

019-A-001-001

1-1 India St, Portland, ME

The Longfellow at Ocean Gateway
Riverwalk, LLC

Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 47

11/22/2006

Pond D7: Hancock

Inflow Area = 1.086 ac, Inflow Depth > 3.12" for 10-Year Storm event
Inflow = 2.06 cfs @ 12.21 hrs, Volume= 0.282 af
Outflow = 2.06 cfs @ 12.21 hrs, Volume= 0.282 af, Atten= 0%, Lag= 0.0 min
Primary = 2.06 cfs @ 12.21 hrs, Volume= 0.282 af

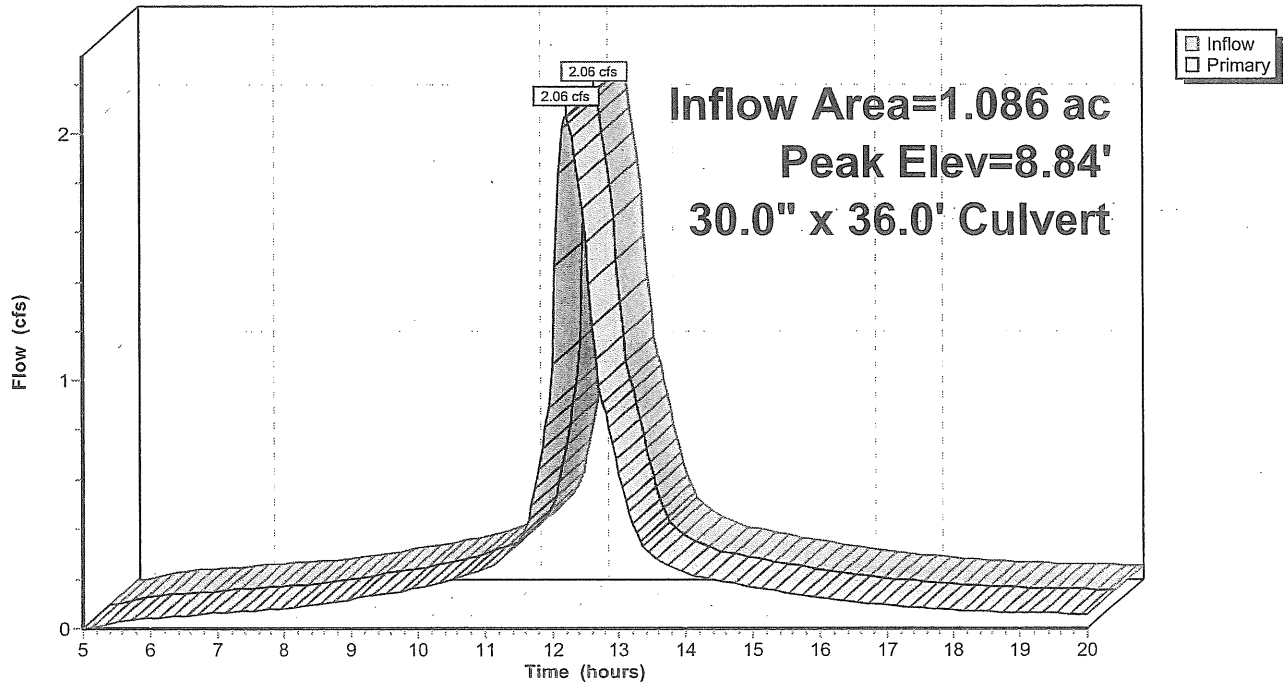
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 8.84' @ 12.21 hrs
Flood Elev= 13.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	8.08'	30.0" x 36.0' long Culvert Ke= 0.500 Outlet Invert= 8.07' S= 0.0003 '/ Cc= 0.900 n= 0.012

Primary OutFlow Max=2.06 cfs @ 12.21 hrs HW=8.84' TW=0.00' (Dynamic Tailwater)
1=Culvert (Barrel Controls 2.06 cfs @ 2.45 fps)

Pond D7: Hancock

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 46

11/22/2006

Pond D3: Commercial

Inflow Area = 1.625 ac, Inflow Depth > 3.87" for 10-Year Storm event
Inflow = 5.03 cfs @ 12.14 hrs, Volume= 0.524 af
Outflow = 5.03 cfs @ 12.14 hrs, Volume= 0.524 af, Atten= 0%, Lag= 0.0 min
Primary = 5.03 cfs @ 12.14 hrs, Volume= 0.524 af

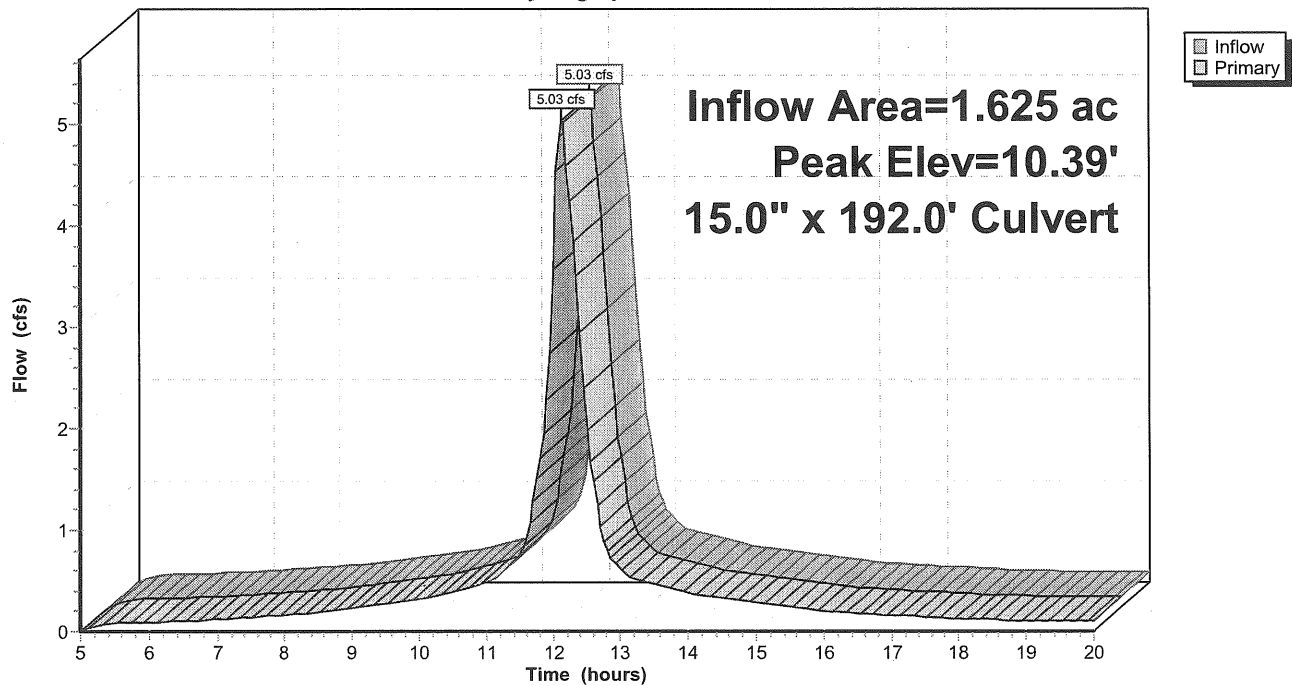
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 10.39' @ 12.14 hrs
Flood Elev= 13.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	8.35'	15.0" x 192.0' long Culvert Ke= 0.500 Outlet Invert= 8.06' S= 0.0015 '/' Cc= 0.900 n= 0.010

Primary OutFlow Max=4.98 cfs @ 12.14 hrs HW=10.37' TW=0.00' (Dynamic Tailwater)
↳ **1=Culvert** (Barrel Controls 4.98 cfs @ 4.05 fps)

Pond D3: Commercial

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 45

11/22/2006

Pond D2: Commercial Street Storm System

Inflow Area = 0.296 ac, Inflow Depth > 2.67" for 10-Year Storm event
Inflow = 0.96 cfs @ 12.06 hrs, Volume= 0.066 af
Outflow = 0.96 cfs @ 12.06 hrs, Volume= 0.066 af, Atten= 0%, Lag= 0.0 min
Primary = 0.96 cfs @ 12.06 hrs, Volume= 0.066 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 10.40' @ 12.19 hrs

Flood Elev= 14.95'

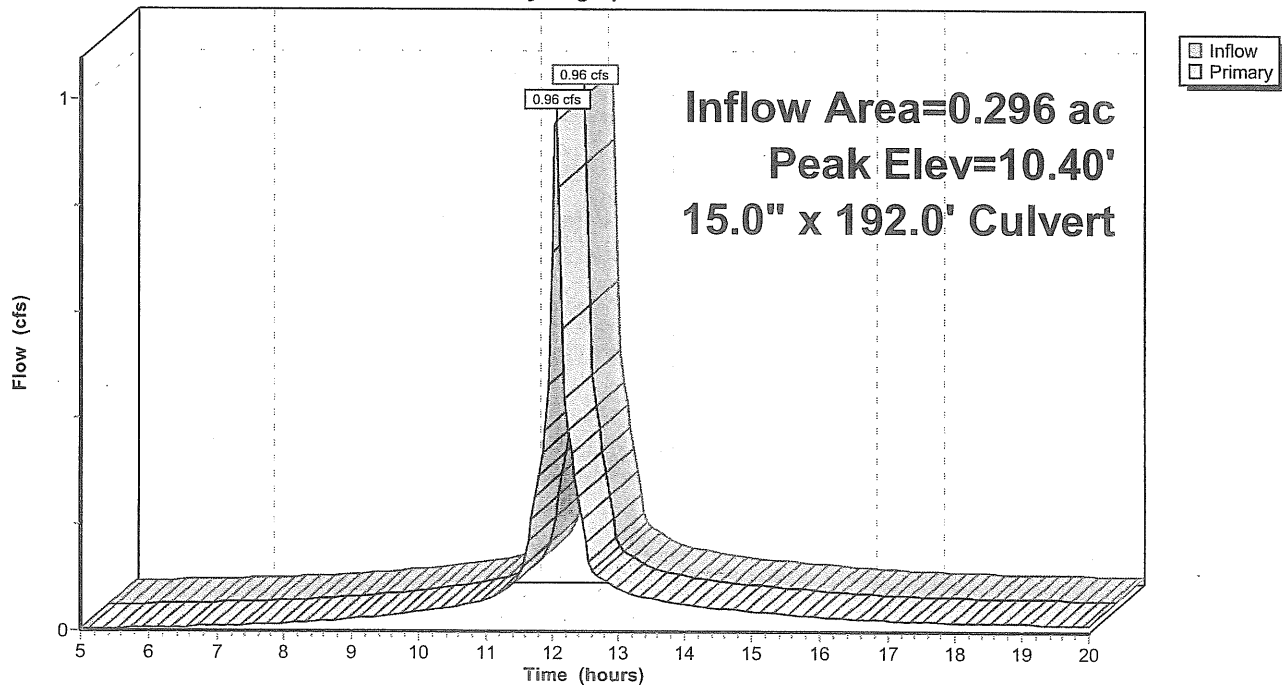
Device	Routing	Invert	Outlet Devices
#1	Primary	8.74'	15.0" x 192.0' long Culvert Ke= 0.500 Outlet Invert= 8.45' S= 0.0015 '/' Cc= 0.900 n= 0.010

Primary OutFlow Max=0.00 cfs @ 12.06 hrs HW=9.85' TW=10.21' (Dynamic Tailwater)

←1=Culvert (Controls 0.00 cfs)

Pond D2: Commercial Street Storm System

Hydrograph



Post-Development-ST

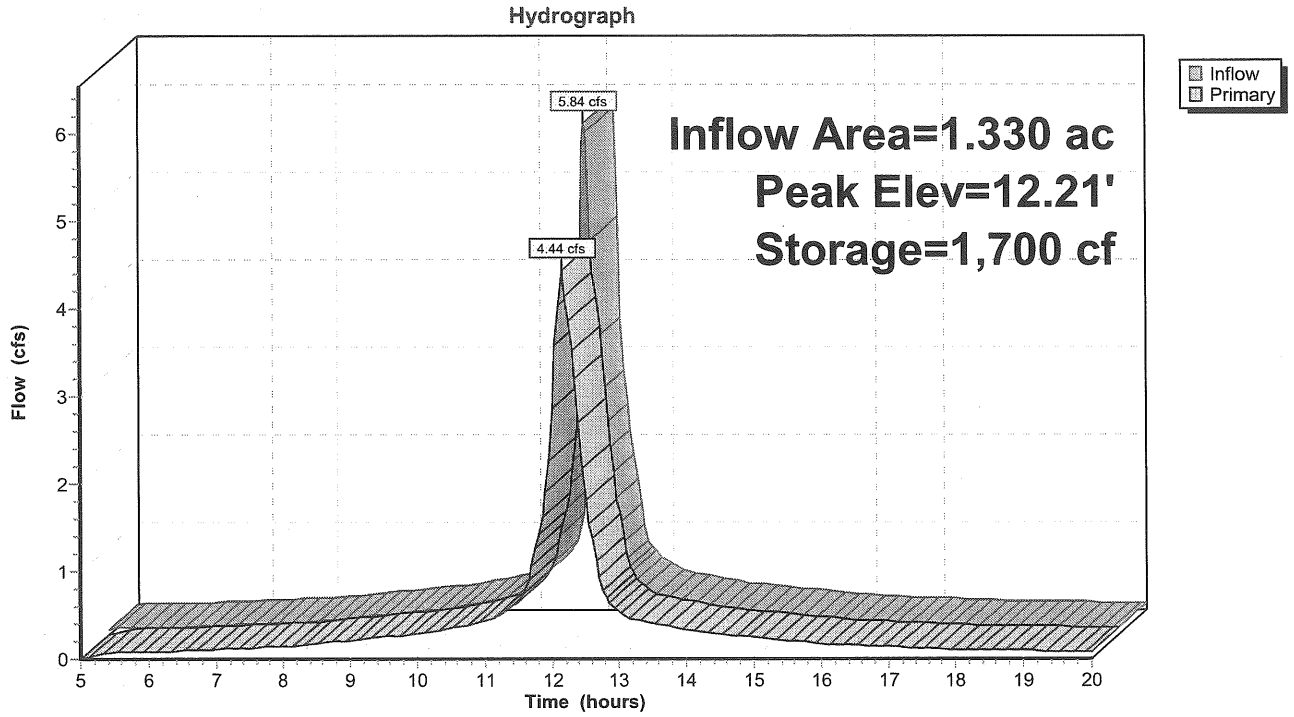
Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 44
11/22/2006

Pond 5C: Subsurface Detention for Plaza



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 43

11/22/2006

Pond 5C: Subsurface Detention for Plaza

Inflow Area = 1.330 ac, Inflow Depth > 4.15" for 10-Year Storm event
 Inflow = 5.84 cfs @ 12.08 hrs, Volume= 0.459 af
 Outflow = 4.44 cfs @ 12.15 hrs, Volume= 0.458 af, Atten= 24%, Lag= 4.4 min
 Primary = 4.44 cfs @ 12.15 hrs, Volume= 0.458 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 12.21' @ 12.16 hrs Surf.Area= 988 sf Storage= 1,700 cf

Plug-Flow detention time= 6.9 min calculated for 0.458 af (100% of inflow)
 Center-of-Mass det. time= 5.3 min (740.4 - 735.2)

Volume	Invert	Avail.Storage	Storage Description
#1	9.50'	1,085 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 3,952 cf Overall - 1,240 cf Embedded = 2,712 cf x 40.0% Voids
#2	10.50'	1,240 cf	44.6"W x 30.0"H x 7.12'L StormTech SC-740 x 27 Inside #1
		2,325 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.50	988	0	0
13.50	988	3,952	3,952

Device	Routing	Invert	Outlet Devices
#1	Primary	9.50'	12.0" x 50.0' long Culvert CMP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 9.00' S= 0.0100 '/' Cc= 0.900 n= 0.011
#2	Device 1	9.50'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.50'	8.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	12.00'	12.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=4.39 cfs @ 12.15 hrs HW=12.20' TW=10.37' (Dynamic Tailwater)

- 1=Culvert (Passes 4.39 cfs of 5.11 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 2.27 cfs @ 6.50 fps)
- 3=Orifice/Grate (Orifice Controls 1.96 cfs @ 5.62 fps)
- 4=Orifice/Grate (Orifice Controls 0.16 cfs @ 1.50 fps)

Post-Development-ST

Prepared by Woodard & Curran

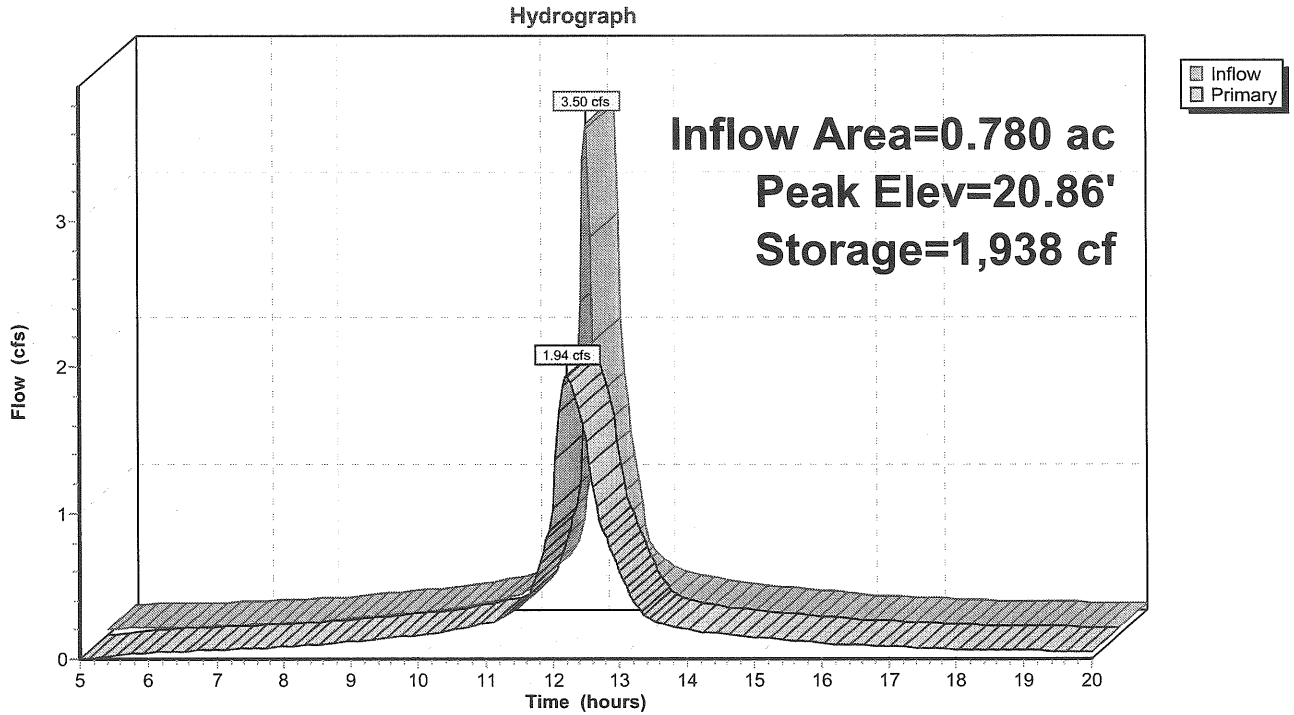
HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 42

