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License Number #30782, #60102

Job No.: XXXXXXX

Re: Sample Client
123 Sample Street #300
Sample City FL 00000

Project: Sample Project
456 Sample Drive,
Sample City FL 00000

To Whom It May Concern:

I have analyzed the above-referenced job, specifically, the installation of the following (2) hurricane screens as per FL#320-R11:

1. 125'' wide x 134'' high
2. 151'' wide x 134'' high

Per my assessment, the screens are safe to use and adequately strong to resist the applicable loads. Page 2 shows the opening and allowable design pressures. Page 3 shows the connection details. Pages 4-7 show the design calculations.

All products are to be installed per the product approval specifications unless noted otherwise.

The design is in compliance with the Florida Building Code 2023 (8th Edition).

Please let me know if you have any questions or concerns.

Thank you.

Sample PE
Engineer of Record
DP

WIND LOAD CALCULATOR FOR COMPONENTS AND CLADDING

ASCE 7-22 Design Pressures (ASD) for Wall Openings (Windows, Shutters & Doors)

Applicable Codes & Standards

1. 2023 Florida Building Code (8th Edition)
2. ASCE/SEI 7-22: Minimum Design Loads on Buildings and Other Structures.

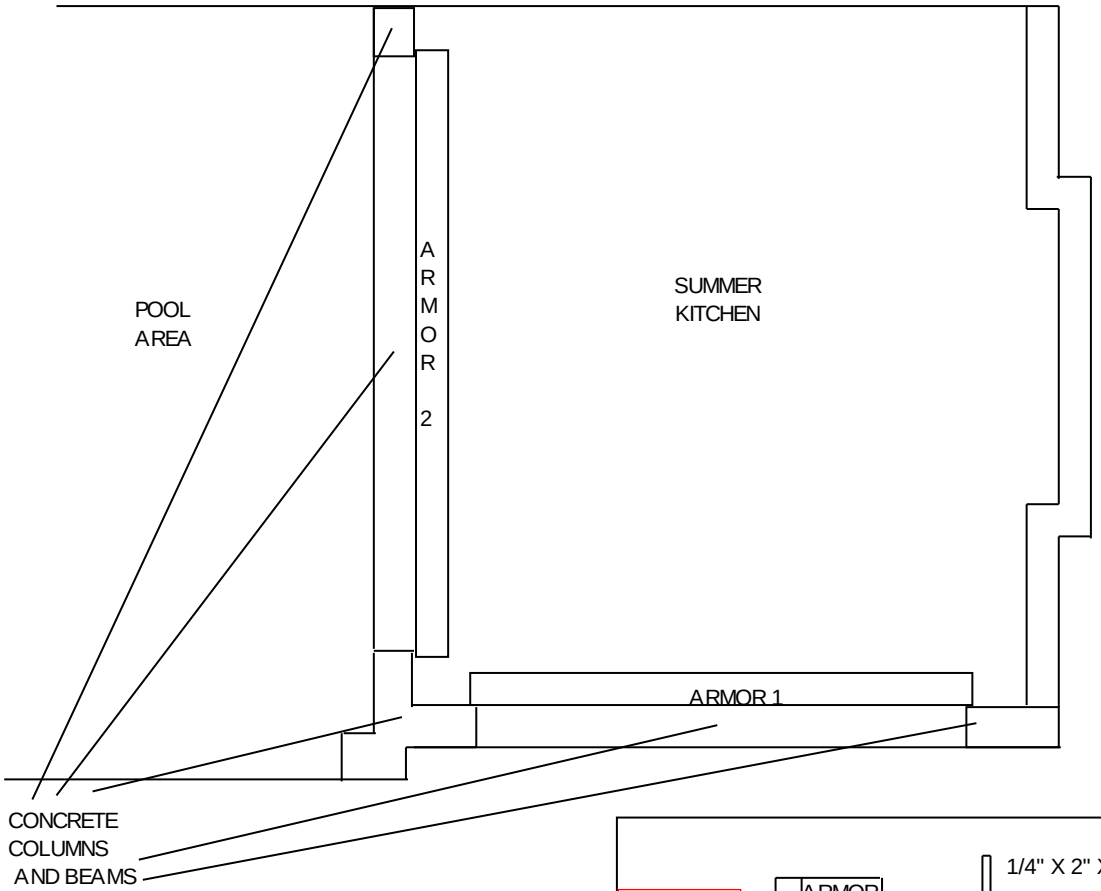
PROJECT INFORMATION	
Date	
Project No.	
Project Address	

