

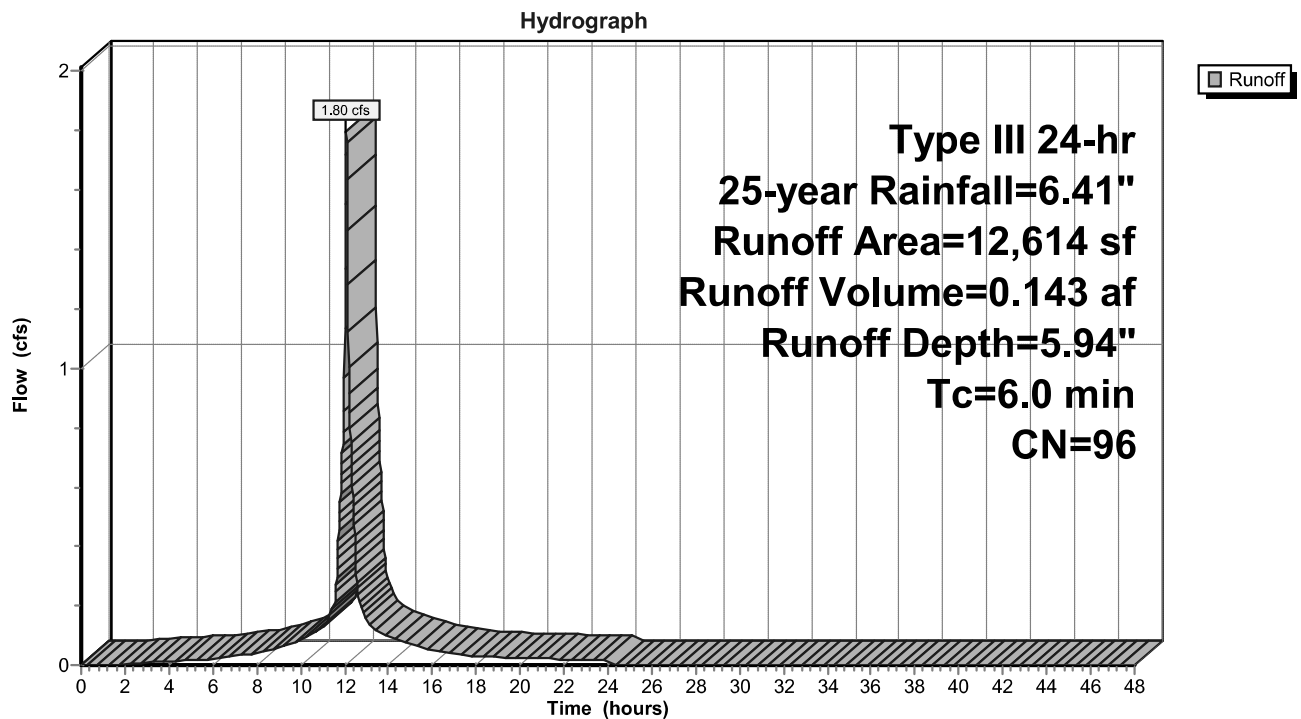
Summary for Subcatchment 2S: FDA-1 to SW Practice

Runoff = 1.80 cfs @ 12.08 hrs, Volume= 0.143 af, Depth= 5.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-year Rainfall=6.41"

Area (sf)	CN	Description
11,057	98	Paved parking, HSG B
780	98	Roofs, HSG B
777	61	>75% Grass cover, Good, HSG B
12,614	96	Weighted Average
777		6.16% Pervious Area
11,837		93.84% Impervious Area

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

Subcatchment 2S: FDA-1 to SW Practice

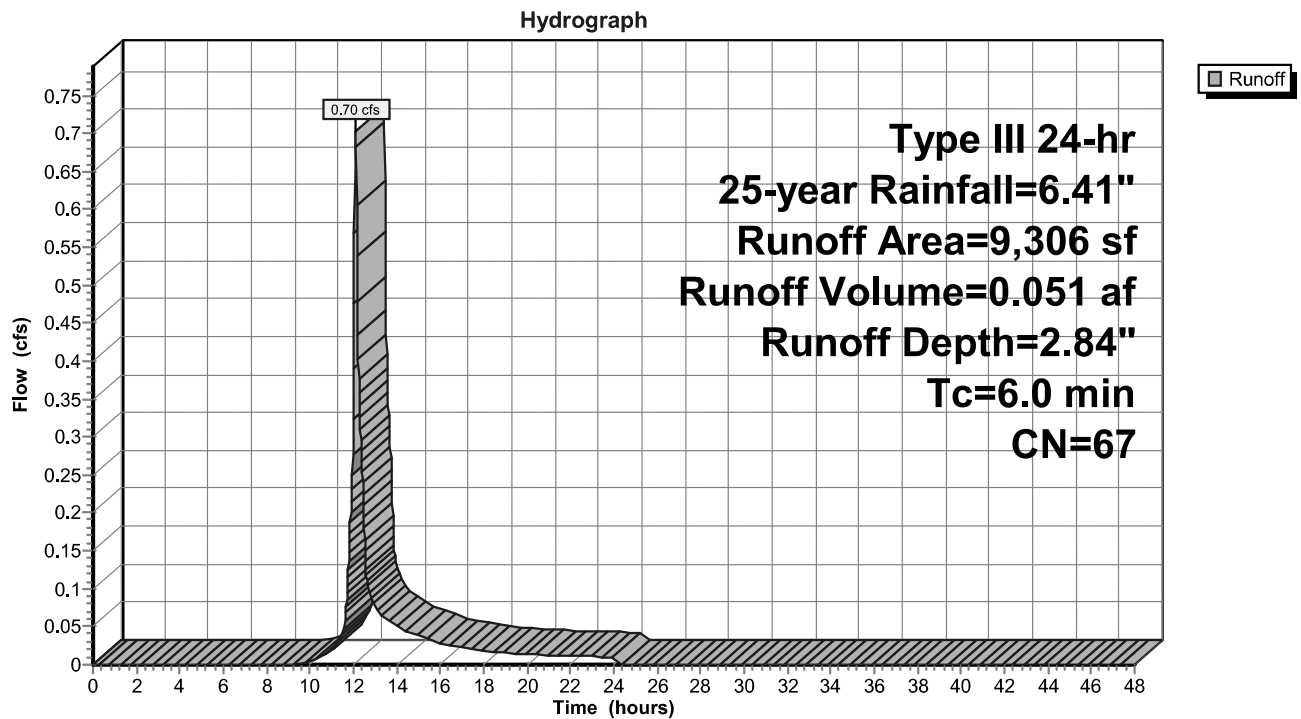
Summary for Subcatchment 3S: FDA-2 to DESIGN POINT

Runoff = 0.70 cfs @ 12.09 hrs, Volume= 0.051 af, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-year Rainfall=6.41"

Area (sf)	CN	Description
1,562	98	Paved parking, HSG B
7,744	61	>75% Grass cover, Good, HSG B
9,306	67	Weighted Average
7,744		83.22% Pervious Area
1,562		16.78% Impervious Area

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

Subcatchment 3S: FDA-2 to DESIGN POINT

Summary for Subcatchment 5S: FDA-3

Runoff = 0.07 cfs @ 12.09 hrs, Volume= 0.005 af, Depth= 2.28"

