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Preliminary Stormwater Management Plan

Bridge Park Block B

City of Dublin, Ohio

June 23, 2015

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Stormwater Management Plan

Bridge Park
Block B

City of Dublin, Ohio

Prepared By:

EMH&T
5500 New Albany Road
Columbus, Ohio 43054

I hereby certify that the calculations contained herein are accurate to the best of my knowledge and belief.

By: Alex J. McBride, P.E., CFM

6/25/15
Date

Project Summary:

Project Name:	Bridge Park Block B
Location:	City of Dublin, Ohio
Type:	Stormwater Management Plan
Reviewing Agency:	City of Dublin

Hydrologic Summary:

Rainfall Data: City of Dublin Stormwater Management Design Manual

1-yr	2.20”
2-yr	2.63”
5-yr	3.24”
10-yr	3.74”
25-yr	4.44”
50-yr	5.02”
100-yr	5.63”

Rainfall Distribution:	NRCS Type II 24 hour
Detention Policy:	City of Dublin
Water Quality:	City of Dublin, Ohio EPA
Hydrology Modeling Program:	HydroCAD 10.00

Design Summary:

Detention:	Not required due to project being located within the “Bridge Street District East A Exemption Area”
Water Quality:	Bio-retention Basins, StormTech Isolator Rows
Receiving Water Body:	Scioto River

Table of Contents

Appendices

1.0 INTRODUCTION

The following report provides a detailed analysis and design of the stormwater management plan for the Bridge Park Block B redevelopment project in the City of Dublin, Ohio. The proposed site is located southeast of the intersection of Dale Drive and Riverside Drive. The proposed project will disturb 3.55 acres of existing commercial development and is proposing to add four new mix-used buildings. This project is not required to provide stormwater quantity control due to its location within the "Bridge Street District East A Exemption Area" as shown on Figure 2-1 within the City of Dublin Stormwater Management Design Manual. A portion of the project area will be routed to the two proposed bio-retention basins and StormTech Isolator Rows for post-construction water quality treatment. Runoff from the site discharges to the Scioto River which is located directly west of the project area.

2.0 HYDROLOGIC ANALYSIS

Hydrologic parameters such as Runoff Curve Number (RCN) and Time of Concentration were determined using standard Natural Resources Conservation Service (NRCS) methodology. The 1-, 2-, 5-, 10-, 25-, 50-, and 100-year storm event discharge amounts were calculated using the NRCS TR-55 method. This analysis reflects the NRCS Type II distribution, 24-hr storm duration. Rainfall depths were obtained from the City of Dublin Stormwater Management Design Manual. The peak flow rates were computed using the HydroCAD 10.00 computer program.

3.0 EXISTING CONDITIONS ANALYSIS

The existing condition project area, as shown in Exhibit 1 in Appendix C, is comprised of two subareas, Existing LOD 01 and Existing LOD 02 (LOD = Limits of Disturbance). Existing LOD 01 consists of 2.25 acres of impervious area and open space in Type "C" Soils (Milton Silt Loam) which corresponds to a Runoff Curve Number of 95 (based on the area being 86% impervious).

Existing 02 consists of 1.30 acres of impervious area and open space in Type "C" Soils (Milton Silt Loam) which corresponds to a Runoff Curve Number of 96 (based on the area being 92% impervious). The existing site characteristics are shown in Table 1.

Table 1
Existing Subarea Characteristics

Subarea Identifier	Tributary Area (acres)	Land Usage	% Impervious	Composite Runoff Curve Number
Existing LOD 01	2.25	Impervious Area, Open Space	86%	95
Existing LOD 02	1.30	Impervious Area, Open Space	92%	96
Total	**3.55**	-	-	-

The proposed redevelopment is located within the "Bridge Street District East A Exemption Area" and will not be required to provide stormwater quantity control. Since there is no detention requirement, no existing condition peak flow rate analysis has been performed.

4.0 PROPOSED CONDITIONS ANALYSIS

Exhibit 2, provided within Appendix C, shows the post-developed site condition. The proposed development will utilize two bio-retention basins (Bio-Basin 01 and Bio-Basin 02) and an underground StormTech system (StormTech 01) to meet post-construction water quality requirements. The post-developed site is comprised of four subareas: Proposed LOD 01, Proposed LOD 02, Subarea 01 and Subarea 02. The post-developed 3.55 acre project area is encompassed within Proposed LOD 01 and Proposed LOD 02 which can be compared to the existing condition subareas. Subarea 01 represents the amount of rooftop area from Building B4 that will be directed to the proposed Bio-Basin 01. Runoff from Subarea 01 and Bio-Basin 01 will receive supplemental treatment within the StormTech Isolator Rows, labeled as StormTech 01, situated downstream of Bio-Basin 01. Subarea 02 represents the amount of rooftop area from Building B1 that will be directed to the proposed Bio-Basin 02.

The remaining project area outside of Subareas 01 and 02 will be directly routed to the onsite storm sewer system which discharges to the public storm sewer systems within the adjacent public roadways. All stormwater runoff from the project area will discharge directly to the Scioto River, situated west of the project area. The post-developed subarea characteristics are summarized in Table 2.

Table 2
Post-developed Subarea Characteristics

Subarea Identifier	Tributary Area (acres)	Land Usage	% Impervious	Composite Runoff Curve Number	Time of Concentration (min)
Proposed LOD 01	2.25	Buildings B3 and B4, Bio-Basin 01	97%	97	5.0
Proposed LOD 02	1.30	Buildings B1 and B2, Bio-Basin 02	98%	98	5.0
Total Proposed LOD	**3.55**				
Subarea 01*	1.00	Building B4, Bio-Basin 01	100%	98	5.0
Subarea 02**	0.50	Building B1, Bio-Basin 02	100%	98	5.0
Total	**1.50**	-	-	-	-

*Discharges to Bio-Basin 01 and StormTech 01
**Discharges to Bio-Basin 02

5.0 OUTLET DESIGN

The function of the outlet control structures for the proposed stormwater management features are described below. Outlet details and elevations will be finalized with construction plans and summarized in a revised stormwater management report.

The proposed bio-retention basins, Bio-Basin 01 and Bio-Basin 02, will be situated in an offline configuration from the building roof drains and downstream storm sewer system. The proposed roof drain will come into a "diversion" structure at an elevation below the bottom of the proposed bio-retention basin surface. Within the diversion structure, a weir wall will be placed to force stormwater runoff coming from the roof drain to back-up until it reaches the elevation of an open window which directs runoff to the bio-

retention surface. As runoff continues to pond up in the diversion structure and bio-retention basin, it will overtop the weir wall and direct runoff to the downstream storm sewer system. Runoff that gets trapped behind the weir wall (below the crest of the weir wall) and lower than the window will be drained by a small diameter relief orifice at the bottom of the weir wall which directs the runoff to the downstream storm sewer on the opposite side of the wall.

The proposed StormTech Isolator Row system, which is located downstream of Bio-Basin 01, will also be situated in an offline configuration to allow larger storm events to bypass the water quality feature. A weir wall be used to direct the water quality flow into StormTech Isolator Row which will then discharge the clean runoff on the downstream side of the weir wall.

6.0 POST-CONTRUCTION WATER QUALITY

The proposed project is classified as a redevelopment project per the EPA General Permit. Strategies to meet the requirements include treating at least 20% of the existing impervious area; reduce the impervious area by 20%, or a combination of the two. It is also required that 100% of the water quality volume for new impervious area be treated. The project will treat more than 20% of the required water quality volume from existing impervious/pervious areas and 100% of new impervious areas to meet water quality requirements. The project area associated with the redevelopment condition is 3.55 acres of which 3.13 acres is existing impervious area and 3.47 acres is proposed impervious area. The required amount of redevelopment water quality volume treatment for the entire project area (3.55 acres) is 2,136 cubic feet, or 0.049 acre-feet. Water quality calculations are provided within Appendix A.

Impervious areas within the development are tributary to the proposed bio-retention basins and StormTech Isolator Row. To determine the amount of surface area that is required for the bio-retention basins, the water quality volume for the tributary area was calculated. Per the City of Dublin Stormwater Management Design Manual, the required bio-retention basin surface areas are shown in Table 3.

Table 3
Bio-retention Surface Area Requirements

Bio-retention Basin	Subarea Identifier	Tributary area (acres)	Calculated Water Quality Volume (ac-ft)	Required Bio-retention Surface Area (ft^2)	Provided Bio-retention Surface Area (ft^2)
01	Subarea 01	1.00	0.050	1678	302
02	Subarea 02	0.50	0.025	839	245
Total	**-**	**1.50**	**0.075**	**2,518**	**547**

Due to the bio-retention basins providing insufficient surface area to treat the required water quality volume, the Bio-Basin 01 will be supplemented with a StormTech Isolator Row situated downstream of the Bio-Basin 01. Due to site constraints and insufficient room for a traditional water quality BMP, the StormTech Isolator Row will be utilized as a supplemental BMP to assist with meeting the 80% TSS Removal requirement. The proposed StormTech Isolator Row, labeled as StormTech 01, will provide full treatment of Subarea 01 which exceeds and meets the water quality requirements for the 3.55 acre project area. The use of a StormTech Isolator row as a water quality BMP has been justified by independent testing. Included within Appendix A of this report is a document presenting the results of TSS removal testing of the StormTech Isolator Row. There is no drawdown requirement for this site due to the project directly discharging to the Scioto River.

The StormTech Isolator Row is designed to trap sediment and pollutants. The Isolator Row is lined with a geo-textile fabric, which keep sediment and pollutants within the Isolator Row where they will be removed periodically based on a proposed maintenance schedule (typically every 6-12 months, the frequency based on first year observations). The water quality flow that is generated from the water quality event will be routed to the Isolator Row where it will be filtered before it can reach the proposed outlet control structure.

To calculate a water quality flow for determining the required amount of Isolator Row chambers, a HydroCAD model was created to determine the peak runoff rate based on a rainfall depth of 0.75". Accurate modeling of runoff from a common rainfall event was accomplished by using the 2-hour duration, 0-10 mi^2, 1st Quartile, 50% Huff distribution with a rainfall depth of 0.75". Adjustments to the Runoff Curve Number were made so as to produce a runoff volume equal to, or slightly higher than, the calculated water quality volume. A curve number of 99 was found to generate the calculated water quality volumes (runoff volumes).

The MC-3500 chamber is recommended for this application due to the restricted amount of space available. Each chamber is 85.4 inches long with a width of 51 inches. Each chamber is rated to treat 2.5 gallons per minute per square foot of chamber bed area. The MC-3500 has a chamber bed area of 43.2 square feet per chamber which is being provided in an offline configuration as shown on Exhibit 2. Water quality calculations to determine the number of required chambers and information on the MC-3500 chamber are provided in Appendix A and are summarized in Table 4 below.

Table 4
StormTech Sizing Calculations

Subarea Identifier	StormTech Identifier	Tributary area (acres)	Calculated Water Quality Volume (ac-ft)	Water Quality Flow (cfs)	Required Number of MC-3500 Chambers	Provided Number of MC-3500 Chambers
Subarea 01	01	1.00	0.050	0.95	4	5

The StormTech system will treat a tributary area of 1.00 acres (Subarea 01). **The required water quality volume to be treated for the 3.55 acres of disturbance is 2,136 cubic feet, or 0.049 acre-feet. The StormTech Isolator Row will treat a water quality volume of 0.050 ac-ft or 2,178 cubic feet.**

7.0 CONCLUSION

The proposed stormwater management plan for the Bridge Park Block B meets all requirements for both the City of Dublin and the Ohio EPA.


83° 6' 41" W
83° 6' 24" W
320040
320100
320160
320220
320280
320340
320400
40° 6' 12" N
40° 5' 55" N
4441390
4441330
4441270
4441210
4441150
4441090
4441030
4440970
4440910
4440850
MkB
Dale Dr
MIC2
MoC2
MoB
257
Scioto River
33
RhD2
Ramp
Riverside Dr
Map Scale: 1:2,670 if printed on A portrait (8.5" x 11") sheet.
Meters
0 35 70 140 210
Feet
0 100 200 400 600
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

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

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Franklin County, Ohio
Survey Area Data: Version 12, Sep 18, 2014

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

Date(s) aerial images were photographed: Aug 4, 2014—Aug 27, 2014

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Franklin County, Ohio (OH049)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
MkB	Miamian silt loam, 2 to 6 percent slopes	C	0.2	0.6%
MlC2	Miamian silty clay loam, 6 to 12 percent slopes, eroded	C	4.4	16.9%
MoB	Milton silt loam, 2 to 6 percent slopes	C	14.9	56.7%
MoC2	Milton silt loam, 6 to 12 percent slopes, eroded	C	6.7	25.6%
RhD2	Ritchey silt loam, 12 to 18 percent slopes, eroded	D	0.1	0.2%
Totals for Area of Interest			**26.3**	**100.0%**

APPENDIX A:

Water Quality Calculations

Water Quality Volume Calculation Spreadsheet

Project Name: Bridge Park Block B

Limits of Distrubance = 3.55 acres

Redevelopment Area =	3.21 acres	(3.13 acres of ex. Impervious area)
New Impervious Area=	0.34 acres	
	3.55 acres	

Per redevelopment requirements only 20% of water quality volume for the existing impervious area and open space will require treatment:

Existing Impervious Area and Open Space (Redevelopment Area)

Area =	3.21	acres
% imp =	0.95	
C =	0.80	
WQv =	0.160	ac-ft
or…	6982	ft^3
20% of WQv =	1396	ft^3

Per redevelopment requirements,100% of water quality volume for new impervious area will require treatment:

New Impervious Area

Area =	0.34	acres
% imp =	0.95	
C =	0.80	
WQv =	0.017	ac-ft
or…	740	ft^3
100% of WQv =	740	ft^3

Total Required WQv = 2136 ft^3

WQ Calculation Summary

Required WQv = 2136 ft^3

Provided WQv = 2178 ft^3 (in StormTech 01)

Water quality volume calculated using the Ohio EPA formula CPA/12

The "C" coefficient was calculated using the ASCE method

C= 0.858i^3 - 0.778i^2 + 0.774i + 0.04

Ohio EPA formula

WQv = CPA/12

A = area (acres)
P = 0.75"
C = (see above)

Water Quality Volume Calculation Spreadsheet

Project Name: Bridge Park Block B

Subarea 01		*Subarea 02*	
Area =	1.00 acres	Area =	0.50 acres
% imp =	0.95	% imp =	0.95
C =	0.80	C =	0.80
WQv =	**0.050 ac-ft**	**WQv =**	**0.025 ac-ft**
WQf =	**0.95 cfs**	**WQf =**	**0.48 cfs**

Water quality volume calculated using the Ohio EPA formula CPA/12

The "C" coefficient was calculated using the ASCE method

C= 0.858i^3 - 0.778i^2 + 0.774i + 0.04

Ohio EPA formula

WQv = CPA/12
A = area (acres)
P = 0.75"
C = (see previous page)

Surface Area Calculations

Bio Basin 01

Subarea 01	
WQv =	0.050 ac-ft
d =	2.00 ft
K =	$1.2x10^{-5}$ ft/s
T =	24 hr
h =	0.50 ft
A =	0.039 acres
or	
A =	**1,678 ft^2**

Area required =	1678	**ft^2**
Area provided =	302	**ft^2**

Bio Basin 02

Subarea 02	
WQv =	0.025 ac-ft
d =	2.00 ft
K =	$1.2x10^{-5}$ ft/s
T =	24 hr
h =	0.50 ft
A =	0.019 acres
or	
A =	**839 ft^2**

Area required =	839	**ft^2**
Area provided =	245	**ft^2**

$A=WQv*d_s/(3600*K*(h_s+d_s)*t_s)$

d_s = planting media depth = 2 ft
h_s = average depth water = 1/2 maximum depth = 0.90 feet/2 = 0.45 feet
K = planting media permeability=$1.2x10^{-5}$ ft/sec
t_s = drawdown time = 24 hours

Water Quality Peak Flow Calculation Spreadsheet

Project Name: Bridge Park Block B

StormTech Isolator Row

Use NRCS method to determine peak flow during 2-hour duration, 0.75" rainfall event
Impervious and pervious area runoff volume modeled seperately to more accurately predict peak flow
Rainfall distribution, Huff, 1st quartile, 2-hour duration storm, 0-10 sq. mile, 50% probability curve

Subarea 01 Isolator Row

Water Quality Peak Flow =	0.95	cfs	
Water Quality Volume =	0.05	ac-ft	
Required Isolator Area =	170.544	sq. ft.	(2.5 gpm/ft^2)
Chamber Model =	MC3500		
Chamber floor area =	43.2	sq. ft.	(per chamber)
Required Chambers =	4		
Provided Chambers =	5		

WQf Subarea 01

WQf Subarea 02

Subcat Reach Pond Link

Routing Diagram for 20131481 - Block B
Prepared by Symanetc, Printed 6/23/2015

Summary for Subcatchment 26S: WQf Subarea 02

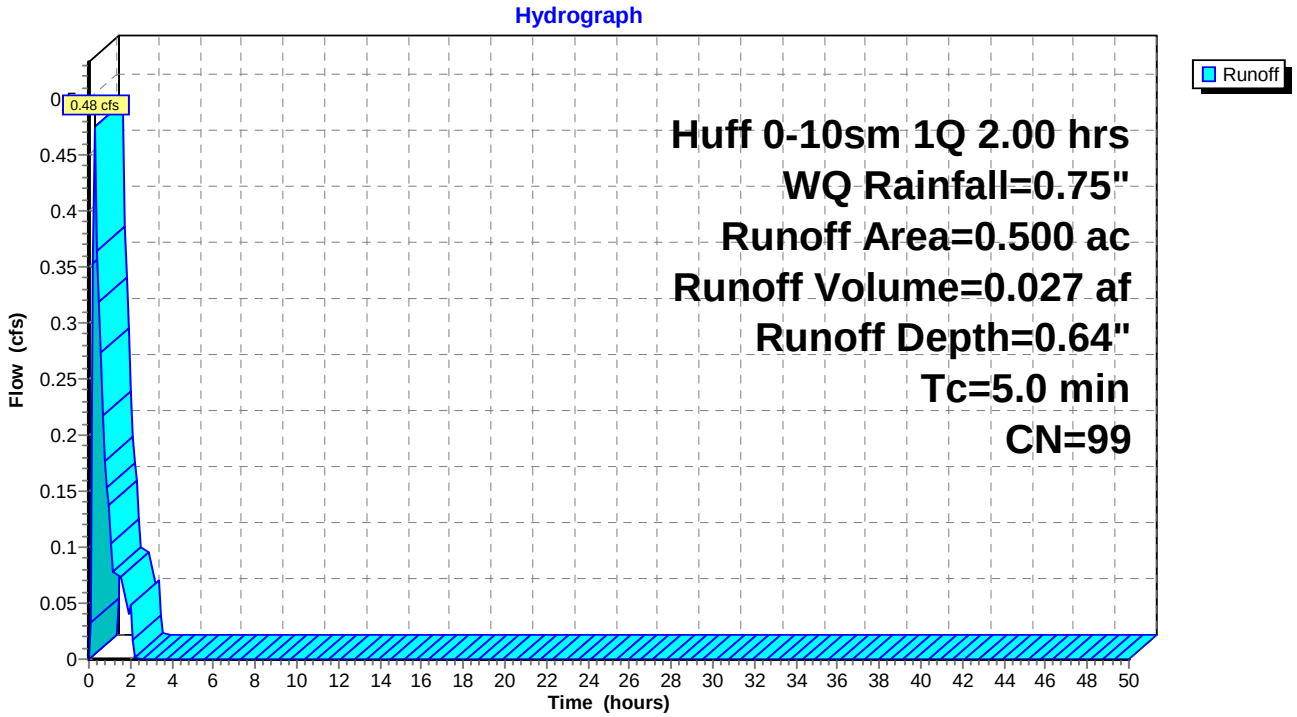
Runoff = 0.48 cfs @ 0.30 hrs, Volume= 0.027 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Huff 0-10sm 1Q 2.00 hrs WQ Rainfall=0.75"

