ADDENDUM TO
STORMWATER MANAGEMENT REPORT

371 BOSTON STREET

TOPSFIELD, MASSACHUSETTS

October 23, 2019
Revised: July 29, 2021

SUBMITTED TO:

TOWN OF TOPSFIELD
TOPSFIELD PLANNING BOARD
8 WEST COMMON STREET
TOPSFIELD, MA 01983

APPLICANT:

MAUREEN & RANDY SABINO
447 BOSTON STREET, SUITE 4
TOPSFIELD, MA 01983

PREPARED BY:

THE MORIN-CAMERON GROUP, INC.
66 ELM STREET
DANVERS, MA 01923

Stormwater Management

The stormwater management design was reviewed by the Topsfield Stormwater Officer, Dave Bond, for compliance with local and state stormwater management standards. Mr. Bond requested that the design be re-evaluated to see if the post condition 25-year storm could be mitigated to maintain or reduce the existing conditions 25-year storm peak stormwater runoff rates. The design was re-evaluated and it was determined that modifications to the outlet control structure of the underground chamber system and modifications to the emergency spillway elevation and outlet control structure for the infiltration basin would reduce the post development 25-year storm peak runoff rate to match the existing conditions 25-year storm peak runoff rate.

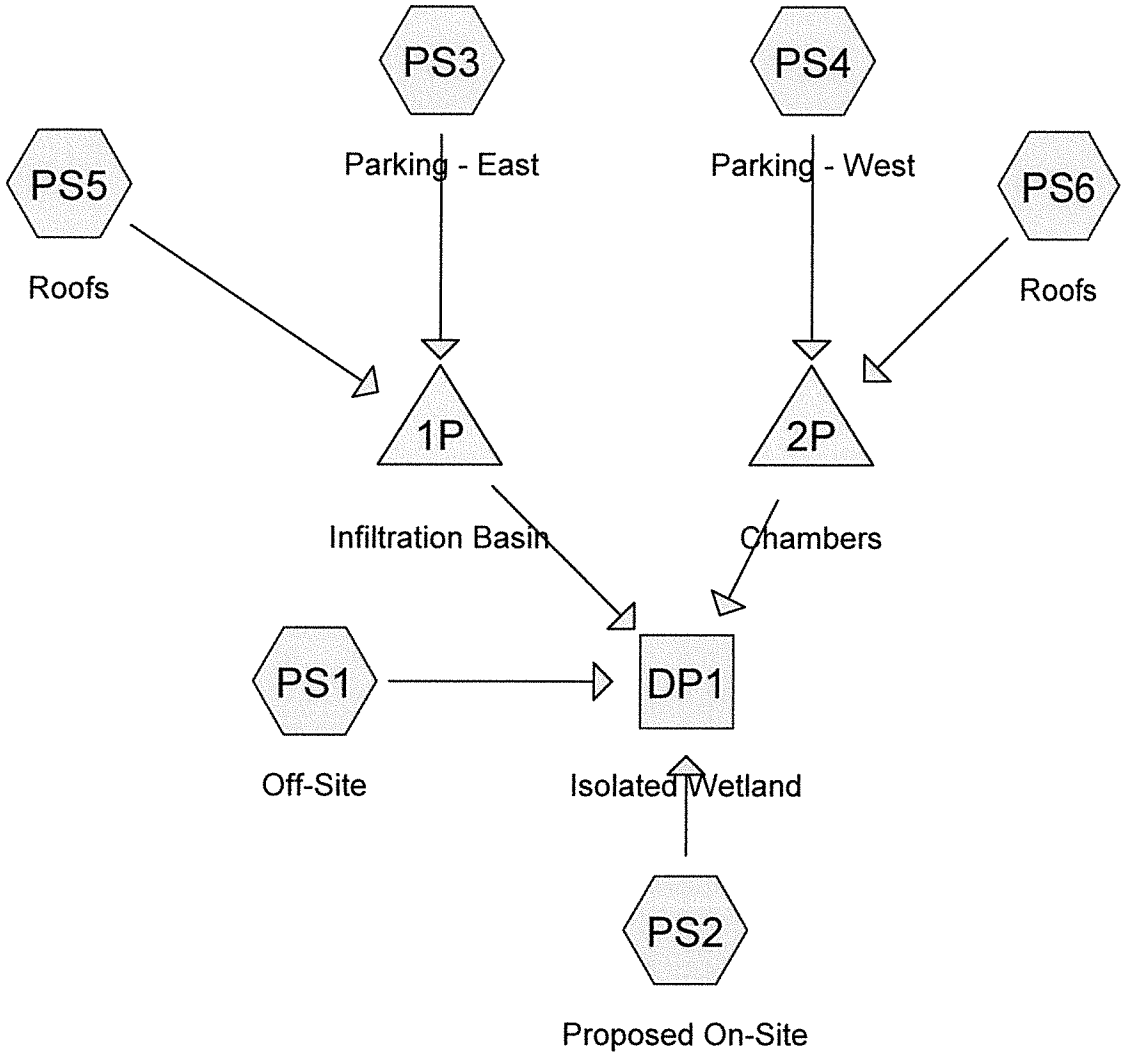
The following is a listing of the total pre-and post-development rates of stormwater runoff for the proposed development for the 2, 10, 25 and 100-year rainfall events:

Design Point	Storm Event (Years)	Existing Conditions (Peak CFS)	Proposed Conditions (Peak CFS)	Change in Peak (CFS)
DP-1	2	1.3	1.2	-0.1
	10	5.6	5.6	0
	25	10.3	10.3	0
	100	22.3	24.9	2.6

As shown in the tables above the proposed development will maintain or reduce peak flow rates and volumes to DP 1 for the 2, 10 and 25-year design storm events. In conclusion, the modified drainage system is in full compliance with the Town's Stormwater and Erosion Control Regulations and the MA DEP Stormwater Management Standards. The proposed development will have no adverse impacts on abutting properties or wetland resource areas.

Attachments:

Revised Appendix C: Proposed Conditions Hydrologic Analysis



Subcat Reach Pond Link

Routing Diagram for 2669 Proposed Conditions
Prepared by The Morin-Cameron Group, Inc.

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS1: Off-Site Runoff Area=296,709 sf 12.03% Impervious Runoff Depth=0.31"
Flow Length=1,000' Tc=9.9 min CN=WQ Runoff=1.1 cfs 7,570 cf

Subcatchment PS2: Proposed On-Site Runoff Area=30,016 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=WQ Runoff=0.0 cfs 1 cf

Subcatchment PS3: Parking - East Runoff Area=13,881 sf 66.54% Impervious Runoff Depth=1.97"
Tc=6.0 min CN=WQ Runoff=0.6 cfs 2,284 cf

Subcatchment PS4: Parking - West Runoff Area=10,629 sf 73.74% Impervious Runoff Depth=2.19"
Tc=6.0 min CN=WQ Runoff=0.5 cfs 1,938 cf

Subcatchment PS5: Roofs Runoff Area=3,889 sf 100.00% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=98 Runoff=0.3 cfs 962 cf

Subcatchment PS6: Roofs Runoff Area=2,252 sf 100.00% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=98 Runoff=0.1 cfs 557 cf

Reach DP1: Isolated Wetland Inflow=1.2 cfs 8,185 cf
Outflow=1.2 cfs 8,185 cf

Pond 1P: Infiltration Basin Peak Elev=46.85' Storage=937 cf Inflow=0.9 cfs 3,246 cf
Discarded=0.1 cfs 2,862 cf Primary=0.1 cfs 384 cf Outflow=0.1 cfs 3,246 cf

Pond 2P: Chambers Peak Elev=47.19' Storage=677 cf Inflow=0.7 cfs 2,495 cf
Discarded=0.1 cfs 2,265 cf Primary=0.0 cfs 230 cf Outflow=0.1 cfs 2,495 cf

Summary for Subcatchment PS1: Off-Site

Runoff = 1.1 cfs @ 12.19 hrs, Volume= 7,570 cf, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.20"

Area (sf)	CN	Description
86,417	54	1/2 acre lots, 25% imp, HSG A
56,305	70	1/2 acre lots, 25% imp, HSG B
54,759	30	Woods, Good, HSG A
99,228	55	Woods, Good, HSG B
296,709		Weighted Average
261,029		87.97% Pervious Area
35,681		12.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.1500	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
4.4	950	0.0500	3.60		**Shallow Concentrated Flow, Shallow Concentrated** Unpaved Kv= 16.1 fps
9.9	1,000	Total			

Summary for Subcatchment PS2: Proposed On-Site

Runoff = 0.0 cfs @ 24.02 hrs, Volume= 1 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
	7,650	30	Woods, Good, HSG A
*	22,366	39	>75% Grass cover, Good, HSG A
	30,016		Weighted Average
	30,016		100.00% Pervious Area

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

Summary for Subcatchment PS3: Parking - East

Runoff = 0.6 cfs @ 12.13 hrs, Volume= 2,284 cf, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.20"

Area (sf)	CN	Description
9,236	98	Paved parking, HSG A
4,645	39	>75% Grass cover, Good, HSG A
13,881		Weighted Average
4,645		33.46% Pervious Area
9,236		66.54% Impervious Area

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

Summary for Subcatchment PS4: Parking - West

Runoff = 0.5 cfs @ 12.13 hrs, Volume= 1,938 cf, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.20"

