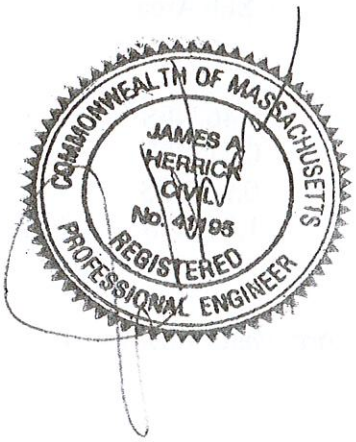
DRAINAGE REPORT

at

41 Kernwood Avenue
Haverhill, MA

April 2024



Civil Environmental Consultants LLC 8 Oak Street Peabody MA 01960

Drainage Report
41 Kernwood Ave
Haverhill, MA

April 2024

General

This Report is Enclosed to accompany the drainage details shown on the site plan, submitted for the 41 Kernwood Avenue project. The Site is installing a paved parking lot for the Pagoda.

The soil classification for this site was derived from the USDA NRCS Web Soil Survey Web Site. According to this site, the underlying soils are Deerfield loamy fine sand or Wareham loamy sand , 0 to 3 percent slopes , which has a hydrologic soil classification of A for developed land. The Rawl's Infiltration Rate for A Soils-ranges from 2.41 to 18.27 inches per hr. for the purpose of this report the rate of 2.41 inches per hr will be used

Drainage Analysis showing peak runoff for the 2 yr., 10 yr., 25 yr. and 100 yr. storms is provided herein.

The Stormwater runoff will be Collected on site via Catch Basins Installed at the low side of the Parking Lot which will then then flow into the site's proposed infiltration system which consists of 16 Cultec 330LXHD Infiltrators and then infiltrate into the soil or for larger more infrequent storms, overflow via the Drain overflow into the back area of the Lot, then ultimately infiltrate into the ground.

Methodology

Hydrocad Software Solutions LLC's Hydro-Cad Software was used to analyze pre and post developed site conditions to determine time of concentration, composite runoff numbers, rainfall intensity, and storm runoff.

The table below summarize the computations for the SITE showing that the post developed flows from the construction of project do not increase the amount of flow from the existing site.

Year Storm	Existing Sub Area	Proposed Sub Area	Outflow	Difference Outflow - Existing
	4S	2S		
2Yr. 3.15"	0.15 CFS	0.46 CFS	0.00 CFS	-0.15 CFS
10 Yr. 4.86"	0.37 CFS	0.71 CFS	0.00 CFS	-0.37 CFS
25 Yr. 6.15"	0.56 CFS	0.90 CFS	0.00 CFS	-0.56 CFS
100 Yr. 8.94"	0.98 CFS	1.31 CFS	0.45 CFS	-0.54 CFS

The Net Resultant is a Reduction of Storm water flow for all Design Storms.

GROUNDWATER RECHARGE CALCULATIONS

IMPERVIOUS AREA
7050 sq.ft.
INFILTRATE 1" OF RAINFALL
7050/12 = 587.5 CU.FT. RECHARGE CALCULATION

16 CULTEC 330XLHD INFILTRATOR SYSTEM
VOLUME OF CHAMBER
16 Chambers x 52.2 cf = 835.2 cf Chamber Storage

VOLUME OF STONE CALCULATION
61.5' X13.17'X4.04'=3272.2 CU.FT. STONE VOLUME

3272.2 CU.FT. STONE VOLUME – 835.2 CU.FT CHAMBER VOLUME
=2437.1 CU.FT. VOLUME STONE X 0.4 (VOIDS)= 974.8 CU.FT. TOTAL VOID STORAGE
974.8 CU.FT VOID STORAGE + 835.2 CU.FT. CHAMBER STORAGE =
1810.0 CU.FT. TOTAL STORAGE
1810.0 CU.FT. SYSTEM STORAGE >587.5 CU.FT. REQUIRED STORAGE VOLUME

MA Stormwater Standards Compliance

Standard 1: No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The proposed project's Storm water Management system consists of 16 CULTEC 330XLHD infiltrators. No discharges of stormwater will flow offsite directly into waters or wetlands of the Commonwealth of Massachusetts.

Standard 2: Storm water management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

The stormwater management system is designed so that the peak discharge rates do not exceed the pre-developed discharge rate for most cases. See table in the Methodology Section. For the 2, 10, 25 & 100 year storms, the peak outflow does not exceed the pre-developed discharge rate. The discharge of stormwater is subsurface and infiltrates naturally into the ground except for the larger most infrequent storms.

Standard 3: Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Storm water Handbook.

The proposed stormwater Management System- which consists of 16 CULTEC 330XLHD Infiltrators - will infiltrate stormwater into the ground, ensuring that the annual recharge to groundwater will not be lost, in fact, this system ensures that the vast majority of stormwater from rain events are infiltrated into the ground on site.

Standard 4: Storm water management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

The proposed system consisting of a deep sump catch basins and a proprietary infiltration system is designed to remove in excess of 80% TSS.

Standard 5: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Storm water Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

The project is a proposed Parking area there are no higher potential pollutant loads anticipated on the site for the development.

Standard 6: Storm water discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Storm water Handbook.

Project site is not in a Zone II or Interim Wellhead Protection Area or other critical areas.

Standard 7: A redevelopment project is required to meet the following Storm water Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Storm water Management Standards and improve existing conditions.

The proposed project is a redevelopment project, meets Standard 2 and Standard 3
The proposed project meets the pretreatment standard 4.
The proposed project meets standard 5 due to there being no anticipated higher pollutant loads from the site.
The proposed project complies with all other requirements of the Storm Water Management Standards and improves upon existing conditions.

Standard 8: A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

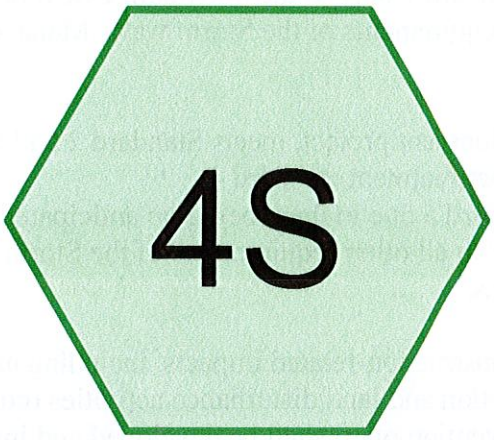
The proposed work consists of the grading, paving and the installation of the infiltration system in the parking area, however a straw wattle will surround the work area on the site for erosion control

Standard 9: A Long -Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

A long term O & M plan will be developed and implemented to ensure that the stormwater management system functions as designed, See O & M plan.

Standard 10: All illicit discharges to the stormwater management system are prohibited.

There will be no illicit discharges into the stormwater management system see illicit discharge form.



41 KERNWOOD-EXISTING YARD

Subcat Reach Pond Link

Routing Diagram for 41 KERNWOOD HAVERHILL
Prepared by Civil Environmental Consultants LLC, Printed 4/8/2024

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
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Rainfall events imported from "NRCS-Rain.txt" for 4106 MA Gloucester Essex County
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Rainfall events imported from "NRCS-Rain.txt" for 4175 MA Medford Middlesex County South
Rainfall events imported from "NRCS-Rain.txt" for 4341 MA Wilmington Middlesex County Central
Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
Rainfall events imported from "NRCS-Rain.txt" for 4050 MA Canton Norfolk County
Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
Rainfall events imported from "NRCS-Rain.txt" for 4175 MA Medford Middlesex County South
Rainfall events imported from "NRCS-Rain.txt" for 4175 MA Medford Middlesex County South
Rainfall events imported from "NRCS-Rain.txt" for 4049 MA Cambridge Middlesex County South
Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
Rainfall events imported from "NRCS-Rain.txt" for 4292 MA Taunton Bristol County
Rainfall events imported from "NRCS-Rain.txt" for 4049 MA Cambridge Middlesex County South
Rainfall events imported from "NRCS-Rain.txt" for 4127 MA Haverhill Essex County

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.162	72	Dirt roads, HSG A (4S)
0.162	**72**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.162	HSG A	4S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.162		**TOTAL AREA**

Summary for Subcatchment 4S: 41 KERNWOOD-EXISTING YARD

[49] Hint: Tc<2dt may require smaller dt

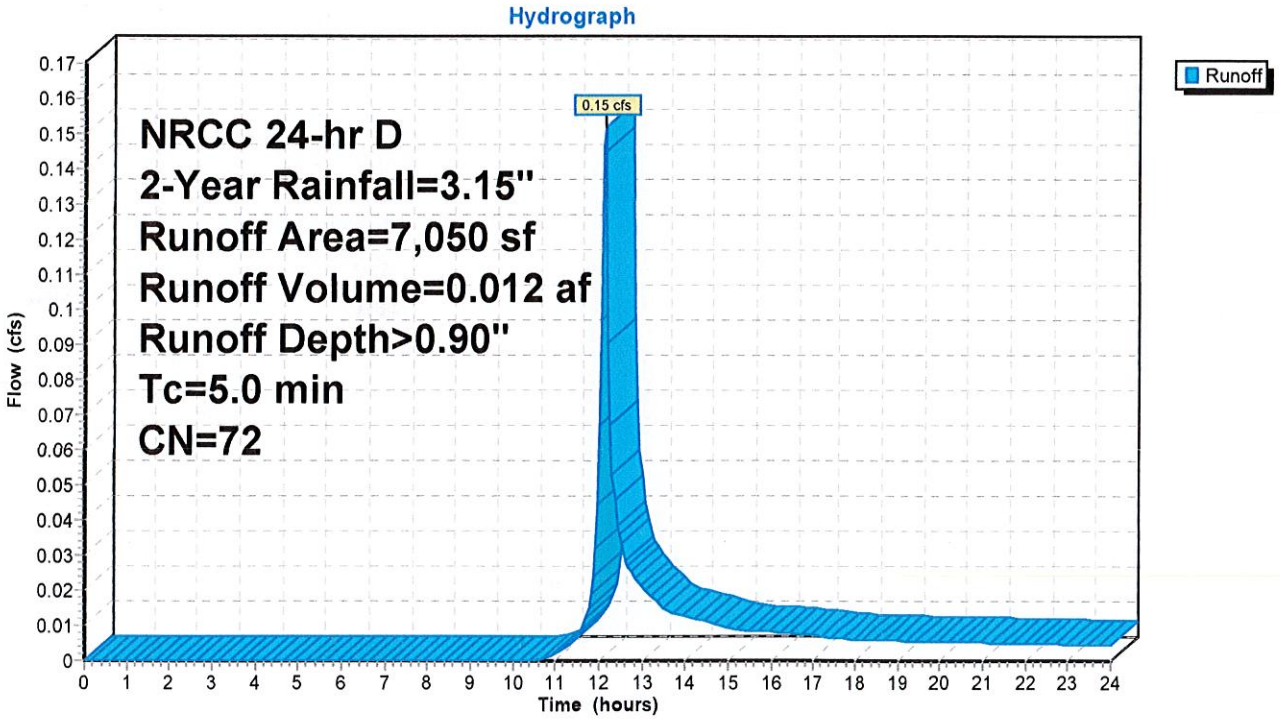
Runoff = 0.15 cfs @ 12.12 hrs, Volume= 0.012 af, Depth> 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
7,050	72	Dirt roads, HSG A
7,050		100.00% Pervious Area

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

Subcatchment 4S: 41 KERNWOOD-EXISTING YARD



Hydrograph for Subcatchment 4S: 41 KERNWOOD-EXISTING YARD

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.25	0.01	0.00	0.00
0.50	0.02	0.00	0.00
0.75	0.03	0.00	0.00
1.00	0.05	0.00	0.00
1.25	0.06	0.00	0.00
1.50	0.07	0.00	0.00
1.75	0.08	0.00	0.00
2.00	0.09	0.00	0.00
2.25	0.11	0.00	0.00
2.50	0.12	0.00	0.00
2.75	0.13	0.00	0.00
3.00	0.15	0.00	0.00
3.25	0.16	0.00	0.00
3.50	0.17	0.00	0.00
3.75	0.19	0.00	0.00
4.00	0.20	0.00	0.00
4.25	0.22	0.00	0.00
4.50	0.23	0.00	0.00
4.75	0.25	0.00	0.00
5.00	0.26	0.00	0.00
5.25	0.28	0.00	0.00
5.50	0.29	0.00	0.00
5.75	0.31	0.00	0.00
6.00	0.32	0.00	0.00
6.25	0.34	0.00	0.00
6.50	0.36	0.00	0.00
6.75	0.38	0.00	0.00
7.00	0.40	0.00	0.00
7.25	0.42	0.00	0.00
7.50	0.44	0.00	0.00
7.75	0.46	0.00	0.00
8.00	0.48	0.00	0.00
8.25	0.50	0.00	0.00
8.50	0.53	0.00	0.00
8.75	0.55	0.00	0.00
9.00	0.58	0.00	0.00
9.25	0.61	0.00	0.00
9.50	0.64	0.00	0.00
9.75	0.67	0.00	0.00
10.00	0.71	0.00	0.00
10.25	0.75	0.00	0.00
10.50	0.79	0.00	0.00
10.75	0.84	0.00	0.00
11.00	0.89	0.00	0.00
11.25	0.97	0.01	0.00
11.50	1.06	0.02	0.01
11.75	1.19	0.04	0.02
12.00	1.51	0.12	**0.07**
12.25	1.96	0.28	**0.07**
12.50	2.09	0.33	0.03
12.75	2.18	0.37	0.03
13.00	2.26	0.41	0.02
13.25	2.31	0.43	0.02
13.50	2.36	0.46	0.02
13.75	2.40	0.48	0.01
14.00	2.44	0.50	0.01
14.25	2.48	0.52	0.01
14.50	2.51	0.54	0.01
14.75	2.54	0.55	0.01
15.00	2.57	0.57	0.01
15.25	2.60	0.58	0.01
15.50	2.62	0.59	0.01
15.75	2.65	0.61	0.01
16.00	2.67	0.62	0.01
16.25	2.69	0.63	0.01
16.50	2.71	0.64	0.01
16.75	2.73	0.65	0.01
17.00	2.75	0.67	0.01
17.25	2.77	0.68	0.01
17.50	2.79	0.69	0.01
17.75	2.81	0.70	0.01
18.00	2.83	0.71	0.01
18.25	2.84	0.72	0.01
18.50	2.86	0.72	0.01
18.75	2.87	0.73	0.01
19.00	2.89	0.74	0.01
19.25	2.90	0.75	0.01
19.50	2.92	0.76	0.01
19.75	2.93	0.77	0.01
20.00	2.95	0.78	0.01
20.25	2.96	0.79	0.01
20.50	2.98	0.79	0.01
20.75	2.99	0.80	0.01
21.00	3.00	0.81	0.01
21.25	3.02	0.82	0.01
21.50	3.03	0.83	0.01
21.75	3.04	0.83	0.01
22.00	3.06	0.84	0.01
22.25	3.07	0.85	0.00
22.50	3.08	0.86	0.00
22.75	3.09	0.86	0.00
23.00	3.10	0.87	0.00
23.25	3.12	0.88	0.00
23.50	3.13	0.88	0.00
23.75	3.14	0.89	0.00
24.00	**3.15**	**0.90**	0.00

Summary for Subcatchment 4S: 41 KERNWOOD-EXISTING YARD

[49] Hint: Tc<2dt may require smaller dt

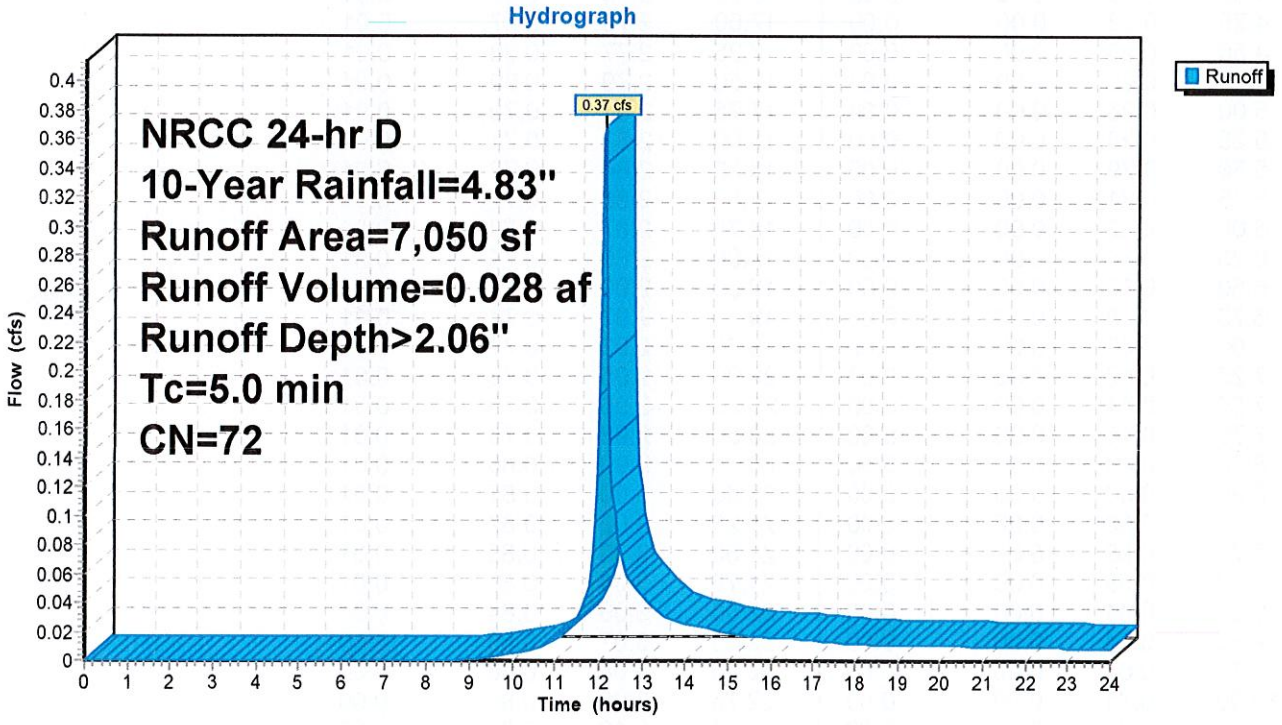
Runoff = 0.37 cfs @ 12.12 hrs, Volume= 0.028 af, Depth> 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
7,050	72	Dirt roads, HSG A
7,050		100.00% Pervious Area