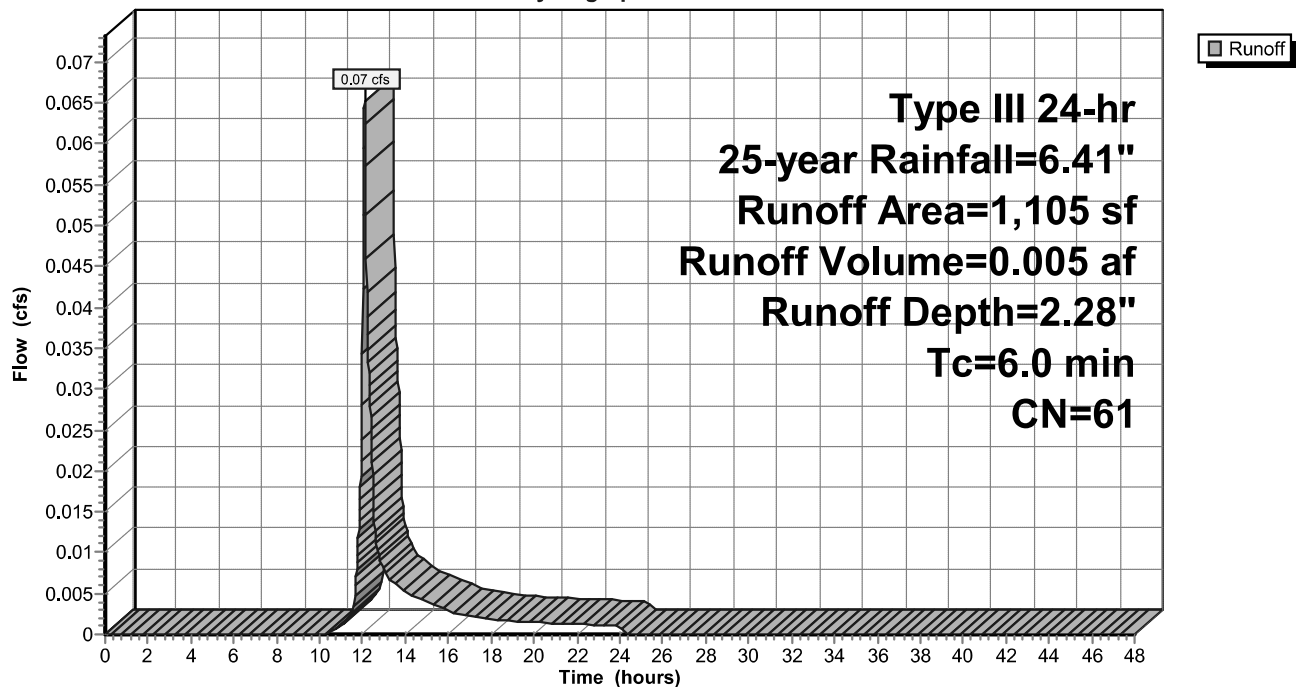
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-year Rainfall=6.41"

Area (sf)	CN	Description
1,105	61	>75% Grass cover, Good, HSG B
1,105		100.00% Pervious Area

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

Subcatchment 5S: FDA-3

Hydrograph



Summary for Reach 5R: Culvert Pipes to Exist CB

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.290 ac, 93.84% Impervious, Inflow Depth = 1.75" for 25-year event
 Inflow = 1.21 cfs @ 12.16 hrs, Volume= 0.042 af
 Outflow = 1.21 cfs @ 12.17 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Max. Velocity= 6.50 fps, Min. Travel Time= 0.4 min

Avg. Velocity = 2.85 fps, Avg. Travel Time= 0.8 min

Peak Storage= 26 cf @ 12.16 hrs

Average Depth at Peak Storage= 0.29' , Surface Width= 0.90'

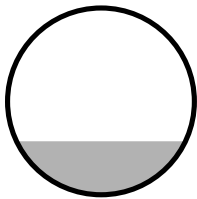
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.74 cfs

12.0" Round Pipe

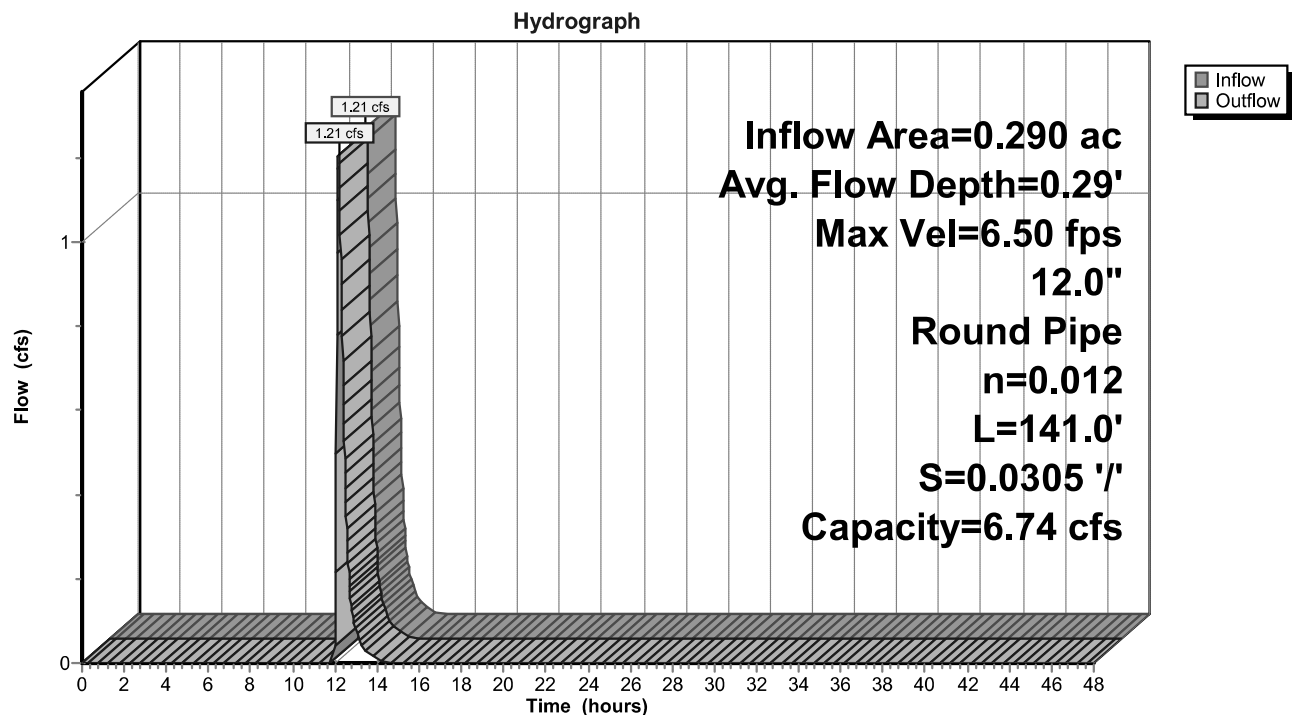
n= 0.012

Length= 141.0' Slope= 0.0305 '/'

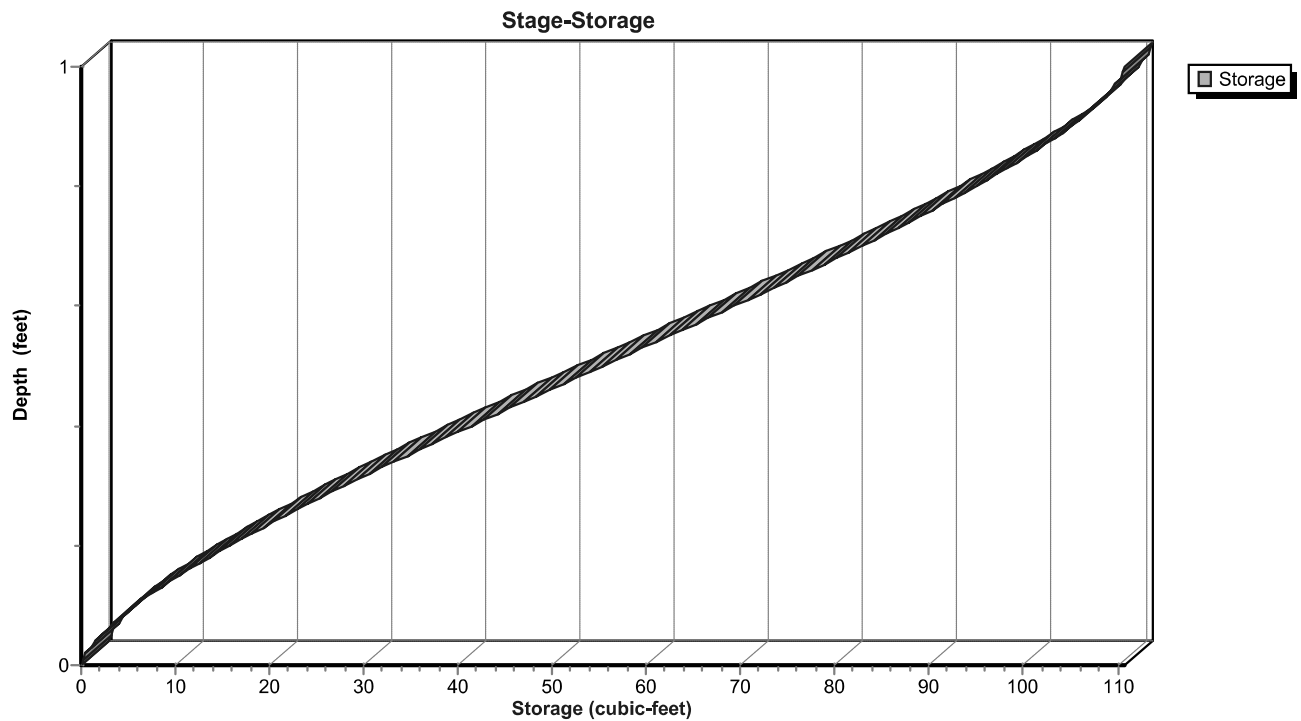
Inlet Invert= 21.80', Outlet Invert= 17.50'