Area (sf)	CN	Description
7,838	98	Paved parking, HSG A
2,688	39	>75% Grass cover, Good, HSG A
103	30	Woods, Good, HSG A
10,629		Weighted Average
2,791		26.26% Pervious Area
7,838		73.74% Impervious Area

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

Summary for Subcatchment PS5: Roofs

Runoff = 0.3 cfs @ 12.13 hrs, Volume= 962 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	3,889	98	Roofs, HSG A
	3,889		100.00% Impervious Area

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

Summary for Subcatchment PS6: Roofs

Runoff = 0.1 cfs @ 12.13 hrs, Volume= 557 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	2,252	98	Roofs, HSG A
	2,252		100.00% Impervious Area

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

Summary for Reach DP1: Isolated Wetland

Inflow Area = 357,376 sf, 16.48% Impervious, Inflow Depth = 0.27" for 2-Year event
Inflow = 1.2 cfs @ 12.20 hrs, Volume= 8,185 cf
Outflow = 1.2 cfs @ 12.20 hrs, Volume= 8,185 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Infiltration Basin

Inflow Area = 17,770 sf, 73.86% Impervious, Inflow Depth = 2.19" for 2-Year event
Inflow = 0.9 cfs @ 12.13 hrs, Volume= 3,246 cf
Outflow = 0.1 cfs @ 12.57 hrs, Volume= 3,246 cf, Atten= 84%, Lag= 26.7 min
Discarded = 0.1 cfs @ 12.57 hrs, Volume= 2,862 cf
Primary = 0.1 cfs @ 12.57 hrs, Volume= 384 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 46.85' @ 12.57 hrs Surf.Area= 1,328 sf Storage= 937 cf

Plug-Flow detention time= 69.6 min calculated for 3,245 cf (100% of inflow)
Center-of-Mass det. time= 69.6 min (830.1 - 760.5)

Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	2,835 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.00	885	0	0	885
47.00	1,413	1,139	1,139	1,426
48.00	1,997	1,697	2,835	2,028

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	47.40'	**12.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Primary	46.00'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.00' / 45.50' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#4	Device 3	46.50'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 3	46.80'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 3	47.40'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.1 cfs @ 12.57 hrs HW=46.85' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.1 cfs @ 12.57 hrs HW=46.85' (Free Discharge)
├─**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)
└─**3=Culvert** (Passes 0.1 cfs of 1.8 cfs potential flow)
  ├─**4=Orifice/Grate** (Orifice Controls 0.1 cfs @ 2.50 fps)
  ├─**5=Orifice/Grate** (Orifice Controls 0.0 cfs @ 0.78 fps)
  └─**6=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 2P: Chambers

Inflow Area =	12,881 sf,	78.33% Impervious,	Inflow Depth =	2.32" for 2-Year event
Inflow =	0.7 cfs @	12.13 hrs, Volume=	2,495 cf	
Outflow =	0.1 cfs @	12.57 hrs, Volume=	2,495 cf,	Atten= 84%, Lag= 26.8 min
Discarded =	0.1 cfs @	12.57 hrs, Volume=	2,265 cf	
Primary =	0.0 cfs @	12.57 hrs, Volume=	230 cf	

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 47.19' @ 12.57 hrs Surf.Area= 868 sf Storage= 677 cf

Plug-Flow detention time= 62.5 min calculated for 2,495 cf (100% of inflow)
Center-of-Mass det. time= 62.5 min (822.9 - 760.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	46.00'	691 cf	**28.00'W x 31.00'L x 3.21'H Field A** 2,785 cf Overall - 1,056 cf Embedded = 1,728 cf x 40.0% Voids
#2A	46.50'	1,056 cf	**Cultec R-280HD** x 24 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 6 rows
		1,748 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	46.00'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.00' / 45.50' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	46.90'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	47.50'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	48.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 2	48.90'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.1 cfs @ 12.57 hrs HW=47.19' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 12.57 hrs HW=47.19' (Free Discharge)
└─**2=Culvert** (Passes 0.0 cfs of 2.5 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 2.19 fps)
  ├─**4=Orifice/Grate** (Controls 0.0 cfs)
  ├─**5=Orifice/Grate** (Controls 0.0 cfs)
  └─**6=Orifice/Grate** (Controls 0.0 cfs)

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS1: Off-Site Runoff Area=296,709 sf 12.03% Impervious Runoff Depth=0.93"
Flow Length=1,000' Tc=9.9 min CN=WQ Runoff=5.3 cfs 22,975 cf

Subcatchment PS2: Proposed On-Site Runoff Area=30,016 sf 0.00% Impervious Runoff Depth=0.13"
Tc=6.0 min CN=WQ Runoff=0.0 cfs 330 cf

Subcatchment PS3: Parking - East Runoff Area=13,881 sf 66.54% Impervious Runoff Depth=3.15"
Tc=6.0 min CN=WQ Runoff=0.9 cfs 3,642 cf

