

STORMWATER MANAGEMENT REPORT

“1471-1475 BRALEY ROAD CONDOMINIUMS”

**1471-1475 Braley Road
New Bedford, Massachusetts**

January 10, 2019
Revised April 24, 2019

Prepared for:

Braley Woods Condominiums

1471-1475 Braley Road
New Bedford, MA

Prepared by:



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SECTION I - INTRODUCTION

The existing Braley Woods Condominiums site is located east side of Braley Road in New Bedford, Massachusetts. The property is situated north of Susan Street and westerly of Mass State Route 140. The Condominium Association is proposing the repaving of the existing parking areas at 1471 and 1475 Braley Road.

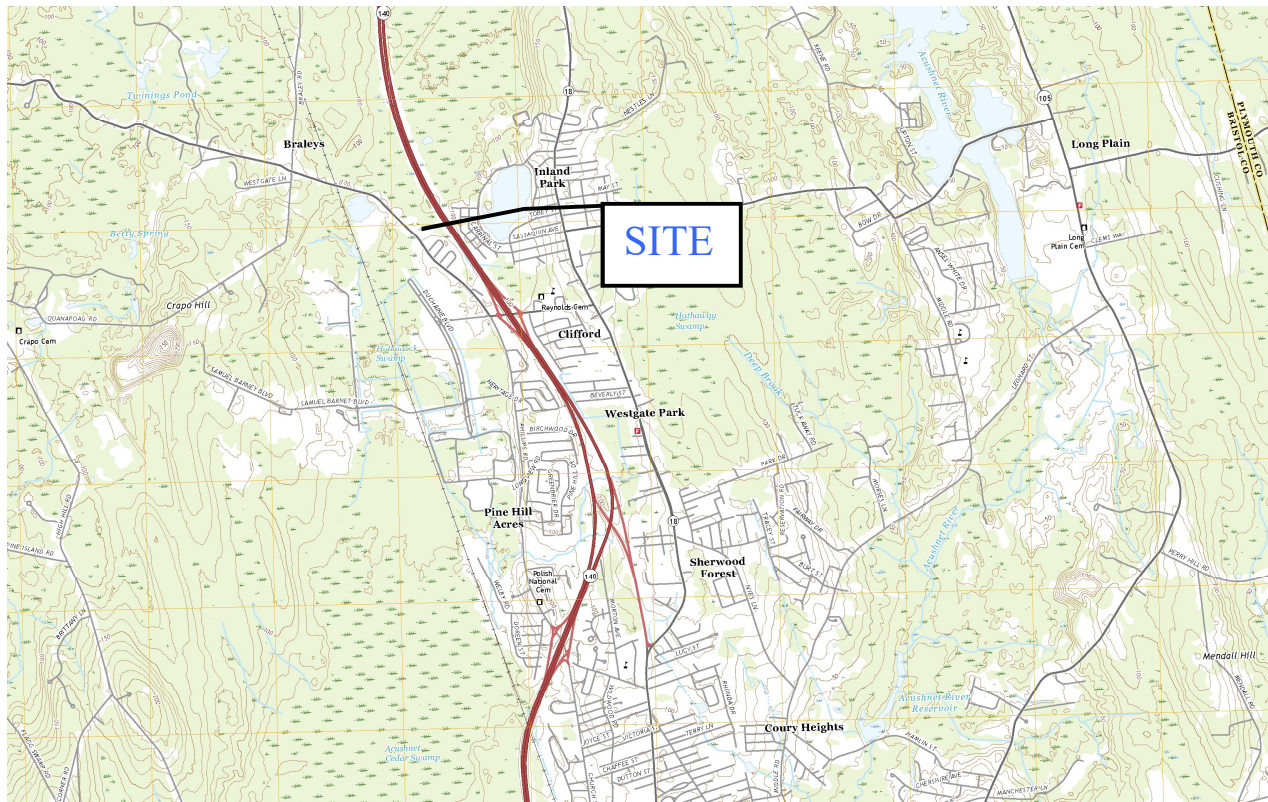
The condominium site parking will not create any additional parking spaces however will meet the required drainage standards of the New Bedford Department of Public Infrastructure (DPI). This drainage report is intended to be used in conjunction with the Site Plans of “NOI - 1471-1475 Braley Woods Condominium” in New Bedford, MA.

SECTION II - EXISTING SITE CONDITIONS

The existing project is shown on New Bedford Assessor Map 137 Lots 108 and 109. The proposed site comprises of 5.89± acres (lot 108) and 0.53 acres (lot 109) of land located within the New Bedford Zoning district “MUB”. Residential properties surround the existing site.

The site currently has two three story existing condominium building with associated parking areas. The site has gently sloping terrain running from south to north and east to west towards Braley Road. The majority of the stormwater flows are captured within to a closed drainage system consisting of two catch basins. Each catch basin has outlet pipes that are directed to an existing wetland to the north within Lot 108. This system has been in existence since the property was built. storm. The site is comprised of sand and gravel soils.

Locus Map



Soil Classification

The SCS Soil Maps designate two soil types, Sudbury and Pits, Hydrologic Soil Group” B” series soils. Refer to the soil map (see Figure 2) for Soil and Water Features from the *New Bedford, Massachusetts, Soil Survey* a cooperative effort of the United States Department of Agriculture (USDA), Soil Conservation Service, and the Massachusetts Agricultural Experiment Station.



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
39A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	6.4	14.3%
52A	Freetown muck, 0 to 1 percent slopes	20.0	44.6%
242B	Hinckley loamy sand, 3 to 8 percent slopes	0.7	1.6%
242C	Hinckley loamy sand, 8 to 15 percent slopes	0.4	0.9%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	12.4	27.6%
260B	Sudbury fine sandy loam, 3 to 8 percent slopes	2.7	5.9%
617	Pits - Udorthents complex, gravelly	2.2	5.0%
Totals for Area of Interest		45.0	100.0%

SECTION III - PROPOSED SITE CONDITIONS

Project Description

The owner proposes the reconstruction and repaving of an existing condominium parking lot with improvements described as follows:

- Bituminous asphalt of existing parking lots
- Installation of drainage trench drain
- Downstream Defender Hydrodynamic separators
- Drywell

Site Drainage Calculations

A comprehensive site drainage system was developed for a total contributing watershed of approximately $0.22 \pm$ acres for a 100-year design storm frequency. The stormwater runoff includes landscaping and paved surface. The drainage design includes two subareas. The total watershed area consists of a parking area along the south side and overflow from the upper parking lot to the east. The stormwater is directed to the west to a stormwater system consisting of a trench drain and deep sump catch basin

Times of concentrations (TOC) for the longest overland flow path within each area were determined using the TR-55 Method. Each flow path is represented individually the subarea calc sheets. A minimum of 5 minutes was taken for the initial TOC's. A weighted curve number CN, was derived for each subarea based on land usage and soil types

SECTION IV – Massachusetts Department of Environmental Management (MADEP) Stormwater Management Standards

The goal of the MADEP Stormwater Management Policy is to improve water quality by the implementation of performance standards for stormwater management. These standards address both water quality (pollutants) and water quantity (flood control) problems by establishing the level of required controls through the use of Best Management Practices (BMP's).

The following ten (10) standards and proposed stormwater management measures are listed below.

1. No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The stormwater management system for this site has improved the BMP's to control increased runoff and remove sediments and other pollutants prior to outfall discharge points to local closed drainage system. The use of a trench drains, hydro particle separators and drywell are the BMP's utilized in the design.

No untreated stormwater discharges directly to wetlands or waters of the Commonwealth.

2. Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

Post-Development Peak Discharge Rates

Methodology

The stormwater system was designed using Technical Release 55 (TR55) - Second Edition, dated June, 1986. All stormwater management runoff hydrographs and peak discharge rate computations and detention pond modeling has been performed through the use of the **Hydrocad V 10.00-13** Stormwater modeling software.

The rainfall duration intensity curves were developed from Bristol County, Tech Paper 40. The drainage analysis is based on the SCS method with a rainfall distribution Type III, for the 10-year, 50 year and 100-year design frequency storms.

2-year storm:	3.0 inches
10-year storm:	4.5 inches
25-year storm:	5.3 inches
100-year storm:	6.5 inches

Peak Runoff Analysis of Discharges

The objective of this analysis is to prove that post-development peak discharge rates do not exceed pre-development peak discharge rates. This was accomplished through the use of a drywell for the increased impervious areas which were designed for all the design frequency storms. The 100-year 24-hour storm event was evaluated to demonstrate that there is no infiltration overflow or increased flooding impacts offsite.

Calculations to meet the requirements for Standard 2 necessitate an analysis to review the characteristics of pre- and post-development watersheds. Evaluation of the contributing area(s), size, soil type(s), slope, and ground cover provide the necessary information required to develop rainfall event hydrographs. Rainfall event hydrographs are time/volume mathematical representations of how stormwater runoff volume is generated from different size storm events over a period of 24 hours for a specific watershed area. Each hydrograph depicts a bell-shaped curve where the area under the curve represents the volume of stormwater flow in cubic feet per second (cfs).

Hydrographs were developed for each drainage subarea for pre-and post-development conditions and the peak discharge rate determined for each storm event.

The contributing watershed area was analyzed for pre-development and post-development conditions. Evaluation of the contributing area(s), size, soil type(s), slope, and ground cover provide the necessary information required to develop rainfall event hydrographs. Rainfall event hydrographs are time/volume mathematical representations of how stormwater runoff volume is generated from different size storm events over a period of 24 hours for a specific watershed area. Each hydrograph depicts a bell-shaped curve where the area under the curve represents the volume of stormwater flow in cubic feet per second (cfs).

Hydrographs were developed for Pre and Post development conditions and the peak discharge rate determined for each storm event. The hydrographs demonstrate that the post-development runoff rates are less than the pre-development runoff rates without any stormwater controls. The decrease in runoff was due to lessening the amount of impervious areas. No stormwater management is required to manage post development flows.

TABLE 1: BRALEY ROAD CONDOMINIUMS WATERSHED AREA			
EXISTING CONDITIONS WATERSHED NAME	TOTAL AREA (ACRES)	PROPOSED CONDITIONS WATERSHED NAME	TOTAL AREA (ACRES)
Pre-Construction		Post-Construction	
Pre	.22	Post 1A and 1B	0.22
TOTAL =	0.22	TOTAL =	0.22

EXISTING CONDITIONS			PROPOSED CONDITIONS			
WATERSHED AREA (ACRES)	FREQUENCY STORM (YEAR)	PEAK DISCHARGE (CFS)	WATERSHED AREA(S) (ACRES)	FREQUENCY STORM (YEAR)	PEAK DISCHARGE (CFS)	PEAK DISCHARGE DIFFERENCE
Pre 1	2	0.53	Post 1A and 1B	2	0.01	-0.01
	10	0.85		10	0.01	-.84
	25	1.03		25	0.04	-0.99
	100	1.35		100	0.40	-0.95

Comparison of Pre- and Post-Development Peak Discharge Rates

The conclusion of the results shows that under post-development conditions, the peak discharge rates are less than the pre-development condition rates for the 2, 10-year, 25-year, and 100-year design frequency storms.

3. **Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to the maximum extent practicable. The annual recharge from the post-development site should approximate the annual recharge from the pre-development or existing conditions, based on soil types.**

Stormwater recharge for the proposed site is to be provided through infiltration of treated runoff from the proposed driveway. Recharge is provided in a drywell unit.

4. **For new development, stormwater management systems must be designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS). It is presumed that this is met when:**
 - a) **Suitable nonstructural practices for source control and pollution prevention are implemented;**
 - b) **Stormwater management best management practices (BMP's) are sized to capture the prescribed runoff volume; and**
 - c) **Stormwater management BMP's are maintained as designed.**

The project is not a new development however the project has proposed improvements to the stormwater management system. Downstream Defender Hydrodynamic separator units will remove the requisite 80% of the average annual load of TSS.

5. Stormwater discharges from areas with higher potential pollutant loads require the use of specific stormwater management BMP's. The use of infiltration practices without pretreatment is prohibited.

The site is not a land use with higher potential pollutant loads (LUHPPL). Standard 5 is not applicable to this project.

6. Stormwater discharges to critical areas must utilize certain stormwater management BMP's approved for critical areas. Critical areas are Outstanding Resource Waters (ORW's), shellfish beds, swimming beaches, cold water fisheries, and recharge areas for public water supplies.

The site does not have any stormwater discharges to critical areas. Standard 6 is not applicable to this project.

7. Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable. However, if it is not practicable to meet all the Standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions.

The site is a Redevelopment Project. The stormwater system has been expanded to provide recharge as well as TSS removal.

8. Erosion and sedimentation controls must be implemented to prevent impacts during construction or land disturbance activities.

The site shall be developed in a manner to minimize land disturbances. All erosion and sedimentation control measures are indicated on the construction drawings. Site specific areas of concern are:

- Construction vehicles shall be limited to one ingress/egress point on Braley Road where a stone construction pad entrance will be provided.
- The HOA shall have the sole responsibility for the design implementation. They shall be responsible for ensuring that all contractors and subcontractors are aware of all provisions of the plans and specifications.
- Erosion controls shall be installed as appropriate to prevent sediments from entering the open drainage systems and will remain in place until construction is complete.
- During grading operations, disturbed slopes will be mulched and vegetation established to prevent sediment erosion to the satisfaction of the engineer.
- The contractor is responsible for adhering to and complying with the City of New Bedford planning regulations and the Massachusetts Stormwater Policies
- The contractor will be responsible for maintaining the soil erosion and sediment control measures use. All perimeter and interior controls shall be inspected weekly and following each significant rain event. Damaged controls shall be repaired immediately. Control measures will be maintained until stabilization of all disturbed

areas is achieved, and after final inspection (with approval) of site improvements is performed.

- Sediment shall be removed once the volume reaches $\frac{1}{4}$ to $\frac{1}{2}$ the height of the silt fence or hay bale
- All stockpiles shall be surrounded by sediment controls
- Disturbed areas remaining idle for more than 14 days shall be stabilized with straw or grass seed mix.
- Dust shall be controlled at the site.
- All facilities used as temporary measures shall be cleaned prior to being put into final operation.
- No turbid waters are to be released beyond the project limits. Temporary sedimentation basins, tanks, and/or other measures should be utilized as necessary and at the discretion of the A/E to contain turbid water generated by dewatering operations or concentrated stormwater flows.
- Accessible reserves of silt sock are to be maintained on site for routine maintenance and in the event of unanticipated problems requiring emergency response.

9. All stormwater management systems must have an operation and maintenance plan to ensure that systems function as designed.

The owner will be responsible for the operation and maintenance of the stormwater management system and all its appurtenances. Stormwater system operation and maintenance is attached to this report.

In addition, the site shall provide the following operation and maintenance measures:

O&M Access and Safety:

- Access to ALL Stormwater management systems should be safe and efficient
- All egress and ingress routes should be maintained to design standard below:
- Access routes should be inspected and maintained
- Obstacles preventing maintenance personnel and / or equipment access should be removed
- Gravel or ground cover should be added if erosion occurs (for example, as a result of vehicle or pedestrian traffic)
- All fences should be maintained to preserve their functionality and appearance
- Collapsed fences should be restore to an upright position
- Jagged edges and damaged fences should be repaired or replaced

10. The owner must provide measure to prohibit the use of illicit discharges from the site.

The owner will be responsible for the prohibition of illicit discharges from the site. A no illicit Discharge Compliance Statement will be submitted to the Conservation Commission prior to construction.

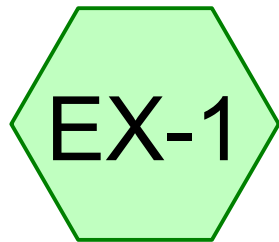
APPENDICES

APPENDIX A

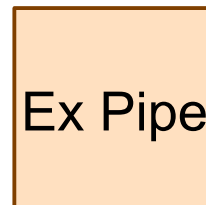
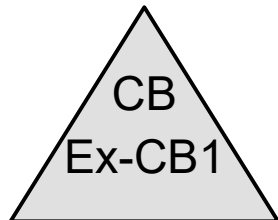
2, 10, 25 & 100-Year Storm Calculations (Pre and Post Construction)

- Drainage Diagram
- Area Listing
- Storm Event Summary Sheet
- Area Summaries
- Times of Concentration
- Hydrographs
- Outlet Structure (Post only)
- Basin Routing (Post only)
- Basin Volumes (Post only)

PRE-CONSTRUCTION 2, 10, 25, 100-YEAR STORM

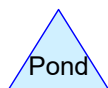
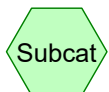


Lower parking



Existing CB1

10" outlet pipe



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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.041	39	>75% Grass cover, Good, HSG A (EX-1)
0.185	98	Paved parking, HSG A (EX-1)
0.226	87	TOTAL AREA

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 EX-1: Lower parking

Runoff Area=9,850 sf 81.73% Impervious Runoff Depth>1.96"

Tc=6.0 min CN=87 Runoff=0.54 cfs 0.037 af

Reach Ex Pipe: 10" outlet pipe

Avg. Flow Depth=0.25' Max Vel=4.02 fps Inflow=0.54 cfs 0.037 af

10.0" Round Pipe n=0.010 L=112.0' S=0.0100 '/ Capacity=2.85 cfs Outflow=0.53 cfs 0.037 af

Pond Ex-CB1: Existing CB1

Peak Elev=85.89' Inflow=0.54 cfs 0.037 af

Outflow=0.54 cfs 0.037 af

Total Runoff Area = 0.226 ac Runoff Volume = 0.037 af Average Runoff Depth = 1.96"
18.27% Pervious = 0.041 ac 81.73% Impervious = 0.185 ac

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Type III 24-hr 2-Year Rainfall=3.40"

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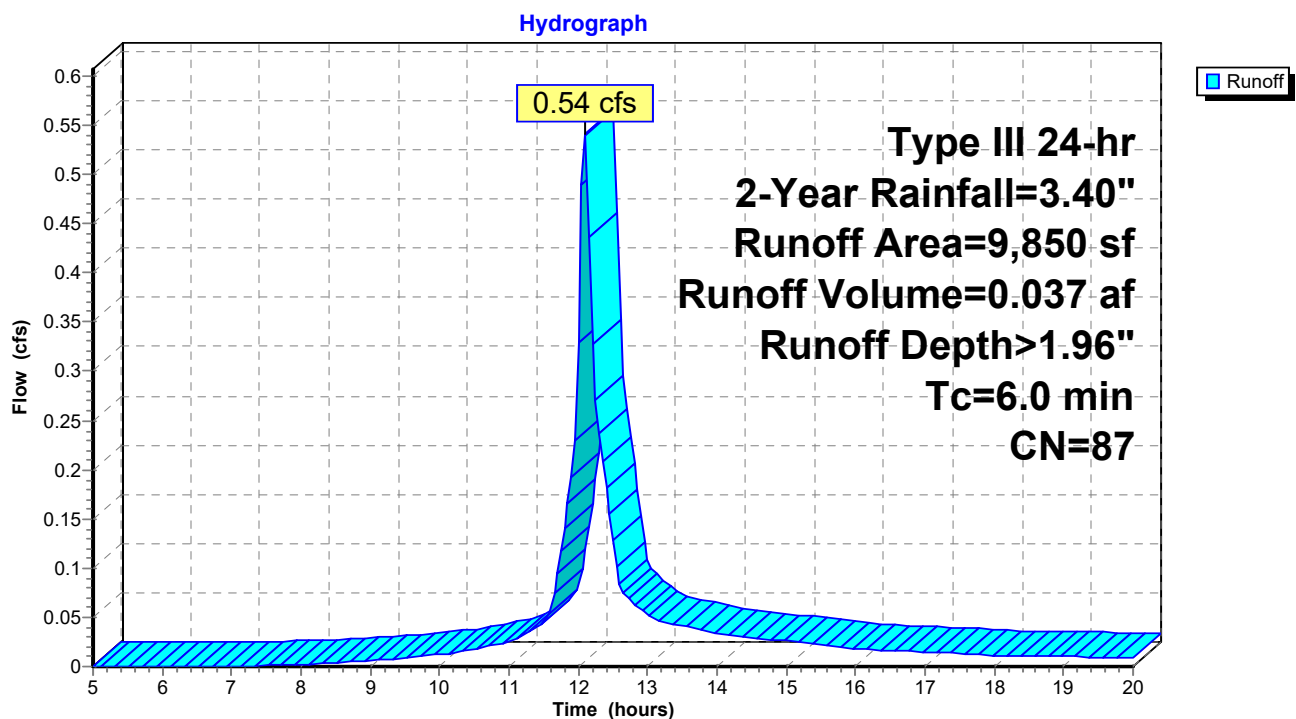
Summary for Subcatchment EX-1: Lower parking

Runoff = 0.54 cfs @ 12.09 hrs, Volume= 0.037 af, Depth> 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.40"

Area (sf)	CN	Description
8,050	98	Paved parking, HSG A
1,800	39	>75% Grass cover, Good, HSG A
9,850	87	Weighted Average
1,800		18.27% Pervious Area
8,050		81.73% Impervious Area

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

Subcatchment EX-1: Lower parking

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Type III 24-hr 2-Year Rainfall=3.40"

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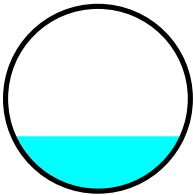
Summary for Reach Ex Pipe: 10" outlet pipe

Inflow Area = 0.226 ac, 81.73% Impervious, Inflow Depth > 1.96" for 2-Year event
Inflow = 0.54 cfs @ 12.09 hrs, Volume= 0.037 af
Outflow = 0.53 cfs @ 12.10 hrs, Volume= 0.037 af, Atten= 2%, Lag= 0.7 min

