Civil & Structural Engineering Design Services Pty. Ltd.

Client: **Extreme Marquees Pty Ltd**
Project: Design check – 2.4m × 2.4m, 3m × 3m, 3m × 4.5m, 3m × 6m, 4m × 4m, 4m × 6m & 4m × 8m Tectonic Range Folding Marquees Structure for 60km/hr Wind Speed
Reference: Extreme Marquees Technical Data

Report by: KZ
Checked by: EAB
Date: 24/02/2017

JOB NO: E-11-265-134-4

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1 Introduction

The following structural drawings and calculations are for the applicable transportable tents supplied by Extreme Marquees Pty Ltd.

The report examines the effect of 3s gust wind of 50 km/hr on 4m x8 m Folding Marquees as the worst case scenario. The relevant Australian Standards AS1170.0:2002 General principles, AS1170.1:2002 Permanent, imposed and other actions and AS1170.2:2011 Wind actions are used. The design check is in accordance with AS/NZS 4100:1998 Steel Structures.

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2 Design Restrictions and Limitations

2.1 The erected structure is for temporary use only.

2.2 It should be noted that if high gust wind speeds are anticipated or forecast in the locality of the tent, the temporary erected structure should be folded.

2.3 For forecast winds in excess of **(refer to summary)** the structure should be completely folded.

(Please note that the locality squall or gust wind speed is affected by factors such as terrain exposure and site elevations.)

2.4 The structure may only be erected in regions with wind classifications no greater than the limits specified on the attached wind analysis.

2.5 The wind classifications are based upon category 2 in AS. Considerations have also been made to the regional wind terrain category, topographical location and site shielding from adjacent structures. Please note that in many instances topographical factors such as a location on the crest of a hill or on top of an escarpment may yield a higher wind speed classification than that derived for a higher wind terrain category in a level topographical region. For this reason, particular regard shall be paid to the topographical location of the structure. For localities which do not conform to the standard prescribed descriptions for wind classes as defined above, a qualified Structural Engineer may be employed to determine an appropriate wind class for that the particular site.

2.6 The structures in no circumstances shall ever be erected in tropical or severe tropical cyclonic condition.

2.7 The tent structure has not been designed to withstand snow and ice loadings such as when erected in alpine regions.

2.8 For the projects, where the site conditions approach the design limits, extra consideration should be given to pullout tests of the stakes and professional assessment of the appropriate wind classification for the site.

2.9 Design of fabric by others.

2.10 No Fabrics or doors should be used for covering the sides of <u>unbraced</u> Folding Marquees due to the lack of bracing within the system and insufficient out-of-plane stiffness of framing.

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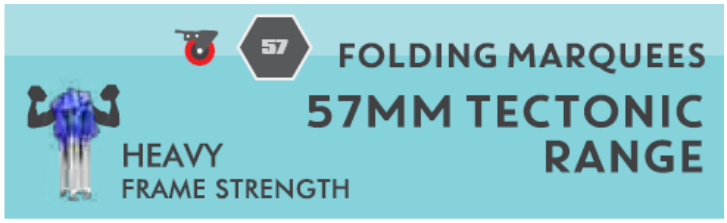
3 Specifications

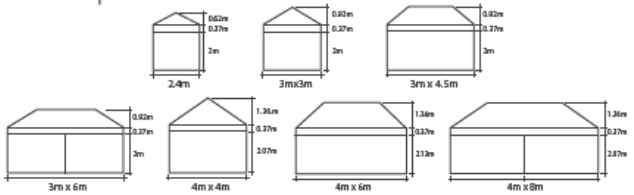
3.1 General

Tent category	
Material	Aluminum 6061 – T6

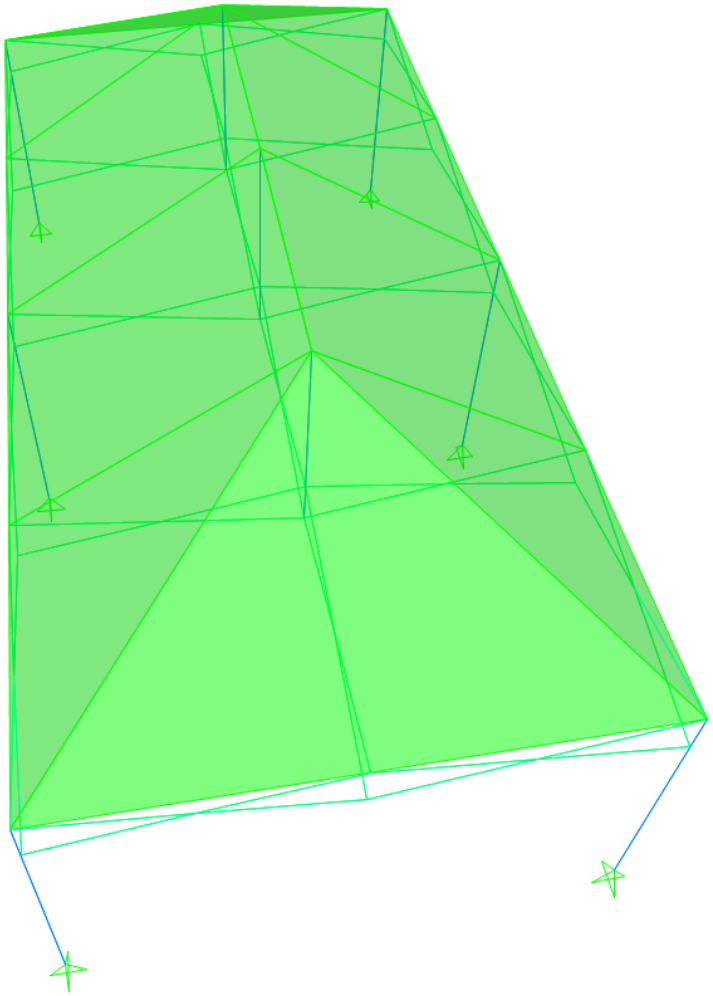
Size	Model
3m x 6m	Folding Marquees – Tectonic Range



The Extreme Tectonic Range is built to last. Built with 57mm hexagonal aluminium legs, the tectonic is the most heavy duty folding marquee on the Australian market. The frame also features pull ring pins for ease of setup, extruded aluminium connectors, steel feet and a spring tensioned roof system. Roofs are PVC coated polyester and available in 8 vibrant colours or can be custom printed.



