

Багатоповерхові промислові та цивільні будівлі

Конструктивні схеми каркасних
багатоповерхових будівель

The world's tallest buildings

Since the late 20th century, the Gulf states and Asia have been competing to reach the skies

1,200m

1,000

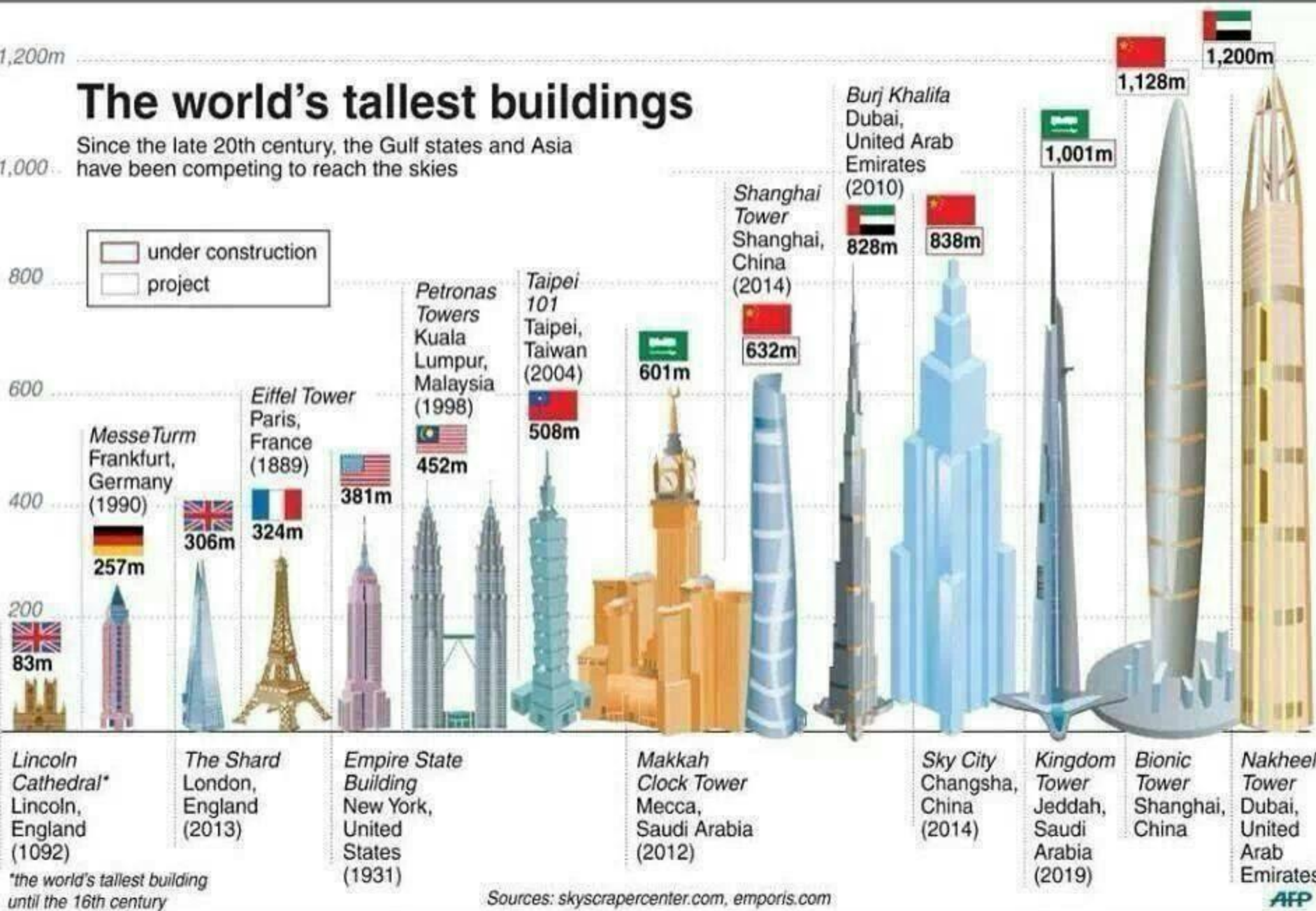
800

600

400

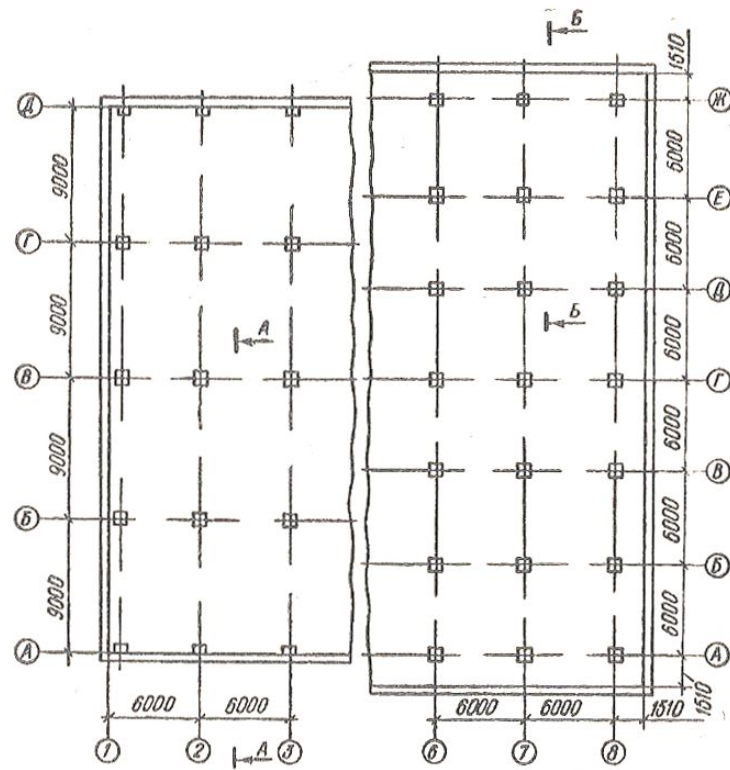
200

under construction
project



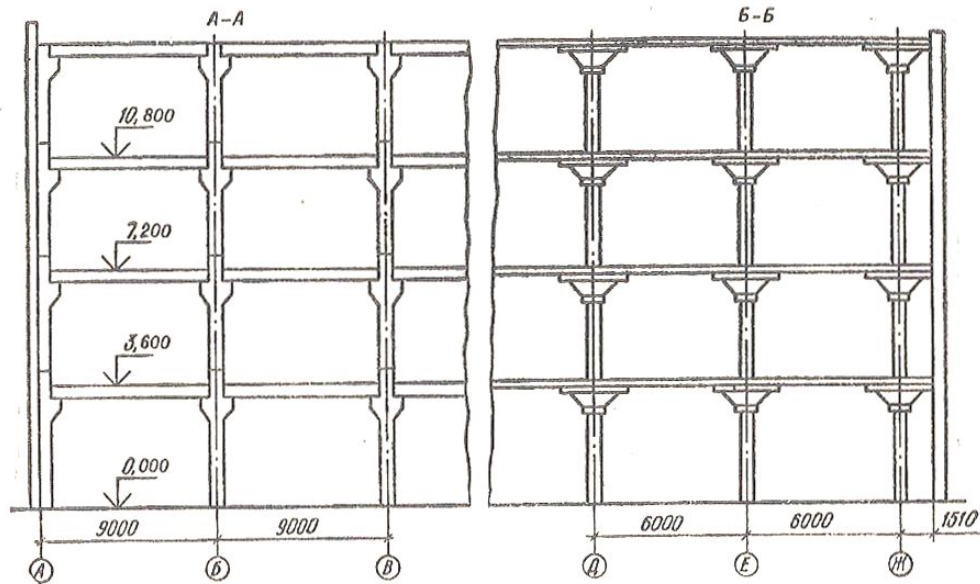
*the world's tallest building until the 16th century

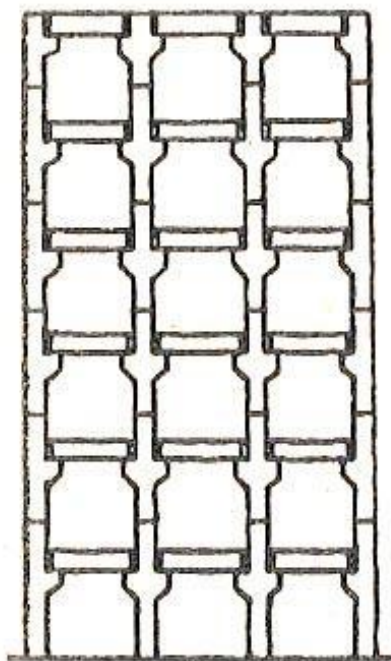
Sources: skyscrapercenter.com, emporis.com