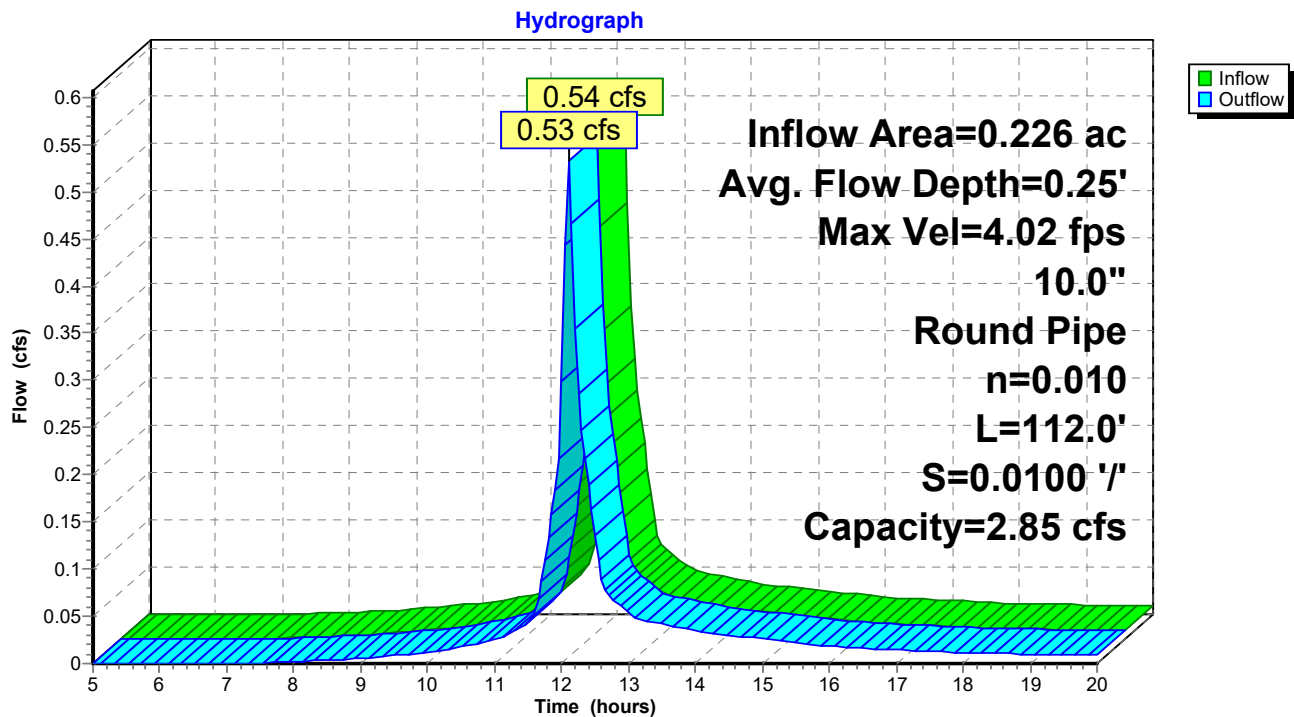
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.02 fps, Min. Travel Time= 0.5 min
Avg. Velocity= 1.49 fps, Avg. Travel Time= 1.3 min

Peak Storage= 15 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 2.85 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 112.0' Slope= 0.0100 '/'
Inlet Invert= 85.50', Outlet Invert= 84.38'



Reach Ex Pipe: 10" outlet pipe



Summary for Pond Ex-CB1: Existing CB1

Inflow Area = 0.226 ac, 81.73% Impervious, Inflow Depth > 1.96" for 2-Year event
 Inflow = 0.54 cfs @ 12.09 hrs, Volume= 0.037 af
 Outflow = 0.54 cfs @ 12.09 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.54 cfs @ 12.09 hrs, Volume= 0.037 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 85.89' @ 12.09 hrs

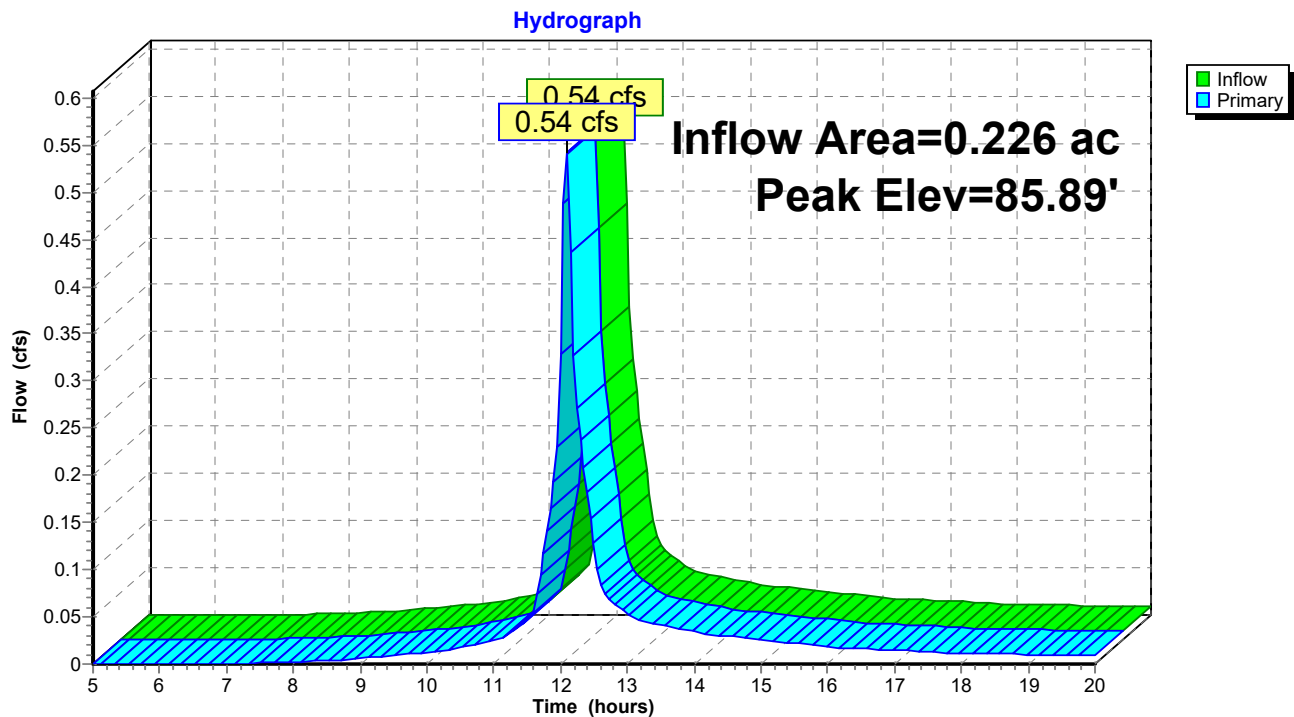
Device	Routing	Invert	Outlet Devices
#1	Primary	85.50'	10.0" Vert. Orifice/Grate C= 0.600
#2	Primary	89.00'	1.0" x 1.0" Horiz. Orifice/Grate X 8.00 columns X 8 rows C= 0.600 in 24.0" x 24.0" Grate (11% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.53 cfs @ 12.09 hrs HW=85.89' (Free Discharge)

1=Orifice/Grate (Orifice Controls 0.53 cfs @ 2.12 fps)

2=Orifice/Grate (Controls 0.00 cfs)

Pond Ex-CB1: Existing CB1



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

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 EX-1: Lower parking

Runoff Area=9,850 sf 81.73% Impervious Runoff Depth>3.18"

Tc=6.0 min CN=87 Runoff=0.86 cfs 0.060 af

Reach Ex Pipe: 10" outlet pipe

Avg. Flow Depth=0.31' Max Vel=4.58 fps Inflow=0.86 cfs 0.060 af

10.0" Round Pipe n=0.010 L=112.0' S=0.0100 '/' Capacity=2.85 cfs Outflow=0.85 cfs 0.060 af

Pond Ex-CB1: Existing CB1

Peak Elev=86.01' Inflow=0.86 cfs 0.060 af

Outflow=0.86 cfs 0.060 af

Total Runoff Area = 0.226 ac Runoff Volume = 0.060 af Average Runoff Depth = 3.18"
18.27% Pervious = 0.041 ac 81.73% Impervious = 0.185 ac

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

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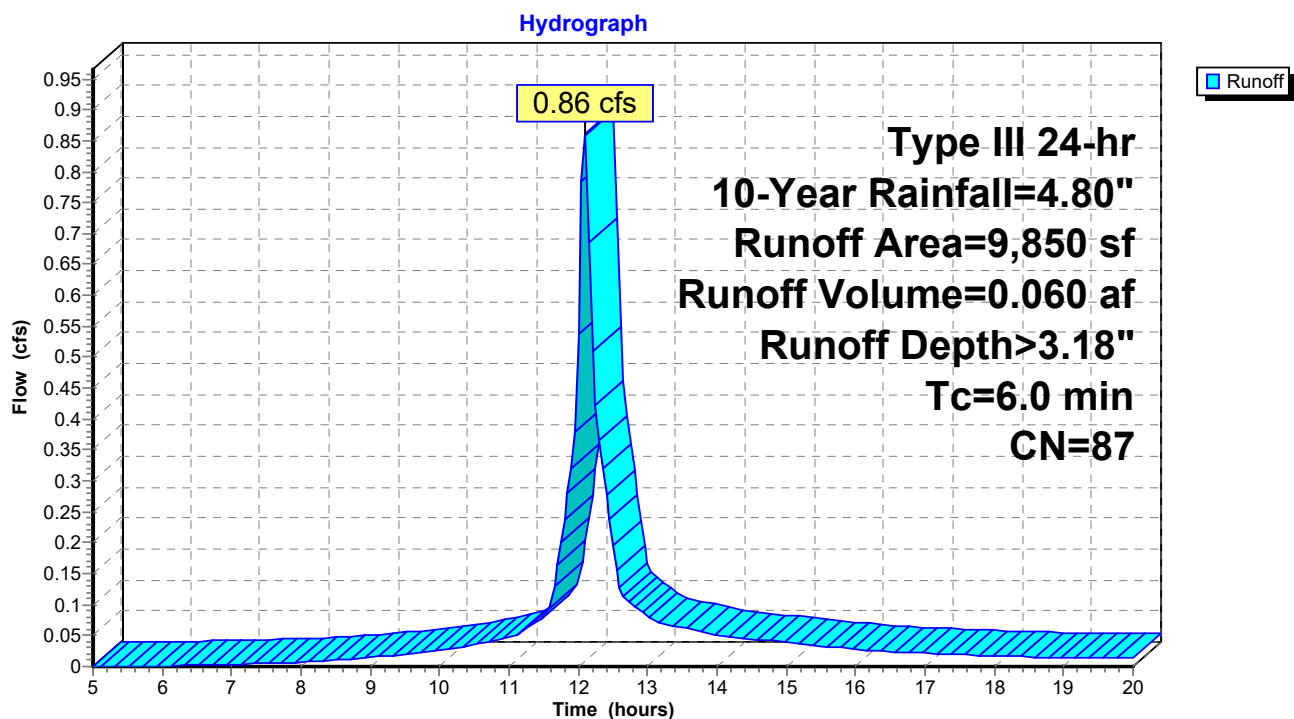
Summary for Subcatchment EX-1: Lower parking

Runoff = 0.86 cfs @ 12.09 hrs, Volume= 0.060 af, Depth> 3.18"

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

Area (sf)	CN	Description
8,050	98	Paved parking, HSG A
1,800	39	>75% Grass cover, Good, HSG A
9,850	87	Weighted Average
1,800		18.27% Pervious Area
8,050		81.73% Impervious Area

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

Subcatchment EX-1: Lower parking

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

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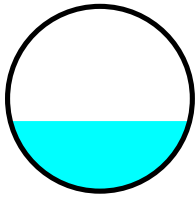
Summary for Reach Ex Pipe: 10" outlet pipe

Inflow Area = 0.226 ac, 81.73% Impervious, Inflow Depth > 3.18" for 10-Year event
Inflow = 0.86 cfs @ 12.09 hrs, Volume= 0.060 af
Outflow = 0.85 cfs @ 12.10 hrs, Volume= 0.060 af, Atten= 2%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.58 fps, Min. Travel Time= 0.4 min
Avg. Velocity= 1.65 fps, Avg. Travel Time= 1.1 min

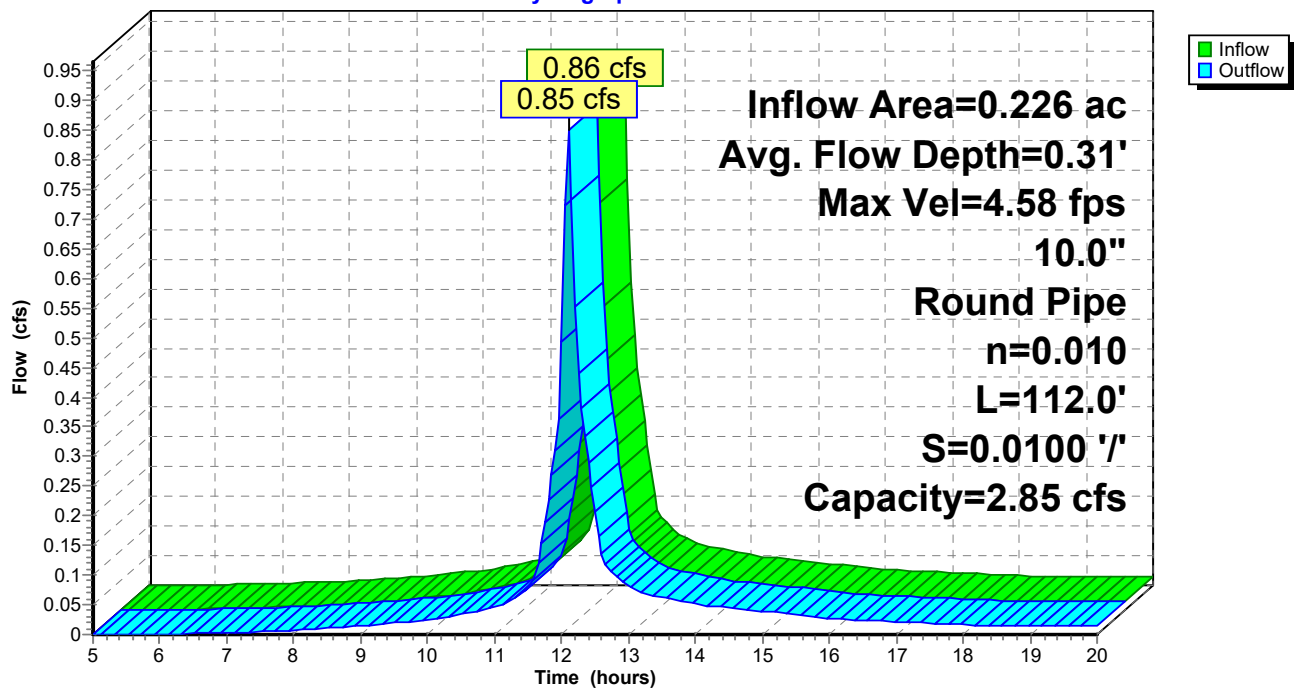
Peak Storage= 21 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 2.85 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 112.0' Slope= 0.0100 '/'
Inlet Invert= 85.50', Outlet Invert= 84.38'



Reach Ex Pipe: 10" outlet pipe

Hydrograph



Summary for Pond Ex-CB1: Existing CB1

Inflow Area = 0.226 ac, 81.73% Impervious, Inflow Depth > 3.18" for 10-Year event
 Inflow = 0.86 cfs @ 12.09 hrs, Volume= 0.060 af
 Outflow = 0.86 cfs @ 12.09 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.86 cfs @ 12.09 hrs, Volume= 0.060 af

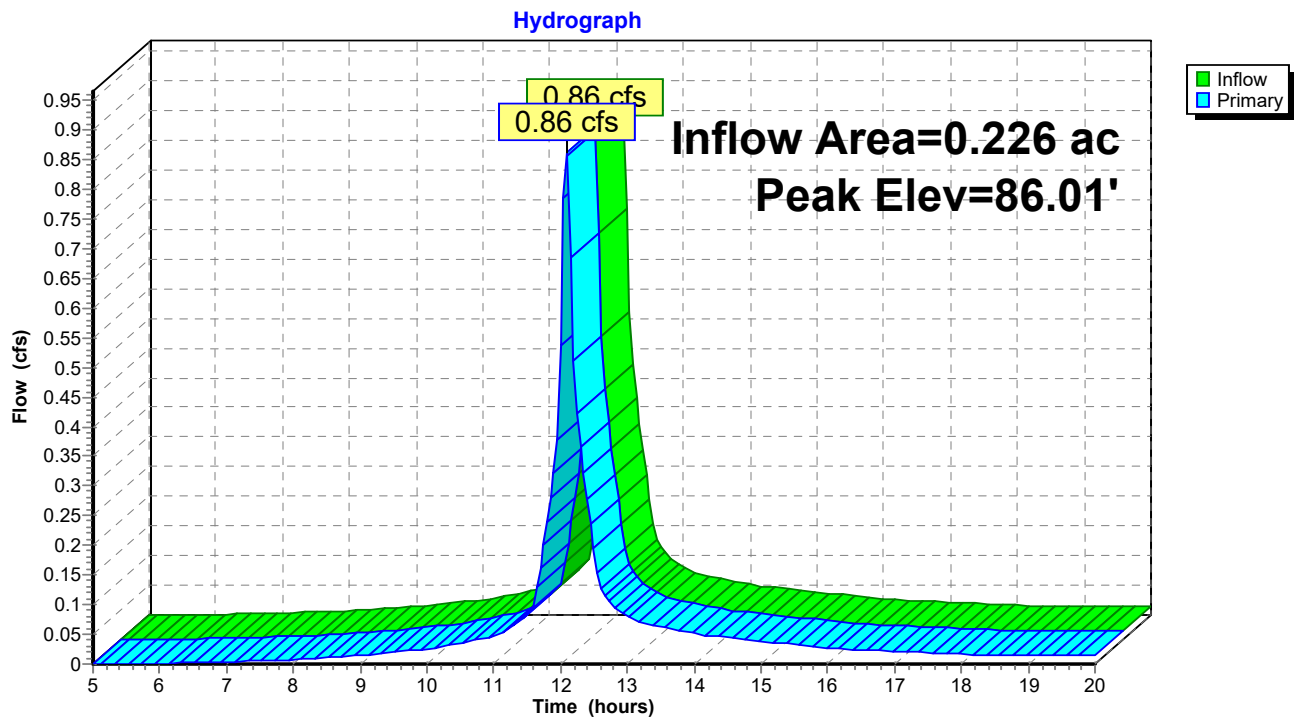
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 86.01' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	85.50'	10.0" Vert. Orifice/Grate C= 0.600
#2	Primary	89.00'	1.0" x 1.0" Horiz. Orifice/Grate X 8.00 columns X 8 rows C= 0.600 in 24.0" x 24.0" Grate (11% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.84 cfs @ 12.09 hrs HW=86.01' (Free Discharge)

1=Orifice/Grate (Orifice Controls 0.84 cfs @ 2.42 fps)

2=Orifice/Grate (Controls 0.00 cfs)

Pond Ex-CB1: Existing CB1

18-045 Braley Condominiums 9-14-18*Type III 24-hr 25-Year Rainfall=5.60"*

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 EX-1: Lower parking

Runoff Area=9,850 sf 81.73% Impervious Runoff Depth>3.90"

Tc=6.0 min CN=87 Runoff=1.05 cfs 0.074 af

Reach Ex Pipe: 10" outlet pipe

Avg. Flow Depth=0.35' Max Vel=4.82 fps Inflow=1.05 cfs 0.074 af

10.0" Round Pipe n=0.010 L=112.0' S=0.0100 '/ Capacity=2.85 cfs Outflow=1.03 cfs 0.073 af

Pond Ex-CB1: Existing CB1

Peak Elev=86.08' Inflow=1.05 cfs 0.074 af

Outflow=1.05 cfs 0.074 af

Total Runoff Area = 0.226 ac Runoff Volume = 0.074 af Average Runoff Depth = 3.90"
18.27% Pervious = 0.041 ac 81.73% Impervious = 0.185 ac

18-045 Braley Condominiums 9-14-18

Type III 24-hr 25-Year Rainfall=5.60"

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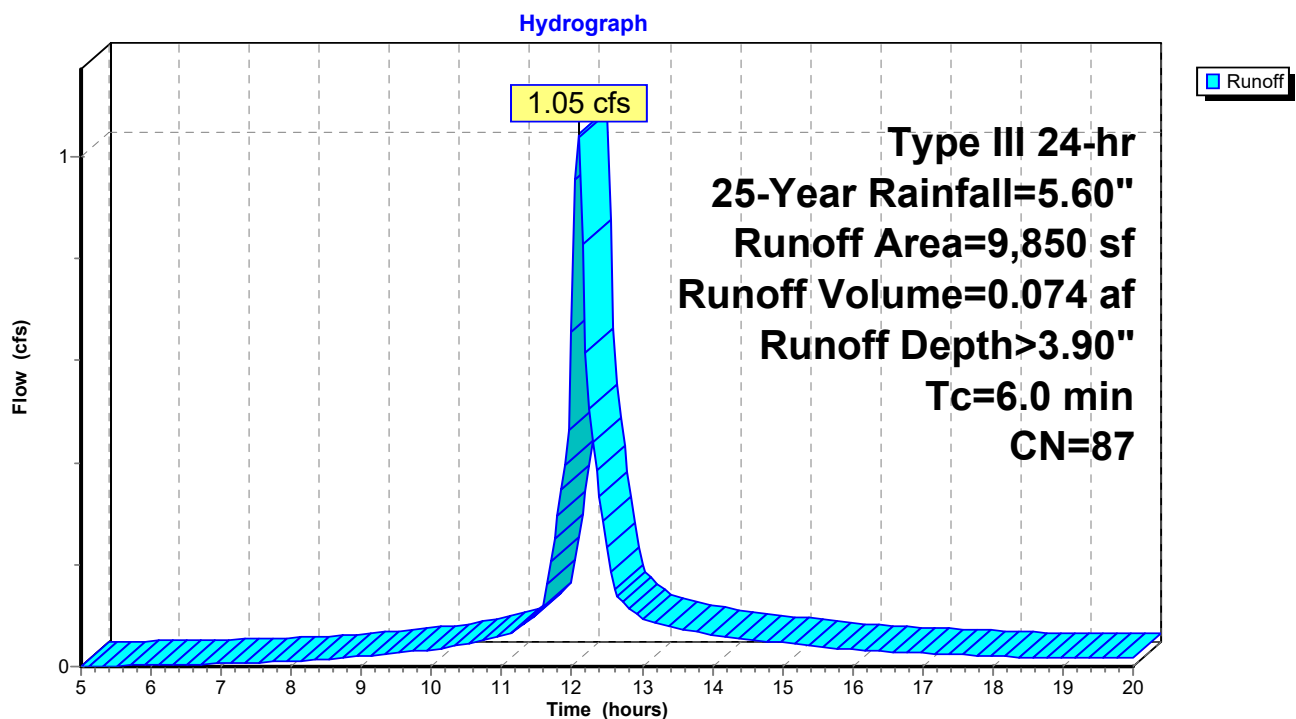
Summary for Subcatchment EX-1: Lower parking

