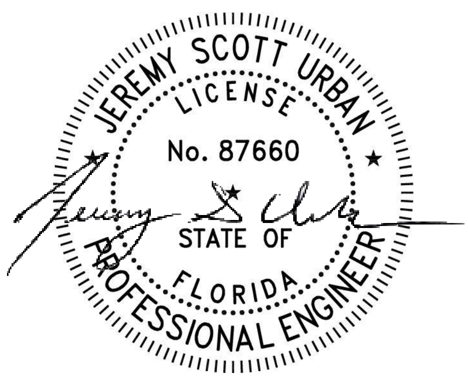
Knotwood Standard Fencing
Calculation Booklet

Date Prepared … March 26, 2020

Prepared for:

Knotwood a Division of OmniMax International, Inc.
30 Technology Pkwy S, Suite 400/Suite 600
Peachtree Corners, GA 30092
Phone…(855) 566-8966



Prepared by:
PVE, LLC
2000 Georgetowne Drive, Suite 101
Sewickley, PA 15143
Phone ... (724) 444-1100

TABLE OF CONTENTS

Page No.

DESIGN CODES AND STANDARDS

The following codes and standards, including all specifications referenced within, apply to the design and construction of this project:

- IBC, INTERNATIONAL BUILDING CODE – 2015
- FBC, FLORIDA BUILDING CODE - 2017
- ASCE 7-10, MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
- ADM, ALUMINUM DESIGN MANUAL - 2010

GENERAL NOTES

1. Contractor to verify all dimensions in the field prior to installation. Do not scale off drawings.
2. All members shall be saw cut in field as required.
3. No splices shall be permitted unless indicated otherwise on the drawings.
4. Touch up all scratches with dealer provided colors to match.
5. Welding is not permitted, unless otherwise indicated on the drawings.
6. The contents show the application of aluminum Knotwood framing components only. The installing contractor is to refer to the project documents for additional requirements.
7. Dimensions herein are for engineering purposes only and must be reviewed for the purpose of approval. All conditions are subject to approval and to field verification prior to fabrication or installation.
8. Before ordering, fabricating or erecting any material, make any necessary surveys and measurements to verify that in place work has been built according to the contract documents and are within acceptable tolerances. This includes the original buildings and all additions thereto. Notify the Architect/Engineer and owner's representatives of any discrepancies prior to construction.
9. Temporary bracing of the system and safety during construction is solely the responsibility of the contractor. Temporary bracing of the system shall remain in place until the system is totally in place. Contractor shall coordinate locations of temporary bracing with other contractors. Refer to drawings for additional criteria.
10. This submittal is subject to the review and approval of the project Architect/Engineer of record prior to installation.
11. These design calculations are not a substitute for any NOA or FBPA required testing for product approval.
12. The fences contained within are not designed for any guardrail loading applications.
13. The fence spacing/heights are designed to a maximum height of 6' per the Florida Building Code Section 1616.2. Any heights greater than this shall be engineered on a project by project basis.
14. The fence posts shall be coated and embedded in concrete at the bases. If baseplate/anchorage are desired, they shall be engineered on a project by project basis.

Design Loads:

PVE LLC
2000 Georgetowne Drive, Suite 101
Sewickley, PA 15143-8992
724-444-1100

JOB TITLE	Standard Knotwood Fencing		
JOB NO.		**SHEET NO.**	
CALCULATED BY	DSG	**DATE**	3/25/20
CHECKED BY	JSU	**DATE**	3/25/20

Code Search

Code: Florida Building Code 2017

Occupancy:

Occupancy Group = R Residential

Risk Category & Importance Factors:

Risk Category =	I
Wind factor =	1.00
Snow factor =	0.80
Seismic factor =	1.00

Type of Construction:

Fire Rating:

Roof =	0.0 hr
Floor =	0.0 hr

Building Geometry:

Roof angle (θ)	0.00 / 12	0.0 deg
Building length (L)	24.0 ft	
Least width (B)	24.0 ft	
Mean Roof Ht (h)	6.0 ft	
Parapet ht above grd	0.0 ft	
Minimum parapet ht	0.0 ft	

Live Loads:

Roof

	0 to 200 sf:	20 psf
	200 to 600 sf:	24 - 0.02Area, but not less than 12 psf
	over 600 sf:	12 psf

Floor:

Typical Floor		N/A
Partitions		N/A
Partitions	N/A	
Partitions		N/A
Partitions	N/A	

PVE LLC
2000 Georgetowne Drive, Suite 101
Sewickley, PA 15143-8992
724-444-1100

JOB TITLE	Standard Knotwood Fencing		
JOB NO.		**SHEET NO.**	
CALCULATED BY	DSG	**DATE**	3/25/20
CHECKED BY	JSU	**DATE**	3/25/20

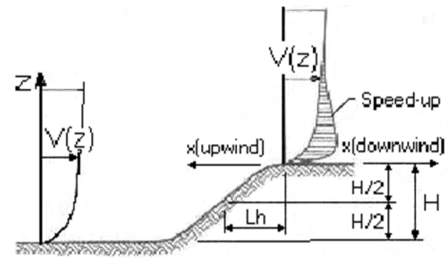
Wind Loads : ASCE 7 - 10

Ultimate Wind Speed	115 mph
Nominal Wind Speed	89.1 mph
Risk Category	I
Exposure Category	C
Enclosure Classif.	Open Building
Internal pressure	+/-0.00
Directionality (Kd)	0.85
Kh case 1	0.849
Kh case 2	0.849
Type of roof	Monoslope

