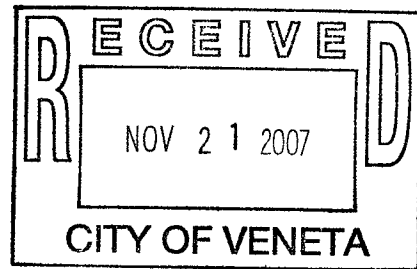


# Storm Detention Analysis

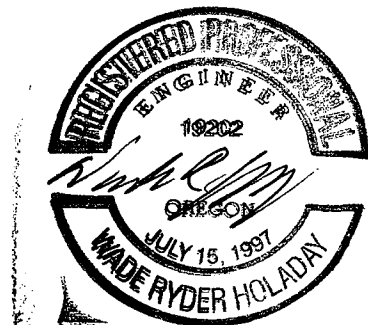
## Labrador Partition

November 2, 2007



Prepared for:  
**Eric Hample**

By:  
**Olson & Morris**



The proposed subdivision is located along the west side of 8<sup>th</sup> Street, south of Park View, and has an area of 1.00 acres. Site is located within Tax Map 17-06-36 42, Tax Lot 2300.

This analysis was created by the use of HydroCAD Stormwater modeling software.

**Existing System:**

The site naturally slopes from south to north and has a low area approximately 140 feet west of the 8<sup>th</sup> Street right of way, at this low area surface runoff from the site flows northward along the common lot line of tax lots 2100 and 2200. This flow continues along the lot line for about 70 feet at which point the flow turns to the northeast and enters tax lot 2200, from this point the runoff crosses the northwest corner of tax lot 2200 prior to crossing a 20 foot panhandle of tax lot 2100 and entering the public park area drain and drainage system.

Refer to Existing Condition Report printouts for existing flow rates that are generated from the subject property.

**Proposed System:**

The proposed system will consist of individual detention systems for each of the proposed three lots. Each system is designed to reduce the runoff from the new impervious areas, created with development, to at or below existing condition flow rates.

Each system will consist of an underground trench that will have a 4" perforated pipe running along the bottom of trench for its entire length. Cleanouts will be provided at each end of the trench for future maintenance of the system. The detention trench will be lined with geotextile filter fabric and backfill with open graded rock with a minimum of 30% voids. Each of the three detention systems will have a flow control structure, as shown on the attached detail, that is designed to outlet at a rate below the existing condition flows. These outlet structures will release runoff into a piped system that will then outlet into the existing low area along the north property line to allow the flow to continue along the current flow path.

**Calculations:**

The calculations for this system were calculated using HydroCad version 6.0 storm water modeling software that utilizes the SCS method for runoff calculations. Refer to computer reports for calculations and detention system summary.

**System Flow Summary:**

**Existing Conditions:**  
(flow crossing panhandle of Tax Lot 2200)

2 Year Event	= 0.33 cfs
10 Year Event	= 0.54 cfs
25 Year Event	= 0.65 cfs

For the developed condition calculations, we have assumed an impervious of 2,600 sf for each of the future homes. The driveway area within each lot is also included as an impervious area.

Developed Conditions: (without detention)

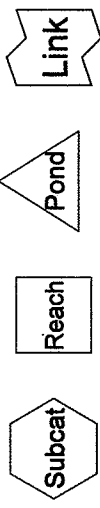
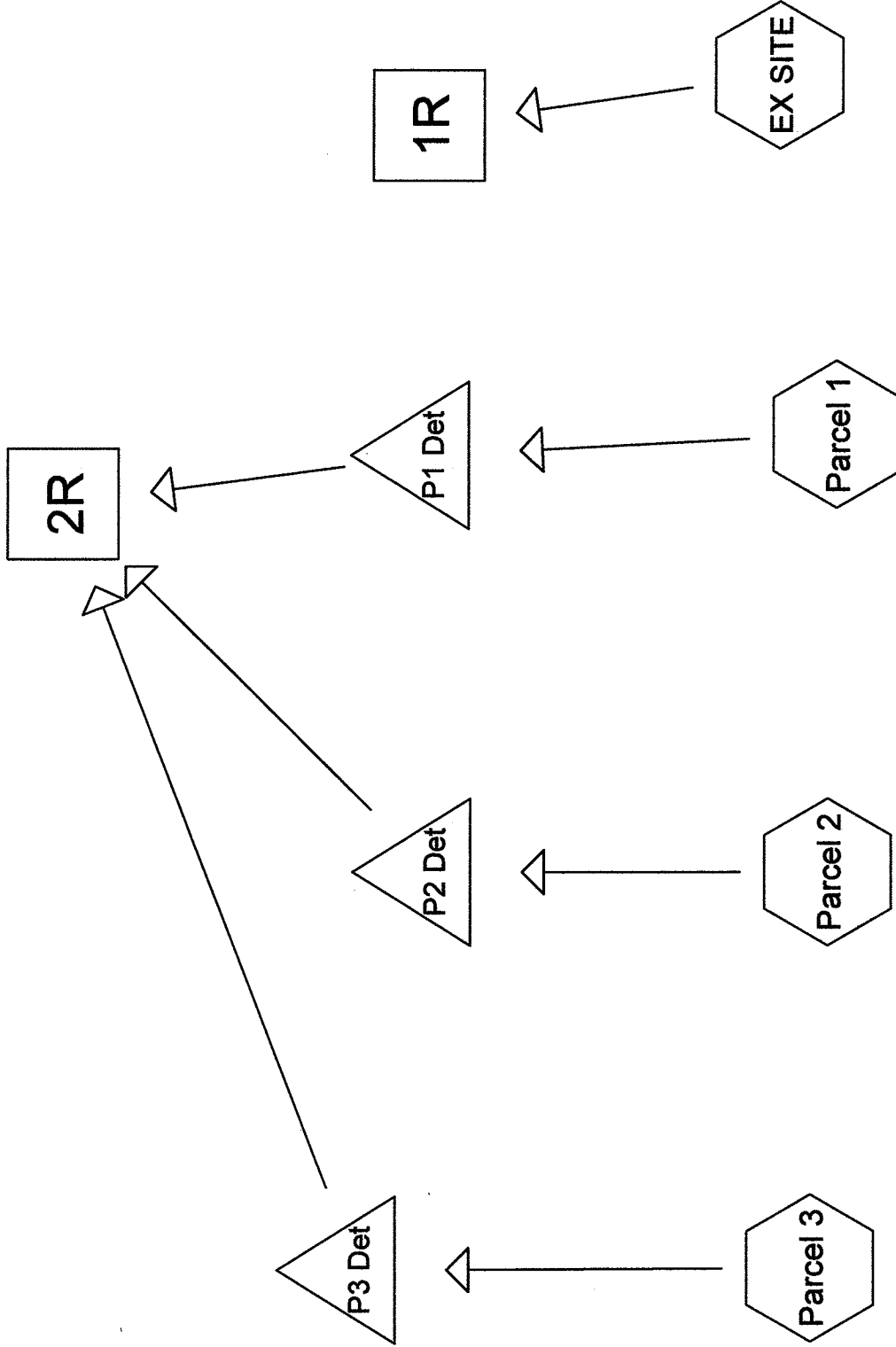
2 Year Event	= 0.52 cfs
10 Year Event	= 0.76 cfs
25 Year Event	= 0.89 cfs

Developed Conditions: (with detention)

2 Year Event	= 0.20 cfs
10 Year Event	= 0.28 cfs
25 Year Event	= 0.34 cfs

**Conclusion:**

The proposed partition and detention systems will reduce the amount storm water runoff currently crossing Tax Lot 2200 and entering the exiting area drain and pipe system within the City park, with this, we feel that this development will have no adverse impacts to the existing drainage system.



**Drainage Diagram for 3787-HAMPLE**  
 Prepared by {enter your company name here} 11/8/2007  
 HydroCAD® 6.00 s/n 001772 © 1986-2001 Applied Microcomputer Systems

**Subcatchment EX SITE: EX CONDITIONS**

Runoff = 0.33 cfs @ 8.03 hrs, Volume= 0.124 af

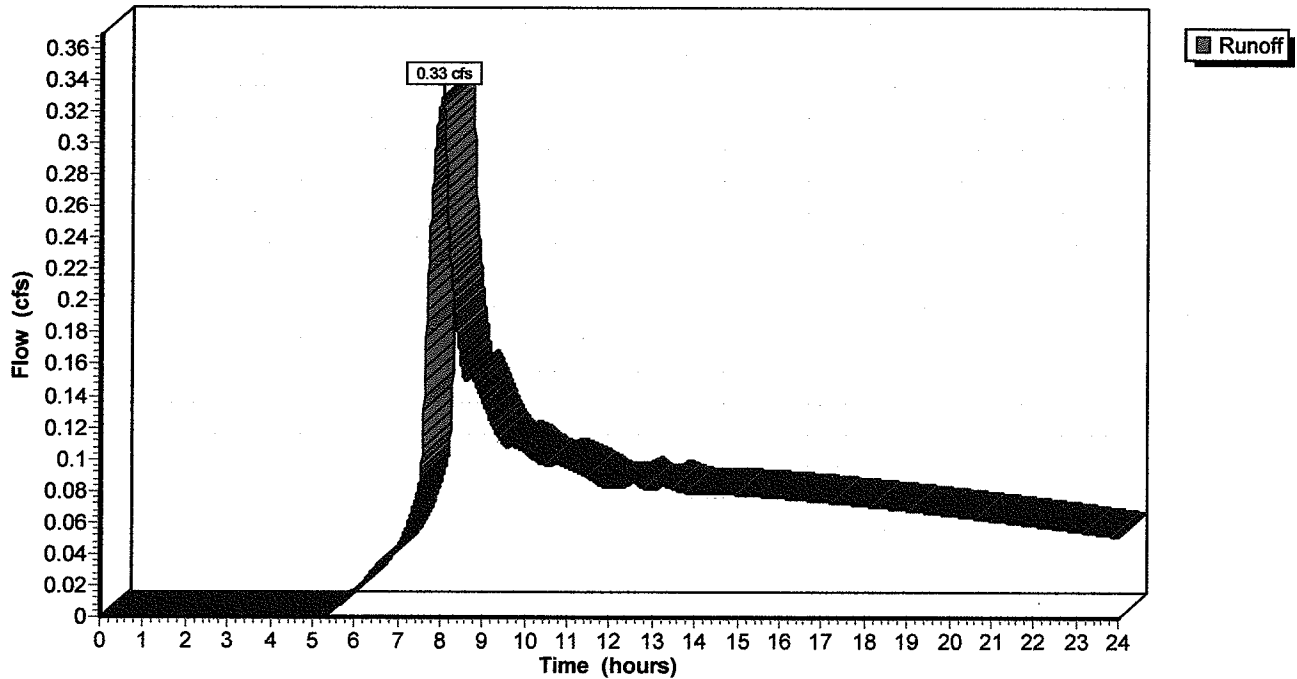
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Type IA 24-hr Rainfall=3.50"

Area (ac)	CN	Description
0.940	77	Brush, Fair, HSG D
0.060	98	Paved parking & roofs
1.000	78	Weighted Average

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

**Subcatchment EX SITE: EX CONDITIONS**

Hydrograph Plot



**Reach 1R: EXISTING FLOW PATTERN**

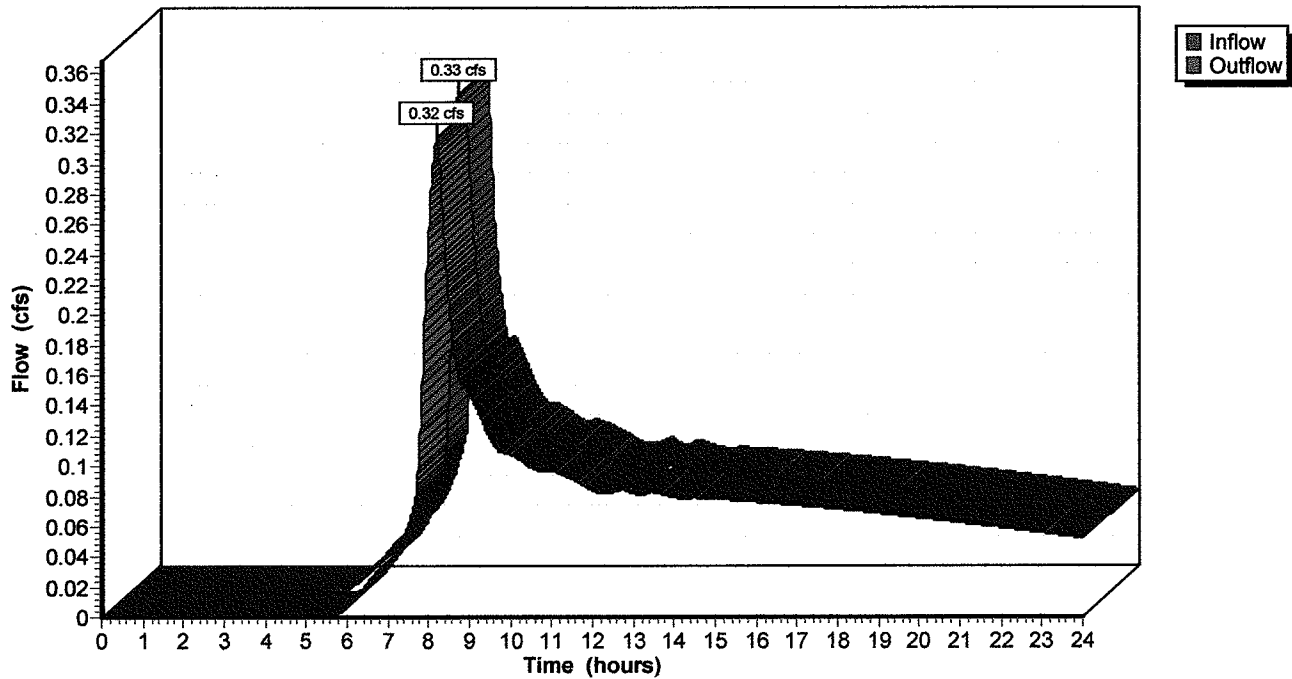
Inflow = 0.33 cfs @ 8.03 hrs, Volume= 0.124 af  
Outflow = 0.32 cfs @ 8.20 hrs, Volume= 0.123 af, Atten= 4%, Lag= 10.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.3 fps, Min. Travel Time= 7.1 min  
Avg. Velocity = 0.2 fps, Avg. Travel Time= 11.2 min

