HOWARD STEIN HUDSON

Engineers + Planners

SUPPLEMENTAL DATA REPORT

Proposed Drive-Through Development

1021 Boylston Street

Newton, Massachusetts

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Contents

Hydrology

The project site consists of an existing 17,280 square foot property on Boylston Street in Newton. There is an existing 1,525 square foot commercial building, with a 2,035 square foot roof and overhang on the property. There is an associated parking lot abutting the existing building on the west side, there is also an existing small shed on the east side of the property. A paved driveway wraps around the existing building with a paved area in the rear of the lot, with a gravel area abutting the pavement. The existing low point on the site is in the rear of the lot in the gravel area, with a portion of the front of the lot running into Boylston Street. There is an existing 12" RCP pipe on the west side of the property that ties into town drainage.

The proposed project is a redevelopment project and will use the existing commercial building and convert it to a drive-thru restaurant. The proposed entrance is on the east side of the property where the existing curb cut exists and continues north around the building and south back to Boylston Street to the one-way exit. There is a proposed driveway in the front of the existing building to connect the entrance to the exit. The grades in Boylston Street shall remain the same, and the proposed drive-thru will grade downwards to the rear of the site. The proposed drainage system will include underground infiltration chambers to collect and treat the stormwater run-off from the site. The existing tie into the town drainage will be used as an outflow to infiltration chamber 1.

The project site is a low point for the surrounding area and captures offsite runoff as a result. As the site exists now, in the 100-year storm the depression is the rear of the site stages to elevation 120.29. This is not contained just to the project site; the staging occurs on the abutters to the east and north of the project site. In the 100-year storm the infiltration basin and infiltration chamber 2 contains offsite runoff from the north. The offsite runoff from the east is collected through a pipe through a wall on the perimeter of the project site. The pipe connects to underground infiltration chambers. These chambers fully contain the 2 and 10-year storm, during the 25 and 100-year storm the chambers are fully utilized and the water will stage up on the abutting property and slowly draw down as the chambers infiltrate stormwater. The abutting site stages to elevation 121.79 in the 100-year storm, the staging difference from pre to post is 1.50 feet.

Based on soil tests performed by soil evaluator Daniel Hazen, the soil is classified as Type A, Sand.

A HydroCAD model has been prepared to model the 2, 10, 25, and 100 year events and is located in Appendix B.

Stormwater Management Standards

Standard 1: No new untreated discharges

The Massachusetts Stormwater Handbook requires that the project demonstrates that no new stormwater conveyances (e.g. outfalls) discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The proposed project will not discharge untreated stormwater directly to or cause erosion in wetlands or waters. No outfall discharge to wetlands or waters is proposed.

Standard 2: Post-development peak discharge rates not to exceed pre-development peak discharge rates

Post-development peak discharge rates do not exceed the pre-development peak discharge rates. The stormwater management system has been designed to capture, treat, and infiltrate all stormwater runoff from the paved staging area from all storm events up to and including the 10-year storm. The site is a redevelopment, and the drainage is designed the maximum extent practicable and shows that the stormwater management system prevents any downstream flooding in the 100-year storm.

Table 1. | Peak Rates and Rate Reductions

Storm Event	2-year	10-year	25-year	100-year
AP1 Pre-development rates (cfs) (Boylston St)	0.00	0.03	0.06	0.13
AP1 Post-development rates (cfs) (Boylston St)	0.03	0.05	0.06	0.10
AP1 Rate reductions (cfs) (Boylston St)	**+0.03**	**+0.02**	**-0.00**	**-0.03**
AP2 Pre-development rates (cfs) (Town drainage)	0.00	0.23	0.73	2.30
AP2 Post-Development rates (cfs) (Town Drainage)	0.00	0.06	0.55	1.90
AP2 Rate reductions (cfs) (Town Drainage)	**-0.00**	**-0.17**	**-0.18**	**-0.40**

Standard 3: Minimize or eliminate loss of annual recharge to groundwater

The stormwater management system has been designed to capture, treat, and infiltrate stormwater runoff.

Required Recharge

Calculated as *Rv = F x Impervious Area*, where:

Rv = Required Recharge Volume, expressed in cubic feet, cubic yards, or acre-feet

F = Target Depth Factor associated with each Hydrologic Soil Group

Existing Roof and Pavement = 15,510 sf

Proposed Roof and Pavement = 19,599 sf

Hydrologic Group Volume to Recharge (x Total New Impervious Area)

A 0.60 inches of runoff	*4,089 SF x (0.6/12) = 205 CF*
B 0.35 inches of runoff	*No B soils were found on site*
C 0.25 inches of runoff	*No C soils were found on site*
D 0.10 inches of runoff	*No D soils were found on site*

Required Recharge = 205 cf

Provided Recharge = volume in the Stormtech Chambers = 9,253 cf

The 9,253 cf provided volume in the infiltration basin exceeds the 205 cf required volume, therefore the recharge requirement is met.

Drawdown Within 72 Hours

To determine whether an infiltration BMP will drain within 72 hours, the following formula must be used:

$$Time_{drawdown} = \frac{Rv}{(K)\ (Bottom\ Area)}$$

Where:
Rv= Storage Volume
K = Saturated Hydraulic Conductivity For "Static" and "Simply Dynamic" Methods
Bottom Area = Bottom Area of Recharge Structure

Stormtech Chambers 1

Time = 2,059 cf/(2.41in/hr x 1/12ft/in x 998 sf)

10.27 hours required to fully draw down

Stormtech Chambers 2

Time = 2,388 cf/(2.41in/hr x 1/12ft/in x 1,155 sf)

10.29 hours required to fully draw down

Stormtech Chambers 3

Time = 4,447 cf/(2.41 in/hr x 1/12ft/in x 2,238 sf)

9.89 hours required to fully draw down

Standard 4: Stormwater management system to remove 80% of the average annual load of Total Suspended Solids (TSS)

The stormwater management system is designed to remove more than 80% of the average annual total suspended solids (TSS) from the proposed parking area.

TSS Removal Calculation:

TSS Removal Train 1 (Underground Infiltration System #2)

Deep Sump Hooded Catch Basin 25% TSS	100% x 25%= 25%	100% - 25%= 75%
Isolator Row 50% TSS:	75% x 50%= 37.5%	75% - 37.5%= 37.5%
Stormtech Chamber 80% TSS	37.5% x 80%= 30%	37.5% - 30%= 0.5%

Removal Prior to Infiltration: 25% + 50% = 62.5% > 44%

Stormtech Infiltration Chambers 80% TSS (With pretreatment of 44%)

Total TSS Removal = 95.5%

TSS Removal Train 2 (Underground Infiltration System #1)

Isolator Row 50% TSS	100% x 50%= 50%	100% - 50%= 50%
Stormtech Chamber 80% TSS	50% x 80%= 40%	50% - 40%= 10%

Removal Prior to Infiltration: 50% ~ 44%

Stormtech Infiltration Chambers 80% TSS (With pretreatment of 44%)

Total TSS Removal = 90%

Required Water Quality Volume:

Calculated as *Impervious Area x WQV*, where:

WQV = water quality volume in watershed inches

= 1 inch for discharges within a Zone II, IWPA, critical area, from a LUHPPL, or to soil with infiltration rate greater than 2.4 in/hr.

= 0.5 inch for all else

Stormtech Chambers 1
Q= (6,521 sf) x (1 in)x(1ft/12in)
Q= 543 cf required
The isolator row stores 585 cf.
Designed Infiltration Chambers = 1,574 cf below outlet

Stormtech Chambers 2
Q= (5,150 sf) x (1 in)x(1ft/12in)
Q= 430 cf required
The isolator row stores 665 cf.
Designed Infiltration Chambers = 2,323 cf

Stormtech Chambers 3
Q=(1,663 sf) x (1 in)x(1ft/12in)
Q=139 cf required
Designed Infiltration Chambers = 2,268 cf

Standard 5: Land uses with higher potential pollutant loads

The development is not considered a land use that generally produces higher potential pollutant loads.

Standard 6: Stormwater discharges to critical areas

The proposed stormwater system does not discharge to a critical area.

Standard 7: Redevelopment projects

The project is considered a redevelopment project. The stormwater management standards are met to maximum extent practicable.

Standard 8: Control construction-related impacts

The project will install erosion and sediment controls prior to any earthwork activity. Silt fence and haybales will be placed down slope from the proposed construction to prevent erosion and sedimentation into the surrounding areas.

Standard 9: Long-term operation and maintenance plan

See Appendix A for the operation and maintenance requirements of the stormwater management system.

Standard 10: No illicit discharges

An illicit discharge compliance statement will be provided by the property owner under separate cover.

Appendix A: Operation and Maintenance Plan

Deep Sump Hooded Catchbasin

(Per DEP Stormwater Structural BMP's Vol 2)

Inspect or clean deep sump basins at least four times per year and at the end of the foliage and snow removal seasons. Sediments must also be removed four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin. If handling runoff from land uses with higher potential pollutant loads or discharging runoff near or to a critical area, more frequent cleaning may be necessary. Clamshell buckets are typically used to remove sediment in Massachusetts. However, vacuum trucks are preferable, because they remove more trapped sediment and supernatant than clamshells. Vacuuming is also a speedier process and is less likely to snap the cast iron hood within the deep sump catch basin.

Date	Inspector	Condition	Maintenance Performed*

*Evidence of maintenance (ie. receipts) must be provided.

Isolator Row

(Per DEP Stormwater Structural BMP's Vol 2)

In the first year of operation, the Isolator Row should be inspected every 6 months for depth of sediment. Therein after, the Isolator Row should be inspected annually. If sediment is present, a stadia rod should be inserted into the inspection port to determine depth of sediment. If/when the depth exceeds 3 inches throughout the length of the Isolator Row, clean out should be performed.

Date	Inspector	Condition	Maintenance Performed*

*Evidence of maintenance (ie. receipts) must be provided.

Infiltration Basin

The Operation and Maintenance Plan required by Standard 9 must include inspections and preventive maintenance at least twice a year. The Plan must require inspecting the pretreatment BMPs in accordance with the minimal requirements specified for those practices and after every major storm event. A major storm event is defined as a storm that is equal to or greater than the 2-year, 24-hour storm (generally 2.9 to 3.6 inches in a 24-hour period, depending in geographic location in Massachusetts).

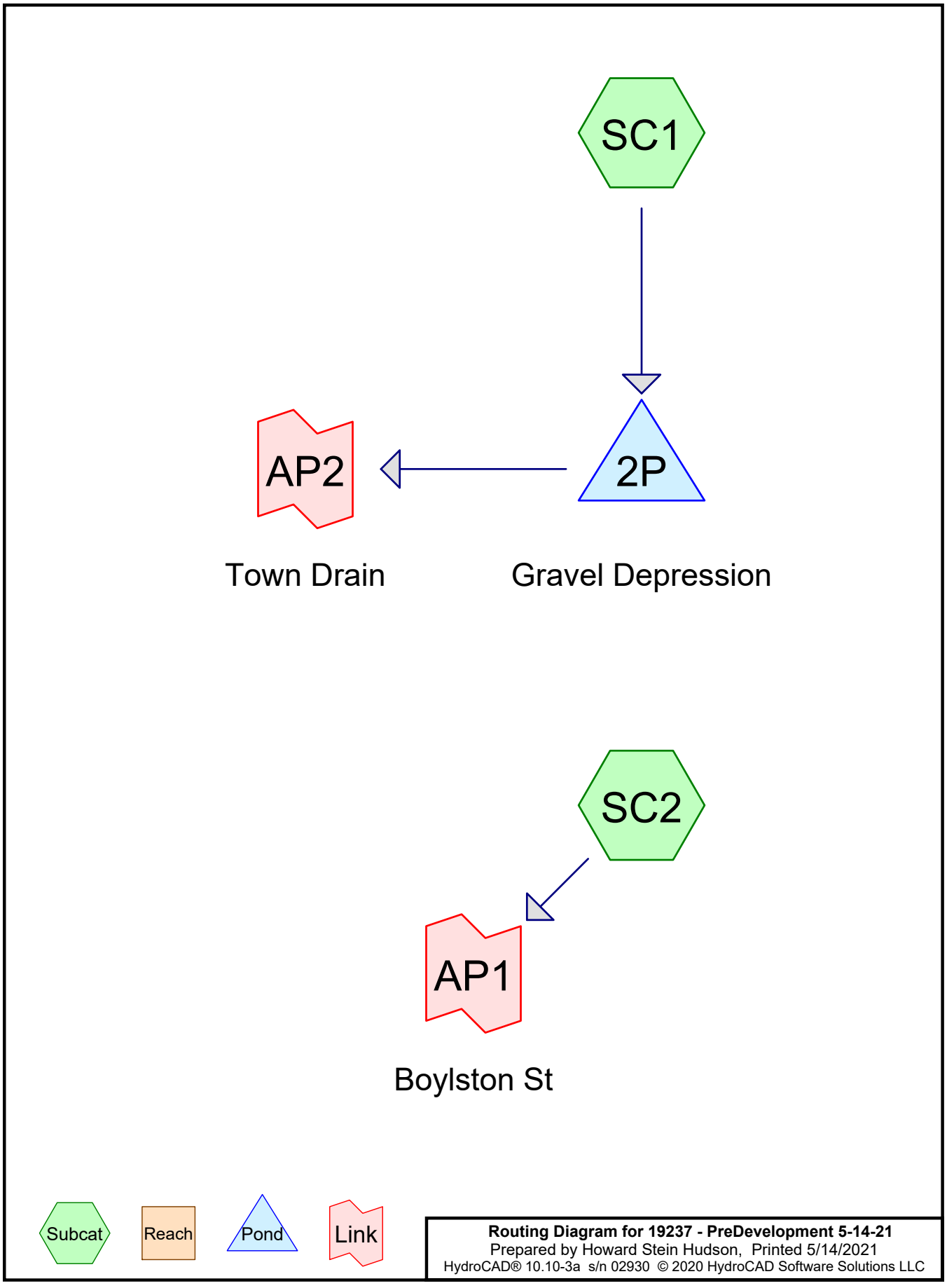
Once the basin is in use, inspect it after every major storm for the first few months to ensure it is stabilized and functioning properly and if necessary take corrective action. Note how long water remains standing in the basin after a storm; standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity may have been overestimated. If the ponding is due to clogging, immediately address the reasons for the clogging (such as upland sediment erosion, excessive compaction of soils, or low spots).

Inspect and clean pretreatment devices associated with basins at least twice a year, and ideally every other month, to ensure inlets and outlets remain unobstructed. Inlets and outlets and forebays shall also be inspected for potential sediment, erosion, cracking, tree growth, damage to the emergency spillway and erosion within the basin and on the banks. Upper side slopes, embankment and emergency spillway shall be mowed annually. Any tree saplings shall be removed. Accumulated sediment shall be removed as necessary and at least once every ten years. Bare spots shall be repaired and planted with native ground cover material.

Date	Inspector	Water Depth to Sediment[1]	Floatable Layer Thickness[2]	Maintenance Performed*	Comments

*Evidence of maintenance (ie. receipts) must be provided.

