

# **Storm Drainage Report**

**53 Ganung Drive  
Ossining, New York**



PREPARED BY:  
**SJF ENGINEERING SERVICES**  
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July 22, 2020

## Project Summary

The site consists of a 0.65 acre residential site and is located at 53 Ganung Drive in Ossining, New York. The existing and proposed site is a combination of paved driveway, landscaping and grassed area in good condition. The site primarily has "C" soils in "fair" condition throughout. The new addition will increase the impervious area within the property lines by approximately **800** square feet.

The attached storm water calculations have been run using a TR-55 Urban Hydrology Modeling program to estimate the runoff from the existing and proposed site conditions.

The attached storm water calculations reveal the following flows for each storm event:

### Existing site conditions

#### **Hydrograph Peak/Peak Time Table:**

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period			
	1-Yr (cfs)	5-Yr (cfs)	10-Yr (cfs)	25-Yr (cfs)
-----				
<b>Exist. 1S</b>	0.89	1.99	2.32	3.01

### Proposed site conditions

#### **Hydrograph Peak/Peak Time Table:**

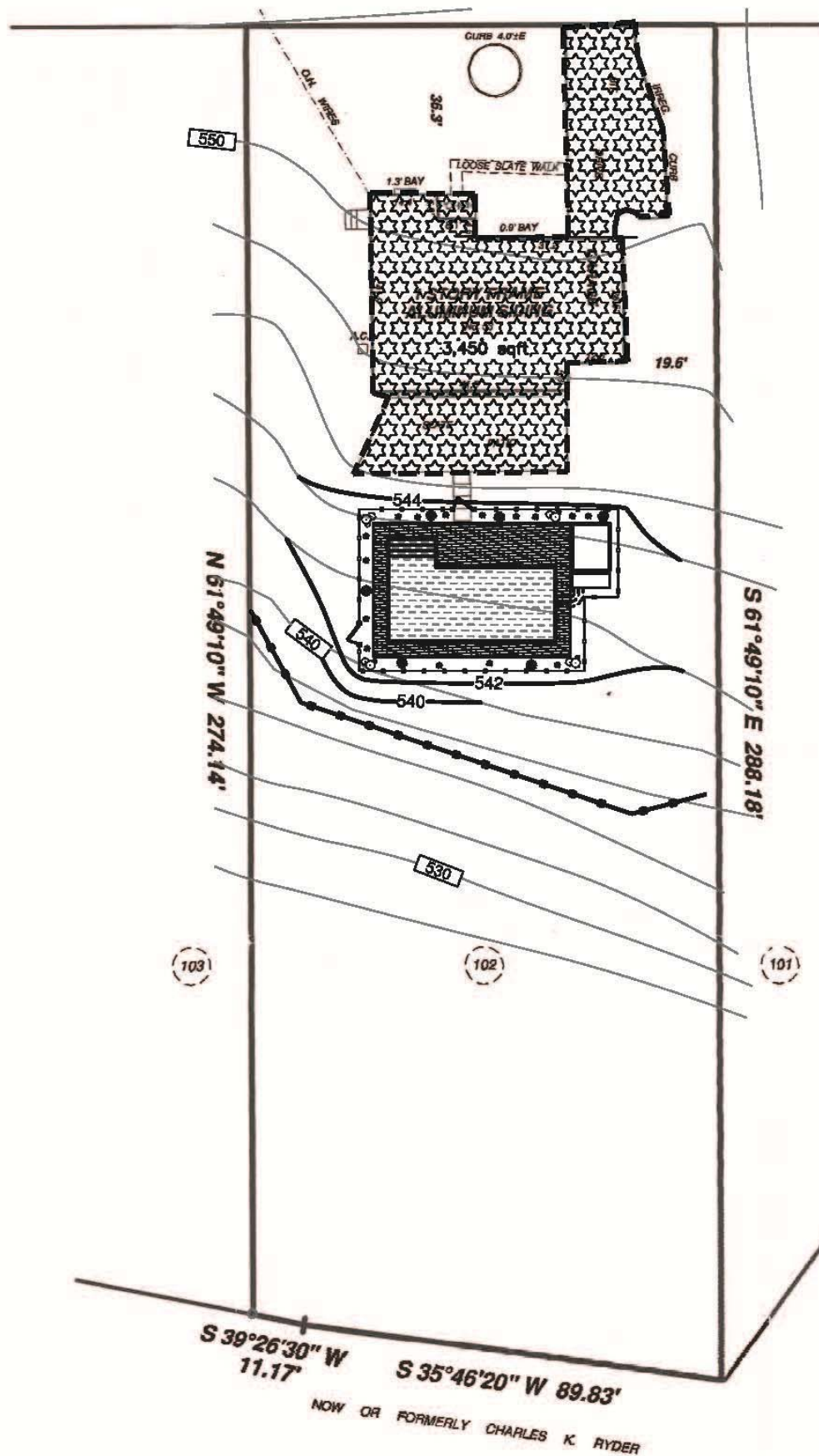
Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period			
	1-Yr (cfs)	5-Yr (cfs)	10-Yr (cfs)	25-Yr (cfs)
-----				
<b>Prop. 1S</b>	1.12	2.43	2.83	3.64

The above summary shows there was a change from 3.01 cfs to 3.64 cfs for the 25-year storm event. The calculated results for the 25-year storm are attached to this report. This indicates the need for on-site storage in order to match the pre-construction site runoff for this storm. (See required storage graph in report.)

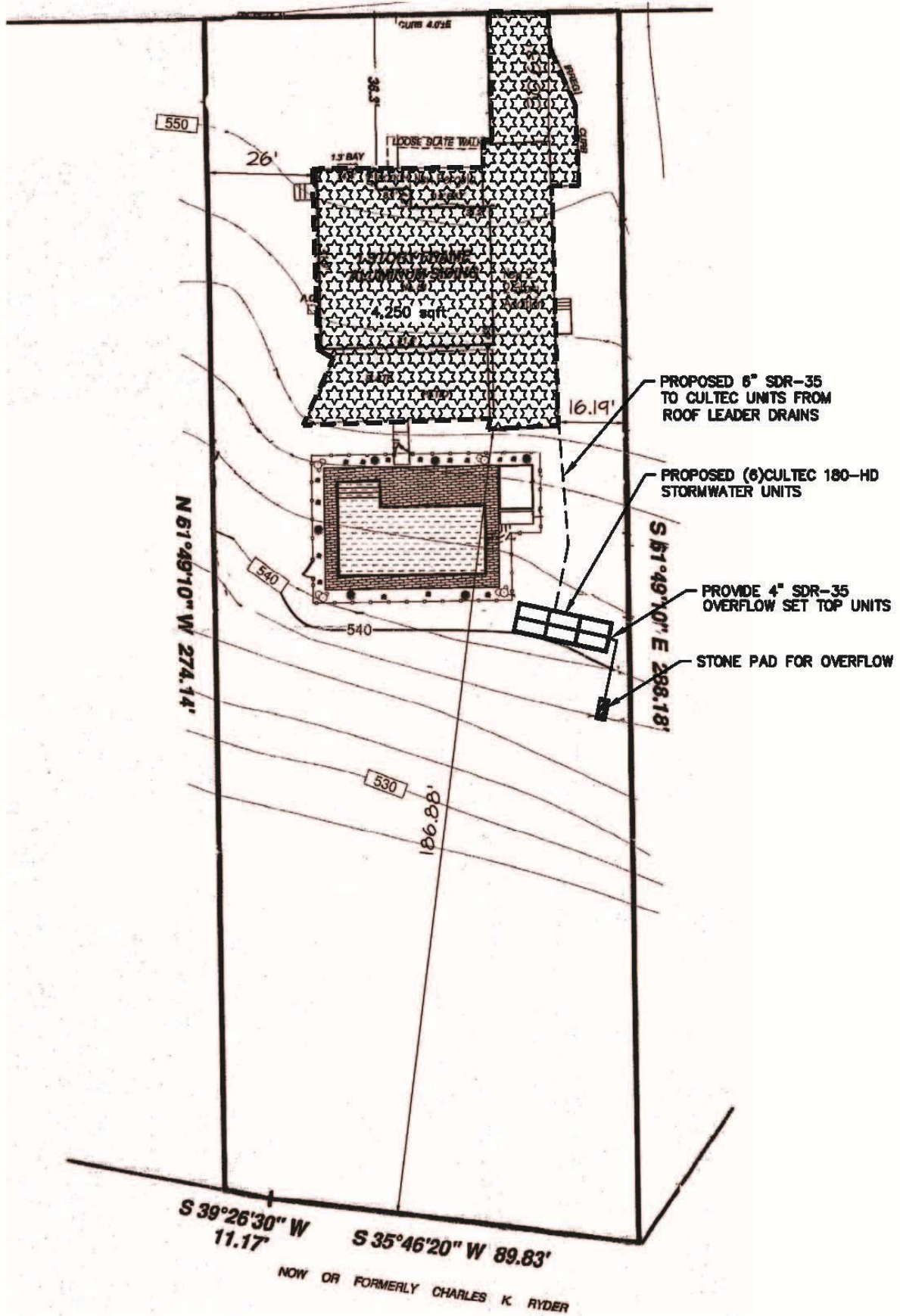
*More specifically the required storm water storage amounts to a total volume of 200 cubic feet. The total storage available with the proposed Cultec units, (6) Cultec Recharger 180HD units, equates to a volume of 216 cubic feet with the stone gravel as specified.*