Topographic Factor (Kzt)

Topography	Flat
Hill Height (H)	0.0 ft
Half Hill Length (Lh)	0.0 ft
Actual H/Lh =	0.00
Use H/Lh =	0.00
Modified Lh =	0.0 ft
From top of crest: x =	0.0 ft
Bldg up/down wind?	downwind

H< 15ft;exp C
∴ Kzt=1.0

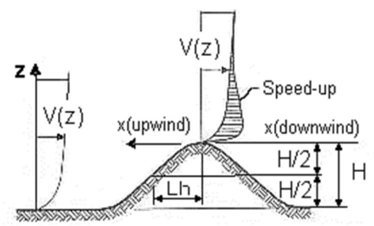


ESCARPMENT

H/Lh= 0.00	K_1 = 0.000
x/Lh = 0.00	K_2 = 0.000
z/Lh = 0.00	K_3 = 1.000

At Mean Roof Ht:

$Kzt = (1+K_1K_2K_3)^2 = 1.00$



2D RIDGE or 3D AXISYMMETRICAL HILL

Gust Effect Factor

h =	6.0 ft
B =	24.0 ft
/z (0.6h) =	15.0 ft

Flexible structure if natural frequency < 1 Hz (T > 1 second).
If building h/B>4 then may be flexible and should be investigated.
h/B = 0.25 Rigid structure (low rise bldg)

G = 0.85 Using rigid structure default

Rigid Structure

ē =	0.20
ℓ =	500 ft
z_{min} =	15 ft
c =	0.20
g_Q, g_v =	3.4
L_z =	427.1 ft
Q =	0.95
I_z =	0.23
G =	0.90 use G = 0.85

Flexible or Dynamically Sensitive Structure

34ıcy (η_1) =	0.0 Hz				
Damping ratio (β) =	0				
/b =	0.65				
/α =	0.15				
Vz =	97.1				
N_1 =	0.00				
R_n =	0.000				
R_h =	28.282	η =	0.000	h =	6.0 ft
R_B =	28.282	η =	0.000		
R_L =	28.282	η =	0.000		
g_R =	0.000				
R =	0.000				
Gf =	0.000				

PVE LLC
2000 Georgetowne Drive, Suite 101
Sewickley, PA 15143-8992
724-444-1100

JOB TITLE	Standard Knotwood Fencing		
JOB NO.		**SHEET NO.**	
CALCULATED BY	DSG	**DATE**	3/25/20
CHECKED BY	JSU	**DATE**	3/25/20

Wind Loads - Other Structures:

ASCE 7 - 10 — Ultimate Wind Pressures

Wind Factor =	1.00		
Gust Effect Factor (G) =	0.85	Ultimate Wind Speed =	115 mph
Kzt =	1.00	Exposure =	C

A. Solid Freestanding Walls & Solid Signs (& open signs with less than 30% open)

		s/h =	1.00	**Case A & B**	
Dist to sign top (h)	6.0 ft	B/s =	2.00	C_f =	1.40
Height (s)	6.0 ft	Lr/s =	0.00	F = qz G Cf As =	**29.1 As**
Width (B)	12.0 ft	Kz =	0.849	As =	36.0 sf
Wall Return (Lr) =		qz =	24.4 psf	F =	1047 lbs
Directionality (Kd)	0.85				
Percent of open area to gross area	0.0%	Open reduction factor =	1.00		

CaseC

Horiz dist from windward edge	Cf	F=qzGCfAs (psf)
0 to s	1.80	37.4 **As**
s to 2s	1.20	24.9 **As**

Case C reduction factors

Factor if s/h>0.8 =	0.80
Wall return factor for Cf at 0 to s =	1.00

B. Open Signs & Lattice Frameworks (openings 30% or more of gross area)

Height to centroid of Af (z)	0.0 ft			Kz =	0.849
				Base pressure (qz) =	24.4 psf
Width (zero if round)	0.0 ft				
Diameter (zero if rect)	0.0 ft			$F = q_z G C_f A_f$ =	**0.0 Af**
Percent of open area		Ï =	0	Solid Area: A_f =	0.0 sf
to gross area	0.0%	C_f =	2	F =	0 lbs
Directionality (Kd)	0.85			Design sign as solid sign	

C. Chimneys, Tanks, Rooftop Equipment (h>60') & Similar Structures

Height to centroid of Af (z)	0.0 ft	Kz =	0.849
Cross-Section	Square	Base pressure (qz) =	25.9 psf
Directionality (Kd)	0.90	h/D =	1.00
Height (h)	0.0 ft		
Width (D)	0.0 ft		
Type of Surface	N/A		

Square (wind along diagonal)		Square (wind normal to face)	
Cf =	1.00	C_f =	1.30
F = qz G Cf Af =	**22.0 Af**	$F = q_z G C_f A_f$ =	**28.6 Af**
Af =	sf	A_f =	0.0 sf
F =	0 lbs	F =	0 lbs

