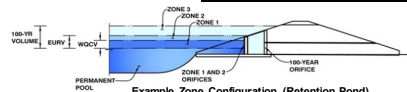


## DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Legacy Church - Green Mountain Falls- West Pond

Basin ID: \_\_\_\_\_



**POOL**      **Example Zone Configuration (Retention Pond)**

#### Required Volume Calculation

Selected BMP Type =	<b>EDB</b>	
Watershed Area =	1.35	acres
Watershed Length =	445	ft
Watershed Slope =	0.080	ft/ft
Watershed Imperviousness =	74.10%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depth = User Input		
Water Quality Capture Volume (WQCV) =	0.093	acre-feet
Excess Urban Runoff Volume (EURV) =	0.008	acre-feet
2-yr Runoff Volume ( $P1 = 1.19$ in.) =	0.564	acre-feet
5-yr Runoff Volume ( $P1 = 1.57$ in.) =	0.130	acre-feet
10-yr Runoff Volume ( $P1 = 1.75$ in.) =	0.156	acre-feet
25-yr Runoff Volume ( $P1 = 0$ in.) =	0.000	acre-feet
50-yr Runoff Volume ( $P1 = 0$ in.) =	0.000	acre-feet
100-yr Runoff Volume ( $P1 = 2.52$ in.) =	0.261	acre-feet
50-yr Runoff Volume ( $P2 = 0$ in.) =	0.000	acre-feet
Approximate 2-yr Detention Volume =	0.088	acre-feet
Approximate 5-yr Detention Volume =	0.122	acre-feet
Approximate 10-yr Detention Volume =	0.140	acre-feet
Approximate 25-yr Detention Volume =	0.000	acre-feet
Approximate 50-yr Detention Volume =	0.000	acre-feet
Approximate 100-yr Detention Volume =	0.163	acre-feet

Water Quality Capture Volume (WQCV) =	0.033	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EVRV) =	0.098	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.094	acre-feet		1.19 inches
5-yr Runoff Volume (P1 = 1.51 in.) =	0.130	acre-feet		1.51 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.156	acre-feet		1.75 inches
25-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches
50-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet		inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.261	acre-feet	2.52 inches	
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet	inches	

