Annexure – A

Illustrative example for design of "Sullage Stabilization Ponds System"

Let us assume size of existing pond is 3 Acre measuring 124'-0" × 1054'-9" Broad arrangement of 5 Ponds would be as under:-

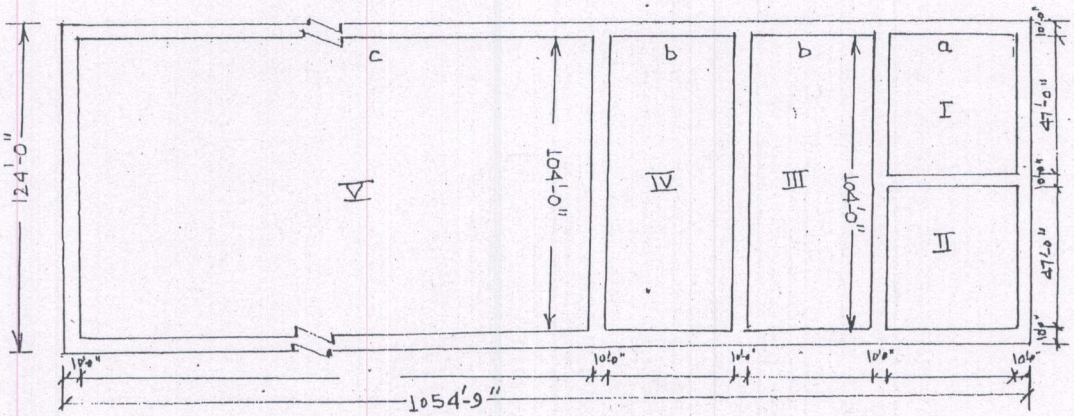


FIG - 1

I - Anaerobic Pond

II – Alternate Anaerobic Pond

III – Facultative Pond

IV – Maturation Pond

V – 2nd Maturation Pond

Keeping in view, width as 124'-0", top width of earthern partition wall/ embankment as 10'-0", one side of these five ponds would be 47', 47', 104', 104' and 104' respectively. Let us assume other side of these ponds (in feet) as a, a, b, b, c respectively. Let us assume that discharge coming into this pond is 100 KLD (i.e. quantity of waste water discharging into it is 100 Kilolitres per day or 1,00,000 litres per day)

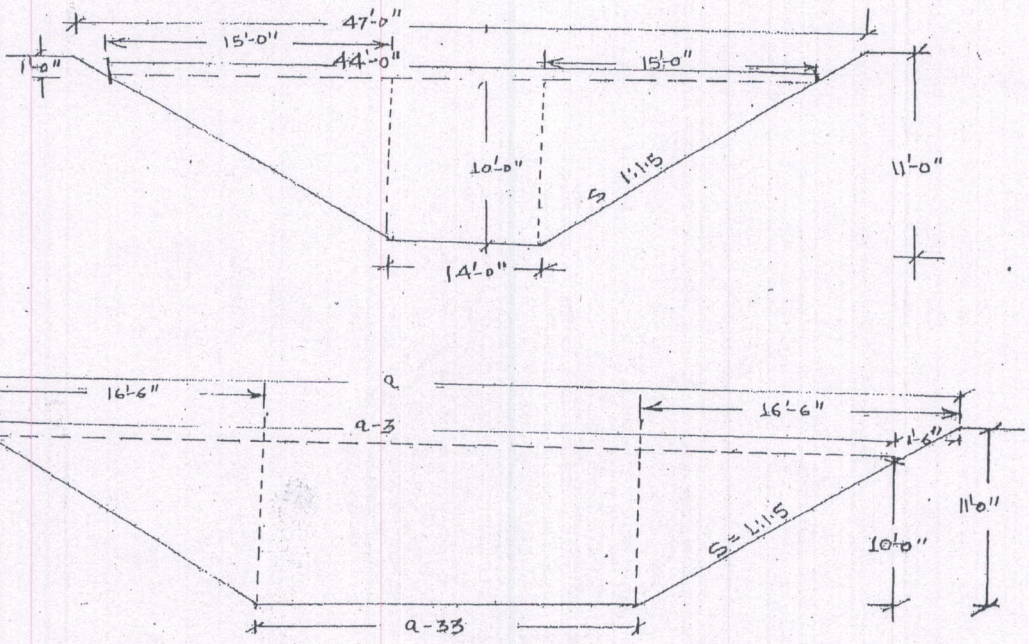
Let us assume that side slope of embankment would be kept as 1:1.5. Assume a Free Board of 1 Ft.

