L. E. STIFFLER, Engineer, LLC
309 West Laurel Avenue
Foley, Alabama 36535

251-943-8501
251-943-8441 (FAX)
randy@lesengr.com

27 May, 2014

City of Orange Beach
PO Box 458
Orange Beach, AL 36561

RE: Orange Beach Fire Station #5

Gentleman:

The contractor EJ builders asked me to verify the foundation slab would carry the load of a 56,000 lb fire truck on a 5" slab, 3000 psi, with 6/6 W2.9/2.9 wire mesh.

I have checked the loads and find no issues with this configuration, assuming the soil has a min. capacity of between 1500 and 2000 psf.

Concrete slab loads are more dependent on the the compaction and quality of the base material and soil. Also note a change from 3000 psi concrete to 4000 psi concrete will increase the factor of safety from 2.7 to 3.1.

Let me know if you have any questions.

Sincerely,

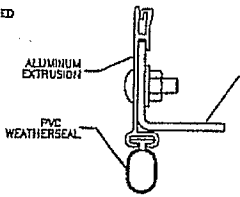
Randy Ray Arp P.E.
Alabama #24556

ALABAMA LICENSED No. 24556 PROFESSIONAL ENGINEER RANDY RAY ARP

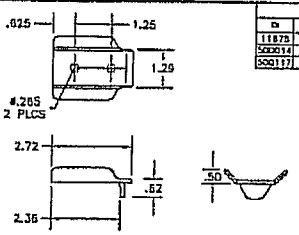
5/27/14

NOTES

1. DESIGNED AND TESTED IN ACCORDANCE WITH FLORIDA BLDG CODE AND INTERNATIONAL BLDG CODE.
2. SPACING IS THE CENTER TO CENTER DIMENSION. BOTTOM FASTENER WITHIN 6 INCHES OF FLOOR.
3. PRESSURES LISTED AS ±DESIGN PSF.
4. CONCRETE JAMBS SHALL BE 3000 PSI CONCRETE MINIMUM.
5. WOOD JAMBS SHALL BE SOUTHERN YELLOW PINE (SP. GR.=0.55) MINIMUM.
6. APPROVED CONCRETE ANCHORS: TAPCON, POWERS POWERBOLT, HILTI KWIKBOLT 3 OR EQUIVALENT.
7. STEEL GAUGE THICKNESSES PER DASMA TDS#154.
8. JAMB CONSTRUCTION AND DESIGN BY OTHERS. JAMBS MUST BE DESIGNED TO WITHSTAND THE MAXIMUM MOMENT, NORMAL, AND PARALLEL FORCES IMPOSED ON THEM BY THE DOOR, AS LISTED BELOW:
   GUIDE 1: MOMENT= 1183 IN-LBS PER FT OF DOOR HEIGHT
   NORMAL= 188 LBS/FT OF DOOR HEIGHT
   PARALLEL = 358 LBS/FT OF DOOR HEIGHT
   GUIDE 2: MOMENT= 1777 IN-LBS PER FT OF DOOR HEIGHT
   NORMAL= 248 LBS/FT OF DOOR HEIGHT
   PARALLEL= 848 LBS/FT OF DOOR HEIGHT



BOTTOM BAR DETAIL
P/N 220018

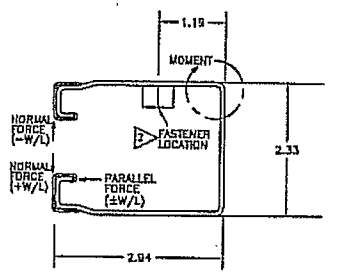


WINDLOCK DETAIL
THREE WINDLOCKS PER FOOT HEIGHT
P/N 220130

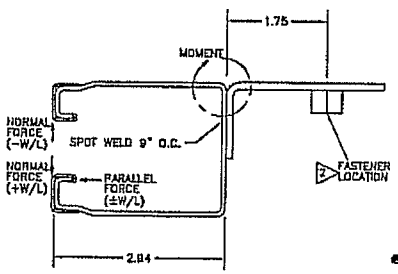
REVISIONS				
ECN	REV	DESCRIPTION	DATE	APPROVAL
11875	—	RTF PER EN	9/8/04	LK
500014	A	REVISE PER ER	3/13/09	JWP
500117	B	REVISE PER ER	7/2/09	JWP

