

ESCADAS

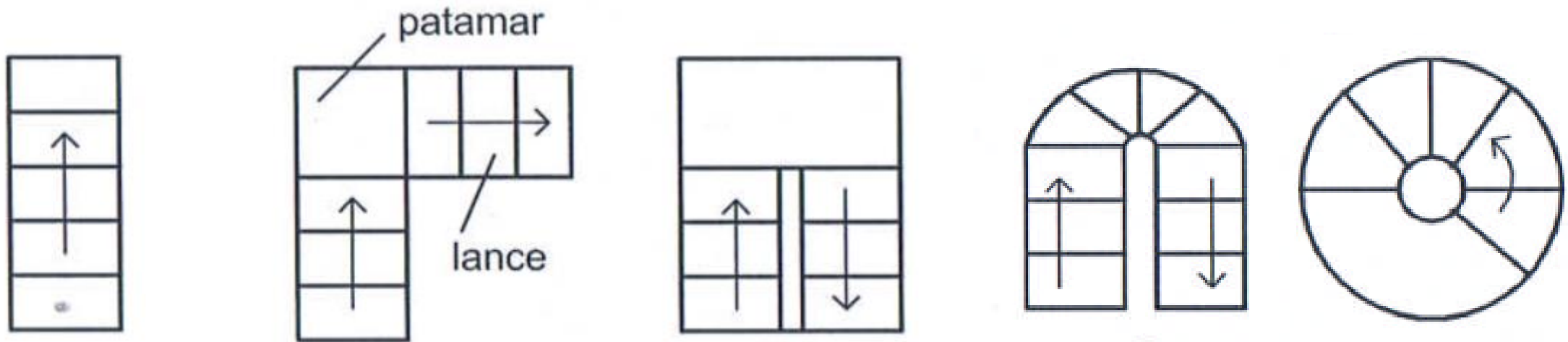
PROFESSORA: SARA BRANDÃO

UNIVERSIDADE PAULISTA

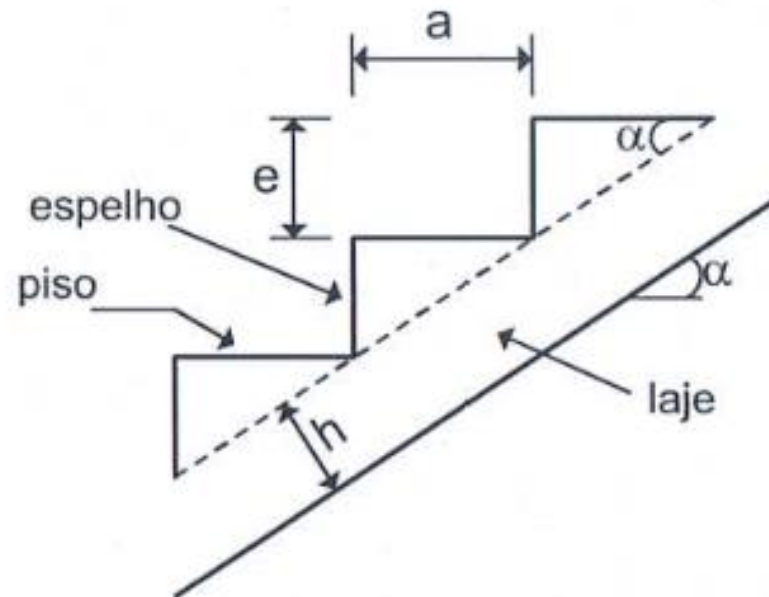
CURSO GRADUAÇÃO EM ENGENHARIA CIVIL



INTRODUÇÃO



DIMENSÕES



$$a + 2e = 60 \text{ cm a } 64 \text{ m}$$

$$26 \leq s \leq 32 \text{ cm}$$

$$16 \leq e \leq 19 \text{ cm}$$

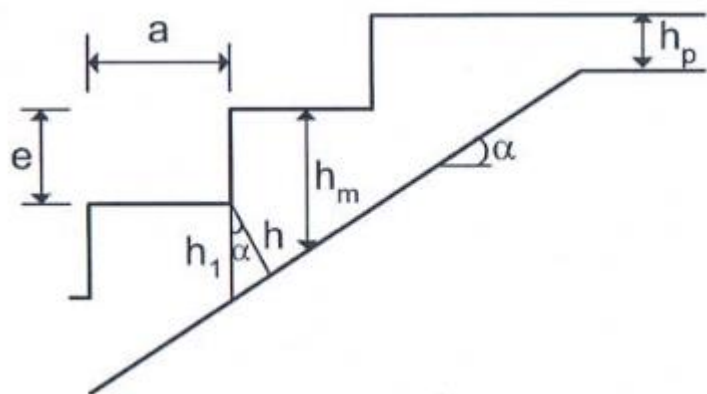
$$\cos \alpha = \frac{a}{\sqrt{a^2 + e^2}}$$

$$6 \leq h \leq 12 \text{ cm}$$

A largura da escada deve ser, geralmente, de 80 cm e 120 cm em edifícios de apartamentos, hotéis e escritórios.