Size	2.4x2.4	3x3m	3x4.5m	3x6m	4x4m	4x6m	4x8m
Height	2.99m	3.29m	3.29m	3.29m	3.73m	3.73m	3.73m
Clearance	2m						
Frame Box Dimensions	163x 34x33	163x 34x33	163x 46x33	163x 58x33	203x 34x33	208x 46x33	208x 57x33
Frame Weight	30kg	33kg	43kg	56kg	35kg	51kg	69kg
Roof Canopy Weight POLY PVC	5kg 7.5kg	7kg 11kg	10kg 17kg	13kg 19kg	11kg 19kg	15kg 23kg	20kg 31kg
Main Profile	57 x 50 x 2mm						
Truss Bars	36x18						
Material	Reinforced Aluminium						
Framework	6005/T6						
Pull Ring System	Yes						
Roof Tension	Spring						
Fabric	580GSM Imported Belgian PVC or PVC enforced polyester						
Nuts & Bolts	Stainless Steel						
Connectors	Extruded Aluminium						
Feet	Galvanised Steel						
Marquee Includes	Tie Down Ropes, Steel Pins & Protective Cover						
Warranty	10 Year						



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3.2 Section Properties

MEMBER(S)	Section	b	d	t	y_c	A_g	Z_x	Z_y	S_x	S_y	I_x	I_y	J	r_x	r_y
		mm	*mm*	*mm*	*mm*	*mm²*	*mm³*	*mm³*	*mm³*	*mm³*	*mm⁴*	*mm⁴*	*mm⁴*	*mm*	*mm*
Upright Support	Hex 57x50	57	50	2	28.5	332.6	3692.8	3692.8	5324.0	5324.0	106602.0	106602.0	194193.0	17.9	17.9
Truss Bar	36x18x2	18	36	2	18.0	200.0	1764.1	1131.0	2248.0	1348.0	31754.7	10178.7	23674.9	12.6	7.1

4 Design Loads

4.1 Ultimate

		Distributed load (kPa)	Design load factor (-)	Factored imposed load (kPa)
Live	Q	-	1.5	-
Self weight	G	self weight	1.35, 1.2, 0.9	1.2 self weight, 0.9 self weight
3s 60km/hr gust	W	0.138 C_{fig}	1.0	0.138 C_{fig}

4.2 Load Combinations

4.2.1 Serviceability

Gravity = $1.0 \times G$

Wind = $1.0 \times G + 1.0 \times W$

4.2.2 Ultimate

Downward = $1.35 \times G$
= $1.2 \times G + W_u$

Upward = $0.9 \times G + W_u$

5 Wind Analysis

Wind towards surface (+ve), away from surface (-ve)

5.1 Parameters

Terrain category = 2
Site wind speed ($V_{sit,\beta}$) = $V_R M_d (M_{z,cat} M_s M_t)$
V_R = 13.89m/s (50 km/hr) *(regional 3 s gust wind speed)*
M_d = 1
M_s = 1
M_t = 1
$M_{z,cat}$ = 0.91 *(Table 4.1(B) AS1170.2)*
$V_{sit,\beta}$ = 16.67 m/s

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Height of structure (h) = 3 m *(mid of peak and eave)*
Width of structure (w) = 4 m
Length of structure (l) = 8 m

Pressure (P) = $0.5\rho_{air} (V_{sit,\beta})^2 C_{fig} C_{dyn}$
= $0.138 C_{fig}$ kPa

5.2 Pressure Coefficients (C_{fig})

Name	Symbol	Value	Unit	*Notes*	*Ref.*
Input					
Importance level		2			*Table 3.1 - Table 3.2 (AS1170.0)*
Annual probability of exceedance		Temporary			*Table 3.3*
Regional gust wind speed		**60**	Km/hr		*Table 3.1 (AS1170.2)*
Regional gust wind speed	V_R	**16.67**	m/s		
Wind Direction Multipliers	M_d	1			*Table 3.2 (AS1170.2)*
Terrain Category Multiplier	$M_{Z,Cat}$	0.91			*Table 4.1 (AS1170.2)*
Shield Multiplier	M_S	1			*4.3 (AS1170.2)*
Topographic Multiplier	M_t	1			*4.4 (AS1170.2)*
Site Wind Speed	$V_{Site,\beta}$	**15.17**	m/s	$V_{Site,\beta}=V_R*M_d*M_{z,cat}*M_S,M_t$	
Pitch	α	30	Deg		
Pitch	α	0.52	rad		
Width	B	4	m		
Length	D	8	m		
Height	Z	2.95	m		
Wind Pressure					
ρair	ρ	1.2	Kg/m^3		
dynamic response factor	C_{dyn}	1			
Wind Pressure	$\rho*C_{fig}$	**0.138**	Kg/m^2	$\rho=0.5\rho_{air}*(V_{des,\beta})^2*C_{fig}*C_{dyn}$	*2.4 (AS1170.2)*
WIND DIRECTION 1 (θ=0,180)					
4. Free Roof				$\alpha=0^o$	

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Area Reduction Factor	K_a	1			*D7*
local pressure factor	K_l	1			
porous cladding reduction factor	K_p	1			
External Pressure Coefficient **MIN**	$C_{P,w}$	-0.3			
External Pressure Coefficient **MAX**	$C_{P,w}$	0.8			
External Pressure Coefficient **MIN**	$C_{P,l}$	-0.7			
External Pressure Coefficient **MAX**	$C_{P,l}$	0			
aerodynamic shape factor **MIN**	$C_{fig,w}$	-0.30			
aerodynamic shape factor **MAX**	$C_{fig,w}$	0.80			
aerodynamic shape factor **MIN**	$C_{fig,l}$	-0.70			
aerodynamic shape factor **MAX**	$C_{fig,l}$	0.00			
Pressure Windward **MIN**	P	**-0.04**	**kPa**		
Pressure Windward **MAX**	P	**0.11**	**kPa**		
Pressure Leeward **MIN**	P	**-0.10**	**kPa**		
Pressure Leeward **MAX**	P	**0.00**	**kPa**		

WIND DIRECTION 2 (θ=90,270)

4. Free Roof				*α=180°*	*D7*
Area Reduction Factor	K_a	1			
local pressure factor	K_l	1			
porous cladding reduction factor	K_p	1			
External Pressure Coefficient **MIN**	$C_{P,w}$	-0.3			
External Pressure Coefficient **MAX**	$C_{P,w}$	0.4			
External Pressure Coefficient **MIN**	$C_{P,l}$	-0.4			
External Pressure Coefficient **MAX**	$C_{P,l}$	0			
aerodynamic shape factor **MIN**	$C_{fig,w}$	-0.30			
aerodynamic shape factor **MAX**	$C_{fig,w}$	0.40			
aerodynamic shape factor **MIN**	$C_{fig,l}$	-0.40			
aerodynamic shape factor **MAX**	$C_{fig,l}$	0.00			

