

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPR2: Overland Flow Northeast Runoff Area=2,975 sf 0.00% Impervious Runoff Depth>0.77"
 Tc=5.0 min CN=39 Runoff=0.03 cfs 190 cf

SubcatchmentPR20: Offsite Flow to Runoff Area=259,227 sf 38.00% Impervious Runoff Depth>2.70"
 Flow Length=329' Slope=0.0638 '/' Tc=6.0 min CN=61 Runoff=18.40 cfs 58,286 cf

SubcatchmentPRA1: Runoff Area=8,133 sf 64.42% Impervious Runoff Depth>4.36"
 Tc=5.0 min CN=77 Runoff=0.99 cfs 2,956 cf

SubcatchmentPRA3: Runoff Area=5,679 sf 64.80% Impervious Runoff Depth>4.36"
 Tc=5.0 min CN=77 Runoff=0.69 cfs 2,064 cf

SubcatchmentPRB2: Runoff Area=8,768 sf 86.58% Impervious Runoff Depth>5.82"
 Tc=5.0 min CN=90 Runoff=1.34 cfs 4,252 cf

SubcatchmentPRC10: Offsite Flow to Runoff Area=141,885 sf 38.00% Impervious Runoff Depth>2.70"
 Flow Length=454' Slope=0.0462 '/' Tc=6.0 min CN=61 Runoff=10.07 cfs 31,902 cf

SubcatchmentPRD1: Runoff Area=12,642 sf 72.20% Impervious Runoff Depth>4.91"
 Tc=5.0 min CN=82 Runoff=1.71 cfs 5,175 cf

SubcatchmentPRD10: Offsite Flow to Runoff Area=36,850 sf 38.00% Impervious Runoff Depth>2.70"
 Flow Length=100' Slope=0.0300 '/' Tc=6.0 min CN=61 Runoff=2.62 cfs 8,286 cf

SubcatchmentPRD2: Runoff Area=6,009 sf 67.27% Impervious Runoff Depth>4.58"
 Tc=5.0 min CN=79 Runoff=0.76 cfs 2,294 cf

SubcatchmentPRD20: Offsite Flow to Runoff Area=5,490 sf 38.00% Impervious Runoff Depth>2.70"
 Flow Length=100' Slope=0.0300 '/' Tc=6.0 min CN=61 Runoff=0.39 cfs 1,234 cf

SubcatchmentPRE1: Runoff Area=1,173 sf 35.38% Impervious Runoff Depth>2.60"
 Tc=5.0 min CN=60 Runoff=0.08 cfs 254 cf

SubcatchmentPRF1: Buidling 1 Runoff Area=18,632 sf 100.00% Impervious Runoff Depth>6.76"
 Tc=5.0 min CN=98 Runoff=3.04 cfs 10,491 cf

SubcatchmentPRF2: Building 2 Runoff Area=3,040 sf 100.00% Impervious Runoff Depth>6.76"
 Tc=5.0 min CN=98 Runoff=0.50 cfs 1,712 cf

SubcatchmentPRF3: Building 3 Runoff Area=3,040 sf 100.00% Impervious Runoff Depth>6.76"
 Tc=5.0 min CN=98 Runoff=0.50 cfs 1,712 cf

Reach DP1: Municipal System Inflow=7.03 cfs 63,712 cf
 Outflow=7.03 cfs 63,712 cf

