



## **Stormwater Management Plan**

**REE – BLOOMINGTON LYNDAL APARTMENTS**  
Bloomington, MN

**Prepared by Loucks**  
**December 09, 2025**

**Loucks Project No. 25438A**

**REE – Bloomington Lyndale Apartments**  
Bloomington, Minnesota

**Stormwater Management Plan**  
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# REE – Bloomington Lyndale Apartments

Bloomington, Minnesota

## Stormwater Management Plan

### Introduction

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This stormwater management plan was created for the Real Estate Equities Apartment project located on Lyndale Avenue South in Bloomington, MN. The project site encompasses roughly 3.866 acres.

The project generally consists of clearing the existing Wixon Jewelers site, vacant residential sites and constructing a new apartment building with below ground parking, a surface parking lot, and associated utilities.

Included in this plan are calculations for the existing and proposed discharge of storm water from the site.

### Methodology

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#### City of Bloomington Requirements:

1. Rate Control – Runoff rates for the proposed activity shall not exceed runoff rates for the 1, 2, 10, & 100-year critical storm events.
2. There is to be no increase in TSS, or TP from the existing conditions.
3. Volume reduction per NPDES requires 1.1-inch over the new impervious surface.

#### Methodology

The stormwater calculations were made utilizing the stormwater-modeling program HydroCAD 10.00. Calculations were performed for Atlas-14 1-year, 2-year, 10-year, and 100-year rainfall events of 2.48 inches, 2.86 inches, 4.26 inches, and 7.32 inches respectively.

### Existing Conditions

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The existing site is currently a few different properties. There is the former Wixon Jewelers and vacant residential sites. There is no existing stormwater treatment onsite. All runoff is captured in storm structures and routed off site. The existing site is broken up into four drainage areas.

Drainage area DA-1E will drain off-site to the north. Drainage area DA-2E will drain off-site to the east. Drainage area DA-3E will drain off-site to the south. Drainage area DA-4E will drain off-site to the west.

## Proposed Conditions

The proposed site consists of constructing an apartment building, parking lot, entrance drives, utilities, and stormwater management practices. To meet stormwater requirements for the site, an underground infiltration vault will be proposed. The site will be broken up into five drainage areas.

Drainage area DA-1P will drain off-site to the north. Drainage area DA-2P will drain off-site to the east. Drainage area DA-3P will drain off-site to the south. Drainage area DA-4P will drain off-site to the west. Drainage area DA-5P will drain TO THE Underground Infiltration vault before connecting into the storm sewer in Lyndale Avenue South.

### Rate Control

The rate control requirements are that peak rates shall not exceed existing rates for the 1, 2, 10, and 100-year events.

Tables 1.1 below lists the existing areas and runoff rates  
 Tables 1.2 below lists the proposed areas and runoff rates

**Table 1.1 – Existing Peak Runoff Rates**

Existing Conditions						
			1-YR Event	2-YR Event	10-YR Event	100-YR Event
Subcatch	Area (SF)	Impervious (SF)	Rate (cfs)	Rate (cfs)	Rate (cfs)	Rate (cfs)
DA-1E	5,600	3,106	0.19	0.25	0.47	0.99
DA-2E	36,963	1,772	0.16	0.34	1.27	4.04
DA-3E	15,231	0	0.04	0.10	0.45	1.55
DA-4E	110,611	34,839	1.94	2.82	6.58	16.17
<b>TOTAL EXISTING</b>	<b>168,405</b>	<b>39,717</b>	<b>2.31</b>	<b>3.49</b>	<b>8.77</b>	<b>22.73</b>

**Table 1.2 – Proposed Peak Runoff Rates**

Proposed Conditions						
			1-YR Event	2-YR Event	10-YR Event	100-YR Event
Subcatch	Area (SF)	Impervious (SF)	Rate (cfs)	Rate (cfs)	Rate (cfs)	Rate (cfs)
DA-1P	1,330	0	0.00	0.00	0.05	6.18
DA-2P	14,057	0	0.24	0.35	0.92	2.58
DA-3P	4,024	549	0.00	0.00	0.01	0.05
DA-4P	12,981	924	0.24	0.35	0.92	2.58
DA-5P to Vault	136,013	118,093	0.00	0.00	0.01	0.05
Total to West	148,994	119,017	0.00	0.00	0.01	0.05
<b>TOTAL PROPOSED</b>	<b>168,405</b>	<b>119,566</b>	<b>0.24</b>	<b>0.36</b>	<b>0.94</b>	<b>7.06</b>

Water Resources Review: These tables indicate a significant increase in rates flowing to the north during the 100-yr event and a minor increase in rates to the east. Revise to ensure rate control at each site boundary, to avoid adversely impacting neighboring properties.

Proposed 100-yr at DA-1P appears to be by a typo, based on HydroCAD results.

Water Resources Review: City requires WQV of 1.1" of new AND fully reconstructed impervious. Verify that this is provided (i.e. not just net new impervious).

Volume Control

A water quality volume of 1.1" of runoff from the new impervious surfaces created by the project is treated. Required volume calculations are shown below:

Volume Required:	119,566 SF x 1.1" x 1'/12"	=	10,960 CF
Volume Provided:	Infiltration Vault (820.5.00-819.3)	=	11,660 CF
Total Volume Provided:		=	11,660 CF

The proposed water quality volume for the storm vault is 11,660 CF which exceeds the required volume of 10,960 CF.

Drawdown Calculation

The infiltration basins will be constructed and designed to draw down in less than 48 hours. The proposed drawdown depth is 1.2 ft

Allowable Depth for 48 Hour Drawdown = Infiltration Rate (in/hr) \* 1/12 (ft/in) \* 48 hr

Allowable Depth for 48 Hour Drawdown = 0.30 (in/hr) \* 1/12 (ft/in) \* 48 hr = 1.2 ft

Water Quality

The city requires that there is no net increase in total suspended solids (TSS) or phosphorus (TP) leaving the site from the existing site to the proposed site. The existing site TSS is 510.3 lbs & the proposed TSS is 132.3 lbs. The existing site TP is 2.809 lbs & the proposed TP is 0.729 lbs. Both meeting the city requirement of proposed being less than existing.

Water Resources Review: City requires no net increase in TSS & TP loading AND 60% removal of TP and 90% removal of TSS on an average annual basis. WQ model provided shows 87% TSS removal.

Best Management Practices

Best management practices (BMP's) will be implemented in accordance with the project Stormwater Pollution Prevention Plan (C3-2 & C3-3). During construction, erosion control measures will include dust control, silt fencing, bio logs, inlet protection, and a temporary rock construction entrance. Permanent BMP's will include stormwater management systems, surface pavements, and turf establishment (vegetation) of disturbed areas.

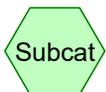
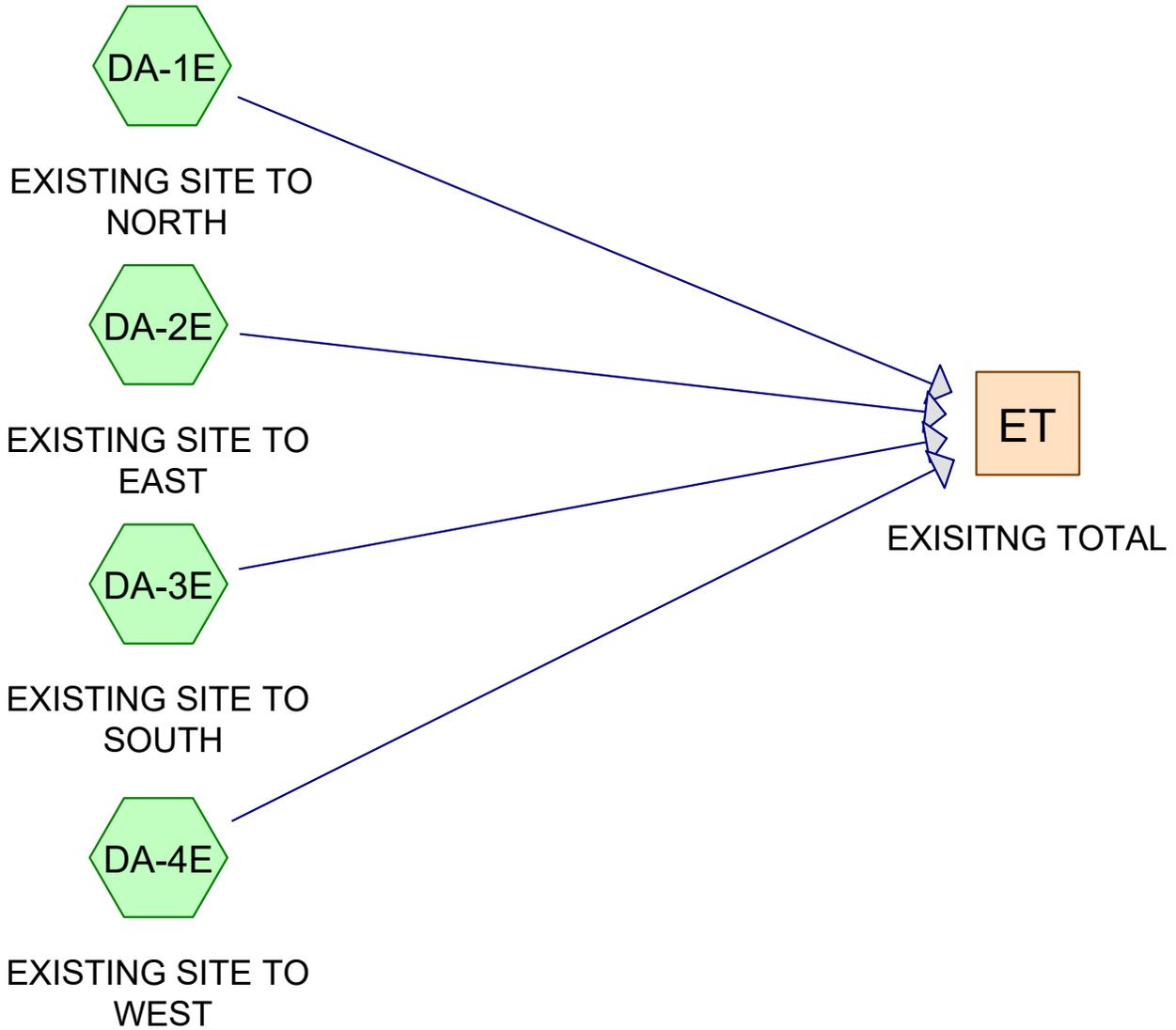
Conclusion

The proposed Stormwater Management Plan for the project provides a solution for the conveyance of stormwater from the site. The underground infiltration vault captures the runoff and outlets to city storm sewer. They will provide rate control for the development and meet water quality requirements through the proposed infiltration.

## **Appendix A**

Existing HydroCAD Report

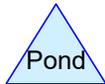
EXISTING SITE



Subcat



Reach



Pond



Link

**Routing Diagram for REE - Bloomington**

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## REE - Bloomington

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### Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	MSE 24-hr	3	Default	24.00	1	2.48	2
2	2-Year	MSE 24-hr	3	Default	24.00	1	2.86	2
3	10-Year	MSE 24-hr	3	Default	24.00	1	4.26	2
4	100-Year	MSE 24-hr	3	Default	24.00	1	7.32	2

## REE - Bloomington

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### Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.954	61	>75% Grass cover, Good, HSG B (DA-1E, DA-2E, DA-3E, DA-4E)
0.912	98	Paved parking, HSG B (DA-1E, DA-2E, DA-4E)
<b>3.866</b>	<b>70</b>	<b>TOTAL AREA</b>

**REE - Bloomington**

MSE 24-hr 3 1-Year Rainfall=2.48"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentDA-1E: EXISTING SITE TO** Runoff Area=5,600 sf 55.46% Impervious Runoff Depth=0.98"  
Tc=10.0 min CN=82 Runoff=0.19 cfs 0.011 af

**SubcatchmentDA-2E: EXISTING SITE TO** Runoff Area=36,963 sf 4.79% Impervious Runoff Depth=0.24"  
Tc=10.0 min CN=63 Runoff=0.16 cfs 0.017 af

**SubcatchmentDA-3E: EXISTING SITE TO** Runoff Area=15,231 sf 0.00% Impervious Runoff Depth=0.19"  
Tc=10.0 min CN=61 Runoff=0.04 cfs 0.006 af

**SubcatchmentDA-4E: EXISTING SITE TO** Runoff Area=110,611 sf 31.50% Impervious Runoff Depth=0.56"  
Tc=10.0 min CN=73 Runoff=1.94 cfs 0.118 af

**Reach ET: EXISITNG TOTAL**

Inflow=2.31 cfs 0.151 af  
Outflow=2.31 cfs 0.151 af

**Total Runoff Area = 3.866 ac Runoff Volume = 0.151 af Average Runoff Depth = 0.47"**  
**76.42% Pervious = 2.954 ac 23.58% Impervious = 0.912 ac**

**Summary for Subcatchment DA-1E: EXISTING SITE TO NORTH**

Runoff = 0.19 cfs @ 12.18 hrs, Volume= 0.011 af, Depth= 0.98"  
 Routed to Reach ET : EXISITNG TOTAL

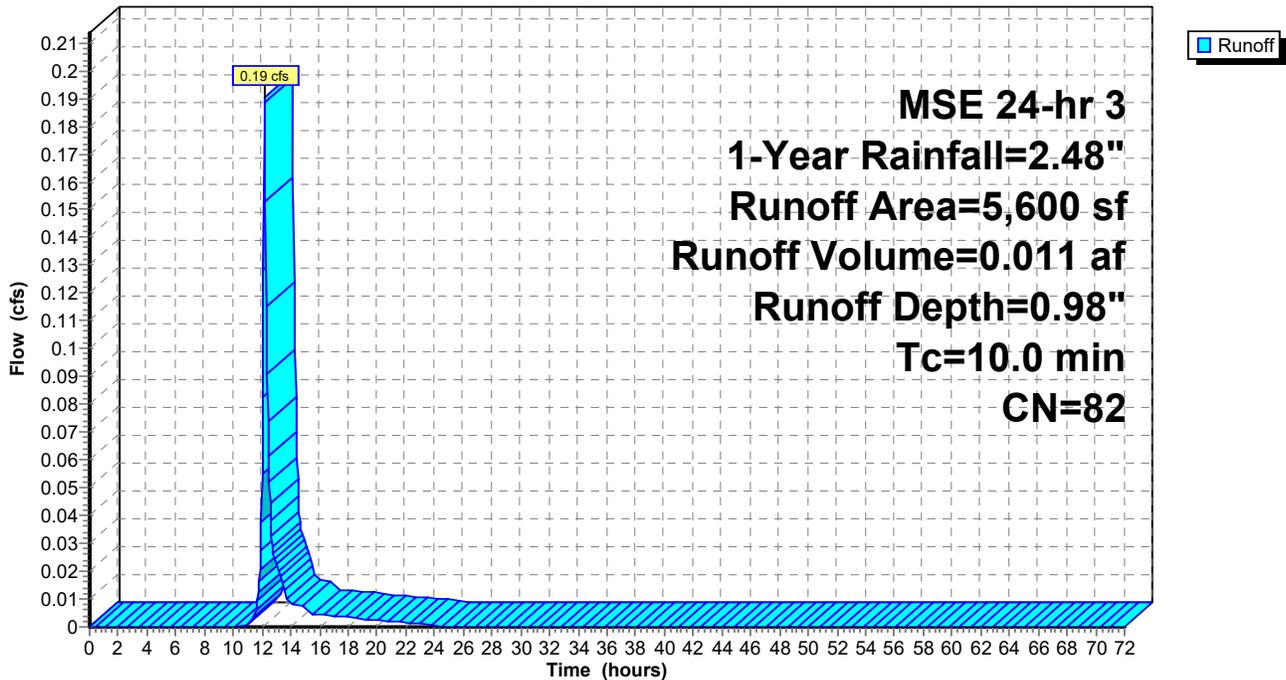
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
3,106	98	Paved parking, HSG B
2,494	61	>75% Grass cover, Good, HSG B
5,600	82	Weighted Average
2,494		44.54% Pervious Area
3,106		55.46% Impervious Area

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

**Subcatchment DA-1E: EXISTING SITE TO NORTH**

Hydrograph



**Summary for Subcatchment DA-2E: EXISTING SITE TO EAST**

Runoff = 0.16 cfs @ 12.24 hrs, Volume= 0.017 af, Depth= 0.24"  
 Routed to Reach ET : EXISITNG TOTAL

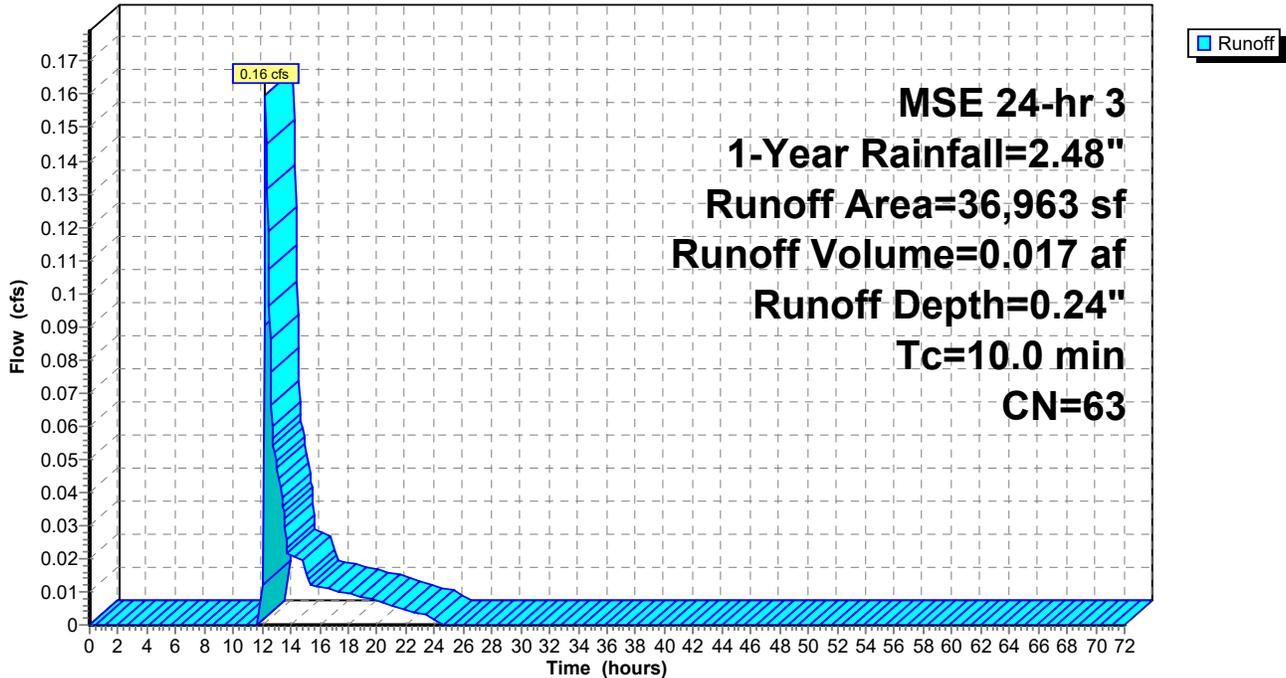
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
1,772	98	Paved parking, HSG B
35,191	61	>75% Grass cover, Good, HSG B
36,963	63	Weighted Average
35,191		95.21% Pervious Area
1,772		4.79% Impervious Area

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

**Subcatchment DA-2E: EXISTING SITE TO EAST**

Hydrograph



**Summary for Subcatchment DA-3E: EXISTING SITE TO SOUTH**

Runoff = 0.04 cfs @ 12.27 hrs, Volume= 0.006 af, Depth= 0.19"  
 Routed to Reach ET : EXISITNG TOTAL

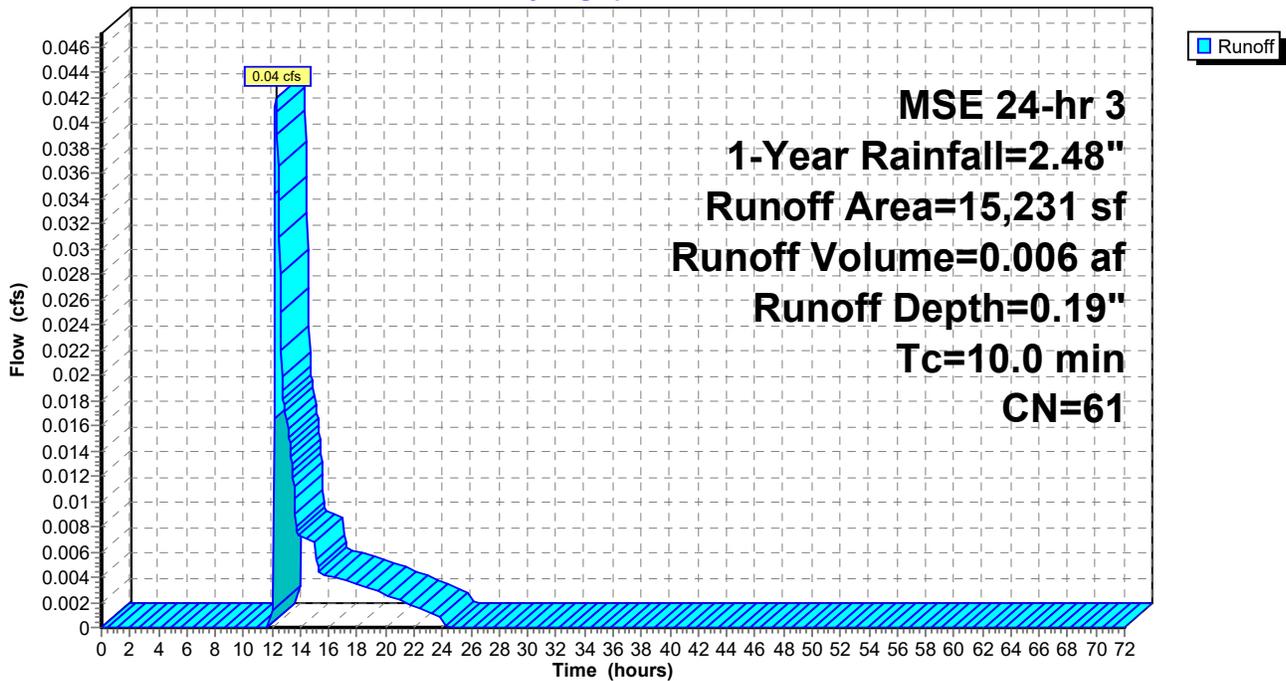
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
0	98	Paved parking, HSG B
15,231	61	>75% Grass cover, Good, HSG B
15,231	61	Weighted Average
15,231		100.00% Pervious Area

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

**Subcatchment DA-3E: EXISTING SITE TO SOUTH**

Hydrograph



**Summary for Subcatchment DA-4E: EXISTING SITE TO WEST**

Runoff = 1.94 cfs @ 12.20 hrs, Volume= 0.118 af, Depth= 0.56"  
 Routed to Reach ET : EXISITNG TOTAL

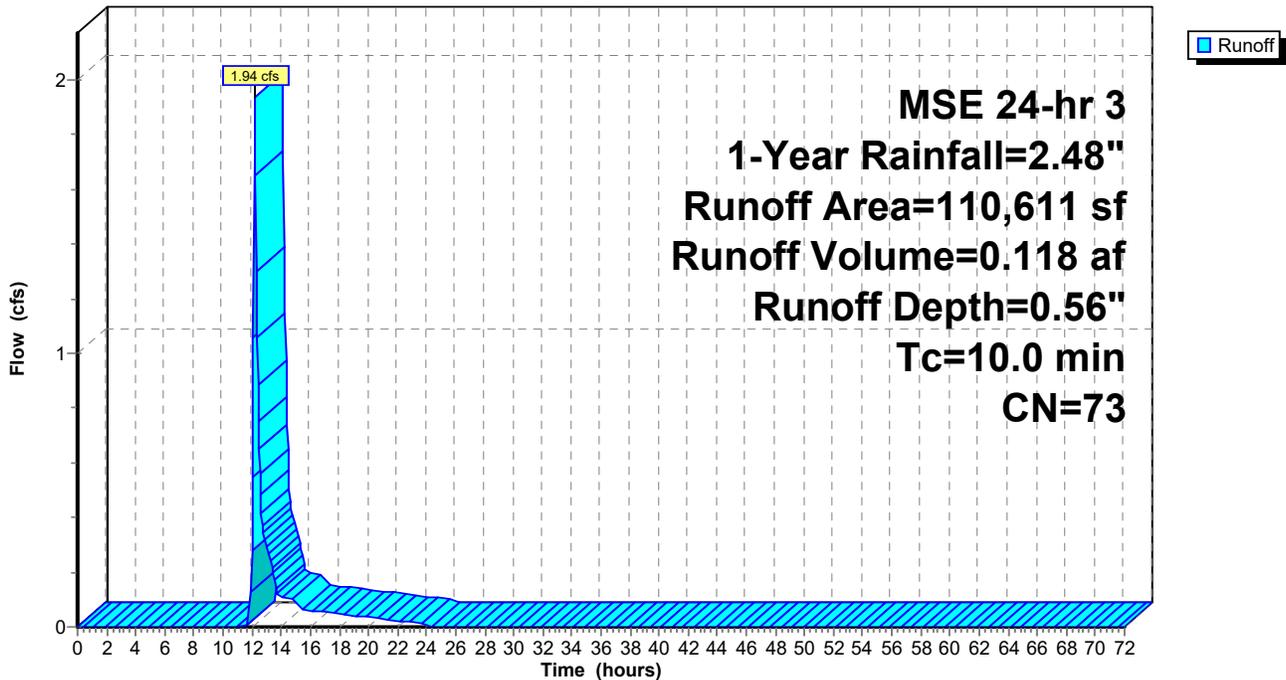
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
34,839	98	Paved parking, HSG B
75,772	61	>75% Grass cover, Good, HSG B
110,611	73	Weighted Average
75,772		68.50% Pervious Area
34,839		31.50% Impervious Area

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

**Subcatchment DA-4E: EXISTING SITE TO WEST**

Hydrograph



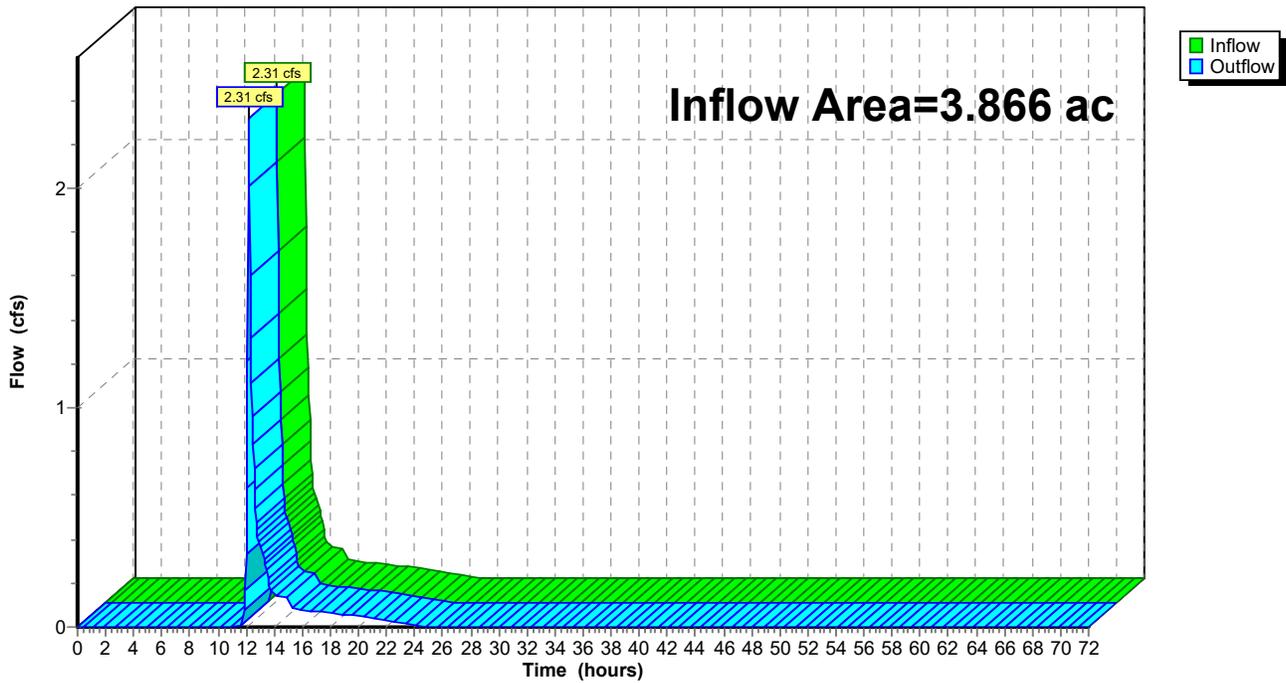
### Summary for Reach ET: EXISITNG TOTAL

Inflow Area = 3.866 ac, 23.58% Impervious, Inflow Depth = 0.47" for 1-Year event  
Inflow = 2.31 cfs @ 12.20 hrs, Volume= 0.151 af  
Outflow = 2.31 cfs @ 12.20 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Reach ET: EXISITNG TOTAL

Hydrograph



**REE - Bloomington**

MSE 24-hr 3 2-Year Rainfall=2.86"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentDA-1E: EXISTING SITE TO** Runoff Area=5,600 sf 55.46% Impervious Runoff Depth=1.27"  
Tc=10.0 min CN=82 Runoff=0.25 cfs 0.014 af

**SubcatchmentDA-2E: EXISTING SITE TO** Runoff Area=36,963 sf 4.79% Impervious Runoff Depth=0.38"  
Tc=10.0 min CN=63 Runoff=0.34 cfs 0.027 af

**SubcatchmentDA-3E: EXISTING SITE TO** Runoff Area=15,231 sf 0.00% Impervious Runoff Depth=0.31"  
Tc=10.0 min CN=61 Runoff=0.10 cfs 0.009 af

**SubcatchmentDA-4E: EXISTING SITE TO** Runoff Area=110,611 sf 31.50% Impervious Runoff Depth=0.77"  
Tc=10.0 min CN=73 Runoff=2.82 cfs 0.163 af

**Reach ET: EXISITNG TOTAL** Inflow=3.49 cfs 0.213 af  
Outflow=3.49 cfs 0.213 af

**Total Runoff Area = 3.866 ac Runoff Volume = 0.213 af Average Runoff Depth = 0.66"**  
**76.42% Pervious = 2.954 ac 23.58% Impervious = 0.912 ac**

**Summary for Subcatchment DA-1E: EXISTING SITE TO NORTH**

Runoff = 0.25 cfs @ 12.18 hrs, Volume= 0.014 af, Depth= 1.27"  
 Routed to Reach ET : EXISITNG TOTAL

