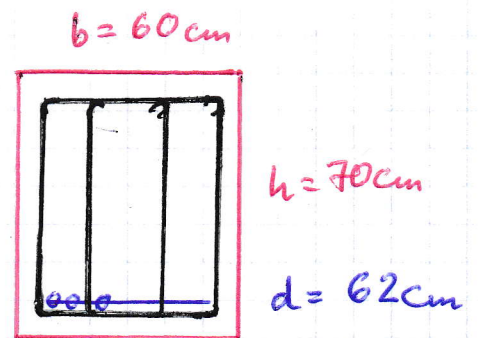
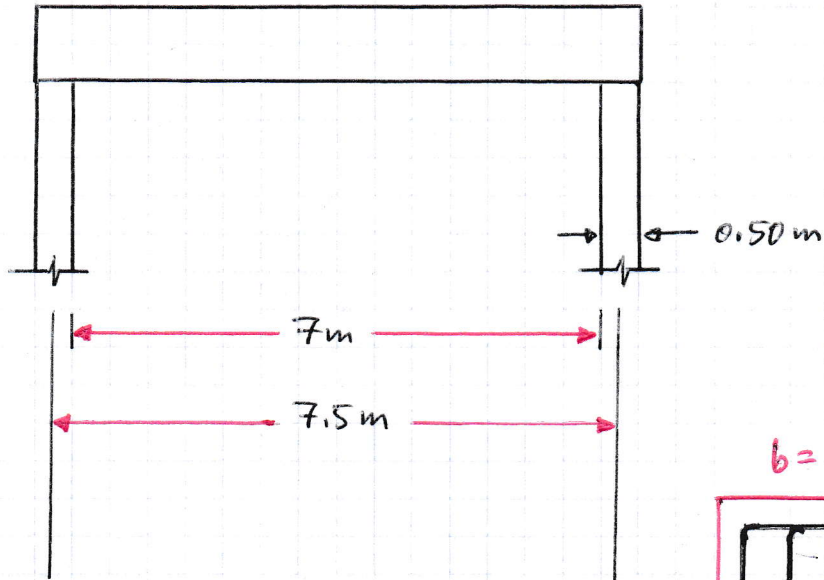


Example:

Service Loads: $w_{DL} = 12 \text{ t/m}$ $\times 1.2 = 14.4 \text{ t/m}$
 $w_{LL} = 8 \text{ t/m}$ $\times 1.6 = 12.8 \text{ t/m}$

 $w_u = 27.2 \text{ t/m}$



$f'_c = 28 \text{ MPa}$
 $f_y = 420 \text{ MPa}$

$$\phi V_c = 0.75 (0.17) (1.0) \frac{\sqrt{28}}{100} (60)(62)$$
$$= 25.10 \text{ t}$$

