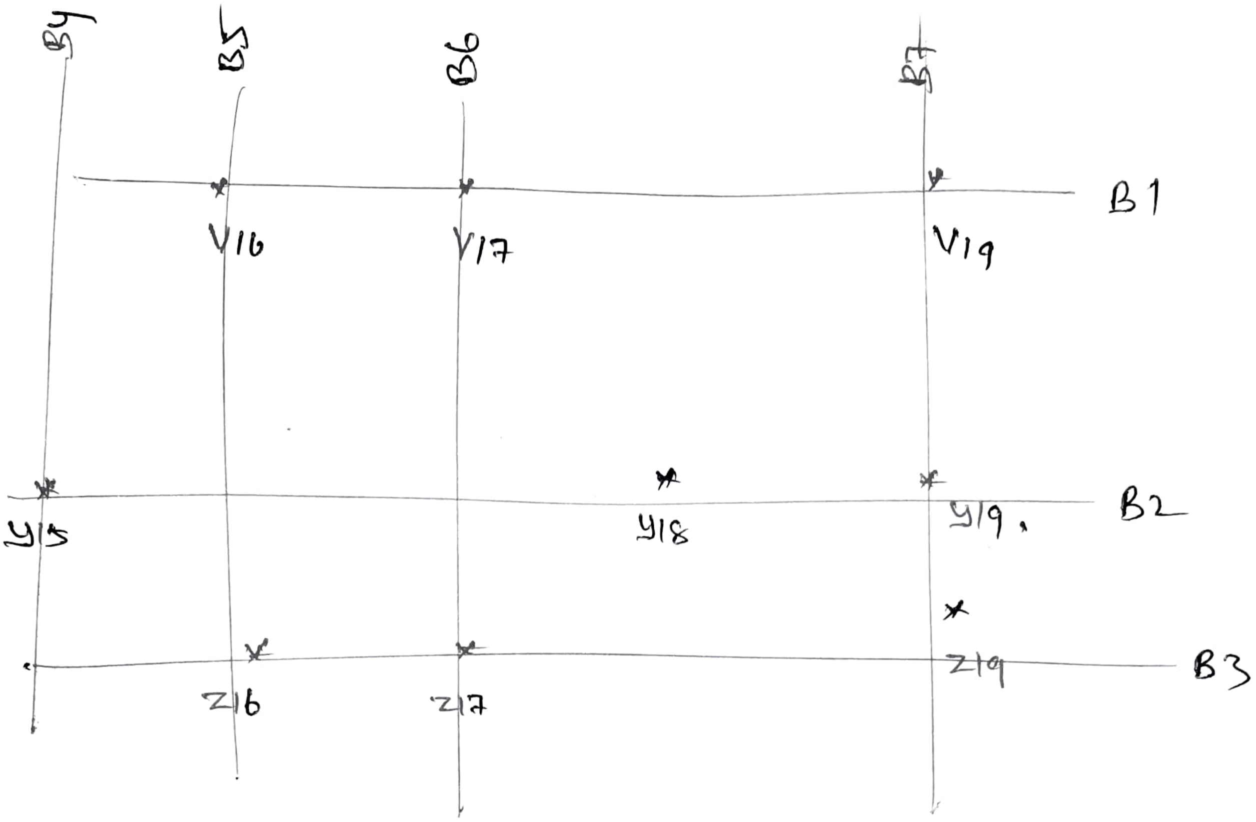
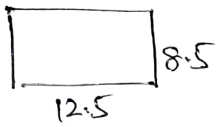



Slab:




B1 → (800 x 1100)

B2 → 500 x 1100)

B3 → (820 x 1100)

B4 → (~~1250~~ 1300 x 650)

B5 → (500 x 600)

B6 → (~~430~~ 530 x 650)

B7 → (~~910~~ 960 x 650)