Runoff = 1.05 cfs @ 12.09 hrs, Volume= 0.074 af, Depth> 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.60"

Area (sf)	CN	Description
8,050	98	Paved parking, HSG A
1,800	39	>75% Grass cover, Good, HSG A
9,850	87	Weighted Average
1,800		18.27% Pervious Area
8,050		81.73% Impervious Area

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

Subcatchment EX-1: Lower parking

18-045 Braley Condominiums 9-14-18

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Type III 24-hr 25-Year Rainfall=5.60"

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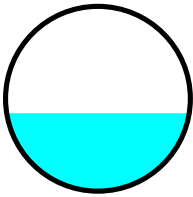
Summary for Reach Ex Pipe: 10" outlet pipe

Inflow Area = 0.226 ac, 81.73% Impervious, Inflow Depth > 3.90" for 25-Year event
Inflow = 1.05 cfs @ 12.09 hrs, Volume= 0.074 af
Outflow = 1.03 cfs @ 12.10 hrs, Volume= 0.073 af, Atten= 1%, Lag= 0.6 min

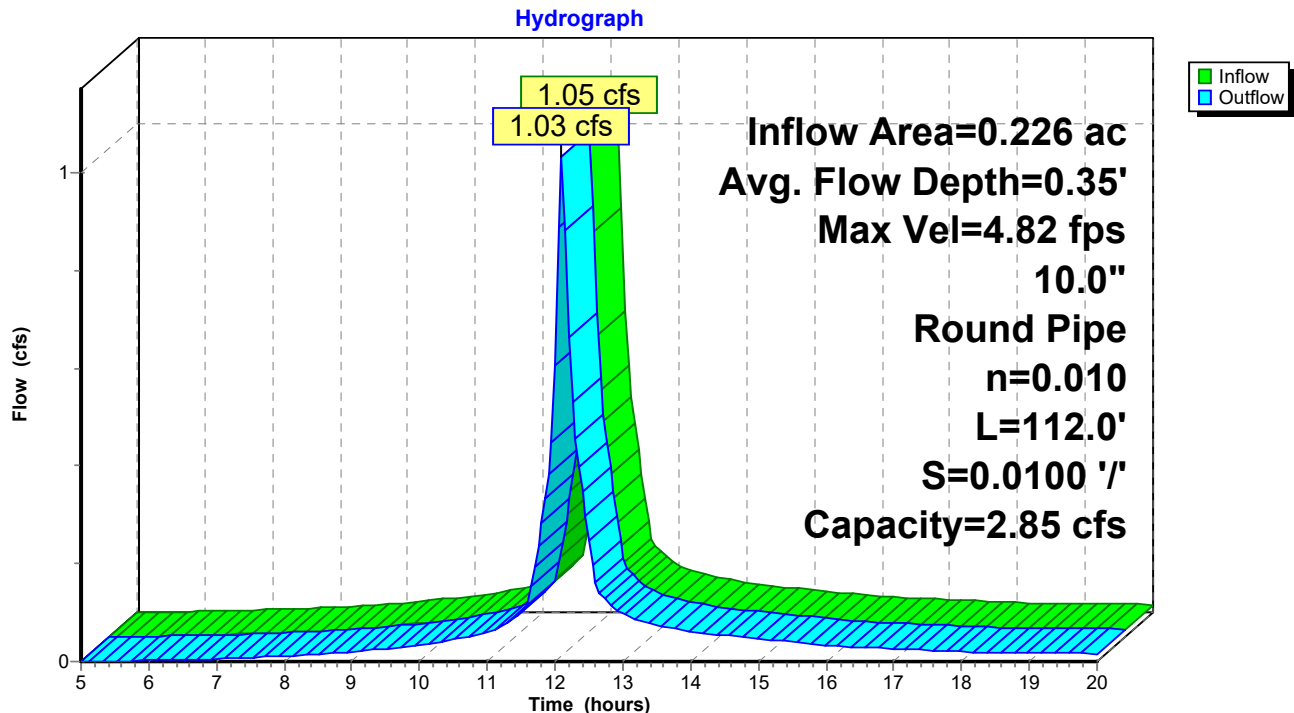
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.82 fps, Min. Travel Time= 0.4 min
Avg. Velocity= 1.74 fps, Avg. Travel Time= 1.1 min

Peak Storage= 24 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 2.85 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 112.0' Slope= 0.0100 '/'
Inlet Invert= 85.50', Outlet Invert= 84.38'



Reach Ex Pipe: 10" outlet pipe



Summary for Pond Ex-CB1: Existing CB1

Inflow Area = 0.226 ac, 81.73% Impervious, Inflow Depth > 3.90" for 25-Year event
 Inflow = 1.05 cfs @ 12.09 hrs, Volume= 0.074 af
 Outflow = 1.05 cfs @ 12.09 hrs, Volume= 0.074 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.05 cfs @ 12.09 hrs, Volume= 0.074 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 86.08' @ 12.09 hrs

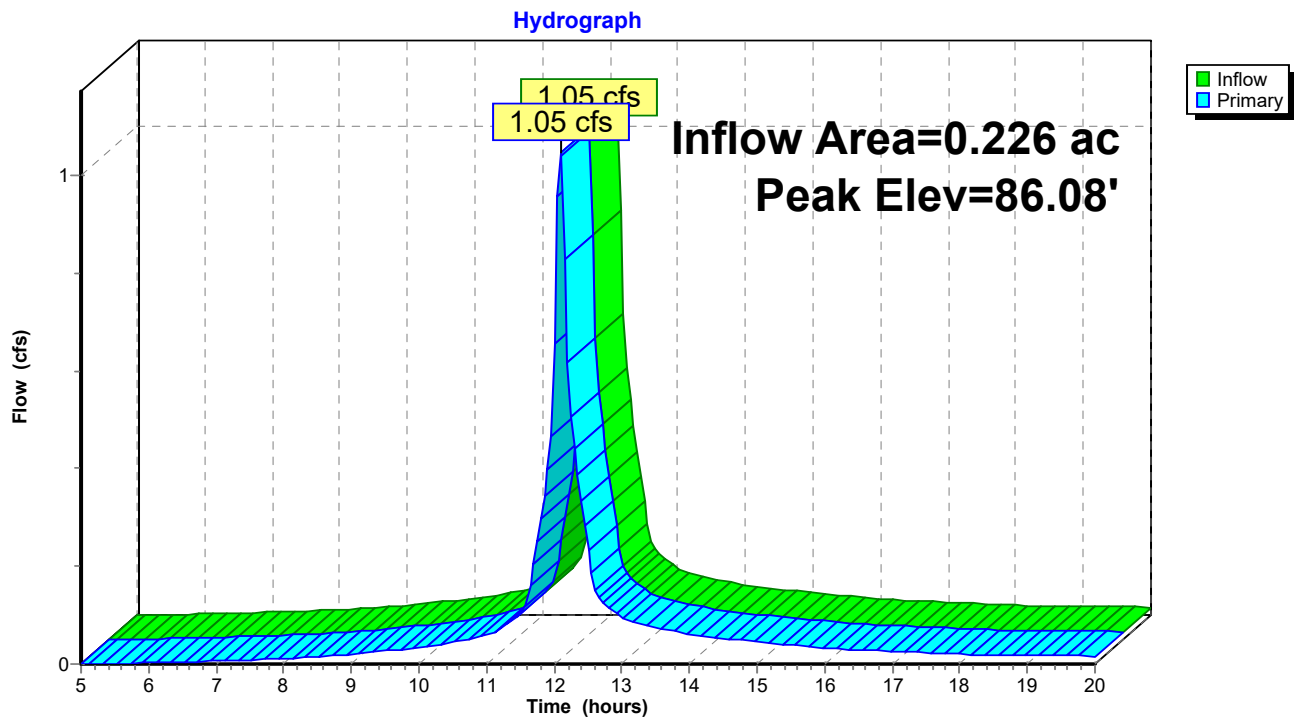
Device	Routing	Invert	Outlet Devices
#1	Primary	85.50'	10.0" Vert. Orifice/Grate C= 0.600
#2	Primary	89.00'	1.0" x 1.0" Horiz. Orifice/Grate X 8.00 columns X 8 rows C= 0.600 in 24.0" x 24.0" Grate (11% open area) Limited to weir flow at low heads

Primary OutFlow Max=1.02 cfs @ 12.09 hrs HW=86.07' (Free Discharge)

1=Orifice/Grate (Orifice Controls 1.02 cfs @ 2.57 fps)

2=Orifice/Grate (Controls 0.00 cfs)

Pond Ex-CB1: Existing CB1



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Type III 24-hr 100-Year Rainfall=7.00"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 EX-1: Lower parking

Runoff Area=9,850 sf 81.73% Impervious Runoff Depth>5.18"

Tc=6.0 min CN=87 Runoff=1.37 cfs 0.098 af

Reach Ex Pipe: 10" outlet pipe

Avg. Flow Depth=0.41' Max Vel=5.17 fps Inflow=1.37 cfs 0.098 af

10.0" Round Pipe n=0.010 L=112.0' S=0.0100 '/' Capacity=2.85 cfs Outflow=1.35 cfs 0.098 af

Pond Ex-CB1: Existing CB1

Peak Elev=86.19' Inflow=1.37 cfs 0.098 af

Outflow=1.37 cfs 0.098 af

Total Runoff Area = 0.226 ac Runoff Volume = 0.098 af Average Runoff Depth = 5.18"
18.27% Pervious = 0.041 ac 81.73% Impervious = 0.185 ac

18-045 Braley Condominiums 9-14-18

Type III 24-hr 100-Year Rainfall=7.00"

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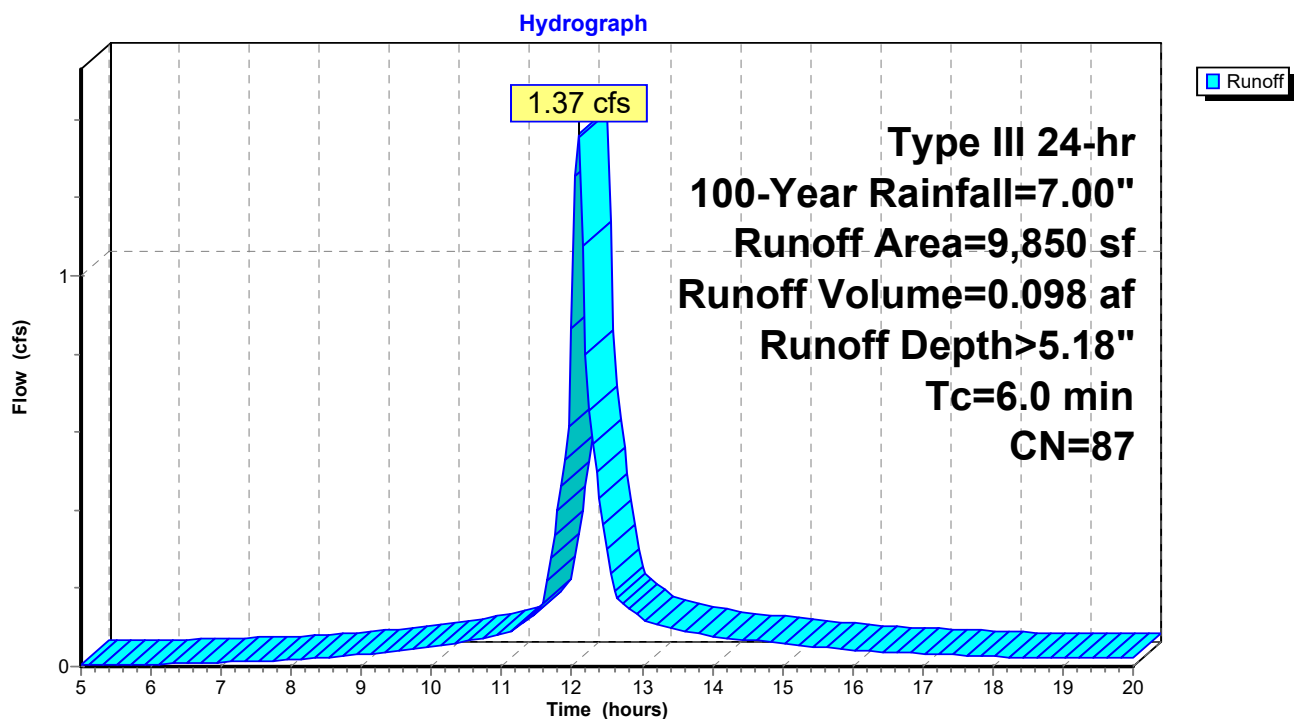
Summary for Subcatchment EX-1: Lower parking

Runoff = 1.37 cfs @ 12.09 hrs, Volume= 0.098 af, Depth> 5.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
8,050	98	Paved parking, HSG A
1,800	39	>75% Grass cover, Good, HSG A
9,850	87	Weighted Average
1,800		18.27% Pervious Area
8,050		81.73% Impervious Area

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

Subcatchment EX-1: Lower parking

18-045 Braley Condominiums 9-14-18

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Type III 24-hr 100-Year Rainfall=7.00"

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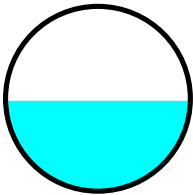
Summary for Reach Ex Pipe: 10" outlet pipe

Inflow Area = 0.226 ac, 81.73% Impervious, Inflow Depth > 5.18" for 100-Year event
Inflow = 1.37 cfs @ 12.09 hrs, Volume= 0.098 af
Outflow = 1.35 cfs @ 12.10 hrs, Volume= 0.098 af, Atten= 1%, Lag= 0.6 min

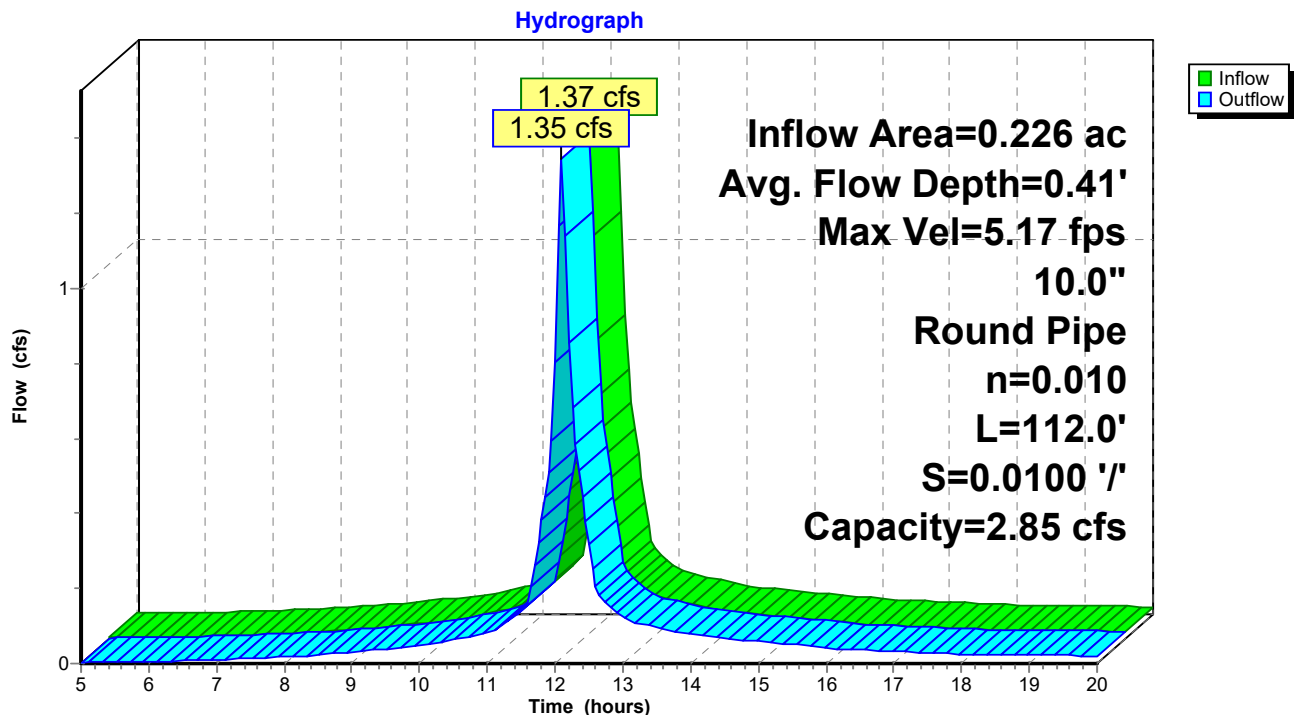
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.17 fps, Min. Travel Time= 0.4 min
Avg. Velocity= 1.92 fps, Avg. Travel Time= 1.0 min

Peak Storage= 30 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.41'
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 2.85 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 112.0' Slope= 0.0100 '/'
Inlet Invert= 85.50', Outlet Invert= 84.38'



Reach Ex Pipe: 10" outlet pipe



Summary for Pond Ex-CB1: Existing CB1

Inflow Area = 0.226 ac, 81.73% Impervious, Inflow Depth > 5.18" for 100-Year event
 Inflow = 1.37 cfs @ 12.09 hrs, Volume= 0.098 af
 Outflow = 1.37 cfs @ 12.09 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.37 cfs @ 12.09 hrs, Volume= 0.098 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 86.19' @ 12.09 hrs

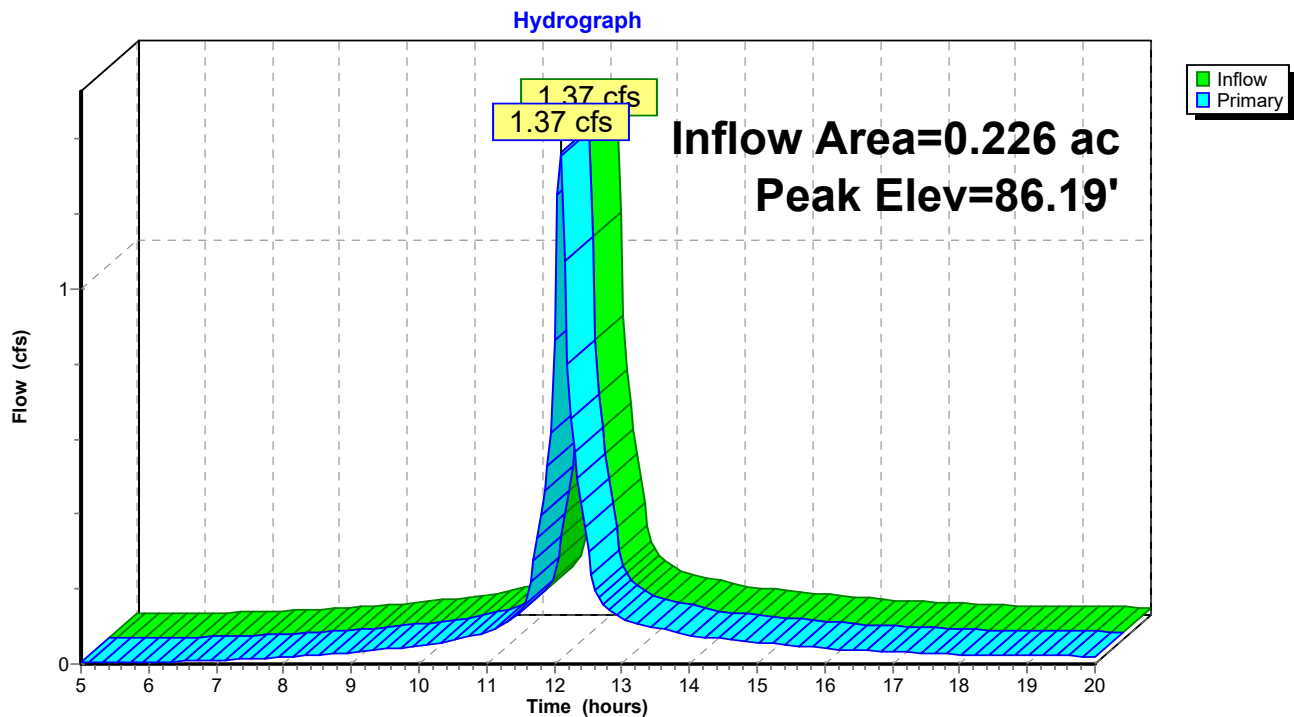
Device	Routing	Invert	Outlet Devices
#1	Primary	85.50'	10.0" Vert. Orifice/Grate C= 0.600
#2	Primary	89.00'	1.0" x 1.0" Horiz. Orifice/Grate X 8.00 columns X 8 rows C= 0.600 in 24.0" x 24.0" Grate (11% open area) Limited to weir flow at low heads

