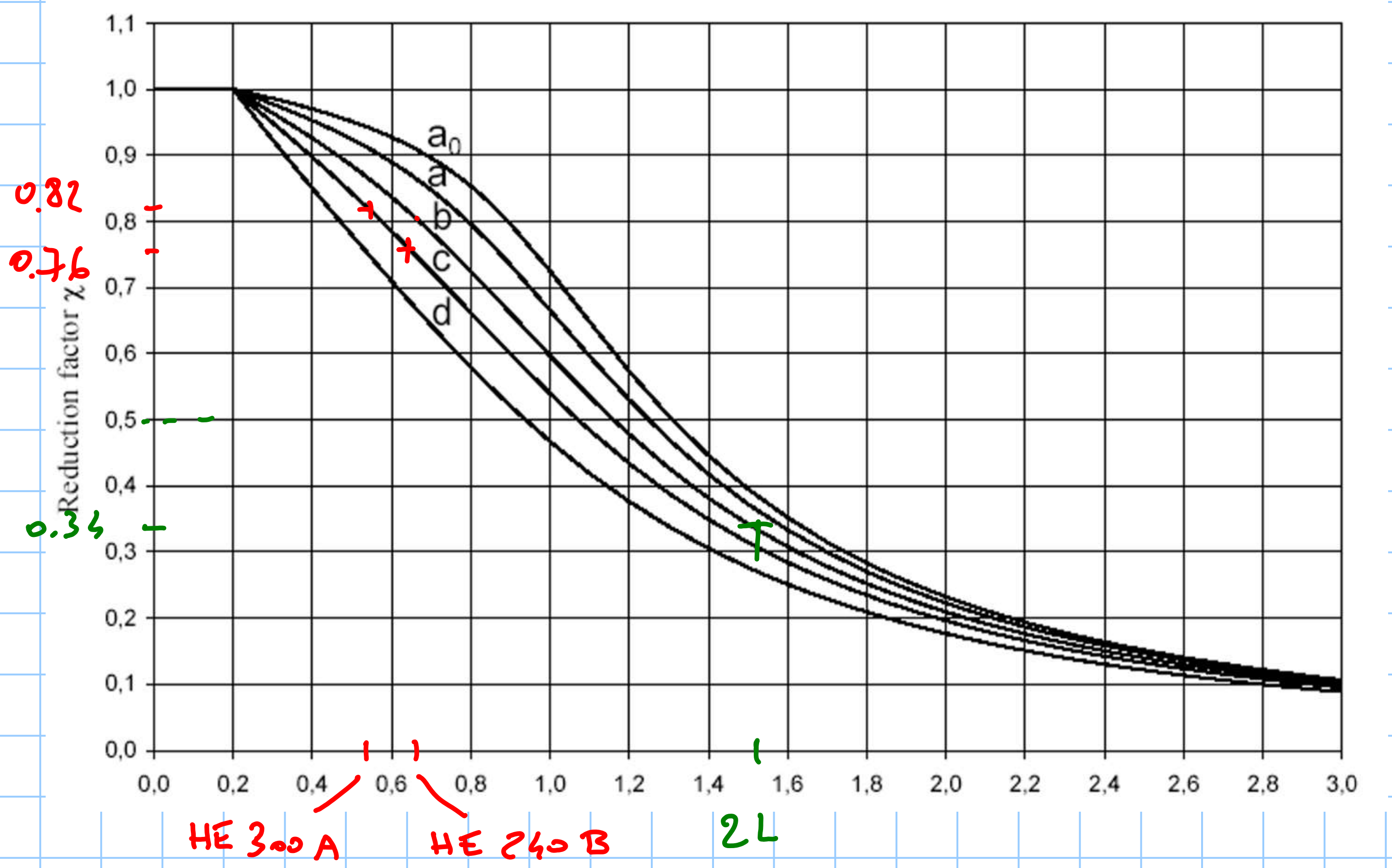
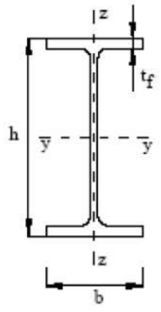
$$N_{b,Rd} = \chi A \frac{f_y}{\gamma_{M1}}$$

$$\gamma_{M1} = 1.05$$

$$\chi = f(\lambda, \text{forma sez.})$$



| Sezione trasversale | | Limiti | | Inflessione intorno all'asse | Curva di instabilità S235, S275, S355, S420 | Curva di instabilità S460 |
|---|---|---|---|---|---|---|
| Sezioni laminate |  | h/b > 1,2 | $t_f \leq 40$ mm | y-y | a | $a_0$ |
| | | | | z-z | b | $a_0$ |
| | | | 40 mm $< t_f \leq 100$ mm | y-y | b | a |
| | | | | z-z | c | a |
| | | h/b ≤ 1,2 | $t_f \leq 100$ mm | y-y | b | a |
| | | | | z-z | c | a |
| | | | $t_f > 100$ mm | y-y | d | c |
| | | | | z-z | d | c |

