

Stormwater Detention and Infiltration Design Data Sheet

SDI-Design Data v2.00, Released January 2020

Stormwater Facility Name: **Eagleview Water Quality Pond #1**

Facility Location & Jurisdiction: **El Paso County, Colorado**

User Input: Watershed Characteristics

Extended Detention Basin (EDB) ▼	EDB		
Watershed Area =	120.24	acres	
Watershed Length =	4,200	ft	
Watershed Length to Centroid =	1,900	ft	
Watershed Slope =	0.035	ft/ft	
Watershed Imperviousness =	10.3%	percent	
Percentage Hydrologic Soil Group A =	0.0%	percent	
Percentage Hydrologic Soil Group B =	100.0%	percent	
Percentage Hydrologic Soil Groups C/D =	0.0%	percent	
Target WQCV Drain Time =	40.0	hours	
Location for 1-hr Rainfall Depths (use dropdown):			
User Input ▼			

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Once CUHP has been run and the Stage-Area-Discharge information has been provided, click 'Process Data' to interpolate the Stage-Area-Volume-Discharge data and generate summary results in the table below. Once this is complete, click 'Print to PDF'.

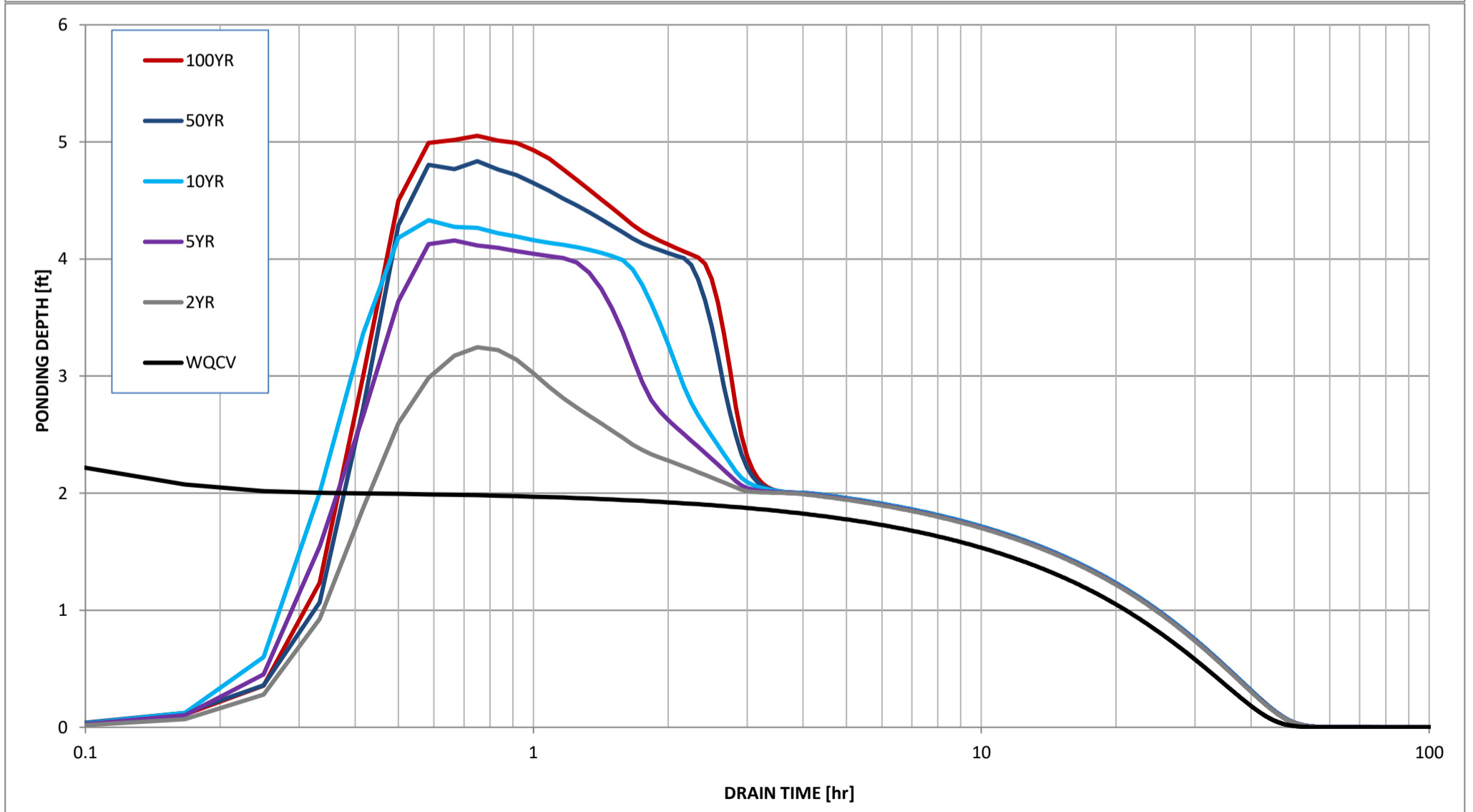
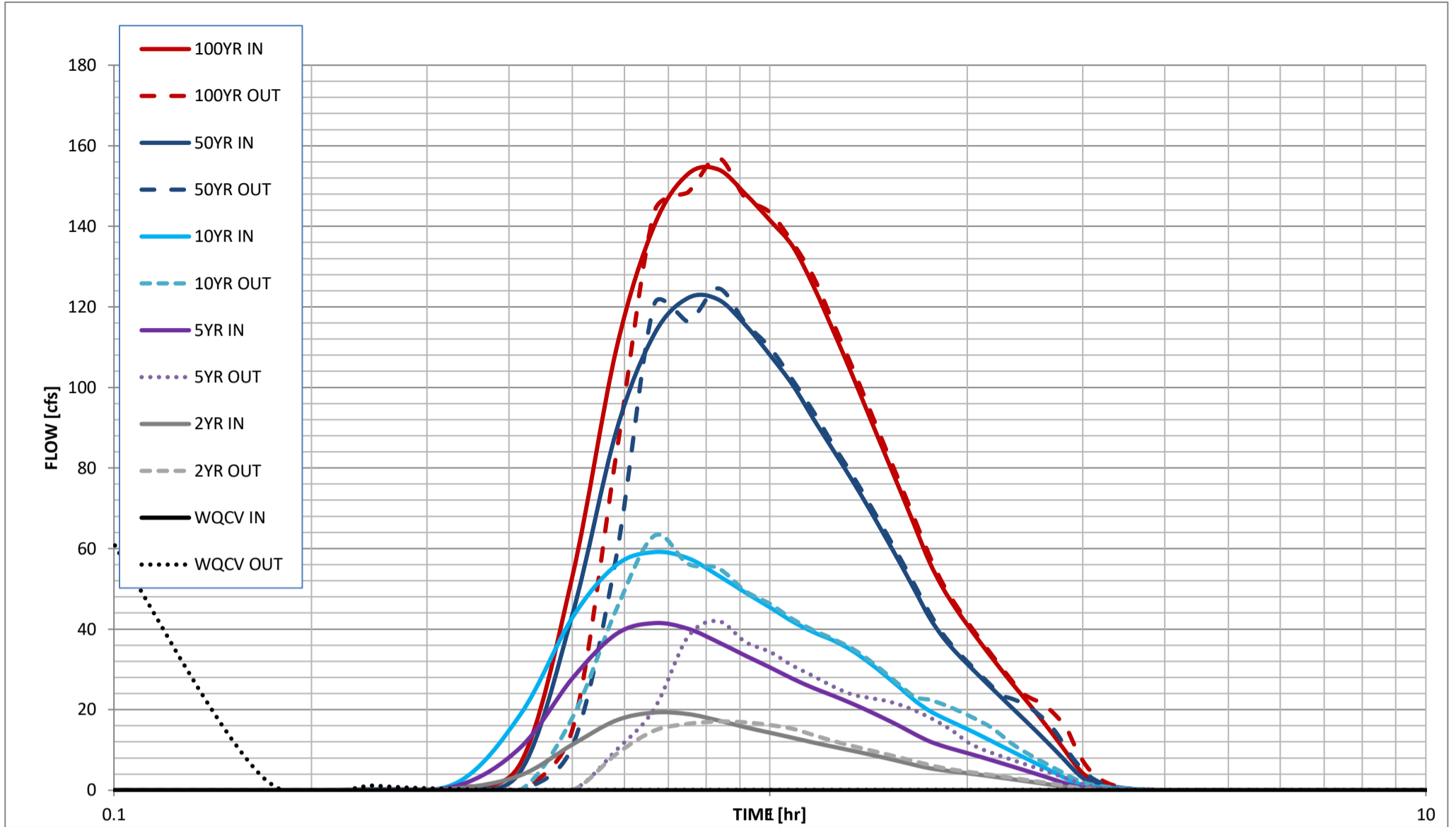
User Defined Stage [ft]	User Defined Area [ft ²]	User Defined Stage [ft]	User Defined Discharge [cfs]
0.00	173	0.00	0.00
1.00	1,485	1.00	0.02
2.00	3,717	2.00	0.05
3.00	5,303	3.00	15.05
4.00	7,015	4.00	23.20
5.00	6,838	5.00	144.85
6.00	11,184	6.00	385.11