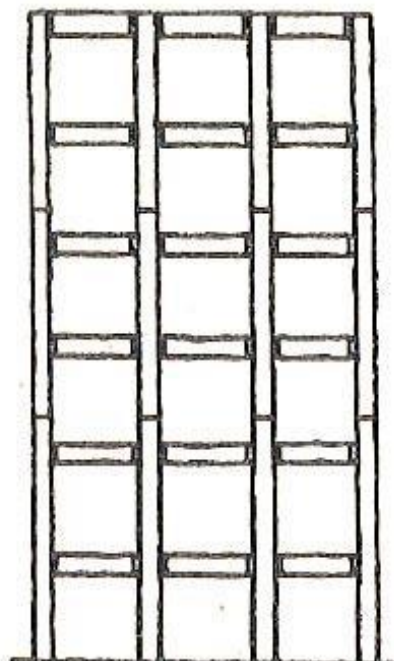
a

b

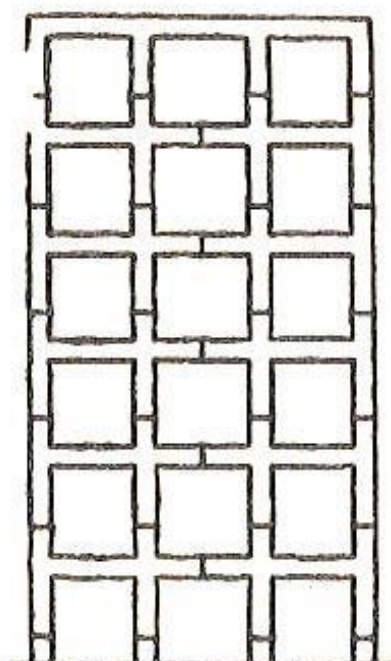




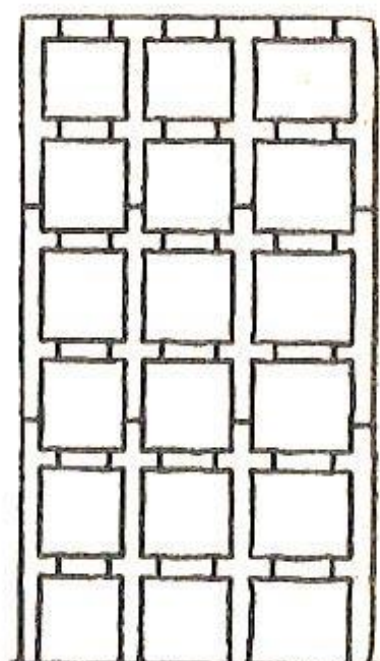
a



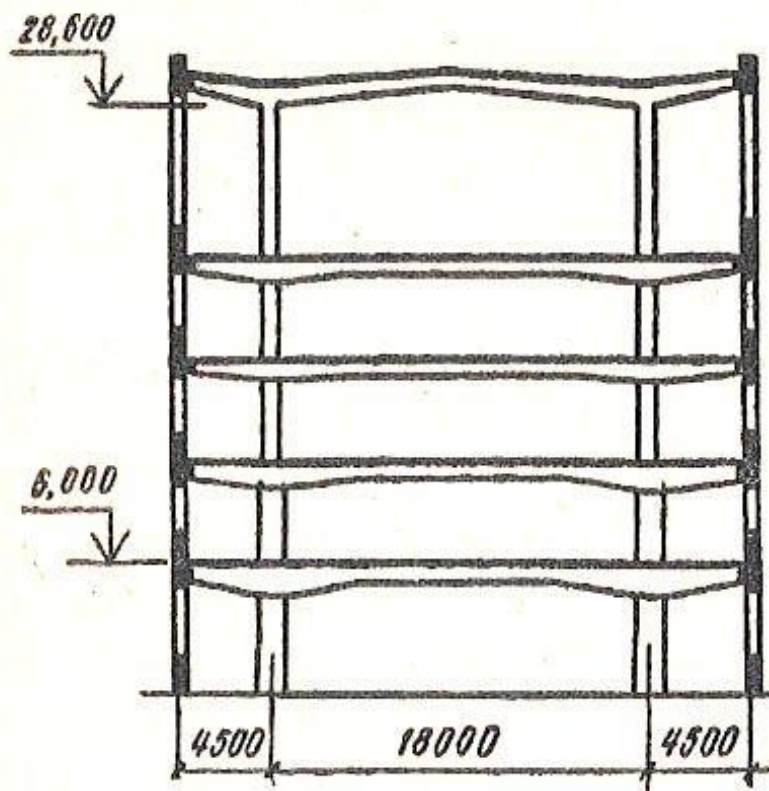
b