Peak Depth= 0.13'  
Capacity at bank full= 1.39 cfs  
Inlet Invert= 426.00', Outlet Invert= 420.00'  
20.00' x 0.25' deep Parabolic Channel, n= 0.250 Length= 112.0' Slope= 0.0536 1'

**Reach 1R: EXISTING FLOW PATTERN**

Hydrograph Plot



**Subcatchment EX SITE: EX CONDITIONS**

Runoff = 0.65 cfs @ 8.01 hrs, Volume= 0.225 af

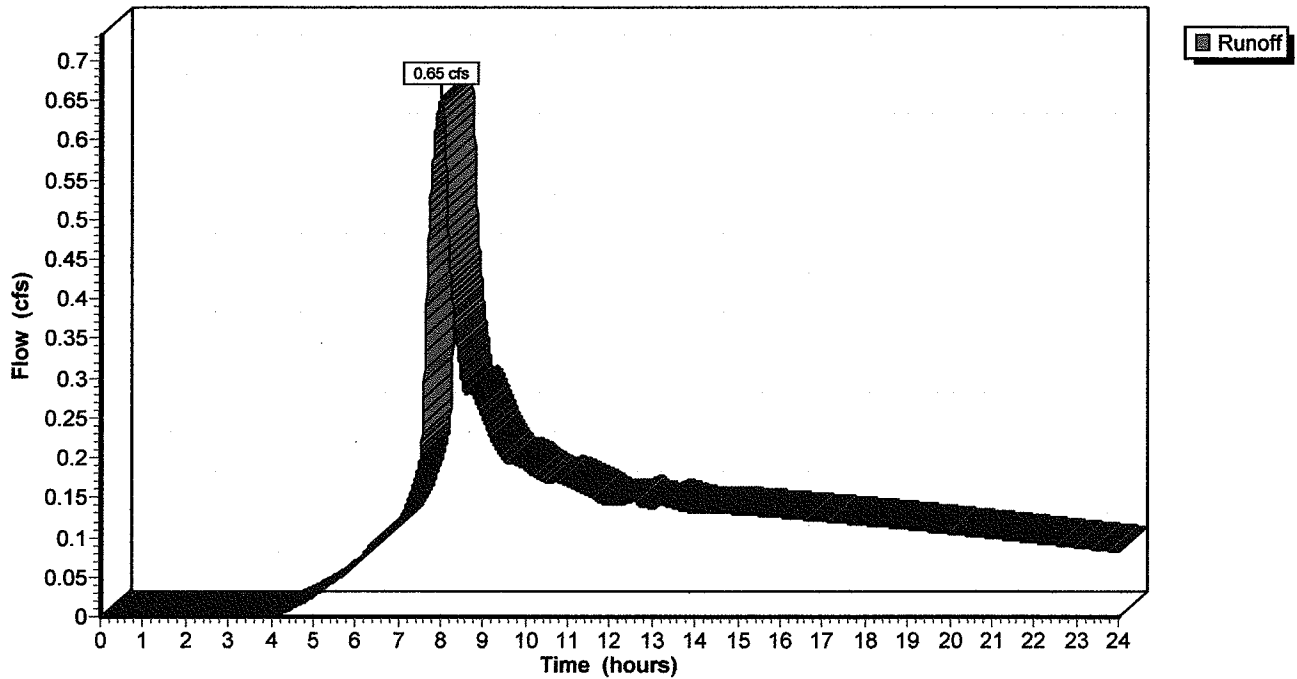
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Type IA 24-hr Rainfall=5.00"

Area (ac)	CN	Description
0.940	77	Brush, Fair, HSG D
0.060	98	Paved parking & roofs
1.000	78	Weighted Average

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

**Subcatchment EX SITE: EX CONDITIONS**

Hydrograph Plot



**Subcatchment Parcel 1: Parcel 1**

Runoff = 0.23 cfs @ 7.94 hrs, Volume= 0.075 af

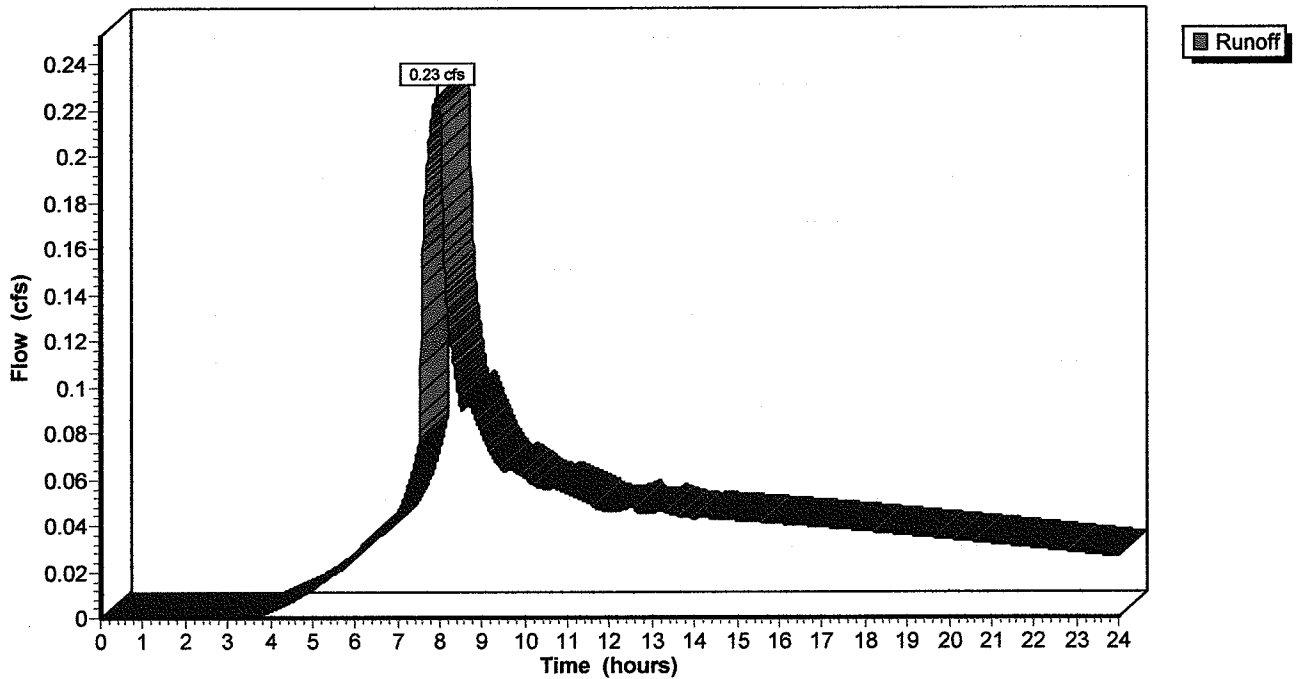
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Type IA 24-hr Rainfall=3.50"

Area (ac)	CN	Description
0.150	98	Paved parking & roofs
0.300	79	50-75% Grass cover, Fair, HSG C
0.450	85	Weighted Average

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

**Subcatchment Parcel 1: Parcel 1**

Hydrograph Plot



**Pond P1 Det: Parcel 1 Detention**

Inflow = 0.23 cfs @ 7.94 hrs, Volume= 0.075 af  
 Outflow = 0.10 cfs @ 8.38 hrs, Volume= 0.073 af, Atten= 54%, Lag= 26.6 min  
 Primary = 0.10 cfs @ 8.38 hrs, Volume= 0.073 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 425.50' Storage= 428 cf

Flood Elev= 426.50' Storage= 1,287 cf

Plug-Flow detention time= 60.6 min calculated for 0.073 af (97% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
425.00	0	0
425.50	426	426
426.00	435	861
426.50	426	1,287

**Primary OutFlow (Free Discharge)**

↑1=Orifice/Grate

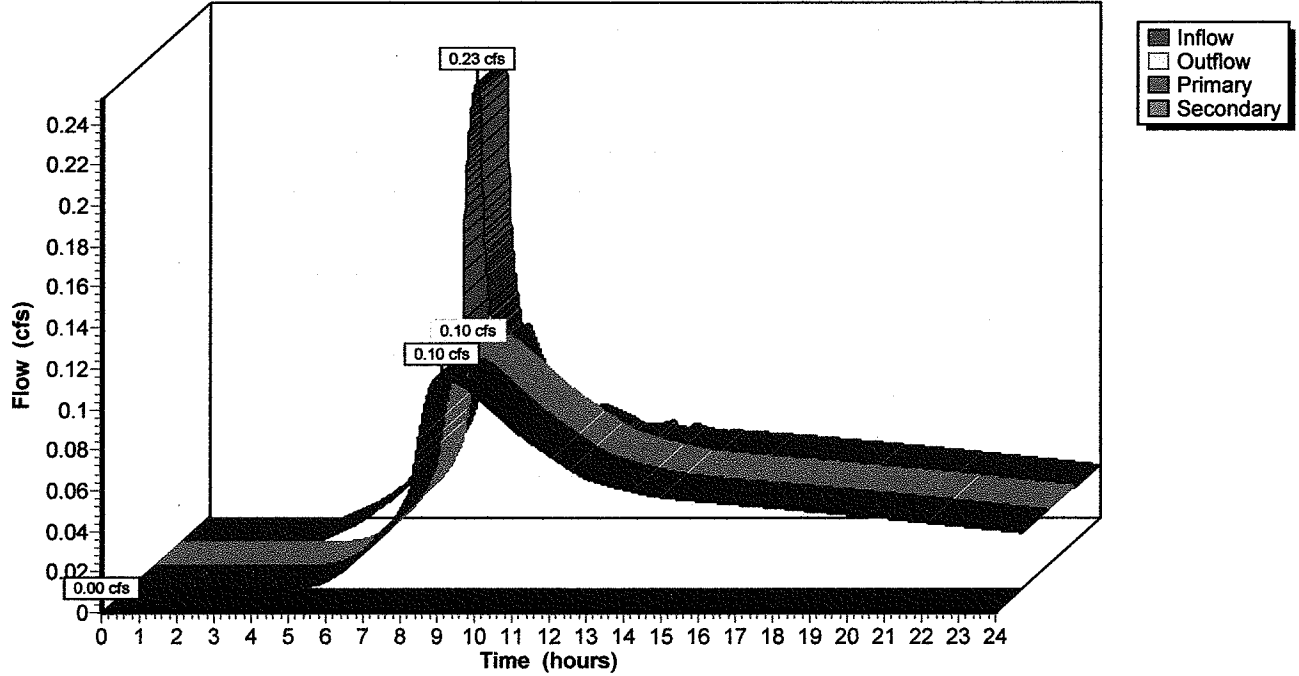
**Secondary OutFlow (Free Discharge)**

↑2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	425.00'	2.5" Vert. Orifice/Grate C= 0.600
2	Secondary	425.80'	2.0" Vert. Orifice/Grate C= 0.600

### Pond P1 Det: Parcel 1 Detention

Hydrograph Plot



**Subcatchment Parcel 2: Parcel 2**

Runoff = 0.14 cfs @ 7.93 hrs, Volume= 0.047 af

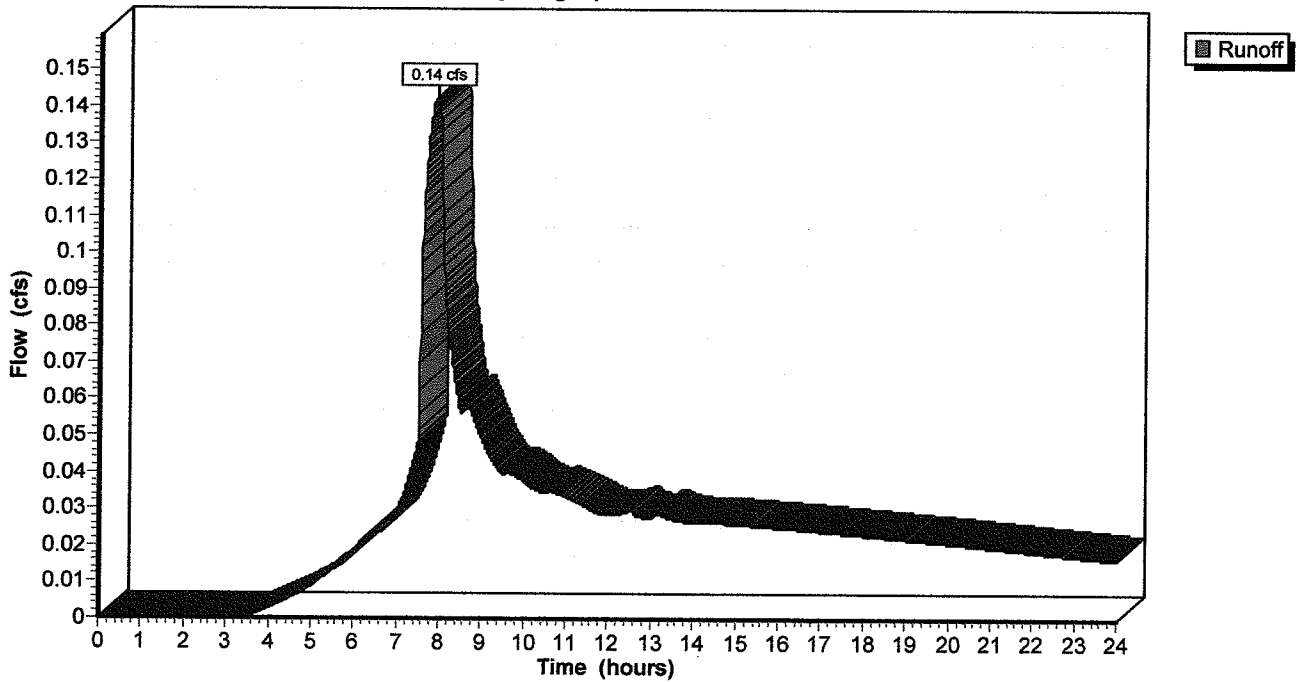
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Type IA 24-hr Rainfall=3.50"

Area (ac)	CN	Description
0.100	98	Paved parking & roofs
0.170	79	50-75% Grass cover, Fair, HSG C
0.270	86	Weighted Average

