



2/22/2010

**Project:** Supporting girder for rear balcony guardrail.  
**Address:** 333 Pilgrim Rd  
West Palm Beach, FL 33405

This letter subscribes a beam girder to support 2<sup>nd</sup> floor balcony guardrails of the aforementioned property with a maximum span of 7 ft. and 7 inches. The candidate guardrail shall be supported by aluminum beam girder TS3x3x.188 (3" X 3" with 3/16" thickness). The girder aluminum materials shall be 60631-T5 alloy or better. This beam girder meets the load requirements for railing under sections 1607.7.1 and 1610.4.6 of Florida Building code 2007 and Section 4.4, Chapter 4, ASCE 7-05. The design calculations and specifications are enclosed in appendix A.

The candidate guardrail shall be attached to the surface contact between the bottom railing and the top edge of the girder. The center line of the vertical axis of both the bottom railing flange and the top edge of the girder shall be in the same vertical line. The railing shall be fastened to the girder top surface using (4) 1/4" x 3/4" screws.

The girder shall be attached to the main structure using (4) 3/4" x 3" angles (3"X3" and 3" long) of similar alloy to that of the girder. The angles shall be fastened to the bottom surface of girder using (4) 1/4" x 3/4" screws. Vertical leg shall be connected to post using (4) 1/4" x 3/4" screws. New holes shall be located 3/4" from the edges. Allow for 1/4" expansion gap between girder. Builder shall provide a guardrail whose product approval conforms with the mentioned specifications. Design assumes a sound main structure.

SEAL

AL ALI, PhD, PE  
FL PE # 53318



## Appendix A

# Aluminum Beam design Calculations

Project: Support for under floor air conditioning  
Address: 3337 Palm Jumeirah Road, Palm Jumeirah, Dubai, U.A.E.  
Website: www.uefirm.com

**Job:** 333 Pilgrim, WPB, FL

**Description:** Balcony Guardrail Supporting Girder

**Time:** Sat Feb 20 15:14:13 2010

**Designed By:** A.A.

**Checked By:** A.A.

**Program:** Aluminum Design 2.0

**50 p/ft loading**

**GENERAL INFORMATION**

Description	Value	Description	Value
Run Mode	Check Mode	Total Load Deflection Limit	L / 240
Design Code	Aluminum Association 1986	Live Load Deflection Limit	L / 360
Member Length	7.600	Lateral Torsional Braced (LTB) Length	7.63 ft
Alloy	6061-T6	Section Shape	
Max Compression	200	Maximum Section Depth	
Max Tension	300	Minimum Section Depth	
% Tens. Area Reduction	15.000	Minimum Spacing (double angles only)	
L <sub>x</sub>		Minimum Spacing (double angles only)	
L <sub>y</sub>		Section Size	3x3x.188
K <sub>x</sub>		Weld	
K <sub>y</sub>		Weld	No

**LOAD INFORM**

Ref. No.	Load Case	Load Type	Dir	Value	End Position
1	Live	Linear		50 (kips / ft)	7.600 (ft)
2	Live	Linear		50 (kips / ft)	7.600 (ft)

DESIGN OPTION: 1

ELEMENTS: 1

MODE: CHECK

DESCRIPTION	DESIGN CODE	ALLOY	MEMBER LENGTH	TENS AREA REDUCTION	STRESS	LL DEFL	TOT DEFL	COMP	KLR
TENS KLR									
Element 1	Aluminum Association 1986	6061-T6	7.600	15.000%	1.000	L/360	L/240	200	
300									

AXIAL BUCKLING

LATERAL TORSIONAL BUCKLING





AXIS LB K BRACED LENGTHS (LIST)

AXIS	LB	K	BRACED LENGTHS (LIST)
X	8.00 Ft	1.000	7.6 Ft
Y	8.00 Ft	1.000	

DESIGN FORCES

ELEM NO	LOAD COMB	END	AXIAL	SHEAR X	SIGN CONVENTION : BEAM DESIGNERS		DIST	SHEAR Y	MOMENT X	MAX MOM	DIST
					MOMENT Y	MAX MOM					
			K	K	K -Ft	K -Ft	Ft	K	K -Ft	K -Ft	Ft
1	1	NE	0.00	-0.30	0.00	-0.58	3.80	-0.30	0.00	-0.58	3.80
		PE	0.00	0.30	0.00	0.30		0.30	0.00		