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

Subcatchment 4S: 41 KERNWOOD-EXISTING YARD



Hydrograph for Subcatchment 4S: 41 KERNWOOD-EXISTING YARD

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.25	0.02	0.00	0.00
0.50	0.03	0.00	0.00
0.75	0.05	0.00	0.00
1.00	0.07	0.00	0.00
1.25	0.09	0.00	0.00
1.50	0.11	0.00	0.00
1.75	0.13	0.00	0.00
2.00	0.15	0.00	0.00
2.25	0.17	0.00	0.00
2.50	0.19	0.00	0.00
2.75	0.21	0.00	0.00
3.00	0.23	0.00	0.00
3.25	0.25	0.00	0.00
3.50	0.27	0.00	0.00
3.75	0.29	0.00	0.00
4.00	0.31	0.00	0.00
4.25	0.33	0.00	0.00
4.50	0.36	0.00	0.00
4.75	0.38	0.00	0.00
5.00	0.40	0.00	0.00
5.25	0.43	0.00	0.00
5.50	0.45	0.00	0.00
5.75	0.47	0.00	0.00
6.00	0.50	0.00	0.00
6.25	0.52	0.00	0.00
6.50	0.55	0.00	0.00
6.75	0.58	0.00	0.00
7.00	0.61	0.00	0.00
7.25	0.64	0.00	0.00
7.50	0.67	0.00	0.00
7.75	0.70	0.00	0.00
8.00	0.74	0.00	0.00
8.25	0.77	0.00	0.00
8.50	0.81	0.00	0.00
8.75	0.85	0.00	0.00
9.00	0.89	0.00	0.00
9.25	0.93	0.01	0.00
9.50	0.98	0.01	0.00
9.75	1.03	0.02	0.00
10.00	1.08	0.02	0.00
10.25	1.14	0.03	0.01
10.50	1.21	0.04	0.01
10.75	1.28	0.06	0.01
11.00	1.37	0.08	0.01
11.25	1.48	0.11	0.02
11.50	1.62	0.15	0.03
11.75	1.83	0.22	0.05
12.00	2.31	0.43	**0.18**
12.25	3.00	0.81	**0.15**
12.50	3.21	0.94	0.08
12.75	3.35	1.02	0.05
13.00	3.46	1.09	0.04
13.25	3.55	1.15	0.04
13.50	3.62	1.20	0.03
13.75	3.69	1.25	0.03
14.00	3.75	1.29	0.03
14.25	3.80	1.32	0.02
14.50	3.85	1.36	0.02
14.75	3.90	1.39	0.02
15.00	3.94	1.42	0.02
15.25	3.98	1.45	0.02
15.50	4.02	1.47	0.02
15.75	4.06	1.50	0.02
16.00	4.09	1.53	0.02
16.25	4.13	1.55	0.02
16.50	4.16	1.57	0.02
16.75	4.19	1.60	0.01
17.00	4.22	1.62	0.01
17.25	4.25	1.64	0.01
17.50	4.28	1.66	0.01
17.75	4.31	1.68	0.01
18.00	4.33	1.70	0.01
18.25	4.36	1.72	0.01
18.50	4.38	1.73	0.01
18.75	4.40	1.75	0.01
19.00	4.43	1.77	0.01
19.25	4.45	1.78	0.01
19.50	4.47	1.80	0.01
19.75	4.50	1.82	0.01
20.00	4.52	1.83	0.01
20.25	4.54	1.85	0.01
20.50	4.56	1.87	0.01
20.75	4.58	1.88	0.01
21.00	4.60	1.90	0.01
21.25	4.62	1.91	0.01
21.50	4.64	1.93	0.01
21.75	4.66	1.94	0.01
22.00	4.68	1.96	0.01
22.25	4.70	1.97	0.01
22.50	4.72	1.99	0.01
22.75	4.74	2.00	0.01
23.00	4.76	2.01	0.01
23.25	4.78	2.03	0.01
23.50	4.80	2.04	0.01
23.75	4.81	2.05	0.01
24.00	**4.83**	**2.07**	0.01

Summary for Subcatchment 4S: 41 KERNWOOD-EXISTING YARD

[49] Hint: Tc<2dt may require smaller dt

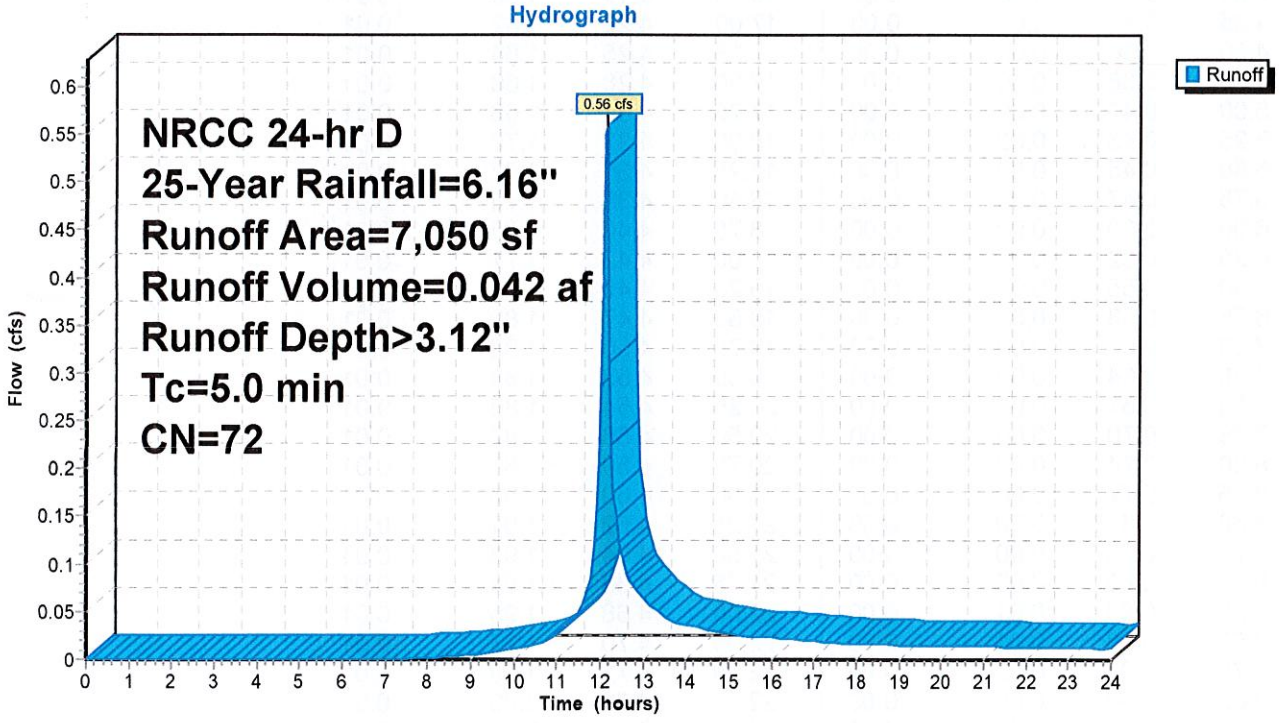
Runoff = 0.56 cfs @ 12.12 hrs, Volume= 0.042 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.16"

Area (sf)	CN	Description
7,050	72	Dirt roads, HSG A
7,050		100.00% Pervious Area

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

Subcatchment 4S: 41 KERNWOOD-EXISTING YARD



Hydrograph for Subcatchment 4S: 41 KERNWOOD-EXISTING YARD

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.25	0.02	0.00	0.00
0.50	0.04	0.00	0.00
0.75	0.07	0.00	0.00
1.00	0.09	0.00	0.00
1.25	0.11	0.00	0.00
1.50	0.14	0.00	0.00
1.75	0.16	0.00	0.00
2.00	0.19	0.00	0.00
2.25	0.21	0.00	0.00
2.50	0.24	0.00	0.00
2.75	0.26	0.00	0.00
3.00	0.29	0.00	0.00
3.25	0.31	0.00	0.00
3.50	0.34	0.00	0.00
3.75	0.37	0.00	0.00
4.00	0.40	0.00	0.00
4.25	0.43	0.00	0.00
4.50	0.45	0.00	0.00
4.75	0.48	0.00	0.00
5.00	0.51	0.00	0.00
5.25	0.54	0.00	0.00
5.50	0.57	0.00	0.00
5.75	0.60	0.00	0.00
6.00	0.63	0.00	0.00
6.25	0.67	0.00	0.00
6.50	0.70	0.00	0.00
6.75	0.74	0.00	0.00
7.00	0.77	0.00	0.00
7.25	0.81	0.00	0.00
7.50	0.85	0.00	0.00
7.75	0.90	0.00	0.00
8.00	0.94	0.01	0.00
8.25	0.98	0.01	0.00
8.50	1.03	0.02	0.00
8.75	1.08	0.02	0.00
9.00	1.13	0.03	0.01
9.25	1.19	0.04	0.01
9.50	1.25	0.05	0.01
9.75	1.31	0.06	0.01
10.00	1.38	0.08	0.01
10.25	1.46	0.10	0.01
10.50	1.54	0.12	0.02
10.75	1.64	0.15	0.02
11.00	1.75	0.19	0.03
11.25	1.89	0.25	0.04
11.50	2.06	0.32	0.05
11.75	2.33	0.44	0.08
12.00	2.95	0.78	**0.29**
12.25	3.83	1.34	**0.22**
12.50	4.10	1.53	0.11
12.75	4.27	1.65	0.08
13.00	4.41	1.75	0.06
13.25	4.52	1.84	0.05
13.50	4.62	1.91	0.04
13.75	4.70	1.97	0.04
14.00	4.78	2.03	0.04
14.25	4.85	2.08	0.03
14.50	4.91	2.13	0.03
14.75	4.97	2.18	0.03
15.00	5.03	2.22	0.03
15.25	5.08	2.26	0.03
15.50	5.13	2.30	0.02
15.75	5.18	2.33	0.02
16.00	5.22	2.37	0.02
16.25	5.26	2.40	0.02
16.50	5.31	2.44	0.02
16.75	5.35	2.47	0.02
17.00	5.39	2.50	0.02
17.25	5.42	2.53	0.02
17.50	5.46	2.56	0.02
17.75	5.49	2.58	0.02
18.00	5.53	2.61	0.02
18.25	5.56	2.63	0.02
18.50	5.59	2.66	0.02
18.75	5.62	2.68	0.02
19.00	5.65	2.71	0.02
19.25	5.68	2.73	0.02
19.50	5.71	2.75	0.02
19.75	5.73	2.78	0.02
20.00	5.76	2.80	0.01
20.25	5.79	2.82	0.01
20.50	5.82	2.85	0.01
20.75	5.85	2.87	0.01
21.00	5.87	2.89	0.01
21.25	5.90	2.91	0.01
21.50	5.92	2.93	0.01
21.75	5.95	2.95	0.01
22.00	5.97	2.97	0.01
22.25	6.00	2.99	0.01
22.50	6.02	3.01	0.01
22.75	6.05	3.03	0.01
23.00	6.07	3.05	0.01
23.25	6.09	3.07	0.01
23.50	6.12	3.09	0.01
23.75	6.14	3.11	0.01
24.00	**6.16**	**3.12**	0.01

Summary for Subcatchment 4S: 41 KERNWOOD-EXISTING YARD

[49] Hint: Tc<2dt may require smaller dt

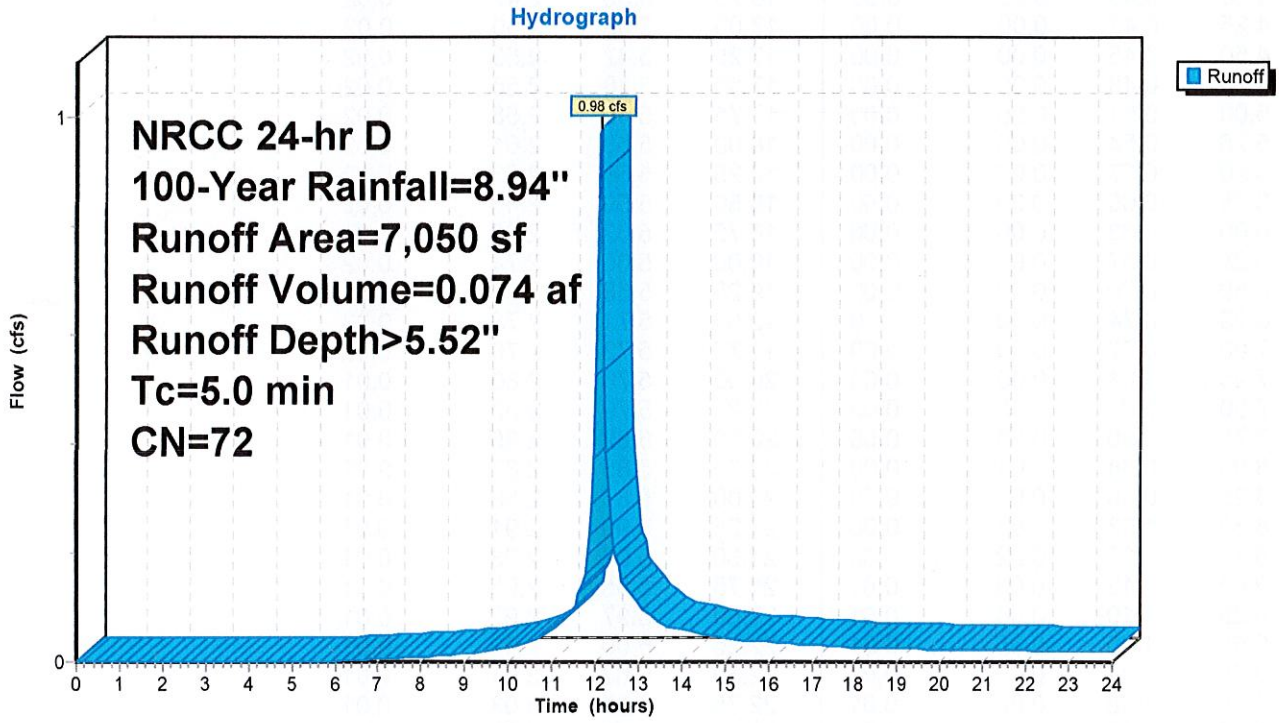
Runoff = 0.98 cfs @ 12.11 hrs, Volume= 0.074 af, Depth> 5.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
7,050	72	Dirt roads, HSG A
7,050		100.00% Pervious Area

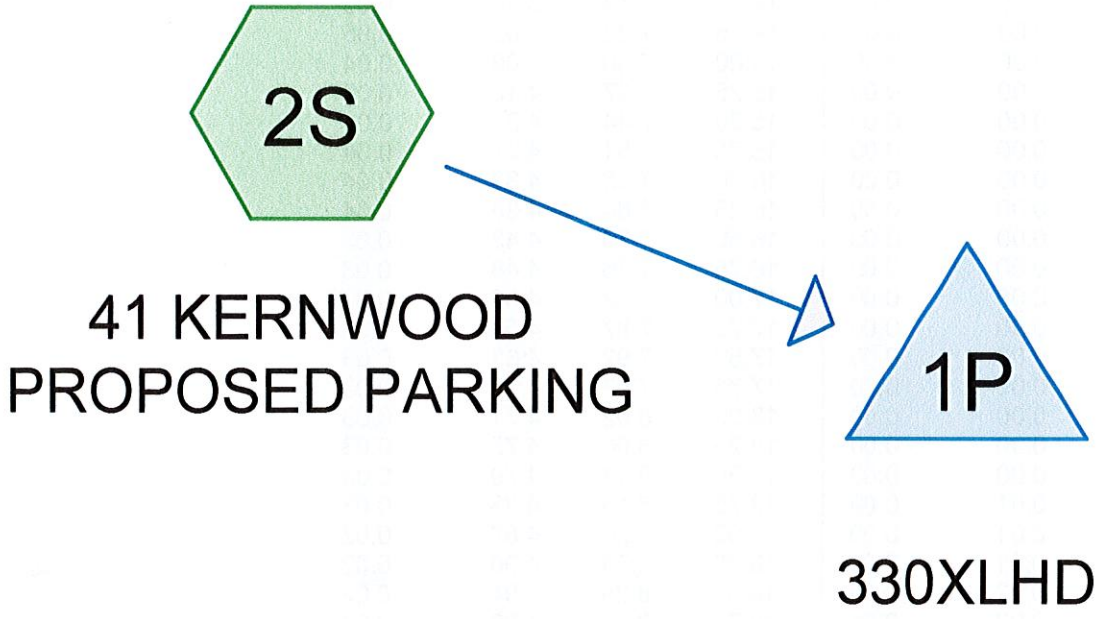
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 4S: 41 KERNWOOD-EXISTING YARD



Hydrograph for Subcatchment 4S: 41 KERNWOOD-EXISTING YARD

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.25	0.03	0.00	0.00
0.50	0.06	0.00	0.00
0.75	0.10	0.00	0.00
1.00	0.13	0.00	0.00
1.25	0.16	0.00	0.00
1.50	0.20	0.00	0.00
1.75	0.23	0.00	0.00
2.00	0.27	0.00	0.00
2.25	0.31	0.00	0.00
2.50	0.34	0.00	0.00
2.75	0.38	0.00	0.00
3.00	0.42	0.00	0.00
3.25	0.46	0.00	0.00
3.50	0.50	0.00	0.00
3.75	0.54	0.00	0.00
4.00	0.58	0.00	0.00
4.25	0.62	0.00	0.00
4.50	0.66	0.00	0.00
4.75	0.70	0.00	0.00
5.00	0.74	0.00	0.00
5.25	0.79	0.00	0.00
5.50	0.83	0.00	0.00
5.75	0.88	0.00	0.00
6.00	0.92	0.01	0.00
6.25	0.97	0.01	0.00
6.50	1.02	0.01	0.00
6.75	1.07	0.02	0.00
7.00	1.12	0.03	0.01
7.25	1.18	0.04	0.01
7.50	1.24	0.05	0.01
7.75	1.30	0.06	0.01
8.00	1.36	0.08	0.01
8.25	1.43	0.09	0.01
8.50	1.50	0.11	0.01
8.75	1.57	0.13	0.01
9.00	1.64	0.16	0.02
9.25	1.72	0.18	0.02
9.50	1.81	0.22	0.02
9.75	1.90	0.25	0.02
10.00	2.00	0.29	0.03
10.25	2.12	0.34	0.03
10.50	2.23	0.40	0.04
10.75	2.37	0.46	0.05
11.00	2.54	0.55	0.06
11.25	2.75	0.66	0.08
11.50	2.99	0.81	0.10
11.75	3.38	1.04	0.16
12.00	4.28	1.66	**0.52**
12.25	5.56	2.64	**0.38**
12.50	5.95	2.95	0.18
12.75	6.19	3.15	0.13
13.00	6.40	3.32	0.11
13.25	6.57	3.46	0.09
13.50	6.71	3.58	0.07
13.75	6.82	3.68	0.06
14.00	6.94	3.77	0.06
14.25	7.04	3.86	0.06
14.50	7.13	3.94	0.05
14.75	7.22	4.02	0.05
15.00	7.30	4.09	0.04
15.25	7.37	4.15	0.04
15.50	7.44	4.21	0.04
15.75	7.51	4.27	0.04
16.00	7.58	4.33	0.04
16.25	7.64	4.38	0.04
16.50	7.70	4.43	0.03
16.75	7.76	4.48	0.03
17.00	7.82	4.53	0.03
17.25	7.87	4.58	0.03
17.50	7.92	4.63	0.03
17.75	7.97	4.67	0.03
18.00	8.02	4.71	0.03
18.25	8.06	4.75	0.03
18.50	8.11	4.79	0.03
18.75	8.15	4.83	0.03
19.00	8.20	4.87	0.02
19.25	8.24	4.90	0.02
19.50	8.28	4.94	0.02
19.75	8.32	4.98	0.02
20.00	8.36	5.02	0.02
20.25	8.40	5.05	0.02
20.50	8.44	5.09	0.02
20.75	8.48	5.12	0.02
21.00	8.52	5.16	0.02
21.25	8.56	5.19	0.02
21.50	8.60	5.22	0.02
21.75	8.63	5.26	0.02
22.00	8.67	5.29	0.02
22.25	8.71	5.32	0.02
22.50	8.74	5.35	0.02
22.75	8.78	5.38	0.02
23.00	8.81	5.41	0.02
23.25	8.84	5.44	0.02
23.50	8.88	5.47	0.02
23.75	8.91	5.50	0.02
24.00	**8.94**	**5.53**	0.02



