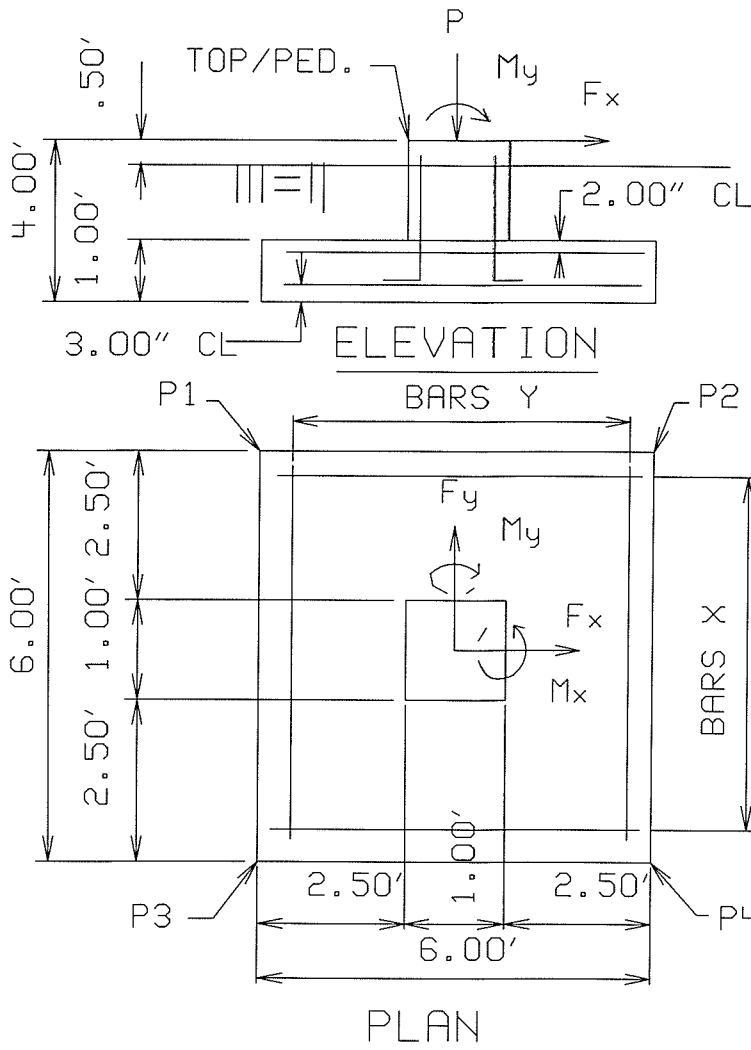


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ISOLATED SPREAD FOOTING DESIGN:



$f_c' = 4.00$ KSI
 CONC WT = 150 PCF
 SOIL WT = 100 PCF
 COEFF OF FRICTION = .45
 ADHESION = 0.00 KSF

BASIC SERVICE LOADS:

LOAD NO.	P (k)	Fx (k)	Fy (k)	Mx (k*ft)	My (k*ft)
D	50.00	0.00	0.00	0.00	0.00
L	40.00	0.00	0.00	0.00	0.00
S	20.00	0.00	0.00	0.00	0.00
W1	0.00	5.00	0.00	0.00	0.00
W2	0.00	-5.00	0.00	0.00	0.00
E	0.00	2.00	0.00	0.00	0.00

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TITLE:ISOFOOT Example Calculation

JOB NO.
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DATE:

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ISOLATED SPREAD FOOTING DESIGN:

Compute Self-Weight of Footing:

Footing Weight=0.15* 6.00'* 6.00'* 1.00' = 5.40 k
Pedestal Weight = 0.15* 1.00'* 1.00'* 3.00' = .45 k
Soil Weight=(6.00'* 6.00'- 1.00'* 1.00')* 2.50'*100 pcf/1000 = 8.75 k

Total = 14.60 k

Soil Pressures and Stability Results:

Service Load Group No. 1 = D:

Loads Applied to Top/Pedestal:

P= 50.00 k, Fx= 0.00 k, Fy= 0.00 k, Mx= 0.00 k*ft, My= 0.00 k*ft

Loads At Bottom of Footing:

P= 64.60 k, Fx= 0.00 k, Fy= 0.00 k, Mx= 0.00 k*ft, My= 0.00 k*ft

Pressures:P1=1.79 ksf, P2=1.79 ksf, P3=1.79 ksf, P4=1.79 ksf

Factored Load Group No. 1=1.4*D:

Factored Loads At Bottom of Pedestal:

Pu= 70.00 k, Mxu= 0.00 k*ft, Myu= 0.00 k*ft

Factored Loads At Bottom of Footing:

Pu= 90.44 k, Fxu= 0.00 k, Fyu= 0.00 k, Mxu= 0.00 k*ft, Myu= 0.00 k*ft

Factored Pressures:PU1=2.51 ksf, PU2=2.51 ksf, PU3=2.51 ksf, PU4=2.51 ksf

Service Load Group No. 2 = D + L:

Loads Applied to Top/Pedestal:

P= 90.00 k, Fx= 0.00 k, Fy= 0.00 k, Mx= 0.00 k*ft, My= 0.00 k*ft

Loads At Bottom of Footing:

P= 104.60 k, Fx= 0.00 k, Fy= 0.00 k, Mx= 0.00 k*ft, My= 0.00 k*ft

Pressures:P1=2.91 ksf, P2=2.91 ksf, P3=2.91 ksf, P4=2.91 ksf

Factored Load Group No. 2=1.2*D + 1.6*L:

Factored Loads At Bottom of Pedestal:

Pu= 124.00 k, Mxu= 0.00 k*ft, Myu= 0.00 k*ft

Factored Loads At Bottom of Footing:

Pu= 141.52 k, Fxu= 0.00 k, Fyu= 0.00 k, Mxu= 0.00 k*ft, Myu= 0.00 k*ft

Factored Pressures:PU1=3.93 ksf, PU2=3.93 ksf, PU3=3.93 ksf, PU4=3.93 ksf

Service Load Group No. 3 = D + S:

Loads Applied to Top/Pedestal:

P= 70.00 k, Fx= 0.00 k, Fy= 0.00 k, Mx= 0.00 k*ft, My= 0.00 k*ft

Loads At Bottom of Footing:

P= 84.60 k, Fx= 0.00 k, Fy= 0.00 k, Mx= 0.00 k*ft, My= 0.00 k*ft

Pressures:P1=2.35 ksf, P2=2.35 ksf, P3=2.35 ksf, P4=2.35 ksf

Factored Load Group No. 3=1.2*D + 1.6*S:

Factored Loads At Bottom of Pedestal:

Pu= 92.00 k, Mxu= 0.00 k*ft, Myu= 0.00 k*ft

Factored Loads At Bottom of Footing:

Pu= 109.52 k, Fxu= 0.00 k, Fyu= 0.00 k, Mxu= 0.00 k*ft, Myu= 0.00 k*ft

Factored Pressures:PU1=3.04 ksf, PU2=3.04 ksf, PU3=3.04 ksf, PU4=3.04 ksf

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ISOLATED SPREAD FOOTING DESIGN:

Soil Pressures and Stability Results (Cont'd):

(Continuation of Group Load 3)

Service Load Group No. 4 = D + 0.75*L + 0.75*S:

Loads Applied to Top/Pedestal:

P= 95.00 k, Fx= 0.00 k, Fy= 0.00 k, Mx= 0.00 k*ft, My= 0.00 k*ft

Loads At Bottom of Footing:

P= 109.60 k, Fx= 0.00 k, Fy= 0.00 k, Mx= 0.00 k*ft, My= 0.00 k*ft

Pressures:P1=3.04 ksf, P2=3.04 ksf, P3=3.04 ksf, P4=3.04 ksf

Factored Load Group No. 4=1.2*D + 1.6*L + 0.5*S:

Factored Loads At Bottom of Pedestal:

Pu= 134.00 k, Mxu= 0.00 k*ft, Myu= 0.00 k*ft

Factored Loads At Bottom of Footing:

Pu= 151.52 k, Fxu= 0.00 k, Fyu= 0.00 k, Mxu= 0.00 k*ft, Myu= 0.00 k*ft

Factored Pressures:PU1=4.21 ksf, PU2=4.21 ksf, PU3=4.21 ksf, PU4=4.21 ksf

Service Load Group No. 5 = D + 0.75*W1 + 0.75*L + 0.75*S:

Loads Applied to Top/Pedestal:

P= 95.00 k, Fx= 3.75 k, Fy= 0.00 k, Mx= 0.00 k*ft, My= 0.00 k*ft

Loads At Bottom of Footing:

P= 109.60 k, Fx= 3.75 k, Fy= 0.00 k, Mx= 0.00 k*ft, My= 15.00 k*ft

Pressures:P1=2.63 ksf, P2=3.46 ksf (MAX), P3=2.63 ksf, P4=3.46 ksf (MAX)

Safety Factor Against Overturning Y Axis:

Righting moment, MrY= 109.6 k * 6.00 ft/2 = 328.80 k*ft

SF=328.8 k*ft/ 15.0 k*ft = 21.92 > 1.5 (OK)

Safety Factor Against Sliding:

Friction = ν * P + Adhesion

= .45*(109.6 k) + 0.000 ksf * 6.00 ft * 6.00 ft = 49.3 k

Horiz.Load = $[(3.75)^2 + (0.00 k)^2]^{1/2} = 3.75 k$

SF= 49.3 k/ 3.7 k = 13.15 > 1.5 (OK)

Factored Load Group No. 5=1.2*D + 1.6*W1 + L + 0.5*S:

Factored Loads At Bottom of Pedestal:

Pu= 110.00 k, Mxu= 0.00 k*ft, Myu= 24.00 k*ft

Factored Loads At Bottom of Footing:

Pu= 127.52 k, Fxu= 8.00 k, Fyu= 0.00 k, Mxu= 0.00 k*ft, Myu= 32.00 k*ft

Factored Pressures:PU1=2.65 ksf, PU2=4.43 ksf, PU3=2.65 ksf, PU4=4.43 ksf

Service Load Group No. 6 = D + 0.75*W2 + 0.75*L + 0.75*S:

Loads Applied to Top/Pedestal:

P= 95.00 k, Fx= -3.75 k, Fy= 0.00 k, Mx= 0.00 k*ft, My= 0.00 k*ft

Loads At Bottom of Footing:

P= 109.60 k, Fx= -3.75 k, Fy= 0.00 k, Mx= 0.00 k*ft, My= -15.00 k*ft

Pressures:P1=3.46 ksf (MAX), P2=2.63 ksf, P3=3.46 ksf (MAX), P4=2.63 ksf

Safety Factor Against Overturning Y Axis:

Righting moment, MrY= 109.6 k * 6.00 ft/2 = 328.80 k*ft

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TITLE:ISOFOOT Example Calculation

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ISOLATED SPREAD FOOTING DESIGN:

Soil Pressures and Stability Results (Cont'd):

(Continuation of Group Load 6)

$$SF=328.8 \text{ k*ft} / -15.0 \text{ k*ft} = 21.92 > 1.5 \text{ (OK)}$$

Safety Factor Against Sliding:

$$\text{Friction} = \nu * P + \text{Adhesion}$$

$$= .45 * (109.6 \text{ k}) + 0.000 \text{ ksf} * 6.00 \text{ ft} * 6.00 \text{ ft} = 49.3 \text{ k}$$

$$\text{Horiz.Load} = [(-3.75)^2 + (0.00 \text{ k})^2]^{1/2} = 3.75 \text{ k}$$

$$SF=49.3 \text{ k} / 3.7 \text{ k} = 13.15 > 1.5 \text{ (OK)}$$

Factored Load Group No. 6=1.2*D + 1.6*W2 + L + 0.5*S:

Factored Loads At Bottom of Pedestal:

$$P_u = 110.00 \text{ k}, M_{xu} = 0.00 \text{ k*ft}, M_{yu} = 24.00 \text{ k*ft}$$

Factored Loads At Bottom of Footing:

$$P_u = 127.52 \text{ k}, F_{xu} = -8.00 \text{ k}, F_{yu} = 0.00 \text{ k}, M_{xu} = 0.00 \text{ k*ft}, M_{yu} = -32.00 \text{ k*ft}$$

$$\text{Factored Pressures: } P_{U1}=4.43 \text{ ksf}, P_{U2}=2.65 \text{ ksf}, P_{U3}=4.43 \text{ ksf}, P_{U4}=2.65 \text{ ksf}$$

Service Load Group No. 7 = 0.6*D + W1:

Loads Applied to Top/Pedestal:

$$P = 30.00 \text{ k}, F_x = 5.00 \text{ k}, F_y = 0.00 \text{ k}, M_x = 0.00 \text{ k*ft}, M_y = 0.00 \text{ k*ft}$$

Loads At Bottom of Footing:

$$P = 44.60 \text{ k}, F_x = 5.00 \text{ k}, F_y = 0.00 \text{ k}, M_x = 0.00 \text{ k*ft}, M_y = 20.00 \text{ k*ft}$$

$$\text{Pressures: } P_1=.68 \text{ ksf}, P_2=1.79 \text{ ksf}, P_3=.68 \text{ ksf}, P_4=1.79 \text{ ksf}$$

Safety Factor Against Overturning Y Axis:

$$\text{Righting moment, } M_{rY} = 44.6 \text{ k} * 6.00 \text{ ft} / 2 = 133.80 \text{ k*ft}$$

$$SF=133.8 \text{ k*ft} / 20.0 \text{ k*ft} = 6.69 > 1.5 \text{ (OK)}$$

Safety Factor Against Sliding:

$$\text{Friction} = \nu * P + \text{Adhesion}$$

$$= .45 * (44.6 \text{ k}) + 0.000 \text{ ksf} * 6.00 \text{ ft} * 6.00 \text{ ft} = 20.1 \text{ k}$$

$$\text{Horiz.Load} = [(5.00)^2 + (0.00 \text{ k})^2]^{1/2} = 5.00 \text{ k}$$

$$SF=20.1 \text{ k} / 5.0 \text{ k} = 4.01 > 1.5 \text{ (OK)}$$

Factored Load Group No. 7=0.9*D + 1.6*W1:

Factored Loads At Bottom of Pedestal:

$$P_u = 45.00 \text{ k}, M_{xu} = 0.00 \text{ k*ft}, M_{yu} = 24.00 \text{ k*ft}$$

Factored Loads At Bottom of Footing:

$$P_u = 58.14 \text{ k}, F_{xu} = 8.00 \text{ k}, F_{yu} = 0.00 \text{ k}, M_{xu} = 0.00 \text{ k*ft}, M_{yu} = 32.00 \text{ k*ft}$$

$$\text{Factored Pressures: } P_{U1}=.73 \text{ ksf}, P_{U2}=2.50 \text{ ksf}, P_{U3}=.73 \text{ ksf}, P_{U4}=2.50 \text{ ksf}$$

Service Load Group No. 8 = 0.6*D + W2:

Loads Applied to Top/Pedestal:

$$P = 30.00 \text{ k}, F_x = -5.00 \text{ k}, F_y = 0.00 \text{ k}, M_x = 0.00 \text{ k*ft}, M_y = 0.00 \text{ k*ft}$$

Loads At Bottom of Footing:

$$P = 44.60 \text{ k}, F_x = -5.00 \text{ k}, F_y = 0.00 \text{ k}, M_x = 0.00 \text{ k*ft}, M_y = -20.00 \text{ k*ft}$$

$$\text{Pressures: } P_1=1.79 \text{ ksf}, P_2=.68 \text{ ksf}, P_3=1.79 \text{ ksf}, P_4=.68 \text{ ksf}$$

Safety Factor Against Overturning Y Axis:

$$\text{Righting moment, } M_{rY} = 44.6 \text{ k} * 6.00 \text{ ft} / 2 = 133.80 \text{ k*ft}$$

$$SF=133.8 \text{ k*ft} / -20.0 \text{ k*ft} = 6.69 > 1.5 \text{ (OK)}$$

Safety Factor Against Sliding:

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TITLE:ISOFOOT Example Calculation

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SHEET NO: 5
DATE:

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ISOLATED SPREAD FOOTING DESIGN:

Soil Pressures and Stability Results (Cont'd):

