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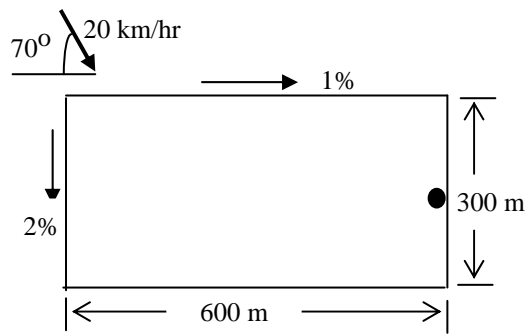
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S_S, S_L

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$$B_p = \frac{Q_s * TDH}{102}$$



(CHW=150)

(CHW=120)

$N_d = \Pi - 1$ $(T_i)_{\text{max at day}} = 12 \text{ hr}$ $I_b = 12 \text{ mm/hr}$
 $E_p = 75 \%$, $h_s = 0.85 \text{ m}$, $H_r = 70 \text{ cm}$, $(CHW)_L = 120$, $(CHW)_{\text{main}} = 150$
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$$T_{aw} = 120 \text{ mm/m}$$

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$$D_{rz} = 80 - 110 \text{ cm} = 95 \text{ cm}$$

$$T_{aw} = T_{aw_{1m}} \times D_{rz}(m)$$

$$T_{aw} = 120 \times 0.95 = 114 \text{ mm}$$

$$M_{ad} = 50\%$$

$$D_n = M_{ad} \times T_{aw}$$

$$D_n = 0.50 \times 114 = 57 \text{ mm}$$

: ET_c () () ()

$$ET_c = 9.2 \text{ mm/day}$$

$$\Pi = \frac{D_n}{ET_c} = \frac{57}{9.2} = 6.2 = 6 \text{ day}$$

$$N_d = II - 1 = 6 - 1 = 5 \text{ day}$$

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$$D_n = II \times ET_c = 6 \times 9.2 = 55.2 \text{ mm}$$

$$Mad = \frac{D_n}{Taw} = \frac{55.2}{114} \times 100 = 48.4\%$$

: Ea

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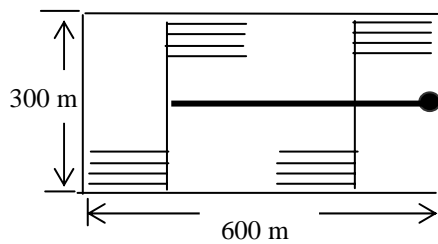
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$$E_a = 65\%$$

Dg

$$D_g = \frac{D_n}{E_a} = \frac{55.2}{0.65} = 84.9 \text{ mm}$$

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: Ss

Ss

Ss (m)	9	12	18
Nsp	16.66	12.5	8.33
L irrigation (m)	148.5	150	144

$$\therefore S_s = 12 \text{ m}$$

$$\therefore S_s = 12 \text{ m}$$

$$N_{sp} = 12$$

$$\therefore S_L = 12 \text{ m or } 15 \text{ m or } 18 \text{ m}$$

: S_L

S_L

S _L (m)	12	15	18
NL	25	20	16.66
L irrigation (m)	300	300	288

$$\therefore S_L = 12 \text{ m or } 15 \text{ m}$$

$$\therefore S_s = 12 \text{ m}$$

$$\therefore S_L = 15 \text{ m}$$

$$\begin{aligned}
 d_{\text{nozzle}}(\text{mm}) &= 5.16 \\
 P_{\text{SP}}(\text{kg/cm}^2) &= 3.52 \\
 Q_{\text{SP}}(\text{m}^3/\text{hr}) &= 2.16 \\
 D_w(\text{m}) &= 25.91 \\
 \text{Cu}(\%) &= 83
 \end{aligned}$$

$$R_a = \frac{Q_{\text{sp}}}{S_s \times S_L} = \frac{2.16}{12 \times 15} \times 1000 = 12 \text{ mm/hr}$$

$$T_{\text{Set}} = T_i = \frac{D_g}{R_a} = \frac{84}{12} = 7.07 \text{ hr}$$

$$N/\text{day} = \frac{T_{\text{day}}}{T_i} = \frac{12}{7.07} = 1.7 = 1$$

$$N_{o(\text{irr. total})} = N/\text{day} \times N_{\text{day}} = 1 \times 5 = 5$$

