

May 31, 2023

Patrick Deschenes, Department Director
Walpole Zoning Board of Appeals
135 School Street
Walpole, MA 02081

**Re: Engineering Memorandum
Proposed Multi-Family Development
981, 989 & 1015 East Street
Walpole, MA**

Dear Mr. Deschenes:

This letter provides a summary of the pre- and post-development drainage conditions that are anticipated to occur as a result of the proposed multi-family development project (hereinafter referred to as the "Project") located at 981, 989 and 1015 East Street. The Project consists of the construction of a 24,650± square-foot multi-family building along with associated site, utility, and drainage improvements. Please refer to the enclosed "Preliminary Civil Engineering Plan Set", prepared by Bohler and dated May 31, 2023. A comparative analysis of the calculated pre- and post-development site runoff conditions and description of the Project's compliance with the Massachusetts Stormwater Standards and Town of Walpole Stormwater Management and Erosion Control Bylaw is also included. In support of this analysis, please find attached the following documents:

- "Preliminary Civil Engineering Plan Set", prepared by Bohler and dated May 31, 2023;
- "Pre-Conditions" HydroCAD report, prepared by Bohler, dated May 31, 2023;
- "Post-Conditions" HydroCAD report, prepared by Bohler, dated May 31, 2023; and
- Recharge, drawdown, water quality and TSS removal calculation sheets, prepared by Bohler, dated May 31, 2023.

Existing Conditions:

The site is located on the north side of East Street within the Central Business Zoning District and consists of 1.9± acres of land with commercial and residential uses located on three (3) abutting parcels. The site is bordered by the Massachusetts Bay Transportation Authority (MBTA) railroad to the north and west, commercial uses to the east, and East Street (Route 27) to the south.

Stormwater runoff generated on the commercial parcel is collected via a series of inlets which flow to Spring Brook located north of the site. There are currently no stormwater mitigation or treatment measures onsite. Runoff generated on the residential parcels flows overland to the stormwater collection system in East Street and discharges to Spring Brook.

For the purposes of this analysis, the site was analyzed with one (1) design point, Spring Brook, denoted as DP1. Accordingly, the pre- and post-development stormwater models have been arranged to assess the anticipated stormwater conditions at this location.

Proposed Conditions:

The Project proposes the construction of a 24,650± square-foot multi-family building along with associated site, utility, and drainage improvements. The proposed condition results in an increase in impervious area by approximately 7,230 square-feet. Runoff generated from the Project has been designed to drain to deep-ump, hooded catch basins that will convey stormwater runoff, via an underground pipe system, to multiple underground infiltration basins for recharge, and ultimately discharge to Spring Brook. A portion of the site to the north will be collected in a proprietary water quality unit for treatment prior to discharge.

The Project proposes to reduce runoff rates and volumes to meet pre-development conditions and complies with the MA Stormwater Standards and Town Stormwater Bylaw to the maximum extent practicable as further detailed below.

Drainage Summary:

The Project falls under M.G.L. Chapter 40B for affordable housing; therefore, local bylaws can be waived as part of the Chapter 40B process if state regulations are met. However, local stormwater regulations were considered and complied with to the maximum extent practicable. The proposed stormwater management system was designed to comply with the Massachusetts Stormwater Standards.

Standard #1: No New Untreated Discharges

The project has been designed so that proposed impervious areas shall be collected and passed through the proposed drainage system for treatment prior to discharge.

Standard #2: Peak Rate Attenuation

Local bylaws indicate the use of more conservative rainfall rates (NOAA Atlas 14 & Cornell) compared to the current Massachusetts Stormwater Standards (TP-40). More conservative runoff rates were used for the stormwater design, as listed below in **Table 1**.

Table 1: Rainfall Data

Frequency	2 year	10 year	25 year	100 year
Rainfall (inches)	3.46*	5.35*	6.53*	9.03**

Values derived from NOAA Atlas 14* and Cornell ** on 05/09/2023

The Project and associated stormwater management systems have been designed so that post-development peak rates of runoff and volumes are below pre-development conditions for the 2-, 10-, 25- and 100-year storm events at the design point. See **Tables 2 and 3** below.

Table 2: Design Point Peak Runoff Rate Summary

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DP1	5.17	5.12	-0.05	8.36	8.23	-0.13	10.36	10.35	-0.01	14.58	14.43	-0.15

**Flows are represented in cubic feet per second (cfs)*

Table 3: Design Point Peak Runoff Volume Summary

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DPI	0.440	0.395	-0.04	0.729	0.692	-0.04	0.912	0.879	-0.03	1.304	1.274	-0.03

**Volumes are represented in acre-feet (af)*

Standard #3: Recharge

Stormwater runoff generated from the Project will be collected and diverted to multiple proposed underground basins for recharge. The stormwater basins are designed to remove sediment from the “first flush” of rainfall and have been sized to retain the first 0.5-inch of runoff from all post-construction impervious surfaces. The basins are designed to drain completely within 72 hours of the end of the storm event.

Soils within the analyzed area consist of urban land as classified by the Natural Resource Conservation Service (NRCS), and therefore have no Hydrologic Soil Group (HSG) classification. For the purposes of this analysis, the site was classified as HSG ‘C’ for use in the associated calculations. Based upon boring data prepared by McPhail Associates, separation from the bottom of the proposed basins to groundwater is anticipated to be greater than four (4) feet, and therefore a groundwater mounding analysis has not been provided. Test pits will be completed to confirm onsite soil classifications and depth to seasonal high groundwater and will be provided in a drainage report prepared and submitting during subsequent permitting efforts.

Standard #4: Water Quality

The proposed stormwater management system has been designed to the maximum extent practicable for the removal of TSS for the increase in impervious area compared to the pre-developed condition using several BMPs, including deep-sump hooded catch basins, isolator rows, underground infiltration systems, and a proprietary water quality unit. The Project will provide the 0.5-inch of water quality volume as defined in Stormwater Standard 4 and the Town Stormwater Bylaw for a redevelopment project. The site will achieve a weighted TSS removal of 80% minimum for paved areas located on-site. In addition, a minimum of 44% pretreatment will be provided via deep-sump hooded catch basins and isolator rows prior to discharge to the recharge systems.

Standard #5: Land Use with Higher Potential Pollutant Loads

Not applicable for this project.

Standard #6: Critical Areas

Not applicable for this project.

Standard #7: Redevelopment

Although the Project is classified as a redevelopment, it has been designed to comply with the MA Stormwater Standards as if it were a new development.

Standard #8: Construction Period Pollution prevention and Erosion and Sedimentation Control

The proposed Project will provide construction period erosion and sedimentation controls as proposed on the Site Development Plans. This includes a proposed construction exit, protection for stormwater inlets, protection around temporary material stock piles and various other techniques as outlined on the erosion

and sediment control sheets. Additionally, the project is required to file a Notice of Intent with the US EPA and implement a Stormwater Pollution Prevention Plan (SWPPP) during the construction period. The SWPPP will be prepared prior to the start of construction and will be implemented by the site contractor under the guidance and responsibility of the project's proponent.

Standard #9: Operation and Maintenance Plan (O&M Plan)

An Operation and Maintenance (O&M) Plan for this site will be prepared. The O&M will include a list of responsible parties and outline procedures and time tables for the long-term operation and maintenance of the proposed site stormwater management system, including initial inspections upon completion of construction and periodic monitoring of the system components, in accordance with established practices and the manufacturer's recommendations.

Standard #10: Prohibition of Illicit Discharges

The proposed stormwater system will only convey allowable non-stormwater discharges (firefighting waters, irrigation, air conditioning condensates, etc.) and will not contain any illicit discharges from prohibited sources.

Summary:

In summary, the Project will result in a decrease in peak stormwater runoff rates and volumes to Spring Brook for the 2-, 10-, 25- and 100-year storm events. Additionally, the Project has been designed to comply with the MA Stormwater Standards as if it were a new development, and Town Bylaw to the maximum extent practicable as a redevelopment project.

We trust the above as well as the attached information are sufficient for your review of the Project. Should you have any questions or require additional information, please do not hesitate to contact me at (508) 480-9900. Thank you.

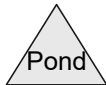
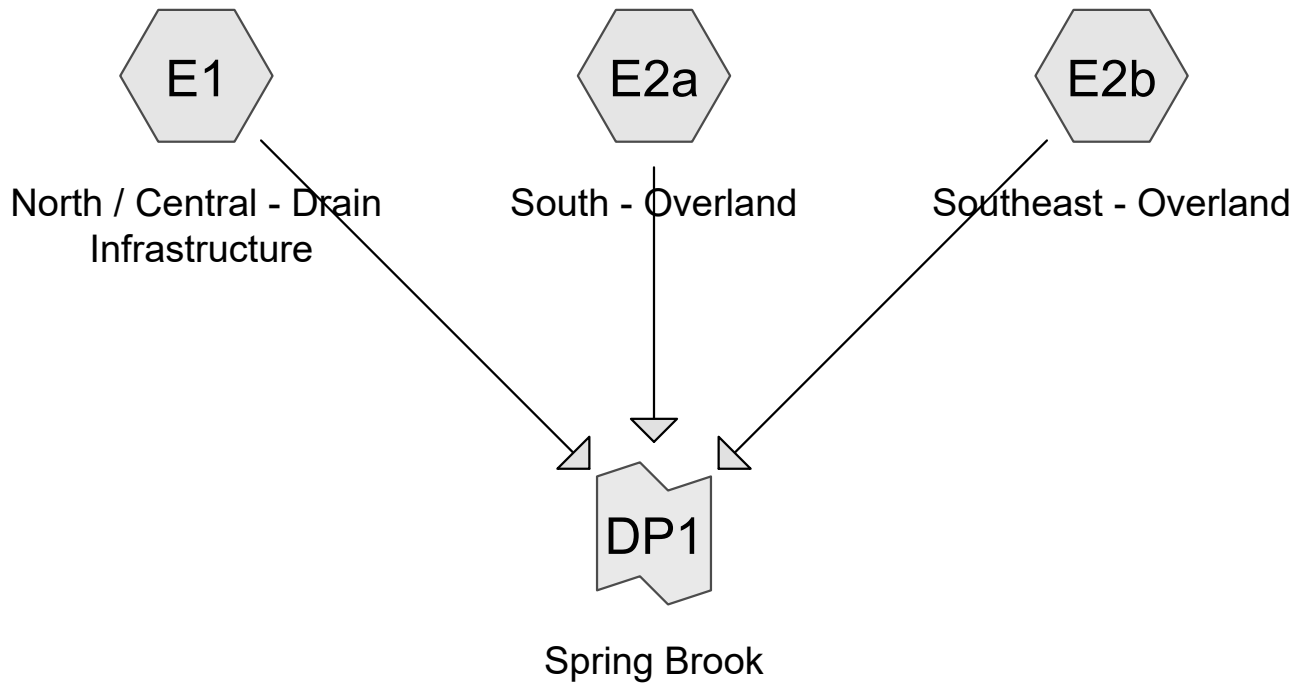
Sincerely,

Bohler



John A. Kucich, P.E.