Reach 5R: Culvert Pipes to Exist CB



Reach 5R: Culvert Pipes to Exist CB



Summary for Pond 5P: SW Practice

Inflow Area = 0.290 ac, 93.84% Impervious, Inflow Depth = 5.94" for 25-year event
 Inflow = 1.80 cfs @ 12.08 hrs, Volume= 0.143 af
 Outflow = 1.31 cfs @ 12.16 hrs, Volume= 0.143 af, Atten= 27%, Lag= 4.5 min
 Discarded = 0.10 cfs @ 10.46 hrs, Volume= 0.101 af
 Primary = 1.21 cfs @ 12.16 hrs, Volume= 0.042 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Peak Elev= 24.16' @ 12.16 hrs Surf.Area= 863 sf Storage= 1,258 cf

Plug-Flow detention time= 45.5 min calculated for 0.143 af (100% of inflow)
 Center-of-Mass det. time= 45.5 min (802.3 - 756.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	22.08'	689 cf	19.17'W x 45.00'L x 3.21'H Field A 2,767 cf Overall - 1,044 cf Embedded = 1,723 cf x 40.0% Voids
#2A	22.58'	1,044 cf	Cultec R-280HD x 24 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 4 rows
		1,733 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	22.58'	12.0" Round Culvert L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 22.58' / 22.25' S= 0.1100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	23.50'	6.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	24.25'	6.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#4	Device 1	25.00'	3.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#5	Discarded	22.08'	5.000 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.10 cfs @ 10.46 hrs HW=22.11' (Free Discharge)
 ↑ **5=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=1.21 cfs @ 12.16 hrs HW=24.16' (Free Discharge)
 ↑ **1=Culvert** (Passes 1.21 cfs of 3.93 cfs potential flow)
 ↑ **2=Orifice/Grate** (Orifice Controls 1.21 cfs @ 3.08 fps)
 ↑ **3=Orifice/Grate** (Controls 0.00 cfs)
 ↑ **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: SW Practice - Chamber Wizard Field A

Chamber Model = Cultec R-280HD (Cultec Recharger® 280HD)

Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf

Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap

Row Length Adjustment= +1.00' x 6.07 sf x 4 rows

47.0" Wide + 6.0" Spacing = 53.0" C-C Row Spacing

6 Chambers/Row x 7.00' Long +1.00' Row Adjustment = 43.00' Row Length +12.0" End Stone x 2 = 45.00' Base Length

4 Rows x 47.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 19.17' Base Width

6.0" Stone Base + 26.5" Chamber Height + 6.0" Stone Cover = 3.21' Field Height

24 Chambers x 42.5 cf +1.00' Row Adjustment x 6.07 sf x 4 Rows = 1,044.3 cf Chamber Storage

2,767.2 cf Field - 1,044.3 cf Chambers = 1,722.8 cf Stone x 40.0% Voids = 689.1 cf Stone Storage

Chamber Storage + Stone Storage = 1,733.5 cf = 0.040 af

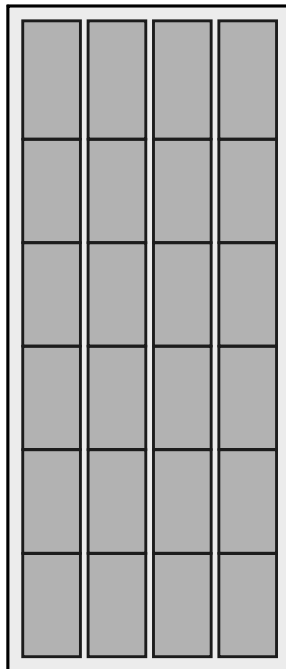
Overall Storage Efficiency = 62.6%

Overall System Size = 45.00' x 19.17' x 3.21'