Appendix B: HydroCAD



Routing Diagram for 19237 - PreDevelopment 5-14-21
Prepared by Howard Stein Hudson, Printed 5/14/2021

Project Notes

Copied 4 events from MA-Newton 24-hr S1 storm
Defined 4 rainfall events from MA-Newton IDF
Defined 4 rainfall events from MA-Newton IDF

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.28	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.16	2
3	25-yr	Type III 24-hr		Default	24.00	1	6.33	2
4	100-yr	Type III 24-hr		Default	24.00	1	8.78	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
9,417	61	1/4 acre lots, 38% imp, HSG A (SC1)
10,203	39	>75% Grass cover, Good, HSG A (SC1, SC2)
1,985	96	Gravel surface, HSG A (SC1)
9,365	98	Paved parking, HSG A (SC1, SC2)
6,145	98	Roofs, HSG A (SC1)
4,950	89	Urban commercial, 85% imp, HSG A (SC1)
26,830	30	Woods, Good, HSG A (SC1)
68,895	**57**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
68,895	HSG A	SC1, SC2
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
68,895		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	S N
9,417	0	0	0	0	9,417	1/4 acre lots, 38% imp	
10,203	0	0	0	0	10,203	>75% Grass cover, Good	
1,985	0	0	0	0	1,985	Gravel surface	
9,365	0	0	0	0	9,365	Paved parking	
6,145	0	0	0	0	6,145	Roofs	
4,950	0	0	0	0	4,950	Urban commercial, 85% imp	
26,830	0	0	0	0	26,830	Woods, Good	
68,895	**0**	**0**	**0**	**0**	**68,895**	**TOTAL AREA**	

Pipe Listing (all 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	2P	119.42	119.14	14.1	0.0199	0.011	12.0	0.0	0.0

Time span=5.00-36.00 hrs, dt=0.03 hrs, 1034 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 SC1: Runoff Area=67,587 sf 33.99% Impervious Runoff Depth=0.34"
Flow Length=189' Tc=12.9 min CN=57 Runoff=0.24 cfs 1,897 cf

Subcatchment SC2: Runoff Area=1,308 sf 24.85% Impervious Runoff Depth=0.25"
Tc=0.0 min CN=54 Runoff=0.00 cfs 27 cf

Pond 2P: Gravel Depression Peak Elev=119.45' Storage=1,874 cf Inflow=0.24 cfs 1,897 cf
12.0" Round Culvert n=0.011 L=14.1' S=0.0199 '/' Outflow=0.00 cfs 111 cf

Link AP1: Boylston St Inflow=0.00 cfs 27 cf
Primary=0.00 cfs 27 cf

Link AP2: Town Drain Inflow=0.00 cfs 111 cf
Primary=0.00 cfs 111 cf

Total Runoff Area = 68,895 sf Runoff Volume = 1,924 cf Average Runoff Depth = 0.34"
66.19% Pervious = 45,599 sf 33.81% Impervious = 23,296 sf

Summary for Subcatchment SC1:

Runoff = 0.24 cfs @ 12.38 hrs, Volume= 1,897 cf, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.28"

Area (sf)	CN	Description
9,417	61	1/4 acre lots, 38% imp, HSG A
4,950	89	Urban commercial, 85% imp, HSG A
26,830	30	Woods, Good, HSG A
1,985	96	Gravel surface, HSG A
6,145	98	Roofs, HSG A
9,040	98	Paved parking, HSG A
9,220	39	>75% Grass cover, Good, HSG A
67,587	57	Weighted Average
44,616		66.01% Pervious Area
22,971		33.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.28"
0.4	75	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	14	0.2100	2.29		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	50	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.9	189	Total			

Summary for Subcatchment SC2:

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.00 cfs @ 12.25 hrs, Volume= 27 cf, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.28"

Area (sf)	CN	Description
983	39	>75% Grass cover, Good, HSG A
325	98	Paved parking, HSG A
1,308	54	Weighted Average
983		75.15% Pervious Area
325		24.85% Impervious Area

Summary for Pond 2P: Gravel Depression

Inflow Area = 67,587 sf, 33.99% Impervious, Inflow Depth = 0.34" for 2-yr event
Inflow = 0.24 cfs @ 12.38 hrs, Volume= 1,897 cf
Outflow = 0.00 cfs @ 24.22 hrs, Volume= 111 cf, Atten= 98%, Lag= 711.0 min
Primary = 0.00 cfs @ 24.22 hrs, Volume= 111 cf

Routing by Stor-Ind method, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs
Peak Elev= 119.45' @ 24.22 hrs Surf.Area= 4,223 sf Storage= 1,874 cf

Plug-Flow detention time= 908.4 min calculated for 111 cf (6% of inflow)
Center-of-Mass det. time= 699.1 min (1,641.0 - 941.9)

Volume	Invert	Avail.Storage	Storage Description
#1	118.90'	18,863 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
118.90	986	187.0	0	0	986
119.00	3,237	259.0	200	200	3,541
120.00	5,606	307.0	4,368	4,568	5,722
121.00	7,147	405.0	6,361	10,929	11,286
122.00	8,748	425.0	7,934	18,863	12,671

Device	Routing	Invert	Outlet Devices
#1	Primary	119.42'	**12.0" Round Culvert** L= 14.1' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.42' / 119.14' S= 0.0199 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 24.22 hrs HW=119.45' (Free Discharge)
1=Culvert (Inlet Controls 0.00 cfs @ 0.59 fps)

Summary for Link AP1: Boylston St

Inflow Area = 1,308 sf, 24.85% Impervious, Inflow Depth = 0.25" for 2-yr event
Inflow = 0.00 cfs @ 12.25 hrs, Volume= 27 cf
Primary = 0.00 cfs @ 12.25 hrs, Volume= 27 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs

Summary for Link AP2: Town Drain

Inflow Area = 67,587 sf, 33.99% Impervious, Inflow Depth > 0.02" for 2-yr event
Inflow = 0.00 cfs @ 24.22 hrs, Volume= 111 cf
Primary = 0.00 cfs @ 24.22 hrs, Volume= 111 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs

Time span=5.00-36.00 hrs, dt=0.03 hrs, 1034 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 SC1: Runoff Area=67,587 sf 33.99% Impervious Runoff Depth=1.19"
Flow Length=189' Tc=12.9 min CN=57 Runoff=1.47 cfs 6,707 cf

Subcatchment SC2: Runoff Area=1,308 sf 24.85% Impervious Runoff Depth=1.00"
Tc=0.0 min CN=54 Runoff=0.03 cfs 109 cf

Pond 2P: Gravel Depression Peak Elev=119.65' Storage=2,777 cf Inflow=1.47 cfs 6,707 cf
12.0" Round Culvert n=0.011 L=14.1' S=0.0199 '/' Outflow=0.23 cfs 4,898 cf

Link AP1: Boylston St Inflow=0.03 cfs 109 cf
Primary=0.03 cfs 109 cf

Link AP2: Town Drain Inflow=0.23 cfs 4,898 cf
Primary=0.23 cfs 4,898 cf

Total Runoff Area = 68,895 sf Runoff Volume = 6,816 cf Average Runoff Depth = 1.19"
66.19% Pervious = 45,599 sf 33.81% Impervious = 23,296 sf

Summary for Subcatchment SC1:

Runoff = 1.47 cfs @ 12.20 hrs, Volume= 6,707 cf, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
9,417	61	1/4 acre lots, 38% imp, HSG A
4,950	89	Urban commercial, 85% imp, HSG A
26,830	30	Woods, Good, HSG A
1,985	96	Gravel surface, HSG A
6,145	98	Roofs, HSG A
9,040	98	Paved parking, HSG A
9,220	39	>75% Grass cover, Good, HSG A
67,587	57	Weighted Average
44,616		66.01% Pervious Area
22,971		33.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.28"
0.4	75	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	14	0.2100	2.29		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	50	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.9	189	Total			

Summary for Subcatchment SC2:

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.03 cfs @ 12.02 hrs, Volume= 109 cf, Depth= 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
983	39	>75% Grass cover, Good, HSG A
325	98	Paved parking, HSG A
1,308	54	Weighted Average
983		75.15% Pervious Area
325		24.85% Impervious Area

Summary for Pond 2P: Gravel Depression

Inflow Area = 67,587 sf, 33.99% Impervious, Inflow Depth = 1.19" for 10-yr event
Inflow = 1.47 cfs @ 12.20 hrs, Volume= 6,707 cf
Outflow = 0.23 cfs @ 13.53 hrs, Volume= 4,898 cf, Atten= 85%, Lag= 79.5 min
Primary = 0.23 cfs @ 13.53 hrs, Volume= 4,898 cf

Routing by Stor-Ind method, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs
Peak Elev= 119.65' @ 13.53 hrs Surf.Area= 4,709 sf Storage= 2,777 cf

Plug-Flow detention time= 258.4 min calculated for 4,894 cf (73% of inflow)
Center-of-Mass det. time= 157.6 min (1,046.6 - 889.0)

Volume	Invert	Avail.Storage	Storage Description
#1	118.90'	18,863 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
118.90	986	187.0	0	0	986
119.00	3,237	259.0	200	200	3,541
120.00	5,606	307.0	4,368	4,568	5,722
121.00	7,147	405.0	6,361	10,929	11,286
122.00	8,748	425.0	7,934	18,863	12,671

Device	Routing	Invert	Outlet Devices
#1	Primary	119.42'	**12.0" Round Culvert** L= 14.1' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.42' / 119.14' S= 0.0199 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.23 cfs @ 13.53 hrs HW=119.65' (Free Discharge)
1=Culvert (Inlet Controls 0.23 cfs @ 1.64 fps)

Summary for Link AP1: Boylston St

Inflow Area = 1,308 sf, 24.85% Impervious, Inflow Depth = 1.00" for 10-yr event
Inflow = 0.03 cfs @ 12.02 hrs, Volume= 109 cf
Primary = 0.03 cfs @ 12.02 hrs, Volume= 109 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs

Summary for Link AP2: Town Drain

Inflow Area = 67,587 sf, 33.99% Impervious, Inflow Depth > 0.87" for 10-yr event
Inflow = 0.23 cfs @ 13.53 hrs, Volume= 4,898 cf
Primary = 0.23 cfs @ 13.53 hrs, Volume= 4,898 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs

Time span=5.00-36.00 hrs, dt=0.03 hrs, 1034 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 SC1: Runoff Area=67,587 sf 33.99% Impervious Runoff Depth=1.88"
Flow Length=189' Tc=12.9 min CN=57 Runoff=2.51 cfs 10,588 cf

Subcatchment SC2: Runoff Area=1,308 sf 24.85% Impervious Runoff Depth=1.63"
Tc=0.0 min CN=54 Runoff=0.06 cfs 177 cf

Pond 2P: Gravel Depression Peak Elev=119.85' Storage=3,767 cf Inflow=2.51 cfs 10,588 cf
12.0" Round Culvert n=0.011 L=14.1' S=0.0199 '/' Outflow=0.73 cfs 8,776 cf

Link AP1: Boylston St Inflow=0.06 cfs 177 cf
Primary=0.06 cfs 177 cf

Link AP2: Town Drain Inflow=0.73 cfs 8,776 cf
Primary=0.73 cfs 8,776 cf

Total Runoff Area = 68,895 sf Runoff Volume = 10,765 cf Average Runoff Depth = 1.88"
66.19% Pervious = 45,599 sf 33.81% Impervious = 23,296 sf

Summary for Subcatchment SC1:

Runoff = 2.51 cfs @ 12.19 hrs, Volume= 10,588 cf, Depth= 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs
Type III 24-hr 25-yr Rainfall=6.33"

Area (sf)	CN	Description
9,417	61	1/4 acre lots, 38% imp, HSG A
4,950	89	Urban commercial, 85% imp, HSG A
26,830	30	Woods, Good, HSG A
1,985	96	Gravel surface, HSG A
6,145	98	Roofs, HSG A
9,040	98	Paved parking, HSG A
9,220	39	>75% Grass cover, Good, HSG A
67,587	57	Weighted Average
44,616		66.01% Pervious Area
22,971		33.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.28"
0.4	75	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	14	0.2100	2.29		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	50	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.9	189	Total			

Summary for Subcatchment SC2:

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.06 cfs @ 12.01 hrs, Volume= 177 cf, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs
Type III 24-hr 25-yr Rainfall=6.33"

Area (sf)	CN	Description
983	39	>75% Grass cover, Good, HSG A
325	98	Paved parking, HSG A
1,308	54	Weighted Average
983		75.15% Pervious Area
325		24.85% Impervious Area

Summary for Pond 2P: Gravel Depression

Inflow Area = 67,587 sf, 33.99% Impervious, Inflow Depth = 1.88" for 25-yr event
Inflow = 2.51 cfs @ 12.19 hrs, Volume= 10,588 cf
Outflow = 0.73 cfs @ 12.69 hrs, Volume= 8,776 cf, Atten= 71%, Lag= 29.5 min
Primary = 0.73 cfs @ 12.69 hrs, Volume= 8,776 cf

Routing by Stor-Ind method, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs
Peak Elev= 119.85' @ 12.69 hrs Surf.Area= 5,214 sf Storage= 3,767 cf

Plug-Flow detention time= 180.7 min calculated for 8,776 cf (83% of inflow)
Center-of-Mass det. time= 106.9 min (980.8 - 873.8)

Volume	Invert	Avail.Storage	Storage Description
#1	118.90'	18,863 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
118.90	986	187.0	0	0	986
119.00	3,237	259.0	200	200	3,541
120.00	5,606	307.0	4,368	4,568	5,722
121.00	7,147	405.0	6,361	10,929	11,286
122.00	8,748	425.0	7,934	18,863	12,671

Device	Routing	Invert	Outlet Devices
#1	Primary	119.42'	**12.0" Round Culvert** L= 14.1' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.42' / 119.14' S= 0.0199 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.73 cfs @ 12.69 hrs HW=119.85' (Free Discharge)
1=Culvert (Inlet Controls 0.73 cfs @ 2.24 fps)

Summary for Link AP1: Boylston St

Inflow Area = 1,308 sf, 24.85% Impervious, Inflow Depth = 1.63" for 25-yr event
Inflow = 0.06 cfs @ 12.01 hrs, Volume= 177 cf
Primary = 0.06 cfs @ 12.01 hrs, Volume= 177 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs

Summary for Link AP2: Town Drain

Inflow Area = 67,587 sf, 33.99% Impervious, Inflow Depth > 1.56" for 25-yr event
Inflow = 0.73 cfs @ 12.69 hrs, Volume= 8,776 cf
Primary = 0.73 cfs @ 12.69 hrs, Volume= 8,776 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs

Time span=5.00-36.00 hrs, dt=0.03 hrs, 1034 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 SC1: Runoff Area=67,587 sf 33.99% Impervious Runoff Depth=3.57"
Flow Length=189' Tc=12.9 min CN=57 Runoff=5.06 cfs 20,100 cf

Subcatchment SC2: Runoff Area=1,308 sf 24.85% Impervious Runoff Depth=3.21"
Tc=0.0 min CN=54 Runoff=0.13 cfs 350 cf

