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$$\frac{\text{Rainfall } M_{100-10}}{\omega \text{ } r=0.3} = R_{M100}$$

Mins	Z ₁	x	mm.	x	Z ₂ _{M100}	R _{mm} _{M100}
10	0.49	x	20	x	1.91	= 18.7 mm
15	0.59		20		1.93	= 22.8 mm
30	0.77		20		1.95	= 30.0
60	1		20		2.00	= 40.0
120	1.25		20		2.03	= 50.75
240	1.57		20		2.0	= 62.8

Two soakaways per property. Each soakaway has Impermeable Area = 66m².

$$I_{10} = \text{Impermeable Area} \times R_{M100}$$

⇒

$$I_{10} = 66 \times 18.7 \times 10^{-3} = 1.2342$$

$$I_{15} = 66 \times 22.8 \times 10^{-3} = 1.5008$$

$$I_{30} = 66 \times 30 \times 10^{-3} = 1.98$$

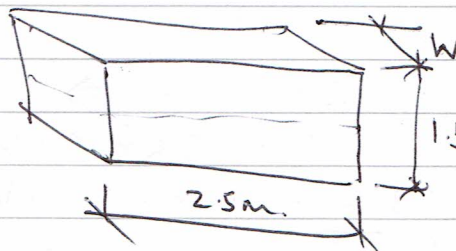
$$I_{60} = 66 \times 40 \times 10^{-3} = 2.64$$

$$I_{120} = 66 \times 50.75 \times 10^{-3} = 3.35$$

$$I_{240} = 66 \times 62.8 \times 10^{-3} = 4.145$$

$$O_{\text{outflow}} = O = A_{S_{50}} \times f \times D$$

$$\text{Where } A_{S_{50}} =$$



$$= \left(\frac{2.5 \times 1.5}{2} \right) \times 2 + \left(\frac{W \times 1.5}{2} \right) \times 2$$

$$= 3.75 + 1.5W$$

$$\text{and from testing } f = 1.82 \times 10^{-5}$$

$$\therefore O_{\text{outflow}_{10}} = (3.75 + 1.5W) \times 1.82 \times 10^{-5} \times 1.82 \times 10^{-5} \times 10 \times 60$$

$$= 0.04095 + 0.01638W$$

$$\text{SOAKAWAY VOLUME } S = 2.5 \times 1.5 \times W \times 0.3 \text{ (Using 30\% free volume)}$$

$$S = 1.125W$$

$$\Rightarrow I_{10} - O_{10} = S$$

$$\Rightarrow 1.2342 - (0.04095 + 0.01638W) = 1.125W$$

$$\Rightarrow W_{10} = 1.045$$

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Applying same process gives.

$$W_{10} = 1.045$$

$$W_{15} = 1.256$$

$$W_{30} = 1.5817$$

$$W_{60} = 1.96$$

$$W_{120} = 2.163 \quad \leftarrow \text{MAX WIDTH}$$

$$W_{240} = 2.083$$

The MAX width required for the Mwe rainfall is at 120 min.
The pit required is 2.5m L x 2.163 W x 1.5m Deep

∴ I propose to change the pit size to
3.5m Long x 1.5m Wide x 1.5m Deep. as easier to
dig and form the soakaway.

∴ Recheck the figures based on the new size

$$\text{SOAKAWAY VOLUME } 230\% = 3.5 \times 1.5 \times 1.5 \times 0.3 =$$

$$A_{s50} = \left(\frac{3.5 \times 1.5}{2} \right) \times 2 + \left(\frac{1.5 \times 1.5}{2} \right) \times 2$$

$$A_{s50} = 7.5$$

Worst case is at 120 minutes $\Rightarrow$ Confirm width

$$\text{SOAKAWAY } 230\% = 3.5 \times 1.5 \times W \times 0.3 = 1.575W$$

$$A_{s50} = \left(\frac{3.5 \times 1.5}{2} \right) \times 2 + \left(\frac{W \times 1.5}{2} \right) \times 2$$
$$= 5.25 + 1.5W$$

@ 120 minutes

$$O_{120} = (5.25 + 1.5W) \times 1.82 \times 10^{-5} \times 120 \times 60$$
$$= 0.723341 + 0.19656W$$

$$\Rightarrow S = I_{120} - O_{120}$$
$$= 3.35 - 0.723341 - 0.19656W = 1.575W$$
$$\Rightarrow W = 1.483 \text{ m}$$

This is smaller than the proposed 1.5m wide

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$$\begin{aligned}\text{INFLOW}_{60} &= \text{IMPERMEABLE AREA} \times \text{RAINFALL RATE} \\ &= 66 \times 0.04 \\ &= 2.64 \text{ m}^3\end{aligned}$$

$$\begin{aligned}\text{OUTFLOW} &= A_{SS0} \times f \times D \\ &= 7.5 \times 1.82 \times 10^{-5} \times 60 \times 60 \\ &= 0.4914\end{aligned}$$

$$\begin{aligned}\text{SOAKAWAY STORAGE REQD} &= \text{INFLOW} - \text{OUTFLOW} = 2.64 - 0.4914 \\ &= 2.1486\end{aligned}$$

$$\begin{aligned}(37) \text{ EFFECTIVE STORAGE VOLUME} &= 0.3 \times L \times W \times D \\ &= 0.3 \times 3.5 \times 1.5 \times 1.5 \\ &= 2.3625\end{aligned}$$

$$\begin{aligned}\text{EFFECTIVE STORAGE VOLUME} - \text{SOAKAWAY STORAGE VOL. REQD} &= 2.3625 - 2.1486 \\ &= 0.2139\end{aligned}$$

$$= +Ve$$

∴ OK ✓

$$\begin{aligned}\text{TIME OF EMPTYING} = T_{SS0} &= (S_{REQ} \times 0.5) \div (A_{SS0} \times f) \\ &= (2.1486 \times 0.5) \div (7.5 \times 1.82 \times 10^{-5}) \\ &= 7870 \text{ secs}\end{aligned}$$

$$\begin{aligned}&= 2 \text{ hrs } 11 \text{ mins} \\ &\text{ie less than } 24 \text{ hrs} \\ &\therefore \text{OK} \quad \checkmark\end{aligned}$$