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## STORMWATER ANALYSIS

### 3 LIDO AVENUE, BURLINGTON

This drainage study was conducted at 3 Lido Avenue, Burlington due to the applicant proposing to teardown and build a new single family dwelling.

The stormwater management for this site involves a trench grate, crushed stone trench, and 500 gallon concrete drywell to collect, store, and infiltrate the easterly proposed paved driveway. The front portion of the majority of the new house will be collected and conveyed via 4" roof drains to a 500 gallon concrete drywell with 2 feet of crushed stone surrounding. Additionally, there is a 4 foot wide crushed stone swale proposed along the length of the rear lot line which will serve to collect the rear portion of the house roof and overland flow as it moves across the property. The two drywells have been designed with an emergency overflow for large storm event by means of a 4" HPDE drain pipe to a NDS pop-up emitter. The pop-up emitter will allow a control release of large storms. The soil conditions onsite are medium coarse sand with gravel. As such, a Rawls rate of 8.27 in/hr is being used as the soil exfiltration rate.

A detailed HydroCAD analysis was performed to evaluate the Predevelopment vs. Postdevelopment design scenario for the 2, 10, and 100 year storm event. The following table demonstrates the summary showing a reduction in peak rates of stomwater runoff for all storm events.

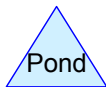
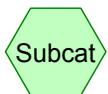
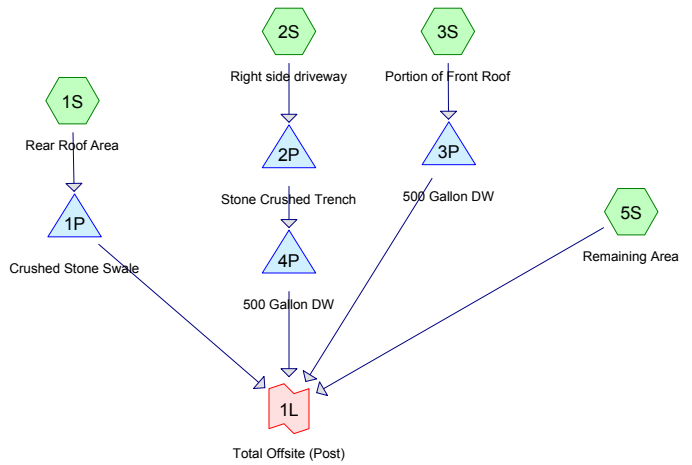
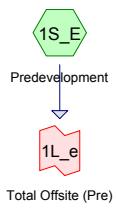
<u>Storm Event</u>	Predevelopment (cfs)	Postdevelopment (cfs)
2 Year	0.21	0.19
10 Year	0.78	0.60
100 Year	1.49	1.06

Very Truly Yours,



9.4.2020

John (Jack) D. Sullivan III, PE



### 3 Lido Avenue

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Type III 24-hr 2-Year Storm Rainfall=3.20"

Page 2

9/4/2020

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

#### Subcatchment 1S: Rear Roof Area

Runoff Area=2,882 sf Runoff Depth=2.77"  
Tc=6.0 min CN=98 Runoff=0.20 cfs 0.015 af

#### Subcatchment 1S\_E: Predevelopment

Runoff Area=24,485 sf Runoff Depth=0.42"  
Tc=6.0 min CN=62 Runoff=0.21 cfs 0.020 af

#### Subcatchment 2S: Right side driveway

Runoff Area=2,466 sf Runoff Depth=2.77"  
Tc=6.0 min CN=98 Runoff=0.17 cfs 0.013 af

#### Subcatchment 3S: Portion of Front Roof

Runoff Area=1,736 sf Runoff Depth=2.77"  
Tc=6.0 min CN=98 Runoff=0.12 cfs 0.009 af

#### Subcatchment 5S: Remaining Area

Runoff Area=17,421 sf Runoff Depth=0.08"  
Tc=6.0 min CN=49 Runoff=0.01 cfs 0.003 af

#### Pond 1P: Crushed Stone Swale

Peak Elev=187.05' Storage=86 cf Inflow=0.20 cfs 0.015 af  
Outflow=0.08 cfs 0.015 af

#### Pond 2P: Stone Crushed Trench

Peak Elev=188.79' Storage=23 cf Inflow=0.17 cfs 0.013 af  
6.0" x 10.0' Culvert Outflow=0.17 cfs 0.013 af

#### Pond 3P: 500 Gallon DW

Peak Elev=194.16' Storage=236 cf Inflow=0.12 cfs 0.009 af  
Outflow=0.06 cfs 0.004 af

#### Pond 4P: 500 Gallon DW

Peak Elev=188.57' Storage=168 cf Inflow=0.17 cfs 0.013 af  
Outflow=0.08 cfs 0.013 af

#### Link 1L: Total Offsite (Post)

Inflow=0.19 cfs 0.035 af  
Primary=0.19 cfs 0.035 af

#### Link 1L\_e: Total Offsite (Pre)

Inflow=0.21 cfs 0.020 af  
Primary=0.21 cfs 0.020 af

**Total Runoff Area = 1.125 ac Runoff Volume = 0.060 af Average Runoff Depth = 0.64"**

### 3 Lido Avenue

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Type III 24-hr 2-Year Storm Rainfall=3.20"

Page 3  
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### Subcatchment 1S: Rear Roof Area

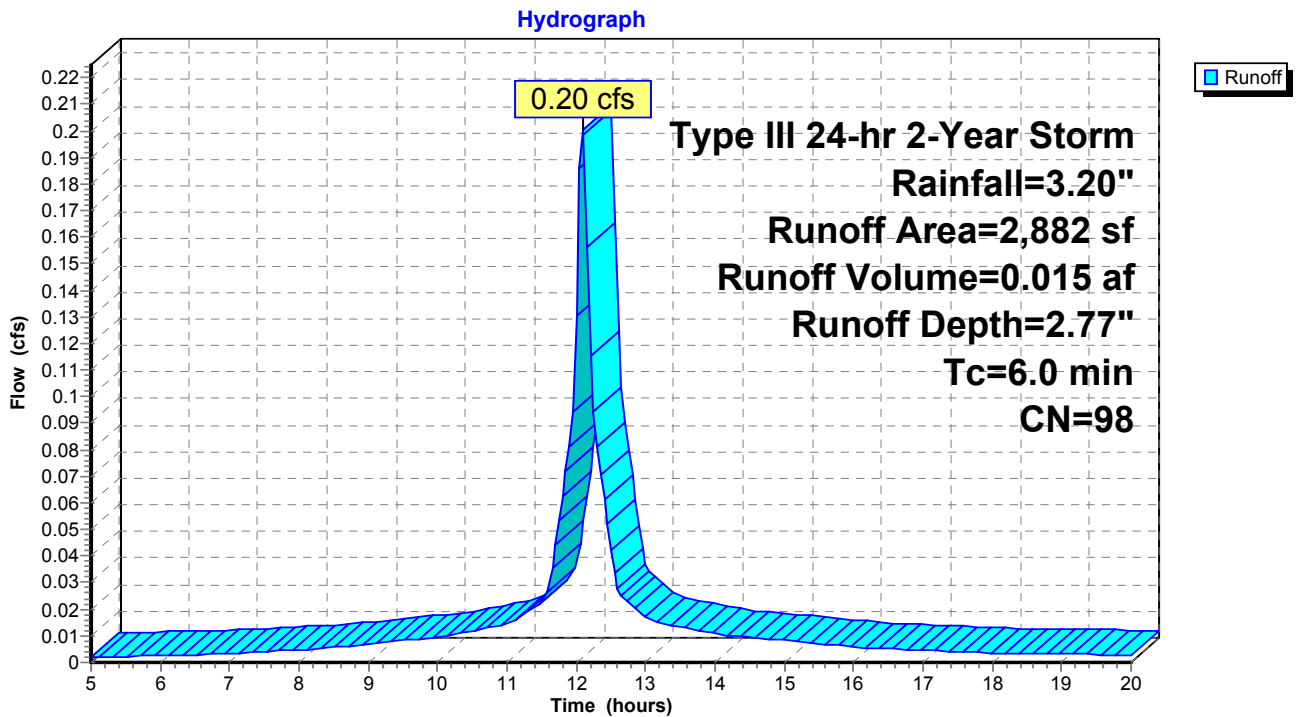
Runoff = 0.20 cfs @ 12.09 hrs, Volume= 0.015 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
2,882	98	Rear Roof Area

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

### Subcatchment 1S: Rear Roof Area



### 3 Lido Avenue

Type III 24-hr 2-Year Storm Rainfall=3.20"

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Page 4

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### Subcatchment 1S\_E: Predevelopment

Runoff = 0.21 cfs @ 12.12 hrs, Volume= 0.020 af, Depth= 0.42"

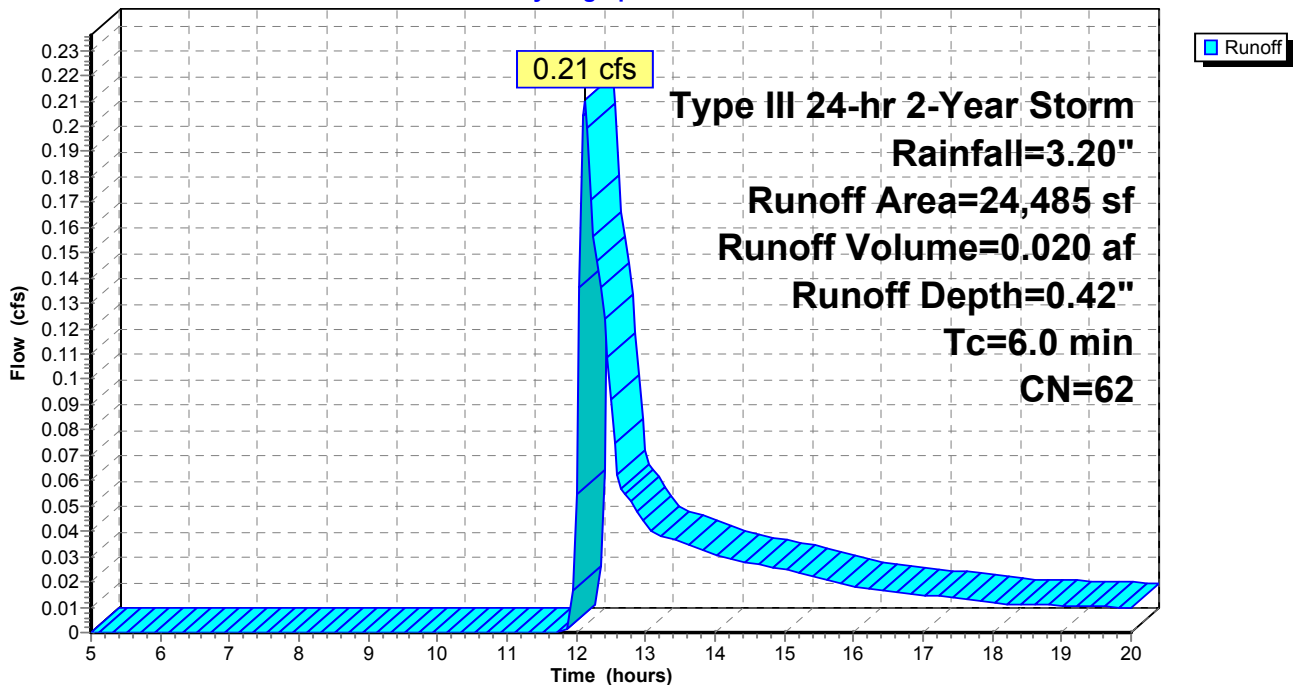
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
962	98	driveway/walkway
1,462	98	House
21,941	58	50-75% Grass cover, Fair, HSG A
120	98	shed
24,485	62	Weighted Average

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

### Subcatchment 1S\_E: Predevelopment

Hydrograph



**3 Lido Avenue**

Type III 24-hr 2-Year Storm Rainfall=3.20"

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Page 5

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**Subcatchment 2S: Right side driveway**

Runoff = 0.17 cfs @ 12.09 hrs, Volume= 0.013 af, Depth= 2.77"

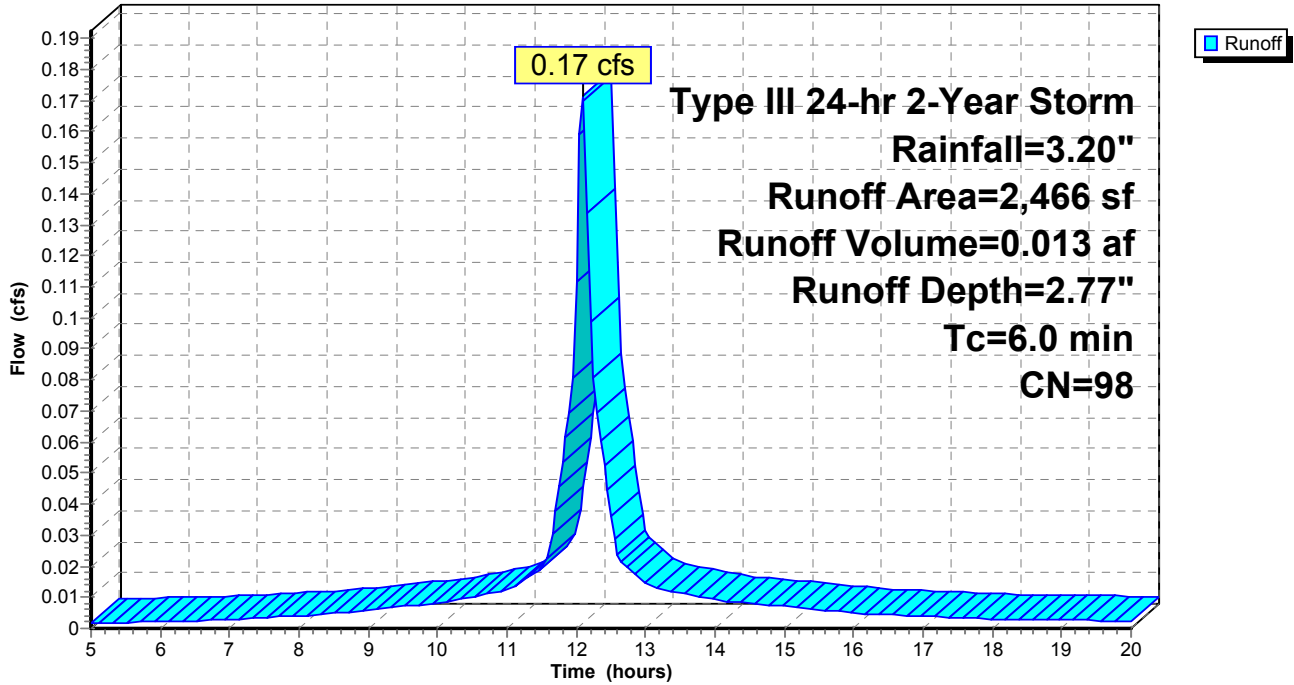
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
2,466	98	Driveway Area

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

**Subcatchment 2S: Right side driveway**

Hydrograph



**3 Lido Avenue**

Type III 24-hr 2-Year Storm Rainfall=3.20"

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Page 6

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**Subcatchment 3S: Portion of Front Roof**