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Pressure **MIN (Windward Side)**	P	**-0.04**	**kPa**		
Pressure **MAX (Windward Side)**	P	**0.06**	**kPa**		
Pressure **MIN (Leeward Side)**	P	**-0.06**	**kPa**		
Pressure **MAX (Leeward Side)**	P	**0.00**	**kPa**		

5.2.1 Pressure summary

WIND EXTERNAL PRESSURE	Direction1		Direction2		
	Min (Kpa)	Max (Kpa)		Min (Kpa)	Max (Kpa)
W	-0.04	0.11	**W**	-0.04	0.06
L	-0.10	0.00	**L**	-0.06	0.00

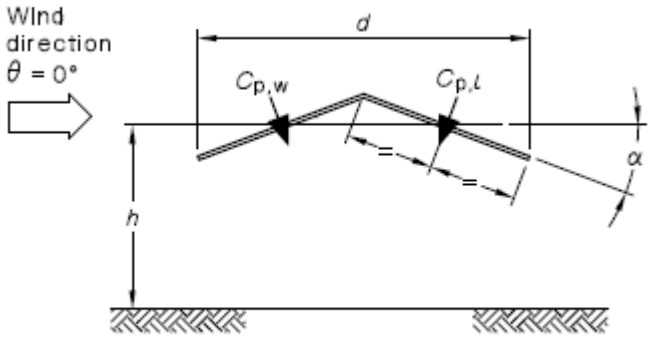
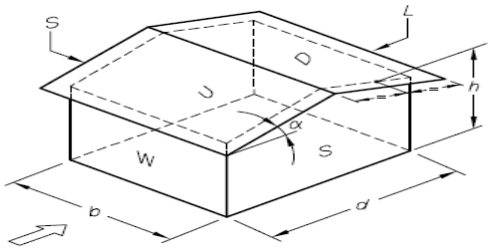
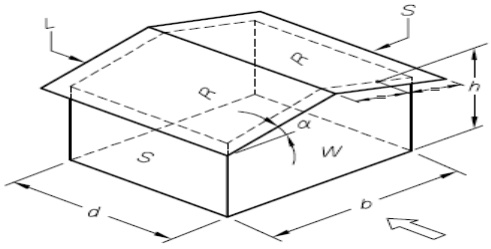


FIGURE D3 PITCHED FREE ROOFS



Direction 1



Direction 2

AS1170.2

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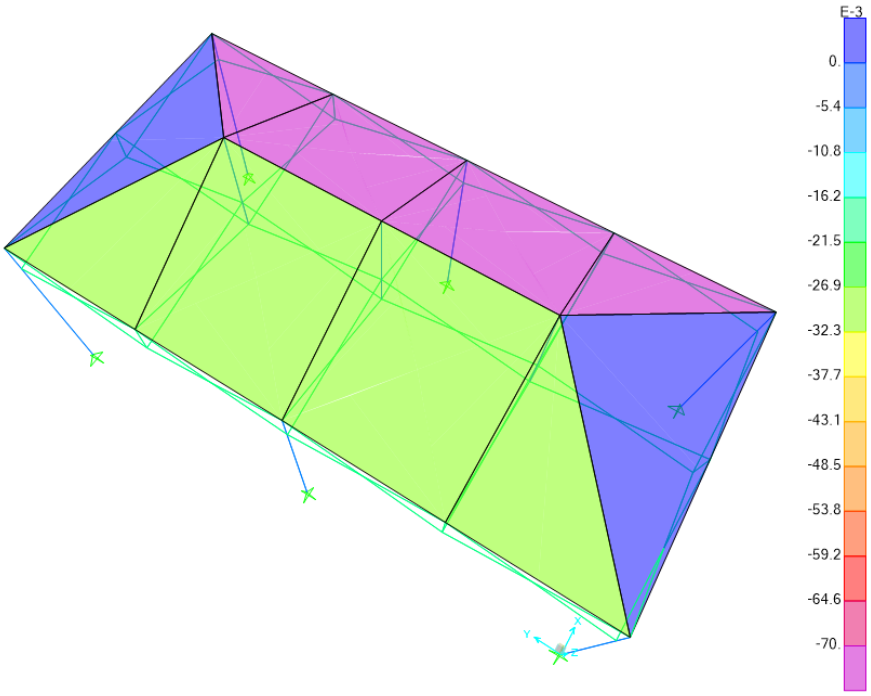
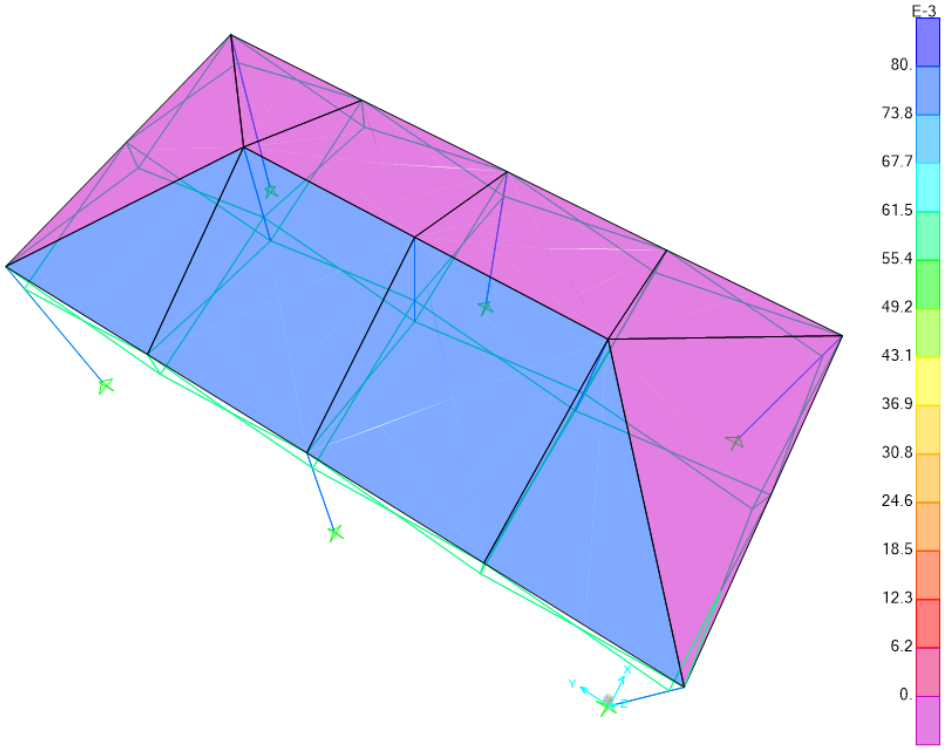
5.3 Wind Load Diagrams