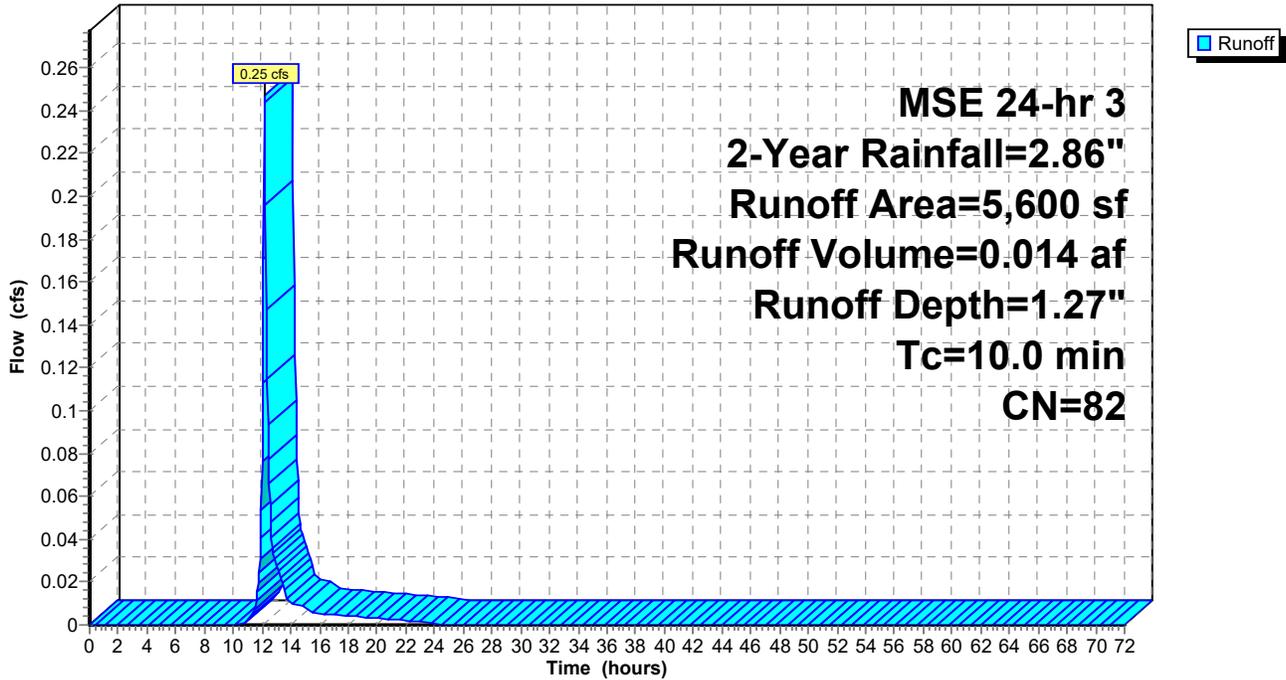
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
3,106	98	Paved parking, HSG B
2,494	61	>75% Grass cover, Good, HSG B
5,600	82	Weighted Average
2,494		44.54% Pervious Area
3,106		55.46% Impervious Area

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

**Subcatchment DA-1E: EXISTING SITE TO NORTH**

Hydrograph



**Summary for Subcatchment DA-2E: EXISTING SITE TO EAST**

Runoff = 0.34 cfs @ 12.22 hrs, Volume= 0.027 af, Depth= 0.38"  
 Routed to Reach ET : EXISITNG TOTAL

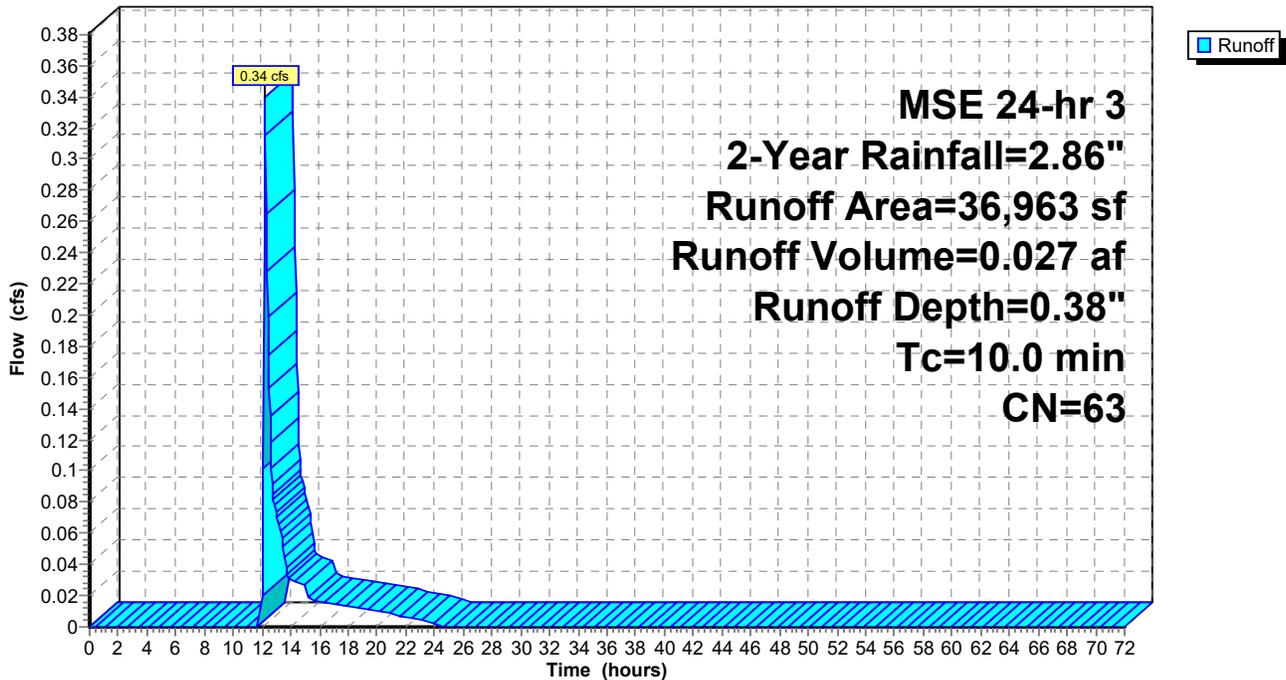
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
1,772	98	Paved parking, HSG B
35,191	61	>75% Grass cover, Good, HSG B
36,963	63	Weighted Average
35,191		95.21% Pervious Area
1,772		4.79% Impervious Area

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

**Subcatchment DA-2E: EXISTING SITE TO EAST**

Hydrograph



**Summary for Subcatchment DA-3E: EXISTING SITE TO SOUTH**

Runoff = 0.10 cfs @ 12.22 hrs, Volume= 0.009 af, Depth= 0.31"  
 Routed to Reach ET : EXISITNG TOTAL

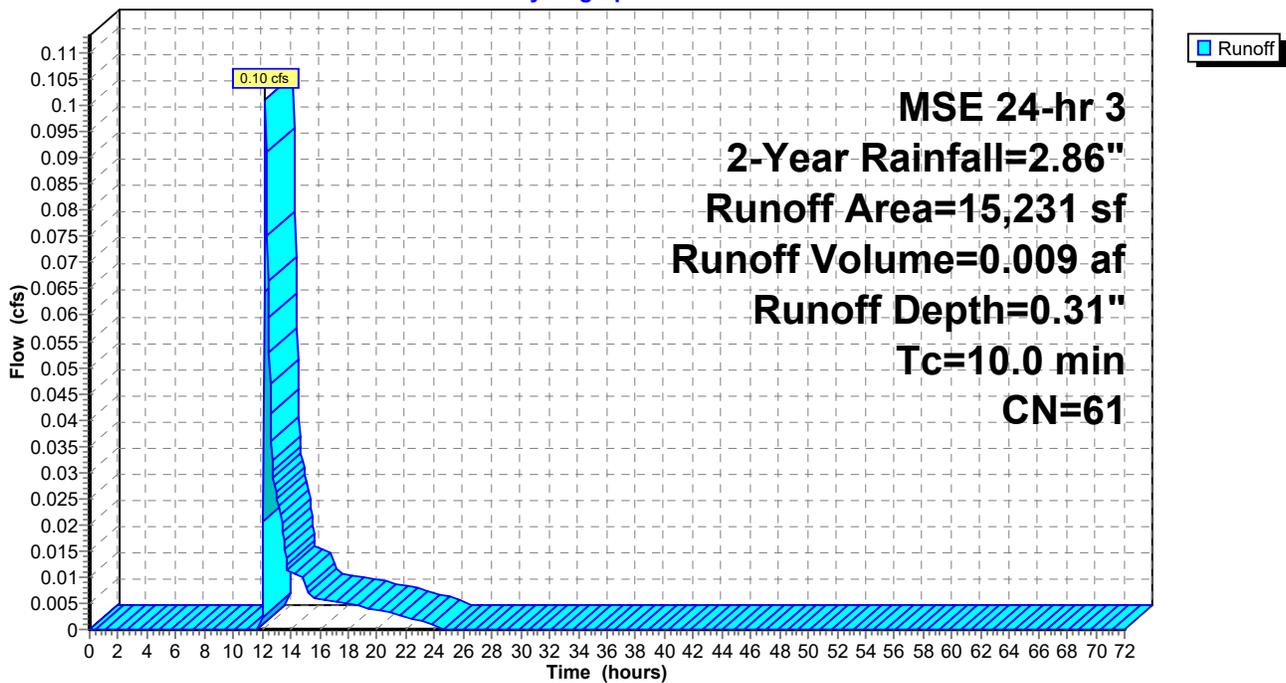
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
0	98	Paved parking, HSG B
15,231	61	>75% Grass cover, Good, HSG B
15,231	61	Weighted Average
15,231		100.00% Pervious Area

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

**Subcatchment DA-3E: EXISTING SITE TO SOUTH**

Hydrograph



**Summary for Subcatchment DA-4E: EXISTING SITE TO WEST**

Runoff = 2.82 cfs @ 12.19 hrs, Volume= 0.163 af, Depth= 0.77"  
 Routed to Reach ET : EXISITNG TOTAL

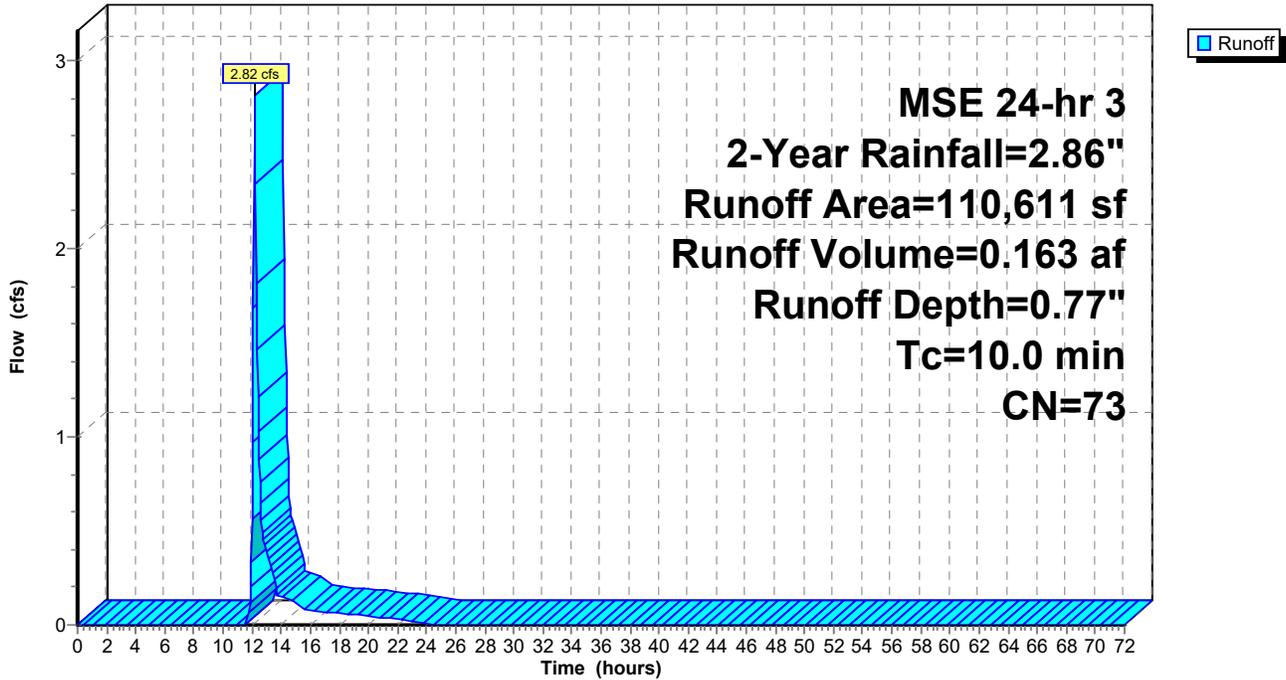
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
34,839	98	Paved parking, HSG B
75,772	61	>75% Grass cover, Good, HSG B
110,611	73	Weighted Average
75,772		68.50% Pervious Area
34,839		31.50% Impervious Area

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

**Subcatchment DA-4E: EXISTING SITE TO WEST**

Hydrograph



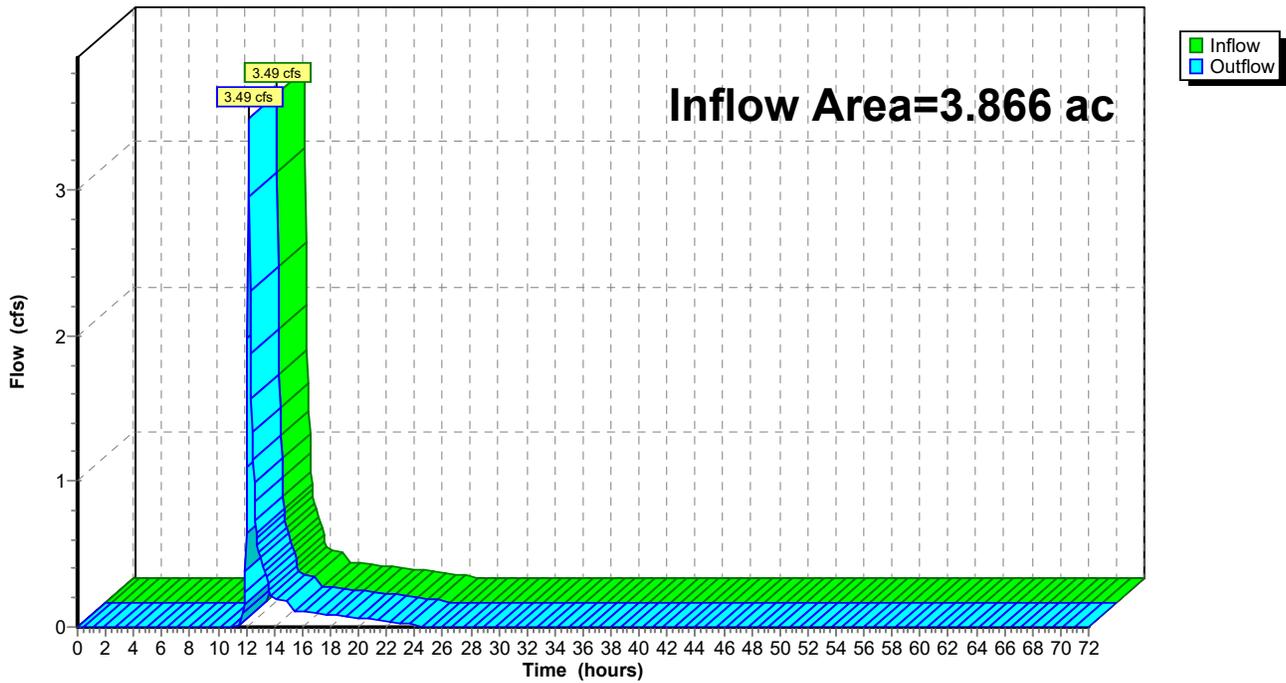
### Summary for Reach ET: EXISITNG TOTAL

Inflow Area = 3.866 ac, 23.58% Impervious, Inflow Depth = 0.66" for 2-Year event  
Inflow = 3.49 cfs @ 12.20 hrs, Volume= 0.213 af  
Outflow = 3.49 cfs @ 12.20 hrs, Volume= 0.213 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Reach ET: EXISITNG TOTAL

Hydrograph



**REE - Bloomington**

MSE 24-hr 3 10-Year Rainfall=4.26"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentDA-1E: EXISTING SITE TO** Runoff Area=5,600 sf 55.46% Impervious Runoff Depth=2.43"  
Tc=10.0 min CN=82 Runoff=0.47 cfs 0.026 af

**SubcatchmentDA-2E: EXISTING SITE TO** Runoff Area=36,963 sf 4.79% Impervious Runoff Depth=1.06"  
Tc=10.0 min CN=63 Runoff=1.27 cfs 0.075 af

**SubcatchmentDA-3E: EXISTING SITE TO** Runoff Area=15,231 sf 0.00% Impervious Runoff Depth=0.95"  
Tc=10.0 min CN=61 Runoff=0.45 cfs 0.028 af

**SubcatchmentDA-4E: EXISTING SITE TO** Runoff Area=110,611 sf 31.50% Impervious Runoff Depth=1.72"  
Tc=10.0 min CN=73 Runoff=6.58 cfs 0.363 af

**Reach ET: EXISITNG TOTAL** Inflow=8.77 cfs 0.492 af  
Outflow=8.77 cfs 0.492 af

**Total Runoff Area = 3.866 ac Runoff Volume = 0.492 af Average Runoff Depth = 1.53"**  
**76.42% Pervious = 2.954 ac 23.58% Impervious = 0.912 ac**

**Summary for Subcatchment DA-1E: EXISTING SITE TO NORTH**

Runoff = 0.47 cfs @ 12.18 hrs, Volume= 0.026 af, Depth= 2.43"  
 Routed to Reach ET : EXISITNG TOTAL

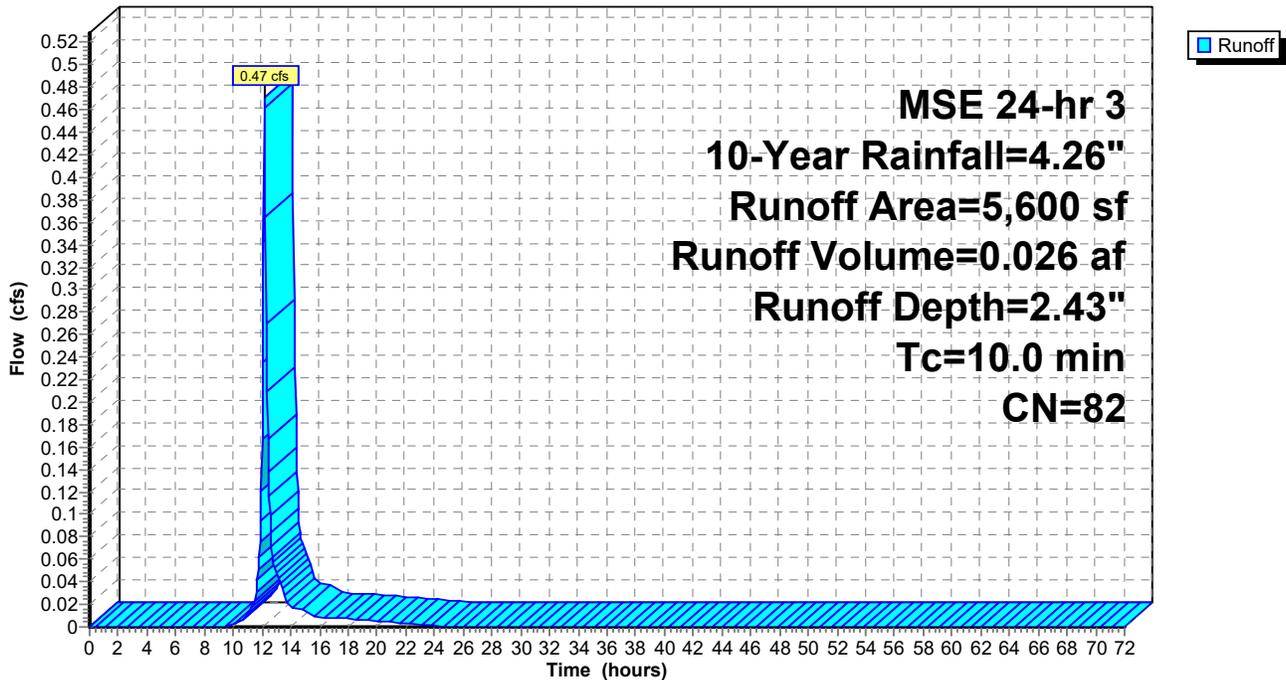
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
3,106	98	Paved parking, HSG B
2,494	61	>75% Grass cover, Good, HSG B
5,600	82	Weighted Average
2,494		44.54% Pervious Area
3,106		55.46% Impervious Area

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

**Subcatchment DA-1E: EXISTING SITE TO NORTH**

Hydrograph



**Summary for Subcatchment DA-2E: EXISTING SITE TO EAST**

Runoff = 1.27 cfs @ 12.19 hrs, Volume= 0.075 af, Depth= 1.06"  
 Routed to Reach ET : EXISITNG TOTAL

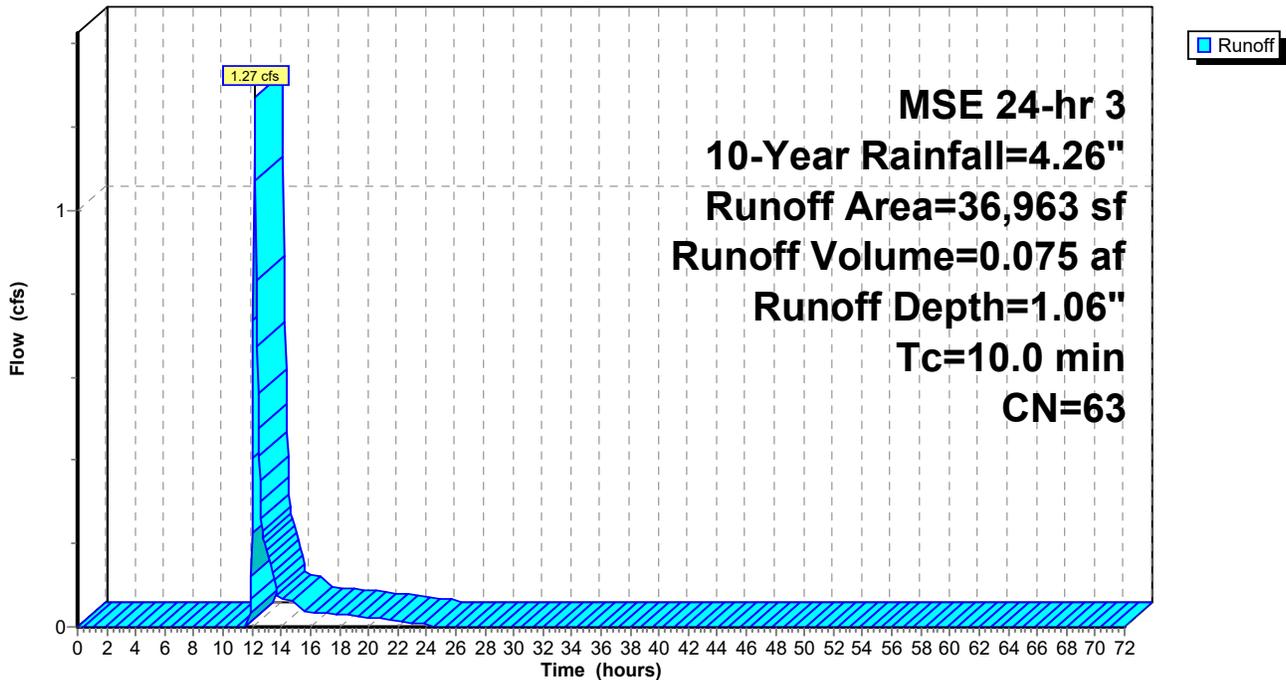
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
1,772	98	Paved parking, HSG B
35,191	61	>75% Grass cover, Good, HSG B
36,963	63	Weighted Average
35,191		95.21% Pervious Area
1,772		4.79% Impervious Area

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

**Subcatchment DA-2E: EXISTING SITE TO EAST**

Hydrograph



**Summary for Subcatchment DA-3E: EXISTING SITE TO SOUTH**

Runoff = 0.45 cfs @ 12.20 hrs, Volume= 0.028 af, Depth= 0.95"  
 Routed to Reach ET : EXISITNG TOTAL

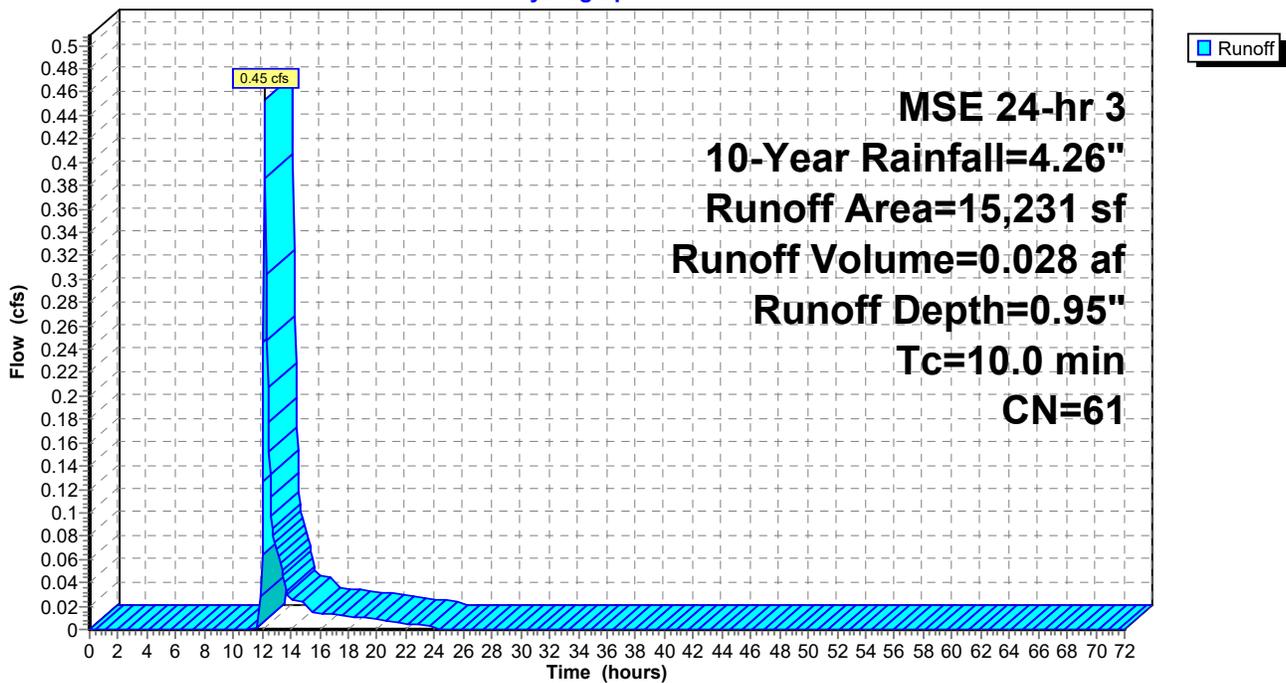
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
0	98	Paved parking, HSG B
15,231	61	>75% Grass cover, Good, HSG B
15,231	61	Weighted Average
15,231		100.00% Pervious Area

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

**Subcatchment DA-3E: EXISTING SITE TO SOUTH**

Hydrograph



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MSE 24-hr 3 10-Year Rainfall=4.26"

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**Summary for Subcatchment DA-4E: EXISTING SITE TO WEST**

Runoff = 6.58 cfs @ 12.18 hrs, Volume= 0.363 af, Depth= 1.72"

Routed to Reach ET : EXISITNG TOTAL

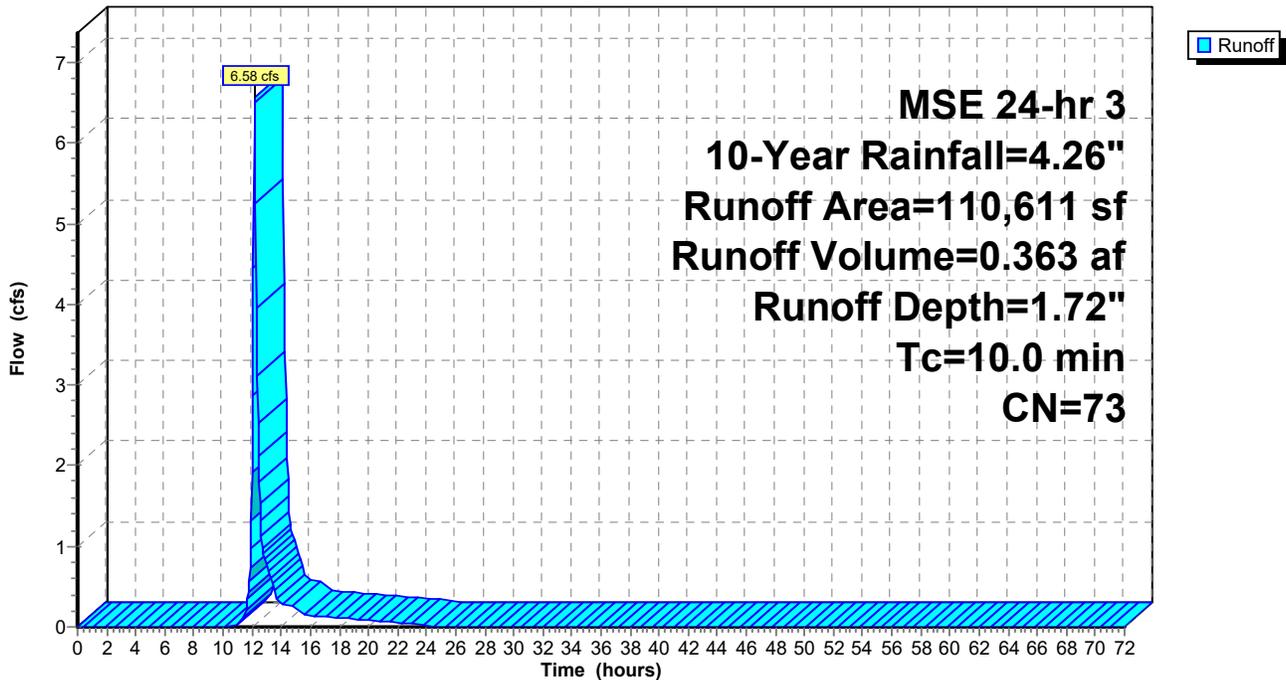
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
34,839	98	Paved parking, HSG B
75,772	61	>75% Grass cover, Good, HSG B
110,611	73	Weighted Average
75,772		68.50% Pervious Area
34,839		31.50% Impervious Area

