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Find Dead Load:

**COLUMN:**
- **Length:** 30'
- **K:** 1.0
- **$f_y$:** 36 ksi
- **E:** 29,000 ksi
- **F.S.:** 3
- **No Bracing**

**W10 x 33**

- $I_x = 170 \text{ in}^4$
- $I_y = 36.64 \text{ in}^4$
- $A = 9.71 \text{ in}$

**Total Area:**

$2(9.71) + 2(12) = 43.42 \text{ in}^2$

$I_x = 2(170) + 2\left(\frac{12(12)^3}{12}\right) + 2\left(9.71(12)^2\right) = 1032.80 \text{ in}^4 \leftarrow \text{controls}$

$I_y = 2\left(36.6\right) + 2\left(\frac{12(12)^3}{12}\right) + 2\left(9.71(12)^2\right) = 1060.32 \text{ in}^4$

$F_x = \sqrt{\frac{1032.8}{43.42}} = 4.877 \text{ in}$

$P_{cr} = \frac{\pi^2 EA}{(KX/r)^2} = \frac{\pi^2 \cdot 29000(43.42)}{(1(360)/4.877)^2} = 928.1 \text{ k}$

$P_y = f_yA = 36(43.42) = 1563 \text{ k} \leftarrow \text{controls}$

$P_{allow} = 1563 / 3 = 521 \text{ k}$