---

## Design of Slab:

$\frac{l_y}{l_x} = \frac{6}{3.5} = 1.70$

~~One Short Edge~~

Two adj. Edges Discontinious

$\alpha_x(-) = 0.084$ $\alpha_y(-)$ 0.047

$\alpha_x + = 0.063$ $\alpha_y(+)$ 0.035

$M_{x(-)} = 0.084 \times 97 \times 3.5^2 = 100$ KN-M

$M_{y(-)} = 0.047 \times 97 \times 3.5^2 = 56$ KN-M

$M_{x(+)} = 0.063 \times 97 \times 3.5^2 = 75$ KN-M

$M_{y(+)} = 0.035 \times 97 \times 3.5^2 = 42$ KN-M

$d_{req} = \sqrt{\frac{1.5 \times 100 \times 10^6}{(1000)(0.133(25))}}$

$= 213$ mm

$D = 213 + 75 = 288$

$D = 350$ mm (say)

$d = 292$ mm

$\frac{M_y}{bd^2} = \frac{1.5 \times 100 \times 10^6}{1000 \times 292^2} = 1.80 N/m^2$

$P_t = 0.456$

AST = 1332 $mm^2$

#16@ 135c/c (Bottom Mat) (X-Dir)

$$\frac{M_u}{bd^2} = \frac{1.5\times75\times10^6}{1000\times292^2} = 1.32\,N/mm^2$$

$$\frac{0.333}{100}\times1000\times292 = 973\,mm^2$$

#16 φ@ 200 c/c

#12 φ@100c/c (Top Mat in Z-Dir)

$(\alpha_y)(w)(l_x)^2 \Rightarrow$

$$\frac{M_y}{bd^2} = \frac{1.5\times56\times10^6}{1000\times292^2} = 1.0\,N/mm^2$$

$p_t = 0.242$

$A_{ST} = 710\,mm^2$

#12 φ@ 150c/c (Bottom Mat in x Dir).

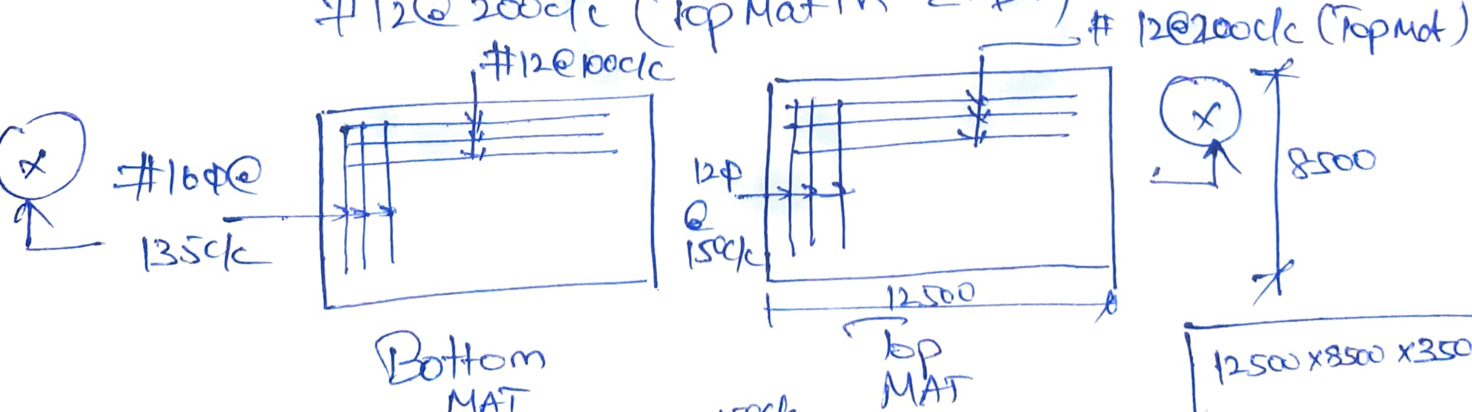
$\alpha_y + (w)(l_x)^2$

$$\frac{M_y}{bd^2} = \frac{1.5\times42\times10^6}{1000\times292^2} = 0.75\,N/mm^2$$