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

**Subcatchment Parcel 2: Parcel 2**

Hydrograph Plot



**Pond P2 Det: Parcel 2 Detention**

Inflow = 0.14 cfs @ 7.93 hrs, Volume= 0.047 af  
 Outflow = 0.05 cfs @ 9.03 hrs, Volume= 0.046 af, Atten= 66%, Lag= 65.8 min  
 Primary = 0.05 cfs @ 9.03 hrs, Volume= 0.046 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 425.74' Storage= 341 cf

Flood Elev= 427.00' Storage= 936 cf

Plug-Flow detention time= 88.0 min calculated for 0.046 af (97% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
425.00	0	0
425.50	228	228
426.00	236	464
426.50	236	700

**Primary OutFlow (Free Discharge)**

↑1=Orifice/Grate

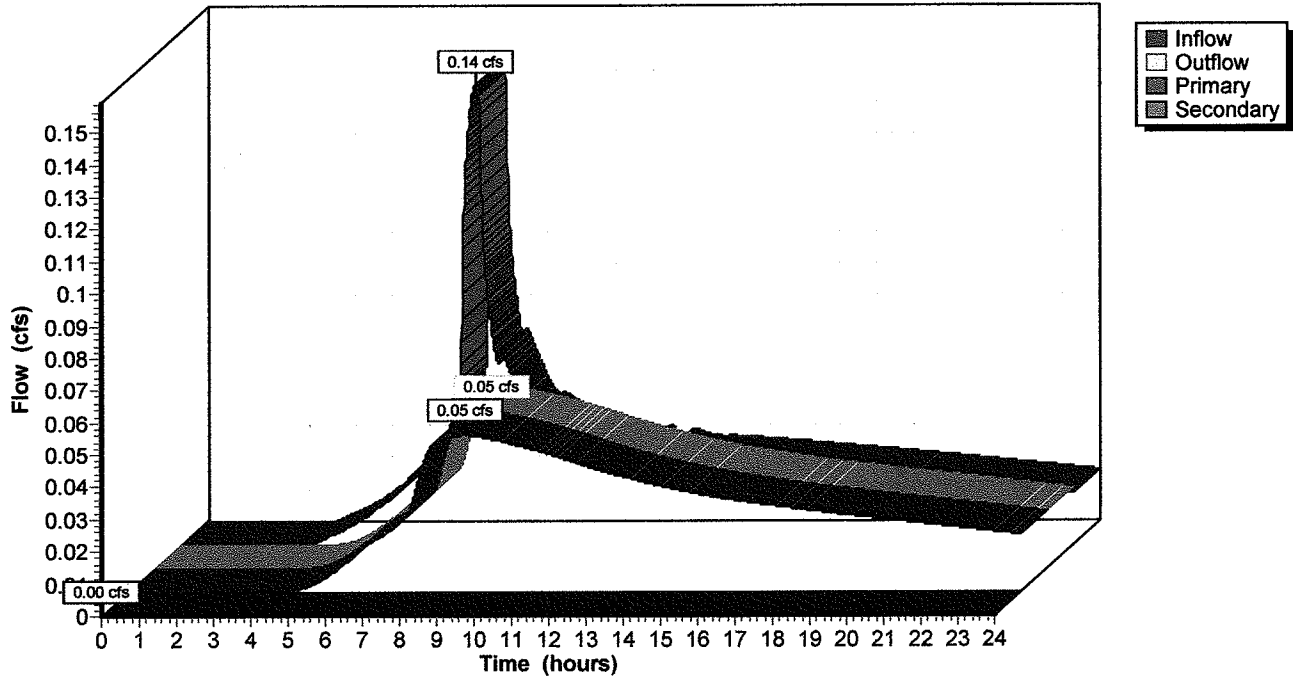
**Secondary OutFlow (Free Discharge)**

↑2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	425.00'	1.5" Vert. Orifice/Grate C= 0.600
2	Secondary	426.00'	1.0" Vert. Orifice/Grate C= 0.600

### Pond P2 Det: Parcel 2 Detention

Hydrograph Plot



**Subcatchment Parcel 3: Parcel 3**

Runoff = 0.15 cfs @ 7.93 hrs, Volume= 0.051 af

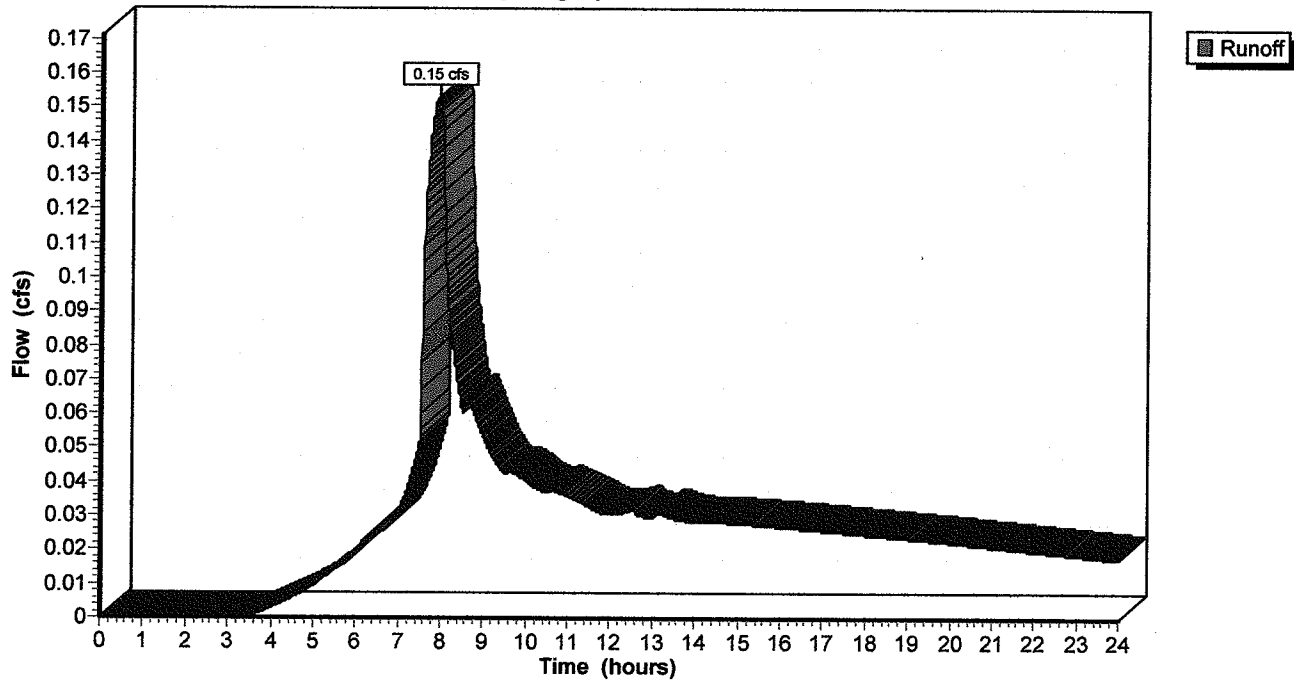
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Type IA 24-hr Rainfall=3.50"

Area (ac)	CN	Description
0.100	98	Paved parking & roofs
0.190	79	50-75% Grass cover, Fair, HSG C
0.290	86	Weighted Average

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

**Subcatchment Parcel 3: Parcel 3**

Hydrograph Plot



**Pond P3 Det: Parcel 3 Detention**

Inflow = 0.15 cfs @ 7.93 hrs, Volume= 0.051 af  
 Outflow = 0.05 cfs @ 9.07 hrs, Volume= 0.049 af, Atten= 67%, Lag= 68.0 min  
 Primary = 0.05 cfs @ 9.07 hrs, Volume= 0.049 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 425.81' Storage= 373 cf  
 Flood Elev= 428.00' Storage= 1,376 cf  
 Plug-Flow detention time= 91.8 min calculated for 0.049 af (97% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
425.00	0	0
425.50	228	228
426.00	236	464
426.50	228	692

**Primary OutFlow (Free Discharge)**

↑1=Orifice/Grate

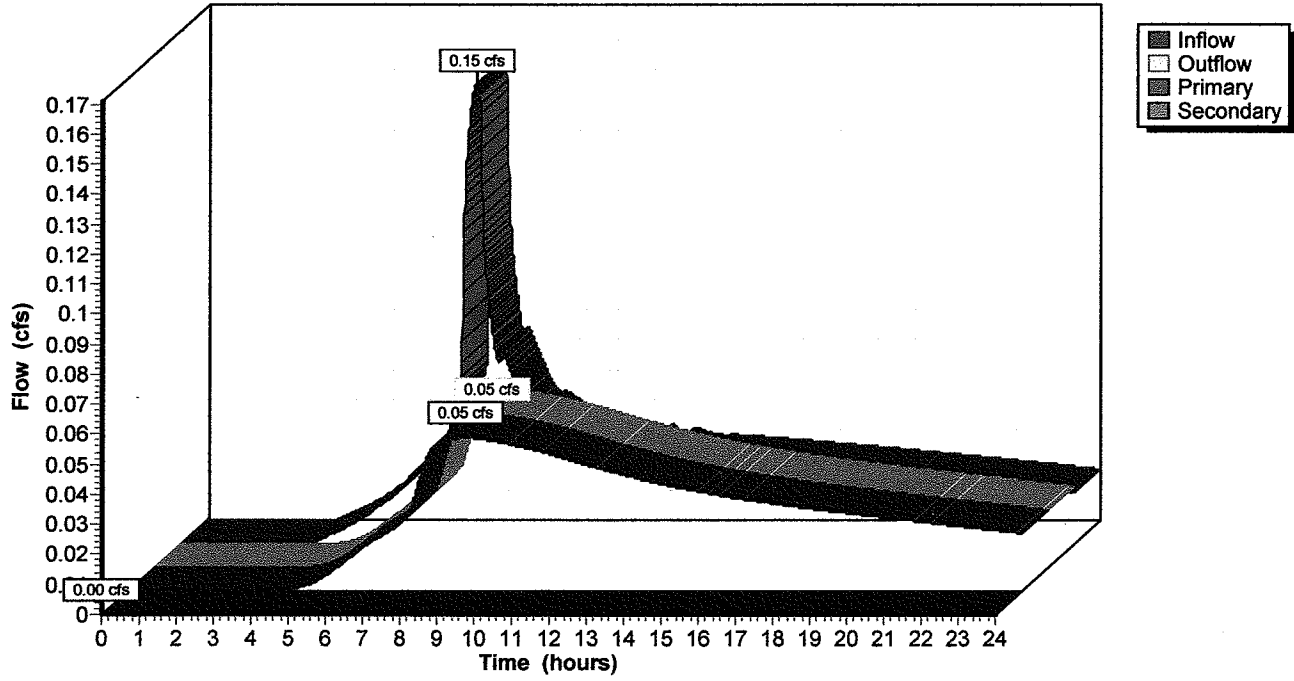
**Secondary OutFlow (Free Discharge)**

↑2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	425.00'	1.5" Vert. Orifice/Grate C= 0.600
2	Secondary	426.00'	1.0" Vert. Orifice/Grate C= 0.600

### Pond P3 Det: Parcel 3 Detention

Hydrograph Plot



**Reach 2R: 6" Discharge**

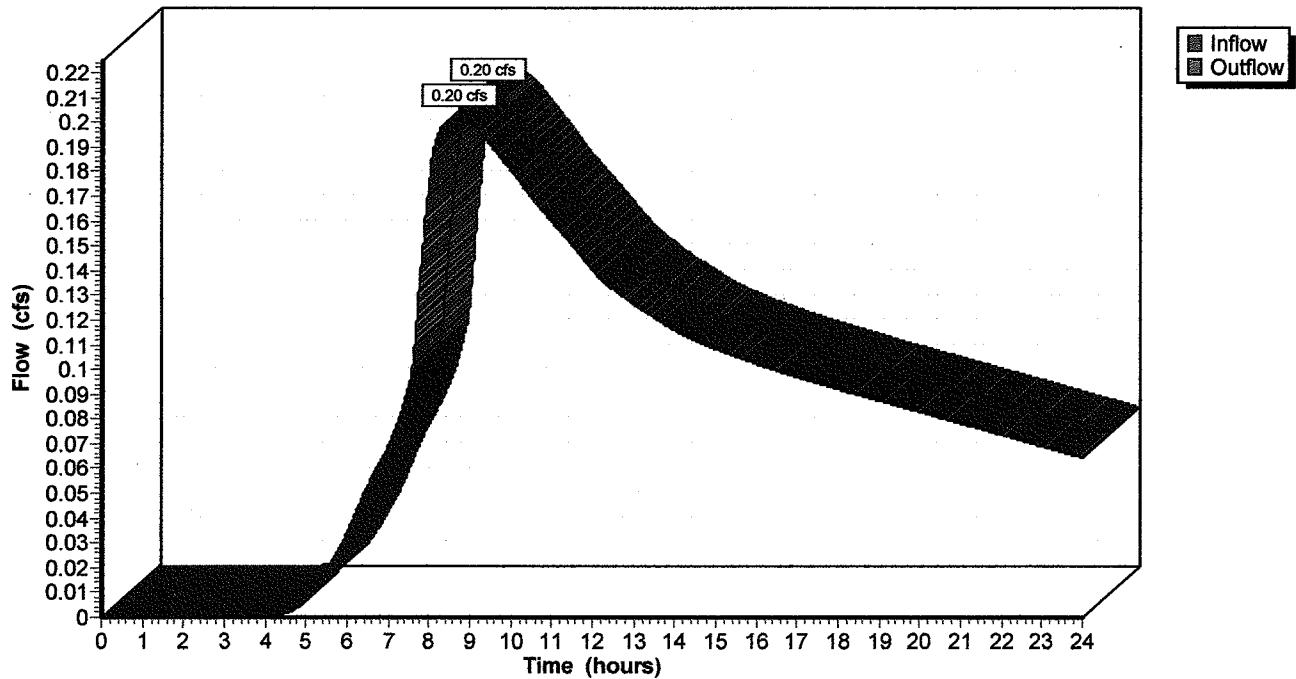
Inflow = 0.20 cfs @ 8.73 hrs, Volume= 0.167 af  
Outflow = 0.20 cfs @ 8.74 hrs, Volume= 0.167 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
Max. Velocity= 3.8 fps, Min. Travel Time= 0.6 min  
Avg. Velocity = 3.0 fps, Avg. Travel Time= 0.7 min

