

## Sample spreadsheet for post footing design per IBC §1807.3

Values are from the design example on the Post Sizing page.

1<sup>st</sup> pass - 7" diameter footing, 48" deep - footing depth is not sufficient.

Non-constrained Concrete Footing for Embedded Posts				
$D_p =$	2.875	in	Post Diameter / Largest Width / Largest Diagonal	
$h =$	120.000	in	Post Height	
$b' =$	6.875	in	Minimum Footing Diameter per IBC §1807.3.3(1)	
$b =$	7.000	in	Footing Diameter	OK $b \geq b'$ is OK
$D =$	48.000	in	Design Footing Depth	OK $12' \geq D \geq 2'$ is OK
$V =$	1.069	ft <sup>3</sup>	Volume of Excavated Soil / Volume of Concrete $V = \pi (\frac{1}{2}b)^2 D$	
Lateral Load				
$P =$	249.000	lb	Lateral Force	$P = f_w$ or $f_i$
$\frac{1}{2}h =$	60.000	in	Height of Lateral Force Application	Modified for fencing - see Eq. 18-1 below
$S =$	150.000	psf / ft	Allowable Lateral Soil Bearing Pressure per ft	Per geotech or Table 1806.2
$M =$	2.000	-	Modifier for Isolated Poles	Per §1806.3.4
$S_1 =$	400.000	psf	Allowable Lateral Soil Bearing Pressure per Depth, D	Per §1807.3.2.1 $S_1 = \frac{1}{3} (D/12) S M$
$A =$	2.497	ft	Soil Bearing Factor	Per §1807.3.2.1 $A = 2.34P / (S_1(b/12))$
$d =$	61.718	in	Minimum Footing Depth <span style="color: red;">modified for fencing</span>	BAD Eq. 18-1 $\frac{1}{2}h$ used in place of h $d = (\frac{1}{2}A(1 + (1 + 4.36 \frac{1}{2} (h/12) / A)^{\frac{1}{2}}))12$
$UC =$	1.286	-	Unity Check	

2<sup>nd</sup> pass – 7" diameter footing, 60" deep – footing depth is sufficient, but bearing area is too small

Non-constrained Concrete Footing for Embedded Posts				
$D_p =$	2.875	in	Post Diameter / Largest Width / Largest Diagonal	
$h =$	120.000	in	Post Height	
$b' =$	6.875	in	Minimum Footing Diameter per IBC §1807.3.3(1)	
$b =$	7.000	in	Footing Diameter	OK $b \geq b'$ is OK
$D =$	60.000	in	Design Footing Depth	OK $12' \geq D \geq 2'$ is OK
$V =$	1.336	ft <sup>3</sup>	Volume of Excavated Soil / Volume of Concrete $V = \pi (\frac{1}{2}b)^2 D$	
Lateral Load				
$P =$	249.000	lb	Lateral Force	$P = f_w$ or $f_i$
$\frac{1}{2}h =$	60.000	in	Height of Lateral Force Application	Modified for fencing - see Eq. 18-1 below
$S =$	150.000	psf / ft	Allowable Lateral Soil Bearing Pressure per ft	Per geotech or Table 1806.2
$M =$	2.000	-	Modifier for Isolated Poles	Per §1806.3.4
$S_1 =$	500.000	psf	Allowable Lateral Soil Bearing Pressure per Depth, D	Per §1807.3.2.1 $S_1 = \frac{1}{3} (D/12) S M$
$A =$	1.998	ft	Soil Bearing Factor	Per §1807.3.2.1 $A = 2.34P / (S_1(b/12))$
$d =$	53.356	in	Minimum Footing Depth <span style="color: red;">modified for fencing</span>	OK Eq. 18-1 $\frac{1}{2}h$ used in place of h $d = (\frac{1}{2}A(1 + (1 + 4.36 \frac{1}{2} (h/12) / A)^{\frac{1}{2}}))12$
$UC =$	0.889	-	Unity Check	
Axial Load				
$D_f =$	200.440	lbs	Footing Weight	$D_f = V \times 150$ pcf
$w_f =$	540.000	lbs	Fencing, Post & Ice (if applicable) Weight	$w_f = p_i'$ or $p_w'$
$D_{max} =$	740.440	lbs	Axial Dead Load	$D_{max} = D_f + w_f$
$A_f =$	0.267	ft <sup>2</sup>	Footing Area	$A_f = \pi (\frac{1}{2}(b/12))^2$
$S_v =$	2000.000	psf	Allowable Vertical Foundation Pressure	Per Geotech or Table 1806.2
$s_v =$	2770.553	psf	Maximum Vertical Pressure	BAD $p_a = D_{max} / A_f$
$UC =$	1.385	-	Unity Check	

Continued next page

3<sup>rd</sup> pass – 9” diameter footing, 60” deep – lateral and axial both pass, but footing is deeper than needed