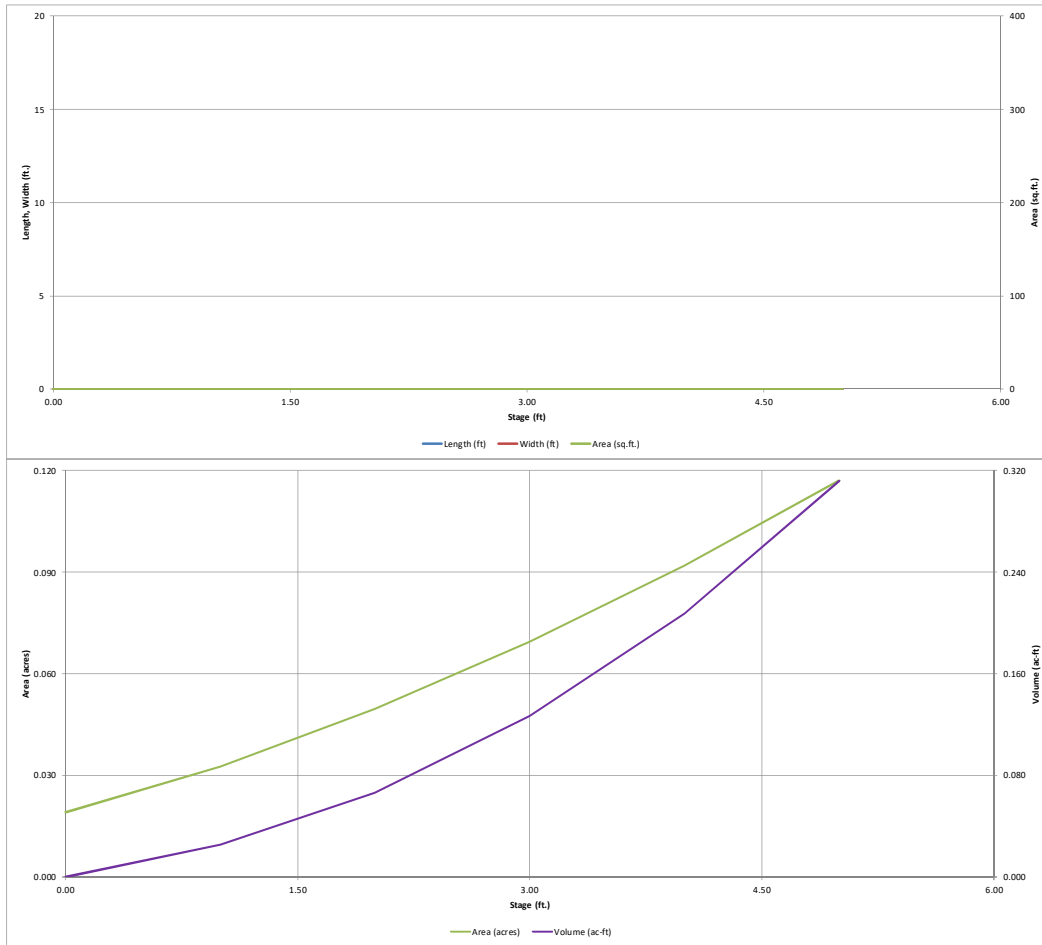
### Stage-Storage Calculation

Zone 1 Volume ( $V_{WCV1}$ )	0.033	acre-feet
Zone 2 Volume ( $ELURV - Zone 1$ )	0.064	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2)	0.065	acre-feet
Total Detention Basin Volume	0.163	acre-feet
Initial Surcharge Volume ( $ISV$ )	user	ft <sup>3</sup>
Initial Surcharge Depth ( $ISD$ )	user	ft
Total Available Detention Depth ( $H_{DAV}$ )	user	ft
Depth of Trickle Channel ( $H_{TC}$ )	user	ft
Slope of Trickle Channel ( $S_{TC}$ )	user	ft/ft
Slopes of Main Basin Sides ( $S_{MAIN}$ )	user	H:V
Basin Length-to-Width Ratio ( $R_{L/W}$ )	user	
Initial Surcharge Area ( $A_{IS}$ )	user	ft <sup>2</sup>
Surcharge Volume Length ( $L_{SV}$ )	user	ft
Surcharge Volume Width ( $W_{SV}$ )	user	ft
Depth of Basin Floor ( $H_{1(100)}$ )	user	ft
Length of Basin Floor ( $L_{1(100)}$ )	user	ft
Width of Basin Floor ( $W_{1(100)}$ )	user	ft
Area of Basin Floor ( $A_{1(100)}$ )	user	ft <sup>2</sup>
Volume of Basin Floor ( $V_{1(100)}$ )	user	ft <sup>3</sup>
Depth of Main Basin ( $H_{MAIN}$ )	user	ft
Length of Main Basin ( $L_{MAIN}$ )	user	ft
Width of Main Basin ( $W_{MAIN}$ )	user	ft
Area of Main Basin ( $A_{MAIN}$ )	user	ft <sup>2</sup>
Volume of Main Basin ( $V_{MAIN}$ )	user	ft <sup>3</sup>
Calculated Total Basin Volume ( $V_{TOTAL}$ )	user	acre-feet

[illegible]

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

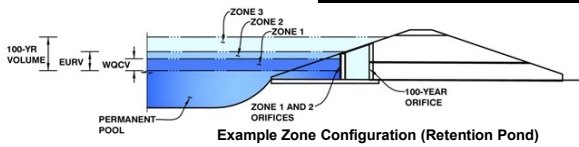


## Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Legacy Church - Green Mountain Falls - West Pond

Basin ID: \_\_\_\_\_



	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.22	0.033	Orifice Plate
Zone 2 (EURV)	2.56	0.064	Orifice Plate
Zone 3 (100-year)	3.49	0.065	Weir&Pipe (Rect.)
		0.163	Total

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 =  ft<sup>2</sup>  
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 =  sq. inches (diameter = 11/16 inch)

Calculated Parameters for Plate

WQ Orifice Area per Row =  ft<sup>2</sup>  
Elliptical Half-Width =  feet  
Elliptical Slot Centroid =  feet  
Elliptical Slot Area =  ft<sup>2</sup>

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	0.61	1.22					
Orifice Area (sq. inches)	0.39	0.39	0.39					

	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)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft <sup>2</sup>
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.04	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	4.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H <sub>1</sub> =	3.04	N/A	feet
Over Flow Weir Slope Length =	4.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =		N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	11.20	N/A	ft <sup>2</sup>
Overflow Grate Open Area w/ Debris =	5.60	N/A	ft <sup>2</sup>

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

	Zone 3 Rectangular	Not Selected	
Depth to Invert of Outlet Pipe =		N/A	ft (distance below basin bottom at Stage = 0 ft)
Rectangular Orifice Width =		N/A	inches
Rectangular Orifice Height =			inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Rectangular	Not Selected	
Outlet Orifice Area =		N/A	ft <sup>2</sup>
Outlet Orifice Centroid =		N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =  ft (relative to basin bottom at Stage = 0 ft)  
Spillway Crest Length =  feet  
Spillway End Slopes =  H:V  
Freeboard above Max Water Surface =  feet