Design

1. Anaerobic Pond & Alternate Anaerobic Pond

Retention time	=	2 days
Capacity required	=	2×100 KL (Discharge of 2 days)
	=	200 KL
	=	2,00,000 litres
	=	200 cum. (1 cum = 1000 litres)---(1)

X-Sections of these proposed ponds, with 47' as one side and 'a' feet (assumed) as other side are as under:-



Capacity of the proposed pond as per above X-Section $= \frac{(a-3)+(a-33)}{2} \times \frac{44+14}{2} \times 10$

$= \left(\frac{a-3+a-33}{2} \times 29\right) \times 10$

$= \left(\frac{2a-36}{2} \times 29\right) \times 10$

$= (a-18) \times 29 \times 10$

$= 290\ (a-18)$ Cft.

$= 290\ (a-18) \times 0.0283$ cum.—(2)

As per (1) & (2),

$290(a-18) \times 0.0283 = 200$

i.e. $a = \frac{200}{290 \times 0.0283} + 18$

$= 42.37$ feet

Say $= 43$ feet

Therefore, Dimension of these ponds = 47'-0" × 43'-0"

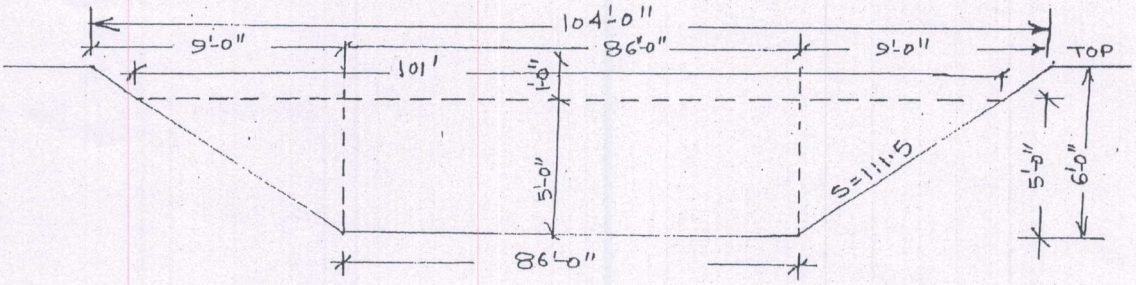
2. Facultative Pond & Maturation Pond

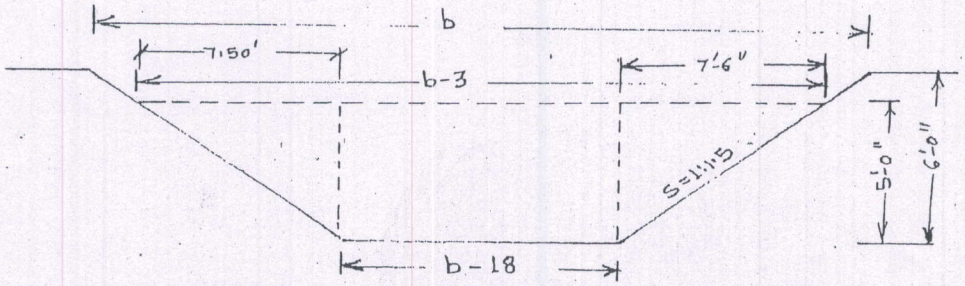
Retention time = 3 to 5 days

Capacity required = 5×100 KL = 500 Kilo litre

= 500 cum------(1)

X-Section with size as 104'-0" × b would be as under:-





Capacity of the proposed pond as per above X-section = $\frac{(b-3)+(b-18)}{2} \times \frac{101+86}{2} \times 5$

= (b-10.5) × 93.5× 5 Cft.

