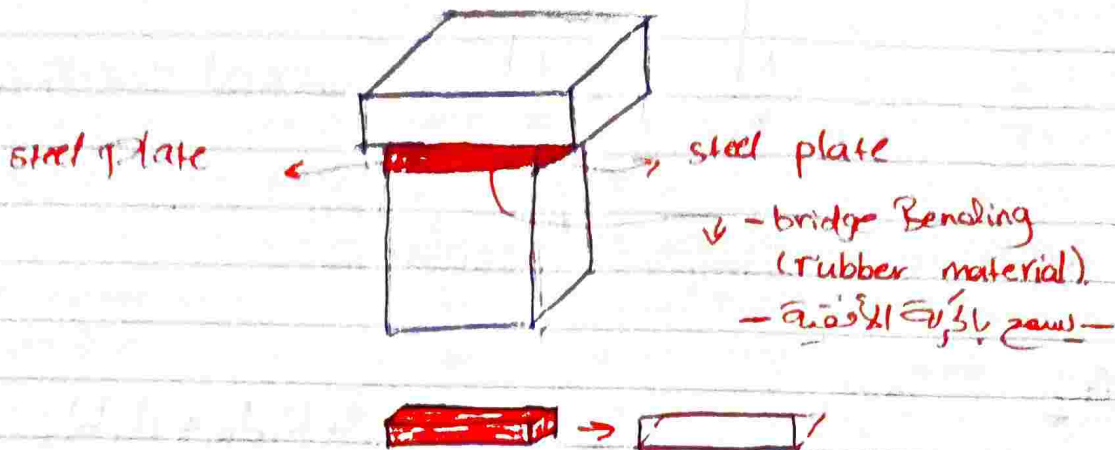
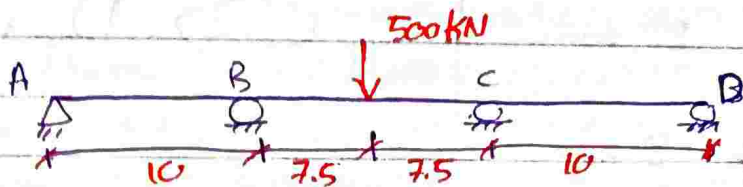


# → Continuous Beam Bridges



Example :

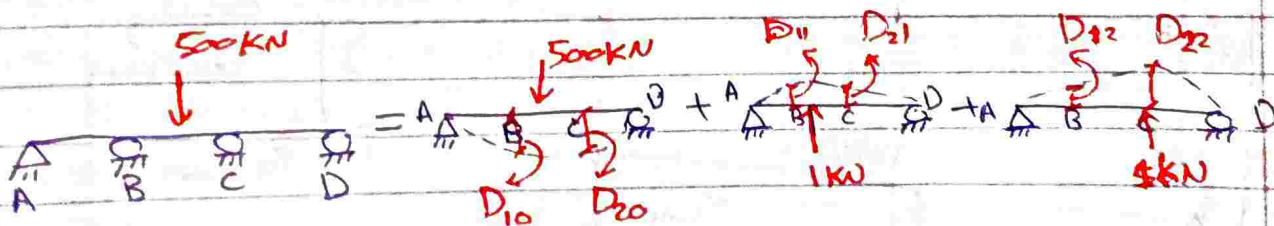


→ Incl. to the 2<sup>nd</sup> degree.

→  $R_1 = b_y$

→  $R_2 = c_y$

نظام قنار برابری سیم  
 مناسب لوا اختیار  
 چیل  
 بیس  
 Unstable



→ Compatibility

Eq. for the vertical dis. at b

$$0 = D_{10} + D_{11} + D_{12}$$

$$0 = D_{10} + R_1 d_{11} + R_2 d_{12}$$

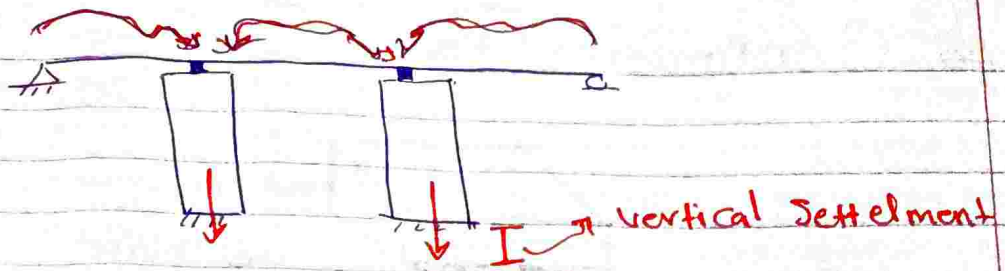
→ Compatibility

Eq. for the vertical dis. at C

$$0 = D_{20} + D_{21} + D_{22}$$

$$0 = D_{20} + R_1 d_{21} + R_2 d_{22}$$

↳ If there is No settlement and No Elastic supports.