Subcat Reach Pond Link

Routing Diagram for 41 KERNWOOD HAVERHILL
Prepared by Civil Environmental Consultants LLC, Printed 4/8/2024

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
Rainfall events imported from "NRCS-Rain.txt" for 4106 MA Gloucester Essex County
Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
Rainfall events imported from "NRCS-Rain.txt" for 4175 MA Medford Middlesex County South
Rainfall events imported from "NRCS-Rain.txt" for 4341 MA Wilmington Middlesex County Central
Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
Rainfall events imported from "NRCS-Rain.txt" for 4050 MA Canton Norfolk County
Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
Rainfall events imported from "NRCS-Rain.txt" for 4175 MA Medford Middlesex County South
Rainfall events imported from "NRCS-Rain.txt" for 4175 MA Medford Middlesex County South
Rainfall events imported from "NRCS-Rain.txt" for 4049 MA Cambridge Middlesex County South
Rainfall events imported from "NRCS-Rain.txt" for 4035 MA Boston Suffolk County
Rainfall events imported from "NRCS-Rain.txt" for 4292 MA Taunton Bristol County
Rainfall events imported from "NRCS-Rain.txt" for 4049 MA Cambridge Middlesex County South
Rainfall events imported from "NRCS-Rain.txt" for 4127 MA Haverhill Essex County

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.162	98	Paved parking, HSG A (2S)
0.162	**98**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.162	HSG A	2S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.162		**TOTAL AREA**

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	1P	69.75	69.50	34.0	0.0074	0.010	6.0	0.0	0.0

Summary for Subcatchment 2S: 41 KERNWOOD PROPOSED PARKING

[49] Hint: Tc<2dt may require smaller dt

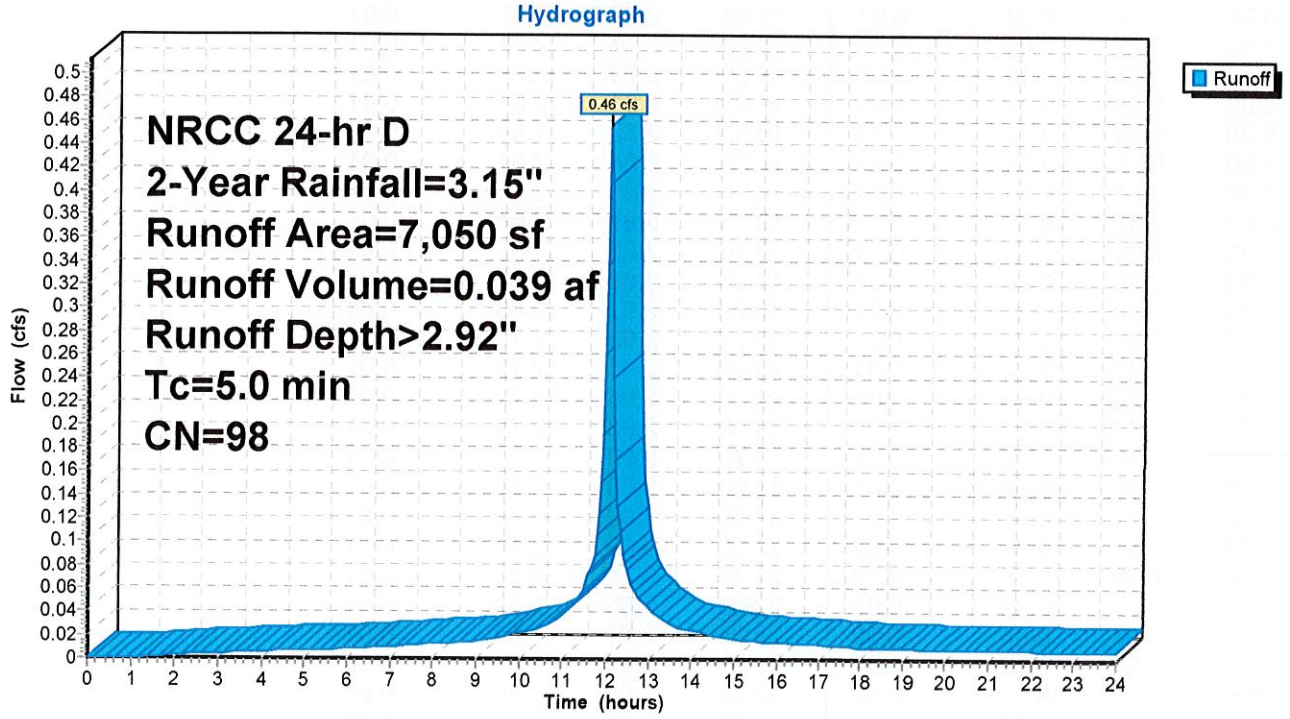
Runoff = 0.46 cfs @ 12.11 hrs, Volume= 0.039 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
7,050	98	Paved parking, HSG A
7,050		100.00% Impervious Area

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

Subcatchment 2S: 41 KERNWOOD PROPOSED PARKING



Hydrograph for Subcatchment 2S: 41 KERNWOOD PROPOSED PARKING

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.25	0.01	0.00	0.00
0.50	0.02	0.00	0.00
0.75	0.03	0.00	0.00
1.00	0.05	0.00	0.00
1.25	0.06	0.00	0.00
1.50	0.07	0.00	0.00
1.75	0.08	0.01	0.00
2.00	0.09	0.01	0.00
2.25	0.11	0.02	0.00
2.50	0.12	0.02	0.00
2.75	0.13	0.03	0.00
3.00	0.15	0.04	0.00
3.25	0.16	0.04	0.01
3.50	0.17	0.05	0.01
3.75	0.19	0.06	0.01
4.00	0.20	0.07	0.01
4.25	0.22	0.08	0.01
4.50	0.23	0.09	0.01
4.75	0.25	0.10	0.01
5.00	0.26	0.12	0.01
5.25	0.28	0.13	0.01
5.50	0.29	0.14	0.01
5.75	0.31	0.15	0.01
6.00	0.32	0.16	0.01
6.25	0.34	0.18	0.01
6.50	0.36	0.19	0.01
6.75	0.38	0.21	0.01
7.00	0.40	0.23	0.01
7.25	0.42	0.24	0.01
7.50	0.44	0.26	0.01
7.75	0.46	0.28	0.01
8.00	0.48	0.30	0.01
8.25	0.50	0.32	0.01
8.50	0.53	0.34	0.01
8.75	0.55	0.37	0.02
9.00	0.58	0.39	0.02
9.25	0.61	0.42	0.02
9.50	0.64	0.44	0.02
9.75	0.67	0.48	0.02
10.00	0.71	0.51	0.02
10.25	0.75	0.55	0.02
10.50	0.79	0.59	0.03
10.75	0.84	0.63	0.03
11.00	0.89	0.69	0.04
11.25	0.97	0.76	0.05
11.50	1.06	0.84	0.06
11.75	1.19	0.98	0.09
12.00	1.51	1.29	**0.26**
12.25	1.96	1.73	**0.17**
12.50	2.09	1.87	0.08
12.75	2.18	1.96	0.06
13.00	2.26	2.03	0.04
13.25	2.31	2.09	0.04
13.50	2.36	2.13	0.03
13.75	2.40	2.18	0.03
14.00	2.44	2.21	0.02
14.25	2.48	2.25	0.02
14.50	2.51	2.28	0.02
14.75	2.54	2.31	0.02
15.00	2.57	2.34	0.02
15.25	2.60	2.37	0.02
15.50	2.62	2.39	0.02
15.75	2.65	2.42	0.02
16.00	2.67	2.44	0.01
16.25	2.69	2.46	0.01
16.50	2.71	2.48	0.01
16.75	2.73	2.50	0.01
17.00	2.75	2.52	0.01
17.25	2.77	2.54	0.01
17.50	2.79	2.56	0.01
17.75	2.81	2.58	0.01
18.00	2.83	2.59	0.01
18.25	2.84	2.61	0.01
18.50	2.86	2.63	0.01
18.75	2.87	2.64	0.01
19.00	2.89	2.66	0.01
19.25	2.90	2.67	0.01
19.50	2.92	2.69	0.01
19.75	2.93	2.70	0.01
20.00	2.95	2.72	0.01
20.25	2.96	2.73	0.01
20.50	2.98	2.74	0.01
20.75	2.99	2.76	0.01
21.00	3.00	2.77	0.01
21.25	3.02	2.78	0.01
21.50	3.03	2.80	0.01
21.75	3.04	2.81	0.01
22.00	3.06	2.82	0.01
22.25	3.07	2.84	0.01
22.50	3.08	2.85	0.01
22.75	3.09	2.86	0.01
23.00	3.10	2.87	0.01
23.25	3.12	2.88	0.01
23.50	3.13	2.90	0.01
23.75	3.14	2.91	0.01
24.00	**3.15**	**2.92**	0.01

Summary for Pond 1P: 330XLHD

Inflow Area = 0.162 ac,100.00% Impervious, Inflow Depth > 2.92" for 2-Year event
Inflow = 0.46 cfs @ 12.11 hrs, Volume= 0.039 af
Outflow = 0.05 cfs @ 11.30 hrs, Volume= 0.039 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.30 hrs, Volume= 0.039 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.25' @ 13.00 hrs Surf.Area= 810 sf Storage= 475 cf

Plug-Flow detention time= 65.8 min calculated for 0.039 af (100% of inflow)
Center-of-Mass det. time= 64.8 min (824.1 - 759.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	67.00'	966 cf	**13.17'W x 61.50'L x 4.04'H Field A** 3,273 cf Overall - 857 cf Embedded = 2,416 cf x 40.0% Voids
#2A	68.00'	857 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,823 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	69.75'	**6.0" Round Culvert** L= 34.0' Ke= 0.500 Inlet / Outlet Invert= 69.75' / 69.50' S= 0.0074 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.05 cfs @ 11.30 hrs HW=67.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=67.00' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond 1P: 330XLHD - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

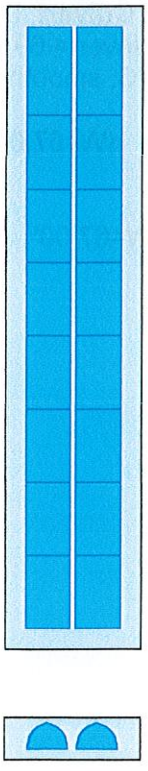
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +24.0" End Stone x 2 = 61.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 24.0" Side Stone x 2 = 13.17' Base Width
12.0" Base + 30.5" Chamber Height + 6.0" Cover = 4.04' Field Height

16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 856.9 cf Chamber Storage

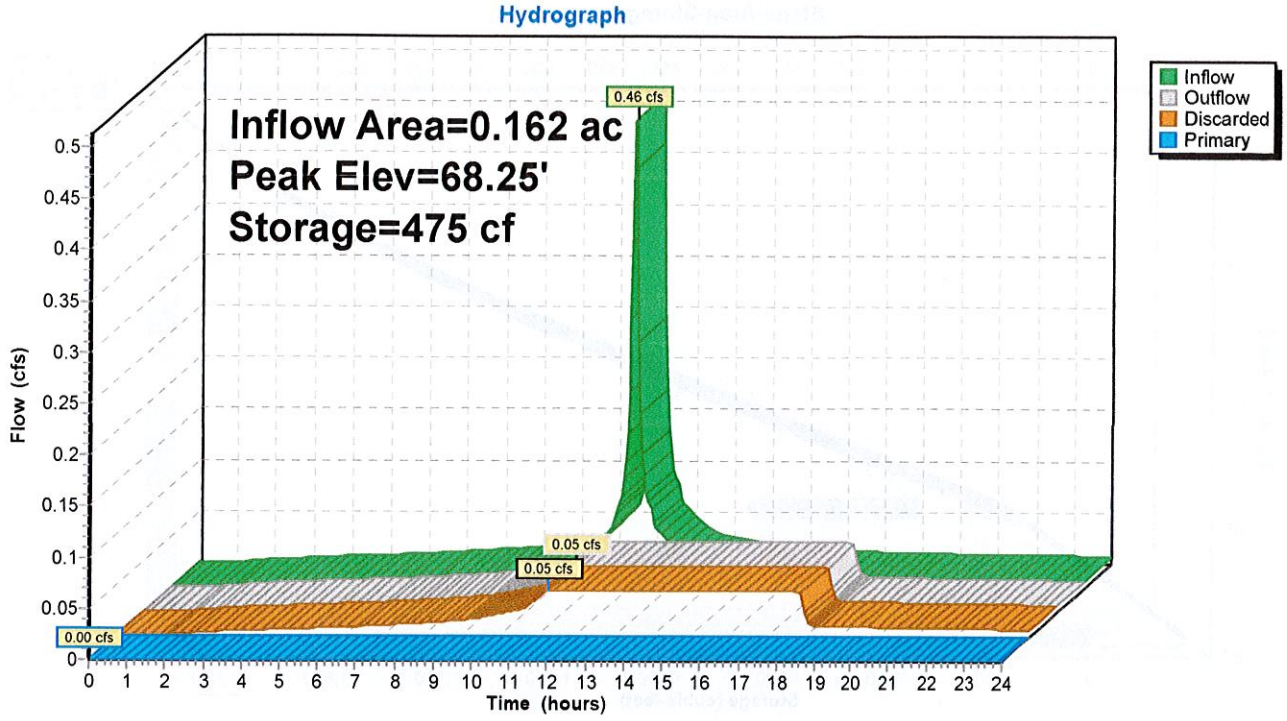
3,272.7 cf Field - 856.9 cf Chambers = 2,415.9 cf Stone x 40.0% Voids = 966.3 cf Stone Storage

Chamber Storage + Stone Storage = 1,823.2 cf = 0.042 af
Overall Storage Efficiency = 55.7%
Overall System Size = 61.50' x 13.17' x 4.04'

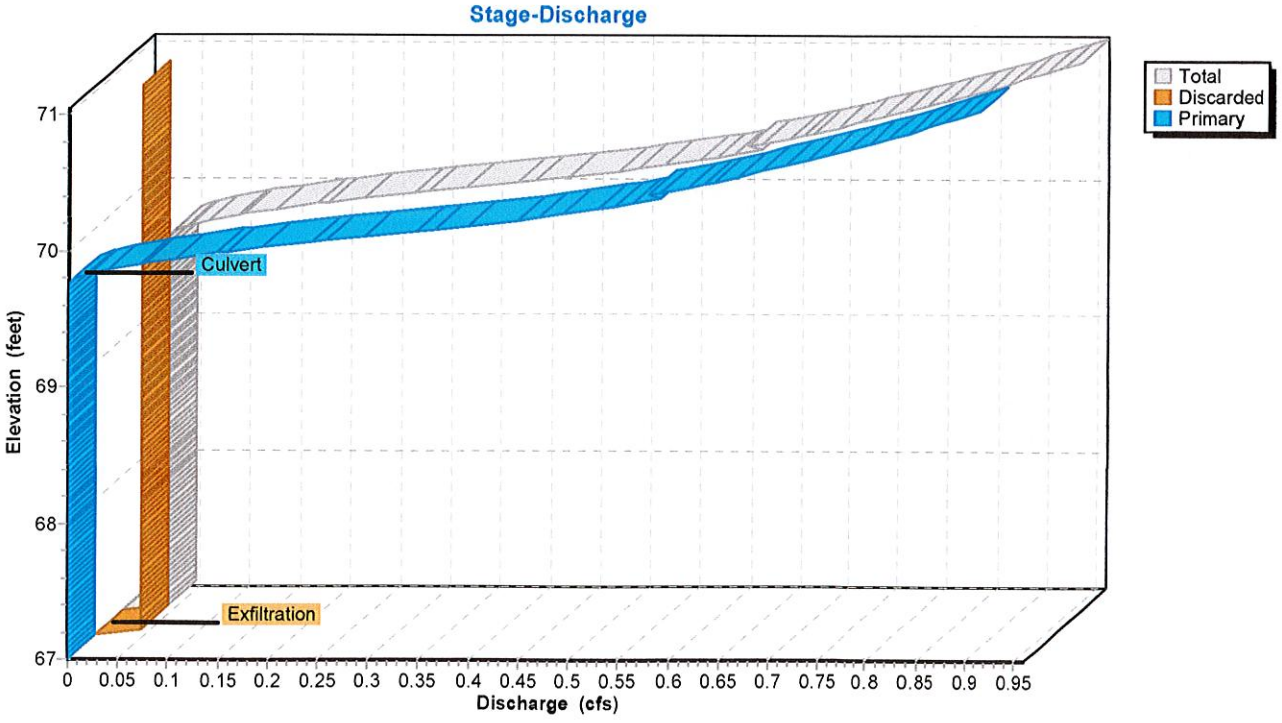
16 Chambers
121.2 cy Field
89.5 cy Stone



