

Site Location:

Customer:

Site and Geometrical Variables

IBC _____

ASCE 7- _____

Risk Category _____

Frost Depth _____ ft

Basic Wind Speed, $V_w =$ _____ mph

Wind Pressure, $q_w =$ _____ psf

Exposure Category _____

Topographical Factor, $K_{zt} =$ _____

Site Elevation, $Z_e =$ _____ ft

Elevation Factor, $K_e =$ _____

Height of fence, $h =$ _____ ft

Gap at bottom of fence, $g =$ _____ ft (zero if no gap)

Height of fencing material, $s = h - g =$ _____ ft

Velocity Pressure Exposure Coefficient, $K_z =$ _____

Wind & Axial Loading

Fence Run # _____ Length of Fence, B = _____ ft Post spacing, L = _____ ft

Post Type: Line Posts () Post near end or corner ()

Solidity Ratio, $\epsilon =$ _____ Inverted Fence Opening Reduction Factor, $R_{1w} =$ _____

Case C Reduction Factor, $R_{2w} =$ _____ Return Corner Reduction Factor, $R_{3w} =$ _____

Force Height Adjustment Factor, $F_{hw} =$ _____ Wind Force Coefficient, $C_{fw} =$ _____

Wind area tributary to the post, $A_w = \epsilon s L = \frac{\text{_____}}{\epsilon} \times \frac{\text{_____}}{s} \times \frac{\text{_____}}{L} = \frac{\text{_____}}{A_w} \text{ ft}^2$

Dead Load of fencing materials, D_m _____ psf

Lateral and Axial Forces for Wind Loading

Minimum wind force to the post, $f_{min} = (0.6) 16.0 A_w = 9.6 \times \frac{\text{_____}}{A_w} = \frac{\text{_____}}{f_{min}} \text{ lbs}$

Calculated Wind Force to the post, $f_w = q_w K_z K_{zt} K_e R_{1w} F_{hw} C_{fw} A_w$

$f_w = \frac{\text{_____}}{q_w} \times \frac{\text{_____}}{K_z} \times \frac{\text{_____}}{K_{zt}} \times \frac{\text{_____}}{K_e} \times \frac{\text{_____}}{R_{1w}} \times \frac{\text{_____}}{F_{hw}} \times \frac{\text{_____}}{C_{fw}} \times \frac{\text{_____}}{A_w} = \frac{\text{_____}}{f_w} \text{ lbs}$

Maximum wind force to the post, $f_w' = \text{maximum value of either } f_{min} \text{ or } f_w = \frac{\text{_____}}{f_w'} \text{ lbs}$

The Axial Force supported by the post, $p_w = D_m s L$

$p_w = \frac{\text{_____}}{D_m} \times \frac{\text{_____}}{s} \times \frac{\text{_____}}{L} = \frac{\text{_____}}{p_w} \text{ lbs}$

$5 \times p_w = \text{_____} \text{ lbs (used for stability check)}$

Post Selection

Using the diameter of the desired post size, O.D., and the Fence Height, h, look through the post charts for post types that have F_a values larger than the f_w' value, and P_a values larger than the p_w value. If the post has an * next to the P_a value, only use it if the P_a value is $\geq 5 \times p_w$ due to stability requirements.

Put in the O.D, post type, weight per foot, D_p and fence height, h and calculate p_w' to include the weight of the post. Add any additional weight if needed.

f_w' / F_a is the bending strength ratio for Wind.

p_w' / P_a is the axial strength ratio for Wind

If the sum of the bending strength and axial strength ratios for both Wind and Wind & Ice loading are ≤ 1.0 , the post is acceptable.

O.D.	Post Type	D _p (lb/f)	h (ft)	p _w ' = p _w + (D _p × h)	
				p _w ' =	
Wind					
f _w ' = _____ =		p _w ' = _____ =		$\frac{f_w'}{F_a} + \frac{p_w'}{P_a} =$	
F _a =		P _a =			

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F _a =		P _a =			

Footing Sizing (non-constrained footings)

Design Footing Depth, $D = \underline{\hspace{2cm}}$ ft Footing Diameter, $b = \underline{\hspace{2cm}}$ ft

Lateral Bearing Pressure per foot of depth, $S = \underline{\hspace{2cm}}$ psf / ft per geotechnical analysis or table 1806.2

Maximum Wind Force, $P = f_w' = \underline{\hspace{2cm}}$ lbs Post Height, $h = \underline{\hspace{2cm}}$ ft

Modifier for Isolated Posts, $M = 2.0$ per IBC §1086.3.4

Allowable Lateral Soil Bearing Pressure for non-constrained footings, $S_1 = \frac{1}{3} D S M$

$S_1 = \frac{1}{3} \times \frac{\hspace{1cm}}{D} \times \frac{\hspace{1cm}}{S} \times 2.0 = \frac{\hspace{1cm}}{S_1}$ psf per IBC §1807.3.2.1

Soil Bearing Factor, $A = 2.34 P / (S_1 b)$ per IBC §1807.3.2.1

$A = 2.34 \times \frac{\hspace{1cm}}{P} \div \left(\frac{\hspace{1cm}}{S_1} \times \frac{\hspace{1cm}}{b} \right) = \frac{\hspace{1cm}}{A}$

Minimum Depth, $d = \frac{1}{2} A \left(1 + \sqrt{1 + \frac{4.36 \frac{1}{2} h}{A}} \right)$ per Eq. 18-1, **modified for fencing**

$d = \frac{1}{2} \times \frac{\hspace{1cm}}{A} \times \left(1 + \sqrt{1 + \left(4.36 \times \frac{1}{2} \times \frac{\hspace{1cm}}{h} \times \frac{\hspace{1cm}}{A} \right)} \right) = \frac{\hspace{1cm}}{d}$ ft

Area of the bottom of the footing, $A_f = \pi \left(\frac{1}{2} b \right)^2 = 3.14 \times \left(\frac{1}{2} \times \frac{\hspace{1cm}}{b} \right)^2 = \frac{\hspace{1cm}}{A_f}$ ft²

Footing Volume, $V = A_f D = \frac{\hspace{1cm}}{A_f} \times \frac{\hspace{1cm}}{D} = \frac{\hspace{1cm}}{V}$ ft³

Weight of footing, $D_f = 150 V = 150 \times \frac{\hspace{1cm}}{V} = \frac{\hspace{1cm}}{D_f}$ lbs (Typical Concrete weight is 150 lbs / ft³)

Axial Dead Load, $D_{max} = D_f + p_w'$

$D_{max} = \frac{\hspace{1cm}}{D_f} + \frac{\hspace{1cm}}{p_w'} = \frac{\hspace{1cm}}{D_{max}}$ lbs

Maximum Vertical Foundation Pressure, $S_y = \underline{\hspace{2cm}}$ psf per geotechnical analysis or table 1806.2

Maximum Axial Pressure on the soil, $s_y = D_{max} / A_f = \frac{\hspace{1cm}}{D_{max}} \div \frac{\hspace{1cm}}{A_f} = \frac{\hspace{1cm}}{s_y}$ psf

Actual to Allowable Soil Strength Ratio, $s_y / S_y = \frac{\hspace{1cm}}{s_y} \div \frac{\hspace{1cm}}{S_y} = \underline{\hspace{1cm}} \leq 1.0$ is OK

s_y / S_y must be less than 1.0. If not, start over with a larger footing diameter, b