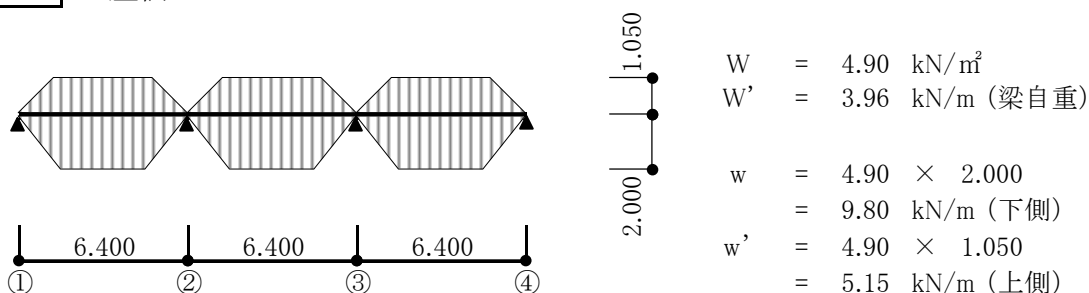


B1 屋根



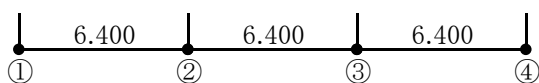
(1) 応力計算

$$\begin{aligned}
 C &= 1/12 \cdot w \cdot (L^2 - 2 \cdot a^2 + a^3/L) + 1/12 \cdot w' \cdot (L^2 - 2 \cdot a'^2 + a'^3/L) + 1/12 \cdot W' \cdot L^2 \\
 &= 1/12 \times 9.80 \times (6.40^2 - 2 \times 2.00^2 + 2.00^3 / 6.400) \\
 &\quad + 1/12 \times 5.15 \times (6.40^2 - 2 \times 1.05^2 + 1.05^3 / 6.400) \\
 &\quad + 1/12 \times 3.96 \times 6.40^2 \\
 &= 58.2 \text{ kN}\cdot\text{m}
 \end{aligned}$$

$$\begin{aligned}
 M0 &= 1/24 \cdot w \cdot (3 \cdot L^2 - 4 \cdot a^2) + 1/24 \cdot w' \cdot (3 \cdot L^2 - 4 \cdot a'^2) + 1/24 \cdot W' \cdot L^2 \\
 &= 1/24 \times 9.80 \times (3 \times 6.40^2 - 4 \times 2.00^2) \\
 &\quad + 1/24 \times 5.15 \times (3 \times 6.40^2 - 4 \times 1.05^2) \\
 &\quad + 1/8 \times 3.96 \times 6.40^2 \\
 &= 89.4 \text{ kN}\cdot\text{m}
 \end{aligned}$$

$$\begin{aligned}
 Q &= 1/2 \cdot w \cdot (L - a) + 1/2 \cdot w' \cdot (L - a) + 1/2 \cdot W' \cdot L \\
 &= 1/2 \times 9.80 \times (6.400 - 2.000) \\
 &\quad + 1/2 \times 5.15 \times (6.400 - 1.050) \\
 &\quad + 1/2 \times 3.96 \times 6.400 \\
 &= 48.0 \text{ kN}
 \end{aligned}$$

応力図(曲げモーメント)



・①～②間 ①端 $0.6 \cdot C = 0.6 \times 58.2 = 35.0 \text{ kN}\cdot\text{m}$
 中央 $M0 - 0.65 \cdot C = 89.4 - 0.65 \times 58.2 = 51.6 \text{ kN}\cdot\text{m}$
 ②端 $1.2 \cdot C = 1.2 \times 58.2 = 69.9 \text{ kN}\cdot\text{m}$

・②～③間 ②端 $C = 58.2 \text{ kN}\cdot\text{m}$
 中央 $M0 - 0.75 \cdot C = 89.4 - 0.75 \times 58.2 = 45.8 \text{ kN}\cdot\text{m}$

(2)断面検定(曲げ応力に対する検討)

$$b \times D = 30 \times 55 \text{ cm}$$

$$d_t = 6.2 \text{ cm} \quad d = 55 - 6.2 = 48.8 \text{ cm}$$

$$j = 7/8 \times 48.8 = 42.7 \text{ cm}$$

・端部

$$C = M / b \cdot d^2 = 69.9 \times 1000000 / (300 \times 488^2) \\ = 0.97 \text{ N/mm}^2 \quad \rightarrow \text{つり合い鉄筋比以下}$$

$$a_t = M / f_t \cdot j$$

$$= 69.9 \times 100 / 21.5 \cdot 42.7 = 7.62 \text{ cm}^2$$

$$\text{配筋: 4-D19} \quad (11.48 \text{ cm}^2) \quad \text{検定比} \quad 0.66 < 1.0 \quad \therefore \text{OK}$$

・中央

$$C = M / b \cdot d^2 = 51.6 \times 1000000 / (300 \times 488^2) \\ = 0.72 \text{ N/mm}^2 \quad \rightarrow \text{つり合い鉄筋比以下}$$

$$a_t = M / f_t \cdot j$$

$$= 51.6 \times 100 / 21.5 \cdot 42.7 = 5.63 \text{ cm}^2$$

$$\text{配筋: 3-D19} \quad (8.61 \text{ cm}^2) \quad \text{検定比} \quad 0.65 < 1.0 \quad \therefore \text{OK}$$

(3)せん断の検討

$$\tau = Q / b \cdot j$$

$$= 48.0 / 30 \cdot 42.7$$

$$= 0.038 \text{ kN/cm}^2 \quad \therefore \text{OK}$$

$$\tau / f_s = 0.038 / 0.080 = 0.48 < 1.0 \quad \therefore \text{OK}$$