John E Scates 7/2/09
JOHN E. SCATES, P.E. FL PE #31737 3121 TARGATE CARROLLTON, TX 75

FL # 12111-R2



SECTION A-A GUIDE 1
(STEEL JAMB UP TO 14' WIDE OPENING – AS INDICATED IN CHART B)
DEEP GUIDE (14 GA) ASSY DETAIL DWG# 220186
(STEEL JAMB SHOWN)



SECTION A-A (ROTATED) GUIDE 2
DEEP GUIDE (14 GA) W/WALL ANGLE (1.33 x 2.75 x 11 GA) ASSY DETAIL DWG# 220186
MASONRY/WOOD JAMBS ALL SIZES
STEEL JAMBS 14'-1" TO 20'-0" WIDE OPENING
(STEEL JAMB SHOWN)

GUIDE 1 SPECIFICATION

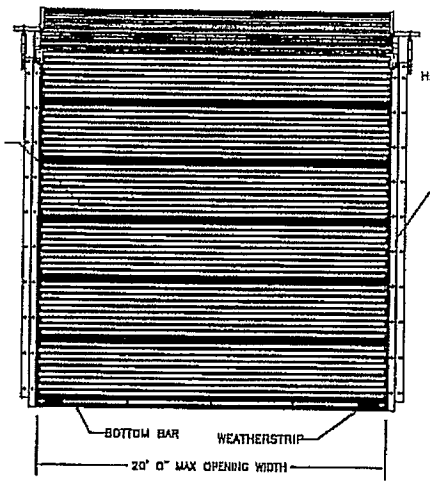
	JAMB TYPE	22/-22 psf	26/-26 psf	31/-31 psf	36/-36 psf	41/-41 psf
8' Wide	STEEL	S1	S1	S1	S2	S2
	CONCRETE	C1	C1	C1	C1	C1
	WOOD	W1	W1	W1	W1	W1
10' Wide	STEEL	S1	S2	S2	S2	S2
	CONCRETE	C1	C1	C1	USE GUIDE 2	USE GUIDE 2
	WOOD	W1	W1	W1	W1	USE GUIDE 2
12' Wide	STEEL	S2	S2	S3		
	CONCRETE	C2	USE GUIDE 2	USE GUIDE 2		
	WOOD	W1	USE GUIDE 2	USE GUIDE 2		
14' Wide	STEEL	S3	S3			
	CONCRETE	USE GUIDE 2	USE GUIDE 2			
	WOOD	USE GUIDE 2	USE GUIDE 2			

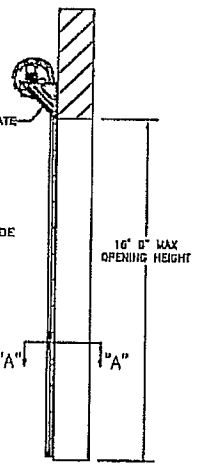
GUIDE 2 SPECIFICATION

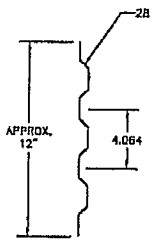
	JAMB TYPE	22/-22 psf	26/-26 psf	31/-31 psf	36/-36 psf	41/-41 psf
8' Wide	STEEL	USE GUIDE 1	USE GUIDE 1	USE GUIDE 1	USE GUIDE 1	USE GUIDE 1
	CONC SCREW	C1	C1	C1	none	none
	CONC ANCHOR	C4	C4	C4	C4	C4
	WOOD	W2	W2	W3	W3	W3
10' Wide	STEEL	USE GUIDE 1	USE GUIDE 1	USE GUIDE 1	USE GUIDE 1	USE GUIDE 1
	CONC SCREW	C1	C1	C1	none	none
	CONC ANCHOR	C4	C4	C4	C4	C4
	WOOD	W2	W3	W3	W3	W3
12' Wide	STEEL	USE GUIDE 1	USE GUIDE 1	USE GUIDE 1	S3	S3
	CONC SCREW	C1	C1	C1	none	none
	CONC ANCHOR	C4	C4	C4	C4	C4
	WOOD	W2	W3	W3	W3	W3
14' Wide	STEEL	USE GUIDE 1	USE GUIDE 1	S3	S3	
	CONC SCREW	C1	C1	C1	none	
	CONC ANCHOR	C4	C4	C4	C4	
	WOOD	W2	W3	W3	W3	
16' Wide	STEEL	S2	S3	S3		
	CONC SCREW	C1	C1	C1		
	CONC ANCHOR	C4	C4	C4		
	WOOD	W3	W3	W3		
18' Wide	STEEL	S3	S3			
	CONC SCREW	C1	C1			
	CONC ANCHOR	C4	C4			
	WOOD	W3	W3			
20' Wide	STEEL	S3				
	CONC SCREW	C1				
	CONC ANCHOR	C4				
	WOOD	W3				