GENERAL INPUTS				
Basic Wind Speed	=		180	mph
Exposure Category	=		D	
Enclosure Classification	=		Enclosed	
Roof Pitch	=		3	in 12
Mean roof height	=		20.00	ft
Minimum horizontal building dimension	=		50.00	ft

Sr. No.	Width	Height	Zone	Unit	Design Pressures		FPA No. or NOA No.	Allowable Pressures	
				Elevation	Positive	Negative		Positive	Negative
	in	in		ft	psf	psf		psf	psf
1	125.00	134.00	5	12.00	45.65	-55.40	FL 320-R11	110.00	110.00
2	151.00	134.00	5	12.00	44.99	-54.07	FL 320-R11	110.00	110.00
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Sr. No.	Width	Height	Zone	Unit	Design Pressures		FPA No. or NOA No.	Allowable Pressures	
				Elevation	Positive	Negative		Positive	Negative
	in	in		ft	psf	psf		psf	psf
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									

HOME WITH IMPACT DOORS AND WINDOWS



SAMPLE CLIENT

ARMOR SCREEN INSTALL
FOR

SAMPLE PROJECT

FL320_R11_II_DWG(1)

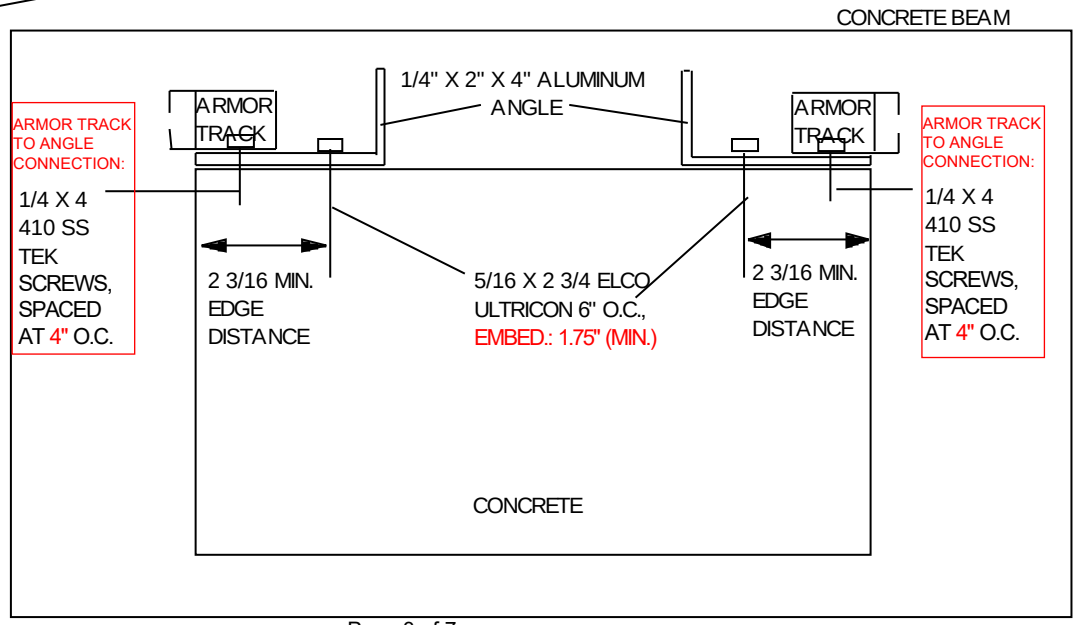
456 SAMPLE DRIVE

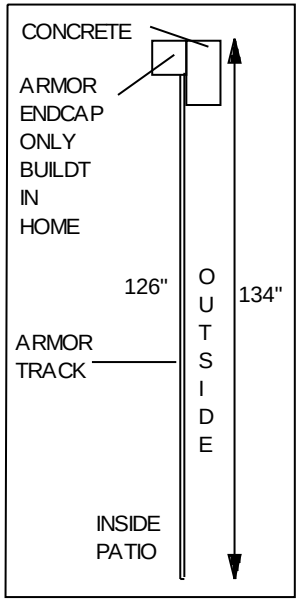
SAMPLE CITY, FL 00000

GENERAL NOTES:

1. EXISTING CONCRETE COMPRESSIVE STRENGTH SHALL BE 5000 PSI.
2. ALUMINUM ANGLES SHALL BE AL 6063-T52 (OR STRONGER).
3. THE MIN. DISTANCE FROM THE CENTER OF THE ANCHOR TO THE EDGE/FACE OF THE CONCRETE SHALL BE 2-3/16".
4. FASTENERS MUST PENETRATE BEYOND THE METAL A MIN. OF 3 THREAD PITCHES.
5. MIN. DISTANCE FROM THE EDGE/FACE OF THE ALUM ANGLE TO THE CENTER OF THE FASTENER SHALL BE 0.75".
6. THE CONTRACTOR SHALL FOLLOW PRODUCT SPECIFICATIONS WHEREVER APPLICABLE.