Pond 2P: Gravel Depression Peak Elev=120.29' Storage=6,255 cf Inflow=5.06 cfs 20,100 cf
12.0" Round Culvert n=0.011 L=14.1' S=0.0199 '/' Outflow=2.30 cfs 18,285 cf

Link AP1: Boylston St Inflow=0.13 cfs 350 cf
Primary=0.13 cfs 350 cf

Link AP2: Town Drain Inflow=2.30 cfs 18,285 cf
Primary=2.30 cfs 18,285 cf

Total Runoff Area = 68,895 sf Runoff Volume = 20,450 cf Average Runoff Depth = 3.56"
66.19% Pervious = 45,599 sf 33.81% Impervious = 23,296 sf

Summary for Subcatchment SC1:

Runoff = 5.06 cfs @ 12.19 hrs, Volume= 20,100 cf, Depth= 3.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=8.78"

Area (sf)	CN	Description
9,417	61	1/4 acre lots, 38% imp, HSG A
4,950	89	Urban commercial, 85% imp, HSG A
26,830	30	Woods, Good, HSG A
1,985	96	Gravel surface, HSG A
6,145	98	Roofs, HSG A
9,040	98	Paved parking, HSG A
9,220	39	>75% Grass cover, Good, HSG A
67,587	57	Weighted Average
44,616		66.01% Pervious Area
22,971		33.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.28"
0.4	75	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	14	0.2100	2.29		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	50	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.9	189	Total			

Summary for Subcatchment SC2:

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.13 cfs @ 12.01 hrs, Volume= 350 cf, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=8.78"

Area (sf)	CN	Description
983	39	>75% Grass cover, Good, HSG A
325	98	Paved parking, HSG A
1,308	54	Weighted Average
983		75.15% Pervious Area
325		24.85% Impervious Area

Summary for Pond 2P: Gravel Depression

Inflow Area = 67,587 sf, 33.99% Impervious, Inflow Depth = 3.57" for 100-yr event
Inflow = 5.06 cfs @ 12.19 hrs, Volume= 20,100 cf
Outflow = 2.30 cfs @ 12.52 hrs, Volume= 18,285 cf, Atten= 55%, Lag= 20.0 min
Primary = 2.30 cfs @ 12.52 hrs, Volume= 18,285 cf

Routing by Stor-Ind method, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs
Peak Elev= 120.29' @ 12.52 hrs Surf.Area= 6,034 sf Storage= 6,255 cf

Plug-Flow detention time= 114.2 min calculated for 18,267 cf (91% of inflow)
Center-of-Mass det. time= 70.2 min (924.4 - 854.2)

Volume	Invert	Avail.Storage	Storage Description
#1	118.90'	18,863 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
118.90	986	187.0	0	0	986
119.00	3,237	259.0	200	200	3,541
120.00	5,606	307.0	4,368	4,568	5,722
121.00	7,147	405.0	6,361	10,929	11,286
122.00	8,748	425.0	7,934	18,863	12,671

Device	Routing	Invert	Outlet Devices
#1	Primary	119.42'	**12.0" Round Culvert** L= 14.1' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.42' / 119.14' S= 0.0199 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.30 cfs @ 12.52 hrs HW=120.29' (Free Discharge)
↑**1=Culvert** (Inlet Controls 2.30 cfs @ 3.17 fps)

Summary for Link AP1: Boylston St

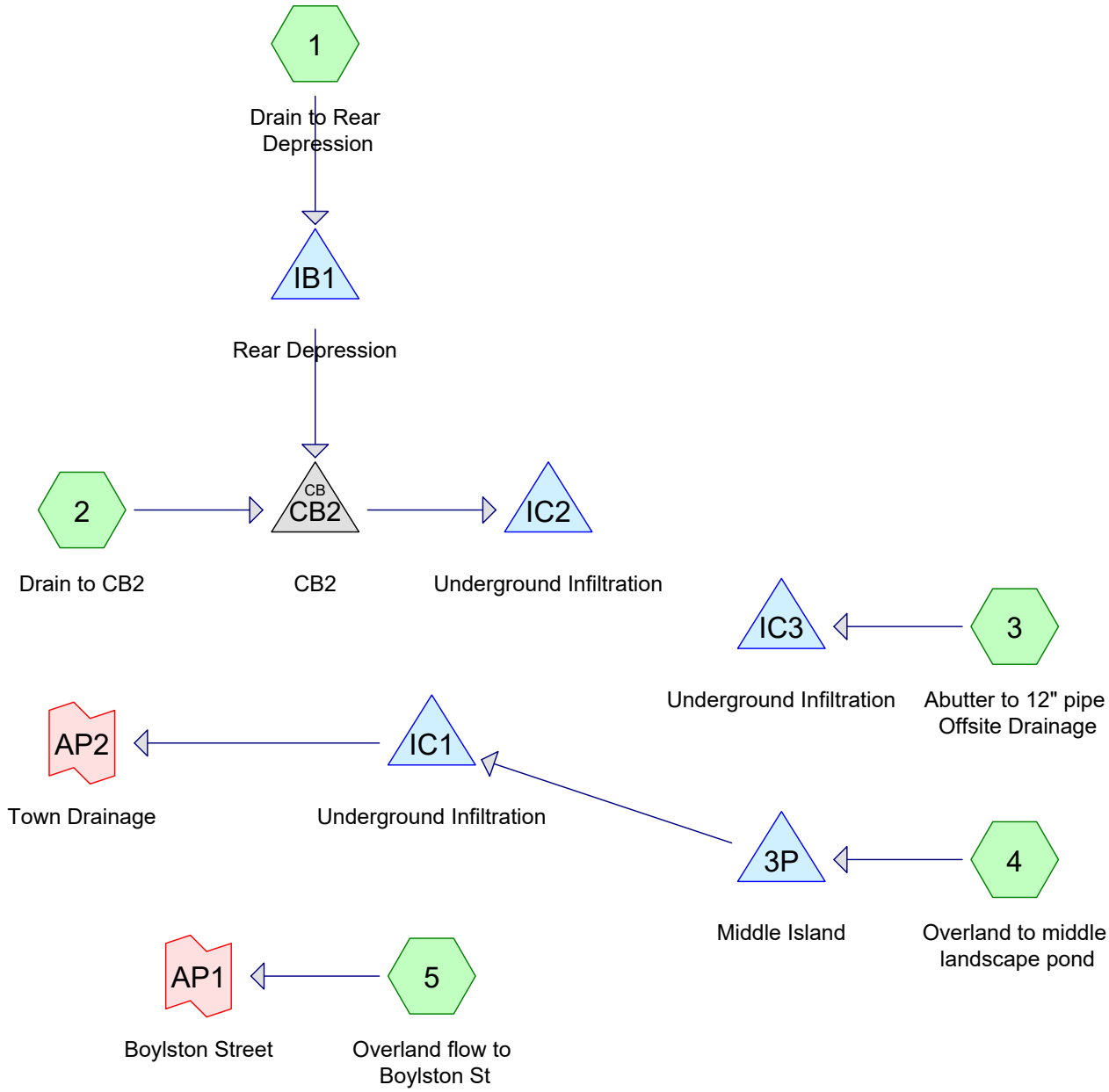
Inflow Area = 1,308 sf, 24.85% Impervious, Inflow Depth = 3.21" for 100-yr event
Inflow = 0.13 cfs @ 12.01 hrs, Volume= 350 cf
Primary = 0.13 cfs @ 12.01 hrs, Volume= 350 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs

Summary for Link AP2: Town Drain

Inflow Area = 67,587 sf, 33.99% Impervious, Inflow Depth > 3.25" for 100-yr event
Inflow = 2.30 cfs @ 12.52 hrs, Volume= 18,285 cf
Primary = 2.30 cfs @ 12.52 hrs, Volume= 18,285 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-35.99 hrs, dt= 0.03 hrs



Subcat Reach Pond Link

Routing Diagram for 19237 - PostDevelopment
Prepared by Howard Stein Hudson, Printed 5/14/2021

Project Notes

Copied 4 events from MA-Newton 24-hr S1 storm
Defined 4 rainfall events from MA-Newton IDF
Defined 4 rainfall events from MA-Newton IDF

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.28	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.16	2
3	25-yr	Type III 24-hr		Default	24.00	1	6.33	2
4	100-yr	Type III 24-hr		Default	24.00	1	8.78	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
9,417	61	1/4 acre lots, 38% imp, HSG A (1, 3)
12,153	39	>75% Grass cover, Good, HSG A (1, 2, 3, 4, 5)
13,746	98	Paved parking, HSG A (2, 3, 4, 5)
5,853	98	Roofs, HSG A (3, 4)
4,950	89	Urban commercial, 85% imp, HSG A (3, 4)
23,046	30	Woods, Good, HSG A (1, 3)
69,165	**59**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
69,165	HSG A	1, 2, 3, 4, 5
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
69,165		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	S N
9,417	0	0	0	0	9,417	1/4 acre lots, 38% imp	
12,153	0	0	0	0	12,153	>75% Grass cover, Good	
13,746	0	0	0	0	13,746	Paved parking	
5,853	0	0	0	0	5,853	Roofs	
4,950	0	0	0	0	4,950	Urban commercial, 85% imp	
23,046	0	0	0	0	23,046	Woods, Good	
69,165	**0**	**0**	**0**	**0**	**69,165**	**TOTAL AREA**	

Pipe Listing (all 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	3P	120.50	119.00	3.0	0.5000	0.010	12.0	0.0	0.0
2	CB2	118.75	118.15	20.0	0.0300	0.010	12.0	0.0	0.0
3	IB1	121.50	121.20	5.0	0.0600	0.010	6.0	0.0	0.0
4	IC1	119.42	119.35	14.2	0.0049	0.011	12.0	0.0	0.0

Time span=5.00-36.00 hrs, dt=0.01 hrs, 3101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Drain to Rear Depression Runoff Area=31,523 sf 10.10% Impervious Runoff Depth=0.00"
Flow Length=152' Tc=14.1 min CN=39 Runoff=0.00 cfs 4 cf

Subcatchment 2: Drain to CB2 Runoff Area=8,996 sf 57.25% Impervious Runoff Depth=1.03"
Tc=6.0 min CN=73 Runoff=0.24 cfs 775 cf

Subcatchment 3: Abutter to 12" pipe Runoff Area=13,897 sf 52.89% Impervious Runoff Depth=0.78"
Tc=6.0 min CN=68 Runoff=0.25 cfs 899 cf

Subcatchment 4: Overland to middle Runoff Area=14,217 sf 79.40% Impervious Runoff Depth=1.90"
Tc=6.0 min CN=86 Runoff=0.73 cfs 2,257 cf

Subcatchment 5: Overland flow to Boylston St Runoff Area=532 sf 77.44% Impervious Runoff Depth=1.83"
Tc=6.0 min CN=85 Runoff=0.03 cfs 81 cf

Pond 3P: Middle Island Peak Elev=120.97' Storage=161 cf Inflow=0.73 cfs 2,257 cf
Discarded=0.01 cfs 584 cf Primary=0.68 cfs 1,672 cf Outflow=0.69 cfs 2,257 cf

Pond CB2: CB2 Peak Elev=119.02' Inflow=0.24 cfs 775 cf
12.0" Round Culvert n=0.010 L=20.0' S=0.0300 '/' Outflow=0.24 cfs 775 cf

Pond IB1: Rear Depression Peak Elev=120.00' Storage=0 cf Inflow=0.00 cfs 4 cf
Discarded=0.00 cfs 4 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 4 cf

Pond IC1: Underground Infiltration Peak Elev=118.22' Storage=750 cf Inflow=0.68 cfs 1,672 cf
Discarded=0.09 cfs 1,673 cf Primary=0.00 cfs 0 cf Outflow=0.09 cfs 1,673 cf

Pond IC2: Underground Infiltration Peak Elev=117.29' Storage=134 cf Inflow=0.24 cfs 775 cf
Outflow=0.07 cfs 776 cf

Pond IC3: Underground Infiltration Peak Elev=117.46' Storage=179 cf Inflow=0.25 cfs 899 cf
Outflow=0.07 cfs 900 cf

Link AP1: Boylston Street Inflow=0.03 cfs 81 cf
Primary=0.03 cfs 81 cf

Link AP2: Town Drainage Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 69,165 sf Runoff Volume = 4,016 cf Average Runoff Depth = 0.70"
60.41% Pervious = 41,780 sf 39.59% Impervious = 27,385 sf

Summary for Subcatchment 1: Drain to Rear Depression

Runoff = 0.00 cfs @ 24.02 hrs, Volume= 4 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.28"

Area (sf)	CN	Description
19,697	30	Woods, Good, HSG A
3,448	39	>75% Grass cover, Good, HSG A
8,378	61	1/4 acre lots, 38% imp, HSG A
31,523	39	Weighted Average
28,339		89.90% Pervious Area
3,184		10.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.28"
1.8	75	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	27	0.1480	5.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	152	Total			

Summary for Subcatchment 2: Drain to CB2

Runoff = 0.24 cfs @ 12.10 hrs, Volume= 775 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.28"

Area (sf)	CN	Description
3,846	39	>75% Grass cover, Good, HSG A
5,150	98	Paved parking, HSG A
8,996	73	Weighted Average
3,846		42.75% Pervious Area
5,150		57.25% Impervious Area

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

Summary for Subcatchment 3: Abutter to 12" pipe Offsite Drainage

Runoff = 0.25 cfs @ 12.10 hrs, Volume= 899 cf, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.28"

Area (sf)	CN	Description
3,349	30	Woods, Good, HSG A
1,039	61	1/4 acre lots, 38% imp, HSG A
3,615	89	Urban commercial, 85% imp, HSG A
2,011	39	>75% Grass cover, Good, HSG A
1,663	98	Paved parking, HSG A
2,220	98	Roofs, HSG A
13,897	68	Weighted Average
6,546		47.11% Pervious Area
7,351		52.89% Impervious Area

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

Summary for Subcatchment 4: Overland to middle landscape pond

Runoff = 0.73 cfs @ 12.09 hrs, Volume= 2,257 cf, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.28"

Area (sf)	CN	Description
1,335	89	Urban commercial, 85% imp, HSG A
3,633	98	Roofs, HSG A
6,521	98	Paved parking, HSG A
2,728	39	>75% Grass cover, Good, HSG A
14,217	86	Weighted Average
2,928		20.60% Pervious Area
11,289		79.40% Impervious Area

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

Summary for Subcatchment 5: Overland flow to Boylston St

Runoff = 0.03 cfs @ 12.09 hrs, Volume= 81 cf, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.28"

Area (sf)	CN	Description
120	39	>75% Grass cover, Good, HSG A
412	98	Paved parking, HSG A
532	85	Weighted Average
120		22.56% Pervious Area
412		77.44% Impervious Area

