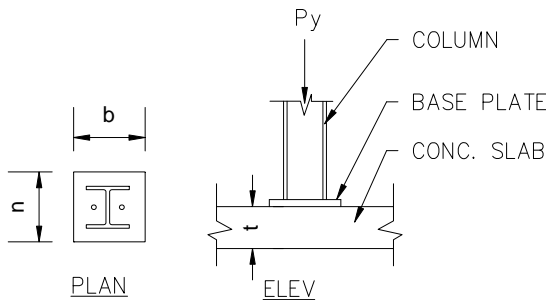


PURPOSE: Compute slab on grade thickness for applied column load, assumed unreinforced slab.

ASSUMPTIONS: Ref: "Designing Floor Slabs On Grade" by Boyd C. Ringo and Robert B. Anderson, pages 43 to 45.

$f_c := 3000\text{-psi}$ $t := 6\text{-in}$ $b := 8.0\text{-in}$ $n := 8.0\text{-in}$ $k := 150 \cdot \frac{\text{lb}\cdot\text{f}}{\text{in}^3}$ $SF := 2.0$



CALCULATION:

Applied column load: $P_y := 7700\text{-lb}\cdot\text{f}$

$A := \frac{0.03}{\sqrt{f_c\cdot\text{psi}}}$ $B := 915000 \cdot \sqrt{f_c\cdot\text{psi}}$ $C := k \cdot b^4$ $P_u := P_y \cdot SF$ $P_u = 15400\text{-lb}\cdot\text{f}$

Given $P_u = \frac{t^2}{A \cdot \log\left(\frac{B \cdot t^3}{C}\right)}$ $t := \text{Find}(t)$ $t = 5.982\text{-in}$ $P_{all} := P_y$ $P_{all} = 7700\text{-lb}\cdot\text{f}$

Compute allowable column load for punching shear $d := t - 2\text{-in}$

$b_o := (b + n + 2 \cdot d) \cdot 2$ $b_o = 47.927\text{-in}$

$V_u := 4 \cdot \sqrt{f_c\cdot\text{psi}} \cdot b_o \cdot d$ $V_u = 41809\text{-lb}\cdot\text{f}$ $V_{all} := \frac{V_u}{SF}$ $V_{all} = 20905\text{-lb}\cdot\text{f}$

CONCLUSION: Max. column load P_{all} :

$P_{all} := V_u \cdot (V_u \leq P_{all}) + P_{all} \cdot (P_{all} < V_u)$

$P_{all} = 7700\text{-lb}\cdot\text{f}$ **GREATER THAN OR EQUAL TO P_y .** $P_y = 7700\text{-lb}\cdot\text{f}$

Required floor thickness to resist applied load: $t = 5.982\text{in}$

Floor Thickness = 6 Inches Minimum