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

**Subcatchment DA-4E: EXISTING SITE TO WEST**

Hydrograph



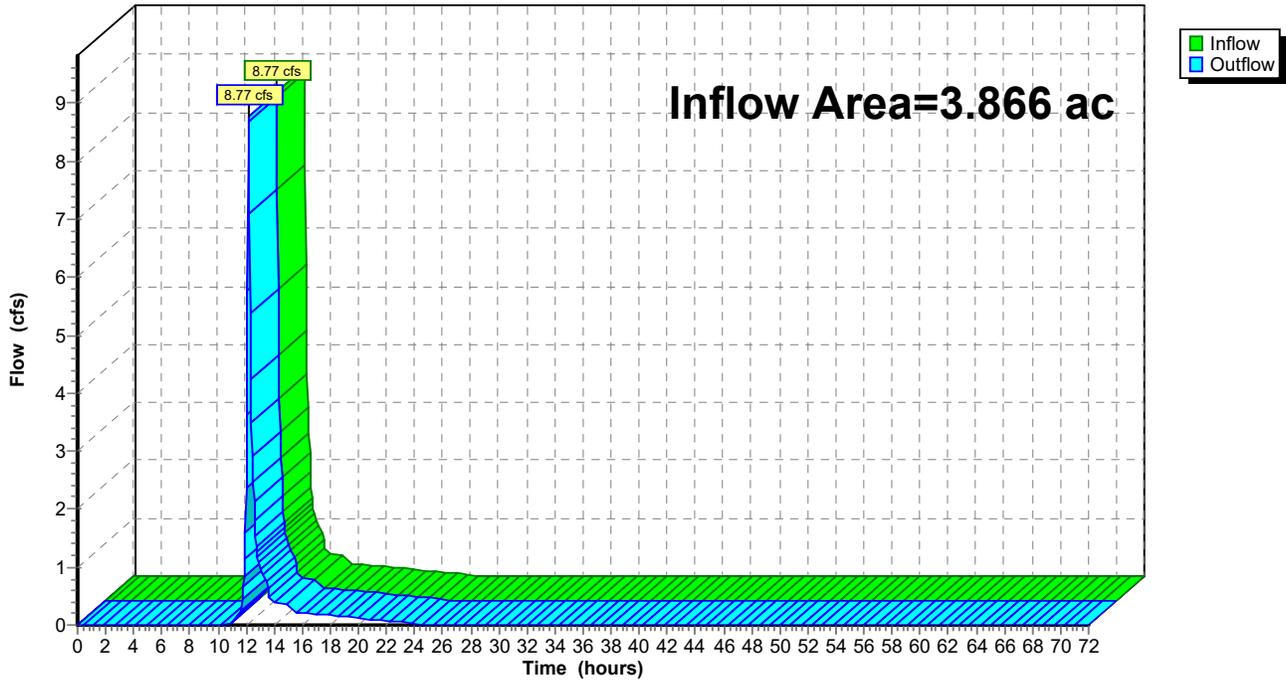
Summary for Reach ET: EXISITNG TOTAL

Inflow Area = 3.866 ac, 23.58% Impervious, Inflow Depth = 1.53" for 10-Year event  
Inflow = 8.77 cfs @ 12.19 hrs, Volume= 0.492 af  
Outflow = 8.77 cfs @ 12.19 hrs, Volume= 0.492 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach ET: EXISITNG TOTAL

Hydrograph



**REE - Bloomington**

MSE 24-hr 3 100-Year Rainfall=7.32"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentDA-1E: EXISTING SITE TO** Runoff Area=5,600 sf 55.46% Impervious Runoff Depth=5.22"  
Tc=10.0 min CN=82 Runoff=0.99 cfs 0.056 af

**SubcatchmentDA-2E: EXISTING SITE TO** Runoff Area=36,963 sf 4.79% Impervious Runoff Depth=3.14"  
Tc=10.0 min CN=63 Runoff=4.04 cfs 0.222 af

**SubcatchmentDA-3E: EXISTING SITE TO** Runoff Area=15,231 sf 0.00% Impervious Runoff Depth=2.94"  
Tc=10.0 min CN=61 Runoff=1.55 cfs 0.086 af

**SubcatchmentDA-4E: EXISTING SITE TO** Runoff Area=110,611 sf 31.50% Impervious Runoff Depth=4.21"  
Tc=10.0 min CN=73 Runoff=16.17 cfs 0.891 af

**Reach ET: EXISITNG TOTAL** Inflow=22.73 cfs 1.255 af  
Outflow=22.73 cfs 1.255 af

**Total Runoff Area = 3.866 ac Runoff Volume = 1.255 af Average Runoff Depth = 3.90"**  
**76.42% Pervious = 2.954 ac 23.58% Impervious = 0.912 ac**

**Summary for Subcatchment DA-1E: EXISTING SITE TO NORTH**

Runoff = 0.99 cfs @ 12.17 hrs, Volume= 0.056 af, Depth= 5.22"  
 Routed to Reach ET : EXISITNG TOTAL

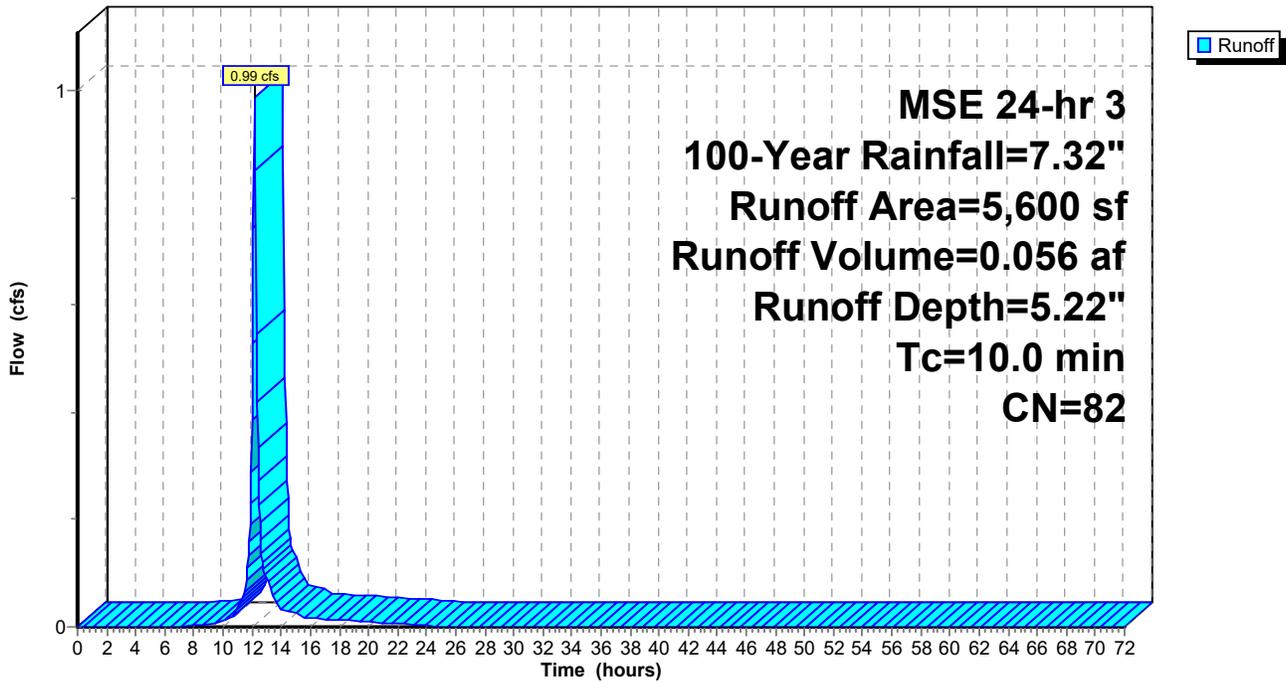
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
3,106	98	Paved parking, HSG B
2,494	61	>75% Grass cover, Good, HSG B
5,600	82	Weighted Average
2,494		44.54% Pervious Area
3,106		55.46% Impervious Area

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

**Subcatchment DA-1E: EXISTING SITE TO NORTH**

Hydrograph



**Summary for Subcatchment DA-2E: EXISTING SITE TO EAST**

Runoff = 4.04 cfs @ 12.18 hrs, Volume= 0.222 af, Depth= 3.14"  
 Routed to Reach ET : EXISITNG TOTAL

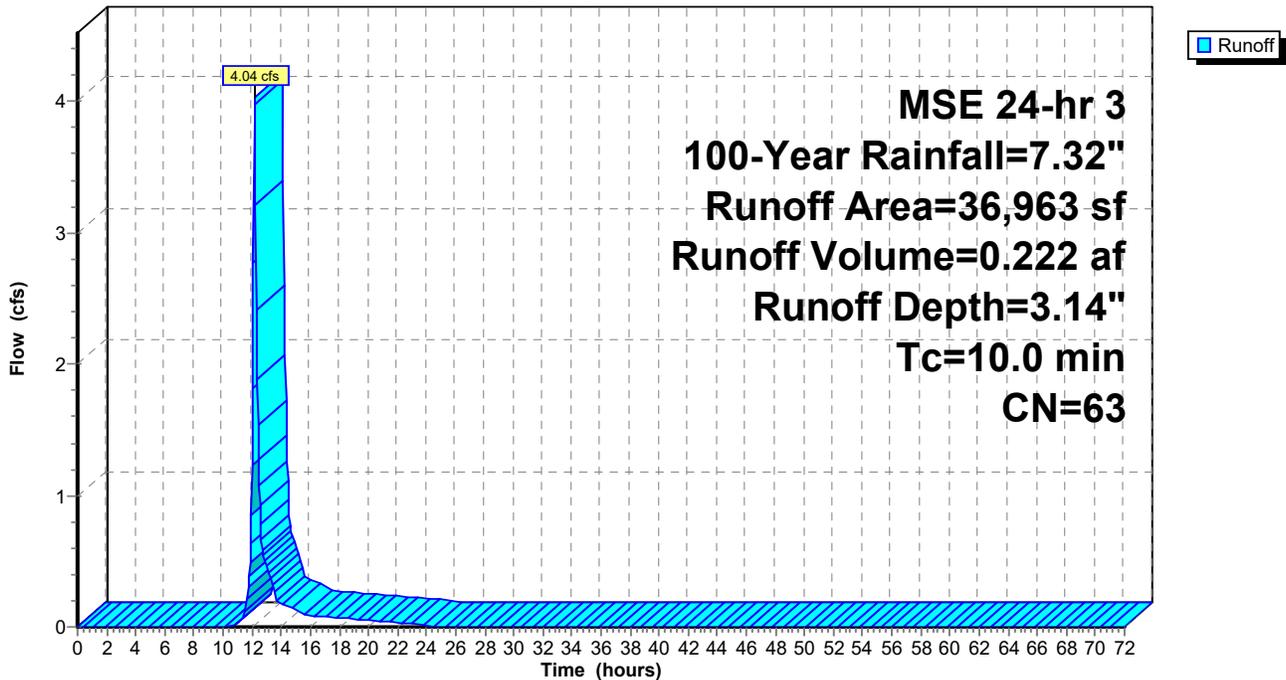
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
1,772	98	Paved parking, HSG B
35,191	61	>75% Grass cover, Good, HSG B
36,963	63	Weighted Average
35,191		95.21% Pervious Area
1,772		4.79% Impervious Area

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

**Subcatchment DA-2E: EXISTING SITE TO EAST**

Hydrograph



**Summary for Subcatchment DA-3E: EXISTING SITE TO SOUTH**

Runoff = 1.55 cfs @ 12.18 hrs, Volume= 0.086 af, Depth= 2.94"  
 Routed to Reach ET : EXISITNG TOTAL

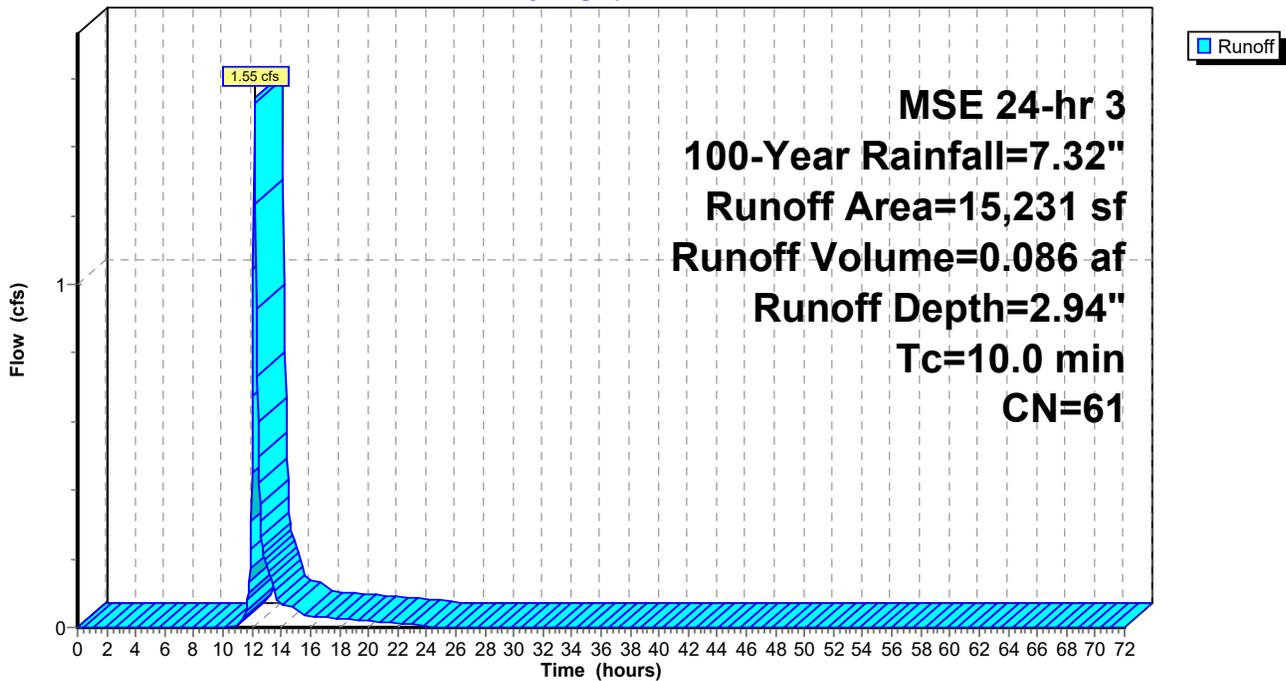
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
0	98	Paved parking, HSG B
15,231	61	>75% Grass cover, Good, HSG B
15,231	61	Weighted Average
15,231		100.00% Pervious Area

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

**Subcatchment DA-3E: EXISTING SITE TO SOUTH**

Hydrograph



**REE - Bloomington**

MSE 24-hr 3 100-Year Rainfall=7.32"

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**Summary for Subcatchment DA-4E: EXISTING SITE TO WEST**

Runoff = 16.17 cfs @ 12.18 hrs, Volume= 0.891 af, Depth= 4.21"  
 Routed to Reach ET : EXISITNG TOTAL

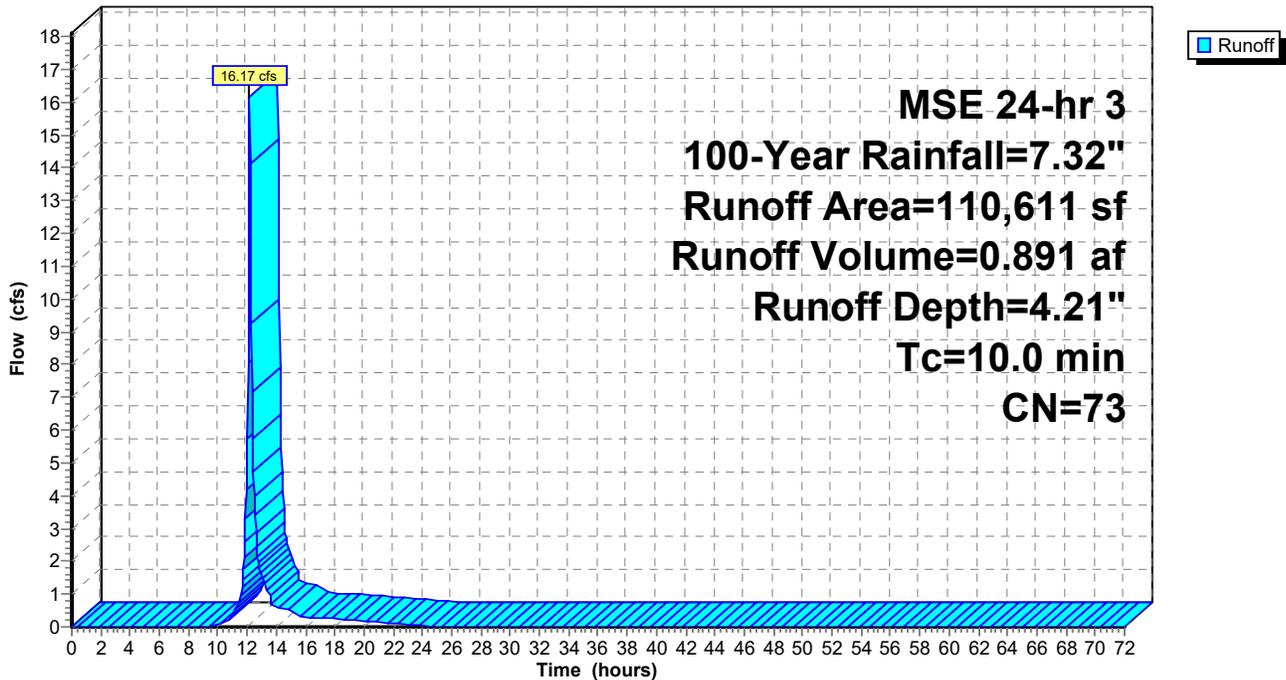
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
34,839	98	Paved parking, HSG B
75,772	61	>75% Grass cover, Good, HSG B
110,611	73	Weighted Average
75,772		68.50% Pervious Area
34,839		31.50% Impervious Area

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

**Subcatchment DA-4E: EXISTING SITE TO WEST**

Hydrograph



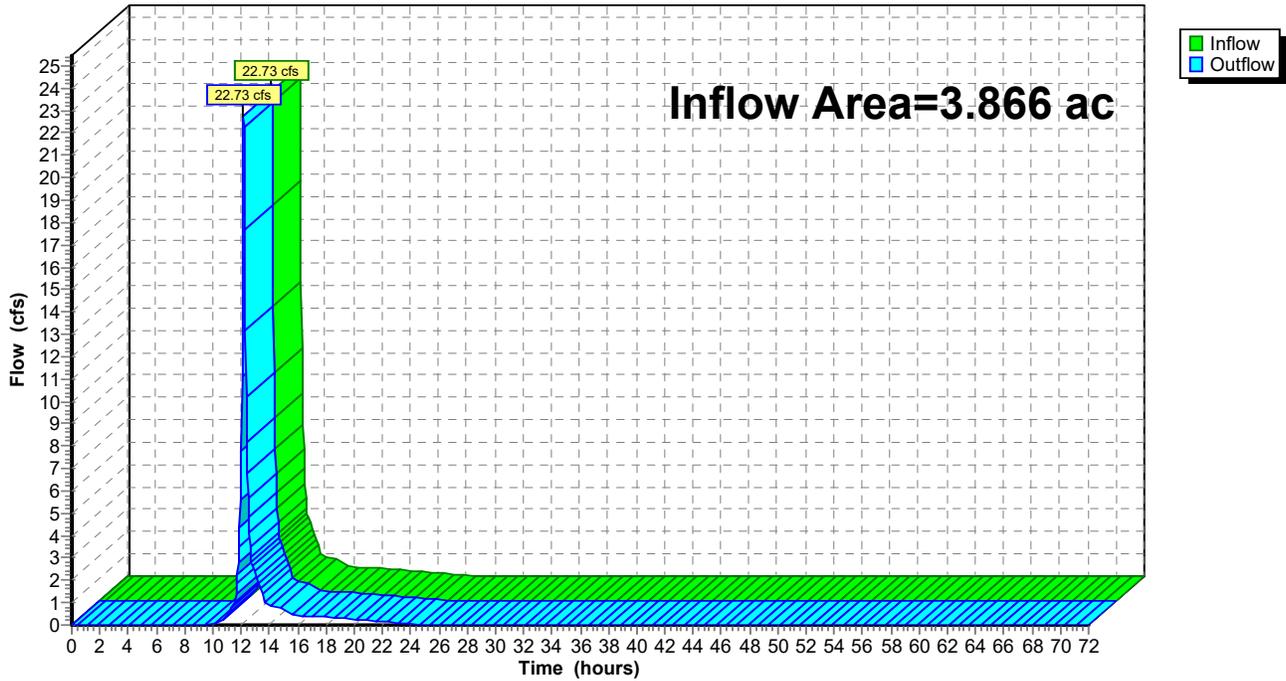
### Summary for Reach ET: EXISITNG TOTAL

Inflow Area = 3.866 ac, 23.58% Impervious, Inflow Depth = 3.90" for 100-Year event  
Inflow = 22.73 cfs @ 12.18 hrs, Volume= 1.255 af  
Outflow = 22.73 cfs @ 12.18 hrs, Volume= 1.255 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Reach ET: EXISITNG TOTAL

Hydrograph



## **Appendix B**

Proposed HydroCAD Report

PROPOSED SITE



PROPOSED SITE TO NORTH



PROPOSED SITE TO EAST



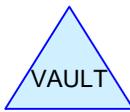
PROPOSED SITE TO SOUTH



PROPOSED SITE TO WEST



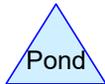
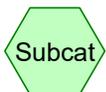
PROPOSED SITE TO 36" INFILTRATION VAULT



PROPOSED TOTAL



PROPOSED WEST TOTAL



Routing Diagram for REE - Bloomington

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## REE - Bloomington

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### Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	MSE 24-hr	3	Default	24.00	1	2.48	2
2	2-Year	MSE 24-hr	3	Default	24.00	1	2.86	2
3	10-Year	MSE 24-hr	3	Default	24.00	1	4.26	2
4	100-Year	MSE 24-hr	3	Default	24.00	1	7.32	2

## REE - Bloomington

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### Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.121	61	>75% Grass cover, Good, HSG B (DA-1P, DA-2P, DA-3P, DA-4P, DA-5P)
2.745	98	Paved parking, HSG B (DA-3P, DA-4P, DA-5P)
<b>3.866</b>	<b>87</b>	<b>TOTAL AREA</b>

**REE - Bloomington**

MSE 24-hr 3 1-Year Rainfall=2.48"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentDA-1P: PROPOSED SITE TO** Runoff Area=1,330 sf 0.00% Impervious Runoff Depth=0.19"  
Tc=7.0 min CN=61 Runoff=0.00 cfs 0.000 af

**SubcatchmentDA-2P: PROPOSED SITE TO** Runoff Area=14,057 sf 0.00% Impervious Runoff Depth=0.19"  
Tc=7.0 min CN=61 Runoff=0.04 cfs 0.005 af

**SubcatchmentDA-3P: PROPOSED SITE TO** Runoff Area=4,024 sf 13.64% Impervious Runoff Depth=0.32"  
Tc=7.0 min CN=66 Runoff=0.04 cfs 0.002 af

**SubcatchmentDA-4P: PROPOSED SITE TO** Runoff Area=12,981 sf 7.12% Impervious Runoff Depth=0.26"  
Tc=7.0 min CN=64 Runoff=0.08 cfs 0.007 af

**SubcatchmentDA-5P: PROPOSED SITE** Runoff Area=136,013 sf 86.82% Impervious Runoff Depth=1.76"  
Tc=7.0 min CN=93 Runoff=9.20 cfs 0.458 af

**Reach PT: PROPOSED TOTAL** Inflow=0.16 cfs 0.015 af  
Outflow=0.16 cfs 0.015 af

**Reach PWT: PROPOSED WEST TOTAL** Inflow=0.08 cfs 0.007 af  
Outflow=0.08 cfs 0.007 af

**Pond VAULT: 36" INFILTRATIONVAULT** Peak Elev=819.12' Storage=14,425 cf Inflow=9.20 cfs 0.458 af  
Discarded=0.19 cfs 0.458 af Primary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.458 af

**Total Runoff Area = 3.866 ac Runoff Volume = 0.473 af Average Runoff Depth = 1.47"**  
**29.00% Pervious = 1.121 ac 71.00% Impervious = 2.745 ac**

**Summary for Subcatchment DA-1P: PROPOSED SITE TO NORTH**

Runoff = 0.00 cfs @ 12.21 hrs, Volume= 0.000 af, Depth= 0.19"  
 Routed to Reach PT : PROPOSED TOTAL

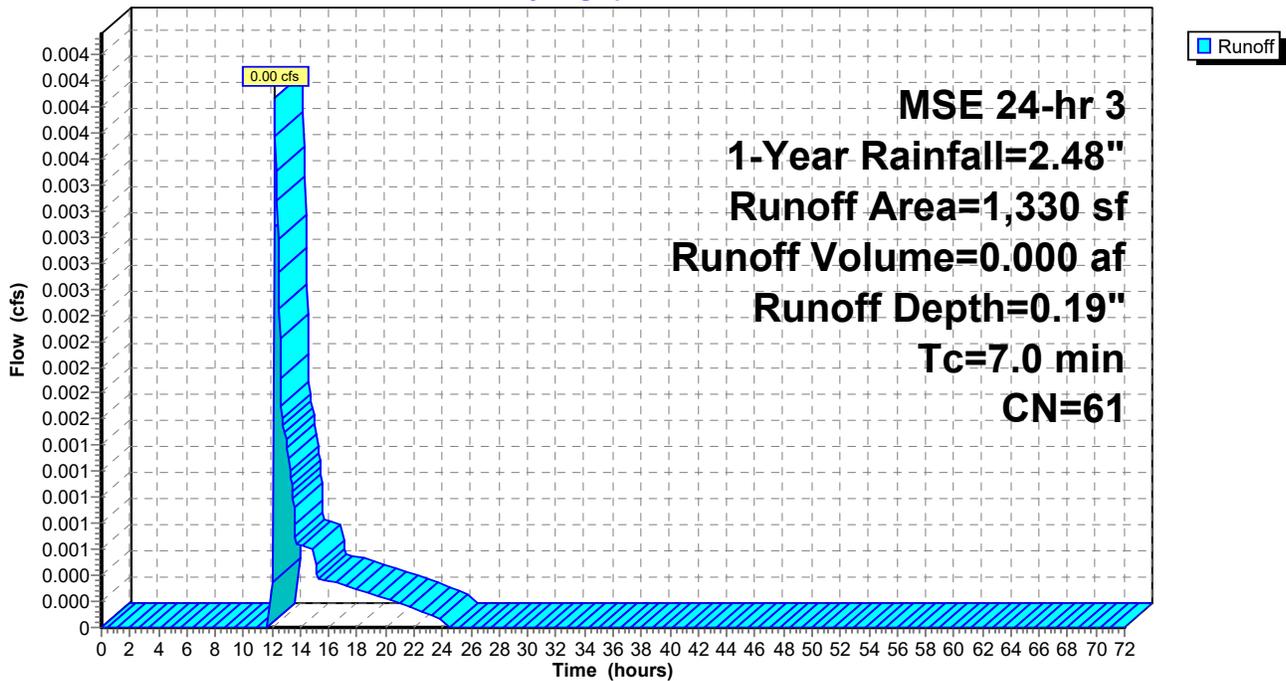
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
0	98	Paved parking, HSG B
1,330	61	>75% Grass cover, Good, HSG B
1,330	61	Weighted Average
1,330		100.00% Pervious Area

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

**Subcatchment DA-1P: PROPOSED SITE TO NORTH**

Hydrograph



**Summary for Subcatchment DA-2P: PROPOSED SITE TO EAST**

Runoff = 0.04 cfs @ 12.21 hrs, Volume= 0.005 af, Depth= 0.19"  
 Routed to Reach PT : PROPOSED TOTAL

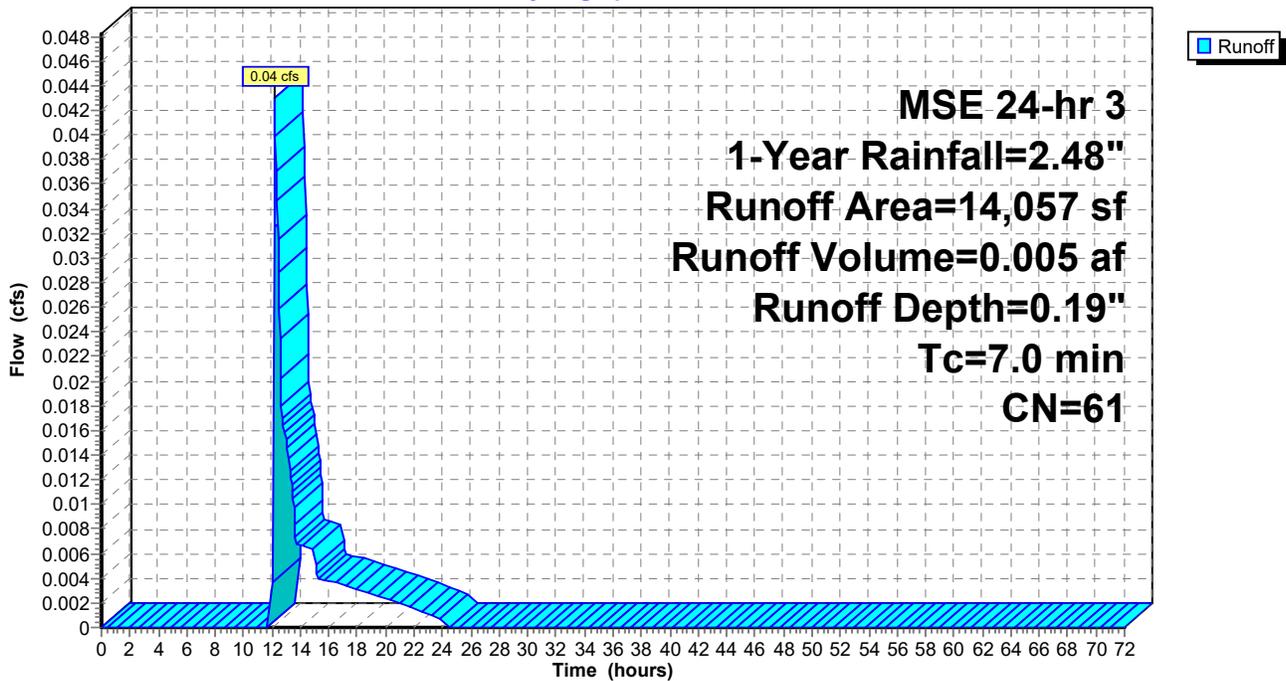
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
0	98	Paved parking, HSG B
14,057	61	>75% Grass cover, Good, HSG B
14,057	61	Weighted Average
14,057		100.00% Pervious Area

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

**Subcatchment DA-2P: PROPOSED SITE TO EAST**

Hydrograph



**Summary for Subcatchment DA-3P: PROPOSED SITE TO SOUTH**

Runoff = 0.04 cfs @ 12.17 hrs, Volume= 0.002 af, Depth= 0.32"  
 Routed to Reach PT : PROPOSED TOTAL