Primary OutFlow Max=1.33 cfs @ 12.09 hrs HW=86.18' (Free Discharge)

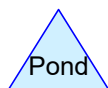
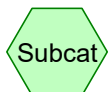
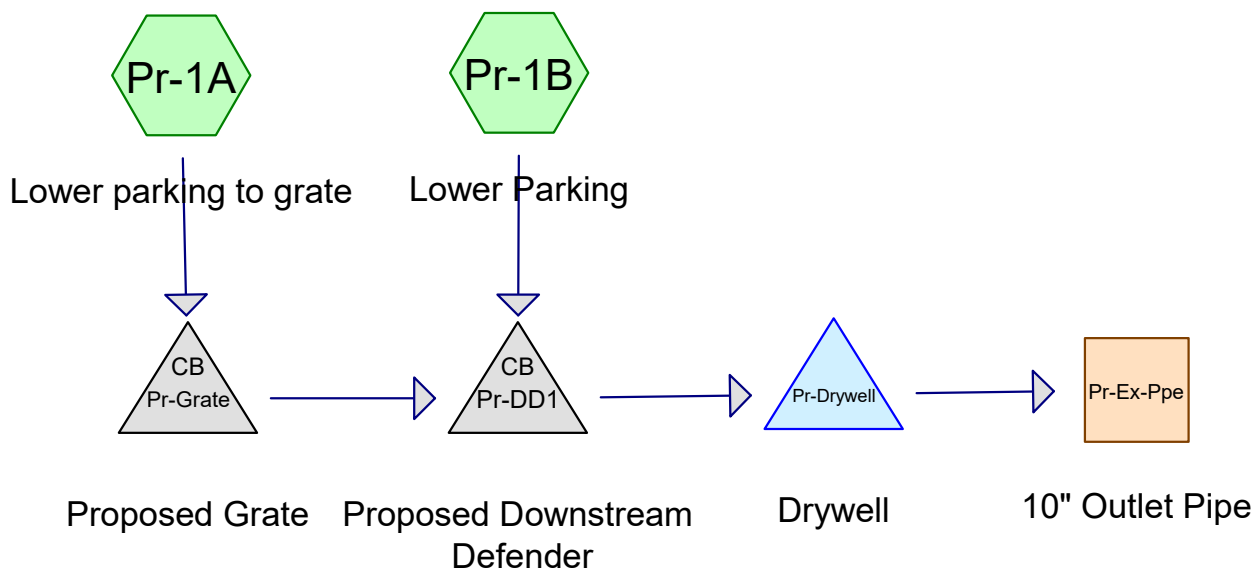
1=Orifice/Grate (Orifice Controls 1.33 cfs @ 2.80 fps)

2=Orifice/Grate (Controls 0.00 cfs)

Pond Ex-CB1: Existing CB1



POST-CONSTRUCTION 2, 10, 25, 100-YEAR STORM



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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.041	39	>75% Grass cover, Good, HSG A (Pr-1B)
0.196	98	Paved parking, HSG A (Pr-1A, Pr-1B)
0.237	88	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.237	HSG A	Pr-1A, Pr-1B
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.237		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.041	0.000	0.000	0.000	0.000	0.041	>75% Grass cover, Good	Pr-1B
0.196	0.000	0.000	0.000	0.000	0.196	Paved parking	Pr-1A, Pr-1B
0.237	0.000	0.000	0.000	0.000	0.237	TOTAL AREA	

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Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	Pr-Ex-Ppe	85.50	84.38	112.0	0.0100	0.010	10.0	0.0	0.0

18-045 Braley Condominiums 4-24-19*Type III 24-hr 2-Year Rainfall=3.40"*

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 Pr-1A: Lower parking to Runoff Area=0.011 ac 100.00% Impervious Runoff Depth>2.96"
Tc=6.0 min CN=98 Runoff=0.04 cfs 0.003 af

Subcatchment Pr-1B: Lower Parking Runoff Area=9,850 sf 81.73% Impervious Runoff Depth>1.96"
Tc=6.0 min CN=87 Runoff=0.54 cfs 0.037 af

Reach Pr-Ex-Ppe: 10" Outlet Pipe Avg. Flow Depth=0.02' Max Vel=0.95 fps Inflow=0.00 cfs 0.000 af
10.0" Round Pipe n=0.010 L=112.0' S=0.0100 '/' Capacity=2.85 cfs Outflow=0.00 cfs 0.000 af

Pond Pr-DD1: Proposed Downstream Defender Peak Elev=85.91' Inflow=0.58 cfs 0.040 af
Outflow=0.58 cfs 0.040 af

Pond Pr-Drywell: Drywell Peak Elev=85.43' Storage=0.000 af Inflow=0.58 cfs 0.040 af
Discarded=0.57 cfs 0.039 af Primary=0.00 cfs 0.000 af Outflow=0.58 cfs 0.040 af

Pond Pr-Grate: Proposed Grate Peak Elev=87.29' Inflow=0.04 cfs 0.003 af
Outflow=0.04 cfs 0.003 af

Total Runoff Area = 0.237 ac Runoff Volume = 0.040 af Average Runoff Depth = 2.01"
17.43% Pervious = 0.041 ac 82.57% Impervious = 0.196 ac

18-045 Braley Condominiums 4-24-19

Type III 24-hr 2-Year Rainfall=3.40"

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Summary for Subcatchment Pr-1A: Lower parking to grate

Runoff = 0.04 cfs @ 12.09 hrs, Volume= 0.003 af, Depth> 2.96"

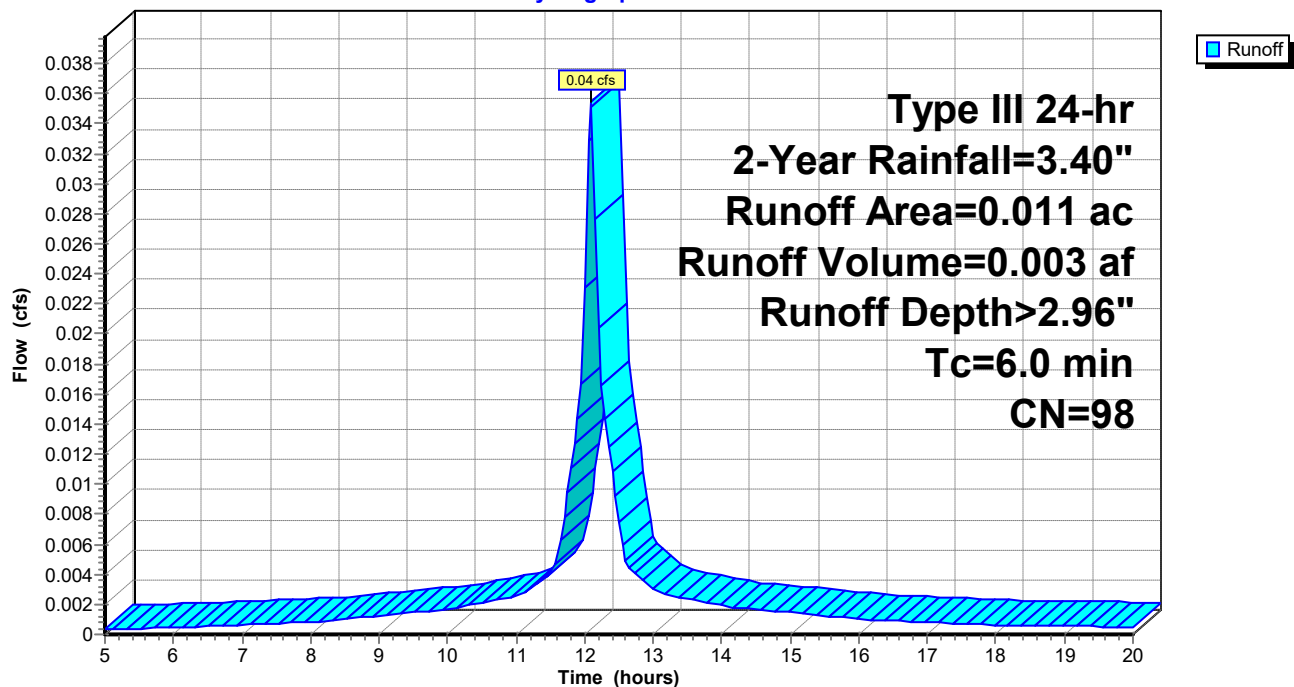
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.40"

Area (ac)	CN	Description
0.011	98	Paved parking, HSG A
0.011		100.00% Impervious Area

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

Subcatchment Pr-1A: Lower parking to grate

Hydrograph



18-045 Braley Condominiums 4-24-19

Type III 24-hr 2-Year Rainfall=3.40"

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Summary for Subcatchment Pr-1B: Lower Parking

Runoff = 0.54 cfs @ 12.09 hrs, Volume= 0.037 af, Depth> 1.96"

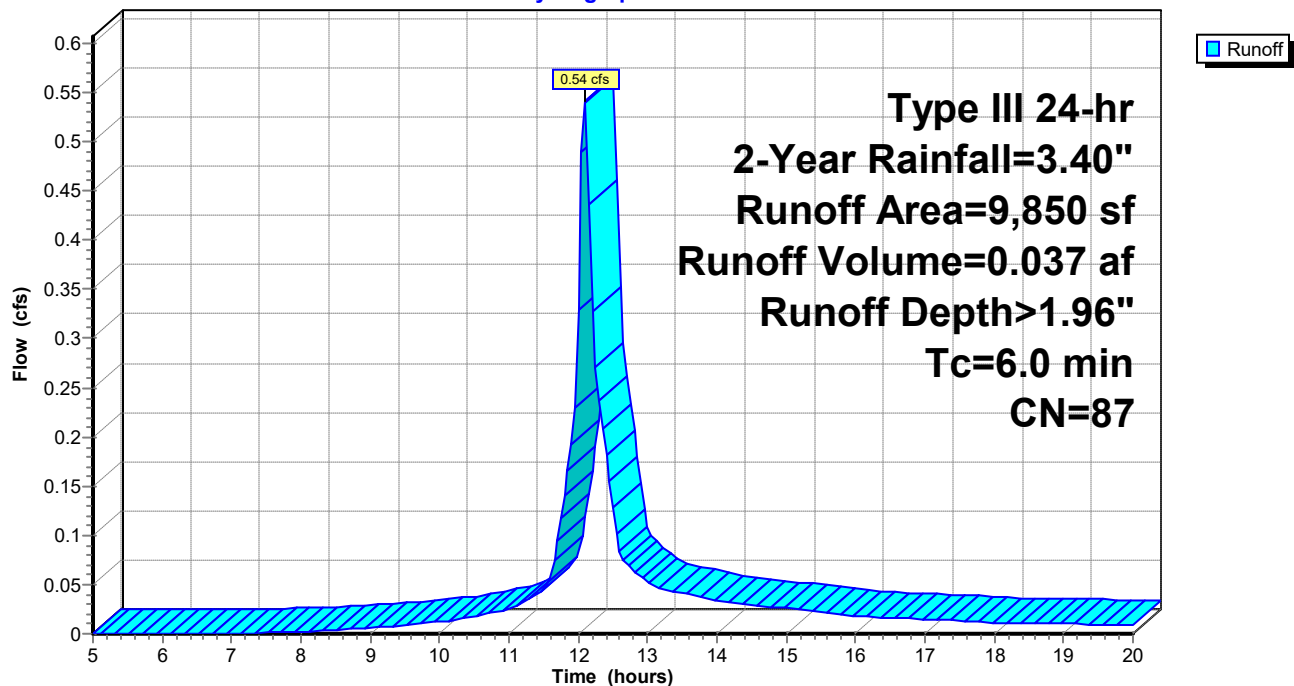
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.40"

Area (sf)	CN	Description
8,050	98	Paved parking, HSG A
1,800	39	>75% Grass cover, Good, HSG A
9,850	87	Weighted Average
1,800		18.27% Pervious Area
8,050		81.73% Impervious Area

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

Subcatchment Pr-1B: Lower Parking

Hydrograph



18-045 Braley Condominiums 4-24-19

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Type III 24-hr 2-Year Rainfall=3.40"

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Summary for Reach Pr-Ex-Ppe: 10" Outlet Pipe

Inflow Area = 0.237 ac, 82.57% Impervious, Inflow Depth > 0.02" for 2-Year event
Inflow = 0.00 cfs @ 12.09 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 12.15 hrs, Volume= 0.000 af, Atten= 7%, Lag= 3.6 min

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

Max. Velocity= 0.95 fps, Min. Travel Time= 2.0 min

Avg. Velocity= 0.49 fps, Avg. Travel Time= 3.8 min

Peak Storage= 1 cf @ 12.12 hrs

Average Depth at Peak Storage= 0.02'

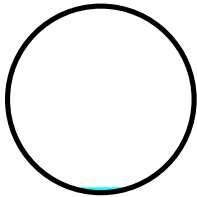
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 2.85 cfs

10.0" Round Pipe

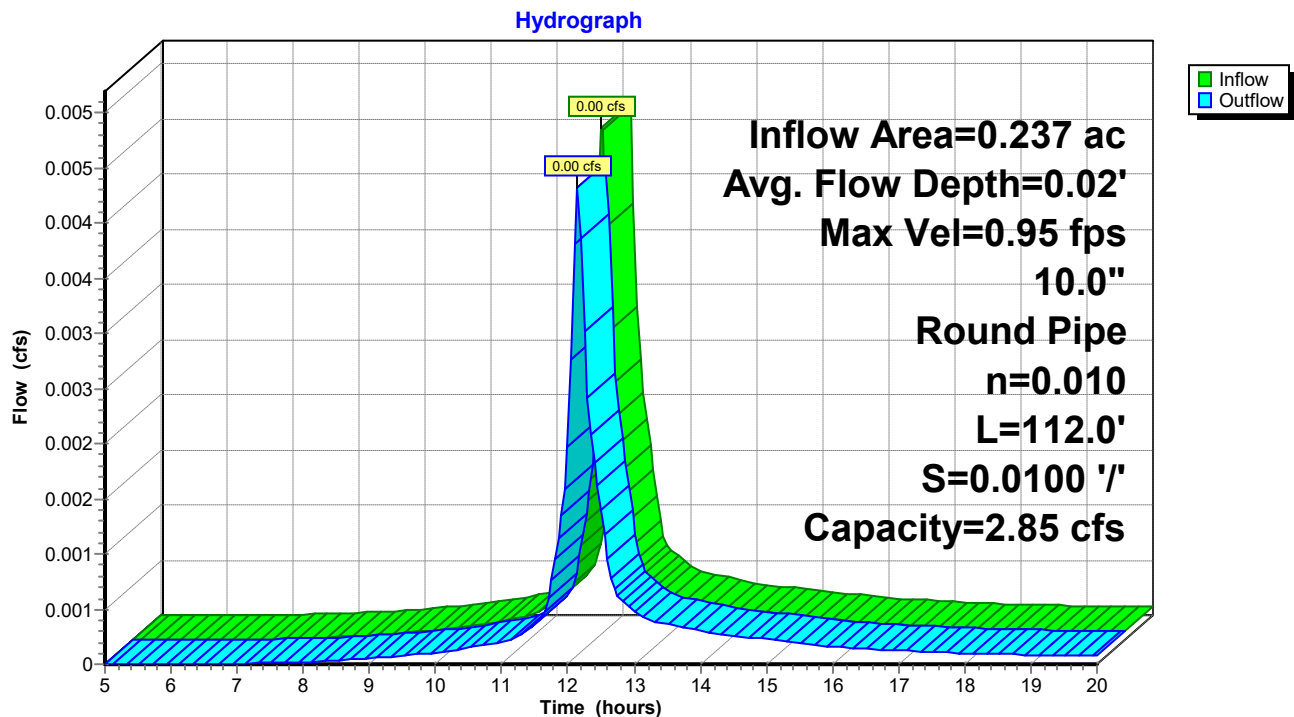
n= 0.010 PVC, smooth interior

Length= 112.0' Slope= 0.0100 '/'

Inlet Invert= 85.50', Outlet Invert= 84.38'



Reach Pr-Ex-Ppe: 10" Outlet Pipe



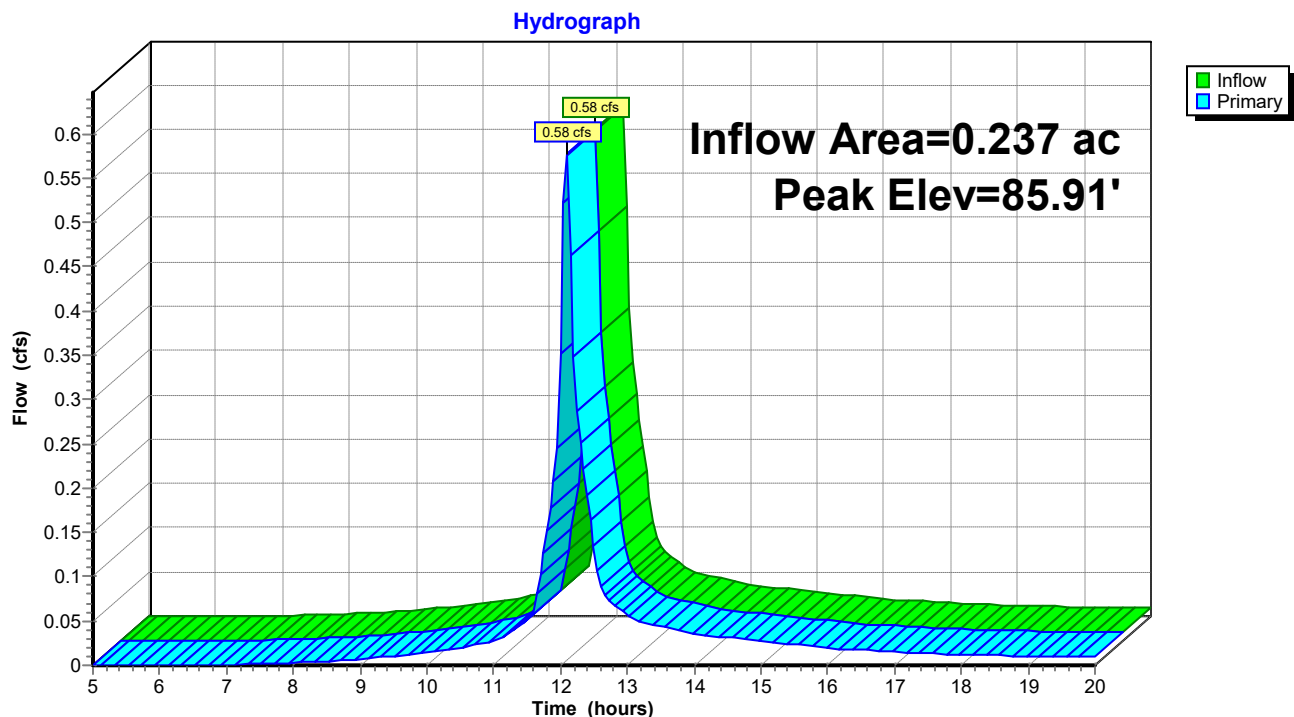
Summary for Pond Pr-DD1: Proposed Downstream Defender

Inflow Area = 0.237 ac, 82.57% Impervious, Inflow Depth > 2.01" for 2-Year event
 Inflow = 0.58 cfs @ 12.09 hrs, Volume= 0.040 af
 Outflow = 0.58 cfs @ 12.09 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.58 cfs @ 12.09 hrs, Volume= 0.040 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 85.91' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	85.50'	10.0" Vert. Orifice/Grate C= 0.600
#2	Primary	89.00'	1.0" x 1.0" Horiz. Orifice/Grate X 8.00 columns X 8 rows C= 0.600 in 24.0" x 24.0" Grate (11% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.56 cfs @ 12.09 hrs HW=85.90' (Free Discharge)
 1=Orifice/Grate (Orifice Controls 0.56 cfs @ 2.16 fps)
 2=Orifice/Grate (Controls 0.00 cfs)

Pond Pr-DD1: Proposed Downstream Defender

Summary for Pond Pr-Drywell: Drywell

Inflow Area = 0.237 ac, 82.57% Impervious, Inflow Depth > 2.01" for 2-Year event
 Inflow = 0.58 cfs @ 12.09 hrs, Volume= 0.040 af
 Outflow = 0.58 cfs @ 12.09 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.57 cfs @ 12.09 hrs, Volume= 0.039 af
 Primary = 0.00 cfs @ 12.09 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 85.43' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af

Plug-Flow detention time= 0.0 min calculated for 0.040 af (100% of inflow)
 Center-of-Mass det. time= 0.0 min (779.5 - 779.5)

