

5.10-1 Use A992 steel ($F_y = 50$ ksi) and select a W-shape for the following beam:

- Simply supported with a span length of 30 feet
- Laterally braced only at the ends
- Service dead load = 0.75 kips/ft
- The service live load consists of a 34-kip concentrated load at the center of the span

There is no limit on the deflection. ASSUME $C_b = 1.0$

$$W_U = 1.2(0.75 \text{ k/ft}) = 0.9 \text{ k/ft} \quad P_U = 1.6(34 \text{ k}) = 54.4 \text{ k}$$

$$M_U = \frac{W_U L^2}{8} + \frac{P_U L}{4} = \frac{0.9 \text{ k/ft} (30 \text{ ft})^2}{8} + \frac{54.4 \text{ k} (30 \text{ ft})}{4}$$
$$= \underline{509.25 \text{ kft}}$$

* FROM TABLE 3-10 WITH $L_b = 30 \text{ ft}$ & $\phi M_n \approx 509.25 \text{ kft}$

$$\underline{W14 \times 99} \Rightarrow \phi_b M_n = 525 \text{ kft}$$