5.3.1 Wind 1(case 1)



5.3.2 Wind 1(case 2)



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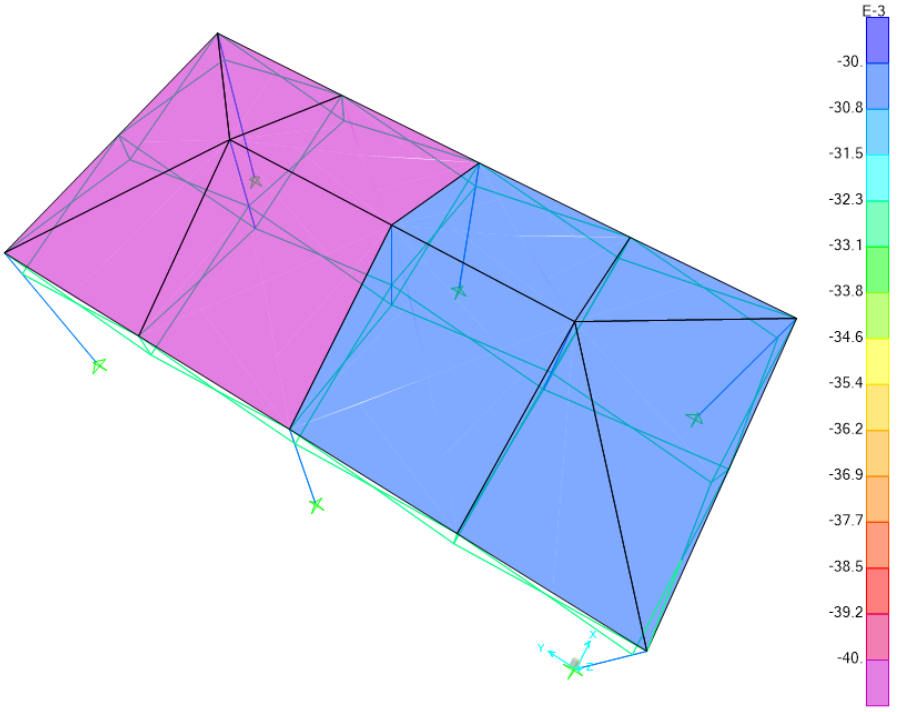
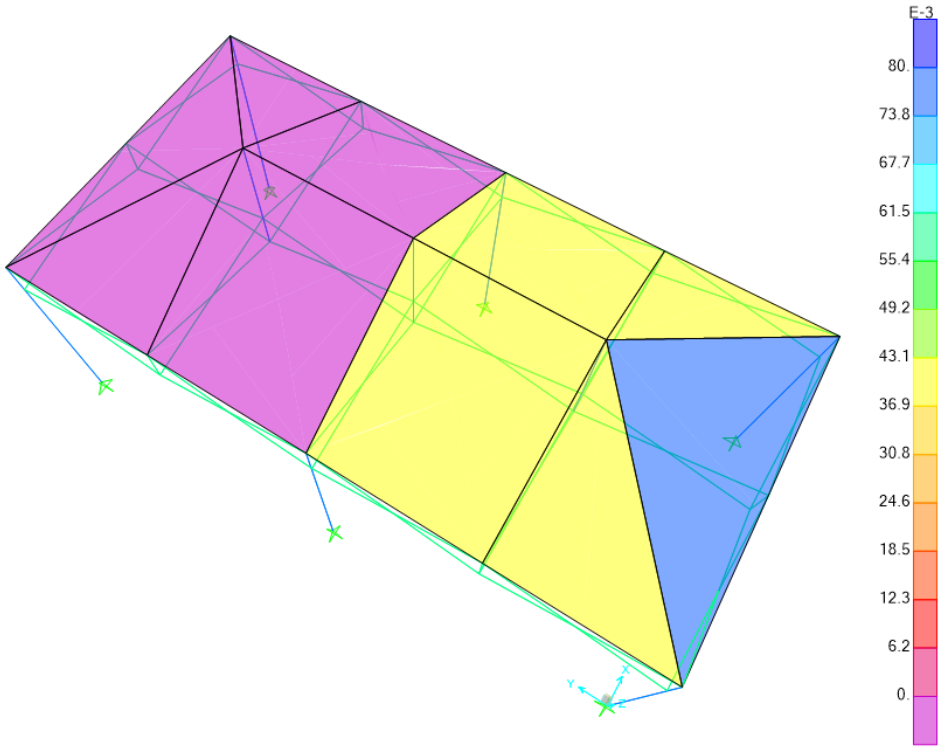
5.3.3 Wind 2(Case1)



5.3.4 Wind 2(case 2)



After 3D model analysis, each member is checked based on adverse load combination.
In this regard the maximum bending moment, shear and axial force due to adverse load combinations for each member are presented as below:

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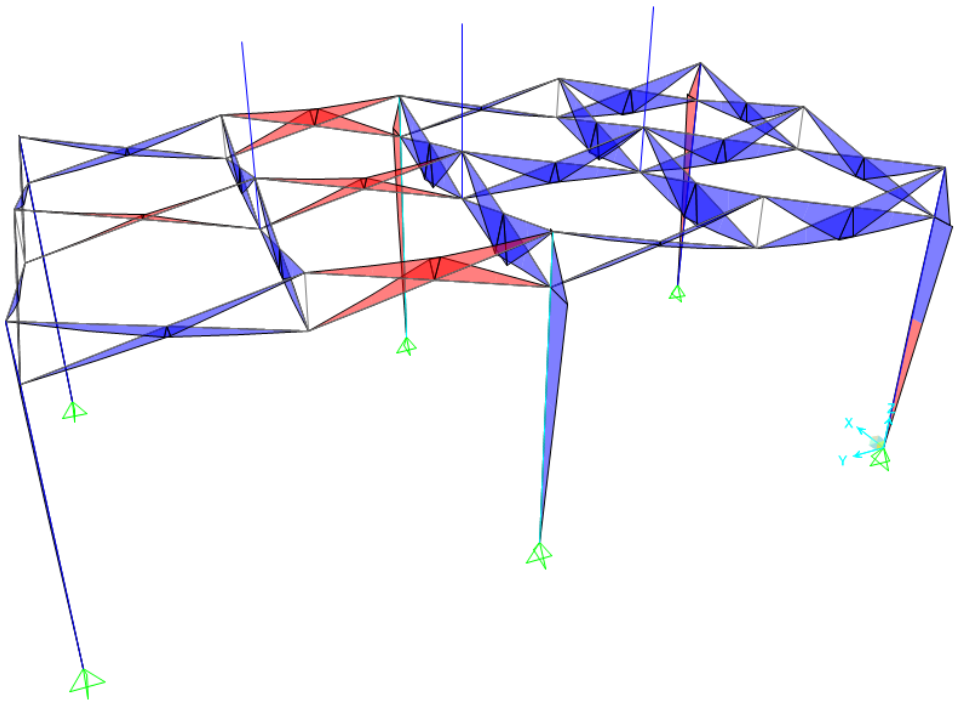
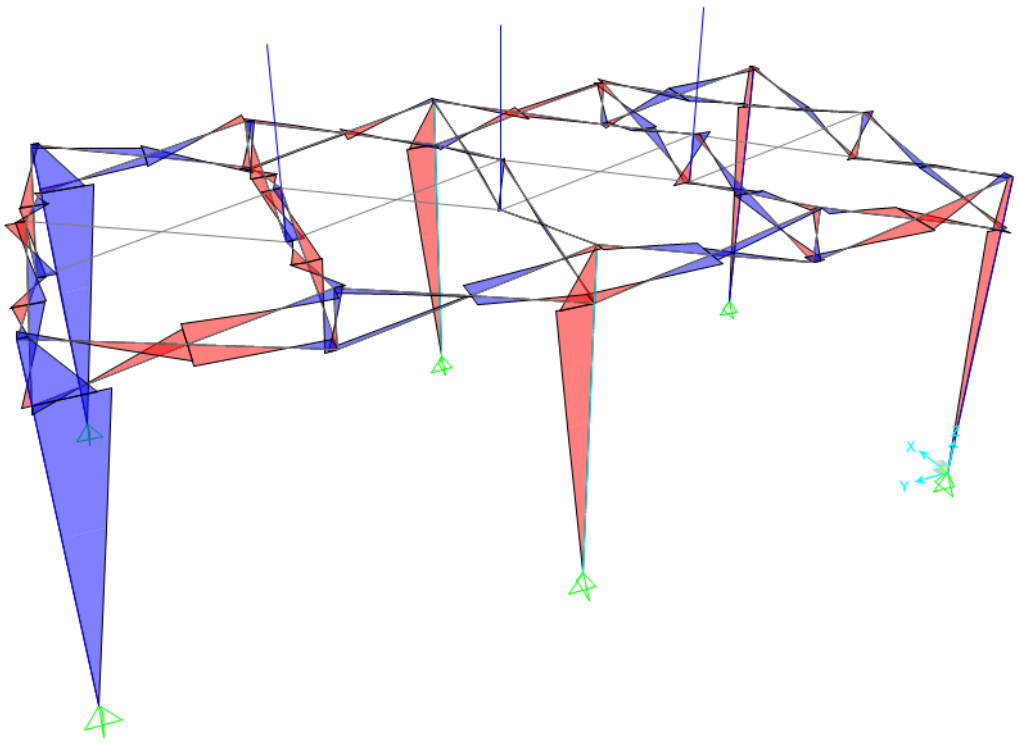
5.3.5 Max Bending Moment due to critical load combination in major axis



5.3.6 Max Bending Moment in minor axis due to critical load combination



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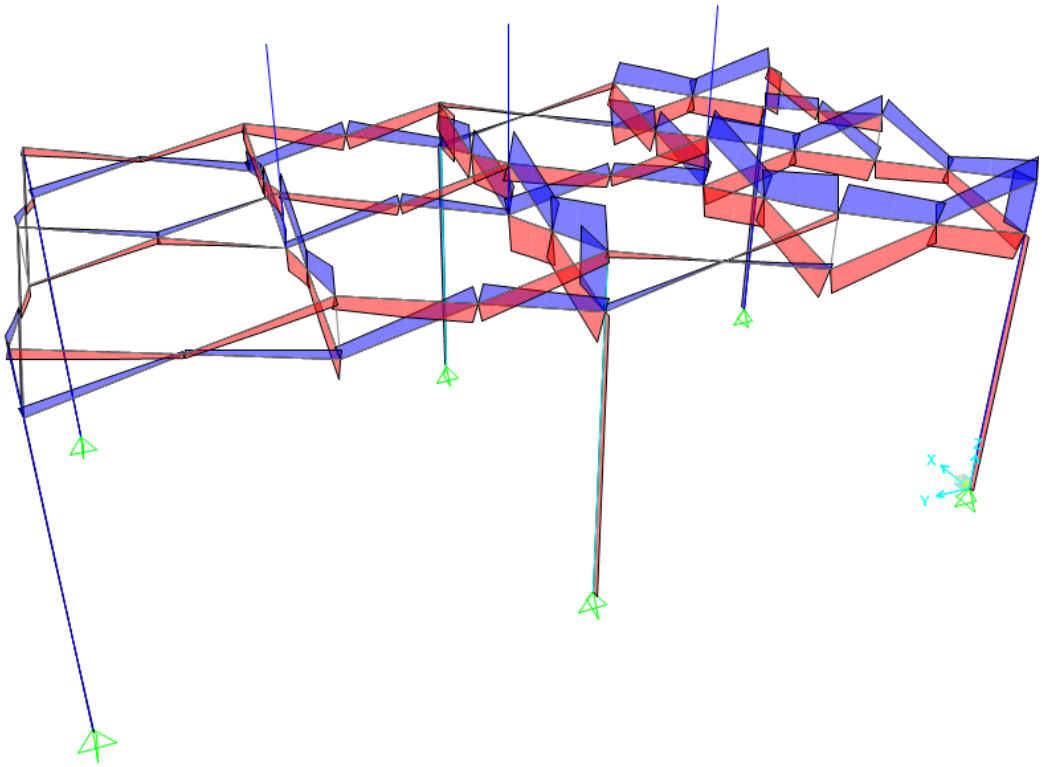
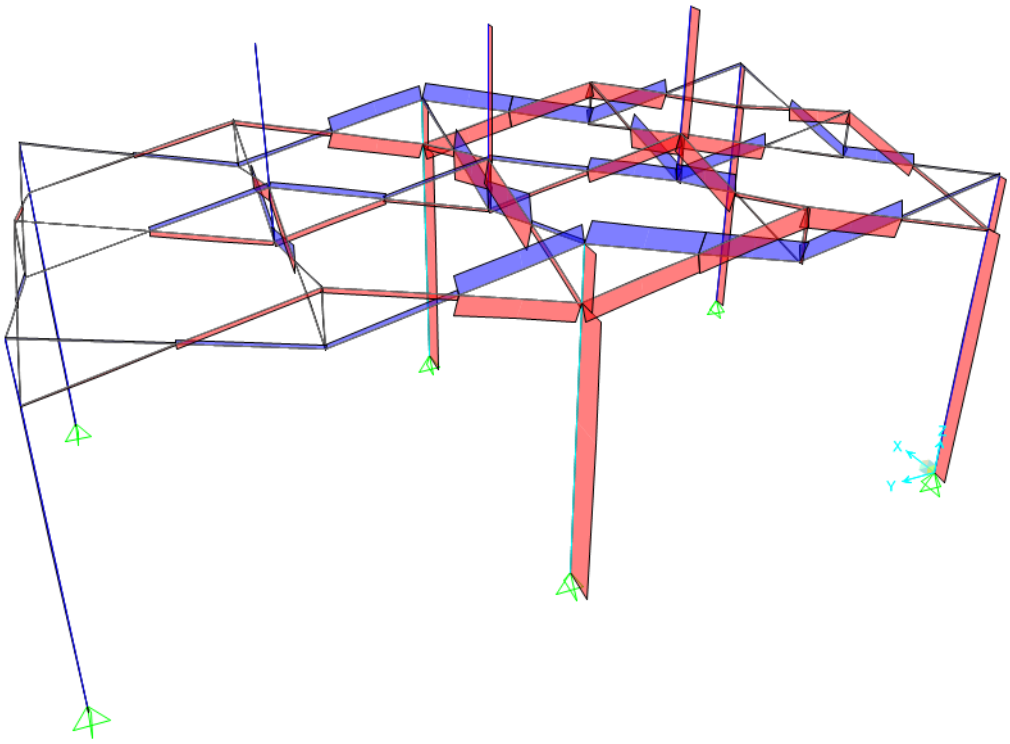
5.3.7 Max Shear in due to critical load combination



