

PRELIMINARY DRAINAGE REPORT

Sherwin Williams

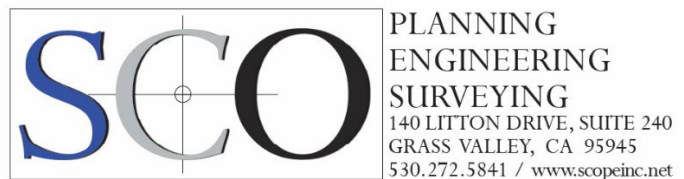
Nevada City Highway and Gates Place Grass Valley, CA 95945



Prepared For:

McWhirter Realty Partners
3100 Pinebrook RD, STE 2600A
Park City, UT 84098

Prepared By:



November 2023

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1. Project Description

The project is located close to the intersection of Nevada City Highway and gates Place. Development includes an approximately 4,365 square foot Sherwin Williams paint store and associated infrastructure. The remaining land will be used for future development.

2. Existing Conditions

2.1 Existing Land Uses

The existing site is undeveloped.

2.2 Existing Site Drainage

Existing site drainage consists of sheet flow across the parcel and into two earthen ditches, described in section 2.3. Portions of the existing site run onto the adjacent parcel and into the storm drain system. Existing flow characteristics result in four DMAs, concentrating in the drainage manhole in Nevada City Highway (East).

2.3 Existing Hydraulics

Existing site Hydraulics consist of two earthen ditches that convey run-on drainage through the development site. Ditches discharge into 36" (East) and 24" (south) culverts with flared end sections. All existing drainage collects in a drainage manhole located in Nevada City Highway.

2.4 Existing Soils Data

Soils data for this preliminary report has been determined from Web Soil Survey (WSS). A geotechnical report will be completed as part of final design.

2.5 Groundwater

No groundwater data exists for the site. Groundwater investigation will be done as part of the geotechnical report.

3. Proposed Conditions

3.1 Proposed Land Uses

Development includes an approximately 4,365 square foot Sherwin Williams paint store and associated infrastructure. The remaining land will be used for future development.

3.2 Proposed Site Drainage

Proposed site drainage routes existing run-on flow through a 36" (East) or 24" (south) HDPE pipe and into the existing culverts. Onsite drainage is collected in downspouts and gutters and directed into treatment areas using drainage inlets, HDPE piping and curb cuts.

Proposed drainage is broken up into five DMAs. Drainage is collected into three separate water quality and attenuation facilities before discharging into either the 24" or 36" bypass piping. See section 5 for additional information on water quality treatment.

4. Hydrologic and Hydraulic Modeling

4.1 Methodology

The hydrology of storm water runoff and drainage was modeled using Hydrology Studio, which follows NRCS TR-55 methodology. The National Resources Conservation Service (NRCS) runoff method and a Severe Convective Storm (SCS) Type IA, 24-hour storm event was used to determine peak values.

Table 1 - Analysis Rainfall Depth

	Active	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Active						✓	✓		✓
SCS Storms	> SCS Dimensionless Storms								
SCS 6hr		1.55	1.86	0	2.28	2.65	3.17	3.60	4.05
Type I, 24-hr		3.68	4.68	0	5.95	6.98	8.35	9.39	10.40
Type IA, 24-hr	✓	3.68	4.68	0	5.95	6.98	8.35	9.39	10.40
Type II, 24-hr		3.68	4.68	0	5.95	6.98	8.35	9.39	10.40
Type II FL, 24-hr		3.68	4.68	0	5.95	6.98	8.35	9.39	10.40
Type III, 24-hr		3.68	4.68	0	5.95	6.98	8.35	9.39	10.40

4.2 Existing Conditions Modeling and Results

Existing run-on drainage flows through the site. As part of the proposed condition this drainage is routed through the site using storm drains. A relatively short portion in relation to the total watershed of earthen ditches are being replaced with storm drain, this has a negligible effect on flow characteristics and is ignored. The predevelopment model and results are included in the appendix of this report.

4.3 Proposed Conditions Modeling and Results

Pipe and Inlet Hydraulics will be provided with the final drainage report, as part of the construction documents. The post development model and results are included in the appendix of this report. At the final outfall manhole, the post development peak outflow is less than the pre-development outflow for the 2-, 10-, 25- and 100-year events. The post development model and results are included in the appendix of this report.

5. Water Quality Management

Water quality is provided using underground chambers, and a bio retention pond. These provide both treatment and attenuation prior to existing the site. The SMARTS Post-Construction Calculator was used to calculate the required water quality volume for the site. Included in the appendix. SMARTS Calculator does not include a section for volume-based treatment, instead providing a water quality volume requirement for the project. This volume was then dispersed to each of the treatment areas based on a weighted average of impervious area.

6. Limitations

This report was prepared on a preliminary level and in general accordance with the accepted standards of practice existing in Northern California for projects of similar size. No warranties, express or implied, are made.

Findings in this report are intended for the exclusive use of the project specified, and the design shown. Use beyond the specified could lead to environmental/structural damage, and noncompliance with regulatory requirements.

Readers should recognize that evaluation and study of hydrologic systems is an inexact art. Conclusions and recommendations are generally made with incomplete knowledge and assumptions. More extensive studies can reduce, but not eliminate the uncertainties associated with hydrologic design. Standard information, such as rainfall data, topographic mapping, and soils data, without verification or modification has been used. New information or regulations could fundamentally influence design. As the project is finalized or as additional information becomes available this report may require change.

Readers and, or reviewers who have additional information that is pertinent to this design or have noted material errors should contact us at the earliest opportunity, to facilitate timely changes.

7. References

California Stormwater Quality Association (CASQA), 2003, Stormwater best management practices handbook, new development and redevelopment

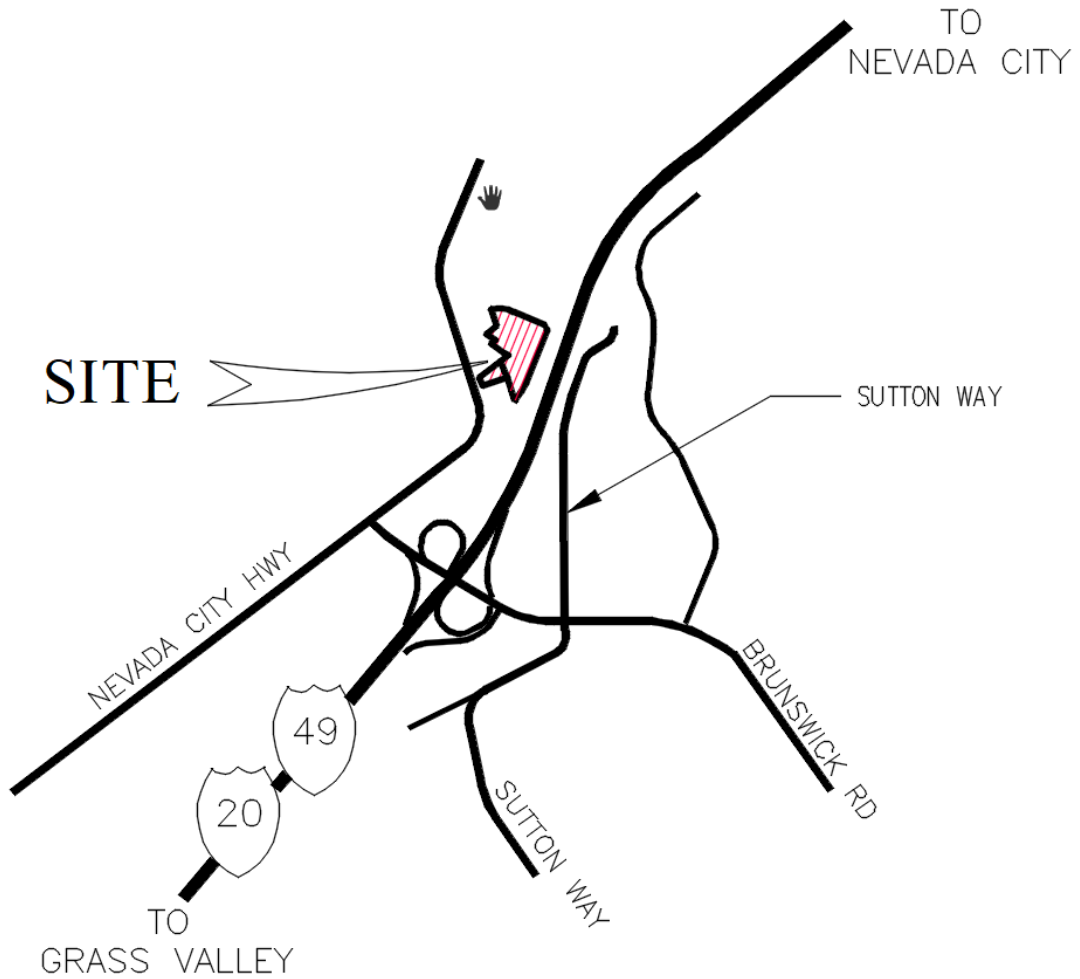
State Water Resources Control Board, 2013, Water quality order no. 2013-0001-DWQ, National pollutant discharge elimination system (NPDES) general permit no. CAS000004, Waste discharge requirements (WDRs) for storm water discharges from small municipal separate storm sewer systems (MS4s) (General Permit)

Town of Truckee, 2003, Town of Truckee Public Improvement and Engineering Standards

US Department of Agriculture (USDA), 1986, Urban hydrology for small watershed TR-55, for the Natural Resources Conservation Service and Conservation Engineering Division,

Plate 1

Project Location Map



VICINITY MAP

NO SCALE

Plate 2

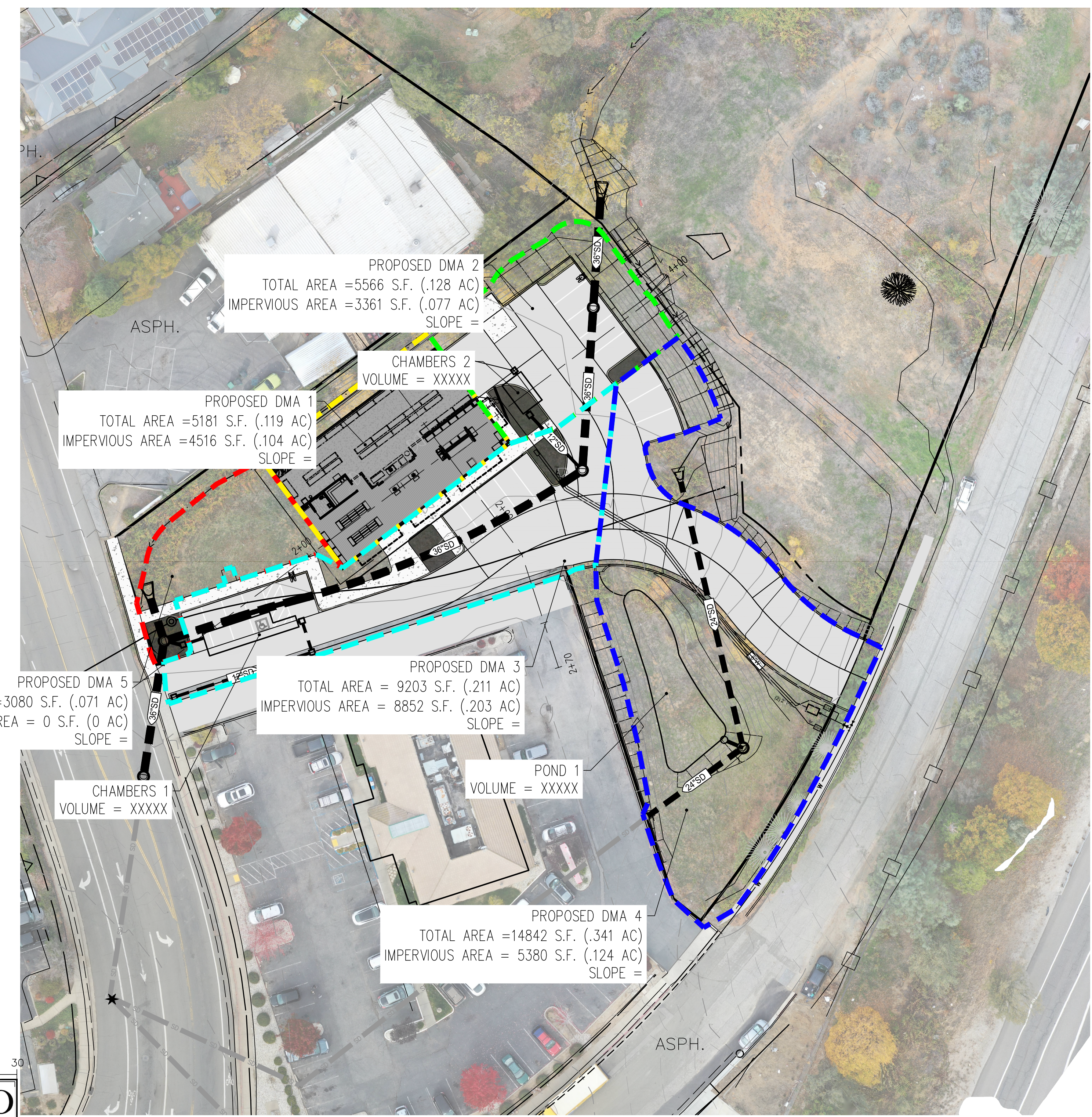
Pre and Post Development Hydrology Map

LEGEND:

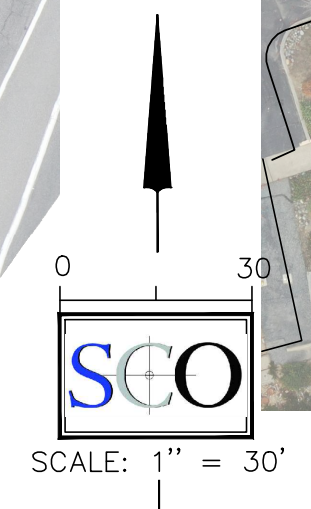
- PROPERTY LINE
- ★ STORMWATER DISCHARGE LOCATION
- FLOW LINE
- SURFACE FLOW DIRECTION
- DRAIN INLET
- 15"SD— STORM DRAIN PIPE



PRE DEVELOPMENT DRAINAGE MAP



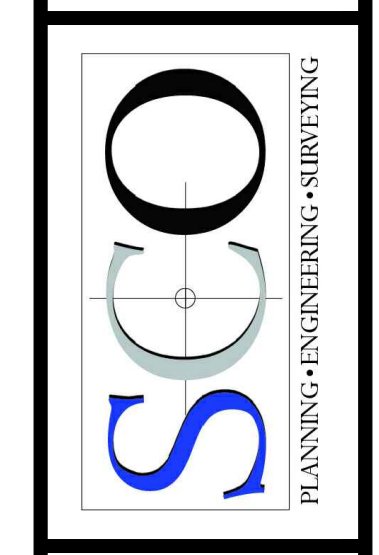
POST DEVELOPMENT DRAINAGE MAP



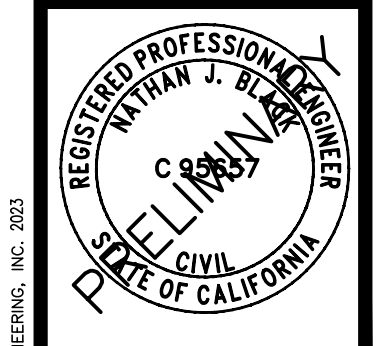
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PROJ. NO: 202345	
DATE: NOVEMBER, 2023	
DWG: SEE DAY STAMP	

SITE PLAN
SHERWIN WILLIAMS
DRAINAGE AREA MAP

TOWN/CITY/COUNTY
CALIFORNIA



GRASS VALLEY
(530) 272-5841
TRUCKEE
(530) 582-4043



S:\- Jobs\202345 Sherwin Williams (Matt McWhirter)\Admin\Reports\Drainage\Drawings\202345 DRAINAGE.dwg, 11/21/2023 10:54:19 AM, AutoCAD PDF (General Documentation).pc3

Appendix A

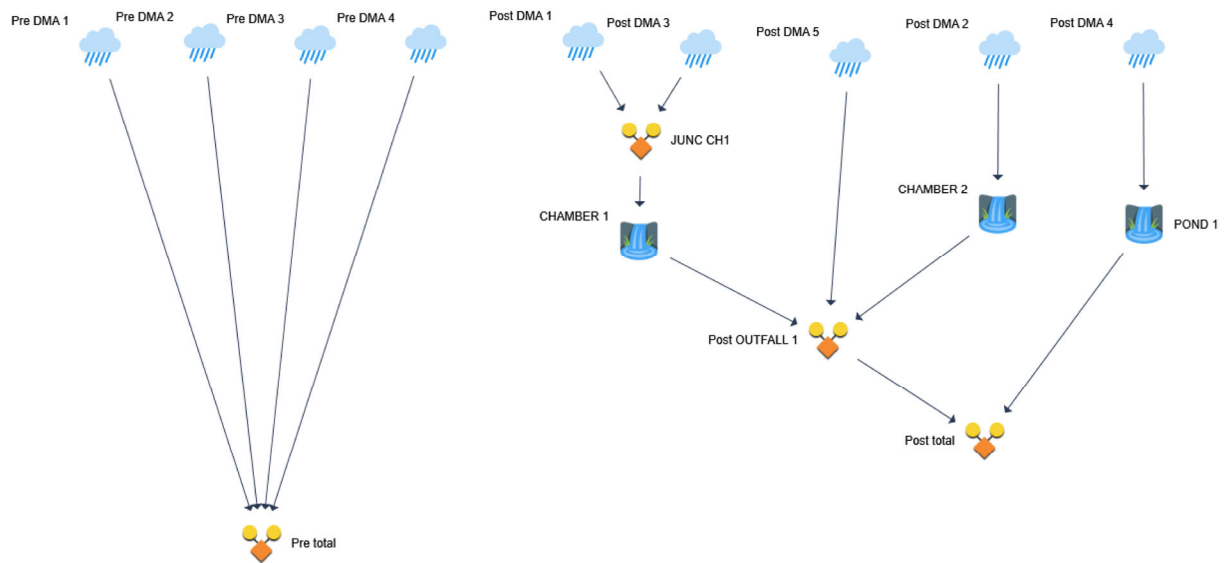
Hydrology Basin Model

Basin Model

Hydrology Studio v 3.0.0.29

Project Name:

11-21-2023



Appendix B

Hydrograph Reports

Hydrograph 2-yr Summary

Project Name:

Hydrology Studio v 3.0.0.29

11-21-2023

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	Pre DMA 1	0.108	7.97	1,718	---		
2	NRCS Runoff	Pre DMA 2	0.174	7.97	2,767	---		
3	NRCS Runoff	Pre DMA 3	0.059	7.93	883	---		
4	NRCS Runoff	Pre DMA 4	0.084	7.93	1,248	---		
5	NRCS Runoff	Post DMA 1	0.119	7.87	1,660	---		
6	NRCS Runoff	Post DMA 2	0.107	7.87	1,485	---		
7	NRCS Runoff	Post DMA 3	0.220	7.83	3,115	---		
8	NRCS Runoff	Post DMA 4	0.231	7.90	3,320	---		
9	NRCS Runoff	Post DMA 5	0.032	7.97	510	---		
10	Junction	JUNC CH1	0.339	7.83	4,775	5, 7		
11	Pond Route	CHAMBER 1	0.271	8.07	4,775	10	103.36	852
12	Pond Route	CHAMBER 2	0.060	8.17	1,325	6	102.61	296
13	Junction	Post OUTFALL 1	0.358	8.03	6,610	9, 11, 12		
14	Pond Route	POND 1	0.057	10.23	3,320	8	100.36	548
15	Junction	Post total	0.412	8.03	9,930	13, 14		
16	Junction	Pre total	0.424	7.97	6,615	1, 2, 3, 4		

Hydrograph 10-yr Summary

Project Name:

Hydrology Studio v 3.0.0.29

11-21-2023

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	Pre DMA 1	0.224	7.93	3,273	---		
2	NRCS Runoff	Pre DMA 2	0.361	7.93	5,273	---		
3	NRCS Runoff	Pre DMA 3	0.113	7.90	1,596	---		
4	NRCS Runoff	Pre DMA 4	0.159	7.90	2,253	---		
5	NRCS Runoff	Post DMA 1	0.183	7.83	2,585	---		
6	NRCS Runoff	Post DMA 2	0.178	7.87	2,450	---		
7	NRCS Runoff	Post DMA 3	0.332	7.83	4,763	---		
8	NRCS Runoff	Post DMA 4	0.415	7.90	5,778	---		
9	NRCS Runoff	Post DMA 5	0.067	7.93	972	---		
10	Junction	JUNC CH1	0.515	7.83	7,347	5, 7		
11	Pond Route	CHAMBER 1	0.514	7.87	7,347	10	103.50	877
12	Pond Route	CHAMBER 2	0.150	8.03	2,289	6	103.22	359
13	Junction	Post OUTFALL 1	0.716	7.93	10,609	9, 11, 12		
14	Pond Route	POND 1	0.069	13.77	5,777	8	100.95	1,619
15	Junction	Post total	0.775	7.93	16,386	13, 14		
16	Junction	Pre total	0.856	7.93	12,396	1, 2, 3, 4		

Hydrograph 25-yr Summary

Project Name:

Hydrology Studio v 3.0.0.29

11-21-2023

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	Pre DMA 1	0.298	7.90	4,262	---		
2	NRCS Runoff	Pre DMA 2	0.480	7.90	6,865	---		
3	NRCS Runoff	Pre DMA 3	0.146	7.90	2,041	---		
4	NRCS Runoff	Pre DMA 4	0.206	7.90	2,879	---		
5	NRCS Runoff	Post DMA 1	0.221	7.83	3,137	---		
6	NRCS Runoff	Post DMA 2	0.219	7.87	3,033	---		
7	NRCS Runoff	Post DMA 3	0.398	7.83	5,745	---		
8	NRCS Runoff	Post DMA 4	0.527	7.87	7,288	---		
9	NRCS Runoff	Post DMA 5	0.089	7.90	1,266	---		
10	Junction	JUNC CH1	0.619	7.83	8,882	5, 7		
11	Pond Route	CHAMBER 1	0.618	7.87	8,882	10	103.54	884
12	Pond Route	CHAMBER 2	0.223	7.83	2,873	6	103.30	365
13	Junction	Post OUTFALL 1	0.928	7.83	13,021	9, 11, 12		
14	Pond Route	POND 1	0.128	9.90	7,287	8	101.08	1,894
15	Junction	Post total	0.990	7.83	20,308	13, 14		
16	Junction	Pre total	1.131	7.90	16,047	1, 2, 3, 4		

Hydrograph 100-yr Summary

Project Name:

Hydrology Studio v 3.0.0.29

11-21-2023

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	Pre DMA 1	0.413	7.90	5,790	---		
2	NRCS Runoff	Pre DMA 2	0.665	7.90	9,326	---		
3	NRCS Runoff	Pre DMA 3	0.196	7.87	2,720	---		
4	NRCS Runoff	Pre DMA 4	0.277	7.87	3,836	---		
5	NRCS Runoff	Post DMA 1	0.277	7.83	3,965	---		
6	NRCS Runoff	Post DMA 2	0.282	7.87	3,912	---		
7	NRCS Runoff	Post DMA 3	0.497	7.83	7,216	---		
8	NRCS Runoff	Post DMA 4	0.694	7.87	9,581	---		
9	NRCS Runoff	Post DMA 5	0.123	7.90	1,720	---		
10	Junction	JUNC CH1	0.774	7.83	11,180	5, 7		
11	Pond Route	CHAMBER 1	0.773	7.87	11,180	10	103.62	897
12	Pond Route	CHAMBER 2	0.284	7.70	3,751	6	103.33	367
13	Junction	Post OUTFALL 1	1.177	7.87	16,651	9, 11, 12		
14	Pond Route	POND 1	0.281	8.40	9,580	8	101.20	2,142
15	Junction	Post total	1.261	8.00	26,232	13, 14		
16	Junction	Pre total	1.551	7.90	21,672	1, 2, 3, 4		

Appendix C

Summary of Peak Flows

Hydrograph by Return Period

Project Name:

Hydrology Studio v 3.0.0.29

11-21-2023

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)							
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1	NRCS Runoff	Pre DMA 1		0.108			0.224	0.298		0.413
2	NRCS Runoff	Pre DMA 2		0.174			0.361	0.480		0.665
3	NRCS Runoff	Pre DMA 3		0.059			0.113	0.146		0.196
4	NRCS Runoff	Pre DMA 4		0.084			0.159	0.206		0.277
5	NRCS Runoff	Post DMA 1		0.119			0.183	0.221		0.277
6	NRCS Runoff	Post DMA 2		0.107			0.178	0.219		0.282
7	NRCS Runoff	Post DMA 3		0.220			0.332	0.398		0.497
8	NRCS Runoff	Post DMA 4		0.231			0.415	0.527		0.694
9	NRCS Runoff	Post DMA 5		0.032			0.067	0.089		0.123
10	Junction	JUNC CH1		0.339			0.515	0.619		0.774
11	Pond Route	CHAMBER 1		0.271			0.514	0.618		0.773
12	Pond Route	CHAMBER 2		0.060			0.150	0.223		0.284
13	Junction	Post OUTFALL 1		0.358			0.716	0.928		1.177
14	Pond Route	POND 1		0.057			0.069	0.128		0.281
15	Junction	Post total		0.412			0.775	0.990		1.261
16	Junction	Pre total		0.424			0.856	1.131		1.551