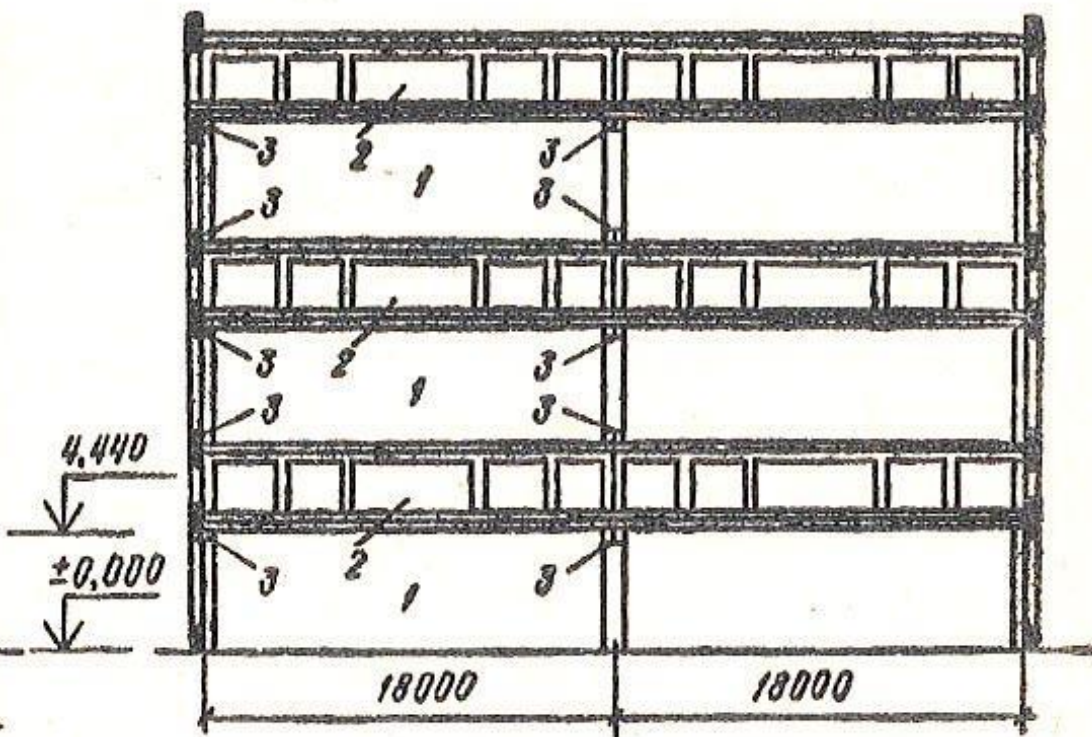
c



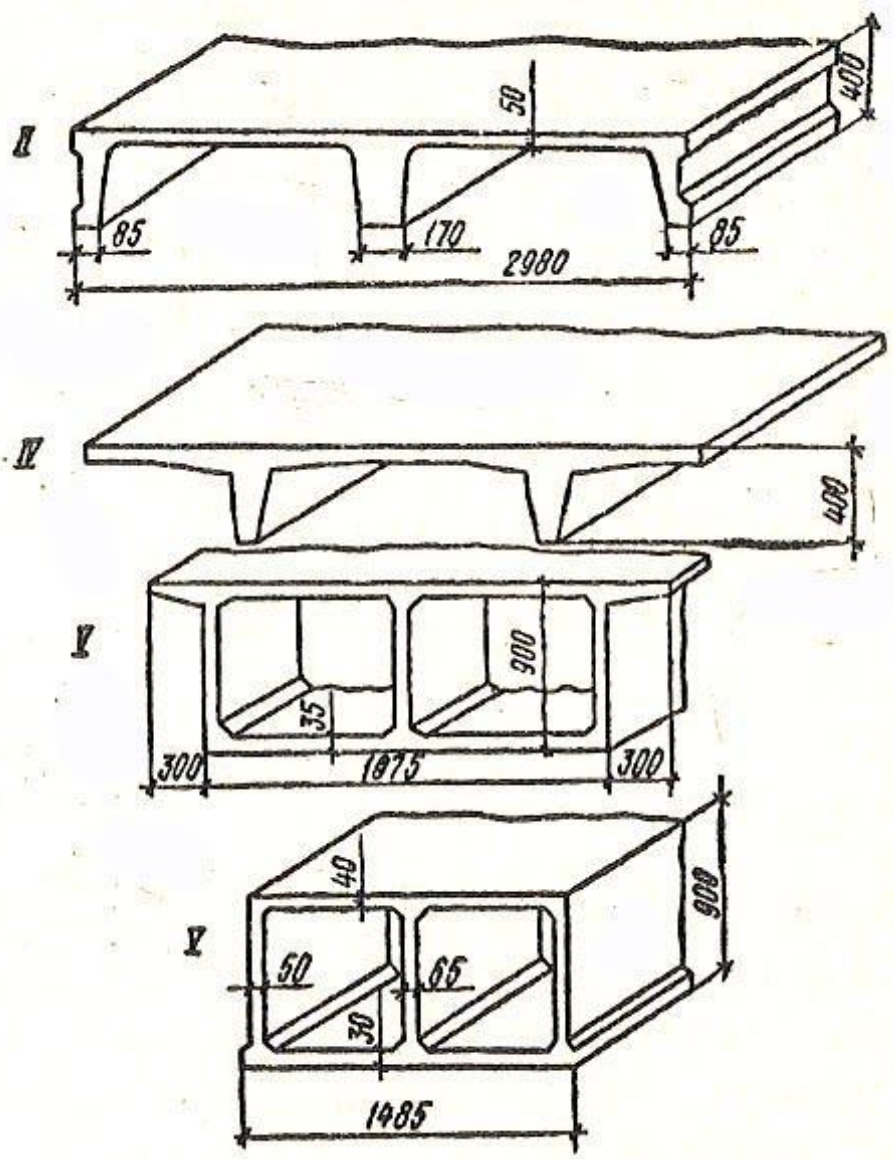
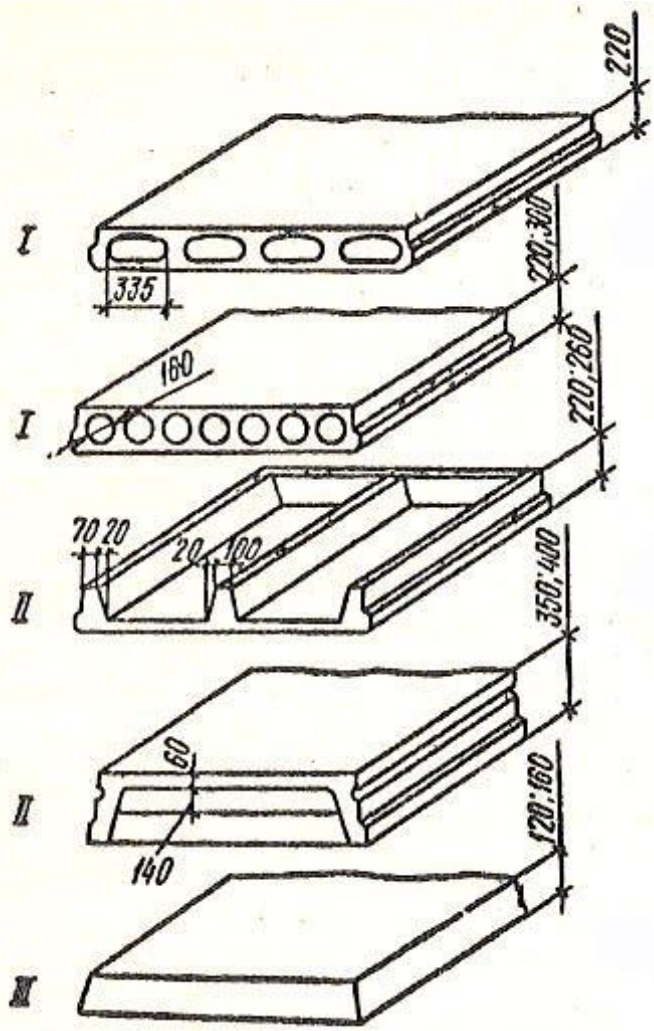
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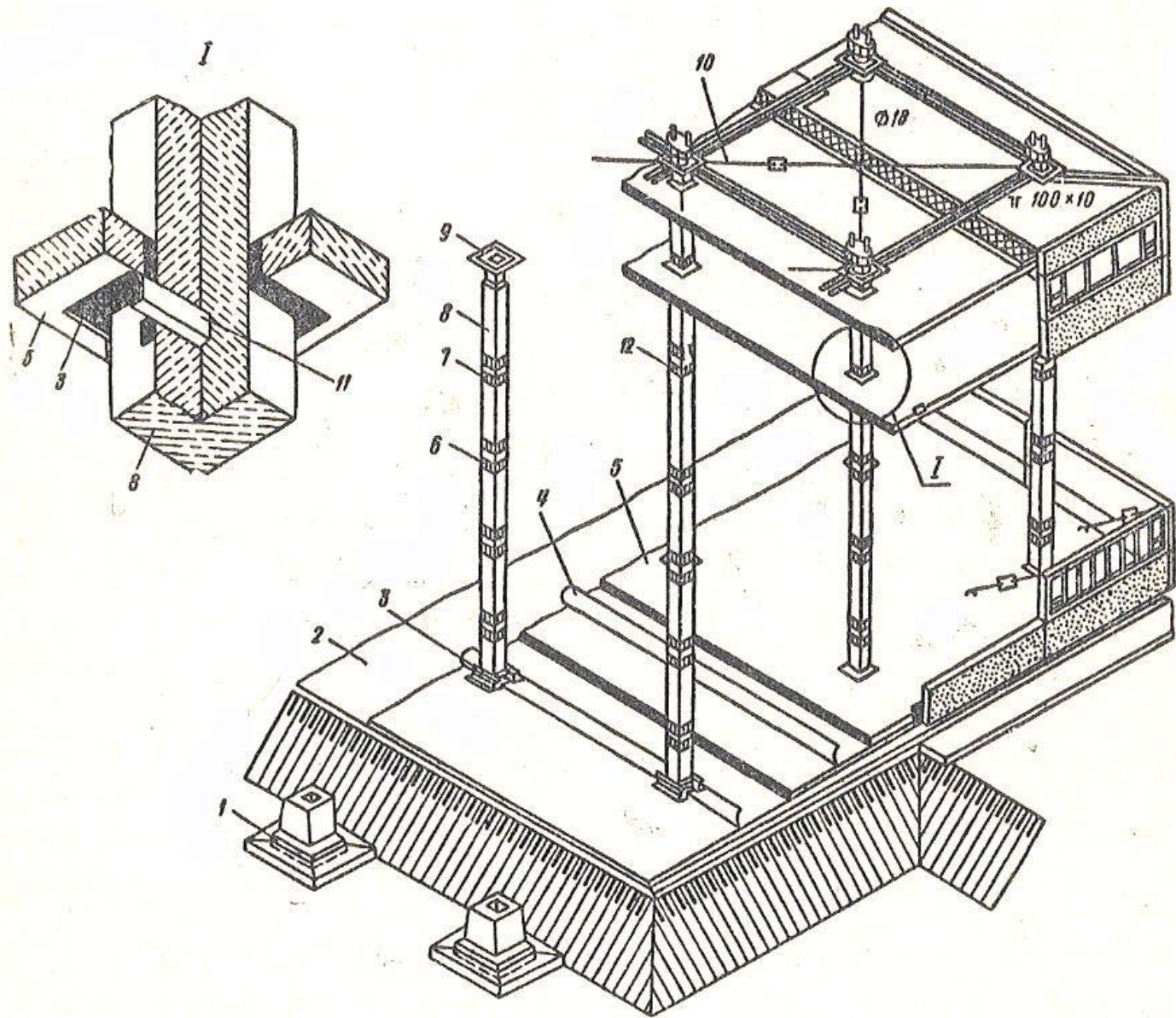