Reach DP2: Abutting Properties Inflow=0.00 cfs 0 cf
 Outflow=0.00 cfs 0 cf

Pond 1P: DMH C6	Peak Elev=23.80' Inflow=7.03 cfs 63,712 cf 12.0" Round Culvert n=0.012 L=112.0' S=0.0009 '/' Outflow=7.03 cfs 63,712 cf
Pond BR1: Blue Roof	Peak Elev=77.35' Storage=6,236 cf Inflow=3.04 cfs 10,491 cf Outflow=0.22 cfs 8,032 cf
Pond CBA1: CBA1	Peak Elev=18.91' Storage=59 cf Inflow=0.99 cfs 2,956 cf 12.0" Round Culvert n=0.012 L=114.0' S=0.0030 '/' Outflow=0.99 cfs 2,905 cf
Pond CBA3: CBA3	Peak Elev=18.83' Storage=61 cf Inflow=1.68 cfs 4,970 cf 12.0" Round Culvert n=0.012 L=219.0' S=0.0046 '/' Outflow=1.68 cfs 4,918 cf
Pond CBB2: CBB2	Peak Elev=22.16' Storage=116 cf Inflow=5.52 cfs 8,859 cf 12.0" Round Culvert n=0.009 L=112.7' S=0.0076 '/' Outflow=5.45 cfs 8,810 cf
Pond CBC1: CBC1	Peak Elev=22.56' Inflow=10.07 cfs 31,902 cf Primary=6.81 cfs 30,718 cf Secondary=3.26 cfs 1,184 cf Outflow=10.07 cfs 31,902 cf
Pond CBD2: CBD2	Peak Elev=21.69' Storage=1,552 cf Inflow=6.70 cfs 55,452 cf 12.0" Round Culvert n=0.009 L=123.0' S=0.0051 '/' Outflow=5.71 cfs 55,403 cf
Pond CBE1: CBE1	Peak Elev=17.69' Inflow=0.08 cfs 254 cf 12.0" Round Culvert n=0.012 L=10.0' S=0.0130 '/' Outflow=0.08 cfs 254 cf
Pond DMHD2: DMH D2	Peak Elev=21.13' Inflow=12.25 cfs 39,528 cf Outflow=12.25 cfs 39,528 cf
Pond DMHD6:	Peak Elev=21.74' Inflow=6.95 cfs 63,458 cf 12.0" Round Culvert n=0.011 L=10.0' S=0.0100 '/' Outflow=6.95 cfs 63,458 cf
Pond DMHD8:	Peak Elev=21.74' Inflow=7.03 cfs 63,712 cf 12.0" Round Culvert n=0.011 L=16.0' S=0.0000 '/' Outflow=7.03 cfs 63,712 cf
Pond PR2P: Offsite Isolated Wetland	Peak Elev=21.68' Storage=27,505 cf Inflow=18.43 cfs 58,476 cf Discarded=1.28 cfs 51,842 cf Primary=0.00 cfs 0 cf Outflow=1.28 cfs 51,842 cf
Pond S1: Infiltration System S1 (Stormtech	Peak Elev=21.56' Storage=1,146 cf Inflow=0.22 cfs 8,032 cf Discarded=0.07 cfs 3,804 cf Primary=0.14 cfs 3,136 cf Outflow=0.21 cfs 6,940 cf
Pond S2: CBD1 & System S3	Peak Elev=21.94' Storage=12,846 cf Inflow=16.52 cfs 52,989 cf 12.0" Round Culvert n=0.012 L=92.8' S=0.0034 '/' Outflow=5.76 cfs 51,924 cf

Summary for Subcatchment PR2: Overland Flow Northeast

Runoff = 0.03 cfs @ 12.12 hrs, Volume= 190 cf, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
2,975	39	>75% Grass cover, Good, HSG A
2,975		100.00% Pervious Area

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

Summary for Subcatchment PR20: Offsite Flow to Isolated Pocket Wetland (From Peabody GIS)

Runoff = 18.40 cfs @ 12.09 hrs, Volume= 58,286 cf, Depth> 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
259,227	61	1/4 acre lots, 38% imp, HSG A
160,721		62.00% Pervious Area
98,506		38.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0638	2.19		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.9	229	0.0638	4.07		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.3					Direct Entry, 1/10 Hour Minimum
6.0	329	Total			

Summary for Subcatchment PRA1:

Runoff = 0.99 cfs @ 12.07 hrs, Volume= 2,956 cf, Depth> 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
5,239	98	Paved parking, HSG A
2,894	39	>75% Grass cover, Good, HSG A
8,133	77	Weighted Average
2,894		35.58% Pervious Area
5,239		64.42% Impervious Area

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

Summary for Subcatchment PRA3:

Runoff = 0.69 cfs @ 12.07 hrs, Volume= 2,064 cf, Depth> 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
2,838	98	Paved parking, HSG A
1,999	39	>75% Grass cover, Good, HSG A
* 842	98	Walks
5,679	77	Weighted Average
1,999		35.20% Pervious Area
3,680		64.80% Impervious Area

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

Summary for Subcatchment PRB2:

Runoff = 1.34 cfs @ 12.07 hrs, Volume= 4,252 cf, Depth> 5.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
7,591	98	Paved parking, HSG A
1,177	39	>75% Grass cover, Good, HSG A
8,768	90	Weighted Average
1,177		13.42% Pervious Area
7,591		86.58% Impervious Area

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

Summary for Subcatchment PRC10: Offsite Flow to CBC1

Runoff = 10.07 cfs @ 12.09 hrs, Volume= 31,902 cf, Depth> 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
141,885	61	1/4 acre lots, 38% imp, HSG A
87,969		62.00% Pervious Area
53,916		38.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0462	1.92		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.4	354	0.0462	4.36		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.7					Direct Entry, 1/10 Hour Minumum
6.0	454	Total			

Summary for Subcatchment PRD1:

Runoff = 1.71 cfs @ 12.07 hrs, Volume= 5,175 cf, Depth> 4.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
9,127	98	Paved parking, HSG A
3,515	39	>75% Grass cover, Good, HSG A
12,642	82	Weighted Average
3,515		27.80% Pervious Area
9,127		72.20% Impervious Area

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

Summary for Subcatchment PRD10: Offsite Flow to CBD1

Runoff = 2.62 cfs @ 12.09 hrs, Volume= 8,286 cf, Depth> 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
36,850	61	1/4 acre lots, 38% imp, HSG A
22,847		62.00% Pervious Area
14,003		38.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	100	0.0300	1.62		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
5.0					Direct Entry, 1/10 Hour Minumum
6.0	100	Total			

Summary for Subcatchment PRD2:

