Stormwater Analysis

234 Taylor Street
Littleton, Massachusetts

Planning
Landscape
Architecture
Civil
Engineering
Surveying

PREPARED FOR:

Sanctuary Medicinals

COMMONWEALTH OF MASSACHUSETTS
Susan E. Carter
CIVIL ENGINEER
NO. 41270
REGISTERED PROFESSIONAL ENGINEER
7-18-23

Date: July 18, 2023

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Existing Conditions

The site contains 6.34 acres of land which contains an industrial building and appurtenances housing Sanctuary Medicinals. The site is located on the easterly side of Taylor Street and slopes to the east. No wetlands or wetland buffer zones impact the site so the Point of Analysis are the property lines.

There is an existing catchbasin on the site which, as shown on the 1996 site plan, drains to the drainage system on the northerly abutter (N/F Concord Associates Foster Street Trust). All other runoff generally flows towards the northerly, easterly or southerly property lines.

NCRS Soil Maps indicate that the soils on the front of the site (westerly) are Paxton-Urban Complex with a Hydrologic Soil Group of C and at the rear of the site, they are Woodbridge Fine Sandy Loam, Hydrologic Soil Group C/D. Soil testing has been performed on the site for the multiple septic systems which have served the building as well as soil probes performed in 2020 in anticipation of a building addition.

Proposed Conditions

The proposed building and associated paved loading area will be located to the rear of the existing building on a small knoll. Pre-Development subcatchment area 5 will be impacted by this construction with a minor decrease in surface area to subcatchment 1. The table below will address the impact on this subcatchment area as the others remain unchanged.

The runoff from the proposed roof is considered clean and will be collected and directed to the stormwater infiltration area. Runoff from the paved loading area will be collected into a stormwater treatment unit (CDS or similar hydrodynamic unit) equipped with a catchbasin frame and grate. This hydrodynamic unit will provide 80% TSS removal so that pre-treated runoff can be directed into the stormwater infiltration area.

The stormwater infiltration area will provide recharge to the soils to mitigate the impervious areas and will provide attenuation of the rate of runoff to the pre-development rates. To compare the Pre and Post Development rates of runoff, the discharge from the infiltration system and the overland flows were routed to Link 8 with the Point of Analysis being the north-northeast property line.

The hydrologic analysis for this site was performed using the HydroCAD modelling software using the SCS TR-20 methodology to route the stormwater through the site. The design storms were downloaded directly from the NOAA site for the TP-40 rainfall amounts as directed by the regulations. Typically, the 2,10 and 100 year events are required for wetlands permits. The HydoCAD printouts provided include detailed printouts of the 25 year storm (Design Storm) and summaries of the 2, 10 and 100 year events.

Summary of Drainage Flow Rates (cfs)

HydroCAD Analysis Results				
Subcatchment	Storm Event Discharge Rates (cfs)			
Design Storm Event	2-Year	10-Year	25-Year	100-Year
Existing Conditions (Subcat 5)	1.62	3.74	5.53	8.57
Proposed Conditions (Link 8)	1.62	3.74	5.60	8.43

Groundwater Recharge:

Required recharge rate for C soils is 0.25 inch of rainfall for impervious areas.
New Impervious Areas= 14,346 roof+1882 pave= 16,228 s.f. x 0.25"= 338 c.f.

Volume provided below lowest outlet=1,728 c.f. > 338 c.f.

Soil Map—Middlesex County, Massachusetts

Map Scale: 1:1,730 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 22, Sep 9, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
103D	Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes	4.3	29.0%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	4.0	27.0%
317C	Scituate fine sandy loam, 8 to 15 percent slopes, extremely stony	0.3	2.1%
622C	Paxton-Urban land complex, 3 to 15 percent slopes	6.2	41.9%
Totals for Area of Interest		**14.8**	**100.0%**

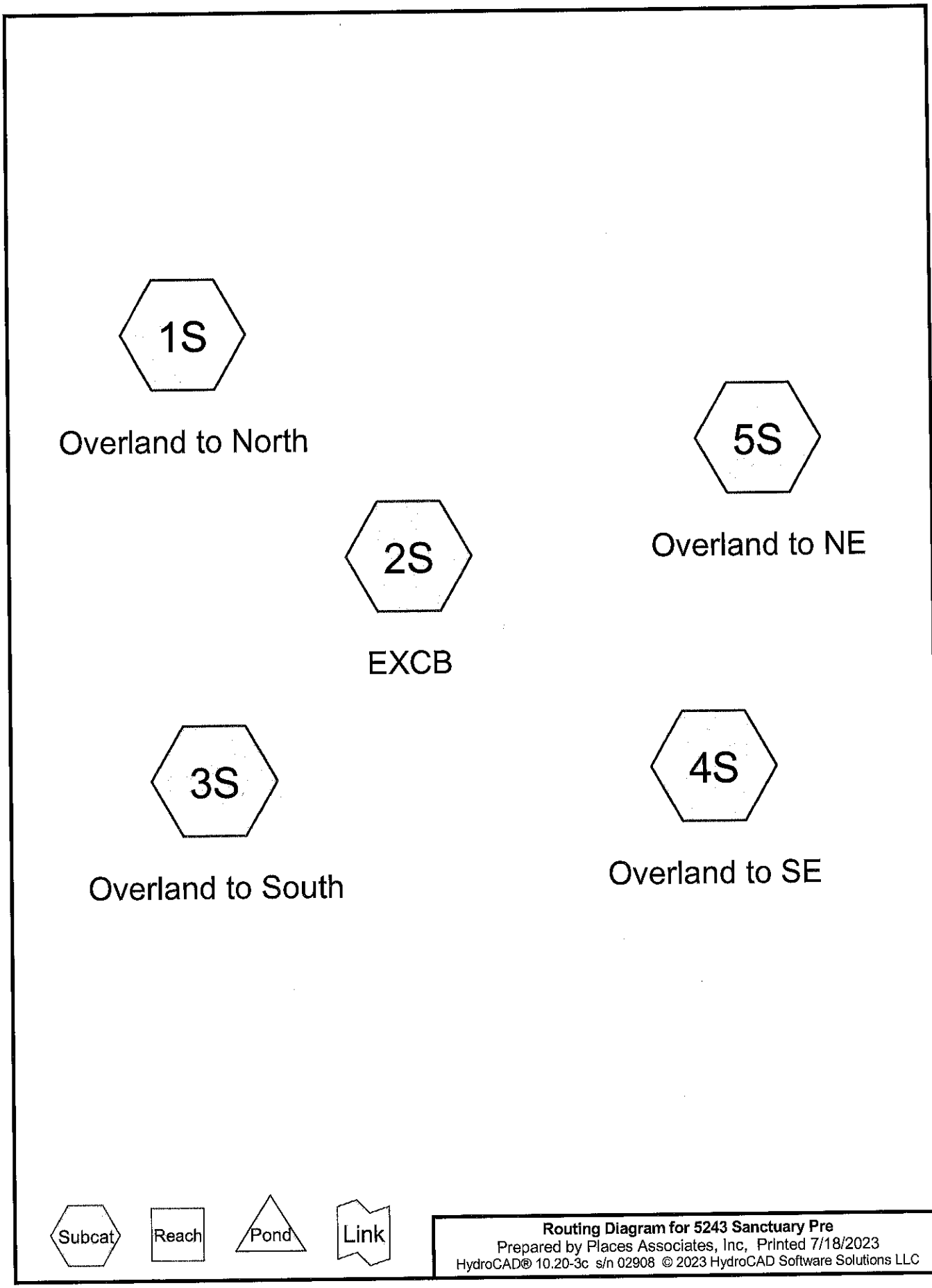
Stage-Area-Storage for Pond 1P: Recharge

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
343.50	**1,668**	0
343.55	1,668	33
343.60	1,668	67
343.65	1,668	100
343.70	1,668	133
343.75	1,668	167
343.80	1,668	200
343.85	1,668	233
343.90	1,668	267
343.95	1,668	300
344.00	1,668	334
344.05	1,668	406
344.10	1,668	479
344.15	1,668	551
344.20	1,668	622
344.25	1,668	694
344.30	1,668	765
344.35	1,668	836
344.40	1,668	906
344.45	1,668	977
344.50	1,668	1,047
344.55	1,668	1,117
344.60	1,668	1,186
344.65	1,668	1,255
344.70	1,668	1,324
344.75	1,668	1,392
344.80	1,668	1,460
344.85	1,668	1,527
344.90	1,668	1,594
344.95	1,668	1,661
345.00	1,668	1,728
345.05	1,668	1,794
345.10	1,668	1,859
345.15	1,668	1,925
345.20	1,668	1,989
345.25	1,668	2,053
345.30	1,668	2,116
345.35	1,668	2,178
345.40	1,668	2,240
345.45	1,668	2,301
345.50	1,668	2,361
345.55	1,668	2,420
345.60	1,668	2,479
345.65	1,668	2,536
345.70	1,668	2,592
345.75	1,668	2,646
345.80	1,668	2,700
345.85	1,668	2,751
345.90	1,668	2,801
345.95	1,668	2,848
346.00	1,668	2,892
346.05	1,668	2,932
346.10	1,668	2,970
346.15	1,668	3,006
346.20	1,668	3,040
346.25	1,668	3,073
346.30	1,668	3,106
346.35	1,668	3,140
346.40	1,668	3,173
346.45	1,668	3,206
346.50	1,668	3,240
346.55	1,668	3,273
346.60	1,668	3,306
346.65	1,668	3,340
346.70	1,668	**3,373**

Storage below lowest outlet

HydroCAD Data

PRE- DEVELOPMENT



Routing Diagram for 5243 Sanctuary Pre
Prepared by Places Associates, Inc, Printed 7/18/2023