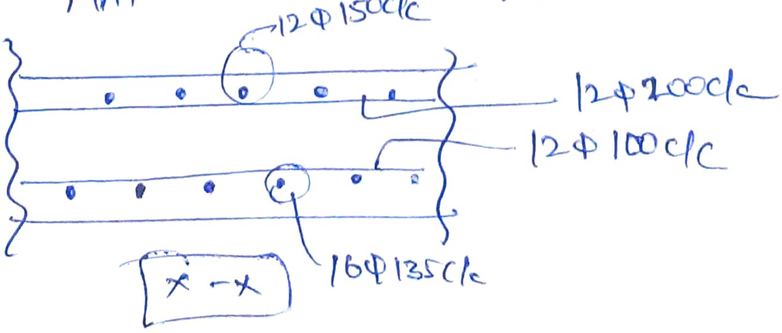
$p_t = 0.180\%$

$A_{st} = 530\,mm^2$

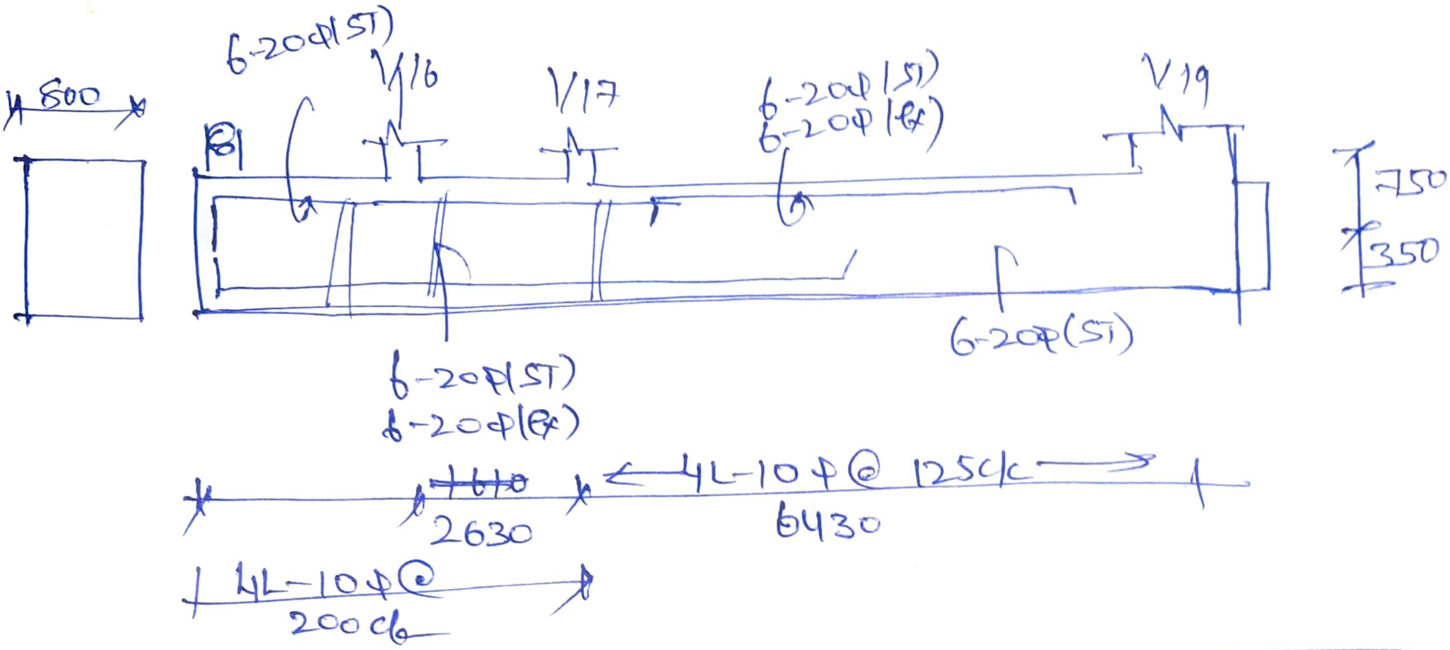
#12@ 200c/c (Top Mat in z-Dir)