After completing and printing this worksheet to a pdf, go to: <https://maperture.digitaldataservices.com/qvh/?viewer=cswdif>
 Create a new stormwater facility, and attach the PDF of this worksheet to that record.

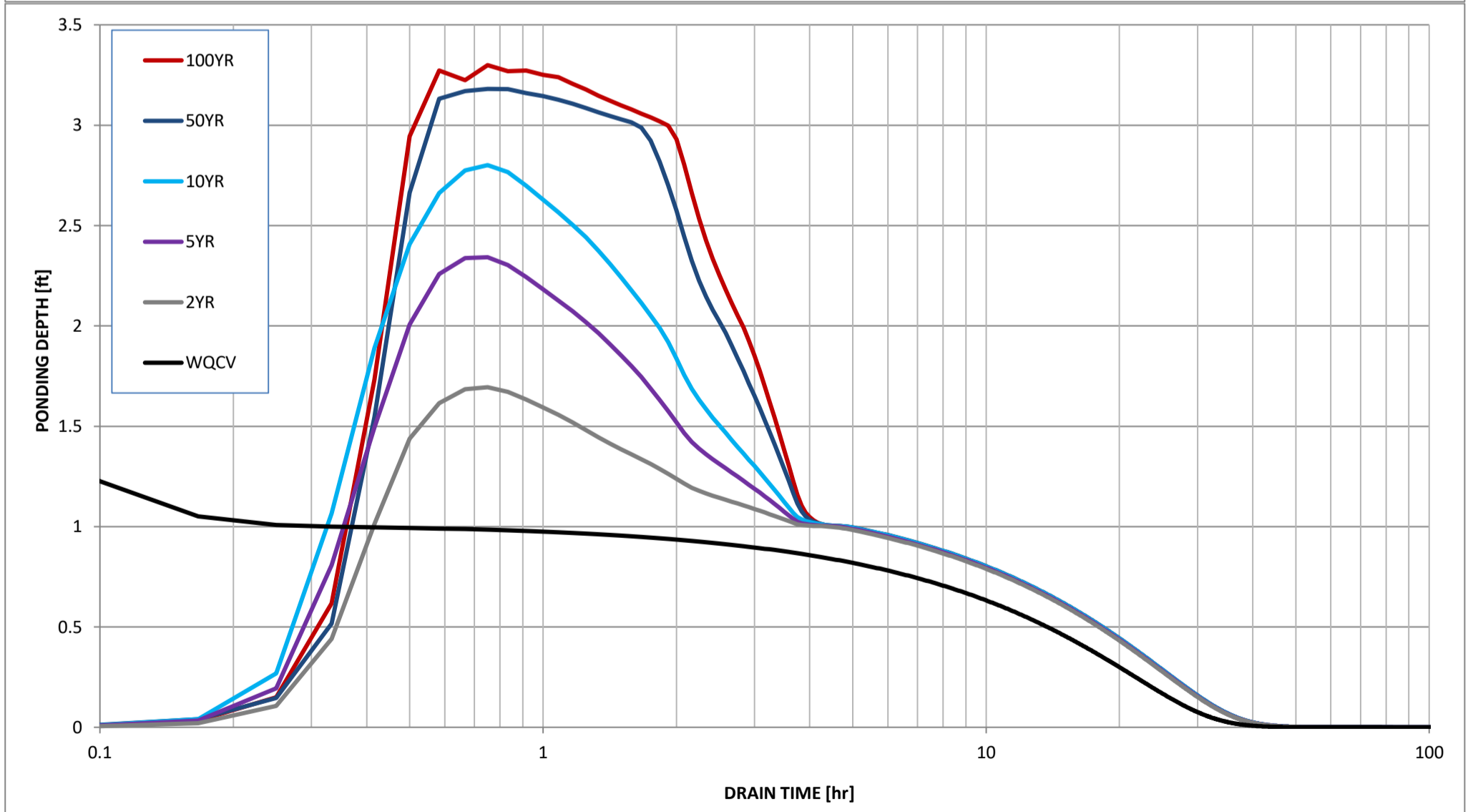
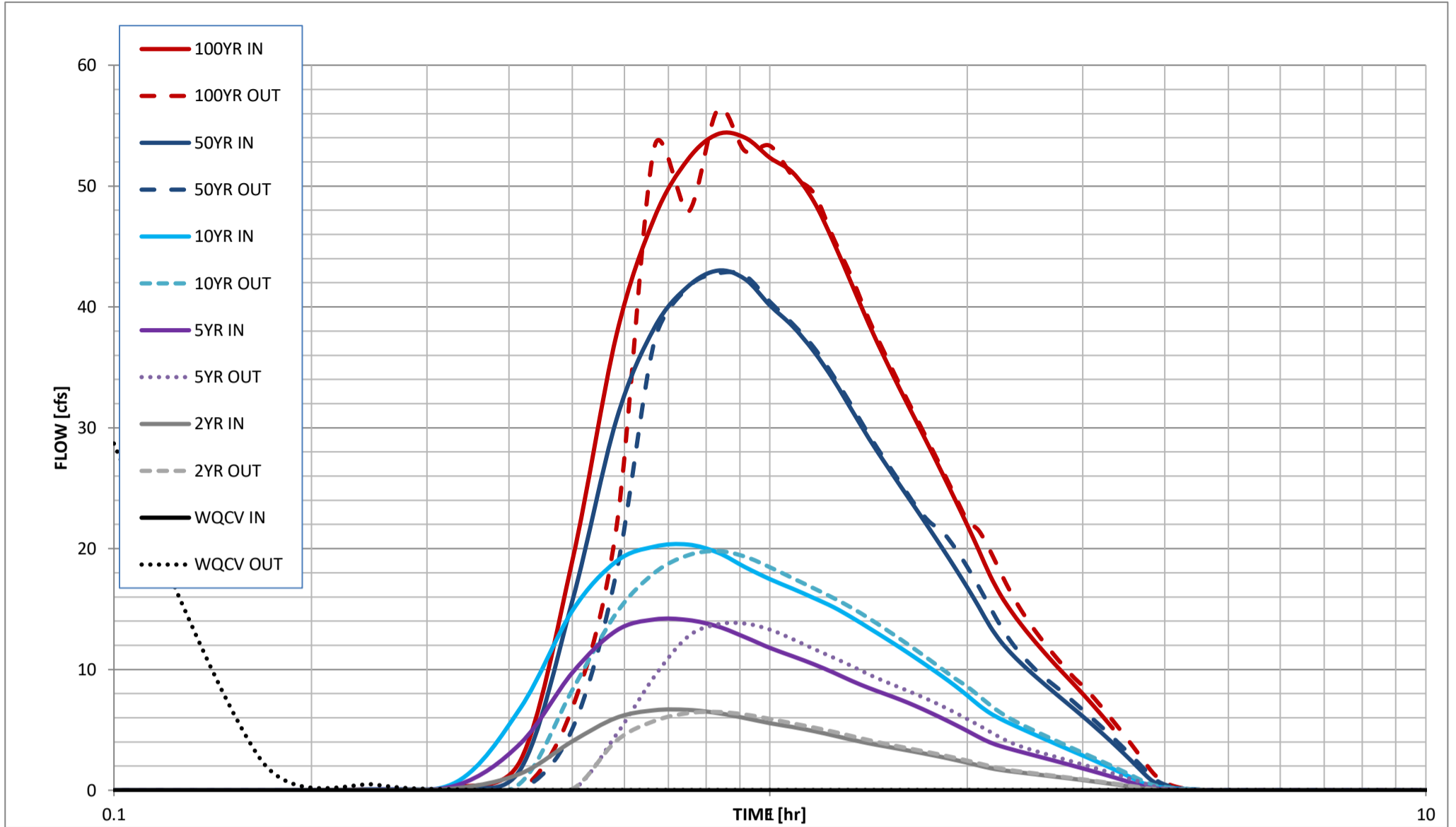
Routed Hydrograph Results