	Area (ac)	CN	Description
*	0.500	99	
	0.500		100.00% Impervious Area

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

Subcatchment 26S: WQf Subarea 02



Summary for Subcatchment 39S: WQf Subarea 01

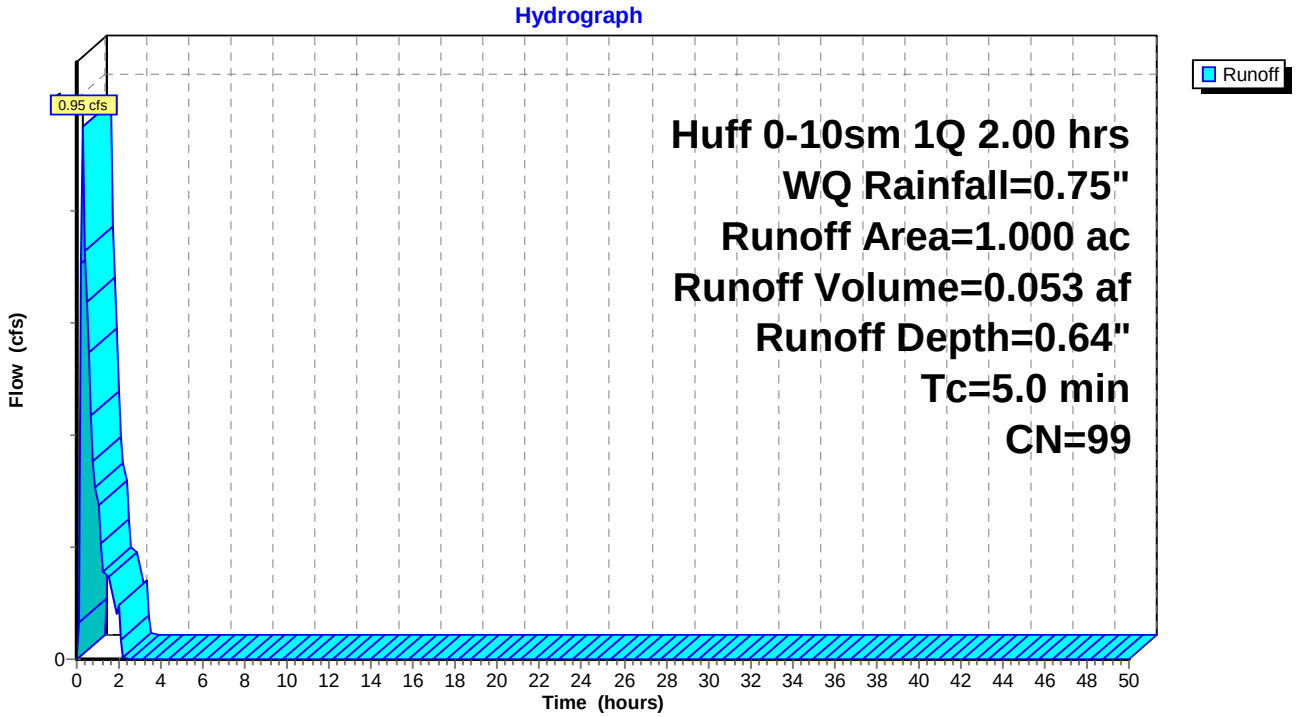
Runoff = 0.95 cfs @ 0.30 hrs, Volume= 0.053 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Huff 0-10sm 1Q 2.00 hrs WQ Rainfall=0.75"

	Area (ac)	CN	Description
*	1.000	99	
	1.000		100.00% Impervious Area

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

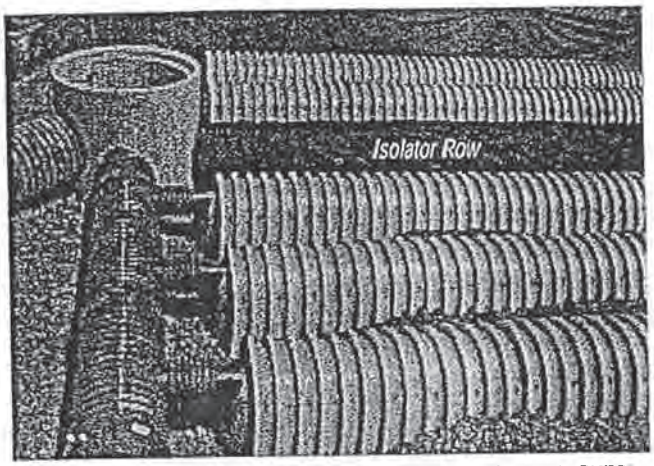
Subcatchment 39S: WQf Subarea 01



StormTech®
Detention • Retention • Recharge
Subsurface Stormwater Management℠

Isolator Row™ Performance Test Results

as reported by Tennessee Technological University



StormTech chambers are the only chambers that meet stringent AASHTO safety factors for traffic load and deep burial applications.

Four SC-740 chambers in test apparatus at Tennessee Tech.

Uniform sediment distribution (US Silica OK-110 SG=2.65).

The Isolator Row is an innovative yet simple system that inexpensively removes total suspended solids (TSS) from storm water and provides easy access for inspection and maintenance. In the Isolator Row, StormTech chambers are completely enclosed by geotextile fabrics. Sediment is captured in the Isolator Row as storm water passes through the fabric to the stone and adjacent chambers.

The recent completion of TSS removal testing at Tennessee Tech provides design engineers and regulators solid data that can be used to estimate the maintenance free interval and establishes the Isolator Row as a best management practice (BMP) for TSS removal.

For additional information on the Isolator Row (patent pending), contact StormTech at (888) 892-2694.

Performance Summary:

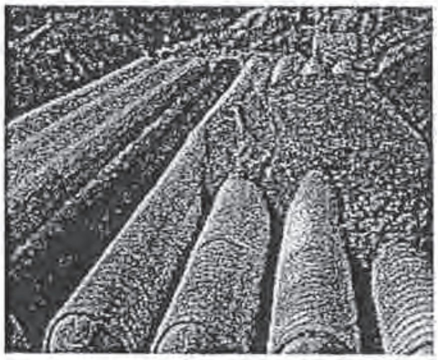
- 97% Overall TSS Removal
- 80% TSS Captured in the Isolator Row
- Estimated Maintenance Interval – 3 years

Isolator Row TSS Removal Efficiency

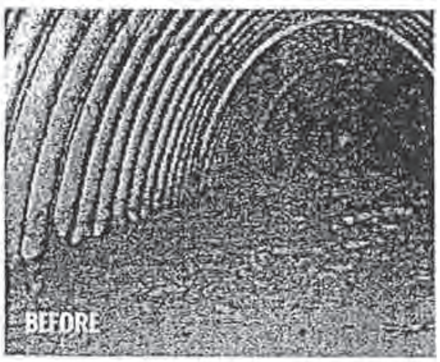
Another Success Story for the Isolator Row

After One Year of Operation, Harvey Industries Inspected and Cleaned Their Isolator Row in Portland, Maine

150 StormTech SC-740 chambers were installed in April, 2003. On July 7, 2004, after one year in service, StormTech inspected the Isolator Row and observed maintenance procedures.



Vactor trucks are typically equipped with both jetting and vacuum equipment.



During maintenance, the jetting nozzle propels itself down the Isolator Row scouring up sediment and washing it down to the access manhole where it is vacuumed into the truck.

After four passes of the jetting nozzle at pressures up to 1900 psi, the bottom fabric was scoured clean.

StormTech®
Detention • Retention • Recharge
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20 Beaver Road Suite 104 | Wethersfield | Connecticut | 06109
860.529.8188 | 888.892.2694 | fax 866.328.8401 | www.stormtech.com

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Detention • Retention • Water Quality

A division of ADS®

Save Valuable Land and Protect Water Resources

Isolator® Row O&M Manual

StormTech® Chamber System for Stormwater Management

1.0 The Isolator® Row

1.1 INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a patented technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.

Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

1.2 THE ISOLATOR ROW

The Isolator Row is a row of StormTech chambers, either SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-4500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC-310-3 and SC-740 models) allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

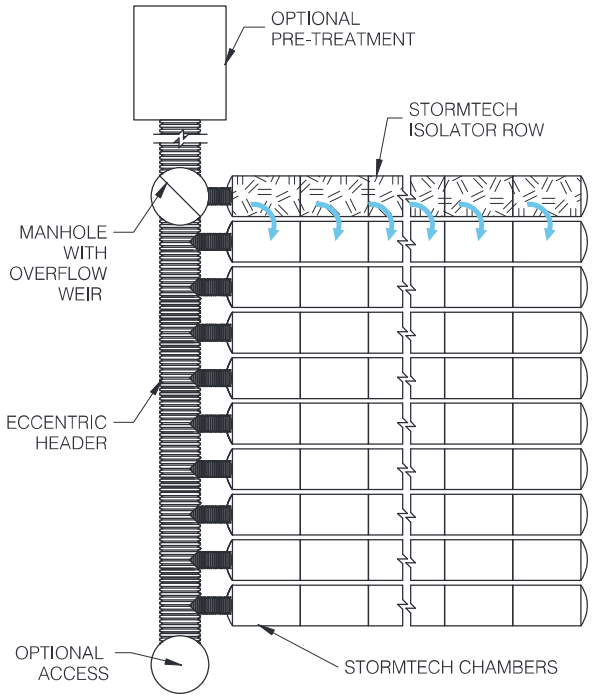
Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber. The non-woven fabric is not required over the DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

The Isolator Row is typically designed to capture the "first flush" and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

StormTech Isolator Row with Overflow Spillway
(not to scale)



2.0 Isolator Row Inspection/Maintenance

2.1 INSPECTION

The frequency of Inspection and Maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

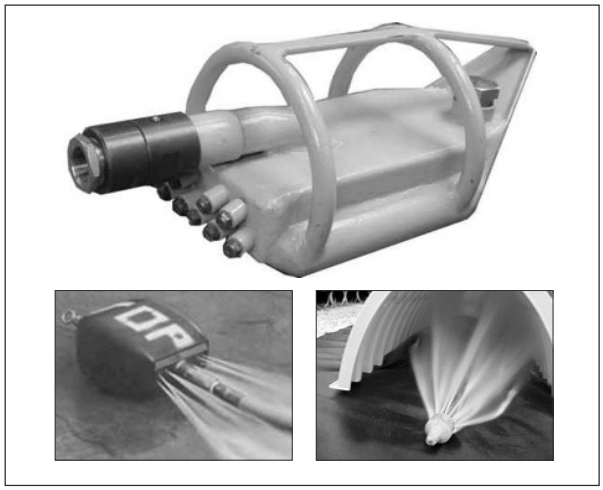
At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

2.2 MAINTENANCE

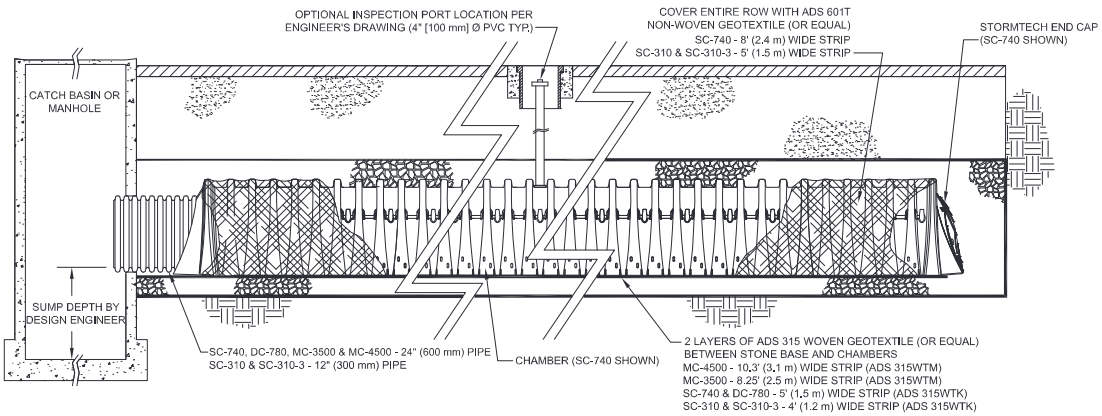
The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.



Examples of culvert cleaning nozzles appropriate for Isolator Row maintenance. (These are not StormTech products.)

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)



NOTE: NON-WOVEN FABRIC IS ONLY REQUIRED OVER THE INLET PIPE CONNECTION INTO THE END CAP FOR DC-780, MC-3500 AND MC-4500 CHAMBER MODELS AND IS NOT REQUIRED OVER THE ENTIRE ISOLATOR ROW.

3.0 Isolator Row Step By Step Maintenance Procedures

Step 1) Inspect Isolator Row for sediment

A) Inspection ports (if present)

i. Remove lid from floor box frame

ii. Remove cap from inspection riser

iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.

iv. If sediment is at, or above, 3 inch depth proceed to Step 2. If not proceed to step 3.

B) All Isolator Rows

i. Remove cover from manhole at upstream end of Isolator Row

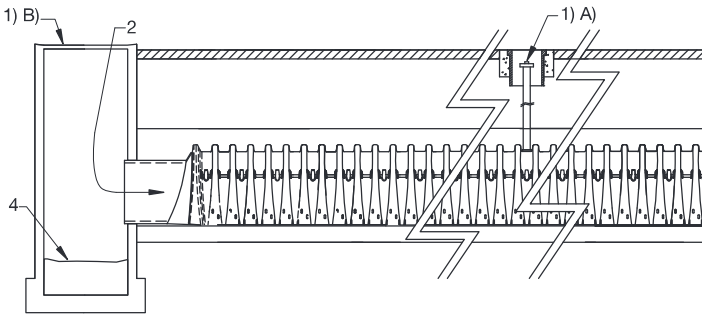
ii. Using a flashlight, inspect down Isolator Row through outlet pipe

1. Mirrors on poles or cameras may be used to avoid a confined space entry

2. Follow OSHA regulations for confined space entry if entering manhole

iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches) proceed to Step 2. If not proceed to Step 3.

StormTech Isolator Row (not to scale)



Step 2) Clean out Isolator Row using the JetVac process

A) A fixed culvert cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable

B) Apply multiple passes of JetVac until backflush water is clean

C) Vacuum manhole sump as required

Step 3) Replace all caps, lids and covers, record observations and actions

Step 4) Inspect & clean catch basins and manholes upstream of the StormTech system

Sample Maintenance Log

Date	Stadia Rod Readings		Sediment Depth (1) - (2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/01	6.3 ft.	none		New installation. Fixed point is CI frame at grade	djm
9/24/01		6.2	0.1 ft.	Some grit felt	sm
6/20/03		5.8	0.5 ft.	Mucky feel, debris visible in manhole and in Isolator row, maintenance due	rv
7/7/03	6.3 ft.		0	System jetted and vacuumed	djm

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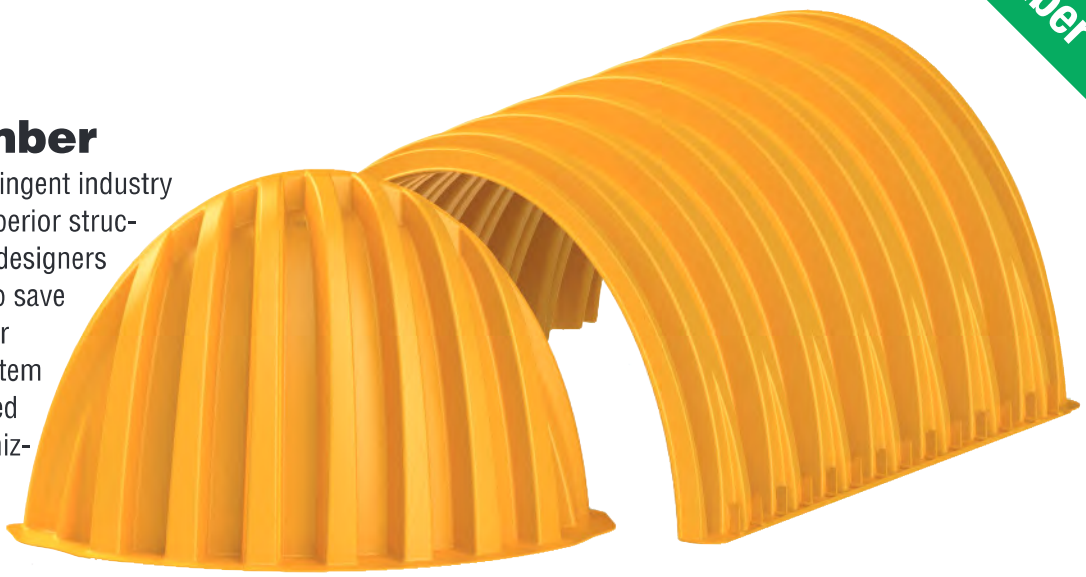
MC-3500 Chamber

StormTech MC-3500 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots thus maximizing land usage for commercial and municipal applications.



StormTech MC-3500 Chamber (not to scale)

Nominal Chamber Specifications

Size (L x W x H)	90" (2286 mm) x 77" (1956 mm) x 45" (1143 mm)
Chamber Storage	109.9 ft³ (3.11 m³)
Min. Installed Storage*	178.9 ft³ (5.06 m³)
Weight	134 lbs (60.8 kg)

* This assumes a minimum of 12" (305 mm) of stone above, 9" (229 mm) of stone below chambers, 9" (229 mm) of row spacing, and 40% stone porosity.

StormTech MC-3500 End Cap (not to scale)

Nominal End Cap Specifications

Size (L x W x H)	25.7" (653 mm) x 75" (1905 mm) x 45" (1143 mm)
End Cap Storage	14.9 ft³ (0.42 m³)
Min. Installed Storage*	46.0 ft³ (1.30 m³)
Weight	49 lbs (22.2 kg)

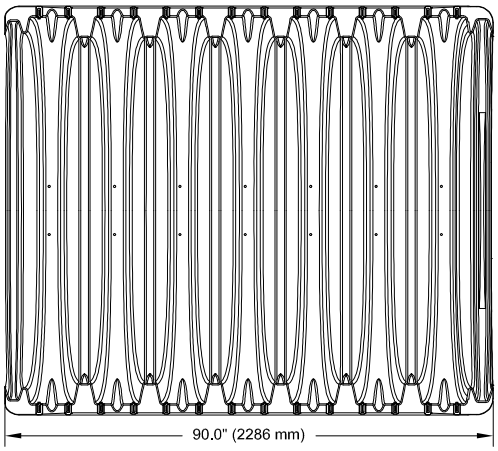
* This assumes a minimum of 12" (305mm) of stone above, 9" (229 mm) of stone below, 9" (229 mm) row spacing, 6" (152 mm) of stone perimeter, and 40% stone porosity.