Enclosures



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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.251	74	>75% Grass cover, Good, HSG C (E1, E2a, E2b)
0.076	89	Gravel roads, HSG C (E2b)
1.090	98	Paved parking, HSG C (E1, E2a, E2b)
0.395	98	Roofs, HSG C (E1, E2b)
0.095	70	Woods, Good, HSG C (E2b)
1.907	93	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
1.907	HSG C	E1, E2a, E2b
0.000	HSG D	
0.000	Other	
1.907		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.251	0.000	0.000	0.251	>75% Grass cover, Good	E1, E2a, E2b
0.000	0.000	0.076	0.000	0.000	0.076	Gravel roads	E2b
0.000	0.000	1.090	0.000	0.000	1.090	Paved parking	E1, E2a, E2b
0.000	0.000	0.395	0.000	0.000	0.395	Roofs	E1, E2b
0.000	0.000	0.095	0.000	0.000	0.095	Woods, Good	E2b
0.000	0.000	1.907	0.000	0.000	1.907	TOTAL AREA	

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Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	E1	0.00	0.00	83.0	0.0010	0.013	8.0	0.0	0.0
2	E1	0.00	0.00	99.0	0.0050	0.013	10.0	0.0	0.0
3	E1	0.00	0.00	76.0	0.0013	0.013	12.0	0.0	0.0
4	E1	0.00	0.00	26.0	0.0230	0.013	12.0	0.0	0.0
5	E2a	0.00	0.00	413.0	0.0040	0.013	36.0	0.0	0.0
6	E2b	0.00	0.00	413.0	0.0040	0.013	36.0	0.0	0.0

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Pre-Conditions HydroCAD W211263

Type III 24-hr 2-YR Rainfall=3.46"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentE1: North / Central - Drain Runoff Area=1.317 ac 96.05% Impervious Runoff Depth=3.11"
Flow Length=543' Tc=6.0 min CN=97 Runoff=4.27 cfs 0.342 af

SubcatchmentE2a: South - Overland Runoff Area=0.103 ac 95.15% Impervious Runoff Depth=3.11"
Flow Length=836' Tc=6.0 min CN=97 Runoff=0.33 cfs 0.027 af

SubcatchmentE2b: Southeast - Overland Runoff Area=0.487 ac 25.05% Impervious Runoff Depth=1.75"
Flow Length=539' Tc=13.6 min CN=82 Runoff=0.78 cfs 0.071 af

Link DP1: Spring Brook

Inflow=5.17 cfs 0.440 af
Primary=5.17 cfs 0.440 af

Total Runoff Area = 1.907 ac Runoff Volume = 0.440 af Average Runoff Depth = 2.77"
22.13% Pervious = 0.422 ac 77.87% Impervious = 1.485 ac

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Pre-Conditions HydroCAD W211263

Type III 24-hr 2-YR Rainfall=3.46"

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Summary for Subcatchment E1: North / Central - Drain Infrastructure

Runoff = 4.27 cfs @ 12.09 hrs, Volume= 0.342 af, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.46"

Area (ac)	CN	Description
0.052	74	>75% Grass cover, Good, HSG C
0.287	98	Roofs, HSG C
0.978	98	Paved parking, HSG C
1.317	97	Weighted Average
0.052		3.95% Pervious Area
1.265		96.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0586	1.91		Sheet Flow, 145.28-142.35 Smooth surfaces n= 0.011 P2= 3.46"
1.1	209	0.0236	3.12		Shallow Concentrated Flow, 142.35-137.41 Paved Kv= 20.3 fps
1.3	83	0.0010	1.09	0.38	Pipe Channel, 133.7-133.7 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.013 Corrugated PE, smooth interior
0.6	99	0.0050	2.84	1.55	Pipe Channel, 133.5-133 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
0.8	76	0.0013	1.64	1.28	Pipe Channel, 132.9-132.8 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
0.1	26	0.0230	6.88	5.40	Pipe Channel, 132.6-132 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
4.3	543	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment E2a: South - Overland

Runoff = 0.33 cfs @ 12.09 hrs, Volume= 0.027 af, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.46"

Area (ac)	CN	Description
0.005	74	>75% Grass cover, Good, HSG C
0.098	98	Paved parking, HSG C
0.103	97	Weighted Average
0.005		4.85% Pervious Area
0.098		95.15% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0420	1.68		Sheet Flow, 144.9-142.8 Smooth surfaces n= 0.011 P2= 3.46"
2.6	373	0.0140	2.40		Shallow Concentrated Flow, 142.8-137.74 Paved Kv= 20.3 fps
1.2	413	0.0040	5.97	42.18	Pipe Channel, 133.7-132 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013 Corrugated PE, smooth interior
4.3	836	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment E2b: Southeast - Overland

Runoff = 0.78 cfs @ 12.19 hrs, Volume= 0.071 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.46"

Area (ac)	CN	Description
0.108	98	Roofs, HSG C
0.076	89	Gravel roads, HSG C
0.095	70	Woods, Good, HSG C
0.194	74	>75% Grass cover, Good, HSG C
0.014	98	Paved parking, HSG C
0.487	82	Weighted Average
0.365		74.95% Pervious Area
0.122		25.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	30	0.0150	0.06		Sheet Flow, 140.2-139.75 Grass: Bermuda n= 0.410 P2= 3.46"
2.6	20	0.1380	0.13		Sheet Flow, 139.75-137 Woods: Light underbrush n= 0.400 P2= 3.46"
0.7	50	0.0300	1.21		Shallow Concentrated Flow, 137-135.5 Short Grass Pasture Kv= 7.0 fps
0.1	26	0.0270	3.34		Shallow Concentrated Flow, 138.43-137.74 Paved Kv= 20.3 fps
1.2	413	0.0040	5.97	42.18	Pipe Channel, 133.7-132 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013 Corrugated PE, smooth interior
13.6	539	Total			

Summary for Link DP1: Spring Brook

Inflow Area = 1.907 ac, 77.87% Impervious, Inflow Depth = 2.77" for 2-YR event
 Inflow = 5.17 cfs @ 12.09 hrs, Volume= 0.440 af
 Primary = 5.17 cfs @ 12.09 hrs, Volume= 0.440 af, Atten= 0%, Lag= 0.0 min

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Pre-Conditions HydroCAD W211263
Type III 24-hr 2-YR Rainfall=3.46"

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Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Pre-Conditions HydroCAD W211263

Type III 24-hr 10-YR Rainfall=5.35"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentE1: North / Central - Drain Runoff Area=1.317 ac 96.05% Impervious Runoff Depth=5.00"
Flow Length=543' Tc=6.0 min CN=97 Runoff=6.69 cfs 0.548 af

SubcatchmentE2a: South - Overland Runoff Area=0.103 ac 95.15% Impervious Runoff Depth=5.00"
Flow Length=836' Tc=6.0 min CN=97 Runoff=0.52 cfs 0.043 af

SubcatchmentE2b: Southeast - Overland Runoff Area=0.487 ac 25.05% Impervious Runoff Depth=3.39"
Flow Length=539' Tc=13.6 min CN=82 Runoff=1.50 cfs 0.138 af

Link DP1: Spring Brook

Inflow=8.36 cfs 0.729 af
Primary=8.36 cfs 0.729 af

Total Runoff Area = 1.907 ac Runoff Volume = 0.729 af Average Runoff Depth = 4.59"
22.13% Pervious = 0.422 ac 77.87% Impervious = 1.485 ac

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Type III 24-hr 10-YR Rainfall=5.35"

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Summary for Subcatchment E1: North / Central - Drain Infrastructure

Runoff = 6.69 cfs @ 12.09 hrs, Volume= 0.548 af, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.35"

Area (ac)	CN	Description
0.052	74	>75% Grass cover, Good, HSG C
0.287	98	Roofs, HSG C
0.978	98	Paved parking, HSG C
1.317	97	Weighted Average
0.052		3.95% Pervious Area
1.265		96.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0586	1.91		Sheet Flow, 145.28-142.35 Smooth surfaces n= 0.011 P2= 3.46"
1.1	209	0.0236	3.12		Shallow Concentrated Flow, 142.35-137.41 Paved Kv= 20.3 fps
1.3	83	0.0010	1.09	0.38	Pipe Channel, 133.7-133.7 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.013 Corrugated PE, smooth interior
0.6	99	0.0050	2.84	1.55	Pipe Channel, 133.5-133 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
0.8	76	0.0013	1.64	1.28	Pipe Channel, 132.9-132.8 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
0.1	26	0.0230	6.88	5.40	Pipe Channel, 132.6-132 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
4.3	543	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment E2a: South - Overland

Runoff = 0.52 cfs @ 12.09 hrs, Volume= 0.043 af, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.35"

Area (ac)	CN	Description
0.005	74	>75% Grass cover, Good, HSG C
0.098	98	Paved parking, HSG C
0.103	97	Weighted Average
0.005		4.85% Pervious Area
0.098		95.15% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0420	1.68		Sheet Flow, 144.9-142.8 Smooth surfaces n= 0.011 P2= 3.46"
2.6	373	0.0140	2.40		Shallow Concentrated Flow, 142.8-137.74 Paved Kv= 20.3 fps
1.2	413	0.0040	5.97	42.18	Pipe Channel, 133.7-132 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013 Corrugated PE, smooth interior
4.3	836	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment E2b: Southeast - Overland

Runoff = 1.50 cfs @ 12.19 hrs, Volume= 0.138 af, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=5.35"

Area (ac)	CN	Description
0.108	98	Roofs, HSG C
0.076	89	Gravel roads, HSG C
0.095	70	Woods, Good, HSG C
0.194	74	>75% Grass cover, Good, HSG C
0.014	98	Paved parking, HSG C
0.487	82	Weighted Average
0.365		74.95% Pervious Area
0.122		25.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	30	0.0150	0.06		Sheet Flow, 140.2-139.75 Grass: Bermuda n= 0.410 P2= 3.46"
2.6	20	0.1380	0.13		Sheet Flow, 139.75-137 Woods: Light underbrush n= 0.400 P2= 3.46"
0.7	50	0.0300	1.21		Shallow Concentrated Flow, 137-135.5 Short Grass Pasture Kv= 7.0 fps
0.1	26	0.0270	3.34		Shallow Concentrated Flow, 138.43-137.74 Paved Kv= 20.3 fps
1.2	413	0.0040	5.97	42.18	Pipe Channel, 133.7-132 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013 Corrugated PE, smooth interior
13.6	539	Total			

Summary for Link DP1: Spring Brook

Inflow Area = 1.907 ac, 77.87% Impervious, Inflow Depth = 4.59" for 10-YR event
 Inflow = 8.36 cfs @ 12.09 hrs, Volume= 0.729 af
 Primary = 8.36 cfs @ 12.09 hrs, Volume= 0.729 af, Atten= 0%, Lag= 0.0 min

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Pre-Conditions HydroCAD W211263
Type III 24-hr 10-YR Rainfall=5.35"

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Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Pre-Conditions HydroCAD W211263

Type III 24-hr 25-YR Rainfall=6.53"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentE1: North / Central - Drain Runoff Area=1.317 ac 96.05% Impervious Runoff Depth=6.17"
Flow Length=543' Tc=6.0 min CN=97 Runoff=8.20 cfs 0.677 af

SubcatchmentE2a: South - Overland Runoff Area=0.103 ac 95.15% Impervious Runoff Depth=6.17"
Flow Length=836' Tc=6.0 min CN=97 Runoff=0.64 cfs 0.053 af

