

Drainage Analysis

**Dublin Rehabilitation Institute
Building Expansion
3805 Emerald Parkway**

Dublin, Ohio

Prepared By:



2130 Quarry Trails Drive, 2nd Floor
Columbus, Ohio 43228

EP Ferris # 1266.001

I hereby certify that the calculations contained herein are accurate to the best of my knowledge and belief.

By: Michael J. Overstreet, P.E.

Date

INTRODUCTION:

The following report presents the analysis of stormwater management for the Dublin Rehabilitation Institute building expansion located at 3805 Emerald Parkway in Dublin, Ohio. This report will show that water quantity and water quality requirements for the expansion are provided in existing detention facilities previously designed for the Dublin Rehabilitation Institute. Detention requirements were previously made available in a (west) on-site retention pond combined with underground detention and (east) with underground detention chambers that drains to an existing off-site pond (Chase Pond). This report will analyze the existing ponds (east and west) for the new expansion with no change to outlet controls using guidelines set forth by the City of Dublin Master Drainage Plan.

The building expansion will consist of a new 11,000+/- sf building on the west side of the existing Rehab Institute building, with additional parking spaces at three locations. The total area for the proposed expansion is approximately 0.63 Ac., which includes 0.57 Ac. of building and parking plus 0.05 Ac. of parking addition that is separate but is still tributary to the existing on-site retention pond (west). Approximately 0.016 Ac., accounting for additional parking spaces, is tributary to the existing underground storage chambers and existing Chase Pond to the east.

The existing on-site pond to the west drains approximately 4.103 Ac. of the existing Dublin Rehab Institute, see tributary map in Appendix C. The HydroCAD report will show slight increases in release rate, pond elevation and volume required but will not exceed the parameters previously established with the original pond design for either water quality or quantity.

The existing Chase Pond to the east drains some of the existing Dublin Rehab Institute (approximately 0.74 Ac.) including the additional 0.016 Ac. (four parking spaces) with this building expansion, see tributary map in Appendix C. An existing underground detention system restricts runoff and provides storage. The existing Chase Bank (as-built) pond was analyzed with the additional impervious area (routed through the underground system). No increase in release rate or pond elevation was found in the existing underground system or Chase Pond.

Excerpts from the as-built retention pond and the Chase Pond with the underground detention routed to it can be found in Appendix D. Water quality and water quantity shall be provided within the existing retention facilities per Ohio EPA and City of Dublin requirements.

HYDROLOGIC ANALYSIS:

All hydrologic parameters were determined using the methodology described in the City of Dublin Stormwater Management Design Manual, dated January 2019. Both Pre-Development and Post-Development runoff and peak discharge amounts were calculated through HydroCAD version 10.20 software.

The Master Drainage Plan for the City of Dublin was used to compute allowable release rates for the proposed improvements. This site is part of the Hard Road Watershed (Sub-Area 1005) and the Billingsley Watershed (as per the as-built Chase report).

The release rates for the retention pond (4.103 Ac.) will be limited to the release rate requirements of the Hard Road Watershed (Sub-Area 1005). The underground detention tributary to Chase Bank Pond will apply the Billingsley watershed, and as such will reduce the impact on the Hard Rd. watershed, continuing with the intent of the Chase Pond design.

PRE-DEVELOPED EXPANSION to (Retention Basin):

The pre-developed condition of the site consists of the existing Dublin Rehabilitation Institute with ground cover vegetation, sidewalks, parking and grass. The areas around the site are developed suburban commercial and residential uses. The site slopes to the existing retention pond from the existing building.

POST-DEVELOPED EXPANSION to (Retention Basin):

The post developed condition for the site will consist of a proposed building, and new asphalt pavement parking, and will include the existing impervious improvements. A CN of 98 was for all new impervious areas, with the remaining areas pervious, and a CN 84 used in HSG "D". With the expansion inside the 4.103 tributary area, the impervious area increased from 2.128 Ac. to 2.476 Ac. and the weighted curve number changed from CN 91 to CN 92. The developed tributary area to the pond remains 4.103 acres, however the critical storm increased from 10 yr. to 25 yr. See critical storm calculation.

The outlet flow rates remain controlled based upon the City of Dublin's Master Storm Water Management Plan. A critical storm was determined for the site by comparing pre to post 1 year, 24 hour storm runoff volumes and the increase created by the post developed condition (See calculation below). The expansion creates a 106% increase in the 1 year, 24-hour volume. According to the storm water regulations, this means the critical storm event is a 25-year storm. All events more frequent and equal to the 25-year storm must release at the 1-year pre-developed rate that is determined by the master drainage study.

The detention was sized to release the runoff according to the Master Drainage Plan. By limiting the release rate in this manner, the design intent is that the proposed development does not create adverse conditions to the Hard Road Watershed beyond what is provided in the Master Drainage Plan.

Tables have been provided below summarizing the results of storm water management calculations for the project. Table 1 describes the comparative release rates for pre and post developed storms as well as the allowable release rates based upon the critical storm and as-built pond level information for each respective storm. Table 2 is intended to show the capacity of the as-built pond above the normal water surface elevation. Table 3 is intended to show how the 4.103 acres relates to the Master Drainage Plan release rates allowable per acre of area.

Critical Storm Calculation (Retention Basin):

The critical storm is determined by comparing the increase in runoff volume of the 1-year 24-hour rainfall event from the pre-developed condition to that of the post-developed.

Pre-Development 1-Year Storm Event: 0.235 af
 Post-Development 1-Year Storm Event: 0.485 af
 $((0.485 \text{ af} - 0.235 \text{ af}) / 0.235 \text{ af}) \times 100\% = 106\%$ (**25 year critical storm**)

Table 1 – Stormwater Management Summary Table (As-Built Retention Basin)

	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Predev. Q (cfs)	3.67	5.34	7.93	10.16	13.39	16.13	19.05
Postdev. Q (cfs)	7.95	10.08	13.11	15.59	19.04	21.89	24.87
Un-detained (0.486 Ac.) Release (cfs)	0.50	0.72	1.06	1.36	1.78	2.14	2.53
Allowable Release (cfs)*	0.04	0.04	0.04	0.04	0.04	1.64	2.46
Actual Release (cfs)	0.03	0.03	0.03	0.03	0.04	0.20	0.45
Ponding Elev. (ft)	900.51	900.96	901.56	902.03	902.65	903.09	903.13
Storage (cf) @ Elev.	19,963	25,729	34,117	41,114	51,032	58,678	59,391
Storage Depth (ft)	2.51	2.96	3.56	4.03	4.65	5.09	5.13

*See table 3 for release rate summary and assumptions.

Table 2 – As-Built Pond Storage Elevation-Volume Table (Retention Basin)

Elevation	Total As-Built Storage Provided (cf)
898.18	0 Normal Pool
899.00	4,971
900.00	13,430
901.00	24,655
902.00	38,349
903.00	54,662
904.00	73,564

**Table 3 – Allowable Release Rate Tabulation
(Hard Road Watershed Sub-Basin 1005)
(4.103 Ac.)**

Storm Event	cfs/Acre Allowable	Site Allowable (cfs)
1 year	0.01	0.04
2 year	0.10	0.04
5 year	0.10	0.04
10 year	0.10	0.04
25 year	0.20	0.04
50 year	0.40	1.64
100 year	0.60	2.46

Runoff shall be controlled with an existing standpipe with orifice placed inside an outlet structure which will drain to the existing storm sewer system along Emerald Parkway. Multiple outlet devices are to control the 1 through 100 year events. In the event the outlets fail, an emergency overflow (Set above the 100 Yr. Storm Elev.) will be provided. Top of bank for the pond will be 904.00.

WATER QUALITY:

Water quality storage and treatment shall be provided in the retention pond volume. Water quality calculations can be found in Appendix B. Table 4 below shows the available sediment volume in the pond.

**Table 4 – As-Built Forebay and Micro-pool Storage Elevation-Volume Table
(Sediment)**

Elevation	Total Storage Provided (cf)
Forebay	
895	0
896	390
897	1,105
898	2,230
898.18	2,489
Micro-pool	
893	0
894	154
895	676
896	1,610
897	3,031
898	5,490
898.18	6,028

POST-DEVELOPED CONDITION (Underground Detention) :

The post developed condition for this area will consist of parking space expansion (four spaces) within the tributary area (0.74 Ac). A CN of 95 was previously calculated using HSG “D”. With the expansion of the additional four parking spaces, the impervious area increased from 0.601 Ac. to 0.617 Ac., the weighted curve number did not change from CN 95. The developed tributary area will drain to the existing Chase Pond.

Critical Storm Calculation (Underground Detention):

The critical storm is determined by comparing the increase in runoff volume of the 1-year 24-hour rainfall event from the pre-developed condition to that of the post-developed.

Pre-Development 1-Year Storm Event: 0.047 af
 Post-Development 1-Year Storm Event: 0.101 af
 $((0.101 \text{ af} - 0.047 \text{ af}) / 0.047 \text{ af}) \times 100\% = 115\%$ **(25 year critical storm)**

**Table 1 – Stormwater Management Summary Table
0.74 Ac. As-Built Underground Detention**

	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Predev. Q (cfs)	0.80	1.23	1.78	2.24	2.95	3.60	4.28
Postdev. Q (cfs)	1.70	2.20	2.80	3.27	3.99	4.62	5.28
Un-detained (0.19 Ac.) Release (cfs)	0.44	0.56	0.72	0.84	1.02	1.19	1.36
Allowable Release (cfs)*	0.59	0.59	0.59	0.59	0.59	1.99	2.51
Actual Release (cfs)	0.05	0.18	0.52	0.55	0.57	1.06	1.96
Ponding Elev. (ft)	900.09	900.51	902.88	903.18	903.46	903.60	903.74
Storage (cf) @ Elev.	2,829	3,355	4,025	4,647	5,779	6,565	7,172
Storage Depth (ft)	1.59	2.01	4.56	4.68	4.96	5.10	5.24

*See table 3 for release rate summary and assumptions.

Table 2 - Pond Storage Elevation-Volume Table (Underground Detention)

Elevation	Total Storage Provided (cf)
898.50	0
899.00	595
900.00	2,681
901.00	3,939
902.00	3,939
902.70	3,939
903.70	7,172

**Table 3 – Allowable Release Rate Tabulation
(Billingsley Watershed Sub-Basin 370)
(0.74 Ac.)**

Storm Event	cfs/Acre Allowable	Site Allowable (cfs)
1 year	0.8	0.59
2 year	1.0	0.74
5 year	1.3	0.96
10 year	1.5	1.11
25 year	2.0	1.48
50 year	2.7	1.99
100 year	3.4	2.51

Runoff shall be controlled with an existing orifice plate placed inside an outlet structure which will drain to the existing Chase Pond. Multiple outlet devices are to control the 1 through 100 year events.

WATER QUALITY:

Water quality storage and treatment in the underground detention shall be provided in isolator rows. Water quality calculations can be found in Appendix B.

POST-DEVELOPED CONDITIONS (Chase Bank As-Built After Underground) :

The post developed condition for this facility deducted (0.53 Ac.) that was previously tributary that will now go to the underground detention. The underground detention outfall was routed to the pond to determine the effects on the as-built pond. The results can be found in Table 1 below. Also, see Appendix “D” for Chase Bank As-Built excerpts.

**Table 1 – Stormwater Management Summary Table
(Chase Bank As-Built after Underground 2.76 Ac.)**

	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Predev. Q (cfs)	2.22	3.67	5.64	7.28	9.90	12.29	14.86
Postdev. Q (cfs)	3.30	4.62	6.29	7.77	10.11	11.91	13.82
Allowable Release (cfs)*	1.30	1.30	1.30	1.30	3.26	4.40	5.54
As-Built Release (cfs)	0.13	0.36	0.85	1.21	1.61	1.90	2.15
Actual Release (cfs)	0.14	0.38	0.83	1.17	1.53	1.83	2.12
Ponding Elev. (ft)	900.74	900.93	901.16	901.36	901.64	901.95	902.29
Storage (cf) @ Elev.	5,616	7,233	9,290	11,143	13,979	17,172	20,955
Storage Depth (ft)	5.74	5.93	6.16	6.36	6.64	6.95	7.29

*See table 3 for release rate summary and assumptions.

**Table 2 - Pond Storage Elevation-Volume Table
(Chase Bank As-Built after Underground)**

Elevation	Total Storage Provided (cf)
900.00	0
901.00	7,854
902.00	17,756
903.00	29,710

**Table 3 – Allowable Release Rate Tabulation
(Billingsley Watershed)
(Per Chase Bank As-Built Report)**

Storm Event	cfs/Acre Allowable	Site Allowable (cfs)
1 year	0.8	1.30
2 year	1.0	1.63
5 year	1.3	2.12
10 year	1.5	2.42
25 year	2.0	3.26
50 year	2.7	4.40
100 year	3.4	5.54

Runoff shall be controlled with an existing orifice plate placed inside an outlet structure which will drain to the existing Chase Pond. Multiple outlet devices are to control the 1 through 100 year events.

SUMMARY:

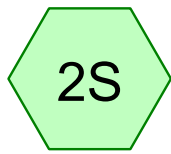
The previously developed site drained into an open air pond with additional storm tech chambers, west, and another underground detention facility is designed to the east, which drains to an existing offsite pond, both controlled via an orifice and weir. The release rates for the open air pond is per the Hard Road Watershed restrictions, the Billingsley Watershed to the east, both provided from the City of Dublin Stormwater Master Plan. The system will use retention pond volume and some underground storm tech chambers to achieve the necessary release rates.

The building expansion is a part of the previously developed tributary area and increases the impervious area both east and west.

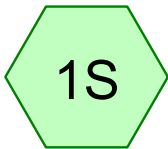
The developed site draining to an underground storage facility to the east is controlled by an orifice and weir. The release rate is per the Billingsley Creek Watershed restrictions provided from the City of Dublin Stormwater Master Plan. The existing system uses ADS Storm Tech chamber fields to achieve the required release rates.

See Appendix "A" for the HydroCAD reports, and Appendix "C" for tributary maps. Appendix "D" has the as-built report excerpts. The retention pond and underground chambers will provide water quality per the current Ohio EPA regulations. See water quality calculations in Appendix "B". Release rates from the underground system will discharge to the Chase Pond but will not adversely impact the existing release rates and pond elevations. See Appendix "E" for Hydrological Soil Group.

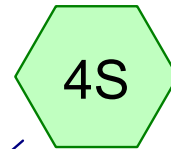
APPENDIX A
HydroCAD REPORT



Rehab Before Expansion



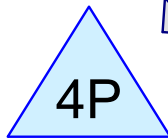
Rehab Pre Dev



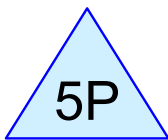
REHAB WITH EXPANSION



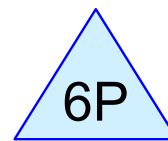
Un-detained



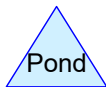
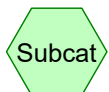
Rehab Storage



WQv Drawdown



WQvForebayMicropool



Routing Diagram for Dublin Rehab Institute As-Built 5-1-23
Prepared by E P Ferris & Associates, Inc, Printed 5/9/2023
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Summary for Subcatchment 1S: Rehab Pre Dev

Runoff = 3.67 cfs @ 12.07 hrs, Volume= 0.235 af, Depth= 0.69"

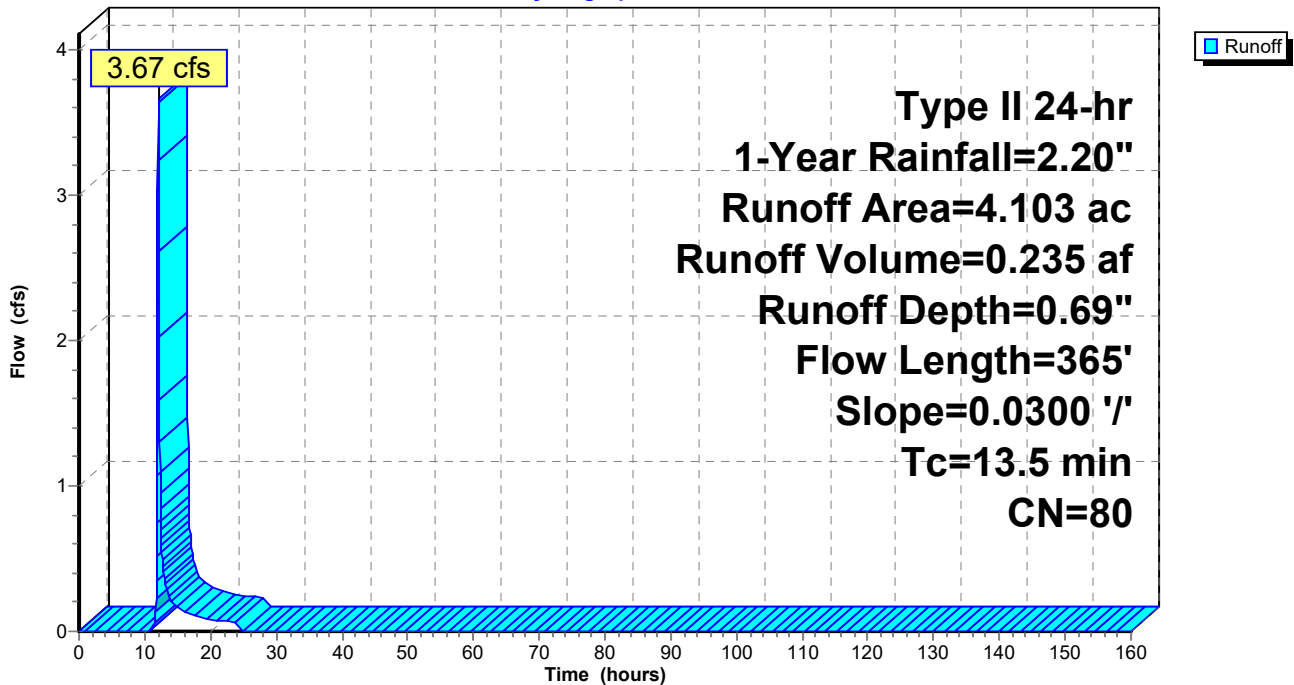
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 1-Year Rainfall=2.20"

Area (ac)	CN	Description
4.103	80	>75% Grass cover, Good, HSG D
4.103		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.0300	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 2.25"
3.6	265	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	365	Total			

Subcatchment 1S: Rehab Pre Dev

Hydrograph



Summary for Subcatchment 2S: Rehab Before Expansion

Runoff = 7.56 cfs @ 12.05 hrs, Volume= 0.458 af, Depth= 1.34"

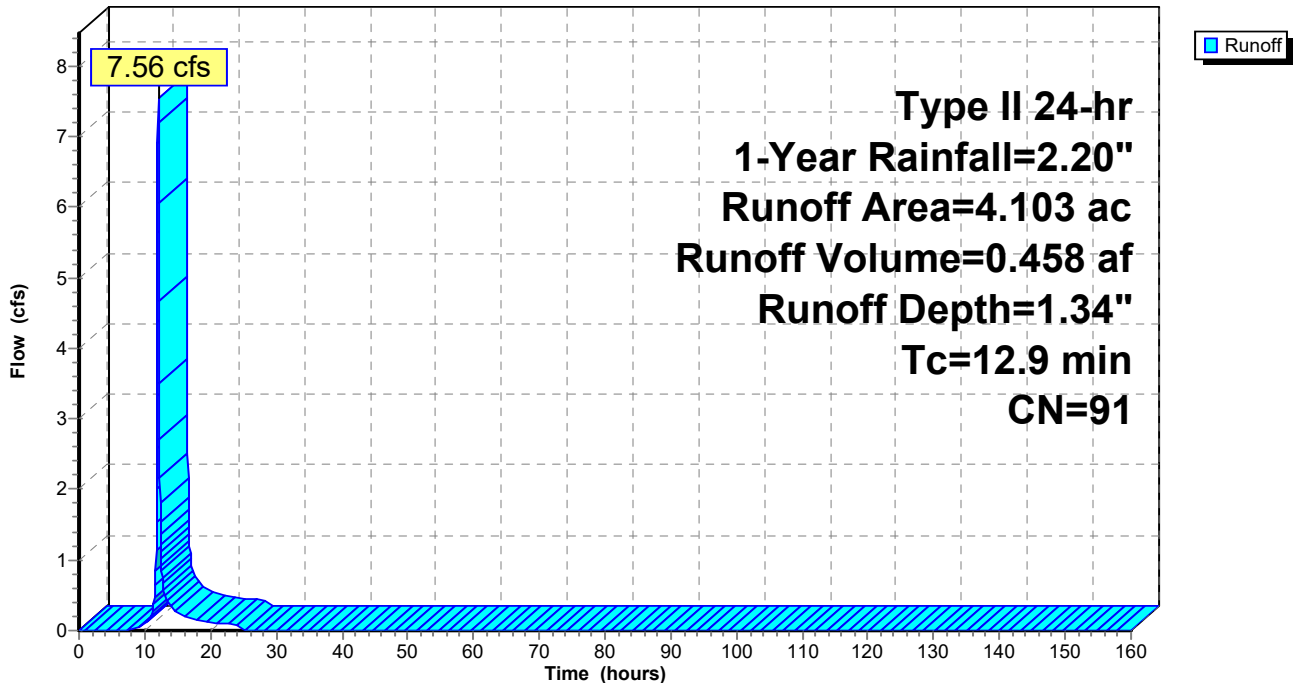
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 1-Year Rainfall=2.20"

Area (ac)	CN	Description
* 2.128	98	Impervious, HSG D
1.975	84	50-75% Grass cover, Fair, HSG D
4.103	91	Weighted Average
1.975		48.14% Pervious Area
2.128		51.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 2S: Rehab Before Expansion

Hydrograph



Summary for Subcatchment 3S: Un-detained

Runoff = 0.50 cfs @ 12.03 hrs, Volume= 0.028 af, Depth= 0.69"

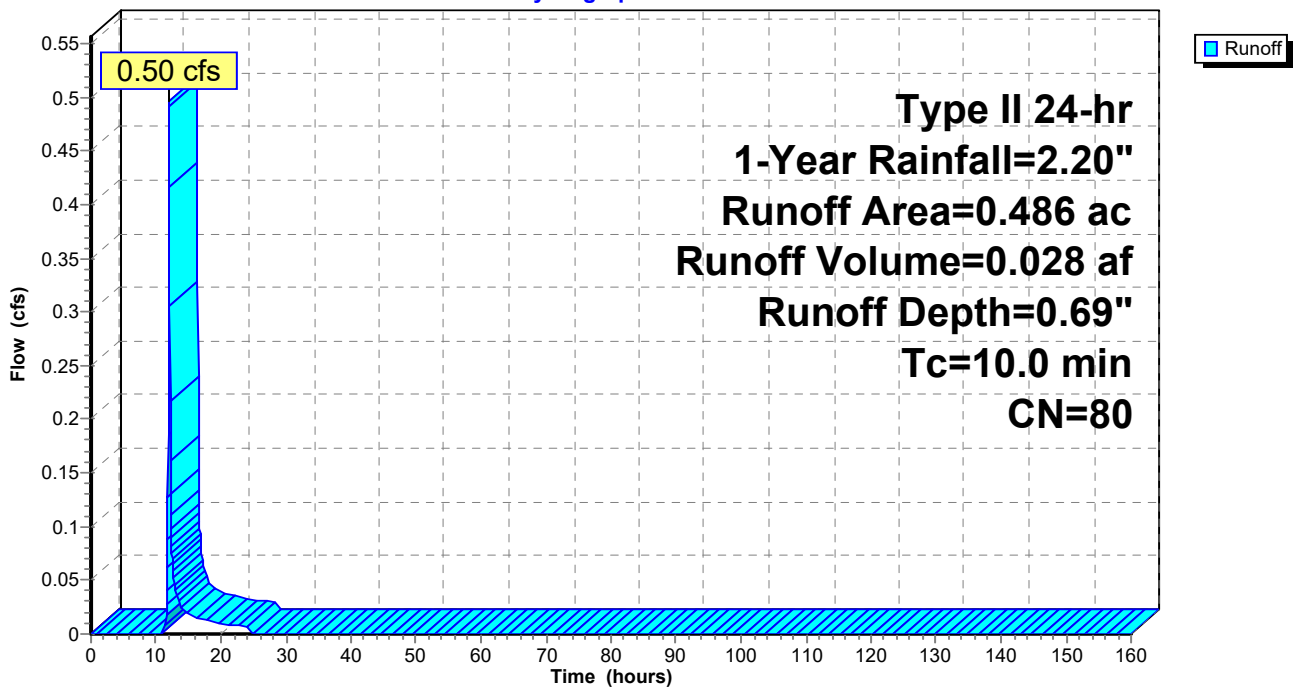
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 1-Year Rainfall=2.20"

Area (ac)	CN	Description
0.486	80	>75% Grass cover, Good, HSG D
0.486		100.00% Pervious Area

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

Subcatchment 3S: Un-detained

Hydrograph



Summary for Subcatchment 4S: REHAB WITH EXPANSION

Runoff = 7.95 cfs @ 12.05 hrs, Volume= 0.485 af, Depth= 1.42"
 Routed to Pond 4P : Rehab Storage

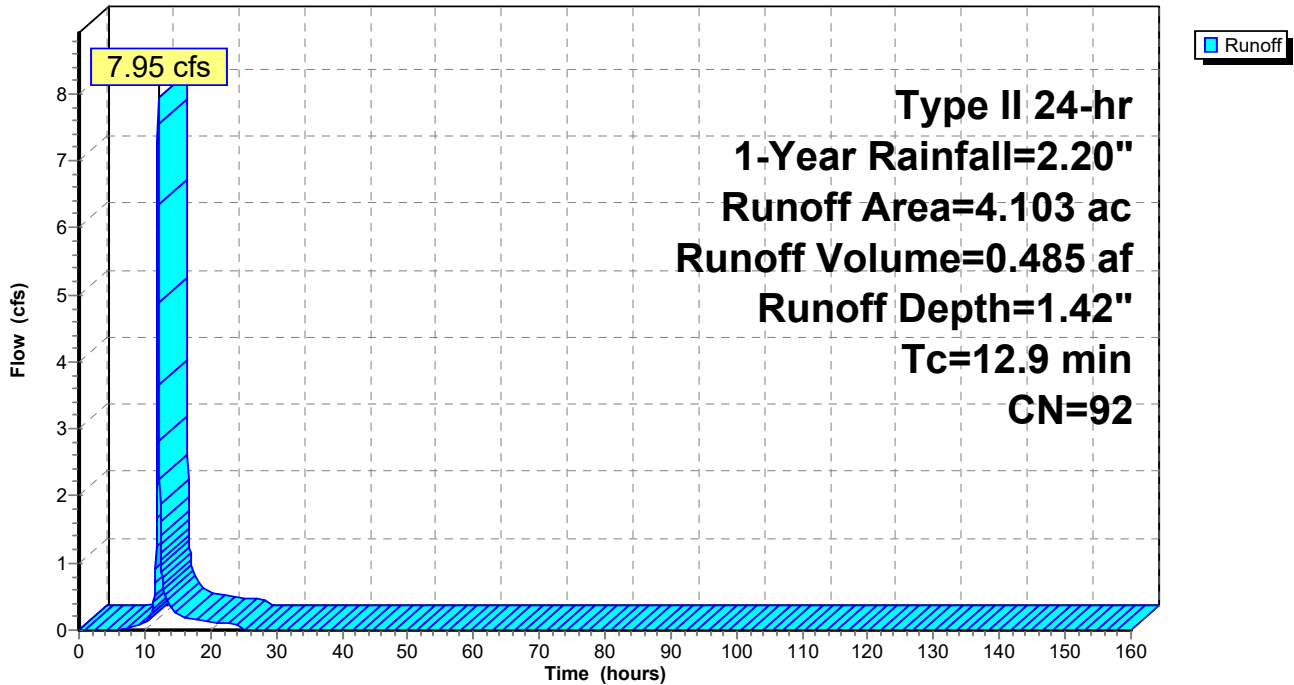
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 1-Year Rainfall=2.20"

Area (ac)	CN	Description
* 2.476	98	Impervious, HSG D
1.627	84	50-75% Grass cover, Fair, HSG D
4.103	92	Weighted Average
1.627		39.65% Pervious Area
2.476		60.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 4S: REHAB WITH EXPANSION

Hydrograph



Summary for Pond 4P: Rehab Storage

Inflow Area = 4.103 ac, 60.35% Impervious, Inflow Depth = 1.42" for 1-Year event
 Inflow = 7.95 cfs @ 12.05 hrs, Volume= 0.485 af
 Outflow = 0.03 cfs @ 24.24 hrs, Volume= 0.278 af, Atten= 100%, Lag= 731.7 min
 Primary = 0.03 cfs @ 24.24 hrs, Volume= 0.278 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 900.51' @ 24.24 hrs Surf.Area= 12,522 sf Storage= 19,963 cf

Plug-Flow detention time= 4,224.1 min calculated for 0.278 af (57% of inflow)
 Center-of-Mass det. time= 4,114.9 min (4,930.3 - 815.3)

Volume	Invert	Avail.Storage	Storage Description
#1	898.18'	73,564 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 'f'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 'f'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 'f'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 'f'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 'f'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 'f'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 'f'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 'f'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 'f'
#11D	898.80'	691 cf	6.25'W x 110.42'L x 3.50'H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		76,037 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.18	5,196	465.4	0	0	5,196
899.00	6,973	453.7	4,971	4,971	6,131
900.00	10,037	497.0	8,459	13,430	9,441
901.00	12,456	535.9	11,225	24,655	12,680
902.00	14,971	573.7	13,694	38,349	16,064
903.00	17,693	573.7	16,313	54,662	16,637
904.00	20,138	623.2	18,902	73,564	21,390

Dublin Rehab Institute As-Built 5-1-23

Type II 24-hr 1-Year Rainfall=2.20"

Prepared by E P Ferris & Associates, Inc

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Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads 36.0" W x 6.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	903.05'	
#4	Secondary	903.36'	16.7' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.03 cfs @ 24.24 hrs HW=900.51' (Free Discharge)

- ↑ 1=Culvert (Passes 0.03 cfs of 4.04 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.03 cfs @ 7.30 fps)
- ↑ 3=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=898.18' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Rehab Storage - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

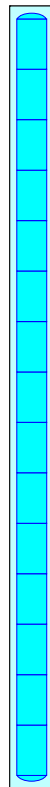
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

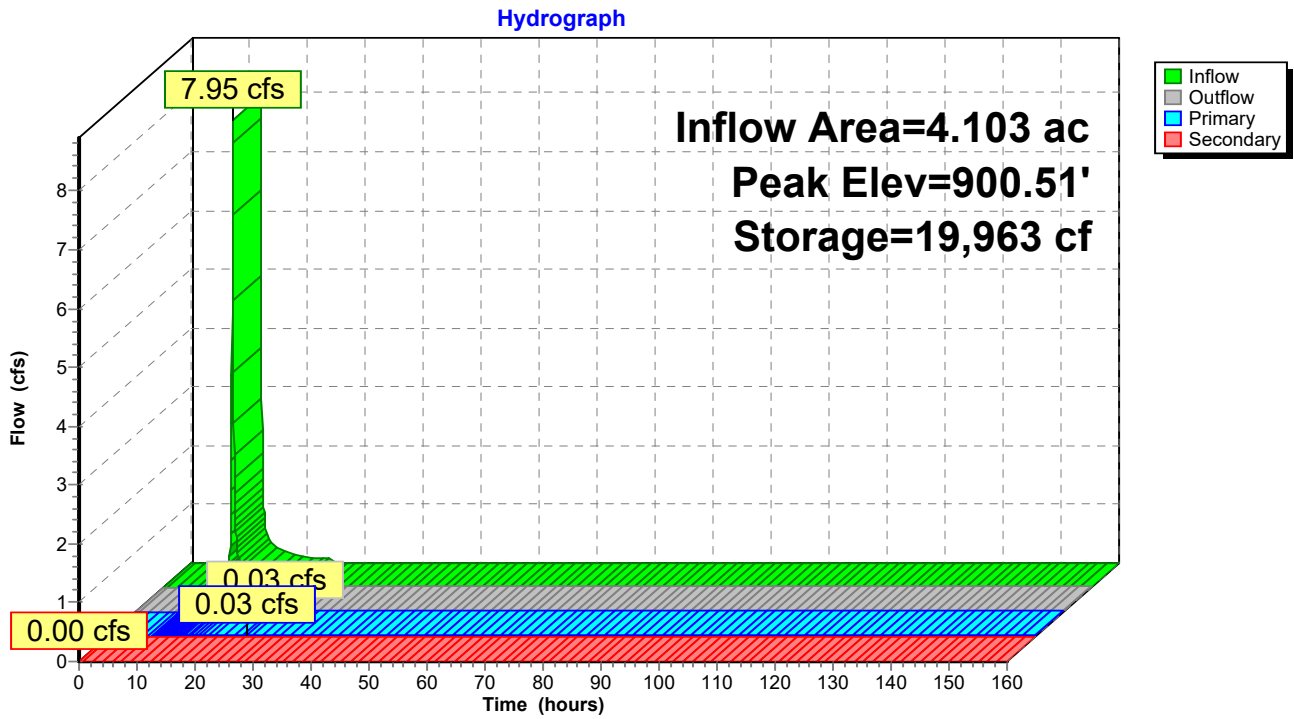
15 Chambers

89.5 cy Field

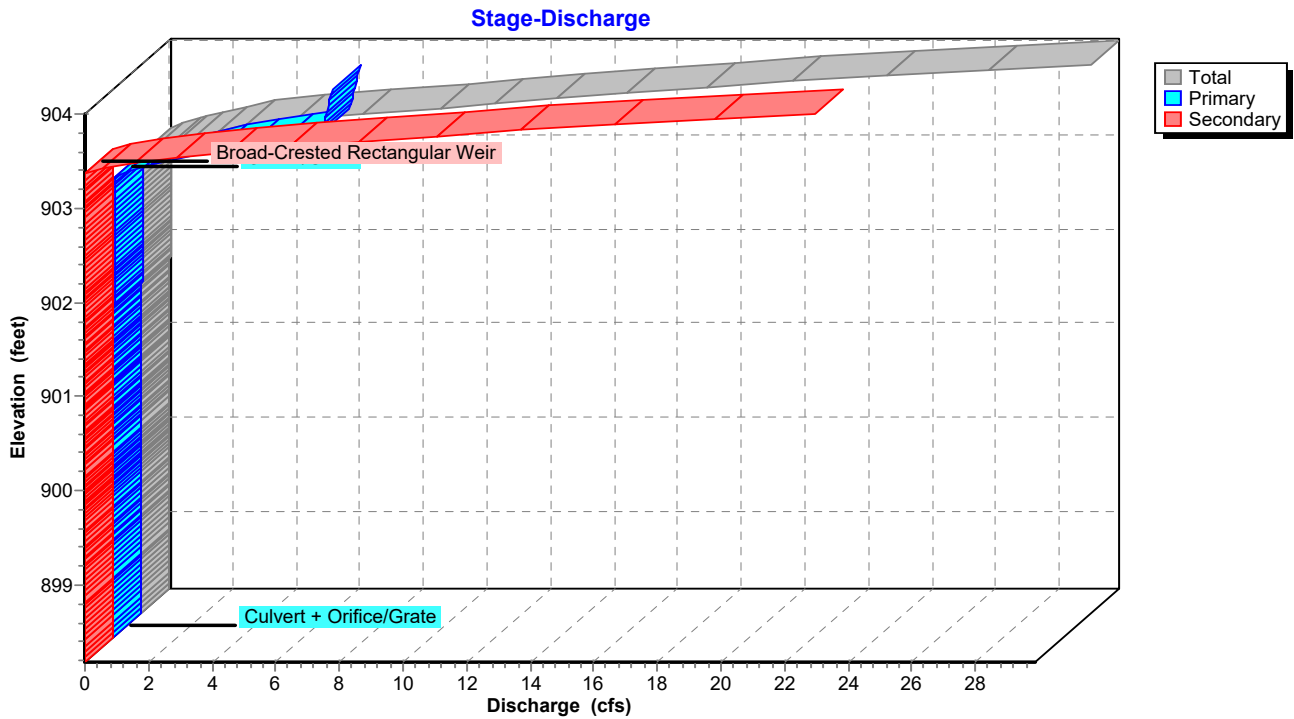
63.9 cy Stone



Pond 4P: Rehab Storage

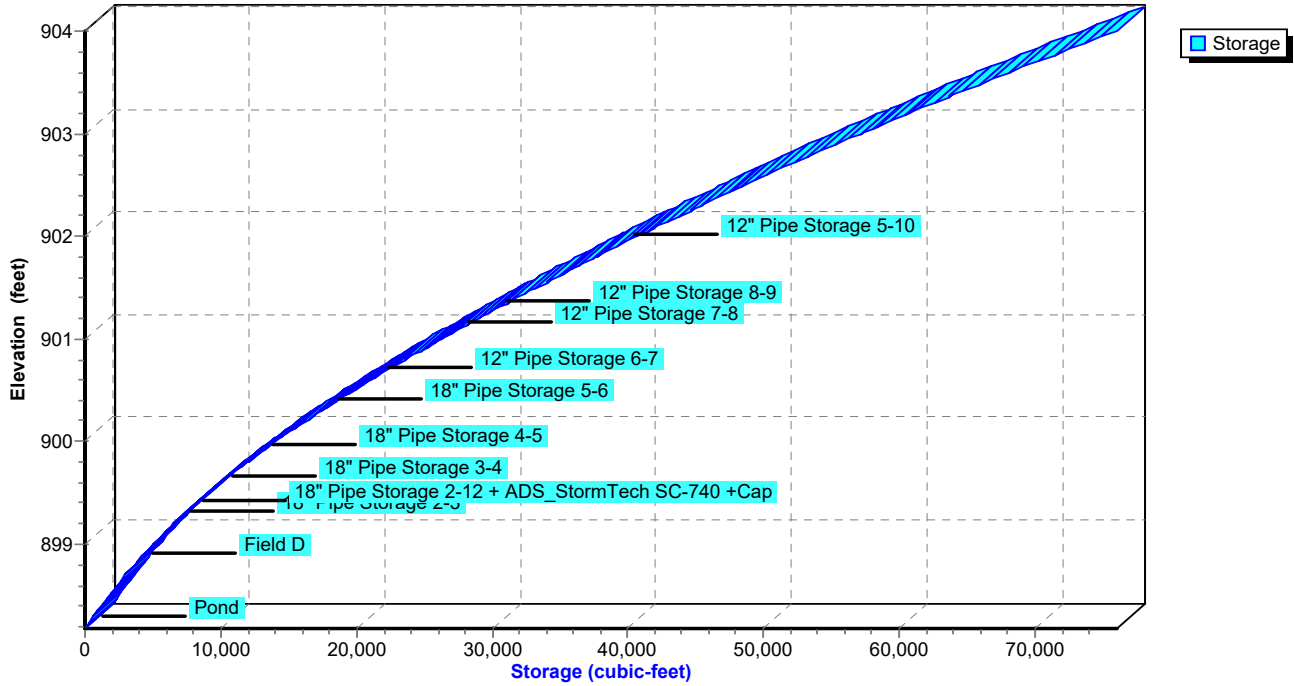


Pond 4P: Rehab Storage



Pond 4P: Rehab Storage

Stage-Area-Storage



Summary for Pond 5P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 903.05' Surf.Area= 18,399 sf Storage= 57,840 cf
 Peak Elev= 903.05' @ 0.00 hrs Surf.Area= 18,399 sf Storage= 57,840 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	898.00'	55,369 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 '/'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 '/'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 '/'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 '/'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 '/'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 '/'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 '/'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 '/'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 '/'
#11D	898.80'	691 cf	6.25"W x 110.42"L x 3.50"H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		57,841 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.00	4,473	367.8	0	0	4,473
899.00	6,974	453.7	5,677	5,677	10,104
900.00	10,037	497.0	8,459	14,137	13,414
901.00	12,456	535.9	11,225	25,361	16,653
902.00	14,971	573.9	13,694	39,056	20,054
903.00	17,693	597.9	16,313	55,369	22,367

Dublin Rehab Institute As-Built 5-1-23

Type II 24-hr 1-Year Rainfall=2.20"

Prepared by E P Ferris & Associates, Inc

Printed 5/9/2023

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Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 0.00 hrs HW=903.05' (Free Discharge)

↑ **1=Culvert** (Passes 0.04 cfs of 6.24 cfs potential flow)

↑ **2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 10.59 fps)

Pond 5P: WQv Drawdown - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

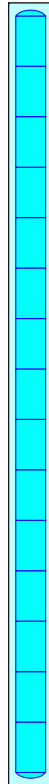
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

15 Chambers

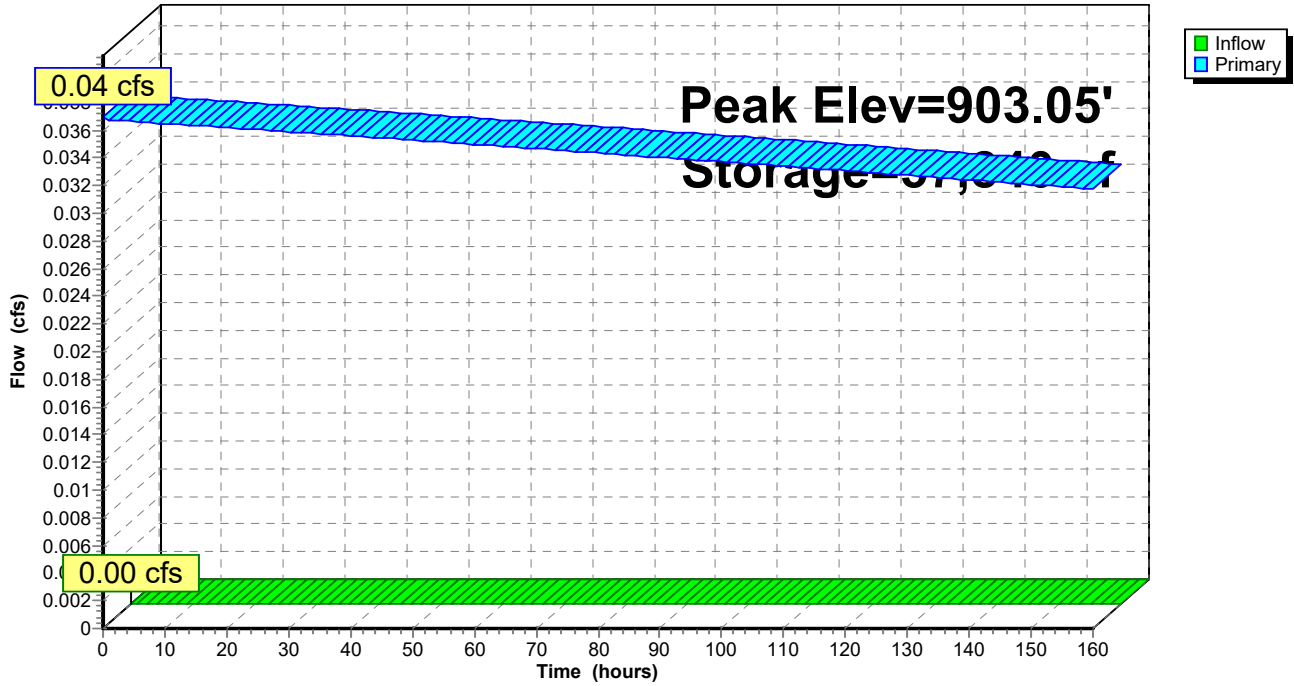
89.5 cy Field

63.9 cy Stone



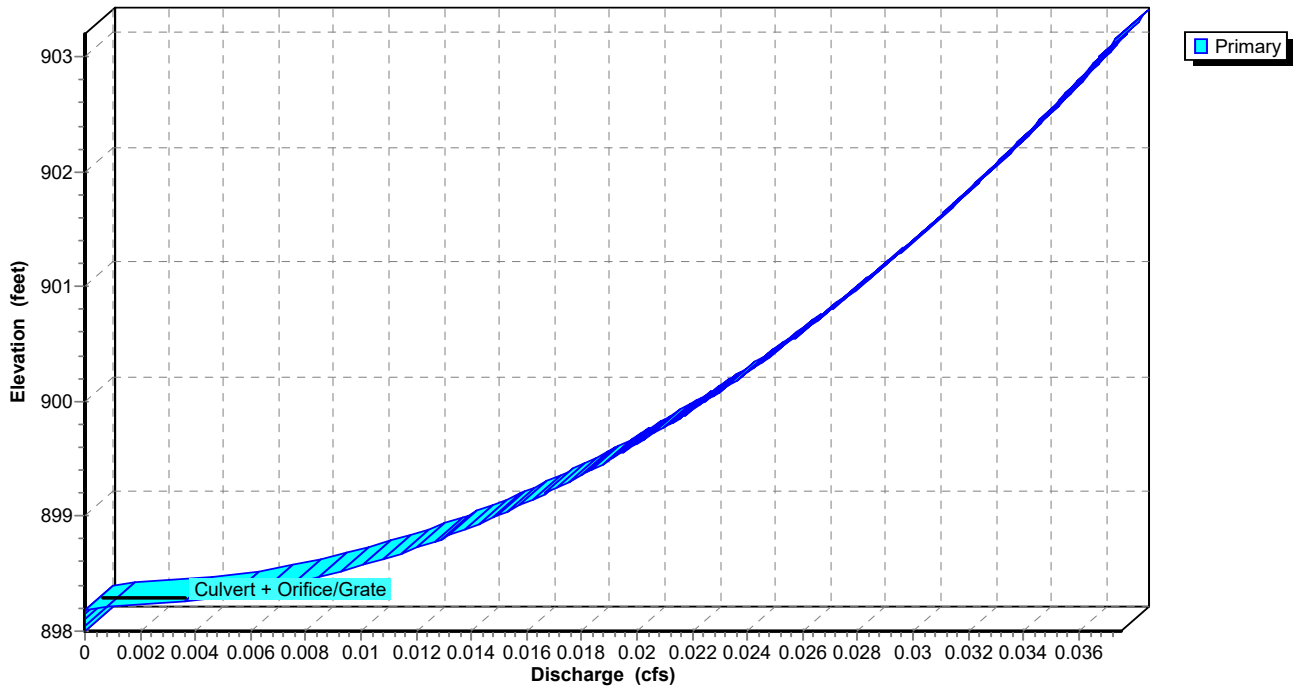
Pond 5P: WQv Drawdown

Hydrograph

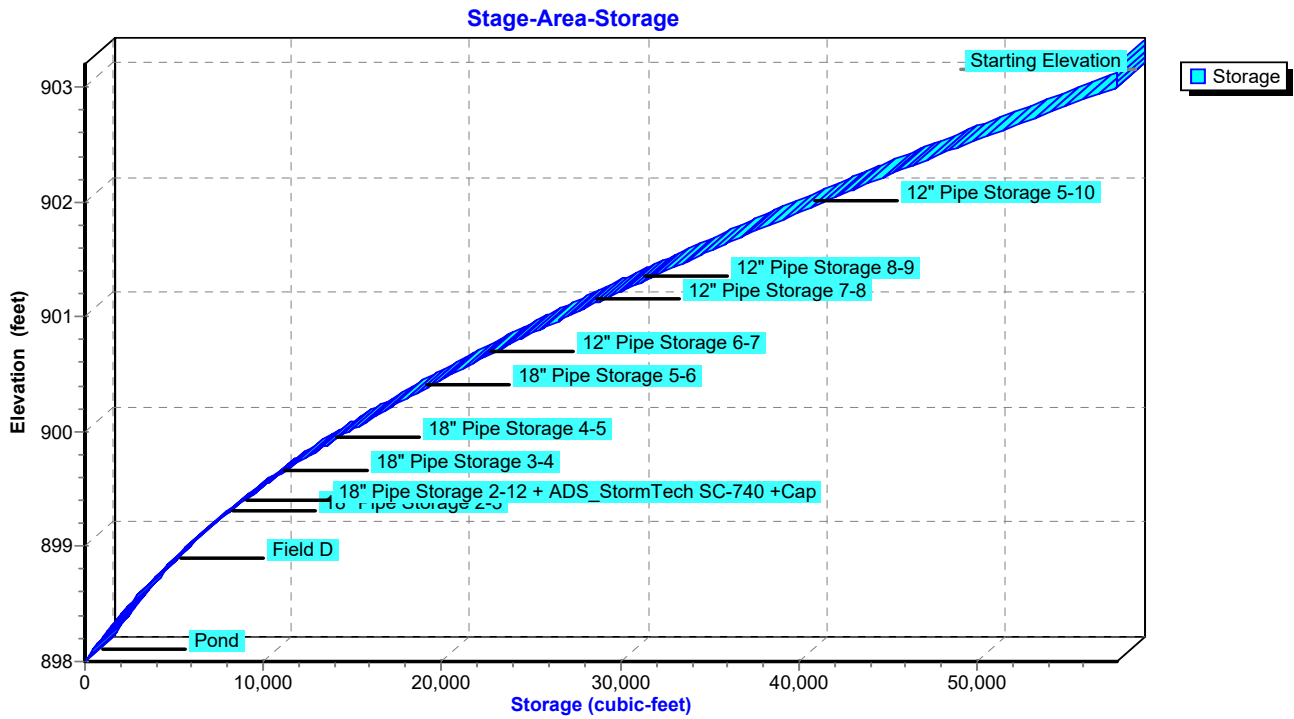


Pond 5P: WQv Drawdown

Stage-Discharge



Pond 5P: WQv Drawdown



Summary for Pond 6P: WQvForebayMicropool

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 896.00' Surf.Area= 1,704 sf Storage= 2,000 cf
 Peak Elev= 896.00' @ 0.00 hrs Surf.Area= 1,704 sf Storage= 2,000 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

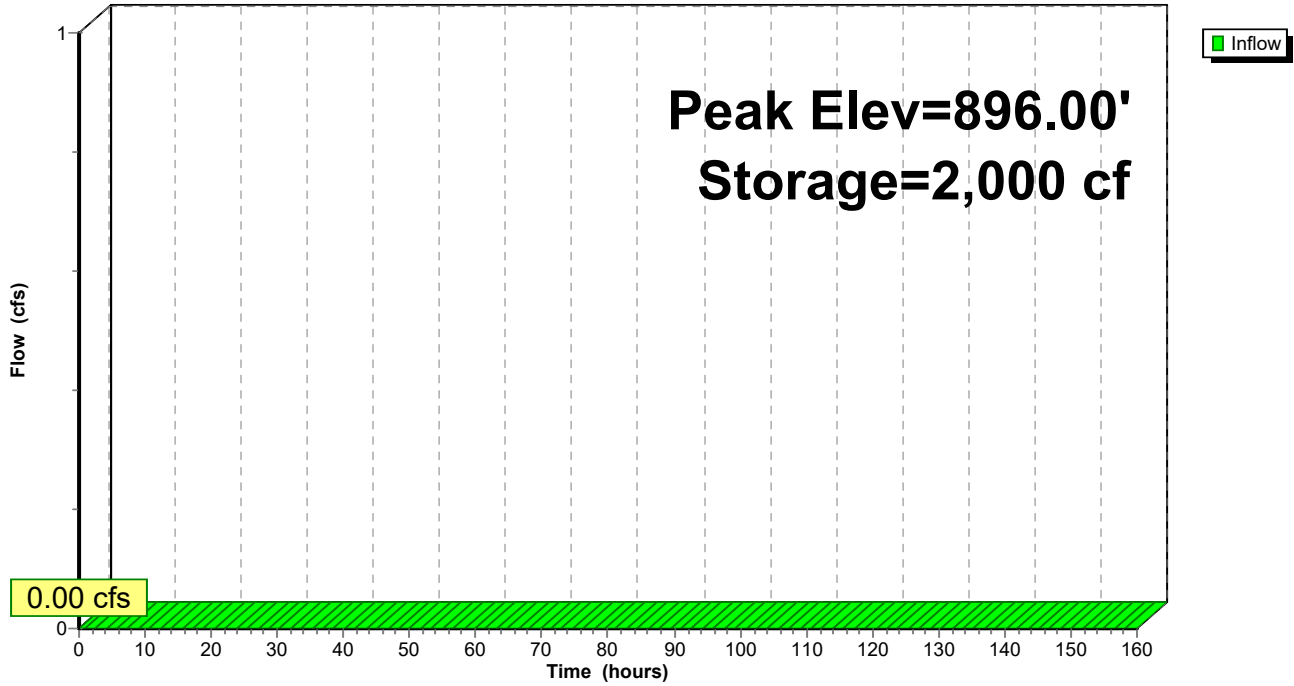
Volume	Invert	Avail.Storage	Storage Description
#1	895.00'	2,489 cf	Forebay (Irregular) Listed below (Recalc)
#2	893.00'	6,028 cf	MicroPool (Irregular) Listed below (Recalc)
		8,517 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
895.00	256	78.4	0	0	256
896.00	541	101.1	390	390	592
897.00	905	124.1	715	1,105	1,020
898.00	1,361	148.8	1,125	2,230	1,573
898.18	1,519	203.7	259	2,489	3,114

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
893.00	25	80.6	0	0	25
894.00	344	100.6	154	154	327
895.00	723	120.6	522	676	696
896.00	1,163	140.6	934	1,610	1,132
897.00	1,695	164.9	1,421	3,031	1,742
898.00	3,312	219.6	2,459	5,490	3,427
898.18	2,677	261.7	538	6,028	5,040

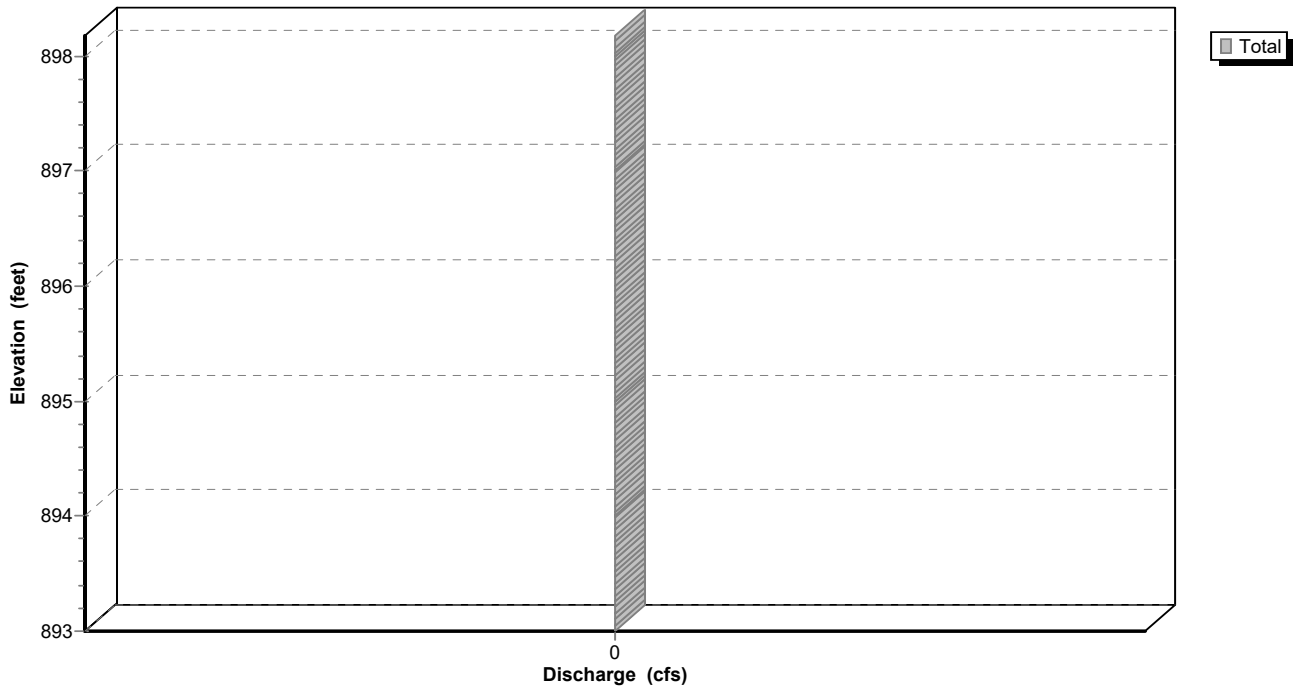
Pond 6P: WQvForebayMicropool

Hydrograph

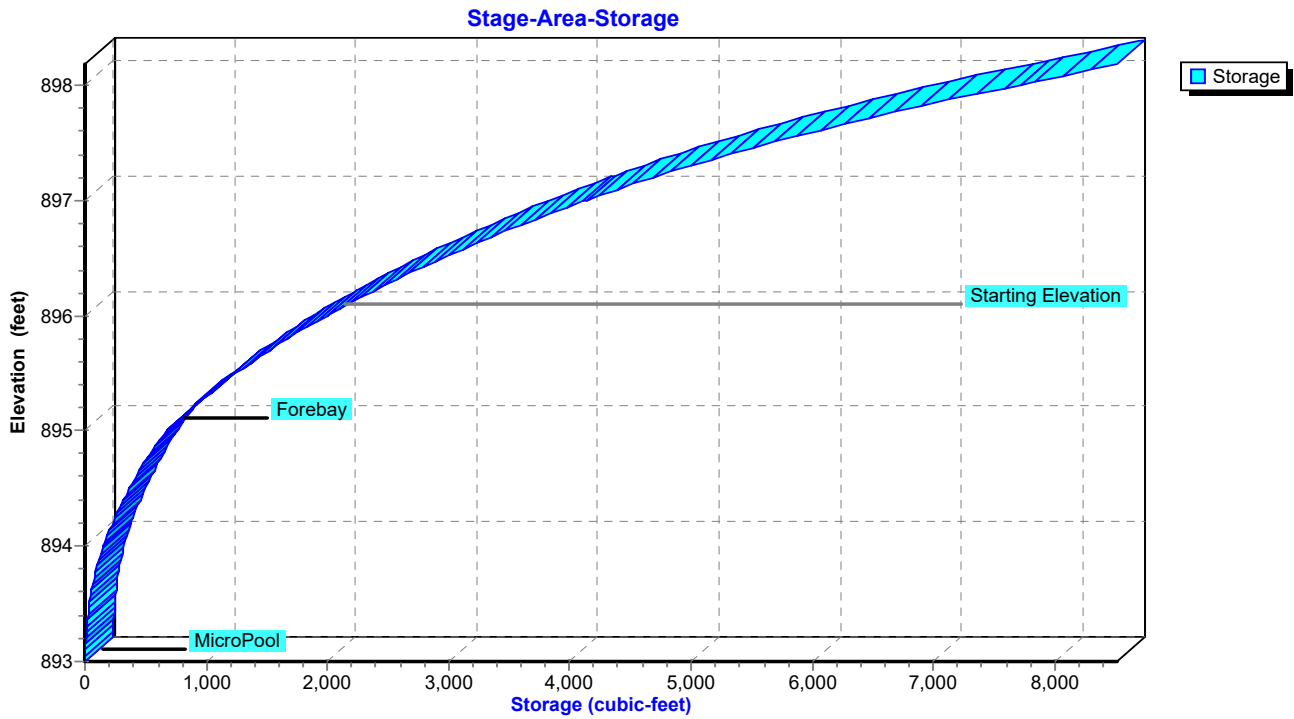


Pond 6P: WQvForebayMicropool

Stage-Discharge



Pond 6P: WQvForebayMicropool



Summary for Subcatchment 1S: Rehab Pre Dev

Runoff = 5.34 cfs @ 12.06 hrs, Volume= 0.335 af, Depth= 0.98"

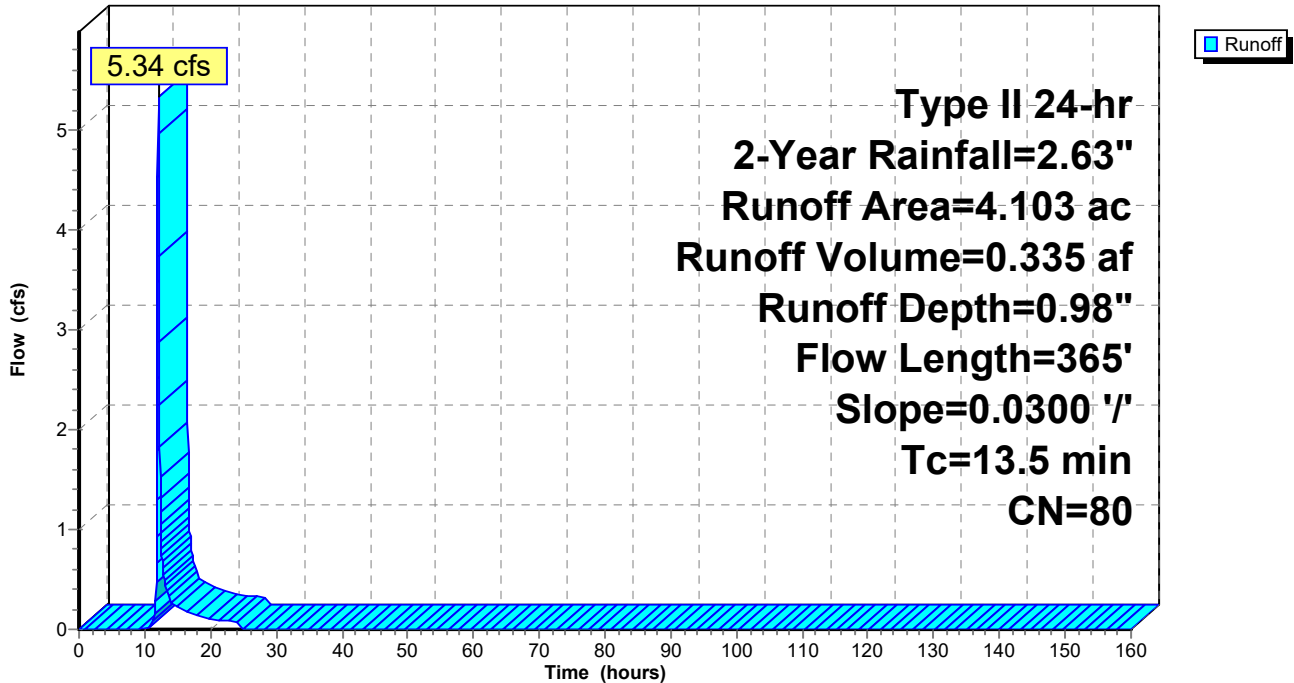
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 2-Year Rainfall=2.63"

Area (ac)	CN	Description
4.103	80	>75% Grass cover, Good, HSG D
4.103		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.0300	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 2.25"
3.6	265	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	365	Total			

Subcatchment 1S: Rehab Pre Dev

Hydrograph



Summary for Subcatchment 2S: Rehab Before Expansion

Runoff = 9.67 cfs @ 12.04 hrs, Volume= 0.591 af, Depth= 1.73"

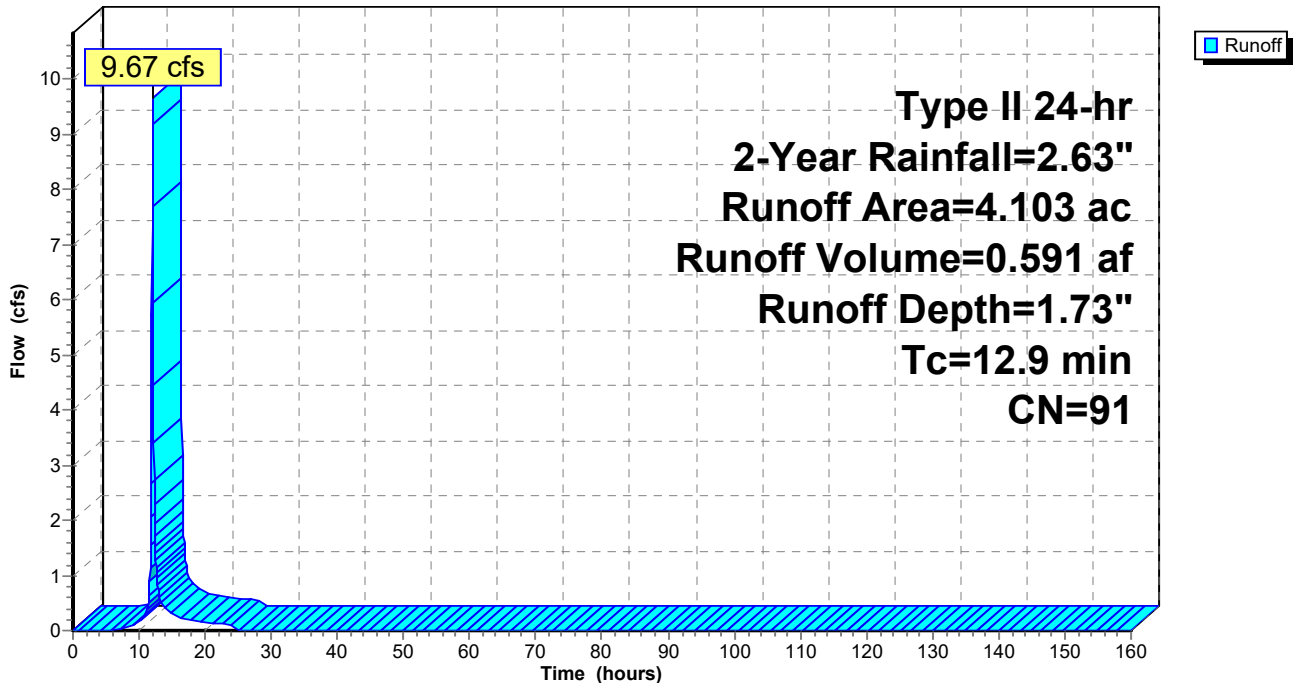
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 2-Year Rainfall=2.63"

Area (ac)	CN	Description
* 2.128	98	Impervious, HSG D
1.975	84	50-75% Grass cover, Fair, HSG D
4.103	91	Weighted Average
1.975		48.14% Pervious Area
2.128		51.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 2S: Rehab Before Expansion

Hydrograph



Summary for Subcatchment 3S: Un-detained

Runoff = 0.72 cfs @ 12.02 hrs, Volume= 0.040 af, Depth= 0.98"

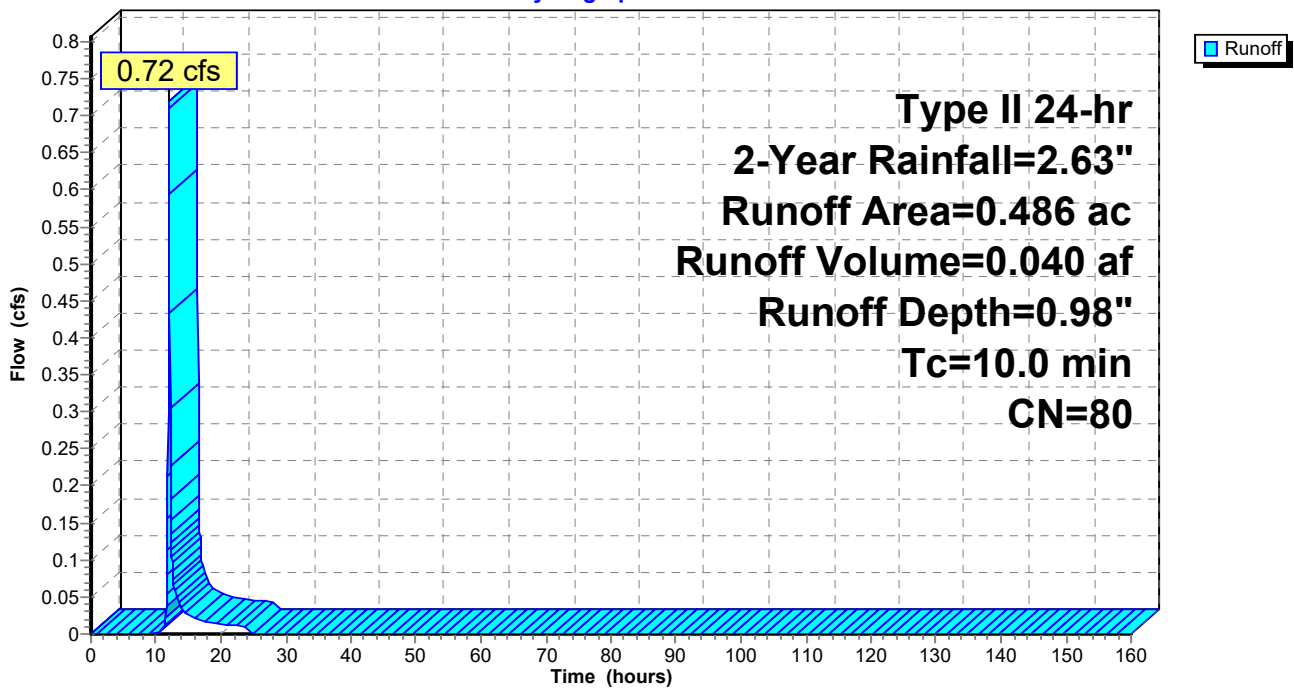
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 2-Year Rainfall=2.63"

Area (ac)	CN	Description
0.486	80	>75% Grass cover, Good, HSG D
0.486		100.00% Pervious Area

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

Subcatchment 3S: Un-detained

Hydrograph



Summary for Subcatchment 4S: REHAB WITH EXPANSION

Runoff = 10.08 cfs @ 12.04 hrs, Volume= 0.620 af, Depth= 1.81"
 Routed to Pond 4P : Rehab Storage

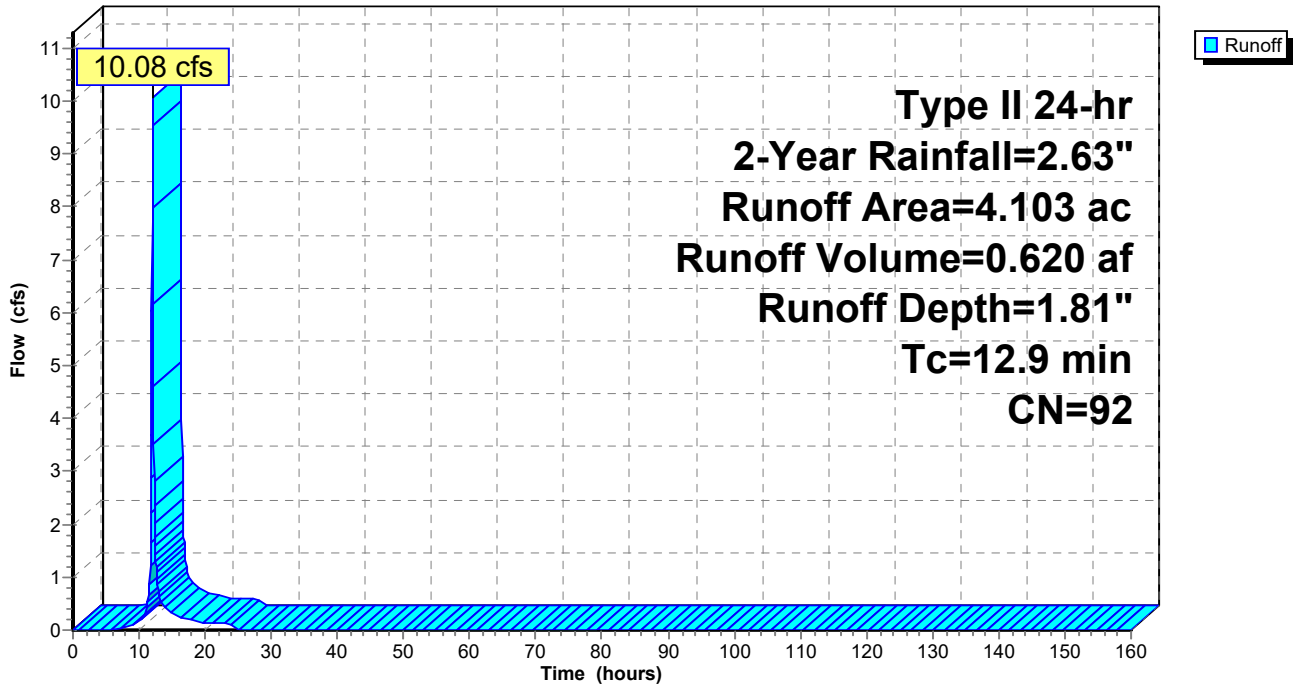
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 2-Year Rainfall=2.63"

Area (ac)	CN	Description
* 2.476	98	Impervious, HSG D
1.627	84	50-75% Grass cover, Fair, HSG D
4.103	92	Weighted Average
1.627		39.65% Pervious Area
2.476		60.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 4S: REHAB WITH EXPANSION

Hydrograph



Summary for Pond 4P: Rehab Storage

Inflow Area = 4.103 ac, 60.35% Impervious, Inflow Depth = 1.81" for 2-Year event
 Inflow = 10.08 cfs @ 12.04 hrs, Volume= 0.620 af
 Outflow = 0.03 cfs @ 24.25 hrs, Volume= 0.311 af, Atten= 100%, Lag= 732.3 min
 Primary = 0.03 cfs @ 24.25 hrs, Volume= 0.311 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 900.96' @ 24.25 hrs Surf.Area= 13,606 sf Storage= 25,729 cf

Plug-Flow detention time= 4,271.5 min calculated for 0.311 af (50% of inflow)
 Center-of-Mass det. time= 4,157.8 min (4,966.1 - 808.3)

Volume	Invert	Avail.Storage	Storage Description
#1	898.18'	73,564 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 '/'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 '/'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 '/'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 '/'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 '/'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 '/'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 '/'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 '/'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 '/'
#11D	898.80'	691 cf	6.25'W x 110.42'L x 3.50'H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		76,037 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.18	5,196	465.4	0	0	5,196
899.00	6,973	453.7	4,971	4,971	6,131
900.00	10,037	497.0	8,459	13,430	9,441
901.00	12,456	535.9	11,225	24,655	12,680
902.00	14,971	573.7	13,694	38,349	16,064
903.00	17,693	573.7	16,313	54,662	16,637
904.00	20,138	623.2	18,902	73,564	21,390

Dublin Rehab Institute As-Built 5-1-23

Type II 24-hr 2-Year Rainfall=2.63"

Prepared by E P Ferris & Associates, Inc

Printed 5/9/2023

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Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 ' S= 0.0556 ' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads 36.0" W x 6.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	903.05'	
#4	Secondary	903.36'	16.7' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.03 cfs @ 24.25 hrs HW=900.96' (Free Discharge)

- ↑ 1=Culvert (Passes 0.03 cfs of 4.51 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.03 cfs @ 7.98 fps)
- ↑ 3=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=898.18' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Rehab Storage - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

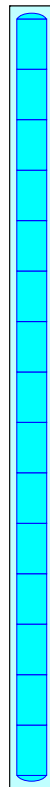
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

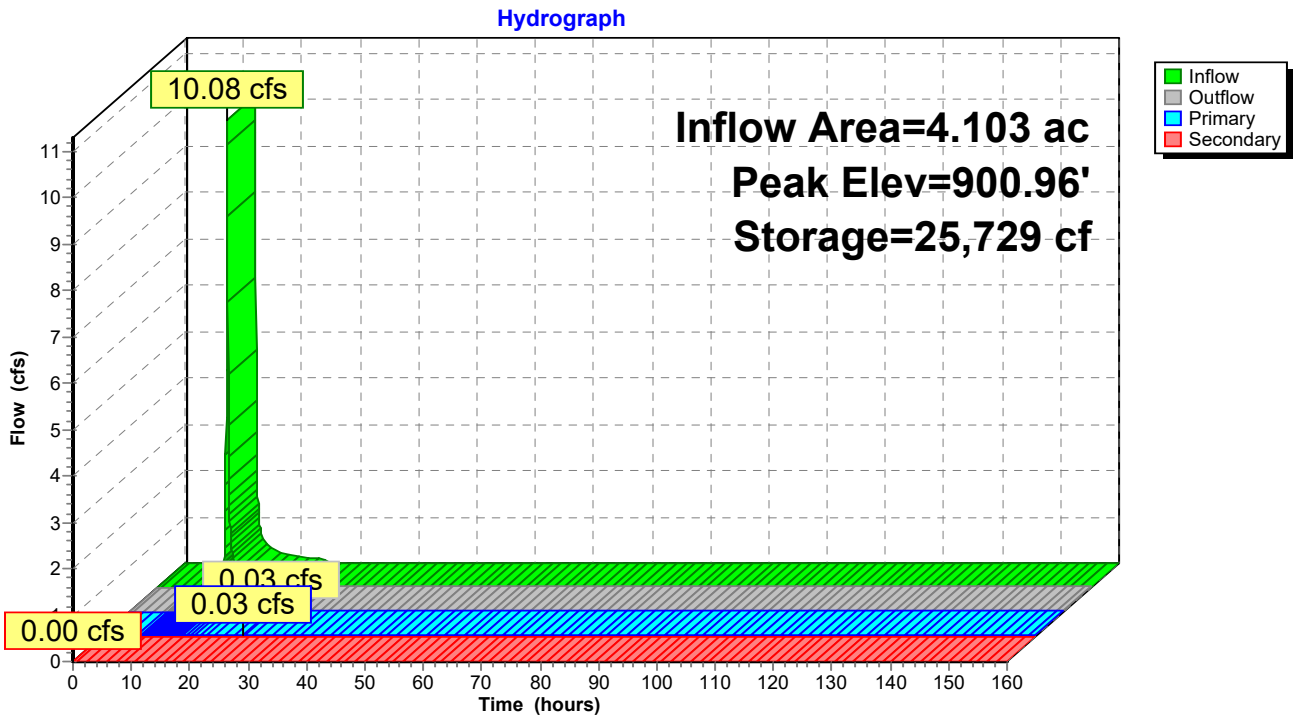
15 Chambers

89.5 cy Field

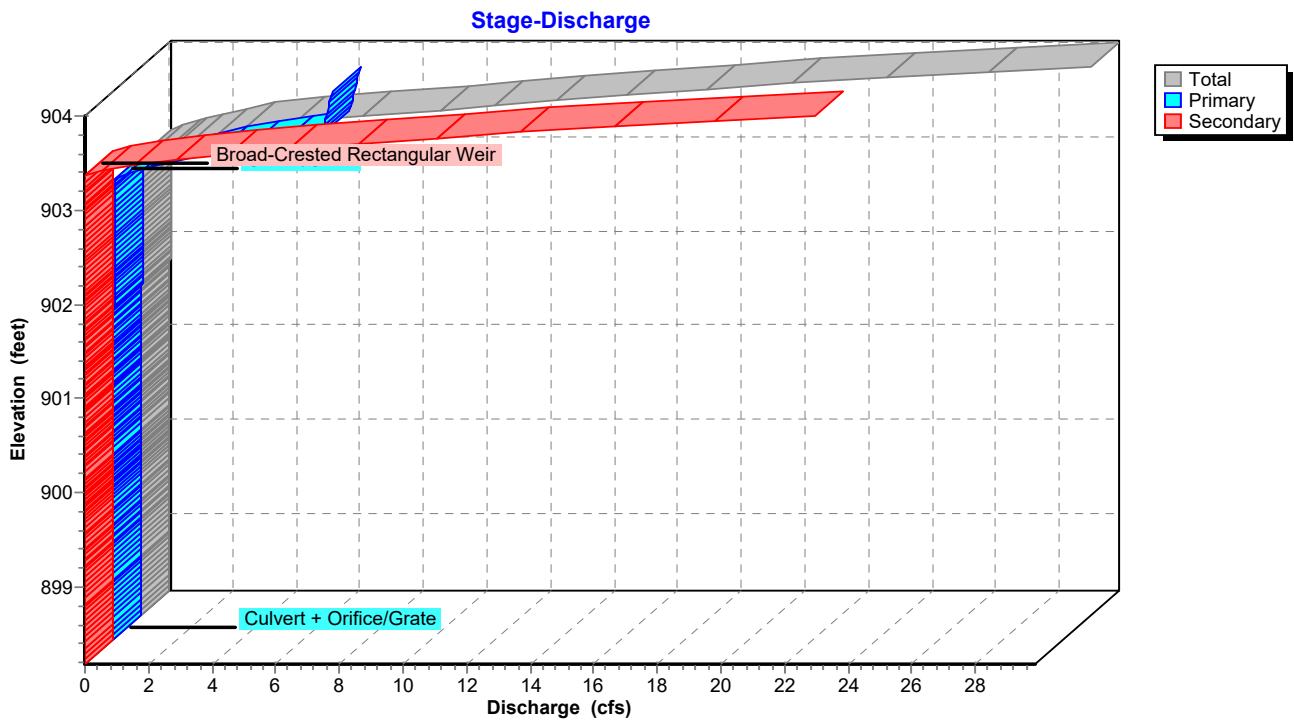
63.9 cy Stone



Pond 4P: Rehab Storage

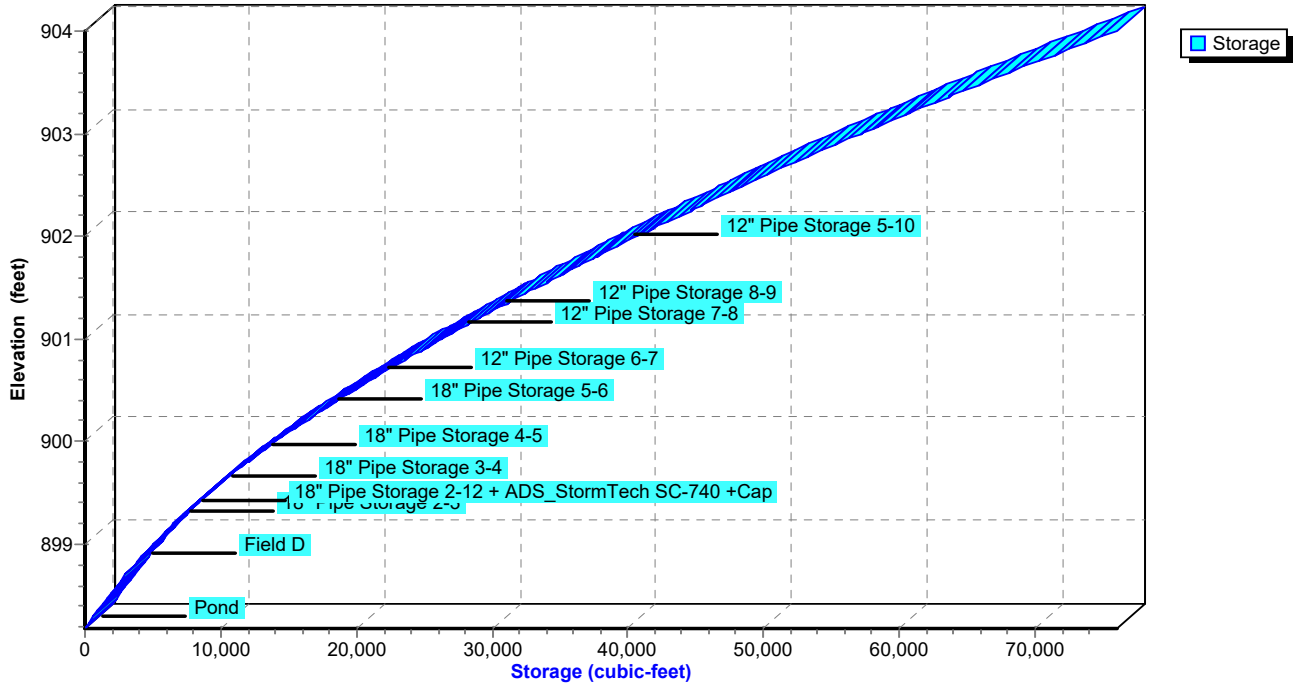


Pond 4P: Rehab Storage



Pond 4P: Rehab Storage

Stage-Area-Storage



Summary for Pond 5P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 903.05' Surf.Area= 18,399 sf Storage= 57,840 cf
 Peak Elev= 903.05' @ 0.00 hrs Surf.Area= 18,399 sf Storage= 57,840 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	898.00'	55,369 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 '/'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 '/'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 '/'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 '/'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 '/'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 '/'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 '/'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 '/'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 '/'
#11D	898.80'	691 cf	6.25"W x 110.42"L x 3.50"H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		57,841 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.00	4,473	367.8	0	0	4,473
899.00	6,974	453.7	5,677	5,677	10,104
900.00	10,037	497.0	8,459	14,137	13,414
901.00	12,456	535.9	11,225	25,361	16,653
902.00	14,971	573.9	13,694	39,056	20,054
903.00	17,693	597.9	16,313	55,369	22,367

Dublin Rehab Institute As-Built 5-1-23

Type II 24-hr 2-Year Rainfall=2.63"

Prepared by E P Ferris & Associates, Inc

Printed 5/9/2023

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Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 0.00 hrs HW=903.05' (Free Discharge)

↑ **1=Culvert** (Passes 0.04 cfs of 6.24 cfs potential flow)

↑ **2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 10.59 fps)

Pond 5P: WQv Drawdown - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

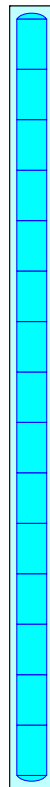
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

15 Chambers

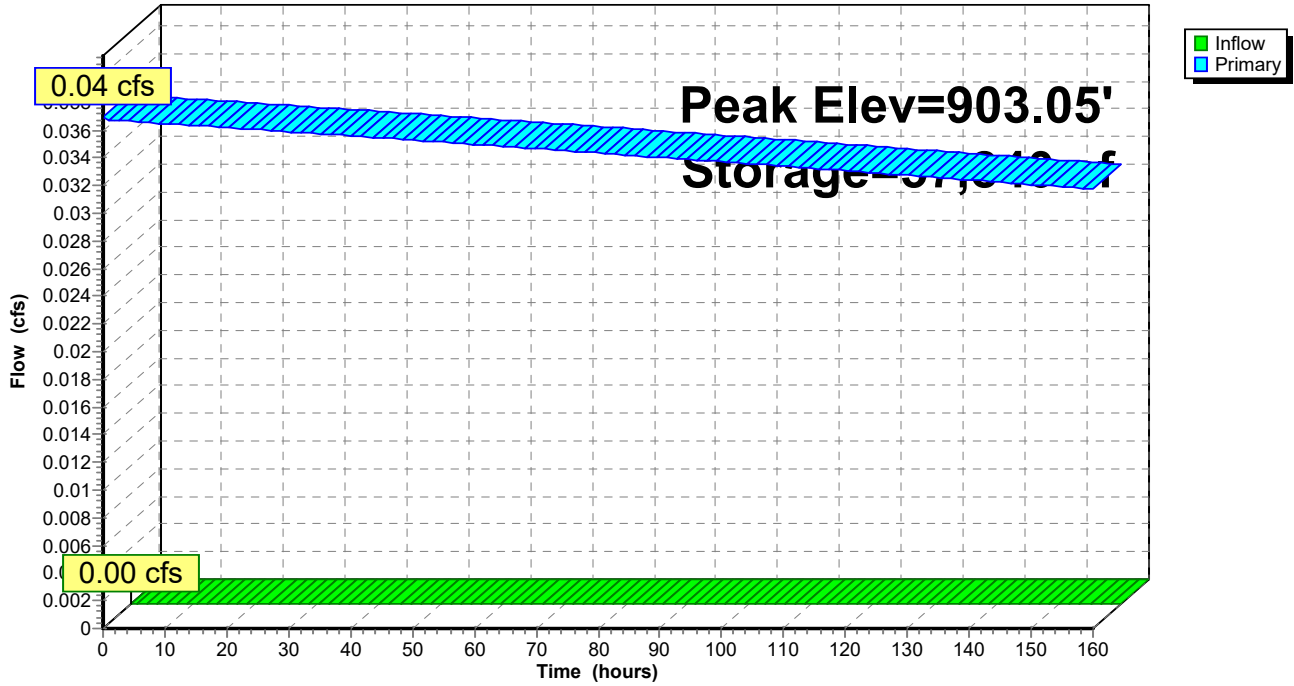
89.5 cy Field

63.9 cy Stone



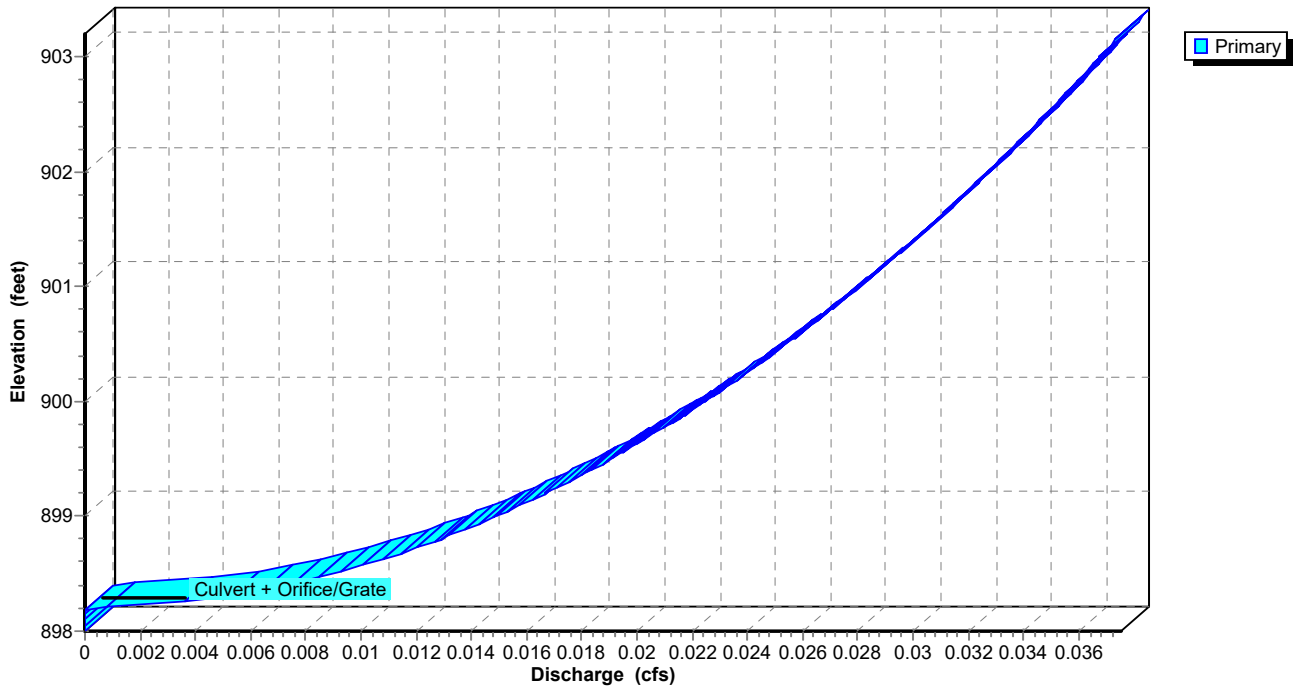
Pond 5P: WQv Drawdown

Hydrograph

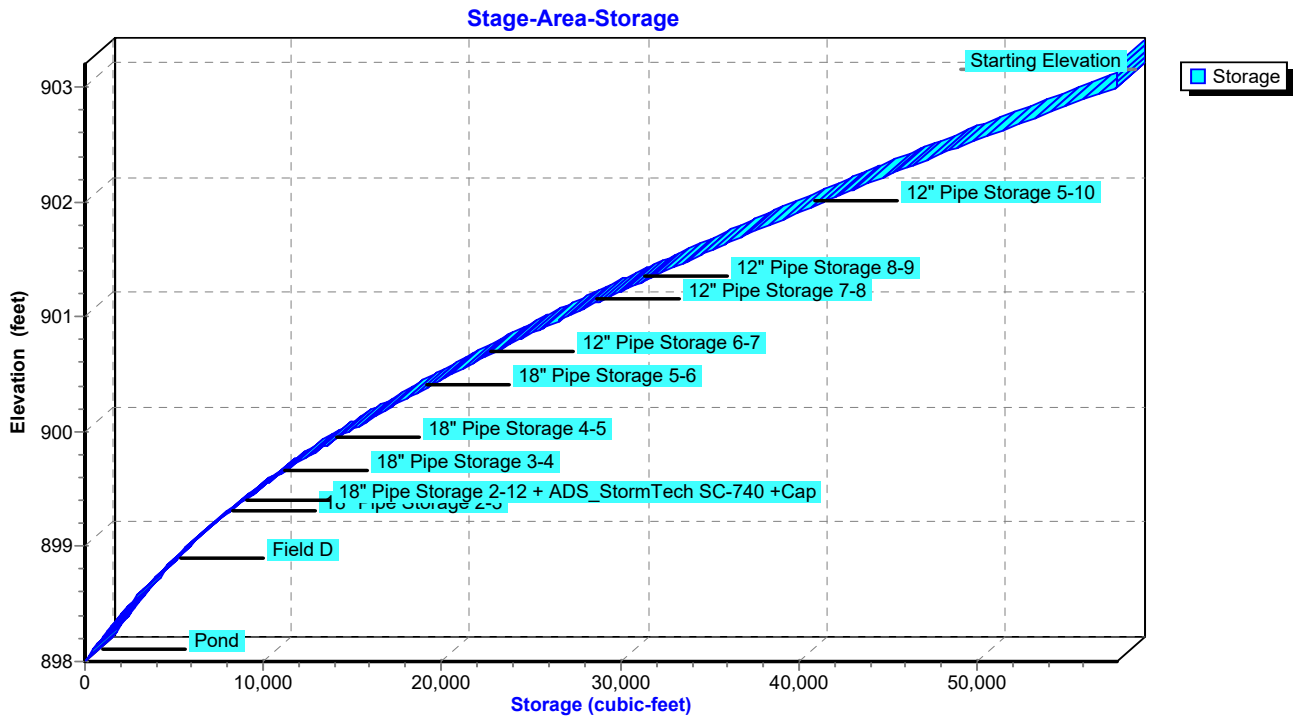


Pond 5P: WQv Drawdown

Stage-Discharge



Pond 5P: WQv Drawdown



Summary for Pond 6P: WQvForebayMicropool

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 896.00' Surf.Area= 1,704 sf Storage= 2,000 cf
 Peak Elev= 896.00' @ 0.00 hrs Surf.Area= 1,704 sf Storage= 2,000 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