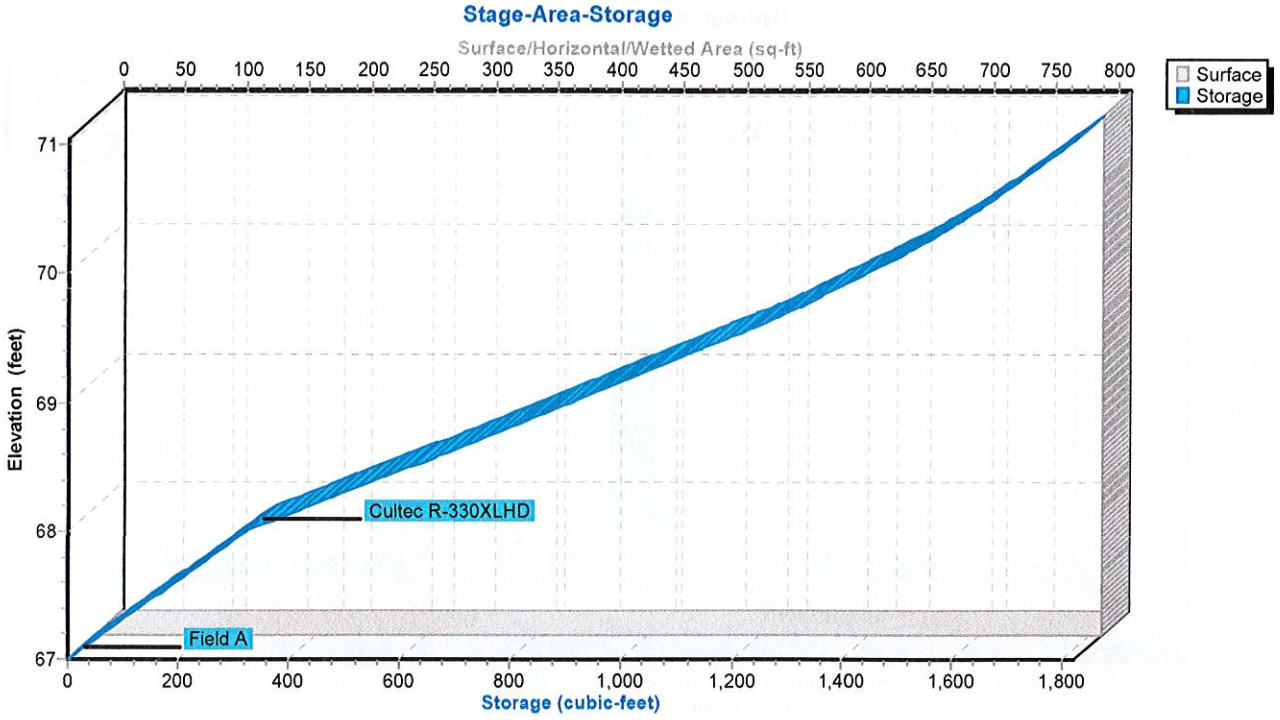
Pond 1P: 330XLHD



Pond 1P: 330XLHD



Pond 1P: 330XLHD



Hydrograph for Pond 1P: 330XLHD

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	67.00	0.00	0.00	**0.00**
0.50	0.00	0	67.00	0.00	0.00	0.00
1.00	0.00	0	67.00	0.00	0.00	0.00
1.50	0.00	0	67.00	0.00	0.00	0.00
2.00	0.00	1	67.00	0.00	0.00	0.00
2.50	0.00	1	67.00	0.00	0.00	0.00
3.00	0.00	1	67.00	0.00	0.00	0.00
3.50	0.01	2	67.00	0.01	0.01	0.00
4.00	0.01	2	67.01	0.01	0.01	0.00
4.50	0.01	2	67.01	0.01	0.01	0.00
5.00	0.01	2	67.01	0.01	0.01	0.00
5.50	0.01	2	67.01	0.01	0.01	0.00
6.00	0.01	2	67.01	0.01	0.01	0.00
6.50	0.01	3	67.01	0.01	0.01	0.00
7.00	0.01	3	67.01	0.01	0.01	0.00
7.50	0.01	3	67.01	0.01	0.01	0.00
8.00	0.01	4	67.01	0.01	0.01	0.00
8.50	0.01	4	67.01	0.01	0.01	0.00
9.00	0.02	4	67.01	0.02	0.02	0.00
9.50	0.02	5	67.02	0.02	0.02	0.00
10.00	0.02	6	67.02	0.02	0.02	0.00
10.50	0.03	7	67.02	0.03	0.03	0.00
11.00	0.04	10	67.03	**0.04**	**0.04**	0.00
11.50	0.06	20	67.06	**0.05**	**0.05**	0.00
12.00	**0.26**	139	67.43	0.05	0.05	0.00
12.50	**0.08**	453	68.22	0.05	0.05	0.00
13.00	0.04	**475**	**68.25**	0.05	0.05	0.00
13.50	0.03	460	68.23	0.05	0.05	0.00
14.00	0.02	427	68.17	0.05	0.05	0.00
14.50	0.02	388	68.11	0.05	0.05	0.00
15.00	0.02	342	68.03	0.05	0.05	0.00
15.50	0.02	290	67.90	0.05	0.05	0.00
16.00	0.01	237	67.73	0.05	0.05	0.00
16.50	0.01	182	67.56	0.05	0.05	0.00
17.00	0.01	124	67.38	0.05	0.05	0.00
17.50	0.01	65	67.20	0.05	0.05	0.00
18.00	0.01	7	67.02	0.02	0.02	0.00
18.50	0.01	3	67.01	0.01	0.01	0.00
19.00	0.01	3	67.01	0.01	0.01	0.00
19.50	0.01	3	67.01	0.01	0.01	0.00
20.00	0.01	3	67.01	0.01	0.01	0.00
20.50	0.01	3	67.01	0.01	0.01	0.00
21.00	0.01	3	67.01	0.01	0.01	0.00
21.50	0.01	2	67.01	0.01	0.01	0.00
22.00	0.01	2	67.01	0.01	0.01	0.00
22.50	0.01	2	67.01	0.01	0.01	0.00
23.00	0.01	2	67.01	0.01	0.01	0.00
23.50	0.01	2	67.01	0.01	0.01	0.00
24.00	0.01	2	67.01	0.01	0.01	0.00

Stage-Discharge for Pond 1P: 330XLHD

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
67.00	0.00	**0.00**	0.00
67.05	0.05	**0.05**	0.00
67.10	0.05	0.05	0.00
67.15	0.05	0.05	0.00
67.20	0.05	0.05	0.00
67.25	0.05	0.05	0.00
67.30	0.05	0.05	0.00
67.35	0.05	0.05	0.00
67.40	0.05	0.05	0.00
67.45	0.05	0.05	0.00
67.50	0.05	0.05	0.00
67.55	0.05	0.05	0.00
67.60	0.05	0.05	0.00
67.65	0.05	0.05	0.00
67.70	0.05	0.05	0.00
67.75	0.05	0.05	0.00
67.80	0.05	0.05	0.00
67.85	0.05	0.05	0.00
67.90	0.05	0.05	0.00
67.95	0.05	0.05	0.00
68.00	0.05	0.05	0.00
68.05	0.05	0.05	0.00
68.10	0.05	0.05	0.00
68.15	0.05	0.05	0.00
68.20	0.05	0.05	0.00
68.25	0.05	0.05	0.00
68.30	0.05	0.05	0.00
68.35	0.05	0.05	0.00
68.40	0.05	0.05	0.00
68.45	0.05	0.05	0.00
68.50	0.05	0.05	0.00
68.55	0.05	0.05	0.00
68.60	0.05	0.05	0.00
68.65	0.05	0.05	0.00
68.70	0.05	0.05	0.00
68.75	0.05	0.05	0.00
68.80	0.05	0.05	0.00
68.85	0.05	0.05	0.00
68.90	0.05	0.05	0.00
68.95	0.05	0.05	0.00
69.00	0.05	0.05	0.00
69.05	0.05	0.05	0.00
69.10	0.05	0.05	0.00
69.15	0.05	0.05	0.00
69.20	0.05	0.05	0.00
69.25	0.05	0.05	0.00
69.30	0.05	0.05	0.00
69.35	0.05	0.05	0.00
69.40	0.05	0.05	0.00
69.45	0.05	0.05	0.00
69.50	0.05	0.05	0.00
69.55	0.05	0.05	0.00
69.60	0.05	0.05	0.00
69.65	0.05	0.05	0.00
69.70	0.05	0.05	0.00
69.75	0.05	0.05	0.00
69.80	0.05	0.05	0.01
69.85	0.07	0.05	0.03
69.90	0.11	0.05	0.06
69.95	0.15	0.05	0.11
70.00	0.20	0.05	0.16
70.05	0.26	0.05	0.22
70.10	0.32	0.05	0.28
70.15	0.39	0.05	0.34
70.20	0.45	0.05	0.41
70.25	0.51	0.05	0.47
70.30	0.56	0.05	0.52
70.35	0.60	0.05	0.56
70.40	0.64	0.05	0.59
70.45	0.65	0.05	0.60
70.50	0.68	0.05	0.63
70.55	0.71	0.05	0.66
70.60	0.74	0.05	0.69
70.65	0.77	0.05	0.72
70.70	0.79	0.05	0.75
70.75	0.82	0.05	0.78
70.80	0.85	0.05	0.80
70.85	0.87	0.05	0.83
70.90	0.90	0.05	0.85
70.95	0.92	0.05	0.87
71.00	**0.94**	0.05	**0.90**

Stage-Area-Storage for Pond 1P: 330XLHD

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
67.00	**810**	0
67.05	810	16
67.10	810	32
67.15	810	49
67.20	810	65
67.25	810	81
67.30	810	97
67.35	810	113
67.40	810	130
67.45	810	146
67.50	810	162
67.55	810	178
67.60	810	194
67.65	810	211
67.70	810	227
67.75	810	243
67.80	810	259
67.85	810	275
67.90	810	292
67.95	810	308
68.00	810	324
68.05	810	354
68.10	810	384
68.15	810	413
68.20	810	443
68.25	810	473
68.30	810	502
68.35	810	532
68.40	810	562
68.45	810	591
68.50	810	621
68.55	810	650
68.60	810	679
68.65	810	709
68.70	810	738
68.75	810	766
68.80	810	795
68.85	810	824
68.90	810	853
68.95	810	881
69.00	810	910
69.05	810	939
69.10	810	967
69.15	810	996
69.20	810	1,024
69.25	810	1,052
69.30	810	1,080
69.35	810	1,108
69.40	810	1,135
69.45	810	1,163
69.50	810	1,190
69.55	810	1,216
69.60	810	1,243
69.65	810	1,269
69.70	810	1,295
69.75	810	1,321
69.80	810	1,346
69.85	810	1,372
69.90	810	1,396
69.95	810	1,421
70.00	810	1,445
70.05	810	1,468
70.10	810	1,491
70.15	810	1,513
70.20	810	1,535
70.25	810	1,556
70.30	810	1,576
70.35	810	1,595
70.40	810	1,614
70.45	810	1,631
70.50	810	1,648
70.55	810	1,664
70.60	810	1,680
70.65	810	1,696
70.70	810	1,713
70.75	810	1,729
70.80	810	1,745
70.85	810	1,761
70.90	810	1,777
70.95	810	1,794
71.00	810	**1,810**

Summary for Subcatchment 2S: 41 KERNWOOD PROPOSED PARKING

[49] Hint: Tc<2dt may require smaller dt

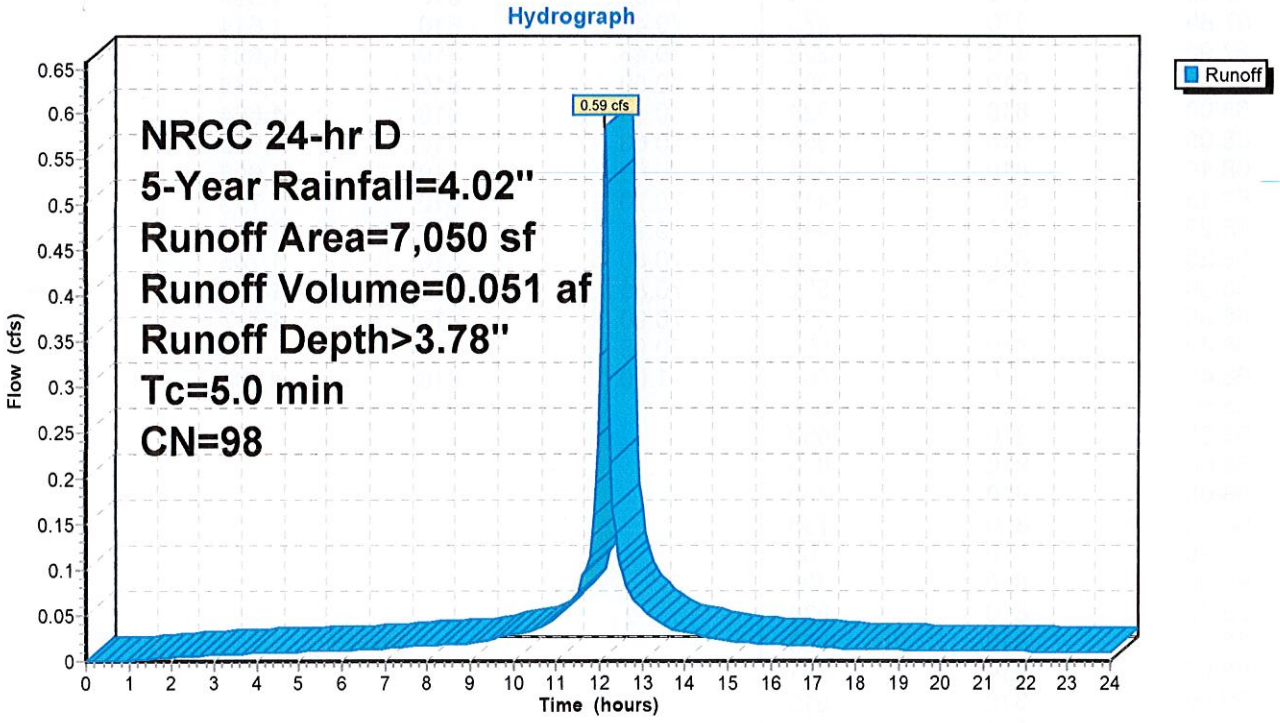
Runoff = 0.59 cfs @ 12.11 hrs, Volume= 0.051 af, Depth> 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 5-Year Rainfall=4.02"

Area (sf)	CN	Description
7,050	98	Paved parking, HSG A
7,050		100.00% Impervious Area

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

Subcatchment 2S: 41 KERNWOOD PROPOSED PARKING



Hydrograph for Subcatchment 2S: 41 KERNWOOD PROPOSED PARKING

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.25	0.01	0.00	0.00
0.50	0.03	0.00	0.00
0.75	0.04	0.00	0.00
1.00	0.06	0.00	0.00
1.25	0.07	0.00	0.00
1.50	0.09	0.01	0.00
1.75	0.11	0.02	0.00
2.00	0.12	0.02	0.00
2.25	0.14	0.03	0.01
2.50	0.15	0.04	0.01
2.75	0.17	0.05	0.01
3.00	0.19	0.06	0.01
3.25	0.21	0.07	0.01
3.50	0.22	0.09	0.01
3.75	0.24	0.10	0.01
4.00	0.26	0.11	0.01
4.25	0.28	0.13	0.01
4.50	0.30	0.14	0.01
4.75	0.32	0.16	0.01
5.00	0.33	0.17	0.01
5.25	0.35	0.19	0.01
5.50	0.37	0.21	0.01
5.75	0.39	0.22	0.01
6.00	0.41	0.24	0.01
6.25	0.44	0.26	0.01
6.50	0.46	0.28	0.01
6.75	0.48	0.30	0.01
7.00	0.50	0.32	0.01
7.25	0.53	0.35	0.02
7.50	0.56	0.37	0.02
7.75	0.58	0.40	0.02
8.00	0.61	0.42	0.02
8.25	0.64	0.45	0.02
8.50	0.67	0.48	0.02
8.75	0.71	0.51	0.02
9.00	0.74	0.54	0.02
9.25	0.77	0.57	0.02
9.50	0.81	0.61	0.02
9.75	0.86	0.65	0.03
10.00	0.90	0.70	0.03
10.25	0.95	0.74	0.03
10.50	1.00	0.79	0.03
10.75	1.07	0.86	0.04
11.00	1.14	0.93	0.05
11.25	1.23	1.02	0.06
11.50	1.35	1.13	0.07
11.75	1.52	1.30	0.11
12.00	1.93	1.70	**0.34**
12.25	2.50	2.27	**0.22**
12.50	2.67	2.44	0.10
12.75	2.79	2.55	0.07
13.00	2.88	2.65	0.06
13.25	2.95	2.72	0.05
13.50	3.02	2.78	0.04
13.75	3.07	2.84	0.03
14.00	3.12	2.89	0.03
14.25	3.16	2.93	0.03
14.50	3.21	2.97	0.03
14.75	3.25	3.01	0.03
15.00	3.28	3.05	0.02
15.25	3.31	3.08	0.02
15.50	3.35	3.11	0.02
15.75	3.38	3.14	0.02
16.00	3.41	3.17	0.02
16.25	3.44	3.20	0.02
16.50	3.46	3.23	0.02
16.75	3.49	3.26	0.02
17.00	3.52	3.28	0.02
17.25	3.54	3.31	0.02
17.50	3.56	3.33	0.02
17.75	3.58	3.35	0.01
18.00	3.61	3.37	0.01
18.25	3.63	3.39	0.01
18.50	3.65	3.41	0.01
18.75	3.67	3.43	0.01
19.00	3.69	3.45	0.01
19.25	3.70	3.47	0.01
19.50	3.72	3.49	0.01
19.75	3.74	3.51	0.01
20.00	3.76	3.53	0.01
20.25	3.78	3.54	0.01
20.50	3.80	3.56	0.01
20.75	3.81	3.58	0.01
21.00	3.83	3.60	0.01
21.25	3.85	3.61	0.01
21.50	3.87	3.63	0.01
21.75	3.88	3.65	0.01
22.00	3.90	3.66	0.01
22.25	3.91	3.68	0.01
22.50	3.93	3.70	0.01
22.75	3.95	3.71	0.01
23.00	3.96	3.73	0.01
23.25	3.98	3.74	0.01
23.50	3.99	3.76	0.01
23.75	4.01	3.77	0.01
24.00	**4.02**	**3.79**	0.01

Summary for Pond 1P: 330XLHD

Inflow Area = 0.162 ac,100.00% Impervious, Inflow Depth > 3.78" for 5-Year event
Inflow = 0.59 cfs @ 12.11 hrs, Volume= 0.051 af
Outflow = 0.05 cfs @ 11.00 hrs, Volume= 0.051 af, Atten= 92%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.00 hrs, Volume= 0.051 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.64' @ 13.31 hrs Surf.Area= 810 sf Storage= 702 cf