Appendix D

Stage Storage Report

Pond Report

Project Name:

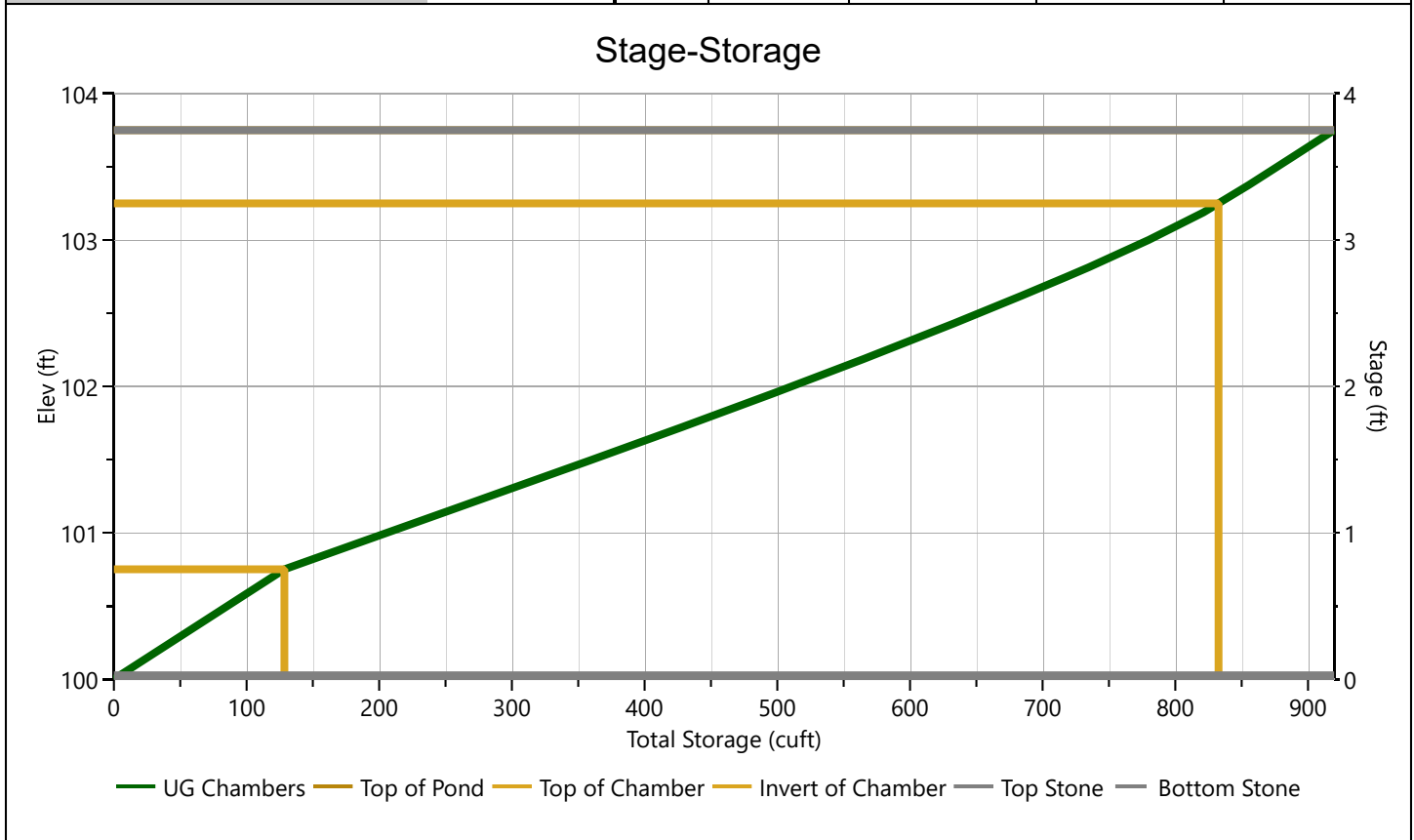
Hydrology Studio v 3.0.0.29

11-21-2023

CHAMBER 1

Stage-Storage

StormTech® SC-780™ Chamber		Stage / Storage Table				
Description	Input	Stage (in)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Chamber Height, in	30	0.0	100.00	428	0.000	0.000
Chamber Shape	Arch	2.3	100.19	428	32.1	32.1
Chamber Width, in	51	4.5	100.38	428	32.1	64.2
Installed Length, ft	7.12	6.8	100.56	428	32.1	96.4
No. Chambers	10	9.0	100.75	428	32.1	128
Bare Chamber Stor, cuft	462	11.3	100.94	428	58.1	187
No. Rows	2	13.5	101.13	428	58.4	245
Space Between Rows, in	6	15.8	101.31	428	58.1	303
Stone Above, in	6	18.0	101.50	428	57.6	361
Stone Below, in	9	20.3	101.69	428	57.0	418
Stone Sides, in	12	22.5	101.88	428	56.2	474
Stone Ends, in	12	24.8	102.06	428	55.2	529
Encasement Voids, %	40.00	27.0	102.25	428	54.0	583
Encasement Bottom Elevation, ft	100.00	29.3	102.44	428	52.5	636
		31.5	102.63	428	50.6	686
		33.8	102.81	428	48.4	735
		36.0	103.00	428	45.4	780
		38.3	103.19	428	41.2	821
		40.5	103.38	428	34.2	855
		42.8	103.56	428	32.1	887
		45.0	103.75	428	32.1	920



Pond Report

Project Name:

Hydrology Studio v 3.0.0.29

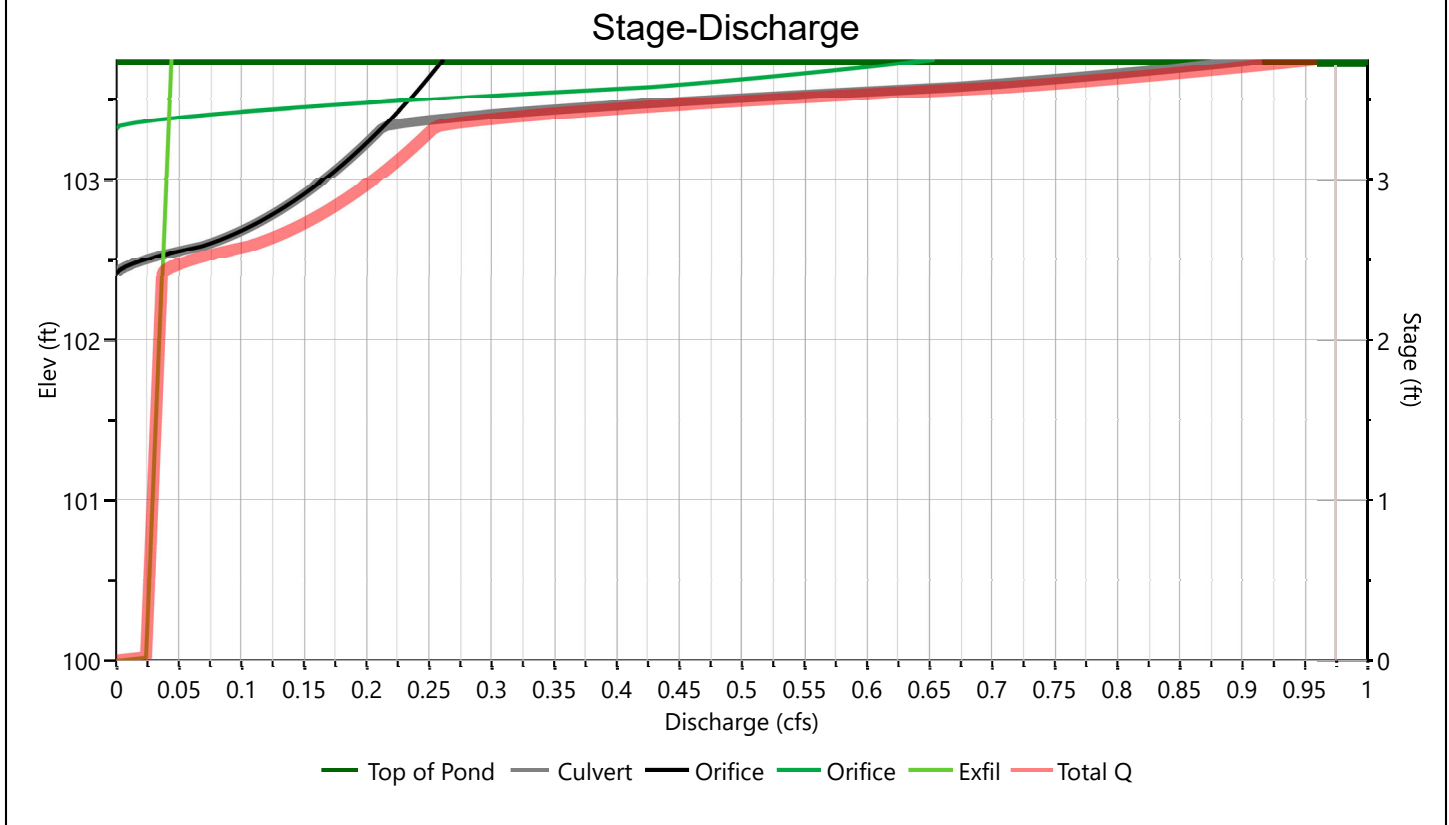
11-21-2023

CHAMBER 1

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser
		1*	2*	3	
Rise, in	12	2	3		Hole Diameter, in
Span, in	12	3.5	12		No. holes
No. Barrels	1	1	1		Invert Elevation, ft
Invert Elevation, ft	100.00	102.42	103.33		Height, ft
Orifice Coefficient, Co	0.60	0.60	0.60		Orifice Coefficient, Co
Length, ft	20				
Barrel Slope, %	1				
N-Value, n	0.013				
Weirs	Riser*	Weirs			Ancillary
		1	2	3	
Shape / Type					Exfiltration, in/hr
Crest Elevation, ft					2.40**
Crest Length, ft					
Angle, deg					
Weir Coefficient, Cw					

*Routes through Culvert. **Rate applied to contours.



Pond Report

Project Name:

Hydrology Studio v 3.0.0.29

11-21-2023

CHAMBER 1

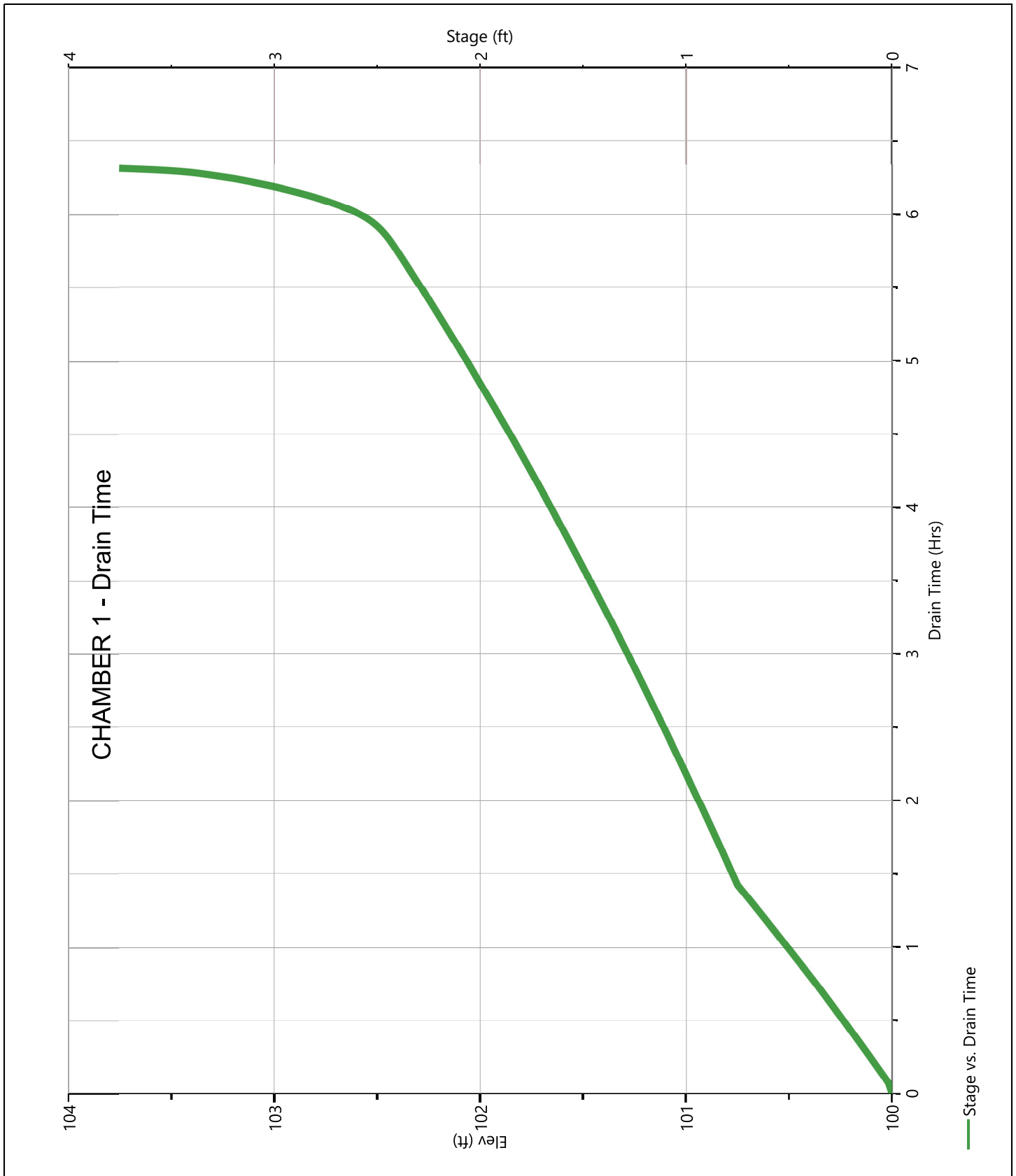
Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	100.00	0.000	0.000	0.000	0.000						0.000		0.000	
0.19	100.19	32.1	0.000	0.000	0.000						0.025		0.025	
0.38	100.38	64.2	0.000	0.000	0.000						0.026		0.026	
0.56	100.56	96.4	0.000	0.000	0.000						0.027		0.027	
0.75	100.75	128	0.000	0.000	0.000						0.028		0.028	
0.94	100.94	187	0.000	0.000	0.000						0.029		0.029	
1.13	101.13	245	0.000	0.000	0.000						0.030		0.030	
1.31	101.31	303	0.000	0.000	0.000						0.031		0.031	
1.50	101.50	361	0.000	0.000	0.000						0.032		0.032	
1.69	101.69	418	0.000	0.000	0.000						0.033		0.033	
1.88	101.88	474	0.000	0.000	0.000						0.034		0.034	
2.06	102.06	529	0.000	0.000	0.000						0.035		0.035	
2.25	102.25	583	0.000	0.000	0.000						0.036		0.036	
2.44	102.44	636	0.002 ic	0.002	0.000						0.037		0.039	
2.63	102.63	686	0.082 ic	0.082	0.000						0.038		0.119	
2.81	102.81	735	0.130 ic	0.130	0.000						0.039		0.169	
3.00	103.00	780	0.165 ic	0.165	0.000						0.040		0.205	
3.19	103.19	821	0.194 ic	0.194	0.000						0.041		0.234	
3.38	103.38	855	0.251 ic	0.219	0.032						0.042		0.293	
3.56	103.56	887	0.623 ic	0.241	0.382						0.043		0.665	
3.75	103.75	920	0.915 ic	0.261	0.654						0.044		0.959	

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

CHAMBER 1

Pond Drawdown



Pond Report

Project Name:

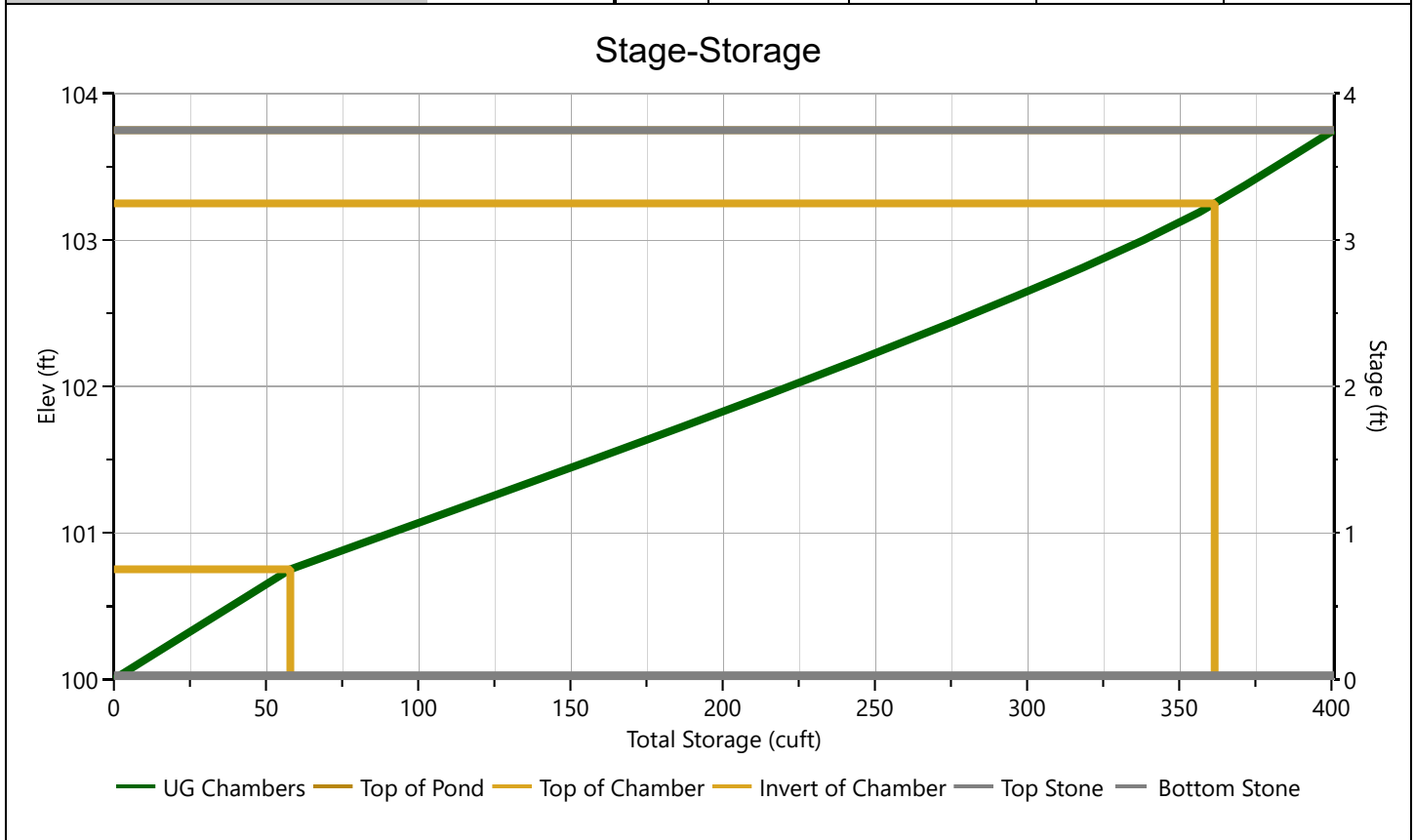
Hydrology Studio v 3.0.0.29

11-21-2023

CHAMBER 2

Stage-Storage

StormTech® SC-780™ Chamber		Stage / Storage Table				
Description	Input	Stage (in)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Chamber Height, in	30	0.0	100.00	193	0.000	0.000
Chamber Shape	Arch	2.3	100.19	193	14.5	14.5
Chamber Width, in	51	4.5	100.38	193	14.5	29.0
Installed Length, ft	7.12	6.8	100.56	193	14.5	43.5
No. Chambers	4	9.0	100.75	193	14.5	58.0
Bare Chamber Stor, cuft	185	11.3	100.94	193	24.9	82.9
No. Rows	2	13.5	101.13	193	25.0	108
Space Between Rows, in	6	15.8	101.31	193	24.9	133
Stone Above, in	6	18.0	101.50	193	24.7	157
Stone Below, in	9	20.3	101.69	193	24.4	182
Stone Sides, in	12	22.5	101.88	193	24.1	206
Stone Ends, in	12	24.8	102.06	193	23.7	230
Encasement Voids, %	40.00	27.0	102.25	193	23.2	253
Encasement Bottom Elevation, ft	100.00	29.3	102.44	193	22.6	276
		31.5	102.63	193	21.9	298
		33.8	102.81	193	21.0	319
		36.0	103.00	193	19.8	338
		38.3	103.19	193	18.1	357
		40.5	103.38	193	15.3	372
		42.8	103.56	193	14.5	386
		45.0	103.75	193	14.5	401



Pond Report

Project Name:

Hydrology Studio v 3.0.0.29

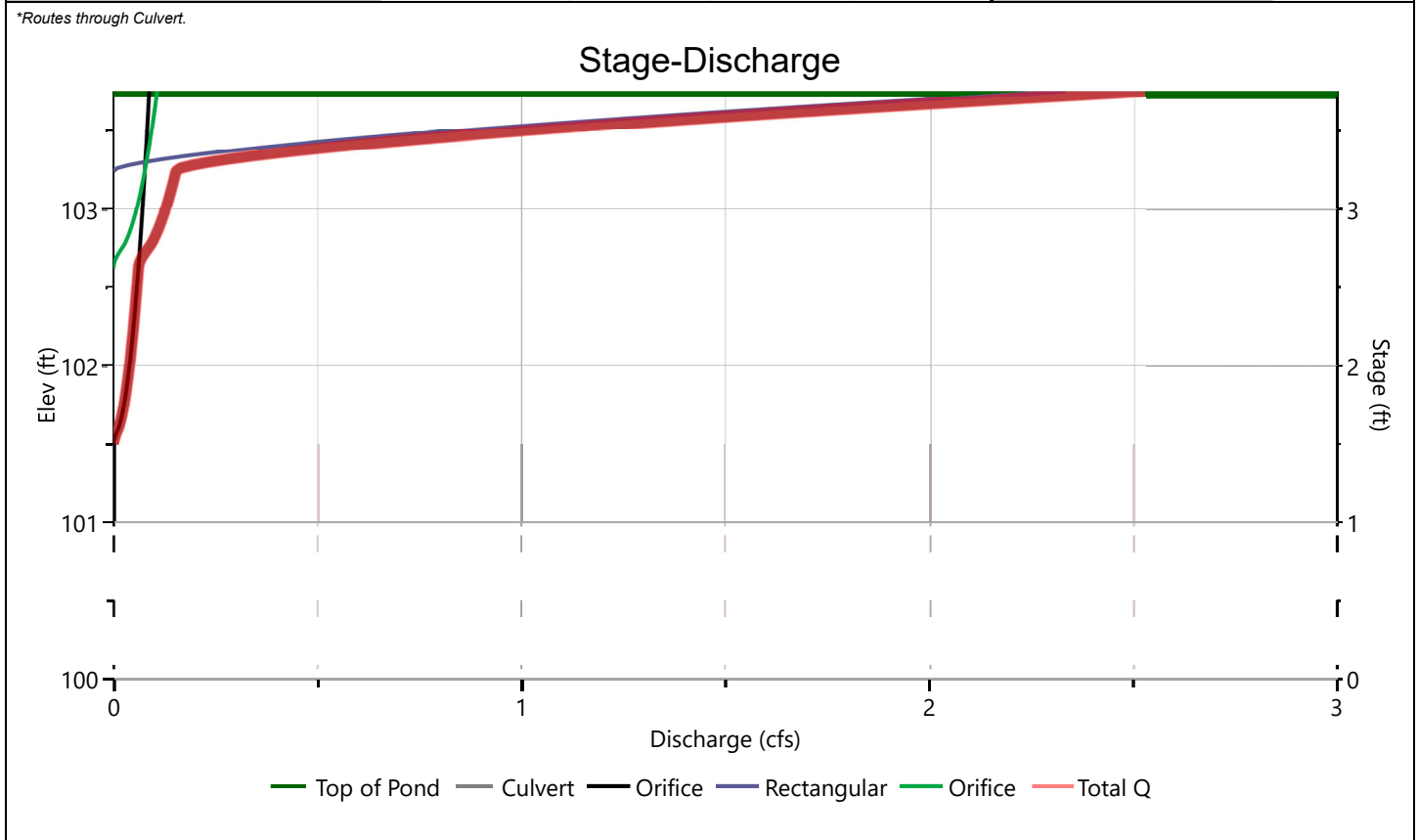
11-21-2023

CHAMBER 2

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser
		1*	2*	3	
Rise, in	12	1.5	2		Hole Diameter, in
Span, in	12	1.5	2		No. holes
No. Barrels	1	1	1		Invert Elevation, ft
Invert Elevation, ft	100.00	101.50	102.63		Height, ft
Orifice Coefficient, Co	0.60	0.60	0.60		Orifice Coefficient, Co
Length, ft	20				
Barrel Slope, %	1				
N-Value, n	0.013				
Weirs	Riser*	Weirs			Ancillary
Shape / Type		Rectangular			Exfiltration, in/hr
Crest Elevation, ft		103.25			
Crest Length, ft		2			
Angle, deg					
Weir Coefficient, Cw		3.3			

*Routes through Culvert.