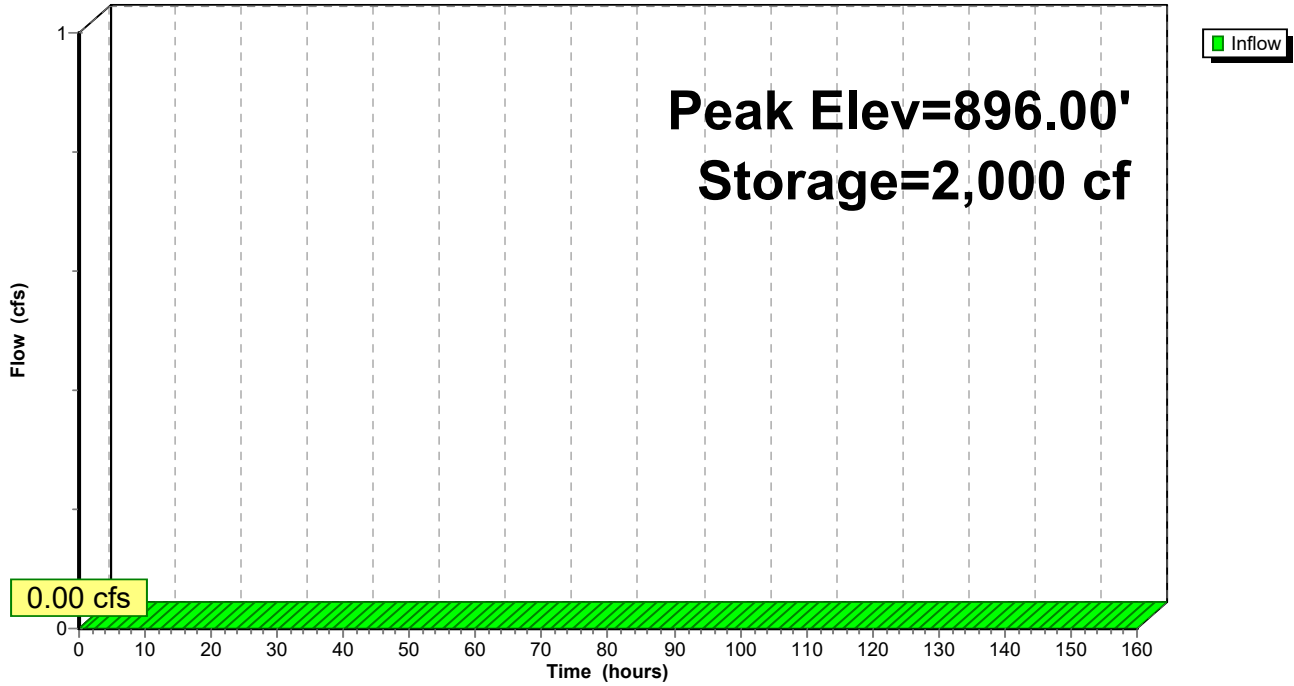
Volume	Invert	Avail.Storage	Storage Description
#1	895.00'	2,489 cf	Forebay (Irregular) Listed below (Recalc)
#2	893.00'	6,028 cf	MicroPool (Irregular) Listed below (Recalc)
		8,517 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
895.00	256	78.4	0	0	256
896.00	541	101.1	390	390	592
897.00	905	124.1	715	1,105	1,020
898.00	1,361	148.8	1,125	2,230	1,573
898.18	1,519	203.7	259	2,489	3,114

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
893.00	25	80.6	0	0	25
894.00	344	100.6	154	154	327
895.00	723	120.6	522	676	696
896.00	1,163	140.6	934	1,610	1,132
897.00	1,695	164.9	1,421	3,031	1,742
898.00	3,312	219.6	2,459	5,490	3,427
898.18	2,677	261.7	538	6,028	5,040

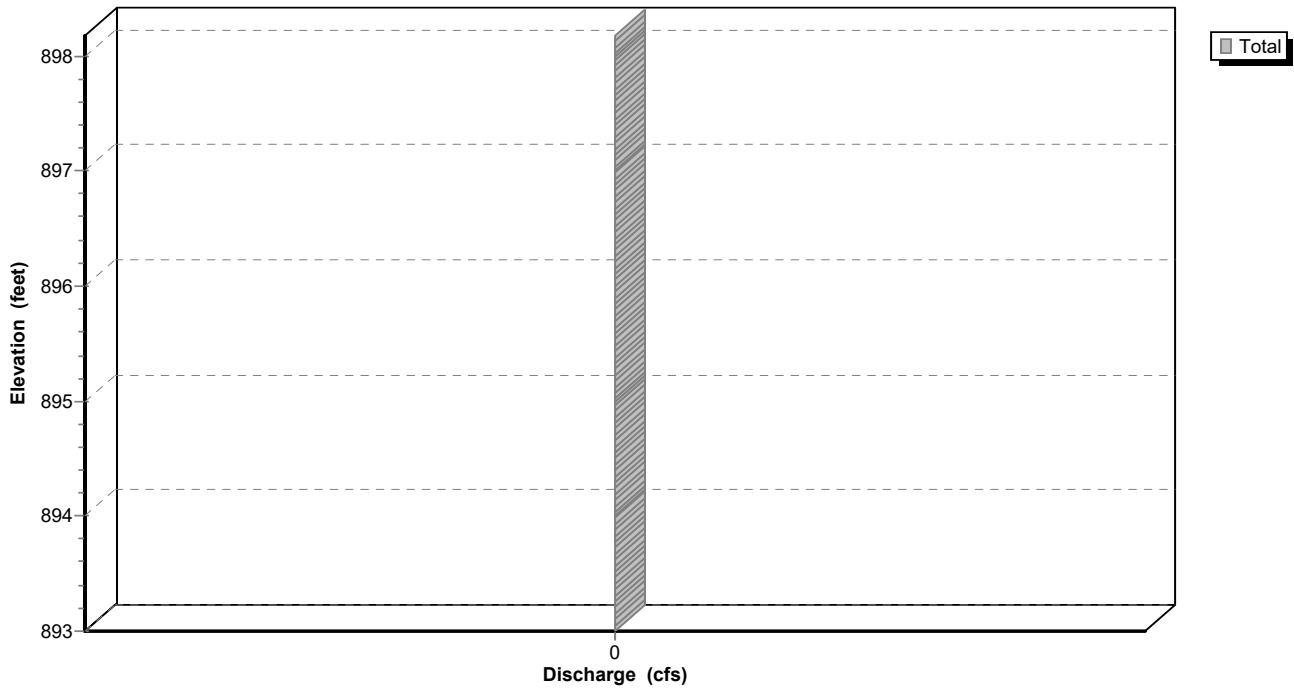
Pond 6P: WQvForebayMicropool

Hydrograph

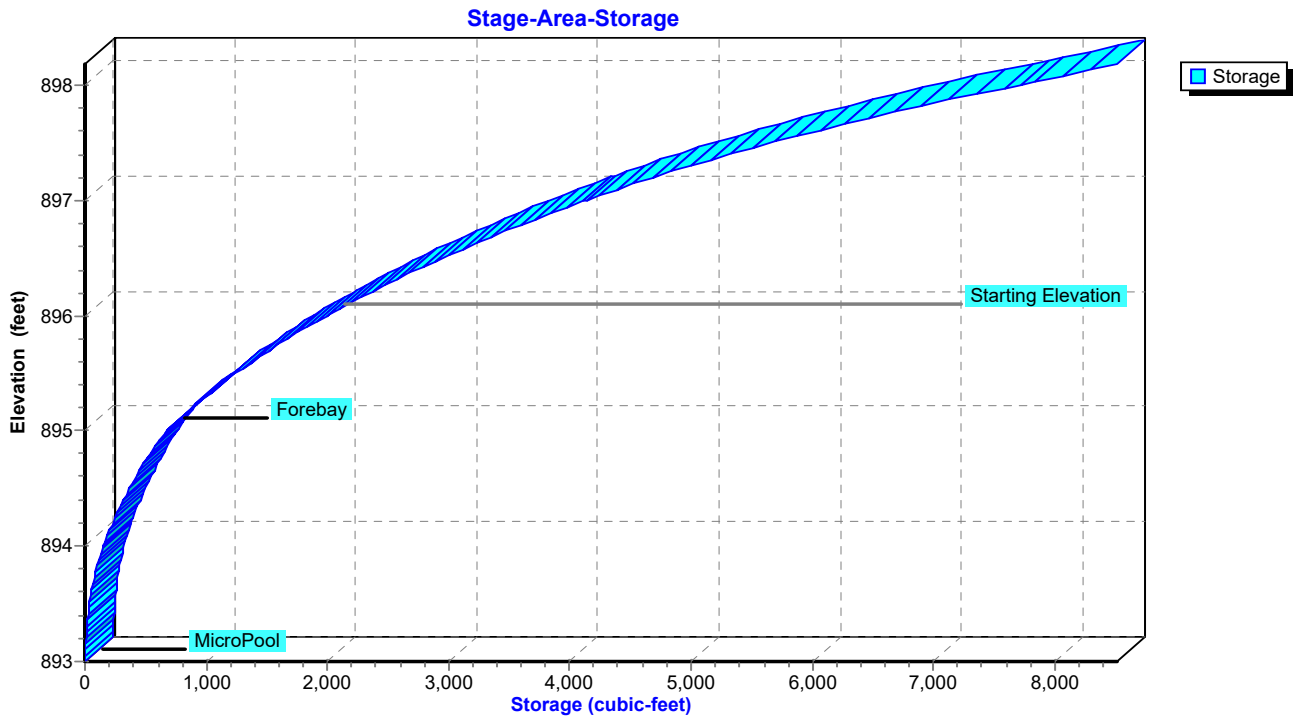


Pond 6P: WQvForebayMicropool

Stage-Discharge



Pond 6P: WQvForebayMicropool



Summary for Subcatchment 1S: Rehab Pre Dev

Runoff = 7.93 cfs @ 12.06 hrs, Volume= 0.490 af, Depth= 1.43"

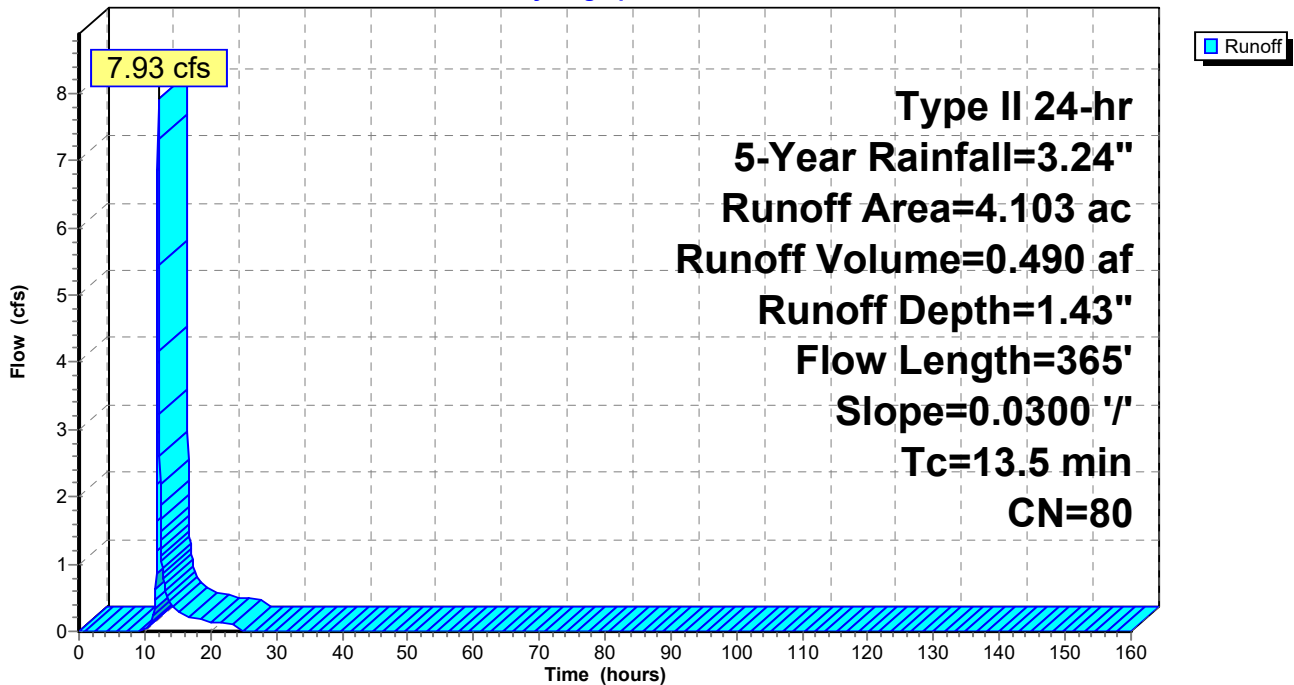
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 5-Year Rainfall=3.24"

Area (ac)	CN	Description
4.103	80	>75% Grass cover, Good, HSG D
4.103		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.0300	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 2.25"
3.6	265	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	365	Total			

Subcatchment 1S: Rehab Pre Dev

Hydrograph



Summary for Subcatchment 2S: Rehab Before Expansion

Runoff = 12.70 cfs @ 12.04 hrs, Volume= 0.785 af, Depth= 2.30"

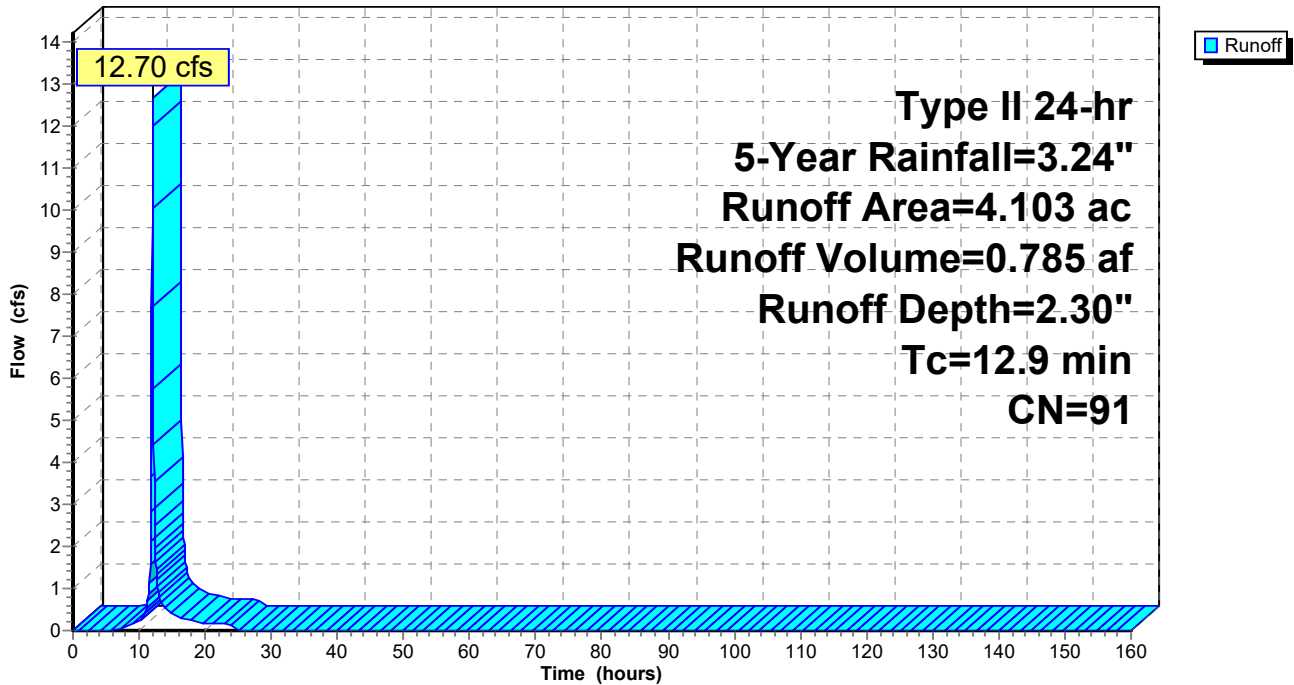
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 5-Year Rainfall=3.24"

Area (ac)	CN	Description
* 2.128	98	Impervious, HSG D
1.975	84	50-75% Grass cover, Fair, HSG D
4.103	91	Weighted Average
1.975		48.14% Pervious Area
2.128		51.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 2S: Rehab Before Expansion

Hydrograph



Summary for Subcatchment 3S: Un-detained

Runoff = 1.06 cfs @ 12.02 hrs, Volume= 0.058 af, Depth= 1.43"

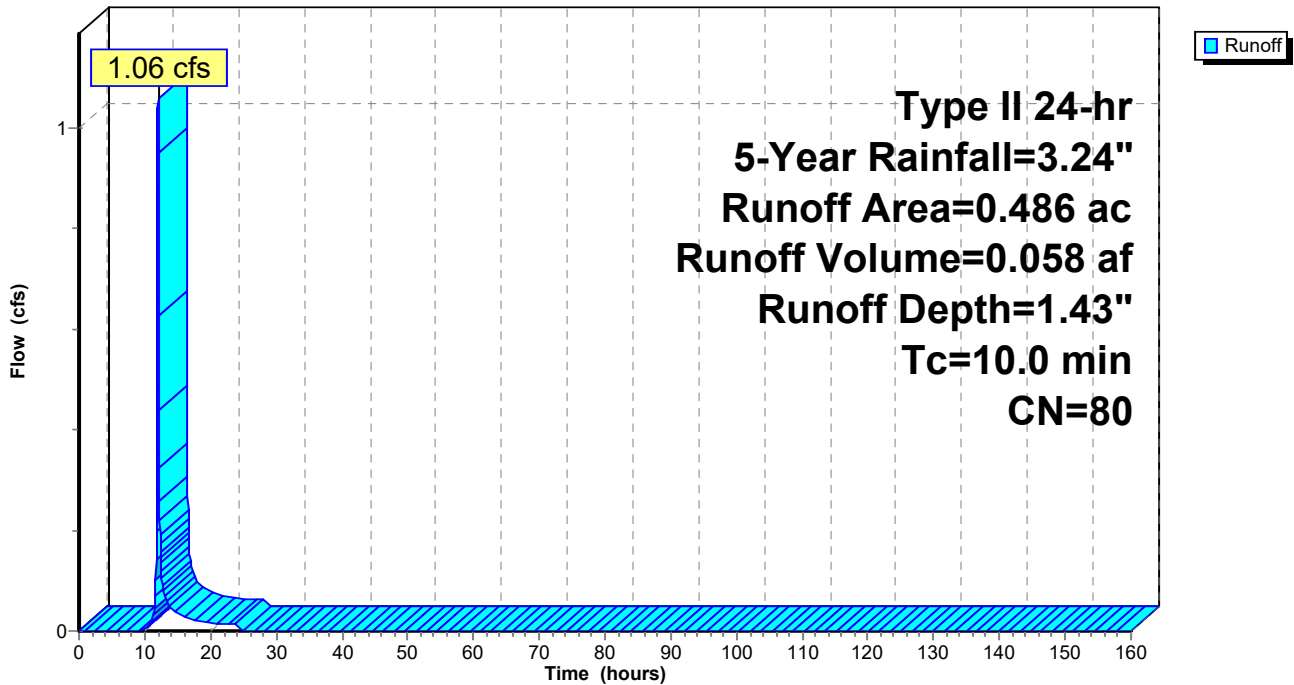
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 5-Year Rainfall=3.24"

Area (ac)	CN	Description
0.486	80	>75% Grass cover, Good, HSG D
0.486		100.00% Pervious Area

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

Subcatchment 3S: Un-detained

Hydrograph



Summary for Subcatchment 4S: REHAB WITH EXPANSION

Runoff = 13.11 cfs @ 12.04 hrs, Volume= 0.817 af, Depth= 2.39"

Routed to Pond 4P : Rehab Storage

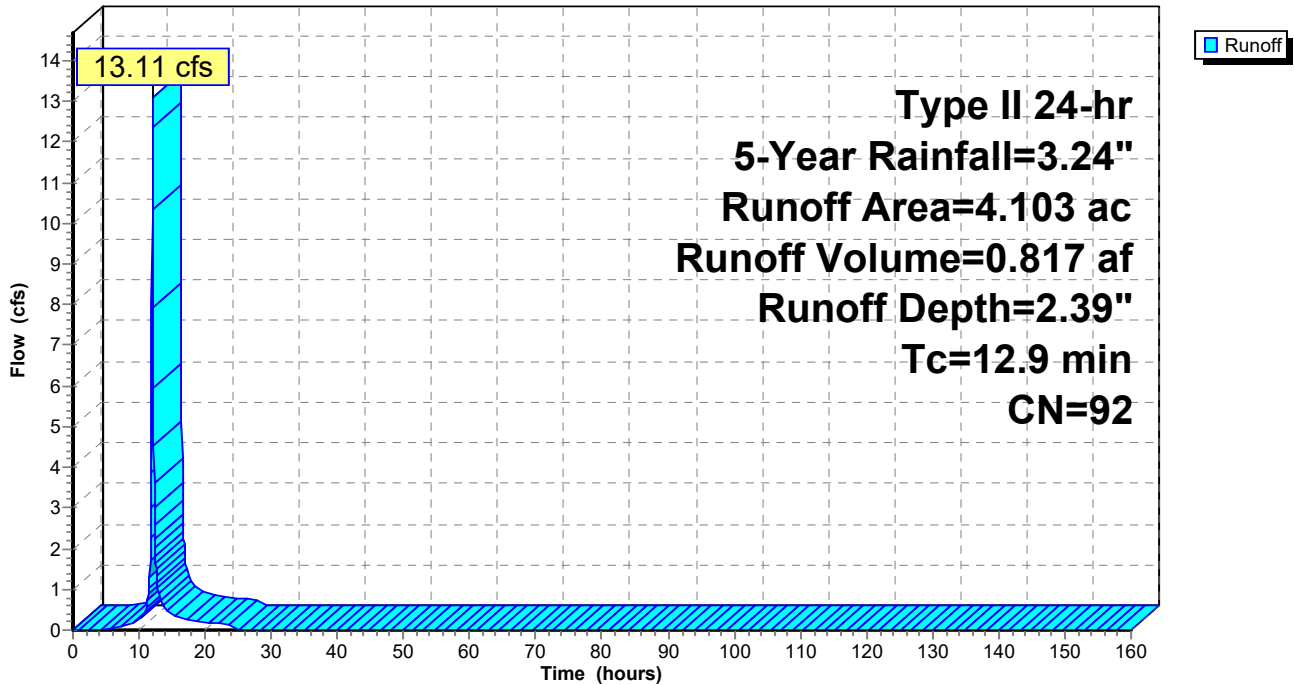
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 5-Year Rainfall=3.24"

Area (ac)	CN	Description
* 2.476	98	Impervious, HSG D
1.627	84	50-75% Grass cover, Fair, HSG D
4.103	92	Weighted Average
1.627		39.65% Pervious Area
2.476		60.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 4S: REHAB WITH EXPANSION

Hydrograph



Summary for Pond 4P: Rehab Storage

Inflow Area = 4.103 ac, 60.35% Impervious, Inflow Depth = 2.39" for 5-Year event
 Inflow = 13.11 cfs @ 12.04 hrs, Volume= 0.817 af
 Outflow = 0.03 cfs @ 24.26 hrs, Volume= 0.350 af, Atten= 100%, Lag= 733.0 min
 Primary = 0.03 cfs @ 24.26 hrs, Volume= 0.350 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 901.56' @ 24.26 hrs Surf.Area= 14,886 sf Storage= 34,117 cf

Plug-Flow detention time= 4,309.6 min calculated for 0.350 af (43% of inflow)
 Center-of-Mass det. time= 4,190.6 min (4,991.2 - 800.6)

Volume	Invert	Avail.Storage	Storage Description
#1	898.18'	73,564 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 '/'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 '/'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 '/'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 '/'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 '/'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 '/'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 '/'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 '/'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 '/'
#11D	898.80'	691 cf	6.25'W x 110.42'L x 3.50'H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		76,037 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.18	5,196	465.4	0	0	5,196
899.00	6,973	453.7	4,971	4,971	6,131
900.00	10,037	497.0	8,459	13,430	9,441
901.00	12,456	535.9	11,225	24,655	12,680
902.00	14,971	573.7	13,694	38,349	16,064
903.00	17,693	573.7	16,313	54,662	16,637
904.00	20,138	623.2	18,902	73,564	21,390

Dublin Rehab Institute As-Built 5-1-23

Type II 24-hr 5-Year Rainfall=3.24"

Prepared by E P Ferris & Associates, Inc

Printed 5/9/2023

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Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 ' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads 36.0" W x 6.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	903.05'	
#4	Secondary	903.36'	16.7' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.03 cfs @ 24.26 hrs HW=901.56' (Free Discharge)

- ↑ 1=Culvert (Passes 0.03 cfs of 5.07 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.03 cfs @ 8.81 fps)
- ↑ 3=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=898.18' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Rehab Storage - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

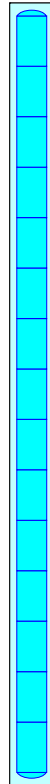
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

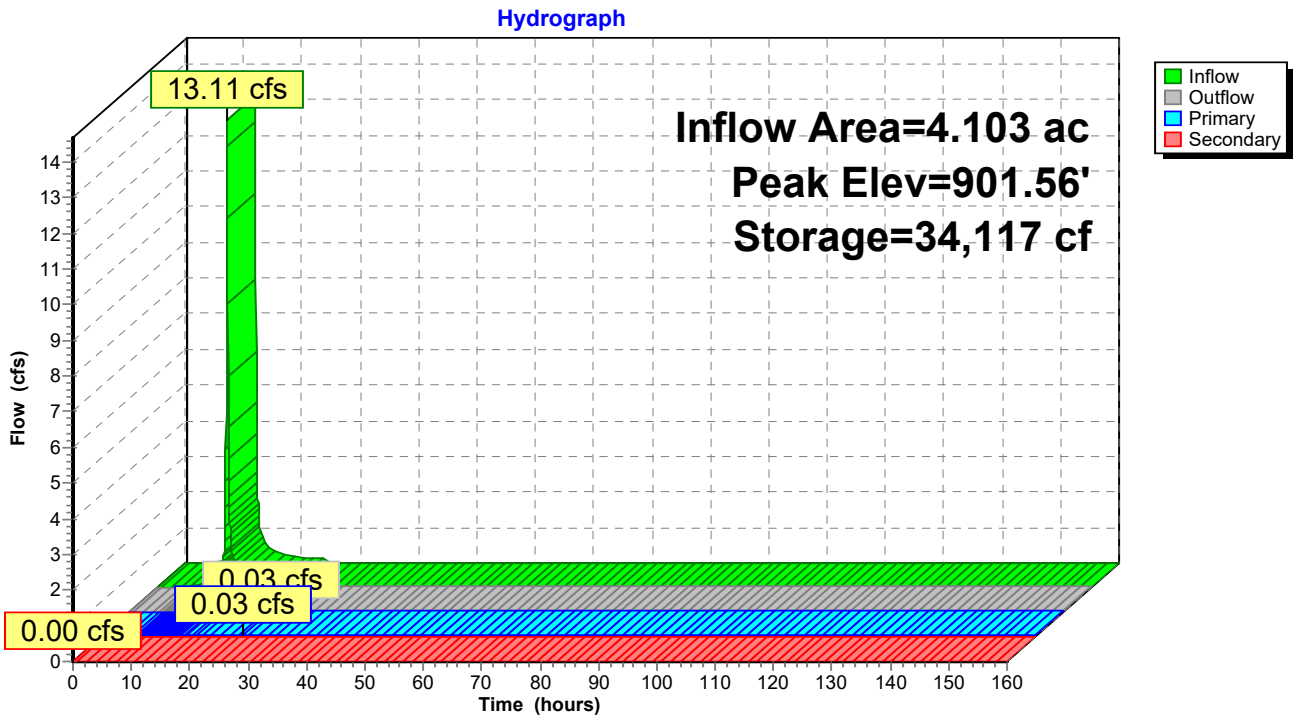
15 Chambers

89.5 cy Field

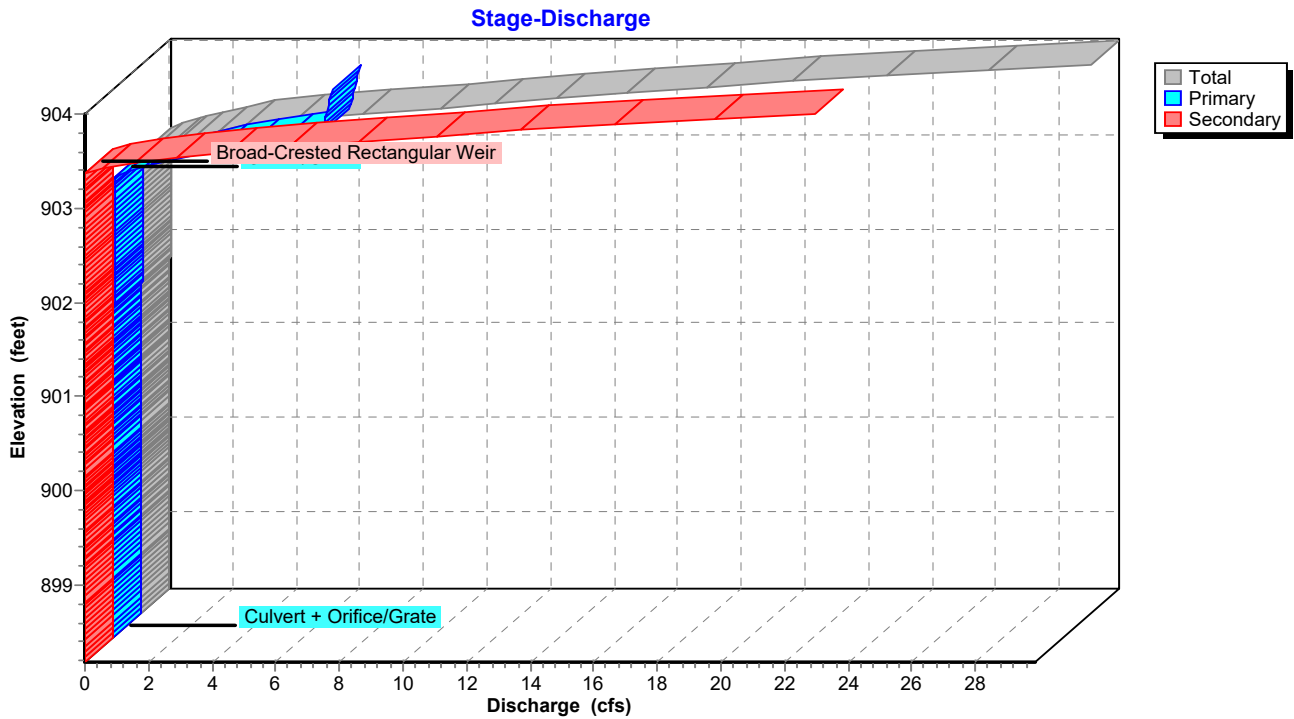
63.9 cy Stone



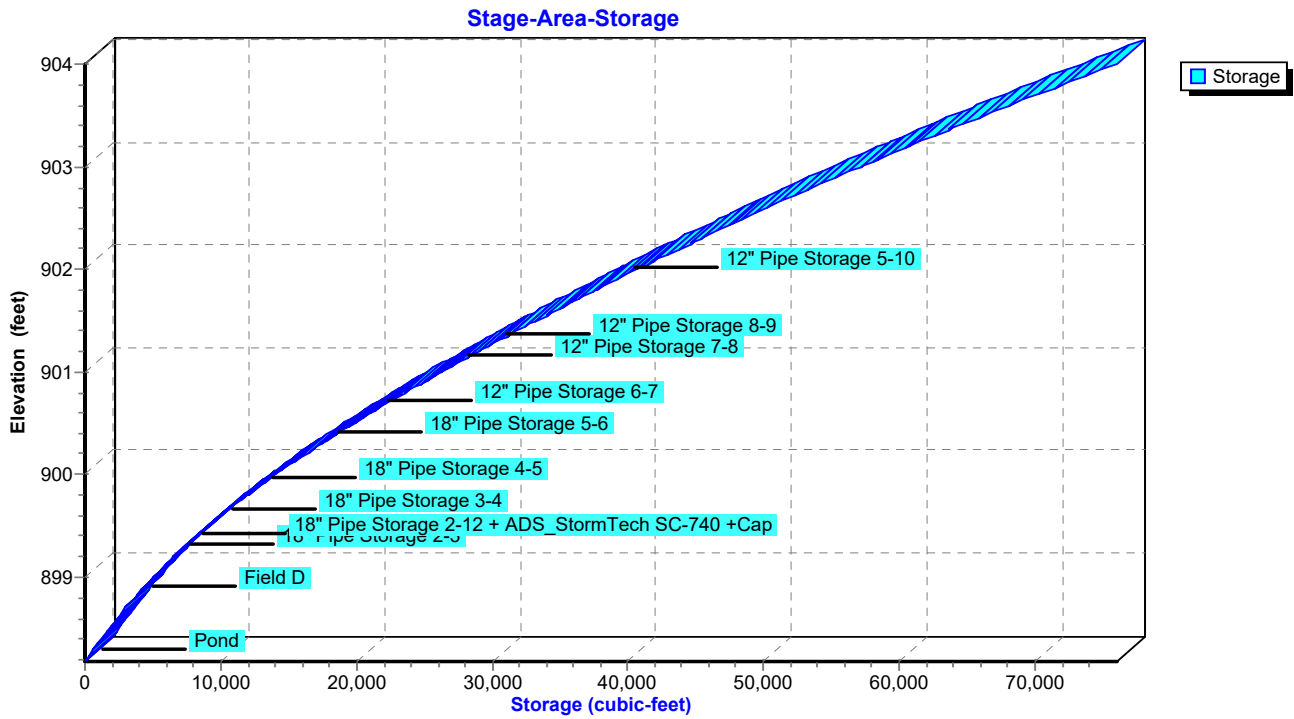
Pond 4P: Rehab Storage



Pond 4P: Rehab Storage



Pond 4P: Rehab Storage



Summary for Pond 5P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 903.05' Surf.Area= 18,399 sf Storage= 57,840 cf
 Peak Elev= 903.05' @ 0.00 hrs Surf.Area= 18,399 sf Storage= 57,840 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	898.00'	55,369 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 '/'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 '/'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 '/'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 '/'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 '/'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 '/'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 '/'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 '/'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 '/'
#11D	898.80'	691 cf	6.25"W x 110.42"L x 3.50"H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		57,841 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.00	4,473	367.8	0	0	4,473
899.00	6,974	453.7	5,677	5,677	10,104
900.00	10,037	497.0	8,459	14,137	13,414
901.00	12,456	535.9	11,225	25,361	16,653
902.00	14,971	573.9	13,694	39,056	20,054
903.00	17,693	597.9	16,313	55,369	22,367

Dublin Rehab Institute As-Built 5-1-23

Type II 24-hr 5-Year Rainfall=3.24"

Prepared by E P Ferris & Associates, Inc

Printed 5/9/2023

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Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 0.00 hrs HW=903.05' (Free Discharge)

↳ **1=Culvert** (Passes 0.04 cfs of 6.24 cfs potential flow)

↳ **2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 10.59 fps)

Pond 5P: WQv Drawdown - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

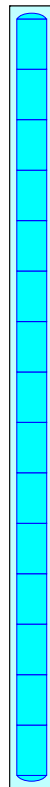
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

15 Chambers

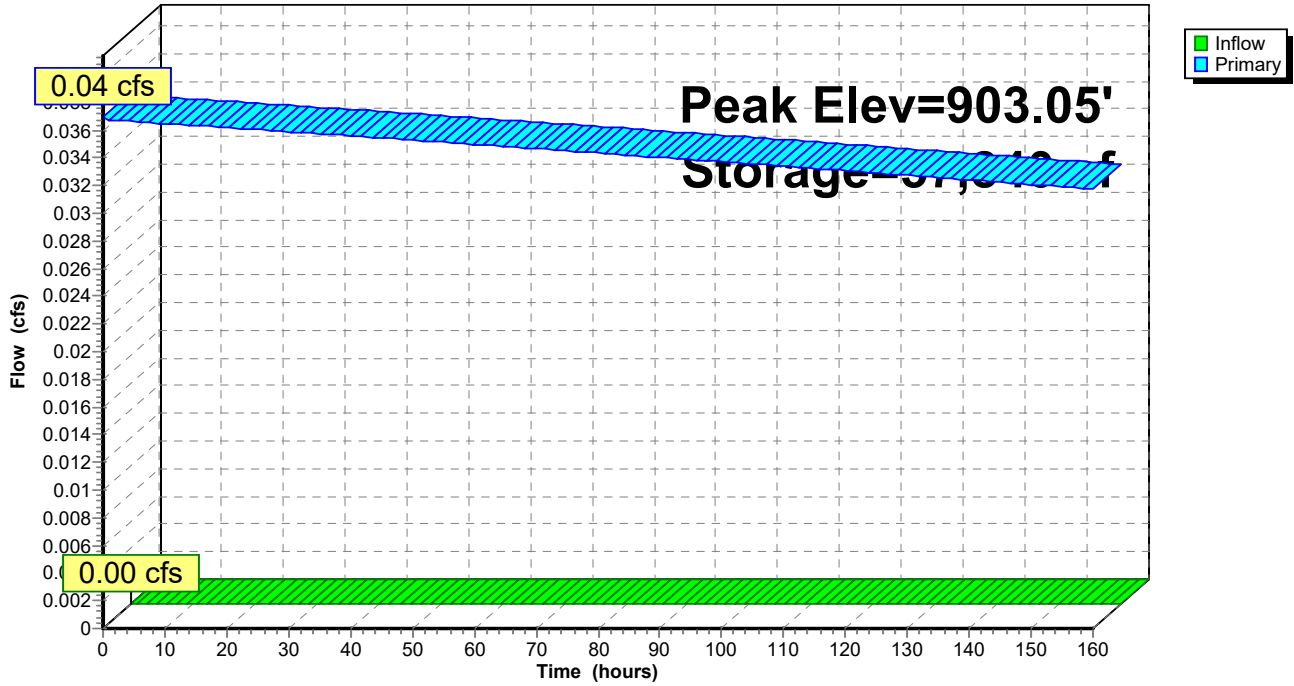
89.5 cy Field

63.9 cy Stone



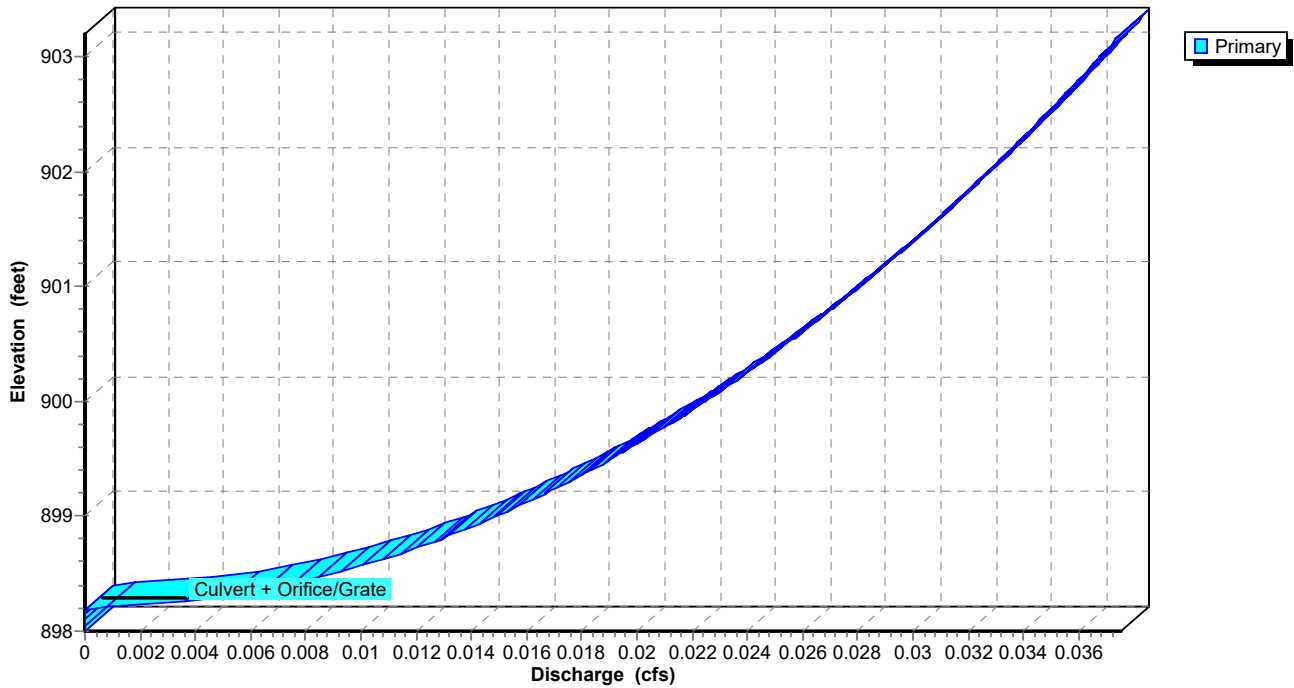
Pond 5P: WQv Drawdown

Hydrograph

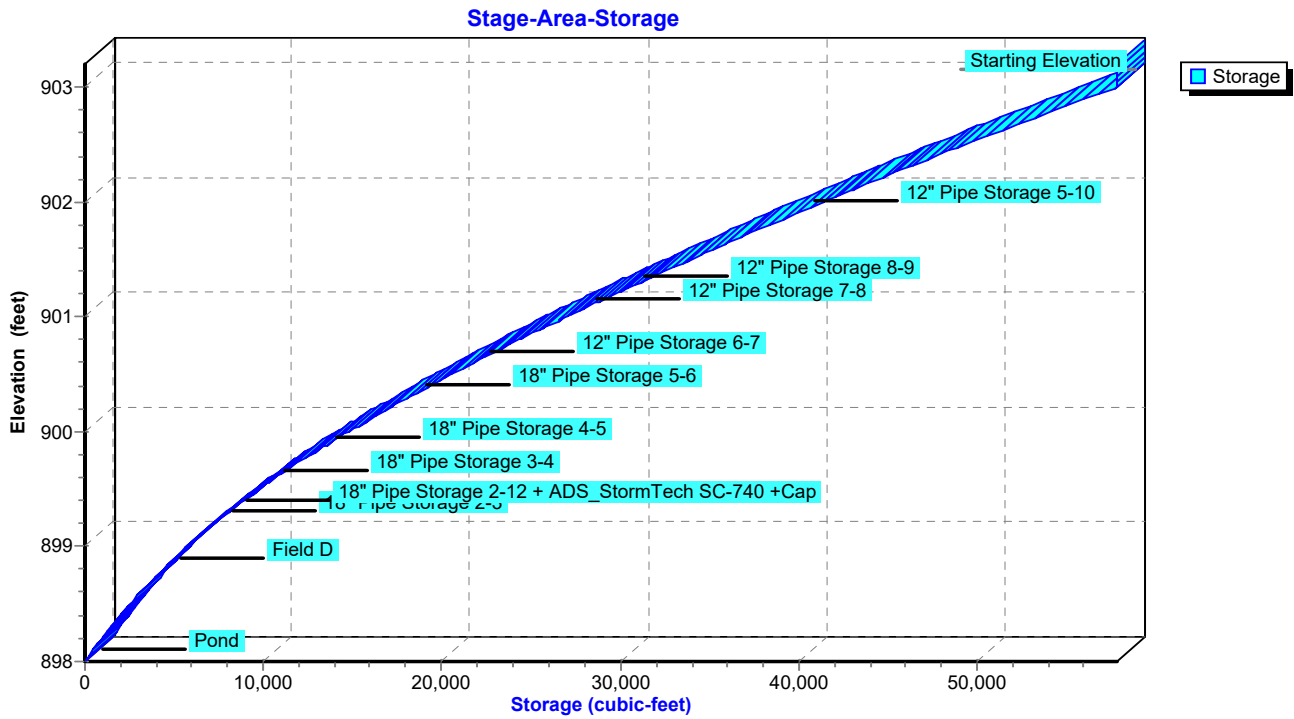


Pond 5P: WQv Drawdown

Stage-Discharge



Pond 5P: WQv Drawdown



Summary for Pond 6P: WQvForebayMicropool

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 896.00' Surf.Area= 1,704 sf Storage= 2,000 cf
 Peak Elev= 896.00' @ 0.00 hrs Surf.Area= 1,704 sf Storage= 2,000 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

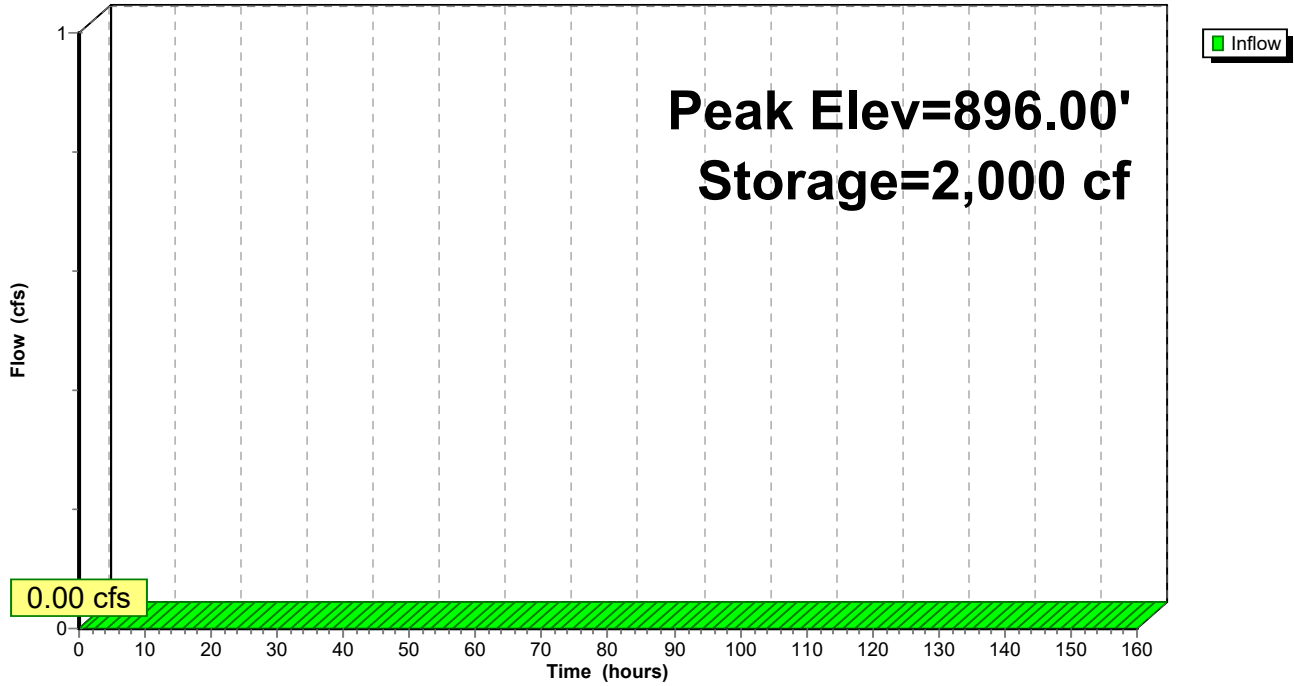
Volume	Invert	Avail.Storage	Storage Description
#1	895.00'	2,489 cf	Forebay (Irregular) Listed below (Recalc)
#2	893.00'	6,028 cf	MicroPool (Irregular) Listed below (Recalc)
		8,517 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
895.00	256	78.4	0	0	256
896.00	541	101.1	390	390	592
897.00	905	124.1	715	1,105	1,020
898.00	1,361	148.8	1,125	2,230	1,573
898.18	1,519	203.7	259	2,489	3,114

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
893.00	25	80.6	0	0	25
894.00	344	100.6	154	154	327
895.00	723	120.6	522	676	696
896.00	1,163	140.6	934	1,610	1,132
897.00	1,695	164.9	1,421	3,031	1,742
898.00	3,312	219.6	2,459	5,490	3,427
898.18	2,677	261.7	538	6,028	5,040

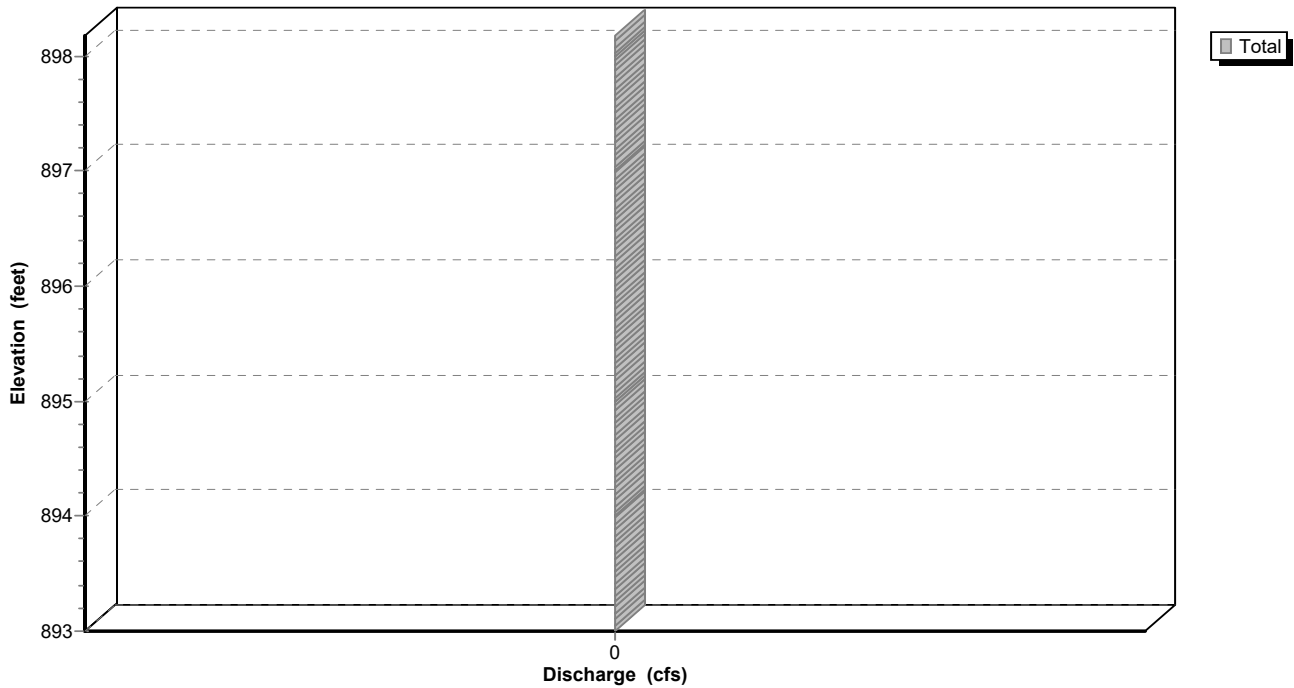
Pond 6P: WQvForebayMicropool

Hydrograph

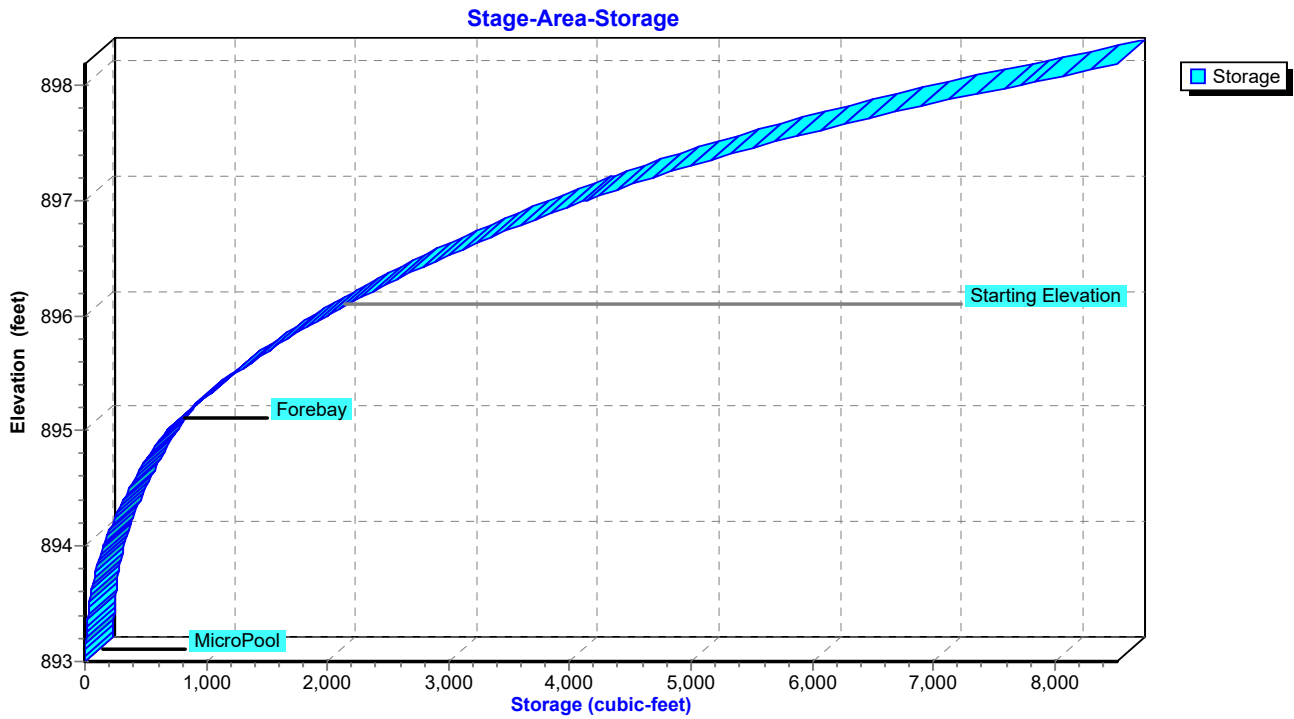


Pond 6P: WQvForebayMicropool

Stage-Discharge



Pond 6P: WQvForebayMicropool



Summary for Subcatchment 1S: Rehab Pre Dev

Runoff = 10.16 cfs @ 12.06 hrs, Volume= 0.625 af, Depth= 1.83"

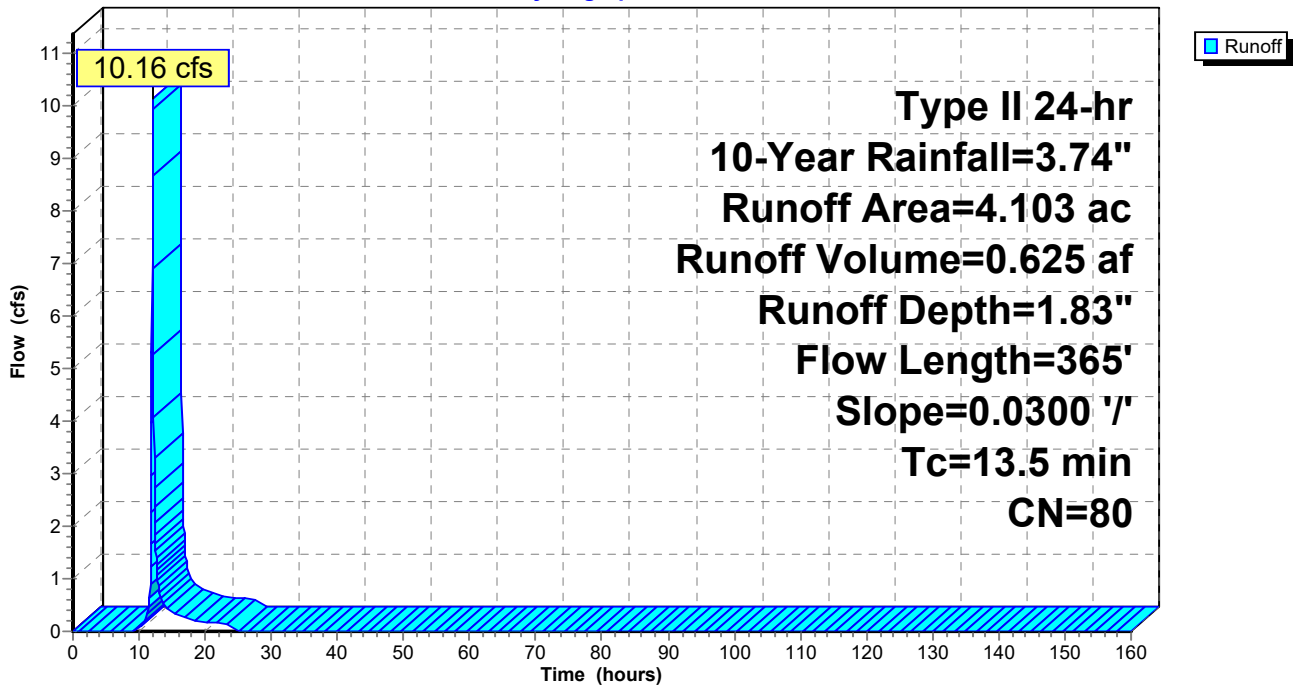
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 10-Year Rainfall=3.74"

Area (ac)	CN	Description
4.103	80	>75% Grass cover, Good, HSG D
4.103		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.0300	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 2.25"
3.6	265	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	365	Total			

Subcatchment 1S: Rehab Pre Dev

Hydrograph



Summary for Subcatchment 2S: Rehab Before Expansion

Runoff = 15.18 cfs @ 12.04 hrs, Volume= 0.947 af, Depth= 2.77"

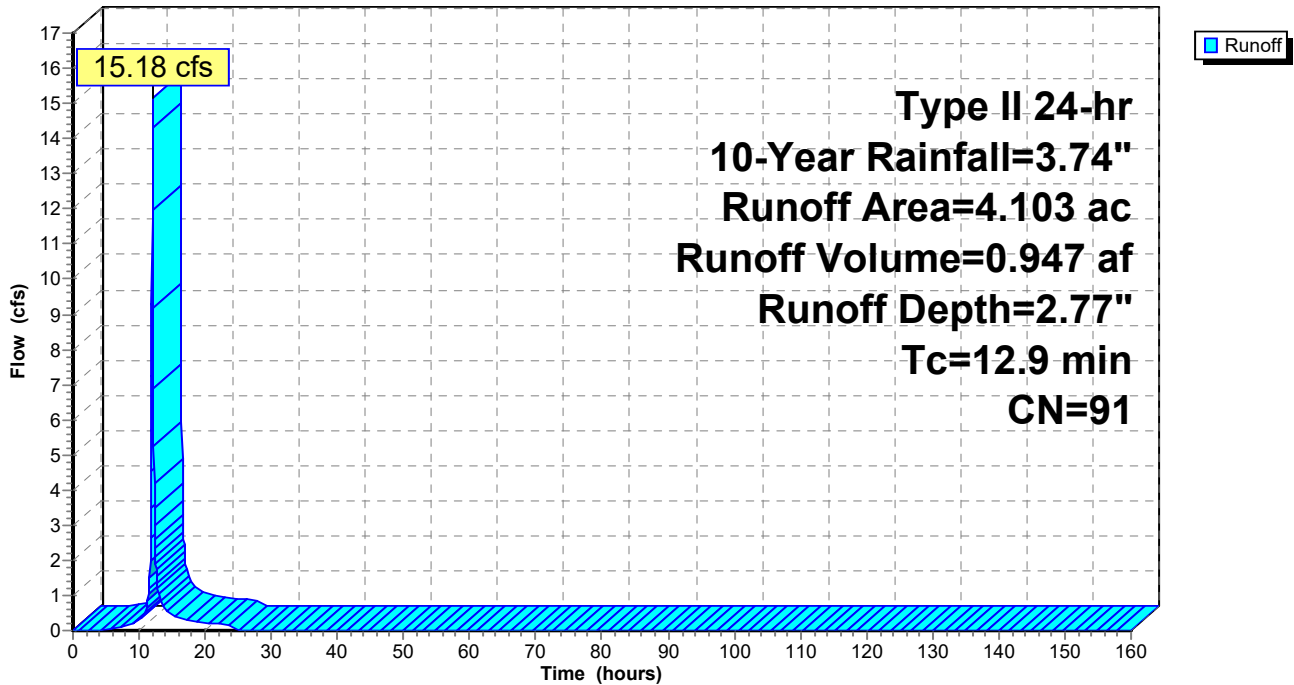
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 10-Year Rainfall=3.74"

Area (ac)	CN	Description
* 2.128	98	Impervious, HSG D
1.975	84	50-75% Grass cover, Fair, HSG D
4.103	91	Weighted Average
1.975		48.14% Pervious Area
2.128		51.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 2S: Rehab Before Expansion

Hydrograph



Summary for Subcatchment 3S: Un-detained

Runoff = 1.36 cfs @ 12.02 hrs, Volume= 0.074 af, Depth= 1.83"

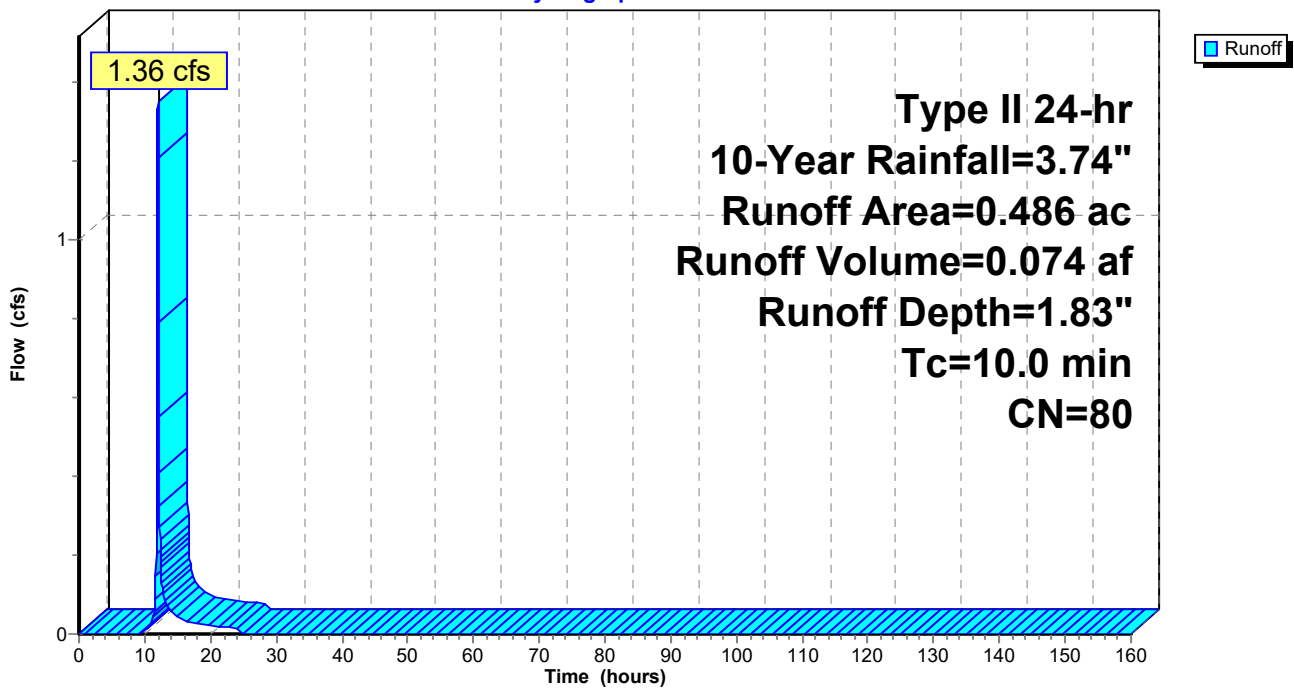
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 10-Year Rainfall=3.74"

Area (ac)	CN	Description
0.486	80	>75% Grass cover, Good, HSG D
0.486		100.00% Pervious Area

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

Subcatchment 3S: Un-detained

Hydrograph



Summary for Subcatchment 4S: REHAB WITH EXPANSION

Runoff = 15.59 cfs @ 12.04 hrs, Volume= 0.980 af, Depth= 2.87"
 Routed to Pond 4P : Rehab Storage

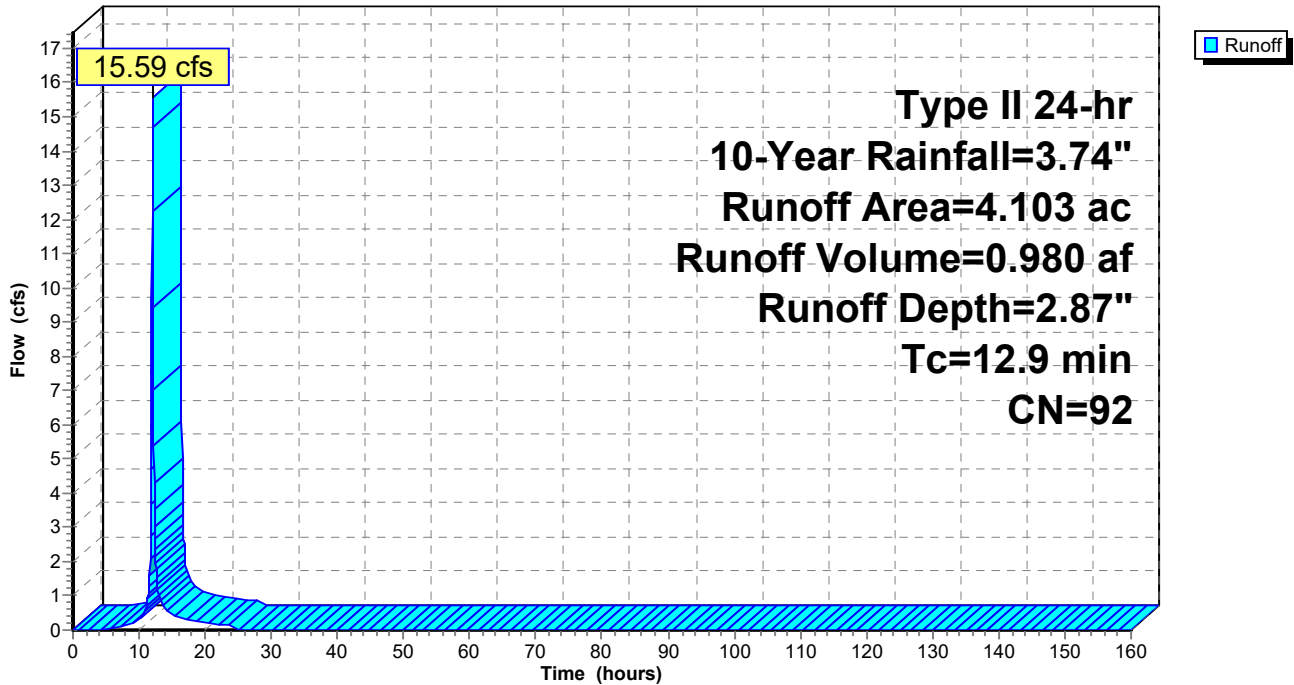
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 10-Year Rainfall=3.74"

Area (ac)	CN	Description
* 2.476	98	Impervious, HSG D
1.627	84	50-75% Grass cover, Fair, HSG D
4.103	92	Weighted Average
1.627		39.65% Pervious Area
2.476		60.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 4S: REHAB WITH EXPANSION

Hydrograph



Summary for Pond 4P: Rehab Storage

Inflow Area = 4.103 ac, 60.35% Impervious, Inflow Depth = 2.87" for 10-Year event
 Inflow = 15.59 cfs @ 12.04 hrs, Volume= 0.980 af
 Outflow = 0.03 cfs @ 24.27 hrs, Volume= 0.378 af, Atten= 100%, Lag= 733.6 min
 Primary = 0.03 cfs @ 24.27 hrs, Volume= 0.378 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 902.03' @ 24.27 hrs Surf.Area= 15,823 sf Storage= 41,114 cf

Plug-Flow detention time= 4,332.2 min calculated for 0.378 af (39% of inflow)
 Center-of-Mass det. time= 4,206.8 min (5,002.2 - 795.5)

Volume	Invert	Avail.Storage	Storage Description
#1	898.18'	73,564 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 '/'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 '/'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 '/'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 '/'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 '/'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 '/'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 '/'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 '/'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 '/'
#11D	898.80'	691 cf	6.25'W x 110.42'L x 3.50'H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		76,037 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.18	5,196	465.4	0	0	5,196
899.00	6,973	453.7	4,971	4,971	6,131
900.00	10,037	497.0	8,459	13,430	9,441
901.00	12,456	535.9	11,225	24,655	12,680
902.00	14,971	573.7	13,694	38,349	16,064
903.00	17,693	573.7	16,313	54,662	16,637
904.00	20,138	623.2	18,902	73,564	21,390

Dublin Rehab Institute As-Built 5-1-23

Type II 24-hr 10-Year Rainfall=3.74"

Prepared by E P Ferris & Associates, Inc

Printed 5/9/2023

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Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads 36.0" W x 6.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	903.05'	
#4	Secondary	903.36'	16.7' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.03 cfs @ 24.27 hrs HW=902.03' (Free Discharge)

- ↑ 1=Culvert (Passes 0.03 cfs of 5.46 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.03 cfs @ 9.40 fps)
- ↑ 3=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=898.18' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Rehab Storage - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

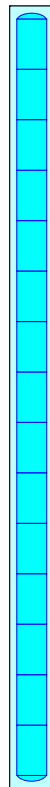
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

15 Chambers

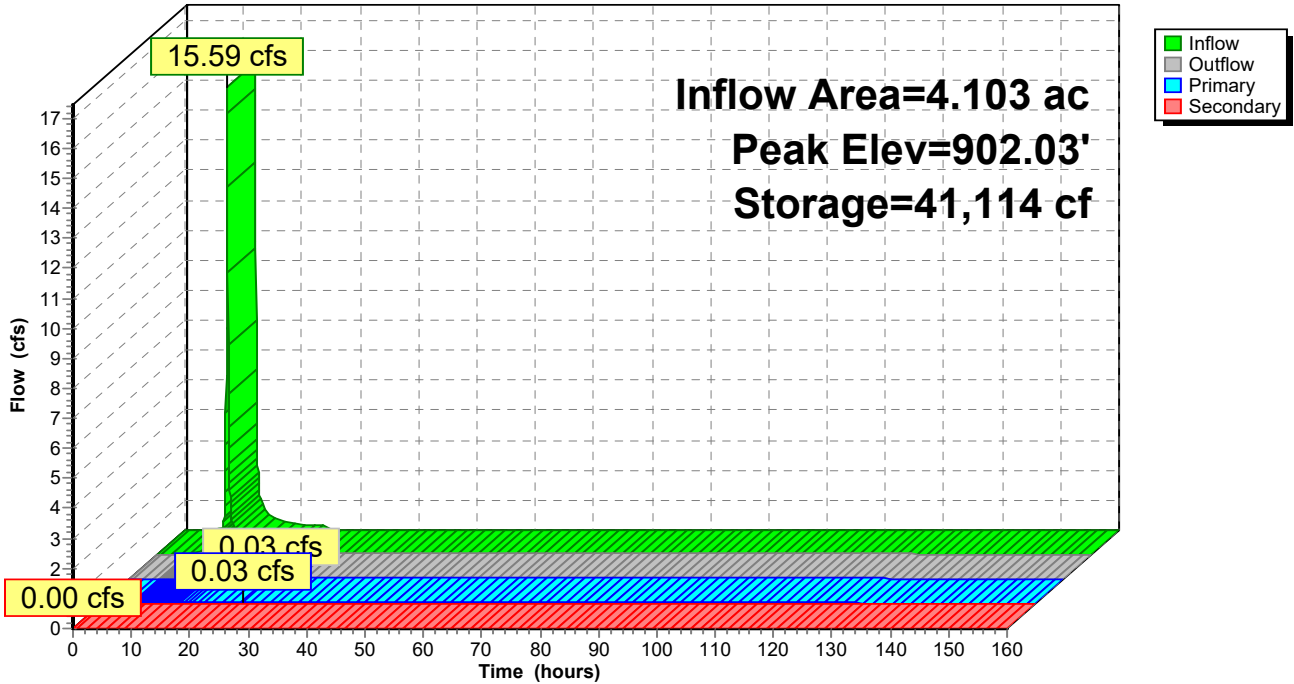
89.5 cy Field

63.9 cy Stone



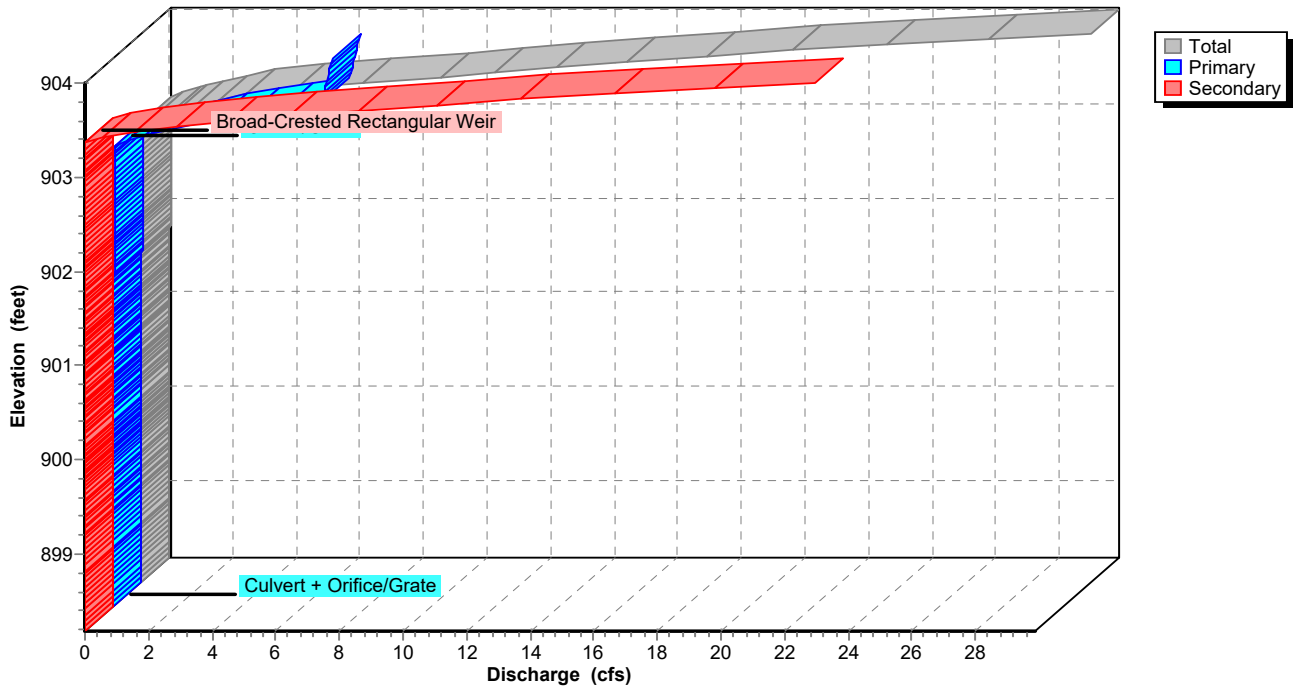
Pond 4P: Rehab Storage

Hydrograph

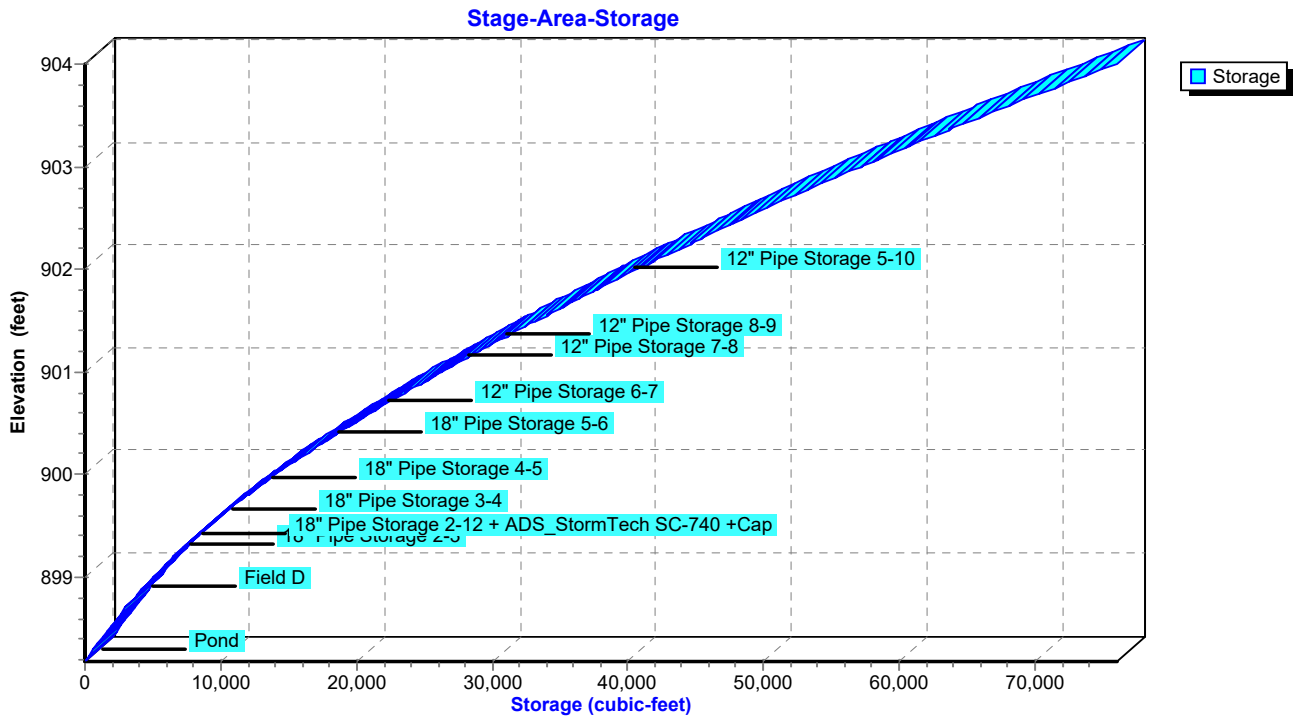


Pond 4P: Rehab Storage

Stage-Discharge



Pond 4P: Rehab Storage



Summary for Pond 5P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 903.05' Surf.Area= 18,399 sf Storage= 57,840 cf
 Peak Elev= 903.05' @ 0.00 hrs Surf.Area= 18,399 sf Storage= 57,840 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	898.00'	55,369 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 '/'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 '/'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 '/'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 '/'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 '/'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 '/'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 '/'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 '/'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 '/'
#11D	898.80'	691 cf	6.25"W x 110.42"L x 3.50"H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		57,841 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.00	4,473	367.8	0	0	4,473
899.00	6,974	453.7	5,677	5,677	10,104
900.00	10,037	497.0	8,459	14,137	13,414
901.00	12,456	535.9	11,225	25,361	16,653
902.00	14,971	573.9	13,694	39,056	20,054
903.00	17,693	597.9	16,313	55,369	22,367

Dublin Rehab Institute As-Built 5-1-23

Type II 24-hr 10-Year Rainfall=3.74"

Prepared by E P Ferris & Associates, Inc

Printed 5/9/2023

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Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 0.00 hrs HW=903.05' (Free Discharge)

↑ **1=Culvert** (Passes 0.04 cfs of 6.24 cfs potential flow)

↑ **2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 10.59 fps)

Pond 5P: WQv Drawdown - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

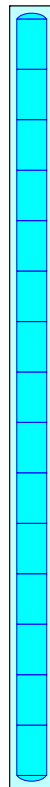
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

15 Chambers

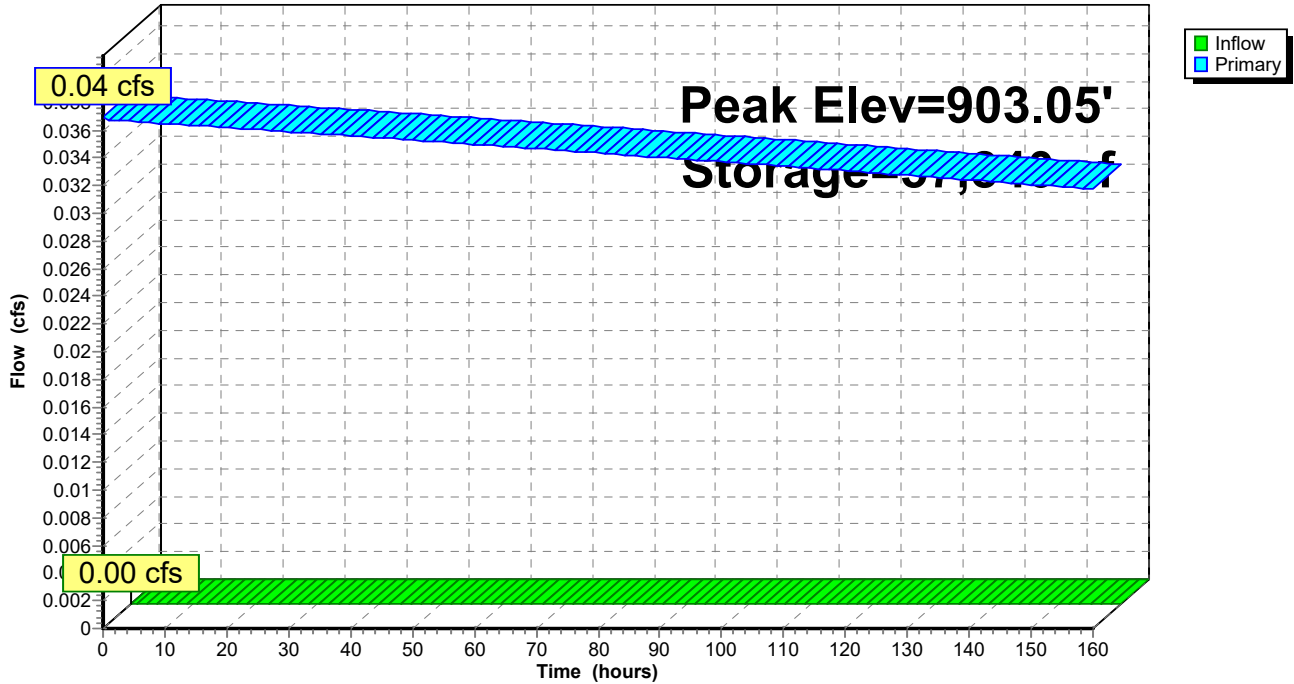
89.5 cy Field

63.9 cy Stone



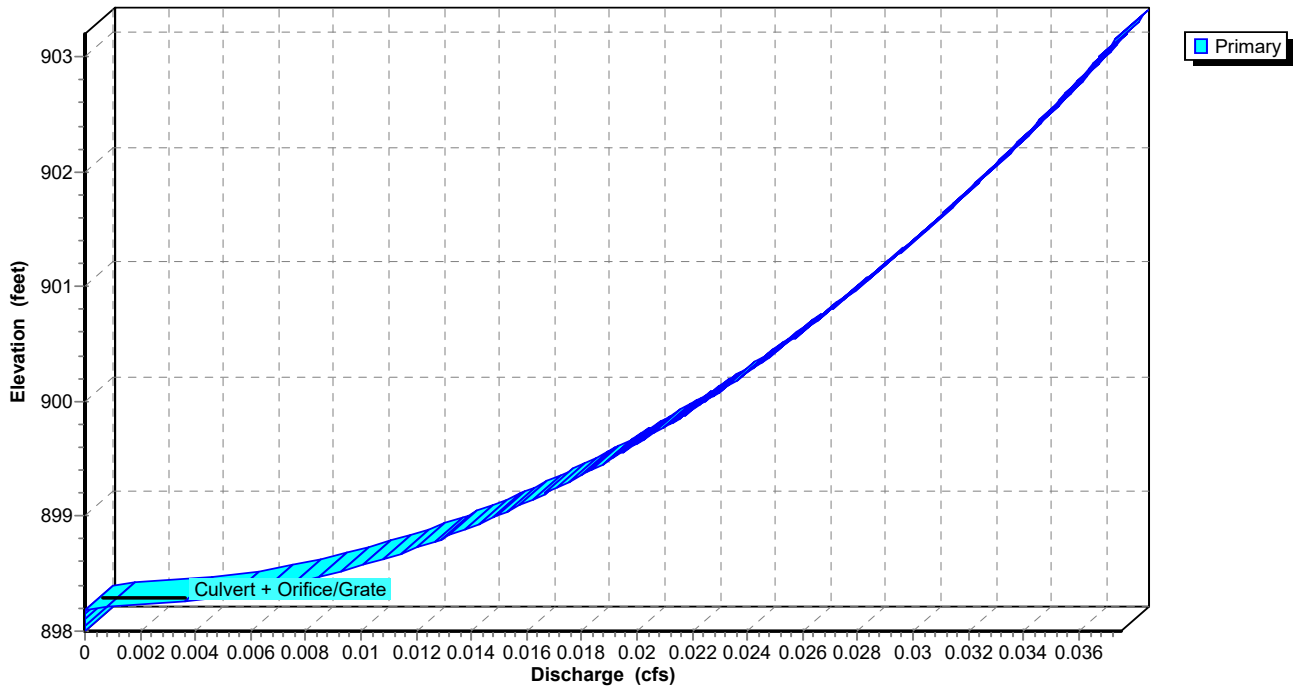
Pond 5P: WQv Drawdown

Hydrograph

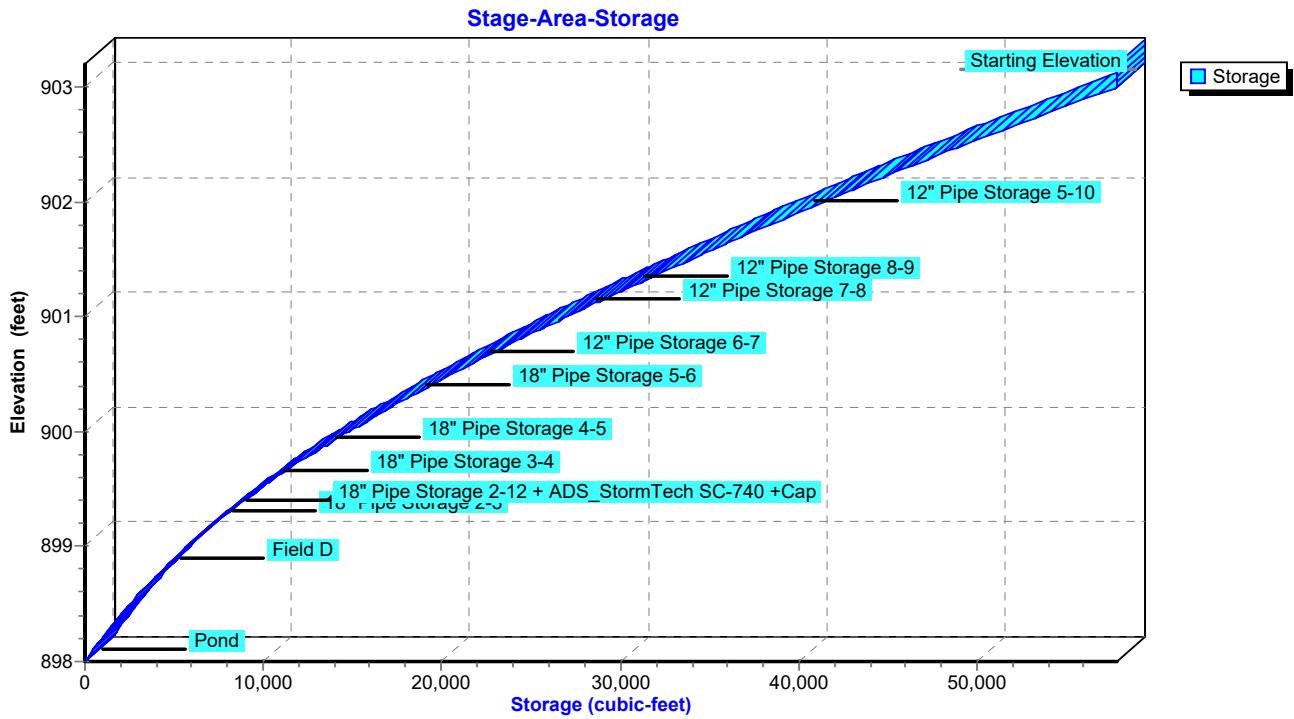


Pond 5P: WQv Drawdown

Stage-Discharge



Pond 5P: WQv Drawdown



Summary for Pond 6P: WQvForebayMicropool

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 896.00' Surf.Area= 1,704 sf Storage= 2,000 cf
 Peak Elev= 896.00' @ 0.00 hrs Surf.Area= 1,704 sf Storage= 2,000 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

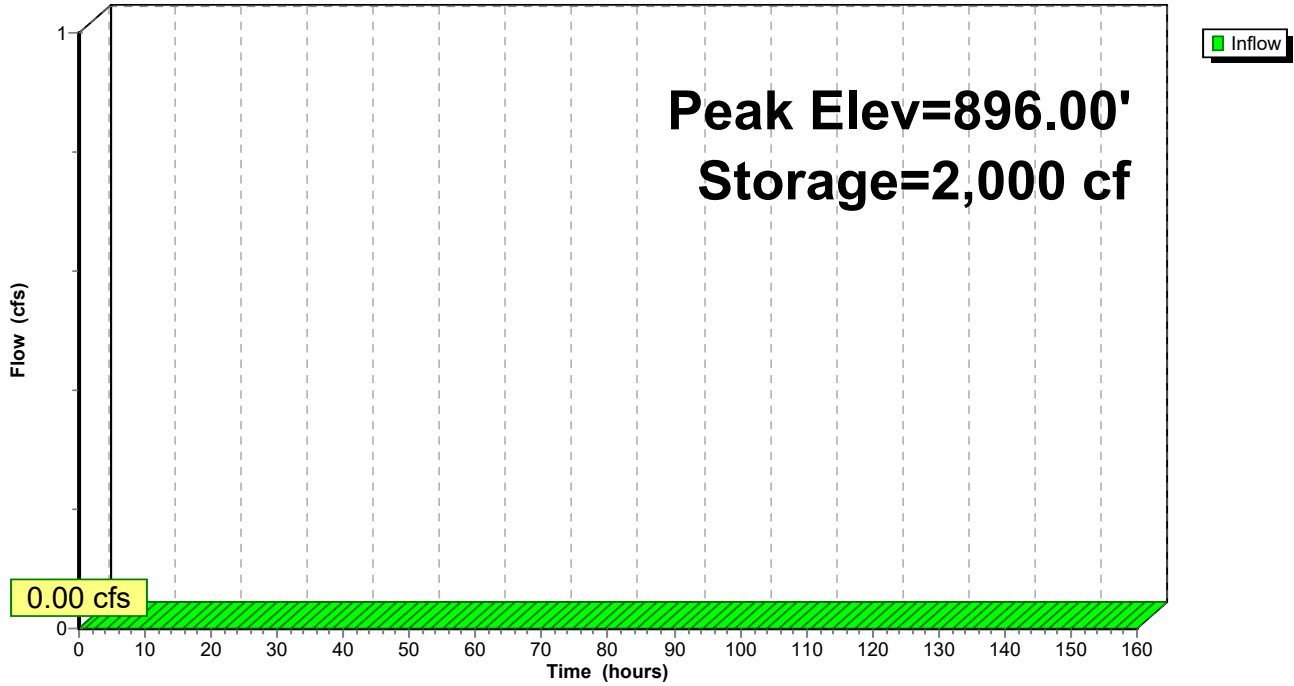
Volume	Invert	Avail.Storage	Storage Description
#1	895.00'	2,489 cf	Forebay (Irregular) Listed below (Recalc)
#2	893.00'	6,028 cf	MicroPool (Irregular) Listed below (Recalc)
		8,517 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
895.00	256	78.4	0	0	256
896.00	541	101.1	390	390	592
897.00	905	124.1	715	1,105	1,020
898.00	1,361	148.8	1,125	2,230	1,573
898.18	1,519	203.7	259	2,489	3,114

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
893.00	25	80.6	0	0	25
894.00	344	100.6	154	154	327
895.00	723	120.6	522	676	696
896.00	1,163	140.6	934	1,610	1,132
897.00	1,695	164.9	1,421	3,031	1,742
898.00	3,312	219.6	2,459	5,490	3,427
898.18	2,677	261.7	538	6,028	5,040