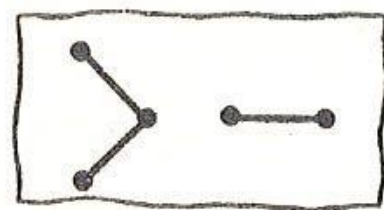
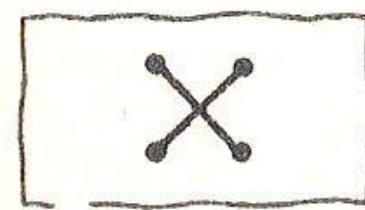
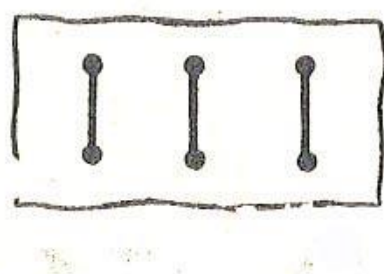
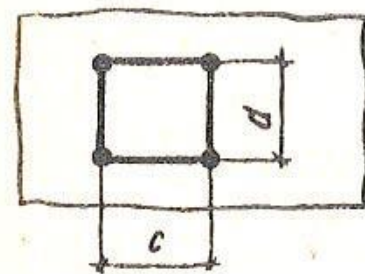
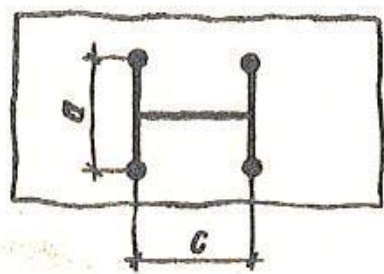
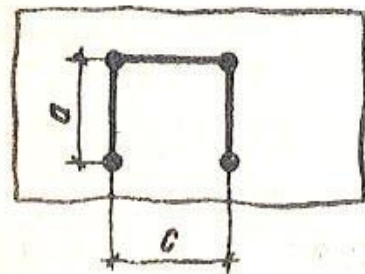
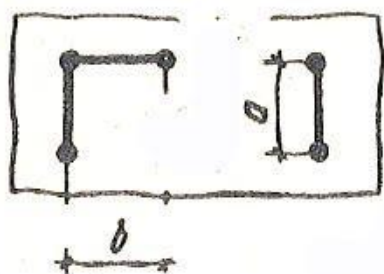
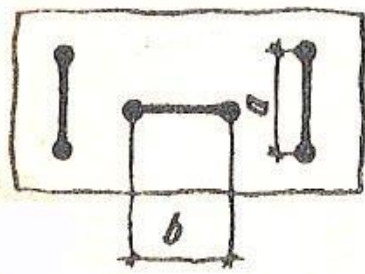
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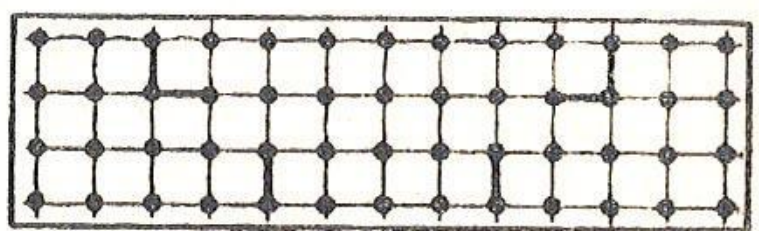
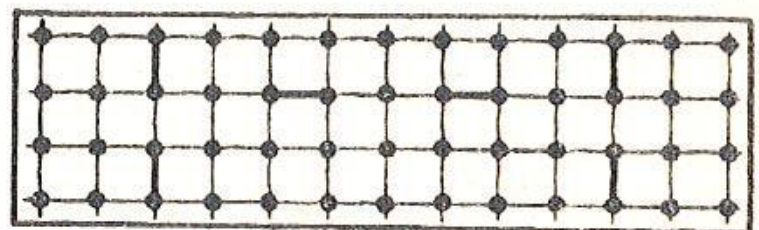
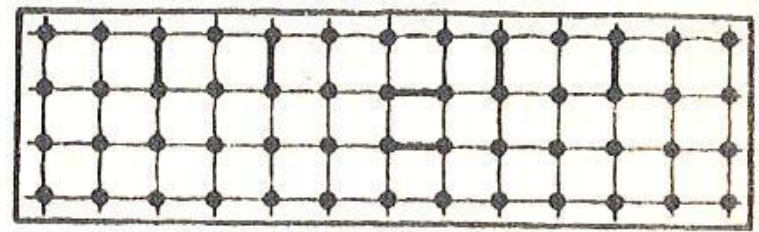
b





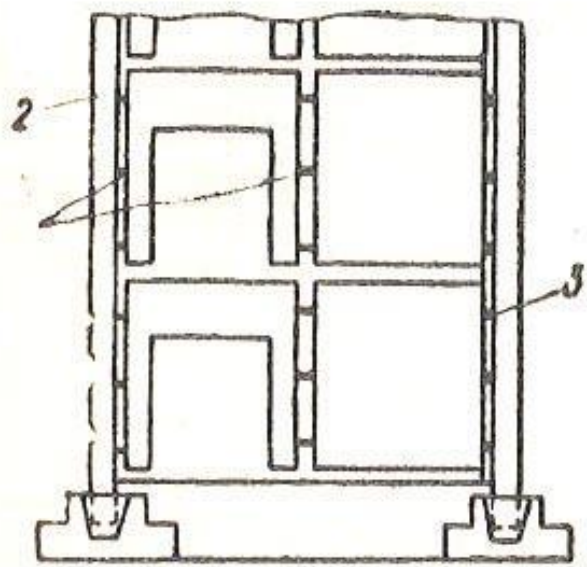


Можливі форми діафрагм та схеми розміщення їх у плані будівель:
 а — можливі форми діафрагм; б — розміщення їх у плані будівель