LOAD COMBINATIONS :  
 COMB 1 : 1.20 X LOAD CASE 1  
 + 1.60 X LOAD CASE 2

ELEM NO	SHAPE	CRIT	LOAD COMB	RATIO
1	TS3x3x.156	DEFL	1	0.41
1	TS3x3x.188	DEFL	1	0.35

ACTUAL/SHAPE/ALLOW	TOTAL LOAD		ACTUAL LIVE LOAD		DEFLECTIONS	
	Dx	COMB	Dx	COMB	ALLOW	Dy
	In		In			In
TS3x3x.156	0.250	1	0.66	1	0.99	0.250
0.99						
TS3x3x.188	0.215	1	0.57	1	0.85	0.215
0.85						

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**200 conc. loading**

**GENERAL INFORMATION**

Description	Value	Description	Value
Run Mode	Check Mode	Total Load Deflection Limit	L / 240
Design Code	Aluminum Association 1986	Live Load Deflection Limit	L / 360
Member Length	7.60 ft	Minimum Lateral Braced (LTB) Length	63 ft
Alloy	6061-T6	Section Shape	
Max Compression	200	Maximum Section Depth	
Max Tension	300	Minimum Section Depth	
% Tens. Area Reduction	15.000%	Minimum Spacing (double angles only)	
L <sub>x</sub>		Minimum Spacing (double angles)	
L <sub>y</sub>		Section Size	3x3x.188
K <sub>x</sub>		Minimum Spacing (double angles)	
K <sub>y</sub>		Wall	No

**LOAD INFORM**

Ref. No.	Load Case	Load Type	Dir	Span	Value	End Position
1	Dead	Concen				-
2	Live	Concen				-
3	Live	Concen				-

DESIGN OPTION: 1  
ELEMENTS: 1  
MODE: CHECK

DESCRIPTION	DESIGN CODE	ALLOY	MEM	SPAN LENGTH	TENS AREA REDUCTION	STRESS	LL DEFL	TOT DEFL	COMP	KLR	TENS
KLR				Ft							
Element 1 300	Aluminum Association 1986	6061-T6	CHECK	7.600	15.000%	1.000	L/360	L/240		200	



# UNIVERSAL ENGINEERING, INC.

AXIS	LB	K	AXIAL BUCKLING BRACED LENGTHS (LIST)	LATERAL TORSIONAL BUCKLING
X	7.60 Ft	1.000	7.6 Ft	
Y	7.60 Ft	1.000		

ELEM NO	LOAD COMB	END	SIGN CONVENTION : BEAM DESIGNERS									
			AXIAL	SHEAR X	MOMENT Y	MAX MOM	DIST	SHEAR Y	MOMENT X	MAX MOM	DIST	
			K	K	K -Ft	K -Ft	Ft	K	K -Ft	K -Ft	Ft	
1	1	NE	0.00	-0.16	0.00	-0.61	3.80	-0.16	0.00	-0.61	3.80	
		PE	0.00	0.16	0.00	0.16		0.16	0.00			

LOAD COMBINATIONS :  
 COMB 1 : 1.20 X LOAD CASE 1  
 + 1.60 X LOAD CASE 2

ELEM GOVNO CRIT	SHAPE	STRESS RATIO	LOAD COMB
1	TS3x3x.156	0.43	1
1	TS3x3x.188	0.37	1

ACTUAL/SHAPE	TOTAL LOAD		ACTUAL/ALLOW		LIVE LOAD		DEFLECTIONS		LOAD ALLOW	
	Dx	COMB	Dx	COMB	Dx	COMB	ALLOW	Dy	COMB	ALLOW
		In	In	In	In	In	In	In	In	In
TS3x3x.156	0.211	1	0.55	0.55	0.211	1	0.83	0.211	1	0.83
TS3x3x.188	0.181	1	0.48	0.48	0.181	1	0.71	0.181	1	0.71