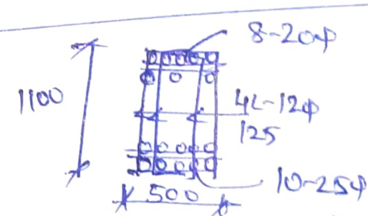

12500 x 8500 x 350

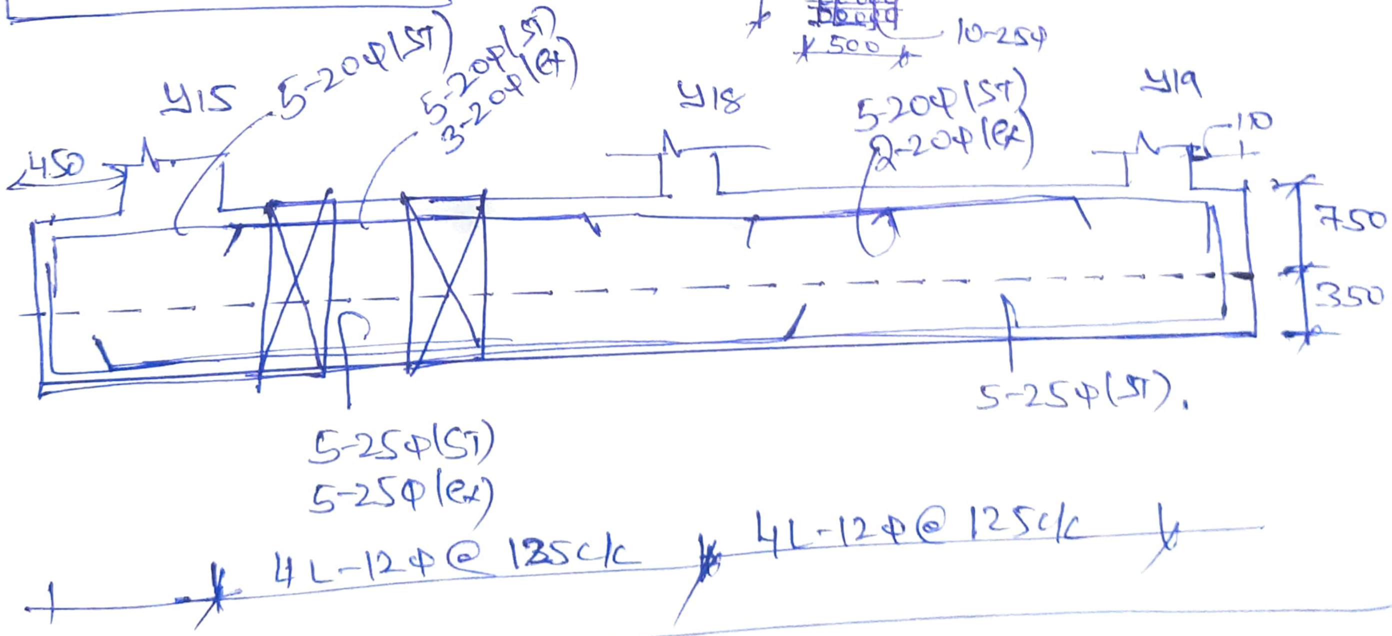


B1- (800x1100)