Peak Depth= 0.16'  
Capacity at bank full= 0.94 cfs  
Inlet Invert= 424.80', Outlet Invert= 422.28'  
6.0" Diameter Pipe n= 0.011 Length= 126.0' Slope= 0.0200 '/'

**Reach 2R: 6" Discharge**

Hydrograph Plot



**Subcatchment EX SITE: EX CONDITIONS**

Runoff = 0.54 cfs @ 8.03 hrs, Volume= 0.190 af

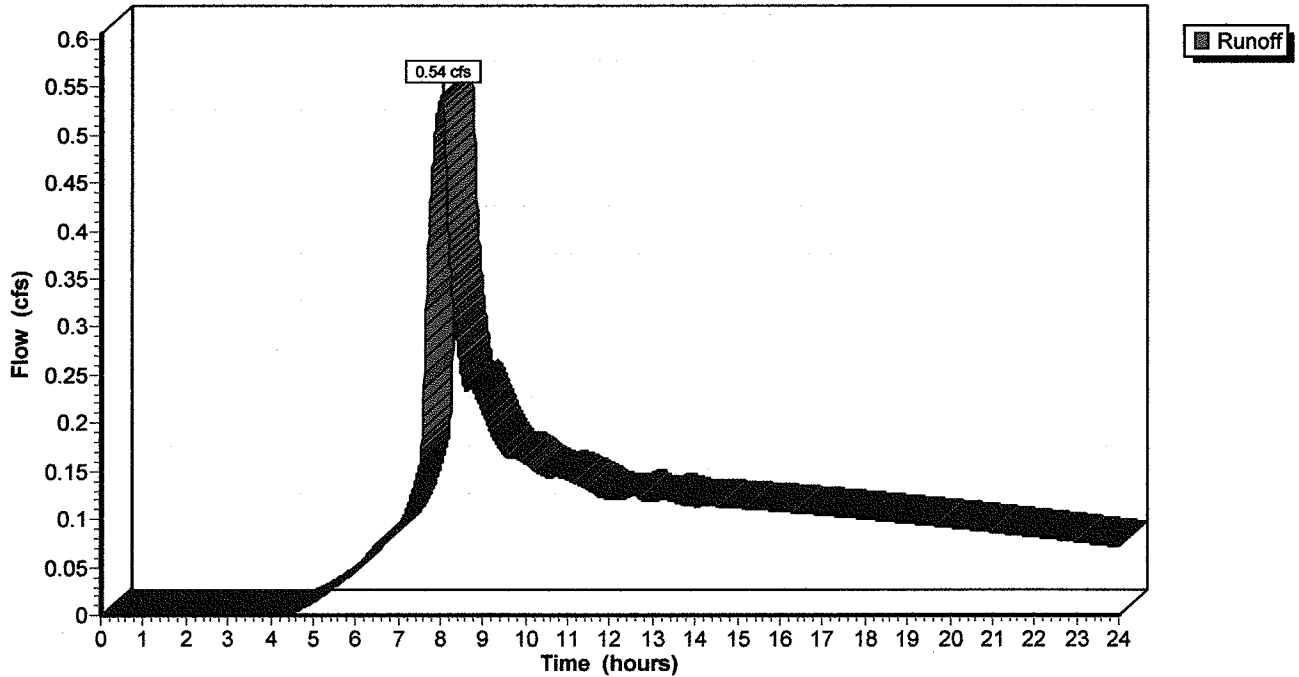
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Type IA 24-hr Rainfall=4.50"

Area (ac)	CN	Description
0.940	77	Brush, Fair, HSG D
0.060	98	Paved parking & roofs
1.000	78	Weighted Average

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

**Subcatchment EX SITE: EX CONDITIONS**

Hydrograph Plot



### Reach 1R: EXISTING FLOW PATTERN

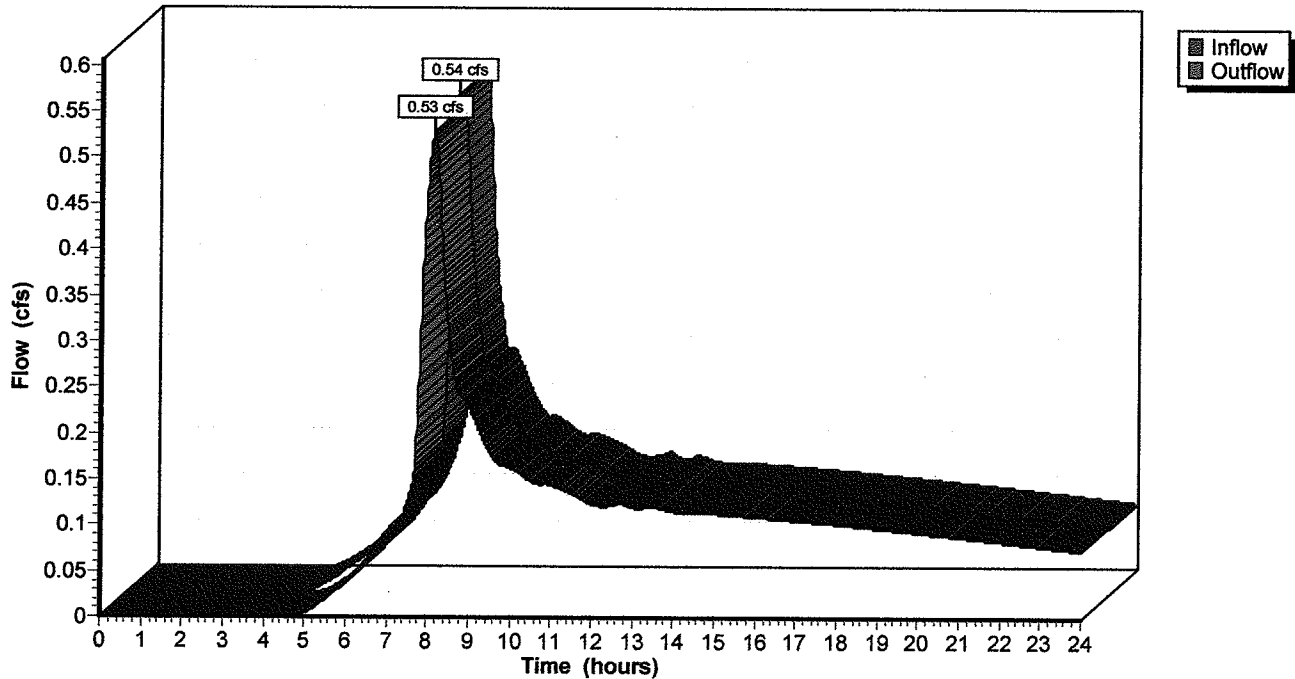
Inflow = 0.54 cfs @ 8.03 hrs, Volume= 0.190 af  
Outflow = 0.53 cfs @ 8.17 hrs, Volume= 0.188 af, Atten= 2%, Lag= 8.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.3 fps, Min. Travel Time= 6.0 min  
Avg. Velocity = 0.2 fps, Avg. Travel Time= 10.1 min

Peak Depth= 0.16'  
Capacity at bank full= 1.39 cfs  
Inlet Invert= 426.00', Outlet Invert= 420.00'  
20.00' x 0.25' deep Parabolic Channel, n= 0.250 Length= 112.0' Slope= 0.0536 '/'

### Reach 1R: EXISTING FLOW PATTERN

Hydrograph Plot



**Subcatchment Parcel 1: Parcel 1**

Runoff = 0.33 cfs @ 7.92 hrs, Volume= 0.109 af

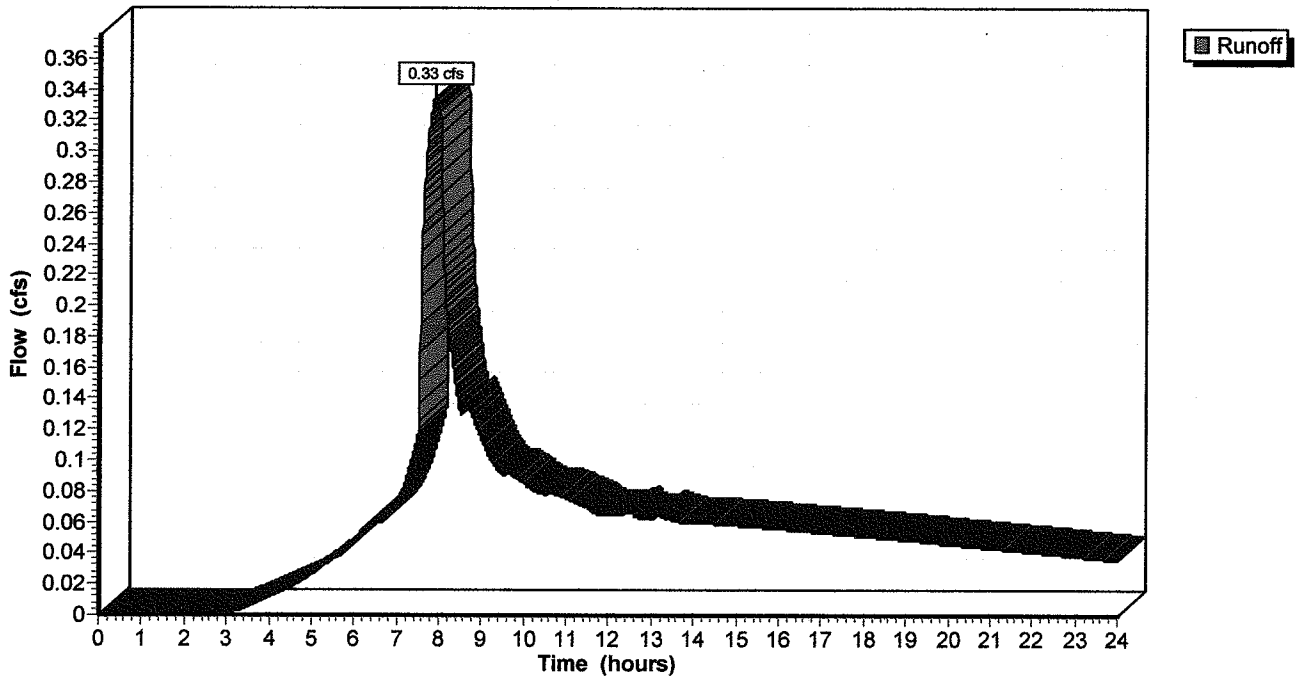
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Type IA 24-hr Rainfall=4.50"

Area (ac)	CN	Description
0.150	98	Paved parking & roofs
0.300	79	50-75% Grass cover, Fair, HSG C
0.450	85	Weighted Average

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

**Subcatchment Parcel 1: Parcel 1**

Hydrograph Plot



**Pond P1 Det: Parcel 1 Detention**

Inflow = 0.33 cfs @ 7.92 hrs, Volume= 0.109 af  
 Outflow = 0.14 cfs @ 8.46 hrs, Volume= 0.106 af, Atten= 59%, Lag= 32.6 min  
 Primary = 0.14 cfs @ 8.46 hrs, Volume= 0.106 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 425.80' Storage= 685 cf

Flood Elev= 426.50' Storage= 1,287 cf

Plug-Flow detention time= 64.4 min calculated for 0.106 af (97% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
425.00	0	0
425.50	426	426
426.00	435	861
426.50	426	1,287

**Primary OutFlow (Free Discharge)**

↑1=Orifice/Grate

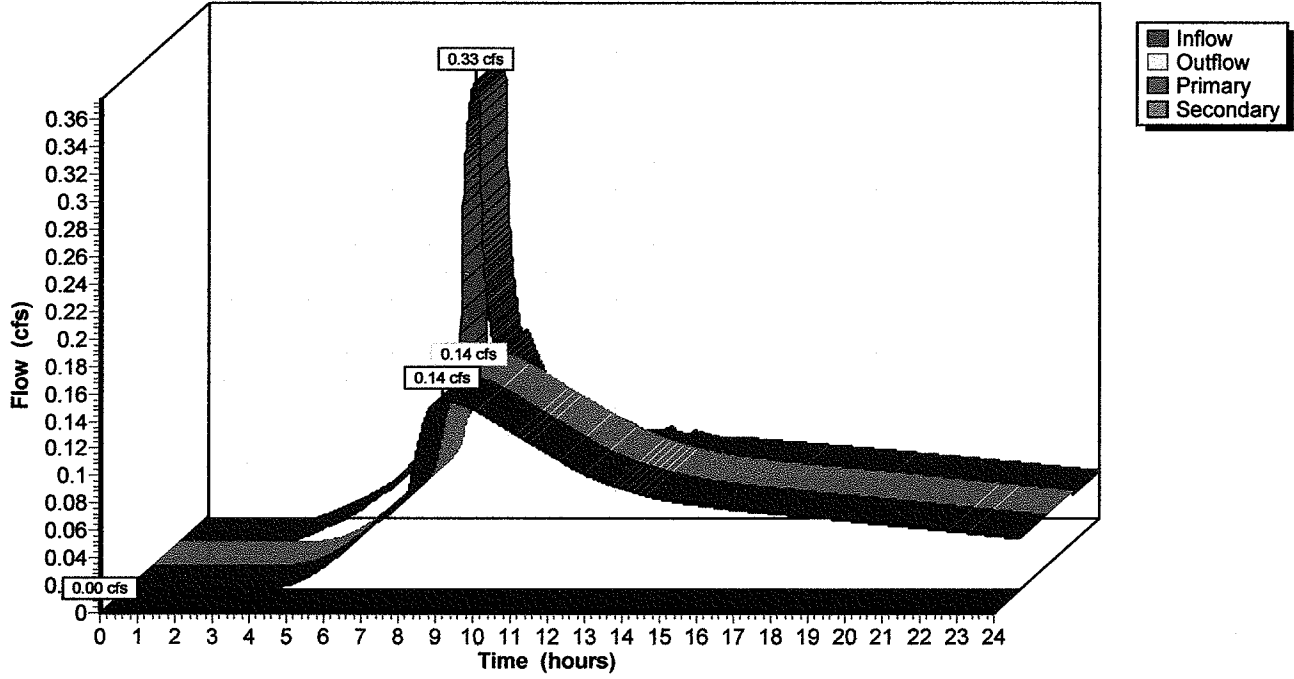
**Secondary OutFlow (Free Discharge)**

↑2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	425.00'	2.5" Vert. Orifice/Grate C= 0.600
2	Secondary	425.80'	2.0" Vert. Orifice/Grate C= 0.600