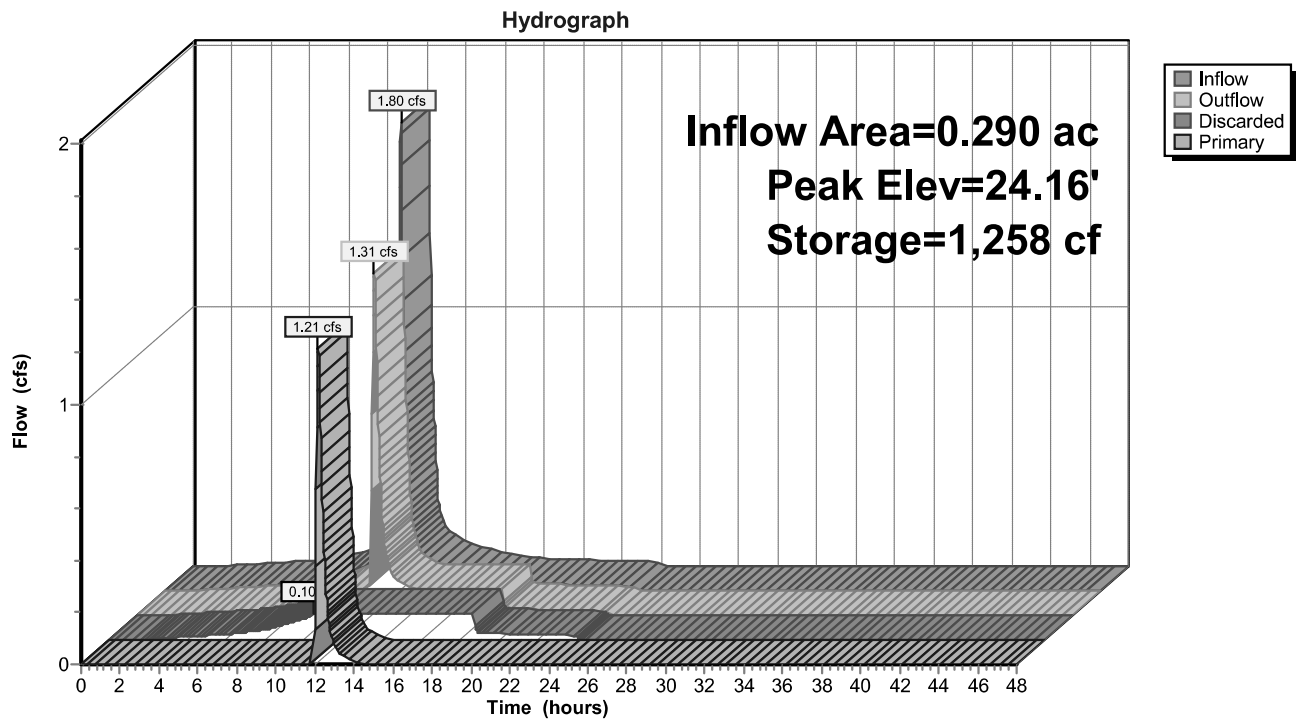
24 Chambers

102.5 cy Field

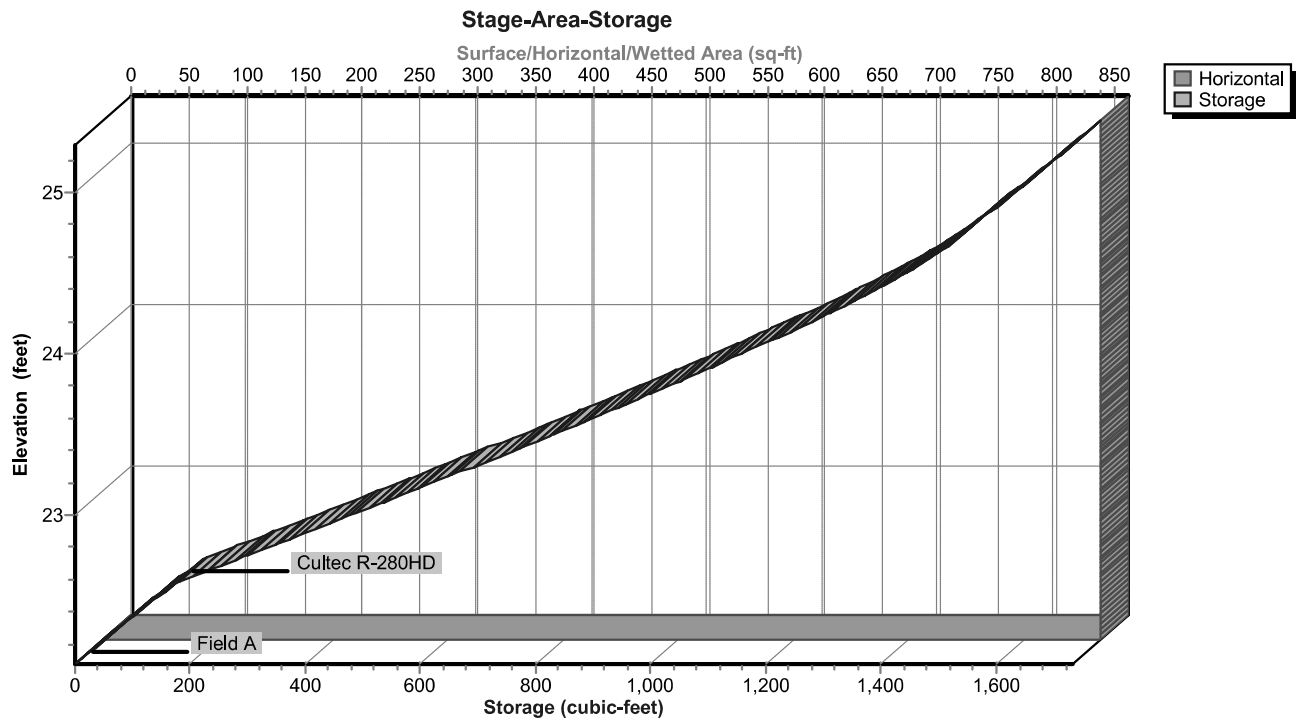
63.8 cy Stone



Pond 5P: SW Practice



Pond 5P: SW Practice

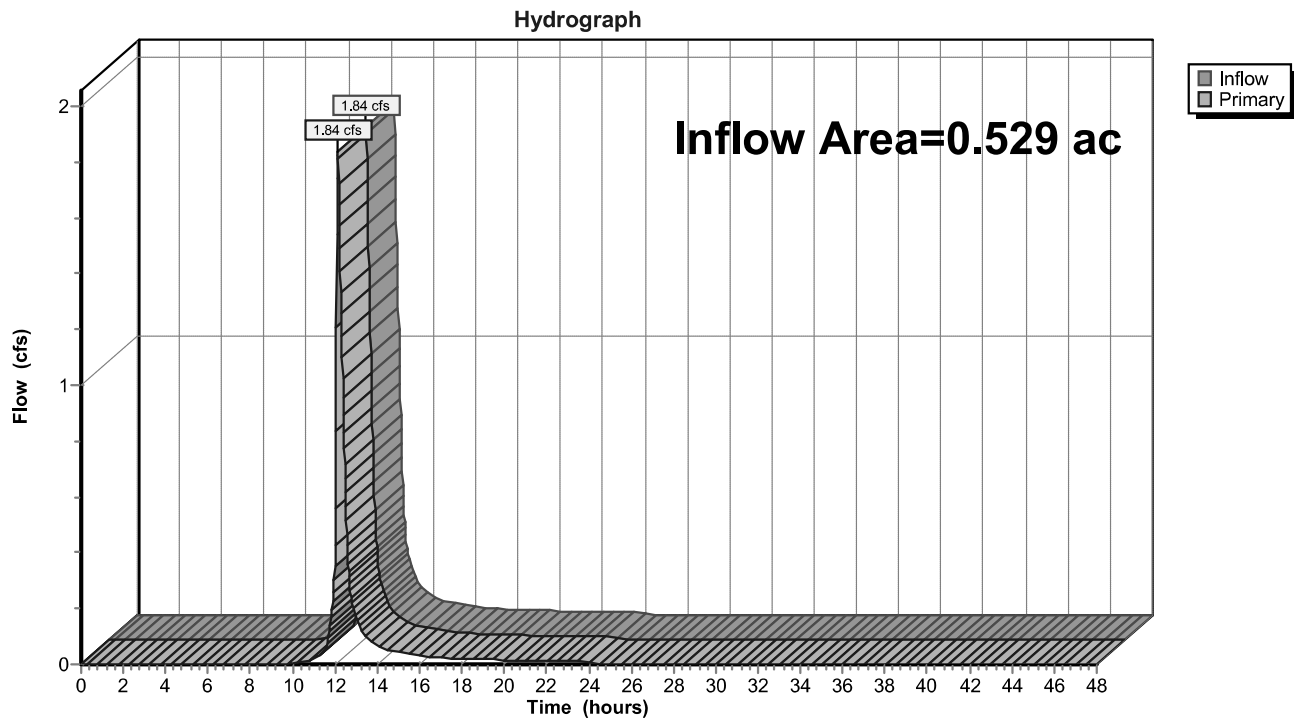


Summary for Link 4L: DESIGN POINT

Inflow Area = 0.529 ac, 58.19% Impervious, Inflow Depth = 2.22" for 25-year event
 Inflow = 1.84 cfs @ 12.13 hrs, Volume= 0.098 af
 Primary = 1.84 cfs @ 12.13 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Link 4L: DESIGN POINT



Toyota City SW Plan_09-29-2021*Type III 24-hr 100-year Rainfall=9.03"*

Prepared by ALP Engineering & Land. Arch. PLLC

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Page 38

Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 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: XDA-1 to DESIGN Runoff Area=23,238 sf 38.01% Impervious Runoff Depth=6.47"
Tc=6.0 min CN=79 Runoff=3.97 cfs 0.288 af

Subcatchment 2S: FDA-1 to SW Practice Runoff Area=12,614 sf 93.84% Impervious Runoff Depth=8.55"
Tc=6.0 min CN=96 Runoff=2.55 cfs 0.206 af

Subcatchment 3S: FDA-2 to DESIGN POINT Runoff Area=9,306 sf 16.78% Impervious Runoff Depth=4.99"
Tc=6.0 min CN=67 Runoff=1.25 cfs 0.089 af

Subcatchment 5S: FDA-3 Runoff Area=1,105 sf 0.00% Impervious Runoff Depth=4.25"
Tc=6.0 min CN=61 Runoff=0.13 cfs 0.009 af

Reach 5R: Culvert Pipes to Exist CB Avg. Flow Depth=0.38' Max Vel=7.59 fps Inflow=2.12 cfs 0.084 af
12.0" Round Pipe n=0.012 L=141.0' S=0.0305 '/' Capacity=6.74 cfs Outflow=2.11 cfs 0.084 af