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25-yr	NOAA 24-hr	D	Default	24.00	1	6.00	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
68,687	74	>75% Grass cover, Good, HSG C (2S, 3S, 4S, 5S)
400	87	Dirt roads, HSG C (1S)
655	87	Dirt roads, HSG C - path (2S)
32,184	98	Paved parking, HSG C (2S, 5S)
10,180	98	Roofs, HSG C (2S)
2,576	98	Unconnected pavement, HSG C - conc pads (3S)
563	98	Unconnected pavement, HSG C - conc pads (5S)
24,275	98	Unconnected roofs, HSG C (3S, 4S, 5S)
667	98	Unconnected roofs, HSG C - conc paths (4S)
6,898	98	Unconnected roofs, HSG C- conc pads (2S)
128,939	70	Woods, Good, HSG C (1S, 2S, 3S, 4S, 5S)
276,024	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
276,024	HSG C	1S, 2S, 3S, 4S, 5S
0	HSG D	
0	Other	
276,024		**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
0	0	68,687	0	0	68,687	>75% Grass cover, Good
0	0	1,055	0	0	1,055	Dirt roads
0	0	32,184	0	0	32,184	Paved parking
0	0	10,180	0	0	10,180	Roofs
0	0	3,139	0	0	3,139	Unconnected pavement
0	0	31,840	0	0	31,840	Unconnected roofs
0	0	128,939	0	0	128,939	Woods, Good
0	**0**	**276,024**	**0**	**0**	**276,024**	**TOTAL AREA**

PRE 25 YEAR – FULL DETAILS

Time span=1.00-30.00 hrs, dt=0.01 hrs, 2901 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 1S: Overland to North Runoff Area=23,342 sf 0.00% Impervious Runoff Depth=2.81"
Flow Length=70' Slope=0.0100 '/' Tc=17.0 min CN=70 Runoff=1.22 cfs 5,457 cf

Subcatchment 2S: EXCB Runoff Area=99,992 sf 48.90% Impervious Runoff Depth=4.30"
Flow Length=592' Tc=15.1 min CN=85 Runoff=8.28 cfs 35,851 cf

Subcatchment 3S: Overland to South Runoff Area=48,010 sf 23.74% Impervious Runoff Depth=3.18"
Tc=6.0 min UI Adjusted CN=74 Runoff=4.13 cfs 12,742 cf

Subcatchment 4S: Overland to SE Runoff Area=31,565 sf 23.63% Impervious Runoff Depth=3.38"
Flow Length=229' Tc=6.0 min UI Adjusted CN=76 Runoff=2.88 cfs 8,891 cf

Subcatchment 5S: Overland to NE Runoff Area=73,115 sf 13.12% Impervious Runoff Depth=3.09"
Flow Length=299' Tc=6.7 min UI Adjusted CN=73 Runoff=5.95 cfs 18,819 cf

Total Runoff Area = 276,024 sf Runoff Volume = 81,760 cf Average Runoff Depth = 3.55"
71.98% Pervious = 198,681 sf 28.02% Impervious = 77,343 sf

Summary for Subcatchment 1S: Overland to North

Runoff = 1.22 cfs @ 12.26 hrs, Volume= 5,457 cf, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.00"

Area (sf)	CN	Description
22,942	70	Woods, Good, HSG C
400	87	Dirt roads, HSG C
23,342	70	Weighted Average
23,342		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	20	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.0	70	Total			

Summary for Subcatchment 2S: EXCB

Runoff = 8.28 cfs @ 12.23 hrs, Volume= 35,851 cf, Depth= 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.00"

	Area (sf)	CN	Description
	28,805	70	Woods, Good, HSG C
*	655	87	Dirt roads, HSG C - path
	31,815	98	Paved parking, HSG C
*	6,898	98	Unconnected roofs, HSG C- conc pads
	10,180	98	Roofs, HSG C
	21,639	74	>75% Grass cover, Good, HSG C
	99,992	85	Weighted Average
	51,099		51.10% Pervious Area
	48,893		48.90% Impervious Area
	6,898		14.11% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	90	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.3	170	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	132	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	150	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.1	592	Total			

Summary for Subcatchment 3S: Overland to South

Runoff = 4.13 cfs @ 12.13 hrs, Volume= 12,742 cf, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.00"

	Area (sf)	CN	Adj	Description
	25,704	70		Woods, Good, HSG C
	8,820	98		Unconnected roofs, HSG C
	10,910	74		>75% Grass cover, Good, HSG C
*	2,576	98		Unconnected pavement, HSG C - conc pads
	48,010	78	74	Weighted Average, UI Adjusted
	36,614			76.26% Pervious Area
	11,396			23.74% Impervious Area
	11,396			100.00% Unconnected

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

Summary for Subcatchment 4S: Overland to SE

Runoff = 2.88 cfs @ 12.13 hrs, Volume= 8,891 cf, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.00"

	Area (sf)	CN	Adj	Description
	7,496	70		Woods, Good, HSG C
	6,793	98		Unconnected roofs, HSG C
	16,609	74		>75% Grass cover, Good, HSG C
*	667	98		Unconnected roofs, HSG C - conc paths
	31,565	79	76	Weighted Average, UI Adjusted
	24,105			76.37% Pervious Area
	7,460			23.63% Impervious Area
	7,460			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.5	53	0.0740	1.90		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	16	0.1560	2.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	110	0.0810	1.42		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	229	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Overland to NE

Runoff = 5.95 cfs @ 12.14 hrs, Volume= 18,819 cf, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.00"

	Area (sf)	CN	Adj	Description
	43,992	70		Woods, Good, HSG C
	8,662	98		Unconnected roofs, HSG C
	19,529	74		>75% Grass cover, Good, HSG C
*	563	98		Unconnected pavement, HSG C - conc pads
	369	98		Paved parking, HSG C
	73,115	75	73	Weighted Average, UI Adjusted
	63,521			86.88% Pervious Area
	9,594			13.12% Impervious Area
	9,225			96.15% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9	84	0.0480	1.53		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	10	0.3000	2.74		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.8	155	0.0830	1.44		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.7	299	Total			

PRE 2 YEAR- SUMMARY

Time span=1.00-30.00 hrs, dt=0.01 hrs, 2901 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 1S: Overland to North Runoff Area=23,342 sf 0.00% Impervious Runoff Depth=0.82"
Flow Length=70' Slope=0.0100 '/' Tc=17.0 min CN=70 Runoff=0.32 cfs 1,599 cf

Subcatchment 2S: EXCB Runoff Area=99,992 sf 48.90% Impervious Runoff Depth=1.75"
Flow Length=592' Tc=15.1 min CN=85 Runoff=3.44 cfs 14,575 cf

Subcatchment 3S: Overland to South Runoff Area=48,010 sf 23.74% Impervious Runoff Depth=1.03"
Tc=6.0 min UI Adjusted CN=74 Runoff=1.31 cfs 4,125 cf

Subcatchment 4S: Overland to SE Runoff Area=31,565 sf 23.63% Impervious Runoff Depth=1.15"
Flow Length=229' Tc=6.0 min UI Adjusted CN=76 Runoff=0.96 cfs 3,012 cf

Subcatchment 5S: Overland to NE Runoff Area=73,115 sf 13.12% Impervious Runoff Depth=0.98"
Flow Length=299' Tc=6.7 min UI Adjusted CN=73 Runoff=1.81 cfs 5,949 cf

Total Runoff Area = 276,024 sf Runoff Volume = 29,260 cf Average Runoff Depth = 1.27"
71.98% Pervious = 198,681 sf 28.02% Impervious = 77,343 sf

Summary for Subcatchment 1S: Overland to North

Runoff = 0.32 cfs @ 12.28 hrs, Volume= 1,599 cf, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr Rainfall=3.19"

Area (sf)	CN	Description
22,942	70	Woods, Good, HSG C
400	87	Dirt roads, HSG C
23,342	70	Weighted Average
23,342		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	20	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.0	70	Total			

Summary for Subcatchment 2S: EXCB

Runoff = 3.44 cfs @ 12.23 hrs, Volume= 14,575 cf, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr Rainfall=3.19"

	Area (sf)	CN	Description
	28,805	70	Woods, Good, HSG C
*	655	87	Dirt roads, HSG C - path
	31,815	98	Paved parking, HSG C
*	6,898	98	Unconnected roofs, HSG C- conc pads
	10,180	98	Roofs, HSG C
	21,639	74	>75% Grass cover, Good, HSG C
	99,992	85	Weighted Average
	51,099		51.10% Pervious Area
	48,893		48.90% Impervious Area
	6,898		14.11% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	90	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.3	170	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	132	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	150	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.1	592	Total			

Summary for Subcatchment 3S: Overland to South

Runoff = 1.31 cfs @ 12.14 hrs, Volume= 4,125 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr Rainfall=3.19"

	Area (sf)	CN	Adj	Description
	25,704	70		Woods, Good, HSG C
	8,820	98		Unconnected roofs, HSG C
	10,910	74		>75% Grass cover, Good, HSG C
*	2,576	98		Unconnected pavement, HSG C - conc pads
	48,010	78	74	Weighted Average, UI Adjusted
	36,614			76.26% Pervious Area
	11,396			23.74% Impervious Area
	11,396			100.00% Unconnected

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

Summary for Subcatchment 4S: Overland to SE

Runoff = 0.96 cfs @ 12.14 hrs, Volume= 3,012 cf, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr Rainfall=3.19"

	Area (sf)	CN	Adj	Description
	7,496	70		Woods, Good, HSG C
	6,793	98		Unconnected roofs, HSG C
	16,609	74		>75% Grass cover, Good, HSG C
*	667	98		Unconnected roofs, HSG C - conc paths
	31,565	79	76	Weighted Average, UI Adjusted
	24,105			76.37% Pervious Area
	7,460			23.63% Impervious Area
	7,460			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.5	53	0.0740	1.90		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	16	0.1560	2.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	110	0.0810	1.42		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	229	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Overland to NE

Runoff = 1.81 cfs @ 12.14 hrs, Volume= 5,949 cf, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr Rainfall=3.19"