Runoff = 0.76 cfs @ 12.07 hrs, Volume= 2,294 cf, Depth> 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
3,501	98	Paved parking, HSG A
1,967	39	>75% Grass cover, Good, HSG A
* 541	98	Walks
6,009	79	Weighted Average
1,967		32.73% Pervious Area
4,042		67.27% Impervious Area

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

Summary for Subcatchment PRD20: Offsite Flow to CBD2

Runoff = 0.39 cfs @ 12.09 hrs, Volume= 1,234 cf, Depth> 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
5,490	61	1/4 acre lots, 38% imp, HSG A
3,404		62.00% Pervious Area
2,086		38.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	100	0.0300	1.62		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
5.0					Direct Entry, 1/10 Hour Minumum
6.0	100	Total			

Summary for Subcatchment PRE1:

Runoff = 0.08 cfs @ 12.08 hrs, Volume= 254 cf, Depth> 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
134	98	Paved parking, HSG A
758	39	>75% Grass cover, Good, HSG A
* 281	98	Walks
1,173	60	Weighted Average
758		64.62% Pervious Area
415		35.38% Impervious Area

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

Summary for Subcatchment PRF1: Buidling 1

Runoff = 3.04 cfs @ 12.07 hrs, Volume= 10,491 cf, Depth> 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
18,632	98	Roofs, HSG A
18,632		100.00% Impervious Area

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

Summary for Subcatchment PRF2: Building 2

Runoff = 0.50 cfs @ 12.07 hrs, Volume= 1,712 cf, Depth> 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
3,040	98	Roofs, HSG A
3,040		100.00% Impervious Area

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

Summary for Subcatchment PRF3: Building 3

Runoff = 0.50 cfs @ 12.07 hrs, Volume= 1,712 cf, Depth> 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
3,040	98	Roofs, HSG A
3,040		100.00% Impervious Area

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

Summary for Reach DP1: Municipal System

Inflow Area = 251,341 sf, 49.66% Impervious, Inflow Depth > 3.04" for 100-year event
Inflow = 7.03 cfs @ 12.09 hrs, Volume= 63,712 cf
Outflow = 7.03 cfs @ 12.09 hrs, Volume= 63,712 cf, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP2: Abutting Properties

Inflow Area = 262,202 sf, 37.57% Impervious, Inflow Depth = 0.00" for 100-year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 1P: DMH C6

Inflow Area = 251,341 sf, 49.66% Impervious, Inflow Depth > 3.04" for 100-year event
Inflow = 7.03 cfs @ 12.09 hrs, Volume= 63,712 cf
Outflow = 7.03 cfs @ 12.09 hrs, Volume= 63,712 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.03 cfs @ 12.09 hrs, Volume= 63,712 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 23.80' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.80'	12.0" Round Culvert L= 112.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 16.80' / 16.70' S= 0.0009 ' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=7.03 cfs @ 12.09 hrs HW=23.79' (Free Discharge)
↑1=Culvert (Barrel Controls 7.03 cfs @ 8.95 fps)

Summary for Pond BR1: Blue Roof

Inflow Area = 18,632 sf, 100.00% Impervious, Inflow Depth > 6.76" for 100-year event
 Inflow = 3.04 cfs @ 12.07 hrs, Volume= 10,491 cf
 Outflow = 0.22 cfs @ 13.15 hrs, Volume= 8,032 cf, Atten= 93%, Lag= 64.5 min
 Primary = 0.22 cfs @ 13.15 hrs, Volume= 8,032 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 77.35' @ 13.15 hrs Surf.Area= 18,000 sf Storage= 6,236 cf

Plug-Flow detention time= 338.9 min calculated for 8,032 cf (77% of inflow)
 Center-of-Mass det. time= 254.4 min (996.0 - 741.6)

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	9,000 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	18,000	0	0
77.50	18,000	9,000	9,000

Device	Routing	Invert	Outlet Devices
#1	Primary	77.00'	2.0" Vert. Orifice/Grate X 4.00 C= 0.600

Primary OutFlow Max=0.22 cfs @ 13.15 hrs HW=77.35' (Free Discharge)
 1=Orifice/Grate (Orifice Controls 0.22 cfs @ 2.47 fps)

Summary for Pond CBA1: CBA1

Inflow Area = 8,133 sf, 64.42% Impervious, Inflow Depth > 4.36" for 100-year event
 Inflow = 0.99 cfs @ 12.07 hrs, Volume= 2,956 cf
 Outflow = 0.99 cfs @ 12.07 hrs, Volume= 2,905 cf, Atten= 0%, Lag= 0.1 min
 Primary = 0.99 cfs @ 12.07 hrs, Volume= 2,905 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 18.91' @ 12.07 hrs Surf.Area= 13 sf Storage= 59 cf

Plug-Flow detention time= 15.6 min calculated for 2,904 cf (98% of inflow)
 Center-of-Mass det. time= 5.4 min (819.0 - 813.6)