SubcatchmentE2b: Southeast - Overland Runoff Area=0.487 ac 25.05% Impervious Runoff Depth=4.48"
Flow Length=539' Tc=13.6 min CN=82 Runoff=1.97 cfs 0.182 af

Link DP1: Spring Brook

Inflow=10.36 cfs 0.912 af
Primary=10.36 cfs 0.912 af

Total Runoff Area = 1.907 ac Runoff Volume = 0.912 af Average Runoff Depth = 5.74"
22.13% Pervious = 0.422 ac 77.87% Impervious = 1.485 ac

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Type III 24-hr 25-YR Rainfall=6.53"

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Summary for Subcatchment E1: North / Central - Drain Infrastructure

Runoff = 8.20 cfs @ 12.09 hrs, Volume= 0.677 af, Depth= 6.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.53"

Area (ac)	CN	Description
0.052	74	>75% Grass cover, Good, HSG C
0.287	98	Roofs, HSG C
0.978	98	Paved parking, HSG C
1.317	97	Weighted Average
0.052		3.95% Pervious Area
1.265		96.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0586	1.91		Sheet Flow, 145.28-142.35 Smooth surfaces n= 0.011 P2= 3.46"
1.1	209	0.0236	3.12		Shallow Concentrated Flow, 142.35-137.41 Paved Kv= 20.3 fps
1.3	83	0.0010	1.09	0.38	Pipe Channel, 133.7-133.7 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.013 Corrugated PE, smooth interior
0.6	99	0.0050	2.84	1.55	Pipe Channel, 133.5-133 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
0.8	76	0.0013	1.64	1.28	Pipe Channel, 132.9-132.8 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
0.1	26	0.0230	6.88	5.40	Pipe Channel, 132.6-132 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
4.3	543	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment E2a: South - Overland

Runoff = 0.64 cfs @ 12.09 hrs, Volume= 0.053 af, Depth= 6.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.53"

Area (ac)	CN	Description
0.005	74	>75% Grass cover, Good, HSG C
0.098	98	Paved parking, HSG C
0.103	97	Weighted Average
0.005		4.85% Pervious Area
0.098		95.15% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0420	1.68		Sheet Flow, 144.9-142.8 Smooth surfaces n= 0.011 P2= 3.46"
2.6	373	0.0140	2.40		Shallow Concentrated Flow, 142.8-137.74 Paved Kv= 20.3 fps
1.2	413	0.0040	5.97	42.18	Pipe Channel, 133.7-132 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013 Corrugated PE, smooth interior
4.3	836	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment E2b: Southeast - Overland

Runoff = 1.97 cfs @ 12.19 hrs, Volume= 0.182 af, Depth= 4.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=6.53"

Area (ac)	CN	Description
0.108	98	Roofs, HSG C
0.076	89	Gravel roads, HSG C
0.095	70	Woods, Good, HSG C
0.194	74	>75% Grass cover, Good, HSG C
0.014	98	Paved parking, HSG C
0.487	82	Weighted Average
0.365		74.95% Pervious Area
0.122		25.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	30	0.0150	0.06		Sheet Flow, 140.2-139.75 Grass: Bermuda n= 0.410 P2= 3.46"
2.6	20	0.1380	0.13		Sheet Flow, 139.75-137 Woods: Light underbrush n= 0.400 P2= 3.46"
0.7	50	0.0300	1.21		Shallow Concentrated Flow, 137-135.5 Short Grass Pasture Kv= 7.0 fps
0.1	26	0.0270	3.34		Shallow Concentrated Flow, 138.43-137.74 Paved Kv= 20.3 fps
1.2	413	0.0040	5.97	42.18	Pipe Channel, 133.7-132 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013 Corrugated PE, smooth interior
13.6	539	Total			

Summary for Link DP1: Spring Brook

Inflow Area = 1.907 ac, 77.87% Impervious, Inflow Depth = 5.74" for 25-YR event
 Inflow = 10.36 cfs @ 12.09 hrs, Volume= 0.912 af
 Primary = 10.36 cfs @ 12.09 hrs, Volume= 0.912 af, Atten= 0%, Lag= 0.0 min

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Type III 24-hr 25-YR Rainfall=6.53"

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Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Type III 24-hr 100-YR Rainfall=9.03"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentE1: North / Central - Drain Runoff Area=1.317 ac 96.05% Impervious Runoff Depth=8.67"
Flow Length=543' Tc=6.0 min CN=97 Runoff=11.38 cfs 0.951 af

SubcatchmentE2a: South - Overland Runoff Area=0.103 ac 95.15% Impervious Runoff Depth=8.67"
Flow Length=836' Tc=6.0 min CN=97 Runoff=0.89 cfs 0.074 af

SubcatchmentE2b: Southeast - Overland Runoff Area=0.487 ac 25.05% Impervious Runoff Depth=6.84"
Flow Length=539' Tc=13.6 min CN=82 Runoff=2.96 cfs 0.278 af

Link DP1: Spring Brook Inflow=14.58 cfs 1.304 af
Primary=14.58 cfs 1.304 af

Total Runoff Area = 1.907 ac Runoff Volume = 1.304 af Average Runoff Depth = 8.20"
22.13% Pervious = 0.422 ac 77.87% Impervious = 1.485 ac

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Pre-Conditions HydroCAD W211263
Type III 24-hr 100-YR Rainfall=9.03"

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Summary for Subcatchment E1: North / Central - Drain Infrastructure

Runoff = 11.38 cfs @ 12.09 hrs, Volume= 0.951 af, Depth= 8.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=9.03"

Area (ac)	CN	Description
0.052	74	>75% Grass cover, Good, HSG C
0.287	98	Roofs, HSG C
0.978	98	Paved parking, HSG C
1.317	97	Weighted Average
0.052		3.95% Pervious Area
1.265		96.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0586	1.91		Sheet Flow, 145.28-142.35 Smooth surfaces n= 0.011 P2= 3.46"
1.1	209	0.0236	3.12		Shallow Concentrated Flow, 142.35-137.41 Paved Kv= 20.3 fps
1.3	83	0.0010	1.09	0.38	Pipe Channel, 133.7-133.7 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.013 Corrugated PE, smooth interior
0.6	99	0.0050	2.84	1.55	Pipe Channel, 133.5-133 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
0.8	76	0.0013	1.64	1.28	Pipe Channel, 132.9-132.8 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
0.1	26	0.0230	6.88	5.40	Pipe Channel, 132.6-132 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
4.3	543	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment E2a: South - Overland

Runoff = 0.89 cfs @ 12.09 hrs, Volume= 0.074 af, Depth= 8.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=9.03"

Area (ac)	CN	Description
0.005	74	>75% Grass cover, Good, HSG C
0.098	98	Paved parking, HSG C
0.103	97	Weighted Average
0.005		4.85% Pervious Area
0.098		95.15% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0420	1.68		Sheet Flow, 144.9-142.8 Smooth surfaces n= 0.011 P2= 3.46"
2.6	373	0.0140	2.40		Shallow Concentrated Flow, 142.8-137.74 Paved Kv= 20.3 fps
1.2	413	0.0040	5.97	42.18	Pipe Channel, 133.7-132 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013 Corrugated PE, smooth interior
4.3	836	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment E2b: Southeast - Overland

Runoff = 2.96 cfs @ 12.18 hrs, Volume= 0.278 af, Depth= 6.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=9.03"

Area (ac)	CN	Description
0.108	98	Roofs, HSG C
0.076	89	Gravel roads, HSG C
0.095	70	Woods, Good, HSG C
0.194	74	>75% Grass cover, Good, HSG C
0.014	98	Paved parking, HSG C
0.487	82	Weighted Average
0.365		74.95% Pervious Area
0.122		25.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	30	0.0150	0.06		Sheet Flow, 140.2-139.75 Grass: Bermuda n= 0.410 P2= 3.46"
2.6	20	0.1380	0.13		Sheet Flow, 139.75-137 Woods: Light underbrush n= 0.400 P2= 3.46"
0.7	50	0.0300	1.21		Shallow Concentrated Flow, 137-135.5 Short Grass Pasture Kv= 7.0 fps
0.1	26	0.0270	3.34		Shallow Concentrated Flow, 138.43-137.74 Paved Kv= 20.3 fps
1.2	413	0.0040	5.97	42.18	Pipe Channel, 133.7-132 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013 Corrugated PE, smooth interior
13.6	539	Total			

Summary for Link DP1: Spring Brook

Inflow Area = 1.907 ac, 77.87% Impervious, Inflow Depth = 8.20" for 100-YR event
 Inflow = 14.58 cfs @ 12.09 hrs, Volume= 1.304 af
 Primary = 14.58 cfs @ 12.09 hrs, Volume= 1.304 af, Atten= 0%, Lag= 0.0 min

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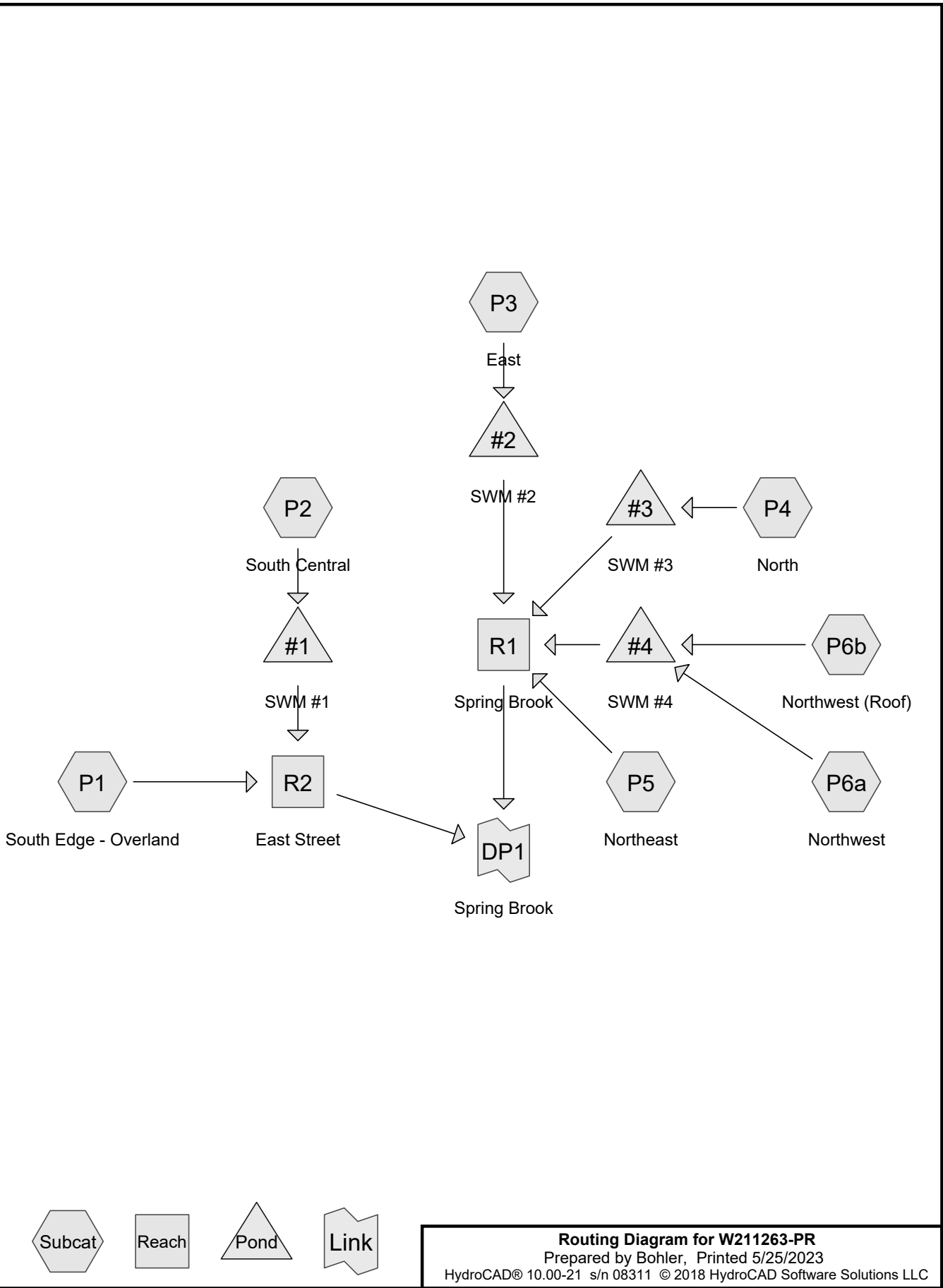
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Type III 24-hr 100-YR Rainfall=9.03"