Pond 5P: SW Practice Peak Elev=24.54' Storage=1,465 cf Inflow=2.55 cfs 0.206 af
Discarded=0.10 cfs 0.123 af Primary=2.12 cfs 0.084 af Outflow=2.22 cfs 0.206 af

Link 4L: DESIGN POINT Inflow=3.33 cfs 0.182 af
Primary=3.33 cfs 0.182 af

Total Runoff Area = 1.062 ac Runoff Volume = 0.592 af Average Runoff Depth = 6.69"
51.94% Pervious = 0.552 ac 48.06% Impervious = 0.510 ac

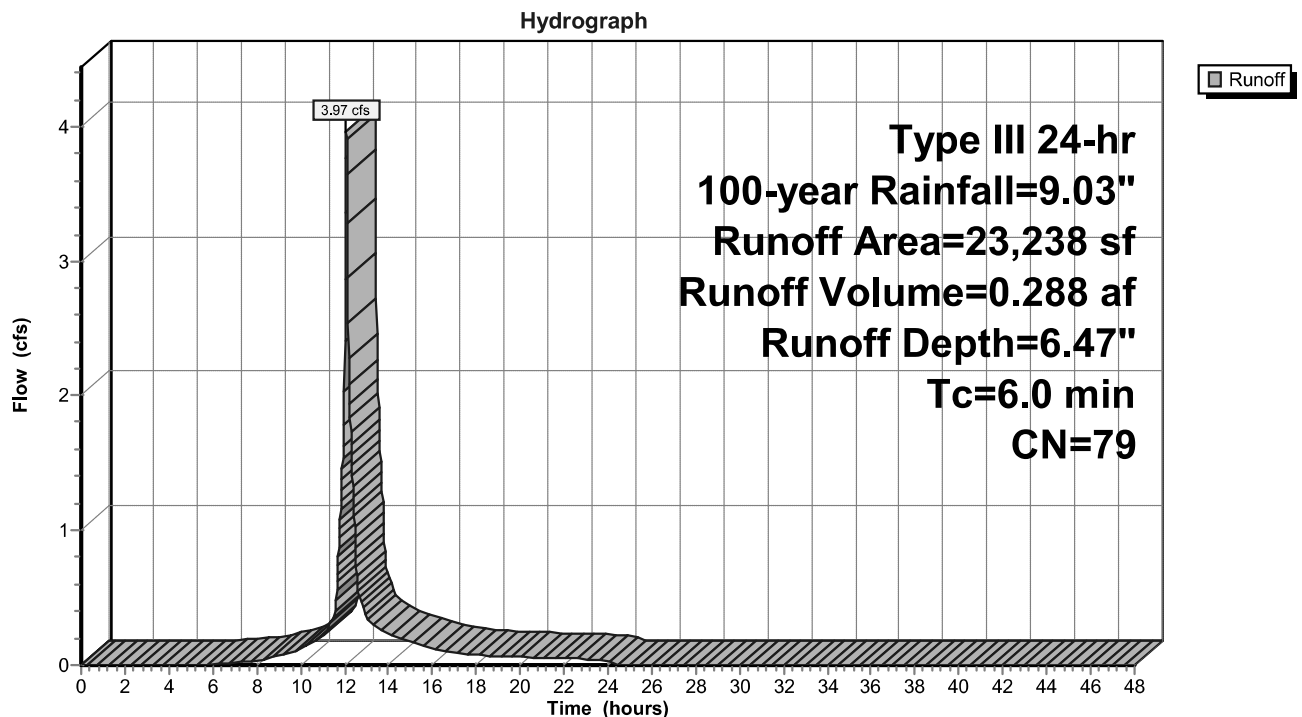
Summary for Subcatchment 1S: XDA-1 to DESIGN POINT

Runoff = 3.97 cfs @ 12.09 hrs, Volume= 0.288 af, Depth= 6.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-year Rainfall=9.03"

Area (sf)	CN	Description
8,833	98	Paved parking, HSG B
10,339	69	50-75% Grass cover, Fair, HSG B
4,066	61	>75% Grass cover, Good, HSG B
23,238	79	Weighted Average
14,405		61.99% Pervious Area
8,833		38.01% Impervious Area

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

Subcatchment 1S: XDA-1 to DESIGN POINT

Summary for Subcatchment 2S: FDA-1 to SW Practice

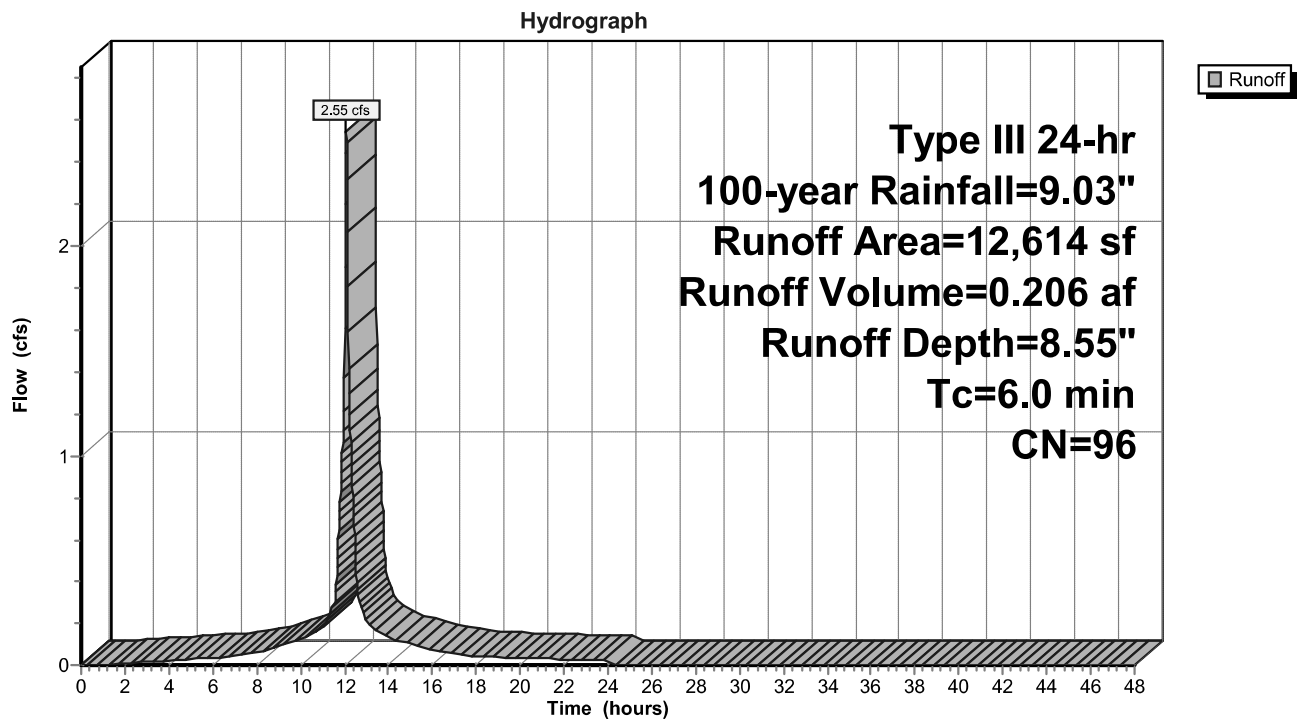
Runoff = 2.55 cfs @ 12.08 hrs, Volume= 0.206 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-year Rainfall=9.03"

Area (sf)	CN	Description
11,057	98	Paved parking, HSG B
780	98	Roofs, HSG B
777	61	>75% Grass cover, Good, HSG B
12,614	96	Weighted Average
777		6.16% Pervious Area
11,837		93.84% Impervious Area