Volume	Invert	Avail.Storage	Storage Description
#1	21.00'	960 cf	Custom Stage Data (Prismatic) Listed below
#2	14.25'	85 cf	4.00'D x 6.75'H Vertical Cone/Cylinder
		1,045 cf	Total Available Storage
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.00	8	0	0
21.50	1,502	378	378
21.75	3,158	583	960

Device	Routing	Invert	Outlet Devices
#1	Primary	18.25'	12.0" Round Culvert L= 114.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 18.25' / 17.91' S= 0.0030 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.98 cfs @ 12.07 hrs HW=18.91' (Free Discharge)

↑1=Culvert (Barrel Controls 0.98 cfs @ 2.55 fps)

Summary for Pond CBA3: CBA3

Inflow Area = 13,812 sf, 64.57% Impervious, Inflow Depth > 4.32" for 100-year event
 Inflow = 1.68 cfs @ 12.07 hrs, Volume= 4,970 cf
 Outflow = 1.68 cfs @ 12.08 hrs, Volume= 4,918 cf, Atten= 0%, Lag= 0.1 min
 Primary = 1.68 cfs @ 12.08 hrs, Volume= 4,918 cf

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

Peak Elev= 18.83' @ 12.08 hrs Surf.Area= 13 sf Storage= 61 cf

Plug-Flow detention time= 9.3 min calculated for 4,918 cf (99% of inflow)

Center-of-Mass det. time= 3.1 min (819.9 - 816.8)

Volume	Invert	Avail.Storage	Storage Description
#1	21.00'	1,001 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	14.01'	75 cf	4.00'D x 6.00'H Vertical Cone/Cylinder
		1,077 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.00	4	0	0
21.50	1,600	401	401
21.75	3,202	600	1,001

Device	Routing	Invert	Outlet Devices
#1	Primary	18.01'	12.0" Round Culvert L= 219.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 18.01' / 17.00' S= 0.0046 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.67 cfs @ 12.08 hrs HW=18.83' (Free Discharge)

↑1=Culvert (Inlet Controls 1.67 cfs @ 2.43 fps)

Summary for Pond CBB2: CBB2

Inflow Area = 14,848 sf, 92.07% Impervious, Inflow Depth > 7.16" for 100-year event
 Inflow = 5.52 cfs @ 12.09 hrs, Volume= 8,859 cf
 Outflow = 5.45 cfs @ 12.10 hrs, Volume= 8,810 cf, Atten= 1%, Lag= 0.4 min
 Primary = 5.45 cfs @ 12.10 hrs, Volume= 8,810 cf

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

Peak Elev= 22.16' @ 12.10 hrs Surf.Area= 120 sf Storage= 116 cf

Plug-Flow detention time= 7.2 min calculated for 8,806 cf (99% of inflow)

Center-of-Mass det. time= 3.6 min (760.8 - 757.2)

Volume	Invert	Avail.Storage	Storage Description
#1	22.15'	1,128 cf	Custom Stage Data (Prismatic) Listed below
#2	15.15'	88 cf	4.00'D x 7.00'H Vertical Cone/Cylinder
		1,216 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.15	8	0	0
22.70	4,094	1,128	1,128

Device	Routing	Invert	Outlet Devices
#1	Primary	19.00'	12.0" Round Culvert L= 112.7' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 19.00' / 18.14' S= 0.0076 '/' Cc= 0.900 n= 0.009, Flow Area= 0.79 sf

Primary OutFlow Max=5.43 cfs @ 12.10 hrs HW=22.15' (Free Discharge)

↑1=Culvert (Inlet Controls 5.43 cfs @ 6.92 fps)

Summary for Pond CBC1: CBC1

Inflow Area = 141,885 sf, 38.00% Impervious, Inflow Depth > 2.70" for 100-year event
 Inflow = 10.07 cfs @ 12.09 hrs, Volume= 31,902 cf
 Outflow = 10.07 cfs @ 12.09 hrs, Volume= 31,902 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.81 cfs @ 12.09 hrs, Volume= 30,718 cf
 Secondary = 3.26 cfs @ 12.09 hrs, Volume= 1,184 cf

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

Peak Elev= 22.56' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	18.76'	12.0" Round Culvert L= 94.8' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 18.76' / 18.14' S= 0.0065 '/' Cc= 0.900 n= 0.009, Flow Area= 0.79 sf
#2	Secondary	22.30'	10.0' long x 2.5' 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 Coef. (English) 2.48 2.60 2.60 2.60 2.64 2.65 2.68 2.75 2.74 2.76 2.89 3.05 3.19 3.32

Primary OutFlow Max=6.81 cfs @ 12.09 hrs HW=22.56' (Free Discharge)

↑1=Culvert (Barrel Controls 6.81 cfs @ 8.67 fps)

Secondary OutFlow Max=3.24 cfs @ 12.09 hrs HW=22.56' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Weir Controls 3.24 cfs @ 1.27 fps)

