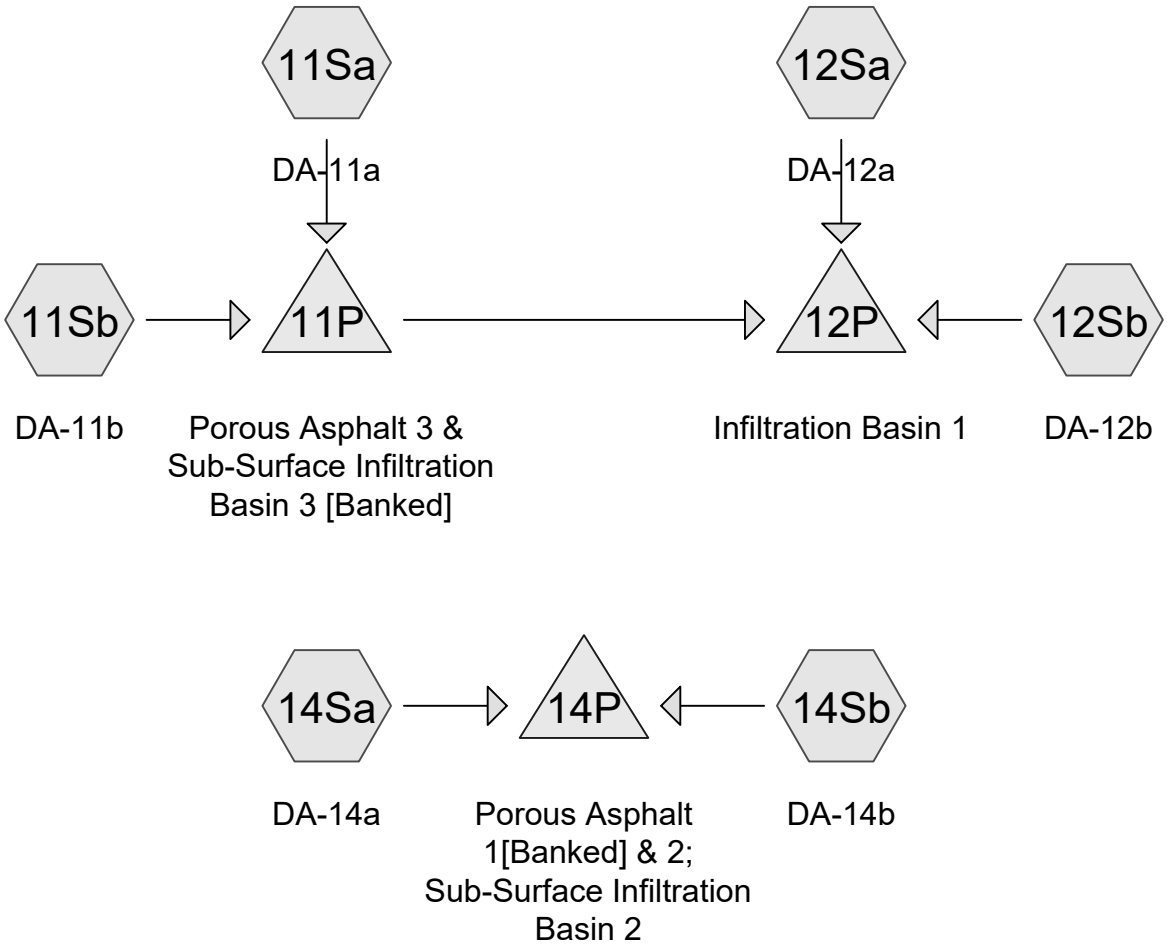

Subcat Reach Pond Link

Routing Diagram for 22-019 Water Quality (10-24-23)
Prepared by The Reynolds Group, Inc
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Time span=0.00-5.00 hrs, dt=0.01 hrs, 501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 11Sa: DA-11a Runoff Area=6,399 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=71' Slope=0.0130 '/' Tc=9.5 min CN=61 Runoff=0.00 cfs 0.000 af

Subcatchment 11Sb: DA-11b Runoff Area=20,908 sf 100.00% Impervious Runoff Depth=1.03"
Flow Length=52' Slope=0.0150 '/' Tc=0.8 min CN=98 Runoff=1.48 cfs 0.041 af

Subcatchment 12Sa: DA-12a Runoff Area=65,962 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=913' Tc=13.8 min CN=59 Runoff=0.00 cfs 0.000 af

Subcatchment 12Sb: DA-12b Runoff Area=19,134 sf 75.87% Impervious Runoff Depth=0.45"
Flow Length=797' Tc=4.3 min CN=89 Runoff=0.68 cfs 0.016 af

Subcatchment 14Sa: DA-14a Runoff Area=17,616 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=164' Tc=9.9 min CN=62 Runoff=0.00 cfs 0.000 af

Subcatchment 14Sb: DA-14b Runoff Area=37,529 sf 100.00% Impervious Runoff Depth=1.03"
Flow Length=60' Slope=0.0150 '/' Tc=0.9 min CN=98 Runoff=2.66 cfs 0.074 af

Pond 11P: Porous Asphalt 3 & Sub-Surface Peak Elev=107.24' Storage=1,802 cf Inflow=1.48 cfs 0.041 af
Outflow=0.00 cfs 0.000 af

Pond 12P: Infiltration Basin 1 Peak Elev=103.24' Storage=718 cf Inflow=0.68 cfs 0.016 af
Outflow=0.00 cfs 0.000 af

Pond 14P: Porous Asphalt 1[Banked] & 2; Peak Elev=97.29' Storage=3,236 cf Inflow=2.66 cfs 0.074 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 3.846 ac Runoff Volume = 0.132 af Average Runoff Depth = 0.41"
56.46% Pervious = 2.172 ac 43.54% Impervious = 1.675 ac

Summary for Subcatchment 11Sa: DA-11a

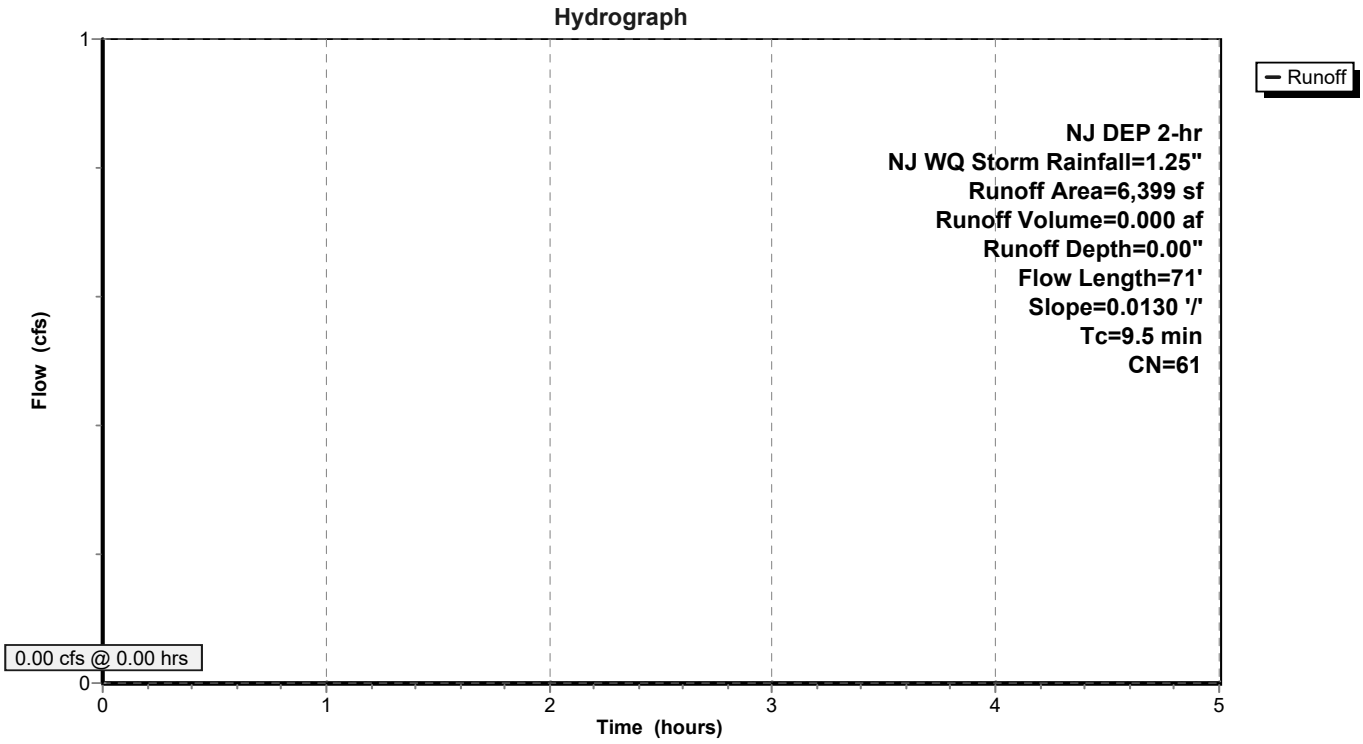
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond 11P : Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJ WQ Storm Rainfall=1.25"

Area (sf)	CN	Description
6,399	61	>75% Grass cover, Good, HSG B
6,399		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	48	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
0.2	23	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.5	71	Total			

Subcatchment 11Sa: DA-11a



Summary for Subcatchment 11Sb: DA-11b

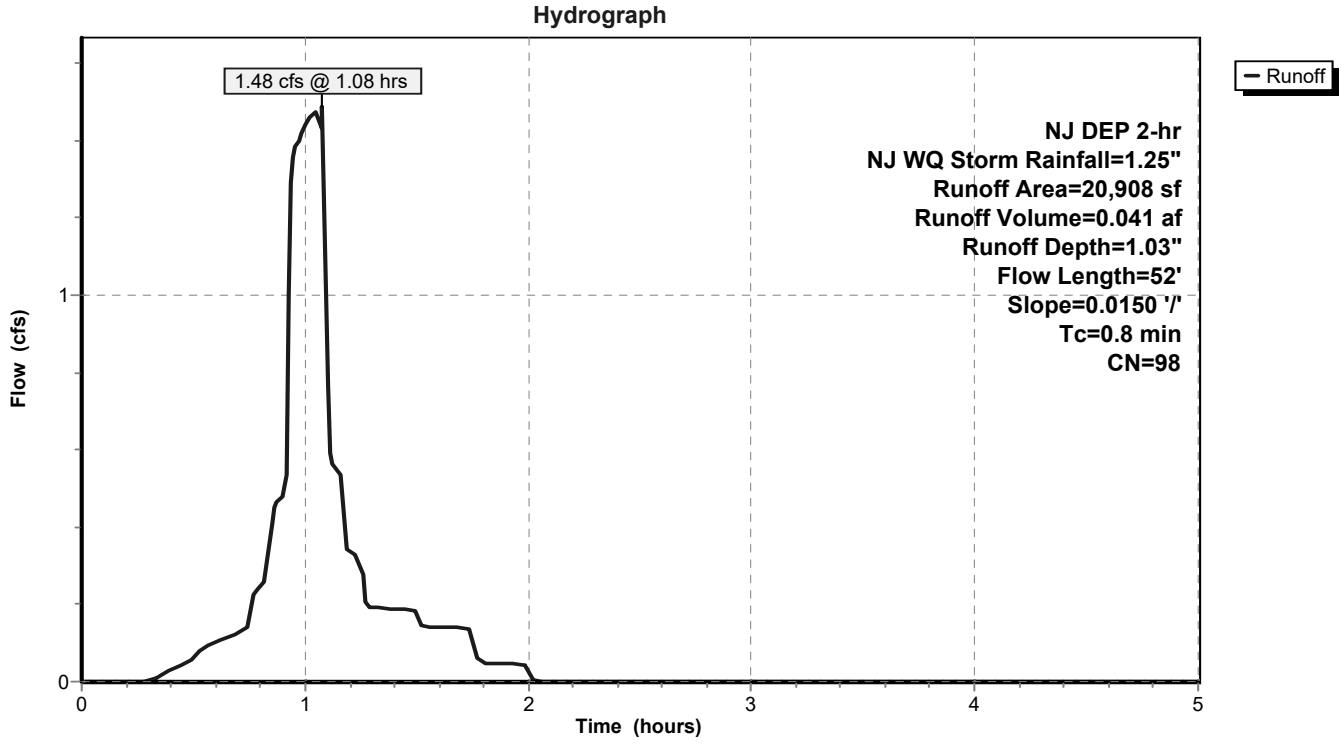
Runoff = 1.48 cfs @ 1.08 hrs, Volume= 0.041 af, Depth= 1.03"
Routed to Pond 11P : Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJ WQ Storm Rainfall=1.25"

	Area (sf)	CN	Description
*	20,908	98	Paved parking, HSG B (Vehicular)
	20,908		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	52	0.0150	1.09		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"

Subcatchment 11Sb: DA-11b



Summary for Subcatchment 12Sa: DA-12a

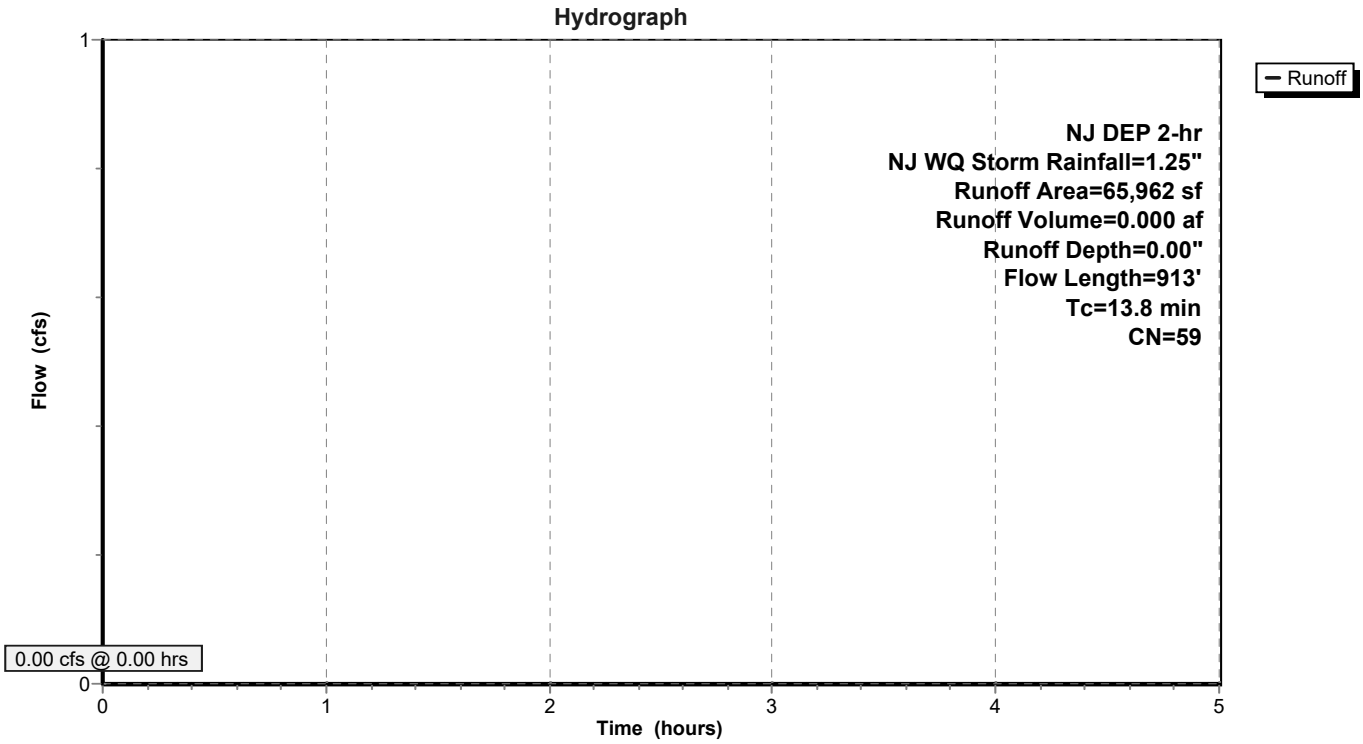
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond 12P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJ WQ Storm Rainfall=1.25"

Area (sf)	CN	Description
16,889	55	Woods, Good, HSG B
49,073	61	>75% Grass cover, Good, HSG B
65,962	59	Weighted Average
65,962		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	25	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.31" Using McCuen-Spiess flow length
1.3	141	0.0140	1.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	143	0.0080	1.82		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	159	0.0050	4.03	4.95	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	445	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
13.8	913	Total			

Subcatchment 12Sa: DA-12a



Summary for Subcatchment 12Sb: DA-12b

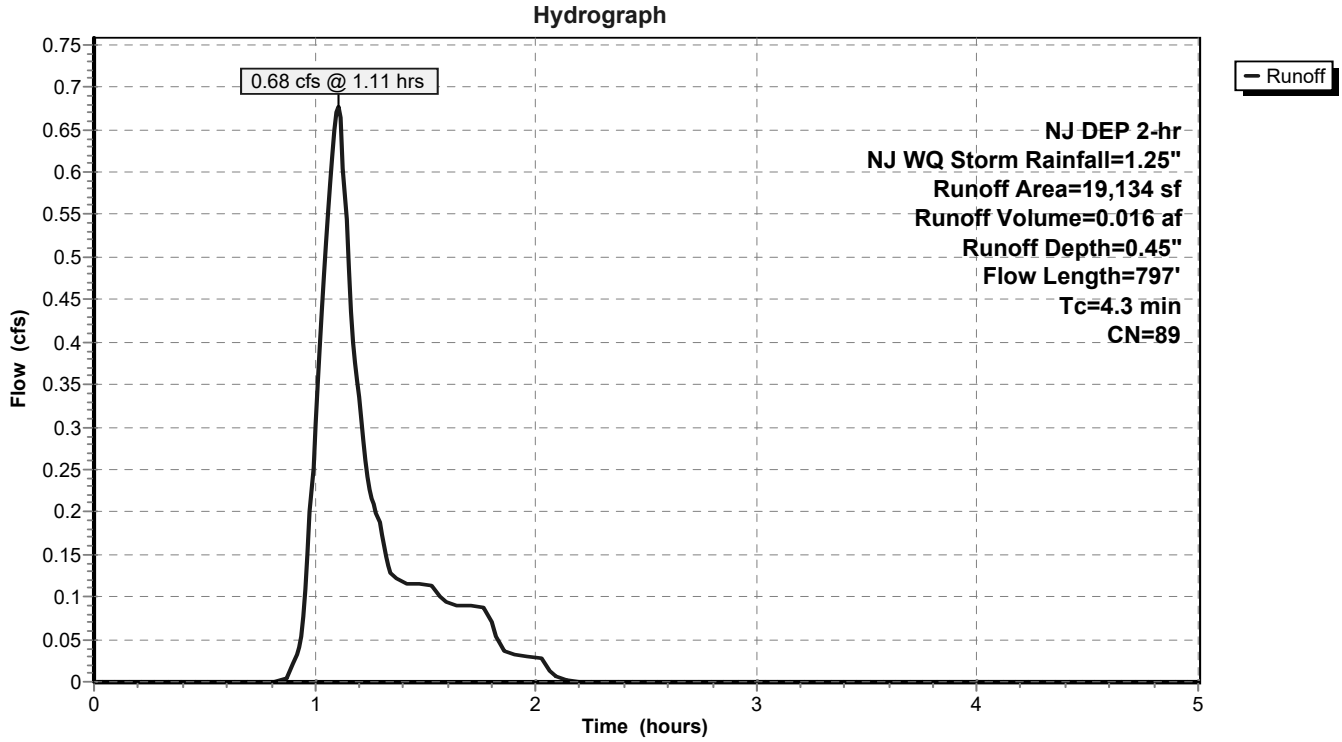
Runoff = 0.68 cfs @ 1.11 hrs, Volume= 0.016 af, Depth= 0.45"
Routed to Pond 12P : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJ WQ Storm Rainfall=1.25"