→ In the Sample assume:-

A ↓ 27.5 mm

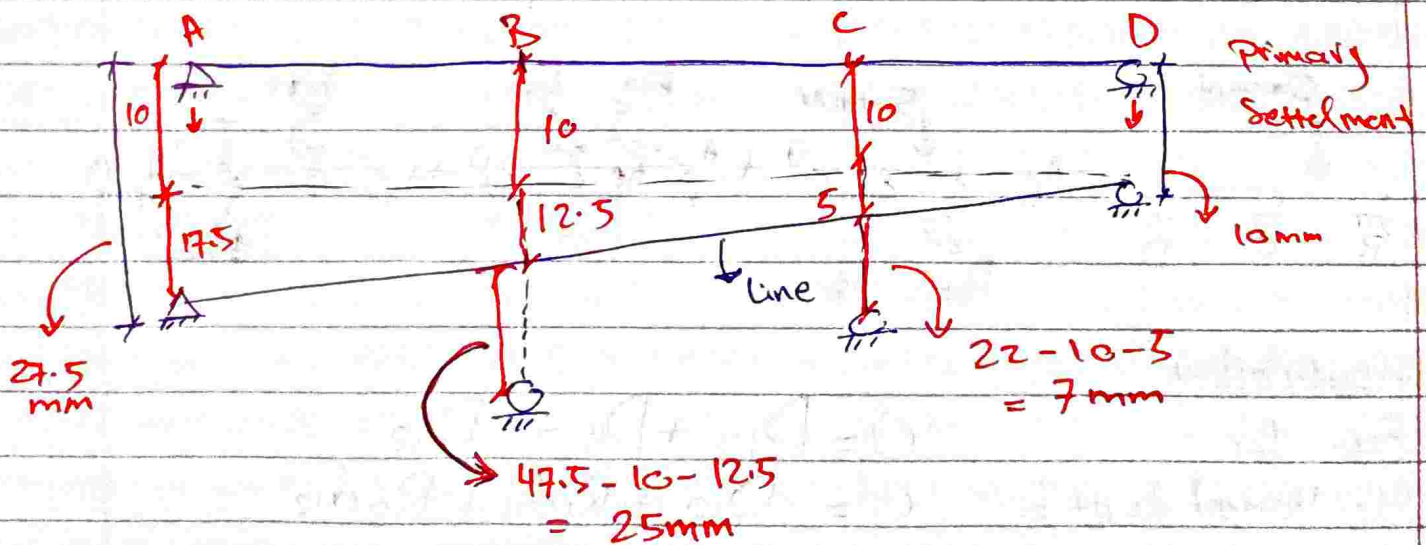
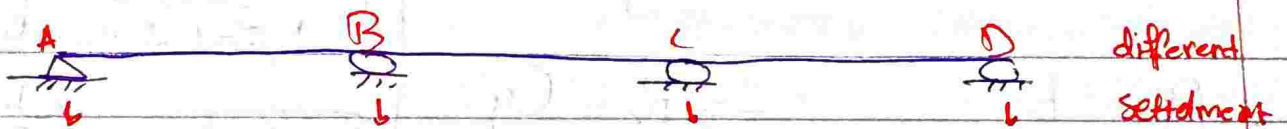
B ↓ 47.5 mm

