Worksheet – Mostly Solid / Solid Fencing – Wind Loading Only

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, ε = ______ 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, $A_w = \varepsilon \, s \, L$ = ______ × ______ × ______ = ______ ft²

(ε) (s) (L) (A_w)

Dead Load of fencing materials, D_m _____ psf

Lateral and Axial Forces for Wind Loading

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 = ______ × ______ × ______ × ______ × ______ × _____ × ______ × ______ = ________ lbs

(q_w) (K_z) (K_{zt}) (K_e) (R_{1w}) (F_{hw}) (C_{fw}) (A_w) (f_w)

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

p_w = _______ × _______ × _______ = _________ lbs

(D_m) (s) (L) (p_w)

5 × p_w = __________ lbs (used for stability check)

Post Selection

Using the desired post size 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 ≥ 5 × p_w due to stability requirements.

Put in the size, 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)	$p_w' = p_w + (D_p \times h)$	
				p_w' =	
Wind					
f_w' = / F_a = ______ =			p_w' = / P_a = ______ =		$\frac{f_w'}{F_a} + \frac{p_w'}{P_a}$ =

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Footing Sizing (non-constrained footings)

Design Footing Depth, D = ______ ft　　　Footing Diameter, b = ______ ft

Lateral Bearing Pressure per foot of depth, S = _____ psf / ft　per geotechnical analysis or table 1806.2

Maximum Wind Force, $P = f_w$ = ______ lbs　　Post Height, h = ______ 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 = ⅓ × ______ × ______ × 2.0 = ________ psf　　per IBC §1807.3.2.1
(D)　(S)　(M)　(S_1)

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

A = 2.34 × ______ ÷ (______ × ______) = ______
(P)　(S_1)　(b)　(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 = ½ × ____ × (1 + √(1 + (4.36 × ½ × ____ ÷ ____)) = ____ ft
(A)　(h)　(A)　(d)

Area of the bottom of the footing, $A_f = \pi\, (\frac{1}{2}\, b)^2$ = 3.14 × (½ × ______)^2 = ______ ft^2
(b)　(A_f)

Footing Volume, $V = A_f\, D$ = ______ × ______ = ______ ft^3
(A_f)　(D)　(V)

Weight of footing, $D_f = 150\, V$ = 150 × ______ = ______ lbs　(Typical Concrete weight is 150 lbs / ft^3)
(V)　(D_f)

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

D_{max} = ______ + ________ = ________ lbs
(D_f)　(p_w')　(D_{max})

Maximum Vertical Foundation Pressure, S_y = _______ psf　per geotechnical analysis or table 1806.2

Maximum Axial Pressure on the soil, $s_y = D_{max} / A_f$ = _______ ÷ _______ = _______ psf
(D_{max})　(A_f)　(s_y)

Actual to Allowable Soil Strength Ratio, s_y / S_y = _______ ÷ _______ = ______ ≤ 1.0 is OK
(s_y)　(S_y)

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