DETENTION POND CALCULATOR

This calculator sizes volumetrically a detention pond such that it treats the Water Quality Volume (WQv).

Input cell =		User enters value
Default value =		User should only change value if able to provide explanation for adjustment
Calculation cell =		User should not change cell

CALCULATOR

Detention Pond Calculator - by Water Quality Volume

1	Water Quality Volume - WQv	4300	cubic feet
2	**Forebay Volume Calculator**	**430**	cubic feet
3	**Dimensions Calculator**		
4	Depth at WQv - d	3	feet (generally between 2 and 5 feet, recommend 3 feet)
5	Pond Length to Width Ratio (L/W)	2	generally between 2 and 4
6	Pond Side Slope	3	feet/feet (ratio of horizontal to vertical, for example, 3 for 3H:1V)
7	Width of Pond Bottom	20	feet (adjust width until storage volume in Step 10 is greater than WQ
8	Length of Pond Bottom	40	feet
9	Width of Pond at WQv Depth	38	feet
	Length of Pond at WQv Depth	58	feet
10	Storage Volume	4,332	cubic feet (must be greater than WQv)
11	**Check of Volume**	**Okay**	
12	Drain time - t	48	hours (recommend 48 hours)
13	Approx. Orifice Diameter for Drain Time	1.0	inches (refine outlet control sizing and configuration during design)
14	Flow Rate thru Orifice	22	gpm (flow rate when basin is at WQv depth)

INSTRUCTIONS

Follow the steps below to determine the required size of your detention pond.

Step	
1	Enter the Water Quality Volume (WQv) for the DMA. The WQv is calculated in Step 14 of the Water Quality Volume and Water Quality Flow R
2	The required volume for the forebay is shown here (typically 10 to 25% of the WQv).
3	Use the following steps of the Dimensions Calculator to determine the configuration of the detention pond.
4	Enter the design water depth of the detention pond (i.e., the water depth when the basin has completely captured the WQv event). Depths are and 5 feet. This depth DOES NOT include freeboard, which is typically 1 foot above the maximum design depth (freeboard should be added i
5	Enter the length to width ratio of the detention pond. A ratio between 2 and 4 is recommended.
6	Enter the side slope of the pond. The slope of earthen side walls should be no steeper than 3:1 (i.e., at least 3 feet horizontal for each 1 foot v vertical hardscaped sidewalls.
7	Enter the width of the pond bottom at the invert of the detention pond.
8	The length of the pond bottom is calculated here.
9	The width and length of the pond at the design water depth (i.e., WQv depth) are calculated here.
10	The storage volume in the pond is calculated here. Adjust the basin depth and/or width (entered in Steps 4 and 7, respectively) until the volum equal to the WQv entered in Step 1.
11	This step checks that the storage volume is greater than the WQv entered in Step1. If the volume is less than the WQv, increase the pond wic
12	The recommended design drain time for the basin is 48 hours.
13	The diameter of the orifice needed to drain the WQv in 48 hours is shown here. This planning level estimate of the required outlet control shou design. The pond outlet must be designed such that less than 50% of the WQv is emptied during the first third of the design drain time (i.e., w hour design drain time). Minimum allowable orifice diameter is 1-inch.
14	The estimated flow rate through the orifice when the water level is at the WQv depth is calculated here.

DEFINITIONS

Water Quality Volume (WQv)	The runoff volume to be managed by the stormwater BMP such that treatment requirements are me calculated by the Water Quality Volume and Water Quality Flow Rate Calculator.
Freeboard	The vertical distance between the maximum design water depth and the top of the basin embankm
Orifice	An orifice is a flow restrictor. It drains the pond slowly to improve water treatment through settling o
Weir	A weir is a designed overflow facility, and is often the crest of the pond/wetland spillway.
Spillway	A spillway is a structure to provide the control release of extreme flows, in the event the capacity of overwhelmed.
Drain Time (t)	The time for the storage area to drain the water quality volume.
Depth at WQv (d)	The depth of the basin from the design water level to the invert of the basin. Does not include freeb