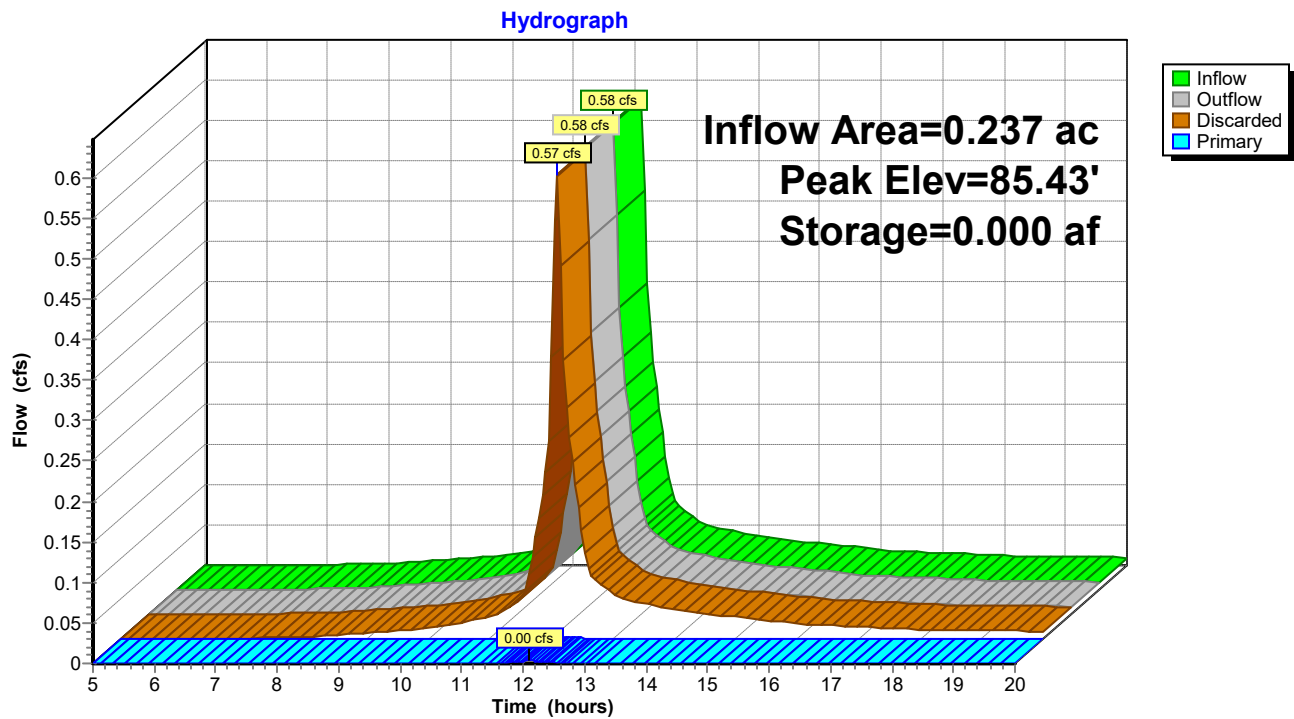
Volume	Invert	Avail.Storage	Storage Description
#1	85.40'	0.001 af	4.00'D x 4.00'H Vertical Cone/Cylinder Inside #2
#2	85.40'	0.000 af	5.00'D x 4.50'H Vertical Cone/Cylinder
			0.002 af Overall - 0.001 af Embedded = 0.001 af x 40.0% Voids
			0.002 af Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	85.40'	10.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	85.40'	1.02 cfs Exfiltration at all elevations

Discarded OutFlow Max=1.02 cfs @ 12.09 hrs HW=85.42' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 1.02 cfs)

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=85.42' (Free Discharge)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.54 fps)

Pond Pr-Drywell: Drywell



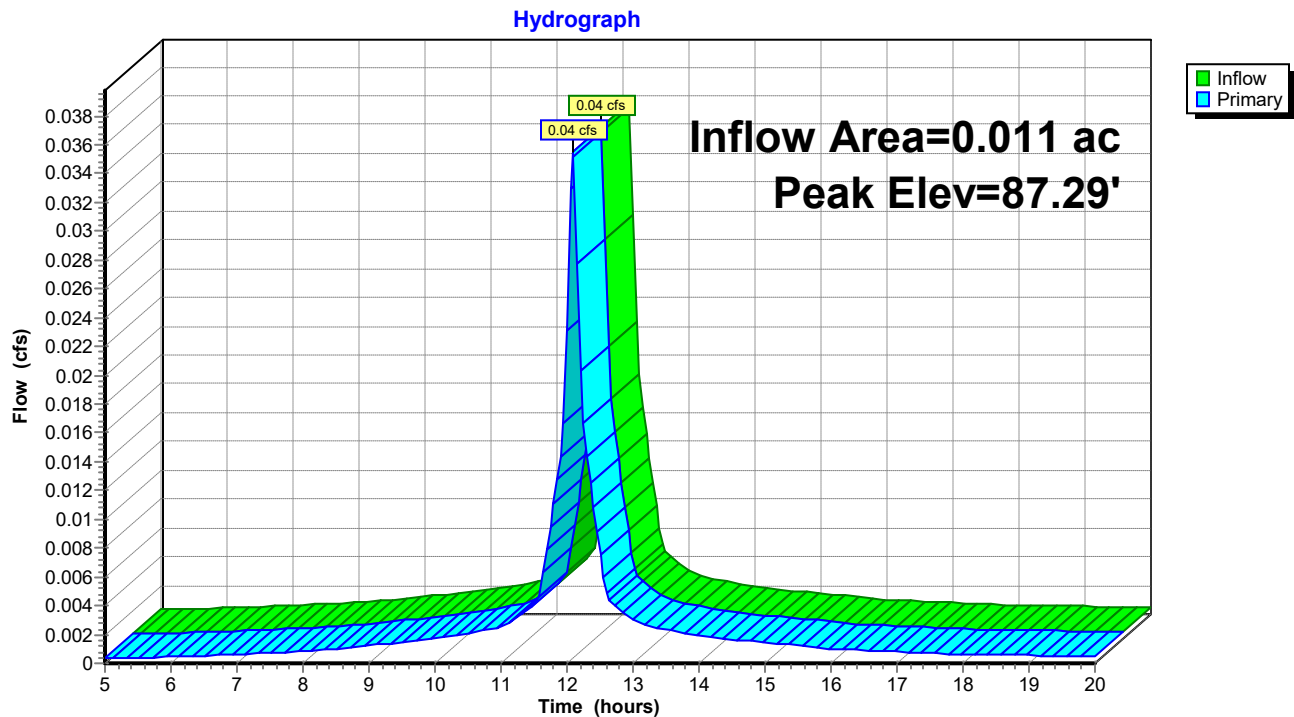
Summary for Pond Pr-Grate: Proposed Grate

Inflow Area = 0.011 ac, 100.00% Impervious, Inflow Depth > 2.96" for 2-Year event
 Inflow = 0.04 cfs @ 12.09 hrs, Volume= 0.003 af
 Outflow = 0.04 cfs @ 12.09 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.04 cfs @ 12.09 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 87.29' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.20'	10.0" Vert. Orifice/Grate C= 0.600
#2	Primary	88.70'	0.8" x 4.8" Horiz. Orifice/Grate X 34.00 columns X 2 rows C= 0.600 in 12.0" x 240.0" Grate (9% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.03 cfs @ 12.09 hrs HW=87.29' (Free Discharge)
 1=Orifice/Grate (Orifice Controls 0.03 cfs @ 1.04 fps)
 2=Orifice/Grate (Controls 0.00 cfs)

Pond Pr-Grate: Proposed Grate

18-045 Braley Condominiums 4-24-19*Type III 24-hr 10-Year Rainfall=4.80"*

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 Pr-1A: Lower parking to Runoff Area=0.011 ac 100.00% Impervious Runoff Depth>4.24"
Tc=6.0 min CN=98 Runoff=0.05 cfs 0.004 af

Subcatchment Pr-1B: Lower Parking Runoff Area=9,850 sf 81.73% Impervious Runoff Depth>3.18"
Tc=6.0 min CN=87 Runoff=0.86 cfs 0.060 af

Reach Pr-Ex-Ppe: 10" Outlet Pipe Avg. Flow Depth=0.03' Max Vel=1.11 fps Inflow=0.01 cfs 0.001 af
10.0" Round Pipe n=0.010 L=112.0' S=0.0100 '/' Capacity=2.85 cfs Outflow=0.01 cfs 0.001 af

Pond Pr-DD1: Proposed Downstream Defender Peak Elev=86.03' Inflow=0.91 cfs 0.064 af
Outflow=0.91 cfs 0.064 af

Pond Pr-Drywell: Drywell Peak Elev=85.44' Storage=0.000 af Inflow=0.91 cfs 0.064 af
Discarded=0.91 cfs 0.063 af Primary=0.01 cfs 0.001 af Outflow=0.91 cfs 0.064 af

Pond Pr-Grate: Proposed Grate Peak Elev=87.31' Inflow=0.05 cfs 0.004 af
Outflow=0.05 cfs 0.004 af

Total Runoff Area = 0.237 ac Runoff Volume = 0.064 af Average Runoff Depth = 3.23"
17.43% Pervious = 0.041 ac 82.57% Impervious = 0.196 ac

18-045 Braley Condominiums 4-24-19

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

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Summary for Subcatchment Pr-1A: Lower parking to grate

Runoff = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af, Depth> 4.24"

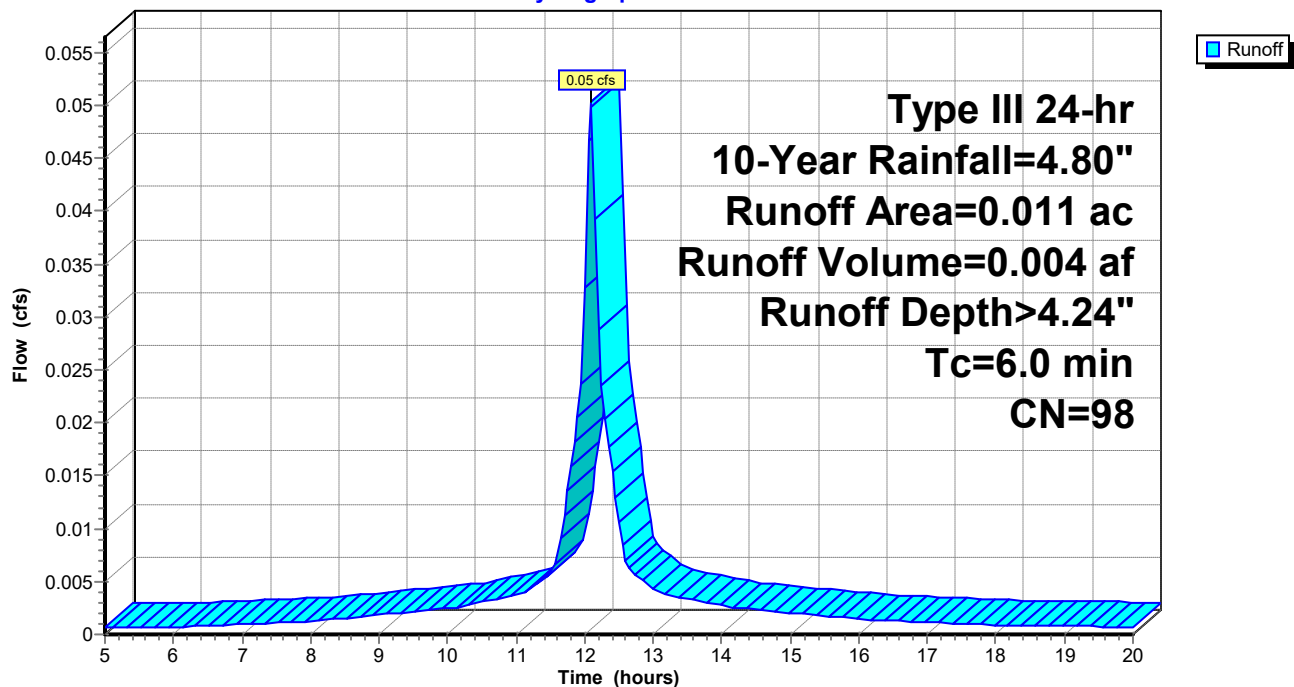
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.011	98	Paved parking, HSG A
0.011		100.00% Impervious Area

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

Subcatchment Pr-1A: Lower parking to grate

Hydrograph



18-045 Braley Condominiums 4-24-19

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

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Summary for Subcatchment Pr-1B: Lower Parking

Runoff = 0.86 cfs @ 12.09 hrs, Volume= 0.060 af, Depth> 3.18"

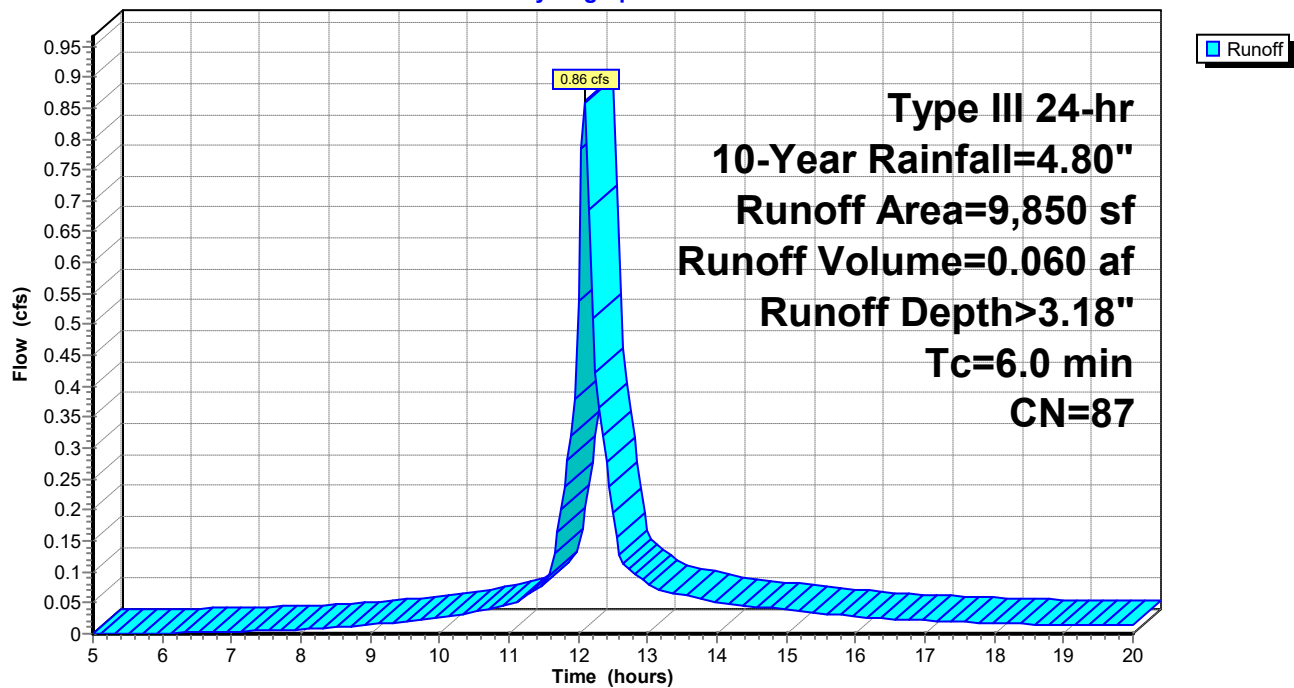
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
8,050	98	Paved parking, HSG A
1,800	39	>75% Grass cover, Good, HSG A
9,850	87	Weighted Average
1,800		18.27% Pervious Area
8,050		81.73% Impervious Area

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

Subcatchment Pr-1B: Lower Parking

Hydrograph



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

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Summary for Reach Pr-Ex-Ppe: 10" Outlet Pipe

Inflow Area = 0.237 ac, 82.57% Impervious, Inflow Depth > 0.03" for 10-Year event
Inflow = 0.01 cfs @ 12.09 hrs, Volume= 0.001 af
Outflow = 0.01 cfs @ 12.14 hrs, Volume= 0.001 af, Atten= 6%, Lag= 3.1 min

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

Max. Velocity= 1.11 fps, Min. Travel Time= 1.7 min

Avg. Velocity= 0.51 fps, Avg. Travel Time= 3.7 min

Peak Storage= 1 cf @ 12.11 hrs

Average Depth at Peak Storage= 0.03'

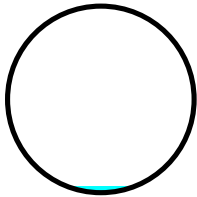
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 2.85 cfs

10.0" Round Pipe

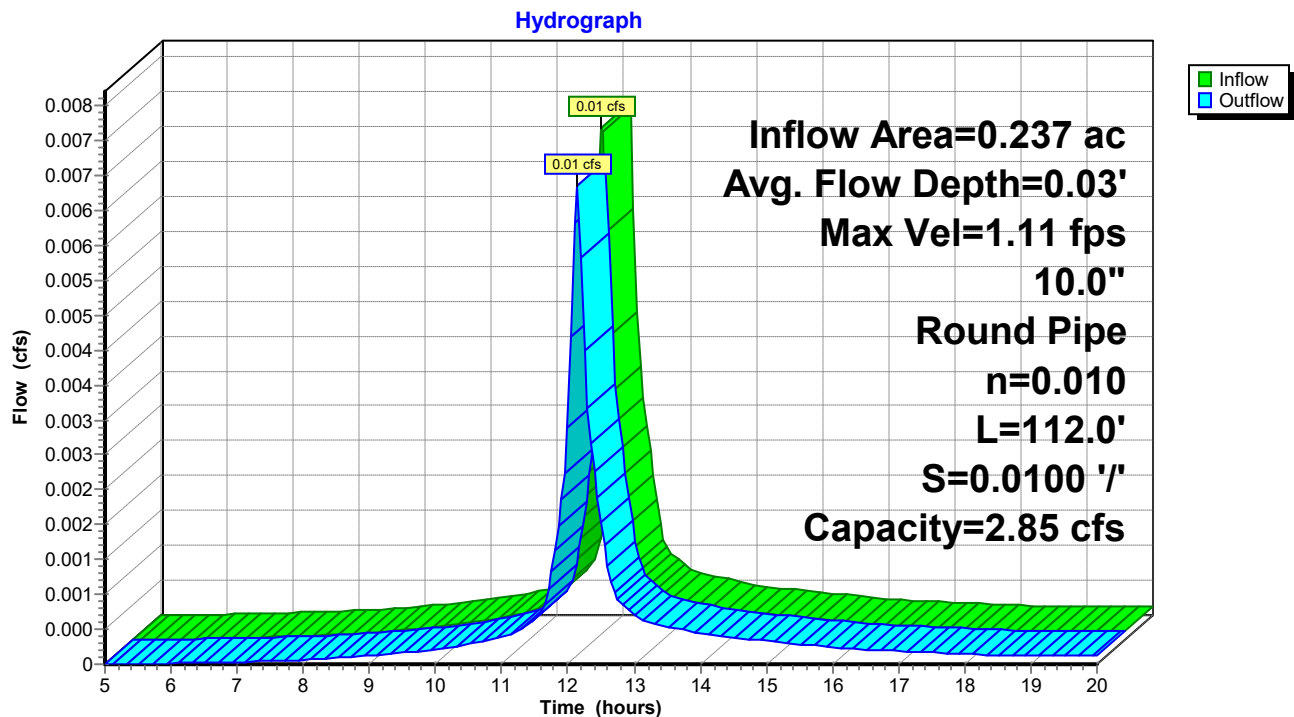
n= 0.010 PVC, smooth interior

Length= 112.0' Slope= 0.0100 '/

Inlet Invert= 85.50', Outlet Invert= 84.38'



Reach Pr-Ex-Ppe: 10" Outlet Pipe



Summary for Pond Pr-DD1: Proposed Downstream Defender

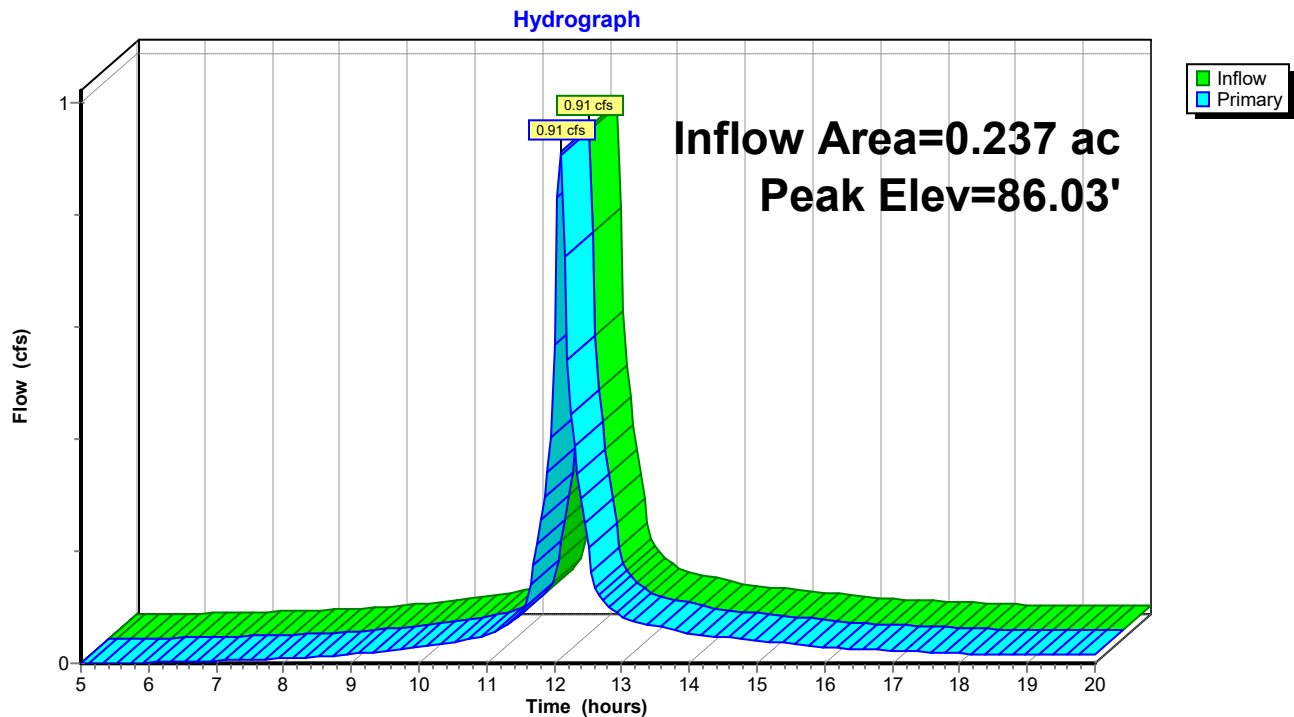
Inflow Area = 0.237 ac, 82.57% Impervious, Inflow Depth > 3.23" for 10-Year event
 Inflow = 0.91 cfs @ 12.09 hrs, Volume= 0.064 af
 Outflow = 0.91 cfs @ 12.09 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.91 cfs @ 12.09 hrs, Volume= 0.064 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 86.03' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	85.50'	10.0" Vert. Orifice/Grate C= 0.600
#2	Primary	89.00'	1.0" x 1.0" Horiz. Orifice/Grate X 8.00 columns X 8 rows C= 0.600 in 24.0" x 24.0" Grate (11% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.89 cfs @ 12.09 hrs HW=86.02' (Free Discharge)
 1=Orifice/Grate (Orifice Controls 0.89 cfs @ 2.47 fps)
 2=Orifice/Grate (Controls 0.00 cfs)

