Design criteria of drying beds

- Period of drying $= 5 \rightarrow 9$ days
- Thickness of one sludge layer $= 10 \rightarrow 15$ cm
- Solid loading rate $= 100 \rightarrow 300$ kg/m^2 .year

Required number of drying beds:

Take Solid Loading $= 300$ kg/m^2/year

$$No.\,of\;Drying\,beds = \frac{Amount\ of\ solids\,withdrawal(kg/d)\times 365(d/year)}{(Solid\ Loadings)\times(area\ of\ drying\,bed)\,m^2}$$

Example:

Primary Sludge Quantities:

Quantity of sludge produced /d assuming 60 % removal of TSS in PST:

$= C_{in}$ (ss) $\times$ % of ss removed per PST $\times$ Q_{av}

$= 400$ gm/m^3 $\times$ 1.0 kg/1000gm $\times$ 0.6 $\times$ 120,000 m^3/d $= 28800$ kg/d

Thickened sludge flow rate:

Amount of sludge entering the thickeners $= 28800$ kg/d.

Solid capture efficiency $= 85 \rightarrow 95\% = 90\%$

Amount of solids withdrawal $= 0.9 * 28800 = 25920$ kg/d

Design of Drying Beds:

Amount of solids withdrawal $= 25920$ kg

Drying bed dimensions $= 10$ m $* 20$ m - 20 m $* 20$ m

Required number of drying beds:

Take Solid Loading $= 300$ kg/m^2/year

$$No.\,of\;Drying\,beds = \frac{Amount\,of\ solids\,withdrawal(kg/d)\times 365(d/year)}{(Solid\ Loadings)\times(area\,of\ drying\,beds)\,m^2} =$$

$$= \frac{25920(kg/d)\times 365(d/year)}{(300)\,kg/m^2/year\times(20\times20)\,m^2} = 78.84 \approx 80\ beds$$