:(SL)

$$(NL)_{\text{total}} = 20 \times 4 = 80$$

$$(NL)_{\text{irr.}} = \frac{(NL)_{\text{total}}}{N_{o(\text{irr total})}} = \frac{80}{5} = 16 \text{ Line}$$

$$F = 0.394$$

$$S_1 = S_s = 12\text{m}$$

$$L = S_1 + S_s(N_{\text{SP}} - 1) = 12 + 12(12 - 1) = 144 \text{ m}$$

$$Q_L = N_{\text{SP}} \times Q_{\text{SP}} = 12 \times \frac{2.16}{3600} = 0.0072 \text{ m}^3/\text{sec} = 7.2 \text{ Lit/sec}$$

$$\therefore h_L \leq \frac{20}{100} H_{\text{SP}}$$

$$\therefore h_L = \frac{20}{100} \times (3.52 \times 10) = 7.04\text{m}$$

$$\therefore h_L = 1.1 H_f \pm \Delta H_z$$

$$7.04 = 1.1 H_f + \frac{1}{100} \times 144$$

$$\therefore H_f = \frac{7.04 - 1.44}{1.1} = 5.09 \text{ m}$$

$$H_f = 1.22 \times 10^{10} \times L \times \left(\frac{Q}{CHW} \right)^{1.852} \times d^{-4.87} \times F$$

$$5.09 = 1.22 \times 10^{10} \times 144 \times \left(\frac{7.2}{120} \right)^{1.852} \times d^{-4.87} \times 0.394$$

$$d = 66 \text{ mm} = 2.62 \text{ in}$$

$$d_{\text{act}} = 3.0 \text{ in} = 76.2 \text{ mm}$$

$$(H_f)_{\text{act}} = 1.22 \times 10^{10} \times 144 \times \left(\frac{7.2}{120} \right)^{1.852} \times 76.2^{-4.87} \times 0.394 = 2.57 \text{ m}$$

$$\therefore H_L = H_{\text{sp}} + 0.75 H_f + H_r \pm 0.5 \Delta H_z$$

$$H_L = 3.52 \times 10 + 0.75 \times 2.57 + .70 + 0.5 \times \frac{1}{100} \times 144 = 38.55 \text{ m}$$

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$$Q_{\text{Sup.main}} = 4 \times Q_L + 4 \times Q_{\text{SP}} = 4 \times 0.0072 + 4 \times \frac{2.16}{3600} = 0.0312 \text{ m}^3/\text{sec}$$

$$A = \frac{Q}{V} = \frac{0.0312}{2} = 0.0156 \text{ m}^2 \quad \therefore \frac{\pi}{4} d^2 = 0.0156$$

$$\therefore d = 0.141 \text{ m} = 141 \text{ mm} = 5.55 \text{ in}$$

$$\therefore d_{\text{act}} = 6 \text{ in} = 152.4 \text{ mm}$$

$$L_{\text{Sup.main}} = \frac{300}{2} - \frac{15}{2} = 150 - 7.5 = 142.5 \text{ m}$$

$$H_f = 1.22 \times 10^{10} \times L \times \left(\frac{Q}{CHW} \right)^{1.852} \times d^{-4.87}$$

$$H_f = 1.22 \times 10^{10} \times 142.5 \times \left(\frac{31.2}{150} \right)^{1.852} \times 152.4^{-4.87} = 2.22 \text{ m}$$

$$Q_{\text{main1}} = 4 \times Q_{\text{Sm}} = 4 \times 0.0312 = 0.1248 \text{ m}^3/\text{sec}$$

$$A = \frac{Q}{V} = \frac{0.1248}{2} = 0.0624 \text{ m}^2 \quad \therefore \frac{\pi}{4} d^2 = 0.0624$$

$$\therefore d = 0.282 \text{ m} = 282 \text{ mm} = 11 \text{ in} \quad \therefore d_{\text{act}} = 10 \text{ in} = 254 \text{ mm}$$

$$L_{\text{main}} = \frac{300}{2} = 150 \text{ m}$$

$$H_f = 10.77 \times L \times \left(\frac{Q}{\text{CHW}} \right)^{1.852} \times d^{-4.87}$$

$$H_f = 1.22 \times 10^{10} \times 150 \times \left(\frac{124.8}{150} \right)^{1.852} \times 254^{-4.87} = 2.53 \text{ m}$$

$$Q_{\text{main2}} = 2 \times Q_{\text{Sm}} = 2 \times 0.0312 = 0.0624 \text{ m}^3/\text{sec}$$

