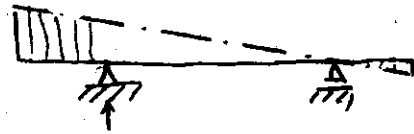
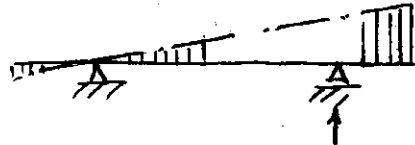


CEFS4605 - HW1

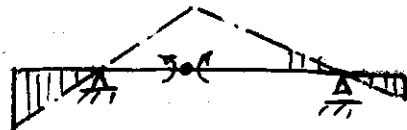
1- * Q.I.L. for left reaction



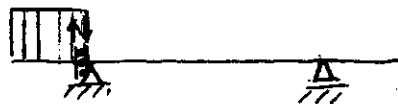
* " " right "



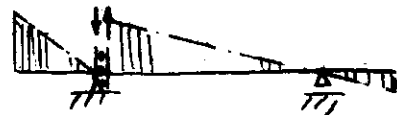
* " " middle moment



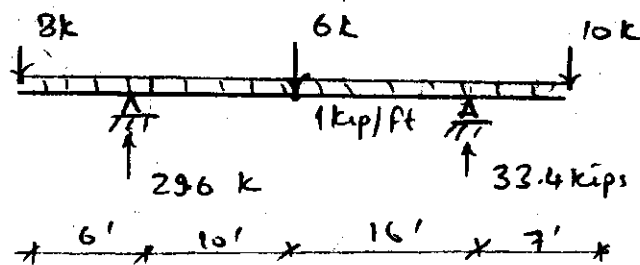
* " " shear to left of support



* " " shear to right of support

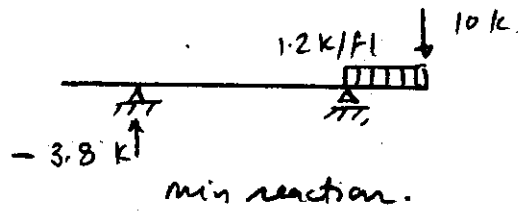
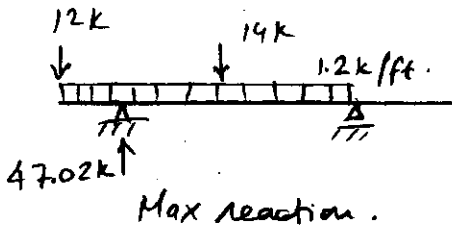


* Dead loading:

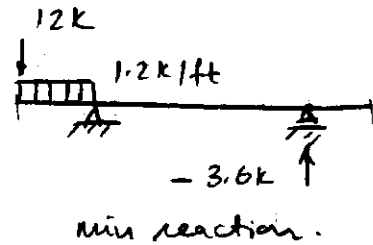
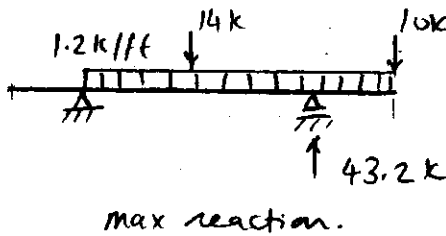


- left dead reaction = 29.6 kips
- right dead reaction = 33.4 kips
- dead moment under conc. load = 40 k ft
- dead shear left of support = -14 kips
- dead shear right of support = +15.6 kips

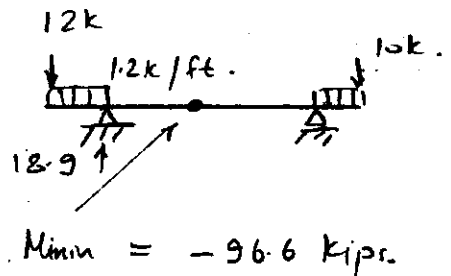
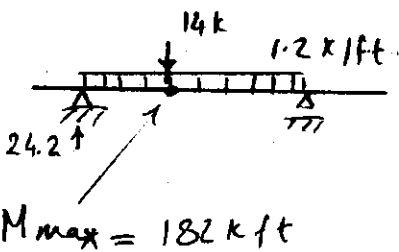
* live loading for left reaction:



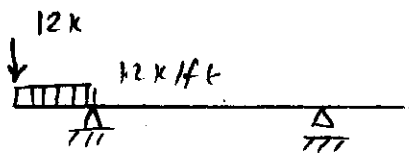
* live loading for right reaction:



* live loading for central moment:

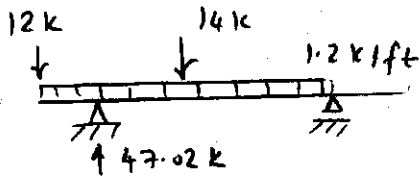


* live load for shear left to support

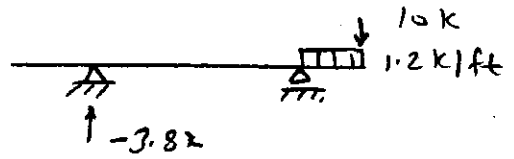


$$Q_{left(max)} = -19.2 \text{ kips.}$$

* live load for shear right of support.



$$Q_R(\text{max}) = 27.8 \text{ k}$$



$$Q_R(\text{min}) = -3.8 \text{ kips}$$

* Load combination for left reaction:

$$\text{Max left reaction} = 1.2D + 1.6L = 110.752$$

$$\text{or } 1.4D = 1.4 \times 29.6 = 41.5 \text{ kips}$$

$$\text{Min left reaction} = 1.2D + 1.6L = 29.4 \text{ kips}$$

$$\Rightarrow \text{Factored design left reaction (max.)} = \underline{110.8 \text{ kips}}$$

$$\Rightarrow \text{Factored design left reaction (min.)} = \underline{29.4 \text{ kips}}$$

* Load combination for right reaction:

$$\text{Max right reaction} = 1.2D + 1.6L = 109.2 \text{ k}$$

$$\text{or } = 1.4D = 46.76 \text{ k}$$

$$\text{Min right reaction} = 1.2D + 1.6L = 34.3 \text{ kips}$$

$$\Rightarrow \text{Factored design right reaction (max.)} = \underline{109.2 \text{ kips}}$$

$$\Rightarrow \text{Factored design right reaction (min.)} = \underline{34.3 \text{ kips}}$$

* load combination for central moment;

$$\begin{aligned} \text{Max central moment (factored)} &= 1.2D + 1.6L = 339.2 \text{ kft} \\ &= 1.4D = 56 \text{ kft} \end{aligned}$$

$$\begin{aligned} \text{Min central moment (factored)} &= 1.2D + 1.6L = -106.56 \text{ kft} \\ &= 40 \quad -96.6 \end{aligned}$$

$$\Rightarrow \text{Factored central design moment (max.)} = \underline{339.2 \text{ kft}}$$

$$\Rightarrow \text{Factored central design moment (min.)} = \underline{-106.6 \text{ kft}}$$

* load combination for Shear left of support:

$$\begin{aligned} \text{Factored shear left (max.)} &= 1.2D + 1.6L = -47.6 \text{ kips} \\ &= 1.4D = -19.6 \text{ kips} \end{aligned}$$

$$\Rightarrow \text{Factored shear left (max.)} = \underline{-47.6 \text{ kips}}$$

* load combination for Shear right of support.

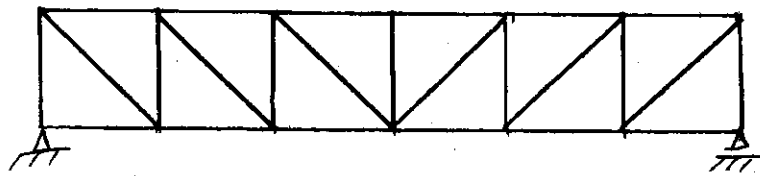
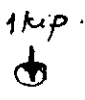
$$\begin{aligned} \text{Factored shear right (max.)} &= 1.2D + 1.6L = 63.2 \text{ kips} \\ &= 1.4D = 21.84 \text{ kips} \end{aligned}$$