= (b-10.5) × 93.5 × 5 ×.0283 cum----(2)

From (1) & (2),

(b-10.5) × 93.5 × 5 ×.0283 = 500

i.e. b = $\frac{500}{93.5 \times 5 \times 0.0283} + 10.5 = 48.29$ feet

say = 49 feet

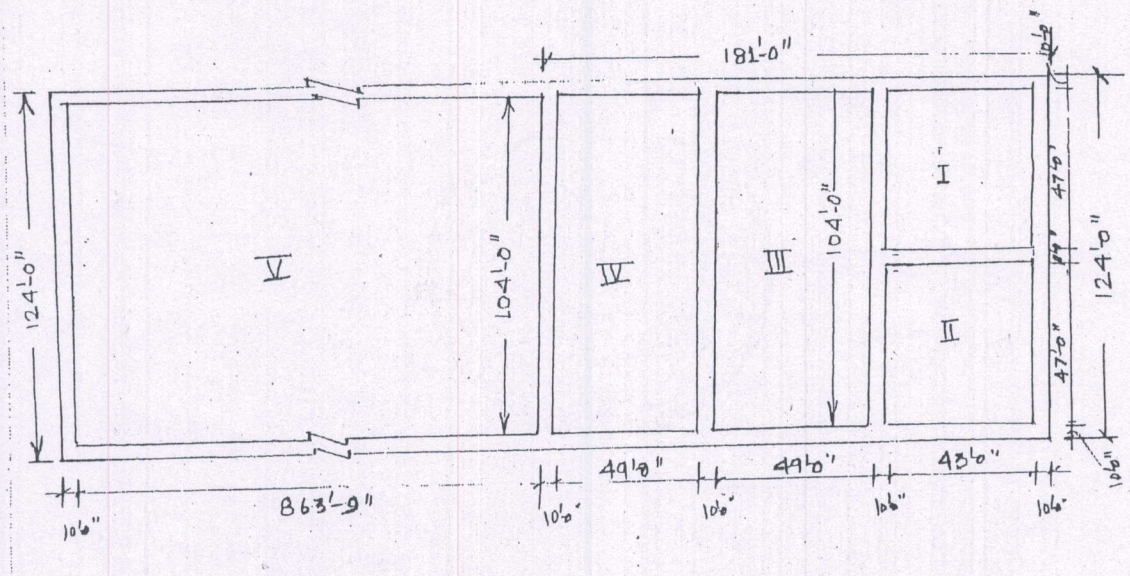
∴ Size of these ponds will be 104' *x* 49'

3. **2nd Maturation Pond :-** Algebric calculation of assumed side 'c' (in feet) with a = 43' & b =49' as calculated at 1 & 2 above, is as under :=

c	=	1054'-9" – (5×10')* -2b-a
(Please refer Fig. 1)		
	=	1054'-9" – 50'-2×49'-43'
	=	863'-9"
Therefore, size of this pond	=	863'-9" × 104'

* 5 No. Embankments measuring 10 feet each

Therefore, size and arrangement of all ponds would be as under:-



It can be seen that,
Area under 4 ponds
(i.e. I, II, III, IV) = $\frac{181' \times 124'}{198' \times 220'} = 0.52$ Acre

Remaining Area for 5th pond= 3-0.52 = 2.48 Acre
(i.e 2nd Maturation Pond)

Therefore it may be easily understood that requirement of area for ponds from I to IV (First four ponds) is only 0.52 Acre for 100 KLD (i.e. liquid waste generated by 1500 persons approximately)