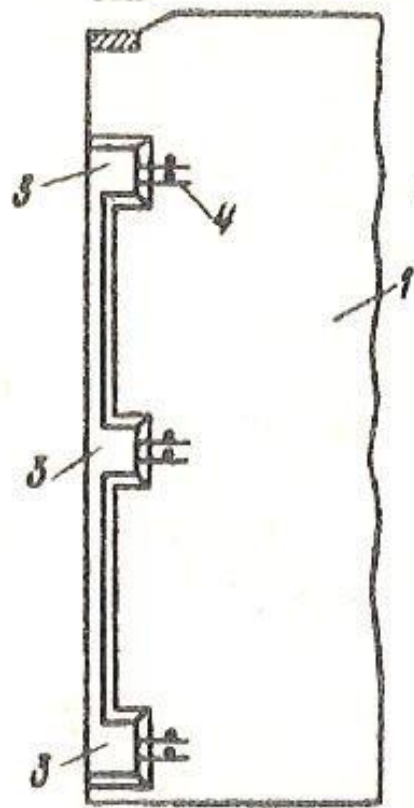


a

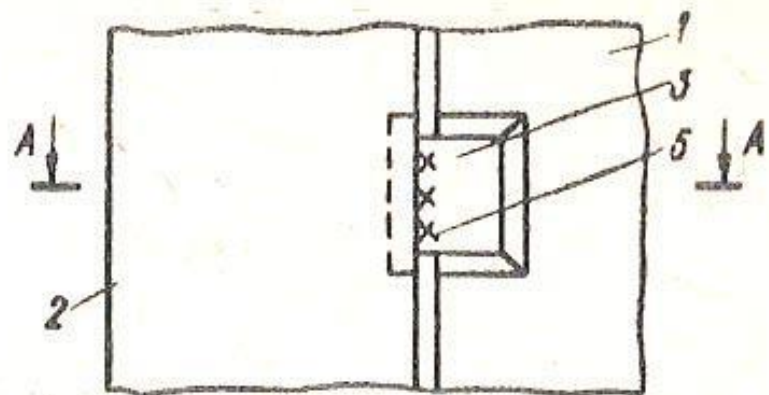
б



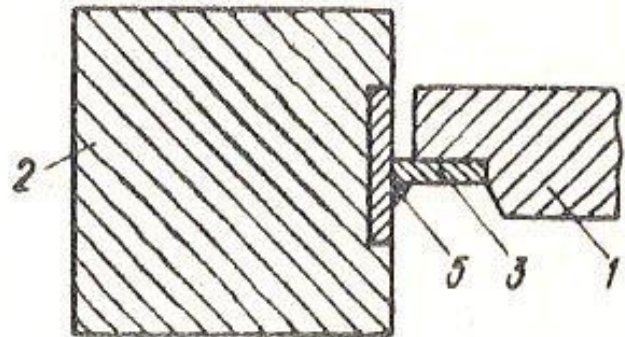
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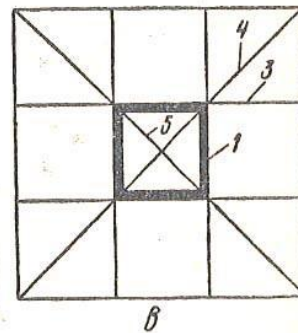
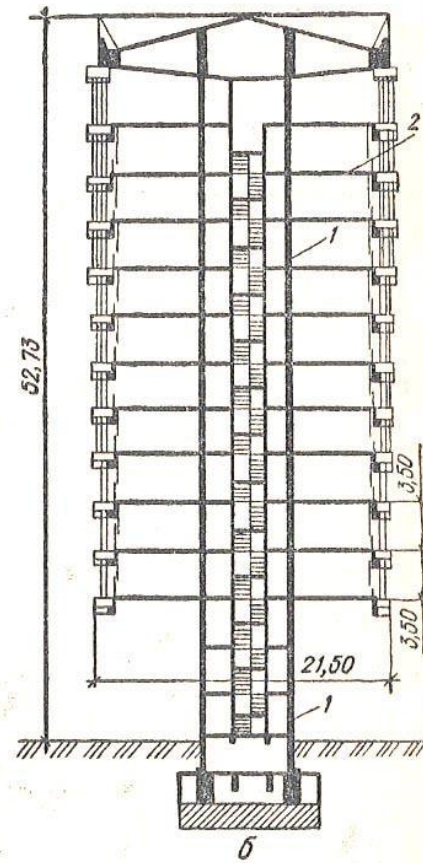
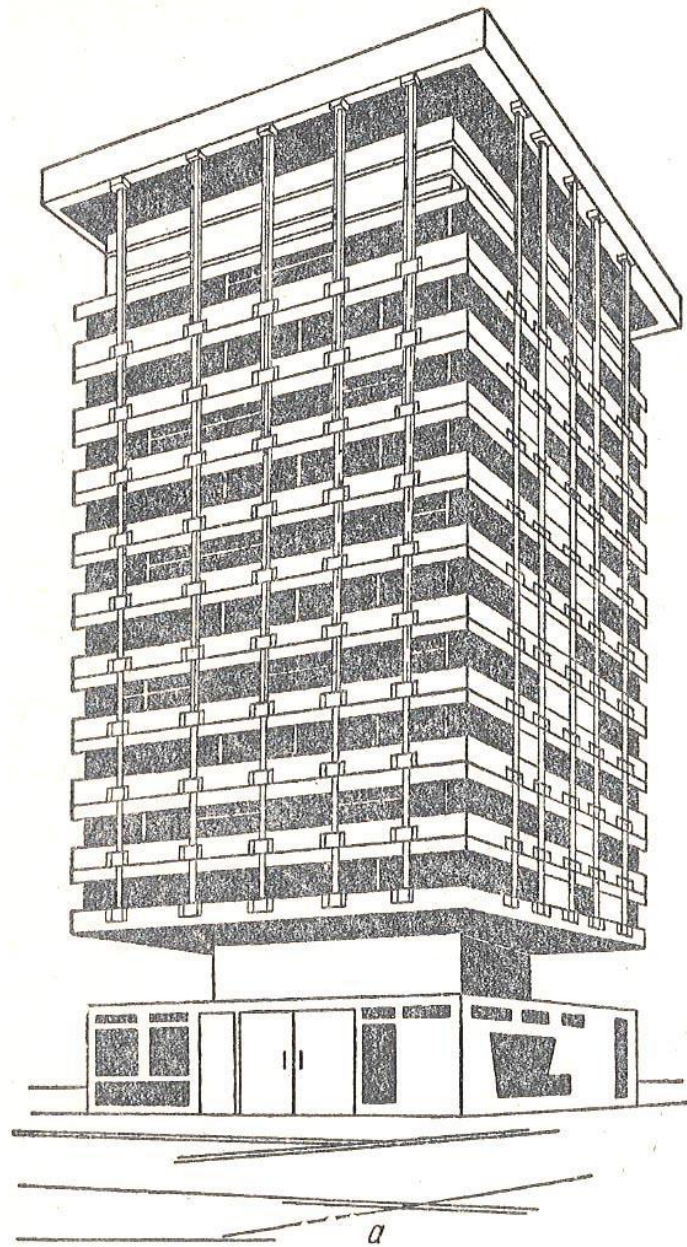
b

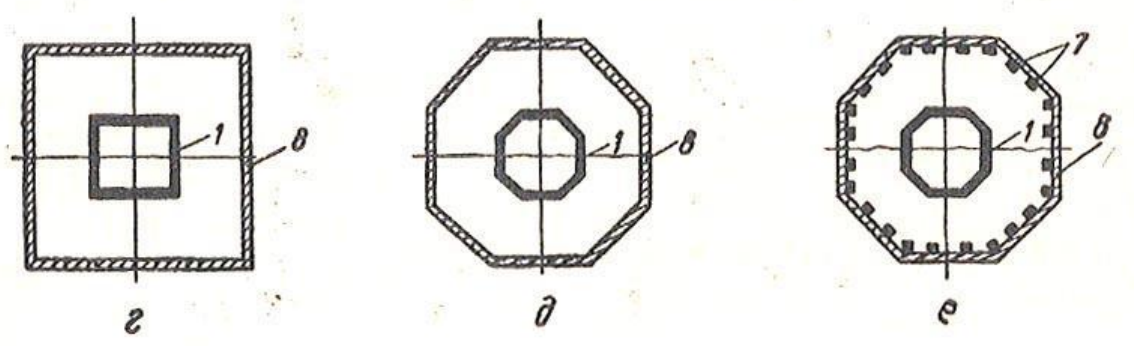
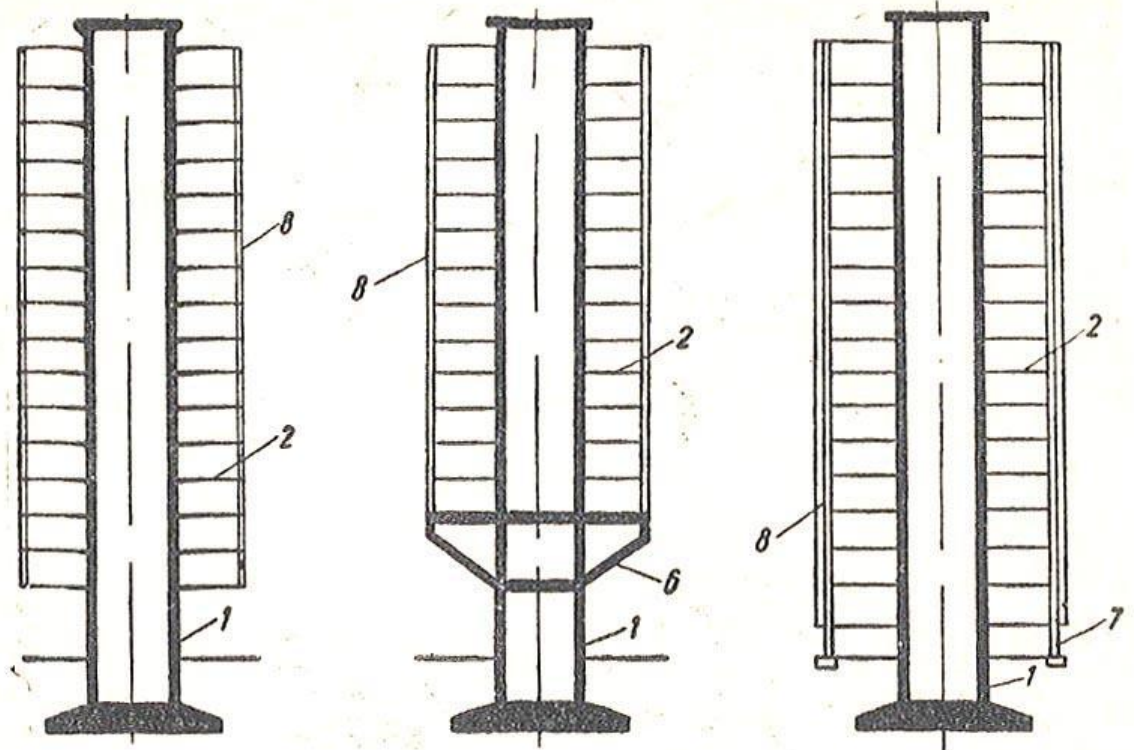


