3.13 Design Aids

Design Aid 3.13.1. Design Strength Interaction Curves for Precast, Prestressed Concrete Columns

**CRITERIA**
1. Concrete $f'_c = 5000$ to $10,000$ psi, normal weight
2. Minimum prestress $= 225$ psi
3. All strand assumed $\frac{1}{2}$ in. diameter, $f_{pu} = 270$ ksi
4. Curves shown for partial development of strand near member end where $f_{pu} = f_{se}$
5. Horizontal portion of curve is the maximum for tied columns $= 0.80 \phi P_0$
6. $\phi$ varies linearly from 0.9 for tension-controlled sections to 0.65 for compression-controlled sections in accordance with ACI 318-14 Section 21.2

**USE OF CURVES**
1. Enter at left with applied factored axial load $P_u$
2. Enter at bottom with applied magnified factored moment $\delta M_u$
3. Intersection point must be to the left of curve indicating required concrete strength

**NOTATION**
- $\phi P_n$ = design axial strength
- $\phi M_n$ = design flexural strength
- $\phi P_0$ = design axial strength at zero eccentricity
- $A_g$ = gross area of the column
- $\delta$ = moment magnifier (ACI 318-14 Section 6.6.4)
Design Aid 3.13.1. Design Strength Interaction Curves for Precast, Prestressed Concrete Columns (cont.)

![Design Strength Interaction Curves](image-url)