Pond Report

Project Name:

Hydrology Studio v 3.0.0.29

11-21-2023

CHAMBER 2

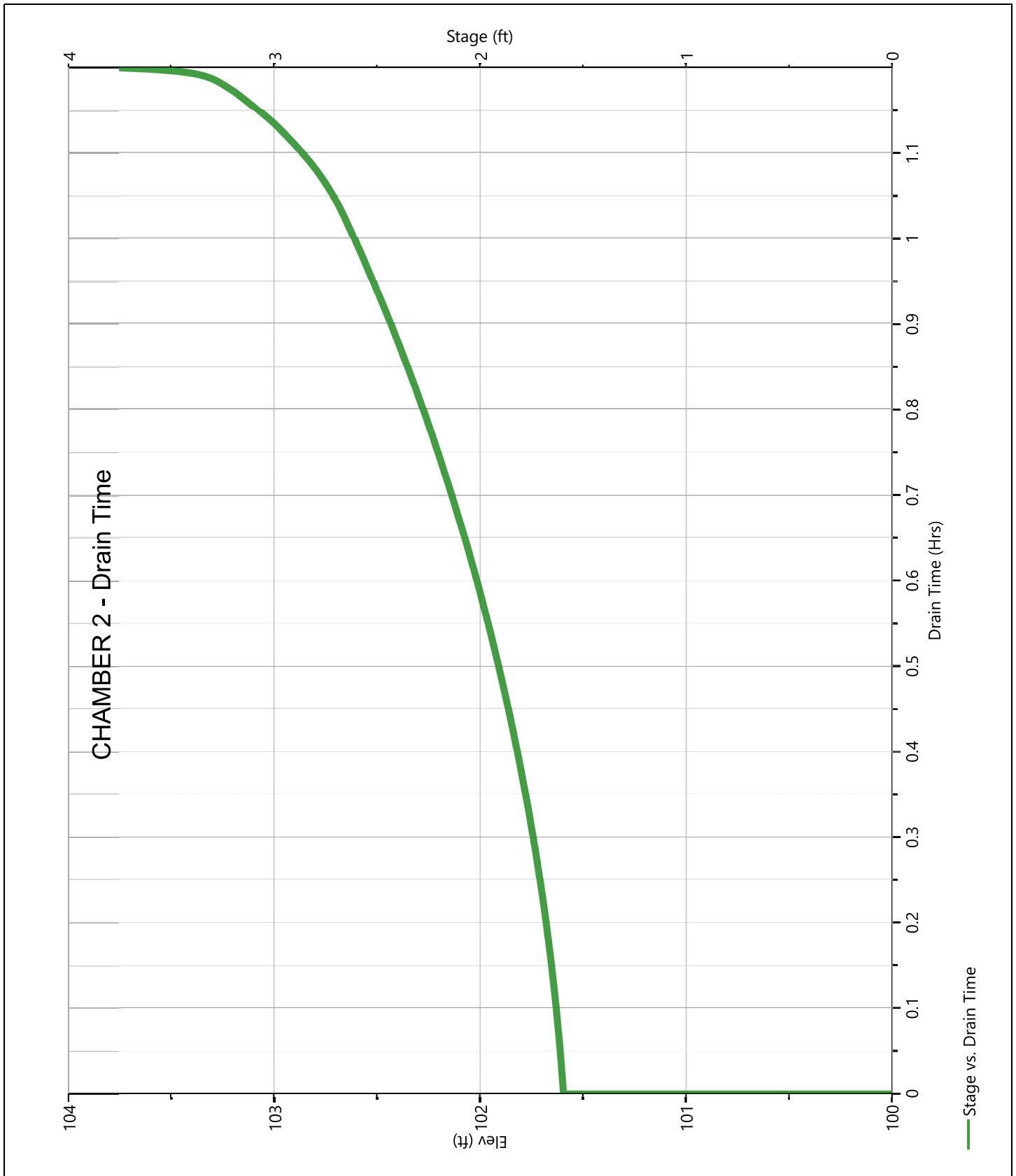
Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	100.00	0.000	0.000	0.000	0.000			0.000						0.000
0.19	100.19	14.5	0.000	0.000	0.000			0.000						0.000
0.38	100.38	29.0	0.000	0.000	0.000			0.000						0.000
0.56	100.56	43.5	0.000	0.000	0.000			0.000						0.000
0.75	100.75	58.0	0.000	0.000	0.000			0.000						0.000
0.94	100.94	82.9	0.000	0.000	0.000			0.000						0.000
1.13	101.13	108	0.000	0.000	0.000			0.000						0.000
1.31	101.31	133	0.000	0.000	0.000			0.000						0.000
1.50	101.50	157	0.000	0.000	0.000			0.000						0.000
1.69	101.69	182	0.021 ic	0.021	0.000			0.000						0.021
1.88	101.88	206	0.033 ic	0.033	0.000			0.000						0.033
2.06	102.06	230	0.042 ic	0.042	0.000			0.000						0.042
2.25	102.25	253	0.049 ic	0.049	0.000			0.000						0.049
2.44	102.44	276	0.055 ic	0.055	0.000			0.000						0.055
2.63	102.63	298	0.061 ic	0.061	0.000			0.000						0.061
2.81	102.81	319	0.099 ic	0.066	0.033			0.000						0.099
3.00	103.00	338	0.127 ic	0.071	0.056			0.000						0.127
3.19	103.19	357	0.148 ic	0.075	0.072			0.000						0.148
3.38	103.38	372	0.457 ic	0.080	0.085			0.292						0.457
3.56	103.56	386	1.333 oc	0.084	0.097			1.153						1.333
3.75	103.75	401	2.528 oc	0.087	0.107			2.333						2.528

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

CHAMBER 2

Pond Drawdown



Pond Report

Project Name:

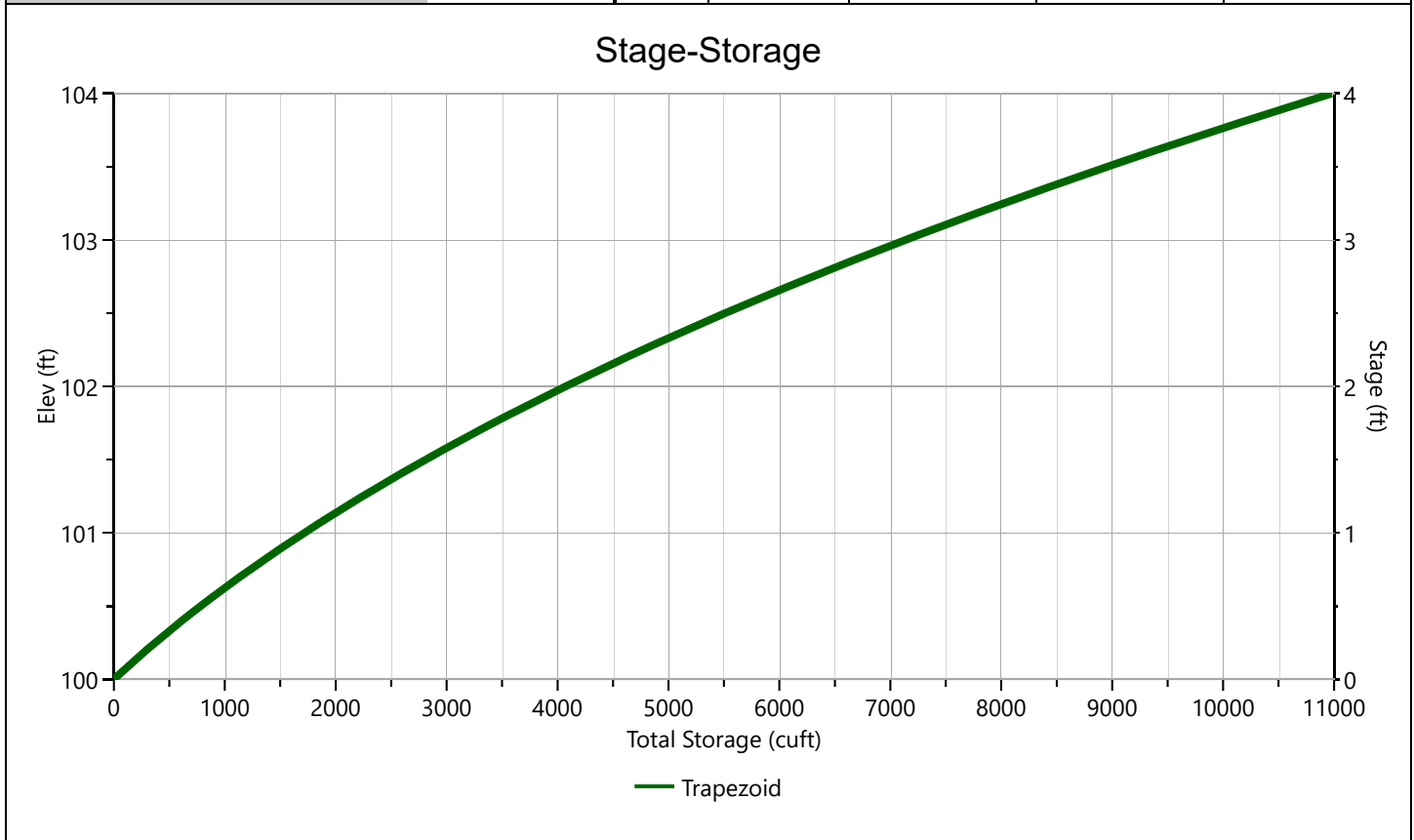
Hydrology Studio v 3.0.0.29

11-21-2023

POND 1

Stage-Storage

Trapezoid		Stage / Storage Table				
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Bottom Elevation, ft	100.00	0.00	100.00	1,425	0.000	0.000
Bottom Length, ft	75.00	0.20	100.20	1,539	296	296
Bottom Width, ft	19.00	0.40	100.40	1,656	320	616
Side Slope, H:1	3.00	0.60	100.60	1,776	343	959
Total Depth, ft	4.00	0.80	100.80	1,899	368	1,327
Voids (%)	100.00	1.00	101.00	2,025	392	1,719
		1.20	101.20	2,154	418	2,137
		1.40	101.40	2,285	444	2,581
		1.60	101.60	2,420	470	3,051
		1.80	101.80	2,557	498	3,549
		2.00	102.00	2,697	525	4,074
		2.20	102.20	2,840	554	4,628
		2.40	102.40	2,986	583	5,210
		2.60	102.60	3,135	612	5,822
		2.80	102.80	3,286	642	6,464
		3.00	103.00	3,441	673	7,137
		3.20	103.20	3,598	704	7,841
		3.40	103.40	3,759	736	8,577
		3.60	103.60	3,922	768	9,345
		3.80	103.80	4,088	801	10,146
		4.00	104.00	4,257	834	10,980



Pond Report

Project Name:

Hydrology Studio v 3.0.0.29

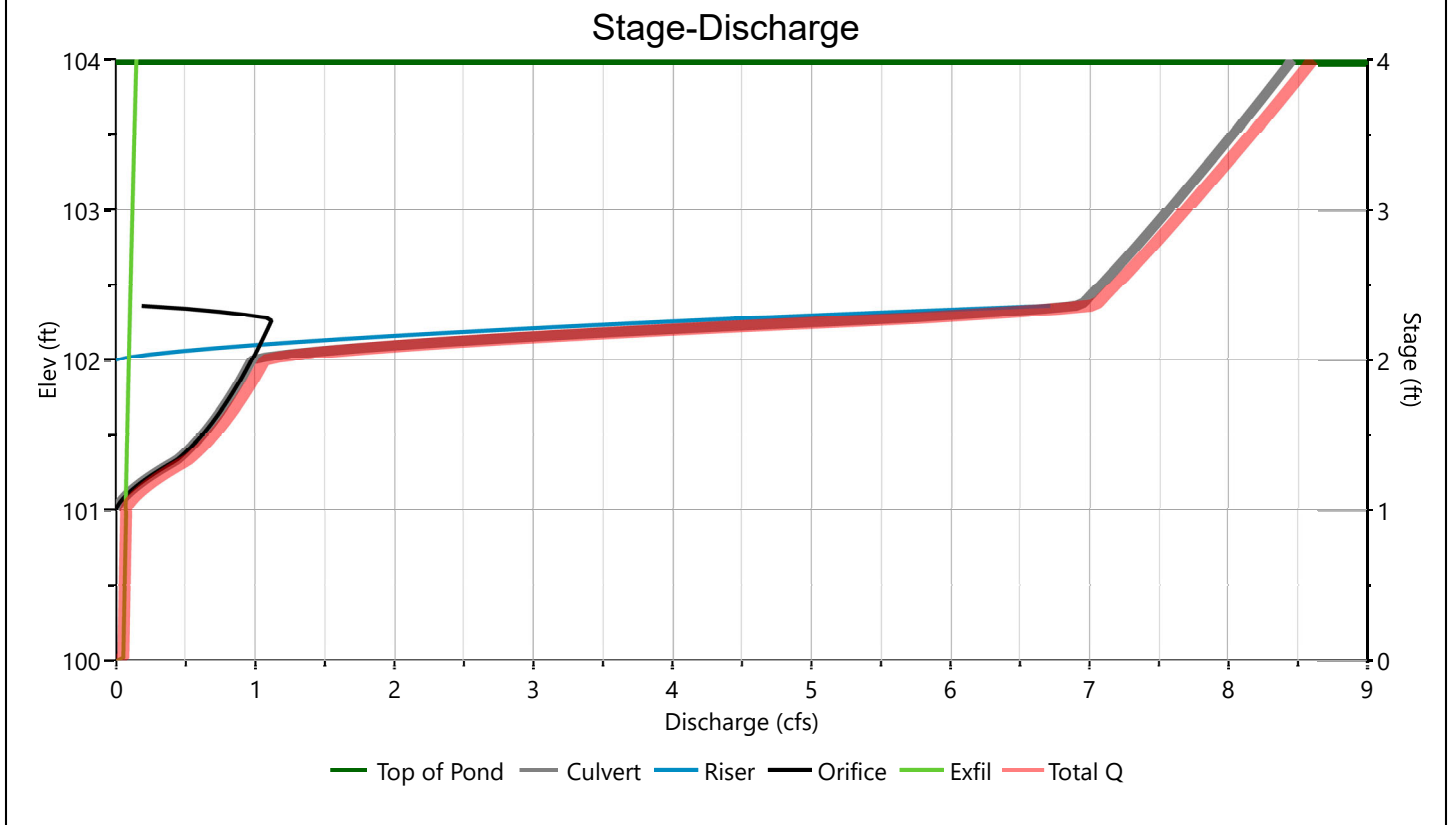
11-21-2023

POND 1

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Orifice Plate
		1*	2	3	
Rise, in	12	4			Orifice Dia, in
Span, in	12	8			No. Orifices
No. Barrels	1	1			Invert Elevation, ft
Invert Elevation, ft	98.50	101.00			Height, ft
Orifice Coefficient, Co	0.60	0.60			Orifice Coefficient, Co
Length, ft	20				
Barrel Slope, %	1				
N-Value, n	0.013				
Weirs	Riser*	Weirs			Ancillary
		1	2	3	
Shape / Type	Circular				Exfiltration, in/hr
Crest Elevation, ft	102				1.50**
Crest Length, ft	9.42				
Angle, deg					
Weir Coefficient, Cw	3.3				

*Routes through Culvert. **Rate applied to contours.



Pond Report

Project Name:

Hydrology Studio v 3.0.0.29

11-21-2023

POND 1

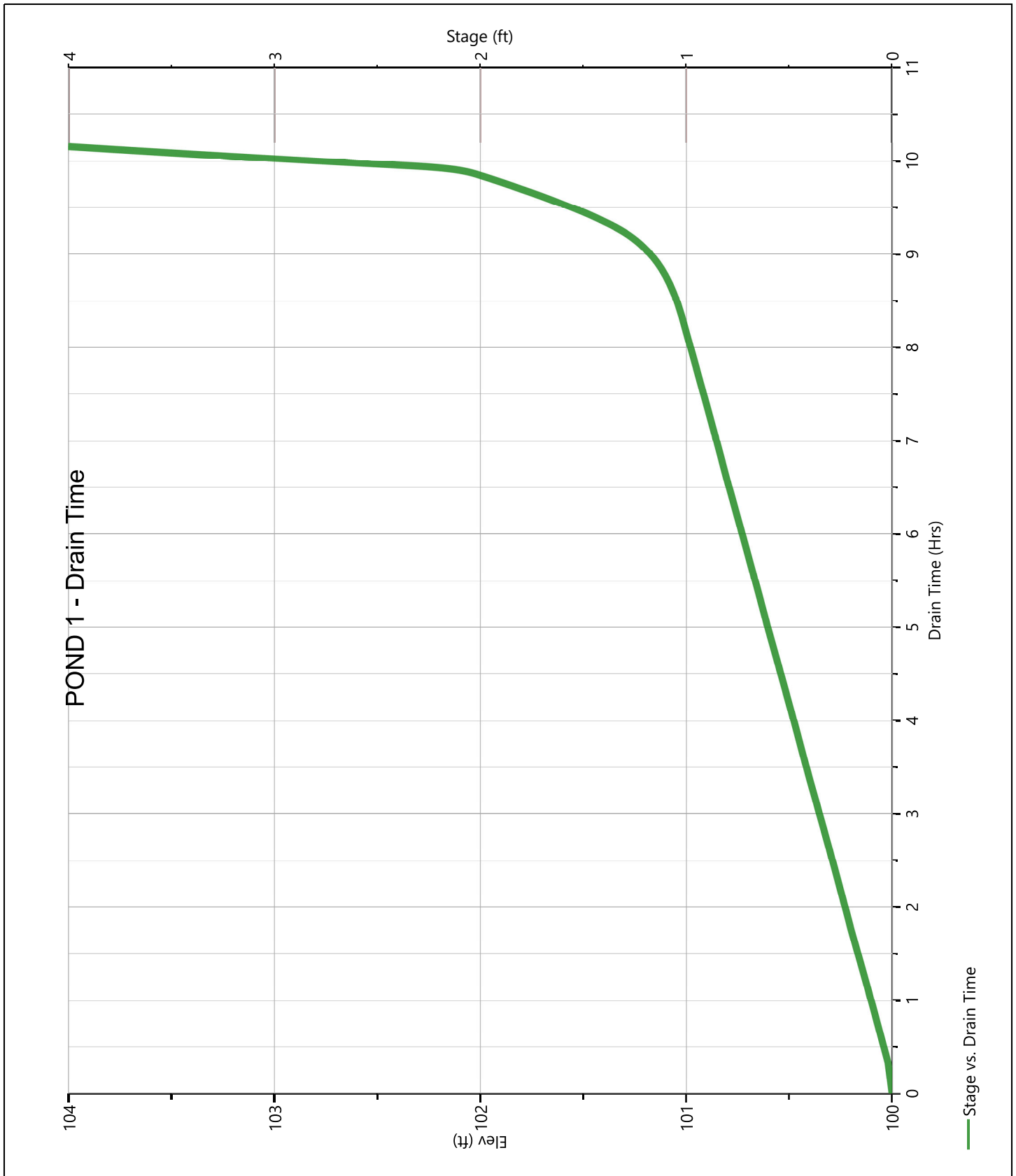
Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	100.00	0.000	0.000	0.000			0.000					0.000		0.000
0.20	100.20	296	0.000 oc	0.000			0.000					0.053		0.053
0.40	100.40	616	0.000 oc	0.000			0.000					0.058		0.058
0.60	100.60	959	0.000 oc	0.000			0.000					0.062		0.062
0.80	100.80	1,327	0.000 oc	0.000			0.000					0.066		0.066
1.00	101.00	1,719	0.000 oc	0.000			0.000					0.070		0.070
1.20	101.20	2,137	0.203 oc	0.203			0.000					0.075		0.278
1.40	101.40	2,581	0.517 oc	0.517			0.000					0.079		0.596
1.60	101.60	3,051	0.704 oc	0.704			0.000					0.084		0.788
1.80	101.80	3,549	0.852 oc	0.852			0.000					0.089		0.940
2.00	102.00	4,074	0.977 oc	0.977			0.000					0.094		1.070
2.20	102.20	4,628	3.868 oc	1.088			2.780					0.099		3.967
2.40	102.40	5,210	6.972 ic	0.000			0.000					0.104		7.076
2.60	102.60	5,822	7.174 ic	0.000			0.000					0.109		7.283
2.80	102.80	6,464	7.371 ic	0.000			0.000					0.114		7.485
3.00	103.00	7,137	7.562 ic	0.000			0.000					0.119		7.682
3.20	103.20	7,841	7.749 ic	0.000			0.000					0.125		7.874
3.40	103.40	8,577	7.932 ic	0.000			0.000					0.131		8.062
3.60	103.60	9,345	8.110 ic	0.000			0.000					0.136		8.246
3.80	103.80	10,146	8.284 ic	0.000			0.000					0.142		8.426
4.00	104.00	10,980	8.455 ic	0.000			0.000					0.148		8.603

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

POND 1

Pond Drawdown



Appendix E

Design Storm and Rainfall Report

Design Storm Report

Custom Storm filename:

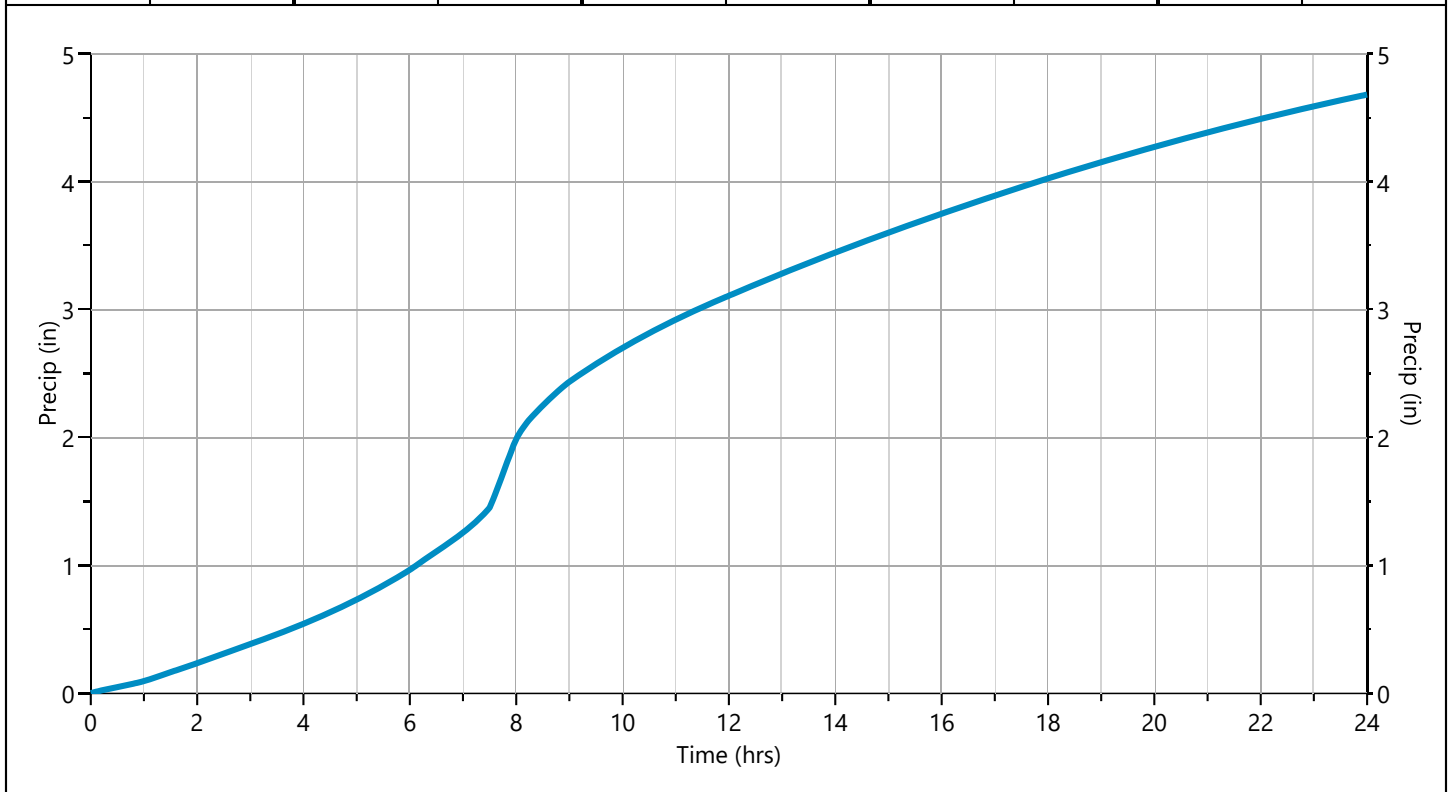
Hydrology Studio v 3.0.0.29

11-21-2023

Storm Distribution: NRCS/SCS - Type IA, 24-hr

Storm Duration	Total Rainfall Volume (in)								
	1-yr	✓ 2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
24 hrs	3.68	4.68	0.00	5.95	6.98	8.35	9.39	10.40	