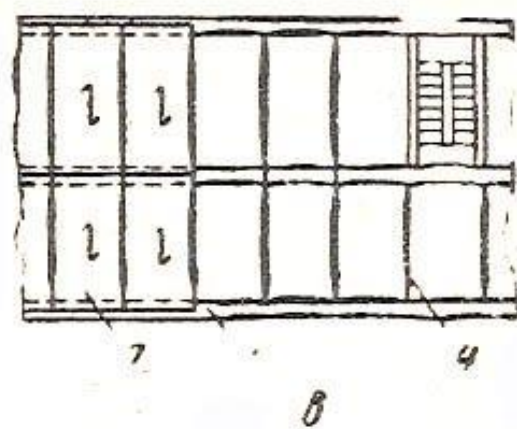
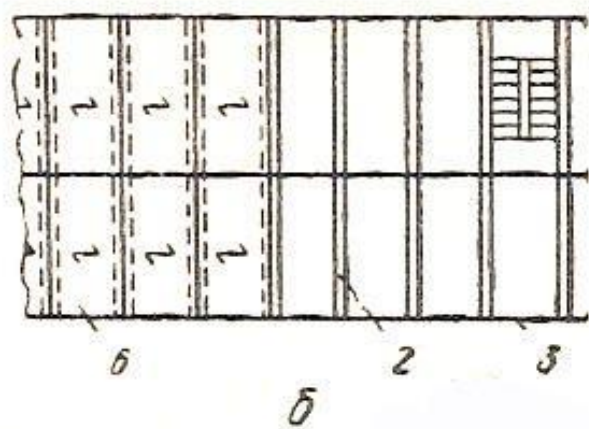
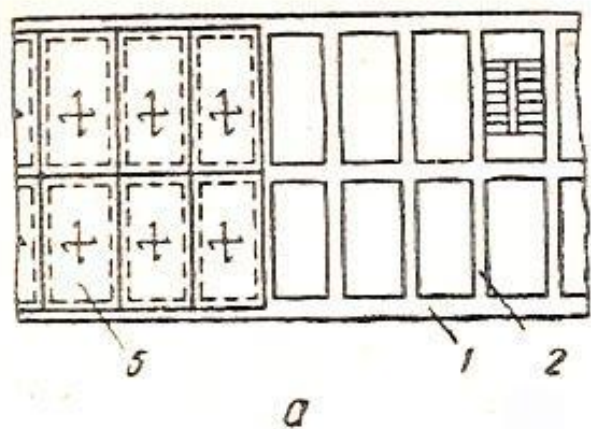
A-A

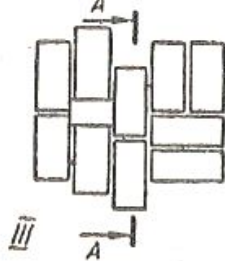
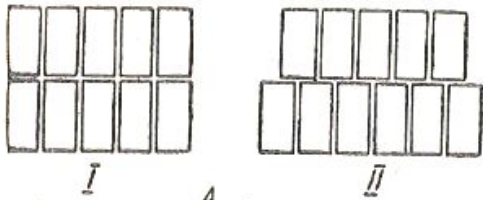
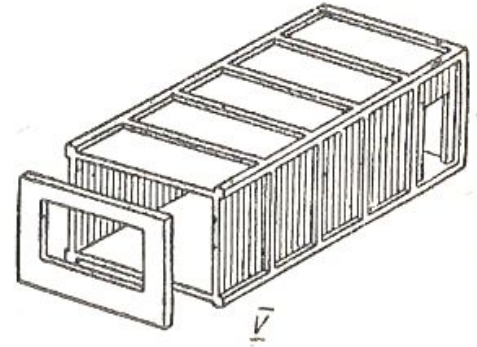
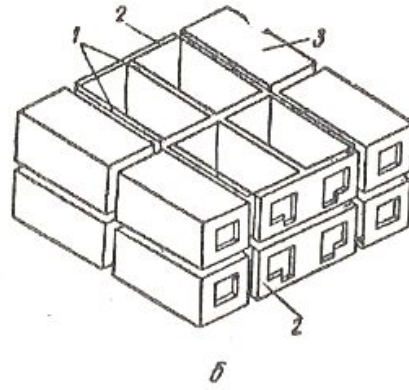
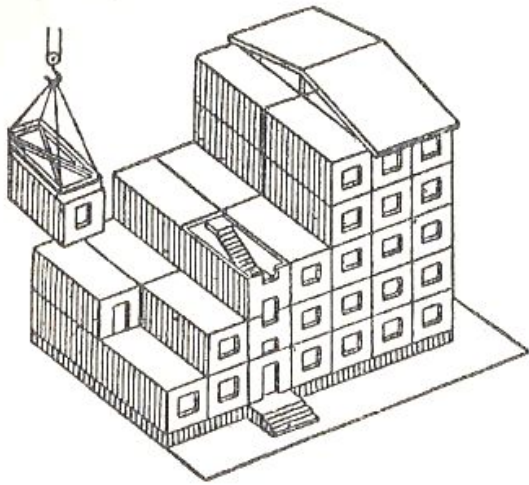


B-B

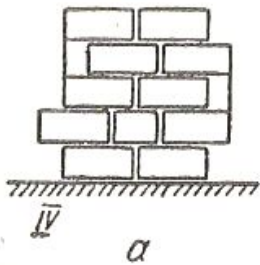




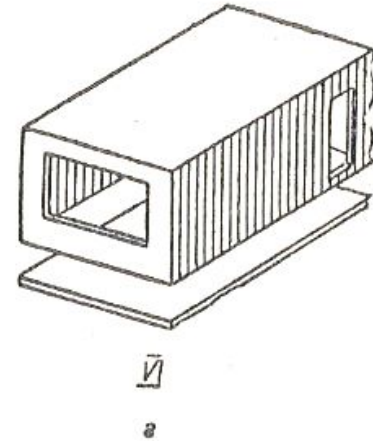
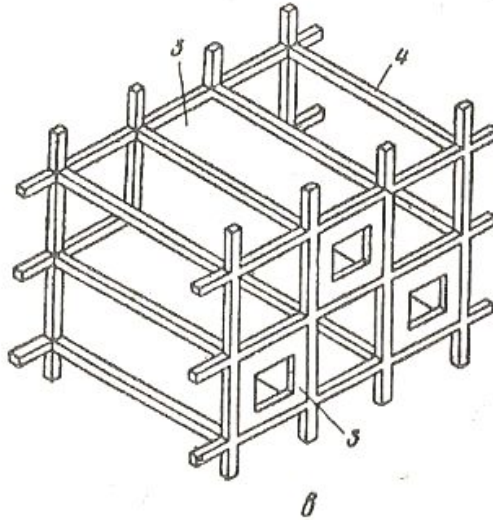