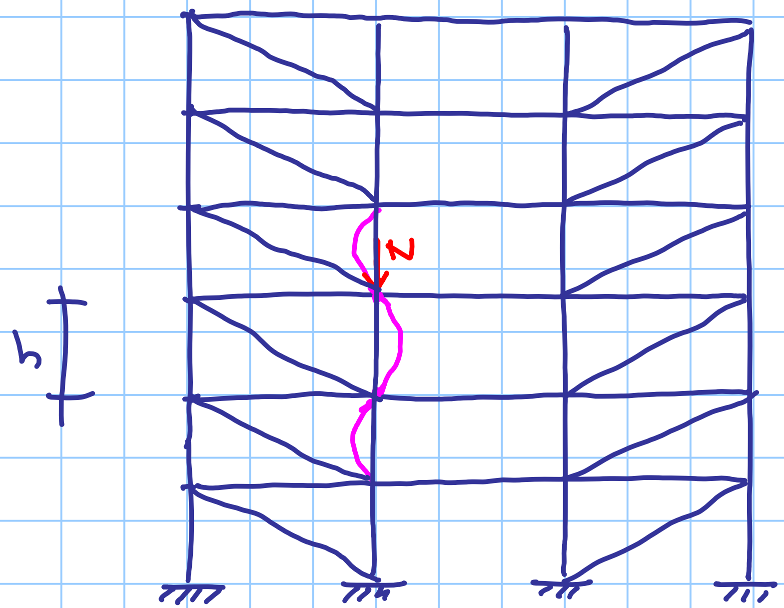
PROGETTO

$N_{Ed} = 2020\ kN$ compressione

$N_{Ed} \leq N_{b,Rd} = \chi\ A\ \frac{f_y}{\gamma_{M1}}$ uso S275

$A \geq \frac{N_{Ed}\ \gamma_{M1}}{\chi\ f_y}$

quale $\ell_0$ per colonne dell'edificio ?




$\ell_0 = h$

profilo : meglio HE perchè la differenza $i_y$ $i_z$ è minore che per IPE la snellezza $\lambda$ potrebbe essere intorno a 50

quindi $\bar{\lambda} \simeq 0.6 \div 0.7$

quindi $\chi \simeq 0.7 \div 0.8$

uso $\chi = 0.75 \rightarrow A \geq \dfrac{N_{Ed}\ \gamma_{M1}}{\chi\ f_y}$

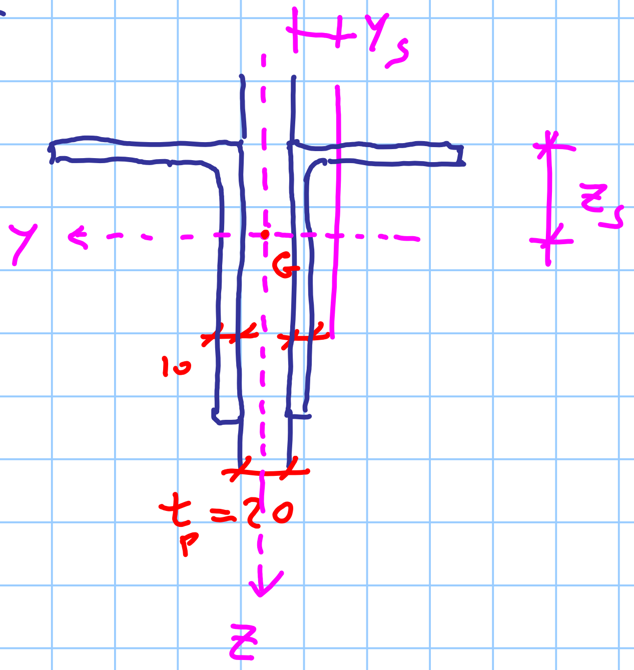
$$A \geq \frac{2020 \times 10^3 \times 1.05}{0.75 \times 275} = 102.8 \times 10^2\ mm^2$$