### Pond P1 Det: Parcel 1 Detention

Hydrograph Plot



**Subcatchment Parcel 2: Parcel 2**

Runoff = 0.21 cfs @ 7.92 hrs, Volume= 0.067 af

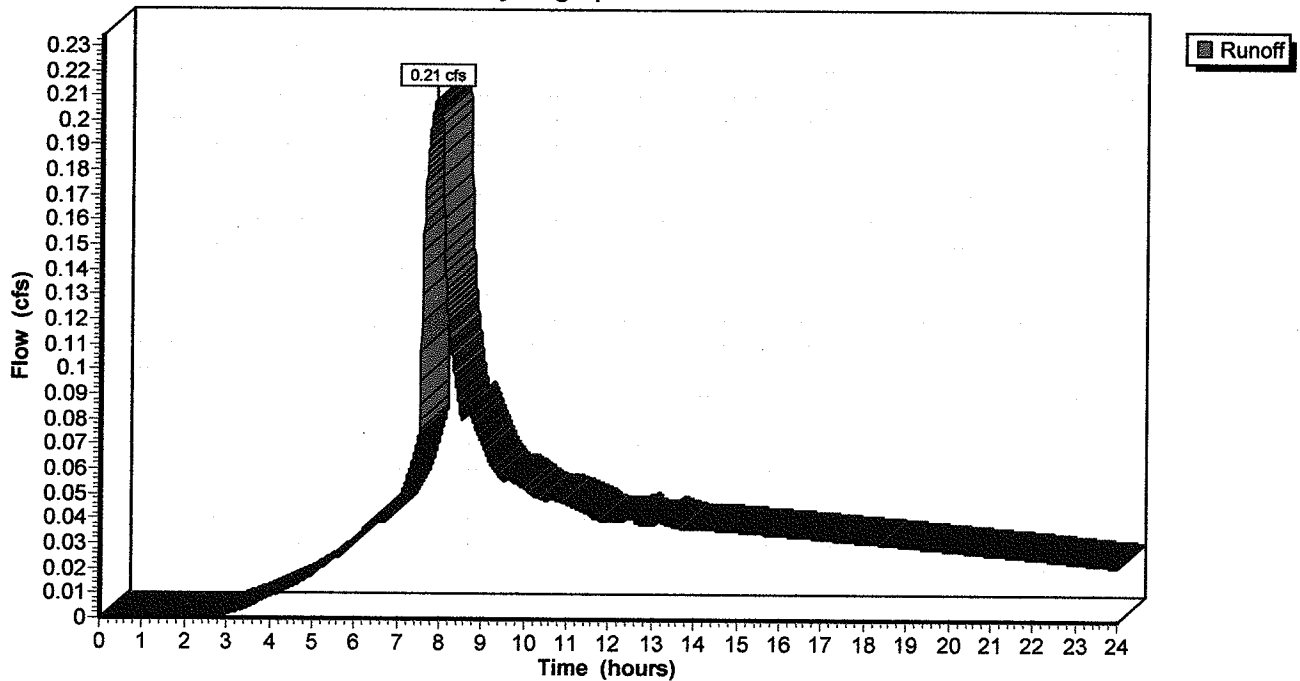
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Type IA 24-hr Rainfall=4.50"

Area (ac)	CN	Description
0.100	98	Paved parking & roofs
0.170	79	50-75% Grass cover, Fair, HSG C
0.270	86	Weighted Average

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

**Subcatchment Parcel 2: Parcel 2**

Hydrograph Plot



**Pond P2 Det: Parcel 2 Detention**

Inflow = 0.21 cfs @ 7.92 hrs, Volume= 0.067 af  
 Outflow = 0.07 cfs @ 8.97 hrs, Volume= 0.065 af, Atten= 66%, Lag= 63.5 min  
 Primary = 0.06 cfs @ 8.97 hrs, Volume= 0.064 af  
 Secondary = 0.01 cfs @ 8.97 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 426.16' Storage= 540 cf  
 Flood Elev= 427.00' Storage= 936 cf  
 Plug-Flow detention time= 105.9 min calculated for 0.065 af (96% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
425.00	0	0
425.50	228	228
426.00	236	464
426.50	236	700

**Primary OutFlow (Free Discharge)**

↑1=Orifice/Grate

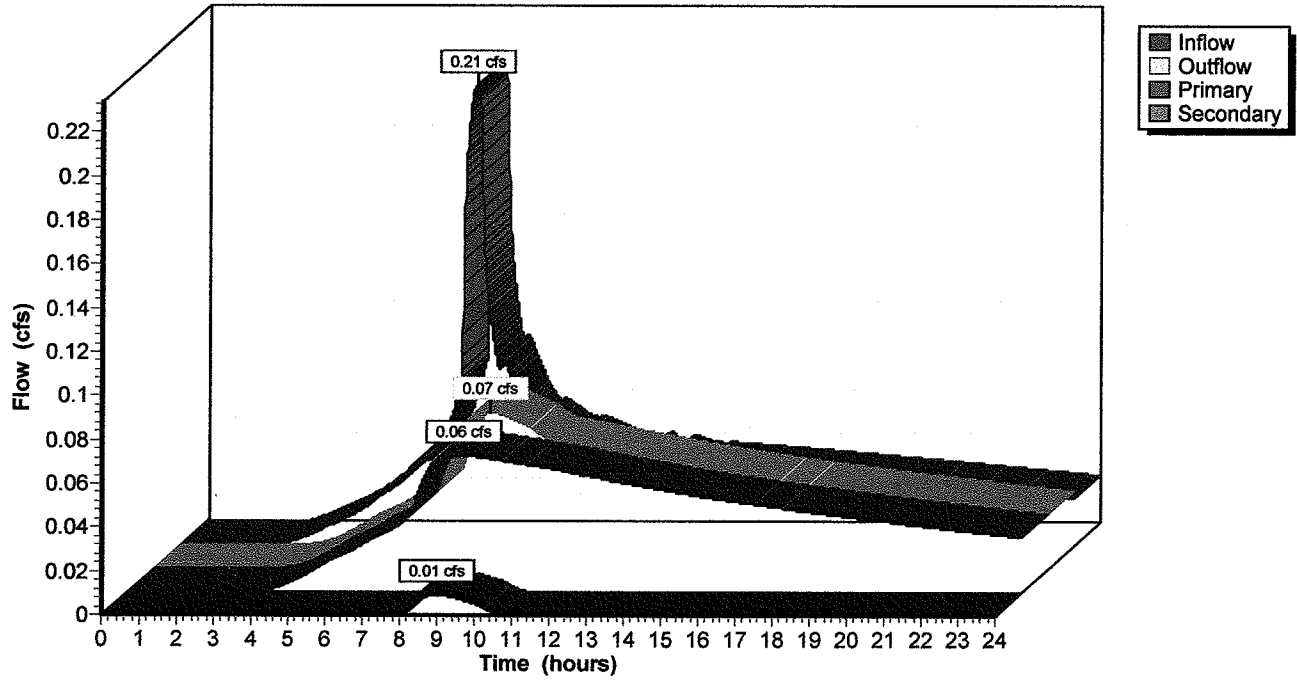
**Secondary OutFlow (Free Discharge)**

↑2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	425.00'	1.5" Vert. Orifice/Grate C= 0.600
2	Secondary	426.00'	1.0" Vert. Orifice/Grate C= 0.600

### Pond P2 Det: Parcel 2 Detention

Hydrograph Plot



**Subcatchment Parcel 3: Parcel 3**

Runoff = 0.22 cfs @ 7.92 hrs, Volume= 0.072 af

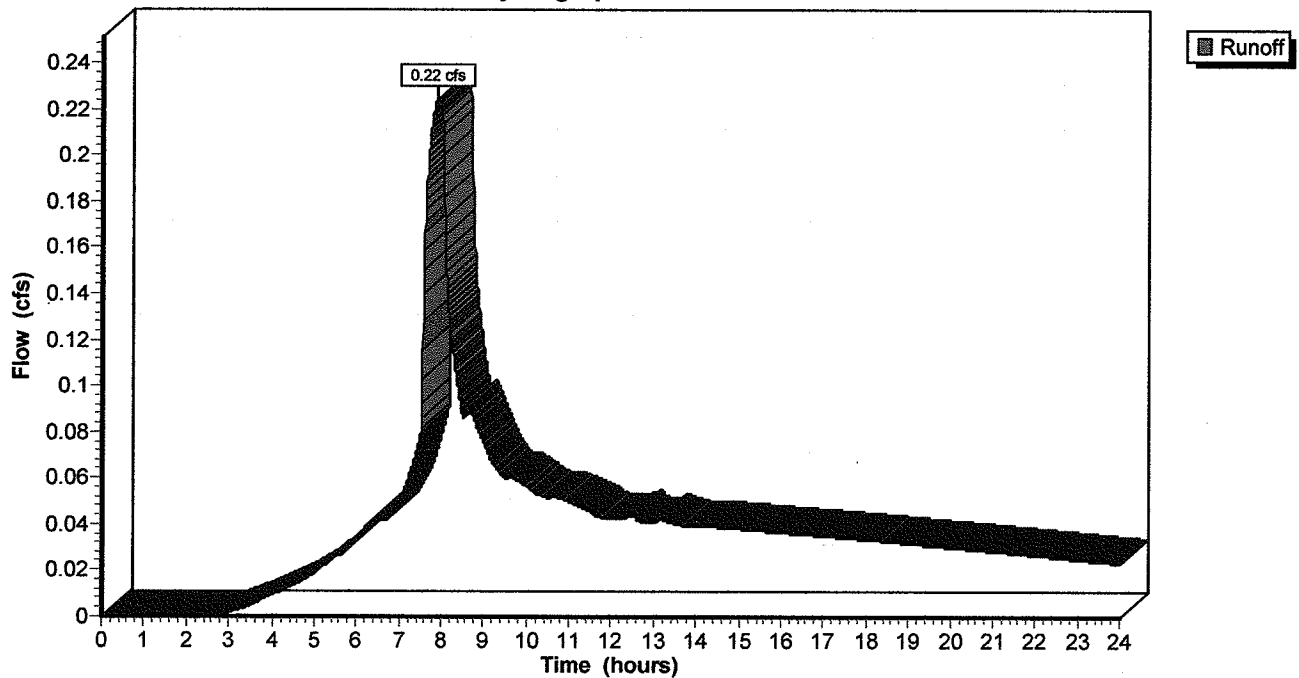
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Type IA 24-hr Rainfall=4.50"

Area (ac)	CN	Description
0.100	98	Paved parking & roofs
0.190	79	50-75% Grass cover, Fair, HSG C
0.290	86	Weighted Average

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

**Subcatchment Parcel 3: Parcel 3**

Hydrograph Plot



**Pond P3 Det: Parcel 3 Detention**

Inflow = 0.22 cfs @ 7.92 hrs, Volume= 0.072 af  
 Outflow = 0.08 cfs @ 8.96 hrs, Volume= 0.070 af, Atten= 66%, Lag= 62.9 min  
 Primary = 0.06 cfs @ 8.96 hrs, Volume= 0.067 af  
 Secondary = 0.01 cfs @ 8.96 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 426.26' Storage= 580 cf

Flood Elev= 428.00' Storage= 1,376 cf

Plug-Flow detention time= 108.3 min calculated for 0.070 af (96% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
425.00	0	0
425.50	228	228
426.00	236	464
426.50	228	692

**Primary OutFlow (Free Discharge)**

↑1=Orifice/Grate

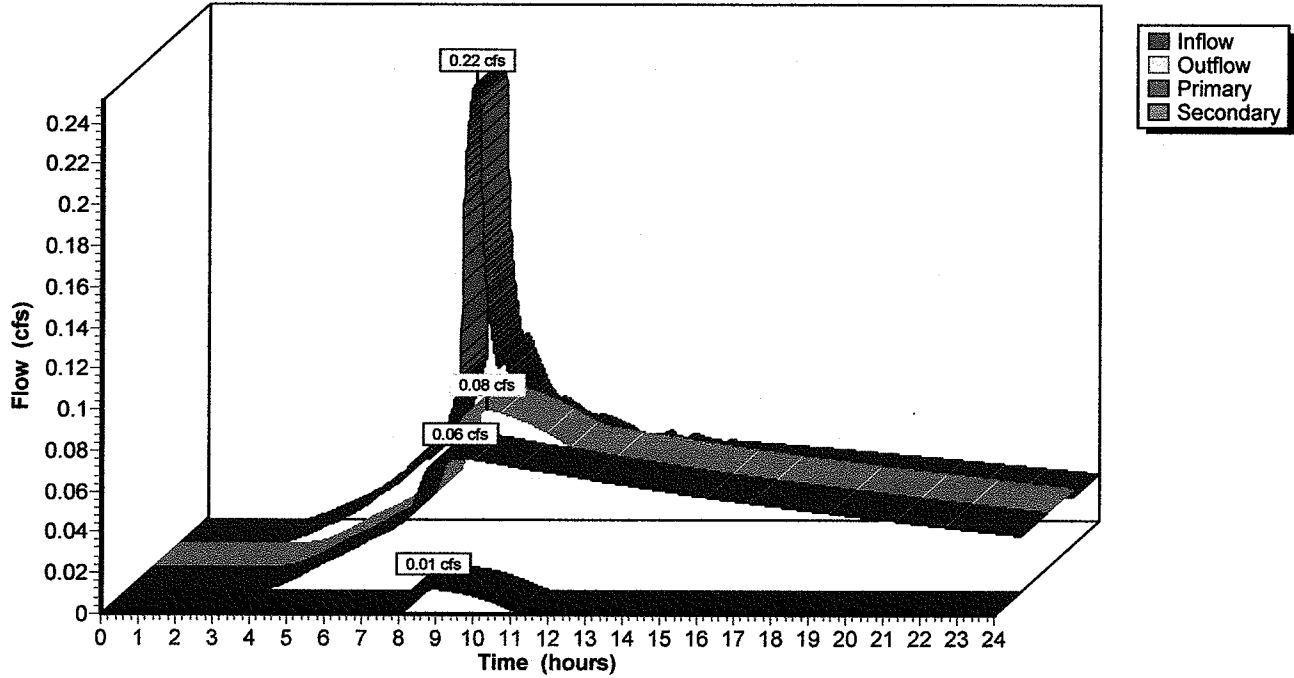
**Secondary OutFlow (Free Discharge)**

↑2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	425.00'	1.5" Vert. Orifice/Grate C= 0.600
2	Secondary	426.00'	1.0" Vert. Orifice/Grate C= 0.600

