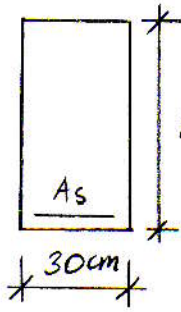


2.)

MALZEME: C20/S420,  $d' = 5\text{cm}$ .

Şekilde verilen betonarme kirişte

a)  $M_g = 8,5\text{ tm}$ ,  $M_q = 9,2\text{ tm}$ ,  $N_g = N_q = 0$ ,

b)  $M_g = 8,5\text{ tm}$ ,  $N_g = 9,2\text{ tm}$ ,  $N_q = 6,2\text{ t}$ ,  $N_q = 7,2\text{ t}$   
(çekme) (çekme)

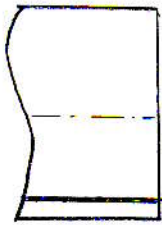
olduğuna göre gerekli donatı alanını hesaplayın.

a)  $M_d = 1,4M_g + 1,6M_q = 1,4 \cdot 8,5 + 1,6 \cdot 9,2 = 26,62\text{ tm}$ .

$$K = \frac{b \cdot d^2}{M_d} = \frac{30 \cdot 70^2}{2662} = 55,2 \xrightarrow{\text{C20/S420}} k_s = 0,302$$

$$A_s = k_s \cdot \frac{M_d}{d} = 0,302 \cdot \frac{2662}{70} = 11,48\text{ cm}^2, 6\Phi 16 (= 12,1\text{ cm}^2)$$
  
 $b_w = 23,8\text{ cm} < 30\text{ cm}$

b)  $M_d = 26,62\text{ tm}$ ,  $N_d = 1,4N_g + 1,6N_q = 1,4 \cdot 6,2 + 1,6 \cdot 7,2 = 20,2\text{ t}$  (çekme)



S noktasına göre moment alındığında

$M_d = 26,62\text{ tm}$

$N_d = 20,2\text{ t}$

$M_{sd} = M_d - N_d \cdot \left(\frac{75}{2} - 5\right)$

$\left(\frac{75}{2} - 5\right)$

$M_{sd} = 2662 - 20,2 (37,5 - 5) = 2005,5\text{ tcm}$ .

$$K = \frac{b d^2}{M_{sd}} = \frac{30 \cdot 70^2}{2005,5} = 73,3 \xrightarrow{\text{C20/S420}} k_s = 0,294$$

$$A_s = k_s \cdot \frac{M_{sd}}{d} + \frac{N_d}{f_{yd}} = 0,294 \cdot \frac{2005,5}{70} + \frac{20,2}{\frac{4,2}{1,15}} = 13,95\text{ cm}^2$$
  
 $7\Phi 16 = 14,1\text{ cm}^2$  seçildi  
 $b_w = 27,4 < 30\text{ cm}$

NOT: Normal kuvvet çekme olduğundan  $A_s$  hesabında (+) alınır.