

MEMORANDUM

DATE: 10/21/2019

TO: City of La Crosse – Engineering Department
Attn: Yuri Nasonovs

FROM: Kris Roppe

SUBJECT: La Crosse Center - Stormwater Management

This stormwater management memo has been prepared to accompany the submitted plans and stormwater calculations for the proposed La Crosse Center Expansion. The property is currently zoned Public – Semi Public. Therefore the project will need to meet the requirements of the City of La Crosse Commercial Design Standards. The project will consist of the construction of a building addition extending west over the existing parking area and Front Street, reconstruction of asphalt pavement, concrete pavement, concrete walk, utilities, erosion control, stormwater management, and landscaping. A project location map is provided on Sheet C0-10 in the submitted plan set.

A geotechnical Report was prepared by Chosen Valley Testing. Soil evaluations indicate that the infiltration rate within 5' of the bottom of the bio-infiltration basin is 0.5 inches/hour based on the requirements of Wisconsin DNR Conservation Practice Standard 1002.

Design Standards

Stormwater management plans and calculations have been prepared to meet the requirements of the City of La Crosse Municipal Code 115-555 by following Chapter 29 of the County of La Crosse Code. A brief overview of the performance standards as they apply to this project are provided below.

- 29.09 (1) – Runoff Control
 - Project is a redevelopment and exempt from 29.09 (1) (b) 1. a, b, & c per 29.06 (3) (b).
 - Stormwater management is required to maintain or reduce peak flow rates from the pre-developed rates for the 10-year and 25-year 24 hour storm events.
- 29.09 (2) – Water Quality
 - Project is a redevelopment and required to meet 60% TSS removal compared to no controls.
- 29.09 (3) – Infiltration
 - Project is a redevelopment and exempt per 29.06 (5) (d).
- 29.09 (4) – Thermal Controls
 - Not applicable as this project is not adjacent to any specific cold water streams.
- 29.09 (5) – Protective Areas
 - Not applicable as there are no protective areas within the project.
- 29.09 (6) – Fueling and Maintenance
 - BMPs are required to reduce petroleum within runoff.

The disturbed area for the project is 1.65 acres and the project will slightly decrease the onsite impervious area by 0.09 acres. Since the project is over an acre it will require a Wisconsin DNR WPDES permit.



Existing Conditions

The existing site is currently paved parking, driveways, street, sidewalk, and landscaped area. The site has been separated into a 10 sub watersheds which drain to existing storm sewer in the parking area and adjacent streets. The existing watersheds and ground cover are provided in the enclosures.

Proposed Conditions

The proposed site has also been separated into 10 sub watersheds and will drain similar to existing conditions. Stormwater management for the site will be a proposed bio-infiltration basin located in the northwest corner of the site to reduce runoff flow and volumes from the proposed sidewalk and parking area as well as provides water quality to meet the City requirements for redevelopment. The proposed building addition will also provide water quality improvements for the site as it will cover the existing parking area on the west side of the site as well as a portion of Front Street. The proposed watersheds and ground cover are provided in the enclosures.

Calculation summary

Calculations were performed for the existing and proposed drainage conditions. Water quantity calculations were completed using hydraulic models developed by utilizing the design data and the HydroCAD Version 10.00-19 computer modeling system. This was used to provide sizing and analysis for the proposed bio-infiltration basin. Hydrographs for existing and proposed scenarios were generated and routed through these models using the Atlas-14 rainfall distribution. The 2-year, 10-year, 25-year and 100-year 24-hour design storm events were analyzed for this project. The HydroCAD calculations for the existing and proposed conditions are included in the enclosures. The table below summarizes the flow for each design storm and shows the proposed peak runoff for the 2-year, 10-year, and 25-year 24 hour events is reduced when compared to existing conditions. The calculations also show that the proposed bio-infiltration basin safely conveys the 100-year 24 hour design storm event without overtopping meeting the City requirements of La Crosse County Code Section 29.09 (1).

Rainfall Event	Existing Conditions	Proposed Conditions
24-Hour Storm	Peak Flow (CFS)	Peak Flow (CFS)
2-year	17.07	16.94
10-year	25.63	25.51
25-year	32.07	31.99
100-year	43.74	43.73

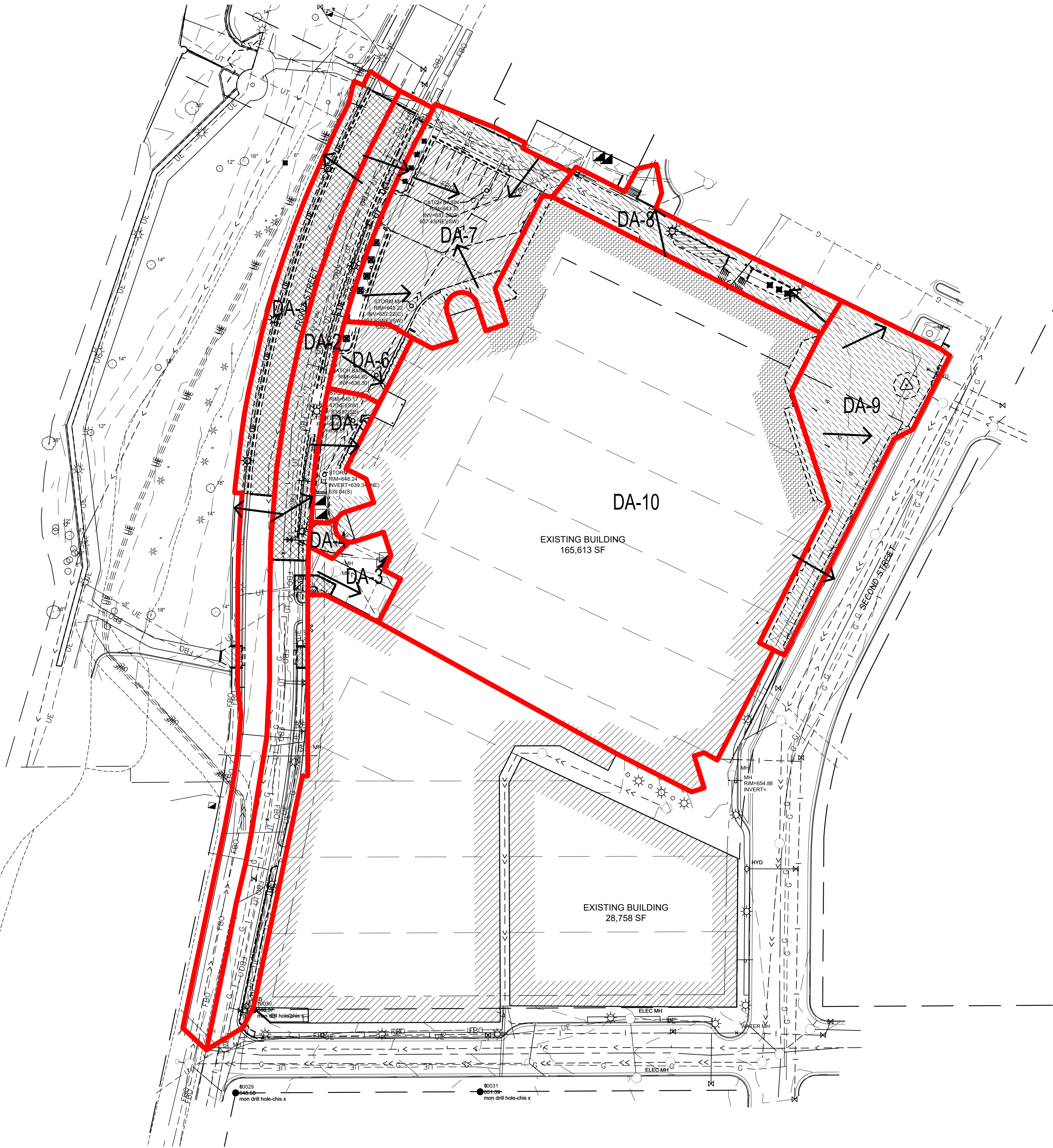
Water quality calculations were completed by utilizing the design data and the WinSLAMM Version 10.3.3 computer modeling system. This was used to provide analysis of the reduction in total suspended solids for the bio-infiltration basin. Results show a reduction of 69.33% of the total suspended solids from the proposed site conditions using suitable parameters for the La Crosse area when compared to no controls. Two separate models were also prepared to show the reduction of total suspended solids by construction the building addition of the parking lot and Front Street. The first model (Proposed No Roof) shows a solids load of 556.6 lbs. The second model (Proposed Roof) shows a solids load of 102.3 lbs. This is a reduction of 454.3 lbs or 81.6 %. The WinSLAMM models show that the proposed conditions meet the City requirements of La Crosse County Code Section 29.09 (2) to reduce total suspended solids by 60% from impervious surfaces compared to no controls. The WinSLAMM Output Report with screenshots of the input parameters can be found in the enclosures.

A maintenance agreement with the City will not be required as the property is City owned. A draft maintenance plan for the permanent stormwater management facilities on site can be found in the enclosures.

Enclosures:

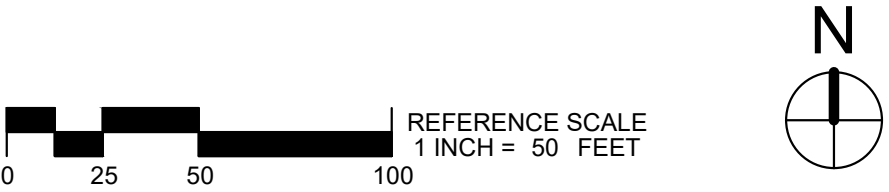
La Crosse Center Plans
Existing Drainage Map
Proposed Drainage Map
Chosen Valley Testing Geotechnical Report

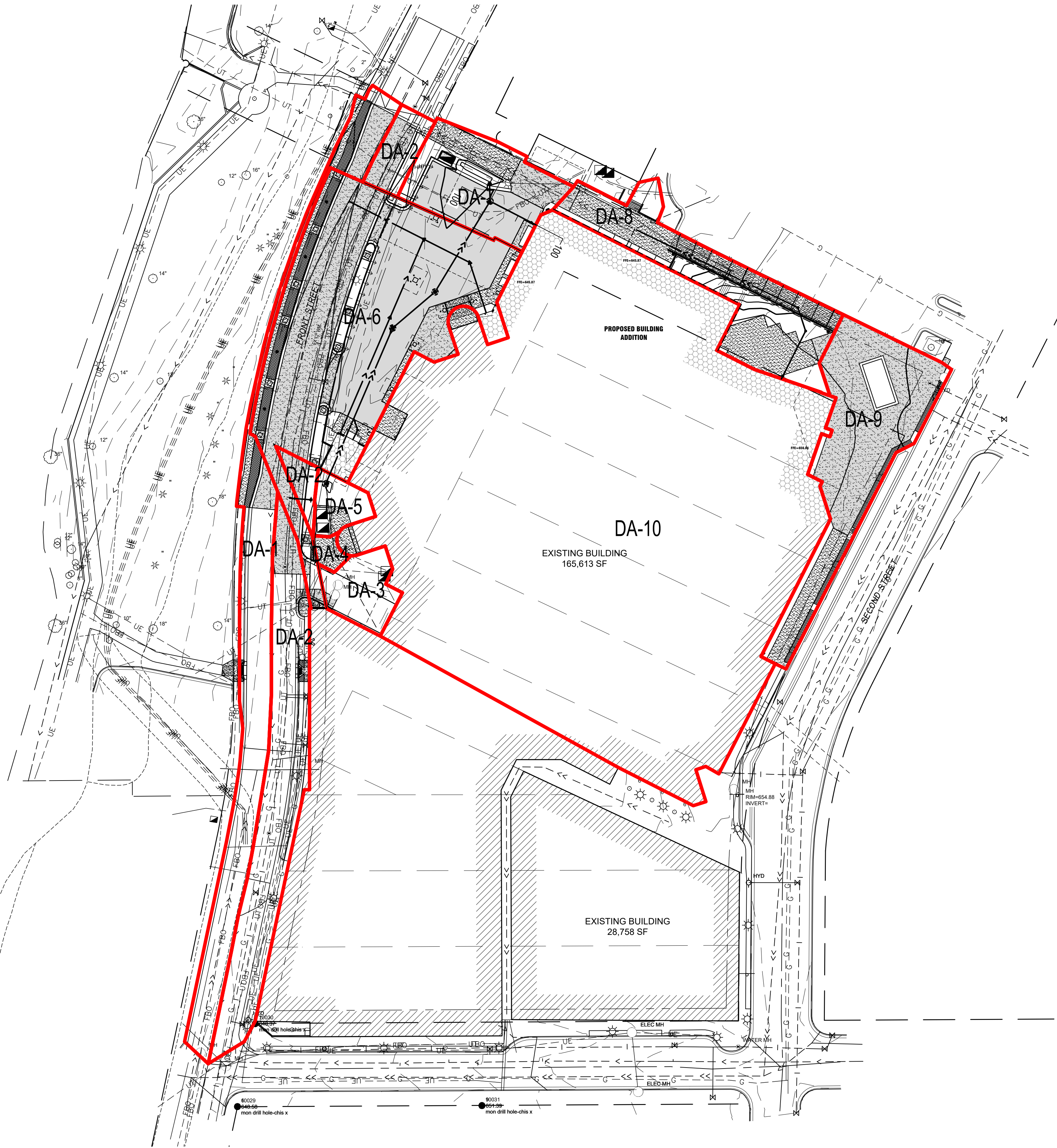
Existing HydroCAD Report
Proposed HydroCAD Report
WinSLAMM Report
Draft Maintenance Plan



Watershed	Surface Cover	Area (SF)	Area (AC)	Percent Impervious
DA-1	Impervious	20844	0.479	100%
	Pervious	0	0.000	
	Total	20844	0.479	
DA-2	Impervious	23150	0.531	100%
	Pervious	0	0.000	
	Total	23150	0.531	
DA-3	Impervious	3208	0.074	100%
	Pervious	0	0.000	
	Total	3208	0.074	
DA-4	Impervious	590	0.014	100%
	Pervious	0	0.000	
	Total	590	0.014	
DA-5	Impervious	3639	0.084	100%
	Pervious	0	0.000	
	Total	3639	0.084	
DA-6	Impervious	2614	0.060	92%
	Pervious	232	0.005	
	Total	2846	0.065	
DA-7	Impervious	16549	0.380	90%
	Pervious	1861	0.043	
	Total	18410	0.423	
DA-8	Impervious	5752	0.132	76%
	Pervious	1815	0.042	
	Total	7567	0.174	
DA-9	Impervious	13787	0.317	95%
	Pervious	786	0.018	
	Total	14573	0.335	
DA-10	Impervious	115310	2.647	100%
	Pervious	0	0.000	
	Total	115310	2.647	
TOTAL IMPERVIOUS				98%
TOTAL PERVIOUS				
TOTAL AREA				

EXISTING DRAINAGE MAP

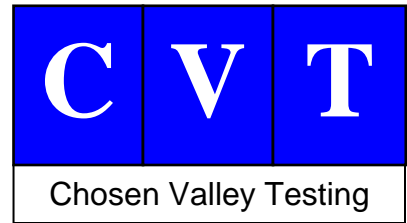




Watershed	Surface Cover	Area (SF)	Area (AC)	Percent Impervious
DA-1	Impervious	13454	0.309	94%
	Pervious	790	0.018	
	Total	14244	0.327	
DA-2	Impervious	14884	0.342	95%
	Pervious	766	0.017	
	Total	15650	0.359	
DA-3	Impervious	2850	0.065	100%
	Pervious	0	0.000	
	Total	2850	0.065	
DA-4	Impervious	536	0.012	100%
	Pervious	0	0.000	
	Total	536	0.012	
DA-5	Impervious	592	0.014	36%
	Pervious	1118	0.025	
	Total	1710	0.039	
DA-6	Impervious	29950	0.688	100%
	Pervious		0.000	
	Total	29950	0.688	
DA-7	Impervious	6385	0.147	82%
	Pervious	1415	0.032	
	Total	7800	0.179	
DA-8	Impervious	7379	0.169	68%
	Pervious	3450	0.080	
	Total	10829	0.249	
DA-9	Impervious	11968	0.275	91%
	Pervious	1177	0.027	
	Total	13145	0.302	
DA-10	Impervious	113509	2.606	100%
	Pervious		0.000	
	Total	113509	2.606	
TOTAL IMPERVIOUS		4.627		96%
TOTAL PERVIOUS		0.199		
TOTAL AREA		4.826		

PROPOSED DRAINAGE MAP





Design Phase Geotechnical Report:

Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

Prepared for:

City of La Crosse
C/O: Kevin Bills AIA, LEED AP BD+ C
Project Architect
I&S Group

September 16, 2019
15131.19.WIL



I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly registered engineer under the laws of the State of Wisconsin.

A handwritten signature in black ink, appearing to read 'Colby T. Verdegan'.

Colby T. Verdegan, PE
Geotechnical Engineer
Registration Number 36326
Date: September 16, 2019

Chosen Valley Testing, Inc.

Geotechnical Engineering & Testing, 1019 2nd Ave. SW, Onalaska, WI 54650, (608) 782-5505 fax (608) 785-2818

City of La Crosse

September 16, 2019

C/O: Kevin Bills AIA, LEED AP BD+C

Project Architect

I&S Group

bgries@gries.design

Re: **Design Phase Geotechnical Evaluation Report
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin
CVT Project Number: 15131.19.WIL**

Dear Mr. Bills:

As authorized, we have completed the geotechnical exploration for the proposed La Crosse Center Expansion and Renovation in La Crosse, Wisconsin. This letter briefly summarizes the findings in the attached report.

Summary of Boring Results

Three of the CPT borings and two of the supplemental borings were drilled through the concrete pavement within the existing facility. The remaining penetration test borings and CPT boring were drilled through pavements outside of the facility. The borings through concrete encountered about 6 to 9 inches of concrete and those through asphalt met 3 to 4 inches of bituminous over about 4 inches of aggregate base.

The results of the CPT soundings indicated soil behavior that was primarily consistent with sands and silty sands. This is consistent with the expected stratification and generally consistent with the penetration test samples. Possible seams or zones of finer grained soils were indicated.

Beneath the pavements, all of the penetration test borings encountered fill materials to depths of about 4 to 12 feet. The fill consisted primarily of rather clean sands with minimal fines (poorly graded sand and poorly graded sand with silt) or silty sands. Traces of concrete, wood, or brick were noted within the fill at a few locations. At the supplemental borings locations (drilled near existing foundations), the fill appeared to be about 4 to 6 ½ feet deep.

The natural soils below the fill were dominated by rather clean sands. All of the borings terminated in the sands at the planned depths of around 15 to 101 feet below the surface.

Water was observed in all of the borings at depths of about 7½ to 20 feet below the surface. The depths of the initial borings correspond to elevations of about 636 to 638 feet while the more recent additional borings encountered groundwater near elevation 630 feet. At the time of our initial exploration, water level in the Mississippi were higher than normal. Water levels at the site are expected to fluctuate similar to levels in the nearby Mississippi River, as well as with local weather patterns.

Summary of Analysis and Recommendations

Based on the data, the site conditions consist of fill materials in the upper 4 to 12 feet of the site and clean natural sands at depth. We recommend all removing fill materials from below the structure, along with any other unsuitable materials, and replacing these materials with engineered fill. Based on the data and the planned elevations for the foundations and slabs, it appears that the natural sands will be present at or within a few feet of footing grades at most foundation locations. The borings at the west edge of the facility were

the notable exceptions and found deeper fill.

We noted that some of the fill within the existing building is presumably engineered fill and portions can plausibly be left in place. For planning purposes we recommend assuming that all fill must be removed, but evaluating the exiting fill during construction.

Footings are expected to bear on engineered sand fill or natural sands below the engineered sand fill. As mentioned earlier, the natural sands were loose to dense, but generally medium dense. These are the typical bearing conditions in the area. In their present condition, some of the sands have somewhat low shear strength and moderate settlement potential. Fortunately, clean sands are rather easily improved by surface compaction and this is routinely used in the area to decrease settlement potential and increase shear strength beneath tall and heavy structures in the areas. Succeeding portions of the report provide recommendations for implementation of surface compaction. A key element of that process is geotechnical monitoring of the results of the surface compaction.

As a result of the discussions of the data with the design team, and in consideration of the supplemental information, spread footing foundations appear to be feasible for the vast majority of the foundations. With implementation of our recommendations, we are of the opinion that a design bearing pressure of up to 6,000 psf may be used.

Installation of the foundations and addressing soil corrections is expected to require support of or re-routing of utilities – particularly on the west side of the facility. In one of more locations, the confluence of foundation loads and utilities are expected to require use of helical anchors or similar micro-pile applications. These foundations are normally designed by the design-building foundation installer. In our experience, helical anchors constructed in this area routinely must be drilled much deeper than planned (often twice the expected depth and more) to attain projected capacities. For that reason, we suggest planning on using either lighter than normal foundation reactions loads per anchor and/or budgeting for much deeper anchors than planned.

Remarks

The attached report provides more details of our recommendations for the proposed project. We appreciate the opportunity to serve you. If you have any questions about our report, please feel free to contact us at (608) 782-5505.

Sincerely,
Chosen Valley Testing, Inc.



Frederick Schuster, PE
Geotechnical Engineer



Colby T. Verdegan, PE
Sr. Geotechnical/Materials Engineer

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Boring Location Sketch

Log of Boring # 1-10, 15-18

Gradation Curves

Soil Evaluation - Storm

Legend to Soil Description

**Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin**

CVT Project Number: 15131.19.WIL
Date: September 16, 2019

A. Introduction

The intent of this report is to present our results to the client in the same logical sequence that led us to arrive at the opinions and recommendations expressed. Since our services must often be completed before the design, assumptions are sometimes needed to prepare a proper evaluation and to analyze the data. A complete and thorough review of this entire document, including the assumptions and the appendices, should be undertaken immediately upon receipt.

A.1. Purpose

This report was prepared for proposed La Crosse Center Expansion and Renovation in La Crosse, Wisconsin. Our services were authorized by the City of La Crosse. Kraus Anderson is the City's Construction Manager for the project. I&S Group is the project design consultant.

A.2. Scope

To obtain data for analysis, we were initially authorized to perform ten standard penetration test borings and four cone penetration test soundings. The borings were drilled to depths of about 15 to 100 feet while the soundings were performed to depths from about 30 feet to equipment refusal depths of about 90 feet.

Upon review of the findings, four additional borings were authorized to explore conditions where new footings are proposed immediately adjacent to existing spread footing foundations. Two of these (B-15 and B-16) were performed inside the existing building, in an area assumed to have been fully "corrected". The other two borings (B-17 and B-18) were drilled just west of the west edge of the existing building, in an area which may also have been corrected but which is occupied by on-grade pavements.

Our preliminary findings were summarized in a preliminary report which were then discussed with other members of the design team. This final report includes the preliminary and supplemental information. The analysis and recommendations in this report are based on refined design information from the discussions with the design team.

A.3. Boring Locations and Elevations

The general initial boring locations were indicated to Chosen Valley Testing on a site plan provided by ISG within the RFP, the additional borings and some locations were minimally offset due to site access and utility

location constraints. The locations of the supplemental borings were selected by CVT based on access constraints. The ***Boring Location Sketch*** in the Appendix shows the approximate boring locations as drilled.

Ground surface elevations were estimated using a laser level. The rim of the sanitary manhole, just south of the Boring B-6 was used as a benchmark #1, and was understood to be at elevation 646.0 feet. The rim of the storm manhole, in the intersection of Pearl St. and 2nd St. S., was also used as a benchmark and was understood to be at elevation 654.6 feet. The rim of the storm manhole, just east of Boring B-7 was additionally used as a benchmark, and was understood to be at elevation 645.2 feet.

A.4. Geologic Background

A geotechnical report is based on subsurface data collected for the specific structure or problem. Available geologic data from the region can help interpretation of the data and is briefly summarized in this section.

Geologic maps suggest that the natural soils in the area are primarily terrace deposits of sands and gravels. Bedrock is expected to be on the order of 200 feet below the surface. The uppermost bedrock is commonly Cambrian Age sandstone. Some fill was expected on site as a result of the existing site development.

B. Subsurface Data

Methods: The CPT Borings were performed at four locations in accordance with ASTM D3441-12 procedures. A 10 square centimeter cone with a maximum point capacity of 100 MPa was used to perform the soundings. Observed values of point resistance, side friction, pore pressure (U₂ position), and tilt angle were recorded continuously throughout the length of the soundings. Soil stratification from was inferred from the readings and is considered approximate, subject to verification generally from associated Penetration samples.

Most of the borings were performed using penetration test procedures (Method of Test D1586 of the American Society for Testing and Materials). This procedure allows for the extraction of intact soil specimen from deep in the ground. With this method, a hollow-stem auger is drilled to the desired sampling depth. A 2-inch OD sampling tube is then screwed onto the end of a sampling rod, inserted through the hole in the auger's tip, and then driven into the soil with a 140-pound hammer dropped repeatedly from a height of 30 inches above the sampling rod. The sampler is driven 18-inches into the soil, unless the material is too hard. The samples are generally taken at 2½ to 5-foot intervals. The core of soil obtained is classified and logged by the driller and a representative portion is then sealed in a jar and delivered to the soils engineer for review.

B.1. Stratification

Three of the CPT borings and two of the supplemental borings were drilled through the concrete pavement within the existing facility. The remaining penetration test borings and CPT boring were drilled through pavements outside of the facility. The borings through concrete encountered about 6 to 9 inches of concrete and those through asphalt met 3 to 4 inches of bituminous over about 4 inches of aggregate base.

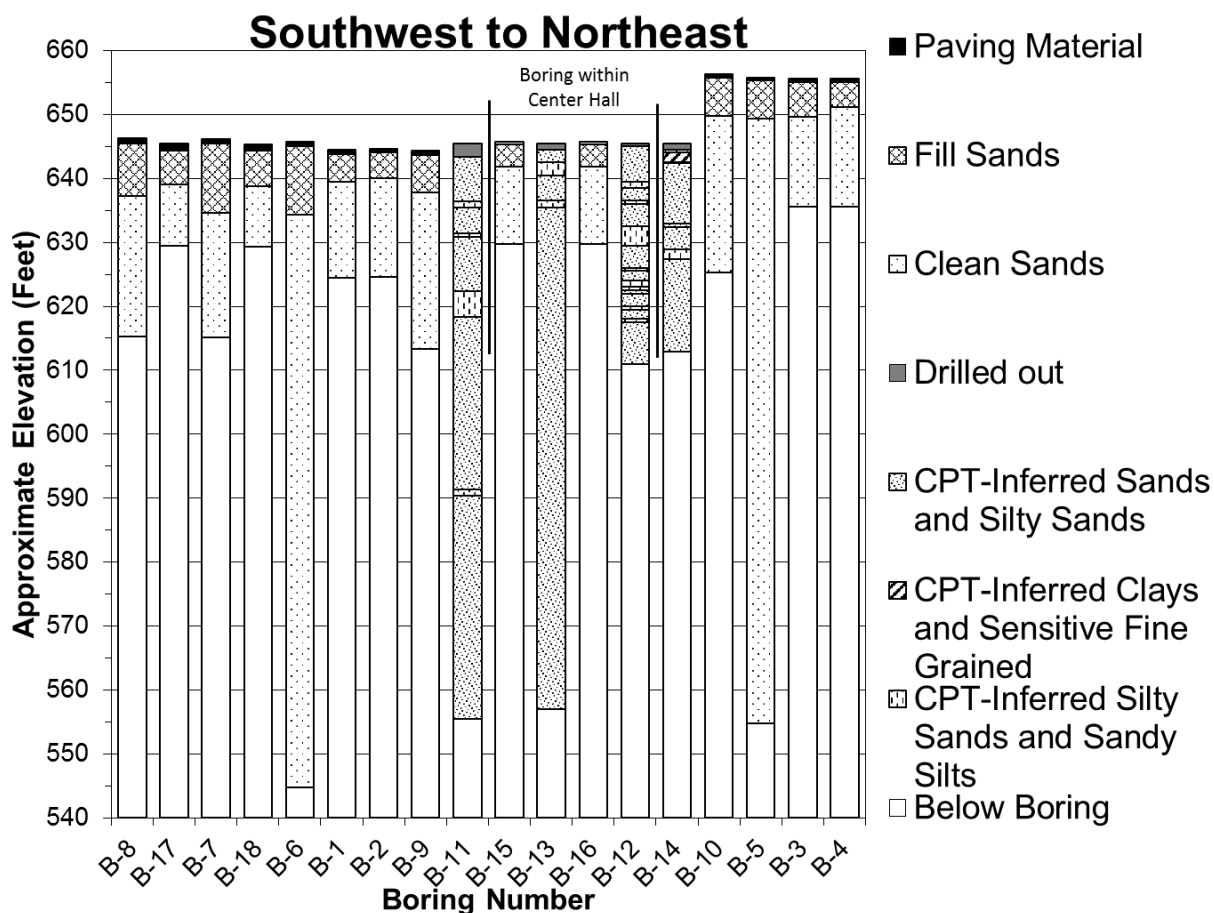
The results of the CPT soundings indicated soil behavior that was primarily consistent with sands and silty sands. This is consistent with the expected stratification and generally consistent with the penetration test samples. Possible seams of zones of finer grained soils were indicated.

Beneath the pavements, all of the penetration test borings encountered fill materials to depths of about 4 to 12

feet. The fill consisted primarily of rather clean sands with minimal fines (poorly graded sand and poorly graded sand with silt) or silty sands. Traces of concrete, wood, or brick were noted within the fill at a few locations. At the supplemental borings locations (drilled near existing foundations), the fill appeared to be about 4 to 6 ½ feet deep.

The natural soils below the fill were dominated by rather clean sands. All of the borings terminated in the sands at the planned depths of around 15 to 101 feet below the surface.

The boring data have been summarized in the following cross section and shows the apparent depth of fill versus natural sands at all locations. The CPT borings are not able to detect fill versus natural soils and are presumed to have penetrated shallow depths of fill. For more detailed information, please refer to the *Log of Boring* sheets and draft CPT boring sheets in the Appendix.



B.2. Penetration Test Results

The number of blows needed for the hammer to advance the penetration test sampler is an indicator of soil characteristics. The number of blows to advance the sampler 1 foot is called the penetration resistance or “N”-value. The results tend to be more meaningful for natural mineral soils, than for fill soils. In fill soils, compaction tests are more meaningful.

Penetration resistance values (N-values) of 2 to 22 Blows per Foot (BPF) were encountered in the sandy fill materials, indicating they were somewhat variable and possibly at times uncompacted. The natural sands

returned values of 2 to 36 BPF, indicating they were very loose to dense, but generally medium dense.

We note that the lowest values were primarily in the upper part of the site, and also tended to be at or close to the water table. Most of this is the result of unbalanced water pressures, and this affect often dissipates with depth.

The higher penetration test values tended to occur about 50 feet or more below the surface. A handful of lower values were also noted at depth. This is fairly common and likely associated with seams of finer sands or even silt that might be expected to occur in Mississippi River sediments.

A key to the descriptors used to qualify the relative density of soil (such as *soft*, *stiff*, *loose*, and *dense*) can be found on the Legend to Soil Description in the Appendix.

B.3. CPT Test Results

The raw CPT data sheets are attached. As also noted in the penetration test borings, the data for the deep CPT borings indicate higher density and resistance beginning about 30 feet below the surface. The reader should note that the scale between the deep borings and the shallow borings is different.

B.4. Onsite PID Testing

A CVT Staff Geologist monitored the completion of the penetration test borings. As previously summarized, the soils encountered during this investigation consisted of generally sands from the ground surface to the final depth of the investigation, which was 20 to 100-feet below ground surface (bgs).

The on-site Staff Geologist evaluated the soil samples that were collected at 2 feet intervals for the Borings B-1 through B-4 and 2½ to 5 feet intervals for the Borings B-5 through B-10 from the surface to the final depth of the investigation at 20 to 100-feet bgs, for petroleum odors or staining. The soil samples were field screened using a photo ionization detector (PID) that detects organic vapors in the parts per million (ppm) range. Results of the PID screening indicated that organic vapors were only present in the approximate 7 feet bgs sample of Boring B-9 of all the soil samples collected from the borings. The PID readings are presented on the Boring logs in the Appendix and are summarized in Table 1 and Table 2 below.

TABLE 1
PID READINGS
parts per million (ppm)

Sample Interval	B-1	B-2	B-3	B-4
0'-2'	0.0	0.0	0.0	0.0
2'-4'	0.0	0.0	0.0	0.0
4'-6'	0.0	0.0	0.0	0.0
6'-8'	0.0	0.0	0.0	0.0
8'-10'	0.0	0.0	0.0	0.0
10'-12'	0.0	0.0	0.0	0.0
12'-14'	0.0	0.0	0.0	0.0
14'-16'	0.0	0.0	0.0	0.0
16'-18'	0.0	0.0	0.0	0.0
18'-20'	0.0	0.0	0.0	0.0

TABLE 2
PID READINGS
parts per million (ppm)

Sample Interval	B-5	B-6	B-7	B-8	B-9	B-10
2' - 3½'	0.0	0.0	0.0	0.0	0.0	0.0
4½' - 6'	0.0	0.0	0.0	0.0	0.0	0.0
7' - 8½'	0.0	0.0	0.0	0.0	10.0	0.0
9½' - 11'	0.0	0.0	0.0	0.0	0.0	0.0
12' - 13½'	0.0	0.0	0.0	0.0	0.0	0.0
14½' - 16'	0.0	0.0	0.0	0.0	0.0	0.0
19½' - 21'	0.0	0.0	0.0	0.0	0.0	0.0
24½' - 26'	0.0	0.0	0.0	0.0	0.0	0.0
29½' - 31'	0.0	0.0	0.0	0.0	0.0	0.0
34½' - 36'	0.0	0.0				
39½' - 41'	0.0	0.0				
44½' - 46'	0.0	0.0				
49½' - 51'	0.0	0.0				
54½' - 56'	0.0	0.0				
59½' - 61'	0.0	0.0				
64½' - 66'	0.0	0.0				
69½' - 71'	0.0	0.0				
74½' - 76'	0.0	0.0				
79½' - 81'	0.0	0.0				
84½' - 86'	0.0	0.0				
89½' - 91'	0.0	0.0				
94½' - 96'	0.0	0.0				
99½' - 101'	0.0	0.0				

Notes: organic vapor readings were conducted with a Thermo Electron Corporation

B.5. Groundwater Data

During the drilling operation, the drillers may note the presence of moisture on the sampling instrument, in the cuttings, or within the boreholes. These observations are recorded on the boring logs. The water level may vary with weather; time of year and other factors and the presence or absence of water during the drilling is subject to interpretation and is not always conclusive.

Water was observed in all of the borings at depths of about 7½ to 20 feet below the surface. The depths of the initial borings correspond to elevations of about 636 to 638 feet while the more recent additional borings encountered groundwater near elevation 630 feet. At the time of our initial exploration, water level in the Mississippi were higher than normal. Water levels at the site are expected to fluctuate similar to levels in the nearby Mississippi River, as well as with local weather patterns.

B.6. Laboratory Testing

Fine sieve analyses was performed on representative samples from the stormwater borings to aid in classification. The following table outlines the results of the analyses and the corresponding USDA soil classification. All tests were performed according to ASTM standards.

Boring	Depth Below Surface (Feet)	Percent Passing #8 Sieve (%)	Percent Passing #30 Sieve (%)	Percent Passing #70 Sieve (%)	Percent Passing #140 Sieve (%)	Percent Passing #270 Sieve (%)	USDA Soil Classification
B-1	5	99.7	99.1	25.7	4.6	2.4	Sand, S
B-2	7	97.5	92.7	4.3	0.8	0.4	Sand, S
B-3	10	100	99.7	18.3	2.2	1.3	Sand, S
B-4	3	92.5	91.1	26.7	7.4	4.0	Sand, S

C. Design Data

Because each structure has a different loading configuration and intensity, different grades, and different structural or performance tolerances, the results of a geotechnical exploration will mean different things for different facilities. If the design of the facility changes, the soils engineer should be contacted to discuss the possible implications of the changes. Without a chance to review such changes, the recommendations of the soils engineer may no longer be valid or appropriate.

The project consists of the expansion & renovation of the La Crosse Center. Estimated maximum structural loads were provided. Structural design information was provided by the structural engineer, Mr. Adam Wietzki, PE of ISG Group. Maximum axial LRDF vertical column loads are understood to range from 330 to 855 kips (exterior columns) and 80 to 510 kips (interior columns), with maximum moment column loads of 10 to 105 ft-kips (exterior columns) to 1 to 7 ft-kips (interior columns), and maximum shear loads are understood to range from 1-7 kips (exterior columns) to 1 to 6 ft-kips (interior columns). Maximum strip footing loads are assumed be 3,000 pounds per foot (exterior) to 9,000 pounds per foot (interior).

As noted earlier, some of the columns are for new or expanded footings that are close to existing foundations. Those columns within the building were projected to have LRFD vertical columns loads of up to 241 kips. New footings to be cast just west of the west foundation perimeter are projected to have LRFD vertical columns loads of up to 633 kips.

Final grades are assumed to be at or near existing grades – with the center and westerly areas have a slab level at or just about the ground surface at the borings in that area or about elevation 946½ feet. Footings in that area, supporting the columns below the elevated ballroom, are then assumed to bear near elevation 941 feet for exterior unheated foundations and near 644½ feet for heated interior foundations. In the eastern areas, finished floor elevation is assumed to be near or slightly above existing grades or about elevation 656 ½ feet and are then assumed to bear near 652½ feet

Depending on bearing conditions, foundations options being considered potential include spread footings, piling, helical anchors, or possibly ground improvements with Geopiers to support spread footings.

D. Analysis

Based on the data, the site conditions consist of fill materials in the upper 4 to 12 feet of the site and clean natural sands at depth. We recommend all removing fill materials from below the structure, along with any

other unsuitable materials, and replacing these materials with engineered fill. Based on the data and the planned elevations for the foundations and slabs, it appears that the natural sands will be present at or within a few feet of footing grades at most foundation locations. The borings at the west edge of the facility were the notable exceptions and found deeper fill.

We noted that some of the fill within the existing building is presumably engineered fill and portions can plausibly be left in place. For planning purposes we recommend assuming that all fill must be removed, but evaluating the existing fill during construction.

Footings are expected to bear on engineered sand fill or natural sands below the engineered sand fill. As mentioned earlier, the natural sands were loose to dense, but generally medium dense. These are the typical bearing conditions in the area. In their present condition, some of the sands have somewhat low shear strength and moderate settlement potential. Fortunately, clean sands are rather easily improved by surface compaction and this is routinely used in the area to decrease settlement potential and increase shear strength beneath tall and heavy structures in the areas. Succeeding portions of the report provide recommendations for implementation of surface compaction. A key element of that process is geotechnical monitoring of the results of the surface compaction.

As a result of the discussions of the data with the design team, and in consideration of the supplemental information, spread footing foundations appear to be feasible for the vast majority of the foundations. With implementation of our recommendations, we are of the opinion that a design bearing pressure of up to 6,000 psf may be used.

Installation of the foundations and addressing soil corrections is expected to require support of or re-routing of utilities – particularly on the west side of the facility. In one of more locations, the confluence of foundation loads and utilities are expected to require use of helical anchors or similar micro-pile applications. These foundations are normally designed by the design-building foundation installer. In our experience, helical anchors constructed in this area routinely must be drilled much deeper than planned (often twice the expected depth and more) to attain projected capacities. For that reason, we suggest planning on using either lighter than normal foundation reaction loads per anchor and/or budgeting for much deeper anchors than planned.

The remainder of the report provides more details of our recommendations.

E. Grading Recommendations

E.1. Groundwater/De-watering

As mentioned, groundwater was encountered at depths of about 7½ to 20 feet below the surface. The depths correspond to elevations of about 636 to 638 feet while the more recent borings found groundwater near elevation 630 feet. Depending upon the level of the nearby Mississippi at the time of construction, the fill removal could extend into the water table in some areas. Soils below the water table typically consisted of

highly permeable sands with some clays and silts. Based on this, dewatering wells may be needed depending on the water levels relative to the improvements.

E.2. Excavation

We recommend removing all paving materials and non-engineered fill from below the structure, along with any existing foundations or otherwise unsuitable soils. The tabulation below show the apparent depth of the fill/unsuitable soils at the locations explored. As noted before, some of the fill soils were presumably “engineered” for the existing facility. For budgeting purposes, we recommend assuming that all fill must be removed from below the footings and slabs.

Boring	Approx. Surface Elevation (feet)	Approx. Depth of Existing pavements/slab and Fill (feet)	Approx. Bottom Elevation of Existing pavements/slab and Fill (feet)	Expected Bottom of Footing Elevation (feet)
B-1	644 1/2	5	639 1/2	641
B-2	644 1/2	4 1/2	640	641
B-3	655 1/2	6	649 1/2	652 1/2
B-4	655 1/2	4 1/2	651	652 1/2
B-5	656	6 1/2	649 1/2	652 1/2
B-6	646	11 1/2	634 1/2	641
B-7	646	11 1/2	634 1/2	641
B-8	646 1/2	9	637 1/2	641
B-9	644 1/2	6 1/2	638	641
B-10	656 1/2	6 1/2	650	652 1/2
B-15	646	4	642	644 1/2
B-16	646	4	642	644 1/2
B-17	645 1/2	6 1/2	639	641
B-18	645 1/2	6 1/2	639	641

E.3. Oversizing

The corrective excavations should be oversized at least 1 foot beyond the building areas for each foot of fill needed below footing grade. This over-sizing can be reduced by up to 50% if rather precise staking is present during grading.

E.4. Filling and Compaction

We recommend using clean sands or gravels having less than 10% particles passing the number 200 sieve, as replacement fill, if needed. Most of the natural sands at the site appear capable of meeting this gradation though much of the fill materials would not. For planning purposes we suggest assuming that imported fill will be needed. Portions of the existing fill might be saved and preserved during construction, subject to closer review at that time.

We recommend using clean, free draining sands having less than 5% passing a #200 sieve in the upper 1 foot of all slab areas. This material would likely have to be imported.

All fill below the foundations should be compacted to a minimum of 100 percent of its maximum standard Proctor density (ASTM D 698). Below slab areas, compaction to 95% is considered adequate.

E.5. Surface Compaction of Soils at Footing Grade

The soils at depth were generally medium dense. To provide more uniform support to the structure, while increasing shear strength and reducing settlement potential, we recommend surface compacting the soils at footing elevation with a large vibratory compactor, or a backhoe with a hoe-ram-type compaction attachment. This is considered applicable to all column footings having vertical LRFD loads of 600 kips or more. For lighter columns, strip footing areas, and columns adjoining existing foundation (which had been at least partially pre-loaded by the existing building), heavy compaction with a turtle type compactor or light compaction with a hoe ram should be adequate.

Tests should be conducted during the compaction operation to evaluate the compaction efforts. Subject to that evaluation, additional compactive effort may be deemed warranted.

F. Building Design

F.1. Foundation Depth

We recommend placing the footings at least 48 inches below the exposed ground surface for frost protection.

F.2. Bearing Capacity and Settlement

With the recommended soil corrections, we are of the opinion that footings may be designed to exert a bearing pressure of up to 6,000 pounds per square foot. This capacity includes a safety factor of at least 3 against shear failure. Total settlements are expected to be 1 inch or less beneath the maximum column loads. Differential settlement between similarly loaded footings is expected to be on the order of ½ inch or less.

F.3. Lateral Support/Resistance

Backfill placed around the structure and above foundation elevation should be compacted to at least 95% of its maximum standard Proctor density (ASTM D 698). Lateral resistance will depend on the materials used. We recommend clean sands or gravels as fill around below-grade walls. The following table includes recommended support values for clean sands. These values do not include a safety factor.

Poorly Graded Sands (SP) 95% standard Proctor density	
Internal Friction Angle (degrees)	34
Cohesion (psf)	0
Coefficient of Friction between Concrete and Soil	0.50
Moist Unit Weight (pcf)	120
Saturated Unit Weight (pcf)	130
At-Rest Coefficient (K _o)	0.44
Active Coefficient (K _a)	0.28
Passive Coefficient (K _p)	3.54

The actual loads exerted on the structure will depend on the movement or flexure of the structure. For sand fill, horizontal movement or flexure of about 0.2% of the height of soil retained may be sufficient to mobilize frictional forces from the at-rest state to the active state.

G. Paved Areas

G.1. Stripping and Grading

We recommend stripping any highly organic topsoil, vegetation and rootzone, and existing pavements from below the newly paved areas. The top of any existing soils that may be present within 2 feet of the surface should be scarified and compacted, to encourage uniformity.

We recommend using clean sands or gravels as fill below the pavements. All fill should be compacted to at least 95% of its maximum standard Proctor density. Compaction to 90% is usually sufficient in green areas. The completed pavement subgrade should be able to pass a test roll. Areas not passing the test roll should be reworked and stabilized as needed to pass the test roll.

G.2. Pavement Design

We recommend designing pavements using support values with the following estimated characteristics:

Soil Type	AASHTO Classification	Frost Index	Design Group Index	K-Value	Soil Support Factor	Est. California Bearing Ratio
Silty Sand	A-2-4/A-4	F-3	10	200	4.5	5 – 15
Poorly-Graded Sand	A-3	F-2	6	250	5.0	10 – 20

Again, the proposed parking areas are assumed to experience primarily auto traffic and occasional commercial truck traffic. We recommend a minimum pavement section consisting of at least 3 inches of bituminous and 6 inches of aggregate base in auto traffic areas. In more frequent heavy truck traffic, we recommend increasing the sections to 4 inches of bituminous and 8 inches of aggregate base. These values appear comparable to heavier than the existing pavement sections.

These sections should be considered preliminary, subject to review by the project civil engineering consultant, and subject to their experience with pavement design and performance in the area of the project.

H. Deep Excavations/Utilities

H.1. Dewatering

As mentioned, groundwater was encountered at depths of about 7½ to 20 feet below the surface in the initial borings and these depths correspond to elevations of about 636 to 638 feet. The more recent water levels appear closer to 630 feet. Soils below the water table typically consisted of highly permeable sands with some clays and silts. Based on this, dewatering wells may be needed depending on the water levels relative to the improvements.

H.2. Trench Sidewalls

The contractor will be required to slope or shore the excavations as needed to meet OSHA requirements for safety. The sands present at the site would classify as Type C materials as defined by OSHA.

H.3. Trench Bottom Stability

The soils encountered at the base of the utility trenches are expected to be natural sands. These materials are expected to provide adequate support for utilities. Care should be taken so that over-size materials such as larger gravels are kept at least ½ foot from utility pipes, to reduce point loads on the pipes.

H.4. Fill Placement and Compaction

Soils placed as backfill in the trenches should be compacted to the densities required of any overlying structures: 95% of standard Proctor density in building and paved areas and 90% in green areas.

I. Stormwater Recommendations

As requested, infiltration rates were estimated for the various materials encountered in the site borings (Boring B-01, B-02, B-03 and B-04). The borings encountered materials ranging from sands or fine sands to loamy sands. Infiltration rates for these materials were estimated to range from 3.60 to 0.50 inches per hour, based on USDA soil classification. The infiltration/permeability values are the recommended design values from the Wisconsin DNR. Please see the *Soil Evaluation – Storm* sheets in the Appendix for more details. Double-ring infiltrometer testing could be performed to provide site specific infiltration values, but was not part of our initial work scope.

J. Construction Recommendations

J.1. Excavation

The stripping can likely be accomplished with a variety of equipment; though rubber tired equipment tends to have difficulty traversing dry sands. For any deep excavations we recommend using a backhoe.

J.2. Cold Weather

If site grading is anticipated during cold weather, we recommend that good winter construction practices be observed. All snow and ice should be removed from cut and fill areas prior to additional grading. No fill should be placed on soils that have frozen or contain frozen material. Frozen soils should not be used as fill.

J.3. Testing and Documentation

Ideally, the foundation improvements should be evaluated and documented by qualified personnel. If the filling proceeds during periods of freezing weather, full-time testing should be considered to help confirm that imported fill is thawed prior to and during compaction, and that all snow has been removed before placement of the fill.

Pockets of deep fill, debris or foundations are often encountered at unexpected locations when working in the downtown area. Geotechnical evaluations and documentation are strongly recommended during grading to help identify conditions, document over-sizing and evaluate options, if necessary.

All fill should be evaluated for conformance to the project gradation requirements and should be tested for compaction. The surface compaction efforts should be tested after compaction with a Dynamic Cone Penetrometer or similar implement. Subject to that evaluation, additional effort or compaction with alternative compaction equipment maybe deemed warranted.

.
Although our firm offers testing services relating to structural components of the project (such as concrete testing, reinforcement observations, etc.), specification of such services is beyond our work scope and the designer(s) should be consulted as to such requirements.

I. Level of Care

The services provided for this project have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area, under similar budget and time constraints. This is our professional responsibility. No other warranty, expressed or implied, is made.

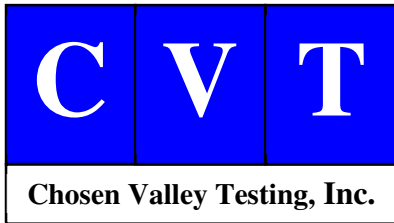
Appendix

Boring Location Sketch

Log of Boring # 1-10, 15-18

CPT Draft Data Sheets

Legend to Soil Description



Legend

- ⊙ Boring Location
- ▣ CPT Sounding
- ▲ Bench Mark

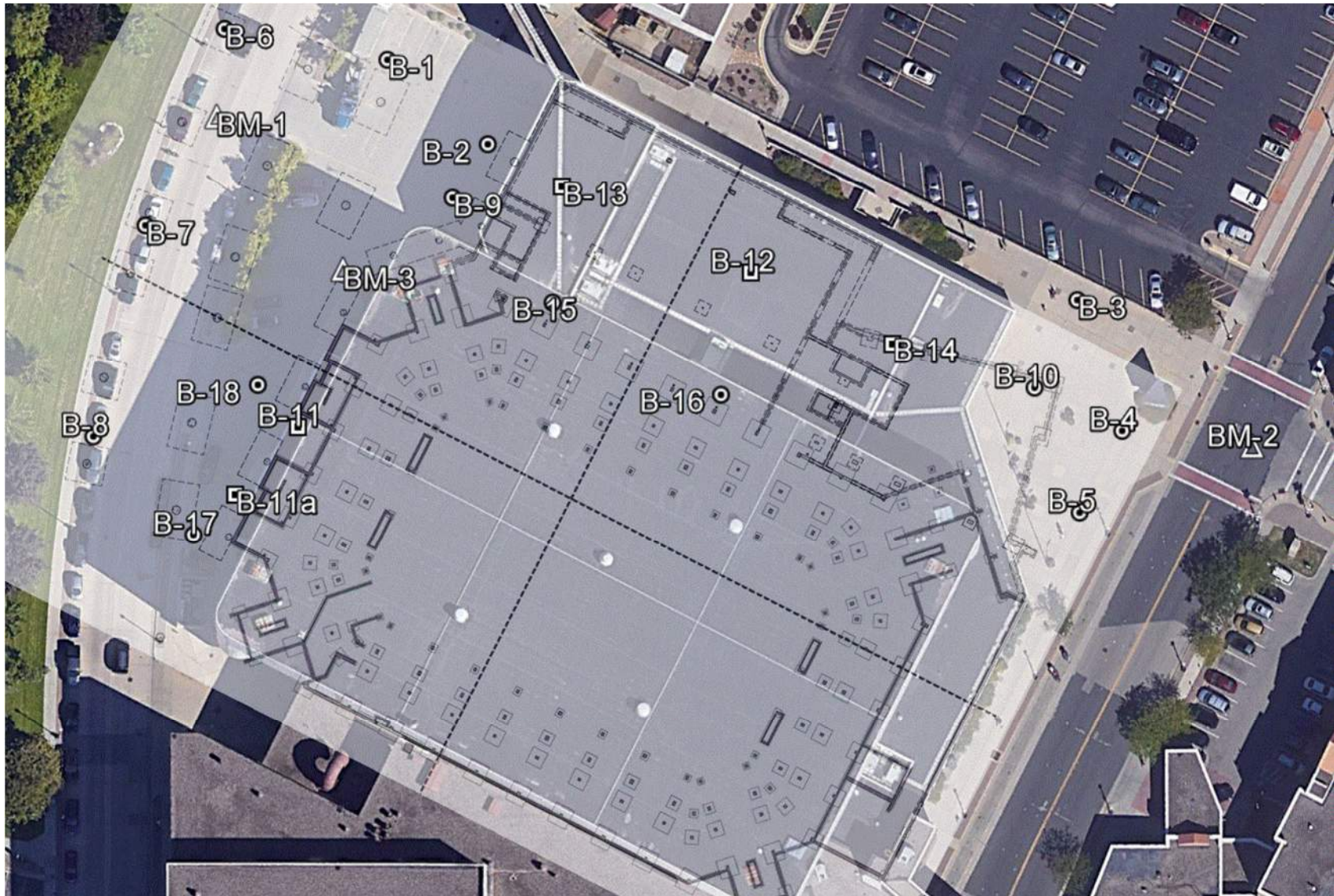
Boring Location Sketch

Proposed La Crosse Center Expansion & Renovation

300 Harborview Plaza

La Crosse, Wisconsin

15131.19.WIL





LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-01**

LOCATION:
See attached sketch

DATE: 6/6/2019

SCALE: 1" = 5'

Elev. 644.5	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
644.2	0.3		4" ASPHALT			
643.8	0.7	SM	4" AGGREGATE BASE	19		Benchmark #1: Rim of the manhole south of B-6, understood elevation 646.0 feet.
642.5	2.0		SILTY SAND trace gravel, fine grained, brown, moist, medium dense.			PID = 0.0 ppm
		SP	(Fill)	9		PID = 0.0 ppm
		SM	POORLY GRADED SAND with SILT fine grained, brown, moist, very loose to loose.			
639.5	5.0		(Fill)	5		PID = 0.0 ppm
		SP	POORLY GRADED SAND with SILT seams of silty sand, fine grained, brown, moist to water bearing, very loose.	2	▽	PID = 0.0 ppm
636.0	8.5	SM	(Alluvium)			
		SP	Water bearing below around 7'.	5		PID = 0.0 ppm
			POORLY GRADED SAND trace gravel, fine to medium grained, brown, water bearing, loose to medium dense.			
			(Alluvium)	7		PID = 0.0 ppm
				8		PID = 0.0 ppm
				4		PID = 0.0 ppm
				7		PID = 0.0 ppm
			Grayish brown below 17'.			
624.5	20.0			4		PID = 0.0 ppm
			End of boring. Water encountered during drilling below around 7'. Boring sealed upon completion.			