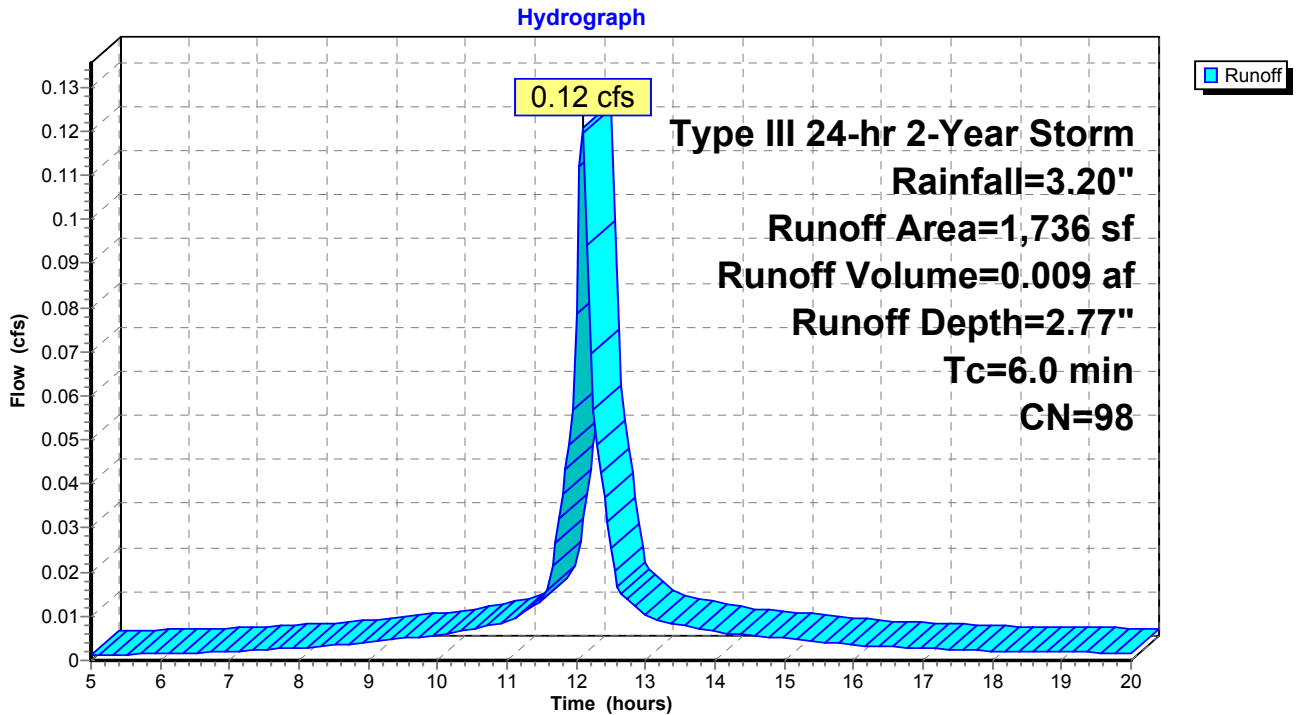
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
1,736	98	Portion of Front Roof

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

**Subcatchment 3S: Portion of Front Roof**



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Page 7  
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**Subcatchment 5S: Remaining Area**

Runoff = 0.01 cfs @ 13.67 hrs, Volume= 0.003 af, Depth= 0.08"

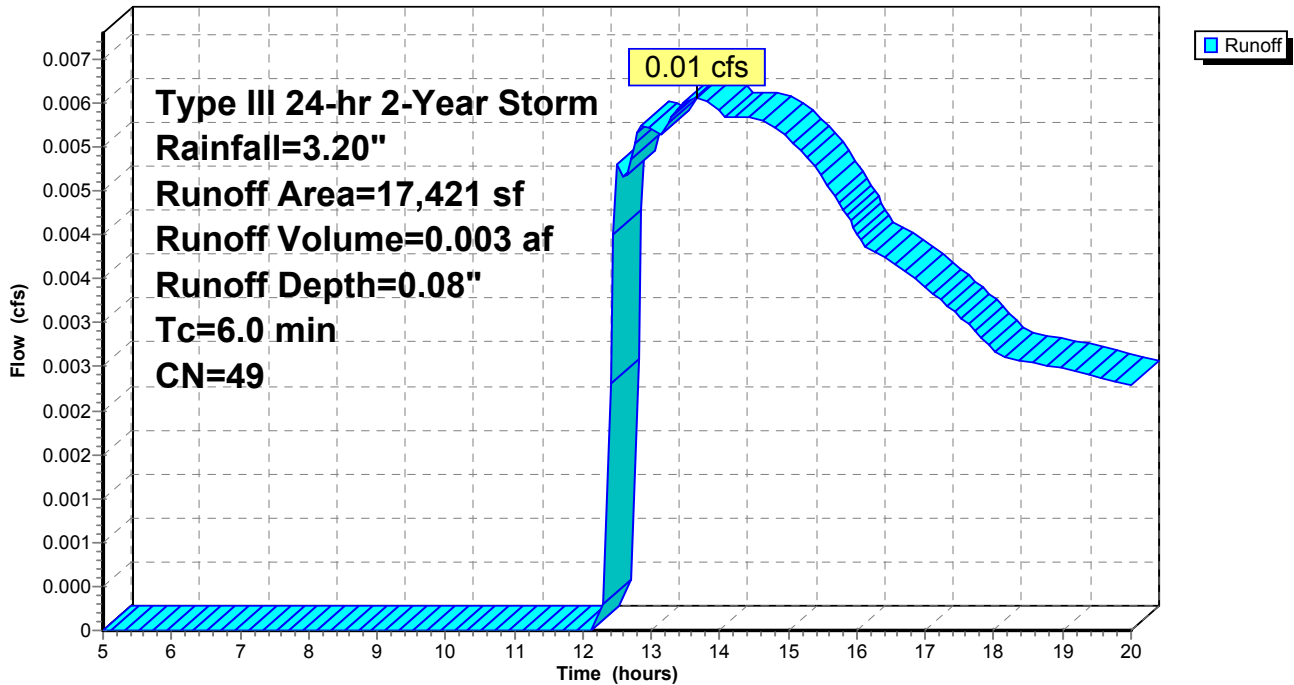
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
17,421	49	50-75% Grass cover, Fair, HSG A

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

**Subcatchment 5S: Remaining Area**

Hydrograph





### 3 Lido Avenue

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Type III 24-hr 2-Year Storm Rainfall=3.20"

Page 8  
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### Pond 1P: Crushed Stone Swale

Rawls Rate for Sand : 8.27 in/hr used

Inflow Area = 0.066 ac, Inflow Depth = 2.77" for 2-Year Storm event  
Inflow = 0.20 cfs @ 12.09 hrs, Volume= 0.015 af  
Outflow = 0.08 cfs @ 11.90 hrs, Volume= 0.015 af, Atten= 63%, Lag= 0.0 min  
Primary = 0.08 cfs @ 11.90 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Peak Elev= 187.05' @ 12.33 hrs Surf.Area= 392 sf Storage= 86 cf  
Plug-Flow detention time= 5.2 min calculated for 0.015 af (100% of inflow)  
Center-of-Mass det. time= 5.0 min ( 743.6 - 738.6 )

#	Invert	Avail.Storage	Storage Description
1	186.50'	314 cf	<b>2.00'W x 196.00'L x 2.00'H Prismatoid</b> 784 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Primary	0.00'	<b>0.011480 fpm Exfiltration over entire Surface area</b>
2	Primary	188.50'	<b>2.00' x 2.00' Horiz. Orifice/Grate</b> Limited to weir flow C= 0.600

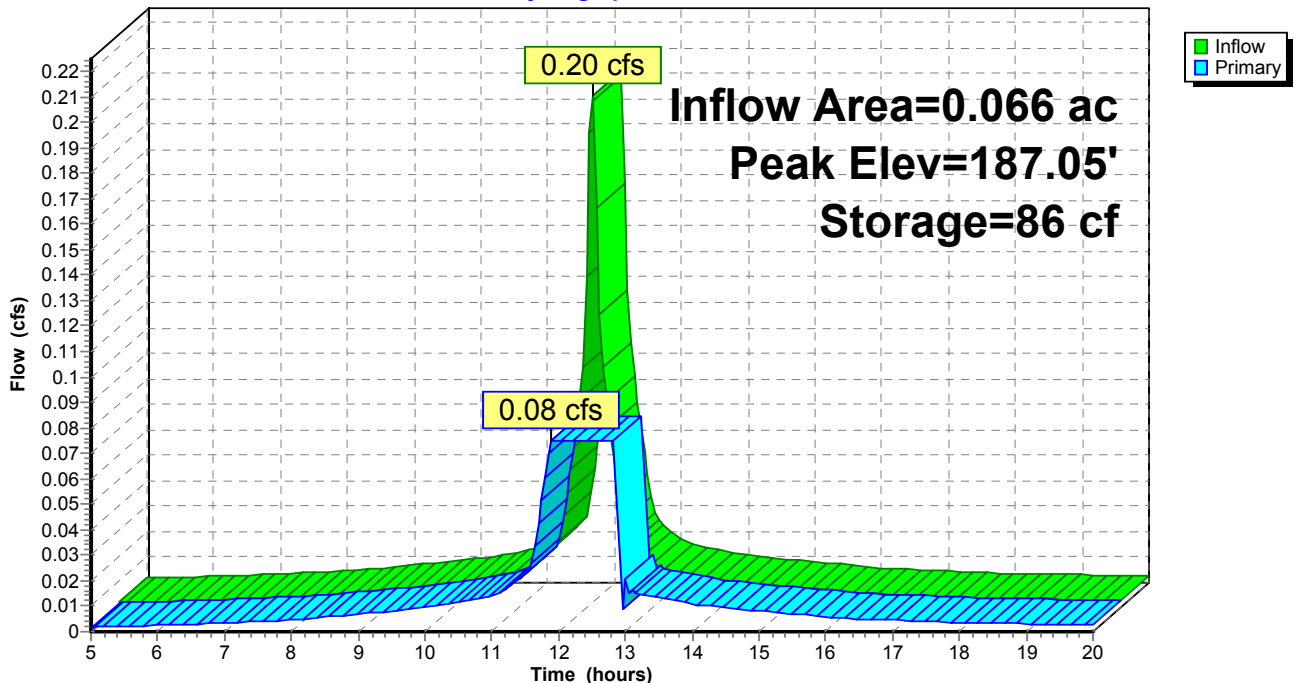
Primary OutFlow Max=0.08 cfs @ 11.90 hrs HW=186.52' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.08 cfs)

2=Orifice/Grate ( Controls 0.00 cfs)

### Pond 1P: Crushed Stone Swale

Hydrograph



### 3 Lido Avenue

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Type III 24-hr 2-Year Storm Rainfall=3.20"

Page 9  
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### Pond 2P: Stone Crushed Trench

Rawls Rate for Sand: 8.27 in/hr

Inflow Area = 0.057 ac, Inflow Depth = 2.77" for 2-Year Storm event  
 Inflow = 0.17 cfs @ 12.09 hrs, Volume= 0.013 af  
 Outflow = 0.17 cfs @ 12.10 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.6 min  
 Primary = 0.17 cfs @ 12.10 hrs, Volume= 0.013 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 188.79' @ 12.10 hrs Surf.Area= 72 sf Storage= 23 cf  
 Plug-Flow detention time= 22.8 min calculated for 0.013 af (97% of inflow)  
 Center-of-Mass det. time= 11.5 min ( 750.1 - 738.6 )

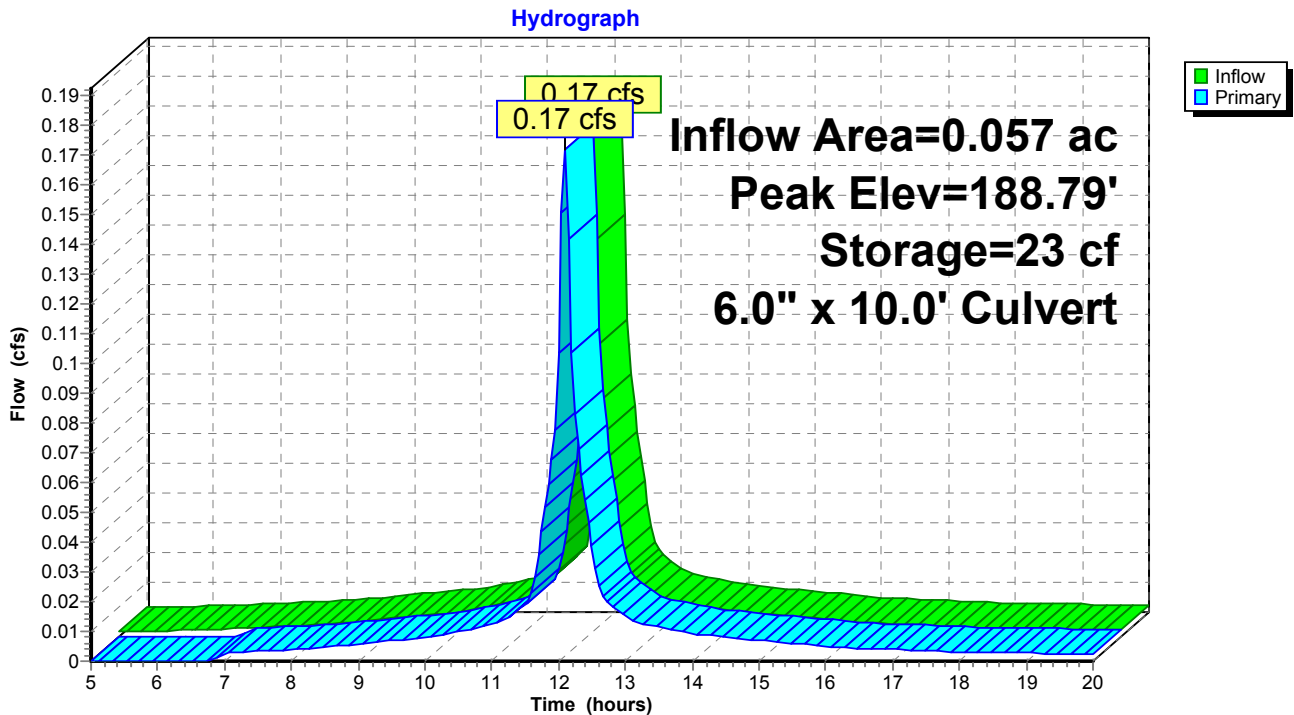
#	Invert	Avail.Storage	Storage Description
1	188.00'	58 cf	<b>4.00'W x 18.00'L x 2.00'H Prismatic</b> 144 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Primary	188.50'	<b>6.0" x 10.0' long Culvert</b> CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 188.00' S= 0.0500 '/' n= 0.011 Cc= 0.900

**Primary OutFlow** Max=0.17 cfs @ 12.10 hrs HW=188.79' (Free Discharge)  
 ↳1=Culvert (Inlet Controls 0.17 cfs @ 1.4 fps)

### Pond 2P: Stone Crushed Trench



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Type III 24-hr 2-Year Storm Rainfall=3.20"

Page 10  
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### Pond 3P: 500 Gallon DW

Rawls Rate for sand: 8.27 in/hr

Inflow Area = 0.040 ac, Inflow Depth = 2.77" for 2-Year Storm event  
 Inflow = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af  
 Outflow = 0.06 cfs @ 12.27 hrs, Volume= 0.004 af, Atten= 49%, Lag= 10.9 min  
 Primary = 0.06 cfs @ 12.27 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 194.16' @ 12.25 hrs Surf.Area= 100 sf Storage= 236 cf  
 Plug-Flow detention time= 226.4 min calculated for 0.004 af (41% of inflow)  
 Center-of-Mass det. time= 115.8 min ( 854.4 - 738.6 )

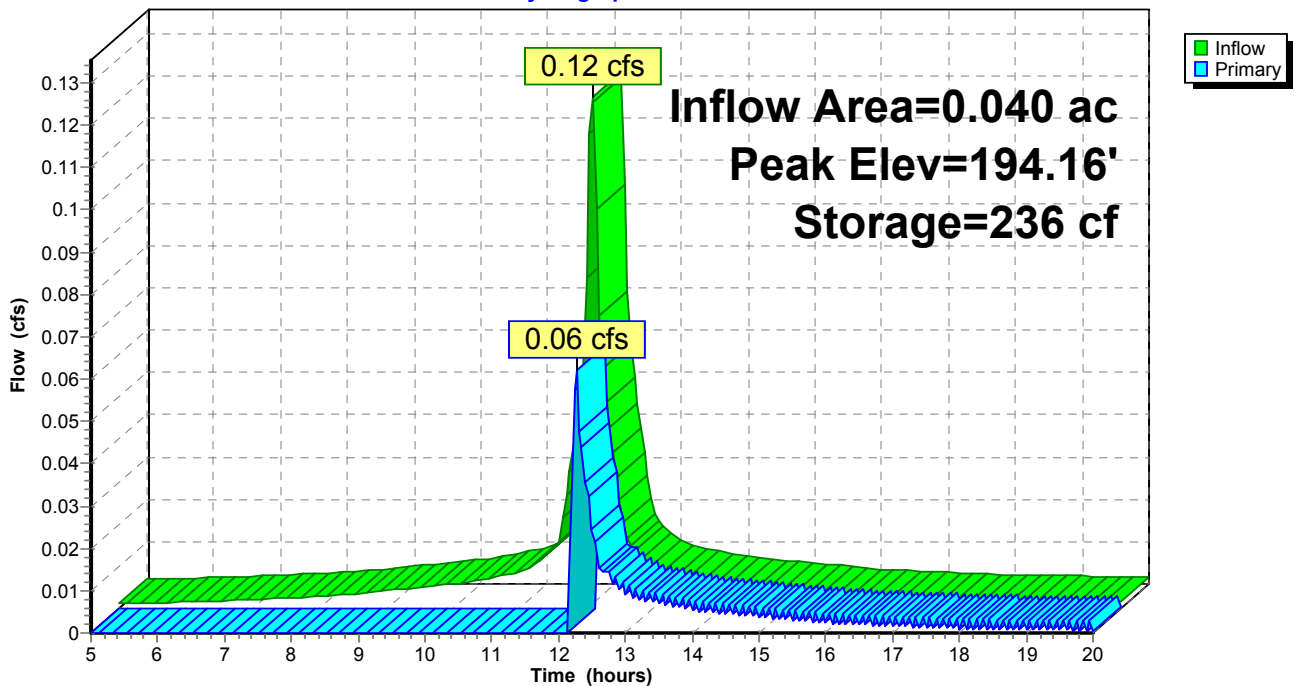
#	Invert	Avail.Storage	Storage Description
1	190.00'	110 cf	<b>10.00'W x 10.00'L x 4.00'H Prismatic</b> 400 cf Overall - 126 cf Embedded = 274 cf x 40.0% Voids
2	190.50'	126 cf	<b>6.00'W x 6.00'L x 3.50'H Prismatic</b> Inside #1
		236 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Primary	194.00'	<b>4.0" Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=0.05 cfs @ 12.27 hrs HW=194.16' (Free Discharge)  
 ←1=Orifice/Grate (Orifice Controls 0.05 cfs @ 1.3 fps)