Summary for Pond CBD2: CBD2

Inflow Area = 217,724 sf, 44.48% Impervious, Inflow Depth > 3.06" for 100-year event
 Inflow = 6.70 cfs @ 12.10 hrs, Volume= 55,452 cf
 Outflow = 5.71 cfs @ 12.85 hrs, Volume= 55,403 cf, Atten= 15%, Lag= 45.0 min
 Primary = 5.71 cfs @ 12.85 hrs, Volume= 55,403 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 21.69' @ 12.85 hrs Surf.Area= 3,897 sf Storage= 1,552 cf

Plug-Flow detention time= 2.3 min calculated for 55,403 cf (100% of inflow)
 Center-of-Mass det. time= 1.8 min (861.0 - 859.2)

Volume	Invert	Avail.Storage	Storage Description
#1	20.80'	1,721 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	13.95'	86 cf	4.00'D x 6.85'H Vertical Cone/Cylinder
		1,807 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.80	4	0	0
21.00	443	45	45
21.50	2,755	800	844
21.75	4,262	877	1,721

Device	Routing	Invert	Outlet Devices
#1	Primary	17.53'	12.0" Round Culvert L= 123.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 17.53' / 16.90' S= 0.0051 ' / Cc= 0.900 n= 0.009, Flow Area= 0.79 sf

Primary OutFlow Max=5.71 cfs @ 12.85 hrs HW=21.69' (Free Discharge)
 ↑1=Culvert (Inlet Controls 5.71 cfs @ 7.27 fps)

Summary for Pond CBE1: CBE1

Inflow Area = 1,173 sf, 35.38% Impervious, Inflow Depth > 2.60" for 100-year event
 Inflow = 0.08 cfs @ 12.08 hrs, Volume= 254 cf
 Outflow = 0.08 cfs @ 12.08 hrs, Volume= 254 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.08 cfs @ 12.08 hrs, Volume= 254 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 17.69' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	17.53'	12.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 17.53' / 17.40' S= 0.0130 ' / Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.08 cfs @ 12.08 hrs HW=17.69' (Free Discharge)

↑1=Culvert (Inlet Controls 0.08 cfs @ 1.06 fps)

Summary for Pond DMHD2: DMH D2

Inflow Area = 156,733 sf, 43.12% Impervious, Inflow Depth > 3.03" for 100-year event
 Inflow = 12.25 cfs @ 12.09 hrs, Volume= 39,528 cf
 Outflow = 12.25 cfs @ 12.09 hrs, Volume= 39,528 cf, Atten= 0%, Lag= 0.0 min
 Primary = 12.25 cfs @ 12.09 hrs, Volume= 39,528 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 21.13' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	17.86'	12.0" Round Culvert to S3 L= 2.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 17.86' / 17.76' S= 0.0500 '/ Cc= 0.900 n= 0.009, Flow Area= 0.79 sf
#2	Primary	18.14'	12.0" Round Culvert to D3 L= 76.4' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 18.14' / 17.76' S= 0.0050 '/ Cc= 0.900 n= 0.009, Flow Area= 0.79 sf

Primary OutFlow Max=12.24 cfs @ 12.09 hrs HW=21.12' (Free Discharge)

↑1=Culvert to S3 (Inlet Controls 6.29 cfs @ 8.01 fps)

↓2=Culvert to D3 (Barrel Controls 5.95 cfs @ 7.58 fps)

Summary for Pond DMHD6:

Inflow Area = 250,168 sf, 49.73% Impervious, Inflow Depth > 3.04" for 100-year event
 Inflow = 6.95 cfs @ 12.09 hrs, Volume= 63,458 cf
 Outflow = 6.95 cfs @ 12.09 hrs, Volume= 63,458 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.95 cfs @ 12.09 hrs, Volume= 63,458 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 21.74' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.90'	12.0" Round Culvert L= 10.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 16.90' / 16.80' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=6.95 cfs @ 12.09 hrs HW=21.74' (Free Discharge)

↑1=Culvert (Inlet Controls 6.95 cfs @ 8.85 fps)

Summary for Pond DMHD8:

Inflow Area = 251,341 sf, 49.66% Impervious, Inflow Depth > 3.04" for 100-year event
 Inflow = 7.03 cfs @ 12.09 hrs, Volume= 63,712 cf
 Outflow = 7.03 cfs @ 12.09 hrs, Volume= 63,712 cf, Atten= 0%, Lag= 0.0 min
 Primary = 7.03 cfs @ 12.09 hrs, Volume= 63,712 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 21.74' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.80'	12.0" Round Culvert L= 16.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 16.80' / 16.80' S= 0.0000 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=7.03 cfs @ 12.09 hrs HW=21.74' (Free Discharge)
 ↑1=Culvert (Inlet Controls 7.03 cfs @ 8.95 fps)

Summary for Pond PR2P: Offsite Isolated Wetland

Inflow Area = 262,202 sf, 37.57% Impervious, Inflow Depth > 2.68" for 100-year event
 Inflow = 18.43 cfs @ 12.09 hrs, Volume= 58,476 cf
 Outflow = 1.28 cfs @ 14.31 hrs, Volume= 51,842 cf, Atten= 93%, Lag= 132.7 min
 Discarded = 1.28 cfs @ 14.31 hrs, Volume= 51,842 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 21.68' @ 14.31 hrs Surf.Area= 23,017 sf Storage= 27,505 cf