### Pond P3 Det: Parcel 3 Detention

Hydrograph Plot



### Reach 2R: 6" Discharge

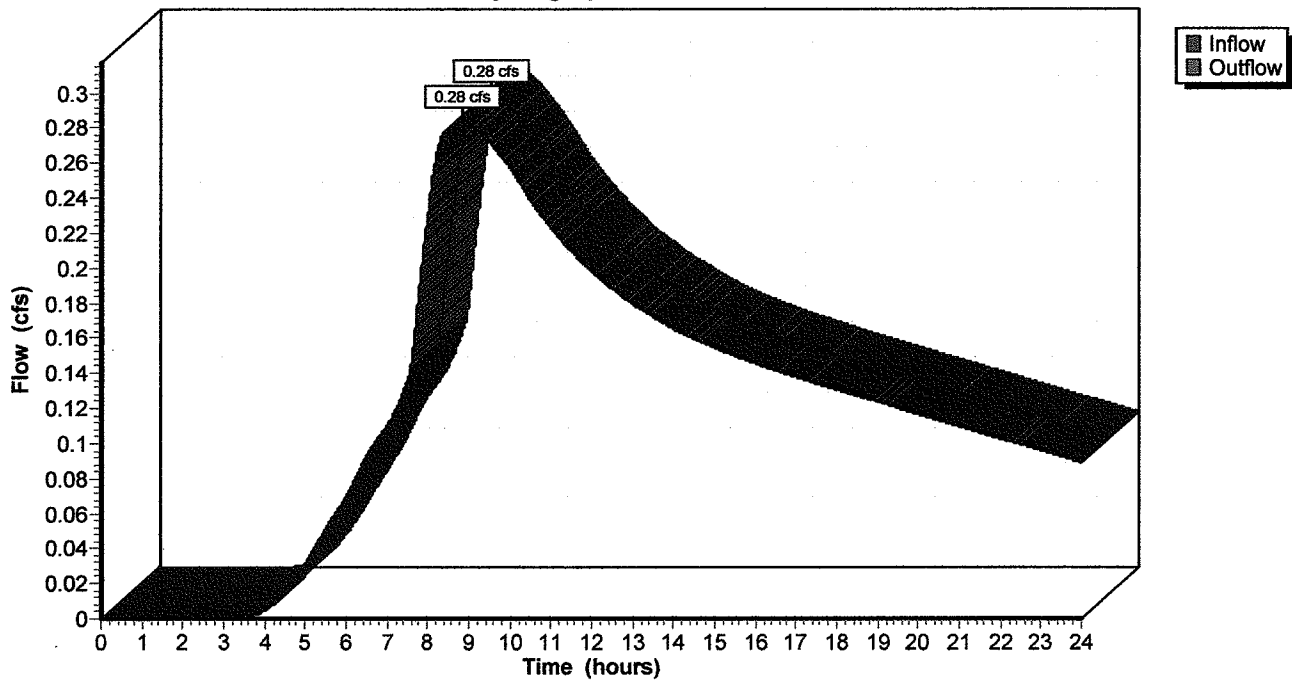
Inflow = 0.28 cfs @ 8.85 hrs, Volume= 0.240 af  
Outflow = 0.28 cfs @ 8.86 hrs, Volume= 0.240 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
Max. Velocity= 4.2 fps, Min. Travel Time= 0.5 min  
Avg. Velocity = 3.2 fps, Avg. Travel Time= 0.6 min

Peak Depth= 0.19'  
Capacity at bank full= 0.94 cfs  
Inlet Invert= 424.80', Outlet Invert= 422.28'  
6.0" Diameter Pipe n= 0.011 Length= 126.0' Slope= 0.0200 '/'

### Reach 2R: 6" Discharge

Hydrograph Plot



### Reach 1R: EXISTING FLOW PATTERN

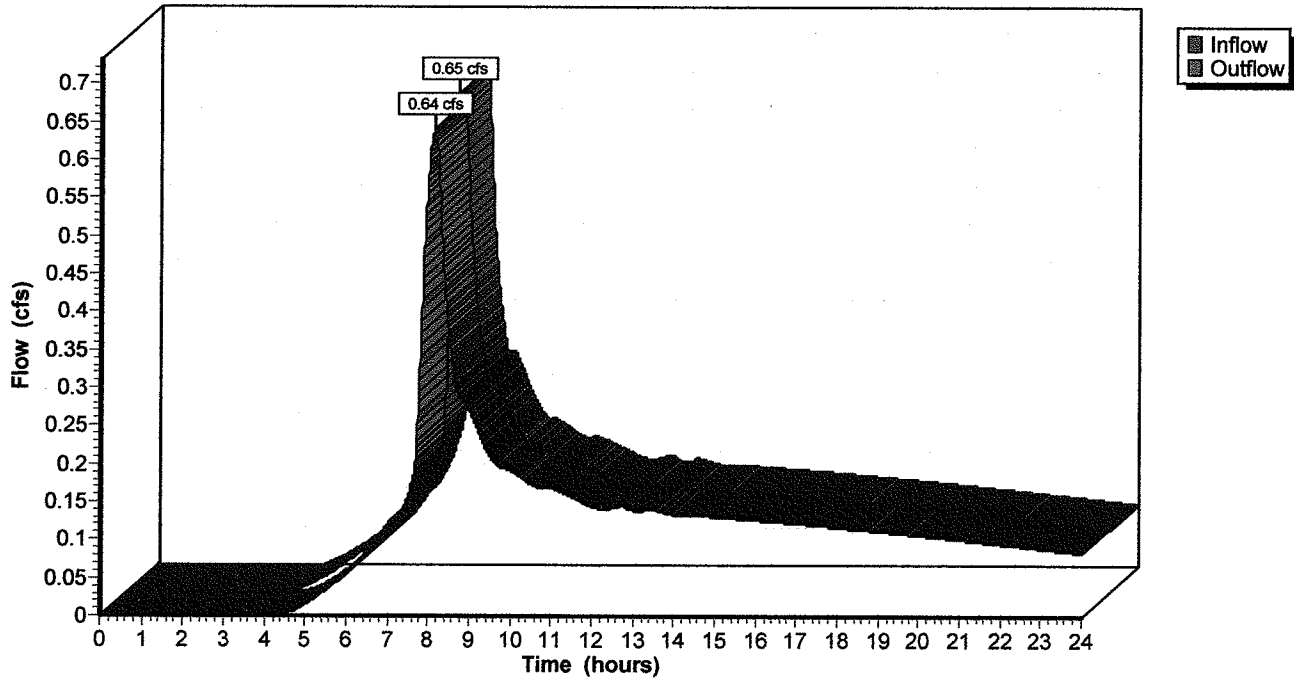
Inflow = 0.65 cfs @ 8.01 hrs, Volume= 0.225 af  
Outflow = 0.64 cfs @ 8.16 hrs, Volume= 0.223 af, Atten= 2%, Lag= 8.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.3 fps, Min. Travel Time= 5.7 min  
Avg. Velocity = 0.2 fps, Avg. Travel Time= 9.6 min

Peak Depth= 0.18'  
Capacity at bank full= 1.39 cfs  
Inlet Invert= 426.00', Outlet Invert= 420.00'  
20.00' x 0.25' deep Parabolic Channel, n= 0.250 Length= 112.0' Slope= 0.0536 1'

### Reach 1R: EXISTING FLOW PATTERN

Hydrograph Plot



**Subcatchment Parcel 1: Parcel 1**

Runoff = 0.39 cfs @ 7.91 hrs, Volume= 0.126 af

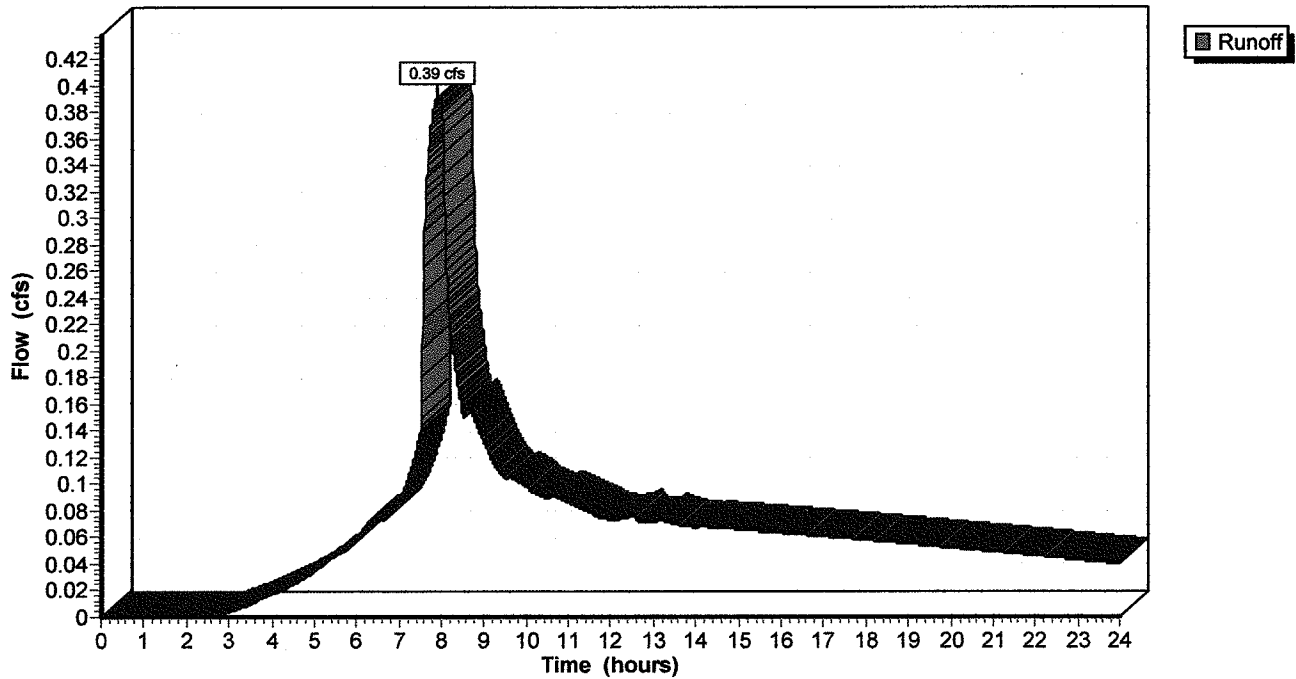
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
Type IA 24-hr Rainfall=5.00"

Area (ac)	CN	Description
0.150	98	Paved parking & roofs
0.300	79	50-75% Grass cover, Fair, HSG C
0.450	85	Weighted Average

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

**Subcatchment Parcel 1: Parcel 1**

Hydrograph Plot



**Pond P1 Det: Parcel 1 Detention**

Inflow = 0.39 cfs @ 7.91 hrs, Volume= 0.126 af  
 Outflow = 0.17 cfs @ 8.38 hrs, Volume= 0.123 af, Atten= 56%, Lag= 28.2 min  
 Primary = 0.15 cfs @ 8.38 hrs, Volume= 0.121 af  
 Secondary = 0.02 cfs @ 8.38 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 425.94' Storage= 805 cf

Flood Elev= 426.50' Storage= 1,287 cf

Plug-Flow detention time= 65.9 min calculated for 0.123 af (97% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
425.00	0	0
425.50	426	426
426.00	435	861
426.50	426	1,287

**Primary OutFlow** (Free Discharge)

↑1=Orifice/Grate

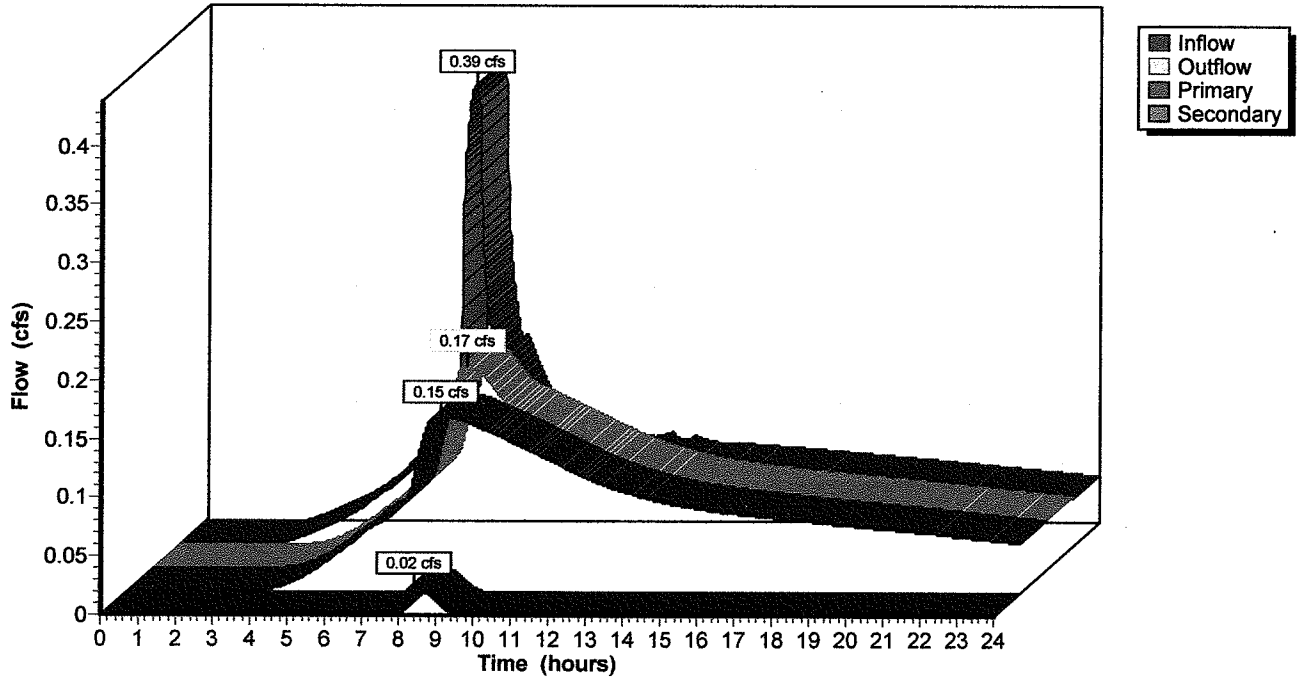
**Secondary OutFlow** (Free Discharge)