11/22/2006

Pond 1B: Subsurface Detention for Parking Garage



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 41

11/22/2006

Pond 1B: Subsurface Detention for Parking Garage

Inflow Area = 0.780 ac, Inflow Depth > 4.15" for 10-Year Storm event
 Inflow = 3.50 cfs @ 12.09 hrs, Volume= 0.270 af
 Outflow = 1.94 cfs @ 12.22 hrs, Volume= 0.267 af, Atten= 45%, Lag= 7.8 min
 Primary = 1.94 cfs @ 12.22 hrs, Volume= 0.267 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 20.86' @ 12.22 hrs Surf.Area= 1,770 sf Storage= 1,938 cf

Plug-Flow detention time= 17.7 min calculated for 0.267 af (99% of inflow)
 Center-of-Mass det. time= 13.8 min (749.3 - 735.5)

Volume	Invert	Avail.Storage	Storage Description
#1	19.00'	1,950 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 7,080 cf Overall - 2,205 cf Embedded = 4,875 cf x 40.0% Voids
#2	20.00'	2,205 cf	44.6"W x 30.0"H x 7.12'L StormTech SC-740 x 48 Inside #1
		4,155 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.00	1,770	0	0
23.00	1,770	7,080	7,080

Device	Routing	Invert	Outlet Devices
#1	Primary	19.00'	12.0" x 150.0' long Culvert CMP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 18.00' S= 0.0067 '/ Cc= 0.900 n= 0.011
#2	Device 1	20.00'	6.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	19.00'	6.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	21.50'	12.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=1.93 cfs @ 12.22 hrs HW=20.85' TW=16.98' (Dynamic Tailwater)

- 1=Culvert (Passes 1.93 cfs of 3.88 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.73 cfs @ 3.73 fps)
- 3=Orifice/Grate (Orifice Controls 1.20 cfs @ 6.09 fps)
- 4=Orifice/Grate (Controls 0.00 cfs)

Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 40

11/22/2006

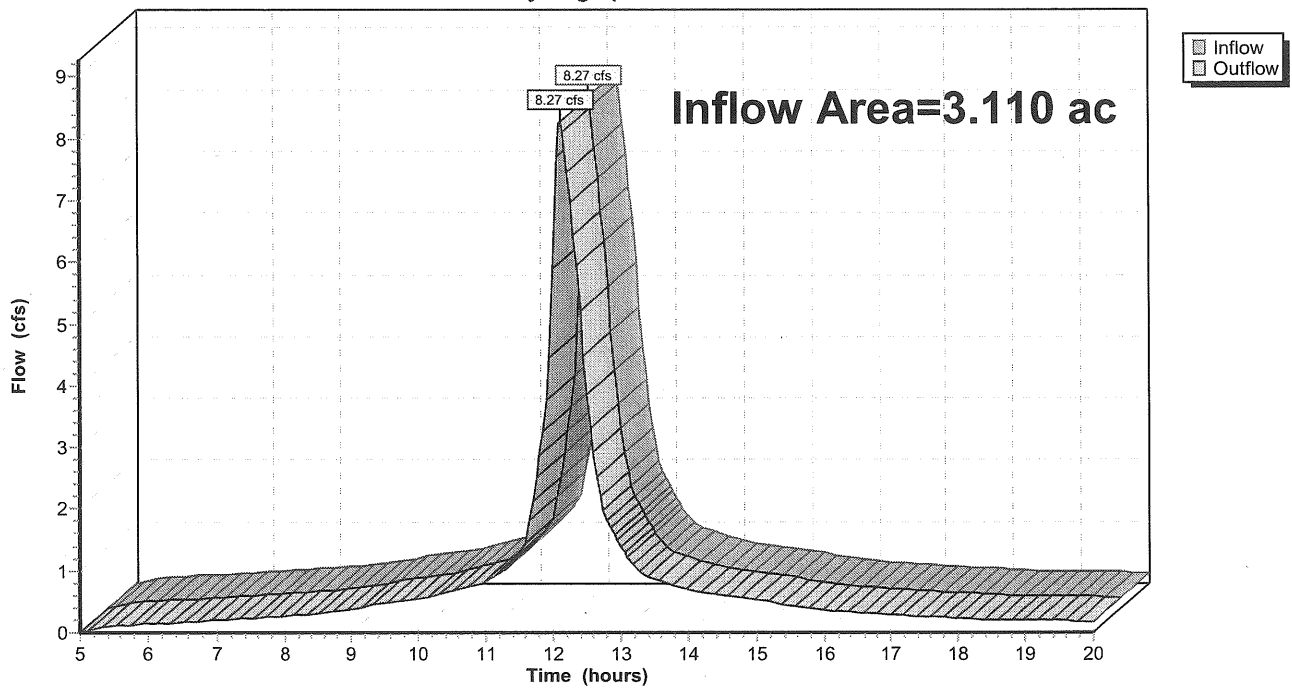
Reach TOT: (new node)

Inflow Area = 3.110 ac, Inflow Depth > 3.56" for 10-Year Storm event
Inflow = 8.27 cfs @ 12.11 hrs, Volume= 0.922 af
Outflow = 8.27 cfs @ 12.11 hrs, Volume= 0.922 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach TOT: (new node)

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 39

11/22/2006

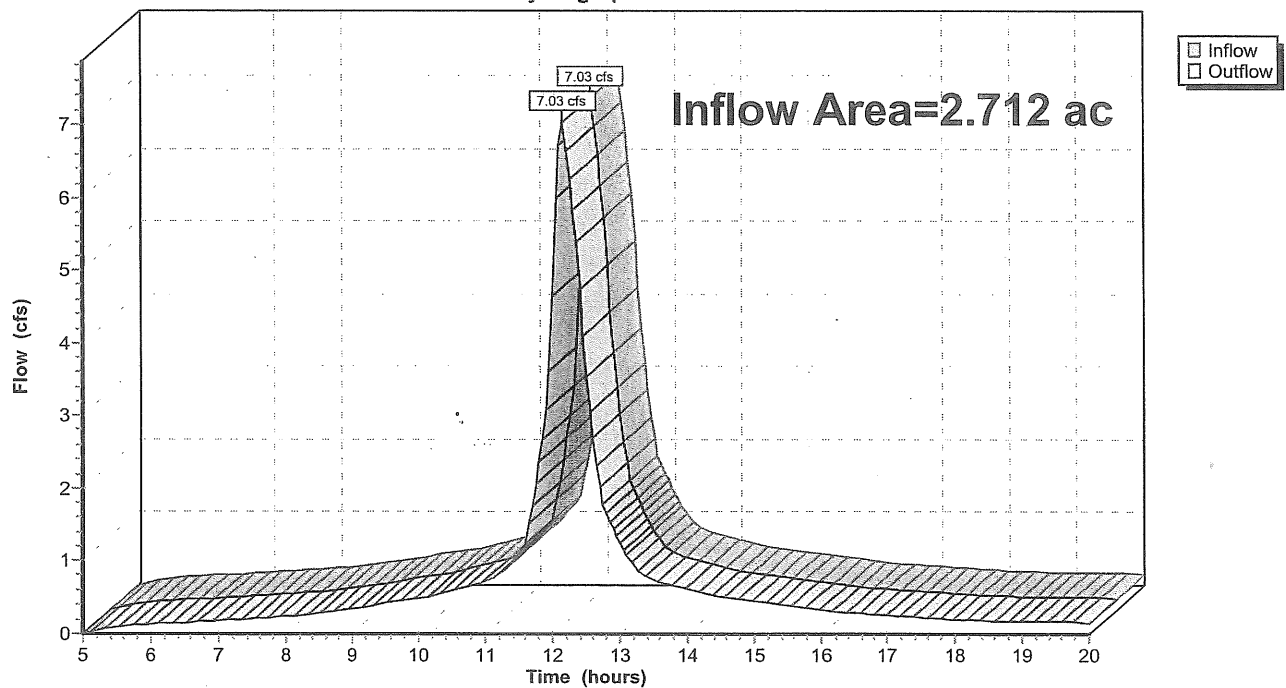
Reach FR: Fore River

Inflow Area = 2.712 ac, Inflow Depth > 3.57" for 10-Year Storm event
Inflow = 7.03 cfs @ 12.15 hrs, Volume= 0.806 af
Outflow = 7.03 cfs @ 12.15 hrs, Volume= 0.806 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach FR: Fore River

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 38

11/22/2006

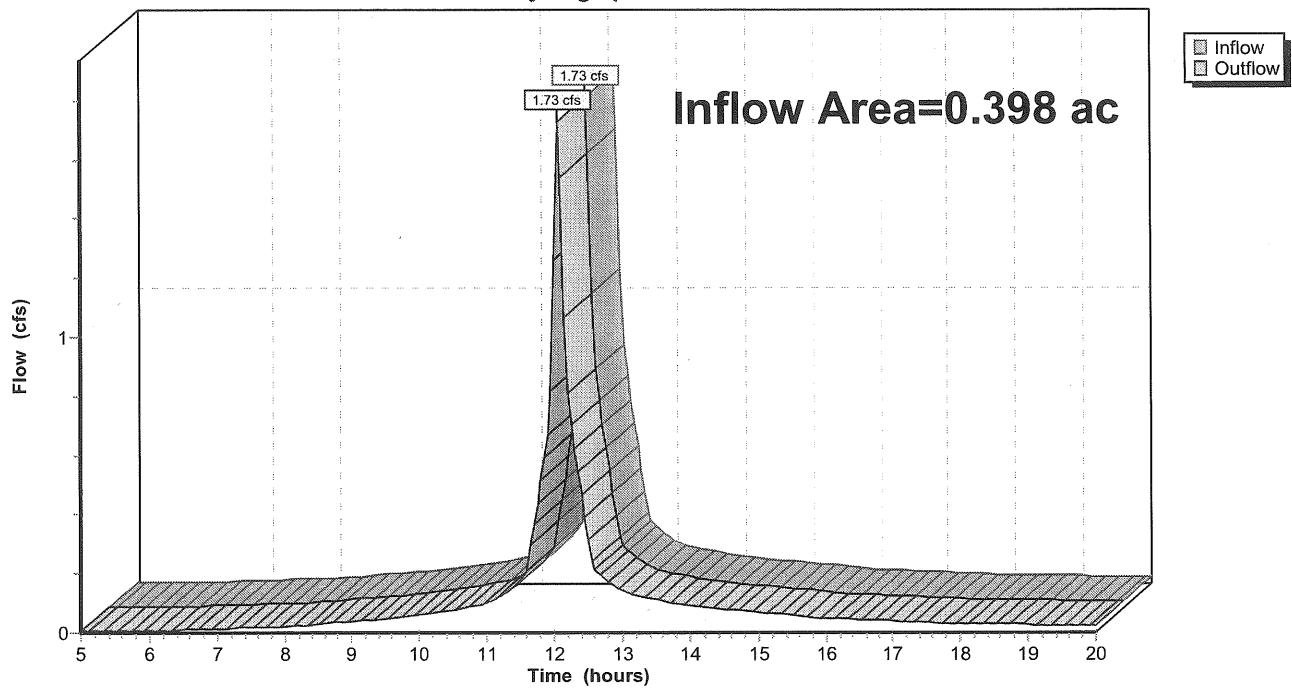
Reach CS: Combined Sewer

Inflow Area = 0.398 ac, Inflow Depth > 3.49" for 10-Year Storm event
Inflow = 1.73 cfs @ 12.06 hrs, Volume= 0.116 af
Outflow = 1.73 cfs @ 12.06 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach CS: Combined Sewer

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 37

11/22/2006

Subcatchment 5CP: Plaza

Runoff = 0.58 cfs @ 12.02 hrs, Volume= 0.040 af, Depth> 4.15"

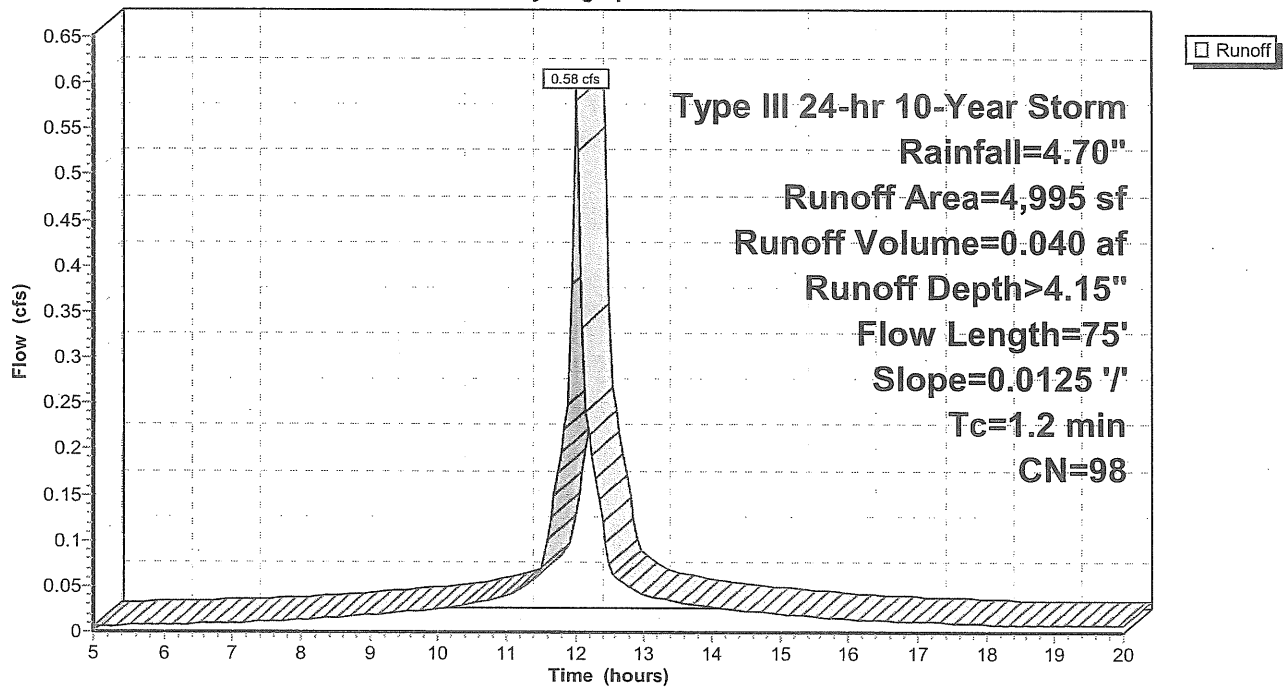
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
4,995	98	Paved parking & roofs
4,995		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	75	0.0125	1.04		Sheet Flow, AB Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment 5CP: Plaza

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech

Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 36

11/22/2006

Subcatchment 5BP: East Half of Complex

Runoff = 3.97 cfs @ 12.09 hrs, Volume= 0.305 af, Depth> 4.15"

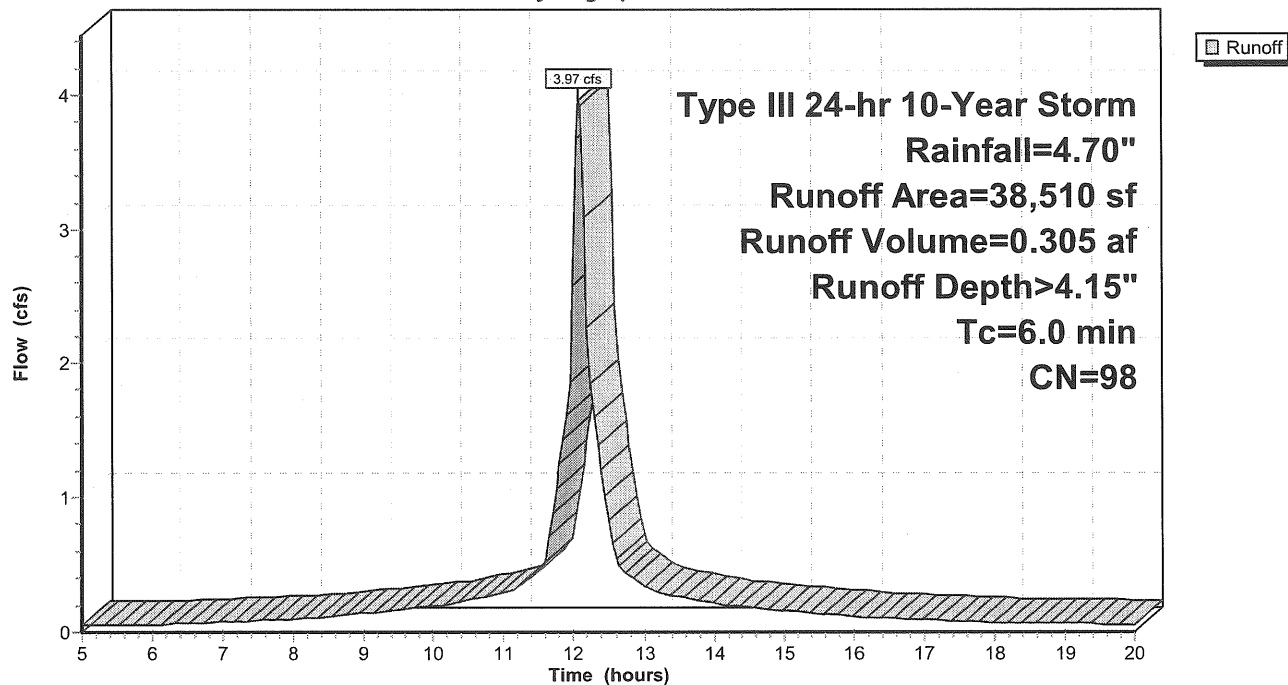
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
32,915	98	Paved parking & roofs
5,595	98	Plaza
38,510	98	Weighted Average
38,510		Impervious Area