SIZES IN INCHES		
UNIT	LENGTH	WIDTH
1	125	134
2	151	134





Connection design:

Shutter #1

Width of the shutter $width := 125\ in$

Height of the shutter $height := 134\ in$

Wind pressure on shutter $wl := 55.5\ psf$

Out of plane load $R_h := 290\ \frac{lbf}{ft}$

In plane load $R_v := 353\ \frac{lbf}{ft}$

1. L 2" x4" x0.25" to Existing app. concrete host

Using 5/16"x 1-3/4"(embed.) ELCO ultracon anchor, spaced at 6" O.C. into 5000 psi concrete.

spacing between anchors $s := 6\ in$

Tension on anchors $T_u := \frac{R_h \cdot s}{0.6} = 241.667\ lbf$

Shear on anchors $V_u := \frac{R_v \cdot s}{0.6} = 294.167\ lbf$

	Hollow Block 1,872 PSI				Concrete 3,513 PSI				Wood #2 SYP Specific Gravity .55			
Dia.	Depth of Embed.	Edge Dist.	Pull-out	Shear	Depth of Embed.	Edge Dist.	Pull-out	Shear	Depth of Embed.	Edge Dist.	Pull-out	Shear
5/16"	1-1/4"	1-9/16"	1,049	708	1"	1-1/4"	737	879	1"	5d	1,423	1,095
					1-3/4"		2,105	1,324	1-1/2"		2,471	1,617
					1"	2-3/16"	836	1,500	2"		2,912	2,367
		3-1/8"	1,149	1,454	1-3/4"	2-3/16"	2,413	3,158	-	-	-	-
					1"	3-1/8"	851	1,801	1"	10d	1,454	1,188
					1-3/4"		2,643	3,404	1-1/2"		2,472	1,677
					2"		3,347	-	2"		3,233	2,407

Nominal tensile capacity $\phi T_n := 0.65 \cdot 2413\ lbf = 1568.45\ lbf$

Nominal shear capacity $\phi V_n := 0.65 \cdot 3158\ lbf = 2052.7\ lbf$

Check, <1, okay $\frac{T_u}{\phi T_n} = 0.154$ $\frac{V_u}{\phi V_n} = 0.143$

Check, <1.2, okay $\frac{T_u}{\phi T_n} + \frac{V_u}{\phi V_n} = 0.297$

Use 5/16"x 1-3/4"(embed.) ELCO UltraCon anchor, spaced at 6" O.C. into 5000 psi concrete.

2. Shutter to L 2" x4" x0.25" (AL 6063-T52)

spacing between TEK screw $s := 6\ in$
Tension on screw $T := R_h \cdot s = 145\ lbf$
Shear on screw $V := R_v \cdot s = 176.5\ lbf$

Using 1/4-20 TEK screw
Connected part: 1/8" thk. 6063-T6 side rail

ESR 4374
table 2 $V_{a1} := 726\ lbf$
table 5 $V_{a2} := 749\ lbf$

shear capacity $V_a := min\left(V_{a1}, V_{a2}\right) = 726\ lbf$

table 2 $T_{a1} := 1014\ lbf$
table 3 $T_{a2} := 742\ lbf$
table 4 $T_{a3} := 190\ lbf$

tensile capacity $T_a := min\left(T_{a1}, T_{a2}, T_{a3}\right) = 190\ lbf$

Check, <1, OKAY $\frac{T}{T_a} = 0.763$ $\frac{V}{V_a} = 0.243$

Check, <1, NOT OKAY $\frac{T}{T_a} + \frac{V}{V_a} = 1.006$

Upgrade the connection
Option: Use 1/4-20 TEK screws, spaced at 4" O.C
spacing between TEK screw $s := 4\ in$
Tension on screw $T := R_h \cdot s = 96.667\ lbf$
Shear on screw $V := R_v \cdot s = 117.667\ lbf$