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL Design Phase Geotechnical Evaluation Proposed La Crosse Center Expansion & Renovation 300 Harborview Plaza La Crosse, Wisconsin				BORING: B-02		
				LOCATION: See attached sketch		
				DATE: 6/6/2019	SCALE: 1" = 5'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
644.6	0.0					
644.3	0.3		4" ASPHALT			Benchmark #1: Rim of the manhole south of B-6, understood elevation 646.0 feet. PID = 0.0 ppm PID = 0.0 ppm
644.0	0.6	SP	3" AGGREGATE BASE	25		
642.6	2.0	SM	POORLY GRADED SAND with SILT fine grained, brown, moist, medium dense. (Fill)	5		
		SP	POORLY GRADED SAND with SILT trace gravel, fine grained, brown, moist, loose. (Fill)	7		PID = 0.0 ppm
640.1	4.5	SM	POORLY GRADED SAND with SILT trace gravel, fine grained, brown, moist, loose. (Fill)	8	▽	PID = 0.0 ppm
		SP	POORLY GRADED SAND fine to medium grained, brown, moist to water bearing, loose to medium dense. (Alluvium) Water bearing below around 7.5'. Trace gravel below 8'.	7		PID = 0.0 ppm
				9		PID = 0.0 ppm
				7		PID = 0.0 ppm
				9		PID = 0.0 ppm
				9		PID = 0.0 ppm
			Grayish brown below 17'.	9		PID = 0.0 ppm
624.6	20.0			10		PID = 0.0 ppm
			End of boring. Water encountered during drilling below around 7.5'. Boring sealed upon completion.			

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-03**

LOCATION:
See attached sketch

DATE: 6/6/2019

SCALE: 1" = 5'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
655.6	0.0					
655.1	0.5		6" CONCRETE			
654.1	1.5	SM	SILTY SAND trace gravel, fine grained, brown, moist, medium dense.	20		Benchmark #2: Rim of the southern manhole in the intersection of 2nd and Pearl Streets, understood elevation 654.6 feet. PID = 0.0 ppm PID = 0.0 ppm PID = 0.0 ppm
		SP	(Fill)			
		SM	POORLY GRADED SAND with SILT trace gravel, fine grained, brown, moist, medium dense.	10		
			(Fill)	16		
649.6	6.0					
		SP	POORLY GRADED SAND with SILT fine grained, brown, moist, loose to medium dense.	9		PID = 0.0 ppm
		SM	(Alluvium)	11		PID = 0.0 ppm
				2		PID = 0.0 ppm
				8		PID = 0.0 ppm
641.1	14.5					
		SP	POORLY GRADED SAND trace gravel, fine to medium grained, grayish brown, moist, medium dense.	9		PID = 0.0 ppm
			(Alluvium)	9		PID = 0.0 ppm
637.1	18.5		Medium to coarse grained below 16.5'.			
635.6	20.0	SP	POORLY GRADED SAND with SILT fine grained, brown, moist to water bearing, loose.	13	▽	PID = 0.0 ppm
		SM	(Alluvium)			
			Fine to medium grained below 19'. Water bearing below around 19.5'. End of boring. Water encountered during drilling below around 19.5'. Boring sealed upon completion.			

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GINN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-04**

LOCATION:
See attached sketch

DATE: 6/6/2019

SCALE: 1" = 5'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
655.6	0.0					
655.1	0.5	SM	6" CONCRETE	25		Benchmark #2: Rim of the southern manhole in the intersection of 2nd and Pearl Streets, understood elevation 654.6 feet.
			SILTY SAND trace gravel, fine grained, brown, moist, medium dense to dense. (Fill)	11		PID = 0.0 ppm
651.1	4.5	SP SM	POORLY GRADED SAND with SILT trace gravel, fine grained, light brown, moist, loose. (Alluvium)	2		PID = 0.0 ppm
				2		PID = 0.0 ppm
				7		PID = 0.0 ppm
				6		PID = 0.0 ppm
				9		PID = 0.0 ppm
641.1	14.5	SP	POORLY GRADED SAND trace gravel, fine to medium grained, brown, moist to water bearing, loose to medium dense. (Alluvium)	8		PID = 0.0 ppm
				15		PID = 0.0 ppm
635.6	20.0		Water bearing below around 19.5'. End of boring. Water encountered during drilling below around 19.5'. Boring sealed upon completion.	9	▽	PID = 0.0 ppm

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNIN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-05**

LOCATION:
See attached sketch

DATE: 6/6/2019

SCALE: 1" = 5'

Elev. 655.8	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
655.3	0.5	SM	6" CONCRETE SILTY SAND trace gravel, fine grained, brown, moist, very loose. (Fill)			Benchmark #2: Rim of the southern manhole in the intersection of 2nd and Pearl Streets, understood elevation 654.6 feet. PID = 0.0 ppm
			Trace concrete around 5'.	2		PID = 0.0 ppm
649.3	6.5	SP SM	POORLY GRADED SAND with SILT fine grained, brown, moist, loose. (Alluvium)	3		PID = 0.0 ppm
				8		PID = 0.0 ppm
				8		PID = 0.0 ppm
			Grayish brown below 11.5'.	8		PID = 0.0 ppm
				9		PID = 0.0 ppm
638.3	17.5	SP	POORLY GRADED SAND fine to medium grained, grayish brown, wet to water bearing, loose to medium dense. (Alluvium) Water bearing below around 20'.	7	▽	PID = 0.0 ppm
				10		PID = 0.0 ppm
				11		PID = 0.0 ppm
				10		PID = 0.0 ppm

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNIN06.GDT 9/13/19

15131.19.WIL

(continued)

B-05 page 1 of 3

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-05 (cont.)**

LOCATION:
See attached sketch

DATE: 6/6/2019

SCALE: 1" = 5'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
618.3	37.5	SP	(continued)			
		SP	POORLY GRADED SAND with GRAVEL medium to coarse grained, grayish brown, water bearing, medium dense. (Alluvium)	14		PID = 0.0 ppm
613.3	42.5	SP	POORLY GRADED SAND trace gravel, medium to coarse grained, grayish brown, water bearing, loose to medium dense. (Alluvium)	14		PID = 0.0 ppm
			Gray below 47.5'.	8		PID = 0.0 ppm
			Fine to medium grained below 52.5'.	25		PID = 0.0 ppm
			Grayish brown below 57.5'. No gravel below 57.5'.	27		PID = 0.0 ppm
				13		PID = 0.0 ppm
				14		PID = 0.0 ppm

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNIN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-05 (cont.)**

LOCATION:
See attached sketch

DATE: 6/6/2019

SCALE: 1" = 5'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
		SP (continued)				
				12		PID = 0.0 ppm
			Trace gravel around 80'.	23		PID = 0.0 ppm
				22		PID = 0.0 ppm
				23		PID = 0.0 ppm
				29		PID = 0.0 ppm
554.8	101.0			25		PID = 0.0 ppm
			End of boring. Water encountered during drilling below around 20'. Boring sealed upon completion.			

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNIN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-06**

LOCATION:
See attached sketch

DATE: 6/7/2019

SCALE: 1" = 5'

Elev. 645.8	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
645.0	0.8		9" CONCRETE			Benchmark #1: Rim of the manhole south of B-6, understood elevation 646.0 feet.
		SP SM	POORLY GRADED SAND with SILT trace gravel, trace brick, fine grained, brown, moist, medium dense. (Fill)	16		PID = 0.0 ppm
				21		PID = 0.0 ppm
639.3	6.5	SP SM	POORLY GRADED SAND with SILT seam of lean clay, fine to medium grained, brown, wet to water bearing, loose. (Fill)	4	▽	PID = 0.0 ppm
636.8	9.0	SM	Water bearing below around 8'.	5		PID = 0.0 ppm
634.3	11.5		SILTY SAND trace gravel, fine grained, brown, water bearing, loose. (Fill)	8		PID = 0.0 ppm
		SP SM	POORLY GRADED SAND with SILT fine grained, brown, water bearing, very loose to loose. (Alluvium)	3		PID = 0.0 ppm
628.3	17.5	SP	POORLY GRADED SAND trace gravel, fine to medium grained, brown, water bearing, loose to medium dense. (Alluvium)	11		PID = 0.0 ppm
			Gray below 22.5'.	9		PID = 0.0 ppm
			No gravel around 25'.	12		PID = 0.0 ppm
			Medium to coarse grained below 27.5'.	12		PID = 0.0 ppm

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNIN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL Design Phase Geotechnical Evaluation Proposed La Crosse Center Expansion & Renovation 300 Harborview Plaza La Crosse, Wisconsin				BORING: B-06 (cont.)		
				LOCATION: See attached sketch		
				DATE: 6/7/2019		SCALE: 1" = 5'
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
		SP <i>(continued)</i>				
603.3	42.5			14		PID = 0.0 ppm
		SP	POORLY GRADED SAND with GRAVEL fine to medium grained, gray, water bearing, dense. (Alluvium)	36		PID = 0.0 ppm
598.3	47.5					
		SP	POORLY GRADED SAND trace gravel, fine to medium grained, grayish brown, water bearing, very loose to dense. (Alluvium)	25		PID = 0.0 ppm
				3		PID = 0.0 ppm
				12		PID = 0.0 ppm
				6		PID = 0.0 ppm
				14		PID = 0.0 ppm

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNIN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-06 (cont.)**

LOCATION:
See attached sketch

DATE: 6/7/2019

SCALE: 1" = 5'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
		SP (continued)	No gravel below 72.5'.			
				26		PID = 0.0 ppm
			Trace gravel around 80'.	28		PID = 0.0 ppm
				26		PID = 0.0 ppm
				29		PID = 0.0 ppm
				26		PID = 0.0 ppm
544.8	101.0			35		PID = 0.0 ppm
			End of boring. Water encountered during drilling below around 8'. Boring sealed upon completion.			

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNIN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-07**

LOCATION:
See attached sketch

DATE: 6/6/2019

SCALE: 1" = 5'

Elev. 646.1	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
645.4	0.7		8.5" CONCRETE			Benchmark #1: Rim of the manhole south of B-6, understood elevation 646.0 feet.
		SP SM	POORLY GRADED SAND with SILT trace plastic, fine grained, brown, moist, loose. (Fill)	9		PID = 0.0 ppm
				9		PID = 0.0 ppm
639.6	6.5	SM	SILTY SAND fine grained, brown, wet to water bearing, loose. (Fill) Trace concrete around 7.5'. Water encountered below around 8.5'. Trace wood around 10'.	6	▽	PID = 0.0 ppm
				4		PID = 0.0 ppm
634.6	11.5	SP SM	POORLY GRADED SAND with SILT trace gravel, fine grained, brown, water bearing, very loose to loose. (Alluvium)	2		PID = 0.0 ppm
				6		PID = 0.0 ppm
628.6	17.5	SP	POORLY GRADED SAND trace gravel, fine to medium grained, gray, water bearing, loose to medium dense. (Alluvium)	11		PID = 0.0 ppm
				7		PID = 0.0 ppm
615.1	31.0			14		PID = 0.0 ppm
			End of boring. Water encountered during drilling below around 8.5'. Boring sealed upon completion.			

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A.GNIN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-08**

LOCATION:
See attached sketch

DATE: 6/6/2019

SCALE: 1" = 5'

Elev. 646.3	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
645.5	0.8		9" CONCRETE			Benchmark #1: Rim of the manhole south of B-6, understood elevation 646.0 feet.
		SM	SILTY SAND trace gravel, fine grained, brown, moist, loose to medium dense. (Fill)	8		PID = 0.0 ppm
				10		PID = 0.0 ppm
639.8	6.5	SP SM	POORLY GRADED SAND with SILT trace gravel, fine to medium grained, brown, moist to wet, loose. (Fill)	5		PID = 0.0 ppm
637.3	9.0	SP SM	POORLY GRADED SAND with SILT fine grained, brown, water bearing loose. (Alluvium)	7	▽	PID = 0.0 ppm
				8		PID = 0.0 ppm
630.8	15.5	SP	POORLY GRADED SAND trace gravel, fine to medium grained, brown, water bearing, loose to medium dense. (Alluvium)	11		PID = 0.0 ppm
				9		PID = 0.0 ppm
				6		PID = 0.0 ppm
615.3	31.0			12		PID = 0.0 ppm
			End of boring. Water encountered during drilling below around 9'. Boring sealed upon completion.			

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-09**

LOCATION:
See attached sketch

DATE: 6/6/2019

SCALE: 1" = 5'

Elev. 644.3	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
644.0	0.3		4" ASPHALT			Benchmark #1: Rim of the manhole south of B-6, understood elevation 646.0 feet. PID = 0.0 ppm
643.6	0.7	SP SM	4" AGGREGATE BASE POORLY GRADED SAND with SILT fine grained, light brown, moist, loose. (Fill)	5		
				9		PID = 0.0 ppm
637.8	6.5	SP	POORLY GRADED SAND trace gravel, fine to medium grained, brown, wet to water bearing, loose. (Alluvium) Water bearing below around 7.5'. Grayish brown below 17.5'.	6 5 8 4 9 7	▽	PID = 10.0 ppm PID = 0.0 ppm PID = 0.0 ppm PID = 0.0 ppm PID = 0.0 ppm
616.8	27.5	SP	POORLY GRADED SAND with GRAVEL medium to coarse grained, gray, water bearing, dense. (Alluvium)	31		PID = 0.0 ppm
613.3	31.0		End of boring. Water encountered during drilling below around 7.5'. Boring sealed upon completion.			

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-10**

LOCATION:
See attached sketch

DATE: 6/6/2019

SCALE: 1" = 5'

Elev. 656.3	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
655.8	0.5	SM	6" CONCRETE SILTY SAND trace concrete, fine grained, dark brown, moist, medium dense. (Fill)	18		Benchmark #2: Rim of the southern manhole in the intersection of 2nd and Pearl Streets, understood elevation 654.6 feet. PID = 0.0 ppm
652.3	4.0	SM	SILTY SAND fine grained, brown, moist, medium dense. (Fill)	16		PID = 0.0 ppm
649.8	6.5	SP SM	POORLY GRADED SAND with SILT fine grained, brown, moist, medium dense. (Alluvium)	10		PID = 0.0 ppm
				10		PID = 0.0 ppm
				10		PID = 0.0 ppm
				12		PID = 0.0 ppm
638.8	17.5	SP	POORLY GRADED SAND trace gravel, fine to medium grained, brown, wet to water bearing, loose to medium dense. (Alluvium) Water bearing below around 20'. Grayish brown below 22.5'.	10	▽	PID = 0.0 ppm
				9		PID = 0.0 ppm
625.3	31.0			10		PID = 0.0 ppm
			End of boring. Water encountered during drilling below around 20'. Boring sealed upon completion.			

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GINN06.GDT 9/13/19

CVT

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNNN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-16**

LOCATION:
See attached sketch

DATE: 9/9/2019

SCALE: 1" = 5'

Elev. 645.8	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
645.3	0.5	SP SM	6" CONCRETE POORLY GRADED SAND with SILT fine grained, light brown, moist, medium dense. (Fill) Trace brick encountered around 1.5'.	16 25		Benchmark #3: Rim of the storm manhole, east of Boring B-7, understood elevation 645.2 feet.
641.8	4.0	SP	POORLY GRADED SAND fine grained, light brown, moist to water bearing, loose. (Alluvium) Fine to medium grained below 6.5'. Trace gravel below 9'. Medium to coarse grained below 9'.	4 6 7		
				5		
				4	▽	
629.8	16.0		Water bearing below 14.5'. End of boring. Water encountered during drilling below around 14.5'. Boring sealed upon completion.			

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-17**

LOCATION:
See attached sketch

DATE: 9/9/2019

SCALE: 1" = 5'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
645.5	0.0					
645.2	0.3		4" ASPHALT			Benchmark #3: Rim of the storm manhole, east of Boring B-7, understood elevation 645.2 feet.
644.7	0.8		6" RECYCLED ASPHALT	22		
644.3	1.2	SM	4" AGGREGATE BASE			
643.8	1.7	SM	SILTY SAND with GRAVEL fine grained, brown, moist.	4		
642.5	3.0	SP	(Fill)			
		SM	SILTY SAND fine grained, brown, moist, loose. (Fill)	2		
639.0	6.5	SP	POORLY GRADED SAND with SILT fine grained, light brown, moist, very loose to loose. (Fill)	9		
			Fine to medium grained below 4'. Seam of silty clay around 5'. Trace glass around 5'.			
			POORLY GRADED SAND fine grained, light brown, moist, loose to medium dense. (Alluvium)	10		
			Fine to medium grained below 9'. Trace gravel below 9'.	10		
			Medium to coarse grained below 14'.			
629.5	16.0		Water bearing below 15'.	11	▽	
			End of boring. Water encountered during drilling below around 15'. Boring sealed upon completion.			

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNN06.GDT 9/13/19

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 15131.19.WIL
Design Phase Geotechnical Evaluation
Proposed La Crosse Center Expansion & Renovation
300 Harborview Plaza
La Crosse, Wisconsin

BORING: **B-18**

LOCATION:
See attached sketch

DATE: 9/9/2019

SCALE: 1" = 5'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
645.3	0.0					
645.0	0.3		3" ASPHALT			Benchmark #3: Rim of the storm manhole, east of Boring B-7, understood elevation 645.2 feet.
644.8	0.5		3.5" ASPHALT			
644.3	1.0	SM	6" AGGREGATE BASE	18		
			SILTY SAND trace gravel, fine grained, brown, moist, loose to medium dense.	7		
641.3	4.0		(Fill)			
		SP	POORLY GRADED SAND with SILT trace brick, trace concrete, fine grained, brown, moist, loose.	6		
		SM	(Fill)			
638.8	6.5		POORLY GRADED SAND fine grained, light brown, moist to water bearing, loose to medium dense.	9		
		SP	(Alluvium)			
			Trace gravel below 9'.	6		
			Medium to coarse grained below 11.5'.	11		
629.3	16.0		Water bearing below 15'.	6	▽	
			End of boring.			
			Water encountered during drilling below around 15'.			
			Boring sealed upon completion.			

CVT STANDARD 15131.19.WIL (LA CROSSE CENTER EXPANSION & RENOVATION).GPJ LOG A GNN06.GDT 9/13/19

**Attachment 2:**

1002-CPS-23
Division of Industry Services
P. O. Box 2658
Madison, Wisconsin 53701
Scott Walker, Governor
Laura Gutierrez, Secretary

SOIL AND SITE EVALUATION – STORM

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

Page 1 of 2

Attach a complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road Please print all information Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]		County La Crosse	
Property Owner La Crosse Center		Parcel I.D.	
Property Owner's Mail Address 300 Harborview Plaza		Reviewed by: Date:	
City State Zip Code Phone Number La Crosse WI 54601 608-789-7400		Property Location Govt. Lot SW 1/4 SE 1/4 S 31 T 16 N R 7 <input checked="" type="checkbox"/> (or) <input type="checkbox"/> (W)	
Drainage area _____ <input type="checkbox"/> sq. ft <input type="checkbox"/> acres Test site suitable for (check all that apply): <input type="checkbox"/> Site not suitable; <input type="checkbox"/> Bioretention; <input type="checkbox"/> Subsurface Dispersal System; <input type="checkbox"/> Reuse; <input type="checkbox"/> Irrigation; <input type="checkbox"/> Other _____		Lot # Block # Subd. Name or CSM # <input checked="" type="checkbox"/> City <input type="checkbox"/> Village <input type="checkbox"/> Town Nearest Road La Crosse Harborview Plaza	
Hydraulic Application Test Method <input checked="" type="checkbox"/> Morphological Evaluation <input type="checkbox"/> Double Ring Infiltrometer <input type="checkbox"/> Other: (specify) _____		Soil Moisture Date of soil borings: 6/6/2019 USDA-NRCS WETS Value: <input type="checkbox"/> Dry = 1; <input checked="" type="checkbox"/> Normal = 2; <input type="checkbox"/> Wet = 3.	

B-1	#OBS. <input type="checkbox"/> Pit <input checked="" type="checkbox"/> Boring	Ground surface elevation. 644.5 ft.		Elevation of limiting factor 637.5 ft.						
Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
4" Asphalt										
4" Aggregate Base										
1	8-24	10 yr 3/3		LS	0sg	ml	as	<10	15-25	1.63
2	24-102	10 yr 4/3	Water encountered below 7"	fS	0sg	ml	gw	<10	5-15	0.50
3	102-204	10 yr 4/3		S	0sg	ml	gw	<10	<10	3.60
4	204-240	10 yr 4/2		S	0sg	ml		<10	<10	3.60
Comments:										

B-2	#OBS. <input type="checkbox"/> Pit <input checked="" type="checkbox"/> Boring	Ground surface elevation. 644.6 ft.		Elevation of limiting factor 637.1 ft.						
Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
4" Asphalt										
4" Aggregate Base										
1	7-24	10 yr 4/4		fS	0sg	ml	as	<10	5-15	0.50
2	24-204	10 yr 4/4		S	0sg	ml	gw	<10	<15	3.60
3	204-240	10 yr 4/2	Water encountered below 7.5'	S	0sg	ml		<10	<10	3.60
Comments:										
Name (Please Print) Frederick Schuster, PE				Signature				Credential Number CST 1356930 / PE 46610		
Address 1019 2nd Ave. SW., Onalaska, WI 54650				Date Evaluation Conducted 6/24/2019				Telephone Number 608-782-5505		

SBD-10793 (R01/17)

WDNR
September 2017

B-3 #OBS. ☐ Pit ☒ Boring Ground surface elevation. 655.6 ft. Elevation of limiting factor 636.1 ft. Page 2 of 2

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
6" Concrete										
1	6-18	10 yr 3/4		LS	0sg	ml	as	<10	15-25	1.63
2	18-174	10 yr 4/4		S	0sg	ml	gw	<10	5-15	3.60
3	174-240	10 yr 4/3	Water encountered below 19.5'	S	0sg	ml		<10	<10	3.60
Comments:										

B-4 #OBS. ☐ Pit ☒ Boring Ground surface elevation. 655.6 ft. Elevation of limiting factor 636.1 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
6" Concrete										
1	6-54	10 yr 4/4		LS	0 f sg	ml	as	<10	15-25	1.63
2	54-102	10 yr 3/6		S	0 f sg	ml	gw	<10	5-15	3.60
3	102-174	10 yr 4/4	Water encountered below 19.5'	S	0 f sg	ml	gw	<10	5-15	3.60
4	174-240	10 yr 4/3		S	0 f sg	ml		<10	<10	3.60
Comments:										

☐ #OBS. ☐ Pit ☐ Boring Ground surface elevation. _____ ft. Elevation of limiting factor _____ ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
Comments:										

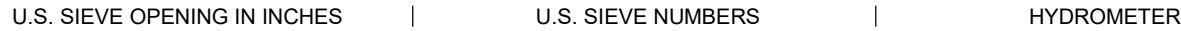
☐ #OBS. ☐ Pit ☐ Boring Ground surface elevation. _____ ft. Elevation of limiting factor _____ ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
Comments:										

SBD-10793 (R 7/17)

Overall Site Comments:

WDNR
September 2017

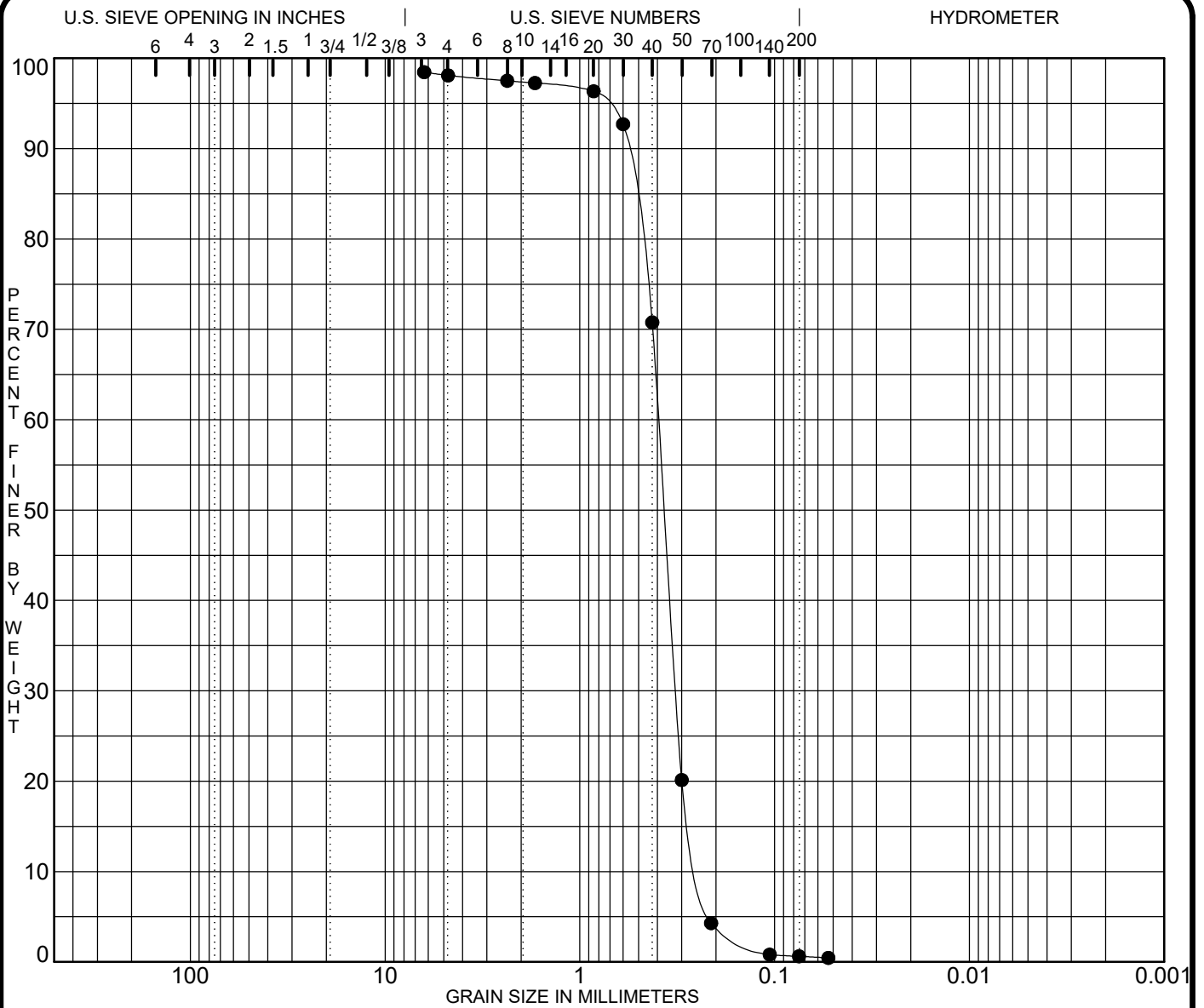


COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

[illegible]

JOB NO.	15131.19.WIL
DATE	6/27/19

GRADATION CURVES



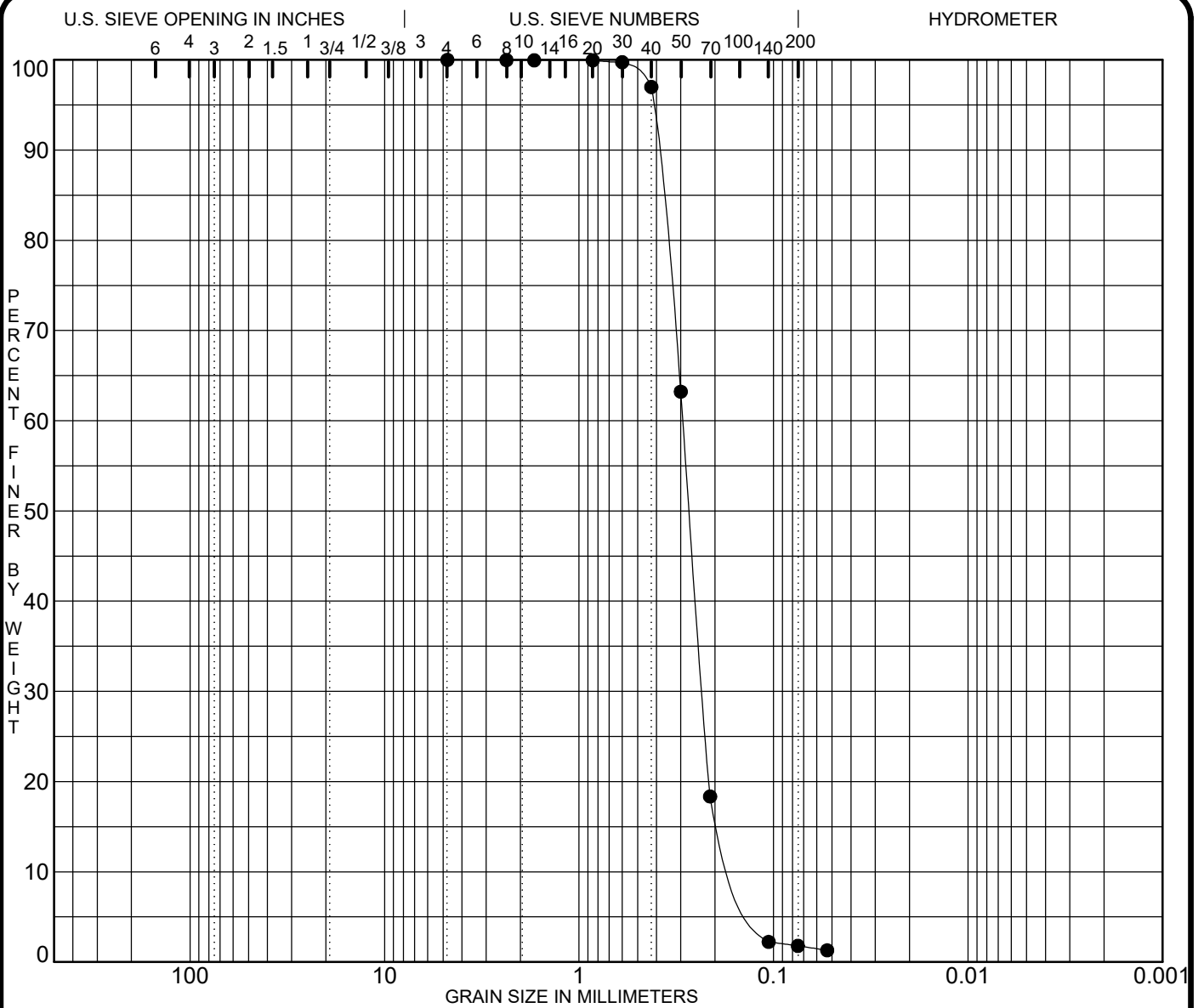
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

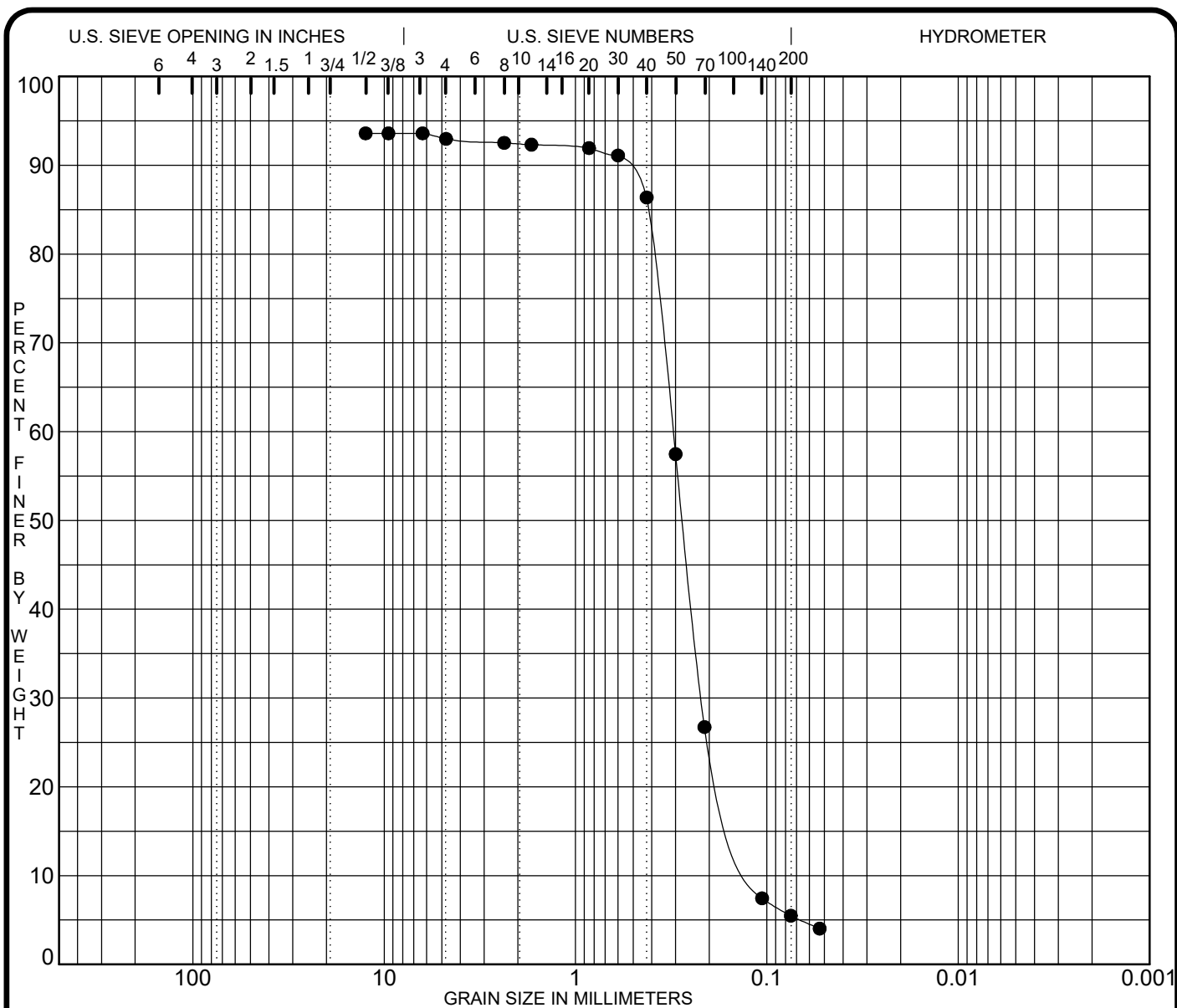
Specimen Identification	Classification					MC%	LL	PL	PI	Cc	Cu
● B-02 7.0	POORLY GRADED SAND SP									1.09	1.6

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-02 7.0	6.30	0.39	0.321	0.2403	0.4	97.5	0.6	

PROJECT	Proposed La Crosse Center Expansion & Renovation - 300 Harborview Plaza	JOB NO.	15131.19.WIL
		DATE	6/27/19

GRADATION CURVES
Chosen Valley Testing





COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

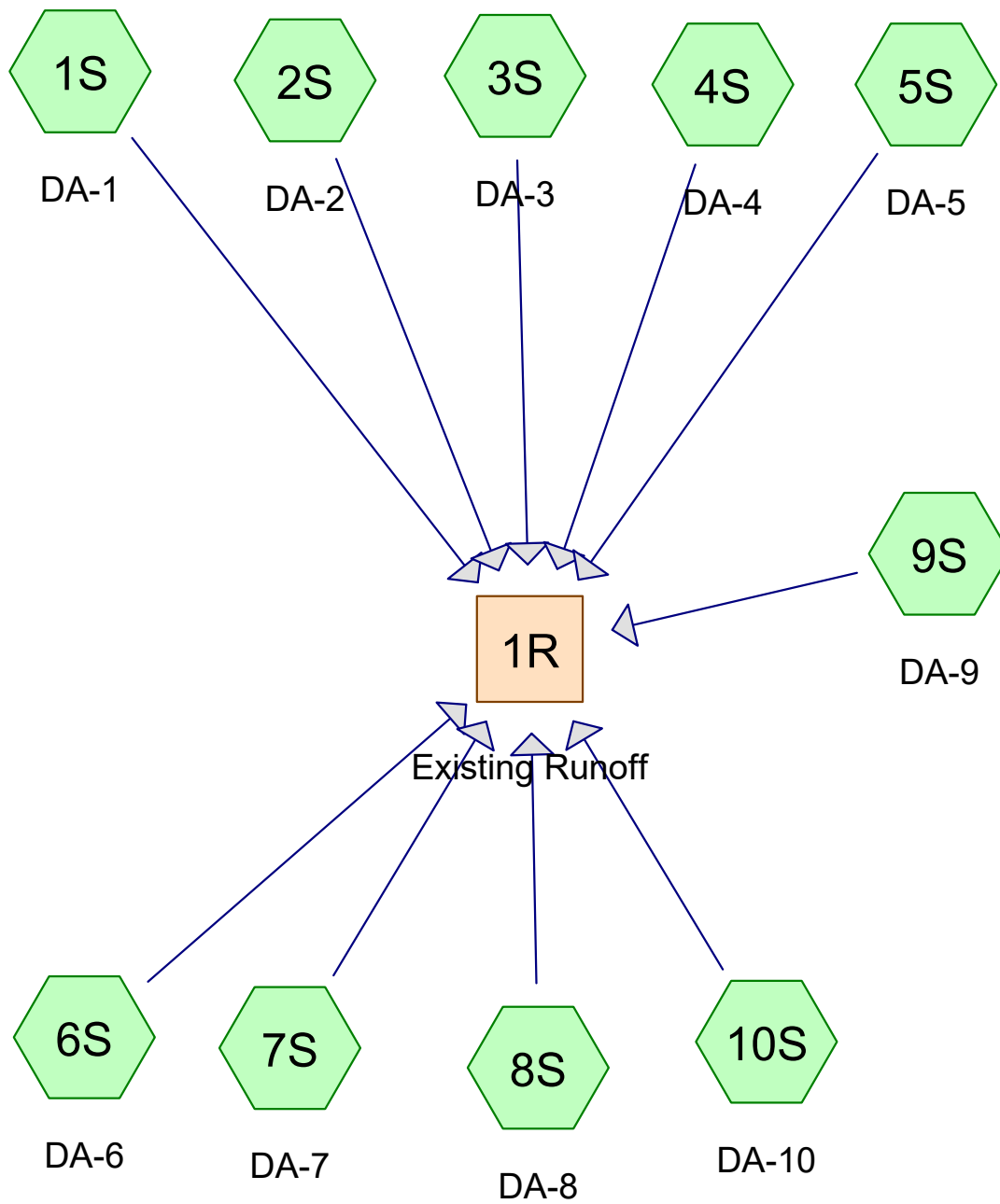
Specimen Identification			Classification				MC%	LL	PL	PI	Cc	Cu
●	B-04	3.0									1.35	2.7
Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-04	3.0	12.50	0.31	0.220	0.1162	0.6	87.5	5.5			

PROJECT **Proposed La Crosse Center Expansion & Renovation - 300 Harborview Plaza**

JOB NO. **15131.19.WIL**
DATE **6/27/19**

GRADATION CURVES

Chosen Valley Testing



19990 Existing Watersheds

Prepared by ISG

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.108	61	>75% Grass cover, Good, HSG B (6S, 7S, 8S, 9S)
0.172	98	Paved parking, HSG A (3S, 4S, 5S)
1.899	98	Paved roads w/curbs & sewers, HSG A (1S, 2S, 6S, 7S, 8S, 9S)
2.646	98	Roofs, HSG A (10S)
4.825	97	TOTAL AREA

19990 Existing Watersheds

Prepared by ISG

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Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
4.717	HSG A	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S
0.108	HSG B	6S, 7S, 8S, 9S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
4.825		TOTAL AREA

19990 Existing Watersheds

Prepared by ISG

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Page 4

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.108	0.000	0.000	0.000	0.108	>75% Grass cover, Good	6S, 7S, 8S, 9S
0.172	0.000	0.000	0.000	0.000	0.172	Paved parking	3S, 4S, 5S
1.899	0.000	0.000	0.000	0.000	1.899	Paved roads w/curbs & sewers	1S, 2S, 6S, 7S, 8S, 9S
2.646	0.000	0.000	0.000	0.000	2.646	Roofs	10 S
4.717	0.108	0.000	0.000	0.000	4.825	TOTAL AREA	

19990 Existing Watersheds

Prepared by ISG

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Type II 24-hr 2-yr Rainfall=3.02"

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Page 5

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=0.479 ac 100.00% Impervious Runoff Depth>2.78"
Flow Length=781' Slope=0.0030 '/' Tc=11.7 min CN=98 Runoff=1.68 cfs 0.111 af

Subcatchment2S: DA-2 Runoff Area=0.531 ac 100.00% Impervious Runoff Depth>2.78"
Flow Length=781' Slope=0.0026 '/' Tc=12.6 min CN=98 Runoff=1.82 cfs 0.123 af

Subcatchment3S: DA-3 Runoff Area=0.074 ac 100.00% Impervious Runoff Depth>2.79"
Tc=5.0 min CN=98 Runoff=0.32 cfs 0.017 af

Subcatchment4S: DA-4 Runoff Area=0.014 ac 100.00% Impervious Runoff Depth>2.79"
Tc=5.0 min CN=98 Runoff=0.06 cfs 0.003 af

Subcatchment5S: DA-5 Runoff Area=0.084 ac 100.00% Impervious Runoff Depth>2.79"
Tc=5.0 min CN=98 Runoff=0.36 cfs 0.020 af

Subcatchment6S: DA-6 Runoff Area=0.065 ac 92.31% Impervious Runoff Depth>2.60"
Tc=5.0 min CN=WQ Runoff=0.26 cfs 0.014 af

Subcatchment7S: DA-7 Runoff Area=0.423 ac 89.83% Impervious Runoff Depth>2.54"
Tc=5.0 min CN=WQ Runoff=1.66 cfs 0.090 af

Subcatchment8S: DA-8 Runoff Area=0.174 ac 75.86% Impervious Runoff Depth>2.20"
Tc=5.0 min CN=WQ Runoff=0.59 cfs 0.032 af

Subcatchment9S: DA-9 Runoff Area=0.335 ac 94.63% Impervious Runoff Depth>2.66"
Tc=5.0 min CN=WQ Runoff=1.37 cfs 0.074 af

Subcatchment10S: DA-10 Runoff Area=2.646 ac 100.00% Impervious Runoff Depth>2.78"
Tc=10.0 min CN=98 Runoff=9.80 cfs 0.614 af

Reach 1R: Existing Runoff Inflow=17.07 cfs 1.098 af
Outflow=17.07 cfs 1.098 af

Total Runoff Area = 4.825 ac Runoff Volume = 1.098 af Average Runoff Depth = 2.73"
2.24% Pervious = 0.108 ac 97.76% Impervious = 4.717 ac

19990 Existing Watersheds

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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 1S: DA-1

Runoff = 1.68 cfs @ 12.03 hrs, Volume= 0.111 af, Depth> 2.78"

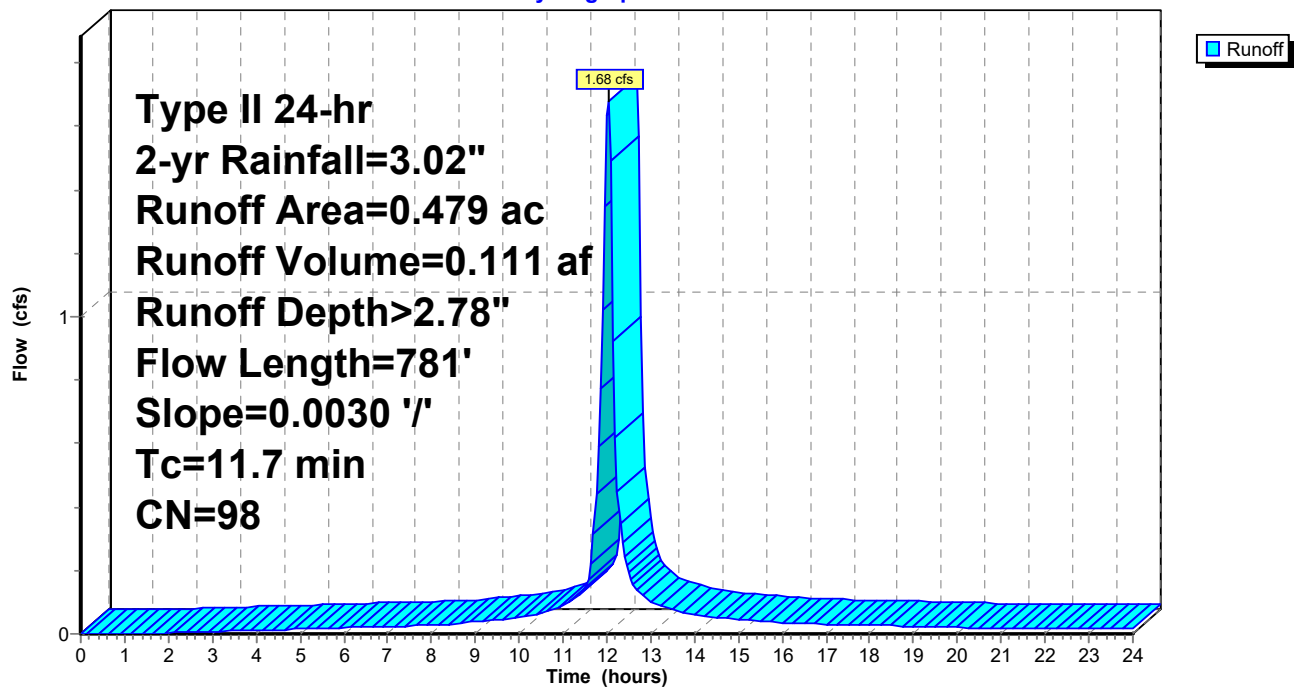
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.479	98	Paved roads w/curbs & sewers, HSG A
0.479		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	781	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 1S: DA-1

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 2S: DA-2

Runoff = 1.82 cfs @ 12.04 hrs, Volume= 0.123 af, Depth> 2.78"

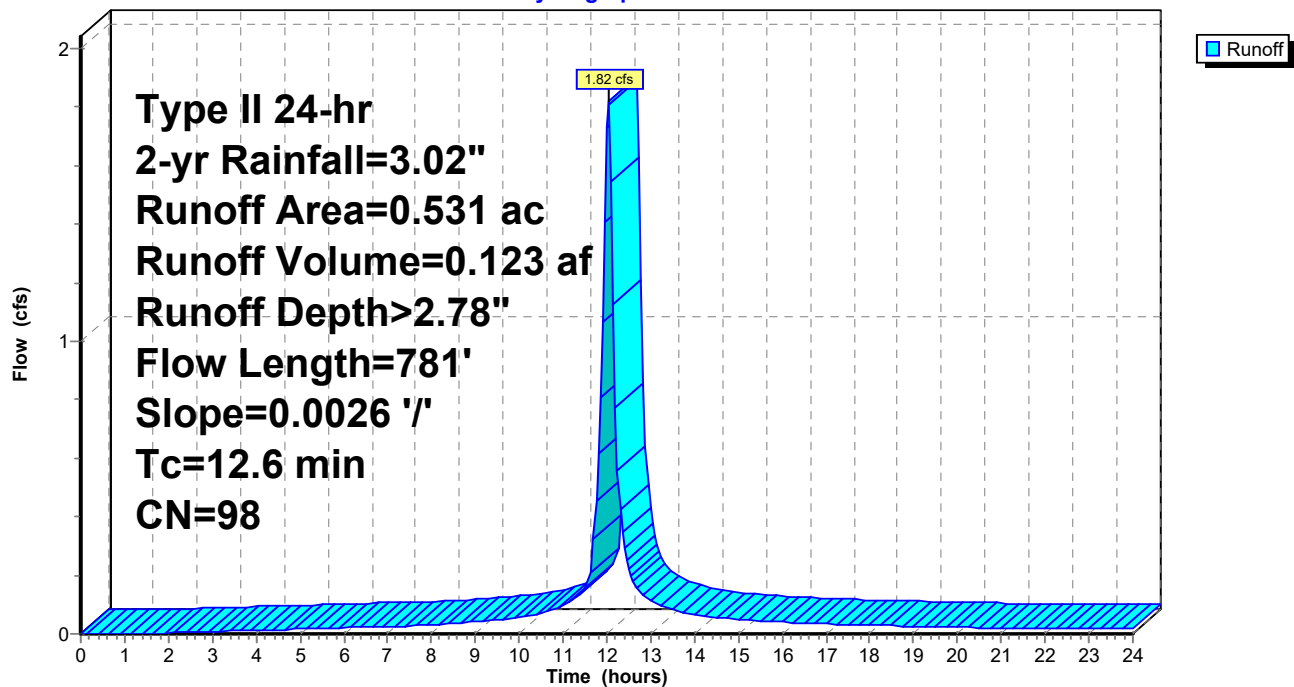
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.531	98	Paved roads w/curbs & sewers, HSG A
0.531		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	781	0.0026	1.04		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 2S: DA-2

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 3S: DA-3

Runoff = 0.32 cfs @ 11.95 hrs, Volume= 0.017 af, Depth> 2.79"

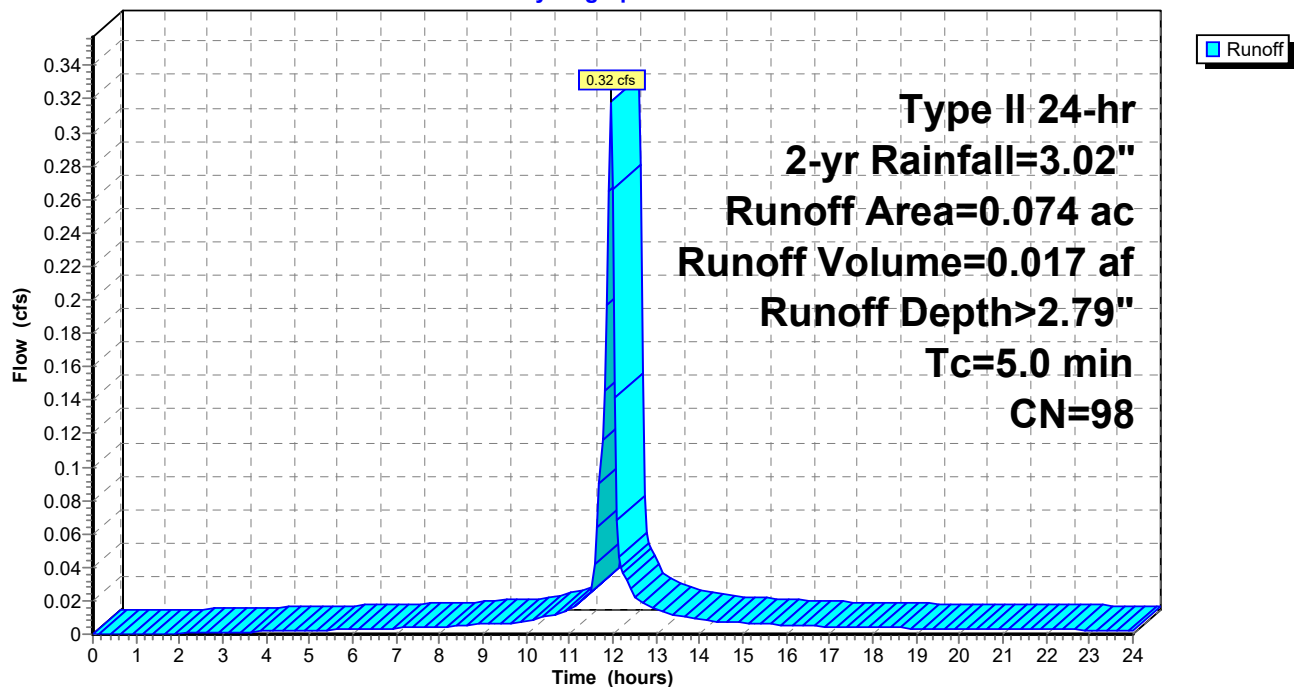
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.074	98	Paved parking, HSG A
0.074		100.00% Impervious Area

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

Subcatchment 3S: DA-3

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 4S: DA-4

Runoff = 0.06 cfs @ 11.95 hrs, Volume= 0.003 af, Depth> 2.79"

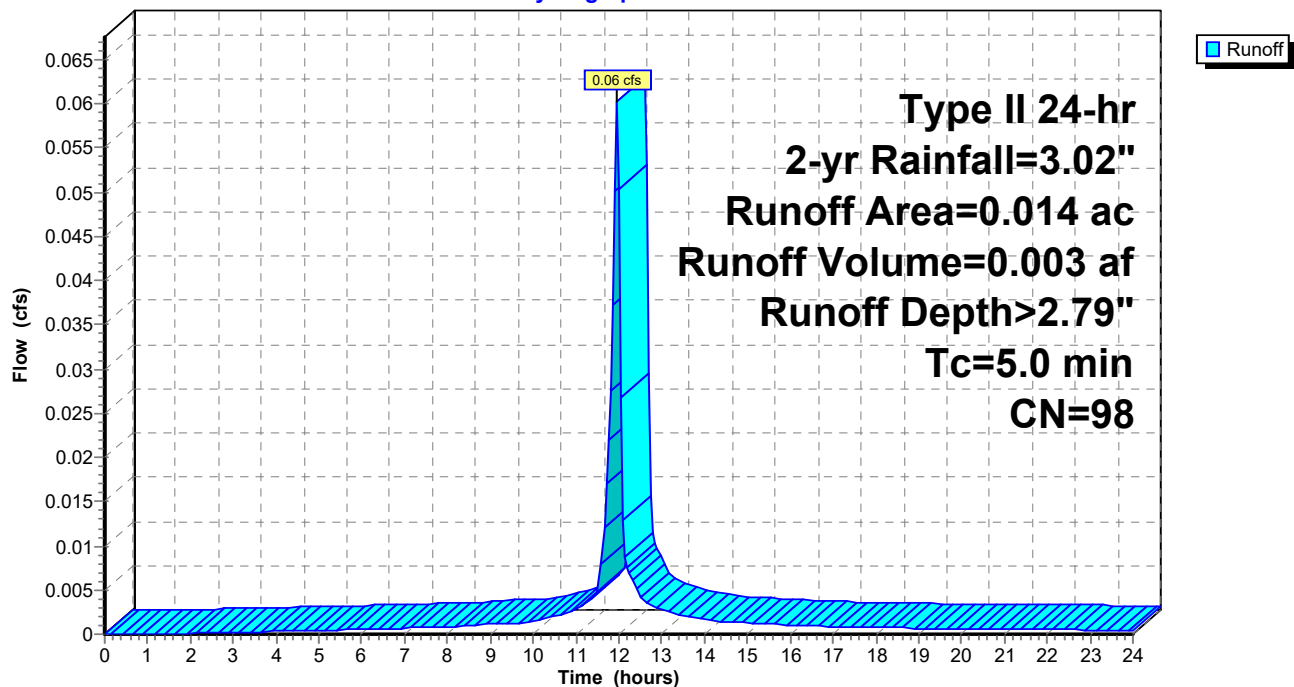
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.014	98	Paved parking, HSG A
0.014		100.00% Impervious Area