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Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.180	74	>75% Grass cover, Good, HSG C (P3, P4, P5, P6a)
1.161	98	Paved parking, HSG C (P1, P2, P3, P4, P5, P6a)
0.566	98	Roofs, HSG C (P3, P4, P6b)
1.907	96	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
1.907	HSG C	P1, P2, P3, P4, P5, P6a, P6b
0.000	HSG D	
0.000	Other	
1.907		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.180	0.000	0.000	0.180	>75% Grass cover, Good	P3, P4, P5, P6a
0.000	0.000	1.161	0.000	0.000	1.161	Paved parking	P1, P2, P3, P4, P5, P6a
0.000	0.000	0.566	0.000	0.000	0.566	Roofs	P3, P4, P6b
0.000	0.000	1.907	0.000	0.000	1.907	TOTAL AREA	

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Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	#1	135.50	135.70	17.0	-0.0118	0.013	12.0	0.0	0.0
2	#2	135.00	134.00	183.0	0.0055	0.013	15.0	0.0	0.0
3	#3	136.50	135.80	11.5	0.0609	0.013	12.0	0.0	0.0
4	#4	135.00	134.00	74.0	0.0135	0.013	15.0	0.0	0.0

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Post-Conditions HydroCAD 211263

Type III 24-hr 2-YR Rainfall=3.46"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 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

SubcatchmentP1: South Edge - Overland	Runoff Area=0.058 ac 100.00% Impervious Runoff Depth=3.23" Flow Length=394' Tc=6.0 min CN=98 Runoff=0.20 cfs 0.016 af
SubcatchmentP2: South Central	Runoff Area=0.130 ac 100.00% Impervious Runoff Depth=3.23" Tc=6.0 min CN=98 Runoff=0.44 cfs 0.035 af
SubcatchmentP3: East	Runoff Area=0.495 ac 87.27% Impervious Runoff Depth=2.90" Tc=6.0 min CN=95 Runoff=1.58 cfs 0.120 af
SubcatchmentP4: North	Runoff Area=0.457 ac 92.78% Impervious Runoff Depth=3.01" Tc=6.0 min CN=96 Runoff=1.49 cfs 0.114 af
SubcatchmentP5: Northeast	Runoff Area=0.195 ac 85.13% Impervious Runoff Depth=2.80" Tc=6.0 min CN=94 Runoff=0.61 cfs 0.045 af
SubcatchmentP6a: Northwest	Runoff Area=0.366 ac 84.97% Impervious Runoff Depth=2.80" Tc=6.0 min CN=94 Runoff=1.14 cfs 0.085 af
SubcatchmentP6b: Northwest (Roof)	Runoff Area=0.206 ac 100.00% Impervious Runoff Depth=3.23" Tc=6.0 min CN=98 Runoff=0.69 cfs 0.055 af
Reach R1: Spring Brook	Inflow=4.53 cfs 0.355 af Outflow=4.53 cfs 0.355 af
Reach R2: East Street	Inflow=0.63 cfs 0.041 af Outflow=0.63 cfs 0.041 af
Pond #1: SWM #1	Peak Elev=137.60' Storage=452 cf Inflow=0.44 cfs 0.035 af Outflow=0.44 cfs 0.025 af
Pond #2: SWM #2	Peak Elev=136.98' Storage=1,063 cf Inflow=1.58 cfs 0.120 af Outflow=1.47 cfs 0.100 af
Pond #3: SWM #3	Peak Elev=137.10' Storage=1,878 cf Inflow=1.49 cfs 0.114 af Outflow=0.89 cfs 0.091 af
Pond #4: SWM #4	Peak Elev=137.53' Storage=1,248 cf Inflow=1.84 cfs 0.141 af Outflow=1.67 cfs 0.118 af
Link DP1: Spring Brook	Inflow=5.12 cfs 0.395 af Primary=5.12 cfs 0.395 af

Total Runoff Area = 1.907 ac Runoff Volume = 0.471 af Average Runoff Depth = 2.96"
9.44% Pervious = 0.180 ac 90.56% Impervious = 1.727 ac

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Post-Conditions HydroCAD 211263

Type III 24-hr 2-YR Rainfall=3.46"

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Summary for Subcatchment P1: South Edge - Overland

Runoff = 0.20 cfs @ 12.08 hrs, Volume= 0.016 af, Depth= 3.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.46"

Area (ac)	CN	Description
0.058	98	Paved parking, HSG C
0.058		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0260	1.38		Sheet Flow, 143.3-142 Smooth surfaces n= 0.011 P2= 3.46"
2.6	344	0.0120	2.22		Shallow Concentrated Flow, 142-137.74 Paved Kv= 20.3 fps
3.2	394	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment P2: South Central

Runoff = 0.44 cfs @ 12.08 hrs, Volume= 0.035 af, Depth= 3.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.46"

Area (ac)	CN	Description
0.130	98	Paved parking, HSG C
0.130		100.00% Impervious Area

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

Summary for Subcatchment P3: East

Runoff = 1.58 cfs @ 12.08 hrs, Volume= 0.120 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.46"

Area (ac)	CN	Description
0.235	98	Paved parking, HSG C
0.197	98	Roofs, HSG C
0.063	74	>75% Grass cover, Good, HSG C
0.495	95	Weighted Average
0.063		12.73% Pervious Area
0.432		87.27% Impervious Area

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

Summary for Subcatchment P4: North

Runoff = 1.49 cfs @ 12.08 hrs, Volume= 0.114 af, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-YR Rainfall=3.46"

Area (ac)	CN	Description
0.261	98	Paved parking, HSG C
0.163	98	Roofs, HSG C
0.033	74	>75% Grass cover, Good, HSG C
0.457	96	Weighted Average
0.033		7.22% Pervious Area
0.424		92.78% Impervious Area

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

Summary for Subcatchment P5: Northeast

Runoff = 0.61 cfs @ 12.08 hrs, Volume= 0.045 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-YR Rainfall=3.46"

Area (ac)	CN	Description
0.166	98	Paved parking, HSG C
0.000	98	Roofs, HSG C
0.029	74	>75% Grass cover, Good, HSG C
0.195	94	Weighted Average
0.029		14.87% Pervious Area
0.166		85.13% Impervious Area

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

Summary for Subcatchment P6a: Northwest

Runoff = 1.14 cfs @ 12.08 hrs, Volume= 0.085 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-YR Rainfall=3.46"

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Post-Conditions HydroCAD 211263

Type III 24-hr 2-YR Rainfall=3.46"

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Area (ac)	CN	Description
0.311	98	Paved parking, HSG C
0.055	74	>75% Grass cover, Good, HSG C
0.366	94	Weighted Average
0.055		15.03% Pervious Area
0.311		84.97% Impervious Area

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

Summary for Subcatchment P6b: Northwest (Roof)

Runoff = 0.69 cfs @ 12.08 hrs, Volume= 0.055 af, Depth= 3.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.46"

Area (ac)	CN	Description
0.206	98	Roofs, HSG C
0.206		100.00% Impervious Area

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

Summary for Reach R1: Spring BrookInflow Area = 1.719 ac, 89.53% Impervious, Inflow Depth = 2.47" for 2-YR event
Inflow = 4.53 cfs @ 12.12 hrs, Volume= 0.355 af
Outflow = 4.53 cfs @ 12.12 hrs, Volume= 0.355 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach R2: East StreetInflow Area = 0.188 ac, 100.00% Impervious, Inflow Depth = 2.59" for 2-YR event
Inflow = 0.63 cfs @ 12.09 hrs, Volume= 0.041 af
Outflow = 0.63 cfs @ 12.09 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond #1: SWM #1Inflow Area = 0.130 ac, 100.00% Impervious, Inflow Depth = 3.23" for 2-YR event
Inflow = 0.44 cfs @ 12.08 hrs, Volume= 0.035 af
Outflow = 0.44 cfs @ 12.09 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.4 min
Primary = 0.44 cfs @ 12.09 hrs, Volume= 0.025 af

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Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 137.60' @ 12.09 hrs Surf.Area= 281 sf Storage= 452 cf

Plug-Flow detention time= 171.0 min calculated for 0.025 af (71% of inflow)
 Center-of-Mass det. time= 78.8 min (833.5 - 754.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	135.00'	283 cf	15.75'W x 17.86'L x 3.50'H Field A 984 cf Overall - 276 cf Embedded = 709 cf x 40.0% Voids
#2A	135.50'	276 cf	ADS_StormTech SC-740 +Cap x 6 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 3 Rows of 2 Chambers
		559 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	135.70'	12.0" Round Culvert L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 135.50' / 135.70' S= -0.0118 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	137.50'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=0.44 cfs @ 12.09 hrs HW=137.60' TW=0.00' (Dynamic Tailwater)

↑1=Culvert (Passes 0.44 cfs of 3.54 cfs potential flow)

↑2=Sharp-Crested Rectangular Weir(Weir Controls 0.44 cfs @ 1.05 fps)

Summary for Pond #2: SWM #2

Inflow Area = 0.495 ac, 87.27% Impervious, Inflow Depth = 2.90" for 2-YR event
 Inflow = 1.58 cfs @ 12.08 hrs, Volume= 0.120 af
 Outflow = 1.47 cfs @ 12.12 hrs, Volume= 0.100 af, Atten= 7%, Lag= 1.9 min
 Primary = 1.47 cfs @ 12.12 hrs, Volume= 0.100 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 136.98' @ 12.12 hrs Surf.Area= 658 sf Storage= 1,063 cf

Plug-Flow detention time= 116.1 min calculated for 0.100 af (83% of inflow)
 Center-of-Mass det. time= 48.3 min (826.9 - 778.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	134.50'	627 cf	20.50'W x 32.10'L x 3.50'H Field A 2,303 cf Overall - 735 cf Embedded = 1,568 cf x 40.0% Voids
#2A	135.00'	735 cf	ADS_StormTech SC-740 +Cap x 16 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 4 Rows of 4 Chambers
		1,362 cf	Total Available Storage