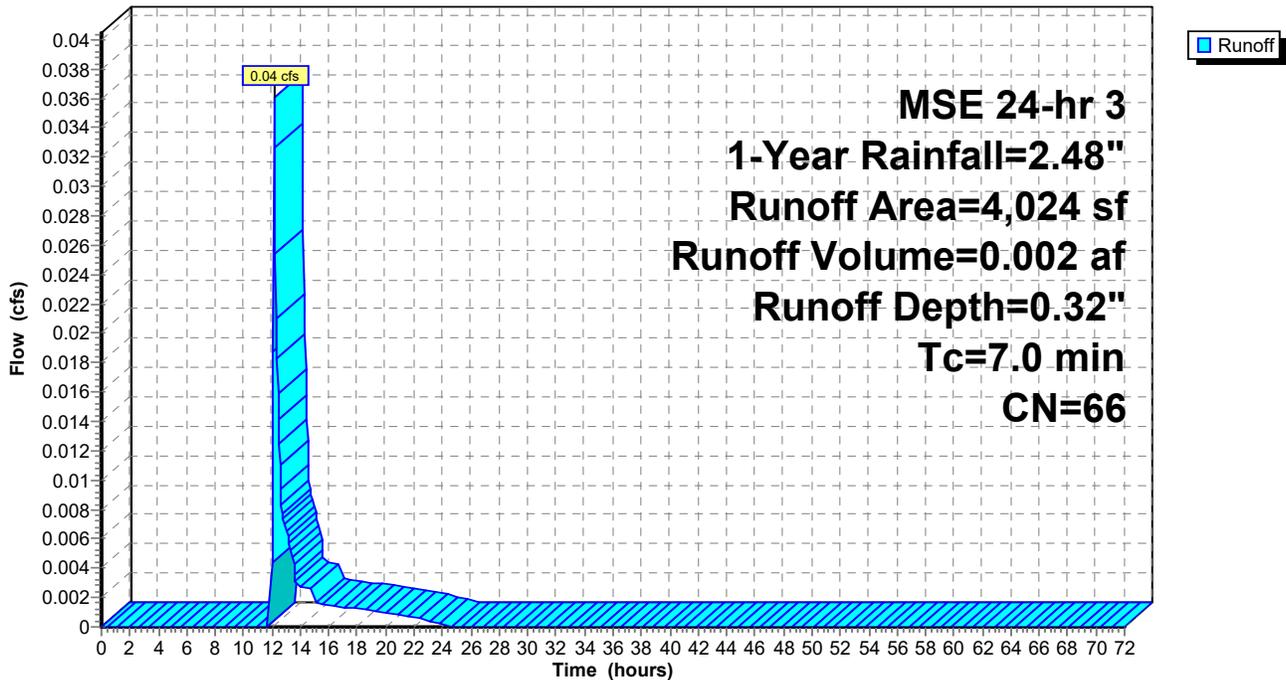
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
549	98	Paved parking, HSG B
3,475	61	>75% Grass cover, Good, HSG B
4,024	66	Weighted Average
3,475		86.36% Pervious Area
549		13.64% Impervious Area

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

**Subcatchment DA-3P: PROPOSED SITE TO SOUTH**

Hydrograph



**Summary for Subcatchment DA-4P: PROPOSED SITE TO WEST**

Runoff = 0.08 cfs @ 12.18 hrs, Volume= 0.007 af, Depth= 0.26"

Routed to Reach PWT : PROPOSED WEST TOTAL

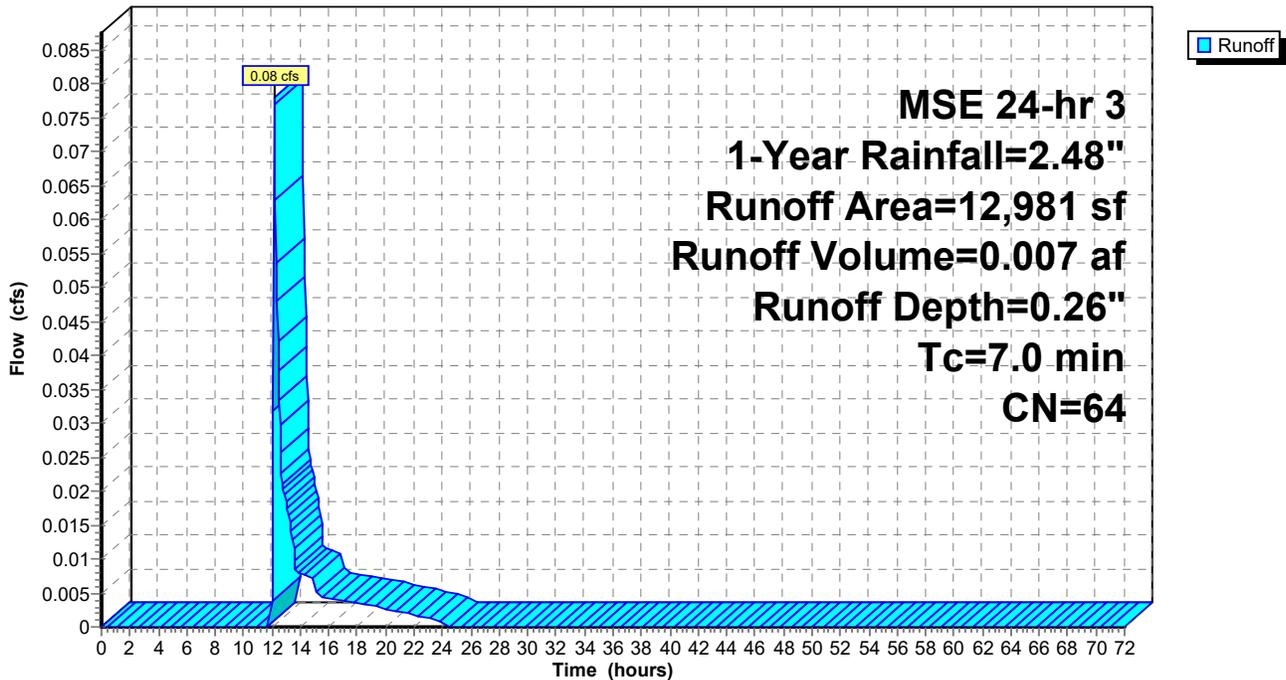
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
924	98	Paved parking, HSG B
12,057	61	>75% Grass cover, Good, HSG B
12,981	64	Weighted Average
12,057		92.88% Pervious Area
924		7.12% Impervious Area

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

**Subcatchment DA-4P: PROPOSED SITE TO WEST**

Hydrograph



**Summary for Subcatchment DA-5P: PROPOSED SITE TO VAULT**

Runoff = 9.20 cfs @ 12.14 hrs, Volume= 0.458 af, Depth= 1.76"

Routed to Pond VAULT : 36" INFILTRATION VAULT

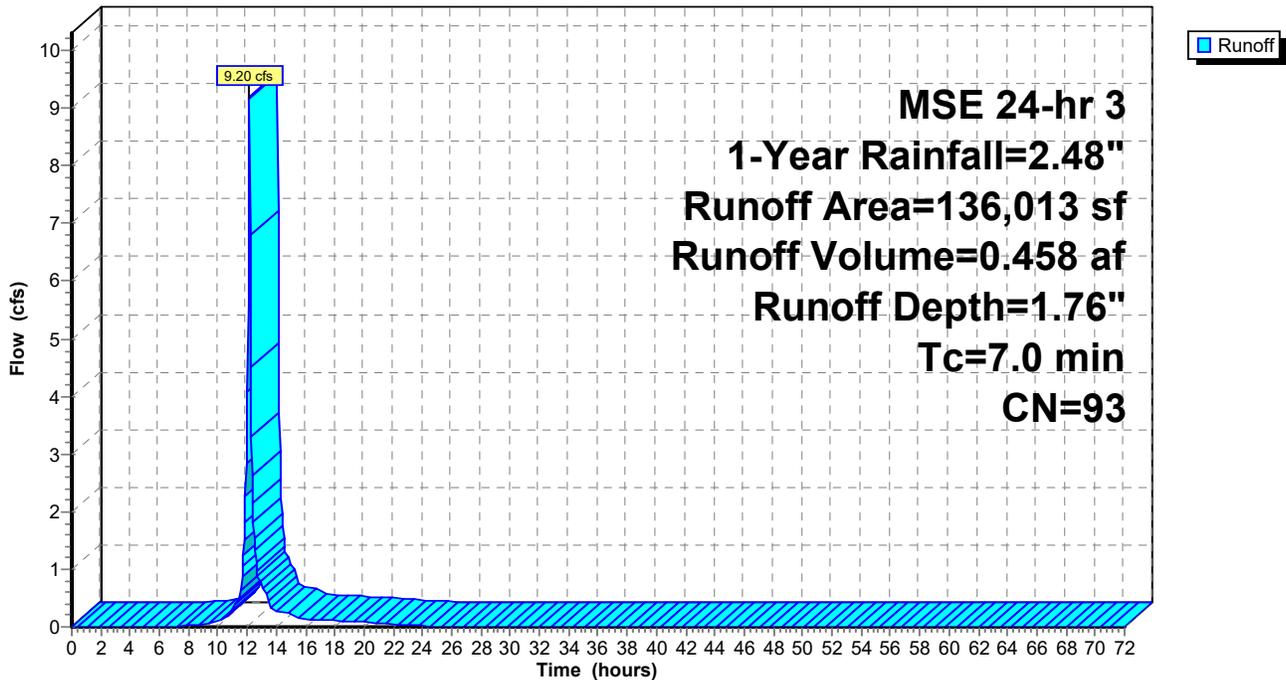
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
118,093	98	Paved parking, HSG B
17,920	61	>75% Grass cover, Good, HSG B
136,013	93	Weighted Average
17,920		13.18% Pervious Area
118,093		86.82% Impervious Area

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

**Subcatchment DA-5P: PROPOSED SITE TO VAULT**

Hydrograph



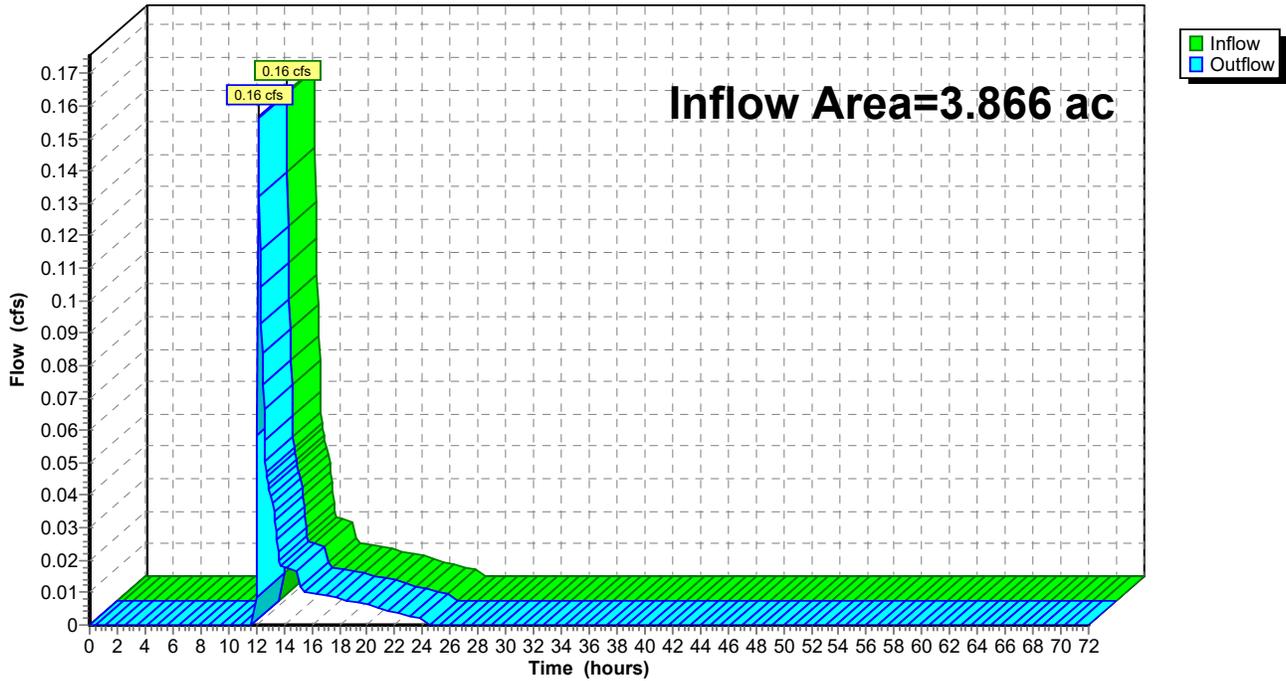
Summary for Reach PT: PROPOSED TOTAL

Inflow Area = 3.866 ac, 71.00% Impervious, Inflow Depth = 0.05" for 1-Year event  
Inflow = 0.16 cfs @ 12.19 hrs, Volume= 0.015 af  
Outflow = 0.16 cfs @ 12.19 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach PT: PROPOSED TOTAL

Hydrograph



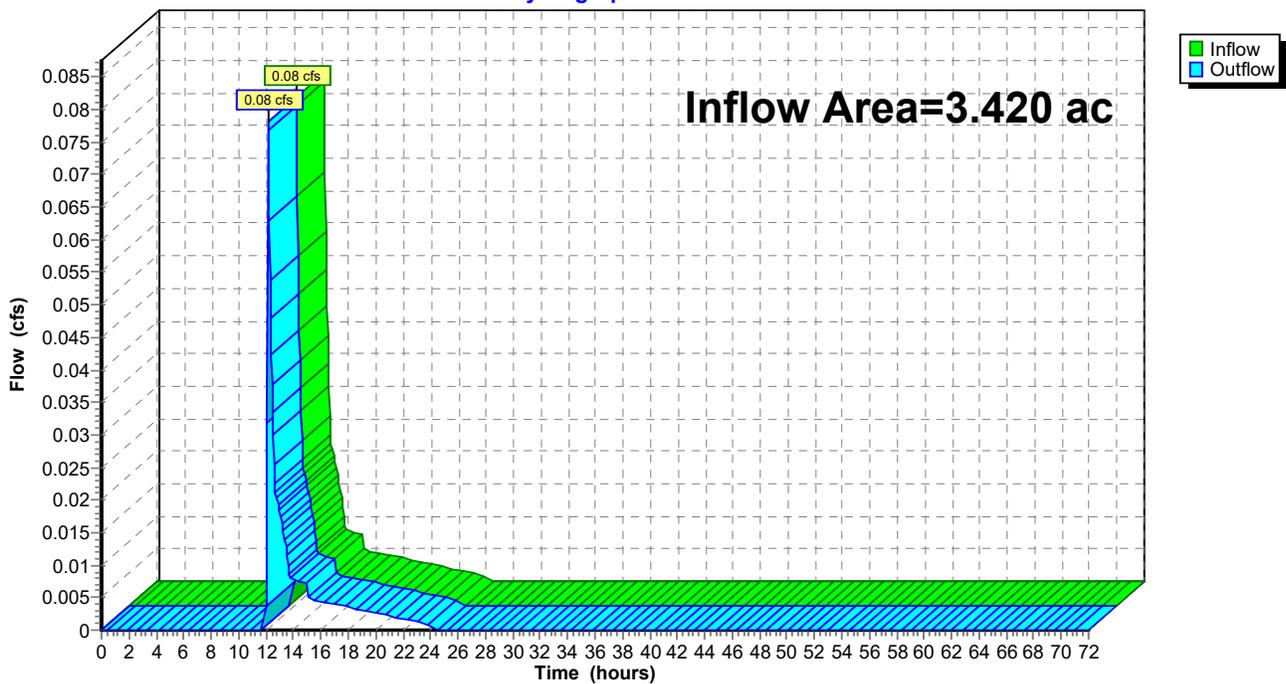
### Summary for Reach PWT: PROPOSED WEST TOTAL

Inflow Area = 3.420 ac, 79.88% Impervious, Inflow Depth = 0.02" for 1-Year event  
Inflow = 0.08 cfs @ 12.18 hrs, Volume= 0.007 af  
Outflow = 0.08 cfs @ 12.18 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min  
Routed to Reach PT : PROPOSED TOTAL

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Reach PWT: PROPOSED WEST TOTAL

Hydrograph



**Summary for Pond VAULT: 36" INFILTRATION VAULT**

Inflow Area = 3.122 ac, 86.82% Impervious, Inflow Depth = 1.76" for 1-Year event  
 Inflow = 9.20 cfs @ 12.14 hrs, Volume= 0.458 af  
 Outflow = 0.19 cfs @ 12.70 hrs, Volume= 0.458 af, Atten= 98%, Lag= 33.5 min  
 Discarded = 0.19 cfs @ 12.70 hrs, Volume= 0.458 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routed to Reach PWT : PROPOSED WEST TOTAL

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 Peak Elev= 819.12' @ 15.10 hrs Surf.Area= 28,036 sf Storage= 14,425 cf

Plug-Flow detention time= 1,084.3 min calculated for 0.458 af (100% of inflow)  
 Center-of-Mass det. time= 1,085.1 min ( 1,871.5 - 786.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	818.80'	13,627 cf	<b>86.00'W x 163.00'L x 4.00'H Field A</b> 56,072 cf Overall - 22,005 cf Embedded = 34,067 cf x 40.0% Voids
#2A	819.30'	22,005 cf	<b>CMP Round 36 x 152 Inside #1</b> Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf Overall Size= 36.0"W x 36.0"H x 20.00'L Row Length Adjustment= -5.00' x 7.07 sf x 19 rows 84.00' Header x 7.07 sf x 2 = 1,187.5 cf Inside
#3	815.80'	12,616 cf	<b>86.00'W x 163.00'L x 3.00'H Prismaoid</b> 42,054 cf Overall x 30.0% Voids
		48,248 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	815.80'	<b>0.300 in/hr Exfiltration over Surface area</b>
#2	Primary	820.50'	<b>12.0" Round Culvert</b> L= 55.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 820.50' / 820.36' S= 0.0025 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 0.79 sf

**Discarded OutFlow** Max=0.19 cfs @ 12.70 hrs HW=818.81' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.19 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=815.80' (Free Discharge)

↑2=Culvert ( Controls 0.00 cfs)

**Pond VAULT: 36" INFILTRATION VAULT - Chamber Wizard Field A**

**Chamber Model = CMP Round 36 (Round Corrugated Metal Pipe)**

Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf

Overall Size= 36.0"W x 36.0"H x 20.00'L

Row Length Adjustment= -5.00' x 7.07 sf x 19 rows

36.0" Wide + 18.0" Spacing = 54.0" C-C Row Spacing

8 Chambers/Row x 20.00' Long -5.00' Row Adjustment +3.00' Header x 2 = 161.00' Row Length +12.0"

End Stone x 2 = 163.00' Base Length

19 Rows x 36.0" Wide + 18.0" Spacing x 18 + 12.0" Side Stone x 2 = 86.00' Base Width

6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

152 Chambers x 141.4 cf -5.00' Row Adjustment x 7.07 sf x 19 Rows + 84.00' Header x 7.07 sf x 2 =  
22,004.5 cf Chamber Storage

56,072.0 cf Field - 22,004.5 cf Chambers = 34,067.5 cf Stone x 40.0% Voids = 13,627.0 cf Stone Storage

Chamber Storage + Stone Storage = 35,631.5 cf = 0.818 af

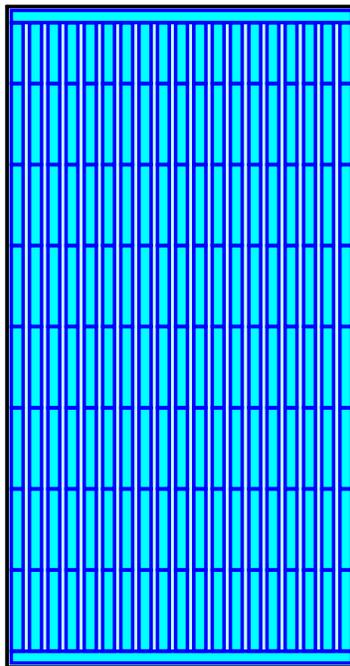
Overall Storage Efficiency = 63.5%

Overall System Size = 163.00' x 86.00' x 4.00'

152 Chambers

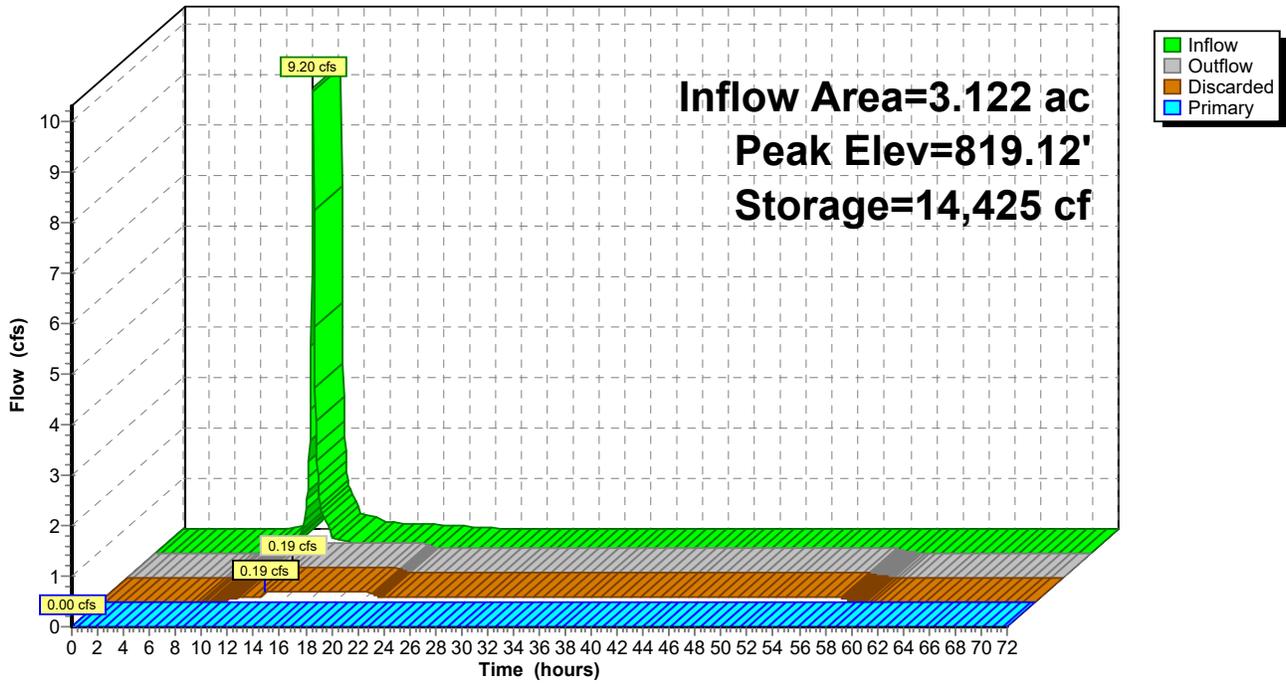
2,076.7 cy Field

1,261.8 cy Stone



### Pond VAULT: 36" INFILTRATION VAULT

Hydrograph



**REE - Bloomington**

MSE 24-hr 3 2-Year Rainfall=2.86"

Prepared by {enter your company name here}

Printed 12/5/2025

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentDA-1P: PROPOSED SITE TO** Runoff Area=1,330 sf 0.00% Impervious Runoff Depth=0.31"  
Tc=7.0 min CN=61 Runoff=0.01 cfs 0.001 af

**SubcatchmentDA-2P: PROPOSED SITE TO** Runoff Area=14,057 sf 0.00% Impervious Runoff Depth=0.31"  
Tc=7.0 min CN=61 Runoff=0.10 cfs 0.008 af

**SubcatchmentDA-3P: PROPOSED SITE TO** Runoff Area=4,024 sf 13.64% Impervious Runoff Depth=0.48"  
Tc=7.0 min CN=66 Runoff=0.06 cfs 0.004 af

**SubcatchmentDA-4P: PROPOSED SITE TO** Runoff Area=12,981 sf 7.12% Impervious Runoff Depth=0.41"  
Tc=7.0 min CN=64 Runoff=0.16 cfs 0.010 af

**SubcatchmentDA-5P: PROPOSED SITE** Runoff Area=136,013 sf 86.82% Impervious Runoff Depth=2.12"  
Tc=7.0 min CN=93 Runoff=10.96 cfs 0.552 af

**Reach PT: PROPOSED TOTAL** Inflow=0.34 cfs 0.023 af  
Outflow=0.34 cfs 0.023 af

**Reach PWT: PROPOSED WEST TOTAL** Inflow=0.16 cfs 0.010 af  
Outflow=0.16 cfs 0.010 af

**Pond VAULT: 36" INFILTRATIONVAULT** Peak Elev=819.59' Storage=17,727 cf Inflow=10.96 cfs 0.552 af  
Discarded=0.19 cfs 0.552 af Primary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.552 af

**Total Runoff Area = 3.866 ac Runoff Volume = 0.575 af Average Runoff Depth = 1.78"**  
**29.00% Pervious = 1.121 ac 71.00% Impervious = 2.745 ac**

**Summary for Subcatchment DA-1P: PROPOSED SITE TO NORTH**

Runoff = 0.01 cfs @ 12.18 hrs, Volume= 0.001 af, Depth= 0.31"  
 Routed to Reach PT : PROPOSED TOTAL

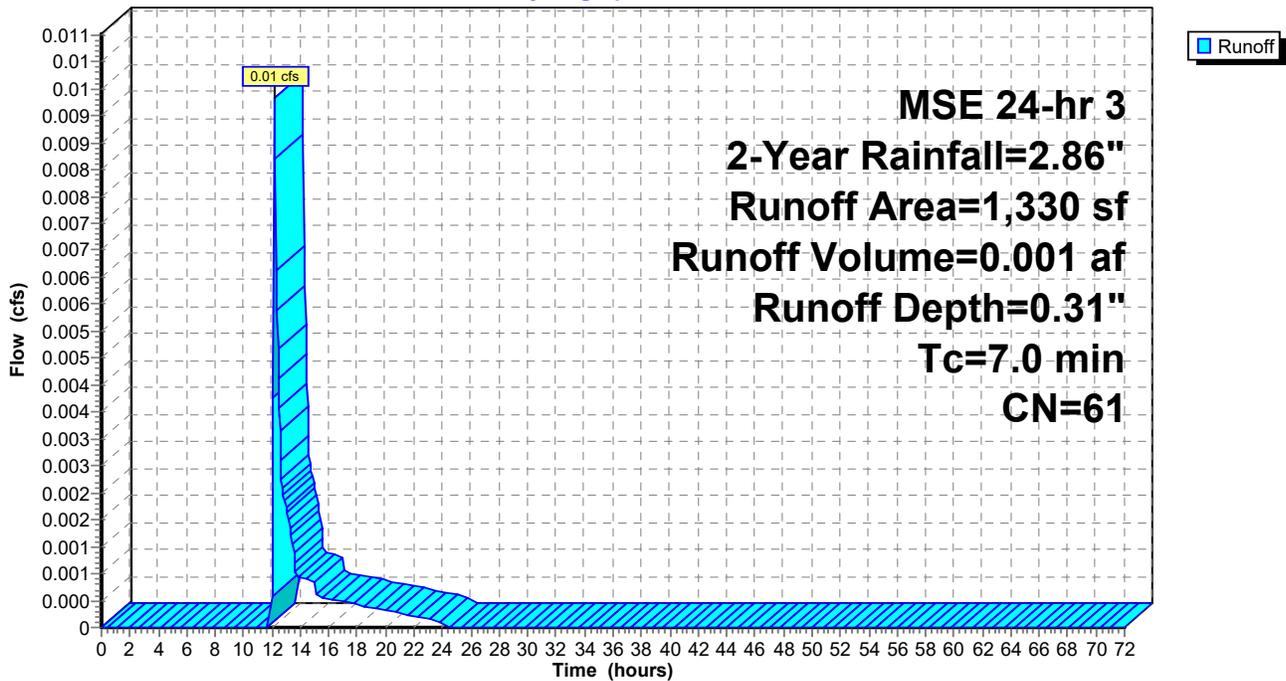
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
0	98	Paved parking, HSG B
1,330	61	>75% Grass cover, Good, HSG B
1,330	61	Weighted Average
1,330		100.00% Pervious Area

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

**Subcatchment DA-1P: PROPOSED SITE TO NORTH**

Hydrograph



**Summary for Subcatchment DA-2P: PROPOSED SITE TO EAST**

Runoff = 0.10 cfs @ 12.18 hrs, Volume= 0.008 af, Depth= 0.31"  
 Routed to Reach PT : PROPOSED TOTAL

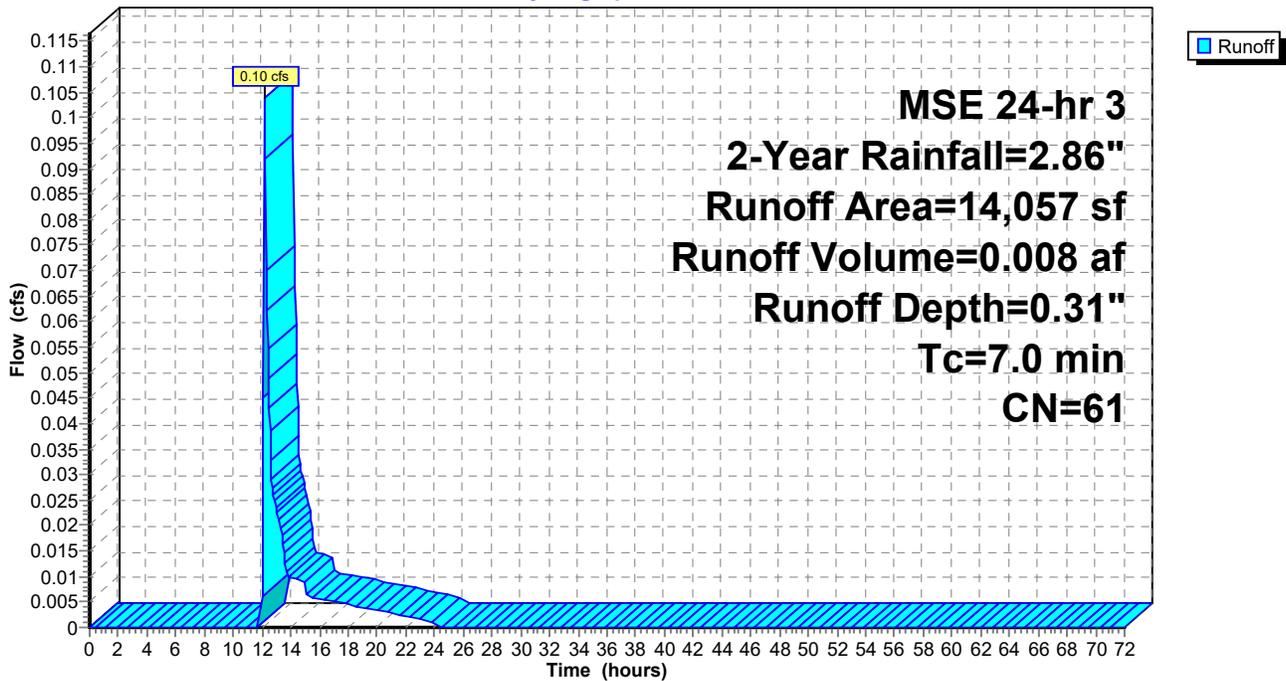
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
0	98	Paved parking, HSG B
14,057	61	>75% Grass cover, Good, HSG B
14,057	61	Weighted Average
14,057		100.00% Pervious Area