Calculated Parameters for Spillway

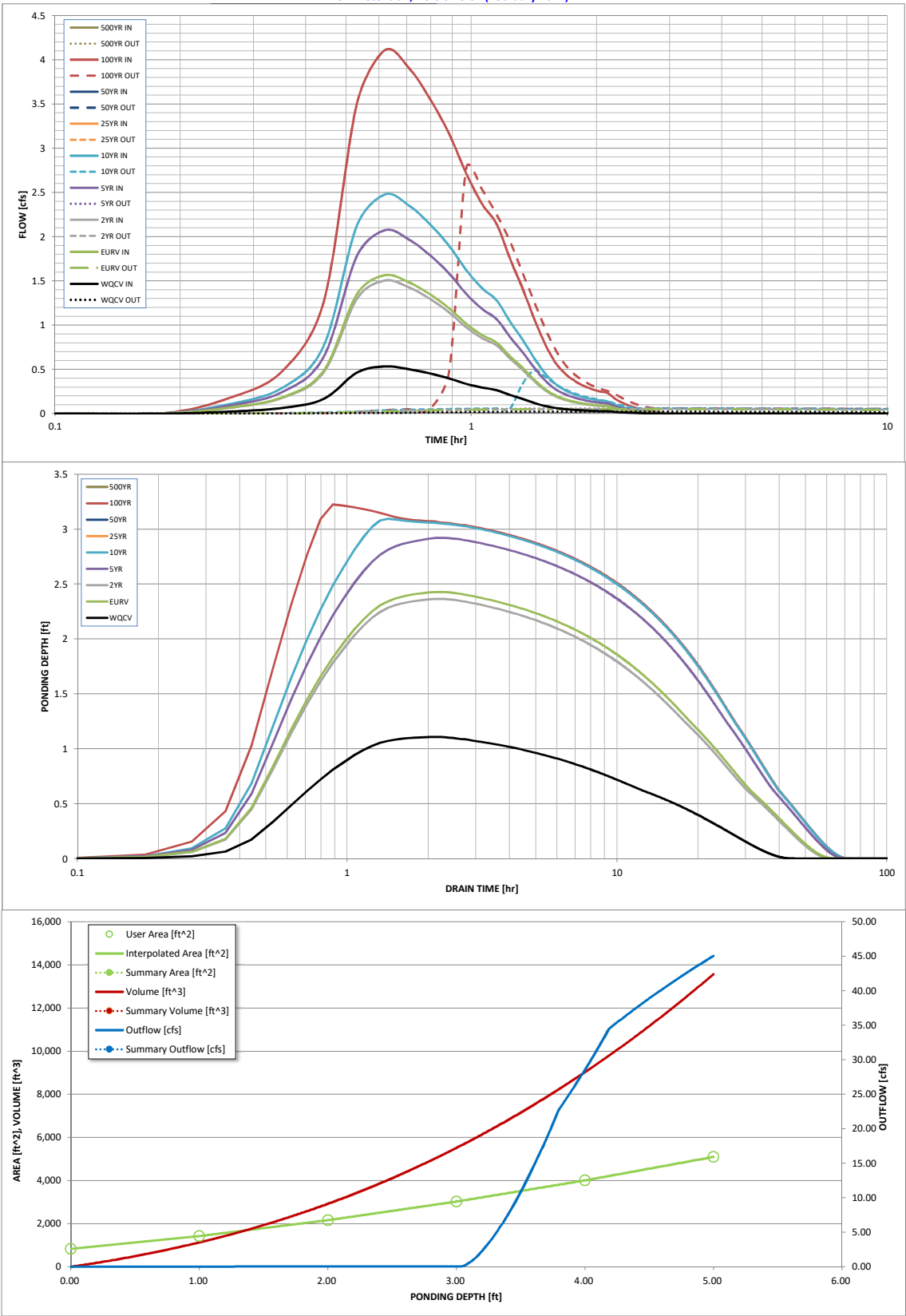
Spillway Design Flow Depth =  feet  
Stage at Top of Freeboard =  feet  
Basin Area at Top of Freeboard =  acres

### Routed Hydrograph Results

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =									
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.51	1.75	0.00	0.00	2.52	0.00
Calculated Runoff Volume (acre-ft) =	0.033	0.098	0.094	0.130	0.156	0.000	0.000	0.261	0.000
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.033	0.098	0.094	0.130	0.156	#N/A	#N/A	0.260	#N/A
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.11	0.31	0.00	0.00	1.27	0.00
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.2	0.4	0.0	0.0	1.7	0.0
Peak Inflow Q (cfs) =	0.5	1.6	1.5	2.1	2.5	#N/A	#N/A	4.1	#N/A
Peak Outflow Q (cfs) =	0.0	0.1	0.1	0.1	0.5	#N/A	#N/A	2.8	#N/A
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.4	1.2	#N/A	#N/A	1.6	#N/A
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Grate 1	#N/A	#N/A	Overflow Grate 1	#N/A
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.0	#N/A	#N/A	0.0	#N/A
Max Velocity through Grate 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) =	37	49	49	54	54	#N/A	#N/A	49	#N/A
Time to Drain 99% of Inflow Volume (hours) =	40	55	55	61	62	#N/A	#N/A	59	#N/A
Maximum Ponding Depth (ft) =	1.11	2.43	2.36	2.92	3.09	#N/A	#N/A	3.22	#N/A
Area at Maximum Ponding Depth (acres) =	0.03	0.06	0.06	0.07	0.07	#N/A	#N/A	0.07	#N/A
Maximum Volume Stored (acre-ft) =	0.029	0.090	0.086	0.121	0.133	#N/A	#N/A	0.142	#N/A