CARGAS NAS ESCADAS

1. PESO PRÓPRIO:



$$h_1 = \frac{h}{\cos \alpha}$$

$$h_m = h_1 + \frac{e}{2}$$

$$q_{pp} = h_m \times \gamma_c$$

CARGAS NAS ESCADAS

2. REVESTIMENTOS



Dependendo do tipo de revestimento pode-se adotar:

- *Cerâmicas:*

$$q_{rv} = 1,0 \text{ kN/m}^2$$

- *Pedras (Granitos/Mármore):*

$$q_{rv} = 1,5 \text{ kN/m}^2$$

CARGAS NAS ESCADAS

3. CARGA ACIDENTAL

Segundo NBR 6120:

- Escadas com acesso público : $3,0 \text{ kN/m}^2$
- Escadas sem acesso público: $2,5 \text{ kN/m}^2$

CARGAS NAS ESCADAS

4. PARAPEITOS



- *Carga para 1 metro de parapeito:*

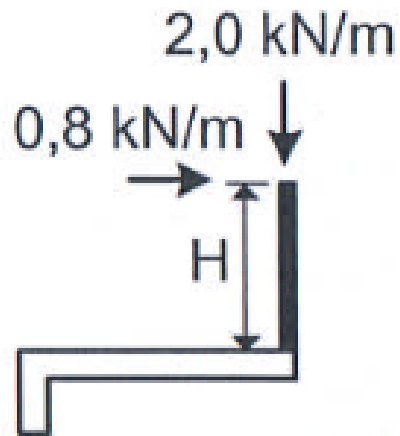
$$q_{PR} = \gamma \times H \times t, \text{ kN/m}$$

- *Carga distribuída por área:*

$$q_{PR} = \frac{\gamma \times H \times t}{L}, \text{ kN/m}^2$$

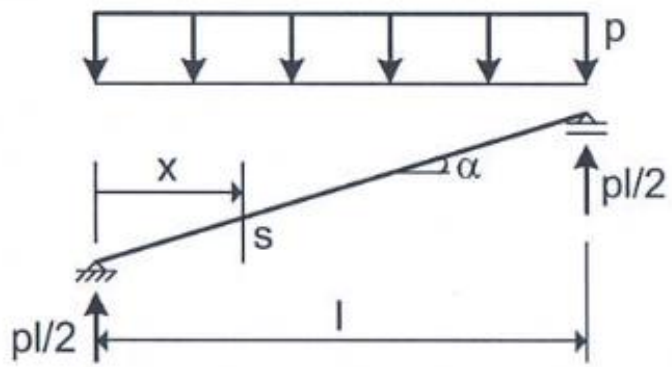
CARGAS NAS ESCADAS

5. CARGA ACIDENTAL NOS PARAPEITOS



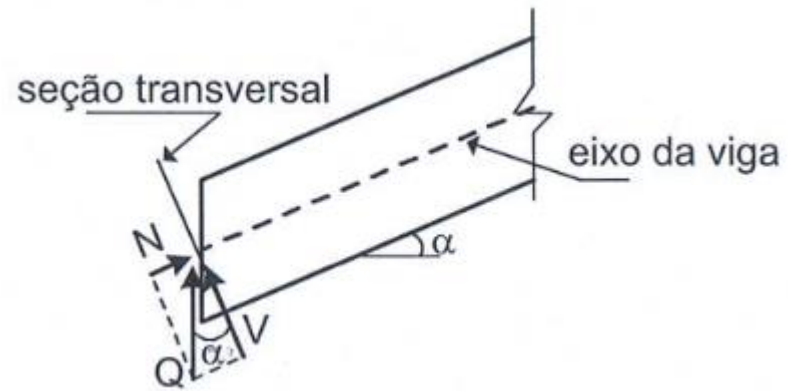
- *Segundo NBR 6120:*
- *Carga horizontal = $0,8 \text{ kN/m}$*
- *Carga vertical = $2,0 \text{ kN/m}$*

ESFORÇOS NAS ESCADAS



$$Q(x) = \frac{pl}{2} - px$$

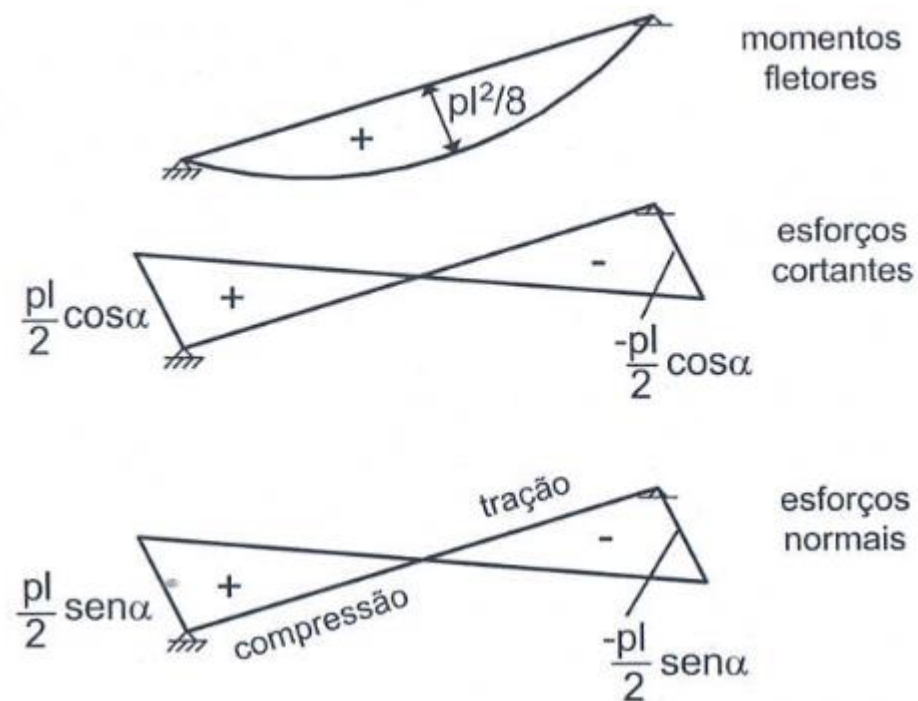
$$M(x) = \frac{pl}{2}x - \frac{px^2}{2}$$