Plug-Flow detention time= 106.2 min calculated for 0.051 af (100% of inflow)
Center-of-Mass det. time= 105.2 min (858.7 - 753.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	67.00'	966 cf	**13.17'W x 61.50'L x 4.04'H Field A** 3,273 cf Overall - 857 cf Embedded = 2,416 cf x 40.0% Voids
#2A	68.00'	857 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,823 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	69.75'	**6.0" Round Culvert** L= 34.0' Ke= 0.500 Inlet / Outlet Invert= 69.75' / 69.50' S= 0.0074 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.05 cfs @ 11.00 hrs HW=67.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=67.00' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond 1P: 330XLHD - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

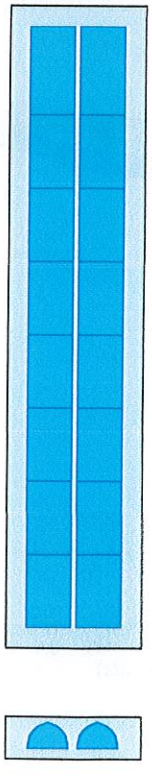
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +24.0" End Stone x 2 = 61.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 24.0" Side Stone x 2 = 13.17' Base Width
12.0" Base + 30.5" Chamber Height + 6.0" Cover = 4.04' Field Height

16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 856.9 cf Chamber Storage

3,272.7 cf Field - 856.9 cf Chambers = 2,415.9 cf Stone x 40.0% Voids = 966.3 cf Stone Storage

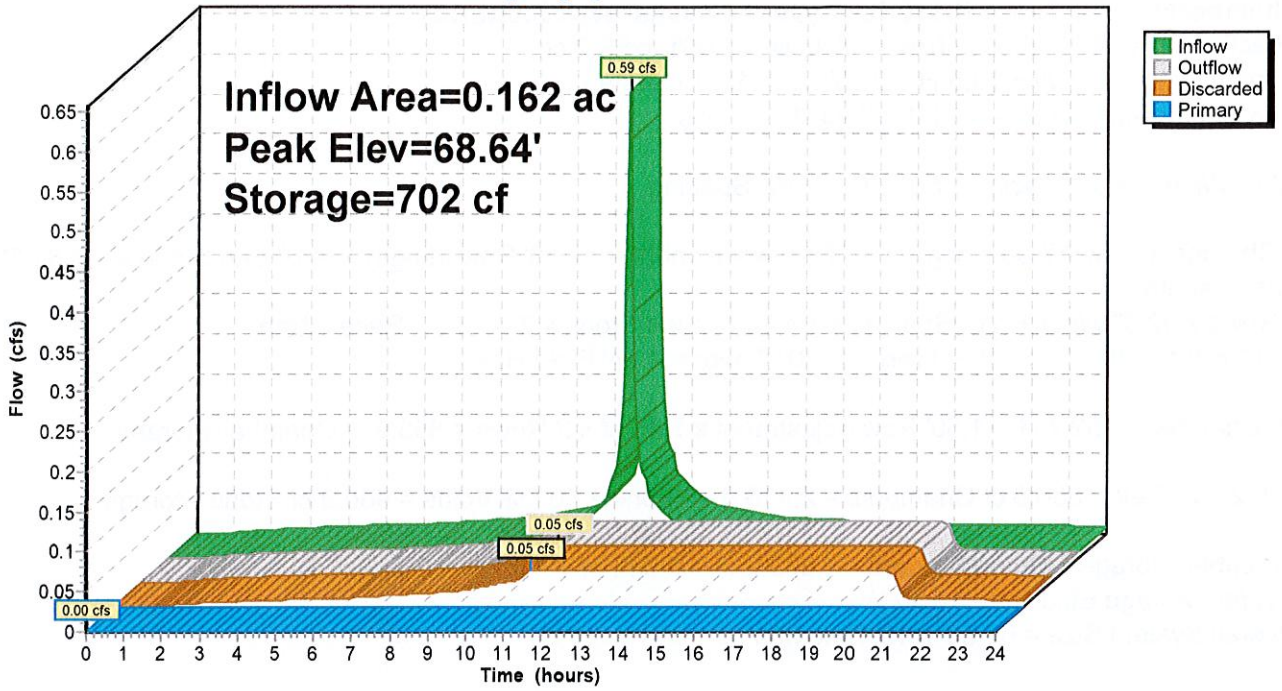
Chamber Storage + Stone Storage = 1,823.2 cf = 0.042 af
Overall Storage Efficiency = 55.7%
Overall System Size = 61.50' x 13.17' x 4.04'

16 Chambers
121.2 cy Field
89.5 cy Stone



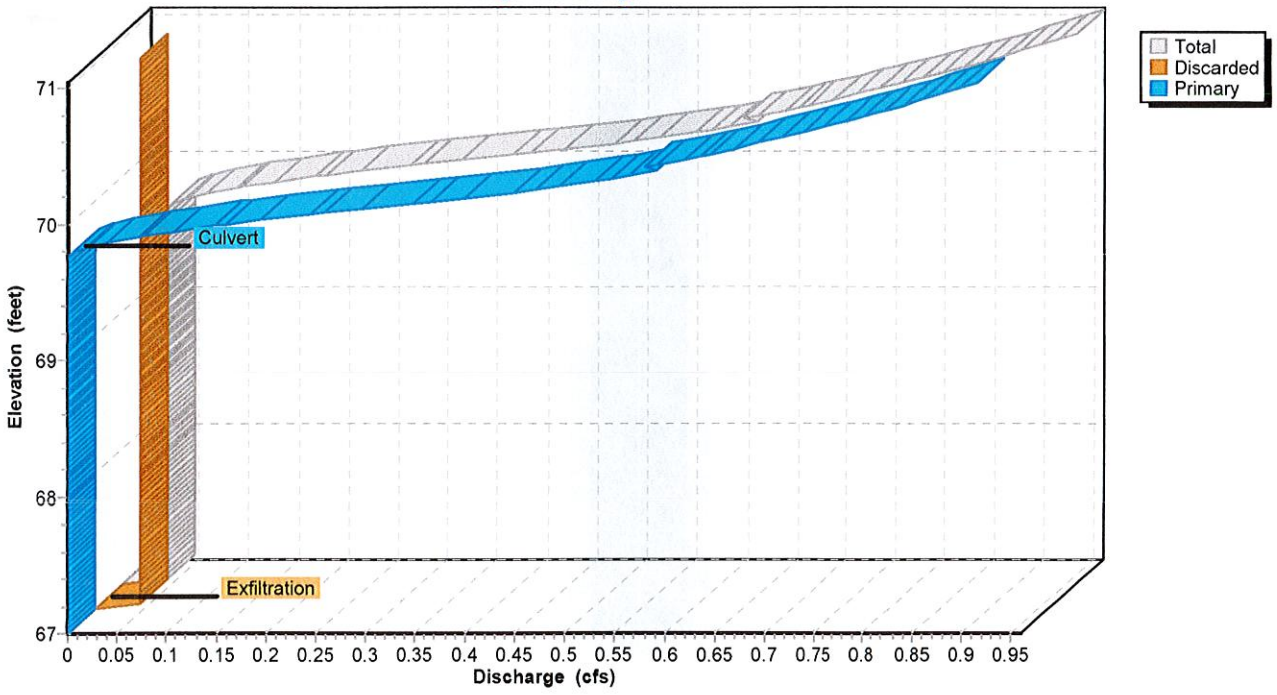
Pond 1P: 330XLHD

Hydrograph

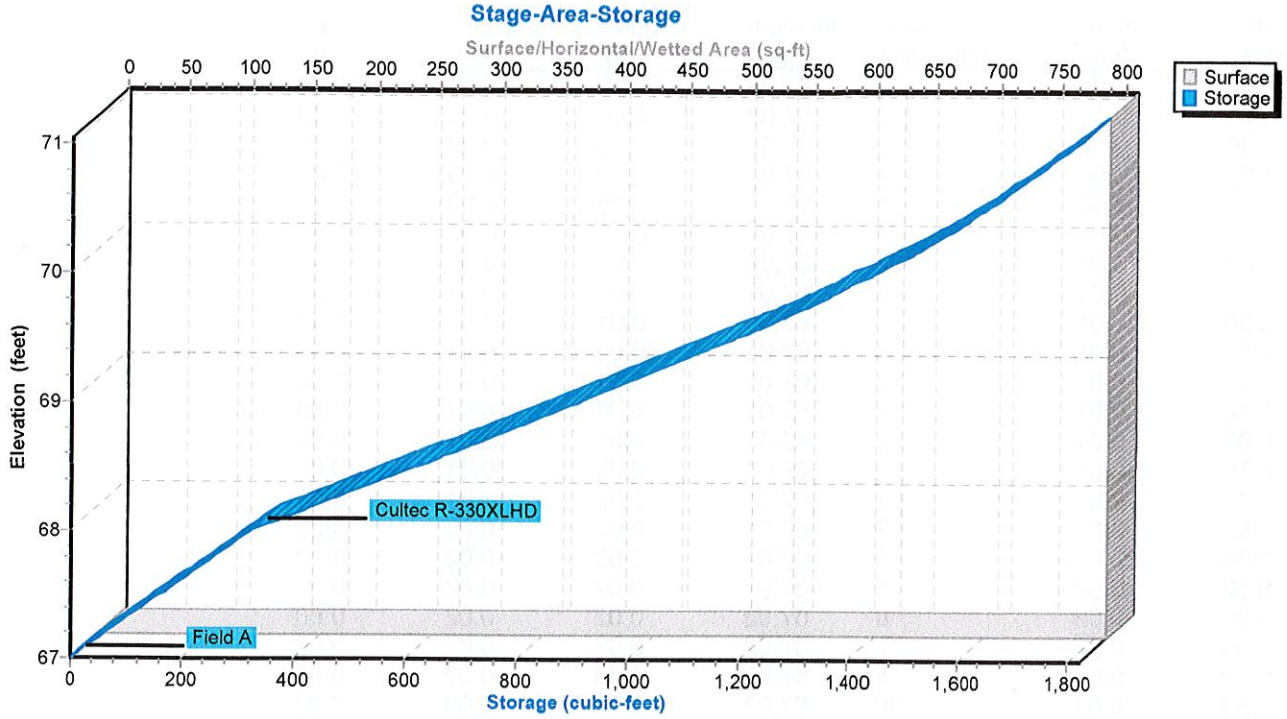


Pond 1P: 330XLHD

Stage-Discharge



Pond 1P: 330XLHD



Hydrograph for Pond 1P: 330XLHD

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	67.00	0.00	0.00	**0.00**
0.50	0.00	0	67.00	0.00	0.00	0.00
1.00	0.00	0	67.00	0.00	0.00	0.00
1.50	0.00	1	67.00	0.00	0.00	0.00
2.00	0.00	1	67.00	0.00	0.00	0.00
2.50	0.01	2	67.01	0.01	0.01	0.00
3.00	0.01	2	67.01	0.01	0.01	0.00
3.50	0.01	2	67.01	0.01	0.01	0.00
4.00	0.01	3	67.01	0.01	0.01	0.00
4.50	0.01	3	67.01	0.01	0.01	0.00
5.00	0.01	3	67.01	0.01	0.01	0.00
5.50	0.01	3	67.01	0.01	0.01	0.00
6.00	0.01	3	67.01	0.01	0.01	0.00
6.50	0.01	4	67.01	0.01	0.01	0.00
7.00	0.01	4	67.01	0.01	0.01	0.00
7.50	0.02	5	67.01	0.02	0.02	0.00
8.00	0.02	5	67.02	0.02	0.02	0.00
8.50	0.02	5	67.02	0.02	0.02	0.00
9.00	0.02	6	67.02	0.02	0.02	0.00
9.50	0.02	7	67.02	0.02	0.02	0.00
10.00	0.03	8	67.03	0.03	0.03	0.00
10.50	0.03	10	67.03	0.03	0.03	0.00
11.00	0.05	14	67.04	**0.05**	**0.05**	0.00
11.50	0.07	43	67.13	0.05	0.05	0.00
12.00	**0.34**	220	67.68	0.05	0.05	0.00
12.50	**0.10**	645	68.54	0.05	0.05	0.00
13.00	0.06	**696**	**68.63**	0.05	0.05	0.00
13.50	0.04	**700**	**68.64**	0.05	0.05	0.00
14.00	0.03	681	68.60	0.05	0.05	0.00
14.50	0.03	653	68.55	0.05	0.05	0.00
15.00	0.02	616	68.49	0.05	0.05	0.00
15.50	0.02	574	68.42	0.05	0.05	0.00
16.00	0.02	528	68.34	0.05	0.05	0.00
16.50	0.02	480	68.26	0.05	0.05	0.00
17.00	0.02	429	68.18	0.05	0.05	0.00
17.50	0.02	376	68.09	0.05	0.05	0.00
18.00	0.01	321	67.99	0.05	0.05	0.00
18.50	0.01	263	67.81	0.05	0.05	0.00
19.00	0.01	205	67.63	0.05	0.05	0.00
19.50	0.01	146	67.45	0.05	0.05	0.00
20.00	0.01	87	67.27	0.05	0.05	0.00
20.50	0.01	27	67.08	0.05	0.05	0.00
21.00	0.01	3	67.01	0.01	0.01	0.00
21.50	0.01	3	67.01	0.01	0.01	0.00
22.00	0.01	3	67.01	0.01	0.01	0.00
22.50	0.01	3	67.01	0.01	0.01	0.00
23.00	0.01	3	67.01	0.01	0.01	0.00
23.50	0.01	3	67.01	0.01	0.01	0.00
24.00	0.01	3	67.01	0.01	0.01	0.00

Stage-Discharge for Pond 1P: 330XLHD

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
67.00	0.00	**0.00**	0.00
67.05	0.05	**0.05**	0.00
67.10	0.05	0.05	0.00
67.15	0.05	0.05	0.00
67.20	0.05	0.05	0.00
67.25	0.05	0.05	0.00
67.30	0.05	0.05	0.00
67.35	0.05	0.05	0.00
67.40	0.05	0.05	0.00
67.45	0.05	0.05	0.00
67.50	0.05	0.05	0.00
67.55	0.05	0.05	0.00
67.60	0.05	0.05	0.00
67.65	0.05	0.05	0.00
67.70	0.05	0.05	0.00
67.75	0.05	0.05	0.00
67.80	0.05	0.05	0.00
67.85	0.05	0.05	0.00
67.90	0.05	0.05	0.00
67.95	0.05	0.05	0.00
68.00	0.05	0.05	0.00
68.05	0.05	0.05	0.00
68.10	0.05	0.05	0.00
68.15	0.05	0.05	0.00
68.20	0.05	0.05	0.00
68.25	0.05	0.05	0.00
68.30	0.05	0.05	0.00
68.35	0.05	0.05	0.00
68.40	0.05	0.05	0.00
68.45	0.05	0.05	0.00
68.50	0.05	0.05	0.00
68.55	0.05	0.05	0.00
68.60	0.05	0.05	0.00
68.65	0.05	0.05	0.00
68.70	0.05	0.05	0.00
68.75	0.05	0.05	0.00
68.80	0.05	0.05	0.00
68.85	0.05	0.05	0.00
68.90	0.05	0.05	0.00
68.95	0.05	0.05	0.00
69.00	0.05	0.05	0.00
69.05	0.05	0.05	0.00
69.10	0.05	0.05	0.00
69.15	0.05	0.05	0.00
69.20	0.05	0.05	0.00
69.25	0.05	0.05	0.00
69.30	0.05	0.05	0.00
69.35	0.05	0.05	0.00
69.40	0.05	0.05	0.00
69.45	0.05	0.05	0.00
69.50	0.05	0.05	0.00
69.55	0.05	0.05	0.00
69.60	0.05	0.05	0.00
69.65	0.05	0.05	0.00
69.70	0.05	0.05	0.00
69.75	0.05	0.05	0.00
69.80	0.05	0.05	0.01
69.85	0.07	0.05	0.03
69.90	0.11	0.05	0.06
69.95	0.15	0.05	0.11
70.00	0.20	0.05	0.16
70.05	0.26	0.05	0.22
70.10	0.32	0.05	0.28
70.15	0.39	0.05	0.34
70.20	0.45	0.05	0.41
70.25	0.51	0.05	0.47
70.30	0.56	0.05	0.52
70.35	0.60	0.05	0.56
70.40	0.64	0.05	0.59
70.45	0.65	0.05	0.60
70.50	0.68	0.05	0.63
70.55	0.71	0.05	0.66
70.60	0.74	0.05	0.69
70.65	0.77	0.05	0.72
70.70	0.79	0.05	0.75
70.75	0.82	0.05	0.78
70.80	0.85	0.05	0.80
70.85	0.87	0.05	0.83
70.90	0.90	0.05	0.85
70.95	0.92	0.05	0.87
71.00	**0.94**	0.05	**0.90**

Stage-Area-Storage for Pond 1P: 330XLHD

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
67.00	**810**	0
67.05	810	16
67.10	810	32
67.15	810	49
67.20	810	65
67.25	810	81
67.30	810	97
67.35	810	113
67.40	810	130
67.45	810	146
67.50	810	162
67.55	810	178
67.60	810	194
67.65	810	211
67.70	810	227
67.75	810	243
67.80	810	259
67.85	810	275
67.90	810	292
67.95	810	308
68.00	810	324
68.05	810	354
68.10	810	384
68.15	810	413
68.20	810	443
68.25	810	473
68.30	810	502
68.35	810	532
68.40	810	562
68.45	810	591
68.50	810	621
68.55	810	650
68.60	810	679
68.65	810	709
68.70	810	738
68.75	810	766
68.80	810	795
68.85	810	824
68.90	810	853
68.95	810	881
69.00	810	910
69.05	810	939
69.10	810	967
69.15	810	996
69.20	810	1,024
69.25	810	1,052
69.30	810	1,080
69.35	810	1,108
69.40	810	1,135
69.45	810	1,163
69.50	810	1,190
69.55	810	1,216
69.60	810	1,243
69.65	810	1,269
69.70	810	1,295
69.75	810	1,321
69.80	810	1,346
69.85	810	1,372
69.90	810	1,396
69.95	810	1,421
70.00	810	1,445
70.05	810	1,468
70.10	810	1,491
70.15	810	1,513
70.20	810	1,535
70.25	810	1,556
70.30	810	1,576
70.35	810	1,595
70.40	810	1,614
70.45	810	1,631
70.50	810	1,648
70.55	810	1,664
70.60	810	1,680
70.65	810	1,696
70.70	810	1,713
70.75	810	1,729
70.80	810	1,745
70.85	810	1,761
70.90	810	1,777
70.95	810	1,794
71.00	810	**1,810**