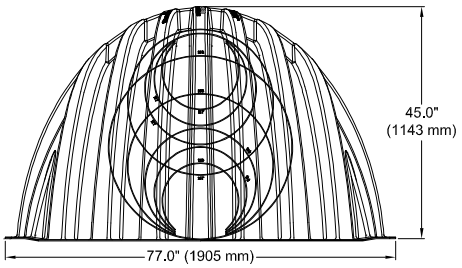
Shipping

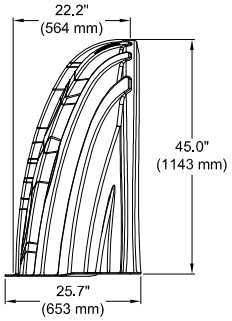
15 chambers/pallet

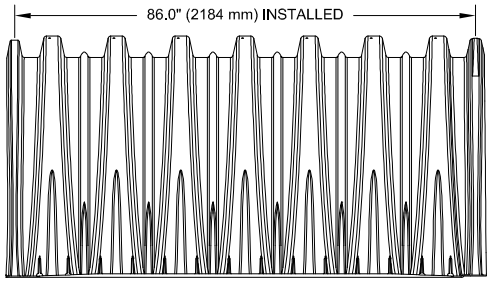
7 end caps/pallet

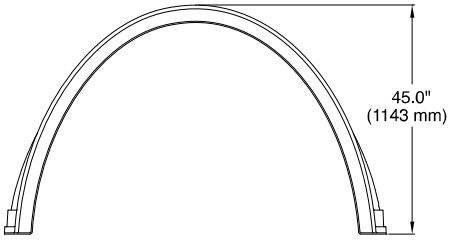
7 pallets/truck











Storage Volume Per Chamber/End Cap ft³ (m³)

	Bare Unit Storage	Chamber/End Cap and Stone Volume — Stone Foundation Depth in. (mm)			
	ft³ (m³)	9 (229)	12 (305)	15 (381)	18 (457)
MC-3500 Chamber	109.9 (3.11)	178.9 (5.06)	184.0 (5.21)	189.2 (5.36)	194.3 (5.5)
MC-3500 End Cap	14.9 (0.42)	46.0 (1.33)	47.7 (1.35)	49.4 (1.40)	51.1 (1.45)

NOTE: Assumes 40% porosity for the stone plus the chamber/end cap volume. End Cap volume assumes 6" (152mm) stone perimeter.

Volume of Excavation Per Chamber/End Cap in yd³ (m³)

	Stone Foundation Depth in. (mm)			
	9 (229)	12 (305)	15 (381)	18 (457)
MC-3500	12.4 (9.5)	12.8 (9.8)	13.3 (10.2)	13.8 (10.5)
End Cap	4.1 (3.1)	4.2 (3.2)	4.4 (3.3)	4.5 (3.5)

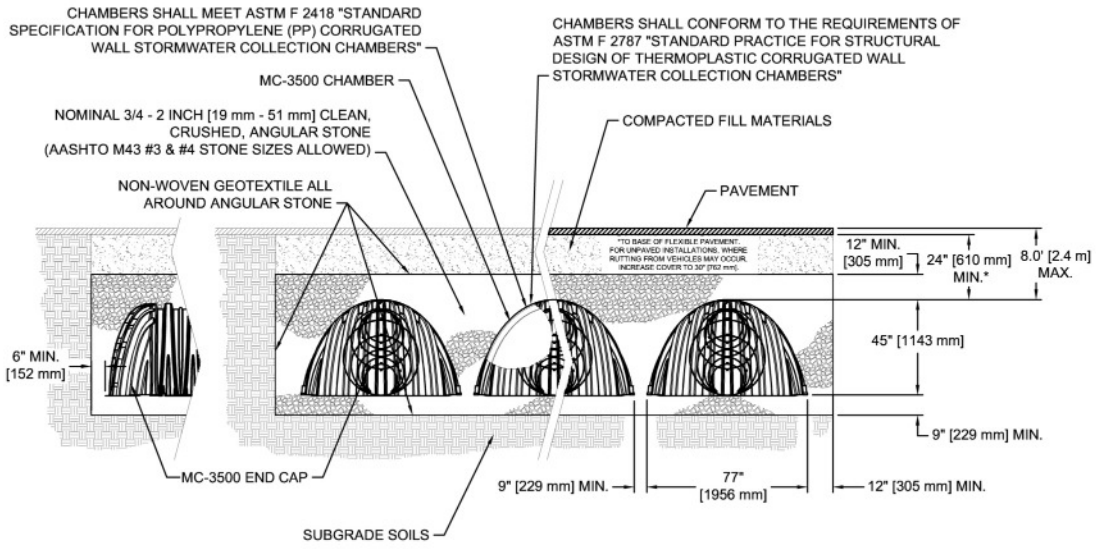
NOTE: Assumes 9" (229 mm) of separation between chamber rows, 6" (152 mm) of perimeter in front of end caps, and 24" (610 mm) of cover. The volume of excavation will vary as depth of cover increases.

Amount of Stone Per Chamber

ENGLISH tons (yd³)	Stone Foundation Depth			
	9 in.	12 in.	15 in.	18 in.
MC-3500	9.1 (6.4)	9.7 (6.9)	10.4 (7.3)	11.1 (7.8)
End Cap	4.1 (2.9)	4.3 (3.0)	4.5 (3.2)	4.7 (3.3)
METRIC kg (m³)	**229 mm**	**305 mm**	**381 mm**	**457 mm**
MC-3500	8220 (4.9)	8831 (5.3)	9443 (5.6)	10054 (6.0)
End Cap	3699 (2.2)	3900 (2.3)	4100 (2.4)	4301 (2.6)

NOTE: Assumes 12" (305 mm) of stone above, and 9" (229 mm) row spacing, and 6" (152mm) of perimeter stone in front of end caps.

General Cross Section



NOTES:
1. THIS CROSS SECTION PROVIDES GENERAL INFORMATION FOR THE MC-3500 CHAMBER. STORMTECH MC-3500 CHAMBERS MUST BE DESIGNED AND INSTALLED IN ACCORDANCE WITH THE MC-3500 DESIGN MANUAL AND MC-3500 CONSTRUCTION GUIDE.
2. PROPERLY INSTALLED MC-3500 CHAMBERS PROVIDE THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR EARTH AND LIVE LOADS WITH CONSIDERATION FOR IMPACT AND MULTIPLE PRESENCES.
3. PERIMETER STONE MUST ALWAYS BE BROUGHT UP EVENLY WITH BACKFILL OF BED. PERIMETER STONE MUST EXTEND HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH STRAIGHT OR SLOPED SIDEWALLS.

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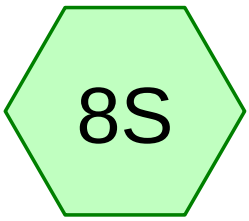
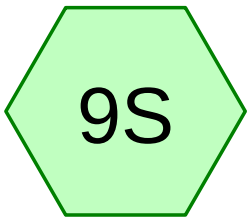
APPENDIX B:

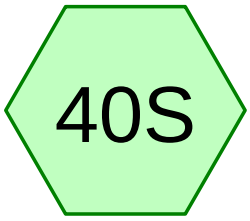
HydroCAD Output



Existing LOD 01

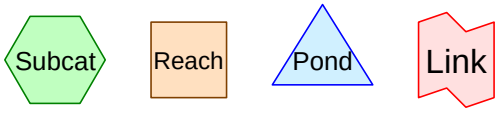


Existing LOD 02



Proposed LOD 01

Proposed LOD 02



Routing Diagram for 20131481 - Block B
Prepared by Symanetc, Printed 6/23/2015

Summary for Subcatchment 8S: Existing LOD 01

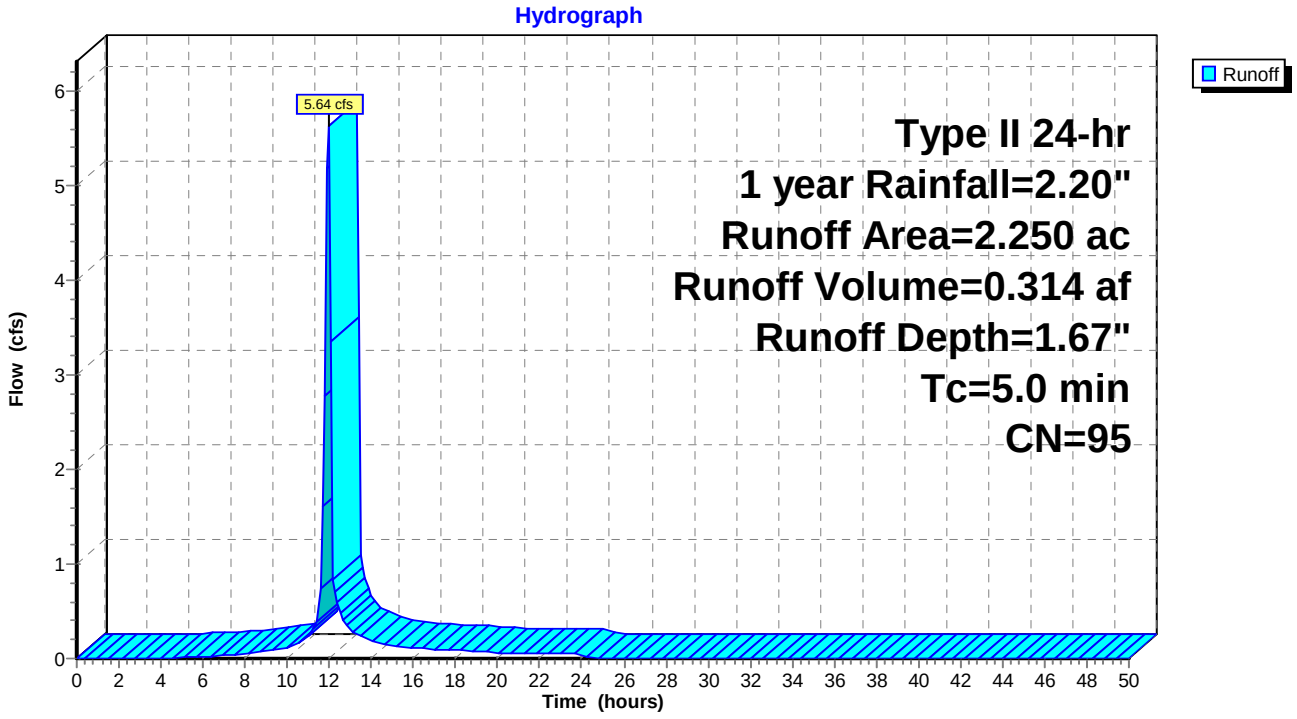
Runoff = 5.64 cfs @ 11.95 hrs, Volume= 0.314 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 1 year Rainfall=2.20"

	Area (ac)	CN	Description
*	1.930	98	
*	0.320	74	
	2.250	95	Weighted Average
	0.320		14.22% Pervious Area
	1.930		85.78% Impervious Area

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

Subcatchment 8S: Existing LOD 01



Summary for Subcatchment 9S: Existing LOD 02

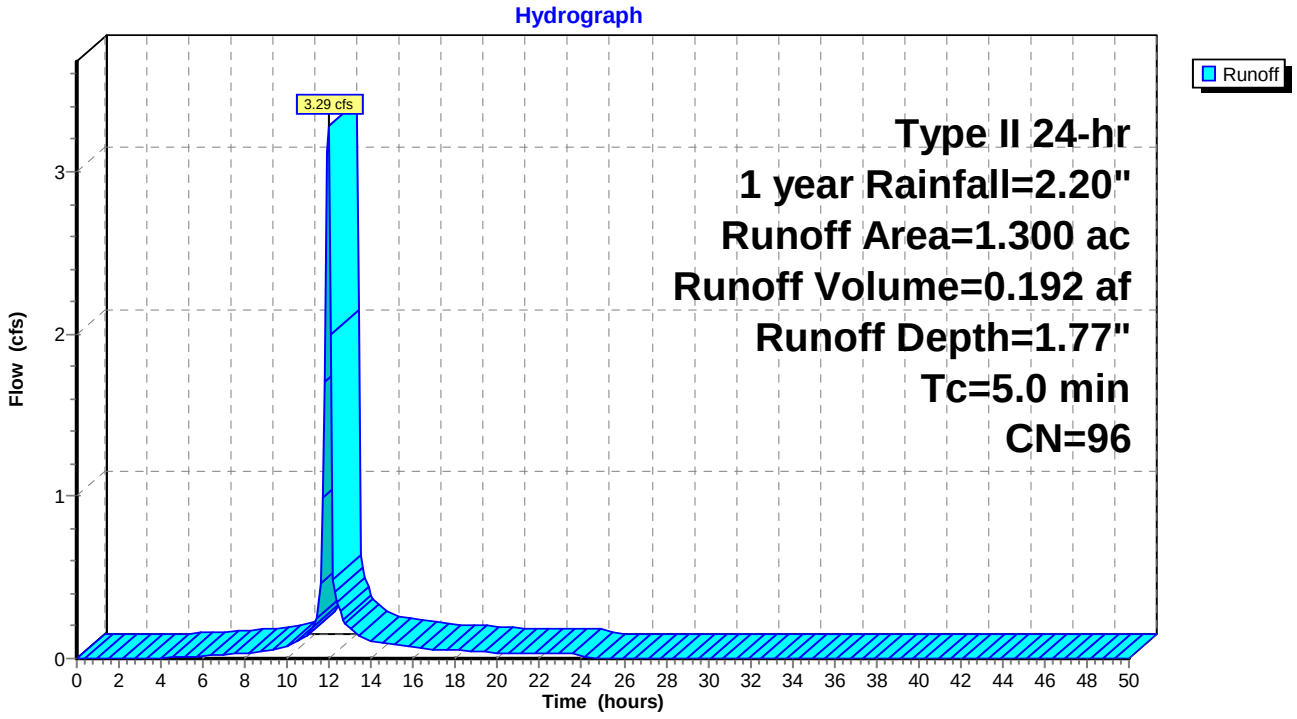
Runoff = 3.29 cfs @ 11.95 hrs, Volume= 0.192 af, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 1 year Rainfall=2.20"

Area (ac)	CN	Description
1.200	98	Paved parking, HSG C
0.100	74	>75% Grass cover, Good, HSG C
1.300	96	Weighted Average
0.100		7.69% Pervious Area
1.200		92.31% Impervious Area

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

Subcatchment 9S: Existing LOD 02



Summary for Subcatchment 40S: Proposed LOD 01

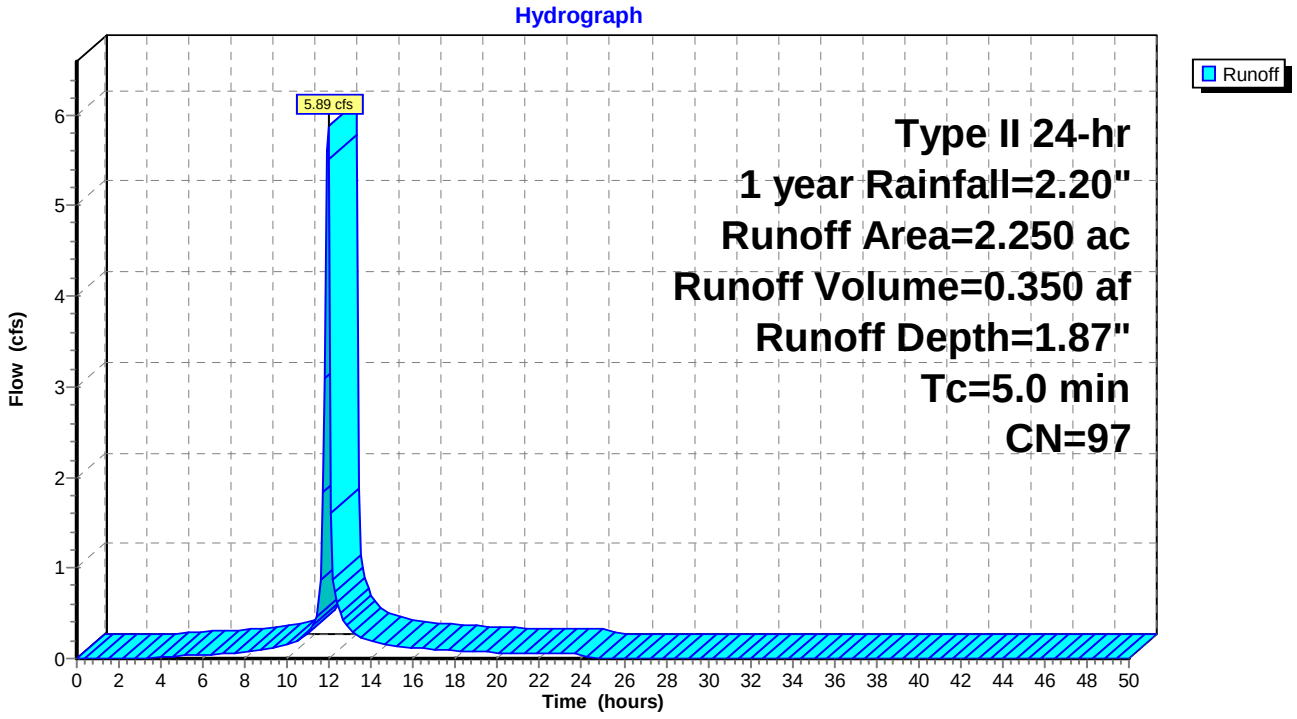
Runoff = 5.89 cfs @ 11.95 hrs, Volume= 0.350 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 1 year Rainfall=2.20"

	Area (ac)	CN	Description
*	2.190	98	
*	0.060	74	
	2.250	97	Weighted Average
	0.060		2.67% Pervious Area
	2.190		97.33% Impervious Area