Subcatchment PS4: Parking - West Runoff Area=10,629 sf 73.74% Impervious Runoff Depth=3.47"
Tc=6.0 min CN=WQ Runoff=0.8 cfs 3,072 cf

Subcatchment PS5: Roofs Runoff Area=3,889 sf 100.00% Impervious Runoff Depth=4.64"
Tc=6.0 min CN=98 Runoff=0.4 cfs 1,505 cf

Subcatchment PS6: Roofs Runoff Area=2,252 sf 100.00% Impervious Runoff Depth=4.64"
Tc=6.0 min CN=98 Runoff=0.2 cfs 871 cf

Reach DP1: Isolated Wetland Inflow=5.6 cfs 25,527 cf
Outflow=5.6 cfs 25,527 cf

Pond 1P: Infiltration Basin Peak Elev=47.23' Storage=1,479 cf Inflow=1.3 cfs 5,147 cf
Discarded=0.1 cfs 3,838 cf Primary=0.2 cfs 1,309 cf Outflow=0.3 cfs 5,147 cf

Pond 2P: Chambers Peak Elev=47.78' Storage=1,082 cf Inflow=1.0 cfs 3,944 cf
Discarded=0.1 cfs 3,031 cf Primary=0.2 cfs 913 cf Outflow=0.2 cfs 3,944 cf

Summary for Subcatchment PS1: Off-Site

Runoff = 5.3 cfs @ 12.18 hrs, Volume= 22,975 cf, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.88"

Area (sf)	CN	Description
86,417	54	1/2 acre lots, 25% imp, HSG A
56,305	70	1/2 acre lots, 25% imp, HSG B
54,759	30	Woods, Good, HSG A
99,228	55	Woods, Good, HSG B
296,709		Weighted Average
261,029		87.97% Pervious Area
35,681		12.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.1500	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
4.4	950	0.0500	3.60		**Shallow Concentrated Flow, Shallow Concentrated** Unpaved Kv= 16.1 fps
9.9	1,000	Total			

Summary for Subcatchment PS2: Proposed On-Site

Runoff = 0.0 cfs @ 13.34 hrs, Volume= 330 cf, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.88"

	Area (sf)	CN	Description
	7,650	30	Woods, Good, HSG A
*	22,366	39	>75% Grass cover, Good, HSG A
	30,016		Weighted Average
	30,016		100.00% Pervious Area

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

Summary for Subcatchment PS3: Parking - East

Runoff = 0.9 cfs @ 12.13 hrs, Volume= 3,642 cf, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.88"

Area (sf)	CN	Description
9,236	98	Paved parking, HSG A
4,645	39	>75% Grass cover, Good, HSG A
13,881		Weighted Average
4,645		33.46% Pervious Area
9,236		66.54% Impervious Area

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

Summary for Subcatchment PS4: Parking - West

Runoff = 0.8 cfs @ 12.13 hrs, Volume= 3,072 cf, Depth= 3.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.88"

Area (sf)	CN	Description
7,838	98	Paved parking, HSG A
2,688	39	>75% Grass cover, Good, HSG A
103	30	Woods, Good, HSG A
10,629		Weighted Average
2,791		26.26% Pervious Area
7,838		73.74% Impervious Area

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

Summary for Subcatchment PS5: Roofs

Runoff = 0.4 cfs @ 12.13 hrs, Volume= 1,505 cf, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.88"

	Area (sf)	CN	Description
*	3,889	98	Roofs, HSG A
	3,889		100.00% Impervious Area

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

Summary for Subcatchment PS6: Roofs

Runoff = 0.2 cfs @ 12.13 hrs, Volume= 871 cf, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.88"

	Area (sf)	CN	Description
*	2,252	98	Roofs, HSG A
	2,252		100.00% Impervious Area

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

Summary for Reach DP1: Isolated Wetland

Inflow Area = 357,376 sf, 16.48% Impervious, Inflow Depth = 0.86" for 10-Year event
Inflow = 5.6 cfs @ 12.18 hrs, Volume= 25,527 cf
Outflow = 5.6 cfs @ 12.18 hrs, Volume= 25,527 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Infiltration Basin

Inflow Area = 17,770 sf, 73.86% Impervious, Inflow Depth = 3.48" for 10-Year event
Inflow = 1.3 cfs @ 12.13 hrs, Volume= 5,147 cf
Outflow = 0.3 cfs @ 12.38 hrs, Volume= 5,147 cf, Atten= 77%, Lag= 15.1 min
Discarded = 0.1 cfs @ 12.38 hrs, Volume= 3,838 cf
Primary = 0.2 cfs @ 12.38 hrs, Volume= 1,309 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 47.23' @ 12.38 hrs Surf.Area= 1,539 sf Storage= 1,479 cf