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

## Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename: \_\_\_\_\_

Storm Inflow Hydrographs

UD-Detention, Version 3.07 (February 2017)

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

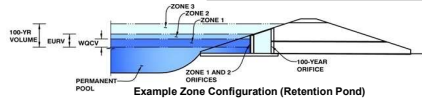
Time Interval	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	#N/A	#N/A	WORKBOOK	#N/A
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.31 min	0:00:00	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	0:05:19	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
Hydrograph	0:10:37	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
Constant	0:15:56	0.02	0.07	0.07	0.10	0.11	#N/A	#N/A	0.19	#N/A
0.941	0:21:14	0.07	0.19	0.18	0.25	0.30	#N/A	#N/A	0.50	#N/A
	0:26:33	0.17	0.49	0.47	0.65	0.77	#N/A	#N/A	1.27	#N/A
	0:31:52	0.46	1.35	1.30	1.78	2.12	#N/A	#N/A	3.50	#N/A
	0:37:10	0.53	1.56	1.50	2.07	2.48	#N/A	#N/A	4.11	#N/A
	0:42:29	0.50	1.48	1.43	1.97	2.35	#N/A	#N/A	3.91	#N/A
	0:47:47	0.45	1.35	1.30	1.79	2.14	#N/A	#N/A	3.56	#N/A
	0:53:06	0.40	1.19	1.15	1.58	1.90	#N/A	#N/A	3.16	#N/A
	0:58:25	0.34	1.01	0.98	1.35	1.62	#N/A	#N/A	2.71	#N/A
	1:03:43	0.30	0.89	0.85	1.18	1.42	#N/A	#N/A	2.37	#N/A
	1:09:02	0.27	0.80	0.77	1.07	1.28	#N/A	#N/A	2.14	#N/A
	1:14:20	0.21	0.65	0.62	0.87	1.04	#N/A	#N/A	1.75	#N/A
	1:19:39	0.17	0.52	0.50	0.70	0.84	#N/A	#N/A	1.42	#N/A
	1:24:58	0.12	0.39	0.37	0.52	0.63	#N/A	#N/A	1.08	#N/A
	1:30:16	0.09	0.28	0.27	0.38	0.46	#N/A	#N/A	0.79	#N/A
	1:35:35	0.07	0.21	0.20	0.28	0.34	#N/A	#N/A	0.58	#N/A
	1:40:53	0.05	0.16	0.16	0.22	0.26	#N/A	#N/A	0.45	#N/A
	1:46:12	0.04	0.13	0.13	0.18	0.22	#N/A	#N/A	0.37	#N/A
	1:51:31	0.04	0.12	0.11	0.15	0.19	#N/A	#N/A	0.32	#N/A
	1:56:49	0.03	0.10	0.10	0.14	0.16	#N/A	#N/A	0.28	#N/A
	2:02:08	0.03	0.09	0.09	0.12	0.15	#N/A	#N/A	0.25	#N/A
	2:07:26	0.03	0.09	0.08	0.12	0.14	#N/A	#N/A	0.23	#N/A
	2:12:45	0.02	0.06	0.06	0.08	0.10	#N/A	#N/A	0.17	#N/A
	2:18:04	0.02	0.05	0.04	0.06	0.07	#N/A	#N/A	0.13	#N/A
	2:23:22	0.01	0.03	0.03	0.05	0.05	#N/A	#N/A	0.09	#N/A
	2:28:41	0.01	0.02	0.02	0.03	0.04	#N/A	#N/A	0.07	#N/A
	2:33:59	0.01	0.02	0.02	0.02	0.03	#N/A	#N/A	0.05	#N/A
	2:39:18	0.00	0.01	0.01	0.02	0.02	#N/A	#N/A	0.03	#N/A
	2:44:37	0.00	0.01	0.01	0.01	0.01	#N/A	#N/A	0.02	#N/A
	2:49:55	0.00	0.00	0.00	0.01	0.01	#N/A	#N/A	0.01	#N/A
	2:55:14	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.01	#N/A
	3:00:32	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:05:51	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:11:10	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:16:28	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:21:47	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:27:05	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:32:24	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:37:43	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:43:01	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:48:20	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:53:38	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:58:57	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:04:16	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:09:34	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:14:53	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:20:11	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:25:30	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:30:49	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:36:07	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:41:26	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:46:44	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:52:03	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:57:22	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:02:40	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:07:59	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:13:17	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:18:36	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:23:55	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:29:13	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:34:32	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:39:50	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:45:09	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:50:28	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:55:46	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	6:01:05	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	6:06:23	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	6:11:42	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	6:17:01	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	6:22:19	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Legacy Church - Green Mountain Falls - East Pond