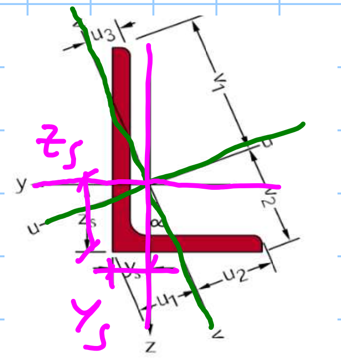
| | | | $\bar{\lambda}$ | $\chi$ |
|---|---|---|---|---|
| HE 240 B $\rightarrow$ | $A = 106.0 \times 10^2\ mm^2$ | $i_z = 6.08 \times 10\ mm$ | 0.665 | 0.76 |
| HE 300 A $\rightarrow$ | $A = 112.5 \times 10^2\ mm^2$ | $i_z = 7.49 \times 10\ mm$ | 0.539 | 0.82 |

vanno entrambi bene

2 L 150 × 100 × 10 $\qquad \ell_0 = 4.80$ m $\qquad A = 24.2 \times 10^2$ mm

S275




$i_u = 5.14 \times 10$ mm

$i_v = 2.17 \times 10$ mm

$i_y = 4.78 \times 10$ mm

$i_z = 2.87 \times 10$ mm

$y_s = 2.34 \times 10$ mm

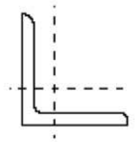
$z_s = 4.82 \times 10$ mm

$i_y^{(2)} = i_y^{(1)}$

$I_y^{(2)} = 2\, I_y^{(1)}$

$A^{(2)} = 2\, A^{(1)}$

$\bar{I}_y^{(1)}$

| | | | | |
|---|---|---|---|---|
| Sezioni ad L |  | qualunque | b | b |

$$I_z^{(1)} = A^{(1)} \, i_z^{(1)\,2}$$

$$I_{z,G^{(2)}}^{(1)} = I_z^{(1)} + A^{(1)} \left( y_s + \frac{t_b}{2} \right)^2$$

$$I_{z,G}^{(2)} = 2 \left[ I_z^{(1)} + A^{(1)} \left( y_s + \frac{t_b}{2} \right)^2 \right]$$

$$A^{(2)} = 2 \, A^{(1)}$$

$$i_z^{(2)} = \sqrt{\frac{I_{z,G}^{(2)}}{A^{(2)}}} = \sqrt{\frac{\cancel{2} \left[ I_z^{(1)} + A^{(1)} \left( y_s + \frac{t_b}{2} \right)^2 \right]}{\cancel{2} \, A^{(1)}}} = \sqrt{i_z^{(1)\,2} + \left( y_s + \frac{t_s}{2} \right)^2}$$

$$= \sqrt{(2.87 \times 10)^2 + \left( 2.34 \times 10 + \frac{20}{2} \right)^2} = 4.40 \times 10 \text{ mm}$$