(Continuation of Group Load 8)

Friction = $\nu * P + \text{Adhesion}$

$$= .45 * (44.6 \text{ k}) + 0.000 \text{ ksf} * 6.00 \text{ ft} * 6.00 \text{ ft} = 20.1 \text{ k}$$

$$\text{Horiz. Load} = [(-5.00)^2 + (0.00 \text{ k})^2]^{1/2} = 5.00 \text{ k}$$

$$\text{SF} = 20.1 \text{ k} / 5.0 \text{ k} = 4.01 > 1.5 \text{ (OK)}$$

Factored Load Group No. 8 = $0.9 * D + 1.6 * W2$:

Factored Loads At Bottom of Pedestal:

$$P_u = 45.00 \text{ k}, M_{xu} = 0.00 \text{ k*ft}, M_{yu} = 24.00 \text{ k*ft}$$

Factored Loads At Bottom of Footing:

$$P_u = 58.14 \text{ k}, F_{xu} = -8.00 \text{ k}, F_{yu} = 0.00 \text{ k}, M_{xu} = 0.00 \text{ k*ft}, M_{yu} = -32.00 \text{ k*ft}$$

$$\text{Factored Pressures: } P_{U1} = 2.50 \text{ ksf}, P_{U2} = .73 \text{ ksf}, P_{U3} = 2.50 \text{ ksf}, P_{U4} = .73 \text{ ksf}$$

Service Load Group No. 9 = $D + 0.525 * E + 0.75 * L + 0.75 * S$:

Loads Applied to Top/Pedestal:

$$P = 95.00 \text{ k}, F_x = 1.05 \text{ k}, F_y = 0.00 \text{ k}, M_x = 0.00 \text{ k*ft}, M_y = 0.00 \text{ k*ft}$$

Loads At Bottom of Footing:

$$P = 109.60 \text{ k}, F_x = 1.05 \text{ k}, F_y = 0.00 \text{ k}, M_x = 0.00 \text{ k*ft}, M_y = 4.20 \text{ k*ft}$$

$$\text{Pressures: } P_1 = 2.93 \text{ ksf}, P_2 = 3.16 \text{ ksf}, P_3 = 2.93 \text{ ksf}, P_4 = 3.16 \text{ ksf}$$

Safety Factor Against Overturning Y Axis:

$$\text{Righting moment, } M_{rY} = 109.6 \text{ k} * 6.00 \text{ ft} / 2 = 328.80 \text{ k*ft}$$

$$\text{SF} = 328.8 \text{ k*ft} / 4.2 \text{ k*ft} = 78.29 > 1.5 \text{ (OK)}$$

Safety Factor Against Sliding:

Friction = $\nu * P + \text{Adhesion}$

$$= .45 * (109.6 \text{ k}) + 0.000 \text{ ksf} * 6.00 \text{ ft} * 6.00 \text{ ft} = 49.3 \text{ k}$$

$$\text{Horiz. Load} = [(1.05)^2 + (0.00 \text{ k})^2]^{1/2} = 1.05 \text{ k}$$

$$\text{SF} = 49.3 \text{ k} / 1.0 \text{ k} = 46.97 > 1.5 \text{ (OK)}$$

Factored Load Group No. 9 = $1.2 * D + 1.0 * E + 1.0 * L + 0.2 * S$:

Factored Loads At Bottom of Pedestal:

$$P_u = 104.00 \text{ k}, M_{xu} = 0.00 \text{ k*ft}, M_{yu} = 6.00 \text{ k*ft}$$

Factored Loads At Bottom of Footing:

$$P_u = 121.52 \text{ k}, F_{xu} = 2.00 \text{ k}, F_{yu} = 0.00 \text{ k}, M_{xu} = 0.00 \text{ k*ft}, M_{yu} = 8.00 \text{ k*ft}$$

$$\text{Factored Pressures: } P_{U1} = 3.15 \text{ ksf}, P_{U2} = 3.60 \text{ ksf}, P_{U3} = 3.15 \text{ ksf}, P_{U4} = 3.60 \text{ ksf}$$

Service Load Group No. 10 = $0.6 * D + E$:

Loads Applied to Top/Pedestal:

$$P = 30.00 \text{ k}, F_x = 2.00 \text{ k}, F_y = 0.00 \text{ k}, M_x = 0.00 \text{ k*ft}, M_y = 0.00 \text{ k*ft}$$

Loads At Bottom of Footing:

$$P = 44.60 \text{ k}, F_x = 2.00 \text{ k}, F_y = 0.00 \text{ k}, M_x = 0.00 \text{ k*ft}, M_y = 8.00 \text{ k*ft}$$

$$\text{Pressures: } P_1 = 1.02 \text{ ksf}, P_2 = 1.46 \text{ ksf}, P_3 = 1.02 \text{ ksf}, P_4 = 1.46 \text{ ksf}$$

Safety Factor Against Overturning Y Axis:

$$\text{Righting moment, } M_{rY} = 44.6 \text{ k} * 6.00 \text{ ft} / 2 = 133.80 \text{ k*ft}$$

$$\text{SF} = 133.8 \text{ k*ft} / 8.0 \text{ k*ft} = 16.73 > 1.5 \text{ (OK)}$$

Safety Factor Against Sliding:

Friction = $\nu * P + \text{Adhesion}$

$$= .45 * (44.6 \text{ k}) + 0.000 \text{ ksf} * 6.00 \text{ ft} * 6.00 \text{ ft} = 20.1 \text{ k}$$

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ISOLATED SPREAD FOOTING DESIGN:

Soil Pressures and Stability Results (Cont'd):

(Continuation of Group Load 10)

$$\text{Horiz.Load} = [(2.00)^2 + (0.00 \text{ k})^2]^{1/2} = 2.00 \text{ k}$$

$$\text{SF} = 20.1 \text{ k} / 2.0 \text{ k} = 10.03 > 1.5 \text{ (OK)}$$

Factored Load Group No. 10=0.9*D + 1.0*E:

Factored Loads At Bottom of Pedestal:

Pu= 45.00 k, Mxu= 0.00 k*ft, Myu= 6.00 k*ft

Factored Loads At Bottom of Footing:

Pu= 58.14 k, Fxu= 2.00 k, Fyu= 0.00 k, Mxu= 0.00 k*ft, Myu= 8.00 k*ft

Factored Pressures:PU1=1.39 ksf, PU2=1.84 ksf, PU3=1.39 ksf, PU4=1.84 ksf

=====

ISOLATED SPREAD FOOTING DESIGN:

SHEAR CHECKS:

X Direction Shear Capacity:

$$\phi * V_c = 0.85 * 2 * (4000)^{1/2} / 1000 * (8.50 \text{ in}) * (72.00 \text{ in})$$

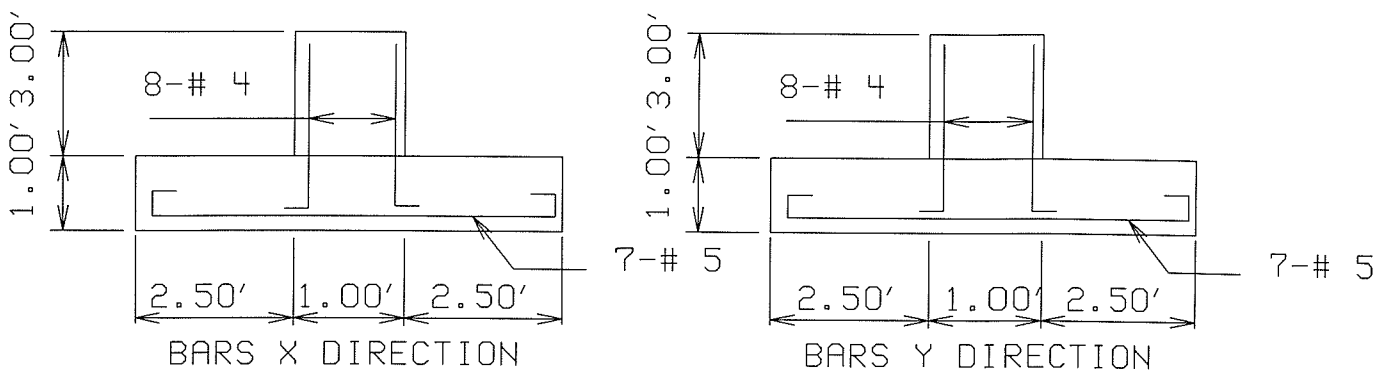
$$= 65.8 \text{ k} > 56.4 \text{ k for Factored Load Case 4 (OK)}$$

Y Direction Shear Capacity:

$$\phi * V_c = 0.85 * 2 * (4000)^{1/2} / 1000 * (8.50 \text{ in}) * (72.00 \text{ in})$$

$$= 65.8 \text{ k} > 56.4 \text{ k for Factored Load Case 4 (OK)}$$

REINFORCING REQUIREMENTS:



X Direction:Bottom Bars Req'd= 2.04 sq. in. (Factored Load Group 4)

For 7 - #5, $A_s = 2.15 \text{ sq. in.} > 2.04 \text{ sq. in. (OK)}$

Check $l_{dh} = [\text{Basic } l_{dh} \text{ length}] * (\text{Epoxy coating Mod.}) * (A_s, \text{req'd} / A_s, \text{provided})$
 $= [11.86 \text{ in}] * (1.00) * (.95) = 11.26 < 28.00 \text{ in (OK)}$

X Direction:Top Bars Req'd = 0.00 sq. in.

X Direction, Temp. and Shrinkage Requirements (ACI 7.12.2.1):

Total $A_s = 2.15 \text{ sq. in.} > 0.0018 * 72.00 \text{ in} * 12.00 \text{ in} = 1.56 \text{ sq. in. (OK)}$

Y Direction:Bottom Bars Req'd= 2.04 sq. in. (Factored Load Group 4)

For 7 - #5, $A_s = 2.15 \text{ sq. in.} > 2.04 \text{ sq. in. (OK)}$

Check $l_{dh} = [\text{Basic } l_{dh} \text{ length}] * (\text{Epoxy coating Mod.}) * (A_s, \text{req'd} / A_s, \text{provided})$
 $= [11.86 \text{ in}] * (1.00) * (.95) = 11.26 < 28.00 \text{ in (OK)}$

Y Direction:Top Bars Req'd = 0.00 sq. in.