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

Subcatchment 4S: DA-4

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 5S: DA-5

Runoff = 0.36 cfs @ 11.95 hrs, Volume= 0.020 af, Depth> 2.79"

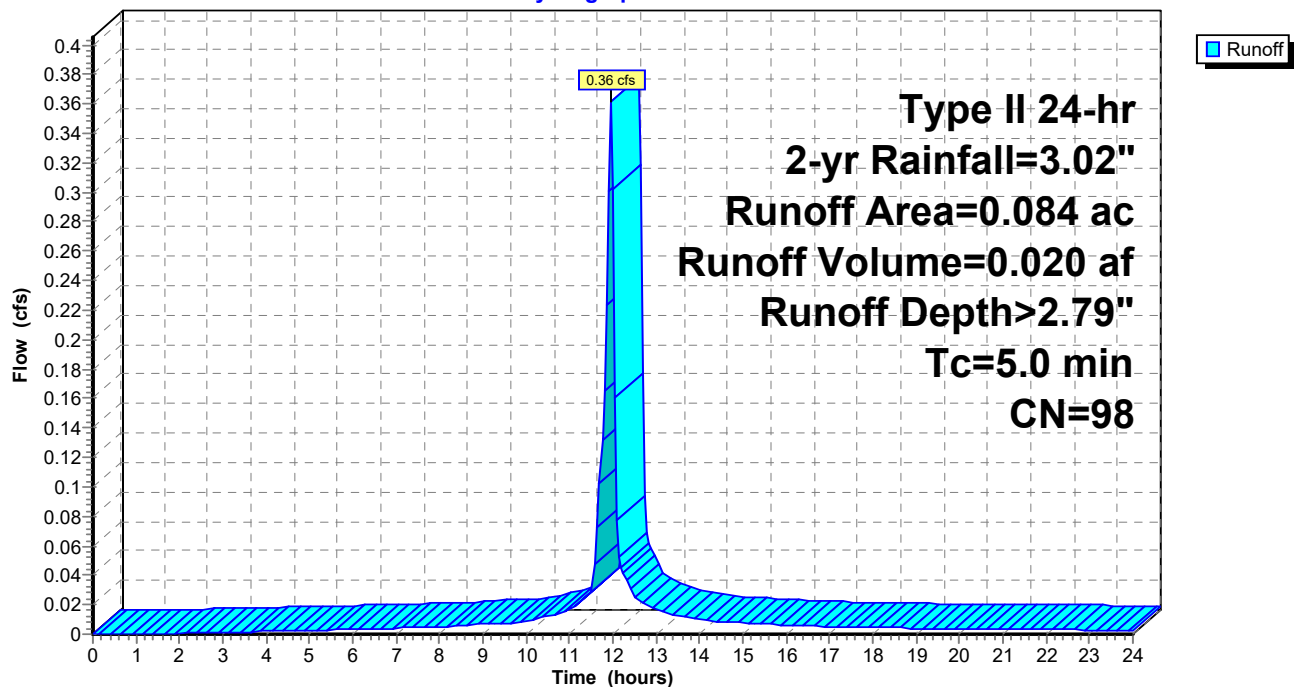
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.084	98	Paved parking, HSG A
0.084		100.00% Impervious Area

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

Subcatchment 5S: DA-5

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 6S: DA-6

Runoff = 0.26 cfs @ 11.95 hrs, Volume= 0.014 af, Depth> 2.60"

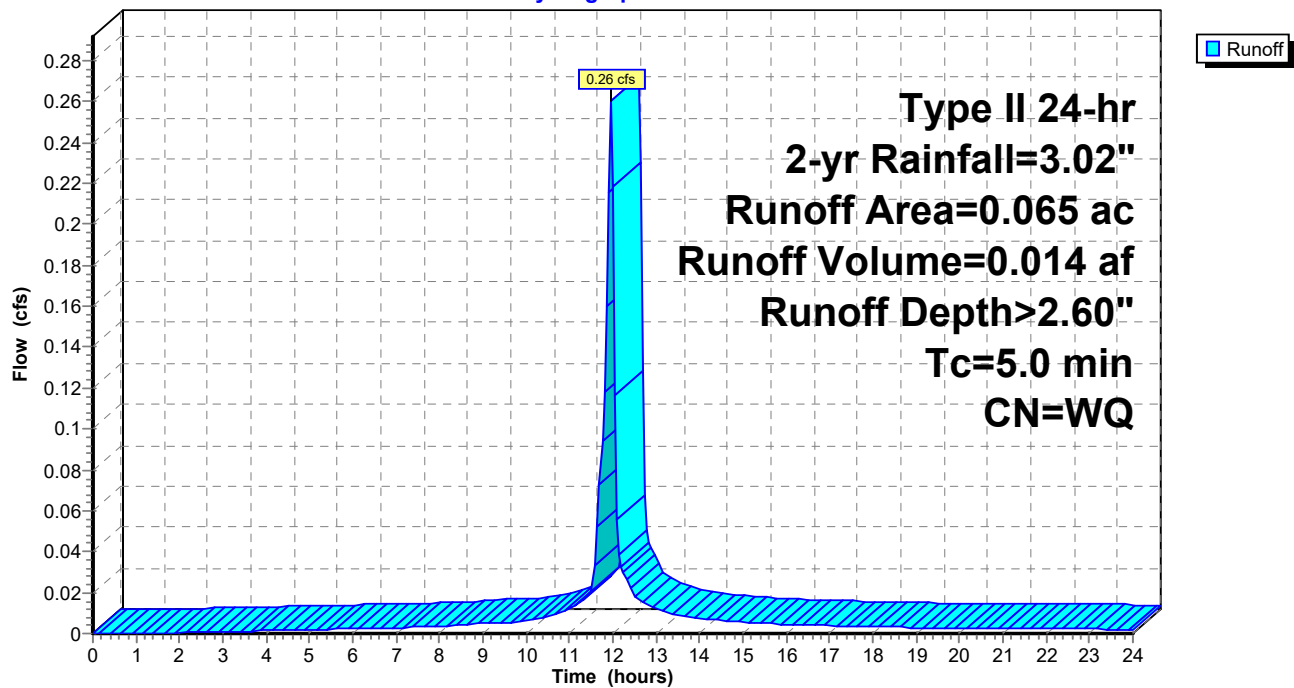
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.060	98	Paved roads w/curbs & sewers, HSG A
0.005	61	>75% Grass cover, Good, HSG B
0.065		Weighted Average
0.005		7.69% Pervious Area
0.060		92.31% Impervious Area

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

Subcatchment 6S: DA-6

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 7S: DA-7

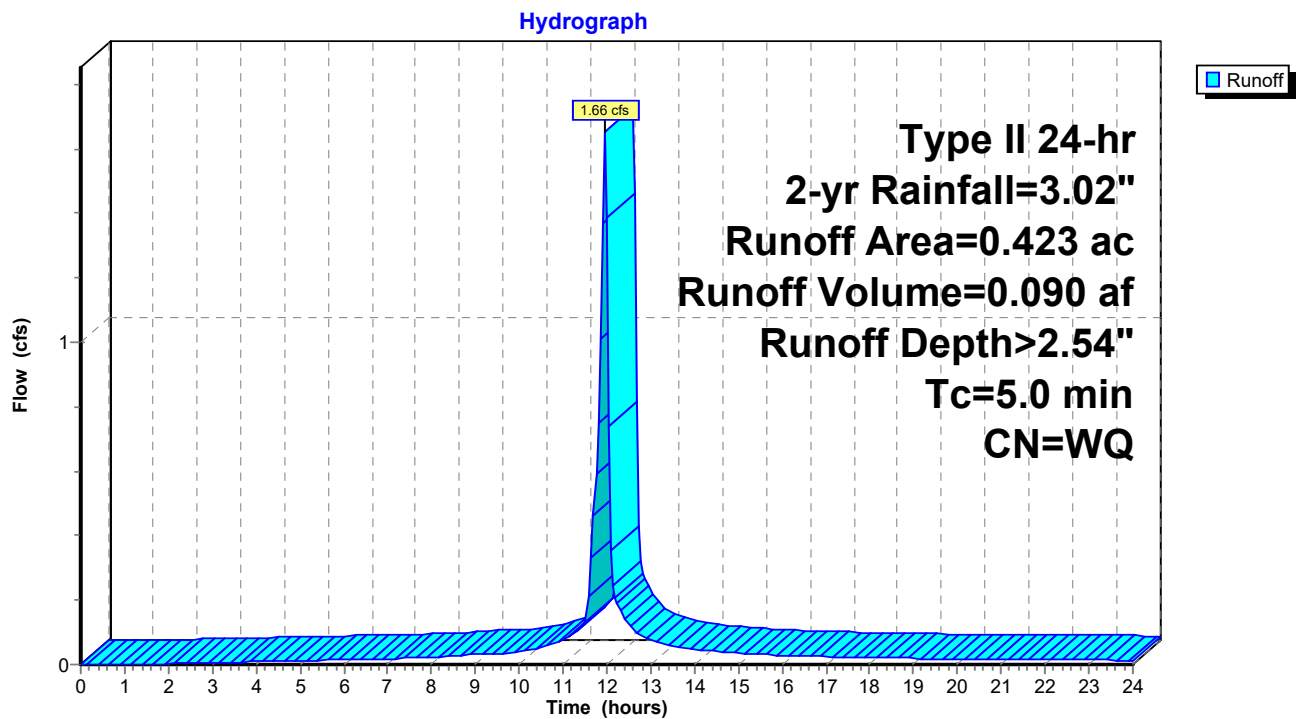
Runoff = 1.66 cfs @ 11.95 hrs, Volume= 0.090 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.380	98	Paved roads w/curbs & sewers, HSG A
0.043	61	>75% Grass cover, Good, HSG B
0.423		Weighted Average
0.043		10.17% Pervious Area
0.380		89.83% Impervious Area

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

Subcatchment 7S: DA-7



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 8S: DA-8

Runoff = 0.59 cfs @ 11.95 hrs, Volume= 0.032 af, Depth> 2.20"

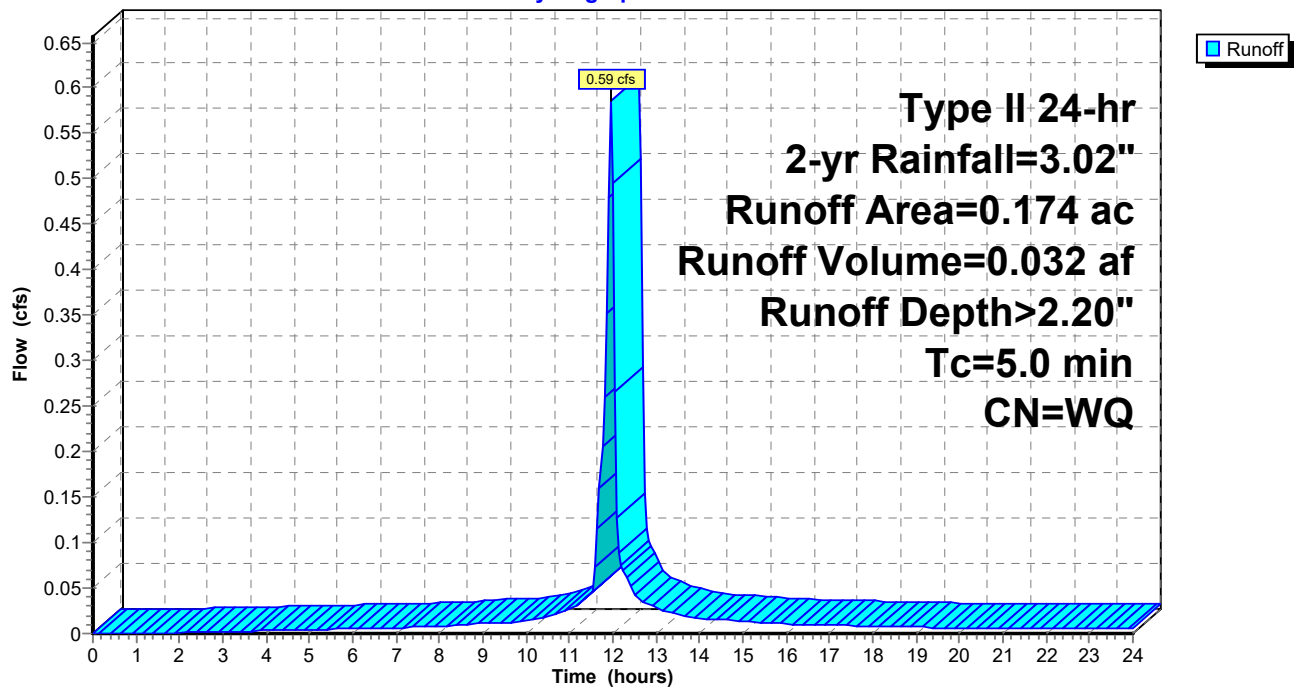
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.132	98	Paved roads w/curbs & sewers, HSG A
0.042	61	>75% Grass cover, Good, HSG B
0.174		Weighted Average
0.042		24.14% Pervious Area
0.132		75.86% Impervious Area

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

Subcatchment 8S: DA-8

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 9S: DA-9

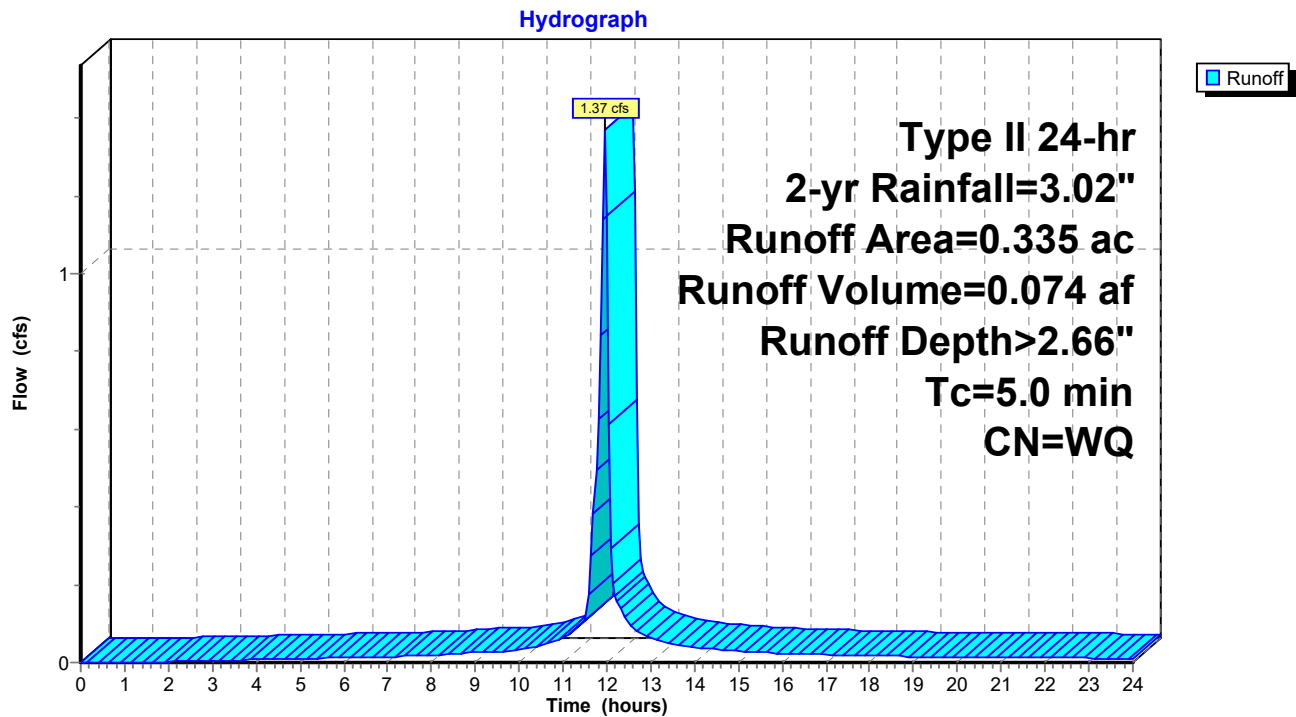
Runoff = 1.37 cfs @ 11.95 hrs, Volume= 0.074 af, Depth> 2.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.317	98	Paved roads w/curbs & sewers, HSG A
0.018	61	>75% Grass cover, Good, HSG B
0.335		Weighted Average
0.018		5.37% Pervious Area
0.317		94.63% Impervious Area

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

Subcatchment 9S: DA-9



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 10S: DA-10

Runoff = 9.80 cfs @ 12.01 hrs, Volume= 0.614 af, Depth> 2.78"

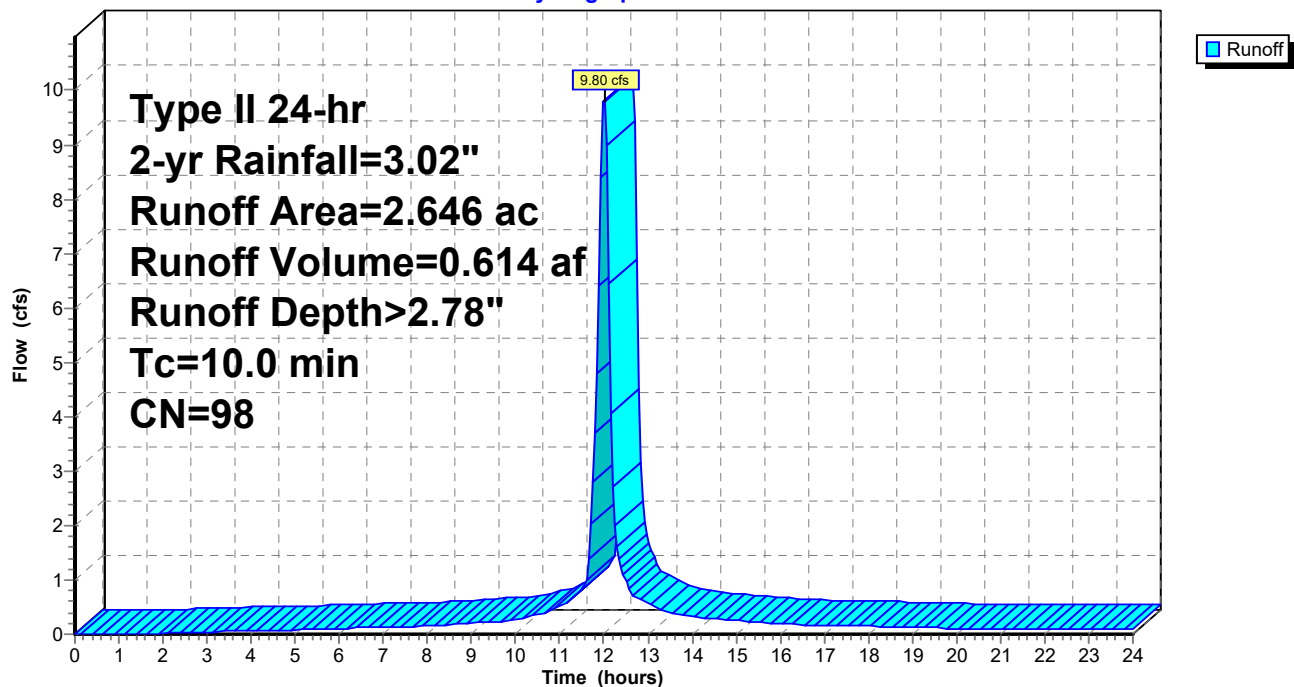
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
2.646	98	Roofs, HSG A
2.646		100.00% Impervious Area

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

Subcatchment 10S: DA-10

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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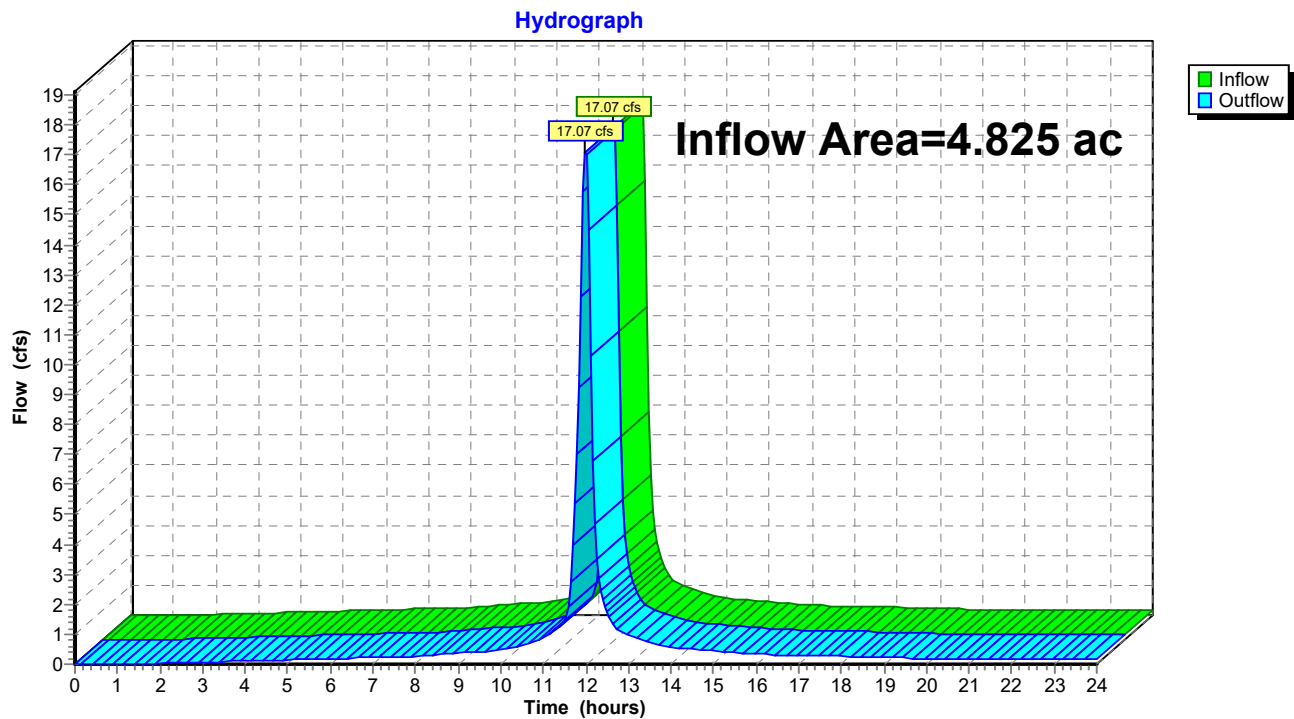
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Summary for Reach 1R: Existing Runoff

Inflow Area = 4.825 ac, 97.76% Impervious, Inflow Depth > 2.73" for 2-yr event
Inflow = 17.07 cfs @ 11.99 hrs, Volume= 1.098 af
Outflow = 17.07 cfs @ 11.99 hrs, Volume= 1.098 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 1R: Existing Runoff



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Type II 24-hr 10-yr Rainfall=4.48"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1	Runoff Area=0.479 ac 100.00% Impervious Runoff Depth>4.24" Flow Length=781' Slope=0.0030 '/' Tc=11.7 min CN=98 Runoff=2.52 cfs 0.169 af
Subcatchment2S: DA-2	Runoff Area=0.531 ac 100.00% Impervious Runoff Depth>4.24" Flow Length=781' Slope=0.0026 '/' Tc=12.6 min CN=98 Runoff=2.72 cfs 0.187 af
Subcatchment3S: DA-3	Runoff Area=0.074 ac 100.00% Impervious Runoff Depth>4.24" Tc=5.0 min CN=98 Runoff=0.48 cfs 0.026 af
Subcatchment4S: DA-4	Runoff Area=0.014 ac 100.00% Impervious Runoff Depth>4.24" Tc=5.0 min CN=98 Runoff=0.09 cfs 0.005 af
Subcatchment5S: DA-5	Runoff Area=0.084 ac 100.00% Impervious Runoff Depth>4.24" Tc=5.0 min CN=98 Runoff=0.54 cfs 0.030 af
Subcatchment6S: DA-6	Runoff Area=0.065 ac 92.31% Impervious Runoff Depth>4.00" Tc=5.0 min CN=WQ Runoff=0.40 cfs 0.022 af
Subcatchment7S: DA-7	Runoff Area=0.423 ac 89.83% Impervious Runoff Depth>3.92" Tc=5.0 min CN=WQ Runoff=2.52 cfs 0.138 af
Subcatchment8S: DA-8	Runoff Area=0.174 ac 75.86% Impervious Runoff Depth>3.48" Tc=5.0 min CN=WQ Runoff=0.92 cfs 0.050 af
Subcatchment9S: DA-9	Runoff Area=0.335 ac 94.63% Impervious Runoff Depth>4.07" Tc=5.0 min CN=WQ Runoff=2.07 cfs 0.114 af
Subcatchment10S: DA-10	Runoff Area=2.646 ac 100.00% Impervious Runoff Depth>4.24" Tc=10.0 min CN=98 Runoff=14.65 cfs 0.934 af
Reach 1R: Existing Runoff	Inflow=25.63 cfs 1.676 af Outflow=25.63 cfs 1.676 af

Total Runoff Area = 4.825 ac Runoff Volume = 1.676 af Average Runoff Depth = 4.17"
2.24% Pervious = 0.108 ac 97.76% Impervious = 4.717 ac

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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 1S: DA-1

Runoff = 2.52 cfs @ 12.03 hrs, Volume= 0.169 af, Depth> 4.24"

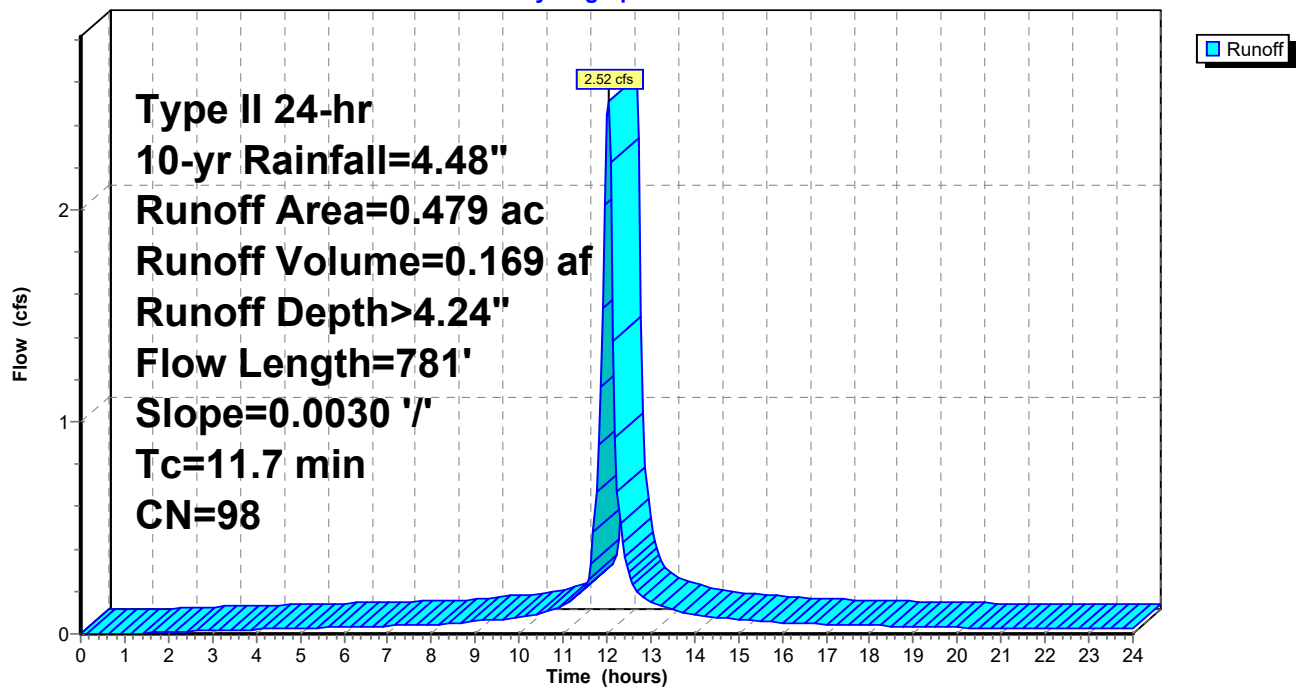
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.479	98	Paved roads w/curbs & sewers, HSG A
0.479		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	781	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 1S: DA-1

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 2S: DA-2

Runoff = 2.72 cfs @ 12.04 hrs, Volume= 0.187 af, Depth> 4.24"

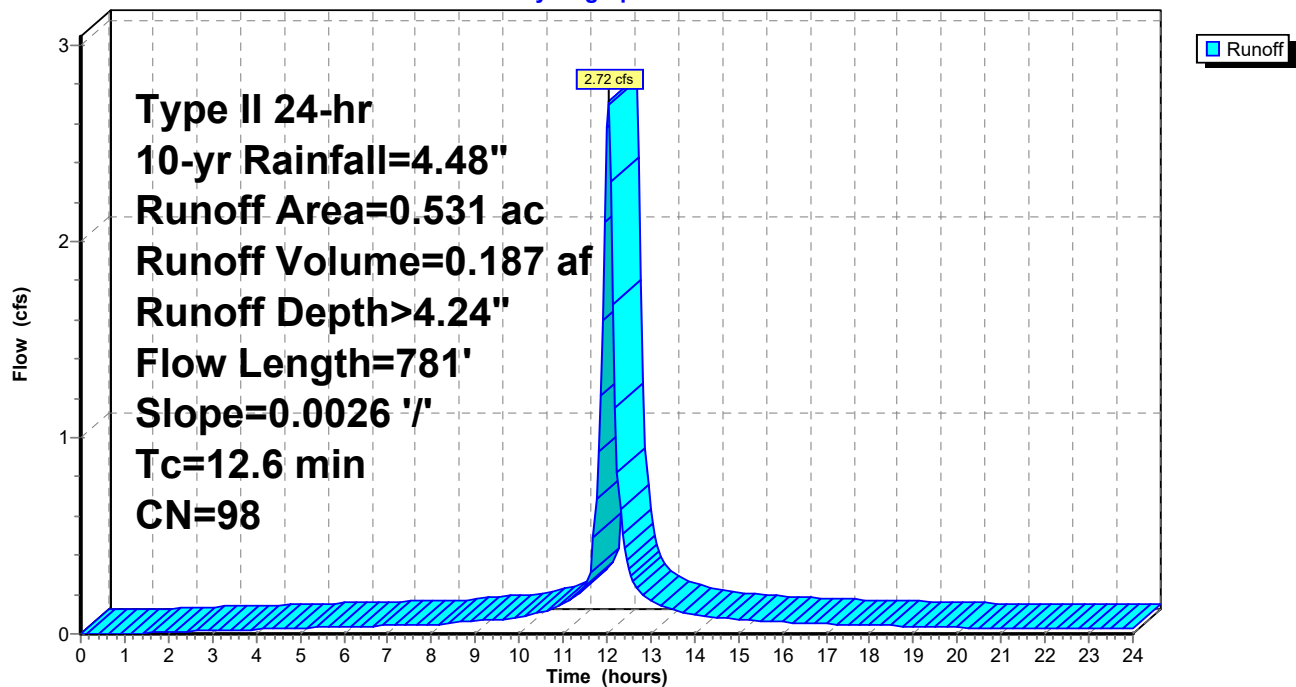
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.531	98	Paved roads w/curbs & sewers, HSG A
0.531		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	781	0.0026	1.04		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 2S: DA-2

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 3S: DA-3

Runoff = 0.48 cfs @ 11.95 hrs, Volume= 0.026 af, Depth> 4.24"

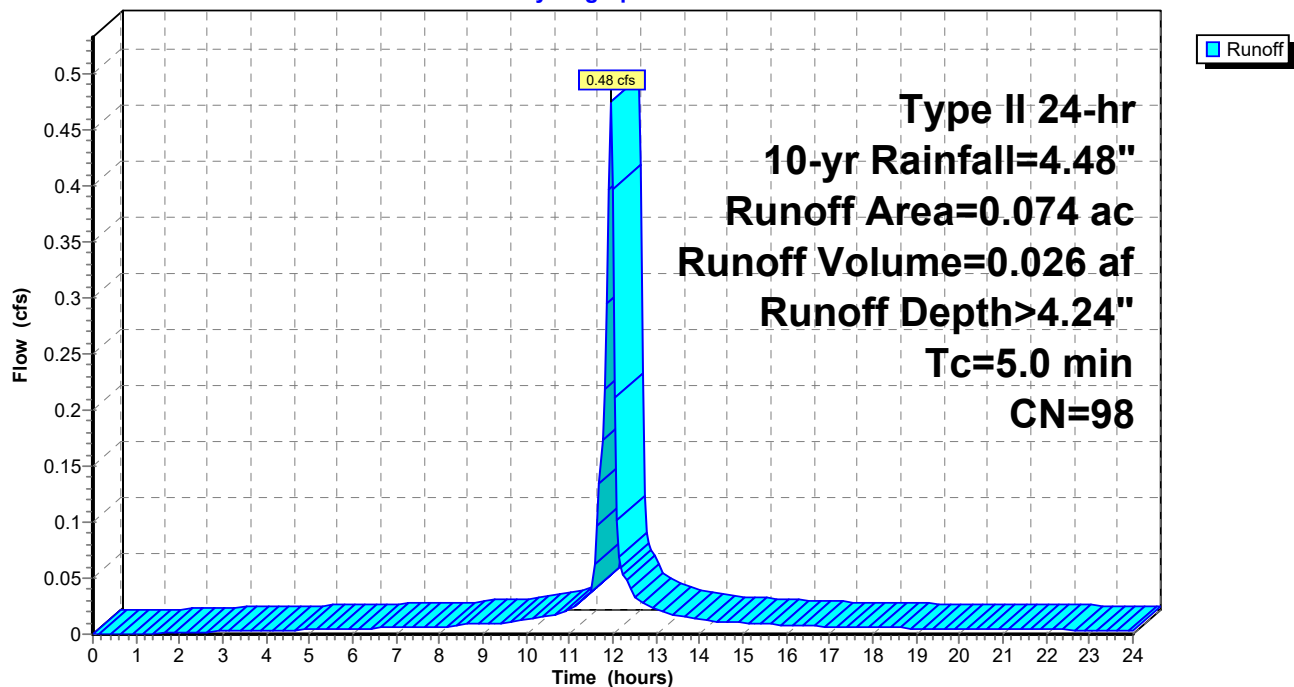
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.074	98	Paved parking, HSG A
0.074		100.00% Impervious Area

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

Subcatchment 3S: DA-3

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 4S: DA-4

Runoff = 0.09 cfs @ 11.95 hrs, Volume= 0.005 af, Depth> 4.24"

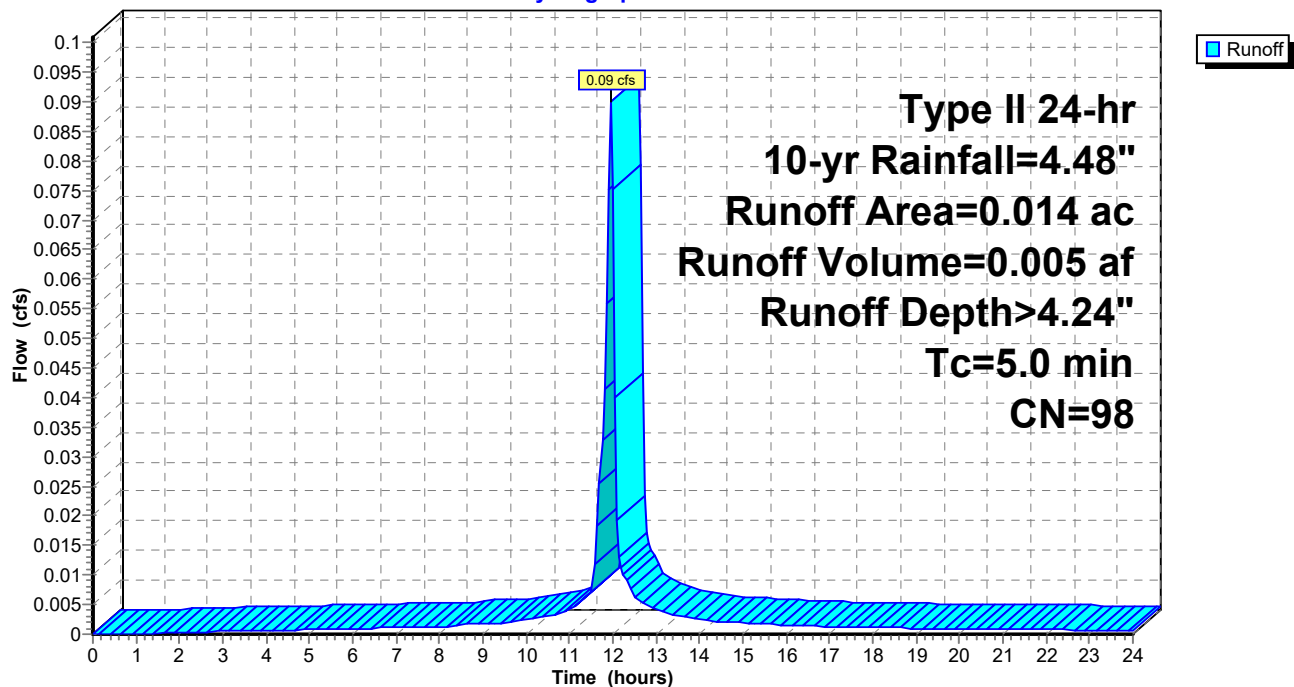
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.014	98	Paved parking, HSG A
0.014		100.00% Impervious Area

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

Subcatchment 4S: DA-4

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 5S: DA-5

Runoff = 0.54 cfs @ 11.95 hrs, Volume= 0.030 af, Depth> 4.24"

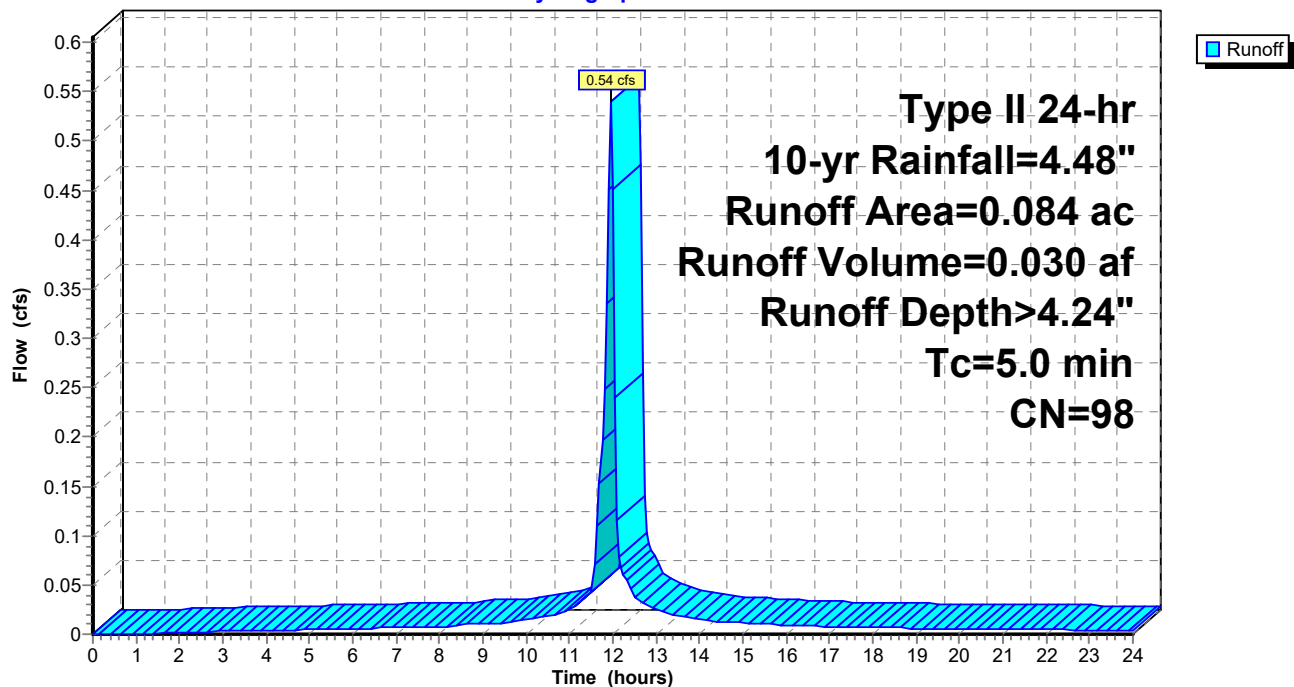
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.084	98	Paved parking, HSG A
0.084		100.00% Impervious Area

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

Subcatchment 5S: DA-5

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 6S: DA-6

Runoff = 0.40 cfs @ 11.95 hrs, Volume= 0.022 af, Depth> 4.00"

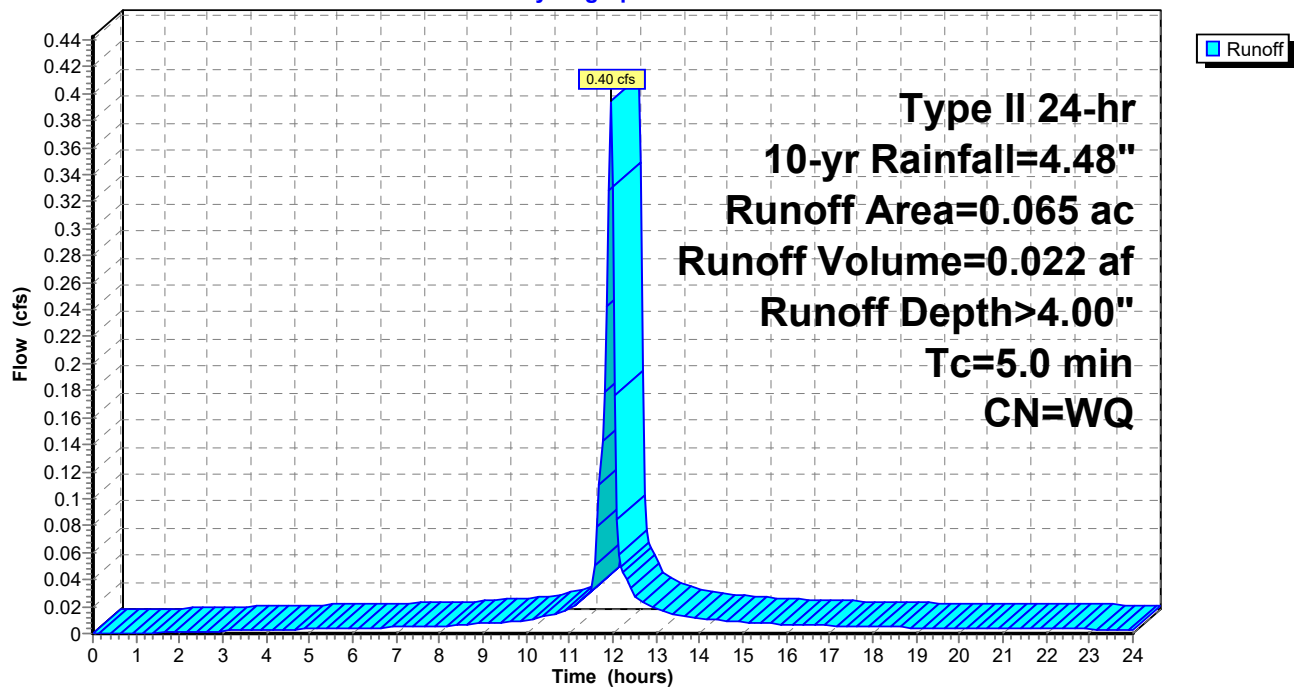
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.060	98	Paved roads w/curbs & sewers, HSG A
0.005	61	>75% Grass cover, Good, HSG B
0.065		Weighted Average
0.005		7.69% Pervious Area
0.060		92.31% Impervious Area

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

Subcatchment 6S: DA-6

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 7S: DA-7

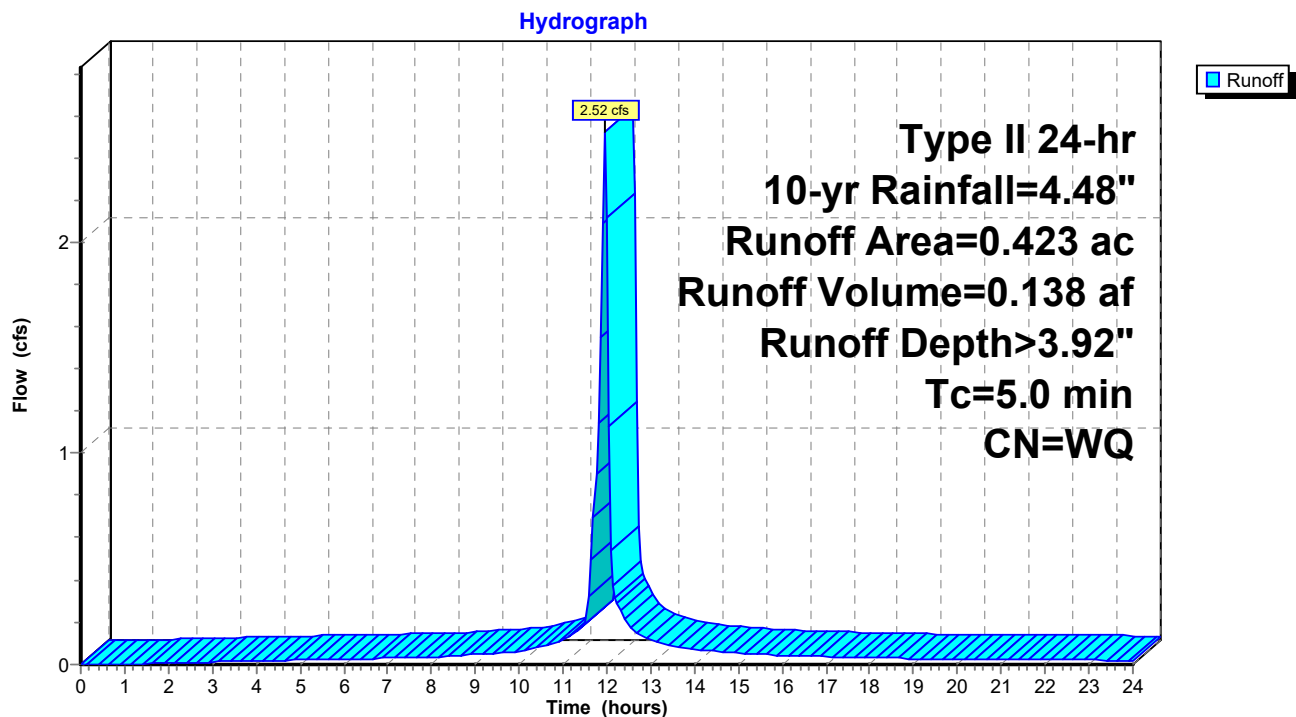
Runoff = 2.52 cfs @ 11.95 hrs, Volume= 0.138 af, Depth> 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.380	98	Paved roads w/curbs & sewers, HSG A
0.043	61	>75% Grass cover, Good, HSG B
0.423		Weighted Average
0.043		10.17% Pervious Area
0.380		89.83% Impervious Area

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

Subcatchment 7S: DA-7



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 8S: DA-8

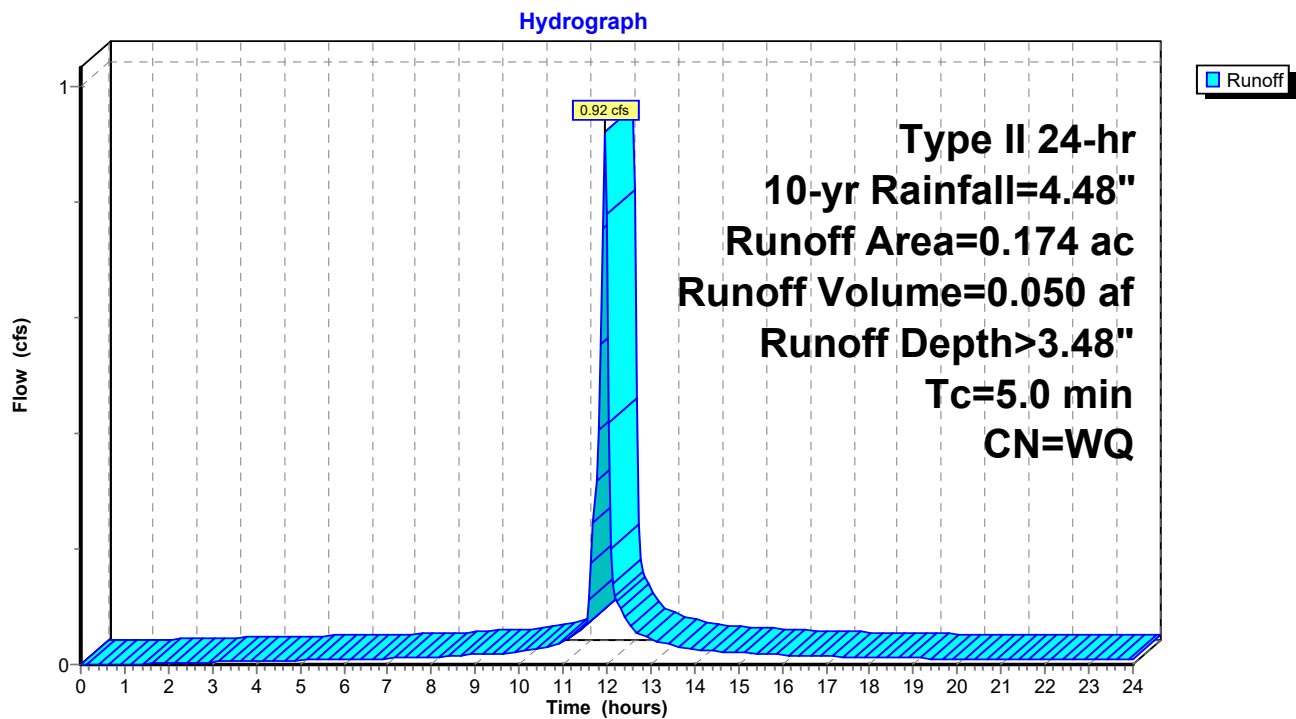
Runoff = 0.92 cfs @ 11.95 hrs, Volume= 0.050 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.132	98	Paved roads w/curbs & sewers, HSG A
0.042	61	>75% Grass cover, Good, HSG B
0.174		Weighted Average
0.042		24.14% Pervious Area
0.132		75.86% Impervious Area

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

Subcatchment 8S: DA-8



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 9S: DA-9

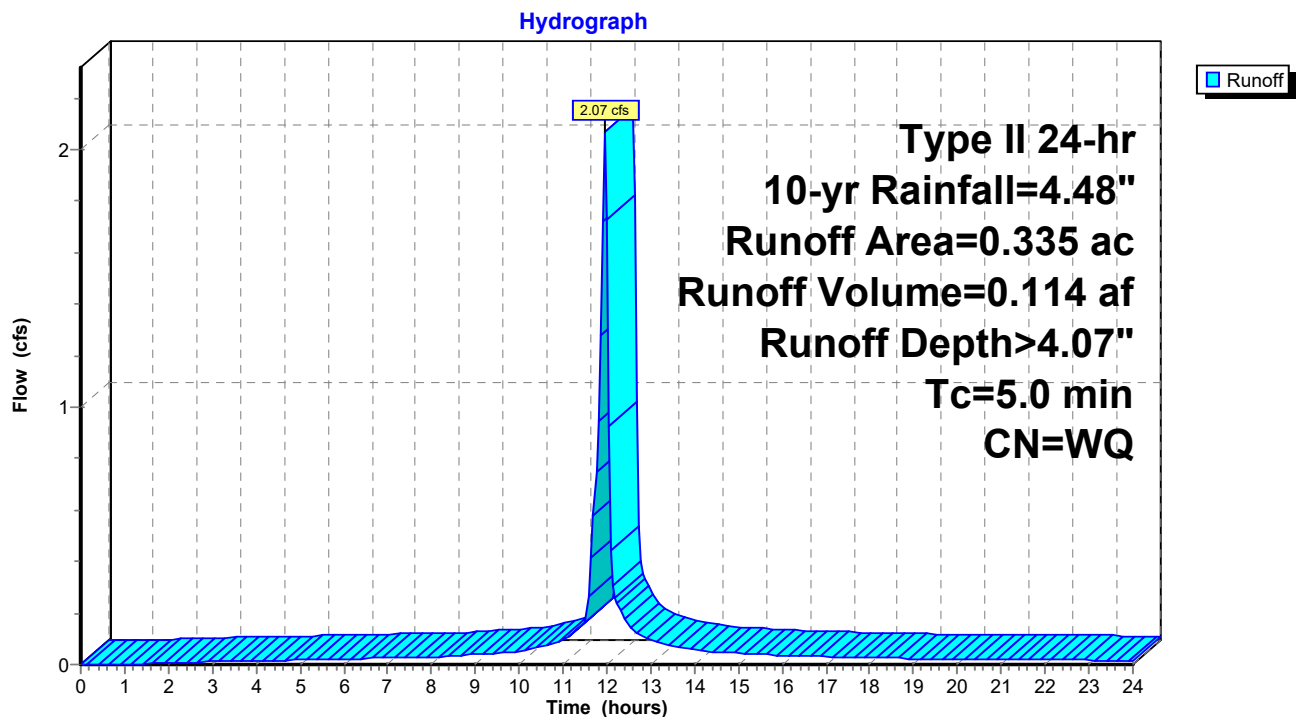
Runoff = 2.07 cfs @ 11.95 hrs, Volume= 0.114 af, Depth> 4.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.317	98	Paved roads w/curbs & sewers, HSG A
0.018	61	>75% Grass cover, Good, HSG B
0.335		Weighted Average
0.018		5.37% Pervious Area
0.317		94.63% Impervious Area

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

Subcatchment 9S: DA-9



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 10S: DA-10

Runoff = 14.65 cfs @ 12.01 hrs, Volume= 0.934 af, Depth> 4.24"