$$V(x) = \left(\frac{pl}{2} - px \right) \times \cos \alpha$$

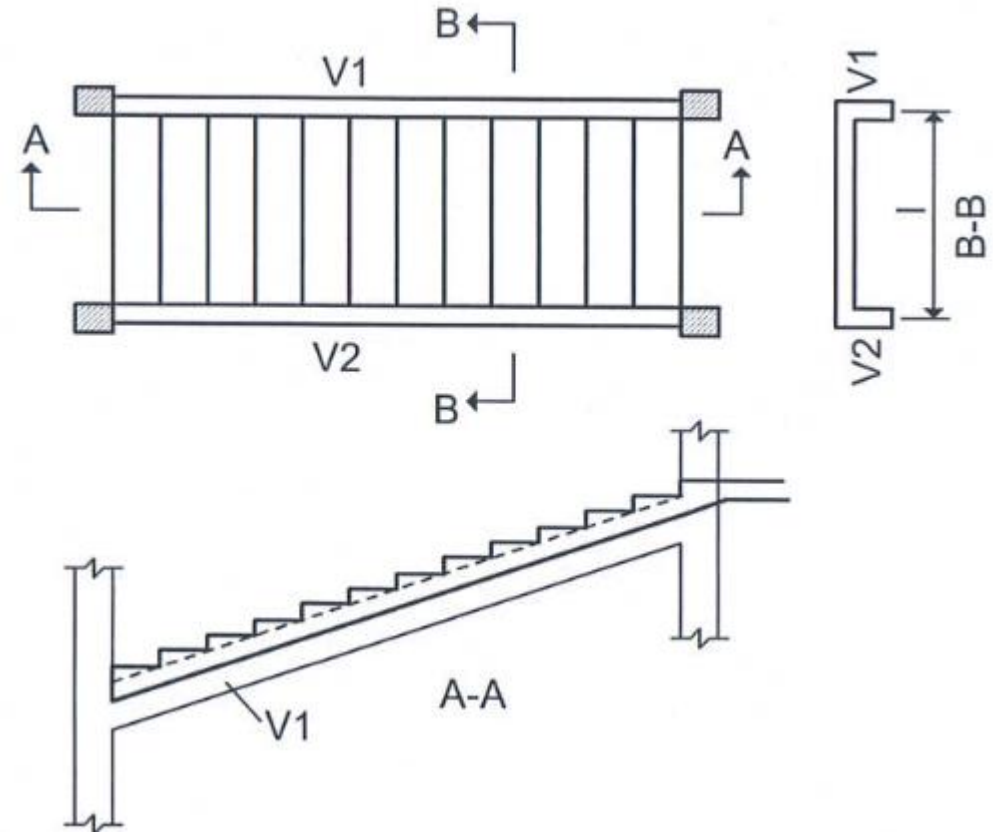
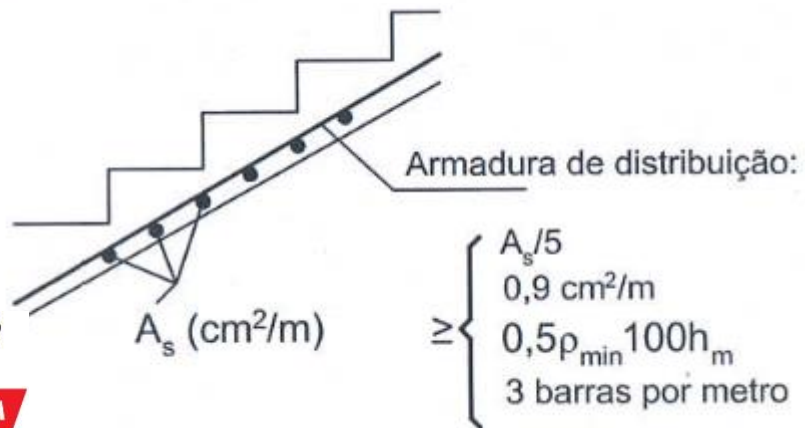
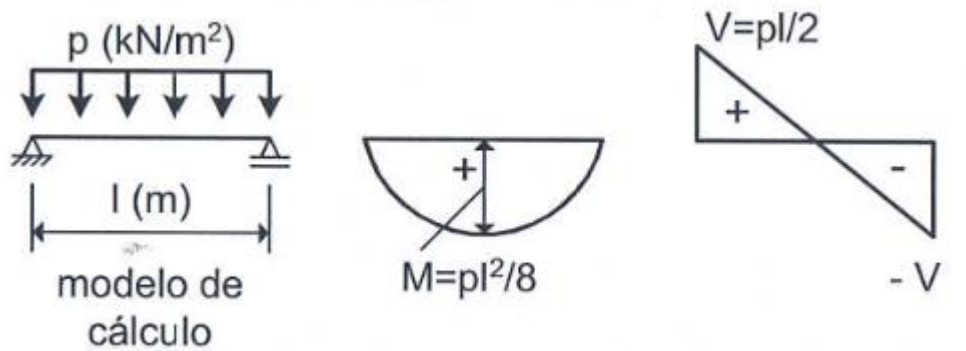
$$N(x) = \left(\frac{pl}{2} - px \right) \times \sin \alpha$$