	Area (sf)	CN	Adj	Description
	43,992	70		Woods, Good, HSG C
	8,662	98		Unconnected roofs, HSG C
	19,529	74		>75% Grass cover, Good, HSG C
*	563	98		Unconnected pavement, HSG C - conc pads
	369	98		Paved parking, HSG C
	73,115	75	73	Weighted Average, UI Adjusted
	63,521			86.88% Pervious Area
	9,594			13.12% Impervious Area
	9,225			96.15% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9	84	0.0480	1.53		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	10	0.3000	2.74		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.8	155	0.0830	1.44		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.7	299	Total			

PRE 10 YEAR- SUMMARY

Time span=1.00-30.00 hrs, dt=0.01 hrs, 2901 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 1S: Overland to North Runoff Area=23,342 sf 0.00% Impervious Runoff Depth=1.98"
Flow Length=70' Slope=0.0100 '/' Tc=17.0 min CN=70 Runoff=0.85 cfs 3,846 cf

Subcatchment 2S: EXCB Runoff Area=99,992 sf 48.90% Impervious Runoff Depth=3.29"
Flow Length=592' Tc=15.1 min CN=85 Runoff=6.41 cfs 27,449 cf

Subcatchment 3S: Overland to South Runoff Area=48,010 sf 23.74% Impervious Runoff Depth=2.30"
Tc=6.0 min UI Adjusted CN=74 Runoff=2.99 cfs 9,204 cf

Subcatchment 4S: Overland to SE Runoff Area=31,565 sf 23.63% Impervious Runoff Depth=2.47"
Flow Length=229' Tc=6.0 min UI Adjusted CN=76 Runoff=2.11 cfs 6,496 cf

Subcatchment 5S: Overland to NE Runoff Area=73,115 sf 13.12% Impervious Runoff Depth=2.22"
Flow Length=299' Tc=6.7 min UI Adjusted CN=73 Runoff=4.27 cfs 13,514 cf

Total Runoff Area = 276,024 sf Runoff Volume = 60,510 cf Average Runoff Depth = 2.63"
71.98% Pervious = 198,681 sf 28.02% Impervious = 77,343 sf

Summary for Subcatchment 1S: Overland to North

Runoff = 0.85 cfs @ 12.26 hrs, Volume= 3,846 cf, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr Rainfall=4.92"

Area (sf)	CN	Description
22,942	70	Woods, Good, HSG C
400	87	Dirt roads, HSG C
23,342	70	Weighted Average
23,342		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	20	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.0	70	Total			

Summary for Subcatchment 2S: EXCB

Runoff = 6.41 cfs @ 12.23 hrs, Volume= 27,449 cf, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr Rainfall=4.92"

	Area (sf)	CN	Description
	28,805	70	Woods, Good, HSG C
*	655	87	Dirt roads, HSG C - path
	31,815	98	Paved parking, HSG C
*	6,898	98	Unconnected roofs, HSG C- conc pads
	10,180	98	Roofs, HSG C
	21,639	74	>75% Grass cover, Good, HSG C
	99,992	85	Weighted Average
	51,099		51.10% Pervious Area
	48,893		48.90% Impervious Area
	6,898		14.11% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	90	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.3	170	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	132	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	150	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.1	592	Total			

Summary for Subcatchment 3S: Overland to South

Runoff = 2.99 cfs @ 12.13 hrs, Volume= 9,204 cf, Depth= 2.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr Rainfall=4.92"

	Area (sf)	CN	Adj	Description
	25,704	70		Woods, Good, HSG C
	8,820	98		Unconnected roofs, HSG C
	10,910	74		>75% Grass cover, Good, HSG C
*	2,576	98		Unconnected pavement, HSG C - conc pads
	48,010	78	74	Weighted Average, UI Adjusted
	36,614			76.26% Pervious Area
	11,396			23.74% Impervious Area
	11,396			100.00% Unconnected

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

Summary for Subcatchment 4S: Overland to SE

Runoff = 2.11 cfs @ 12.13 hrs, Volume= 6,496 cf, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr Rainfall=4.92"

	Area (sf)	CN	Adj	Description
	7,496	70		Woods, Good, HSG C
	6,793	98		Unconnected roofs, HSG C
	16,609	74		>75% Grass cover, Good, HSG C
*	667	98		Unconnected roofs, HSG C - conc paths
	31,565	79	76	Weighted Average, UI Adjusted
	24,105			76.37% Pervious Area
	7,460			23.63% Impervious Area
	7,460			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.5	53	0.0740	1.90		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	16	0.1560	2.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	110	0.0810	1.42		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	229	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Overland to NE

Runoff = 4.27 cfs @ 12.14 hrs, Volume= 13,514 cf, Depth= 2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr Rainfall=4.92"

	Area (sf)	CN	Adj	Description
	43,992	70		Woods, Good, HSG C
	8,662	98		Unconnected roofs, HSG C
	19,529	74		>75% Grass cover, Good, HSG C
*	563	98		Unconnected pavement, HSG C - conc pads
	369	98		Paved parking, HSG C
	73,115	75	73	Weighted Average, UI Adjusted
	63,521			86.88% Pervious Area
	9,594			13.12% Impervious Area
	9,225			96.15% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9	84	0.0480	1.53		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	10	0.3000	2.74		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.8	155	0.0830	1.44		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.7	299	Total			

PRE 100 YEAR-SUMMARY

Time span=1.00-30.00 hrs, dt=0.01 hrs, 2901 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 1S: Overland to North Runoff Area=23,342 sf 0.00% Impervious Runoff Depth=4.17"
Flow Length=70' Slope=0.0100 '/' Tc=17.0 min CN=70 Runoff=1.82 cfs 8,118 cf

Subcatchment 2S: EXCB Runoff Area=99,992 sf 48.90% Impervious Runoff Depth=5.89"
Flow Length=592' Tc=15.1 min CN=85 Runoff=11.16 cfs 49,043 cf

Subcatchment 3S: Overland to South Runoff Area=48,010 sf 23.74% Impervious Runoff Depth=4.62"
Tc=6.0 min UI Adjusted CN=74 Runoff=5.95 cfs 18,495 cf

Subcatchment 4S: Overland to SE Runoff Area=31,565 sf 23.63% Impervious Runoff Depth=4.85"
Flow Length=229' Tc=6.0 min UI Adjusted CN=76 Runoff=4.08 cfs 12,756 cf

Subcatchment 5S: Overland to NE Runoff Area=73,115 sf 13.12% Impervious Runoff Depth=4.51"
Flow Length=299' Tc=6.7 min UI Adjusted CN=73 Runoff=8.63 cfs 27,478 cf

Total Runoff Area = 276,024 sf Runoff Volume = 115,891 cf Average Runoff Depth = 5.04"
71.98% Pervious = 198,681 sf 28.02% Impervious = 77,343 sf

Summary for Subcatchment 1S: Overland to North

Runoff = 1.82 cfs @ 12.26 hrs, Volume= 8,118 cf, Depth= 4.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr Rainfall=7.66"

Area (sf)	CN	Description
22,942	70	Woods, Good, HSG C
400	87	Dirt roads, HSG C
23,342	70	Weighted Average
23,342		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	20	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.0	70	Total			

Summary for Subcatchment 2S: EXCB

Runoff = 11.16 cfs @ 12.23 hrs, Volume= 49,043 cf, Depth= 5.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr Rainfall=7.66"

	Area (sf)	CN	Description
	28,805	70	Woods, Good, HSG C
*	655	87	Dirt roads, HSG C - path
	31,815	98	Paved parking, HSG C
*	6,898	98	Unconnected roofs, HSG C- conc pads
	10,180	98	Roofs, HSG C
	21,639	74	>75% Grass cover, Good, HSG C
	99,992	85	Weighted Average
	51,099		51.10% Pervious Area
	48,893		48.90% Impervious Area
	6,898		14.11% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	90	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.3	170	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	132	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	150	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.1	592	Total			

Summary for Subcatchment 3S: Overland to South

Runoff = 5.95 cfs @ 12.13 hrs, Volume= 18,495 cf, Depth= 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr Rainfall=7.66"

	Area (sf)	CN	Adj	Description
	25,704	70		Woods, Good, HSG C
	8,820	98		Unconnected roofs, HSG C
	10,910	74		>75% Grass cover, Good, HSG C
*	2,576	98		Unconnected pavement, HSG C - conc pads
	48,010	78	74	Weighted Average, UI Adjusted
	36,614			76.26% Pervious Area
	11,396			23.74% Impervious Area
	11,396			100.00% Unconnected

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

Summary for Subcatchment 4S: Overland to SE

Runoff = 4.08 cfs @ 12.13 hrs, Volume= 12,756 cf, Depth= 4.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr Rainfall=7.66"

	Area (sf)	CN	Adj	Description
	7,496	70		Woods, Good, HSG C
	6,793	98		Unconnected roofs, HSG C
	16,609	74		>75% Grass cover, Good, HSG C
*	667	98		Unconnected roofs, HSG C - conc paths
	31,565	79	76	Weighted Average, UI Adjusted
	24,105			76.37% Pervious Area
	7,460			23.63% Impervious Area
	7,460			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.5	53	0.0740	1.90		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	16	0.1560	2.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	110	0.0810	1.42		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	229	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Overland to NE