Plug-Flow detention time= 73.0 min calculated for 5,146 cf (100% of inflow)
Center-of-Mass det. time= 73.0 min (828.4 - 755.4)

Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	2,835 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.00	885	0	0	885
47.00	1,413	1,139	1,139	1,426
48.00	1,997	1,697	2,835	2,028

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	47.40'	**12.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Primary	46.00'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.00' / 45.50' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#4	Device 3	46.50'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 3	46.80'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 3	47.40'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.1 cfs @ 12.38 hrs HW=47.23' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.2 cfs @ 12.38 hrs HW=47.23' (Free Discharge)
├**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)
└**3=Culvert** (Passes 0.2 cfs of 2.6 cfs potential flow)
  ├**4=Orifice/Grate** (Orifice Controls 0.1 cfs @ 3.87 fps)
  ├**5=Orifice/Grate** (Orifice Controls 0.1 cfs @ 2.66 fps)
  └**6=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 2P: Chambers

Inflow Area =	12,881 sf,	78.33% Impervious,	Inflow Depth =	3.67" for 10-Year event
Inflow =	1.0 cfs @	12.13 hrs, Volume=	3,944 cf	
Outflow =	0.2 cfs @	12.37 hrs, Volume=	3,944 cf,	Atten= 76%, Lag= 14.2 min
Discarded =	0.1 cfs @	12.37 hrs, Volume=	3,031 cf	
Primary =	0.2 cfs @	12.37 hrs, Volume=	913 cf	

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 47.78' @ 12.37 hrs Surf.Area= 868 sf Storage= 1,082 cf

Plug-Flow detention time= 68.4 min calculated for 3,943 cf (100% of inflow)
Center-of-Mass det. time= 68.3 min (822.6 - 754.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	46.00'	691 cf	**28.00'W x 31.00'L x 3.21'H Field A** 2,785 cf Overall - 1,056 cf Embedded = 1,728 cf x 40.0% Voids
#2A	46.50'	1,056 cf	**Cultec R-280HD** x 24 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 6 rows
		1,748 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	46.00'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.00' / 45.50' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	46.90'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	47.50'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	48.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 2	48.90'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.1 cfs @ 12.37 hrs HW=47.78' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.2 cfs @ 12.37 hrs HW=47.78' (Free Discharge)
└─**2=Culvert** (Passes 0.2 cfs of 3.4 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.1 cfs @ 4.30 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 0.1 cfs @ 1.91 fps)
  ├─**5=Orifice/Grate** (Controls 0.0 cfs)
  └─**6=Orifice/Grate** (Controls 0.0 cfs)

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS1: Off-Site Runoff Area=296,709 sf 12.03% Impervious Runoff Depth=1.58"
Flow Length=1,000' Tc=9.9 min CN=WQ Runoff=9.7 cfs 39,174 cf

Subcatchment PS2: Proposed On-Site Runoff Area=30,016 sf 0.00% Impervious Runoff Depth=0.40"
Tc=6.0 min CN=WQ Runoff=0.1 cfs 1,006 cf

Subcatchment PS3: Parking - East Runoff Area=13,881 sf 66.54% Impervious Runoff Depth=4.14"
Tc=6.0 min CN=WQ Runoff=1.2 cfs 4,793 cf

Subcatchment PS4: Parking - West Runoff Area=10,629 sf 73.74% Impervious Runoff Depth=4.53"
Tc=6.0 min CN=WQ Runoff=1.0 cfs 4,015 cf

Subcatchment PS5: Roofs Runoff Area=3,889 sf 100.00% Impervious Runoff Depth=5.97"
Tc=6.0 min CN=98 Runoff=0.5 cfs 1,935 cf

Subcatchment PS6: Roofs Runoff Area=2,252 sf 100.00% Impervious Runoff Depth=5.97"
Tc=6.0 min CN=98 Runoff=0.3 cfs 1,121 cf

Reach DP1: Isolated Wetland Inflow=10.3 cfs 44,035 cf
Outflow=10.3 cfs 44,035 cf

Pond 1P: Infiltration Basin Peak Elev=47.45' Storage=1,826 cf Inflow=1.7 cfs 6,728 cf
Discarded=0.1 cfs 4,488 cf Primary=0.7 cfs 2,240 cf Outflow=0.8 cfs 6,728 cf

Pond 2P: Chambers Peak Elev=48.25' Storage=1,365 cf Inflow=1.3 cfs 5,136 cf
Discarded=0.1 cfs 3,520 cf Primary=0.4 cfs 1,616 cf Outflow=0.5 cfs 5,136 cf

Summary for Subcatchment PS1: Off-Site

Runoff = 9.7 cfs @ 12.18 hrs, Volume= 39,174 cf, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=6.21"