	WQCV	2 Year	5 Year	10 Year	50 Year	100 Year	
Design Storm Return Period =							
One-Hour Rainfall Depth =	N/A	1.19	1.50	1.75	2.25	2.52	in
CUHP Runoff Volume =	0.688	1.636	3.586	5.529	11.339	14.730	acre-ft
Inflow Hydrograph Volume =	N/A	1.636	3.586	5.529	11.339	14.730	acre-ft
Time to Drain 97% of Inflow Volume =	25.8	12.0	2.5	2.3	1.8	1.3	hours
Time to Drain 99% of Inflow Volume =	34.2	26.2	16.7	10.3	2.9	2.9	hours
Maximum Ponding Depth =	6.00	3.25	4.16	4.33	4.84	5.05	ft
Maximum Ponded Area =	0.26	0.13	0.16	0.16	0.16	0.16	acres
Maximum Volume Stored =	0.689	0.213	0.349	0.376	0.456	0.490	acre-ft

Stormwater Detention and Infiltration Design Data Sheet

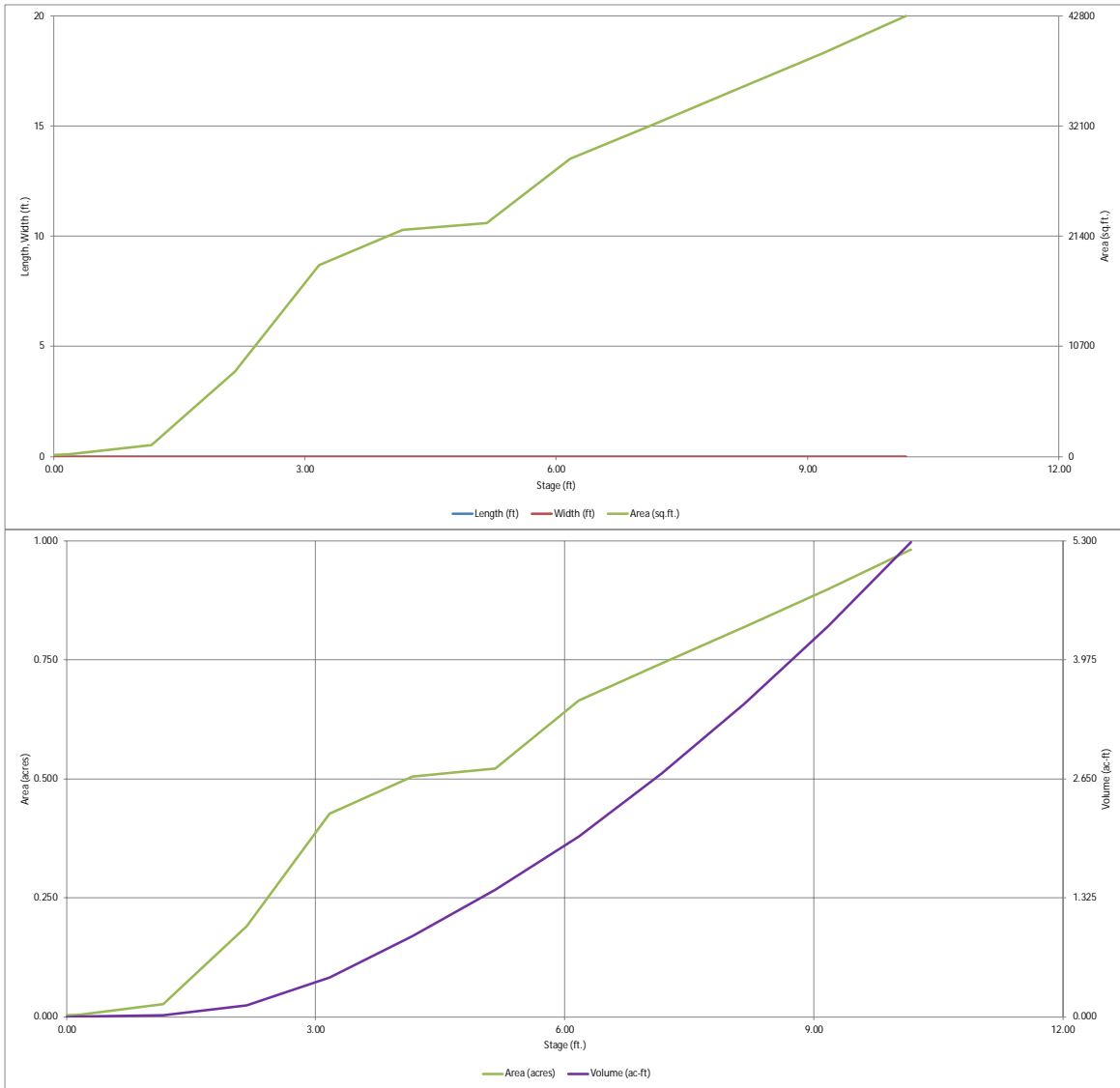


Stormwater Detention and Infiltration Design Data Sheet



DETENTION BASIN STAGE-STORAGE TABLE BUILDER

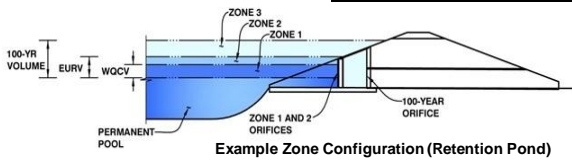
MHFD-Detention, Version 4.04 (February 2021)



DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD- Detention, Version 4.04 (February 2021)

Project: EAGLEVIEW
Basin ID: POND 3



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.79	0.713	Orifice Plate
Zone 2 (EURV)	4.67	0.436	Rectangular Orifice
Zone 3 (100-year)	9.98	3.950	Weir&Pipe (Restrict)
Total (all zones)		5.099	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth = ft (distance below the filtration media surface)
Underdrain Orifice Diameter = inches

Calculated Parameters for Underdrain
Underdrain Orifice Area = ft²
Underdrain Orifice Centroid = feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice = ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = inches
Orifice Plate: Orifice Area per Row = inches

Calculated Parameters for Plate
WQ Orifice Area per Row = ft²
Elliptical Half-Width = feet
Elliptical Slot Centroid = feet
Elliptical Slot Area = ft²

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.63	1.26	1.89	2.52	3.15		
Orifice Area (sq. inches)	1.00	1.00	1.00	1.20	1.20	1.20		

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	<input type="text" value="4.00"/>	<input type="text" value="N/A"/>	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	<input type="text" value="4.67"/>	<input type="text" value="N/A"/>	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	<input type="text" value="3.50"/>	<input type="text" value="N/A"/>	inches