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

Subcatchment 40S: Proposed LOD 01



Summary for Subcatchment 41S: Proposed LOD 02

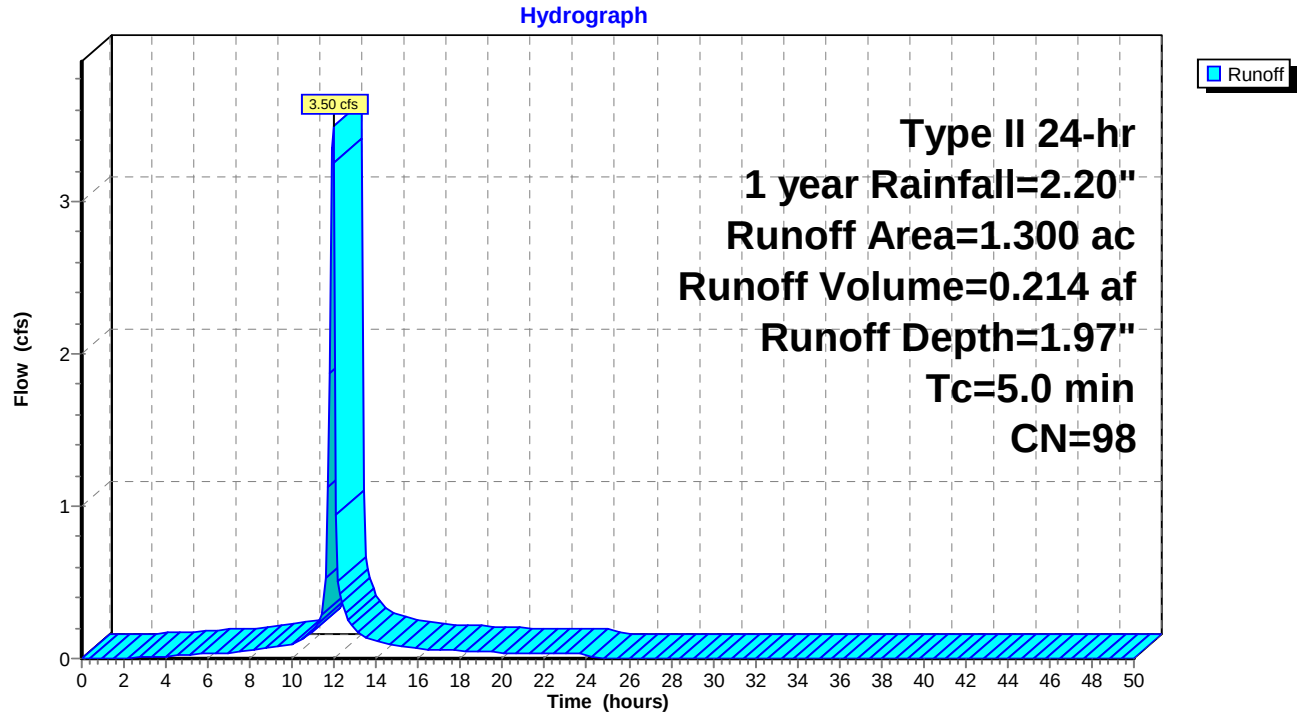
Runoff = 3.50 cfs @ 11.94 hrs, Volume= 0.214 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 1 year Rainfall=2.20"

	Area (ac)	CN	Description
*	1.280	98	
*	0.020	74	
	1.300	98	Weighted Average
	0.020		1.54% Pervious Area
	1.280		98.46% Impervious Area

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

Subcatchment 41S: Proposed LOD 02



Summary for Subcatchment 8S: Existing LOD 01

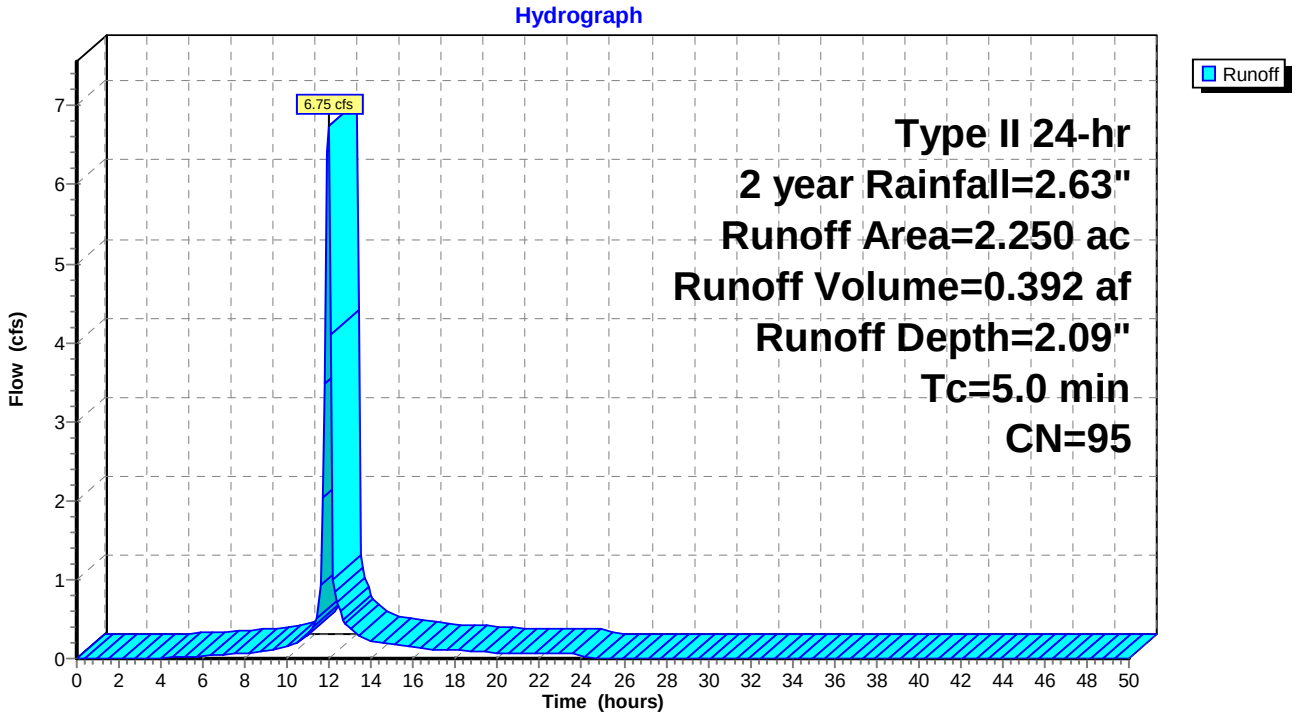
Runoff = 6.75 cfs @ 11.95 hrs, Volume= 0.392 af, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 2 year Rainfall=2.63"

	Area (ac)	CN	Description
*	1.930	98	
*	0.320	74	
	2.250	95	Weighted Average
	0.320		14.22% Pervious Area
	1.930		85.78% Impervious Area

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

Subcatchment 8S: Existing LOD 01



Summary for Subcatchment 9S: Existing LOD 02

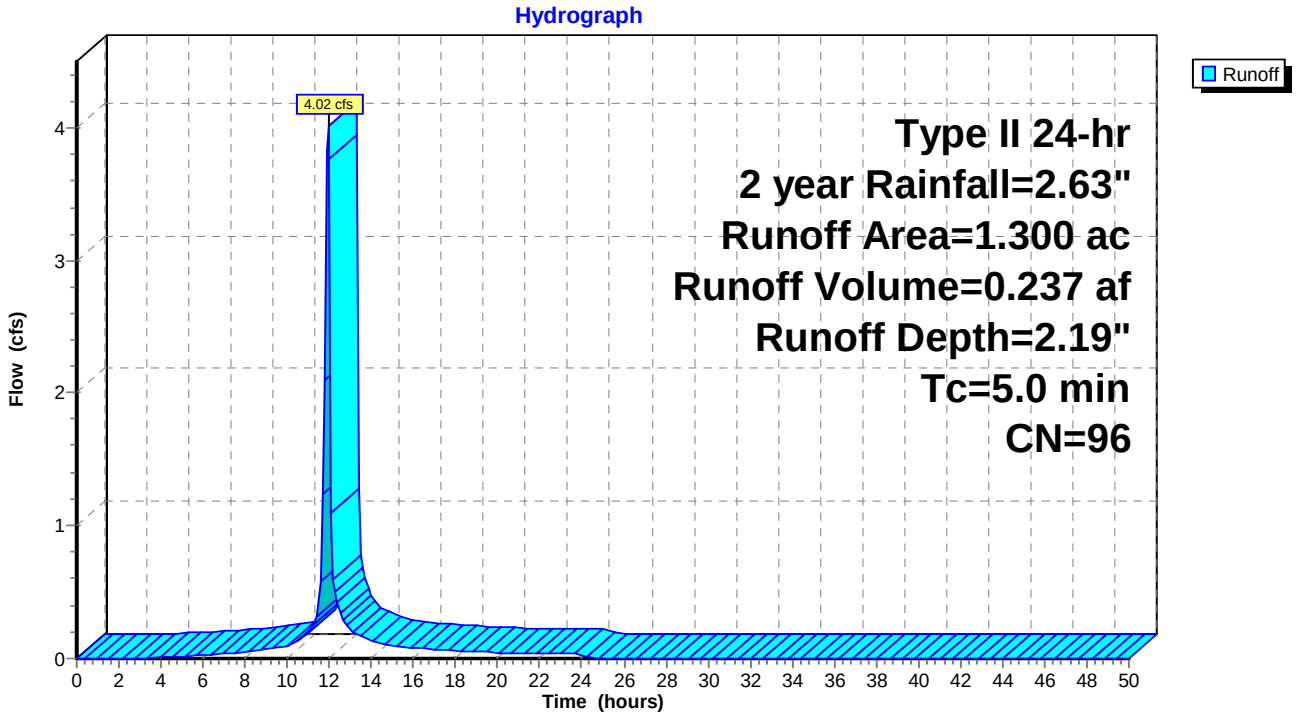
Runoff = 4.02 cfs @ 11.95 hrs, Volume= 0.237 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 2 year Rainfall=2.63"

Area (ac)	CN	Description
1.200	98	Paved parking, HSG C
0.100	74	>75% Grass cover, Good, HSG C
1.300	96	Weighted Average
0.100		7.69% Pervious Area
1.200		92.31% Impervious Area

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

Subcatchment 9S: Existing LOD 02



Summary for Subcatchment 40S: Proposed LOD 01

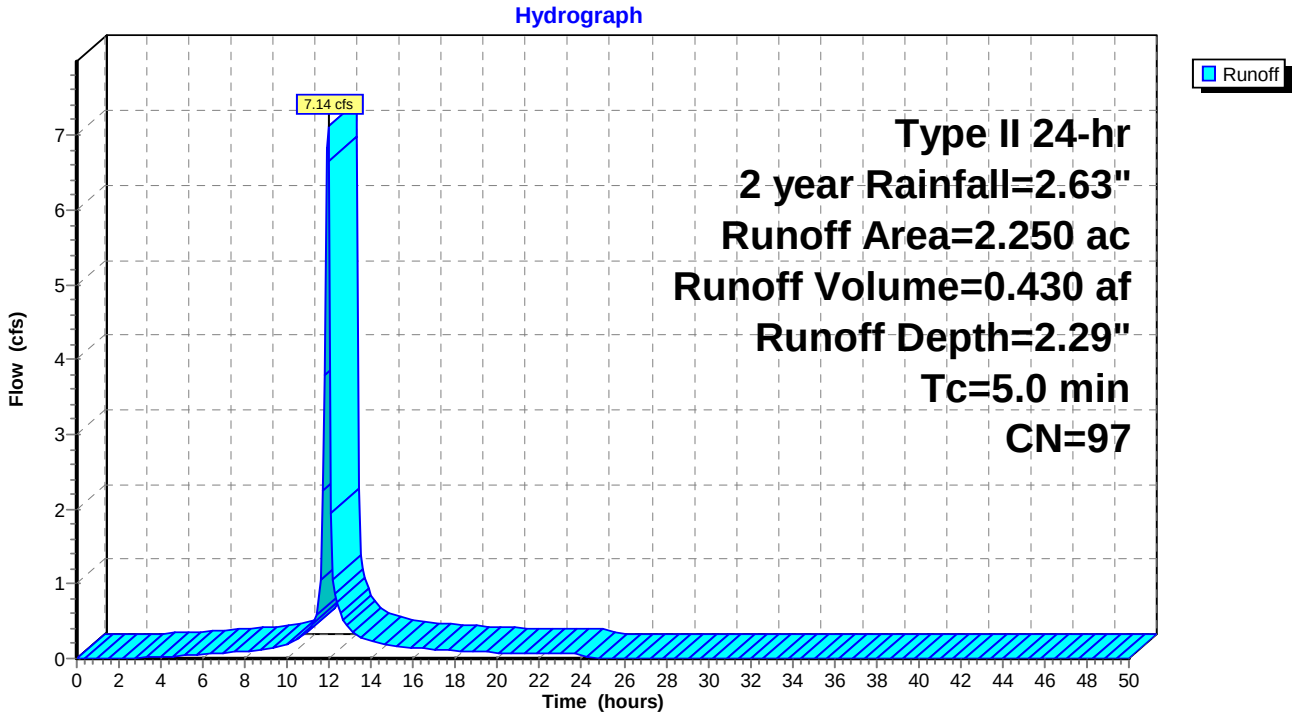
Runoff = 7.14 cfs @ 11.94 hrs, Volume= 0.430 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 2 year Rainfall=2.63"

	Area (ac)	CN	Description
*	2.190	98	
*	0.060	74	
	2.250	97	Weighted Average
	0.060		2.67% Pervious Area
	2.190		97.33% Impervious Area

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

Subcatchment 40S: Proposed LOD 01



Summary for Subcatchment 41S: Proposed LOD 02

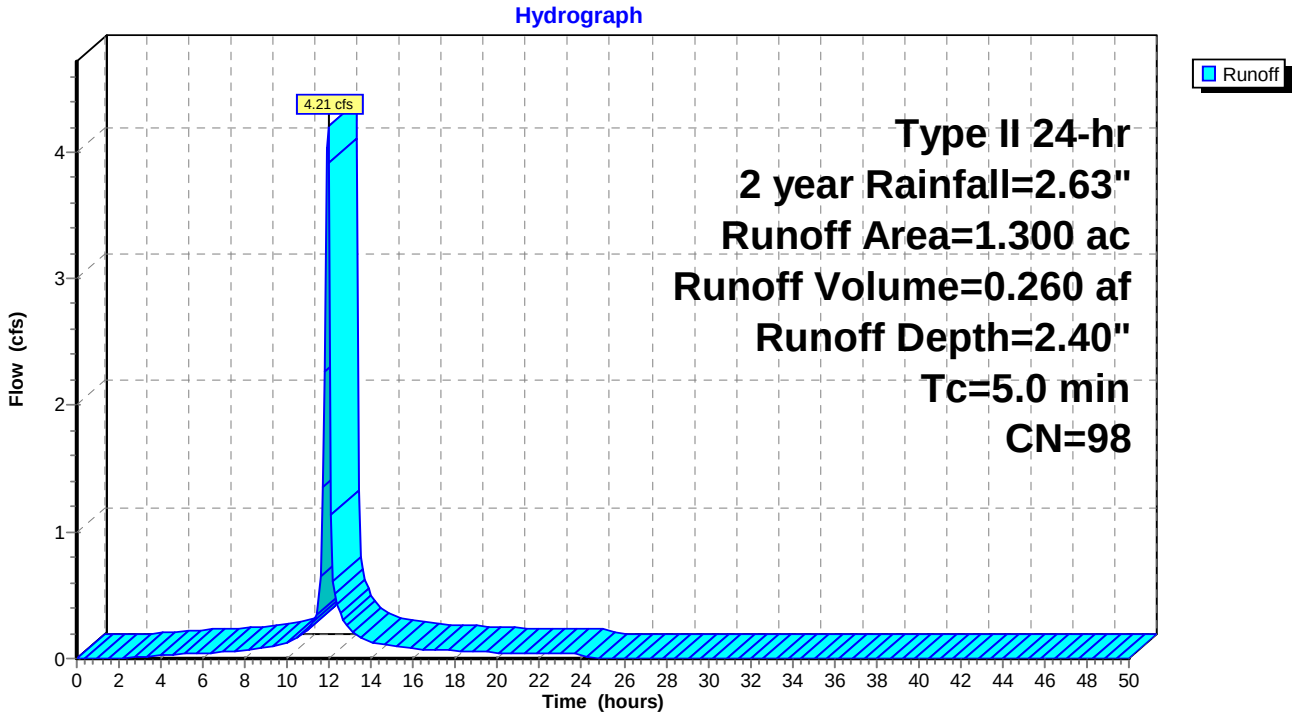
Runoff = 4.21 cfs @ 11.94 hrs, Volume= 0.260 af, Depth= 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 2 year Rainfall=2.63"

	Area (ac)	CN	Description
*	1.280	98	
*	0.020	74	
	1.300	98	Weighted Average
	0.020		1.54% Pervious Area
	1.280		98.46% Impervious Area

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

Subcatchment 41S: Proposed LOD 02



Summary for Subcatchment 8S: Existing LOD 01

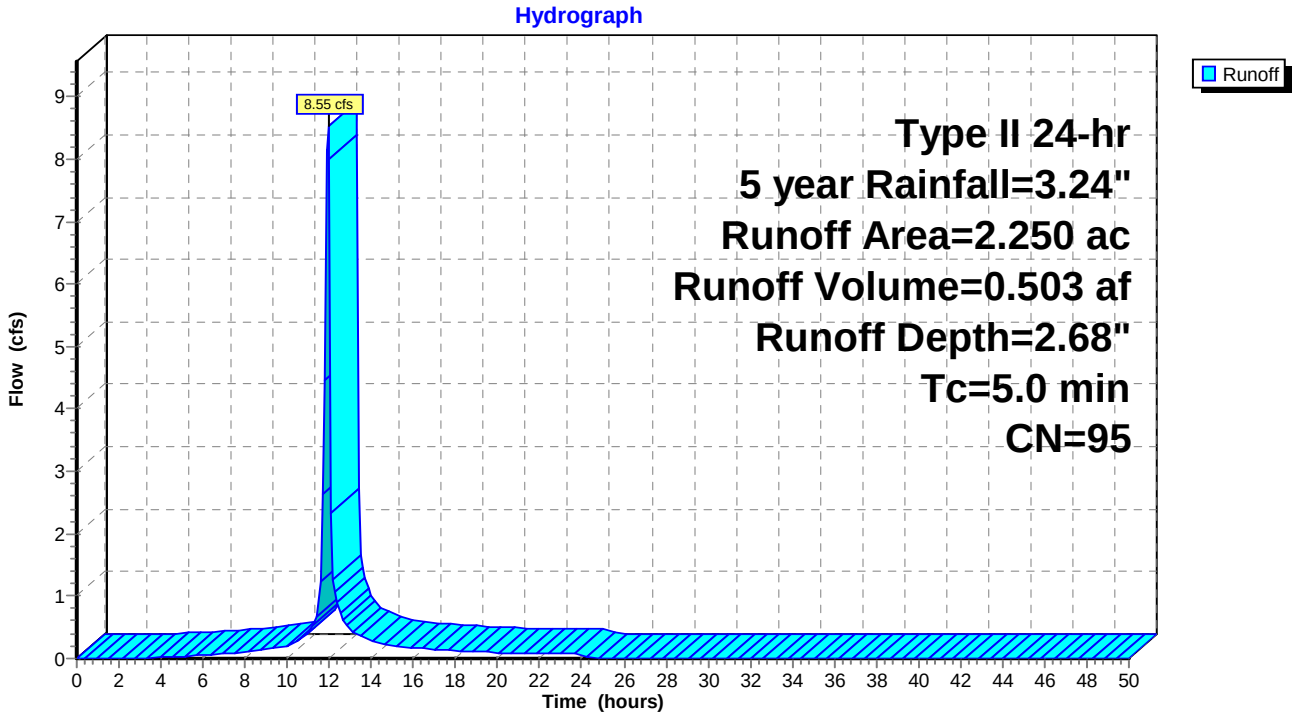
Runoff = 8.55 cfs @ 11.95 hrs, Volume= 0.503 af, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 5 year Rainfall=3.24"