$$A = \frac{Q}{V} = \frac{0.0624}{2} = 0.0312 \text{ m}^2 \quad \therefore \frac{\pi}{4} d^2 = 0.0312$$

$$\therefore d = 0.199 \text{ m} = 199 \text{ mm} = 7.85 \text{ in}$$

$$\therefore d_{\text{act}} = 8 \text{ in} = 203 \text{ mm} \quad L_{\text{main}} = 300 \text{ m}$$

$$H_f = 1.22 \times 10^{10} \times L \times \left(\frac{Q}{\text{CHW}} \right)^{1.852} \times d^{-4.87}$$

$$H_f = 1.22 \times 10^{10} \times 300 \times \left(\frac{62.4}{150} \right)^{1.852} \times 203^{-4.87} = 4.17 \text{ m}$$

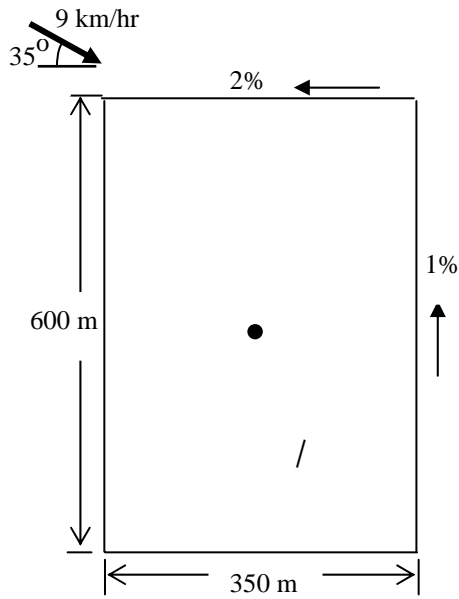
$$\therefore H_{\text{main}} = H_L + 1.1 H_f \pm (\Delta H_z)_{\text{main}} + h_s$$

$$\therefore H_{\text{main}} = 38.55 + 1.1(2.2 + 2.53 + 4.17) + \frac{2}{100} \times 142.5 + \frac{1}{100} \times 300 + 0.85 = 55 \text{ m}$$

$$\therefore H = \text{TDH} = h_{\text{pump}} = H_{\text{main}} \quad \therefore H = 55 \text{ m}$$

$$Q_S = Q_{\text{pump}} = Q_{\text{main1}} = 0.1248 \text{ m}^3/\text{sec} = 124.8 \text{ L}/\text{sec}$$

$$\text{BP} = \frac{Q_S \times H}{102 \times E_p} = \frac{55 \times 124.8}{102 \times 0.75} = 89.72 \text{ kw}$$



($C_{HW}=140$)

win = 9 km/hr $E_a = 80\%$

$ET_c = 10$ day $Drz = 85$ cm $Taw = 100$ mm/m $I_b = 12$ mm/hr

$(T_i)_{max}$ at day = 14 hr $Q_{well} = 55$ Lit/sec $Mad = 40 - 50\%$

$Hr = 1.5$ m $CHW = 140$ $hs = 1.5$ m $Ep = 75\%$

$$Taw = Taw_{1m} \times Drz(m)$$

$$Taw = 100 \times 0.85 = 85 \text{ mm}$$

$Mad = 50\%$

$$Dn = Mad \times Taw$$

$$Dn = 0.50 \times 85 = 42.5 \text{ mm}$$

$$\Pi = \frac{Dn}{ET_c} = \frac{42.5}{10} = 4.25 = 4 \text{ day}$$

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$$Dn = \Pi \times ET_c = 4 \times 10 = 40 \text{ mm}$$

(% -)

$$Mad = \frac{Dn}{TAW} = \frac{40}{85} = 47\%$$

Dg

$$D_g = \frac{D_n}{E_a} = \frac{40}{0.80} = 50 \text{ mm}$$

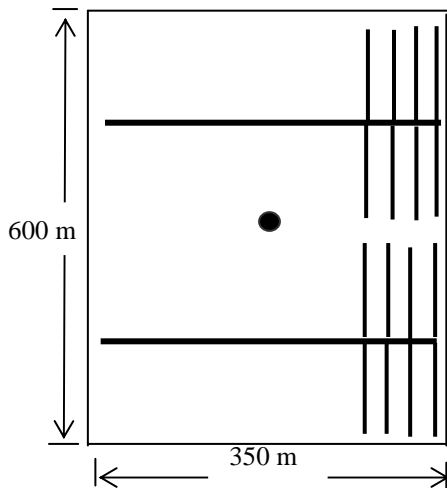
: Q_{si}

Q_{Well}

$$Q_{si} = \frac{A_{total} \times D_g}{(T_i)_{total}} = \frac{(600 \times 350) \times 0.050}{(4 \times 14)} = 187.5 \text{ m}^3/\text{hr} = 52.1 \text{ L/sec}$$