Area (sf)	CN	Description
86,417	54	1/2 acre lots, 25% imp, HSG A
56,305	70	1/2 acre lots, 25% imp, HSG B
54,759	30	Woods, Good, HSG A
99,228	55	Woods, Good, HSG B
296,709		Weighted Average
261,029		87.97% Pervious Area
35,681		12.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.1500	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
4.4	950	0.0500	3.60		**Shallow Concentrated Flow, Shallow Concentrated** Unpaved Kv= 16.1 fps
9.9	1,000	Total			

Summary for Subcatchment PS2: Proposed On-Site

Runoff = 0.1 cfs @ 12.17 hrs, Volume= 1,006 cf, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=6.21"

	Area (sf)	CN	Description
	7,650	30	Woods, Good, HSG A
*	22,366	39	>75% Grass cover, Good, HSG A
	30,016		Weighted Average
	30,016		100.00% Pervious Area

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

Summary for Subcatchment PS3: Parking - East

Runoff = 1.2 cfs @ 12.13 hrs, Volume= 4,793 cf, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=6.21"

Area (sf)	CN	Description
9,236	98	Paved parking, HSG A
4,645	39	>75% Grass cover, Good, HSG A
13,881		Weighted Average
4,645		33.46% Pervious Area
9,236		66.54% Impervious Area

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

Summary for Subcatchment PS4: Parking - West

Runoff = 1.0 cfs @ 12.13 hrs, Volume= 4,015 cf, Depth= 4.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=6.21"

Area (sf)	CN	Description
7,838	98	Paved parking, HSG A
2,688	39	>75% Grass cover, Good, HSG A
103	30	Woods, Good, HSG A
10,629		Weighted Average
2,791		26.26% Pervious Area
7,838		73.74% Impervious Area

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

Summary for Subcatchment PS5: Roofs

Runoff = 0.5 cfs @ 12.13 hrs, Volume= 1,935 cf, Depth= 5.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=6.21"

	Area (sf)	CN	Description
*	3,889	98	Roofs, HSG A
	3,889		100.00% Impervious Area

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

Summary for Subcatchment PS6: Roofs

Runoff = 0.3 cfs @ 12.13 hrs, Volume= 1,121 cf, Depth= 5.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=6.21"

	Area (sf)	CN	Description
*	2,252	98	Roofs, HSG A
	2,252		100.00% Impervious Area

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

Summary for Reach DP1: Isolated Wetland

Inflow Area = 357,376 sf, 16.48% Impervious, Inflow Depth = 1.48" for 25-Year event
Inflow = 10.3 cfs @ 12.19 hrs, Volume= 44,035 cf
Outflow = 10.3 cfs @ 12.19 hrs, Volume= 44,035 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Infiltration Basin

Inflow Area = 17,770 sf, 73.86% Impervious, Inflow Depth = 4.54" for 25-Year event
Inflow = 1.7 cfs @ 12.13 hrs, Volume= 6,728 cf
Outflow = 0.8 cfs @ 12.24 hrs, Volume= 6,728 cf, Atten= 55%, Lag= 6.6 min
Discarded = 0.1 cfs @ 12.24 hrs, Volume= 4,488 cf
Primary = 0.7 cfs @ 12.24 hrs, Volume= 2,240 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 47.45' @ 12.24 hrs Surf.Area= 1,662 sf Storage= 1,826 cf

Plug-Flow detention time= 75.6 min calculated for 6,726 cf (100% of inflow)
Center-of-Mass det. time= 75.5 min (829.6 - 754.1)

Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	2,835 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.00	885	0	0	885
47.00	1,413	1,139	1,139	1,426
48.00	1,997	1,697	2,835	2,028

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	47.40'	**12.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Primary	46.00'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.00' / 45.50' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#4	Device 3	46.50'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 3	46.80'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 3	47.40'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.1 cfs @ 12.24 hrs HW=47.45' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.7 cfs @ 12.24 hrs HW=47.45' (Free Discharge)
├─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.3 cfs @ 0.53 fps)
└─**3=Culvert** (Passes 0.4 cfs of 2.9 cfs potential flow)
  ├─**4=Orifice/Grate** (Orifice Controls 0.1 cfs @ 4.48 fps)
  ├─**5=Orifice/Grate** (Orifice Controls 0.2 cfs @ 3.48 fps)
  └─**6=Orifice/Grate** (Weir Controls 0.1 cfs @ 0.71 fps)

Summary for Pond 2P: Chambers

Inflow Area =	12,881 sf,	78.33% Impervious,	Inflow Depth = 4.78"	for 25-Year event
Inflow =	1.3 cfs @	12.13 hrs, Volume=	5,136 cf	
Outflow =	0.5 cfs @	12.28 hrs, Volume=	5,136 cf, Atten= 66%, Lag= 9.3 min	
Discarded =	0.1 cfs @	12.28 hrs, Volume=	3,520 cf	
Primary =	0.4 cfs @	12.28 hrs, Volume=	1,616 cf	