DIAGRAMA DE ESFORÇOS SOLICITANTES

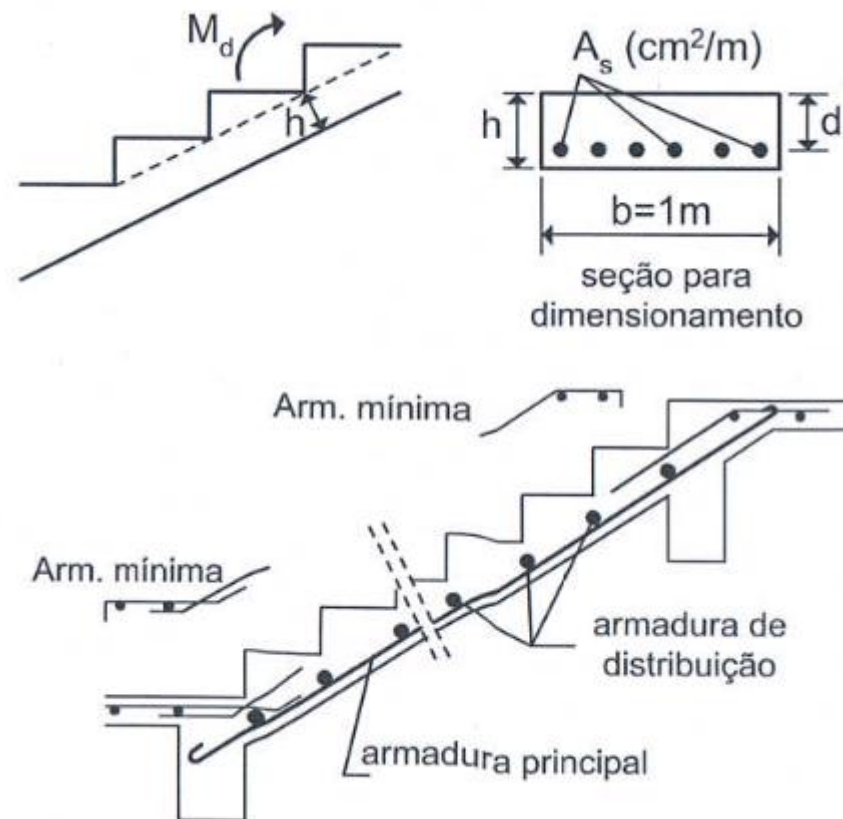
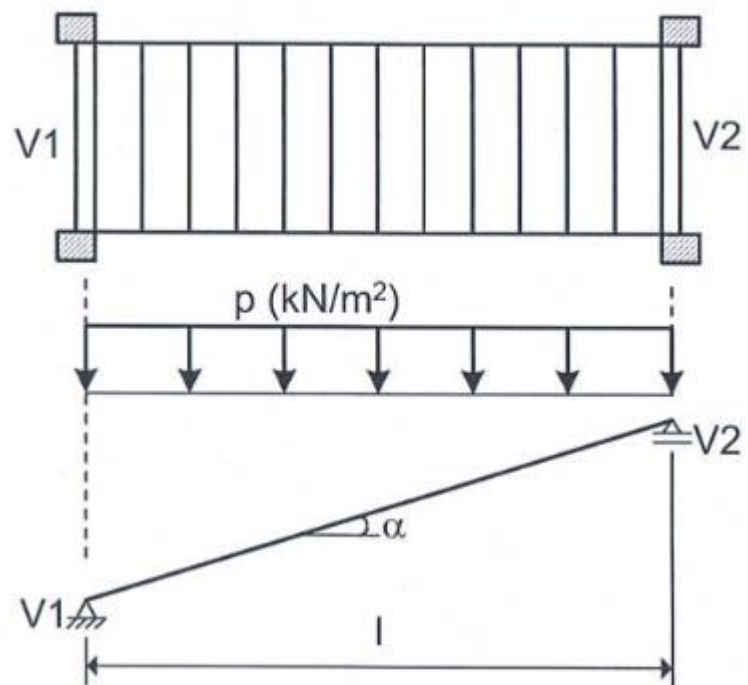