### Pond 3P: 500 Gallon DW

Hydrograph



### 3 Lido Avenue

Type III 24-hr 2-Year Storm Rainfall=3.20"

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Page 11

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### Pond 4P: 500 Gallon DW

Inflow Area = 0.057 ac, Inflow Depth = 2.70" for 2-Year Storm event  
 Inflow = 0.17 cfs @ 12.10 hrs, Volume= 0.013 af  
 Outflow = 0.08 cfs @ 12.36 hrs, Volume= 0.013 af, Atten= 56%, Lag= 15.9 min  
 Primary = 0.08 cfs @ 12.36 hrs, Volume= 0.013 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 188.57' @ 12.36 hrs Surf.Area= 100 sf Storage= 168 cf  
 Plug-Flow detention time= 56.6 min calculated for 0.013 af (100% of inflow)  
 Center-of-Mass det. time= 56.2 min ( 806.4 - 750.1 )

#	Invert	Avail.Storage	Storage Description
1	185.67'	110 cf	<b>10.00'W x 10.00'L x 4.00'H Prismaoid</b> 400 cf Overall - 126 cf Embedded = 274 cf x 40.0% Voids
2	186.17'	126 cf	<b>6.00'W x 6.00'L x 3.50'H Prismaoid</b> Inside #1
		236 cf	Total Available Storage

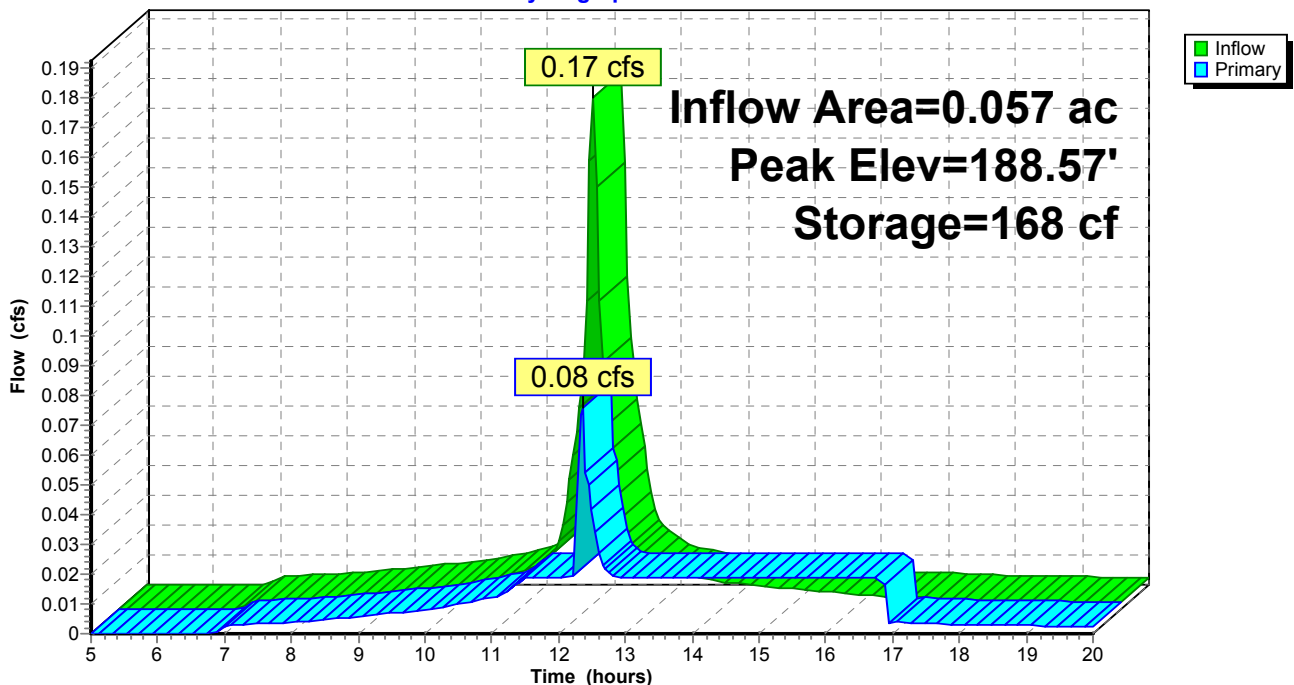
#	Routing	Invert	Outlet Devices
1	Primary	0.00'	<b>0.011480 fpm Exfiltration over entire Surface area</b>
2	Primary	188.50'	<b>4.0" Horiz. Orifice/Grate</b> Limited to weir flow C= 0.600

**Primary OutFlow** Max=0.07 cfs @ 12.36 hrs HW=188.56' (Free Discharge)

- 1=Exfiltration (Exfiltration Controls 0.02 cfs)
- 2=Orifice/Grate (Weir Controls 0.05 cfs @ 0.8 fps)

### Pond 4P: 500 Gallon DW

Hydrograph



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Type III 24-hr 2-Year Storm Rainfall=3.20"

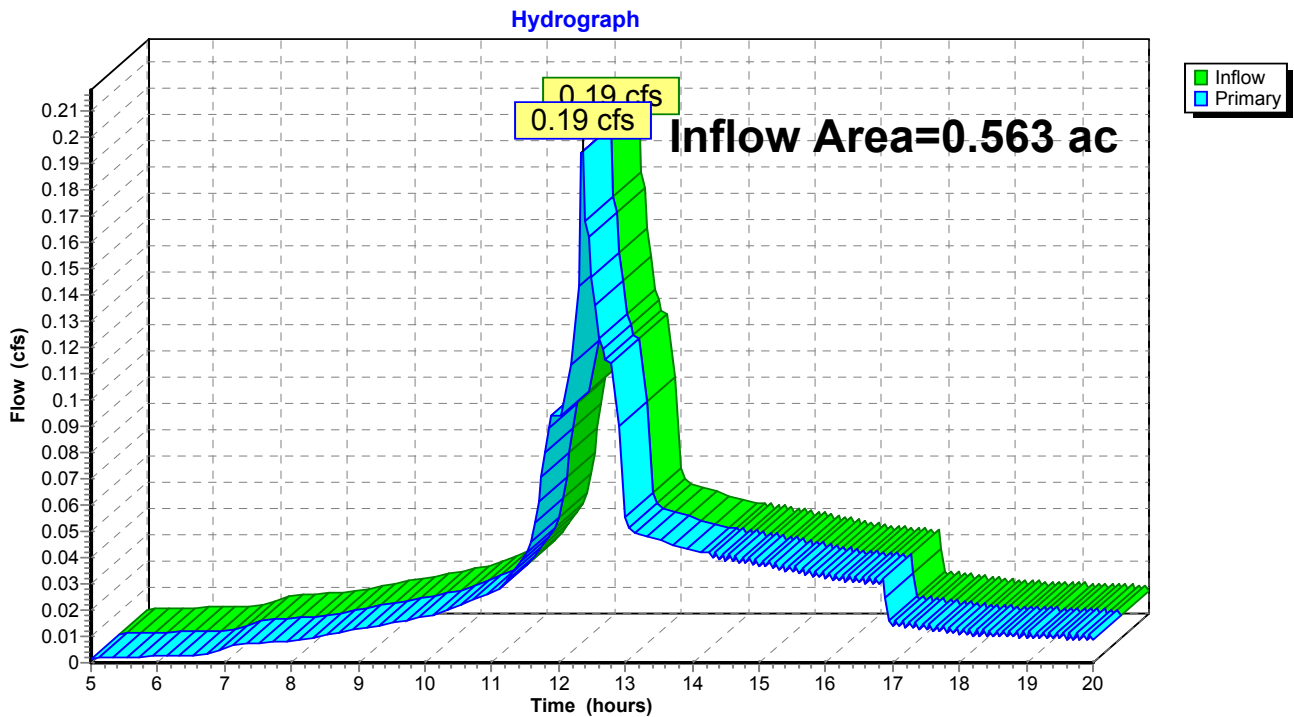
Page 12  
9/4/2020

### Link 1L: Total Offsite (Post)

Inflow Area = 0.563 ac, Inflow Depth = 0.74" for 2-Year Storm event  
Inflow = 0.19 cfs @ 12.36 hrs, Volume= 0.035 af  
Primary = 0.19 cfs @ 12.36 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

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

### Link 1L: Total Offsite (Post)



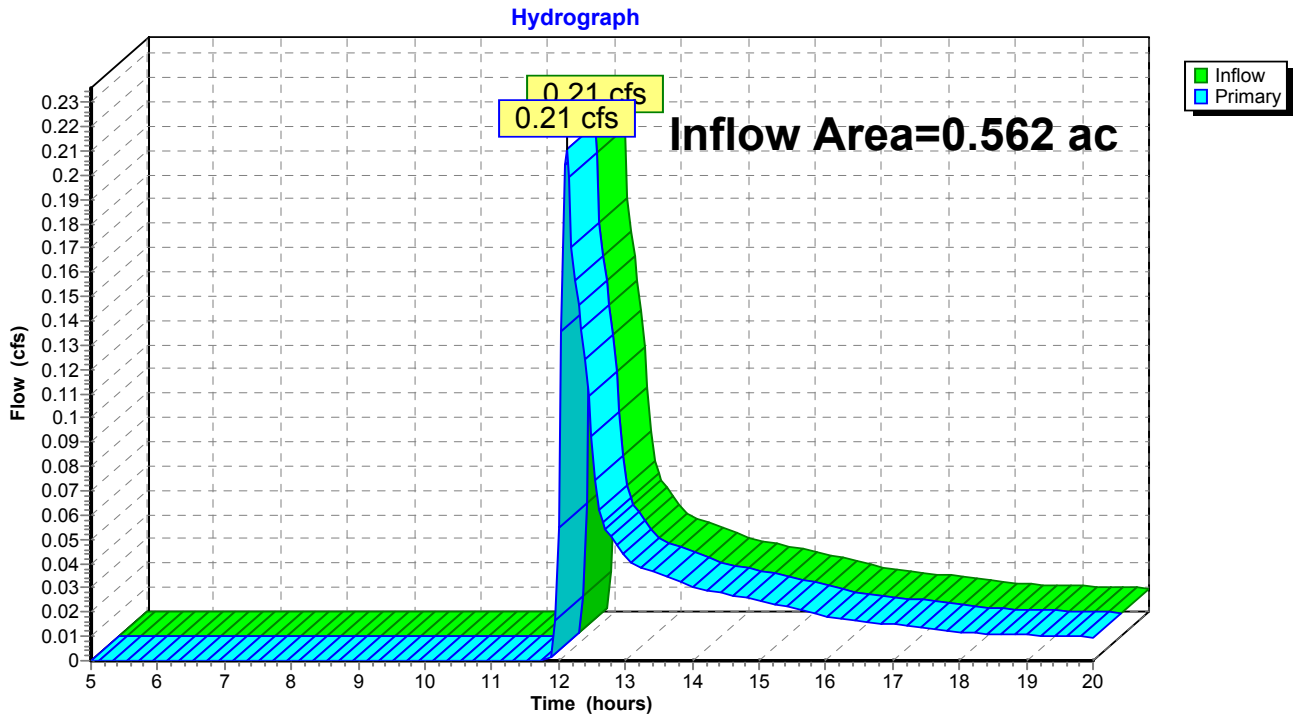
**3 Lido Avenue**

**Link 1L\_e: Total Offsite (Pre)**

Inflow Area = 0.562 ac, Inflow Depth = 0.42" for 2-Year Storm event  
Inflow = 0.21 cfs @ 12.12 hrs, Volume= 0.020 af  
Primary = 0.21 cfs @ 12.12 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

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

**Link 1L\_e: Total Offsite (Pre)**



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Page 14

9/4/2020

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

#### Subcatchment 1S: Rear Roof Area

Runoff Area=2,882 sf Runoff Depth=4.24"  
Tc=6.0 min CN=98 Runoff=0.30 cfs 0.023 af

#### Subcatchment 1S\_E: Predevelopment

Runoff Area=24,485 sf Runoff Depth=1.19"  
Tc=6.0 min CN=62 Runoff=0.78 cfs 0.056 af

#### Subcatchment 2S: Right side driveway

Runoff Area=2,466 sf Runoff Depth=4.24"  
Tc=6.0 min CN=98 Runoff=0.26 cfs 0.020 af

#### Subcatchment 3S: Portion of Front Roof

Runoff Area=1,736 sf Runoff Depth=4.24"  
Tc=6.0 min CN=98 Runoff=0.18 cfs 0.014 af

#### Subcatchment 5S: Remaining Area

Runoff Area=17,421 sf Runoff Depth=0.49"  
Tc=6.0 min CN=49 Runoff=0.13 cfs 0.016 af

#### Pond 1P: Crushed Stone Swale

Peak Elev=187.84' Storage=211 cf Inflow=0.30 cfs 0.023 af  
Outflow=0.08 cfs 0.023 af

#### Pond 2P: Stone Crushed Trench

Peak Elev=188.87' Storage=25 cf Inflow=0.26 cfs 0.020 af  
6.0" x 10.0' Culvert Outflow=0.26 cfs 0.020 af

#### Pond 3P: 500 Gallon DW

Peak Elev=194.36' Storage=236 cf Inflow=0.18 cfs 0.014 af  
Outflow=0.18 cfs 0.009 af

#### Pond 4P: 500 Gallon DW

Peak Elev=188.78' Storage=181 cf Inflow=0.26 cfs 0.020 af  
Outflow=0.25 cfs 0.020 af