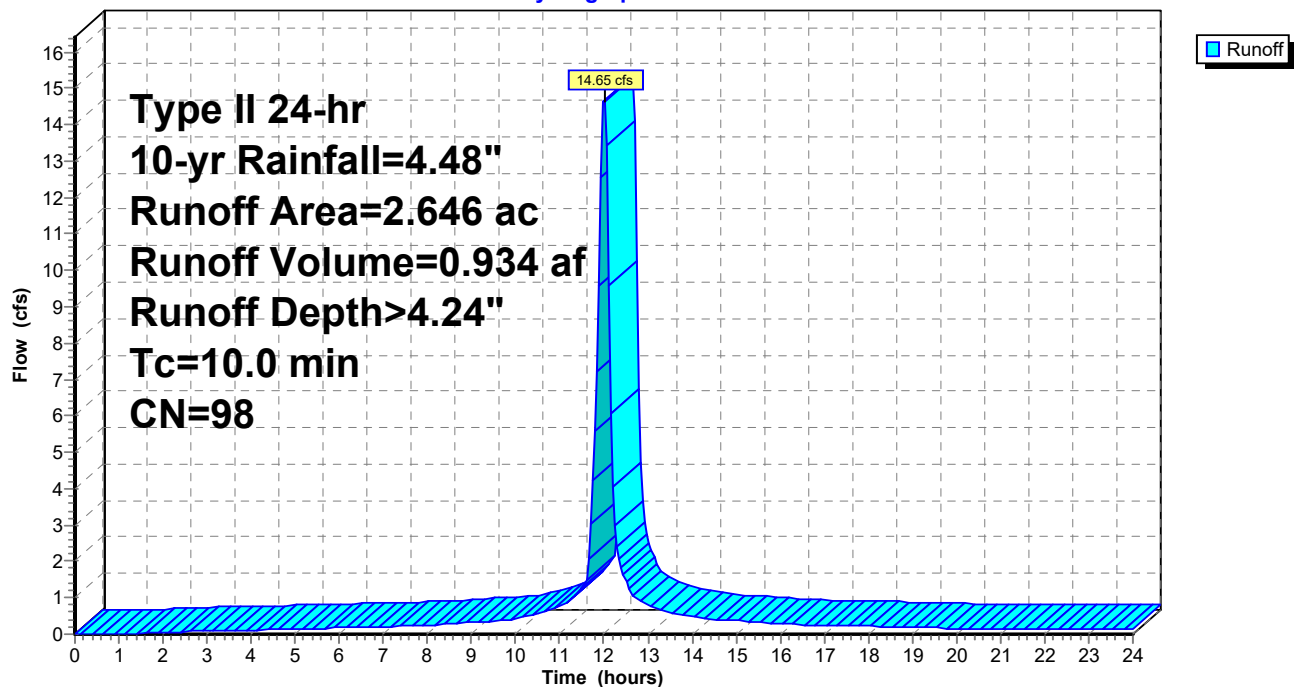
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
2.646	98	Roofs, HSG A
2.646		100.00% Impervious Area

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

Subcatchment 10S: DA-10

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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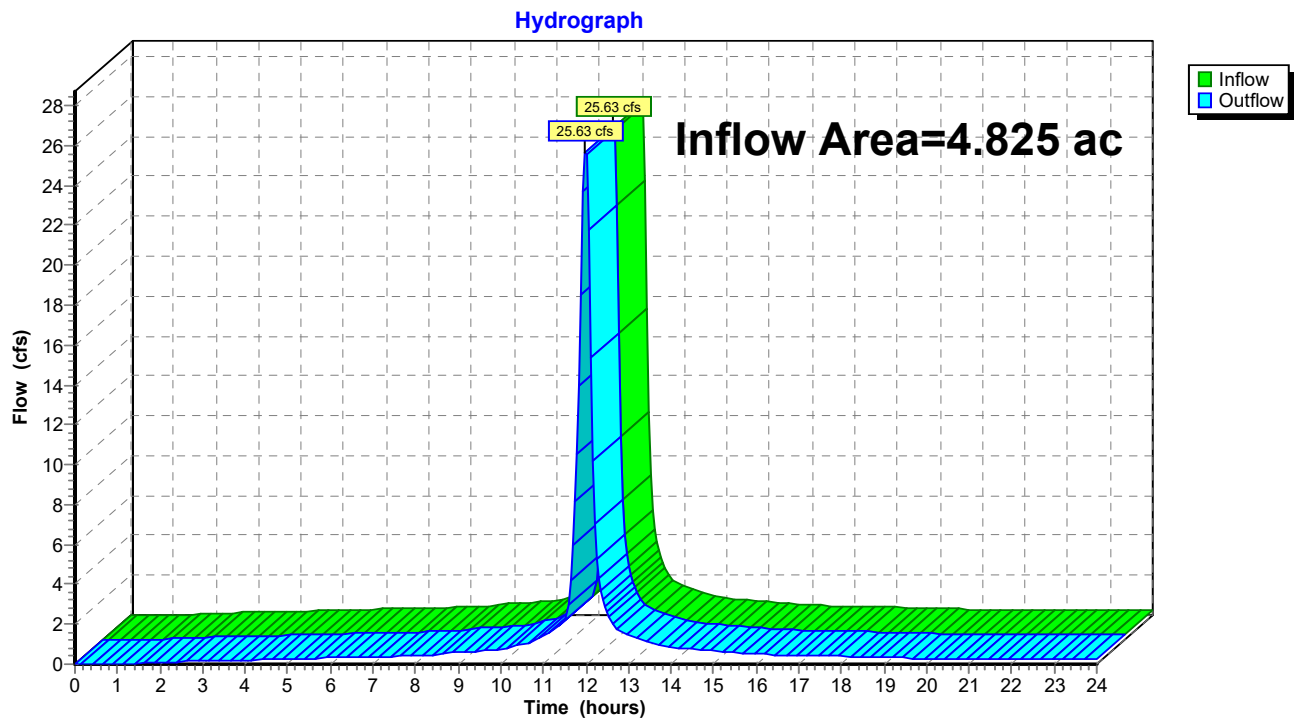
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Summary for Reach 1R: Existing Runoff

Inflow Area = 4.825 ac, 97.76% Impervious, Inflow Depth > 4.17" for 10-yr event
Inflow = 25.63 cfs @ 11.99 hrs, Volume= 1.676 af
Outflow = 25.63 cfs @ 11.99 hrs, Volume= 1.676 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 1R: Existing Runoff



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Type II 24-hr 25-yr Rainfall=5.58"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1	Runoff Area=0.479 ac 100.00% Impervious Runoff Depth>5.33" Flow Length=781' Slope=0.0030 '/' Tc=11.7 min CN=98 Runoff=3.14 cfs 0.213 af
Subcatchment2S: DA-2	Runoff Area=0.531 ac 100.00% Impervious Runoff Depth>5.33" Flow Length=781' Slope=0.0026 '/' Tc=12.6 min CN=98 Runoff=3.40 cfs 0.236 af
Subcatchment3S: DA-3	Runoff Area=0.074 ac 100.00% Impervious Runoff Depth>5.34" Tc=5.0 min CN=98 Runoff=0.59 cfs 0.033 af
Subcatchment4S: DA-4	Runoff Area=0.014 ac 100.00% Impervious Runoff Depth>5.34" Tc=5.0 min CN=98 Runoff=0.11 cfs 0.006 af
Subcatchment5S: DA-5	Runoff Area=0.084 ac 100.00% Impervious Runoff Depth>5.34" Tc=5.0 min CN=98 Runoff=0.68 cfs 0.037 af
Subcatchment6S: DA-6	Runoff Area=0.065 ac 92.31% Impervious Runoff Depth>5.06" Tc=5.0 min CN=WQ Runoff=0.50 cfs 0.027 af
Subcatchment7S: DA-7	Runoff Area=0.423 ac 89.83% Impervious Runoff Depth>4.97" Tc=5.0 min CN=WQ Runoff=3.18 cfs 0.175 af
Subcatchment8S: DA-8	Runoff Area=0.174 ac 75.86% Impervious Runoff Depth>4.47" Tc=5.0 min CN=WQ Runoff=1.19 cfs 0.065 af
Subcatchment9S: DA-9	Runoff Area=0.335 ac 94.63% Impervious Runoff Depth>5.15" Tc=5.0 min CN=WQ Runoff=2.60 cfs 0.144 af
Subcatchment10S: DA-10	Runoff Area=2.646 ac 100.00% Impervious Runoff Depth>5.33" Tc=10.0 min CN=98 Runoff=18.30 cfs 1.176 af
Reach 1R: Existing Runoff	Inflow=32.07 cfs 2.113 af Outflow=32.07 cfs 2.113 af

Total Runoff Area = 4.825 ac Runoff Volume = 2.113 af Average Runoff Depth = 5.25"
2.24% Pervious = 0.108 ac 97.76% Impervious = 4.717 ac

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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 1S: DA-1

Runoff = 3.14 cfs @ 12.03 hrs, Volume= 0.213 af, Depth> 5.33"

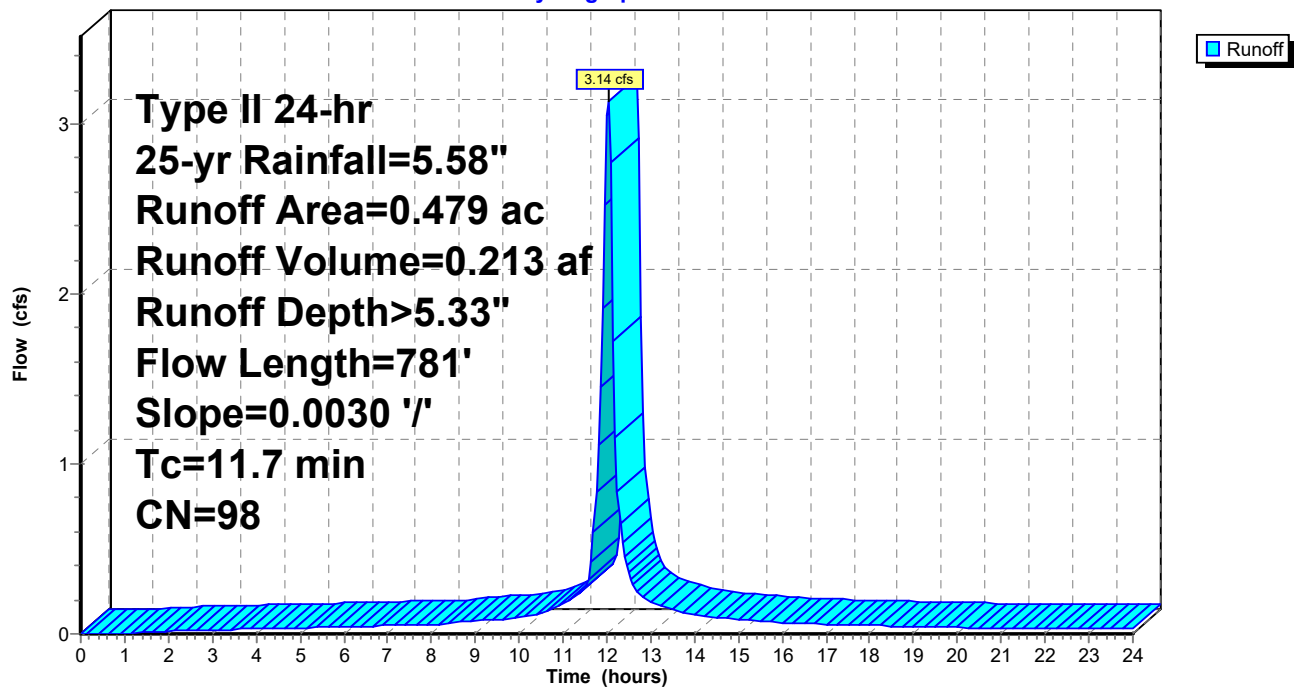
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.479	98	Paved roads w/curbs & sewers, HSG A
0.479		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	781	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 1S: DA-1

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 2S: DA-2

Runoff = 3.40 cfs @ 12.04 hrs, Volume= 0.236 af, Depth> 5.33"

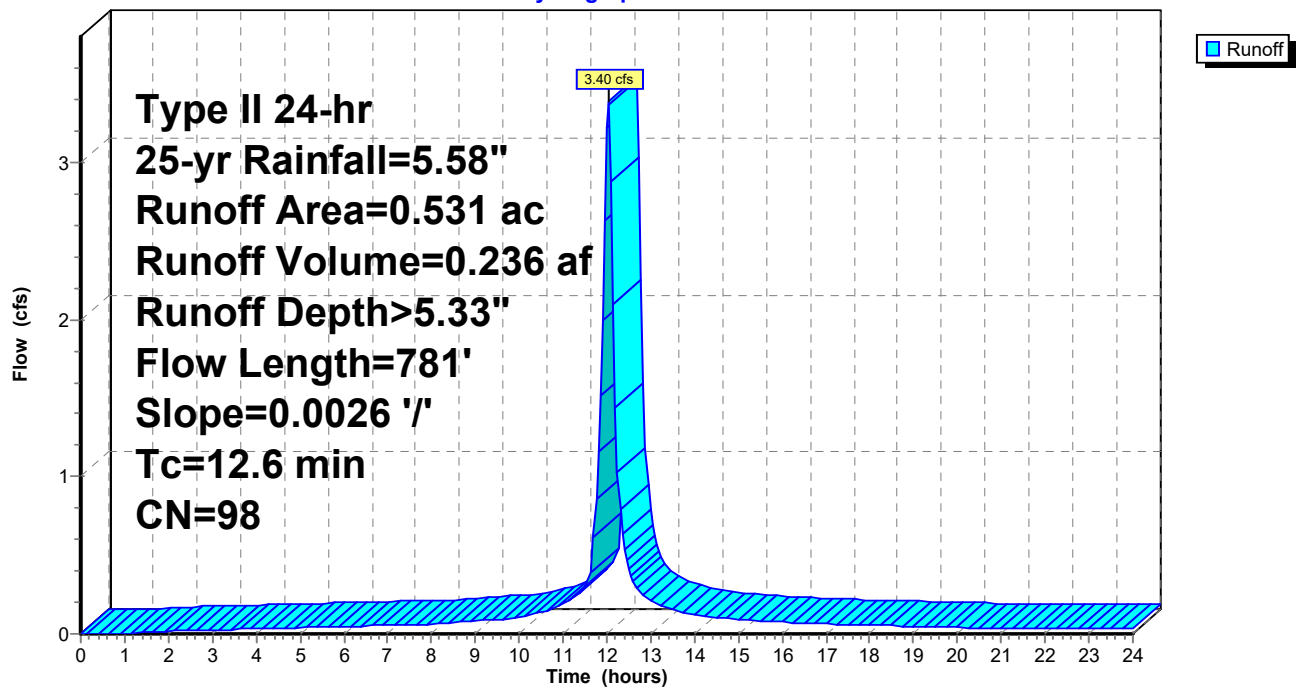
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.531	98	Paved roads w/curbs & sewers, HSG A
0.531		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	781	0.0026	1.04		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 2S: DA-2

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 3S: DA-3

Runoff = 0.59 cfs @ 11.95 hrs, Volume= 0.033 af, Depth> 5.34"

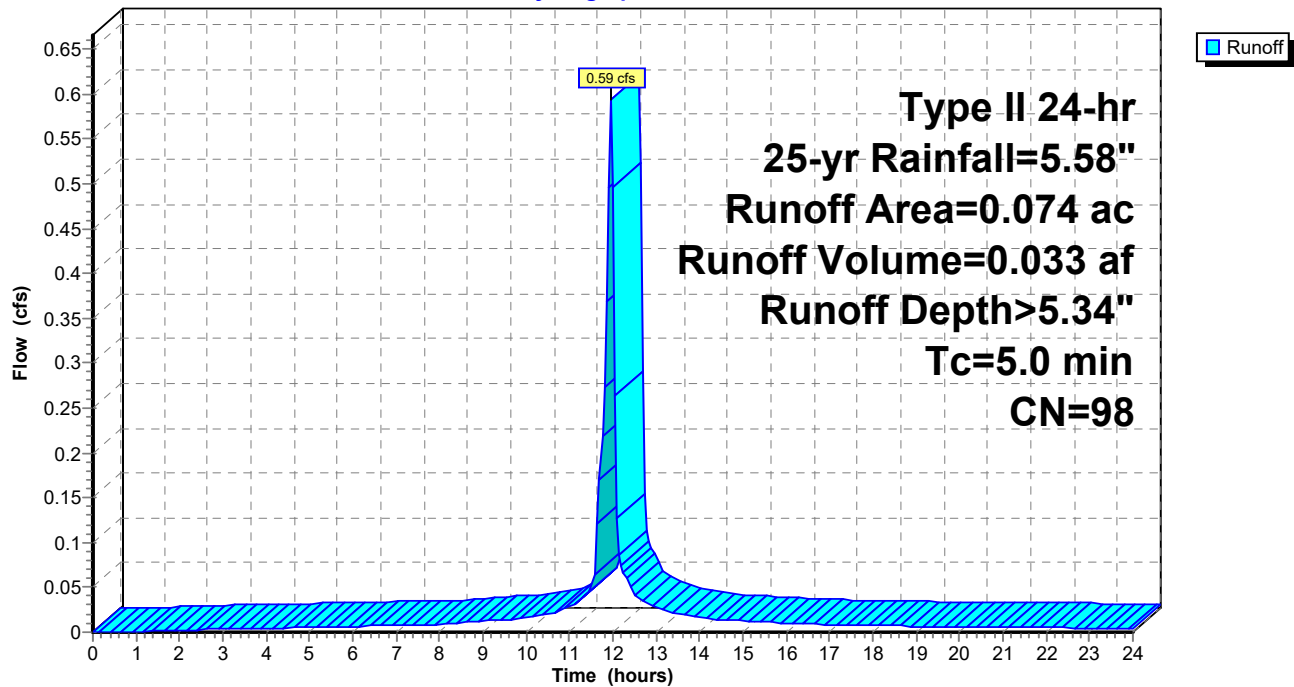
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.074	98	Paved parking, HSG A
0.074		100.00% Impervious Area

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

Subcatchment 3S: DA-3

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 4S: DA-4

Runoff = 0.11 cfs @ 11.95 hrs, Volume= 0.006 af, Depth> 5.34"

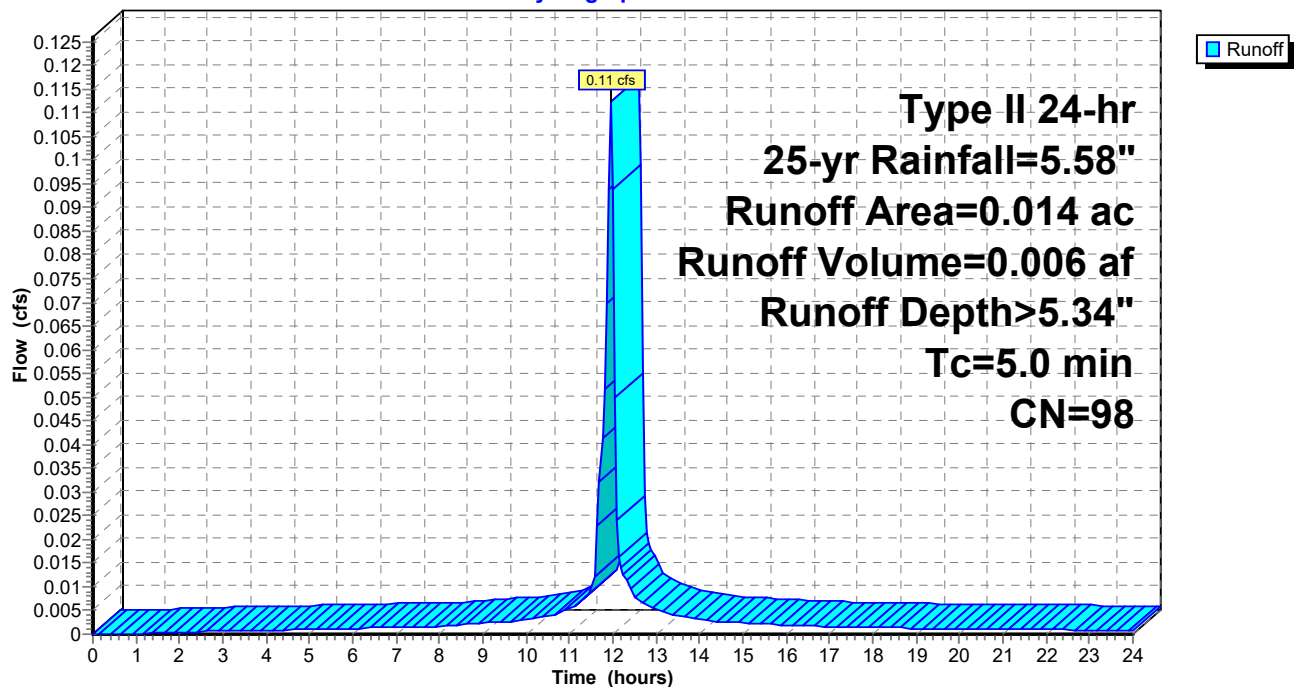
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.014	98	Paved parking, HSG A
0.014		100.00% Impervious Area

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

Subcatchment 4S: DA-4

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 5S: DA-5

Runoff = 0.68 cfs @ 11.95 hrs, Volume= 0.037 af, Depth> 5.34"

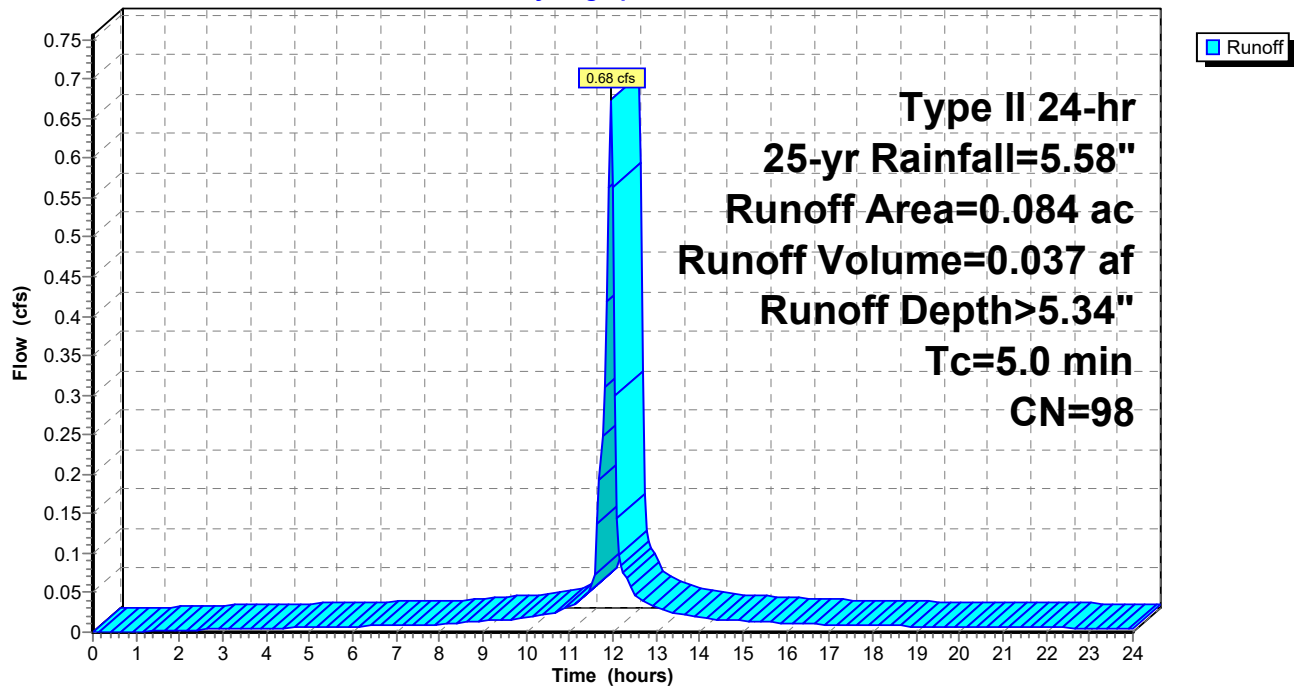
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.084	98	Paved parking, HSG A
0.084		100.00% Impervious Area

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

Subcatchment 5S: DA-5

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 6S: DA-6

Runoff = 0.50 cfs @ 11.95 hrs, Volume= 0.027 af, Depth> 5.06"

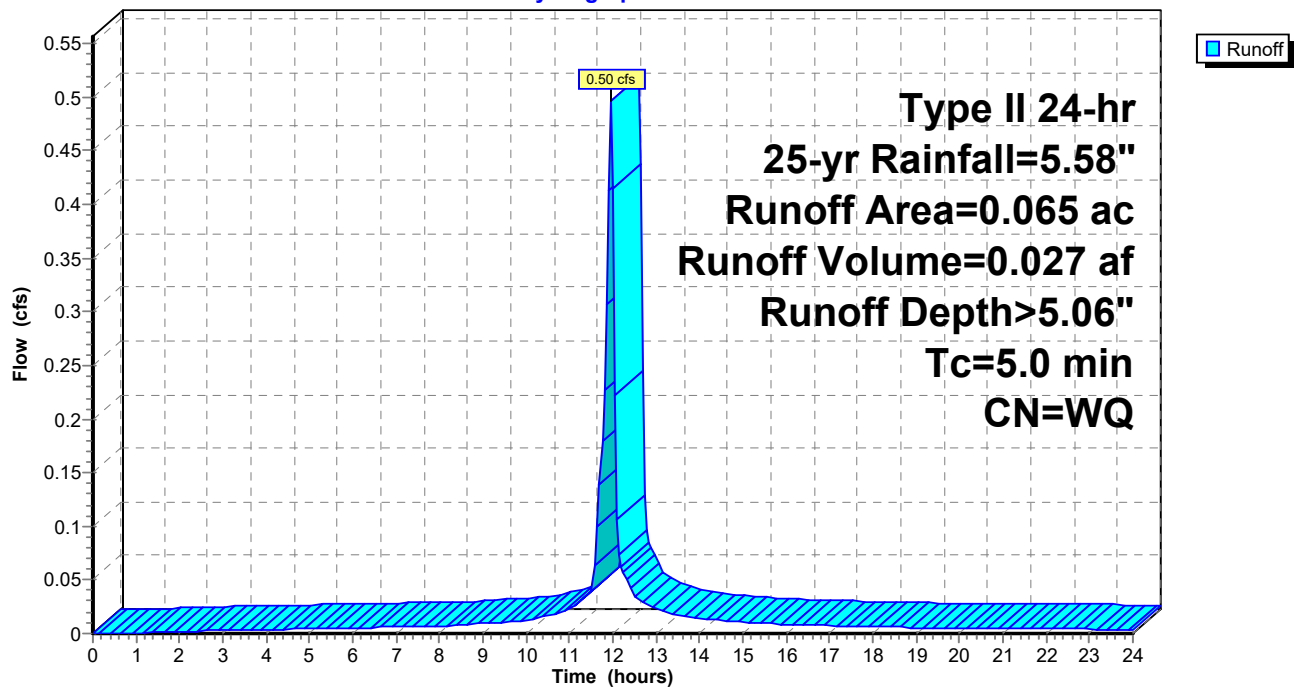
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.060	98	Paved roads w/curbs & sewers, HSG A
0.005	61	>75% Grass cover, Good, HSG B
0.065		Weighted Average
0.005		7.69% Pervious Area
0.060		92.31% Impervious Area

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

Subcatchment 6S: DA-6

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 7S: DA-7

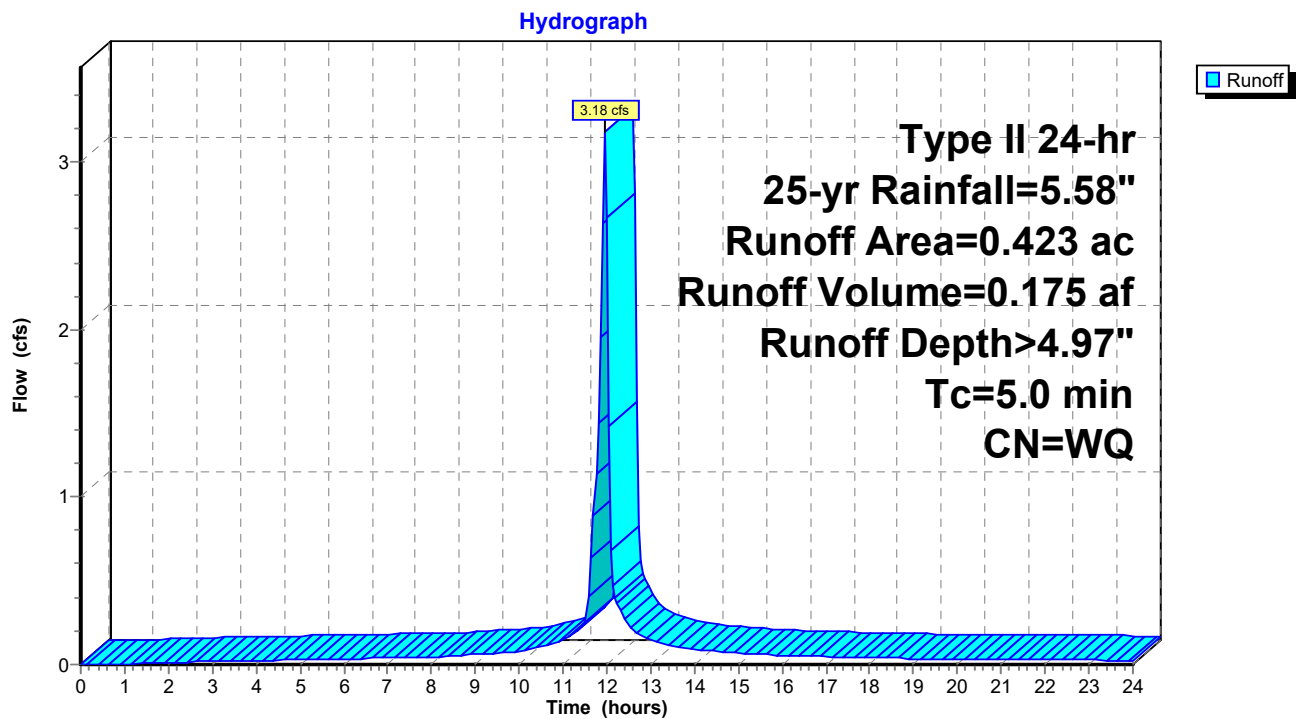
Runoff = 3.18 cfs @ 11.95 hrs, Volume= 0.175 af, Depth> 4.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.380	98	Paved roads w/curbs & sewers, HSG A
0.043	61	>75% Grass cover, Good, HSG B
0.423		Weighted Average
0.043		10.17% Pervious Area
0.380		89.83% Impervious Area

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

Subcatchment 7S: DA-7



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 8S: DA-8

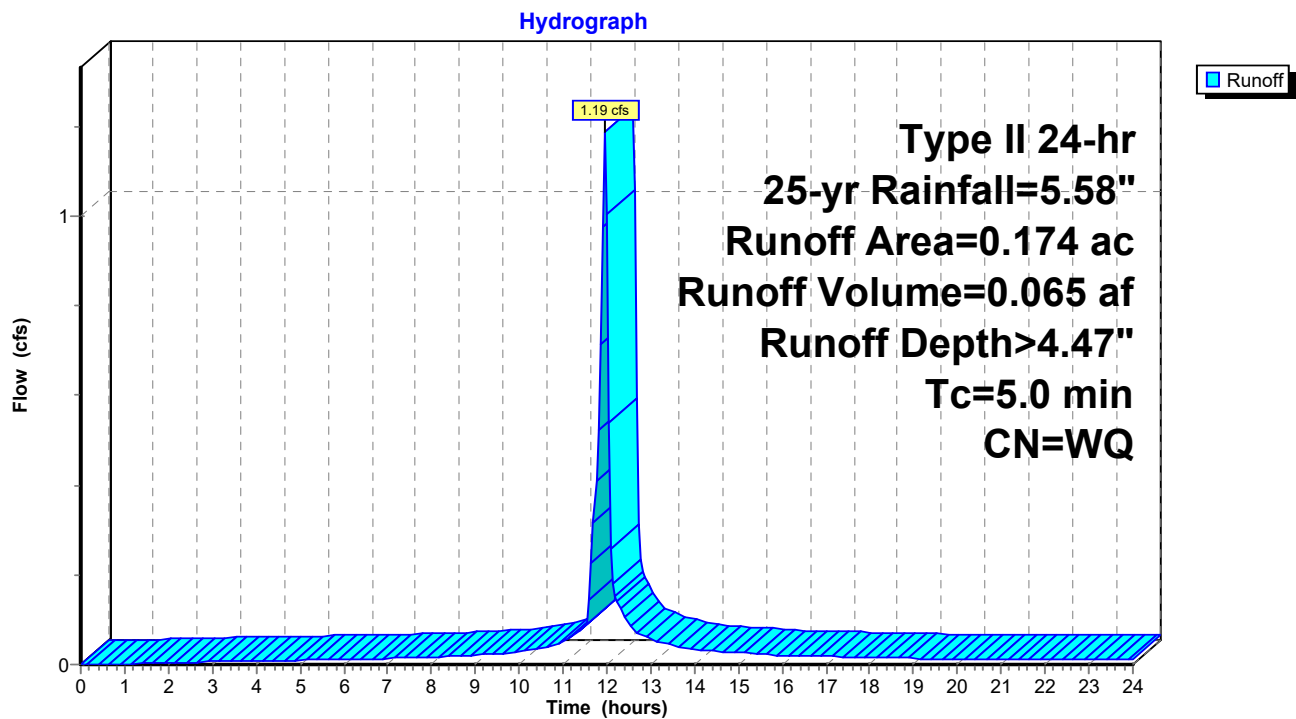
Runoff = 1.19 cfs @ 11.95 hrs, Volume= 0.065 af, Depth> 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.132	98	Paved roads w/curbs & sewers, HSG A
0.042	61	>75% Grass cover, Good, HSG B
0.174		Weighted Average
0.042		24.14% Pervious Area
0.132		75.86% Impervious Area

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

Subcatchment 8S: DA-8



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 9S: DA-9

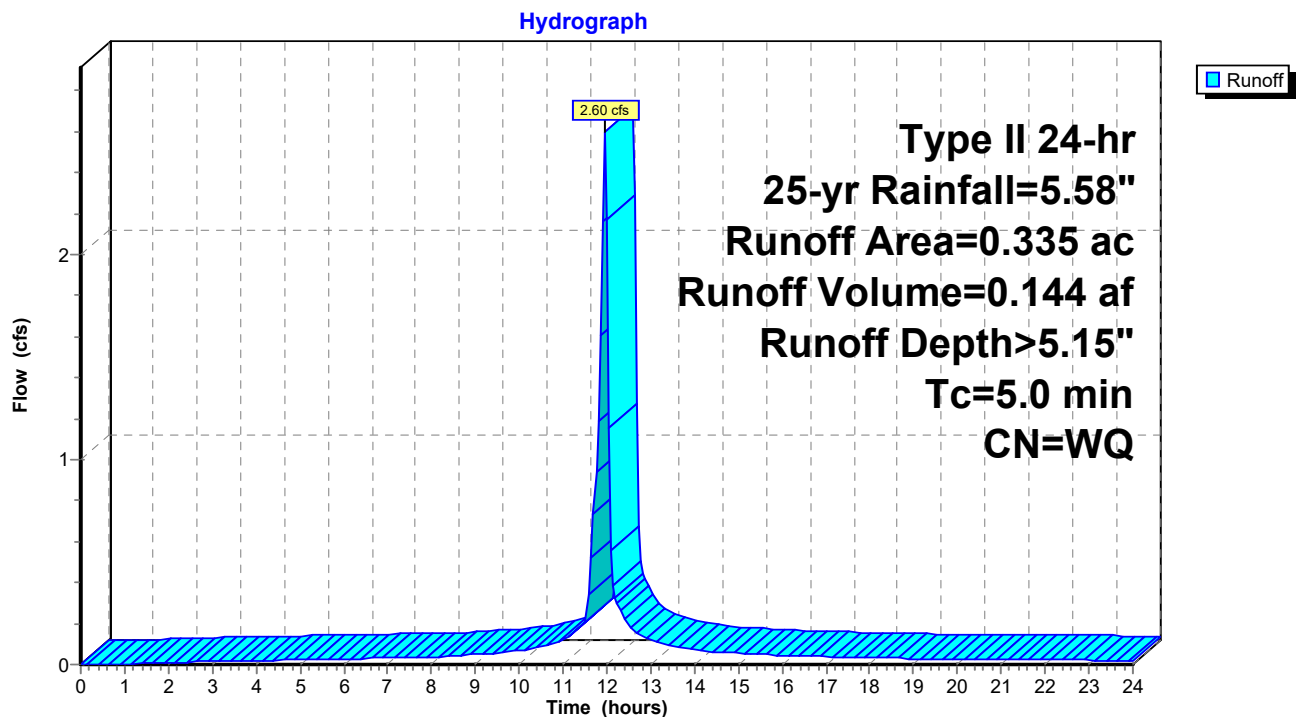
Runoff = 2.60 cfs @ 11.95 hrs, Volume= 0.144 af, Depth> 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.317	98	Paved roads w/curbs & sewers, HSG A
0.018	61	>75% Grass cover, Good, HSG B
0.335		Weighted Average
0.018		5.37% Pervious Area
0.317		94.63% Impervious Area

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

Subcatchment 9S: DA-9



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 10S: DA-10

Runoff = 18.30 cfs @ 12.01 hrs, Volume= 1.176 af, Depth> 5.33"

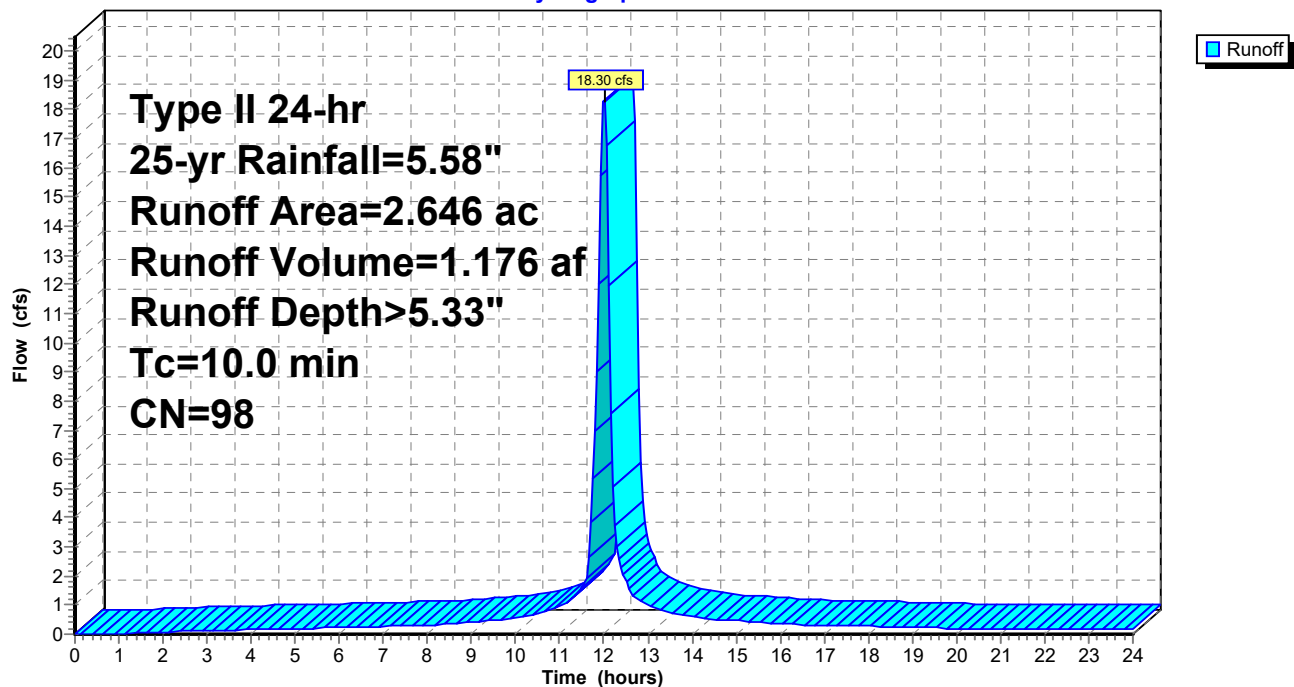
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
2.646	98	Roofs, HSG A
2.646		100.00% Impervious Area

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

Subcatchment 10S: DA-10

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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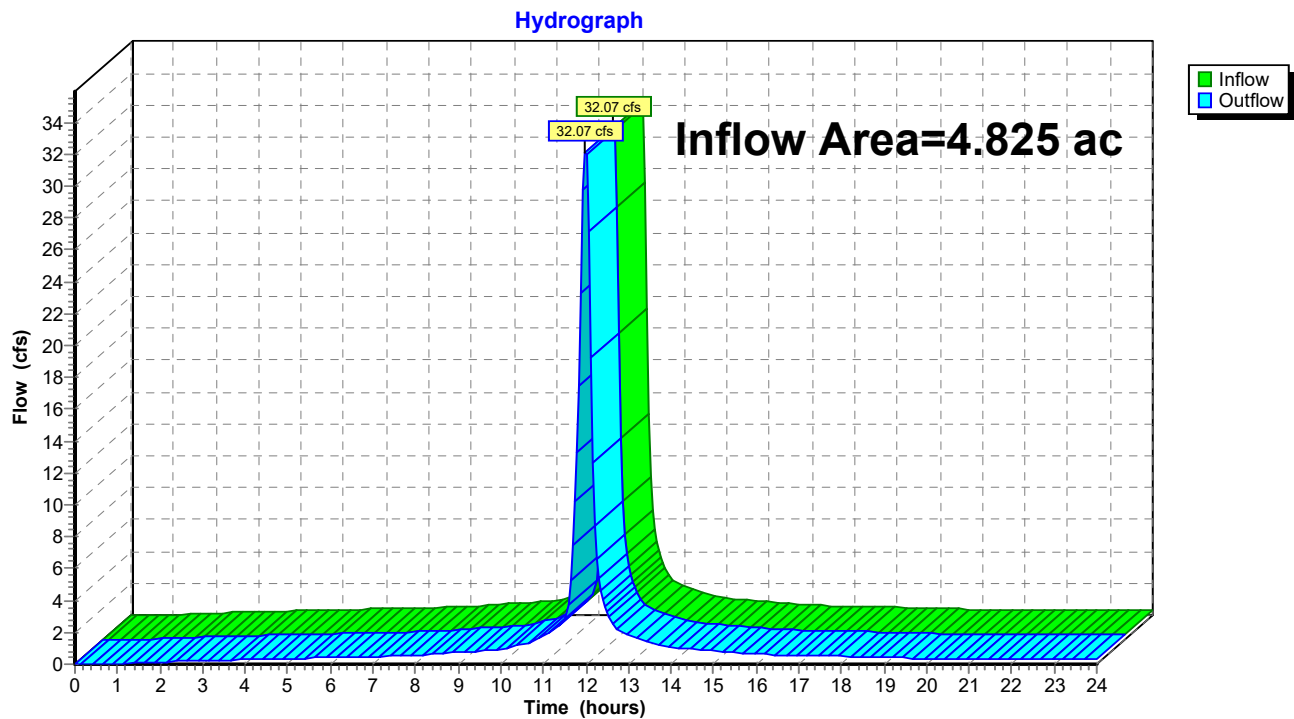
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Summary for Reach 1R: Existing Runoff

Inflow Area = 4.825 ac, 97.76% Impervious, Inflow Depth > 5.25" for 25-yr event
Inflow = 32.07 cfs @ 11.99 hrs, Volume= 2.113 af
Outflow = 32.07 cfs @ 11.99 hrs, Volume= 2.113 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 1R: Existing Runoff



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Type II 24-hr 100-yr Rainfall=7.57"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1	Runoff Area=0.479 ac 100.00% Impervious Runoff Depth>7.32" Flow Length=781' Slope=0.0030 '/' Tc=11.7 min CN=98 Runoff=4.27 cfs 0.292 af
Subcatchment2S: DA-2	Runoff Area=0.531 ac 100.00% Impervious Runoff Depth>7.32" Flow Length=781' Slope=0.0026 '/' Tc=12.6 min CN=98 Runoff=4.62 cfs 0.324 af
Subcatchment3S: DA-3	Runoff Area=0.074 ac 100.00% Impervious Runoff Depth>7.33" Tc=5.0 min CN=98 Runoff=0.81 cfs 0.045 af
Subcatchment4S: DA-4	Runoff Area=0.014 ac 100.00% Impervious Runoff Depth>7.33" Tc=5.0 min CN=98 Runoff=0.15 cfs 0.009 af
Subcatchment5S: DA-5	Runoff Area=0.084 ac 100.00% Impervious Runoff Depth>7.33" Tc=5.0 min CN=98 Runoff=0.92 cfs 0.051 af
Subcatchment6S: DA-6	Runoff Area=0.065 ac 92.31% Impervious Runoff Depth>7.00" Tc=5.0 min CN=WQ Runoff=0.68 cfs 0.038 af
Subcatchment7S: DA-7	Runoff Area=0.423 ac 89.83% Impervious Runoff Depth>6.90" Tc=5.0 min CN=WQ Runoff=4.39 cfs 0.243 af
Subcatchment8S: DA-8	Runoff Area=0.174 ac 75.86% Impervious Runoff Depth>6.31" Tc=5.0 min CN=WQ Runoff=1.68 cfs 0.091 af
Subcatchment9S: DA-9	Runoff Area=0.335 ac 94.63% Impervious Runoff Depth>7.10" Tc=5.0 min CN=WQ Runoff=3.56 cfs 0.198 af
Subcatchment10S: DA-10	Runoff Area=2.646 ac 100.00% Impervious Runoff Depth>7.32" Tc=10.0 min CN=98 Runoff=24.87 cfs 1.614 af
Reach 1R: Existing Runoff	Inflow=43.74 cfs 2.906 af Outflow=43.74 cfs 2.906 af

Total Runoff Area = 4.825 ac Runoff Volume = 2.906 af Average Runoff Depth = 7.23"
2.24% Pervious = 0.108 ac 97.76% Impervious = 4.717 ac

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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 1S: DA-1

Runoff = 4.27 cfs @ 12.03 hrs, Volume= 0.292 af, Depth> 7.32"

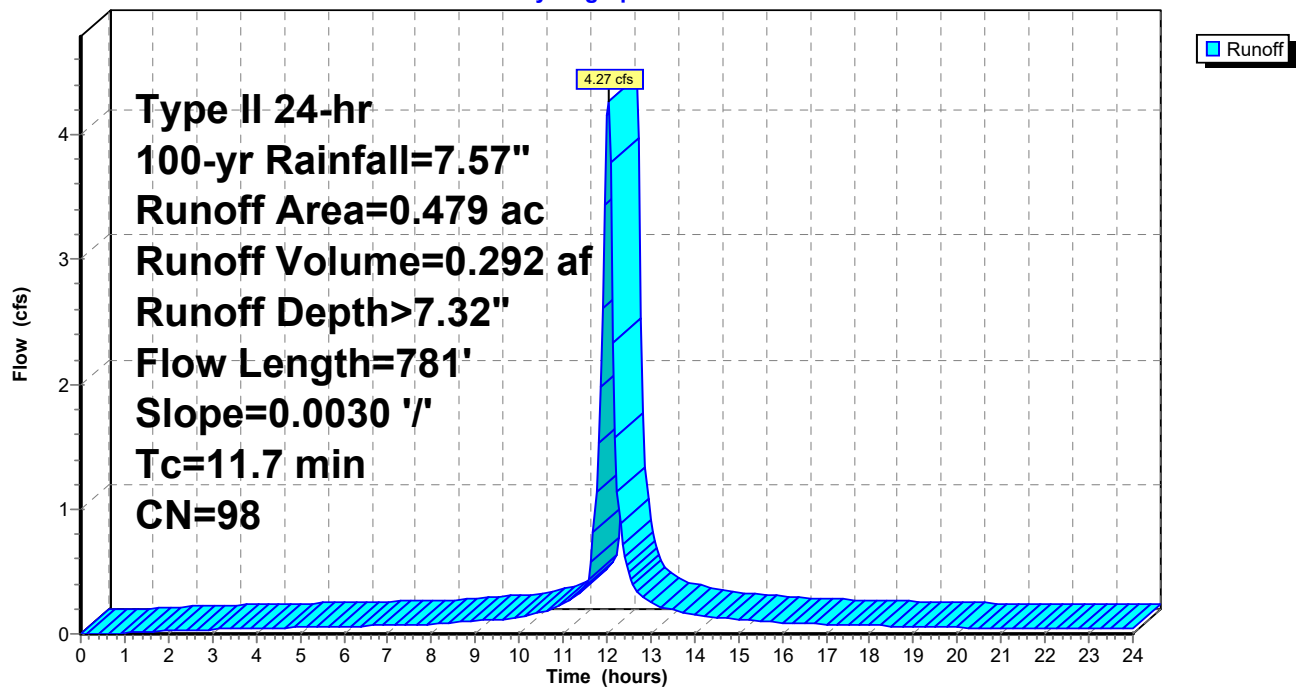
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.479	98	Paved roads w/curbs & sewers, HSG A
0.479		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	781	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 1S: DA-1

Hydrograph



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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 2S: DA-2

Runoff = 4.62 cfs @ 12.04 hrs, Volume= 0.324 af, Depth> 7.32"

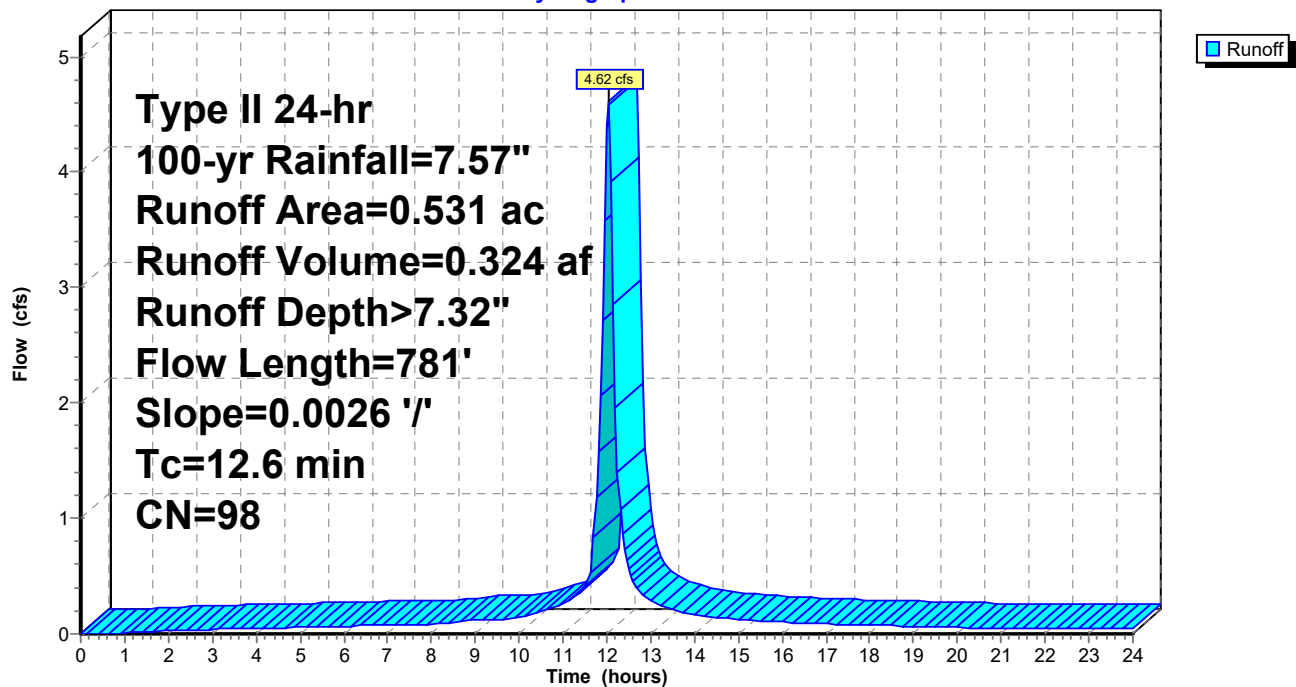
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.531	98	Paved roads w/curbs & sewers, HSG A
0.531		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	781	0.0026	1.04		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 2S: DA-2

Hydrograph



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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 3S: DA-3

Runoff = 0.81 cfs @ 11.95 hrs, Volume= 0.045 af, Depth> 7.33"

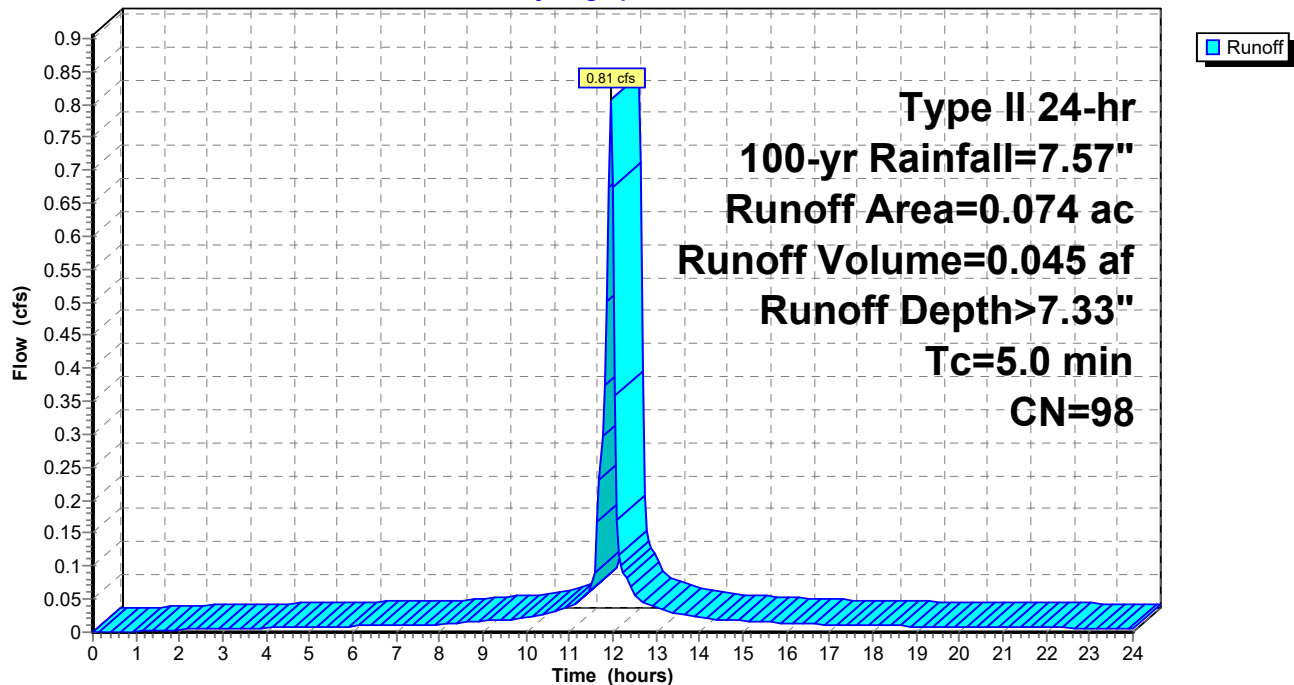
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.074	98	Paved parking, HSG A
0.074		100.00% Impervious Area