Plug-Flow detention time= 248.4 min calculated for 51,842 cf (89% of inflow)
 Center-of-Mass det. time= 194.9 min (1,045.5 - 850.6)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	61,224 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	6,704	0	0
21.00	19,440	13,072	13,072
22.00	24,701	22,071	35,143
23.00	27,462	26,082	61,224

Device	Routing	Invert	Outlet Devices
#1	Primary	22.96'	24.0' long x 15.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Discarded	20.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.28 cfs @ 14.31 hrs HW=21.68' (Free Discharge)
 ↑2=Exfiltration (Exfiltration Controls 1.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir(Controls 0.00 cfs)

Summary for Pond S1: Infiltration System S1 (Stormtech SC-310 Chambers)

Inflow Area = 18,632 sf, 100.00% Impervious, Inflow Depth > 5.17" for 100-year event
 Inflow = 0.22 cfs @ 13.15 hrs, Volume= 8,032 cf
 Outflow = 0.21 cfs @ 14.63 hrs, Volume= 6,940 cf, Atten= 3%, Lag= 88.9 min
 Discarded = 0.07 cfs @ 11.31 hrs, Volume= 3,804 cf
 Primary = 0.14 cfs @ 14.63 hrs, Volume= 3,136 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 21.56' @ 14.63 hrs Surf.Area= 1,293 sf Storage= 1,146 cf

Plug-Flow detention time= 93.9 min calculated for 6,937 cf (86% of inflow)
 Center-of-Mass det. time= 37.2 min (1,033.2 - 996.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	19.87'	693 cf	28.17'W x 45.92'L x 2.33'H Field A 3,018 cf Overall - 708 cf Embedded = 2,310 cf x 30.0% Voids
#2A	20.37'	708 cf	ADS_StormTech SC-310 +Cap x 48 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 48 Chambers in 8 Rows
		1,401 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.37'	12.0" Round Culvert L= 17.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.37' / 16.90' S= 0.2629 ' S= 0.2629 ' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Discarded	19.87'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.07 cfs @ 11.31 hrs HW=19.90' (Free Discharge)
 ↑2=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.14 cfs @ 14.63 hrs HW=21.56' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.14 cfs @ 1.31 fps)

Summary for Pond S2: CBD1 & System S3

Inflow Area = 206,225 sf, 43.99% Impervious, Inflow Depth > 3.08" for 100-year event
 Inflow = 16.52 cfs @ 12.09 hrs, Volume= 52,989 cf
 Outflow = 5.76 cfs @ 12.41 hrs, Volume= 51,924 cf, Atten= 65%, Lag= 19.1 min
 Primary = 5.76 cfs @ 12.41 hrs, Volume= 51,924 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 21.94' @ 12.41 hrs Surf.Area= 34,447 sf Storage= 12,846 cf

Plug-Flow detention time= 39.8 min calculated for 51,902 cf (98% of inflow)
 Center-of-Mass det. time= 28.2 min (861.6 - 833.4)

Volume	Invert	Avail.Storage	Storage Description
#1	20.83'	26,713 cf	Custom Stage Data (Prismatic) Listed below
#2	14.00'	86 cf	4.00'D x 6.83'H Vertical Cone/Cylinder
#3	17.76'	6,385 cf	14.13'W x 6.89'L x 1.83'H Stormtrap (14") (Prismatoid) x 56 9,977 cf Overall x 64.0% Voids
		33,185 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.83	8	0	0
21.00	531	46	46
21.50	3,886	1,104	1,150
21.75	5,942	1,229	2,379
22.00	36,605	5,318	7,697
22.50	39,461	19,017	26,713

Device	Routing	Invert	Outlet Devices
#1	Primary	17.76'	12.0" Round Culvert L= 92.8' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 17.76' / 17.44' S= 0.0034 ' / Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=5.76 cfs @ 12.41 hrs HW=21.94' (Free Discharge)

↑1=Culvert (Barrel Controls 5.76 cfs @ 7.34 fps)

Appendix VII. Recharge Calculations

STANDARD #3

INFILTRATION SYSTEM S1 (BUILDING A) CALCULATIONS

INFILTRATION SYSTEM STORAGE VOLUME

SC-310 CHAMBER VOUME

OUTLET ORIFICE INVERT	I_W	=	<u>21.37</u>	ft.
BOTTOM INVERT CHAMBERS	I_C	=	<u>20.37</u>	ft.
STORMWATER DEPTH	D_C	=	<u>1.0</u>	ft.
VOLUME PER CHAMBER	V_C	=	<u>13.7</u>	cf.
NUMER OF ROWS	R_C	=	<u>8</u>	
CHAMBERS PER ROW	C_C	=	<u>6</u>	
NUMBER OF CHAMBERS	N_C	=	<u>48</u>	

$N_C = (R_C * C_C)$

$V_{CHAMBERS} = (V_C * N_C)$

TOTAL VOLUME OF CHAMBERS BELOW OUTLET $V_{CHAMBERS} = \underline{659.5}$ cf.