Summary for Subcatchment 2S: 41 KERNWOOD PROPOSED PARKING

[49] Hint: Tc<2dt may require smaller dt

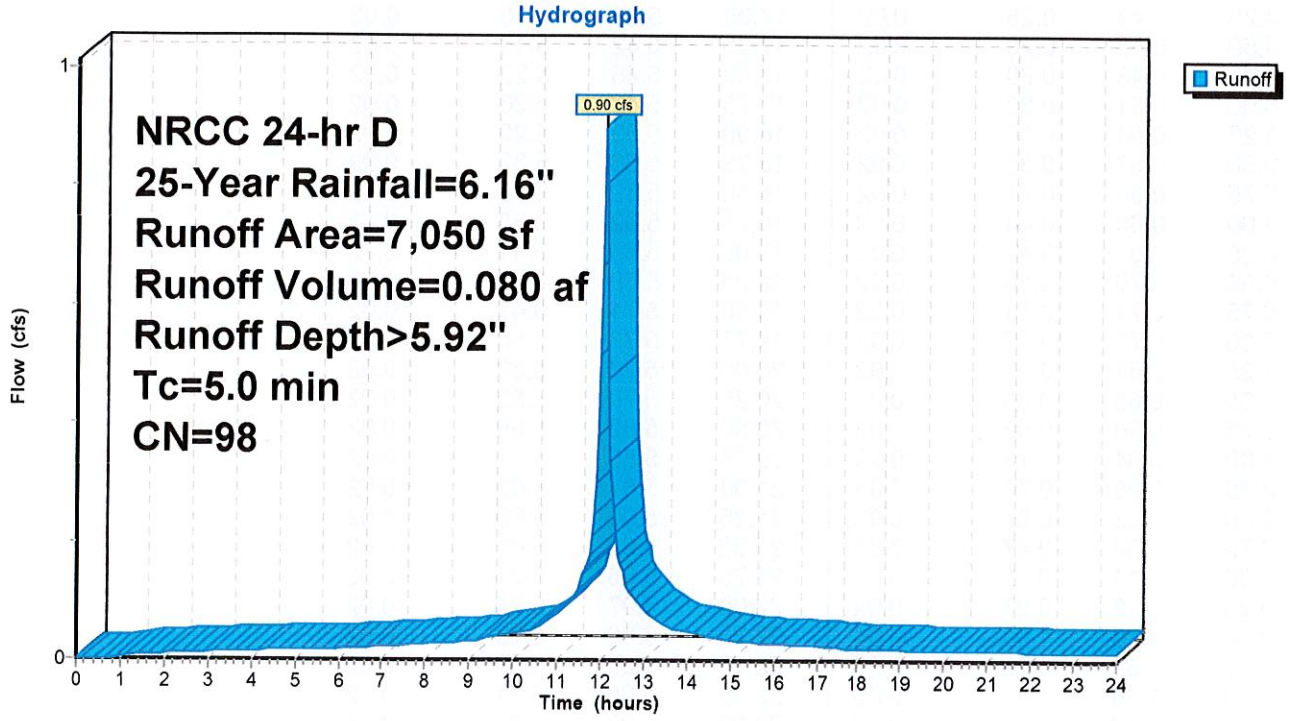
Runoff = 0.90 cfs @ 12.11 hrs, Volume= 0.080 af, Depth> 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.16"

Area (sf)	CN	Description
7,050	98	Paved parking, HSG A
7,050		100.00% Impervious Area

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

Subcatchment 2S: 41 KERNWOOD PROPOSED PARKING



Hydrograph for Subcatchment 2S: 41 KERNWOOD PROPOSED PARKING

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.25	0.02	0.00	0.00
0.50	0.04	0.00	0.00
0.75	0.07	0.00	0.00
1.00	0.09	0.01	0.00
1.25	0.11	0.02	0.01
1.50	0.14	0.03	0.01
1.75	0.16	0.04	0.01
2.00	0.19	0.06	0.01
2.25	0.21	0.08	0.01
2.50	0.24	0.10	0.01
2.75	0.26	0.11	0.01
3.00	0.29	0.14	0.01
3.25	0.31	0.16	0.01
3.50	0.34	0.18	0.01
3.75	0.37	0.20	0.02
4.00	0.40	0.23	0.02
4.25	0.43	0.25	0.02
4.50	0.45	0.28	0.02
4.75	0.48	0.30	0.02
5.00	0.51	0.33	0.02
5.25	0.54	0.36	0.02
5.50	0.57	0.38	0.02
5.75	0.60	0.41	0.02
6.00	0.63	0.44	0.02
6.25	0.67	0.47	0.02
6.50	0.70	0.50	0.02
6.75	0.74	0.54	0.02
7.00	0.77	0.57	0.02
7.25	0.81	0.61	0.02
7.50	0.85	0.65	0.03
7.75	0.90	0.69	0.03
8.00	0.94	0.73	0.03
8.25	0.98	0.78	0.03
8.50	1.03	0.82	0.03
8.75	1.08	0.87	0.03
9.00	1.13	0.92	0.03
9.25	1.19	0.97	0.04
9.50	1.25	1.03	0.04
9.75	1.31	1.09	0.04
10.00	1.38	1.16	0.05
10.25	1.46	1.24	0.05
10.50	1.54	1.32	0.05
10.75	1.64	1.41	0.06
11.00	1.75	1.53	0.08
11.25	1.89	1.67	0.10
11.50	2.06	1.84	0.12
11.75	2.33	2.10	0.18
12.00	2.95	2.72	**0.52**
12.25	3.83	3.60	**0.33**
12.50	4.10	3.86	0.16
12.75	4.27	4.03	0.11
13.00	4.41	4.17	0.09
13.25	4.52	4.29	0.07
13.50	4.62	4.39	0.06
13.75	4.70	4.47	0.05
14.00	4.78	4.54	0.05
14.25	4.85	4.61	0.05
14.50	4.91	4.68	0.04
14.75	4.97	4.74	0.04
15.00	5.03	4.79	0.03
15.25	5.08	4.84	0.03
15.50	5.13	4.89	0.03
15.75	5.18	4.94	0.03
16.00	5.22	4.98	0.03
16.25	5.26	5.03	0.03
16.50	5.31	5.07	0.03
16.75	5.35	5.11	0.03
17.00	5.39	5.15	0.03
17.25	5.42	5.19	0.02
17.50	5.46	5.22	0.02
17.75	5.49	5.26	0.02
18.00	5.53	5.29	0.02
18.25	5.56	5.32	0.02
18.50	5.59	5.35	0.02
18.75	5.62	5.38	0.02
19.00	5.65	5.41	0.02
19.25	5.68	5.44	0.02
19.50	5.71	5.47	0.02
19.75	5.73	5.50	0.02
20.00	5.76	5.53	0.02
20.25	5.79	5.55	0.02
20.50	5.82	5.58	0.02
20.75	5.85	5.61	0.02
21.00	5.87	5.63	0.02
21.25	5.90	5.66	0.02
21.50	5.92	5.69	0.02
21.75	5.95	5.71	0.02
22.00	5.97	5.74	0.02
22.25	6.00	5.76	0.02
22.50	6.02	5.79	0.02
22.75	6.05	5.81	0.02
23.00	6.07	5.83	0.02
23.25	6.09	5.85	0.01
23.50	6.12	5.88	0.01
23.75	6.14	5.90	0.01
24.00	**6.16**	**5.92**	0.01

Summary for Pond 1P: 330XLHD

Inflow Area = 0.162 ac,100.00% Impervious, Inflow Depth > 5.92" for 25-Year event
Inflow = 0.90 cfs @ 12.11 hrs, Volume= 0.080 af
Outflow = 0.05 cfs @ 13.99 hrs, Volume= 0.068 af, Atten= 95%, Lag= 112.5 min
Discarded = 0.05 cfs @ 10.05 hrs, Volume= 0.067 af
Primary = 0.00 cfs @ 13.99 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 69.79' @ 13.99 hrs Surf.Area= 810 sf Storage= 1,340 cf

Plug-Flow detention time= 213.6 min calculated for 0.068 af (85% of inflow)
Center-of-Mass det. time= 135.5 min (880.8 - 745.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	67.00'	966 cf	**13.17'W x 61.50'L x 4.04'H Field A** 3,273 cf Overall - 857 cf Embedded = 2,416 cf x 40.0% Voids
#2A	68.00'	857 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,823 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	69.75'	**6.0" Round Culvert** L= 34.0' Ke= 0.500 Inlet / Outlet Invert= 69.75' / 69.50' S= 0.0074 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.05 cfs @ 10.05 hrs HW=67.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 13.99 hrs HW=69.79' (Free Discharge)
↑—**2=Culvert** (Barrel Controls 0.00 cfs @ 0.86 fps)

Pond 1P: 330XLHD - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

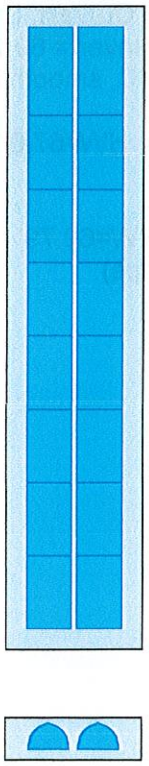
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +24.0" End Stone x 2 = 61.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 24.0" Side Stone x 2 = 13.17' Base Width
12.0" Base + 30.5" Chamber Height + 6.0" Cover = 4.04' Field Height

16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 856.9 cf Chamber Storage

3,272.7 cf Field - 856.9 cf Chambers = 2,415.9 cf Stone x 40.0% Voids = 966.3 cf Stone Storage

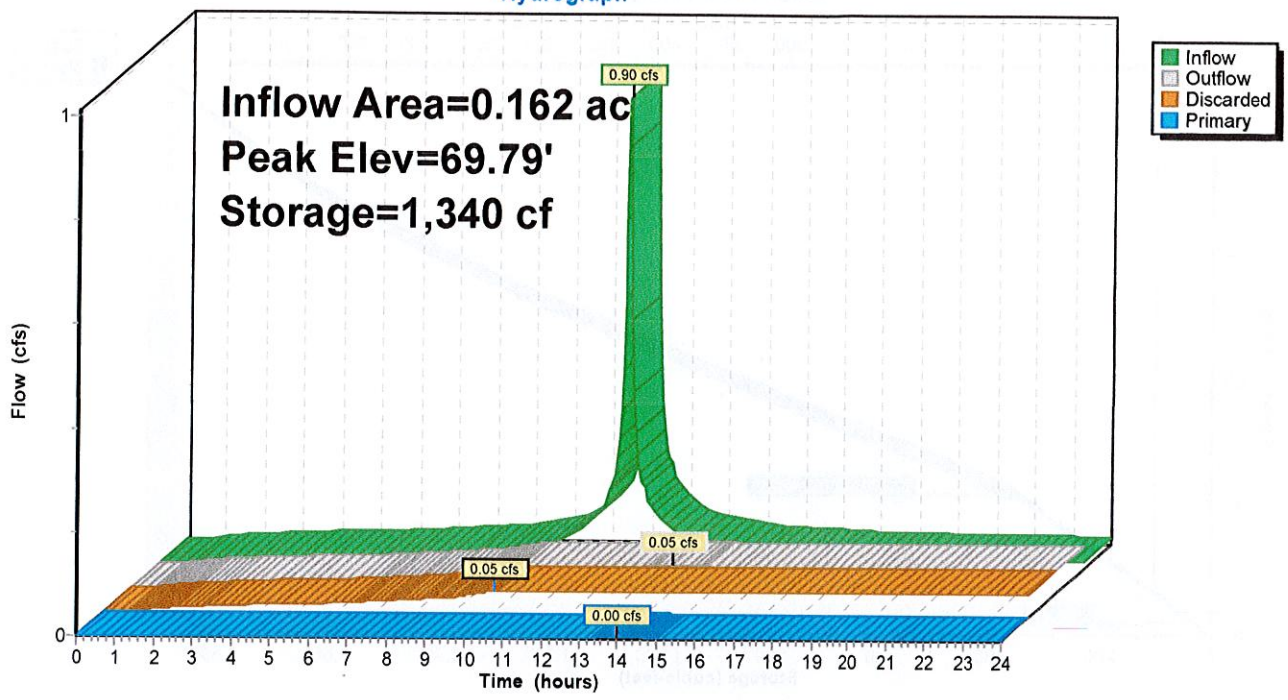
Chamber Storage + Stone Storage = 1,823.2 cf = 0.042 af
Overall Storage Efficiency = 55.7%
Overall System Size = 61.50' x 13.17' x 4.04'

16 Chambers
121.2 cy Field
89.5 cy Stone



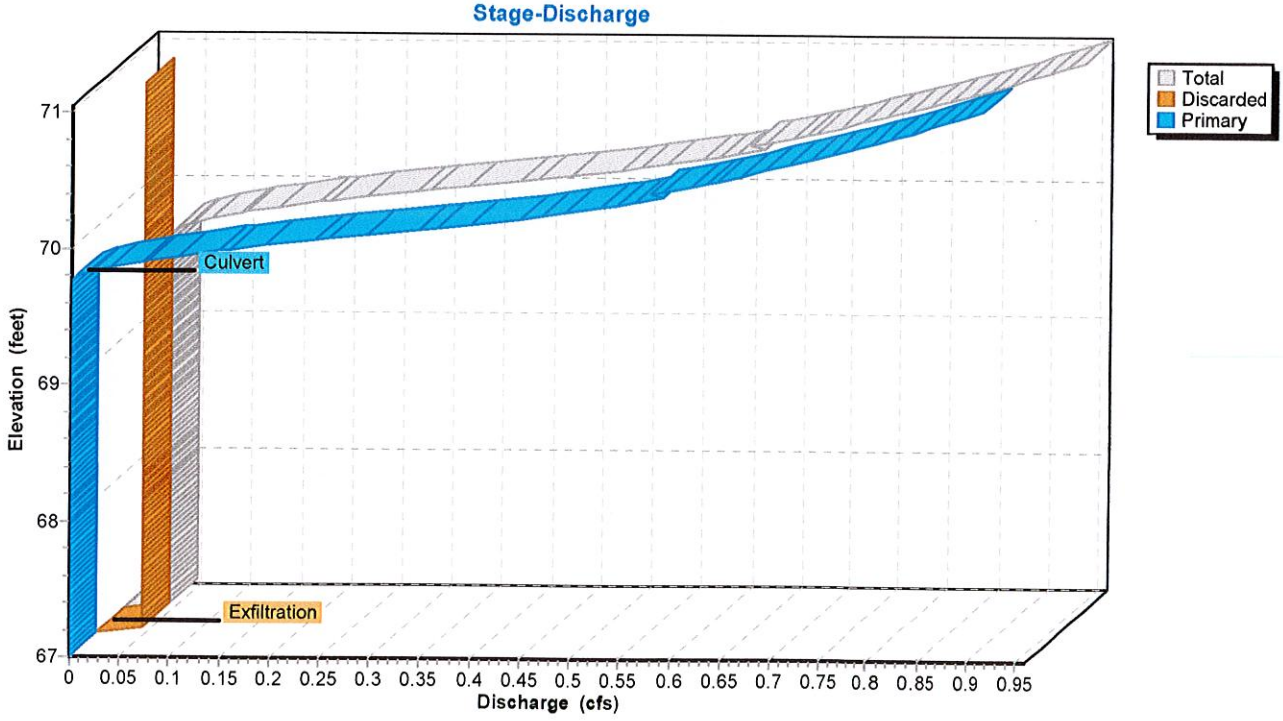
Pond 1P: 330XLHD

Hydrograph

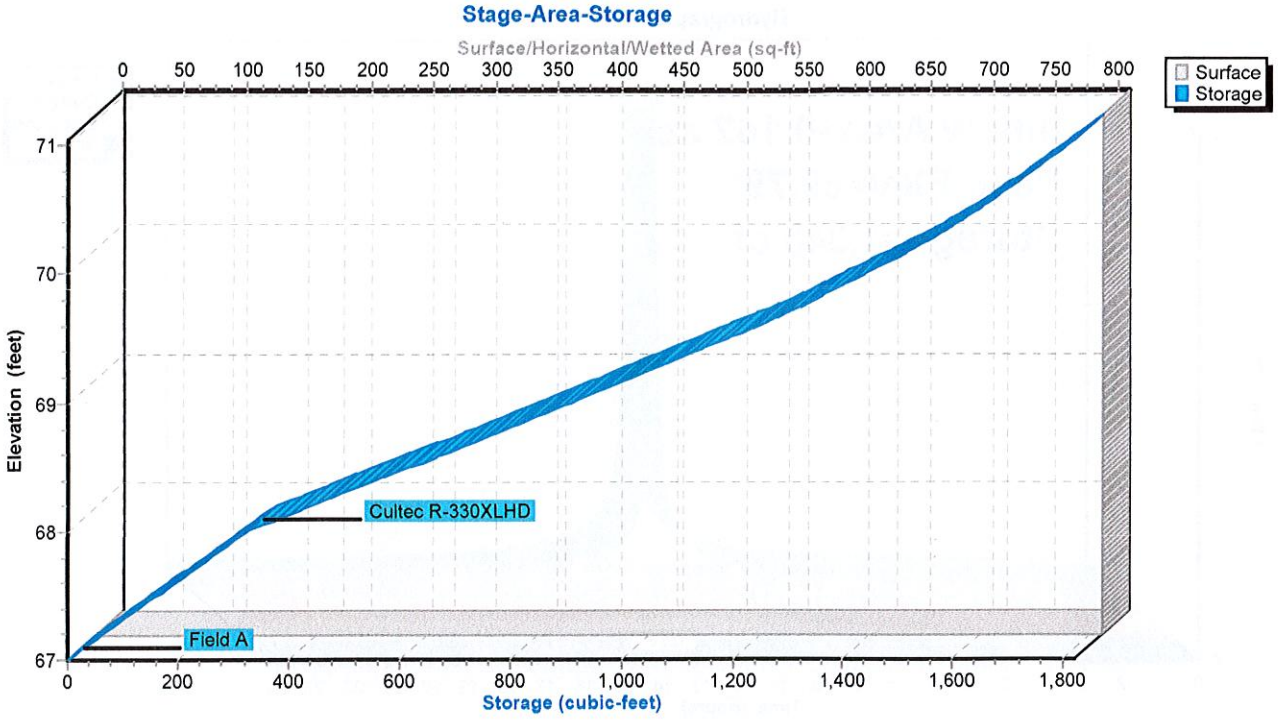


Pond 1P: 330XLHD

Stage-Discharge



Pond 1P: 330XLHD



Hydrograph for Pond 1P: 330XLHD

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	67.00	0.00	0.00	0.00
0.50	0.00	0	67.00	0.00	0.00	0.00
1.00	0.00	1	67.00	0.00	0.00	0.00
1.50	0.01	2	67.01	0.01	0.01	0.00
2.00	0.01	3	67.01	0.01	0.01	0.00
2.50	0.01	3	67.01	0.01	0.01	0.00
3.00	0.01	4	67.01	0.01	0.01	0.00
3.50	0.01	4	67.01	0.01	0.01	0.00
4.00	0.02	5	67.01	0.02	0.02	0.00
4.50	0.02	5	67.01	0.02	0.02	0.00
5.00	0.02	5	67.02	0.02	0.02	0.00
5.50	0.02	5	67.02	0.02	0.02	0.00
6.00	0.02	5	67.02	0.02	0.02	0.00
6.50	0.02	6	67.02	0.02	0.02	0.00
7.00	0.02	7	67.02	0.02	0.02	0.00
7.50	0.03	7	67.02	0.03	0.03	0.00
8.00	0.03	8	67.02	0.03	0.03	0.00
8.50	0.03	9	67.03	0.03	0.03	0.00
9.00	0.03	9	67.03	0.03	0.03	0.00
9.50	0.04	11	67.03	0.04	0.04	0.00
10.00	0.05	13	67.04	0.04	**0.04**	0.00
10.50	0.05	21	67.06	0.05	**0.05**	0.00
11.00	0.08	55	67.17	0.05	0.05	0.00
11.50	0.12	146	67.45	0.05	0.05	0.00
12.00	**0.52**	463	68.23	0.05	0.05	0.00
12.50	**0.16**	1,161	69.45	0.05	0.05	0.00
13.00	0.09	1,283	69.68	0.05	0.05	0.00
13.50	0.06	1,332	69.77	0.05	0.05	0.00
14.00	0.05	**1,340**	**69.79**	**0.05**	0.05	**0.00**
14.50	0.04	1,334	69.78	0.05	0.05	0.00
15.00	0.03	1,320	69.75	0.05	0.05	0.00
15.50	0.03	1,297	69.70	0.05	0.05	0.00
16.00	0.03	1,271	69.65	0.05	0.05	0.00
16.50	0.03	1,240	69.60	0.05	0.05	0.00
17.00	0.03	1,206	69.53	0.05	0.05	0.00
17.50	0.02	1,168	69.46	0.05	0.05	0.00
18.00	0.02	1,127	69.38	0.05	0.05	0.00
18.50	0.02	1,082	69.30	0.05	0.05	0.00
19.00	0.02	1,036	69.22	0.05	0.05	0.00
19.50	0.02	989	69.14	0.05	0.05	0.00
20.00	0.02	941	69.05	0.05	0.05	0.00
20.50	0.02	893	68.97	0.05	0.05	0.00
21.00	0.02	843	68.88	0.05	0.05	0.00
21.50	0.02	792	68.80	0.05	0.05	0.00
22.00	0.02	741	68.71	0.05	0.05	0.00
22.50	0.02	688	68.62	0.05	0.05	0.00
23.00	0.02	635	68.52	0.05	0.05	0.00
23.50	0.01	580	68.43	0.05	0.05	0.00
24.00	0.01	525	68.34	0.05	0.05	0.00