$$\frac{\phi V_c}{2} = 12.55 \text{ t}$$

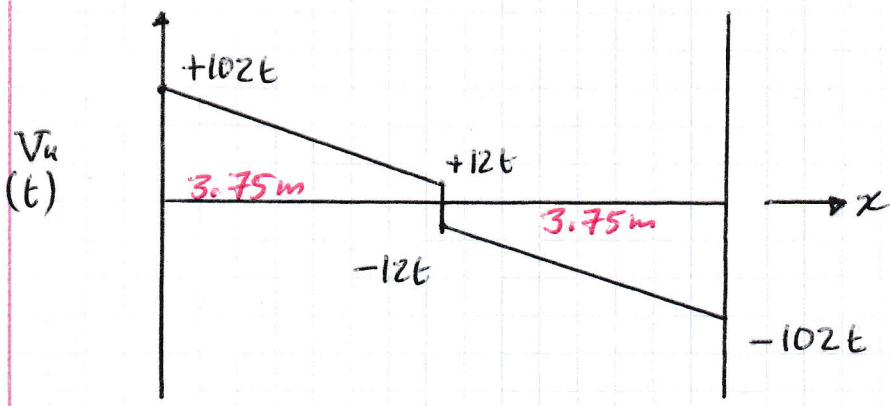
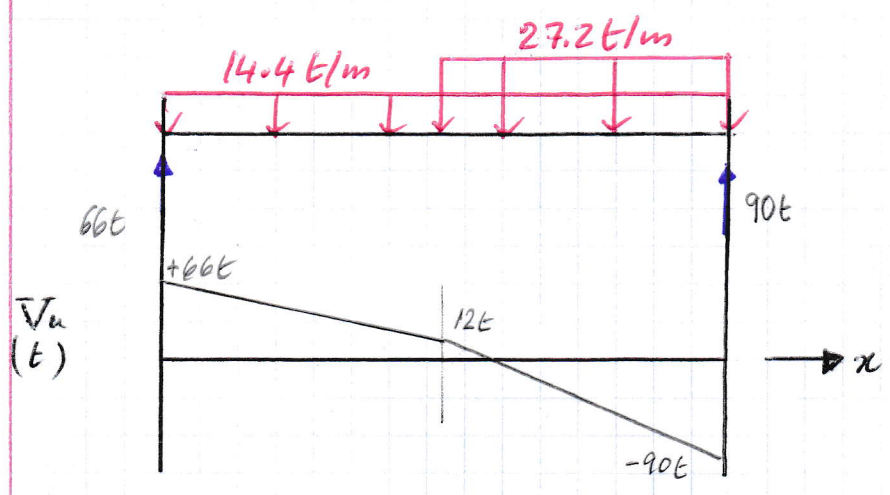
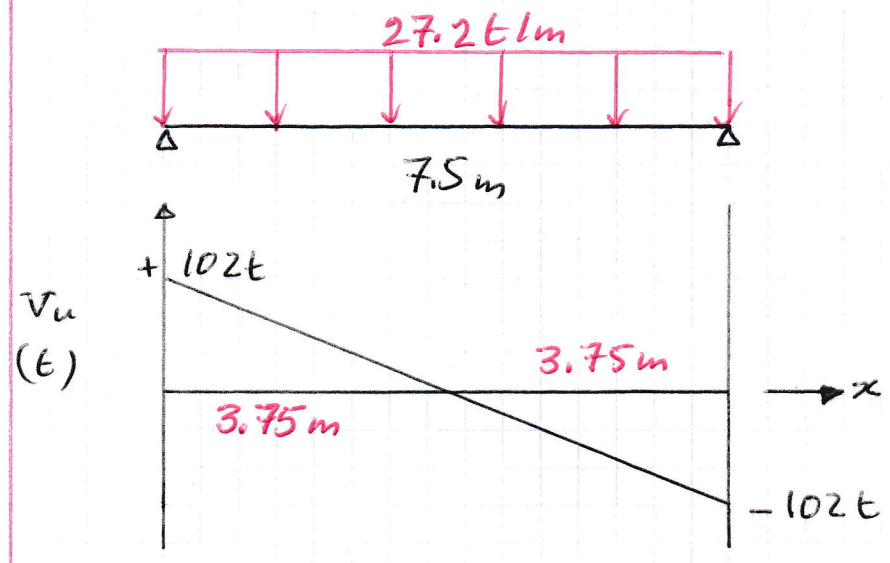
$$3\phi V_c = 75.29 \text{ t}$$