JAMB AND FASTER DEFINITIONS

FASTENER:	
S1	1/4"-20 SELF DRILLING SCREW 12" SPACING JAMB STEEL 14 GA THICK MIN.
S2	1/4"-20 SELF DRILLING SCREW 12" SPACING JAMB STEEL 12 GA THICK MIN.
S3	1/4"-20 SELF DRILLING SCREW 6" SPACING JAMB STEEL 12 GA THICK MIN.
C1	1/4" TAPCON, 1.75" EMBED 12" SPACING
C2	1/4" TAPCON, 1.75" EMBED 6" SPACING
C3	5/16" TAPCON, 2.25" EMBED 12" SPACING
C4	3/8" POWERS POWERBOLT OR 3/8" HILTI KWIKBOLT 3, 3" EMBED 12" SPACING
W1	1/4" X 2.5" LAG SCREW 12" SPACING
W2	3/8" X 2.5" LAG SCREW 12" SPACING
W3	3/8" X 2.5" LAG SCREW 6" SPACING







CURTAIN DETAIL
P/N 220000

REF DWG	USED ON

UNLESS OTHERWISE SPECIFIED: WHOLE NUMBERS: ±.28; .X ±.1; .XX ±.03; .XXX ±.010; ANGLES: ±1°; HOLES: ±

FINISH: NONE
UNIT OF MEASURE: EACH
MATERIAL: N/A

DRAWN BY	C. BLUME	9/10/04
DESIGNED BY	G. FINEMAN	9/10/04
APPROVED BY	L. KRUPKE	9/10/04

DRAWING TITLE: WINDLOAD, 700 CW, +/-22 PSF THRU +/-41 PSF
DRAWING NUMBER: D- 220185
SCALE: NONE SHEET 1 OF 1

Basic Wind Speed	170	mph
Exposure Category	B	

Structure Information

Building Length	60	ft
Building Width	40	ft
Mean Roof Height	16	ft
Roof Angle	> 10°	
Enclosure Classification	Enclosed	

Door Information

Door Width	12	ft
Door Height	14	ft
Distance From Edge of Door to Corner of Building	6	ft

Positive Design Pressure	**26.1 psf**
Negative Design Pressure	**-28.8 psf**

L.E. Stiffler, Engineer LLC

Project :	OB Fire Station	**File :**	140504
Subject :	170 wind load	**Date :**	8/15/2014
Location :	Orange Beach, AL	**Eng :**	RRA

Desgin Wind Pressure, p, Equation 30.4-1 (ASCE 7-10).

System Type	Structure Type	Equation
Components and Cladding (Envelope Procedure)	Low-Rise Buildings with h <= 60 ft Gabled & Hipped Roofs	*p* : qh[(GCp) – (GCpi)] qh : velocity pressure at h GCp : Figures 30.4-1 & 30.4-2 GCpi : Table 26.11-1

Velocity Pressure Calculations:

Velocity pressure qh is calculated in accordance with section 30.3.

qh = Velocity pressure @ mean roof height (h)

qh = Constant · Kh · Kzt · Kd · V^2 (Eq 30.3-1)

Where : Constant	=	Numerical Constant	(Section C27.3.2)
	=	½ · [(Air density lb/ cu ft) / (32.2 ft/s^2)] ·[(mi/h)(5280 ft/mi) · (1 hr/3600 s)] ^{2}	
	=	0.00256	
Mean Sea Level	=	10.00 ft	
Air Density @MSL	=	0.0765 lb/cu ft	(Table C27.3-2)
Occupancy Category	=	III	(Table 1.5-1)
Exposure Category	=	B	(Section 26.7.3)
α	=	7.00	(Table 26.9-1)
Zg	=	1,200.00 ft	(Table 26.9-1)
Basic Wind Speed	=	170.00 mph	(Figure 26.5-1 A-C)
Mean Roof Height	=	16.00 ft	
Where : Kh	=	Velocity pressure coefficient @ height h	
	=	2.01·(Z/Zg) ^ (2/α) for 15 ft <= Z <= Zg	(Table 30.3-1)
	=	2.01 · (15/Zg) ^ (2/α) for Z < 15 ft	
	=	0.70	
Kzt	=	Topographic factor	(Figure 26.8-1)
	=	(1 + K1 · K2 · K3) ^{2}	
Topography	=	None	
Kzt @h	=	1.00	
Kd	=	Wind directionality factor	(Table 26.6-1)
	=	0.85	
qh	=	44.06 (psf)	