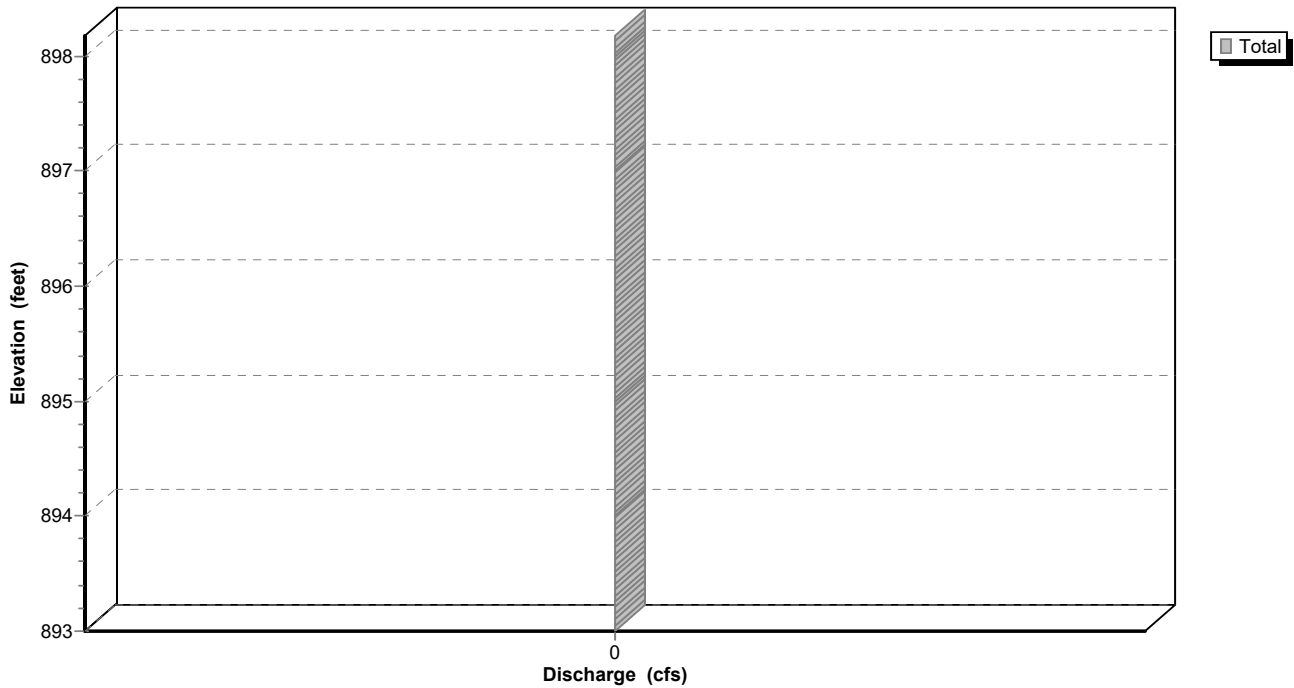
Pond 6P: WQvForebayMicropool

Hydrograph

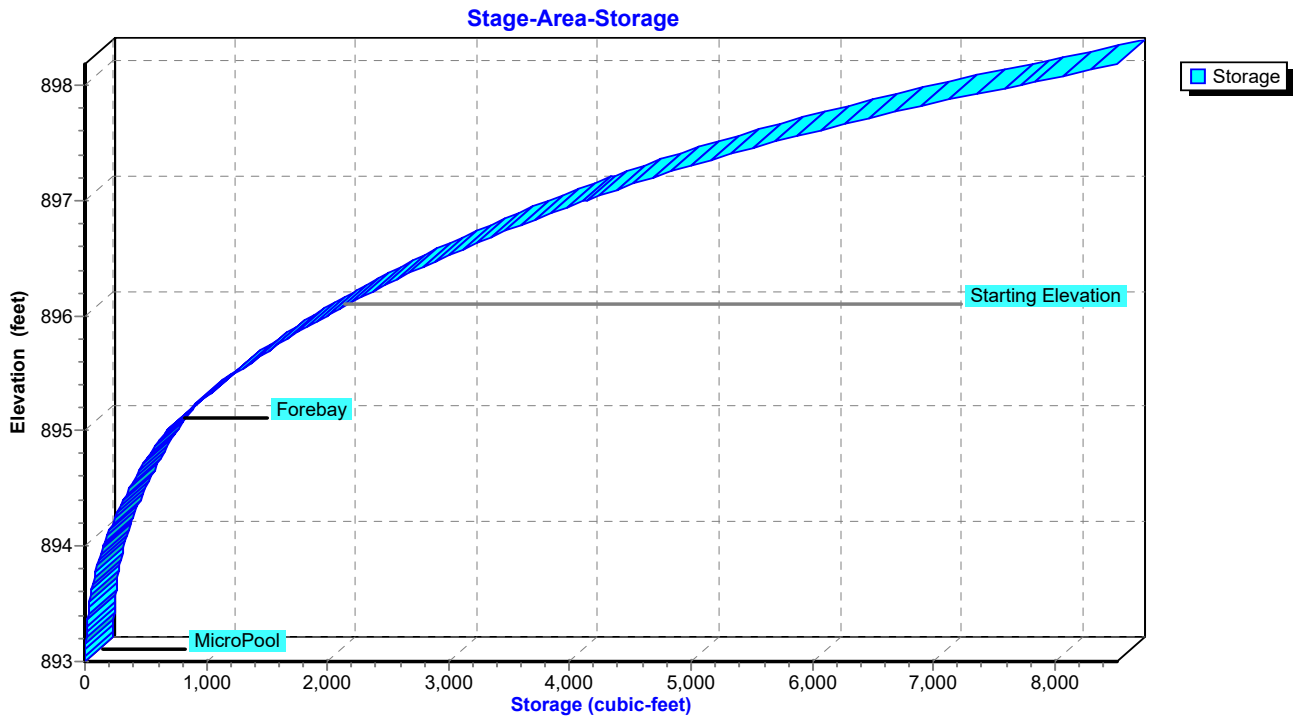


Pond 6P: WQvForebayMicropool

Stage-Discharge



Pond 6P: WQvForebayMicropool



Summary for Subcatchment 1S: Rehab Pre Dev

Runoff = 13.39 cfs @ 12.05 hrs, Volume= 0.824 af, Depth= 2.41"

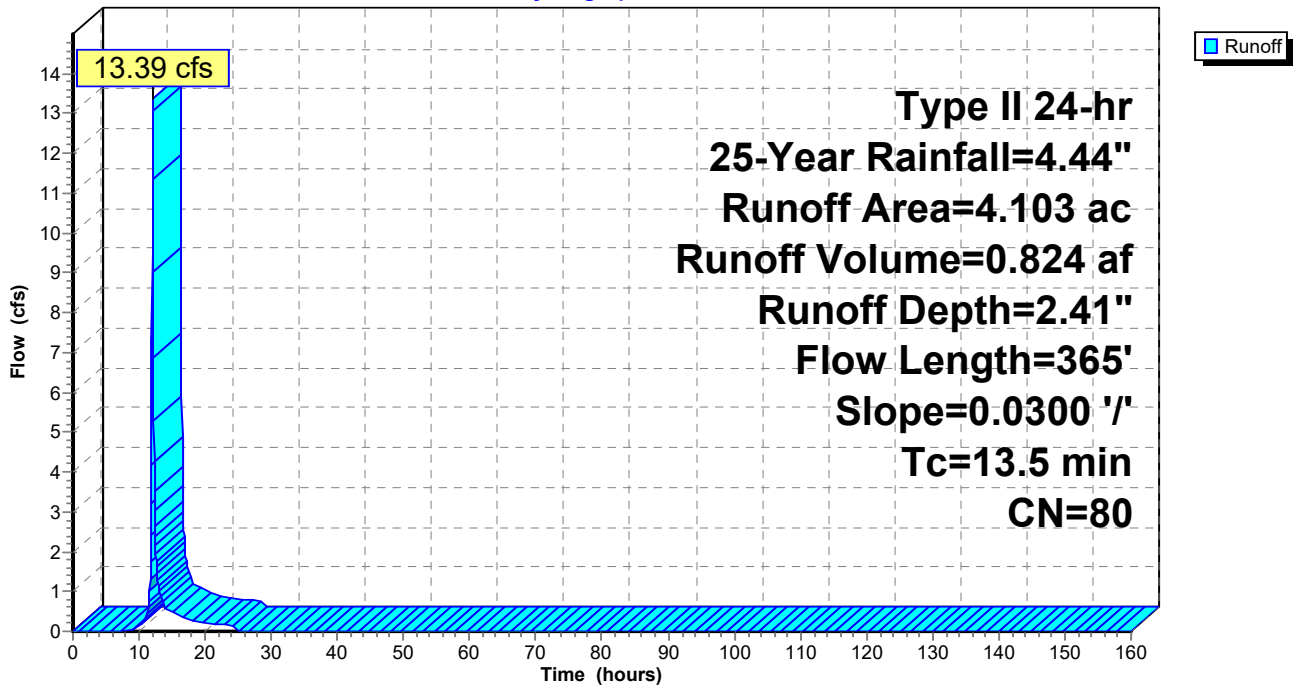
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 25-Year Rainfall=4.44"

Area (ac)	CN	Description
4.103	80	>75% Grass cover, Good, HSG D
4.103		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.0300	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 2.25"
3.6	265	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	365	Total			

Subcatchment 1S: Rehab Pre Dev

Hydrograph



Summary for Subcatchment 2S: Rehab Before Expansion

Runoff = 18.65 cfs @ 12.04 hrs, Volume= 1.176 af, Depth= 3.44"

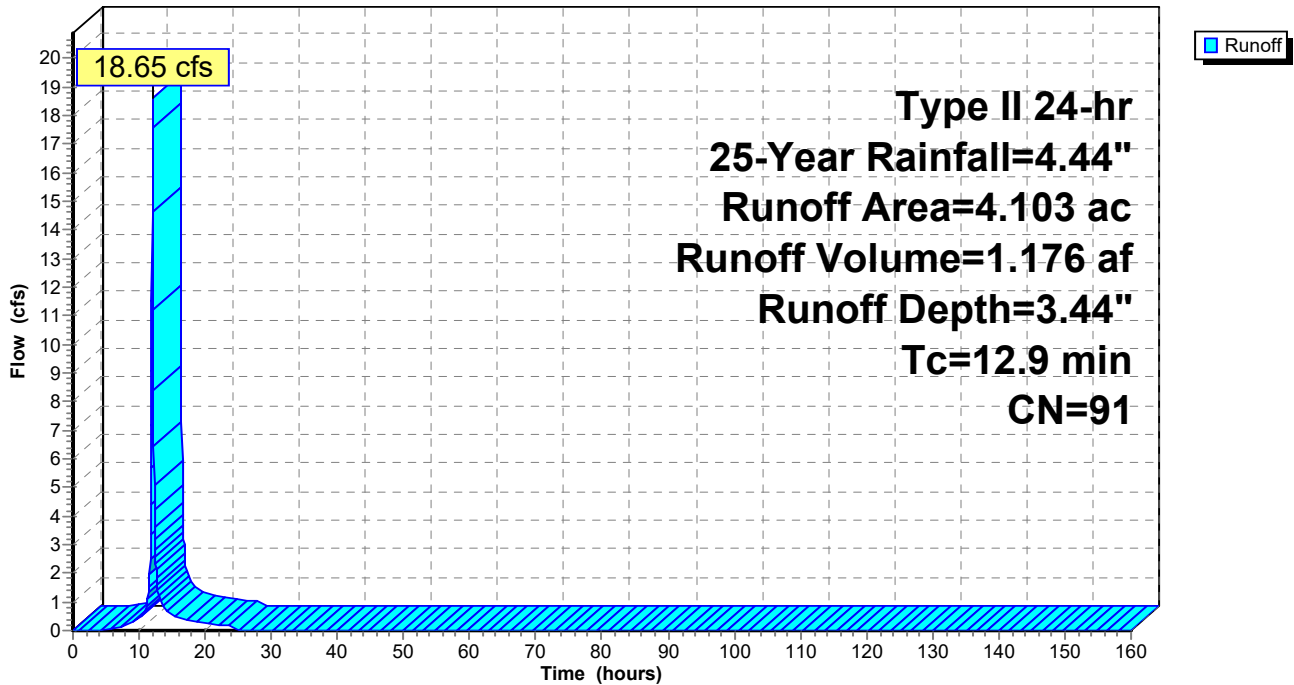
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 25-Year Rainfall=4.44"

Area (ac)	CN	Description
* 2.128	98	Impervious, HSG D
1.975	84	50-75% Grass cover, Fair, HSG D
4.103	91	Weighted Average
1.975		48.14% Pervious Area
2.128		51.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 2S: Rehab Before Expansion

Hydrograph



Summary for Subcatchment 3S: Un-detained

Runoff = 1.78 cfs @ 12.02 hrs, Volume= 0.098 af, Depth= 2.41"

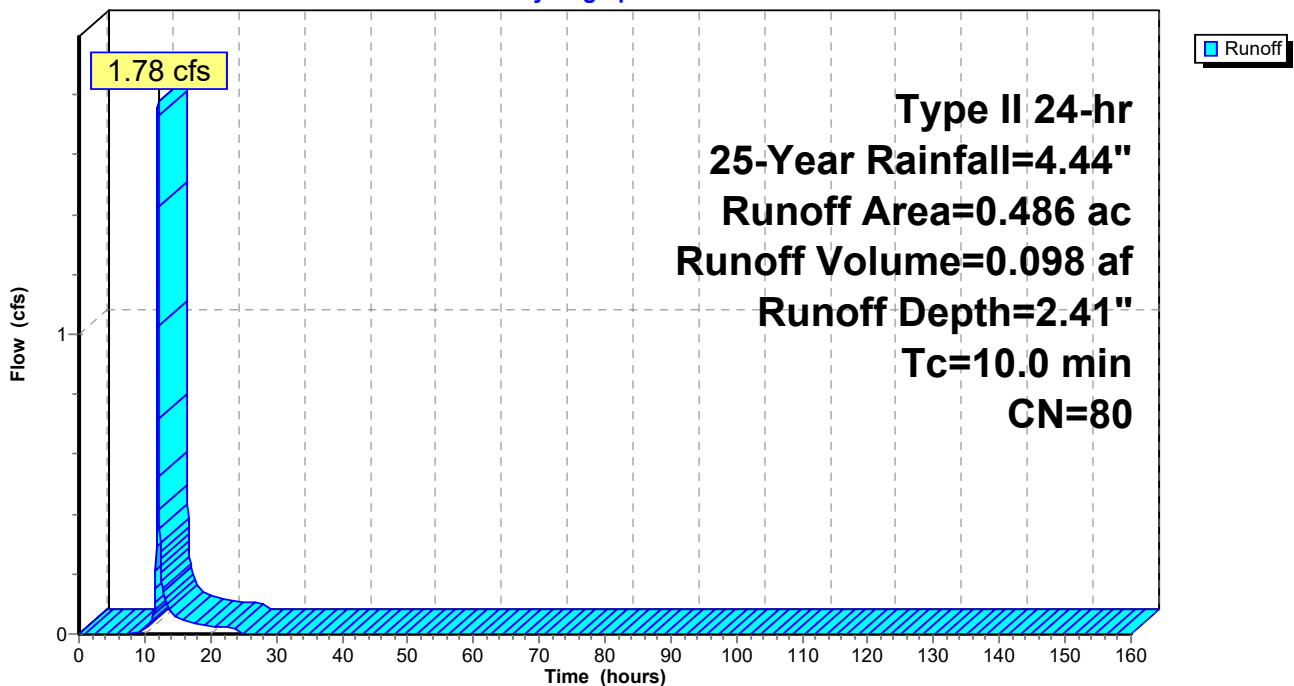
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 25-Year Rainfall=4.44"

Area (ac)	CN	Description
0.486	80	>75% Grass cover, Good, HSG D
0.486		100.00% Pervious Area

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

Subcatchment 3S: Un-detained

Hydrograph



Summary for Subcatchment 4S: REHAB WITH EXPANSION

Runoff = 19.04 cfs @ 12.04 hrs, Volume= 1.212 af, Depth= 3.54"

Routed to Pond 4P : Rehab Storage

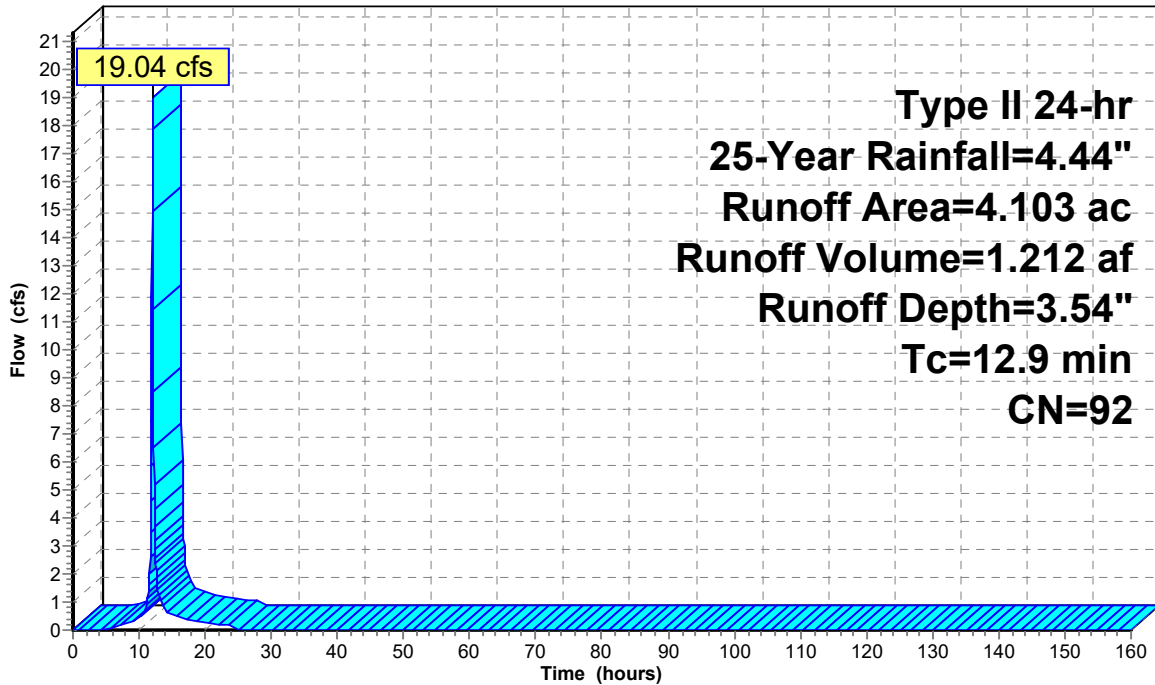
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 25-Year Rainfall=4.44"

Area (ac)	CN	Description
* 2.476	98	Impervious, HSG D
1.627	84	50-75% Grass cover, Fair, HSG D
4.103	92	Weighted Average
1.627		39.65% Pervious Area
2.476		60.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 4S: REHAB WITH EXPANSION

Hydrograph



Runoff

**Type II 24-hr
 25-Year Rainfall=4.44"
 Runoff Area=4.103 ac
 Runoff Volume=1.212 af
 Runoff Depth=3.54"
 Tc=12.9 min
 CN=92**

Summary for Pond 4P: Rehab Storage

Inflow Area = 4.103 ac, 60.35% Impervious, Inflow Depth = 3.54" for 25-Year event
 Inflow = 19.04 cfs @ 12.04 hrs, Volume= 1.212 af
 Outflow = 0.04 cfs @ 24.28 hrs, Volume= 0.413 af, Atten= 100%, Lag= 734.2 min
 Primary = 0.04 cfs @ 24.28 hrs, Volume= 0.413 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 902.65' @ 24.28 hrs Surf.Area= 17,457 sf Storage= 51,032 cf

Plug-Flow detention time= 4,359.5 min calculated for 0.413 af (34% of inflow)
 Center-of-Mass det. time= 4,222.5 min (5,012.1 - 789.6)

Volume	Invert	Avail.Storage	Storage Description
#1	898.18'	73,564 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 '/'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 '/'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 '/'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 '/'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 '/'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 '/'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 '/'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 '/'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 '/'
#11D	898.80'	691 cf	6.25'W x 110.42'L x 3.50'H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		76,037 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.18	5,196	465.4	0	0	5,196
899.00	6,973	453.7	4,971	4,971	6,131
900.00	10,037	497.0	8,459	13,430	9,441
901.00	12,456	535.9	11,225	24,655	12,680
902.00	14,971	573.7	13,694	38,349	16,064
903.00	17,693	573.7	16,313	54,662	16,637
904.00	20,138	623.2	18,902	73,564	21,390

Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads 36.0" W x 6.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	903.05'	
#4	Secondary	903.36'	16.7' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.04 cfs @ 24.28 hrs HW=902.65' (Free Discharge)

- ↑ 1=Culvert (Passes 0.04 cfs of 5.95 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.04 cfs @ 10.14 fps)
- ↑ 3=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=898.18' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Rehab Storage - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

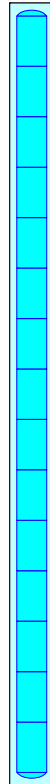
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

15 Chambers

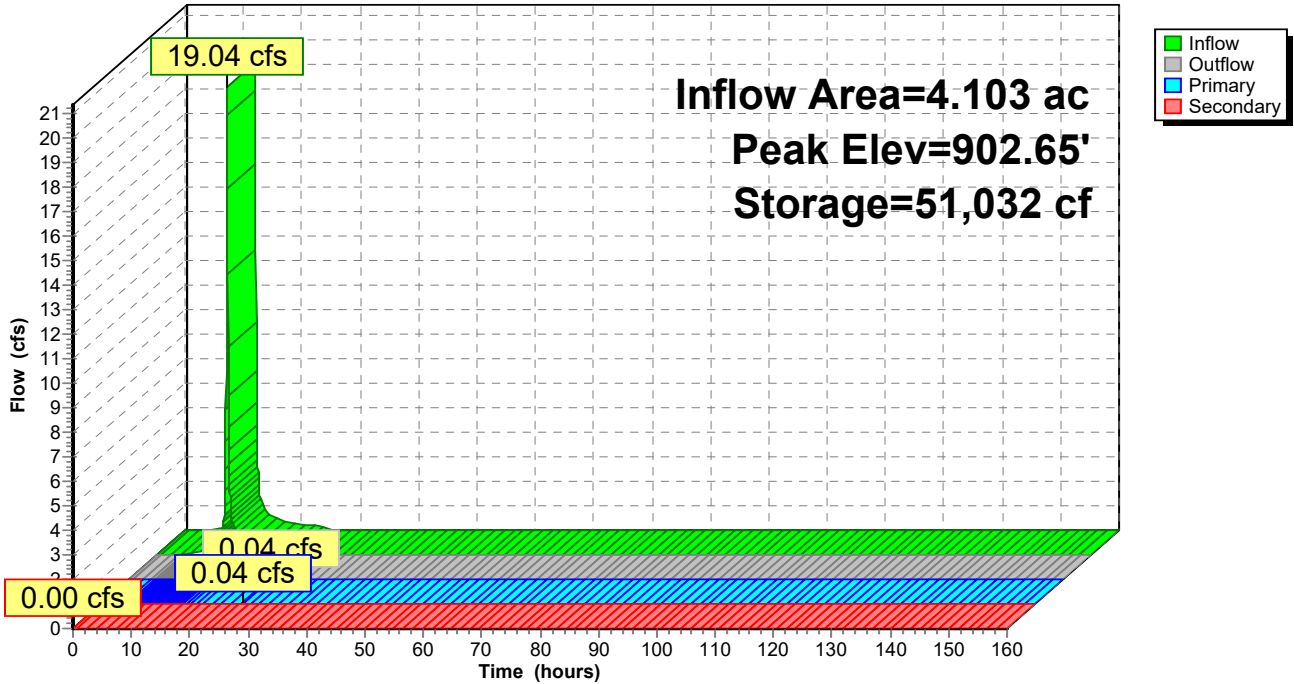
89.5 cy Field

63.9 cy Stone



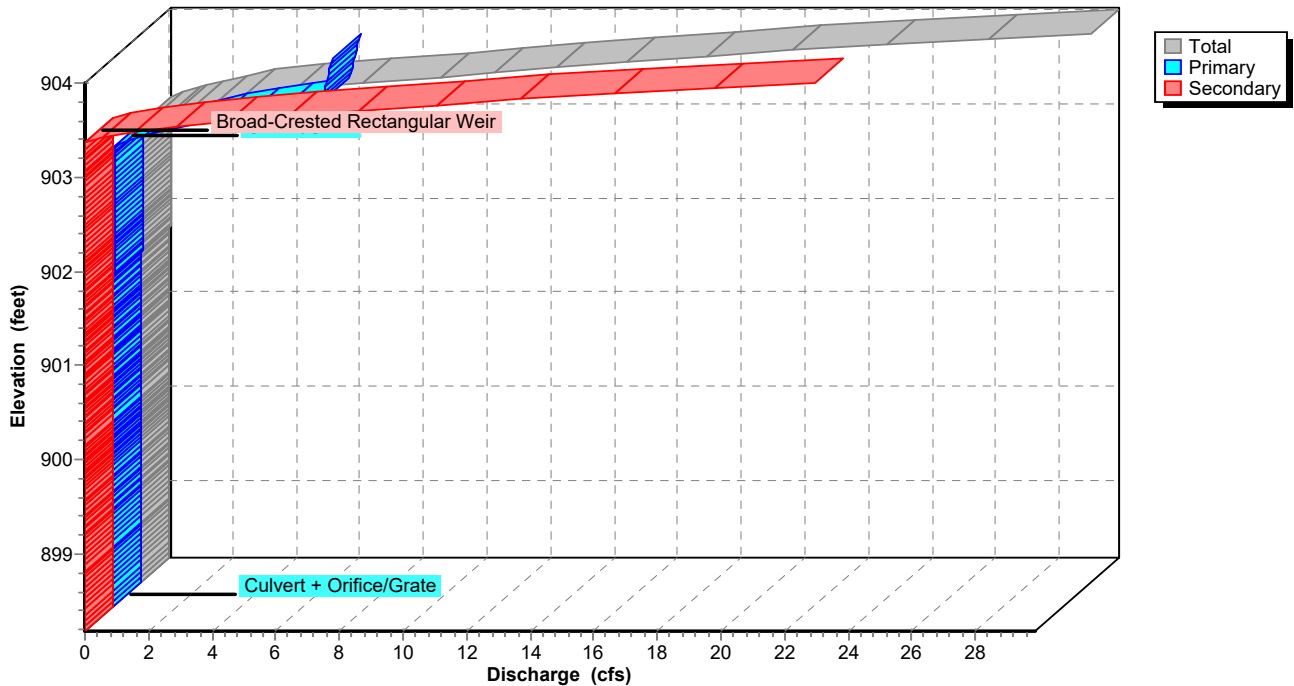
Pond 4P: Rehab Storage

Hydrograph

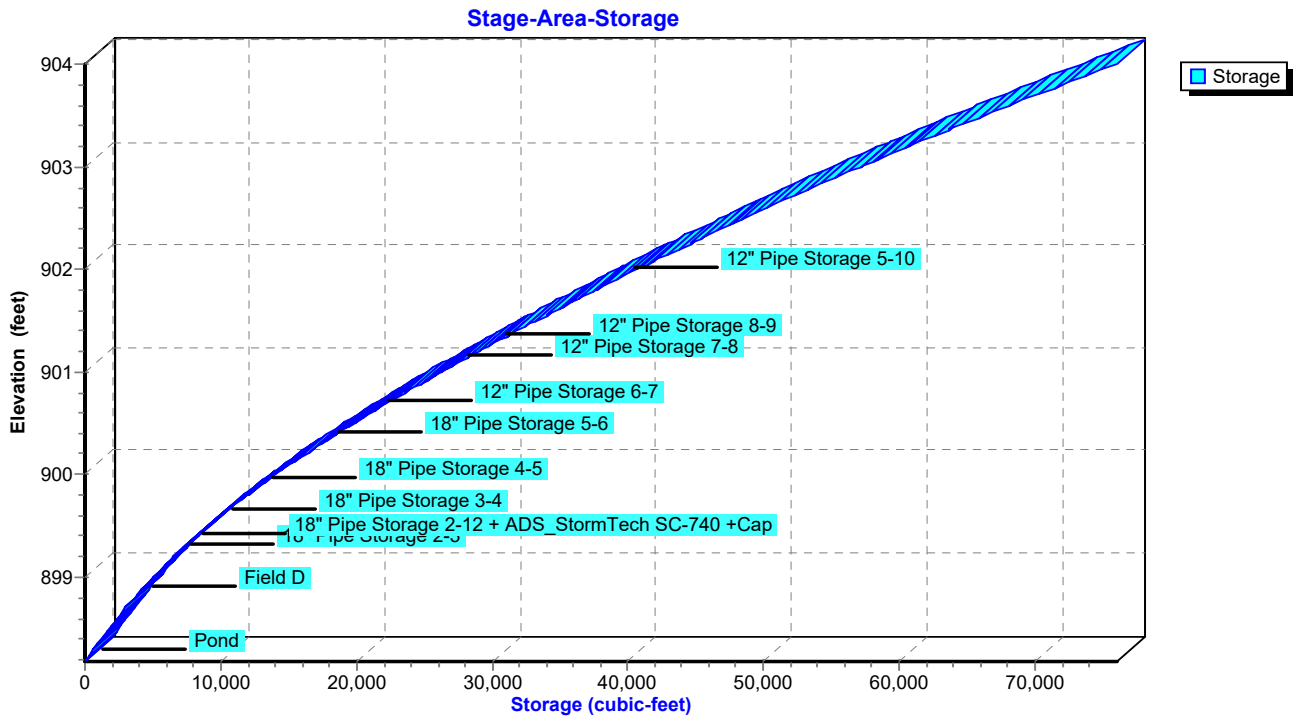


Pond 4P: Rehab Storage

Stage-Discharge



Pond 4P: Rehab Storage



Summary for Pond 5P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 903.05' Surf.Area= 18,399 sf Storage= 57,840 cf
 Peak Elev= 903.05' @ 0.00 hrs Surf.Area= 18,399 sf Storage= 57,840 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	898.00'	55,369 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 '/'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 '/'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 '/'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 '/'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 '/'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 '/'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 '/'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 '/'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 '/'
#11D	898.80'	691 cf	6.25"W x 110.42"L x 3.50"H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		57,841 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.00	4,473	367.8	0	0	4,473
899.00	6,974	453.7	5,677	5,677	10,104
900.00	10,037	497.0	8,459	14,137	13,414
901.00	12,456	535.9	11,225	25,361	16,653
902.00	14,971	573.9	13,694	39,056	20,054
903.00	17,693	597.9	16,313	55,369	22,367

Dublin Rehab Institute As-Built 5-1-23

Type II 24-hr 25-Year Rainfall=4.44"

Prepared by E P Ferris & Associates, Inc

Printed 5/9/2023

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Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 0.00 hrs HW=903.05' (Free Discharge)

↑ **1=Culvert** (Passes 0.04 cfs of 6.24 cfs potential flow)

↑ **2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 10.59 fps)

Pond 5P: WQv Drawdown - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

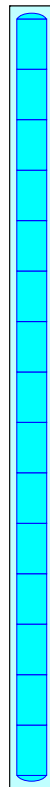
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

15 Chambers

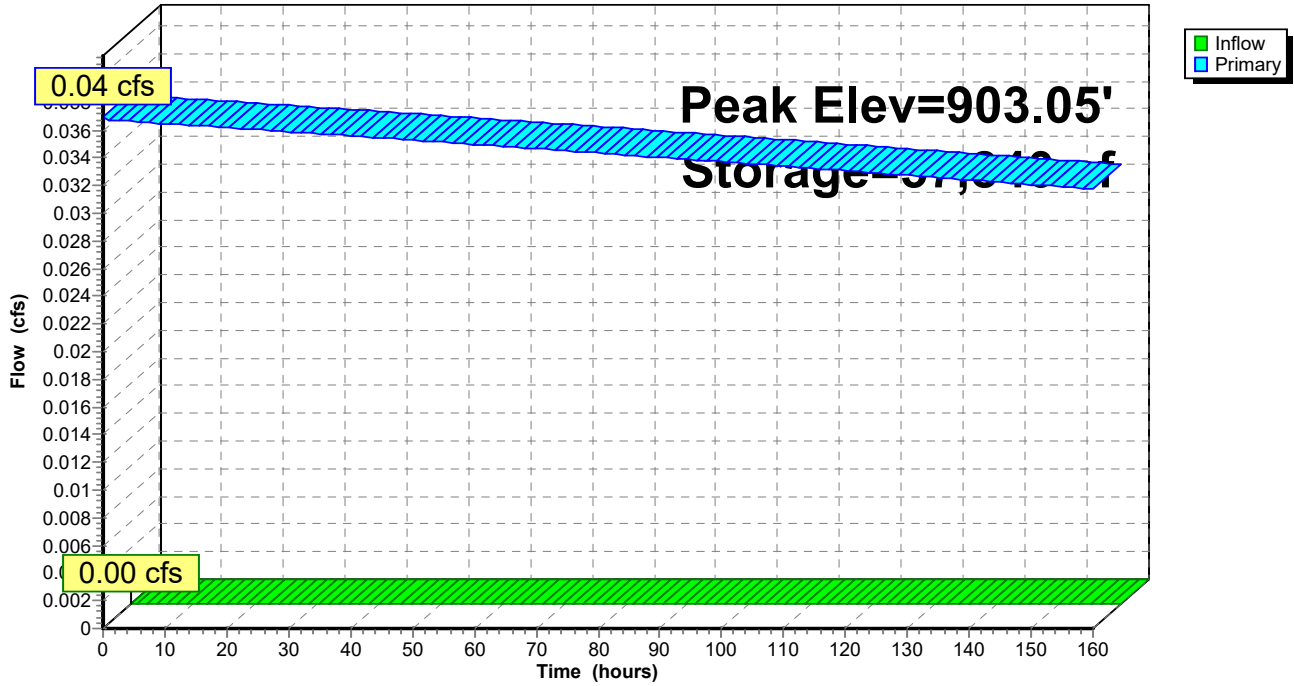
89.5 cy Field

63.9 cy Stone



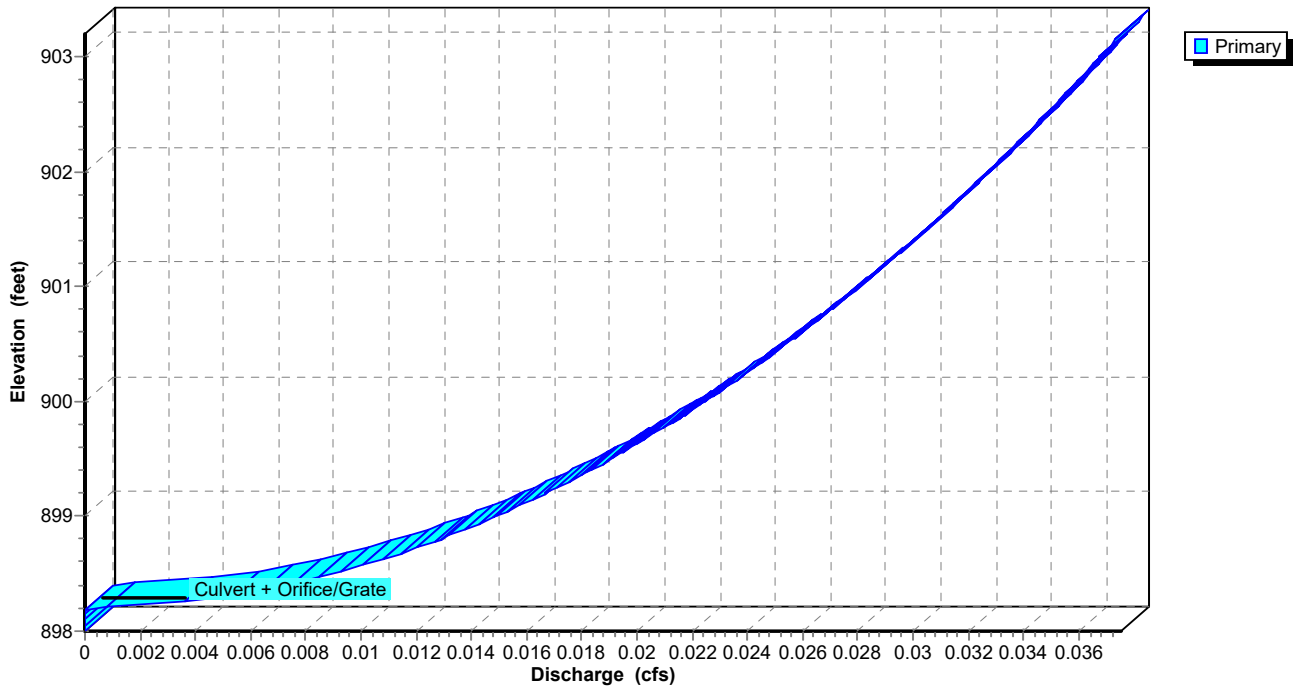
Pond 5P: WQv Drawdown

Hydrograph

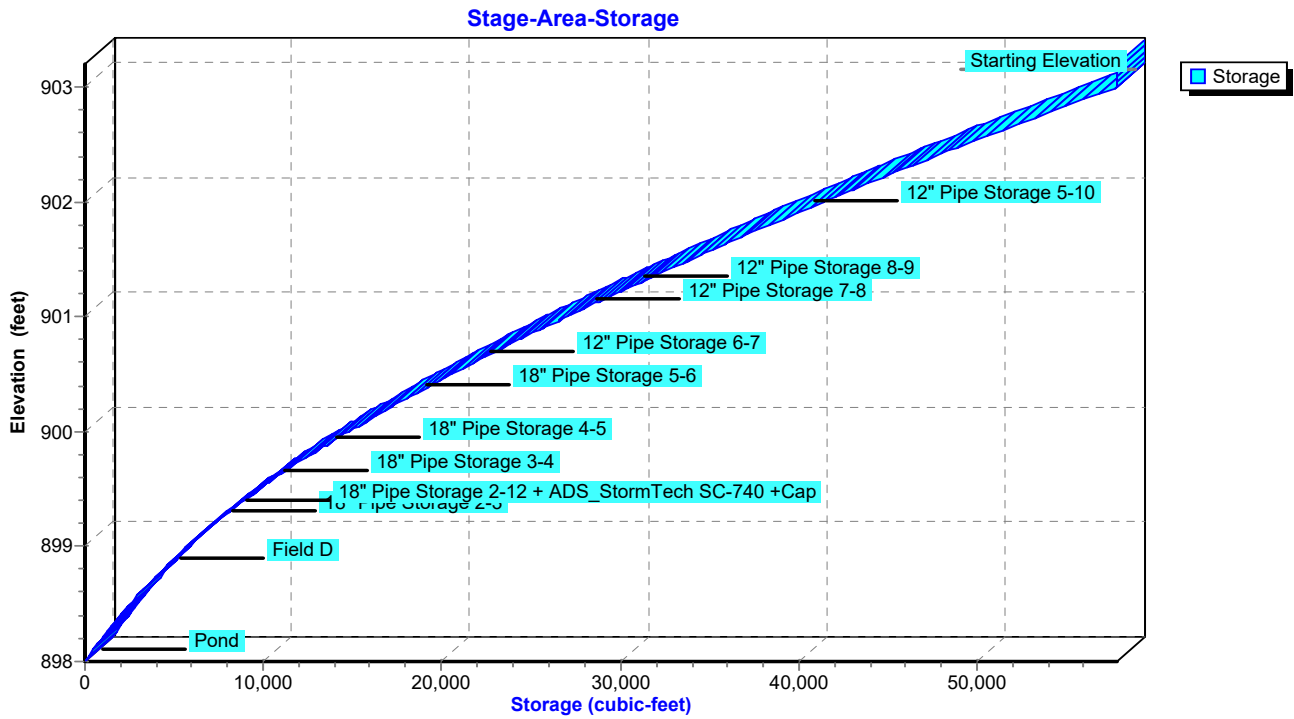


Pond 5P: WQv Drawdown

Stage-Discharge



Pond 5P: WQv Drawdown



Summary for Pond 6P: WQvForebayMicropool

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 896.00' Surf.Area= 1,704 sf Storage= 2,000 cf
 Peak Elev= 896.00' @ 0.00 hrs Surf.Area= 1,704 sf Storage= 2,000 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

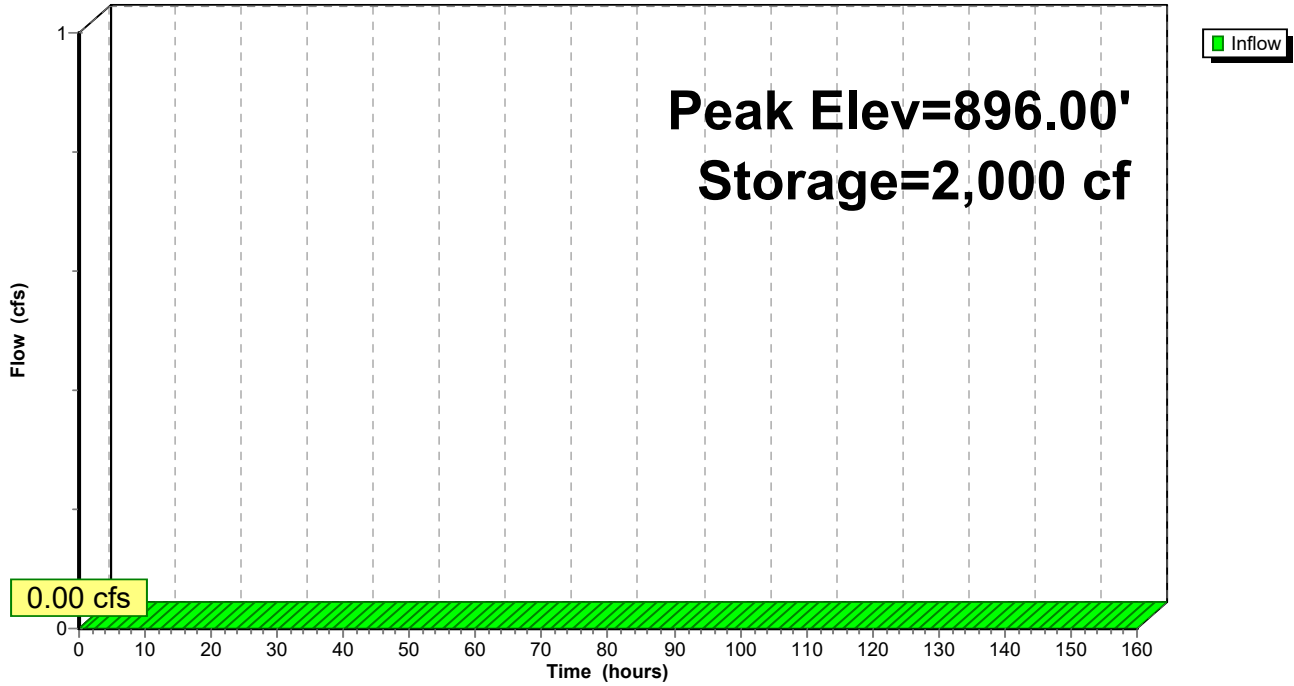
Volume	Invert	Avail.Storage	Storage Description
#1	895.00'	2,489 cf	Forebay (Irregular) Listed below (Recalc)
#2	893.00'	6,028 cf	MicroPool (Irregular) Listed below (Recalc)
		8,517 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
895.00	256	78.4	0	0	256
896.00	541	101.1	390	390	592
897.00	905	124.1	715	1,105	1,020
898.00	1,361	148.8	1,125	2,230	1,573
898.18	1,519	203.7	259	2,489	3,114

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
893.00	25	80.6	0	0	25
894.00	344	100.6	154	154	327
895.00	723	120.6	522	676	696
896.00	1,163	140.6	934	1,610	1,132
897.00	1,695	164.9	1,421	3,031	1,742
898.00	3,312	219.6	2,459	5,490	3,427
898.18	2,677	261.7	538	6,028	5,040

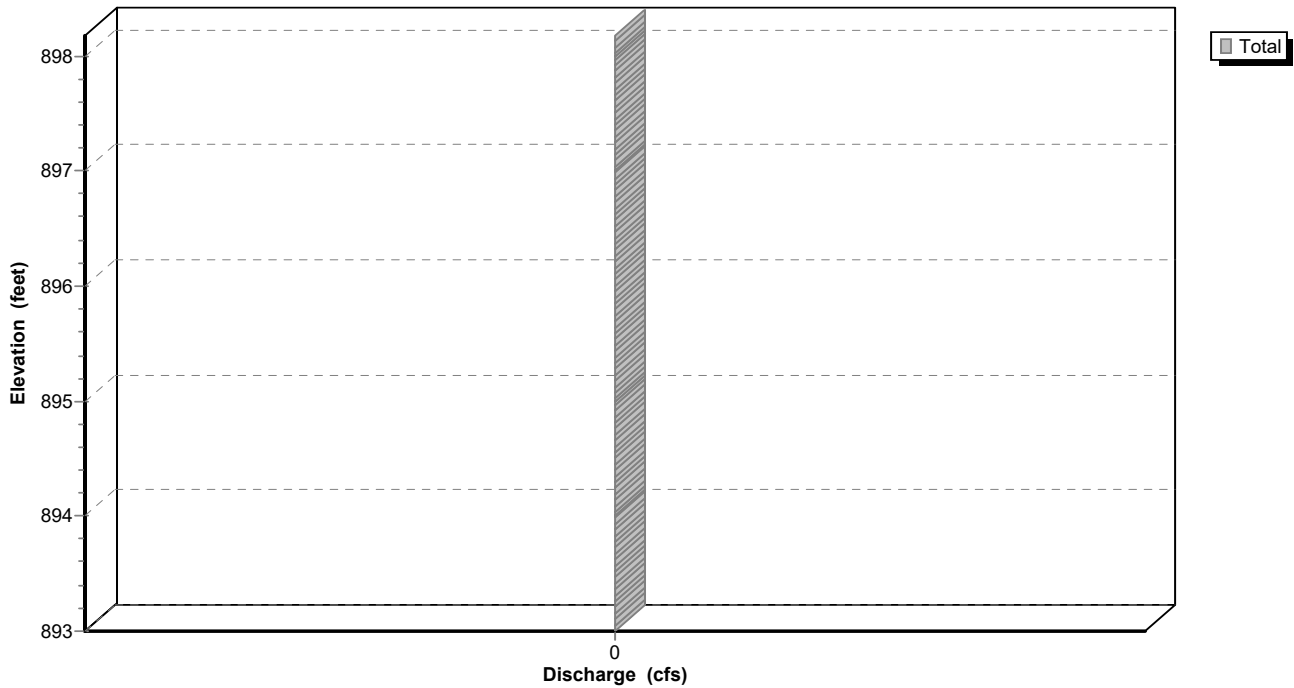
Pond 6P: WQvForebayMicropool

Hydrograph

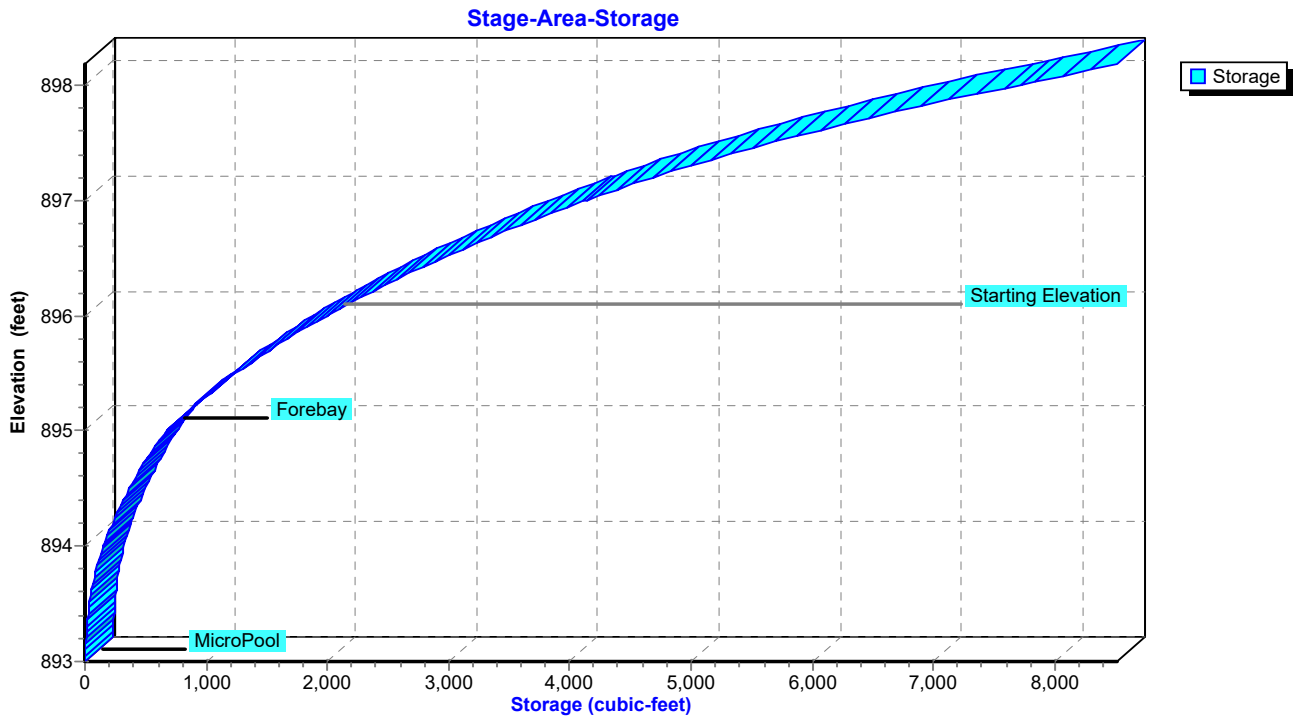


Pond 6P: WQvForebayMicropool

Stage-Discharge



Pond 6P: WQvForebayMicropool



Summary for Subcatchment 1S: Rehab Pre Dev

Runoff = 16.13 cfs @ 12.05 hrs, Volume= 0.995 af, Depth= 2.91"

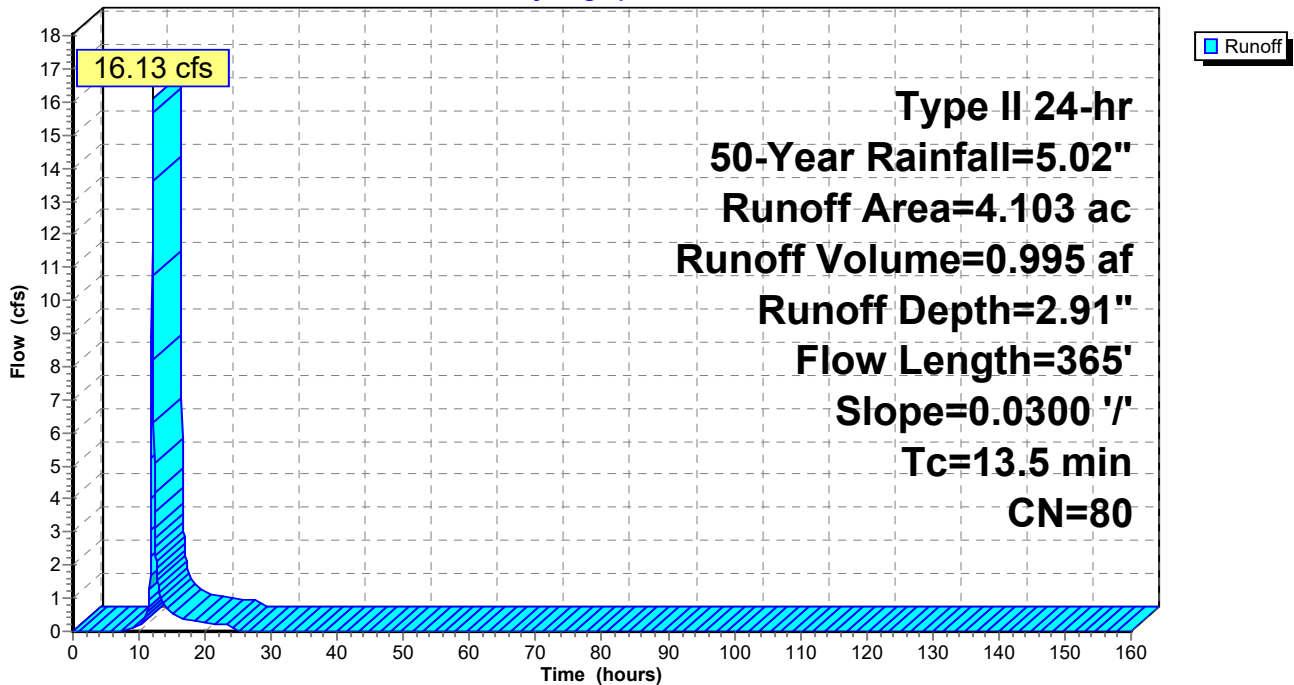
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 50-Year Rainfall=5.02"

Area (ac)	CN	Description
4.103	80	>75% Grass cover, Good, HSG D
4.103		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.0300	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 2.25"
3.6	265	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	365	Total			

Subcatchment 1S: Rehab Pre Dev

Hydrograph



Summary for Subcatchment 2S: Rehab Before Expansion

Runoff = 21.51 cfs @ 12.04 hrs, Volume= 1.368 af, Depth= 4.00"

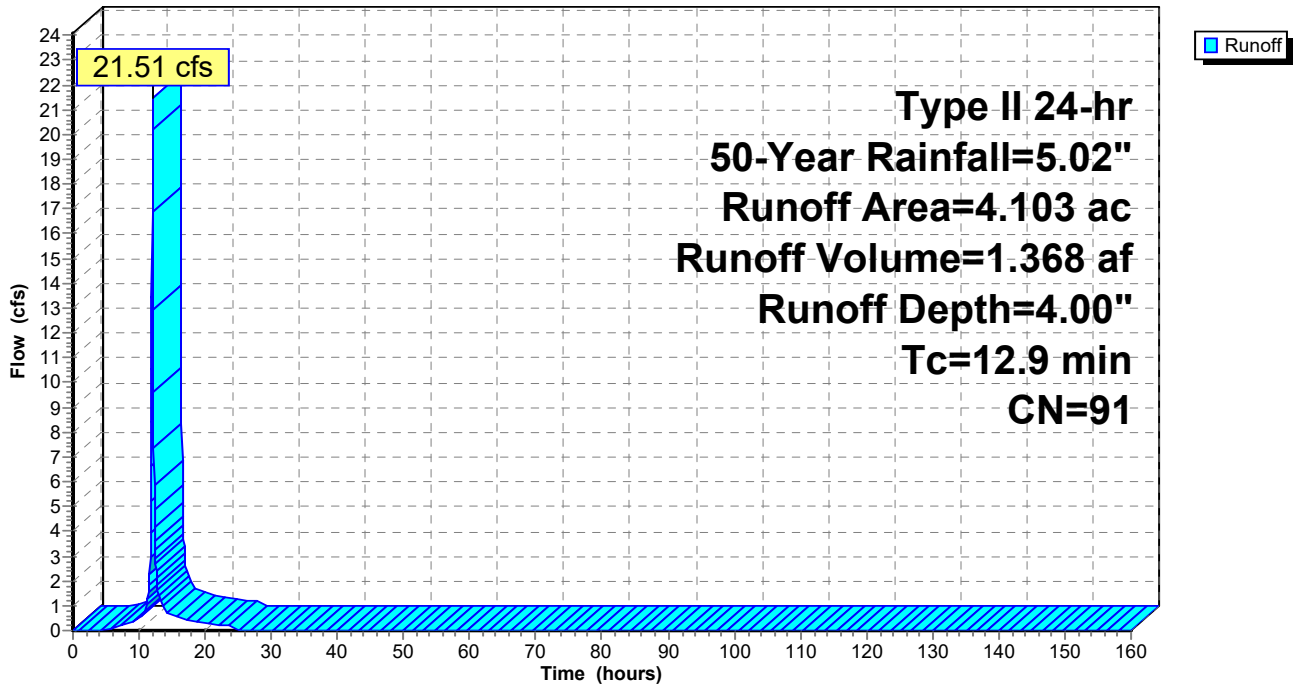
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 50-Year Rainfall=5.02"

Area (ac)	CN	Description
* 2.128	98	Impervious, HSG D
1.975	84	50-75% Grass cover, Fair, HSG D
4.103	91	Weighted Average
1.975		48.14% Pervious Area
2.128		51.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 2S: Rehab Before Expansion

Hydrograph



Summary for Subcatchment 3S: Un-detained

Runoff = 2.14 cfs @ 12.02 hrs, Volume= 0.118 af, Depth= 2.91"

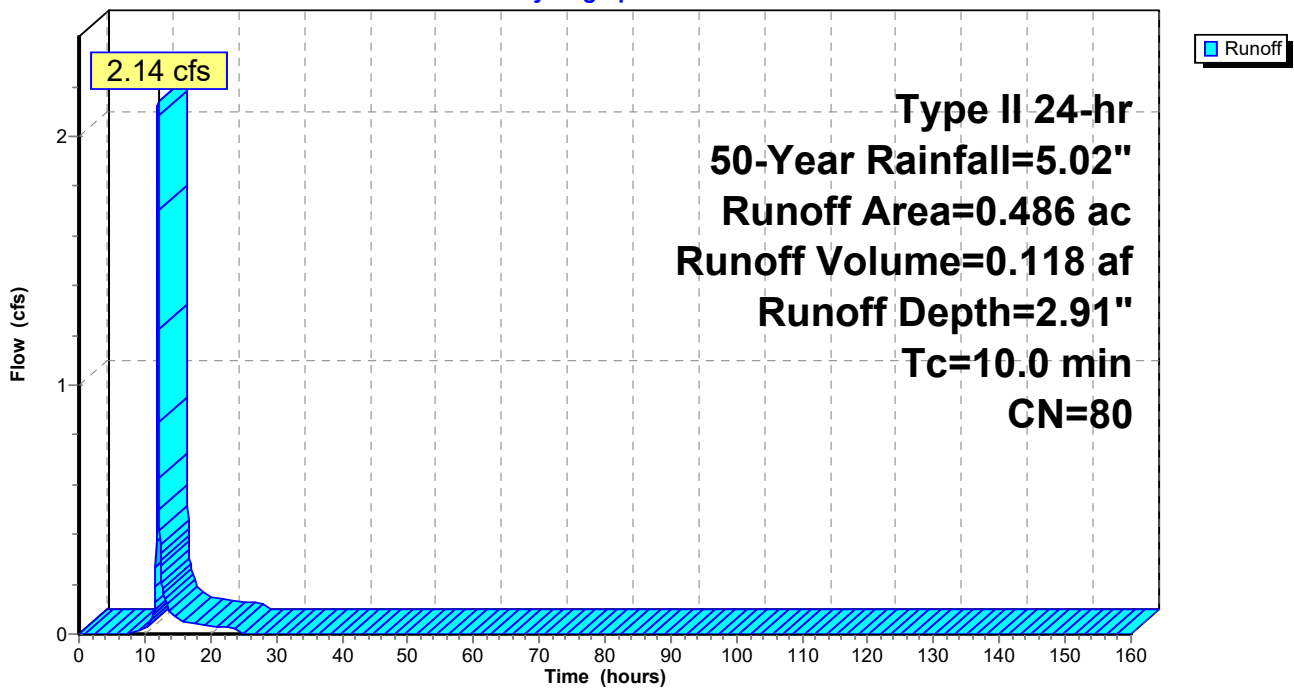
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 50-Year Rainfall=5.02"

Area (ac)	CN	Description
0.486	80	>75% Grass cover, Good, HSG D
0.486		100.00% Pervious Area

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

Subcatchment 3S: Un-detained

Hydrograph



Summary for Subcatchment 4S: REHAB WITH EXPANSION

Runoff = 21.89 cfs @ 12.04 hrs, Volume= 1.405 af, Depth= 4.11"
 Routed to Pond 4P : Rehab Storage

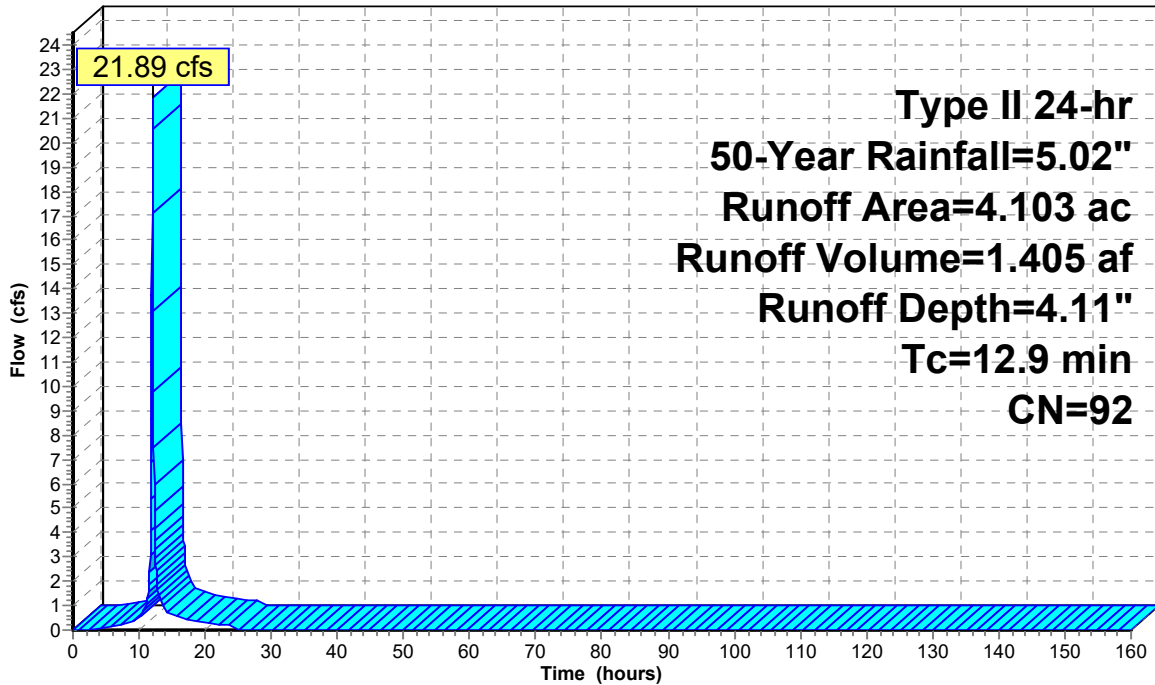
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 50-Year Rainfall=5.02"

Area (ac)	CN	Description
* 2.476	98	Impervious, HSG D
1.627	84	50-75% Grass cover, Fair, HSG D
4.103	92	Weighted Average
1.627		39.65% Pervious Area
2.476		60.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 4S: REHAB WITH EXPANSION

Hydrograph



**Type II 24-hr
 50-Year Rainfall=5.02"
 Runoff Area=4.103 ac
 Runoff Volume=1.405 af
 Runoff Depth=4.11"
 Tc=12.9 min
 CN=92**

Summary for Pond 4P: Rehab Storage

Inflow Area = 4.103 ac, 60.35% Impervious, Inflow Depth = 4.11" for 50-Year event
 Inflow = 21.89 cfs @ 12.04 hrs, Volume= 1.405 af
 Outflow = 0.20 cfs @ 24.10 hrs, Volume= 0.459 af, Atten= 99%, Lag= 723.3 min
 Primary = 0.20 cfs @ 24.10 hrs, Volume= 0.459 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 903.09' @ 24.10 hrs Surf.Area= 18,600 sf Storage= 58,678 cf

Plug-Flow detention time= 4,187.9 min calculated for 0.459 af (33% of inflow)
 Center-of-Mass det. time= 4,045.0 min (4,830.7 - 785.6)

Volume	Invert	Avail.Storage	Storage Description
#1	898.18'	73,564 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 '/'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 '/'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 '/'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 '/'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 '/'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 '/'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 '/'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 '/'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 '/'
#11D	898.80'	691 cf	6.25'W x 110.42'L x 3.50'H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		76,037 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.18	5,196	465.4	0	0	5,196
899.00	6,973	453.7	4,971	4,971	6,131
900.00	10,037	497.0	8,459	13,430	9,441
901.00	12,456	535.9	11,225	24,655	12,680
902.00	14,971	573.7	13,694	38,349	16,064
903.00	17,693	573.7	16,313	54,662	16,637
904.00	20,138	623.2	18,902	73,564	21,390

Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads 36.0" W x 6.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	903.05'	
#4	Secondary	903.36'	16.7' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.17 cfs @ 24.10 hrs HW=903.09' (Free Discharge)

- ↑ 1=Culvert (Passes 0.17 cfs of 6.27 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.04 cfs @ 10.63 fps)
- ↑ 3=Orifice/Grate (Orifice Controls 0.14 cfs @ 0.62 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=898.18' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Rehab Storage - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

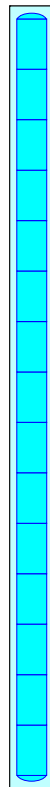
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

15 Chambers

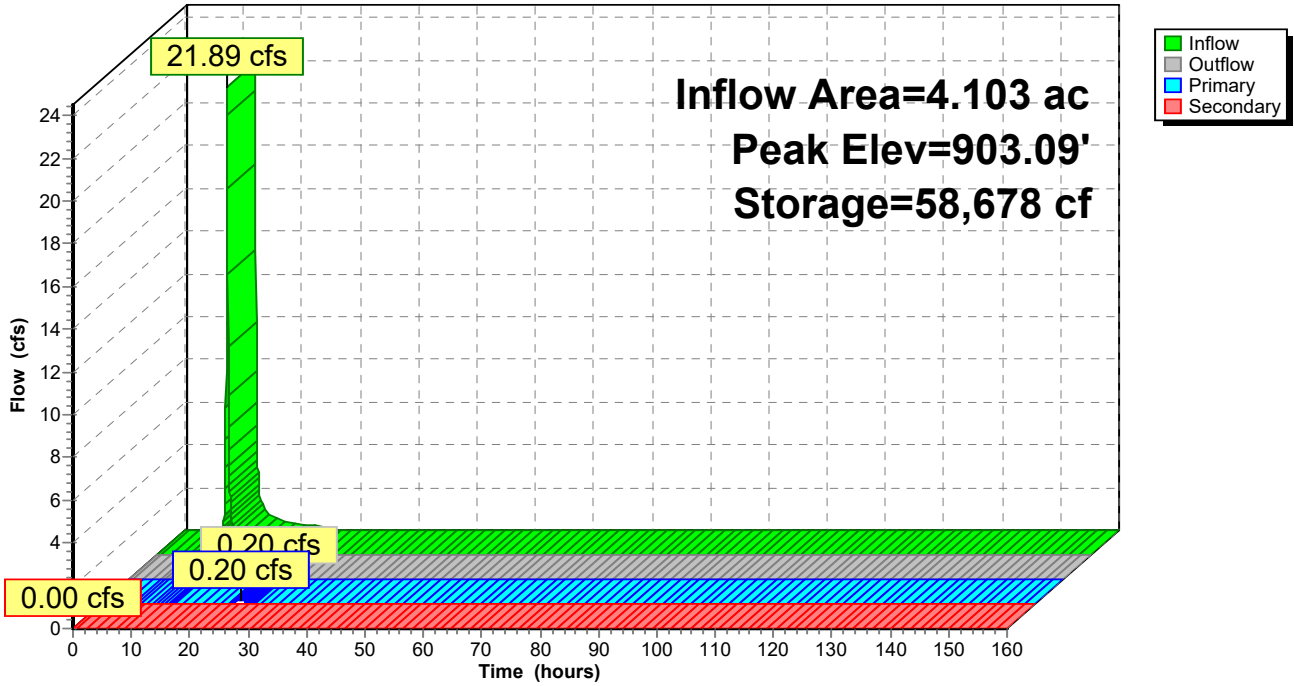
89.5 cy Field

63.9 cy Stone



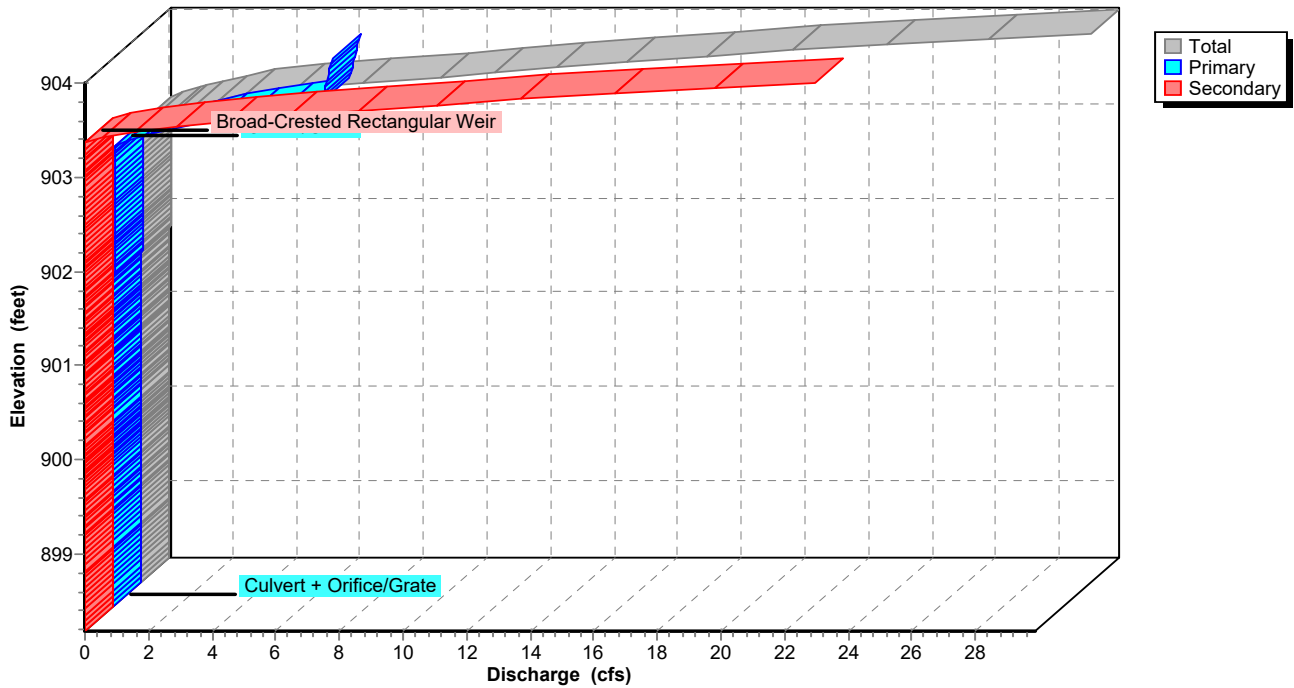
Pond 4P: Rehab Storage

Hydrograph



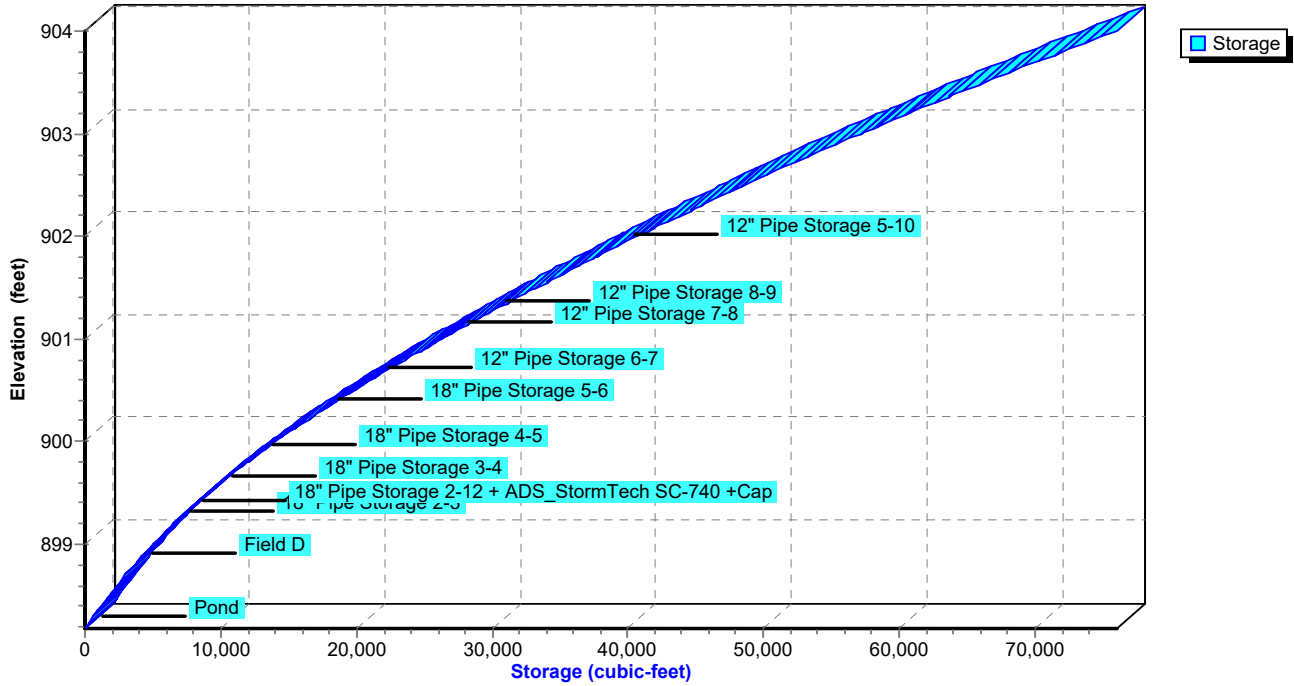
Pond 4P: Rehab Storage

Stage-Discharge



Pond 4P: Rehab Storage

Stage-Area-Storage



Summary for Pond 5P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 903.05' Surf.Area= 18,399 sf Storage= 57,840 cf
 Peak Elev= 903.05' @ 0.00 hrs Surf.Area= 18,399 sf Storage= 57,840 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	898.00'	55,369 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 '/'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 '/'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 '/'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 '/'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 '/'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 '/'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 '/'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 '/'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 '/'
#11D	898.80'	691 cf	6.25"W x 110.42"L x 3.50"H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		57,841 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.00	4,473	367.8	0	0	4,473
899.00	6,974	453.7	5,677	5,677	10,104
900.00	10,037	497.0	8,459	14,137	13,414
901.00	12,456	535.9	11,225	25,361	16,653
902.00	14,971	573.9	13,694	39,056	20,054
903.00	17,693	597.9	16,313	55,369	22,367

Dublin Rehab Institute As-Built 5-1-23

Type II 24-hr 50-Year Rainfall=5.02"

Prepared by E P Ferris & Associates, Inc

Printed 5/9/2023

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Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 0.00 hrs HW=903.05' (Free Discharge)

↑ **1=Culvert** (Passes 0.04 cfs of 6.24 cfs potential flow)

↑ **2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 10.59 fps)

Pond 5P: WQv Drawdown - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

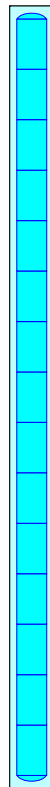
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

15 Chambers

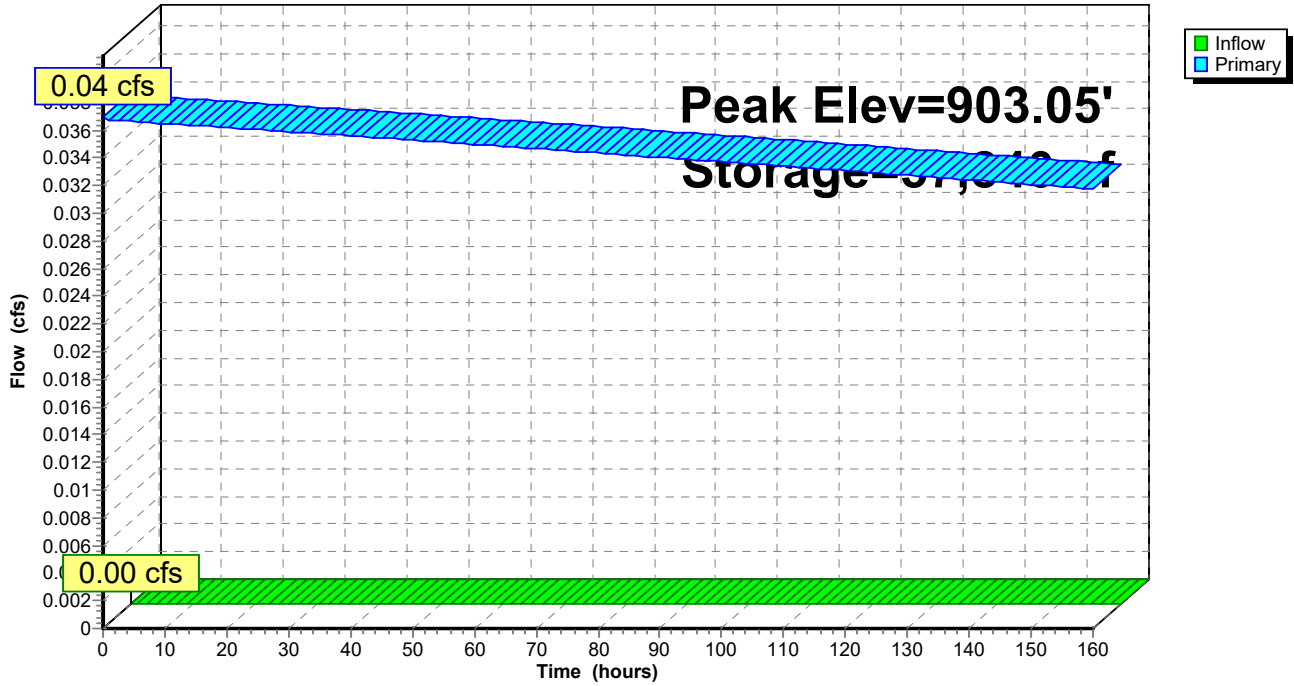
89.5 cy Field

63.9 cy Stone



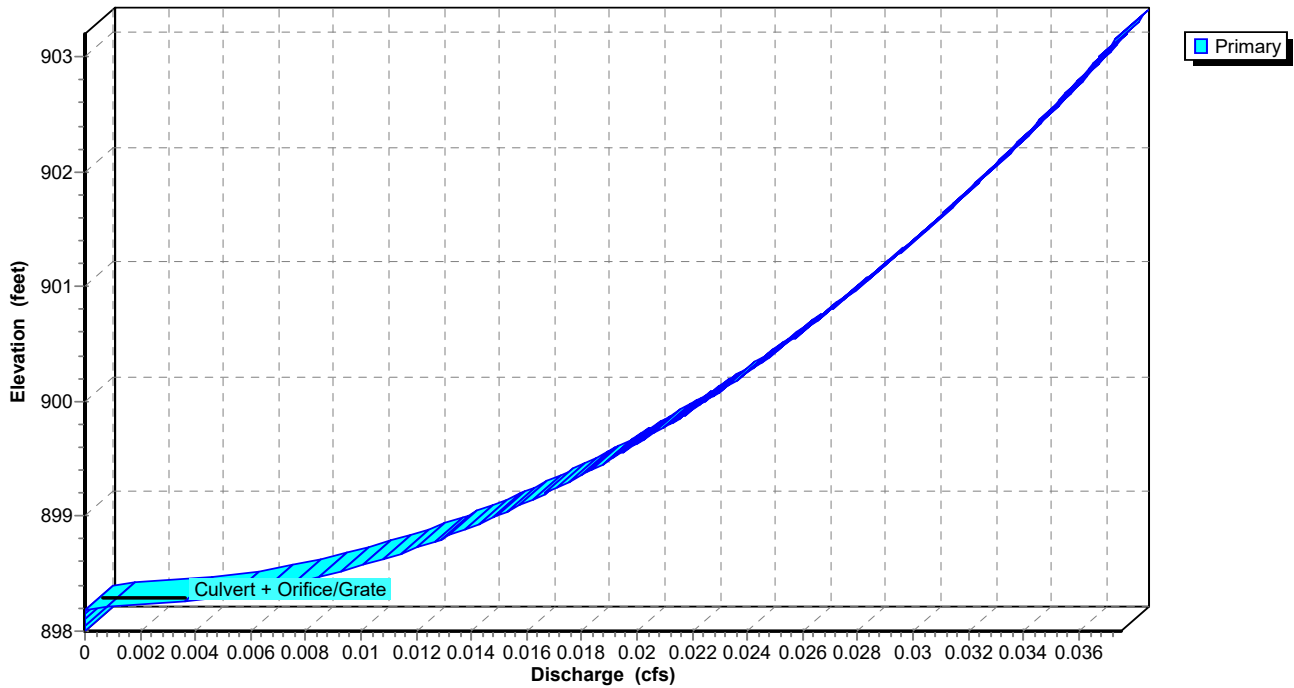
Pond 5P: WQv Drawdown

Hydrograph

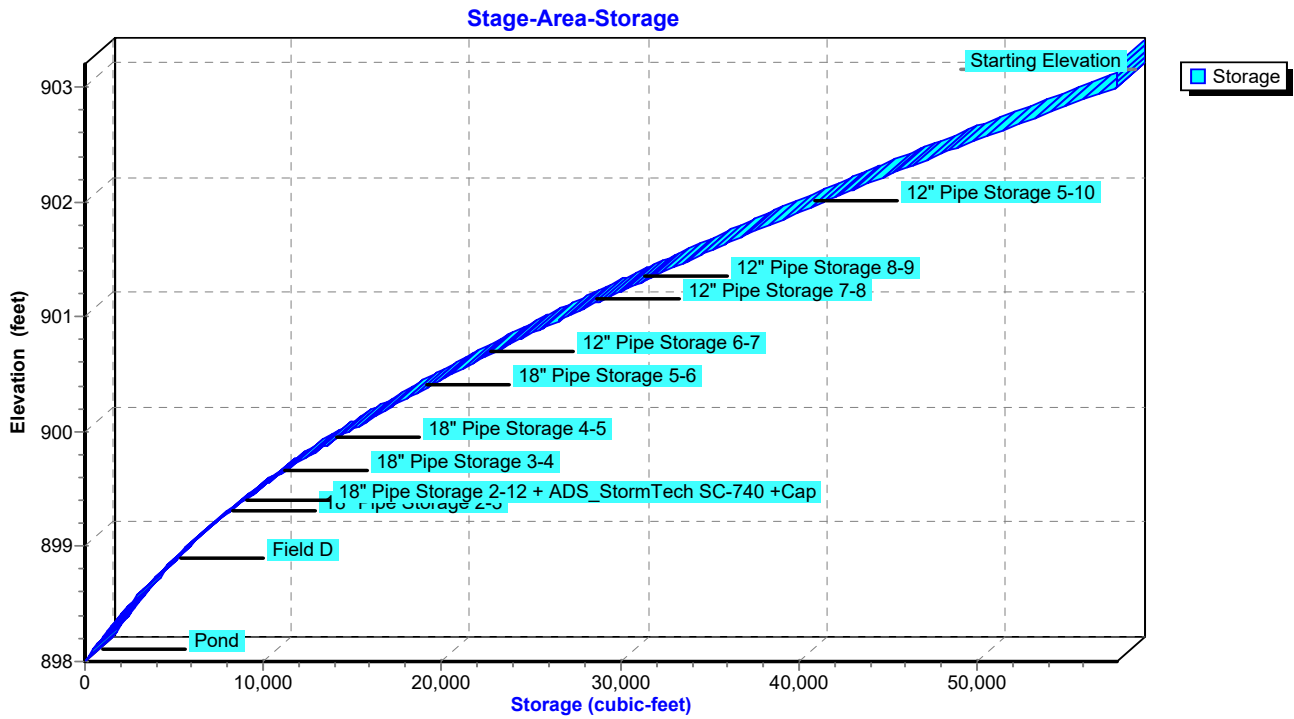


Pond 5P: WQv Drawdown

Stage-Discharge



Pond 5P: WQv Drawdown



Summary for Pond 6P: WQvForebayMicropool

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 896.00' Surf.Area= 1,704 sf Storage= 2,000 cf
 Peak Elev= 896.00' @ 0.00 hrs Surf.Area= 1,704 sf Storage= 2,000 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

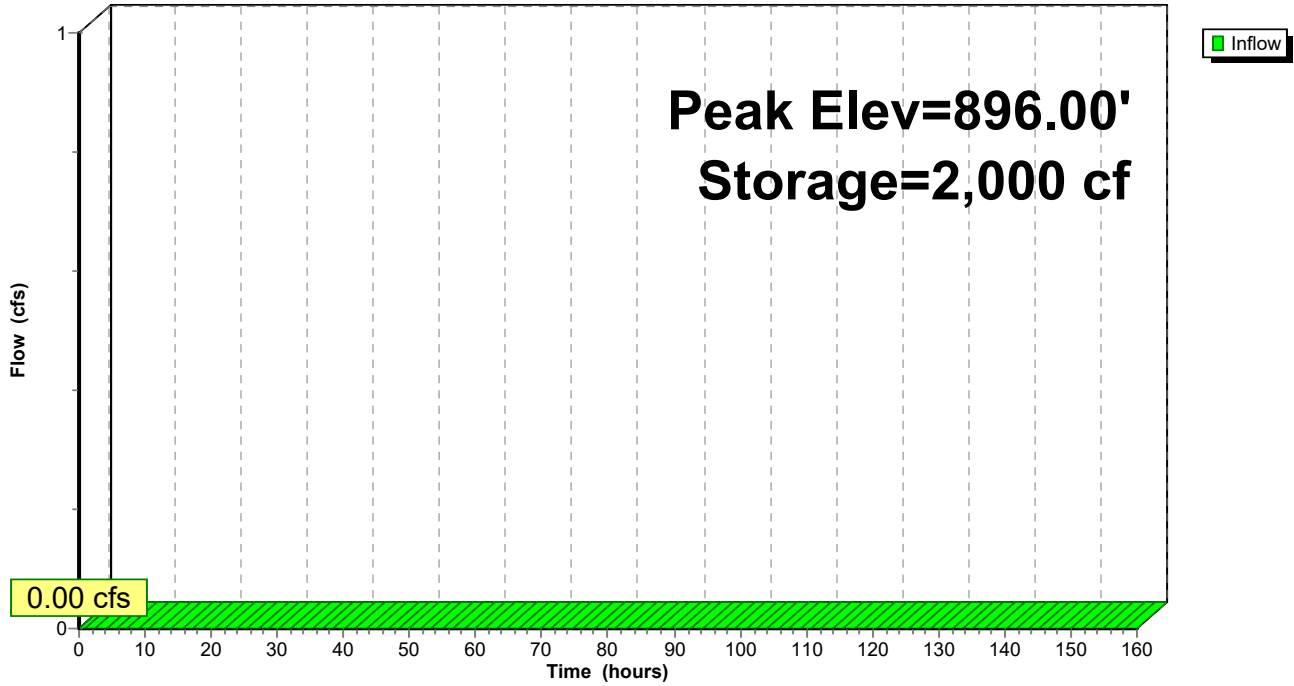
Volume	Invert	Avail.Storage	Storage Description
#1	895.00'	2,489 cf	Forebay (Irregular) Listed below (Recalc)
#2	893.00'	6,028 cf	MicroPool (Irregular) Listed below (Recalc)
		8,517 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
895.00	256	78.4	0	0	256
896.00	541	101.1	390	390	592
897.00	905	124.1	715	1,105	1,020
898.00	1,361	148.8	1,125	2,230	1,573
898.18	1,519	203.7	259	2,489	3,114

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
893.00	25	80.6	0	0	25
894.00	344	100.6	154	154	327
895.00	723	120.6	522	676	696
896.00	1,163	140.6	934	1,610	1,132
897.00	1,695	164.9	1,421	3,031	1,742
898.00	3,312	219.6	2,459	5,490	3,427
898.18	2,677	261.7	538	6,028	5,040

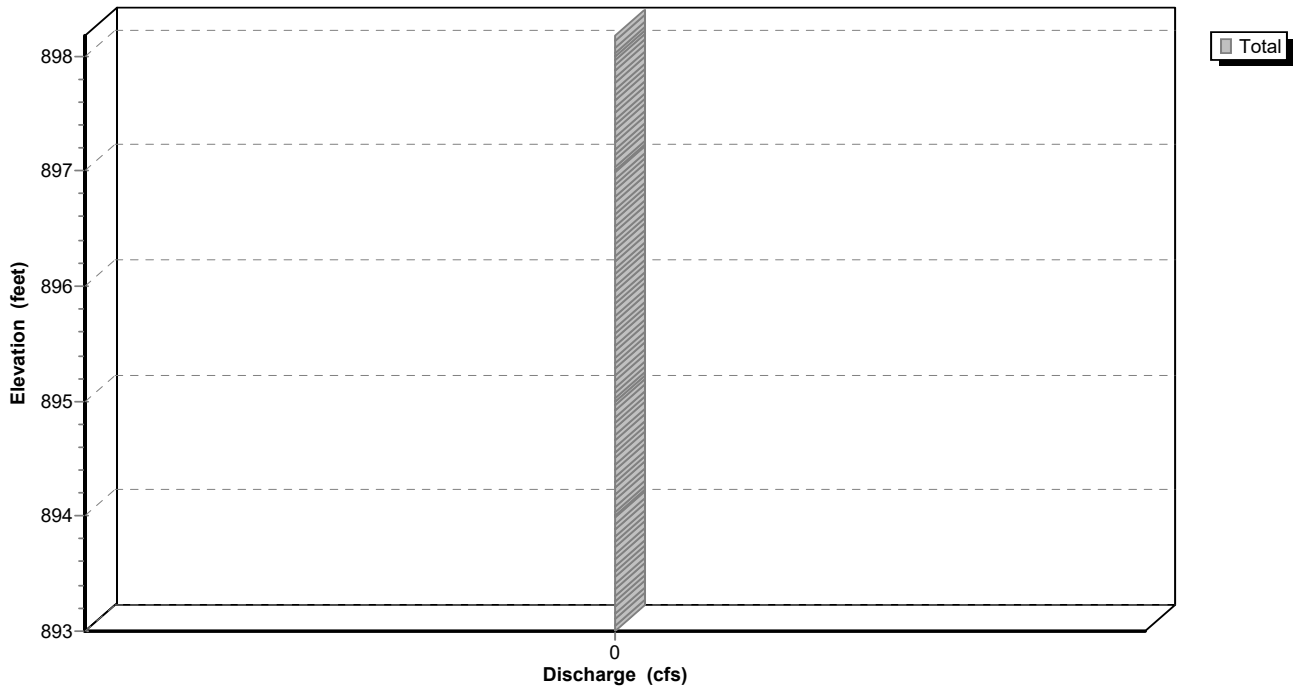
Pond 6P: WQvForebayMicropool

Hydrograph

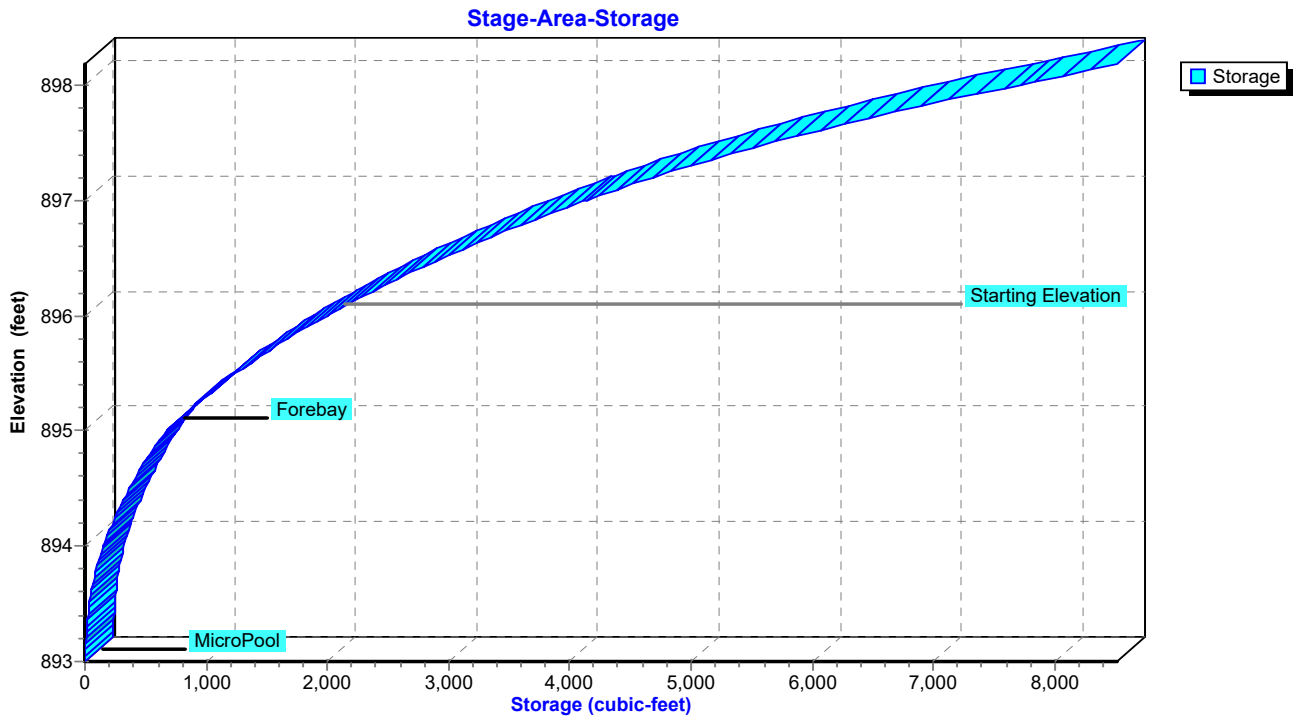


Pond 6P: WQvForebayMicropool

Stage-Discharge



Pond 6P: WQvForebayMicropool



Summary for Subcatchment 1S: Rehab Pre Dev

Runoff = 19.05 cfs @ 12.05 hrs, Volume= 1.179 af, Depth= 3.45"

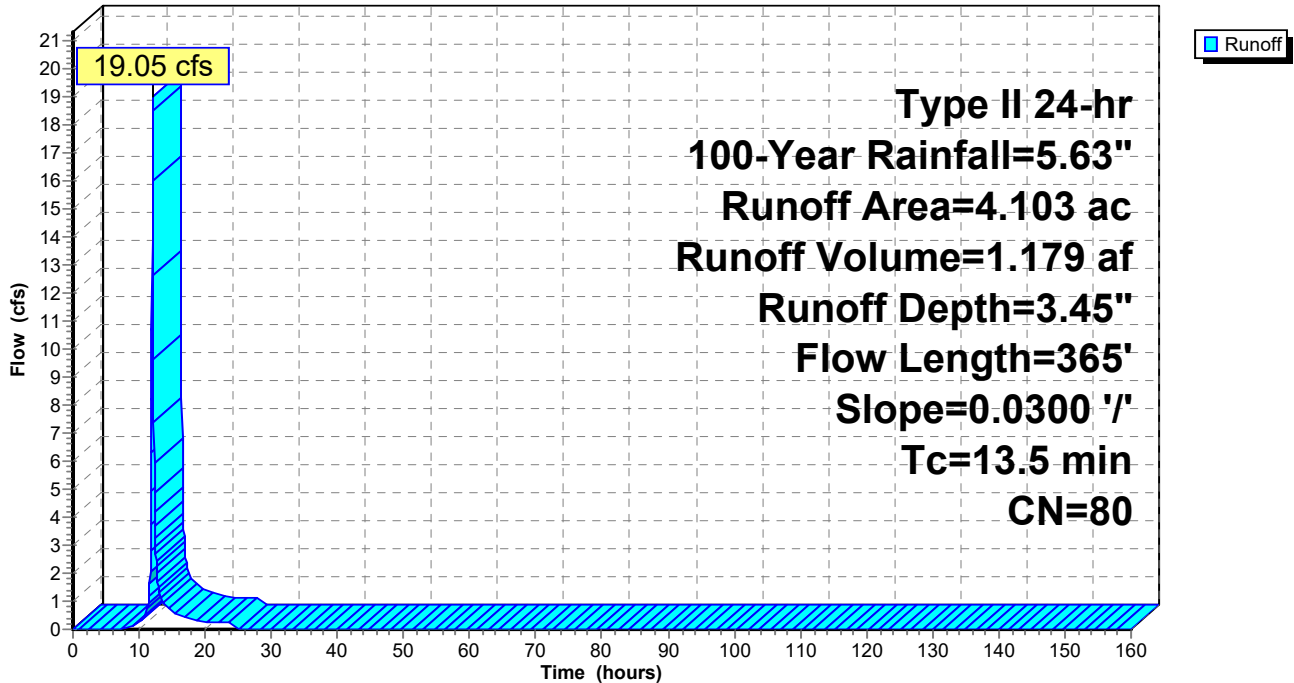
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 100-Year Rainfall=5.63"

Area (ac)	CN	Description
4.103	80	>75% Grass cover, Good, HSG D
4.103		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.0300	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 2.25"
3.6	265	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	365	Total			

Subcatchment 1S: Rehab Pre Dev

Hydrograph



Summary for Subcatchment 2S: Rehab Before Expansion

Runoff = 24.50 cfs @ 12.04 hrs, Volume= 1.571 af, Depth= 4.60"

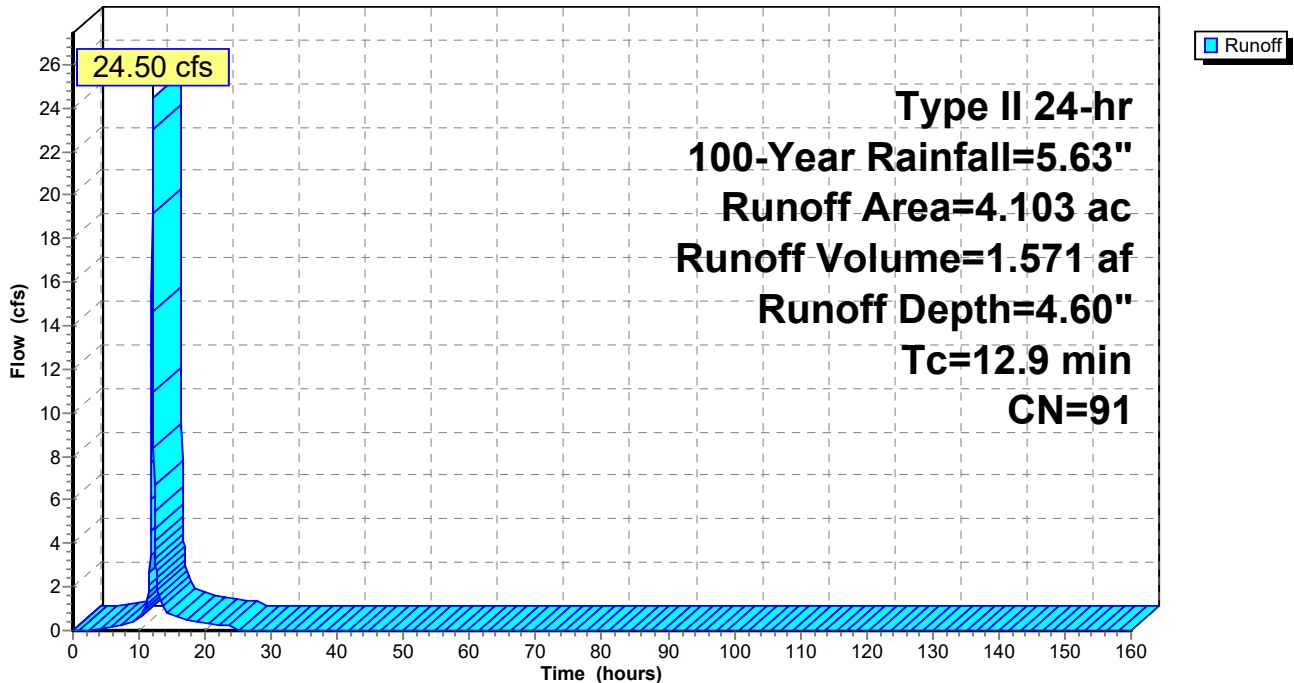
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 100-Year Rainfall=5.63"

Area (ac)	CN	Description
* 2.128	98	Impervious, HSG D
1.975	84	50-75% Grass cover, Fair, HSG D
4.103	91	Weighted Average
1.975		48.14% Pervious Area
2.128		51.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 2S: Rehab Before Expansion

Hydrograph



Summary for Subcatchment 3S: Un-detained

Runoff = 2.53 cfs @ 12.01 hrs, Volume= 0.140 af, Depth= 3.45"

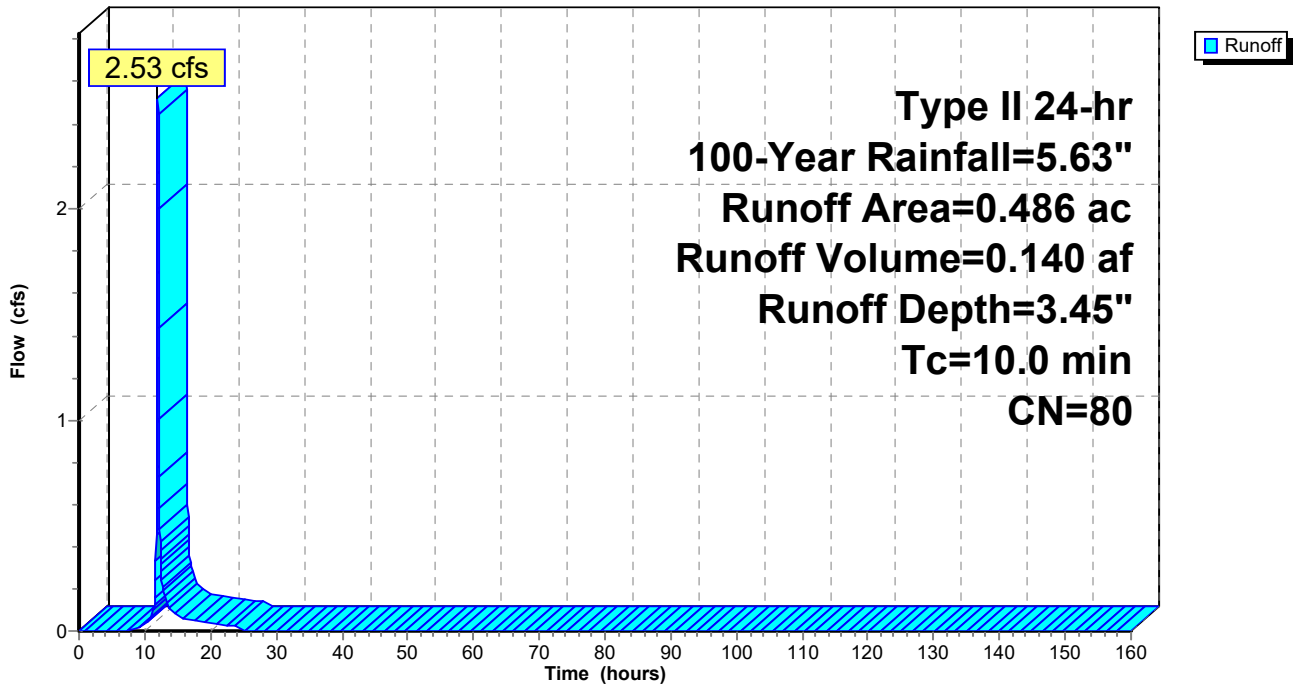
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 100-Year Rainfall=5.63"

Area (ac)	CN	Description
0.486	80	>75% Grass cover, Good, HSG D
0.486		100.00% Pervious Area

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

Subcatchment 3S: Un-detained

Hydrograph



Summary for Subcatchment 4S: REHAB WITH EXPANSION

Runoff = 24.87 cfs @ 12.04 hrs, Volume= 1.609 af, Depth= 4.71"
 Routed to Pond 4P : Rehab Storage

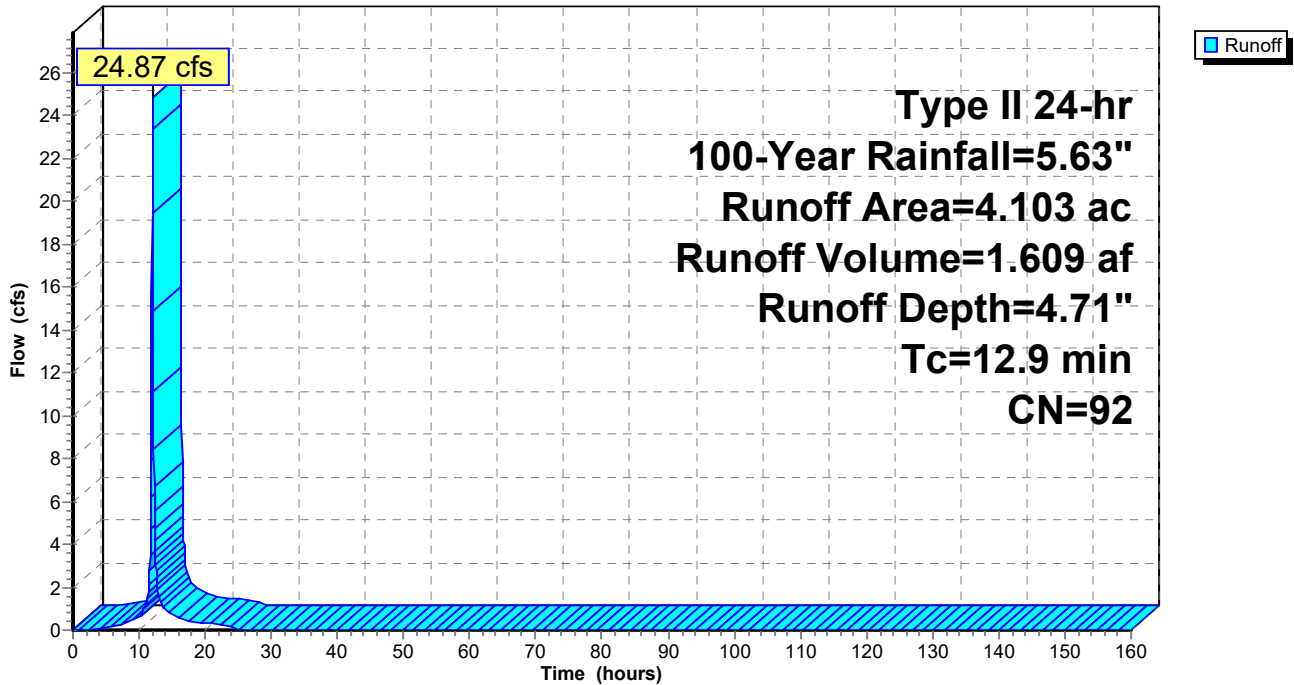
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs
 Type II 24-hr 100-Year Rainfall=5.63"

Area (ac)	CN	Description
* 2.476	98	Impervious, HSG D
1.627	84	50-75% Grass cover, Fair, HSG D
4.103	92	Weighted Average
1.627		39.65% Pervious Area
2.476		60.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9					Direct Entry, Tc Post From Storm Pipe Calcs.