↑2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	425.00'	2.5" Vert. Orifice/Grate C= 0.600
2	Secondary	425.80'	2.0" Vert. Orifice/Grate C= 0.600

### Pond P1 Det: Parcel 1 Detention

Hydrograph Plot



**Subcatchment Parcel 2: Parcel 2**

Runoff = 0.24 cfs @ 7.91 hrs, Volume= 0.078 af

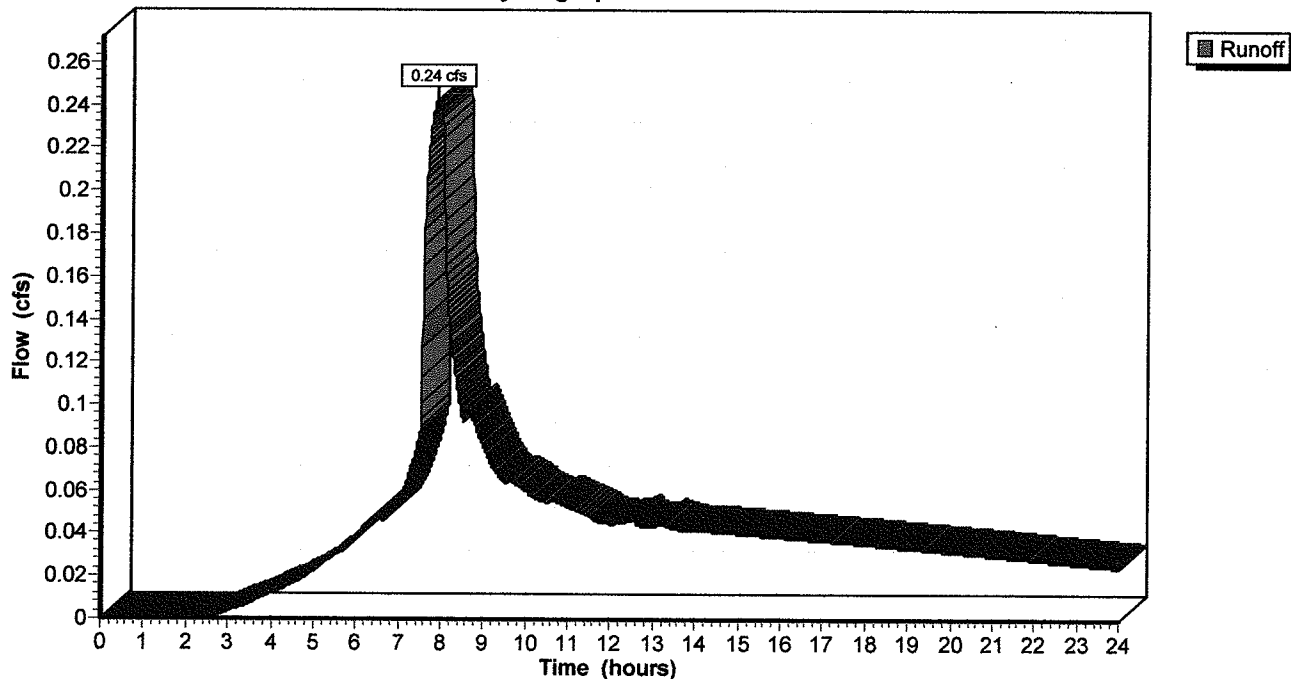
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Type IA 24-hr Rainfall=5.00"

Area (ac)	CN	Description
0.100	98	Paved parking & roofs
0.170	79	50-75% Grass cover, Fair, HSG C
0.270	86	Weighted Average

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

**Subcatchment Parcel 2: Parcel 2**

Hydrograph Plot



**Pond P2 Det: Parcel 2 Detention**

Inflow = 0.24 cfs @ 7.91 hrs, Volume= 0.078 af  
 Outflow = 0.08 cfs @ 8.95 hrs, Volume= 0.075 af, Atten= 66%, Lag= 62.5 min  
 Primary = 0.07 cfs @ 8.95 hrs, Volume= 0.071 af  
 Secondary = 0.02 cfs @ 8.95 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 426.37' Storage= 638 cf

Flood Elev= 427.00' Storage= 936 cf

Plug-Flow detention time= 110.7 min calculated for 0.075 af (96% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
425.00	0	0
425.50	228	228
426.00	236	464
426.50	236	700

**Primary OutFlow (Free Discharge)**

↑1=Orifice/Grate

**Secondary OutFlow (Free Discharge)**

↑2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	425.00'	1.5" Vert. Orifice/Grate C= 0.600
2	Secondary	426.00'	1.0" Vert. Orifice/Grate C= 0.600

**Subcatchment Parcel 3: Parcel 3**

Runoff = 0.26 cfs @ 7.91 hrs, Volume= 0.084 af

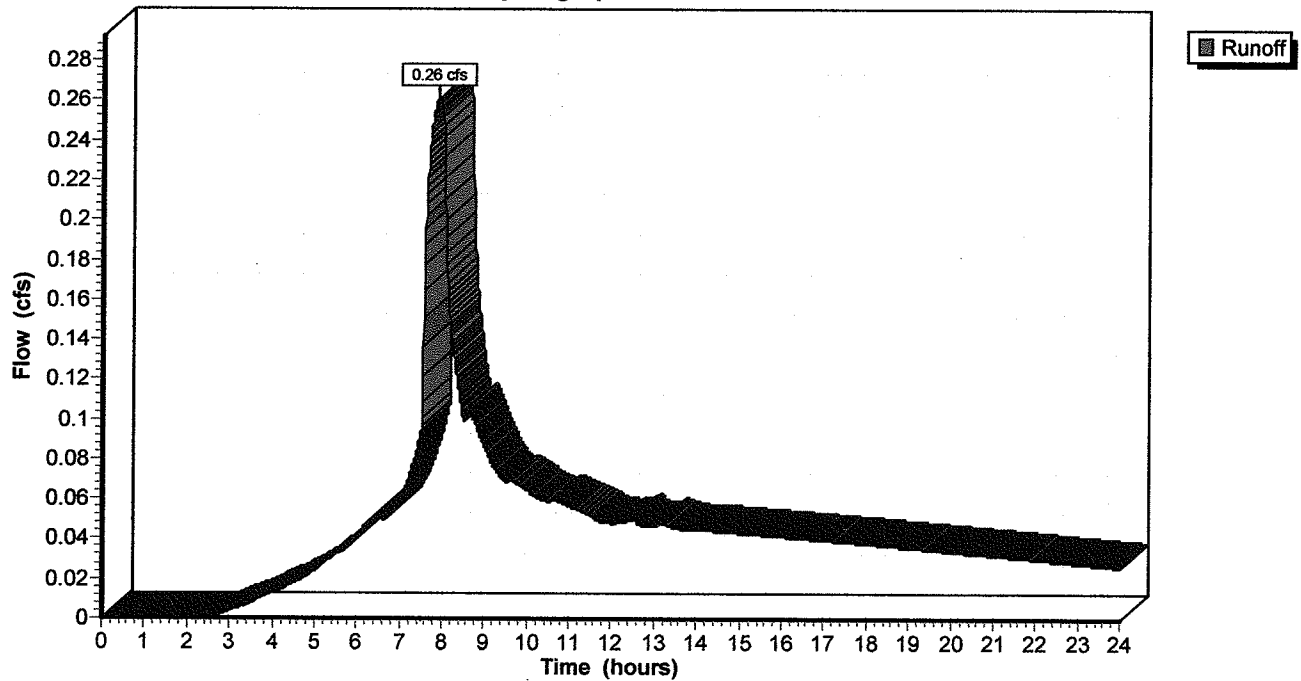
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Type IA 24-hr Rainfall=5.00"

Area (ac)	CN	Description
0.100	98	Paved parking & roofs
0.190	79	50-75% Grass cover, Fair, HSG C
0.290	86	Weighted Average

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

**Subcatchment Parcel 3: Parcel 3**

Hydrograph Plot



**Pond P3 Det: Parcel 3 Detention**

Inflow = 0.26 cfs @ 7.91 hrs, Volume= 0.084 af  
 Outflow = 0.09 cfs @ 8.95 hrs, Volume= 0.080 af, Atten= 66%, Lag= 62.8 min  
 Primary = 0.07 cfs @ 8.95 hrs, Volume= 0.075 af  
 Secondary = 0.02 cfs @ 8.95 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 426.50' Storage= 690 cf

Flood Elev= 428.00' Storage= 1,376 cf

Plug-Flow detention time= 113.2 min calculated for 0.080 af (96% of inflow)

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
425.00	0	0
425.50	228	228
426.00	236	464
426.50	228	692

**Primary OutFlow** (Free Discharge)

↑1=Orifice/Grate

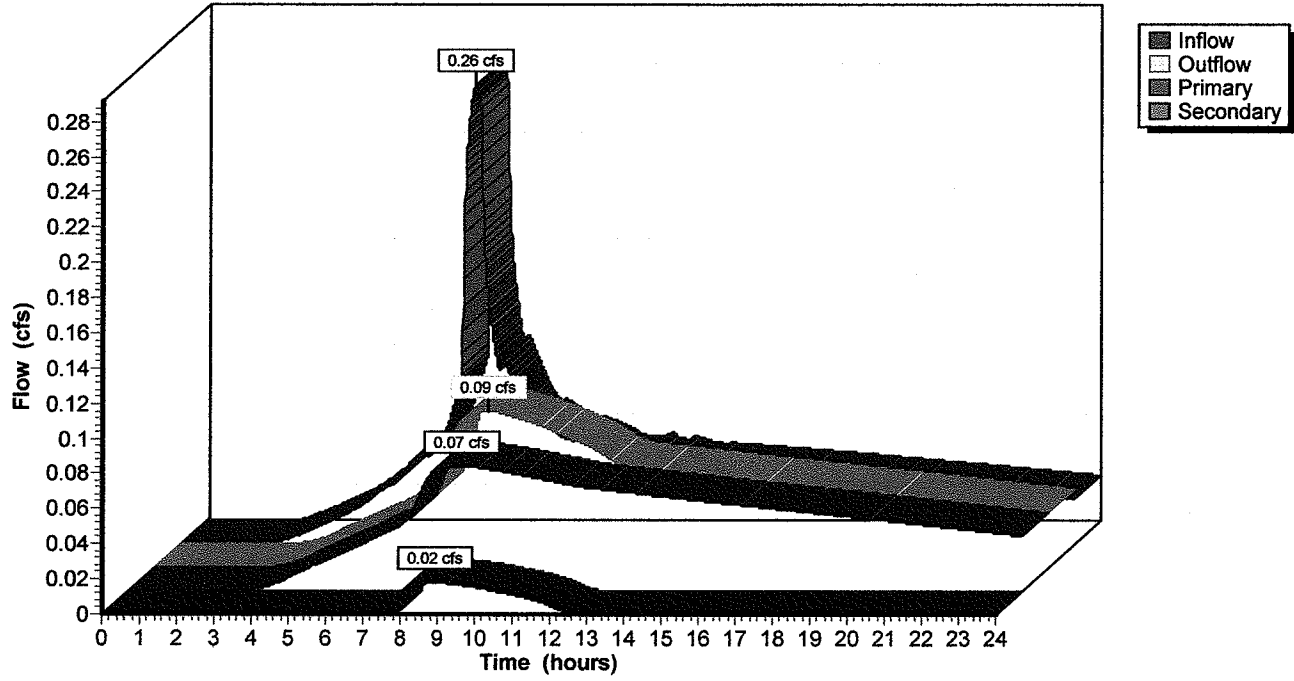
**Secondary OutFlow** (Free Discharge)

↑2=Orifice/Grate

#	Routing	Invert	Outlet Devices
1	Primary	425.00'	1.5" Vert. Orifice/Grate C= 0.600
2	Secondary	426.00'	1.0" Vert. Orifice/Grate C= 0.600

### Pond P3 Det: Parcel 3 Detention

Hydrograph Plot



### Reach 2R: 6" Discharge

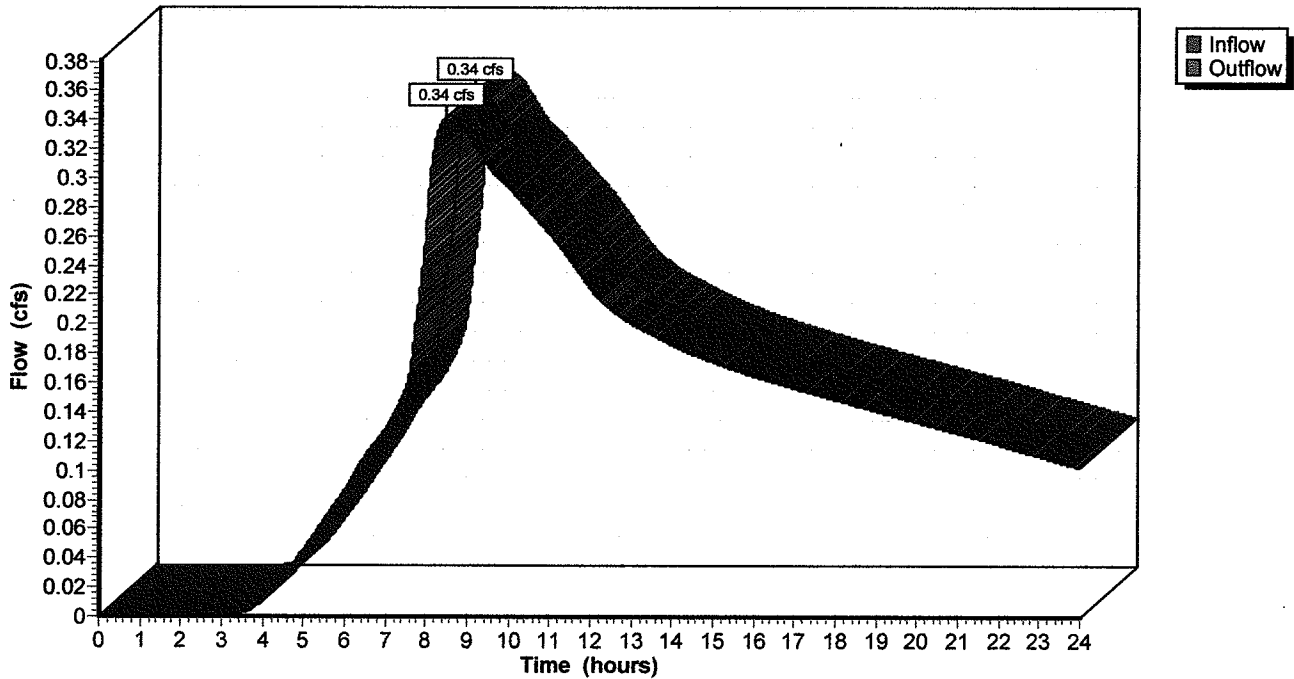
Inflow = 0.34 cfs @ 8.44 hrs, Volume= 0.278 af  
Outflow = 0.34 cfs @ 8.45 hrs, Volume= 0.277 af, Atten= 0%, Lag= 0.8 min