$$\text{Factored shear right (min.)} = 1.2D + 1.6L = 12.64 \text{ kips}$$

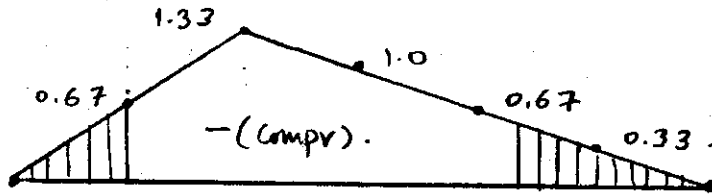
$$\Rightarrow \text{Factored design shear right (max.)} = \underline{63.2 \text{ kips}}$$

$$\Rightarrow \text{Factored design shear right (min.)} = \underline{12.64 \text{ kips}}$$

2 -

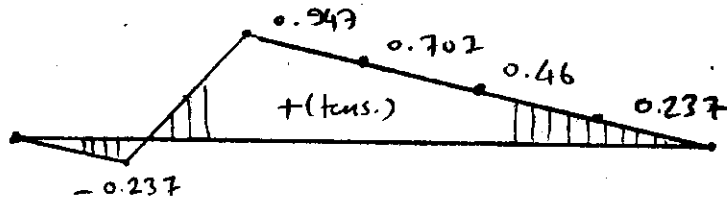


IL 1



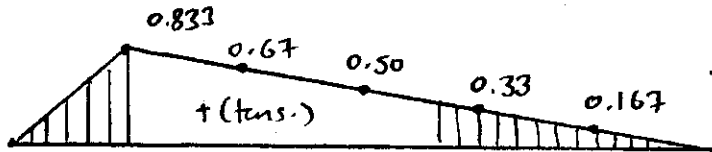
7

IL 2



7

IL 3



7

- ** Member 1 - dead load force : -16 kips (Compr.) 3
- I.L. shows that max. live load occurs when live load acts on whole span 3
- ⇒ live load force = -24 kips.
- Wind force = + 16 Kips (wind load acts on whole span). 3

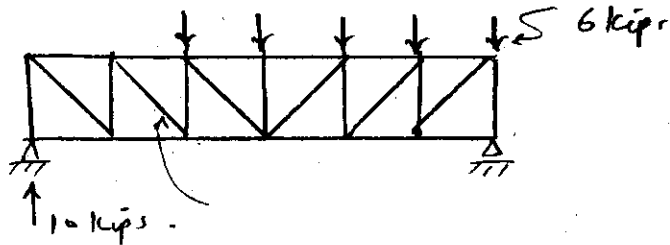
$$\begin{aligned}
 \text{Factored design load} &= 1.4D = -22.4 \text{ kips} \\
 &= 1.2D + 1.6L = -57.6 \text{ kips} \\
 &= 0.9D + 1.3W = +6.4 \text{ kips}
 \end{aligned}$$

⇒ Member is subjected to 57.6 kips (Compr) & 6.4 kips (tens)

①

** Member 2 - dead force = +8.4 (tens.)

- I.L. Shows that max live force occurs when live load acts as follows:



$$\text{live force} = 10 / \cos 45 = 14.14 \text{ kips (tens.)}$$

- wind force = -8.4 (compr.)

$$\begin{aligned} \text{Factored design load} &= 1.4D = +11.76 \text{ kips} \\ &= 1.2D + 1.6L = +32.7 \text{ kips} \\ &= 0.9D + 1.3W = -3.36 \text{ kips} \end{aligned}$$

⇒ Member is subjected to 32.7 kips (tens.) and 3.36 kips (compr.)

** Member 3 - dead force = +10 kips (tens.)

- live force = +15 kips (tens.) ← (L.L. acting on whole span)
- wind force = -10 kips (compr.)

$$\begin{aligned} \text{Factored design load} &= 1.4D = 14 \text{ kips (tens.)} \\ &= 1.2D + 1.6L = 36 \text{ kips (tens.)} \\ &= 0.9D + 1.3W = -4 \text{ k (compr.)} \end{aligned}$$

⇒ Member is subjected to 36 kips (tens.) & 4 kips (compr.)