	Area (sf)	CN	Description
*	14,517	98	Paved parking, HSG B (Vehicular)
*	4,617	61	Sidewalks, HSG B (Non Vehicular)
	19,134	89	Weighted Average
	4,617		24.13% Pervious Area
	14,517		75.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0130	1.15		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"
1.0	104	0.0070	1.70		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	159	0.0050	4.03	4.95	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.3	445	0.0050	5.52	17.33	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
4.3	797	Total			

Subcatchment 12Sb: DA-12b



Summary for Subcatchment 14Sa: DA-14a

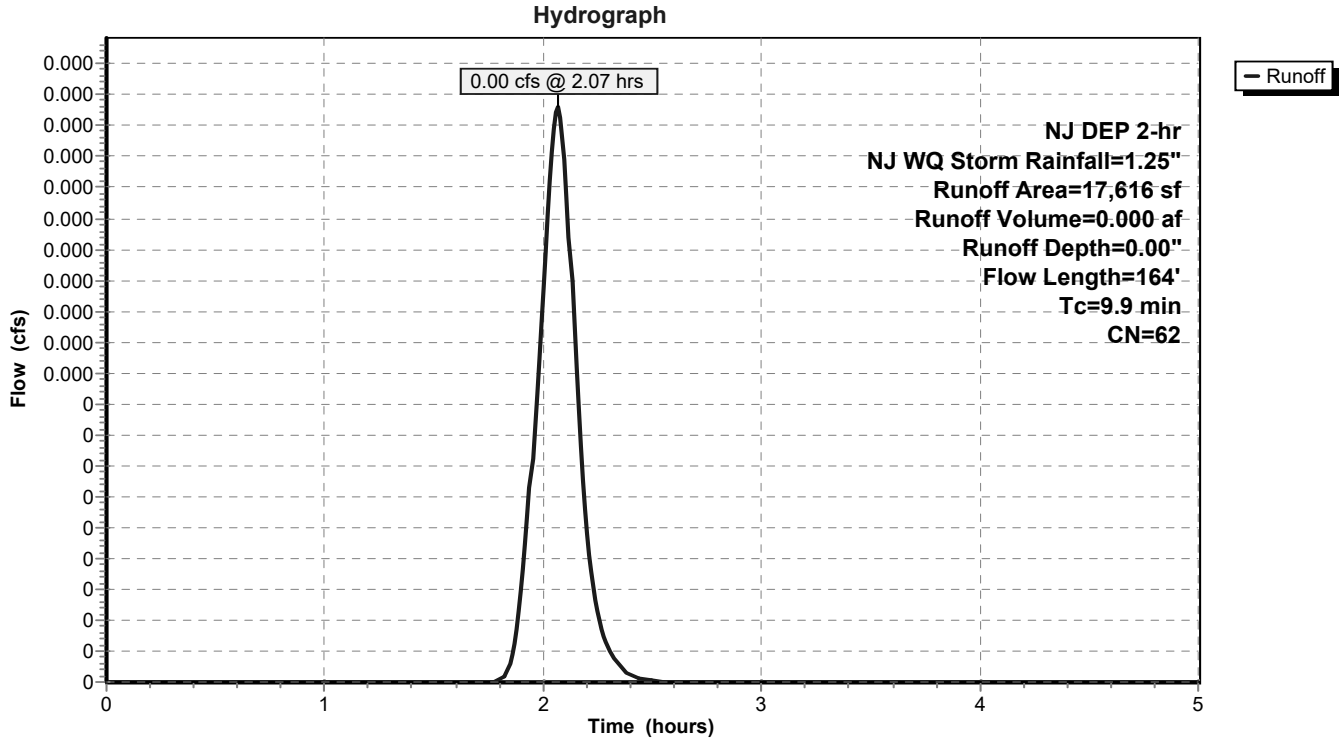
Runoff = 0.00 cfs @ 2.07 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond 14P : Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJ WQ Storm Rainfall=1.25"

Area (sf)	CN	Description
16,171	61	>75% Grass cover, Good, HSG B
1,445	74	>75% Grass cover, Good, HSG C
17,616	62	Weighted Average
17,616		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	46	0.0120	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.31" Using McCuen-Spiess flow length
0.5	50	0.0120	1.64		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	68	0.0100	4.91	3.86	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
9.9	164	Total			

Subcatchment 14Sa: DA-14a



Summary for Subcatchment 14Sb: DA-14b

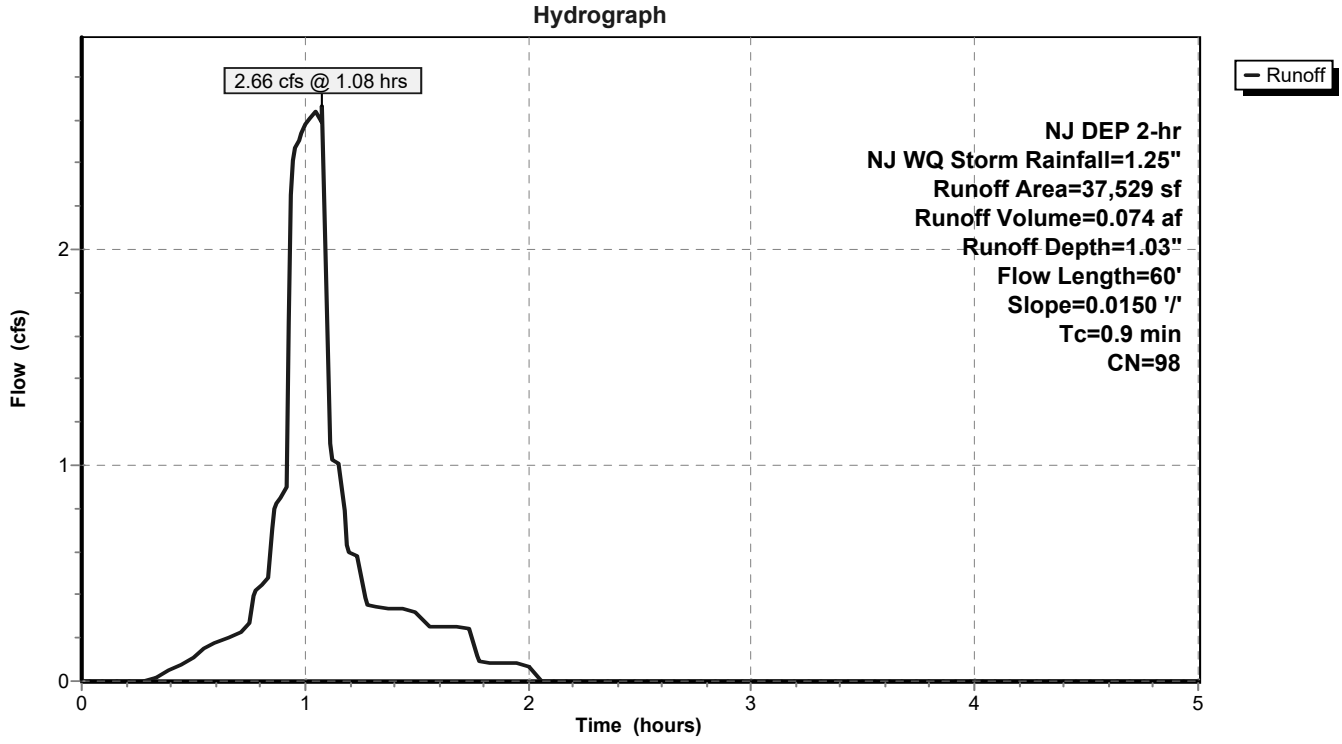
Runoff = 2.66 cfs @ 1.08 hrs, Volume= 0.074 af, Depth= 1.03"
Routed to Pond 14P : Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJ WQ Storm Rainfall=1.25"

	Area (sf)	CN	Description
*	34,989	98	Paved parking, HSG B (Vehicular)
*	2,540	98	Paved parking, HSG C (Vehicular)
	37,529	98	Weighted Average
	37,529		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	60	0.0150	1.13		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.31"

Subcatchment 14Sb: DA-14b



Summary for Pond 11P: Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]

Inflow Area = 0.627 ac, 76.57% Impervious, Inflow Depth = 0.79" for NJ WQ Storm event
Inflow = 1.48 cfs @ 1.08 hrs, Volume= 0.041 af
Outflow = 0.00 cfs @ 2.04 hrs, Volume= 0.000 af, Atten= 100%, Lag= 57.7 min
Primary = 0.00 cfs @ 2.04 hrs, Volume= 0.000 af
Routed to Pond 12P : Infiltration Basin 1

Routing by Stor-Ind method, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Peak Elev= 107.24' @ 2.04 hrs Surf.Area= 5,782 sf Storage= 1,802 cf

Plug-Flow detention time= 186.0 min calculated for 0.000 af (0% of inflow)
Center-of-Mass det. time= 141.3 min (206.8 - 65.5)

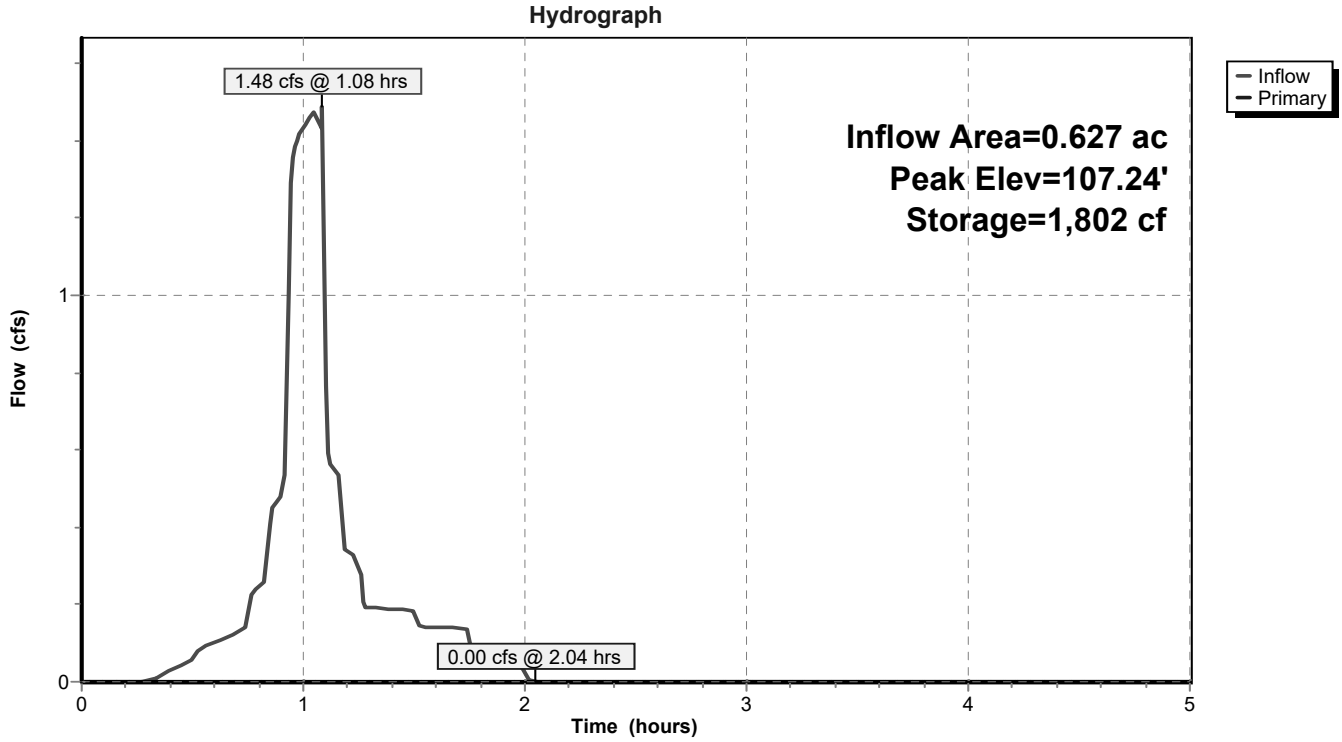
Volume	Invert	Avail.Storage	Storage Description
#1	106.50'	6,813 cf	**Stone Bed (Prismatic)**Listed below (Recalc) 20,237 cf Overall - 3,205 cf Embedded = 17,032 cf x 40.0% Voids
#2	107.00'	942 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 100.0' 1,283 cf Overall - 2.0" Wall Thickness = 942 cf
#3	107.00'	622 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 66.0'
#4	107.00'	377 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 40.0'
#5	107.00'	462 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 49.0'
#6	107.00'	462 cf	**24.0" Round Pipe Storage** x 3 Inside #1 L= 49.0'
		9,678 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.50	5,782	0	0
110.00	5,782	20,237	20,237

Device	Routing	Invert	Outlet Devices
#1	Primary	107.24'	**3.0" Vert. Lower Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	109.75'	**12.0" Vert. Upper Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 2.04 hrs HW=107.24' (Free Discharge)
1=Lower Orifice (Orifice Controls 0.00 cfs @ 0.18 fps)
2=Upper Orifice (Controls 0.00 cfs)

Pond 11P: Porous Asphalt 3 & Sub-Surface Infiltration Basin 3 [Banked]



Summary for Pond 12P: Infiltration Basin 1

Inflow Area = 2.580 ac, 31.52% Impervious, Inflow Depth > 0.08" for NJ WQ Storm event
Inflow = 0.68 cfs @ 1.11 hrs, Volume= 0.016 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to nonexistent node 19R

Routing by Stor-Ind method, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Peak Elev= 103.24' @ 5.00 hrs Surf.Area= 5,408 sf Storage= 718 cf

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

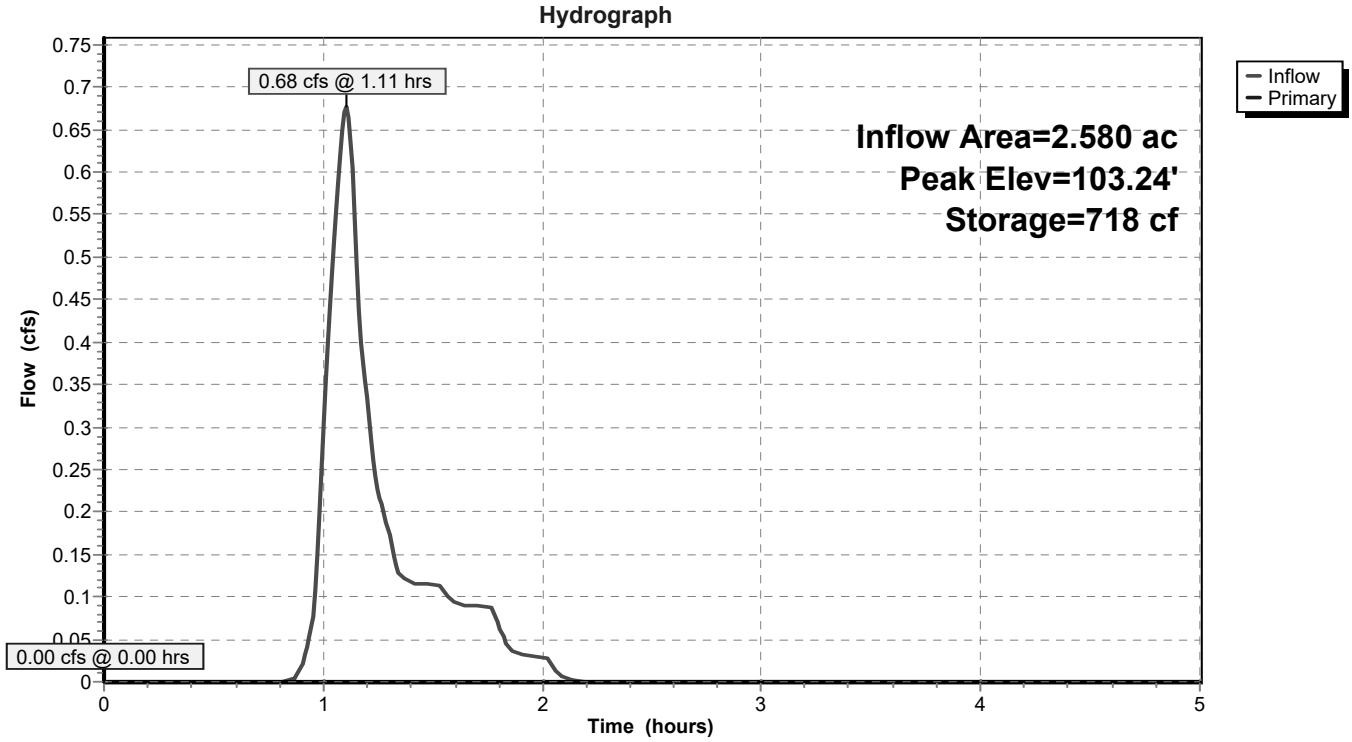
Volume	Invert	Avail.Storage	Storage Description
#1	103.10'	17,202 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.10	5,155	0	0
104.00	6,832	5,394	5,394
105.00	8,725	7,779	13,173
105.43	10,016	4,029	17,202

Device	Routing	Invert	Outlet Devices
#1	Primary	103.24'	**0.9' long Rectangular Weir** 2 End Contraction(s)
#2	Primary	104.75'	**40.0' long + 8.0 '/' SideZ x 10.0' breadth Emergency Spillway**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.10' (Free Discharge)
1=Rectangular Weir (Controls 0.00 cfs)
2=Emergency Spillway (Controls 0.00 cfs)

Pond 12P: Infiltration Basin 1



Summary for Pond 14P: Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2

Inflow Area = 1.266 ac, 68.06% Impervious, Inflow Depth = 0.70" for NJ WQ Storm event
Inflow = 2.66 cfs @ 1.08 hrs, Volume= 0.074 af
Outflow = 0.00 cfs @ 2.18 hrs, Volume= 0.000 af, Atten= 100%, Lag= 66.2 min
Primary = 0.00 cfs @ 2.18 hrs, Volume= 0.000 af
Routed to nonexistent node 19R

