

# Concrete Footing Design

**Job:**  
**Description:**  
**Time:** 4:57 PM 5/11/2009

**Designed By:**  
**Checked By:**  
**Program:** Spread Footing Design v3.0 Code: ACI 2008

| SOIL DATA                             | CONCRETE DATA                   | COLUMN DATA          |
|---------------------------------------|---------------------------------|----------------------|
| Max. Vert Press. = 3.000 K /Ft ^2     | F'c = 3.000 K /In ^2            | F'c = 4.000 K /In ^2 |
| Max. Flexural Press. = 3.500 K /Ft ^2 | Density = 150.000 Lb/Ft ^3      | X Dim. = 12.000 In   |
| Density = 90.000 Lb/Ft ^3             | Fy = 60.000 K /In ^2            | Z Dim. = 12.000 In   |
| Phi Angle = 30.000 Deg                |                                 | X Offset = 0.000 Ft  |
| Coeff. of Friction = 0.330            |                                 | Z Offset = 0.000 Ft  |
| Cohesion = 0.000 Lb/Ft ^2             |                                 |                      |
| Ftg. Depth = 3.500 Ft                 | SURCHARGE DATA                  |                      |
| FS Uplift = 1.700                     | +X,+Z Quadrant = 0.000 K /Ft ^2 |                      |
| FS Overturning = 1.700                | +X,-Z Quadrant = 0.000 K /Ft ^2 | BASE PLATE DATA      |
| FS Sliding = 2.000                    | -X,-Z Quadrant = 0.000 K /Ft ^2 | X Dim. = 0.000 In    |
|                                       | -X,+Z Quadrant = 0.000 K /Ft ^2 | Z Dim. = 0.000 In    |

## C O L U M N L O A D D E S C R I P T I O N S

| COLUMN LOAD | DESCRIPTION |
|-------------|-------------|
| 1           |             |
| 2           |             |

## L O A D C O M B I N A T I O N S

| LOAD COMBINATION | DESCRIPTION            |
|------------------|------------------------|
| 1                | 1.4D                   |
| 2                | 1.2D + 1.6L + 0.5R     |
| 3                | 1.2D + L + 1.6R        |
| 4                | 1.2D + 0.8W + 1.6R     |
| 5                | 1.2D + L + 1.6W + 0.5R |
| 6                | 1.2D + L + 1.4E + 0.2R |
| 7                | 0.9D + 1.6W            |
| 8                | 0.9D + 1.4E            |
| 9                | 1.2D - 0.8W + 1.6R     |
| 10               | 1.2D + L - 1.6W + 0.5R |
| 11               | 1.2D + L - 1.4E + 0.2R |
| 12               | 0.9D - 1.6W            |
| 13               | 0.9D - 1.4E            |

## U N F A C T O R E D L O A D S I N P U T

| COLUMN LOAD        | No.        | DEAD LOAD        | LIVE LOAD        | WIND LOAD        | EARTHQUAKE LOAD        | ROOF LOAD        |
|--------------------|------------|------------------|------------------|------------------|------------------------|------------------|
| Vertical           | =          | -200.000 K       | -129.000 K       | 0.000 K          | 0.000 K                | 0.000 K          |
| Moment X           | =          | 0.000 Ft-K       | 0.000 Ft-K       | 23.000 Ft-K      | 0.000 Ft-K             | 0.000 Ft-K       |
| Moment Z           | =          | 0.000 Ft-K       | 0.000 Ft-K       | -34.000 Ft-K     | 0.000 Ft-K             | 0.000 Ft-K       |
| Horizontal X       | =          | 18.000 K         |                  |                  |                        |                  |
| Z                  | =          | 0.000 K          |                  |                  |                        |                  |
| <b>COLUMN LOAD</b> | <b>No.</b> | <b>DEAD LOAD</b> | <b>LIVE LOAD</b> | <b>WIND LOAD</b> | <b>EARTHQUAKE LOAD</b> | <b>ROOF LOAD</b> |
| Vertical           | =          | -12.000 K        | 0.000 K          | 54.000 K         | 0.000 K                | 0.000 K          |
| Moment X           | =          | 0.000 Ft-K       | 0.000 Ft-K       | 34.000 Ft-K      | 0.000 Ft-K             | 0.000 Ft-K       |
| Moment Z           | =          | 0.000 Ft-K       | 0.000 Ft-K       | 36.000 Ft-K      | 0.000 Ft-K             | 0.000 Ft-K       |
| Horizontal X       | =          | 12.000 K         |                  |                  |                        |                  |
| Z                  | =          | 2.000 K          |                  |                  |                        |                  |