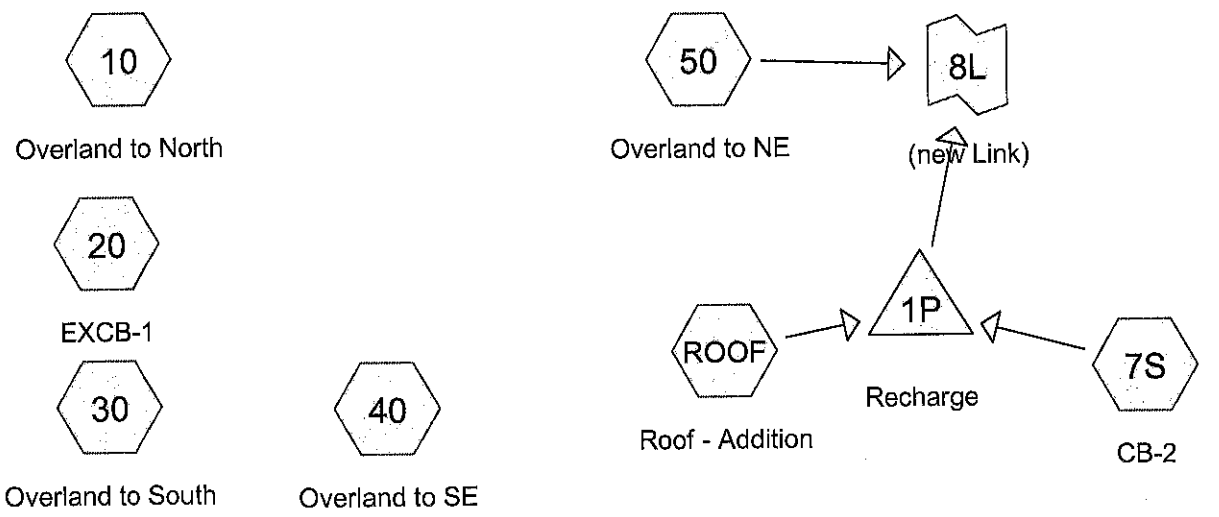
Runoff = 8.63 cfs @ 12.14 hrs, Volume= 27,478 cf, Depth= 4.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr Rainfall=7.66"

	Area (sf)	CN	Adj	Description
	43,992	70		Woods, Good, HSG C
	8,662	98		Unconnected roofs, HSG C
	19,529	74		>75% Grass cover, Good, HSG C
*	563	98		Unconnected pavement, HSG C - conc pads
	369	98		Paved parking, HSG C
	73,115	75	73	Weighted Average, UI Adjusted
	63,521			86.88% Pervious Area
	9,594			13.12% Impervious Area
	9,225			96.15% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9	84	0.0480	1.53		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	10	0.3000	2.74		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.8	155	0.0830	1.44		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.7	299	Total			

POST- DEVELOPMENT



Subcat Reach Pond Link

Routing Diagram for 5243 Sanctuary Post
Prepared by Places Associates, Inc, Printed 7/18/2023

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25-yr	NOAA 24-hr	D	Default	24.00	1	6.00	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
71,762	74	>75% Grass cover, Good, HSG C (7S, 20, 30, 40, 50)
3,137	87	Dirt roads, HSG C (10, 20, 50)
33,697	98	Paved parking, HSG C (7S, 20)
10,180	98	Roofs, HSG C (20)
6,898	98	Unconnected pavement, HSG C - conc paths (20)
2,576	98	Unconnected pavement, HSG C - conc. pads (30)
1,230	98	Unconnected pavement, HSG C- conc pads (40, 50)
38,621	98	Unconnected roofs, HSG C (30, 40, 50, ROOF)
107,923	70	Woods, Good, HSG C (10, 20, 30, 40, 50)
276,024	**81**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
276,024	HSG C	7S, 10, 20, 30, 40, 50, ROOF
0	HSG D	
0	Other	
276,024		**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
0	0	71,762	0	0	71,762	>75% Grass cover, Good
0	0	3,137	0	0	3,137	Dirt roads
0	0	33,697	0	0	33,697	Paved parking
0	0	10,180	0	0	10,180	Roofs
0	0	10,704	0	0	10,704	Unconnected pavement
0	0	38,621	0	0	38,621	Unconnected roofs
0	0	107,923	0	0	107,923	Woods, Good
0	**0**	**276,024**	**0**	**0**	**276,024**	**TOTAL AREA**

POST 25 YEAR – FULL DETAILS

Time span=1.00-30.00 hrs, dt=0.01 hrs, 2901 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 7S: CB-2 Runoff Area=2,244 sf 83.87% Impervious Runoff Depth=5.30"
Tc=6.0 min CN=94 Runoff=0.29 cfs 990 cf

Subcatchment 10: Overland to North Runoff Area=21,986 sf 0.00% Impervious Runoff Depth=2.81"
Flow Length=70' Slope=0.0100 '/' Tc=17.0 min CN=70 Runoff=1.15 cfs 5,140 cf

Subcatchment 20: EXCB-1 Runoff Area=99,992 sf 48.90% Impervious Runoff Depth=4.30"
Flow Length=592' Tc=15.1 min CN=85 Runoff=8.28 cfs 35,851 cf

Subcatchment 30: Overland to South Runoff Area=48,010 sf 23.74% Impervious Runoff Depth=3.18"
Tc=6.0 min UI Adjusted CN=74 Runoff=4.13 cfs 12,742 cf

Subcatchment 40: Overland to SE Runoff Area=31,565 sf 23.63% Impervious Runoff Depth=3.38"
Flow Length=229' Tc=6.0 min UI Adjusted CN=76 Runoff=2.88 cfs 8,891 cf

Subcatchment 50: Overland to NE Runoff Area=57,881 sf 15.94% Impervious Runoff Depth=3.28"
Flow Length=299' Tc=6.7 min UI Adjusted CN=75 Runoff=4.99 cfs 15,831 cf

Subcatchment ROOF: Roof - Addition Runoff Area=14,346 sf 100.00% Impervious Runoff Depth>5.76"
Tc=6.0 min CN=98 Runoff=1.89 cfs 6,886 cf

Pond 1P: Recharge Peak Elev=345.84' Storage=2,737 cf Inflow=2.18 cfs 7,876 cf
Discarded=0.08 cfs 5,203 cf Primary=0.88 cfs 2,658 cf Outflow=0.96 cfs 7,861 cf

Link 8L: (new Link) Inflow=5.60 cfs 18,488 cf
Primary=5.60 cfs 18,488 cf

Total Runoff Area = 276,024 sf Runoff Volume = 86,331 cf Average Runoff Depth = 3.75"
66.23% Pervious = 182,822 sf 33.77% Impervious = 93,202 sf

Summary for Subcatchment 7S: CB-2

Runoff = 0.29 cfs @ 12.13 hrs, Volume= 990 cf, Depth= 5.30"
Routed to Pond 1P : Recharge

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.00"

Area (sf)	CN	Description
1,882	98	Paved parking, HSG C
362	74	>75% Grass cover, Good, HSG C
2,244	94	Weighted Average
362		16.13% Pervious Area
1,882		83.87% Impervious Area

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

Summary for Subcatchment 10: Overland to North

Runoff = 1.15 cfs @ 12.26 hrs, Volume= 5,140 cf, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.00"

Area (sf)	CN	Description
21,586	70	Woods, Good, HSG C
400	87	Dirt roads, HSG C
21,986	70	Weighted Average
21,986		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	20	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.0	70	Total			

Summary for Subcatchment 20: EXCB-1

Runoff = 8.28 cfs @ 12.23 hrs, Volume= 35,851 cf, Depth= 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.00"

	Area (sf)	CN	Description
	28,805	70	Woods, Good, HSG C
	655	87	Dirt roads, HSG C
	31,815	98	Paved parking, HSG C
*	6,898	98	Unconnected pavement, HSG C - conc paths
	10,180	98	Roofs, HSG C
	21,639	74	>75% Grass cover, Good, HSG C
	99,992	85	Weighted Average
	51,099		51.10% Pervious Area
	48,893		48.90% Impervious Area
	6,898		14.11% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	90	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.3	170	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	132	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	150	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.1	592	Total			

Summary for Subcatchment 30: Overland to South

Runoff = 4.13 cfs @ 12.13 hrs, Volume= 12,742 cf, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.00"

	Area (sf)	CN	Adj	Description
	25,704	70		Woods, Good, HSG C
	8,820	98		Unconnected roofs, HSG C
	10,910	74		>75% Grass cover, Good, HSG C
*	2,576	98		Unconnected pavement, HSG C - conc. pads
	48,010	78	74	Weighted Average, UI Adjusted
	36,614			76.26% Pervious Area
	11,396			23.74% Impervious Area
	11,396			100.00% Unconnected

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

Summary for Subcatchment 40: Overland to SE

Runoff = 2.88 cfs @ 12.13 hrs, Volume= 8,891 cf, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.00"

	Area (sf)	CN	Adj	Description
	7,496	70		Woods, Good, HSG C
	6,793	98		Unconnected roofs, HSG C
	16,609	74		>75% Grass cover, Good, HSG C
*	667	98		Unconnected pavement, HSG C- conc pads
	31,565	79	76	Weighted Average, UI Adjusted
	24,105			76.37% Pervious Area
	7,460			23.63% Impervious Area
	7,460			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.5	53	0.0740	1.90		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	16	0.1560	2.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	110	0.0810	1.42		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	229	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 50: Overland to NE

Runoff = 4.99 cfs @ 12.14 hrs, Volume= 15,831 cf, Depth= 3.28"
Routed to Link 8L : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.00"

	Area (sf)	CN	Adj	Description
	24,332	70		Woods, Good, HSG C
	8,662	98		Unconnected roofs, HSG C
	22,242	74		>75% Grass cover, Good, HSG C
	2,082	87		Dirt roads, HSG C
*	563	98		Unconnected pavement, HSG C- conc pads
	57,881	77	75	Weighted Average, UI Adjusted
	48,656			84.06% Pervious Area
	9,225			15.94% Impervious Area
	9,225			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9	84	0.0480	1.53		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	10	0.3000	2.74		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.8	155	0.0830	1.44		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.7	299	Total			

Summary for Subcatchment ROOF: Roof - Addition

Runoff = 1.89 cfs @ 12.13 hrs, Volume= 6,886 cf, Depth> 5.76"
Routed to Pond 1P : Recharge

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.00"