STONE VOLUME

$D_S = I_W - I_S$

STONE BOTTOM INVERT	I_S	=	<u>19.87</u>	ft.
STONE STORMWATER DEPTH	D_S	=	<u>1.5</u>	ft.
STONE WIDTH	W_S	=	<u>28.1</u>	ft.
STONE LENGTH	L_S	=	<u>45.7</u>	ft.
% VOIDS	VOIDS	=	<u>30%</u>	

$V_{STONE} = [(W_S * L_S * (I_W - I_S)) - V_{CHAMBERS}] * VOIDS$

STONE VOLUME $V_{stone} = \underline{381.1}$ cf.

TOTAL VOLUME BELOW INVERT

$V_{TOTAL} = V_{CHAMBERS} + V_{STONE}$

TOTAL STORAGE VOLUME $V_{TOTAL} = \underline{1040.6}$ cf.

BOTTOM AREA

$A_{bottom} = W_S * L_S$

BOTTOM SURFACE AREA $A_{bottom} = \underline{1286.6}$ sf.

REQUIRED RECHARGE VOLUME

STATIC METHOD

SOIL TYPE	=	<u>A</u>	
RECHARGE DEPTH	F	=	<u>0.6</u> in.
IMPERVIOUS AREA	A_{IMP}	=	<u>18632</u> ac.
% IMPERVIOUS AREA CAPTURED	=	<u>100%</u>	
RECHARGE STORAGE VOLUME	R_V	=	<u>931.6</u> cf.

$R_V = (F * A_{imp})$

1040.6 cf.

>>>

931.6 cf.

STANDARD 3 SATISFIED

72 HOUR DRAWDOWN

SOIL TYPE	=	<u>A</u>	
RAWLS RATE	K	=	<u>2.41</u> in/hr
REQUIRED RECHARGE VOLUME	R_V	=	<u>1040.6</u> cf.
BOTTOM AREA	A_{bottom}	=	<u>1286.6</u> sf.

$T_D = (R_V) / (K * A_{bottom})$

DRAWDOWN TIME $T_D = \underline{4.0}$ hr.

4.0 hr.

<<<

72.0 hr.

72 DRAWDOWN SATISFIED

Appendix VIII. Water Quality Calculations

- INSTRUCTIONS:**
1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
 4. To complete Chart Column E value, subtract Column D value within Row from Column C value within Row
 5. Total TSS Removal = Sum All Values in Column D

Location:

A	B	C	D	E
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	25%	1.00	0.25	0.75
Stormceptor Water Quality Unit (Proprietary)	80%	0.75	0.60	0.15

Separate Form Needs to be Completed for Each Outlet or BMP Train

Total TSS Removal =

Project:
 Prepared By:
 Date:

*Equals remaining load from previous BMP (E) which enters the BMP

TSS Removal Calculation Worksheet

STORMWATER MANAGEMENT STANDARDS

STANDARD # 4

WATER QUALITY FLOW RATE FOR DMH D5A

CRITICAL AREA OR LUHPPL

WQV = 1.00 inch runoff x TOTAL IMPERVIOUS AREA

OTHER AREA

WQV = 0.50 inch runoff x TOTAL IMPERVIOUS AREA

IMPERVIOUS AREA = 0.09 acre = 0.00014 sq. mi

Time of Concentration = 6.0 min.

la/P Curve = 0.034

qu = 774 csm/in

$Q_{0.5} = \underline{1 \text{ -inch}} \times \underline{0.00014 \text{ sq. mi.}} \times \underline{774 \text{ csm/min}} = \boxed{0.11} \text{ cfs}$

Use Stormceptor 900 Model

Water Quality Flow Rate Provided = 0.89 cfs

0.89 >>> 0.11

Standard #4 Satisfied

STORMWATER MANAGEMENT STANDARDS

STANDARD # 4

WATER QUALITY FLOW RATE FOR DMH D1A

CRITICAL AREA OR LUHPPL

$$WQV = \underline{1.00} \text{ inch runoff} \times \text{TOTAL IMPERVIOUS AREA}$$

OTHER AREA

$$WQV = \underline{0.50} \text{ inch runoff} \times \text{TOTAL IMPERVIOUS AREA}$$

$$\text{IMPERVIOUS AREA} = \underline{0.20 \text{ acre}} = \underline{0.00031 \text{ sq. mi}}$$

$$\text{Time of Concentration} = \underline{6.0 \text{ min.}}$$

$$\text{Ia/P Curve} = \underline{0.034}$$

$$\text{qu} = \underline{774 \text{ csm/in}}$$

$$Q_{0.5} = \underline{1 \text{ -inch}} \times \underline{0.00031 \text{ sq. mi.}} \times \underline{774 \text{ csm/min}} = \boxed{0.24} \text{ cfs}$$