Stage-Discharge for Pond 1P: 330XLHD

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
67.00	0.00	**0.00**	0.00
67.05	0.05	**0.05**	0.00
67.10	0.05	0.05	0.00
67.15	0.05	0.05	0.00
67.20	0.05	0.05	0.00
67.25	0.05	0.05	0.00
67.30	0.05	0.05	0.00
67.35	0.05	0.05	0.00
67.40	0.05	0.05	0.00
67.45	0.05	0.05	0.00
67.50	0.05	0.05	0.00
67.55	0.05	0.05	0.00
67.60	0.05	0.05	0.00
67.65	0.05	0.05	0.00
67.70	0.05	0.05	0.00
67.75	0.05	0.05	0.00
67.80	0.05	0.05	0.00
67.85	0.05	0.05	0.00
67.90	0.05	0.05	0.00
67.95	0.05	0.05	0.00
68.00	0.05	0.05	0.00
68.05	0.05	0.05	0.00
68.10	0.05	0.05	0.00
68.15	0.05	0.05	0.00
68.20	0.05	0.05	0.00
68.25	0.05	0.05	0.00
68.30	0.05	0.05	0.00
68.35	0.05	0.05	0.00
68.40	0.05	0.05	0.00
68.45	0.05	0.05	0.00
68.50	0.05	0.05	0.00
68.55	0.05	0.05	0.00
68.60	0.05	0.05	0.00
68.65	0.05	0.05	0.00
68.70	0.05	0.05	0.00
68.75	0.05	0.05	0.00
68.80	0.05	0.05	0.00
68.85	0.05	0.05	0.00
68.90	0.05	0.05	0.00
68.95	0.05	0.05	0.00
69.00	0.05	0.05	0.00
69.05	0.05	0.05	0.00
69.10	0.05	0.05	0.00
69.15	0.05	0.05	0.00
69.20	0.05	0.05	0.00
69.25	0.05	0.05	0.00
69.30	0.05	0.05	0.00
69.35	0.05	0.05	0.00
69.40	0.05	0.05	0.00
69.45	0.05	0.05	0.00
69.50	0.05	0.05	0.00
69.55	0.05	0.05	0.00
69.60	0.05	0.05	0.00
69.65	0.05	0.05	0.00
69.70	0.05	0.05	0.00
69.75	0.05	0.05	0.00
69.80	0.05	0.05	0.01
69.85	0.07	0.05	0.03
69.90	0.11	0.05	0.06
69.95	0.15	0.05	0.11
70.00	0.20	0.05	0.16
70.05	0.26	0.05	0.22
70.10	0.32	0.05	0.28
70.15	0.39	0.05	0.34
70.20	0.45	0.05	0.41
70.25	0.51	0.05	0.47
70.30	0.56	0.05	0.52
70.35	0.60	0.05	0.56
70.40	0.64	0.05	0.59
70.45	0.65	0.05	0.60
70.50	0.68	0.05	0.63
70.55	0.71	0.05	0.66
70.60	0.74	0.05	0.69
70.65	0.77	0.05	0.72
70.70	0.79	0.05	0.75
70.75	0.82	0.05	0.78
70.80	0.85	0.05	0.80
70.85	0.87	0.05	0.83
70.90	0.90	0.05	0.85
70.95	0.92	0.05	0.87
71.00	**0.94**	0.05	**0.90**

Stage-Area-Storage for Pond 1P: 330XLHD

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
67.00	**810**	0
67.05	810	16
67.10	810	32
67.15	810	49
67.20	810	65
67.25	810	81
67.30	810	97
67.35	810	113
67.40	810	130
67.45	810	146
67.50	810	162
67.55	810	178
67.60	810	194
67.65	810	211
67.70	810	227
67.75	810	243
67.80	810	259
67.85	810	275
67.90	810	292
67.95	810	308
68.00	810	324
68.05	810	354
68.10	810	384
68.15	810	413
68.20	810	443
68.25	810	473
68.30	810	502
68.35	810	532
68.40	810	562
68.45	810	591
68.50	810	621
68.55	810	650
68.60	810	679
68.65	810	709
68.70	810	738
68.75	810	766
68.80	810	795
68.85	810	824
68.90	810	853
68.95	810	881
69.00	810	910
69.05	810	939
69.10	810	967
69.15	810	996
69.20	810	1,024
69.25	810	1,052
69.30	810	1,080
69.35	810	1,108
69.40	810	1,135
69.45	810	1,163
69.50	810	1,190
69.55	810	1,216
69.60	810	1,243
69.65	810	1,269
69.70	810	1,295
69.75	810	1,321
69.80	810	1,346
69.85	810	1,372
69.90	810	1,396
69.95	810	1,421
70.00	810	1,445
70.05	810	1,468
70.10	810	1,491
70.15	810	1,513
70.20	810	1,535
70.25	810	1,556
70.30	810	1,576
70.35	810	1,595
70.40	810	1,614
70.45	810	1,631
70.50	810	1,648
70.55	810	1,664
70.60	810	1,680
70.65	810	1,696
70.70	810	1,713
70.75	810	1,729
70.80	810	1,745
70.85	810	1,761
70.90	810	1,777
70.95	810	1,794
71.00	810	**1,810**

Summary for Subcatchment 2S: 41 KERNWOOD PROPOSED PARKING

[49] Hint: Tc<2dt may require smaller dt

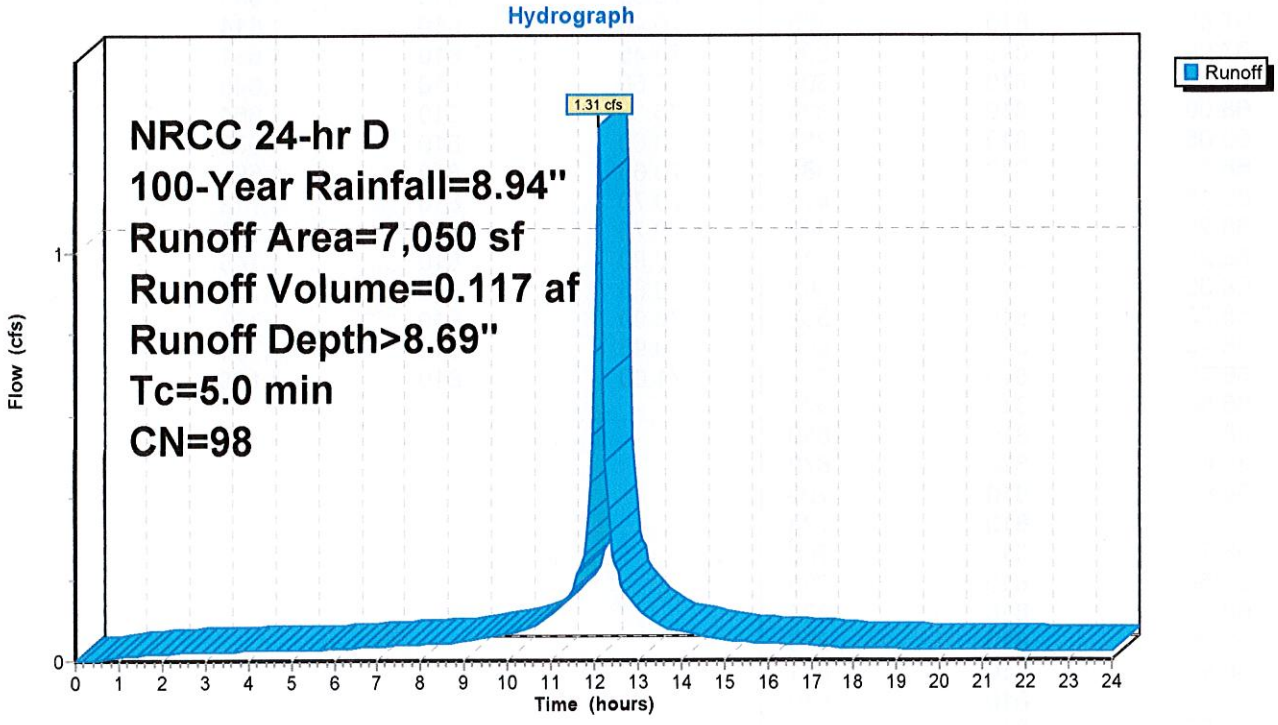
Runoff = 1.31 cfs @ 12.11 hrs, Volume= 0.117 af, Depth> 8.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
7,050	98	Paved parking, HSG A
7,050		100.00% Impervious Area

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

Subcatchment 2S: 41 KERNWOOD PROPOSED PARKING



Hydrograph for Subcatchment 2S: 41 KERNWOOD PROPOSED PARKING

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.25	0.03	0.00	0.00
0.50	0.06	0.00	0.00
0.75	0.10	0.01	0.01
1.00	0.13	0.03	0.01
1.25	0.16	0.05	0.01
1.50	0.20	0.07	0.01
1.75	0.23	0.09	0.02
2.00	0.27	0.12	0.02
2.25	0.31	0.15	0.02
2.50	0.34	0.18	0.02
2.75	0.38	0.21	0.02
3.00	0.42	0.24	0.02
3.25	0.46	0.28	0.02
3.50	0.50	0.31	0.02
3.75	0.54	0.35	0.02
4.00	0.58	0.39	0.02
4.25	0.62	0.43	0.02
4.50	0.66	0.46	0.03
4.75	0.70	0.50	0.03
5.00	0.74	0.54	0.03
5.25	0.79	0.59	0.03
5.50	0.83	0.63	0.03
5.75	0.88	0.67	0.03
6.00	0.92	0.71	0.03
6.25	0.97	0.76	0.03
6.50	1.02	0.81	0.03
6.75	1.07	0.86	0.03
7.00	1.12	0.91	0.03
7.25	1.18	0.97	0.04
7.50	1.24	1.02	0.04
7.75	1.30	1.08	0.04
8.00	1.36	1.15	0.04
8.25	1.43	1.21	0.04
8.50	1.50	1.28	0.04
8.75	1.57	1.35	0.05
9.00	1.64	1.42	0.05
9.25	1.72	1.50	0.05
9.50	1.81	1.58	0.06
9.75	1.90	1.68	0.06
10.00	2.00	1.78	0.07
10.25	2.12	1.89	0.07
10.50	2.23	2.01	0.08
10.75	2.37	2.14	0.09
11.00	2.54	2.31	0.11
11.25	2.75	2.52	0.14
11.50	2.99	2.76	0.17
11.75	3.38	3.15	0.26
12.00	4.28	4.05	**0.75**
12.25	5.56	5.32	**0.49**
12.50	5.95	5.71	0.23
12.75	6.19	5.96	0.16
13.00	6.40	6.16	0.13
13.25	6.57	6.33	0.11
13.50	6.71	6.47	0.09
13.75	6.82	6.59	0.08
14.00	6.94	6.70	0.07
14.25	7.04	6.80	0.07
14.50	7.13	6.89	0.06
14.75	7.22	6.98	0.06
15.00	7.30	7.06	0.05
15.25	7.37	7.13	0.05
15.50	7.44	7.20	0.05
15.75	7.51	7.27	0.04
16.00	7.58	7.34	0.04
16.25	7.64	7.40	0.04
16.50	7.70	7.46	0.04
16.75	7.76	7.52	0.04
17.00	7.82	7.58	0.04
17.25	7.87	7.63	0.04
17.50	7.92	7.68	0.03
17.75	7.97	7.73	0.03
18.00	8.02	7.78	0.03
18.25	8.06	7.82	0.03
18.50	8.11	7.87	0.03
18.75	8.15	7.91	0.03
19.00	8.20	7.96	0.03
19.25	8.24	8.00	0.03
19.50	8.28	8.04	0.03
19.75	8.32	8.08	0.03
20.00	8.36	8.12	0.03
20.25	8.40	8.16	0.03
20.50	8.44	8.20	0.03
20.75	8.48	8.24	0.03
21.00	8.52	8.28	0.03
21.25	8.56	8.32	0.02
21.50	8.60	8.36	0.02
21.75	8.63	8.39	0.02
22.00	8.67	8.43	0.02
22.25	8.71	8.47	0.02
22.50	8.74	8.50	0.02
22.75	8.78	8.54	0.02
23.00	8.81	8.57	0.02
23.25	8.84	8.60	0.02
23.50	8.88	8.64	0.02
23.75	8.91	8.67	0.02
24.00	**8.94**	**8.70**	0.02

Summary for Pond 1P: 330XLHD

Inflow Area = 0.162 ac,100.00% Impervious, Inflow Depth > 8.69" for 100-Year event
Inflow = 1.31 cfs @ 12.11 hrs, Volume= 0.117 af
Outflow = 0.50 cfs @ 12.26 hrs, Volume= 0.098 af, Atten= 62%, Lag= 8.9 min
Discarded = 0.05 cfs @ 8.75 hrs, Volume= 0.075 af
Primary = 0.45 cfs @ 12.26 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 70.24' @ 12.26 hrs Surf.Area= 810 sf Storage= 1,551 cf

Plug-Flow detention time= 158.9 min calculated for 0.098 af (83% of inflow)
Center-of-Mass det. time= 76.2 min (815.9 - 739.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	67.00'	966 cf	**13.17'W x 61.50'L x 4.04'H Field A** 3,273 cf Overall - 857 cf Embedded = 2,416 cf x 40.0% Voids
#2A	68.00'	857 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,823 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	69.75'	**6.0" Round Culvert** L= 34.0' Ke= 0.500 Inlet / Outlet Invert= 69.75' / 69.50' S= 0.0074 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.05 cfs @ 8.75 hrs HW=67.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.45 cfs @ 12.26 hrs HW=70.23' (Free Discharge)
↑**2=Culvert** (Barrel Controls 0.45 cfs @ 2.94 fps)

Pond 1P: 330XLHD - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger®330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

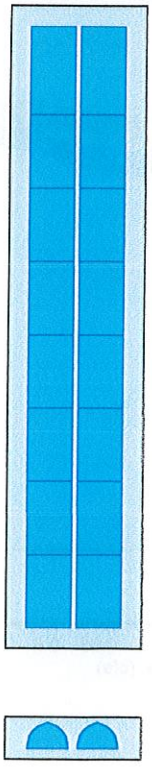
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +24.0" End Stone x 2 = 61.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 24.0" Side Stone x 2 = 13.17' Base Width
12.0" Base + 30.5" Chamber Height + 6.0" Cover = 4.04' Field Height

16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 856.9 cf Chamber Storage

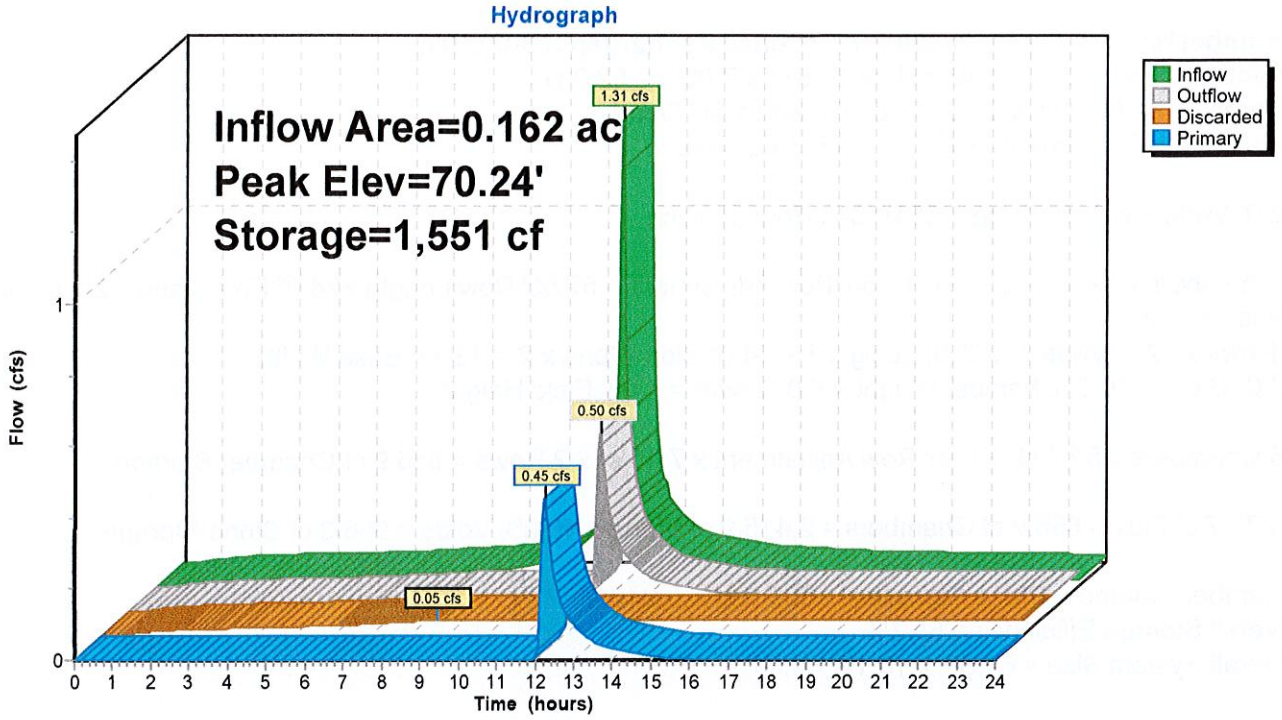
3,272.7 cf Field - 856.9 cf Chambers = 2,415.9 cf Stone x 40.0% Voids = 966.3 cf Stone Storage