$$Q_{Well} = 55 \text{ Lit/sec}$$

$$\therefore Q_{Well} > Q_{si}$$



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: S_s

S_s

S _s (m)	9	12	18
N _{sp}	16.6	12.5	8.3
L irrigation (m)	148.5	150	144

$$\therefore S_s = 12 \text{ m}$$

$$\therefore S_s = 12 \text{ m}$$

$$N_{SP} = 12$$

$$\therefore S_L = 12 \text{ m or } 15 \text{ m or } 18 \text{ m}$$

: S_L

S_L

S _L (m)	12	15	18
NL	29.16	23.3	19.44
L irrigation (m)	348	345	342

$$\therefore S_L = 12 \text{ m}$$

$$\therefore S_s = 12 \text{ m}$$

$$\therefore S_L = 12 \text{ m}$$

$$d_{\text{nozzle}}(\text{mm}) = 3.97 \times 2.38$$

$$P_{\text{SP}} (\text{kg/cm}^2) = 2.81$$

$$Q_{\text{SP}} (\text{m}^3/\text{hr}) = 1.36$$

$$D_w (\text{m}) = 23.78$$

$$\text{Cu} (\%) = 87$$

$$R_a = \frac{Q_{\text{sp}}}{S_s \times S_L} = \frac{1.36}{12 \times 12} = 9.44 \text{ mm/hr}$$

$$T_i = \frac{D_g}{R_a} = \frac{50}{9.44} = 5.3 \text{ hr}$$

$$N/\text{day} = \frac{T_{\text{day}}}{T_i} = \frac{14}{5.3} = 2.64 = 2$$

$$N_{\text{day}} = \text{II} = 4 \text{ day}$$

$$No_{(\text{total})} = N/\text{day} \times N_{\text{day}} = 2 \times 4 = 8$$

:(SL)

$$(NL)_{\text{total}} = 29 \times 4 = 116$$

$$(NL)_{\text{irr.}} = \frac{(NL)_{\text{total}}}{No_{(\text{irr at II})}} = \frac{116}{8} = 14.5 = 16 \text{ Line}$$

$$S_i = S_s = 12 \text{ m}$$

$$L = S_i + S_s(N_{\text{SP}} - 1) = 12 + 12(12 - 1) = 144 \text{ m}$$

$$Q_L = N_{\text{SP}} \times Q_{\text{SP}} = 12 \times 1.36 = 16.32 \text{ m}^3/\text{hr} = 0.00453 \text{ m}^3/\text{sec}$$

$$\therefore h_L \leq \frac{20}{100} H_{\text{SP}}$$

$$\therefore h_L = \frac{20}{100} \times (2.81 \times 10) = 5.62 \text{ m}$$

$$\therefore h_L = 1.1 H_f \pm \Delta H_z$$

$$5.62 = 1.1H_f + \frac{1}{100} \times 144$$

$$\therefore H_f = \frac{5.62 - 1.44}{1.1} = 3.8 \text{ m}$$

$$F = 0.394 \quad 12$$

$$H_f = 1.22 \times 10^{10} \times L \times \left(\frac{Q}{CHW} \right)^{1.852} \times d^{-4.87} \times F$$

$$3.8 = 1.22 \times 10^{10} \times 144 \times \left(\frac{4.53}{140} \right)^{1.852} \times d^{-4.87} \times 0.394$$

$$D = 0.056 \text{ m} = 56 \text{ mm} = 2.2 \text{ in}$$

$$D_{\text{act}} = 2.5 \text{ in} = 63.5 \text{ mm}$$

$$(H_f)_{\text{act}} = 1.22 \times 10^{10} \times 144 \times \left(\frac{4.53}{140} \right)^{1.852} \times 63.5^{-4.87} \times 0.394 = 2 \text{ m}$$

$$\therefore H_L = H_{\text{sp}} + 0.75H_f + H_r \pm 0.5 \Delta H_z$$

$$H_L = 2.81 \times 10 + 0.75 \times 2 + 1.5 + 0.5 \times \frac{1}{100} \times 144 = 31.82 \text{ m}$$