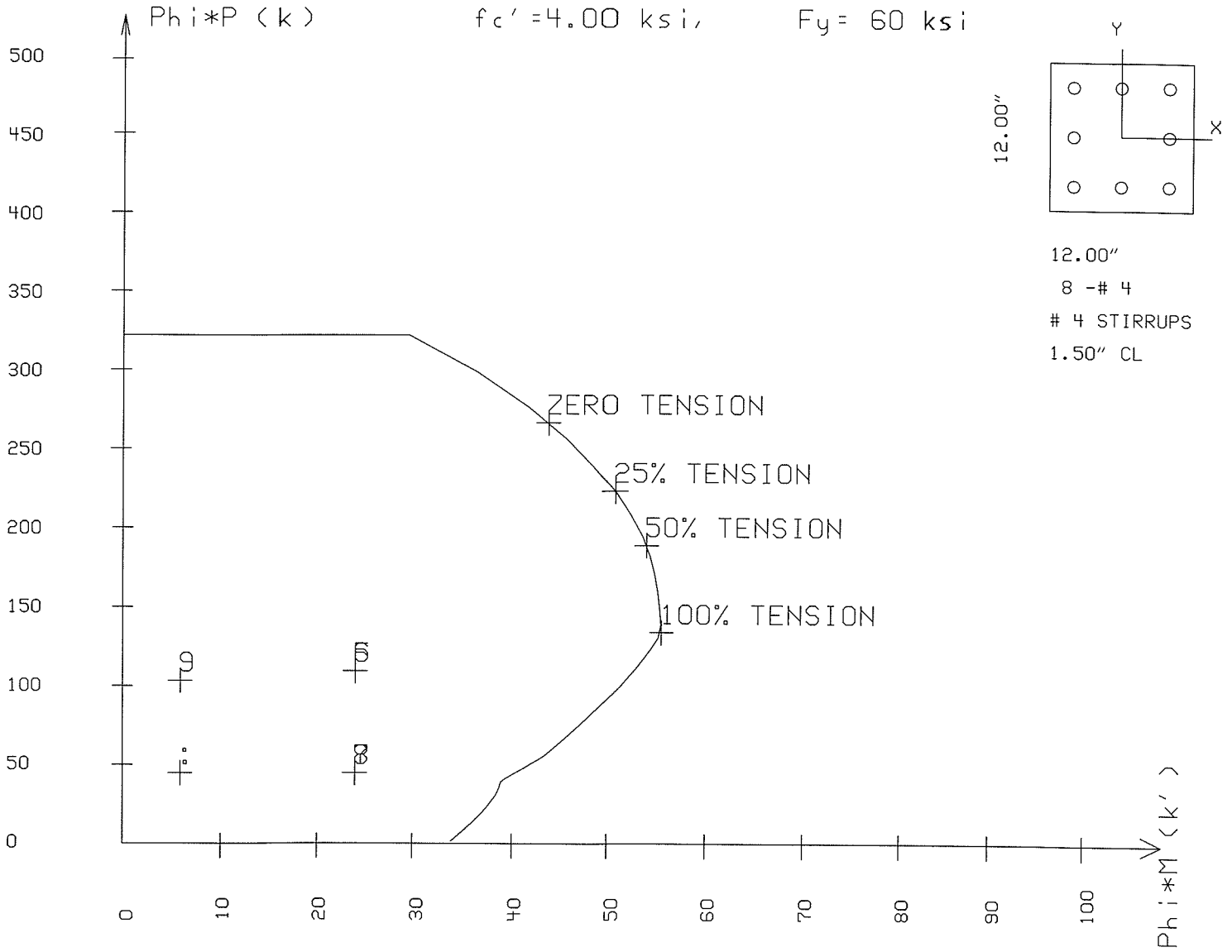
Y Direction, Temp. and Shrinkage Requirements (ACI 7.12.2.1):

Total $A_s = 2.15 \text{ sq. in.} > 0.0018 * 72.00 \text{ in} * 12.00 \text{ in} = 1.56 \text{ sq. in. (OK)}$

=====

ISOLATED SPREAD FOOTING DESIGN:

PEDESTAL REINFORCEMENT:

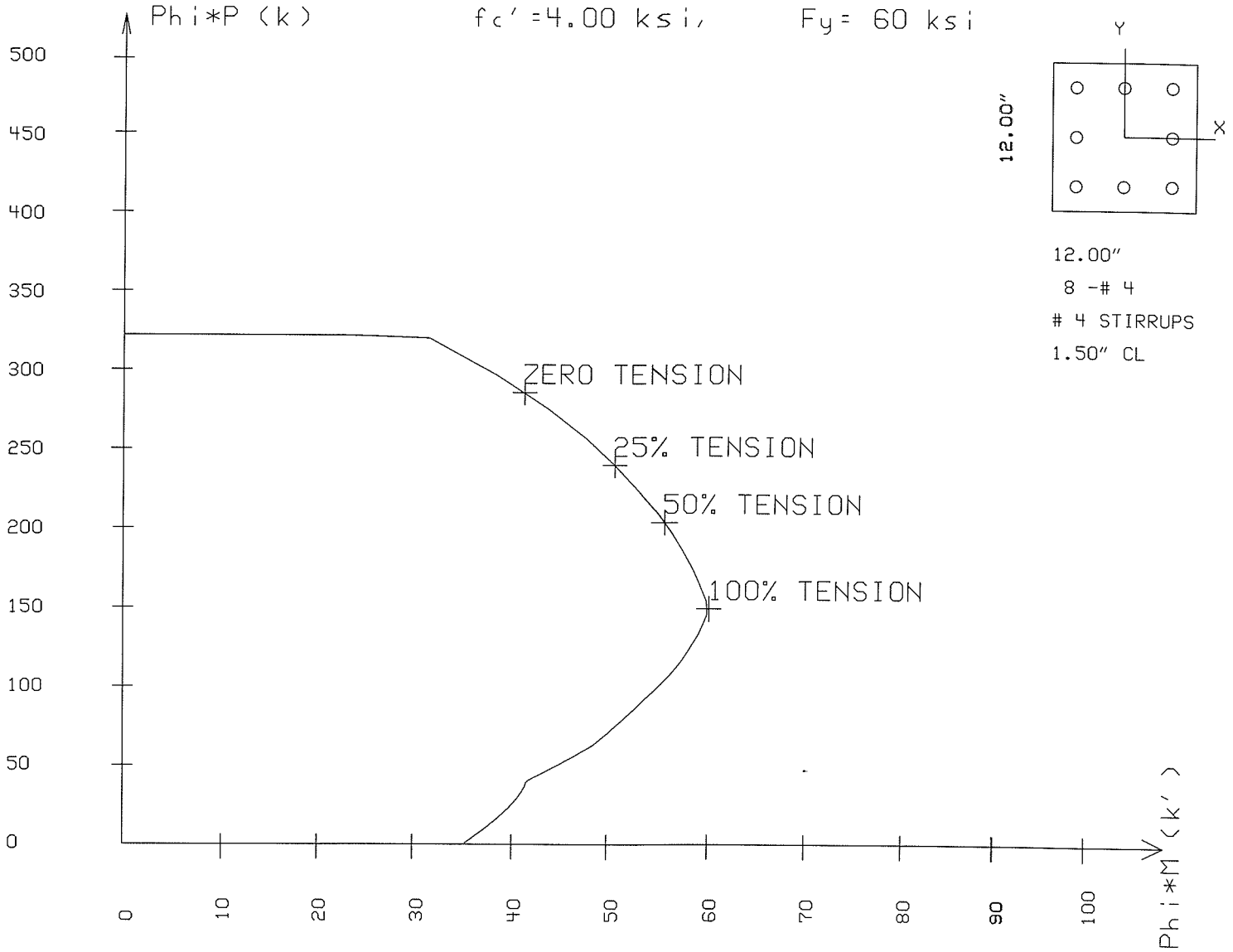


P, MX INTERACTION DIAGRAM

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ISOLATED SPREAD FOOTING DESIGN:

PEDESTAL REINFORCEMENT:



P, MY INTERACTION DIAGRAM

BIAXIAL LOADING CHECK:

When $P_u \geq 0.1f_c'A_g = 58 \text{ k}$, check $P_u > P_{nxy} = 1 / [(1/P_{ny}) + (1/P_{nx}) - (1/P_0)]$
 else, when $P_u < 58 \text{ k}$, check $M_{ratio} = M_x/M_{nx} + M_y/M_{ny} \leq 1$

Load	P_u (k)	M_x (k')	M_y (k')	P_{nxy} (k)	Mratio	Check
1	70	0	0	324		OK
2	124	0	0	324		OK
3	92	0	0	324		OK
4	134	0	0	324		OK
5	110	0	24	230		OK
6	110	0	24	230		OK

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 TITLE:ISOFOOT Example Calculation

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SHEET NO: 10
 DATE:

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ISOLATED SPREAD FOOTING DESIGN:

PEDESTAL REINFORCEMENT:

BIAXIAL LOADING CHECK (Cont "d):

Load	Pu (k)	Mx (k')	My (k')	Pnxy (k)	Mratio	Check
7	45	0	24		.477	OK
8	45	0	24		.477	OK
9	104	0	6	324		OK
10	45	0	6		.154	OK

Check the tension development of pedestal bars into footing:

Length of hooked bar into footing,

Bar length = 12.00 - 3.00 Cl - # 5/8 -# 5/8 = 7.75 in

For # 4 bar, ldh = [Basic ldh length]* (Epoxy coating Mod.)

= [9.49 in] * (1.00) = 9.49 in

The required embedment will be modified by,

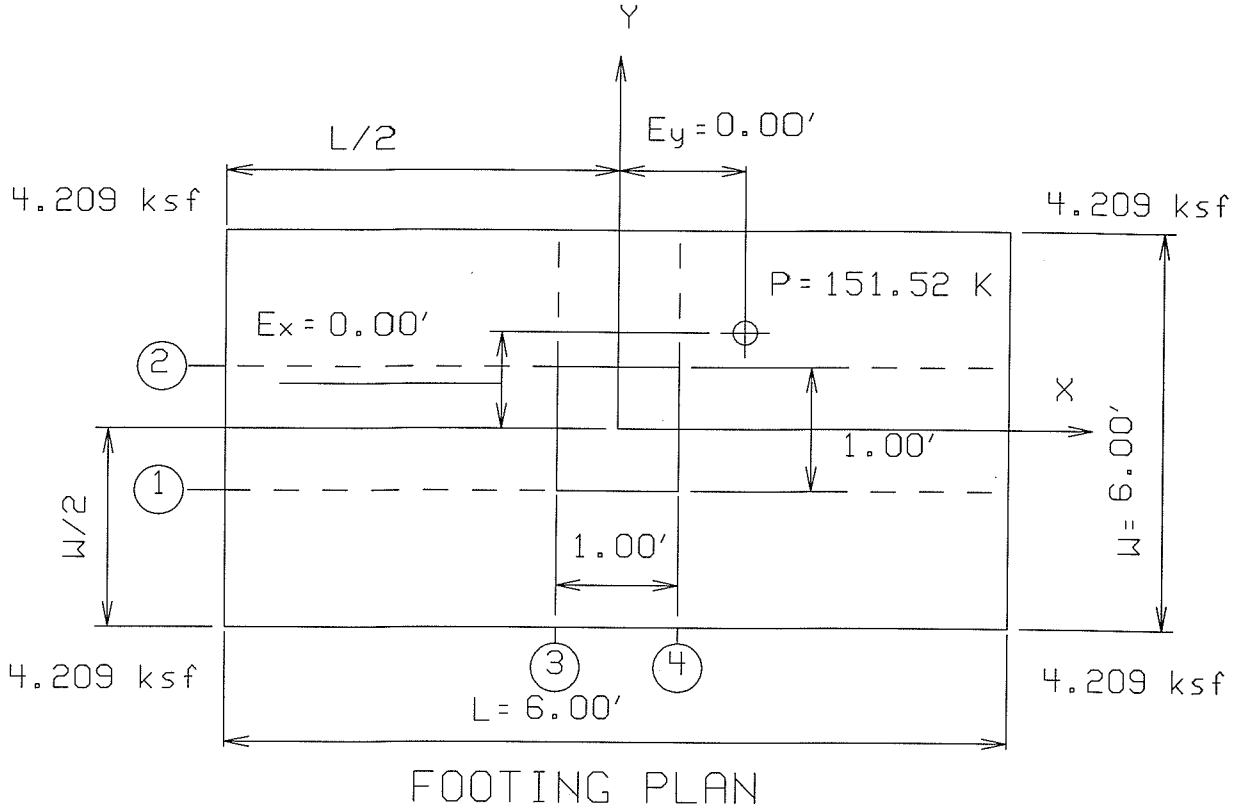
As,req'd/As,provided = .479 (in this case, the maximum Mratio)