C ↓ 22 mm

D ↓ 10 mm

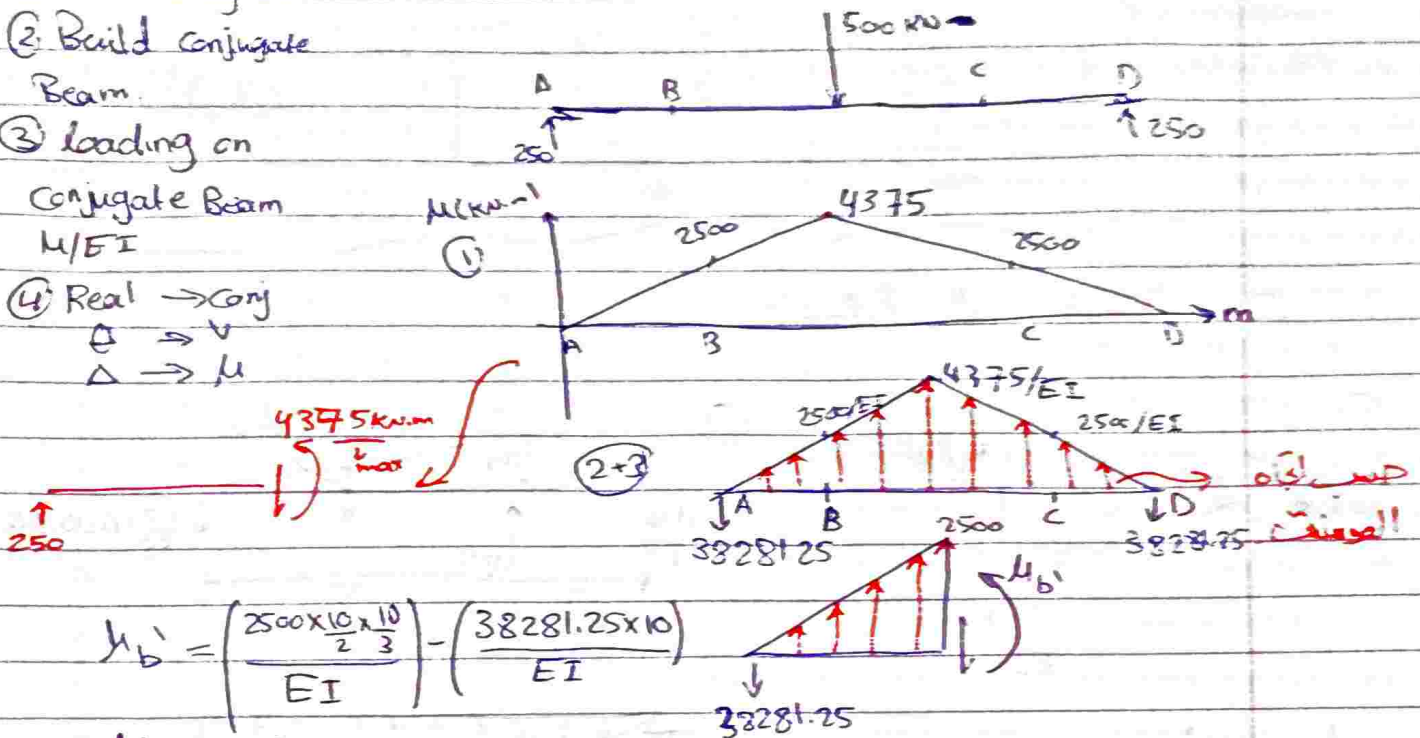
} ⇒ Comp.  $\text{○} = D_{10} + R_1 d_{11} + d_2 R_2$

$\text{○} = D_{20} + R_1 d_{21} + R_2 d_{22}$



## • Find $D_{10}$ Using Conjugate Beam Method?

- ① B.M diagram
- ② Build conjugate Beam
- ③ loading on Conjugate Beam  $M/EI$
- ④ Real  $\rightarrow$  Cony  
 $\Delta \rightarrow V$   
 $\Delta \rightarrow M$



$$M_B' = \left( \frac{2500 \times 10 \times \frac{10}{2} \times \frac{10}{3}}{EI} \right) - \left( \frac{38281.25 \times 10}{EI} \right)$$