L.E. Stiffler, Engineer LLC

Project :	OB Fire Station	**File :**	140504
Subject :	170 wind load	**Date :**	8/15/2014
Location :	Orange Beach, AL	**Eng :**	RRA

Internal Pressure Coefficient, GCpi, Table 26.11-1

Enclosure Classification	GCpi+	GCPi-	Aog (sq. ft.)	Vi (cu. ft.)	Ri	GCpi+	GCPi-
Enclosed Buildings	0.18	-0.18	60	5,000,000	1.00	0.18	-0.18

External Pressure Coefficients, GCp, Figure 30.4-2 (roof) and Figure 30.4-1 (walls)

Zone	Area (sq. ft.)	Angle (deg)	GCp+	GCp-	GCp R. O.
1	150.00	9.76	0.30	-0.80	-
2	150.00	9.76	0.30	-1.20	-2.20
3	150.00	9.76	0.30	-2.00	-2.50
4	150.00	All	0.71	-0.80	-
5	150.00	All	0.71	-0.89	-

Values of GCp for walls (zone 4 & 5) were reduced by 10%

Design Wind Pressure, p, Equation 30.4-1.

Zone	qh (psf)	GCp+	GCp-	GCpi+	GCpi-	p1+ (psf)	p2+ (psf)	p1- (psf)	p2- (psf)
1	44.06	0.30	-0.80	0.18	-0.18	5.29	21.15	-43.18	-27.32
2	44.06	0.30	-1.20	0.18	-0.18	5.29	21.15	-60.80	-44.94
3	44.06	0.30	-2.00	0.18	-0.18	5.29	21.15	-96.05	-80.18
4	44.06	0.71	-0.80	0.18	-0.18	23.49	39.35	-43.31	-27.45
5	44.06	0.71	-0.89	0.18	-0.18	23.49	39.35	-46.97	-31.11

Positive and negative values of external and internal pressures are combined to determine four possible pressures:

p1+ uses GCp+ and GCpi+ *p1- uses GCp- and GCpi+*

p2+ uses GCp+ and GCpi- *p2- uses GCp- and GCpi-*

Roof Overhang Pressure, p, Equation 30.10-1.

Wind pressures acting on the roof overhang (soffit pressures not included).

Zone	qh (psf)	GCp- (R.O.)	GCpi+	GCpi-	p1- (psf)	p2- (psf)
1	44.06	-1.00	0.18	-0.18	-51.99	-36.13
2	44.06	-2.20	0.18	-0.18	-104.86	-89.00
3	44.06	-2.50	0.18	-0.18	-118.07	-102.21

L.E. Stiffler, Engineer LLC

Project :	OB Fire Station	**File :**	140504
Subject :	170 wind load	**Date :**	8/15/2014
Location :	Orange Beach, AL	**Eng :**	RRA

Design Wind Pressure,p,Equation 28.4-1 (ASCE 7-10)

System Type	Structure Type	Equation
Main Wind Force Resisting System (Envelope Procedure)	Rigid Structures Low-Rise Buldings	*p* : qh·[(GCpf) - (GCpi)] qh : velocity pressure at h GCpf : Figure 28.4-1 GCpi : Table 26.11-1

Velocity Pressure Calculations:

Velocity pressure qh is calculated in accordance with section 28.3.2.

qh=Velocity pressure @ mean roof height (h)

qh = Constant · Kh · Kzt · Kd · V^2 (Eq 28.3-1)

Where : Constant	=	Numerical Constant	
	=	½ · [(Air density lb/ cu ft) / (32.2 ft/s^2)] ·[(mi/h)(5280 ft/mi) · (1 hr/3600 s)] ^{2}	(Section C27.3.2)
	=	0.00256	
Mean Sea Level	=	10 ft	
Air Density @MSL	=	0.0765 lb/cu ft	(Table C27.3-2)
Occupancy Category	=	III	(Table 1.5-1)
Exposure Category	=	B	(Section 26.7.3)
α	=	7.00	(Table 26.9-1)
Zg	=	1,200.00 ft	(Table 26.9-1)
Basic Wind Speed	=	170.00 mph	(Figure 26.5-1 A-C)
Mean Roof Height	=	16.00 ft	
Where : Kh	=	Velocity pressure coefficient @ height h	
	=	2.01·(Z/Zg) ^ (2/α) for 15 ft <= Z <= Zg	(Table 28.3-1)
	=	2.01 · (15/Zg) ^ (2/α) for Z < 15 ft	
	=	0.70	
Kzt	=	Topographic factor	(Figure 26.8-1)
	=	(1 + K1 · K2 · K3) ^{2}	
Topography	=	None	
Kzt @h	=	1.00	
Kd	=	Wind directionality factor	(Table 26.6-1)
	=	0.85	
qh	=	44.06 (psf)	