Subcatchment 4S: REHAB WITH EXPANSION

Hydrograph



Summary for Pond 4P: Rehab Storage

Inflow Area = 4.103 ac, 60.35% Impervious, Inflow Depth = 4.71" for 100-Year event
 Inflow = 24.87 cfs @ 12.04 hrs, Volume= 1.609 af
 Outflow = 0.45 cfs @ 17.57 hrs, Volume= 0.662 af, Atten= 98%, Lag= 331.9 min
 Primary = 0.45 cfs @ 17.57 hrs, Volume= 0.662 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 903.13' @ 17.57 hrs Surf.Area= 18,689 sf Storage= 59,391 cf

Plug-Flow detention time= 3,047.7 min calculated for 0.662 af (41% of inflow)
 Center-of-Mass det. time= 2,920.6 min (3,702.7 - 782.0)

Volume	Invert	Avail.Storage	Storage Description
#1	898.18'	73,564 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 ''
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 ''
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 ''
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 ''
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 ''
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 ''
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 ''
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 ''
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 ''
#11D	898.80'	691 cf	6.25'W x 110.42'L x 3.50'H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		76,037 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.18	5,196	465.4	0	0	5,196
899.00	6,973	453.7	4,971	4,971	6,131
900.00	10,037	497.0	8,459	13,430	9,441
901.00	12,456	535.9	11,225	24,655	12,680
902.00	14,971	573.7	13,694	38,349	16,064
903.00	17,693	573.7	16,313	54,662	16,637
904.00	20,138	623.2	18,902	73,564	21,390

Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads 36.0" W x 6.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	903.05'	
#4	Secondary	903.36'	16.7' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.44 cfs @ 17.57 hrs HW=903.13' (Free Discharge)

- ↑ 1=Culvert (Passes 0.44 cfs of 6.30 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.04 cfs @ 10.67 fps)
- ↑ 3=Orifice/Grate (Orifice Controls 0.41 cfs @ 0.89 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=898.18' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Rehab Storage - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

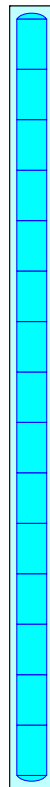
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

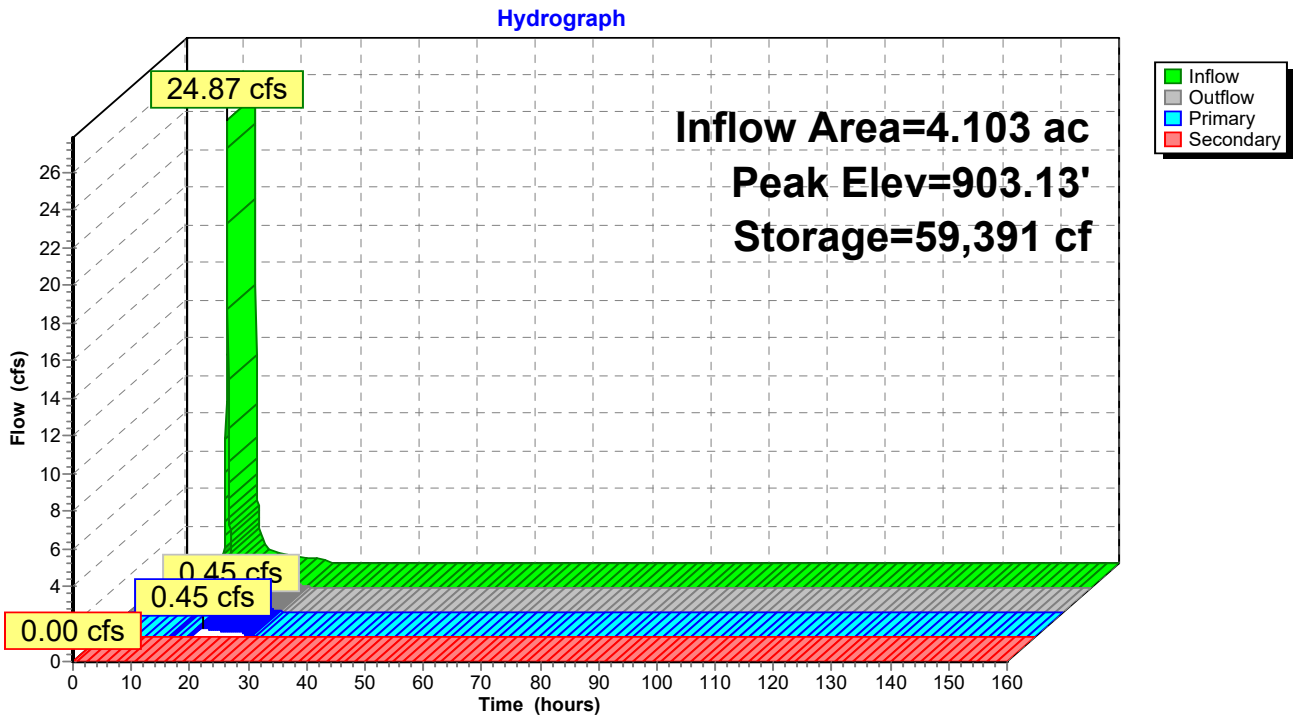
15 Chambers

89.5 cy Field

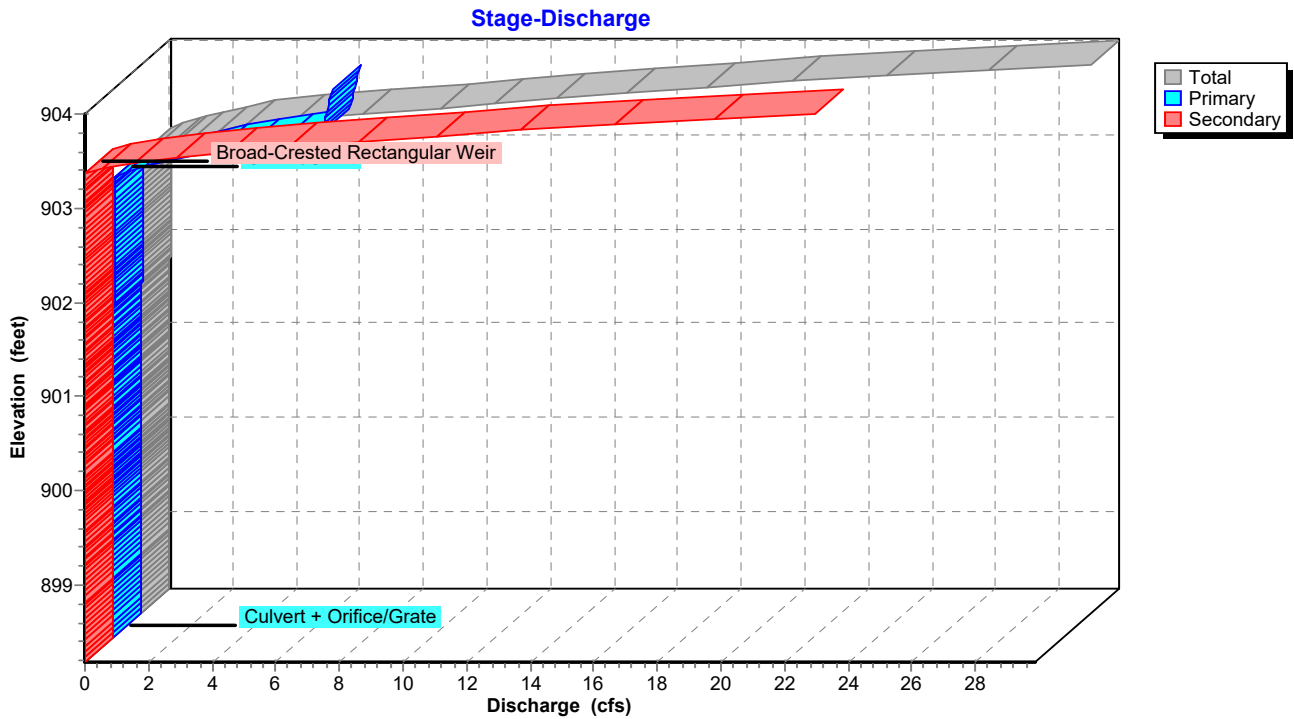
63.9 cy Stone



Pond 4P: Rehab Storage

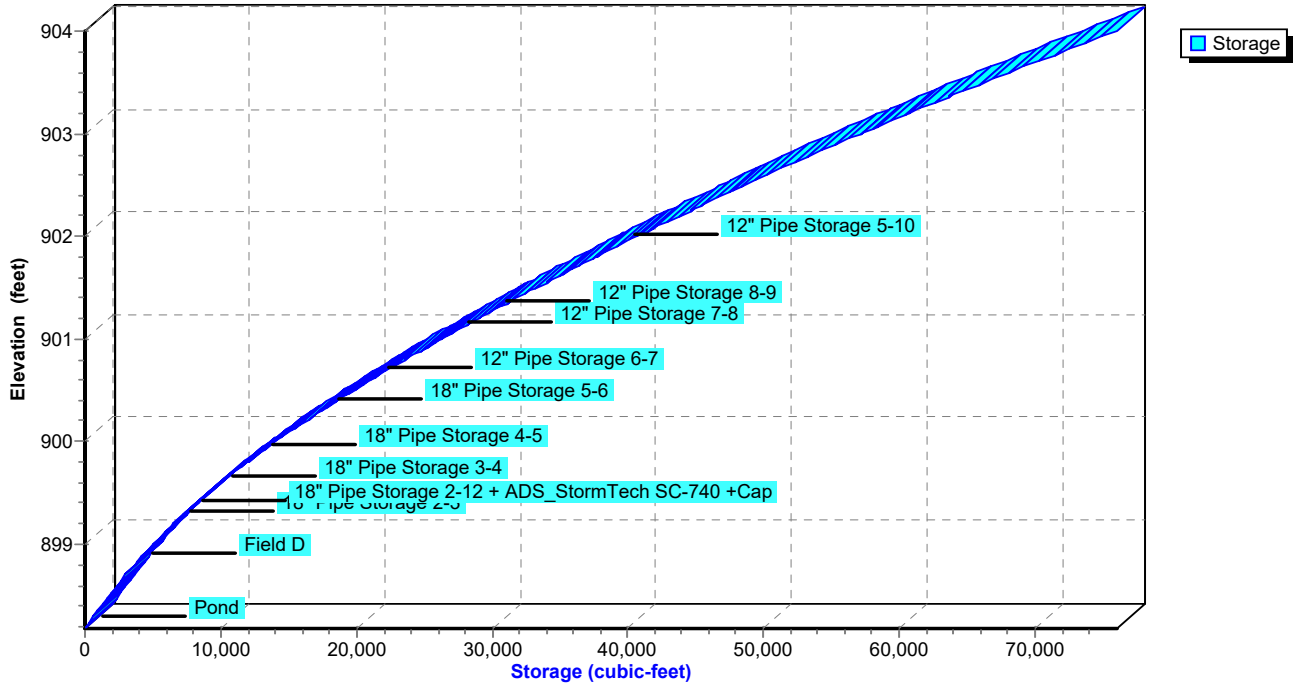


Pond 4P: Rehab Storage



Pond 4P: Rehab Storage

Stage-Area-Storage



Summary for Pond 5P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.04 cfs @ 0.00 hrs, Volume= 0.454 af

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 903.05' Surf.Area= 18,399 sf Storage= 57,840 cf
 Peak Elev= 903.05' @ 0.00 hrs Surf.Area= 18,399 sf Storage= 57,840 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	898.00'	55,369 cf	Pond (Irregular) Listed below (Recalc)
#2	899.20'	181 cf	18.0" Round 18" Pipe Storage 2-3 L= 102.7' S= 0.0034 '/'
#3	899.55'	209 cf	18.0" Round 18" Pipe Storage 3-4 L= 118.1' S= 0.0025 '/'
#4	899.85'	266 cf	18.0" Round 18" Pipe Storage 4-5 L= 150.3' S= 0.0030 '/'
#5	900.30'	182 cf	18.0" Round 18" Pipe Storage 5-6 L= 103.2' S= 0.0029 '/'
#6	900.60'	85 cf	12.0" Round 12" Pipe Storage 6-7 L= 108.5' S= 0.0041 '/'
#7	901.05'	36 cf	12.0" Round 12" Pipe Storage 7-8 L= 45.3' S= 0.0044 '/'
#8	901.25'	30 cf	12.0" Round 12" Pipe Storage 8-9 L= 38.1' S= 0.0052 '/'
#9	901.90'	51 cf	12.0" Round 12" Pipe Storage 5-10 L= 65.4' S= 0.0046 '/'
#10	899.30'	52 cf	18.0" Round 18" Pipe Storage 2-12 L= 29.7' S= 0.0033 '/'
#11D	898.80'	691 cf	6.25"W x 110.42"L x 3.50"H Field D 2,415 cf Overall - 689 cf Embedded = 1,726 cf x 40.0% Voids
#12D	899.30'	689 cf	ADS_StormTech SC-740 +Cap x 15 Inside #11 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		57,841 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
898.00	4,473	367.8	0	0	4,473
899.00	6,974	453.7	5,677	5,677	10,104
900.00	10,037	497.0	8,459	14,137	13,414
901.00	12,456	535.9	11,225	25,361	16,653
902.00	14,971	573.9	13,694	39,056	20,054
903.00	17,693	597.9	16,313	55,369	22,367

Dublin Rehab Institute As-Built 5-1-23

Type II 24-hr 100-Year Rainfall=5.63"

Prepared by E P Ferris & Associates, Inc

Printed 5/9/2023

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Device	Routing	Invert	Outlet Devices
#1	Primary	898.18'	12.0" Round Culvert L= 22.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.18' / 896.94' S= 0.0556 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	898.18'	0.8" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 0.00 hrs HW=903.05' (Free Discharge)

↑ **1=Culvert** (Passes 0.04 cfs of 6.24 cfs potential flow)

↑ **2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 10.59 fps)

Pond 5P: WQv Drawdown - Chamber Wizard Field D

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

2,415.4 cf Field - 689.1 cf Chambers = 1,726.3 cf Stone x 40.0% Voids = 690.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,379.6 cf = 0.032 af

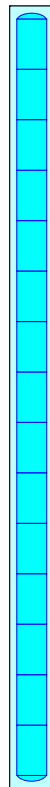
Overall Storage Efficiency = 57.1%

Overall System Size = 110.42' x 6.25' x 3.50'

15 Chambers

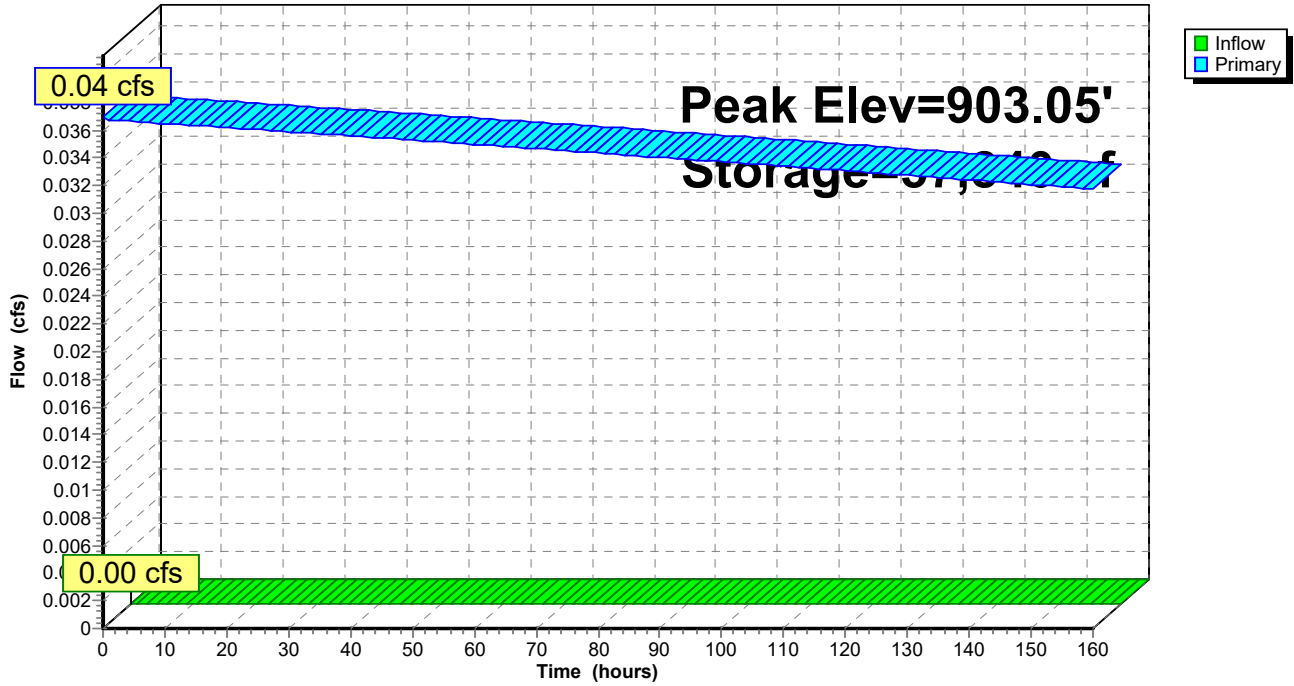
89.5 cy Field

63.9 cy Stone



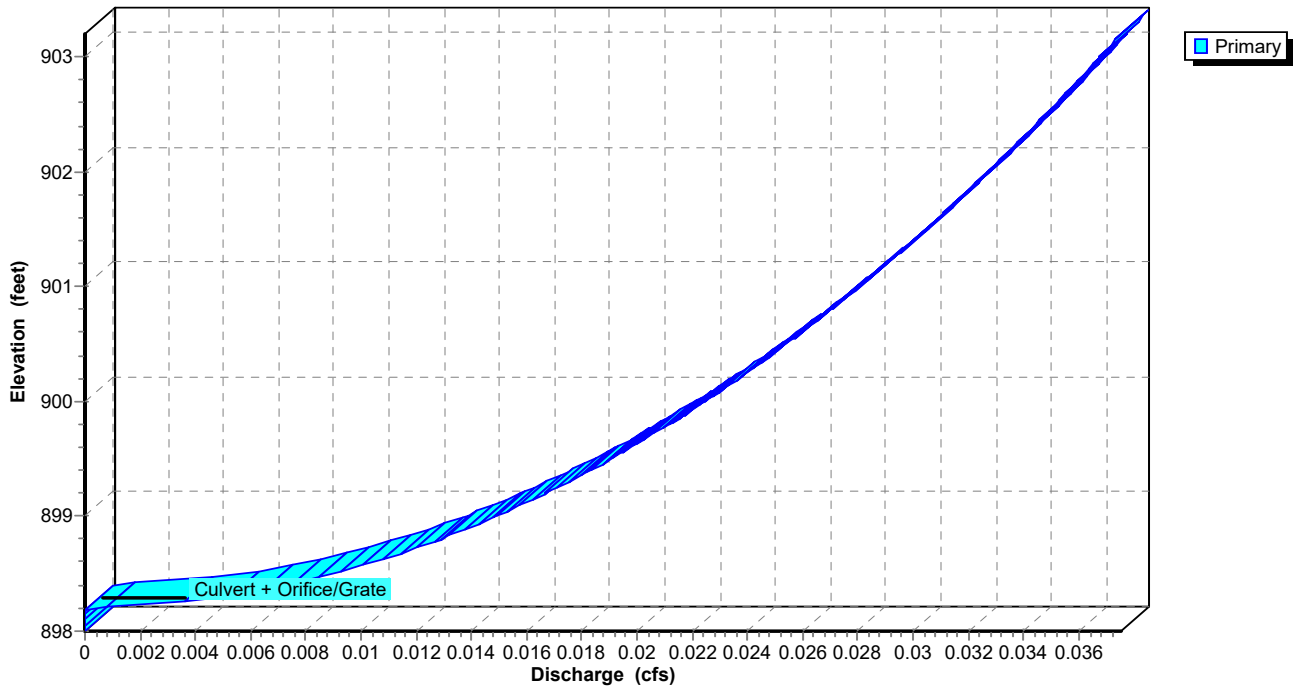
Pond 5P: WQv Drawdown

Hydrograph

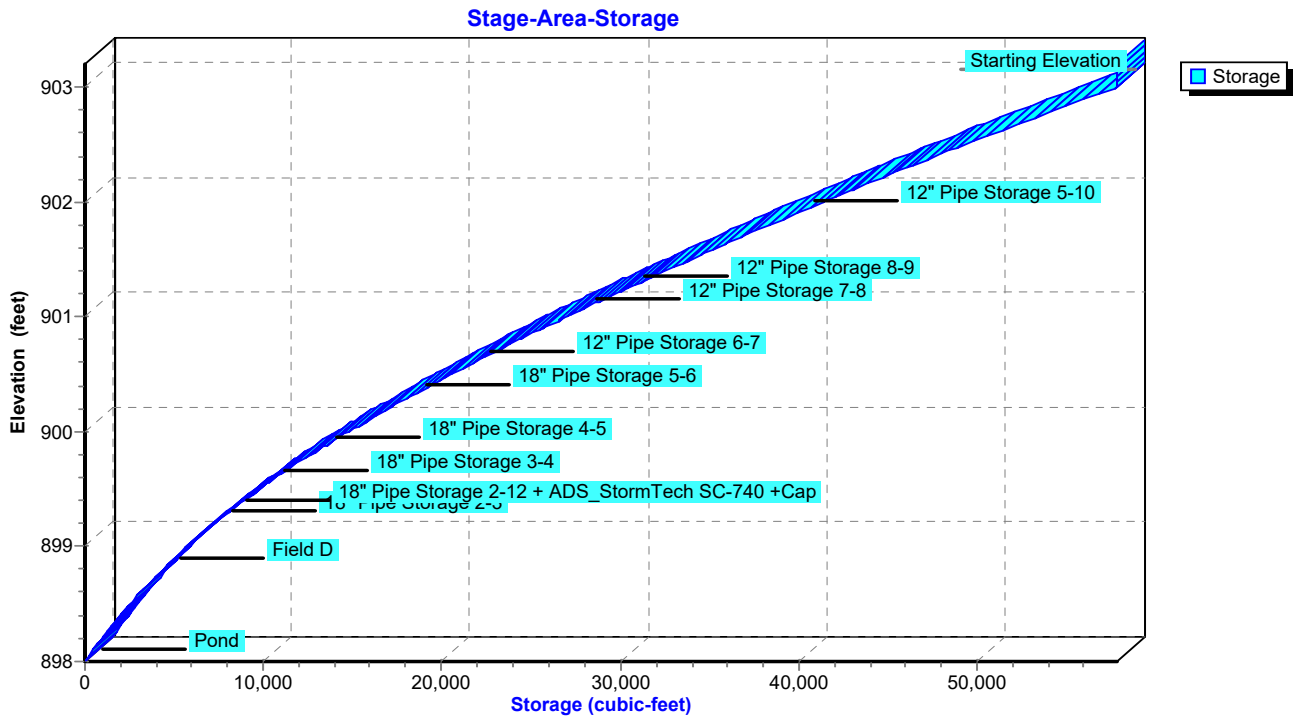


Pond 5P: WQv Drawdown

Stage-Discharge



Pond 5P: WQv Drawdown



Summary for Pond 6P: WQvForebayMicropool

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-160.00 hrs, dt= 0.04 hrs / 2
 Starting Elev= 896.00' Surf.Area= 1,704 sf Storage= 2,000 cf
 Peak Elev= 896.00' @ 0.00 hrs Surf.Area= 1,704 sf Storage= 2,000 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

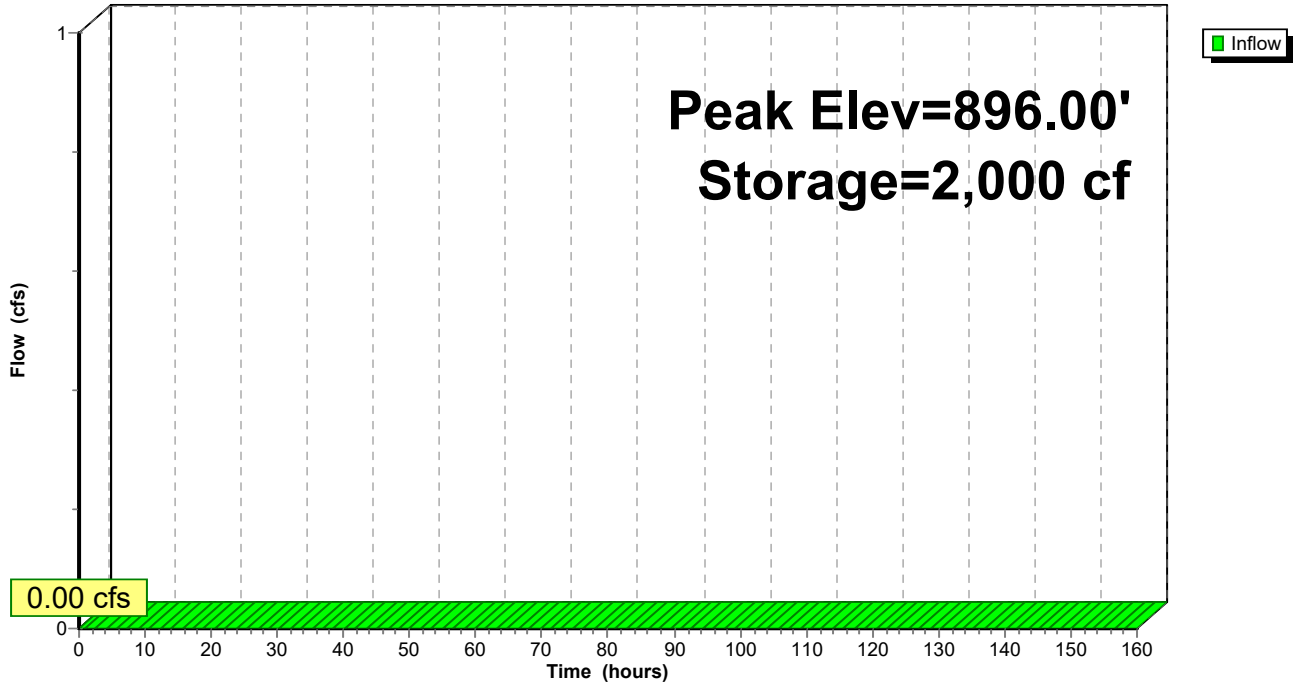
Volume	Invert	Avail.Storage	Storage Description
#1	895.00'	2,489 cf	Forebay (Irregular) Listed below (Recalc)
#2	893.00'	6,028 cf	MicroPool (Irregular) Listed below (Recalc)
		8,517 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
895.00	256	78.4	0	0	256
896.00	541	101.1	390	390	592
897.00	905	124.1	715	1,105	1,020
898.00	1,361	148.8	1,125	2,230	1,573
898.18	1,519	203.7	259	2,489	3,114

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
893.00	25	80.6	0	0	25
894.00	344	100.6	154	154	327
895.00	723	120.6	522	676	696
896.00	1,163	140.6	934	1,610	1,132
897.00	1,695	164.9	1,421	3,031	1,742
898.00	3,312	219.6	2,459	5,490	3,427
898.18	2,677	261.7	538	6,028	5,040

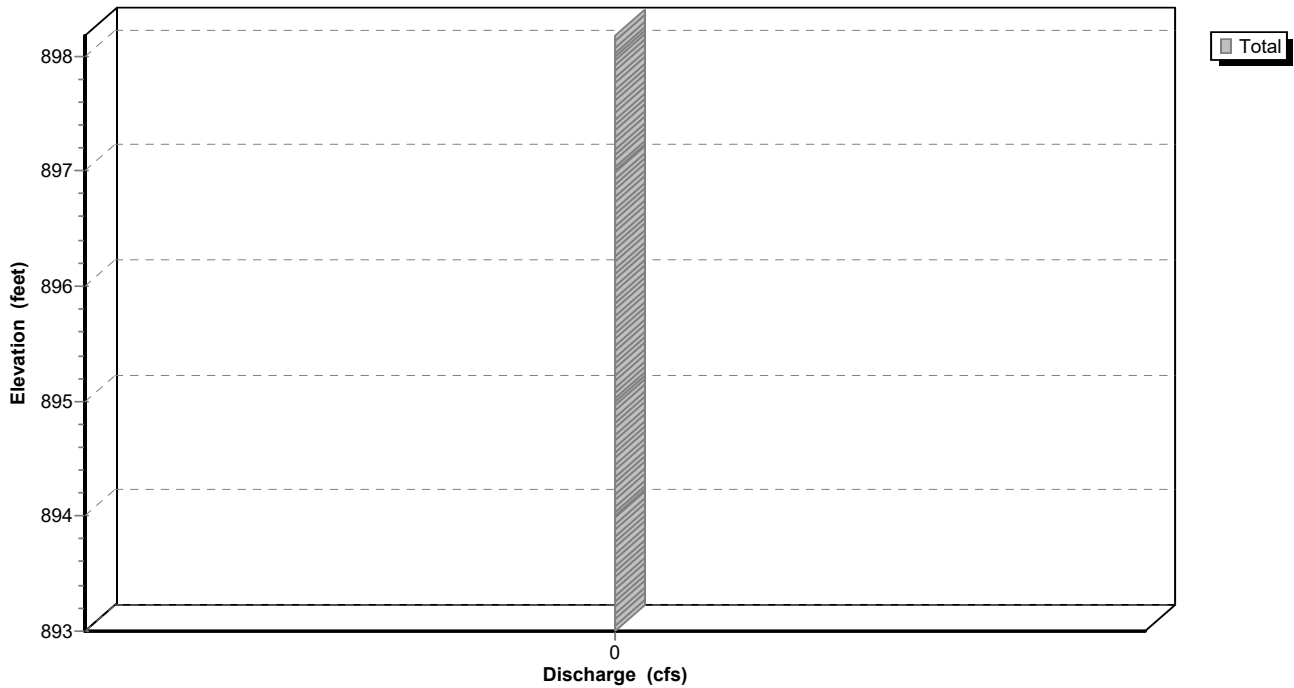
Pond 6P: WQvForebayMicropool

Hydrograph

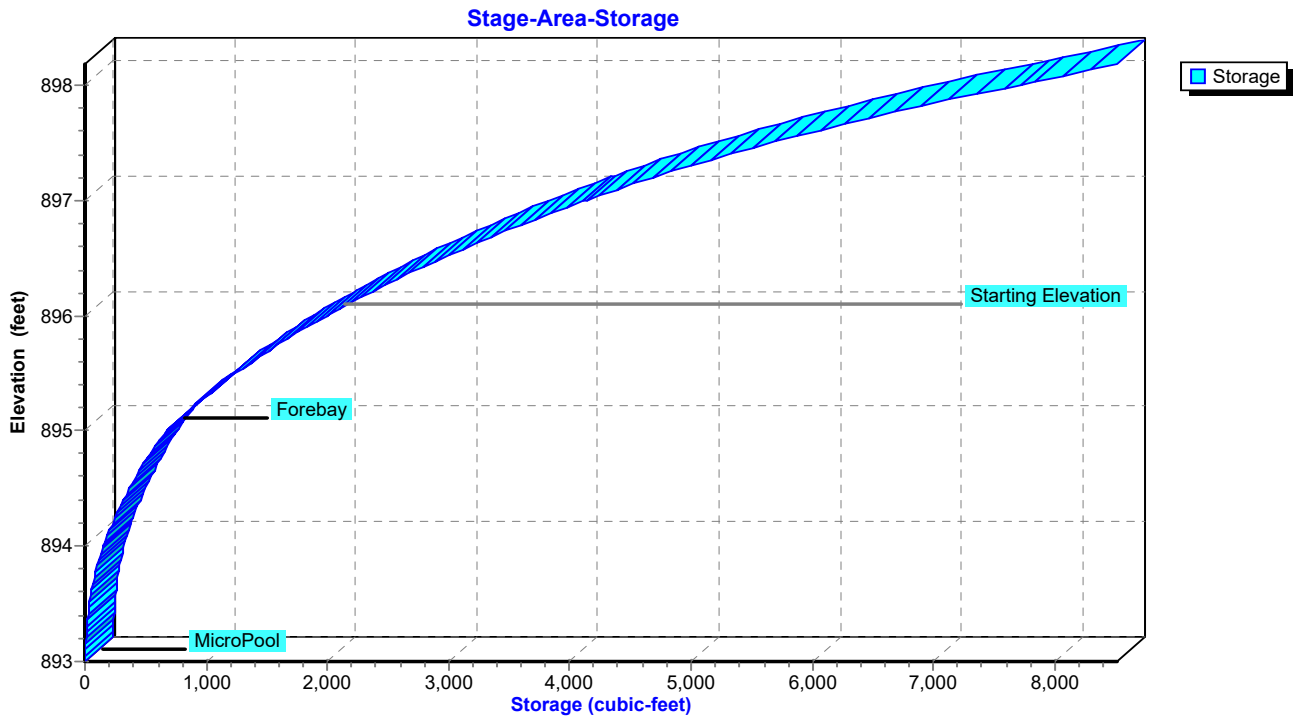


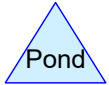
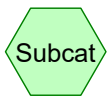
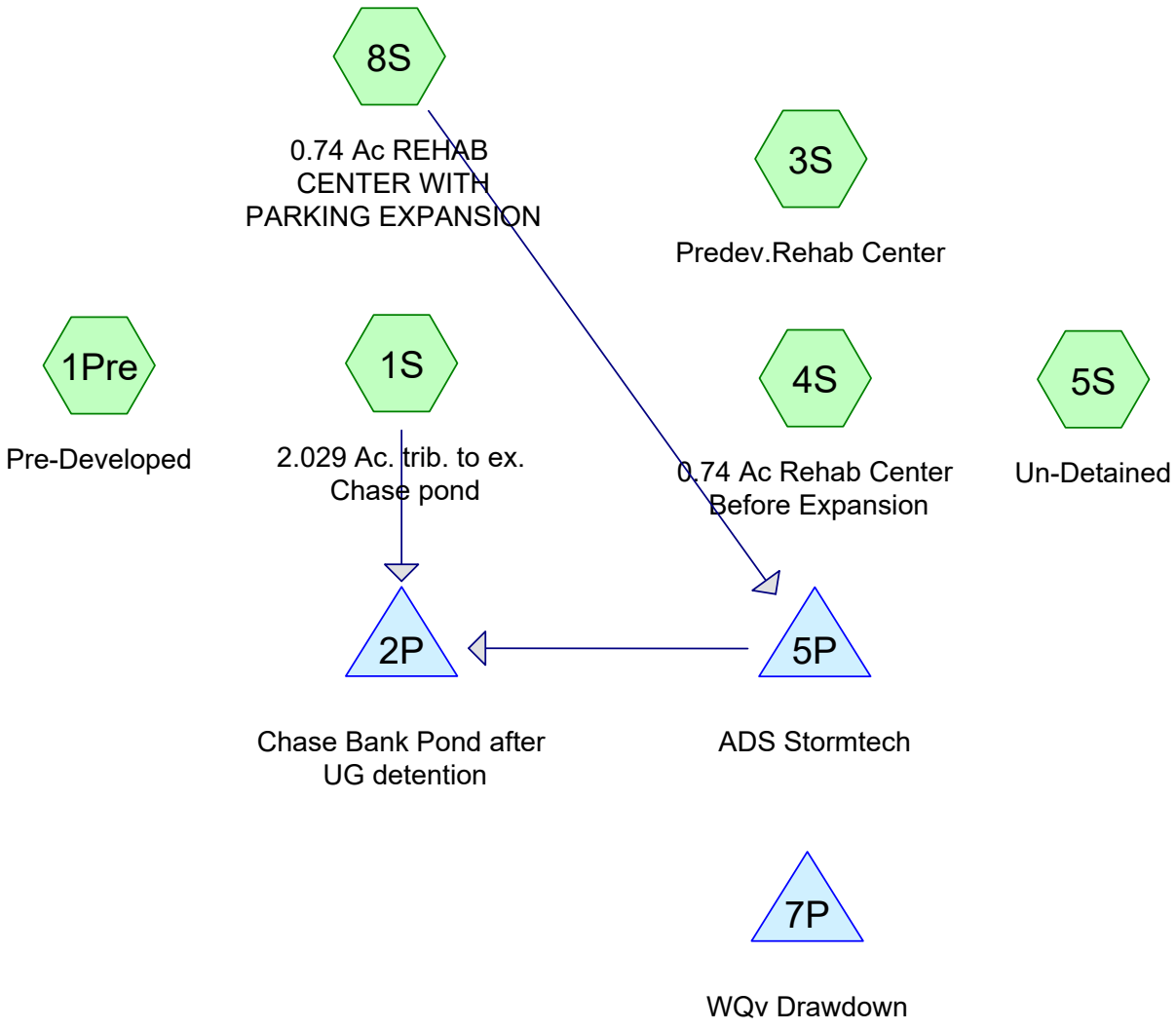
Pond 6P: WQvForebayMicropool

Stage-Discharge



Pond 6P: WQvForebayMicropool





Summary for Subcatchment 1Pre: Pre-Developed

Runoff = 2.22 cfs @ 12.02 hrs, Volume= 0.137 af, Depth= 0.58"

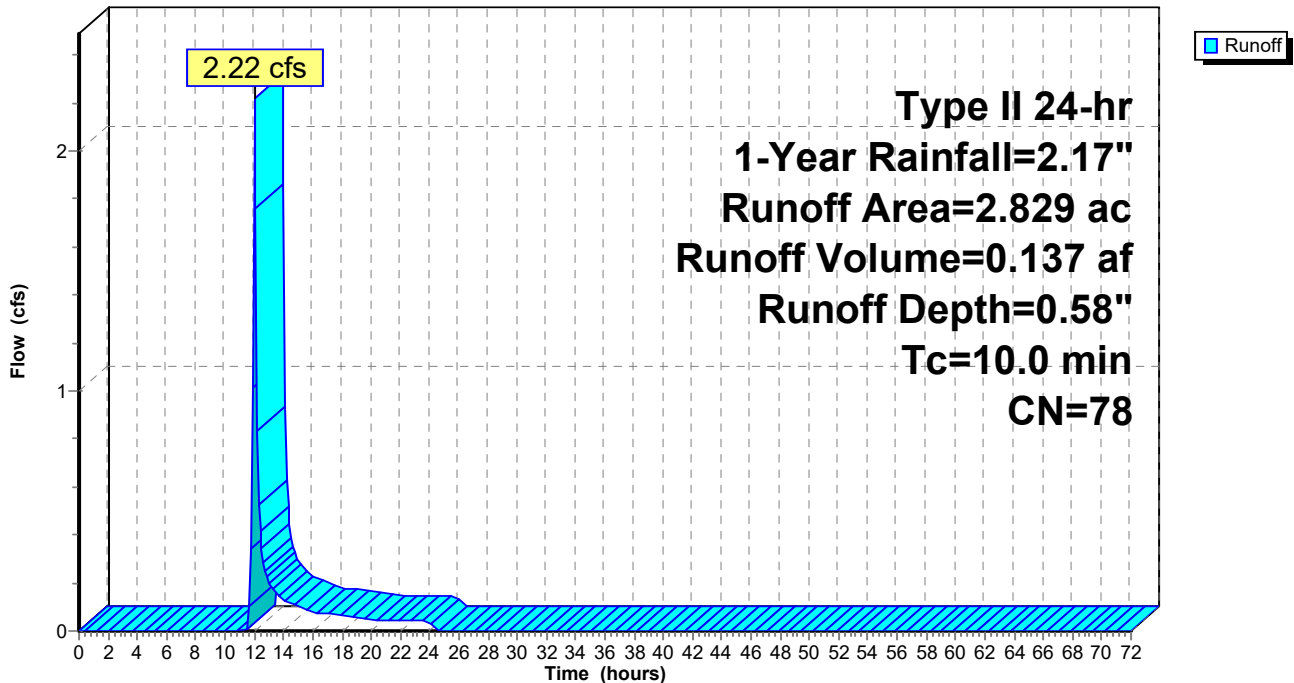
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 1-Year Rainfall=2.17"

Area (ac)	CN	Description
* 2.829	78	Predeveloped Open Area
2.829		100.00% Pervious Area

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

Subcatchment 1Pre: Pre-Developed

Hydrograph



Summary for Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

Runoff = 3.25 cfs @ 12.01 hrs, Volume= 0.187 af, Depth= 1.10"
 Routed to Pond 2P : Chase Bank Pond after UG detention

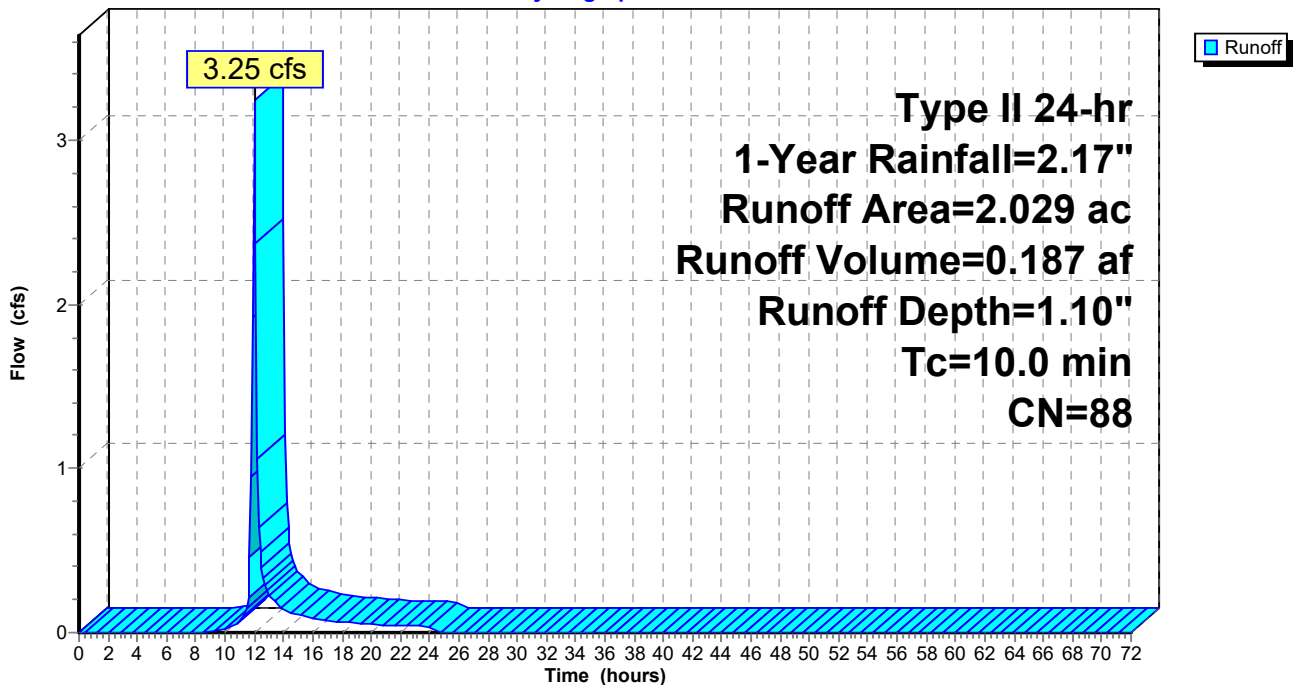
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 1-Year Rainfall=2.17"

Area (ac)	CN	Description
* 0.997	98	Paved/Roof Area
* 0.183	95	Pond Surface Area
* 0.849	74	Lawn/Landscape Area
2.029	88	Weighted Average
1.032		50.86% Pervious Area
0.997		49.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Minimum Assumed ToF C

Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

Hydrograph



Summary for Subcatchment 3S: Predev.Rehab Center

Runoff = 0.89 cfs @ 12.02 hrs, Volume= 0.052 af, Depth= 0.81"

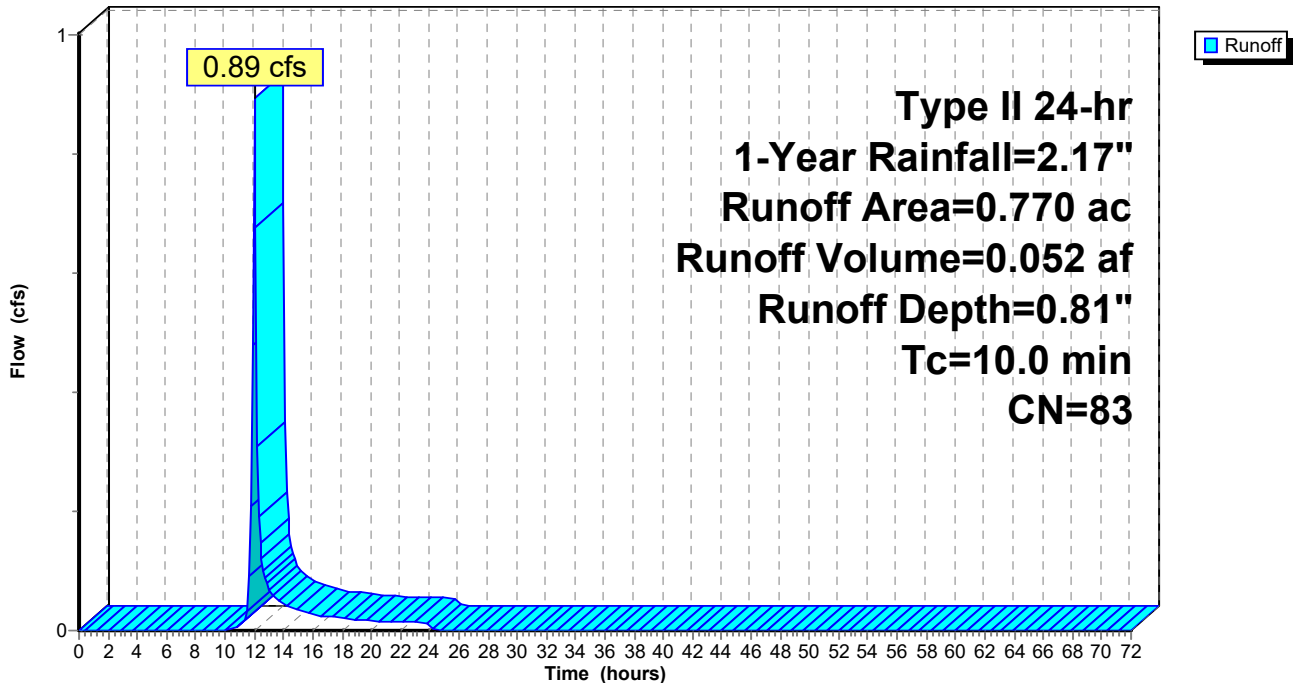
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 1-Year Rainfall=2.17"

Area (ac)	CN	Description
0.110	98	Paved roads w/curbs & sewers, HSG D
0.660	80	>75% Grass cover, Good, HSG D
0.770	83	Weighted Average
0.660		85.71% Pervious Area
0.110		14.29% Impervious Area

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

Subcatchment 3S: Predev.Rehab Center

Hydrograph



Summary for Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Runoff = 1.70 cfs @ 12.00 hrs, Volume= 0.101 af, Depth= 1.65"

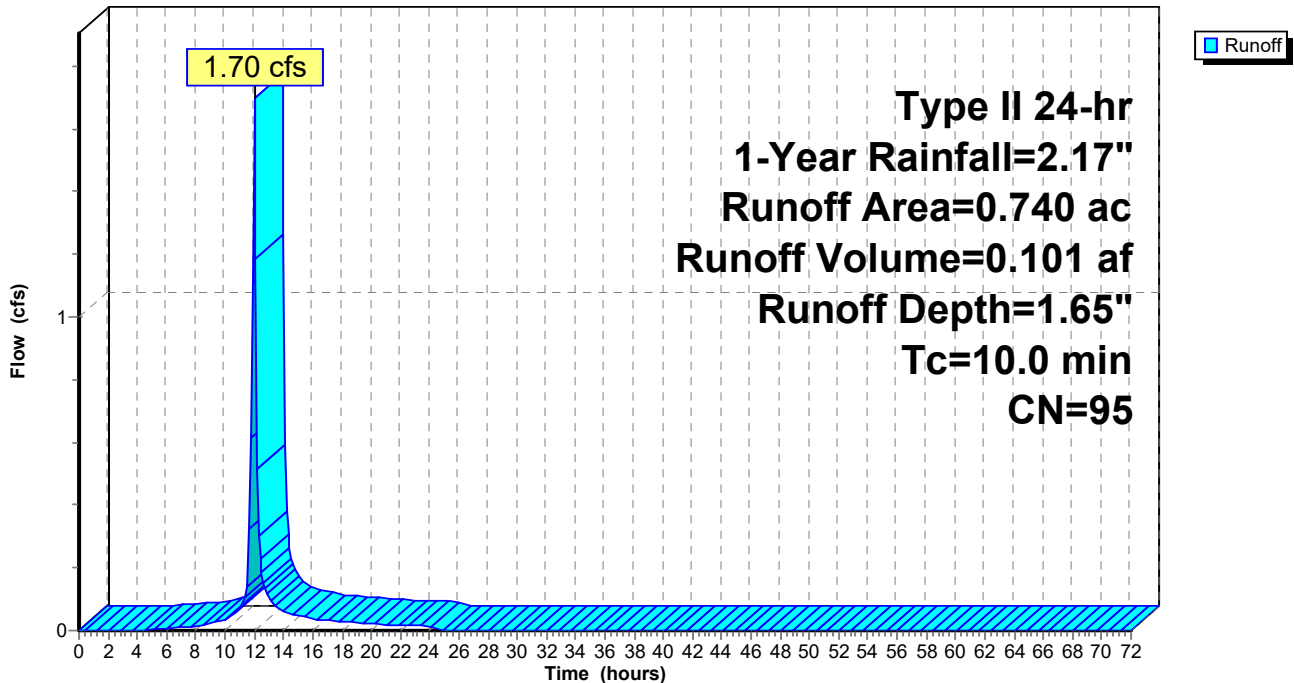
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 1-Year Rainfall=2.17"

Area (ac)	CN	Description
0.601	98	Paved parking, HSG C
0.139	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.139		18.78% Pervious Area
0.601		81.22% Impervious Area

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

Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Hydrograph



Summary for Subcatchment 5S: Un-Detained

Runoff = 0.44 cfs @ 12.00 hrs, Volume= 0.026 af, Depth= 1.65"

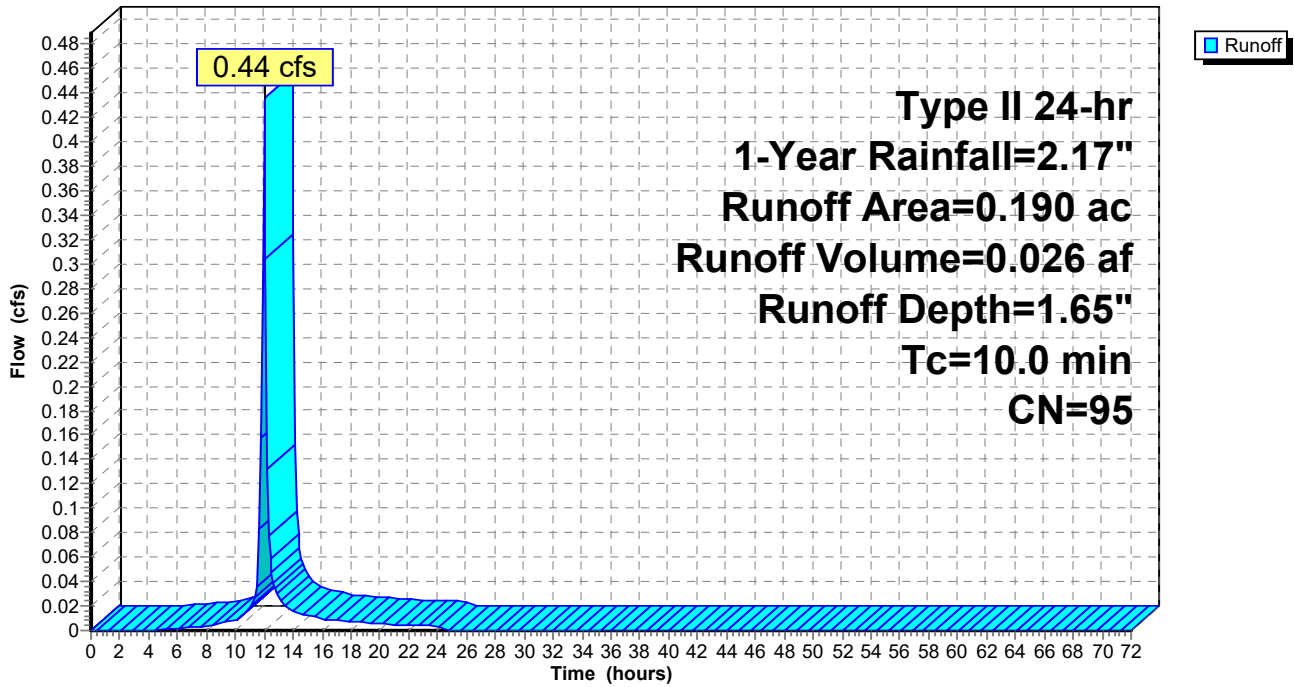
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 1-Year Rainfall=2.17"

Area (ac)	CN	Description
0.190	95	Urban commercial, 85% imp, HSG D
0.028		15.00% Pervious Area
0.161		85.00% Impervious Area

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

Subcatchment 5S: Un-Detained

Hydrograph



Summary for Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION

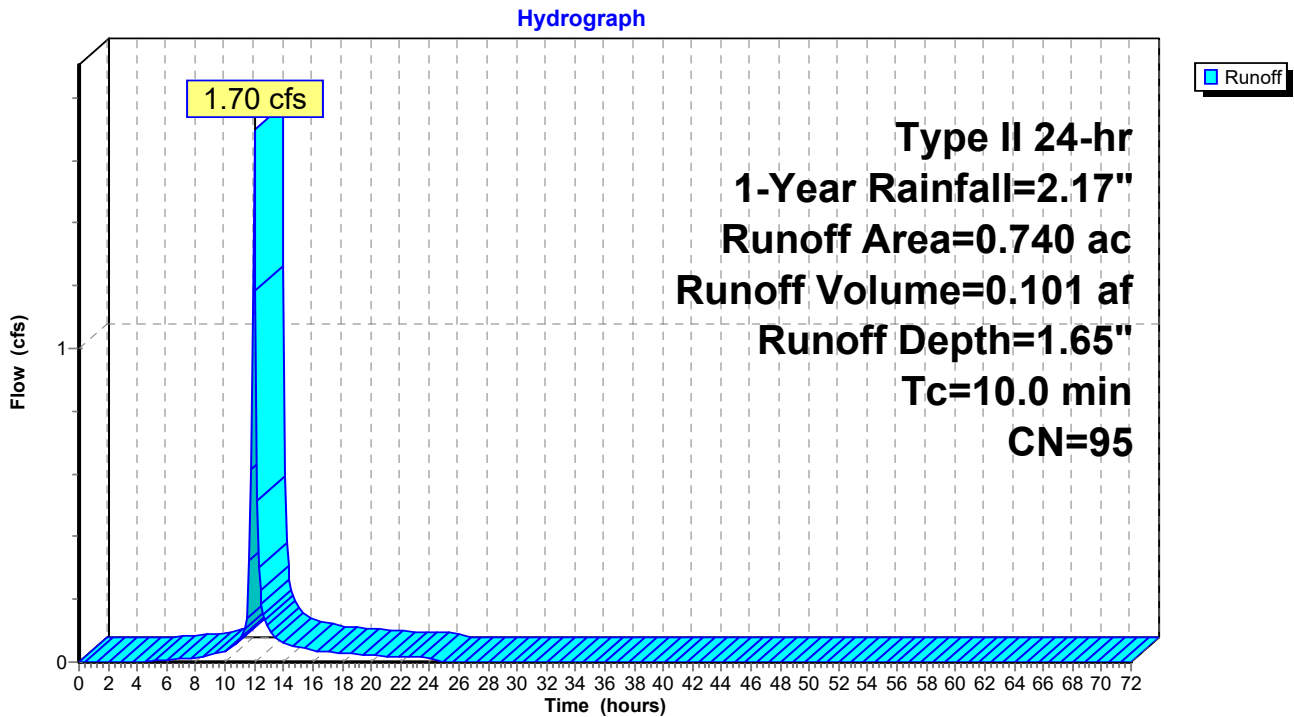
Runoff = 1.70 cfs @ 12.00 hrs, Volume= 0.101 af, Depth= 1.65"
 Routed to Pond 5P : ADS Stormtech

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 1-Year Rainfall=2.17"

Area (ac)	CN	Description
0.617	98	Paved parking, HSG C
0.123	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.123		16.62% Pervious Area
0.617		83.38% Impervious Area

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

Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION



Summary for Pond 2P: Chase Bank Pond after UG detention

Inflow Area = 2.769 ac, 58.29% Impervious, Inflow Depth = 1.24" for 1-Year event
 Inflow = 3.30 cfs @ 12.01 hrs, Volume= 0.287 af
 Outflow = 0.14 cfs @ 15.83 hrs, Volume= 0.280 af, Atten= 96%, Lag= 229.4 min
 Primary = 0.14 cfs @ 15.83 hrs, Volume= 0.280 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 6,800 sf Storage= 13,583 cf
 Peak Elev= 900.74' @ 15.83 hrs Surf.Area= 8,378 sf Storage= 19,219 cf (5,637 cf above start)
 Flood Elev= 903.00' Surf.Area= 13,066 sf Storage= 43,293 cf (29,710 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= 629.2 min (1,670.7 - 1,041.5)

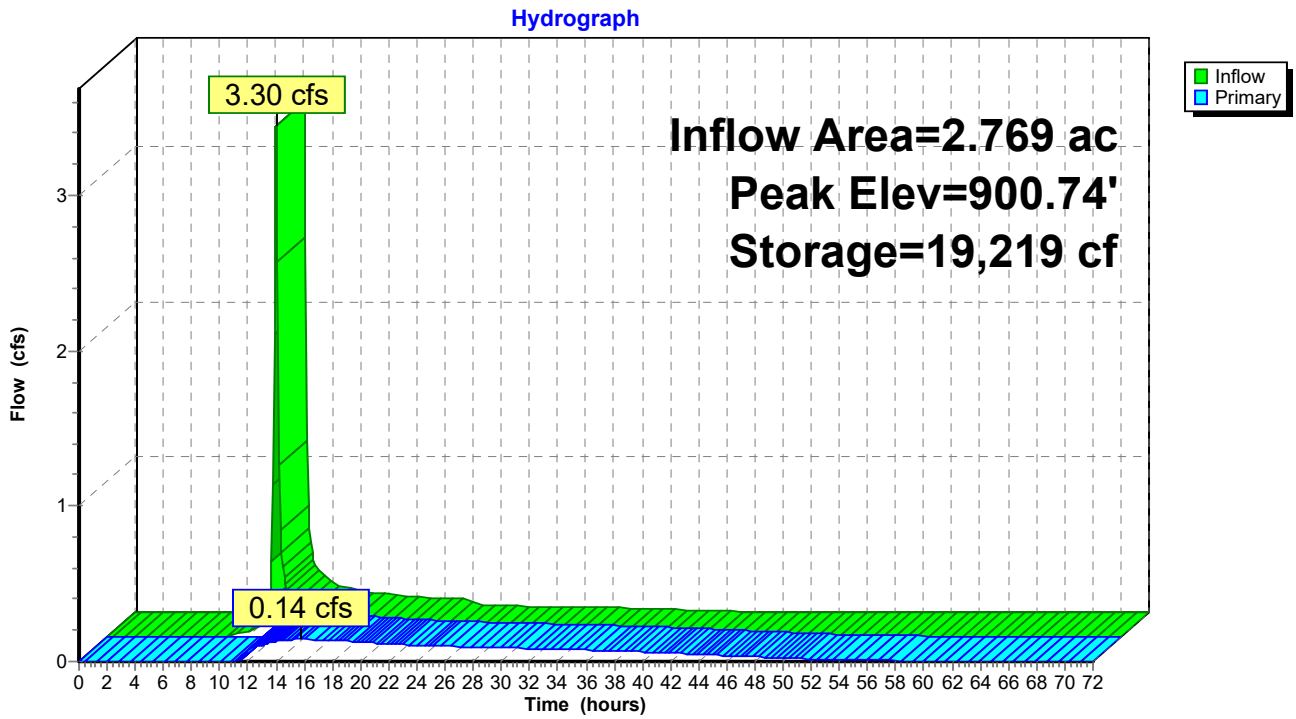
Volume	Invert	Avail.Storage	Storage Description		
#1	895.00'	43,293 cf	Wet Pond - Chase (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
895.00	663	142.0	0	0	663
896.00	1,284	167.0	957	957	1,297
897.00	2,006	193.0	1,632	2,588	2,063
898.00	2,872	223.0	2,426	5,014	3,078
899.00	3,815	248.0	3,332	8,347	4,044
900.00	6,800	369.0	5,236	13,583	9,993
901.00	8,959	404.0	7,855	21,437	12,180
902.00	10,875	435.0	9,902	31,339	14,292
903.00	13,066	480.0	11,954	43,293	17,601

Device	Routing	Invert	Outlet Devices
#1	Primary	900.03'	1.00" Vert. WQ ORIFI X 5.00 C= 0.600 Limited to weir flow at low heads
#2	Primary	900.65'	8.00" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	903.00'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

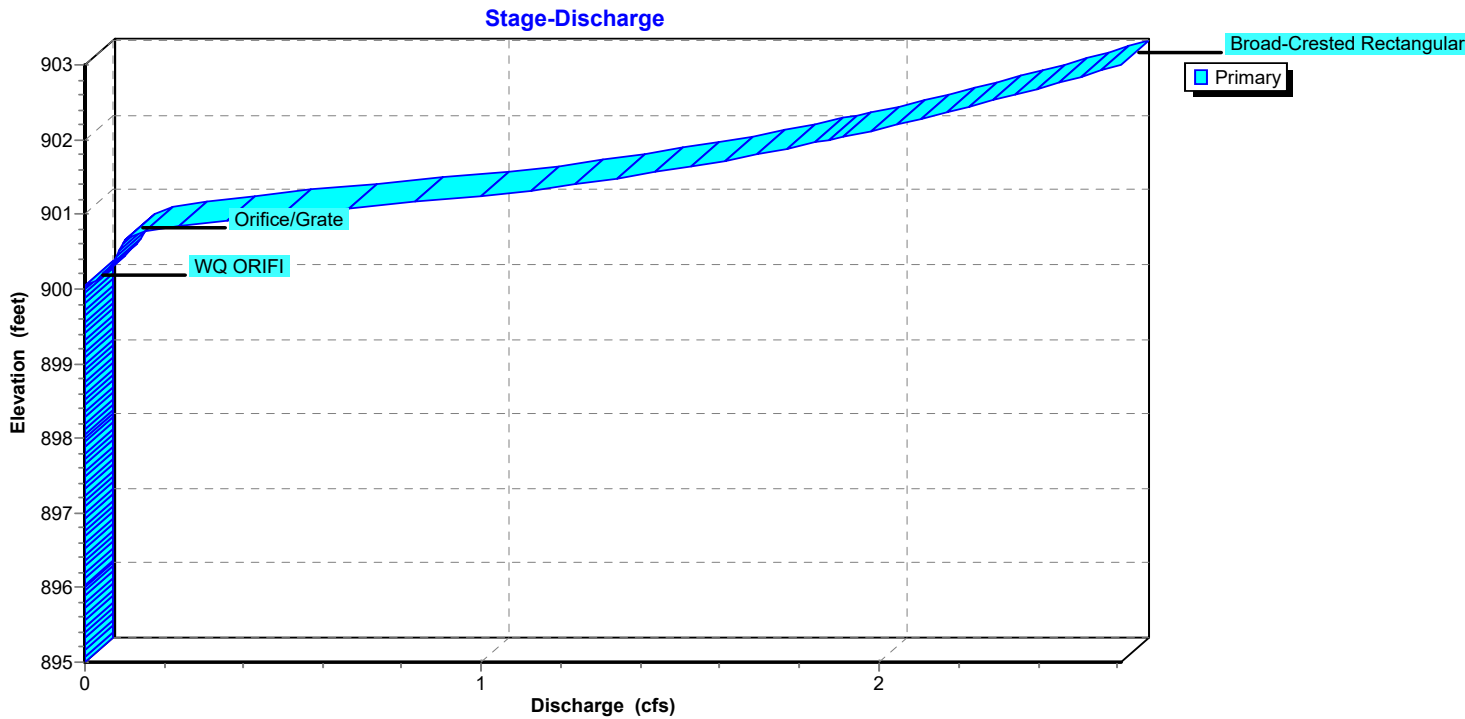
Primary OutFlow Max=0.14 cfs @ 15.83 hrs HW=900.74' (Free Discharge)

- 1=WQ ORIFI (Orifice Controls 0.11 cfs @ 3.95 fps)
- 2=Orifice/Grate (Orifice Controls 0.03 cfs @ 1.04 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

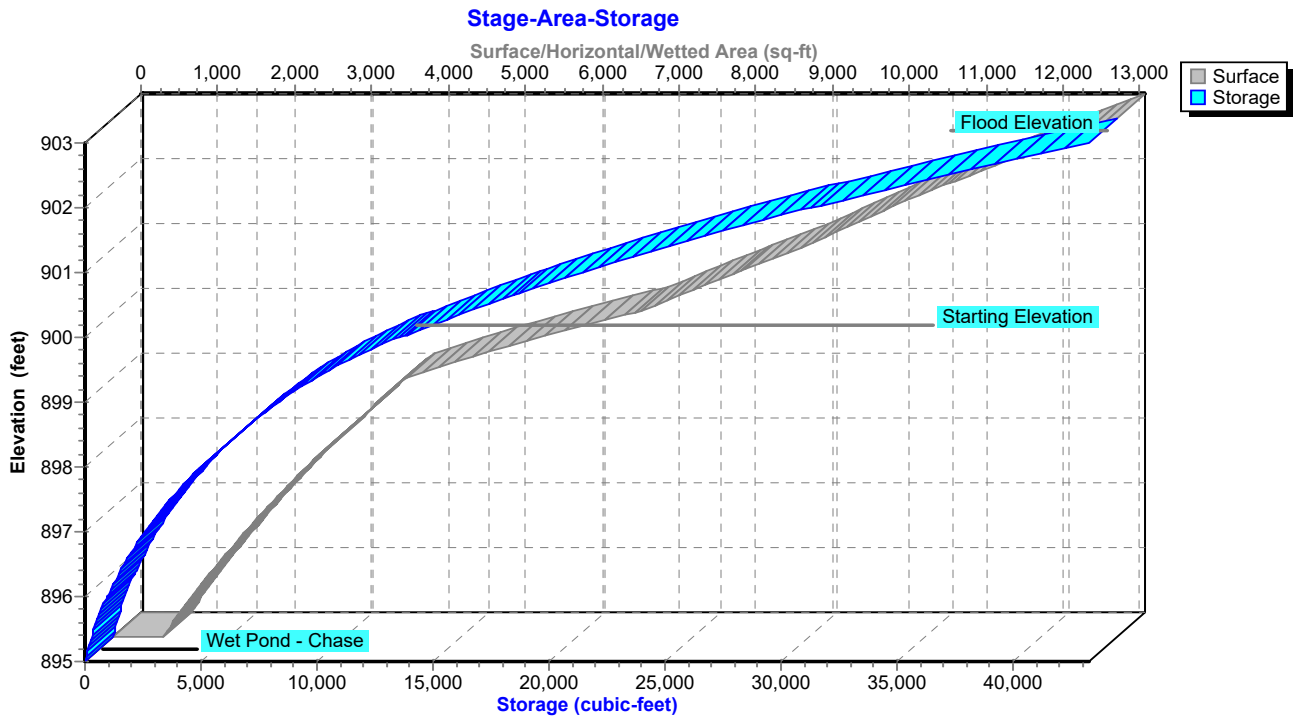
Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Summary for Pond 5P: ADS Stormtech

Inflow Area = 0.740 ac, 83.38% Impervious, Inflow Depth = 1.65" for 1-Year event
 Inflow = 1.70 cfs @ 12.00 hrs, Volume= 0.101 af
 Outflow = 0.05 cfs @ 14.38 hrs, Volume= 0.100 af, Atten= 97%, Lag= 142.6 min
 Primary = 0.05 cfs @ 14.38 hrs, Volume= 0.100 af
 Routed to Pond 2P : Chase Bank Pond after UG detention

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Peak Elev= 900.09' @ 14.38 hrs Surf.Area= 2,975 sf Storage= 2,829 cf

Plug-Flow detention time= 646.5 min calculated for 0.100 af (99% of inflow)
 Center-of-Mass det. time= 637.2 min (1,431.4 - 794.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.38'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.38' / 897.97' S= 0.0139 1/ S Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.55'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600

Limited to weir flow at low heads

#4	Device 1	903.47'	3.0' long Sharp-Crested Rectangular Weir	2 End Contraction(s)
#5	Device 1	903.81'	4.2' long Sharp-Crested Rectangular Weir	2 End Contraction(s)

1.0' Crest Height

Primary OutFlow Max=0.05 cfs @ 14.38 hrs HW=900.09' (Free Discharge)

- 1=Culvert (Passes 0.05 cfs of 3.29 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.05 cfs @ 5.88 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)
- 4=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)
- 5=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: ADS Stormtech - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04'

Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

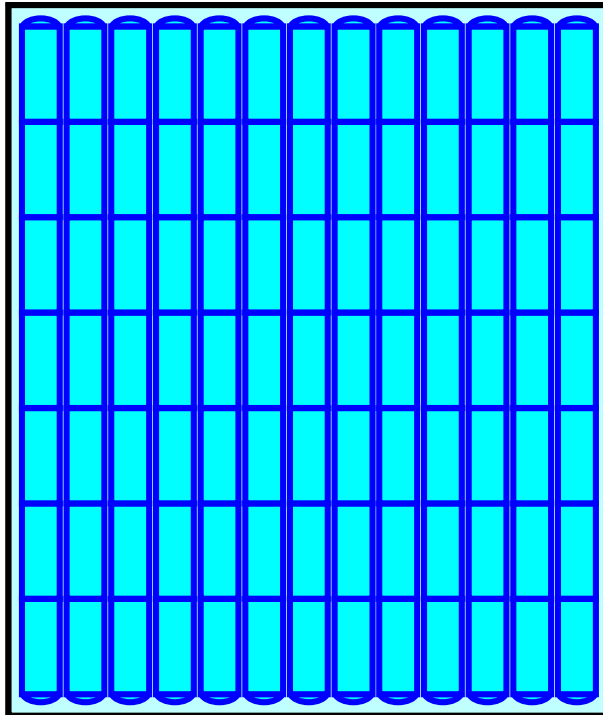
Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers

220.2 cy Field

170.5 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

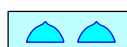
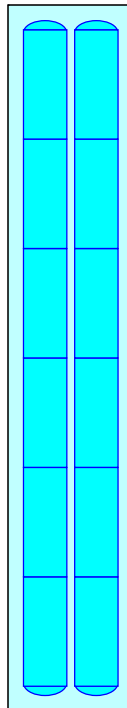
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

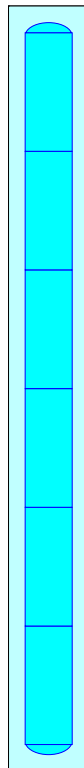
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

6 Chambers

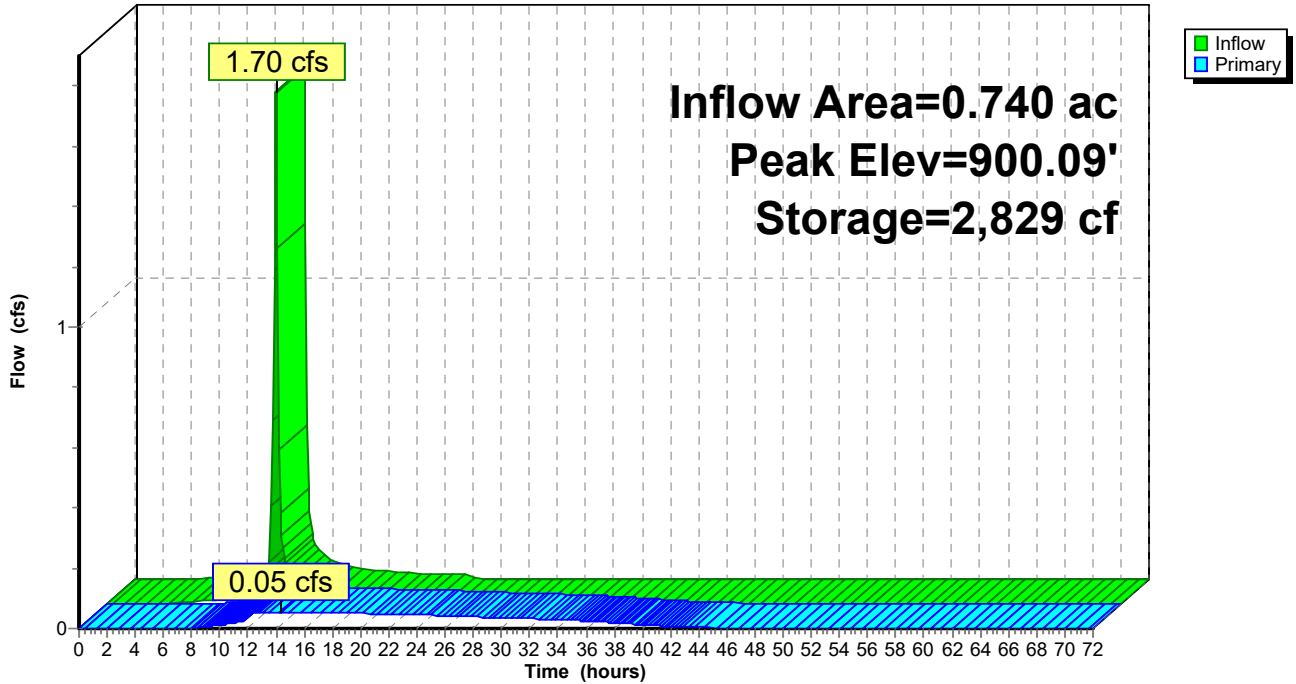
20.6 cy Field

17.3 cy Stone



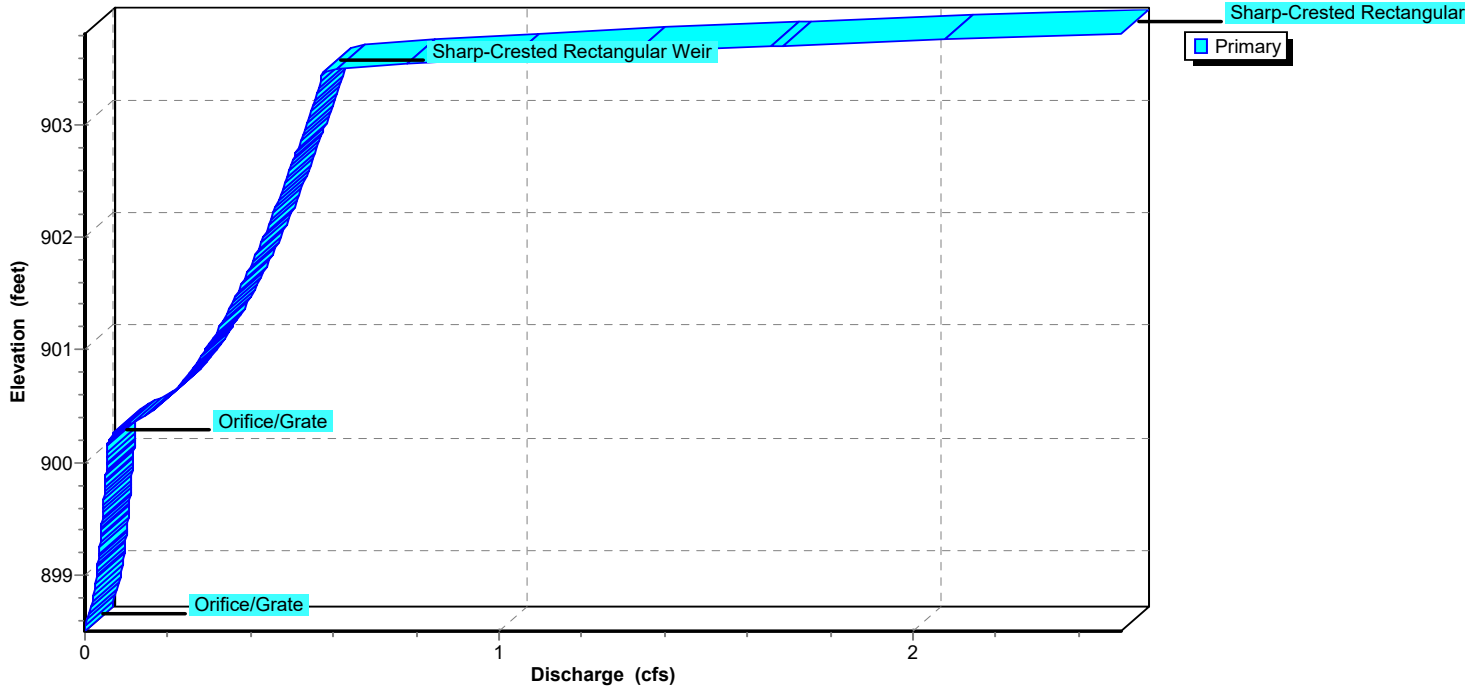
Pond 5P: ADS Stormtech

Hydrograph

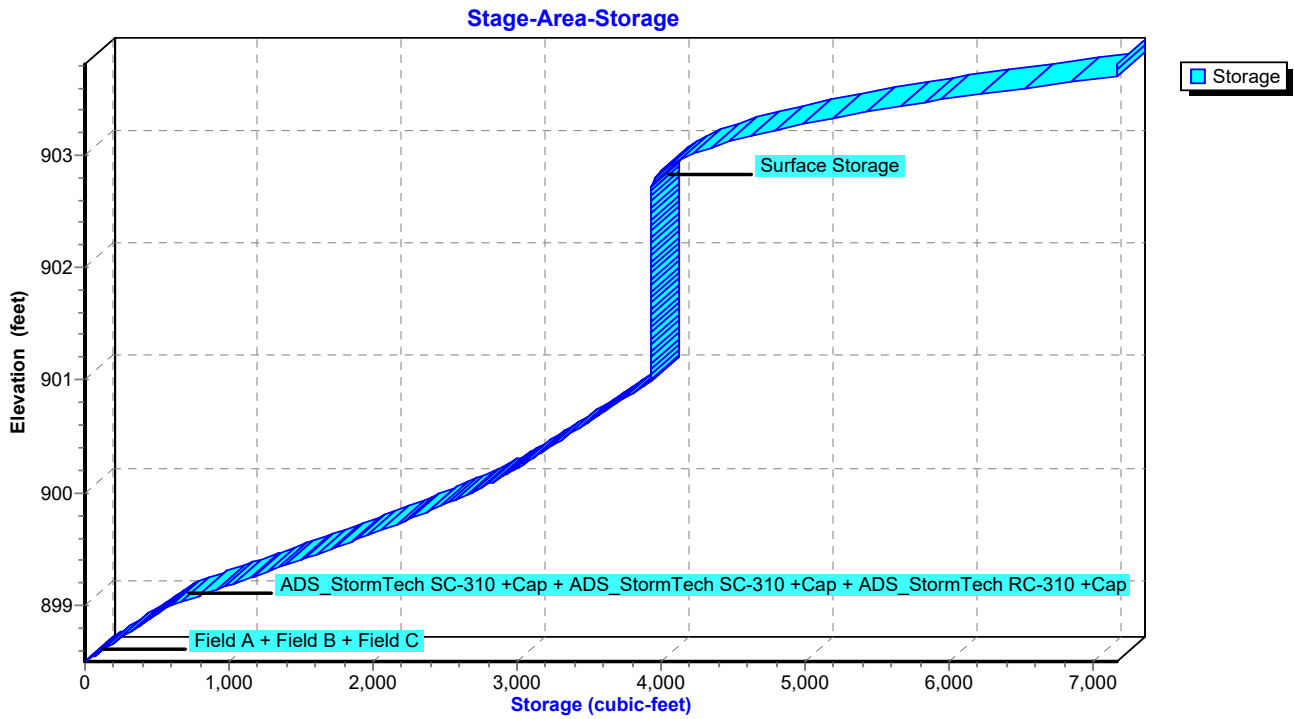


Pond 5P: ADS Stormtech

Stage-Discharge



Pond 5P: ADS Stormtech



Summary for Pond 7P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 2,975 sf Storage= 2,681 cf
 Peak Elev= 900.00' @ 0.00 hrs Surf.Area= 2,975 sf Storage= 2,681 cf

Plug-Flow detention time= (not calculated: no plugs found)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.22'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.22' / 897.97' S= 0.0085 1/ S Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.50'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.05 cfs @ 0.00 hrs HW=900.00' (Free Discharge)
↑**1=Culvert** (Passes 0.05 cfs of 3.38 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 0.05 cfs @ 5.79 fps)
↑**3=Orifice/Grate** (Controls 0.00 cfs)

Pond 7P: WQv Drawdown - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

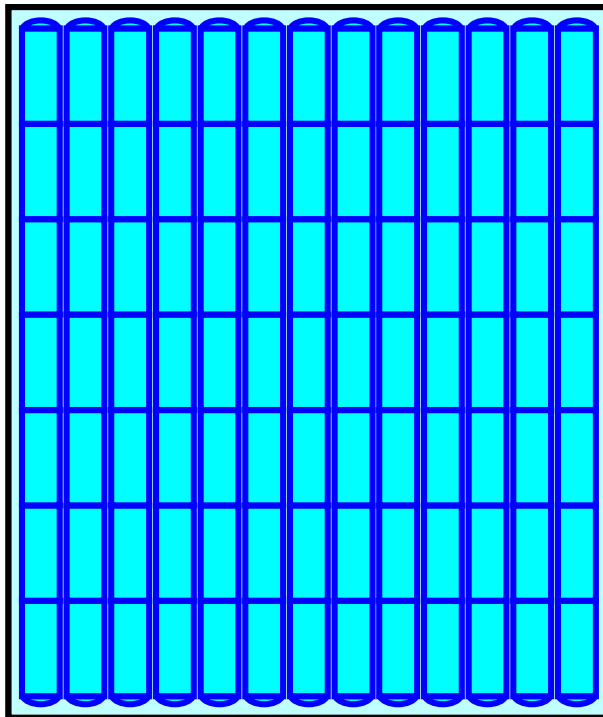
5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers
220.2 cy Field
170.5 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

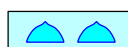
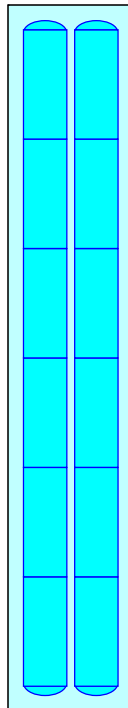
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

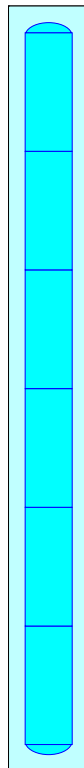
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