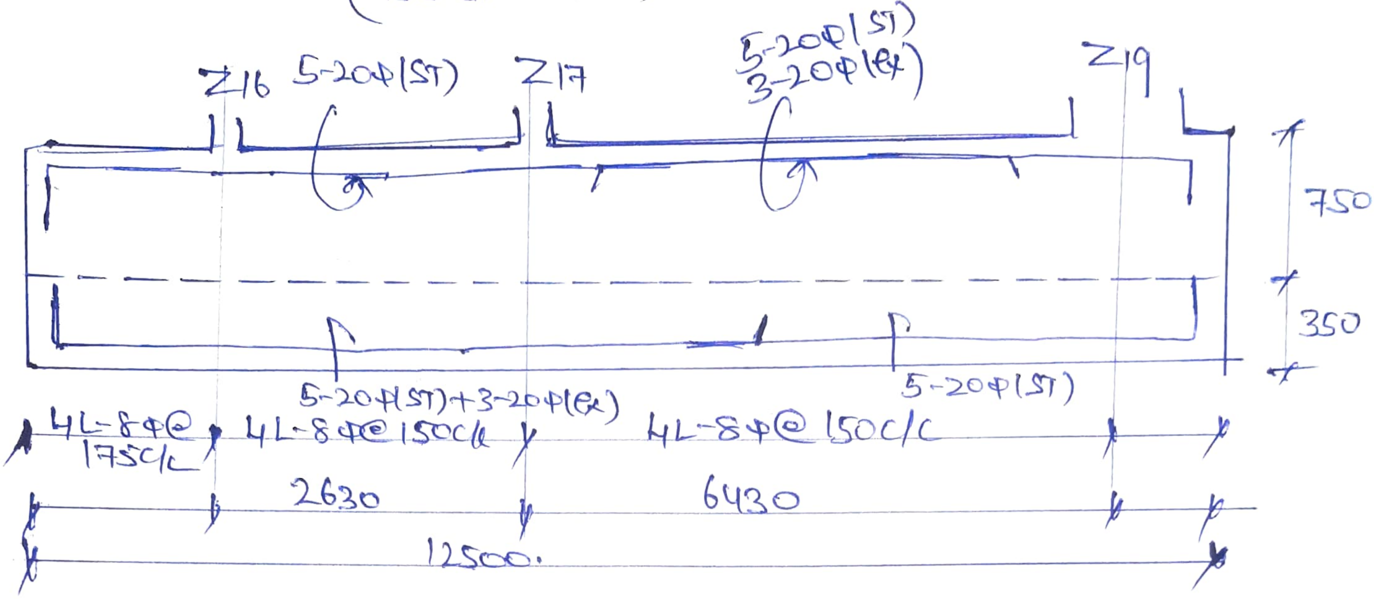



B2 → 500X1100

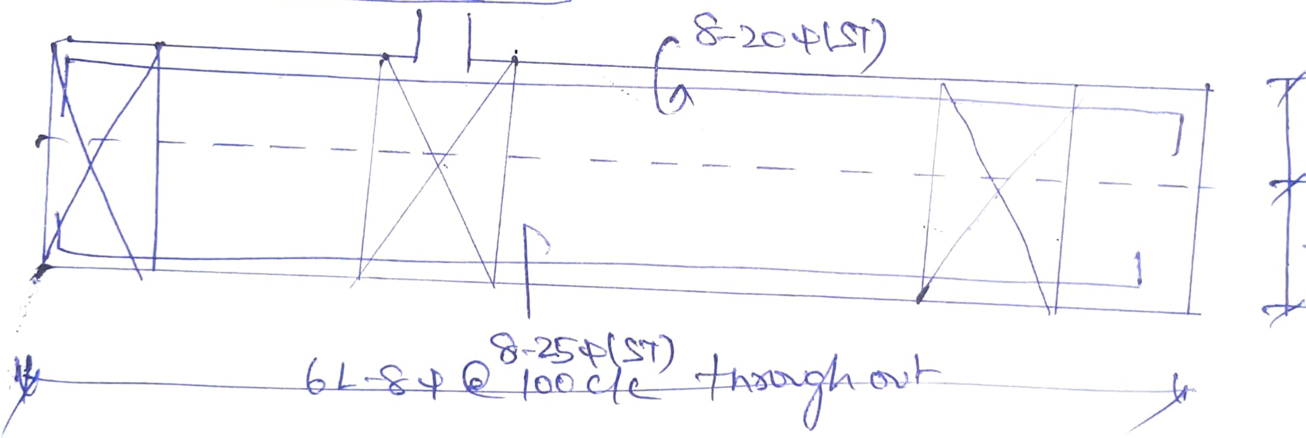