Routing by Stor-Ind method, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Peak Elev= 97.29' @ 2.18 hrs Surf.Area= 8,359 sf Storage= 3,236 cf

Plug-Flow detention time= 189.2 min calculated for 0.000 af (0% of inflow)
Center-of-Mass det. time= 143.6 min (209.2 - 65.6)

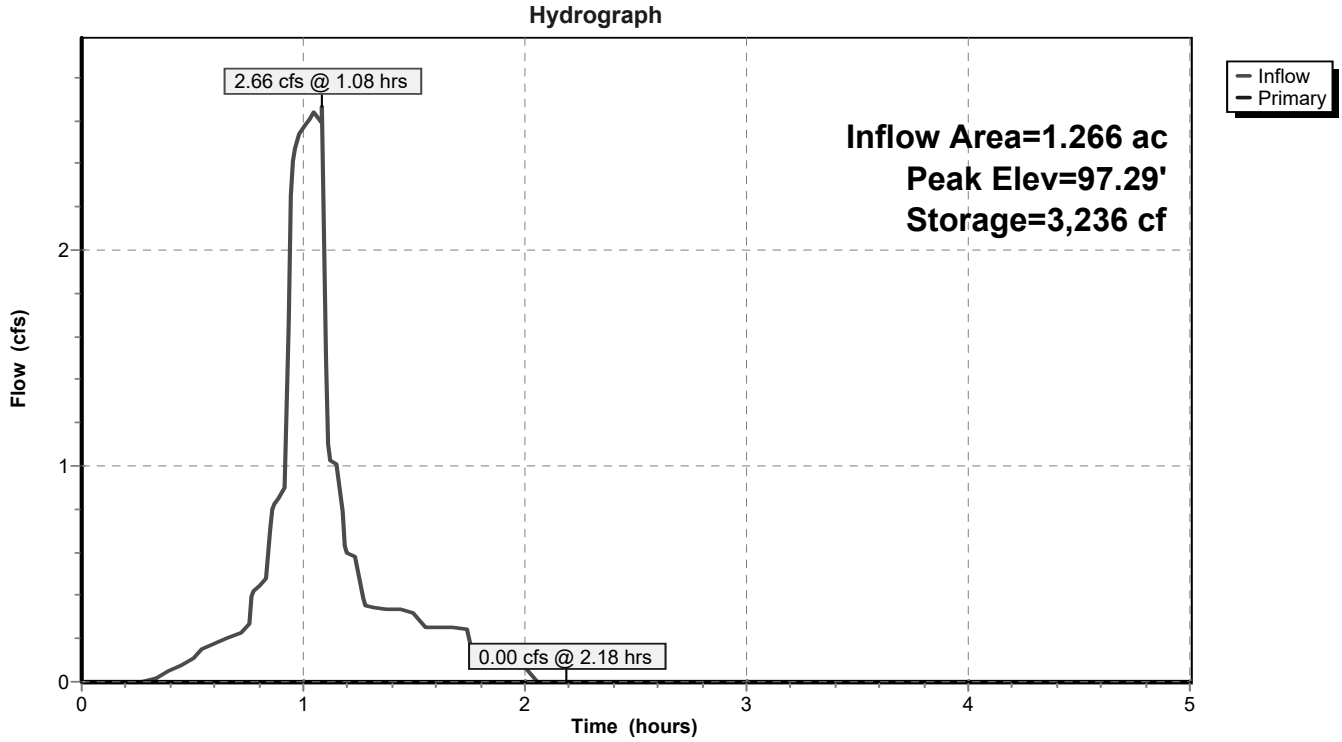
Volume	Invert	Avail.Storage	Storage Description
#1	96.30'	9,272 cf	**Lower Section Stone Bed-Perforated Pipes (Prismatic)** Listed below (Reca 33,436 cf Overall - 10,257 cf Embedded = 23,179 cf x 40.0% Voids
#2	97.05'	2,916 cf	**30.0" Round Perforated Pipes** x 6 Inside #1 L= 99.0' 4,199 cf Overall - 3.0" Wall Thickness = 2,916 cf
#3	97.05'	1,149 cf	**30.0" Round Perforated Pipes** x 3 Inside #1 L= 78.0' 1,654 cf Overall - 3.0" Wall Thickness = 1,149 cf
#4	97.05'	928 cf	**30.0" Round Perforated Pipes** x 3 Inside #1 L= 63.0' 1,336 cf Overall - 3.0" Wall Thickness = 928 cf
#5	97.05'	2,130 cf	**30.0" Round Perforated Pipes** Inside #1 L= 434.0' 3,068 cf Overall - 3.0" Wall Thickness = 2,130 cf
		16,394 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
96.30	8,359	0	0
100.30	8,359	33,436	33,436

Device	Routing	Invert	Outlet Devices
#1	Primary	97.29'	**2.5" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	99.30'	**1.1' long Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.00 cfs @ 2.18 hrs HW=97.29' (Free Discharge)
1=Orifice (Orifice Controls 0.00 cfs @ 0.19 fps)
2=Rectangular Weir (Controls 0.00 cfs)

Pond 14P: Porous Asphalt 1[Banked] & 2; Sub-Surface Infiltration Basin 2



The Lawrenceville School
Campus Drive West, 2500 Main Street, Lawrence, NJ
10/24/23

Sizing Basis:
Filterra High Capacity biofiltration system has received final certification from the NJDEP for 80% TSS removal. Per the NJDEP, Filterra HC is considered a Green Infrastructure (GI) MTD. The sizing for the Filterra HC system under NJDEP regulations is based on the methodology outlined in Chapter 5 of the NJDEP BMP Manual. The NRCS method is utilized to determine a water quality flow rate for the drainage area in question. To validate the sizing, the parameters below were assumed.

Design Parameters:
Design Storm = NJDEP Water Quality Design Storm (1.25-inch/2-hour storm event)
Filterra HC Media Flow Rate = 300 inches/hour
Allowable Ponding in Filterra = 9”

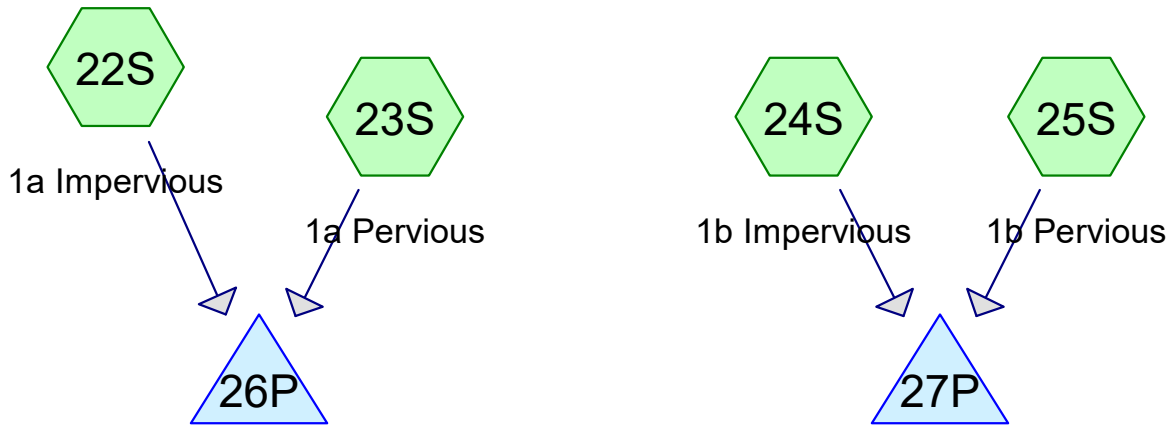
Design Summary:
Utilizing NRCS Method and HydroCAD software, a hydrograph can be derived to represent the design storm. As seen in the provided HydroCAD report, the WQ flow is routed to an appropriately sized Filterra unit. Since the Filterra system can provide up to 9” of ponding, some flow attenuation is possible. The Filterra system is able to accommodate a portion of the water quality volume in the head space above the media and release it at the system’s NJDEP certified maximum treatment flow rate.

Site Designation	Impervious Drainage Area (sf)	Pervious Drainage Area (ac)	Filterra HC Model Analyzed
MTD #1a	9,696	19,494	6’x12’/12’x6’ Offline Filterra HC Bioscape Vault
MTD #1b	8,642	4,859	6’x12’/12’x6’ Offline Filterra HC Bioscape Vault

Thank you for the opportunity to present this to you and your client. Please do not hesitate to contact me should you have any additional questions.

Sincerely,

Taylor Murdock
Stormwater Design Engineer
Contech Engineered Solutions, LLC.



Subcat Reach Pond Link

Routing Diagram for Lawrenceville School (10-24-23)
Prepared by Contech Engineered Solutions, Printed 10/31/2023
HydroCAD® 10.20-3f s/n 00447 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment 22S: 1a Impervious

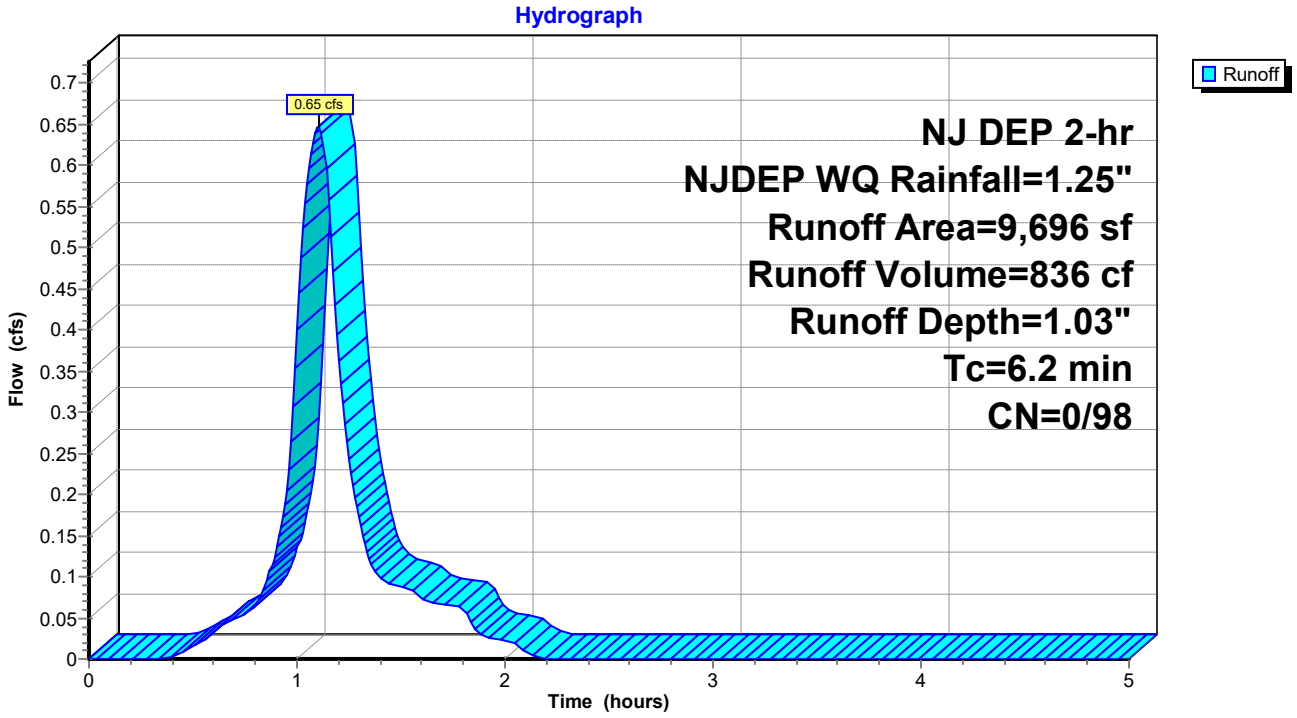
Runoff = 0.65 cfs @ 1.11 hrs, Volume= 836 cf, Depth= 1.03"
Routed to Pond 26P : MTD #1a 6x12/12x6 FTBSV

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJDEP WQ Rainfall=1.25"

	Area (sf)	CN	Description
*	9,696	98	
	9,696	98	100.00% Impervious Area

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

Subcatchment 22S: 1a Impervious



Summary for Subcatchment 23S: 1a Pervious

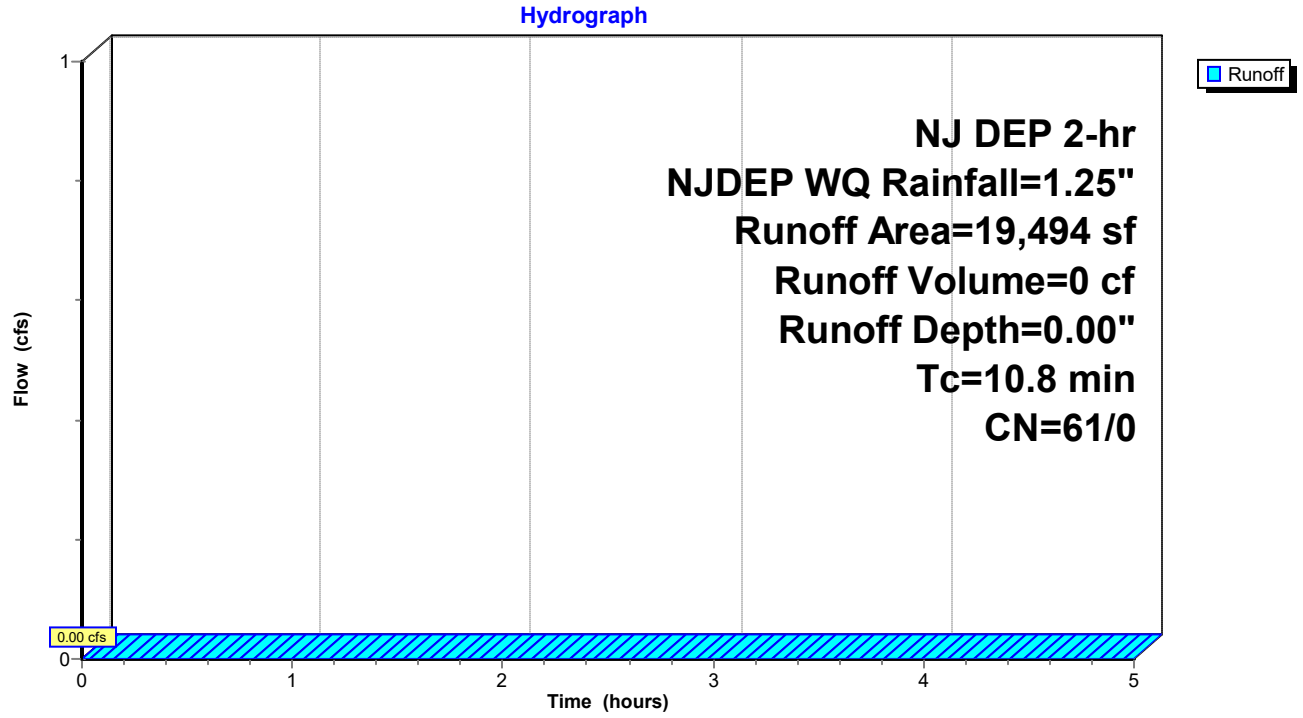
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Pond 26P : MTD #1a 6x12/12x6 FTBSV

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJDEP WQ Rainfall=1.25"

	Area (sf)	CN	Description
*	19,494	61	
	19,494	61	100.00% Pervious Area

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

Subcatchment 23S: 1a Pervious



Summary for Pond 26P: MTD #1a 6x12/12x6 FTBSV

Inflow Area = 29,190 sf, 33.22% Impervious, Inflow Depth = 0.34" for NJDEP WQ event
Inflow = 0.65 cfs @ 1.11 hrs, Volume= 836 cf
Outflow = 0.50 cfs @ 1.03 hrs, Volume= 836 cf, Atten= 23%, Lag= 0.0 min
Primary = 0.50 cfs @ 1.03 hrs, Volume= 836 cf

Routing by Stor-Ind method, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Peak Elev= 0.68' @ 1.16 hrs Surf.Area= 0.002 ac Storage= 0.001 af

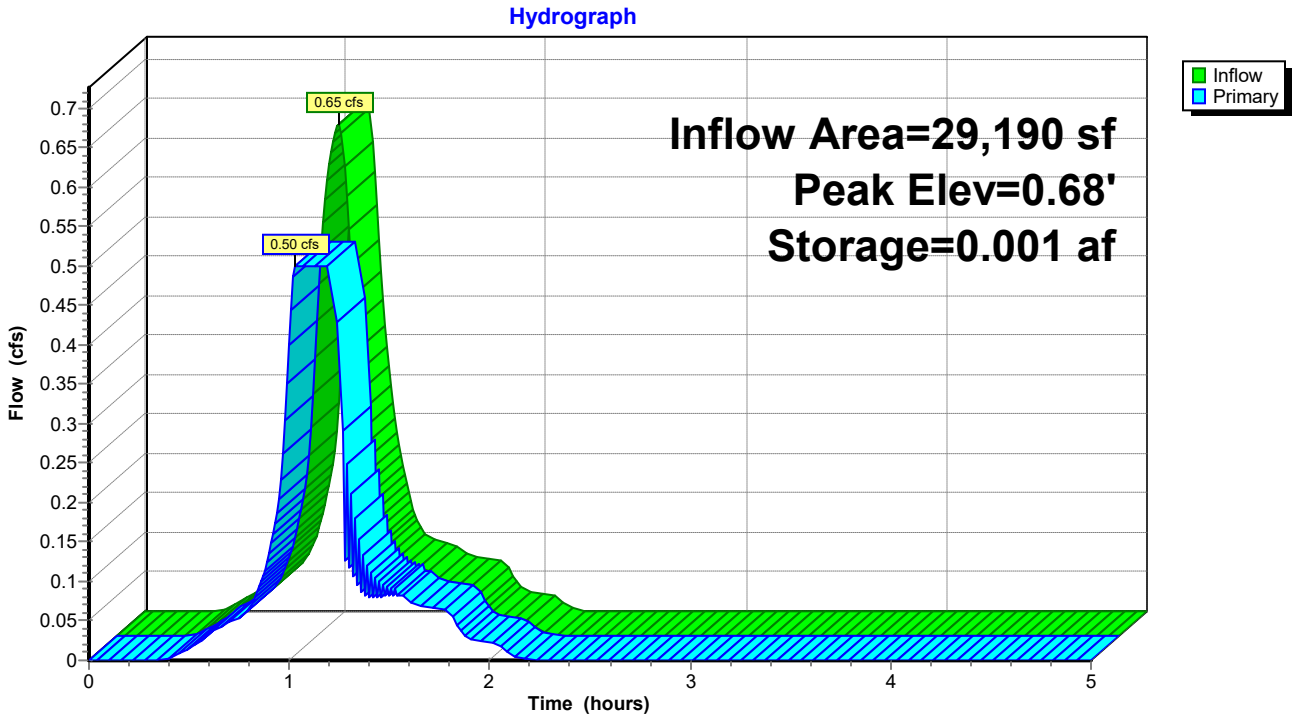
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.4 min (70.9 - 70.5)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.001 af	**6.00'W x 12.00'L x 0.75'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**300.000 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.50 cfs @ 1.03 hrs HW=0.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.50 cfs @ 0.01 fps)