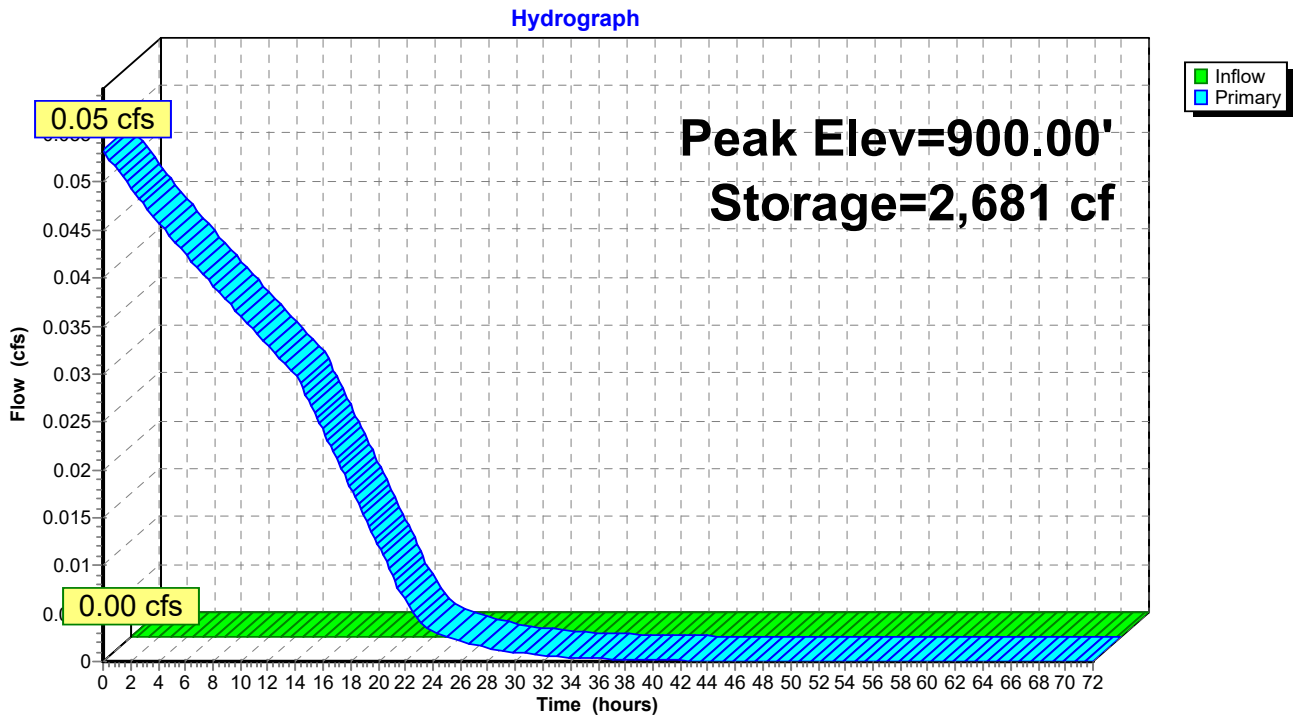
6 Chambers

20.6 cy Field

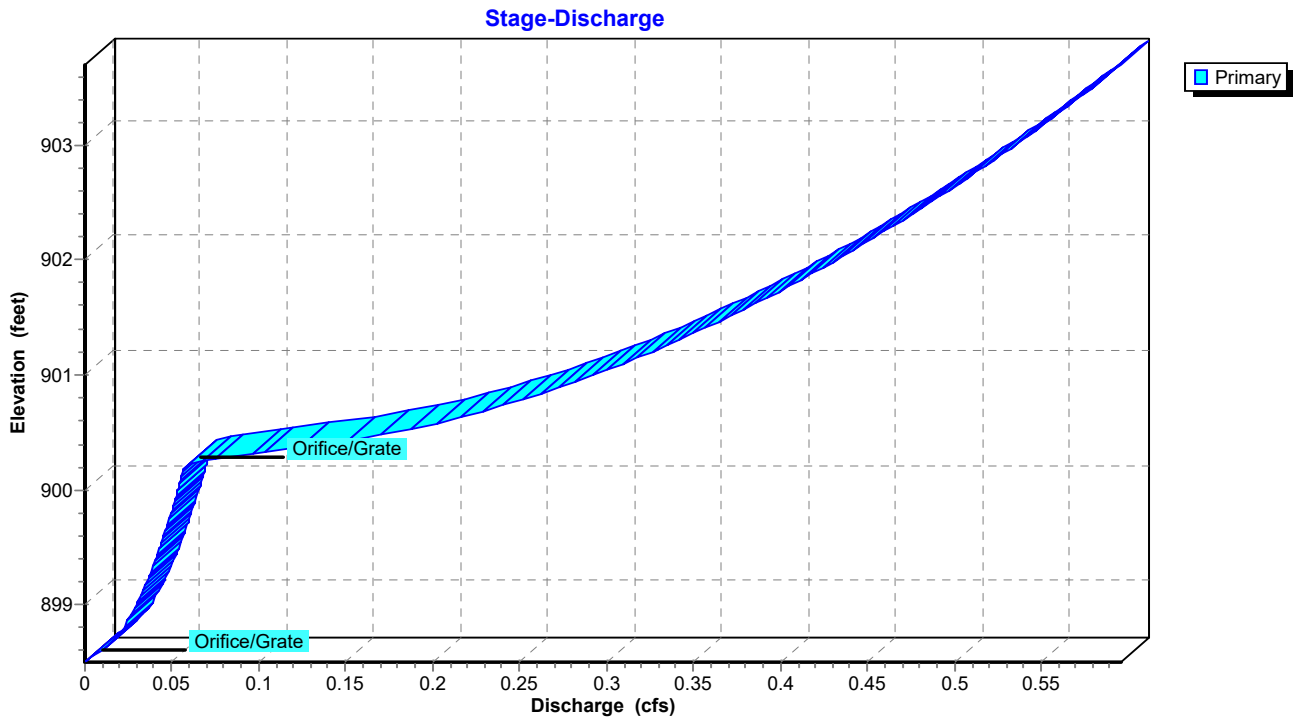
17.3 cy Stone



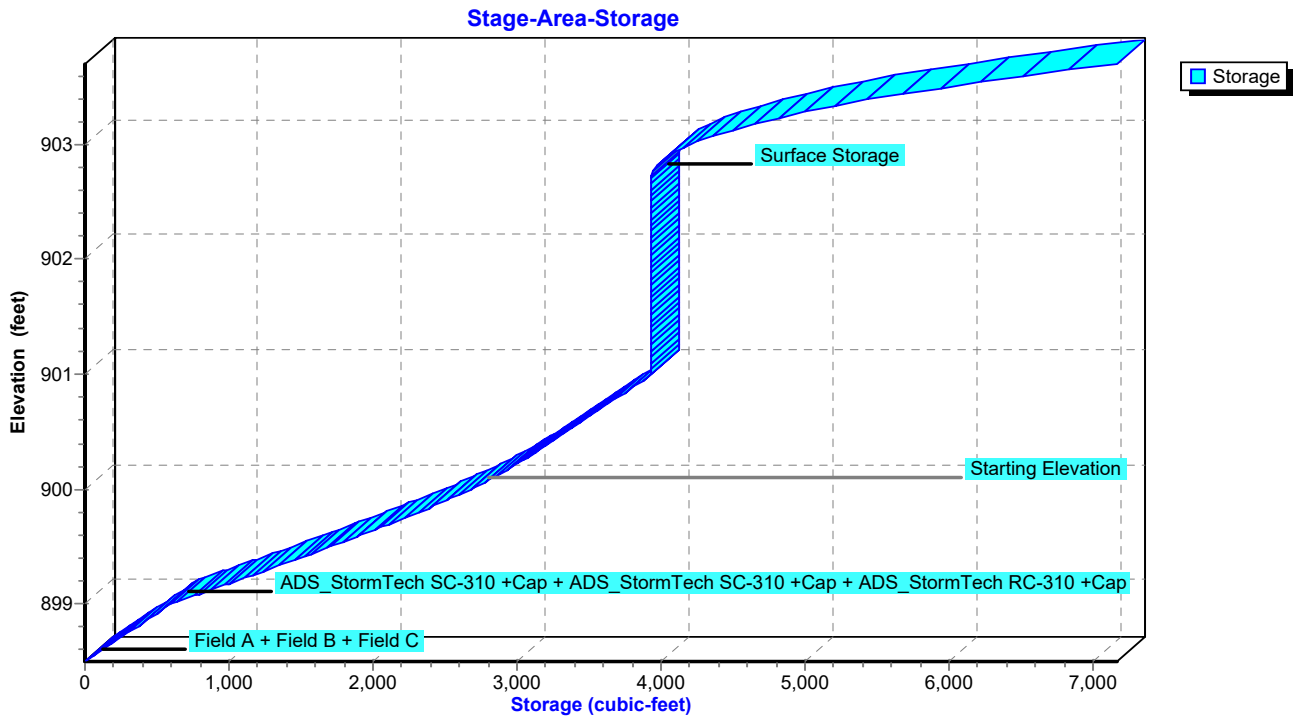
Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Summary for Subcatchment 1Pre: Pre-Developed

Runoff = 3.67 cfs @ 12.02 hrs, Volume= 0.217 af, Depth= 0.92"

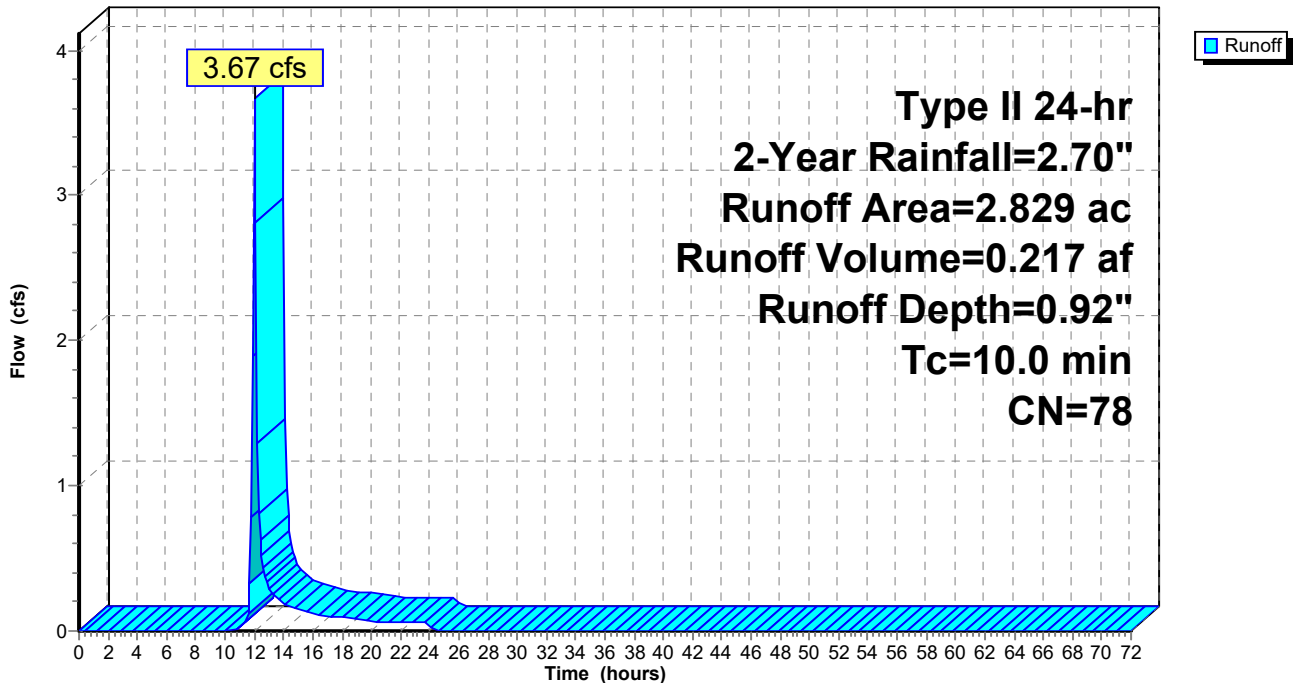
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 2-Year Rainfall=2.70"

Area (ac)	CN	Description
* 2.829	78	Predeveloped Open Area
2.829		100.00% Pervious Area

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

Subcatchment 1Pre: Pre-Developed

Hydrograph



Summary for Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

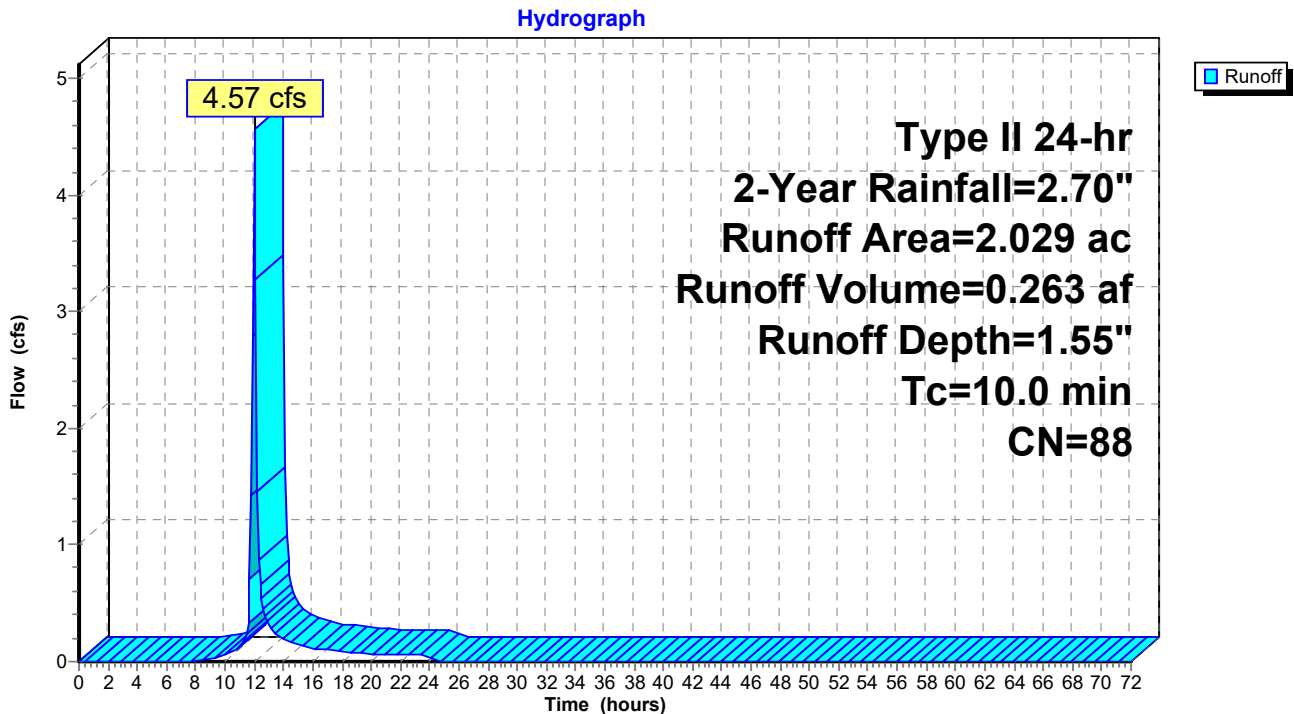
Runoff = 4.57 cfs @ 12.01 hrs, Volume= 0.263 af, Depth= 1.55"
 Routed to Pond 2P : Chase Bank Pond after UG detention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 2-Year Rainfall=2.70"

Area (ac)	CN	Description
* 0.997	98	Paved/Roof Area
* 0.183	95	Pond Surface Area
* 0.849	74	Lawn/Landscape Area
2.029	88	Weighted Average
1.032		50.86% Pervious Area
0.997		49.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Minimum Assumed ToF C

Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond



Summary for Subcatchment 3S: Predev.Rehab Center

Runoff = 1.35 cfs @ 12.01 hrs, Volume= 0.078 af, Depth= 1.21"

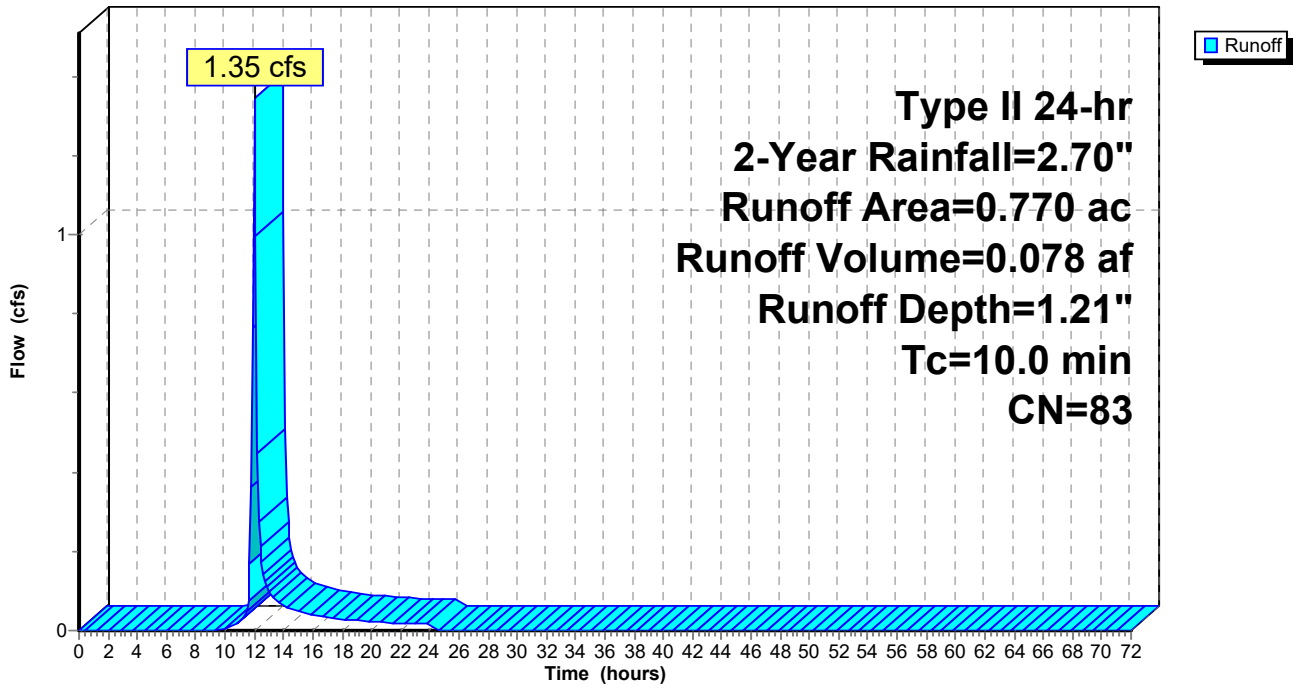
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 2-Year Rainfall=2.70"

Area (ac)	CN	Description
0.110	98	Paved roads w/curbs & sewers, HSG D
0.660	80	>75% Grass cover, Good, HSG D
0.770	83	Weighted Average
0.660		85.71% Pervious Area
0.110		14.29% Impervious Area

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

Subcatchment 3S: Predev.Rehab Center

Hydrograph



Summary for Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Runoff = 2.20 cfs @ 12.00 hrs, Volume= 0.133 af, Depth= 2.16"

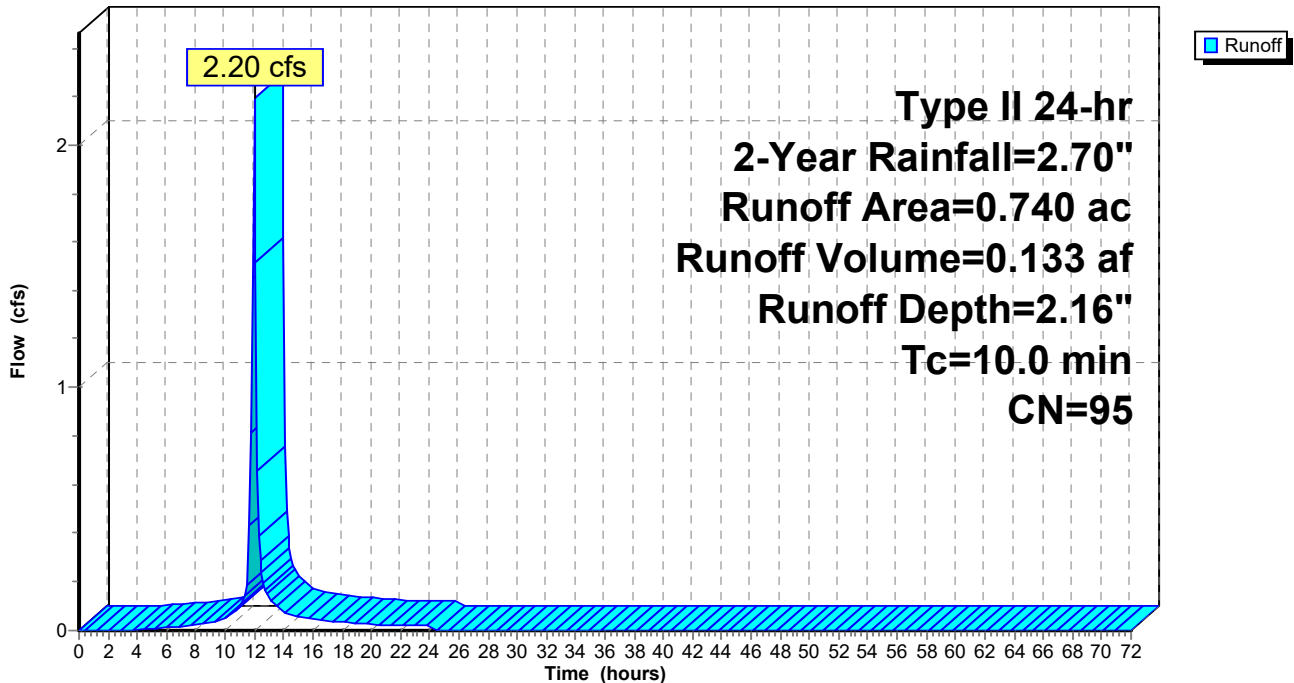
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 2-Year Rainfall=2.70"

Area (ac)	CN	Description
0.601	98	Paved parking, HSG C
0.139	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.139		18.78% Pervious Area
0.601		81.22% Impervious Area

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

Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Hydrograph



Summary for Subcatchment 5S: Un-Detained

Runoff = 0.56 cfs @ 12.00 hrs, Volume= 0.034 af, Depth= 2.16"

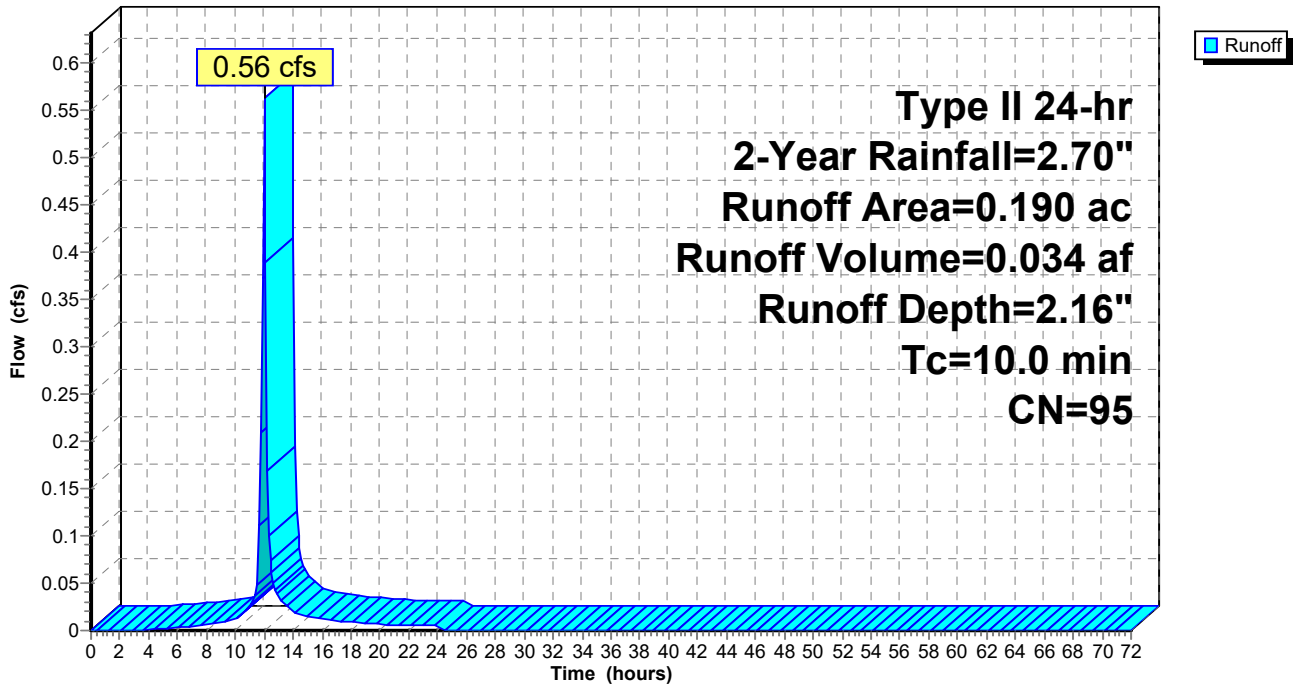
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 2-Year Rainfall=2.70"

Area (ac)	CN	Description
0.190	95	Urban commercial, 85% imp, HSG D
0.028		15.00% Pervious Area
0.161		85.00% Impervious Area

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

Subcatchment 5S: Un-Detained

Hydrograph



Summary for Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION

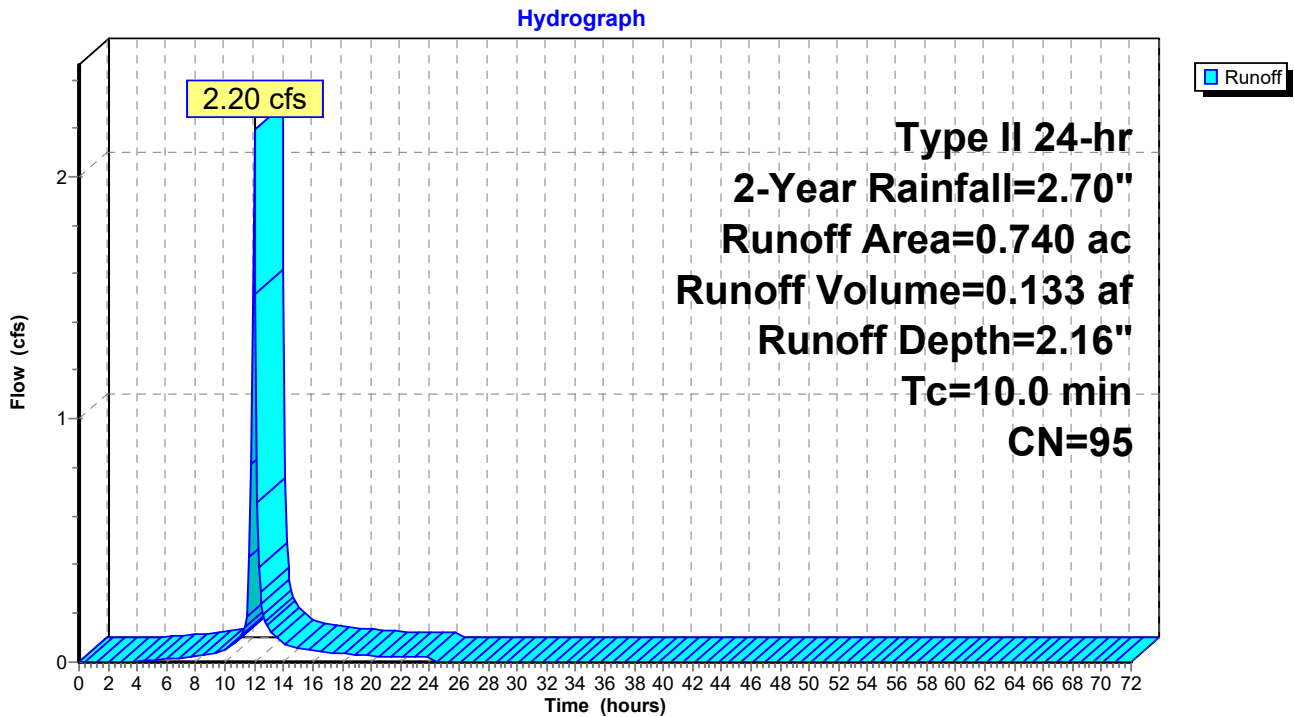
Runoff = 2.20 cfs @ 12.00 hrs, Volume= 0.133 af, Depth= 2.16"
 Routed to Pond 5P : ADS Stormtech

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 2-Year Rainfall=2.70"

Area (ac)	CN	Description
0.617	98	Paved parking, HSG C
0.123	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.123		16.62% Pervious Area
0.617		83.38% Impervious Area

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

Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION



Summary for Pond 2P: Chase Bank Pond after UG detention

Inflow Area = 2.769 ac, 58.29% Impervious, Inflow Depth = 1.71" for 2-Year event
 Inflow = 4.62 cfs @ 12.01 hrs, Volume= 0.394 af
 Outflow = 0.38 cfs @ 13.50 hrs, Volume= 0.388 af, Atten= 92%, Lag= 89.7 min
 Primary = 0.38 cfs @ 13.50 hrs, Volume= 0.388 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 6,800 sf Storage= 13,583 cf
 Peak Elev= 900.93' @ 13.50 hrs Surf.Area= 8,803 sf Storage= 20,836 cf (7,254 cf above start)
 Flood Elev= 903.00' Surf.Area= 13,066 sf Storage= 43,293 cf (29,710 cf above start)

Plug-Flow detention time= 1,984.0 min calculated for 0.076 af (19% of inflow)
 Center-of-Mass det. time= 519.7 min (1,522.0 - 1,002.3)

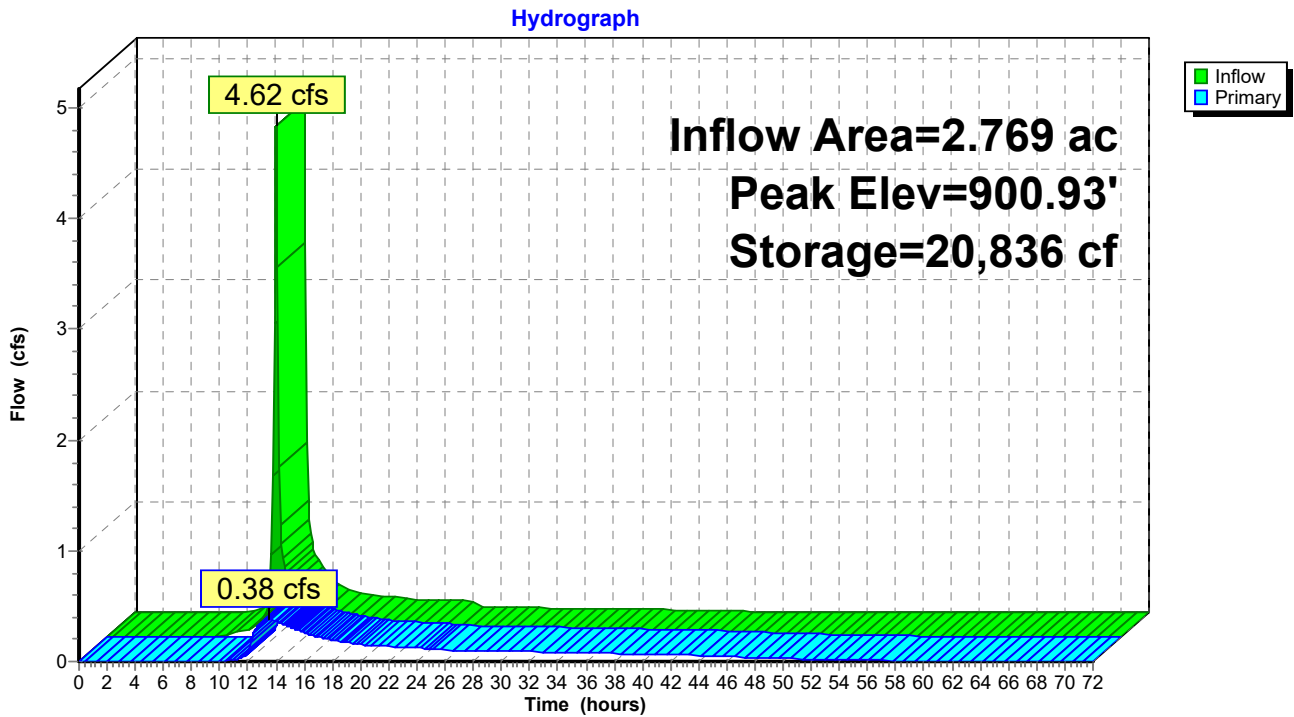
Volume	Invert	Avail.Storage	Storage Description			
#1	895.00'	43,293 cf	Wet Pond - Chase (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
895.00	663	142.0	0	0	663	
896.00	1,284	167.0	957	957	1,297	
897.00	2,006	193.0	1,632	2,588	2,063	
898.00	2,872	223.0	2,426	5,014	3,078	
899.00	3,815	248.0	3,332	8,347	4,044	
900.00	6,800	369.0	5,236	13,583	9,993	
901.00	8,959	404.0	7,855	21,437	12,180	
902.00	10,875	435.0	9,902	31,339	14,292	
903.00	13,066	480.0	11,954	43,293	17,601	

Device	Routing	Invert	Outlet Devices
#1	Primary	900.03'	1.00" Vert. WQ ORIFI X 5.00 C= 0.600 Limited to weir flow at low heads
#2	Primary	900.65'	8.00" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	903.00'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

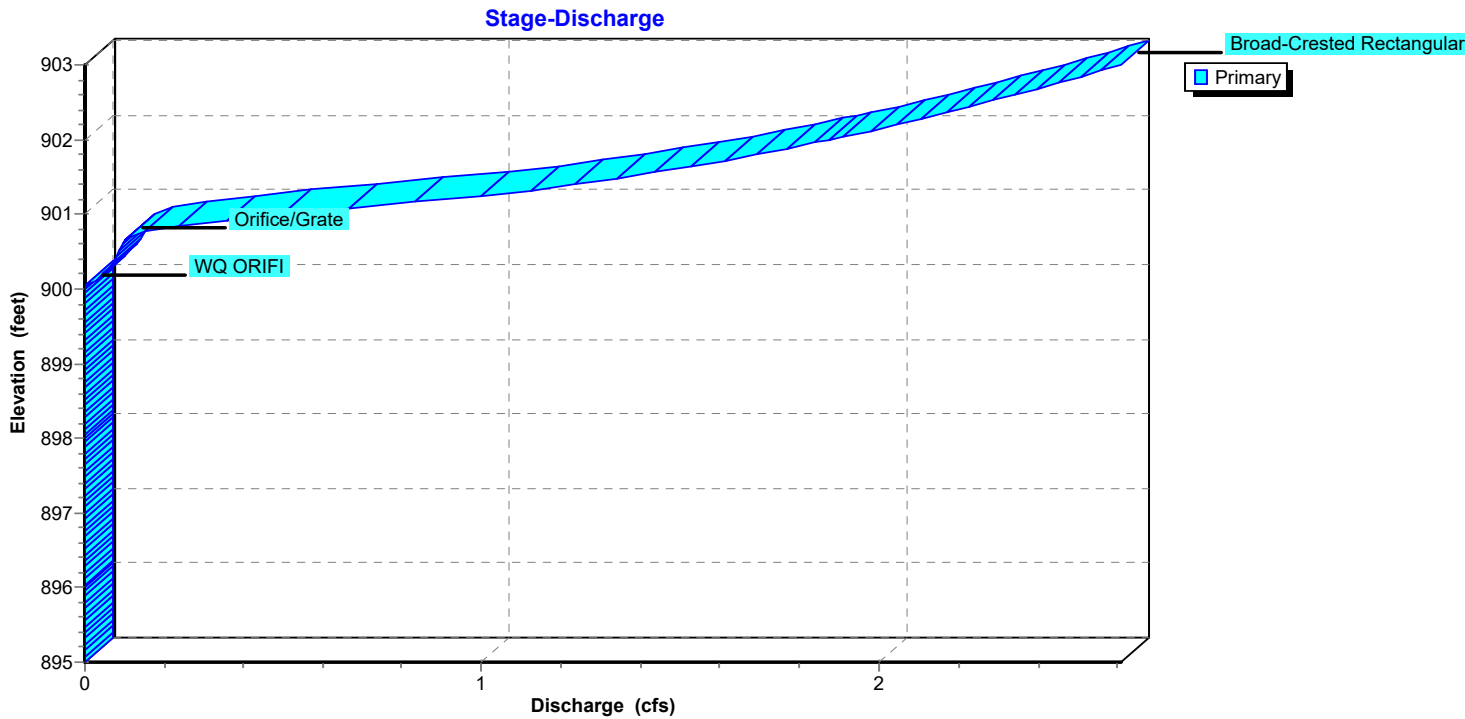
Primary OutFlow Max=0.38 cfs @ 13.50 hrs HW=900.93' (Free Discharge)

- 1=WQ ORIFI (Orifice Controls 0.12 cfs @ 4.47 fps)
- 2=Orifice/Grate (Orifice Controls 0.25 cfs @ 1.81 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

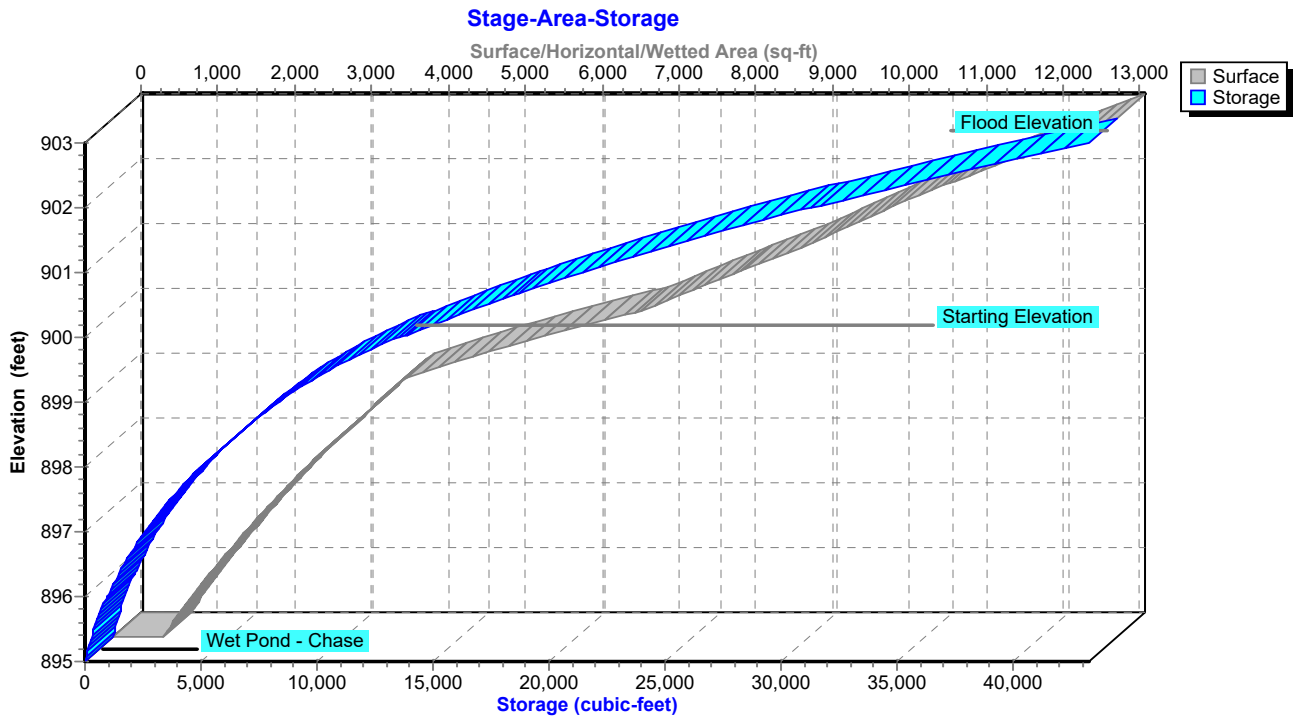
Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Summary for Pond 5P: ADS Stormtech

Inflow Area = 0.740 ac, 83.38% Impervious, Inflow Depth = 2.16" for 2-Year event
 Inflow = 2.20 cfs @ 12.00 hrs, Volume= 0.133 af
 Outflow = 0.18 cfs @ 12.65 hrs, Volume= 0.132 af, Atten= 92%, Lag= 39.1 min
 Primary = 0.18 cfs @ 12.65 hrs, Volume= 0.132 af
 Routed to Pond 2P : Chase Bank Pond after UG detention

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Peak Elev= 900.51' @ 12.65 hrs Surf.Area= 2,975 sf Storage= 3,355 cf

Plug-Flow detention time= 578.7 min calculated for 0.131 af (99% of inflow)
 Center-of-Mass det. time= 573.9 min (1,360.7 - 786.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.38'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.38' / 897.97' S= 0.0139 1/ S Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.55'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600

Limited to weir flow at low heads

#4	Device 1	903.47'	3.0' long Sharp-Crested Rectangular Weir	2 End Contraction(s)
#5	Device 1	903.81'	4.2' long Sharp-Crested Rectangular Weir	2 End Contraction(s)

1.0' Crest Height

Primary OutFlow Max=0.18 cfs @ 12.65 hrs HW=900.51' (Free Discharge)

- 1=Culvert (Passes 0.18 cfs of 3.81 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.06 cfs @ 6.64 fps)
- 3=Orifice/Grate (Orifice Controls 0.12 cfs @ 2.13 fps)
- 4=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)
- 5=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: ADS Stormtech - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04'

Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

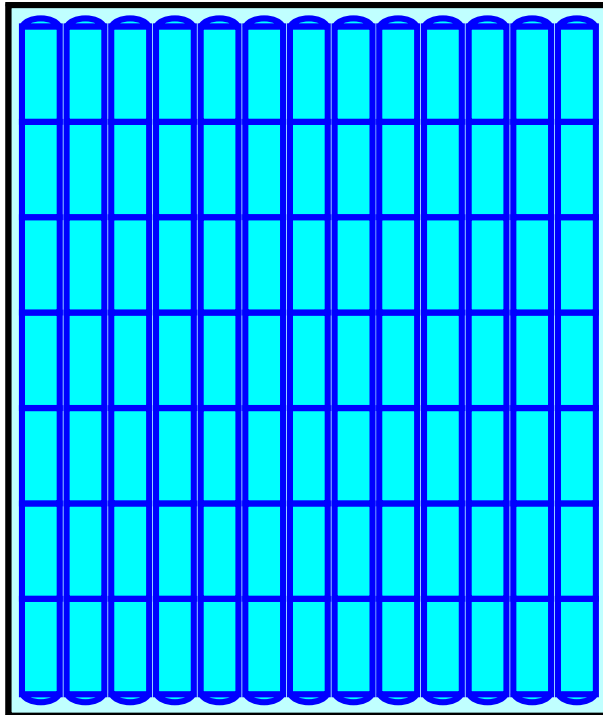
Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers

220.2 cy Field

170.5 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

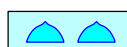
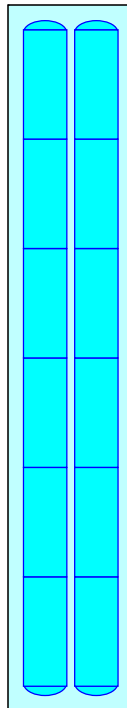
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

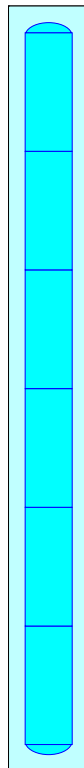
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

6 Chambers

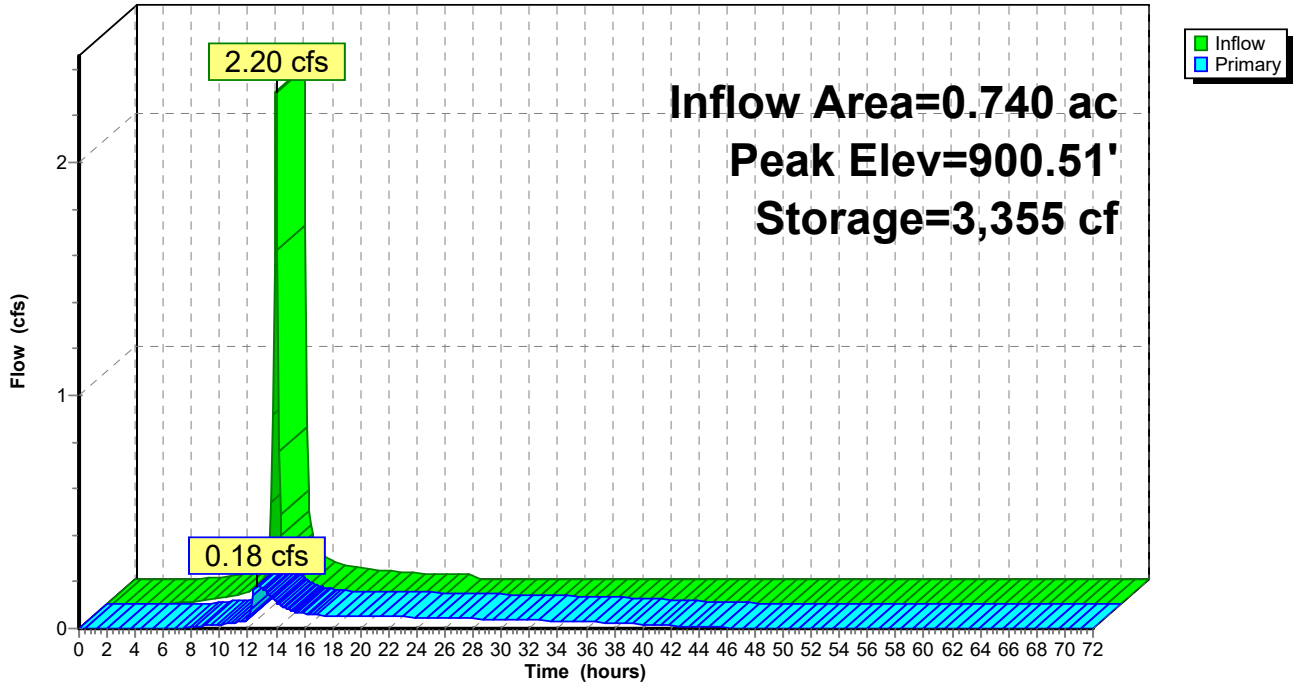
20.6 cy Field

17.3 cy Stone



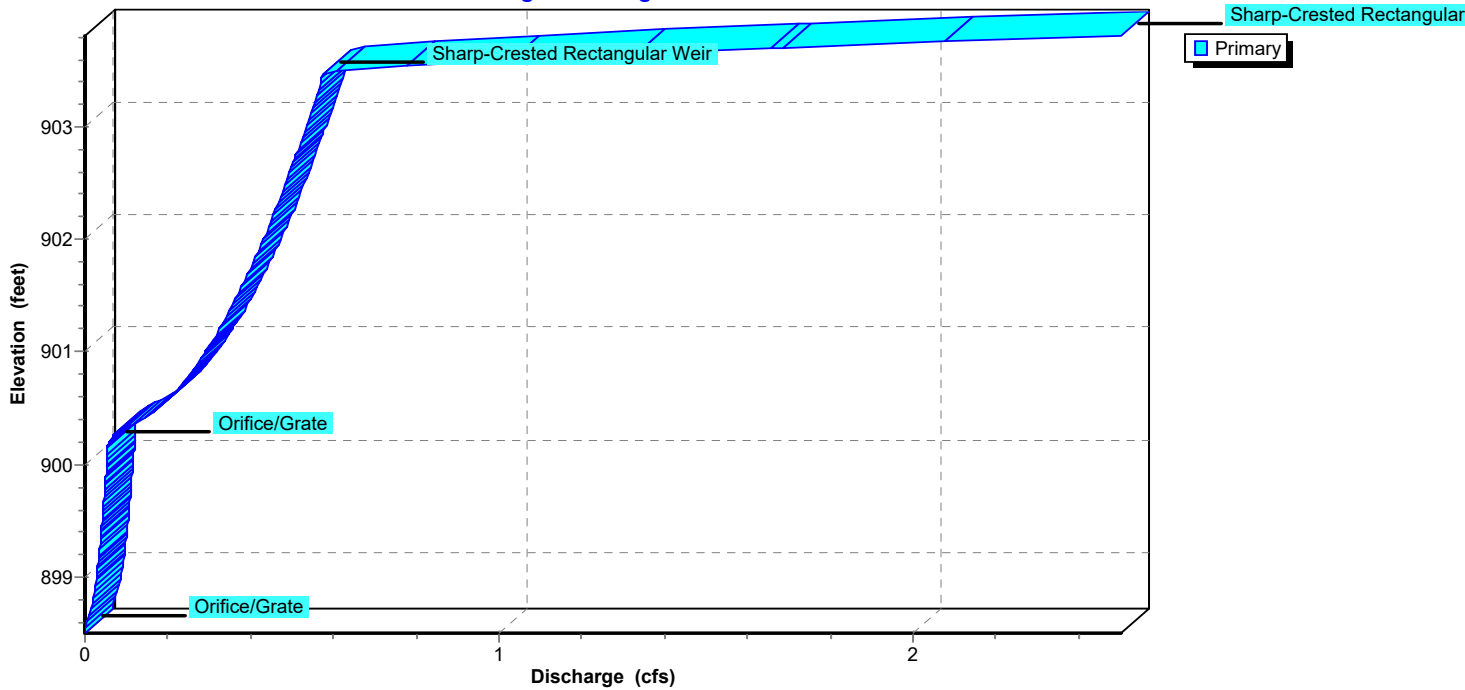
Pond 5P: ADS Stormtech

Hydrograph

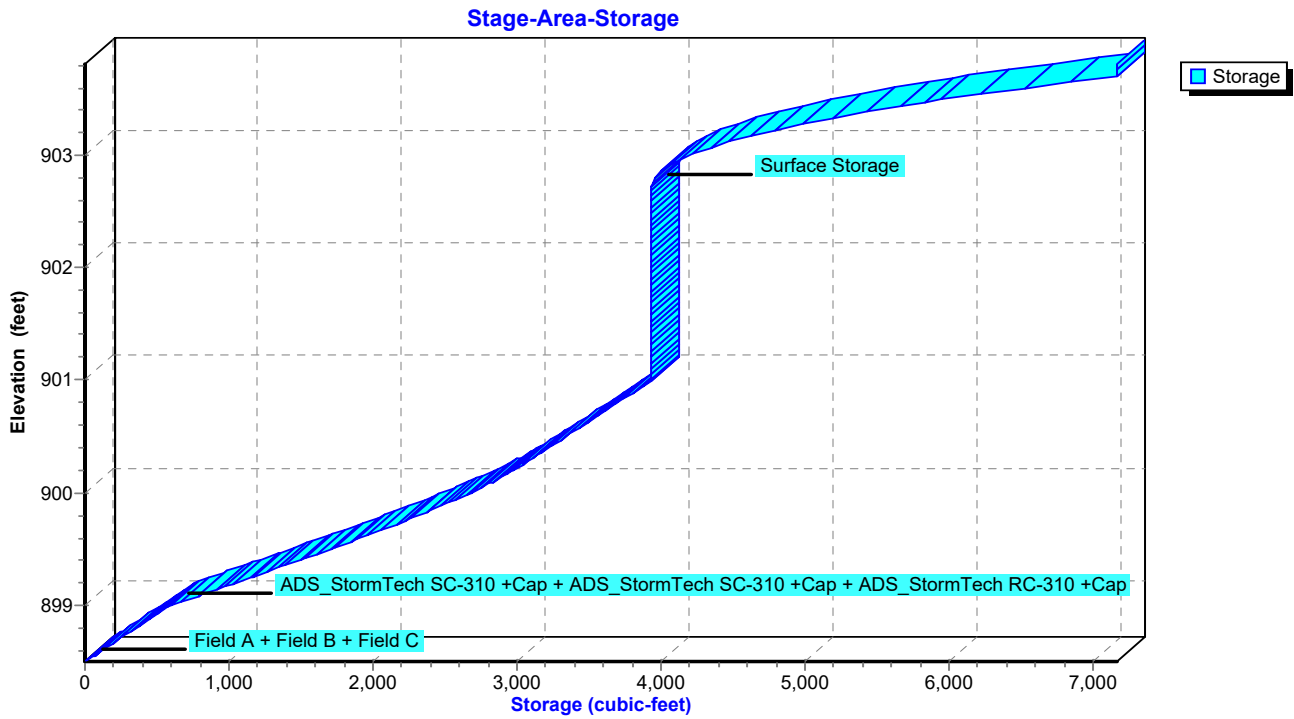


Pond 5P: ADS Stormtech

Stage-Discharge



Pond 5P: ADS Stormtech



Summary for Pond 7P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 2,975 sf Storage= 2,681 cf
 Peak Elev= 900.00' @ 0.00 hrs Surf.Area= 2,975 sf Storage= 2,681 cf

Plug-Flow detention time= (not calculated: no plugs found)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.22'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.22' / 897.97' S= 0.0085 '/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.50'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.05 cfs @ 0.00 hrs HW=900.00' (Free Discharge)
↑ 1=Culvert (Passes 0.05 cfs of 3.38 cfs potential flow)
↑ 2=Orifice/Grate (Orifice Controls 0.05 cfs @ 5.79 fps)
↑ 3=Orifice/Grate (Controls 0.00 cfs)

Pond 7P: WQv Drawdown - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

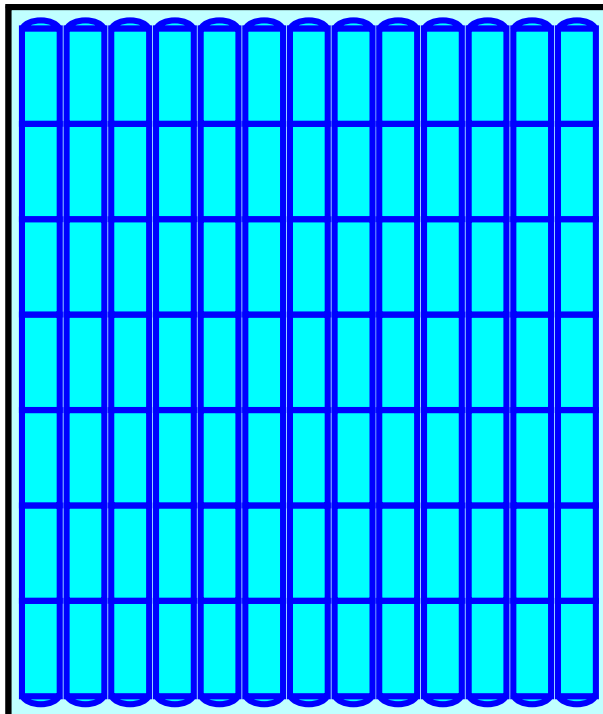
5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers
220.2 cy Field
170.5 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

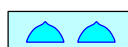
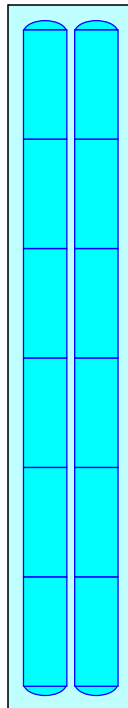
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

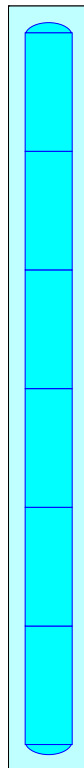
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

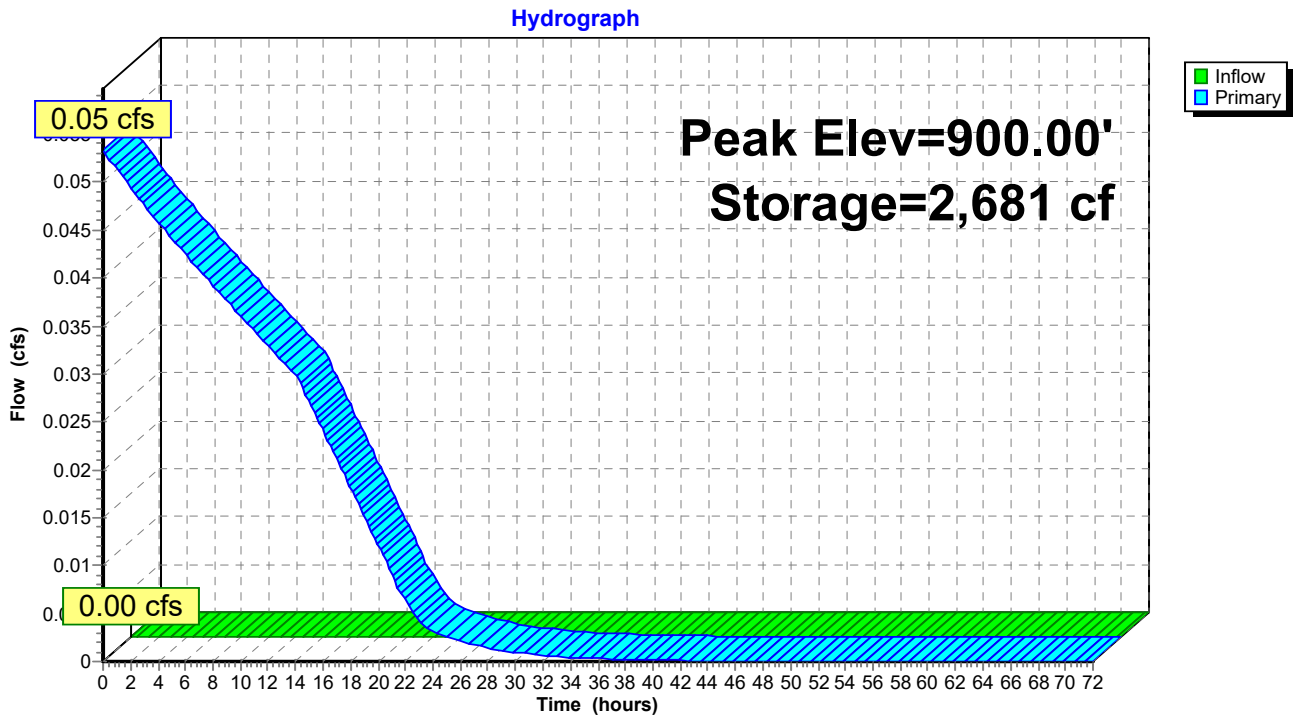
6 Chambers

20.6 cy Field

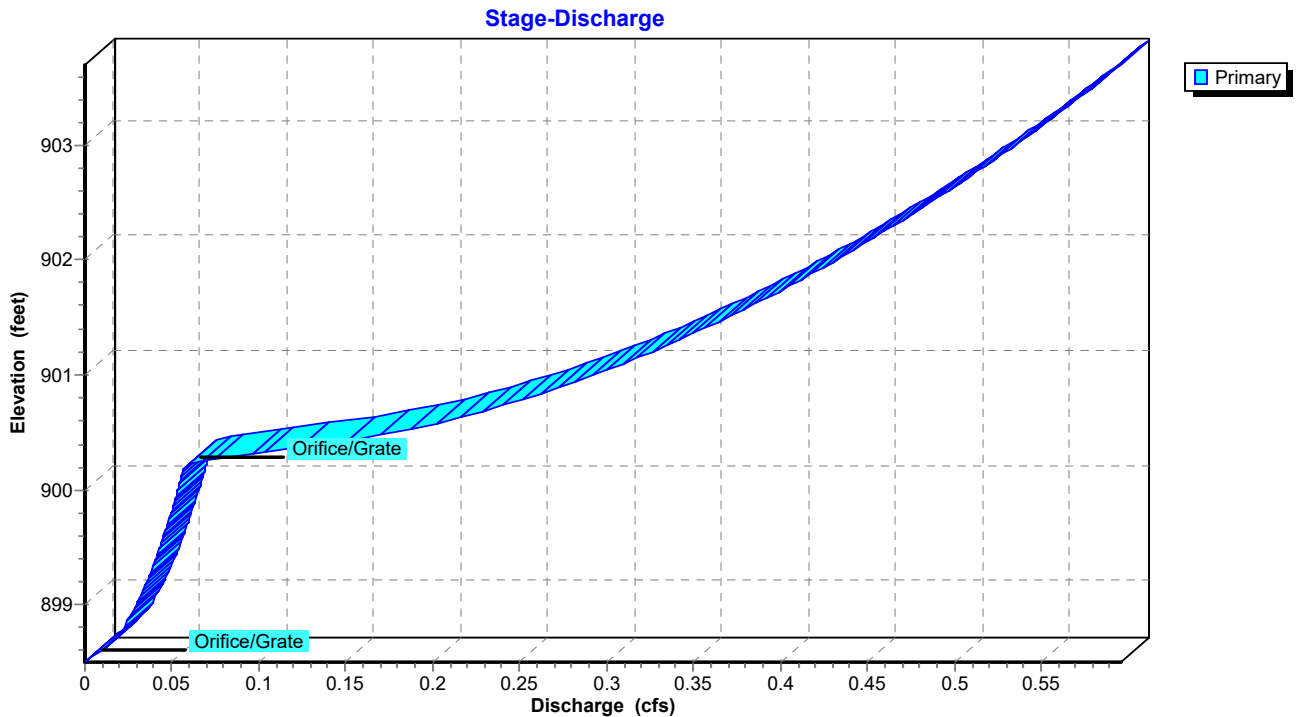
17.3 cy Stone



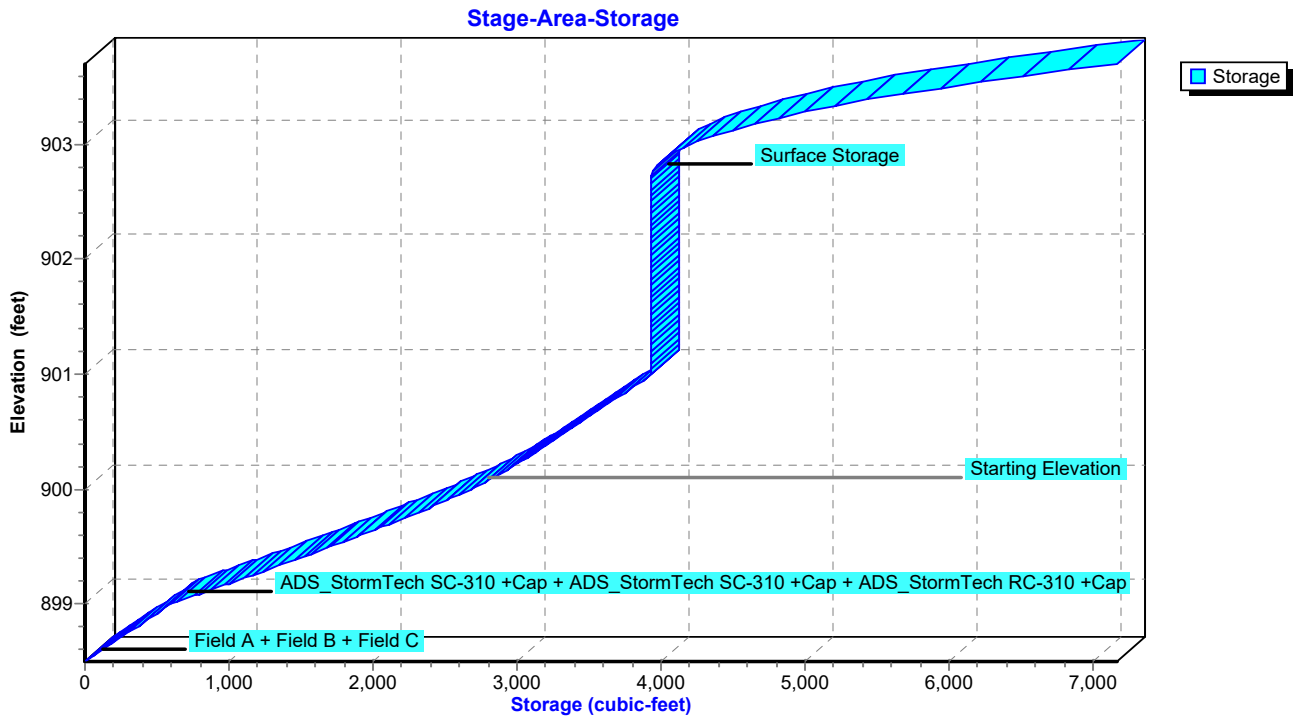
Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Summary for Subcatchment 1Pre: Pre-Developed

Runoff = 5.64 cfs @ 12.01 hrs, Volume= 0.326 af, Depth= 1.38"

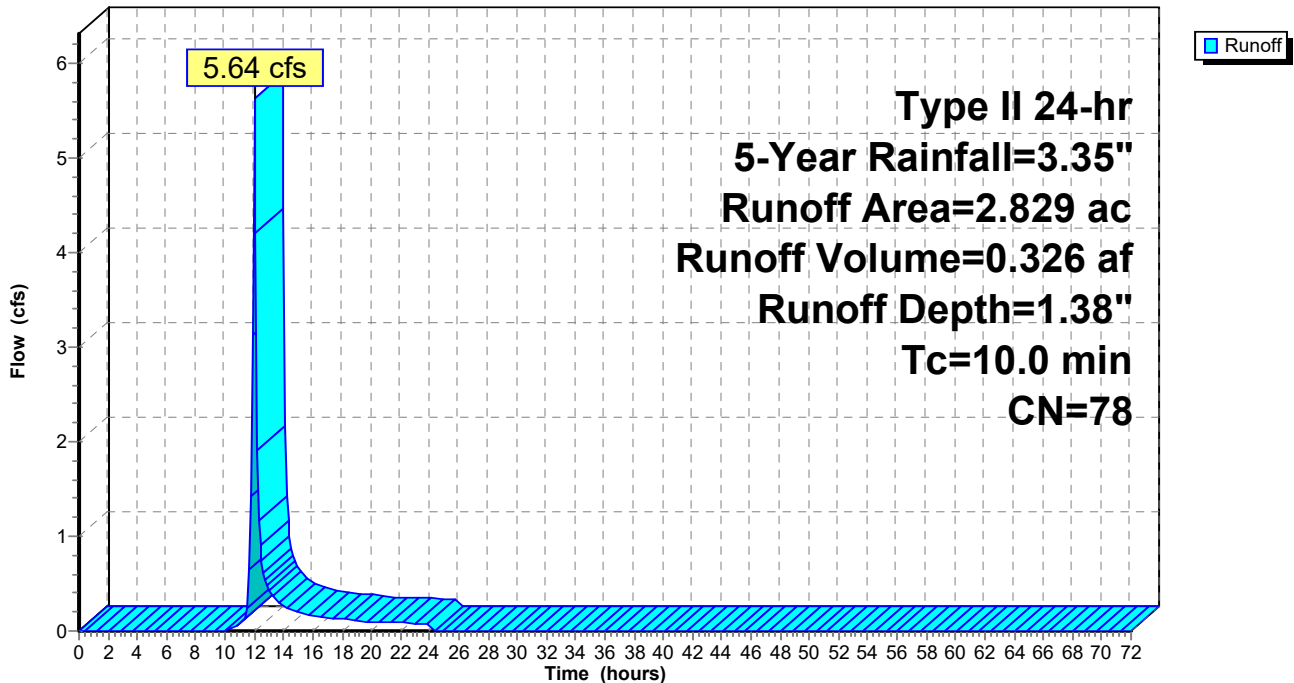
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 5-Year Rainfall=3.35"

Area (ac)	CN	Description
* 2.829	78	Predeveloped Open Area
2.829		100.00% Pervious Area

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

Subcatchment 1Pre: Pre-Developed

Hydrograph



Summary for Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

Runoff = 6.23 cfs @ 12.01 hrs, Volume= 0.361 af, Depth= 2.13"
 Routed to Pond 2P : Chase Bank Pond after UG detention

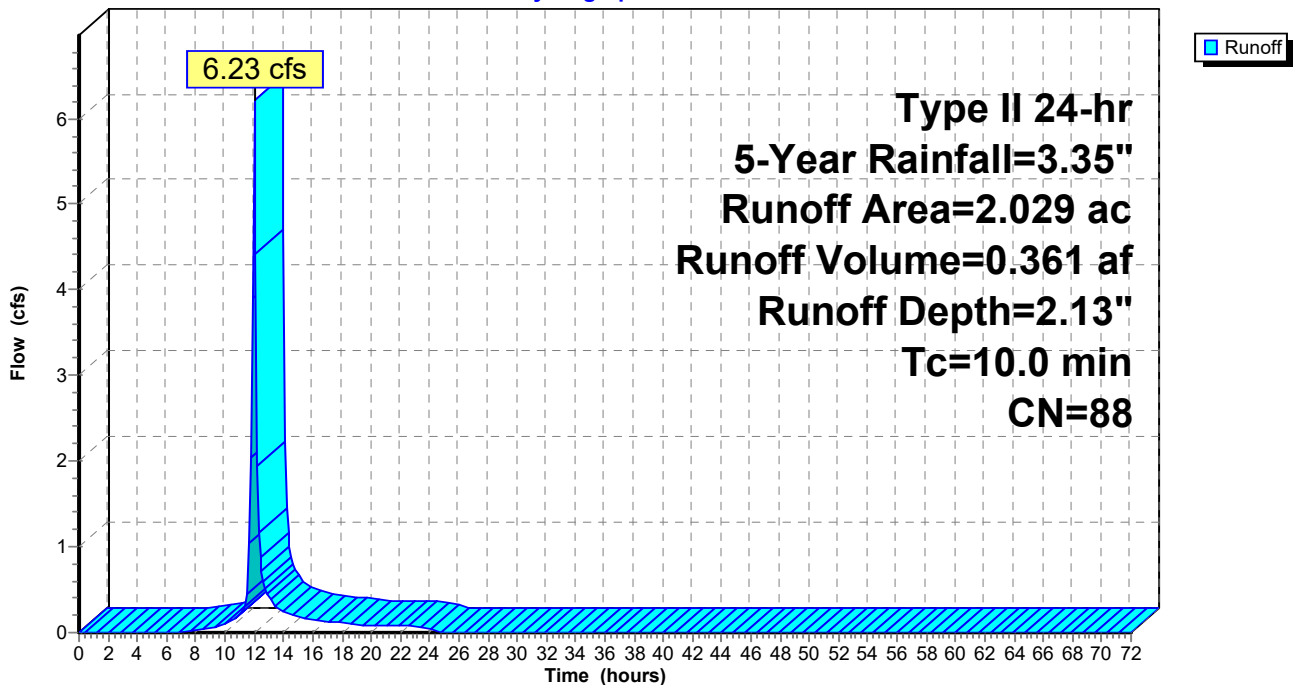
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 5-Year Rainfall=3.35"

Area (ac)	CN	Description
* 0.997	98	Paved/Roof Area
* 0.183	95	Pond Surface Area
* 0.849	74	Lawn/Landscape Area
2.029	88	Weighted Average
1.032		50.86% Pervious Area
0.997		49.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Minimum Assumed ToF C

Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

Hydrograph



Summary for Subcatchment 3S: Predev.Rehab Center

Runoff = 1.94 cfs @ 12.01 hrs, Volume= 0.111 af, Depth= 1.73"

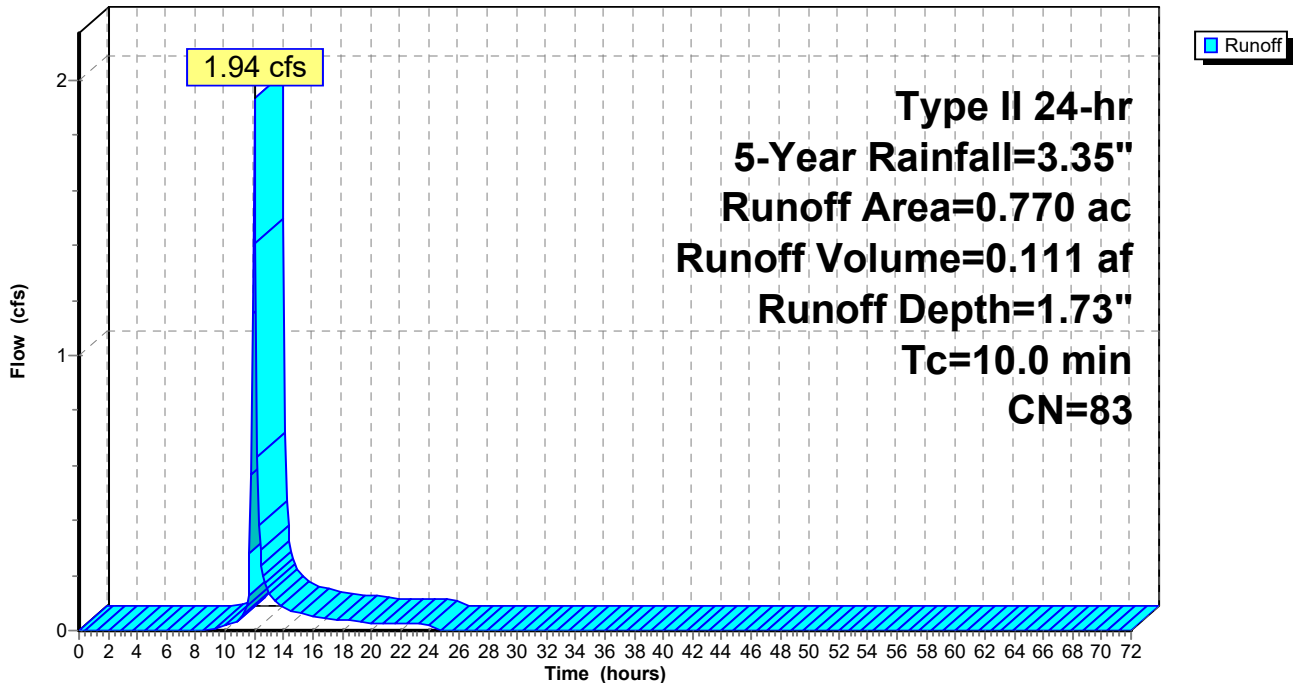
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 5-Year Rainfall=3.35"

Area (ac)	CN	Description
0.110	98	Paved roads w/curbs & sewers, HSG D
0.660	80	>75% Grass cover, Good, HSG D
0.770	83	Weighted Average
0.660		85.71% Pervious Area
0.110		14.29% Impervious Area

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

Subcatchment 3S: Predev.Rehab Center

Hydrograph



Summary for Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Runoff = 2.80 cfs @ 12.00 hrs, Volume= 0.172 af, Depth= 2.79"

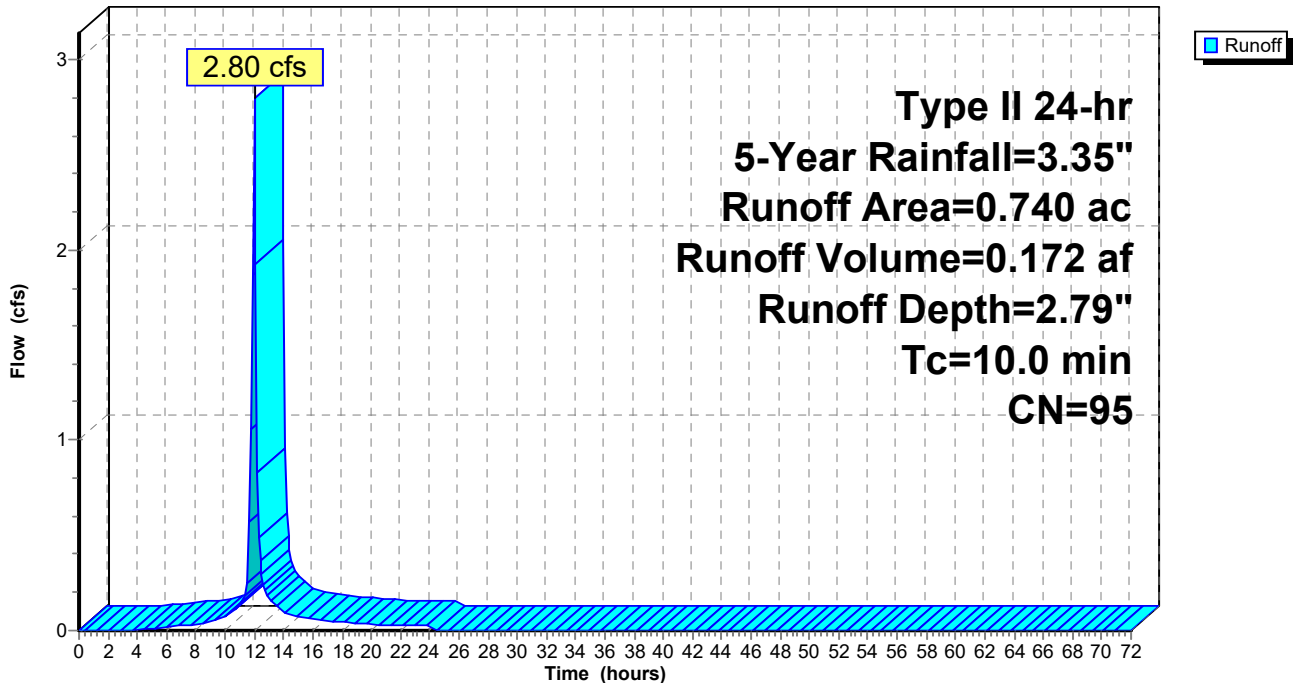
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 5-Year Rainfall=3.35"

Area (ac)	CN	Description
0.601	98	Paved parking, HSG C
0.139	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.139		18.78% Pervious Area
0.601		81.22% Impervious Area

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

Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Hydrograph



Summary for Subcatchment 5S: Un-Detained

Runoff = 0.72 cfs @ 12.00 hrs, Volume= 0.044 af, Depth= 2.79"

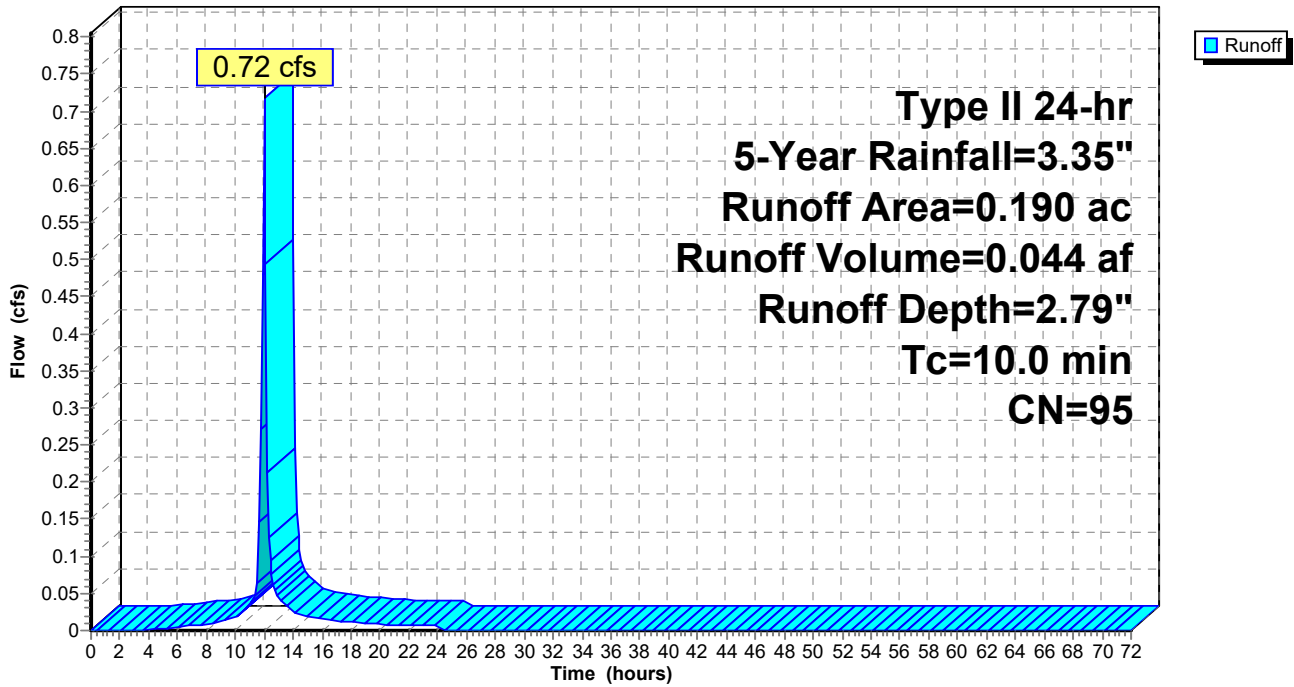
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 5-Year Rainfall=3.35"

Area (ac)	CN	Description
0.190	95	Urban commercial, 85% imp, HSG D
0.028		15.00% Pervious Area
0.161		85.00% Impervious Area

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

Subcatchment 5S: Un-Detained

Hydrograph



Summary for Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION

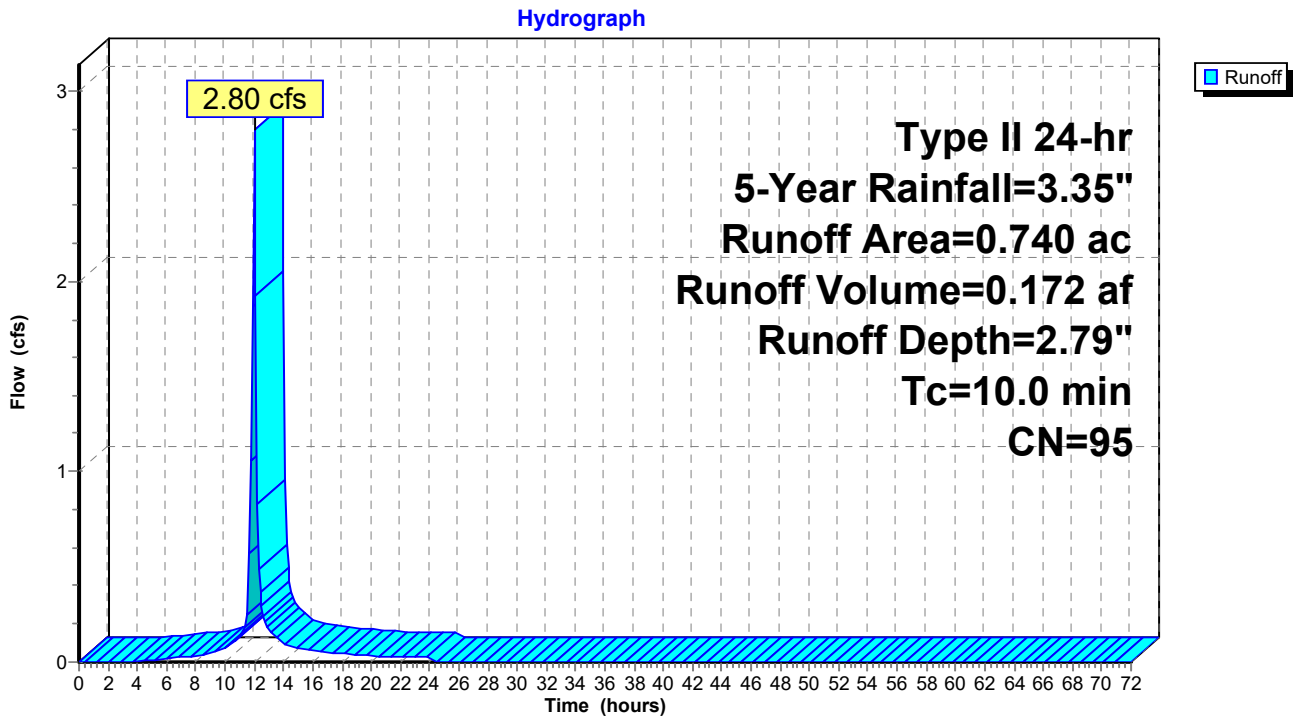
Runoff = 2.80 cfs @ 12.00 hrs, Volume= 0.172 af, Depth= 2.79"
 Routed to Pond 5P : ADS Stormtech

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 5-Year Rainfall=3.35"

Area (ac)	CN	Description
0.617	98	Paved parking, HSG C
0.123	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.123		16.62% Pervious Area
0.617		83.38% Impervious Area

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

Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION



Summary for Pond 2P: Chase Bank Pond after UG detention

Inflow Area = 2.769 ac, 58.29% Impervious, Inflow Depth = 2.30" for 5-Year event
 Inflow = 6.29 cfs @ 12.01 hrs, Volume= 0.531 af
 Outflow = 0.83 cfs @ 12.66 hrs, Volume= 0.525 af, Atten= 87%, Lag= 39.0 min
 Primary = 0.83 cfs @ 12.66 hrs, Volume= 0.525 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 6,800 sf Storage= 13,583 cf
 Peak Elev= 901.16' @ 12.66 hrs Surf.Area= 9,253 sf Storage= 22,893 cf (9,310 cf above start)
 Flood Elev= 903.00' Surf.Area= 13,066 sf Storage= 43,293 cf (29,710 cf above start)

Plug-Flow detention time= 1,365.0 min calculated for 0.213 af (40% of inflow)
 Center-of-Mass det. time= 421.6 min (1,381.0 - 959.4)

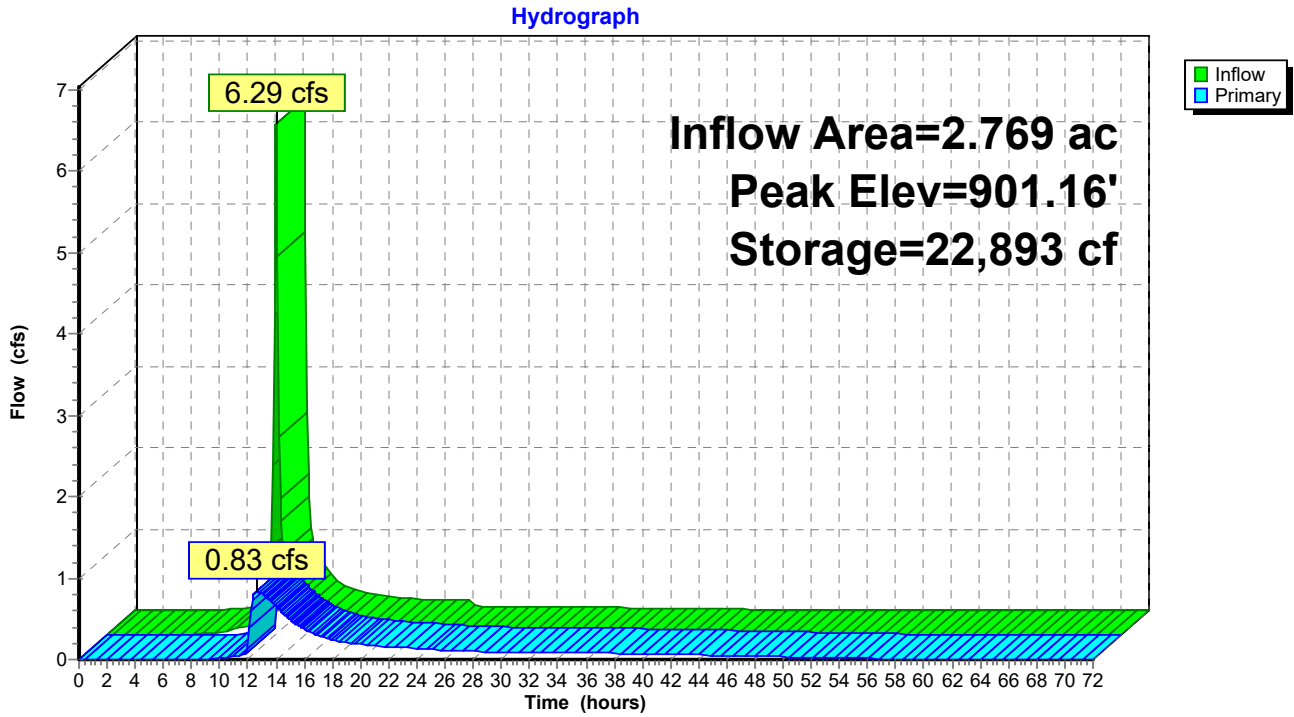
Volume	Invert	Avail.Storage	Storage Description			
#1	895.00'	43,293 cf	Wet Pond - Chase (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
895.00	663	142.0	0	0	663	
896.00	1,284	167.0	957	957	1,297	
897.00	2,006	193.0	1,632	2,588	2,063	
898.00	2,872	223.0	2,426	5,014	3,078	
899.00	3,815	248.0	3,332	8,347	4,044	
900.00	6,800	369.0	5,236	13,583	9,993	
901.00	8,959	404.0	7,855	21,437	12,180	
902.00	10,875	435.0	9,902	31,339	14,292	
903.00	13,066	480.0	11,954	43,293	17,601	

Device	Routing	Invert	Outlet Devices
#1	Primary	900.03'	1.00" Vert. WQ ORIFI X 5.00 C= 0.600 Limited to weir flow at low heads
#2	Primary	900.65'	8.00" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	903.00'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

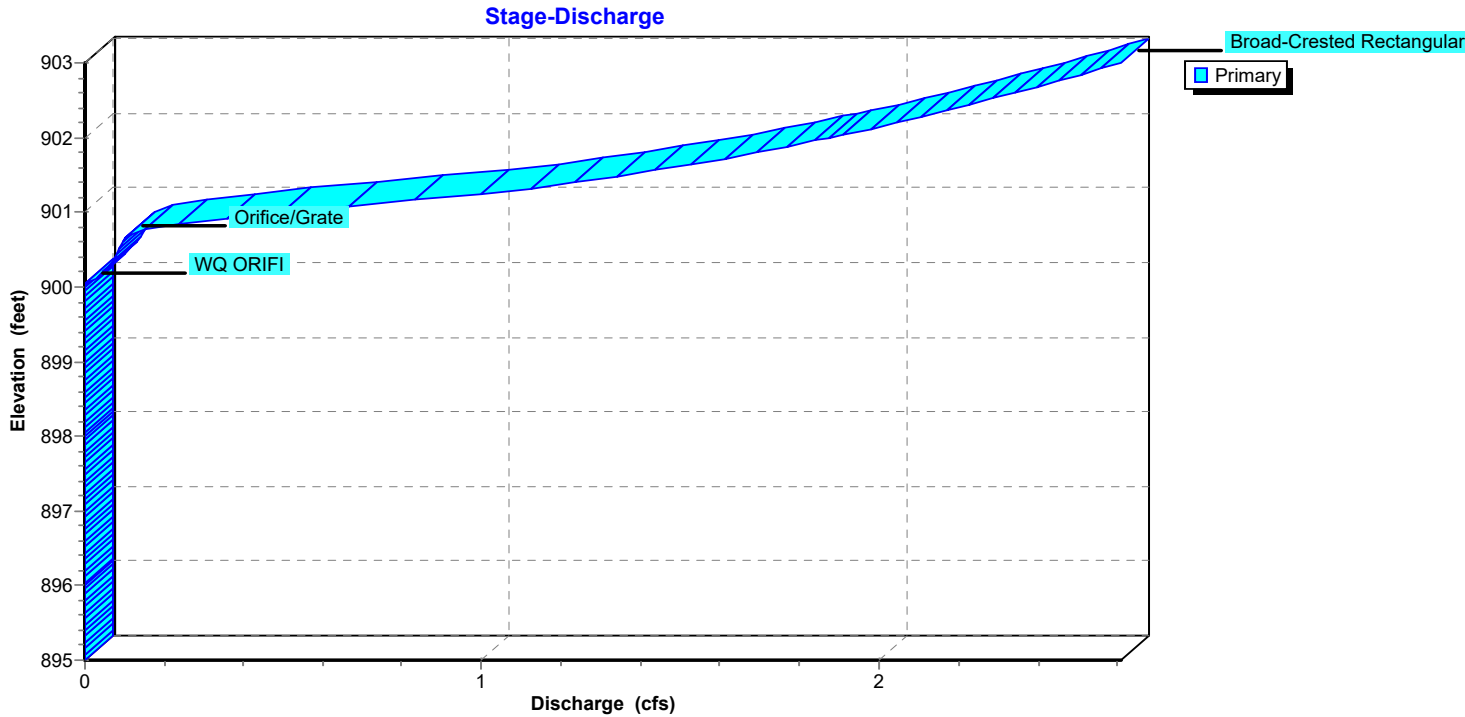
Primary OutFlow Max=0.83 cfs @ 12.66 hrs HW=901.16' (Free Discharge)

- 1=WQ ORIFI (Orifice Controls 0.14 cfs @ 5.02 fps)
- 2=Orifice/Grate (Orifice Controls 0.70 cfs @ 2.43 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

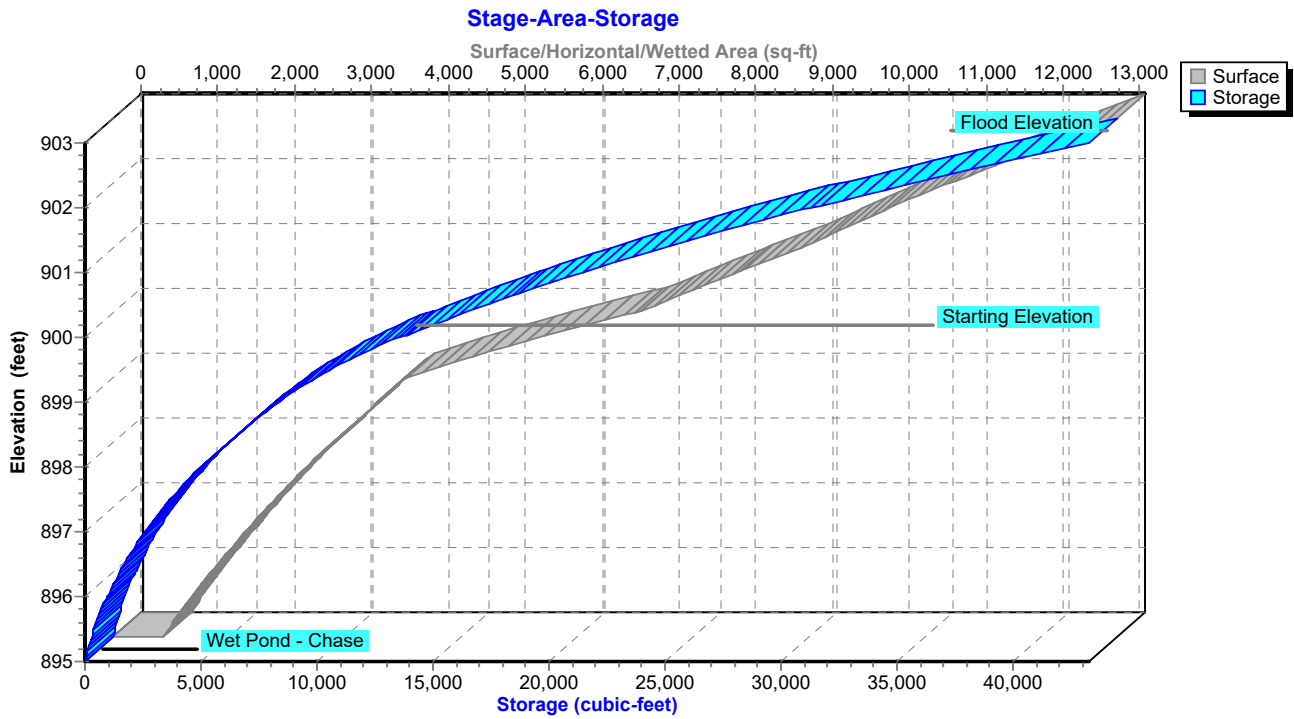
Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Summary for Pond 5P: ADS Stormtech