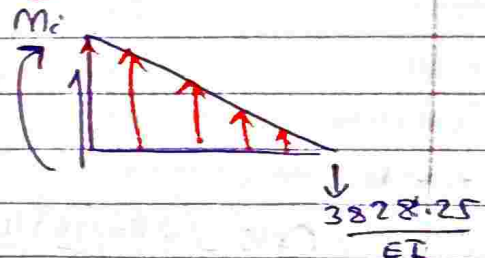
$$M_B = -341145.8$$

$$M_B = 341145.8 \text{ kNm CW}$$

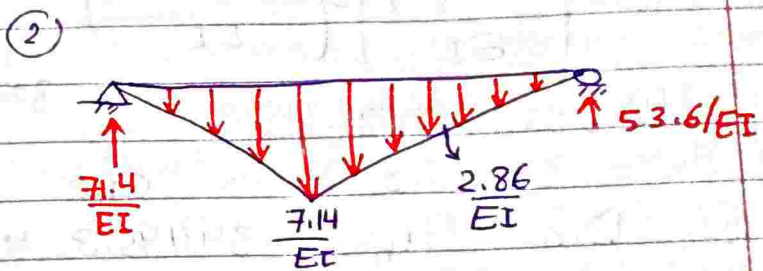
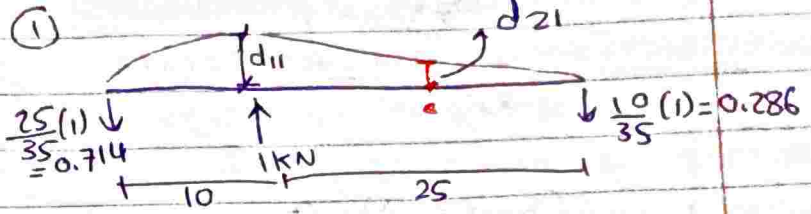
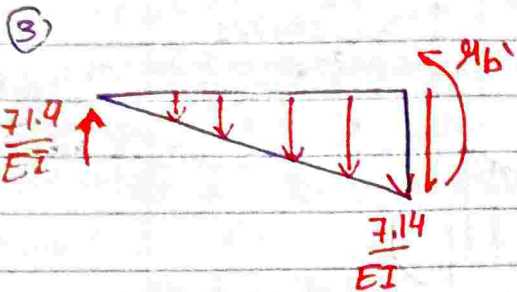
$$\textcircled{a} D_{10} = M_B' = 341145.8 \text{ } \cancel{\text{R}}$$

## • Find $D_{20}$ In the same way.

$$D_{20} = M_C' = -341145.8 \text{ kNm}$$



To Find  $d_{11} / d_{22}$ ?



$\rightarrow d_{11} = M_b'$   
 $M_b' = \frac{71.4(10)}{EI} - \left( \frac{1}{2} \left( \frac{7.14}{EI} \right) (10) \left( \frac{10}{3} \right) \right)$   
 $M_b' = \frac{595}{EI}$

$\rightarrow d_{21} = M_c'$   
 $M_c' = \frac{53.6 \times 10}{EI} - \left( \frac{2.86}{EI} \left( \frac{10}{3} \right) \left( \frac{10}{2} \right) \right)$   
 $= \frac{488.33}{EI}$

حالة خاصة

$D_{22} = D_{11}$   
 $D_{21} = D_{12}$

الرسامان المومنت متساويان  
بس بالعكس

## Compatibility Eqs:-

$$\textcircled{1} \quad -25 \times 10^{-3} = -\frac{341145}{EI} + R_1 \frac{595}{EI} + R_2 \frac{488}{EI}$$

$$\textcircled{2} \quad -7 \times 10^{-3} = -\frac{34145}{EI} + R_1 \frac{488}{EI} + R_2 \frac{595}{EI}$$

Settlement:-

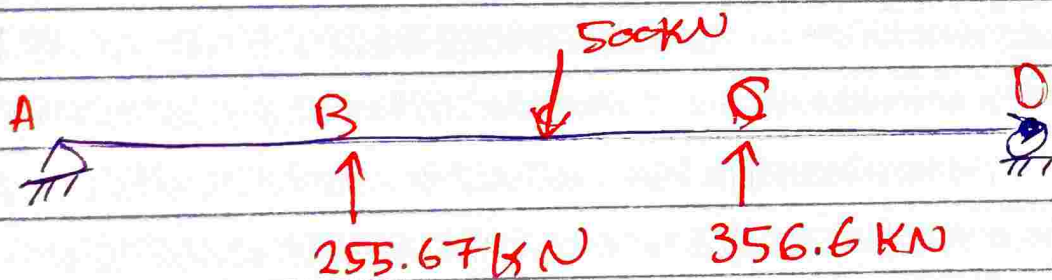
$$\ominus \Rightarrow \frac{34145}{EI}$$

$$\begin{Bmatrix} 326145 \\ 336945 \end{Bmatrix} = \begin{bmatrix} 595 & 488 \\ 488 & 595 \end{bmatrix} \begin{Bmatrix} R_1 \\ R_2 \end{Bmatrix}$$

$$R_1 = 225.67$$

$$R_2 = 356.6$$

• To Find the Reaction  $\Rightarrow$  Equ. Eq



$$A_y = 35 \text{ kN} \downarrow$$

$$D_y = 77.76 \text{ kN} \downarrow$$