Basin ID: \_\_\_\_\_



#### Required Volume Calculation

Selected BMP Type =	<b>EDB</b>	
Watershed Area =	1.71	acres
Watershed Length =	454	ft
Watershed Slope =	0.060	ft
Watershed Imperviousness =	77.70%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.045	acre-feet
Excess Urban Runoff Volume (EORV) =	0.130	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.125	1.19 inches
5-yr Runoff Volume (P1 = 1.51 in.) =	0.172	1.51 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.206	1.75 inches
25-yr Runoff Volume (P1 = 0 in.) =	0.000	inches
50-yr Runoff Volume (P1 = 0 in.) =	0.000	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.336	2.52 inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	inches
Approximate 2-yr Detention Volume =	0.118	acre-feet
Approximate 5-yr Detention Volume =	0.162	acre-feet
Approximate 10-yr Detention Volume =	0.185	acre-feet
Approximate 25-yr Detention Volume =	0.000	acre-feet
Approximate 50-yr Detention Volume =	0.000	acre-feet
Approximate 100-yr Detention Volume =	0.214	acre-feet

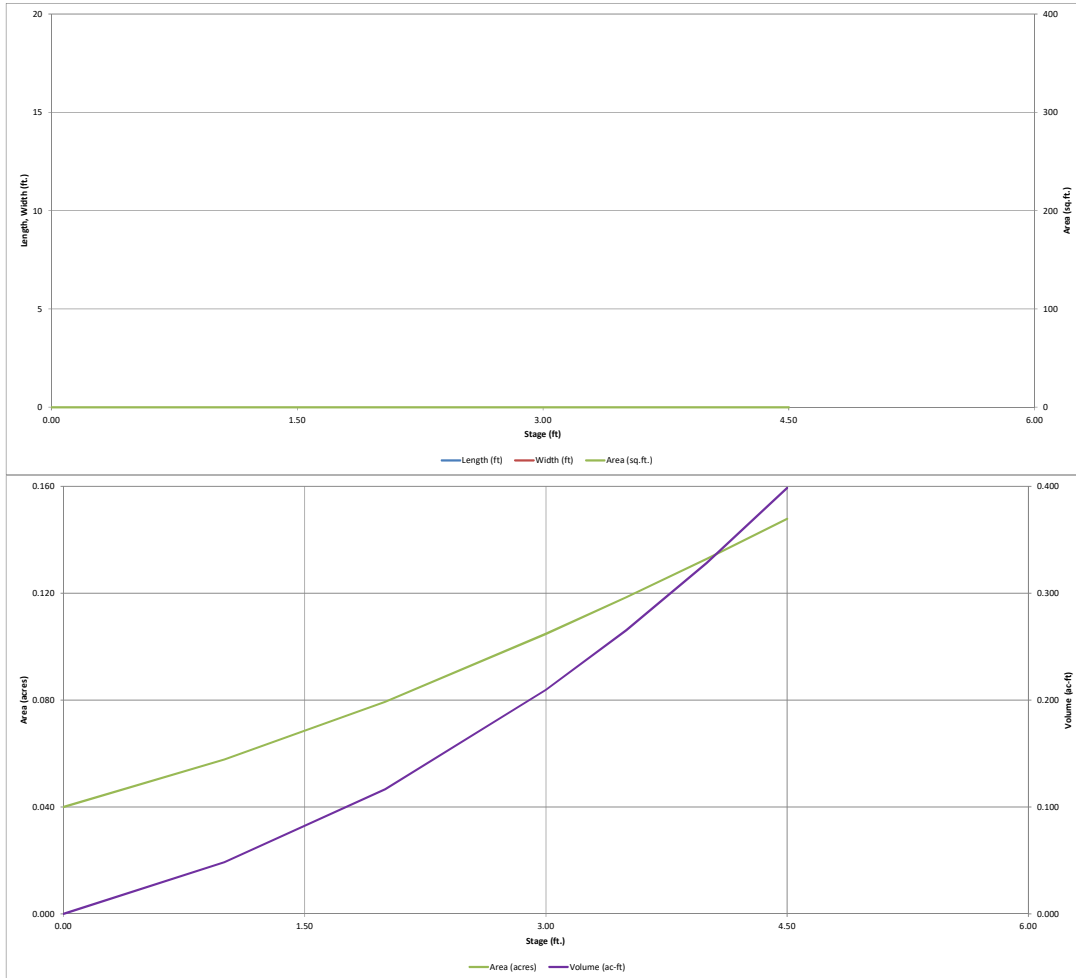
### Stage-Storage Calculation

Zone 1 Volume ( $WOCV_1$ ) =	0.045	acre-feet
Zone 2 Volume ( $EJRV - Zone 1$ ) =	0.085	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.084	acre-feet
Total Detention Basin Volume =	0.214	acre-feet
Initial Surcharge Volume ( $ISV$ ) =	user#	ft <sup>3</sup>
Initial Surcharge Depth ( $ISD$ ) =	user#	ft
Total Available Detention Depth ( $H_{total}$ ) =	user#	ft
Depth of Trickle Channel ( $H_{TC}$ ) =	user#	ft
Slope of Trickle Channel ( $S_{TC}$ ) =	user#	ft/ft
Slopes of Main Basin Sides ( $S_{main}$ ) =	user#	H:V
Basin Length-to-Width Ratio ( $R_{L/W}$ ) =	user#	
Initial Surcharge Area ( $A_{ISV}$ ) =	user#	ft <sup>2</sup>
Surcharge Volume Length ( $L_{ISV}$ ) =	user#	ft
Surcharge Volume Width ( $W_{ISV}$ ) =	user#	ft
Depth of Basin Floor ( $H_{b,floor}$ ) =	user#	ft
Length of Basin Floor ( $L_{b,floor}$ ) =	user#	ft
Width of Basin Floor ( $W_{b,floor}$ ) =	user#	ft
Area of Basin Floor ( $A_{b,floor}$ ) =	user#	ft <sup>2</sup>
Volume of Basin Floor ( $V_{b,floor}$ ) =	user#	ft <sup>3</sup>
Depth of Main Basin ( $H_{main}$ ) =	user#	ft
Length of Main Basin ( $L_{main}$ ) =	user#	ft
Width of Main Basin ( $W_{main}$ ) =	user#	ft
Area of Main Basin ( $A_{main}$ ) =	user#	ft <sup>2</sup>
Volume of Main Basin ( $V_{main}$ ) =	user#	ft <sup>3</sup>
Calculated Total Basin Volume ( $V_{total}$ ) =	user#	acre-feet

[illegible]

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

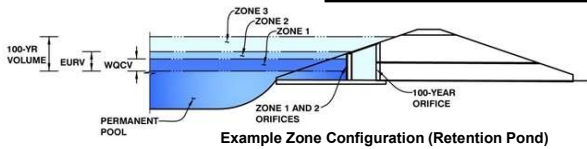


## Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: **Legacy Church - Green Mountain Falls - East Pond**