Pond Pr-DD1: Proposed Downstream Defender



Summary for Pond Pr-Drywell: Drywell

Inflow Area = 0.237 ac, 82.57% Impervious, Inflow Depth > 3.23" for 10-Year event
 Inflow = 0.91 cfs @ 12.09 hrs, Volume= 0.064 af
 Outflow = 0.91 cfs @ 12.09 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.91 cfs @ 12.09 hrs, Volume= 0.063 af
 Primary = 0.01 cfs @ 12.09 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 85.44' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af

Plug-Flow detention time= 0.0 min calculated for 0.064 af (100% of inflow)
 Center-of-Mass det. time= 0.0 min (768.9 - 768.8)

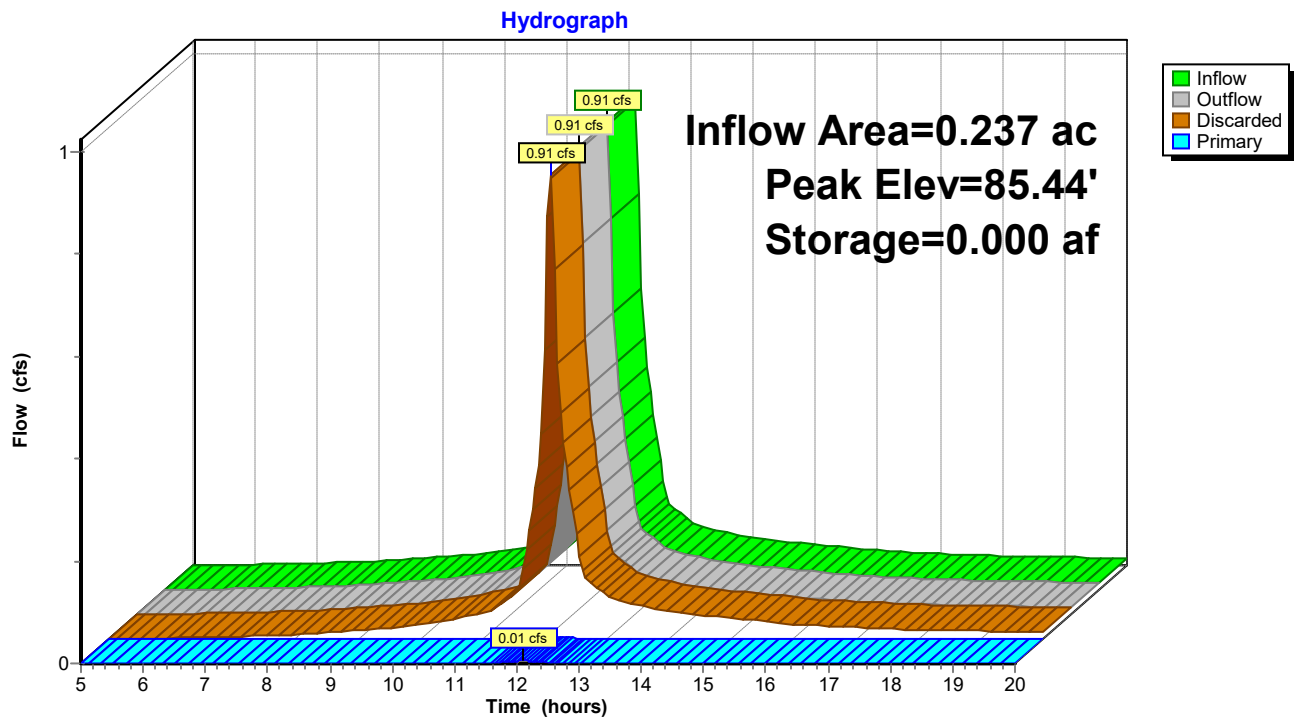
Volume	Invert	Avail.Storage	Storage Description
#1	85.40'	0.001 af	4.00'D x 4.00'H Vertical Cone/Cylinder Inside #2
#2	85.40'	0.000 af	5.00'D x 4.50'H Vertical Cone/Cylinder
			0.002 af Overall - 0.001 af Embedded = 0.001 af x 40.0% Voids
			0.002 af Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	85.40'	10.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	85.40'	1.02 cfs Exfiltration at all elevations

Discarded OutFlow Max=1.02 cfs @ 12.09 hrs HW=85.44' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 1.02 cfs)

Primary OutFlow Max=0.01 cfs @ 12.09 hrs HW=85.44' (Free Discharge)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.67 fps)

Pond Pr-Drywell: Drywell



Summary for Pond Pr-Grate: Proposed Grate

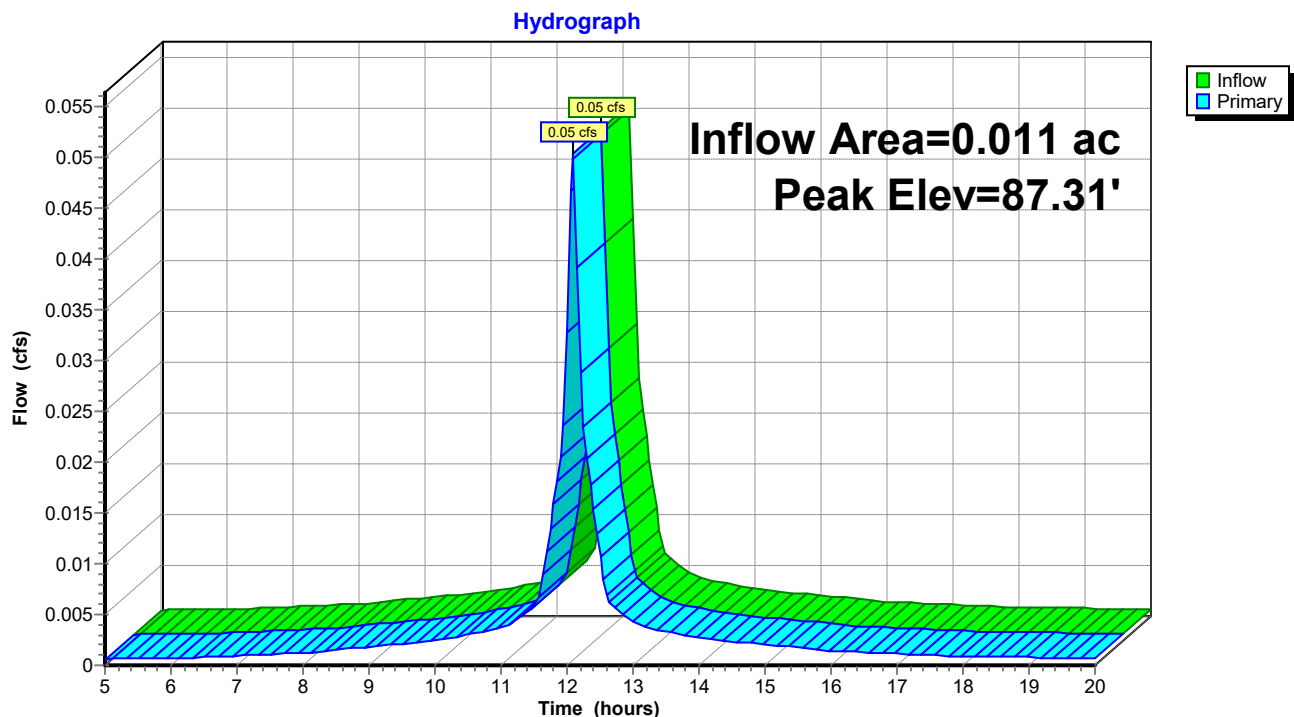
Inflow Area = 0.011 ac, 100.00% Impervious, Inflow Depth > 4.24" for 10-Year event
 Inflow = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af
 Outflow = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 87.31' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.20'	10.0" Vert. Orifice/Grate C= 0.600
#2	Primary	88.70'	0.8" x 4.8" Horiz. Orifice/Grate X 34.00 columns X 2 rows C= 0.600 in 12.0" x 240.0" Grate (9% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.05 cfs @ 12.09 hrs HW=87.31' (Free Discharge)
 1=Orifice/Grate (Orifice Controls 0.05 cfs @ 1.13 fps)
 2=Orifice/Grate (Controls 0.00 cfs)

Pond Pr-Grate: Proposed Grate



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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 Pr-1A: Lower parking to Runoff Area=0.011 ac 100.00% Impervious Runoff Depth>4.97"
Tc=6.0 min CN=98 Runoff=0.06 cfs 0.005 af

Subcatchment Pr-1B: Lower Parking Runoff Area=9,850 sf 81.73% Impervious Runoff Depth>3.90"
Tc=6.0 min CN=87 Runoff=1.05 cfs 0.074 af

Reach Pr-Ex-Ppe: 10" Outlet Pipe Avg. Flow Depth=0.08' Max Vel=1.92 fps Inflow=0.06 cfs 0.001 af
10.0" Round Pipe n=0.010 L=112.0' S=0.0100 '/' Capacity=2.85 cfs Outflow=0.04 cfs 0.001 af

Pond Pr-DD1: Proposed Downstream Defender Peak Elev=86.10' Inflow=1.10 cfs 0.078 af
Outflow=1.10 cfs 0.078 af

Pond Pr-Drywell: Drywell Peak Elev=85.53' Storage=0.000 af Inflow=1.10 cfs 0.078 af
Discarded=1.03 cfs 0.077 af Primary=0.06 cfs 0.001 af Outflow=1.09 cfs 0.078 af

Pond Pr-Grate: Proposed Grate Peak Elev=87.32' Inflow=0.06 cfs 0.005 af
Outflow=0.06 cfs 0.005 af

Total Runoff Area = 0.237 ac Runoff Volume = 0.078 af Average Runoff Depth = 3.95"
17.43% Pervious = 0.041 ac 82.57% Impervious = 0.196 ac

18-045 Braley Condominiums 4-24-19

Type III 24-hr 25-Year Rainfall=5.60"

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Summary for Subcatchment Pr-1A: Lower parking to grate

Runoff = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af, Depth> 4.97"

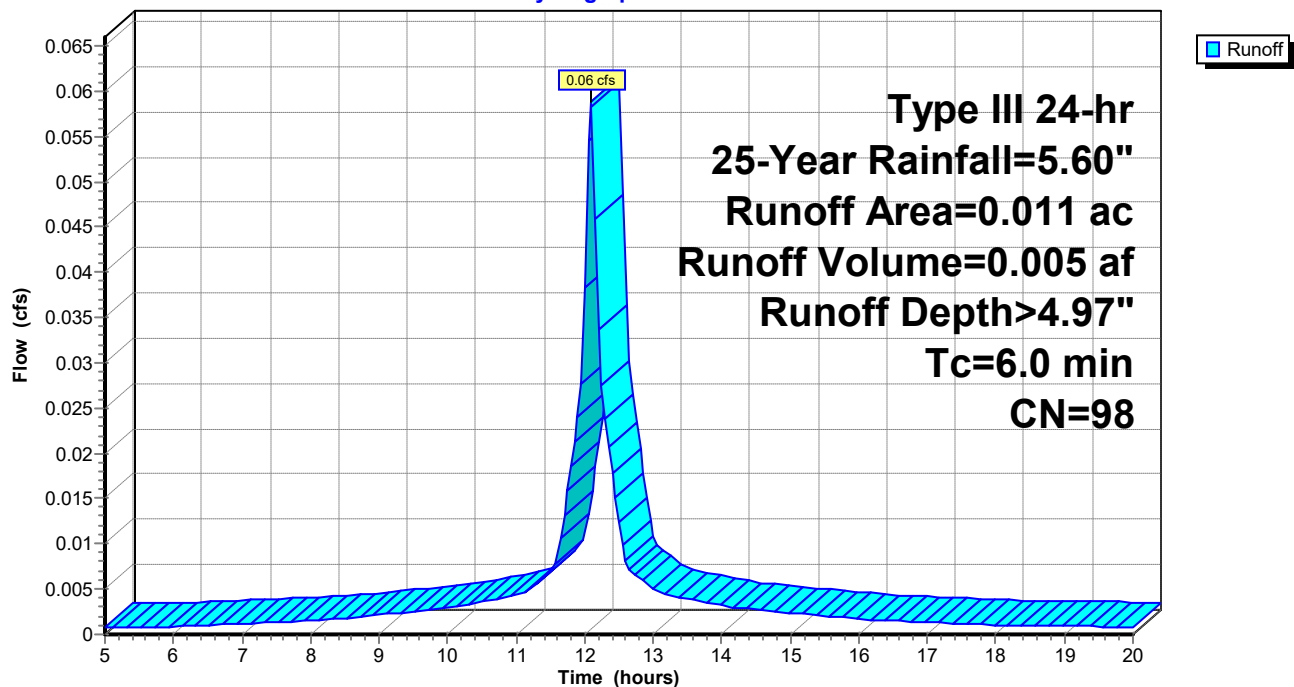
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.60"

Area (ac)	CN	Description
0.011	98	Paved parking, HSG A
0.011		100.00% Impervious Area

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

Subcatchment Pr-1A: Lower parking to grate

Hydrograph



18-045 Braley Condominiums 4-24-19

Type III 24-hr 25-Year Rainfall=5.60"

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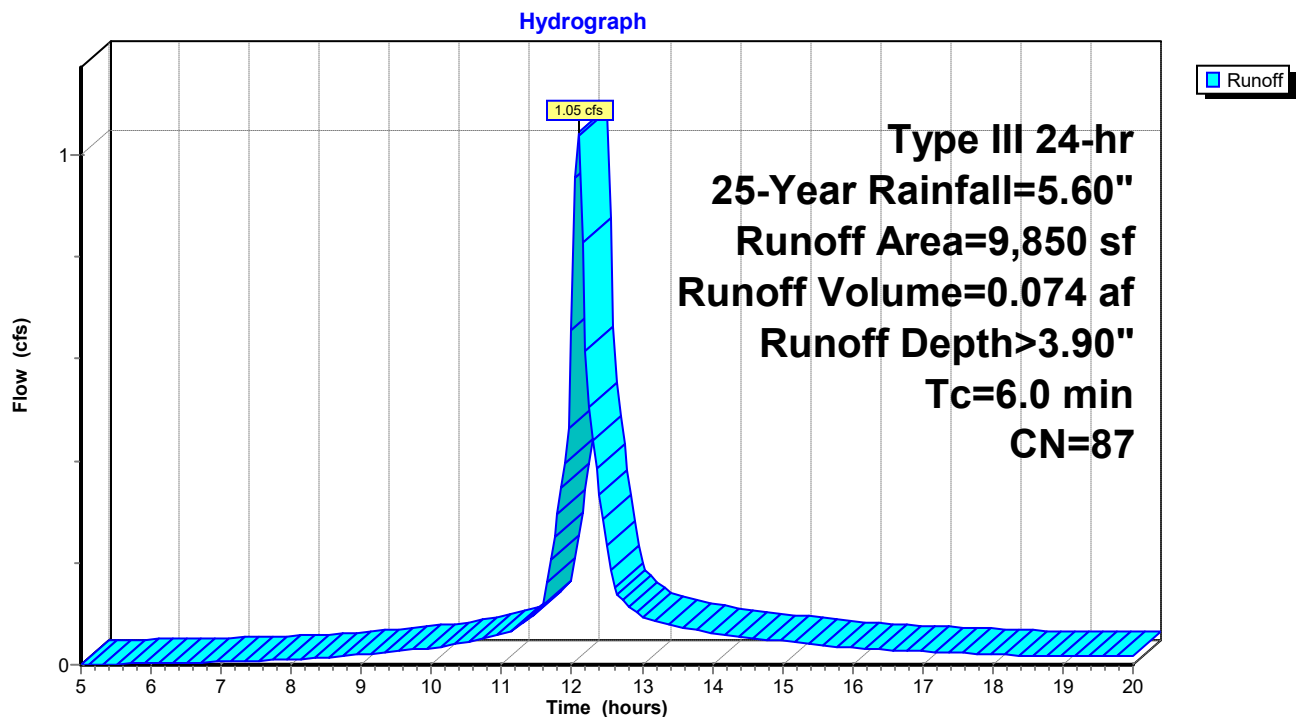
Summary for Subcatchment Pr-1B: Lower Parking

Runoff = 1.05 cfs @ 12.09 hrs, Volume= 0.074 af, Depth> 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.60"

Area (sf)	CN	Description
8,050	98	Paved parking, HSG A
1,800	39	>75% Grass cover, Good, HSG A
9,850	87	Weighted Average
1,800		18.27% Pervious Area
8,050		81.73% Impervious Area

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

Subcatchment Pr-1B: Lower Parking

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Type III 24-hr 25-Year Rainfall=5.60"

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Summary for Reach Pr-Ex-Ppe: 10" Outlet Pipe

Inflow Area = 0.237 ac, 82.57% Impervious, Inflow Depth > 0.04" for 25-Year event
Inflow = 0.06 cfs @ 12.10 hrs, Volume= 0.001 af
Outflow = 0.04 cfs @ 12.13 hrs, Volume= 0.001 af, Atten= 40%, Lag= 1.9 min

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

Max. Velocity= 1.92 fps, Min. Travel Time= 1.0 min

Avg. Velocity= 0.52 fps, Avg. Travel Time= 3.6 min

Peak Storage= 3 cf @ 12.11 hrs

Average Depth at Peak Storage= 0.08'

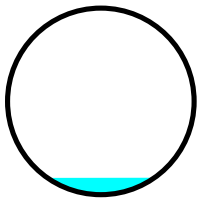
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 2.85 cfs

10.0" Round Pipe

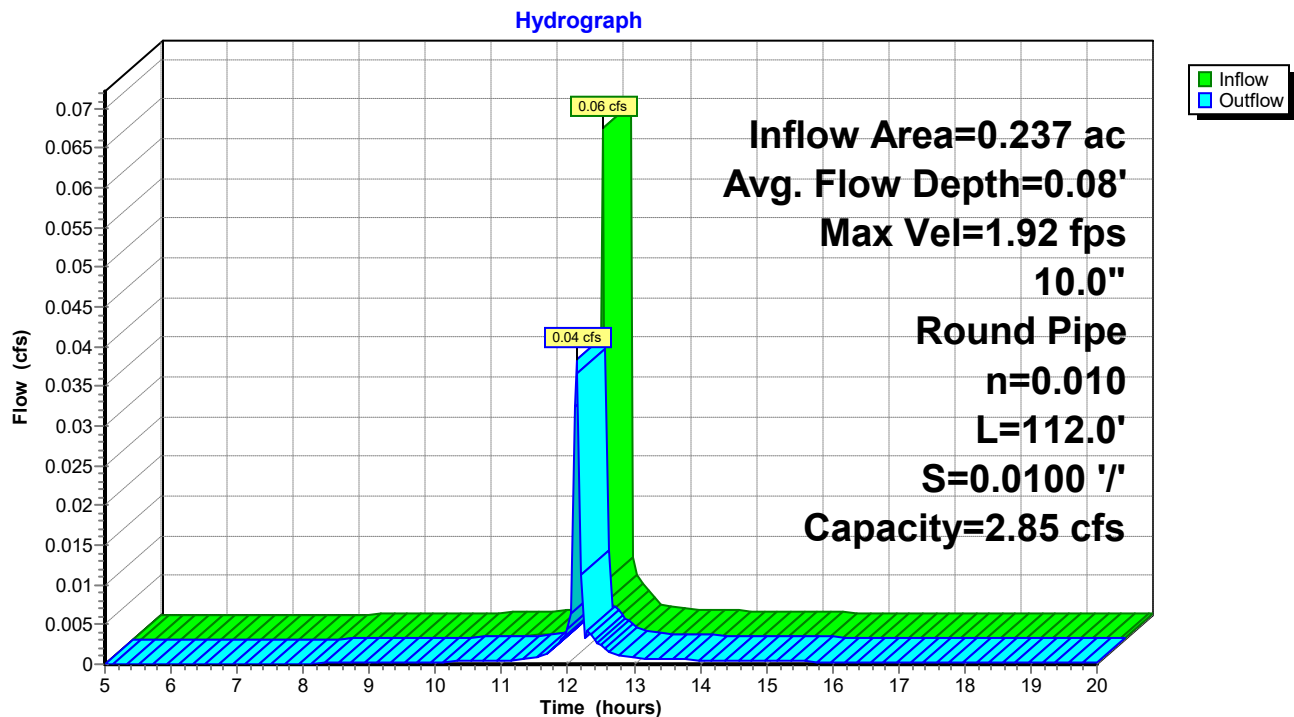
n= 0.010 PVC, smooth interior

Length= 112.0' Slope= 0.0100 '/'

Inlet Invert= 85.50', Outlet Invert= 84.38'