Area (sf)	CN	Description
14,346	98	Unconnected roofs, HSG C
14,346		100.00% Impervious Area
14,346		100.00% Unconnected

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

Summary for Pond 1P: Recharge

Inflow Area = 16,590 sf, 97.82% Impervious, Inflow Depth > 5.70" for 25-yr event
Inflow = 2.18 cfs @ 12.13 hrs, Volume= 7,876 cf
Outflow = 0.96 cfs @ 12.25 hrs, Volume= 7,861 cf, Atten= 56%, Lag= 7.2 min
Discarded = 0.08 cfs @ 12.25 hrs, Volume= 5,203 cf
Primary = 0.88 cfs @ 12.25 hrs, Volume= 2,658 cf
Routed to Link 8L : (new Link)

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 345.84' @ 12.25 hrs Surf.Area= 1,668 sf Storage= 2,737 cf

Plug-Flow detention time= 189.6 min calculated for 7,861 cf (100% of inflow)
Center-of-Mass det. time= 188.2 min (937.8 - 749.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	343.50'	1,314 cf	**19.17'W x 87.00'L x 3.21'H Field A** 5,350 cf Overall - 2,064 cf Embedded = 3,286 cf x 40.0% Voids
#2A	344.00'	2,064 cf	**Cultec R-280HD** x 48 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 4 rows
		3,379 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	343.50'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 341.20'
#2	Primary	342.00'	**12.0" Round Culvert** L= 122.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 342.00' / 335.00' S= 0.0574 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	346.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 2	345.40'	**4.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	345.00'	**4.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 5	344.50'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.08 cfs @ 12.25 hrs HW=345.84' (Free Discharge)
└**1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=0.88 cfs @ 12.25 hrs HW=345.84' (Free Discharge)
└**2=Culvert** (Passes 0.88 cfs of 6.91 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  ├**4=Orifice/Grate** (Orifice Controls 0.27 cfs @ 2.46 fps)
  └**5=Orifice/Grate** (Orifice Controls 0.61 cfs @ 3.66 fps)
    └**6=Orifice/Grate** (Passes 0.61 cfs of 3.46 cfs potential flow)

Pond 1P: Recharge - Chamber Wizard Field A

Chamber Model = Cultec R-280HD (Cultec Recharger® 280HD)
Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf
Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap
Row Length Adjustment= +1.00' x 6.07 sf x 4 rows

47.0" Wide + 6.0" Spacing = 53.0" C-C Row Spacing

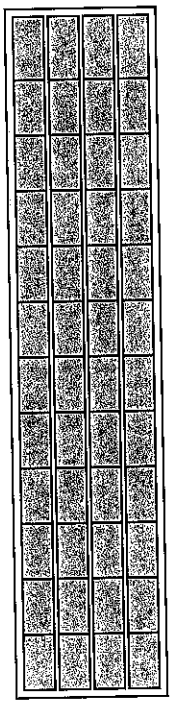
12 Chambers/Row x 7.00' Long +1.00' Row Adjustment = 85.00' Row Length +12.0" End Stone x 2 = 87.00' Base Length
4 Rows x 47.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 19.17' Base Width
6.0" Stone Base + 26.5" Chamber Height + 6.0" Stone Cover = 3.21' Field Height

48 Chambers x 42.5 cf +1.00' Row Adjustment x 6.07 sf x 4 Rows = 2,064.4 cf Chamber Storage

5,349.9 cf Field - 2,064.4 cf Chambers = 3,285.5 cf Stone x 40.0% Voids = 1,314.2 cf Stone Storage

Chamber Storage + Stone Storage = 3,378.6 cf = 0.078 af
Overall Storage Efficiency = 63.2%
Overall System Size = 87.00' x 19.17' x 3.21'

48 Chambers
198.1 cy Field
121.7 cy Stone



Summary for Link 8L: (new Link)

Inflow Area = 74,471 sf, 34.18% Impervious, Inflow Depth = 2.98" for 25-yr event
Inflow = 5.60 cfs @ 12.15 hrs, Volume= 18,488 cf
Primary = 5.60 cfs @ 12.15 hrs, Volume= 18,488 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs

POST 2 YEAR – SUMMARY

Time span=1.00-30.00 hrs, dt=0.01 hrs, 2901 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 7S: CB-2 Runoff Area=2,244 sf 83.87% Impervious Runoff Depth=2.53"
Tc=6.0 min CN=94 Runoff=0.14 cfs 474 cf

Subcatchment 10: Overland to North Runoff Area=21,986 sf 0.00% Impervious Runoff Depth=0.82"
Flow Length=70' Slope=0.0100 '/' Tc=17.0 min CN=70 Runoff=0.30 cfs 1,507 cf

Subcatchment 20: EXCB-1 Runoff Area=99,992 sf 48.90% Impervious Runoff Depth=1.75"
Flow Length=592' Tc=15.1 min CN=85 Runoff=3.44 cfs 14,575 cf

Subcatchment 30: Overland to South Runoff Area=48,010 sf 23.74% Impervious Runoff Depth=1.03"
Tc=6.0 min UI Adjusted CN=74 Runoff=1.31 cfs 4,125 cf

Subcatchment 40: Overland to SE Runoff Area=31,565 sf 23.63% Impervious Runoff Depth=1.15"
Flow Length=229' Tc=6.0 min UI Adjusted CN=76 Runoff=0.96 cfs 3,012 cf

Subcatchment 50: Overland to NE Runoff Area=57,881 sf 15.94% Impervious Runoff Depth=1.09"
Flow Length=299' Tc=6.7 min UI Adjusted CN=75 Runoff=1.62 cfs 5,244 cf

Subcatchment ROOF: Roof - Addition Runoff Area=14,346 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=1.00 cfs 3,536 cf

Pond 1P: Recharge Peak Elev=345.06' Storage=1,804 cf Inflow=1.14 cfs 4,010 cf
Discarded=0.07 cfs 3,949 cf Primary=0.02 cfs 61 cf Outflow=0.08 cfs 4,010 cf

Link 8L: (new Link) Inflow=1.62 cfs 5,304 cf
Primary=1.62 cfs 5,304 cf

Total Runoff Area = 276,024 sf Runoff Volume = 32,471 cf Average Runoff Depth = 1.41"
66.23% Pervious = 182,822 sf 33.77% Impervious = 93,202 sf

Summary for Subcatchment 7S: CB-2

Runoff = 0.14 cfs @ 12.13 hrs, Volume= 474 cf, Depth= 2.53"
Routed to Pond 1P : Recharge

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr Rainfall=3.19"

Area (sf)	CN	Description
1,882	98	Paved parking, HSG C
362	74	>75% Grass cover, Good, HSG C
2,244	94	Weighted Average
362		16.13% Pervious Area
1,882		83.87% Impervious Area

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

Summary for Subcatchment 10: Overland to North

Runoff = 0.30 cfs @ 12.28 hrs, Volume= 1,507 cf, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr Rainfall=3.19"

Area (sf)	CN	Description
21,586	70	Woods, Good, HSG C
400	87	Dirt roads, HSG C
21,986	70	Weighted Average
21,986		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	20	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.0	70	Total			

Summary for Subcatchment 20: EXCB-1

Runoff = 3.44 cfs @ 12.23 hrs, Volume= 14,575 cf, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr Rainfall=3.19"

	Area (sf)	CN	Description
	28,805	70	Woods, Good, HSG C
	655	87	Dirt roads, HSG C
	31,815	98	Paved parking, HSG C
*	6,898	98	Unconnected pavement, HSG C - conc paths
	10,180	98	Roofs, HSG C
	21,639	74	>75% Grass cover, Good, HSG C
	99,992	85	Weighted Average
	51,099		51.10% Pervious Area
	48,893		48.90% Impervious Area
	6,898		14.11% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	90	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.3	170	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	132	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	150	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.1	592	Total			

Summary for Subcatchment 30: Overland to South

Runoff = 1.31 cfs @ 12.14 hrs, Volume= 4,125 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr Rainfall=3.19"

	Area (sf)	CN	Adj	Description
	25,704	70		Woods, Good, HSG C
	8,820	98		Unconnected roofs, HSG C
	10,910	74		>75% Grass cover, Good, HSG C
*	2,576	98		Unconnected pavement, HSG C - conc. pads
	48,010	78	74	Weighted Average, UI Adjusted
	36,614			76.26% Pervious Area
	11,396			23.74% Impervious Area
	11,396			100.00% Unconnected

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

Summary for Subcatchment 40: Overland to SE

Runoff = 0.96 cfs @ 12.14 hrs, Volume= 3,012 cf, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr Rainfall=3.19"

	Area (sf)	CN	Adj	Description
	7,496	70		Woods, Good, HSG C
	6,793	98		Unconnected roofs, HSG C
	16,609	74		>75% Grass cover, Good, HSG C
*	667	98		Unconnected pavement, HSG C- conc pads
	31,565	79	76	Weighted Average, UI Adjusted
	24,105			76.37% Pervious Area
	7,460			23.63% Impervious Area
	7,460			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.5	53	0.0740	1.90		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	16	0.1560	2.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	110	0.0810	1.42		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	229	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 50: Overland to NE

Runoff = 1.62 cfs @ 12.14 hrs, Volume= 5,244 cf, Depth= 1.09"
Routed to Link 8L : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr Rainfall=3.19"

	Area (sf)	CN	Adj	Description
	24,332	70		Woods, Good, HSG C
	8,662	98		Unconnected roofs, HSG C
	22,242	74		>75% Grass cover, Good, HSG C
	2,082	87		Dirt roads, HSG C
*	563	98		Unconnected pavement, HSG C- conc pads
	57,881	77	75	Weighted Average, UI Adjusted
	48,656			84.06% Pervious Area
	9,225			15.94% Impervious Area
	9,225			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9	84	0.0480	1.53		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	10	0.3000	2.74		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.8	155	0.0830	1.44		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.7	299	Total			