Basin ID: \_\_\_\_\_



**Example Zone Configuration (Retention Pond)**

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	0.93	0.045	Orifice Plate
Zone 2 (EURV)	2.16	0.085	Orifice Plate
Zone 3 (100-year)	3.05	0.084	Weir&Pipe (Rect.)
		0.214	Total

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

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

**Calculated Parameters for Underdrain**

Underdrain Orifice Area =	N/A	ft <sup>2</sup>
Underdrain Orifice Centroid =	N/A	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 =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	2.64	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	0.60	sq. inches (diameter = 7/8 inch)

**Calculated Parameters for Plate**

WQ Orifice Area per Row =	4.167E-03	ft <sup>2</sup>
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft <sup>2</sup>

**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	0.46	0.47					
Orifice Area (sq. inches)	0.60	0.60	0.60					

	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)**

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

**Calculated Parameters for Vertical Orifice**

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft <sup>2</sup>
Vertical Orifice Centroid =	N/A	N/A	feet

**User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)**

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, H <sub>o</sub> =	2.64	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	4.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

**Calculated Parameters for Overflow Weir**

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H <sub>t</sub> =	2.64	N/A	feet
Overflow Weir Slope Length =	4.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =		N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	11.20	N/A	ft <sup>2</sup>
Overflow Grate Open Area w/ Debris =	5.60	N/A	ft <sup>2</sup>

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

	Zone 3 Rectangular	Not Selected	
Depth to Invert of Outlet Pipe =		N/A	ft (distance below basin bottom at Stage = 0 ft)
Rectangular Orifice Width =		N/A	inches
Rectangular Orifice Height =			inches

**Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate**

	Zone 3 Rectangular	Not Selected	
Outlet Orifice Area =		N/A	ft <sup>2</sup>
Outlet Orifice Centroid =		N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

**User Input: Emergency Spillway (Rectangular or Trapezoidal)**

Spillway Invert Stage =	4.00	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =		feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	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