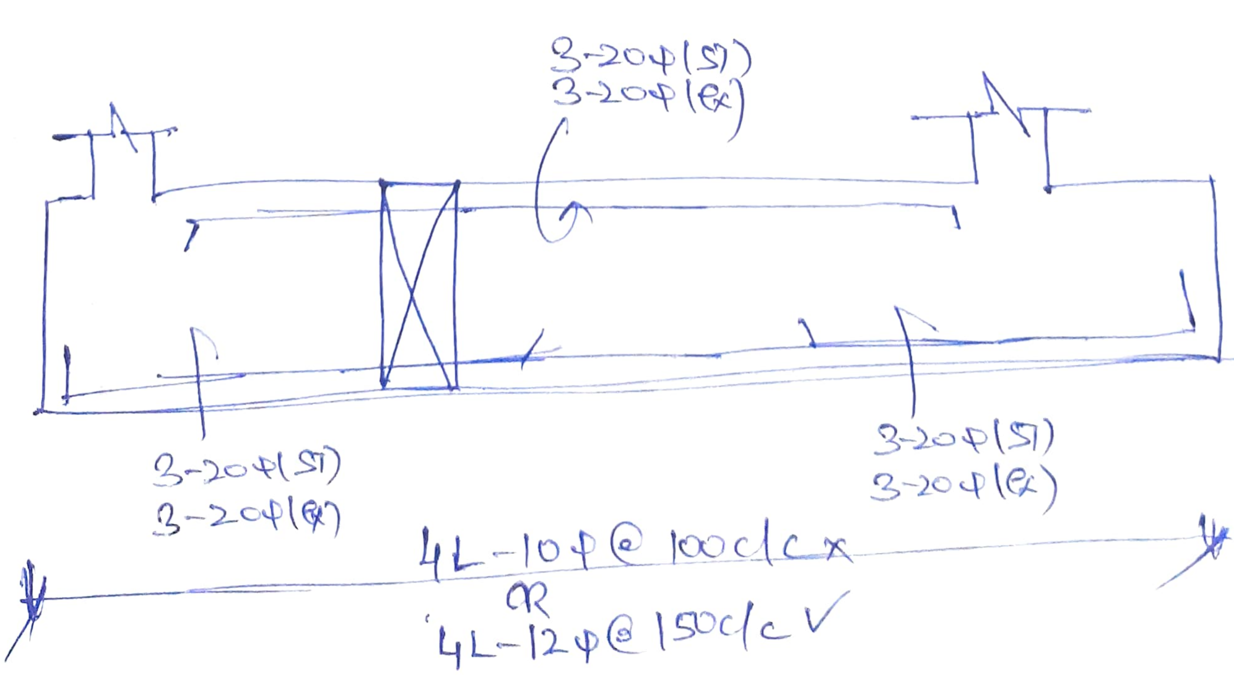
(B3 820x1100)