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

**Subcatchment DA-2P: PROPOSED SITE TO EAST**

Hydrograph



**Summary for Subcatchment DA-3P: PROPOSED SITE TO SOUTH**

Runoff = 0.06 cfs @ 12.16 hrs, Volume= 0.004 af, Depth= 0.48"  
 Routed to Reach PT : PROPOSED TOTAL

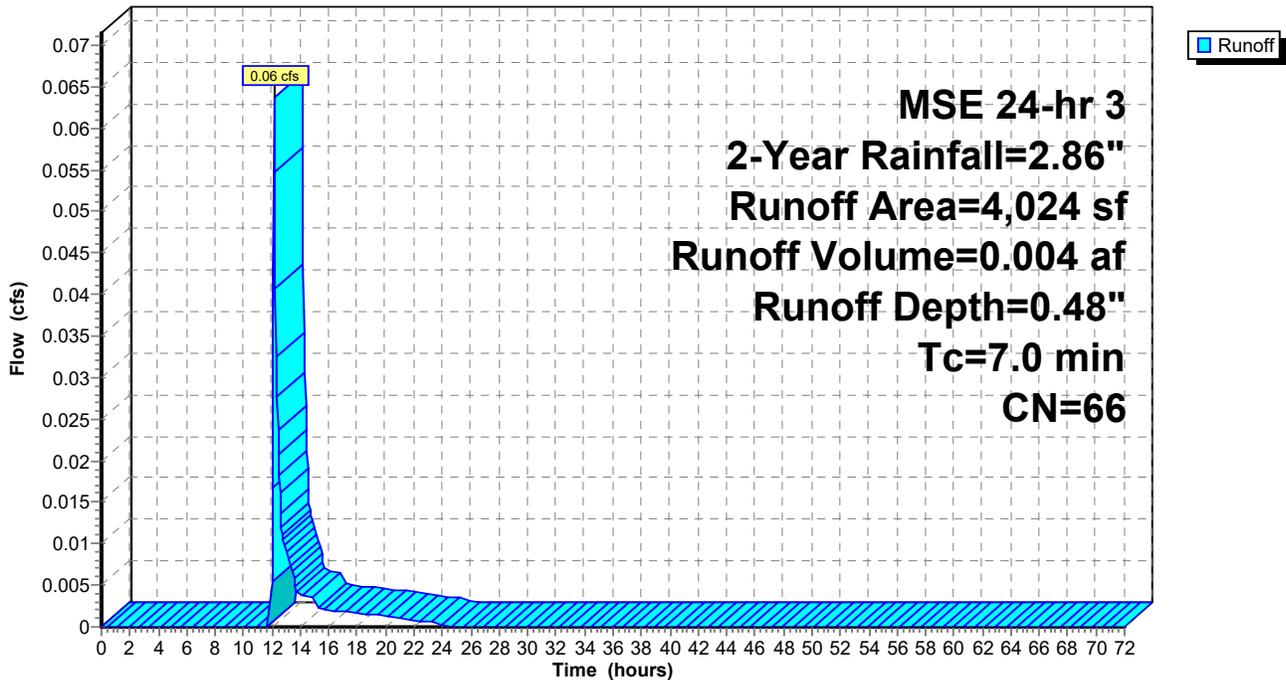
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
549	98	Paved parking, HSG B
3,475	61	>75% Grass cover, Good, HSG B
4,024	66	Weighted Average
3,475		86.36% Pervious Area
549		13.64% Impervious Area

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

**Subcatchment DA-3P: PROPOSED SITE TO SOUTH**

Hydrograph



**Summary for Subcatchment DA-4P: PROPOSED SITE TO WEST**

Runoff = 0.16 cfs @ 12.17 hrs, Volume= 0.010 af, Depth= 0.41"

Routed to Reach PWT : PROPOSED WEST TOTAL

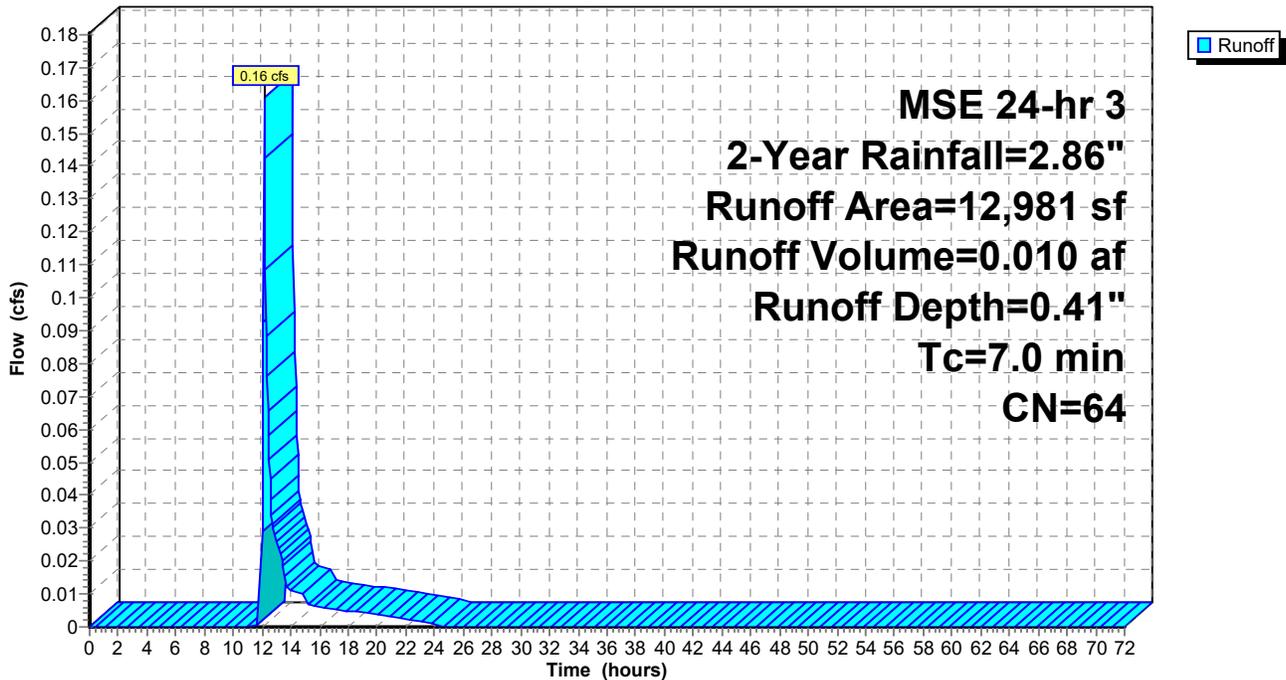
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
924	98	Paved parking, HSG B
12,057	61	>75% Grass cover, Good, HSG B
12,981	64	Weighted Average
12,057		92.88% Pervious Area
924		7.12% Impervious Area

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

**Subcatchment DA-4P: PROPOSED SITE TO WEST**

Hydrograph



**Summary for Subcatchment DA-5P: PROPOSED SITE TO VAULT**

Runoff = 10.96 cfs @ 12.14 hrs, Volume= 0.552 af, Depth= 2.12"

Routed to Pond VAULT : 36" INFILTRATION VAULT

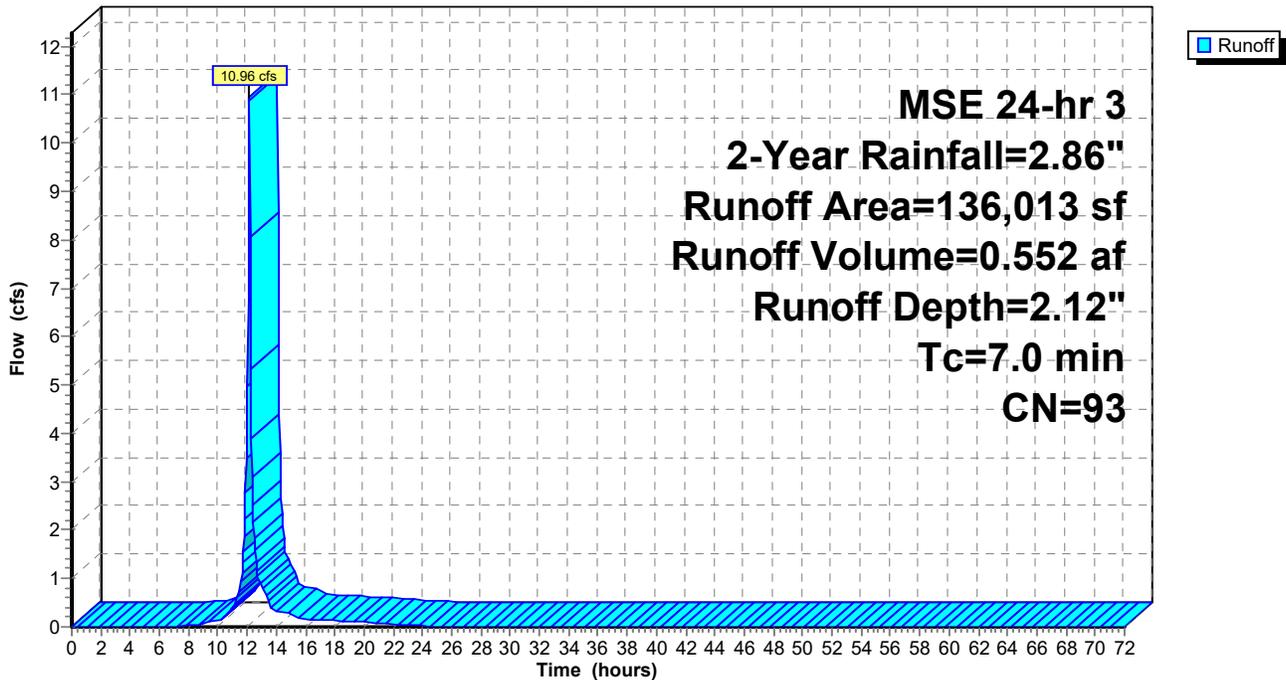
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
118,093	98	Paved parking, HSG B
17,920	61	>75% Grass cover, Good, HSG B
136,013	93	Weighted Average
17,920		13.18% Pervious Area
118,093		86.82% Impervious Area

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

**Subcatchment DA-5P: PROPOSED SITE TO VAULT**

Hydrograph



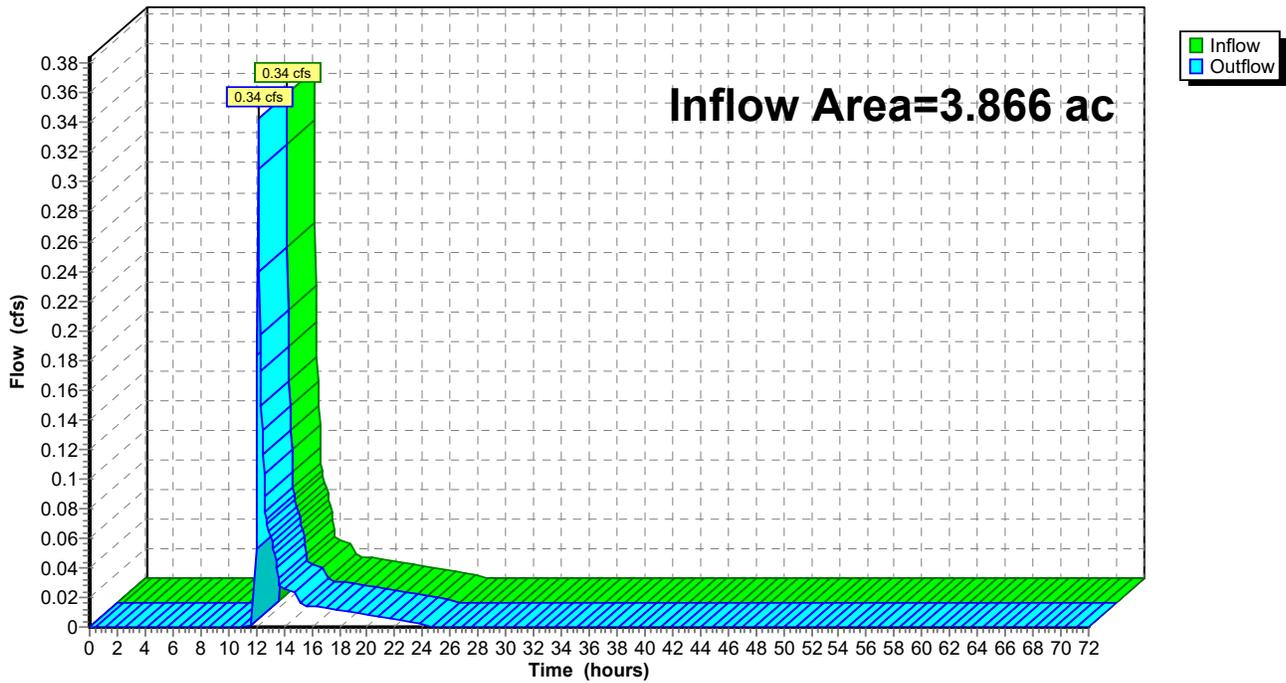
### Summary for Reach PT: PROPOSED TOTAL

Inflow Area = 3.866 ac, 71.00% Impervious, Inflow Depth = 0.07" for 2-Year event  
Inflow = 0.34 cfs @ 12.17 hrs, Volume= 0.023 af  
Outflow = 0.34 cfs @ 12.17 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Reach PT: PROPOSED TOTAL

Hydrograph



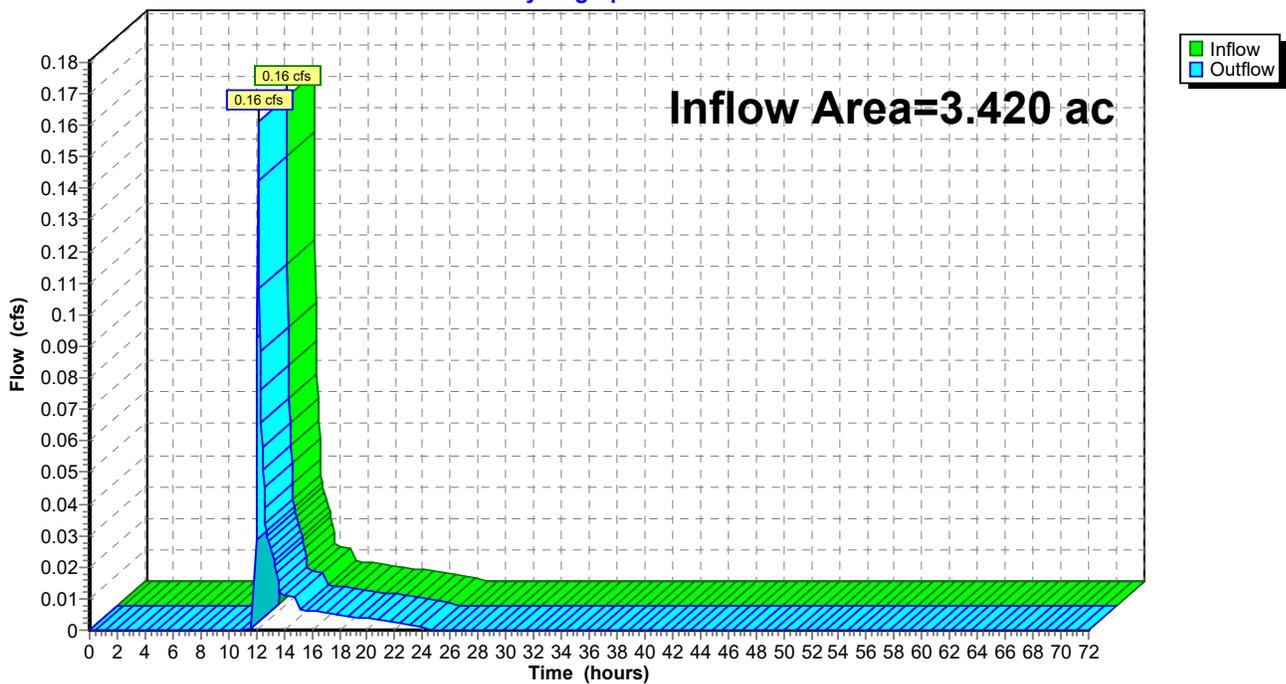
### Summary for Reach PWT: PROPOSED WEST TOTAL

Inflow Area = 3.420 ac, 79.88% Impervious, Inflow Depth = 0.04" for 2-Year event  
Inflow = 0.16 cfs @ 12.17 hrs, Volume= 0.010 af  
Outflow = 0.16 cfs @ 12.17 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min  
Routed to Reach PT : PROPOSED TOTAL

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Reach PWT: PROPOSED WEST TOTAL

Hydrograph



**Summary for Pond VAULT: 36" INFILTRATION VAULT**

Inflow Area = 3.122 ac, 86.82% Impervious, Inflow Depth = 2.12" for 2-Year event  
 Inflow = 10.96 cfs @ 12.14 hrs, Volume= 0.552 af  
 Outflow = 0.19 cfs @ 12.30 hrs, Volume= 0.552 af, Atten= 98%, Lag= 9.6 min  
 Discarded = 0.19 cfs @ 12.30 hrs, Volume= 0.552 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routed to Reach PWT : PROPOSED WEST TOTAL

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 Peak Elev= 819.59' @ 15.15 hrs Surf.Area= 28,036 sf Storage= 17,727 cf

Plug-Flow detention time= 1,158.7 min calculated for 0.552 af (100% of inflow)  
 Center-of-Mass det. time= 1,158.6 min ( 1,941.3 - 782.7 )

Volume	Invert	Avail.Storage	Storage Description
#1A	818.80'	13,627 cf	<b>86.00'W x 163.00'L x 4.00'H Field A</b> 56,072 cf Overall - 22,005 cf Embedded = 34,067 cf x 40.0% Voids
#2A	819.30'	22,005 cf	<b>CMP Round 36 x 152 Inside #1</b> Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf Overall Size= 36.0"W x 36.0"H x 20.00'L Row Length Adjustment= -5.00' x 7.07 sf x 19 rows 84.00' Header x 7.07 sf x 2 = 1,187.5 cf Inside
#3	815.80'	12,616 cf	<b>86.00'W x 163.00'L x 3.00'H Prismaoid</b> 42,054 cf Overall x 30.0% Voids
		48,248 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	815.80'	<b>0.300 in/hr Exfiltration over Surface area</b>
#2	Primary	820.50'	<b>12.0" Round Culvert</b> L= 55.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 820.50' / 820.36' S= 0.0025 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 0.79 sf

**Discarded OutFlow** Max=0.19 cfs @ 12.30 hrs HW=818.82' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.19 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=815.80' (Free Discharge)

↑2=Culvert ( Controls 0.00 cfs)

**Pond VAULT: 36" INFILTRATION VAULT - Chamber Wizard Field A**

**Chamber Model = CMP Round 36 (Round Corrugated Metal Pipe)**

Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf

Overall Size= 36.0"W x 36.0"H x 20.00'L

Row Length Adjustment= -5.00' x 7.07 sf x 19 rows

36.0" Wide + 18.0" Spacing = 54.0" C-C Row Spacing

8 Chambers/Row x 20.00' Long -5.00' Row Adjustment +3.00' Header x 2 = 161.00' Row Length +12.0"

End Stone x 2 = 163.00' Base Length

19 Rows x 36.0" Wide + 18.0" Spacing x 18 + 12.0" Side Stone x 2 = 86.00' Base Width

6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

152 Chambers x 141.4 cf -5.00' Row Adjustment x 7.07 sf x 19 Rows + 84.00' Header x 7.07 sf x 2 =  
22,004.5 cf Chamber Storage

56,072.0 cf Field - 22,004.5 cf Chambers = 34,067.5 cf Stone x 40.0% Voids = 13,627.0 cf Stone Storage

Chamber Storage + Stone Storage = 35,631.5 cf = 0.818 af

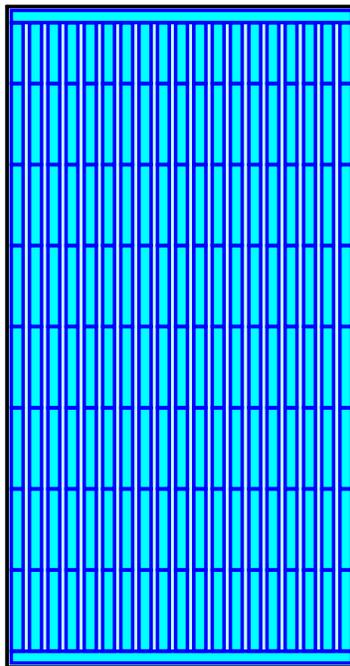
Overall Storage Efficiency = 63.5%

Overall System Size = 163.00' x 86.00' x 4.00'

152 Chambers

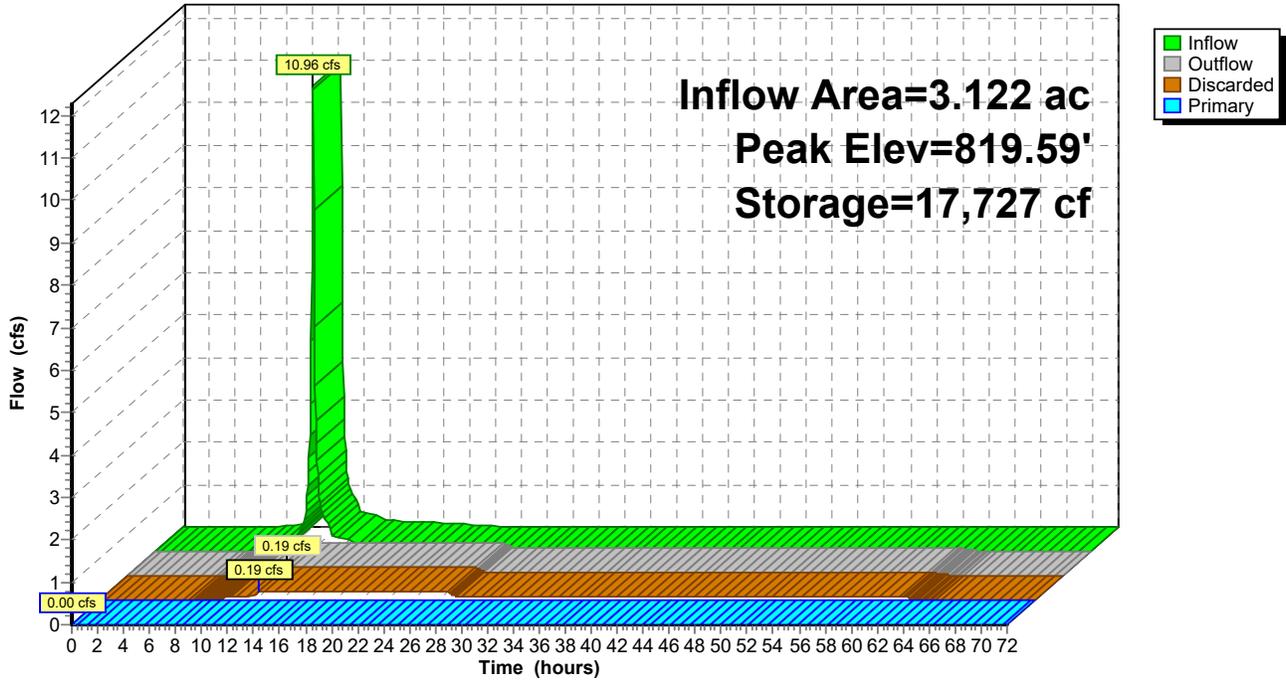
2,076.7 cy Field

1,261.8 cy Stone



### Pond VAULT: 36" INFILTRATION VAULT

Hydrograph



**REE - Bloomington**

MSE 24-hr 3 10-Year Rainfall=4.26"

Prepared by {enter your company name here}

Printed 12/5/2025

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentDA-1P: PROPOSED SITE TO** Runoff Area=1,330 sf 0.00% Impervious Runoff Depth=0.95"  
Tc=7.0 min CN=61 Runoff=0.05 cfs 0.002 af

**SubcatchmentDA-2P: PROPOSED SITE TO** Runoff Area=14,057 sf 0.00% Impervious Runoff Depth=0.95"  
Tc=7.0 min CN=61 Runoff=0.49 cfs 0.025 af

**SubcatchmentDA-3P: PROPOSED SITE TO** Runoff Area=4,024 sf 13.64% Impervious Runoff Depth=1.24"  
Tc=7.0 min CN=66 Runoff=0.19 cfs 0.010 af

**SubcatchmentDA-4P: PROPOSED SITE TO** Runoff Area=12,981 sf 7.12% Impervious Runoff Depth=1.12"  
Tc=7.0 min CN=64 Runoff=0.55 cfs 0.028 af

**SubcatchmentDA-5P: PROPOSED SITE** Runoff Area=136,013 sf 86.82% Impervious Runoff Depth=3.47"  
Tc=7.0 min CN=93 Runoff=17.41 cfs 0.904 af

**Reach PT: PROPOSED TOTAL** Inflow=1.28 cfs 0.124 af  
Outflow=1.28 cfs 0.124 af

**Reach PWT: PROPOSED WEST TOTAL** Inflow=0.55 cfs 0.086 af  
Outflow=0.55 cfs 0.086 af

**Pond VAULT: 36" INFILTRATIONVAULT** Peak Elev=820.76' Storage=29,973 cf Inflow=17.41 cfs 0.904 af  
Discarded=0.19 cfs 0.781 af Primary=0.16 cfs 0.058 af Outflow=0.35 cfs 0.839 af

**Total Runoff Area = 3.866 ac Runoff Volume = 0.969 af Average Runoff Depth = 3.01"**  
**29.00% Pervious = 1.121 ac 71.00% Impervious = 2.745 ac**

**Summary for Subcatchment DA-1P: PROPOSED SITE TO NORTH**

Runoff = 0.05 cfs @ 12.16 hrs, Volume= 0.002 af, Depth= 0.95"  
 Routed to Reach PT : PROPOSED TOTAL

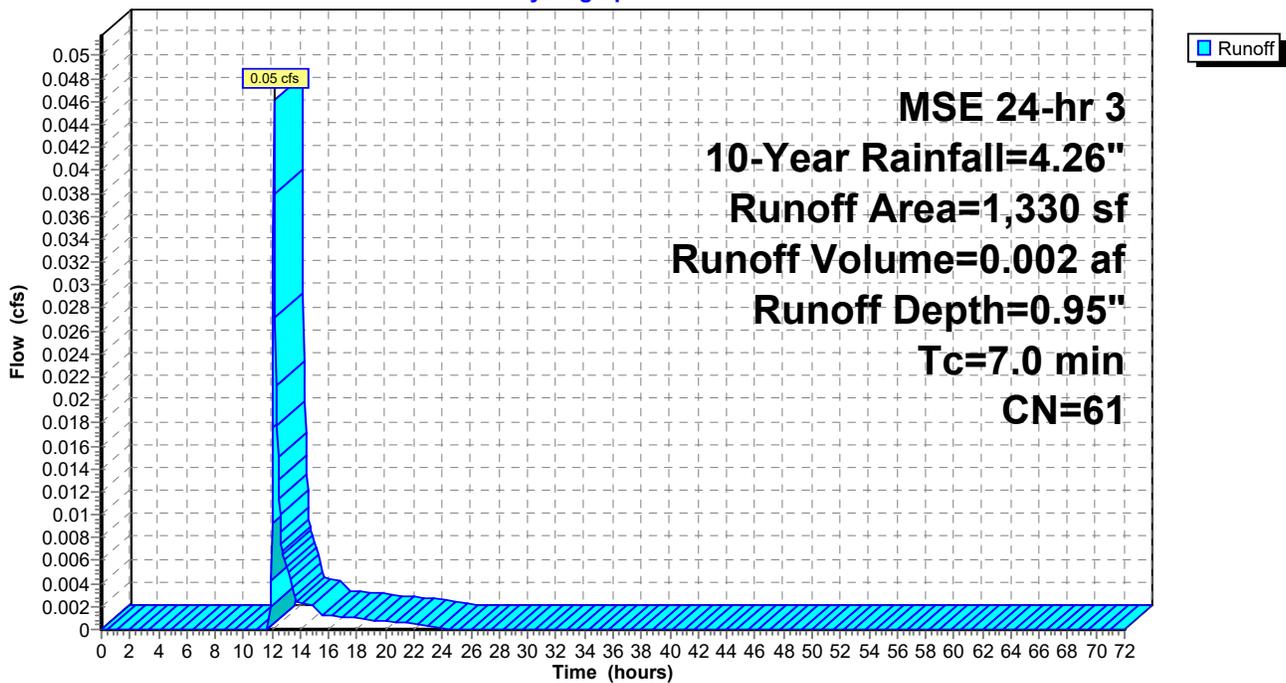
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
0	98	Paved parking, HSG B
1,330	61	>75% Grass cover, Good, HSG B
1,330	61	Weighted Average
1,330		100.00% Pervious Area

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

**Subcatchment DA-1P: PROPOSED SITE TO NORTH**

Hydrograph



**Summary for Subcatchment DA-2P: PROPOSED SITE TO EAST**

Runoff = 0.49 cfs @ 12.16 hrs, Volume= 0.025 af, Depth= 0.95"  
 Routed to Reach PT : PROPOSED TOTAL

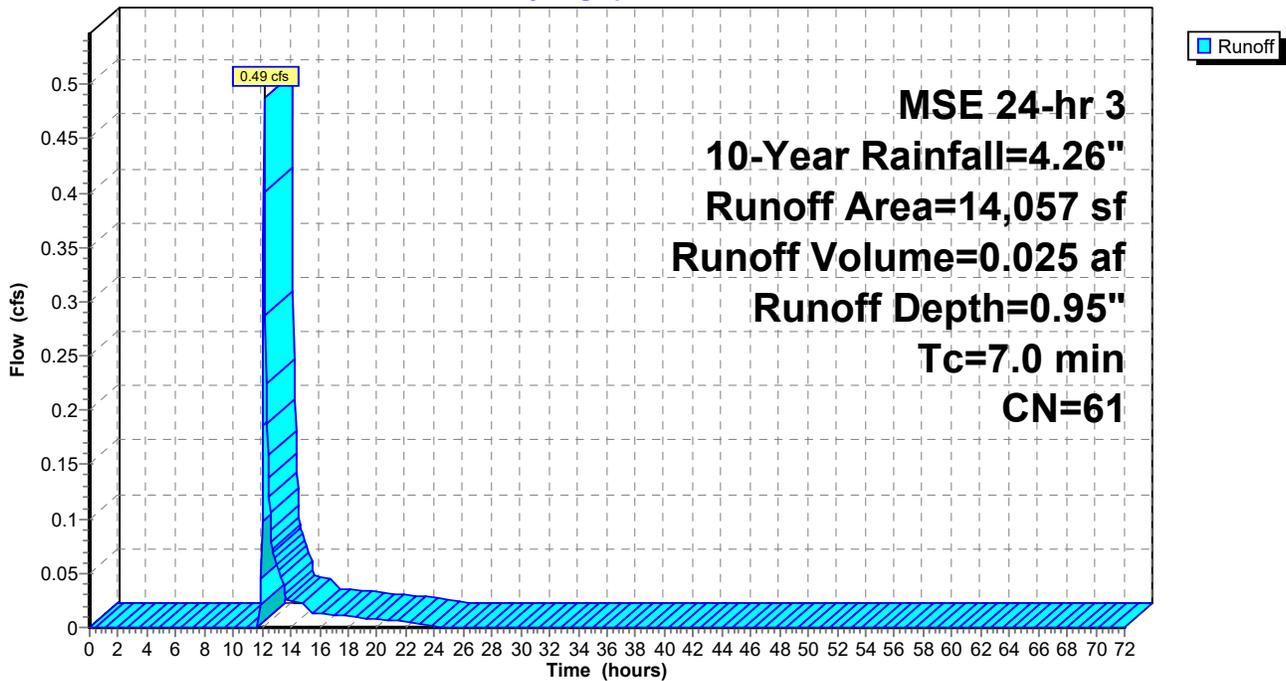
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
0	98	Paved parking, HSG B
14,057	61	>75% Grass cover, Good, HSG B
14,057	61	Weighted Average
14,057		100.00% Pervious Area

