

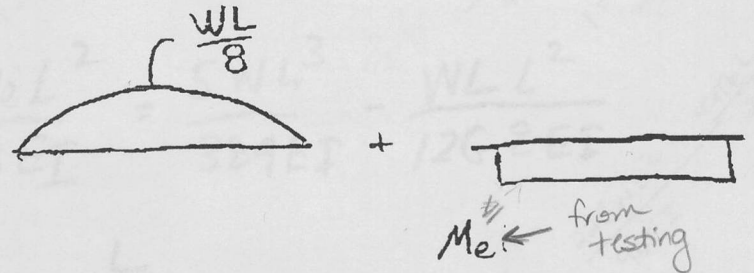
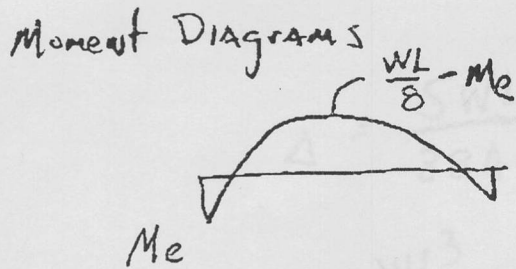
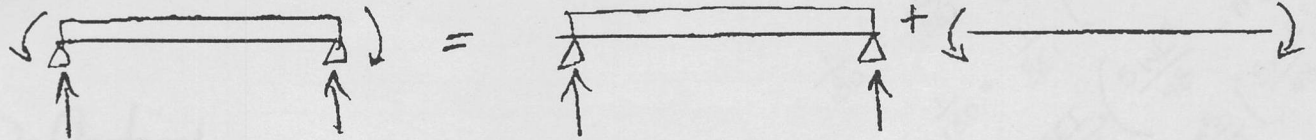
For Beams with linear spring constant:

Appendix A

(1)

(2)

(3)



W - total Beam load (kips)

$$\theta_{E(1)} = \theta_{E(2)} - \theta_{E(3)}$$

$$\theta_{E(1)} = \frac{WL^2}{24EI} - \frac{M_e L}{2EI}$$

For linear M vs θ Relationship $M_e = F\theta$ so $\frac{M_e}{F} = \theta$

$$\frac{M_e}{F} = \frac{WL^2}{24EI} - \frac{M_e L}{2EI}$$

$$M_e = \frac{WL/12}{\frac{2EI}{FL} + 1} = \frac{WL}{12G} = \frac{FCM}{G}$$

$$\text{where } G = \frac{2EI}{FL} + 1$$

Spring constant

$$M_{MAX} = \frac{WL}{8} - \frac{WL}{12G}$$

$$W = \frac{M_{MAX}}{\frac{L}{8} - \frac{L}{12G}}$$

Verify that M_e is within limits.

Shut Capacity

$\frac{WL}{8} = M_{MAX}$