Vertical Orifice Width =	<input type="text" value="16.00"/>	<input type="text" value="N/A"/>	inches

Calculated Parameters for Vertical Orifice
Vertical Orifice Area = ft²
Vertical Orifice Centroid = feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe))

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	<input type="text" value="4.80"/>	<input type="text" value="N/A"/>	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	<input type="text" value="15.00"/>	<input type="text" value="N/A"/>	feet
Overflow Weir Gate Slope =	<input type="text" value="10.00"/>	<input type="text" value="N/A"/>	H:V
Horiz. Length of Weir Sides =	<input type="text" value="5.00"/>	<input type="text" value="N/A"/>	feet
Overflow Gate Type =	<input type="text" value="Type C Gate"/>	<input type="text" value="N/A"/>	
Debris Clogging % =	<input type="text" value="50%"/>	<input type="text" value="N/A"/>	%

Calculated Parameters for Overflow Weir
Height of Gate Upper Edge, H₁ = feet
Overflow Weir Slope Length = feet
Gate Open Area / 100-yr Orifice Area = ft²
Overflow Gate Open Area w/o Debris = ft²
Overflow Gate Open Area w/ Debris = ft²

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	<input type="text" value="0.49"/>	<input type="text" value="N/A"/>	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	<input type="text" value="42.00"/>	<input type="text" value="N/A"/>	inches
Restrictor Plate Height Above Pipe Invert =	<input type="text" value="32.50"/>	<input type="text" value="N/A"/>	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate
Outlet Orifice Area = ft²
Outlet Orifice Centroid = feet
Half-Central Angle of Restrictor Plate on Pipe = radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	<input type="text" value="8.17"/>	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	<input type="text" value="40.00"/>	feet
Spillway End Slopes =	<input type="text" value="4.00"/>	H:V
Freeboard above Max Water Surface =	<input type="text" value="1.00"/>	feet

Calculated Parameters for Spillway
Spillway Design Flow Depth = feet
Stage at Top of Freeboard = feet
Basin Area at Top of Freeboard = acres
Basin Volume at Top of Freeboard = acre-ft