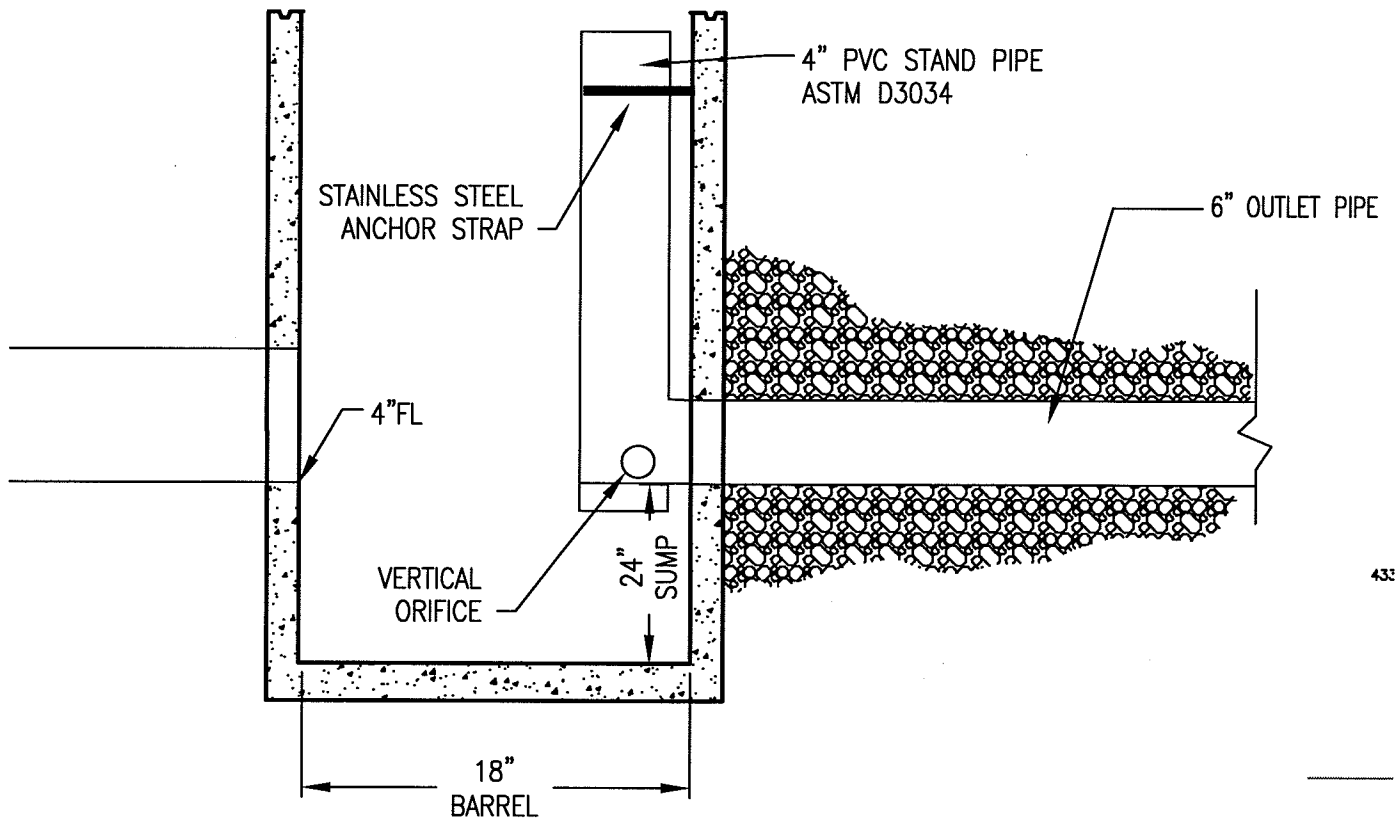
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
Max. Velocity= 4.4 fps, Min. Travel Time= 0.5 min  
Avg. Velocity = 3.4 fps, Avg. Travel Time= 0.6 min

Peak Depth= 0.21'  
Capacity at bank full= 0.94 cfs  
Inlet Invert= 424.80', Outlet Invert= 422.28'  
6.0" Diameter Pipe n= 0.011 Length= 126.0' Slope= 0.0200 '/'

### Reach 2R: 6" Discharge

Hydrograph Plot



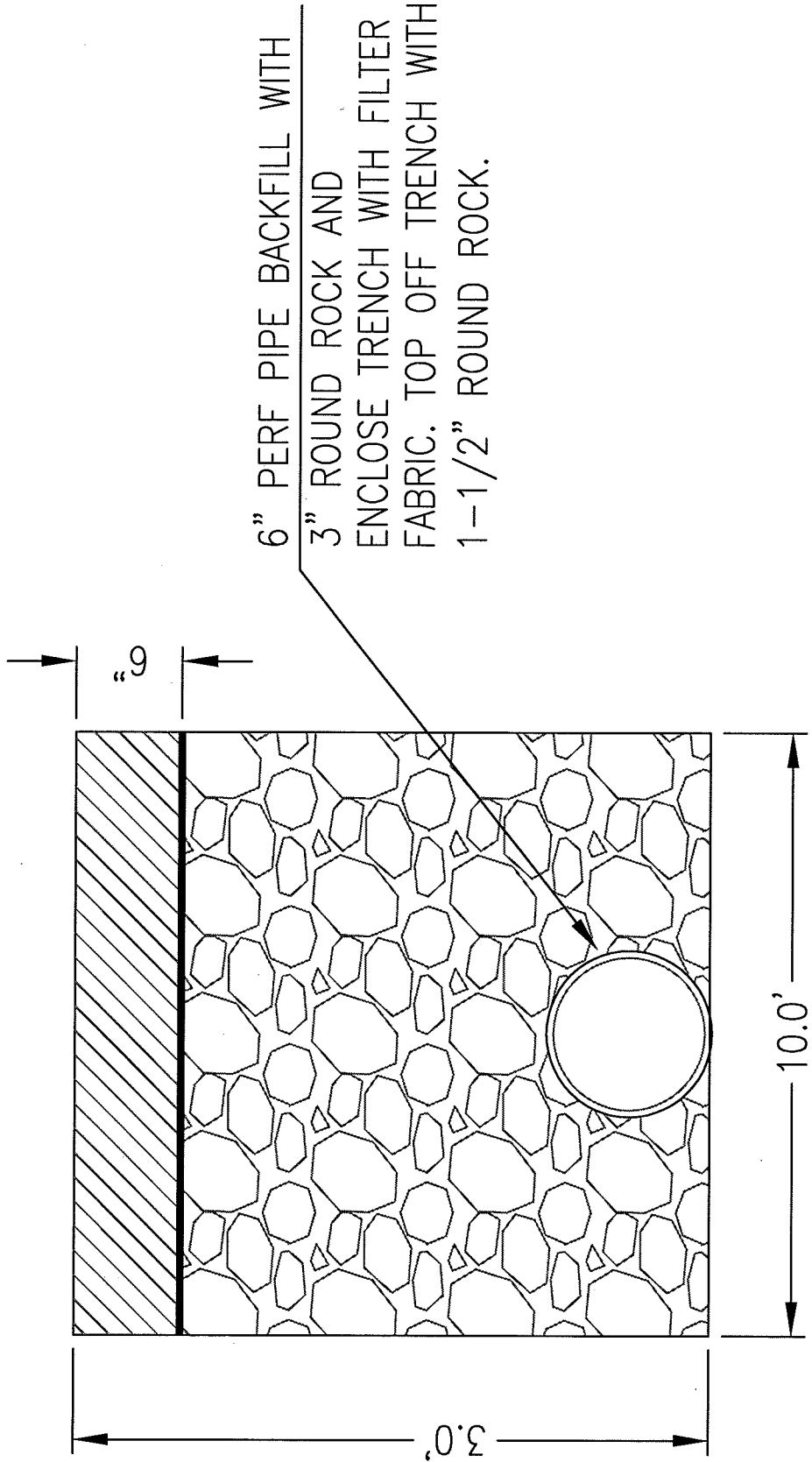


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## FLOW CONTROL STRUCTURE DETAIL

N.T.S.

REFER TO THE INDIVIDUAL DETENTION SYSTEM REPORTS FOR  
ORIFACE SIZE AND ELEVATIONS.

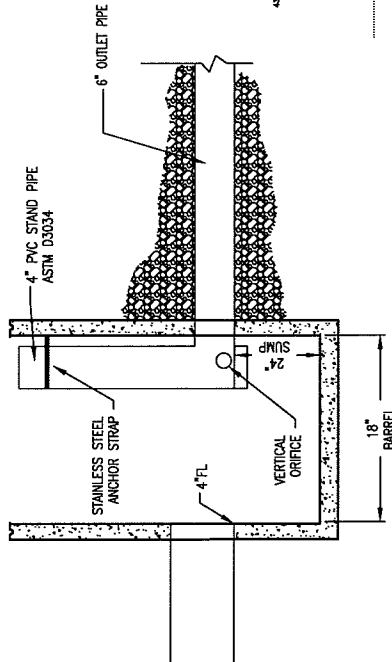


**DETENTION TRENCH DETAIL**

NTS

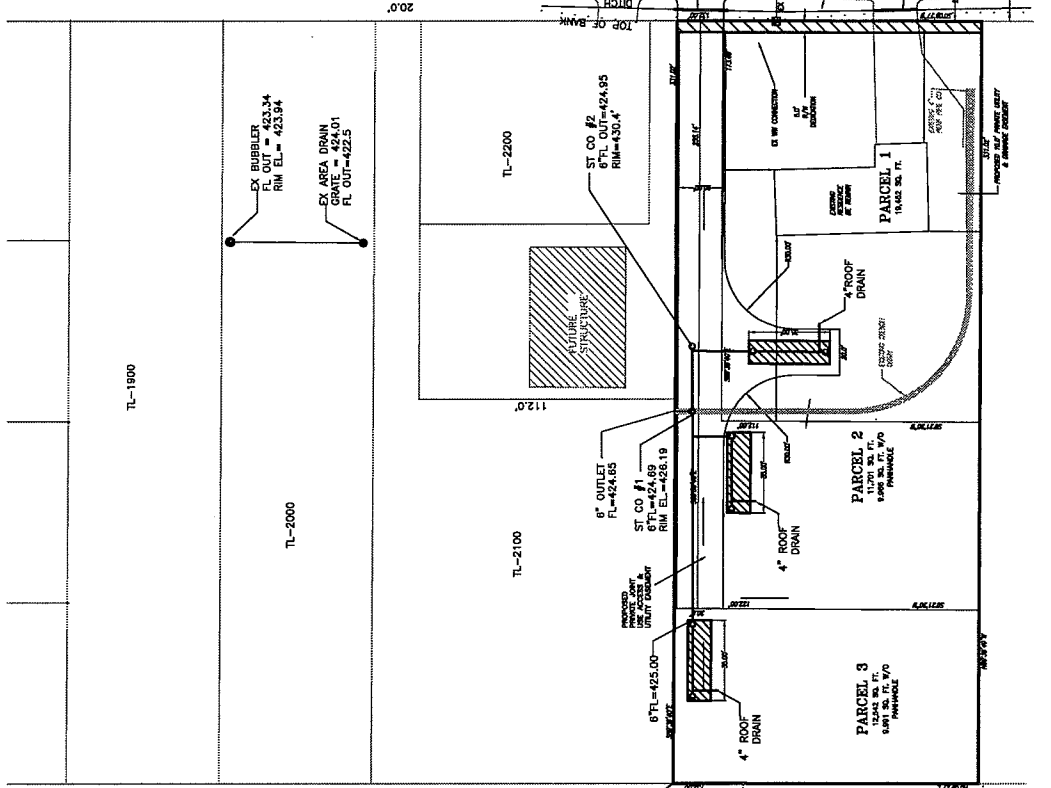
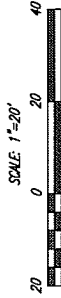
**TENTATIVE PLAN  
FOR  
LABRADOR LLC PARTITION**  
SE 1/4 SEC. 36, T.17S, R.6W, W.M.  
VENETA, LANE COUNTY, OREGON  
SURVEYED: OCTOBER 24, 2007  
AREA DRAINAGE PLAN

THE PROPOSED STORM SYSTEM FOR THIS DEVELOPMENT WILL CONSIST OF INDIVIDUAL DETENTION SYSTEMS FOR EACH LOT THAT WILL DETAIN THE INCREASE IN STORM WATER RUNOFF AND RELEASE IT THROUGH A PIPED SYSTEM. THIS SYSTEM WILL OUTLET TO THE EXISTING DRAINAGE PATTERN LOCATION ALONG THE NORTH PROPERTY BOUNDARY. THE FLOW WILL THEN FOLLOW THE EXISTING DRAINAGE PATTERN ACROSS THE ADJACENT LOTS.



**FLOW CONTROL STRUCTURE DETAIL**  
N.T.S.

REFER TO THE INDIVIDUAL DETENTION SYSTEM REPORTS FOR ORIFICE SIZE AND ELEVATIONS.



**OWNER/CLIENT/DEVELOPER**  
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541-517-5328

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**SURVEYOR**  
OLSON & MORRIS  
380 O STREET, SUITE 200  
SPRINGFIELD, OR 97477  
541-302-9790

REGISTERED  
PROFESSIONAL  
LAND SURVEYOR

OREGON  
JULY 11, 1984  
LAWRENCE B. OLSON  
655  
RENEWAL DATE: 12-31-2008