	Area (ac)	CN	Description
*	1.930	98	
*	0.320	74	
	2.250	95	Weighted Average
	0.320		14.22% Pervious Area
	1.930		85.78% Impervious Area

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

Subcatchment 8S: Existing LOD 01



Summary for Subcatchment 9S: Existing LOD 02

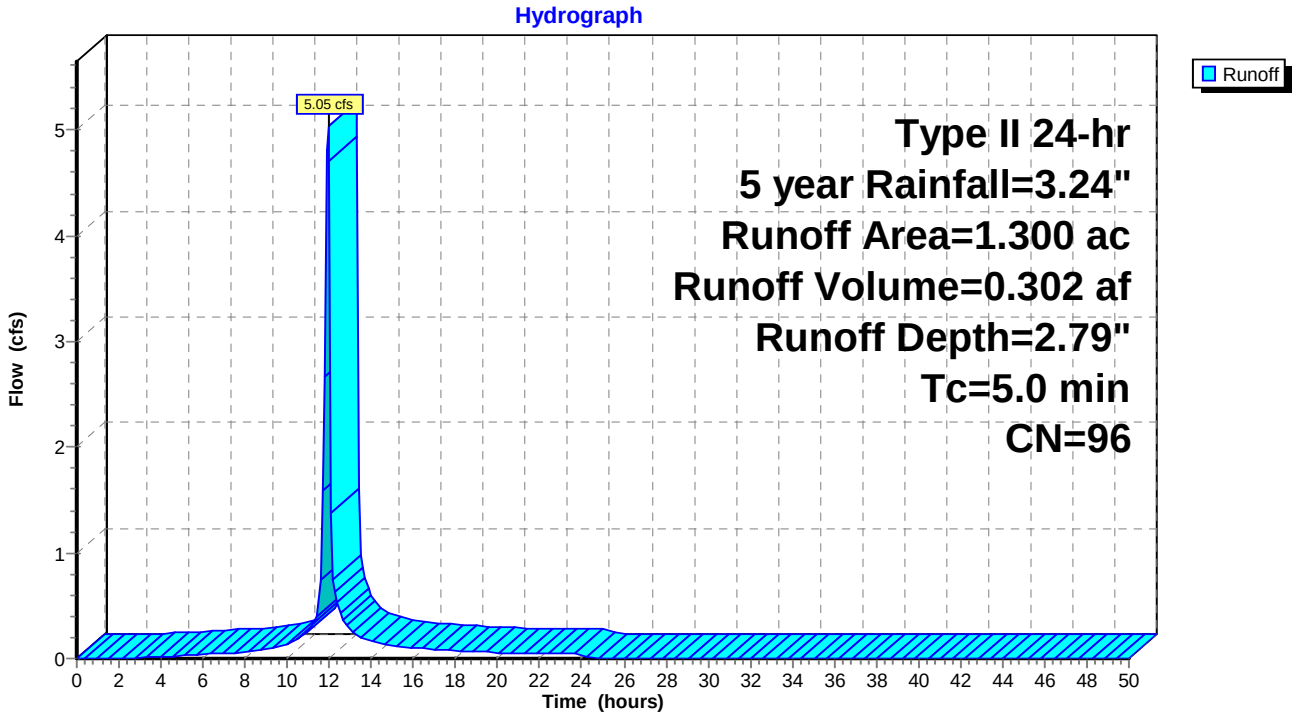
Runoff = 5.05 cfs @ 11.95 hrs, Volume= 0.302 af, Depth= 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 5 year Rainfall=3.24"

Area (ac)	CN	Description
1.200	98	Paved parking, HSG C
0.100	74	>75% Grass cover, Good, HSG C
1.300	96	Weighted Average
0.100		7.69% Pervious Area
1.200		92.31% Impervious Area

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

Subcatchment 9S: Existing LOD 02



Summary for Subcatchment 40S: Proposed LOD 01

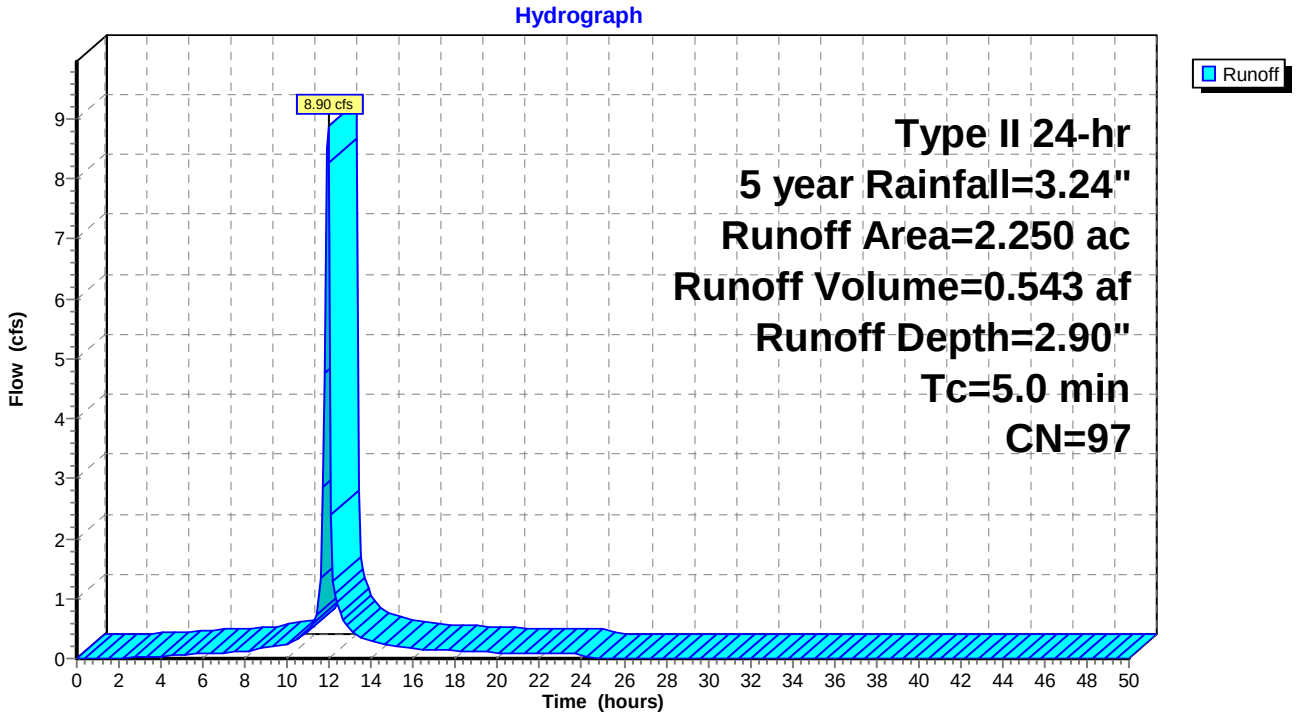
Runoff = 8.90 cfs @ 11.94 hrs, Volume= 0.543 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 5 year Rainfall=3.24"

	Area (ac)	CN	Description
*	2.190	98	
*	0.060	74	
	2.250	97	Weighted Average
	0.060		2.67% Pervious Area
	2.190		97.33% Impervious Area

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

Subcatchment 40S: Proposed LOD 01



Summary for Subcatchment 41S: Proposed LOD 02

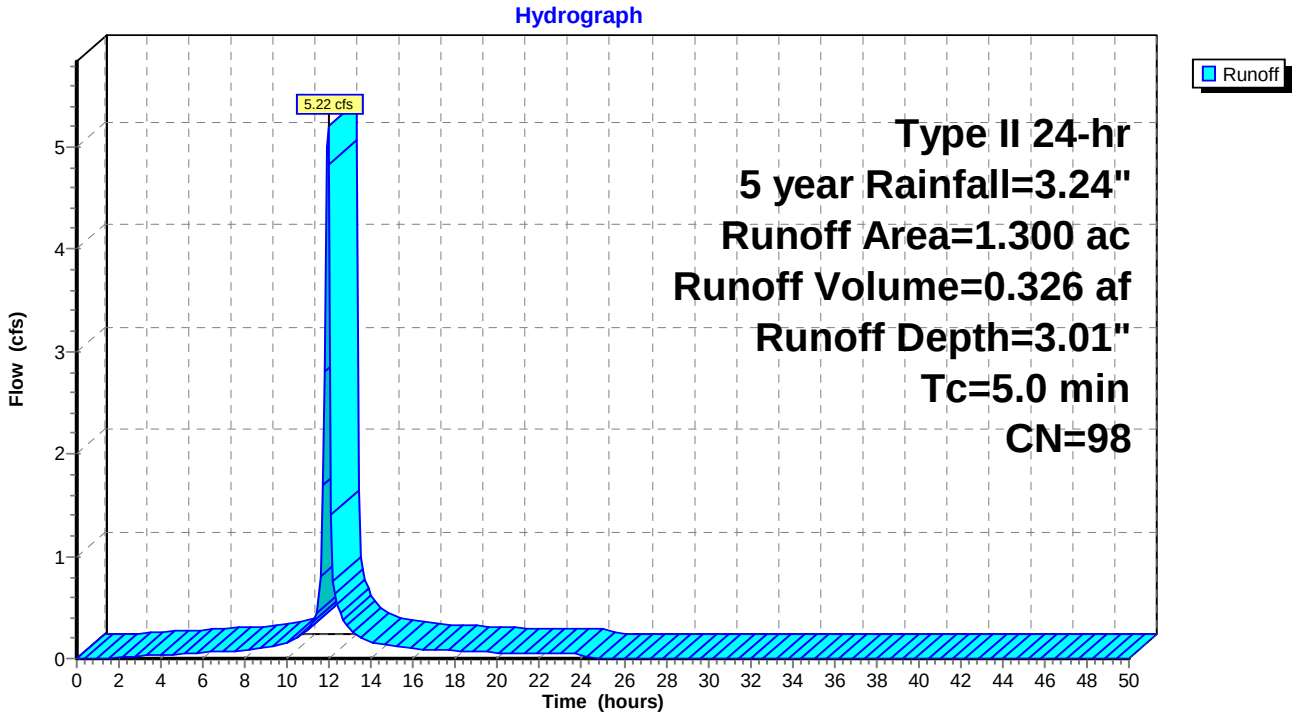
Runoff = 5.22 cfs @ 11.94 hrs, Volume= 0.326 af, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 5 year Rainfall=3.24"

	Area (ac)	CN	Description
*	1.280	98	
*	0.020	74	
	1.300	98	Weighted Average
	0.020		1.54% Pervious Area
	1.280		98.46% Impervious Area

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

Subcatchment 41S: Proposed LOD 02



Summary for Subcatchment 8S: Existing LOD 01

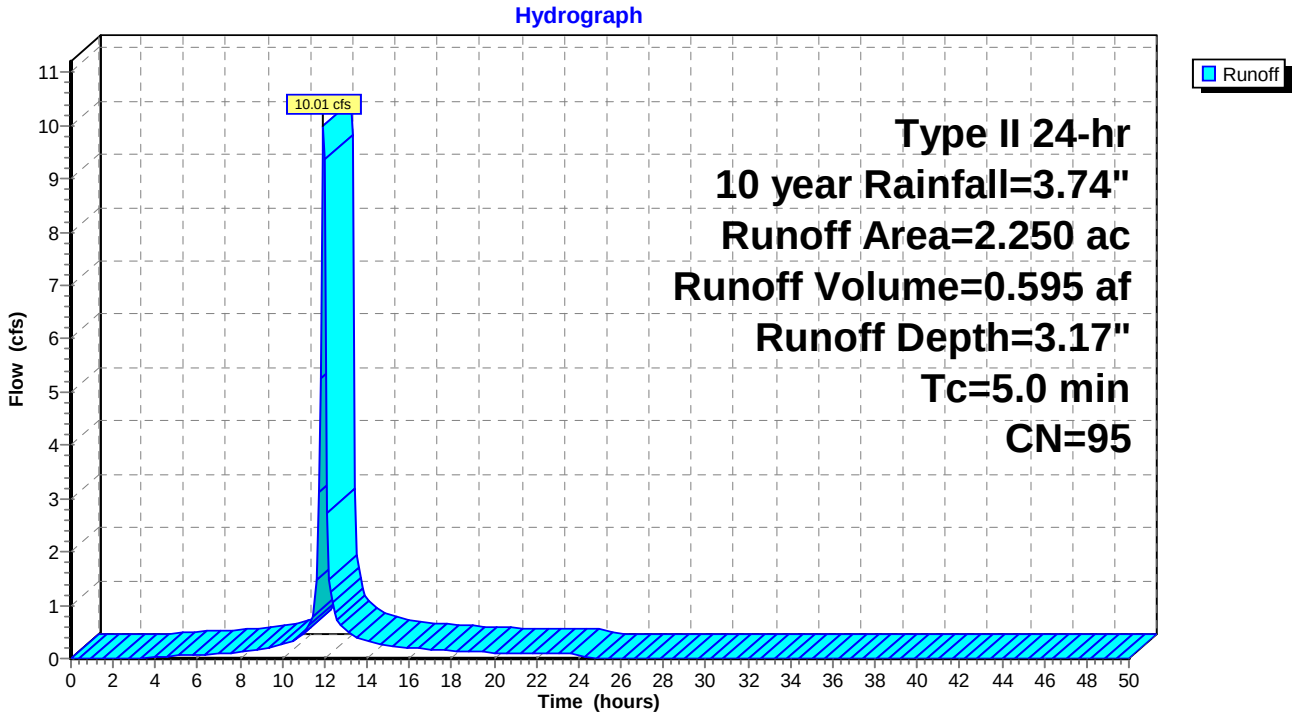
Runoff = 10.01 cfs @ 11.95 hrs, Volume= 0.595 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 10 year Rainfall=3.74"

	Area (ac)	CN	Description
*	1.930	98	
*	0.320	74	
	2.250	95	Weighted Average
	0.320		14.22% Pervious Area
	1.930		85.78% Impervious Area

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

Subcatchment 8S: Existing LOD 01



Summary for Subcatchment 9S: Existing LOD 02

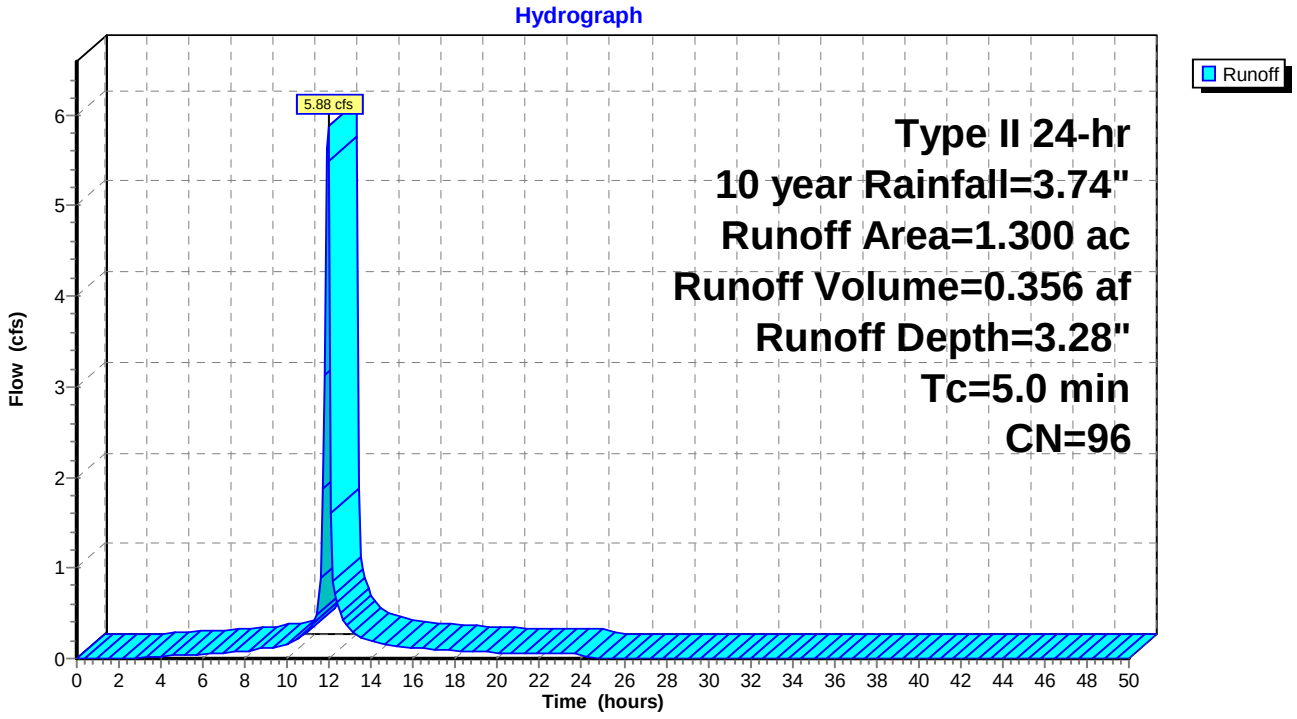
Runoff = 5.88 cfs @ 11.94 hrs, Volume= 0.356 af, Depth= 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 10 year Rainfall=3.74"

Area (ac)	CN	Description
1.200	98	Paved parking, HSG C
0.100	74	>75% Grass cover, Good, HSG C
1.300	96	Weighted Average
0.100		7.69% Pervious Area
1.200		92.31% Impervious Area

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

Subcatchment 9S: Existing LOD 02



Summary for Subcatchment 40S: Proposed LOD 01

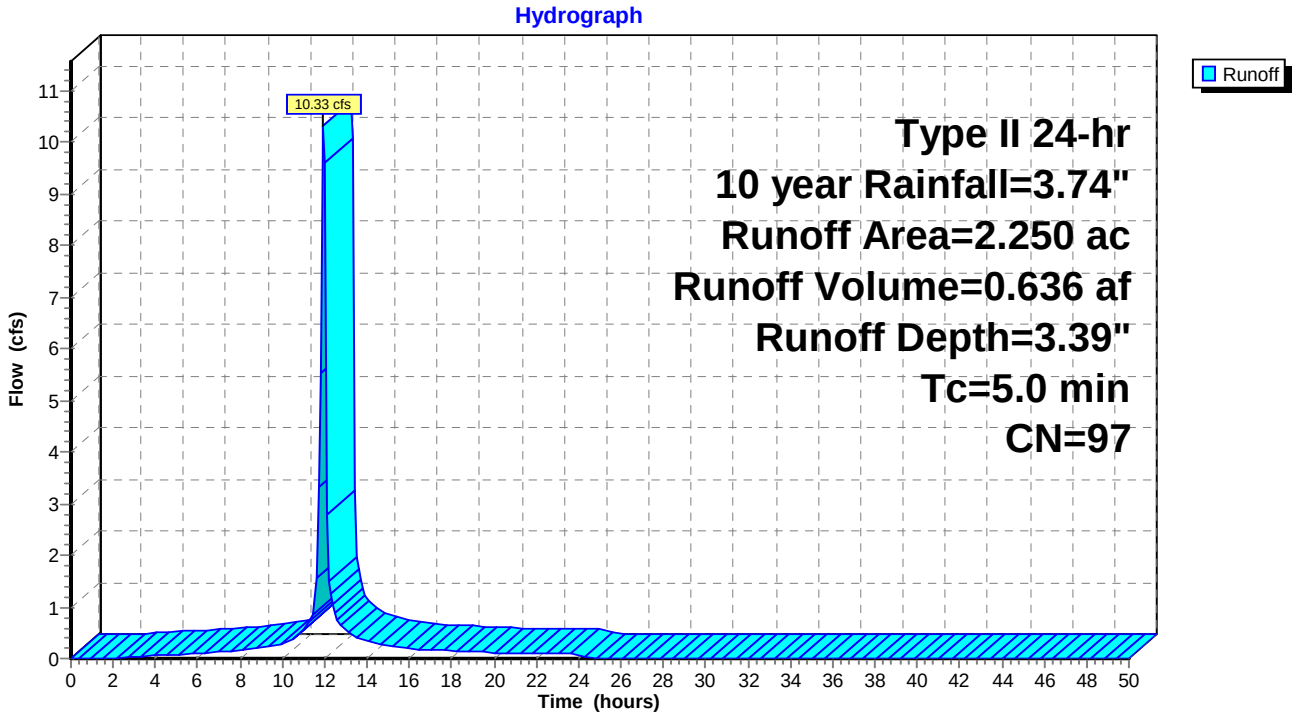
Runoff = 10.33 cfs @ 11.94 hrs, Volume= 0.636 af, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 10 year Rainfall=3.74"