*Soil testing at the site revealed a maximum percolation rate of 15 minutes per inch at two locations at the depth of the proposed gravel bed in the rear of the existing residence. The soil will be adequate to drain these units as proposed.*

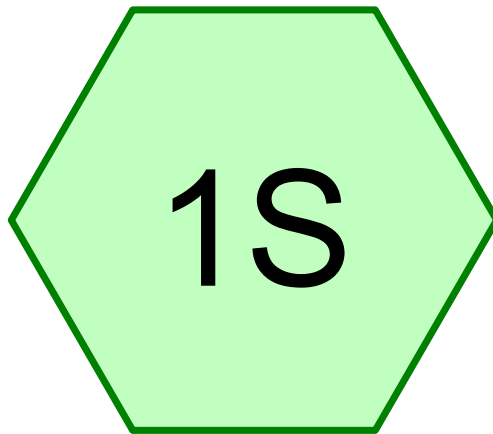
TR-55 ANALYSIS  
AND CALCULATIONS



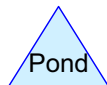
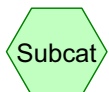
**EXISTING SITE PLAN**



**PROPOSED SITE PLAN**



Existing condition  
(53 GANUNG)



**Exist- typelll**

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**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.570	79	50-75% Grass cover, Fair, HSG C (1S)
0.080	98	Paved parking/Roofs (1S)
<b>0.650</b>	<b>81</b>	<b>TOTAL AREA</b>

**Exist- typeIII**

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Page 3

**Soil Listing (all nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.570	HSG C	1S
0.000	HSG D	
0.080	Other	1S
<b>0.650</b>		<b>TOTAL AREA</b>



**Exist- typelll**

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**Ground Covers (all nodes)**

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.570	0.000	0.000	0.570	50-75% Grass cover, Fair	1S
0.000	0.000	0.000	0.000	0.080	0.080	Paved parking/Roofs	1S
<b>0.000</b>	<b>0.000</b>	<b>0.570</b>	<b>0.000</b>	<b>0.080</b>	<b>0.650</b>	<b>TOTAL AREA</b>	

**Exist- typeIII***Type III 24-hr 1 Rainfall=2.80"*

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Time span=11.00-26.00 hrs, dt=0.01 hrs, 1501 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

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

**Subcatchment 1S: Existing condition**

Runoff Area=0.650 ac 12.31% Impervious Runoff Depth&gt;1.14"

Flow Length=100' Slope=0.0800 '/' Tc=5.4 min CN=81 Runoff=0.89 cfs 0.062 af

**Total Runoff Area = 0.650 ac   Runoff Volume = 0.062 af   Average Runoff Depth = 1.14"**  
**87.69% Pervious = 0.570 ac   12.31% Impervious = 0.080 ac**

**Exist- typelll**

Type III 24-hr 1 Rainfall=2.80"

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**Summary for Subcatchment 1S: Existing condition (53 GANUNG)**

Runoff = 0.89 cfs @ 12.08 hrs, Volume= 0.062 af, Depth&gt; 1.14"

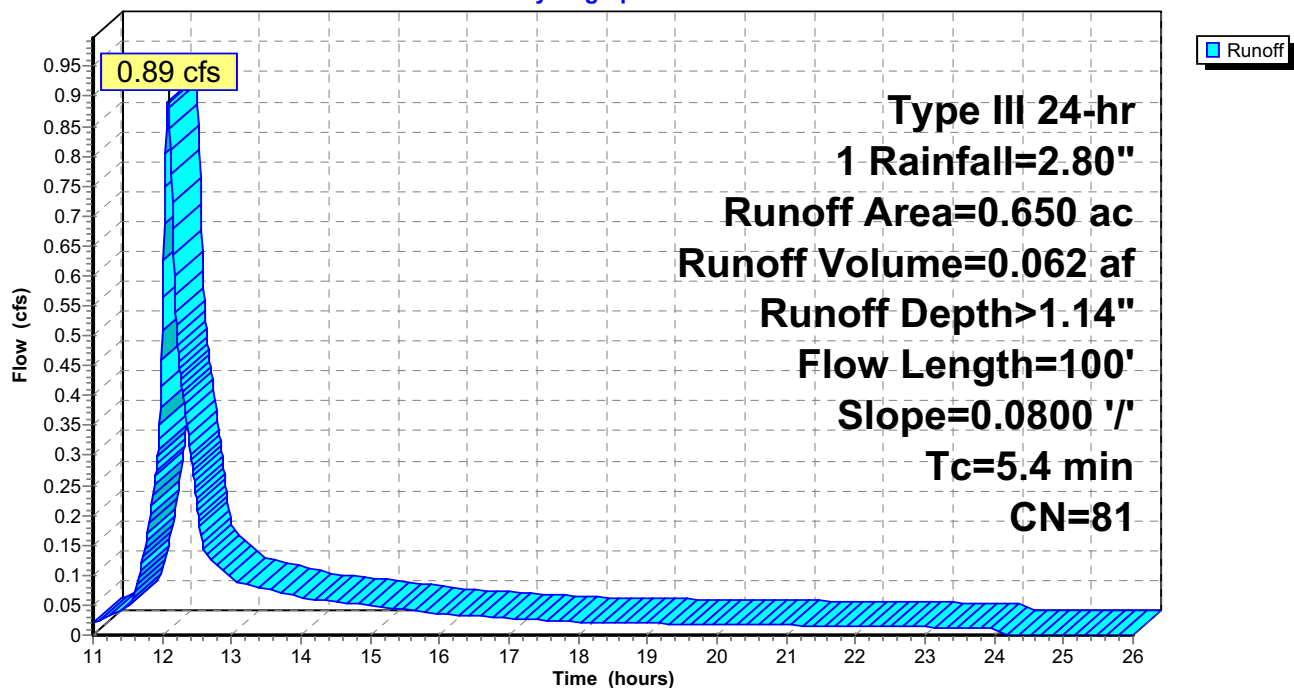
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-26.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1 Rainfall=2.80"

Area (ac)	CN	Description
0.570	79	50-75% Grass cover, Fair, HSG C
* 0.080	98	Paved parking/Roofs
0.650	81	Weighted Average
0.570		87.69% Pervious Area
0.080		12.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	100	0.0800	0.31		Sheet Flow, Existing Sheet Flow Grass: Short n= 0.150 P2= 3.50"

**Subcatchment 1S: Existing condition (53 GANUNG)**

Hydrograph



**Exist- typeIII***Type III 24-hr 5 Rainfall=4.50"*

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Time span=11.00-26.00 hrs, dt=0.01 hrs, 1501 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

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

**Subcatchment 1S: Existing condition**

Runoff Area=0.650 ac 12.31% Impervious Runoff Depth&gt;2.42"

Flow Length=100' Slope=0.0800 '/' Tc=5.4 min CN=81 Runoff=1.99 cfs 0.131 af

**Total Runoff Area = 0.650 ac   Runoff Volume = 0.131 af   Average Runoff Depth = 2.42"**  
**87.69% Pervious = 0.570 ac   12.31% Impervious = 0.080 ac**

**Exist- typelll**

Type III 24-hr 5 Rainfall=4.50"

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**Summary for Subcatchment 1S: Existing condition (53 GANUNG)**

Runoff = 1.99 cfs @ 12.08 hrs, Volume= 0.131 af, Depth&gt; 2.42"

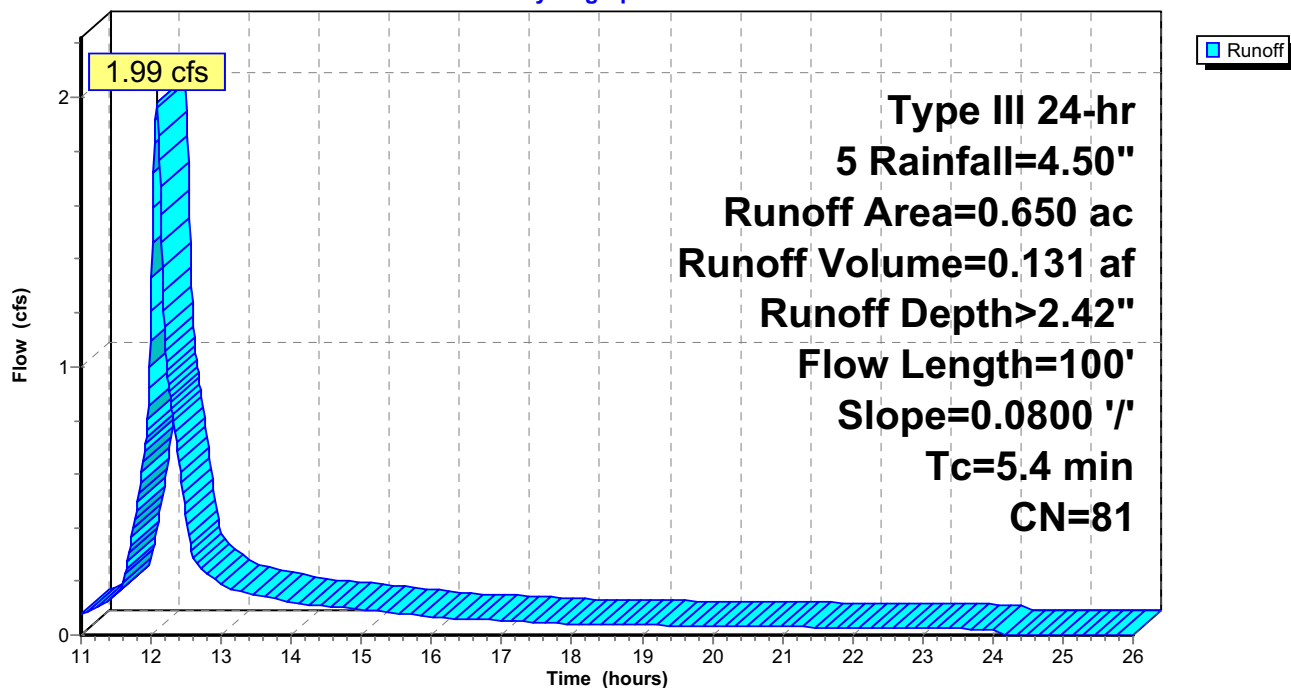
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-26.00 hrs, dt= 0.01 hrs  
Type III 24-hr 5 Rainfall=4.50"