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Type III 24-hr 2-YR Rainfall=3.46"

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Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	15.0" Round Culvert L= 183.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0055 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	136.50'	20.0" W x 4.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	137.50'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=1.47 cfs @ 12.12 hrs HW=136.98' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 1.47 cfs of 5.21 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 1.47 cfs @ 2.65 fps)
 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond #3: SWM #3

Inflow Area = 0.457 ac, 92.78% Impervious, Inflow Depth = 3.01" for 2-YR event
 Inflow = 1.49 cfs @ 12.08 hrs, Volume= 0.114 af
 Outflow = 0.89 cfs @ 12.19 hrs, Volume= 0.091 af, Atten= 40%, Lag= 6.2 min
 Primary = 0.89 cfs @ 12.19 hrs, Volume= 0.091 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 137.10' @ 12.19 hrs Surf.Area= 2,840 sf Storage= 1,878 cf

Plug-Flow detention time= 160.0 min calculated for 0.091 af (80% of inflow)
 Center-of-Mass det. time= 83.6 min (855.4 - 771.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	136.00'	2,002 cf	34.83'W x 81.52'L x 2.33'H Field A 6,626 cf Overall - 1,622 cf Embedded = 5,004 cf x 40.0% Voids
#2A	136.50'	1,622 cf	ADS_StormTech SC-310 +Cap x 110 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Rows of 11 Chambers
		3,623 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	136.50'	12.0" Round Culvert L= 11.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 136.50' / 135.80' S= 0.0609 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	136.70'	14.0" W x 4.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	137.83'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

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Primary OutFlow Max=0.89 cfs @ 12.19 hrs HW=137.10' TW=0.00' (Dynamic Tailwater)

- ↑ 1=Culvert (Passes 0.89 cfs of 1.04 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.89 cfs @ 2.30 fps)
- ↑ 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond #4: SWM #4

Inflow Area = 0.572 ac, 90.38% Impervious, Inflow Depth = 2.95" for 2-YR event
 Inflow = 1.84 cfs @ 12.08 hrs, Volume= 0.141 af
 Outflow = 1.67 cfs @ 12.12 hrs, Volume= 0.118 af, Atten= 9%, Lag= 2.3 min
 Primary = 1.67 cfs @ 12.12 hrs, Volume= 0.118 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 137.53' @ 12.12 hrs Surf.Area= 666 sf Storage= 1,248 cf

Plug-Flow detention time= 116.8 min calculated for 0.118 af (84% of inflow)
 Center-of-Mass det. time= 50.2 min (823.0 - 772.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	134.50'	639 cf	11.00'W x 60.58'L x 3.50'H Field A 2,332 cf Overall - 735 cf Embedded = 1,597 cf x 40.0% Voids
#2A	135.00'	735 cf	ADS_StormTech SC-740 +Cap x 16 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 2 Rows of 8 Chambers
		1,374 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	15.0" Round Culvert L= 74.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0135 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	136.75'	20.0" W x 3.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	137.50'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=1.67 cfs @ 12.12 hrs HW=137.53' TW=0.00' (Dynamic Tailwater)

- ↑ 1=Culvert (Passes 1.67 cfs of 6.43 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 1.62 cfs @ 3.88 fps)
- ↑ 3=Sharp-Crested Rectangular Weir (Weir Controls 0.05 cfs @ 0.52 fps)

Summary for Link DP1: Spring Brook

Inflow Area = 1.907 ac, 90.56% Impervious, Inflow Depth = 2.49" for 2-YR event
 Inflow = 5.12 cfs @ 12.12 hrs, Volume= 0.395 af
 Primary = 5.12 cfs @ 12.12 hrs, Volume= 0.395 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 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

SubcatchmentP1: South Edge - Overland	Runoff Area=0.058 ac 100.00% Impervious Runoff Depth=5.11" Flow Length=394' Tc=6.0 min CN=98 Runoff=0.30 cfs 0.025 af
SubcatchmentP2: South Central	Runoff Area=0.130 ac 100.00% Impervious Runoff Depth=5.11" Tc=6.0 min CN=98 Runoff=0.68 cfs 0.055 af
SubcatchmentP3: East	Runoff Area=0.495 ac 87.27% Impervious Runoff Depth=4.77" Tc=6.0 min CN=95 Runoff=2.53 cfs 0.197 af
SubcatchmentP4: North	Runoff Area=0.457 ac 92.78% Impervious Runoff Depth=4.88" Tc=6.0 min CN=96 Runoff=2.36 cfs 0.186 af
SubcatchmentP5: Northeast	Runoff Area=0.195 ac 85.13% Impervious Runoff Depth=4.65" Tc=6.0 min CN=94 Runoff=0.98 cfs 0.076 af
SubcatchmentP6a: Northwest	Runoff Area=0.366 ac 84.97% Impervious Runoff Depth=4.65" Tc=6.0 min CN=94 Runoff=1.85 cfs 0.142 af
SubcatchmentP6b: Northwest (Roof)	Runoff Area=0.206 ac 100.00% Impervious Runoff Depth=5.11" Tc=6.0 min CN=98 Runoff=1.08 cfs 0.088 af
Reach R1: Spring Brook	Inflow=7.26 cfs 0.622 af Outflow=7.26 cfs 0.622 af
Reach R2: East Street	Inflow=0.98 cfs 0.070 af Outflow=0.98 cfs 0.070 af
Pond #1: SWM #1	Peak Elev=137.64' Storage=457 cf Inflow=0.68 cfs 0.055 af Outflow=0.68 cfs 0.045 af
Pond #2: SWM #2	Peak Elev=137.40' Storage=1,203 cf Inflow=2.53 cfs 0.197 af Outflow=2.29 cfs 0.177 af
Pond #3: SWM #3	Peak Elev=137.36' Storage=2,375 cf Inflow=2.36 cfs 0.186 af Outflow=1.31 cfs 0.162 af
Pond #4: SWM #4	Peak Elev=137.69' Storage=1,292 cf Inflow=2.93 cfs 0.230 af Outflow=2.91 cfs 0.207 af
Link DP1: Spring Brook	Inflow=8.23 cfs 0.692 af Primary=8.23 cfs 0.692 af

Total Runoff Area = 1.907 ac Runoff Volume = 0.768 af Average Runoff Depth = 4.83"
9.44% Pervious = 0.180 ac 90.56% Impervious = 1.727 ac

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Summary for Subcatchment P1: South Edge - Overland

Runoff = 0.30 cfs @ 12.08 hrs, Volume= 0.025 af, Depth= 5.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.35"

Area (ac)	CN	Description
0.058	98	Paved parking, HSG C
0.058		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0260	1.38		Sheet Flow, 143.3-142 Smooth surfaces n= 0.011 P2= 3.46"
2.6	344	0.0120	2.22		Shallow Concentrated Flow, 142-137.74 Paved Kv= 20.3 fps
3.2	394	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment P2: South Central

Runoff = 0.68 cfs @ 12.08 hrs, Volume= 0.055 af, Depth= 5.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.35"

Area (ac)	CN	Description
0.130	98	Paved parking, HSG C
0.130		100.00% Impervious Area

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

Summary for Subcatchment P3: East

Runoff = 2.53 cfs @ 12.08 hrs, Volume= 0.197 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.35"

Area (ac)	CN	Description
0.235	98	Paved parking, HSG C
0.197	98	Roofs, HSG C
0.063	74	>75% Grass cover, Good, HSG C
0.495	95	Weighted Average
0.063		12.73% Pervious Area
0.432		87.27% Impervious Area

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

Summary for Subcatchment P4: North

Runoff = 2.36 cfs @ 12.08 hrs, Volume= 0.186 af, Depth= 4.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.35"

Area (ac)	CN	Description
0.261	98	Paved parking, HSG C
0.163	98	Roofs, HSG C
0.033	74	>75% Grass cover, Good, HSG C
0.457	96	Weighted Average
0.033		7.22% Pervious Area
0.424		92.78% Impervious Area

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

Summary for Subcatchment P5: Northeast

Runoff = 0.98 cfs @ 12.08 hrs, Volume= 0.076 af, Depth= 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.35"

Area (ac)	CN	Description
0.166	98	Paved parking, HSG C
0.000	98	Roofs, HSG C
0.029	74	>75% Grass cover, Good, HSG C
0.195	94	Weighted Average
0.029		14.87% Pervious Area
0.166		85.13% Impervious Area

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

Summary for Subcatchment P6a: Northwest

Runoff = 1.85 cfs @ 12.08 hrs, Volume= 0.142 af, Depth= 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.35"

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Area (ac)	CN	Description
0.311	98	Paved parking, HSG C
0.055	74	>75% Grass cover, Good, HSG C
0.366	94	Weighted Average
0.055		15.03% Pervious Area
0.311		84.97% Impervious Area

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

Summary for Subcatchment P6b: Northwest (Roof)

Runoff = 1.08 cfs @ 12.08 hrs, Volume= 0.088 af, Depth= 5.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.35"

Area (ac)	CN	Description
0.206	98	Roofs, HSG C
0.206		100.00% Impervious Area

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

Summary for Reach R1: Spring BrookInflow Area = 1.719 ac, 89.53% Impervious, Inflow Depth = 4.34" for 10-YR event
Inflow = 7.26 cfs @ 12.10 hrs, Volume= 0.622 af
Outflow = 7.26 cfs @ 12.10 hrs, Volume= 0.622 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach R2: East StreetInflow Area = 0.188 ac, 100.00% Impervious, Inflow Depth = 4.47" for 10-YR event
Inflow = 0.98 cfs @ 12.09 hrs, Volume= 0.070 af
Outflow = 0.98 cfs @ 12.09 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond #1: SWM #1Inflow Area = 0.130 ac, 100.00% Impervious, Inflow Depth = 5.11" for 10-YR event
Inflow = 0.68 cfs @ 12.08 hrs, Volume= 0.055 af
Outflow = 0.68 cfs @ 12.09 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.3 min
Primary = 0.68 cfs @ 12.09 hrs, Volume= 0.045 af

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Type III 24-hr 10-YR Rainfall=5.35"

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Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 137.64' @ 12.09 hrs Surf.Area= 281 sf Storage= 457 cf

Plug-Flow detention time= 136.4 min calculated for 0.045 af (82% of inflow)
 Center-of-Mass det. time= 63.5 min (810.4 - 746.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	135.00'	283 cf	15.75'W x 17.86'L x 3.50'H Field A 984 cf Overall - 276 cf Embedded = 709 cf x 40.0% Voids
#2A	135.50'	276 cf	ADS_StormTech SC-740 +Cap x 6 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 3 Rows of 2 Chambers
		559 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	135.70'	12.0" Round Culvert L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 135.50' / 135.70' S= -0.0118 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	137.50'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=0.68 cfs @ 12.09 hrs HW=137.64' TW=0.00' (Dynamic Tailwater)

↑1=Culvert (Passes 0.68 cfs of 3.58 cfs potential flow)