	Area (ac)	CN	Description
*	2.190	98	
*	0.060	74	
	2.250	97	Weighted Average
	0.060		2.67% Pervious Area
	2.190		97.33% Impervious Area

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

Subcatchment 40S: Proposed LOD 01



Summary for Subcatchment 41S: Proposed LOD 02

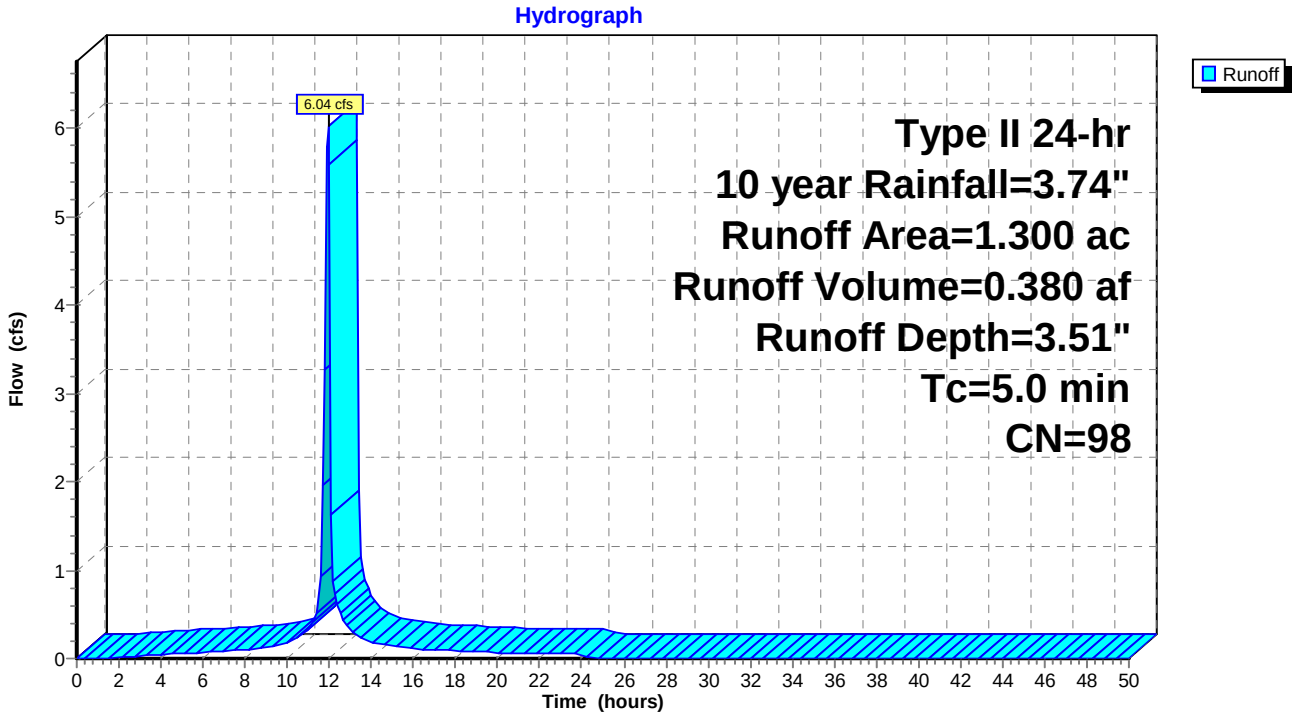
Runoff = 6.04 cfs @ 11.94 hrs, Volume= 0.380 af, Depth= 3.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 10 year Rainfall=3.74"

	Area (ac)	CN	Description
*	1.280	98	
*	0.020	74	
	1.300	98	Weighted Average
	0.020		1.54% Pervious Area
	1.280		98.46% Impervious Area

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

Subcatchment 41S: Proposed LOD 02



Summary for Subcatchment 8S: Existing LOD 01

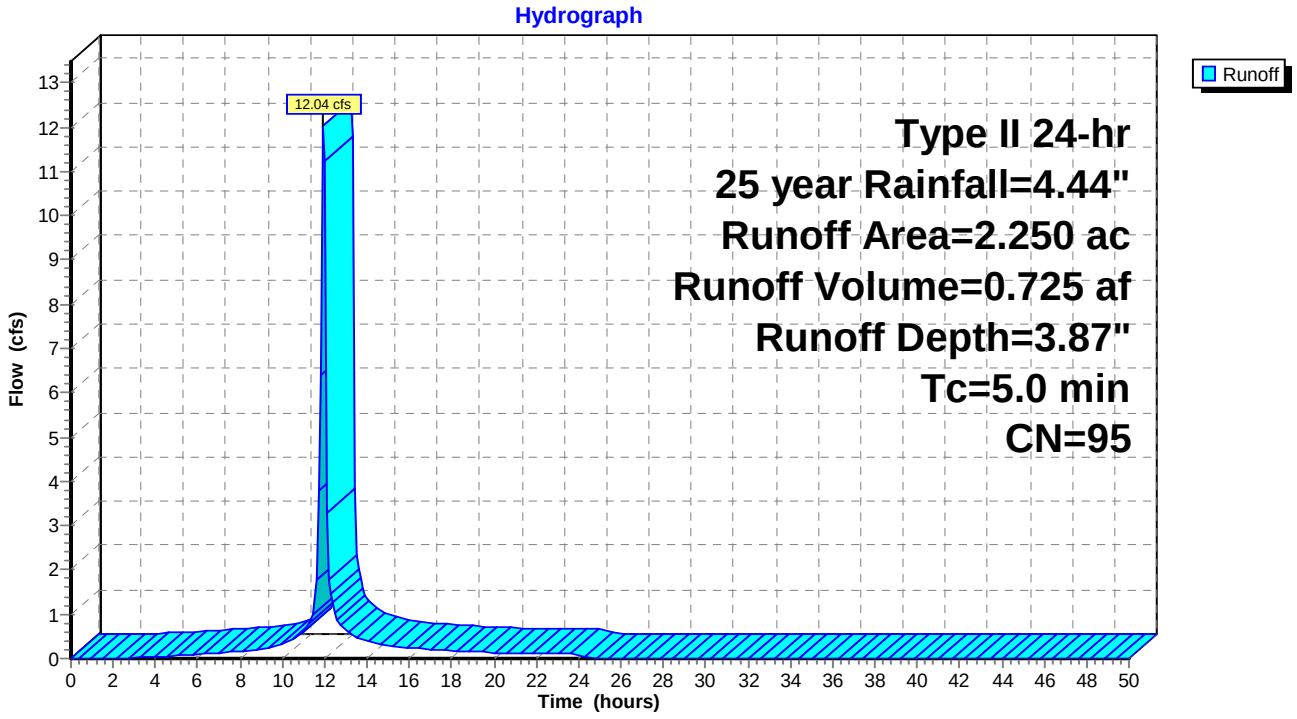
Runoff = 12.04 cfs @ 11.95 hrs, Volume= 0.725 af, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 25 year Rainfall=4.44"

	Area (ac)	CN	Description
*	1.930	98	
*	0.320	74	
	2.250	95	Weighted Average
	0.320		14.22% Pervious Area
	1.930		85.78% Impervious Area

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

Subcatchment 8S: Existing LOD 01



Summary for Subcatchment 9S: Existing LOD 02

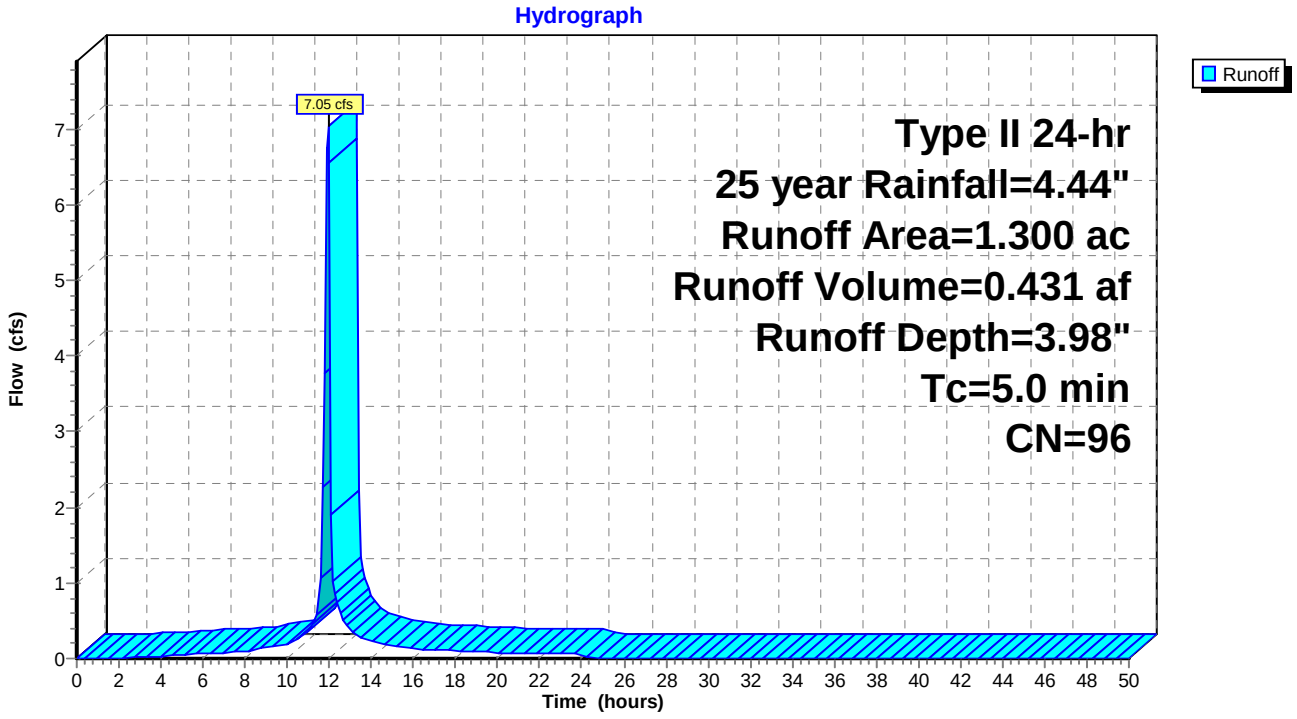
Runoff = 7.05 cfs @ 11.94 hrs, Volume= 0.431 af, Depth= 3.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 25 year Rainfall=4.44"

Area (ac)	CN	Description
1.200	98	Paved parking, HSG C
0.100	74	>75% Grass cover, Good, HSG C
1.300	96	Weighted Average
0.100		7.69% Pervious Area
1.200		92.31% Impervious Area

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

Subcatchment 9S: Existing LOD 02



Summary for Subcatchment 40S: Proposed LOD 01

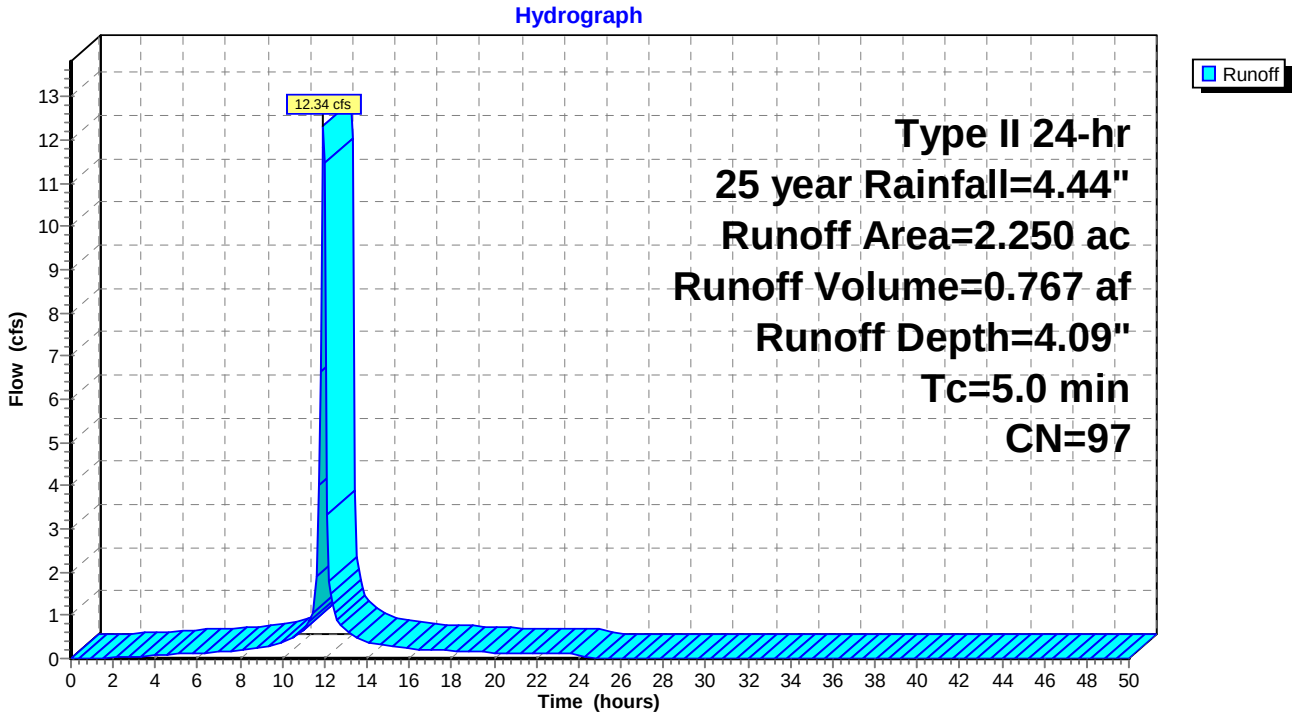
Runoff = 12.34 cfs @ 11.94 hrs, Volume= 0.767 af, Depth= 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 25 year Rainfall=4.44"

	Area (ac)	CN	Description
*	2.190	98	
*	0.060	74	
	2.250	97	Weighted Average
	0.060		2.67% Pervious Area
	2.190		97.33% Impervious Area

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

Subcatchment 40S: Proposed LOD 01



Summary for Subcatchment 41S: Proposed LOD 02

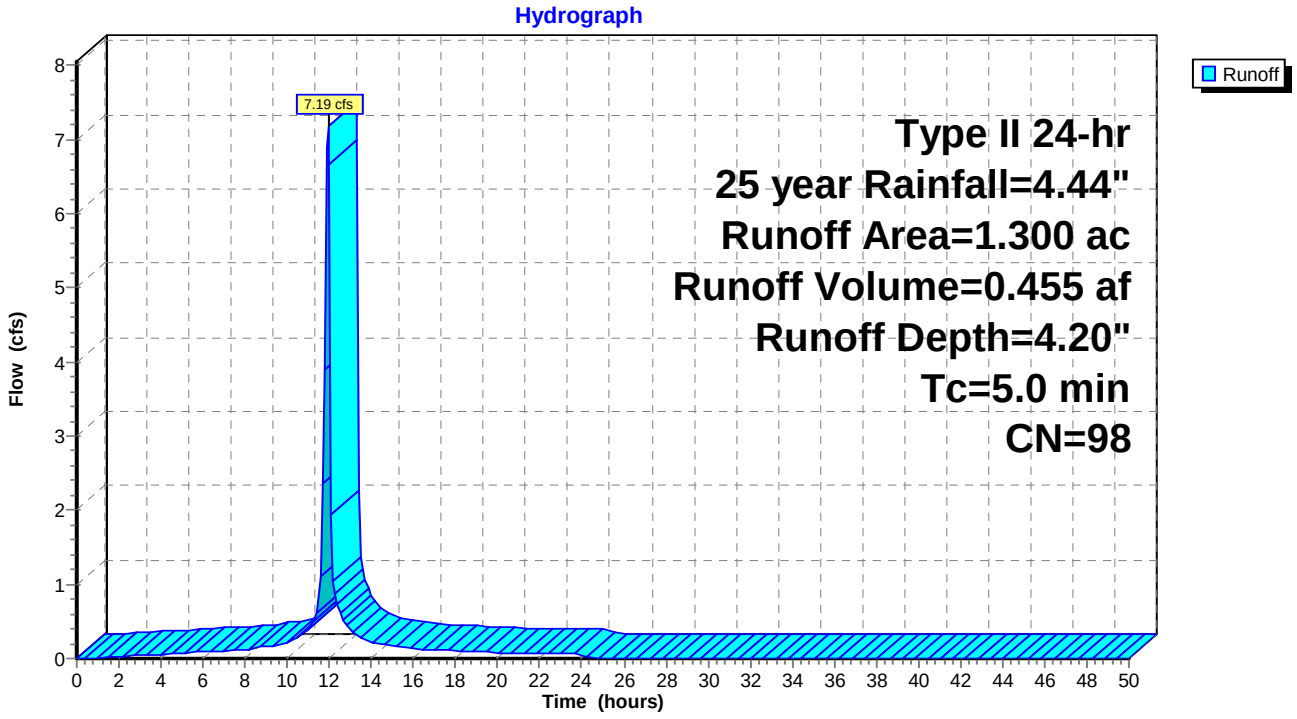
Runoff = 7.19 cfs @ 11.94 hrs, Volume= 0.455 af, Depth= 4.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 25 year Rainfall=4.44"

	Area (ac)	CN	Description
*	1.280	98	
*	0.020	74	
	1.300	98	Weighted Average
	0.020		1.54% Pervious Area
	1.280		98.46% Impervious Area