TIPOS DE ESCADAS

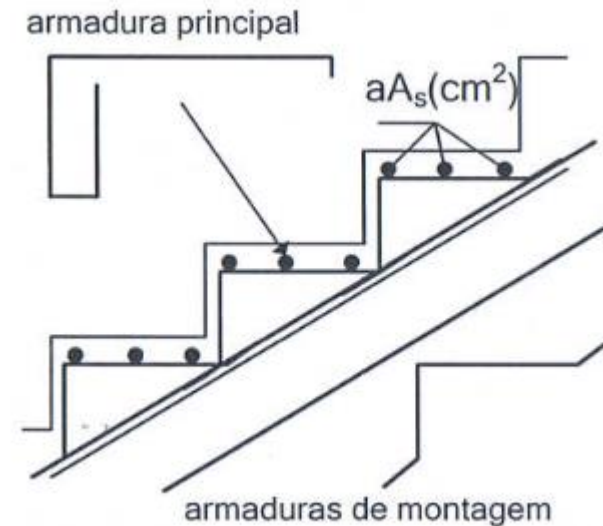
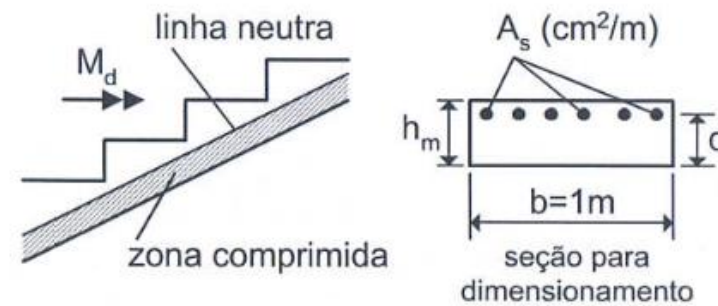
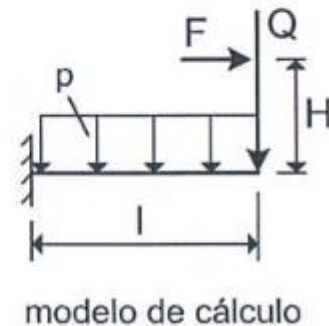
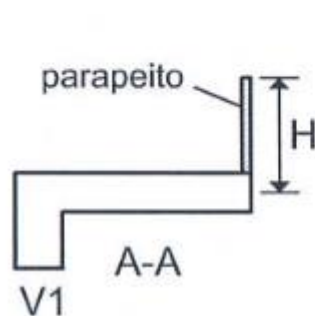
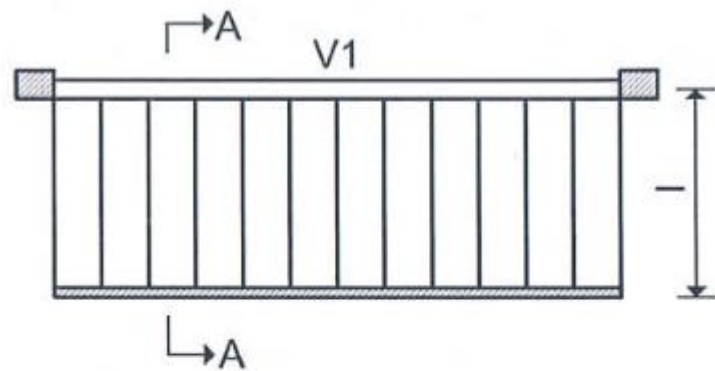
ESCADA ARMADA TRANSVERSALMENTE



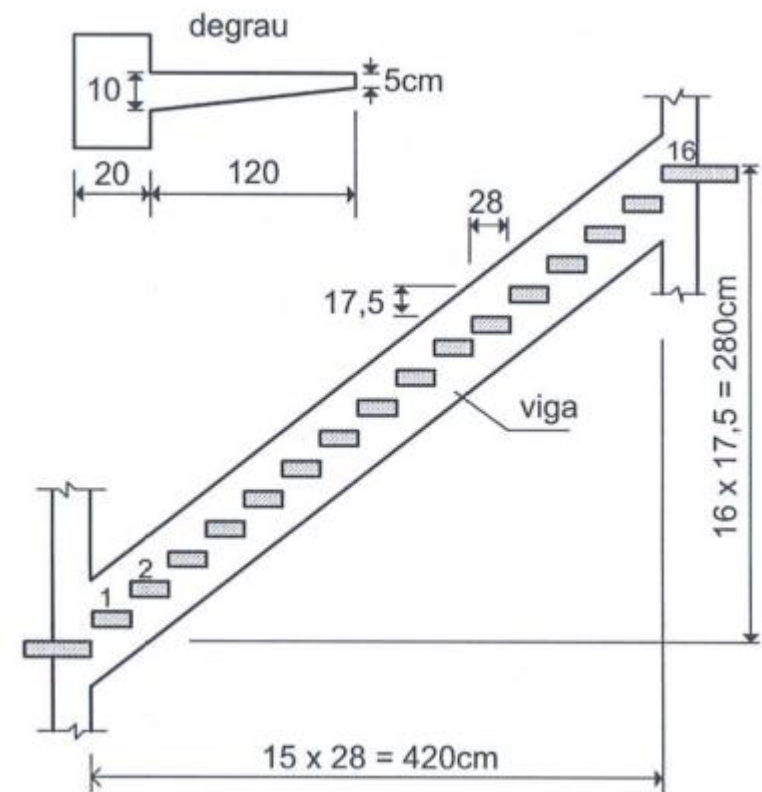
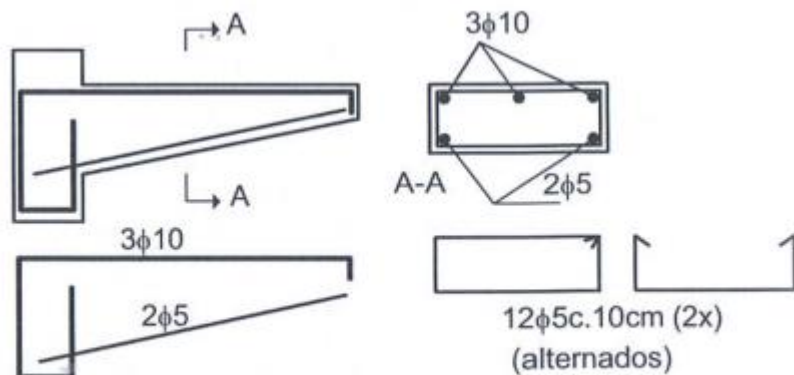
ESCADA ARMADA LONGITUDINALMENTE