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

Subcatchment 2S: FDA-1 to SW Practice



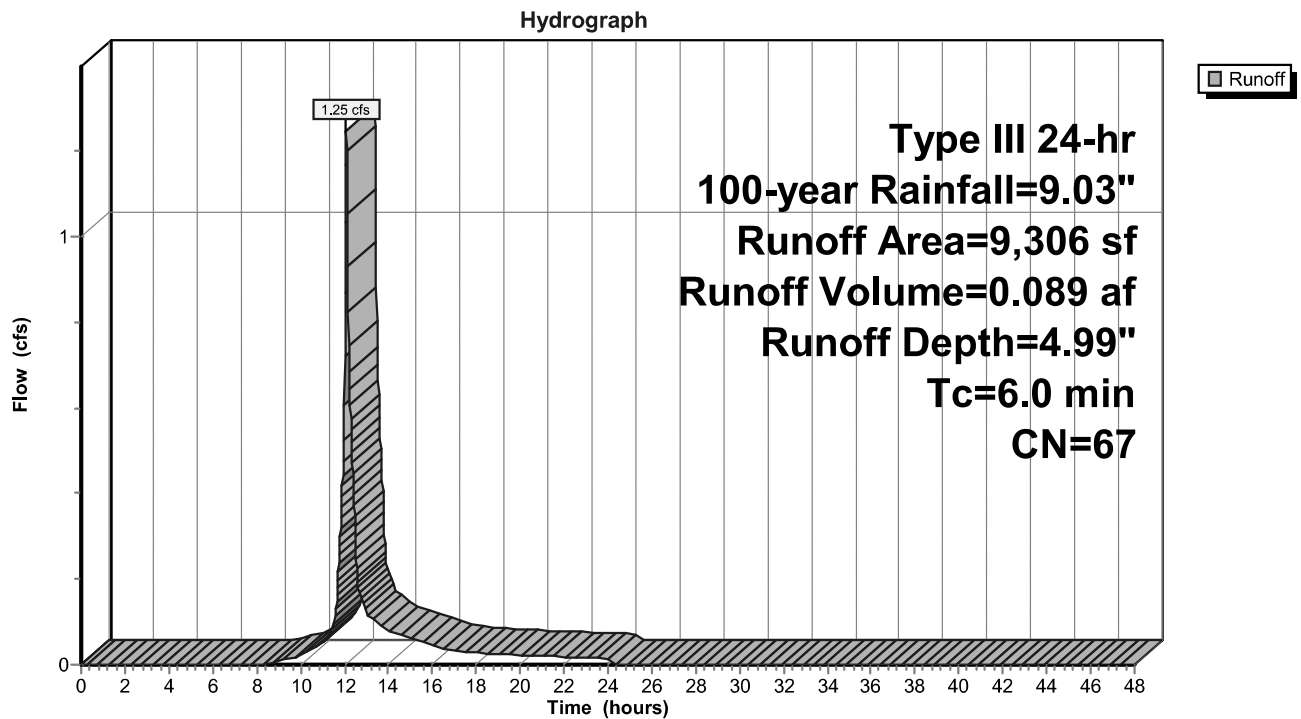
Summary for Subcatchment 3S: FDA-2 to DESIGN POINT

Runoff = 1.25 cfs @ 12.09 hrs, Volume= 0.089 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-year Rainfall=9.03"

Area (sf)	CN	Description
1,562	98	Paved parking, HSG B
7,744	61	>75% Grass cover, Good, HSG B
9,306	67	Weighted Average
7,744		83.22% Pervious Area
1,562		16.78% Impervious Area

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

Subcatchment 3S: FDA-2 to DESIGN POINT

Summary for Subcatchment 5S: FDA-3

Runoff = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 4.25"

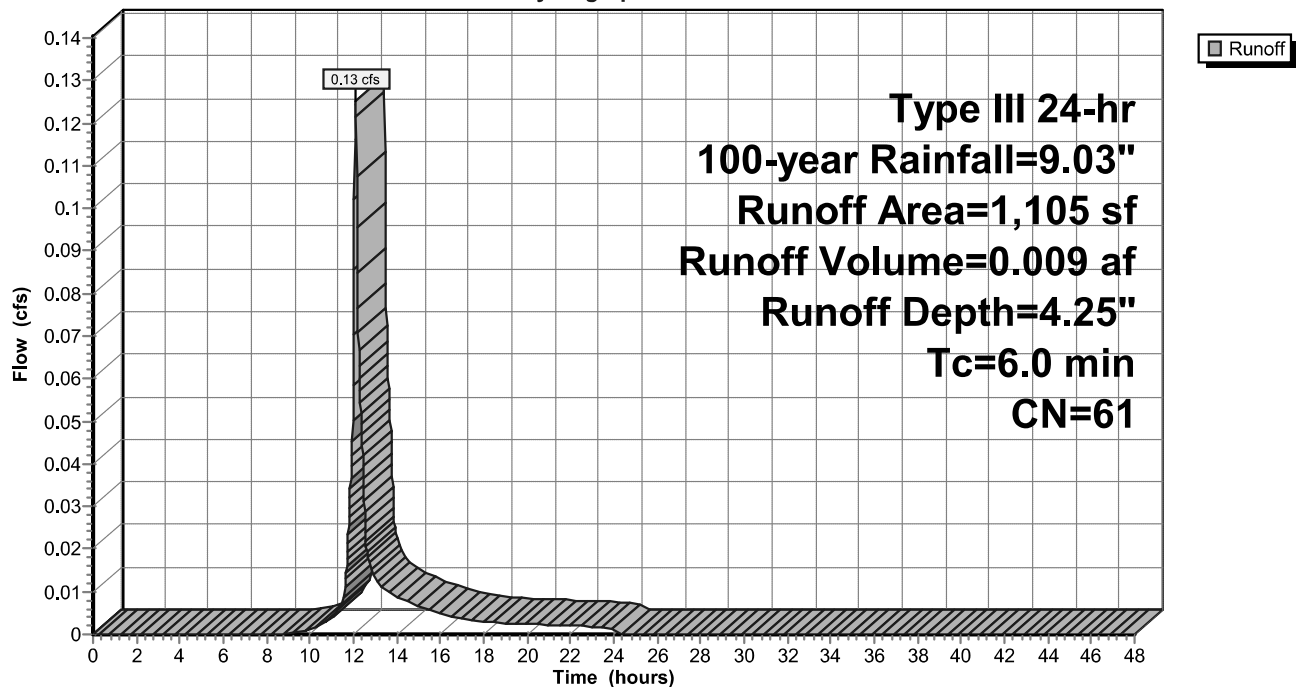
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-year Rainfall=9.03"

Area (sf)	CN	Description
1,105	61	>75% Grass cover, Good, HSG B
1,105		100.00% Pervious Area

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

Subcatchment 5S: FDA-3

Hydrograph



Summary for Reach 5R: Culvert Pipes to Exist CB

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.290 ac, 93.84% Impervious, Inflow Depth = 3.47" for 100-year event
 Inflow = 2.12 cfs @ 12.13 hrs, Volume= 0.084 af
 Outflow = 2.11 cfs @ 12.14 hrs, Volume= 0.084 af, Atten= 1%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Max. Velocity= 7.59 fps, Min. Travel Time= 0.3 min

Avg. Velocity = 3.07 fps, Avg. Travel Time= 0.8 min

Peak Storage= 39 cf @ 12.13 hrs

Average Depth at Peak Storage= 0.38' , Surface Width= 0.97'