#### Link 1L: Total Offsite (Post)

Inflow=0.60 cfs 0.068 af  
Primary=0.60 cfs 0.068 af

#### Link 1L\_e: Total Offsite (Pre)

Inflow=0.78 cfs 0.056 af  
Primary=0.78 cfs 0.056 af

**Total Runoff Area = 1.125 ac Runoff Volume = 0.129 af Average Runoff Depth = 1.38"**

**3 Lido Avenue**

**Subcatchment 1S: Rear Roof Area**

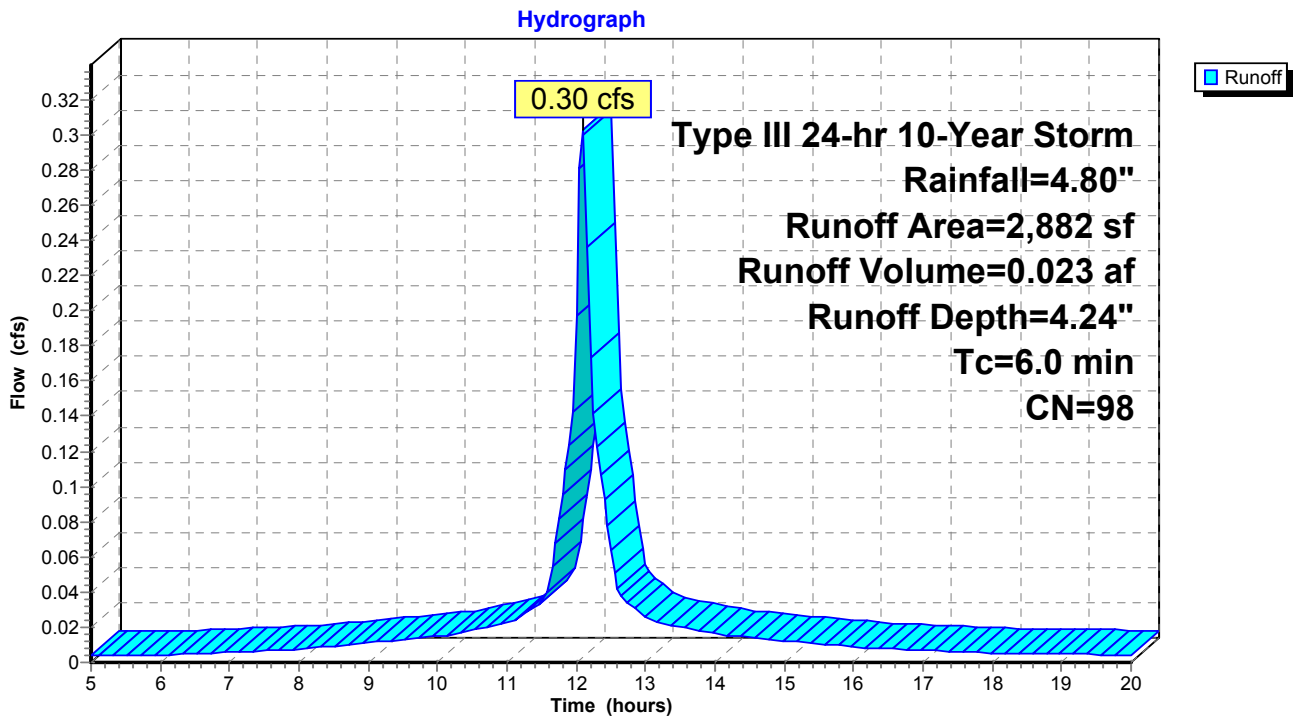
Runoff = 0.30 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 4.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Storm Rainfall=4.80"

Area (sf)	CN	Description
2,882	98	Rear Roof Area

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

**Subcatchment 1S: Rear Roof Area**





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Type III 24-hr 10-Year Storm Rainfall=4.80"

Page 16  
 9/4/2020

### Subcatchment 1S\_E: Predevelopment

Runoff = 0.78 cfs @ 12.10 hrs, Volume= 0.056 af, Depth= 1.19"

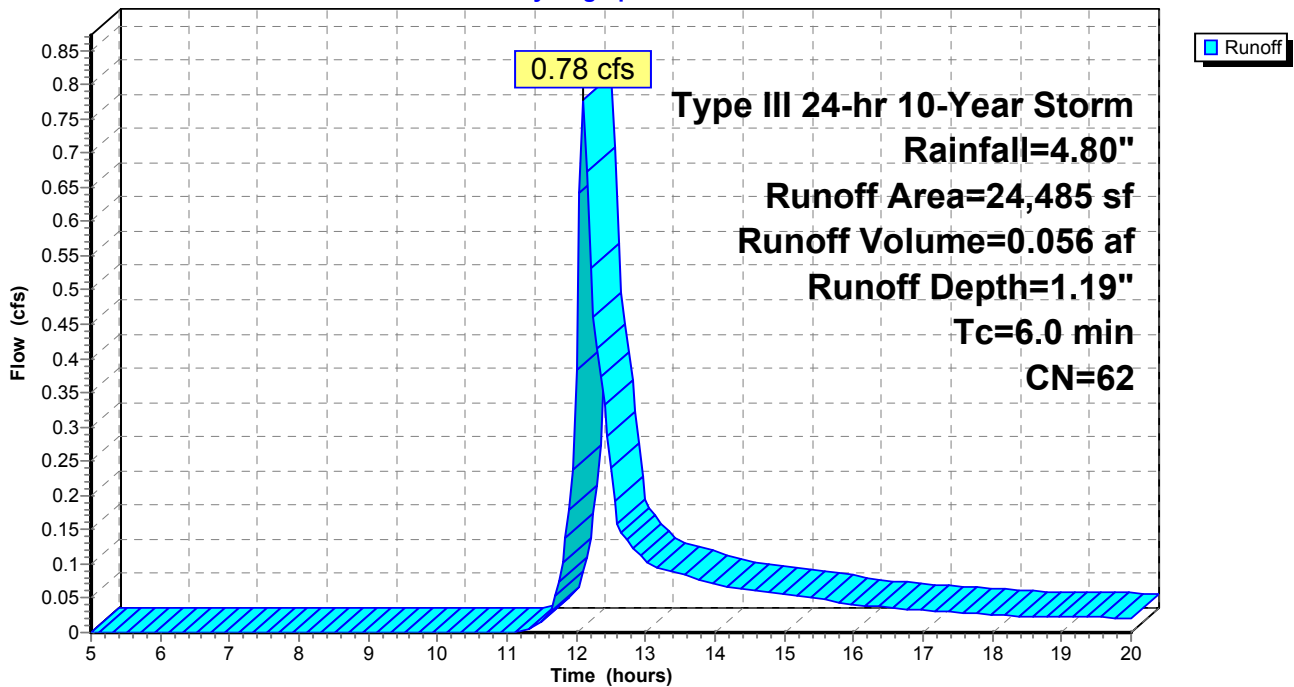
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Storm Rainfall=4.80"

Area (sf)	CN	Description
962	98	driveway/walkway
1,462	98	House
21,941	58	50-75% Grass cover, Fair, HSG A
120	98	shed
24,485	62	Weighted Average

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

### Subcatchment 1S\_E: Predevelopment

Hydrograph



**3 Lido Avenue**

**Subcatchment 2S: Right side driveway**

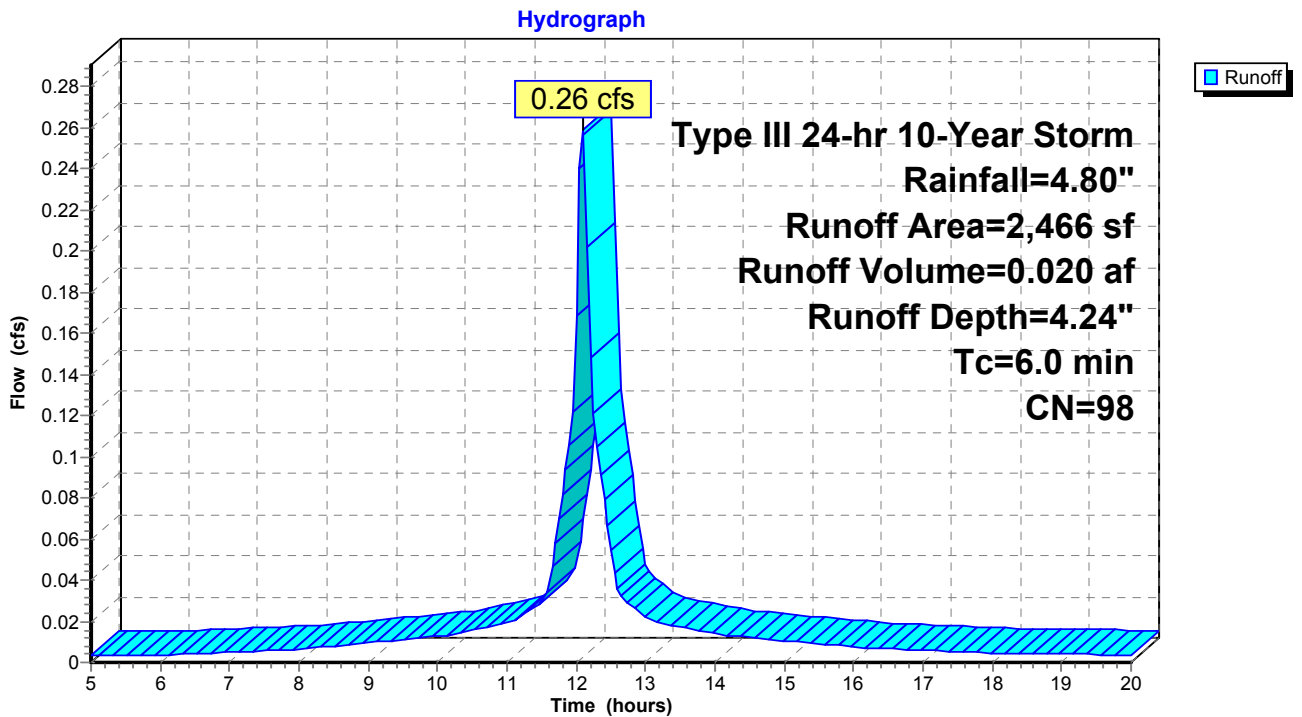
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 0.020 af, Depth= 4.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Storm Rainfall=4.80"

Area (sf)	CN	Description
2,466	98	Driveway Area

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

**Subcatchment 2S: Right side driveway**



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Type III 24-hr 10-Year Storm Rainfall=4.80"

Page 18  
9/4/2020

### Subcatchment 3S: Portion of Front Roof

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 0.014 af, Depth= 4.24"

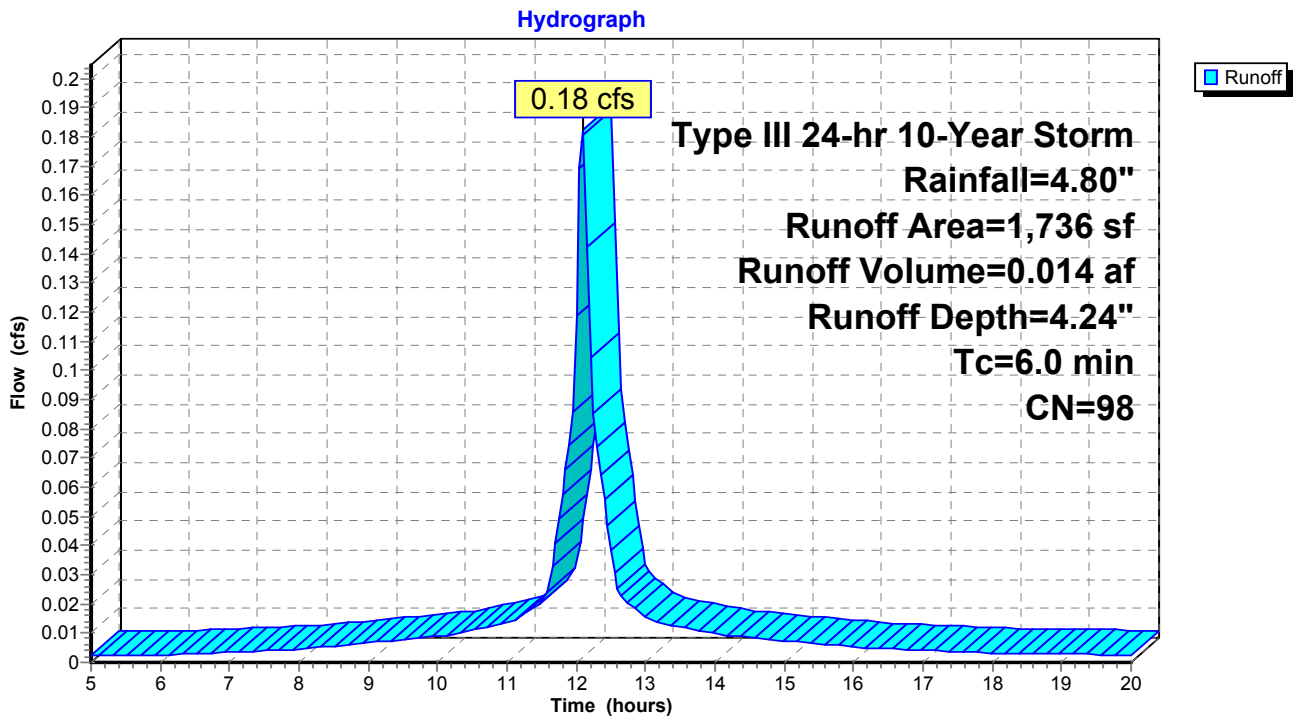
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Storm Rainfall=4.80"

Area (sf)	CN	Description
1,736	98	Portion of Front Roof

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

### Subcatchment 3S: Portion of Front Roof



### 3 Lido Avenue

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Type III 24-hr 10-Year Storm Rainfall=4.80"

Page 19  
9/4/2020

### Subcatchment 5S: Remaining Area

Runoff = 0.13 cfs @ 12.15 hrs, Volume= 0.016 af, Depth= 0.49"

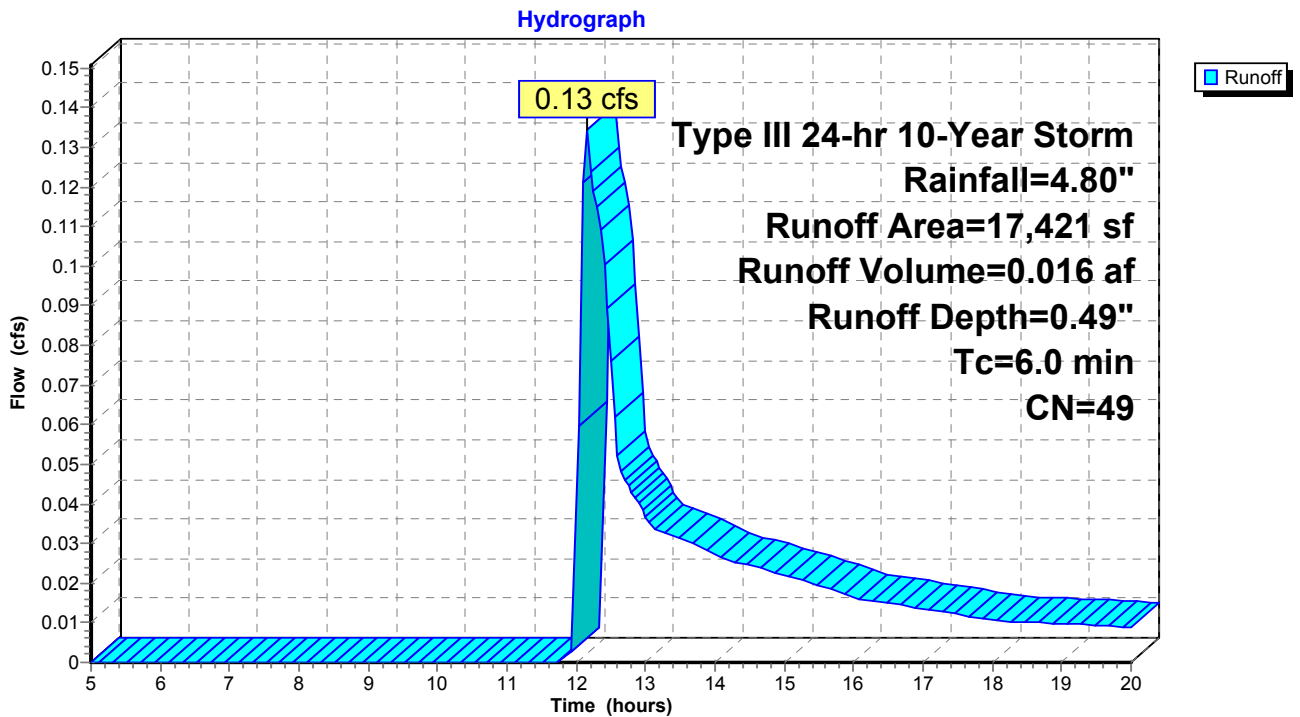
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Storm Rainfall=4.80"

Area (sf)	CN	Description
17,421	49	50-75% Grass cover, Fair, HSG A

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

### Subcatchment 5S: Remaining Area



### 3 Lido Avenue

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Type III 24-hr 10-Year Storm Rainfall=4.80"

Page 20  
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### Pond 1P: Crushed Stone Swale

Rawls Rate for Sand : 8.27 in/hr used

Inflow Area = 0.066 ac, Inflow Depth = 4.24" for 10-Year Storm event  
 Inflow = 0.30 cfs @ 12.09 hrs, Volume= 0.023 af  
 Outflow = 0.08 cfs @ 11.75 hrs, Volume= 0.023 af, Atten= 75%, Lag= 0.0 min  
 Primary = 0.08 cfs @ 11.75 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 187.84' @ 12.46 hrs Surf.Area= 392 sf Storage= 211 cf  
 Plug-Flow detention time= 13.9 min calculated for 0.023 af (100% of inflow)  
 Center-of-Mass det. time= 13.7 min ( 749.1 - 735.4 )