Check, <1, OKAY $\frac{T}{T_a} = 0.509$ $\frac{V}{V_a} = 0.162$

Check, <1, NOT OKAY $\frac{T}{T_a} + \frac{V}{V_a} = 0.671$

Use 1/4-20 TEK screws, spaced at 4" O.C

Shutter #2

Width of the shutter $width := 151\ in$

Height of the shutter $height := 134\ in$

Wind pressure on shutter $wl := 55\ psf$

Out of plane load $R_h := 347\ \frac{lbf}{ft}$

In plane load $R_v := 423\ \frac{lbf}{ft}$

1. L 2" x4" x0.25" to Existing app. concrete host

Using 5/16"x 1-3/4"(embed.) ELCO ultracon anchor, spaced at 6" O.C. into 5000 psi concrete.

spacing between anchors $s := 6\ in$

Tension on anchors $T_u := \frac{R_h \cdot s}{0.6} = 289.167\ lbf$

Shear on anchors $V_u := \frac{R_v \cdot s}{0.6} = 352.5\ lbf$

	Hollow Block 1,872 PSI				Concrete 3,513 PSI				Wood #2 SYP Specific Gravity .55			
Dia.	Depth of Embed.	Edge Dist.	Pull-out	Shear	Depth of Embed.	Edge Dist.	Pull-out	Shear	Depth of Embed.	Edge Dist.	Pull-out	Shear
5/16"	1-1/4"	1-9/16"	1,049	708	1"	1-1/4"	737	879	1"	5d	1,423	1,095
					1-3/4"		2,105	1,324	1-1/2"		2,471	1,617
		3-1/8"	1,149	1,454	1"	2-3/16"	836	1,500	2"		2,912	2,367
					1-3/4"	2-3/16"	2,413	3,158	-	-	-	-
					1"	3-1/8"	851	1,801	1"	10d	1,454	1,188
					1-3/4"		2,643	3,404	1-1/2"		2,472	1,677
					2"		3,347	-	2"		3,233	2,407

Nominal tensile capacity $\phi T_n := 0.65 \cdot 2413\ lbf = 1568.45\ lbf$

Nominal shear capacity $\phi V_n := 0.65 \cdot 3158\ lbf = 2052.7\ lbf$

Check, <1, okay $\frac{T_u}{\phi T_n} = 0.184$ $\frac{V_u}{\phi V_n} = 0.172$

Check, <1.2, okay $\frac{T_u}{\phi T_n} + \frac{V_u}{\phi V_n} = 0.356$

Use 5/16"x 1-3/4"(embed.) ELCO UltraCon anchor, spaced at 6" O.C. into 5000 psi concrete.

2. Shutter to L 2" x4" x0.25" (AL 6063-T52)

spacing between TEK screw $s := 6\ in$
Tension on screw $T := R_h \cdot s = 173.5\ lbf$
Shear on screw $V := R_v \cdot s = 211.5\ lbf$

Using 1/4-20 TEK screw
Connected part: 1/8" thk. 6063-T6 side rail

ESR 4374
table 2 $V_{a1} := 726\ lbf$
table 5 $V_{a2} := 749\ lbf$

shear capacity $V_a := min\left(V_{a1}, V_{a2}\right) = 726\ lbf$

table 2 $T_{a1} := 1014\ lbf$
table 3 $T_{a2} := 742\ lbf$
table 4 $T_{a3} := 190\ lbf$

tensile capacity $T_a := min\left(T_{a1}, T_{a2}, T_{a3}\right) = 190\ lbf$

Check, <1, OKAY $\frac{T}{T_a} = 0.913$ $\frac{V}{V_a} = 0.291$

Check, <1, NOT OKAY $\frac{T}{T_a} + \frac{V}{V_a} = 1.204$

Upgrade the connection
Option: Use 1/4-20 TEK screws, spaced at 4" O.C
spacing between TEK screw $s := 4\ in$
Tension on screw $T := R_h \cdot s = 115.667\ lbf$
Shear on screw $V := R_v \cdot s = 141\ lbf$

Check, <1, OKAY $\frac{T}{T_a} = 0.609$ $\frac{V}{V_a} = 0.194$

Check, <1, NOT OKAY $\frac{T}{T_a} + \frac{V}{V_a} = 0.803$

Use 1/4-20 TEK screws, spaced at 4" O.C