↑2=Sharp-Crested Rectangular Weir(Weir Controls 0.68 cfs @ 1.22 fps)

Summary for Pond #2: SWM #2

Inflow Area = 0.495 ac, 87.27% Impervious, Inflow Depth = 4.77" for 10-YR event
 Inflow = 2.53 cfs @ 12.08 hrs, Volume= 0.197 af
 Outflow = 2.29 cfs @ 12.12 hrs, Volume= 0.177 af, Atten= 10%, Lag= 2.3 min
 Primary = 2.29 cfs @ 12.12 hrs, Volume= 0.177 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 137.40' @ 12.12 hrs Surf.Area= 658 sf Storage= 1,203 cf

Plug-Flow detention time= 88.4 min calculated for 0.177 af (90% of inflow)
 Center-of-Mass det. time= 38.9 min (805.4 - 766.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	134.50'	627 cf	20.50'W x 32.10'L x 3.50'H Field A 2,303 cf Overall - 735 cf Embedded = 1,568 cf x 40.0% Voids
#2A	135.00'	735 cf	ADS_StormTech SC-740 +Cap x 16 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 4 Rows of 4 Chambers
		1,362 cf	Total Available Storage

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Type III 24-hr 10-YR Rainfall=5.35"

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Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	15.0" Round Culvert L= 183.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0055 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	136.50'	20.0" W x 4.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	137.50'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=2.28 cfs @ 12.12 hrs HW=137.40' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 2.28 cfs of 5.81 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 2.28 cfs @ 4.11 fps)
 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond #3: SWM #3

Inflow Area = 0.457 ac, 92.78% Impervious, Inflow Depth = 4.88" for 10-YR event
 Inflow = 2.36 cfs @ 12.08 hrs, Volume= 0.186 af
 Outflow = 1.31 cfs @ 12.20 hrs, Volume= 0.162 af, Atten= 44%, Lag= 7.0 min
 Primary = 1.31 cfs @ 12.20 hrs, Volume= 0.162 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 137.36' @ 12.20 hrs Surf.Area= 2,840 sf Storage= 2,375 cf

Plug-Flow detention time= 126.7 min calculated for 0.162 af (87% of inflow)
 Center-of-Mass det. time= 69.4 min (830.2 - 760.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	136.00'	2,002 cf	34.83'W x 81.52'L x 2.33'H Field A 6,626 cf Overall - 1,622 cf Embedded = 5,004 cf x 40.0% Voids
#2A	136.50'	1,622 cf	ADS_StormTech SC-310 +Cap x 110 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Rows of 11 Chambers
		3,623 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	136.50'	12.0" Round Culvert L= 11.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 136.50' / 135.80' S= 0.0609 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	136.70'	14.0" W x 4.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	137.83'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

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Type III 24-hr 10-YR Rainfall=5.35"

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Primary OutFlow Max=1.31 cfs @ 12.20 hrs HW=137.36' TW=0.00' (Dynamic Tailwater)

- ↑ 1=Culvert (Passes 1.31 cfs of 1.80 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 1.31 cfs @ 3.38 fps)
- ↑ 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond #4: SWM #4

Inflow Area = 0.572 ac, 90.38% Impervious, Inflow Depth = 4.82" for 10-YR event
 Inflow = 2.93 cfs @ 12.08 hrs, Volume= 0.230 af
 Outflow = 2.91 cfs @ 12.09 hrs, Volume= 0.207 af, Atten= 0%, Lag= 0.5 min
 Primary = 2.91 cfs @ 12.09 hrs, Volume= 0.207 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 137.69' @ 12.09 hrs Surf.Area= 666 sf Storage= 1,292 cf

Plug-Flow detention time= 88.5 min calculated for 0.207 af (90% of inflow)
 Center-of-Mass det. time= 39.9 min (802.1 - 762.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	134.50'	639 cf	11.00'W x 60.58'L x 3.50'H Field A 2,332 cf Overall - 735 cf Embedded = 1,597 cf x 40.0% Voids
#2A	135.00'	735 cf	ADS_StormTech SC-740 +Cap x 16 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 2 Rows of 8 Chambers
		1,374 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	15.0" Round Culvert L= 74.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0135 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	136.75'	20.0" W x 3.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	137.50'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=2.91 cfs @ 12.09 hrs HW=137.69' TW=0.00' (Dynamic Tailwater)

- ↑ 1=Culvert (Passes 2.91 cfs of 6.71 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 1.81 cfs @ 4.35 fps)
- ↑ 3=Sharp-Crested Rectangular Weir (Weir Controls 1.10 cfs @ 1.44 fps)

Summary for Link DP1: Spring Brook

Inflow Area = 1.907 ac, 90.56% Impervious, Inflow Depth = 4.36" for 10-YR event
 Inflow = 8.23 cfs @ 12.10 hrs, Volume= 0.692 af
 Primary = 8.23 cfs @ 12.10 hrs, Volume= 0.692 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 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

SubcatchmentP1: South Edge - Overland	Runoff Area=0.058 ac 100.00% Impervious Runoff Depth=6.29" Flow Length=394' Tc=6.0 min CN=98 Runoff=0.37 cfs 0.030 af
SubcatchmentP2: South Central	Runoff Area=0.130 ac 100.00% Impervious Runoff Depth=6.29" Tc=6.0 min CN=98 Runoff=0.83 cfs 0.068 af
SubcatchmentP3: East	Runoff Area=0.495 ac 87.27% Impervious Runoff Depth=5.94" Tc=6.0 min CN=95 Runoff=3.12 cfs 0.245 af
SubcatchmentP4: North	Runoff Area=0.457 ac 92.78% Impervious Runoff Depth=6.06" Tc=6.0 min CN=96 Runoff=2.90 cfs 0.231 af
SubcatchmentP5: Northeast	Runoff Area=0.195 ac 85.13% Impervious Runoff Depth=5.82" Tc=6.0 min CN=94 Runoff=1.22 cfs 0.095 af
SubcatchmentP6a: Northwest	Runoff Area=0.366 ac 84.97% Impervious Runoff Depth=5.82" Tc=6.0 min CN=94 Runoff=2.28 cfs 0.178 af
SubcatchmentP6b: Northwest (Roof)	Runoff Area=0.206 ac 100.00% Impervious Runoff Depth=6.29" Tc=6.0 min CN=98 Runoff=1.32 cfs 0.108 af
Reach R1: Spring Brook	Inflow=9.16 cfs 0.790 af Outflow=9.16 cfs 0.790 af
Reach R2: East Street	Inflow=1.20 cfs 0.089 af Outflow=1.20 cfs 0.089 af
Pond #1: SWM #1	Peak Elev=137.66' Storage=460 cf Inflow=0.83 cfs 0.068 af Outflow=0.83 cfs 0.058 af
Pond #2: SWM #2	Peak Elev=137.61' Storage=1,259 cf Inflow=3.12 cfs 0.245 af Outflow=3.05 cfs 0.225 af
Pond #3: SWM #3	Peak Elev=137.56' Storage=2,696 cf Inflow=2.90 cfs 0.231 af Outflow=1.55 cfs 0.207 af
Pond #4: SWM #4	Peak Elev=137.76' Storage=1,310 cf Inflow=3.60 cfs 0.286 af Outflow=3.59 cfs 0.263 af
Link DP1: Spring Brook	Inflow=10.35 cfs 0.879 af Primary=10.35 cfs 0.879 af

Total Runoff Area = 1.907 ac Runoff Volume = 0.954 af Average Runoff Depth = 6.01"
9.44% Pervious = 0.180 ac 90.56% Impervious = 1.727 ac

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Type III 24-hr 25-YR Rainfall=6.53"

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Summary for Subcatchment P1: South Edge - Overland

Runoff = 0.37 cfs @ 12.08 hrs, Volume= 0.030 af, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.53"

Area (ac)	CN	Description
0.058	98	Paved parking, HSG C
0.058		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0260	1.38		Sheet Flow, 143.3-142 Smooth surfaces n= 0.011 P2= 3.46"
2.6	344	0.0120	2.22		Shallow Concentrated Flow, 142-137.74 Paved Kv= 20.3 fps
3.2	394	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment P2: South Central

Runoff = 0.83 cfs @ 12.08 hrs, Volume= 0.068 af, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.53"

Area (ac)	CN	Description
0.130	98	Paved parking, HSG C
0.130		100.00% Impervious Area

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

Summary for Subcatchment P3: East

Runoff = 3.12 cfs @ 12.08 hrs, Volume= 0.245 af, Depth= 5.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.53"

Area (ac)	CN	Description
0.235	98	Paved parking, HSG C
0.197	98	Roofs, HSG C
0.063	74	>75% Grass cover, Good, HSG C
0.495	95	Weighted Average
0.063		12.73% Pervious Area
0.432		87.27% Impervious Area

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

Summary for Subcatchment P4: North

Runoff = 2.90 cfs @ 12.08 hrs, Volume= 0.231 af, Depth= 6.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.53"

Area (ac)	CN	Description
0.261	98	Paved parking, HSG C
0.163	98	Roofs, HSG C
0.033	74	>75% Grass cover, Good, HSG C
0.457	96	Weighted Average
0.033		7.22% Pervious Area
0.424		92.78% Impervious Area

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

Summary for Subcatchment P5: Northeast

Runoff = 1.22 cfs @ 12.08 hrs, Volume= 0.095 af, Depth= 5.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.53"

Area (ac)	CN	Description
0.166	98	Paved parking, HSG C
0.000	98	Roofs, HSG C
0.029	74	>75% Grass cover, Good, HSG C
0.195	94	Weighted Average
0.029		14.87% Pervious Area
0.166		85.13% Impervious Area

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

Summary for Subcatchment P6a: Northwest

Runoff = 2.28 cfs @ 12.08 hrs, Volume= 0.178 af, Depth= 5.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.53"

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Area (ac)	CN	Description
0.311	98	Paved parking, HSG C
0.055	74	>75% Grass cover, Good, HSG C
0.366	94	Weighted Average
0.055		15.03% Pervious Area
0.311		84.97% Impervious Area

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

Summary for Subcatchment P6b: Northwest (Roof)

Runoff = 1.32 cfs @ 12.08 hrs, Volume= 0.108 af, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.53"

Area (ac)	CN	Description
0.206	98	Roofs, HSG C
0.206		100.00% Impervious Area

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

Summary for Reach R1: Spring BrookInflow Area = 1.719 ac, 89.53% Impervious, Inflow Depth = 5.52" for 25-YR event
Inflow = 9.16 cfs @ 12.10 hrs, Volume= 0.790 af
Outflow = 9.16 cfs @ 12.10 hrs, Volume= 0.790 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach R2: East StreetInflow Area = 0.188 ac, 100.00% Impervious, Inflow Depth = 5.65" for 25-YR event
Inflow = 1.20 cfs @ 12.09 hrs, Volume= 0.089 af
Outflow = 1.20 cfs @ 12.09 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond #1: SWM #1Inflow Area = 0.130 ac, 100.00% Impervious, Inflow Depth = 6.29" for 25-YR event
Inflow = 0.83 cfs @ 12.08 hrs, Volume= 0.068 af
Outflow = 0.83 cfs @ 12.09 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.3 min
Primary = 0.83 cfs @ 12.09 hrs, Volume= 0.058 af