Pond 26P: MTD #1a 6x12/12x6 FTBSV



Summary for Subcatchment 24S: 1b Impervious

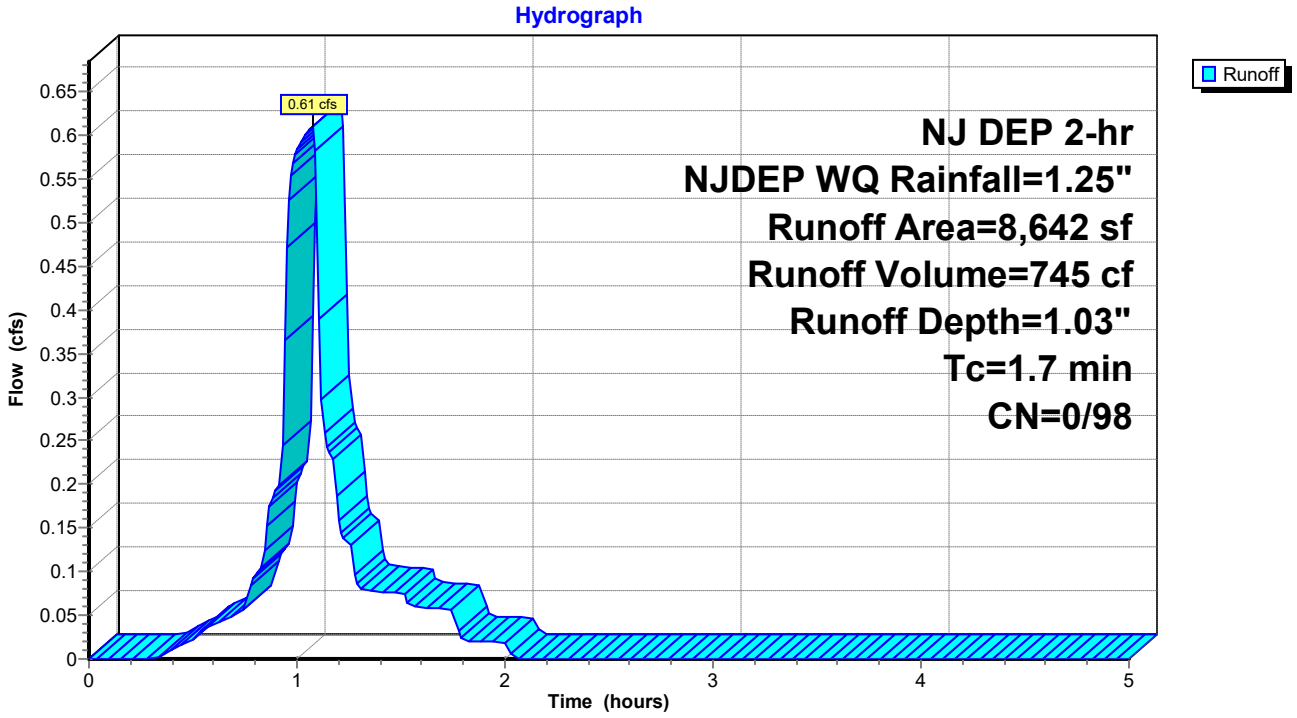
Runoff = 0.61 cfs @ 1.08 hrs, Volume= 745 cf, Depth= 1.03"
Routed to Pond 27P : MTD #1b 6x12/12x6 FTBSV

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJDEP WQ Rainfall=1.25"

	Area (sf)	CN	Description
*	8,642	98	
	8,642	98	100.00% Impervious Area

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

Subcatchment 24S: 1b Impervious



Summary for Subcatchment 25S: 1b Pervious

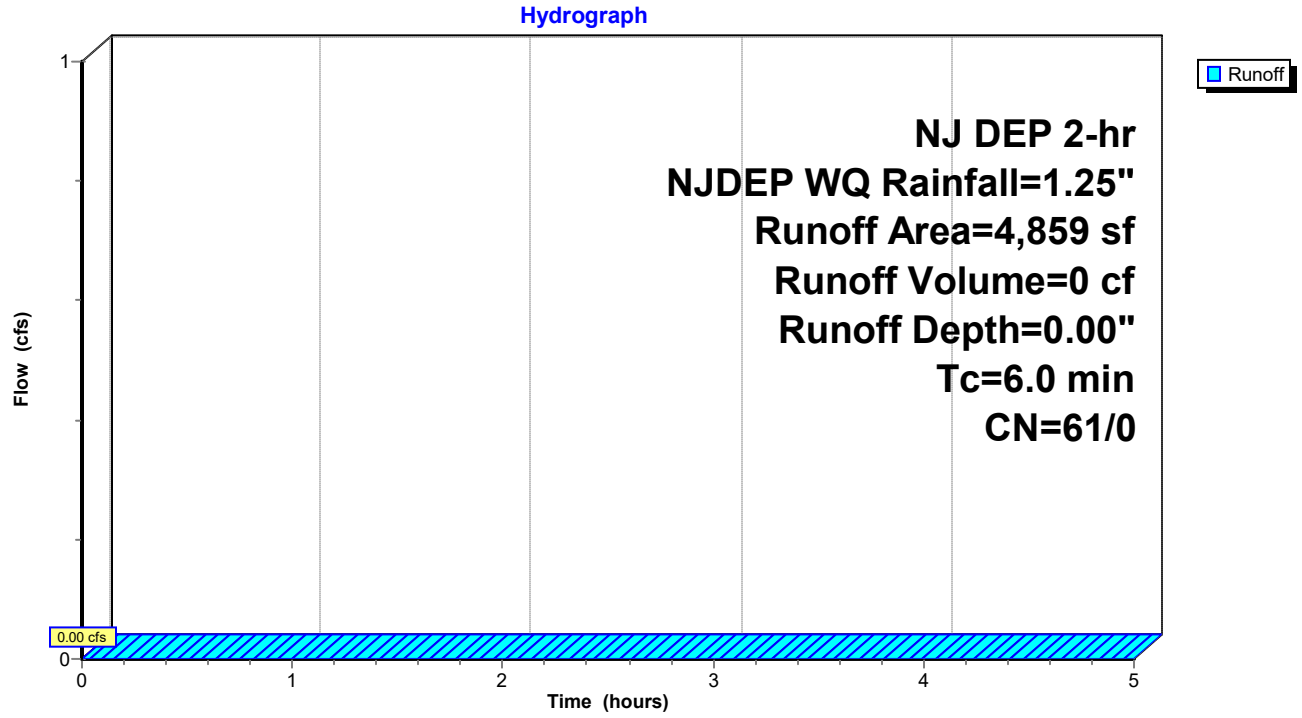
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Pond 27P : MTD #1b 6x12/12x6 FTBSV

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJDEP WQ Rainfall=1.25"

	Area (sf)	CN	Description
*	4,859	61	
	4,859	61	100.00% Pervious Area

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

Subcatchment 25S: 1b Pervious



Summary for Pond 27P: MTD #1b 6x12/12x6 FTBSV

Inflow Area = 13,501 sf, 64.01% Impervious, Inflow Depth = 0.66" for NJDEP WQ event
Inflow = 0.61 cfs @ 1.08 hrs, Volume= 745 cf
Outflow = 0.50 cfs @ 0.96 hrs, Volume= 745 cf, Atten= 18%, Lag= 0.0 min
Primary = 0.50 cfs @ 0.96 hrs, Volume= 745 cf

Routing by Stor-Ind method, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Peak Elev= 0.63' @ 1.10 hrs Surf.Area= 0.002 ac Storage= 0.001 af

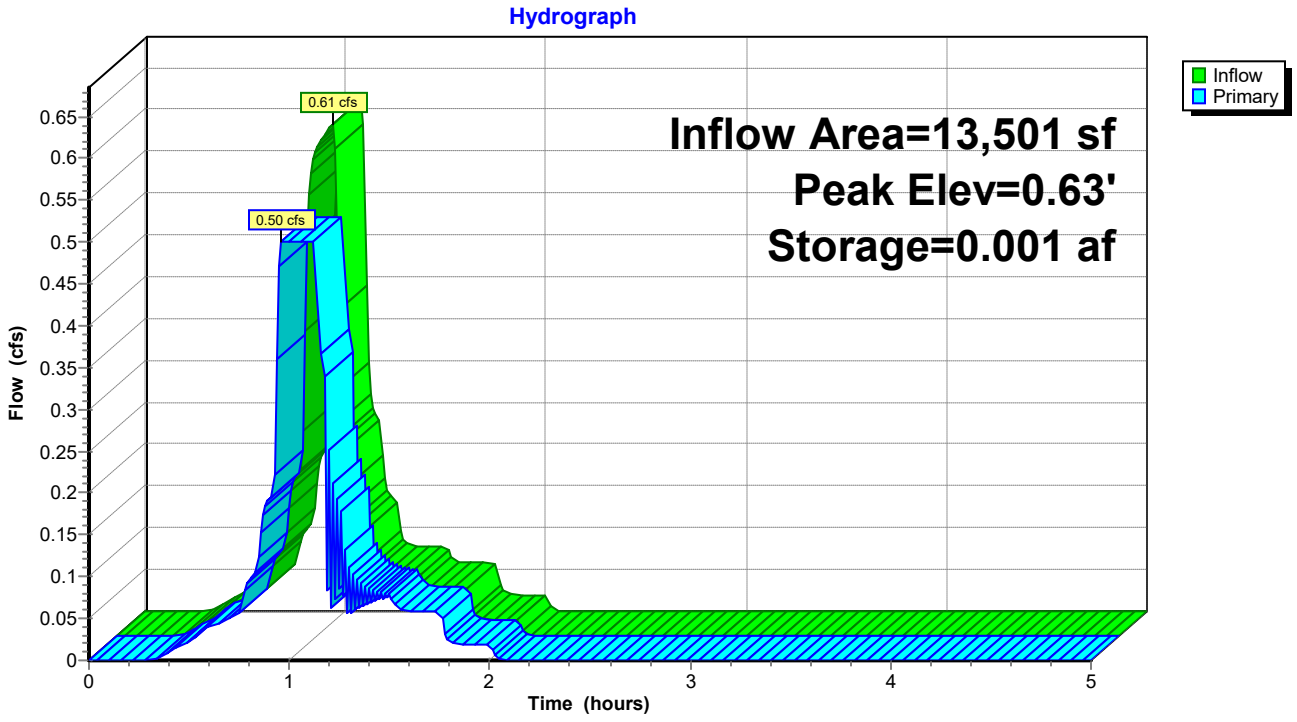
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.4 min (66.7 - 66.3)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.001 af	**6.00'W x 12.00'L x 0.75'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**300.000 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.50 cfs @ 0.96 hrs HW=0.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.50 cfs @ 0.01 fps)

Pond 27P: MTD #1b 6x12/12x6 FTBSV



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER QUALITY
Bureau of Stormwater Permitting
401 East State Street
P.O. Box 420 Mail Code 401-02B
Trenton, NJ 08625-0420
Tel. (609) 633-7021 • Fax (609) 777-0432
www.nj.gov/dep/dwq/bnpc_home.htm

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

SHAWN M. LATOURETTE
Acting Commissioner

February 12, 2021

Derek M. Berg
Director – Stormwater Regulatory Management - East
Contech Engineered Solutions LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Lab Certification
Filterra® HC Bioretention System
Off-line Installation Approved

TSS Removal Rate 80%

Dear Mr. Berg:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions LLC has requested a Laboratory Certification for the Filterra® HC Bioretention System (Filterra® HC.)

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated January 2021) for this device is published online at http://www.njcat.org/uploads/newDocs/NJCATFilterraTechnologyVerificationReportFinal._.pdf.

The NJDEP certifies the use of the Filterra® HC stormwater treatment unit by Contech Engineered Solutions LLC at a TSS removal rate of 80% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 3.12 gpm/ft^2 of effective filtration treatment area.

2. The Filterra® HC stormwater treatment unit shall be installed using the same configuration reviewed by NJCAT, and sized in accordance with the criteria specified in item 7 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Filterra® HC. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at https://www.conteches.com/Portals/0/Documents/Maintenance%20Guides/Filterra%20HC%20OM%20Packet.pdf for any changes to the maintenance requirements.

6. For an MTD to be considered "green infrastructure" (GI) in accordance with the March 2, 2020 amendments to the Stormwater Management rules at N.J.A.C. 7:8, the MTD must meet the GI definition noted at amended N.J.A.C. 7:8-1.2. Specifically, the MTD shall (1) treat stormwater runoff through infiltration into subsoil; and/or (2) treat stormwater runoff through filtration by vegetation or soil; or (3) store stormwater runoff for reuse.

   The Filterra® HC filters stormwater runoff through an engineered biofiltration soil media and, thus, meets the definition of GI. Filterra® HC can be configured with or without a precast vault. Installations that will not include a precast vault will additionally need to comply the NJDEP Stormwater BMP Manual conditions regarding separation from the seasonal high water table and, if infiltration is proposed as an outlet, minimum vertical saturated hydraulic conductivity of the subsoil. Installations without a precast vault that do not rely on infiltration are required to maintain at least a one-foot separation from the seasonal high water table measured from the lowest point of the system. Installations without a precast vault that utilize infiltration are required to have the most hydraulically restrictive soil layer below the MTD meet the minimum tested vertical saturated hydraulic conductivity of one inch per hour and have at least two feet of separation from the seasonal high water table measured from the lowest point of the system.

7. Sizing Requirement:

The example below demonstrates the sizing procedure for the Filterra® HC:

Example: A 0.25-acre impervious site is to be treated to 80% TSS removal using the Filterra® HC. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

The selection of the appropriate model of Filterra® HC is based upon both the maximum inflow drainage area and the MTFR. It is necessary to calculate the required model using both methods and to use the largest model determined by the two methods.

Inflow Drainage Area Evaluation:

The drainage area to the Filterra® HC in this example is 0.25 acres. Included in Table 1 below, all of the Filterra® HC models are designed with a maximum allowable drainage area greater than 0.25 acres. Specifically, the Filterra® HC with a 4'x4' media bay and a maximum allowable drainage area of 0.40 acres would be the smallest model able to treat runoff without exceeding the maximum allowable drainage area.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was based on the following:
time of concentration = 10 minutes
i = 3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
c = 0.99 (runoff coefficient for impervious)
Q = ciA = 0.99 x 3.2 x 0.25 = 0.79 cfs

Given the site runoff is 0.79 cfs and based on the MTFR's listed in Table 1 below, the Filterra® HC with a 16'x8' media bay and an MTFR of 0.889 cfs would be the smallest model that could be used to treat the impervious area without exceeding the MTFR. If using more than one unit for treating runoff, the units should be configured such that the flowrate to each unit does not exceed the design MTFR for each unit and ensuring the entire 0.25 acre area is treated.

The MTFR evaluation results will be used since that method results in the highest minimum configuration determined by the two methods.

The sizing table corresponding to the available system models is noted below:

Table 1. Filterra® HC MTFRs and Maximum Allowable Drainage Areas

	Available Filterra® Media Bay Sizes (feet)	Effective Filtration Treatment Area (ft^2)	Treatment Flow Rate (cfs)	Maximum Allowable Drainage Area (ac)
Standard Configuration Filterra and Filterra Biosape Vaults	4x4	16	0.111	0.40
	4x6 or 6x4	24	0.167	0.60
	4.5x7.83 or 7.83x4.5 (Nominal 4x8/8x4)	35.24	0.245	0.89
	6x6	36	0.250	0.91
	6x8 or 8x6	48	0.333	1.21
	6x10 or 10x6	60	0.417	1.51
	6x12 or 12x6	72	0.500	1.81
	7x13 or 13x7	91	0.632	2.29
	14x8	112	0.778	2.82
	16x8	128	0.889	3.22
	18x8	144	1.000	3.62
	20x8	160	1.111	4.03
	22x8	176	1.222	4.43
Peak Diversion Filterra Vaults	4x4	16	0.111	0.40
	4.5x5.83 (Nominal 4x6)	26.24	0.182	0.66
	6x4	24	0.167	0.60
	6x6	36	0.250	0.91
	6x8	48	0.333	1.21
	6x10 or 10x6	60	0.417	1.51
	7x10	70	0.486	1.76
	8x10.5	84	0.583	2.11
	8x12.5	100	0.694	2.52
	Custom and/or Filterra Bioscape	Media Area in ft^2	0.00694 * (Media Area in ft^2)	0.0252 * (Media Area in ft^2)

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact me at (609) 633-7021.

Sincerely,

Gabriel Mahon, Chief
Bureau of Stormwater Permitting

Attachment: Maintenance Plan
cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP – Water & Land Management
Nancy Kempel, NJDEP– BSTP
Keith Stampfel, NJDEP – DLRP
Dennis Contois, NJDEP – DLRP

The Reynolds Group Inc.
Engineers-Surveyors-Landscape Architects
575 Route 28 - Suite 110
Raritan, NJ 08869

The Lawrenceville School
Campus Drive West

DESIGN COMPUTATIONS FOR POROUS ASPHALT BMPS

BMP #	Porous Asphalt (SF)	OS-HSG 'B' (SF)	Impervious (SF)	Total Area (SF)	Ratio [3.0 Max.]	Runoff Vol. (CF)	BMP[1] Depth (in)	Drain Time[2] (hr)
#1A	2,981	863	6,995	10,839	2.64	860	**10.5**	1.09
#1B	2,922	1,195	7,064	11,181	2.83	861	**10.7**	1.09
#1C	1,302	214	3,352	4,868	2.74	401	**11.2**	0.51
#2	3,850	1,157	9,030	14,037	2.65	1,111	**10.5**	1.40
#3A	5,033	5,297	9,794	20,124	3.00	1,279	**9.2**	1.61
#3B	1,798	476	4,909	7,183	2.99	578	**11.7**	0.73

[1]Minimum BMP (Stone) Depth = 10", Depth rounded up to the next inch (Design Stone Bed Depths shown on plans).