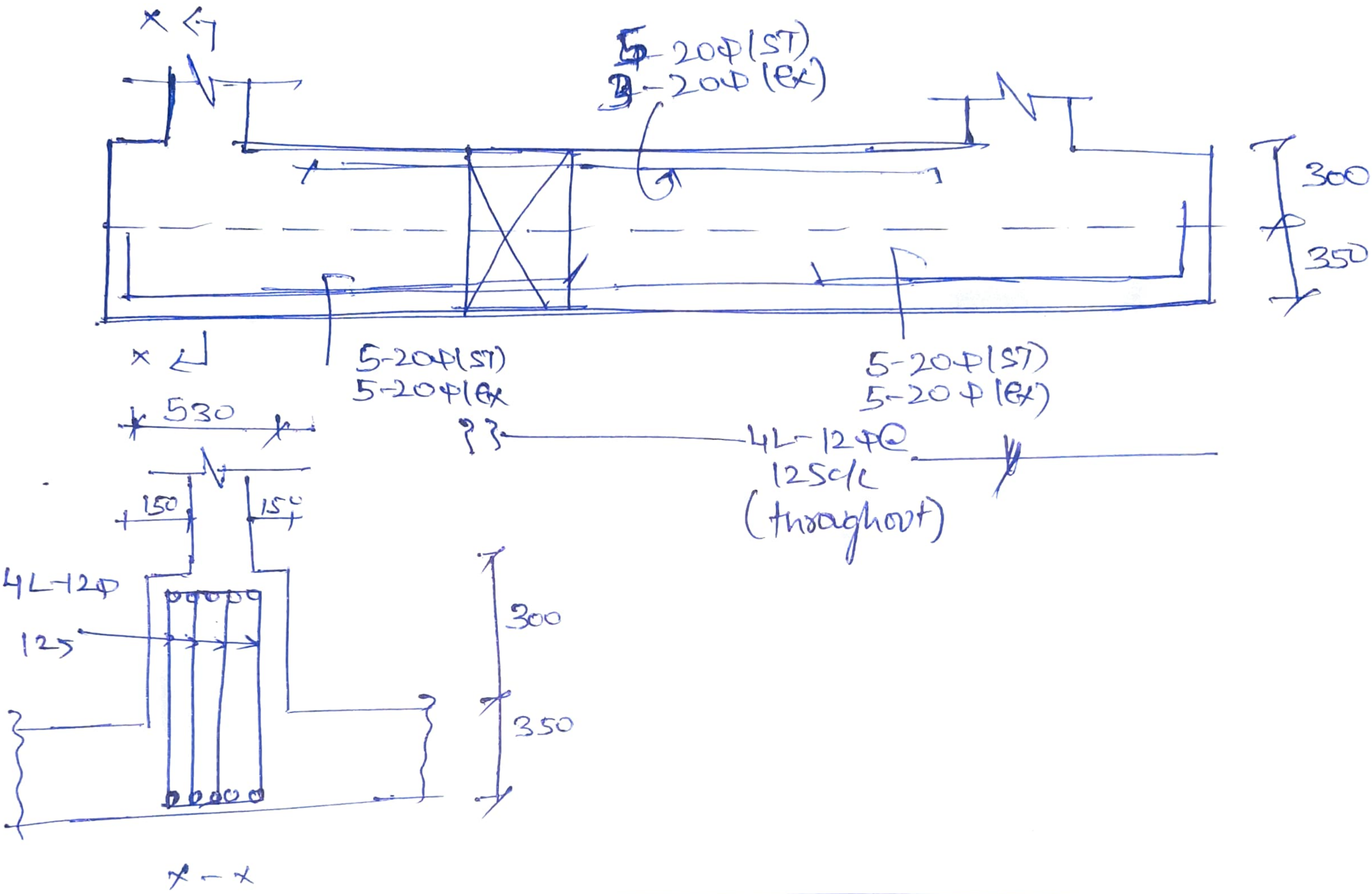

B4 → 1300x650



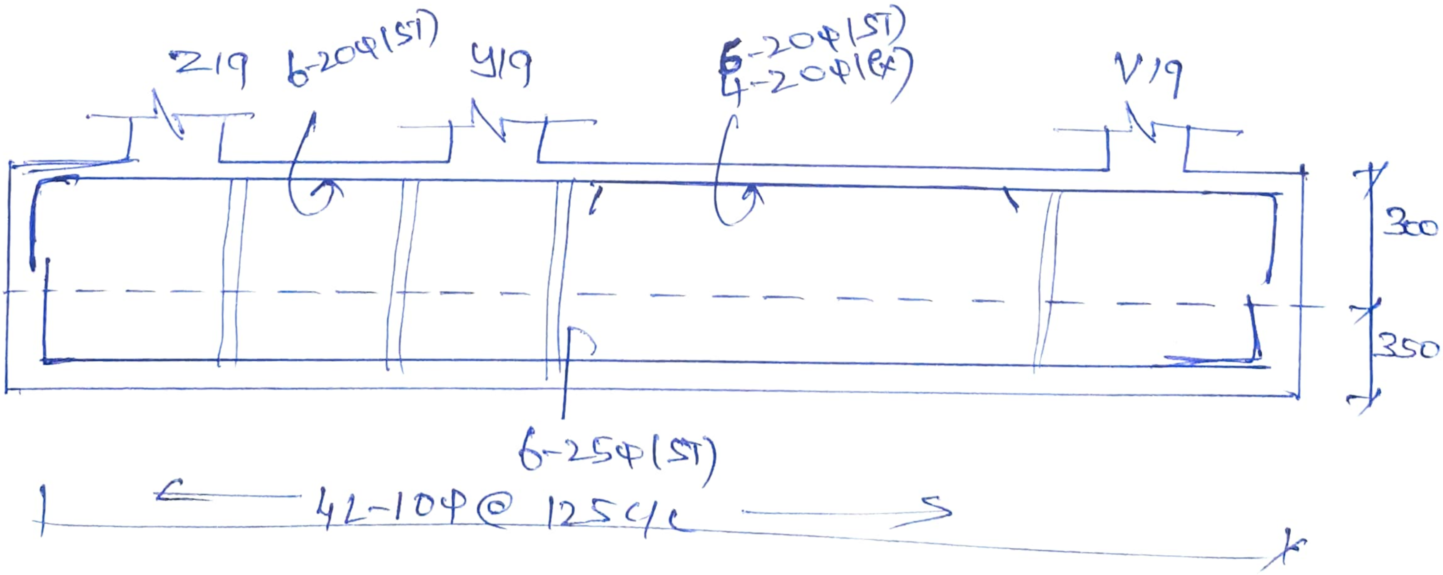

B5 (500x 650)