#	Invert	Avail.Storage	Storage Description
1	186.50'	314 cf	<b>2.00'W x 196.00'L x 2.00'H Prismatoid</b> 784 cf Overall x 40.0% Voids

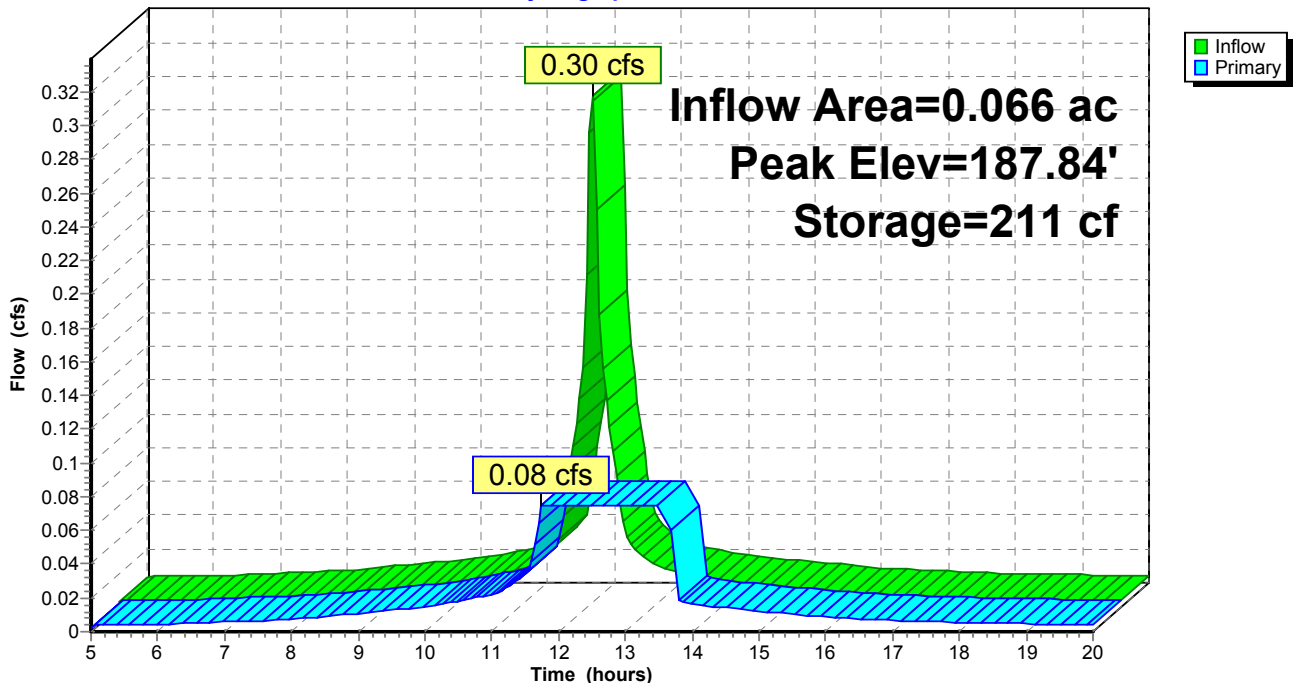
#	Routing	Invert	Outlet Devices
1	Primary	0.00'	<b>0.011480 fpm Exfiltration over entire Surface area</b>
2	Primary	188.50'	<b>2.00' x 2.00' Horiz. Orifice/Grate</b> Limited to weir flow C= 0.600

**Primary OutFlow** Max=0.08 cfs @ 11.75 hrs HW=186.52' (Free Discharge)

- 1=Exfiltration (Exfiltration Controls 0.08 cfs)
- 2=Orifice/Grate ( Controls 0.00 cfs)

### Pond 1P: Crushed Stone Swale

Hydrograph



**3 Lido Avenue**

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Type III 24-hr 10-Year Storm Rainfall=4.80"

Page 21  
 9/4/2020

**Pond 2P: Stone Crushed Trench**

Rawls Rate for Sand: 8.27 in/hr

Inflow Area = 0.057 ac, Inflow Depth = 4.24" for 10-Year Storm event  
 Inflow = 0.26 cfs @ 12.09 hrs, Volume= 0.020 af  
 Outflow = 0.26 cfs @ 12.09 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.5 min  
 Primary = 0.26 cfs @ 12.09 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 188.87' @ 12.09 hrs Surf.Area= 72 sf Storage= 25 cf  
 Plug-Flow detention time= 16.2 min calculated for 0.020 af (98% of inflow)  
 Center-of-Mass det. time= 8.2 min ( 743.5 - 735.4 )

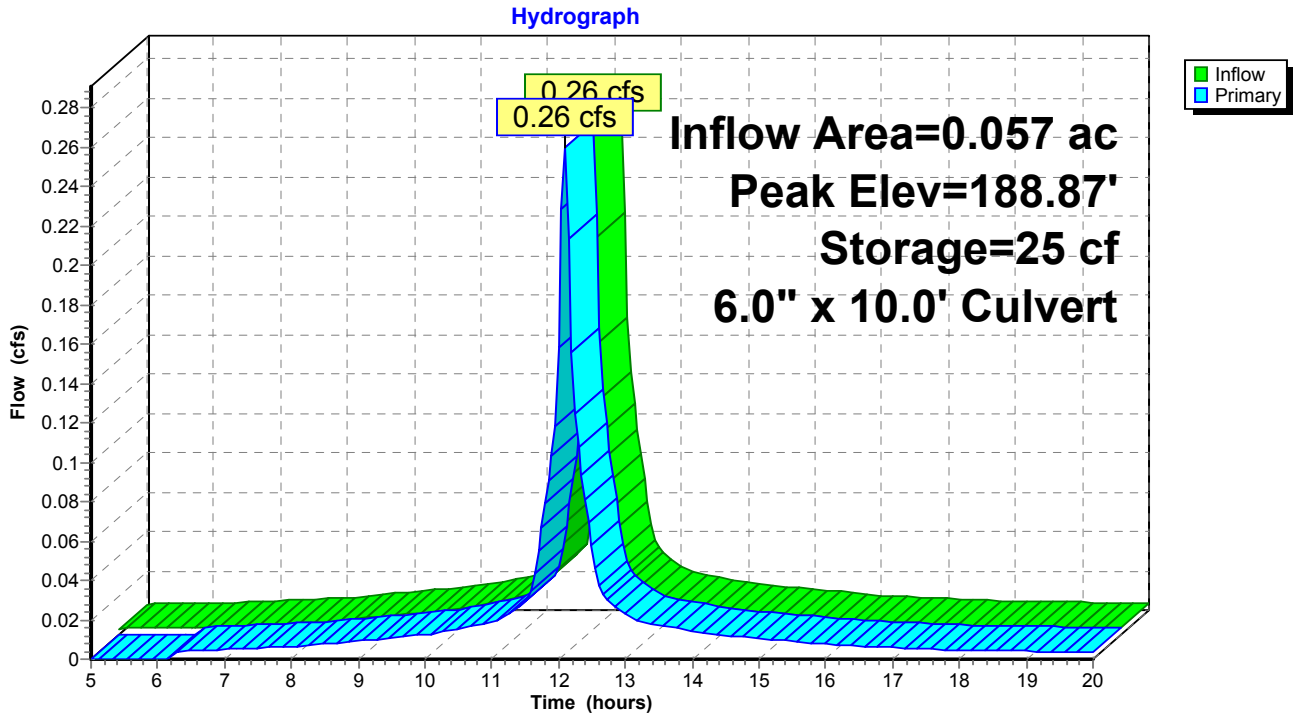
#	Invert	Avail.Storage	Storage Description
1	188.00'	58 cf	<b>4.00'W x 18.00'L x 2.00'H Prismatic</b> 144 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Primary	188.50'	<b>6.0" x 10.0' long Culvert</b> CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 188.00' S= 0.0500 '/' n= 0.011 Cc= 0.900

**Primary OutFlow** Max=0.26 cfs @ 12.09 hrs HW=188.87' (Free Discharge)  
 ←1=Culvert (Inlet Controls 0.26 cfs @ 1.6 fps)

**Pond 2P: Stone Crushed Trench**



**3 Lido Avenue**

Type III 24-hr 10-Year Storm Rainfall=4.80"

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Page 22

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**Pond 3P: 500 Gallon DW**

Rawls Rate for sand: 8.27 in/hr

Inflow Area = 0.040 ac, Inflow Depth = 4.24" for 10-Year Storm event  
 Inflow = 0.18 cfs @ 12.09 hrs, Volume= 0.014 af  
 Outflow = 0.18 cfs @ 12.07 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min  
 Primary = 0.18 cfs @ 12.07 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 194.36' @ 12.07 hrs Surf.Area= 100 sf Storage= 236 cf  
 Plug-Flow detention time= 153.3 min calculated for 0.009 af (61% of inflow)  
 Center-of-Mass det. time= 75.5 min ( 810.9 - 735.4 )

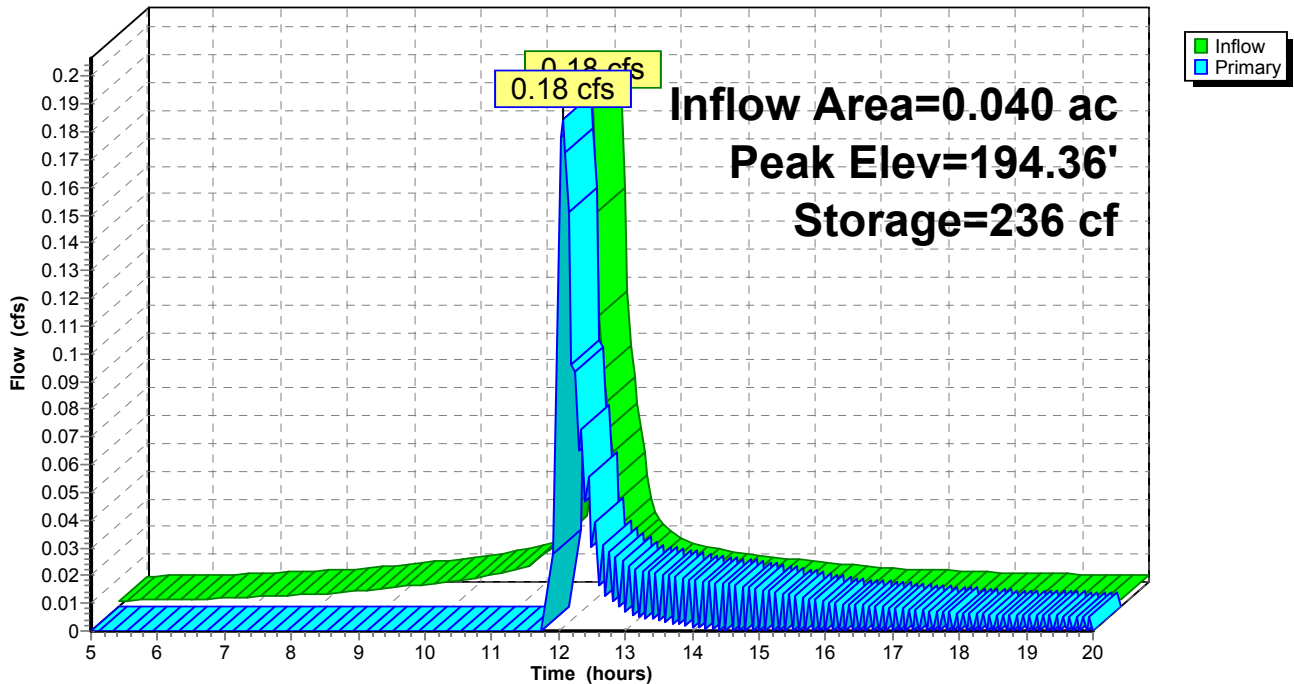
#	Invert	Avail.Storage	Storage Description
1	190.00'	110 cf	<b>10.00'W x 10.00'L x 4.00'H Prismatic</b> 400 cf Overall - 126 cf Embedded = 274 cf x 40.0% Voids
2	190.50'	126 cf	<b>6.00'W x 6.00'L x 3.50'H Prismatic</b> Inside #1
		236 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Primary	194.00'	<b>4.0" Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=0.18 cfs @ 12.07 hrs HW=194.34' (Free Discharge)  
 ←1=Orifice/Grate (Orifice Controls 0.18 cfs @ 2.0 fps)

**Pond 3P: 500 Gallon DW**

Hydrograph



### 3 Lido Avenue

Type III 24-hr 10-Year Storm Rainfall=4.80"

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Page 23

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### Pond 4P: 500 Gallon DW

Inflow Area = 0.057 ac, Inflow Depth = 4.16" for 10-Year Storm event  
 Inflow = 0.26 cfs @ 12.09 hrs, Volume= 0.020 af  
 Outflow = 0.25 cfs @ 12.16 hrs, Volume= 0.020 af, Atten= 5%, Lag= 4.1 min  
 Primary = 0.25 cfs @ 12.16 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 188.78' @ 12.16 hrs Surf.Area= 100 sf Storage= 181 cf  
 Plug-Flow detention time= 49.9 min calculated for 0.020 af (100% of inflow)  
 Center-of-Mass det. time= 49.7 min ( 793.3 - 743.5 )

#	Invert	Avail.Storage	Storage Description
1	185.67'	110 cf	<b>10.00'W x 10.00'L x 4.00'H Prismatic</b> 400 cf Overall - 126 cf Embedded = 274 cf x 40.0% Voids
2	186.17'	126 cf	<b>6.00'W x 6.00'L x 3.50'H Prismatic</b> Inside #1
		236 cf	Total Available Storage

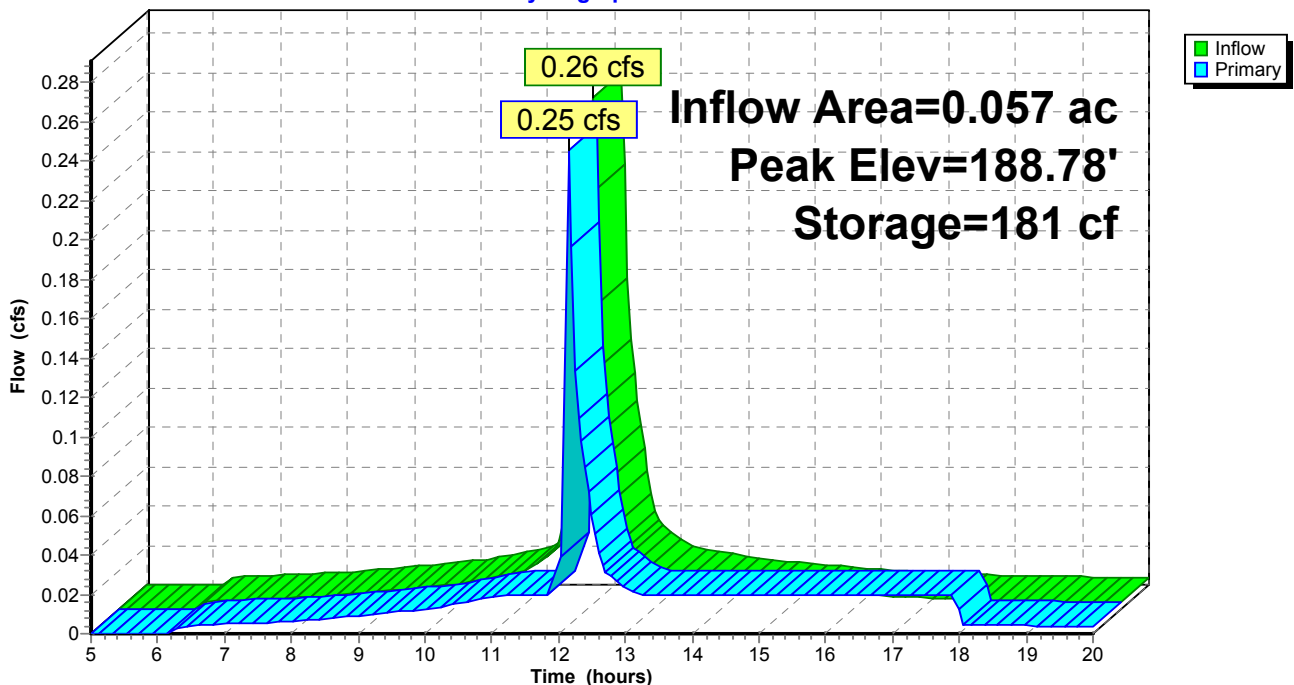
#	Routing	Invert	Outlet Devices
1	Primary	0.00'	<b>0.011480 fpm Exfiltration over entire Surface area</b>
2	Primary	188.50'	<b>4.0" Horiz. Orifice/Grate</b> Limited to weir flow C= 0.600