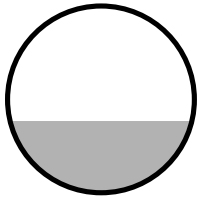
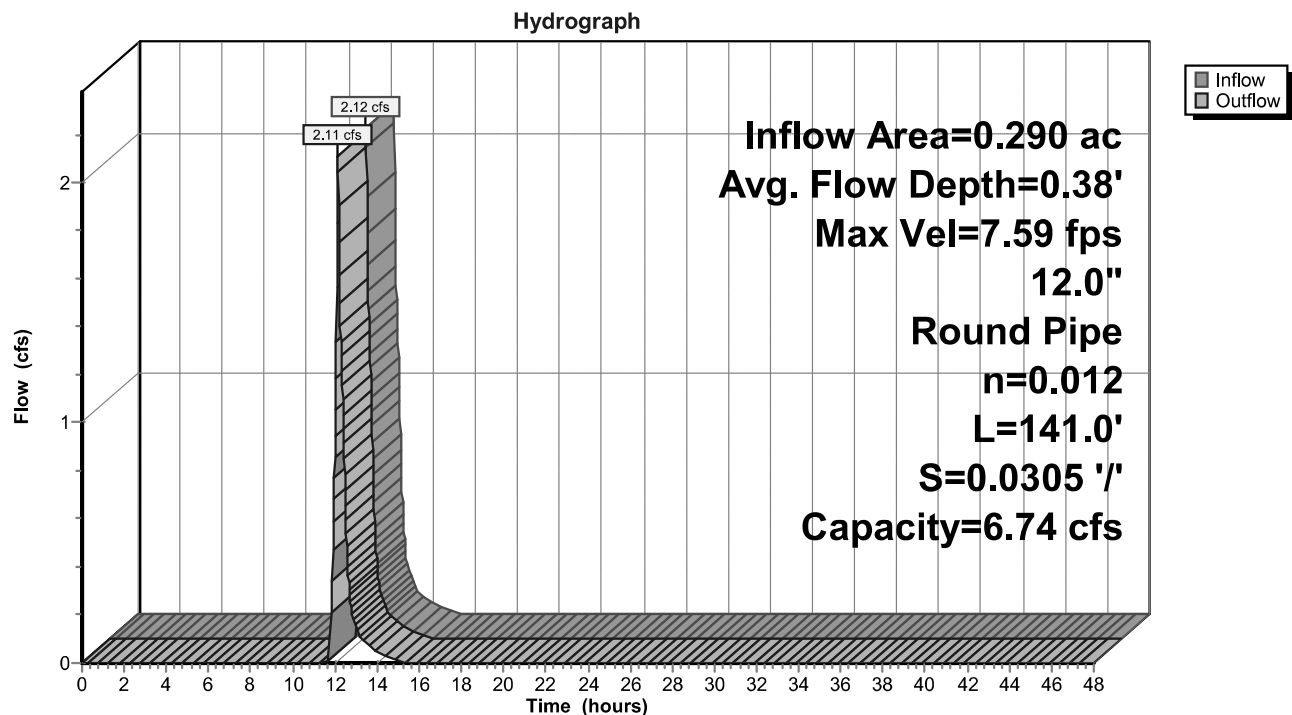
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.74 cfs

12.0" Round Pipe

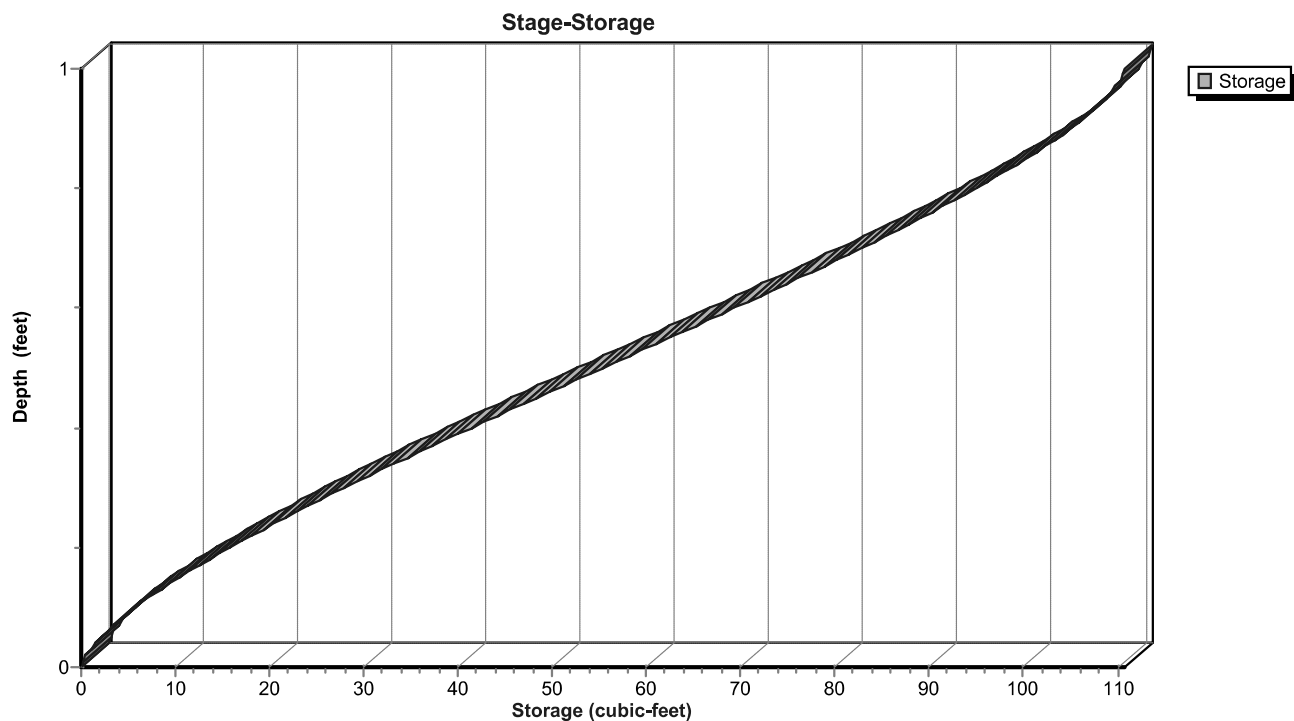
n= 0.012

Length= 141.0' Slope= 0.0305 '/'

Inlet Invert= 21.80', Outlet Invert= 17.50'

**Reach 5R: Culvert Pipes to Exist CB**

Reach 5R: Culvert Pipes to Exist CB



Summary for Pond 5P: SW Practice

Inflow Area = 0.290 ac, 93.84% Impervious, Inflow Depth = 8.55" for 100-year event
 Inflow = 2.55 cfs @ 12.08 hrs, Volume= 0.206 af
 Outflow = 2.22 cfs @ 12.13 hrs, Volume= 0.206 af, Atten= 13%, Lag= 2.8 min
 Discarded = 0.10 cfs @ 9.36 hrs, Volume= 0.123 af
 Primary = 2.12 cfs @ 12.13 hrs, Volume= 0.084 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Peak Elev= 24.54' @ 12.13 hrs Surf.Area= 863 sf Storage= 1,465 cf

Plug-Flow detention time= 42.2 min calculated for 0.206 af (100% of inflow)
 Center-of-Mass det. time= 42.2 min (792.3 - 750.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	22.08'	689 cf	19.17'W x 45.00'L x 3.21'H Field A 2,767 cf Overall - 1,044 cf Embedded = 1,723 cf x 40.0% Voids
#2A	22.58'	1,044 cf	Cultec R-280HD x 24 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 4 rows
		1,733 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	22.58'	12.0" Round Culvert L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 22.58' / 22.25' S= 0.1100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	23.50'	6.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	24.25'	6.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#4	Device 1	25.00'	3.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#5	Discarded	22.08'	5.000 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.10 cfs @ 9.36 hrs HW=22.11' (Free Discharge)
 ↑ **5=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=2.10 cfs @ 12.13 hrs HW=24.54' (Free Discharge)
 ↑ **1=Culvert** (Passes 2.10 cfs of 4.56 cfs potential flow)
 ↑ **2=Orifice/Grate** (Orifice Controls 1.68 cfs @ 4.27 fps)
 ↑ **3=Orifice/Grate** (Orifice Controls 0.43 cfs @ 1.82 fps)
 ↑ **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: SW Practice - Chamber Wizard Field A

Chamber Model = Cultec R-280HD (Cultec Recharger® 280HD)

Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf

Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap

Row Length Adjustment= +1.00' x 6.07 sf x 4 rows

47.0" Wide + 6.0" Spacing = 53.0" C-C Row Spacing

6 Chambers/Row x 7.00' Long +1.00' Row Adjustment = 43.00' Row Length +12.0" End Stone x 2 = 45.00' Base Length

4 Rows x 47.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 19.17' Base Width

6.0" Stone Base + 26.5" Chamber Height + 6.0" Stone Cover = 3.21' Field Height

24 Chambers x 42.5 cf +1.00' Row Adjustment x 6.07 sf x 4 Rows = 1,044.3 cf Chamber Storage

2,767.2 cf Field - 1,044.3 cf Chambers = 1,722.8 cf Stone x 40.0% Voids = 689.1 cf Stone Storage

Chamber Storage + Stone Storage = 1,733.5 cf = 0.040 af

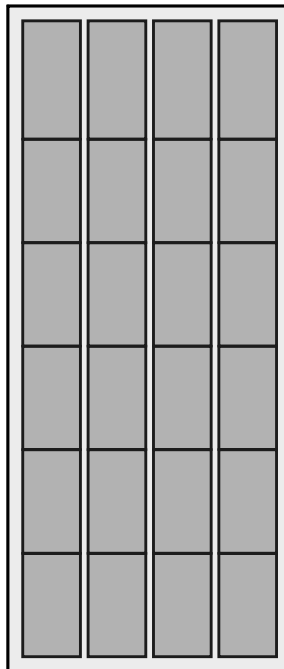
Overall Storage Efficiency = 62.6%

Overall System Size = 45.00' x 19.17' x 3.21'

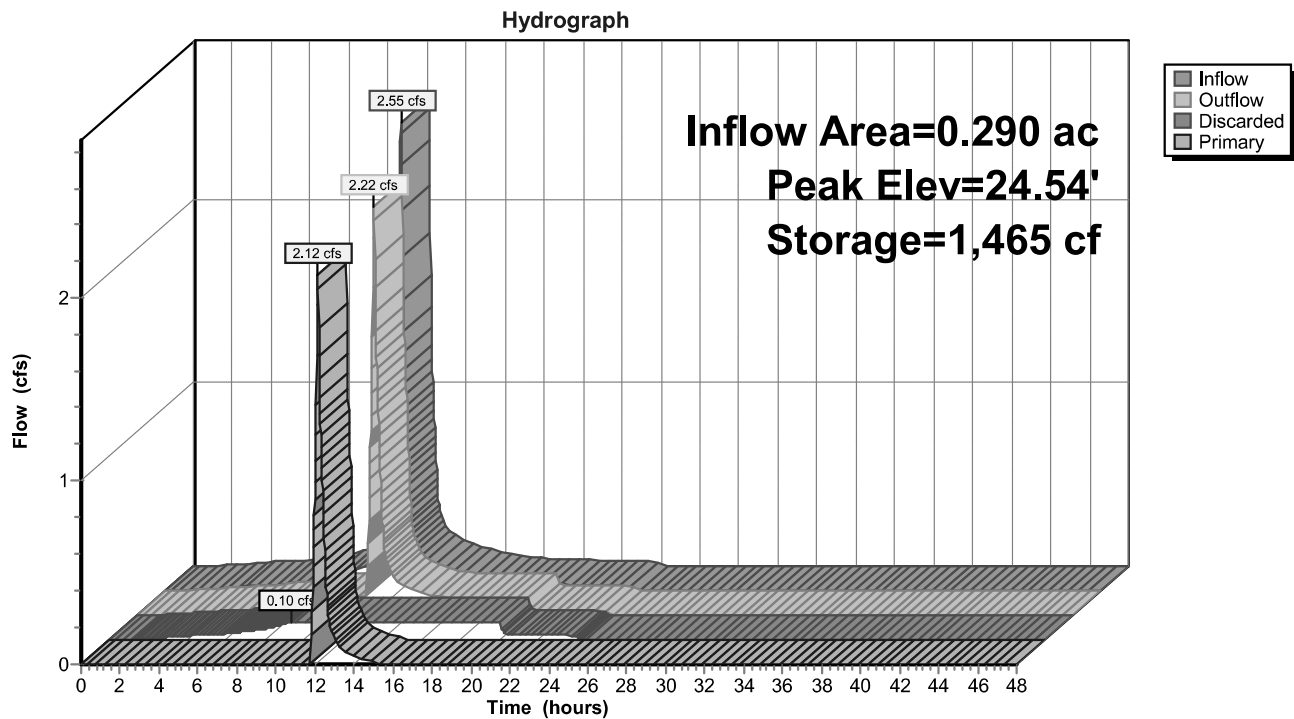
24 Chambers

102.5 cy Field

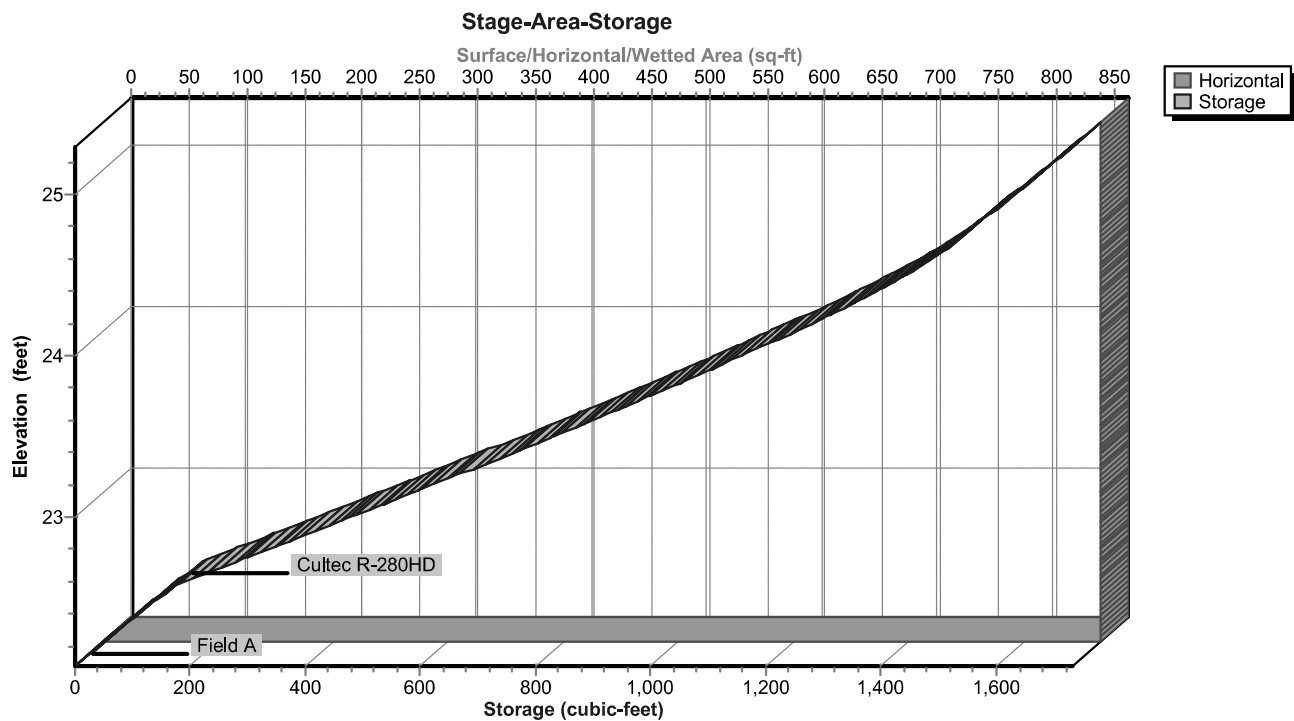
63.8 cy Stone



Pond 5P: SW Practice



Pond 5P: SW Practice



Summary for Link 4L: DESIGN POINT

Inflow Area = 0.529 ac, 58.19% Impervious, Inflow Depth = 4.12" for 100-year event
 Inflow = 3.33 cfs @ 12.12 hrs, Volume= 0.182 af
 Primary = 3.33 cfs @ 12.12 hrs, Volume= 0.182 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Link 4L: DESIGN POINT