Summary for Subcatchment ROOF: Roof - Addition

Runoff = 1.00 cfs @ 12.13 hrs, Volume= 3,536 cf, Depth= 2.96"
Routed to Pond 1P : Recharge

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr Rainfall=3.19"

Area (sf)	CN	Description
14,346	98	Unconnected roofs, HSG C
14,346		100.00% Impervious Area
14,346		100.00% Unconnected

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

Summary for Pond 1P: Recharge

Inflow Area = 16,590 sf, 97.82% Impervious, Inflow Depth = 2.90" for 2-yr event
Inflow = 1.14 cfs @ 12.13 hrs, Volume= 4,010 cf
Outflow = 0.08 cfs @ 13.43 hrs, Volume= 4,010 cf, Atten= 93%, Lag= 77.9 min
Discarded = 0.07 cfs @ 13.43 hrs, Volume= 3,949 cf
Primary = 0.02 cfs @ 13.43 hrs, Volume= 61 cf
Routed to Link 8L : (new Link)

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 345.06' @ 13.43 hrs Surf.Area= 1,668 sf Storage= 1,804 cf

Plug-Flow detention time= 249.7 min calculated for 4,008 cf (100% of inflow)
Center-of-Mass det. time= 249.7 min (1,012.1 - 762.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	343.50'	1,314 cf	**19.17'W x 87.00'L x 3.21'H Field A** 5,350 cf Overall - 2,064 cf Embedded = 3,286 cf x 40.0% Voids
#2A	344.00'	2,064 cf	**Cultec R-280HD** x 48 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap

Row Length Adjustment= +1.00' x 6.07 sf x 4 rows

3,379 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	343.50'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 341.20'
#2	Primary	342.00'	**12.0" Round Culvert** L= 122.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 342.00' / 335.00' S= 0.0574 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	346.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 2	345.40'	**4.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	345.00'	**4.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 5	344.50'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 13.43 hrs HW=345.06' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=0.01 cfs @ 13.43 hrs HW=345.06' (Free Discharge)
↑—**2=Culvert** (Passes 0.01 cfs of 6.05 cfs potential flow)
—**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
—**4=Orifice/Grate** (Controls 0.00 cfs)
—**5=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.77 fps)
↑—**6=Orifice/Grate** (Passes 0.01 cfs of 0.52 cfs potential flow)

Summary for Link 8L: (new Link)

Inflow Area = 74,471 sf, 34.18% Impervious, Inflow Depth = 0.85" for 2-yr event
Inflow = 1.62 cfs @ 12.14 hrs, Volume= 5,304 cf
Primary = 1.62 cfs @ 12.14 hrs, Volume= 5,304 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs

POST 10 YEAR- SUMMARY

Time span=1.00-30.00 hrs, dt=0.01 hrs, 2901 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 7S: CB-2 Runoff Area=2,244 sf 83.87% Impervious Runoff Depth=4.23"
Tc=6.0 min CN=94 Runoff=0.23 cfs 791 cf

Subcatchment 10: Overland to North Runoff Area=21,986 sf 0.00% Impervious Runoff Depth=1.98"
Flow Length=70' Slope=0.0100 '/' Tc=17.0 min CN=70 Runoff=0.80 cfs 3,623 cf

Subcatchment 20: EXCB-1 Runoff Area=99,992 sf 48.90% Impervious Runoff Depth=3.29"
Flow Length=592' Tc=15.1 min CN=85 Runoff=6.41 cfs 27,449 cf

Subcatchment 30: Overland to South Runoff Area=48,010 sf 23.74% Impervious Runoff Depth=2.30"
Tc=6.0 min UI Adjusted CN=74 Runoff=2.99 cfs 9,204 cf

Subcatchment 40: Overland to SE Runoff Area=31,565 sf 23.63% Impervious Runoff Depth=2.47"
Flow Length=229' Tc=6.0 min UI Adjusted CN=76 Runoff=2.11 cfs 6,496 cf

Subcatchment 50: Overland to NE Runoff Area=57,881 sf 15.94% Impervious Runoff Depth=2.38"
Flow Length=299' Tc=6.7 min UI Adjusted CN=75 Runoff=3.64 cfs 11,502 cf

Subcatchment ROOF: Roof - Addition Runoff Area=14,346 sf 100.00% Impervious Runoff Depth>4.68"
Tc=6.0 min CN=98 Runoff=1.55 cfs 5,598 cf

Pond 1P: Recharge Peak Elev=345.52' Storage=2,382 cf Inflow=1.78 cfs 6,389 cf
Discarded=0.07 cfs 4,807 cf Primary=0.44 cfs 1,582 cf Outflow=0.51 cfs 6,389 cf

Link 8L: (new Link) Inflow=3.74 cfs 13,084 cf
Primary=3.74 cfs 13,084 cf

Total Runoff Area = 276,024 sf Runoff Volume = 64,664 cf Average Runoff Depth = 2.81"
66.23% Pervious = 182,822 sf 33.77% Impervious = 93,202 sf

Summary for Subcatchment 7S: CB-2

Runoff = 0.23 cfs @ 12.13 hrs, Volume= 791 cf, Depth= 4.23"
Routed to Pond 1P : Recharge

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr Rainfall=4.92"

Area (sf)	CN	Description
1,882	98	Paved parking, HSG C
362	74	>75% Grass cover, Good, HSG C
2,244	94	Weighted Average
362		16.13% Pervious Area
1,882		83.87% Impervious Area

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

Summary for Subcatchment 10: Overland to North

Runoff = 0.80 cfs @ 12.26 hrs, Volume= 3,623 cf, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr Rainfall=4.92"

Area (sf)	CN	Description
21,586	70	Woods, Good, HSG C
400	87	Dirt roads, HSG C
21,986	70	Weighted Average
21,986		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	20	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.0	70	Total			

Summary for Subcatchment 20: EXCB-1

Runoff = 6.41 cfs @ 12.23 hrs, Volume= 27,449 cf, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr Rainfall=4.92"

	Area (sf)	CN	Description
	28,805	70	Woods, Good, HSG C
	655	87	Dirt roads, HSG C
	31,815	98	Paved parking, HSG C
*	6,898	98	Unconnected pavement, HSG C - conc paths
	10,180	98	Roofs, HSG C
	21,639	74	>75% Grass cover, Good, HSG C
	99,992	85	Weighted Average
	51,099		51.10% Pervious Area
	48,893		48.90% Impervious Area
	6,898		14.11% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	90	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.3	170	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	132	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	150	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.1	592	Total			

Summary for Subcatchment 30: Overland to South

Runoff = 2.99 cfs @ 12.13 hrs, Volume= 9,204 cf, Depth= 2.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr Rainfall=4.92"

	Area (sf)	CN	Adj	Description
	25,704	70		Woods, Good, HSG C
	8,820	98		Unconnected roofs, HSG C
	10,910	74		>75% Grass cover, Good, HSG C
*	2,576	98		Unconnected pavement, HSG C - conc. pads
	48,010	78	74	Weighted Average, UI Adjusted
	36,614			76.26% Pervious Area
	11,396			23.74% Impervious Area
	11,396			100.00% Unconnected

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

Summary for Subcatchment 40: Overland to SE

Runoff = 2.11 cfs @ 12.13 hrs, Volume= 6,496 cf, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr Rainfall=4.92"

	Area (sf)	CN	Adj	Description
	7,496	70		Woods, Good, HSG C
	6,793	98		Unconnected roofs, HSG C
	16,609	74		>75% Grass cover, Good, HSG C
*	667	98		Unconnected pavement, HSG C- conc pads
	31,565	79	76	Weighted Average, UI Adjusted
	24,105			76.37% Pervious Area
	7,460			23.63% Impervious Area
	7,460			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.5	53	0.0740	1.90		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	16	0.1560	2.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	110	0.0810	1.42		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	229	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 50: Overland to NE

Runoff = 3.64 cfs @ 12.14 hrs, Volume= 11,502 cf, Depth= 2.38"
Routed to Link 8L : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr Rainfall=4.92"

	Area (sf)	CN	Adj	Description
	24,332	70		Woods, Good, HSG C
	8,662	98		Unconnected roofs, HSG C
	22,242	74		>75% Grass cover, Good, HSG C
	2,082	87		Dirt roads, HSG C
*	563	98		Unconnected pavement, HSG C- conc pads
	57,881	77	75	Weighted Average, UI Adjusted
	48,656			84.06% Pervious Area
	9,225			15.94% Impervious Area
	9,225			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9	84	0.0480	1.53		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	10	0.3000	2.74		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.8	155	0.0830	1.44		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.7	299	Total			

Summary for Subcatchment ROOF: Roof - Addition

Runoff = 1.55 cfs @ 12.13 hrs, Volume= 5,598 cf, Depth> 4.68"
Routed to Pond 1P : Recharge

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr Rainfall=4.92"

Area (sf)	CN	Description
14,346	98	Unconnected roofs, HSG C
14,346		100.00% Impervious Area
14,346		100.00% Unconnected

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

Summary for Pond 1P: Recharge

Inflow Area = 16,590 sf, 97.82% Impervious, Inflow Depth > 4.62" for 10-yr event
Inflow = 1.78 cfs @ 12.13 hrs, Volume= 6,389 cf
Outflow = 0.51 cfs @ 12.34 hrs, Volume= 6,389 cf, Atten= 71%, Lag= 12.9 min
Discarded = 0.07 cfs @ 12.34 hrs, Volume= 4,807 cf
Primary = 0.44 cfs @ 12.34 hrs, Volume= 1,582 cf
Routed to Link 8L : (new Link)

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 345.52' @ 12.34 hrs Surf.Area= 1,668 sf Storage= 2,382 cf

Plug-Flow detention time= 207.5 min calculated for 6,387 cf (100% of inflow)
Center-of-Mass det. time= 207.5 min (960.6 - 753.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	343.50'	1,314 cf	**19.17'W x 87.00'L x 3.21'H Field A** 5,350 cf Overall - 2,064 cf Embedded = 3,286 cf x 40.0% Voids
#2A	344.00'	2,064 cf	**Cultec R-280HD** x 48 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap

Row Length Adjustment= +1.00' x 6.07 sf x 4 rows

3,379 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	343.50'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 341.20'
#2	Primary	342.00'	**12.0" Round Culvert** L= 122.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 342.00' / 335.00' S= 0.0574 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	346.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 2	345.40'	**4.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	345.00'	**4.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 5	344.50'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 12.34 hrs HW=345.52' (Free Discharge)
└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=0.44 cfs @ 12.34 hrs HW=345.52' (Free Discharge)
└**2=Culvert** (Passes 0.44 cfs of 6.57 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  ├**4=Orifice/Grate** (Orifice Controls 0.04 cfs @ 1.10 fps)
  └**5=Orifice/Grate** (Orifice Controls 0.40 cfs @ 2.38 fps)
    └**6=Orifice/Grate** (Passes 0.40 cfs of 2.72 cfs potential flow)

Summary for Link 8L: (new Link)

Inflow Area = 74,471 sf, 34.18% Impervious, Inflow Depth = 2.11" for 10-yr event
Inflow = 3.74 cfs @ 12.14 hrs, Volume= 13,084 cf
Primary = 3.74 cfs @ 12.14 hrs, Volume= 13,084 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs

POST 100 YEAR SUMMARY

Time span=1.00-30.00 hrs, dt=0.01 hrs, 2901 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 7S: CB-2 Runoff Area=2,244 sf 83.87% Impervious Runoff Depth=6.94"
Tc=6.0 min CN=94 Runoff=0.37 cfs 1,299 cf

Subcatchment 10: Overland to North Runoff Area=21,986 sf 0.00% Impervious Runoff Depth=4.17"
Flow Length=70' Slope=0.0100 '/' Tc=17.0 min CN=70 Runoff=1.72 cfs 7,647 cf

Subcatchment 20: EXCB-1 Runoff Area=99,992 sf 48.90% Impervious Runoff Depth=5.89"
Flow Length=592' Tc=15.1 min CN=85 Runoff=11.16 cfs 49,043 cf

Subcatchment 30: Overland to South Runoff Area=48,010 sf 23.74% Impervious Runoff Depth=4.62"
Tc=6.0 min UI Adjusted CN=74 Runoff=5.95 cfs 18,495 cf

Subcatchment 40: Overland to SE Runoff Area=31,565 sf 23.63% Impervious Runoff Depth=4.85"
Flow Length=229' Tc=6.0 min UI Adjusted CN=76 Runoff=4.08 cfs 12,756 cf

Subcatchment 50: Overland to NE Runoff Area=57,881 sf 15.94% Impervious Runoff Depth=4.74"
Flow Length=299' Tc=6.7 min UI Adjusted CN=75 Runoff=7.14 cfs 22,844 cf

Subcatchment ROOF: Roof - Addition Runoff Area=14,346 sf 100.00% Impervious Runoff Depth>7.41"
Tc=6.0 min CN=98 Runoff=2.42 cfs 8,864 cf

Pond 1P: Recharge Peak Elev=346.38' Storage=3,159 cf Inflow=2.79 cfs 10,162 cf
Discarded=0.09 cfs 5,569 cf Primary=1.94 cfs 4,415 cf Outflow=2.03 cfs 9,983 cf

Link 8L: (new Link) Inflow=8.43 cfs 27,258 cf
Primary=8.43 cfs 27,258 cf

Total Runoff Area = 276,024 sf Runoff Volume = 120,947 cf Average Runoff Depth = 5.26"
66.23% Pervious = 182,822 sf 33.77% Impervious = 93,202 sf

Summary for Subcatchment 7S: CB-2

Runoff = 0.37 cfs @ 12.13 hrs, Volume= 1,299 cf, Depth= 6.94"
Routed to Pond 1P : Recharge

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr Rainfall=7.66"

Area (sf)	CN	Description
1,882	98	Paved parking, HSG C
362	74	>75% Grass cover, Good, HSG C
2,244	94	Weighted Average
362		16.13% Pervious Area
1,882		83.87% Impervious Area

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

Summary for Subcatchment 10: Overland to North

Runoff = 1.72 cfs @ 12.26 hrs, Volume= 7,647 cf, Depth= 4.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr Rainfall=7.66"

Area (sf)	CN	Description
21,586	70	Woods, Good, HSG C
400	87	Dirt roads, HSG C
21,986	70	Weighted Average
21,986		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	20	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.0	70	Total			

Summary for Subcatchment 20: EXCB-1

Runoff = 11.16 cfs @ 12.23 hrs, Volume= 49,043 cf, Depth= 5.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr Rainfall=7.66"

	Area (sf)	CN	Description
	28,805	70	Woods, Good, HSG C
	655	87	Dirt roads, HSG C
	31,815	98	Paved parking, HSG C
*	6,898	98	Unconnected pavement, HSG C - conc paths
	10,180	98	Roofs, HSG C
	21,639	74	>75% Grass cover, Good, HSG C
	99,992	85	Weighted Average
	51,099		51.10% Pervious Area
	48,893		48.90% Impervious Area
	6,898		14.11% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	90	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.3	170	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	132	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	150	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.1	592	Total			

Summary for Subcatchment 30: Overland to South

Runoff = 5.95 cfs @ 12.13 hrs, Volume= 18,495 cf, Depth= 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr Rainfall=7.66"

	Area (sf)	CN	Adj	Description
	25,704	70		Woods, Good, HSG C
	8,820	98		Unconnected roofs, HSG C
	10,910	74		>75% Grass cover, Good, HSG C
*	2,576	98		Unconnected pavement, HSG C - conc. pads
	48,010	78	74	Weighted Average, UI Adjusted
	36,614			76.26% Pervious Area
	11,396			23.74% Impervious Area
	11,396			100.00% Unconnected

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

Summary for Subcatchment 40: Overland to SE

Runoff = 4.08 cfs @ 12.13 hrs, Volume= 12,756 cf, Depth= 4.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr Rainfall=7.66"

	Area (sf)	CN	Adj	Description
	7,496	70		Woods, Good, HSG C
	6,793	98		Unconnected roofs, HSG C
	16,609	74		>75% Grass cover, Good, HSG C
*	667	98		Unconnected pavement, HSG C- conc pads
	31,565	79	76	Weighted Average, UI Adjusted
	24,105			76.37% Pervious Area
	7,460			23.63% Impervious Area
	7,460			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.5	53	0.0740	1.90		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	16	0.1560	2.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	110	0.0810	1.42		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.8	229	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 50: Overland to NE

Runoff = 7.14 cfs @ 12.14 hrs, Volume= 22,844 cf, Depth= 4.74"
Routed to Link 8L : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr Rainfall=7.66"

	Area (sf)	CN	Adj	Description
	24,332	70		Woods, Good, HSG C
	8,662	98		Unconnected roofs, HSG C
	22,242	74		>75% Grass cover, Good, HSG C
	2,082	87		Dirt roads, HSG C
*	563	98		Unconnected pavement, HSG C- conc pads
	57,881	77	75	Weighted Average, UI Adjusted
	48,656			84.06% Pervious Area
	9,225			15.94% Impervious Area
	9,225			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9	84	0.0480	1.53		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	10	0.3000	2.74		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.8	155	0.0830	1.44		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.7	299	Total			

Summary for Subcatchment ROOF: Roof - Addition

Runoff = 2.42 cfs @ 12.13 hrs, Volume= 8,864 cf, Depth> 7.41"
Routed to Pond 1P : Recharge

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr Rainfall=7.66"

Area (sf)	CN	Description
14,346	98	Unconnected roofs, HSG C
14,346		100.00% Impervious Area
14,346		100.00% Unconnected

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

Summary for Pond 1P: Recharge

Inflow Area = 16,590 sf, 97.82% Impervious, Inflow Depth > 7.35" for 100-yr event
Inflow = 2.79 cfs @ 12.13 hrs, Volume= 10,162 cf
Outflow = 2.03 cfs @ 12.18 hrs, Volume= 9,983 cf, Atten= 27%, Lag= 3.4 min
Discarded = 0.09 cfs @ 12.18 hrs, Volume= 5,569 cf
Primary = 1.94 cfs @ 12.18 hrs, Volume= 4,415 cf
Routed to Link 8L : (new Link)

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 346.38' @ 12.18 hrs Surf.Area= 1,668 sf Storage= 3,159 cf

Plug-Flow detention time= 166.4 min calculated for 9,983 cf (98% of inflow)
Center-of-Mass det. time= 154.7 min (900.6 - 745.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	343.50'	1,314 cf	**19.17'W x 87.00'L x 3.21'H Field A** 5,350 cf Overall - 2,064 cf Embedded = 3,286 cf x 40.0% Voids
#2A	344.00'	2,064 cf	**Cultec R-280HD** x 48 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap

Row Length Adjustment= +1.00' x 6.07 sf x 4 rows

3,379 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	343.50'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 341.20'
#2	Primary	342.00'	**12.0" Round Culvert** L= 122.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 342.00' / 335.00' S= 0.0574 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	346.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 2	345.40'	**4.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	345.00'	**4.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 5	344.50'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