[2]Drain Time = Runoff Volume ÷ Underdrain Pipe Capacity

Capacity of 4" PVC pipe @ 1.0% (min.) = 0.22 cfs

Impervious $Q_{runoff,\ in}$ = 1.035; S = 0.204

Open Space $Q_{runoff,\ in}$ = 0; S = 6.393

APPENDIX D

GROUNDWATER RECHARGE

ANNUAL GROUNDWATER RECHARGE ANALYSIS, GSR 32

TIME TO DRAIN CALCULATIONS

GROUNDWATER MOUNDING ANALYSIS

New Jersey Groundwater Recharge Spreadsheet Version 2.0 November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
MERCER CO., LAWRENCE TWP	44.9	1.43

Project Name:	The Lawrenceville School
Description:	Campus Drive West
Analysis Date:	10/24/23

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	1.72	Woods	Matapeake	13.0	81,439
2	9.2	Open space	Matapeake	12.9	431,533
3	0.19	Gravel, dirt	Matapeake	7.3	5,024
4	3.91	Impervious areas	Matapeake	0.0	-
5	2.58	Woods	Mattapex	10.6	98,979
6	0.98	Open space	Mattapex	10.4	37,147
7	0.04	Impervious areas	Mattapex	0.0	-
8	0.03	Woods	Udorthents	0.0	-
9	0.13	Open space	Udorthents	0.0	-
10	0.06	Impervious areas	Udorthents	0.0	-
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	18.8			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				9.6	654,123

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	1.38	Woods	Matapeake	13.0	65,341
2	8.19	Open space	Matapeake	12.9	384,158
3	5.45	Impervious areas	Matapeake	0.0	-
4	2.56	Woods	Mattapex	10.6	98,212
5	0.95	Open space	Mattapex	10.4	36,010
6	0.09	Impervious areas	Mattapex	0.0	-
7	0.03	Woods	Udorthents	0.0	-
8	0.06	Open space	Udorthents	0.0	-
9	0.13	Impervious areas	Udorthents	0.0	-
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	18.8			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				8.5	583,721

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft) 246,985
Post-Development Annual Recharge Deficit=	*70,402*	(cubic feet)

Recharge Efficiency Parameters Calculations (area averages)

RWC=	8.24	(in)	DRWC=	3.00	(in)
ERWC =	2.35	(in)	EDRWC=	0.85	(in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Project Name	Description	Analysis Date	BMP or LID Type
The Lawrenceville School	Campus Drive West	10/24/23	Infiltration Basin #1

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	5155.0	sq.ft
BMP Effective Depth, this is the design variable	dBMP	1.7	in
Upper level of the BMP surface (negative if above ground)	dBMPu	27.0	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	28.8	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	0	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	2.35	in
ERWC Modified to consider dEXC	EDRWC	0.85	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.71	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	0.45	in
Inches of Rainfall to capture	Pdesign	0.57	in
Recharge Provided Avg. over Imp. Area		9.6	in
Runoff Captured Avg. over imp. Area		22.1	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.27	unitless
BMP Volume	VBMP	721	cu.ft

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef	15,250	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	19,134	sq.ft
Root Zone Water Capacity	RWC	8.24	in
RWC Modified to consider dEXC	DRWC	3.00	in
Climatic Factor	C-factor	1.43	no units
Average Annual P	Pavg	44.9	in
Recharge Requirement over Imp. Area	dr	0.7	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		15,250	cu.ft
Avg BMP Recharge Efficiency		43.3%	Represents % Infiltration Recharged
%Rainfall became Runoff		77.7%	%
%Runoff Infiltrated		63.2%	%
%Runoff Recharged		2.1%	%
%Rainfall Recharged		1.7%	%

CALCULATION CHECK MESSAGES

Volume Balance-> OK
dBMP Check---> OK
dEXC Check---> OK

BMP Location---> Location is selected as distributed or undetermined

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensetive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP.
To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration clik the "Default Vdef & Aimp" button.

Project Name	Description	Analysis Date	BMP or LID Type
The Lawrenceville School	Campus Drive West	10/24/23	SubSurface Infilt Basin #2 & Porous Asphalt #1 [Banked] & #2

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	8359.0	sq.ft
BMP Effective Depth, this is the design variable	dBMP	4.6	in
Upper level of the BMP surface (negative if above ground)	dBMPu	39.6	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	44.4	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	0	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	2.35	in
ERWC Modified to consider dEXC	EDRWC	0.38	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.30	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	1.10	in
Inches of Rainfall to capture	Pdesign	1.31	in
Recharge Provided Avg. over Imp. Area		25.4	in
Runoff Captured Avg. over imp. Area		30.7	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.22	unitless
BMP Volume	VBMP	3,239	cu.ft

CALCULATION CHECK MESSAGES

Volume Balance-> OK
dBMP Check---> OK
dEXC Check---> OK

BMP Location---> Location is selected as distributed or undetermined

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef	79,590	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	37,529	sq.ft
Root Zone Water Capacity	RWC	8.24	in
RWC Modified to consider dEXC	DRWC	1.34	in
Climatic Factor	C-factor	1.43	no units
Average Annual P	Pavg	44.9	in
Recharge Requirement over Imp. Area	dr	3.9	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		79,590	cu.ft
Avg BMP Recharge Efficiency		83.0%	Represents % Infiltration Recharged
%Rainfall became Runoff		77.7%	%
%Runoff Infiltrated		87.9%	%
%Runoff Recharged		11.1%	%
%Rainfall Recharged		8.6%	%

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensetive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP.
To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration clik the "Default Vdef & Aimp" button.

Project Name	Description	Analysis Date	BMP or LID Type
The Lawrenceville School	Campus Drive West	10/24/23	SubSurface Infiltration Basin #3 & Porous Asphalt #3 {Banked}

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	5782.0	sq.ft
BMP Effective Depth, this is the design variable	dBMP	3.7	in
Upper level of the BMP surface (negative if above ground)	dBMPu	44.0	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	48.0	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	0	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	2.35	in
ERWC Modified to consider dEXC	EDRWC	0.34	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.27	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	1.10	in
Inches of Rainfall to capture	Pdesign	1.31	in
Recharge Provided Avg. over Imp. Area		24.9	in
Runoff Captured Avg. over imp. Area		30.6	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.28	unitless
BMP Volume	VBMP	1,798	cu.ft

CALCULATION CHECK MESSAGES

Volume Balance-> OK
dBMP Check---> OK
dEXC Check---> OK

BMP Location---> Location is selected as distributed or undetermined

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef	43,350	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	20,908	sq.ft
Root Zone Water Capacity	RWC	8.24	in
RWC Modified to consider dEXC	DRWC	1.20	in
Climatic Factor	C-factor	1.43	no units
Average Annual P	Pavg	44.9	in
Recharge Requirement over Imp. Area	dr	2.1	in

System Performance Calculated Parameters

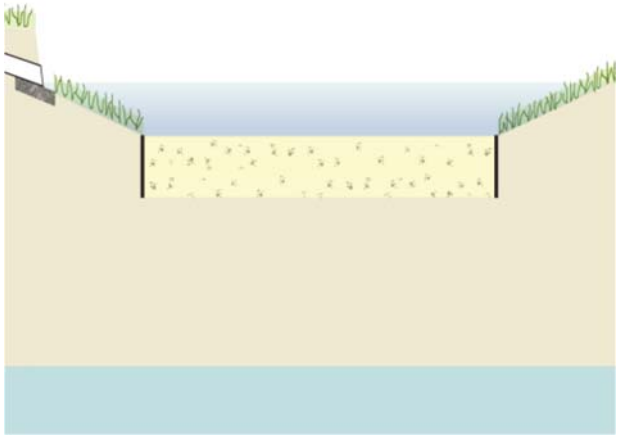
Annual BMP Recharge Volume		43,350	cu.ft
Avg BMP Recharge Efficiency		81.2%	Represents % Infiltration Recharged
%Rainfall became Runoff		77.7%	%
%Runoff Infiltrated		87.8%	%
%Runoff Recharged		6.0%	%
%Rainfall Recharged		4.7%	%

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensetive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP.
To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration clik the "Default Vdef & Aimp" button.

PROPOSED Infiltration Basin #1



ESTIMATED DRAIN TIME:

Design Data:

WQ Storm Runoff Volume: 718 CF*

Basin Bottom Surface Area: 5,155 SF

* Peak WQ Storm Water Surface Elevation = 103.24

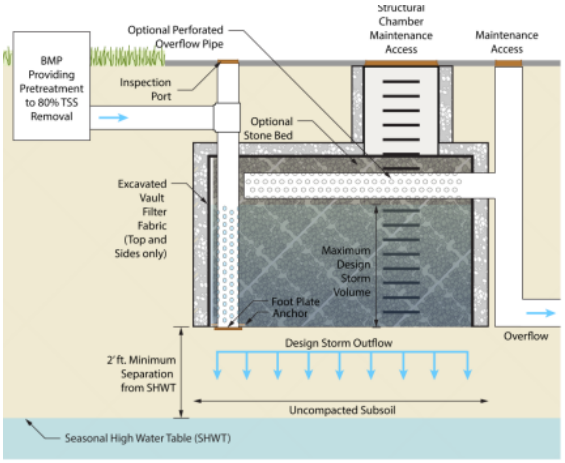
Volume below 0.9-ft wide Weir, Elev. = 103.24:	**718 CF** [Use for Drain Time Calc.]
TP#4: (Tube Permeameter, 2.6 in/hr @ 10 ft, Proposed soil replacement to elev. 92.5)	1.3 inch/hr, Design Permeability

$$Drain\ Time = \frac{\text{Water Quality Design Storm Runoff Volume}}{\text{Surface Area x Subsoil Design Permeability Rate}}$$

$$Drain\ Time = \frac{718\ \text{cu. ft.}}{5{,}155\ \text{sq. ft. x}\ 1.3\frac{\text{inch}}{\text{hr}}\ x\ \frac{1ft}{12\ inches}}$$

$$Drain\ Time = 1.29\ \text{hours}$$

PROPOSED Subsurface Infiltration Basin #2



ESTIMATED DRAIN TIME:

Design Data:

WQ Storm Runoff Volume: 3,236 CF*

Basin Bottom Surface Area: 8,359 SF

* Peak WQ Storm Water Surface Elevation = 97.29

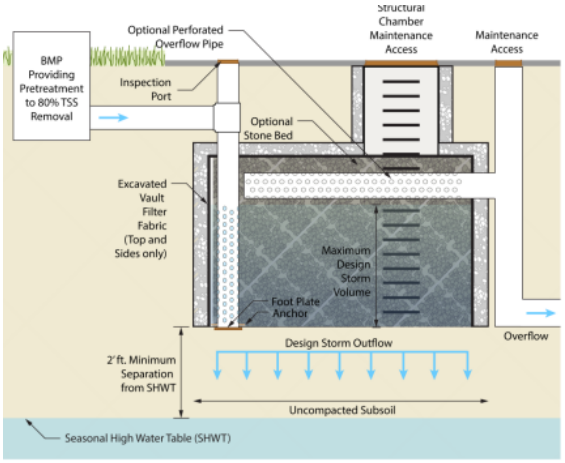
Volume below 2.5"Ø Orifice, Elev. = 97.29	**3,236 CF** [Use for Drain Time Calc.]
TP#11: (Tube Permeameter, 2.9 in/hr @ 8 ft, Proposed soil replacement to elev. 94.2)	1.3 inch/hr, Design Permeability

$$Drain\ Time = \frac{\text{Water Quality Design Storm Runoff Volume}}{\text{Surface Area x Subsoil Design Permeability Rate}}$$

$$Drain\ Time = \frac{3{,}236\ \text{cu. ft.}}{8{,}359\ \text{sq. ft. x}\ 1.45\ \frac{\text{inch}}{\text{hr}}\ x\ \frac{1ft}{12\ inches}}$$

$$Drain\ Time = 3.20\ \text{hours}$$

PROPOSED Subsurface Infiltration Basin #3



ESTIMATED DRAIN TIME:

Design Data:

WQ Storm Runoff Volume: 1,802 CF*

Basin Bottom Surface Area: 5,782 SF

* Peak WQ Storm Water Surface Elevation = 107.24

Volume below 3.0"Ø Orifice, Elev. = 107.24	**1,802 CF** [Use for Drain Time Calc.]
TP#22: Single ring infiltration test, 2.7 in/hr @ 5 ft	1.3 inch/hr, Design Permeability

$$Drain\ Time = \frac{\text{Water Quality Design Storm Runoff Volume}}{\text{Surface Area x Subsoil Design Permeability Rate}}$$

$$Drain\ Time = \frac{1{,}802\ \text{cu. ft.}}{5{,}782\ \text{sq. ft. x}\ 1.35\ \frac{\text{inch}}{\text{hr}}\ x\ \frac{1ft}{12\ inches}}$$

$$Drain\ Time = 2.77\ \text{hours}$$

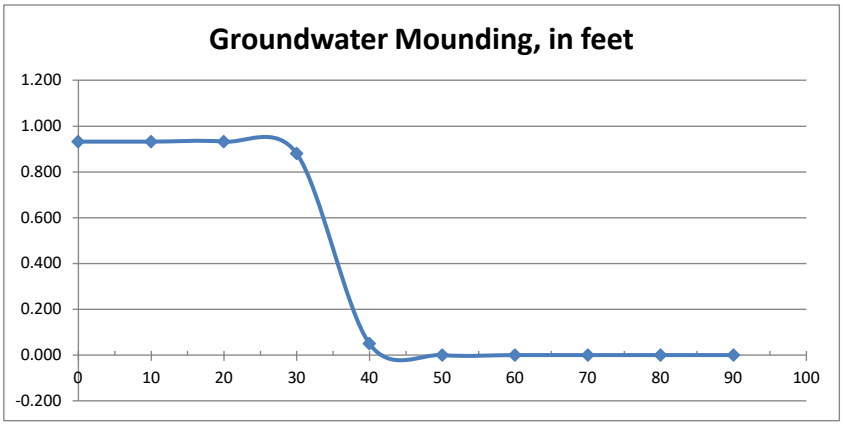
Input Values

1.30	*R*	Recharge rate (permeability rate) (in/hr)
		Specific yield, Sy (dimensionless)
0.150	Sy	default value is 0.15; max value is 0.2 provided that a lab test data is submitted
		Horizontal hydraulic conductivity (in/hr)
1.30	Kh	Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
35.000	x	1/2 length of basin (x direction, in feet)
48.000	y	1/2 width of basin (y direction, in feet)
1.29	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

10.932	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
0.932	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.932	0
0.932	10
0.932	20
0.880	30
0.050	40
0.000	50
0.000	60
0.000	70
0.000	80
0.000	90

Re-Calculate Now



Disclaimer

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Infiltration Basin #1
'x' Direction

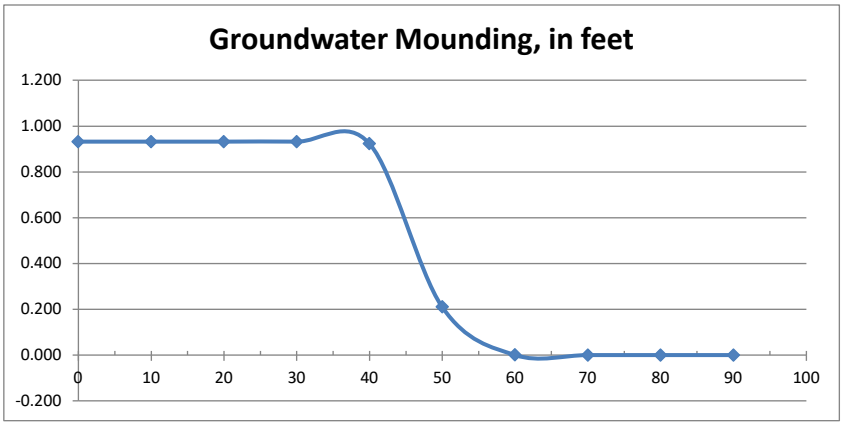
Input Values

1.30	R	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
1.30	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
48.000	x	1/2 length of basin (x direction, in feet)
35.000	y	1/2 width of basin (y direction, in feet)
1.29	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

10.932	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
0.932	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.932	0
0.932	10
0.932	20
0.932	30
0.922	40
0.210	50
0.001	60
0.000	70
0.000	80
0.000	90

Re-Calculate Now



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Infiltration Basin #1
'y' Direction

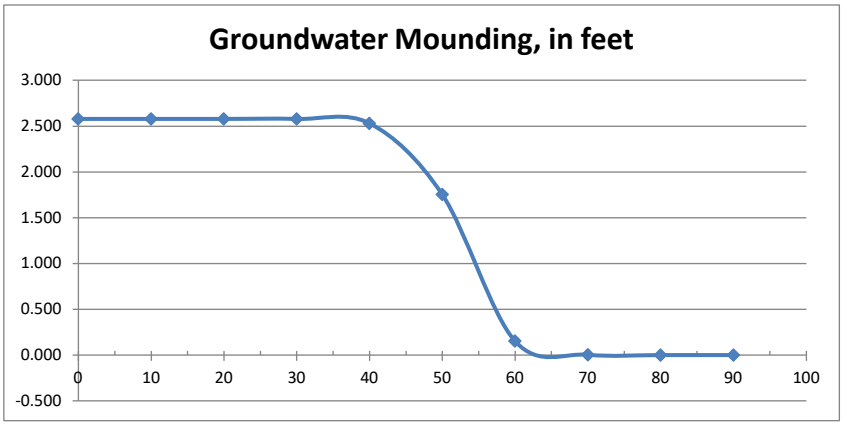
Input Values

1.45	*R*	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
1.45	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
52.000	x	1/2 length of basin (x direction, in feet)
67.500	y	1/2 width of basin (y direction, in feet)
3.20	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

12.578	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
2.578	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
2.578	0
2.578	10
2.578	20
2.577	30
2.529	40
1.753	50
0.153	60
0.004	70
0.001	80
0.001	90

Re-Calculate Now



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Subsurface Infiltration Basin #2
'x' Direction

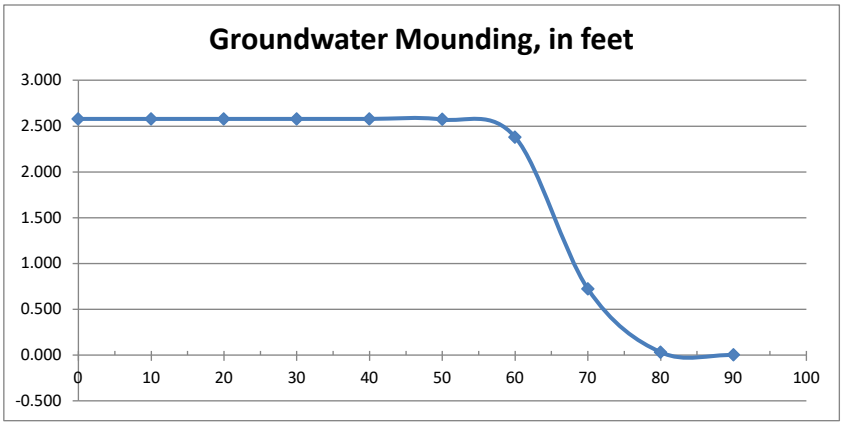
Input Values

1.45	*R*	Recharge rate (permeability rate) (in/hr)
		Specific yield, Sy (dimensionless)
0.150	Sy	default value is 0.15; max value is 0.2 provided that a lab test data is submitted
		Horizontal hydraulic conductivity (in/hr)
1.45	Kh	Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
67.500	x	1/2 length of basin (x direction, in feet)
52.000	y	1/2 width of basin (y direction, in feet)
3.20	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