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

Summary for Pond 3P: Middle Island

Inflow Area = 14,217 sf, 79.40% Impervious, Inflow Depth = 1.90" for 2-yr event
Inflow = 0.73 cfs @ 12.09 hrs, Volume= 2,257 cf
Outflow = 0.69 cfs @ 12.12 hrs, Volume= 2,257 cf, Atten= 5%, Lag= 1.6 min
Discarded = 0.01 cfs @ 12.12 hrs, Volume= 584 cf
Primary = 0.68 cfs @ 12.12 hrs, Volume= 1,672 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 120.97' @ 12.12 hrs Surf.Area= 267 sf Storage= 161 cf

Plug-Flow detention time= 28.1 min calculated for 2,256 cf (100% of inflow)
Center-of-Mass det. time= 28.2 min (849.6 - 821.5)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	585 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	81	67.6	0	0	81
121.00	274	113.8	168	168	754
122.00	579	133.0	417	585	1,151

Device	Routing	Invert	Outlet Devices
#1	Primary	120.50'	**12.0" Round Culvert** L= 3.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 120.50' / 119.00' S= 0.5000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	120.50'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	120.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.12 hrs HW=120.97' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.68 cfs @ 12.12 hrs HW=120.97' TW=117.66' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.68 cfs @ 1.85 fps)
└**2=Orifice/Grate** (Passes 0.68 cfs of 0.86 cfs potential flow)

Summary for Pond CB2: CB2

[57] Hint: Peaked at 119.02' (Flood elevation advised)

Inflow Area = 40,519 sf, 20.57% Impervious, Inflow Depth = 0.23" for 2-yr event
Inflow = 0.24 cfs @ 12.10 hrs, Volume= 775 cf
Outflow = 0.24 cfs @ 12.10 hrs, Volume= 775 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.24 cfs @ 12.10 hrs, Volume= 775 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 119.02' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	118.75'	**12.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 118.75' / 118.15' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.24 cfs @ 12.10 hrs HW=119.02' TW=117.10' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.24 cfs @ 1.39 fps)

Summary for Pond IB1: Rear Depression

Inflow Area = 31,523 sf, 10.10% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 24.02 hrs, Volume= 4 cf
Outflow = 0.00 cfs @ 24.02 hrs, Volume= 4 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 24.02 hrs, Volume= 4 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 120.00' @ 5.00 hrs Surf.Area= 156 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,358.1 - 1,358.1)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	1,081 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	156	108.1	0	0	156
121.00	464	127.8	296	296	544
122.00	1,158	173.0	785	1,081	1,637

Device	Routing	Invert	Outlet Devices
#1	Discarded	120.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'
#2	Primary	121.50'	**6.0" Round Culvert X 2.00** L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.20' S= 0.0600 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.00 cfs @ 24.02 hrs HW=120.00' (Free Discharge)
↑**1=Exfiltration** (Passes 0.00 cfs of 0.01 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=120.00' TW=118.75' (Dynamic Tailwater)
↑**2=Culvert** (Controls 0.00 cfs)

Summary for Pond IC1: Underground Infiltration

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=298)

Inflow Area = 14,217 sf, 79.40% Impervious, Inflow Depth = 1.41" for 2-yr event
Inflow = 0.68 cfs @ 12.12 hrs, Volume= 1,672 cf
Outflow = 0.09 cfs @ 12.72 hrs, Volume= 1,673 cf, Atten= 87%, Lag= 36.2 min
Discarded = 0.09 cfs @ 12.72 hrs, Volume= 1,673 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 118.22' @ 12.72 hrs Surf.Area= 998 sf Storage= 750 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 81.5 min (864.4 - 782.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	117.00'	793 cf	**15.75'W x 53.46'L x 3.50'H Field A** 2,947 cf Overall - 965 cf Embedded = 1,982 cf x 40.0% Voids
#2A	117.50'	965 cf	**ADS_StormTech SC-740 +Cap** x 21 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 21 Chambers in 3 Rows
#3B	117.00'	163 cf	**6.25'W x 24.98'L x 3.50'H Field B** 546 cf Overall - 138 cf Embedded = 409 cf x 40.0% Voids
#4B	117.50'	138 cf	**ADS_StormTech SC-740 +Cap** x 3 Inside #3 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		2,059 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'
#2	Primary	119.42'	**12.0" Round Overflow Pipe** L= 14.2' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.42' / 119.35' S= 0.0049 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Discarded OutFlow Max=0.09 cfs @ 12.72 hrs HW=118.22' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=117.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Overflow Pipe** (Controls 0.00 cfs)

Pond IC1: Underground Infiltration - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

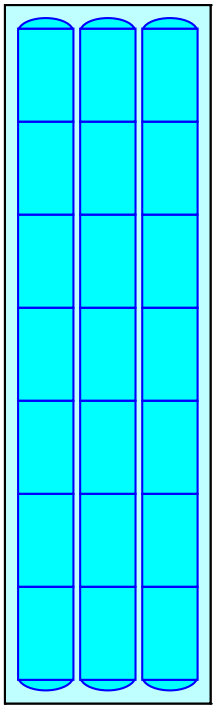
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

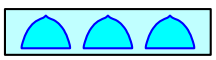
21 Chambers x 45.9 cf = 964.7 cf Chamber Storage

2,946.8 cf Field - 964.7 cf Chambers = 1,982.1 cf Stone x 40.0% Voids = 792.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,757.6 cf = 0.040 af
Overall Storage Efficiency = 59.6%
Overall System Size = 53.46' x 15.75' x 3.50'

21 Chambers
109.1 cy Field
73.4 cy Stone





Pond IC1: Underground Infiltration - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

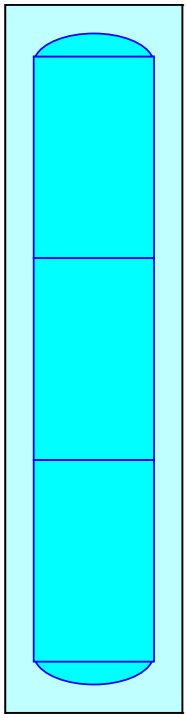
3 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 22.98' Row Length +12.0" End Stone x 2 = 24.98' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

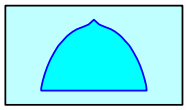
3 Chambers x 45.9 cf = 137.8 cf Chamber Storage

546.4 cf Field - 137.8 cf Chambers = 408.5 cf Stone x 40.0% Voids = 163.4 cf Stone Storage

Chamber Storage + Stone Storage = 301.2 cf = 0.007 af
Overall Storage Efficiency = 55.1%
Overall System Size = 24.98' x 6.25' x 3.50'

3 Chambers
20.2 cy Field
15.1 cy Stone





Summary for Pond IC2: Underground Infiltration

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=531)

Inflow Area = 40,519 sf, 20.57% Impervious, Inflow Depth = 0.23" for 2-yr event
Inflow = 0.24 cfs @ 12.10 hrs, Volume= 775 cf
Outflow = 0.07 cfs @ 12.48 hrs, Volume= 776 cf, Atten= 69%, Lag= 22.9 min
Discarded = 0.07 cfs @ 12.48 hrs, Volume= 776 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 117.29' @ 12.48 hrs Surf.Area= 1,155 sf Storage= 134 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 9.4 min (873.1 - 863.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	117.00'	895 cf	**15.75'W x 60.58'L x 3.50'H Field A** 3,339 cf Overall - 1,103 cf Embedded = 2,237 cf x 40.0% Voids
#2A	117.50'	1,103 cf	**ADS_StormTech SC-740 +Cap** x 24 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 24 Chambers in 3 Rows
#3B	117.00'	207 cf	**6.25'W x 32.10'L x 3.50'H Field B** 702 cf Overall - 184 cf Embedded = 518 cf x 40.0% Voids
#4B	117.50'	184 cf	**ADS_StormTech SC-740 +Cap** x 4 Inside #3 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		2,388 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'

Discarded OutFlow Max=0.07 cfs @ 12.48 hrs HW=117.29' (Free Discharge)
↑**1=Exfiltration** (Controls 0.07 cfs)

Pond IC2: Underground Infiltration - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

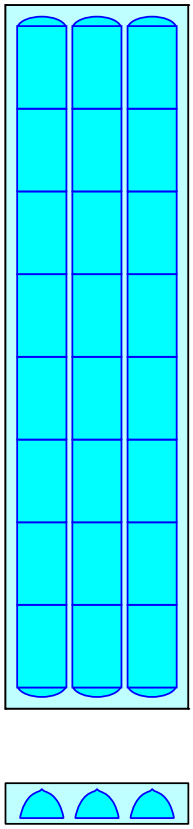
8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

24 Chambers x 45.9 cf = 1,102.6 cf Chamber Storage

3,339.3 cf Field - 1,102.6 cf Chambers = 2,236.7 cf Stone x 40.0% Voids = 894.7 cf Stone Storage

Chamber Storage + Stone Storage = 1,997.3 cf = 0.046 af
Overall Storage Efficiency = 59.8%
Overall System Size = 60.58' x 15.75' x 3.50'

24 Chambers
123.7 cy Field
82.8 cy Stone



Pond IC2: Underground Infiltration - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

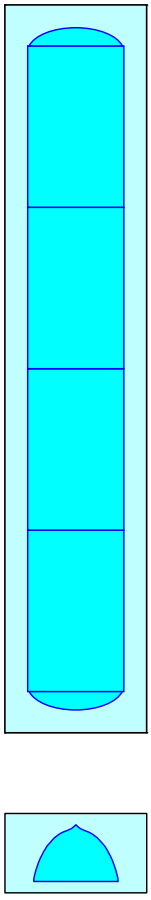
4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

4 Chambers x 45.9 cf = 183.8 cf Chamber Storage

702.1 cf Field - 183.8 cf Chambers = 518.4 cf Stone x 40.0% Voids = 207.3 cf Stone Storage

Chamber Storage + Stone Storage = 391.1 cf = 0.009 af
Overall Storage Efficiency = 55.7%
Overall System Size = 32.10' x 6.25' x 3.50'

4 Chambers
26.0 cy Field
19.2 cy Stone



Summary for Pond IC3: Underground Infiltration

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=492)

Inflow Area = 13,897 sf, 52.89% Impervious, Inflow Depth = 0.78" for 2-yr event
Inflow = 0.25 cfs @ 12.10 hrs, Volume= 899 cf
Outflow = 0.07 cfs @ 12.55 hrs, Volume= 900 cf, Atten= 73%, Lag= 26.6 min
Discarded = 0.07 cfs @ 12.55 hrs, Volume= 900 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 117.46' @ 12.55 hrs Surf.Area= 976 sf Storage= 179 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 15.9 min (897.0 - 881.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	117.00'	628 cf	**18.67'W x 52.31'L x 2.00'H Field A** 1,953 cf Overall - 383 cf Embedded = 1,570 cf x 40.0% Voids
#2A	117.50'	383 cf	**ADS_StormTech SC-160LP +Cap** x 56 Inside #1 Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap 56 Chambers in 8 Rows
#3	119.00'	3,795 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		4,806 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.00	455	0	0
120.00	1,105	780	780
121.00	1,495	1,300	2,080
122.00	1,935	1,715	3,795

Device	Routing	Invert	Outlet Devices
#1	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'

Discarded OutFlow Max=0.07 cfs @ 12.55 hrs HW=117.46' (Free Discharge)
↑**1=Exfiltration** (Controls 0.07 cfs)

Pond IC3: Underground Infiltration - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-160LP +Cap (ADS StormTech® SC-160LP with cap length)
Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf
Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap

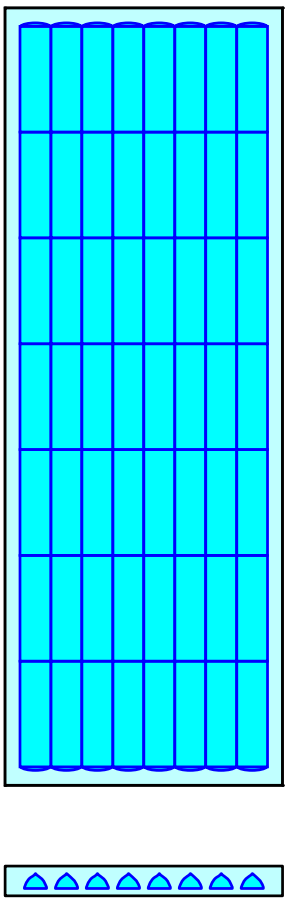
7 Chambers/Row x 7.12' Long +0.23' Cap Length x 2 = 50.31' Row Length +12.0" End Stone x 2 = 52.31' Base Length
8 Rows x 25.0" Wide + 12.0" Side Stone x 2 = 18.67' Base Width
6.0" Stone Base + 12.0" Chamber Height + 6.0" Stone Cover = 2.00' Field Height

56 Chambers x 6.8 cf = 382.9 cf Chamber Storage

1,952.8 cf Field - 382.9 cf Chambers = 1,569.9 cf Stone x 40.0% Voids = 628.0 cf Stone Storage

Chamber Storage + Stone Storage = 1,010.8 cf = 0.023 af
Overall Storage Efficiency = 51.8%
Overall System Size = 52.31' x 18.67' x 2.00'

56 Chambers
72.3 cy Field
58.1 cy Stone



Summary for Link AP1: Boylston Street

Inflow Area = 532 sf, 77.44% Impervious, Inflow Depth = 1.83" for 2-yr event
Inflow = 0.03 cfs @ 12.09 hrs, Volume= 81 cf
Primary = 0.03 cfs @ 12.09 hrs, Volume= 81 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Summary for Link AP2: Town Drainage

Inflow Area = 14,217 sf, 79.40% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Time span=5.00-36.00 hrs, dt=0.01 hrs, 3101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Drain to Rear Depression Runoff Area=31,523 sf 10.10% Impervious Runoff Depth=0.23"
Flow Length=152' Tc=14.1 min CN=39 Runoff=0.03 cfs 614 cf

Subcatchment 2: Drain to CB2 Runoff Area=8,996 sf 57.25% Impervious Runoff Depth=2.41"
Tc=6.0 min CN=73 Runoff=0.58 cfs 1,804 cf

Subcatchment 3: Abutter to 12" pipe Runoff Area=13,897 sf 52.89% Impervious Runoff Depth=1.99"
Tc=6.0 min CN=68 Runoff=0.73 cfs 2,310 cf

Subcatchment 4: Overland to middle Runoff Area=14,217 sf 79.40% Impervious Runoff Depth=3.62"
Tc=6.0 min CN=86 Runoff=1.36 cfs 4,285 cf

Subcatchment 5: Overland flow to Boylston St Runoff Area=532 sf 77.44% Impervious Runoff Depth=3.52"
Tc=6.0 min CN=85 Runoff=0.05 cfs 156 cf

Pond 3P: Middle Island Peak Elev=121.19' Storage=223 cf Inflow=1.36 cfs 4,285 cf
Discarded=0.02 cfs 679 cf Primary=1.28 cfs 3,606 cf Outflow=1.30 cfs 4,285 cf

Pond CB2: CB2 Peak Elev=119.18' Inflow=0.58 cfs 1,804 cf
12.0" Round Culvert n=0.010 L=20.0' S=0.0300 '/' Outflow=0.58 cfs 1,804 cf