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

Subcatchment 41S: Proposed LOD 02



Summary for Subcatchment 8S: Existing LOD 01

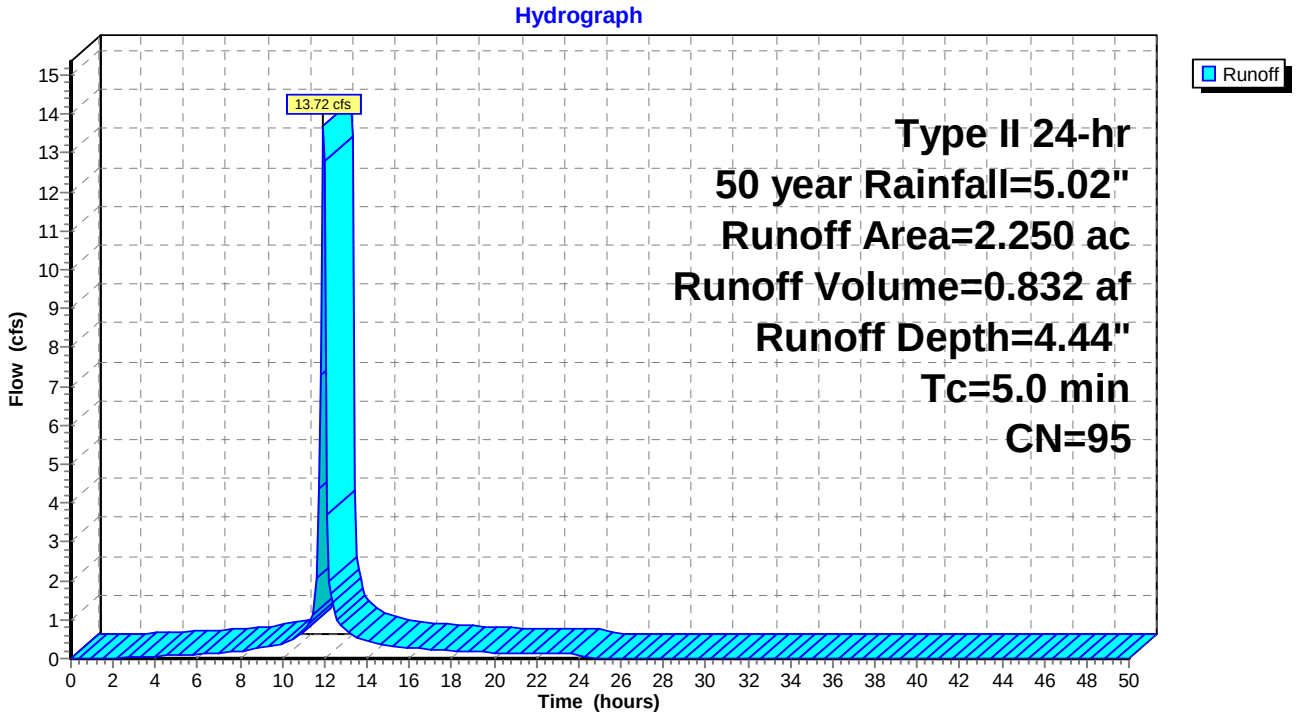
Runoff = 13.72 cfs @ 11.94 hrs, Volume= 0.832 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 50 year Rainfall=5.02"

	Area (ac)	CN	Description
*	1.930	98	
*	0.320	74	
	2.250	95	Weighted Average
	0.320		14.22% Pervious Area
	1.930		85.78% Impervious Area

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

Subcatchment 8S: Existing LOD 01



Summary for Subcatchment 9S: Existing LOD 02

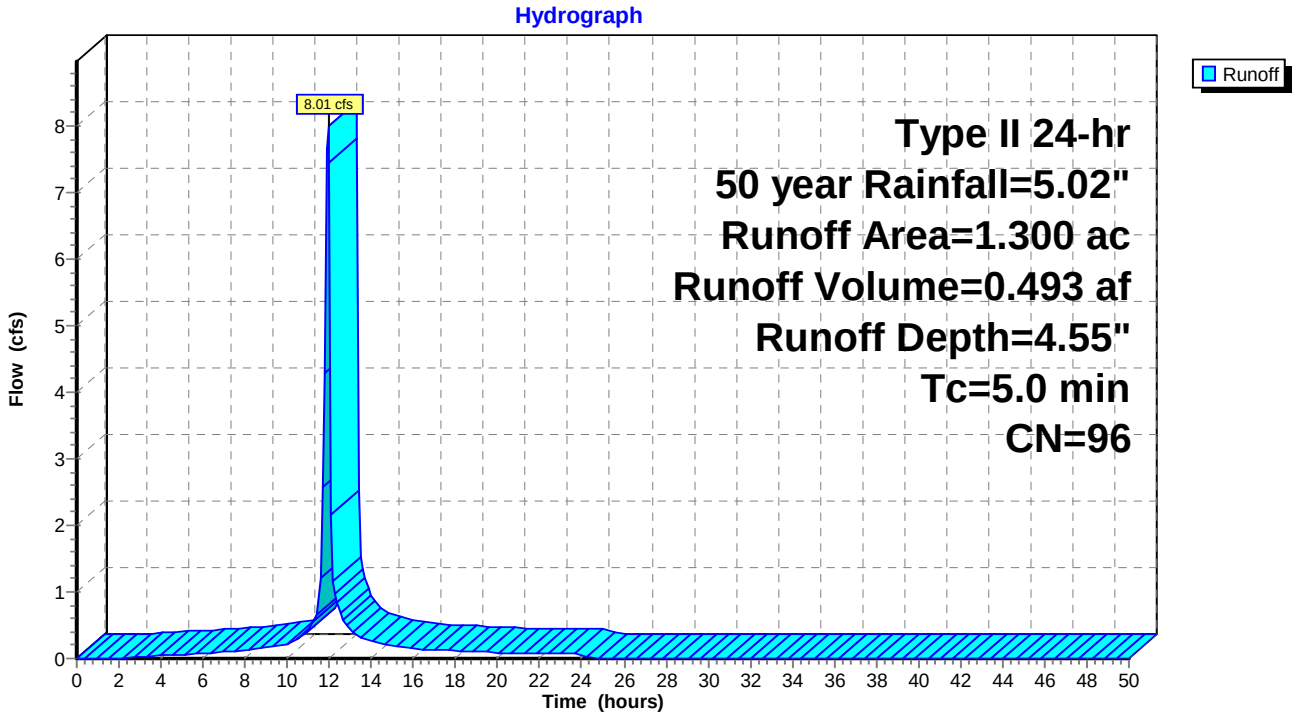
Runoff = 8.01 cfs @ 11.94 hrs, Volume= 0.493 af, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 50 year Rainfall=5.02"

Area (ac)	CN	Description
1.200	98	Paved parking, HSG C
0.100	74	>75% Grass cover, Good, HSG C
1.300	96	Weighted Average
0.100		7.69% Pervious Area
1.200		92.31% Impervious Area

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

Subcatchment 9S: Existing LOD 02



Summary for Subcatchment 40S: Proposed LOD 01

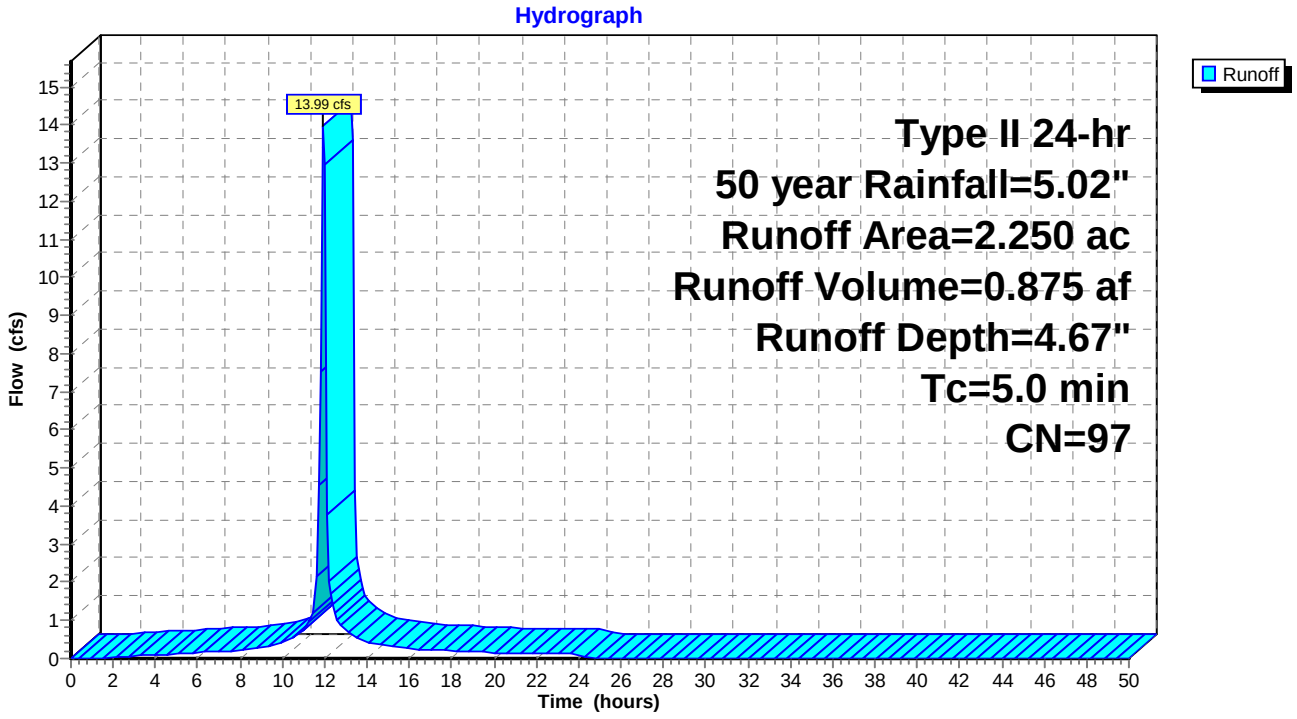
Runoff = 13.99 cfs @ 11.94 hrs, Volume= 0.875 af, Depth= 4.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 50 year Rainfall=5.02"

	Area (ac)	CN	Description
*	2.190	98	
*	0.060	74	
	2.250	97	Weighted Average
	0.060		2.67% Pervious Area
	2.190		97.33% Impervious Area

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

Subcatchment 40S: Proposed LOD 01



Summary for Subcatchment 41S: Proposed LOD 02

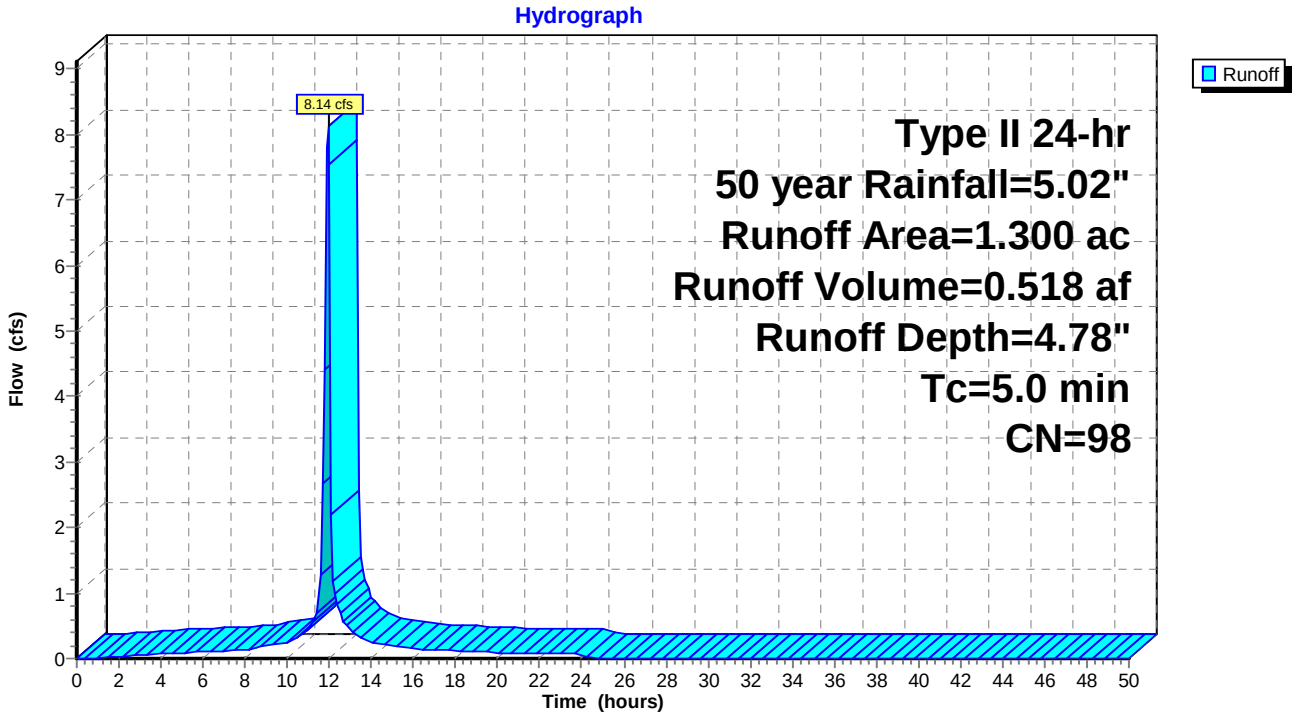
Runoff = 8.14 cfs @ 11.94 hrs, Volume= 0.518 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 50 year Rainfall=5.02"

	Area (ac)	CN	Description
*	1.280	98	
*	0.020	74	
	1.300	98	Weighted Average
	0.020		1.54% Pervious Area
	1.280		98.46% Impervious Area

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

Subcatchment 41S: Proposed LOD 02



Summary for Subcatchment 8S: Existing LOD 01

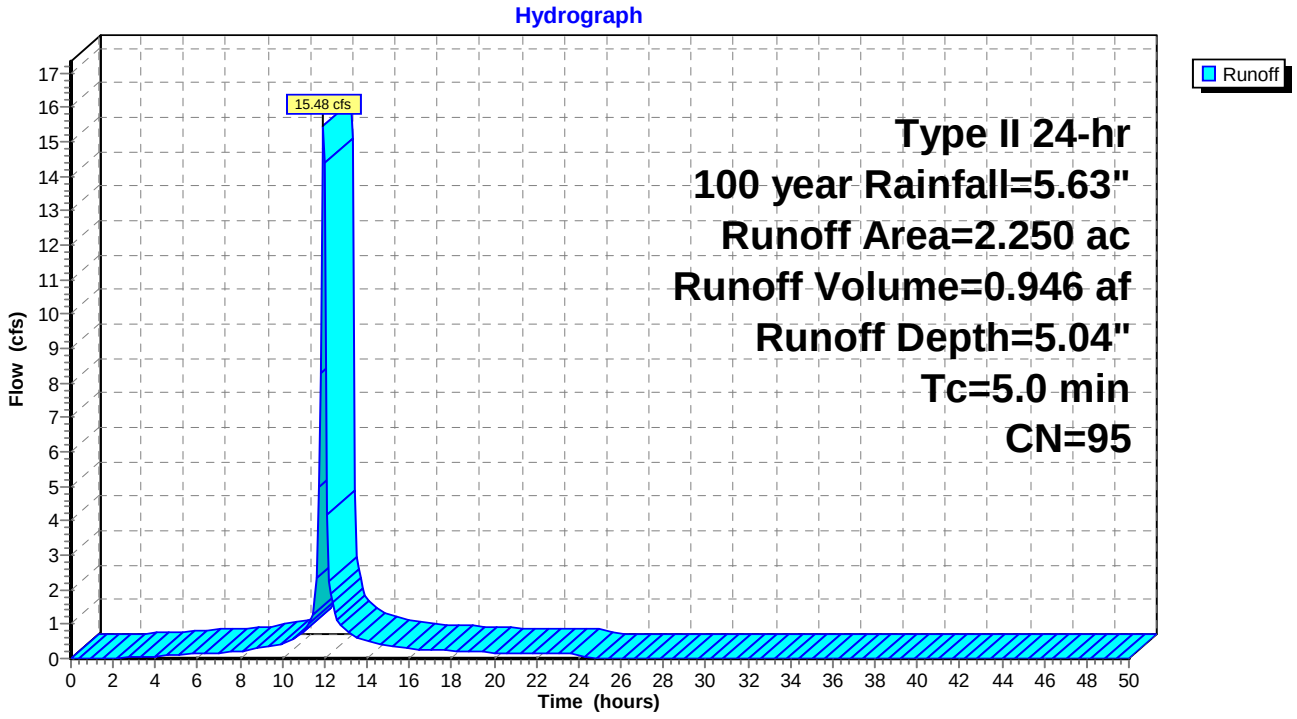
Runoff = 15.48 cfs @ 11.94 hrs, Volume= 0.946 af, Depth= 5.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 100 year Rainfall=5.63"

	Area (ac)	CN	Description
*	1.930	98	
*	0.320	74	
	2.250	95	Weighted Average
	0.320		14.22% Pervious Area
	1.930		85.78% Impervious Area

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

Subcatchment 8S: Existing LOD 01



Summary for Subcatchment 9S: Existing LOD 02

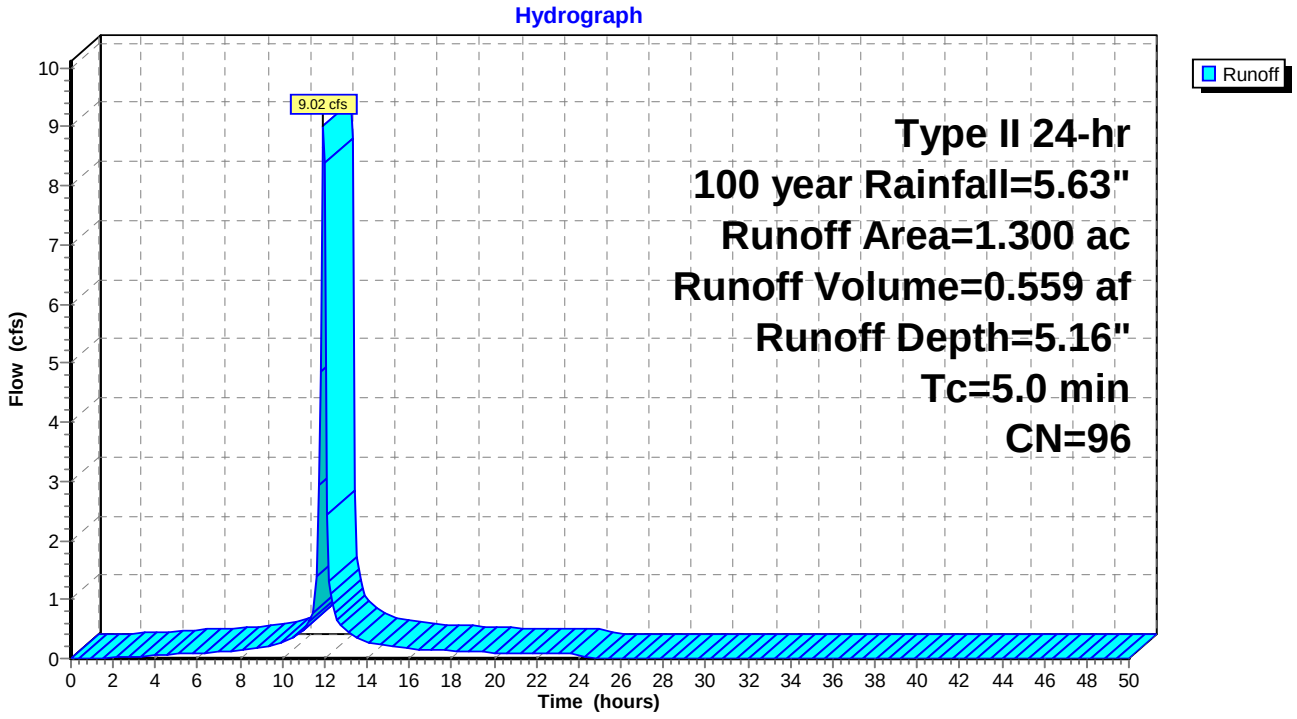
Runoff = 9.02 cfs @ 11.94 hrs, Volume= 0.559 af, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 100 year Rainfall=5.63"