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

**Subcatchment DA-2P: PROPOSED SITE TO EAST**

Hydrograph



**Summary for Subcatchment DA-3P: PROPOSED SITE TO SOUTH**

Runoff = 0.19 cfs @ 12.15 hrs, Volume= 0.010 af, Depth= 1.24"  
 Routed to Reach PT : PROPOSED TOTAL

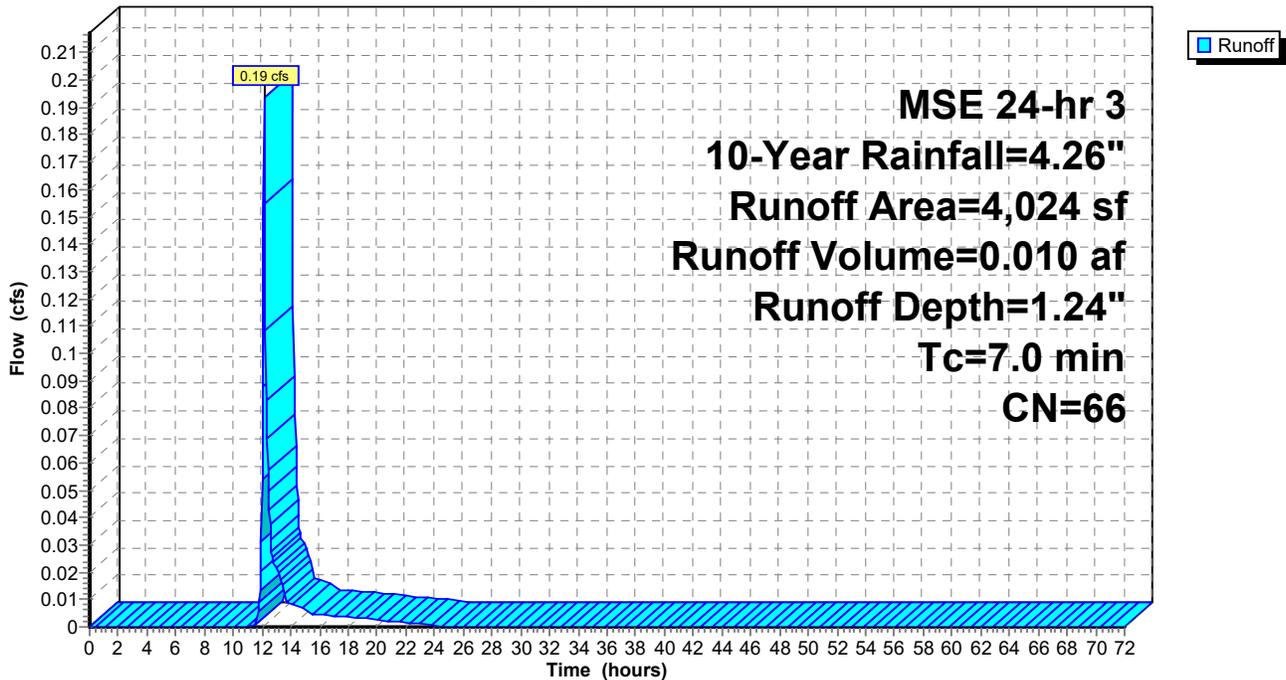
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
549	98	Paved parking, HSG B
3,475	61	>75% Grass cover, Good, HSG B
4,024	66	Weighted Average
3,475		86.36% Pervious Area
549		13.64% Impervious Area

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

**Subcatchment DA-3P: PROPOSED SITE TO SOUTH**

Hydrograph



**Summary for Subcatchment DA-4P: PROPOSED SITE TO WEST**

Runoff = 0.55 cfs @ 12.15 hrs, Volume= 0.028 af, Depth= 1.12"

Routed to Reach PWT : PROPOSED WEST TOTAL

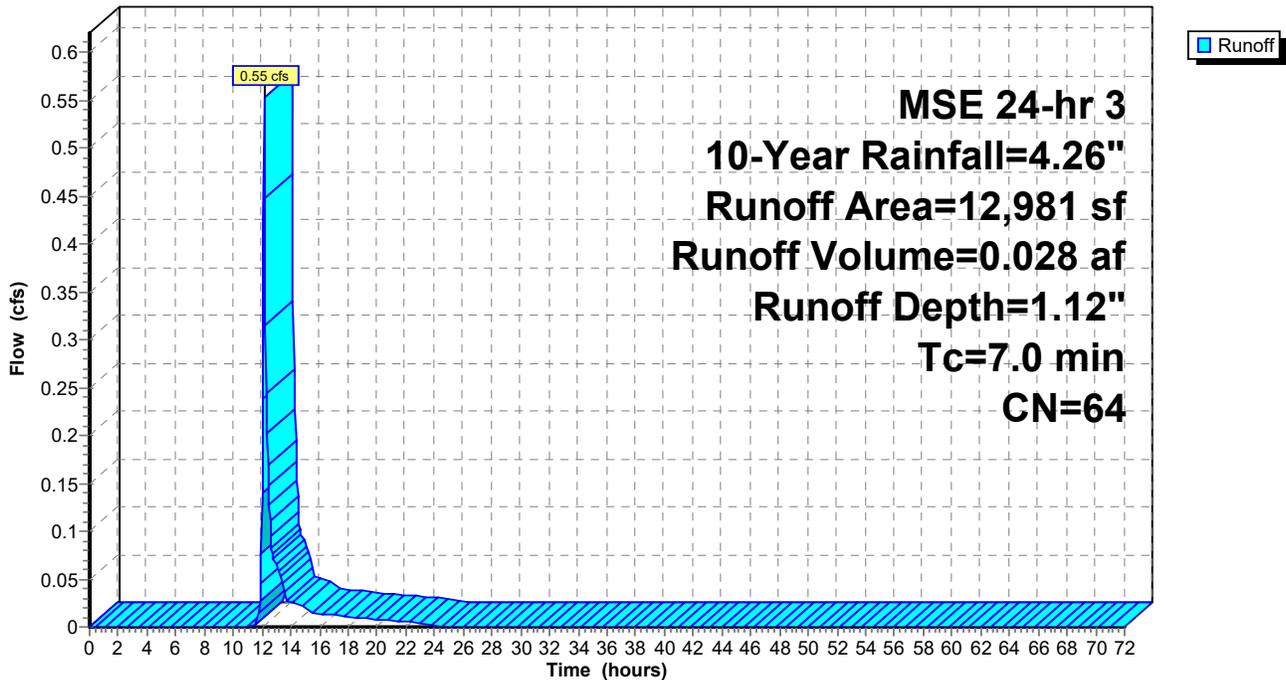
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
924	98	Paved parking, HSG B
12,057	61	>75% Grass cover, Good, HSG B
12,981	64	Weighted Average
12,057		92.88% Pervious Area
924		7.12% Impervious Area

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

**Subcatchment DA-4P: PROPOSED SITE TO WEST**

Hydrograph



**Summary for Subcatchment DA-5P: PROPOSED SITE TO VAULT**

Runoff = 17.41 cfs @ 12.14 hrs, Volume= 0.904 af, Depth= 3.47"

Routed to Pond VAULT : 36" INFILTRATION VAULT

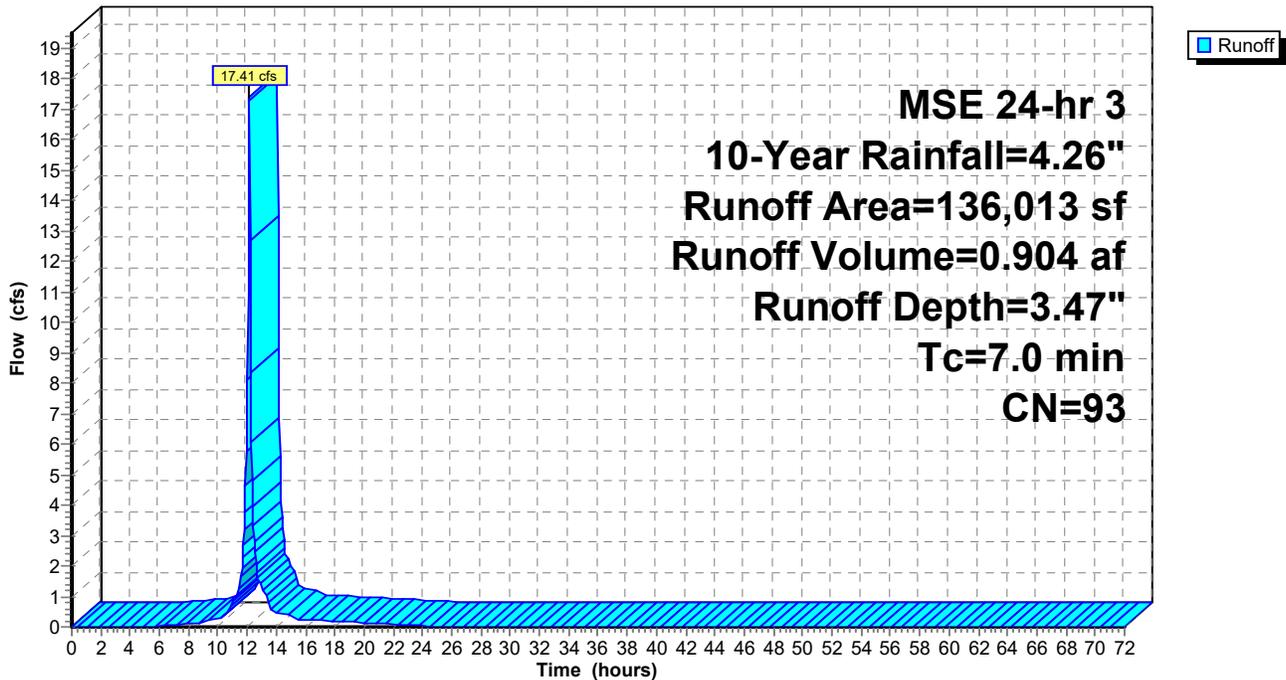
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
118,093	98	Paved parking, HSG B
17,920	61	>75% Grass cover, Good, HSG B
136,013	93	Weighted Average
17,920		13.18% Pervious Area
118,093		86.82% Impervious Area

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

**Subcatchment DA-5P: PROPOSED SITE TO VAULT**

Hydrograph



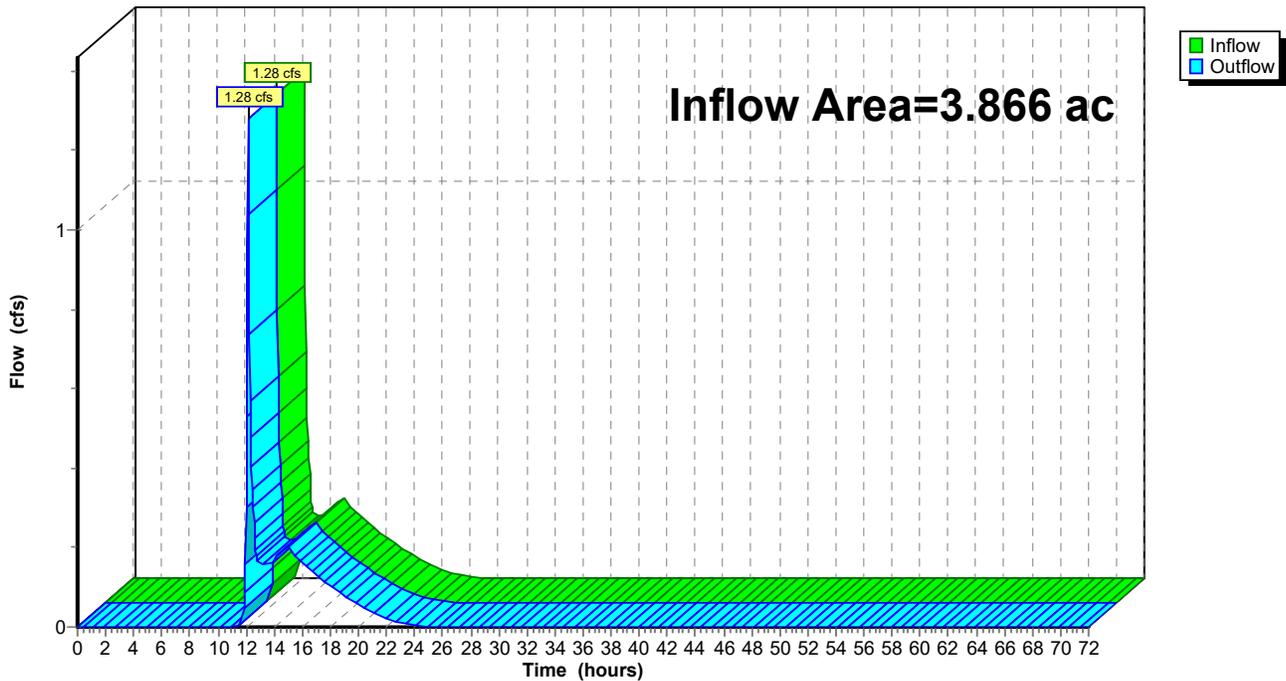
### Summary for Reach PT: PROPOSED TOTAL

Inflow Area = 3.866 ac, 71.00% Impervious, Inflow Depth = 0.38" for 10-Year event  
Inflow = 1.28 cfs @ 12.15 hrs, Volume= 0.124 af  
Outflow = 1.28 cfs @ 12.15 hrs, Volume= 0.124 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Reach PT: PROPOSED TOTAL

Hydrograph



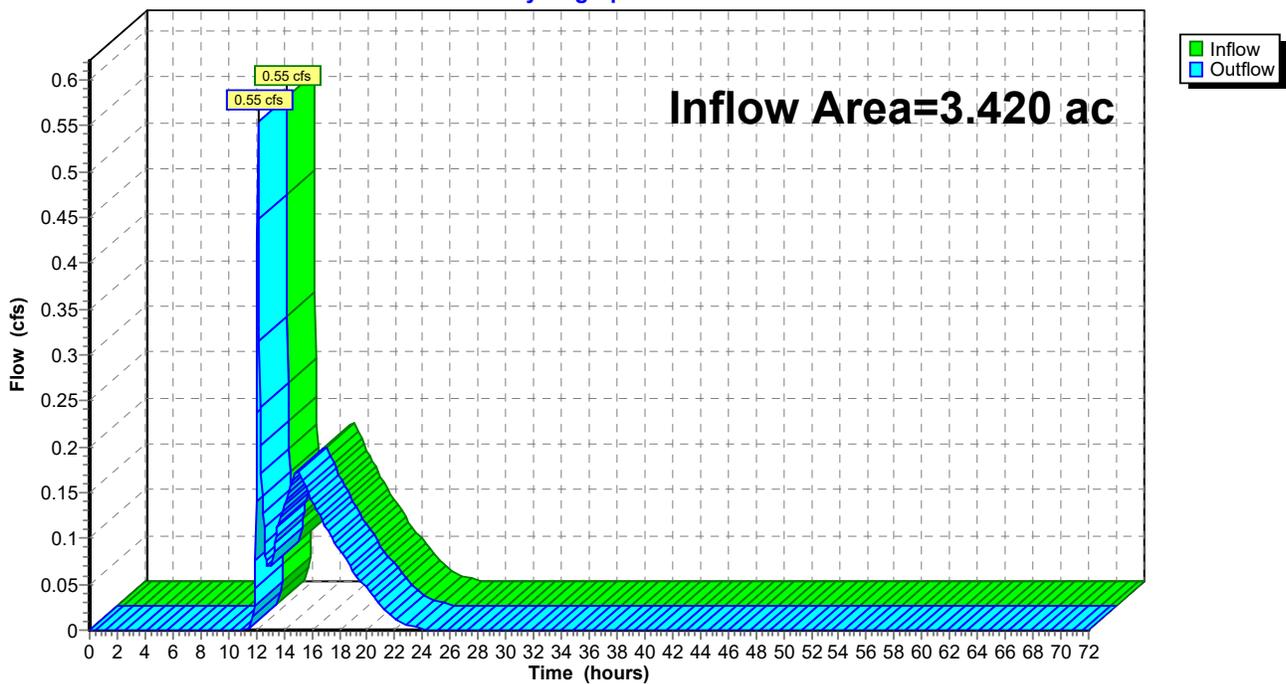
### Summary for Reach PWT: PROPOSED WEST TOTAL

Inflow Area = 3.420 ac, 79.88% Impervious, Inflow Depth = 0.30" for 10-Year event  
Inflow = 0.55 cfs @ 12.15 hrs, Volume= 0.086 af  
Outflow = 0.55 cfs @ 12.15 hrs, Volume= 0.086 af, Atten= 0%, Lag= 0.0 min  
Routed to Reach PT : PROPOSED TOTAL

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Reach PWT: PROPOSED WEST TOTAL

Hydrograph



**Summary for Pond VAULT: 36" INFILTRATION VAULT**

Inflow Area = 3.122 ac, 86.82% Impervious, Inflow Depth = 3.47" for 10-Year event  
 Inflow = 17.41 cfs @ 12.14 hrs, Volume= 0.904 af  
 Outflow = 0.35 cfs @ 15.09 hrs, Volume= 0.839 af, Atten= 98%, Lag= 177.3 min  
 Discarded = 0.19 cfs @ 12.10 hrs, Volume= 0.781 af  
 Primary = 0.16 cfs @ 15.09 hrs, Volume= 0.058 af  
 Routed to Reach PWT : PROPOSED WEST TOTAL

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 Peak Elev= 820.76' @ 15.09 hrs Surf.Area= 28,036 sf Storage= 29,973 cf

Plug-Flow detention time= 1,330.9 min calculated for 0.839 af (93% of inflow)  
 Center-of-Mass det. time= 1,299.2 min ( 2,072.2 - 773.0 )

Volume	Invert	Avail.Storage	Storage Description
#1A	818.80'	13,627 cf	<b>86.00'W x 163.00'L x 4.00'H Field A</b> 56,072 cf Overall - 22,005 cf Embedded = 34,067 cf x 40.0% Voids
#2A	819.30'	22,005 cf	<b>CMP Round 36 x 152 Inside #1</b> Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf Overall Size= 36.0"W x 36.0"H x 20.00'L Row Length Adjustment= -5.00' x 7.07 sf x 19 rows 84.00' Header x 7.07 sf x 2 = 1,187.5 cf Inside
#3	815.80'	12,616 cf	<b>86.00'W x 163.00'L x 3.00'H Prismaoid</b> 42,054 cf Overall x 30.0% Voids
		48,248 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	815.80'	<b>0.300 in/hr Exfiltration over Surface area</b>
#2	Primary	820.50'	<b>12.0" Round Culvert</b> L= 55.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 820.50' / 820.36' S= 0.0025 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 0.79 sf

**Discarded OutFlow** Max=0.19 cfs @ 12.10 hrs HW=818.92' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.19 cfs)

**Primary OutFlow** Max=0.16 cfs @ 15.09 hrs HW=820.76' (Free Discharge)  
 ↑2=Culvert (Barrel Controls 0.16 cfs @ 1.46 fps)

**Pond VAULT: 36" INFILTRATION VAULT - Chamber Wizard Field A**

**Chamber Model = CMP Round 36 (Round Corrugated Metal Pipe)**

Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf

Overall Size= 36.0"W x 36.0"H x 20.00'L

Row Length Adjustment= -5.00' x 7.07 sf x 19 rows

36.0" Wide + 18.0" Spacing = 54.0" C-C Row Spacing

8 Chambers/Row x 20.00' Long -5.00' Row Adjustment +3.00' Header x 2 = 161.00' Row Length +12.0"

End Stone x 2 = 163.00' Base Length

19 Rows x 36.0" Wide + 18.0" Spacing x 18 + 12.0" Side Stone x 2 = 86.00' Base Width

6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

152 Chambers x 141.4 cf -5.00' Row Adjustment x 7.07 sf x 19 Rows + 84.00' Header x 7.07 sf x 2 =  
22,004.5 cf Chamber Storage

56,072.0 cf Field - 22,004.5 cf Chambers = 34,067.5 cf Stone x 40.0% Voids = 13,627.0 cf Stone Storage

Chamber Storage + Stone Storage = 35,631.5 cf = 0.818 af

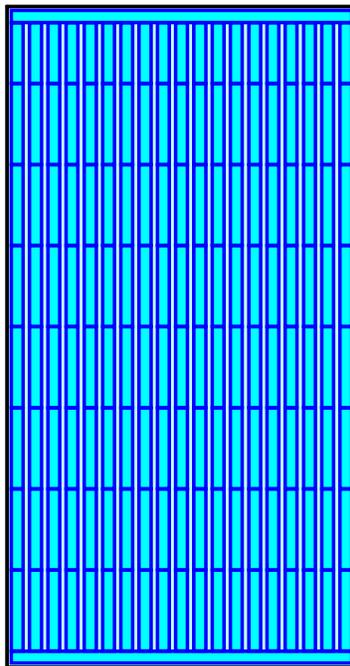
Overall Storage Efficiency = 63.5%

Overall System Size = 163.00' x 86.00' x 4.00'

152 Chambers

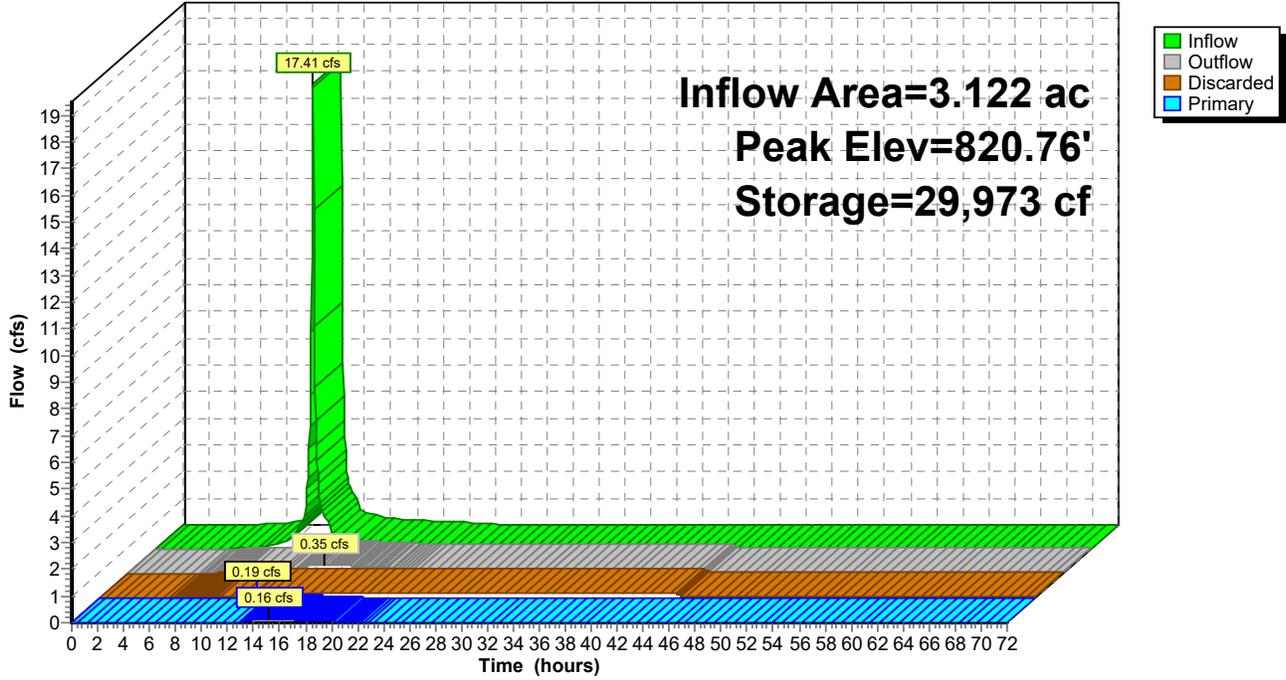
2,076.7 cy Field

1,261.8 cy Stone



### Pond VAULT: 36" INFILTRATION VAULT

Hydrograph



**REE - Bloomington**

MSE 24-hr 3 100-Year Rainfall=7.32"

Prepared by {enter your company name here}

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentDA-1P: PROPOSED SITE TO** Runoff Area=1,330 sf 0.00% Impervious Runoff Depth=2.94"  
Tc=7.0 min CN=61 Runoff=0.16 cfs 0.007 af

**SubcatchmentDA-2P: PROPOSED SITE TO** Runoff Area=14,057 sf 0.00% Impervious Runoff Depth=2.94"  
Tc=7.0 min CN=61 Runoff=1.65 cfs 0.079 af

**SubcatchmentDA-3P: PROPOSED SITE TO** Runoff Area=4,024 sf 13.64% Impervious Runoff Depth=3.46"  
Tc=7.0 min CN=66 Runoff=0.56 cfs 0.027 af

**SubcatchmentDA-4P: PROPOSED SITE TO** Runoff Area=12,981 sf 7.12% Impervious Runoff Depth=3.25"  
Tc=7.0 min CN=64 Runoff=1.69 cfs 0.081 af

**SubcatchmentDA-5P: PROPOSED SITE** Runoff Area=136,013 sf 86.82% Impervious Runoff Depth=6.49"  
Tc=7.0 min CN=93 Runoff=31.26 cfs 1.688 af

**Reach PT: PROPOSED TOTAL** Inflow=4.87 cfs 0.984 af  
Outflow=4.87 cfs 0.984 af

**Reach PWT: PROPOSED WEST TOTAL** Inflow=3.70 cfs 0.871 af  
Outflow=3.70 cfs 0.871 af

**Pond VAULT: 36" INFILTRATIONVAULT** Peak Elev=822.32' Storage=45,548 cf Inflow=31.26 cfs 1.688 af  
Discarded=0.19 cfs 0.817 af Primary=3.44 cfs 0.791 af Outflow=3.63 cfs 1.608 af

**Total Runoff Area = 3.866 ac Runoff Volume = 1.882 af Average Runoff Depth = 5.84"**  
**29.00% Pervious = 1.121 ac 71.00% Impervious = 2.745 ac**

**Summary for Subcatchment DA-1P: PROPOSED SITE TO NORTH**

Runoff = 0.16 cfs @ 12.15 hrs, Volume= 0.007 af, Depth= 2.94"  
 Routed to Reach PT : PROPOSED TOTAL

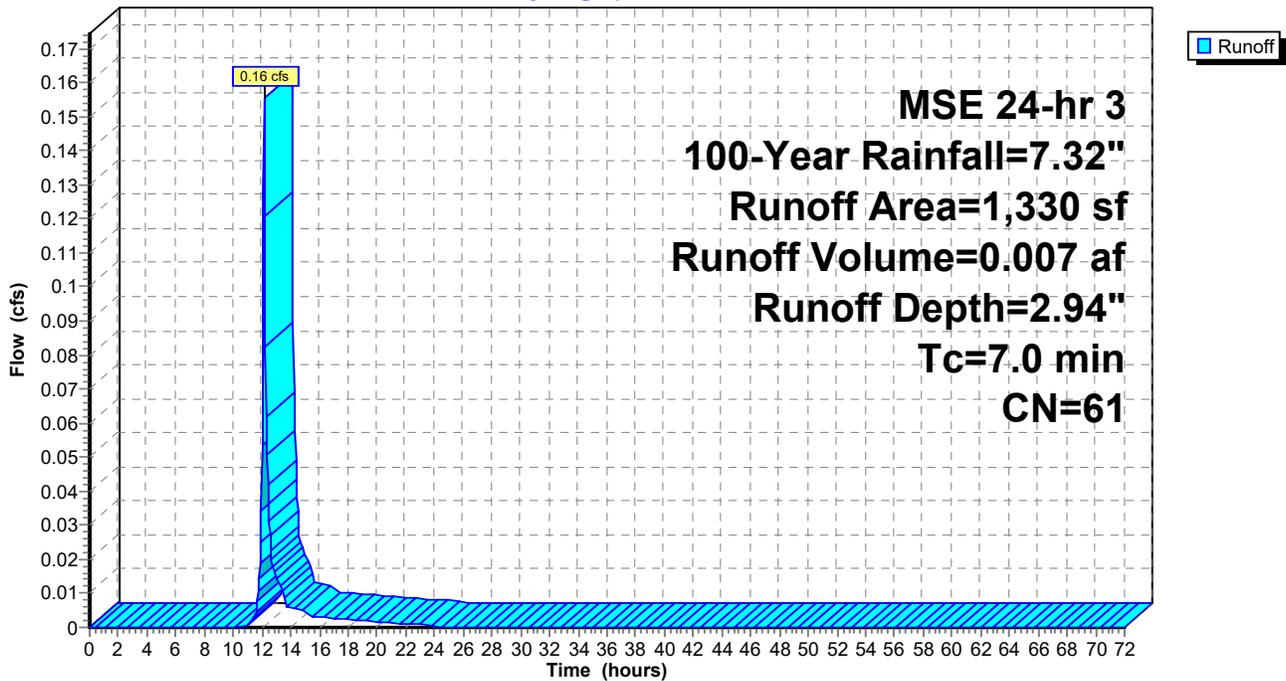
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
0	98	Paved parking, HSG B
1,330	61	>75% Grass cover, Good, HSG B
1,330	61	Weighted Average
1,330		100.00% Pervious Area

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

**Subcatchment DA-1P: PROPOSED SITE TO NORTH**

Hydrograph



**Summary for Subcatchment DA-2P: PROPOSED SITE TO EAST**

Runoff = 1.65 cfs @ 12.15 hrs, Volume= 0.079 af, Depth= 2.94"  
 Routed to Reach PT : PROPOSED TOTAL

