N-1

Data: Design Sedimentation Tank

$Q = 25000\ m^3/d$ $\quad 0.289\ m^3/s$

$SOR = 25\ m/d = 2.89 \times 10^{-4}\ m/s$

$T_d = 2\ hrs = 0.0833\ d$

Sludge storage capacity = 20% of effective volume (extra vol.)

Ideal conditions

particle size = ?

$\nu = 1.2 \times 10^{-2}\ cm^2/s = 1.2 \times 10^{-6}\ m^2/s$

$S_s = 2.65$

Sol:

$SOR = \frac{Q}{A}$

$A = \frac{Q}{SOR} = \frac{25000}{05} = 1000\ m^2$ for 2 tank

$500\ m^2$ for 1 tank

Let $L : W = 2.5 : 1$

$L = 2.5\,w$

As $L \times W = 500$

$2.5w \times w = 500$

$w = 14.14\ m$

$L = 2.5w = 35.36\ m$

vol. $V = Q t_D$

$= 25000 \times 0.0833 = 2082.5\ m^3$ for 2 tanks

vol. $V = 1041.25\ m^3$ for 1 tank

Sludge storage $= 1.2 \times 1041.25$

$= 1249.5$

vol: $V = L \times W \times D$

$1250 = 35.36 \times 14.4 \times D$

$D = 2.5\ m$

As $V_s = \frac{g d^2 (S_p - 1)}{18\nu}$

$2.89 \times 10^{-4} = \frac{9.81 \times d^2 (2.65 - 1)}{18 \times 1.2 \times 10^{-6}}$

$d = 1.96 \times 10^{-5}\ m$

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N-2

Data:

No. of tanks = ?

Size = ? L, W, H, d = ?

$Q = 20000\ m^3/d = 0.2315\ m^3/s$

$SOR = 24\ m/d = 2.78 \times 10^{-4}\ m/s$

$T_D = 4\ hrs = 0.1667\ d$

Ideal condition: D = ?

$\nu = 1.2 \times 10^{-2}\ cm^2/s = 1.2 \times 10^{-6}\ m^2/s$

$S_s = 2.65$

Sol:

$A_s = \frac{Q}{SOR} = \frac{20000}{24} = 833.33\ m^2$

No. of tanks = 2

So $A_s = 416.67\ m^2$

$L = 2.5w$

And $L \times w = 416.67$

$2.5w \times w = 416.67$

$w = 12.91\ m$

$L = 32.275\ m$

$V = Q\ t_D$

$= 20,000 \times 0.1667 = 3334\ m^3$ (for 2 tanks)

$V = 1667\ m^3$ (for 1 tank)

Sludge capacity $= 1.2 \times 1667 = 2000.4\ m^3$

Volume $= A_s \times D$

$2000.4 = 416.67 \times D$

$D = 4.8\ m$

$V_s = \frac{g d^2 (S_p - 1)}{18 \nu}$

$2.78 \times 10^{-4} = \frac{9.81 \times d^2 (2.65 - 1)}{18 \times 1.2 \times 10^{-6}}$

$d = 1.93 \times 10^{-5}\ m$

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