Area (ac)	CN	Description
0.570	79	50-75% Grass cover, Fair, HSG C
* 0.080	98	Paved parking/Roofs
0.650	81	Weighted Average
0.570		87.69% Pervious Area
0.080		12.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	100	0.0800	0.31		Sheet Flow, Existing Sheet Flow Grass: Short n= 0.150 P2= 3.50"

**Subcatchment 1S: Existing condition (53 GANUNG)**

Hydrograph



**Exist- typeIII***Type III 24-hr 10 Rainfall=5.00"*

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Time span=11.00-26.00 hrs, dt=0.01 hrs, 1501 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

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

**Subcatchment 1S: Existing condition**

Runoff Area=0.650 ac 12.31% Impervious Runoff Depth&gt;2.80"

Flow Length=100' Slope=0.0800 '/' Tc=5.4 min CN=81 Runoff=2.32 cfs 0.152 af

**Total Runoff Area = 0.650 ac   Runoff Volume = 0.152 af   Average Runoff Depth = 2.80"**  
**87.69% Pervious = 0.570 ac   12.31% Impervious = 0.080 ac**

**Exist- typelll**

Type III 24-hr 10 Rainfall=5.00"

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**Summary for Subcatchment 1S: Existing condition (53 GANUNG)**

Runoff = 2.32 cfs @ 12.08 hrs, Volume= 0.152 af, Depth&gt; 2.80"

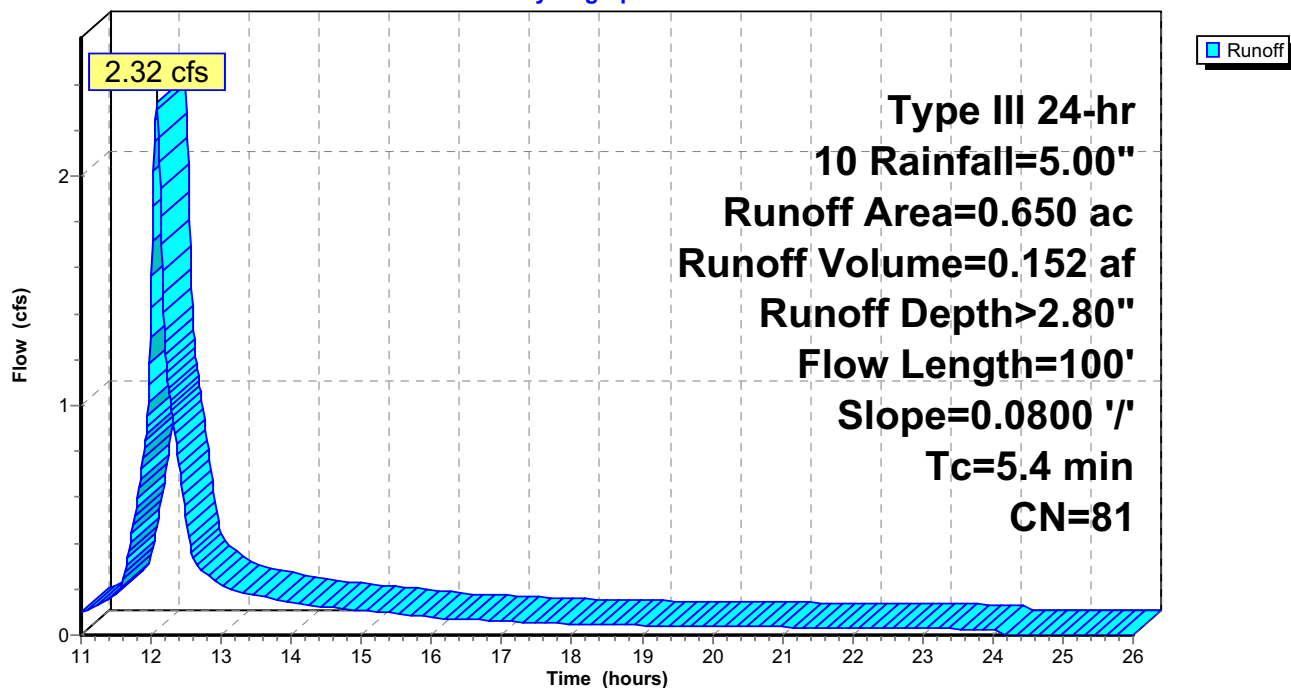
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-26.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 Rainfall=5.00"

Area (ac)	CN	Description
0.570	79	50-75% Grass cover, Fair, HSG C
* 0.080	98	Paved parking/Roofs
0.650	81	Weighted Average
0.570		87.69% Pervious Area
0.080		12.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	100	0.0800	0.31		Sheet Flow, Existing Sheet Flow Grass: Short n= 0.150 P2= 3.50"

**Subcatchment 1S: Existing condition (53 GANUNG)**

Hydrograph



**Exist- typeIII***Type III 24-hr 25 Rainfall=6.00"*

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Time span=11.00-26.00 hrs, dt=0.01 hrs, 1501 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

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

**Subcatchment 1S: Existing condition**

Runoff Area=0.650 ac 12.31% Impervious Runoff Depth&gt;3.59"

Flow Length=100' Slope=0.0800 '/' Tc=5.4 min CN=81 Runoff=3.01 cfs 0.194 af

**Total Runoff Area = 0.650 ac   Runoff Volume = 0.194 af   Average Runoff Depth = 3.59"**  
**87.69% Pervious = 0.570 ac   12.31% Impervious = 0.080 ac**



**Exist- typelll**

Type III 24-hr 25 Rainfall=6.00"

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**Summary for Subcatchment 1S: Existing condition (53 GANUNG)**

Runoff = 3.01 cfs @ 12.08 hrs, Volume= 0.194 af, Depth&gt; 3.59"

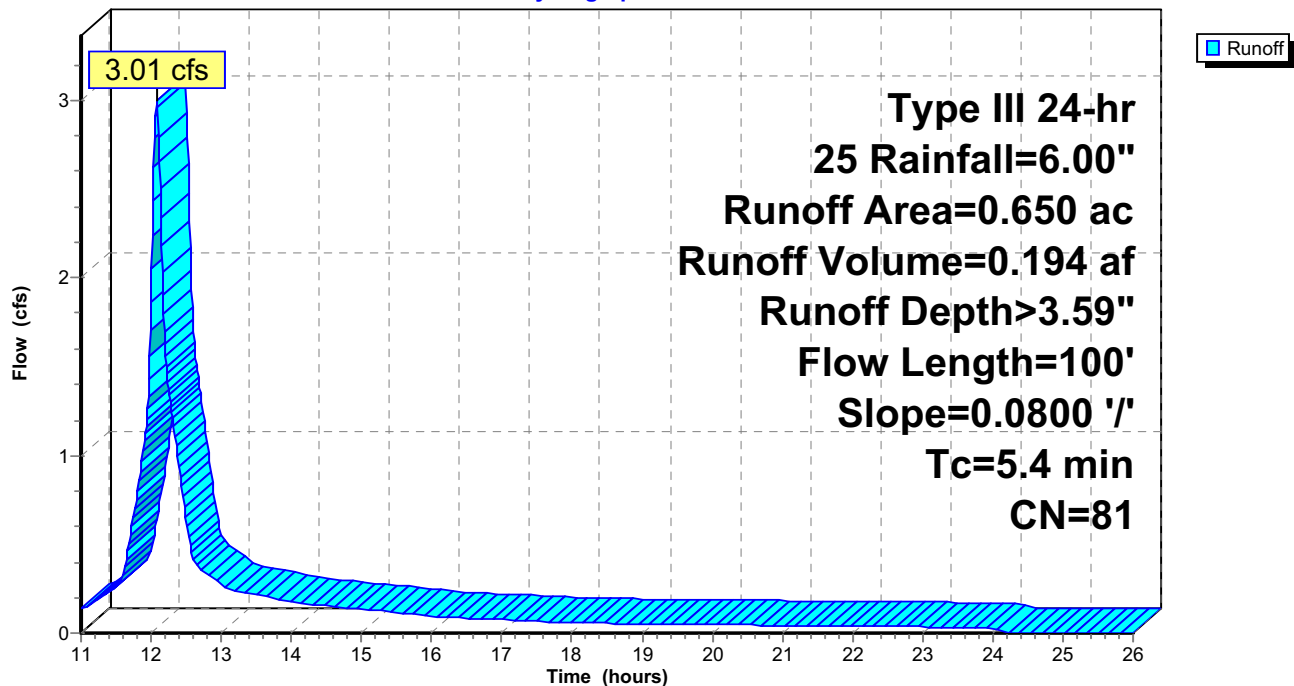
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-26.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25 Rainfall=6.00"