Inflow Area = 0.740 ac, 83.38% Impervious, Inflow Depth = 2.79" for 5-Year event
 Inflow = 2.80 cfs @ 12.00 hrs, Volume= 0.172 af
 Outflow = 0.52 cfs @ 12.34 hrs, Volume= 0.171 af, Atten= 81%, Lag= 20.3 min
 Primary = 0.52 cfs @ 12.34 hrs, Volume= 0.171 af
 Routed to Pond 2P : Chase Bank Pond after UG detention

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Peak Elev= 902.88' @ 12.34 hrs Surf.Area= 4,053 sf Storage= 4,025 cf

Plug-Flow detention time= 490.2 min calculated for 0.170 af (99% of inflow)
 Center-of-Mass det. time= 487.0 min (1,266.9 - 779.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.38'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.38' / 897.97' S= 0.0139 1/ S Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.55'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600

Limited to weir flow at low heads

#4	Device 1	903.47'	3.0' long Sharp-Crested Rectangular Weir	2 End Contraction(s)
#5	Device 1	903.81'	4.2' long Sharp-Crested Rectangular Weir	2 End Contraction(s)

1.0' Crest Height

Primary OutFlow Max=0.52 cfs @ 12.34 hrs HW=902.83' (Free Discharge)

- 1=Culvert (Passes 0.52 cfs of 5.93 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.09 cfs @ 9.90 fps)
- 3=Orifice/Grate (Orifice Controls 0.43 cfs @ 7.64 fps)
- 4=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)
- 5=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: ADS Stormtech - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04'

Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

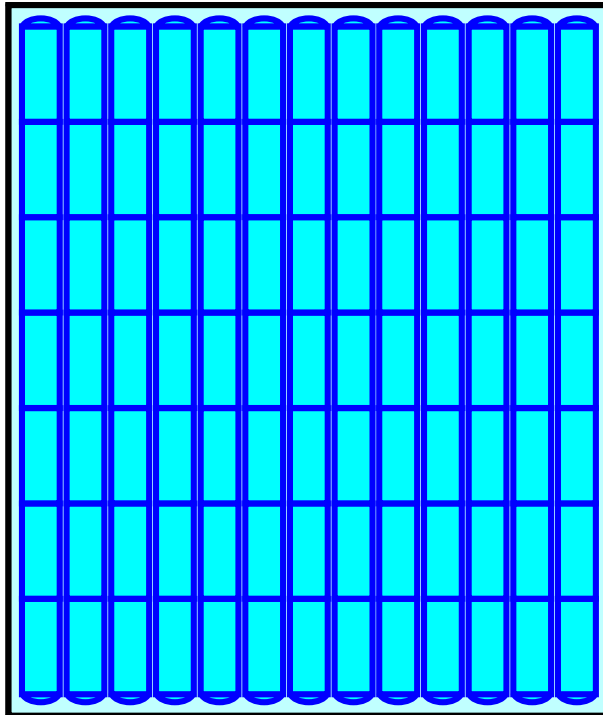
Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers

220.2 cy Field

170.5 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

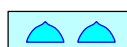
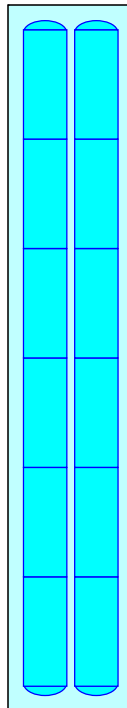
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

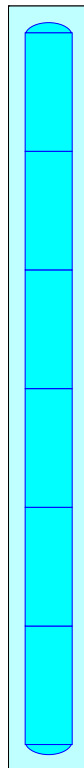
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

6 Chambers

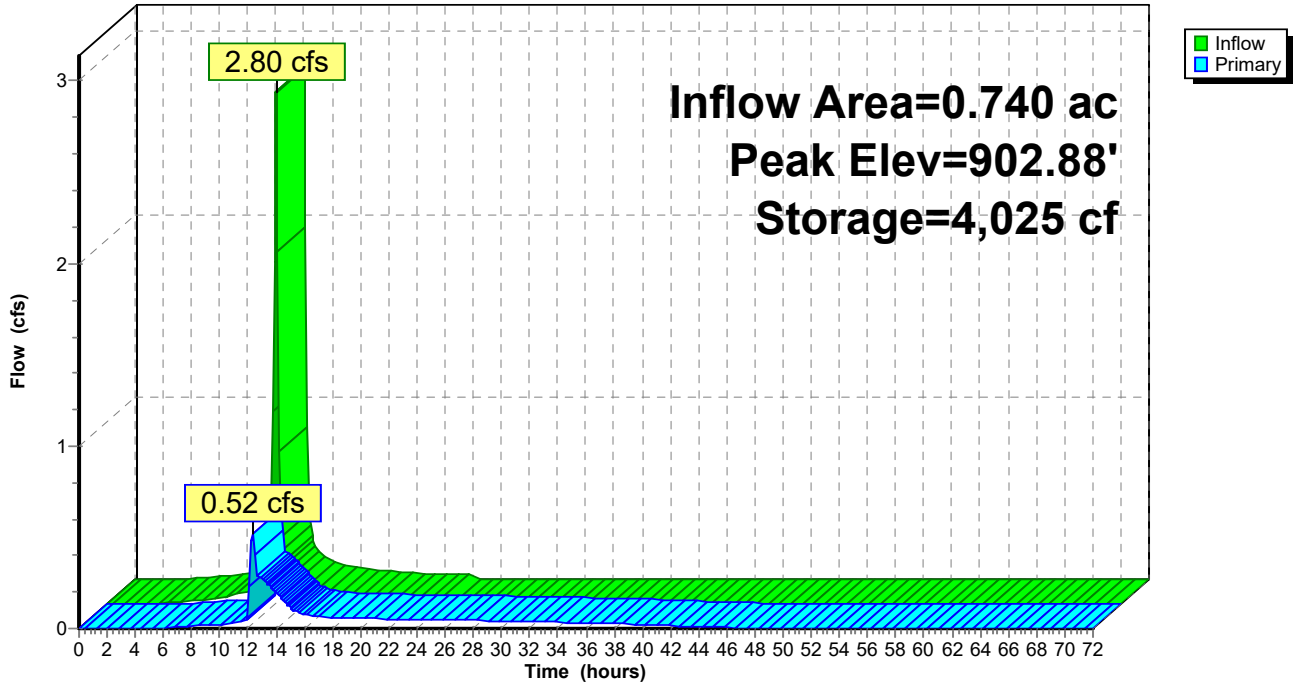
20.6 cy Field

17.3 cy Stone



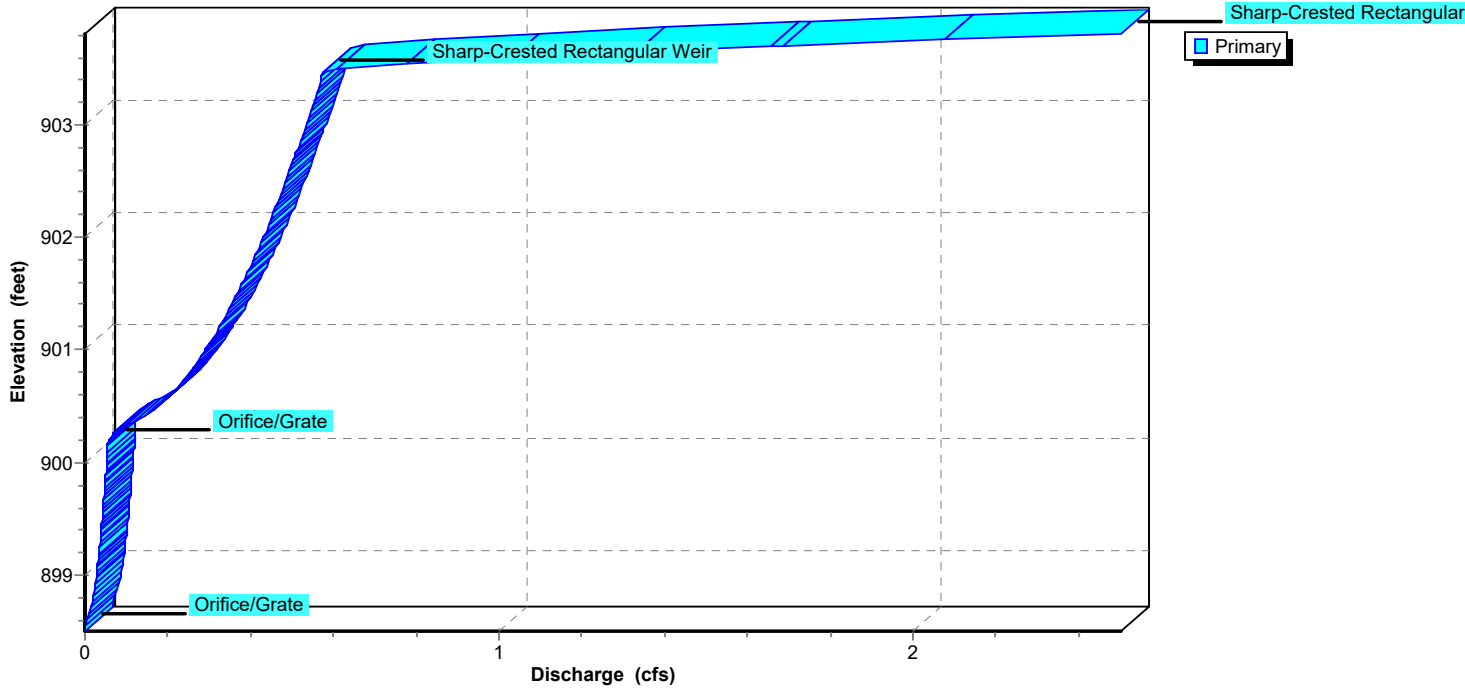
Pond 5P: ADS Stormtech

Hydrograph

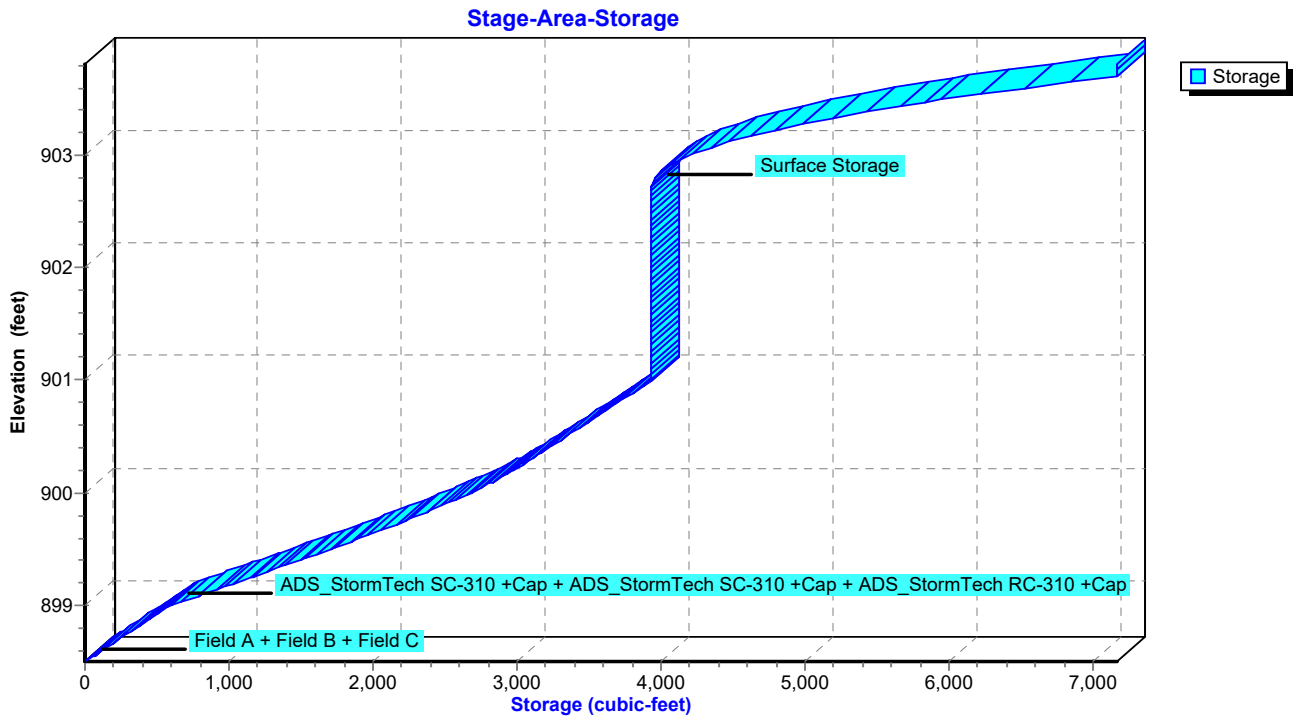


Pond 5P: ADS Stormtech

Stage-Discharge



Pond 5P: ADS Stormtech



Summary for Pond 7P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 2,975 sf Storage= 2,681 cf
 Peak Elev= 900.00' @ 0.00 hrs Surf.Area= 2,975 sf Storage= 2,681 cf

Plug-Flow detention time= (not calculated: no plugs found)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.22'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.22' / 897.97' S= 0.0085 '/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.50'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.05 cfs @ 0.00 hrs HW=900.00' (Free Discharge)
↑
1=Culvert (Passes 0.05 cfs of 3.38 cfs potential flow)
↑
2=Orifice/Grate (Orifice Controls 0.05 cfs @ 5.79 fps)
↑
3=Orifice/Grate (Controls 0.00 cfs)

Pond 7P: WQv Drawdown - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

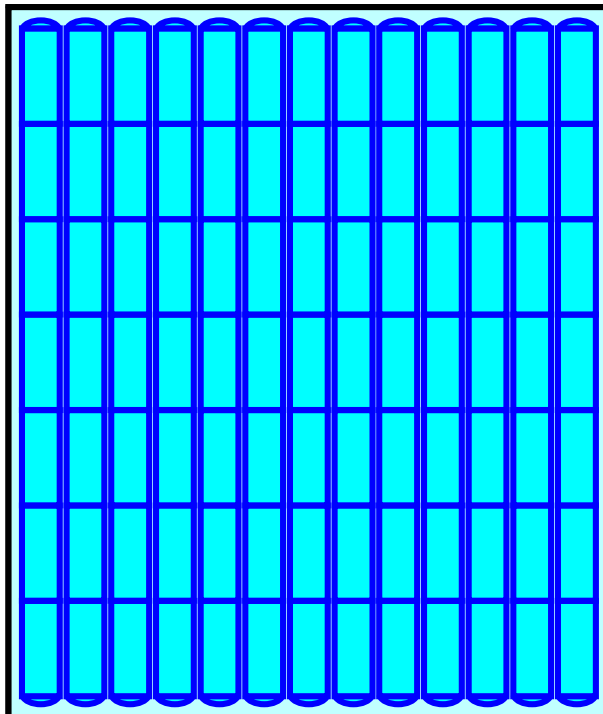
5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers
220.2 cy Field
170.5 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

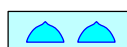
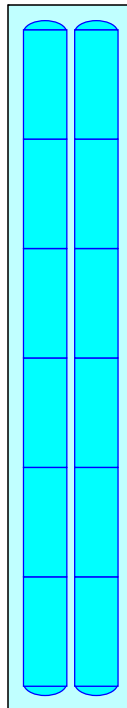
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

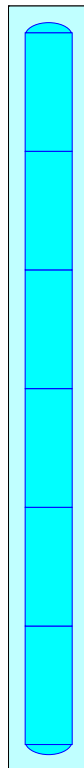
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

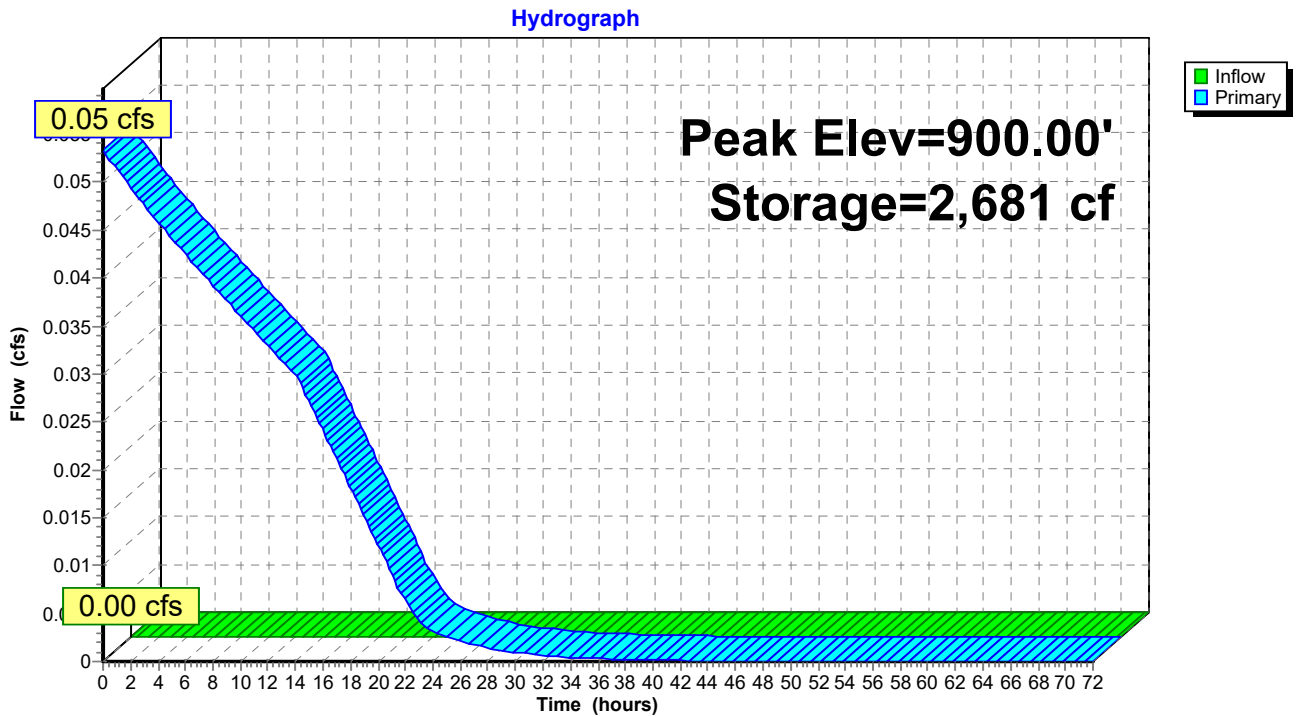
6 Chambers

20.6 cy Field

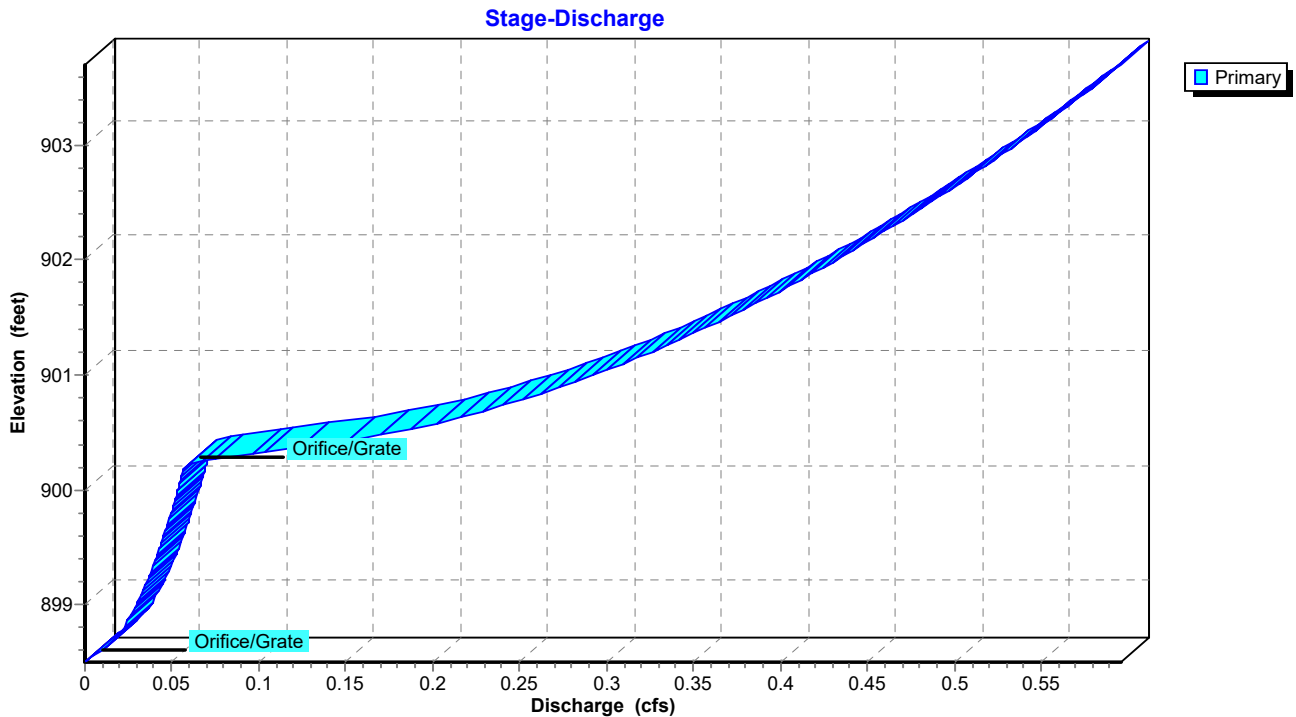
17.3 cy Stone



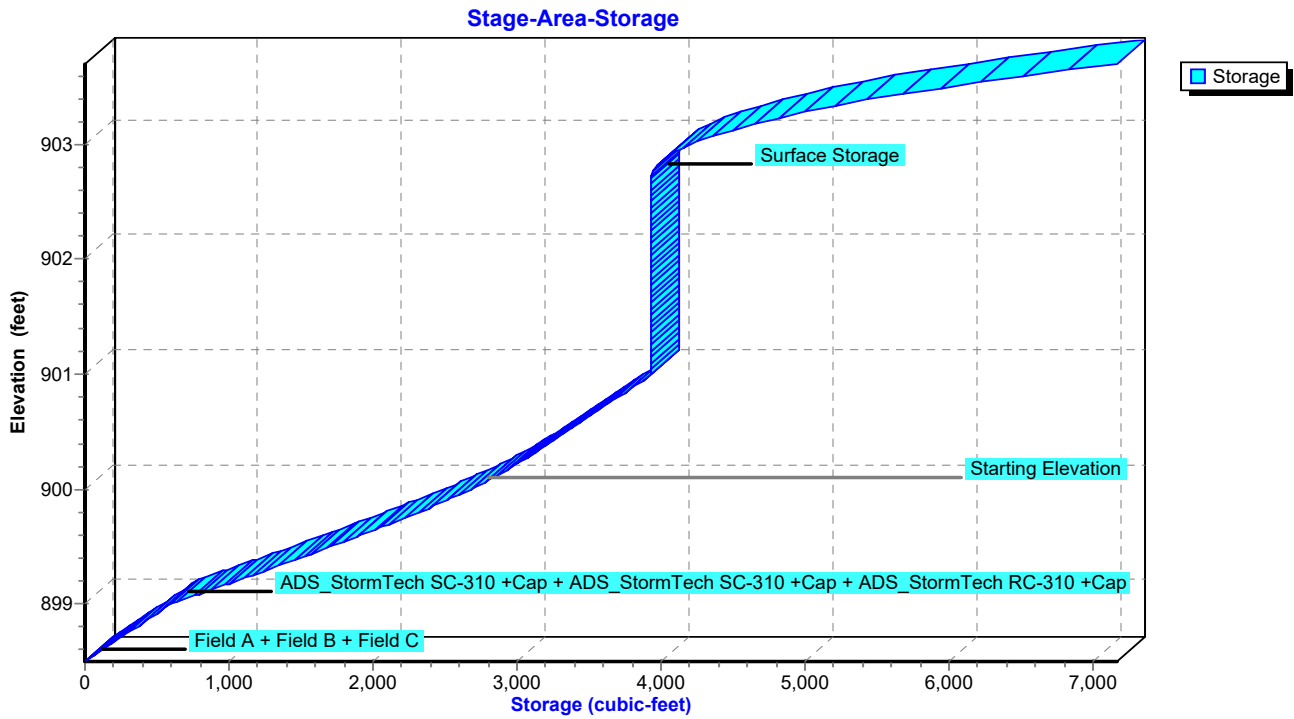
Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Summary for Subcatchment 1Pre: Pre-Developed

Runoff = 7.28 cfs @ 12.01 hrs, Volume= 0.419 af, Depth= 1.78"

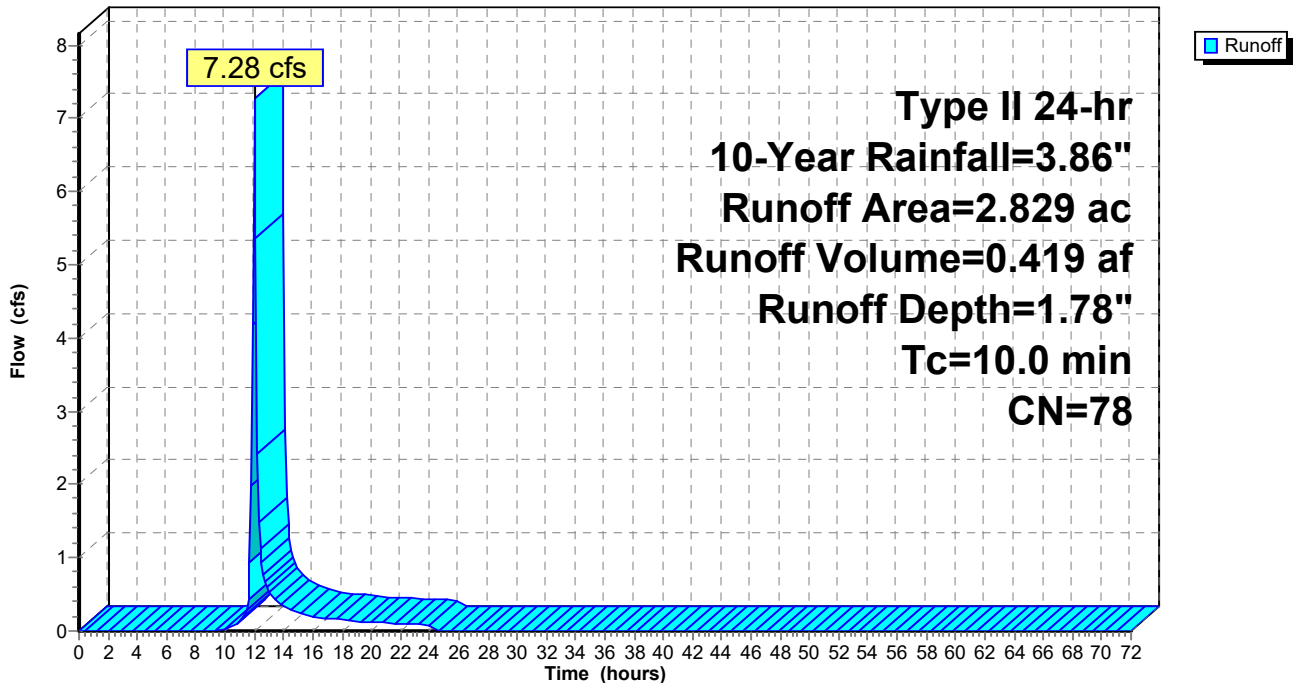
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 10-Year Rainfall=3.86"

Area (ac)	CN	Description
* 2.829	78	Predeveloped Open Area
2.829		100.00% Pervious Area

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

Subcatchment 1Pre: Pre-Developed

Hydrograph



Summary for Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

Runoff = 7.54 cfs @ 12.01 hrs, Volume= 0.439 af, Depth= 2.60"
 Routed to Pond 2P : Chase Bank Pond after UG detention

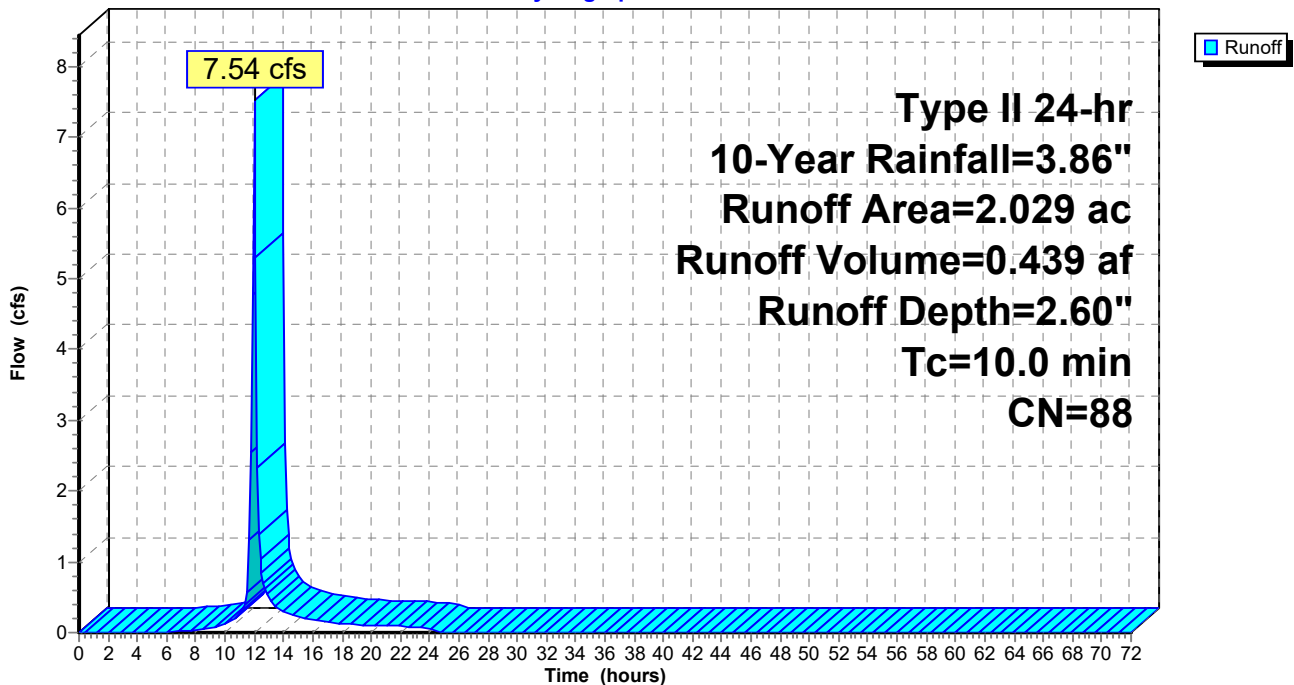
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 10-Year Rainfall=3.86"

Area (ac)	CN	Description
* 0.997	98	Paved/Roof Area
* 0.183	95	Pond Surface Area
* 0.849	74	Lawn/Landscape Area
2.029	88	Weighted Average
1.032		50.86% Pervious Area
0.997		49.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Minimum Assumed Tof C

Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

Hydrograph



Summary for Subcatchment 3S: Predev.Rehab Center

Runoff = 2.42 cfs @ 12.01 hrs, Volume= 0.139 af, Depth= 2.17"

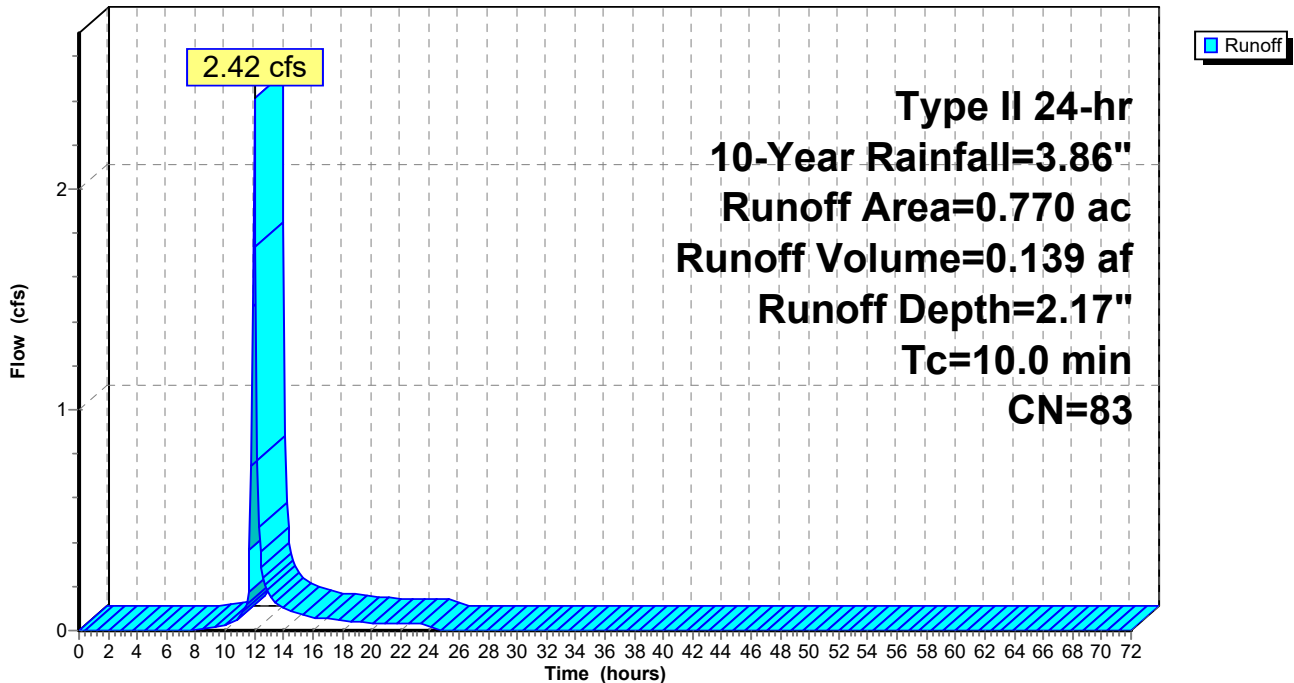
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 10-Year Rainfall=3.86"

Area (ac)	CN	Description
0.110	98	Paved roads w/curbs & sewers, HSG D
0.660	80	>75% Grass cover, Good, HSG D
0.770	83	Weighted Average
0.660		85.71% Pervious Area
0.110		14.29% Impervious Area

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

Subcatchment 3S: Predev.Rehab Center

Hydrograph



Summary for Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Runoff = 3.27 cfs @ 12.00 hrs, Volume= 0.203 af, Depth= 3.29"

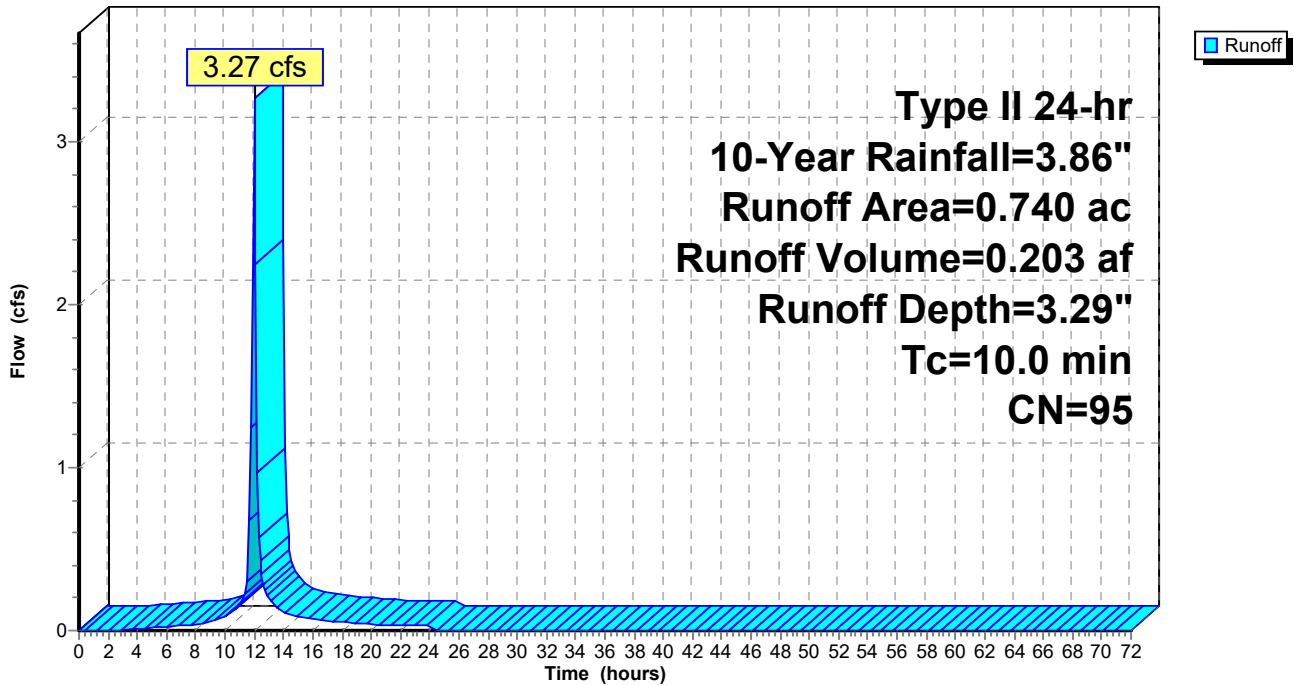
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 10-Year Rainfall=3.86"

Area (ac)	CN	Description
0.601	98	Paved parking, HSG C
0.139	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.139		18.78% Pervious Area
0.601		81.22% Impervious Area

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

Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Hydrograph



Summary for Subcatchment 5S: Un-Detained

Runoff = 0.84 cfs @ 12.00 hrs, Volume= 0.052 af, Depth= 3.29"

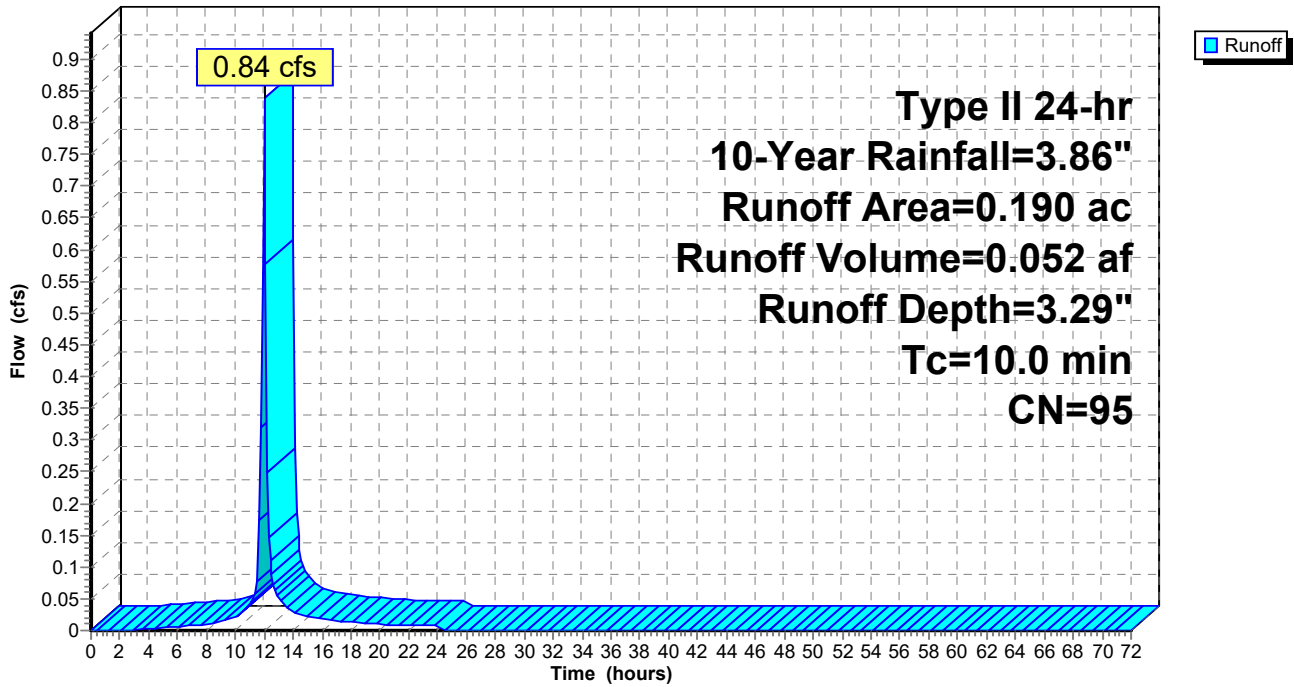
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 10-Year Rainfall=3.86"

Area (ac)	CN	Description
0.190	95	Urban commercial, 85% imp, HSG D
0.028		15.00% Pervious Area
0.161		85.00% Impervious Area

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

Subcatchment 5S: Un-Detained

Hydrograph



Summary for Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION

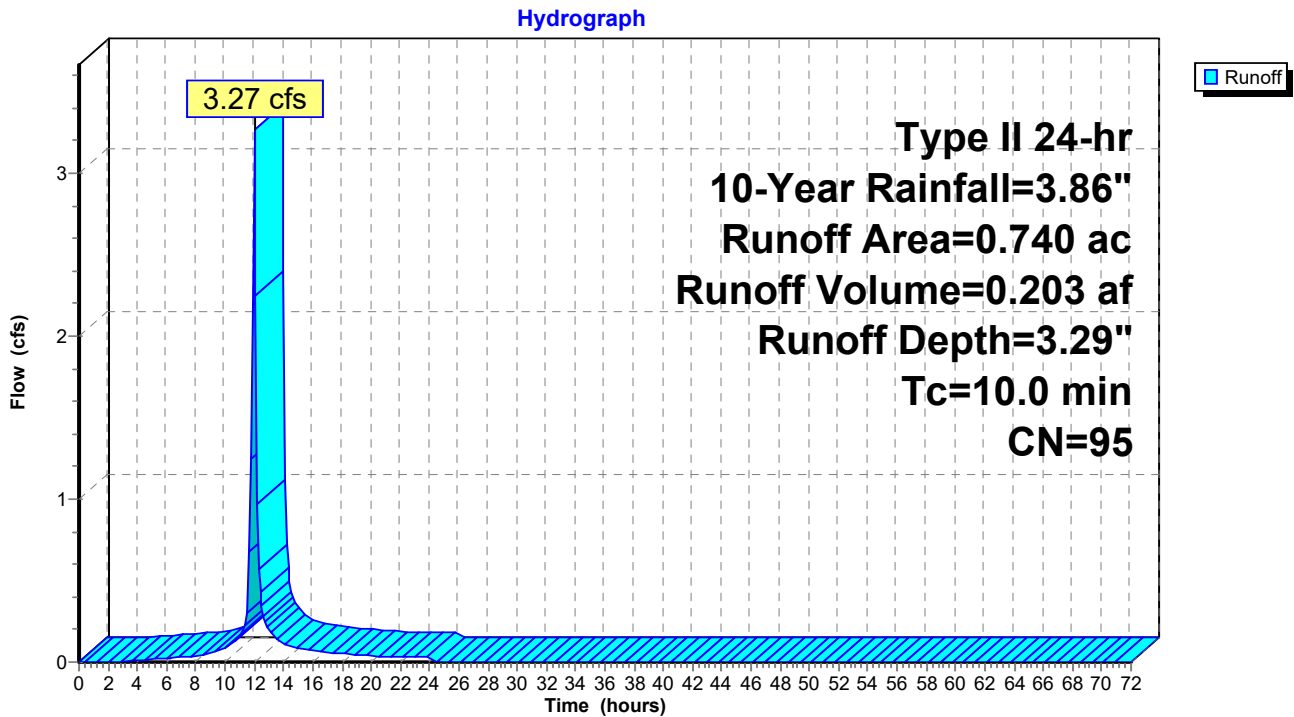
Runoff = 3.27 cfs @ 12.00 hrs, Volume= 0.203 af, Depth= 3.29"
 Routed to Pond 5P : ADS Stormtech

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 10-Year Rainfall=3.86"

Area (ac)	CN	Description
0.617	98	Paved parking, HSG C
0.123	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.123		16.62% Pervious Area
0.617		83.38% Impervious Area

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

Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION



Summary for Pond 2P: Chase Bank Pond after UG detention

Inflow Area = 2.769 ac, 58.29% Impervious, Inflow Depth = 2.78" for 10-Year event
 Inflow = 7.73 cfs @ 12.01 hrs, Volume= 0.641 af
 Outflow = 1.17 cfs @ 12.68 hrs, Volume= 0.635 af, Atten= 85%, Lag= 40.2 min
 Primary = 1.17 cfs @ 12.68 hrs, Volume= 0.635 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 6,800 sf Storage= 13,583 cf
 Peak Elev= 901.36' @ 12.68 hrs Surf.Area= 9,620 sf Storage= 24,746 cf (11,163 cf above start)
 Flood Elev= 903.00' Surf.Area= 13,066 sf Storage= 43,293 cf (29,710 cf above start)

Plug-Flow detention time= 1,064.3 min calculated for 0.322 af (50% of inflow)
 Center-of-Mass det. time= 371.1 min (1,306.8 - 935.6)

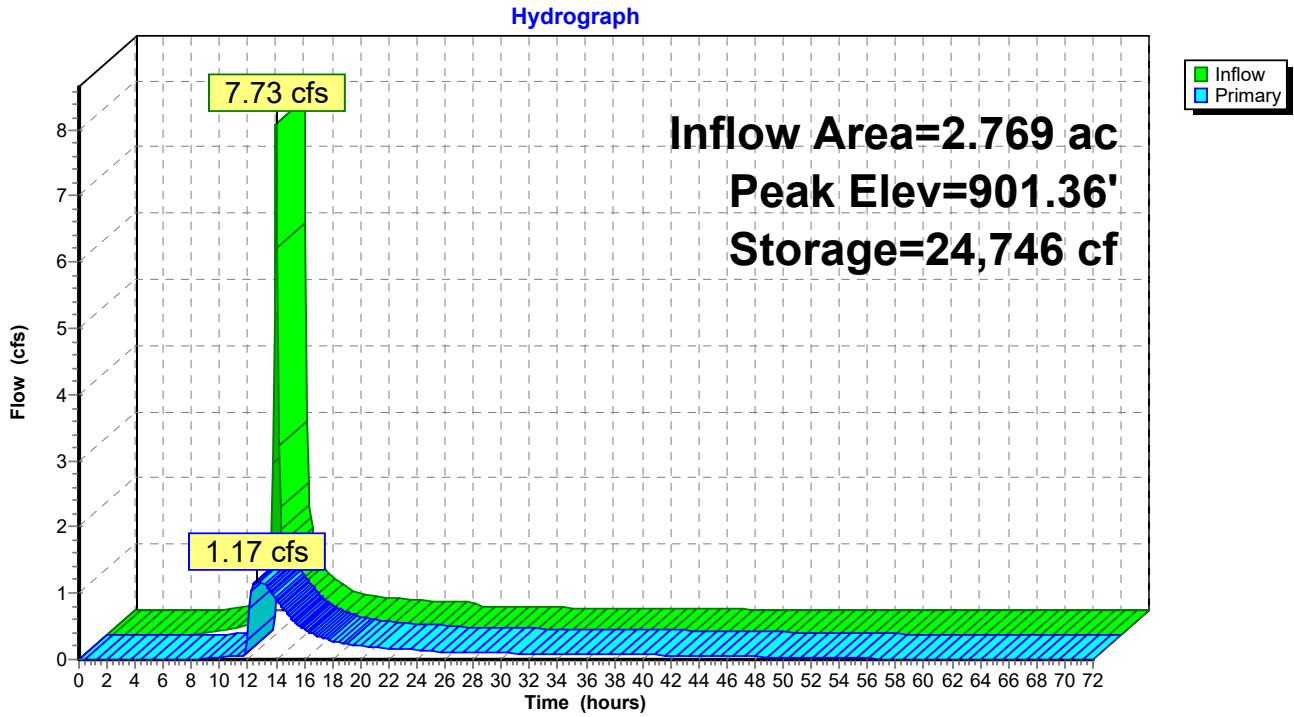
Volume	Invert	Avail.Storage	Storage Description		
#1	895.00'	43,293 cf	Wet Pond - Chase (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
895.00	663	142.0	0	0	663
896.00	1,284	167.0	957	957	1,297
897.00	2,006	193.0	1,632	2,588	2,063
898.00	2,872	223.0	2,426	5,014	3,078
899.00	3,815	248.0	3,332	8,347	4,044
900.00	6,800	369.0	5,236	13,583	9,993
901.00	8,959	404.0	7,855	21,437	12,180
902.00	10,875	435.0	9,902	31,339	14,292
903.00	13,066	480.0	11,954	43,293	17,601

Device	Routing	Invert	Outlet Devices
#1	Primary	900.03'	1.00" Vert. WQ ORIFI X 5.00 C= 0.600 Limited to weir flow at low heads
#2	Primary	900.65'	8.00" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	903.00'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

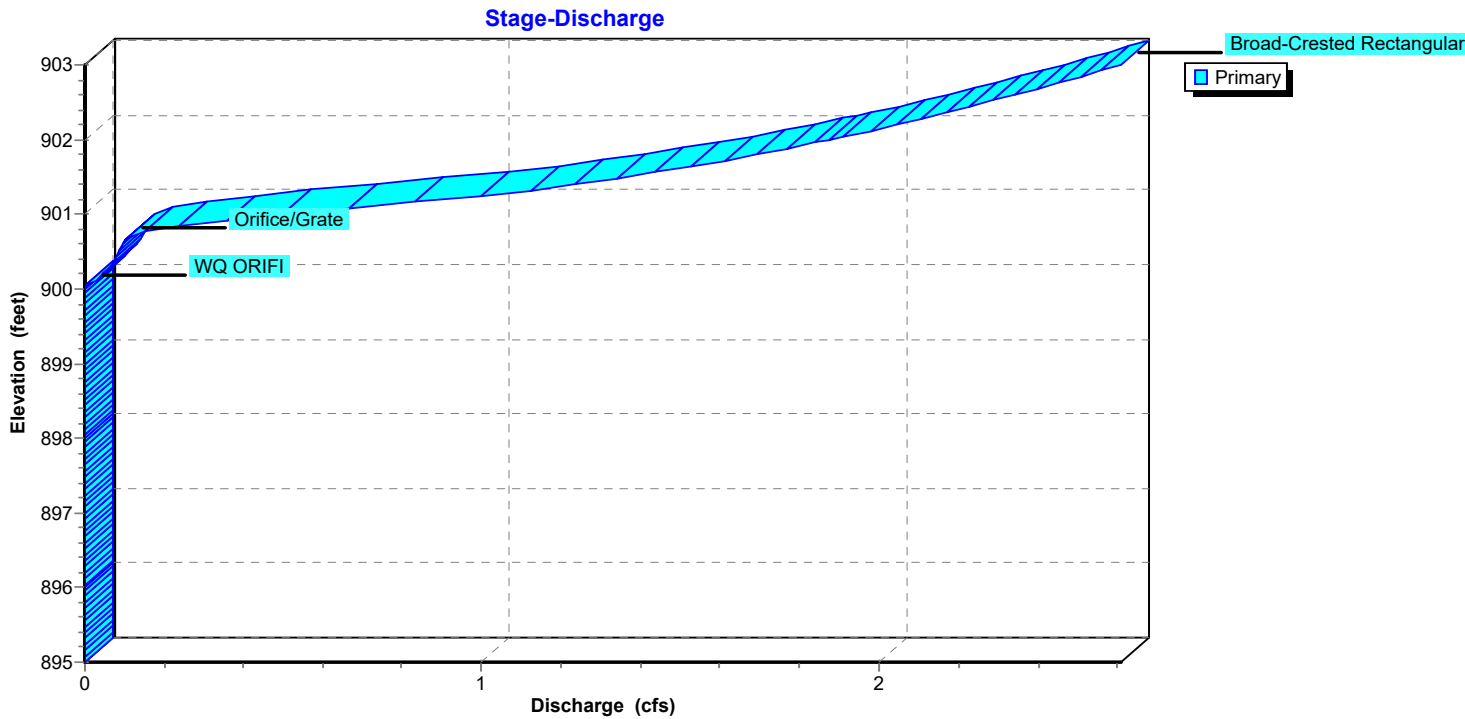
Primary OutFlow Max=1.17 cfs @ 12.68 hrs HW=901.36' (Free Discharge)

- 1=WQ ORIFI (Orifice Controls 0.15 cfs @ 5.46 fps)
- 2=Orifice/Grate (Orifice Controls 1.03 cfs @ 2.94 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

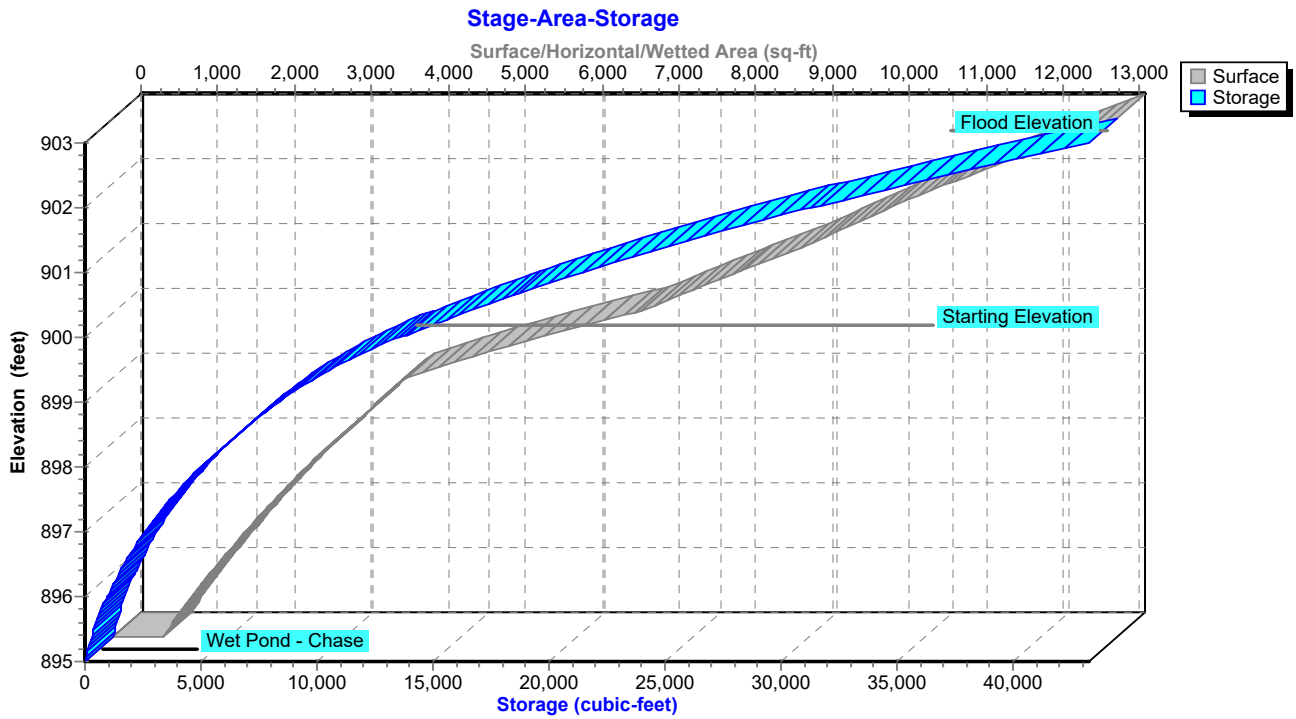
Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Summary for Pond 5P: ADS Stormtech

Inflow Area = 0.740 ac, 83.38% Impervious, Inflow Depth = 3.29" for 10-Year event
 Inflow = 3.27 cfs @ 12.00 hrs, Volume= 0.203 af
 Outflow = 0.55 cfs @ 12.33 hrs, Volume= 0.202 af, Atten= 83%, Lag= 19.8 min
 Primary = 0.55 cfs @ 12.33 hrs, Volume= 0.202 af
 Routed to Pond 2P : Chase Bank Pond after UG detention

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Peak Elev= 903.18' @ 12.33 hrs Surf.Area= 6,062 sf Storage= 4,647 cf

Plug-Flow detention time= 442.9 min calculated for 0.202 af (99% of inflow)
 Center-of-Mass det. time= 437.8 min (1,213.4 - 775.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.38'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.38' / 897.97' S= 0.0139 1/ S Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.55'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600

Limited to weir flow at low heads

#4	Device 1	903.47'	3.0' long Sharp-Crested Rectangular Weir	2 End Contraction(s)
#5	Device 1	903.81'	4.2' long Sharp-Crested Rectangular Weir	2 End Contraction(s)

1.0' Crest Height

Primary OutFlow Max=0.55 cfs @ 12.33 hrs HW=903.18' (Free Discharge)

- 1=Culvert (Passes 0.55 cfs of 6.19 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.09 cfs @ 10.29 fps)
- 3=Orifice/Grate (Orifice Controls 0.45 cfs @ 8.15 fps)
- 4=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)
- 5=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: ADS Stormtech - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04'

Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

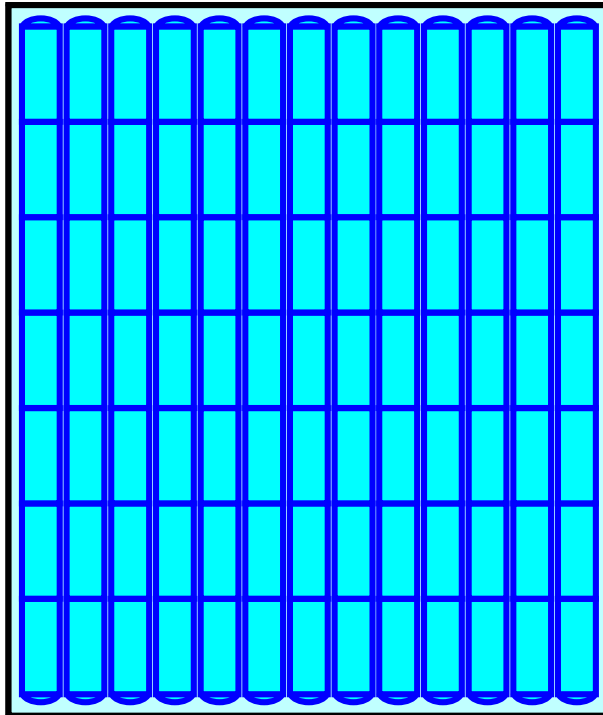
Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers

220.2 cy Field

170.5 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

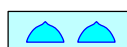
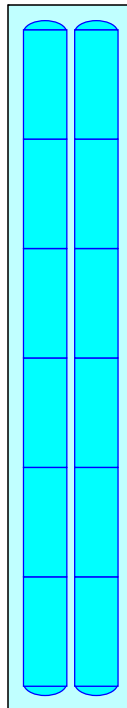
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

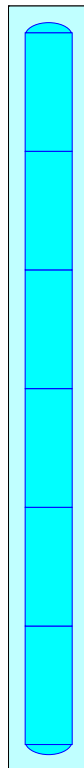
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

6 Chambers

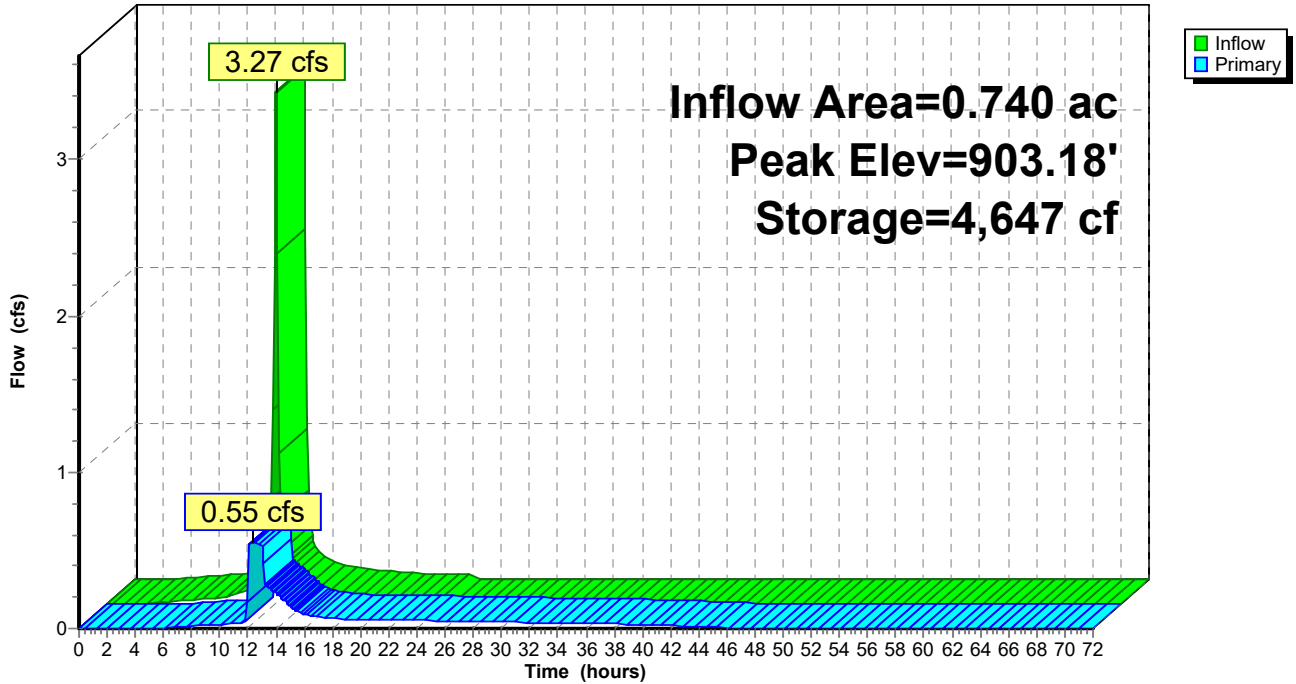
20.6 cy Field

17.3 cy Stone



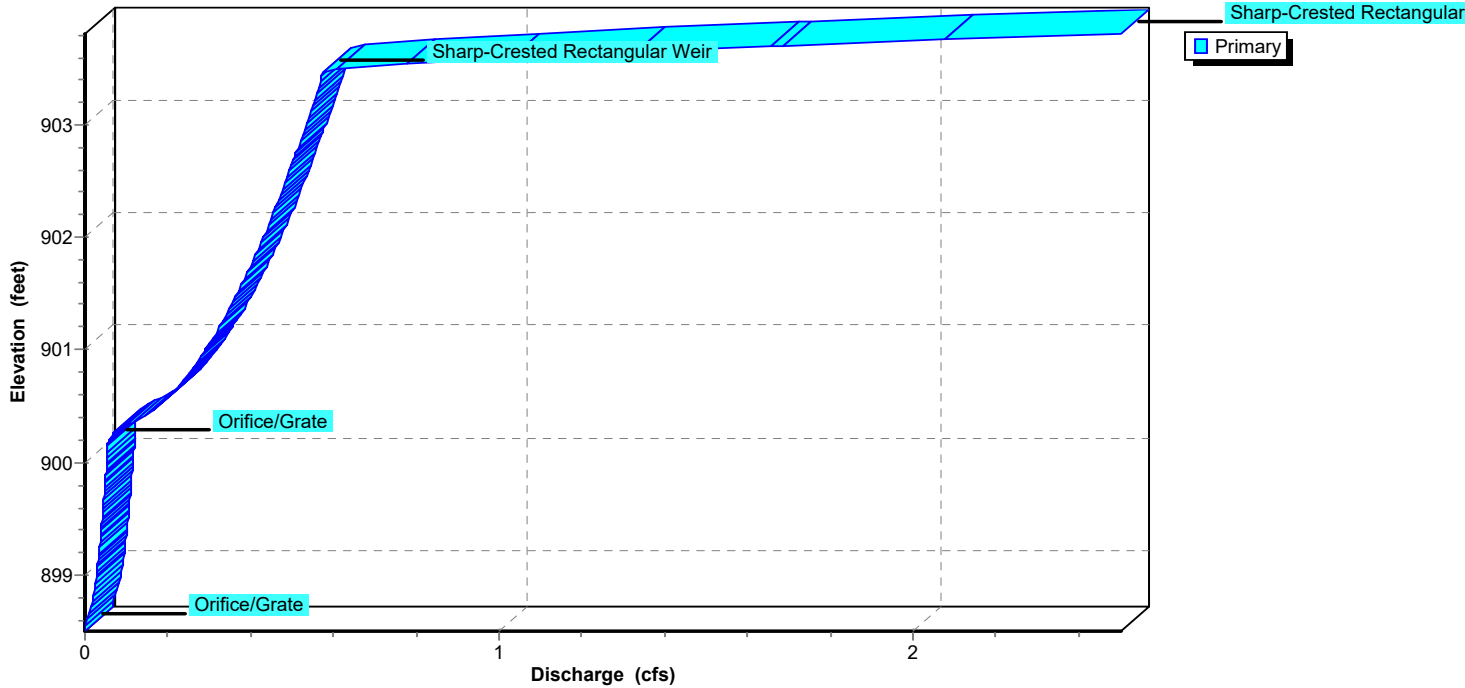
Pond 5P: ADS Stormtech

Hydrograph

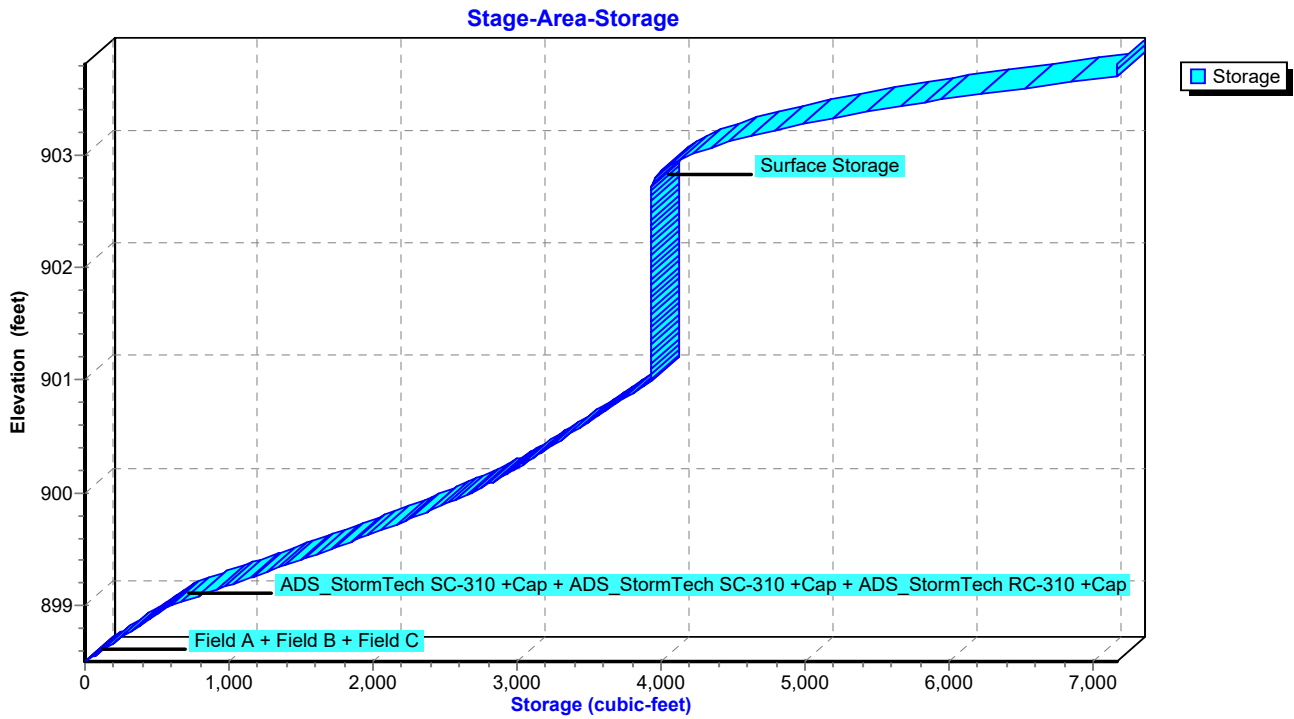


Pond 5P: ADS Stormtech

Stage-Discharge



Pond 5P: ADS Stormtech



Summary for Pond 7P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 2,975 sf Storage= 2,681 cf
 Peak Elev= 900.00' @ 0.00 hrs Surf.Area= 2,975 sf Storage= 2,681 cf

Plug-Flow detention time= (not calculated: no plugs found)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.22'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.22' / 897.97' S= 0.0085 '/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.50'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.05 cfs @ 0.00 hrs HW=900.00' (Free Discharge)
↑ 1=Culvert (Passes 0.05 cfs of 3.38 cfs potential flow)
↑ 2=Orifice/Grate (Orifice Controls 0.05 cfs @ 5.79 fps)
↑ 3=Orifice/Grate (Controls 0.00 cfs)

Pond 7P: WQv Drawdown - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

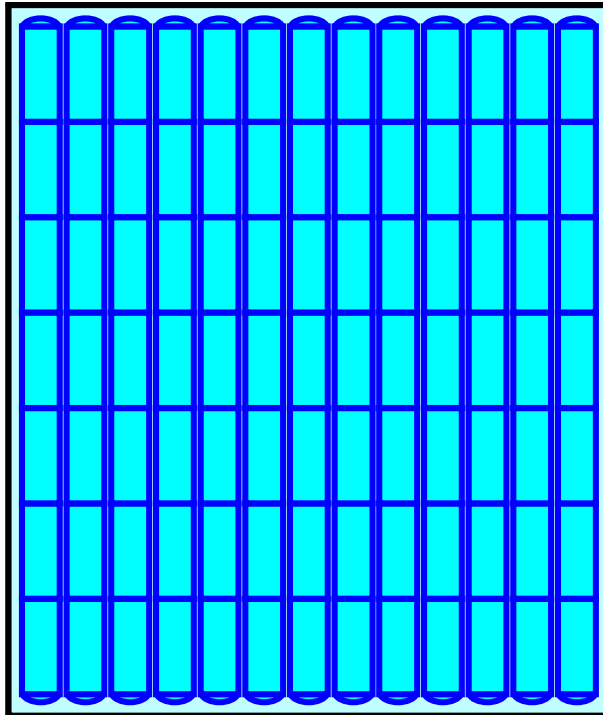
Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers

220.2 cy Field

170.5 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

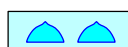
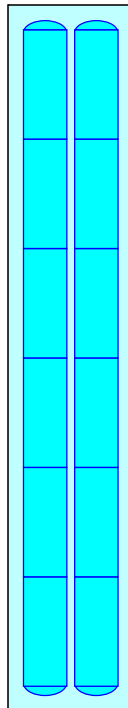
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

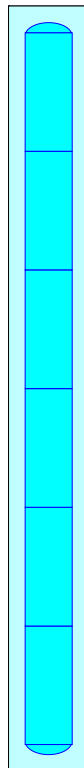
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

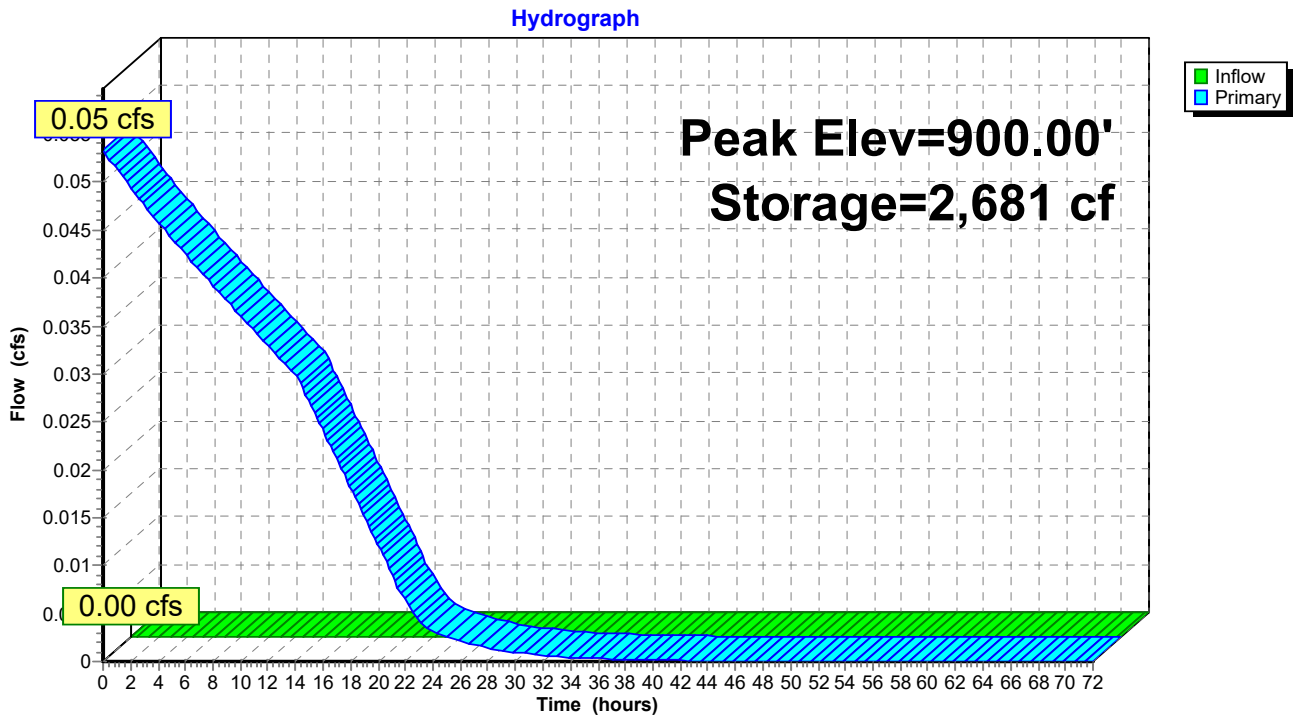
6 Chambers

20.6 cy Field

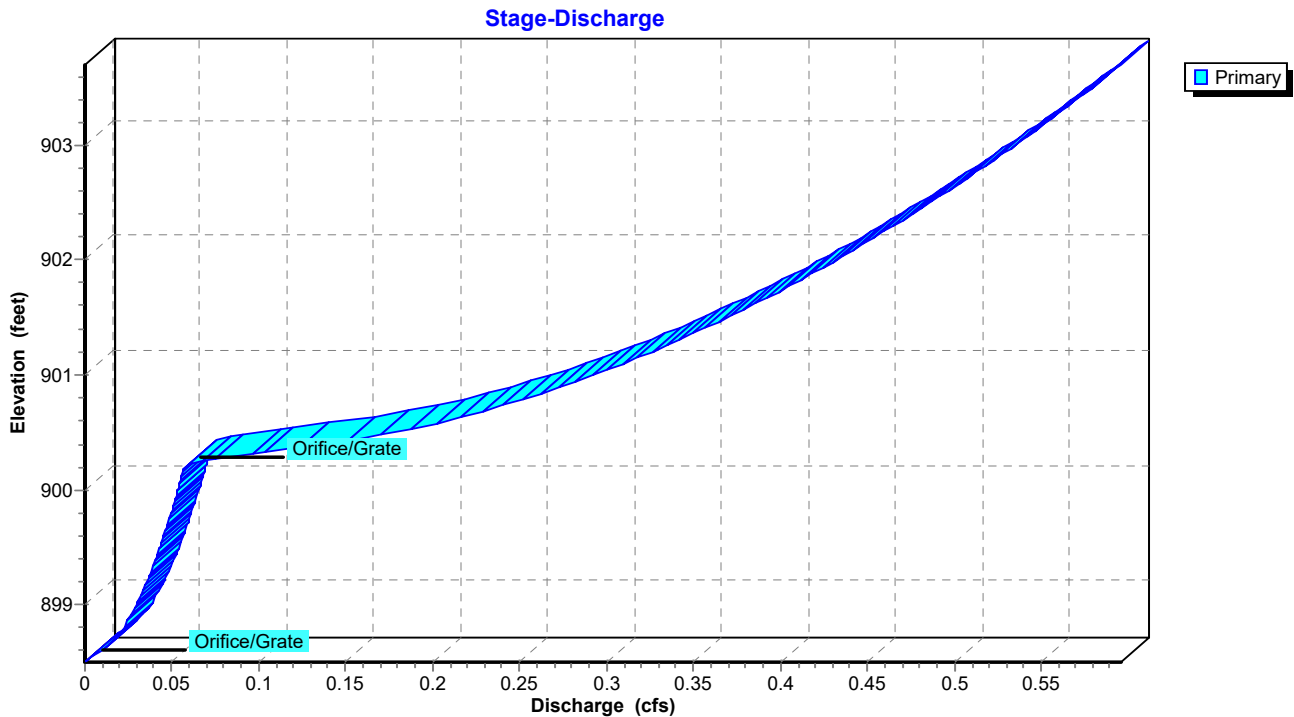
17.3 cy Stone



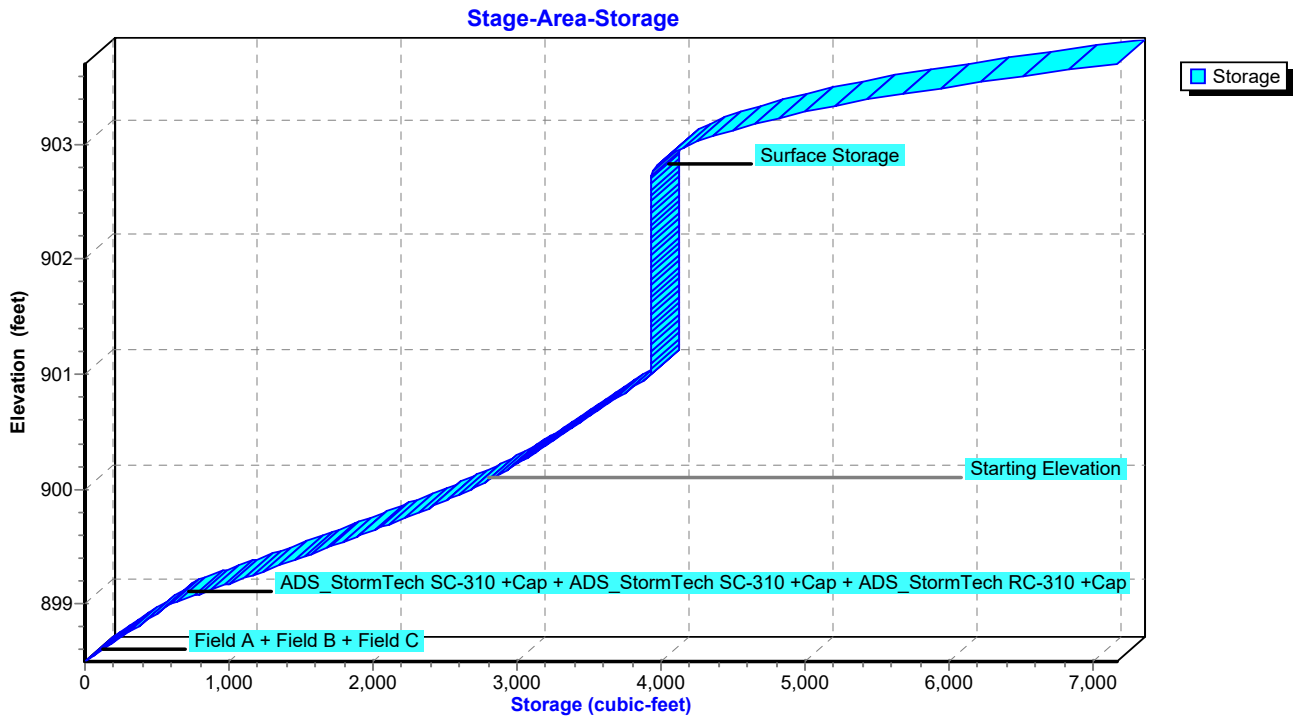
Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Summary for Subcatchment 1Pre: Pre-Developed

Runoff = 9.90 cfs @ 12.01 hrs, Volume= 0.568 af, Depth= 2.41"

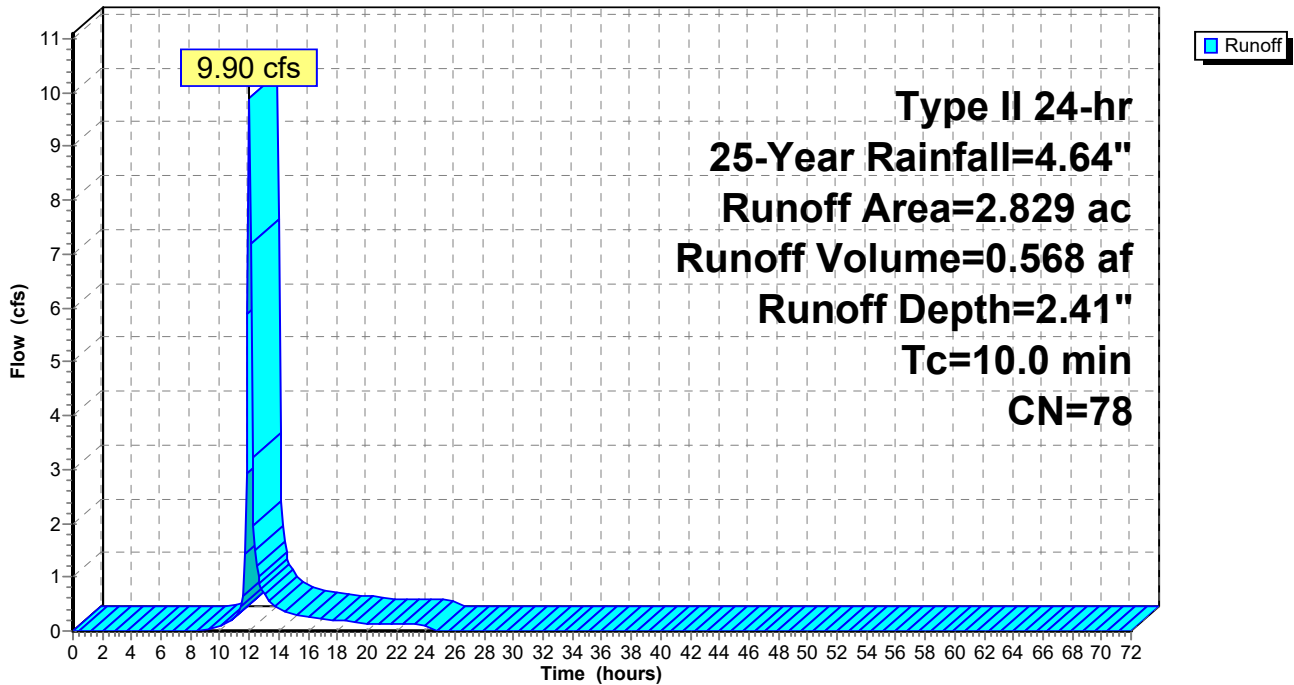
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 25-Year Rainfall=4.64"

Area (ac)	CN	Description
* 2.829	78	Predeveloped Open Area
2.829		100.00% Pervious Area

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

Subcatchment 1Pre: Pre-Developed

Hydrograph



Summary for Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

Runoff = 9.55 cfs @ 12.00 hrs, Volume= 0.563 af, Depth= 3.33"
 Routed to Pond 2P : Chase Bank Pond after UG detention

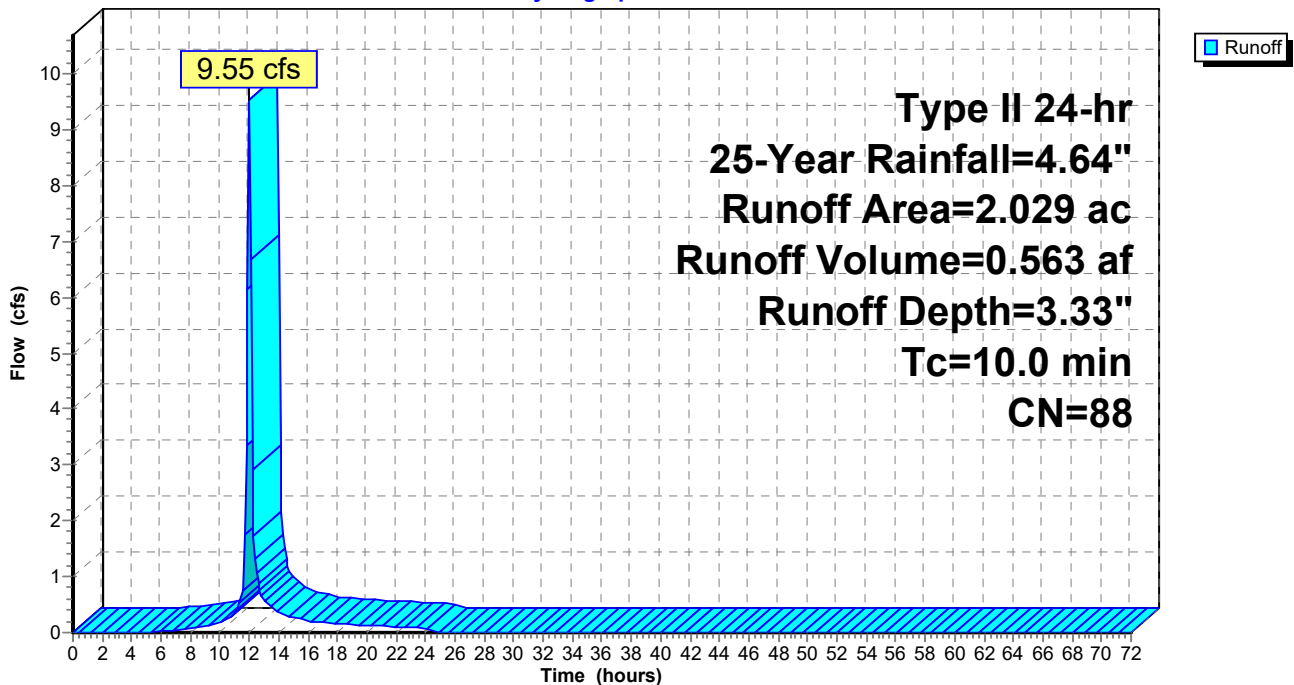
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 25-Year Rainfall=4.64"

Area (ac)	CN	Description
* 0.997	98	Paved/Roof Area
* 0.183	95	Pond Surface Area
* 0.849	74	Lawn/Landscape Area
2.029	88	Weighted Average
1.032		50.86% Pervious Area
0.997		49.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Minimum Assumed Tof C

Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

Hydrograph



Summary for Subcatchment 3S: Predev.Rehab Center

Runoff = 3.17 cfs @ 12.01 hrs, Volume= 0.183 af, Depth= 2.85"

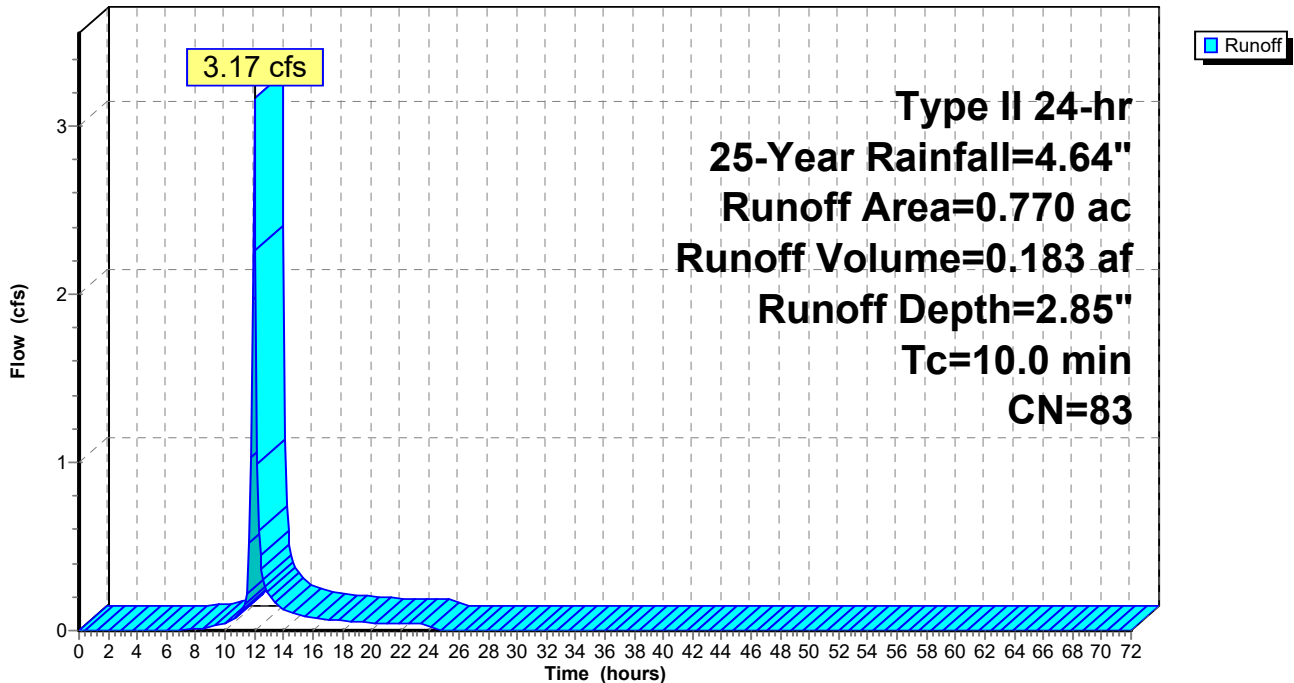
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 25-Year Rainfall=4.64"

Area (ac)	CN	Description
0.110	98	Paved roads w/curbs & sewers, HSG D
0.660	80	>75% Grass cover, Good, HSG D
0.770	83	Weighted Average
0.660		85.71% Pervious Area
0.110		14.29% Impervious Area

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

Subcatchment 3S: Predev.Rehab Center

Hydrograph



Summary for Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Runoff = 3.99 cfs @ 12.00 hrs, Volume= 0.251 af, Depth= 4.06"

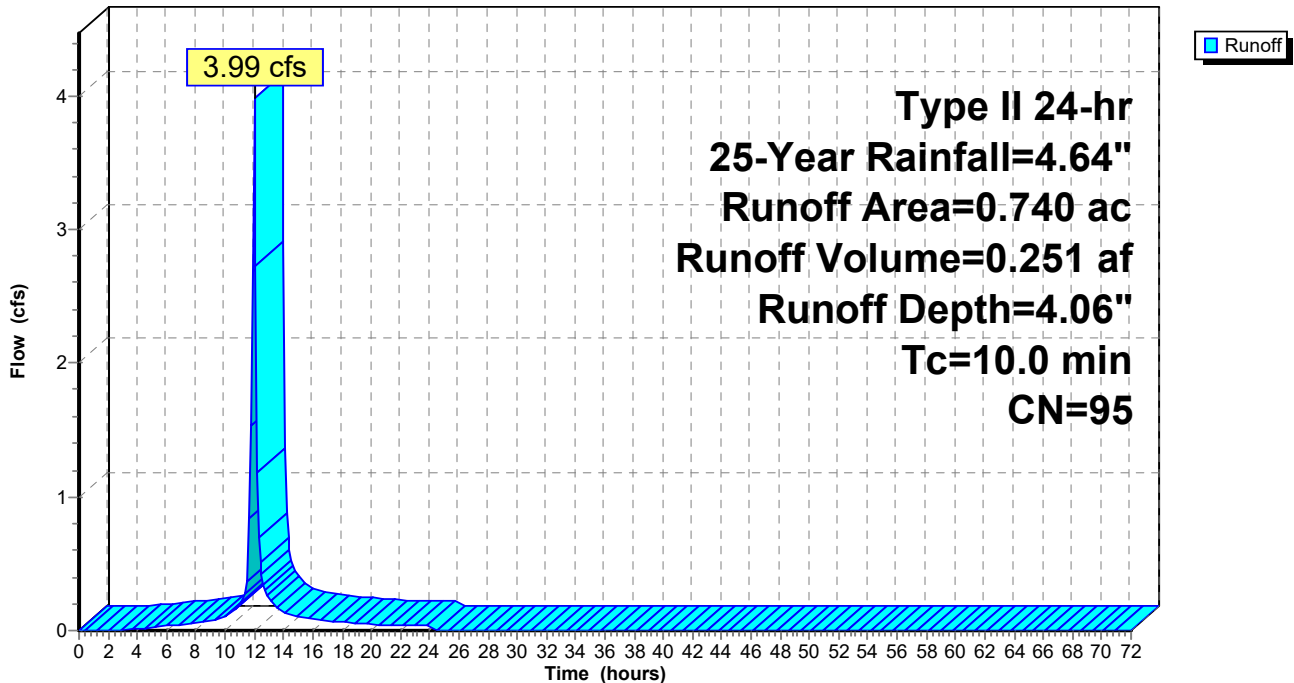
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 25-Year Rainfall=4.64"

Area (ac)	CN	Description
0.601	98	Paved parking, HSG C
0.139	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.139		18.78% Pervious Area
0.601		81.22% Impervious Area

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

Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Hydrograph



Summary for Subcatchment 5S: Un-Detained

Runoff = 1.02 cfs @ 12.00 hrs, Volume= 0.064 af, Depth= 4.06"