5.3.8 Max Axial force in upright support and roof beam due to critical load combination



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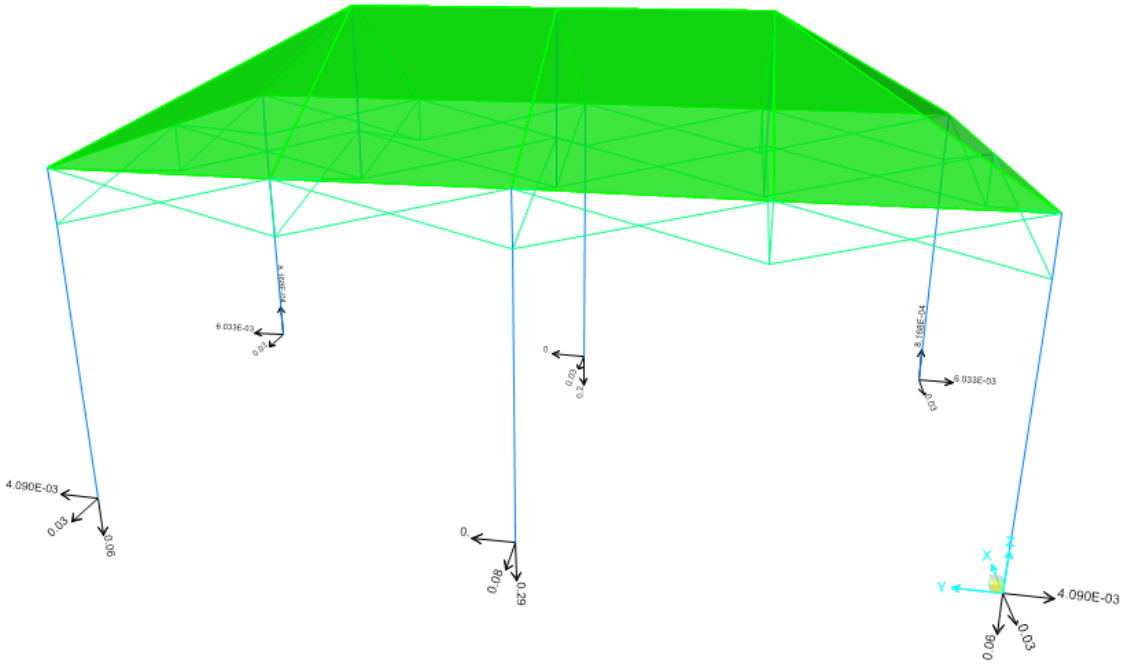
5.3.9 Max reactions



Max Reaction $N^* = 0.82kN$

6 Checking Members Based on AS1664.1 ALUMINIUM LSD

6.1 Upright Support

NAME	SYMBOL		VALUE	UNIT	NOTES	REF
Hex 57x50	**Upright Support**					
Alloy and temper	6061-T6					AS1664.1
Tension	F_{tu}	=	262	MPa	*Ultimate*	T3.3(A)
	F_{ty}	=	241	MPa	*Yield*	
Compression	F_{cy}	=	241	MPa		
Shear	F_{su}	=	165	MPa	*Ultimate*	
	F_{sy}	=	138	MPa	*Yield*	
Bearing	F_{bu}	=	551	MPa	*Ultimate*	
	F_{by}	=	386	MPa	*Yield*	
Modulus of elasticity	E	=	70000	MPa	*Compressive*	
	k_t	=	1.0			T3.4(B)
	k_c	=	1.0			

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FEM ANALYSIS RESULTS						
Axial force	P	=	0.795	kN	*compression*	
	P	=	0	kN	*Tension*	
In plane moment	M_x	=	0.6029	kNm		
Out of plane moment	M_y	=	4.92E-13	kNm		
DESIGN STRESSES						
Gross cross section area	A_g	=	332.55	mm^2		
In-plane elastic section modulus	Z_x	=	3692.8	mm^3		
Out-of-plane elastic section mod.	Z_y	=	3692.8	mm^3		
Stress from axial force	f_a	=	P/A_g			
		=	**2.39**	**MPa**	*compression*	
		=	**0.00**	**MPa**	*Tension*	
Stress from in-plane bending	f_{bx}	=	M_x/Z_x			
		=	**163.26**	**MPa**	*compression*	
Stress from out-of-plane bending	f_{by}	=	M_y/Z_y			
		=	**0.00**	**MPa**	*compression*	
Tension						
3.4.3 *Tension in rectangular tubes*						
	ϕF_L	=	**228.95**	**MPa**		
		OR				
	ϕF_L	=	**222.70**	**MPa**		
COMPRESSION						
3.4.8 *Compression in columns, axial, gross section*						
1. General						… 3.4.8.1
Unsupported length of member	L	=	2420	mm		
Effective length factor	k	=	1			
Radius of gyration about buckling axis (Y)	r_y	=	17.90	mm		
Radius of gyration about buckling axis (X)	r_x	=	17.90	mm		
Slenderness ratio	kLb/ry	=	115.64			
Slenderness ratio	kL/rx	=	135.20			
Slenderness parameter	λ	=	2.53			
	D_c*	=	90.3			
	S_1*	=	0.33			
	S_2*	=	1.23			