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

Subcatchment 3S: DA-3

Hydrograph



19990 Existing Watersheds

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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 4S: DA-4

Runoff = 0.15 cfs @ 11.95 hrs, Volume= 0.009 af, Depth> 7.33"

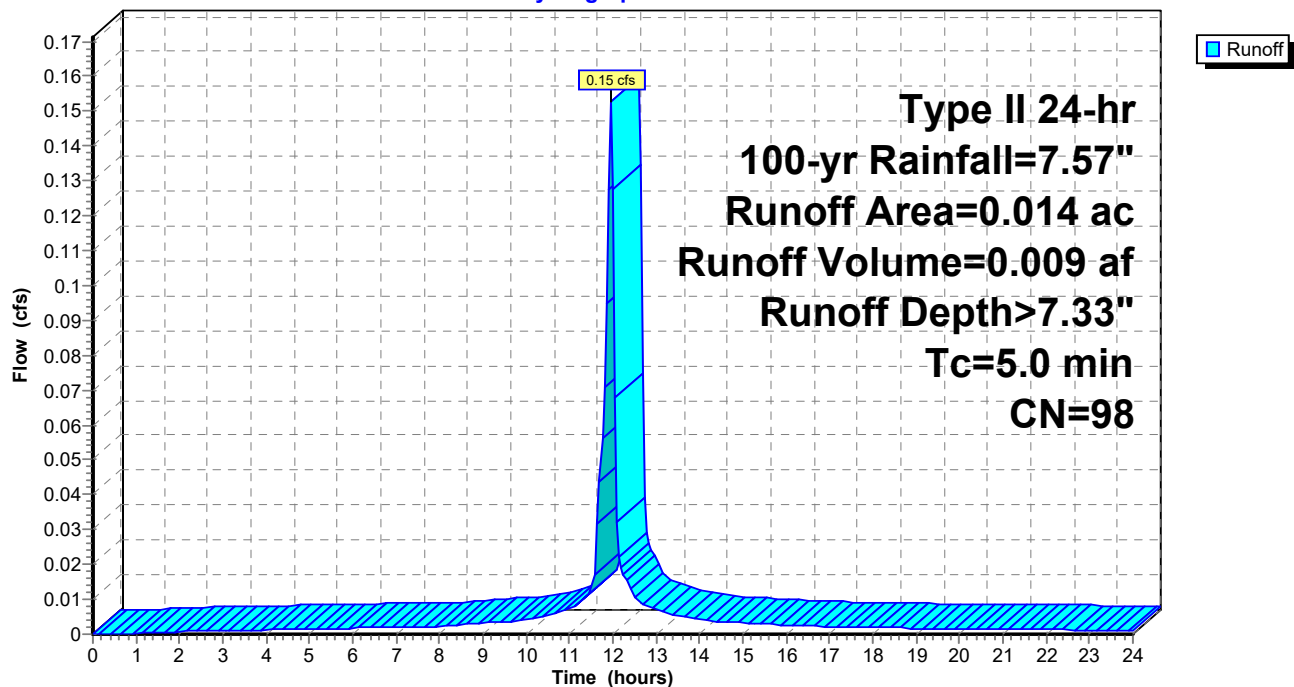
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.014	98	Paved parking, HSG A
0.014		100.00% Impervious Area

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

Subcatchment 4S: DA-4

Hydrograph



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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 5S: DA-5

Runoff = 0.92 cfs @ 11.95 hrs, Volume= 0.051 af, Depth> 7.33"

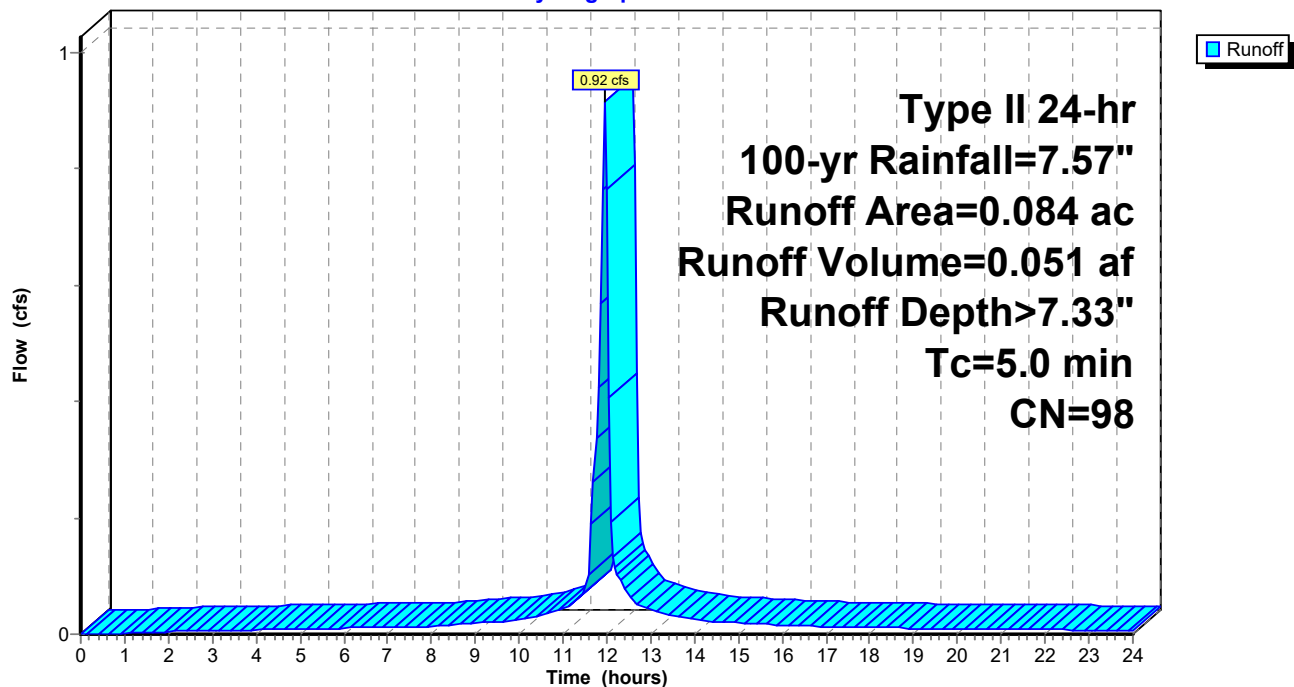
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.084	98	Paved parking, HSG A
0.084		100.00% Impervious Area

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

Subcatchment 5S: DA-5

Hydrograph



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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 6S: DA-6

Runoff = 0.68 cfs @ 11.95 hrs, Volume= 0.038 af, Depth> 7.00"

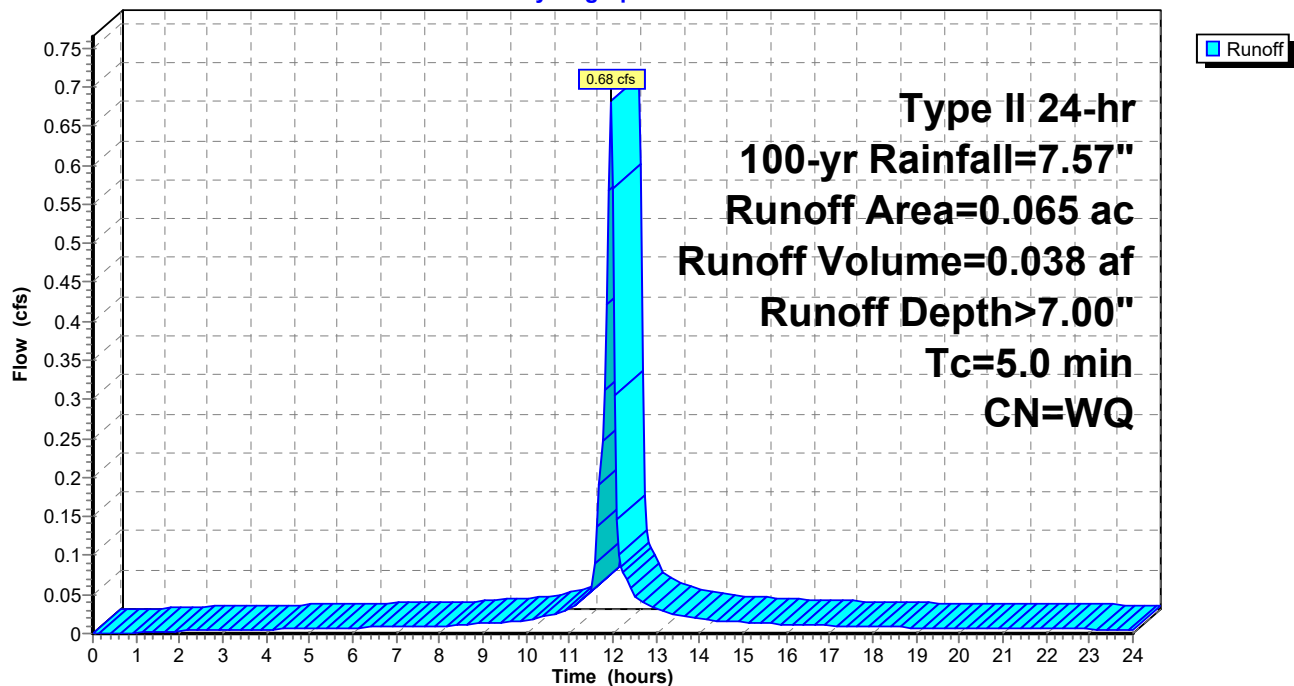
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.060	98	Paved roads w/curbs & sewers, HSG A
0.005	61	>75% Grass cover, Good, HSG B
0.065		Weighted Average
0.005		7.69% Pervious Area
0.060		92.31% Impervious Area

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

Subcatchment 6S: DA-6

Hydrograph



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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 7S: DA-7

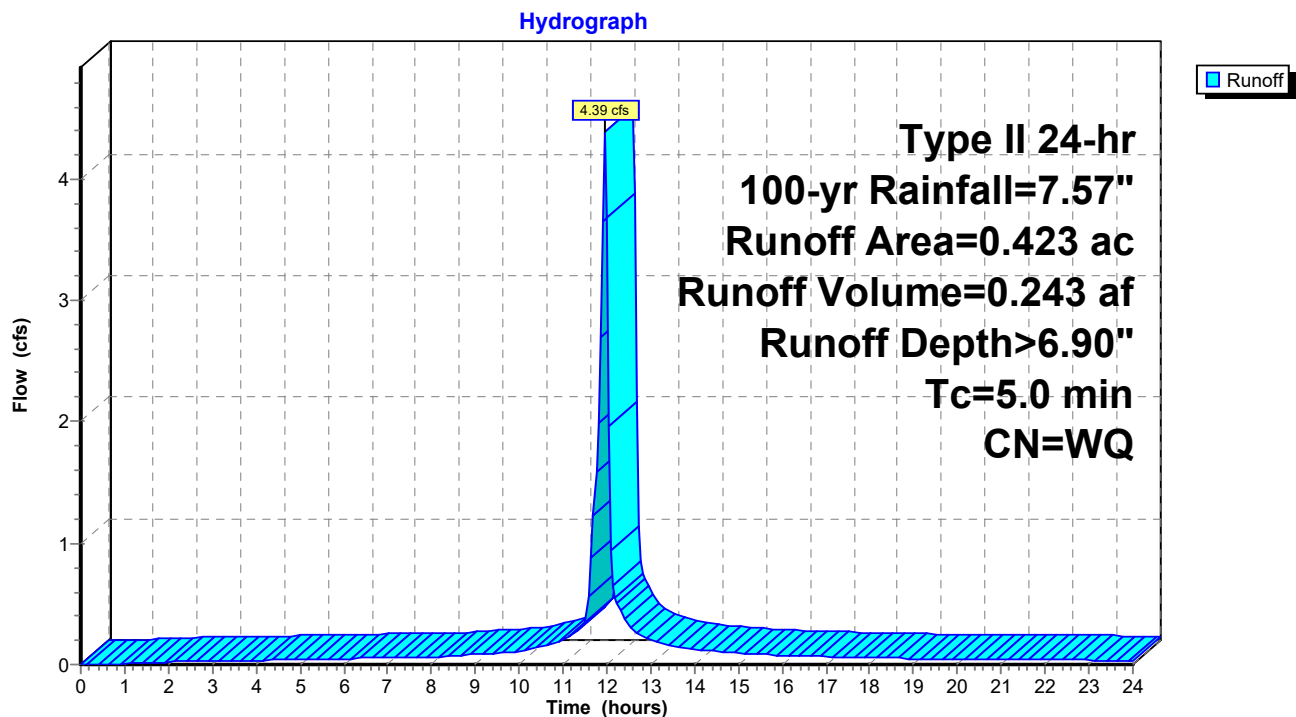
Runoff = 4.39 cfs @ 11.95 hrs, Volume= 0.243 af, Depth> 6.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.380	98	Paved roads w/curbs & sewers, HSG A
0.043	61	>75% Grass cover, Good, HSG B
0.423		Weighted Average
0.043		10.17% Pervious Area
0.380		89.83% Impervious Area

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

Subcatchment 7S: DA-7



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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 8S: DA-8

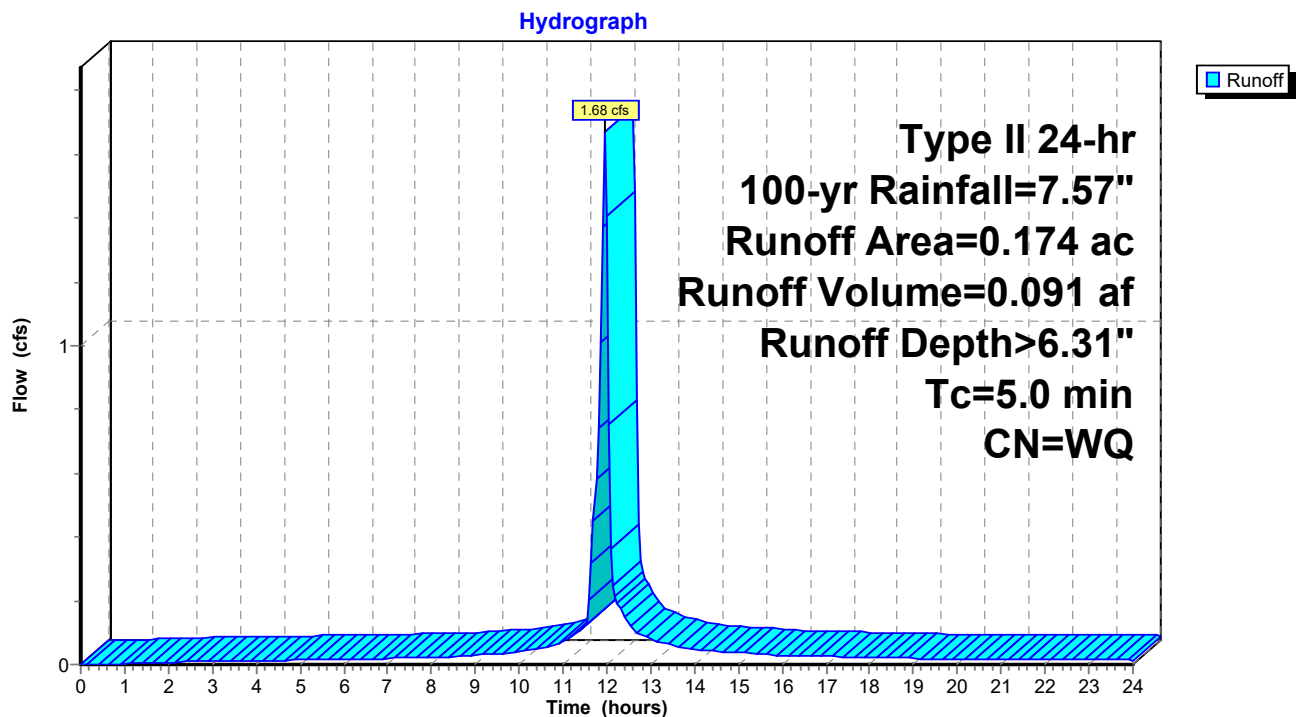
Runoff = 1.68 cfs @ 11.95 hrs, Volume= 0.091 af, Depth> 6.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.132	98	Paved roads w/curbs & sewers, HSG A
0.042	61	>75% Grass cover, Good, HSG B
0.174		Weighted Average
0.042		24.14% Pervious Area
0.132		75.86% Impervious Area

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

Subcatchment 8S: DA-8



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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 9S: DA-9

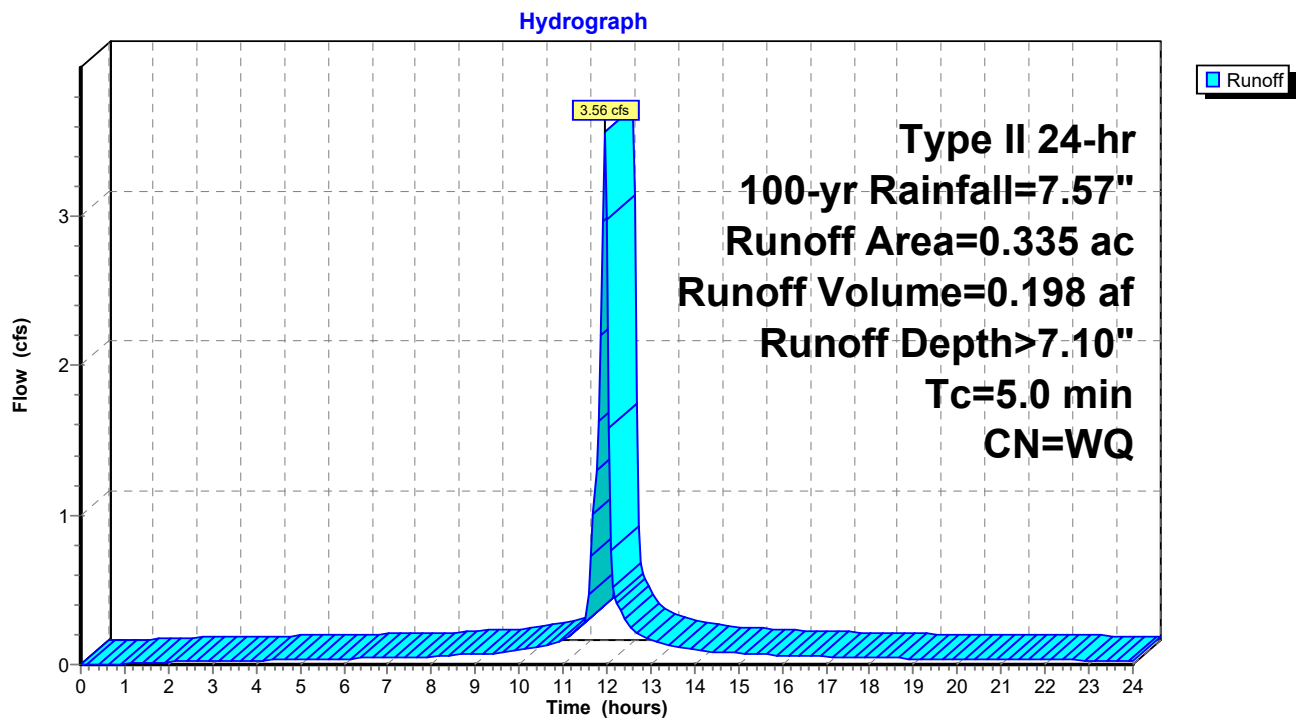
Runoff = 3.56 cfs @ 11.95 hrs, Volume= 0.198 af, Depth> 7.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.317	98	Paved roads w/curbs & sewers, HSG A
0.018	61	>75% Grass cover, Good, HSG B
0.335		Weighted Average
0.018		5.37% Pervious Area
0.317		94.63% Impervious Area

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

Subcatchment 9S: DA-9



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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 10S: DA-10

Runoff = 24.87 cfs @ 12.01 hrs, Volume= 1.614 af, Depth> 7.32"

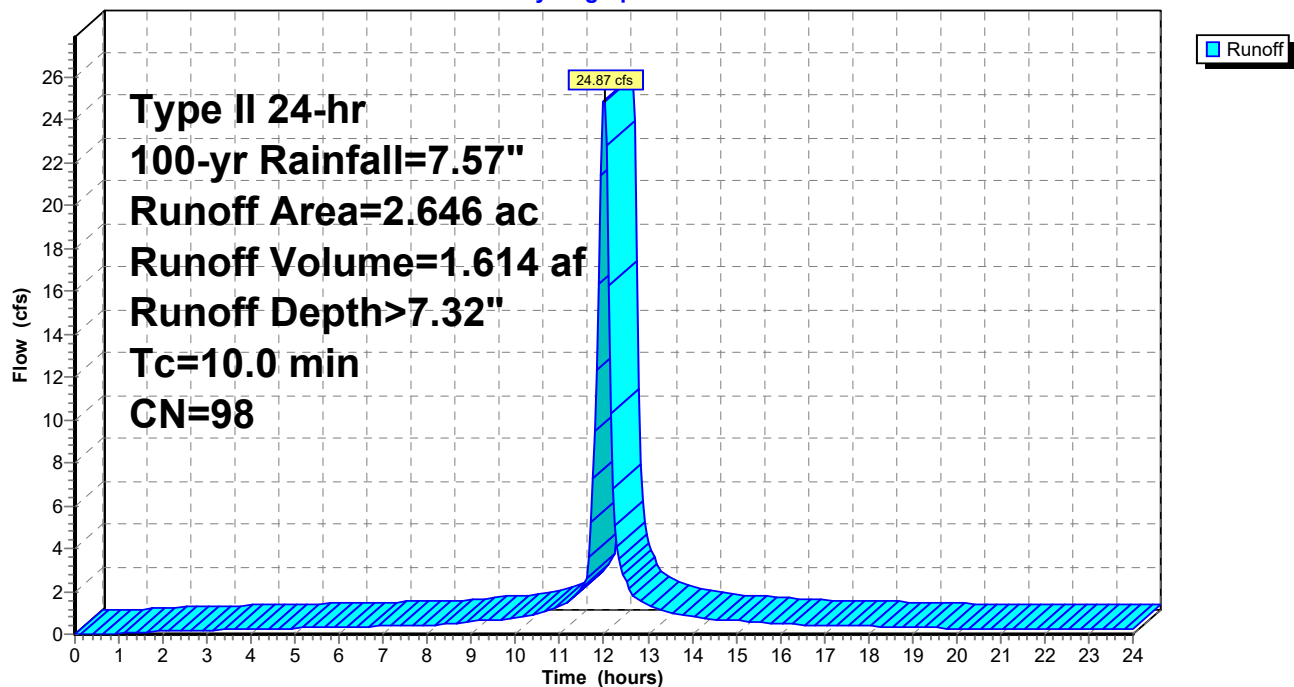
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
2.646	98	Roofs, HSG A
2.646		100.00% Impervious Area

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

Subcatchment 10S: DA-10

Hydrograph



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Type II 24-hr 100-yr Rainfall=7.57"

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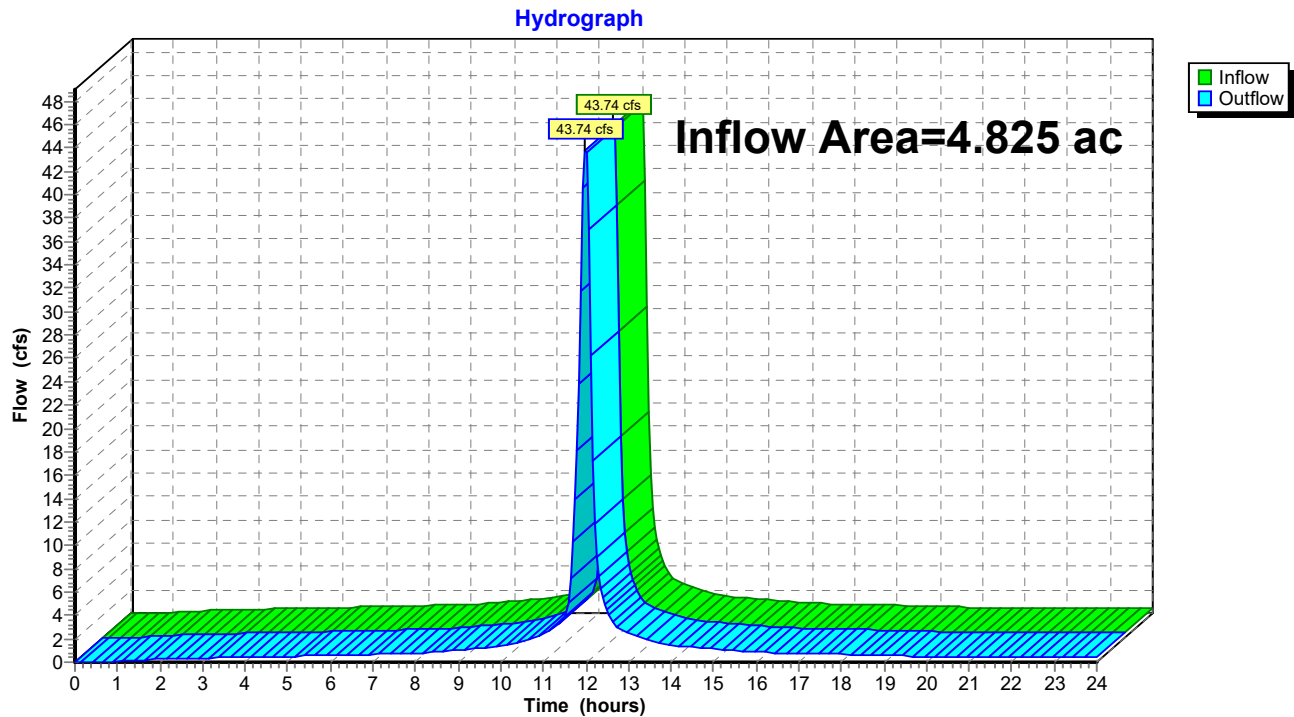
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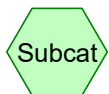
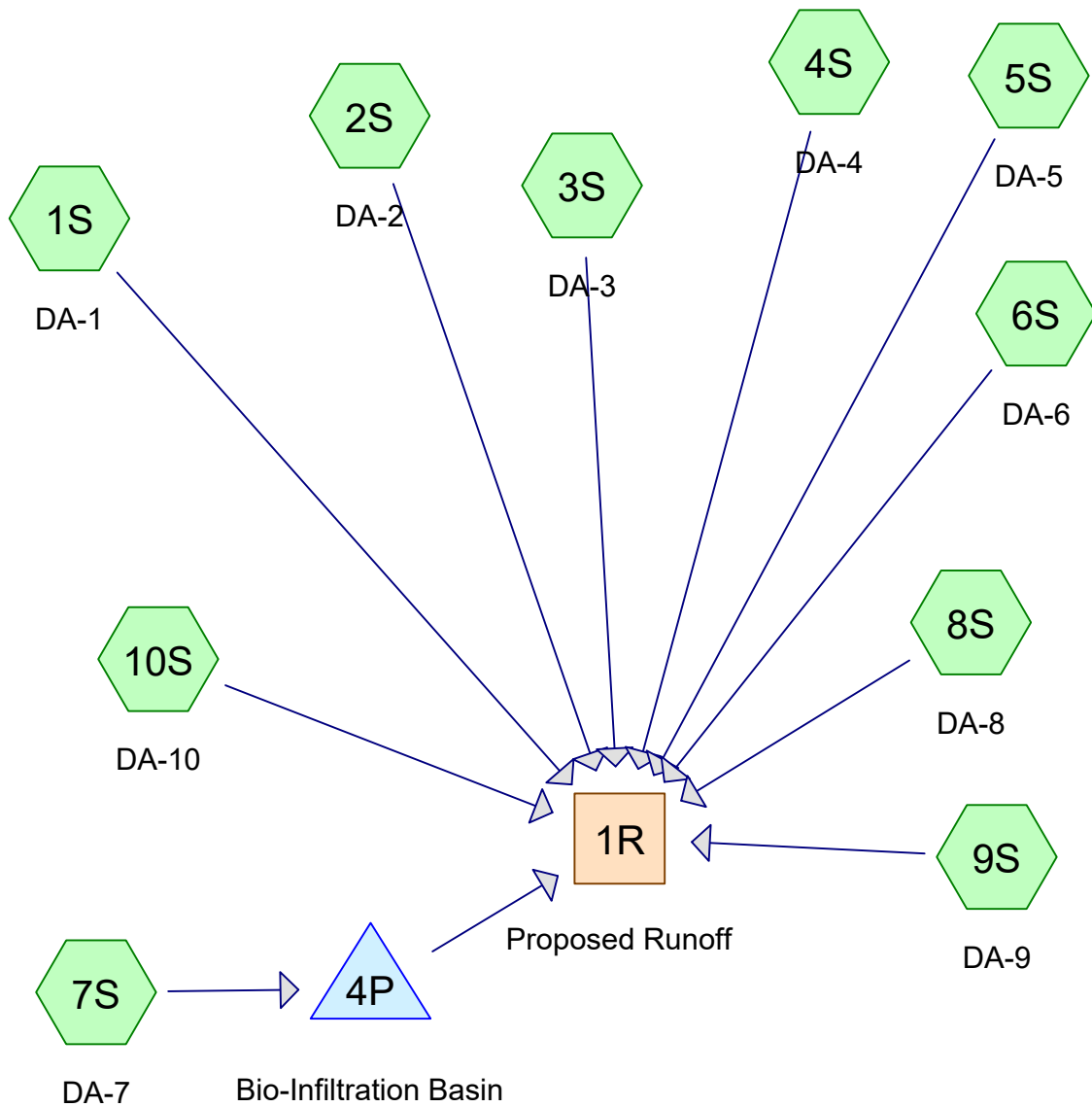
Summary for Reach 1R: Existing Runoff

Inflow Area = 4.825 ac, 97.76% Impervious, Inflow Depth > 7.23" for 100-yr event
Inflow = 43.74 cfs @ 11.99 hrs, Volume= 2.906 af
Outflow = 43.74 cfs @ 11.99 hrs, Volume= 2.906 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 1R: Existing Runoff

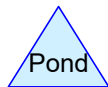




Subcat



Reach



Pond



Link

Routing Diagram for 19990 Proposed Watersheds

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19990 Proposed Watersheds

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.199	61	>75% Grass cover, Good, HSG B (1S, 2S, 5S, 7S, 8S, 9S)
0.091	98	Paved parking, HSG A (3S, 4S, 5S)
1.242	98	Paved roads w/curbs & sewers, HSG A (1S, 2S, 7S, 8S, 9S)
3.294	98	Roofs, HSG A (6S, 10S)
4.826	96	TOTAL AREA

19990 Proposed Watersheds

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
4.627	HSG A	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S
0.199	HSG B	1S, 2S, 5S, 7S, 8S, 9S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
4.826		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.199	0.000	0.000	0.000	0.199	>75% Grass cover, Good	1S, 2S, 5S, 7S, 8S, 9S
0.091	0.000	0.000	0.000	0.000	0.091	Paved parking	3S, 4S, 5S
1.242	0.000	0.000	0.000	0.000	1.242	Paved roads w/curbs & sewers	1S, 2S, 7S, 8S, 9S
3.294	0.000	0.000	0.000	0.000	3.294	Roofs	6S, 10 S
4.627	0.199	0.000	0.000	0.000	4.826	TOTAL AREA	

19990 Proposed Watersheds

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Type II 24-hr 2-yr Rainfall=3.02"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=0.327 ac 94.50% Impervious Runoff Depth>2.65"
Flow Length=781' Slope=0.0030 '/' Tc=11.7 min CN=WQ Runoff=1.09 cfs 0.072 af

Subcatchment2S: DA-2 Runoff Area=0.359 ac 95.26% Impervious Runoff Depth>2.67"
Flow Length=781' Slope=0.0026 '/' Tc=12.6 min CN=WQ Runoff=1.18 cfs 0.080 af

Subcatchment3S: DA-3 Runoff Area=0.065 ac 100.00% Impervious Runoff Depth>2.79"
Tc=5.0 min CN=98 Runoff=0.28 cfs 0.015 af

Subcatchment4S: DA-4 Runoff Area=0.012 ac 100.00% Impervious Runoff Depth>2.79"
Tc=5.0 min CN=98 Runoff=0.05 cfs 0.003 af

Subcatchment5S: DA-5 Runoff Area=0.039 ac 35.90% Impervious Runoff Depth>1.24"
Tc=5.0 min CN=WQ Runoff=0.07 cfs 0.004 af

Subcatchment6S: DA-6 Runoff Area=0.688 ac 100.00% Impervious Runoff Depth>2.78"
Tc=10.0 min CN=98 Runoff=2.55 cfs 0.160 af

Subcatchment7S: DA-7 Runoff Area=0.179 ac 82.12% Impervious Runoff Depth>2.35"
Tc=5.0 min CN=WQ Runoff=0.65 cfs 0.035 af

Subcatchment8S: DA-8 Runoff Area=0.249 ac 67.87% Impervious Runoff Depth>2.01"
Tc=5.0 min CN=WQ Runoff=0.76 cfs 0.042 af

Subcatchment9S: DA-9 Runoff Area=0.302 ac 91.06% Impervious Runoff Depth>2.57"
Tc=5.0 min CN=WQ Runoff=1.20 cfs 0.065 af

Subcatchment10S: DA-10 Runoff Area=2.606 ac 100.00% Impervious Runoff Depth>2.78"
Tc=10.0 min CN=98 Runoff=9.66 cfs 0.605 af

Reach 1R: Proposed Runoff Inflow=16.94 cfs 1.072 af
Outflow=16.94 cfs 1.072 af

Pond 4P: Bio-Infiltration Basin Peak Elev=644.65' Storage=153 cf Inflow=0.65 cfs 0.035 af
Discarded=0.00 cfs 0.006 af Primary=0.62 cfs 0.027 af Outflow=0.62 cfs 0.033 af

Total Runoff Area = 4.826 ac Runoff Volume = 1.080 af Average Runoff Depth = 2.68"
4.12% Pervious = 0.199 ac 95.88% Impervious = 4.627 ac

19990 Proposed Watersheds

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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 1S: DA-1

Runoff = 1.09 cfs @ 12.03 hrs, Volume= 0.072 af, Depth> 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

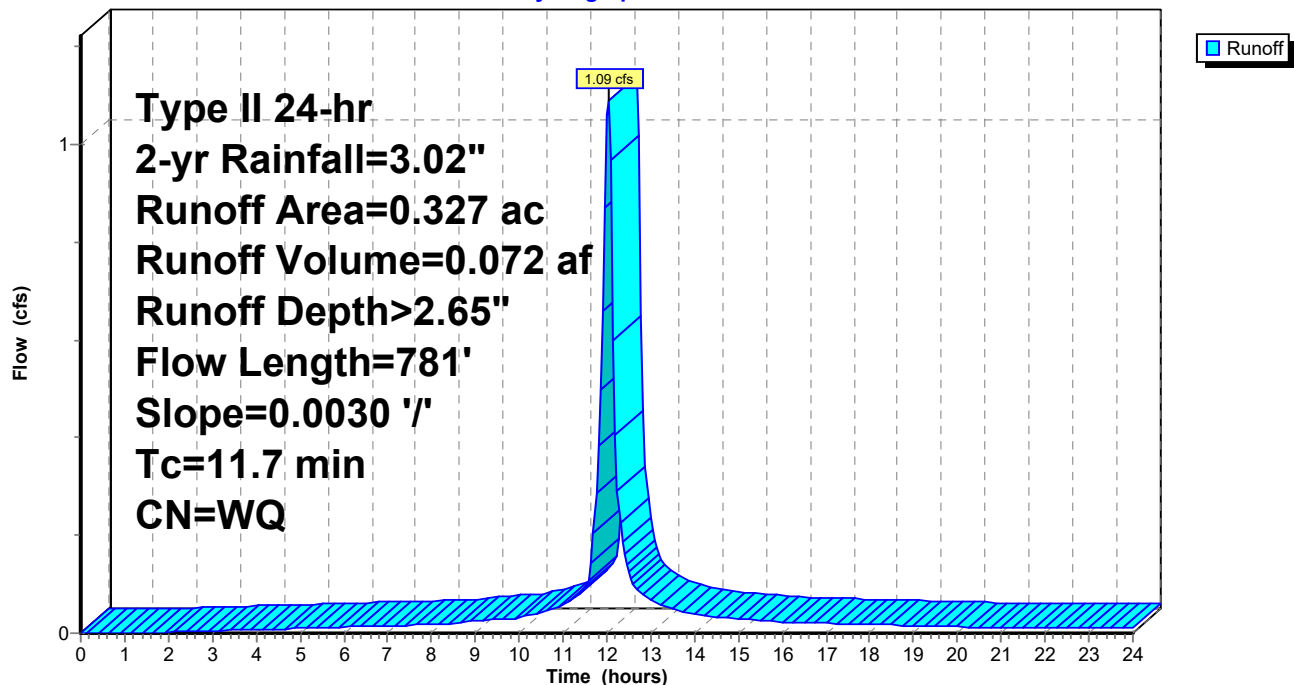
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.309	98	Paved roads w/curbs & sewers, HSG A
0.018	61	>75% Grass cover, Good, HSG B
0.327		Weighted Average
0.018		5.50% Pervious Area
0.309		94.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	781	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 1S: DA-1

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 2S: DA-2

Runoff = 1.18 cfs @ 12.04 hrs, Volume= 0.080 af, Depth> 2.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

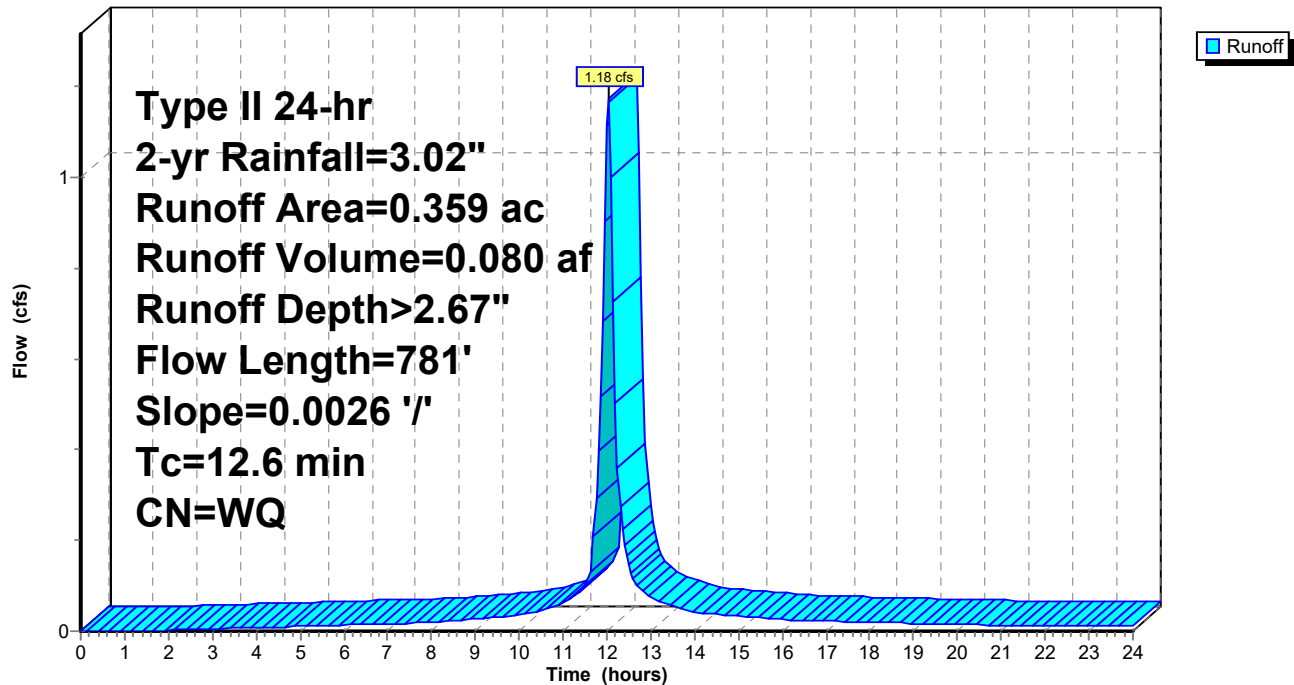
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.342	98	Paved roads w/curbs & sewers, HSG A
0.017	61	>75% Grass cover, Good, HSG B
0.359		Weighted Average
0.017		4.74% Pervious Area
0.342		95.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	781	0.0026	1.04		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 2S: DA-2

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 3S: DA-3

Runoff = 0.28 cfs @ 11.95 hrs, Volume= 0.015 af, Depth> 2.79"

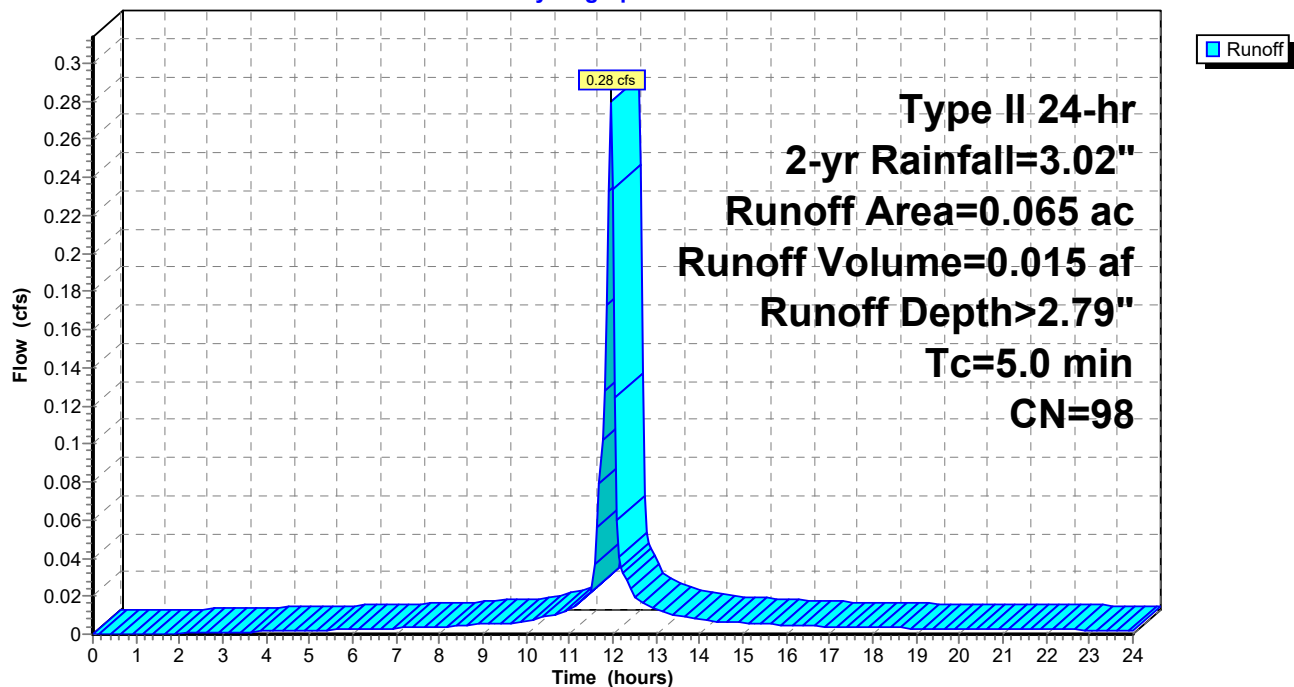
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.065	98	Paved parking, HSG A
0.065		100.00% Impervious Area

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

Subcatchment 3S: DA-3

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 4S: DA-4

Runoff = 0.05 cfs @ 11.95 hrs, Volume= 0.003 af, Depth> 2.79"

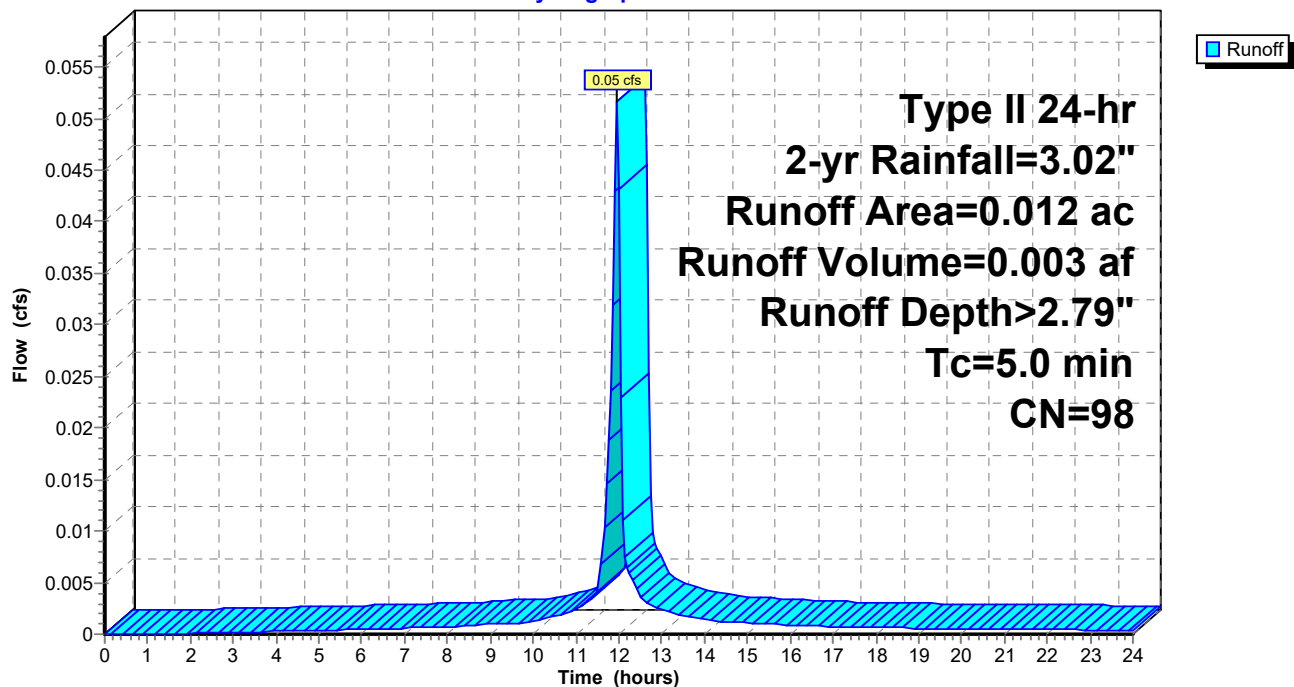
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.012	98	Paved parking, HSG A
0.012		100.00% Impervious Area

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

Subcatchment 4S: DA-4

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 5S: DA-5

Runoff = 0.07 cfs @ 11.96 hrs, Volume= 0.004 af, Depth> 1.24"

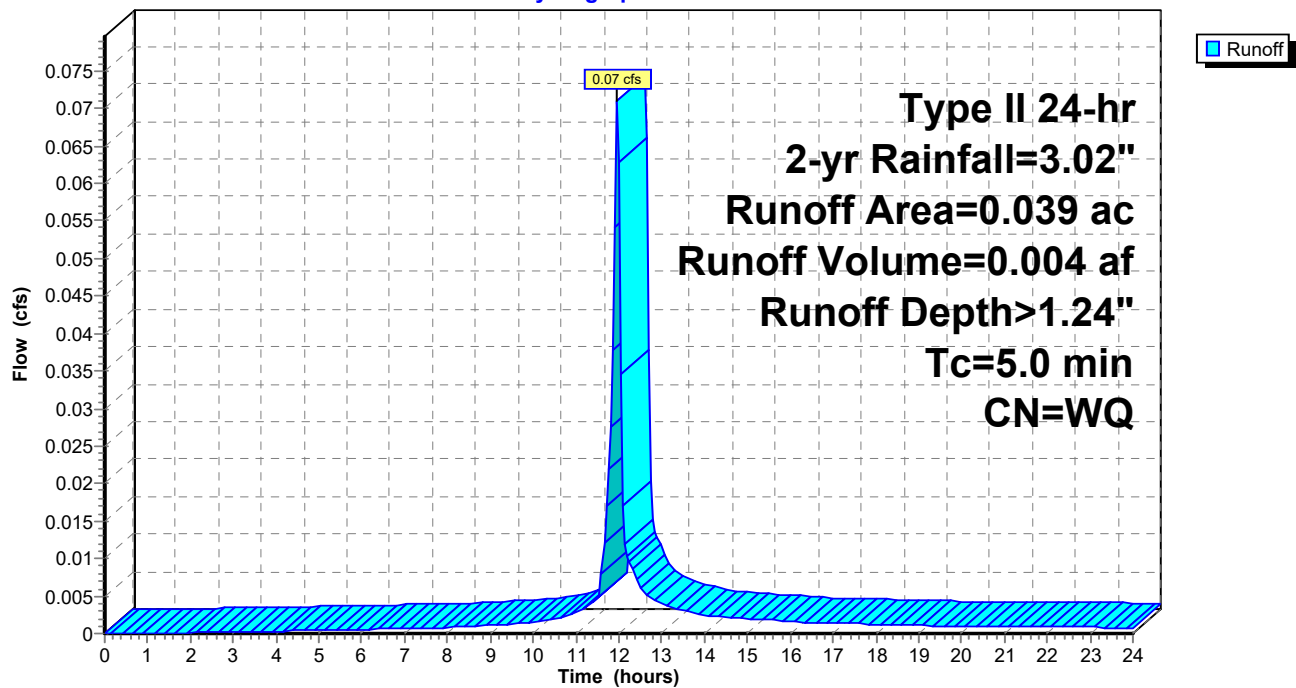
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.014	98	Paved parking, HSG A
0.025	61	>75% Grass cover, Good, HSG B
0.039		Weighted Average
0.025		64.10% Pervious Area
0.014		35.90% Impervious Area

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

Subcatchment 5S: DA-5

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 6S: DA-6

Runoff = 2.55 cfs @ 12.01 hrs, Volume= 0.160 af, Depth> 2.78"

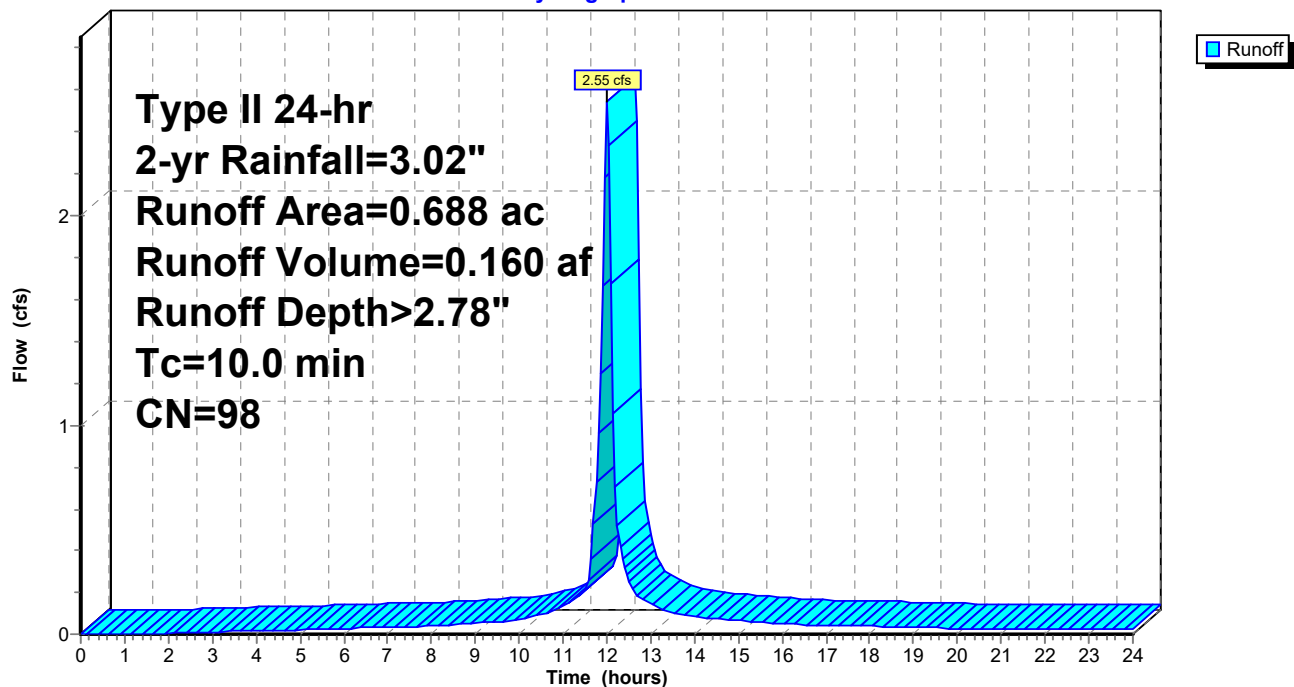
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.688	98	Roofs, HSG A
0.688		100.00% Impervious Area

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

Subcatchment 6S: DA-6

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 7S: DA-7

Runoff = 0.65 cfs @ 11.95 hrs, Volume= 0.035 af, Depth> 2.35"