Incremental Rainfall Distribution, 2-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
6.80	0.009652	7.17	0.012001	7.53	0.031927	7.90	0.036665	8.27	0.016576
6.83	0.009789	7.20	0.012306	7.57	0.033469	7.93	0.035970	8.30	0.015827
6.87	0.009941	7.23	0.012626	7.60	0.034618	7.97	0.035091	8.33	0.015141
6.90	0.010109	7.27	0.012962	7.63	0.035583	8.00	0.034027	8.37	0.014517
6.93	0.010292	7.30	0.013313	7.67	0.036364	8.03	0.023716	8.40	0.013955
6.97	0.010491	7.33	0.013679	7.70	0.036960	8.07	0.022379	8.43	0.013456
7.00	0.010704	7.37	0.014060	7.73	0.037372	8.10	0.021256	8.47	0.013019
7.03	0.010933	7.40	0.014457	7.77	0.037599	8.13	0.020195	8.50	0.012645
7.07	0.011177	7.43	0.014869	7.80	0.037642	8.17	0.019197	8.53	0.015441
7.10	0.011436	7.47	0.015296	7.83	0.037501	8.20	0.018261	8.57	0.014100
7.13	0.011711	7.50	0.015738	7.87	0.037175	8.23	0.017387	8.60	0.013802



Design Storm Report

Custom Storm filename:

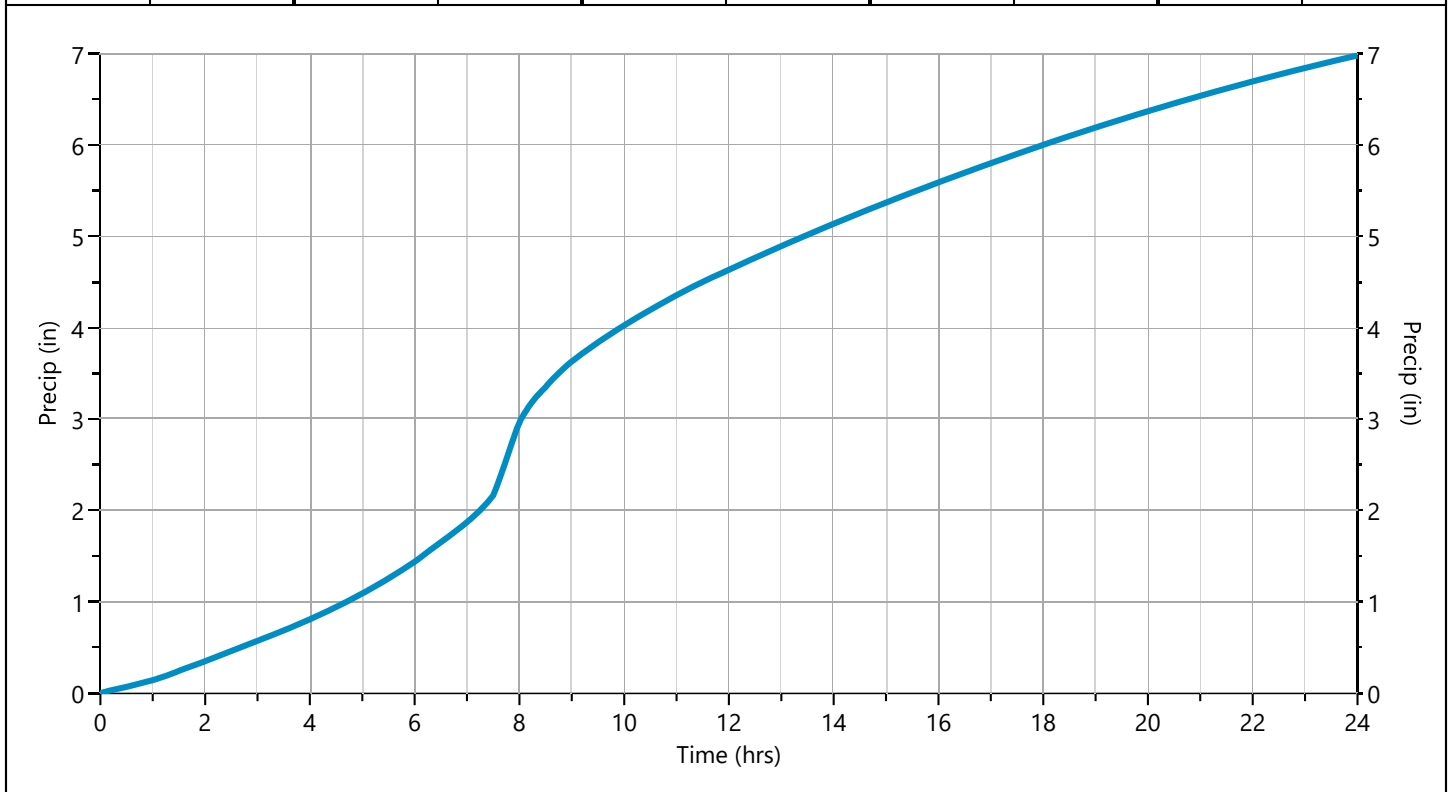
Hydrology Studio v 3.0.0.29

11-21-2023

Storm Distribution: NRCS/SCS - Type IA, 24-hr

Storm Duration	Total Rainfall Volume (in)								
	1-yr	2-yr	3-yr	5-yr	✓ 10-yr	25-yr	50-yr	100-yr	
24 hrs	3.68	4.68	0.00	5.95	6.98	8.35	9.39	10.40	

Incremental Rainfall Distribution, 10-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
6.80	0.014395	7.17	0.017899	7.53	0.047617	7.90	0.054684	8.27	0.024722
6.83	0.014600	7.20	0.018354	7.57	0.049917	7.93	0.053648	8.30	0.023606
6.87	0.014827	7.23	0.018831	7.60	0.051631	7.97	0.052336	8.33	0.022582
6.90	0.015078	7.27	0.019332	7.63	0.053071	8.00	0.050750	8.37	0.021651
6.93	0.015350	7.30	0.019855	7.67	0.054235	8.03	0.035372	8.40	0.020813
6.97	0.015646	7.33	0.020401	7.70	0.055124	8.07	0.033377	8.43	0.020069
7.00	0.015965	7.37	0.020970	7.73	0.055739	8.10	0.031702	8.47	0.019418
7.03	0.016306	7.40	0.021561	7.77	0.056078	8.13	0.030120	8.50	0.018859
7.07	0.016670	7.43	0.022176	7.80	0.056142	8.17	0.028631	8.53	0.023030
7.10	0.017057	7.47	0.022813	7.83	0.055931	8.20	0.027235	8.57	0.021030
7.13	0.017466	7.50	0.023472	7.87	0.055445	8.23	0.025932	8.60	0.020585



Design Storm Report

Custom Storm filename:

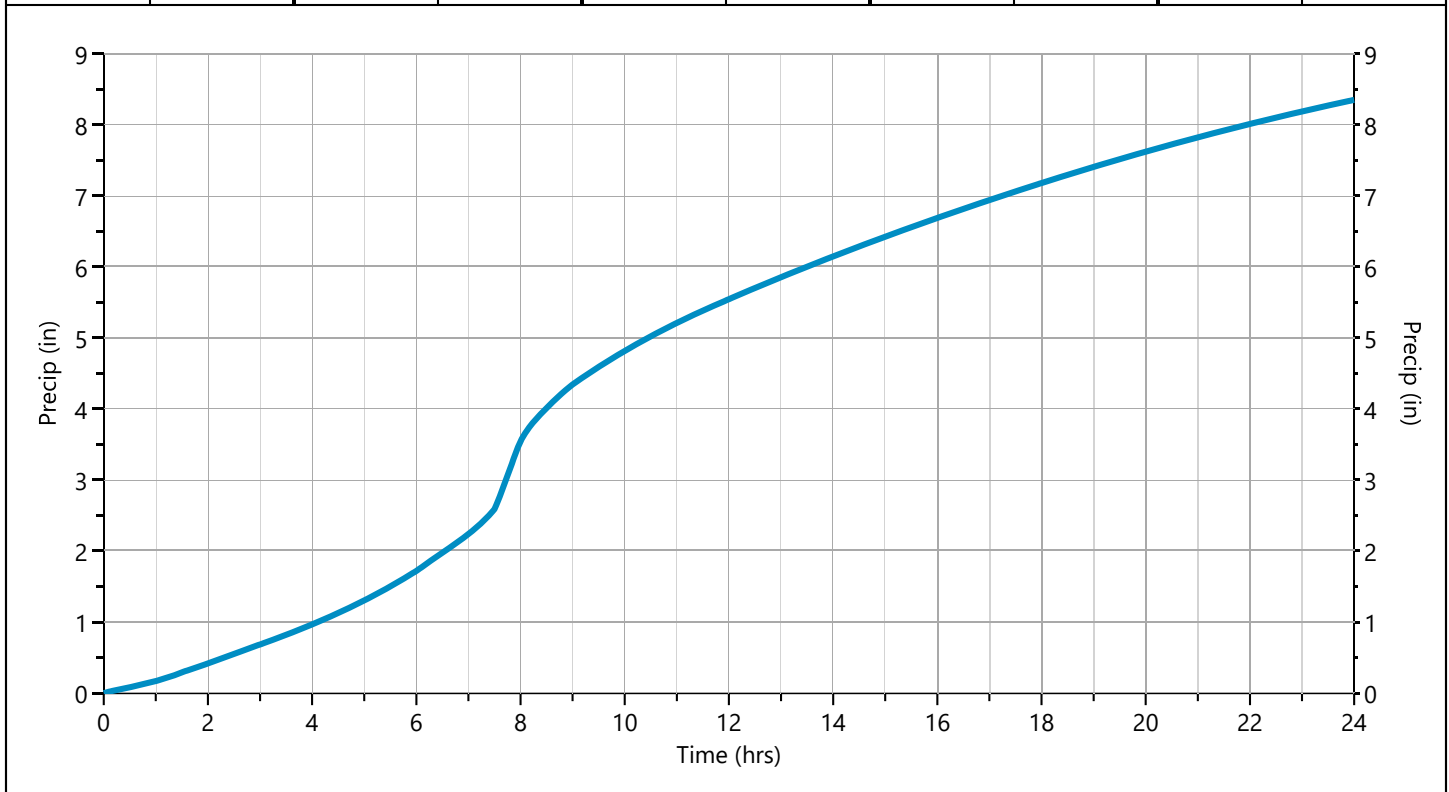
Hydrology Studio v 3.0.0.29

11-21-2023

Storm Distribution: NRCS/SCS - Type IA, 24-hr

Storm Duration	Total Rainfall Volume (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	✓ 25-yr	50-yr	100-yr
24 hrs	3.68	4.68	0.00	5.95	6.98	8.35	9.39	10.40

Incremental Rainfall Distribution, 25-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
6.80	0.017221	7.17	0.021412	7.53	0.056963	7.90	0.065417	8.27	0.029575
6.83	0.017465	7.20	0.021956	7.57	0.059714	7.93	0.064177	8.30	0.028239
6.87	0.017737	7.23	0.022527	7.60	0.061765	7.97	0.062608	8.33	0.027014
6.90	0.018037	7.27	0.023126	7.63	0.063487	8.00	0.060711	8.37	0.025901
6.93	0.018363	7.30	0.023752	7.67	0.064880	8.03	0.042315	8.40	0.024899
6.97	0.018717	7.33	0.024405	7.70	0.065944	8.07	0.039929	8.43	0.024008
7.00	0.019098	7.37	0.025086	7.73	0.066679	8.10	0.037925	8.47	0.023229
7.03	0.019506	7.40	0.025793	7.77	0.067084	8.13	0.036032	8.50	0.022561
7.07	0.019942	7.43	0.026528	7.80	0.067161	8.17	0.034251	8.53	0.027550
7.10	0.020405	7.47	0.027290	7.83	0.066909	8.20	0.032581	8.57	0.025157
7.13	0.020895	7.50	0.028079	7.87	0.066327	8.23	0.031022	8.60	0.024625



Design Storm Report

Custom Storm filename:

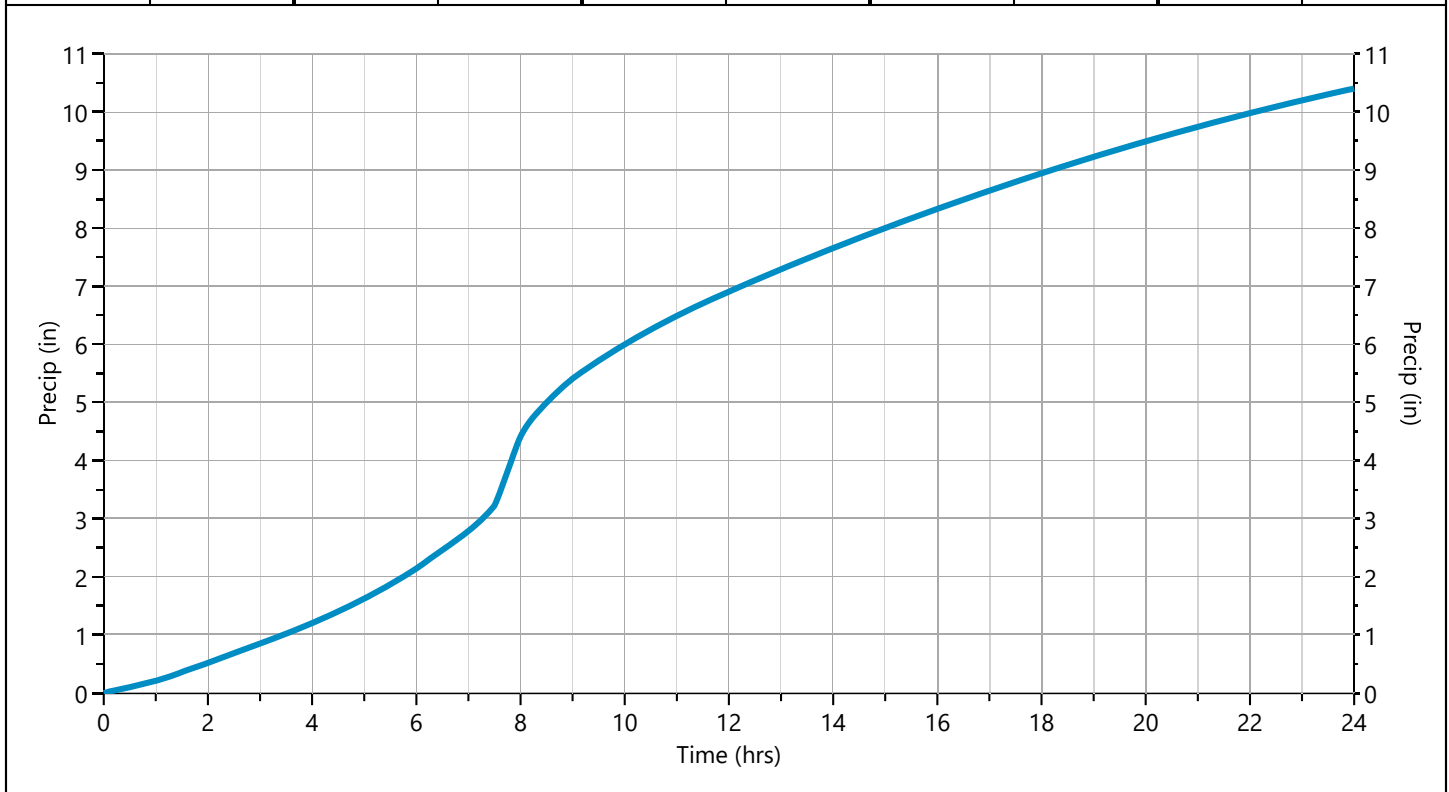
Hydrology Studio v 3.0.0.29

11-21-2023

Storm Distribution: NRCS/SCS - Type IA, 24-hr

Storm Duration	Total Rainfall Volume (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	✓ 100-yr
24 hrs	3.68	4.68	0.00	5.95	6.98	8.35	9.39	10.40

Incremental Rainfall Distribution, 100-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
6.80	0.021448	7.17	0.026668	7.53	0.070948	7.90	0.081477	8.27	0.036835
6.83	0.021753	7.20	0.027346	7.57	0.074375	7.93	0.079933	8.30	0.035172
6.87	0.022092	7.23	0.028058	7.60	0.076929	7.97	0.077980	8.33	0.033646
6.90	0.022465	7.27	0.028804	7.63	0.079074	8.00	0.075616	8.37	0.032259
6.93	0.022872	7.30	0.029583	7.67	0.080809	8.03	0.052703	8.40	0.031012
6.97	0.023313	7.33	0.030397	7.70	0.082134	8.07	0.049732	8.43	0.029902
7.00	0.023787	7.37	0.031244	7.73	0.083049	8.10	0.047235	8.47	0.028932
7.03	0.024296	7.40	0.032126	7.77	0.083554	8.13	0.044878	8.50	0.028100
7.07	0.024838	7.43	0.033041	7.80	0.083650	8.17	0.042659	8.53	0.034314
7.10	0.025414	7.47	0.033990	7.83	0.083335	8.20	0.040580	8.57	0.031333
7.13	0.026024	7.50	0.034973	7.87	0.082611	8.23	0.038638	8.60	0.030671



IDF Report

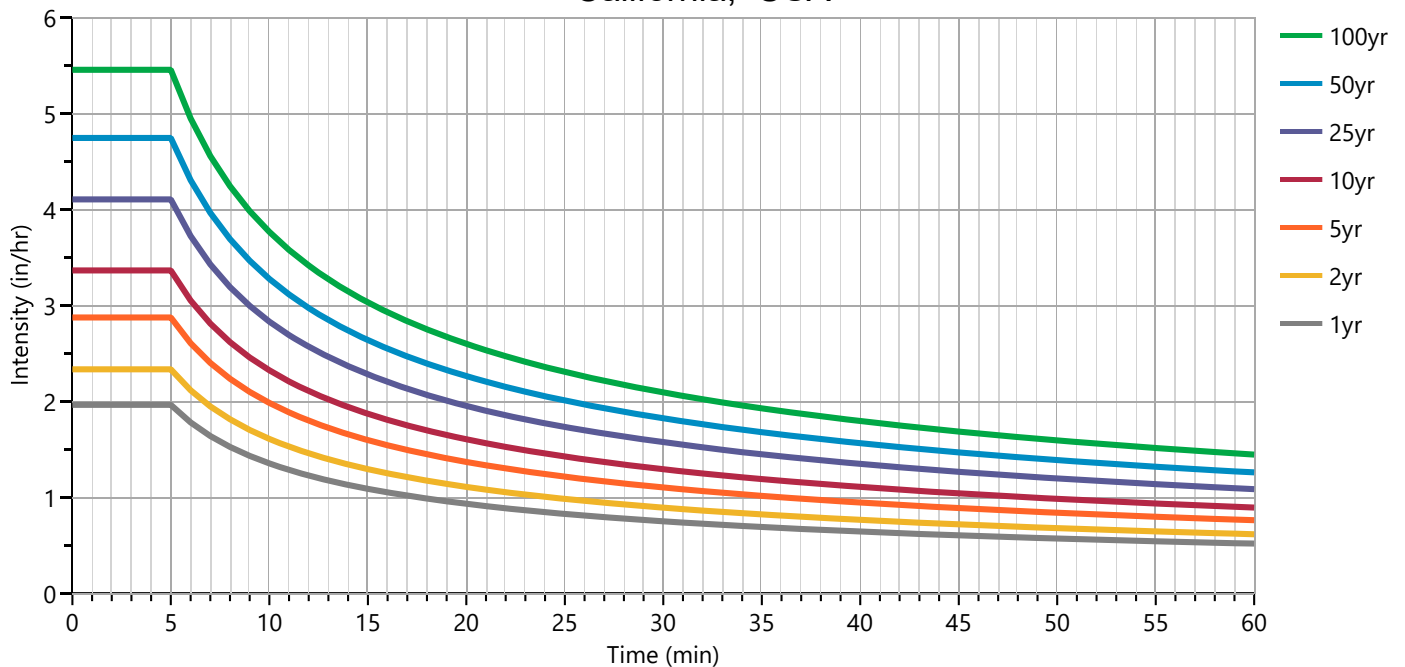
Equation Coefficients	Intensity = B / (Tc + D)^E (in/hr)								
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
B	4.6563	5.5308	0.0000	6.7919	7.9393	9.7106	11.1991	12.8911	
D	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
E	0.5376	0.5371	0.0000	0.5352	0.5343	0.5357	0.5342	0.5349	

Minimum Tc = 5 minutes

Tc (min)	Intensity Values (in/hr)								
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
Cf	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
5	1.96	2.33	0	2.87	3.36	4.10	4.74	5.45	
10	1.35	1.61	0	1.98	2.32	2.83	3.27	3.76	
15	1.09	1.29	0	1.59	1.87	2.28	2.64	3.03	
20	0.93	1.11	0	1.37	1.60	1.95	2.26	2.60	
25	0.83	0.98	0	1.21	1.42	1.73	2.01	2.30	
30	0.75	0.89	0	1.10	1.29	1.57	1.82	2.09	
35	0.69	0.82	0	1.01	1.19	1.45	1.68	1.92	
40	0.64	0.76	0	0.94	1.11	1.35	1.56	1.79	
45	0.60	0.72	0	0.89	1.04	1.26	1.47	1.68	
50	0.57	0.68	0	0.84	0.98	1.19	1.39	1.59	
55	0.54	0.64	0	0.80	0.93	1.13	1.32	1.51	
60	0.52	0.61	0	0.76	0.89	1.08	1.26	1.44	

Cf = Correction Factor applied to Rational Method runoff coefficient.

California, USA



Appendix F

Project Specific Calculator

Post-Construction Water Balance Calculator

1	Post-Construction Water Balance Calculator											
2												
3	User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below		(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.		NEVADA					
4					(Step 1c) If you would like a more precise value select the location closest to your site. If you do not recognize any of these locations, leave this drop-down menu at location. The average value for the County will be used.		GRASS VALLEY NO 2					
5	Project Information				Runoff Calculations							
6	Project Name:		Sherwin Williams		(Step 2) Indicate the Soil Type (dropdown menu to right):		Group C Soils		Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 inch/hr when wet.			
7	Waste Discharge Identification (WDID):		Optional		(Step 3) Indicate the existing dominant non-built land Use Type (dropdown menu to right):		Open Space: grass cover >75%					
8	Date:		Optional		(Step 4) Indicate the proposed dominant non-built land Use Type (dropdown menu to right):		A mix of lawn, grass, pasture and tress covering more than 75% of the open space					
9	Sub Drainage Area Name (from map):		Optional				Complete Either					
10	Runoff Curve Numbers						Sq Ft		Acres			
11	Existing Runoff Curve Number		75		(Step 5) Total Project Site Area:		40075		0.00			
12	Proposed Development Runoff Curve Number		87		(Step 6) Sub-watershed Area:				0.87			
13	Design Storm				Percent of total project :		95%					
14	Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.		1.39		in							
15	The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)		0.67		In		(Step 7) Sub-watershed Conditions		Complete Either			
16	P used for calculations (in) (the greater of the above two criteria)		1.39		In		Sub-watershed Area (acres)		Calculated Acres			
17	^Available at www.cabmphandbooks.com						Sq Ft		Acres			
18					Existing Rooftop Impervious Coverage		0		0			
19					Existing Non-Rooftop Impervious Coverage		1572		0			
20					Proposed Rooftop Impervious Coverage		4516		0			
21					Proposed Non-Rooftop Impervious Coverage		17593		0			
22					Credits		Acres		Square Feet			
23					Porous Pavement		0.00		0			
24					Tree Planting		0.00		0			
25	Pre-Project Runoff Volume (cu ft)		408		Cu.Ft.		Downspout Disconnection		0.00			
26	Project-Related Runoff Volume Increase w/o credits (cu ft)		1,051		Cu.Ft.		Impervious Area Disconnection		0.00			
27							Green Roof		0.00			
28							Stream Buffer		0.00			
29							Vegetated Swales		0.00			
30	Project-Related Volume Increase with Credits (cu ft)		1,051		Cu.Ft.		Subtotal		0.00			
31							Subtotal Runoff Volume Reduction Credit		0 Cu. Ft.			
32	You need to do more impervious area reduction to meet minimum requirements											
33					(Step 9) Impervious Volume Reduction Credits		Volume (cubic feet)					
34					Rain Barrels/Cisterns		0 Cu. Ft.					
35					Soil Quality		0 Cu. Ft.					
36					Subtotal Runoff Volume Reduction		0 Cu. Ft.					
37					Total Runoff Volume Reduction Credit		0 Cu. Ft.					
38												
39												