12.578	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
2.578	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
2.578	0
2.578	10
2.578	20
2.578	30
2.578	40
2.572	50
2.378	60
0.723	70
0.032	80
0.001	90

Re-Calculate Now



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Subsurface Infiltration Basin #2
'y' Direction

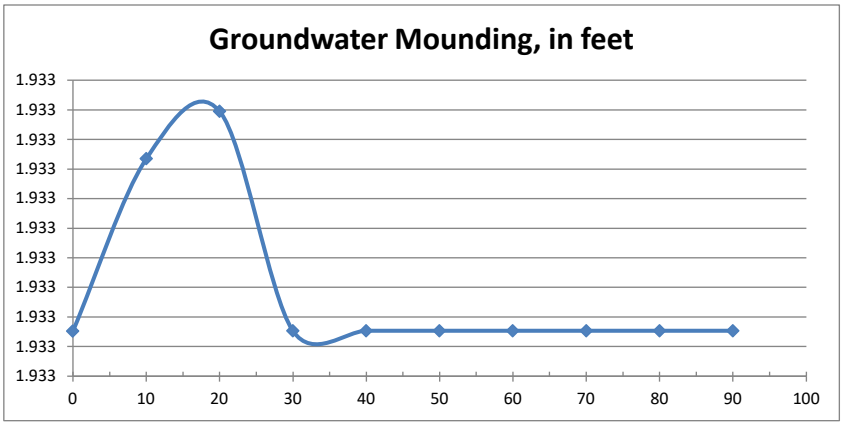
Input Values

1.35	R	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
1.35	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
164.500	x	1/2 length of basin (x direction, in feet)
9.000	y	1/2 width of basin (y direction, in feet)
2.77	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

11.933	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.933	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.933	0
1.933	10
1.933	20
1.933	30
1.933	40
1.933	50
1.933	60
1.933	70
1.933	80
1.933	90

Re-Calculate Now



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Subsurface Infiltration Basin #3
'x' Direction

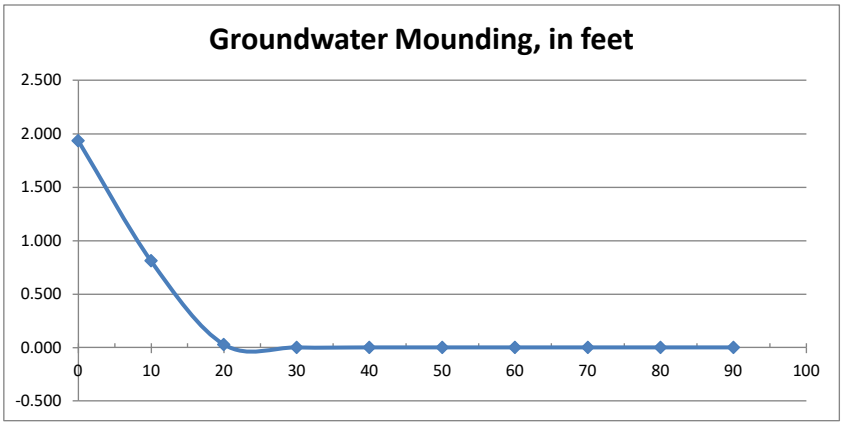
Input Values

1.35	R	Recharge rate (permeability rate) (in/hr)
		Specific yield, Sy (dimensionless)
0.150	Sy	default value is 0.15; max value is 0.2 provided that a lab test data is submitted
		Horizontal hydraulic conductivity (in/hr)
1.35	Kh	Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
9.000	x	1/2 length of basin (x direction, in feet)
164.500	y	1/2 width of basin (y direction, in feet)
2.77	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

11.933	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.933	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.933	0
0.810	10
0.028	20
0.001	30
0.001	40
0.001	50
0.001	60
0.001	70
0.001	80
0.001	90

Re-Calculate Now



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Subsurface Infiltration Basin #3
'y' Direction

APPENDIX E

STORM SEWER DESIGN & CONDUIT OUTLET PROTECTION (C.O.P)

The Reynolds Group Inc.
Engineers-Surveyors-Landscape Architects
575 Route 28 - Suite 110
Raritan, NJ 08869

THE LAWRENCEVILLE SCHOOL
Campus Drive West
Inlet Area Data

Impervious C=0.99; O.S. C=0.25

DESC	AREA *(SF)*	O.S. (B) *(SF)*	IMP. *(SF)*	"C"	AREA *(Ac.)*
Infiltration Basin #1					
B Inlet #1	19,164	17,036	2,128	***0.33***	**0.44**
B Inlet #2	4,138	1,181	2,957	***0.78***	**0.09**
Lawn Inl #1	3,508	3,203	305	***0.31***	**0.08**
Lawn Inl #2	2,643	2,269	374	***0.35***	**0.06**
B Inlet #6	3,953	966	2,987	***0.81***	**0.09**
A Inlet #7	22,972	19,563	3,409	***0.36***	**0.53**
A Inlet #8	4,319	2,266	2,053	***0.60***	**0.10**
E Inlet #9	12,035	6,900	5,135	***0.57***	**0.28**
Existing Outfall #1					
A Inlet #10	20,922	19,084	1,838	***0.32***	**0.48**
A Inlet #11	4,381	3,699	682	***0.37***	**0.10**
B Inlet #12	12,017	3,406	8,611	***0.78***	**0.28**
E Inlet #13	29,190	19,996	9,194	***0.48***	**0.67**
Existing Outfall #2					
B Inlet #14	7,266	5,557	1,709	***0.42***	**0.17**
E Inlet #24 *(Existing)*	27,005	24,724	2,281	***0.31***	**0.62**
B Inlet #22	14,335	2,933	11,402	***0.84***	**0.33**
B Inlet #23	3,952	1,209	2,743	***0.76***	**0.09**
Subsurface Basin #2					
Lawn Inl #3	4,507	4,507	0	***0.25***	**0.10**
Lawn Inl #4	1,558	1,558	0	***0.25***	**0.04**
B Inlet #18 **Includes: LI #5, #6, #7**	31,116	6,500	24,616	***0.84***	**0.71**

NOAA Atlas 14, Volume 2, Version 3
Location name: Lawrence Township, New Jersey, USA*
Latitude: 40.2963°, Longitude: -74.7308°
Elevation: 119.04 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.08** (3.70-4.50)	**4.86** (4.42-5.38)	**5.78** (5.23-6.38)	**6.46** (5.83-7.12)	**7.28** (6.54-8.03)	**7.90** (7.06-8.70)	**8.50** (7.55-9.38)	**9.05** (8.00-10.0)	**9.76** (8.54-10.9)	**10.3** (8.94-11.5)
10-min	**3.26** (2.95-3.60)	**3.89** (3.53-4.30)	**4.63** (4.19-5.11)	**5.17** (4.66-5.69)	**5.81** (5.21-6.40)	**6.28** (5.62-6.92)	**6.74** (6.00-7.45)	**7.18** (6.34-7.95)	**7.72** (6.76-8.60)	**8.11** (7.04-9.08)
15-min	**2.72** (2.46-3.00)	**3.26** (2.96-3.60)	**3.91** (3.53-4.31)	**4.36** (3.93-4.80)	**4.90** (4.40-5.41)	**5.30** (4.74-5.85)	**5.68** (5.06-6.28)	**6.04** (5.34-6.69)	**6.48** (5.67-7.22)	**6.78** (5.89-7.60)
30-min	**1.86** (1.69-2.05)	**2.25** (2.05-2.49)	**2.78** (2.51-3.06)	**3.15** (2.85-3.48)	**3.63** (3.26-4.00)	**3.99** (3.57-4.40)	**4.35** (3.87-4.81)	**4.70** (4.15-5.21)	**5.15** (4.51-5.74)	**5.49** (4.77-6.16)
60-min	**1.16** (1.05-1.28)	**1.41** (1.28-1.56)	**1.78** (1.61-1.96)	**2.05** (1.85-2.26)	**2.42** (2.17-2.67)	**2.71** (2.42-2.98)	**3.00** (2.67-3.31)	**3.29** (2.91-3.65)	**3.70** (3.24-4.12)	**4.01** (3.48-4.49)
2-hr	**0.704** (0.636-0.778)	**0.857** (0.776-0.948)	**1.09** (0.982-1.20)	**1.26** (1.14-1.39)	**1.50** (1.35-1.66)	**1.70** (1.51-1.87)	**1.90** (1.68-2.10)	**2.11** (1.85-2.34)	**2.40** (2.09-2.67)	**2.63** (2.26-2.94)
3-hr	**0.515** (0.464-0.573)	**0.627** (0.566-0.699)	**0.796** (0.716-0.886)	**0.927** (0.832-1.03)	**1.11** (0.992-1.24)	**1.26** (1.12-1.40)	**1.42** (1.25-1.58)	**1.58** (1.38-1.76)	**1.81** (1.56-2.03)	**1.99** (1.69-2.25)
6-hr	**0.327** (0.295-0.366)	**0.397** (0.358-0.444)	**0.502** (0.451-0.561)	**0.588** (0.526-0.655)	**0.712** (0.631-0.793)	**0.815** (0.717-0.908)	**0.927** (0.807-1.03)	**1.05** (0.902-1.17)	**1.22** (1.03-1.37)	**1.37** (1.14-1.54)
12-hr	**0.197** (0.178-0.222)	**0.239** (0.215-0.269)	**0.304** (0.273-0.341)	**0.359** (0.321-0.403)	**0.442** (0.391-0.494)	**0.514** (0.450-0.575)	**0.592** (0.512-0.662)	**0.680** (0.579-0.763)	**0.810** (0.676-0.915)	**0.922** (0.756-1.05)
24-hr	**0.114** (0.105-0.125)	**0.138** (0.127-0.151)	**0.176** (0.162-0.192)	**0.208** (0.191-0.227)	**0.256** (0.232-0.279)	**0.297** (0.268-0.323)	**0.343** (0.306-0.372)	**0.393** (0.347-0.428)	**0.468** (0.407-0.511)	**0.532** (0.456-0.583)
2-day	**0.066** (0.061-0.072)	**0.080** (0.074-0.088)	**0.102** (0.094-0.112)	**0.120** (0.110-0.132)	**0.147** (0.133-0.160)	**0.170** (0.153-0.185)	**0.194** (0.174-0.212)	**0.221** (0.196-0.242)	**0.261** (0.227-0.286)	**0.294** (0.253-0.324)
3-day	**0.047** (0.043-0.051)	**0.057** (0.052-0.062)	**0.072** (0.066-0.078)	**0.084** (0.077-0.092)	**0.102** (0.093-0.111)	**0.117** (0.106-0.128)	**0.134** (0.120-0.145)	**0.151** (0.135-0.165)	**0.177** (0.156-0.194)	**0.199** (0.173-0.218)
4-day	**0.037** (0.034-0.040)	**0.045** (0.041-0.049)	**0.056** (0.052-0.061)	**0.066** (0.061-0.072)	**0.080** (0.073-0.086)	**0.091** (0.083-0.099)	**0.103** (0.093-0.112)	**0.116** (0.104-0.126)	**0.135** (0.120-0.147)	**0.151** (0.133-0.165)
7-day	**0.025** (0.023-0.027)	**0.030** (0.027-0.032)	**0.037** (0.034-0.040)	**0.043** (0.039-0.047)	**0.051** (0.047-0.056)	**0.059** (0.053-0.064)	**0.066** (0.060-0.072)	**0.074** (0.067-0.081)	**0.086** (0.076-0.094)	**0.095** (0.084-0.104)
10-day	**0.020** (0.018-0.021)	**0.024** (0.022-0.026)	**0.029** (0.027-0.031)	**0.033** (0.031-0.036)	**0.039** (0.036-0.042)	**0.044** (0.041-0.048)	**0.049** (0.045-0.053)	**0.055** (0.050-0.059)	**0.062** (0.056-0.068)	**0.068** (0.061-0.075)
20-day	**0.013** (0.013-0.014)	**0.016** (0.015-0.017)	**0.019** (0.018-0.020)	**0.021** (0.020-0.023)	**0.025** (0.023-0.026)	**0.027** (0.025-0.029)	**0.030** (0.028-0.032)	**0.033** (0.030-0.035)	**0.036** (0.033-0.039)	**0.039** (0.035-0.042)
30-day	**0.011** (0.010-0.012)	**0.013** (0.012-0.014)	**0.015** (0.014-0.016)	**0.017** (0.016-0.018)	**0.019** (0.018-0.020)	**0.021** (0.020-0.022)	**0.023** (0.021-0.024)	**0.024** (0.023-0.026)	**0.027** (0.025-0.028)	**0.028** (0.026-0.030)
45-day	**0.009** (0.009-0.010)	**0.011** (0.011-0.012)	**0.013** (0.012-0.013)	**0.014** (0.013-0.015)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)	**0.019** (0.018-0.020)	**0.021** (0.019-0.022)	**0.022** (0.020-0.023)
60-day	**0.008** (0.008-0.009)	**0.010** (0.009-0.010)	**0.011** (0.011-0.012)	**0.012** (0.012-0.013)	**0.014** (0.013-0.014)	**0.015** (0.014-0.015)	**0.016** (0.015-0.016)	**0.016** (0.016-0.017)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)

[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.

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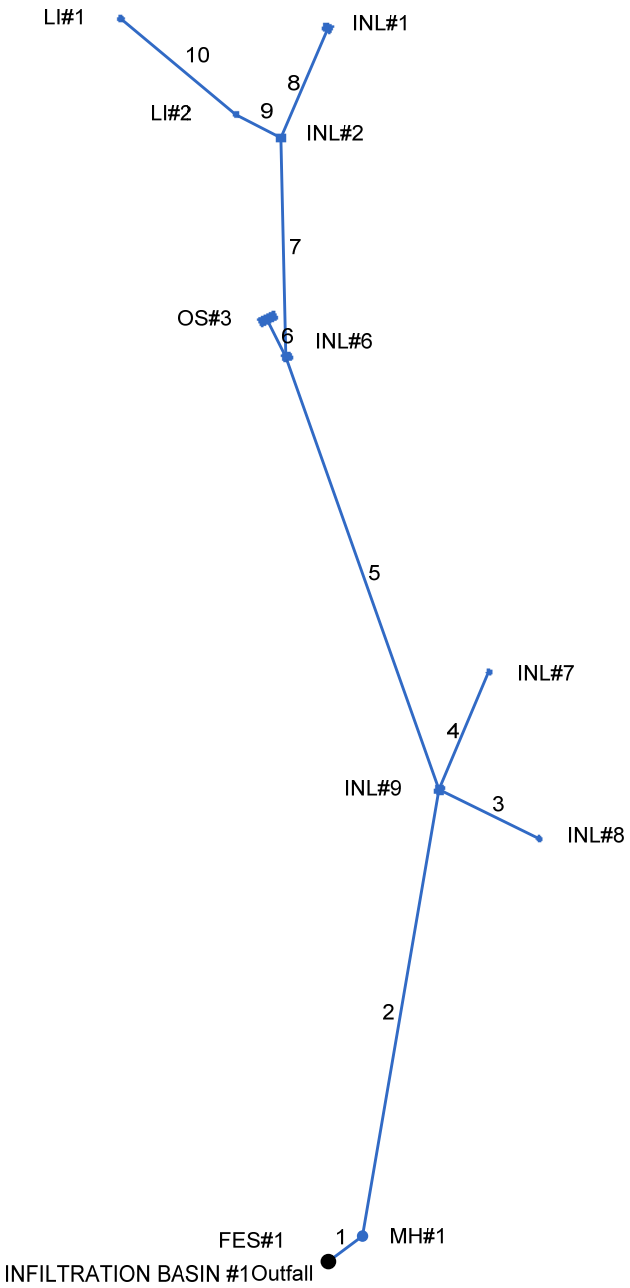
PF graphical

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



Project File: 22-019 Pipes Basin-1 R0.stm	Number of lines: 10	Date: 11/1/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	20.000	0.00	1.67	0.00	0.00	0.74	0.0	23.1	4.2	3.39	6.06	3.14	14 x 23 e	0.30	103.10	103.16	104.14	103.86	104.27	105.50	MH#1-FES#1
2	1	213.040	0.28	1.67	0.57	0.16	0.74	10.0	21.7	4.3	3.49	7.83	3.49	14 x 23 e	0.50	103.26	104.33	104.00	105.08	105.50	107.79	INL#9-MH#1
3	2	52.000	0.10	0.10	0.60	0.06	0.06	10.0	10.0	5.9	0.36	4.95	1.76	15	0.50	104.72	104.98	105.08	105.21	107.79	107.50	INL#8-INL#9
4	2	60.000	0.53	0.53	0.36	0.19	0.19	10.0	10.0	5.9	1.14	4.95	3.21	15	0.50	104.72	105.02	105.13	105.44	107.79	108.40	INL#7-INL#9
5	2	215.653	0.09	0.76	0.81	0.07	0.33	10.0	18.8	4.6	1.83	8.05	3.47	18	0.50	104.57	105.65	105.08	106.16	107.79	111.30	INL#6-INL#9
6	5	20.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.29	8.04	1.42	18	0.50	105.75	105.85	106.16	106.05	111.30	112.25	OS#3-INL#6
7	5	103.166	0.09	0.67	0.78	0.07	0.26	10.0	17.4	4.8	1.24	6.99	3.76	15	1.00	108.59	109.62	108.95	110.06	111.30	112.75	INL#2-INL#6
8	7	56.000	0.44	0.44	0.33	0.15	0.15	10.0	10.0	5.9	0.86	7.00	3.06	15	1.00	109.72	110.28	110.06	110.64	112.75	113.15	INL#1-INL#2
9	7	23.780	0.06	0.14	0.35	0.02	0.05	10.0	16.2	4.9	0.22	2.74	2.10	12	0.50	109.87	109.99	110.06	110.18	112.75	112.95	LI#2-INL#2
10	9	70.389	0.08	0.08	0.31	0.02	0.02	10.0	10.0	5.9	0.15	2.72	1.84	12	0.50	110.09	110.44	110.25	110.60	112.95	112.95	LI#1-LI#2

Project File: 22-019 Pipes Basin-1 R0.stm | Number of lines: 10 | Run Date: 11/1/2023