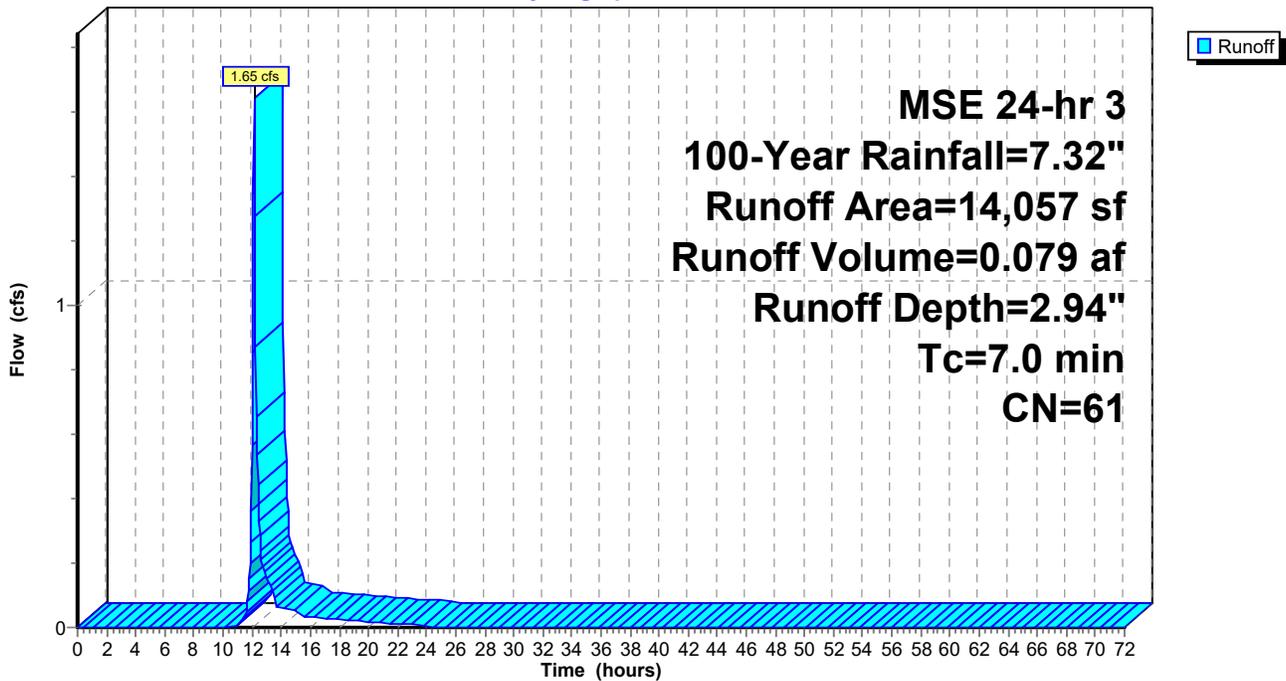
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
0	98	Paved parking, HSG B
14,057	61	>75% Grass cover, Good, HSG B
14,057	61	Weighted Average
14,057		100.00% Pervious Area

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

**Subcatchment DA-2P: PROPOSED SITE TO EAST**

Hydrograph



**REE - Bloomington**

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MSE 24-hr 3 100-Year Rainfall=7.32"

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**Summary for Subcatchment DA-3P: PROPOSED SITE TO SOUTH**

Runoff = 0.56 cfs @ 12.15 hrs, Volume= 0.027 af, Depth= 3.46"  
 Routed to Reach PT : PROPOSED TOTAL

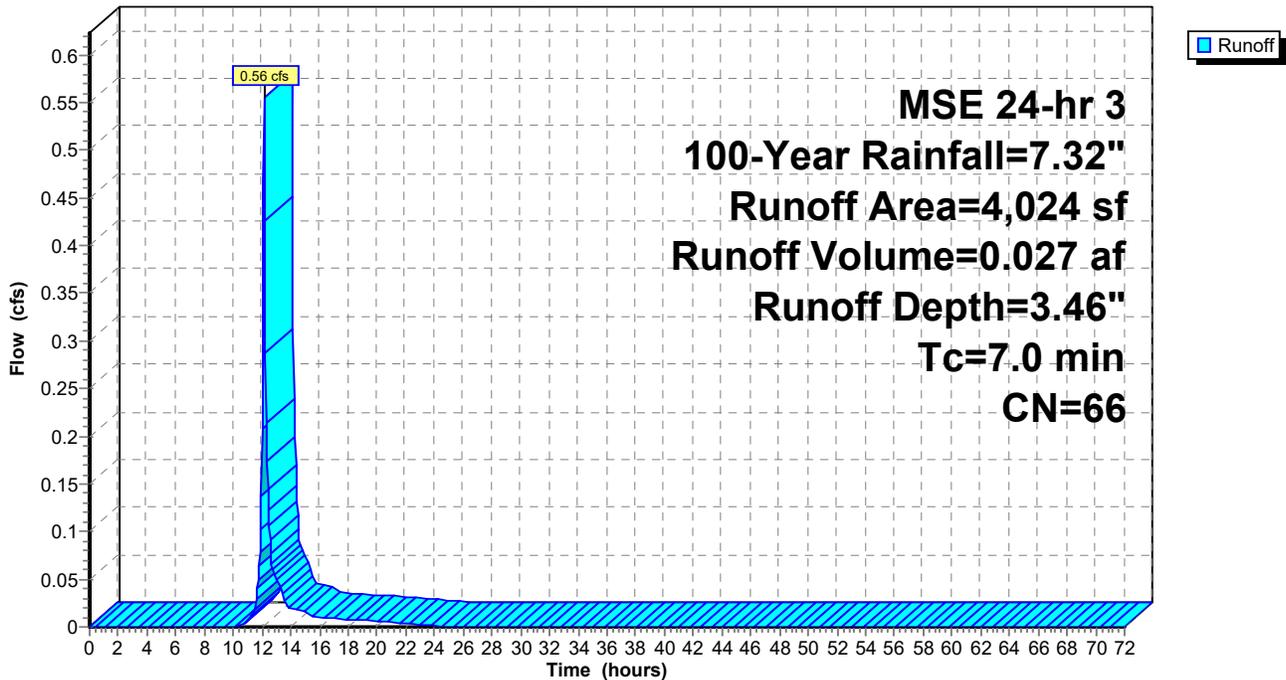
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
549	98	Paved parking, HSG B
3,475	61	>75% Grass cover, Good, HSG B
4,024	66	Weighted Average
3,475		86.36% Pervious Area
549		13.64% Impervious Area

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

**Subcatchment DA-3P: PROPOSED SITE TO SOUTH**

Hydrograph



**Summary for Subcatchment DA-4P: PROPOSED SITE TO WEST**

Runoff = 1.69 cfs @ 12.15 hrs, Volume= 0.081 af, Depth= 3.25"

Routed to Reach PWT : PROPOSED WEST TOTAL

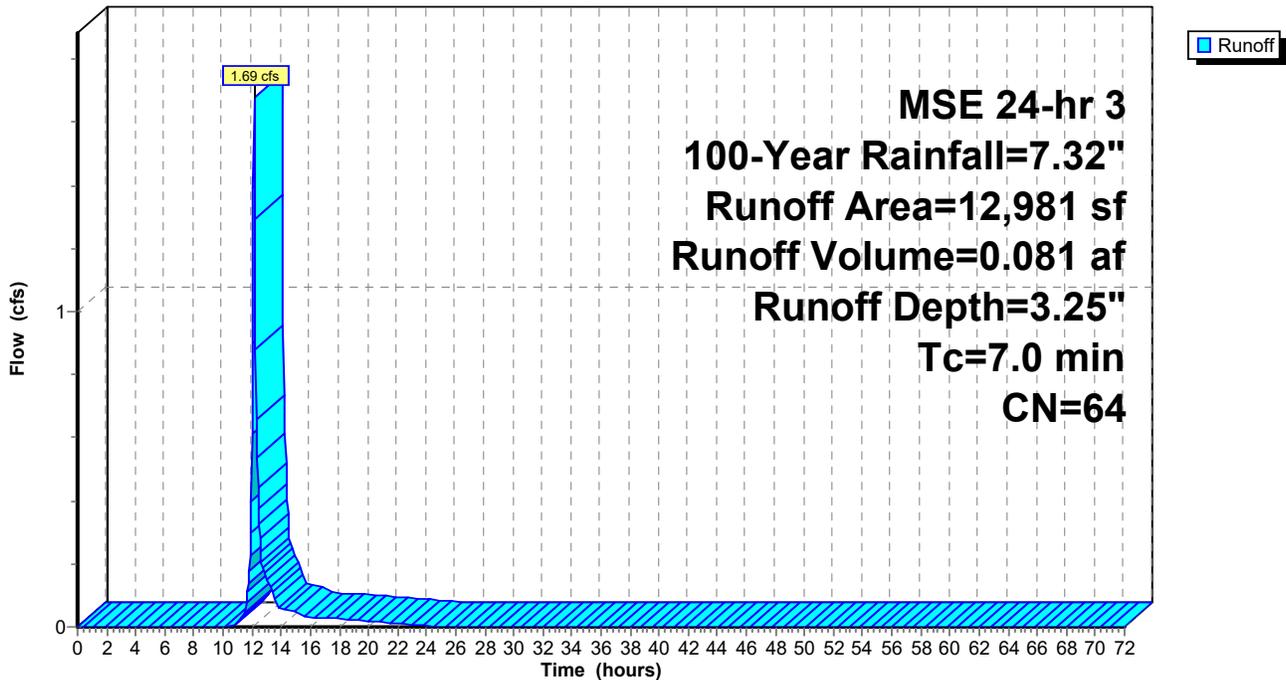
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
924	98	Paved parking, HSG B
12,057	61	>75% Grass cover, Good, HSG B
12,981	64	Weighted Average
12,057		92.88% Pervious Area
924		7.12% Impervious Area

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

**Subcatchment DA-4P: PROPOSED SITE TO WEST**

Hydrograph



**REE - Bloomington**

MSE 24-hr 3 100-Year Rainfall=7.32"

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**Summary for Subcatchment DA-5P: PROPOSED SITE TO VAULT**

Runoff = 31.26 cfs @ 12.14 hrs, Volume= 1.688 af, Depth= 6.49"

Routed to Pond VAULT : 36" INFILTRATION VAULT

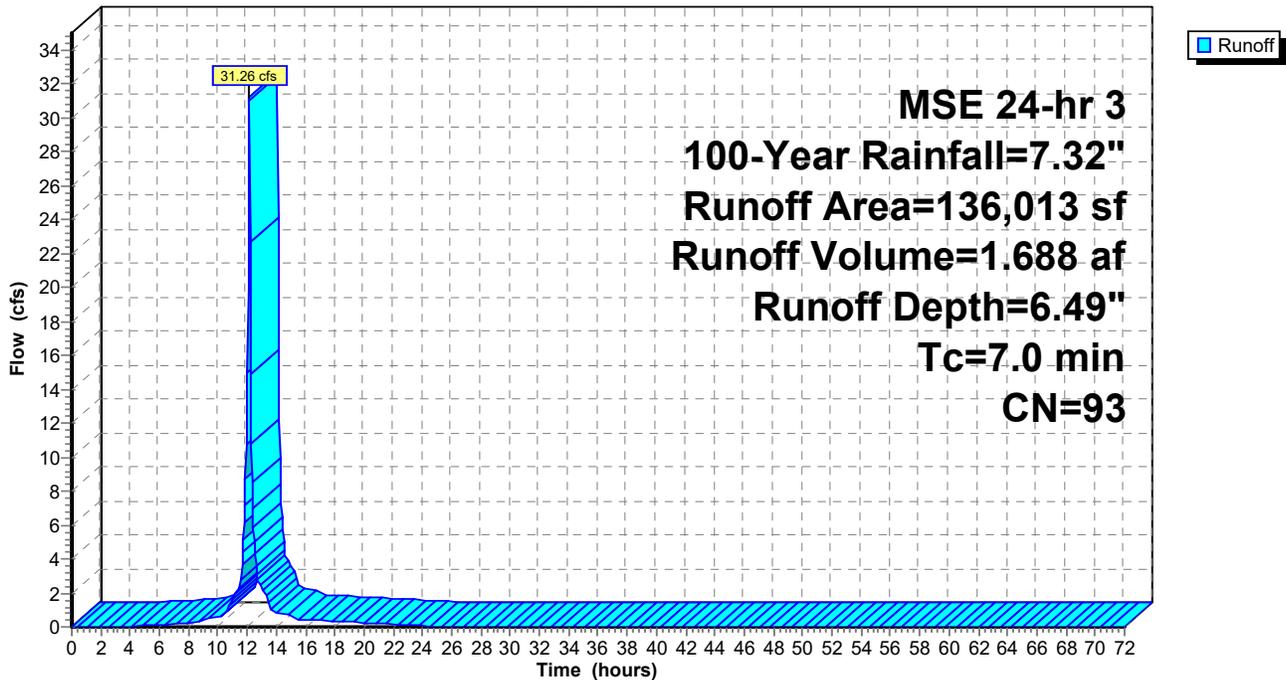
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
118,093	98	Paved parking, HSG B
17,920	61	>75% Grass cover, Good, HSG B
136,013	93	Weighted Average
17,920		13.18% Pervious Area
118,093		86.82% Impervious Area

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

**Subcatchment DA-5P: PROPOSED SITE TO VAULT**

Hydrograph



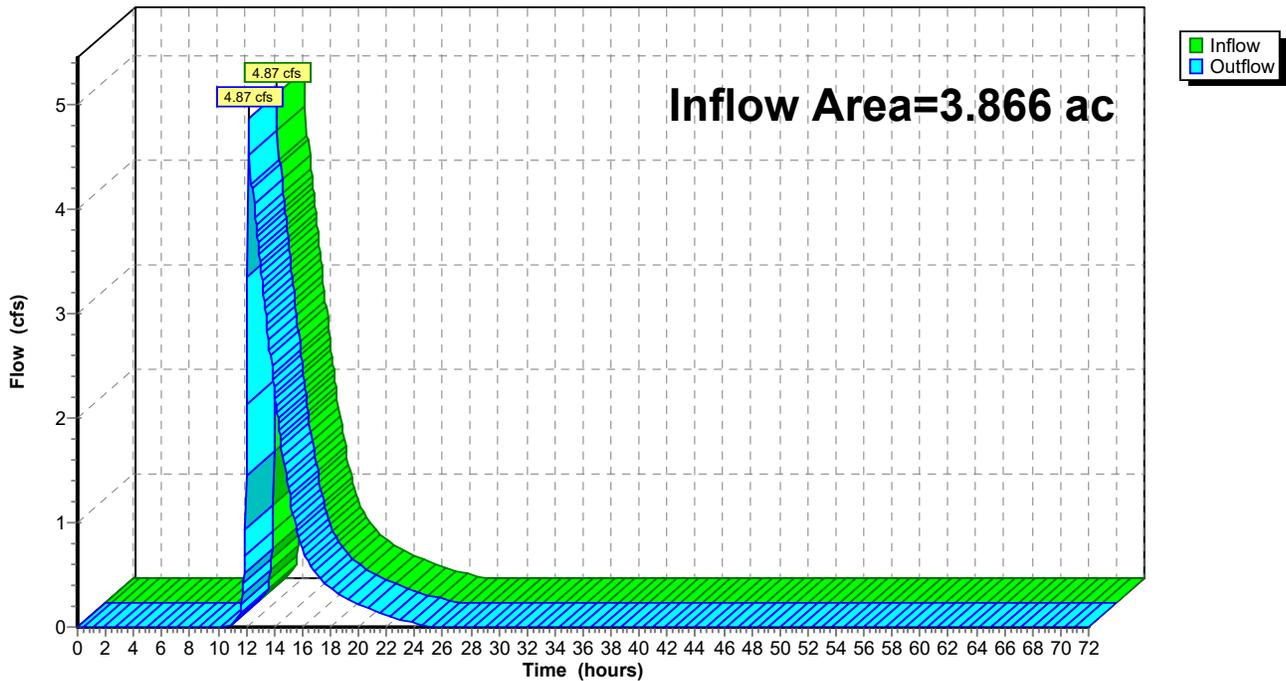
### Summary for Reach PT: PROPOSED TOTAL

Inflow Area = 3.866 ac, 71.00% Impervious, Inflow Depth = 3.05" for 100-Year event  
Inflow = 4.87 cfs @ 12.19 hrs, Volume= 0.984 af  
Outflow = 4.87 cfs @ 12.19 hrs, Volume= 0.984 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Reach PT: PROPOSED TOTAL

Hydrograph



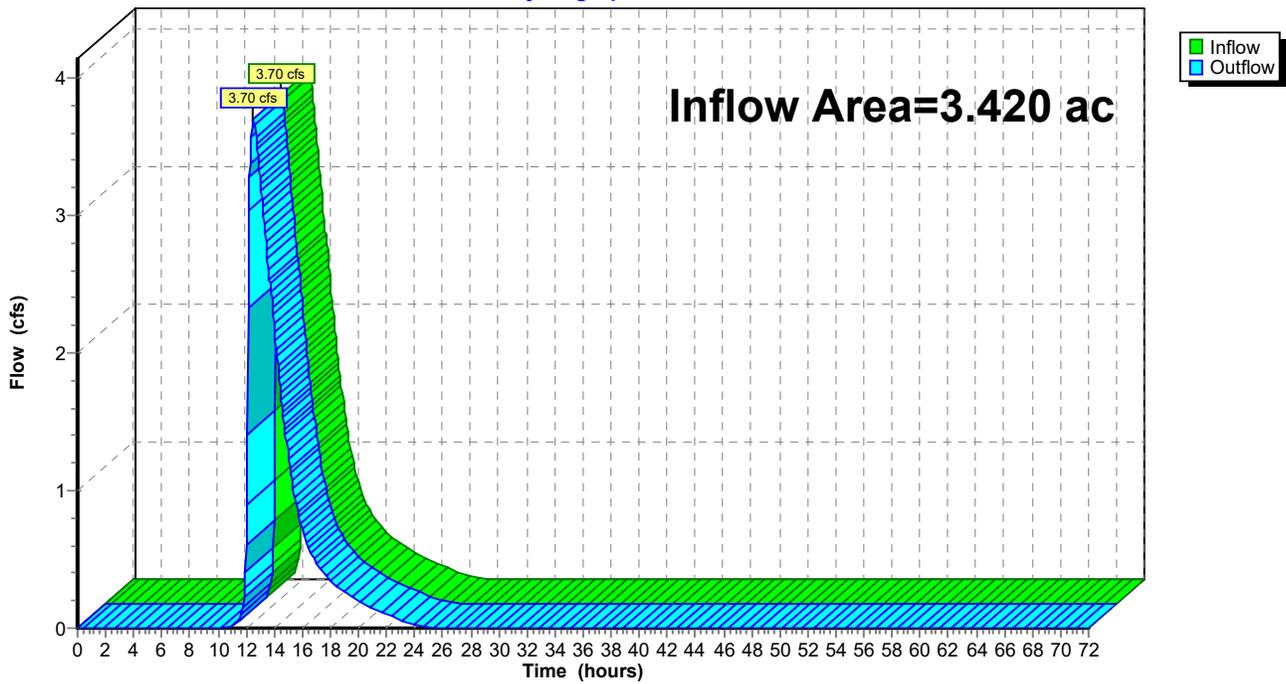
### Summary for Reach PWT: PROPOSED WEST TOTAL

Inflow Area = 3.420 ac, 79.88% Impervious, Inflow Depth = 3.06" for 100-Year event  
Inflow = 3.70 cfs @ 12.54 hrs, Volume= 0.871 af  
Outflow = 3.70 cfs @ 12.54 hrs, Volume= 0.871 af, Atten= 0%, Lag= 0.0 min  
Routed to Reach PT : PROPOSED TOTAL

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

### Reach PWT: PROPOSED WEST TOTAL

Hydrograph



**Summary for Pond VAULT: 36" INFILTRATION VAULT**

Inflow Area = 3.122 ac, 86.82% Impervious, Inflow Depth = 6.49" for 100-Year event  
 Inflow = 31.26 cfs @ 12.14 hrs, Volume= 1.688 af  
 Outflow = 3.63 cfs @ 12.60 hrs, Volume= 1.608 af, Atten= 88%, Lag= 27.8 min  
 Discarded = 0.19 cfs @ 11.75 hrs, Volume= 0.817 af  
 Primary = 3.44 cfs @ 12.60 hrs, Volume= 0.791 af

Routed to Reach PWT : PROPOSED WEST TOTAL

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs  
 Peak Elev= 822.32' @ 12.60 hrs Surf.Area= 28,036 sf Storage= 45,548 cf

Plug-Flow detention time= 770.0 min calculated for 1.608 af (95% of inflow)  
 Center-of-Mass det. time= 745.6 min ( 1,507.0 - 761.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	818.80'	13,627 cf	<b>86.00'W x 163.00'L x 4.00'H Field A</b> 56,072 cf Overall - 22,005 cf Embedded = 34,067 cf x 40.0% Voids
#2A	819.30'	22,005 cf	<b>CMP Round 36 x 152 Inside #1</b> Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf Overall Size= 36.0"W x 36.0"H x 20.00'L Row Length Adjustment= -5.00' x 7.07 sf x 19 rows 84.00' Header x 7.07 sf x 2 = 1,187.5 cf Inside
#3	815.80'	12,616 cf	<b>86.00'W x 163.00'L x 3.00'H Prismatic</b> 42,054 cf Overall x 30.0% Voids
		48,248 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	815.80'	<b>0.300 in/hr Exfiltration over Surface area</b>
#2	Primary	820.50'	<b>12.0" Round Culvert</b> L= 55.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 820.50' / 820.36' S= 0.0025 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 0.79 sf

**Discarded OutFlow** Max=0.19 cfs @ 11.75 hrs HW=818.85' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.19 cfs)

**Primary OutFlow** Max=3.43 cfs @ 12.60 hrs HW=822.32' (Free Discharge)

↑2=Culvert (Barrel Controls 3.43 cfs @ 4.37 fps)

**Pond VAULT: 36" INFILTRATION VAULT - Chamber Wizard Field A**

**Chamber Model = CMP Round 36 (Round Corrugated Metal Pipe)**

Effective Size= 36.0"W x 36.0"H => 7.07 sf x 20.00'L = 141.4 cf

Overall Size= 36.0"W x 36.0"H x 20.00'L

Row Length Adjustment= -5.00' x 7.07 sf x 19 rows

36.0" Wide + 18.0" Spacing = 54.0" C-C Row Spacing

8 Chambers/Row x 20.00' Long -5.00' Row Adjustment +3.00' Header x 2 = 161.00' Row Length +12.0"

End Stone x 2 = 163.00' Base Length

19 Rows x 36.0" Wide + 18.0" Spacing x 18 + 12.0" Side Stone x 2 = 86.00' Base Width

6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

152 Chambers x 141.4 cf -5.00' Row Adjustment x 7.07 sf x 19 Rows + 84.00' Header x 7.07 sf x 2 =  
22,004.5 cf Chamber Storage

56,072.0 cf Field - 22,004.5 cf Chambers = 34,067.5 cf Stone x 40.0% Voids = 13,627.0 cf Stone Storage

Chamber Storage + Stone Storage = 35,631.5 cf = 0.818 af

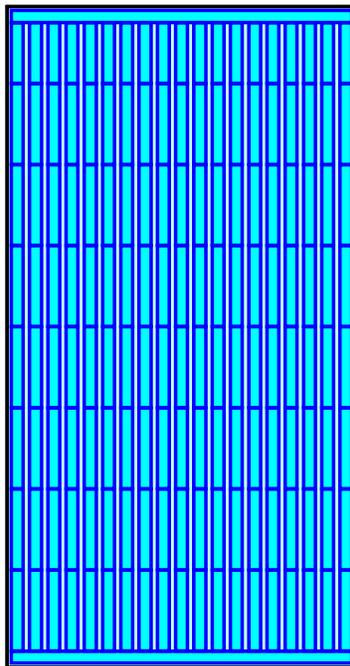
Overall Storage Efficiency = 63.5%

Overall System Size = 163.00' x 86.00' x 4.00'

152 Chambers

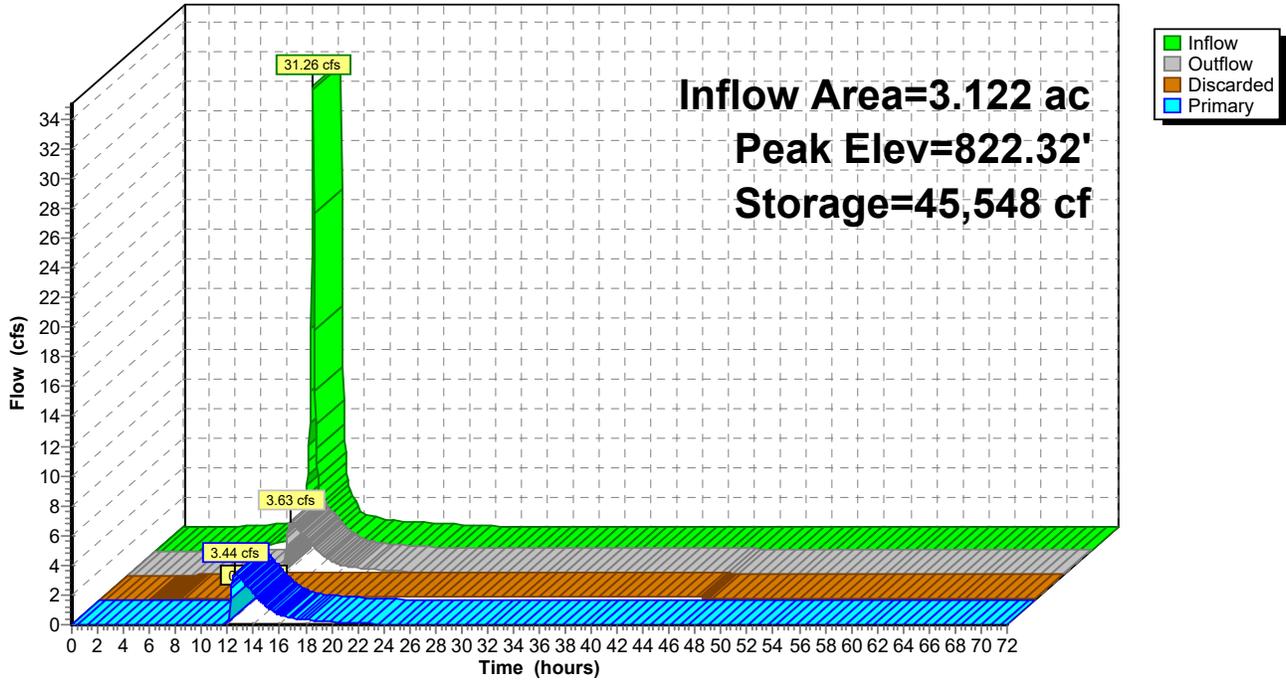
2,076.7 cy Field

1,261.8 cy Stone



### Pond VAULT: 36" INFILTRATION VAULT

Hydrograph

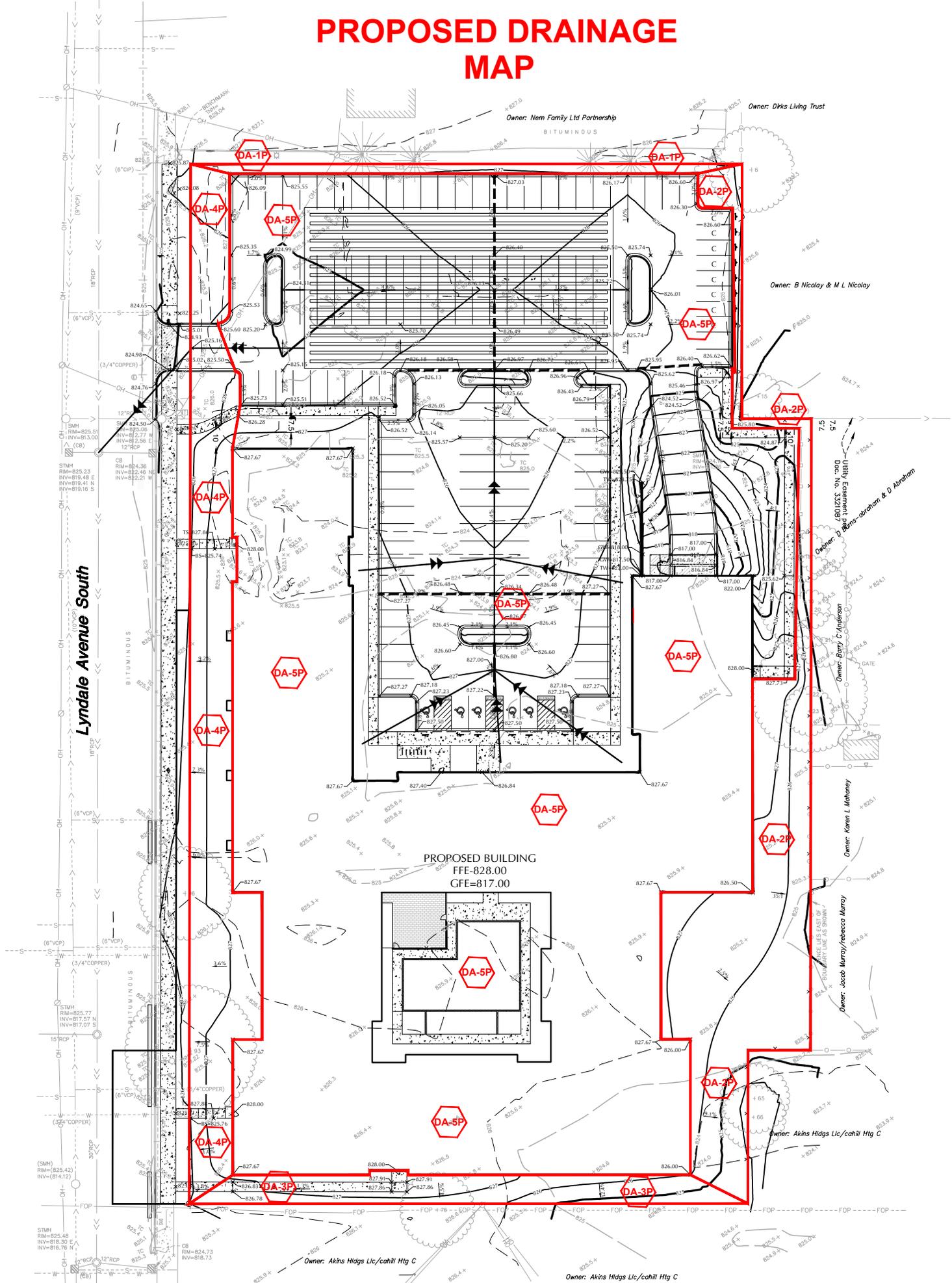


## **Figures**

Existing Drainage Exhibit  
Proposed Drainage Exhibit  
Infiltration Vault Storage Data  
Mids Existing  
Mids Proposed  
Pipe Sizing Spreadsheet



# PROPOSED DRAINAGE MAP



Lyndale Avenue South

PROPOSED BUILDING  
FFE=828.00  
GFE=817.00

Owner: Akhis Higgs Lic/cahill Mtg C

**REE - Bloomington**

MSE 24-hr 3 100-Year Rainfall=7.32"