Use Stormceptor 450i Model

$$\text{Water Quality Flow Rate Provided} = \boxed{0.89} \text{ cfs}$$

$$\underline{0.89} \gg \underline{0.24}$$

Standard #4 Satisfied

STORMWATER MANAGEMENT STANDARDS

STANDARD # 4

WATER QUALITY FLOW RATE FOR DMH C1

CRITICAL AREA OR LUHPPL

WQV = 1.00 inch runoff x TOTAL IMPERVIOUS AREA

OTHER AREA

WQV = 0.50 inch runoff x TOTAL IMPERVIOUS AREA

IMPERVIOUS AREA = 0.31 acre = 0.00049 sq. mi

Time of Concentration = 6.0 min.

la/P Curve = 0.034

qu = 774 csm/in

$Q_{0.5} = \underline{1 \text{ -inch}} \times \underline{0.00049 \text{ sq. mi.}} \times \underline{774 \text{ csm/min}} = \boxed{0.38} \text{ cfs}$

Use Stormceptor 450i Model

Water Quality Flow Rate Provided = 0.89 cfs

0.89 >>> 0.38

Standard #4 Satisfied

STORMWATER MANAGEMENT STANDARDS

STANDARD # 4

WATER QUALITY FLOW RATE FOR DMH A2

CRITICAL AREA OR LUHPPL

WQV = 1.00 inch runoff x TOTAL IMPERVIOUS AREA

OTHER AREA

WQV = 0.50 inch runoff x TOTAL IMPERVIOUS AREA

IMPERVIOUS AREA = 0.18 acre = 0.00028 sq. mi

Time of Concentration = 5.0 min.

la/P Curve = 0.034

qu = 795 csm/in

$Q_{0.5} = \underline{1 \text{ -inch}} \times \underline{0.00028 \text{ sq. mi.}} \times \underline{795 \text{ csm/min}} = \boxed{0.22} \text{ cfs}$

Use Stormceptor 450i Model

Water Quality Flow Rate Provided = 0.89 cfs

0.89 >>> 0.22

Standard #4 Satisfied



UNIVERSITY OF MASSACHUSETTS
AT AMHERST

Water Resources Research Center
Blaisdell House, UMass
310 Hicks Way
Amherst, MA 01003

Massachusetts Stormwater
Evaluation Project

(413) 545-5532
(413) 545-2304 FAX
www.mastep.net

MASTEP Technology Review

Technology Name: Stormceptor

Studies Reviewed: Final NJCAT Technology Verification Stormceptor STC900 September 2004; Coventry University Study, 1996; Technology Assessment, University of Massachusetts, 1997; SeaTac Stormceptor Performance report 2001; SWAMP report Ontario 2004; Phoenix Group Edmonton report 1995; Stormceptor 1200 Field Evaluation report 2004; Applied Hydrology Associates Denver report 2003; Rinker Materials Como Park St. Paul MN report 2002; VA DOT / UVA "Testing of Ultra-Urban Stormwater Best Management Practices" report 2001. Hydrodynamic Separator Sediment Retention Testing, Mohseni, 2010.

Date: September 17, 2013

Reviewer: Jerry Schoen

Rating: 2

Brief rationale for rating: This rating is primarily based on the 2005 NJCAT Technology Verification study.

In general, this was a well-conducted test, which in large part followed NJDEP test guidelines for laboratory studies, which MASTEP considers as the laboratory equivalent of TARP field protocols. Issues of concern: the study measured suspended sediment concentration (SSC) rather than total suspended solids (TSS). Although SSC is considered by many scientists to be the preferred method, it is at odds with Massachusetts stormwater regulations, which are based on TSS treatment. Comparing SSC and TSS results is considered an inexact science. The test was conducted with higher influent sediment concentrations than is preferred, but results were fairly consistent across all ranges studied. The particle size distribution also appears to be slightly higher than the target test range. There are additional field studies that in general support the results obtained in this laboratory studies. These studies do not satisfy TARP protocols, but they do not contradict results obtained in the NJCAT study.

TARP Requirements Not Met*:

- Measurements in TSS.
- Influent sediment concentration is 100 – 300 mg/l: actual was 153-460.
- No documentation of a Quality Assurance Project Plan
- Third party studies are preferred. This was conducted by Stormceptor personnel, with sample analyses conducted by an external laboratory.

Other Comments:

* The 2010 Mohseni study evaluates the susceptibility of the Stormceptor to scouring, or washout of collected sediments. Report concluded that the unit does not scour at high flows as long as sediment depth does not exceed maintenance level.

* Criteria also based on NJDEP laboratory testing guidelines.

Appendix IX. Operations and Maintenance Log

40 Oak Street, Peabody, Massachusetts
Stormwater Operation and Maintenance Plan

INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Best Management practice	Inspection Frequency	Date Inspected	Contractor	Current Conditions and Minimum Maintenance / Repairs, If Necessary	Completed Maintenance / Repair (i.e. date, contractor, tasks complete, etc.)
Catch Basins	Quarterly				
Infiltration Systems	Biannual				
Blue Roof	Quarterly				
Stormceptors	Quarterly				
Stormtrap System	Biannual				
Overall Site Condition	Quarterly				

Property Manager: _____ Date: _____