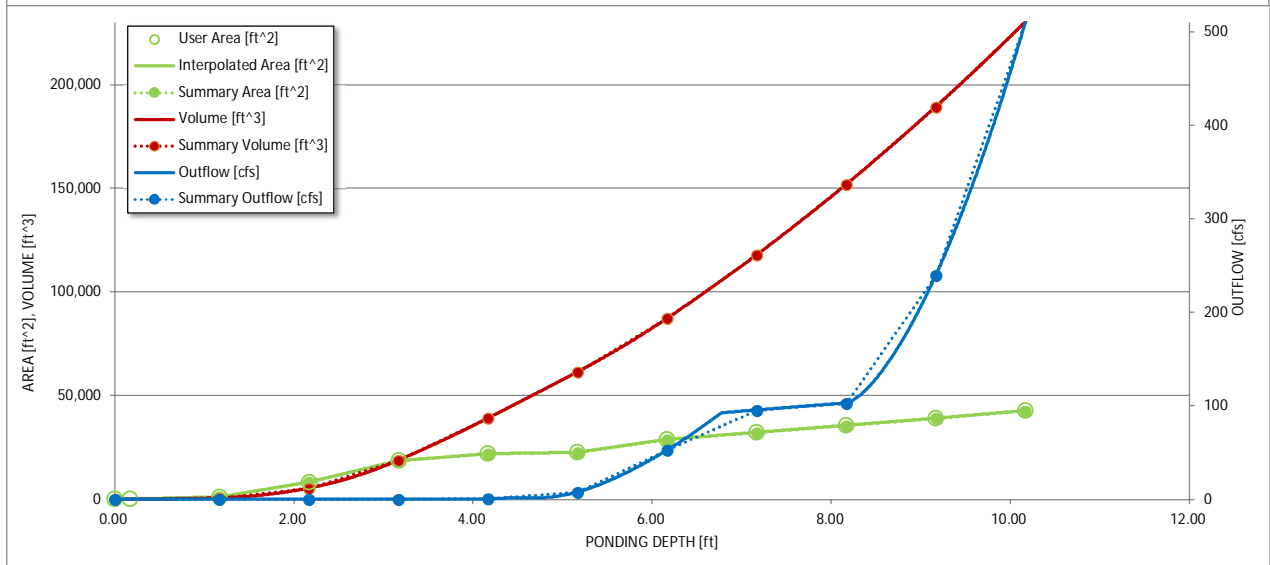
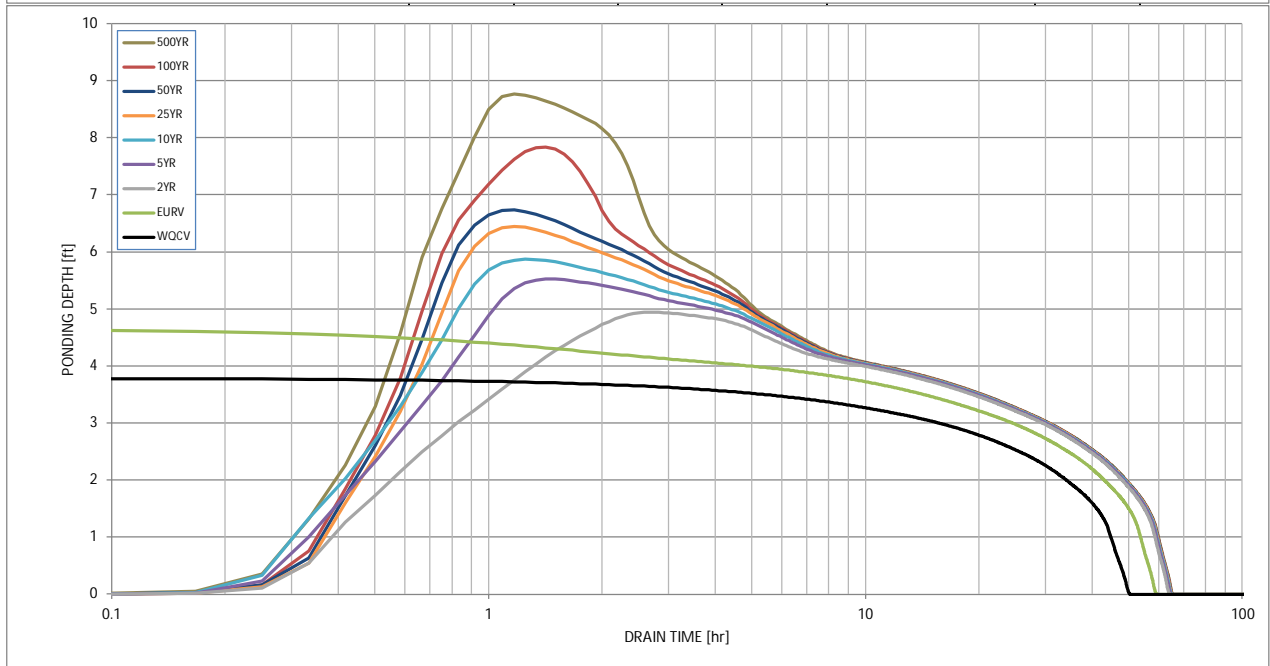
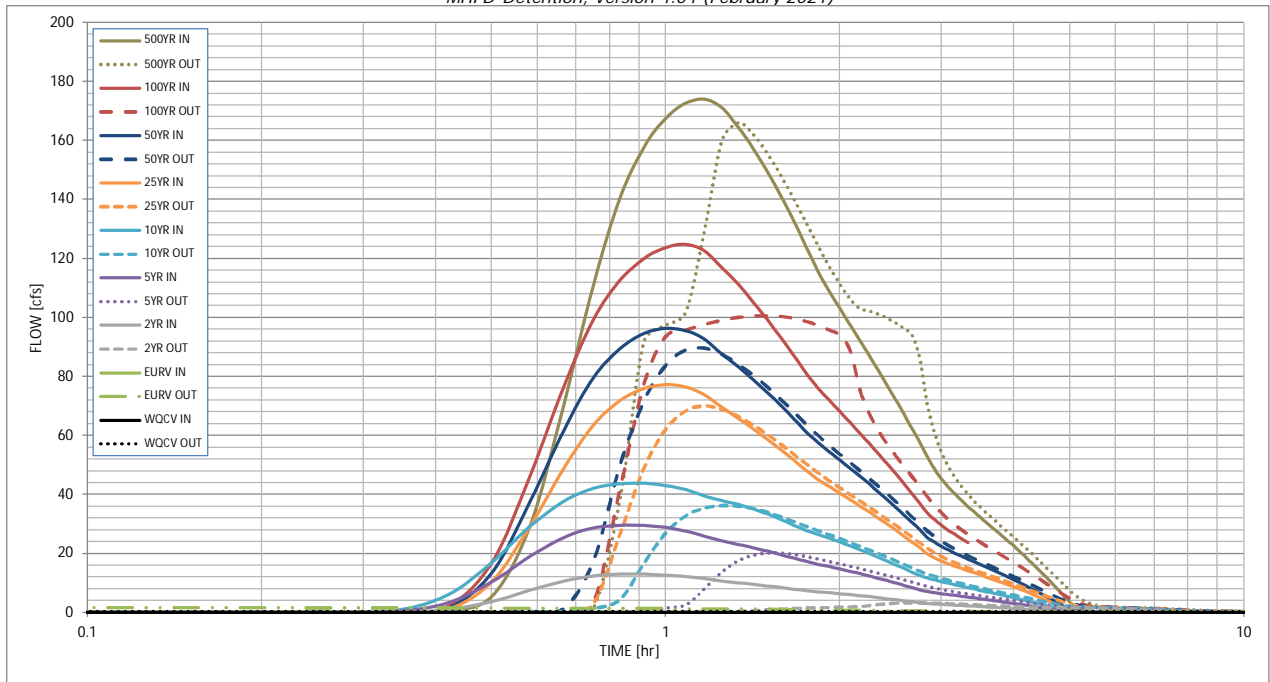
Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
One-Hour Rainfall Depth (in)	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft)	0.713	1.149	1.820	4.208	6.619	11.003	13.954	18.242	26.002
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	1.820	4.208	6.619	11.003	13.954	18.242	26.002
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	8.6	24.5	38.6	71.9	90.8	119.6	168.6
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.06	0.16	0.26	0.47	0.60	0.79	1.11
Peak Inflow Q (cfs)	N/A	N/A	13.0	29.6	43.8	77.2	96.3	124.8	174.0
Peak Outflow Q (cfs)	0.3	1.7	3.3	20.2	36.3	70.0	89.6	100.7	166.0
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	0.8	0.9	1.0	1.0	0.8	1.0
Structure Controlling Flow	Plate	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Gate 1 (fps)	N/A	N/A	0.02	0.3	0.6	1.3	1.6	1.8	2.0
Max Velocity through Gate 2 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours)	43	50	52	46	40	32	28	22	13
Time to Drain 99% of Inflow Volume (hours)	46	54	57	54	52	48	45	42	37
Maximum Ponding Depth (ft)	3.80	4.67	4.95	5.53	5.87	6.45	6.74	7.85	8.77
Area at Maximum Ponding Depth (acres)	0.48	0.51	0.52	0.57	0.62	0.69	0.71	0.79	0.87
Maximum Volume Stored (acre-ft)	0.718	1.154	1.293	1.603	1.812	2.193	2.388	3.221	3.993