Modified ldh = 9.49 in * .479 = 4.54 in < 7.75 in (OK)

DESIGNER NOTE!: This program does not check adequacy of anchor bolts.

=====

DETAILED CALCULATION, FACTORED LOAD CASE NO. 4: 1.2*D + 1.6*L + 0.5*S



Compute Factored Footing Pressures:

Section properties of area in contact:

A= 36.00 ft² , I_x= 108.00 ft⁴ , I_y= 108.0 ft⁴ , I_{xy}= 0.00 ft⁴
 C.G. at X_c= 3.00 ft, Y_c= 3.00 ft (measured from bottom left corner)

Moments resolved about C.G.:

M_{xu}= (3.00 + 0.00 - 3.00) * 151.52 k= 0.00 k'
 M_{yu}= (3.00 + 0.00 - 3.00) * 151.52 k= 0.00 k'

PU1 = 151.52/ 36.00 + 0.00*(3.00)/ 108.00
 + 0.00*(-3.00)/ 108.0 = 4.209 ksf
 PU2 = 151.52/ 36.00 + 0.00*(3.00)/ 108.00
 + 0.00*(3.00)/ 108.0 = 4.209 ksf
 PU3 = 151.52/ 36.00 + 0.00*(-3.00)/ 108.00
 + 0.00*(-3.00)/ 108.0 = 4.209 ksf
 PU4 = 151.52/ 36.00 + 0.00*(-3.00)/ 108.00
 + 0.00*(3.00)/ 108.0 = 4.209 ksf

FIRM:DesignCalcs, Inc.
MADE BY:KJH DATE:05-14-2012
TITLE:ISOFOOT Example Calculation

JOB NO.
CHECKED BY:

SHEET NO: 12
DATE:

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DETAILED CALCULATION, FACTORED LOAD CASE NO. 4: 1.2*D + 1.6*L + 0.5*S

In the following footing moment calculations, the weight of soil and the footing are deducted from the footing pressures:

Footing Weight=0.15* 1.00' = .150 ksf

Soil Weight= 2.50'*100 pcf/1000 = .250 ksf

Total = .400 ksf

x 1.20 (DL Load Factor)= .480 ksf

(to be deducted
from pressures)

Factored Shears for this Load Case:

Vux = 56.4 k at occurring at section 3

Vuy = 56.4 k at occurring at section 1

X Direction, Bottom Bar Design:

Max. footing Mu = 69.91 k*ft occurring at section 3

d = 8.500 in

Assume that a= .460 in

As,req'd = 12*Mu/[0.9*60 ksi*(d - a/2)]

= 12*(69.91 k*ft)/[0.9*60 ksi*(8.500 - .460/2)]
= 1.88 in²

Check a = As,req'd*Fy/(0.85*fc'*bw)

= 1.88*60/(0.85*4.00* 72 in)= .460 in (checks)

As,min = 200 * b_w * d/Fy (ACI 10.5.1)

= 200 * 72.00 * 8.50/60000 = 2.04 in² (governs minimum)

or As,min = 1.33 * As,req'd (ACI 10.5.3)

= 1.33 * 1.88 = 2.50 in²

As,req'd = 1.88 in² < As,min = 2.04 in² (GOVERNS)

Y Direction, Bottom Bar Design:

Max. footing Mu = 69.91 k*ft occurring at section 1

d = 8.500 in

Assume that a= .460 in

As,req'd = 12*Mu/[0.9*60 ksi*(d - a/2)]

= 12*(69.91 k*ft)/[0.9*60 ksi*(8.500 - .460/2)]
= 1.88 in²

Check a = As,req'd*Fy/(0.85*fc'*bw)

= 1.88*60/(0.85*4.00* 72 in)= .460 in (checks)

As,min = 200 * b_w * d/Fy (ACI 10.5.1)

= 200 * 72.00 * 8.50/60000 = 2.04 in² (governs minimum)

or As,min = 1.33 * As,req'd (ACI 10.5.3)

= 1.33 * 1.88 = 2.50 in²

As,req'd = 1.88 in² < As,min = 2.04 in² (GOVERNS)