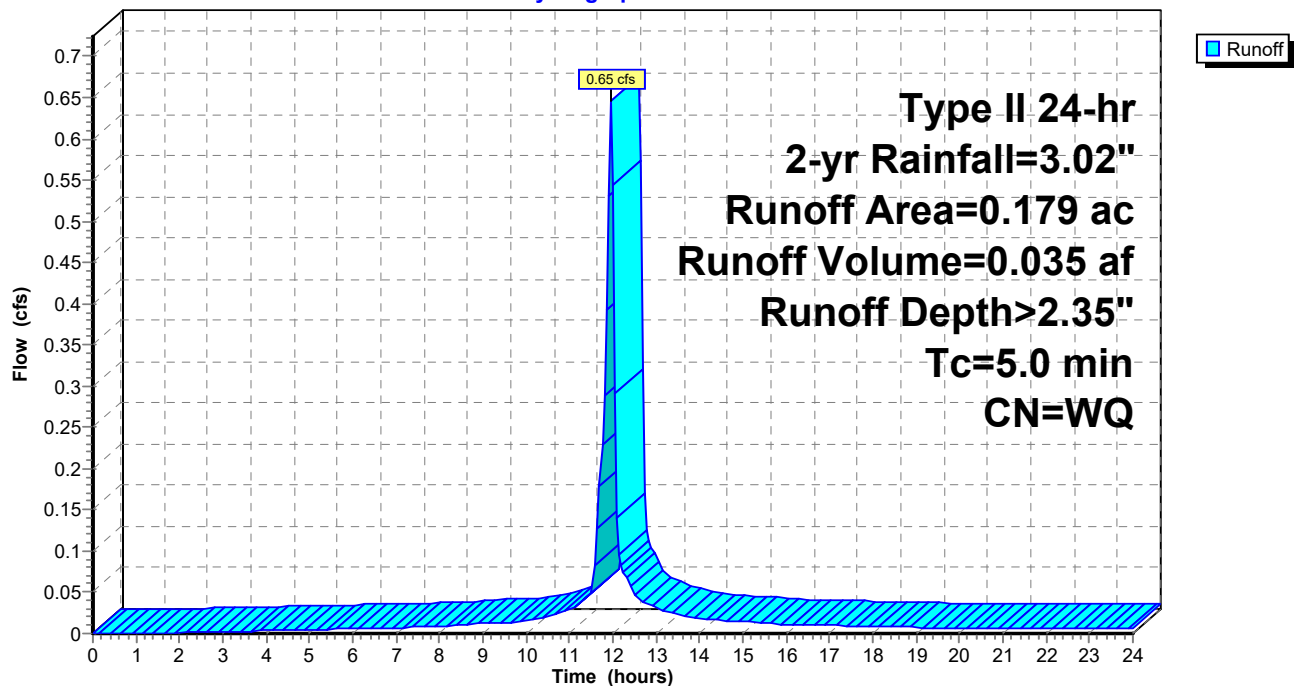
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.147	98	Paved roads w/curbs & sewers, HSG A
0.032	61	>75% Grass cover, Good, HSG B
0.179		Weighted Average
0.032		17.88% Pervious Area
0.147		82.12% Impervious Area

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

Subcatchment 7S: DA-7

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 8S: DA-8

Runoff = 0.76 cfs @ 11.95 hrs, Volume= 0.042 af, Depth> 2.01"

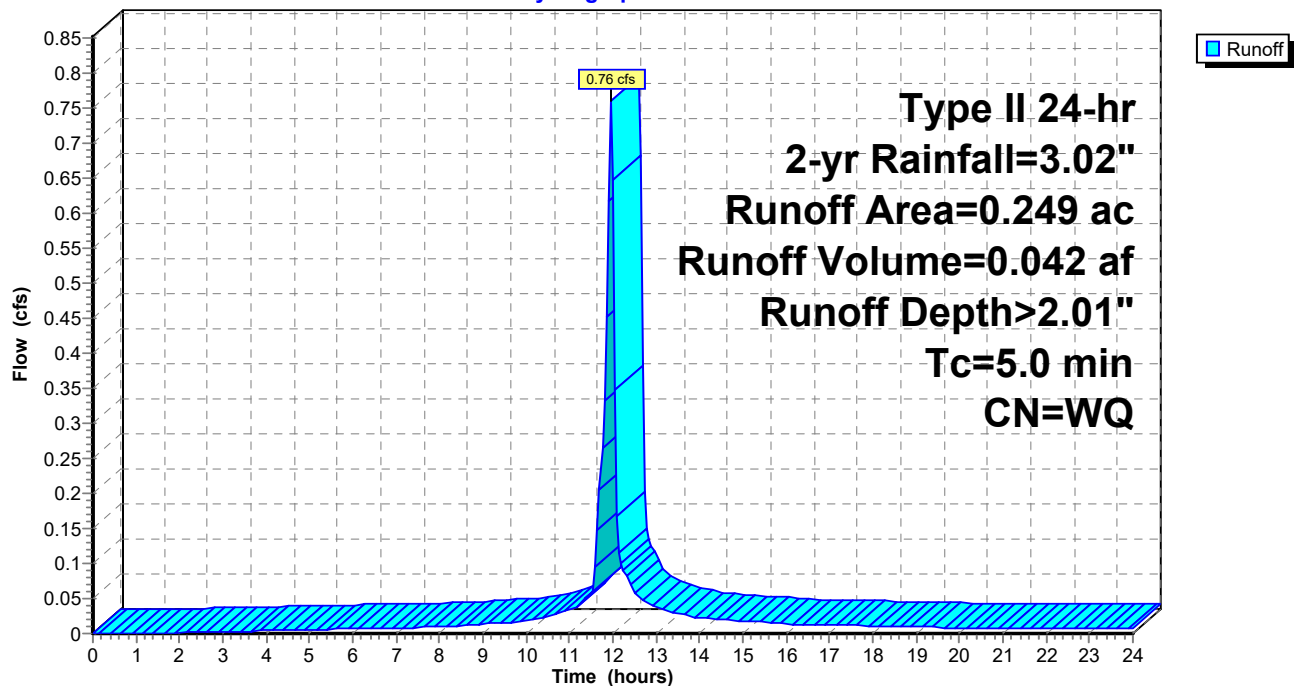
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.169	98	Paved roads w/curbs & sewers, HSG A
0.080	61	>75% Grass cover, Good, HSG B
0.249		Weighted Average
0.080		32.13% Pervious Area
0.169		67.87% Impervious Area

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

Subcatchment 8S: DA-8

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 9S: DA-9

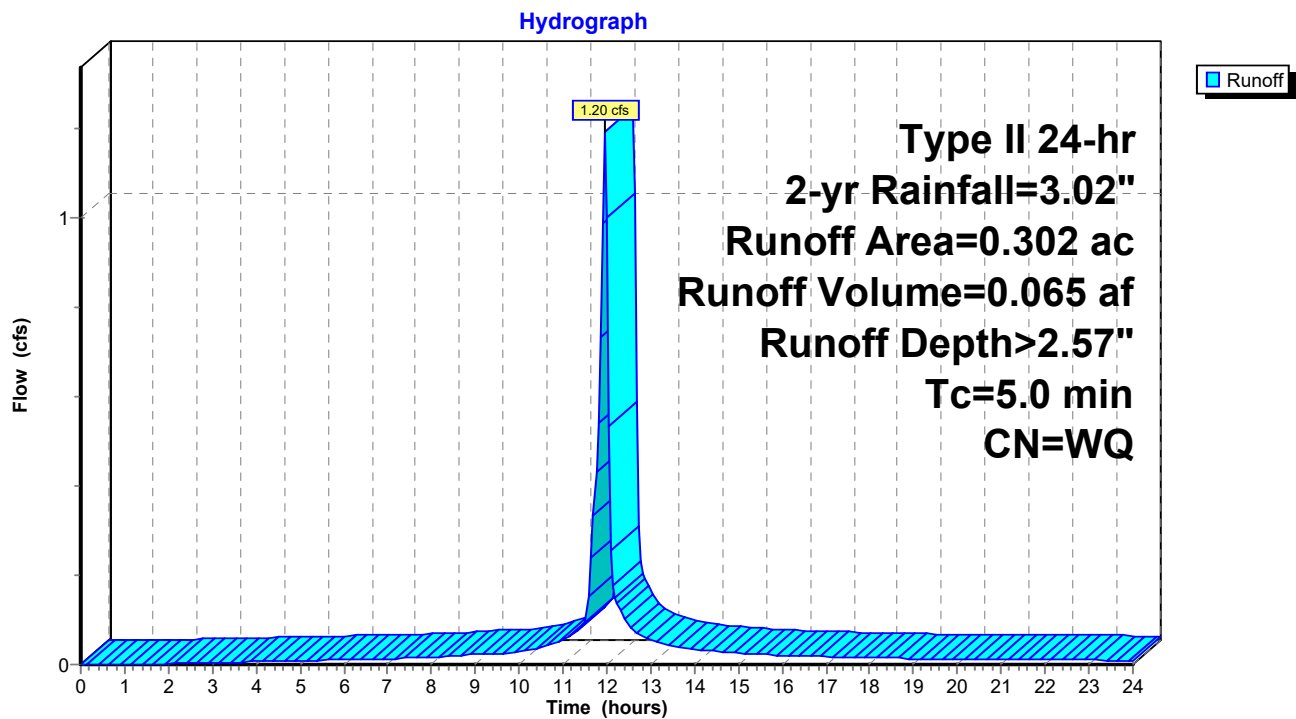
Runoff = 1.20 cfs @ 11.95 hrs, Volume= 0.065 af, Depth> 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
0.275	98	Paved roads w/curbs & sewers, HSG A
0.027	61	>75% Grass cover, Good, HSG B
0.302		Weighted Average
0.027		8.94% Pervious Area
0.275		91.06% Impervious Area

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

Subcatchment 9S: DA-9



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Subcatchment 10S: DA-10

Runoff = 9.66 cfs @ 12.01 hrs, Volume= 0.605 af, Depth> 2.78"

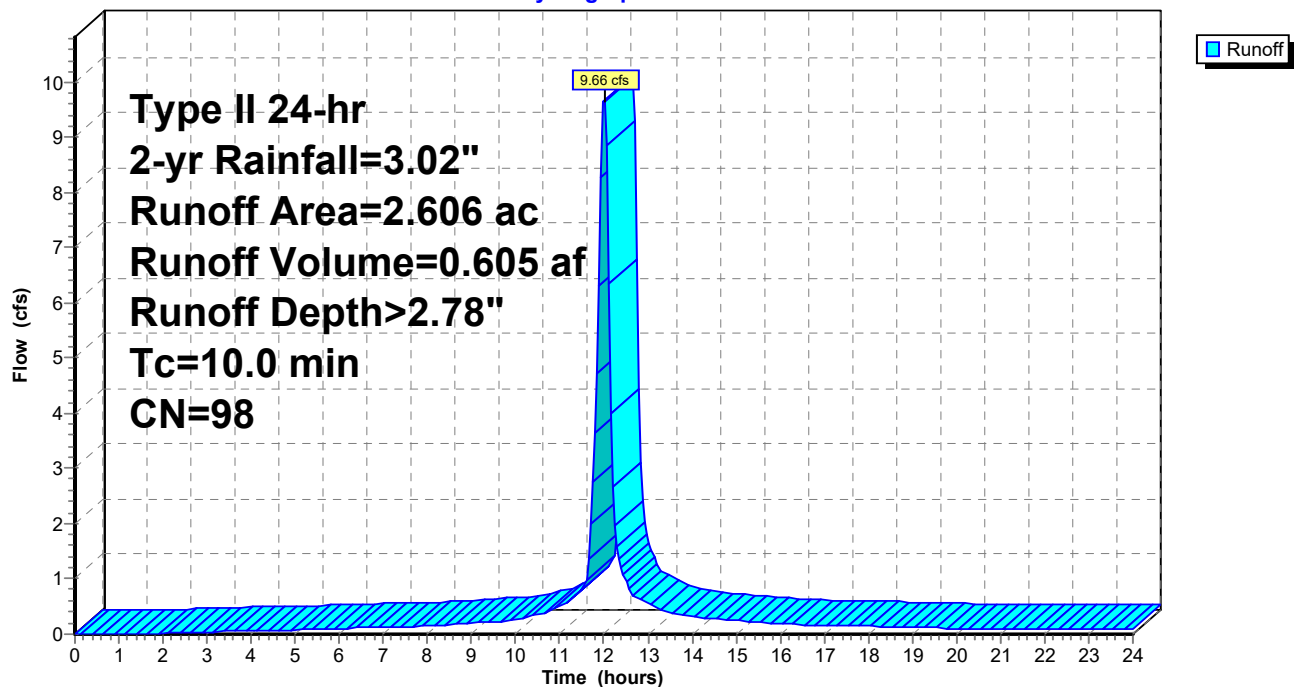
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.02"

Area (ac)	CN	Description
2.606	98	Roofs, HSG A
2.606		100.00% Impervious Area

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

Subcatchment 10S: DA-10

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.02"

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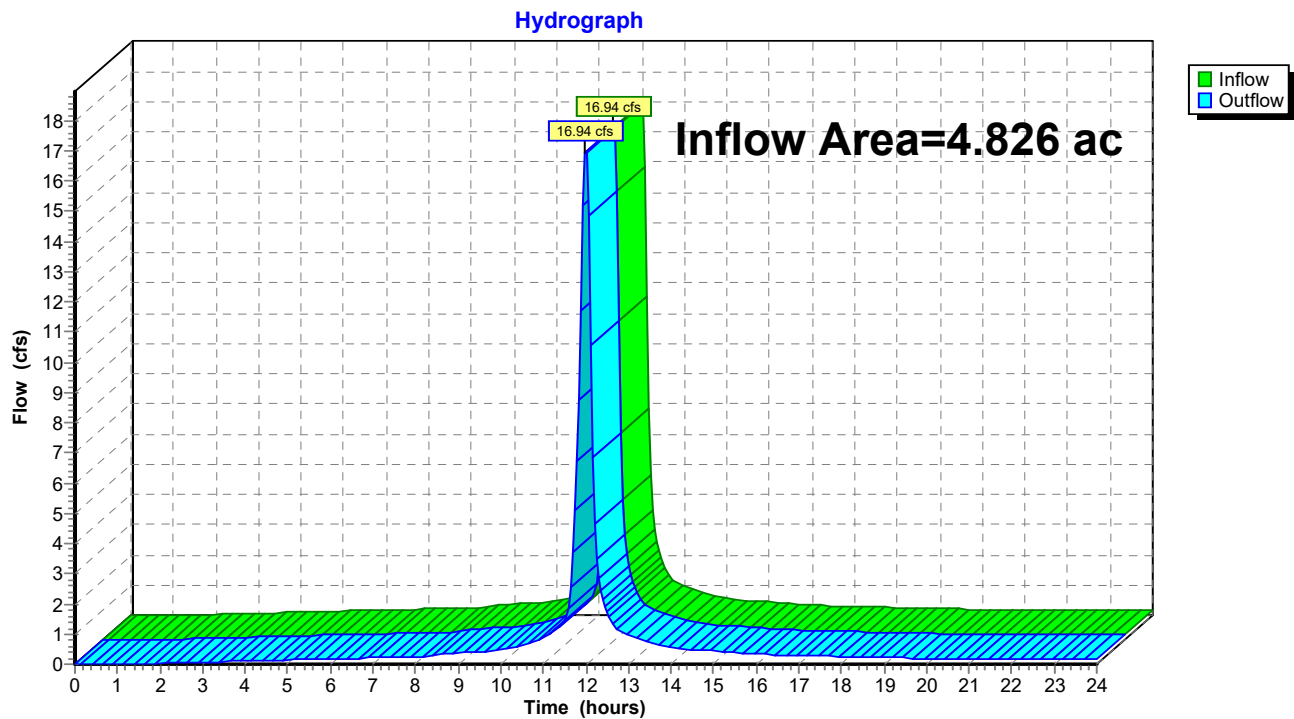
Page 16

Summary for Reach 1R: Proposed Runoff

Inflow Area = 4.826 ac, 95.88% Impervious, Inflow Depth > 2.66" for 2-yr event
Inflow = 16.94 cfs @ 12.00 hrs, Volume= 1.072 af
Outflow = 16.94 cfs @ 12.00 hrs, Volume= 1.072 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 1R: Proposed Runoff



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Type II 24-hr 2-yr Rainfall=3.02"

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Summary for Pond 4P: Bio-Infiltration Basin

Inflow Area = 0.179 ac, 82.12% Impervious, Inflow Depth > 2.35" for 2-yr event
Inflow = 0.65 cfs @ 11.95 hrs, Volume= 0.035 af
Outflow = 0.62 cfs @ 11.97 hrs, Volume= 0.033 af, Atten= 4%, Lag= 1.0 min
Discarded = 0.00 cfs @ 11.97 hrs, Volume= 0.006 af
Primary = 0.62 cfs @ 11.97 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 644.65' @ 11.97 hrs Surf.Area= 354 sf Storage= 153 cf

Plug-Flow detention time= 64.7 min calculated for 0.033 af (93% of inflow)
Center-of-Mass det. time= 25.9 min (783.0 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1	644.00'	298 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

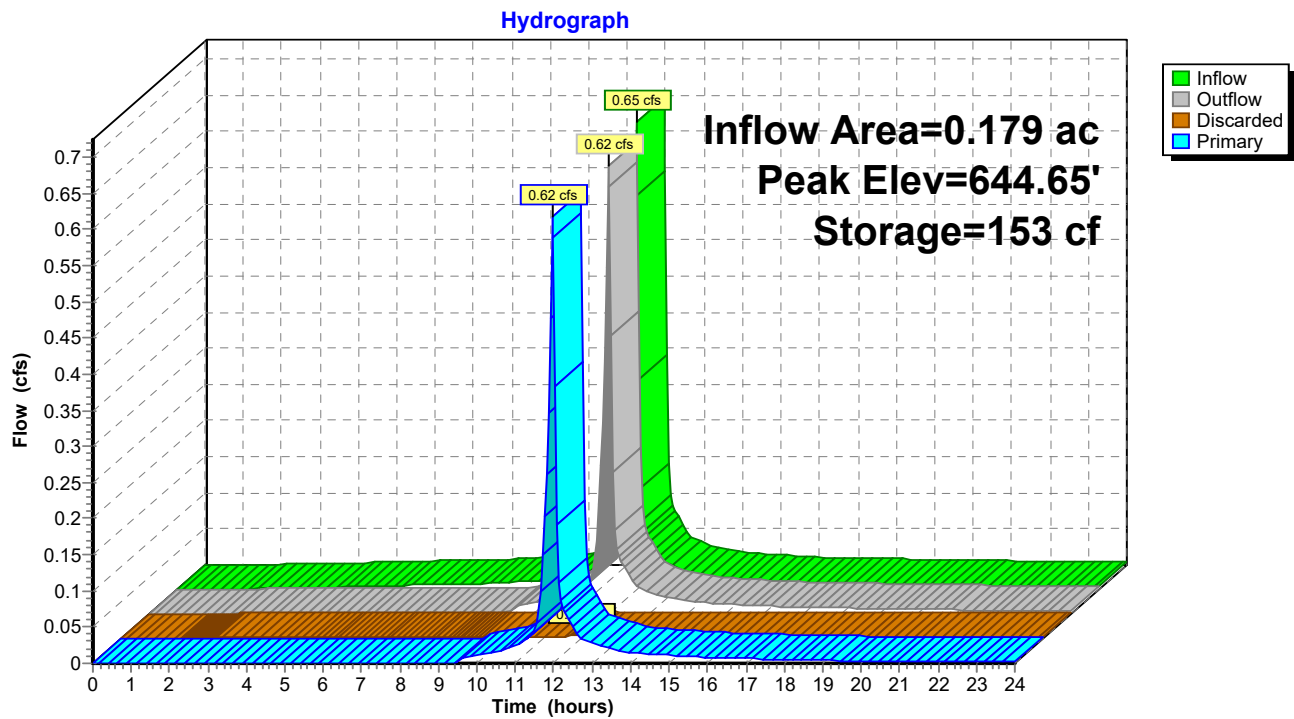
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
644.00	115	0	0
645.00	480	298	298

Device	Routing	Invert	Outlet Devices
#1	Discarded	644.00'	0.500 in/hr Exfiltration over Surface area
#2	Primary	644.50'	12.0" Horiz. Orifice/Grate C= 0.600 in 12.0" Grate (100% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 11.97 hrs HW=644.65' (Free Discharge)
↑ **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.60 cfs @ 11.97 hrs HW=644.65' (Free Discharge)
↑ **2=Orifice/Grate** (Weir Controls 0.60 cfs @ 1.27 fps)

Pond 4P: Bio-Infiltration Basin



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Type II 24-hr 10-yr Rainfall=4.48"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=0.327 ac 94.50% Impervious Runoff Depth>4.06"
Flow Length=781' Slope=0.0030 '/' Tc=11.7 min CN=WQ Runoff=1.65 cfs 0.111 af

Subcatchment2S: DA-2 Runoff Area=0.359 ac 95.26% Impervious Runoff Depth>4.09"
Flow Length=781' Slope=0.0026 '/' Tc=12.6 min CN=WQ Runoff=1.78 cfs 0.122 af

Subcatchment3S: DA-3 Runoff Area=0.065 ac 100.00% Impervious Runoff Depth>4.24"
Tc=5.0 min CN=98 Runoff=0.42 cfs 0.023 af

Subcatchment4S: DA-4 Runoff Area=0.012 ac 100.00% Impervious Runoff Depth>4.24"
Tc=5.0 min CN=98 Runoff=0.08 cfs 0.004 af

Subcatchment5S: DA-5 Runoff Area=0.039 ac 35.90% Impervious Runoff Depth>2.21"
Tc=5.0 min CN=WQ Runoff=0.13 cfs 0.007 af

Subcatchment6S: DA-6 Runoff Area=0.688 ac 100.00% Impervious Runoff Depth>4.24"
Tc=10.0 min CN=98 Runoff=3.81 cfs 0.243 af

Subcatchment7S: DA-7 Runoff Area=0.179 ac 82.12% Impervious Runoff Depth>3.67"
Tc=5.0 min CN=WQ Runoff=1.00 cfs 0.055 af

Subcatchment8S: DA-8 Runoff Area=0.249 ac 67.87% Impervious Runoff Depth>3.22"
Tc=5.0 min CN=WQ Runoff=1.23 cfs 0.067 af

Subcatchment9S: DA-9 Runoff Area=0.302 ac 91.06% Impervious Runoff Depth>3.96"
Tc=5.0 min CN=WQ Runoff=1.82 cfs 0.100 af

Subcatchment10S: DA-10 Runoff Area=2.606 ac 100.00% Impervious Runoff Depth>4.24"
Tc=10.0 min CN=98 Runoff=14.43 cfs 0.920 af

Reach 1R: Proposed Runoff Inflow=25.51 cfs 1.643 af
Outflow=25.51 cfs 1.643 af

Pond 4P: Bio-Infiltration Basin Peak Elev=644.71' Storage=172 cf Inflow=1.00 cfs 0.055 af
Discarded=0.00 cfs 0.006 af Primary=0.96 cfs 0.046 af Outflow=0.97 cfs 0.052 af

Total Runoff Area = 4.826 ac Runoff Volume = 1.652 af Average Runoff Depth = 4.11"
4.12% Pervious = 0.199 ac 95.88% Impervious = 4.627 ac

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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 1S: DA-1

Runoff = 1.65 cfs @ 12.03 hrs, Volume= 0.111 af, Depth> 4.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

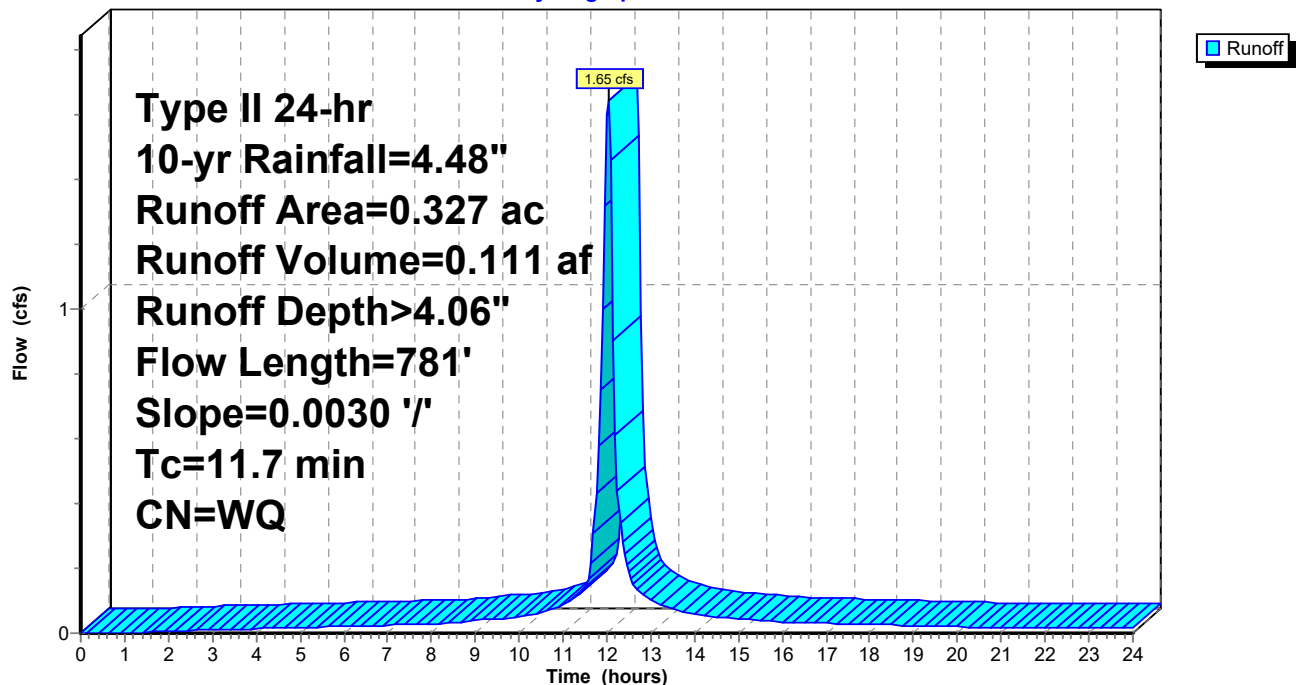
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.309	98	Paved roads w/curbs & sewers, HSG A
0.018	61	>75% Grass cover, Good, HSG B
0.327		Weighted Average
0.018		5.50% Pervious Area
0.309		94.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	781	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 1S: DA-1

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 2S: DA-2

Runoff = 1.78 cfs @ 12.04 hrs, Volume= 0.122 af, Depth> 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

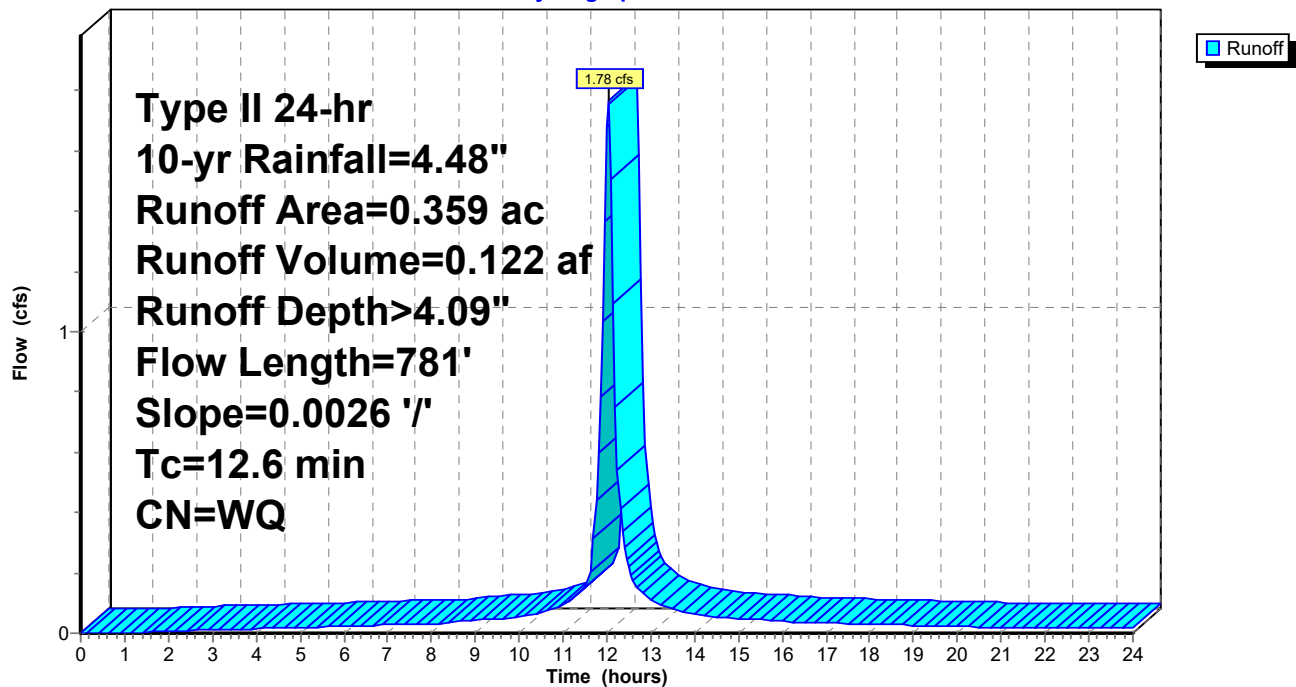
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.342	98	Paved roads w/curbs & sewers, HSG A
0.017	61	>75% Grass cover, Good, HSG B
0.359		Weighted Average
0.017		4.74% Pervious Area
0.342		95.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	781	0.0026	1.04		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 2S: DA-2

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 3S: DA-3

Runoff = 0.42 cfs @ 11.95 hrs, Volume= 0.023 af, Depth> 4.24"

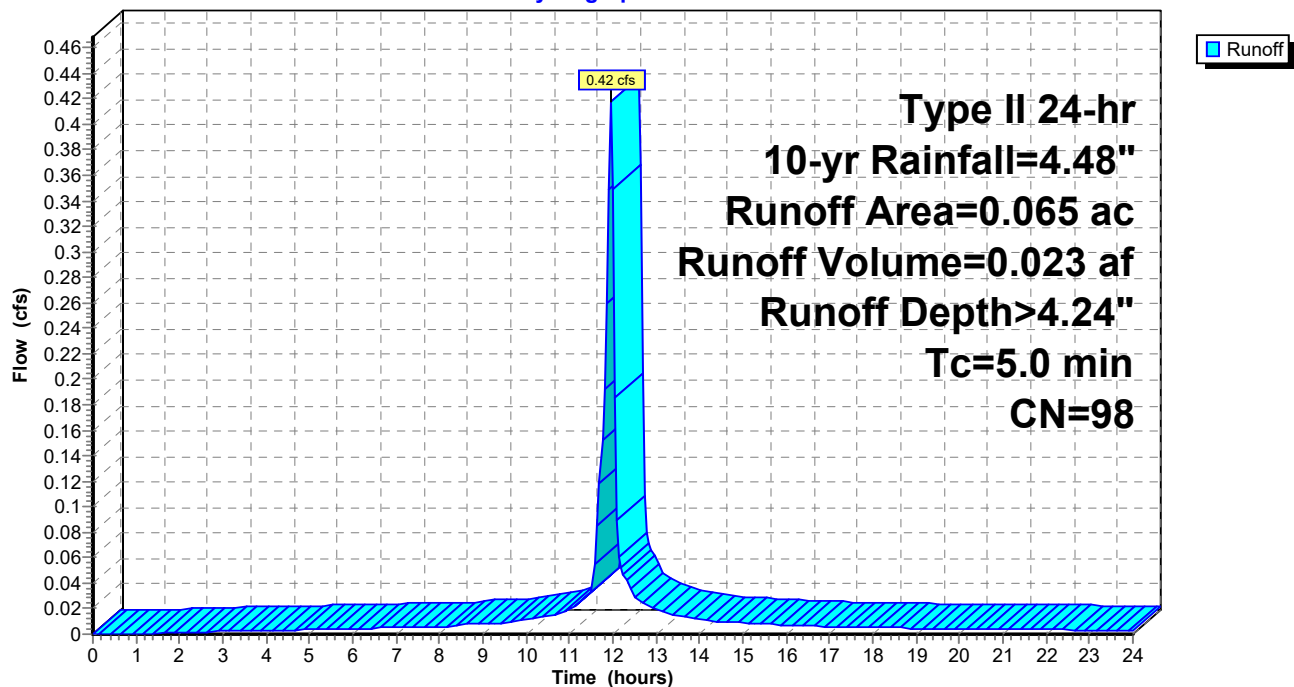
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.065	98	Paved parking, HSG A
0.065		100.00% Impervious Area

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

Subcatchment 3S: DA-3

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 4S: DA-4

Runoff = 0.08 cfs @ 11.95 hrs, Volume= 0.004 af, Depth> 4.24"

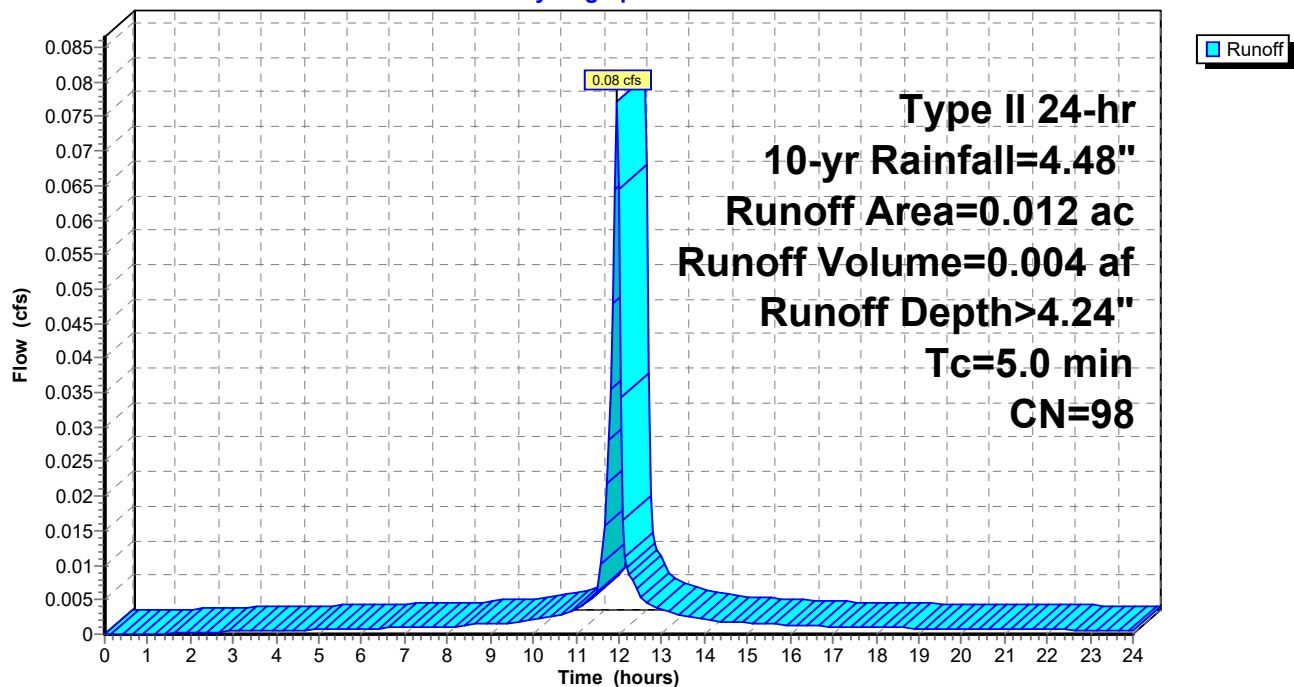
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.012	98	Paved parking, HSG A
0.012		100.00% Impervious Area

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

Subcatchment 4S: DA-4

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 5S: DA-5

Runoff = 0.13 cfs @ 11.96 hrs, Volume= 0.007 af, Depth> 2.21"

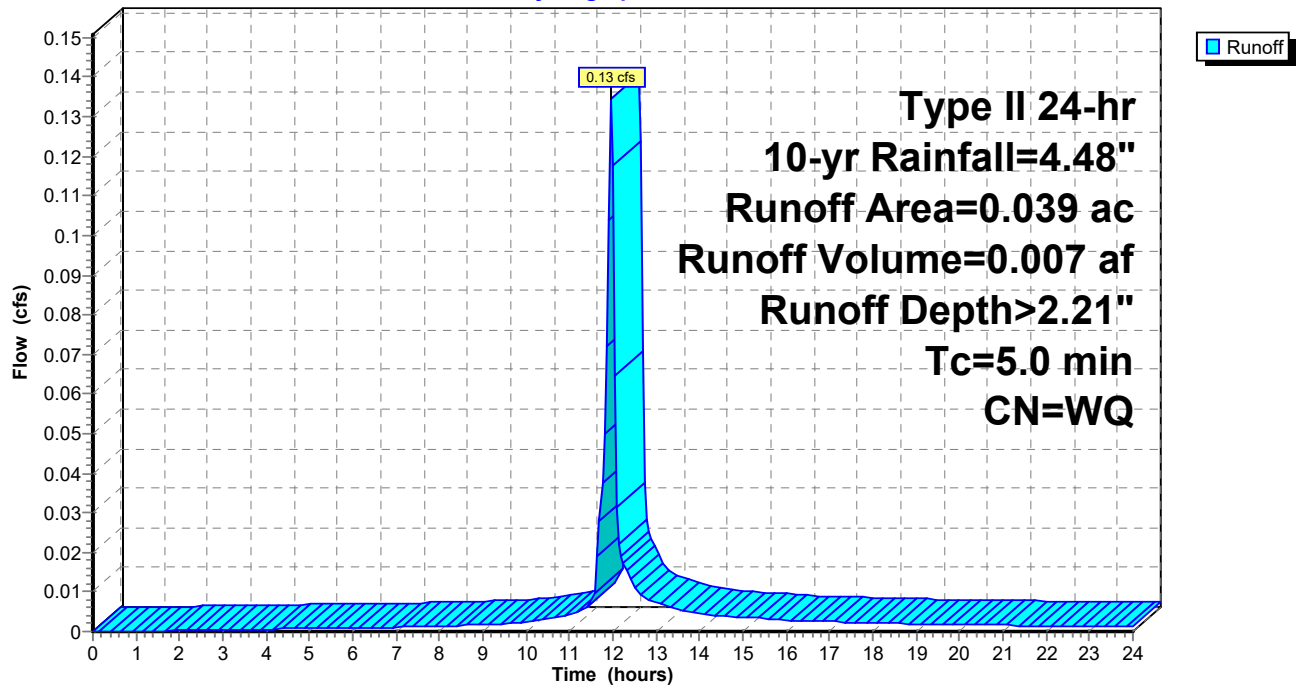
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.014	98	Paved parking, HSG A
0.025	61	>75% Grass cover, Good, HSG B
0.039		Weighted Average
0.025		64.10% Pervious Area
0.014		35.90% Impervious Area

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

Subcatchment 5S: DA-5

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 6S: DA-6

Runoff = 3.81 cfs @ 12.01 hrs, Volume= 0.243 af, Depth> 4.24"

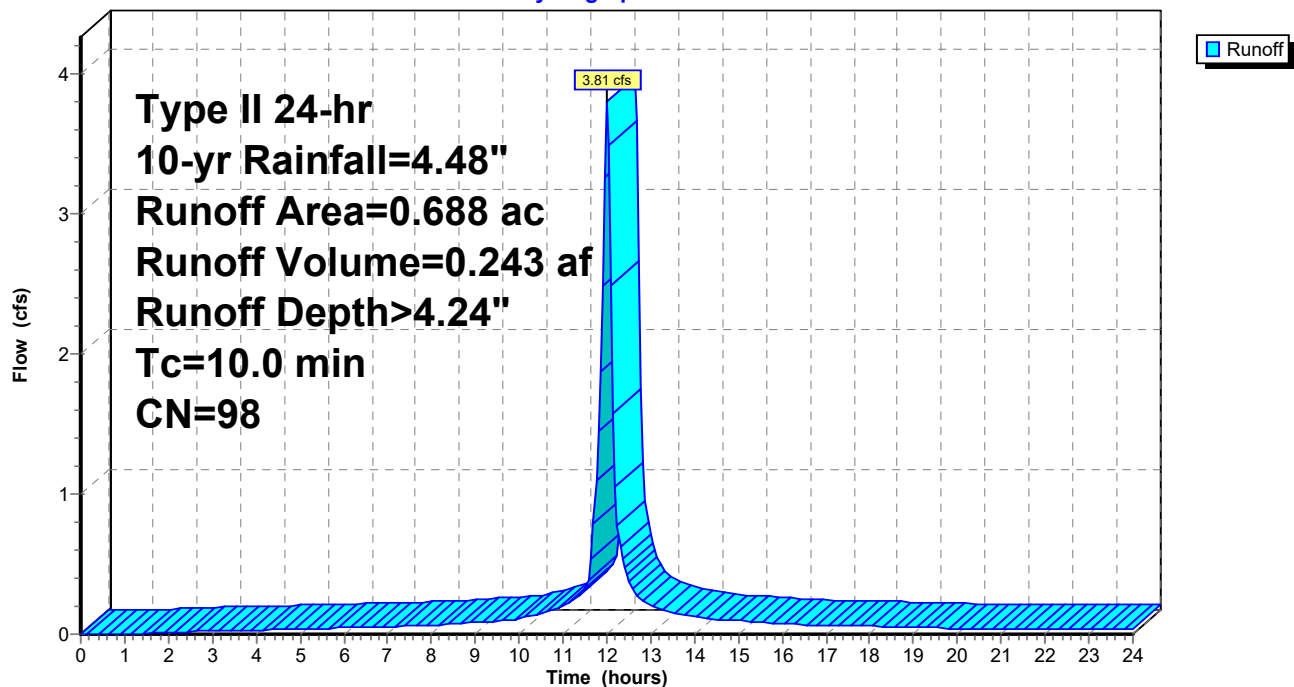
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.688	98	Roofs, HSG A
0.688		100.00% Impervious Area

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

Subcatchment 6S: DA-6

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 7S: DA-7

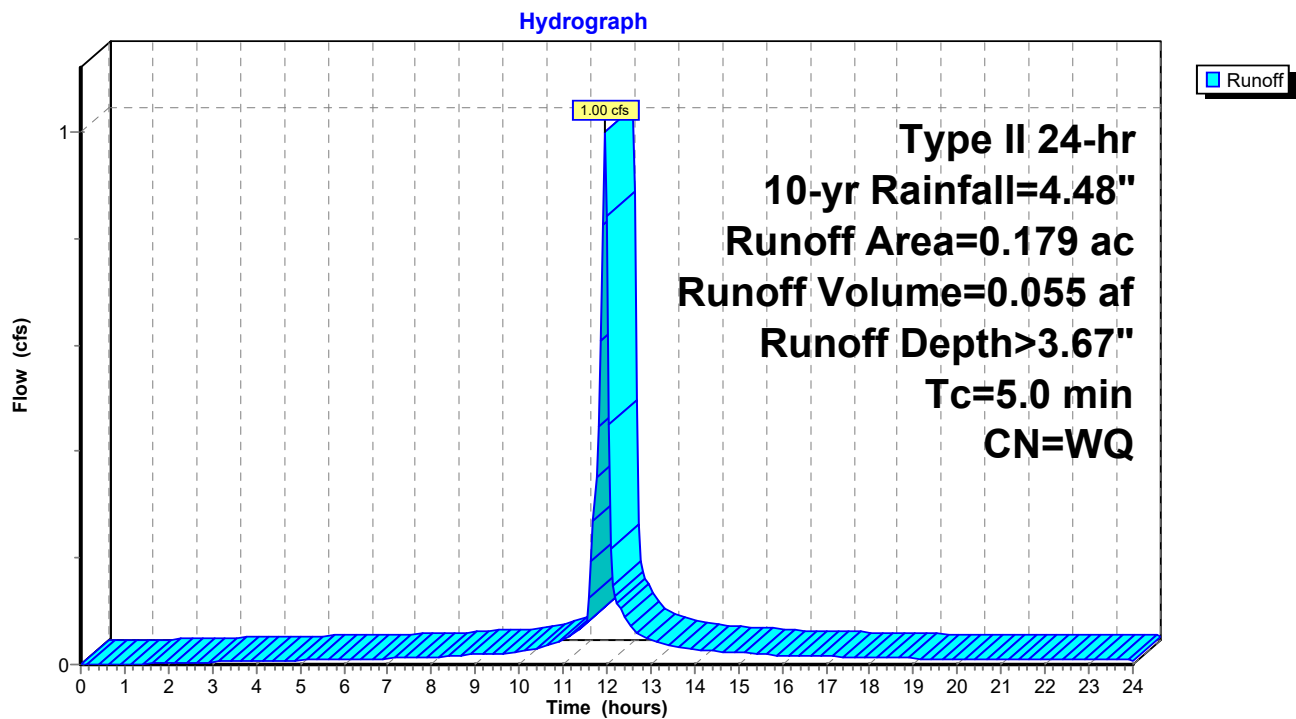
Runoff = 1.00 cfs @ 11.95 hrs, Volume= 0.055 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.147	98	Paved roads w/curbs & sewers, HSG A
0.032	61	>75% Grass cover, Good, HSG B
0.179		Weighted Average
0.032		17.88% Pervious Area
0.147		82.12% Impervious Area

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

Subcatchment 7S: DA-7



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 8S: DA-8

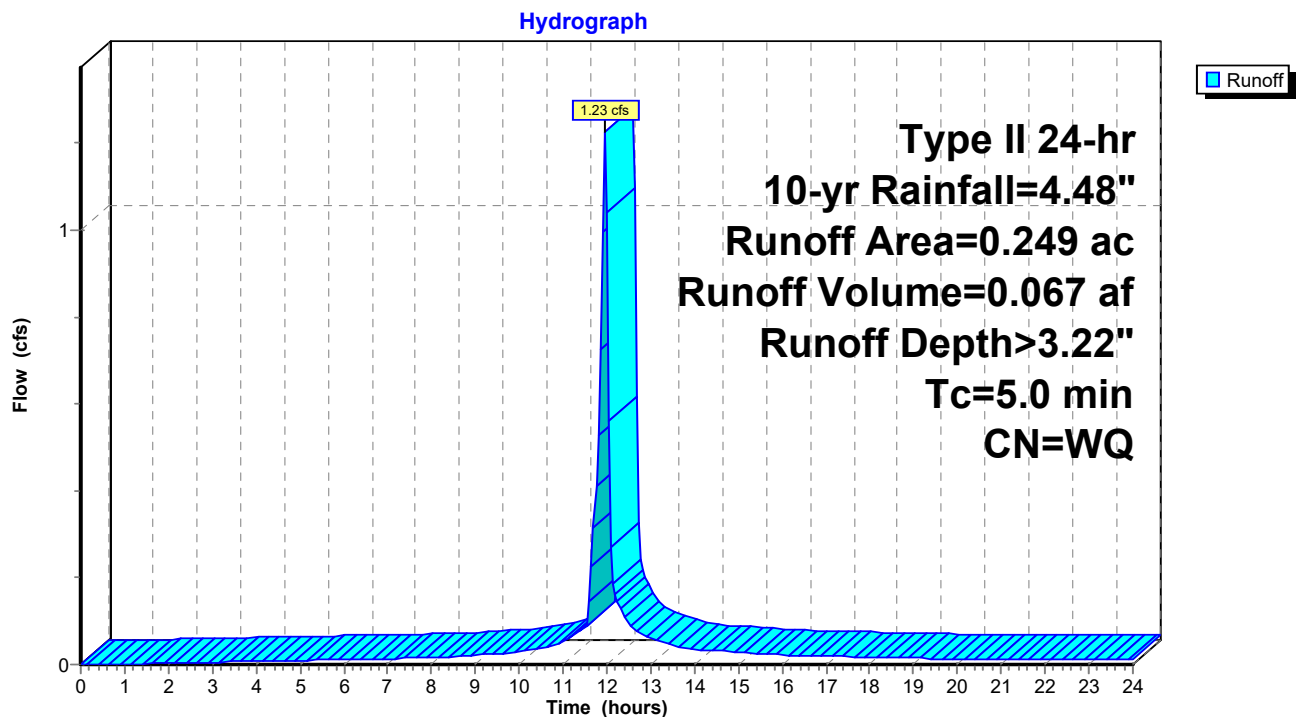
Runoff = 1.23 cfs @ 11.95 hrs, Volume= 0.067 af, Depth> 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.169	98	Paved roads w/curbs & sewers, HSG A
0.080	61	>75% Grass cover, Good, HSG B
0.249		Weighted Average
0.080		32.13% Pervious Area
0.169		67.87% Impervious Area

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

Subcatchment 8S: DA-8



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 9S: DA-9

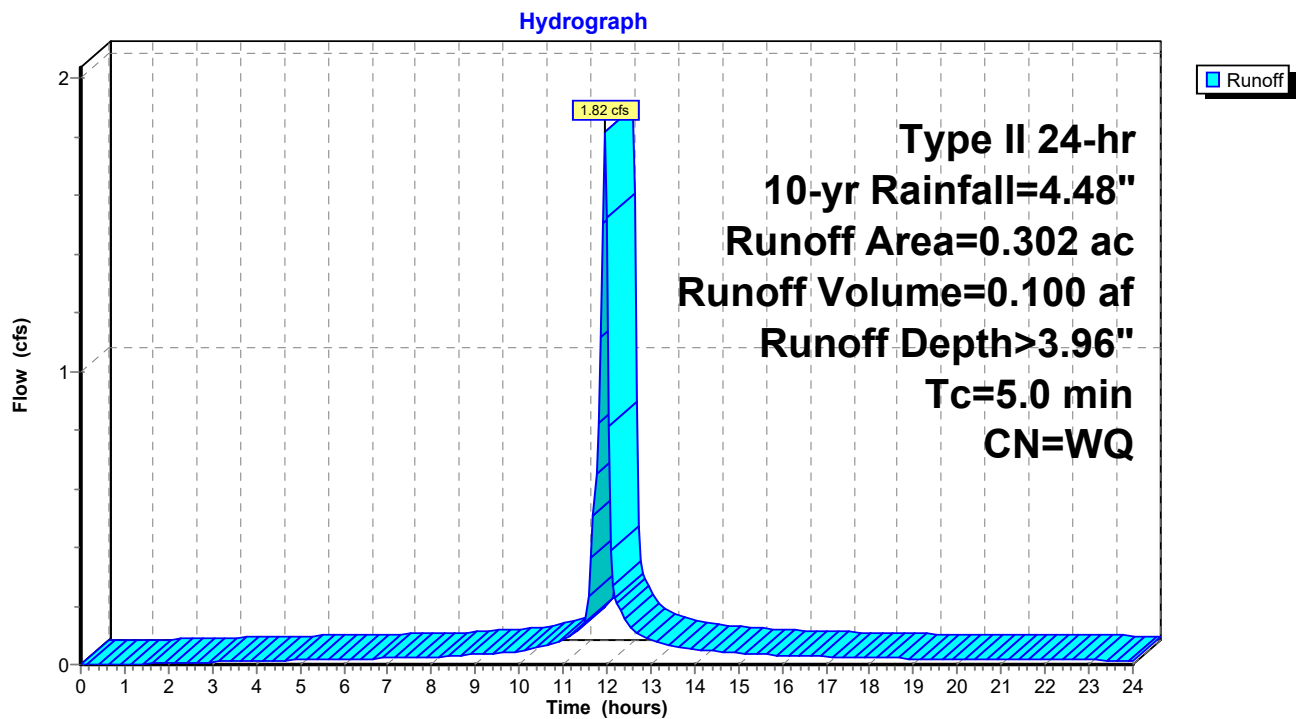
Runoff = 1.82 cfs @ 11.95 hrs, Volume= 0.100 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
0.275	98	Paved roads w/curbs & sewers, HSG A
0.027	61	>75% Grass cover, Good, HSG B
0.302		Weighted Average
0.027		8.94% Pervious Area
0.275		91.06% Impervious Area

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

Subcatchment 9S: DA-9



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Subcatchment 10S: DA-10

Runoff = 14.43 cfs @ 12.01 hrs, Volume= 0.920 af, Depth> 4.24"

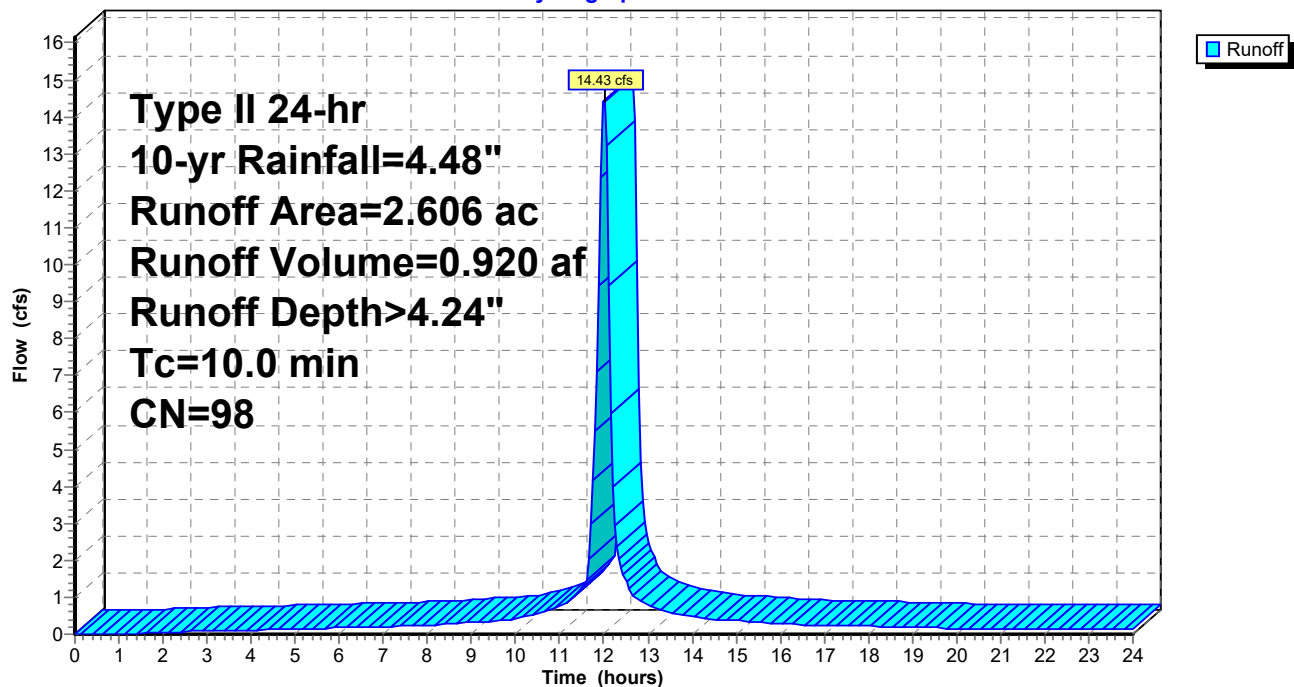
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.48"

Area (ac)	CN	Description
2.606	98	Roofs, HSG A
2.606		100.00% Impervious Area

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

Subcatchment 10S: DA-10

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.48"