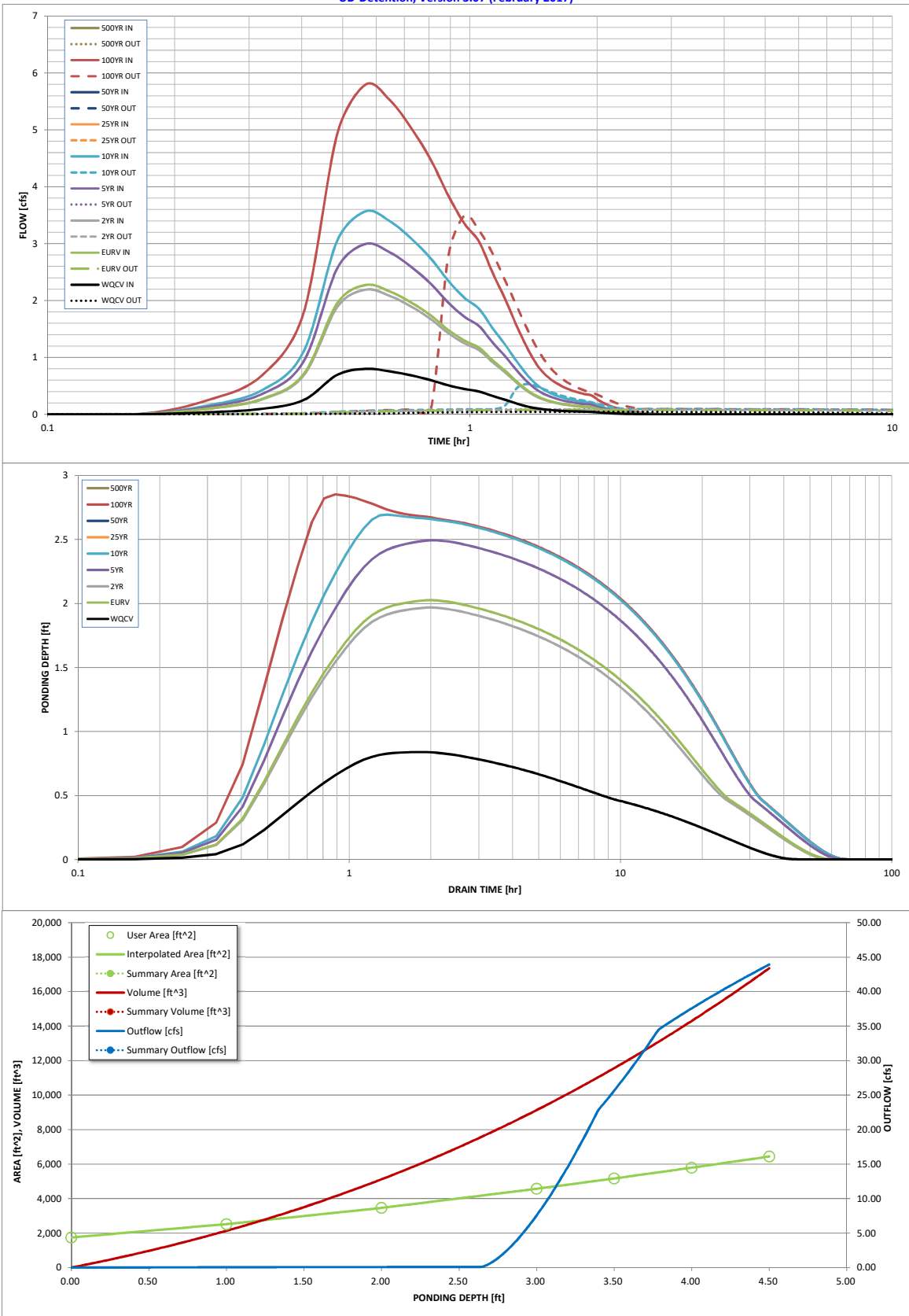
### Routed Hydrograph Results

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =									
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.51	1.75	0.00	0.00	2.52	0.00
Calculated Runoff Volume (acre-ft) =	0.045	0.130	0.125	0.172	0.206	0.000	0.000	0.336	0.000
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.045	0.130	0.125	0.172	0.205	#N/A	#N/A	0.336	#N/A
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.12	0.34	0.00	0.00	1.36	0.00
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.2	0.6	0.0	0.0	2.3	0.0
Peak Inflow Q (cfs) =	0.8	2.3	2.2	3.0	3.6	#N/A	#N/A	5.8	#N/A
Peak Outflow Q (cfs) =	0.0	0.1	0.1	0.1	0.5	#N/A	#N/A	3.5	#N/A
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.4	0.9	#N/A	#N/A	1.5	#N/A
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Grate 1	#N/A	#N/A	Overflow Grate 1	#N/A
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.0	#N/A	#N/A	0.0	#N/A
Max Velocity through Grate 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) =	36	45	45	49	49	#N/A	#N/A	44	#N/A
Time to Drain 99% of Inflow Volume (hours) =	40	52	51	56	57	#N/A	#N/A	55	#N/A
Maximum Ponding Depth (ft) =	0.84	2.03	1.97	2.49	2.69	#N/A	#N/A	2.85	#N/A
Area at Maximum Ponding Depth (acres) =	0.05	0.08	0.08	0.09	0.10	#N/A	#N/A	0.10	#N/A
Maximum Volume Stored (acre-ft) =	0.039	0.119	0.114	0.159	0.178	#N/A	#N/A	0.194	#N/A



Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

## Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

Storm Inflow Hydrographs

UD-Detention, Version 3.07 (February 2017)

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

	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	#N/A	#N/A	WORKBOOK	#N/A
Time Interval	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]
4.85 min	0:00:00	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	0:04:51	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
Hydrograph Constant	0:09:42	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	0:14:33	0.04	0.10	0.10	0.14	0.16	#N/A	#N/A	0.26	#N/A
1.031	0:19:24	0.10	0.28	0.27	0.36	0.43	#N/A	#N/A	0.70	#N/A
	0:24:15	0.25	0.71	0.68	0.93	1.11	#N/A	#N/A	1.79	#N/A
	0:29:06	0.69	1.95	1.88	2.56	3.05	#N/A	#N/A	4.92	#N/A
	0:33:57	0.80	2.27	2.19	2.99	3.57	#N/A	#N/A	5.80	#N/A
	0:38:48	0.75	2.16	2.08	2.84	3.39	#N/A	#N/A	5.52	#N/A
	0:43:39	0.68	1.96	1.89	2.59	3.08	#N/A	#N/A	5.02	#N/A
	0:48:30	0.60	1.74	1.67	2.29	2.74	#N/A	#N/A	4.47	#N/A
	0:53:21	0.51	1.48	1.43	1.96	2.35	#N/A	#N/A	3.84	#N/A
	0:58:12	0.45	1.30	1.25	1.72	2.05	#N/A	#N/A	3.35	#N/A
	1:03:03	0.40	1.17	1.13	1.55	1.85	#N/A	#N/A	3.04	#N/A
	1:07:54	0.32	0.95	0.92	1.26	1.51	#N/A	#N/A	2.49	#N/A
	1:12:45	0.25	0.76	0.74	1.02	1.22	#N/A	#N/A	2.02	#N/A
	1:17:36	0.19	0.57	0.55	0.77	0.92	#N/A	#N/A	1.54	#N/A
	1:22:27	0.13	0.41	0.40	0.56	0.67	#N/A	#N/A	1.13	#N/A
	1:27:18	0.10	0.30	0.29	0.41	0.49	#N/A	#N/A	0.83	#N/A
	1:32:09	0.08	0.24	0.23	0.32	0.39	#N/A	#N/A	0.64	#N/A
	1:37:00	0.07	0.20	0.19	0.27	0.32	#N/A	#N/A	0.53	#N/A
	1:41:51	0.06	0.17	0.16	0.23	0.27	#N/A	#N/A	0.45	#N/A
	1:46:42	0.05	0.15	0.14	0.20	0.24	#N/A	#N/A	0.40	#N/A
	1:51:33	0.05	0.14	0.13	0.18	0.22	#N/A	#N/A	0.36	#N/A
	1:56:24	0.04	0.13	0.12	0.17	0.20	#N/A	#N/A	0.33	#N/A
	2:01:15	0.03	0.09	0.09	0.12	0.15	#N/A	#N/A	0.24	#N/A
	2:06:06	0.02	0.07	0.07	0.09	0.11	#N/A	#N/A	0.18	#N/A
	2:10:57	0.02	0.05	0.05	0.07	0.08	#N/A	#N/A	0.13	#N/A
	2:15:48	0.01	0.04	0.03	0.05	0.06	#N/A	#N/A	0.10	#N/A
	2:20:39	0.01	0.02	0.02	0.03	0.04	#N/A	#N/A	0.07	#N/A
	2:25:30	0.01	0.02	0.02	0.02	0.03	#N/A	#N/A	0.05	#N/A
	2:30:21	0.00	0.01	0.01	0.02	0.02	#N/A	#N/A	0.03	#N/A
	2:35:12	0.00	0.01	0.01	0.01	0.01	#N/A	#N/A	0.02	#N/A
	2:40:03	0.00	0.00	0.00	0.01	0.01	#N/A	#N/A	0.01	#N/A
	2:44:54	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.01	#N/A
	2:49:45	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	2:54:36	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	2:59:27	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:04:18	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:09:09	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:14:00	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:18:51	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:23:42	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:28:33	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:33:24	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:38:15	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:43:06	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:47:57	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:52:48	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	3:57:39	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:02:30	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:07:21	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:12:12	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:17:03	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:21:54	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:26:45	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:31:36	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:36:27	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:41:18	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:46:09	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:51:00	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	4:55:51	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:00:42	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:05:33	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:10:24	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:15:15	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:20:06	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:24:57	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:29:48	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:34:39	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:39:30	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:44:21	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A
	5:49:12	0.00	0.00	0.00	0.00	0.00	#N/A	#N/A	0.00	#N/A