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Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 137.66' @ 12.09 hrs Surf.Area= 281 sf Storage= 460 cf

Plug-Flow detention time= 121.8 min calculated for 0.058 af (85% of inflow)
Center-of-Mass det. time= 57.1 min (801.1 - 743.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	135.00'	283 cf	15.75'W x 17.86'L x 3.50'H Field A 984 cf Overall - 276 cf Embedded = 709 cf x 40.0% Voids
#2A	135.50'	276 cf	ADS_StormTech SC-740 +Cap x 6 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 3 Rows of 2 Chambers
		559 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	135.70'	12.0" Round Culvert L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 135.50' / 135.70' S= -0.0118 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	137.50'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=0.83 cfs @ 12.09 hrs HW=137.66' TW=0.00' (Dynamic Tailwater)

↑1=Culvert (Passes 0.83 cfs of 3.61 cfs potential flow)

↑2=Sharp-Crested Rectangular Weir(Weir Controls 0.83 cfs @ 1.31 fps)

Summary for Pond #2: SWM #2

Inflow Area = 0.495 ac, 87.27% Impervious, Inflow Depth = 5.94" for 25-YR event
Inflow = 3.12 cfs @ 12.08 hrs, Volume= 0.245 af
Outflow = 3.05 cfs @ 12.10 hrs, Volume= 0.225 af, Atten= 2%, Lag= 1.1 min
Primary = 3.05 cfs @ 12.10 hrs, Volume= 0.225 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 137.61' @ 12.10 hrs Surf.Area= 658 sf Storage= 1,259 cf

Plug-Flow detention time= 77.5 min calculated for 0.225 af (92% of inflow)
Center-of-Mass det. time= 35.1 min (796.7 - 761.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	134.50'	627 cf	20.50'W x 32.10'L x 3.50'H Field A 2,303 cf Overall - 735 cf Embedded = 1,568 cf x 40.0% Voids
#2A	135.00'	735 cf	ADS_StormTech SC-740 +Cap x 16 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 4 Rows of 4 Chambers
		1,362 cf	Total Available Storage

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Post-Conditions HydroCAD 211263
Type III 24-hr 25-YR Rainfall=6.53"

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Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	15.0" Round Culvert L= 183.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0055 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	136.50'	20.0" W x 4.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	137.50'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=3.04 cfs @ 12.10 hrs HW=137.61' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 3.04 cfs of 6.09 cfs potential flow)

2=Orifice/Grate (Orifice Controls 2.59 cfs @ 4.66 fps)

3=Sharp-Crested Rectangular Weir (Weir Controls 0.45 cfs @ 1.07 fps)

Summary for Pond #3: SWM #3

Inflow Area =	0.457 ac, 92.78% Impervious, Inflow Depth = 6.06" for 25-YR event
Inflow =	2.90 cfs @ 12.08 hrs, Volume= 0.231 af
Outflow =	1.55 cfs @ 12.21 hrs, Volume= 0.207 af, Atten= 46%, Lag= 7.5 min
Primary =	1.55 cfs @ 12.21 hrs, Volume= 0.207 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 137.56' @ 12.21 hrs Surf.Area= 2,840 sf Storage= 2,696 cf

Plug-Flow detention time= 114.0 min calculated for 0.207 af (90% of inflow)

Center-of-Mass det. time= 63.9 min (820.3 - 756.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	136.00'	2,002 cf	34.83'W x 81.52'L x 2.33'H Field A 6,626 cf Overall - 1,622 cf Embedded = 5,004 cf x 40.0% Voids
#2A	136.50'	1,622 cf	ADS_StormTech SC-310 +Cap x 110 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Rows of 11 Chambers
		3,623 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	136.50'	12.0" Round Culvert L= 11.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 136.50' / 135.80' S= 0.0609 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	136.70'	14.0" W x 4.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	137.83'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

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Primary OutFlow Max=1.55 cfs @ 12.21 hrs HW=137.56' TW=0.00' (Dynamic Tailwater)

- ↑ 1=Culvert (Passes 1.55 cfs of 2.23 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 1.55 cfs @ 3.99 fps)
- ↑ 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond #4: SWM #4

Inflow Area = 0.572 ac, 90.38% Impervious, Inflow Depth = 5.99" for 25-YR event
 Inflow = 3.60 cfs @ 12.08 hrs, Volume= 0.286 af
 Outflow = 3.59 cfs @ 12.09 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.4 min
 Primary = 3.59 cfs @ 12.09 hrs, Volume= 0.263 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 137.76' @ 12.09 hrs Surf.Area= 666 sf Storage= 1,310 cf

Plug-Flow detention time= 77.4 min calculated for 0.263 af (92% of inflow)
 Center-of-Mass det. time= 35.7 min (793.6 - 757.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	134.50'	639 cf	11.00'W x 60.58'L x 3.50'H Field A 2,332 cf Overall - 735 cf Embedded = 1,597 cf x 40.0% Voids
#2A	135.00'	735 cf	ADS_StormTech SC-740 +Cap x 16 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 2 Rows of 8 Chambers
		1,374 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	15.0" Round Culvert L= 74.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0135 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	136.75'	20.0" W x 3.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	137.50'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=3.59 cfs @ 12.09 hrs HW=137.76' TW=0.00' (Dynamic Tailwater)

- ↑ 1=Culvert (Passes 3.59 cfs of 6.81 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 1.88 cfs @ 4.52 fps)
- ↑ 3=Sharp-Crested Rectangular Weir (Weir Controls 1.70 cfs @ 1.66 fps)

Summary for Link DP1: Spring Brook

Inflow Area = 1.907 ac, 90.56% Impervious, Inflow Depth = 5.53" for 25-YR event
 Inflow = 10.35 cfs @ 12.10 hrs, Volume= 0.879 af
 Primary = 10.35 cfs @ 12.10 hrs, Volume= 0.879 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 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

SubcatchmentP1: South Edge - Overland	Runoff Area=0.058 ac 100.00% Impervious Runoff Depth=8.79" Flow Length=394' Tc=6.0 min CN=98 Runoff=0.51 cfs 0.042 af
SubcatchmentP2: South Central	Runoff Area=0.130 ac 100.00% Impervious Runoff Depth=8.79" Tc=6.0 min CN=98 Runoff=1.15 cfs 0.095 af
SubcatchmentP3: East	Runoff Area=0.495 ac 87.27% Impervious Runoff Depth=8.43" Tc=6.0 min CN=95 Runoff=4.35 cfs 0.348 af
SubcatchmentP4: North	Runoff Area=0.457 ac 92.78% Impervious Runoff Depth=8.55" Tc=6.0 min CN=96 Runoff=4.03 cfs 0.326 af
SubcatchmentP5: Northeast	Runoff Area=0.195 ac 85.13% Impervious Runoff Depth=8.31" Tc=6.0 min CN=94 Runoff=1.70 cfs 0.135 af
SubcatchmentP6a: Northwest	Runoff Area=0.366 ac 84.97% Impervious Runoff Depth=8.31" Tc=6.0 min CN=94 Runoff=3.20 cfs 0.253 af
SubcatchmentP6b: Northwest (Roof)	Runoff Area=0.206 ac 100.00% Impervious Runoff Depth=8.79" Tc=6.0 min CN=98 Runoff=1.83 cfs 0.151 af
Reach R1: Spring Brook	Inflow=12.77 cfs 1.147 af Outflow=12.77 cfs 1.147 af
Reach R2: East Street	Inflow=1.67 cfs 0.128 af Outflow=1.67 cfs 0.128 af
Pond #1: SWM #1	Peak Elev=137.70' Storage=466 cf Inflow=1.15 cfs 0.095 af Outflow=1.15 cfs 0.085 af
Pond #2: SWM #2	Peak Elev=137.74' Storage=1,295 cf Inflow=4.35 cfs 0.348 af Outflow=4.33 cfs 0.328 af
Pond #3: SWM #3	Peak Elev=137.99' Storage=3,232 cf Inflow=4.03 cfs 0.326 af Outflow=2.80 cfs 0.302 af
Pond #4: SWM #4	Peak Elev=137.88' Storage=1,342 cf Inflow=5.03 cfs 0.404 af Outflow=5.01 cfs 0.382 af
Link DP1: Spring Brook	Inflow=14.43 cfs 1.274 af Primary=14.43 cfs 1.274 af

Total Runoff Area = 1.907 ac Runoff Volume = 1.350 af Average Runoff Depth = 8.50"
9.44% Pervious = 0.180 ac 90.56% Impervious = 1.727 ac

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Type III 24-hr 100-YR Rainfall=9.03"

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Summary for Subcatchment P1: South Edge - Overland

Runoff = 0.51 cfs @ 12.08 hrs, Volume= 0.042 af, Depth= 8.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=9.03"

Area (ac)	CN	Description
0.058	98	Paved parking, HSG C
0.058		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0260	1.38		Sheet Flow, 143.3-142 Smooth surfaces n= 0.011 P2= 3.46"
2.6	344	0.0120	2.22		Shallow Concentrated Flow, 142-137.74 Paved Kv= 20.3 fps
3.2	394	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment P2: South Central

Runoff = 1.15 cfs @ 12.08 hrs, Volume= 0.095 af, Depth= 8.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=9.03"

Area (ac)	CN	Description
0.130	98	Paved parking, HSG C
0.130		100.00% Impervious Area

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

Summary for Subcatchment P3: East

Runoff = 4.35 cfs @ 12.08 hrs, Volume= 0.348 af, Depth= 8.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=9.03"

Area (ac)	CN	Description
0.235	98	Paved parking, HSG C
0.197	98	Roofs, HSG C
0.063	74	>75% Grass cover, Good, HSG C
0.495	95	Weighted Average
0.063		12.73% Pervious Area
0.432		87.27% Impervious Area

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

Summary for Subcatchment P4: North

Runoff = 4.03 cfs @ 12.08 hrs, Volume= 0.326 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=9.03"

Area (ac)	CN	Description
0.261	98	Paved parking, HSG C
0.163	98	Roofs, HSG C
0.033	74	>75% Grass cover, Good, HSG C
0.457	96	Weighted Average
0.033		7.22% Pervious Area
0.424		92.78% Impervious Area

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

Summary for Subcatchment P5: Northeast

Runoff = 1.70 cfs @ 12.08 hrs, Volume= 0.135 af, Depth= 8.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=9.03"

Area (ac)	CN	Description
0.166	98	Paved parking, HSG C
0.000	98	Roofs, HSG C
0.029	74	>75% Grass cover, Good, HSG C
0.195	94	Weighted Average
0.029		14.87% Pervious Area
0.166		85.13% Impervious Area

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

Summary for Subcatchment P6a: Northwest

Runoff = 3.20 cfs @ 12.08 hrs, Volume= 0.253 af, Depth= 8.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=9.03"

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Area (ac)	CN	Description
0.311	98	Paved parking, HSG C
0.055	74	>75% Grass cover, Good, HSG C
0.366	94	Weighted Average
0.055		15.03% Pervious Area
0.311		84.97% Impervious Area

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

Summary for Subcatchment P6b: Northwest (Roof)

Runoff = 1.83 cfs @ 12.08 hrs, Volume= 0.151 af, Depth= 8.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=9.03"