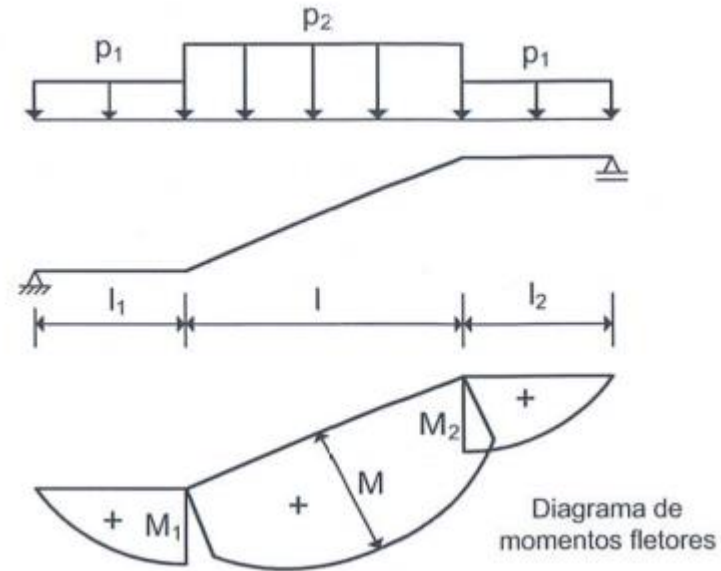
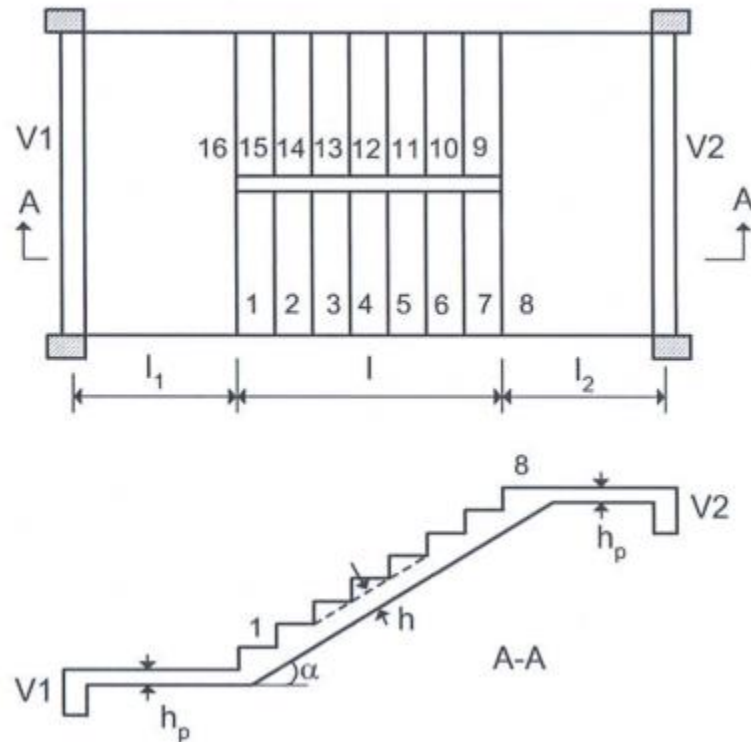
ESCADA EM BALANÇO ENGASTADA EM VIGA LATERAL