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

Subcatchment 5BP: East Half of Complex

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
 Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 35

11/22/2006

Subcatchment 5AP: West Half of Complex

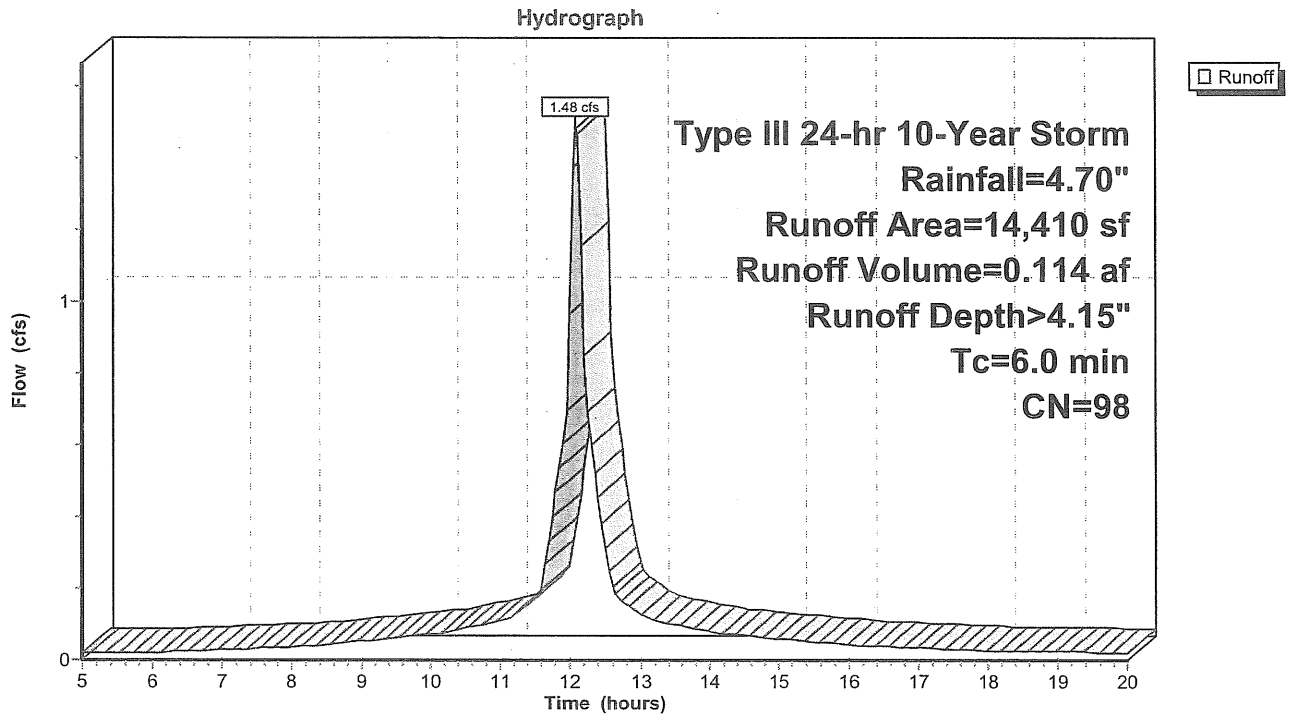
Runoff = 1.48 cfs @ 12.09 hrs, Volume= 0.114 af, Depth> 4.15"

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=4.70"

Area (sf)	CN	Description
13,840	98	Buildings
570	98	Paved
14,410	98	Weighted Average
14,410		Impervious Area

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

Subcatchment 5AP: West Half of Complex



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 34

11/22/2006

Subcatchment 4P: Back of PS

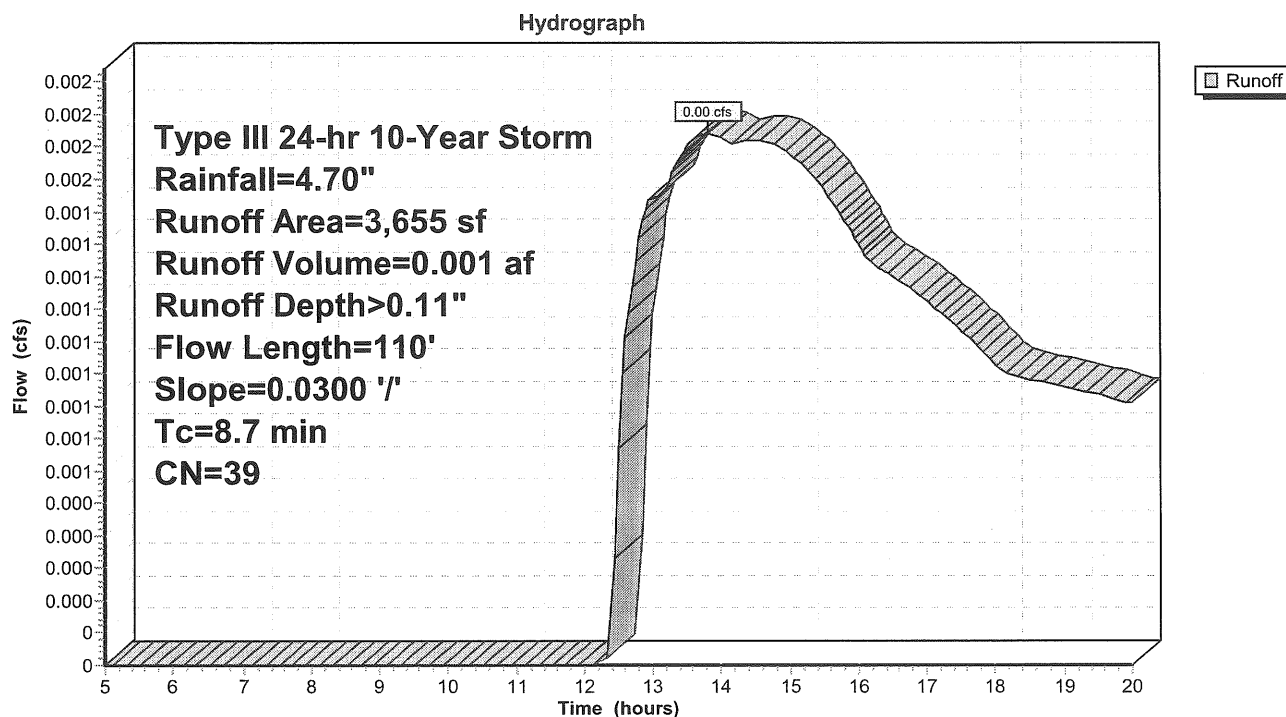
Runoff = 0.00 cfs @ 13.81 hrs, Volume= 0.001 af, Depth> 0.11"

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=4.70"

Area (sf)	CN	Description
3,655	39	>75% Grass cover, Good, HSG A
3,655		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	100	0.0300	0.19		Sheet Flow, AB Grass: Short n= 0.150 P2= 3.00"
0.1	10	0.0300	1.21		Shallow Concentrated Flow, BC Short Grass Pasture Kv= 7.0 fps
8.7	110	Total			

Subcatchment 4P: Back of PS



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 33
11/22/2006

Subcatchment 3P: Turner Barker

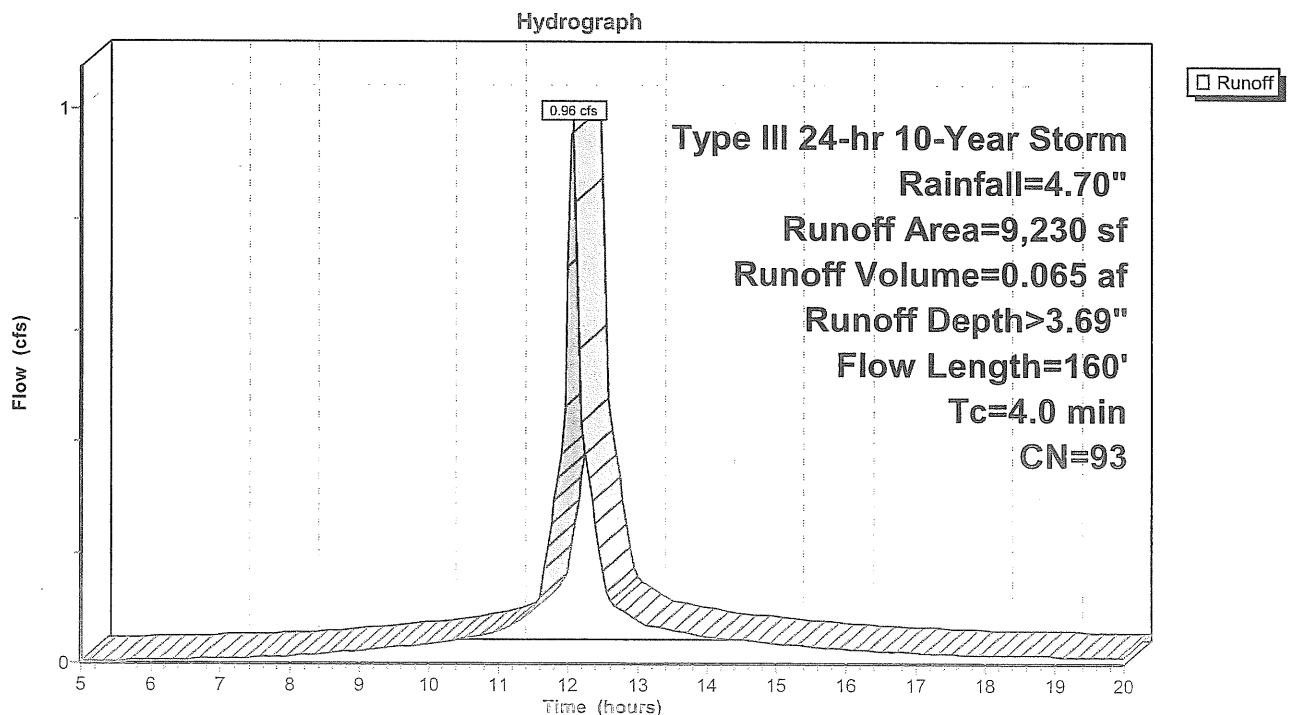
Runoff = 0.96 cfs @ 12.06 hrs, Volume= 0.065 af, Depth> 3.69"

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=4.70"

Area (sf)	CN	Description
4,000	98	Building
4,380	98	Paved parking & roofs
850	39	>75% Grass cover, Good, HSG A
9,230	93	Weighted Average
850		Pervious Area
8,380		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	10	0.0050	0.06		Sheet Flow, AB Grass: Short n= 0.150 P2= 3.00"
0.8	30	0.0050	0.60		Sheet Flow, BC Smooth surfaces n= 0.011 P2= 3.00"
0.4	120	0.0100	5.36	4.21	Circular Channel (pipe), CDE Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
4.0	160	Total			

Subcatchment 3P: Turner Barker



Post-Development-ST

Prepared by Woodard & Curran

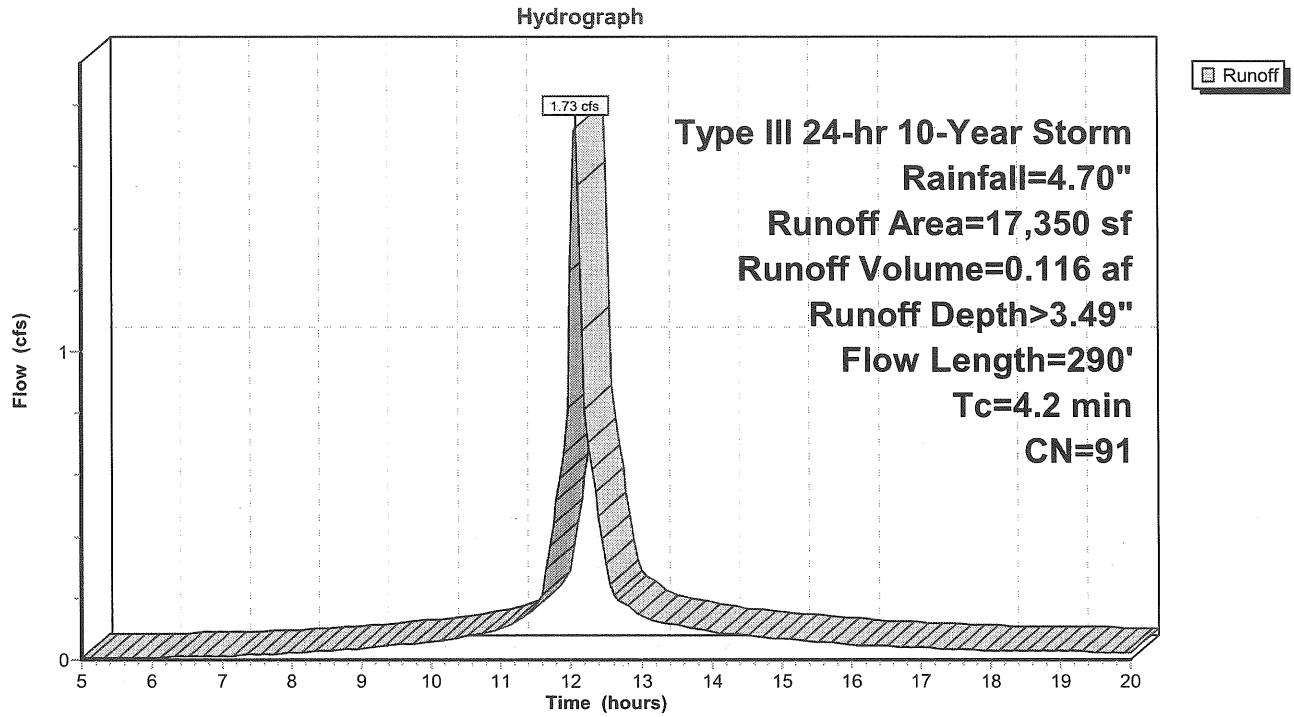
HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 32

11/22/2006

Subcatchment 2P: Office Building



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 31

11/22/2006

Subcatchment 2P: Office Building

Runoff = 1.73 cfs @ 12.06 hrs, Volume= 0.116 af, Depth> 3.49"

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=4.70"

Area (sf)	CN	Description
5,810	98	Building
1,110	98	Paved roads w/curbs & sewers
2,130	39	>75% Grass cover, Good, HSG A
8,300	98	Gravel Parking
17,350	91	Weighted Average
2,130		Pervious Area
15,220		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	90	0.0250	1.43		Sheet Flow, AB Smooth surfaces n= 0.011 P2= 3.00"
2.1	90	0.0100	0.70		Shallow Concentrated Flow, BC Short Grass Pasture Kv= 7.0 fps
0.1	25	0.2000	3.13		Shallow Concentrated Flow, CD Short Grass Pasture Kv= 7.0 fps
0.9	85	0.0060	1.57		Shallow Concentrated Flow, DE Paved Kv= 20.3 fps
4.2	290	Total			

Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
 Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 30
 11/22/2006

Subcatchment 1BP: Parking Garage

Runoff = 3.50 cfs @ 12.09 hrs, Volume= 0.270 af, Depth> 4.15"

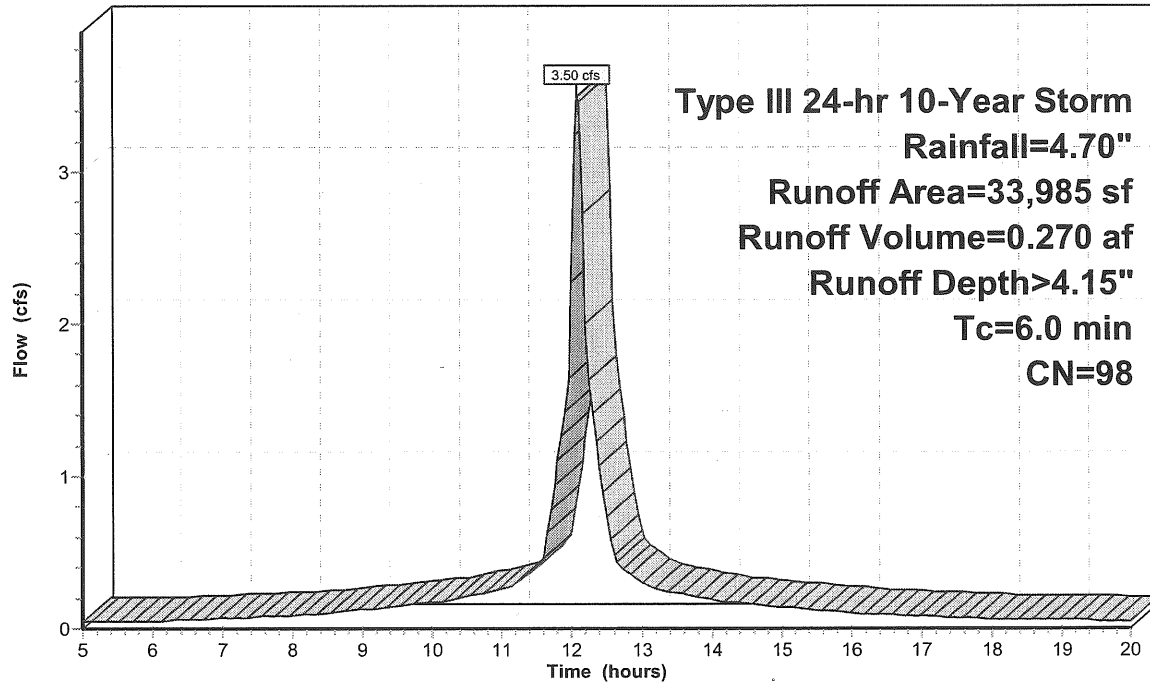
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
30,730	98	Building
3,255	98	Paved
33,985	98	Weighted Average
33,985		Impervious Area

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

Subcatchment 1BP: Parking Garage

Hydrograph



Runoff

**Type III 24-hr 10-Year Storm
 Rainfall=4.70"
 Runoff Area=33,985 sf
 Runoff Volume=0.270 af
 Runoff Depth>4.15"
 Tc=6.0 min
 CN=98**

Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
 Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 29

11/22/2006

Subcatchment 1AP: Open Space

Runoff = 0.15 cfs @ 12.13 hrs, Volume= 0.015 af, Depth> 0.59"

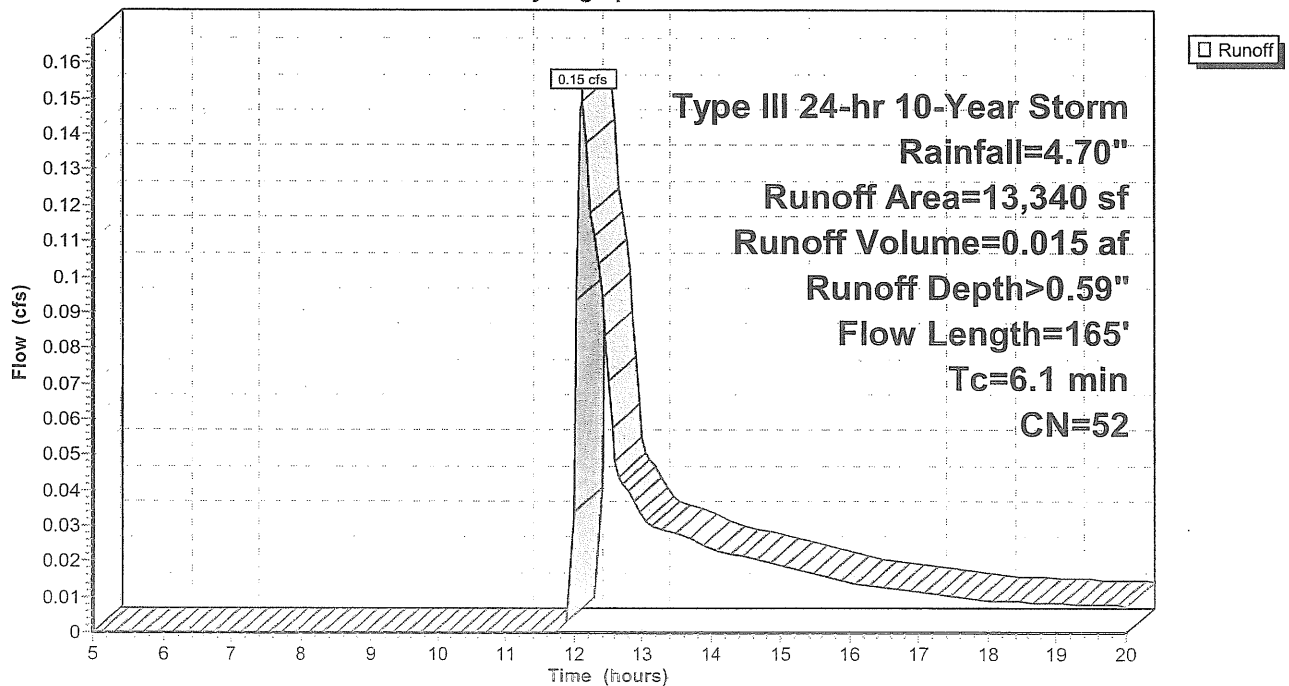
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
10,440	39	>75% Grass cover, Good, HSG A
2,900	98	Paved parking & roofs
13,340	52	Weighted Average
10,440		Pervious Area
2,900		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	45	0.0200	1.14		Sheet Flow, AB Smooth surfaces n= 0.011 P2= 3.00"
4.8	55	0.0400	0.19		Sheet Flow, BC Grass: Short n= 0.150 P2= 3.00"
0.6	65	0.0600	1.71		Shallow Concentrated Flow, CD Short Grass Pasture Kv= 7.0 fps
6.1	165	Total			

Subcatchment 1AP: Open Space

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 28

11/22/2006

Pond D7: Hancock

Peak Elev=8.84' Inflow=2.06 cfs 0.282 af
30.0" x 36.0' Culvert Outflow=2.06 cfs 0.282 af

Pond D8: Hancock Street Storm System

Peak Elev=10.38' Inflow=2.06 cfs 0.282 af
24.0" x 196.0' Culvert Outflow=2.06 cfs 0.282 af

Pond UH1: Hancock Link DMH1

Peak Elev=12.23' Inflow=2.06 cfs 0.282 af
24.0" x 125.0' Culvert Outflow=2.06 cfs 0.282 af

Pond UH2: Hancock Link DMH2

Peak Elev=16.99' Inflow=2.06 cfs 0.282 af
24.0" x 106.0' Culvert Outflow=2.06 cfs 0.282 af

Total Runoff Area = 3.110 ac Runoff Volume = 0.926 af Average Runoff Depth = 3.57"
12.60% Pervious Area = 0.392 ac 87.40% Impervious Area = 2.718 ac

Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 10-Year Storm Rainfall=4.70"

Page 27

11/22/2006

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

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1AP: Open Space

Runoff Area=13,340 sf Runoff Depth>0.59"
Flow Length=165' Tc=6.1 min CN=52 Runoff=0.15 cfs 0.015 af

Subcatchment 1BP: Parking Garage

Runoff Area=33,985 sf Runoff Depth>4.15"
Tc=6.0 min CN=98 Runoff=3.50 cfs 0.270 af

Subcatchment 2P: Office Building

Runoff Area=17,350 sf Runoff Depth>3.49"
Flow Length=290' Tc=4.2 min CN=91 Runoff=1.73 cfs 0.116 af

Subcatchment 3P: Turner Barker

Runoff Area=9,230 sf Runoff Depth>3.69"
Flow Length=160' Tc=4.0 min CN=93 Runoff=0.96 cfs 0.065 af

Subcatchment 4P: Back of PS

Runoff Area=3,655 sf Runoff Depth>0.11"
Flow Length=110' Slope=0.0300 '/ Tc=8.7 min CN=39 Runoff=0.00 cfs 0.001 af

Subcatchment 5AP: West Half of Complex

Runoff Area=14,410 sf Runoff Depth>4.15"
Tc=6.0 min CN=98 Runoff=1.48 cfs 0.114 af

Subcatchment 5BP: East Half of Complex

Runoff Area=38,510 sf Runoff Depth>4.15"
Tc=6.0 min CN=98 Runoff=3.97 cfs 0.305 af

Subcatchment 5CP: Plaza

Runoff Area=4,995 sf Runoff Depth>4.15"
Flow Length=75' Slope=0.0125 '/ Tc=1.2 min CN=98 Runoff=0.58 cfs 0.040 af

Reach CS: Combined Sewer

Inflow=1.73 cfs 0.116 af
Outflow=1.73 cfs 0.116 af

Reach FR: Fore River

Inflow=7.03 cfs 0.806 af
Outflow=7.03 cfs 0.806 af

Reach TOT: (new node)

Inflow=8.27 cfs 0.922 af
Outflow=8.27 cfs 0.922 af

Pond 1B: Subsurface Detention for Parking G Peak Elev=20.86' Storage=1,938 cf Inflow=3.50 cfs 0.270 af
Outflow=1.94 cfs 0.267 af

Pond 5C: Subsurface Detention for Plaza Peak Elev=12.21' Storage=1,700 cf Inflow=5.84 cfs 0.459 af
Outflow=4.44 cfs 0.458 af

Pond D2: Commercial Street Storm System Peak Elev=10.40' Inflow=0.96 cfs 0.066 af
15.0" x 192.0' Culvert Outflow=0.96 cfs 0.066 af

Pond D3: Commercial Peak Elev=10.39' Inflow=5.03 cfs 0.524 af
15.0" x 192.0' Culvert Outflow=5.03 cfs 0.524 af

Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 26

11/22/2006

Pond UH2: Hancock Link DMH2

Inflow Area = 1.086 ac, Inflow Depth > 1.87" for 2-Year Storm event
Inflow = 1.25 cfs @ 12.21 hrs, Volume= 0.169 af
Outflow = 1.25 cfs @ 12.21 hrs, Volume= 0.169 af, Atten= 0%, Lag= 0.0 min
Primary = 1.25 cfs @ 12.21 hrs, Volume= 0.169 af

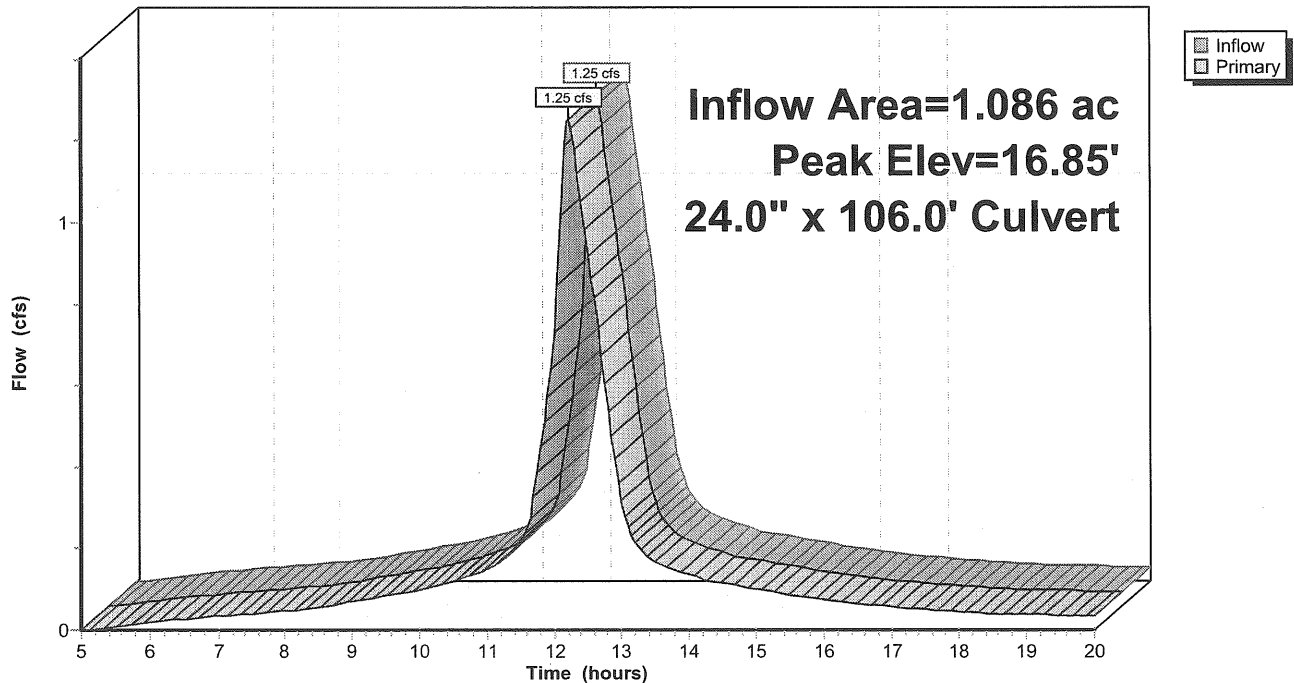
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 16.85' @ 12.21 hrs
Flood Elev= 22.41'

Device	Routing	Invert	Outlet Devices
#1	Primary	16.39'	24.0" x 106.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 11.73' S= 0.0440 '/ Cc= 0.900 n= 0.012

Primary OutFlow Max=1.25 cfs @ 12.21 hrs HW=16.85' TW=12.09' (Dynamic Tailwater)
↑=Culvert (Inlet Controls 1.25 cfs @ 2.30 fps)

Pond UH2: Hancock Link DMH2

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 25
11/22/2006

Pond UH1: Hancock Link DMH1

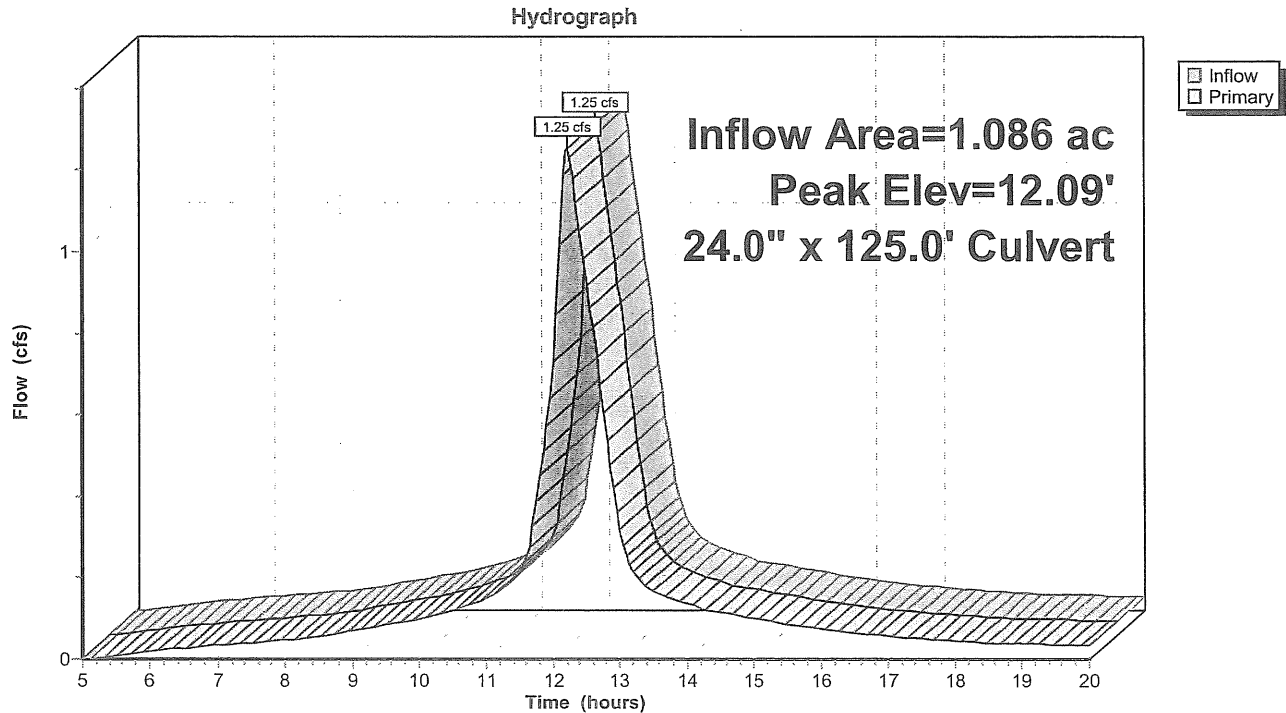
Inflow Area = 1.086 ac, Inflow Depth > 1.87" for 2-Year Storm event
Inflow = 1.25 cfs @ 12.21 hrs, Volume= 0.169 af
Outflow = 1.25 cfs @ 12.21 hrs, Volume= 0.169 af, Atten= 0%, Lag= 0.0 min
Primary = 1.25 cfs @ 12.21 hrs, Volume= 0.169 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 12.09' @ 12.21 hrs
Flood Elev= 16.51'

Device	Routing	Invert	Outlet Devices
#1	Primary	11.63'	24.0" x 125.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 9.88' S= 0.0140 '/' Cc= 0.900 n= 0.012

Primary OutFlow Max=1.25 cfs @ 12.21 hrs HW=12.09' TW=10.24' (Dynamic Tailwater)
↑1=Culvert (Inlet Controls 1.25 cfs @ 2.30 fps)

Pond UH1: Hancock Link DMH1



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 24

11/22/2006

Pond D8: Hancock Street Storm System

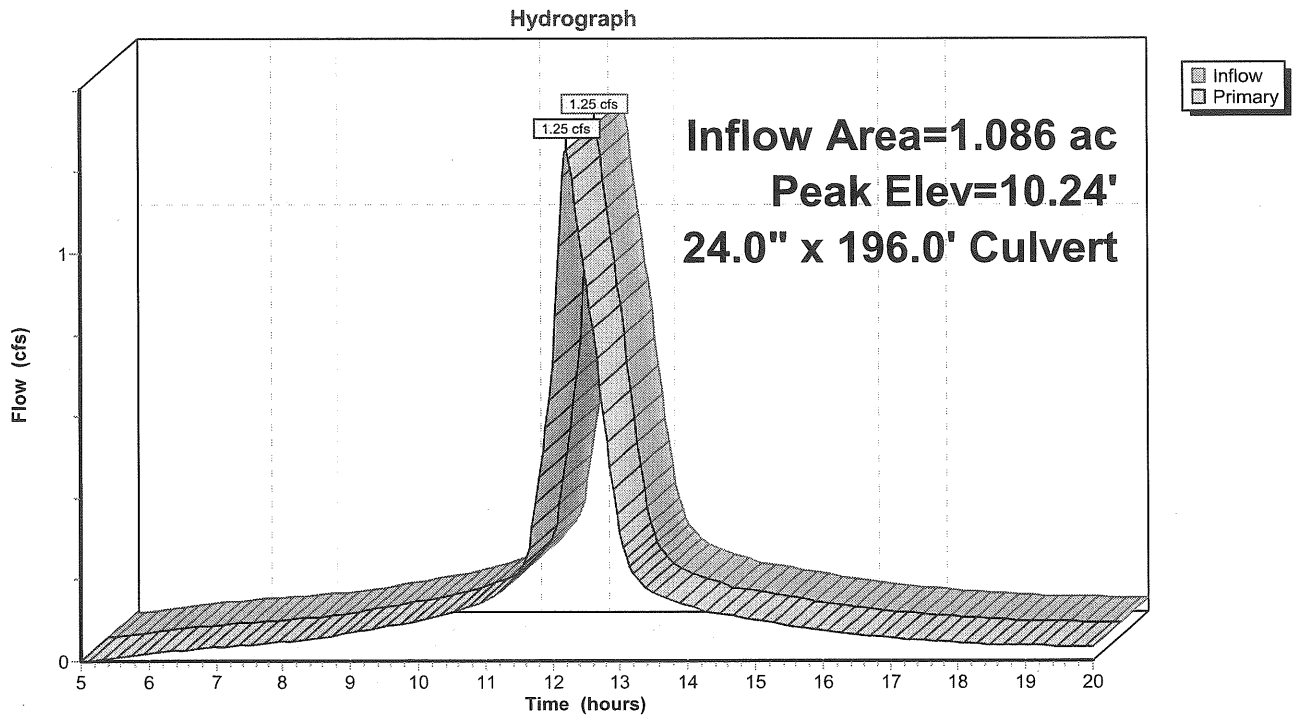
Inflow Area = 1.086 ac, Inflow Depth > 1.87" for 2-Year Storm event
Inflow = 1.25 cfs @ 12.21 hrs, Volume= 0.169 af
Outflow = 1.25 cfs @ 12.21 hrs, Volume= 0.169 af, Atten= 0%, Lag= 0.0 min
Primary = 1.25 cfs @ 12.21 hrs, Volume= 0.169 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 10.24' @ 12.21 hrs
Flood Elev= 15.38'