Reach Pr-Ex-Ppe: 10" Outlet Pipe



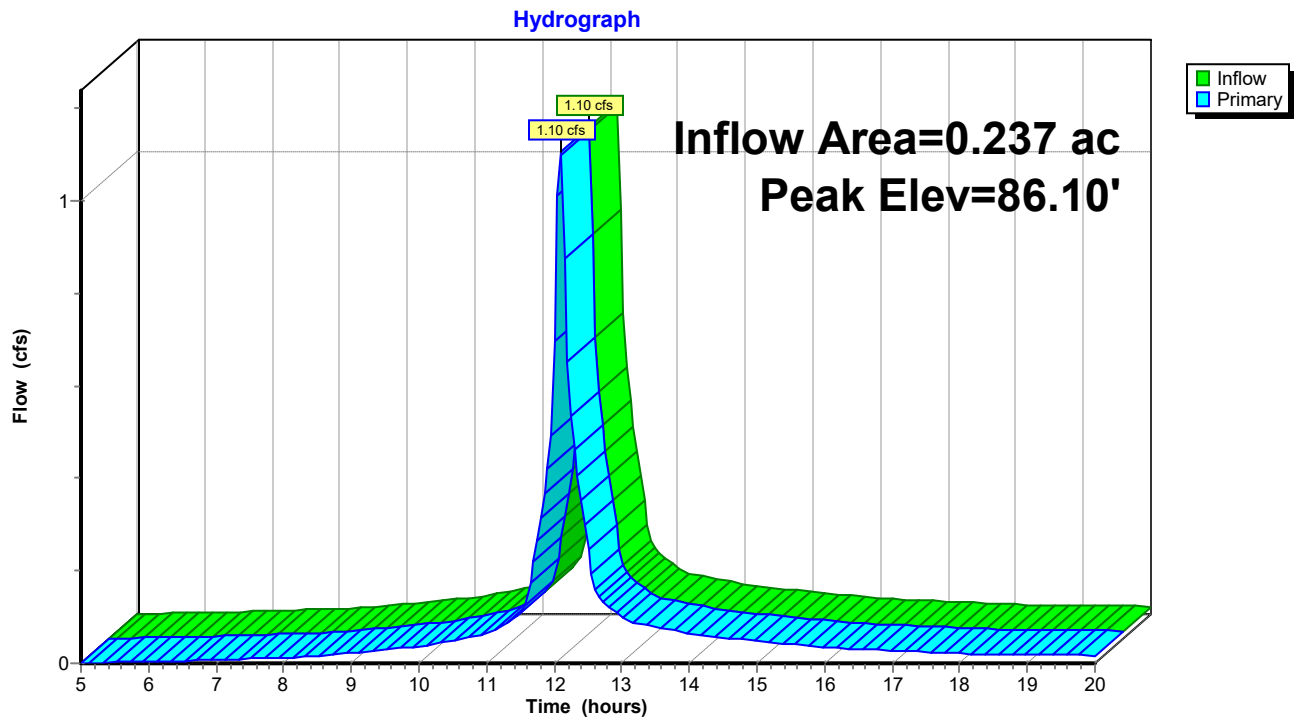
Summary for Pond Pr-DD1: Proposed Downstream Defender

Inflow Area = 0.237 ac, 82.57% Impervious, Inflow Depth > 3.95" for 25-Year event
 Inflow = 1.10 cfs @ 12.09 hrs, Volume= 0.078 af
 Outflow = 1.10 cfs @ 12.09 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.10 cfs @ 12.09 hrs, Volume= 0.078 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 86.10' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	85.50'	10.0" Vert. Orifice/Grate C= 0.600
#2	Primary	89.00'	1.0" x 1.0" Horiz. Orifice/Grate X 8.00 columns X 8 rows C= 0.600 in 24.0" x 24.0" Grate (11% open area) Limited to weir flow at low heads

Primary OutFlow Max=1.08 cfs @ 12.09 hrs HW=86.09' (Free Discharge)
 1=Orifice/Grate (Orifice Controls 1.08 cfs @ 2.61 fps)
 2=Orifice/Grate (Controls 0.00 cfs)

Pond Pr-DD1: Proposed Downstream Defender

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Type III 24-hr 25-Year Rainfall=5.60"

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Summary for Pond Pr-Drywell: Drywell

Inflow Area = 0.237 ac, 82.57% Impervious, Inflow Depth > 3.95" for 25-Year event
 Inflow = 1.10 cfs @ 12.09 hrs, Volume= 0.078 af
 Outflow = 1.09 cfs @ 12.09 hrs, Volume= 0.078 af, Atten= 1%, Lag= 0.0 min
 Discarded = 1.03 cfs @ 12.08 hrs, Volume= 0.077 af
 Primary = 0.06 cfs @ 12.10 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 85.53' @ 12.10 hrs Surf.Area= 0.000 ac Storage= 0.000 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= (not calculated: outflow precedes inflow)

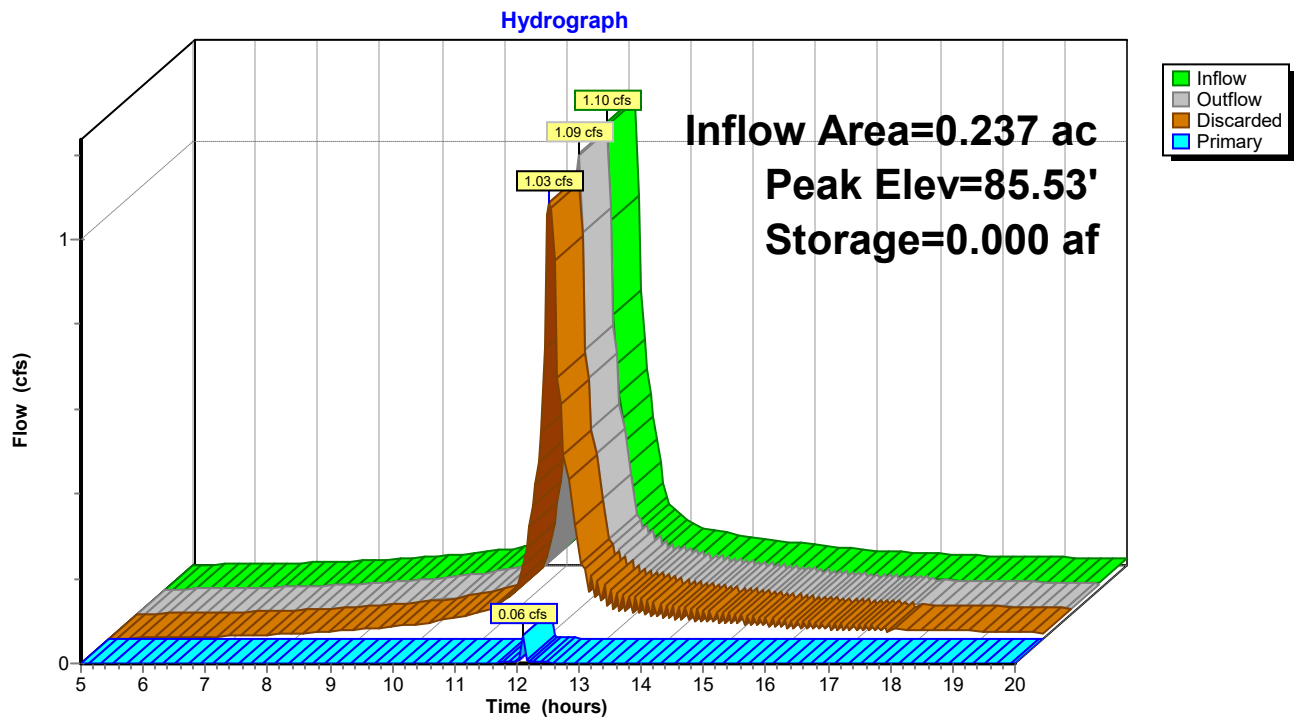
Volume	Invert	Avail.Storage	Storage Description
#1	85.40'	0.001 af	4.00'D x 4.00'H Vertical Cone/Cylinder Inside #2
#2	85.40'	0.000 af	5.00'D x 4.50'H Vertical Cone/Cylinder
			0.002 af Overall - 0.001 af Embedded = 0.001 af x 40.0% Voids
		0.002 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	85.40'	10.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	85.40'	1.02 cfs Exfiltration at all elevations

Discarded OutFlow Max=1.02 cfs @ 12.08 hrs HW=85.50' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 1.02 cfs)

Primary OutFlow Max=0.06 cfs @ 12.10 hrs HW=85.53' (Free Discharge)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.06 cfs @ 1.21 fps)

Pond Pr-Drywell: Drywell



Summary for Pond Pr-Grate: Proposed Grate

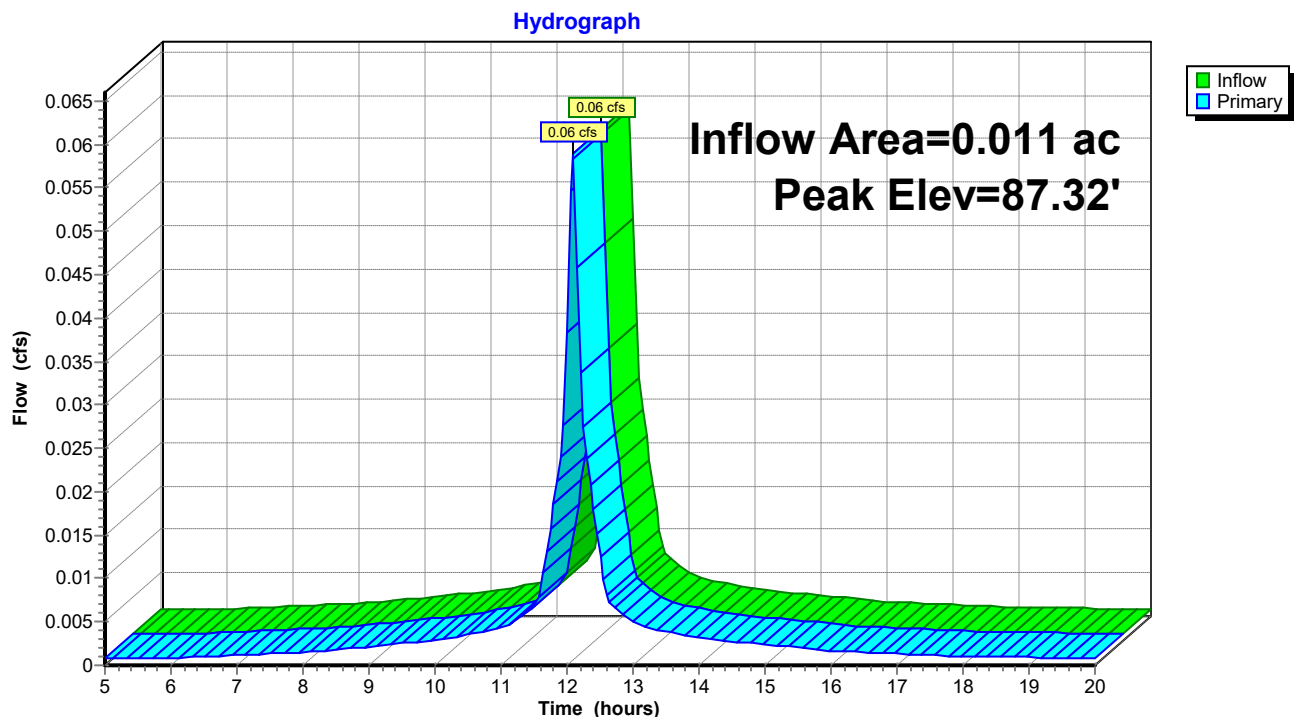
Inflow Area = 0.011 ac, 100.00% Impervious, Inflow Depth > 4.97" for 25-Year event
 Inflow = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af
 Outflow = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 87.32' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.20'	10.0" Vert. Orifice/Grate C= 0.600
#2	Primary	88.70'	0.8" x 4.8" Horiz. Orifice/Grate X 34.00 columns X 2 rows C= 0.600 in 12.0" x 240.0" Grate (9% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.06 cfs @ 12.09 hrs HW=87.32' (Free Discharge)
 1=Orifice/Grate (Orifice Controls 0.06 cfs @ 1.18 fps)
 2=Orifice/Grate (Controls 0.00 cfs)

Pond Pr-Grate: Proposed Grate



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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 Pr-1A: Lower parking to Runoff Area=0.011 ac 100.00% Impervious Runoff Depth>6.24"
Tc=6.0 min CN=98 Runoff=0.07 cfs 0.006 af

Subcatchment Pr-1B: Lower Parking Runoff Area=9,850 sf 81.73% Impervious Runoff Depth>5.18"
Tc=6.0 min CN=87 Runoff=1.37 cfs 0.098 af

Reach Pr-Ex-Ppe: 10" Outlet Pipe Avg. Flow Depth=0.22' Max Vel=3.79 fps Inflow=0.44 cfs 0.004 af
10.0" Round Pipe n=0.010 L=112.0' S=0.0100 '/' Capacity=2.85 cfs Outflow=0.40 cfs 0.004 af

Pond Pr-DD1: Proposed Downstream Defender Peak Elev=86.22' Inflow=1.44 cfs 0.103 af
Outflow=1.44 cfs 0.103 af

Pond Pr-Drywell: Drywell Peak Elev=85.75' Storage=0.000 af Inflow=1.44 cfs 0.103 af
Discarded=1.02 cfs 0.099 af Primary=0.44 cfs 0.004 af Outflow=1.46 cfs 0.103 af

Pond Pr-Grate: Proposed Grate Peak Elev=87.34' Inflow=0.07 cfs 0.006 af
Outflow=0.07 cfs 0.006 af

Total Runoff Area = 0.237 ac Runoff Volume = 0.103 af Average Runoff Depth = 5.23"
17.43% Pervious = 0.041 ac 82.57% Impervious = 0.196 ac

Summary for Subcatchment Pr-1A: Lower parking to grate

Runoff = 0.07 cfs @ 12.09 hrs, Volume= 0.006 af, Depth> 6.24"

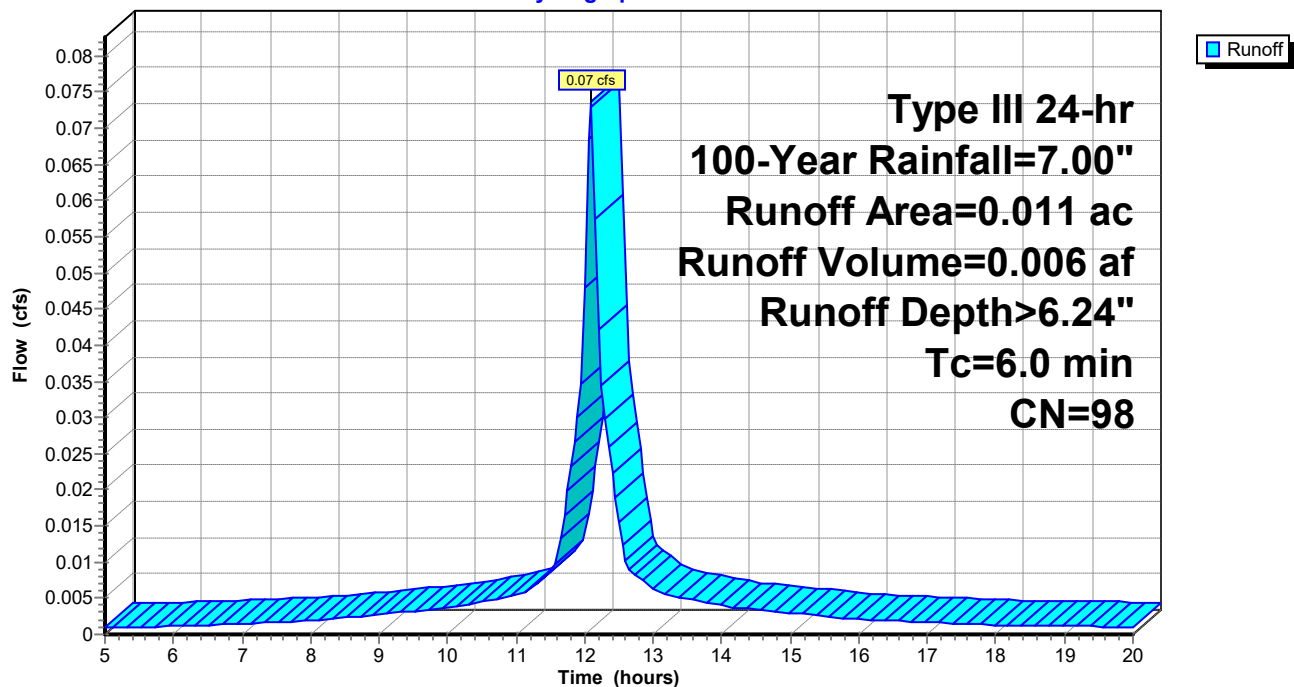
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (ac)	CN	Description
0.011	98	Paved parking, HSG A
0.011		100.00% Impervious Area

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

Subcatchment Pr-1A: Lower parking to grate

Hydrograph



18-045 Braley Condominiums 4-24-19

Type III 24-hr 100-Year Rainfall=7.00"

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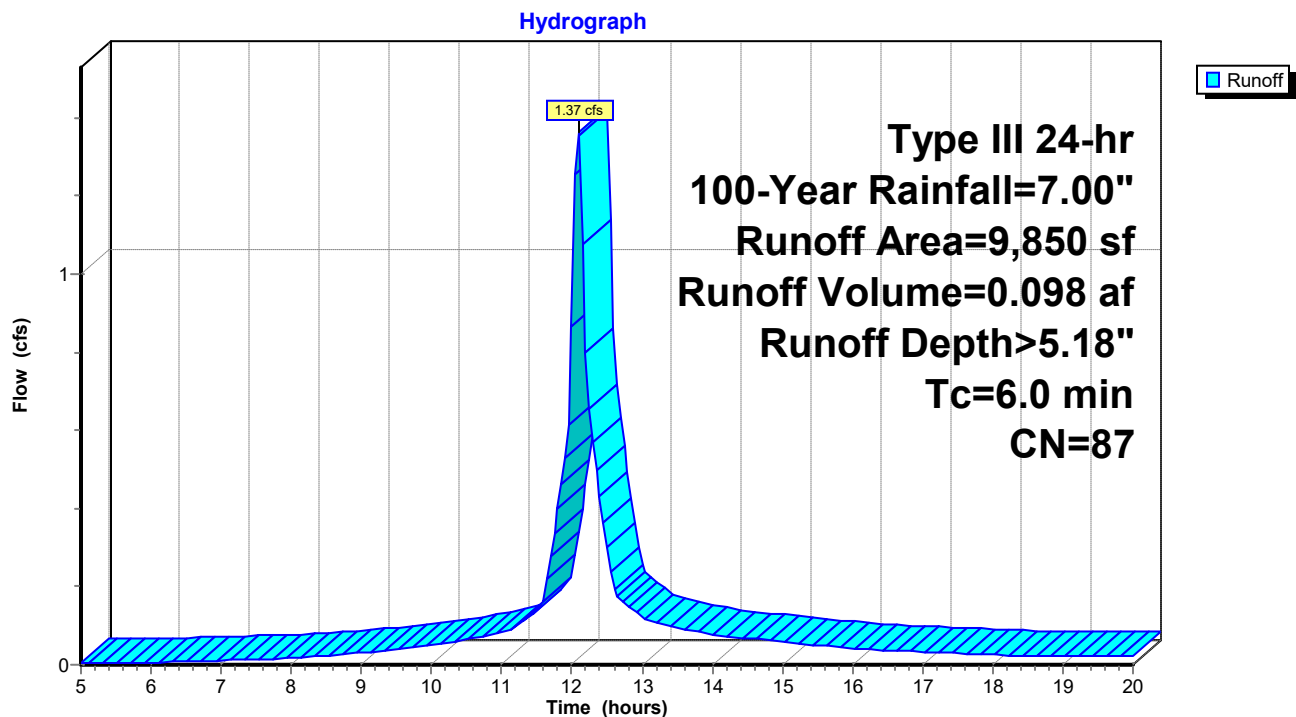
Summary for Subcatchment Pr-1B: Lower Parking

Runoff = 1.37 cfs @ 12.09 hrs, Volume= 0.098 af, Depth> 5.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.00"

Area (sf)	CN	Description
8,050	98	Paved parking, HSG A
1,800	39	>75% Grass cover, Good, HSG A
9,850	87	Weighted Average
1,800		18.27% Pervious Area
8,050		81.73% Impervious Area

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

Subcatchment Pr-1B: Lower Parking

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Prepared by {enter your company name here}

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Type III 24-hr 100-Year Rainfall=7.00"

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Summary for Reach Pr-Ex-Ppe: 10" Outlet Pipe

Inflow Area = 0.237 ac, 82.57% Impervious, Inflow Depth > 0.21" for 100-Year event
Inflow = 0.44 cfs @ 12.09 hrs, Volume= 0.004 af
Outflow = 0.40 cfs @ 12.10 hrs, Volume= 0.004 af, Atten= 8%, Lag= 0.7 min

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

Max. Velocity= 3.79 fps, Min. Travel Time= 0.5 min

Avg. Velocity = 0.55 fps, Avg. Travel Time= 3.4 min

Peak Storage= 13 cf @ 12.10 hrs

Average Depth at Peak Storage= 0.22'

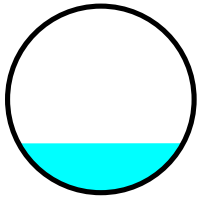
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 2.85 cfs