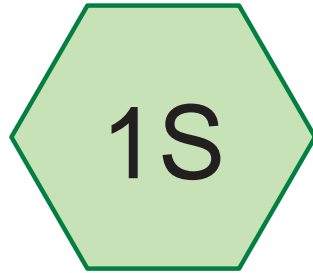
Area (ac)	CN	Description
0.570	79	50-75% Grass cover, Fair, HSG C
* 0.080	98	Paved parking/Roofs
0.650	81	Weighted Average
0.570		87.69% Pervious Area
0.080		12.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	100	0.0800	0.31		Sheet Flow, Existing Sheet Flow Grass: Short n= 0.150 P2= 3.50"

**Subcatchment 1S: Existing condition (53 GANUNG)**

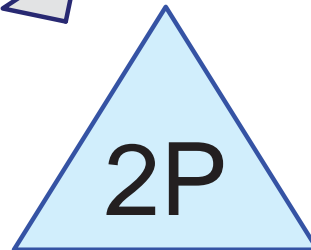
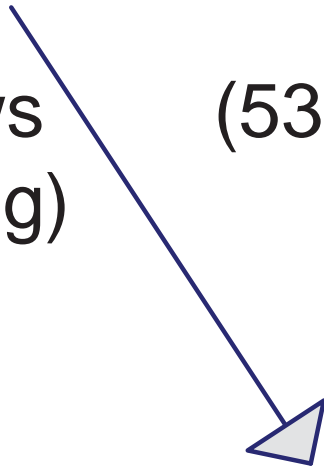
Hydrograph



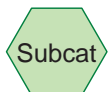


Proposed Flows  
Ganung)

(53



Required Storage



**Proposed 2 with pond typelll**

Type III 24-hr 1 Rainfall=2.80"

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Page 1

**Summary for Subcatchment 1S: Proposed Flows (53 Ganung)**[49] Hint:  $T_c < 2dt$  may require smaller  $dt$ 

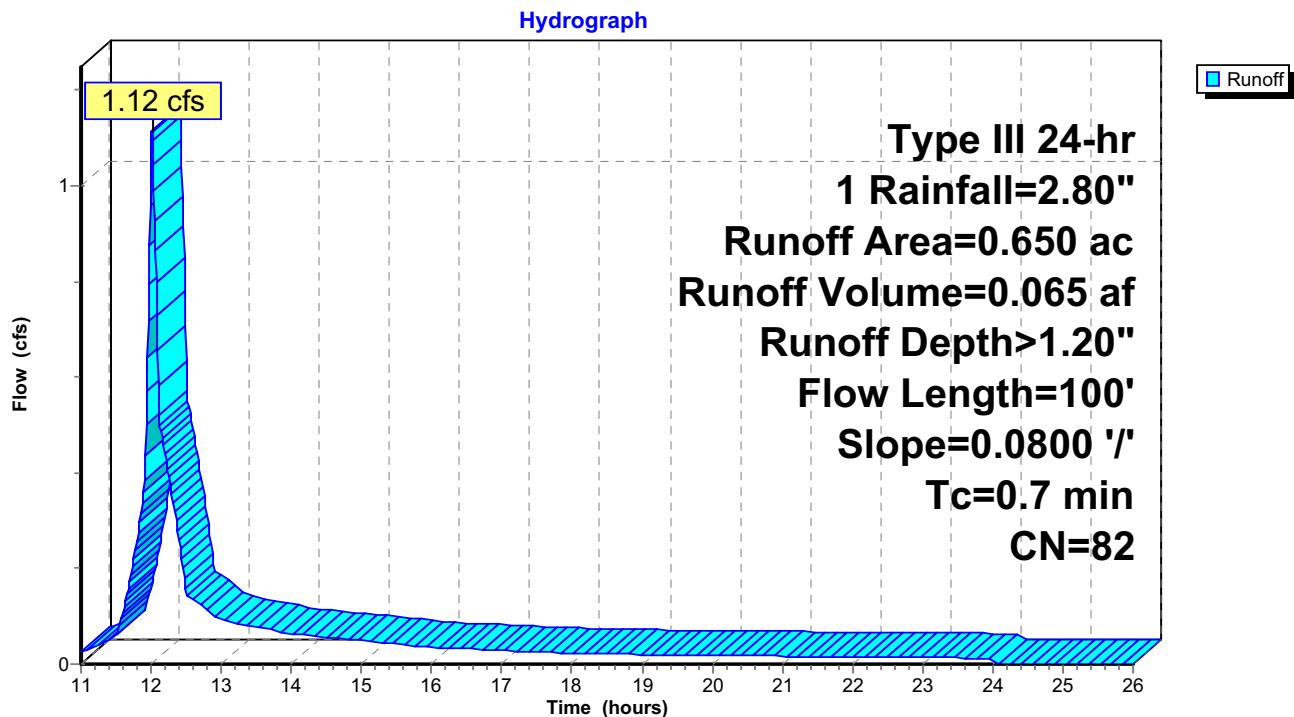
Runoff = 1.12 cfs @ 12.01 hrs, Volume= 0.065 af, Depth&gt; 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-26.00 hrs,  $dt=0.01$  hrs  
Type III 24-hr 1 Rainfall=2.80"

Area (ac)	CN	Description
0.553	79	50-75% Grass cover, Fair, HSG C
0.097	98	Roofs, HSG C
0.650	82	Weighted Average
0.553		85.08% Pervious Area
0.097		14.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	100	0.0800	2.50		Sheet Flow, Existing Sheet Flow
					Smooth surfaces n= 0.011 P2= 3.50"

**Subcatchment 1S: Proposed Flows (53 Ganung)**

## Proposed 2 with pond typelll

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Type III 24-hr 5 Rainfall=4.50"

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### Summary for Subcatchment 1S: Proposed Flows (53 Ganung)

[49] Hint:  $T_c < 2dt$  may require smaller  $dt$

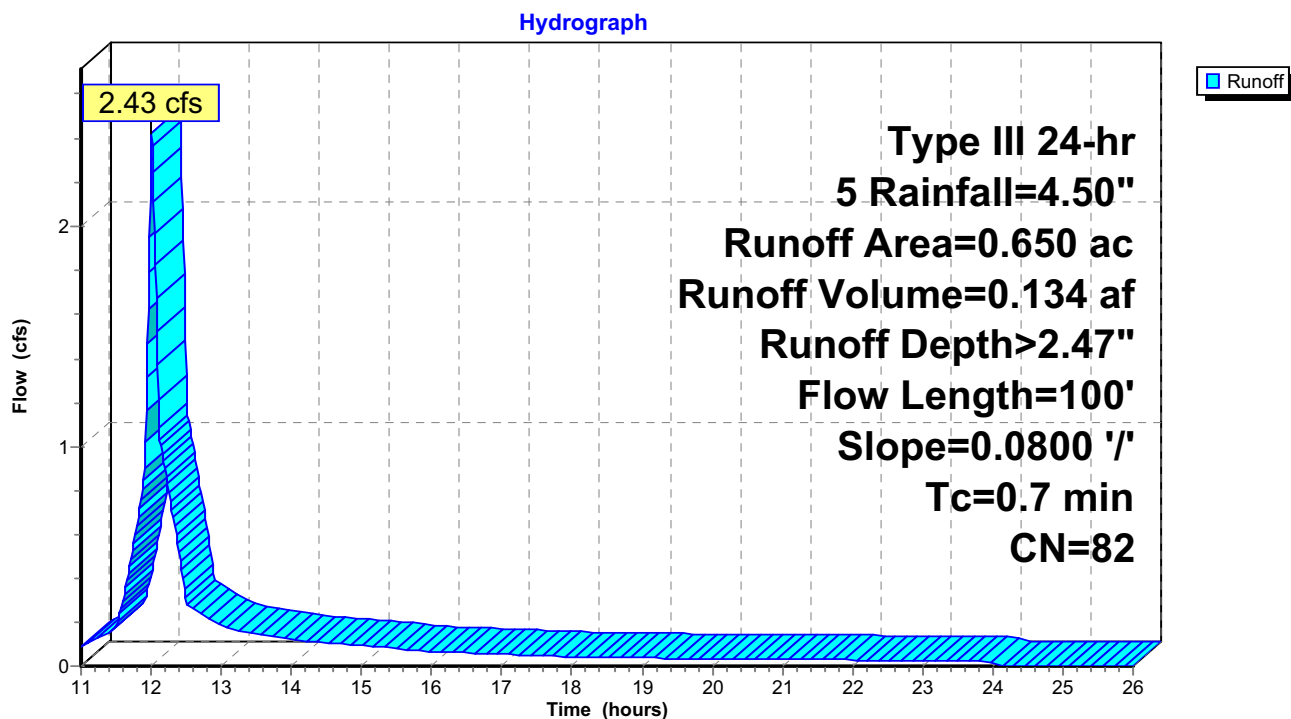
Runoff = 2.43 cfs @ 12.01 hrs, Volume= 0.134 af, Depth> 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-26.00 hrs,  $dt=0.01$  hrs  
Type III 24-hr 5 Rainfall=4.50"