Device	Routing	Invert	Outlet Devices
#1	Primary	9.78'	24.0" x 196.0' long Culvert Ke= 0.500 Outlet Invert= 8.18' S= 0.0082 '/ Cc= 0.900 n= 0.011

Primary OutFlow Max=1.25 cfs @ 12.21 hrs HW=10.24' TW=8.68' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.25 cfs @ 2.30 fps)

Pond D8: Hancock Street Storm System



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 23

11/22/2006

Pond D7: Hancock

Inflow Area = 1.086 ac, Inflow Depth > 1.87" for 2-Year Storm event
Inflow = 1.25 cfs @ 12.21 hrs, Volume= 0.169 af
Outflow = 1.25 cfs @ 12.21 hrs, Volume= 0.169 af, Atten= 0%, Lag= 0.0 min
Primary = 1.25 cfs @ 12.21 hrs, Volume= 0.169 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 8.68' @ 12.21 hrs

Flood Elev= 13.91'

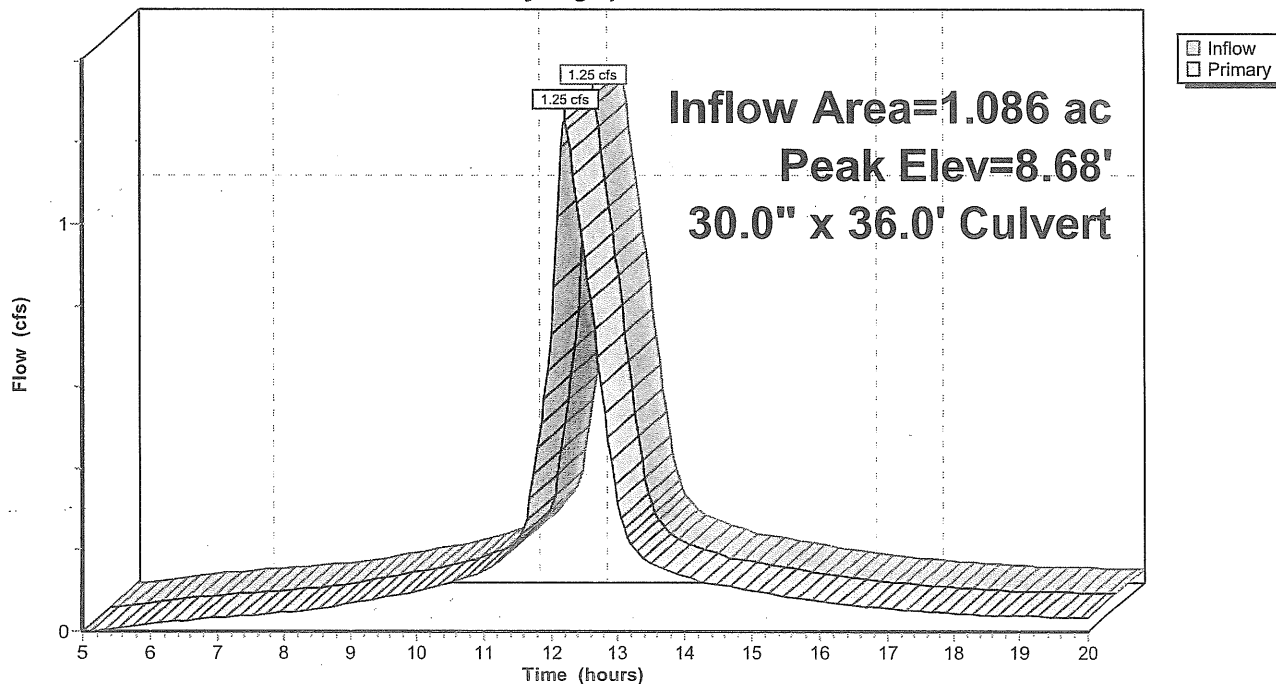
Device	Routing	Invert	Outlet Devices
#1	Primary	8.08'	30.0" x 36.0' long Culvert Ke= 0.500 Outlet Invert= 8.07' S= 0.0003 '/' Cc= 0.900 n= 0.012

Primary OutFlow Max=1.25 cfs @ 12.21 hrs HW=8.68' TW=0.00' (Dynamic Tailwater)

↑=Culvert (Barrel Controls 1.25 cfs @ 2.09 fps)

Pond D7: Hancock

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 22

11/22/2006

Pond D3: Commercial

Inflow Area = 1.625 ac, Inflow Depth > 2.39" for 2-Year Storm event
Inflow = 3.44 cfs @ 12.12 hrs, Volume= 0.323 af
Outflow = 3.44 cfs @ 12.12 hrs, Volume= 0.323 af, Atten= 0%, Lag= 0.0 min
Primary = 3.44 cfs @ 12.12 hrs, Volume= 0.323 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 9.65' @ 12.12 hrs

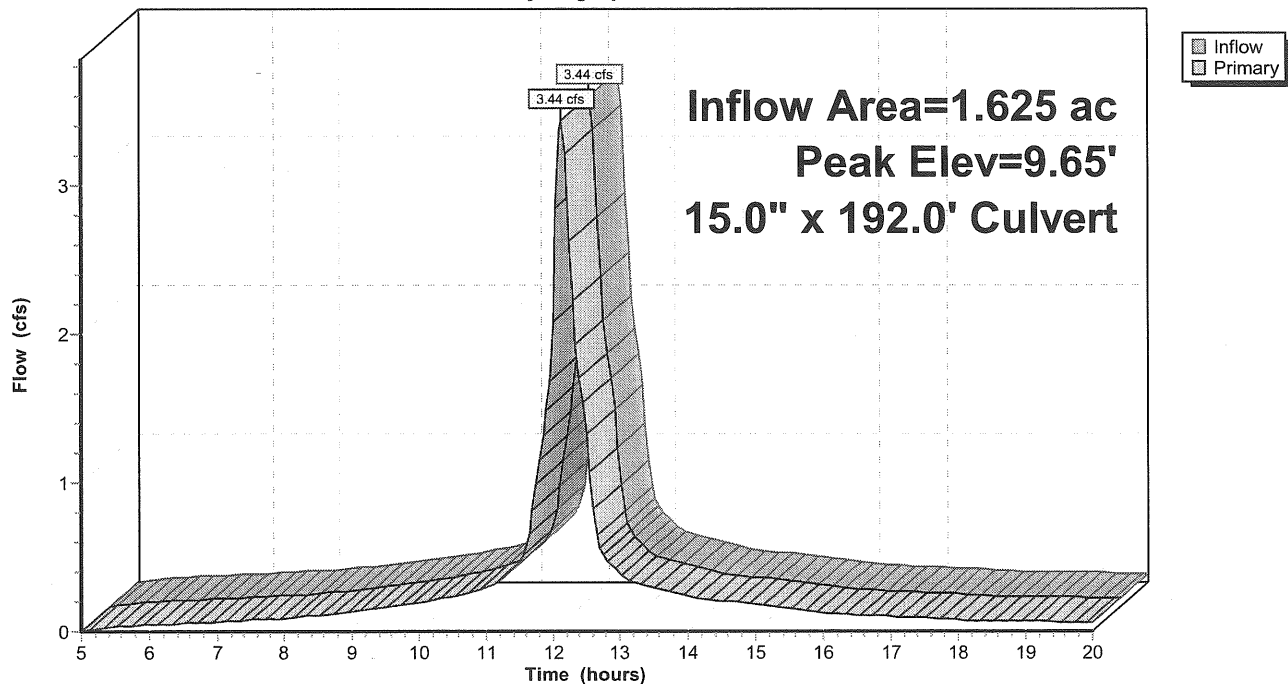
Flood Elev= 13.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	8.35'	15.0" x 192.0' long Culvert Ke= 0.500 Outlet Invert= 8.06' S= 0.0015 '/' Cc= 0.900 n= 0.010

Primary OutFlow Max=3.37 cfs @ 12.12 hrs HW=9.63' TW=0.00' (Dynamic Tailwater)
1=Culvert (Barrel Controls 3.37 cfs @ 3.33 fps)

Pond D3: Commercial

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 21

11/22/2006

Pond D2: Commercial Street Storm System

Inflow Area = 0.296 ac, Inflow Depth > 1.53" for 2-Year Storm event
Inflow = 0.57 cfs @ 12.06 hrs, Volume= 0.038 af
Outflow = 0.57 cfs @ 12.06 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min
Primary = 0.57 cfs @ 12.06 hrs, Volume= 0.038 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 9.66' @ 12.17 hrs

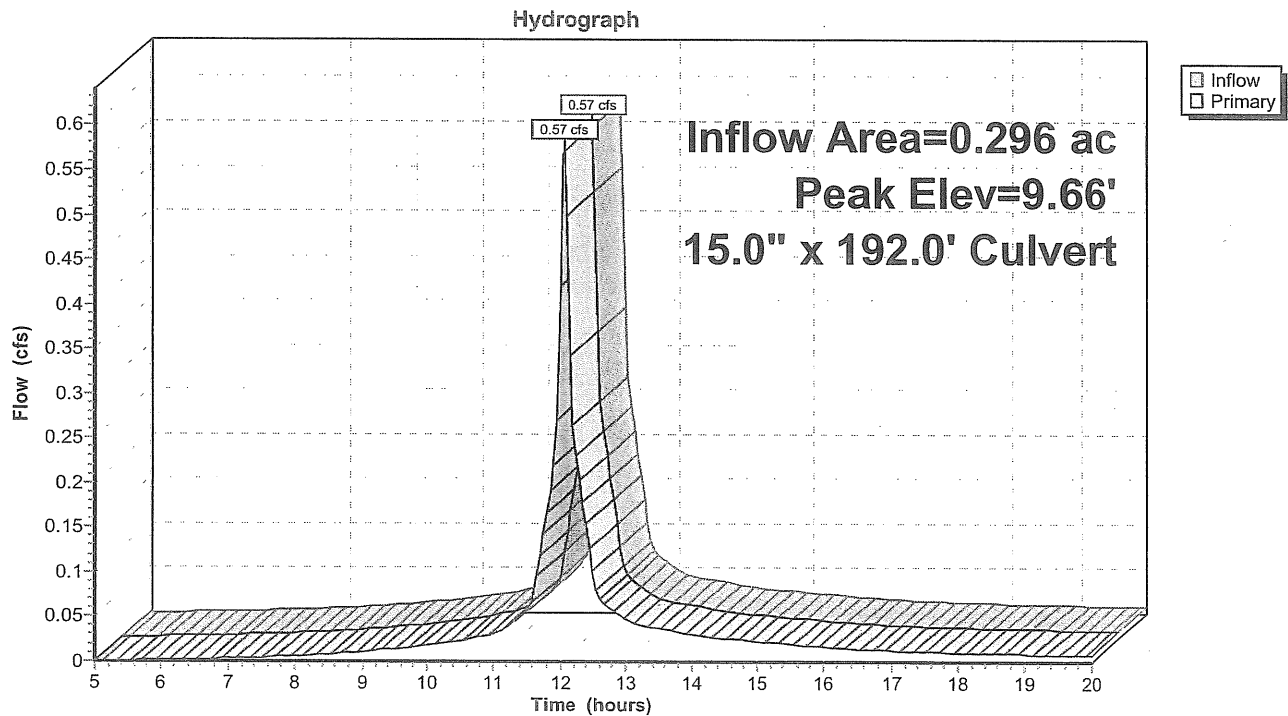
Flood Elev= 14.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	8.74'	15.0" x 192.0' long Culvert Ke= 0.500 Outlet Invert= 8.45' S= 0.0015 '/ Cc= 0.900 n= 0.010

Primary OutFlow Max=0.00 cfs @ 12.06 hrs HW=9.43' TW=9.51' (Dynamic Tailwater)

1=Culvert (Controls 0.00 cfs)

Pond D2: Commercial Street Storm System



Post-Development-ST

Prepared by Woodard & Curran

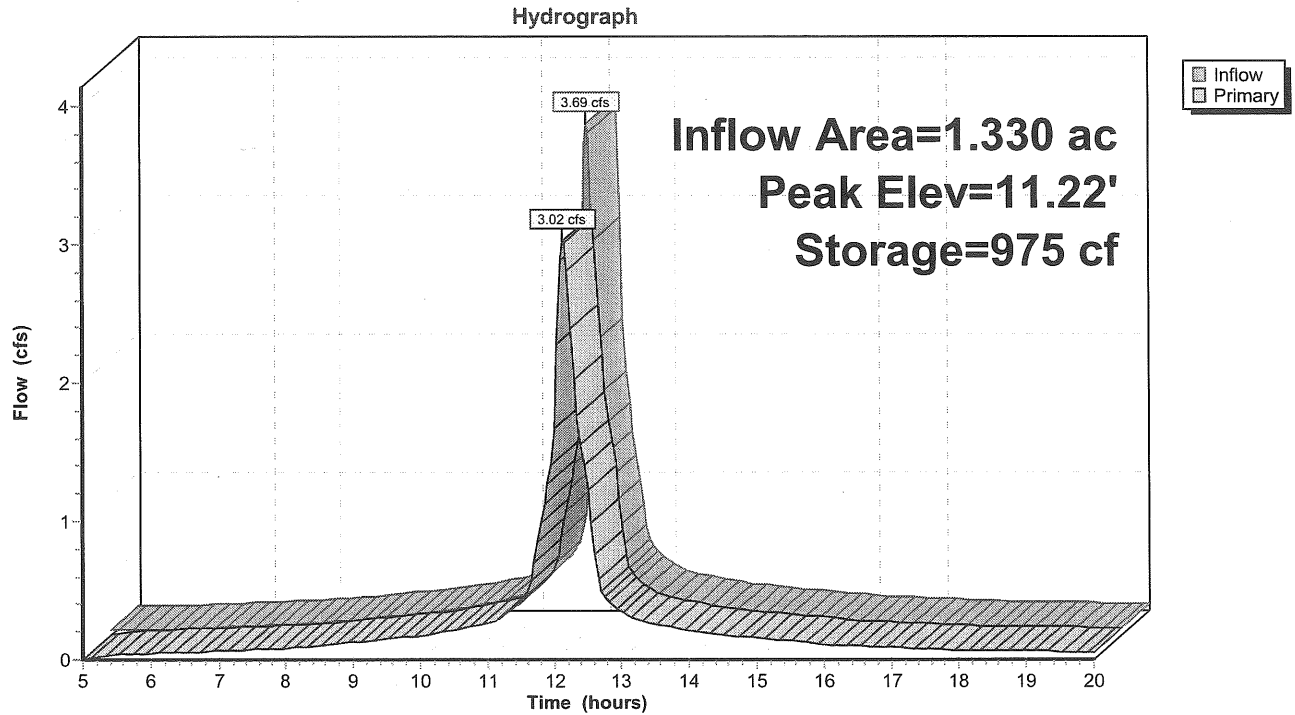
HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 20

11/22/2006

Pond 5C: Subsurface Detention for Plaza



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 19

11/22/2006

Pond 5C: Subsurface Detention for Plaza

Inflow Area = 1.330 ac, Inflow Depth > 2.59" for 2-Year Storm event
 Inflow = 3.69 cfs @ 12.08 hrs, Volume= 0.287 af
 Outflow = 3.02 cfs @ 12.14 hrs, Volume= 0.286 af, Atten= 18%, Lag= 3.8 min
 Primary = 3.02 cfs @ 12.14 hrs, Volume= 0.286 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 11.22' @ 12.14 hrs Surf.Area= 988 sf Storage= 975 cf

Plug-Flow detention time= 7.6 min calculated for 0.285 af (99% of inflow)
 Center-of-Mass det. time= 5.6 min (744.5 - 738.9)

Volume	Invert	Avail.Storage	Storage Description
#1	9.50'	1,085 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 3,952 cf Overall - 1,240 cf Embedded = 2,712 cf x 40.0% Voids
#2	10.50'	1,240 cf	44.6"W x 30.0"H x 7.12'L StormTech SC-740 x 27 Inside #1
		2,325 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.50	988	0	0
13.50	988	3,952	3,952

Device	Routing	Invert	Outlet Devices
#1	Primary	9.50'	12.0" x 50.0' long Culvert CMP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 9.00' S= 0.0100 '/' Cc= 0.900 n= 0.011
#2	Device 1	9.50'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.50'	8.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	12.00'	12.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=3.00 cfs @ 12.14 hrs HW=11.21' TW=9.63' (Dynamic Tailwater)

- ↑ 1=Culvert (Passes 3.00 cfs of 4.16 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 1.97 cfs @ 5.65 fps)
- ↑ 3=Orifice/Grate (Orifice Controls 1.03 cfs @ 2.95 fps)
- ↑ 4=Orifice/Grate (Controls 0.00 cfs)