B6 (~~430~~ 530 x 650)




B7 (960 x 650)



Equivalent Shear

$V_e = V_u + 1.6 \frac{T_u}{b}$

$= 1100 + 1.6 \left(\frac{103}{0.50}\right)$

$= 1430 kN$

Shear Stress

$V_u = \frac{1430 \times 10^3}{(500)(1000)}$

$= 2.90 N/mm^2 < 3.1 N/mm^2$ (SAFE)

$P_t$ provided $= \frac{10 \times 491}{500 \times 1000} \times 100 = 0.982\%$

$\tau_c \Rightarrow 0.60 N/mm^2$

$V_{us} = 2.90 - 0.60 = (2.30 N/mm^2)(500)(1000) = 1150 kN$

$S_v = \frac{(0.87)(415)(4 \times 113)(1000)}{(1150 \times 10^3)}$

$=$

#12 @ 135 c/c @ 4L

$S_v = \frac{(0.87)(415)(4 \times 113)(1000)}{(1497 - \frac{(451)(500)(1000)}{(1272)})}$

$= 4L - 12\phi @ 125 c/c$

---

B3 (820 X 1100)

$V_u = 257 kN$

$V_u = 645 kN$

$\tau_c = 0.390$

$P_t = \left(\frac{8 - 314}{820 \times 1000}\right) \times 100 = 0.31\%$

$\tau_c = 0.390 N/mm^2$

$V_{us} = (645 - [(0.390)(820)(1000)])$

$= 325 kN$

$S_v = \frac{(0.87)(415)(4)(50.24)(1000)}{325 \times 10^3} = 200 c/c$

---

B4 (1300 X 650)

$M_z = 485 kN$

$\frac{M_u}{bd^2} = \frac{485 \times 10^6}{1300 \times 550^2} = 1.25 N/mm^2$

$P_t = 0.360$

$A_{ST} = 2574$

B – 1 (800x 1100)

$\frac{1145 \times 10^3}{800 \times 1000} = 1.45\ N/mm^2$ ✓

$p_{t\,prov} = \frac{12 \times 314}{800 \times 100} = 0.47\%$

$\tau_c = 0.40\ N/mm^2$ ✓

$V_{us} = (1.45 - 0.45) = 1.05$

$V_{us} = 1.05 \times 800 \times 1000 = 840\ kN$

$S_v = \frac{0.87 \times 415 \times 4 \times 78.50 \times 1000}{840 \times 10^3} = 135\ mm$

∴ 4L–10φ @ 125 c/c

---

B2 → 500 x 1100

B = 500
D = 1100
d = 1000

$M_z$ = 1557 (Support Moment)

$M_x$ = 103 kN-M

$V_u$ = 1100 kN @ deff

Due to $M_x$ (Torsion)

Eq. Bending Moment

$M_{e1} = M_u + M_T$

$M_u = \frac{M_y}{bd^2} = \frac{1557 \times 10^6}{500 \times 1000^2} = 3.15\ N/mm^2$ ✓

$p_t = 0.880$

AST = 4400 mm² ✓

$M_T = T_u \left( \frac{1 + D/b}{1.7} \right) = (103) \left( \frac{1 + \frac{1.1}{0.5}}{1.7} \right)$

⇒ 103 (1.883)

= 195 kN-M

$\frac{M_{uT}}{bd^2} = \frac{195 \times 10^6}{500 \times 1000^2} \simeq 0.40$

(or) $\frac{(1557 + 195)\,10^6}{500 \times 1000^2} = 3.504$

Double Reinf. Section

$\frac{d'}{d} = \frac{25 + 10}{1000} = 0.035$

$p_t = 0.986 \Rightarrow 4930\ mm^2$ ✓

$p_c = 0.044 \Rightarrow 220\ mm^2$ ✓