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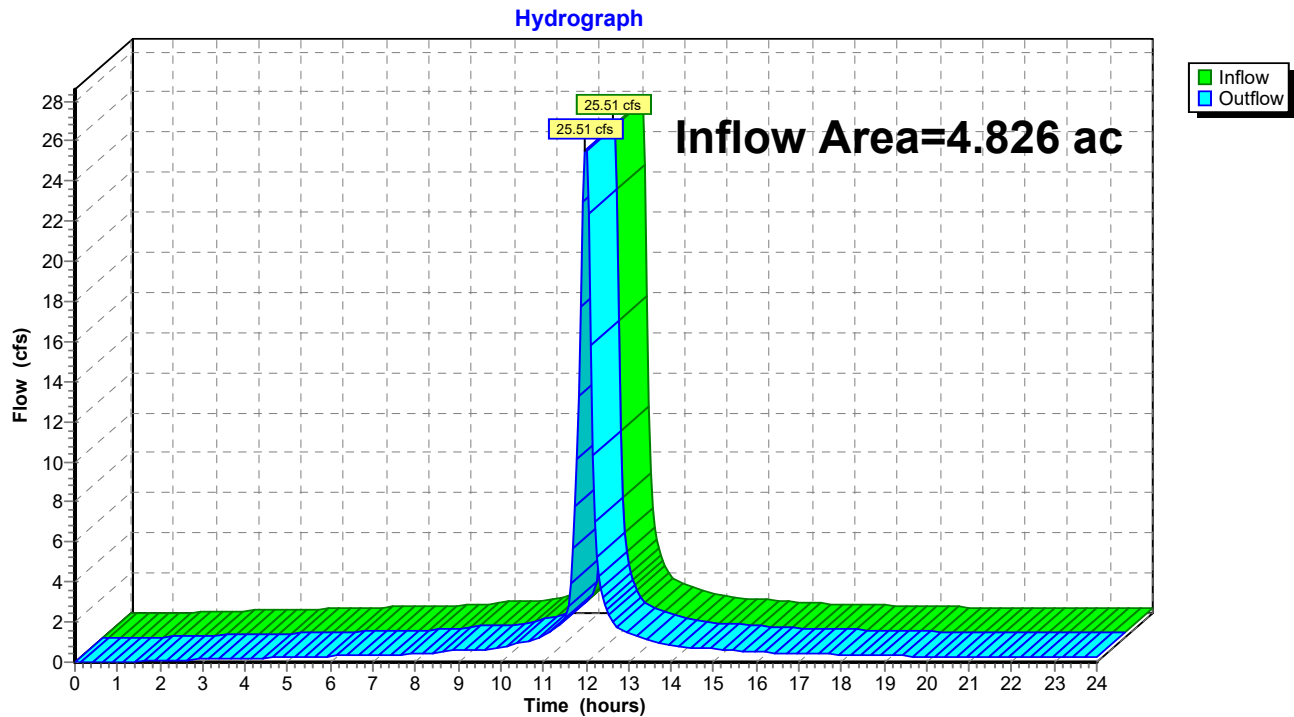
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Summary for Reach 1R: Proposed Runoff

Inflow Area = 4.826 ac, 95.88% Impervious, Inflow Depth > 4.09" for 10-yr event
Inflow = 25.51 cfs @ 12.00 hrs, Volume= 1.643 af
Outflow = 25.51 cfs @ 12.00 hrs, Volume= 1.643 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 1R: Proposed Runoff



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Type II 24-hr 10-yr Rainfall=4.48"

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Summary for Pond 4P: Bio-Infiltration Basin

Inflow Area = 0.179 ac, 82.12% Impervious, Inflow Depth > 3.67" for 10-yr event
Inflow = 1.00 cfs @ 11.95 hrs, Volume= 0.055 af
Outflow = 0.97 cfs @ 11.97 hrs, Volume= 0.052 af, Atten= 4%, Lag= 0.9 min
Discarded = 0.00 cfs @ 11.97 hrs, Volume= 0.006 af
Primary = 0.96 cfs @ 11.97 hrs, Volume= 0.046 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 644.71' @ 11.97 hrs Surf.Area= 373 sf Storage= 172 cf

Plug-Flow detention time= 48.6 min calculated for 0.052 af (95% of inflow)
Center-of-Mass det. time= 21.9 min (773.2 - 751.3)

Volume	Invert	Avail.Storage	Storage Description
#1	644.00'	298 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
644.00	115	0	0
645.00	480	298	298

Device	Routing	Invert	Outlet Devices
#1	Discarded	644.00'	0.500 in/hr Exfiltration over Surface area
#2	Primary	644.50'	12.0" Horiz. Orifice/Grate C= 0.600 in 12.0" Grate (100% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 11.97 hrs HW=644.70' (Free Discharge)
↑ **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.94 cfs @ 11.97 hrs HW=644.70' (Free Discharge)
↑ **2=Orifice/Grate** (Weir Controls 0.94 cfs @ 1.47 fps)

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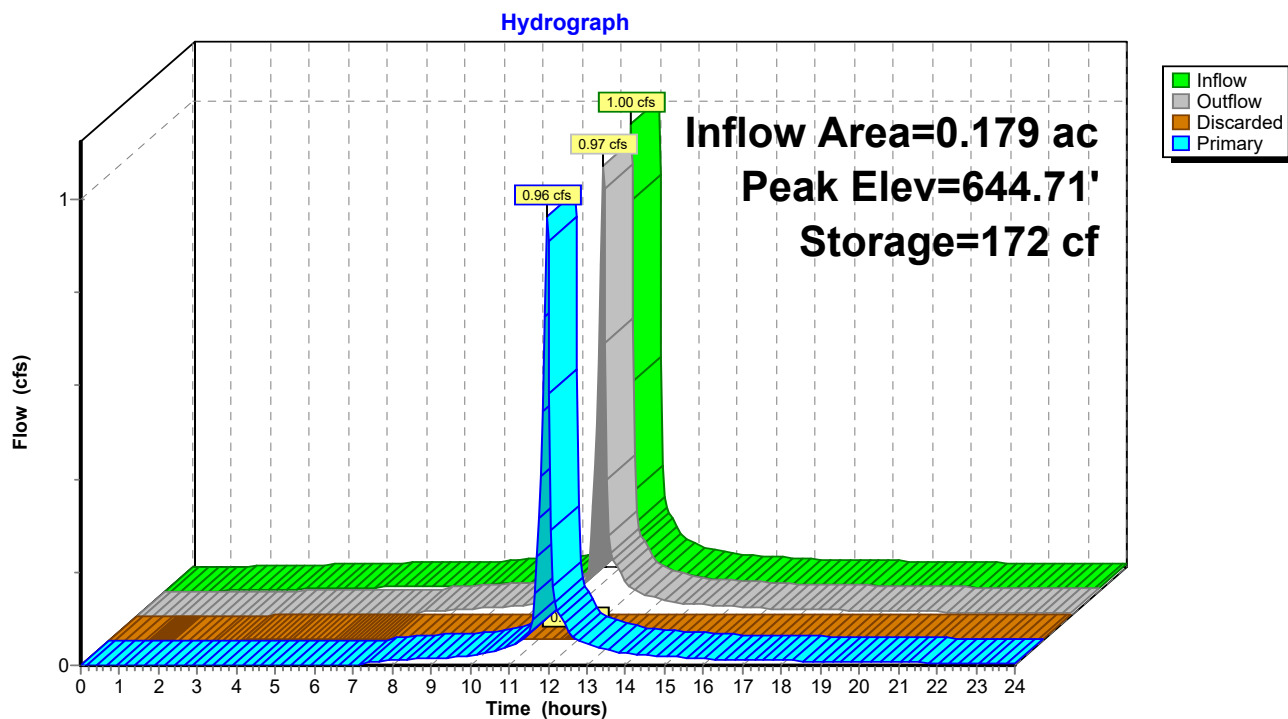
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Type II 24-hr 10-yr Rainfall=4.48"

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Pond 4P: Bio-Infiltration Basin



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Type II 24-hr 25-yr Rainfall=5.58"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=0.327 ac 94.50% Impervious Runoff Depth>5.13"
Flow Length=781' Slope=0.0030 '/' Tc=11.7 min CN=WQ Runoff=2.07 cfs 0.140 af

Subcatchment2S: DA-2 Runoff Area=0.359 ac 95.26% Impervious Runoff Depth>5.16"
Flow Length=781' Slope=0.0026 '/' Tc=12.6 min CN=WQ Runoff=2.23 cfs 0.154 af

Subcatchment3S: DA-3 Runoff Area=0.065 ac 100.00% Impervious Runoff Depth>5.34"
Tc=5.0 min CN=98 Runoff=0.52 cfs 0.029 af

Subcatchment4S: DA-4 Runoff Area=0.012 ac 100.00% Impervious Runoff Depth>5.34"
Tc=5.0 min CN=98 Runoff=0.10 cfs 0.005 af

Subcatchment5S: DA-5 Runoff Area=0.039 ac 35.90% Impervious Runoff Depth>3.02"
Tc=5.0 min CN=WQ Runoff=0.19 cfs 0.010 af

Subcatchment6S: DA-6 Runoff Area=0.688 ac 100.00% Impervious Runoff Depth>5.33"
Tc=10.0 min CN=98 Runoff=4.76 cfs 0.306 af

Subcatchment7S: DA-7 Runoff Area=0.179 ac 82.12% Impervious Runoff Depth>4.69"
Tc=5.0 min CN=WQ Runoff=1.28 cfs 0.070 af

Subcatchment8S: DA-8 Runoff Area=0.249 ac 67.87% Impervious Runoff Depth>4.18"
Tc=5.0 min CN=WQ Runoff=1.60 cfs 0.087 af

Subcatchment9S: DA-9 Runoff Area=0.302 ac 91.06% Impervious Runoff Depth>5.02"
Tc=5.0 min CN=WQ Runoff=2.29 cfs 0.126 af

Subcatchment10S: DA-10 Runoff Area=2.606 ac 100.00% Impervious Runoff Depth>5.33"
Tc=10.0 min CN=98 Runoff=18.02 cfs 1.158 af

Reach 1R: Proposed Runoff Inflow=31.99 cfs 2.077 af
Outflow=31.99 cfs 2.077 af

Pond 4P: Bio-Infiltration Basin Peak Elev=644.74' Storage=186 cf Inflow=1.28 cfs 0.070 af
Discarded=0.00 cfs 0.006 af Primary=1.23 cfs 0.061 af Outflow=1.23 cfs 0.068 af

Total Runoff Area = 4.826 ac Runoff Volume = 2.086 af Average Runoff Depth = 5.19"
4.12% Pervious = 0.199 ac 95.88% Impervious = 4.627 ac

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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 1S: DA-1

Runoff = 2.07 cfs @ 12.03 hrs, Volume= 0.140 af, Depth> 5.13"

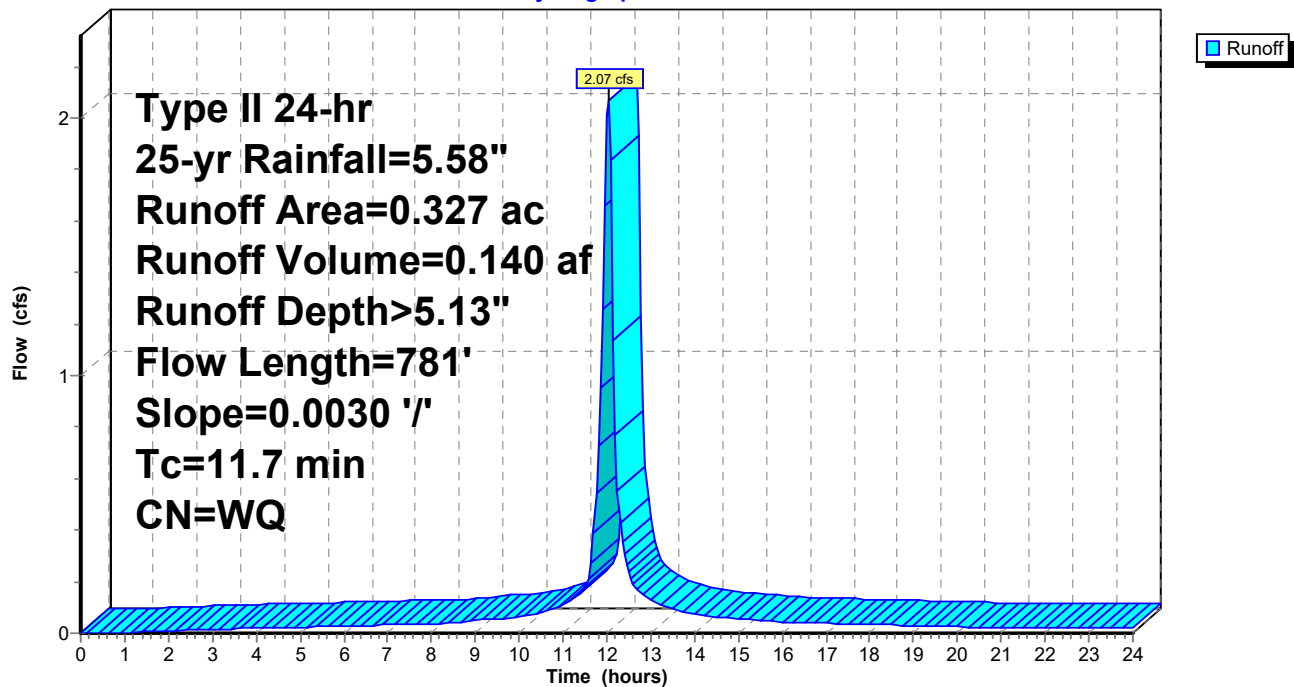
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.309	98	Paved roads w/curbs & sewers, HSG A
0.018	61	>75% Grass cover, Good, HSG B
0.327		Weighted Average
0.018		5.50% Pervious Area
0.309		94.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	781	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 1S: DA-1

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 2S: DA-2

Runoff = 2.23 cfs @ 12.04 hrs, Volume= 0.154 af, Depth> 5.16"

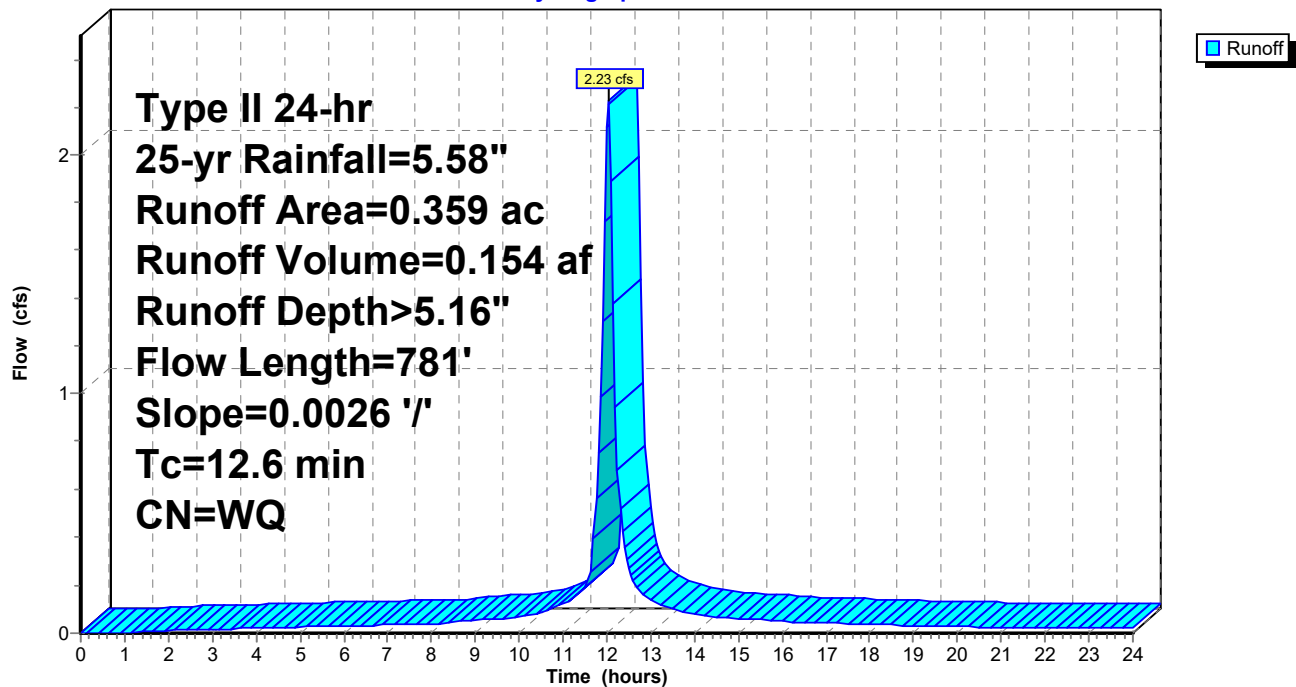
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.342	98	Paved roads w/curbs & sewers, HSG A
0.017	61	>75% Grass cover, Good, HSG B
0.359		Weighted Average
0.017		4.74% Pervious Area
0.342		95.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	781	0.0026	1.04		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 2S: DA-2

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 3S: DA-3

Runoff = 0.52 cfs @ 11.95 hrs, Volume= 0.029 af, Depth> 5.34"

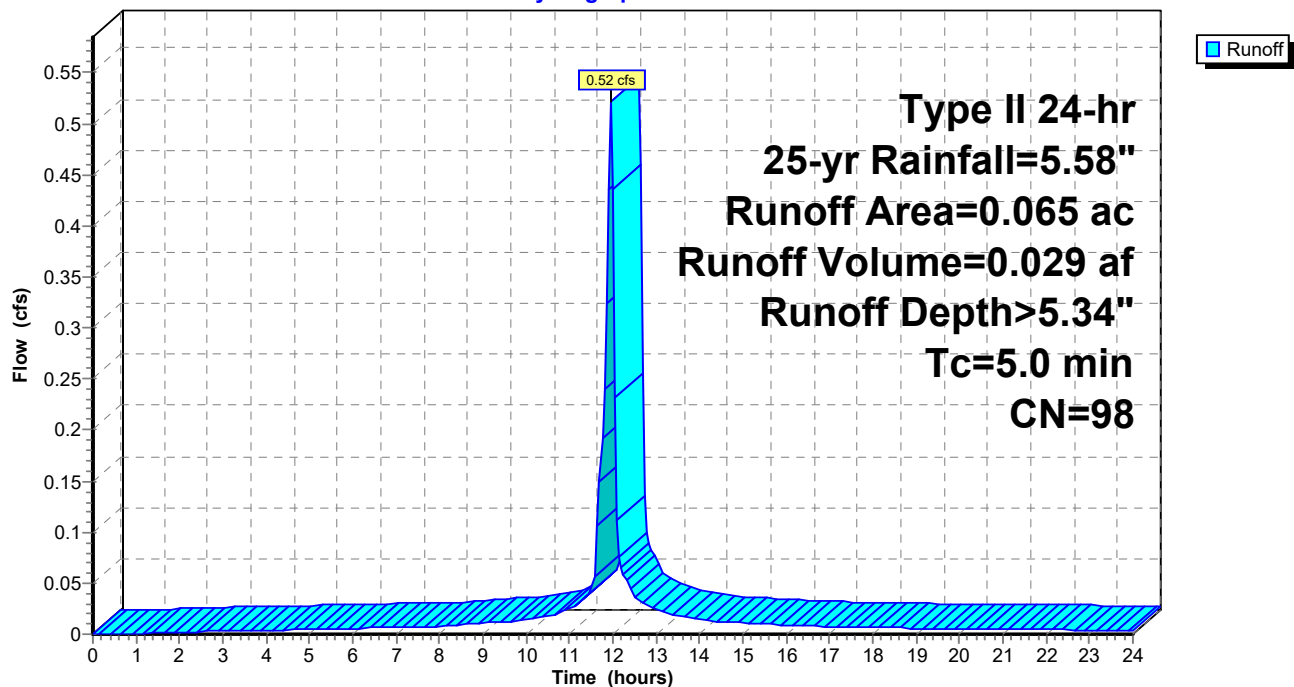
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.065	98	Paved parking, HSG A
0.065		100.00% Impervious Area

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

Subcatchment 3S: DA-3

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 4S: DA-4

Runoff = 0.10 cfs @ 11.95 hrs, Volume= 0.005 af, Depth> 5.34"

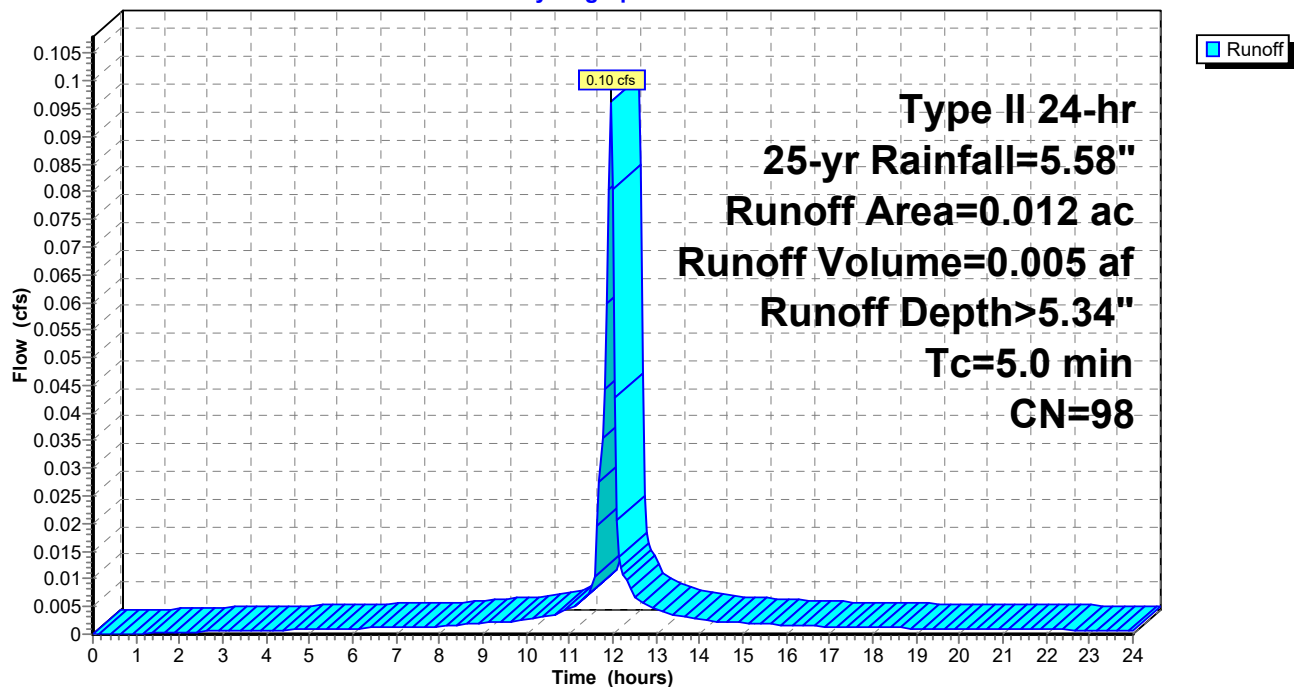
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.012	98	Paved parking, HSG A
0.012		100.00% Impervious Area

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

Subcatchment 4S: DA-4

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 5S: DA-5

Runoff = 0.19 cfs @ 11.96 hrs, Volume= 0.010 af, Depth> 3.02"

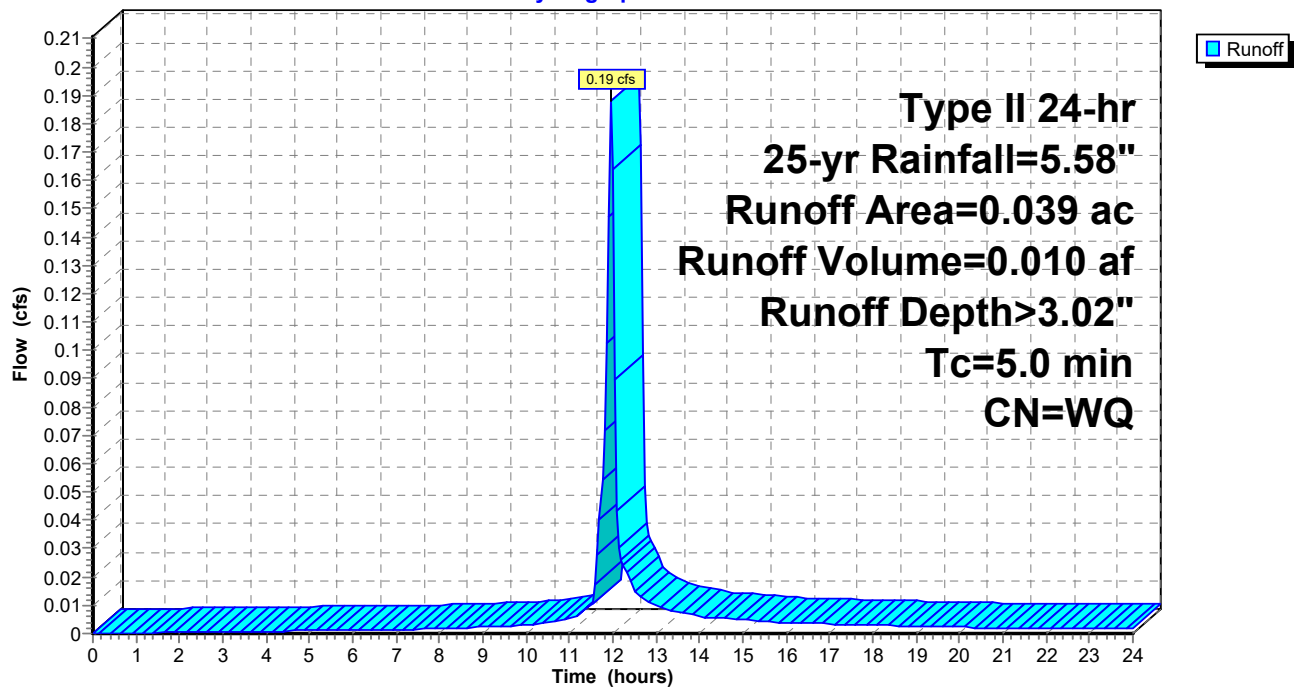
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.014	98	Paved parking, HSG A
0.025	61	>75% Grass cover, Good, HSG B
0.039		Weighted Average
0.025		64.10% Pervious Area
0.014		35.90% Impervious Area

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

Subcatchment 5S: DA-5

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 6S: DA-6

Runoff = 4.76 cfs @ 12.01 hrs, Volume= 0.306 af, Depth> 5.33"

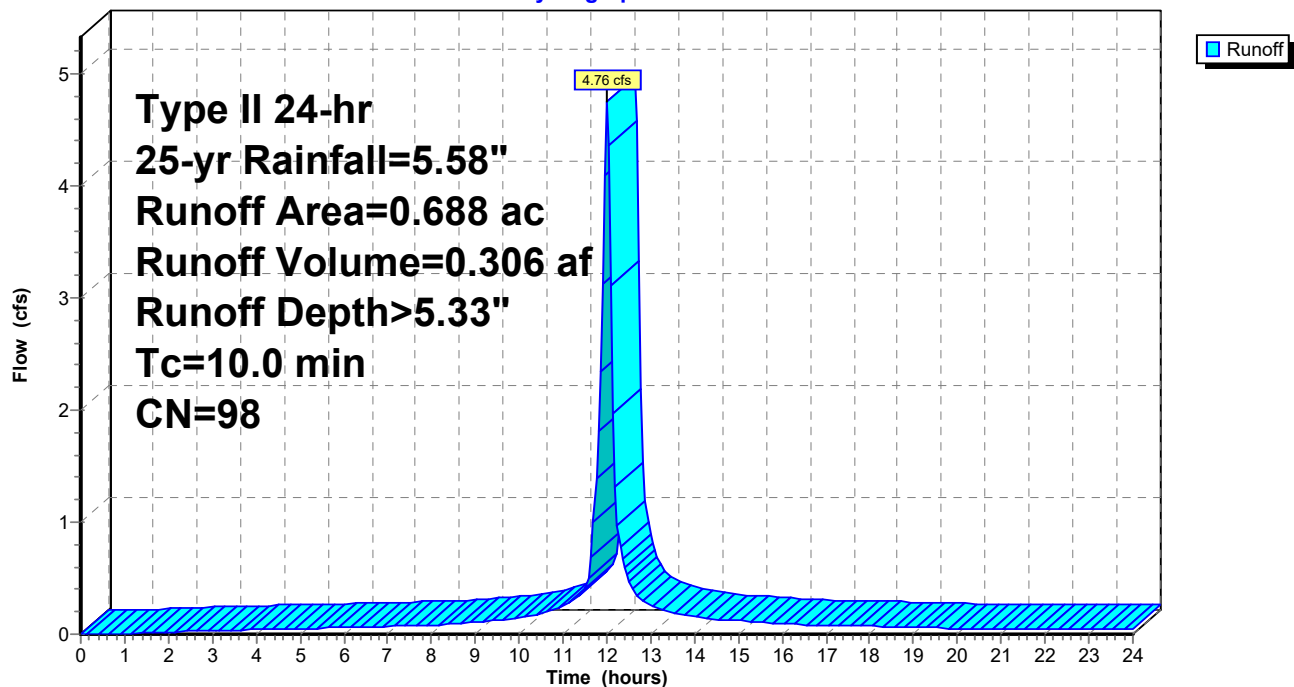
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.688	98	Roofs, HSG A
0.688		100.00% Impervious Area

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

Subcatchment 6S: DA-6

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 7S: DA-7

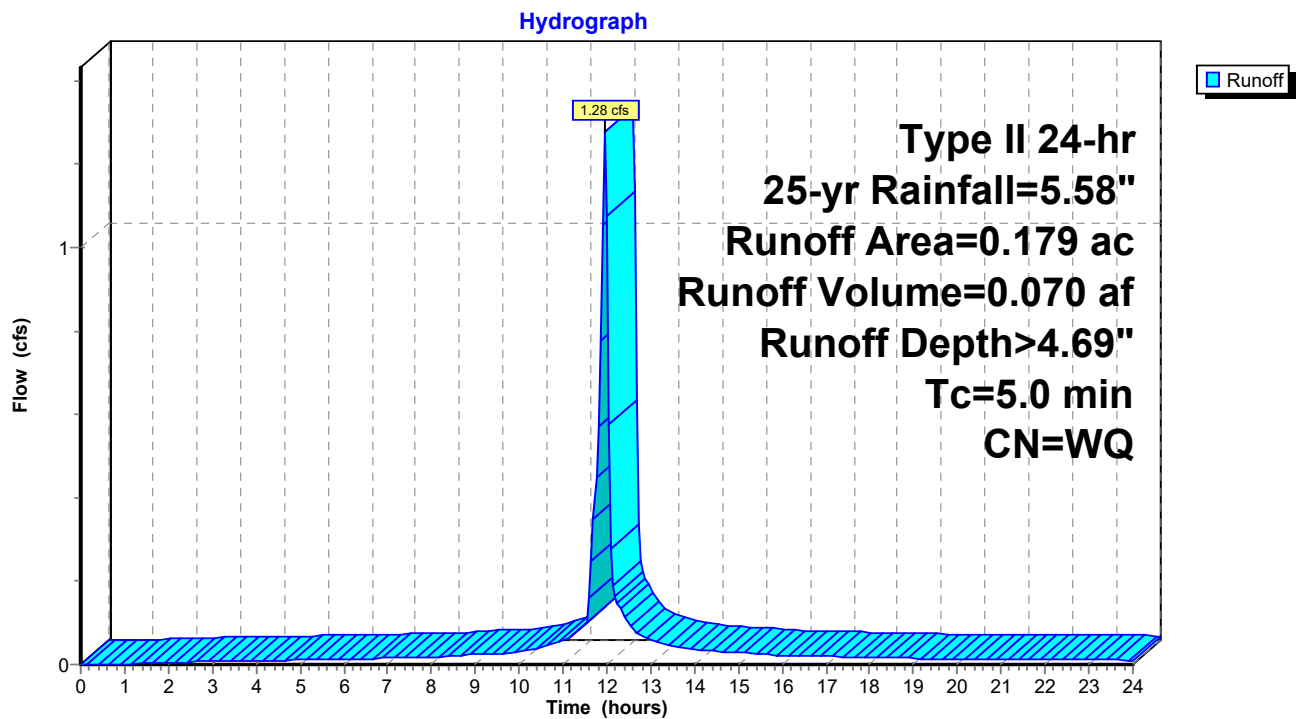
Runoff = 1.28 cfs @ 11.95 hrs, Volume= 0.070 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.147	98	Paved roads w/curbs & sewers, HSG A
0.032	61	>75% Grass cover, Good, HSG B
0.179		Weighted Average
0.032		17.88% Pervious Area
0.147		82.12% Impervious Area

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

Subcatchment 7S: DA-7



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 8S: DA-8

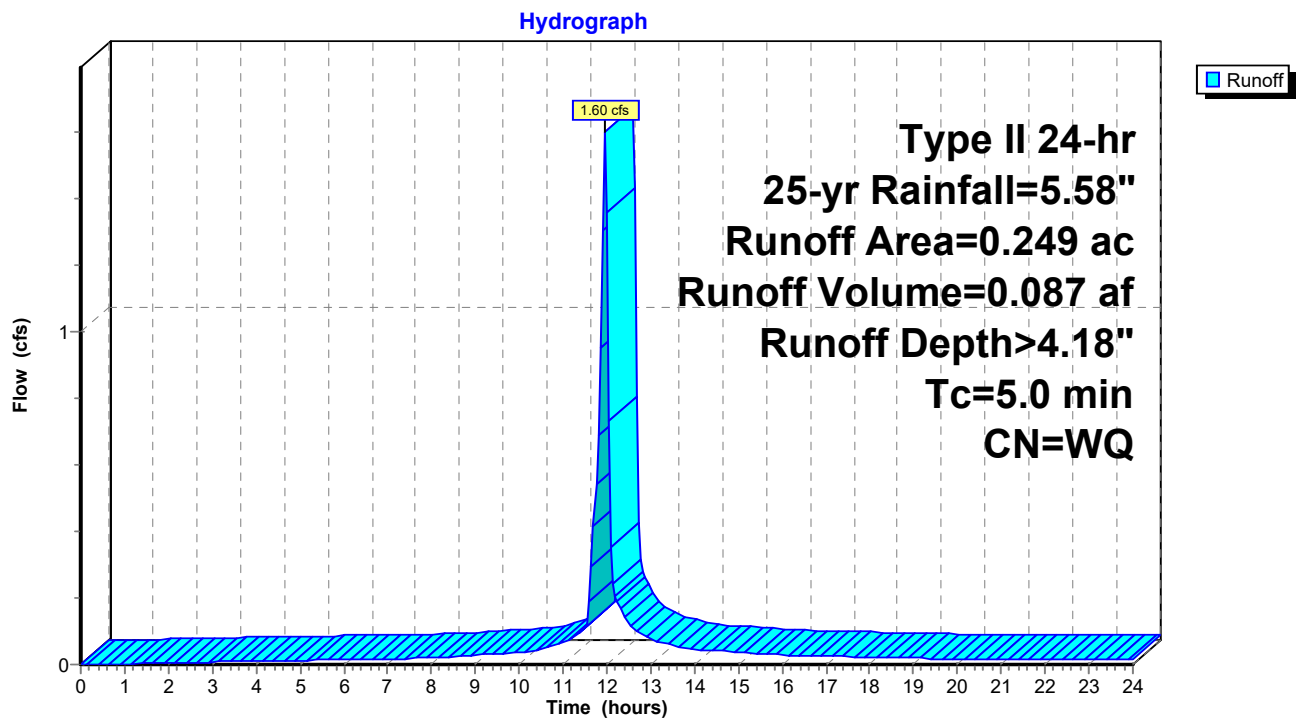
Runoff = 1.60 cfs @ 11.95 hrs, Volume= 0.087 af, Depth> 4.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.169	98	Paved roads w/curbs & sewers, HSG A
0.080	61	>75% Grass cover, Good, HSG B
0.249		Weighted Average
0.080		32.13% Pervious Area
0.169		67.87% Impervious Area

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

Subcatchment 8S: DA-8



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 9S: DA-9

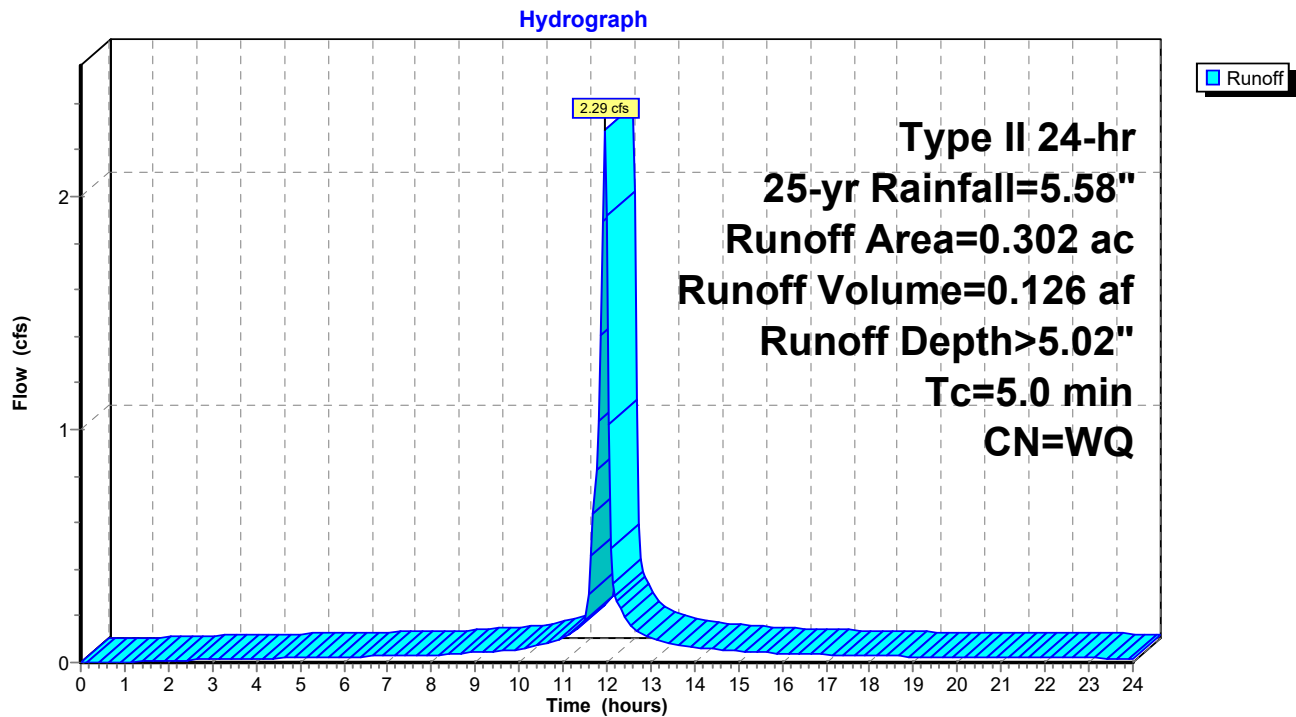
Runoff = 2.29 cfs @ 11.95 hrs, Volume= 0.126 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
0.275	98	Paved roads w/curbs & sewers, HSG A
0.027	61	>75% Grass cover, Good, HSG B
0.302		Weighted Average
0.027		8.94% Pervious Area
0.275		91.06% Impervious Area

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

Subcatchment 9S: DA-9



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Subcatchment 10S: DA-10

Runoff = 18.02 cfs @ 12.01 hrs, Volume= 1.158 af, Depth> 5.33"

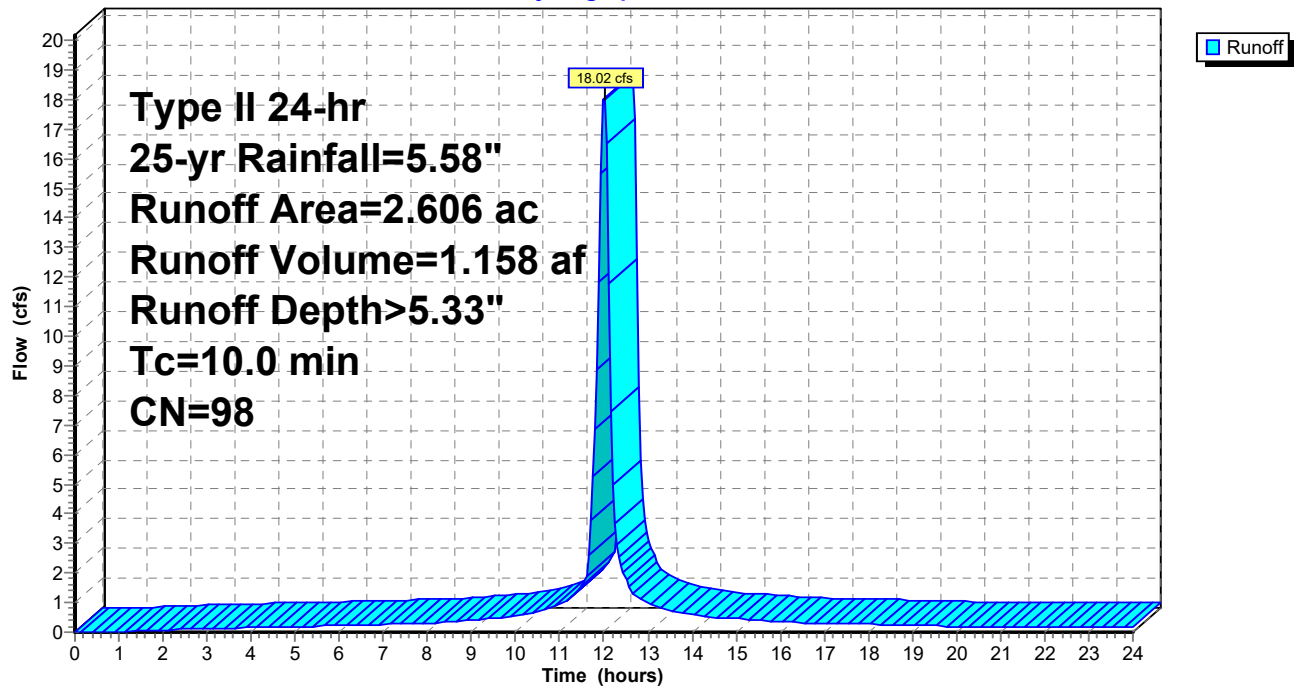
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.58"

Area (ac)	CN	Description
2.606	98	Roofs, HSG A
2.606		100.00% Impervious Area

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

Subcatchment 10S: DA-10

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.58"

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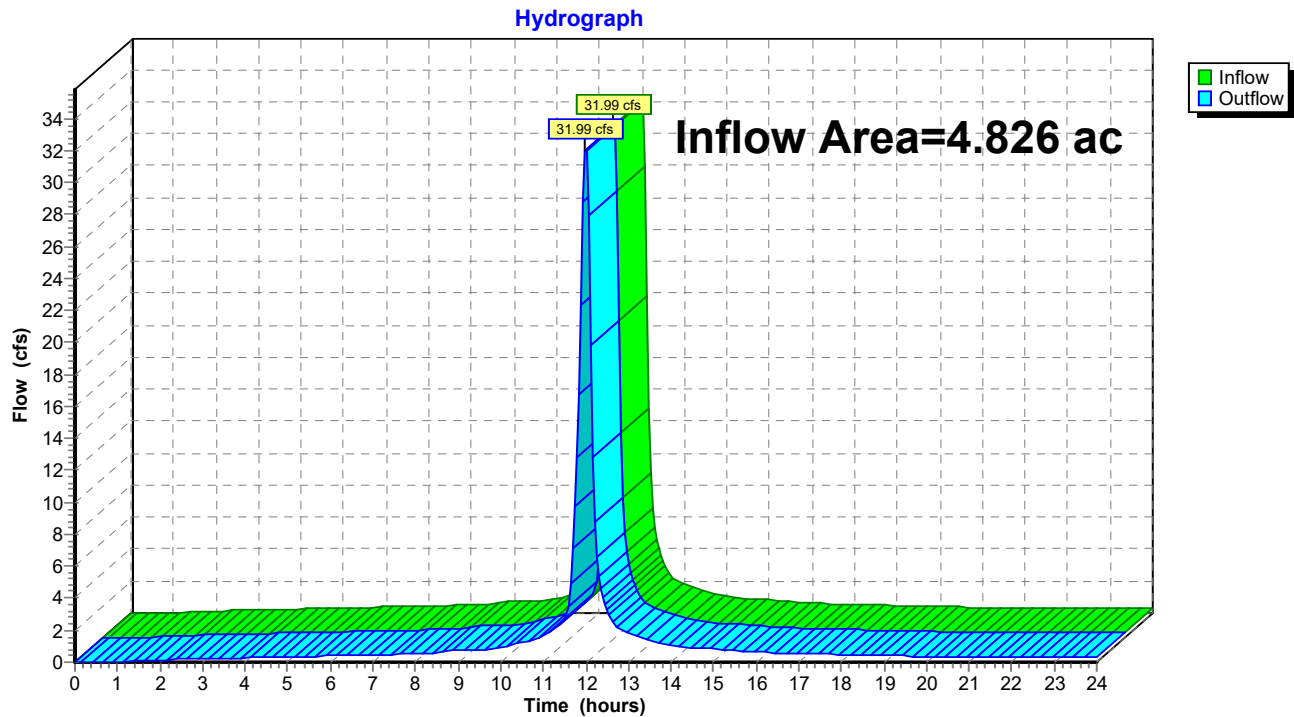
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Summary for Reach 1R: Proposed Runoff

Inflow Area = 4.826 ac, 95.88% Impervious, Inflow Depth > 5.16" for 25-yr event
Inflow = 31.99 cfs @ 12.00 hrs, Volume= 2.077 af
Outflow = 31.99 cfs @ 12.00 hrs, Volume= 2.077 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 1R: Proposed Runoff



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Type II 24-hr 25-yr Rainfall=5.58"

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Summary for Pond 4P: Bio-Infiltration Basin

Inflow Area = 0.179 ac, 82.12% Impervious, Inflow Depth > 4.69" for 25-yr event
Inflow = 1.28 cfs @ 11.95 hrs, Volume= 0.070 af
Outflow = 1.23 cfs @ 11.97 hrs, Volume= 0.068 af, Atten= 3%, Lag= 0.9 min
Discarded = 0.00 cfs @ 11.97 hrs, Volume= 0.006 af
Primary = 1.23 cfs @ 11.97 hrs, Volume= 0.061 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 644.74' @ 11.97 hrs Surf.Area= 386 sf Storage= 186 cf

Plug-Flow detention time= 40.7 min calculated for 0.067 af (96% of inflow)
Center-of-Mass det. time= 19.1 min (767.8 - 748.6)

Volume	Invert	Avail.Storage	Storage Description
#1	644.00'	298 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
644.00	115	0	0
645.00	480	298	298

Device	Routing	Invert	Outlet Devices
#1	Discarded	644.00'	0.500 in/hr Exfiltration over Surface area
#2	Primary	644.50'	12.0" Horiz. Orifice/Grate C= 0.600 in 12.0" Grate (100% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 11.97 hrs HW=644.74' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.20 cfs @ 11.97 hrs HW=644.74' (Free Discharge)
↑**2=Orifice/Grate** (Weir Controls 1.20 cfs @ 1.60 fps)

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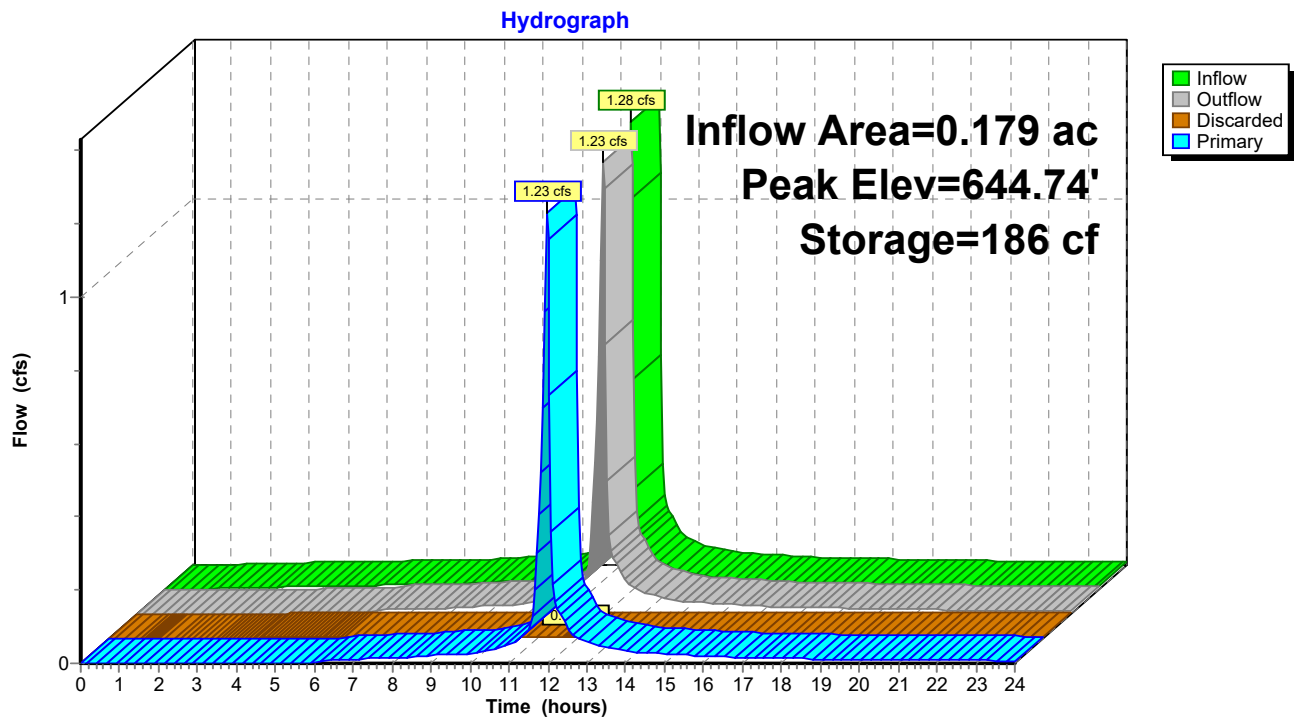
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Type II 24-hr 25-yr Rainfall=5.58"

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Pond 4P: Bio-Infiltration Basin



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Type II 24-hr 100-yr Rainfall=7.57"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=0.327 ac 94.50% Impervious Runoff Depth>7.09"
Flow Length=781' Slope=0.0030 '/' Tc=11.7 min CN=WQ Runoff=2.84 cfs 0.193 af

Subcatchment2S: DA-2 Runoff Area=0.359 ac 95.26% Impervious Runoff Depth>7.12"
Flow Length=781' Slope=0.0026 '/' Tc=12.6 min CN=WQ Runoff=3.05 cfs 0.213 af

Subcatchment3S: DA-3 Runoff Area=0.065 ac 100.00% Impervious Runoff Depth>7.33"
Tc=5.0 min CN=98 Runoff=0.71 cfs 0.040 af

Subcatchment4S: DA-4 Runoff Area=0.012 ac 100.00% Impervious Runoff Depth>7.33"
Tc=5.0 min CN=98 Runoff=0.13 cfs 0.007 af

Subcatchment5S: DA-5 Runoff Area=0.039 ac 35.90% Impervious Runoff Depth>4.63"
Tc=5.0 min CN=WQ Runoff=0.29 cfs 0.015 af

Subcatchment6S: DA-6 Runoff Area=0.688 ac 100.00% Impervious Runoff Depth>7.32"
Tc=10.0 min CN=98 Runoff=6.47 cfs 0.420 af

Subcatchment7S: DA-7 Runoff Area=0.179 ac 82.12% Impervious Runoff Depth>6.57"
Tc=5.0 min CN=WQ Runoff=1.78 cfs 0.098 af

Subcatchment8S: DA-8 Runoff Area=0.249 ac 67.87% Impervious Runoff Depth>5.97"
Tc=5.0 min CN=WQ Runoff=2.29 cfs 0.124 af

Subcatchment9S: DA-9 Runoff Area=0.302 ac 91.06% Impervious Runoff Depth>6.95"
Tc=5.0 min CN=WQ Runoff=3.15 cfs 0.175 af

Subcatchment10S: DA-10 Runoff Area=2.606 ac 100.00% Impervious Runoff Depth>7.32"
Tc=10.0 min CN=98 Runoff=24.50 cfs 1.590 af

Reach 1R: Proposed Runoff Inflow=43.73 cfs 2.865 af
Outflow=43.73 cfs 2.865 af

Pond 4P: Bio-Infiltration Basin Peak Elev=644.80' Storage=211 cf Inflow=1.78 cfs 0.098 af
Discarded=0.00 cfs 0.006 af Primary=1.72 cfs 0.089 af Outflow=1.73 cfs 0.096 af

Total Runoff Area = 4.826 ac Runoff Volume = 2.874 af Average Runoff Depth = 7.15"
4.12% Pervious = 0.199 ac 95.88% Impervious = 4.627 ac

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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 1S: DA-1

Runoff = 2.84 cfs @ 12.03 hrs, Volume= 0.193 af, Depth> 7.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

