

DETENTION POND DESIGN CALCULATION

Project Name: **Sample**
 Site Location: _____

Cont. Drainage Area (Acres): **23.00** (L)
 Proposed Runoff Coefficient "C" Value: **0.37** (M)
 Allowable Release Rate per Acre (CFS/ Acre) **0.15** (N)
 Maximum Allowable Release Rate (CFS) **3.45** (O)

1.00 in first flush

A	B	C	D	E	F	G	H	I	J	K
Duration (Minutes)	Duration (Hours)	100-Year 24-Hour Total Rainfall (Inches)	100-Year 24-Hour Rainfall Avg. Intensity (Inch/Hr)	Proposed 100yr-24hr Avg. Runoff Flowrate (CFS)	Proposed 100yr-24hr Runoff Volume (CFT)	Maximum Allowable Release Rate (CFS)	Required 100yr-24hr Storage Volume (CFT)	Bankfull 2yr-24hr Storage Volume (CFT)	First Flush (1/2 Inch) Storage Volume (CFT)	Total Required Storage Volume (CFT)
5	0.08	0.62	7.44	63.31	18,994	3.45	17,959	74,757	30,891	74,757
10	0.17	1.09	6.54	55.66	33,393	3.45	32,358	74,757	30,891	74,757
15	0.25	1.40	5.60	47.66	42,890	3.45	41,338	74,757	30,891	74,757
20	0.33	1.57	4.72	40.17	48,201	3.45	46,131	74,757	30,891	74,757
30	0.50	1.92	3.84	32.68	58,821	3.45	55,716	74,757	30,891	74,757
40	0.67	2.09	3.14	26.72	64,131	3.45	59,991	74,757	30,891	74,757
50	0.83	2.27	2.72	23.15	69,442	3.45	64,267	74,757	30,891	74,757
60	1.00	2.44	2.44	20.76	74,752	3.45	68,542	74,757	30,891	74,757
90	1.50	2.73	1.82	15.49	83,636	3.45	74,321	74,757	30,891	74,757
120	2.00	3.02	1.51	12.85	92,521	3.45	80,101	74,757	30,891	80,101
180	3.00	3.33	1.11	9.45	102,018	3.45	83,388	74,757	30,891	83,388
240	4.00	3.52	0.88	7.49	107,839	3.45	82,999	74,757	30,891	82,999
300	5.00	3.71	0.74	6.31	113,660	3.45	82,610	74,757	30,891	82,610
360	6.00	3.90	0.65	5.53	119,480	3.45	82,220	74,757	30,891	82,220
540	9.00	4.21	0.47	3.98	128,978	3.45	73,088	74,757	30,891	74,757
720	12.00	4.52	0.38	3.21	138,475	3.45	63,955	74,757	30,891	74,757
900	15.00	4.71	0.31	2.67	144,142	3.45	50,992	74,757	30,891	74,757
1080	18.00	4.89	0.27	2.31	149,810	3.45	38,030	74,757	30,891	74,757
1260	21.00	4.97	0.24	2.01	152,292	3.45	21,882	74,757	30,891	74,757
1440	24.00	5.20	0.22	1.84	159,307	3.45	10,267	74,757	30,891	74,757
2880	48.00	5.70	0.12	1.01	174,625	3.45	-123,455	74,757	30,891	74,757

Required 100yr-24hr Detention Storage (CFT) **83,388**

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PERMANENT RETENTION POND DESIGN CALCULATION

Retain Consecutive 100-Year 24 Hour Design Storm Events from the Entire Contributing Area (5.2 Inches of Rainfall)

321,270 CFT

- A) Duration of the storm event in minutes.
- B) Duration of the storm event in hours.
- C) Total amount of rainfall during a 100-year recurrence storm event for the given duration in Column A & B (ref.: midwestern climatological center rainfall Atlas-Bulletin 71).
- D) Average rainfall intensity during the 100-year recurrence storm event. Calculated by dividing Column C by Column B
- E) The unrestricted 100-year recurrence average discharge flowrate from the proposed site under fully developed conditions. Calculated by multiplying Intensity (D), Runoff Coefficient (M) and Drainage Area (L).
- F) The unrestricted 100-year recurrence discharge volume from the proposed site for the given duration. Calculated by multiplying the Proposed Runoff Flowrate (E) by the Storm Duration (A) and by 60 seconds/minute.
- G) The maximum allowable discharge from the site is determined by multiplying the drainage area by the allowed per acre release rate (N) .
- H) The required detention storage is determined by multiplying the flowrate differential (Inflow (E) - 0.5*Outflow (G), by the corresponding duration (A) and by 60 seconds/minute. The calculated maximum release rate only occurs when the pond is full. As the pond dewateres the actual release rate from the pond will decrease from the maximum allowed release rate to 0. Therefore, an average release rate equal to 50% of the maximum rate is used in calculating the required storage volume. Calculated storage volumes will vary based on rainfall intensity, the size of the drainage area, and the allowable discharge. The maximum volume of storage for the various storm durations will be the required detention storage volume.
- I) The bank full volume is based on storing the runoff from 2 year - 24 hour storm event (2.42 Inches).
- J) The first flush volume is based on storing the runoff from the first 1/2 inch of rain.
- K) Total required storage volume is the maximum required storage between the 100-year 24-hour at the allowable discharge rate or the total volume of the bank full storm.
- L) Area contributing to the proposed detention/ retention facility
- M) Weighted Runoff Coefficient based on proposed development conditions
- N) Allowable Release Rate from the site per Acre. Based on capacity of downstream conveyence system.

Calculation By: _____

Date: _____