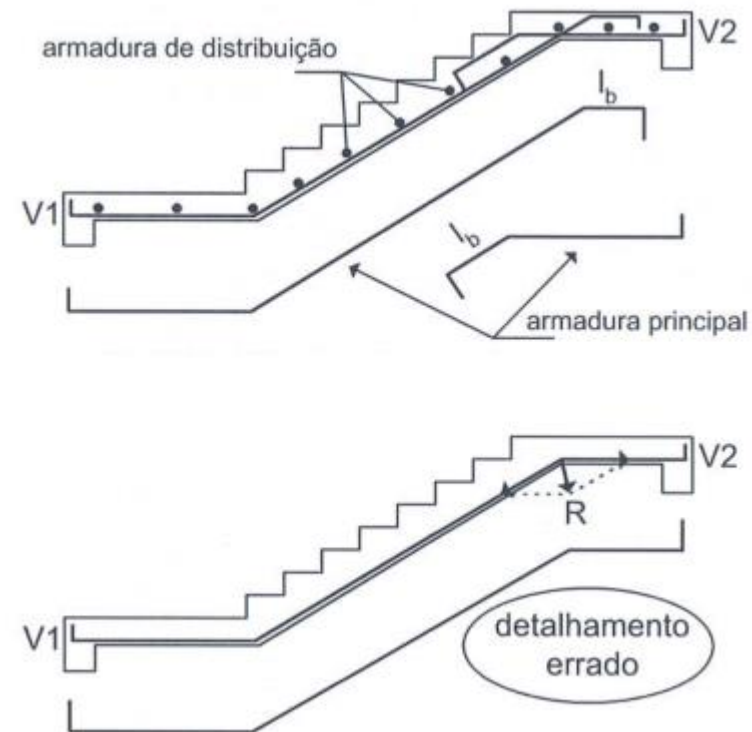
ESCADA EM BALANÇO COM DEGRAUS ISOLADOS



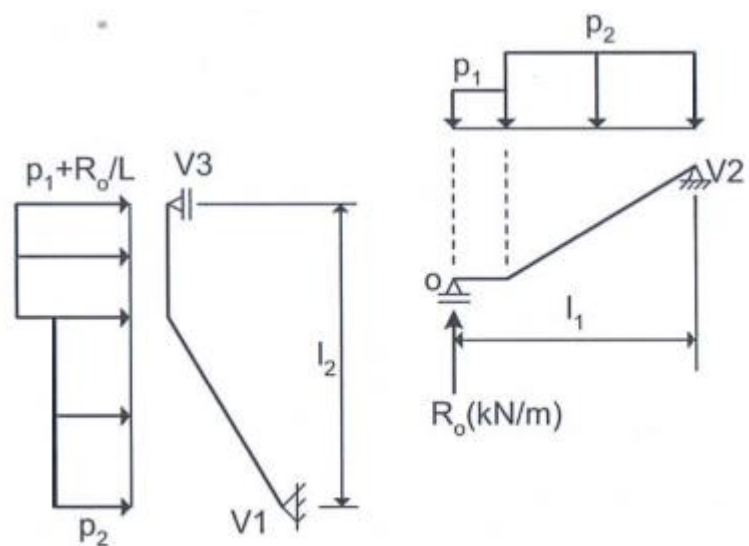
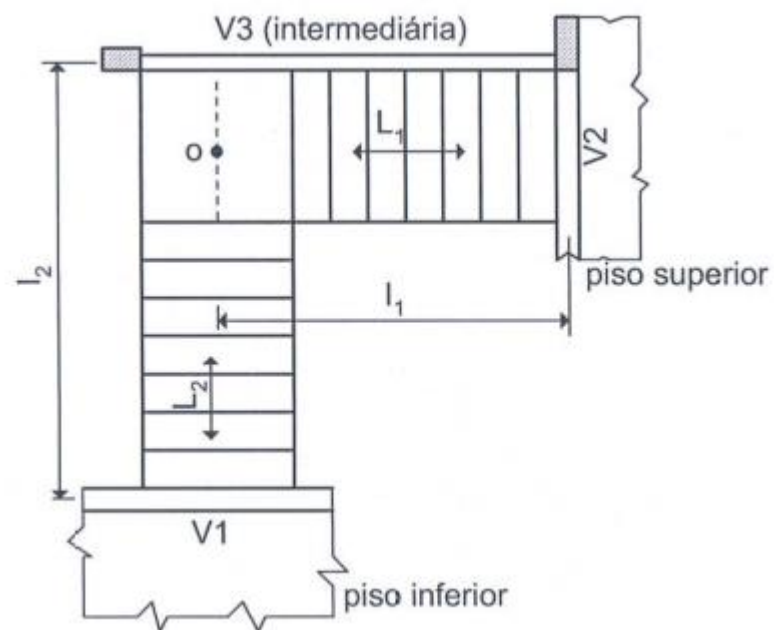
ESCADA DE DOIS LANCES COM PATAMAR INTERMEDIÁRIO