Pond IB1: Rear Depression Peak Elev=120.50' Storage=111 cf Inflow=0.03 cfs 614 cf
Discarded=0.02 cfs 614 cf Primary=0.00 cfs 0 cf Outflow=0.02 cfs 614 cf

Pond IC1: Underground Infiltration Peak Elev=119.56' Storage=1,650 cf Inflow=1.28 cfs 3,606 cf
Discarded=0.13 cfs 3,520 cf Primary=0.06 cfs 87 cf Outflow=0.18 cfs 3,607 cf

Pond IC2: Underground Infiltration Peak Elev=117.86' Storage=558 cf Inflow=0.58 cfs 1,804 cf
Outflow=0.09 cfs 1,805 cf

Pond IC3: Underground Infiltration Peak Elev=118.46' Storage=800 cf Inflow=0.73 cfs 2,310 cf
Outflow=0.09 cfs 2,310 cf

Link AP1: Boylston Street Inflow=0.05 cfs 156 cf
Primary=0.05 cfs 156 cf

Link AP2: Town Drainage Inflow=0.06 cfs 87 cf
Primary=0.06 cfs 87 cf

Total Runoff Area = 69,165 sf Runoff Volume = 9,168 cf Average Runoff Depth = 1.59"
60.41% Pervious = 41,780 sf 39.59% Impervious = 27,385 sf

Summary for Subcatchment 1: Drain to Rear Depression

Runoff = 0.03 cfs @ 12.58 hrs, Volume= 614 cf, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
19,697	30	Woods, Good, HSG A
3,448	39	>75% Grass cover, Good, HSG A
8,378	61	1/4 acre lots, 38% imp, HSG A
31,523	39	Weighted Average
28,339		89.90% Pervious Area
3,184		10.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.28"
1.8	75	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	27	0.1480	5.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	152	Total			

Summary for Subcatchment 2: Drain to CB2

Runoff = 0.58 cfs @ 12.09 hrs, Volume= 1,804 cf, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
3,846	39	>75% Grass cover, Good, HSG A
5,150	98	Paved parking, HSG A
8,996	73	Weighted Average
3,846		42.75% Pervious Area
5,150		57.25% Impervious Area

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

Summary for Subcatchment 3: Abutter to 12" pipe Offsite Drainage

Runoff = 0.73 cfs @ 12.09 hrs, Volume= 2,310 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
3,349	30	Woods, Good, HSG A
1,039	61	1/4 acre lots, 38% imp, HSG A
3,615	89	Urban commercial, 85% imp, HSG A
2,011	39	>75% Grass cover, Good, HSG A
1,663	98	Paved parking, HSG A
2,220	98	Roofs, HSG A
13,897	68	Weighted Average
6,546		47.11% Pervious Area
7,351		52.89% Impervious Area

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

Summary for Subcatchment 4: Overland to middle landscape pond

Runoff = 1.36 cfs @ 12.09 hrs, Volume= 4,285 cf, Depth= 3.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
1,335	89	Urban commercial, 85% imp, HSG A
3,633	98	Roofs, HSG A
6,521	98	Paved parking, HSG A
2,728	39	>75% Grass cover, Good, HSG A
14,217	86	Weighted Average
2,928		20.60% Pervious Area
11,289		79.40% Impervious Area

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

Summary for Subcatchment 5: Overland flow to Boylston St

Runoff = 0.05 cfs @ 12.09 hrs, Volume= 156 cf, Depth= 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.16"

Area (sf)	CN	Description
120	39	>75% Grass cover, Good, HSG A
412	98	Paved parking, HSG A
532	85	Weighted Average
120		22.56% Pervious Area
412		77.44% Impervious Area

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

Summary for Pond 3P: Middle Island

Inflow Area = 14,217 sf, 79.40% Impervious, Inflow Depth = 3.62" for 10-yr event
Inflow = 1.36 cfs @ 12.09 hrs, Volume= 4,285 cf
Outflow = 1.30 cfs @ 12.11 hrs, Volume= 4,285 cf, Atten= 5%, Lag= 1.6 min
Discarded = 0.02 cfs @ 12.11 hrs, Volume= 679 cf
Primary = 1.28 cfs @ 12.11 hrs, Volume= 3,606 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 121.19' @ 12.11 hrs Surf.Area= 322 sf Storage= 223 cf

Plug-Flow detention time= 18.2 min calculated for 4,283 cf (100% of inflow)
Center-of-Mass det. time= 18.3 min (821.5 - 803.2)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	585 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	81	67.6	0	0	81
121.00	274	113.8	168	168	754
122.00	579	133.0	417	585	1,151

Device	Routing	Invert	Outlet Devices
#1	Primary	120.50'	**12.0" Round Culvert** L= 3.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 120.50' / 119.00' S= 0.5000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	120.50'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	120.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 12.11 hrs HW=121.18' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=1.28 cfs @ 12.11 hrs HW=121.18' TW=118.31' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.28 cfs @ 2.22 fps)
└**2=Orifice/Grate** (Passes 1.28 cfs of 1.62 cfs potential flow)

Summary for Pond CB2: CB2

[57] Hint: Peaked at 119.18' (Flood elevation advised)

Inflow Area = 40,519 sf, 20.57% Impervious, Inflow Depth = 0.53" for 10-yr event
Inflow = 0.58 cfs @ 12.09 hrs, Volume= 1,804 cf
Outflow = 0.58 cfs @ 12.09 hrs, Volume= 1,804 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.58 cfs @ 12.09 hrs, Volume= 1,804 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 119.18' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	118.75'	**12.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 118.75' / 118.15' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.58 cfs @ 12.09 hrs HW=119.18' TW=117.50' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.58 cfs @ 1.77 fps)

Summary for Pond IB1: Rear Depression

Inflow Area = 31,523 sf, 10.10% Impervious, Inflow Depth = 0.23" for 10-yr event
Inflow = 0.03 cfs @ 12.58 hrs, Volume= 614 cf
Outflow = 0.02 cfs @ 15.93 hrs, Volume= 614 cf, Atten= 49%, Lag= 201.0 min
Discarded = 0.02 cfs @ 15.93 hrs, Volume= 614 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 120.50' @ 15.93 hrs Surf.Area= 291 sf Storage= 111 cf

Plug-Flow detention time= 76.4 min calculated for 613 cf (100% of inflow)
Center-of-Mass det. time= 76.5 min (1,083.7 - 1,007.2)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	1,081 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	156	108.1	0	0	156
121.00	464	127.8	296	296	544
122.00	1,158	173.0	785	1,081	1,637

Device	Routing	Invert	Outlet Devices
#1	Discarded	120.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'
#2	Primary	121.50'	**6.0" Round Culvert X 2.00** L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.20' S= 0.0600 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.02 cfs @ 15.93 hrs HW=120.50' (Free Discharge)
↑**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=120.00' TW=118.75' (Dynamic Tailwater)
↑**2=Culvert** (Controls 0.00 cfs)

Summary for Pond IC1: Underground Infiltration

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=170)

Inflow Area = 14,217 sf, 79.40% Impervious, Inflow Depth = 3.04" for 10-yr event
Inflow = 1.28 cfs @ 12.11 hrs, Volume= 3,606 cf
Outflow = 0.18 cfs @ 12.65 hrs, Volume= 3,607 cf, Atten= 86%, Lag= 32.3 min
Discarded = 0.13 cfs @ 12.65 hrs, Volume= 3,520 cf
Primary = 0.06 cfs @ 12.65 hrs, Volume= 87 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 119.56' @ 12.65 hrs Surf.Area= 998 sf Storage= 1,650 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 133.0 min (922.7 - 789.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	117.00'	793 cf	**15.75'W x 53.46'L x 3.50'H Field A** 2,947 cf Overall - 965 cf Embedded = 1,982 cf x 40.0% Voids
#2A	117.50'	965 cf	**ADS_StormTech SC-740 +Cap** x 21 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 21 Chambers in 3 Rows
#3B	117.00'	163 cf	**6.25'W x 24.98'L x 3.50'H Field B** 546 cf Overall - 138 cf Embedded = 409 cf x 40.0% Voids
#4B	117.50'	138 cf	**ADS_StormTech SC-740 +Cap** x 3 Inside #3 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		2,059 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'
#2	Primary	119.42'	**12.0" Round Overflow Pipe** L= 14.2' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.42' / 119.35' S= 0.0049 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Discarded OutFlow Max=0.13 cfs @ 12.65 hrs HW=119.56' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.13 cfs)

Primary OutFlow Max=0.06 cfs @ 12.65 hrs HW=119.56' TW=0.00' (Dynamic Tailwater)
↑—**2=Overflow Pipe** (Barrel Controls 0.06 cfs @ 1.32 fps)

Pond IC1: Underground Infiltration - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

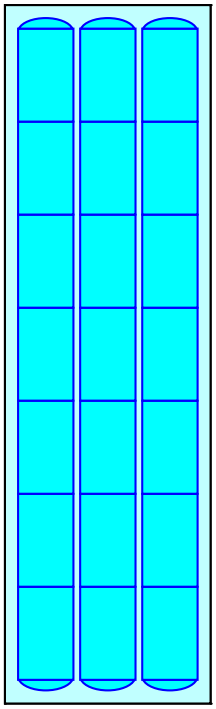
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

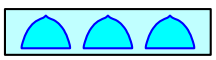
21 Chambers x 45.9 cf = 964.7 cf Chamber Storage

2,946.8 cf Field - 964.7 cf Chambers = 1,982.1 cf Stone x 40.0% Voids = 792.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,757.6 cf = 0.040 af
Overall Storage Efficiency = 59.6%
Overall System Size = 53.46' x 15.75' x 3.50'

21 Chambers
109.1 cy Field
73.4 cy Stone





Pond IC1: Underground Infiltration - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

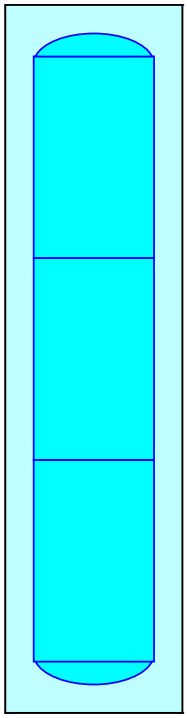
3 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 22.98' Row Length +12.0" End Stone x 2 = 24.98' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

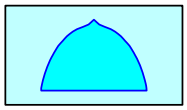
3 Chambers x 45.9 cf = 137.8 cf Chamber Storage

546.4 cf Field - 137.8 cf Chambers = 408.5 cf Stone x 40.0% Voids = 163.4 cf Stone Storage

Chamber Storage + Stone Storage = 301.2 cf = 0.007 af
Overall Storage Efficiency = 55.1%
Overall System Size = 24.98' x 6.25' x 3.50'

3 Chambers
20.2 cy Field
15.1 cy Stone





Summary for Pond IC2: Underground Infiltration

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=393)

Inflow Area = 40,519 sf, 20.57% Impervious, Inflow Depth = 0.53" for 10-yr event
Inflow = 0.58 cfs @ 12.09 hrs, Volume= 1,804 cf
Outflow = 0.09 cfs @ 12.61 hrs, Volume= 1,805 cf, Atten= 84%, Lag= 31.3 min
Discarded = 0.09 cfs @ 12.61 hrs, Volume= 1,805 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 117.86' @ 12.61 hrs Surf.Area= 1,155 sf Storage= 558 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 46.4 min (884.8 - 838.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	117.00'	895 cf	**15.75'W x 60.58'L x 3.50'H Field A** 3,339 cf Overall - 1,103 cf Embedded = 2,237 cf x 40.0% Voids
#2A	117.50'	1,103 cf	**ADS_StormTech SC-740 +Cap** x 24 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 24 Chambers in 3 Rows
#3B	117.00'	207 cf	**6.25'W x 32.10'L x 3.50'H Field B** 702 cf Overall - 184 cf Embedded = 518 cf x 40.0% Voids
#4B	117.50'	184 cf	**ADS_StormTech SC-740 +Cap** x 4 Inside #3 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		2,388 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'

Discarded OutFlow Max=0.09 cfs @ 12.61 hrs HW=117.86' (Free Discharge)
1=Exfiltration (Controls 0.09 cfs)

Pond IC2: Underground Infiltration - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

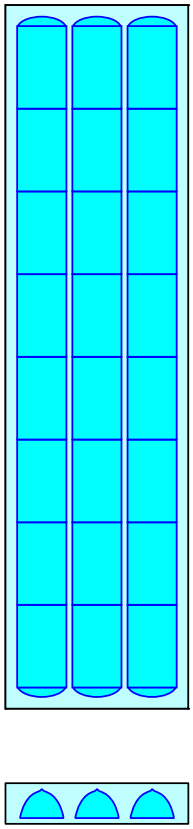
8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

24 Chambers x 45.9 cf = 1,102.6 cf Chamber Storage

3,339.3 cf Field - 1,102.6 cf Chambers = 2,236.7 cf Stone x 40.0% Voids = 894.7 cf Stone Storage

Chamber Storage + Stone Storage = 1,997.3 cf = 0.046 af
Overall Storage Efficiency = 59.8%
Overall System Size = 60.58' x 15.75' x 3.50'

24 Chambers
123.7 cy Field
82.8 cy Stone



Pond IC2: Underground Infiltration - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

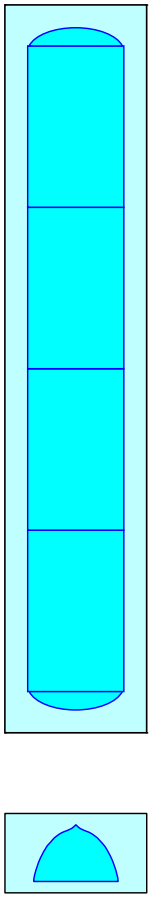
4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

4 Chambers x 45.9 cf = 183.8 cf Chamber Storage

702.1 cf Field - 183.8 cf Chambers = 518.4 cf Stone x 40.0% Voids = 207.3 cf Stone Storage

Chamber Storage + Stone Storage = 391.1 cf = 0.009 af
Overall Storage Efficiency = 55.7%
Overall System Size = 32.10' x 6.25' x 3.50'

4 Chambers
26.0 cy Field
19.2 cy Stone



Summary for Pond IC3: Underground Infiltration

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=275)

Inflow Area = 13,897 sf, 52.89% Impervious, Inflow Depth = 1.99" for 10-yr event
Inflow = 0.73 cfs @ 12.09 hrs, Volume= 2,310 cf
Outflow = 0.09 cfs @ 12.88 hrs, Volume= 2,310 cf, Atten= 87%, Lag= 46.9 min
Discarded = 0.09 cfs @ 12.88 hrs, Volume= 2,310 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 118.46' @ 12.88 hrs Surf.Area= 976 sf Storage= 800 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 81.0 min (932.1 - 851.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	117.00'	628 cf	**18.67'W x 52.31'L x 2.00'H Field A** 1,953 cf Overall - 383 cf Embedded = 1,570 cf x 40.0% Voids
#2A	117.50'	383 cf	**ADS_StormTech SC-160LP +Cap** x 56 Inside #1 Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap 56 Chambers in 8 Rows
#3	119.00'	3,795 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		4,806 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.00	455	0	0
120.00	1,105	780	780
121.00	1,495	1,300	2,080
122.00	1,935	1,715	3,795