**Primary OutFlow** Max=0.23 cfs @ 12.16 hrs HW=188.75' (Free Discharge)

- 1=Exfiltration (Exfiltration Controls 0.02 cfs)
- 2=Orifice/Grate (Orifice Controls 0.21 cfs @ 2.4 fps)

### Pond 4P: 500 Gallon DW

Hydrograph





### 3 Lido Avenue

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Type III 24-hr 10-Year Storm Rainfall=4.80"

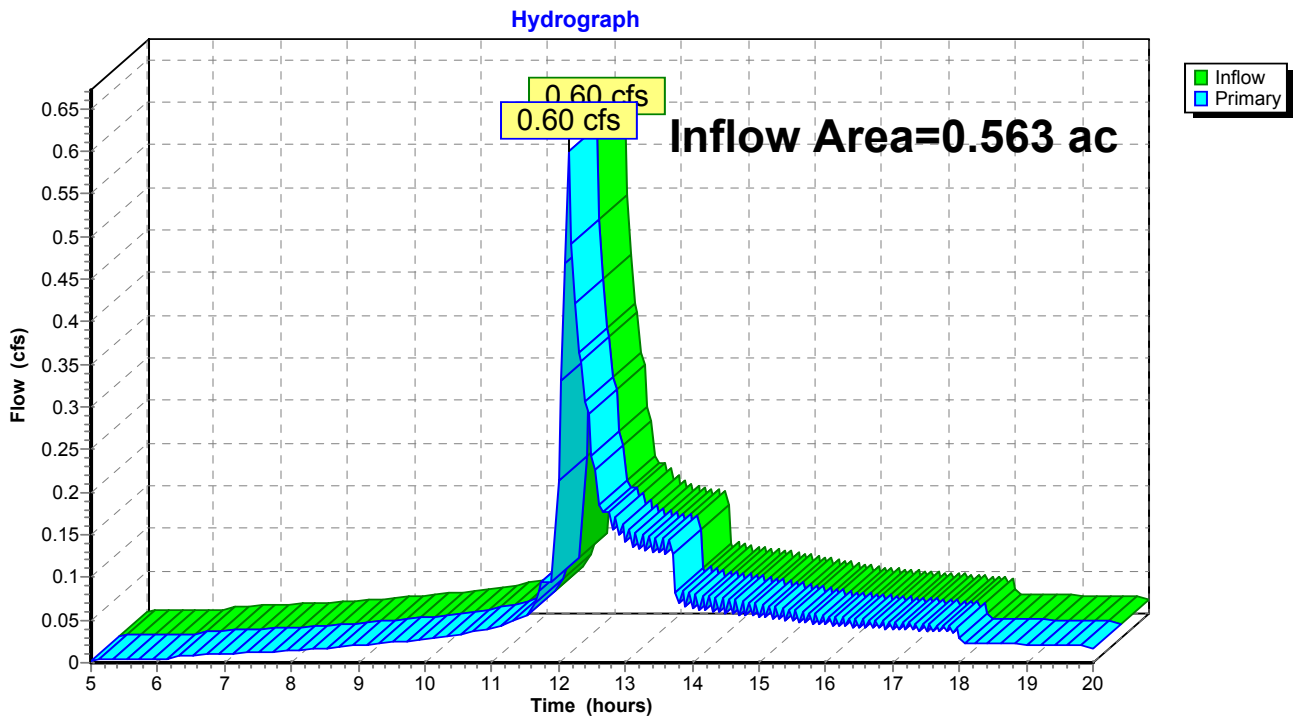
Page 24  
9/4/2020

### Link 1L: Total Offsite (Post)

Inflow Area = 0.563 ac, Inflow Depth = 1.45" for 10-Year Storm event  
Inflow = 0.60 cfs @ 12.15 hrs, Volume= 0.068 af  
Primary = 0.60 cfs @ 12.15 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min

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

### Link 1L: Total Offsite (Post)



### 3 Lido Avenue

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Type III 24-hr 10-Year Storm Rainfall=4.80"

Page 25

9/4/2020

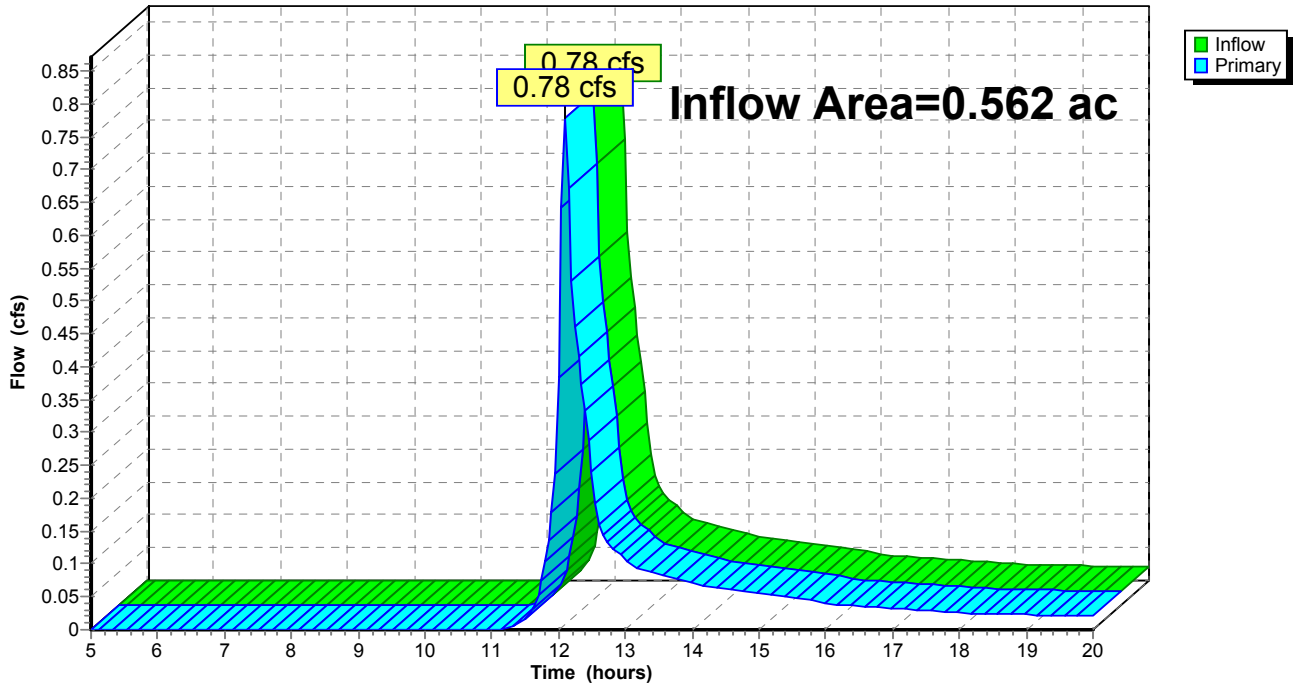
### Link 1L\_e: Total Offsite (Pre)

Inflow Area = 0.562 ac, Inflow Depth = 1.19" for 10-Year Storm event  
Inflow = 0.78 cfs @ 12.10 hrs, Volume= 0.056 af  
Primary = 0.78 cfs @ 12.10 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

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

### Link 1L\_e: Total Offsite (Pre)

Hydrograph



### 3 Lido Avenue

Type III 24-hr 100-Year Storm Rainfall=6.40"

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Page 26

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9/4/2020

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

#### Subcatchment 1S: Rear Roof Area

Runoff Area=2,882 sf Runoff Depth=5.69"  
Tc=6.0 min CN=98 Runoff=0.41 cfs 0.031 af

#### Subcatchment 1S\_E: Predevelopment

Runoff Area=24,485 sf Runoff Depth=2.17"  
Tc=6.0 min CN=62 Runoff=1.49 cfs 0.102 af

#### Subcatchment 2S: Right side driveway

Runoff Area=2,466 sf Runoff Depth=5.69"  
Tc=6.0 min CN=98 Runoff=0.35 cfs 0.027 af

#### Subcatchment 3S: Portion of Front Roof

Runoff Area=1,736 sf Runoff Depth=5.69"  
Tc=6.0 min CN=98 Runoff=0.24 cfs 0.019 af

#### Subcatchment 5S: Remaining Area

Runoff Area=17,421 sf Runoff Depth=1.13"  
Tc=6.0 min CN=49 Runoff=0.47 cfs 0.038 af

#### Pond 1P: Crushed Stone Swale

Peak Elev=188.52' Storage=314 cf Inflow=0.41 cfs 0.031 af  
Outflow=0.18 cfs 0.031 af

#### Pond 2P: Stone Crushed Trench

Peak Elev=188.96' Storage=28 cf Inflow=0.35 cfs 0.027 af  
6.0" x 10.0' Culvert Outflow=0.35 cfs 0.026 af

#### Pond 3P: 500 Gallon DW

Peak Elev=194.55' Storage=236 cf Inflow=0.24 cfs 0.019 af  
Outflow=0.26 cfs 0.014 af

#### Pond 4P: 500 Gallon DW

Peak Elev=188.99' Storage=194 cf Inflow=0.35 cfs 0.026 af  
Outflow=0.31 cfs 0.026 af

#### Link 1L: Total Offsite (Post)

Inflow=1.06 cfs 0.109 af  
Primary=1.06 cfs 0.109 af

#### Link 1L\_e: Total Offsite (Pre)

Inflow=1.49 cfs 0.102 af  
Primary=1.49 cfs 0.102 af

**Total Runoff Area = 1.125 ac Runoff Volume = 0.217 af Average Runoff Depth = 2.31"**

**3 Lido Avenue**

Type III 24-hr 100-Year Storm Rainfall=6.40"

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Page 27

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9/4/2020

**Subcatchment 1S: Rear Roof Area**

Runoff = 0.41 cfs @ 12.09 hrs, Volume= 0.031 af, Depth= 5.69"

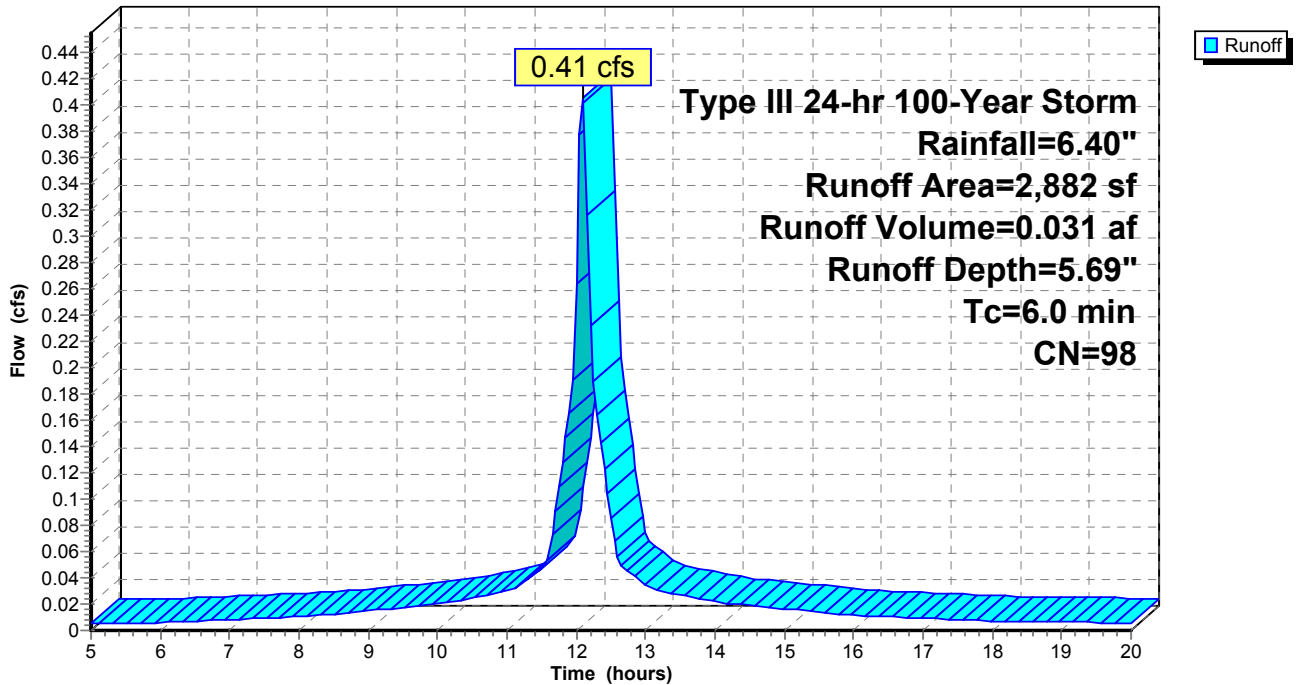
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-Year Storm Rainfall=6.40"

Area (sf)	CN	Description
2,882	98	Rear Roof Area

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

**Subcatchment 1S: Rear Roof Area**

Hydrograph



**3 Lido Avenue**

Type III 24-hr 100-Year Storm Rainfall=6.40"

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Page 28

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**Subcatchment 1S\_E: Predevelopment**

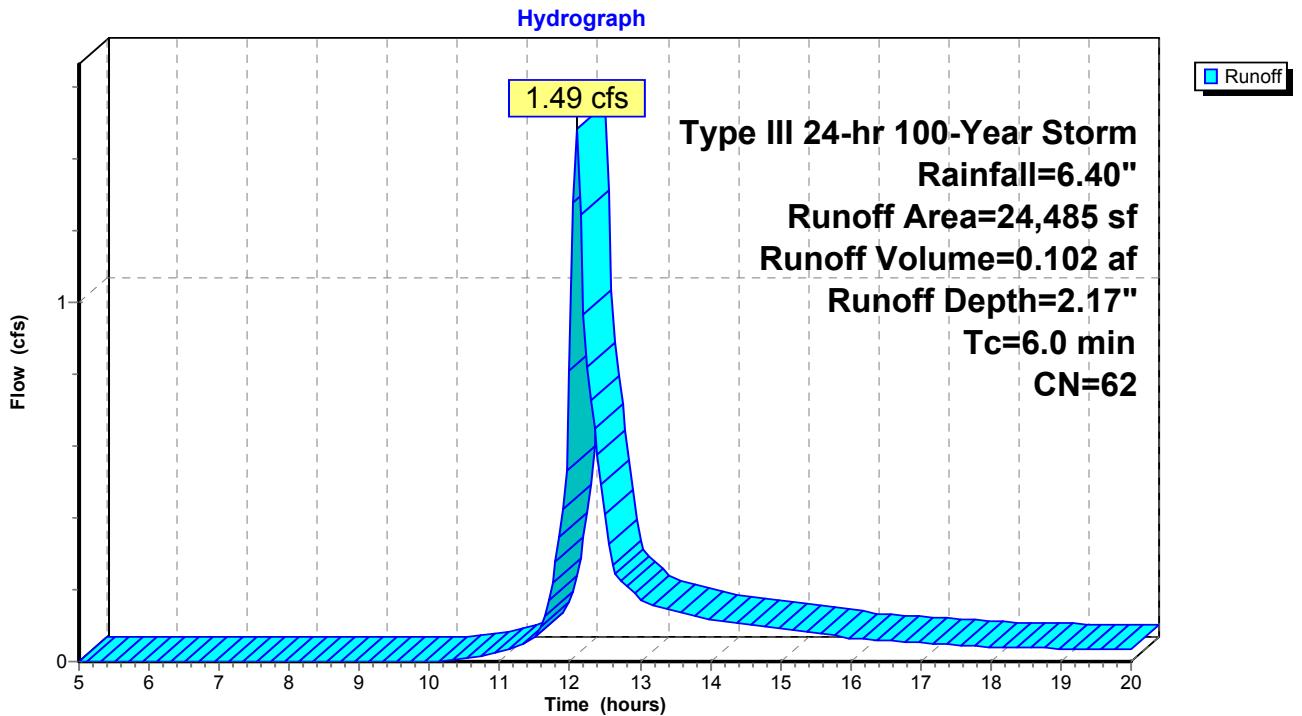
Runoff = 1.49 cfs @ 12.10 hrs, Volume= 0.102 af, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100-Year Storm Rainfall=6.40"