Area (ac)	CN	Description
1.200	98	Paved parking, HSG C
0.100	74	>75% Grass cover, Good, HSG C
1.300	96	Weighted Average
0.100		7.69% Pervious Area
1.200		92.31% Impervious Area

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

Subcatchment 9S: Existing LOD 02



Summary for Subcatchment 40S: Proposed LOD 01

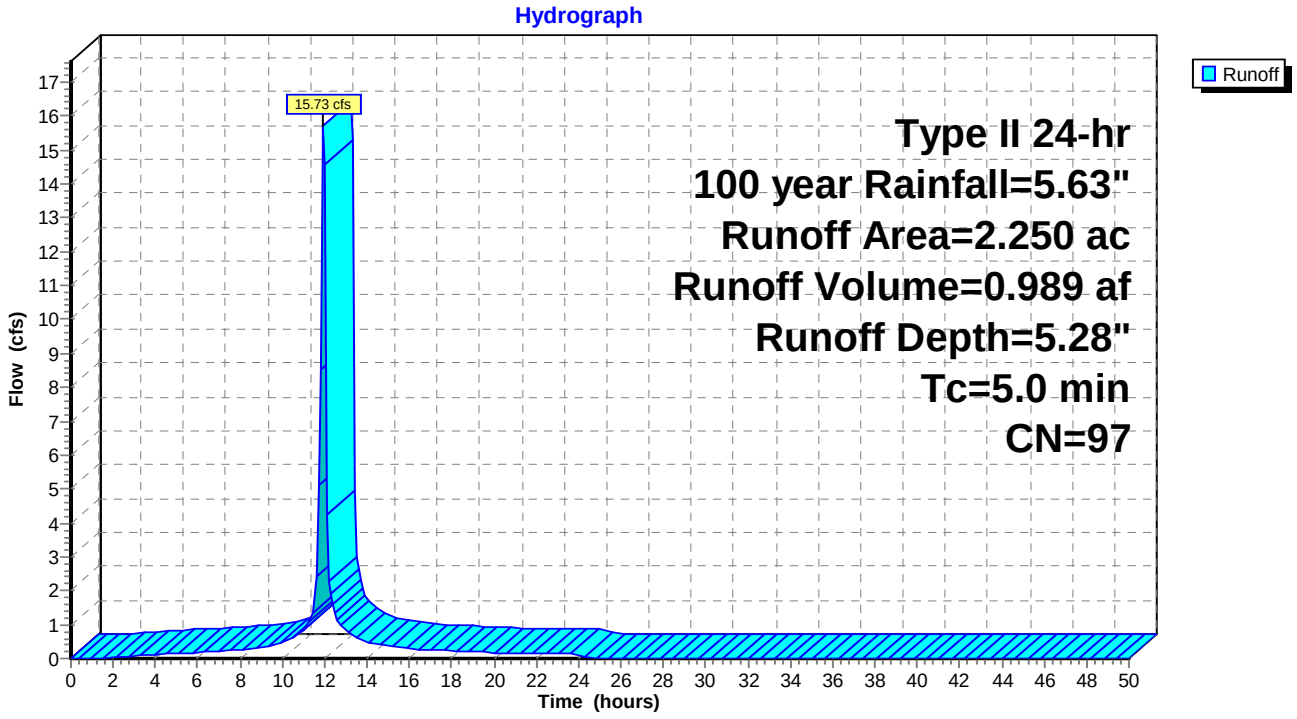
Runoff = 15.73 cfs @ 11.94 hrs, Volume= 0.989 af, Depth= 5.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 100 year Rainfall=5.63"

	Area (ac)	CN	Description
*	2.190	98	
*	0.060	74	
	2.250	97	Weighted Average
	0.060		2.67% Pervious Area
	2.190		97.33% Impervious Area

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

Subcatchment 40S: Proposed LOD 01



Summary for Subcatchment 41S: Proposed LOD 02

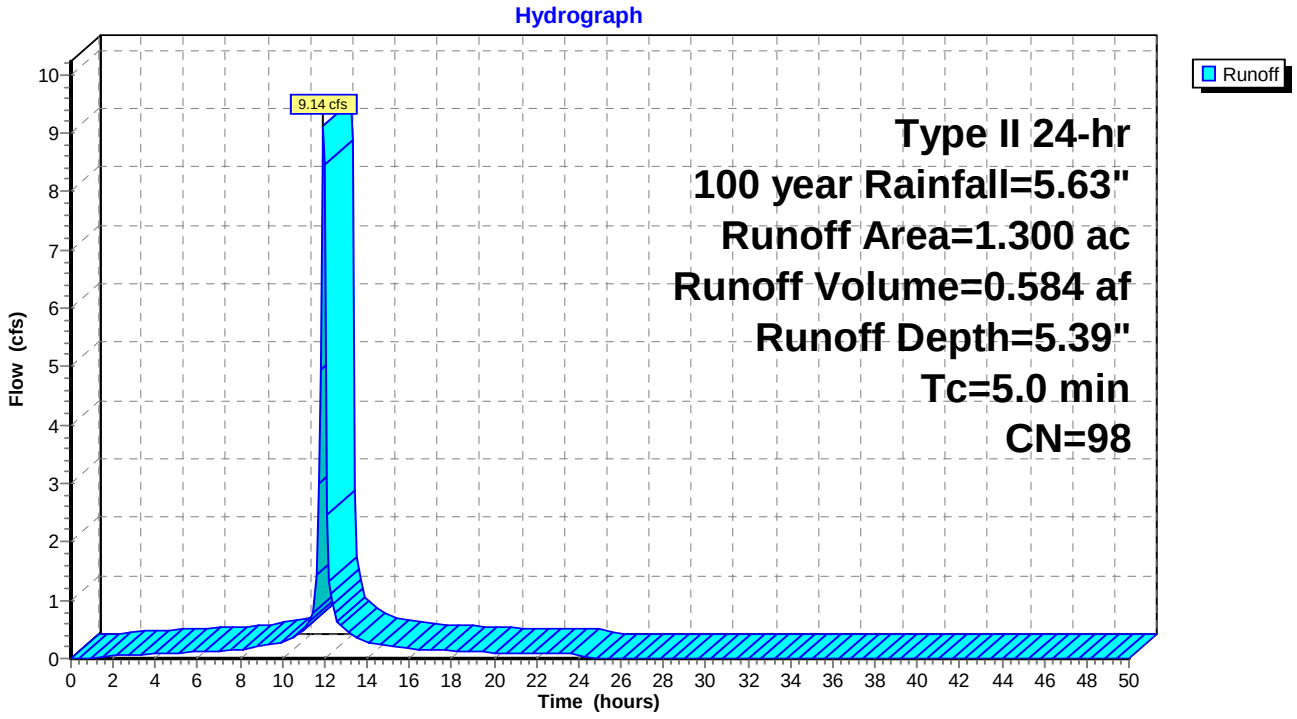
Runoff = 9.14 cfs @ 11.94 hrs, Volume= 0.584 af, Depth= 5.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type II 24-hr 100 year Rainfall=5.63"

	Area (ac)	CN	Description
*	1.280	98	
*	0.020	74	
	1.300	98	Weighted Average
	0.020		1.54% Pervious Area
	1.280		98.46% Impervious Area

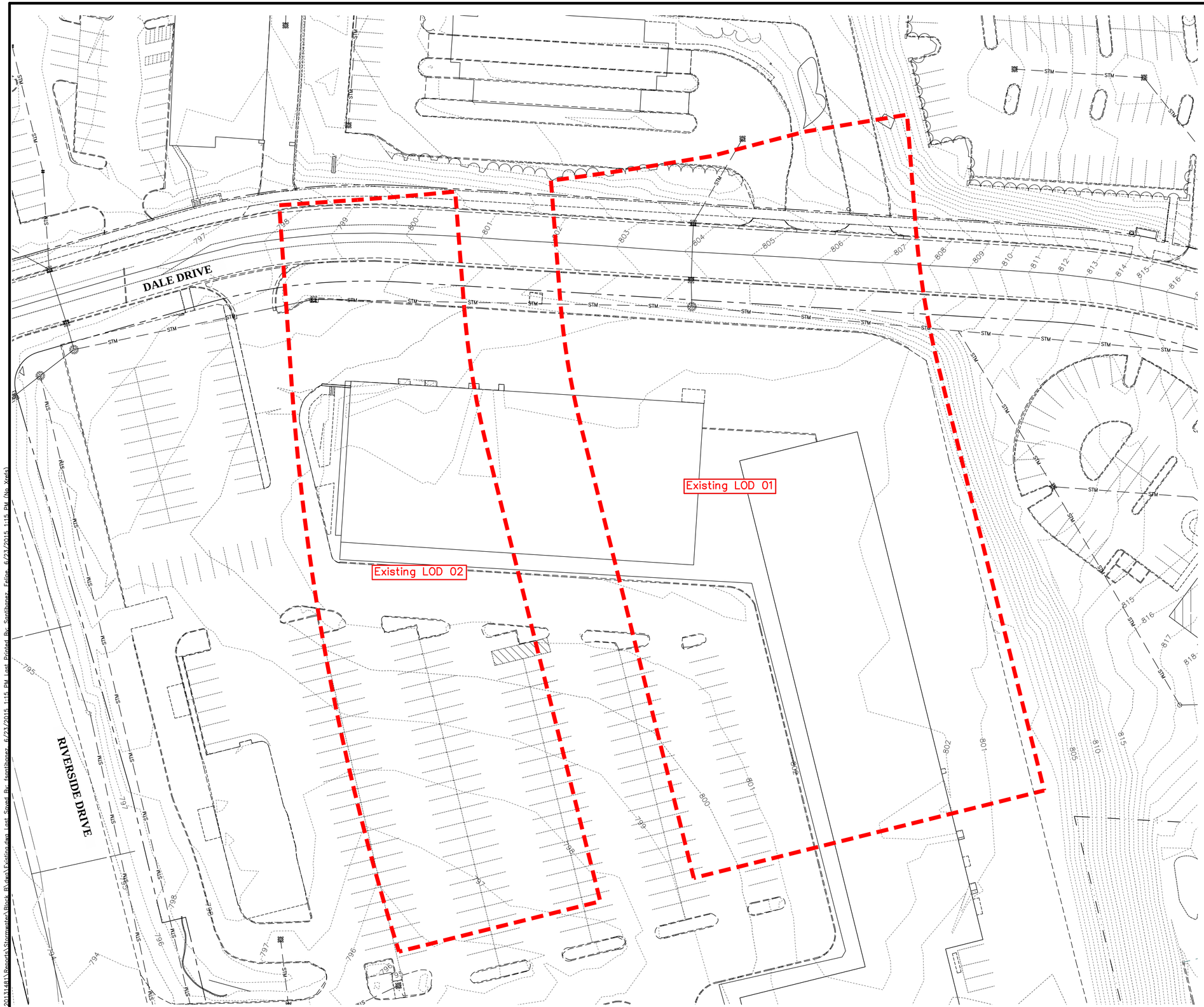
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

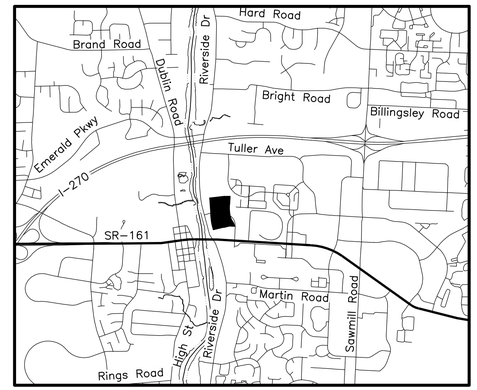
Subcatchment 41S: Proposed LOD 02



APPENDIX C:

Exhibits





LOCATION MAP
Not to Scale

GRAPHIC SCALE

0 15 30 60

1 inch = 30 feet

Existing LOD 01
Area= 2.25 acres
RCN= 95
TC= 5.0 min

Existing LOD 02
Area= 1.30 acres
RCN= 96
TC= 5.0 min

Legend

Limits of Disturbance

Soil Classification

MoC2 – Milton Silt Loam Type "C" Soils

REVISIONS

MARK	DATE	DESCRIPTION

CRAWFORD HOYING development

CITY OF DUBLIN, FRANKLIN COUNTY, OHIO
STORMWATER MANAGEMENT PLAN
FOR
BRIDGE PARK BLOCK B
EXISTING CONDITIONS EXHIBIT

EMH&T
Evans, Mechwart, Hambleton & Tilton, Inc.
Engineers • Surveyors • Planners • Scientists
5500 New Albany Road, Columbus, OH 43054
Phone: 614.775.4500 Toll Free: 888.775.3648
emht.com

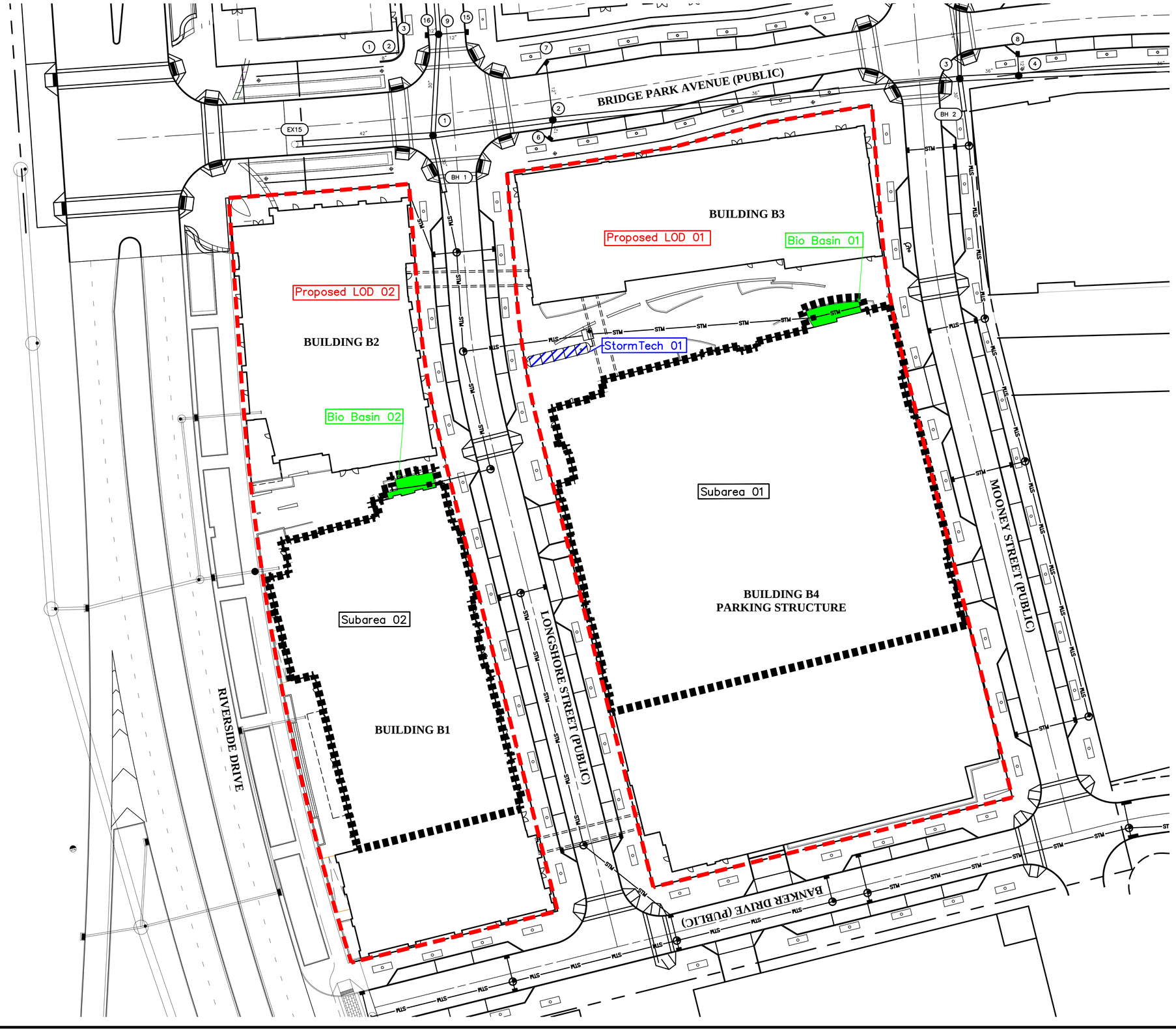
DATE
June 23, 2015

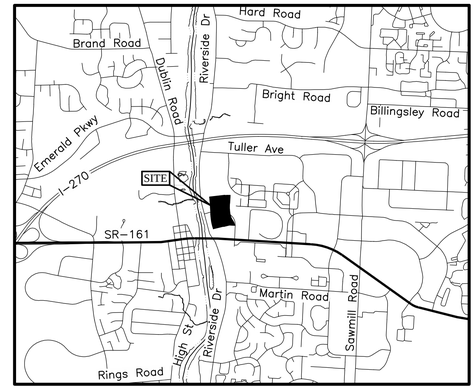
SCALE
As Noted

JOB NO.
2013-1481

SHEET
Exhibit 1

J:\2013\1481\Reports\Stormwater\Block B\dwg\Existing.dwg Last Saved By: fgutierrez 6/23/2015 1:15 PM Last Printed By: fgutierrez 6/23/2015 1:15 PM (No Xrefs)





LOCATION MAP
Not to Scale

GRAPHIC SCALE
0 15 30 60
1 inch = 30 feet

Proposed LOD 01
Area= 2.25 acres
RCN= 97
TC= 5.0 min

Proposed LOD 02
Area= 1.30 acres
RCN= 98
TC= 5.0 min

Subarea 01
Area= 1.00 acres
RCN= 98
TC= 5.0 min

Subarea 02
Area= 0.50 acres
RCN= 98
TC= 5.0 min

StormTech 01 Isolator Row – 5 chambers

Legend

- Limits of Disturbance
- Tributary Boundary
- Bioretention Area
- StormTech Isolator Row

Soil Classification

MoC2 – Milton Silt Loam — Type "C" Soils

REVISIONS

MARK	DATE	DESCRIPTION

CRAWFORD HOYING development

CITY OF DUBLIN, FRANKLIN COUNTY, OHIO
STORMWATER MANAGEMENT PLAN
FOR
BRIDGE PARK
BLOCK B
POST-DEVELOPED EXHIBIT

EMH&T
Evans, Mechwart, Hambleton & Tilton, Inc.
Engineers • Surveyors • Planners • Scientists
5500 New Albany Road, Columbus, OH 43054
Phone: 614.775.4500 Toll Free: 888.775.3648
emht.com

DATE
June 23, 2015

SCALE
As Noted

JOB NO.
2013-1481

SHEET
Exhibit 2