Device	Routing	Invert	Outlet Devices
#1	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'

Discarded OutFlow Max=0.09 cfs @ 12.88 hrs HW=118.46' (Free Discharge)
1=Exfiltration (Controls 0.09 cfs)

Pond IC3: Underground Infiltration - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-160LP +Cap (ADS StormTech® SC-160LP with cap length)
Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf
Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap

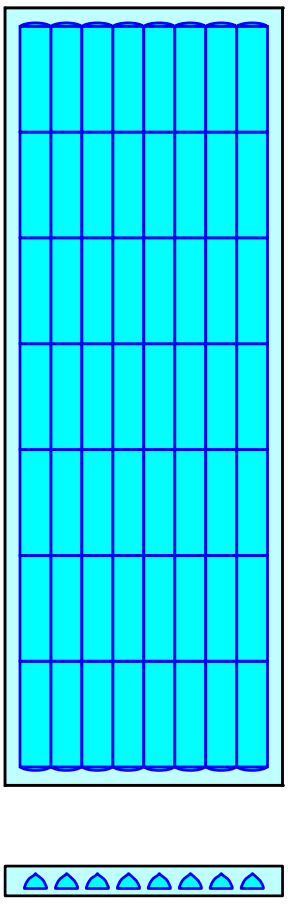
7 Chambers/Row x 7.12' Long +0.23' Cap Length x 2 = 50.31' Row Length +12.0" End Stone x 2 = 52.31' Base Length
8 Rows x 25.0" Wide + 12.0" Side Stone x 2 = 18.67' Base Width
6.0" Stone Base + 12.0" Chamber Height + 6.0" Stone Cover = 2.00' Field Height

56 Chambers x 6.8 cf = 382.9 cf Chamber Storage

1,952.8 cf Field - 382.9 cf Chambers = 1,569.9 cf Stone x 40.0% Voids = 628.0 cf Stone Storage

Chamber Storage + Stone Storage = 1,010.8 cf = 0.023 af
Overall Storage Efficiency = 51.8%
Overall System Size = 52.31' x 18.67' x 2.00'

56 Chambers
72.3 cy Field
58.1 cy Stone



Summary for Link AP1: Boylston Street

Inflow Area = 532 sf, 77.44% Impervious, Inflow Depth = 3.52" for 10-yr event
Inflow = 0.05 cfs @ 12.09 hrs, Volume= 156 cf
Primary = 0.05 cfs @ 12.09 hrs, Volume= 156 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Summary for Link AP2: Town Drainage

Inflow Area = 14,217 sf, 79.40% Impervious, Inflow Depth = 0.07" for 10-yr event
Inflow = 0.06 cfs @ 12.65 hrs, Volume= 87 cf
Primary = 0.06 cfs @ 12.65 hrs, Volume= 87 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Time span=5.00-36.00 hrs, dt=0.01 hrs, 3101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Drain to Rear Depression Runoff Area=31,523 sf 10.10% Impervious Runoff Depth=0.54"
Flow Length=152' Tc=14.1 min CN=39 Runoff=0.16 cfs 1,429 cf

Subcatchment 2: Drain to CB2 Runoff Area=8,996 sf 57.25% Impervious Runoff Depth=3.36"
Tc=6.0 min CN=73 Runoff=0.81 cfs 2,522 cf

Subcatchment 3: Abutter to 12" pipe Runoff Area=13,897 sf 52.89% Impervious Runoff Depth=2.88"
Tc=6.0 min CN=68 Runoff=1.07 cfs 3,331 cf

Subcatchment 4: Overland to middle Runoff Area=14,217 sf 79.40% Impervious Runoff Depth>4.72"
Tc=6.0 min CN=86 Runoff=1.76 cfs 5,596 cf

Subcatchment 5: Overland flow to Boylston St Runoff Area=532 sf 77.44% Impervious Runoff Depth=4.61"
Tc=6.0 min CN=85 Runoff=0.06 cfs 205 cf

Pond 3P: Middle Island Peak Elev=121.31' Storage=265 cf Inflow=1.76 cfs 5,596 cf
Discarded=0.02 cfs 723 cf Primary=1.64 cfs 4,873 cf Outflow=1.66 cfs 5,596 cf

Pond CB2: CB2 Peak Elev=119.28' Inflow=0.81 cfs 2,522 cf
12.0" Round Culvert n=0.010 L=20.0' S=0.0300 '/' Outflow=0.81 cfs 2,522 cf

Pond IB1: Rear Depression Peak Elev=121.24' Storage=423 cf Inflow=0.16 cfs 1,429 cf
Discarded=0.04 cfs 1,429 cf Primary=0.00 cfs 0 cf Outflow=0.04 cfs 1,429 cf

Pond IC1: Underground Infiltration Peak Elev=119.88' Storage=1,811 cf Inflow=1.64 cfs 4,873 cf
Discarded=0.14 cfs 4,073 cf Primary=0.55 cfs 801 cf Outflow=0.68 cfs 4,874 cf

Pond IC2: Underground Infiltration Peak Elev=118.23' Storage=884 cf Inflow=0.81 cfs 2,522 cf
Outflow=0.10 cfs 2,523 cf

Pond IC3: Underground Infiltration Peak Elev=119.35' Storage=1,208 cf Inflow=1.07 cfs 3,331 cf
Outflow=0.16 cfs 3,332 cf

Link AP1: Boylston Street Inflow=0.06 cfs 205 cf
Primary=0.06 cfs 205 cf

Link AP2: Town Drainage Inflow=0.55 cfs 801 cf
Primary=0.55 cfs 801 cf

Total Runoff Area = 69,165 sf Runoff Volume = 13,083 cf Average Runoff Depth = 2.27"
60.41% Pervious = 41,780 sf 39.59% Impervious = 27,385 sf

Summary for Subcatchment 1: Drain to Rear Depression

Runoff = 0.16 cfs @ 12.44 hrs, Volume= 1,429 cf, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.33"

Area (sf)	CN	Description
19,697	30	Woods, Good, HSG A
3,448	39	>75% Grass cover, Good, HSG A
8,378	61	1/4 acre lots, 38% imp, HSG A
31,523	39	Weighted Average
28,339		89.90% Pervious Area
3,184		10.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.28"
1.8	75	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	27	0.1480	5.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	152	Total			

Summary for Subcatchment 2: Drain to CB2

Runoff = 0.81 cfs @ 12.09 hrs, Volume= 2,522 cf, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.33"

Area (sf)	CN	Description
3,846	39	>75% Grass cover, Good, HSG A
5,150	98	Paved parking, HSG A
8,996	73	Weighted Average
3,846		42.75% Pervious Area
5,150		57.25% Impervious Area

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

Summary for Subcatchment 3: Abutter to 12" pipe Offsite Drainage

Runoff = 1.07 cfs @ 12.09 hrs, Volume= 3,331 cf, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.33"

Area (sf)	CN	Description
3,349	30	Woods, Good, HSG A
1,039	61	1/4 acre lots, 38% imp, HSG A
3,615	89	Urban commercial, 85% imp, HSG A
2,011	39	>75% Grass cover, Good, HSG A
1,663	98	Paved parking, HSG A
2,220	98	Roofs, HSG A
13,897	68	Weighted Average
6,546		47.11% Pervious Area
7,351		52.89% Impervious Area

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

Summary for Subcatchment 4: Overland to middle landscape pond

Runoff = 1.76 cfs @ 12.09 hrs, Volume= 5,596 cf, Depth> 4.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.33"

Area (sf)	CN	Description
1,335	89	Urban commercial, 85% imp, HSG A
3,633	98	Roofs, HSG A
6,521	98	Paved parking, HSG A
2,728	39	>75% Grass cover, Good, HSG A
14,217	86	Weighted Average
2,928		20.60% Pervious Area
11,289		79.40% Impervious Area

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

Summary for Subcatchment 5: Overland flow to Boylston St

Runoff = 0.06 cfs @ 12.09 hrs, Volume= 205 cf, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.33"

Area (sf)	CN	Description
120	39	>75% Grass cover, Good, HSG A
412	98	Paved parking, HSG A
532	85	Weighted Average
120		22.56% Pervious Area
412		77.44% Impervious Area

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

Summary for Pond 3P: Middle Island

Inflow Area = 14,217 sf, 79.40% Impervious, Inflow Depth > 4.72" for 25-yr event
Inflow = 1.76 cfs @ 12.09 hrs, Volume= 5,596 cf
Outflow = 1.66 cfs @ 12.11 hrs, Volume= 5,596 cf, Atten= 6%, Lag= 1.7 min
Discarded = 0.02 cfs @ 12.11 hrs, Volume= 723 cf
Primary = 1.64 cfs @ 12.11 hrs, Volume= 4,873 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 121.31' @ 12.11 hrs Surf.Area= 356 sf Storage= 265 cf

Plug-Flow detention time= 15.2 min calculated for 5,594 cf (100% of inflow)
Center-of-Mass det. time= 15.3 min (811.1 - 795.8)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	585 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	81	67.6	0	0	81
121.00	274	113.8	168	168	754
122.00	579	133.0	417	585	1,151

Device	Routing	Invert	Outlet Devices
#1	Primary	120.50'	**12.0" Round Culvert** L= 3.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 120.50' / 119.00' S= 0.5000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	120.50'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	120.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 12.11 hrs HW=121.31' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=1.64 cfs @ 12.11 hrs HW=121.31' TW=118.83' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.64 cfs @ 2.41 fps)
└**2=Orifice/Grate** (Passes 1.64 cfs of 2.08 cfs potential flow)

Summary for Pond CB2: CB2

[57] Hint: Peaked at 119.28' (Flood elevation advised)

Inflow Area = 40,519 sf, 20.57% Impervious, Inflow Depth = 0.75" for 25-yr event
Inflow = 0.81 cfs @ 12.09 hrs, Volume= 2,522 cf
Outflow = 0.81 cfs @ 12.09 hrs, Volume= 2,522 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.81 cfs @ 12.09 hrs, Volume= 2,522 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 119.28' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	118.75'	**12.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 118.75' / 118.15' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.81 cfs @ 12.09 hrs HW=119.28' TW=117.67' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.81 cfs @ 1.95 fps)

Summary for Pond IB1: Rear Depression

Inflow Area = 31,523 sf, 10.10% Impervious, Inflow Depth = 0.54" for 25-yr event
Inflow = 0.16 cfs @ 12.44 hrs, Volume= 1,429 cf
Outflow = 0.04 cfs @ 15.56 hrs, Volume= 1,429 cf, Atten= 76%, Lag= 187.0 min
Discarded = 0.04 cfs @ 15.56 hrs, Volume= 1,429 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 121.24' @ 15.56 hrs Surf.Area= 601 sf Storage= 423 cf

Plug-Flow detention time= 157.9 min calculated for 1,429 cf (100% of inflow)
Center-of-Mass det. time= 158.0 min (1,113.9 - 956.0)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	1,081 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	156	108.1	0	0	156
121.00	464	127.8	296	296	544
122.00	1,158	173.0	785	1,081	1,637

Device	Routing	Invert	Outlet Devices
#1	Discarded	120.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'
#2	Primary	121.50'	**6.0" Round Culvert X 2.00** L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.20' S= 0.0600 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.04 cfs @ 15.56 hrs HW=121.24' (Free Discharge)
↑**1=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=120.00' TW=118.75' (Dynamic Tailwater)
↑**2=Culvert** (Controls 0.00 cfs)

Summary for Pond IC1: Underground Infiltration

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=125)

Inflow Area = 14,217 sf, 79.40% Impervious, Inflow Depth = 4.11" for 25-yr event
Inflow = 1.64 cfs @ 12.11 hrs, Volume= 4,873 cf
Outflow = 0.68 cfs @ 12.34 hrs, Volume= 4,874 cf, Atten= 58%, Lag= 13.8 min
Discarded = 0.14 cfs @ 12.34 hrs, Volume= 4,073 cf
Primary = 0.55 cfs @ 12.34 hrs, Volume= 801 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 119.88' @ 12.34 hrs Surf.Area= 998 sf Storage= 1,811 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 116.0 min (904.1 - 788.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	117.00'	793 cf	**15.75'W x 53.46'L x 3.50'H Field A** 2,947 cf Overall - 965 cf Embedded = 1,982 cf x 40.0% Voids
#2A	117.50'	965 cf	**ADS_StormTech SC-740 +Cap** x 21 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 21 Chambers in 3 Rows
#3B	117.00'	163 cf	**6.25'W x 24.98'L x 3.50'H Field B** 546 cf Overall - 138 cf Embedded = 409 cf x 40.0% Voids
#4B	117.50'	138 cf	**ADS_StormTech SC-740 +Cap** x 3 Inside #3 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		2,059 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'
#2	Primary	119.42'	**12.0" Round Overflow Pipe** L= 14.2' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.42' / 119.35' S= 0.0049 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Discarded OutFlow Max=0.14 cfs @ 12.34 hrs HW=119.88' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.14 cfs)

Primary OutFlow Max=0.55 cfs @ 12.34 hrs HW=119.88' TW=0.00' (Dynamic Tailwater)
↑—**2=Overflow Pipe** (Barrel Controls 0.55 cfs @ 2.26 fps)

Pond IC1: Underground Infiltration - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

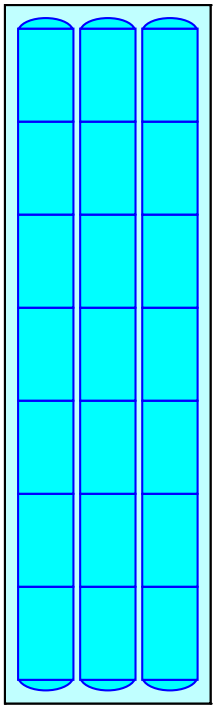
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

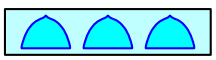
21 Chambers x 45.9 cf = 964.7 cf Chamber Storage

2,946.8 cf Field - 964.7 cf Chambers = 1,982.1 cf Stone x 40.0% Voids = 792.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,757.6 cf = 0.040 af
Overall Storage Efficiency = 59.6%
Overall System Size = 53.46' x 15.75' x 3.50'

21 Chambers
109.1 cy Field
73.4 cy Stone





Pond IC1: Underground Infiltration - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

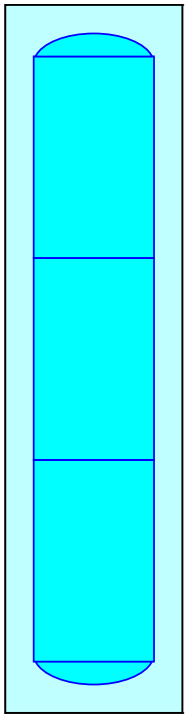
3 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 22.98' Row Length +12.0" End Stone x 2 = 24.98' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

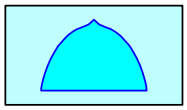
3 Chambers x 45.9 cf = 137.8 cf Chamber Storage