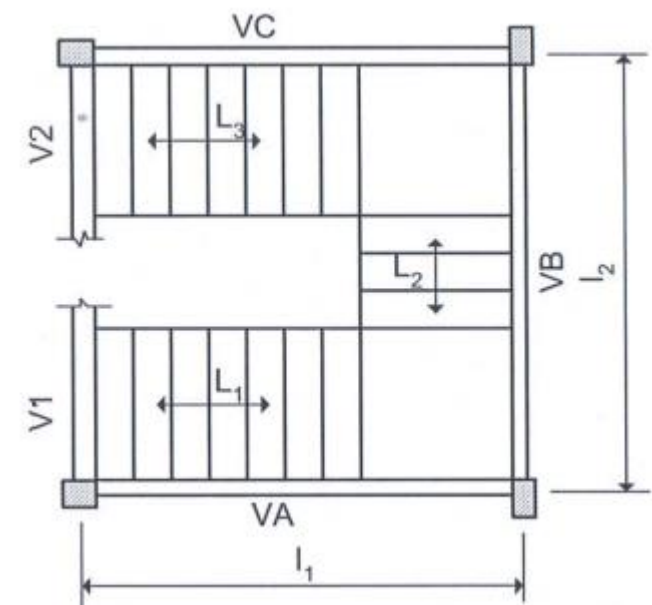
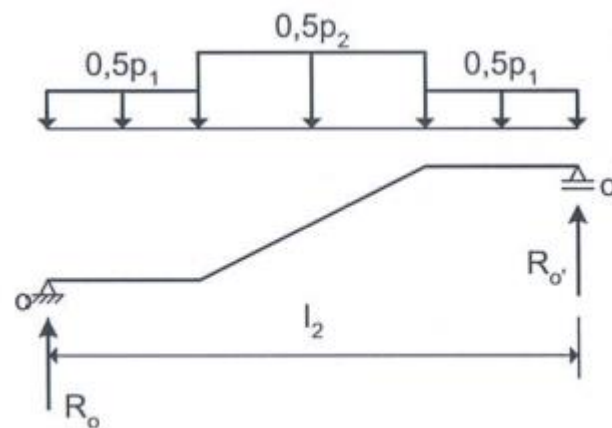
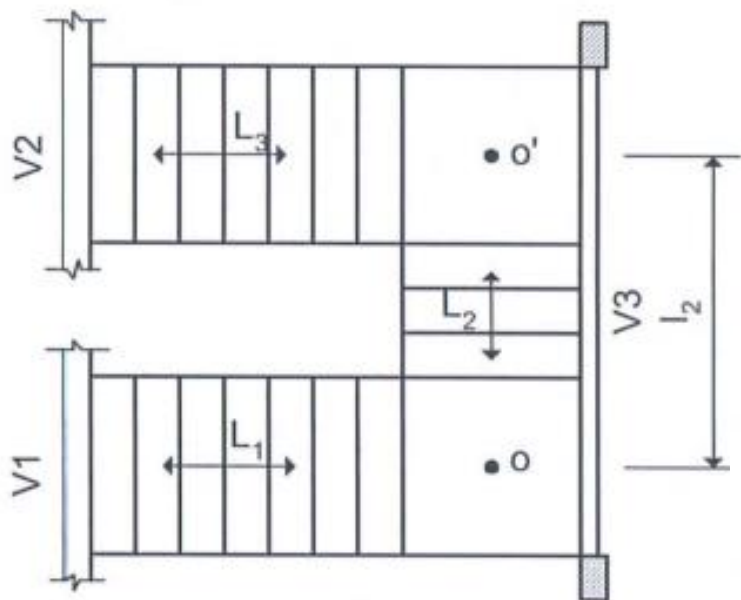
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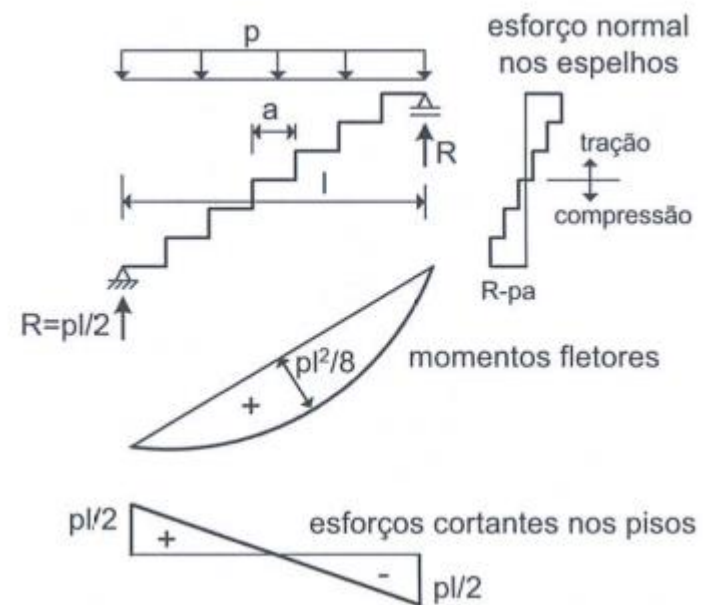
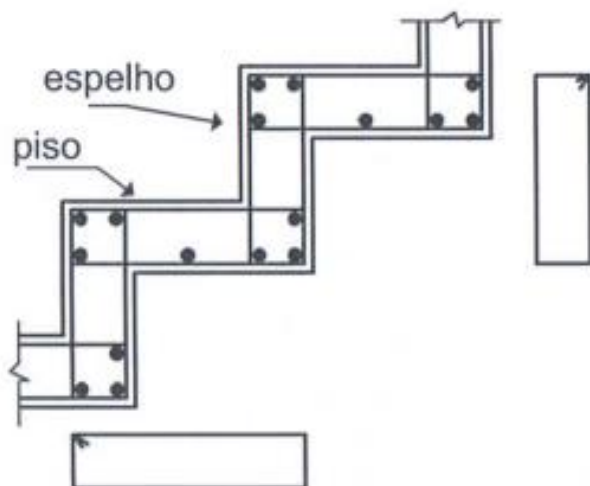
ESCADA DE DOIS LANCES EM L



ESCADA DE TRÊS LANCES



ESCADAS EM CASCATA (PLISSADA)



FINALIZAÇÃO



PRÓXIMA AULA

❖ DIMENSIONAMENTO DE ESCADAS