Area (ac)	CN	Description
0.206	98	Roofs, HSG C
0.206		100.00% Impervious Area

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

Summary for Reach R1: Spring BrookInflow Area = 1.719 ac, 89.53% Impervious, Inflow Depth = 8.01" for 100-YR event
Inflow = 12.77 cfs @ 12.09 hrs, Volume= 1.147 af
Outflow = 12.77 cfs @ 12.09 hrs, Volume= 1.147 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach R2: East StreetInflow Area = 0.188 ac, 100.00% Impervious, Inflow Depth = 8.15" for 100-YR event
Inflow = 1.67 cfs @ 12.09 hrs, Volume= 0.128 af
Outflow = 1.67 cfs @ 12.09 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond #1: SWM #1Inflow Area = 0.130 ac, 100.00% Impervious, Inflow Depth = 8.79" for 100-YR event
Inflow = 1.15 cfs @ 12.08 hrs, Volume= 0.095 af
Outflow = 1.15 cfs @ 12.09 hrs, Volume= 0.085 af, Atten= 0%, Lag= 0.3 min
Primary = 1.15 cfs @ 12.09 hrs, Volume= 0.085 af

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Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 137.70' @ 12.09 hrs Surf.Area= 281 sf Storage= 466 cf

Plug-Flow detention time= 99.7 min calculated for 0.085 af (89% of inflow)
 Center-of-Mass det. time= 47.5 min (787.3 - 739.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	135.00'	283 cf	15.75'W x 17.86'L x 3.50'H Field A 984 cf Overall - 276 cf Embedded = 709 cf x 40.0% Voids
#2A	135.50'	276 cf	ADS_StormTech SC-740 +Cap x 6 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 3 Rows of 2 Chambers
		559 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	135.70'	12.0" Round Culvert L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 135.50' / 135.70' S= -0.0118 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	137.50'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=1.15 cfs @ 12.09 hrs HW=137.70' TW=0.00' (Dynamic Tailwater)

↑1=Culvert (Passes 1.15 cfs of 3.66 cfs potential flow)

↑2=Sharp-Crested Rectangular Weir(Weir Controls 1.15 cfs @ 1.46 fps)

Summary for Pond #2: SWM #2

Inflow Area = 0.495 ac, 87.27% Impervious, Inflow Depth = 8.43" for 100-YR event
 Inflow = 4.35 cfs @ 12.08 hrs, Volume= 0.348 af
 Outflow = 4.33 cfs @ 12.09 hrs, Volume= 0.328 af, Atten= 0%, Lag= 0.4 min
 Primary = 4.33 cfs @ 12.09 hrs, Volume= 0.328 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 137.74' @ 12.09 hrs Surf.Area= 658 sf Storage= 1,295 cf

Plug-Flow detention time= 61.6 min calculated for 0.328 af (94% of inflow)
 Center-of-Mass det. time= 29.2 min (783.7 - 754.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	134.50'	627 cf	20.50'W x 32.10'L x 3.50'H Field A 2,303 cf Overall - 735 cf Embedded = 1,568 cf x 40.0% Voids
#2A	135.00'	735 cf	ADS_StormTech SC-740 +Cap x 16 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 4 Rows of 4 Chambers
		1,362 cf	Total Available Storage

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Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	15.0" Round Culvert L= 183.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0055 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	136.50'	20.0" W x 4.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	137.50'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=4.33 cfs @ 12.09 hrs HW=137.74' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 4.33 cfs of 6.26 cfs potential flow)

2=Orifice/Grate (Orifice Controls 2.77 cfs @ 4.99 fps)

3=Sharp-Crested Rectangular Weir (Weir Controls 1.56 cfs @ 1.62 fps)

Summary for Pond #3: SWM #3

Inflow Area =	0.457 ac, 92.78% Impervious, Inflow Depth = 8.55" for 100-YR event
Inflow =	4.03 cfs @ 12.08 hrs, Volume= 0.326 af
Outflow =	2.80 cfs @ 12.16 hrs, Volume= 0.302 af, Atten= 30%, Lag= 4.8 min
Primary =	2.80 cfs @ 12.16 hrs, Volume= 0.302 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 137.99' @ 12.16 hrs Surf.Area= 2,840 sf Storage= 3,232 cf

Plug-Flow detention time= 94.5 min calculated for 0.302 af (93% of inflow)

Center-of-Mass det. time= 55.3 min (805.5 - 750.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	136.00'	2,002 cf	34.83'W x 81.52'L x 2.33'H Field A 6,626 cf Overall - 1,622 cf Embedded = 5,004 cf x 40.0% Voids
#2A	136.50'	1,622 cf	ADS_StormTech SC-310 +Cap x 110 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Rows of 11 Chambers
		3,623 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	136.50'	12.0" Round Culvert L= 11.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 136.50' / 135.80' S= 0.0609 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	136.70'	14.0" W x 4.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	137.83'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

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Primary OutFlow Max=2.80 cfs @ 12.16 hrs HW=137.99' TW=0.00' (Dynamic Tailwater)↑ **1=Culvert** (Passes 2.80 cfs of 2.97 cfs potential flow)↑ **2=Orifice/Grate** (Orifice Controls 1.98 cfs @ 5.09 fps)↑ **3=Sharp-Crested Rectangular Weir** (Weir Controls 0.81 cfs @ 1.30 fps)**Summary for Pond #4: SWM #4**

Inflow Area = 0.572 ac, 90.38% Impervious, Inflow Depth = 8.48" for 100-YR event
 Inflow = 5.03 cfs @ 12.08 hrs, Volume= 0.404 af
 Outflow = 5.01 cfs @ 12.09 hrs, Volume= 0.382 af, Atten= 0%, Lag= 0.4 min
 Primary = 5.01 cfs @ 12.09 hrs, Volume= 0.382 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 137.88' @ 12.09 hrs Surf.Area= 666 sf Storage= 1,342 cf

Plug-Flow detention time= 61.3 min calculated for 0.382 af (94% of inflow)
 Center-of-Mass det. time= 29.4 min (781.0 - 751.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	134.50'	639 cf	11.00'W x 60.58'L x 3.50'H Field A 2,332 cf Overall - 735 cf Embedded = 1,597 cf x 40.0% Voids
#2A	135.00'	735 cf	ADS_StormTech SC-740 +Cap x 16 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 2 Rows of 8 Chambers
		1,374 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	15.0" Round Culvert L= 74.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0135 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	136.75'	20.0" W x 3.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	137.50'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=5.01 cfs @ 12.09 hrs HW=137.88' TW=0.00' (Dynamic Tailwater)↑ **1=Culvert** (Passes 5.01 cfs of 7.00 cfs potential flow)↑ **2=Orifice/Grate** (Orifice Controls 2.01 cfs @ 4.82 fps)↑ **3=Sharp-Crested Rectangular Weir** (Weir Controls 3.00 cfs @ 2.01 fps)**Summary for Link DP1: Spring Brook**

Inflow Area = 1.907 ac, 90.56% Impervious, Inflow Depth = 8.02" for 100-YR event
 Inflow = 14.43 cfs @ 12.09 hrs, Volume= 1.274 af
 Primary = 14.43 cfs @ 12.09 hrs, Volume= 1.274 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Proposed Multi-Family Development
981, 989 & 1015 East Street
Walpole, MA
Bohler Job Number: W211263
May 31, 2023**

MA DEP Standard 3: Recharge Volume Calculations

Required Recharge Volume - A Soils (0.60 in.)	
Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Proposed Increase in Site Impervious Area (ac)	0.000
Recharge Volume Required (cf)	0

Required Recharge Volume - B Soils (0.35 in.)	
Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Proposed Increase in Site Impervious Area (ac)	0.000
Recharge Volume Required (cf)	0

Required Recharge Volume - C Soils (0.25 in.)	
Existing Site Impervious Area (ac)	1.561
Proposed Site Impervious Area (ac)	1.727
Proposed Increase in Site Impervious Area (ac)	0.166
Recharge Volume Required (cf)	151

Required Recharge Volume - D Soils (0.10 in.)	
Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Proposed Increase in Site Impervious Area (ac)	0.000
Recharge Volume Required (cf)	0

Total Recharge Volume Required (cf)	151
--	------------

Recharge Volume Adjustment Factor	
Impervious Area Directed to Infiltration BMP (ac)	1.448
%Impervious Directed to Infiltration BMP	84%
Adjustment Factor	1.19
Adjusted Total Recharge Volume Required (cf)	180

Provided Recharge Volume*	
SWM #1	436
SWM #2	865
SWM #3	1,018
SWM #4	979
Total Recharge Volume Provided (cf)	3,298

Provided greater than or Equal to Required

*Volume provided below lowest outlet in cubic feet (cf)

**Proposed Multi-Family Development
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MA DEP Standard 3: Drawdown Time Calculations

Drawdown Time - SWM #1	
Volume below outlet pipe (Rv) (cf)	436
Soil Type	Silt Loam - C
Infiltration rate (K)*	0.27
Bottom Area (sf)	281
Drawdown time (Hours)*	69.0
Drawdown Time - SWM #2	
Volume below outlet pipe (Rv) (cf)	865
Soil Type	Silt Loam - C
Infiltration rate (K)*	0.27
Bottom Area (sf)	658
Drawdown time (Hours)**	58.4
Drawdown Time - SWM #3	
Volume below outlet pipe (Rv) (cf)	1,018
Soil Type	Silt Loam - C
Infiltration rate (K)*	0.27
Bottom Area (sf)	2,839
Drawdown time (Hours)**	15.9
Drawdown Time - SWM #4	
Volume below outlet pipe (Rv) (cf)	979
Soil Type	Silt Loam - C
Infiltration rate (K)*	0.27
Bottom Area (sf)	666
Drawdown time (Hours)**	65.3

*Infiltration Rates taken from Rawls Table

**Drawdown time = Rv / (K) x (bottom area)

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**Proposed Multi-Family Development
 981, 989 & 1015 East Street
 Walpole, MA
 Bohler Job Number: W211263
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MA DEP Standard 4: Water Quality Volume Calculations

Water Quality Volume Required	
Water Quality Volume runoff (in.)*	0.5
Total Post Development Impervious Area (sf)	75,228
Required Water Quality Volume (cf)	3,135
*Water Quality volume runoff is equal to 0.5 inches of runoff times the total impervious area of the post development project site (excludes roof)	

Water Quality Volume Provided*	
SWM #1	436
SWM #2	865
SWM #3	1,018
SWM #4	979
Total Provided Water Quality Volume (cf)	3,298

Required Recharge Provided

*Volume provided below lowest outlet pipe in cubic feet (cf)

Proposed Multi-Family Development
981, 989 & 1015 East Street
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MA DEP Standard 4: Weighted TSS Removal Rate

Design Point - Treatment Train Description(s)	TSS Removal (%)	Treated Imp. Area* (ac)	TSS Removal (%)	Untreated Imp. Area (ac)	Total Area
DP1 - Overland to East Street	0.00	0.000	0.00	0.058	0.058
DP1 - To Wqi500	0.80	0.166	0.11	0.000	0.166
DP1 - CBs to UG Basins 1-4 w/ pretreatment	0.85	0.937	0.69	0.000	0.937
Total Weighted TSS Removal Rate	0.80				1.161

*Excludes roof runoff