Area (sf)	CN	Description
962	98	driveway/walkway
1,462	98	House
21,941	58	50-75% Grass cover, Fair, HSG A
120	98	shed
24,485	62	Weighted Average

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

**Subcatchment 1S\_E: Predevelopment**



**3 Lido Avenue**

Type III 24-hr 100-Year Storm Rainfall=6.40"

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Page 29

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**Subcatchment 2S: Right side driveway**

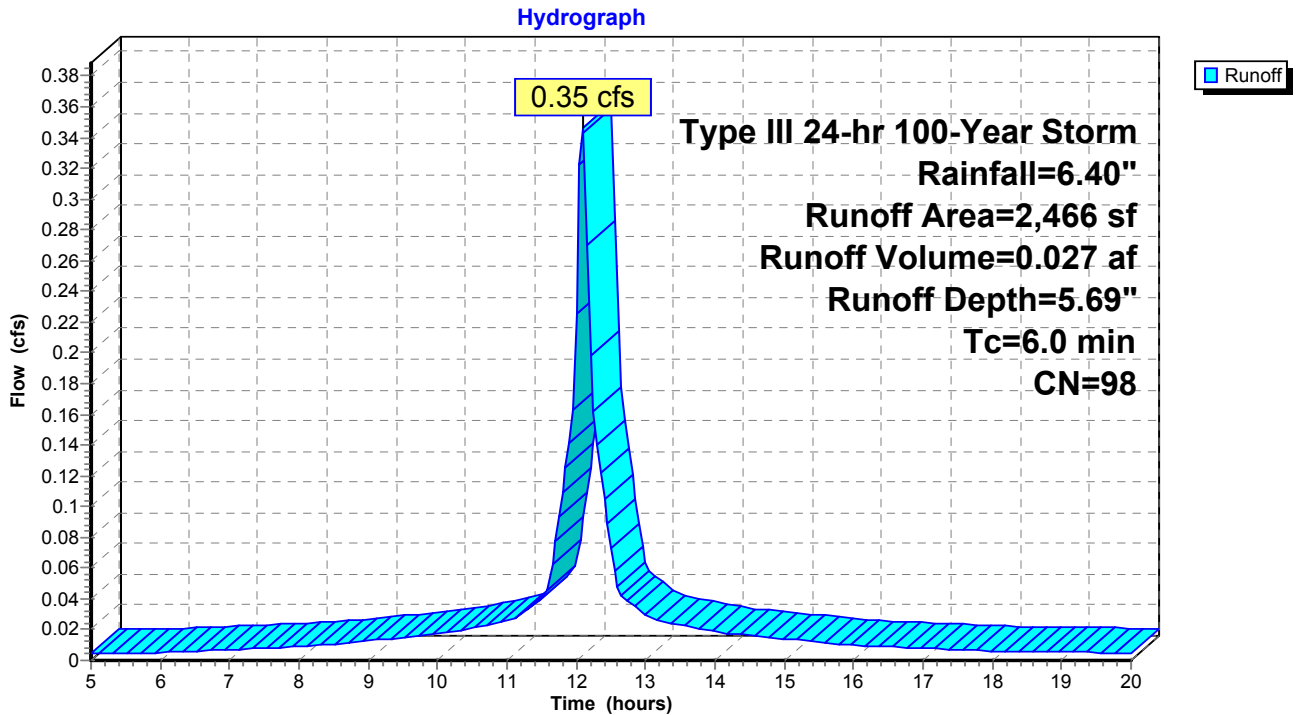
Runoff = 0.35 cfs @ 12.09 hrs, Volume= 0.027 af, Depth= 5.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-Year Storm Rainfall=6.40"

Area (sf)	CN	Description
2,466	98	Driveway Area

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

**Subcatchment 2S: Right side driveway**



### 3 Lido Avenue

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Type III 24-hr 100-Year Storm Rainfall=6.40"

Page 30  
9/4/2020

### Subcatchment 3S: Portion of Front Roof

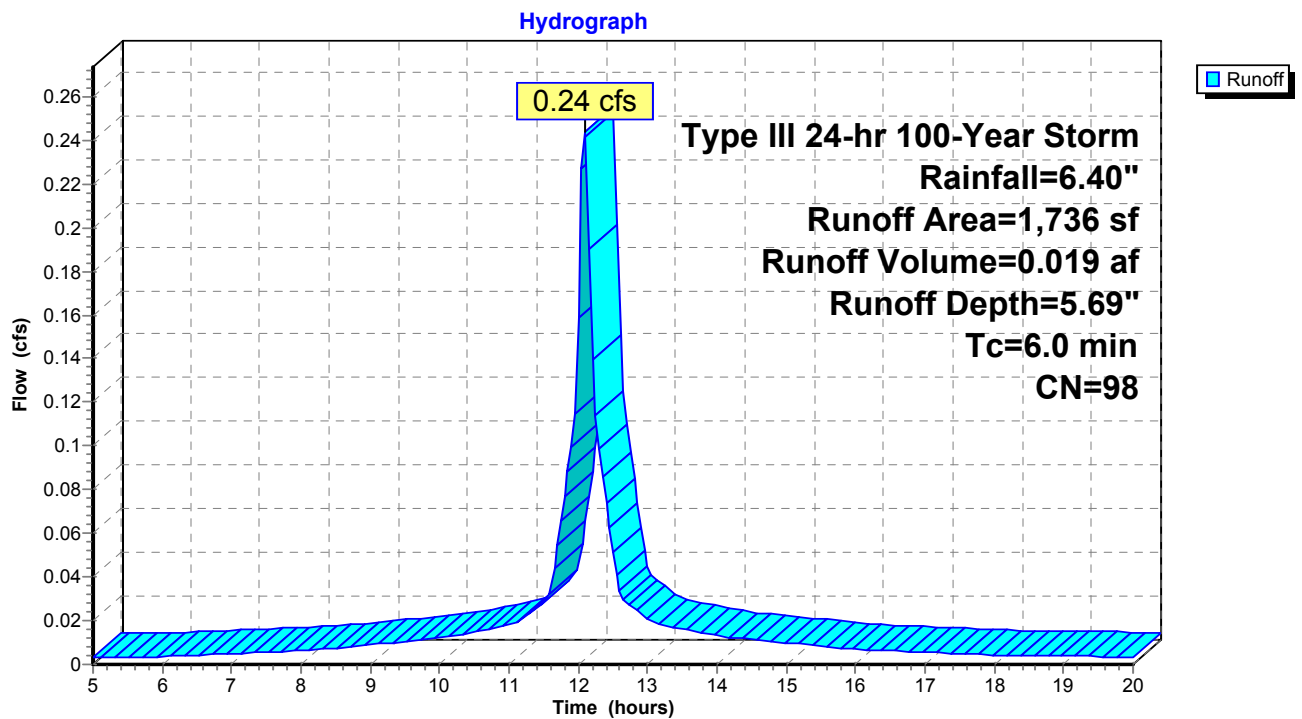
Runoff = 0.24 cfs @ 12.09 hrs, Volume= 0.019 af, Depth= 5.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-Year Storm Rainfall=6.40"

Area (sf)	CN	Description
1,736	98	Portion of Front Roof

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

### Subcatchment 3S: Portion of Front Roof



### 3 Lido Avenue

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Type III 24-hr 100-Year Storm Rainfall=6.40"

Page 31  
9/4/2020

### Subcatchment 5S: Remaining Area

Runoff = 0.47 cfs @ 12.11 hrs, Volume= 0.038 af, Depth= 1.13"

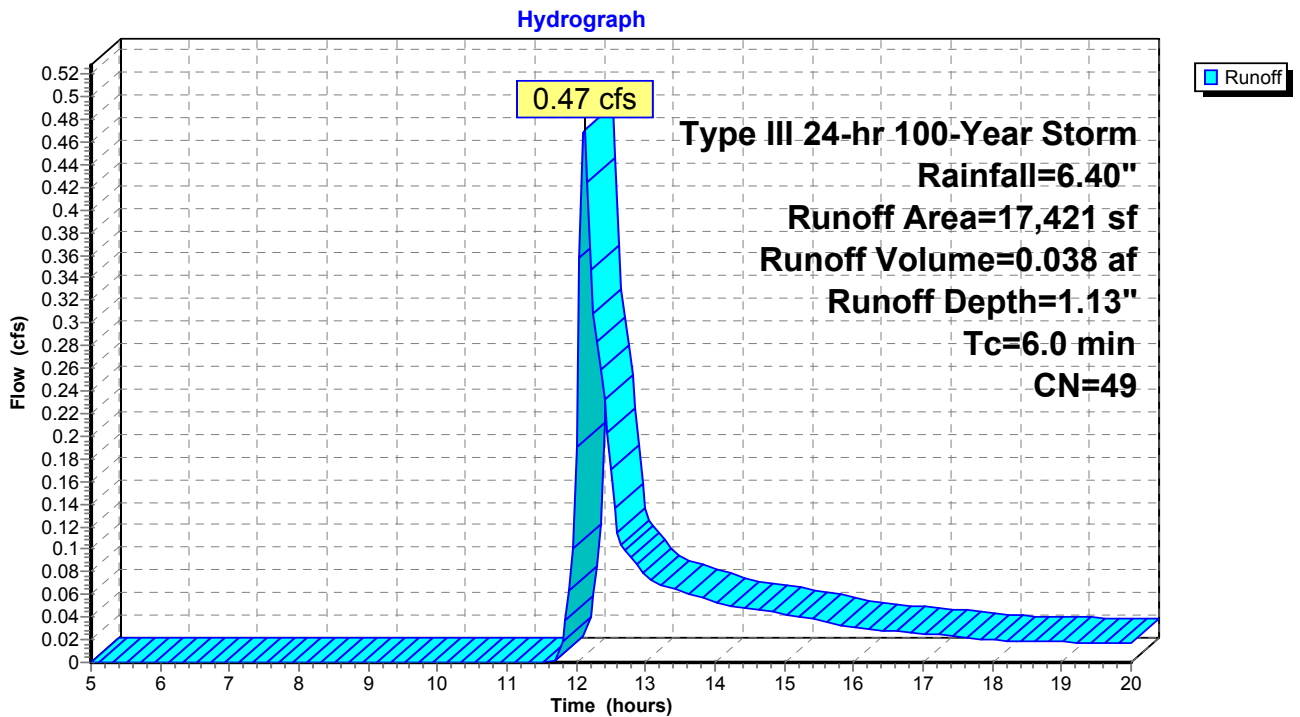
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-Year Storm Rainfall=6.40"

Area (sf)	CN	Description
17,421	49	50-75% Grass cover, Fair, HSG A

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

### Subcatchment 5S: Remaining Area





### 3 Lido Avenue

Type III 24-hr 100-Year Storm Rainfall=6.40"

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Page 32

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### Pond 1P: Crushed Stone Swale

Rawls Rate for Sand : 8.27 in/hr used

Inflow Area = 0.066 ac, Inflow Depth = 5.69" for 100-Year Storm event  
 Inflow = 0.41 cfs @ 12.09 hrs, Volume= 0.031 af  
 Outflow = 0.18 cfs @ 12.34 hrs, Volume= 0.031 af, Atten= 57%, Lag= 15.3 min  
 Primary = 0.18 cfs @ 12.34 hrs, Volume= 0.031 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 188.52' @ 12.34 hrs Surf.Area= 392 sf Storage= 314 cf  
 Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= (not calculated)

#	Invert	Avail.Storage	Storage Description
1	186.50'	314 cf	<b>2.00'W x 196.00'L x 2.00'H Prismatoid</b> 784 cf Overall x 40.0% Voids

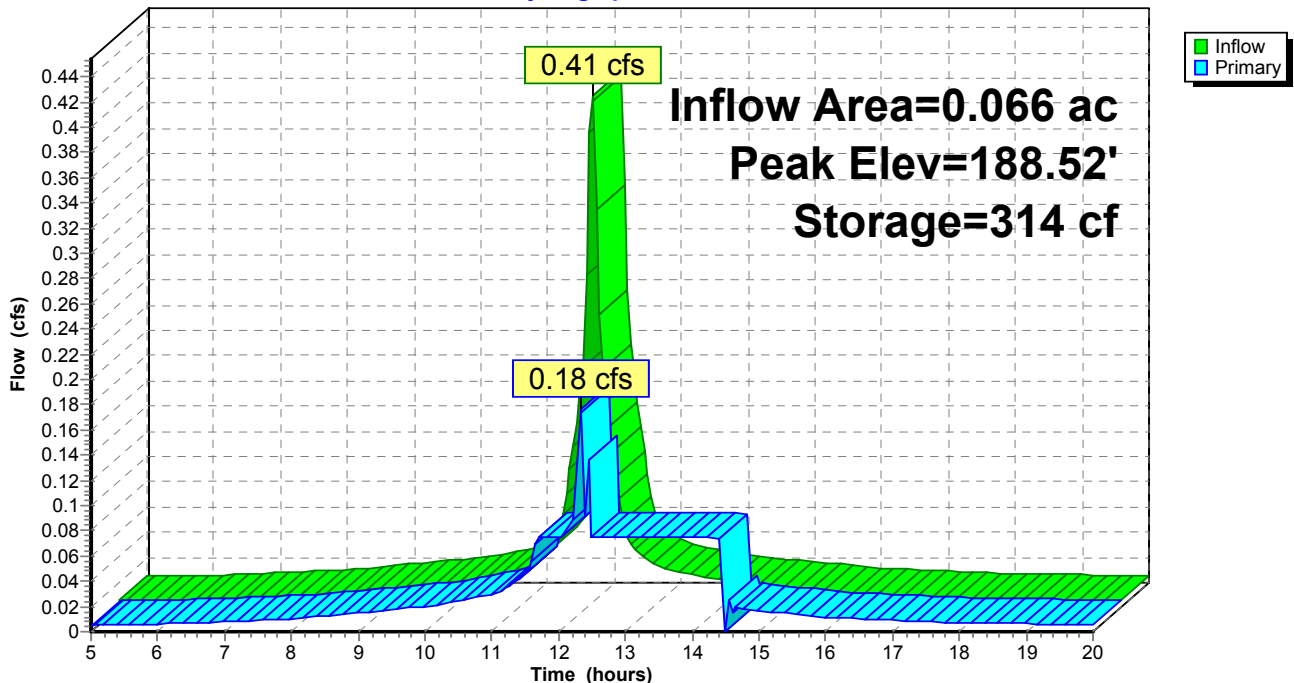
#	Routing	Invert	Outlet Devices
1	Primary	0.00'	<b>0.011480 fpm Exfiltration over entire Surface area</b>
2	Primary	188.50'	<b>2.00' x 2.00' Horiz. Orifice/Grate</b> Limited to weir flow C= 0.600

Primary OutFlow Max=0.16 cfs @ 12.34 hrs HW=188.52' (Free Discharge)

- 1=Exfiltration (Exfiltration Controls 0.08 cfs)
- 2=Orifice/Grate (Weir Controls 0.09 cfs @ 0.5 fps)

### Pond 1P: Crushed Stone Swale

Hydrograph



### 3 Lido Avenue

Type III 24-hr 100-Year Storm Rainfall=6.40"

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Page 33

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### Pond 2P: Stone Crushed Trench

Rawls Rate for Sand: 8.27 in/hr

Inflow Area = 0.057 ac, Inflow Depth = 5.69" for 100-Year Storm event  
 Inflow = 0.35 cfs @ 12.09 hrs, Volume= 0.027 af  
 Outflow = 0.35 cfs @ 12.10 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.5 min  
 Primary = 0.35 cfs @ 12.10 hrs, Volume= 0.026 af