546.4 cf Field - 137.8 cf Chambers = 408.5 cf Stone x 40.0% Voids = 163.4 cf Stone Storage

Chamber Storage + Stone Storage = 301.2 cf = 0.007 af
Overall Storage Efficiency = 55.1%
Overall System Size = 24.98' x 6.25' x 3.50'

3 Chambers
20.2 cy Field
15.1 cy Stone





Summary for Pond IC2: Underground Infiltration

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=310)

Inflow Area = 40,519 sf, 20.57% Impervious, Inflow Depth = 0.75" for 25-yr event
Inflow = 0.81 cfs @ 12.09 hrs, Volume= 2,522 cf
Outflow = 0.10 cfs @ 12.75 hrs, Volume= 2,523 cf, Atten= 87%, Lag= 39.9 min
Discarded = 0.10 cfs @ 12.75 hrs, Volume= 2,523 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 118.23' @ 12.75 hrs Surf.Area= 1,155 sf Storage= 884 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 73.0 min (901.7 - 828.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	117.00'	895 cf	**15.75'W x 60.58'L x 3.50'H Field A** 3,339 cf Overall - 1,103 cf Embedded = 2,237 cf x 40.0% Voids
#2A	117.50'	1,103 cf	**ADS_StormTech SC-740 +Cap** x 24 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 24 Chambers in 3 Rows
#3B	117.00'	207 cf	**6.25'W x 32.10'L x 3.50'H Field B** 702 cf Overall - 184 cf Embedded = 518 cf x 40.0% Voids
#4B	117.50'	184 cf	**ADS_StormTech SC-740 +Cap** x 4 Inside #3 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		2,388 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'

Discarded OutFlow Max=0.10 cfs @ 12.75 hrs HW=118.23' (Free Discharge)
1=Exfiltration (Controls 0.10 cfs)

Pond IC2: Underground Infiltration - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

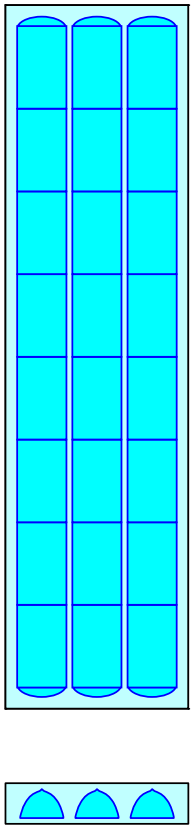
8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

24 Chambers x 45.9 cf = 1,102.6 cf Chamber Storage

3,339.3 cf Field - 1,102.6 cf Chambers = 2,236.7 cf Stone x 40.0% Voids = 894.7 cf Stone Storage

Chamber Storage + Stone Storage = 1,997.3 cf = 0.046 af
Overall Storage Efficiency = 59.8%
Overall System Size = 60.58' x 15.75' x 3.50'

24 Chambers
123.7 cy Field
82.8 cy Stone



Pond IC2: Underground Infiltration - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

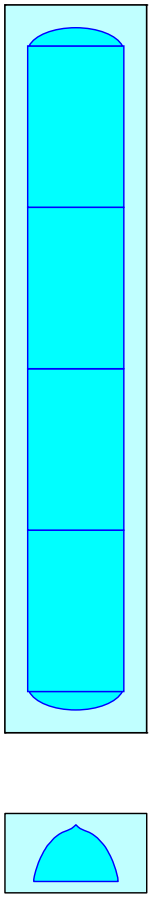
4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

4 Chambers x 45.9 cf = 183.8 cf Chamber Storage

702.1 cf Field - 183.8 cf Chambers = 518.4 cf Stone x 40.0% Voids = 207.3 cf Stone Storage

Chamber Storage + Stone Storage = 391.1 cf = 0.009 af
Overall Storage Efficiency = 55.7%
Overall System Size = 32.10' x 6.25' x 3.50'

4 Chambers
26.0 cy Field
19.2 cy Stone



Summary for Pond IC3: Underground Infiltration

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=191)

Inflow Area = 13,897 sf, 52.89% Impervious, Inflow Depth = 2.88" for 25-yr event
Inflow = 1.07 cfs @ 12.09 hrs, Volume= 3,331 cf
Outflow = 0.16 cfs @ 12.66 hrs, Volume= 3,332 cf, Atten= 85%, Lag= 34.1 min
Discarded = 0.16 cfs @ 12.66 hrs, Volume= 3,332 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 119.35' @ 12.66 hrs Surf.Area= 1,657 sf Storage= 1,208 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 96.1 min (936.3 - 840.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	117.00'	628 cf	**18.67'W x 52.31'L x 2.00'H Field A** 1,953 cf Overall - 383 cf Embedded = 1,570 cf x 40.0% Voids
#2A	117.50'	383 cf	**ADS_StormTech SC-160LP +Cap** x 56 Inside #1 Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap 56 Chambers in 8 Rows
#3	119.00'	3,795 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		4,806 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.00	455	0	0
120.00	1,105	780	780
121.00	1,495	1,300	2,080
122.00	1,935	1,715	3,795

Device	Routing	Invert	Outlet Devices
#1	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'

Discarded OutFlow Max=0.16 cfs @ 12.66 hrs HW=119.35' (Free Discharge)
↑**1=Exfiltration** (Controls 0.16 cfs)

Pond IC3: Underground Infiltration - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-160LP +Cap (ADS StormTech® SC-160LP with cap length)
Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf
Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap

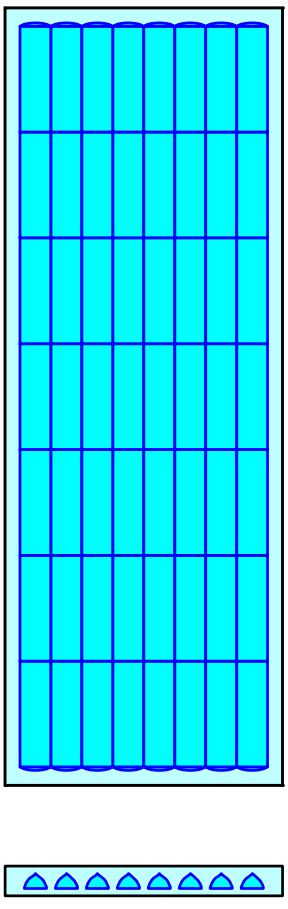
7 Chambers/Row x 7.12' Long +0.23' Cap Length x 2 = 50.31' Row Length +12.0" End Stone x 2 = 52.31' Base Length
8 Rows x 25.0" Wide + 12.0" Side Stone x 2 = 18.67' Base Width
6.0" Stone Base + 12.0" Chamber Height + 6.0" Stone Cover = 2.00' Field Height

56 Chambers x 6.8 cf = 382.9 cf Chamber Storage

1,952.8 cf Field - 382.9 cf Chambers = 1,569.9 cf Stone x 40.0% Voids = 628.0 cf Stone Storage

Chamber Storage + Stone Storage = 1,010.8 cf = 0.023 af
Overall Storage Efficiency = 51.8%
Overall System Size = 52.31' x 18.67' x 2.00'

56 Chambers
72.3 cy Field
58.1 cy Stone



Summary for Link AP1: Boylston Street

Inflow Area = 532 sf, 77.44% Impervious, Inflow Depth = 4.61" for 25-yr event
Inflow = 0.06 cfs @ 12.09 hrs, Volume= 205 cf
Primary = 0.06 cfs @ 12.09 hrs, Volume= 205 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Summary for Link AP2: Town Drainage

Inflow Area = 14,217 sf, 79.40% Impervious, Inflow Depth = 0.68" for 25-yr event
Inflow = 0.55 cfs @ 12.34 hrs, Volume= 801 cf
Primary = 0.55 cfs @ 12.34 hrs, Volume= 801 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Time span=5.00-36.00 hrs, dt=0.01 hrs, 3101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Drain to Rear Depression Runoff Area=31,523 sf 10.10% Impervious Runoff Depth=1.50"
Flow Length=152' Tc=14.1 min CN=39 Runoff=0.72 cfs 3,941 cf

Subcatchment 2: Drain to CB2 Runoff Area=8,996 sf 57.25% Impervious Runoff Depth=5.51"
Tc=6.0 min CN=73 Runoff=1.33 cfs 4,128 cf

Subcatchment 3: Abutter to 12" pipe Runoff Area=13,897 sf 52.89% Impervious Runoff Depth=4.90"
Tc=6.0 min CN=68 Runoff=1.83 cfs 5,673 cf

Subcatchment 4: Overland to middle Runoff Area=14,217 sf 79.40% Impervious Runoff Depth>7.07"
Tc=6.0 min CN=86 Runoff=2.59 cfs 8,382 cf

Subcatchment 5: Overland flow to Boylston St Runoff Area=532 sf 77.44% Impervious Runoff Depth>6.96"
Tc=6.0 min CN=85 Runoff=0.10 cfs 308 cf

Pond 3P: Middle Island Peak Elev=121.60' Storage=379 cf Inflow=2.59 cfs 8,382 cf
Discarded=0.02 cfs 784 cf Primary=2.31 cfs 7,598 cf Outflow=2.33 cfs 8,382 cf

Pond CB2: CB2 Peak Elev=120.36' Inflow=1.33 cfs 5,534 cf
12.0" Round Culvert n=0.010 L=20.0' S=0.0300 '/' Outflow=1.33 cfs 5,534 cf

Pond IB1: Rear Depression Peak Elev=121.79' Storage=854 cf Inflow=0.72 cfs 3,941 cf
Discarded=0.06 cfs 2,536 cf Primary=0.34 cfs 1,405 cf Outflow=0.40 cfs 3,941 cf

Pond IC1: Underground Infiltration Peak Elev=120.40' Storage=2,019 cf Inflow=2.31 cfs 7,598 cf
Discarded=0.15 cfs 5,050 cf Primary=1.90 cfs 2,548 cf Outflow=2.05 cfs 7,598 cf

Pond IC2: Underground Infiltration Peak Elev=120.36' Storage=2,323 cf Inflow=1.33 cfs 5,534 cf
Outflow=0.17 cfs 5,534 cf

Pond IC3: Underground Infiltration Peak Elev=120.40' Storage=2,268 cf Inflow=1.83 cfs 5,673 cf
Outflow=0.23 cfs 5,673 cf

Link AP1: Boylston Street Inflow=0.10 cfs 308 cf
Primary=0.10 cfs 308 cf

Link AP2: Town Drainage Inflow=1.90 cfs 2,548 cf
Primary=1.90 cfs 2,548 cf

Total Runoff Area = 69,165 sf Runoff Volume = 22,432 cf Average Runoff Depth = 3.89"
60.41% Pervious = 41,780 sf 39.59% Impervious = 27,385 sf

Summary for Subcatchment 1: Drain to Rear Depression

Runoff = 0.72 cfs @ 12.24 hrs, Volume= 3,941 cf, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.78"

Area (sf)	CN	Description
19,697	30	Woods, Good, HSG A
3,448	39	>75% Grass cover, Good, HSG A
8,378	61	1/4 acre lots, 38% imp, HSG A
31,523	39	Weighted Average
28,339		89.90% Pervious Area
3,184		10.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.28"
1.8	75	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	27	0.1480	5.77		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	152	Total			

Summary for Subcatchment 2: Drain to CB2

Runoff = 1.33 cfs @ 12.09 hrs, Volume= 4,128 cf, Depth= 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.78"

Area (sf)	CN	Description
3,846	39	>75% Grass cover, Good, HSG A
5,150	98	Paved parking, HSG A
8,996	73	Weighted Average
3,846		42.75% Pervious Area
5,150		57.25% Impervious Area

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

Summary for Subcatchment 3: Abutter to 12" pipe Offsite Drainage

Runoff = 1.83 cfs @ 12.09 hrs, Volume= 5,673 cf, Depth= 4.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.78"

Area (sf)	CN	Description
3,349	30	Woods, Good, HSG A
1,039	61	1/4 acre lots, 38% imp, HSG A
3,615	89	Urban commercial, 85% imp, HSG A
2,011	39	>75% Grass cover, Good, HSG A
1,663	98	Paved parking, HSG A
2,220	98	Roofs, HSG A
13,897	68	Weighted Average
6,546		47.11% Pervious Area
7,351		52.89% Impervious Area

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

Summary for Subcatchment 4: Overland to middle landscape pond

Runoff = 2.59 cfs @ 12.08 hrs, Volume= 8,382 cf, Depth> 7.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.78"

Area (sf)	CN	Description
1,335	89	Urban commercial, 85% imp, HSG A
3,633	98	Roofs, HSG A
6,521	98	Paved parking, HSG A
2,728	39	>75% Grass cover, Good, HSG A
14,217	86	Weighted Average
2,928		20.60% Pervious Area
11,289		79.40% Impervious Area

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

Summary for Subcatchment 5: Overland flow to Boylston St

Runoff = 0.10 cfs @ 12.08 hrs, Volume= 308 cf, Depth> 6.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.78"

Area (sf)	CN	Description
120	39	>75% Grass cover, Good, HSG A
412	98	Paved parking, HSG A
532	85	Weighted Average
120		22.56% Pervious Area
412		77.44% Impervious Area

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

Summary for Pond 3P: Middle Island

[82] Warning: Early inflow requires earlier time span

Inflow Area = 14,217 sf, 79.40% Impervious, Inflow Depth > 7.07" for 100-yr event
Inflow = 2.59 cfs @ 12.08 hrs, Volume= 8,382 cf
Outflow = 2.33 cfs @ 12.12 hrs, Volume= 8,382 cf, Atten= 10%, Lag= 2.3 min
Discarded = 0.02 cfs @ 12.12 hrs, Volume= 784 cf
Primary = 2.31 cfs @ 12.12 hrs, Volume= 7,598 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 121.60' @ 12.12 hrs Surf.Area= 442 sf Storage= 379 cf

Plug-Flow detention time= 11.8 min calculated for 8,379 cf (100% of inflow)
Center-of-Mass det. time= 11.9 min (797.6 - 785.8)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	585 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	81	67.6	0	0	81
121.00	274	113.8	168	168	754
122.00	579	133.0	417	585	1,151

Device	Routing	Invert	Outlet Devices
#1	Primary	120.50'	**12.0" Round Culvert** L= 3.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 120.50' / 119.00' S= 0.5000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	120.50'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	120.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 12.12 hrs HW=121.60' (Free Discharge)
↑└**3=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=2.30 cfs @ 12.12 hrs HW=121.60' TW=120.24' (Dynamic Tailwater)
↑└**1=Culvert** (Inlet Controls 2.30 cfs @ 2.93 fps)
↑└**2=Orifice/Grate** (Passes 2.30 cfs of 2.92 cfs potential flow)

Summary for Pond CB2: CB2

[57] Hint: Peaked at 120.36' (Flood elevation advised)

Inflow Area = 40,519 sf, 20.57% Impervious, Inflow Depth = 1.64" for 100-yr event
Inflow = 1.33 cfs @ 12.09 hrs, Volume= 5,534 cf
Outflow = 1.33 cfs @ 12.09 hrs, Volume= 5,534 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.33 cfs @ 12.09 hrs, Volume= 5,534 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 120.36' @ 13.82 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	118.75'	**12.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 118.75' / 118.15' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.33 cfs @ 12.09 hrs HW=119.45' TW=118.11' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.33 cfs @ 2.25 fps)