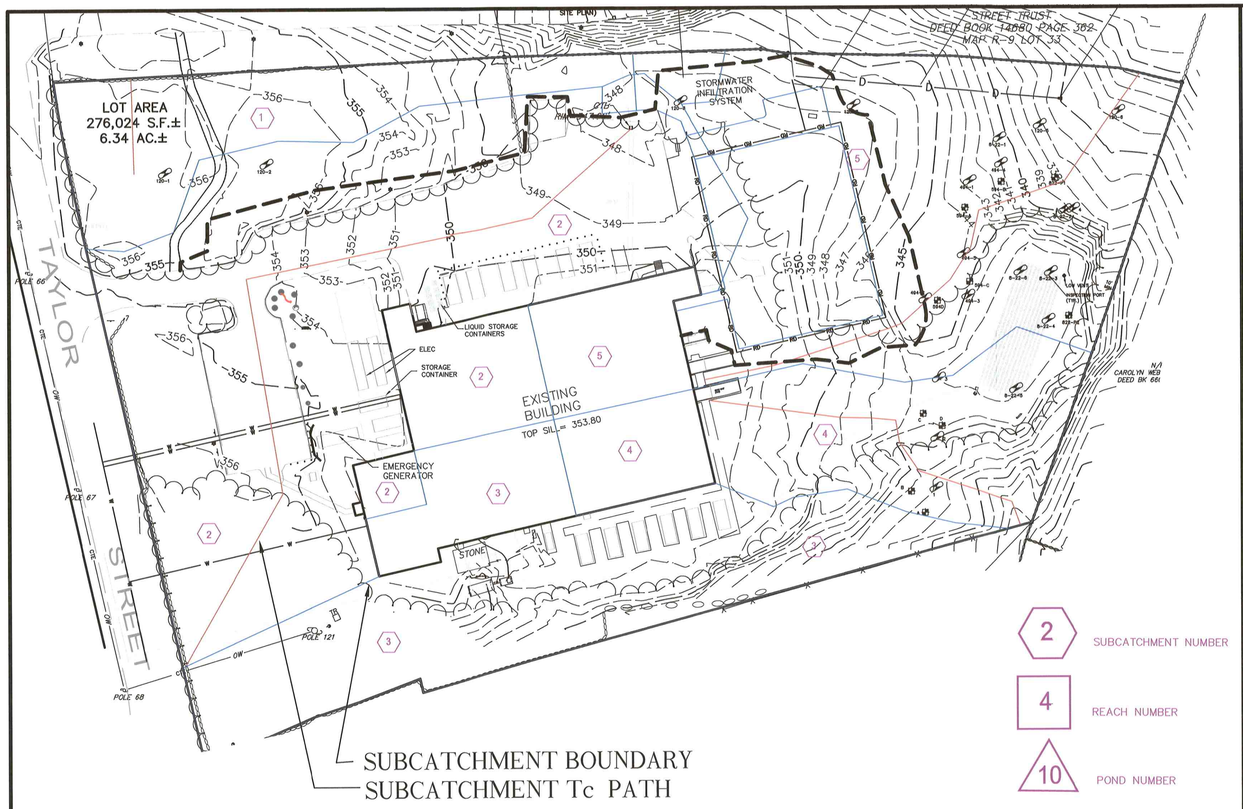
Discarded OutFlow Max=0.09 cfs @ 12.18 hrs HW=346.38' (Free Discharge)
└**1=Exfiltration** (Controls 0.09 cfs)

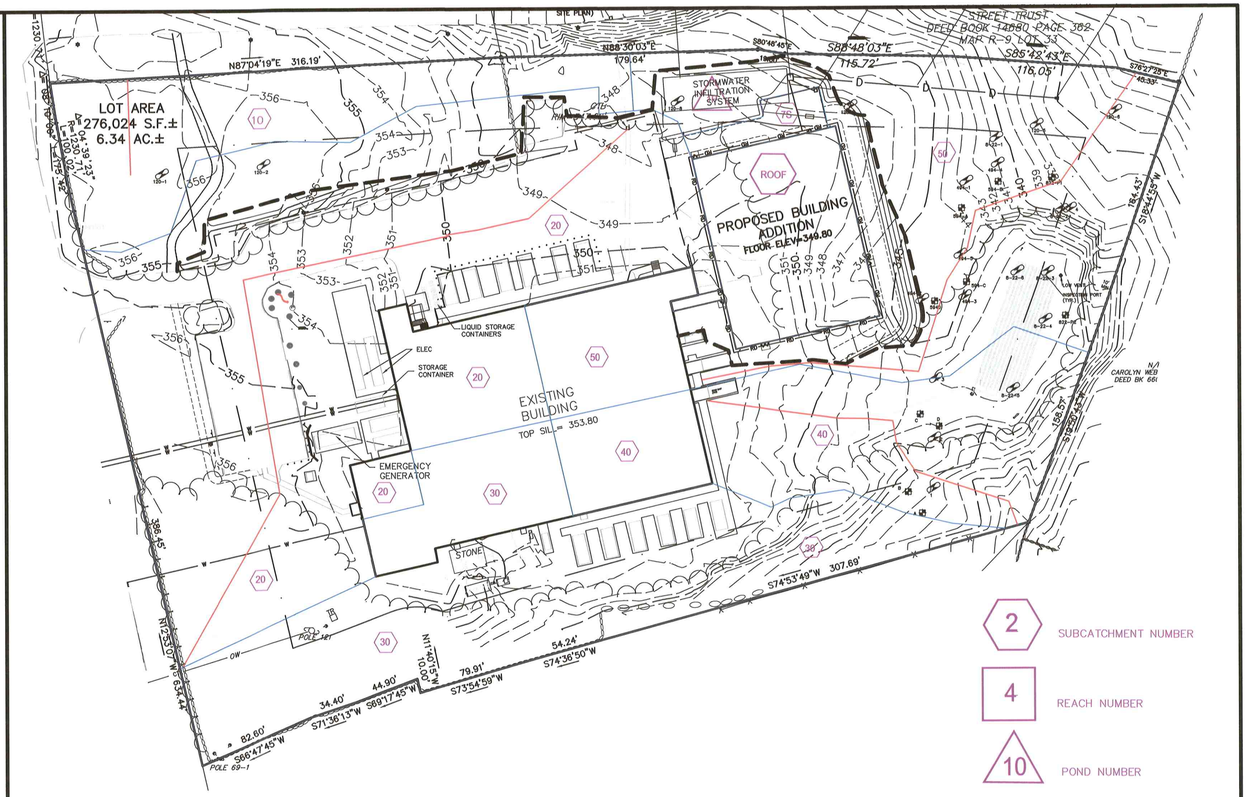
Primary OutFlow Max=1.93 cfs @ 12.18 hrs HW=346.38' (Free Discharge)
└**2=Culvert** (Passes 1.93 cfs of 7.45 cfs potential flow)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.59 cfs @ 1.17 fps)
  ├**4=Orifice/Grate** (Orifice Controls 0.48 cfs @ 4.33 fps)
  └**5=Orifice/Grate** (Orifice Controls 0.85 cfs @ 5.10 fps)
    └**6=Orifice/Grate** (Passes 0.85 cfs of 4.44 cfs potential flow)

Summary for Link 8L: (new Link)

Inflow Area = 74,471 sf, 34.18% Impervious, Inflow Depth = 4.39" for 100-yr event
Inflow = 8.43 cfs @ 12.16 hrs, Volume= 27,258 cf
Primary = 8.43 cfs @ 12.16 hrs, Volume= 27,258 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs





SOIL TESTING

SOIL PROBE TEST RESULTS 1-14-2020
PERFORMED BY SUSAN E. CARTER, PE

120-1 (near Taylor Rd)
0-8" Ap SL 10yr 3/4
8-24" Bw 10 SL 10yr 5/8
24-128" C FSL 2.5 y 6/4 friable, 10% cobbles
93" mottles 7yr 5/8
No Refusal, NGWO, ESHWT@ 93"

120-2 (near Taylor Rd)
0-8" Ap SL 10yr 3/4
8-24" Bw 10 SL 10yr 5/8
24-128" C FSL 2.5 y 6/4 friable, 10-25% cobbles
83" mottles 7yr 5/8
No Refusal, NGWO, ESHWT@ 83"

120-3 (behind 1979 leaching area)
0-8" Ap SL 10yr 3/4
8-24"10 Bw SL 10yr 5/8
24-135" C SL 2.5 y 6/4 friable, 10-25% cobbles, soils more friable below 60"
100" possible mottles
No Refusal, NGWO, ESHWT@ 100"

120-4 (behind 1994 leaching area)
0-8" Ap SL 10yr 3/4
8-24" Bw10 SL 10yr 5/8
24-84" C1 SL 2.5 y 6/4 friable, 50% stone
84-132" C2 SL 10yr ⅝
Mottling inconsistent following soil seams between stone
No Refusal, NGWO

120-5 (behind 1994 leaching area)
0-8" Ap SL 10yr 3/4
8-24" Bw10 SL 10yr 5/8
24-55" C1 SL 2.5 y 6/4 friable
55-99" C2 SL 2.5 y 6/4 Firm with inconsistent mottling
99-146" C3 LS 2.5 y 6/4 friable, 20% stone
GWO@ 129" (seepage) No Refusal, ESHWT @ 99+"

120-6 (near corner of walls at low point of property)
0-8" Ap SL 10yr 3/4
8-24" Bw10 SL 10yr 5/8
24-114" C Ls 2.5 y 6/4 friable, 10% gravel
Mottling @ 39" measured in lower side of test hole
No Refusal, NGWO, ESHWT 39"

120-7 (40' from northerly property line)
0-8" Ap SL 10yr 3/4
8-24" Bw10 SL 10yr 5/8
24-127" C Ls 2.5 y 6/4
Mottling @ 72" high and low chroma
No Refusal, NGWO, ESHWT 72"

120-8 (40' from northerly property line)
0-8" Ap SL 10yr 3/4
8-24" Bw10 SL 10yr 5/8
24-112" C compact SL 2.5 y 6/4
Possible refusal @ 112" large angular rock, NGWO
This hole is similar to 120-1 AND 120-2

Susan E. Carter
CIVIL ENGINEER
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REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS
7-18-23

PRE AND POST DEVELOPMENT DRAINAGE AREA PLAN

LOCATION: 234 TAYLOR STREET
CITY/TOWN: LITTLETON. MA
PREPARED FOR:
SANCTUARY MEDICINALS

SCALE: 1"=40' DATE: JULY 2023

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