Post-Development-ST

Prepared by Woodard & Curran

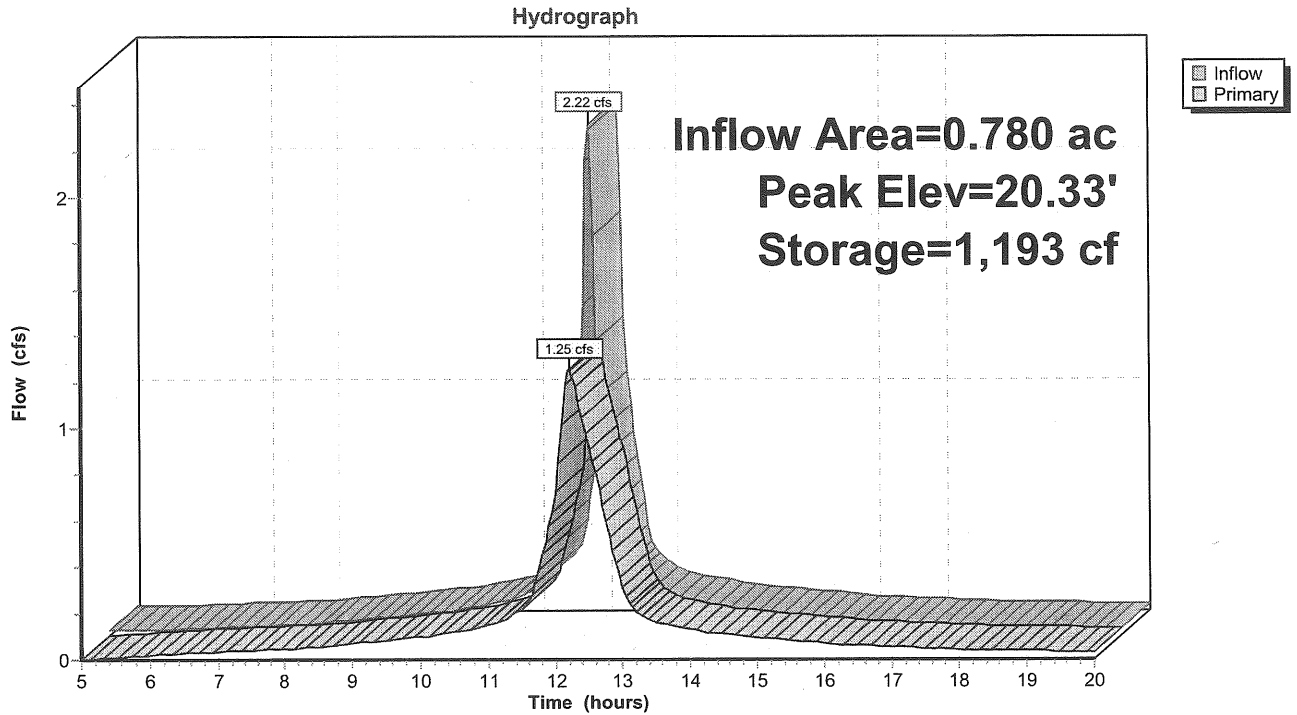
HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 18

11/22/2006

Pond 1B: Subsurface Detention for Parking Garage



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
 Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 17

11/22/2006

Pond 1B: Subsurface Detention for Parking Garage

Inflow Area = 0.780 ac, Inflow Depth > 2.59" for 2-Year Storm event
 Inflow = 2.22 cfs @ 12.09 hrs, Volume= 0.168 af
 Outflow = 1.25 cfs @ 12.21 hrs, Volume= 0.167 af, Atten= 43%, Lag= 7.6 min
 Primary = 1.25 cfs @ 12.21 hrs, Volume= 0.167 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 20.33' @ 12.21 hrs Surf.Area= 1,770 sf Storage= 1,193 cf

Plug-Flow detention time= 19.5 min calculated for 0.167 af (99% of inflow)
 Center-of-Mass det. time= 14.8 min (754.0 - 739.2)

Volume	Invert	Avail.Storage	Storage Description
#1	19.00'	1,950 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 7,080 cf Overall - 2,205 cf Embedded = 4,875 cf x 40.0% Voids
#2	20.00'	2,205 cf	44.6"W x 30.0"H x 7.12'L StormTech SC-740 x 48 Inside #1
		4,155 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.00	1,770	0	0
23.00	1,770	7,080	7,080

Device	Routing	Invert	Outlet Devices
#1	Primary	19.00'	12.0" x 150.0' long Culvert CMP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 18.00' S= 0.0067 '/ Cc= 0.900 n= 0.011
#2	Device 1	20.00'	6.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	19.00'	6.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	21.50'	12.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=1.25 cfs @ 12.21 hrs HW=20.33' TW=16.85' (Dynamic Tailwater)

- 1=Culvert (Passes 1.25 cfs of 3.36 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.27 cfs @ 1.95 fps)
- 3=Orifice/Grate (Orifice Controls 0.98 cfs @ 5.00 fps)
- 4=Orifice/Grate (Controls 0.00 cfs)

Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 16

11/22/2006

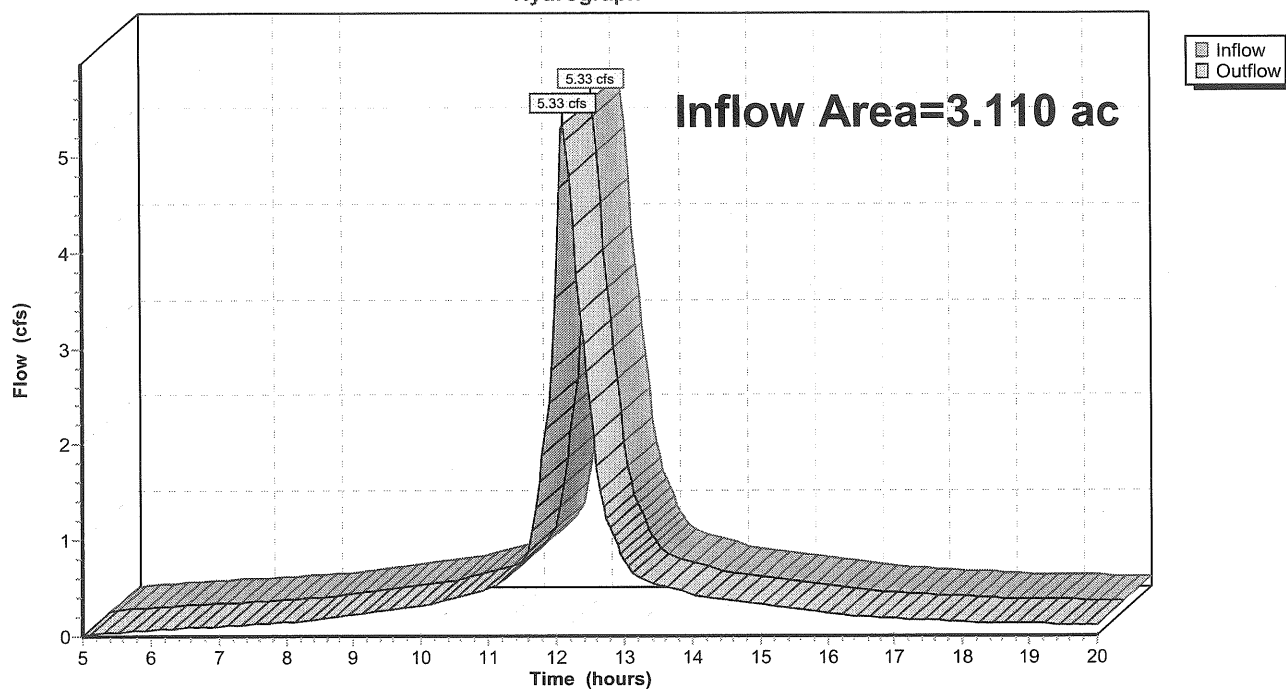
Reach TOT: (new node)

Inflow Area = 3.110 ac, Inflow Depth > 2.15" for 2-Year Storm event
Inflow = 5.33 cfs @ 12.12 hrs, Volume= 0.557 af
Outflow = 5.33 cfs @ 12.12 hrs, Volume= 0.557 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach TOT: (new node)

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 15
11/22/2006

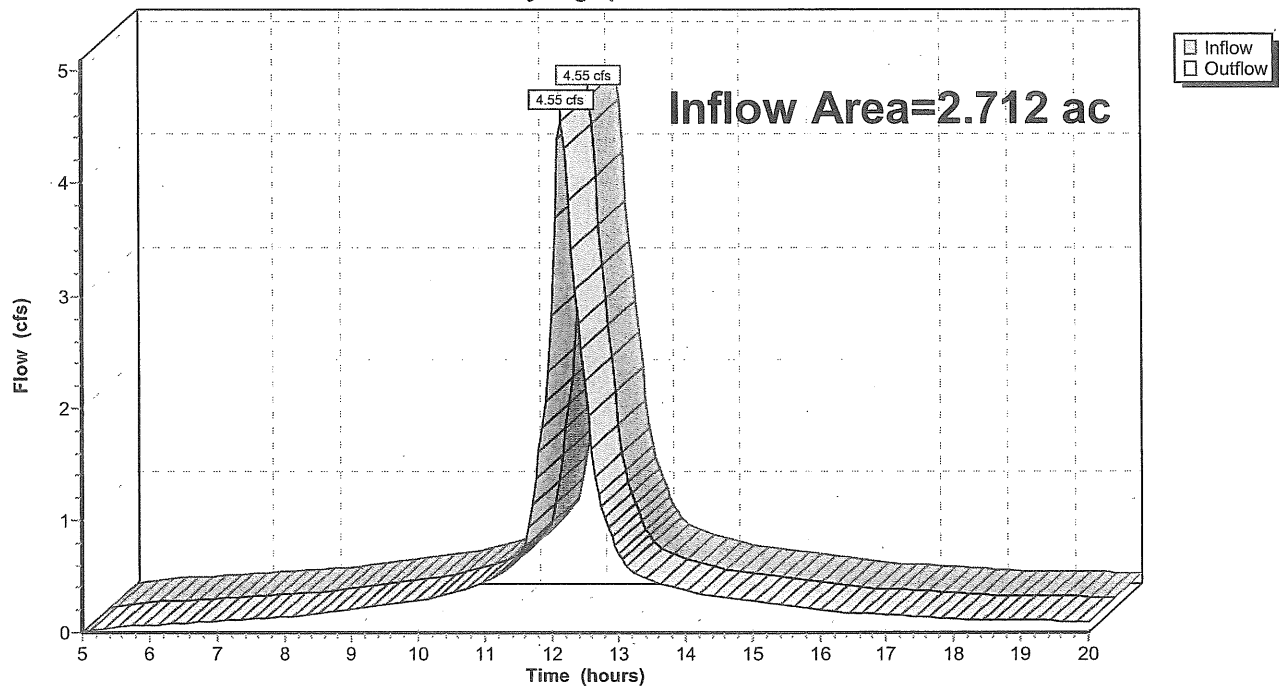
Reach FR: Fore River

Inflow Area = 2.712 ac, Inflow Depth > 2.18" for 2-Year Storm event
Inflow = 4.55 cfs @ 12.14 hrs, Volume= 0.493 af
Outflow = 4.55 cfs @ 12.14 hrs, Volume= 0.493 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach FR: Fore River

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 14

11/22/2006

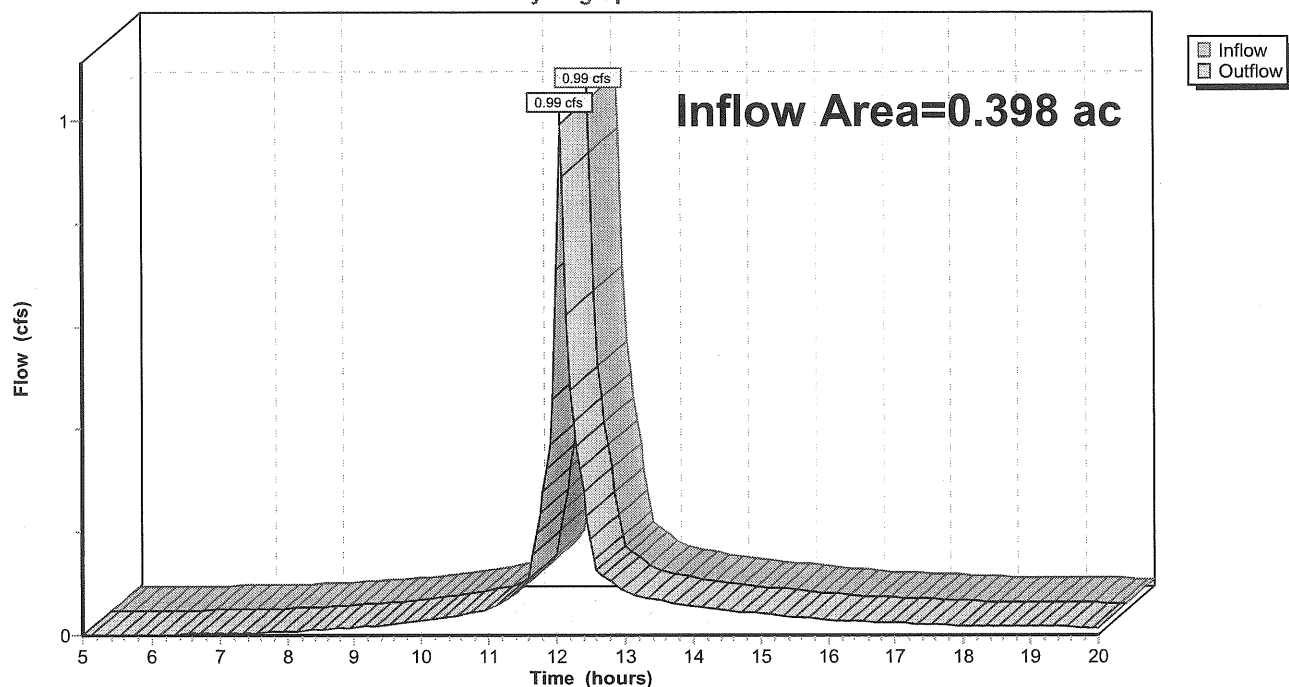
Reach CS: Combined Sewer

Inflow Area = 0.398 ac, Inflow Depth > 1.95" for 2-Year Storm event
Inflow = 0.99 cfs @ 12.06 hrs, Volume= 0.065 af
Outflow = 0.99 cfs @ 12.06 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach CS: Combined Sewer

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
 Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 13
 11/22/2006

Subcatchment 5CP: Plaza

Runoff = 0.37 cfs @ 12.02 hrs, Volume= 0.025 af, Depth> 2.59"

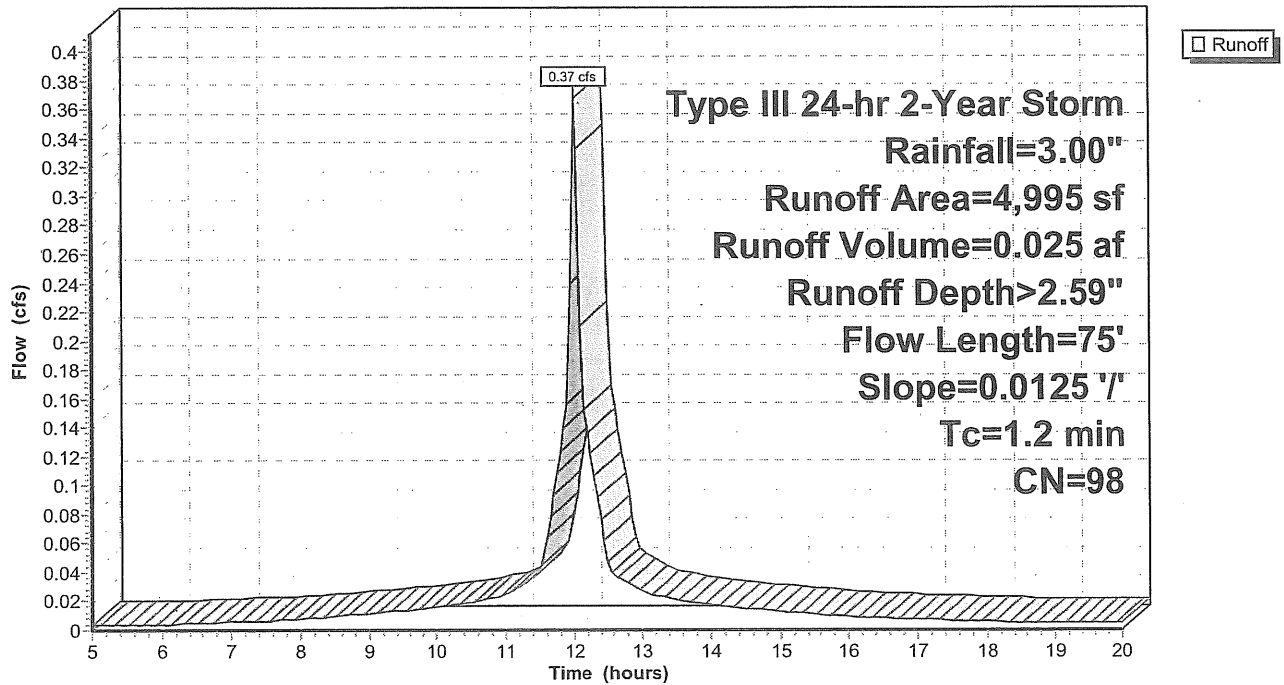
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Storm Rainfall=3.00"

Area (sf)	CN	Description
4,995	98	Paved parking & roofs
4,995		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	75	0.0125	1.04		Sheet Flow, AB Smooth surfaces n= 0.011 P2= 3.00"

Subcatchment 5CP: Plaza

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
 Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 12
 11/22/2006

Subcatchment 5BP: East Half of Complex

Runoff = 2.51 cfs @ 12.09 hrs, Volume= 0.191 af, Depth> 2.59"

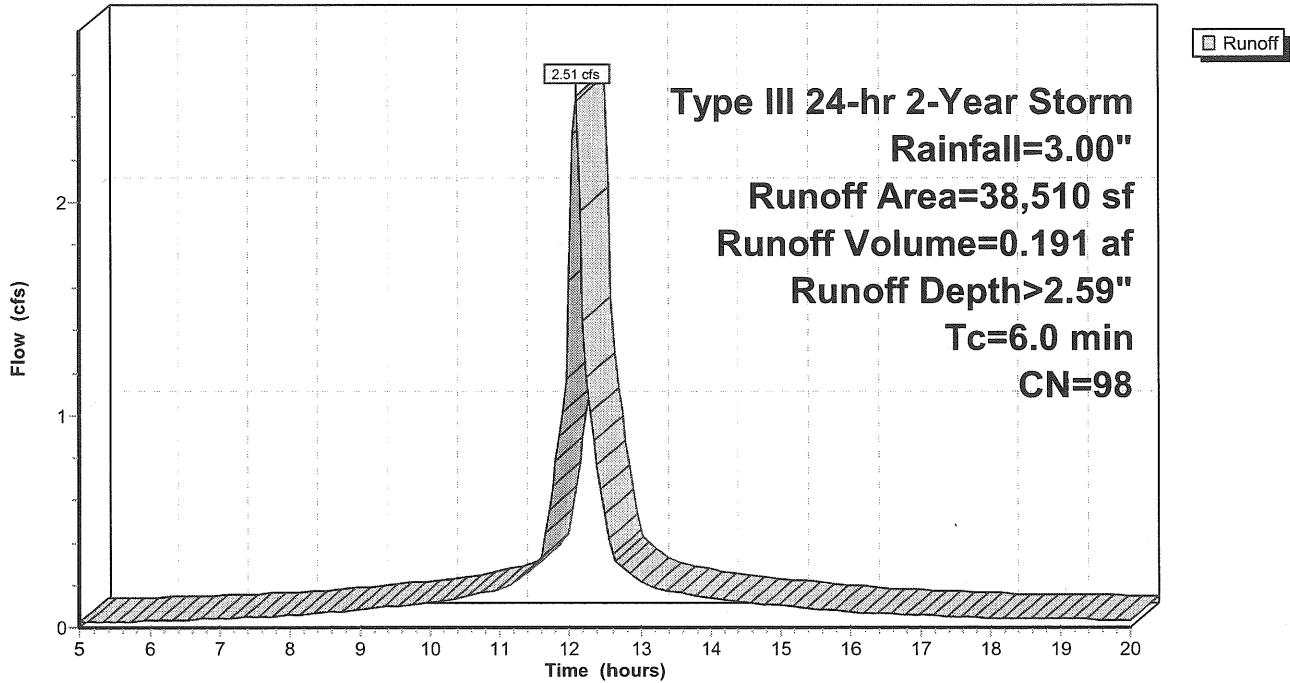
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Storm Rainfall=3.00"