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 48.25' @ 12.28 hrs Surf.Area= 868 sf Storage= 1,365 cf

Plug-Flow detention time= 68.6 min calculated for 5,135 cf (100% of inflow)
Center-of-Mass det. time= 68.6 min (820.9 - 752.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	46.00'	691 cf	**28.00'W x 31.00'L x 3.21'H Field A** 2,785 cf Overall - 1,056 cf Embedded = 1,728 cf x 40.0% Voids
#2A	46.50'	1,056 cf	**Cultec R-280HD** x 24 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 6 rows
		1,748 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	46.00'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.00' / 45.50' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	46.90'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	47.50'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	48.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 2	48.90'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.1 cfs @ 12.28 hrs HW=48.25' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.4 cfs @ 12.28 hrs HW=48.25' (Free Discharge)
└─**2=Culvert** (Passes 0.4 cfs of 3.9 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.1 cfs @ 5.41 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 0.2 cfs @ 3.79 fps)
  ├─**5=Orifice/Grate** (Orifice Controls 0.1 cfs @ 1.69 fps)
  └─**6=Orifice/Grate** (Controls 0.0 cfs)

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS1: Off-Site Runoff Area=296,709 sf 12.03% Impervious Runoff Depth=3.26"
Flow Length=1,000' Tc=9.9 min CN=WQ Runoff=20.4 cfs 80,717 cf

Subcatchment PS2: Proposed On-Site Runoff Area=30,016 sf 0.00% Impervious Runoff Depth=1.35"
Tc=6.0 min CN=WQ Runoff=0.8 cfs 3,388 cf

Subcatchment PS3: Parking - East Runoff Area=13,881 sf 66.54% Impervious Runoff Depth=6.34"
Tc=6.0 min CN=WQ Runoff=1.9 cfs 7,334 cf

Subcatchment PS4: Parking - West Runoff Area=10,629 sf 73.74% Impervious Runoff Depth=6.85"
Tc=6.0 min CN=WQ Runoff=1.6 cfs 6,064 cf

Subcatchment PS5: Roofs Runoff Area=3,889 sf 100.00% Impervious Runoff Depth=8.73"
Tc=6.0 min CN=98 Runoff=0.7 cfs 2,829 cf

Subcatchment PS6: Roofs Runoff Area=2,252 sf 100.00% Impervious Runoff Depth=8.73"
Tc=6.0 min CN=98 Runoff=0.4 cfs 1,638 cf

Reach DP1: Isolated Wetland Inflow=24.9 cfs 92,143 cf
Outflow=24.9 cfs 92,143 cf

Pond 1P: Infiltration Basin Peak Elev=47.54' Storage=1,985 cf Inflow=2.6 cfs 10,163 cf
Discarded=0.1 cfs 5,505 cf Primary=2.4 cfs 4,658 cf Outflow=2.5 cfs 10,163 cf

Pond 2P: Chambers Peak Elev=49.11' Storage=1,714 cf Inflow=2.0 cfs 7,702 cf
Discarded=0.1 cfs 4,322 cf Primary=1.7 cfs 3,380 cf Outflow=1.7 cfs 7,702 cf

Summary for Subcatchment PS1: Off-Site

Runoff = 20.4 cfs @ 12.18 hrs, Volume= 80,717 cf, Depth= 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.97"

Area (sf)	CN	Description
86,417	54	1/2 acre lots, 25% imp, HSG A
56,305	70	1/2 acre lots, 25% imp, HSG B
54,759	30	Woods, Good, HSG A
99,228	55	Woods, Good, HSG B
296,709		Weighted Average
261,029		87.97% Pervious Area
35,681		12.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.1500	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
4.4	950	0.0500	3.60		**Shallow Concentrated Flow, Shallow Concentrated** Unpaved Kv= 16.1 fps
9.9	1,000	Total			

Summary for Subcatchment PS2: Proposed On-Site

Runoff = 0.8 cfs @ 12.14 hrs, Volume= 3,388 cf, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.97"

	Area (sf)	CN	Description
	7,650	30	Woods, Good, HSG A
*	22,366	39	>75% Grass cover, Good, HSG A
	30,016		Weighted Average
	30,016		100.00% Pervious Area

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

Summary for Subcatchment PS3: Parking - East

Runoff = 1.9 cfs @ 12.13 hrs, Volume= 7,334 cf, Depth= 6.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.97"

Area (sf)	CN	Description
9,236	98	Paved parking, HSG A
4,645	39	>75% Grass cover, Good, HSG A
13,881		Weighted Average
4,645		33.46% Pervious Area
9,236		66.54% Impervious Area

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

Summary for Subcatchment PS4: Parking - West

Runoff = 1.6 cfs @ 12.13 hrs, Volume= 6,064 cf, Depth= 6.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.97"