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$$Q_{\text{main}} = N_L \times Q_L + N_S \times Q_{\text{SP}} = 8 \times 0.00453 + 8 \times 0.000377 = 0.039256 \text{ m}^3/\text{sec}$$

$$A = \frac{Q}{V} = \frac{0.039256}{2} = 0.019628 \text{ m}^2 \quad \therefore \frac{\pi}{4} d^2 = 0.019628$$

$$\therefore d = 0.158 \text{ m} = 158 \text{ mm} = 6.22 \text{ in}$$

$$\therefore d_{\text{act}} = 6 \text{ in} = 152.4 \text{ mm}$$

$$L_{\text{Summain}} = \frac{350}{2} - \frac{12}{2} = 175 - 6 = 169 \text{ m} \quad L_{\text{main}} = \frac{600}{4} = 150 \text{ m}$$

$$(H_f)_{\text{Main}} = 1.22 \times 10^{10} \times 150 \times \left(\frac{39.256}{140} \right)^{1.852} \times 152.4^{-4.87} = 4.1 \text{ m}$$

$$(H_f)_{\text{S.M}} = 1.22 \times 10^{10} \times 169 \times \left(\frac{39.256}{140} \right)^{1.852} \times 152.4^{-4.87} = 4.6 \text{ m}$$

$$\therefore H_{\text{main}} = H_L + (1.1H_f \pm (\Delta H_z))_{\text{S.M}} + (1.1H_f \pm (\Delta H_z))_{\text{Main}} + h_s$$

$$\therefore H_{\text{main}} = 31.82 + (1.1 \times 4.1) + \frac{1}{100} \times 150 + (1.1 \times 4.6) + \frac{2}{100} \times 169 + 1.5$$

$$\therefore H_{\text{main}} = 31.82 + 4.51 + 1.50 + 5.06 + 3.38 + 1.5 = 47.8\text{m}$$

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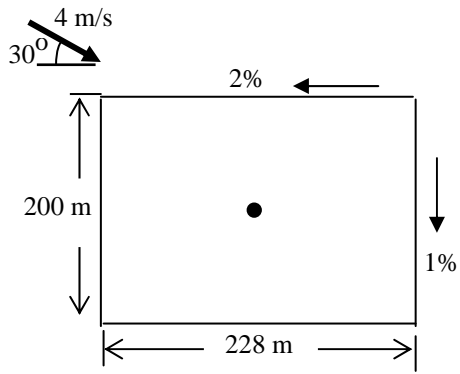
$$\therefore H = \text{TDH} = h_{\text{pump}} = H_{\text{main}}$$

$$\therefore H = 47.8 \text{ m}$$

$$Q_{\text{pump}} = 2 \times Q_{\text{main}} = 2 \times 0.039256 = 0.078512 \text{ m}^3/\text{sec}$$

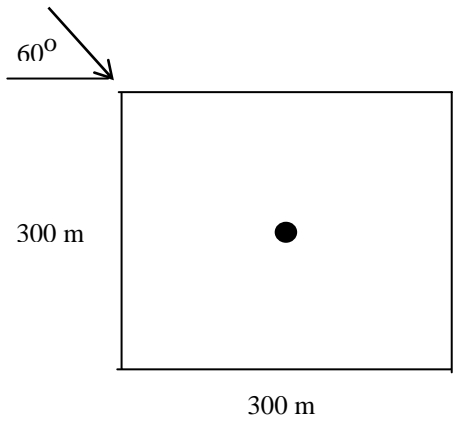
$$Q_s = Q_{\text{pump}} = 0.078512 \text{ m}^3/\text{sec} = 78.512 \text{ L/sec}$$

$$\text{BP} = \frac{Q_s \times H}{102 \times E_p} = \frac{47.8 \times 78.512}{102 \times 0.75} = 49.1 \text{ kw}$$