## F O O T I N G O U T P U T

| FOOTING DESIGN               | SHEAR STRESSES (ONE WAY) | SHEAR STRESSES (TWO WAY) |
|------------------------------|--------------------------|--------------------------|
| X Dimension = 17.000 Ft      | +X Area = 0.035 K /In ^2 | +X Area = 0.145 K /In ^2 |
| Z Dimension = 17.000 Ft      | -X Area = 0.035 K /In ^2 | -X Area = 0.145 K /In ^2 |
| Thickness = 26.000 In        | +Z Area = 0.037 K /In ^2 | +Z Area = 0.145 K /In ^2 |
| Max. Press. = 1.338 K /Ft ^2 | -Z Area = 0.037 K /In ^2 | -Z Area = 0.145 K /In ^2 |
|                              | Allow. = 0.082 K /In ^2  | Allow. = 0.164 K /In ^2  |

X Dimension Governing Column = 2, Combination = 7

Z Dimension Governing Column = 2, Combination = 7  
 Thickness Governing Column = 1, Combination = 2  
 Max. Pressure Governing Column = 1, Combination = 5  
 Design Controlled by Biaxial Negative Pressure (Ult) and Ultimate Design

**BOTTOM STEEL DESIGN (Parallel to X Axis)**

Governing Column = 1, Combination = 2  
 Moment (+X Area) = 840.282 Ft-K  
 (-X Area) = 840.282 Ft-K  
 Steel Required = 8.484 In<sup>2</sup>  
 Dist. to Centroid = 3.500 In

**Typical Spacings**

78 #3 Bars at 2.571 In. Centers  
 43 #4 Bars at 4.714 In. Centers  
 28 #5 Bars at 7.333 In. Centers  
 20 #6 Bars at 10.421 In. Centers  
 15 #7 Bars at 14.143 In. Centers  
 12 #8 Bars at 18.000 In. Centers

**TOP STEEL DESIGN (Parallel to X Axis)**

Governing Column = Temp/Shrink Minimum  
 Moment (+X Area) = -168.568 Ft-K  
 (-X Area) = -116.044 Ft-K  
 Steel Required = 4.774 In<sup>2</sup> (Min)  
 Dist. to Centroid = 3.500 In

**Typical Spacings**

44 #3 Bars at 4.605 In. Centers  
 25 #4 Bars at 8.250 In. Centers  
 16 #5 Bars at 13.200 In. Centers  
 12 #6 Bars at 18.000 In. Centers

**BOTTOM STEEL DESIGN (Parallel to Z Axis)**

Governing Column = 1, Combination = 2  
 Moment (+Z Area) = 840.282 Ft-K  
 (-Z Area) = 840.282 Ft-K  
 Steel Required = 8.897 In<sup>2</sup>  
 Dist. to Centroid = 4.500 In

**Typical Spacings**

81 #3 Bars at 2.475 In. Centers  
 45 #4 Bars at 4.500 In. Centers  
 29 #5 Bars at 7.071 In. Centers  
 21 #6 Bars at 9.900 In. Centers  
 15 #7 Bars at 14.143 In. Centers  
 12 #8 Bars at 18.000 In. Centers

**TOP STEEL DESIGN (Parallel to Z Axis)**

Governing Column = Temp/Shrink Minimum  
 Moment (+Z Area) = -117.503 Ft-K  
 (-Z Area) = -167.109 Ft-K  
 Steel Required = 4.774 In<sup>2</sup> (Min)  
 Dist. to Centroid = 4.500 In

**Typical Spacings**

44 #3 Bars at 4.605 In. Centers  
 25 #4 Bars at 8.250 In. Centers  
 16 #5 Bars at 13.200 In. Centers  
 12 #6 Bars at 18.000 In. Centers

**QUANTITIES :** 1511.906 Lbs of Steel and 626.167 Ft<sup>3</sup> of Concrete.

**HORIZONTAL KEY DESIGN (Parallel to X Axis)**

Keys Not Required. Soil-Ftg. Friction and Passive Pressure Sufficient to Resist Horizontal Load.

**HORIZONTAL KEY DESIGN (Parallel to Z Axis)**