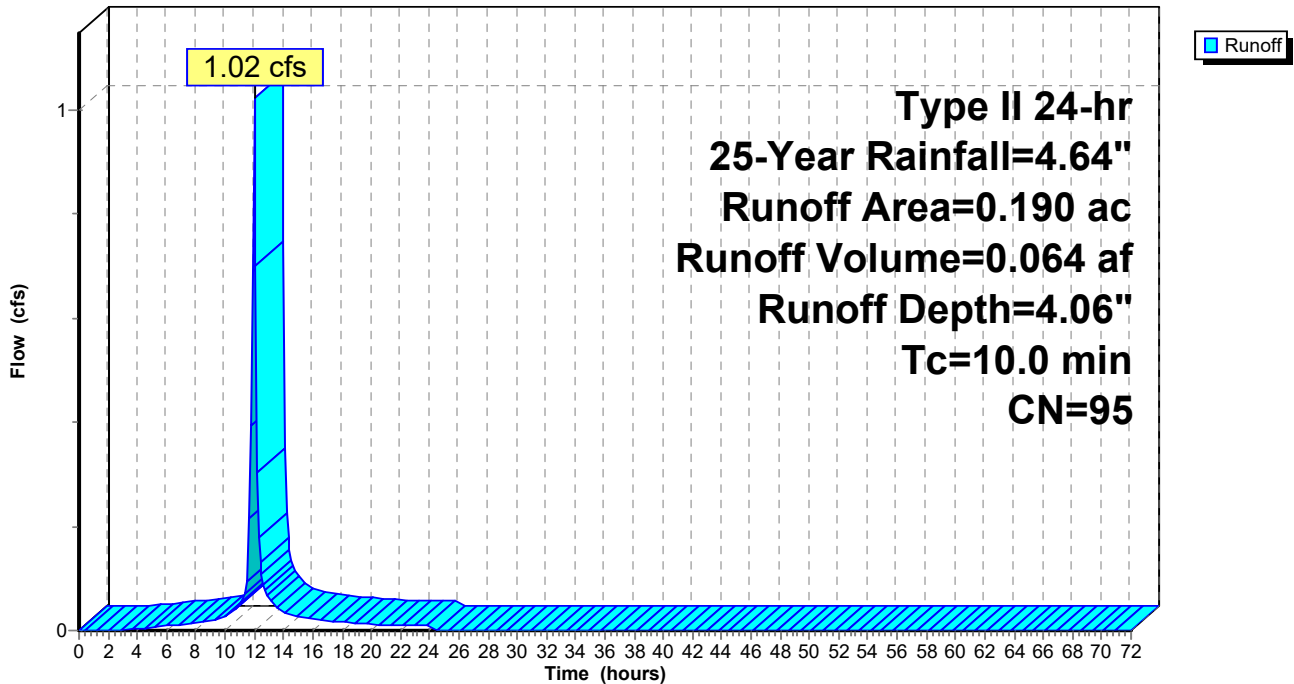
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 25-Year Rainfall=4.64"

Area (ac)	CN	Description
0.190	95	Urban commercial, 85% imp, HSG D
0.028		15.00% Pervious Area
0.161		85.00% Impervious Area

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

Subcatchment 5S: Un-Detained

Hydrograph



Summary for Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION

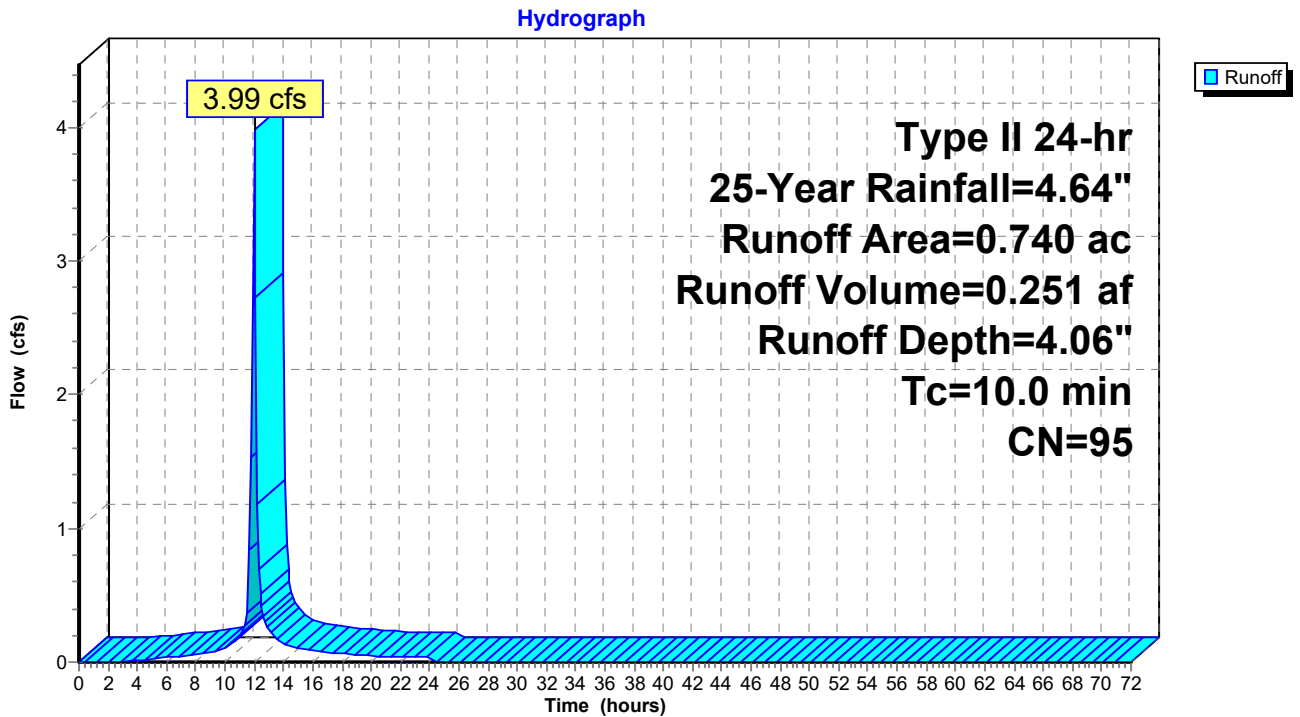
Runoff = 3.99 cfs @ 12.00 hrs, Volume= 0.251 af, Depth= 4.06"
 Routed to Pond 5P : ADS Stormtech

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 25-Year Rainfall=4.64"

Area (ac)	CN	Description
0.617	98	Paved parking, HSG C
0.123	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.123		16.62% Pervious Area
0.617		83.38% Impervious Area

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

Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION



Summary for Pond 2P: Chase Bank Pond after UG detention

Inflow Area = 2.769 ac, 58.29% Impervious, Inflow Depth = 3.52" for 25-Year event
 Inflow = 10.09 cfs @ 12.01 hrs, Volume= 0.812 af
 Outflow = 1.53 cfs @ 12.55 hrs, Volume= 0.805 af, Atten= 85%, Lag= 32.8 min
 Primary = 1.53 cfs @ 12.55 hrs, Volume= 0.805 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 6,800 sf Storage= 13,583 cf
 Peak Elev= 901.64' @ 12.55 hrs Surf.Area= 10,169 sf Storage= 27,582 cf (13,999 cf above start)
 Flood Elev= 903.00' Surf.Area= 13,066 sf Storage= 43,293 cf (29,710 cf above start)

Plug-Flow detention time= 803.5 min calculated for 0.494 af (61% of inflow)
 Center-of-Mass det. time= 321.3 min (1,232.6 - 911.2)

Volume	Invert	Avail.Storage	Storage Description
#1	895.00'	43,293 cf	Wet Pond - Chase (Irregular) Listed below (Recalc)

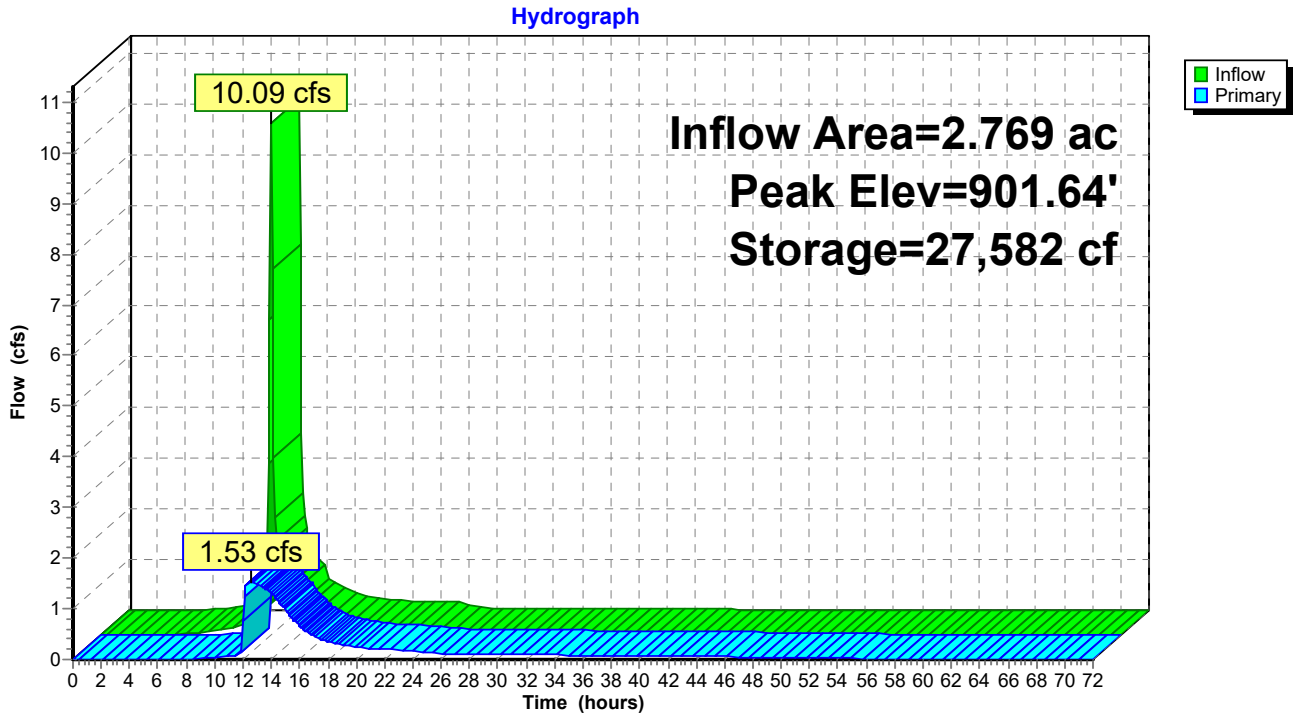
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
895.00	663	142.0	0	0	663
896.00	1,284	167.0	957	957	1,297
897.00	2,006	193.0	1,632	2,588	2,063
898.00	2,872	223.0	2,426	5,014	3,078
899.00	3,815	248.0	3,332	8,347	4,044
900.00	6,800	369.0	5,236	13,583	9,993
901.00	8,959	404.0	7,855	21,437	12,180
902.00	10,875	435.0	9,902	31,339	14,292
903.00	13,066	480.0	11,954	43,293	17,601

Device	Routing	Invert	Outlet Devices
#1	Primary	900.03'	1.00" Vert. WQ ORIFI X 5.00 C= 0.600 Limited to weir flow at low heads
#2	Primary	900.65'	8.00" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	903.00'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

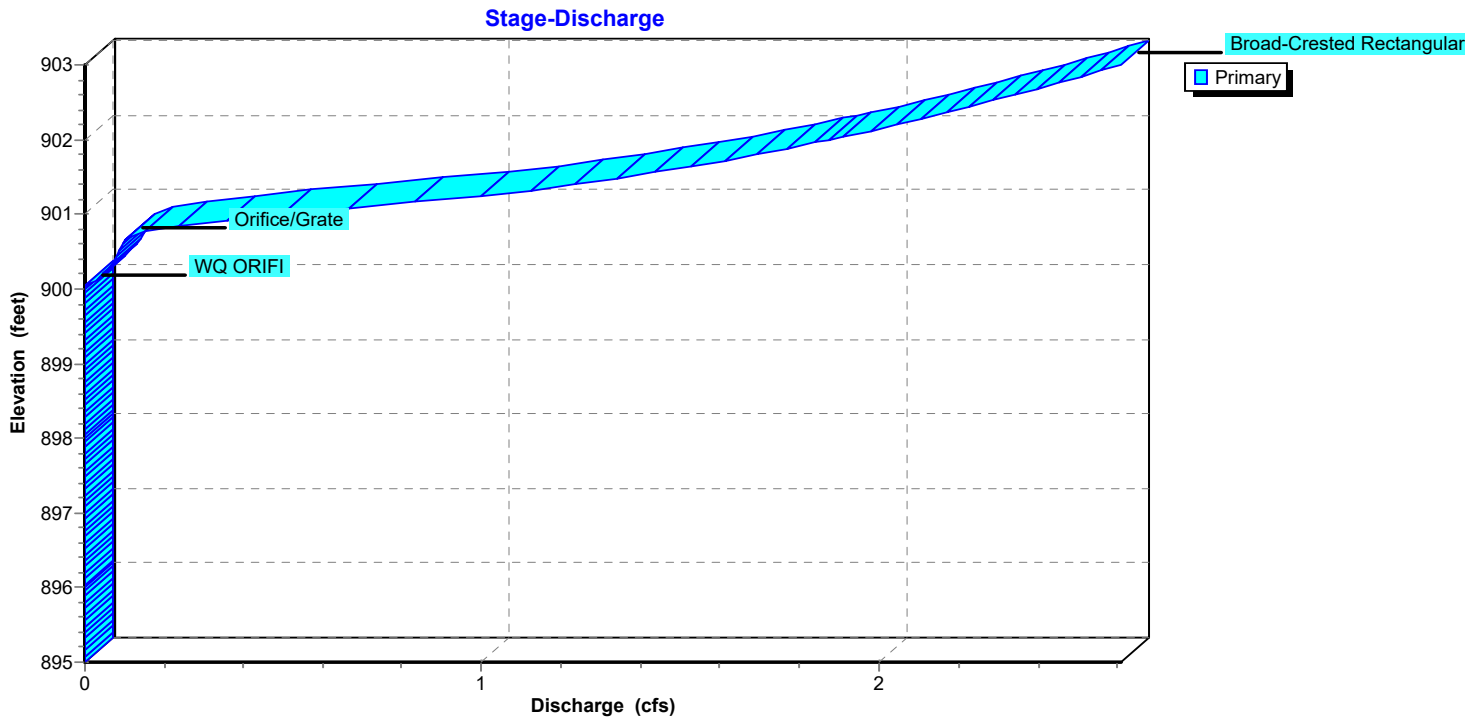
Primary OutFlow Max=1.53 cfs @ 12.55 hrs HW=901.64' (Free Discharge)

- 1=WQ ORIFI (Orifice Controls 0.16 cfs @ 6.03 fps)
- 2=Orifice/Grate (Orifice Controls 1.36 cfs @ 3.91 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

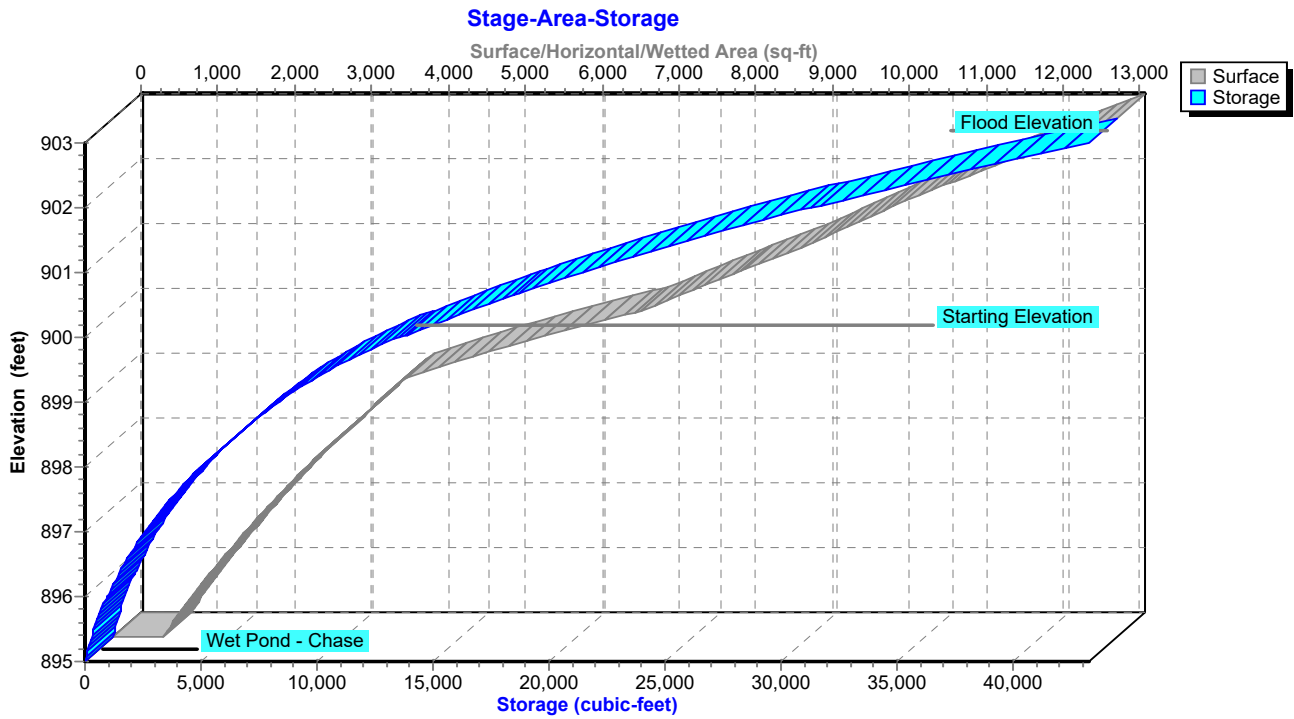
Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Summary for Pond 5P: ADS Stormtech

Inflow Area = 0.740 ac, 83.38% Impervious, Inflow Depth = 4.06" for 25-Year event
 Inflow = 3.99 cfs @ 12.00 hrs, Volume= 0.251 af
 Outflow = 0.57 cfs @ 12.37 hrs, Volume= 0.249 af, Atten= 86%, Lag= 22.2 min
 Primary = 0.57 cfs @ 12.37 hrs, Volume= 0.249 af
 Routed to Pond 2P : Chase Bank Pond after UG detention

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Peak Elev= 903.46' @ 12.37 hrs Surf.Area= 7,952 sf Storage= 5,779 cf

Plug-Flow detention time= 391.0 min calculated for 0.249 af (99% of inflow)
 Center-of-Mass det. time= 389.5 min (1,159.8 - 770.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.38'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.38' / 897.97' S= 0.0139 1/ S Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.55'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600

Limited to weir flow at low heads

#4	Device 1	903.47'	3.0' long Sharp-Crested Rectangular Weir	2 End Contraction(s)
#5	Device 1	903.81'	4.2' long Sharp-Crested Rectangular Weir	2 End Contraction(s)

1.0' Crest Height

Primary OutFlow Max=0.57 cfs @ 12.37 hrs HW=903.46' (Free Discharge)

- 1=Culvert (Passes 0.57 cfs of 6.39 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.10 cfs @ 10.61 fps)
- 3=Orifice/Grate (Orifice Controls 0.48 cfs @ 8.54 fps)
- 4=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)
- 5=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: ADS Stormtech - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

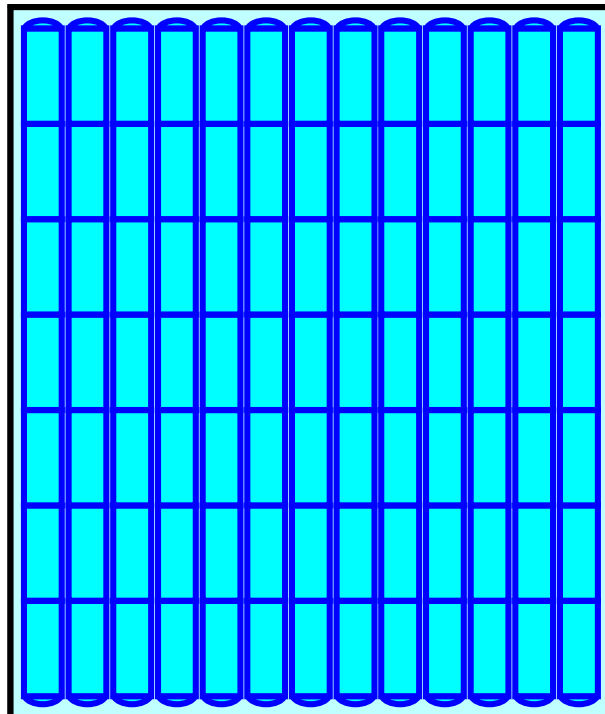
5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers
220.2 cy Field
170.5 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

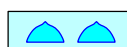
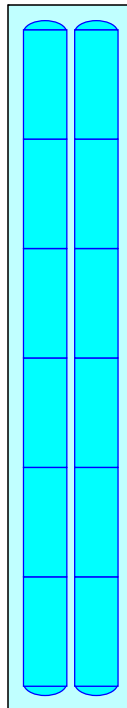
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

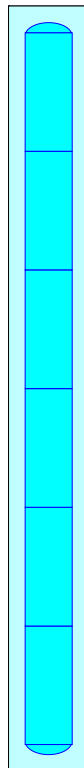
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

6 Chambers

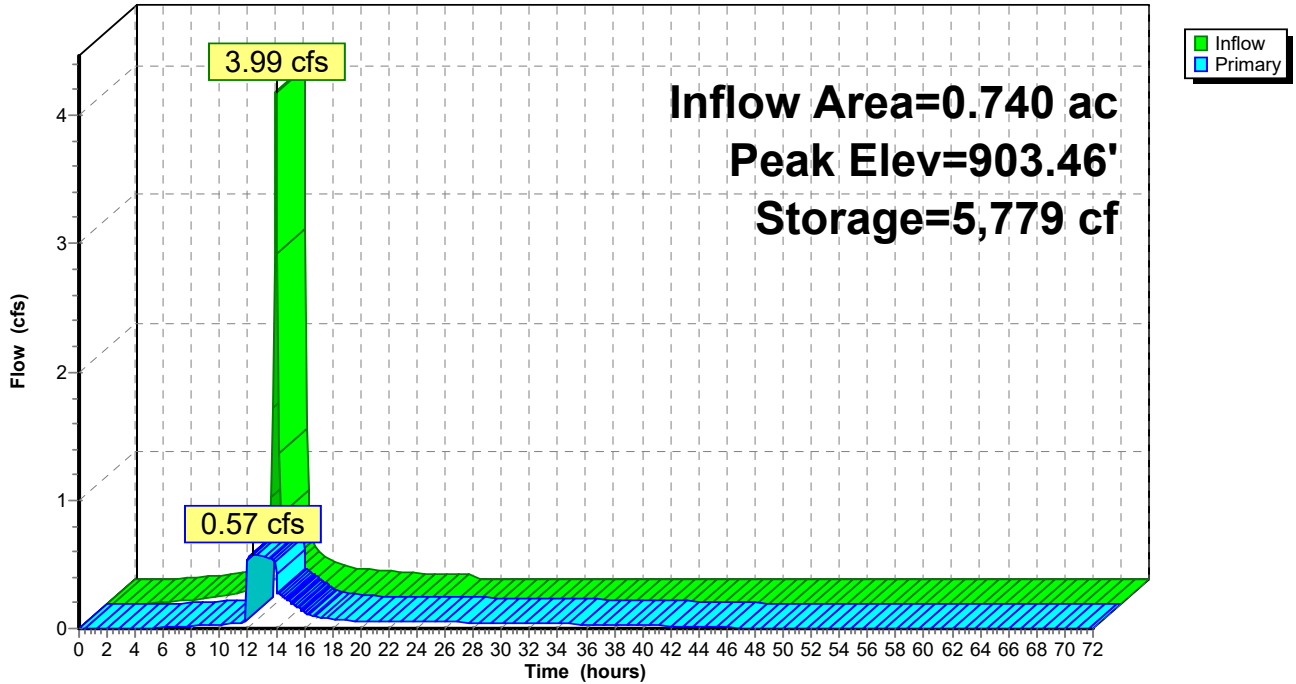
20.6 cy Field

17.3 cy Stone



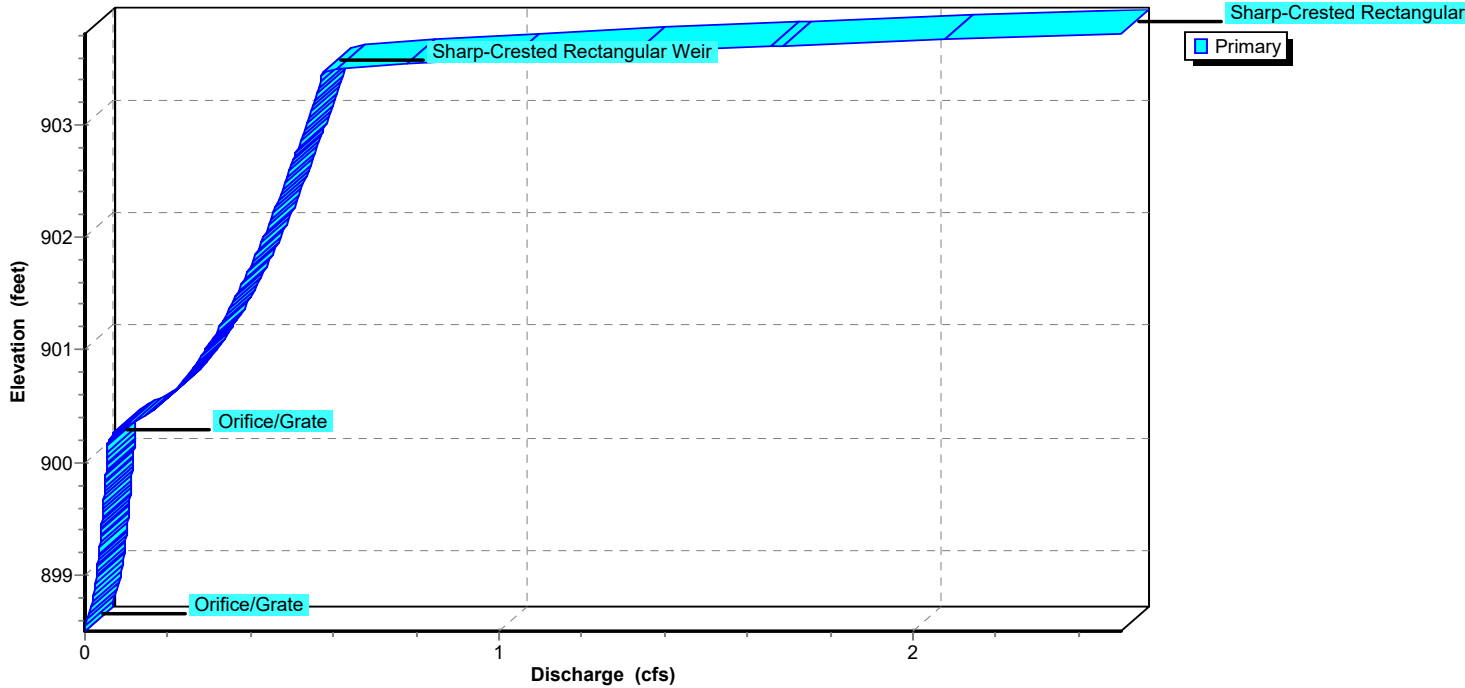
Pond 5P: ADS Stormtech

Hydrograph

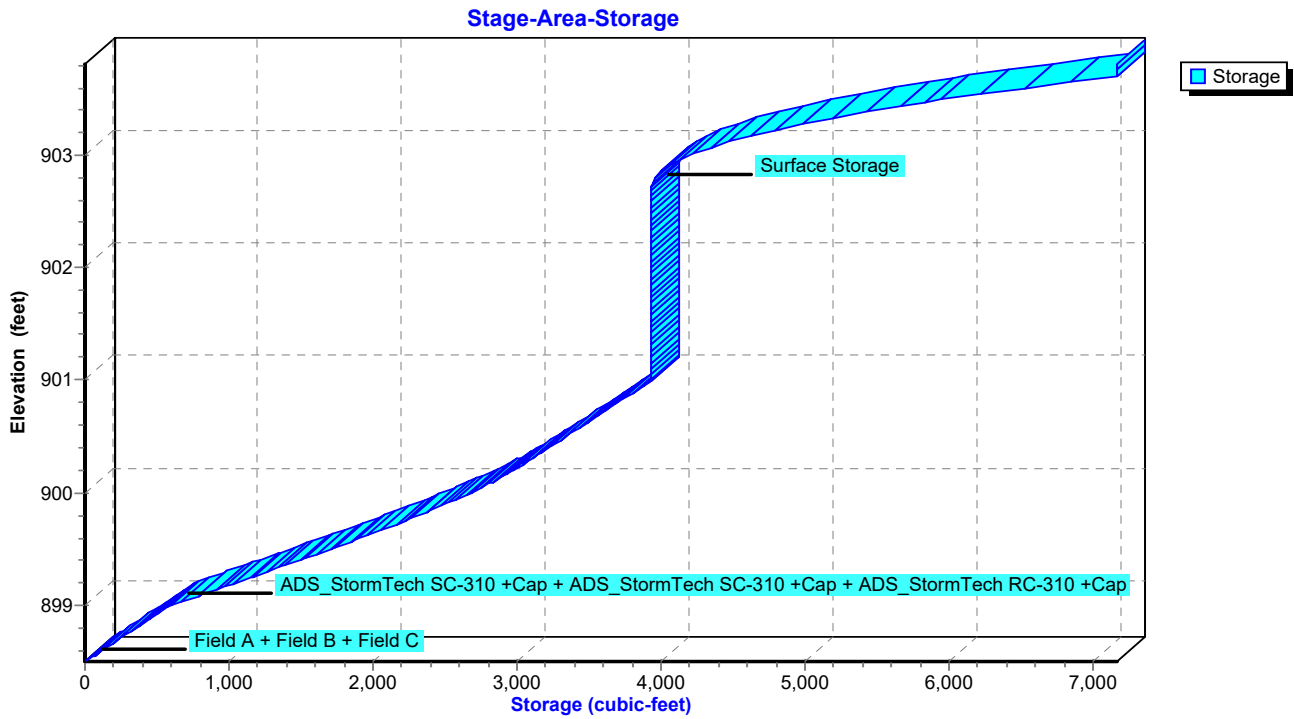


Pond 5P: ADS Stormtech

Stage-Discharge



Pond 5P: ADS Stormtech



Summary for Pond 7P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 2,975 sf Storage= 2,681 cf
 Peak Elev= 900.00' @ 0.00 hrs Surf.Area= 2,975 sf Storage= 2,681 cf

Plug-Flow detention time= (not calculated: no plugs found)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.22'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.22' / 897.97' S= 0.0085 1/ S Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.50'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.05 cfs @ 0.00 hrs HW=900.00' (Free Discharge)

- 1=Culvert (Passes 0.05 cfs of 3.38 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.05 cfs @ 5.79 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)

Pond 7P: WQv Drawdown - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

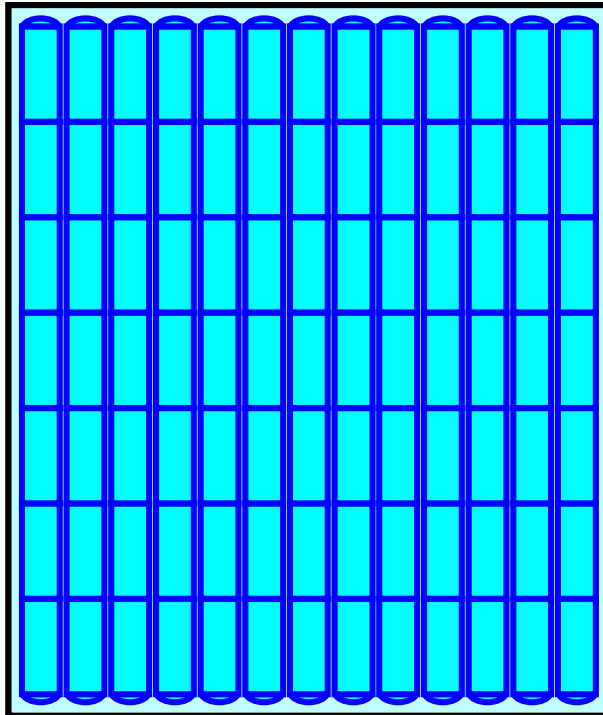
Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers

220.2 cy Field

170.5 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

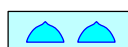
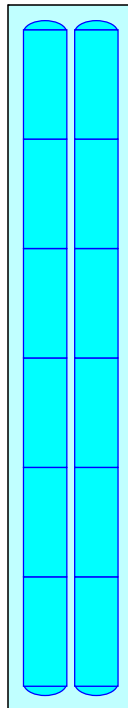
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

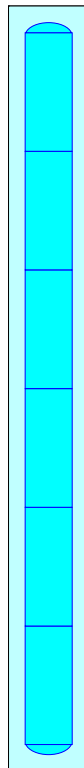
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

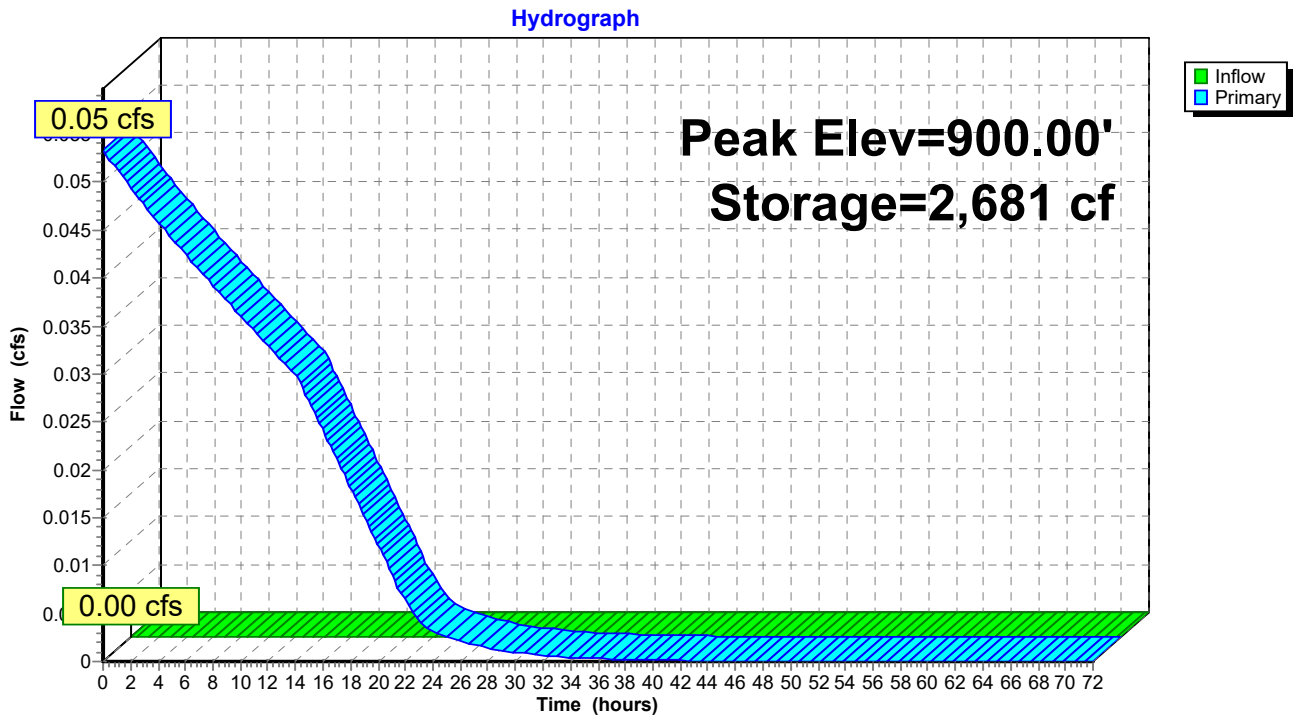
6 Chambers

20.6 cy Field

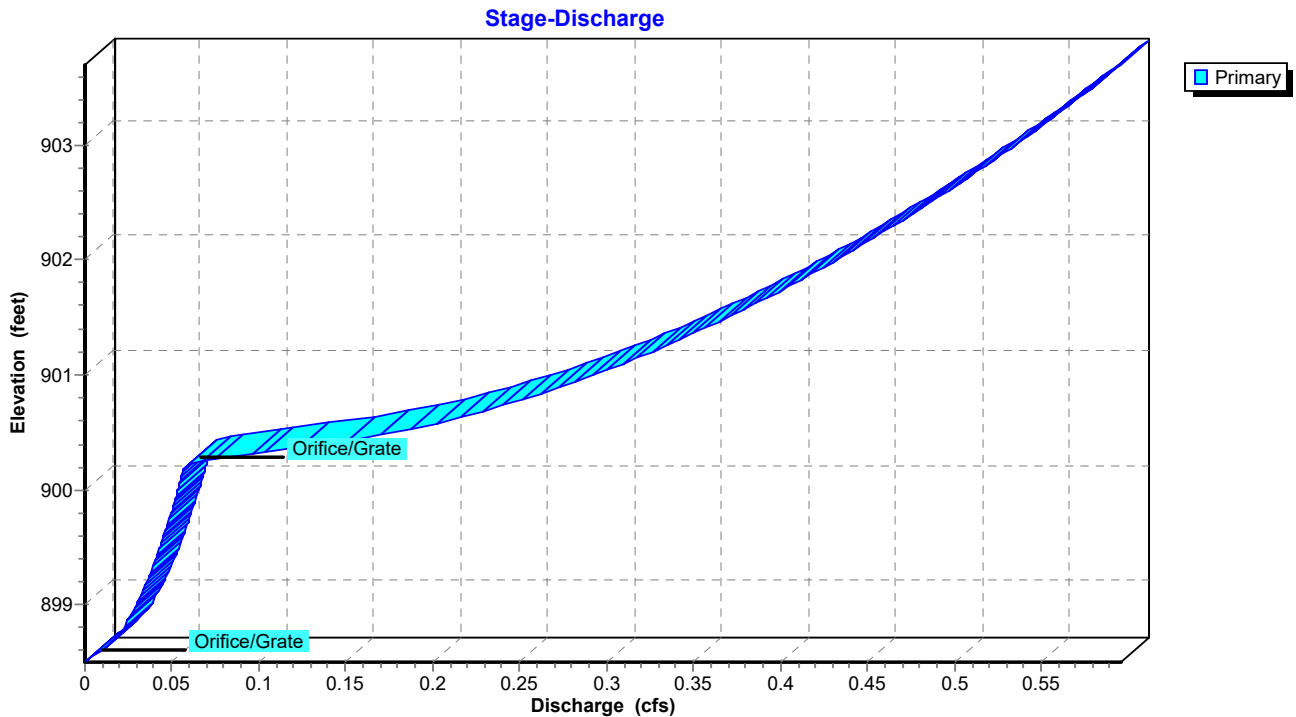
17.3 cy Stone



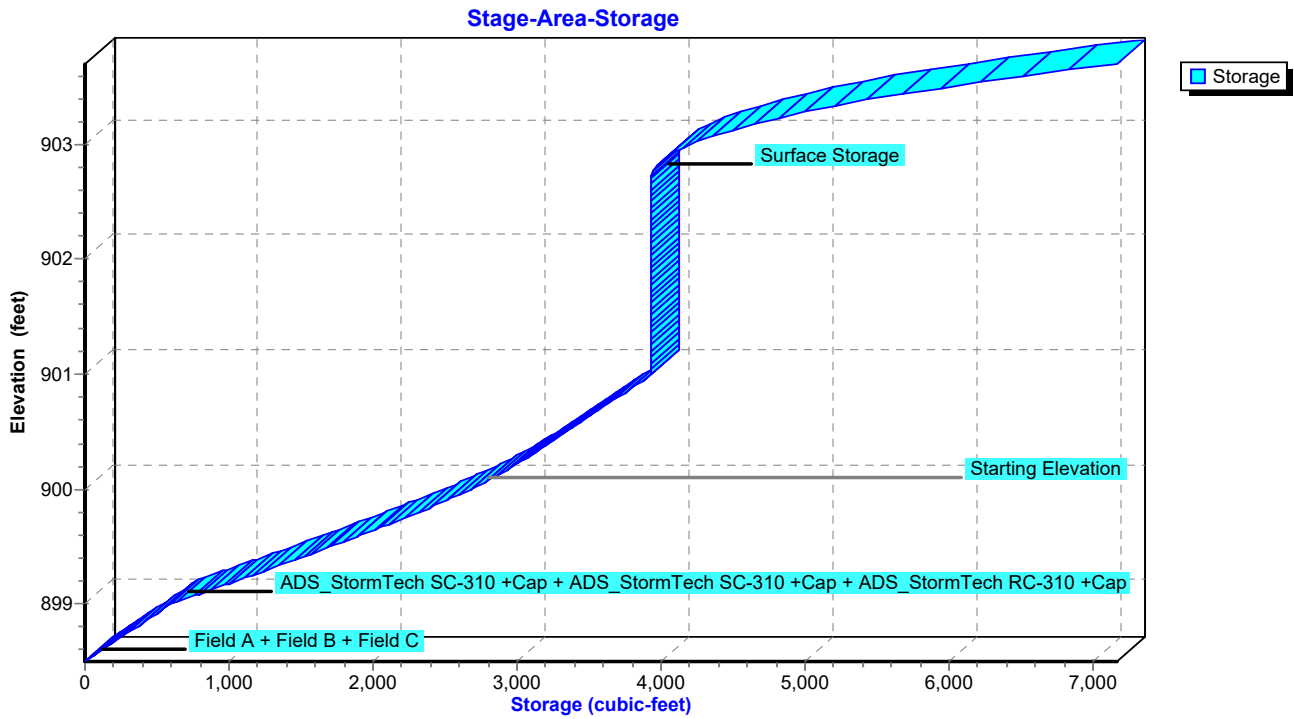
Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Summary for Subcatchment 1Pre: Pre-Developed

Runoff = 12.29 cfs @ 12.01 hrs, Volume= 0.706 af, Depth= 2.99"

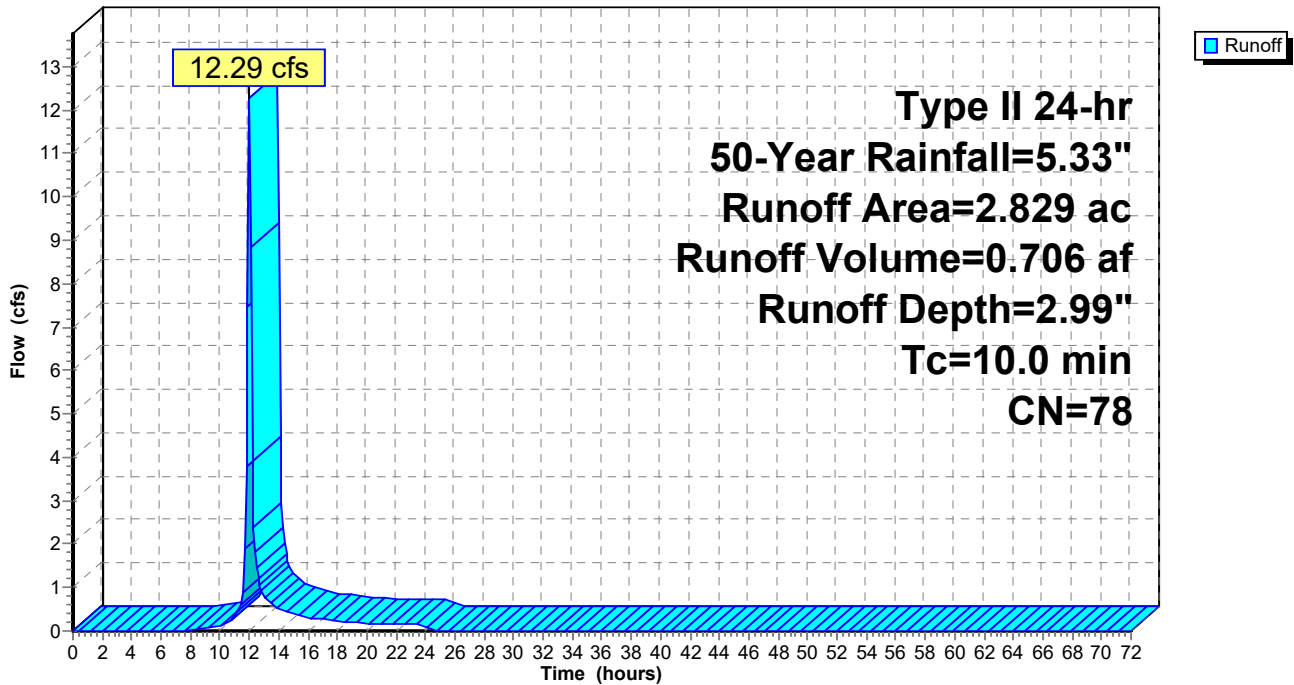
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 50-Year Rainfall=5.33"

Area (ac)	CN	Description
* 2.829	78	Predeveloped Open Area
2.829		100.00% Pervious Area

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

Subcatchment 1Pre: Pre-Developed

Hydrograph



Summary for Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

Runoff = 11.33 cfs @ 12.00 hrs, Volume= 0.673 af, Depth= 3.98"
 Routed to Pond 2P : Chase Bank Pond after UG detention

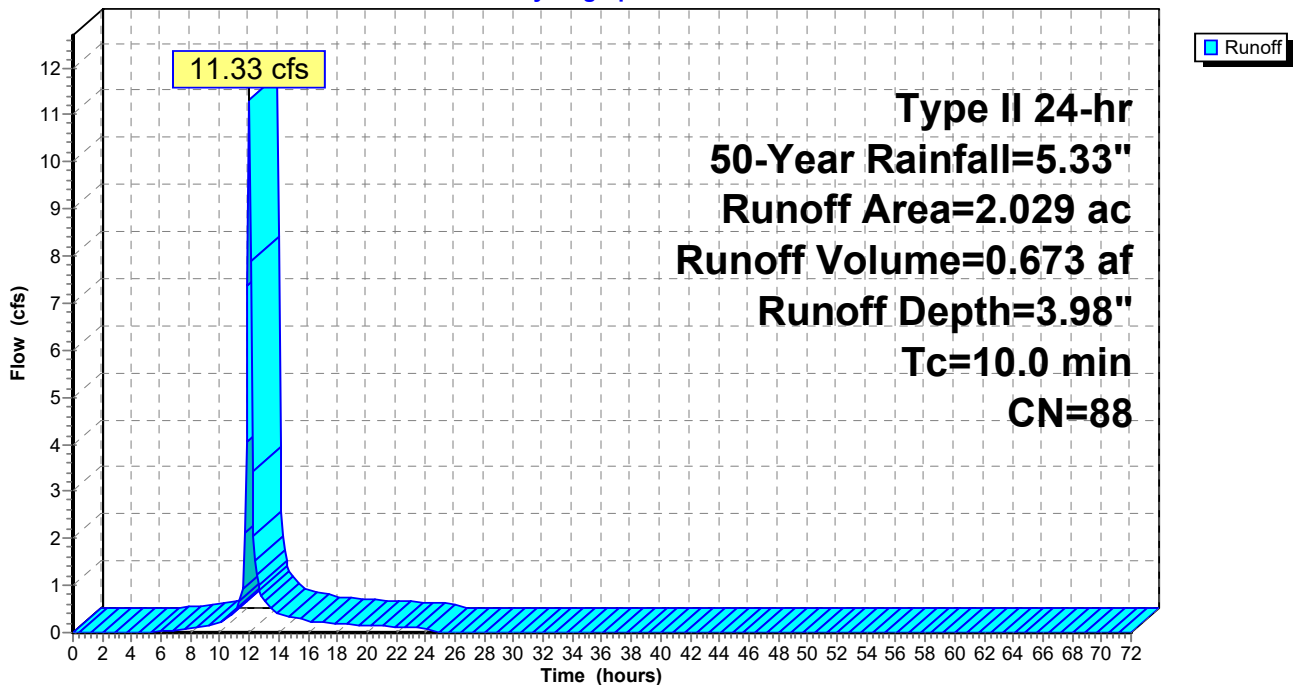
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 50-Year Rainfall=5.33"

Area (ac)	CN	Description
* 0.997	98	Paved/Roof Area
* 0.183	95	Pond Surface Area
* 0.849	74	Lawn/Landscape Area
2.029	88	Weighted Average
1.032		50.86% Pervious Area
0.997		49.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Minimum Assumed Tof C

Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

Hydrograph



Summary for Subcatchment 3S: Predev.Rehab Center

Runoff = 3.84 cfs @ 12.01 hrs, Volume= 0.223 af, Depth= 3.47"

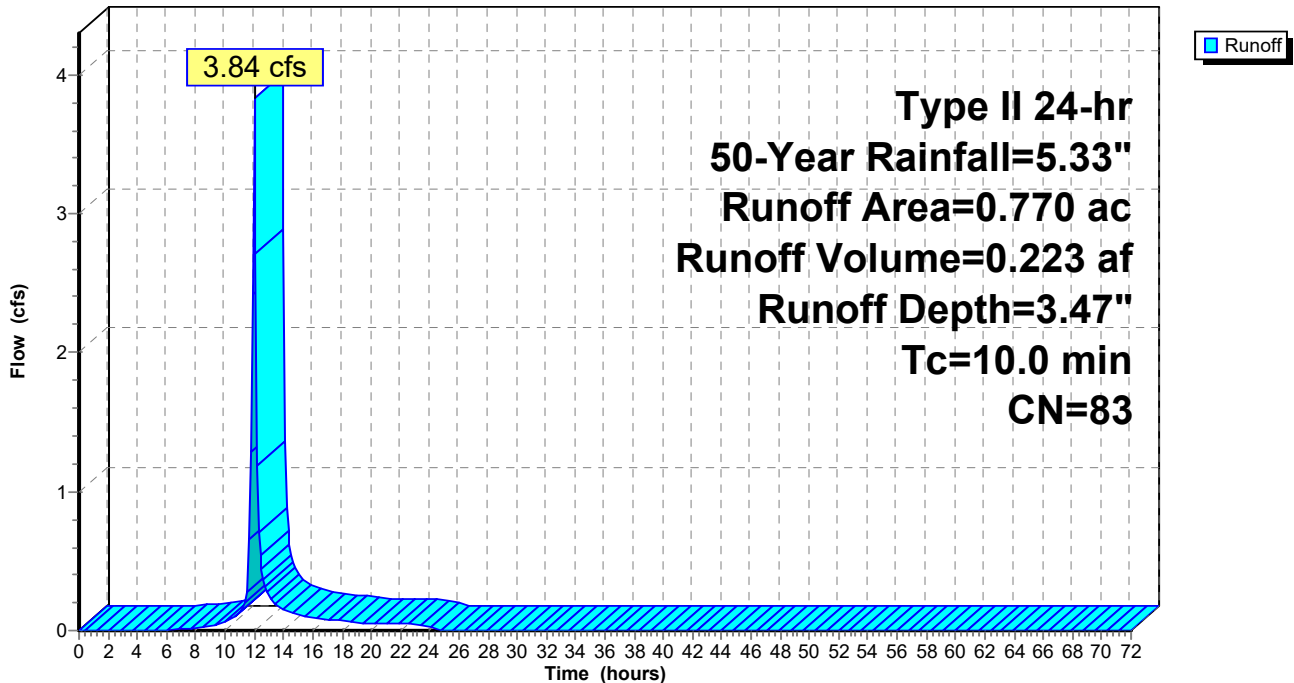
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 50-Year Rainfall=5.33"

Area (ac)	CN	Description
0.110	98	Paved roads w/curbs & sewers, HSG D
0.660	80	>75% Grass cover, Good, HSG D
0.770	83	Weighted Average
0.660		85.71% Pervious Area
0.110		14.29% Impervious Area

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

Subcatchment 3S: Predev.Rehab Center

Hydrograph



Summary for Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Runoff = 4.62 cfs @ 12.00 hrs, Volume= 0.293 af, Depth= 4.75"

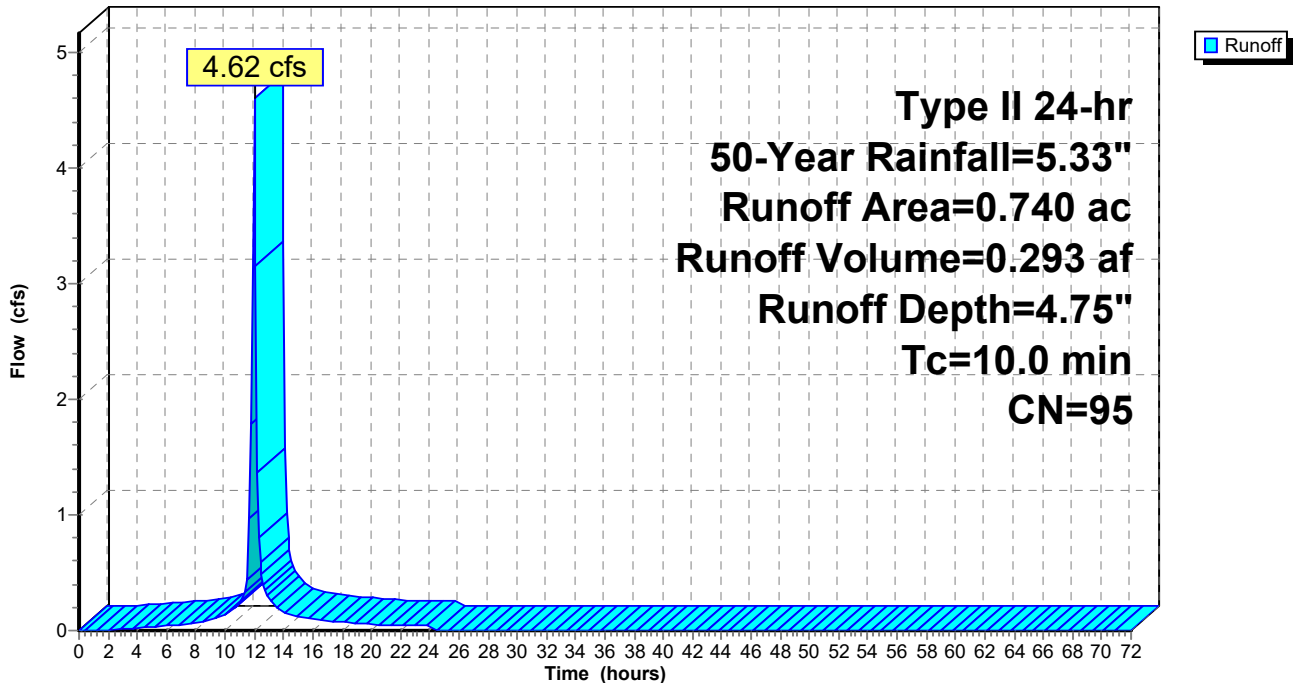
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 50-Year Rainfall=5.33"

Area (ac)	CN	Description
0.601	98	Paved parking, HSG C
0.139	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.139		18.78% Pervious Area
0.601		81.22% Impervious Area

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

Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Hydrograph



Summary for Subcatchment 5S: Un-Detained

Runoff = 1.19 cfs @ 12.00 hrs, Volume= 0.075 af, Depth= 4.75"

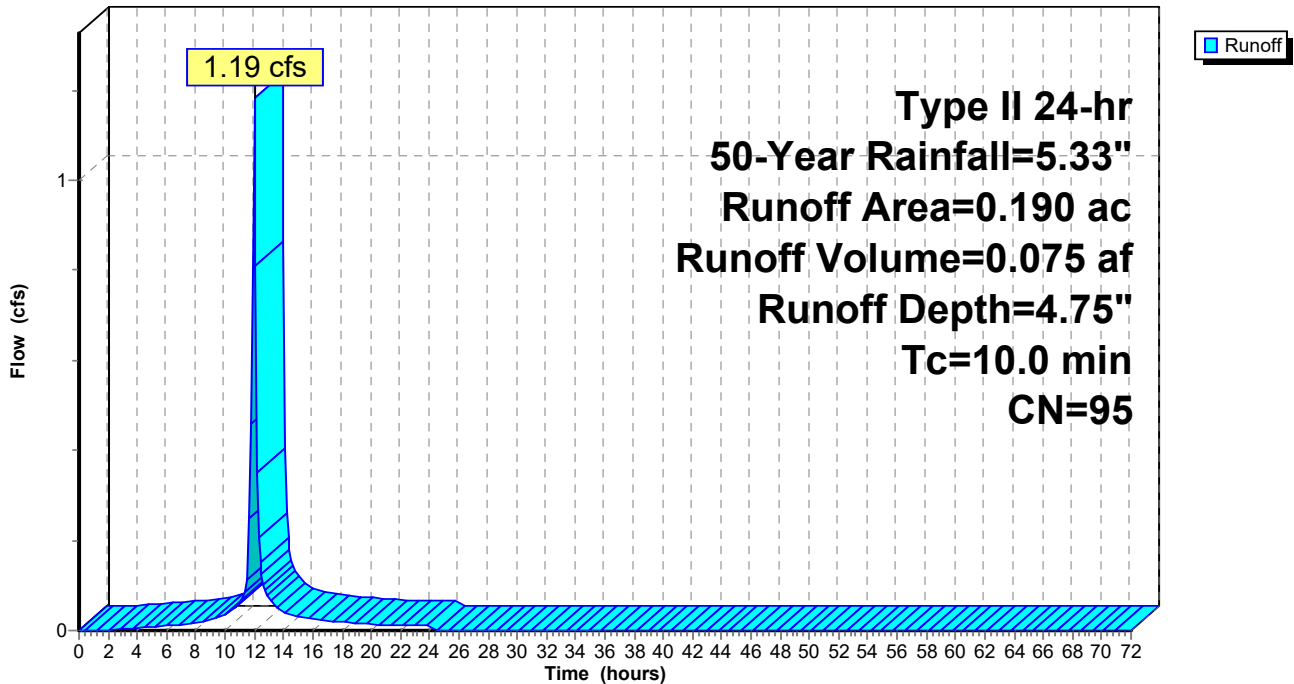
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 50-Year Rainfall=5.33"

Area (ac)	CN	Description
0.190	95	Urban commercial, 85% imp, HSG D
0.028		15.00% Pervious Area
0.161		85.00% Impervious Area

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

Subcatchment 5S: Un-Detained

Hydrograph



Summary for Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION

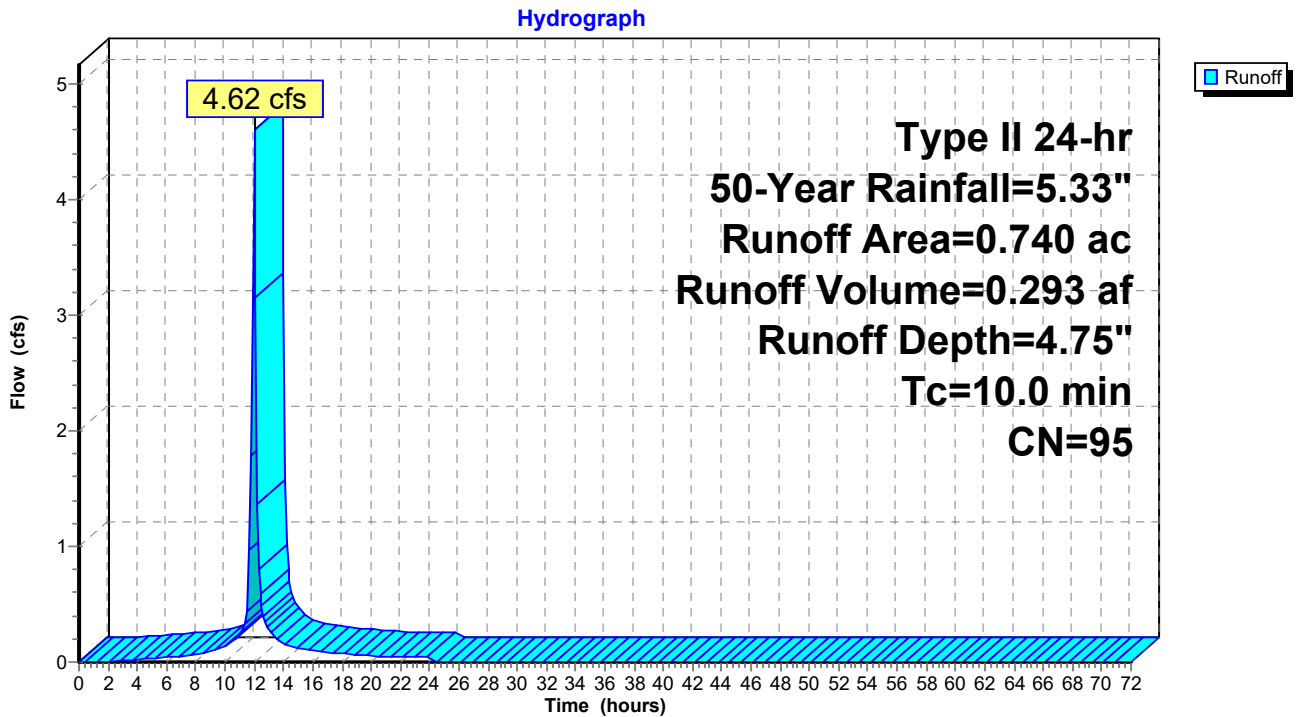
Runoff = 4.62 cfs @ 12.00 hrs, Volume= 0.293 af, Depth= 4.75"
 Routed to Pond 5P : ADS Stormtech

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 50-Year Rainfall=5.33"

Area (ac)	CN	Description
0.617	98	Paved parking, HSG C
0.123	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.123		16.62% Pervious Area
0.617		83.38% Impervious Area

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

Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION



Summary for Pond 2P: Chase Bank Pond after UG detention

Inflow Area = 2.769 ac, 58.29% Impervious, Inflow Depth = 4.18" for 50-Year event
 Inflow = 11.90 cfs @ 12.01 hrs, Volume= 0.965 af
 Outflow = 1.83 cfs @ 12.59 hrs, Volume= 0.958 af, Atten= 85%, Lag= 34.9 min
 Primary = 1.83 cfs @ 12.59 hrs, Volume= 0.958 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 6,800 sf Storage= 13,583 cf
 Peak Elev= 901.95' @ 12.59 hrs Surf.Area= 10,771 sf Storage= 30,775 cf (17,193 cf above start)
 Flood Elev= 903.00' Surf.Area= 13,066 sf Storage= 43,293 cf (29,710 cf above start)

Plug-Flow detention time= 675.1 min calculated for 0.646 af (67% of inflow)
 Center-of-Mass det. time= 294.1 min (1,188.5 - 894.4)

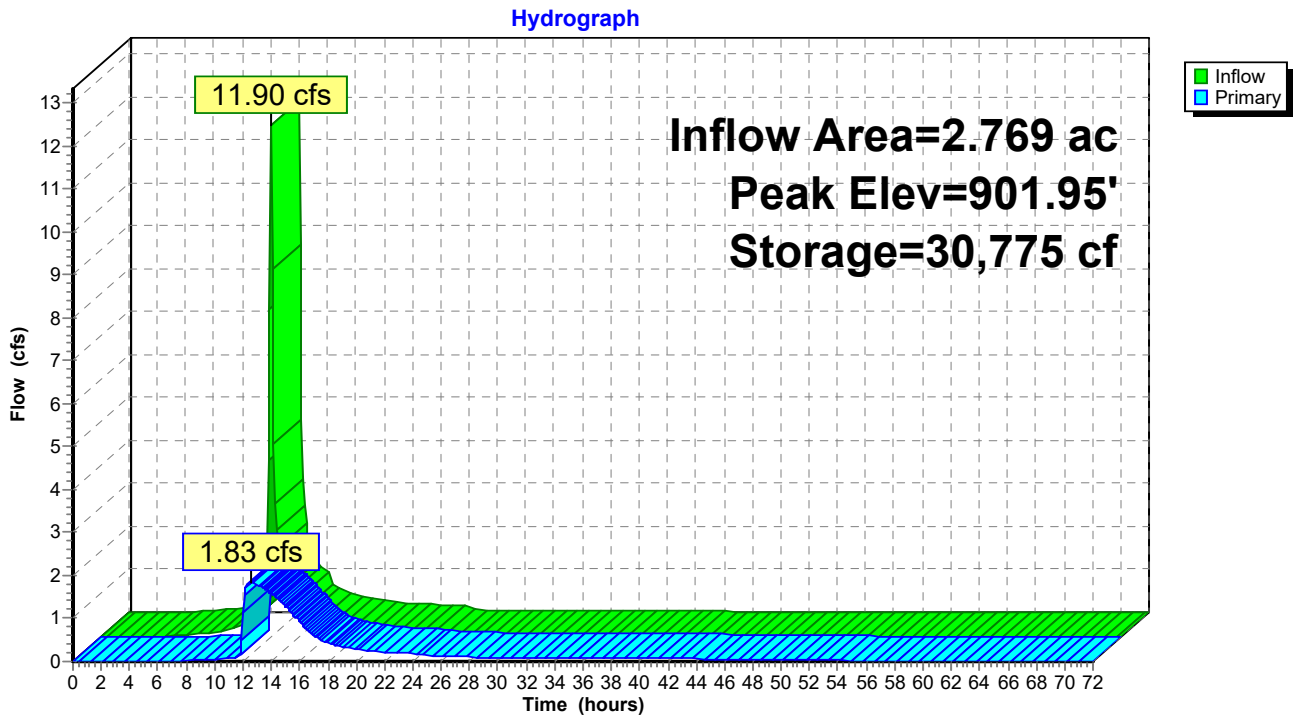
Volume	Invert	Avail.Storage	Storage Description		
#1	895.00'	43,293 cf	Wet Pond - Chase (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
895.00	663	142.0	0	0	663
896.00	1,284	167.0	957	957	1,297
897.00	2,006	193.0	1,632	2,588	2,063
898.00	2,872	223.0	2,426	5,014	3,078
899.00	3,815	248.0	3,332	8,347	4,044
900.00	6,800	369.0	5,236	13,583	9,993
901.00	8,959	404.0	7,855	21,437	12,180
902.00	10,875	435.0	9,902	31,339	14,292
903.00	13,066	480.0	11,954	43,293	17,601

Device	Routing	Invert	Outlet Devices
#1	Primary	900.03'	1.00" Vert. WQ ORIFI X 5.00 C= 0.600 Limited to weir flow at low heads
#2	Primary	900.65'	8.00" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	903.00'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

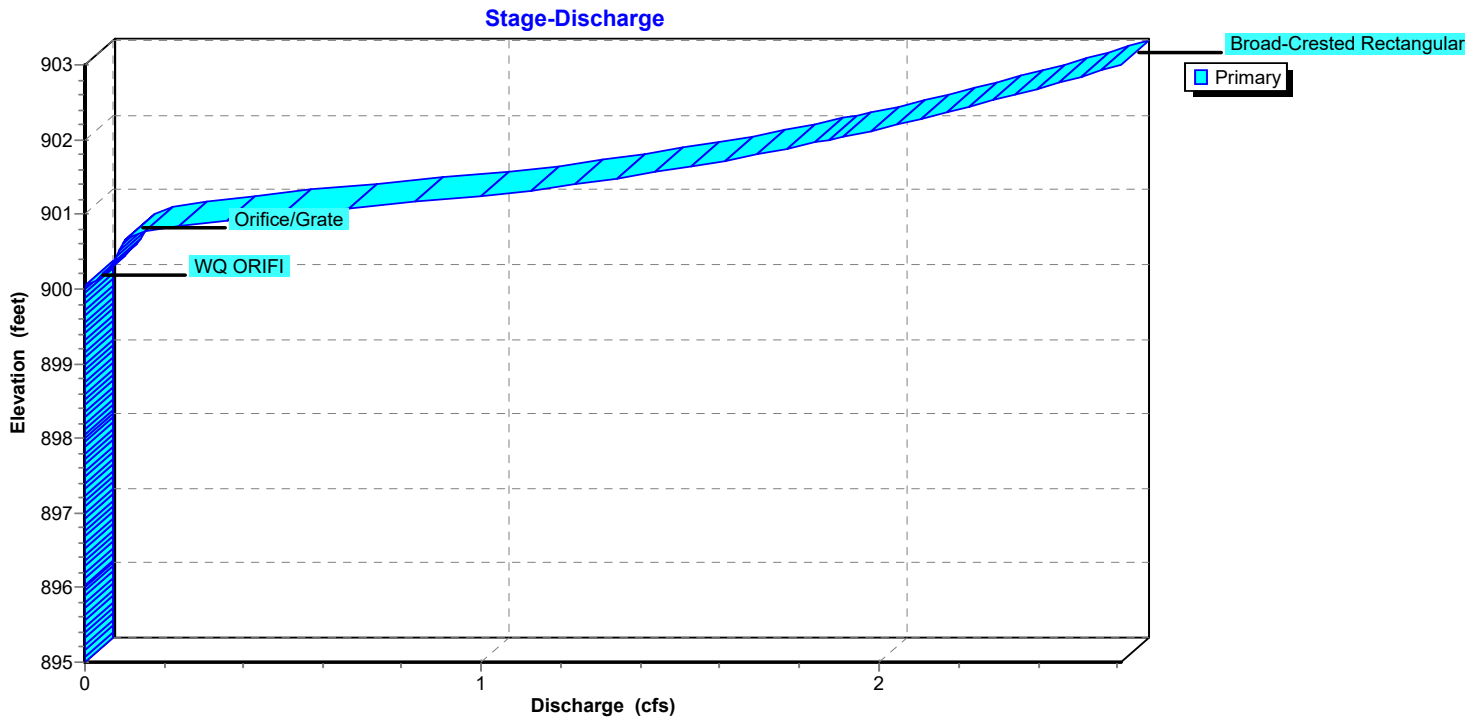
Primary OutFlow Max=1.83 cfs @ 12.59 hrs HW=901.95' (Free Discharge)

- 1=WQ ORIFI (Orifice Controls 0.18 cfs @ 6.59 fps)
- 2=Orifice/Grate (Orifice Controls 1.65 cfs @ 4.73 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

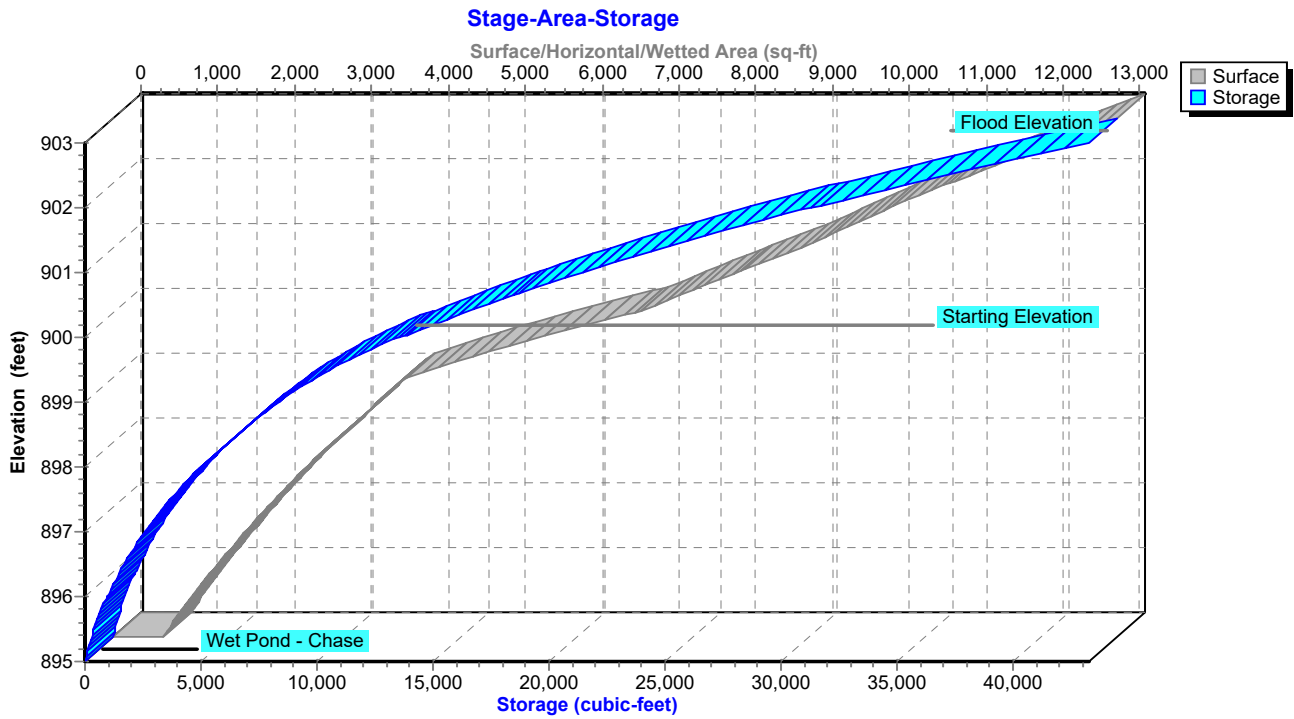
Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Summary for Pond 5P: ADS Stormtech

Inflow Area = 0.740 ac, 83.38% Impervious, Inflow Depth = 4.75" for 50-Year event
 Inflow = 4.62 cfs @ 12.00 hrs, Volume= 0.293 af
 Outflow = 1.06 cfs @ 12.26 hrs, Volume= 0.291 af, Atten= 77%, Lag= 15.6 min
 Primary = 1.06 cfs @ 12.26 hrs, Volume= 0.291 af
 Routed to Pond 2P : Chase Bank Pond after UG detention

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Peak Elev= 903.60' @ 12.26 hrs Surf.Area= 8,920 sf Storage= 6,565 cf

Plug-Flow detention time= 358.7 min calculated for 0.291 af (100% of inflow)
 Center-of-Mass det. time= 355.0 min (1,121.6 - 766.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.38'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.38' / 897.97' S= 0.0139 1/ S Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.55'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600

Limited to weir flow at low heads

#4	Device 1	903.47'	3.0' long Sharp-Crested Rectangular Weir	2 End Contraction(s)
#5	Device 1	903.81'	4.2' long Sharp-Crested Rectangular Weir	2 End Contraction(s)

1.0' Crest Height

Primary OutFlow Max=1.05 cfs @ 12.26 hrs HW=903.60' (Free Discharge)

- 1=Culvert (Passes 1.05 cfs of 6.49 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.10 cfs @ 10.76 fps)
- 3=Orifice/Grate (Orifice Controls 0.49 cfs @ 8.73 fps)
- 4=Sharp-Crested Rectangular Weir (Weir Controls 0.46 cfs @ 1.18 fps)
- 5=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: ADS Stormtech - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04'

Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

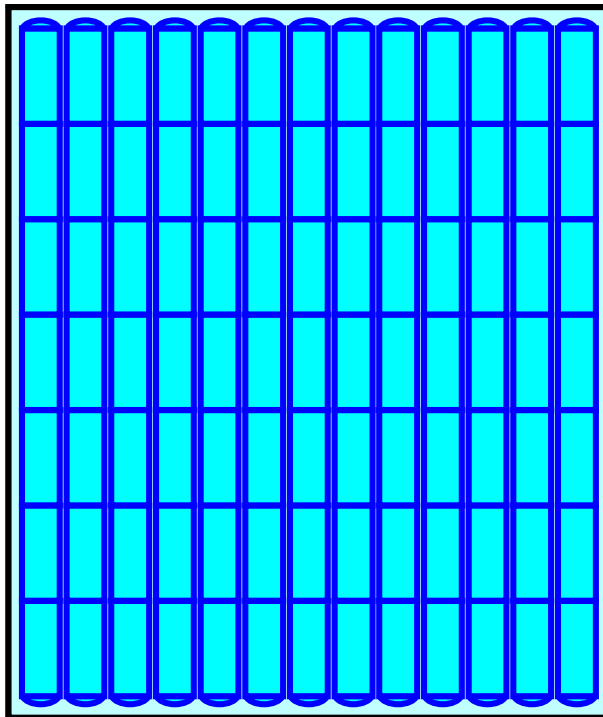
Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers

220.2 cy Field

170.5 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

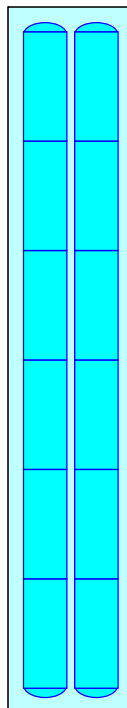
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

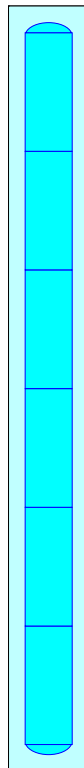
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

6 Chambers

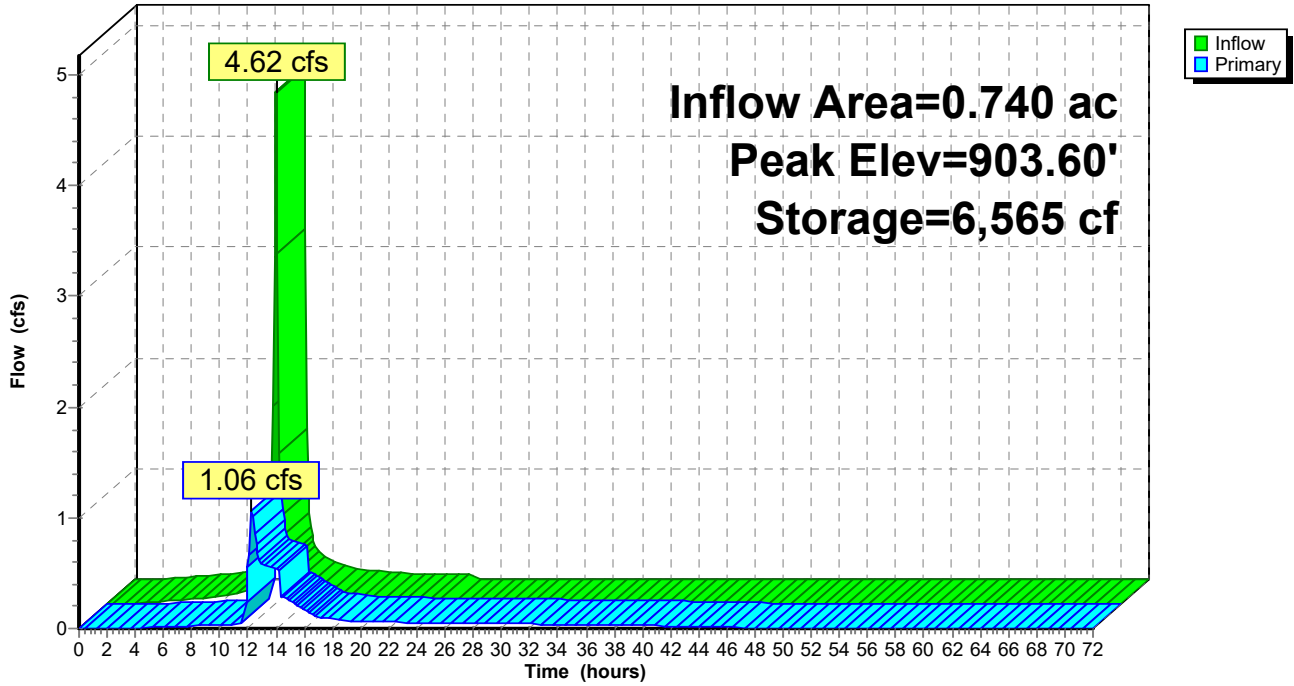
20.6 cy Field

17.3 cy Stone



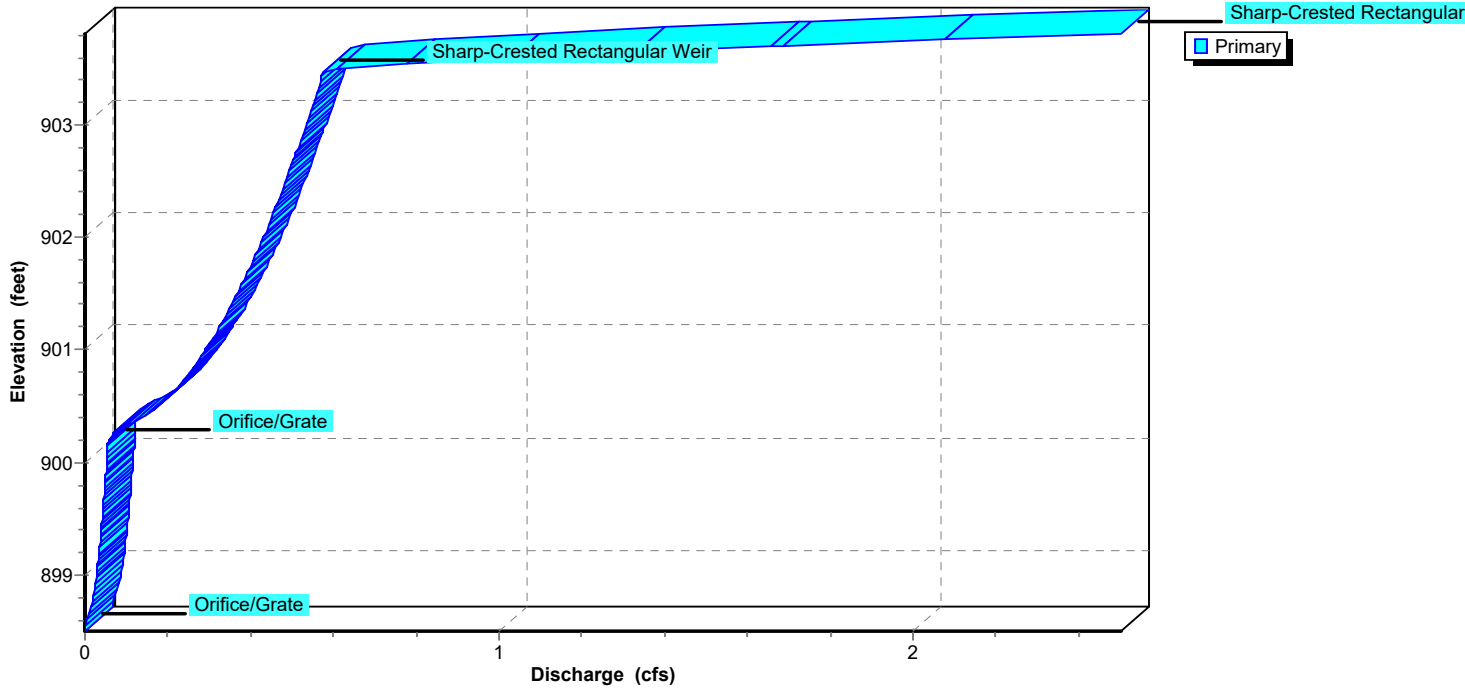
Pond 5P: ADS Stormtech

Hydrograph

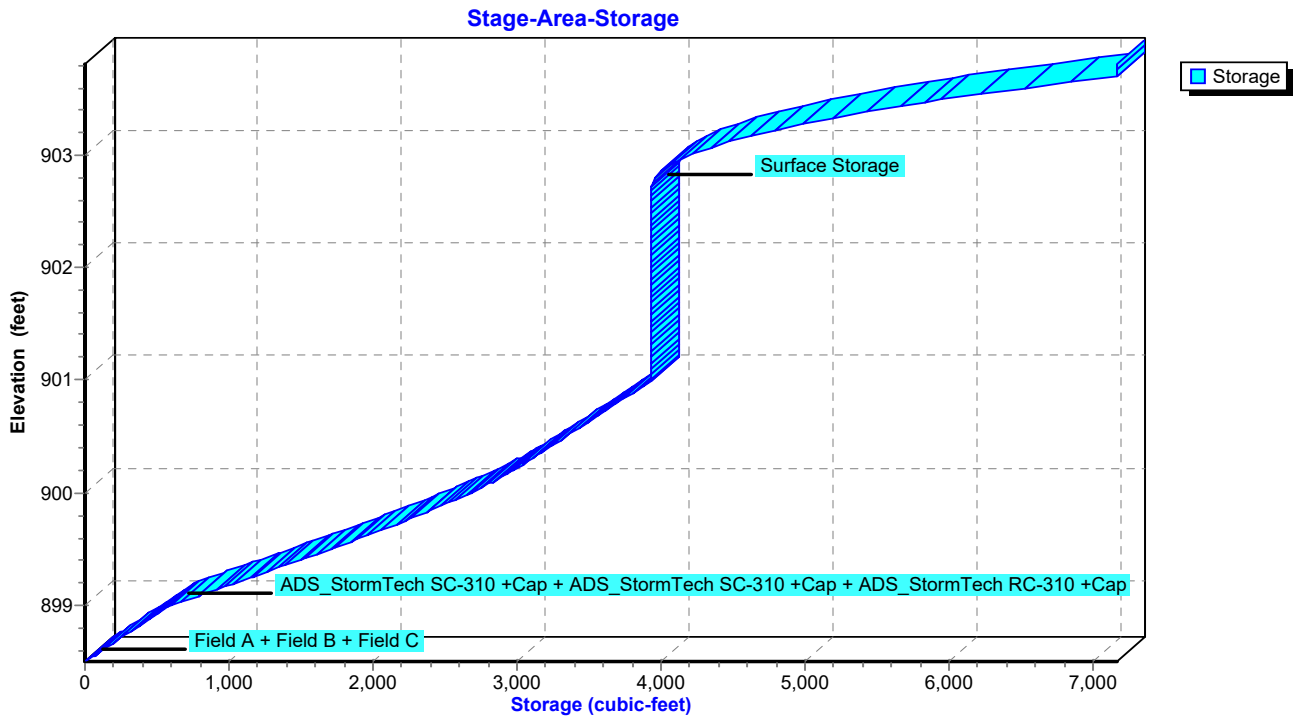


Pond 5P: ADS Stormtech

Stage-Discharge



Pond 5P: ADS Stormtech



Summary for Pond 7P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 2,975 sf Storage= 2,681 cf
 Peak Elev= 900.00' @ 0.00 hrs Surf.Area= 2,975 sf Storage= 2,681 cf

Plug-Flow detention time= (not calculated: no plugs found)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.22'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.22' / 897.97' S= 0.0085 '/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.50'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.05 cfs @ 0.00 hrs HW=900.00' (Free Discharge)

- 1=Culvert (Passes 0.05 cfs of 3.38 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.05 cfs @ 5.79 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)

Pond 7P: WQv Drawdown - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

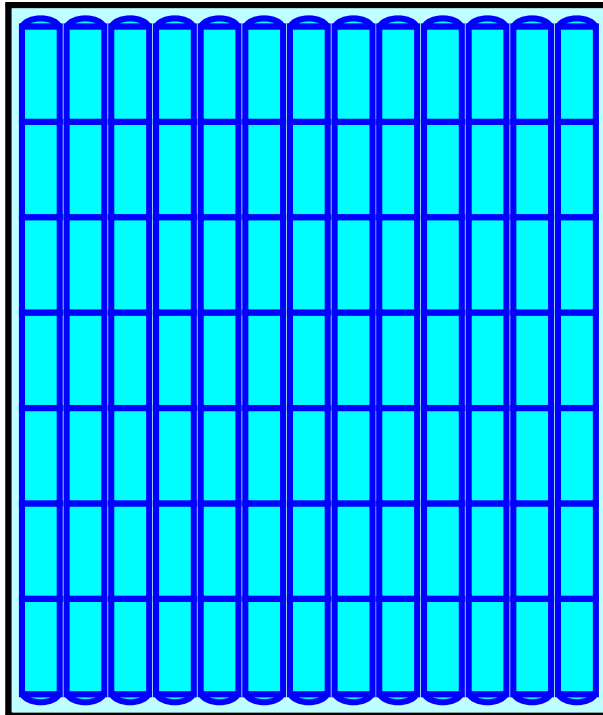
5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers
220.2 cy Field
170.5 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

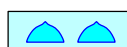
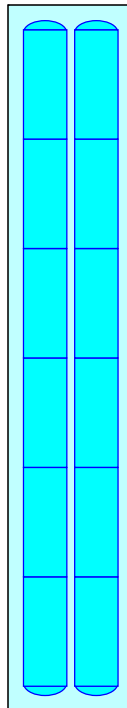
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

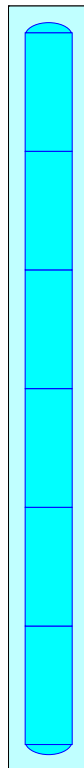
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

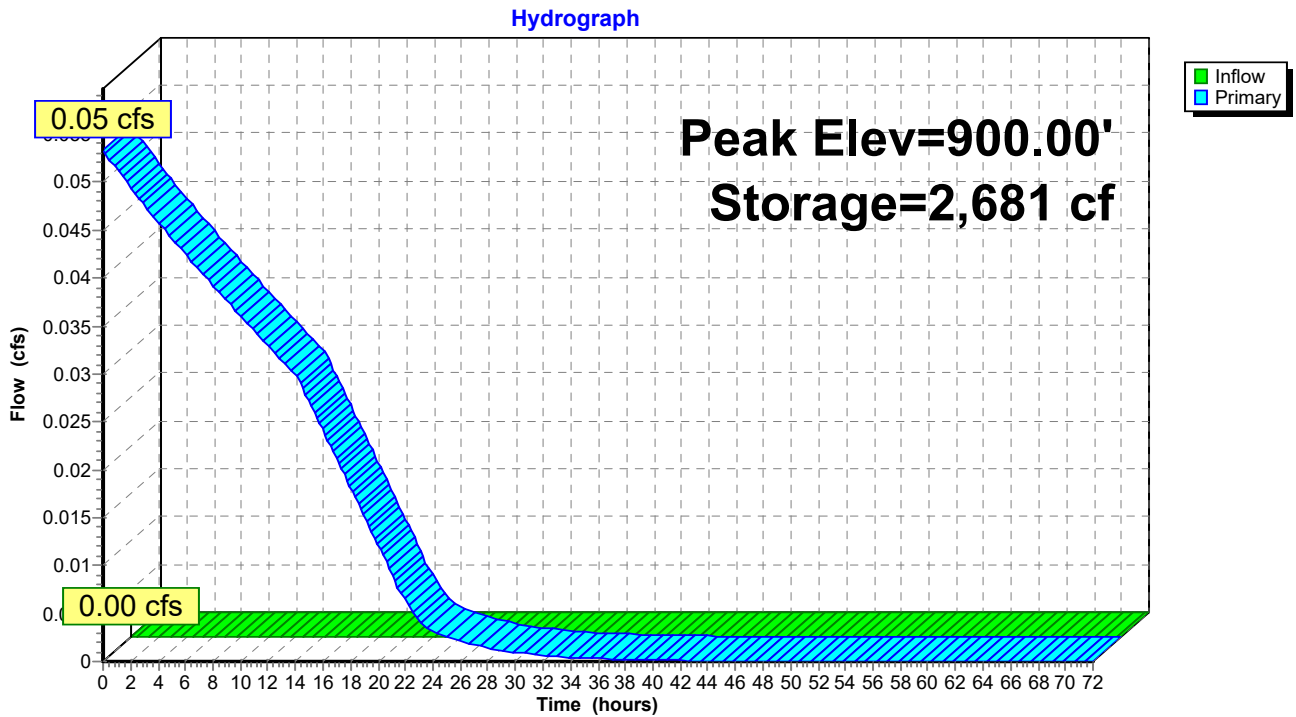
6 Chambers

20.6 cy Field

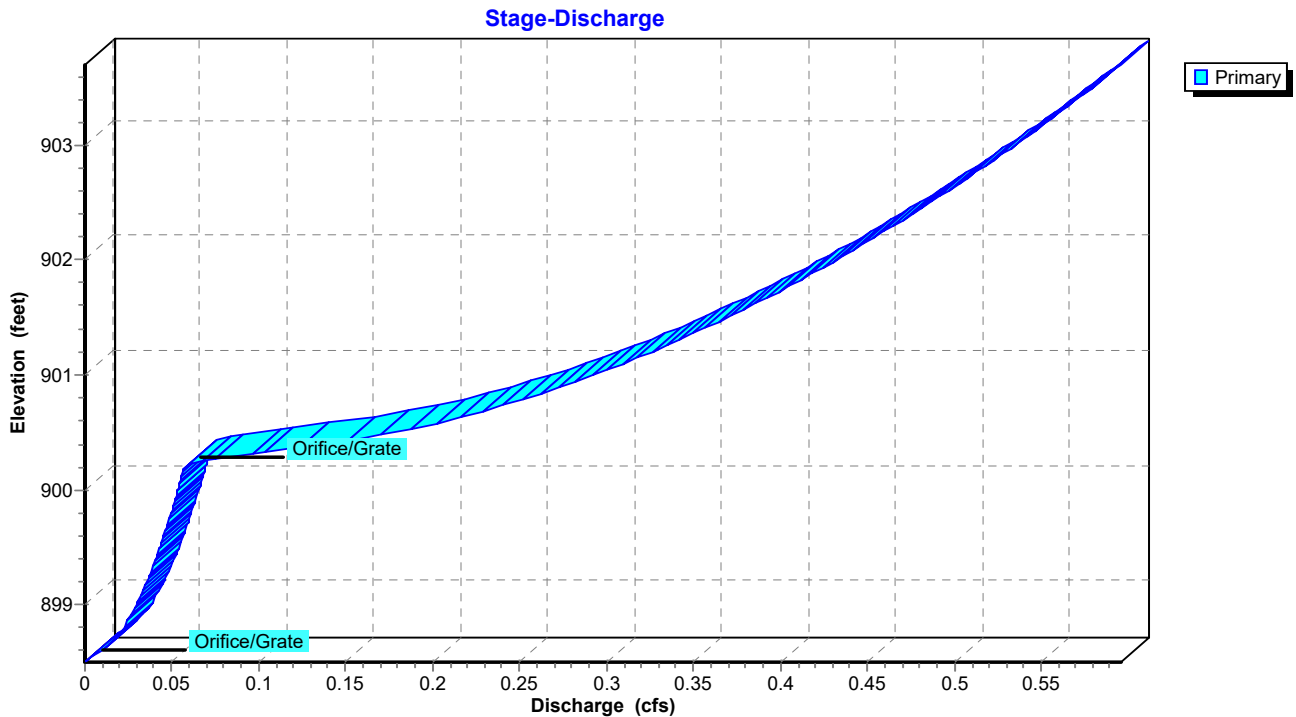
17.3 cy Stone



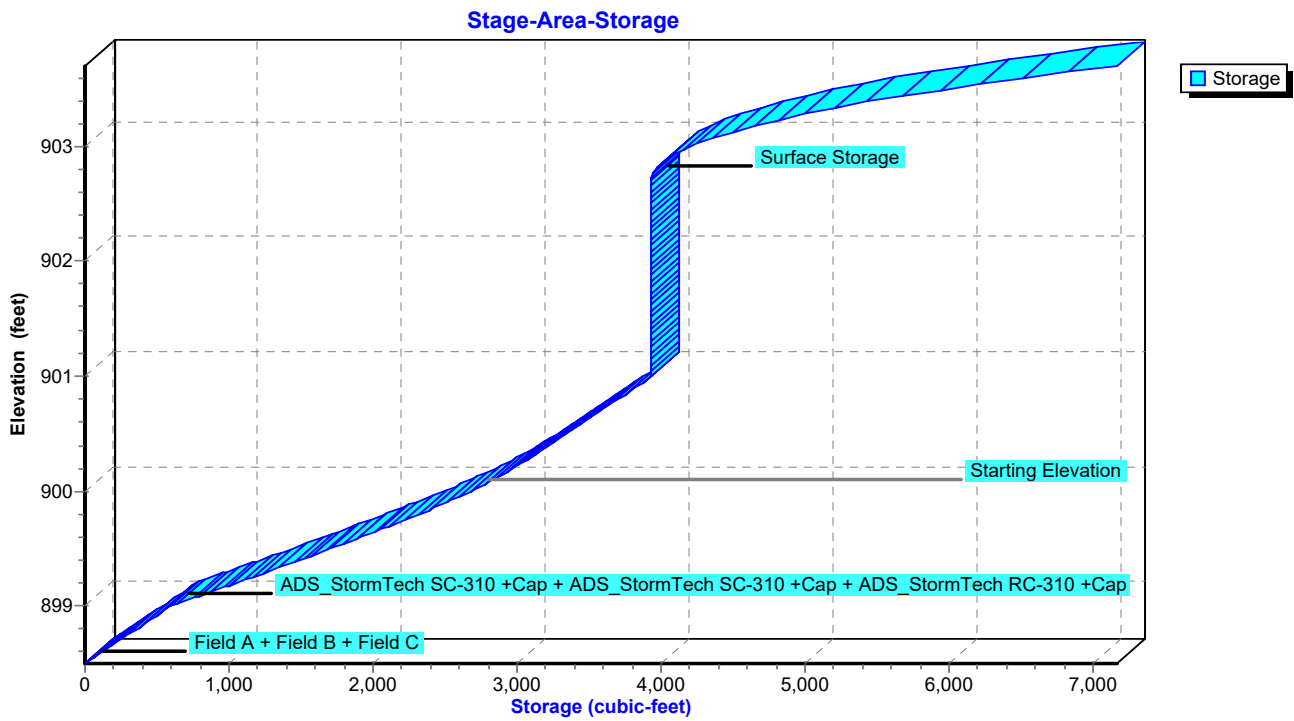
Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Summary for Subcatchment 1Pre: Pre-Developed