D. Trussed Towers

Height to centroid of Af (z)	0.0 ft	Kz =	0.849
∈ =	0.27	Base pressure (qz) =	27.3 psf
Tower Cross Section	triangle		
Member Shape	flat	Diagonal wind factor =	1
Directionality (Kd)	0.95	Round member factor =	1.000

Triangular Cross Section

C_f =	2.38
$F = q_z G C_f A_f$ =	**55.2 Af**
Solid Area: A_f =	0.0 sf
F =	1 lbs

~~10.0~~

Knotwood™ Design Calculation:

Methodology:

When checking **Knotwood™ Fencing** (slats, posts, etc.), the applied wind loads, generated from ASCE 7-10 and the Florida Building Code Section 1616.2, are compared to allowable tension and shear strengths per the Aluminum Design Manual. Per ASCE 7-10, for wind loading the fence is considered to be an "Other Structure - Solid Freestanding Wall". Please note the fences are not designed for guardrail loading.

These calculations are not a substitute for any NOA or FBPA required testing for product approval.

Miscellaneous:

The drawings and models shown within the calculation sheets are not meant to be used for fabrication nor performing work. They are for illustrative purposes only to assist in the preparation of the calculations and may not accurately represent the actual work to be performed.

Fastener Requirements:

Self-Tapping Metal Screws - #10 Minimum.
Galvanized Unless Noted Otherwise
Aluminum Where Noted At High/Salt Exposure

Materials Requirements:

Knotwood Battens:

Aluminum Alloy 6063-T6:	Fy=25 ksi (MIN)	Fu=30 ksi (MIN)
Aluminum Alloy 6061-T6:	Fy=35 ksi (MIN)	Fu=38 ksi (MIN)
Aluminum Alloy 6063-T5:	Fy=16 ksi (MIN)	Fu=22 ksi (MIN)

All Aluminum Welds:
5556 Electrode: Fu=46 ksi

Material Allowable Stress:

Per the ADM Tables 2-19 to 2-21:

Bending Stress:

$F_{ab6061} := 19.5\ ksi$ $\quad F_{ab6063} := 15.2\ ksi$ $\quad F_{ab6063T5} := 5.2\ ksi$

Shear Stress:

$S_1 := \frac{(5.91 - 2\ (0.059))}{0.059} = 98.2$ Use: $F_{avS150} := \frac{38665}{S_1^{\ 2}}\ ksi = 4.01\ ksi$ (6" Slat)

$S_2 := \frac{(3.94 - 2\ (0.118))}{0.118} = 31.4$ Use: $F_{av4x4} := 16.5\ ksi - 0.107\ ksi \cdot S_2 = 13.14\ ksi$ (4x4 Post)

$S_3 := \frac{(1.69 - 2\ (0.197))}{0.197} = 6.6$ Use: $F_{av2.5x2.5} := 16.5\ ksi - 0.107\ ksi \cdot S_3 = 15.8\ ksi$ (2.5x2.5 Post)

Aluminum Modulus of Elasticity:

$E := 10100\ ksi$

Material Section Properties:

Section Properties:

4x4 Post (KESG100100):

$I_{x100100} := 1822940\ mm^4$ (Ixx per Knotwood Techfiles)

$y_{x100100} := 50\ mm$

$S_{x100100} := \dfrac{I_{x100100}}{y_{x100100}} = \left(3.6 \cdot 10^4\right)\ mm^3$

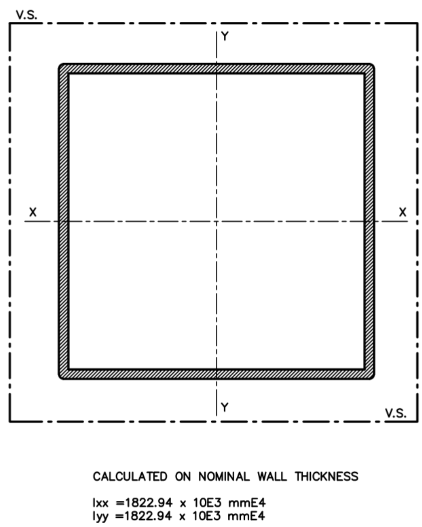
$S_{x100100} = 2.2\ in^3$

$I_{y100100} := 1822940\ mm^4$ (Iyy per Knotwood Techfiles)

$y_{y100100} := 50\ mm$

$S_{y100100} := \dfrac{I_{y100100}}{y_{y100100}} = \left(3.6 \cdot 10^4\right)\ mm^3$

$S_{y100100} = 2.2\ in^3$



6" Wide Slat (KES15016):

$I_{xS150} := 24500\ mm^4$ (Ixx per Knotwood Techfiles)