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$\dots (CHW=120)$



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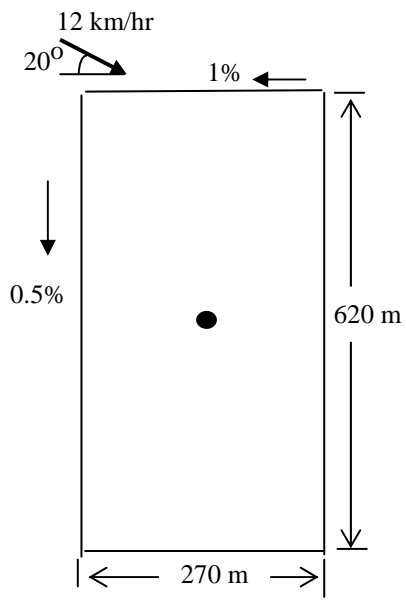
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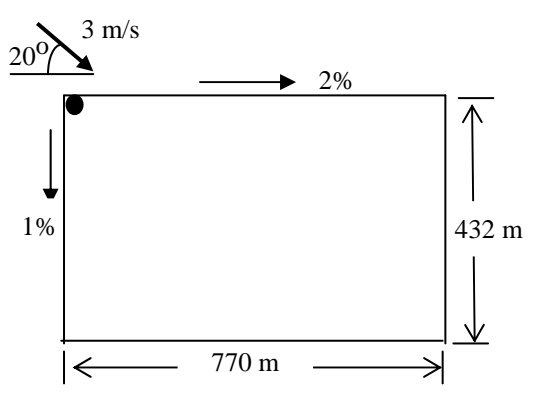
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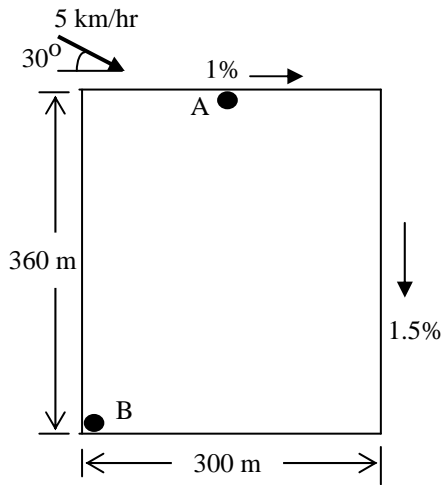
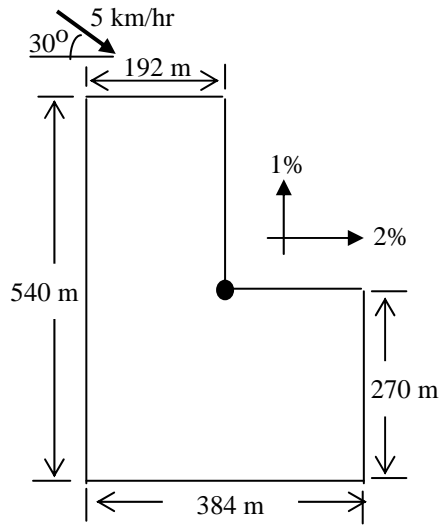


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(C_{HW}=150)

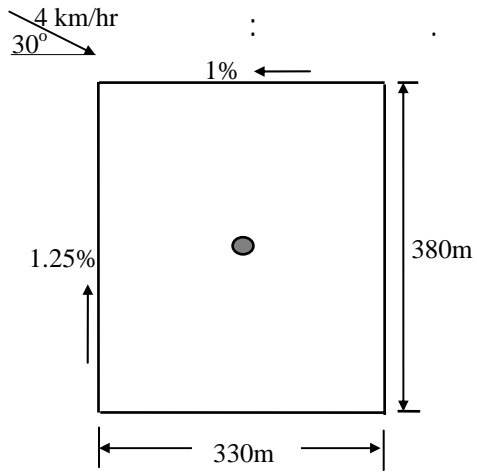
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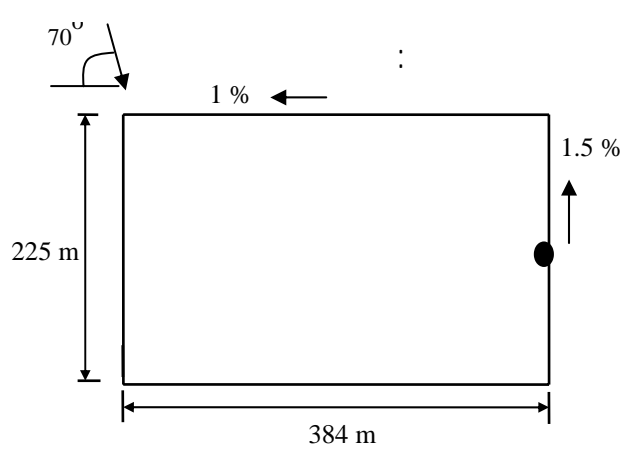
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