coppia di profili

$i_y = 4.78 \times 10$ mm $\qquad i_z = 4.40 \times 10$ mm

$l_0 = 4.80$ m

$$\lambda^{(2)} = \frac{480}{440} = 109.1 \qquad \bar{\lambda} = 1.258$$

singolo profilo

$i_u = 5.14 \times 10$ mm $\qquad i_v = 2.17 \times 10$ mm

mettendo due punti di collegamento a $\frac{1}{3}$ e $\frac{2}{3}\, l_0$

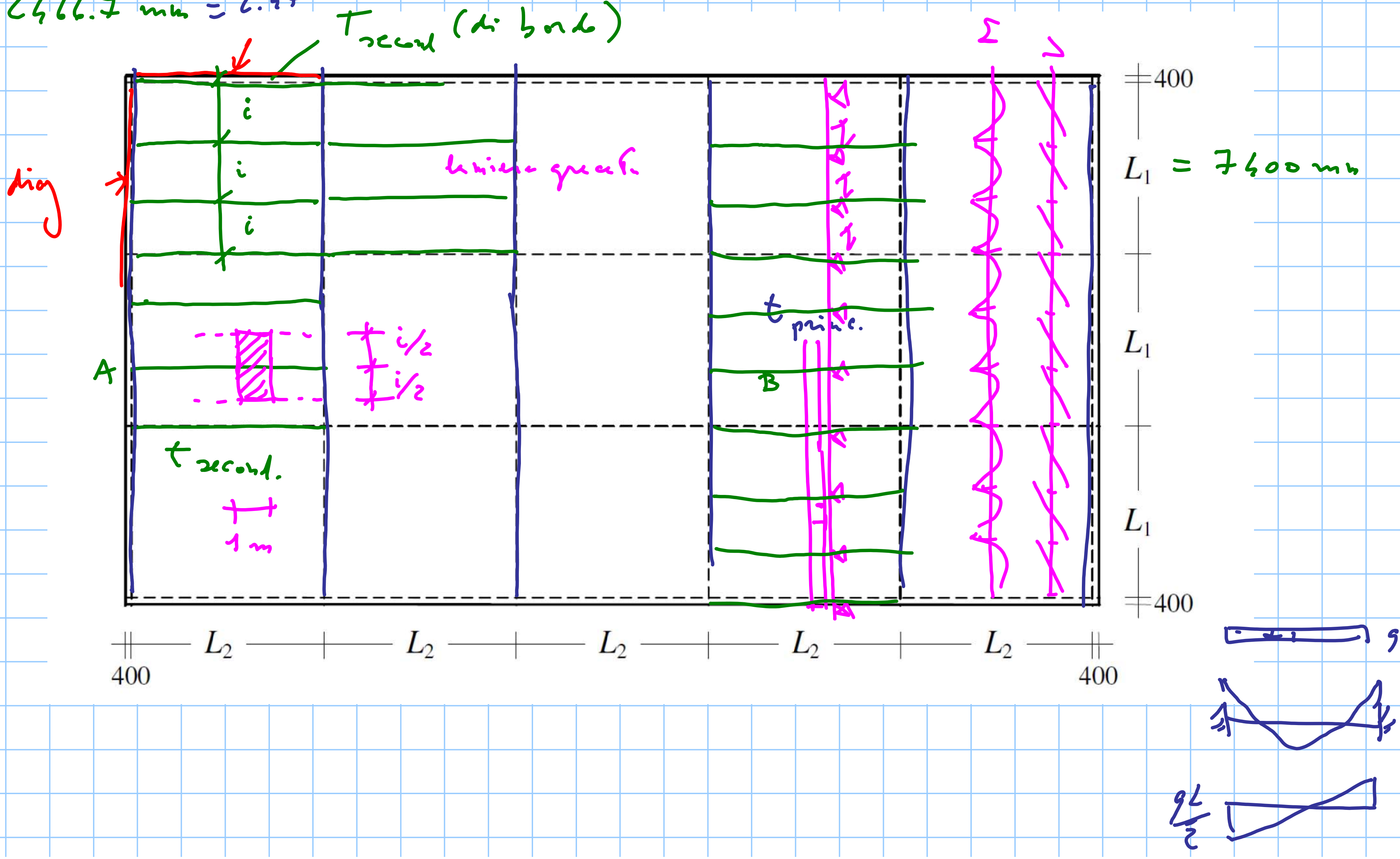
$$l_0 = \frac{4.80 \text{ m}}{3} = 1.60 \text{ m}$$

$$\lambda^{(1)} = \frac{160}{2.17} = 73.7 \qquad \bar{\lambda} = 0.850$$

$$\bar{\lambda}_{eq} = \sqrt{\bar{\lambda}^{(2)\,2} + \bar{\lambda}_1^{(1)\,2}} = \sqrt{1.258^2 + 0.850^2} = 1.518 \qquad \chi = 0.34$$

$$N_{b,Rd} = 0.34 \; 2 \times 24.2 \times 10 \times \frac{275}{1.05} \times 10^{-3} = 43.1 \text{ KN}$$

$i = 2466.7 \text{ mm} = 2.47 \text{ m}$



solaio $g_k + q_k = 6.81$ kN/m²

$g_d + q_d = 9.48$ kN/m²

carichi su trave secondaria

| | | $g_k$ | $q_k$ | SLE | SLU |
|---|---|---|---|---|---|
| solaio | 2.47 | 11.9 | 4.9 | $6.81 \times 2.47 = 16.8$ | $9.48 \times 2.47 = 23.4$ |
| p.p. Trav. sec. | | | | 0.4 | 0.5 |
| TOT | | | | 17.2 kN/m | 23.9 kN/m |