Chamber Storage + Stone Storage = 1,823.2 cf = 0.042 af
Overall Storage Efficiency = 55.7%
Overall System Size = 61.50' x 13.17' x 4.04'

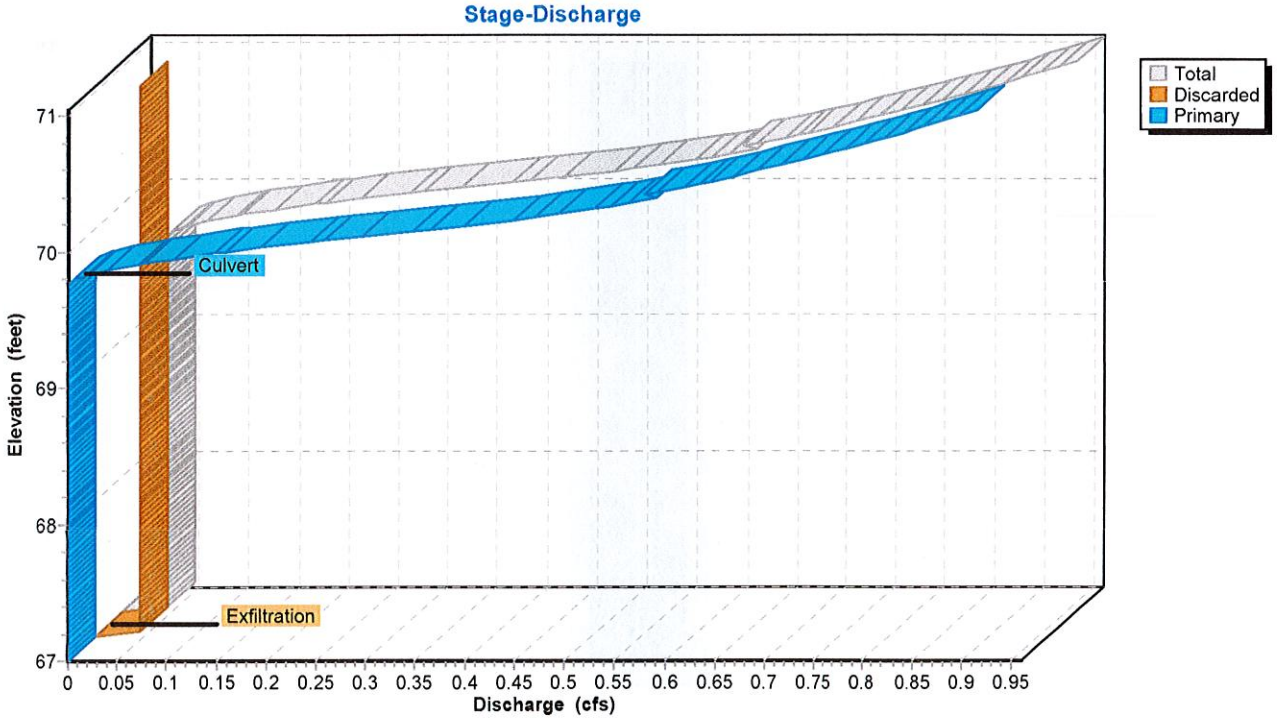
16 Chambers
121.2 cy Field
89.5 cy Stone



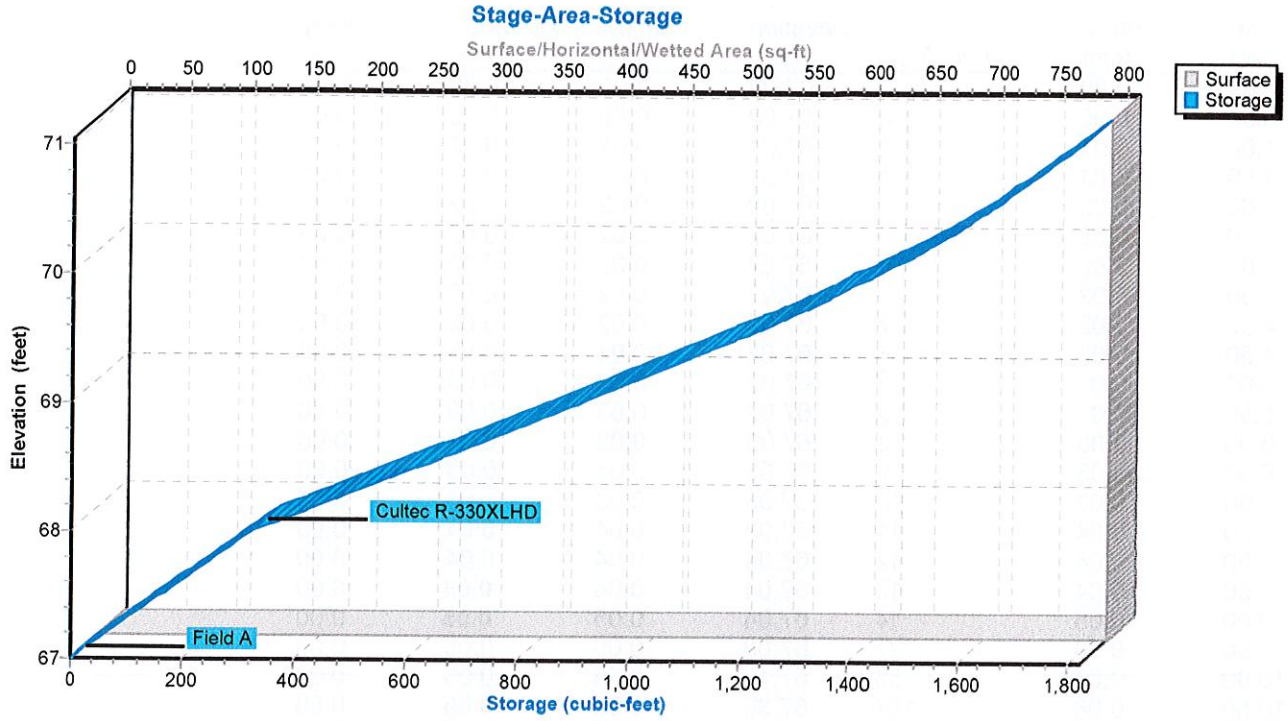
Pond 1P: 330XLHD



Pond 1P: 330XLHD



Pond 1P: 330XLHD



Hydrograph for Pond 1P: 330XLHD

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	67.00	0.00	0.00	0.00
0.50	0.00	0	67.00	0.00	0.00	0.00
1.00	0.01	3	67.01	0.01	0.01	0.00
1.50	0.01	4	67.01	0.01	0.01	0.00
2.00	0.02	5	67.02	0.02	0.02	0.00
2.50	0.02	6	67.02	0.02	0.02	0.00
3.00	0.02	6	67.02	0.02	0.02	0.00
3.50	0.02	7	67.02	0.02	0.02	0.00
4.00	0.02	7	67.02	0.02	0.02	0.00
4.50	0.03	7	67.02	0.03	0.03	0.00
5.00	0.03	8	67.02	0.03	0.03	0.00
5.50	0.03	8	67.02	0.03	0.03	0.00
6.00	0.03	8	67.03	0.03	0.03	0.00
6.50	0.03	9	67.03	0.03	0.03	0.00
7.00	0.03	10	67.03	0.03	0.03	0.00
7.50	0.04	11	67.03	0.04	0.04	0.00
8.00	0.04	12	67.04	0.04	0.04	0.00
8.50	0.04	13	67.04	0.04	**0.04**	0.00
9.00	0.05	14	67.04	0.05	**0.05**	0.00
9.50	0.06	27	67.08	0.05	0.05	0.00
10.00	0.07	58	67.18	0.05	0.05	0.00
10.50	0.08	107	67.33	0.05	0.05	0.00
11.00	0.11	194	67.60	0.05	0.05	0.00
11.50	0.17	364	68.07	0.05	0.05	0.00
12.00	**0.75**	**863**	**68.92**	**0.05**	0.05	**0.00**
12.50	**0.23**	**1,476**	**70.07**	**0.28**	0.05	**0.24**
13.00	0.13	1,417	69.94	0.15	0.05	0.10
13.50	0.09	1,391	69.89	0.10	0.05	0.06
14.00	0.07	1,374	69.86	0.08	0.05	0.03
14.50	0.06	1,364	69.84	0.07	0.05	0.02
15.00	0.05	1,353	69.81	0.06	0.05	0.01
15.50	0.05	1,342	69.79	0.05	0.05	0.01
16.00	0.04	1,334	69.78	0.05	0.05	0.00
16.50	0.04	1,324	69.76	0.05	0.05	0.00
17.00	0.04	1,311	69.73	0.05	0.05	0.00
17.50	0.03	1,293	69.69	0.05	0.05	0.00
18.00	0.03	1,269	69.65	0.05	0.05	0.00
18.50	0.03	1,240	69.60	0.05	0.05	0.00
19.00	0.03	1,211	69.54	0.05	0.05	0.00
19.50	0.03	1,179	69.48	0.05	0.05	0.00
20.00	0.03	1,147	69.42	0.05	0.05	0.00
20.50	0.03	1,113	69.36	0.05	0.05	0.00
21.00	0.03	1,078	69.30	0.05	0.05	0.00
21.50	0.02	1,041	69.23	0.05	0.05	0.00
22.00	0.02	1,003	69.16	0.05	0.05	0.00
22.50	0.02	963	69.09	0.05	0.05	0.00
23.00	0.02	922	69.02	0.05	0.05	0.00
23.50	0.02	880	68.95	0.05	0.05	0.00
24.00	0.02	836	68.87	0.05	0.05	0.00

Stage-Discharge for Pond 1P: 330XLHD

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
67.00	0.00	**0.00**	0.00
67.05	0.05	**0.05**	0.00
67.10	0.05	0.05	0.00
67.15	0.05	0.05	0.00
67.20	0.05	0.05	0.00
67.25	0.05	0.05	0.00
67.30	0.05	0.05	0.00
67.35	0.05	0.05	0.00
67.40	0.05	0.05	0.00
67.45	0.05	0.05	0.00
67.50	0.05	0.05	0.00
67.55	0.05	0.05	0.00
67.60	0.05	0.05	0.00
67.65	0.05	0.05	0.00
67.70	0.05	0.05	0.00
67.75	0.05	0.05	0.00
67.80	0.05	0.05	0.00
67.85	0.05	0.05	0.00
67.90	0.05	0.05	0.00
67.95	0.05	0.05	0.00
68.00	0.05	0.05	0.00
68.05	0.05	0.05	0.00
68.10	0.05	0.05	0.00
68.15	0.05	0.05	0.00
68.20	0.05	0.05	0.00
68.25	0.05	0.05	0.00
68.30	0.05	0.05	0.00
68.35	0.05	0.05	0.00
68.40	0.05	0.05	0.00
68.45	0.05	0.05	0.00
68.50	0.05	0.05	0.00
68.55	0.05	0.05	0.00
68.60	0.05	0.05	0.00
68.65	0.05	0.05	0.00
68.70	0.05	0.05	0.00
68.75	0.05	0.05	0.00
68.80	0.05	0.05	0.00
68.85	0.05	0.05	0.00
68.90	0.05	0.05	0.00
68.95	0.05	0.05	0.00
69.00	0.05	0.05	0.00
69.05	0.05	0.05	0.00
69.10	0.05	0.05	0.00
69.15	0.05	0.05	0.00
69.20	0.05	0.05	0.00
69.25	0.05	0.05	0.00
69.30	0.05	0.05	0.00
69.35	0.05	0.05	0.00
69.40	0.05	0.05	0.00
69.45	0.05	0.05	0.00
69.50	0.05	0.05	0.00
69.55	0.05	0.05	0.00
69.60	0.05	0.05	0.00
69.65	0.05	0.05	0.00
69.70	0.05	0.05	0.00
69.75	0.05	0.05	0.00
69.80	0.05	0.05	0.01
69.85	0.07	0.05	0.03
69.90	0.11	0.05	0.06
69.95	0.15	0.05	0.11
70.00	0.20	0.05	0.16
70.05	0.26	0.05	0.22
70.10	0.32	0.05	0.28
70.15	0.39	0.05	0.34
70.20	0.45	0.05	0.41
70.25	0.51	0.05	0.47
70.30	0.56	0.05	0.52
70.35	0.60	0.05	0.56
70.40	0.64	0.05	0.59
70.45	0.65	0.05	0.60
70.50	0.68	0.05	0.63
70.55	0.71	0.05	0.66
70.60	0.74	0.05	0.69
70.65	0.77	0.05	0.72
70.70	0.79	0.05	0.75
70.75	0.82	0.05	0.78
70.80	0.85	0.05	0.80
70.85	0.87	0.05	0.83
70.90	0.90	0.05	0.85
70.95	0.92	0.05	0.87
71.00	**0.94**	0.05	**0.90**

Stage-Area-Storage for Pond 1P: 330XLHD

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
67.00	**810**	0
67.05	810	16
67.10	810	32
67.15	810	49
67.20	810	65
67.25	810	81
67.30	810	97
67.35	810	113
67.40	810	130
67.45	810	146
67.50	810	162
67.55	810	178
67.60	810	194
67.65	810	211
67.70	810	227
67.75	810	243
67.80	810	259
67.85	810	275
67.90	810	292
67.95	810	308
68.00	810	324
68.05	810	354
68.10	810	384
68.15	810	413
68.20	810	443
68.25	810	473
68.30	810	502
68.35	810	532
68.40	810	562
68.45	810	591
68.50	810	621
68.55	810	650
68.60	810	679
68.65	810	709
68.70	810	738
68.75	810	766
68.80	810	795
68.85	810	824
68.90	810	853
68.95	810	881
69.00	810	910
69.05	810	939
69.10	810	967
69.15	810	996
69.20	810	1,024
69.25	810	1,052
69.30	810	1,080
69.35	810	1,108
69.40	810	1,135
69.45	810	1,163
69.50	810	1,190
69.55	810	1,216
69.60	810	1,243
69.65	810	1,269
69.70	810	1,295
69.75	810	1,321
69.80	810	1,346
69.85	810	1,372
69.90	810	1,396
69.95	810	1,421
70.00	810	1,445
70.05	810	1,468
70.10	810	1,491
70.15	810	1,513
70.20	810	1,535
70.25	810	1,556
70.30	810	1,576
70.35	810	1,595
70.40	810	1,614
70.45	810	1,631
70.50	810	1,648
70.55	810	1,664
70.60	810	1,680
70.65	810	1,696
70.70	810	1,713
70.75	810	1,729
70.80	810	1,745
70.85	810	1,761
70.90	810	1,777
70.95	810	1,794
71.00	810	**1,810**

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: 41 Kernwood Ave Haverhill, MA

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Subsurface Infiltration Structure	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

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

Project: 41 Kernwood Ave Haverhill, MA
Prepared By: l.j.b.
Date: 04/08/24

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

OPERATION AND MANINTENANCE PLAN
PROPOSED DRAINAGE SYSTEM – POST CONSTRUCTION
DATED: April

41 Kernwood Ave Haverhill, MA

Owner:

Tinh Vien Quan Am Pagoda
41 Kernwood Avenue
Haverhill, MA 01830

Party Responsible for Operations and Maintenance:

Tinh Vien Quan Am Pagoda
41 Kernwood Avenue
Haverhill, MA 01830

Source of Funding:

Operation and Maintenance of this storm water management system will be the responsibility of the property owner to include its successor and/or assigns, as the same may appear on record with the appropriate record of deeds.

Post Construction Inspection and Maintenance:

DO NOT STOCKPILE ANYTHING, INCLUDING SNOW OR DEBRIS ON OR AROUND THE STORMWATER SYSTEM

Drain Lines

After Construction, the drain lines shall be inspected after every major storm for the first few months to ensure proper functions. Presence of accumulated sand and silt would indicate that a drainline has been damaged and may need to be replace. Thereafter, the drain lines shall be inspected at least once per year.

Infiltration System

After construction, the Infiltration System shall be inspected for proper function after every major storm event until the site is completely developed and stabilized. After the site has been stabilized, the storm water infiltration system shall be inspected via the inspection ports at least twice per year or if lack of performance is observed and necessary corrective measures shall be performed to maintain infiltration capacity; as required by the MA Storm water Management Handbook. Inspections shall include measuring the water level in the system after a major storm event, and performing necessary corrective action if water is observed 72 hours following the storm.

Inspections

Yearly Inspections of the storm water management system shall be performed. The owner shall be responsible for the maintenance or if necessary, for securing the services of a professional (inspector) on an on-going basis. The inspector shall review the project with respect to the following:

- Proper Maintenance and performance of the storm water Management System
- Review of the system to determine any damaged or ineffective components.
- Corrective Actions

The inspector shall prepare a report documenting the findings and should request the required maintenance or repair for the pollution prevention controls when the inspector finds that it is necessary for the control to be effective. The inspector shall notify the owner to make the changes.

For additional information, refer to Performance, Standards and Guidelines for Storm water Management in Massachusetts, published by the Department of Environmental Protection

Snow Disposal

Snow Disposal is to be located adjacent to or on impervious surfaces. At these locations, the snow meltwater can filter to the soil, leaving behind sand and debris which can be removed I the springtime. Snow shall not be piled upon the subsurface infiltration system to ensure that the system is not compromised due to excessive weight siting on it for extended periods of time. Debris from snow melt should be cleared from the site and properly disposed of at the end of the snow season and no later than May 15.

For additional information, refer to Performance, Standards and Guidelines for Storm water Management in Massachusetts, published by the Department of Environmental Protection