Prepared by {enter your company name here}

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**Stage-Area-Storage for Pond VAULT: 36" INFILTRATION VAULT**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
815.80	14,018	0	816.32	14,018	2,187
815.81	14,018	42	816.33	14,018	2,229
815.82	14,018	84	816.34	14,018	2,271
815.83	14,018	126	816.35	14,018	2,313
815.84	14,018	168	816.36	14,018	2,355
815.85	14,018	210	816.37	14,018	2,397
815.86	14,018	252	816.38	14,018	2,439
815.87	14,018	294	816.39	14,018	2,481
815.88	14,018	336	816.40	14,018	2,523
815.89	14,018	378	816.41	14,018	2,565
815.90	14,018	421	816.42	14,018	2,607
815.91	14,018	463	816.43	14,018	2,649
815.92	14,018	505	816.44	14,018	2,691
815.93	14,018	547	816.45	14,018	2,734
815.94	14,018	589	816.46	14,018	2,776
815.95	14,018	631	816.47	14,018	2,818
815.96	14,018	673	816.48	14,018	2,860
815.97	14,018	715	816.49	14,018	2,902
815.98	14,018	757	816.50	14,018	2,944
815.99	14,018	799	816.51	14,018	2,986
816.00	14,018	841	816.52	14,018	3,028
816.01	14,018	883	816.53	14,018	3,070
816.02	14,018	925	816.54	14,018	3,112
816.03	14,018	967	816.55	14,018	3,154
816.04	14,018	1,009	816.56	14,018	3,196
816.05	14,018	1,051	816.57	14,018	3,238
816.06	14,018	1,093	816.58	14,018	3,280
816.07	14,018	1,135	816.59	14,018	3,322
816.08	14,018	1,178	816.60	14,018	3,364
816.09	14,018	1,220	816.61	14,018	3,406
816.10	14,018	1,262	816.62	14,018	3,448
816.11	14,018	1,304	816.63	14,018	3,490
816.12	14,018	1,346	816.64	14,018	3,533
816.13	14,018	1,388	816.65	14,018	3,575
816.14	14,018	1,430	816.66	14,018	3,617
816.15	14,018	1,472	816.67	14,018	3,659
816.16	14,018	1,514	816.68	14,018	3,701
816.17	14,018	1,556	816.69	14,018	3,743
816.18	14,018	1,598	816.70	14,018	3,785
816.19	14,018	1,640	816.71	14,018	3,827
816.20	14,018	1,682	816.72	14,018	3,869
816.21	14,018	1,724	816.73	14,018	3,911
816.22	14,018	1,766	816.74	14,018	3,953
816.23	14,018	1,808	816.75	14,018	3,995
816.24	14,018	1,850	816.76	14,018	4,037
816.25	14,018	1,892	816.77	14,018	4,079
816.26	14,018	1,934	816.78	14,018	4,121
816.27	14,018	1,977	816.79	14,018	4,163
816.28	14,018	2,019	816.80	14,018	4,205
816.29	14,018	2,061	816.81	14,018	4,247
816.30	14,018	2,103	816.82	14,018	4,290
816.31	14,018	2,145	816.83	14,018	4,332

**Stage-Area-Storage for Pond VAULT: 36" INFILTRATION VAULT (continued)**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
816.84	14,018	4,374	817.36	14,018	6,560
816.85	14,018	4,416	817.37	14,018	6,602
816.86	14,018	4,458	817.38	14,018	6,645
816.87	14,018	4,500	817.39	14,018	6,687
816.88	14,018	4,542	817.40	14,018	6,729
816.89	14,018	4,584	817.41	14,018	6,771
816.90	14,018	4,626	817.42	14,018	6,813
816.91	14,018	4,668	817.43	14,018	6,855
816.92	14,018	4,710	817.44	14,018	6,897
816.93	14,018	4,752	817.45	14,018	6,939
816.94	14,018	4,794	817.46	14,018	6,981
816.95	14,018	4,836	817.47	14,018	7,023
816.96	14,018	4,878	817.48	14,018	7,065
816.97	14,018	4,920	817.49	14,018	7,107
816.98	14,018	4,962	817.50	14,018	7,149
816.99	14,018	5,004	817.51	14,018	7,191
817.00	14,018	5,046	817.52	14,018	7,233
817.01	14,018	5,089	817.53	14,018	7,275
817.02	14,018	5,131	817.54	14,018	7,317
817.03	14,018	5,173	817.55	14,018	7,359
817.04	14,018	5,215	817.56	14,018	7,402
817.05	14,018	5,257	817.57	14,018	7,444
817.06	14,018	5,299	817.58	14,018	7,486
817.07	14,018	5,341	817.59	14,018	7,528
817.08	14,018	5,383	817.60	14,018	7,570
817.09	14,018	5,425	817.61	14,018	7,612
817.10	14,018	5,467	817.62	14,018	7,654
817.11	14,018	5,509	817.63	14,018	7,696
817.12	14,018	5,551	817.64	14,018	7,738
817.13	14,018	5,593	817.65	14,018	7,780
817.14	14,018	5,635	817.66	14,018	7,822
817.15	14,018	5,677	817.67	14,018	7,864
817.16	14,018	5,719	817.68	14,018	7,906
817.17	14,018	5,761	817.69	14,018	7,948
817.18	14,018	5,803	817.70	14,018	7,990
817.19	14,018	5,846	817.71	14,018	8,032
817.20	14,018	5,888	817.72	14,018	8,074
817.21	14,018	5,930	817.73	14,018	8,116
817.22	14,018	5,972	817.74	14,018	8,158
817.23	14,018	6,014	817.75	14,018	8,201
817.24	14,018	6,056	817.76	14,018	8,243
817.25	14,018	6,098	817.77	14,018	8,285
817.26	14,018	6,140	817.78	14,018	8,327
817.27	14,018	6,182	817.79	14,018	8,369
817.28	14,018	6,224	817.80	14,018	8,411
817.29	14,018	6,266	817.81	14,018	8,453
817.30	14,018	6,308	817.82	14,018	8,495
817.31	14,018	6,350	817.83	14,018	8,537
817.32	14,018	6,392	817.84	14,018	8,579
817.33	14,018	6,434	817.85	14,018	8,621
817.34	14,018	6,476	817.86	14,018	8,663
817.35	14,018	6,518	817.87	14,018	8,705

**REE - Bloomington**

MSE 24-hr 3 100-Year Rainfall=7.32"

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**Stage-Area-Storage for Pond VAULT: 36" INFILTRATION VAULT (continued)**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
817.88	14,018	8,747	818.40	14,018	10,934
817.89	14,018	8,789	818.41	14,018	10,976
817.90	14,018	8,831	818.42	14,018	11,018
817.91	14,018	8,873	818.43	14,018	11,060
817.92	14,018	8,915	818.44	14,018	11,102
817.93	14,018	8,958	818.45	14,018	11,144
817.94	14,018	9,000	818.46	14,018	11,186
817.95	14,018	9,042	818.47	14,018	11,228
817.96	14,018	9,084	818.48	14,018	11,270
817.97	14,018	9,126	818.49	14,018	11,313
817.98	14,018	9,168	818.50	14,018	11,355
817.99	14,018	9,210	818.51	14,018	11,397
818.00	14,018	9,252	818.52	14,018	11,439
818.01	14,018	9,294	818.53	14,018	11,481
818.02	14,018	9,336	818.54	14,018	11,523
818.03	14,018	9,378	818.55	14,018	11,565
818.04	14,018	9,420	818.56	14,018	11,607
818.05	14,018	9,462	818.57	14,018	11,649
818.06	14,018	9,504	818.58	14,018	11,691
818.07	14,018	9,546	818.59	14,018	11,733
818.08	14,018	9,588	818.60	14,018	11,775
818.09	14,018	9,630	818.61	14,018	11,817
818.10	14,018	9,672	818.62	14,018	11,859
818.11	14,018	9,714	818.63	14,018	11,901
818.12	14,018	9,757	818.64	14,018	11,943
818.13	14,018	9,799	818.65	14,018	11,985
818.14	14,018	9,841	818.66	14,018	12,027
818.15	14,018	9,883	818.67	14,018	12,069
818.16	14,018	9,925	818.68	14,018	12,112
818.17	14,018	9,967	818.69	14,018	12,154
818.18	14,018	10,009	818.70	14,018	12,196
818.19	14,018	10,051	818.71	14,018	12,238
818.20	14,018	10,093	818.72	14,018	12,280
818.21	14,018	10,135	818.73	14,018	12,322
818.22	14,018	10,177	818.74	14,018	12,364
818.23	14,018	10,219	818.75	14,018	12,406
818.24	14,018	10,261	818.76	14,018	12,448
818.25	14,018	10,303	818.77	14,018	12,490
818.26	14,018	10,345	818.78	14,018	12,532
818.27	14,018	10,387	818.79	14,018	12,574
818.28	14,018	10,429	818.80	<b>28,036</b>	12,616
818.29	14,018	10,471	818.81	28,036	12,672
818.30	14,018	10,514	818.82	28,036	12,728
818.31	14,018	10,556	818.83	28,036	12,784
818.32	14,018	10,598	818.84	28,036	12,840
818.33	14,018	10,640	818.85	28,036	12,897
818.34	14,018	10,682	818.86	28,036	12,953
818.35	14,018	10,724	818.87	28,036	13,009
818.36	14,018	10,766	818.88	28,036	13,065
818.37	14,018	10,808	818.89	28,036	13,121
818.38	14,018	10,850	818.90	28,036	13,177
818.39	14,018	10,892	818.91	28,036	13,233

**REE - Bloomington**

MSE 24-hr 3 100-Year Rainfall=7.32"

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**Stage-Area-Storage for Pond VAULT: 36" INFILTRATION VAULT (continued)**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
818.92	28,036	13,289	819.44	28,036	16,428
818.93	28,036	13,345	819.45	28,036	16,508
818.94	28,036	13,401	819.46	28,036	16,589
818.95	28,036	13,457	819.47	28,036	16,670
818.96	28,036	13,513	819.48	28,036	16,752
818.97	28,036	13,569	819.49	28,036	16,836
818.98	28,036	13,625	819.50	28,036	16,919
818.99	28,036	13,682	819.51	28,036	17,004
819.00	28,036	13,738	819.52	28,036	17,089
819.01	28,036	13,794	819.53	28,036	17,174
819.02	28,036	13,850	819.54	28,036	17,260
819.03	28,036	13,906	819.55	28,036	17,347
819.04	28,036	13,962	819.56	28,036	17,434
819.05	28,036	14,018	819.57	28,036	17,522
819.06	28,036	14,074	819.58	28,036	17,611
819.07	28,036	14,130	819.59	28,036	17,700
819.08	28,036	14,186	819.60	28,036	17,789
819.09	28,036	14,242	819.61	28,036	17,879
819.10	28,036	14,298	819.62	28,036	17,969
819.11	28,036	14,354	819.63	28,036	18,060
819.12	28,036	14,411	819.64	28,036	18,152
819.13	28,036	14,467	819.65	28,036	18,244
819.14	28,036	14,523	819.66	28,036	18,336
819.15	28,036	14,579	819.67	28,036	18,429
819.16	28,036	14,635	819.68	28,036	18,522
819.17	28,036	14,691	819.69	28,036	18,615
819.18	28,036	14,747	819.70	28,036	18,709
819.19	28,036	14,803	819.71	28,036	18,804
819.20	28,036	14,859	819.72	28,036	18,898
819.21	28,036	14,915	819.73	28,036	18,993
819.22	28,036	14,971	819.74	28,036	19,089
819.23	28,036	15,027	819.75	28,036	19,185
819.24	28,036	15,083	819.76	28,036	19,281
819.25	28,036	15,139	819.77	28,036	19,378
819.26	28,036	15,196	819.78	28,036	19,475
819.27	28,036	15,252	819.79	28,036	19,572
819.28	28,036	15,308	819.80	28,036	19,670
819.29	28,036	15,364	819.81	28,036	19,768
<b>819.30</b>	<b>28,036</b>	<b>15,420</b>	819.82	28,036	19,866
819.31	28,036	15,478	819.83	28,036	19,965
819.32	28,036	15,539	819.84	28,036	20,064
819.33	28,036	15,605	819.85	28,036	20,163
819.34	28,036	15,678	819.86	28,036	20,263
819.35	28,036	15,748	819.87	28,036	20,362
819.36	28,036	15,819	819.88	28,036	20,463
819.37	28,036	15,892	819.89	28,036	20,563
819.38	28,036	15,965	819.90	28,036	20,664
819.39	28,036	16,040	819.91	28,036	20,765
819.40	28,036	16,116	819.92	28,036	20,866
819.41	28,036	16,192	819.93	28,036	20,968
819.42	28,036	16,270	819.94	28,036	21,070
819.43	28,036	16,348	819.95	28,036	21,172

**REE - Bloomington**

MSE 24-hr 3 100-Year Rainfall=7.32"

Prepared by {enter your company name here}

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**Stage-Area-Storage for Pond VAULT: 36" INFILTRATION VAULT (continued)**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
819.96	28,036	21,274	820.48	28,036	26,858
819.97	28,036	21,377	820.49	28,036	26,969
819.98	28,036	21,480	<b>820.50</b>	<b>28,036</b>	<b>27,080</b>
819.99	28,036	21,583	820.51	28,036	27,191
820.00	28,036	21,686	820.52	28,036	27,302
820.01	28,036	21,790	820.53	28,036	27,413
820.02	28,036	21,894	820.54	28,036	27,525
820.03	28,036	21,998	820.55	28,036	27,636
820.04	28,036	22,102	820.56	28,036	27,747
820.05	28,036	22,206	820.57	28,036	27,859
820.06	28,036	22,311	820.58	28,036	27,970
820.07	28,036	22,416	820.59	28,036	28,082
820.08	28,036	22,521	820.60	28,036	28,193
820.09	28,036	22,626	820.61	28,036	28,305
820.10	28,036	22,732	820.62	28,036	28,416
820.11	28,036	22,838	820.63	28,036	28,528
820.12	28,036	22,944	820.64	28,036	28,640
820.13	28,036	23,050	820.65	28,036	28,752
820.14	28,036	23,156	820.66	28,036	28,864
820.15	28,036	23,262	820.67	28,036	28,975
820.16	28,036	23,369	820.68	28,036	29,087
820.17	28,036	23,476	820.69	28,036	29,199
820.18	28,036	23,583	820.70	28,036	29,311
820.19	28,036	23,690	820.71	28,036	29,423
820.20	28,036	23,798	820.72	28,036	29,535
820.21	28,036	23,905	820.73	28,036	29,647
820.22	28,036	24,013	820.74	28,036	29,759
820.23	28,036	24,121	820.75	28,036	29,871
820.24	28,036	24,229	820.76	28,036	29,984
820.25	28,036	24,337	820.77	28,036	30,096
820.26	28,036	24,445	820.78	28,036	30,208
820.27	28,036	24,553	820.79	28,036	30,320
820.28	28,036	24,662	820.80	28,036	30,432
820.29	28,036	24,771	820.81	28,036	30,544
820.30	28,036	24,879	820.82	28,036	30,656
820.31	28,036	24,988	820.83	28,036	30,768
820.32	28,036	25,097	820.84	28,036	30,880
820.33	28,036	25,207	820.85	28,036	30,992
820.34	28,036	25,316	820.86	28,036	31,104
820.35	28,036	25,426	820.87	28,036	31,217
820.36	28,036	25,535	820.88	28,036	31,329
820.37	28,036	25,645	820.89	28,036	31,441
820.38	28,036	25,755	820.90	28,036	31,553
820.39	28,036	25,865	820.91	28,036	31,665
820.40	28,036	25,975	820.92	28,036	31,777
820.41	28,036	26,085	820.93	28,036	31,888
820.42	28,036	26,195	820.94	28,036	32,000
820.43	28,036	26,305	820.95	28,036	32,112
820.44	28,036	26,416	820.96	28,036	32,224
820.45	28,036	26,526	820.97	28,036	32,336
820.46	28,036	26,637	820.98	28,036	32,447
820.47	28,036	26,747	820.99	28,036	32,559

**REE - Bloomington**

MSE 24-hr 3 100-Year Rainfall=7.32"

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**Stage-Area-Storage for Pond VAULT: 36" INFILTRATION VAULT (continued)**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
821.00	28,036	32,671	821.52	28,036	38,343
821.01	28,036	32,782	821.53	28,036	38,448
821.02	28,036	32,894	821.54	28,036	38,553
821.03	28,036	33,005	821.55	28,036	38,658
821.04	28,036	33,117	821.56	28,036	38,762
821.05	28,036	33,228	821.57	28,036	38,866
821.06	28,036	33,339	821.58	28,036	38,970
821.07	28,036	33,451	821.59	28,036	39,074
821.08	28,036	33,562	821.60	28,036	39,178
821.09	28,036	33,673	821.61	28,036	39,281
821.10	28,036	33,784	821.62	28,036	39,384
821.11	28,036	33,895	821.63	28,036	39,487
821.12	28,036	34,006	821.64	28,036	39,590
821.13	28,036	34,116	821.65	28,036	39,692
821.14	28,036	34,227	821.66	28,036	39,794
821.15	28,036	34,338	821.67	28,036	39,896
821.16	28,036	34,448	821.68	28,036	39,998
821.17	28,036	34,559	821.69	28,036	40,099
821.18	28,036	34,669	821.70	28,036	40,200
821.19	28,036	34,779	821.71	28,036	40,301
821.20	28,036	34,889	821.72	28,036	40,401
821.21	28,036	34,999	821.73	28,036	40,501
821.22	28,036	35,109	821.74	28,036	40,601
821.23	28,036	35,219	821.75	28,036	40,701
821.24	28,036	35,329	821.76	28,036	40,800
821.25	28,036	35,438	821.77	28,036	40,899
821.26	28,036	35,548	821.78	28,036	40,998
821.27	28,036	35,657	821.79	28,036	41,096
821.28	28,036	35,766	821.80	28,036	41,194
821.29	28,036	35,875	821.81	28,036	41,292
821.30	28,036	35,984	821.82	28,036	41,389
821.31	28,036	36,093	821.83	28,036	41,486
821.32	28,036	36,202	821.84	28,036	41,583
821.33	28,036	36,311	821.85	28,036	41,679
821.34	28,036	36,419	821.86	28,036	41,775
821.35	28,036	36,527	821.87	28,036	41,870
821.36	28,036	36,635	821.88	28,036	41,966
821.37	28,036	36,743	821.89	28,036	42,060
821.38	28,036	36,851	821.90	28,036	42,155
821.39	28,036	36,959	821.91	28,036	42,249
821.40	28,036	37,066	821.92	28,036	42,342
821.41	28,036	37,174	821.93	28,036	42,435
821.42	28,036	37,281	821.94	28,036	42,528
821.43	28,036	37,388	821.95	28,036	42,620
821.44	28,036	37,495	821.96	28,036	42,712
821.45	28,036	37,601	821.97	28,036	42,804
821.46	28,036	37,708	821.98	28,036	42,894
821.47	28,036	37,814	821.99	28,036	42,985
821.48	28,036	37,920	822.00	28,036	43,075
821.49	28,036	38,026	822.01	28,036	43,164
821.50	28,036	38,132	822.02	28,036	43,253
821.51	28,036	38,237	822.03	28,036	43,342

**REE - Bloomington**

MSE 24-hr 3 100-Year Rainfall=7.32"

Prepared by {enter your company name here}

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**Stage-Area-Storage for Pond VAULT: 36" INFILTRATION VAULT (continued)**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
822.04	28,036	43,429	822.56	28,036	46,902
822.05	28,036	43,517	822.57	28,036	46,958
822.06	28,036	43,604	822.58	28,036	47,014
822.07	28,036	43,690	822.59	28,036	47,070
822.08	28,036	43,775	822.60	28,036	47,126
822.09	28,036	43,860	822.61	28,036	47,182
822.10	28,036	43,945	822.62	28,036	47,238
822.11	28,036	44,028	822.63	28,036	47,294
822.12	28,036	44,111	822.64	28,036	47,351
822.13	28,036	44,194	822.65	28,036	47,407
822.14	28,036	44,275	822.66	28,036	47,463
822.15	28,036	44,356	822.67	28,036	47,519
822.16	28,036	44,436	822.68	28,036	47,575
822.17	28,036	44,516	822.69	28,036	47,631
822.18	28,036	44,594	822.70	28,036	47,687
822.19	28,036	44,672	822.71	28,036	47,743
822.20	28,036	44,748	822.72	28,036	47,799
822.21	28,036	44,824	822.73	28,036	47,855
822.22	28,036	44,899	822.74	28,036	47,911
822.23	28,036	44,972	822.75	28,036	47,967
822.24	28,036	45,045	822.76	28,036	48,023
822.25	28,036	45,116	822.77	28,036	48,079
822.26	28,036	45,185	822.78	28,036	48,136
822.27	28,036	45,254	822.79	28,036	48,192
822.28	28,036	45,319	822.80	28,036	<b>48,248</b>
822.29	28,036	45,381			
822.30	28,036	45,444			
822.31	28,036	45,500			
822.32	28,036	45,556			
822.33	28,036	45,612			
822.34	28,036	45,668			
822.35	28,036	45,724			
822.36	28,036	45,781			
822.37	28,036	45,837			
822.38	28,036	45,893			
822.39	28,036	45,949			
822.40	28,036	46,005			
822.41	28,036	46,061			
822.42	28,036	46,117			
822.43	28,036	46,173			
822.44	28,036	46,229			
822.45	28,036	46,285			
822.46	28,036	46,341			
822.47	28,036	46,397			
822.48	28,036	46,453			
822.49	28,036	46,509			
822.50	28,036	46,566			
822.51	28,036	46,622			
822.52	28,036	46,678			
822.53	28,036	46,734			
822.54	28,036	46,790			
822.55	28,036	46,846			

## Project Information

Calculator Version:	Version 3: January 2017
Project Name:	REE - Bloomington Lyndal Apartments - Existing
User Name / Company Name:	Loucks
Date:	12/05/25
Project Description:	
Construction Permit?:	Yes

## Site Information

Retention Requirement (inches):	1.1
Site's Zip Code:	55420
Annual Rainfall (inches):	31.5
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

### Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed		2.954			2.954
			Impervious Area (acres)		0.912
			Total Area (acres)		3.866

### Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed					0
			Impervious Area (acres)		
			Total Area (acres)		0

## Summary Information

### Performance Goal Requirement

Performance goal volume retention requirement:	3642	ft <sup>3</sup>
Volume removed by BMPs towards performance goal:		ft <sup>3</sup>
<b>Percent volume removed towards performance goal</b>		<b>%</b>

### Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	3.4426	acre-ft
Annual runoff volume removed by BMPs:		acre-ft
<b>Percent annual runoff volume removed:</b>		<b>%</b>

Post development annual particulate P load:	1.545	lbs
Annual particulate P removed by BMPs:		lbs
Post development annual dissolved P load:	1.264	lbs
Annual dissolved P removed by BMPs:		lbs
<b>Percent annual total phosphorus removed:</b>		<b>%</b>

Post development annual TSS load:	510.3	lbs
Annual TSS removed by BMPs:		lbs
<b>Percent annual TSS removed:</b>		<b>%</b>

## BMP Summary

### Performance Goal Summary

BMP Name	BMP Volume Capacity (ft <sup>3</sup> )	Volume Recieved (ft <sup>3</sup> )	Volume Retained (ft <sup>3</sup> )	Volume Outflow (ft <sup>3</sup> )	Percent Retained (%)

### Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)

### Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)

### Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
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**TSS Summary**

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
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**BMP Schematic**

## Project Information

Calculator Version:	Version 3: January 2017
Project Name:	REE - Bloomington Lyndal Apartments - Proposed
User Name / Company Name:	Loucks
Date:	12/05/25
Project Description:	
Construction Permit?:	Yes

## Site Information

Retention Requirement (inches):	1.1
Site's Zip Code:	55420
Annual Rainfall (inches):	31.5
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

### Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed		1.121			1.121
			Impervious Area (acres)		2.745
			Total Area (acres)		3.866

### Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed		0.411			0.411
			Impervious Area (acres)		2.711
			Total Area (acres)		3.122

## Summary Information

### Performance Goal Requirement

Performance goal volume retention requirement:	10961	ft <sup>3</sup>
Volume removed by BMPs towards performance goal:	10825	ft <sup>3</sup>
<b>Percent volume removed towards performance goal</b>	<b>99</b>	<b>%</b>

### Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	6.6905	acre-ft
Annual runoff volume removed by BMPs:	5.7979	acre-ft
<b>Percent annual runoff volume removed:</b>	<b>87</b>	<b>%</b>

Post development annual particulate P load:	3.003	lbs
Annual particulate P removed by BMPs:	2.602	lbs
Post development annual dissolved P load:	2.457	lbs
Annual dissolved P removed by BMPs:	2.129	lbs
<b>Percent annual total phosphorus removed:</b>	<b>87</b>	<b>%</b>

Post development annual TSS load:	991.8	lbs
Annual TSS removed by BMPs:	859.5	lbs
<b>Percent annual TSS removed:</b>	<b>87</b>	<b>%</b>

## BMP Summary

### Performance Goal Summary

BMP Name	BMP Volume Capacity (ft <sup>3</sup> )	Volume Recieved (ft <sup>3</sup> )	Volume Retained (ft <sup>3</sup> )	Volume Outflow (ft <sup>3</sup> )	Percent Retained (%)
36" Perforated CMP Infiltration Vault	11660	10825	10825	0	100

### Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
36" Perforated CMP Infiltration Vault	6.2787	0	5.7979	0.4807999999	92

### Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
36" Perforated CMP Infiltration Vault	2.8179	0	2.6021	0.2158	92

### Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
36" Perforated CMP Infiltration Vault	2.3055	0	2.129	0.1765	92

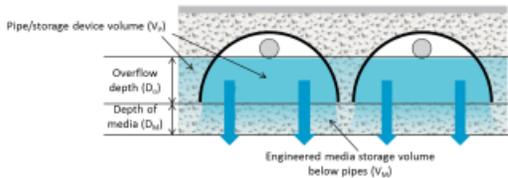
### TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
36" Perforated CMP Infiltration Vault	930.75	0	859.48	71.27	92

### BMP Schematic



### Underground Infiltration



[Underground pipe/storage device recommended volume calculations](#)

Required treatment volume	<input type="text" value="10825"/>	ft <sup>3</sup>
Underground pipe/storage device storage volume below overflow [ V <sub>P</sub> ]	<input type="text" value="11660"/>	ft <sup>3</sup>
Overflow depth between media and overflow [ D <sub>O</sub> ]	<input type="text" value="1.2"/>	ft
Is engineered media present below pipe/storage device?	<input type="text" value="No"/>	
Engineered media surface area [ A <sub>M</sub> ]	<input type="text"/>	ft <sup>2</sup>
Depth of media [ D <sub>M</sub> ]	<input type="text"/>	ft
Media porosity [ n ] (range 0.35-0.50)	<input type="text"/>	ft <sup>3</sup> / ft <sup>3</sup>
Underlying soil - Hydrologic Soil Group	<input type="text" value="7 MH (HSG B.)"/>	
Infiltration rate of underlying soils	<input type="text" value="0.3"/>	in/hr
User defined infiltration rate	<input type="text"/>	in/hr
Required drawdown time	<input type="text" value="48"/>	hrs
Volume reduction capacity of BMP [ V ]	<input type="text" value="11660"/>	ft <sup>3</sup>
Volume of retention provided by BMP	<input type="text" value="10825"/>	ft <sup>3</sup>

Proj #: 24514A  
 Comp By: PJD  
 Checked By: PJD

Plan Date: 8/5/2025  
 Comp Date:

Frequency Storm (yrs) = 10  
 Manning Coefficient = 0.013  
 Minimum Pipe Size (in.) = 12  
 Rainfall Data for Twin Cities Metro Area Only  
 Intensity-Duration-Frequency Data Obtained From MNDOT

cover from top pipe

Run Description																									
From Prefix	From #	To Prefix	To #	Area Up Inlet (Acres)	Sum Area	Area Time of Conc.(min)	Pipe Time (min)	Selected Tot Tc	"C"	CXA	Sum CXA	Intensity (IN/HR)	Q = Flow Q = CAI	Slope %	Pipe Dia.(in.)	Select Dia.(in.)	Capacity of pipe	Full Velocity (fps)	Pipe Length	Rim Elevation		Invert Elev.		Cover	
																				Up M.H.	Dn M.H.	Up M.H.	Dn M.H.	Up M.H.	Dn M.H.
RD	102	STMH	3	0.30	0.30	10.00	0.25	10.00	0.90	0.27	0.27	5.65	1.52	0.50	9.92	12	2.52	3.21	48	828.00	827.00	823.25	823.01	3.58	2.82
STMH	3	CBMH	4	0.00	1.13	10.00	0.08	10.43	0.80	0.00	1.01	5.55	5.62	1.00	14.24	15	6.46	5.26	24	827.00	826.07	822.64	822.40	2.92	2.23
CBMH	4	STMH	5	0.32	1.45	10.00	0.10	10.50	0.80	0.26	1.27	5.54	7.03	1.20	14.96	15	7.08	5.77	34	826.07	826.08	822.40	821.99	2.23	2.65
STMH	5	CBMH	6	0.00	2.13	10.00	0.16	10.60	0.80	0.00	1.88	5.51	10.37	1.20	17.31	18	11.51	6.51	63	826.08	825.20	821.79	821.04	2.58	2.46
CBMH	6	CBMH	1000	0.37	2.49	10.00	0.08	10.76	0.80	0.29	2.17	5.48	11.91	1.50	17.49	18	12.87	7.28	36	825.20	825.50	821.04	820.50	2.46	3.30
RD	100	STMH	5	0.23	0.23	10.00	0.37	10.00	0.90	0.21	0.21	5.65	1.17	0.50	9.00	12	2.52	3.21	71	828.00	826.08	823.25	822.90	3.58	2.02
RD	101	STMH	3	0.43	0.43	10.00	0.41	10.00	0.90	0.38	0.38	5.65	2.16	0.50	11.33	12	2.52	3.21	79	828.00	827.00	823.25	822.86	3.58	2.98
RD	103	STMH	3	0.40	0.40	10.00	0.43	10.00	0.90	0.36	0.36	5.65	2.05	0.50	11.10	12	2.52	3.21	82	828.00	827.00	823.25	822.84	3.58	2.99
RD	104	STMH	5	0.45	0.45	10.00	0.35	10.00	0.90	0.41	0.41	5.65	2.29	0.50	11.58	12	2.52	3.21	68	828.00	826.08	823.25	822.91	3.58	2.00
CB	1	VAULT	1000	0.42	0.42	10.00	0.03	10.00	0.80	0.34	0.34	5.65	1.90	2.00	8.32	12	5.04	6.42	10	824.30	824.50	820.70	820.50	2.43	2.83
CB	2	VAULT	1000	0.32	0.32	10.00	0.02	10.00	0.80	0.26	0.26	5.65	1.45	2.00	7.53	12	5.04	6.42	6	825.22	825.50	820.62	820.50	3.43	3.83