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)



DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	0:15:00	0.00	0.00	0.02	0.03	0.04	0.03	0.04	0.03	0.06
	0:20:00	0.00	0.00	0.10	0.26	0.46	0.12	0.14	0.15	0.46
	0:25:00	0.00	0.00	0.94	3.05	5.62	0.92	1.20	1.80	5.54
	0:30:00	0.00	0.00	3.72	10.36	17.07	10.39	13.54	16.89	29.55
	0:35:00	0.00	0.00	7.59	19.09	29.24	29.39	37.71	46.58	70.85
	0:40:00	0.00	0.00	10.73	25.49	37.80	49.01	61.97	76.82	111.15
	0:45:00	0.00	0.00	12.45	28.65	42.04	63.58	79.64	99.34	140.41
	0:50:00	0.00	0.00	12.98	29.57	43.63	71.76	89.43	112.54	157.71
	0:55:00	0.00	0.00	12.98	29.52	43.83	75.98	94.59	120.02	167.64
	1:00:00	0.00	0.00	12.70	28.82	43.09	77.23	96.30	123.75	172.65
	1:05:00	0.00	0.00	12.21	27.59	41.61	76.46	95.60	124.79	174.04
	1:10:00	0.00	0.00	11.51	25.90	39.54	73.83	92.62	122.63	171.24
	1:15:00	0.00	0.00	10.73	24.34	37.95	69.64	87.71	117.10	164.61
	1:20:00	0.00	0.00	10.13	23.14	36.64	65.88	83.36	111.31	157.38
	1:25:00	0.00	0.00	9.57	21.97	35.11	62.22	78.96	105.27	149.40
	1:30:00	0.00	0.00	9.03	20.79	33.35	58.67	74.57	99.17	141.04
	1:35:00	0.00	0.00	8.48	19.60	31.46	55.08	70.08	93.07	132.52
	1:40:00	0.00	0.00	7.94	18.39	29.53	51.58	65.67	87.03	124.03
	1:45:00	0.00	0.00	7.45	17.31	27.88	48.11	61.30	81.12	115.87
	1:50:00	0.00	0.00	7.06	16.41	26.47	45.22	57.69	76.19	108.99
	1:55:00	0.00	0.00	6.72	15.58	25.16	42.74	54.57	72.01	103.05
	2:00:00	0.00	0.00	6.39	14.78	23.86	40.46	51.69	68.11	97.51
	2:05:00	0.00	0.00	6.06	13.98	22.59	38.28	48.92	64.40	92.23
	2:10:00	0.00	0.00	5.72	13.18	21.30	36.16	46.22	60.78	87.05
	2:15:00	0.00	0.00	5.38	12.38	20.01	34.07	43.55	57.24	81.95
	2:20:00	0.00	0.00	5.04	11.59	18.72	32.01	40.90	53.77	76.95
	2:25:00	0.00	0.00	4.70	10.80	17.45	29.96	38.29	50.39	72.08
	2:30:00	0.00	0.00	4.36	10.01	16.19	27.93	35.70	47.02	67.24
	2:35:00	0.00	0.00	4.03	9.23	14.95	25.90	33.12	43.66	62.43
	2:40:00	0.00	0.00	3.69	8.45	13.73	23.88	30.54	40.31	57.63
	2:45:00	0.00	0.00	3.36	7.69	12.54	21.87	27.98	36.97	52.89
	2:50:00	0.00	0.00	3.08	7.11	11.67	19.93	25.53	33.80	48.55
	2:55:00	0.00	0.00	2.91	6.73	11.03	18.56	23.81	31.47	45.27
	3:00:00	0.00	0.00	2.76	6.41	10.46	17.47	22.42	29.58	42.56
	3:05:00	0.00	0.00	2.64	6.10	9.92	16.54	21.21	27.92	40.15
	3:10:00	0.00	0.00	2.51	5.80	9.42	15.69	20.10	26.42	37.96
	3:15:00	0.00	0.00	2.39	5.51	8.92	14.92	19.10	25.03	35.94
	3:20:00	0.00	0.00	2.27	5.23	8.44	14.18	18.13	23.74	34.04
	3:25:00	0.00	0.00	2.15	4.95	7.98	13.46	17.20	22.52	32.27
	3:30:00	0.00	0.00	2.03	4.68	7.53	12.77	16.30	21.38	30.60
	3:35:00	0.00	0.00	1.92	4.41	7.09	12.08	15.42	20.25	28.96
	3:40:00	0.00	0.00	1.81	4.14	6.67	11.40	14.55	19.13	27.35
	3:45:00	0.00	0.00	1.69	3.88	6.25	10.72	13.69	18.01	25.73
	3:50:00	0.00	0.00	1.58	3.62	5.84	10.04	12.82	16.88	24.13
	3:55:00	0.00	0.00	1.47	3.36	5.42	9.37	11.96	15.76	22.52
	4:00:00	0.00	0.00	1.35	3.10	5.01	8.69	11.11	14.64	20.92
	4:05:00	0.00	0.00	1.24	2.84	4.61	8.02	10.25	13.52	19.31
4:10:00	0.00	0.00	1.13	2.58	4.20	7.35	9.39	12.41	17.72	
4:15:00	0.00	0.00	1.02	2.33	3.79	6.67	8.54	11.29	16.12	
4:20:00	0.00	0.00	0.91	2.07	3.39	6.00	7.69	10.18	14.53	
4:25:00	0.00	0.00	0.80	1.82	2.99	5.33	6.84	9.07	12.94	
4:30:00	0.00	0.00	0.69	1.56	2.59	4.66	5.98	7.95	11.36	
4:35:00	0.00	0.00	0.58	1.30	2.18	3.99	5.13	6.84	9.77	
4:40:00	0.00	0.00	0.47	1.05	1.78	3.32	4.28	5.73	8.18	
4:45:00	0.00	0.00	0.36	0.79	1.38	2.65	3.43	4.61	6.59	
4:50:00	0.00	0.00	0.25	0.54	0.98	1.98	2.58	3.50	5.01	
4:55:00	0.00	0.00	0.15	0.32	0.65	1.33	1.75	2.42	3.51	
5:00:00	0.00	0.00	0.08	0.19	0.46	0.80	1.09	1.55	2.36	
5:05:00	0.00	0.00	0.05	0.14	0.36	0.50	0.72	1.03	1.63	
5:10:00	0.00	0.00	0.04	0.11	0.28	0.32	0.49	0.69	1.14	
5:15:00	0.00	0.00	0.03	0.09	0.23	0.21	0.33	0.45	0.78	
5:20:00	0.00	0.00	0.03	0.07	0.18	0.13	0.22	0.28	0.51	
5:25:00	0.00	0.00	0.02	0.05	0.13	0.09	0.15	0.16	0.32	
5:30:00	0.00	0.00	0.02	0.04	0.10	0.05	0.10	0.08	0.19	
5:35:00	0.00	0.00	0.01	0.03	0.07	0.04	0.07	0.05	0.12	
5:40:00	0.00	0.00	0.01	0.02	0.05	0.03	0.05	0.04	0.08	
5:45:00	0.00	0.00	0.01	0.02	0.03	0.02	0.04	0.03	0.06	
5:50:00	0.00	0.00	0.01	0.01	0.02	0.01	0.03	0.02	0.05	
5:55:00	0.00	0.00	0.00	0.01	0.02	0.01	0.02	0.02	0.04	
6:00:00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.03	