$y_{xS150} := 8\ mm$

$S_{xS150} := \dfrac{I_{xS150}}{y_{xS150}} = \left(3.1 \cdot 10^3\right)\ mm^3$

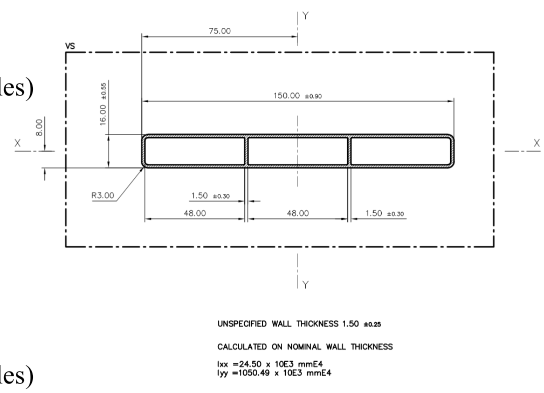
$S_{xS150} = 0.2\ in^3$

$I_{yS150} := 1050490\ mm^4$ (Iyy per Knotwood Techfiles)

$y_{yS150} := 125\ mm$

$S_{yS150} := \dfrac{I_{yS150}}{y_{yS150}} = \left(8.4 \cdot 10^3\right)\ mm^3$

$S_{yS150} = 0.5\ in^3$



Two Way Post (KESP2W6565):

$I_{x2W6565} := 441020\ mm^4$ (Ixx per Knotwood Techfiles)

$y_{x2W6565} := 32.50\ mm$

$S_{x2W6565} := \dfrac{I_{x2W6565}}{y_{x2W6565}} = \left(1.4 \cdot 10^4\right)\ mm^3$

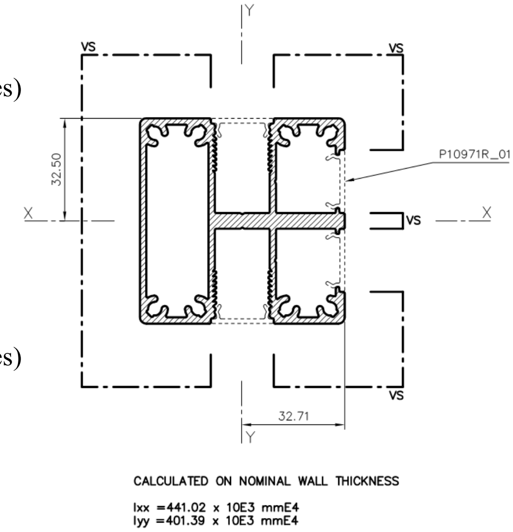
$S_{x2W6565} = 0.8\ in^3$

$I_{y2W6565} := 401390\ mm^4$ (Iyy per Knotwood Techfiles)

$y_{y2W6565} := 32.71\ mm$

$S_{y2W6565} := \dfrac{I_{y2W6565}}{y_{y2W6565}} = \left(1.2 \cdot 10^4\right)\ mm^3$

$S_{y2W6565} = 0.7\ in^3$



Corner Post (KESP2C6565EF):

$I_{x2C65} := 338470\ mm^4$ (Ixx per Knotwood Techfiles)

$y_{x2C65} := 33.36\ mm$

$S_{x2C65} := \dfrac{I_{x2C65}}{y_{x2C65}} = \left(1.0 \cdot 10^4\right)\ mm^3$

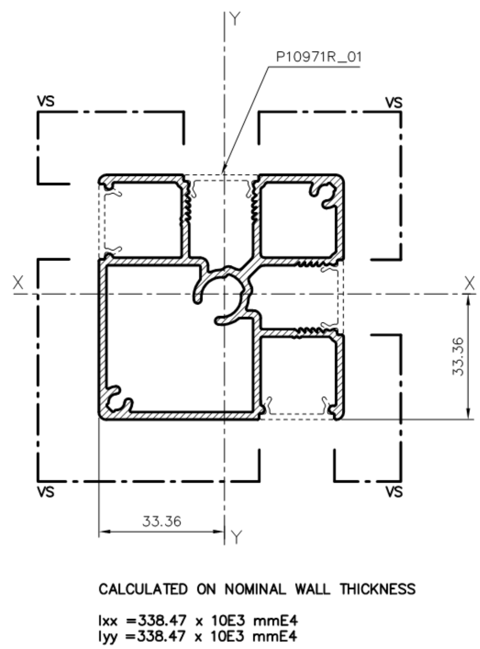
$S_{x2C65} = 0.6\ in^3$

$I_{y2C65} := 338470\ mm^4$ (Iyy per Knotwood Techfiles)

$y_{y2C65} := 33.36\ mm$

$S_{y2C65} := \dfrac{I_{y2C65}}{y_{y2C65}} = \left(1.0 \cdot 10^4\right)\ mm^3$

$S_{y2C65} = 0.6\ in^3$



Load Requirements:

Dead Load:

$DL_{self1W6525} := 0.960 \frac{kgf}{m} = 0.6\ plf$ (Self weight of 1 way post per linear foot)

$DL_{self100100} := 3.138 \frac{kgf}{m} = 2.1\ plf$ (Self weight of 4" post per linear foot)

$DL_{selfS15016} := 1.411 \frac{kgf}{m} = 0.9\ plf$ (Self weight of 6" slat per linear foot)

$DL_{selfGFS} := 1.227 \frac{kgf}{m} = 0.8\ plf$ (Self weight of small gate frame per linear foot)

$DL_{self2W6565} := 2.557 \frac{kgf}{m} = 1.7\ plf$ (Self weight of 2 way post per linear foot)

$DL_{self2C6565} := 2.035 \frac{kgf}{m} = 1.4\ plf$ (Self weight of corner post per linear foot)