Summary for Pond IB1: Rear Depression

Inflow Area = 31,523 sf, 10.10% Impervious, Inflow Depth = 1.50" for 100-yr event
Inflow = 0.72 cfs @ 12.24 hrs, Volume= 3,941 cf
Outflow = 0.40 cfs @ 12.60 hrs, Volume= 3,941 cf, Atten= 44%, Lag= 21.3 min
Discarded = 0.06 cfs @ 12.60 hrs, Volume= 2,536 cf
Primary = 0.34 cfs @ 12.60 hrs, Volume= 1,405 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 121.79' @ 12.60 hrs Surf.Area= 984 sf Storage= 854 cf

Plug-Flow detention time= 123.1 min calculated for 3,940 cf (100% of inflow)
Center-of-Mass det. time= 123.2 min (1,032.0 - 908.8)

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	1,081 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	156	108.1	0	0	156
121.00	464	127.8	296	296	544
122.00	1,158	173.0	785	1,081	1,637

Device	Routing	Invert	Outlet Devices
#1	Discarded	120.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'
#2	Primary	121.50'	**6.0" Round Culvert X 2.00** L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.20' S= 0.0600 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.06 cfs @ 12.60 hrs HW=121.79' (Free Discharge)
↑**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.34 cfs @ 12.60 hrs HW=121.79' TW=119.44' (Dynamic Tailwater)
↑**2=Culvert** (Inlet Controls 0.34 cfs @ 1.44 fps)

Summary for Pond IC1: Underground Infiltration

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=41)

Inflow Area = 14,217 sf, 79.40% Impervious, Inflow Depth = 6.41" for 100-yr event
Inflow = 2.31 cfs @ 12.12 hrs, Volume= 7,598 cf
Outflow = 2.05 cfs @ 12.18 hrs, Volume= 7,598 cf, Atten= 11%, Lag= 3.4 min
Discarded = 0.15 cfs @ 12.18 hrs, Volume= 5,050 cf
Primary = 1.90 cfs @ 12.18 hrs, Volume= 2,548 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 120.40' @ 12.18 hrs Surf.Area= 998 sf Storage= 2,019 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 95.7 min (878.7 - 783.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	117.00'	793 cf	**15.75'W x 53.46'L x 3.50'H Field A** 2,947 cf Overall - 965 cf Embedded = 1,982 cf x 40.0% Voids
#2A	117.50'	965 cf	**ADS_StormTech SC-740 +Cap** x 21 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 21 Chambers in 3 Rows
#3B	117.00'	163 cf	**6.25'W x 24.98'L x 3.50'H Field B** 546 cf Overall - 138 cf Embedded = 409 cf x 40.0% Voids
#4B	117.50'	138 cf	**ADS_StormTech SC-740 +Cap** x 3 Inside #3 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		2,059 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'
#2	Primary	119.42'	**12.0" Round Overflow Pipe** L= 14.2' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.42' / 119.35' S= 0.0049 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Discarded OutFlow Max=0.15 cfs @ 12.18 hrs HW=120.40' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.15 cfs)

Primary OutFlow Max=1.90 cfs @ 12.18 hrs HW=120.40' TW=0.00' (Dynamic Tailwater)
↑—**2=Overflow Pipe** (Barrel Controls 1.90 cfs @ 3.07 fps)

Pond IC1: Underground Infiltration - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

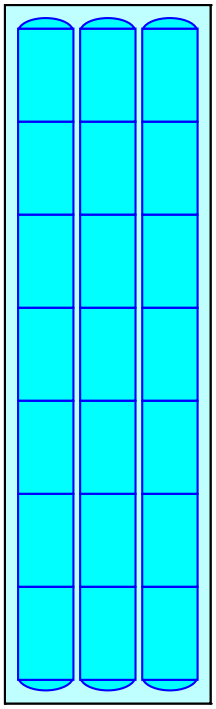
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

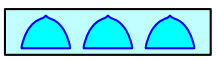
21 Chambers x 45.9 cf = 964.7 cf Chamber Storage

2,946.8 cf Field - 964.7 cf Chambers = 1,982.1 cf Stone x 40.0% Voids = 792.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,757.6 cf = 0.040 af
Overall Storage Efficiency = 59.6%
Overall System Size = 53.46' x 15.75' x 3.50'

21 Chambers
109.1 cy Field
73.4 cy Stone





Pond IC1: Underground Infiltration - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

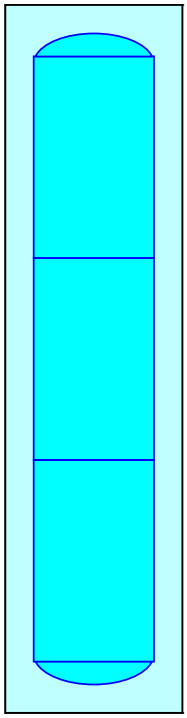
3 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 22.98' Row Length +12.0" End Stone x 2 = 24.98' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

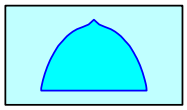
3 Chambers x 45.9 cf = 137.8 cf Chamber Storage

546.4 cf Field - 137.8 cf Chambers = 408.5 cf Stone x 40.0% Voids = 163.4 cf Stone Storage

Chamber Storage + Stone Storage = 301.2 cf = 0.007 af
Overall Storage Efficiency = 55.1%
Overall System Size = 24.98' x 6.25' x 3.50'

3 Chambers
20.2 cy Field
15.1 cy Stone





Summary for Pond IC2: Underground Infiltration

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=51)

Inflow Area = 40,519 sf, 20.57% Impervious, Inflow Depth = 1.64" for 100-yr event
Inflow = 1.33 cfs @ 12.09 hrs, Volume= 5,534 cf
Outflow = 0.17 cfs @ 13.82 hrs, Volume= 5,534 cf, Atten= 87%, Lag= 103.9 min
Discarded = 0.17 cfs @ 13.82 hrs, Volume= 5,534 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 120.36' @ 13.82 hrs Surf.Area= 1,155 sf Storage= 2,323 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 159.0 min (975.9 - 816.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	117.00'	895 cf	**15.75'W x 60.58'L x 3.50'H Field A** 3,339 cf Overall - 1,103 cf Embedded = 2,237 cf x 40.0% Voids
#2A	117.50'	1,103 cf	**ADS_StormTech SC-740 +Cap** x 24 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 24 Chambers in 3 Rows
#3B	117.00'	207 cf	**6.25'W x 32.10'L x 3.50'H Field B** 702 cf Overall - 184 cf Embedded = 518 cf x 40.0% Voids
#4B	117.50'	184 cf	**ADS_StormTech SC-740 +Cap** x 4 Inside #3 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		2,388 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'

Discarded OutFlow Max=0.17 cfs @ 13.82 hrs HW=120.36' (Free Discharge)
1=Exfiltration (Controls 0.17 cfs)

Pond IC2: Underground Infiltration - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

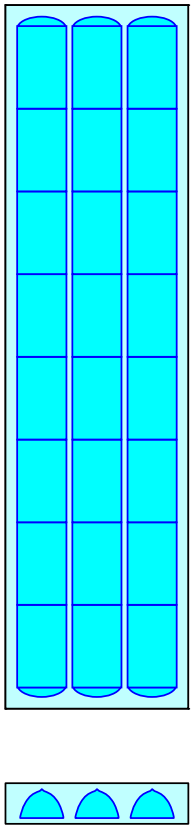
8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

24 Chambers x 45.9 cf = 1,102.6 cf Chamber Storage

3,339.3 cf Field - 1,102.6 cf Chambers = 2,236.7 cf Stone x 40.0% Voids = 894.7 cf Stone Storage

Chamber Storage + Stone Storage = 1,997.3 cf = 0.046 af
Overall Storage Efficiency = 59.8%
Overall System Size = 60.58' x 15.75' x 3.50'

24 Chambers
123.7 cy Field
82.8 cy Stone



Pond IC2: Underground Infiltration - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

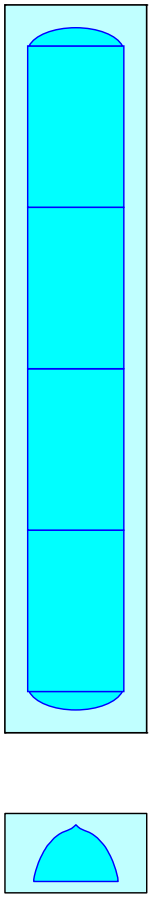
4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

4 Chambers x 45.9 cf = 183.8 cf Chamber Storage

702.1 cf Field - 183.8 cf Chambers = 518.4 cf Stone x 40.0% Voids = 207.3 cf Stone Storage

Chamber Storage + Stone Storage = 391.1 cf = 0.009 af
Overall Storage Efficiency = 55.7%
Overall System Size = 32.10' x 6.25' x 3.50'

4 Chambers
26.0 cy Field
19.2 cy Stone



Summary for Pond IC3: Underground Infiltration

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=60)

Inflow Area = 13,897 sf, 52.89% Impervious, Inflow Depth = 4.90" for 100-yr event
Inflow = 1.83 cfs @ 12.09 hrs, Volume= 5,673 cf
Outflow = 0.23 cfs @ 12.74 hrs, Volume= 5,673 cf, Atten= 87%, Lag= 39.0 min
Discarded = 0.23 cfs @ 12.74 hrs, Volume= 5,673 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 120.40' @ 12.74 hrs Surf.Area= 2,238 sf Storage= 2,268 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 116.8 min (941.7 - 824.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	117.00'	628 cf	**18.67'W x 52.31'L x 2.00'H Field A** 1,953 cf Overall - 383 cf Embedded = 1,570 cf x 40.0% Voids
#2A	117.50'	383 cf	**ADS_StormTech SC-160LP +Cap** x 56 Inside #1 Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap 56 Chambers in 8 Rows
#3	119.00'	3,795 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		4,806 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.00	455	0	0
120.00	1,105	780	780
121.00	1,495	1,300	2,080
122.00	1,935	1,715	3,795

Device	Routing	Invert	Outlet Devices
#1	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 115.00'

Discarded OutFlow Max=0.23 cfs @ 12.74 hrs HW=120.40' (Free Discharge)
↑**1=Exfiltration** (Controls 0.23 cfs)

Pond IC3: Underground Infiltration - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-160LP +Cap (ADS StormTech® SC-160LP with cap length)
Effective Size= 18.0"W x 12.0"H => 0.96 sf x 7.12'L = 6.8 cf
Overall Size= 25.0"W x 12.0"H x 7.56'L with 0.44' Overlap

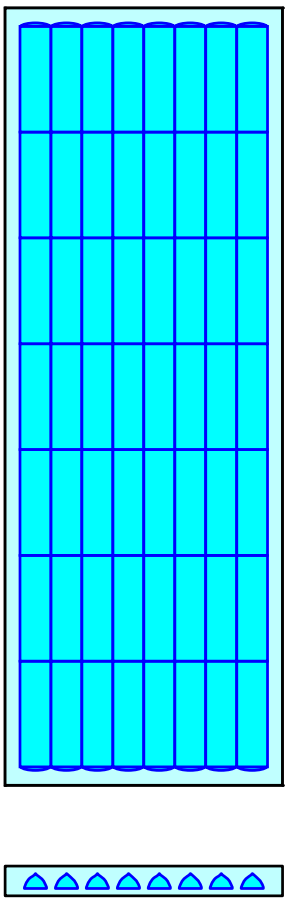
7 Chambers/Row x 7.12' Long +0.23' Cap Length x 2 = 50.31' Row Length +12.0" End Stone x 2 = 52.31' Base Length
8 Rows x 25.0" Wide + 12.0" Side Stone x 2 = 18.67' Base Width
6.0" Stone Base + 12.0" Chamber Height + 6.0" Stone Cover = 2.00' Field Height

56 Chambers x 6.8 cf = 382.9 cf Chamber Storage

1,952.8 cf Field - 382.9 cf Chambers = 1,569.9 cf Stone x 40.0% Voids = 628.0 cf Stone Storage

Chamber Storage + Stone Storage = 1,010.8 cf = 0.023 af
Overall Storage Efficiency = 51.8%
Overall System Size = 52.31' x 18.67' x 2.00'

56 Chambers
72.3 cy Field
58.1 cy Stone



Summary for Link AP1: Boylston Street

Inflow Area = 532 sf, 77.44% Impervious, Inflow Depth > 6.96" for 100-yr event
Inflow = 0.10 cfs @ 12.08 hrs, Volume= 308 cf
Primary = 0.10 cfs @ 12.08 hrs, Volume= 308 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Summary for Link AP2: Town Drainage

Inflow Area = 14,217 sf, 79.40% Impervious, Inflow Depth = 2.15" for 100-yr event
Inflow = 1.90 cfs @ 12.18 hrs, Volume= 2,548 cf
Primary = 1.90 cfs @ 12.18 hrs, Volume= 2,548 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Erosion and Sediment Control Notes

1. Erosion and sediment control measures must be installed prior to the start of construction and maintained and upgraded as necessary during construction by the contractor. It is the contractor's responsibility to inspect and install additional control measures as needed during construction.
2. All catch basins receiving drainage from the project site must be provided with a catch basin filter.
3. Stabilization of all re-graded and soil stockpile areas must be maintained during all phases of construction.
4. Sediment removed from erosion and sediment control devices must be properly removed and disposed. All damaged controls must be removed and replaced.
5. The contractor is responsible for implementing the erosion and sediment control plan. This includes the installation and maintenance of control measures, informing all parties engaged on the construction site of the requirements and objectives of the plan, and notifying the proper city agency of any transfer of this responsibility.
6. The contractor shall be responsible for controlling wind erosion and dust throughout the life of his contract. Dust control may include, but is not limited to, sprinkling of water on exposed soils and street sweeping adjacent roadways.
7. If final grading is to be delayed for more than 21 days after land disturbance activities cease, temporary vegetation or mulch shall be used to stabilized soils within 14 days of the last disturbance.
8. If a disturbed area will be exposed for greater than one year, permanent grasses or other approved cover must be installed.
9. The contractor must keep on-site at all times additional silt fence and hay bales for the installation at the direction of the engineer or the city to mitigate any emergency condition.
10. The construction fencing and erosion and sediment controls as shown may not be practical during all stages of construction. Earthwork activity on-site must be done in a manner such that runoff is directed to a sediment control device or infiltrated to the ground.
11. Demolition and construction debris must be properly contained and disposed of.
12. Disposal of all demolished materials is the responsibility of the contractor and must be hauled off-site in accordance with all federal, state and local requirements.

General Construction Sequence

1. Install erosion and sediment controls prior to starting any earthworks activity.
2. Install construction entrance.
3. Begin clearing, grubbing, and demolition.
4. Begin utility installations.
5. Install site furnishings.
6. Install pavement.
7. Sidewalk reconstruction.
8. Install landscaping.
9. Erosion and sediment controls shall be maintained until permanent cover is established.