Area (sf)	CN	Description
32,915	98	Paved parking & roofs
5,595	98	Plaza
38,510	98	Weighted Average
38,510		Impervious Area

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

Subcatchment 5BP: East Half of Complex

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
 Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 11
 11/22/2006

Subcatchment 5AP: West Half of Complex

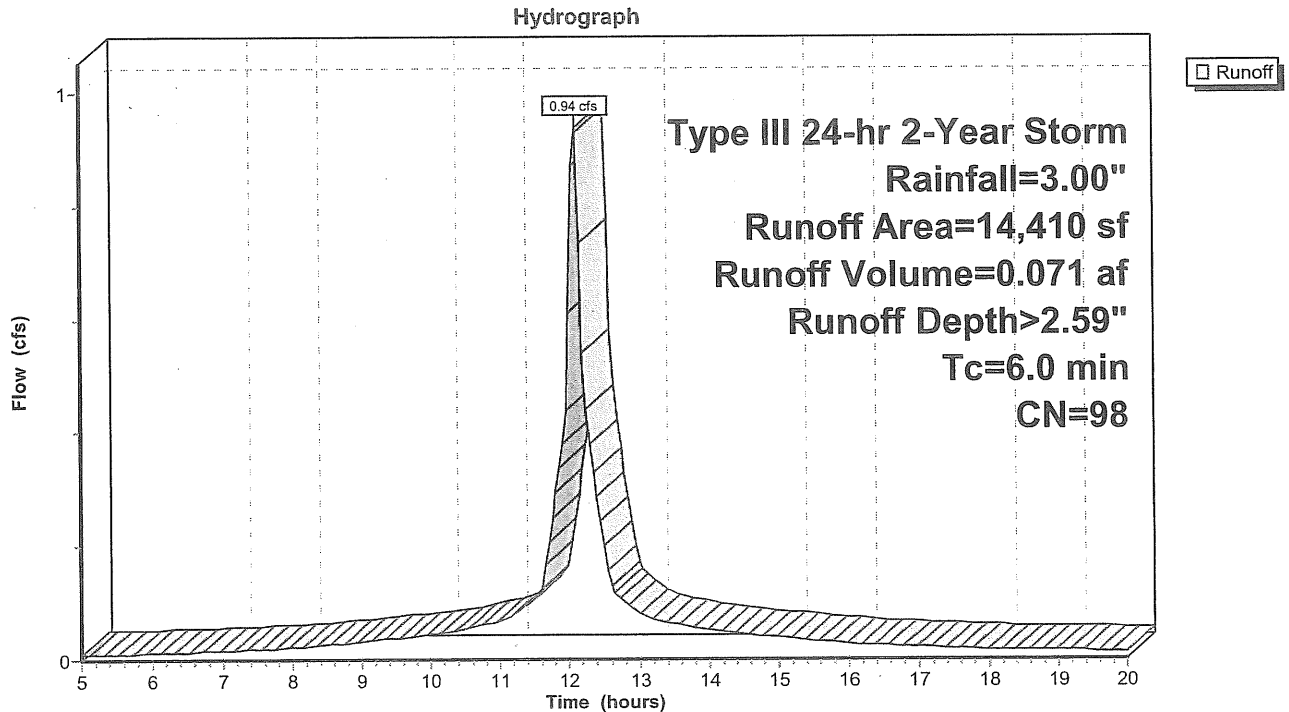
Runoff = 0.94 cfs @ 12.09 hrs, Volume= 0.071 af, Depth> 2.59"

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=3.00"

Area (sf)	CN	Description
13,840	98	Buildings
570	98	Paved
14,410	98	Weighted Average
14,410		Impervious Area

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

Subcatchment 5AP: West Half of Complex



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
 Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 10

11/22/2006

Subcatchment 4P: Back of PS

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

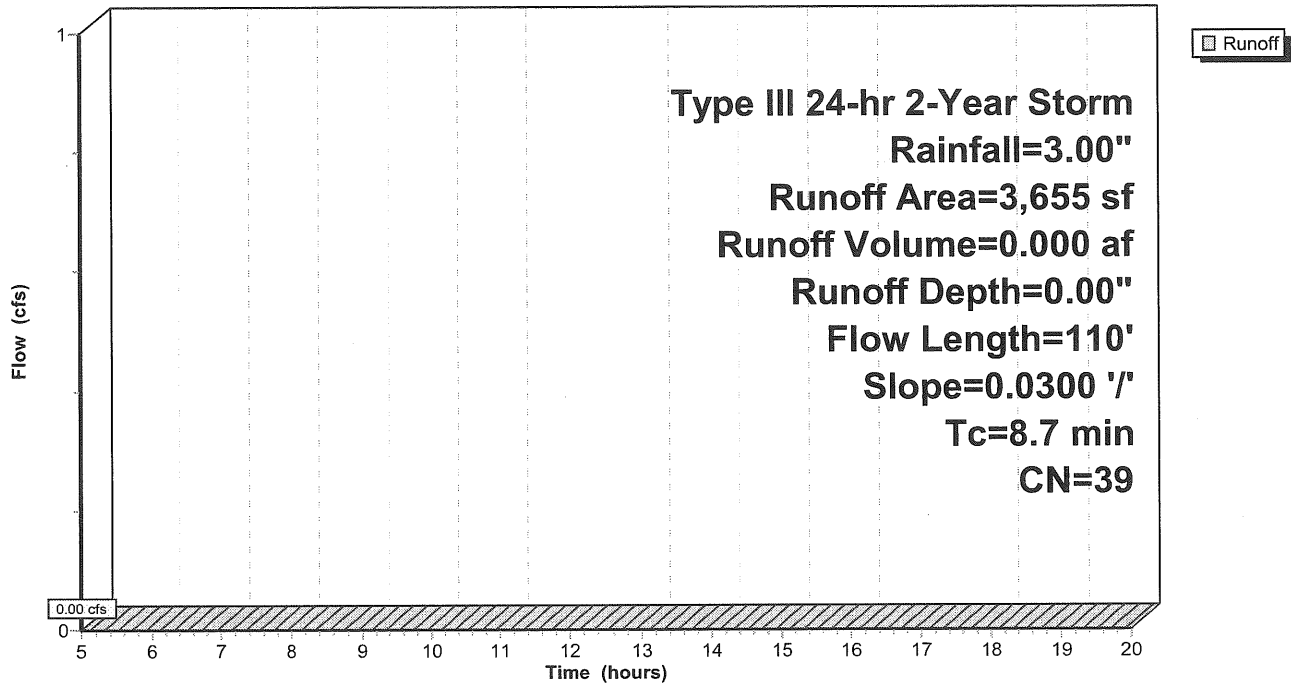
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Storm Rainfall=3.00"

Area (sf)	CN	Description
3,655	39	>75% Grass cover, Good, HSG A
3,655		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	100	0.0300	0.19		Sheet Flow, AB Grass: Short n= 0.150 P2= 3.00"
0.1	10	0.0300	1.21		Shallow Concentrated Flow, BC Short Grass Pasture Kv= 7.0 fps
8.7	110	Total			

Subcatchment 4P: Back of PS

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 9

11/22/2006

Subcatchment 3P: Turner Barker

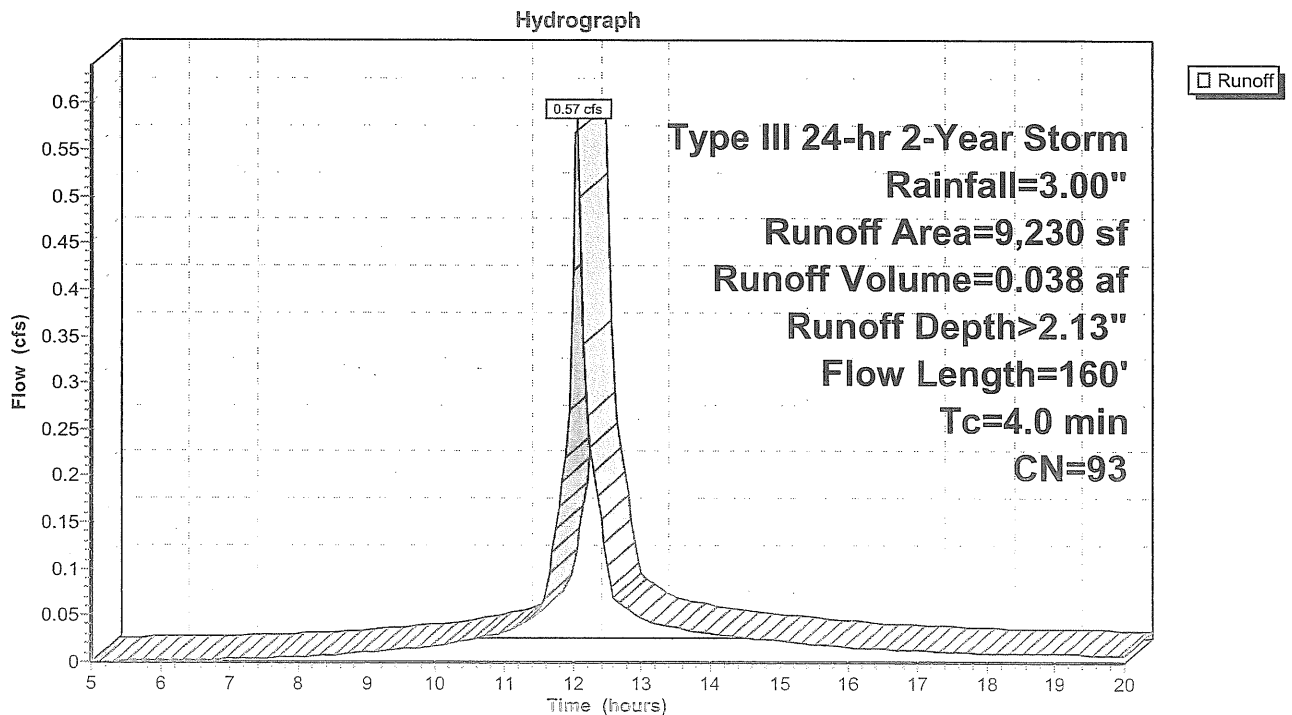
Runoff = 0.57 cfs @ 12.06 hrs, Volume= 0.038 af, Depth> 2.13"

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=3.00"

Area (sf)	CN	Description
4,000	98	Building
4,380	98	Paved parking & roofs
850	39	>75% Grass cover, Good, HSG A
9,230	93	Weighted Average
850		Pervious Area
8,380		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	10	0.0050	0.06		Sheet Flow, AB Grass: Short n= 0.150 P2= 3.00"
0.8	30	0.0050	0.60		Sheet Flow, BC Smooth surfaces n= 0.011 P2= 3.00"
0.4	120	0.0100	5.36	4.21	Circular Channel (pipe), CDE Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
4.0	160	Total			

Subcatchment 3P: Turner Barker



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

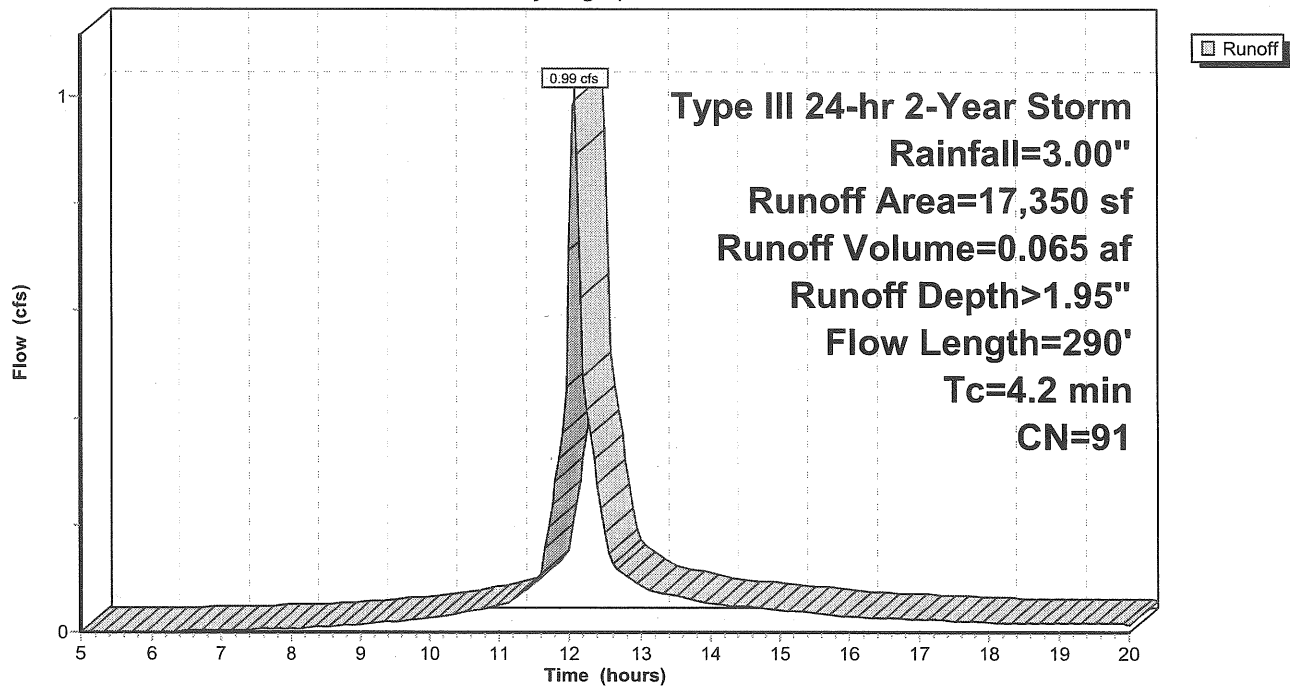
Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 8

11/22/2006

Subcatchment 2P: Office Building

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
 Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 7

11/22/2006

Subcatchment 2P: Office Building

Runoff = 0.99 cfs @ 12.06 hrs, Volume= 0.065 af, Depth> 1.95"

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=3.00"

Area (sf)	CN	Description
5,810	98	Building
1,110	98	Paved roads w/curbs & sewers
2,130	39	>75% Grass cover, Good, HSG A
8,300	98	Gravel Parking
17,350	91	Weighted Average
2,130		Pervious Area
15,220		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	90	0.0250	1.43		Sheet Flow, AB Smooth surfaces n= 0.011 P2= 3.00"
2.1	90	0.0100	0.70		Shallow Concentrated Flow, BC Short Grass Pasture Kv= 7.0 fps
0.1	25	0.2000	3.13		Shallow Concentrated Flow, CD Short Grass Pasture Kv= 7.0 fps
0.9	85	0.0060	1.57		Shallow Concentrated Flow, DE Paved Kv= 20.3 fps
4.2	290	Total			

Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech

Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 6

11/22/2006

Subcatchment 1BP: Parking Garage

Runoff = 2.22 cfs @ 12.09 hrs, Volume= 0.168 af, Depth> 2.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

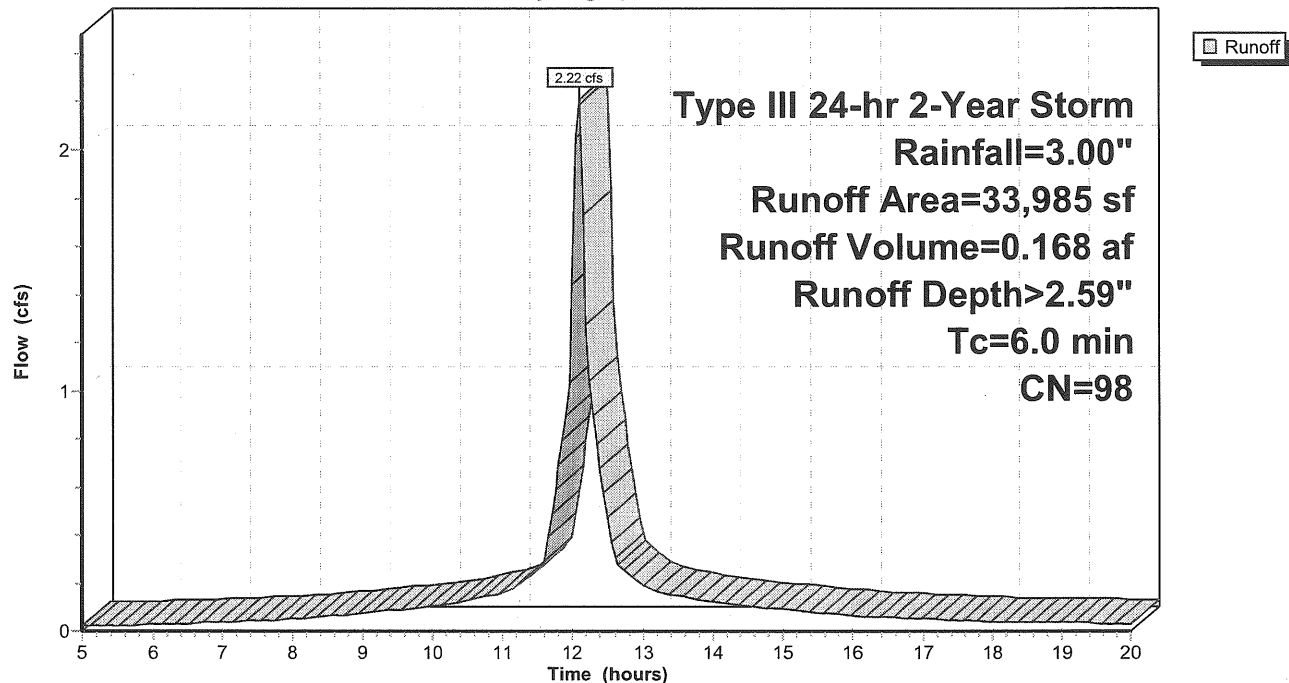
Type III 24-hr 2-Year Storm Rainfall=3.00"