$$5\phi V_c = 125.5 \text{ t}$$

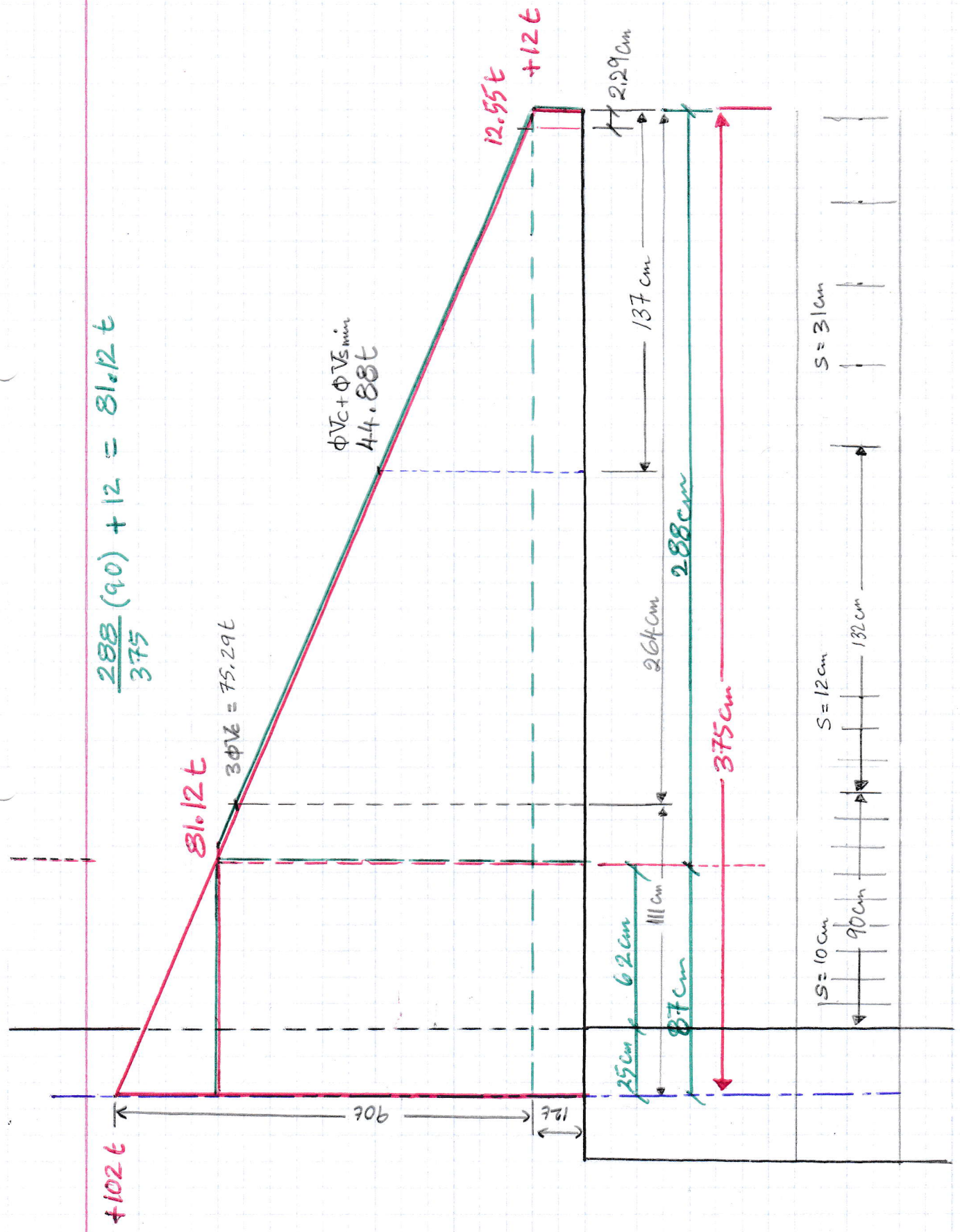
$w_{DL}(u) = 14.4 \text{ t/m}$

$w_{LL}(u) = 12.8 \text{ t/m}$

$w_u = 27.2 \text{ t/m}$



$$\frac{288}{375} (90) + 12 = 81.12t$$



81.12t

$$3\phi V_c = 75.29t$$

$$\phi V_c + \phi V_s_{min} = 44.88t$$

$$12.55t + 12t$$

$$+102t$$

$$906$$

$$12t$$

$$25\text{ cm}, 62\text{ cm}$$

$$111\text{ cm}$$

$$87\text{ cm}$$

$$264\text{ cm}$$

$$137\text{ cm}$$

$$229\text{ cm}$$

$$288\text{ cm}$$

$$375\text{ cm}$$

$$S = 10\text{ cm}$$

$$90\text{ cm}$$

$$S = 12\text{ cm}$$

$$132\text{ cm}$$

$$S = 31\text{ cm}$$

$$S_{max} \leq \frac{3.14 (420)}{0.062 \sqrt{28} (60)} = 67.0 \text{ cm}$$

$$\leq \frac{3.14 (420)}{0.35 (60)} = 62.8 \text{ cm}$$

$$\leq d/2 = \underline{31 \text{ cm}} \text{ controls}$$

$$\leq 60 \text{ cm}$$

$$\phi V_{smin} = \frac{0.75 (3.14) (4.2) (62)}{31} = 19.78 \text{ t}$$

$$\phi V_c + \phi V_{smin} = 25.10 + 19.78 = 44.88 \text{ t}$$

For $V_u = 81.12 \text{ t}$

$$\phi V_{sreq} = 81.12 - 25.10 = 56.02 \text{ t}$$

$$S_{req} = \frac{0.75 (3.14) (4.2) (62)}{56.02} = 10.95 \text{ cm}$$

$$S_{max} \leq 67.0 \text{ cm}$$

$$\leq 62.8 \text{ cm}$$

$$\leq d/4 = 15.5 \text{ cm}$$

$$\leq 30 \text{ cm}$$

use $S = 10 \text{ cm c/c}$

for $V_u = 75.29 \text{ t}$

$$\phi V_{sreq} = 75.29 - 25.10 = 50.19 \text{ t}$$

$$S_{req} = \frac{0.75 (3.14) (4.2) (62)}{50.19} = 12.2 \text{ cm}$$

use $S = 12 \text{ cm c/c}$