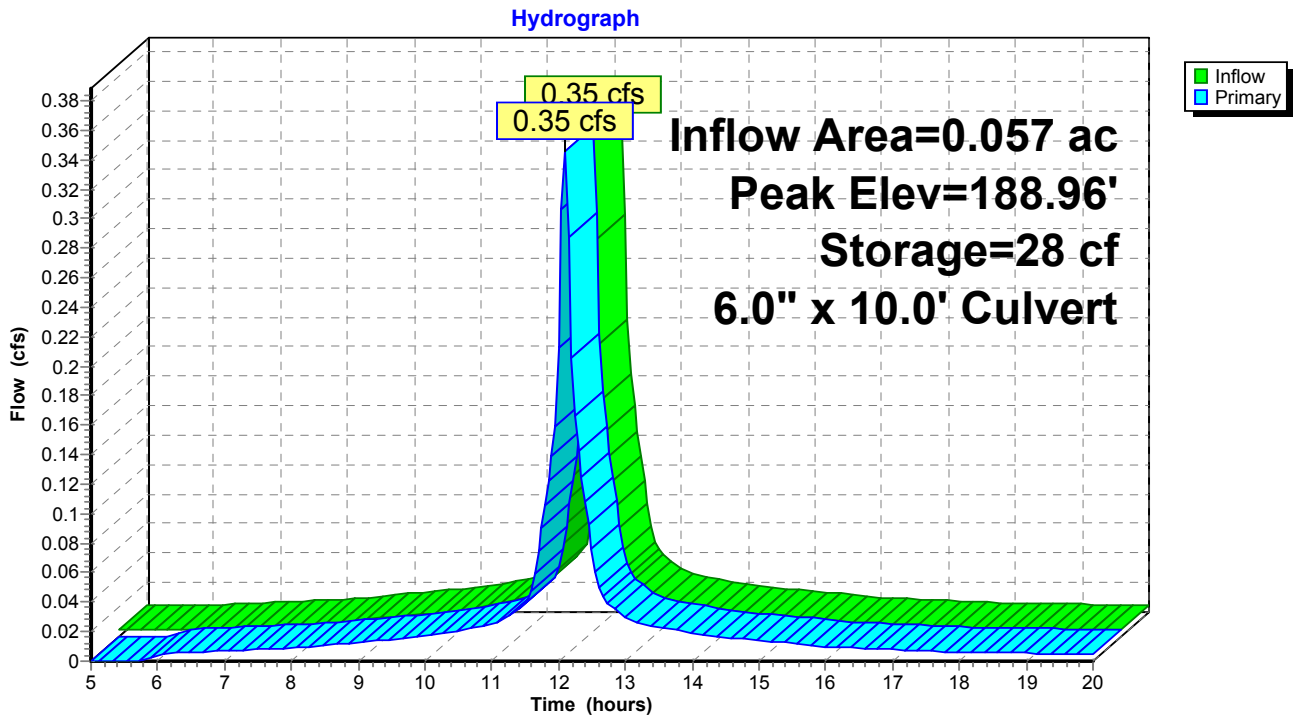
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 188.96' @ 12.10 hrs Surf.Area= 72 sf Storage= 28 cf  
 Plug-Flow detention time= 12.5 min calculated for 0.026 af (98% of inflow)  
 Center-of-Mass det. time= 6.4 min ( 740.2 - 733.9 )

#	Invert	Avail.Storage	Storage Description
1	188.00'	58 cf	<b>4.00'W x 18.00'L x 2.00'H Prismatic</b> 144 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Primary	188.50'	<b>6.0" x 10.0' long Culvert</b> CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 188.00' S= 0.0500 '/' n= 0.011 Cc= 0.900

**Primary OutFlow** Max=0.34 cfs @ 12.10 hrs HW=188.96' (Free Discharge)  
 ↳1=Culvert (Inlet Controls 0.34 cfs @ 1.8 fps)

### Pond 2P: Stone Crushed Trench



### 3 Lido Avenue

Type III 24-hr 100-Year Storm Rainfall=6.40"

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Page 34

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### Pond 3P: 500 Gallon DW

Rawls Rate for sand: 8.27 in/hr

Inflow Area = 0.040 ac, Inflow Depth = 5.69" for 100-Year Storm event  
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 0.019 af  
Outflow = 0.26 cfs @ 12.06 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min  
Primary = 0.26 cfs @ 12.06 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Peak Elev= 194.55' @ 12.06 hrs Surf.Area= 100 sf Storage= 236 cf  
Plug-Flow detention time= 128.3 min calculated for 0.013 af (71% of inflow)  
Center-of-Mass det. time= 62.7 min ( 796.6 - 733.9 )

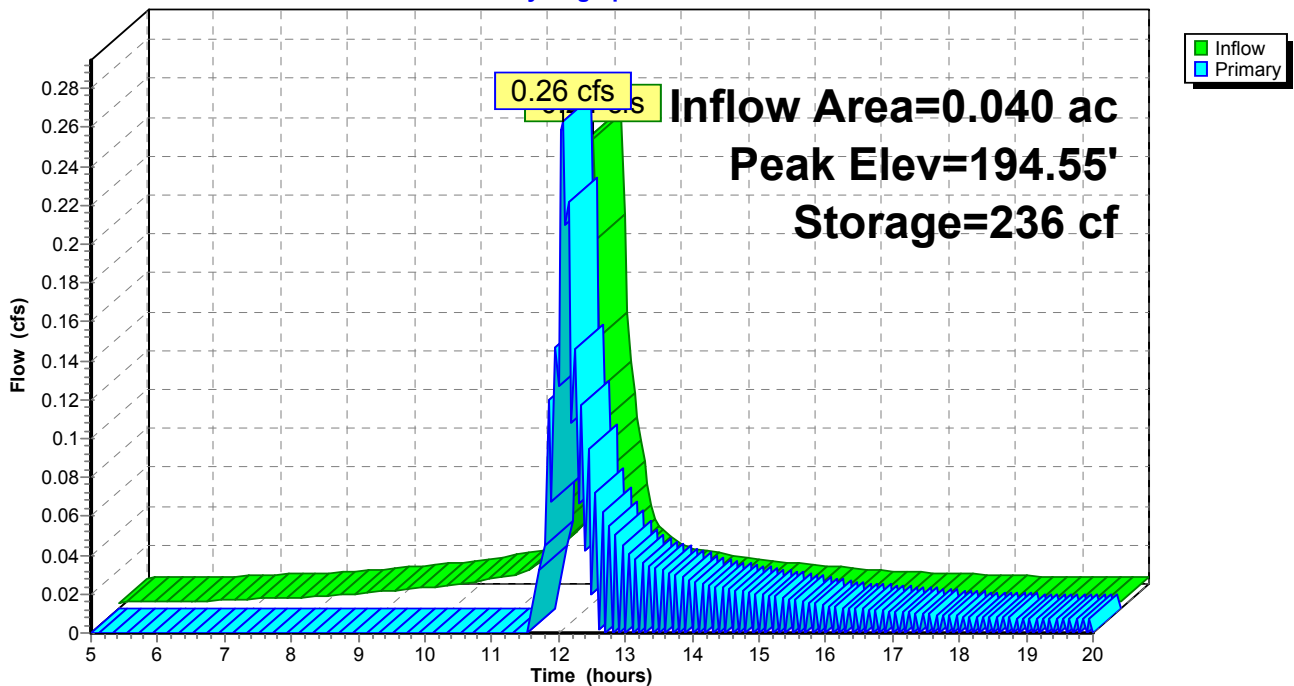
#	Invert	Avail.Storage	Storage Description
1	190.00'	110 cf	<b>10.00'W x 10.00'L x 4.00'H Prismatic</b> 400 cf Overall - 126 cf Embedded = 274 cf x 40.0% Voids
2	190.50'	126 cf	<b>6.00'W x 6.00'L x 3.50'H Prismatic</b> Inside #1
		236 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Primary	194.00'	<b>4.0" Vert. Orifice/Grate</b> C= 0.600

**Primary OutFlow** Max=0.25 cfs @ 12.06 hrs HW=194.52' (Free Discharge)  
↑1=Orifice/Grate (Orifice Controls 0.25 cfs @ 2.8 fps)

### Pond 3P: 500 Gallon DW

Hydrograph



### 3 Lido Avenue

Type III 24-hr 100-Year Storm Rainfall=6.40"

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Page 35

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9/4/2020

### Pond 4P: 500 Gallon DW

Inflow Area = 0.057 ac, Inflow Depth = 5.62" for 100-Year Storm event  
 Inflow = 0.35 cfs @ 12.10 hrs, Volume= 0.026 af  
 Outflow = 0.31 cfs @ 12.13 hrs, Volume= 0.026 af, Atten= 9%, Lag= 2.2 min  
 Primary = 0.31 cfs @ 12.13 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 188.99' @ 12.13 hrs Surf.Area= 100 sf Storage= 194 cf  
 Plug-Flow detention time= 46.5 min calculated for 0.026 af (100% of inflow)  
 Center-of-Mass det. time= 46.4 min ( 786.6 - 740.2 )

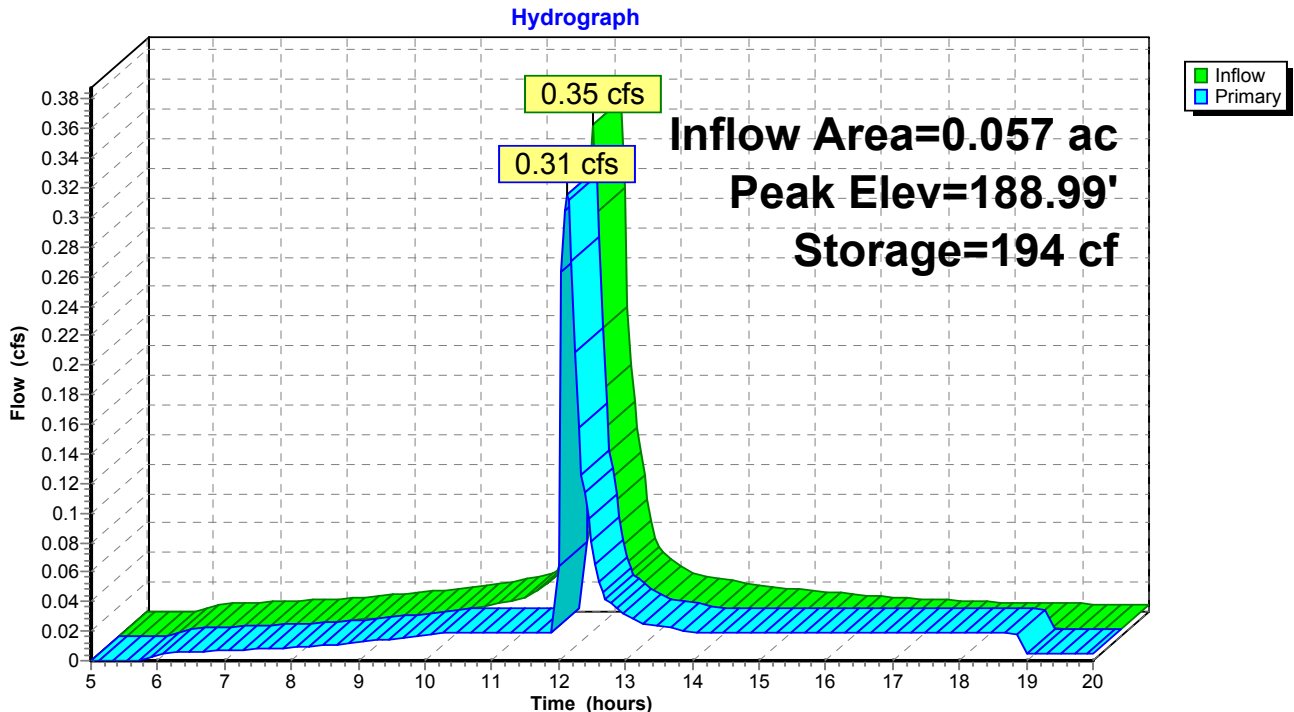
#	Invert	Avail.Storage	Storage Description
1	185.67'	110 cf	<b>10.00'W x 10.00'L x 4.00'H Prismaoid</b> 400 cf Overall - 126 cf Embedded = 274 cf x 40.0% Voids
2	186.17'	126 cf	<b>6.00'W x 6.00'L x 3.50'H Prismaoid</b> Inside #1
		236 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Primary	0.00'	<b>0.011480 fpm Exfiltration over entire Surface area</b>
2	Primary	188.50'	<b>4.0" Horiz. Orifice/Grate</b> Limited to weir flow C= 0.600

**Primary OutFlow** Max=0.31 cfs @ 12.13 hrs HW=188.98' (Free Discharge)

- 1=Exfiltration (Exfiltration Controls 0.02 cfs)
- 2=Orifice/Grate (Orifice Controls 0.29 cfs @ 3.3 fps)

### Pond 4P: 500 Gallon DW



### 3 Lido Avenue

Type III 24-hr 100-Year Storm Rainfall=6.40"

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Page 36

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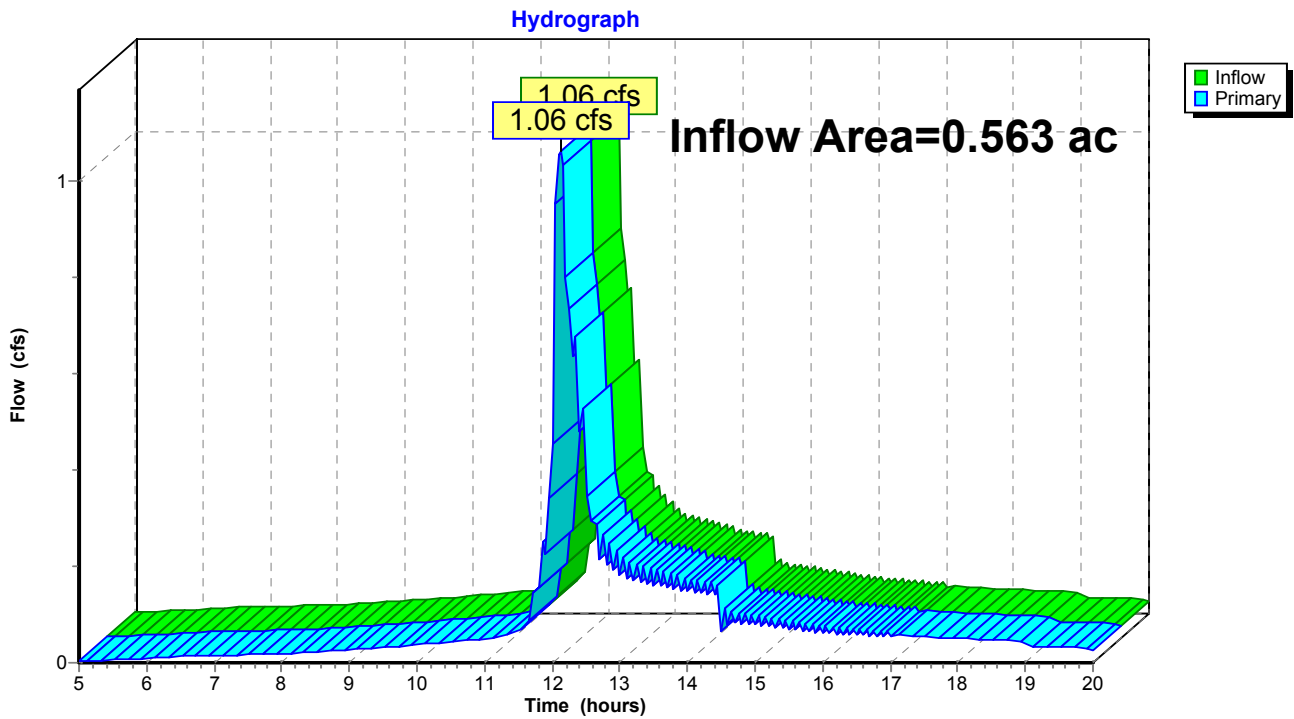
9/4/2020

### Link 1L: Total Offsite (Post)

Inflow Area = 0.563 ac, Inflow Depth = 2.33" for 100-Year Storm event  
Inflow = 1.06 cfs @ 12.12 hrs, Volume= 0.109 af  
Primary = 1.06 cfs @ 12.12 hrs, Volume= 0.109 af, Atten= 0%, Lag= 0.0 min

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

### Link 1L: Total Offsite (Post)



**3 Lido Avenue**

Type III 24-hr 100-Year Storm Rainfall=6.40"

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Page 37

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9/4/2020

**Link 1L\_e: Total Offsite (Pre)**

Inflow Area = 0.562 ac, Inflow Depth = 2.17" for 100-Year Storm event  
Inflow = 1.49 cfs @ 12.10 hrs, Volume= 0.102 af  
Primary = 1.49 cfs @ 12.10 hrs, Volume= 0.102 af, Atten= 0%, Lag= 0.0 min

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

**Link 1L\_e: Total Offsite (Pre)**