Area (sf)	CN	Description
7,838	98	Paved parking, HSG A
2,688	39	>75% Grass cover, Good, HSG A
103	30	Woods, Good, HSG A
10,629		Weighted Average
2,791		26.26% Pervious Area
7,838		73.74% Impervious Area

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

Summary for Subcatchment PS5: Roofs

Runoff = 0.7 cfs @ 12.13 hrs, Volume= 2,829 cf, Depth= 8.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.97"

	Area (sf)	CN	Description
*	3,889	98	Roofs, HSG A
	3,889		100.00% Impervious Area

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

Summary for Subcatchment PS6: Roofs

Runoff = 0.4 cfs @ 12.13 hrs, Volume= 1,638 cf, Depth= 8.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.97"

	Area (sf)	CN	Description
*	2,252	98	Roofs, HSG A
	2,252		100.00% Impervious Area

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

Summary for Reach DP1: Isolated Wetland

Inflow Area = 357,376 sf, 16.48% Impervious, Inflow Depth = 3.09" for 100-Year event
Inflow = 24.9 cfs @ 12.17 hrs, Volume= 92,143 cf
Outflow = 24.9 cfs @ 12.17 hrs, Volume= 92,143 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Infiltration Basin

Inflow Area = 17,770 sf, 73.86% Impervious, Inflow Depth = 6.86" for 100-Year event
Inflow = 2.6 cfs @ 12.13 hrs, Volume= 10,163 cf
Outflow = 2.5 cfs @ 12.15 hrs, Volume= 10,163 cf, Atten= 4%, Lag= 1.2 min
Discarded = 0.1 cfs @ 12.15 hrs, Volume= 5,505 cf
Primary = 2.4 cfs @ 12.15 hrs, Volume= 4,658 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 47.54' @ 12.15 hrs Surf.Area= 1,717 sf Storage= 1,985 cf

Plug-Flow detention time= 74.1 min calculated for 10,161 cf (100% of inflow)
Center-of-Mass det. time= 74.1 min (827.3 - 753.2)

Volume	Invert	Avail.Storage	Storage Description
#1	46.00'	2,835 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.00	885	0	0	885
47.00	1,413	1,139	1,139	1,426
48.00	1,997	1,697	2,835	2,028

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	47.40'	**12.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#3	Primary	46.00'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.00' / 45.50' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#4	Device 3	46.50'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 3	46.80'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 3	47.40'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.1 cfs @ 12.15 hrs HW=47.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=2.4 cfs @ 12.15 hrs HW=47.54' (Free Discharge)
├**2=Broad-Crested Rectangular Weir** (Weir Controls 1.6 cfs @ 0.92 fps)
└**3=Culvert** (Passes 0.8 cfs of 3.0 cfs potential flow)
  ├**4=Orifice/Grate** (Orifice Controls 0.1 cfs @ 4.71 fps)
  ├**5=Orifice/Grate** (Orifice Controls 0.2 cfs @ 3.78 fps)
  └**6=Orifice/Grate** (Weir Controls 0.5 cfs @ 1.23 fps)

Summary for Pond 2P: Chambers

Inflow Area =	12,881 sf,	78.33% Impervious,	Inflow Depth = 7.18"	for 100-Year event
Inflow =	2.0 cfs @	12.13 hrs, Volume=	7,702 cf	
Outflow =	1.7 cfs @	12.16 hrs, Volume=	7,702 cf, Atten= 12%, Lag= 2.0 min	
Discarded =	0.1 cfs @	12.16 hrs, Volume=	4,322 cf	
Primary =	1.7 cfs @	12.16 hrs, Volume=	3,380 cf	

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 49.11' @ 12.16 hrs Surf.Area= 868 sf Storage= 1,714 cf

Plug-Flow detention time= 69.8 min calculated for 7,700 cf (100% of inflow)
Center-of-Mass det. time= 69.8 min (820.3 - 750.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	46.00'	691 cf	**28.00'W x 31.00'L x 3.21'H Field A** 2,785 cf Overall - 1,056 cf Embedded = 1,728 cf x 40.0% Voids
#2A	46.50'	1,056 cf	**Cultec R-280HD** x 24 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 6 rows
		1,748 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	46.00'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	46.00'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.00' / 45.50' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	46.90'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	47.50'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	48.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 2	48.90'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.1 cfs @ 12.16 hrs HW=49.11' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=1.7 cfs @ 12.16 hrs HW=49.11' (Free Discharge)
└─**2=Culvert** (Passes 1.7 cfs of 4.8 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.2 cfs @ 7.02 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 0.3 cfs @ 5.87 fps)
  ├─**5=Orifice/Grate** (Orifice Controls 0.2 cfs @ 4.78 fps)
  └─**6=Orifice/Grate** (Weir Controls 1.0 cfs @ 1.50 fps)