Area (ac)	CN	Description
0.553	79	50-75% Grass cover, Fair, HSG C
0.097	98	Roofs, HSG C
0.650	82	Weighted Average
0.553		85.08% Pervious Area
0.097		14.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	100	0.0800	2.50		Sheet Flow, Existing Sheet Flow Smooth surfaces n= 0.011 P2= 3.50"

### Subcatchment 1S: Proposed Flows (53 Ganung)



## Proposed 2 with pond typelll

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Type III 24-hr 10 Rainfall=5.00"

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### Summary for Subcatchment 1S: Proposed Flows (53 Ganung)

[49] Hint:  $T_c < 2dt$  may require smaller  $dt$

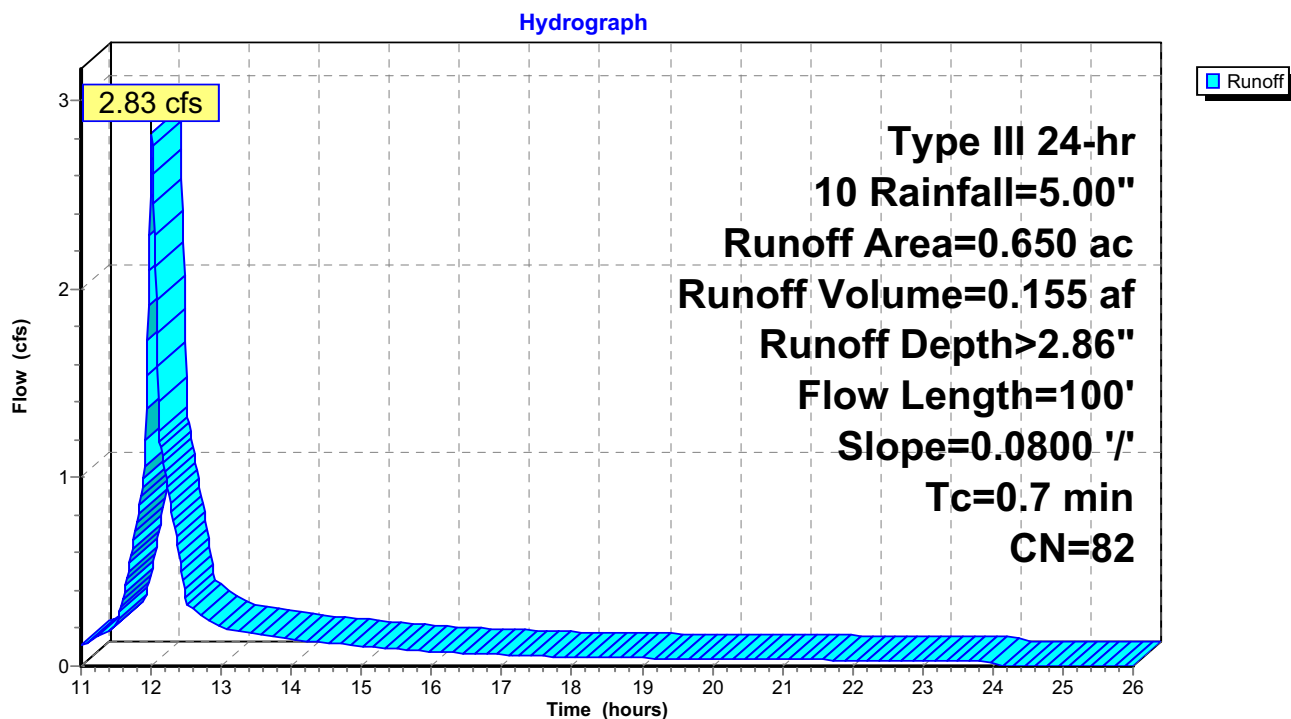
Runoff = 2.83 cfs @ 12.01 hrs, Volume= 0.155 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-26.00 hrs,  $dt=0.01$  hrs  
Type III 24-hr 10 Rainfall=5.00"

Area (ac)	CN	Description
0.553	79	50-75% Grass cover, Fair, HSG C
0.097	98	Roofs, HSG C
0.650	82	Weighted Average
0.553		85.08% Pervious Area
0.097		14.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	100	0.0800	2.50		Sheet Flow, Existing Sheet Flow Smooth surfaces n= 0.011 P2= 3.50"

### Subcatchment 1S: Proposed Flows (53 Ganung)



## Proposed 2 with pond typelll

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Type III 24-hr 25 Rainfall=6.00"

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### Summary for Subcatchment 1S: Proposed Flows (53 Ganung)

[49] Hint:  $T_c < 2dt$  may require smaller  $dt$

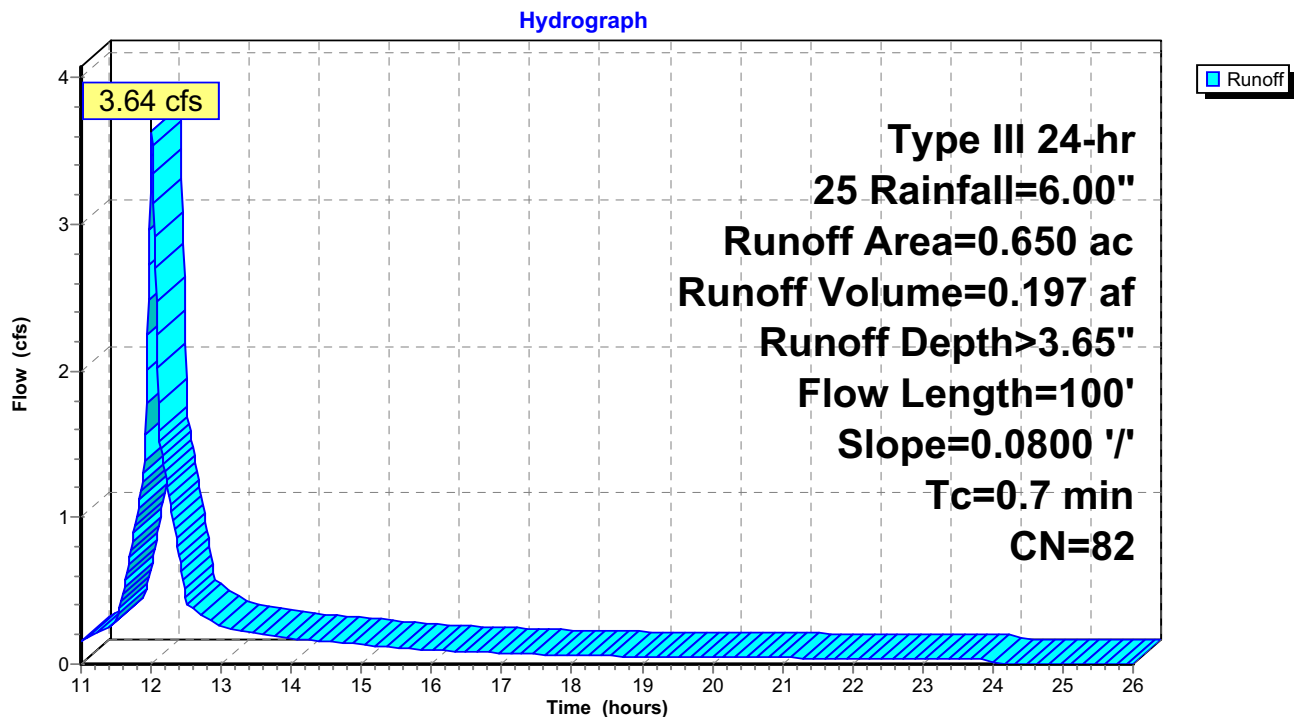
Runoff = 3.64 cfs @ 12.01 hrs, Volume= 0.197 af, Depth> 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-26.00 hrs,  $dt=0.01$  hrs  
Type III 24-hr 25 Rainfall=6.00"

Area (ac)	CN	Description
0.553	79	50-75% Grass cover, Fair, HSG C
0.097	98	Roofs, HSG C
0.650	82	Weighted Average
0.553		85.08% Pervious Area
0.097		14.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	100	0.0800	2.50		Sheet Flow, Existing Sheet Flow Smooth surfaces n= 0.011 P2= 3.50"

### Subcatchment 1S: Proposed Flows (53 Ganung)



**Proposed 2 with pond typelll**

Type III 24-hr Custom Rainfall=6.00"

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**Summary for Subcatchment 1S: Proposed Flows (53 Ganung)**[49] Hint:  $T_c < 2dt$  may require smaller  $dt$ 