A-A

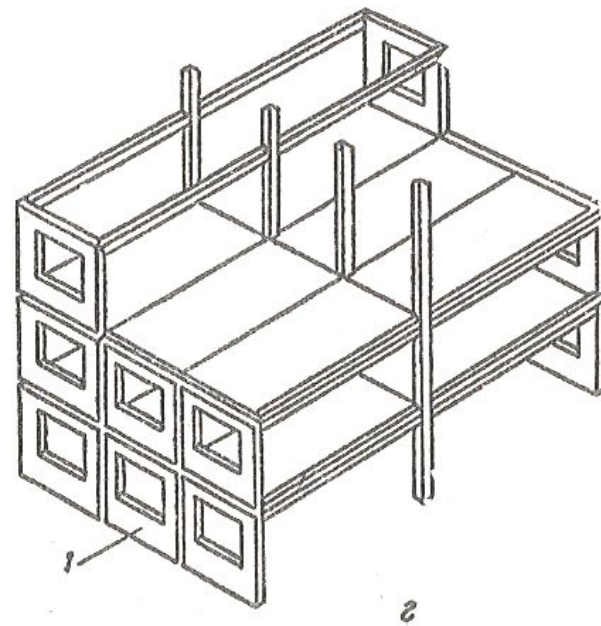
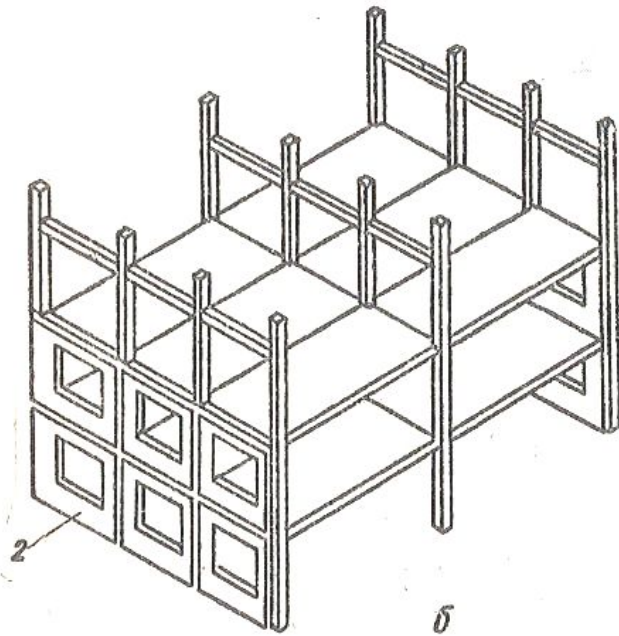
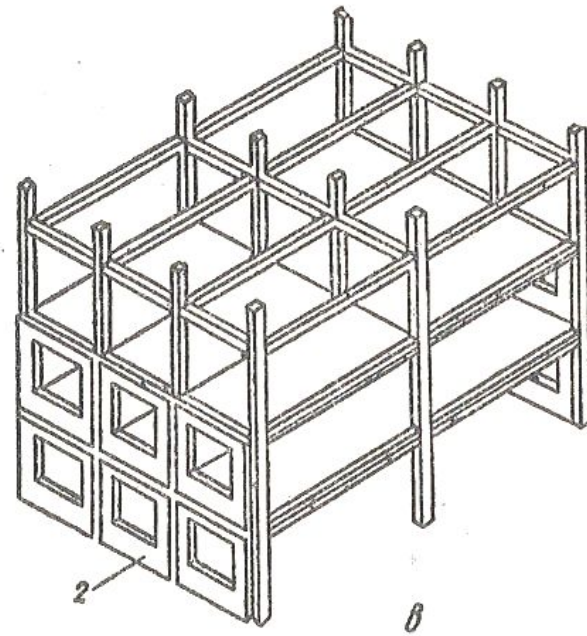
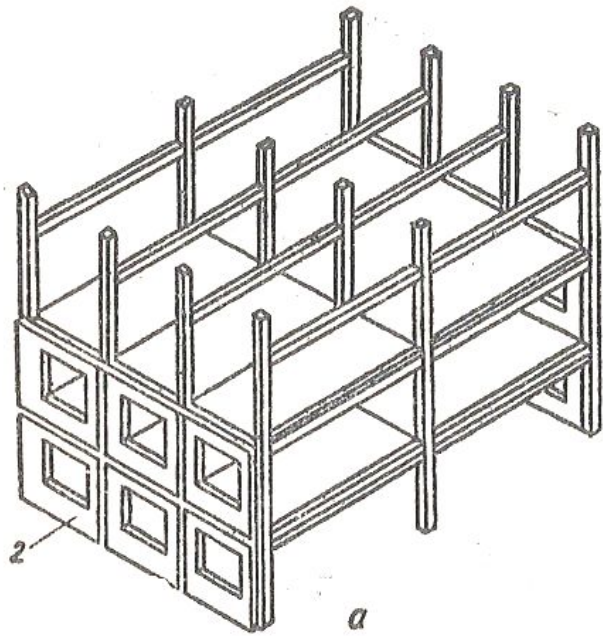