L.E. Stiffler, Engineer LLC

Project :	OB Fire Station	**File :**	140504
Subject :	170 wind load	**Date :**	8/15/2014
Location :	Orange Beach, AL	**Eng :**	RRA

Internal Pressure Coefficient, GCpi, Table 26.11-1

Enclosure Classification	GCpi+	GCPi-	Ri	GCpi+	GCPi-
Enclosed Buildings	0.18	-0.18	1.00	0.18	-0.18

External Pressure Coefficient, GCpf, Figure 28.4-1 (Load Case A)

	Building Surface							
Roof Angle	1	2	3	4	1E	2E	3E	4E
9.76 deg.	0.44	-0.69	-0.40	-0.33	0.67	-1.07	-0.58	-0.50

Design Wind Pressure, p, (psf) Equation 28.4-1 (Load Case A)

Building Surface	Cp	qh (psf)	GCpi +	GCpi -	p+ (psf)	p- (psf)
1	0.44	44.06	0.18	-0.18	11.51	27.37
2	-0.69	44.06	0.18	-0.18	-38.33	-22.47
3	-0.40	44.06	0.18	-0.18	-25.77	-9.91
4	-0.33	44.06	0.18	-0.18	-22.66	-6.80
1E	0.67	44.06	0.18	-0.18	21.60	37.46
2E	-1.07	44.06	0.18	-0.18	-55.07	-39.21
3E	-0.58	44.06	0.18	-0.18	-33.52	-17.66
4E	-0.50	44.06	0.18	-0.18	-29.81	-13.95

p+ uses GCpi+ p- uses GCpi-

Design Wind Pressure for Overhang, p, Section 28.4.3. (Load Case A)

The design equation has been modified to qh·[(GCpf) - (Underside GCp)] for overhang pressures;

0.70 is used for Underside GCp.

Roof Zone	2	2E
Pressure (psf)	-61.24	-77.98

L.E. Stiffler, Engineer LLC

Project :	OB Fire Station	**File :**	140504
Subject :	170 wind load	**Date :**	8/15/2014
Location :	Orange Beach, AL	**Eng :**	RRA

External Pressure Coefficient, GCpf, Figure 28.4-1 (Load Case B)

	Building Surface											
Roof Angle	1	2	3	4	5	6	1E	2E	3E	4E	5E	6E
9.76 deg.	-0.45	-0.69	-0.37	-0.45	0.40	-0.29	-0.48	-1.07	-0.53	-0.48	0.61	-0.43

Design Wind Pressure, p, (psf) Equation 28.4-1 (Load Case B)

Building Surface	Cp	qh (psf)	GCpi +	GCpi -	p+ (psf)	p- (psf)
1	-0.45	44.06	0.18	-0.18	-27.76	-11.90
2	-0.69	44.06	0.18	-0.18	-38.33	-22.47
3	-0.37	44.06	0.18	-0.18	-24.23	-8.37
4	-0.45	44.06	0.18	-0.18	-27.76	-11.90
5	0.40	44.06	0.18	-0.18	9.69	25.55
6	-0.29	44.06	0.18	-0.18	-20.71	-4.85
1E	-0.48	44.06	0.18	-0.18	-29.08	-13.22
2E	-1.07	44.06	0.18	-0.18	-55.07	-39.21
3E	-0.53	44.06	0.18	-0.18	-31.28	-15.42
4E	-0.48	44.06	0.18	-0.18	-29.08	-13.22
5E	0.61	44.06	0.18	-0.18	18.94	34.81
6E	-0.43	44.06	0.18	-0.18	-26.88	-11.01

p+ uses GCpi+ p- uses GCpi-

Design Wind Pressure for Overhang, p, Section 28.4.3. (Load Case B)

The design equation has been modified to qh·[(GCpf) - (Underside GCp)] for overhang pressures;

0.70 is used for Underside GCp.

Roof Zone	2	2E
Pressure (psf)	-61.24	-77.98