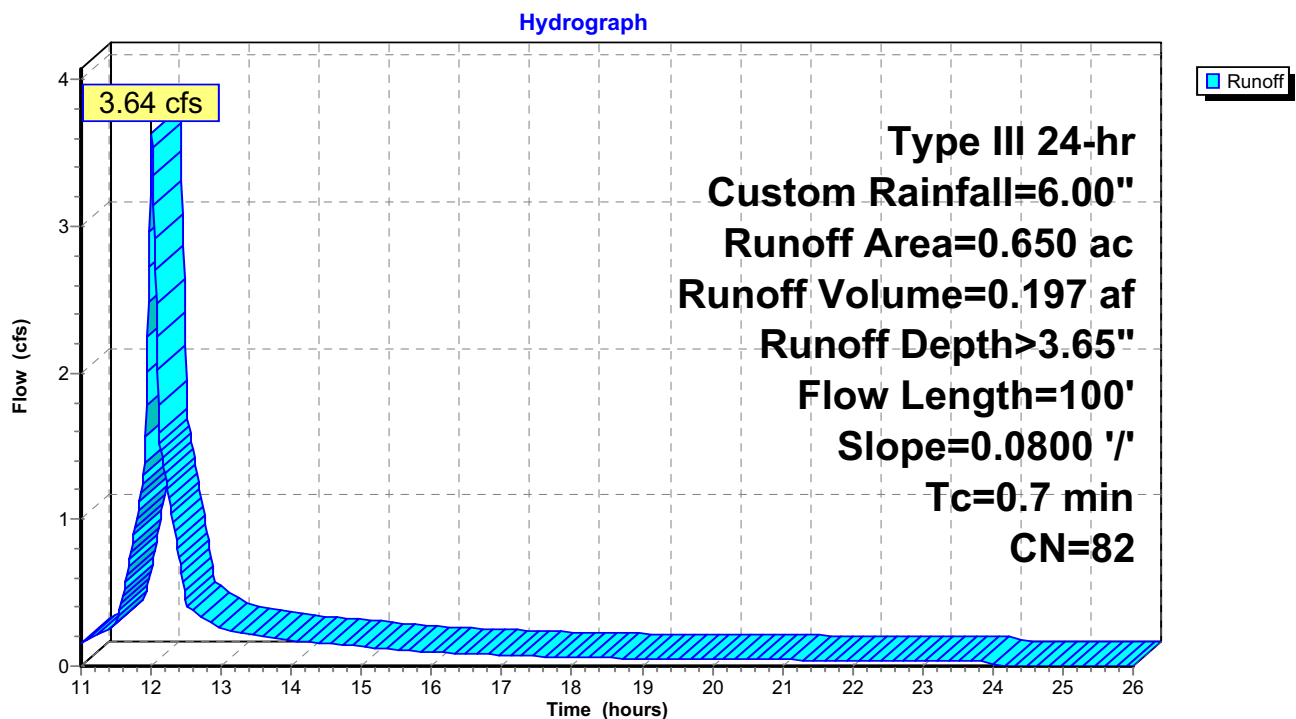
Runoff = 3.64 cfs @ 12.01 hrs, Volume= 0.197 af, Depth&gt; 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-26.00 hrs,  $dt=0.01$  hrs  
Type III 24-hr Custom Rainfall=6.00"

Area (ac)	CN	Description
0.553	79	50-75% Grass cover, Fair, HSG C
0.097	98	Roofs, HSG C
0.650	82	Weighted Average
0.553		85.08% Pervious Area
0.097		14.92% Impervious Area

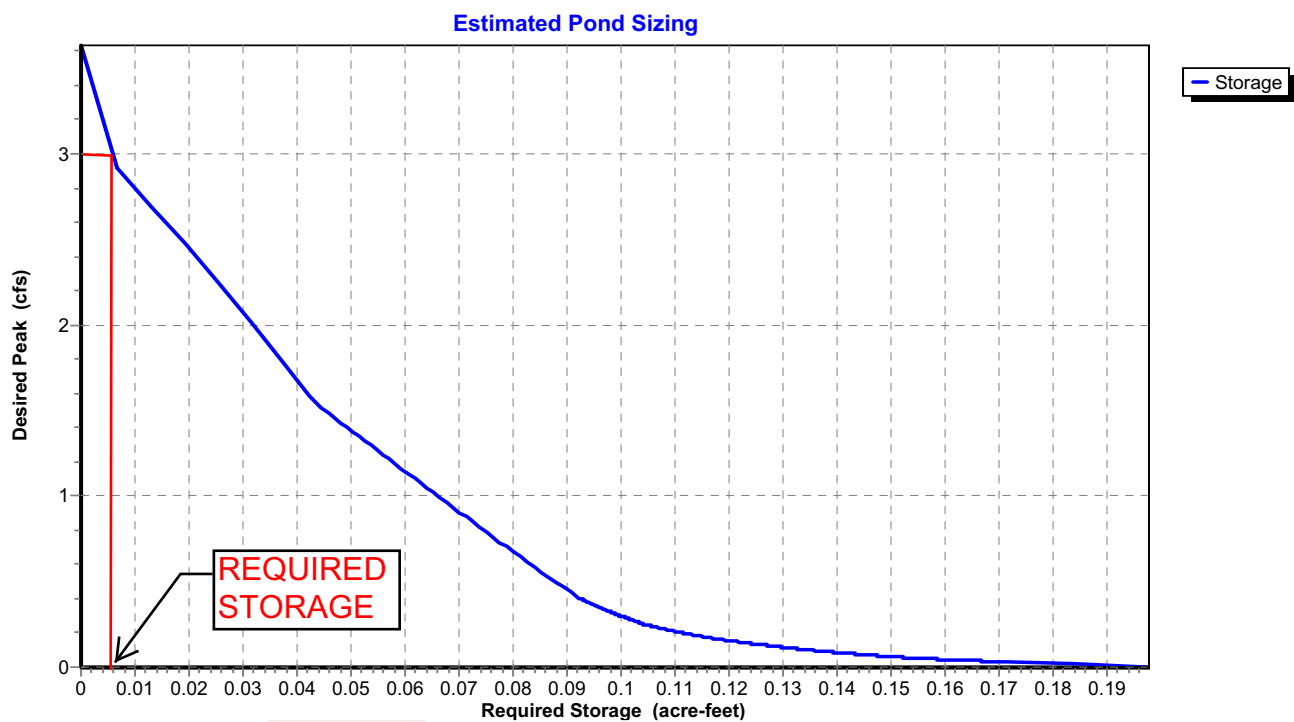
  

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	100	0.0800	2.50		Sheet Flow, Existing Sheet Flow
Smooth surfaces n= 0.011 P2= 3.50"					

**Subcatchment 1S: Proposed Flows (53 Ganung)**

### Pond 2P: Required Storage

#### REQUIRED STORAGE



REQUIRED STORAGE = 200 CUBIC FEET

PROVIDED STORAGE = 6 CULTEC 180-HD UNIT @ 36 CU-FT/UNIT = 216 CUBIC FEET





# CULTEC Recharger® 180HD Stormwater Chamber

The Recharger® 180HD is a 20.5" (521 mm) tall, mid-size chamber and is typically used for installations with depth restrictions or when a larger infiltrative area is required. The Recharger® 180HD has the side portal internal manifold feature. HVLV® FC-24 Feed Connectors are inserted into the side portals to create the internal manifold.

Size (L x W x H)	7.33' x 36" x 20.5" 2.23 m x 914 mm x 521 mm
Installed Length	6.33' 1.93 m
Length Adjustment per Run	1' 0.30 m
Chamber Storage	3.45 ft³/ft 0.32 m³/m 21.81 ft³/unit 0.62 m³/unit
Min. Installed Storage	5.59 ft³/ft 0.52 m³/m 35.37 ft³/unit 1.00 m³/unit
Min. Area Required	20.57 ft² 1.91 m²
Chamber Weight	45.0 lbs 20.41 kg
Shipping	40 chambers/skid 1,905 lbs/skid 16 skids/48' flatbed
Min. Center to Center Spacing	3.25' 0.99 m
Max. Allowable Cover	12' 3.66 m
Max. Inlet Opening in Endwall	15" HDPE, PVC 375 mm HDPE, PVC
Max. Allowable O.D. in Side Portal	10" HDPE, 12" PVC 250 mm HDPE, 300 mm PVC
Compatible Feed Connector	HVLV FC-24 Feed Connector

Calculations are based on installed chamber length.

All above values are nominal.

Min. installed storage includes 6" (152 mm) stone base, 6" (152 mm) stone above crown of chamber and typical stone surround at 39"(991 mm) center-to-center spacing.

	Stone Foundation Depth		
	6" 152 mm	12" 305 mm	18" 457 mm
Chamber and Stone Storage Per Chamber	35.37 ft³ 1.00 m³	39.49 ft³ 1.12 m³	43.60 ft³ 1.23 m³
Min. Effective Depth	2.71' 0.83 m	3.21' 0.98 m	3.71' 1.13 m
Stone Required Per Chamber	1.26 yd³ 0.96 m³	1.64 yd³ 1.25 m³	2.02 yd³ 1.54 m³

Calculations are based on installed chamber length.

Includes 6" (305 mm) stone above crown of chamber and typical stone surround at 39"(991 mm) center-to-center spacing and stone foundation as listed in table.

Stone void calculated at 40%.