Area (sf)	CN	Description
30,730	98	Building
3,255	98	Paved
33,985	98	Weighted Average
33,985		Impervious Area

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

Subcatchment 1BP: Parking Garage

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 5

11/22/2006

Subcatchment 1AP: Open Space

Runoff = 0.01 cfs @ 12.46 hrs, Volume= 0.003 af, Depth> 0.10"

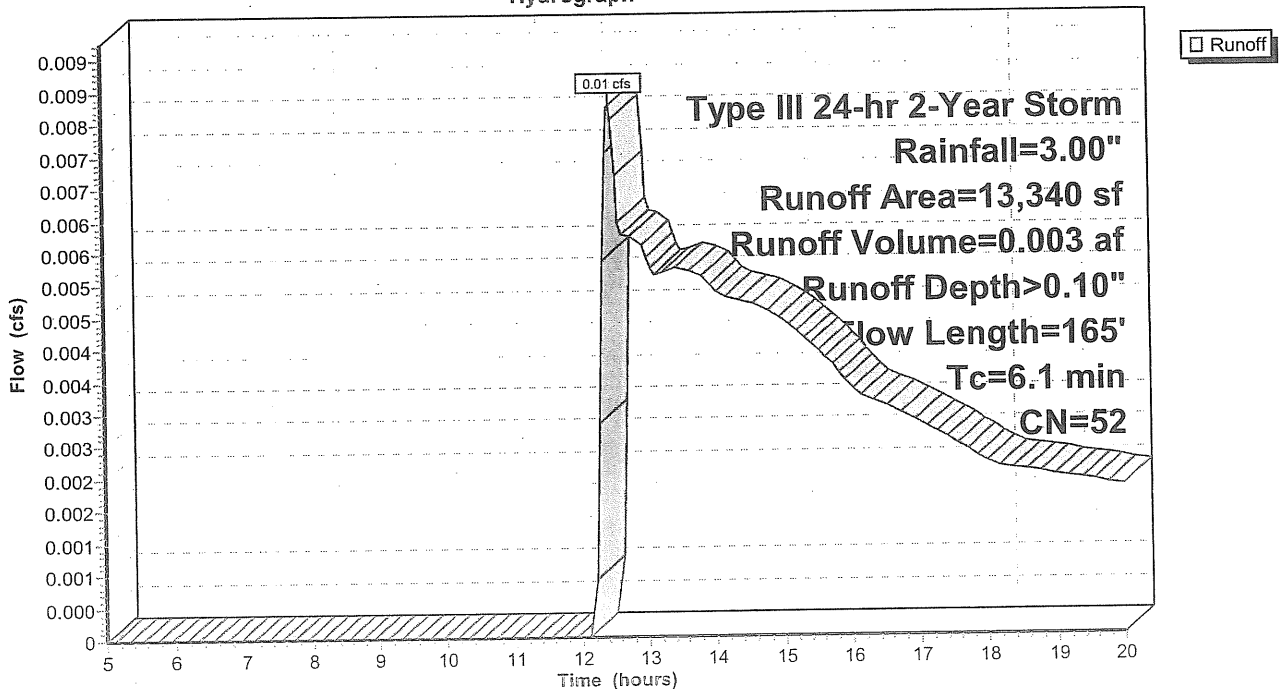
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.00"

Area (sf)	CN	Description
10,440	39	>75% Grass cover, Good, HSG A
2,900	98	Paved parking & roofs
13,340	52	Weighted Average
10,440		Pervious Area
2,900		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	45	0.0200	1.14		Sheet Flow, AB Smooth surfaces n= 0.011 P2= 3.00"
4.8	55	0.0400	0.19		Sheet Flow, BC Grass: Short n= 0.150 P2= 3.00"
0.6	65	0.0600	1.71		Shallow Concentrated Flow, CD Short Grass Pasture Kv= 7.0 fps
6.1	165	Total			

Subcatchment 1AP: Open Space

Hydrograph



Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 4

11/22/2006

Pond D7: Hancock

Peak Elev=8.68' Inflow=1.25 cfs 0.169 af
30.0" x 36.0' Culvert Outflow=1.25 cfs 0.169 af

Pond D8: Hancock Street Storm System

Peak Elev=10.24' Inflow=1.25 cfs 0.169 af
24.0" x 196.0' Culvert Outflow=1.25 cfs 0.169 af

Pond UH1: Hancock Link DMH1

Peak Elev=12.09' Inflow=1.25 cfs 0.169 af
24.0" x 125.0' Culvert Outflow=1.25 cfs 0.169 af

Pond UH2: Hancock Link DMH2

Peak Elev=16.85' Inflow=1.25 cfs 0.169 af
24.0" x 106.0' Culvert Outflow=1.25 cfs 0.169 af

Total Runoff Area = 3.110 ac Runoff Volume = 0.560 af Average Runoff Depth = 2.16"
12.60% Pervious Area = 0.392 ac 87.40% Impervious Area = 2.718 ac

Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n.001204 © 2006 HydroCAD Software Solutions LLC

Post-Development w/ StormTech
Type III 24-hr 2-Year Storm Rainfall=3.00"

Page 3

11/22/2006

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

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1AP: Open Space

Runoff Area=13,340 sf Runoff Depth>0.10"
Flow Length=165' Tc=6.1 min CN=52 Runoff=0.01 cfs 0.003 af

Subcatchment 1BP: Parking Garage

Runoff Area=33,985 sf Runoff Depth>2.59"
Tc=6.0 min CN=98 Runoff=2.22 cfs 0.168 af

Subcatchment 2P: Office Building

Runoff Area=17,350 sf Runoff Depth>1.95"
Flow Length=290' Tc=4.2 min CN=91 Runoff=0.99 cfs 0.065 af

Subcatchment 3P: Turner Barker

Runoff Area=9,230 sf Runoff Depth>2.13"
Flow Length=160' Tc=4.0 min CN=93 Runoff=0.57 cfs 0.038 af

Subcatchment 4P: Back of PS

Runoff Area=3,655 sf Runoff Depth=0.00"
Flow Length=110' Slope=0.0300 '/' Tc=8.7 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 5AP: West Half of Complex

Runoff Area=14,410 sf Runoff Depth>2.59"
Tc=6.0 min CN=98 Runoff=0.94 cfs 0.071 af

Subcatchment 5BP: East Half of Complex

Runoff Area=38,510 sf Runoff Depth>2.59"
Tc=6.0 min CN=98 Runoff=2.51 cfs 0.191 af

Subcatchment 5CP: Plaza

Runoff Area=4,995 sf Runoff Depth>2.59"
Flow Length=75' Slope=0.0125 '/' Tc=1.2 min CN=98 Runoff=0.37 cfs 0.025 af

Reach CS: Combined Sewer

Inflow=0.99 cfs 0.065 af
Outflow=0.99 cfs 0.065 af

Reach FR: Fore River

Inflow=4.55 cfs 0.493 af
Outflow=4.55 cfs 0.493 af

Reach TOT: (new node)

Inflow=5.33 cfs 0.557 af
Outflow=5.33 cfs 0.557 af

Pond 1B: Subsurface Detention for Parking G Peak Elev=20.33' Storage=1,193 cf Inflow=2.22 cfs 0.168 af
Outflow=1.25 cfs 0.167 af

Pond 5C: Subsurface Detention for Plaza Peak Elev=11.22' Storage=975 cf Inflow=3.69 cfs 0.287 af
Outflow=3.02 cfs 0.286 af

Pond D2: Commercial Street Storm System Peak Elev=9.66' Inflow=0.57 cfs 0.038 af
15.0" x 192.0' Culvert Outflow=0.57 cfs 0.038 af

Pond D3: Commercial Peak Elev=9.65' Inflow=3.44 cfs 0.323 af
15.0" x 192.0' Culvert Outflow=3.44 cfs 0.323 af

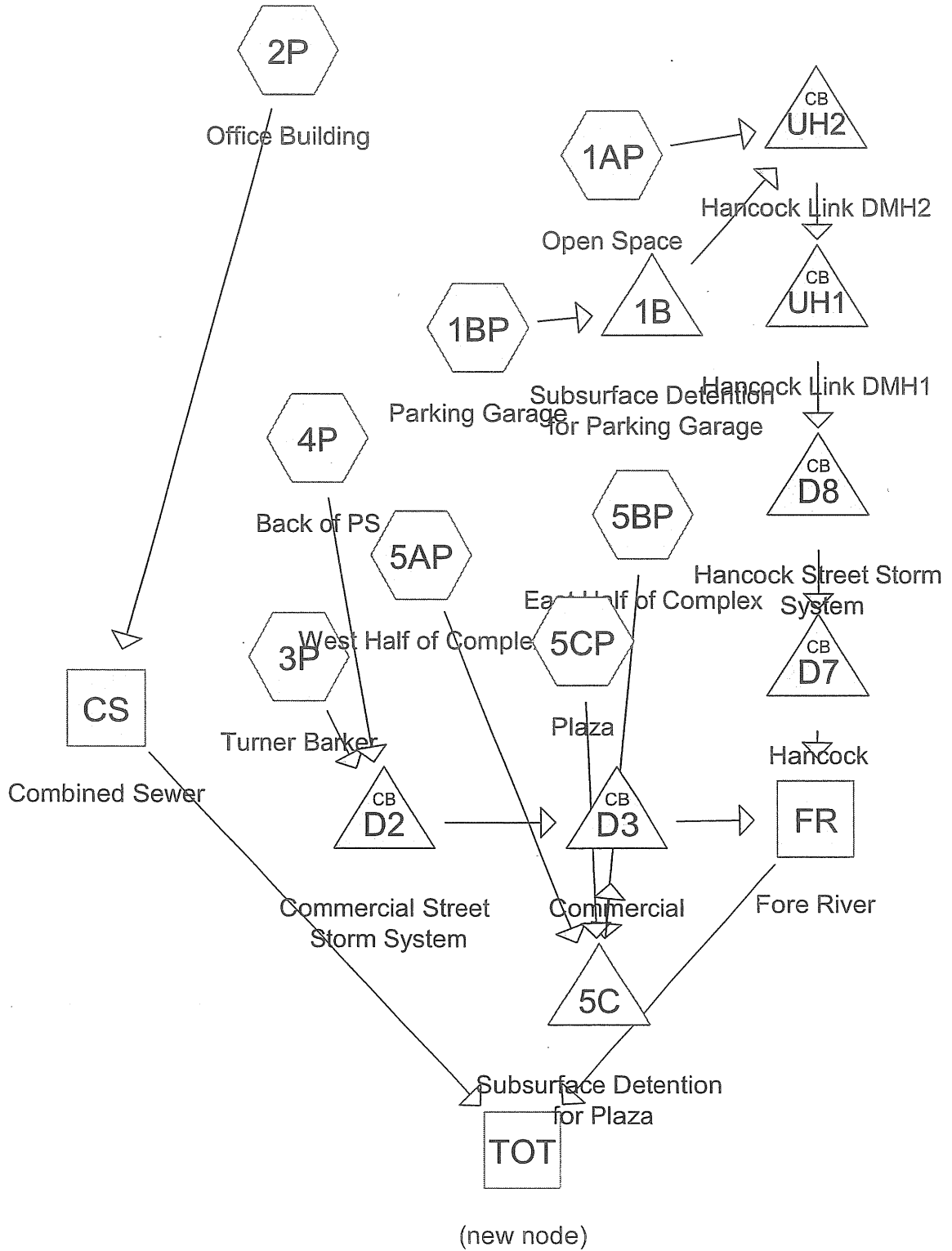
Post-Development-ST

Prepared by Woodard & Curran

HydroCAD® 8.00 s/n 001204 © 2006 HydroCAD Software Solutions LLC

Area Listing (all nodes)

<u>Area (acres)</u>	<u>CN</u>	<u>Description (subcats)</u>
0.392	39	>75% Grass cover, Good, HSG A (1AP,2P,3P,4P)
0.931	98	Building (1BP,2P,3P)
0.318	98	Buildings (5AP)
0.191	98	Gravel Parking (2P)
0.088	98	Paved (1BP,5AP)
1.037	98	Paved parking & roofs (1AP,3P,5BP,5CP)
0.025	98	Paved roads w/curbs & sewers (2P)
0.128	98	Plaza (5BP)
<hr/>		
3.110		



**IMPORTANT NOTICE FROM CITY OF PORTLAND
PLANNING DIVISION**

**TO RESIDENTS AND PROPERTY OWNERS
IN THE VICINITY OF INDIA STREET, FORE STREET, MIDDLE STREET
AND HANCOCK STREET**

WHAT The Portland Planning Board will hold a workshop to consider a plan by Riverwalk LLC . The project is bounded by Middle Street to the north, India Street to the west, the Ocean Gateway development to the south and extension of Hancock Street to the east. On the block east of India St. and south of Fore St., the applicant is proposing to construct a 6 story multi-use condominium building with retail, spa, restaurant, approximately 105 condo units and 11 townhouses. On the block east of India St. And north of Fore St., the project plans show a 6 story parking garage and a 5 story office building. The workshop is an opportunity for the applicant to present a plan to the Planning Board in an informal session, which is open to the public. Public comments will be taken at this meeting.

WHEN Tuesday, February 7, 2006, 3:30 p.m.,
City Hall, Room 209, 2nd Floor

FOR MORE INFORMATION

Plans are available in the Portland Planning Division, 4th Floor, City Hall. If you wish to submit written comments, address them to Bill Needelman, Senior Planner, Planning Division, 4th Floor, 389 Congress Street, Portland, Maine 04101; by phone at (207) 874-8722 or e-mail at wbn@portlandmaine.gov

**IMPORTANT NOTICE FROM CITY OF PORTLAND
PLANNING DIVISION**

**TO RESIDENTS AND PROPERTY OWNERS
IN THE VICINITY OF INDIA STREET, FORE STREET, MIDDLE STREET
AND HANCOCK STREET**

WHAT The Portland Planning Board will hold a workshop to consider a plan by Riverwalk LLC . The project is bounded by Middle Street to the north, India Street to the west, the Ocean Gateway development to the south and extension of Hancock Street to the east. On the block east of India St. and south of Fore St., the applicant is proposing to construct a 6 story multi-use condominium building with retail, spa, restaurant, approximately 105 condo units and 11 townhouses. On the block east of India St. And north of Fore St., the project plans show a 6 story parking garage and a 5 story office building. The workshop is an opportunity for the applicant to present a plan to the Planning Board in an informal session, which is open to the public. Public comments will be taken at this meeting.

WHEN Tuesday, February 7, 2006, 3:30 p.m.,
City Hall, Room 209, 2nd Floor

FOR MORE INFORMATION

Plans are available in the Portland Planning Division, 4th Floor, City Hall. If you wish to submit written comments, address them to Bill Needelman, Senior Planner, Planning Division, 4th Floor, 389 Congress Street, Portland, Maine 04101; by phone at (207) 874-8722 or e-mail at wbn@portlandmaine.gov

**IMPORTANT NOTICE FROM CITY OF PORTLAND
PLANNING DIVISION**

**TO RESIDENTS AND PROPERTY OWNERS
IN THE VICINITY OF INDIA STREET, FORE STREET, MIDDLE STREET
AND HANCOCK STREET**

WHAT The Portland Planning Board will hold a workshop to consider a plan by Riverwalk LLC . The project is bounded by Middle Street to the north, India Street to the west, the Ocean Gateway development to the south and extension of Hancock Street to the east. On the block east of India St. and south of Fore St., the applicant is proposing to construct a 6 story multi-use condominium building with retail, spa, restaurant, approximately 105 condo units and 11 townhouses. On the block east of India St. And north of Fore St., the project plans show a 6 story parking garage and a 5 story office building. The workshop is an opportunity for the applicant to present a plan to the Planning Board in an informal session, which is open to the public. Public comments will be taken at this meeting.

WHEN Tuesday, February 7, 2006, 3:30 p.m.,
City Hall, Room 209, 2nd Floor

FOR MORE INFORMATION

Plans are available in the Portland Planning Division, 4th Floor, City Hall. If you wish to submit written comments, address them to Bill Needelman, Senior Planner, Planning Division, 4th Floor, 389 Congress Street, Portland, Maine 04101; by phone at (207) 874-8722 or e-mail at wbn@portlandmaine.gov

**IMPORTANT NOTICE FROM CITY OF PORTLAND
PLANNING DIVISION**

**TO RESIDENTS AND PROPERTY OWNERS
IN THE VICINITY OF INDIA STREET, FORE STREET, MIDDLE STREET
AND HANCOCK STREET**

WHAT The Portland Planning Board will hold a workshop to consider a plan by Riverwalk LLC . The project is bounded by Middle Street to the north, India Street to the west, the Ocean Gateway development to the south and extension of Hancock Street to the east. On the block east of India St. and south of Fore St., the applicant is proposing to construct a 6 story multi-use condominium building with retail, spa, restaurant, approximately 105 condo units and 11 townhouses. On the block east of India St. And north of Fore St., the project plans show a 6 story parking garage and a 5 story office building. The workshop is an opportunity for the applicant to present a plan to the Planning Board in an informal session, which is open to the public. Public comments will be taken at this meeting.

WHEN Tuesday, February 7, 2006, 3:30 p.m.,
City Hall, Room 209, 2nd Floor

FOR MORE INFORMATION

Plans are available in the Portland Planning Division, 4th Floor, City Hall. If you wish to submit written comments, address them to Bill Needelman, Senior Planner, Planning Division, 4th Floor, 389 Congress Street, Portland, Maine 04101; by phone at (207) 874-8722 or e-mail at wbn@portlandmaine.gov