Wind Loads:

The maximum ultimate design wind load is determined from a 115 mph wind for up to a 6' high fence per Florida Building Code Section 1616.2.1:

$w_{Wind} := 29.1\ psf$

$w_{WindNominal} := 0.6 \cdot w_{Wind} = 17.5\ psf$ (Nominal Design Wind Loading)

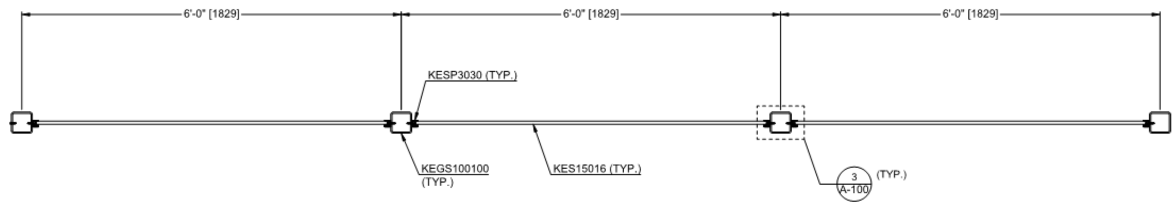


Figure 1 - Typical 4x4 Fencing Plan View (2.5X2.5 Fence Similar)

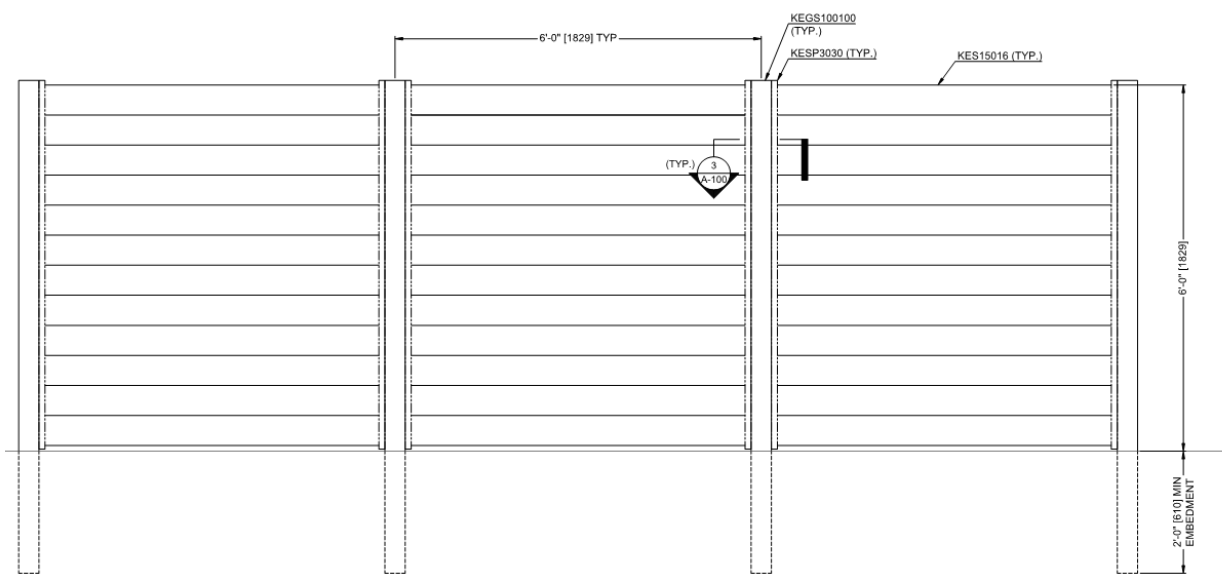


Figure 2 - Typical 4x4 Fencing Elevation View (2.5x2.5 Fence Similar)

Check 6" Slats (KES15016):

$d := 72\ in$ (Max span considered) $l := 6\ in$ (Tributary width on Slat)

Loading:

$DL_{Total} := DL_{selfS15016} = 0.9\ plf$

$w_{WLTotal} := w_{Wind} \cdot l = 14.6\ plf$

Max forces considering slat "pinned"

DL+0.6WL Load Case (Considering WL perpendicular to flat face, so dead load does not cause bending):

$$M_{Dist} := \frac{0.6\ w_{WLTotal} \cdot d^2}{8} = 0.5\ kip \cdot in$$

$$V_{Dist} := \frac{0.6\ w_{WLTotal} \cdot d}{2} + \frac{DL_{Total} \cdot d}{2} = 29.0\ lbf$$

Check Slat Bending:

$$f_{bS150} := \frac{M_{Dist}}{S_{xS150}} = 2.5\ ksi \quad < \quad F_{ab6063T5} = 5.2\ ksi \quad \therefore \text{ OK}$$

Check Slat Shear:

$$A_{S150} := 2 \cdot 147\ mm \cdot 1.5\ mm = 0.7\ in^2$$

$$f_{vS150} := \frac{V_{Dist}}{A_{S150}} = \left(4.2 \cdot 10^{-2}\right)\ ksi \quad < \quad F_{avS150} = 4.0\ ksi \quad \therefore \text{ OK}$$

Therefore, use of KES15016 is Acceptable

Check Slat Fasteners:

Allowable Connection Shear:

The allowable connection shear is determined according to Section J.5.6, which specifies a safety factor $\Omega = 3.0$ for fastener connection shear for building-type structures.