## Recharger® 180HD Bare Chamber Storage Volumes

Elevation		Incremental Storage Volume				Cumulative Storage	
in.	mm	ft³/ft	m³/m	ft³	m³	ft³	m³
20.5	521	0.000	0.000	0.000	0.000	21.818	0.618
20	508	0.233	0.022	1.476	0.042	21.818	0.618
19	483	0.222	0.021	1.406	0.040	20.343	0.576
18	457	0.222	0.021	1.406	0.040	18.937	0.536
17	432	0.221	0.021	1.400	0.040	17.531	0.496
16	406	0.220	0.020	1.393	0.039	16.131	0.457
15	381	0.216	0.020	1.368	0.039	14.738	0.417
14	356	0.209	0.019	1.324	0.037	13.370	0.379
13	330	0.206	0.019	1.305	0.037	12.046	0.341
12	305	0.202	0.019	1.279	0.036	10.741	0.304
11	279	0.198	0.018	1.254	0.036	9.462	0.268
10	254	0.193	0.018	1.222	0.035	8.208	0.232
9	229	0.181	0.017	1.146	0.032	6.986	0.198
8	203	0.171	0.016	1.083	0.031	5.839	0.165
7	178	0.161	0.015	1.020	0.029	4.756	0.135
6	152	0.150	0.014	0.950	0.027	3.737	0.106
5	127	0.135	0.013	0.855	0.024	2.787	0.079
4	102	0.117	0.011	0.741	0.021	1.932	0.055
3	76	0.090	0.008	0.570	0.016	1.191	0.034
2	51	0.060	0.006	0.380	0.011	0.621	0.0318
1	25	0.038	0.004	0.241	0.007	0.241	0.007
Total		3.445	0.320	21.818	0.618	21.818	0.618

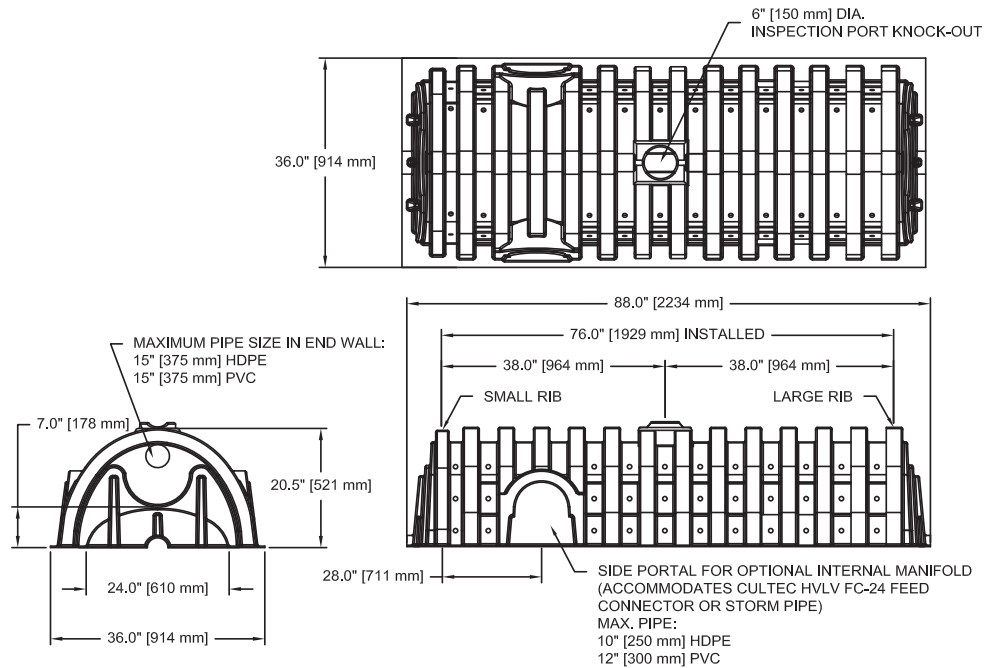
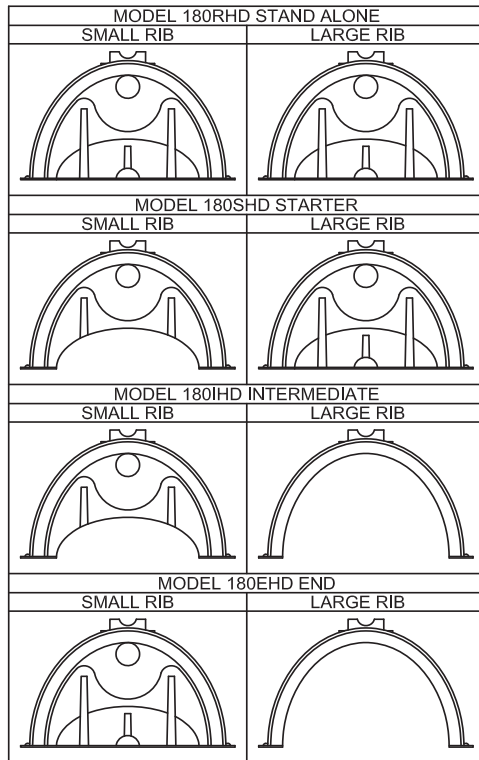
Calculations are based on installed chamber length.

For more information, contact CULTEC at (203) 775-4416 or visit [www.cultec.com](http://www.cultec.com).



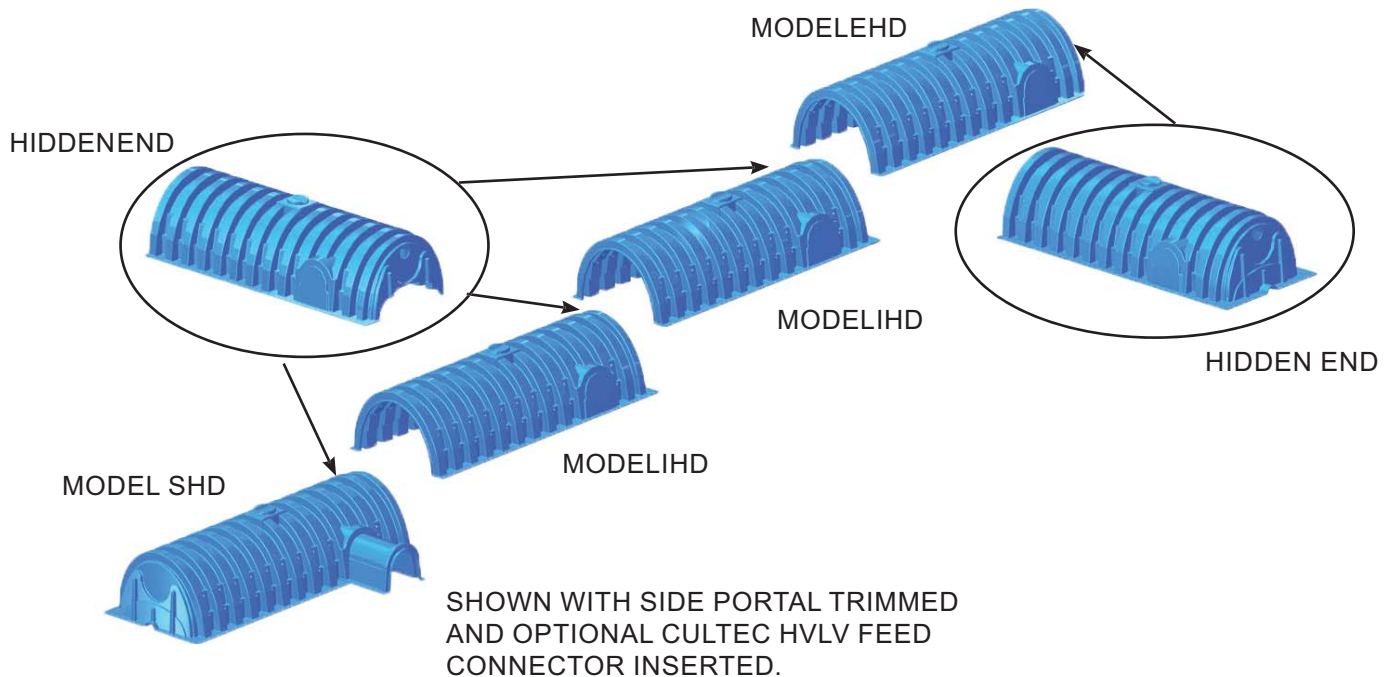
# CULTEC Recharger® 180HD Stormwater Chamber