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	ϕ_{cc}	=	0.934			
Factored limit state stress	ϕF_L	=	**35.29**	**MPa**		
2. Sections not subject to torsional or torsional-flexural buckling						… 3.4.8.2
Largest slenderness ratio for flexural buckling	kL/r	=	135.20			
***3.4.10** Uniform compression in components of columns, gross section - flat plates*						
1. Uniform compression in components of columns, gross section - flat plates with both edges supported						… 3.4.10.1
	k_1	=	0.35			T3.3(D)
Max. distance between toes of fillets of supporting elements for plate	b'	=	53			
	t	=	2	mm		
Slenderness	b/t	=	26.5			
Limit 1	S_1	=	12.34			
Limit 2	S_2	=	32.87			
Factored limit state stress	ϕF_L	=	**189.21**	**MPa**		
Most adverse compressive limit state stress	F_a	=	35.29	MPa		
Most adverse tensile limit state stress	F_a	=	222.70	MPa		
Most adverse compressive & Tensile capacity factor	f_a/F_a	=	0.07		PASS	
BENDING - IN-PLANE						
***3.4.15** Compression in beams, extreme fibre, gross section rectangular tubes, box sections*						
Unbraced length for bending	L_b	=	2070	mm		
Second moment of area (weak axis)	I_y	=	1.07E+05	mm^4		
Torsion modulus	J	=	1.94E+05	mm^3		
Elastic section modulus	Z	=	3692.8	mm^3		
Slenderness	S	=	106.26			
Limit 1	S_1	=	0.39			
Limit 2	S_2	=	1695.86			
Factored limit state stress	ϕF_L	=	**206.74**	**MPa**		… 3.4.15(2)

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3.4.17 *Compression in components of beams (component under uniform compression), gross section - flat plates with both edges supported*						
	k_1	=	0.5			T3.3(D)
	k_2	=	2.04			T3.3(D)
Max. distance between toes of fillets of supporting elements for plate	b'	=	53	mm		
	t	=	2	mm		
Slenderness	b/t	=	26.5			
Limit 1	S_1	=	12.34			
Limit 2	S_2	=	46.95			
Factored limit state stress	ϕF_L	=	**189.21**	**MPa**		
Most adverse in-plane bending limit state stress	F_{bx}	=	189.21	MPa		
Most adverse in-plane bending capacity factor	f_{bx}/F_{bx}	=	0.86		PASS	
BENDING - OUT-OF-PLANE						
NOTE: Limit state stresses, ϕF_L are the same for out-of-plane bending (doubly symmetric section)						
Factored limit state stress	ϕF_L	=	**189.21**	**MPa**		
Most adverse out-of-plane bending limit state stress	F_{by}	=	189.21	MPa		
Most adverse out-of-plane bending capacity factor	f_{by}/F_{by}	=	0.00		PASS	
COMBINED ACTIONS						
4.1.1 *Combined compression and bending*						… 4.1.1(2)
	F_a	=	35.29	MPa		… 3.4.8
	F_{ao}	=	189.21	MPa		… 3.4.10
	F_{bx}	=	189.21	MPa		… 3.4.17
	F_{by}	=	189.21	MPa		… 3.4.17
	f_a/F_a	=	0.068			
Check:	$f_a/F_a + f_{bx}/F_{bx} + f_{by}/F_{by} \leq 1.0$					… 4.1.1 (3)
i.e.	0.93	≤	1.0		PASS	
SHEAR						
3.4.24 *Shear in webs (Major*						…

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Axis)						4.1.1(2)
Clear web height	h	=	46	mm		
	t	=	2	mm		
Slenderness	h/t	=	23			
Limit 1	S_1	=	29.01			
Limit 2	S_2	=	59.31			
Factored limit state stress	**ϕF_L**	=	**131.10**	**MPa**		
Stress From Shear force	**f_{sx}**	=	V/A_w			
			1.58	**MPa**		
3.4.25 *Shear in webs (Minor Axis)*						
Clear web height	b	=	53	mm		
	t	=	2	mm		
Slenderness	b/t	=	26.5			
Factored limit state stress	**ϕF_L**	=	**131.10**	**MPa**		
Stress From Shear force	**f_{sy}**	=	V/A_w			
			0.00	**MPa**		

6.2 Truss Bar

NAME	SYMBOL		VALUE	UNIT	NOTES	REF
36x18x2	**Truss Bar**					
Alloy and temper	6061-T6					AS1664.1
Tension	F_{tu}	=	262	MPa	*Ultimate*	T3.3(A)
	F_{ty}	=	241	MPa	*Yield*	
Compression	F_{cy}	=	241	MPa		
Shear	F_{su}	=	165	MPa	*Ultimate*	
	F_{sy}	=	138	MPa	*Yield*	
Bearing	F_{bu}	=	551	MPa	*Ultimate*	
	F_{by}	=	386	MPa	*Yield*	
Modulus of elasticity	E	=	70000	MPa	*Compressive*	
	k_t	=	1.0			T3.4(B)
	k_c	=	1.0			
FEM ANALYSIS RESULTS						

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Axial force	P	=	0.943	kN	*compression*	
	P	=	0	kN	*Tension*	
In plane moment	M_x	=	0.138	kNm		
Out of plane moment	M_y	=	2.938E-16	kNm		
DESIGN STRESSES						
Gross cross section area	A_g	=	200	mm^2		
In-plane elastic section modulus	Z_x	=	1764.1481	mm^3		
Out-of-plane elastic section mod.	Z_y	=	1130.963	mm^3		
Stress from axial force	f_a	=	P/A_g			
		=	**4.72**	**MPa**	*compression*	
		=	**0.00**	**MPa**	*Tension*	
Stress from in-plane bending	f_{bx}	=	M_x/Z_x			
		=	**78.22**	**MPa**	*compression*	
Stress from out-of-plane bending	f_{by}	=	M_y/Z_y			
		=	**0.00**	**MPa**	*compression*	
Tension						
3.4.3 *Tension in rectangular tubes*						
	ϕF_L	=	**228.95**	**MPa**		
		OR				
	ϕF_L	=	**222.70**	**MPa**		
COMPRESSION						
3.4.8 *Compression in columns, axial, gross section*						
1. General						… 3.4.8.1
Unsupported length of member	L	=	2040	mm		
Effective length factor	k	=	1			
Radius of gyration about buckling axis (Y)	r_y	=	7.13	mm		
Radius of gyration about buckling axis (X)	r_x	=	12.60	mm		
Slenderness ratio	kLb/ry	=	142.98			
Slenderness ratio	kL/rx	=	161.90			
Slenderness parameter	λ	=	3.02			
	D_c*	=	90.3			
	S_1*	=	0.33			
	S_2*	=	1.23			
	ϕ_{cc}	=	0.950			