NOTES:Intensity = 56.34 / (Inlet time + 11.00) ^ 0.74; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	20.000	0.00	1.67	0.00	0.00	0.74	0.0	20.9	5.2	4.43	6.06	2.52	14 x 23 e	0.30	103.10	103.16	104.68	104.71	104.27	105.50	MH#1-FES#1
2	1	213.040	0.28	1.67	0.57	0.16	0.74	10.0	19.8	5.3	4.53	7.83	2.83	14 x 23 e	0.50	103.26	104.33	104.88	105.22	105.50	107.79	INL#9-MH#1
3	2	52.000	0.10	0.10	0.60	0.06	0.06	10.0	10.0	7.0	0.42	4.95	1.45	15	0.50	104.72	104.98	105.49	105.23	107.79	107.50	INL#8-INL#9
4	2	60.000	0.53	0.53	0.36	0.19	0.19	10.0	10.0	7.0	1.33	4.95	2.48	15	0.50	104.72	105.02	105.49	105.47	107.79	108.40	INL#7-INL#9
5	2	215.653	0.09	0.76	0.81	0.07	0.33	10.0	17.5	5.6	2.45	8.05	2.97	18	0.50	104.57	105.65	105.49	106.24	107.79	111.30	INL#6-INL#9
6	5	20.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.58	8.04	1.83	18	0.50	105.75	105.85	106.24	106.13	111.30	112.25	OS#3-INL#6
7	5	103.166	0.09	0.67	0.78	0.07	0.26	10.0	16.3	5.8	1.51	6.99	3.98	15	1.00	108.59	109.62	108.98	110.11	111.30	112.75	INL#2-INL#6
8	7	56.000	0.44	0.44	0.33	0.15	0.15	10.0	10.0	7.0	1.01	7.00	3.09	15	1.00	109.72	110.28	110.11	110.67	112.75	113.15	INL#1-INL#2
9	7	23.780	0.06	0.14	0.35	0.02	0.05	10.0	15.3	5.9	0.27	2.74	2.06	12	0.50	109.87	109.99	110.11	110.20	112.75	112.95	LI#2-INL#2
10	9	70.389	0.08	0.08	0.31	0.02	0.02	10.0	10.0	7.0	0.17	2.72	1.93	12	0.50	110.09	110.44	110.26	110.61	112.95	112.95	LI#1-LI#2

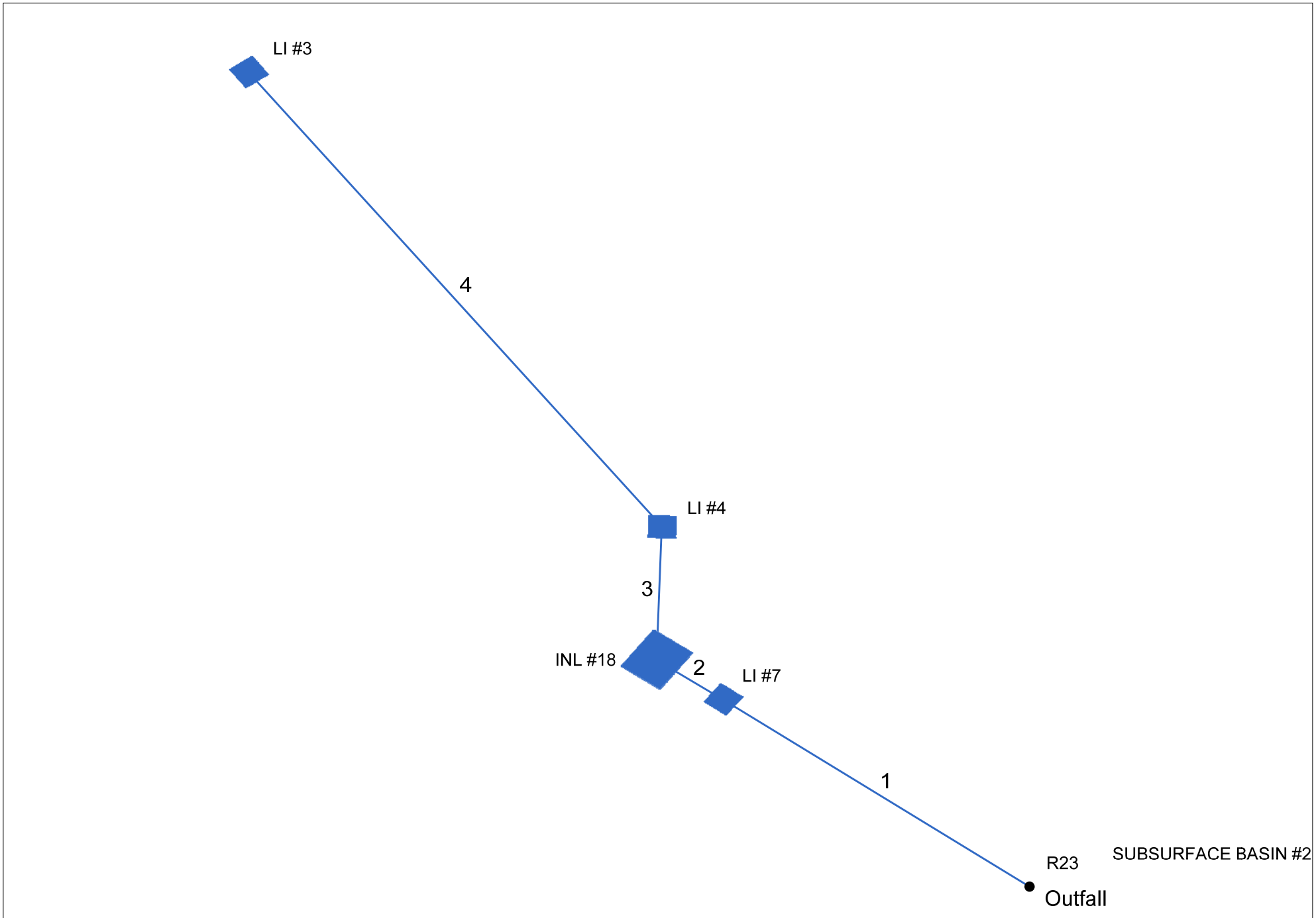
Project File: 22-019 Pipes Basin-1 R0.stm

Number of lines: 10

Run Date: 11/1/2023

NOTES:Intensity = 46.98 / (Inlet time + 8.90) ^ 0.65; Return period =Yrs. 100 ; c = cir e = ellip b = box

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



Project File: 22-019 Pipes Basin-2 R0.stm	Number of lines: 4	Date: 11/1/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	27.819	0.00	0.85	0.00	0.00	0.63	0.0	15.2	5.0	3.19	4.96	2.60	15	0.50	97.05	97.19	99.52	99.58	101.73	101.50	LI#7 - R#23
2	1	6.000	0.71	0.85	0.84	0.60	0.63	10.0	15.2	5.1	3.19	7.00	2.60	15	1.00	98.30	98.36	99.59	99.61	101.50	101.42	INL#18-LI#7
3	2	12.000	0.04	0.14	0.25	0.01	0.04	10.0	14.4	5.2	0.18	2.73	0.23	12	0.50	98.61	98.67	99.74	99.74	101.42	101.00	LI#4-INL#18
4	3	50.505	0.10	0.10	0.25	0.03	0.03	10.0	10.0	5.9	0.15	2.71	0.22	12	0.50	98.77	99.02	99.74	99.74	101.00	101.25	LI#3-LI#4

Project File: 22-019 Pipes Basin-2 R0.stm

Number of lines: 4

Run Date: 11/1/2023

NOTES:Intensity = 56.34 / (Inlet time + 11.00) ^ 0.74; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	27.819	0.00	0.85	0.00	0.00	0.63	0.0	14.5	6.1	3.82	4.96	3.12	15	0.50	97.05	97.19	100.26	100.34	101.73	101.50	LI#7 - R#23
2	1	6.000	0.71	0.85	0.84	0.60	0.63	10.0	14.5	6.1	3.83	7.00	3.12	15	1.00	98.30	98.36	100.37	100.38	101.50	101.42	INL#18-LI#7
3	2	12.000	0.04	0.14	0.25	0.01	0.04	10.0	13.8	6.2	0.22	2.73	0.28	12	0.50	98.61	98.67	100.58	100.58	101.42	101.00	LI#4-INL#18
4	3	50.505	0.10	0.10	0.25	0.03	0.03	10.0	10.0	7.0	0.17	2.71	0.22	12	0.50	98.77	99.02	100.58	100.58	101.00	101.25	LI#3-LI#4

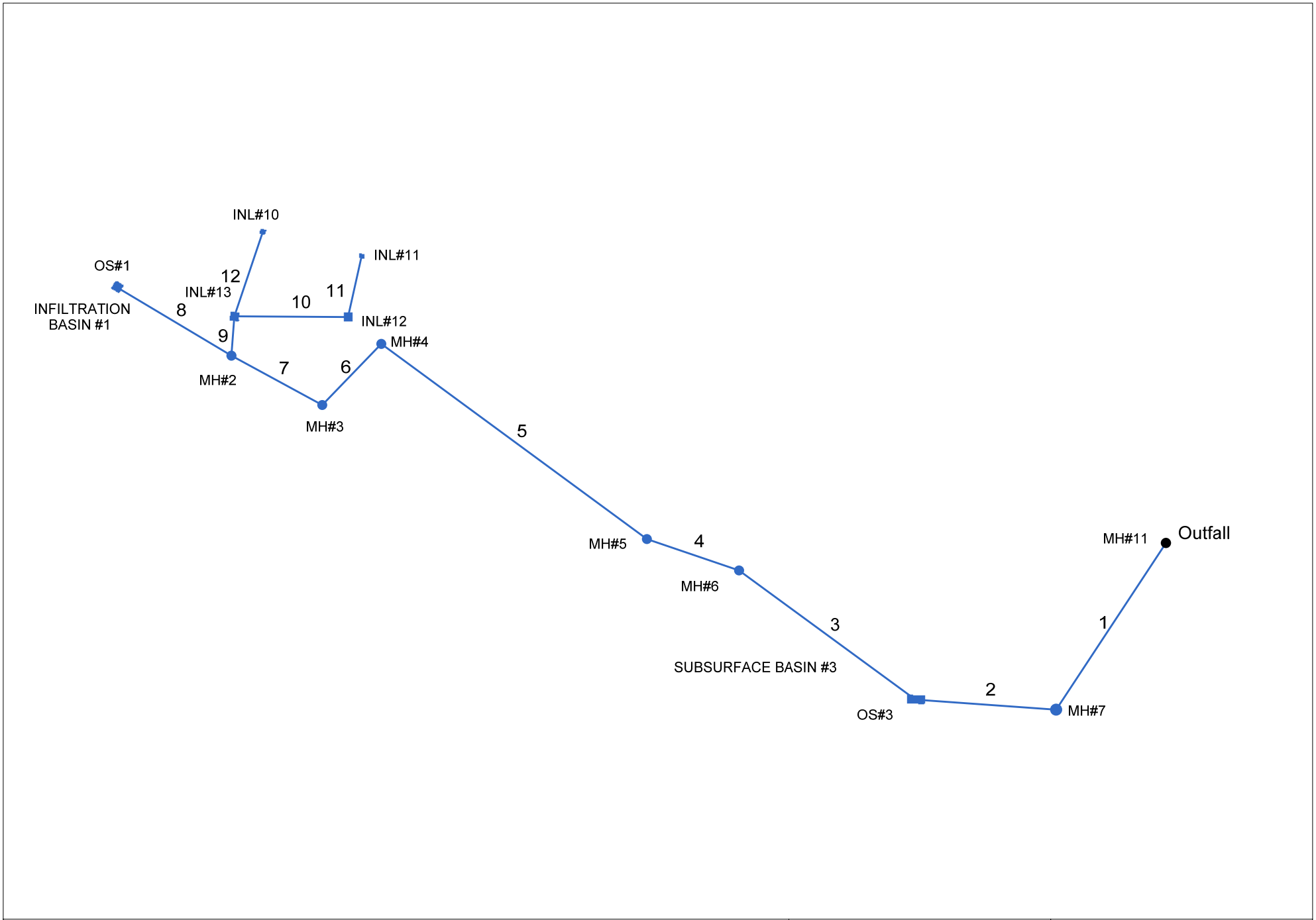
Project File: 22-019 Pipes Basin-2 R0.stm

Number of lines: 4

Run Date: 11/1/2023

NOTES:Intensity = 46.98 / (Inlet time + 8.90) ^ 0.65; Return period =Yrs. 100 ; c = cir e = ellip b = box

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



Project File: 22-019 Pipes Outfall-1 R0.stm	Number of lines: 12	Date: 11/1/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	98.592	0.00	1.53	0.00	0.00	0.73	0.0	17.6	4.7	6.06	13.52	2.01	24	0.30	93.33	93.63	95.33	95.38	102.58	101.85	MH#7-MH#11
2	1	69.467	0.00	1.53	0.00	0.00	0.73	0.0	17.1	4.8	6.11	13.47	2.26	24	0.30	93.73	93.94	95.44	95.47	101.85	102.20	OS#3-MH#7
3	2	107.804	0.00	1.53	0.00	0.00	0.73	0.0	16.1	4.9	5.60	13.35	2.43	24	0.30	93.99	94.31	95.52	95.57	102.20	101.77	MH#6-OS#3
4	3	48.000	0.00	1.53	0.00	0.00	0.73	0.0	15.7	5.0	5.64	17.33	3.70	24	0.50	94.41	94.65	95.61	95.49	101.77	102.08	MH#5-MH#6
5	4	162.500	0.00	1.53	0.00	0.00	0.73	0.0	14.3	5.2	5.79	17.30	4.75	24	0.50	94.75	95.56	95.55	96.41	102.08	102.50	MH#4-MH#5
6	5	41.940	0.00	1.53	0.00	0.00	0.73	0.0	14.0	5.2	5.82	17.34	4.77	24	0.50	95.66	95.87	96.46	96.72	102.50	102.50	MH#3-MH#4
7	6	50.967	0.00	1.53	0.00	0.00	0.73	0.0	13.7	5.3	5.85	11.38	5.77	18	1.00	96.37	96.88	97.13	97.81	102.50	102.40	MH#2-MH#3
8	7	65.778	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.00	24.13	3.08	18	4.50	97.14	100.10	97.81	100.63	102.40	105.50	OS#1-MH#2
9	7	19.500	0.67	1.53	0.48	0.32	0.73	10.0	13.6	5.3	3.86	9.89	5.16	15	2.00	97.13	97.52	97.81	98.31	102.40	101.00	INL#13-MH#2
10	9	56.000	0.28	0.38	0.78	0.22	0.26	10.0	12.9	5.4	1.38	4.95	3.39	15	0.50	98.02	98.30	98.47	98.76	101.00	101.50	INL#12-INL#13
11	10	31.000	0.10	0.10	0.37	0.04	0.04	10.0	10.0	5.9	0.22	7.00	1.79	15	1.00	98.55	98.86	98.76	99.04	101.50	101.50	INL#11-INL#12
12	9	44.000	0.48	0.48	0.32	0.15	0.15	10.0	10.0	5.9	0.91	7.00	3.44	15	1.00	98.02	98.46	98.33	98.83	101.00	102.00	INL#10-INL#13

Project File: 22-019 Pipes Outfall-1 R0.stm

Number of lines: 12

Run Date: 11/1/2023

NOTES:Intensity = 56.34 / (Inlet time + 11.00) ^ 0.74; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	98.592	0.00	1.53	0.00	0.00	0.73	0.0	16.0	5.8	10.76	13.52	3.48	24	0.30	93.33	93.63	95.33	95.50	102.58	101.85	MH#7-MH#11
2	1	69.467	0.00	1.53	0.00	0.00	0.73	0.0	15.6	5.9	10.80	13.47	3.52	24	0.30	93.73	93.94	95.67	95.77	101.85	102.20	OS#3-MH#7
3	2	107.804	0.00	1.53	0.00	0.00	0.73	0.0	15.0	6.0	7.82	13.35	2.67	24	0.30	93.99	94.31	95.89	95.97	102.20	101.77	MH#6-OS#3
4	3	48.000	0.00	1.53	0.00	0.00	0.73	0.0	14.7	6.0	7.85	17.33	3.97	24	0.50	94.41	94.65	96.01	95.65	101.77	102.08	MH#5-MH#6
5	4	162.500	0.00	1.53	0.00	0.00	0.73	0.0	13.6	6.2	7.98	17.30	5.22	24	0.50	94.75	95.56	95.70	96.56	102.08	102.50	MH#4-MH#5
6	5	41.940	0.00	1.53	0.00	0.00	0.73	0.0	13.4	6.3	8.02	17.34	5.23	24	0.50	95.66	95.87	96.62	96.88	102.50	102.50	MH#3-MH#4
7	6	50.967	0.00	1.53	0.00	0.00	0.73	0.0	13.2	6.3	8.04	11.38	6.39	18	1.00	96.37	96.88	97.30	97.98	102.50	102.40	MH#2-MH#3
8	7	65.778	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.45	24.13	3.80	18	4.50	97.14	100.10	97.98	100.81	102.40	105.50	OS#1-MH#2
9	7	19.500	0.67	1.53	0.48	0.32	0.73	10.0	13.1	6.3	4.60	9.89	5.12	15	2.00	97.13	97.52	97.98	98.39	102.40	101.00	INL#13-MH#2
10	9	56.000	0.28	0.38	0.78	0.22	0.26	10.0	12.5	6.4	1.64	4.95	3.56	15	0.50	98.02	98.30	98.52	98.81	101.00	101.50	INL#12-INL#13
11	10	31.000	0.10	0.10	0.37	0.04	0.04	10.0	10.0	7.0	0.26	7.00	1.75	15	1.00	98.55	98.86	98.81	99.06	101.50	101.50	INL#11-INL#12
12	9	44.000	0.48	0.48	0.32	0.15	0.15	10.0	10.0	7.0	1.07	7.00	3.31	15	1.00	98.02	98.46	98.39	98.87	101.00	102.00	INL#10-INL#13