$\Omega := 3.0$ (ASD building-type structures)

$D := 0.19\ \mathbf{in}$ (#10 Fastener Diameter)

$t_1 := 0.059\ \mathbf{in}$ (Slat Thickness)

$t_2 := 0.079\ \mathbf{in}$ (Slat Support Thickness)

Section J.5.6.1 addresses bearing. Since the edge distance is 0.5 in. > 0.38 in. = 2(0.19in.) = 2D, the allowable bearing force is 2FtuDt/W. Using Ftu from Table A.3.4, the allowable shear for bearing is:

$F_{tu} := 22\ \mathbf{ksi}$ (Table A.3.4)

$$F_{bearing} := \frac{2 \cdot F_{tu} \cdot D \cdot t_1}{\Omega} = 164.4\ \mathbf{lbf} \quad > \quad \frac{V_{Dist}}{2} = 15\ \mathbf{lbf} \quad \therefore \text{ OK}$$

Fastener Pull Over:

For $t_2 > t_1$, Pull Over is not a limit state.

Fastener Shear:

$F_{vu} := 1.15\ \mathbf{kip}$ (#10 Ultimate Shear)

$$F_{shear} := \frac{F_{vu}}{\Omega} = 383.3\ \mathbf{lbf} \quad > \quad \frac{V_{Dist}}{2} = 15\ \mathbf{lbf} \quad \therefore \text{ OK}$$

Fastener Tension:

Nominal Pullout (ADM J.5.5, 0.060in ≤ Le ≤ 0.125 in)

$K_s := 1.01$ ADM J.5.5.1.1

$D = 0.2\ \mathbf{in}$ Nominal diameter of screw

$F_{ty2} := 30\ \mathbf{ksi}$ Tensile yield strength of member not in contact with screw head

$L_e := t_2 = \left(7.9 \cdot 10^{-2}\right)\ \mathbf{in}$ Screw engaged length

$R_n := K_s \cdot D \cdot L_e \cdot F_{ty2} = 454.8\ \mathbf{lbf}$ (#10 Ultimate Pullout - ADM J.5-1)

$$F_{pullout} := \frac{R_n}{\Omega} = 151.6\ \mathbf{lbf} \quad > \quad \frac{V_{Dist}}{2} = 15\ \mathbf{lbf} \quad \therefore \text{ OK}$$

Therefore, use of #10 Screw is acceptable

Check 4x4 6' High Posts (6' Max Spacing):

$d := 6\ ft$ (Max height of post) $l := 6\ ft$ Tributary width on post

$$DL_{Total} := \frac{12\ DL_{selfS15016} \cdot l}{d} + DL_{self100100} + 2 \cdot DL_{self1W6525} = 14.8\ plf$$ Total dead load on post

$$w_{WLTotal} := w_{Wind} \cdot l = 174.6\ plf$$

Max forces considering post cantilevered.

DL+0.6WL Load Case (Considering WL perpendicular to flat face, so dead load does not cause bending):

$$M_{Dist2} := \frac{0.6\ w_{WLTotal} \cdot d^2}{2} = 1.9\ kip \cdot ft$$

$$V_{Dist2} := 0.6\ w_{WLTotal} \cdot d + DL_{Total} \cdot d = 717.2\ lbf$$

Check Post Bending:

$S_{y100100} = 2.2\ in^3$ Section Modulus for 4x4 Posts (KESG100100)

$F_{cr4x4} := \frac{M_{Dist2}}{S_{y100100}} = 10.2\ ksi$ $<$ $F_{ab6061} = 19.5\ ksi$ $\therefore$ OK 4x4 Post Maximum

Check Post Shear:

$A_{P4x4} := 2 \cdot 3.58\ in \cdot 0.118\ in = 0.8\ in^2$ (Web Area)

$F_{vpost} := \frac{V_{Dist2}}{A_{P4x4}} = 0.8\ ksi$ $<$ $F_{av4x4} = 13.1\ ksi$ $\therefore$ OK

Check 2-1/2x2-1/2 4' High Posts (Max 6' Spacing) :

$d := 4\ ft$ (Max height of post) $l := 6\ ft$ Tributary width on post

$$DL_{Total} := \frac{8\ DL_{selfS15016} \cdot l}{d} + DL_{self2W6565} = 13.1\ plf$$ Total dead load on post

$$w_{WLTotal} := w_{Wind} \cdot l = 174.6\ plf$$

Max forces considering post cantilevered

DL+0.6WL Load Case (Considering WL perpendicular to flat face, so dead load does not cause bending):

$$M_{Dist3} := \frac{0.6\ w_{WLTotal} \cdot d^2}{2} = 0.8\ kip \cdot ft$$

$$V_{Dist3} := 0.6\ w_{WLTotal} \cdot d + DL_{Total} \cdot d = 471.4\ lbf$$

Check Post Bending:

$$F_{cr65x65} := \frac{M_{Dist3}}{S_{y2W6565}} = 13.4\ ksi \quad < \quad F_{ab6063} = 15.2\ ksi \quad \therefore \text{ OK}$$ 2-1/2x2-1/2 Post Maximum