10.0" Round Pipe

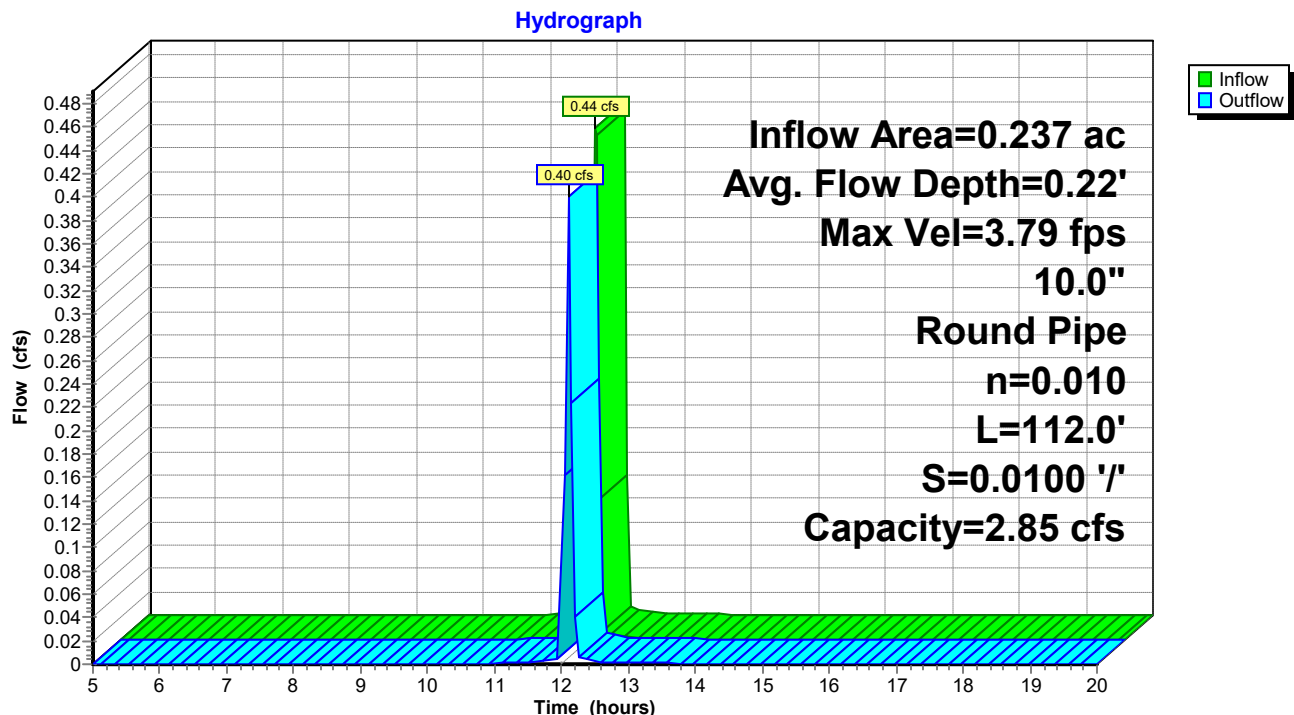
n= 0.010 PVC, smooth interior

Length= 112.0' Slope= 0.0100 '/'

Inlet Invert= 85.50', Outlet Invert= 84.38'



Reach Pr-Ex-Ppe: 10" Outlet Pipe



Summary for Pond Pr-DD1: Proposed Downstream Defender

Inflow Area = 0.237 ac, 82.57% Impervious, Inflow Depth > 5.23" for 100-Year event
 Inflow = 1.44 cfs @ 12.09 hrs, Volume= 0.103 af
 Outflow = 1.44 cfs @ 12.09 hrs, Volume= 0.103 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.44 cfs @ 12.09 hrs, Volume= 0.103 af

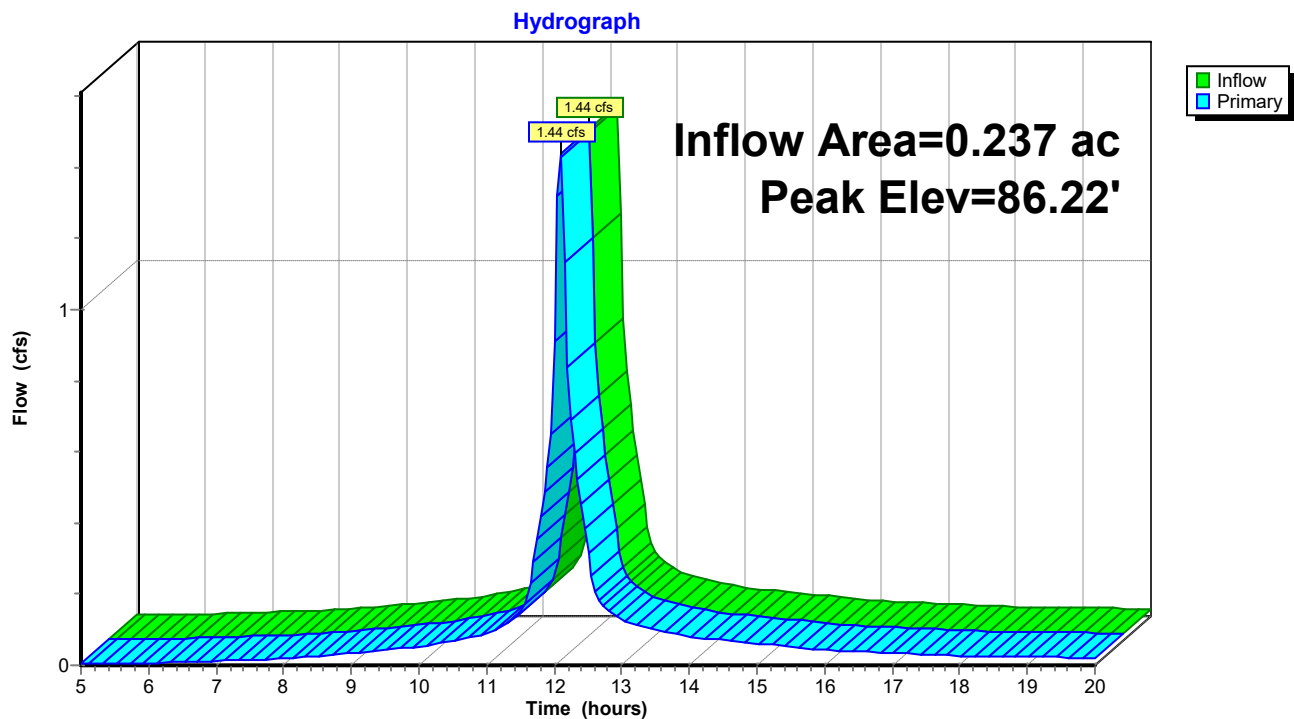
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 86.22' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	85.50'	10.0" Vert. Orifice/Grate C= 0.600
#2	Primary	89.00'	1.0" x 1.0" Horiz. Orifice/Grate X 8.00 columns X 8 rows C= 0.600 in 24.0" x 24.0" Grate (11% open area) Limited to weir flow at low heads

Primary OutFlow Max=1.40 cfs @ 12.09 hrs HW=86.20' (Free Discharge)

1=Orifice/Grate (Orifice Controls 1.40 cfs @ 2.86 fps)

2=Orifice/Grate (Controls 0.00 cfs)

Pond Pr-DD1: Proposed Downstream Defender

Summary for Pond Pr-Drywell: Drywell

Inflow Area = 0.237 ac, 82.57% Impervious, Inflow Depth > 5.23" for 100-Year event
 Inflow = 1.44 cfs @ 12.09 hrs, Volume= 0.103 af
 Outflow = 1.46 cfs @ 12.09 hrs, Volume= 0.103 af, Atten= 0%, Lag= 0.3 min
 Discarded = 1.02 cfs @ 12.05 hrs, Volume= 0.099 af
 Primary = 0.44 cfs @ 12.09 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 85.75' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 0.0 min (758.3 - 758.3)

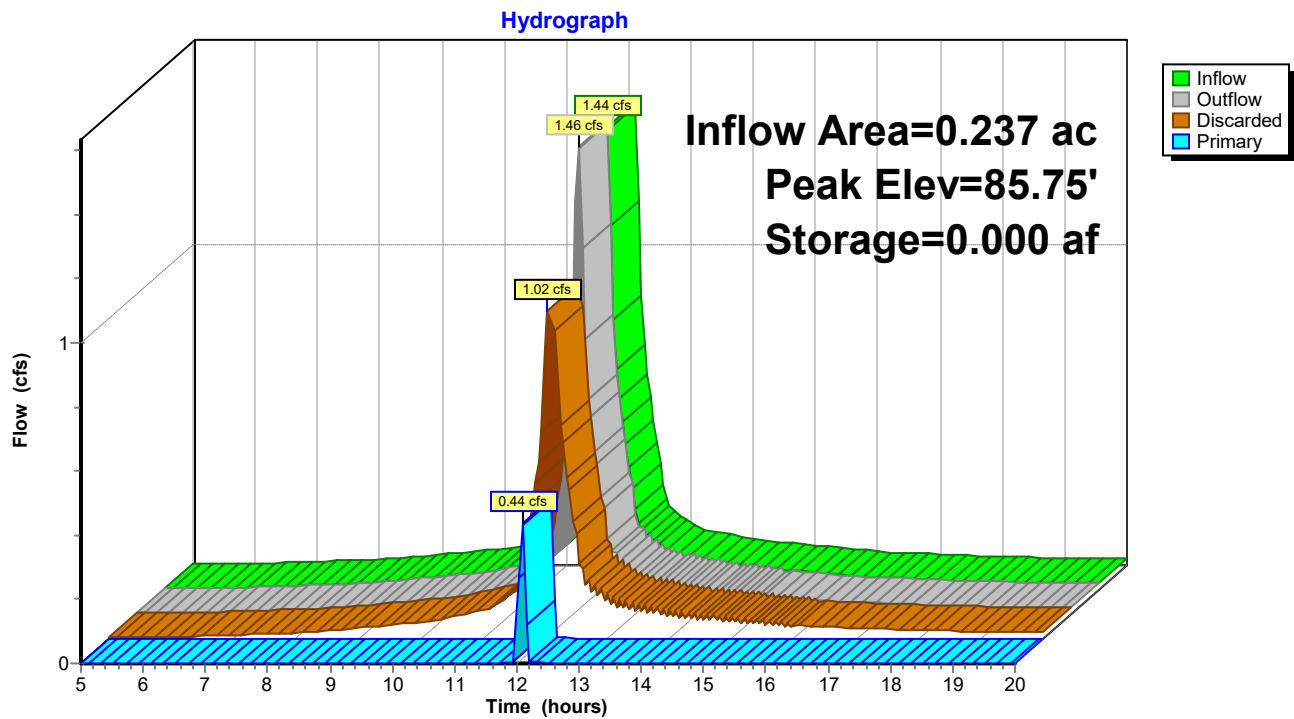
Volume	Invert	Avail.Storage	Storage Description
#1	85.40'	0.001 af	4.00'D x 4.00'H Vertical Cone/Cylinder Inside #2
#2	85.40'	0.000 af	5.00'D x 4.50'H Vertical Cone/Cylinder
			0.002 af Overall - 0.001 af Embedded = 0.001 af x 40.0% Voids
			0.002 af Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	85.40'	10.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	85.40'	1.02 cfs Exfiltration at all elevations

Discarded OutFlow Max=1.02 cfs @ 12.05 hrs HW=85.67' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 1.02 cfs)

Primary OutFlow Max=0.40 cfs @ 12.09 hrs HW=85.74' (Free Discharge)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.40 cfs @ 1.97 fps)

Pond Pr-Drywell: Drywell



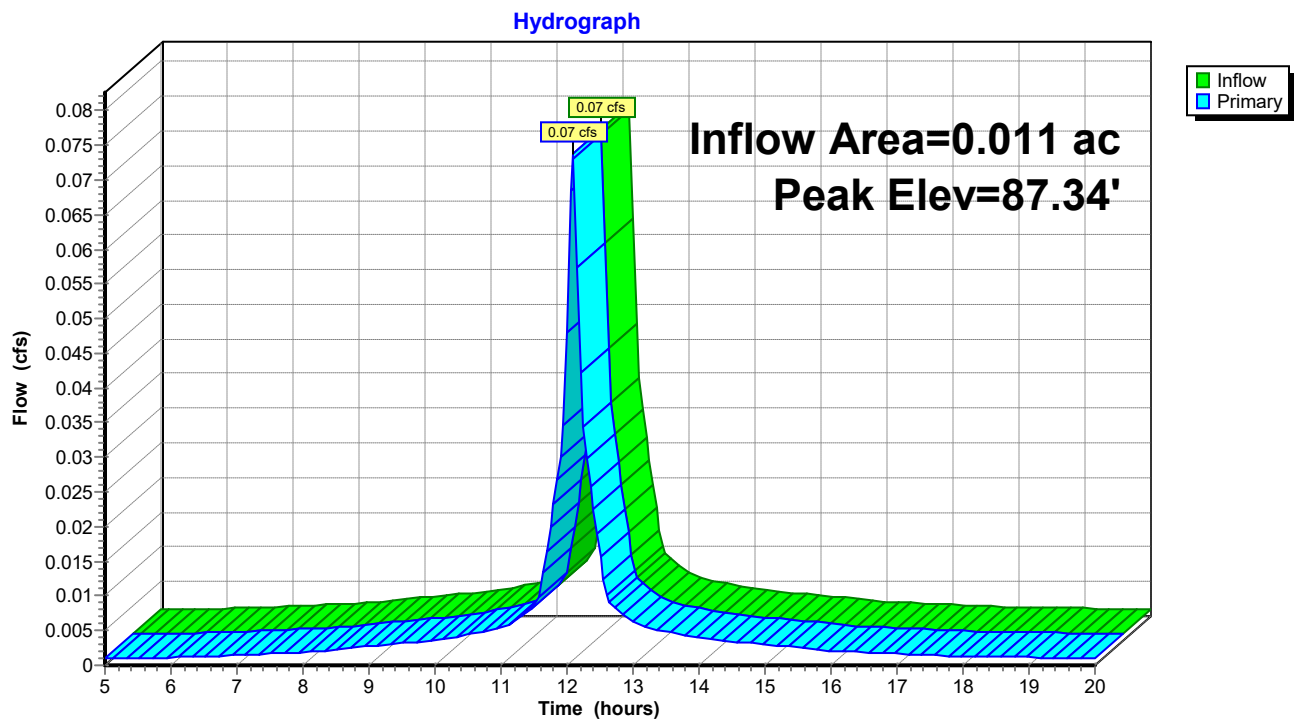
Summary for Pond Pr-Grate: Proposed Grate

Inflow Area = 0.011 ac, 100.00% Impervious, Inflow Depth > 6.24" for 100-Year event
 Inflow = 0.07 cfs @ 12.09 hrs, Volume= 0.006 af
 Outflow = 0.07 cfs @ 12.09 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.07 cfs @ 12.09 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 87.34' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.20'	10.0" Vert. Orifice/Grate C= 0.600
#2	Primary	88.70'	0.8" x 4.8" Horiz. Orifice/Grate X 34.00 columns X 2 rows C= 0.600 in 12.0" x 240.0" Grate (9% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.07 cfs @ 12.09 hrs HW=87.33' (Free Discharge)
 1=Orifice/Grate (Orifice Controls 0.07 cfs @ 1.25 fps)
 2=Orifice/Grate (Controls 0.00 cfs)

Pond Pr-Grate: Proposed Grate

APPENDIX B

Watershed Maps

APPENDIX C

Operation and Maintenance Plan

Post Construction

Operation and Maintenance Plan

Prepared for

“1471-1475 Braley Road Condominiums”

in

New Bedford, Massachusetts

InSite Engineering Services
1539 Fall River Avenue
Seekonk, MA 02771
P: 508-336-4500 F: 508-336-4558



Current Owner and Operator of Project:

Braley Road Condominium Home Owners Association
1471 Braley Road, New Bedford, MA

Future Owners and Operator of Project

Unless and until another party accepts responsibility, the Planning Board shall presume that the owner of the BMP is the landowner of the property on which the BMP is located, unless there is a legally binding agreement with another entity that accepts responsibility for the operation and maintenance. If an applicant envisions that the municipality may accept responsibility for the operation and maintenance of a stormwater BMP, the applicant shall notify the Planning Board and make available to the municipal official responsible for stormwater management the design and operation and maintenance plan for the BMP in order that the municipal official may have an opportunity to review and provide comments to the Planning Board within a reasonable period of time. It is recommended that the Planning Board solicit comments from the responsible municipal official.

To ensure compliance with Standard 9 of the Massachusetts Stormwater Handbook, the Order of Conditions should include the continuing conditions set forth below.

- (1) All stormwater BMP's shall be operated and maintained in accordance with the design plans and the Operation and Maintenance Plan approved by the issuing authority.
- (2) The responsible party shall:
 - (a) maintain an operation and maintenance log (rolling log in which the responsible party records all operation and maintenance activities for the past three years) for the last three years, including inspections, repairs, replacement and disposal (for disposal, the log shall indicate the type of material and the disposal location);
 - (b) make this log available to MassDEP and the Conservation Commission upon request; and
 - (c) allow members and agents of the Planning Board to enter and inspect the premises to evaluate and ensure that the responsibility party complies with the Operation and Maintenance Plan requirements for each BMP.

These same continuing conditions should be included in the Certificate of Compliance.

The Order of Conditions should also include a condition requiring the responsible party to submit an O & M Compliance statement when requesting a Certificate of Compliance. The O & M Compliance Statement shall identify the party responsible for implementation of the Operation and Maintenance Plan and state that:

- a. the site has been inspected for erosion and appropriate steps have been taken to permanently stabilize any eroded areas;
- b. all aspects of the stormwater BMP's have been inspected for damage, wear and malfunction, and appropriate steps have been taken to repair or replace the system or portions of the system so that the stormwater at the site may be managed in accordance with the Stormwater Management Standards;

- c. future responsible parties must be notified of their continuing legal responsibility to operate and maintain the structure; and
- d. the Operation and Maintenance Plan for the stormwater BMP's is being implemented.

In the event that the stormwater BMP's will be operated and maintained by an entity, municipality, state agency or person other than the sole owner of the lot upon which the stormwater management facilities are placed, the applicant shall provide a plan and easement deed that provides a right of access for the legal entity to be able to perform said operation and maintenance functions

Evidence of problems with stormwater BMP's may include without limitation sand plumes at outfalls, excessive sands in catch basins, oil sheens, stressed vegetation, accumulated litter, and/or failure of the BMP to drain after 72 hours.

BMP Maintenance

The Owner will be responsible for the operation and maintenance of the stormwater management system and all of its appurtenances. The following maintenance program shall be implemented:

A. Trench Drains

1. At a minimum, trench drains shall be cleaned four (4) times per year, preferably monthly for maximum efficiency.
2. All sediments shall be handled properly and disposed in compliance with local, state, and federal regulations.

B. Water Quality Inlet – Downstream Defender

1. At a minimum, Downstream Defender shall be inspected twice and cleaned once per year, or upon reaching the sediment depth for required servicing. (Semi-annual inspection during project construction is recommended.)
2. The depth of sediment shall be monitored as an indicator of required service. For the Downstream Defender, service shall be performed when the depth of sediment reaches 8-inches (based on 15% of unit's total storage).
3. All sediments and sludge shall be extracted through the riser pipe using a vacuum truck or manually. Extracted contents shall be handled properly and disposed of in compliance with local, state, and federal regulations.
4. Any accumulated oil shall be removed with a small pump and disposed of in a proper manner.

C. Drywell

1. Inspect facility for signs of wetness or damage to structures twice a year
2. Inspect to ensure proper functioning after every major storm during the first three months of operation and once a year thereafter.

Yard Wastes

All clippings and other waste from maintenance of individual yards and the drainage facilities shall not be disposed within the open space area or within the 100' wetland buffer.

Fertilizer

The use of high nitrate fertilizer is prohibited. Only low nitrate or organic fertilizers can be utilized for lawns and gardens at this site.

Inspections

The Owner shall keep a written record of inspection dates and findings, maintenance operations, and all repairs. An inspection/maintenance checklist shall be used in the specified inspections. Records of inspections and maintenance should be kept for at least three years, and available on reasonable notice for inspection by the Conservation Commission. A copy of all reports shall be sent to the Town Planning and Conservation Commission.

Illicit Discharges

No person shall cause or allow the discharge, emission, disposal, pouring, or pumping directly or indirectly to any stormwater conveyance, the waters of the State, or upon the land in manner and amount that the substance is likely to reach a stormwater conveyance or the waters of the State, any liquid, solid, gas, or other substance, other than stormwater; provided that non-stormwater discharges associated with the following activities are allowed and provided that they do not significantly impact water quality:

- Water line flushing
- Landscape irrigation
- Diverted stream flows
- Rising ground waters
- Uncontaminated ground water infiltration
- Uncontaminated pumped ground water
- Discharges from potable water sources
- Foundation drains
- Air conditioning condensation
- Irrigation water
- Springs
- Water from crawl space pumps
- Footing drains
- Lawn watering
- Individual residential car washing

Prohibited substances include but are not limited to: grease, oil, anti-freeze, chemicals, animal waste, paints, garbage, and litter.

Spills

In the event of oil or hazardous spills contact MassDEP 24hr response notification line at 888-304-1133 and the City of New Bedford.

Yearly Maintenance

Estimated yearly maintenance cost = \$500

Stormwater Construction Site Inspection Report

General Information			
Project Name	Braley Road Condominiums – New Bedford		
NPDES Tracking No.		Location	New Bedford, MA.
Date of Inspection		Start/End Time	
Inspector's Name(s)	InSite Engineering Services		
Inspector's Title(s)	Professional Engineer		
Inspector's Contact Information	1539 Fall River Ave Seekonk, MA 508-336-4500		
Inspector's Qualifications			
Describe present phase of construction			
Type of Inspection: ☐ Regular ☐ Pre-storm event ☐ During storm event ☐ Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? ☐ Yes ☐ No If yes, provide: Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? ☐ Clear ☐ Cloudy ☐ Rain ☐ Sleet ☐ Fog ☐ Snowing ☐ High Winds ☐ Other: Temperature:			
Have any discharges occurred since the last inspection? ☐ Yes ☐ No If yes, describe:			
Are there any discharges at the time of inspection? ☐ Yes ☐ No If yes, describe:			

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP	BMP Maintenance Required?	Corrective Action Needed and Notes
1	<i>Trench Drain</i>	☐ Yes ☐ No	
2	<i>Downstream Defender #1</i>	☐ Yes ☐ No	
3	<i>Downstream Defender #2</i>	☐ Yes ☐ No	
4	Drywell	☐ Yes ☐ No	
5		☐ Yes ☐ No	
6		☐ Yes ☐ No	
7		☐ Yes ☐ No	
8		☐ Yes ☐ No	

CERTIFICATION STATEMENT

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

Print name and title: _____

Signature: _____ **Date:** _____