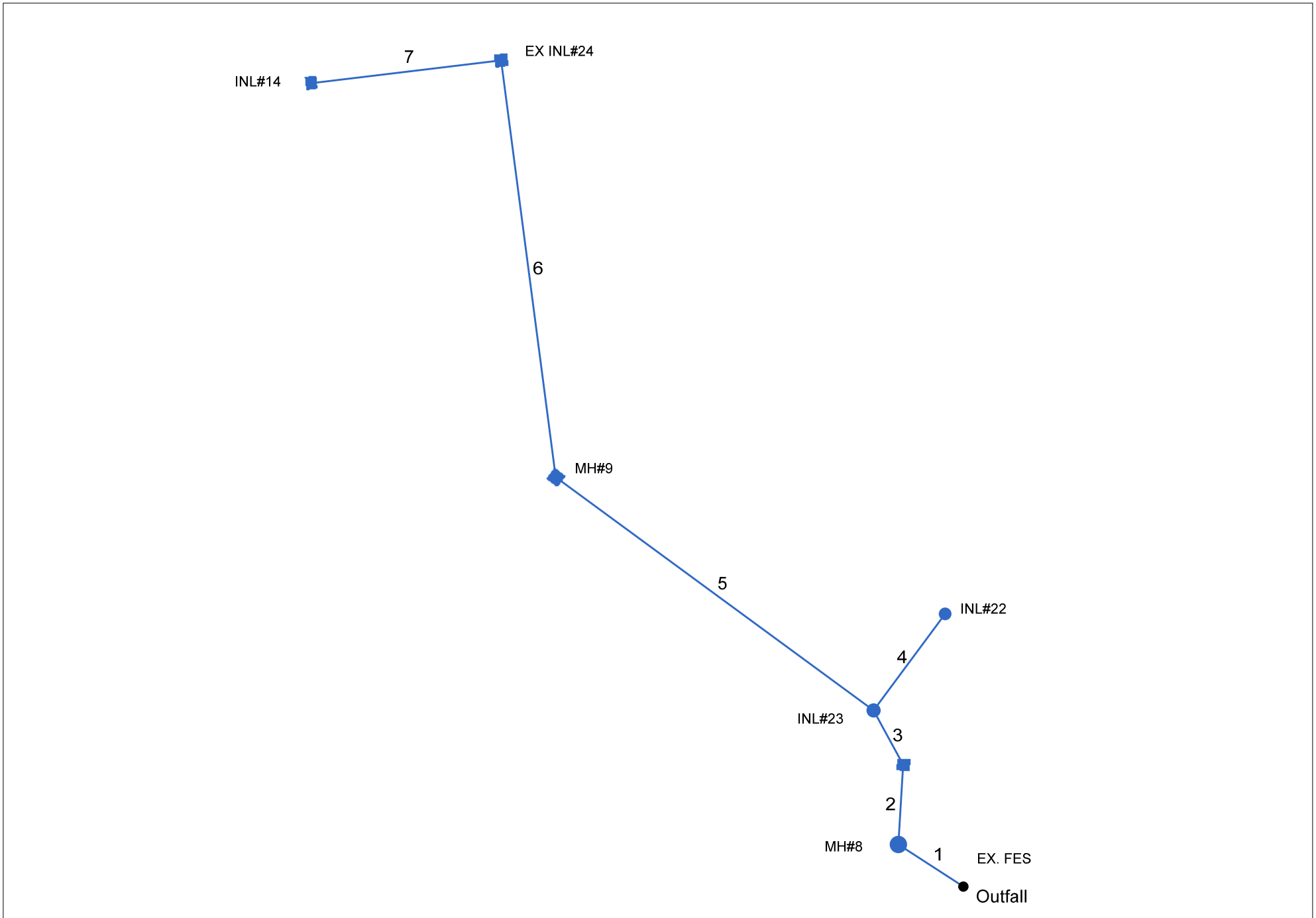
Project File: 22-019 Pipes Outfall-1 R0.stm

Number of lines: 12

Run Date: 11/1/2023

NOTES:Intensity = 46.98 / (Inlet time + 8.90) ^ 0.65; Return period =Yrs. 100 ; c = cir e = ellip b = box

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



Project File: 22-019 Pipes Outfall-2 R0.stm	Number of lines: 7	Date: 11/1/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	25.090	0.00	1.21	0.00	0.00	0.61	0.0	18.5	4.6	2.82	30.73	4.03	19 x 30 e	1.67	97.82	98.24	98.93	98.87	99.82	102.00	MH#6-EXFES
2	1	26.000	0.09	1.21	0.76	0.07	0.61	10.0	18.3	4.7	2.84	8.04	4.02	18	0.50	98.25	98.38	98.87	99.02	102.00	101.30	INL#23-MH#8
3	2	20.061	0.00	1.12	0.00	0.00	0.54	0.0	18.1	4.7	2.53	7.18	3.72	18	0.40	98.43	98.51	99.04	99.12	101.30	101.50	MH#10-INL#23
4	3	39.000	0.33	0.33	0.84	0.28	0.28	10.0	10.0	5.9	1.65	6.46	3.30	15	1.00	98.76	99.15	99.32	99.66	101.50	101.80	INL#22-INL#23
5	3	127.752	0.00	0.79	0.00	0.00	0.26	0.0	15.6	5.0	1.32	6.63	2.21	18	0.40	98.56	99.07	99.32	99.52	101.50	102.60	MH#9-INL#23
6	5	136.577	0.62	0.79	0.31	0.19	0.26	10.0	13.0	5.4	1.42	6.03	2.79	18	0.33	99.15	99.60	99.65	100.10	102.60	102.48	XINL#24-MH#9
7	6	62.000	0.17	0.17	0.42	0.07	0.07	10.0	10.0	5.9	0.42	4.95	1.77	15	0.50	99.85	100.16	100.28	100.41	102.48	103.05	INL#14-XINL24

Project File: 22-019 Pipes Outfall-2 R0.stm

Number of lines: 7

Run Date: 11/1/2023

NOTES:Intensity = 56.34 / (Inlet time + 11.00) ^ 0.74; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	25.090	0.00	1.21	0.00	0.00	0.61	0.0	17.3	5.6	3.43	30.73	1.21	19 x 30 e	1.67	97.82	98.24	99.40	99.44	99.82	102.00	MH#6-EXFES
2	1	26.000	0.09	1.21	0.76	0.07	0.61	10.0	17.1	5.7	3.45	8.04	3.22	18	0.50	98.25	98.38	99.47	99.09	102.00	101.30	INL#23-MH#8
3	2	20.061	0.00	1.12	0.00	0.00	0.54	0.0	16.9	5.7	3.07	7.18	3.91	18	0.40	98.43	98.51	99.12	99.19	101.30	101.50	MH#10-INL#23
4	3	39.000	0.33	0.33	0.84	0.28	0.28	10.0	10.0	7.0	1.93	6.46	3.33	15	1.00	98.76	99.15	99.41	99.70	101.50	101.80	INL#22-INL#23
5	3	127.752	0.00	0.79	0.00	0.00	0.26	0.0	14.8	6.0	1.58	6.63	2.25	18	0.40	98.56	99.07	99.41	99.58	101.50	102.60	MH#9-INL#23
6	5	136.577	0.62	0.79	0.31	0.19	0.26	10.0	12.6	6.4	1.69	6.03	2.93	18	0.33	99.15	99.60	99.69	100.14	102.60	102.48	XINL#24-MH#9
7	6	62.000	0.17	0.17	0.42	0.07	0.07	10.0	10.0	7.0	0.50	4.95	1.80	15	0.50	99.85	100.16	100.34	100.43	102.48	103.05	INL#14-XINL24

Project File: 22-019 Pipes Outfall-2 R0.stm

Number of lines: 7

Run Date: 11/1/2023

NOTES:Intensity = 46.98 / (Inlet time + 8.90) ^ 0.65; Return period =Yrs. 100 ; c = cir e = ellip b = box

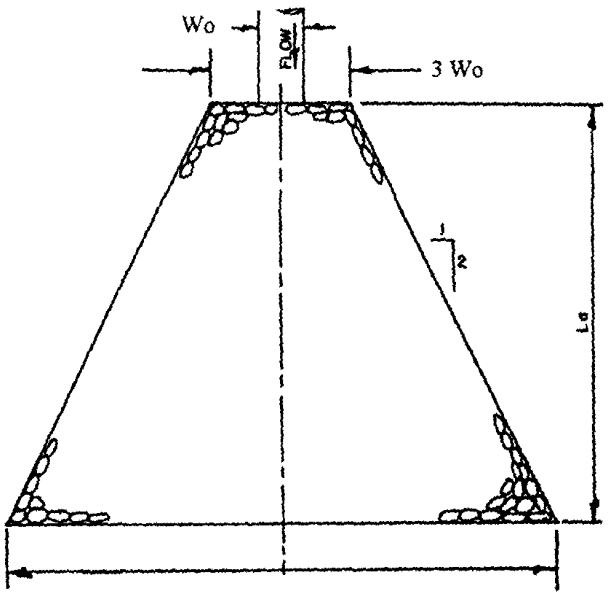
RIPRAP APRON DATA SHEET

PROJECT NAME: **Campus Drive West** TRG #: 22-019

STORM FREQENCIES: **25-year** DATE: Oct-23

For Tailwater < 0.5D_o

OUTLET STRUCT.	YEAR STORM	Q (cfs)	VELOCITY-max (fps)	PIPE HEIGHT (in)	PIPE WIDTH (in)	TAILWATER (ft)	La (ft)	W (beg) (ft)	W (end) (ft)	d50 (in)
FES #1	25	**3.39**	3.14	14	23	0.44	**11.1**	**5.8**	**16.9**	**1.2**



For tailwater elevation less than the elevation of the center of the pipe,

$W = 3\ W_o + L_a$

$L_a = (1.8\frac{q}{D_o^{1/2}}) + 7Do$ TW < ½ D_o

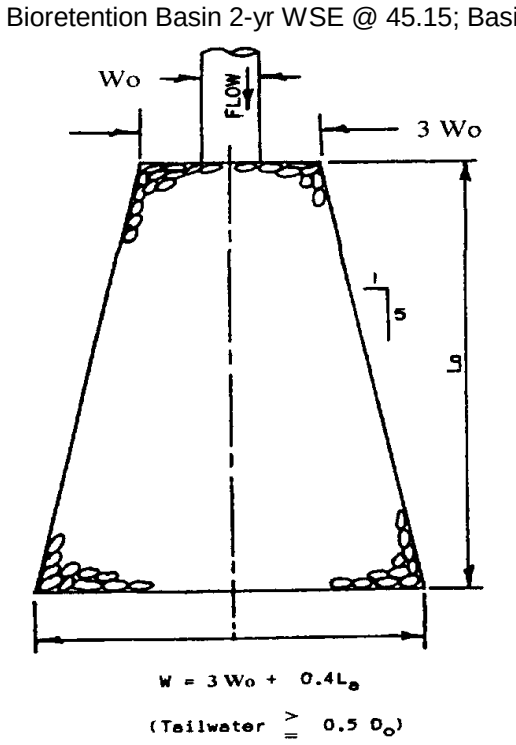
$d_{50} = \frac{0.02}{Tw} q^{1.33}$ where $q = \frac{Q}{Wo}$

$TW = 0.2\ D_o$

For Tailwater >/= 0.5D_o

OUTLET STRUCT.	YEAR STORM	Q (cfs)	VELOCITY-max (fps)	PIPE HEIGHT (in)	PIPE WIDTH (in)	TAILWATER (ft)	La (ft)	W (beg) (ft)	W (end) (ft)	d50 (in)

Bioretention Basin 2-yr WSE @ 45.15; Basin Bottom Elev. 43.33; Tailwater = 1.82 ft



For tailwater elevation greater than or equal to the elevation of the center of the pipe,

$W = 3\ W_o + 0.4\ L_a$

$L_a = 3\frac{q}{D_o^{1/2}}$ TW > ½ D_o

$d_{50} = \frac{0.02}{Tw} q^{1.33}$ where $q = \frac{Q}{Wo}$

$TW = 0.2\ D_o$

APPENDIX F

SOIL LOGS AND PERMEABILITY TESTING

REPORT PREPARED BY GZA GEOENVIRONMENTAL, INC.

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SOIL LOGS AND PERMEABILITY TESTING

Proposed Stormwater Management Facilities – Entry Drive, Phase 2
Lawrence Township, Mercer County, NJ
The Lawrenceville School

March 9, 2023
File No. 26.0092842.00

PREPARED FOR:
The Lawrenceville School
P. O. Box 66067
2500 Main Street
Lawrenceville, New Jersey 08648

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www.gza.com

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CONSTRUCTION MANAGEMENT

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March 9, 2023
File No. 26.0092842.00

The Lawrenceville School
P.O. Box 66067
2500 Main Street
Lawrenceville, New Jersey 08648

Attention: Mr. Frederick Montferrat
Manager of Capital Projects

Report
Soil Logs and Permeability Testing
Proposed Stormwater Management Facilities – Entry Drive, Phase 2
Lawrence Township, Mercer County, New Jersey
The Lawrenceville School

Introduction

This report transmits the results of soil logs and permeability testing performed by GZA GeoEnvironmental, Inc. (GZA) as part of a preliminary stormwater investigation for a new entry drive and parking areas being constructed on The Lawrenceville School campus in Lawrence Township, Mercer County, New Jersey. The subject site is located at 2500 Main Street. The approximate location of the site is shown on the Site Location Map, Plate 1. This report was prepared in general accordance with our revised proposal dated January 19, 2023.

Proposed Construction

It is our understanding that portions of the entry drive are currently being constructed and that this investigation is for Phase 2 portion of the project. A plan prepared by The Reynolds Group dated October 28, 2022 was provided to us which indicates that

potential stormwater management facilities related to the Phase 2 portion of the entry drive project are proposed in the southwest portion of the school campus within existing athletic fields and adjacent wooded areas.

The plan indicates that the new stormwater management would consist of two bioretention basins, porous asphalt pavement, and modifications to an existing bioretention basin. Specifically, Bioretention Basin #8 would have a bottom area of approximately 4,000 square feet and be established at Elevation +103 feet. Bioretention Basin #9 would have a bottom area of approximately 5,200 square feet and be established at Elevation +99 feet. Nineteen existing parking spaces in the parking lot for the Kirby Arts Center would also be converted to porous asphalt and a new parking lot would be constructed southwest of the existing lot with porous asphalt in some of the parking spaces. Bioretention Basin #10 (existing basin) currently encompasses a bottom area of approximately 5,600 square feet and is established at approximately Elevation +96 feet.

Purpose and Scope of Work

The purpose of our stormwater testing services was to:

1) explore the subsurface soil, rock, and groundwater conditions via test pits at the requested 14 locations within the proposed stormwater management areas;

2) collect tube samples of the upper soil layers encountered in the test pits for laboratory tube permeameter permeability testing;

3) perform one single-ring infiltration test in each test pit; and

4) prepare a brief summary report of our findings for use by The Reynolds Group (Reynolds) in their initial evaluation of the stormwater design requirements.

To accomplish these purposes, a subsurface exploration program consisting of the 14 supervised test pit excavations (TP-1 through TP-11, and TP-16 through TP-18) requested by The Reynolds Group was performed. The test pits were advanced using a Kubota KX080-4 tracked excavator subcontracted by the Lawrenceville School directly and extended to depths ranging from approximately 10 feet to 13 feet beneath the existing surface grades (bgs). Refusal to further excavation was encountered in TP-1, 2, 4, 11, 16, 17, and 18. Tube samples were obtained from the upper soil strata encountered in the test pits for laboratory tube permeameter testing. A single ring infiltration test was also performed in each test pit at or near the requested permeability test depths, particularly where significant gravel and cobbles was observed in the overburden soils. The approximate locations of the test pits performed for this study are shown on the Plot Plan, Plate 2.

All field work was performed under the direct technical supervision of a representative from GZA. The test pit locations were staked in the field by Reynolds prior to the start of the field work. Our representative observed that the test pits were completed at the locations staked in the field by Reynolds, maintained continuous logs of the test pits as the work proceeded, obtained samples of the encountered materials, including relatively undisturbed tube samples of the subsoils above bedrock for laboratory tube permeameter permeability testing, and performed single ring infiltration testing.

Detailed descriptions of the subsurface conditions encountered in the test pits are presented on the Test Pits Logs, Plates 3A through 3N. The soil samples from the test pits were visually described in general accordance with the USDA Soil Textural Triangle shown on Plate 4.

All soil samples obtained from the test pits were brought to our office where they were further examined in our soil mechanics laboratory. A laboratory testing program consisting of natural moisture content determinations and mechanical grain-size analyses was performed on select soil samples to assist in their classification. The moisture content test results are shown on the individual test pit logs and the mechanical grain-size analyses are presented on Plates 5A and 5B, Gradation Curves. Replicate tube samples obtained from the test pits were subjected to laboratory tube permeameter permeability testing and the lower of the replicate permeability rates are included on the individual test pit logs.

The following discussions of our findings are subject to the Limitations attached as an Appendix to this report.

Findings

The test pits were performed in either grass areas adjacent to the existing road or parking areas (TP-1 through TP-11) or within the existing basin (TP-16 through TP-18) as requested by Reynolds. The test pits generally encountered 8 to 18 inches of topsoil at the surface except for TP-10 and TP-11 where fill was observed at the surface. Fill and possible fill were observed below the topsoil in the remaining test pits except for TP-3 and TP-4. The fill and possible fill generally consisted of sandy loam, sandy clay loam, loam, silty clay loam, and clay loam soils which extended to depths of 1.8 to 7 feet bgs. The fill and possible fill were underlain by native soils consisting of sand, loamy sand, sandy loam, loam, silt loam, and clay loam soils and extended to depths of 4 to 14 feet bgs. These soils were typically underlain by weathered/fractured shale and sandstone bedrock of the Stockton Formation where most of the test pits were terminated. TP-11 was terminated atop probable sandstone bedrock at 12.5 feet bgs. It is

notable that the shale and sandstone beds of the Stockton Formation often exhibits highly variable decomposition and weathering characteristics and the transition to sounder rock can be gradual. Refusal to further excavation was encountered with the equipment noted in half of the test pits.

Groundwater seepage was encountered at depths of 4 to 12.5 feet bgs in the test pits. Soil mottling and gray low chroma soils, which are generally considered indicative of seasonal saturation by the NJDEP, were observed in the test pits at depths as shallow as 33 inches to as deep as 102 inches bgs. The estimated seasonal high water and groundwater depths are indicated at the test pit locations on the attached Plot Plan for planning purposes.

Tube samples were obtained from various soil layers within the test pits and select samples were subjected to laboratory tube permeameter permeability testing. A single ring infiltration test was performed in each test pit. Per the procedures outlined in Chapter 12 of the NJDEP Stormwater BMP manual for single ring infiltration tests, when the observed field intake rate is less than 1.0 in/hr, the hydraulic conductivity shall be reported as less than 1.0 in/hr. Please refer to the logs for the results and depths of the single ring infiltration and laboratory tube permeameter permeability testing.

Future Work

Additional stormwater testing, potentially consisting of basin flood tests, may be required once this information is reviewed by The Reynolds Group in their evaluation of the site's stormwater design requirements. However, it should be noted that groundwater seepage was often observed above or within a few feet of the surface of the shale or sandstone bedrock and basin flood testing cannot be performed below observed groundwater seepage levels.

Please contact us if you have any questions regarding this information.

The following Plates and Appendix are attached and complete this report:

Plate 1 – Site Location Map
Plate 2 – Plot Plan
Plates 3A through 3N – Test Pit Logs
Plate 4 – USDA Soil Classification System
Plates 5A and 5B – Gradation Curves
Appendix – Limitations

Respectfully submitted,

GZA GeoEnvironmental, Inc.

Cory S. Karinja, P.E.
Project Manager

Mark R. Denno, P.E.
Principal

Robert E. Schwankert, P.E.
Consultant/Reviewer

CSK:MRD/ck
(1 copy submitted via email)