Check Post Shear:

$$A_{P6565} := 2.5\ in \cdot 0.118\ in = 0.3\ in^2$$ (Web Area)

$$F_{vpost} := \frac{V_{Dist3}}{A_{P6565}} = 1.6\ ksi \quad < \quad F_{av2.5x2.5} = 15.8\ ksi \quad \therefore \text{ OK}$$

Check 2-1/2x2-1/2 5' High Posts (Max 4' Spacing) :

$d := 5\ ft$ (Max height of post) $l := 4\ ft$ Tributary width on post

$DL_{Total} := \frac{10\ DL_{selfS15016} \cdot l}{d} + DL_{self2W6565} = 9.3\ plf$ Total dead load on post

$w_{WLTotal} := w_{Wind} \cdot l = 116.4\ plf$

Max forces considering post cantilevered

DL+0.6WL Load Case (Considering WL perpendicular to flat face, so dead load does not cause bending):

$M_{Dist4} := \frac{0.6\ w_{WLTotal} \cdot d^2}{2} = 0.9\ kip \cdot ft$

$V_{Dist4} := 0.6\ w_{WLTotal} \cdot d + DL_{Total} \cdot d = 395.7\ lbf$

Check Post Bending:

$F_{cr65x65} := \frac{M_{Dist4}}{S_{y2W6565}} = 14.0\ ksi$ $<$ $F_{ab6063} = 15.2\ ksi$ ∴ OK 2-1/2x2-1/2 Post Maximum

Check Post Shear:

$A_{P6565} := 2.5\ in \cdot 0.118\ in = 0.3\ in^2$ (Web Area)

$F_{vpost} := \frac{V_{Dist4}}{A_{P6565}} = 1.3\ ksi$ $<$ $F_{av2.5x2.5} = 15.8\ ksi$ ∴ OK

Check 2-1/2x2-1/2 6' High Posts (Max 3' Spacing) :

$d := 6\ ft$ (Max height of post) $l := 3\ ft$ Tributary width on post

$DL_{Total} := \frac{12\ DL_{selfS15016} \cdot l}{d} + DL_{self2W6565} = 7.4\ plf$ Total dead load on post

$w_{WLTotal} := w_{Wind} \cdot l = 87.3\ plf$

Max forces considering post cantilevered

DL+0.6WL Load Case (Considering WL perpendicular to flat face, so dead load does not cause bending):

$$M_{Dist5} := \frac{0.6\ w_{WLTotal} \cdot d^2}{2} = 0.9\ kip \cdot ft$$

$$V_{Dist5} := 0.6\ w_{WLTotal} \cdot d + DL_{Total} \cdot d = 358.7\ lbf$$

Check Post Bending:

$F_{cr65x65} := \frac{M_{Dist5}}{S_{y2W6565}} = 15.1\ ksi$ $<$ $F_{ab6063} = 15.2\ ksi$ $\therefore$ OK 2-1/2x2-1/2 Post Maximum

Check Post Shear:

$A_{P6565} := 2.5\ in \cdot 0.118\ in = 0.3\ in^2$ (Web Area)

$F_{vpost} := \frac{V_{Dist5}}{A_{P6565}} = 1.2\ ksi$ $<$ $F_{av2.5x2.5} = 15.8\ ksi$ $\therefore$ OK

APPENDIX 'A'

(References)

Section 1616.2 from the 2017 Florida Building Code:

1616.2 General design for specific occupancies and structures.

1616.2.1 Fences.

Fences not exceeding 6 feet (1829 mm) in height from grade may be designed for 75 mph (33 m/s) fastest mile wind speed or 115 mph (40 m/s) 3-second gust.

1616.2.1.1 Wood fences.

Wood fence design shall be as specified by Section 2328.

1616.2.2 Sway forces in stadiums.

1. The sway force applied to seats in stadiums, grandstands, bleachers and reviewing stands shall be not less than 24 pounds per lineal foot (350 N/m), applied perpendicularly and along the seats.
2. Sway forces shall be applied simultaneously with gravity loads.
3. Sway forces need not be applied simultaneously with other lateral forces.

1616.3 Deflection.

1616.3.1 Allowable deflections.

The deflection of any structural member or component when subjected to live, wind and other superimposed loads set forth herein shall not exceed the following:

1. Roof and ceiling or components supporting plaster L/360

SELECTOR GUIDE & PERFORMANCE DATA

Part Number			1076000	1112000	1080000	1132000	1114000	1117000	1119000	1121000	1124000	1125000	1078000	1126000
Description			10-16x3/4"	12-14x7/8"	12-14x1"	12-14x1"	12-14x1-1/2"	12-14x2"	1/4-14x1"	1/4-14x1-1/2"	1/4-20x1-1/8"	1/4-20x1-1/2"	1/4-20x2"	1/4-20x2-1/2"
Head Style			HWH	HWH	HWH	UPFH***	HWH	HWH	HWH	HWH	HWH	HWH	HWH	HWH
Drill Point			3	3	3	3	3	3	3	3	4	4	4	4
Drilling Cap			.150"	.187"	.187"	.187"	.187"	.187"	.210"	.210"	.210" - .312"	.210" - .312"	.210" - .312"	.210" - .312"
Max Load Bearing Area*			.500"	.470"	.500"	.500"	1.000"	1.500"	.450"	.950"	.500"	.830"	1.330"	1.830"
Installation Tool			5/16" Driv-Tru™ Socket (P/N: 1513910)	5/16" Driv-Tru™ Socket (P/N: 1513910)	5/16" Driv-Tru™ Socket (P/N: 1513910)	#3 Phillips Bit	5/16" Driv-Tru™ Socket (P/N: 1513910)	5/16" Driv-Tru™ Socket (P/N: 1513910)	3/8" Driv-Tru™ Socket (P/N: 1574910)	3/8" Driv-Tru™ Socket (P/N: 1574910)	3/8" Driv-Tru™ Socket (P/N: 1574910)	3/8" Driv-Tru™ Socket (P/N: 1574910)	3/8" Driv-Tru™ Socket (P/N: 1574910)	3/8" Driv-Tru™ Socket (P/N: 1574910)
PULLOUT VALUES (AVERAGE LBS. ULTIMATE)														
		ksi												
STEEL GAUGE	18	45.5	401	400	400	400	400	400	475	475				
STEEL GAUGE	16	63	699	561	561	561	561	561	631	631	827	827	827	827
STEEL GAUGE	14	55.5	1010	964	964	964	964	964	1062	1062	1258	1258	1258	1258
STEEL GAUGE	12	63	1680	1516	1516	1516	1516	1516	1878	1878	1946	1946	1946	1946
STEEL GAUGE	1/8	56.9	2183	2149	2149	2149	2149	2149	2320	2320	2685	2685	2685	2685
STEEL GAUGE	3/16	65.3		2877	2877	2497	2877	2877	3668	3668	3572	3572	3572	3572
STEEL GAUGE	1/4	48.1									4719	4719	4719	4719
STEEL GAUGE	5/16	49.1									4699	4699	4699	4699
ALUMINUM 6063-T5	1/8	32.4	745	1008	1008	1008	1008	1008	1017	1017	970	970	970	970
ALUMINUM 6063-T5	1/4	32.1		2543	2543	2462	2543	2543	3080	3080	2760	2760	2760	2760
ALUMINUM 6063-T5	3/8	27.7									3851	3851	3851	3851
SHEAR VALUES (AVERAGE LBS. ULTIMATE)														
STEEL GAUGE**	18-18		996	965	965	965	965	965	1100	1100	1026	1026	1026	1026
STEEL GAUGE**	18-14		1872	1803	1803	1803	1803	1803	2132	2132	2089	2089	2089	2089
STEEL GAUGE**	16-16		1331	1360	1360	1360	1360	1360	1414	1414	1359	1359	1359	1359
STEEL GAUGE**	14-14			1815	1815	1815	1815	1815	2439	2439	2357	2357	2357	2357
STEEL GAUGE**	1/8-3/16								2636	2636	2748	2748	2748	2748
STEEL GAUGE**	3/16-1/4										2881	2881	2881	2881
STEEL GAUGE**	12-1/4										2843	2843	2843	2843
ALUMINUM 6063-T5**	1/8-1/8		1526	1846	1846	1846	1846	1846	2087	2087	2106	2106	2106	2106
ALUMINUM 6063-T5**	1/8-1/4			2488	2488	2180	2488	2488	3328	3328	3062	3062	3062	3062
MECHANICAL PROPERTIES														
Yield Stregth, F_y Ksi (MPa)			134 ksi 920 Mpa	134 ksi 920 Mpa	134 ksi 920 Mpa	134 ksi 920 Mpa	134 ksi 920 Mpa	134 ksi 920 Mpa	134 ksi 920 Mpa	134 ksi 920 Mpa	134 ksi 920 Mpa	134 ksi 920 Mpa	134 ksi 920 Mpa	134 ksi 920 Mpa
Tensile Strength F_u Ksi (MPa)			152 ksi 1054 Mpa	152 ksi 1054 Mpa	152 ksi 1054 Mpa	152 ksi 1054 Mpa	152 ksi 1054 Mpa	152 ksi 1054 Mpa	152 ksi 1054 Mpa	152 ksi 1054 Mpa	152 ksi 1054 Mpa	152 ksi 1054 Mpa	152 ksi 1054 Mpa	152 ksi 1054 Mpa

** IMPORTANT: Maximum load bearing area is indicated by brackets.*
*** KSI values are the same as listed in the Pullout Values table.*
**** Undercut Phillips Flat Head*

ITW Buildex
1349 W. Bryn Mawr Ave. | Itasca, IL 60143
800-BUILDEX | www.itwbuildex.com
Climaseal ACR™ and Teks Select™ are trademarks of ITW Buildex and Illinois Tool Works, Inc.
Dril-Flex® is a registered trademark of Elco, Inc.

INSTALLATION GUIDELINES

> May be installed using a standard screw gun with a depth sensitive nosepiece. For optimal fastener performance, the screw gun should be a minimum of 6 amps and have an RPM range of 1800 to 2500 RPM.

> Overdriving may result in torsional failure of the fastener or stripout of the substrate.

> The fastener must penetrate beyond the metal structure a minimum of 3 threads.

> Reference the Selector Guide for the appropriate installation tool.

BX21_rev1211