Non-constrained Concrete Footing for Embedded Posts				
D <sub>p</sub> =	2.875	in	Post Diameter / Largest Width / Largest Diagonal	
h =	120.000	in	Post Height	
b' =	6.875	in	Minimum Footing Diameter per IBC §1807.3.3(1)	b' = D <sub>p</sub> + 4
b =	9.000	in	Footing Diameter	OK b ≥ b' is OK
D =	60.000	in	Design Footing Depth	OK 12' ≥ D ≥ 2' is OK
V =	2.209	ft <sup>3</sup>	Volume of Excavated Soil / Volume of Concrete V = π (½b) <sup>2</sup> D	
Lateral Load				
P =	249.000	lb	Lateral Force P = f <sub>w</sub> or f <sub>i</sub>	
½h =	60.000	in	Height of Lateral Force Application Modified for fencing - see Eq. 18-1 below	
S =	150.000	psf / ft	Allowable Lateral Soil Bearing Pressure per ft Per geotech or Table 1806.2	
M =	2.000	-	Modifier for Isolated Poles Per §1806.3.4	
S <sub>1</sub> =	500.000	psf	Allowable Lateral Soil Bearing Pressure per Depth, D Per §1807.3.2.1 S <sub>1</sub> = ⅓ (D/12) SM	
A =	1.554	ft	Soil Bearing Factor Per §1807.3.2.1 A = 2.34P / (S <sub>1</sub> (b/12))	
d =	45.465	in	Minimum Footing Depth <b>modified for fencing</b>	OK Eq. 18-1 ½h used in place of h d = (½A(1 + (1 + 4.36 ½ (h/12) / A) <sup>½</sup> ))12
UC =	0.758	-	Unity Check	
Axial Load				
D <sub>f</sub> =	331.340	lbs	Footing Weight D <sub>f</sub> = V x 150 pcf	
w <sub>f</sub> =	540.000	lbs	Fencing, Post & Ice (if applicable) Weight w <sub>f</sub> = p <sub>i</sub> ' or p <sub>w</sub> '	
D <sub>max</sub> =	871.340	lbs	Axial Dead Load D <sub>max</sub> = D <sub>f</sub> + w <sub>f</sub>	
A <sub>f</sub> =	0.442	ft <sup>2</sup>	Footing Area A <sub>f</sub> = π (½(b/12)) <sup>2</sup>	
S <sub>v</sub> =	2000.000	psf	Allowable Vertical Foundation Pressure Per Geotech or Table 1806.2	
s <sub>v</sub> =	1972.310	psf	OK	p <sub>a</sub> = D <sub>max</sub> / A <sub>f</sub> UC = s <sub>v</sub> / S <sub>v</sub> UC ≤ 1.0 is OK
UC =	0.986	-		

4<sup>th</sup> pass – 9” diameter footing, 52” deep – lateral and axial both pass, and footing is more economical than previous try

Non-constrained Concrete Footing for Embedded Posts				
D <sub>p</sub> =	2.875	in	Post Diameter / Largest Width / Largest Diagonal	
h =	120.000	in	Post Height	
b' =	6.875	in	Minimum Footing Diameter per IBC §1807.3.3(1)	b' = D <sub>p</sub> + 4
b =	9.000	in	Footing Diameter	OK b ≥ b' is OK
D =	52.000	in	Design Footing Depth	OK 12' ≥ D ≥ 2' is OK
V =	1.914	ft <sup>3</sup>	Volume of Excavated Soil / Volume of Concrete V = π (½b) <sup>2</sup> D	
Lateral Load				
P =	249.000	lb	Lateral Force P = f <sub>w</sub> or f <sub>i</sub>	
½h =	60.000	in	Height of Lateral Force Application Modified for fencing - see Eq. 18-1 below	
S =	150.000	psf / ft	Allowable Lateral Soil Bearing Pressure per ft Per geotech or Table 1806.2	
M =	2.000	-	Modifier for Isolated Poles Per §1806.3.4	
S <sub>1</sub> =	433.333	psf	Allowable Lateral Soil Bearing Pressure per Depth, D Per §1807.3.2.1 S <sub>1</sub> = ⅓ (D/12) SM	
A =	1.793	ft	Soil Bearing Factor Per §1807.3.2.1 A = 2.34P / (S <sub>1</sub> (b/12))	
d =	49.779	in	Minimum Footing Depth <b>modified for fencing</b>	OK Eq. 18-1 ½h used in place of h d = (½A(1 + (1 + 4.36 ½ (h/12) / A) <sup>½</sup> ))12
UC =	0.957	-	Unity Check	
Axial Load				
D <sub>f</sub> =	287.161	lbs	Footing Weight D <sub>f</sub> = V x 150 pcf	
w <sub>f</sub> =	540.000	lbs	Fencing, Post & Ice (if applicable) Weight w <sub>f</sub> = p <sub>i</sub> ' or p <sub>w</sub> '	
D <sub>max</sub> =	827.161	lbs	Axial Dead Load D <sub>max</sub> = D <sub>f</sub> + w <sub>f</sub>	
A <sub>f</sub> =	0.442	ft <sup>2</sup>	Footing Area A <sub>f</sub> = π (½(b/12)) <sup>2</sup>	
S <sub>v</sub> =	2000.000	psf	Allowable Vertical Foundation Pressure Per Geotech or Table 1806.2	
s <sub>v</sub> =	1872.310	psf	OK	p <sub>a</sub> = D <sub>max</sub> / A <sub>f</sub> UC = s <sub>v</sub> / S <sub>v</sub> UC ≤ 1.0 is OK
UC =	0.936	-		