Runoff = 14.86 cfs @ 12.01 hrs, Volume= 0.856 af, Depth= 3.63"

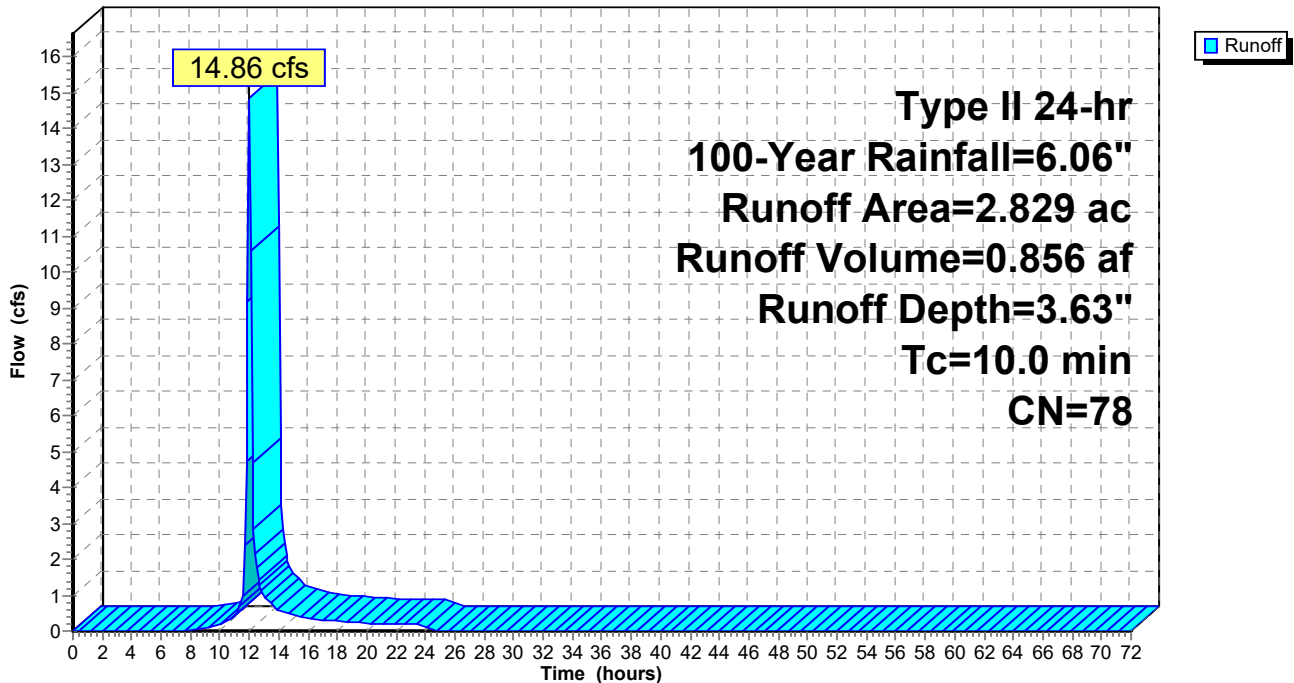
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 100-Year Rainfall=6.06"

Area (ac)	CN	Description
* 2.829	78	Predeveloped Open Area
2.829		100.00% Pervious Area

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

Subcatchment 1Pre: Pre-Developed

Hydrograph



Summary for Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

Runoff = 13.21 cfs @ 12.00 hrs, Volume= 0.792 af, Depth= 4.68"
 Routed to Pond 2P : Chase Bank Pond after UG detention

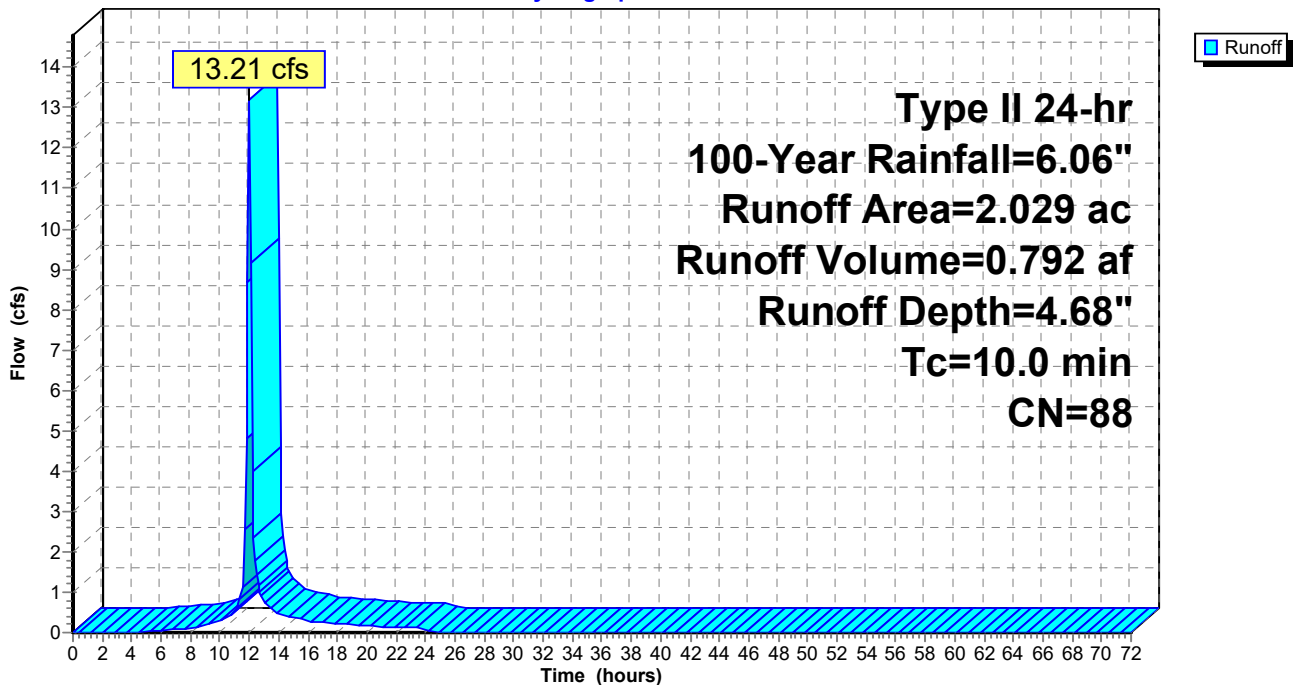
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 100-Year Rainfall=6.06"

Area (ac)	CN	Description
* 0.997	98	Paved/Roof Area
* 0.183	95	Pond Surface Area
* 0.849	74	Lawn/Landscape Area
2.029	88	Weighted Average
1.032		50.86% Pervious Area
0.997		49.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Minimum Assumed ToF C

Subcatchment 1S: 2.029 Ac. trib. to ex. Chase pond

Hydrograph



Summary for Subcatchment 3S: Predev.Rehab Center

Runoff = 4.55 cfs @ 12.00 hrs, Volume= 0.266 af, Depth= 4.15"

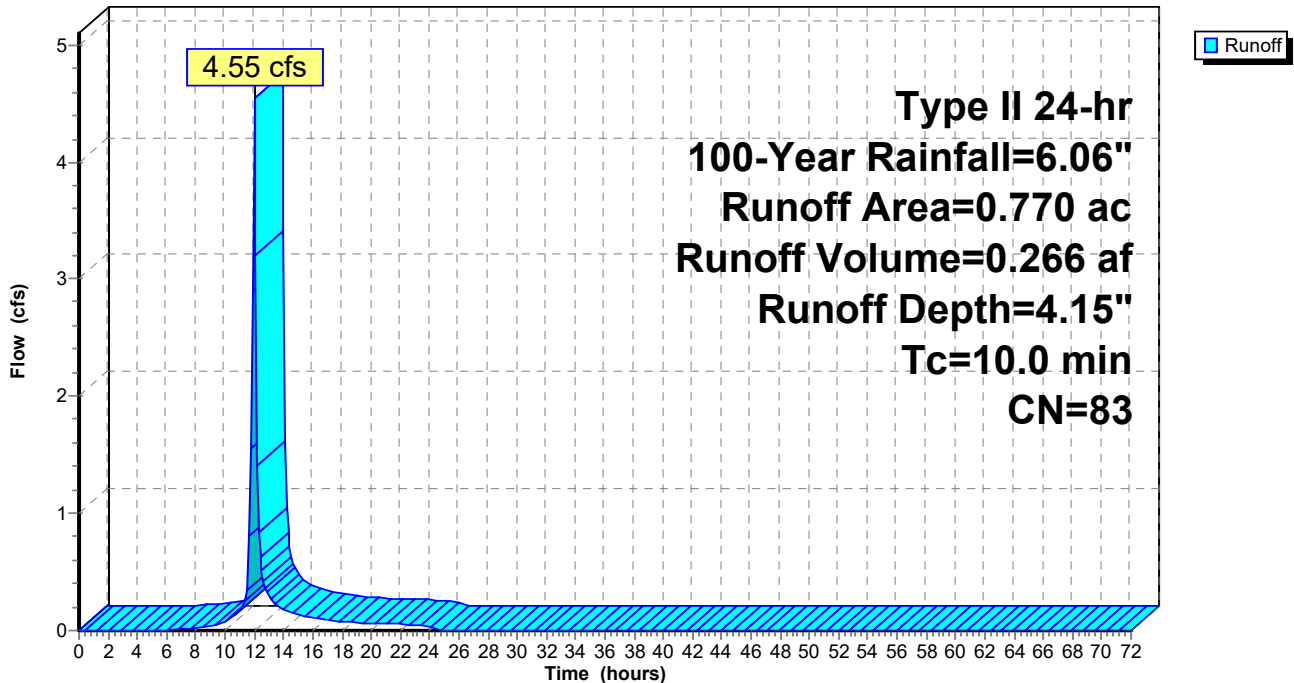
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 100-Year Rainfall=6.06"

Area (ac)	CN	Description
0.110	98	Paved roads w/curbs & sewers, HSG D
0.660	80	>75% Grass cover, Good, HSG D
0.770	83	Weighted Average
0.660		85.71% Pervious Area
0.110		14.29% Impervious Area

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

Subcatchment 3S: Predev.Rehab Center

Hydrograph



Summary for Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Runoff = 5.28 cfs @ 12.00 hrs, Volume= 0.337 af, Depth= 5.47"

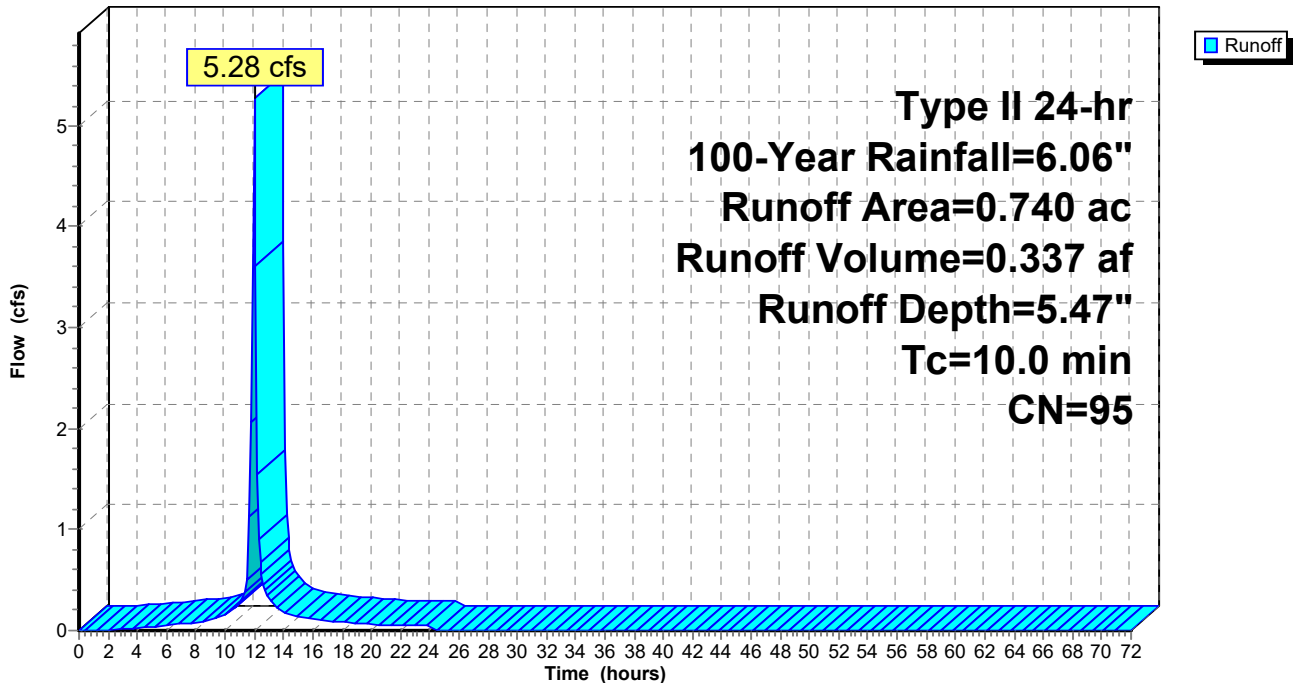
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 100-Year Rainfall=6.06"

Area (ac)	CN	Description
0.601	98	Paved parking, HSG C
0.139	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.139		18.78% Pervious Area
0.601		81.22% Impervious Area

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

Subcatchment 4S: 0.74 Ac Rehab Center Before Expansion

Hydrograph



Summary for Subcatchment 5S: Un-Detained

Runoff = 1.36 cfs @ 12.00 hrs, Volume= 0.087 af, Depth= 5.47"

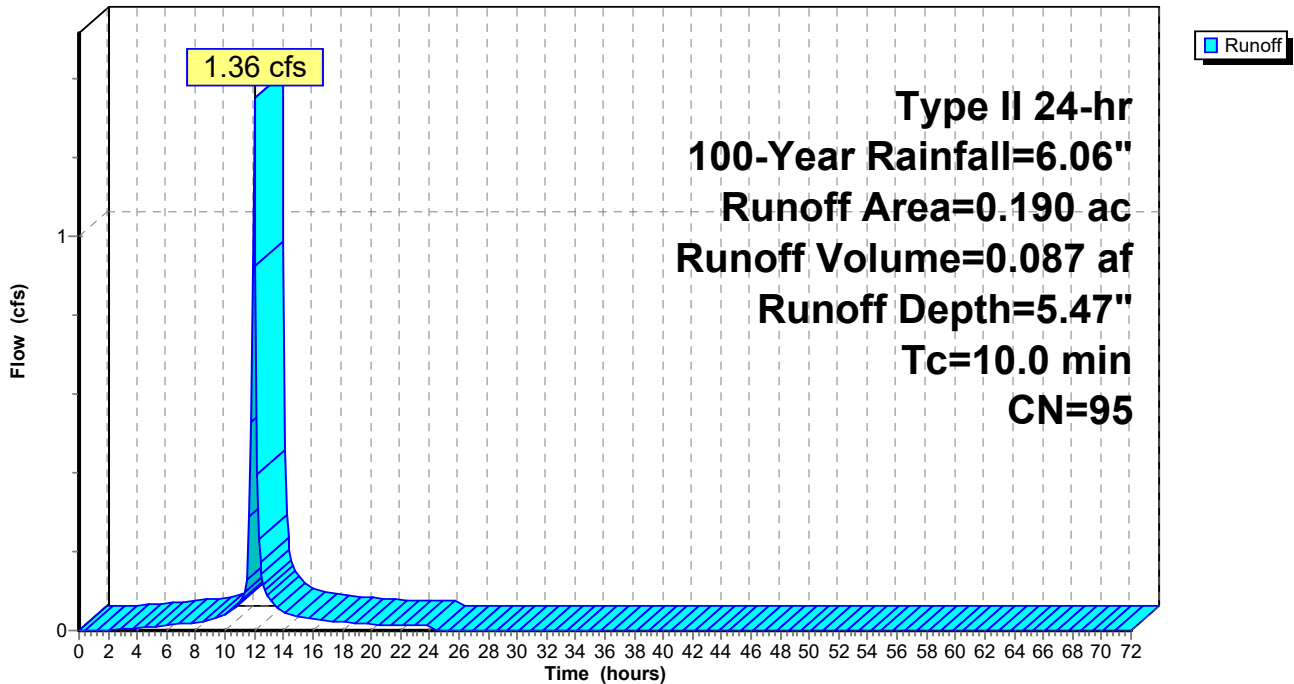
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 100-Year Rainfall=6.06"

Area (ac)	CN	Description
0.190	95	Urban commercial, 85% imp, HSG D
0.028		15.00% Pervious Area
0.161		85.00% Impervious Area

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

Subcatchment 5S: Un-Detained

Hydrograph



Summary for Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION

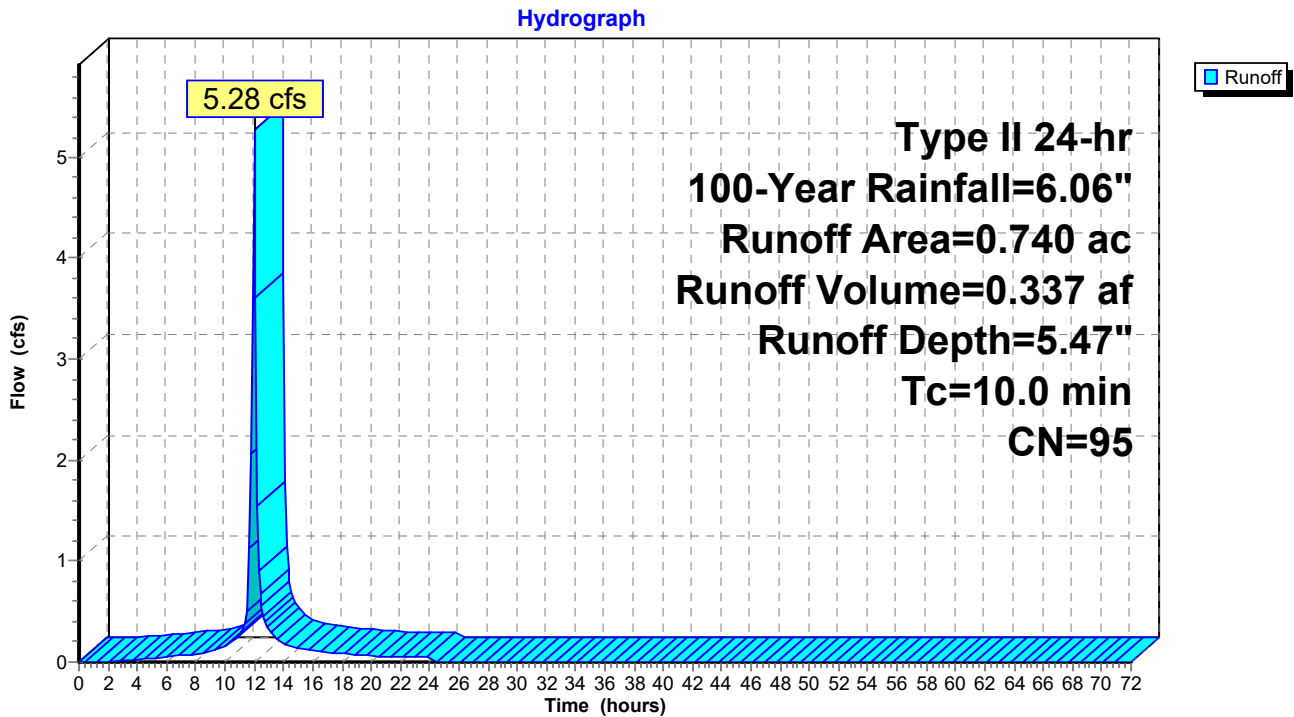
Runoff = 5.28 cfs @ 12.00 hrs, Volume= 0.337 af, Depth= 5.47"
 Routed to Pond 5P : ADS Stormtech

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Type II 24-hr 100-Year Rainfall=6.06"

Area (ac)	CN	Description
0.617	98	Paved parking, HSG C
0.123	80	>75% Grass cover, Good, HSG D
0.740	95	Weighted Average
0.123		16.62% Pervious Area
0.617		83.38% Impervious Area

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

Subcatchment 8S: 0.74 Ac REHAB CENTER WITH PARKING EXPANSION



Summary for Pond 2P: Chase Bank Pond after UG detention

Inflow Area = 2.769 ac, 58.29% Impervious, Inflow Depth = 4.89" for 100-Year event
 Inflow = 13.80 cfs @ 12.01 hrs, Volume= 1.128 af
 Outflow = 2.12 cfs @ 12.60 hrs, Volume= 1.121 af, Atten= 85%, Lag= 35.8 min
 Primary = 2.12 cfs @ 12.60 hrs, Volume= 1.121 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 6,800 sf Storage= 13,583 cf
 Peak Elev= 902.29' @ 12.60 hrs Surf.Area= 11,485 sf Storage= 34,558 cf (20,976 cf above start)
 Flood Elev= 903.00' Surf.Area= 13,066 sf Storage= 43,293 cf (29,710 cf above start)

Plug-Flow detention time= 585.8 min calculated for 0.808 af (72% of inflow)
 Center-of-Mass det. time= 275.4 min (1,154.6 - 879.2)

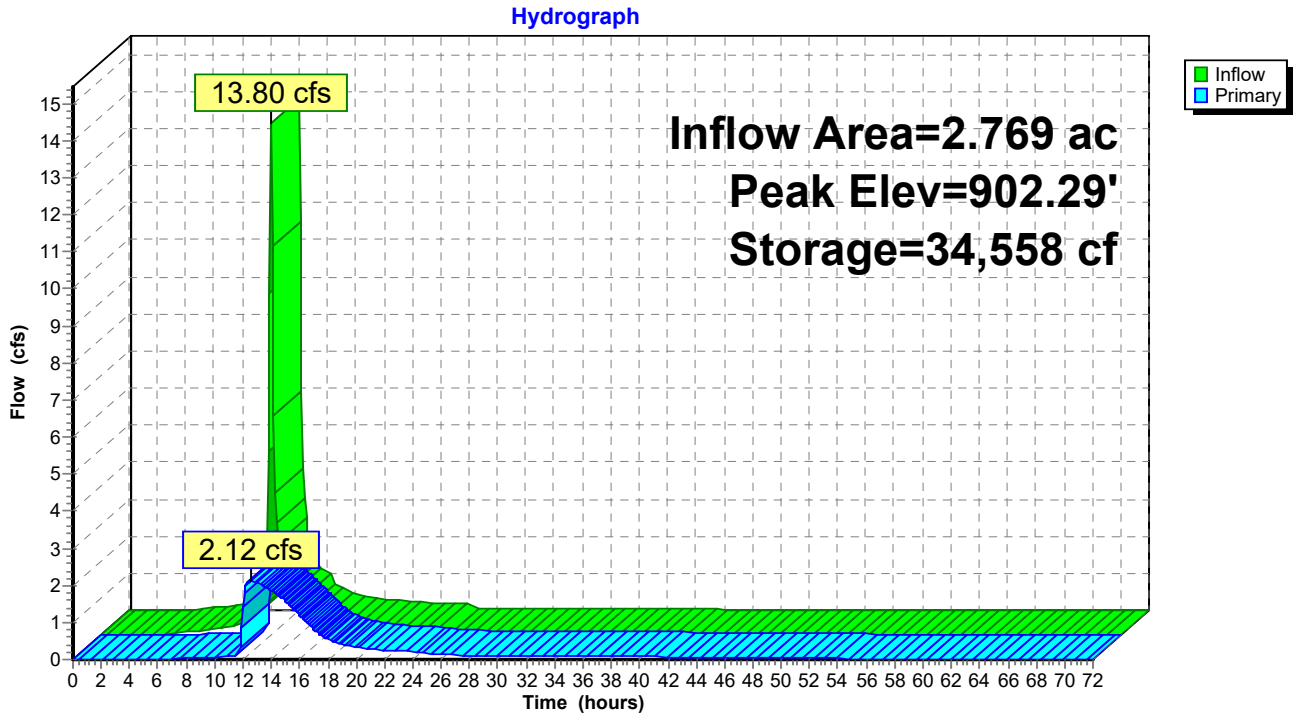
Volume	Invert	Avail.Storage	Storage Description			
#1	895.00'	43,293 cf	Wet Pond - Chase (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
895.00	663	142.0	0	0	663	
896.00	1,284	167.0	957	957	1,297	
897.00	2,006	193.0	1,632	2,588	2,063	
898.00	2,872	223.0	2,426	5,014	3,078	
899.00	3,815	248.0	3,332	8,347	4,044	
900.00	6,800	369.0	5,236	13,583	9,993	
901.00	8,959	404.0	7,855	21,437	12,180	
902.00	10,875	435.0	9,902	31,339	14,292	
903.00	13,066	480.0	11,954	43,293	17,601	

Device	Routing	Invert	Outlet Devices
#1	Primary	900.03'	1.00" Vert. WQ ORIFI X 5.00 C= 0.600 Limited to weir flow at low heads
#2	Primary	900.65'	8.00" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	903.00'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

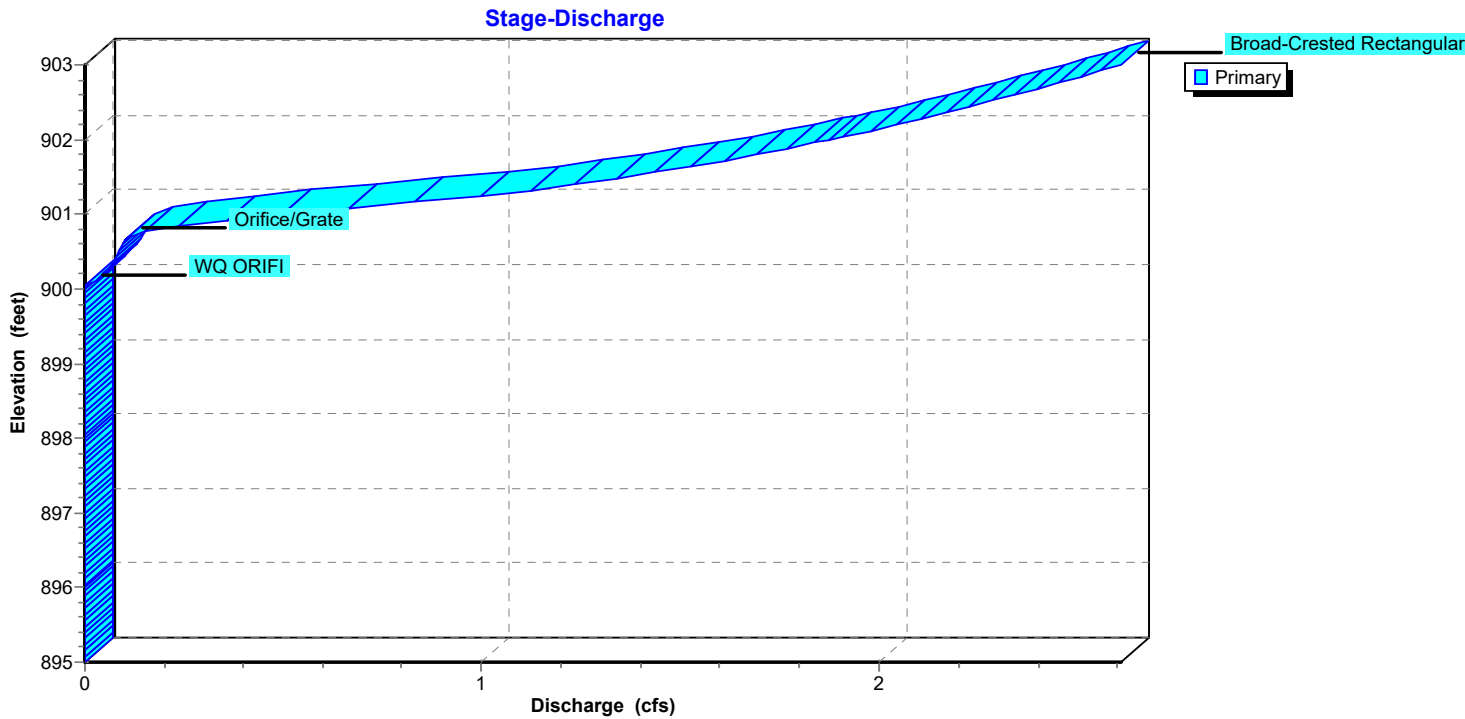
Primary OutFlow Max=2.12 cfs @ 12.60 hrs HW=902.29' (Free Discharge)

- 1=WQ ORIFI (Orifice Controls 0.20 cfs @ 7.17 fps)
- 2=Orifice/Grate (Orifice Controls 1.92 cfs @ 5.50 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

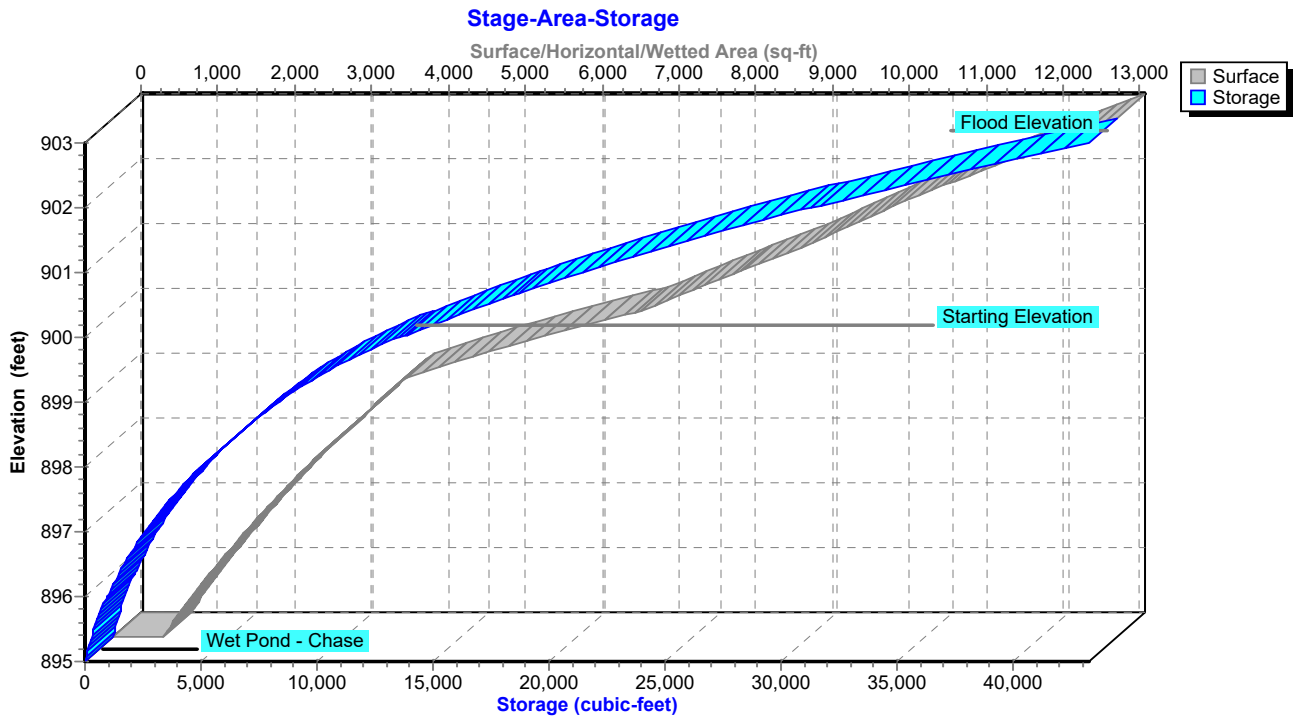
Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Pond 2P: Chase Bank Pond after UG detention



Summary for Pond 5P: ADS Stormtech

Inflow Area = 0.740 ac, 83.38% Impervious, Inflow Depth = 5.47" for 100-Year event
 Inflow = 5.28 cfs @ 12.00 hrs, Volume= 0.337 af
 Outflow = 1.96 cfs @ 12.21 hrs, Volume= 0.336 af, Atten= 63%, Lag= 12.4 min
 Primary = 1.96 cfs @ 12.21 hrs, Volume= 0.336 af
 Routed to Pond 2P : Chase Bank Pond after UG detention

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Peak Elev= 903.74' @ 12.21 hrs Surf.Area= 9,572 sf Storage= 7,172 cf

Plug-Flow detention time= 322.8 min calculated for 0.335 af (99% of inflow)
 Center-of-Mass det. time= 322.4 min (1,085.7 - 763.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.38'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.38' / 897.97' S= 0.0139 1/ S Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.55'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600

Limited to weir flow at low heads

#4	Device 1	903.47'	3.0' long Sharp-Crested Rectangular Weir	2 End Contraction(s)
#5	Device 1	903.81'	4.2' long Sharp-Crested Rectangular Weir	2 End Contraction(s)
			1.0' Crest Height	

Primary OutFlow Max=1.91 cfs @ 12.21 hrs HW=903.74' (Free Discharge)

- 1=Culvert (Passes 1.91 cfs of 6.58 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.10 cfs @ 10.91 fps)
- 3=Orifice/Grate (Orifice Controls 0.50 cfs @ 8.91 fps)
- 4=Sharp-Crested Rectangular Weir (Weir Controls 1.32 cfs @ 1.68 fps)
- 5=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: ADS Stormtech - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04'

Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

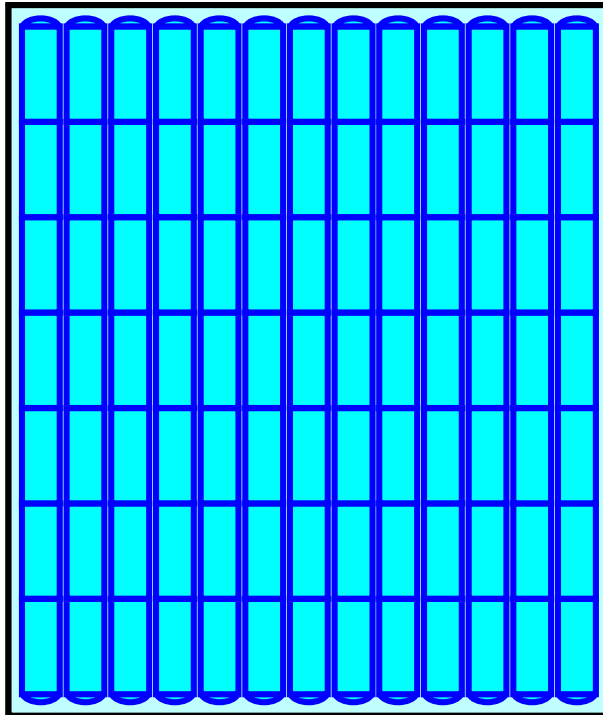
Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers

220.2 cy Field

170.5 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

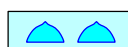
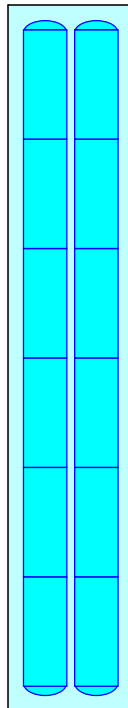
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 5P: ADS Stormtech - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

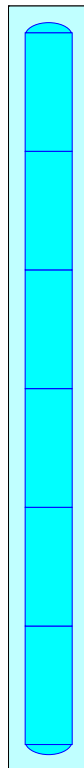
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

6 Chambers

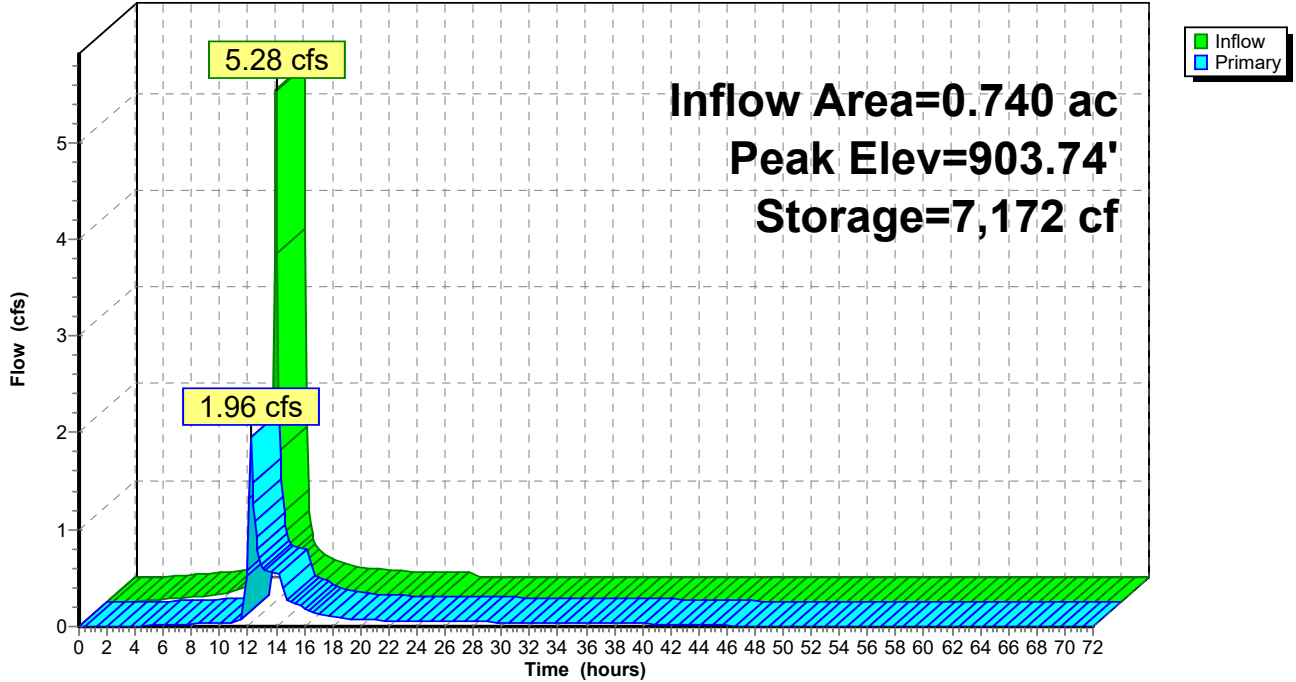
20.6 cy Field

17.3 cy Stone



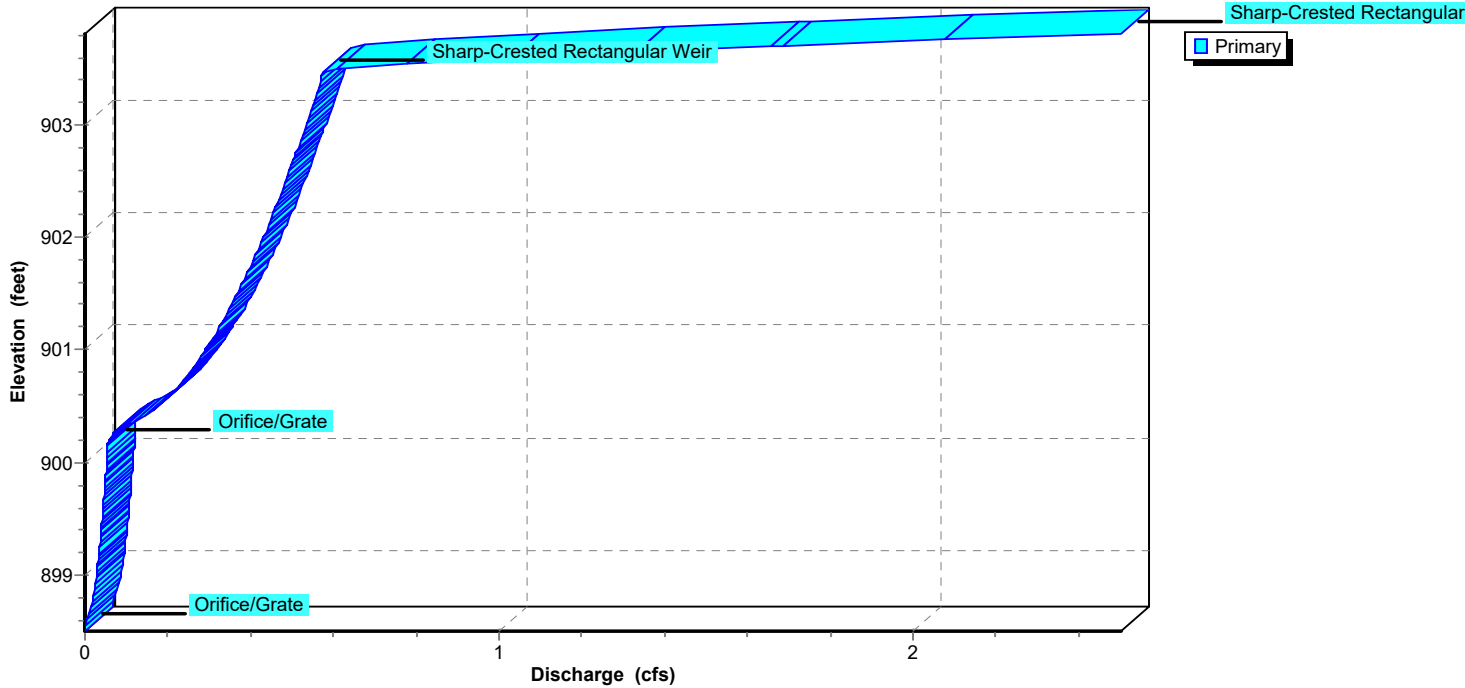
Pond 5P: ADS Stormtech

Hydrograph

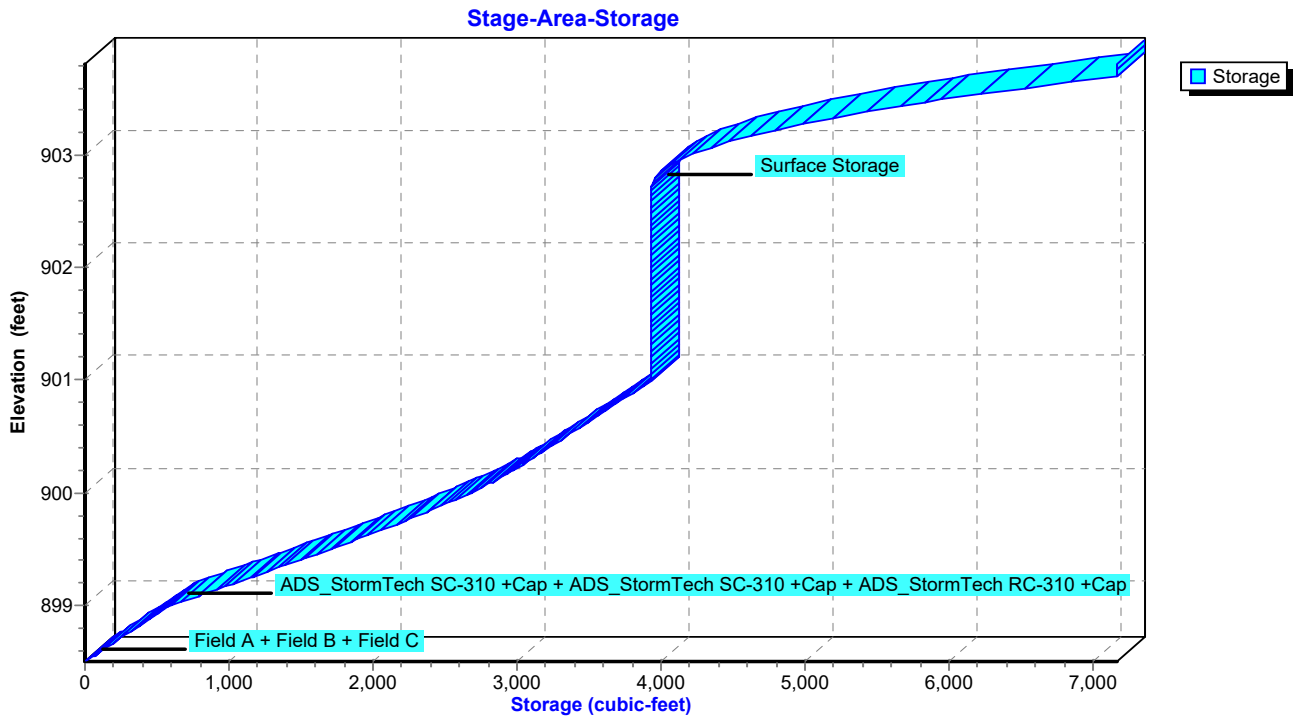


Pond 5P: ADS Stormtech

Stage-Discharge



Pond 5P: ADS Stormtech



Summary for Pond 7P: WQv Drawdown

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 0.00 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
 Starting Elev= 900.00' Surf.Area= 2,975 sf Storage= 2,681 cf
 Peak Elev= 900.00' @ 0.00 hrs Surf.Area= 2,975 sf Storage= 2,681 cf

Plug-Flow detention time= (not calculated: no plugs found)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	898.50'	1,841 cf	44.83'W x 53.04'L x 2.50'H Field A 5,945 cf Overall - 1,342 cf Embedded = 4,603 cf x 40.0% Voids
#2A	899.00'	1,342 cf	ADS_StormTech SC-310 +Cap x 91 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 91 Chambers in 13 Rows
#3B	898.50'	304 cf	8.17'W x 45.92'L x 2.50'H Field B 938 cf Overall - 177 cf Embedded = 761 cf x 40.0% Voids
#4B	899.00'	177 cf	ADS_StormTech SC-310 +Cap x 12 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 2 Rows
#5C	898.50'	187 cf	4.83'W x 45.92'L x 2.50'H Field C 555 cf Overall - 88 cf Embedded = 466 cf x 40.0% Voids
#6C	899.00'	88 cf	ADS_StormTech RC-310 +Cap x 6 Inside #5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#7	902.72'	3,233 cf	Surface Storage (Prismatic) Listed below (Recalc)
		7,172 cf	Total Available Storage

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.72	0	0	0
903.70	6,597	3,233	3,233

Device	Routing	Invert	Outlet Devices
#1	Primary	898.22'	12.00" Round Culvert L= 29.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 898.22' / 897.97' S= 0.0085 1/ S Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	898.50'	1.30" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	900.18'	3.20" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.05 cfs @ 0.00 hrs HW=900.00' (Free Discharge)
↑ 1=Culvert (Passes 0.05 cfs of 3.38 cfs potential flow)
↑ 2=Orifice/Grate (Orifice Controls 0.05 cfs @ 5.79 fps)
↑ 3=Orifice/Grate (Controls 0.00 cfs)

Pond 7P: WQv Drawdown - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length

13 Rows x 34.0" Wide + 6.0" Spacing x 12 + 12.0" Side Stone x 2 = 44.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

91 Chambers x 14.7 cf = 1,341.5 cf Chamber Storage

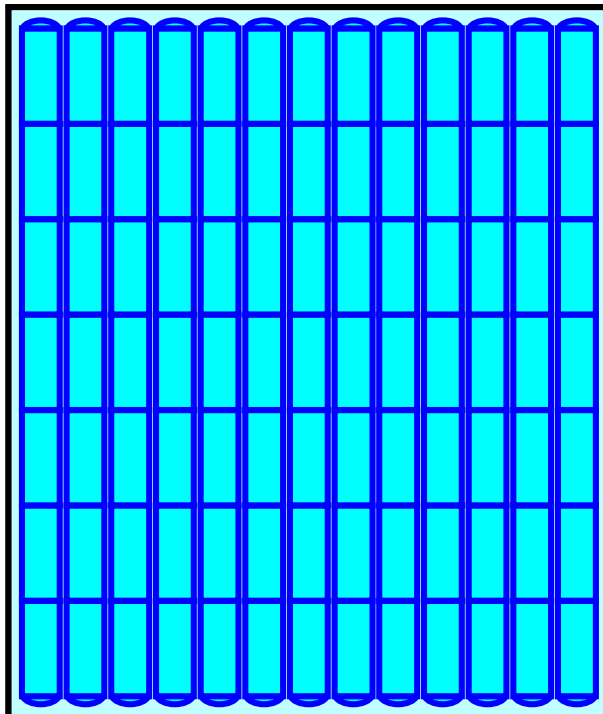
5,944.9 cf Field - 1,341.5 cf Chambers = 4,603.4 cf Stone x 40.0% Voids = 1,841.4 cf Stone Storage

Chamber Storage + Stone Storage = 3,182.9 cf = 0.073 af

Overall Storage Efficiency = 53.5%

Overall System Size = 53.04' x 44.83' x 2.50'

91 Chambers
220.2 cy Field
170.5 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field B

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

12 Chambers x 14.7 cf = 176.9 cf Chamber Storage

937.5 cf Field - 176.9 cf Chambers = 760.6 cf Stone x 40.0% Voids = 304.3 cf Stone Storage

Chamber Storage + Stone Storage = 481.2 cf = 0.011 af

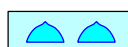
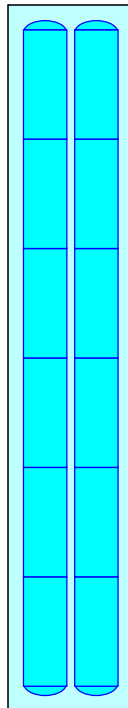
Overall Storage Efficiency = 51.3%

Overall System Size = 45.92' x 8.17' x 2.50'

12 Chambers

34.7 cy Field

28.2 cy Stone



Pond 7P: WQv Drawdown - Chamber Wizard Field C

Chamber Model = ADS_StormTechRC-310 +Cap (ADS StormTech®RC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 8.0" Stone Cover = 2.50' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

554.9 cf Field - 88.5 cf Chambers = 466.4 cf Stone x 40.0% Voids = 186.6 cf Stone Storage

Chamber Storage + Stone Storage = 275.0 cf = 0.006 af

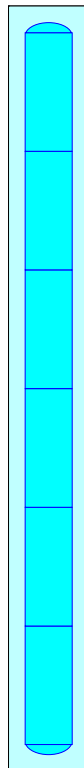
Overall Storage Efficiency = 49.6%

Overall System Size = 45.92' x 4.83' x 2.50'

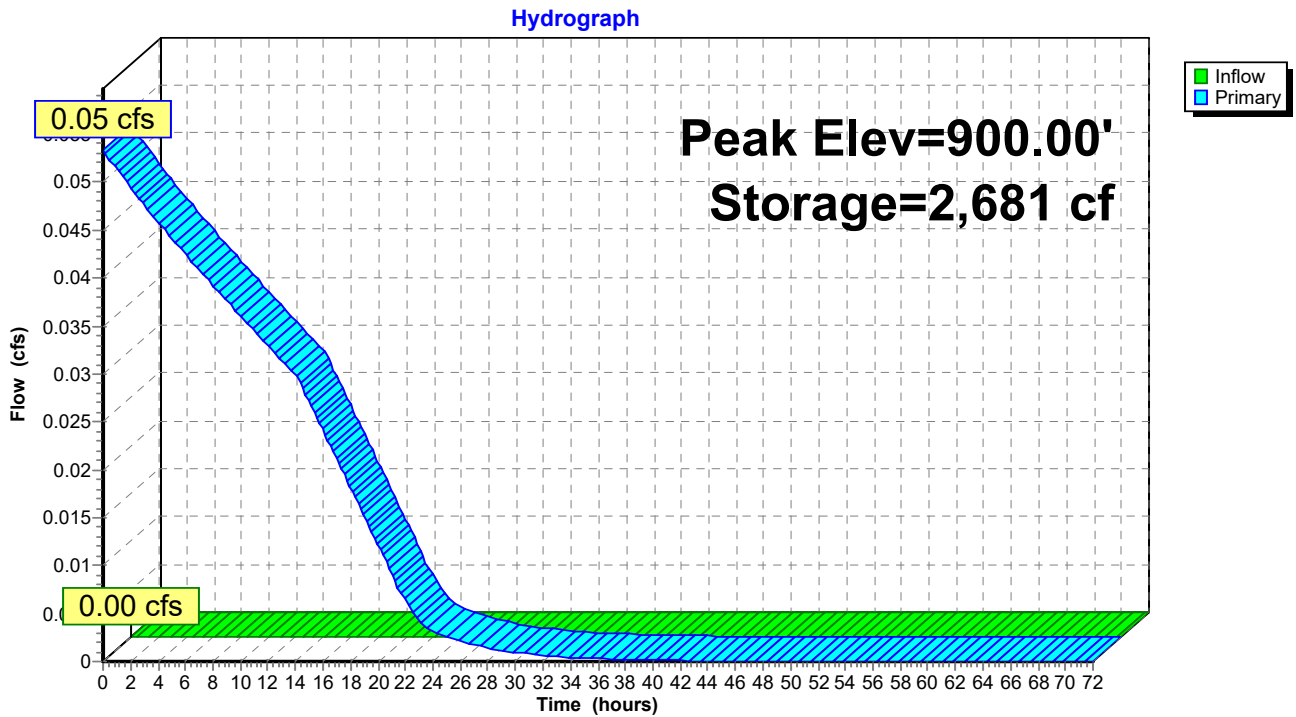
6 Chambers

20.6 cy Field

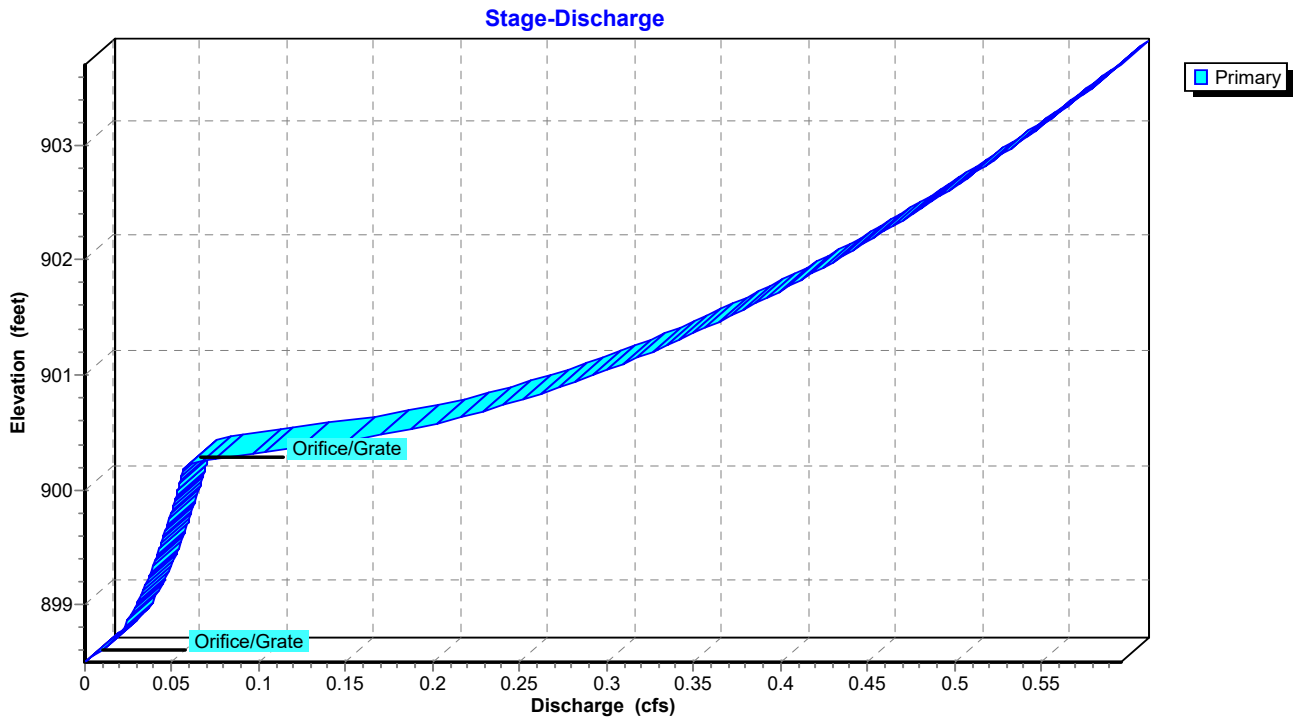
17.3 cy Stone



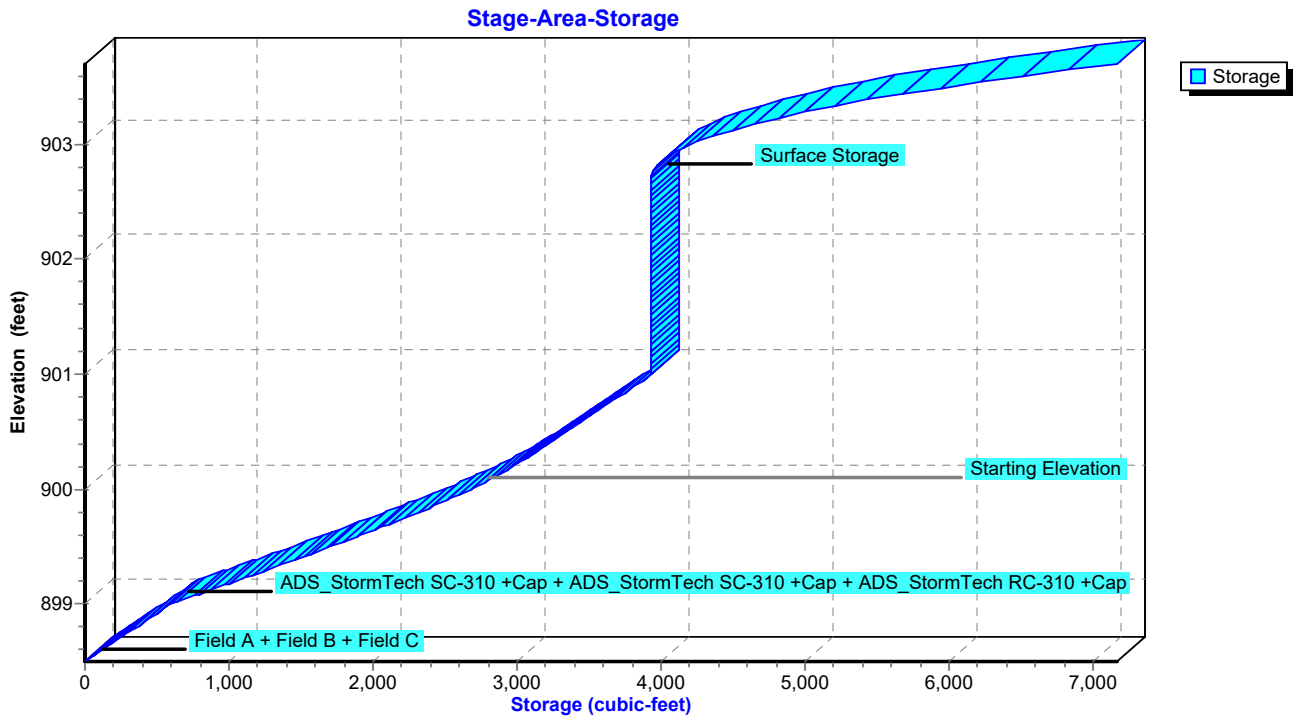
Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



Pond 7P: WQv Drawdown



APPENDIX B
(Water Quality Calculations)

WATER QUALITY CALCULATIONS

E. P. FERRIS and ASSOCIATES INC.
880 King Avenue
Columbus, Ohio 43212
614-299-2999
614-299-2992 (Fax)

Emerald Parkway
Dublin, Ohio

Prepared I MJO
Checked:

Date: 4/28/2023

Project: 1173.000

Water Quality Calculation - Per Ohio EPA requirements

$WQv = Rv \times P \times A$

Rv - Volumetric Runoff Coefficient
P - precipitation depth
A - Area draining to BMP

Table 1 C Values:	C = 0.89 for the pervious pavement surface
Industrial/Commercial	0.8
High Density residential (>8dw/ac)	0.5
Medium Density res. (4 to 8 dw/ac)	0.4
Low Density res (<4 dw/ac)	0.3
Open Space and Recreation Area	0.2

Rv: 0.59
P: 0.9 Per EPA
A: 4.103 Acres
178727 Sq-Ft
i: 0.60

Formula:
 $Rv = 0.9i + 0.05$
i - watershed imperviousness ratio, the percent imperviousness divided by 100
Rv = 0.59

WQv: 2.178693 acre-inches
7909 cubic feet REQUIRED for treatment of disturbed area
0.1815578 acre-feet
1582 cubic feet of sediment volume

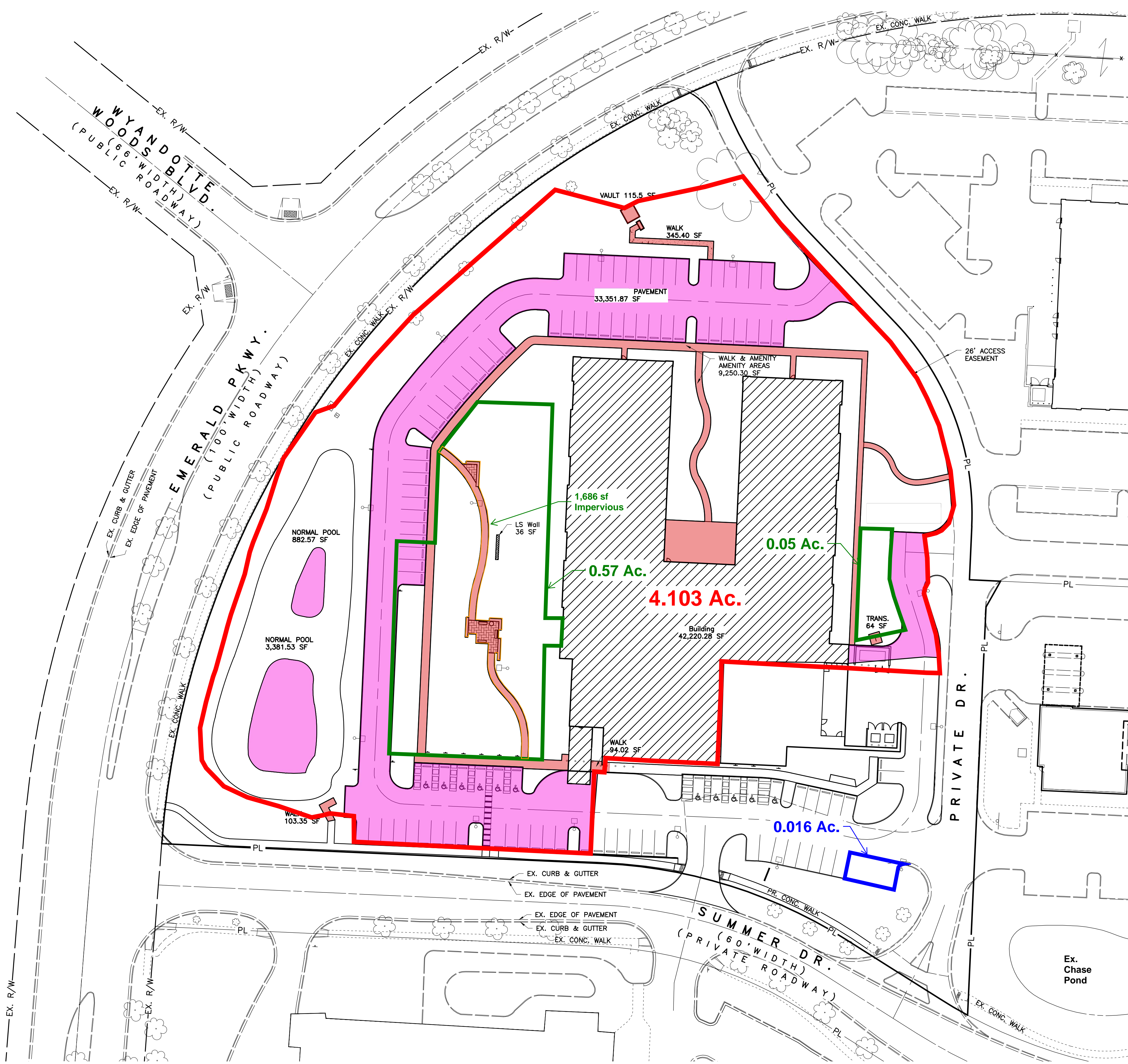
WQv
Total: 9490

INPUT
OUTPUT

Hydrograph for Pond 5P: WQv Drawdown

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	57,840	903.05	0.04
4.00	0.00	57,311	902.97	0.04
8.00	0.00	56,784	902.94	0.04
12.00	0.00	56,259	902.91	0.04
16.00	0.00	55,735	902.88	0.04
20.00	0.00	55,213	902.85	0.04
24.00	0.00	54,693	902.82	0.04
28.00	0.00	54,174	902.79	0.04
32.00	0.00	53,657	902.76	0.04
36.00	0.00	53,142	902.73	0.04
40.00	0.00	52,629	902.70	0.04
44.00	0.00	52,117	902.67	0.04
48.00	0.00	51,607	902.64	0.04
52.00	0.00	51,099	902.61	0.04
56.00	0.00	50,592	902.58	0.04
60.00	0.00	50,088	902.55	0.03
64.00	0.00	49,585	902.52	0.03
68.00	0.00	49,083	902.49	0.03
72.00	0.00	48,584	902.46	0.03
76.00	0.00	48,086	902.42	0.03
80.00	0.00	47,591	902.39	0.03
84.00	0.00	47,097	902.36	0.03
88.00	0.00	46,605	902.33	0.03
92.00	0.00	46,114	902.30	0.03
96.00	0.00	45,626	902.27	0.03
100.00	0.00	45,139	902.24	0.03
104.00	0.00	44,655	902.21	0.03
108.00	0.00	44,172	902.18	0.03
112.00	0.00	43,691	902.15	0.03
116.00	0.00	43,211	902.12	0.03
120.00	0.00	42,734	902.09	0.03
124.00	0.00	42,259	902.06	0.03
128.00	0.00	41,785	902.03	0.03
132.00	0.00	41,313	902.00	0.03
136.00	0.00	40,844	901.96	0.03
140.00	0.00	40,376	901.93	0.03
144.00	0.00	39,910	901.90	0.03
148.00	0.00	39,446	901.87	0.03
152.00	0.00	38,984	901.84	0.03
156.00	0.00	38,524	901.81	0.03
160.00	0.00	38,066	901.78	0.03

APPENDIX C
(Tributary Maps)

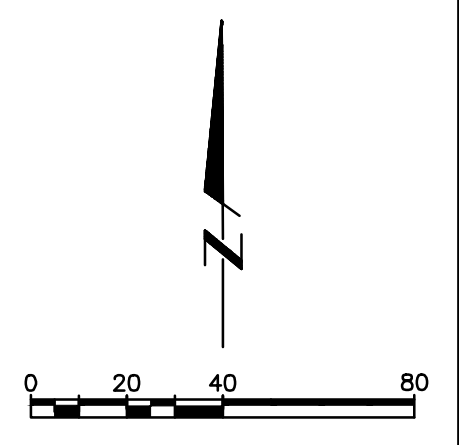


SITE DATA TABLE		
DESCRIPTION	QUANTITY	UNIT
TOTAL SITE AREA TO PR BASIN	4.103	AC.
POST-DEVELOPED IMPERVIOUS AREA	2.128	AC.
POST-DEVELOPED PERVIOUS AREA	1.975	AC.

SITE DATA TABLE BUILDING EXPANSION		
DESCRIPTION	QUANTITY	UNIT
TOTAL SITE AREA TO EX. BASIN	0.62	AC.
PRE DEVELOPED IMPERVIOUS AREA	0.04	AC.
PRE DEVELOPED PERVIOUS AREA	0.58	AC.

SITE DATA TABLE PARKING EXPANSION		
DESCRIPTION	QUANTITY	UNIT
TOTAL SITE AREA TO EX. CHASE POND	0.016	AC.
PRE DEVELOPED IMPERVIOUS AREA	0.000	AC.
PRE DEVELOPED PERVIOUS AREA	0.016	AC.

M:\1173001_Savmill\RD\DWG\Final Engineering Plan\Past_Developed Impervious Area Exhibit.dwg --Staking LAST EDITED BY:SHREMSHOCK ON 3/18/20
 E.P. FERRIS & ASSOCIATES INC



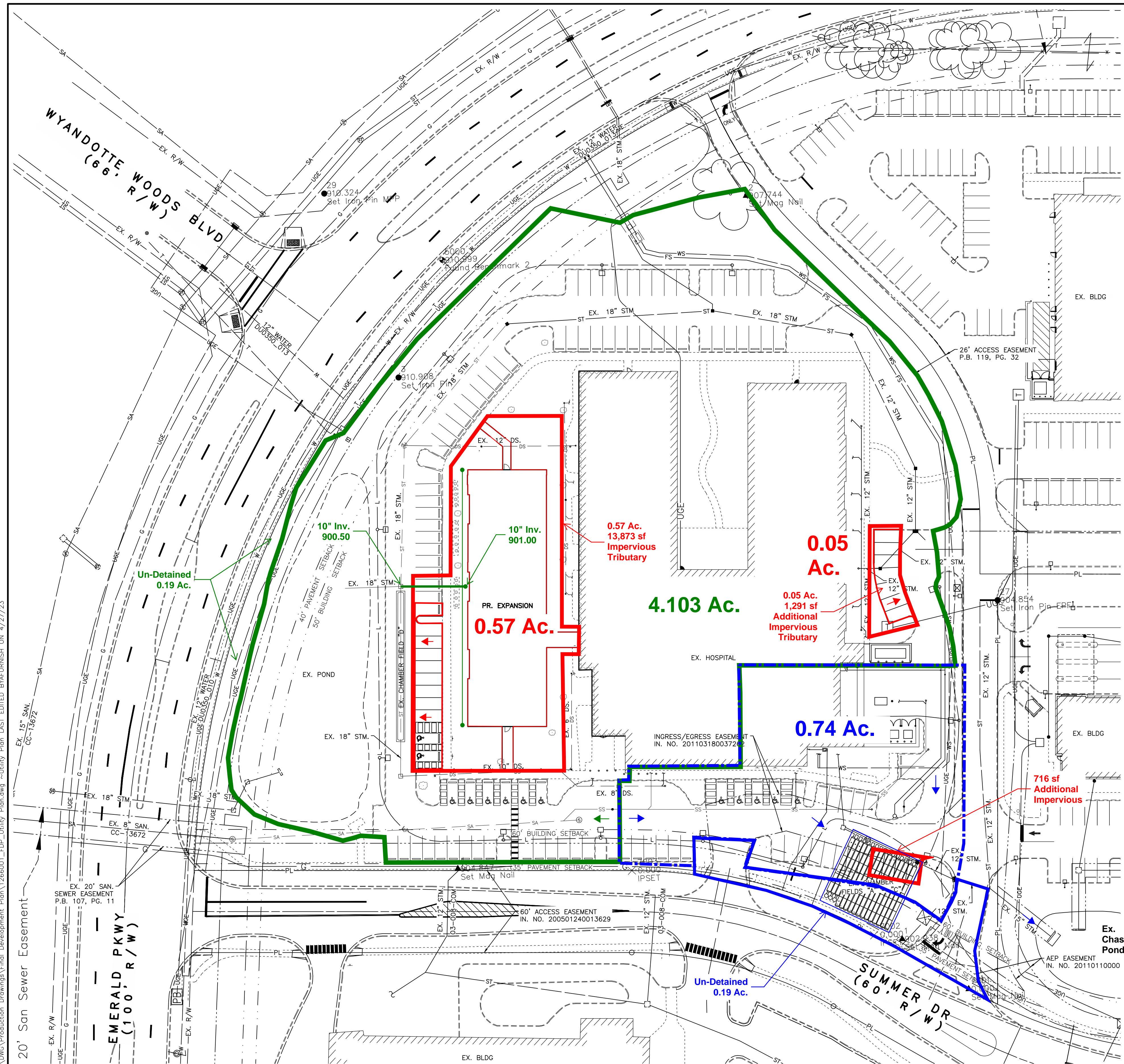
REVISIONS	DATE	BY	CHK

E. P. FERRIS
 AND ASSOCIATES
 INC
 Consulting Civil Engineers and Surveyors
 880 KING AVENUE
 COLUMBUS, OHIO 43212
 (614) 299-2999
 (614) 299-2992 (Fax)
 www.EPFERRIS.com

3805 EMERALD PARKWAY, CITY OF DUBLIN, OHIO
DUBLIN REHABILITATION INSTITUTE
 AMERICAN DEVELOPMENT AND INVESTMENTS, LLC

JOB NO.	1173.001
DESIGNED BY:	DAS
DRAWN BY:	DAS
CHECKED BY:	MJO
APPROVED BY:	MJO
DATE:	03/18/20

EXISTING PRIOR TO EXPANSION
 SCALE: 1" = 40'
 SHEET NO. 1 OF 1



SITE DATA TABLE

SITE AREA	5.759 AC
EX. IMPERVIOUS AREA	3.135 AC (54.4%)
PR. IMPERVIOUS AREA	0.362 AC
TOTAL IMPERVIOUS AREA	3.497 AC (60.7%)

SITE DATA TABLE BUILDING EXPANSION

DESCRIPTION	QUANTITY	UNIT
TOTAL SITE AREA TO EX. BASIN	0.620	AC.
POST DEVELOPED IMPERVIOUS AREA	0.348	AC.
POST DEVELOPED PERVIOUS AREA	0.272	AC.

SITE DATA TABLE PARKING EXPANSION

DESCRIPTION	QUANTITY	UNIT
TOTAL SITE AREA TO EX. CHASE POND	0.016	AC.
POST DEVELOPED IMPERVIOUS AREA	0.016	AC.
POST DEVELOPED PERVIOUS AREA	0.000	AC.

M:\1266001_DublinRehab\DWG\Production Drawings\Final Development Plan\1266001_FDP_Utility Plan.dwg -Utility Plan LAST EDITED BY:AFURNISH ON 4/27/23

REVISIONS	DATE	BY	CHK.

E. P. FERRIS AND ASSOCIATES INC
 Consulting Civil Engineers and Surveyors
 2130 QUARRY TRAILS DR,
 2ND FLOOR
 COLUMBUS, OHIO 43228
 (614) 299-2999
 (614) 299-2992 (Fax)
 www.EPFERRIS.com

**BERKSHIRE TOWNSHIP, DELAWARE COUNTY OHIO
 DUBLIN REHABILITATION INSTITUTE EXPANSION
 VISION DEVELOPMENT**

JOB NO.	1266.001
DESIGNED BY:	WDJ
DRAWN BY:	WDJ
CHECKED BY:	JCP
APPROVED BY:	JCP
DATE:	4/27/23

PROPOSED EXPANSION

SCALE:
1"= 40'
 SHEET NO.

APPENDIX D
(As-Built Excerpts)

Critical Storm Calculation (Retention Basin):

The critical storm is determined by comparing the increase in runoff volume of the 1-year 24-hour rainfall event from the pre-developed condition to that of the post-developed.

Pre-Development 1-Year Storm Event: 0.235 af
 Post-Development 1-Year Storm Event: 0.458 af
 $((0.458 \text{ af} - 0.235 \text{ af}) / 0.235 \text{ af}) \times 100\% = 95\%$ (**10 year critical storm**)

Table 1 – Stormwater Management Summary Table (Retention Basin)

	1 year	2 year	5 year	10 year	25 year	50 year	100 year	
Predev. Q (cfs)	3.67	5.34	7.93	10.16	13.39	16.13	19.05	
Postdev. Q (cfs)	7.56	9.67	12.70	15.18	18.65	21.51	24.50	
Un-detained (0.486 Ac.) Release (cfs)	0.50	0.72	1.06	1.36	1.78	2.14	2.53	
Allowable Release (cfs)*	0.04	0.04	0.04	0.04	0.82	1.64	2.46	
Actual Release (cfs)	0.02 0.03 900.42	0.03 0.03 900.87	0.03 0.03 901.47	0.03 0.03 901.94	0.04 0.04 902.56	0.04 0.04 903.04	0.40 0.40 903.12	
Ponding Elev. (ft)	900.34	900.80	901.41	901.88	902.51	903.00	903.07	
Storage (cf) @ Elev.	18,847 18,815 2.42	24,505 24,471 2.87	32,775 32,737 3.47	39,695 39,657 3.94	49,530 49,491 4.56	57,770 57,731 5.04	59,252 59,023 5.12	
Storage Depth (ft)	2.34	2.80	3.41	3.88	4.51	5.00	5.07	



*See table 3 for release rate summary and assumptions.

Table 2 - Pond Storage Elevation-Volume Table (Retention Basin)

Elevation	Total Storage Provided (cf)
898.18 898.00	0 Normal Pool
899.00	5,827 4,971
900.00	15,028 13,430
901.00	27,127 24,655
902.00	41,469 38,349
903.00	57,793 54,662
904.00	73,564



**Table 3 – Allowable Release Rate Tabulation
(Hard Road Watershed Sub-Basin 1005)
(4.103 Ac.)**

Storm Event	cfs/Acre Allowable	Site Allowable cfs/Acre
1 year	0.01	0.04
2 year	0.10	0.41
5 year	0.10	0.41
10 year	0.10	0.41
25 year	0.20	0.82
50 year	0.40	1.64
100 year	0.60	2.46

Runoff shall be controlled with a standpipe with orifice placed inside an outlet structure which will drain to the existing storm sewer system along Emerald Parkway. Multiple outlet devices are to control the 1 through 100 year events. In the event the outlets fail, an emergency overflow (Set above the 100 Yr. Storm Elev.) will be provided. Top of bank for the pond will be 904.00.

WATER QUALITY:

Water quality storage and treatment shall be provided in the retention pond volume. Water quality calculations can be found in Appendix B. Table 4 below shows the available sediment volume in the pond. See sheet 7 of 21 in the improvement for skimmer sizing and basin table.

Table 4 – Forebay and Micro-pool Storage Elevation-Volume Table (Sediment)

Elevation	Total Storage Provided (cf)	
Forebay		
895	0	
896	335 390	△ 1
897	870 1,105	
898	1,631 2,230	
898.18	2,489	
Micro-pool		
893	0	
894	748 154	
895	1,750 676	△ 1
896	3,030 1,610	
897	4,614 3,031	
898	7,133 5,490	
898.18	6,028	

POST-DEVELOPED CONDITIONS (Underground Detention) :

The post developed condition for this facility will consist of a portion of the proposed development (0.74 Ac). A CN of 95 for Urban Commercial HSG “D” was used. The developed tributary area will drain to the existing Chase Bank pond adding (0.21 Ac.) of tributary area to the (0.53 Ac.) currently tributary.

Critical Storm Calculation (Underground Detention):

The critical storm is determined by comparing the increase in runoff volume of the 1-year 24-hour rainfall event from the pre-developed condition to that of the post-developed.

Pre-Development 1-Year Storm Event: 0.047 af
 Post-Development 1-Year Storm Event: 0.101 af
 $((0.101 \text{ af} - 0.047 \text{ af}) / 0.047 \text{ af}) \times 100\% = 115\%$ **(25 year critical storm)**

Table 1 – Stormwater Management Summary Table (0.74 Ac. Underground Det.)

	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Predev. Q (cfs)	0.80	1.23	1.78	2.24	2.95	3.60	4.28
Postdev. Q (cfs)	1.70	2.20	2.80	3.27	3.99	4.62	5.28
Un-detained (0.19 Ac.) Release (cfs)	0.44	0.56	0.72	0.84	1.02	1.19	1.36
Allowable Release (cfs)*	0.59	0.59	0.59	0.59	0.59	1.99	2.51
Actual Release (cfs)	0.06 0.05	0.20 0.18	0.56 0.52	0.56 0.55	0.59 0.57	1.13 1.06	1.76 1.96
Ponding Elev. (ft)	900.05	900.42	903.06	903.15	903.44	903.60	903.69
Storage (cf) @ Elev.	900.09 2,764 2,829	900.51 3,245 3,355	902.88 4,331 4,025	903.18 4,570 4,647	903.46 5,691 5,779	903.60 6,524 6,565	903.74 7,125 7,172
Storage Depth (ft)	1.55 1.59	1.92 2.01	4.56 4.38	4.65 4.68	4.94 4.96	5.10 5.10	5.19 5.24

*See table 3 for release rate summary and assumptions.



Table 2 - Pond Storage Elevation-Volume Table (Underground Detention)

Elevation	Total Storage Provided (cf)
898.50	0
899.00	595
900.00	2,681
901.00	3,939
902.00	3,939
902.70	3,939
903.70	7,172

**Table 3 – Allowable Release Rate Tabulation
(Billingsley Watershed Sub-Basin 370)
(0.74 Ac.)**

Storm Event	cfs/Acre Allowable	Site Allowable cfs/Acre
1 year	0.8	0.59
2 year	1.0	0.74
5 year	1.3	0.96
10 year	1.5	1.11
25 year	2.0	1.48
50 year	2.7	1.99
100 year	3.4	2.51

Runoff shall be controlled with an orifice plate placed inside an outlet structure which will drain to the existing Chase Bank pond. Multiple outlet devices are to control the 1 through 100 year events.

WATER QUALITY:

Water quality storage and treatment in the underground detention shall be provided in isolator rows. Water quality calculations can be found in Appendix B.

POST-DEVELOPED CONDITIONS (Chase Bank As-Built After Underground) :

The post developed condition for this facility deducted (0.53 Ac.) that was previously tributary that will now go to the underground detention. The underground detention outfall was routed to the pond to determine the effects on the as-built pond. The results can be found in Table 1 below. Also, see Appendix “E” for Chase Bank As-Built excerpts.

**Table 1 – Stormwater Management Summary Table
(Chase Bank As-Built after Underground 2.76 Ac.)**

	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Predev. Q (cfs)	2.22	3.67	5.64	7.28	9.90	12.29	14.86
Postdev. Q (cfs)	3.30	4.62	6.29	7.77	10.11	11.91	13.82
Allowable Release (cfs)*	1.30	1.30	1.30	1.30	3.26	4.40	5.54
As-Built Release (cfs)	0.13	0.36	0.85	1.21	1.61	1.90	2.15
Actual Release (cfs)	0.15 0.14	0.40 0.38	0.84 0.83	1.18 1.17	1.54 1.53	1.84 1.83	2.12 2.12
Ponding Elev. (ft)	900.75	900.94	901.16	901.36	901.65	901.96	902.29
Storage (cf) @ Elev.	900.74 5,685 5,616	900.93 7,338 7,233	901.16 9,322 9,290	901.36 11,215 11,143	901.64 14,059 13,979	901.95 17,272 17,172	902.29 21,041 20,955
Storage Depth (ft)	5.75 5.74	5.94 5.93	6.16 6.16	6.36 6.36	6.65 6.64	6.96 6.95	7.29 7.29



*See table 3 for release rate summary and assumptions.

**Table 2 - Pond Storage Elevation-Volume Table
(Chase Bank As-Built after Underground)**

Elevation	Total Storage Provided (cf)
900.00	0
901.00	7,854
902.00	17,756
903.00	29,710

**Table 3 – Allowable Release Rate Tabulation
(Billingsley Watershed)
(Per Chase Bank As-Built Report)**

Storm Event	cfs/Acre Allowable	Site Allowable cfs/Acre
1 year	0.8	1.30
2 year	1.0	1.63
5 year	1.3	2.12
10 year	1.5	2.42
25 year	2.0	3.26
50 year	2.7	4.40
100 year	3.4	5.54

WATER QUALITY CALCULATIONS

E. P. FERRIS and ASSOCIATES INC.
 880 King Avenue
 Columbus, Ohio 43212
 614-299-2999
 614-299-2992 (Fax)

Emerald Parkway
 Dublin, Ohio
 Prepared | MJO
 Checked: CLL

Date: ~~3/18/2019~~ 5/1/23

Project: 1173.000

Water Quality Calculation - Per Ohio EPA requirements

$WQv = Rv \times P \times A$

Rv - Volumetric Runoff Coefficient

P - precipitation depth

A - Area draining to Pervious Pavers (acres)

Table 1 C Values:

Industrial/Commercial

High Density residential (>8dw/ac)

Medium Density res. (4 to 8 dw/ac)

Low Density res (<4 dw/ac)

Open Space and Recreation Area

C = 0.89 for the pervious pavement surface

0.8

0.5

0.4

0.3

0.2

Rv: 0.59 ~~0.518~~

P: 0.9 Per EPA

A: 4.103 Acres

178727 Sq-Ft

i: 0.60 ~~0.52~~

Formula:

$Rv = 0.9i + 0.05$

i - watershed imperviousness ratio, the percent imperviousness divided by 100

$Rv = \frac{0.518}{0.59}$

WQv: 1.9128186 acre-inches

7,909

~~6944~~ cubic feet

REQUIRED for treatment of disturbed area

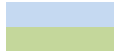
0.159402 acre-feet

1389 cubic feet of sediment volume

WQv

Total: 8332

INPUT
 OUPUT



Required from calcs.

Forebay ~~695~~ CF 791 CF
 Sed. Storage ~~1389~~ CF 1,582 CF
 Extended Det. ~~6944~~ CF 7,909 CF
 Per. Pool Vol. ~~6944~~ CF 7,909 CF

Provided

Forebay ~~1631~~ CF 2,489 CF
 Sed. Storage ~~7133~~ CF 8,517 CF
 Extended Det. ~~55,332~~ CF 57,840 CF
 Per. Pool Vol. ~~8764~~ CF 8,764 CF

APPENDIX E
(Hydrologic Soil Group)

APPENDIX E
(Hydrologic Soil Group)

Custom Soil Resource Report for Franklin County, Ohio



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

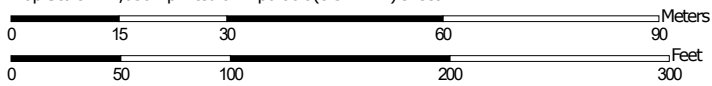
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Map Scale: 1:1,050 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N 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 1:15,800.

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: Franklin County, Ohio
 Survey Area Data: Version 18, Sep 16, 2019

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

Date(s) aerial images were photographed: Aug 4, 2014—Aug 27, 2014

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
Ble1B1	Blount silt loam, end moraine, 2 to 4 percent slopes	3.7	100.0%
Ko	Kokomo silty clay loam, 0 to 2 percent slopes	0.0	0.0%
Totals for Area of Interest		3.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

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onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Franklin County, Ohio

Ble1B1—Blount silt loam, end moraine, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: 2s1j5
Elevation: 700 to 1,300 feet
Mean annual precipitation: 34 to 42 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Blount, end moraine, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blount, End Moraine

Setting

Landform: End moraines on till plains
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wisconsin till derived from limestone and shale

Typical profile

Ap - 0 to 9 inches: silt loam
Bt - 9 to 32 inches: silty clay
BC - 32 to 37 inches: clay loam
Cd - 37 to 79 inches: clay loam

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: 30 to 56 inches to densic material
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 35 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Glynwood, end moraine

Percent of map unit: 9 percent
Landform: End moraines on till plains
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Pewamo, end moraine

Percent of map unit: 6 percent
Landform: End moraines on till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Ko—Kokomo silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2rwj8
Elevation: 820 to 1,140 feet
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 145 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Kokomo and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kokomo

Setting

Landform: Depressions on till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy glaciofluvial deposits derived from sedimentary rock over loamy till derived from limestone and dolomite

Typical profile

Ap - 0 to 11 inches: silty clay loam
Btg - 11 to 41 inches: clay loam
Bt - 41 to 64 inches: clay loam

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2C - 64 to 79 inches: loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Very poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 0 to 6 inches

Frequency of flooding: None

Frequency of ponding: Frequent

Calcium carbonate, maximum in profile: 35 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: C/D

Hydric soil rating: Yes

Minor Components

Celina

Percent of map unit: 5 percent

Landform: Till plains

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Rise

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: No

Crosby

Percent of map unit: 5 percent

Landform: Till plains

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

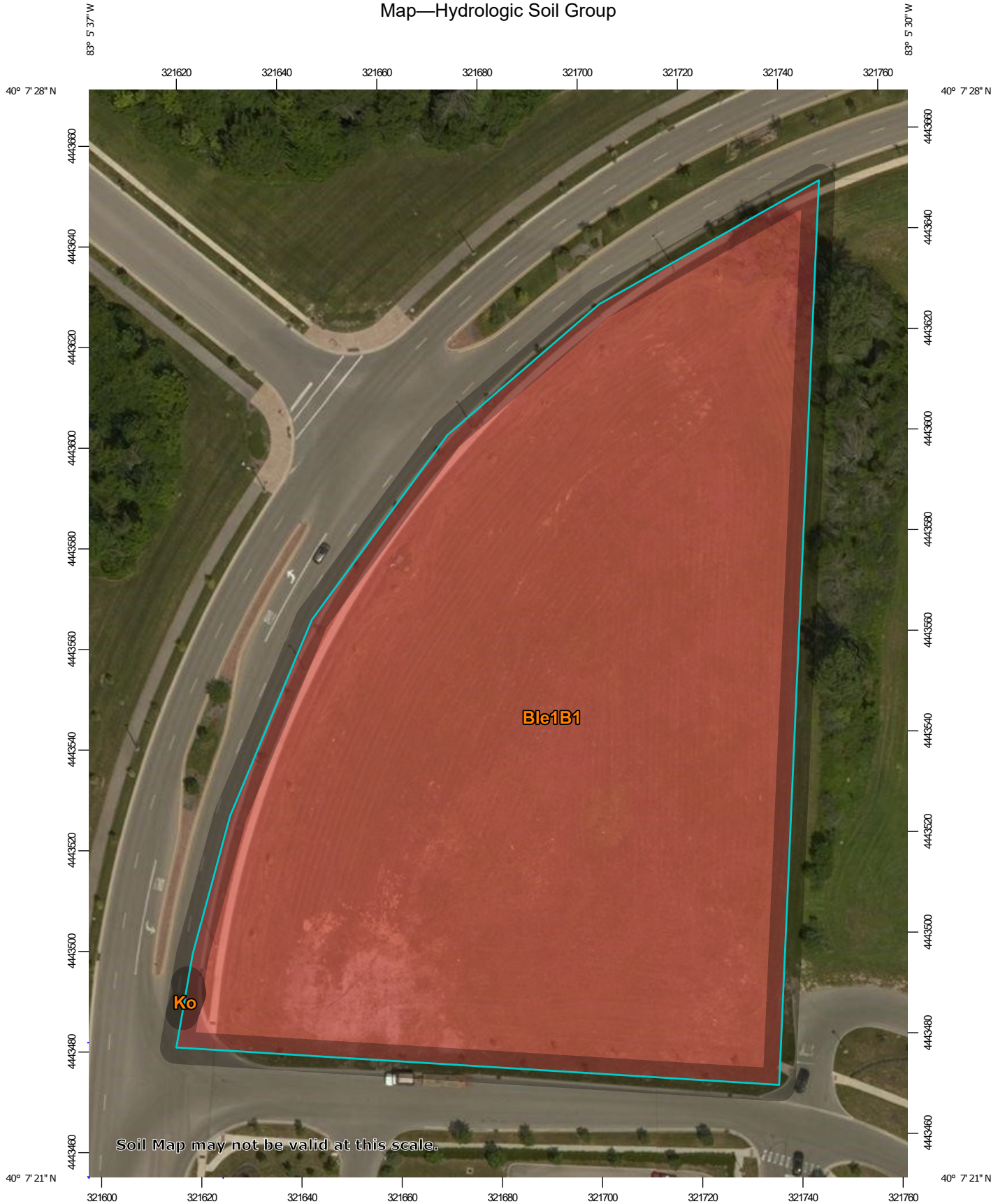
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Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

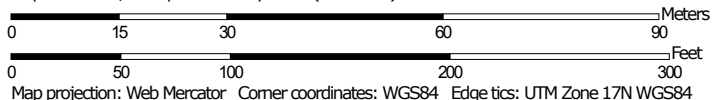
Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

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Map—Hydrologic Soil Group




Map Scale: 1:1,050 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines


-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points






-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available


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 1:15,800.

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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)

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 Survey Area Data: Version 18, Sep 16, 2019

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

Date(s) aerial images were photographed: Aug 4, 2014—Aug 27, 2014

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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Ble1B1	Blount silt loam, end moraine, 2 to 4 percent slopes	D	3.7	100.0%
Ko	Kokomo silty clay loam, 0 to 2 percent slopes	C/D	0.0	0.0%
Totals for Area of Interest			3.7	100.0%

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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