## Three View Drawing

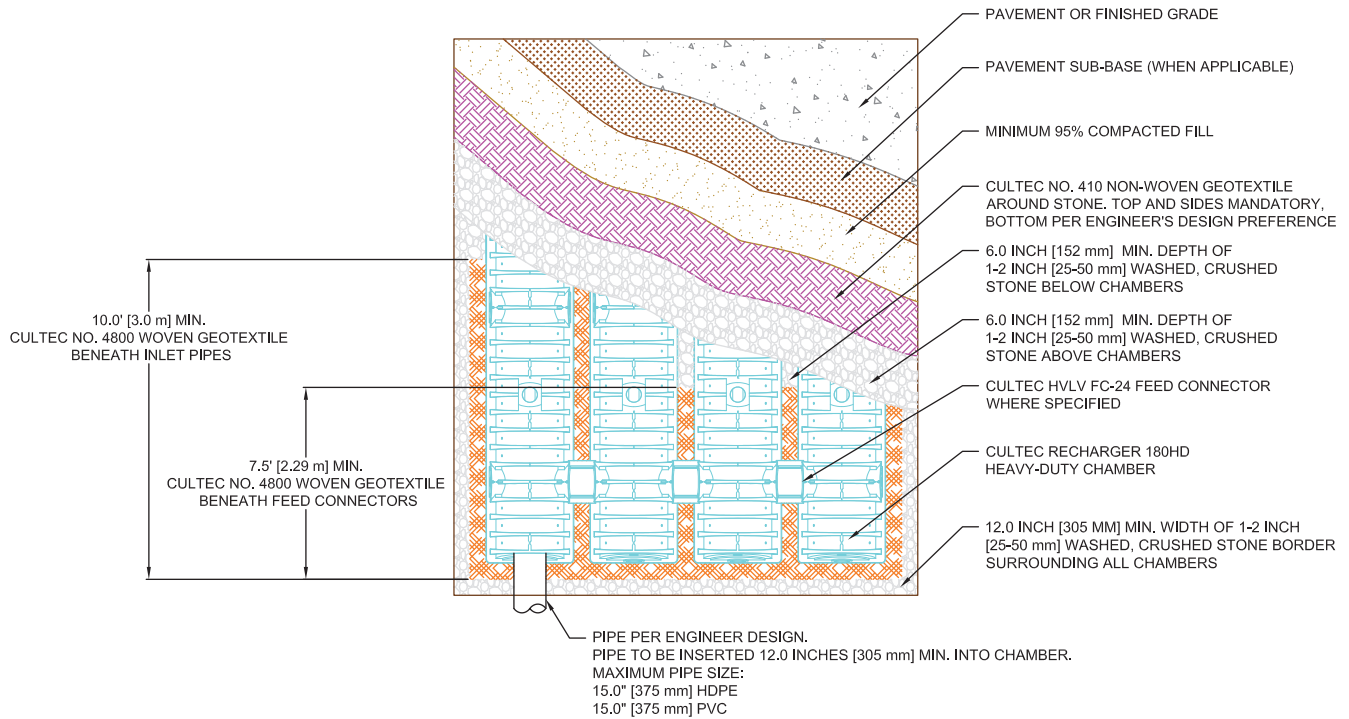


CULTEC RECHARGER 180HD CHAMBER STORAGE = 3.445 FT<sup>3</sup> / FT (0.32 M<sup>3</sup> / M)  
INSTALLED LENGTH ADJUSTMENT = 1.0" [306 mm]

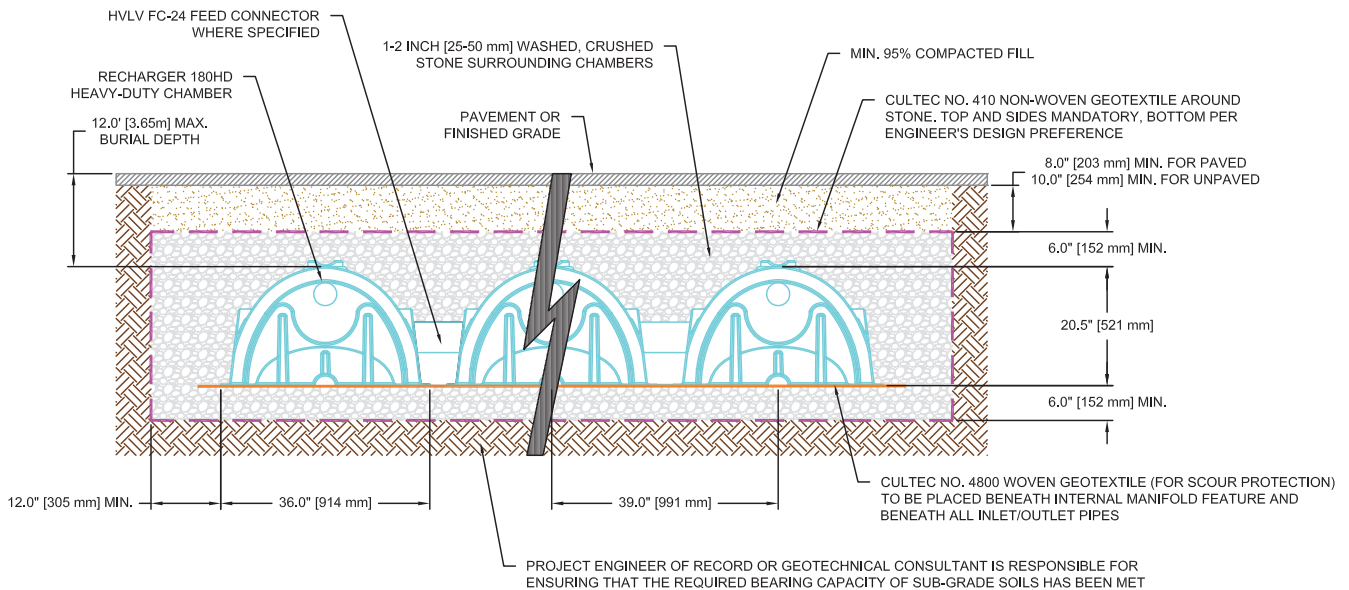
## Typical Interlock Installation



## Plan View Drawing



## Typical Cross Section for Traffic Application





## CULTEC Recharger® 180HD Specifications

### GENERAL

CULTEC Recharger® 180HD chambers are designed for underground stormwater management. The chambers may be used for retention, recharging, detention or controlling the flow of on-site stormwater runoff.

### CHAMBER PARAMETERS

1. The chambers will be manufactured in the U.S.A. by CULTEC, Inc. of Brookfield, CT (cultec.com, 203-775-4416).
2. The chamber shall be vacuum thermoformed of polyethylene with a black interior and blue exterior.
3. The chamber will be arched in shape.
4. The chamber will be open-bottomed.
5. The chamber will be joined using an interlocking overlapping rib method. Connections must be fully shouldered overlapping ribs, having no separate couplings or separate end walls.
6. The nominal chamber dimensions of the CULTEC Recharger® 180HD shall be 20.5 inches (521 mm) tall, 36 inches (914 mm) wide and 7.33 feet (2.23 m) long. The installed length of a joined Recharger® 180HD shall be 6.33 feet (1.93 m).
7. Maximum inlet opening on the chamber endwall is 15 inches (375 mm) HDPE.
8. The chamber will have two side portals to accept CULTEC HVLV® FC-24 Feed Connectors to create an internal manifold. Maximum allowable O.D. in the side portal is 10 inches (250 mm) HDPE and 12 inches (300 mm) PVC.
9. The nominal chamber dimensions of the CULTEC HVLV® FC-24 Feed Connector shall be 12 inches (305 mm) tall, 16 inches (406 mm) wide and 24.2 inches (614 mm) long.
10. The nominal storage volume of the Recharger® 180HD chamber will be 3.445 ft<sup>3</sup> / ft (0.32 m<sup>3</sup> / m) - without stone. The nominal storage volume of a single Recharger 180RHD Stand Alone unit shall be 25.25 ft<sup>3</sup> (0.72 m<sup>3</sup>) - without stone. The nominal storage volume of a joined Recharger® 180IHD Intermediate unit shall be 21.81 ft<sup>3</sup> (0.62 m<sup>3</sup>) - without stone. The nominal storage volume of the length adjustment amount per run shall be 3.445 ft<sup>3</sup> (0.32 m<sup>3</sup>) - without stone. The nominal storage volume of the HVLV® FC-24 Feed Connector will be 0.913 ft<sup>3</sup> / ft (0.085 m<sup>3</sup> / m) - without stone.
11. The Recharger® 180HD chamber will have seventy-eight discharge holes bored into the sidewalls of the unit's core to promote lateral conveyance of water.
12. The Recharger® 180HD chamber shall have 14 corrugations.
13. The endwall of the chamber, when present, will be an integral part of the continuously formed unit. Separate end plates cannot be used with this unit.
14. The Recharger® 180RHD Stand Alone/Starter unit must be formed as a whole chamber having two fully formed integral endwalls and having no separate end plates or separate end walls.
15. The Recharger® 180SHD Starter unit must be formed as a whole chamber having one fully formed integral end wall and one partially formed integral end wall with a lower transfer opening of 7 inches (178 mm) high x 24 inches (610 mm) wide.
16. The Recharger® 180IHD Intermediate unit must be formed as a whole chamber having one fully open end wall and one partially formed integral end wall with a lower transfer opening of 7 inches (178 mm) high x 24 inches (610 mm) wide.
17. The Recharger® 180EHD End unit must be formed as a whole chamber having one fully formed integral endwall and one fully open end wall and having no separate end plates or end walls.
18. The HVLV® FC-24 Feed Connector must be formed as a whole chamber having two open end walls and having no separate end plates or separate end walls. The unit will fit into the side portals of the Recharger® 180HD and act as cross feed connections.
19. Chambers must have horizontal stiffening flex reduction steps between the ribs.
20. The chamber will have a raised integral cap at the top of the arch in the center of each unit to be used as an optional inspection port or clean-out.
21. The units may be trimmed to custom lengths by cutting back to any corrugation on the large rib end.
22. The chamber shall be manufactured in an ISO 9001:2015 certified facility.
23. Maximum allowable cover over the top of the chamber shall be 12' (3.66 m).
24. The chamber shall be designed and manufactured to meet the material and structural requirements of IAPMO PS 63-2019, including resistance to AASHTO H-10 highway live loads, when installed in accordance with CULTEC's installation instructions.
25. The chamber will be designed to withstand traffic loads when installed according to CULTEC's recommended installation instructions.