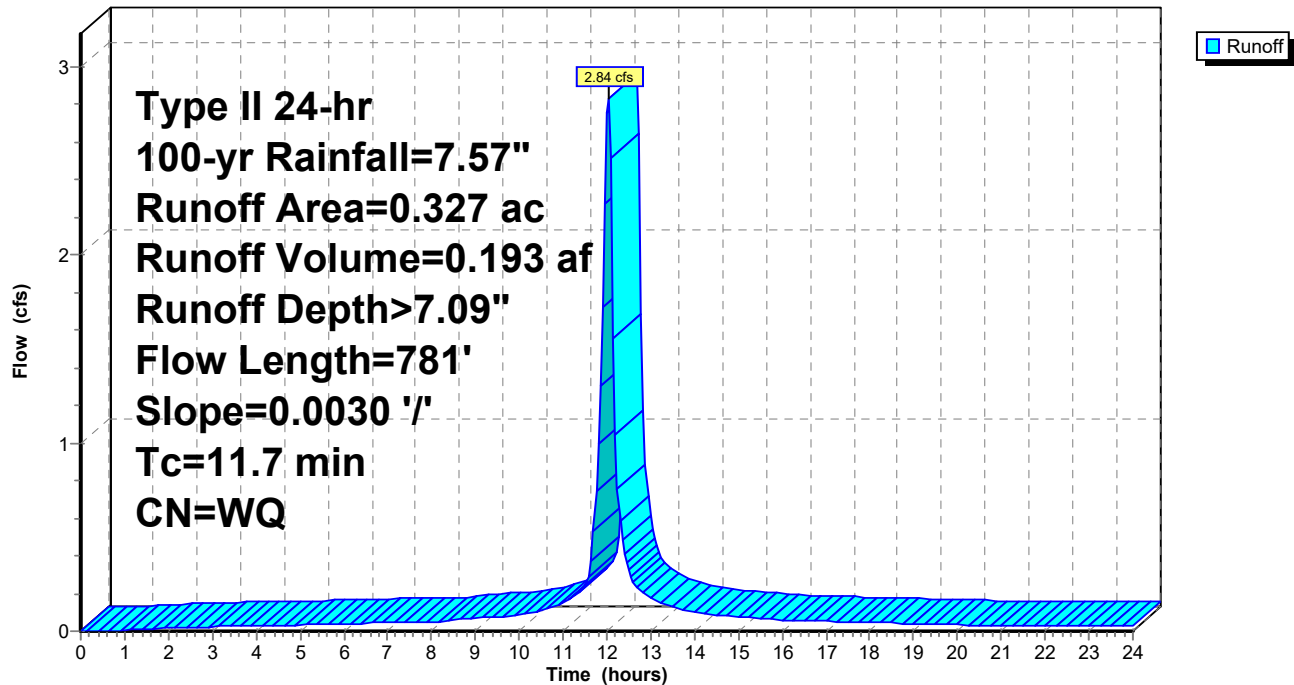
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.309	98	Paved roads w/curbs & sewers, HSG A
0.018	61	>75% Grass cover, Good, HSG B
0.327		Weighted Average
0.018		5.50% Pervious Area
0.309		94.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	781	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 1S: DA-1

Hydrograph



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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 2S: DA-2

Runoff = 3.05 cfs @ 12.04 hrs, Volume= 0.213 af, Depth> 7.12"

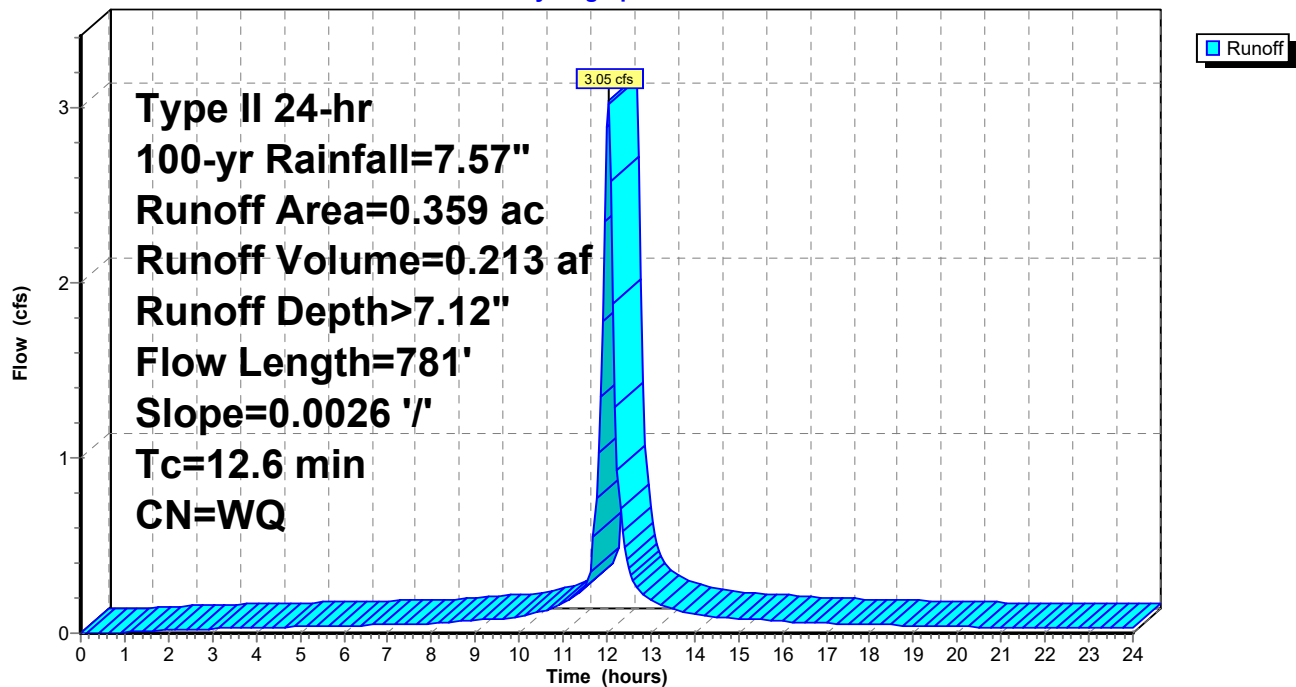
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.342	98	Paved roads w/curbs & sewers, HSG A
0.017	61	>75% Grass cover, Good, HSG B
0.359		Weighted Average
0.017		4.74% Pervious Area
0.342		95.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	781	0.0026	1.04		Shallow Concentrated Flow, Paved Kv= 20.3 fps

Subcatchment 2S: DA-2

Hydrograph



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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 3S: DA-3

Runoff = 0.71 cfs @ 11.95 hrs, Volume= 0.040 af, Depth> 7.33"

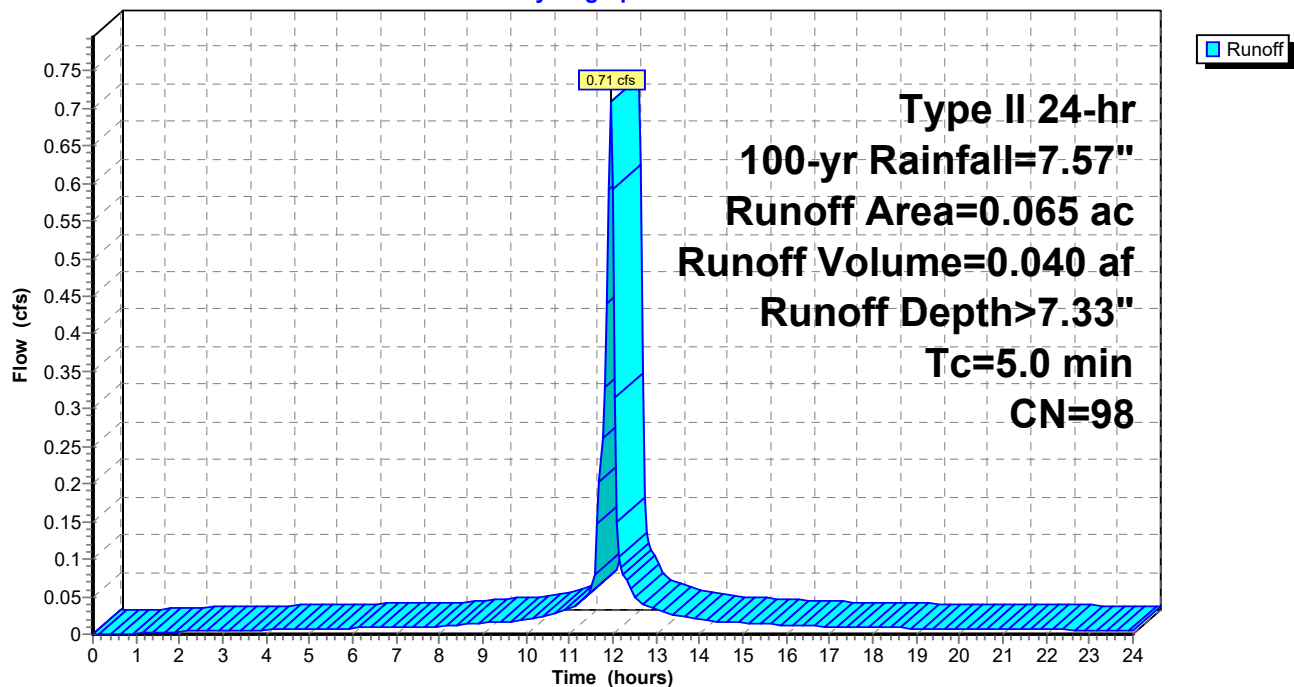
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.065	98	Paved parking, HSG A
0.065		100.00% Impervious Area

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

Subcatchment 3S: DA-3

Hydrograph



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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 4S: DA-4

Runoff = 0.13 cfs @ 11.95 hrs, Volume= 0.007 af, Depth> 7.33"

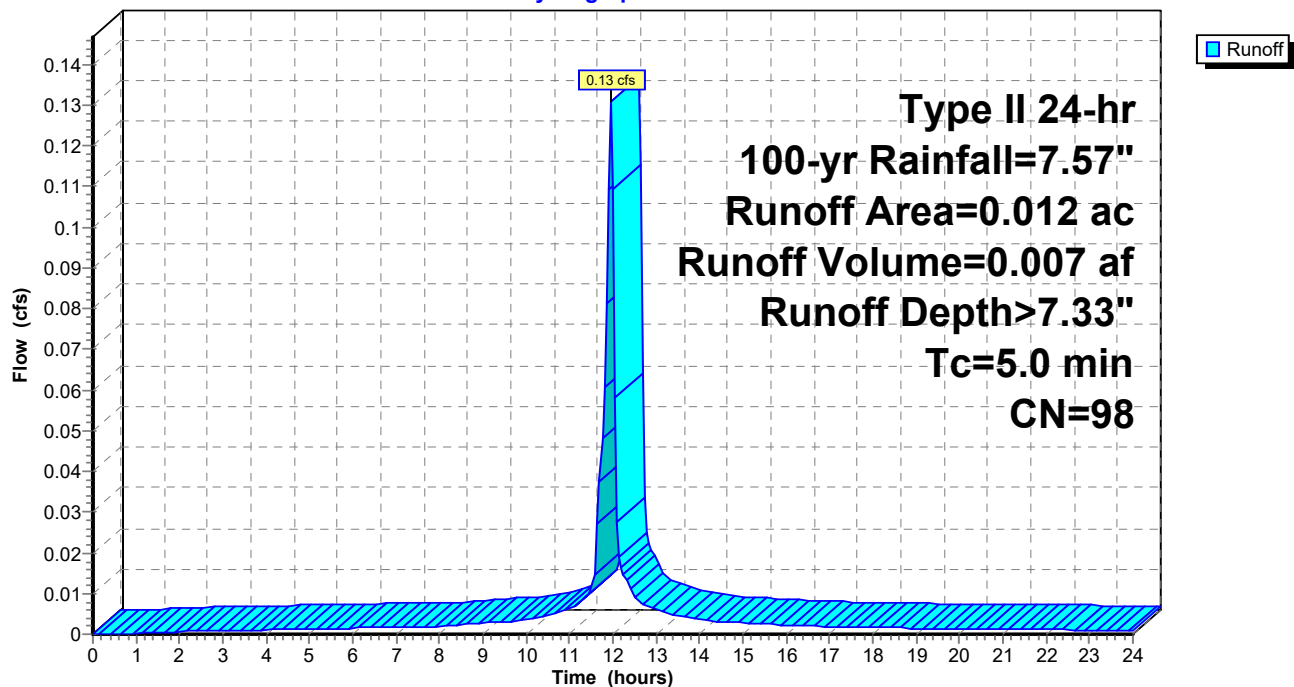
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.012	98	Paved parking, HSG A
0.012		100.00% Impervious Area

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

Subcatchment 4S: DA-4

Hydrograph



19990 Proposed Watersheds

Prepared by ISG

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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 5S: DA-5

Runoff = 0.29 cfs @ 11.96 hrs, Volume= 0.015 af, Depth> 4.63"

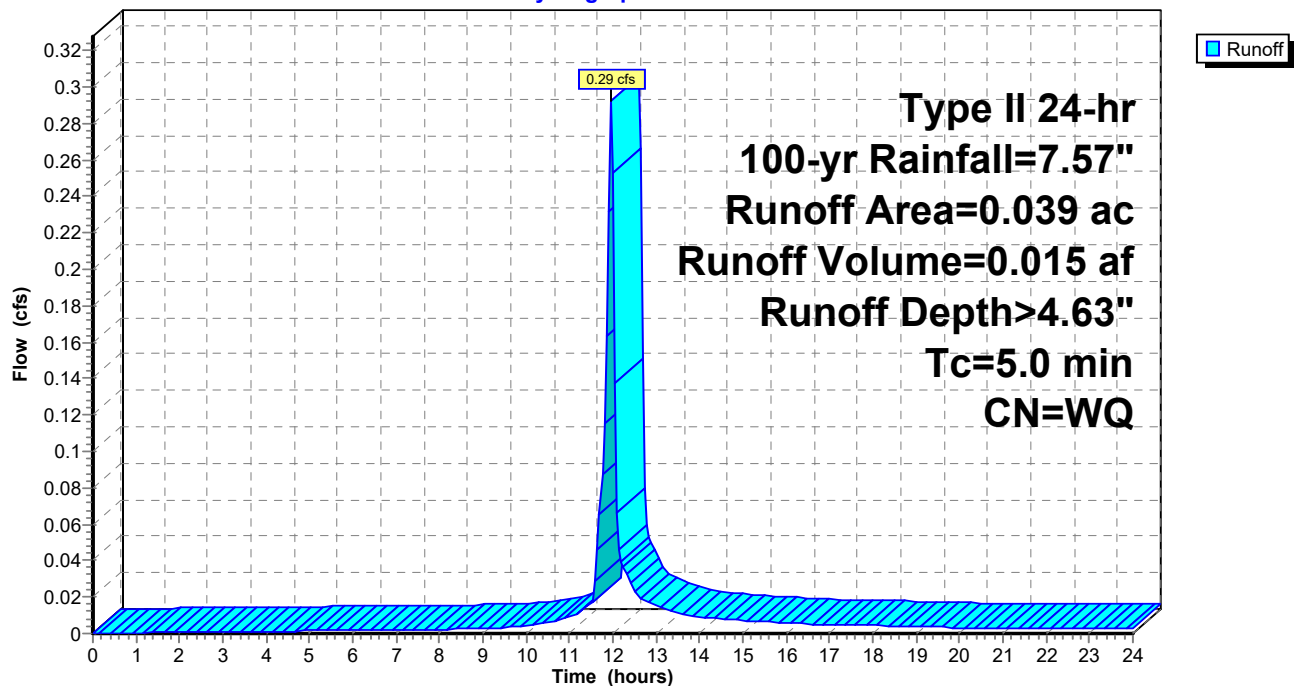
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.014	98	Paved parking, HSG A
0.025	61	>75% Grass cover, Good, HSG B
0.039		Weighted Average
0.025		64.10% Pervious Area
0.014		35.90% Impervious Area

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

Subcatchment 5S: DA-5

Hydrograph



19990 Proposed Watersheds

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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 6S: DA-6

Runoff = 6.47 cfs @ 12.01 hrs, Volume= 0.420 af, Depth> 7.32"

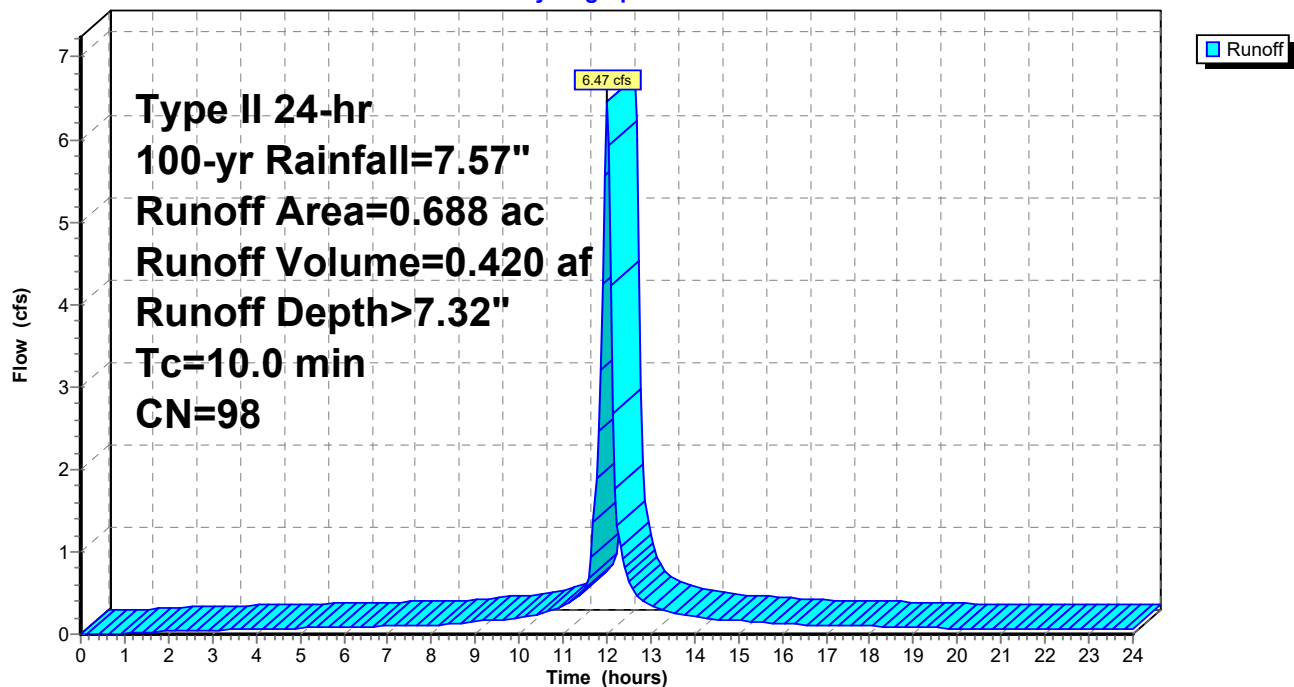
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.688	98	Roofs, HSG A
0.688		100.00% Impervious Area

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

Subcatchment 6S: DA-6

Hydrograph



19990 Proposed Watersheds

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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 7S: DA-7

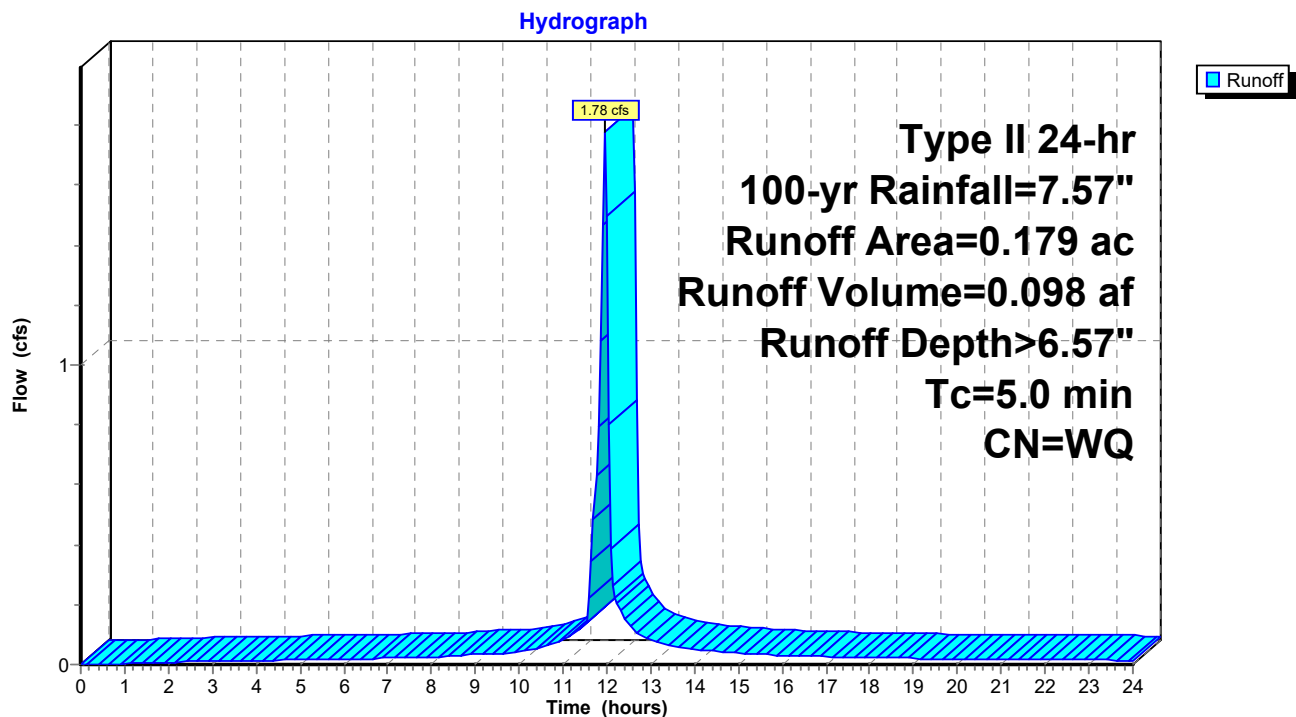
Runoff = 1.78 cfs @ 11.95 hrs, Volume= 0.098 af, Depth> 6.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.147	98	Paved roads w/curbs & sewers, HSG A
0.032	61	>75% Grass cover, Good, HSG B
0.179		Weighted Average
0.032		17.88% Pervious Area
0.147		82.12% Impervious Area

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

Subcatchment 7S: DA-7



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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 8S: DA-8

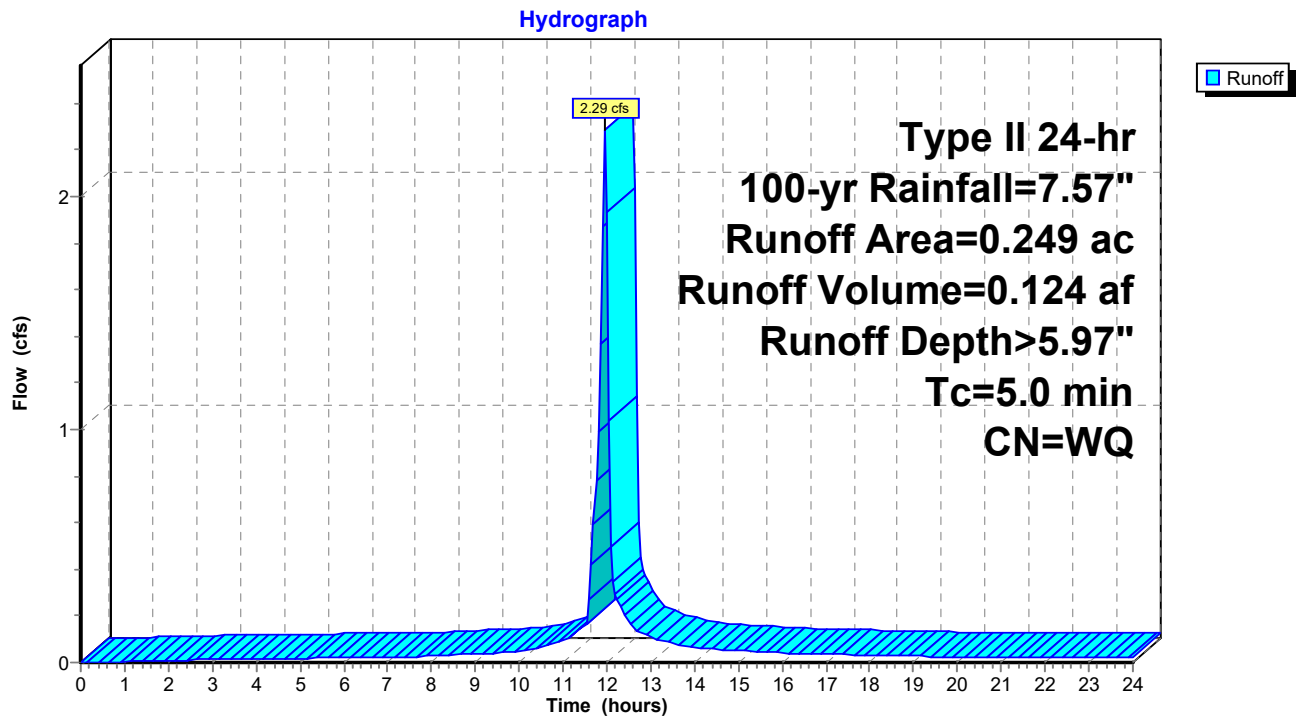
Runoff = 2.29 cfs @ 11.95 hrs, Volume= 0.124 af, Depth> 5.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.169	98	Paved roads w/curbs & sewers, HSG A
0.080	61	>75% Grass cover, Good, HSG B
0.249		Weighted Average
0.080		32.13% Pervious Area
0.169		67.87% Impervious Area

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

Subcatchment 8S: DA-8



19990 Proposed Watersheds

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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 9S: DA-9

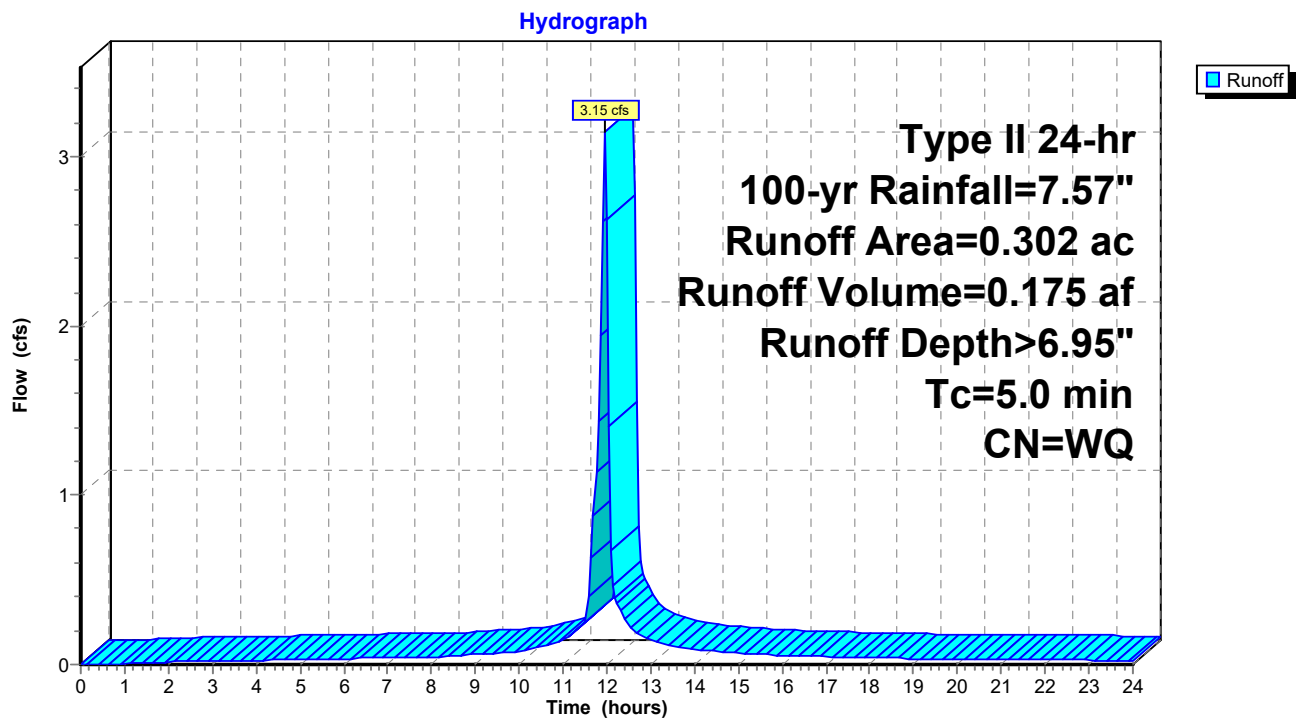
Runoff = 3.15 cfs @ 11.95 hrs, Volume= 0.175 af, Depth> 6.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
0.275	98	Paved roads w/curbs & sewers, HSG A
0.027	61	>75% Grass cover, Good, HSG B
0.302		Weighted Average
0.027		8.94% Pervious Area
0.275		91.06% Impervious Area

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

Subcatchment 9S: DA-9



19990 Proposed Watersheds

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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 10S: DA-10

Runoff = 24.50 cfs @ 12.01 hrs, Volume= 1.590 af, Depth> 7.32"

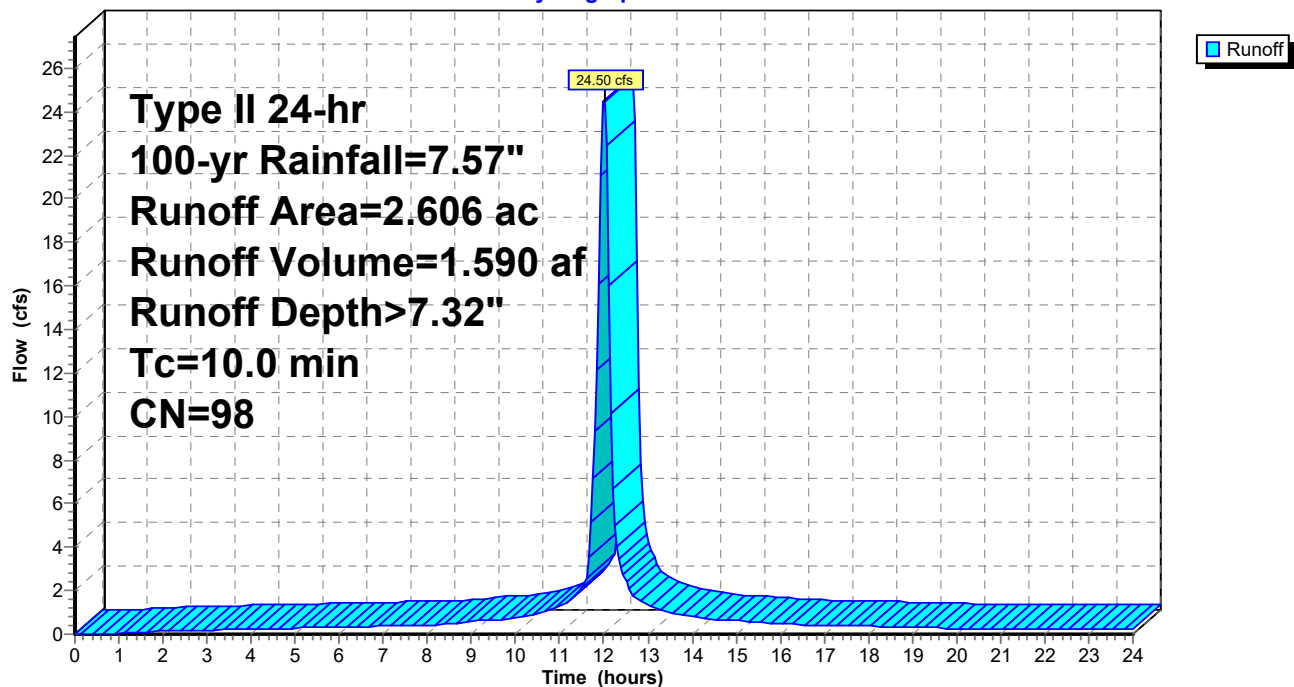
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (ac)	CN	Description
2.606	98	Roofs, HSG A
2.606		100.00% Impervious Area

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

Subcatchment 10S: DA-10

Hydrograph



19990 Proposed Watersheds

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Type II 24-hr 100-yr Rainfall=7.57"

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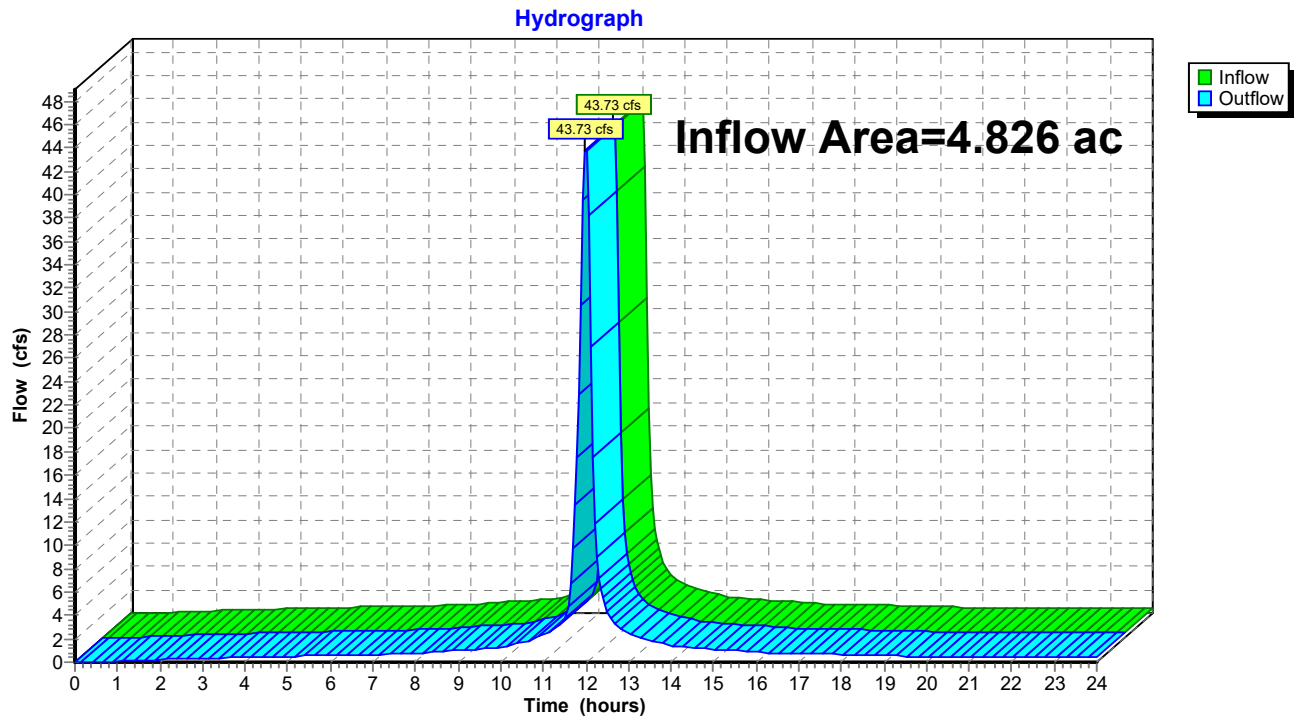
Page 58

Summary for Reach 1R: Proposed Runoff

Inflow Area = 4.826 ac, 95.88% Impervious, Inflow Depth > 7.12" for 100-yr event
Inflow = 43.73 cfs @ 12.00 hrs, Volume= 2.865 af
Outflow = 43.73 cfs @ 12.00 hrs, Volume= 2.865 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 1R: Proposed Runoff



19990 Proposed Watersheds

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Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Pond 4P: Bio-Infiltration Basin

Inflow Area = 0.179 ac, 82.12% Impervious, Inflow Depth > 6.57" for 100-yr event
Inflow = 1.78 cfs @ 11.95 hrs, Volume= 0.098 af
Outflow = 1.73 cfs @ 11.96 hrs, Volume= 0.096 af, Atten= 3%, Lag= 0.8 min
Discarded = 0.00 cfs @ 11.97 hrs, Volume= 0.006 af
Primary = 1.72 cfs @ 11.96 hrs, Volume= 0.089 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 644.80' @ 11.97 hrs Surf.Area= 409 sf Storage= 211 cf

Plug-Flow detention time= 31.4 min calculated for 0.095 af (97% of inflow)
Center-of-Mass det. time= 15.4 min (760.7 - 745.3)

Volume	Invert	Avail.Storage	Storage Description
#1	644.00'	298 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
644.00	115	0	0
645.00	480	298	298

Device	Routing	Invert	Outlet Devices
#1	Discarded	644.00'	0.500 in/hr Exfiltration over Surface area
#2	Primary	644.50'	12.0" Horiz. Orifice/Grate C= 0.600 in 12.0" Grate (100% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 11.97 hrs HW=644.80' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.68 cfs @ 11.96 hrs HW=644.80' (Free Discharge)
↑**2=Orifice/Grate** (Weir Controls 1.68 cfs @ 1.79 fps)

19990 Proposed Watersheds

Prepared by ISG

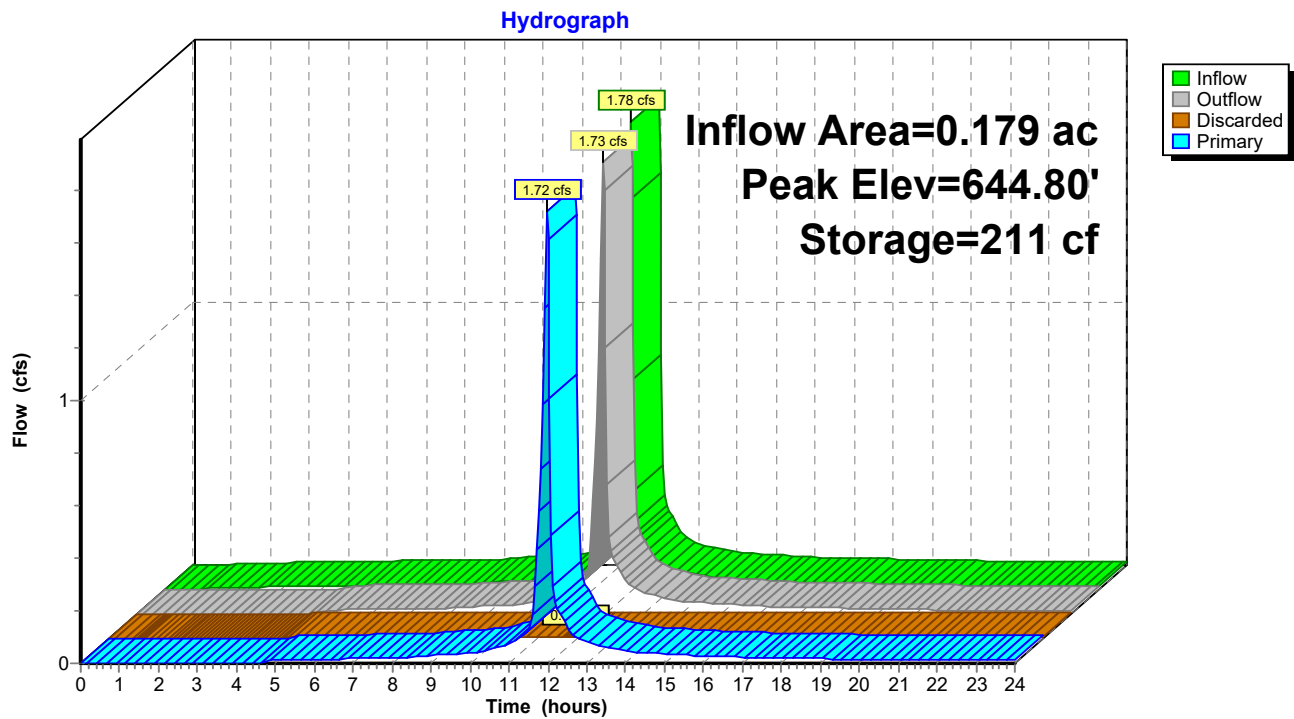
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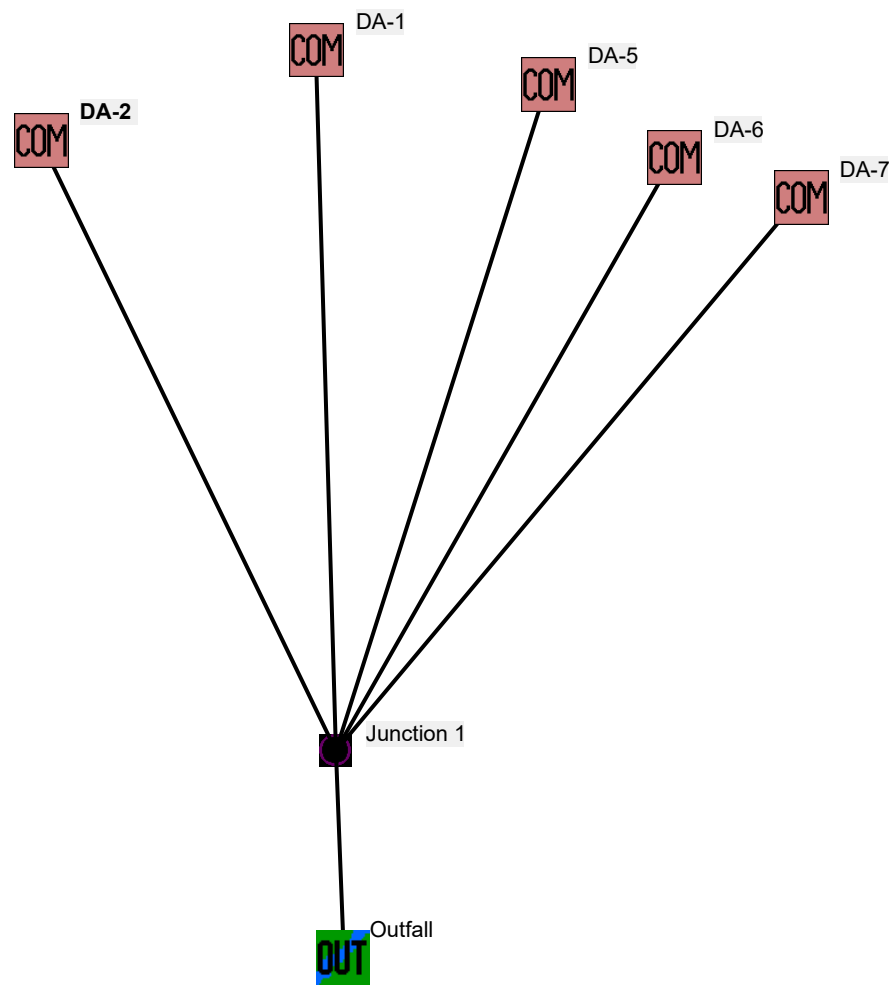
Type II 24-hr 100-yr Rainfall=7.57"

Printed 10/21/2019

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Pond 4P: Bio-Infiltration Basin





1 - PROPOSED NO ROOF

Data file name: S:\Projects\19000 PROJ\19900-19999\19990 La Crosse Center Expansion-La Crosse WI\19990 Civil-Survey\Civil Calcs\Hydrology\Proposed - No Roof
WinSLAMM Version 10.4.1

Rain file name: C:\WinSLAMM Files\Rain Files\MN Minneapolis 59.RAN

Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx

Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx

Residential Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Freeway Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False

Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx

Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv

Cost Data file name:

If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations

Seed for random number generator: -42

Study period starting date: 01/02/59

Study period ending date: 12/28/59

Start of Winter Season: 12/02

End of Winter Season: 03/12

Date: 10-21-2019

Time: 08:10:10

Site information:

LU# 1 - Commercial: DA-2 Total area (ac): 0.158

37 - Streets 1: 0.158 ac. Smooth Street Length = 0.055 curb-mi Street Width (assuming two curb-mi per street mile) = 47.4 ft

Default St. Dirt Accum. Annual Winter Load = 2500 lbs PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 2 - Commercial: DA-1 Total area (ac): 0.166

37 - Streets 1: 0.166 ac. Smooth Street Length = 0.055 curb-mi Street Width (assuming two curb-mi per street mile) = 49.8 ft

Default St. Dirt Accum. Annual Winter Load = 2500 lbs PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 3 - Commercial: DA-5 Total area (ac): 0.045

13 - Paved Parking 1: 0.045 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 4 - Commercial: DA-6 Total area (ac): 0.065

13 - Paved Parking 1: 0.060 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz

51 - Small Landscaped Areas 1: 0.005 ac. Moderately Compacted Sandy PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 5 - Commercial: DA-7 Total area (ac): 0.254

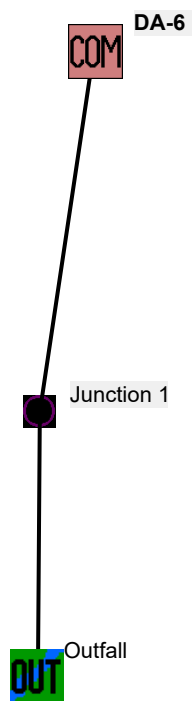
13 - Paved Parking 1: 0.089 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz

31 - Sidewalks 1: 0.055 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz

51 - Small Landscaped Areas 1: 0.110 ac. Moderately Compacted Sandy PSD File: C:\WinSLAMM Files\NURP.cpz

Data file name: S:\Projects\19000 PROJ\19900-19999\19990 La Crosse Center Expansion-La Crosse WI\19990 Civil-Survey\Civil Calcs\Hydrology\Proposed - No Roof
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\MN Minneapolis 59.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppd
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/02/59 Study period ending date: 12/28/59
Start of Winter Season: 12/02 End of Winter Season: 03/12
Model Run Start Date: 01/02/59 Model Run End Date: 12/28/59
Date of run: 10-21-2019 Time of run: 08:11:28
Total Area Modeled (acres): 0.688
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	43976	-	200.0	548.9	-
Outfall Total with Controls:	43973	0.01%	200.0	549.0	-0.02%
Annualized Total After Outfall Controls:	44584			556.6	



2 - PROPOSED ROOF

Data file name: S:\Projects\19000 PROJ\19900-19999\19990 La Crosse Center Expansion-La Crosse WI\19990 Civil-Survey\Civil Calcs\Hydrology\Proposed Model - R
WinSLAMM Version 10.4.1

Rain file name: C:\WinSLAMM Files\Rain Files\MN Minneapolis 59.RAN

Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx

Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx

Residential Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Freeway Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False

Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx

Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv

Cost Data file name:

If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations

Seed for random number generator: -42

Study period starting date: 01/02/59

Study period ending date: 12/28/59

Date: 10-21-2019

Time: 08:12:45

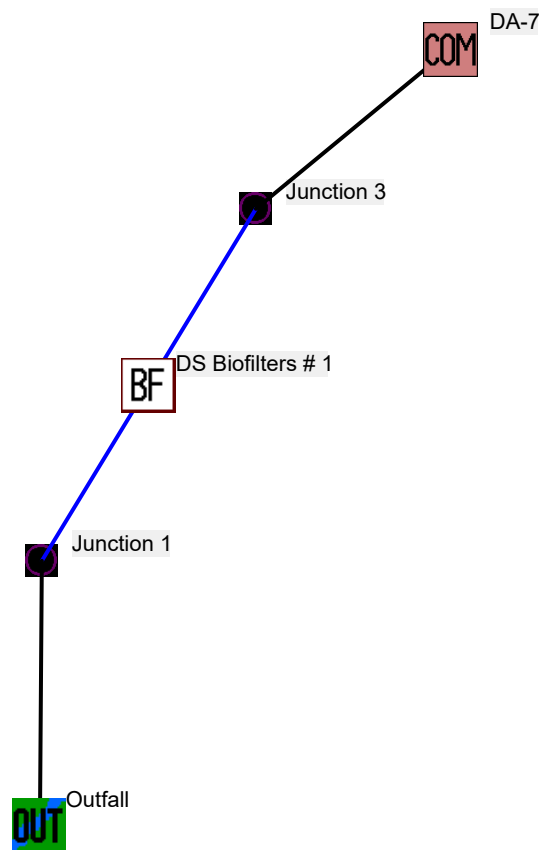
Site information:

LU# 1 - Commercial: DA-6 Total area (ac): 0.688

1 - Roofs 1: 0.688 ac. Flat Connected PSD File: C:\WinSLAMM Files\NURP.cpz

Data file name: S:\Projects\19000 PROJ\19900-19999\19990 La Crosse Center Expansion-La Crosse WI\19990 Civil-Survey\Civil Calcs\Hydrology\Proposed Model - R
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\MN Minneapolis 59.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/02/59 Study period ending date: 12/28/59
Model Run Start Date: 01/02/59 Model Run End Date: 12/28/59
Date of run: 10-21-2019 Time of run: 08:13:39
Total Area Modeled (acres): 0.688
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	48964	-	33.00	100.9	-
Outfall Total with Controls:	48966	0.00%	33.00	100.9	0.00%
Annualized Total After Outfall Controls:	49646			102.3	



3 - PROPOSED BIO-INFILTRATION BASIN

Data file name: S:\Projects\19000 PROJ\19900-19999\19990 La Crosse Center Expansion-La Crosse WI\19990 Civil-Survey\Civil Calcs\Hydrology\Proposed Model.mxd
WinSLAMM Version 10.4.1

Rain file name: C:\WinSLAMM Files\Rain Files\MN Minneapolis 59.RAN

Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx

Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx

Residential Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Freeway Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std

Apply Street Delivery File to Adjust the After Event Load Street Dirt Mass Balance: False

Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx

Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv

Cost Data file name:

If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations

Seed for random number generator: -42

Study period starting date: 01/02/59

Study period ending date: 12/28/59

Date: 10-21-2019

Time: 08:16:03

Site information:

LU# 1 - Commercial: DA-7 Total area (ac): 0.179

13 - Paved Parking 1: 0.092 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz

31 - Sidewalks 1: 0.055 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz

51 - Small Landscaped Areas 1: 0.032 ac. Moderately Compacted Sandy PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Biofilter CP# 1 (DS) - DS Biofilters # 1

1. Top area (square feet) = 480

2. Bottom area (square feet) = 115

3. Depth (ft): 3.5

4. Biofilter width (ft) - for Cost Purposes Only: 10

5. Infiltration rate (in/hr) = 0.5

6. Random infiltration rate generation? No

7. Infiltration rate fraction (side): 0.01

8. Infiltration rate fraction (bottom): 1

9. Depth of biofilter that is rock filled (ft) 0.5

10. Porosity of rock filled volume = 0.4

11. Engineered soil infiltration rate: 13

12. Engineered soil depth (ft) = 2

13. Engineered soil porosity = 0.51

14. Percent solids reduction due to flow through engineered soil = 0

15. Biofilter peak to average flow ratio = 3.8

16. Number of biofiltration control devices = 1

17. Particle size distribution file: Not needed - calculated by program

18. Initial water surface elevation (ft): 0

Soil Data Soil Type Fraction in Eng. Soil

Sands 0.600

Peat as Amendment 0.200

Compost as Amendment 0.200

Saturation water content percent (Porosity) = 0

Field capacity (%) = 0

Permanent Wilting Point (%) = 0

Infiltration rate (in/hr) = 13

Biofilter Outlet/Discharge Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 5

2. Weir crest width (ft): 5

3. Height of datum to bottom of weir opening: 3.4

Outlet type: Vertical Stand Pipe

1. Stand pipe diameter (ft): 1

2. Stand pipe height above datum (ft): 3

Data file name: S:\Projects\19000 PROJ\19900-19999\19990 La Crosse Center Expansion-La Crosse WI\19990 Civil-Survey\Civil Calcs\Hydrology\Proposed Model.mdb
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\MN Minneapolis 59.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/02/59 Study period ending date: 12/28/59
Model Run Start Date: 01/02/59 Model Run End Date: 12/28/59
Date of run: 10-21-2019 Time of run: 08:49:32
Total Area Modeled (acres): 0.179
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	11441	-	125.2	89.43	-
Outfall Total with Controls:	3570	68.80%	123.1	27.43	69.33%
Annualized Total After Outfall Controls:	3620			27.81	

Post-Construction Stormwater Management Maintenance Plan

La Crosse Center – La Crosse, Wisconsin

The stormwater management facilities for this project will be owned and maintained by the City of La Crosse. This document will provide direction for performing an inspection and any necessary maintenance of stormwater management practices. It is the responsibility of the property owner to perform the inspections of the stormwater management practices and to perform maintenance as needed.

The Inspection Process

Below are the inspection checklists to be completed on a scheduled interval stated on each checklist by the property owner or an assigned subcontractor. Refer to the site plans for item identification. Additionally, inspections shall be performed any time standing water is observed in the bio-infiltration basins 48 hours after a rainfall event.

Perform Necessary Maintenance

After performing the inspection process, any required maintenance must be performed by the property owner or an assigned subcontractor within 30 calendar days.

If standing water in bio-infiltration basin remains 2 days (48 hours) after a rainfall event, the system may have become clogged with sediment and the existing sand bottom shall be tilled. If the problem of standing water (for the period in excess of 2 days) occurs two times within a 12 month period, the existing sand bottom shall be removed and replaced. Outlet structures and pipes shall be cleaned annually (at a minimum) and as needed to remove trash/debris and sediment to provide proper conveyance from the rain garden. All removed material shall be properly disposed in a landfill in accordance with state and local laws.

All removed sediment must be disposed of according to applicable regulations.

It is assumed that maintenance will consist of a combination of labor and equipment use to accomplish tasks ranging from sediment removal to trash cleanup.

Record Keeping

It is the responsibility of the property owner to maintain accurate inspection and maintenance records.

BMP Inspection Schedule and Checklist



Stormwater Maintenance Schedule and Inspection List

Facility ID	<u>La Crosse Center</u>
Location	<u>La Crosse, WI</u>
GPS Coordinates	<u></u>
Inspector(s)	<u></u>
Date	<u></u>
Time	<u></u>

Party/Department Responsible for Maintenance:

Contact(s):

Phone Number(s):

Email:

Mailing Address:

BMP Inspection Schedule and Checklist



A. Inlets

- 1 = Good Condition
- 2 = Acceptable, Item on Watch
- 3 = Item Requires Maintenance Within the Year
- 4 = Failed Item, Requires Immediate Maintenance

Note: All items associated with Pretreatment shall be inspected twice a year.
Once in early Spring and once in late Fall.

- 1. Inlets provide stable conveyance into facility
- 2. Excessive trash/debris/sediment accumulation at inlet
- 3. Evidence of erosion at/around inlet

2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039



1 = Good Condition
2 = Acceptable, Item on Watch
3 = Item Requires Maintenance Within the Year
4 = Failed Item, Requires Immediate Maintenance

[illegible]

1 = Good Condition
2 = Acceptable, Item on Watch
3 = Item Requires Maintenance Within the Year
4 = Failed Item, Requires Immediate Maintenance

[illegible]

BMP Inspection Schedule and Checklist

C. Outlets

- 1 = Good Condition
- 2 = Acceptable, Item on Watch
- 3 = Item Requires Maintenance Within the Year
- 4 = Failed Item, Requires Immediate Maintenance

Note: All items associated with Outlets shall be inspected twice a year.
Once in the early Spring and once in late Fall.

- 1. Outlets provide stable conveyance from facility
- 2. Excessive trash/debris/sediment accumulation at outlet
- 3. Evidence of erosion at/around outlet

2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039

D. Miscellaneous

- 1 = Good Condition
- 2 = Acceptable, Item on Watch
- 3 = Item Requires Maintenance Within the Year
- 4 = Failed Item, Requires Immediate Maintenance

Note: All miscellaneous items shall be inspected annually or as otherwise noted.

- 1. Complaints from local residents
- 2. Pest problems
- 4. Adequate safety signage

2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039

[illegible]



Photographs	
Photo ID	Description
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Sketch of Facility