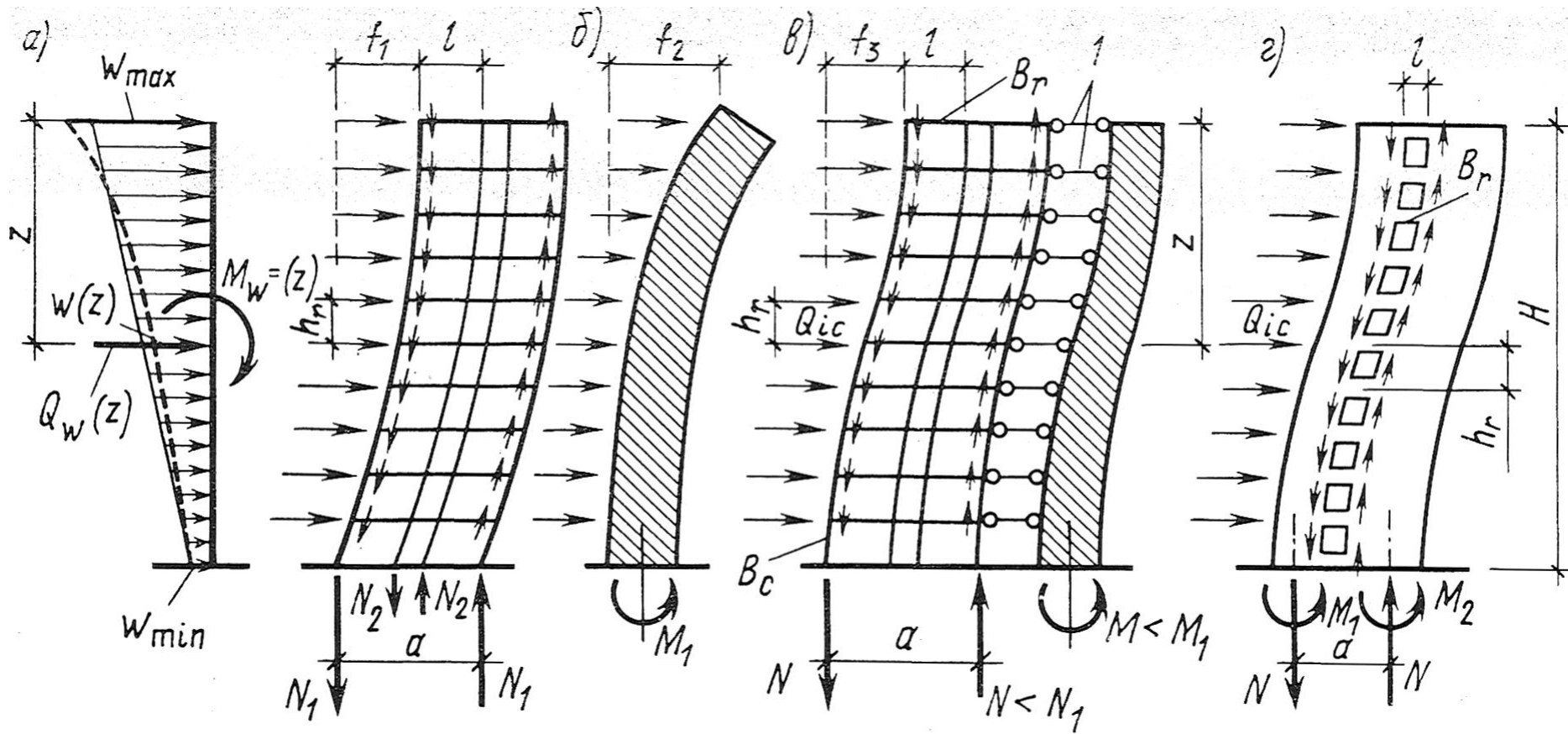
a



V

a





$$Na + \sum M = M_w: \quad (1)$$

$$w(z) = w_{\max} - (w_{\max} - w_{\min})z/H, \quad (2)$$

$$Q_w(z) = [w_{\max} - (w_{\max} - w_{\min})z/(2H)]z, \quad (3)$$

$$Mw(z) = 0,5[w_{\max} - (w_{\max} - w_{\min})z/(3H)]z^2, \quad (4)$$

$$c = v_i(z)/[Q_i(z)/h_r] = h_r a(a/B_r + 0,5h_r/B_c)/12, \quad (5)$$

$$c = h_r l(l/B_r + 0,75h_r/B_c)/12. \quad (6)$$

$$c = h_r l(l/B_r + h_r/B_c)/12. \quad (7)$$

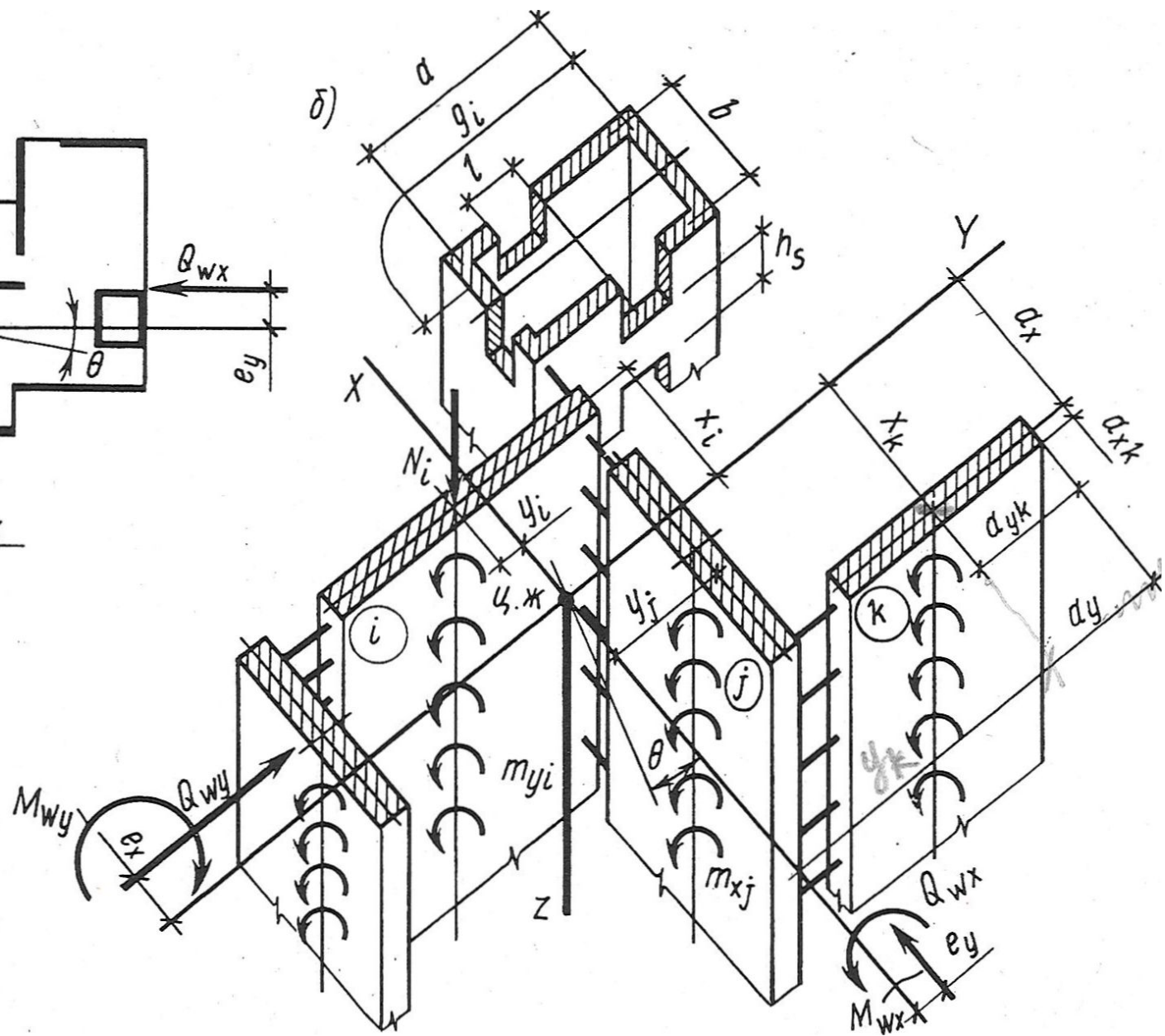
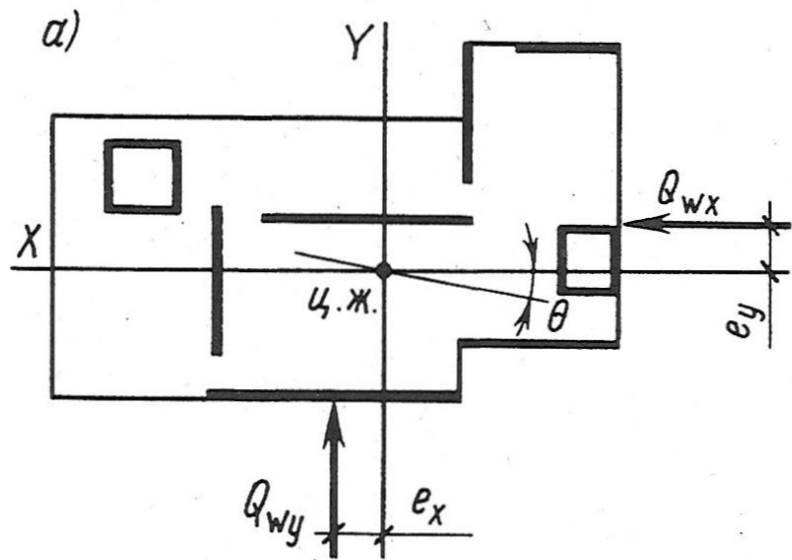
$$c = \gamma h_r l^3 / (12B_r a). \quad (8)$$

$$\gamma = 1 + 3(h/l)^2 - 0,02h/l \quad (9)$$

$$\gamma = 1 \quad B_r = bt^3 / 12$$

$$c = c_1 h_r / a. \quad (10)$$

$$c_1 = 0,75 \cdot 10^{-3} \dots 2 \cdot 10^{-2} \text{ м/МН}$$



$$a_x = \sum_{k=1}^n B_{xk} a_{xk} / \sum_{k=1}^n B_{xk}, \quad (11)$$

$$a_y = \sum_{k=1}^n B_{yk} a_{yk} / \sum_{k=1}^n B_{yk}, \quad (12)$$

$$M_{tw}(z) = M_{wy}(z)e_x - M_{wx}(z)e_y. \quad (13)$$

$$M_{tm}(z) = z \sum (m_{yi} x_i - m_{xj} y_j), \quad (14)$$

$$M_{tq}(z) = \sum_{i=1}^n N_i(z) y_i x_i. \quad (15)$$

$$M_t(z) = M_{tw}(z) + M_{tm}(z) + M_{tq}(z). \quad (16)$$

$$N_i(z) = \int_0^z Q_{ic}(z) dz. \quad (17)$$

$$N'_i(z) = Q_{ic}(z). \quad (18)$$

$$N'_i(z) = \sum_{c=1}^e Q_{ic}(z). \quad (19)$$

$$N''_i(z) = \sum_{c=1}^e Q'_{ic}(z), \quad (i = 1, 2, \dots, n). \quad (20)$$

$$Q'_{ic}(z) = [\alpha'_0 + \Delta\alpha'_i(z) - \alpha'_{1i}(z)]/c_i, \quad (21)$$

$$M_{yk}(z) = B_{xk} \left[\frac{M_{0y}(z) - \sum_{i=1}^n N_i(z)y_i}{\sum_{i=1}^n B_{xi}} + \frac{x_k M_t(z)}{B_{(t)}} \right]. \quad (22)$$

$$B_x = \varkappa_1 EI_x, \quad (23)$$

$$\varkappa_1 = 1 / \left(1 + \frac{EA \Sigma t_1}{E_1 A_1 h_r} \right) \leq 1 \quad (24)$$

$$B_t = \sum (x_i^2 B_{xi} + y_j^2 B_{yj}) \quad (25)$$

$$\alpha_{yk}(z) = \int_z^H \frac{M_{yk}(z)}{B_{ik}}. \quad (26)$$

$$f_y(z) = \int_z^H \alpha_{yk}(z) dz. \quad (27)$$

$$M_k(z) = \left[M_{wy}(z) - \sum_{i=1}^n N_i(z) a_i \right] B_{xk} / \sum_{j=1}^m B_{xj}. \quad (28)$$

$$M_{oy}(z) = M_{wy}(z) \quad M_t(z) = 0$$

$$\sum_{i=1}^n N_i(z) a_i + \sum_{k=1}^m M_k(z) = M_{wy}(z). \quad (29)$$