- IV - Design Examples

4 - Braced frame:

Design Column CD & DE

Section A-A (9", 15", 16")
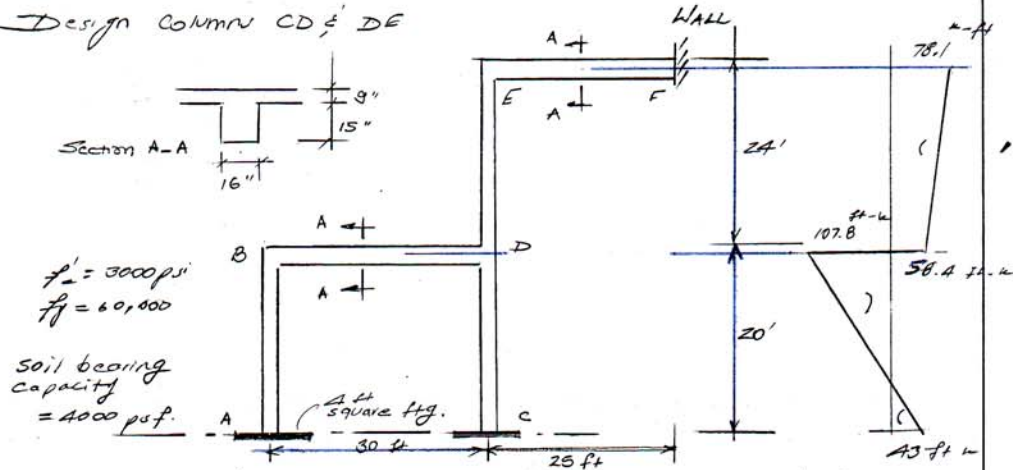
$f'_c = 3000\,psi$
$f_y = 60,000$

soil bearing
capacity
$= 4000\ psf.$

frames are spaced 20 ft apart. All wind forces
are assumed to be resisted by the end walls of
the building

1.

	Column CD	Column DE
Service Load P	Dead = 80 kips Live = 24 kips	Dead = 50 kips Live = 14 kips
Service Moments at top of columns	Dead = +60 ft-kip Live = 14 ft-kip	Dead = -42.4 ft-k Live = -11.0 ft-k
Service Moments at bottom of column	Dead = 21 ft-kip Live = 8 ft-kip	Dead = 32 ft-kip Live = 8 ft-kip

Column CD : $P_u = 1.4\,DL + 1.7\,LL = 152.8$ kips

$M_{top} = 1.4 \times 60 + 1.7 \times 14 = 107.8$ ft-kip

$M_{bot} = 1.4 \times 21 + 1.7 \times 8 = 43$ ft-kip

column bent in double curvature, $\dfrac{M_1}{M_2} = -\dfrac{43}{107.8} = -0.4$

Column DE : $P_u = 1.4\,DL + 1.7\,LL = 93.8$ kips

$M_{top} = -42.4 \times 1.4 - 11 \times 1.7 = -78.1$ ft-kip

$M_{bot} = 1.4 \times 32 + 1.7 \times 8 = 58.4$ ft-kip

column bent in single curvature $\dfrac{M_1}{M_2} = +\dfrac{58.4}{78.1} = 0.75$