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Factored limit state stress	**ϕF_L**	**=**	**25.04**	**MPa**		
2. Sections not subject to torsional or torsional-flexural buckling						… 3.4.8.2
Largest slenderness ratio for flexural buckling	kL/r	=	161.90			
***3.4.10** Uniform compression in components of columns, gross section - flat plates*						
1. Uniform compression in components of columns, gross section - flat plates with both edges supported						… 3.4.10.1
	k_1	=	0.35			T3.3(D)
Max. distance between toes of fillets of supporting elements for plate	b'	=	14			
	t	=	2	mm		
Slenderness	b/t	=	7			
Limit 1	S_1	=	12.34			
Limit 2	S_2	=	32.87			
Factored limit state stress	**ϕF_L**	**=**	**228.95**	**MPa**		
Most adverse compressive limit state stress	F_a	=	25.04	MPa		
Most adverse tensile limit state stress	F_a	=	222.70	MPa		
Most adverse compressive & Tensile capacity factor	f_a/F_a	=	0.19		PASS	
BENDING - IN-PLANE						
***3.4.15** Compression in beams, extreme fibre, gross section rectangular tubes, box sections*						
Unbraced length for bending	L_b	=	1020	mm		
Second moment of area (weak axis)	I_y	=	10178.667	mm^4		
Torsion modulus	J	=	23674.88	mm^3		
Elastic section modulus	Z	=	1764.1481	mm^3		
Slenderness	S	=	231.83			
Limit 1	S_1	=	0.39			
Limit 2	S_2	=	1695.86			
Factored limit state stress	**ϕF_L**	=	**195.46**	**MPa**		… 3.4.15(2)

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3.4.17 *Compression in components of beams (component under uniform compression), gross section - flat plates with both edges supported*						
	k_1	=	0.5			T3.3(D)
	k_2	=	2.04			T3.3(D)
Max. distance between toes of fillets of supporting elements for plate	b'	=	14	mm		
	t	=	2	mm		
Slenderness	b/t	=	7			
Limit 1	S_1	=	12.34			
Limit 2	S_2	=	46.95			
Factored limit state stress	**ϕF_L**	=	**228.95**	**MPa**		
Most adverse in-plane bending limit state stress	F_{bx}	=	195.46	MPa		
Most adverse in-plane bending capacity factor	f_{bx}/F_{bx}	=	0.40		PASS	
BENDING - OUT-OF-PLANE						
NOTE: Limit state stresses, ϕF_L are the same for out-of-plane bending (doubly symmetric section)						
Factored limit state stress	**ϕF_L**	=	**195.46**	**MPa**		
Most adverse out-of-plane bending limit state stress	**F_{by}**	=	195.46	MPa		
Most adverse out-of-plane bending capacity factor	**f_{by}/F_{by}**	=	0.00		PASS	
COMBINED ACTIONS						
4.1.1 *Combined compression and bending*						… 4.1.1(2)
	F_a	=	25.04	MPa		… 3.4.8
	F_{ao}	=	228.95	MPa		… 3.4.10
	F_{bx}	=	195.46	MPa		… 3.4.17
	F_{by}	=	195.46	MPa		… 3.4.17
	f_a/F_a	=	0.188			
Check:	$f_a/F_a + f_{bx}/F_{bx} + f_{by}/F_{by} \leq 1.0$					… 4.1.1 (3)

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	i.e. 0.59	≤	1.0		PASS	
SHEAR						
3.4.24 *Shear in webs (Major Axis)*						… 4.1.1(2)
Clear web height	h	=	32	mm		
	t	=	2	mm		
Slenderness	h/t	=	16			
Limit 1	S_1	=	29.01			
Limit 2	S_2	=	59.31			
Factored limit state stress	ϕF_L	=	**131.10**	**MPa**		
Stress From Shear force	f_{sx}	=	V/A_w			
			1.03	**MPa**		
3.4.25 *Shear in webs (Minor Axis)*						
Clear web height	b	=	14	mm		
	t	=	2	mm		
Slenderness	b/t	=	7			
Factored limit state stress	ϕF_L	=	**131.10**	**MPa**		
Stress From Shear force	f_{sy}	=	V/A_w			
			0.00	**MPa**		

6.3 Summary Forces

MEMBER(S)	Section	b	d	t	Vx	Vy	P (Axial) Negative -> Compression Positive -> Tension	Mx	My
		mm	mm	mm	kN	kN	kN	kN.m	kN.m
Upright Support	Hex 57x50	57	50	2	0.291	-2.4E-13	-0.795	-0.6029	4.92E-13
Truss Bar	36x18x2	18	36	2	0.132	-2.9E-14	-0.943	0.138	-2.938E-16

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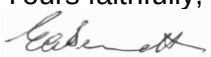
7 Summary

7.1 Conclusions

a. The 4m x 8m Tectonic Range Folding Marquees as specified has been analyzed with a conclusion that it has the capacity to withstand wind speeds up to and including **60km/hr.**
b. For forecast winds in excess of **60km/hr** – the structure should be completely folded.
c. For uplift due to 60km/hr, 1.2 kN (120kg) holding down weight/per leg for upright support is required.
d. The bearing pressure of soil should be clarified and checked by an engineer prior to any construction for considering foundation and base plate.
e. **No Fabrics or doors should be used for covering the sides of unbraced Folding Marquees due to the lack of bracing within the system and insufficient out-of-plane stiffness of framing.**

Yours faithfully,



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8 Appendix A – Base Anchorage Requirements

4m x 8m Tectonic Range Folding Marquees:

Tent Span	Sile Type	Required Weight Per Leg
4 m	A	120kg
	B	120kg
	C	120kg
	D	120kg
	E	120kg

Definition of Soil Types:

Type A : Loose sand such as dunal sand. Uncompacted site filling may also be included in this soil type.

Type B : Medium to stiff clays or silty clays

Type C: Moderately compact sand or gravel eg. of alluvial origin.

Type D : Compact sand and gravel eg. Weathered sandstone or compacted quarry rubble hardstand

Type E : Concrete slab on ground .

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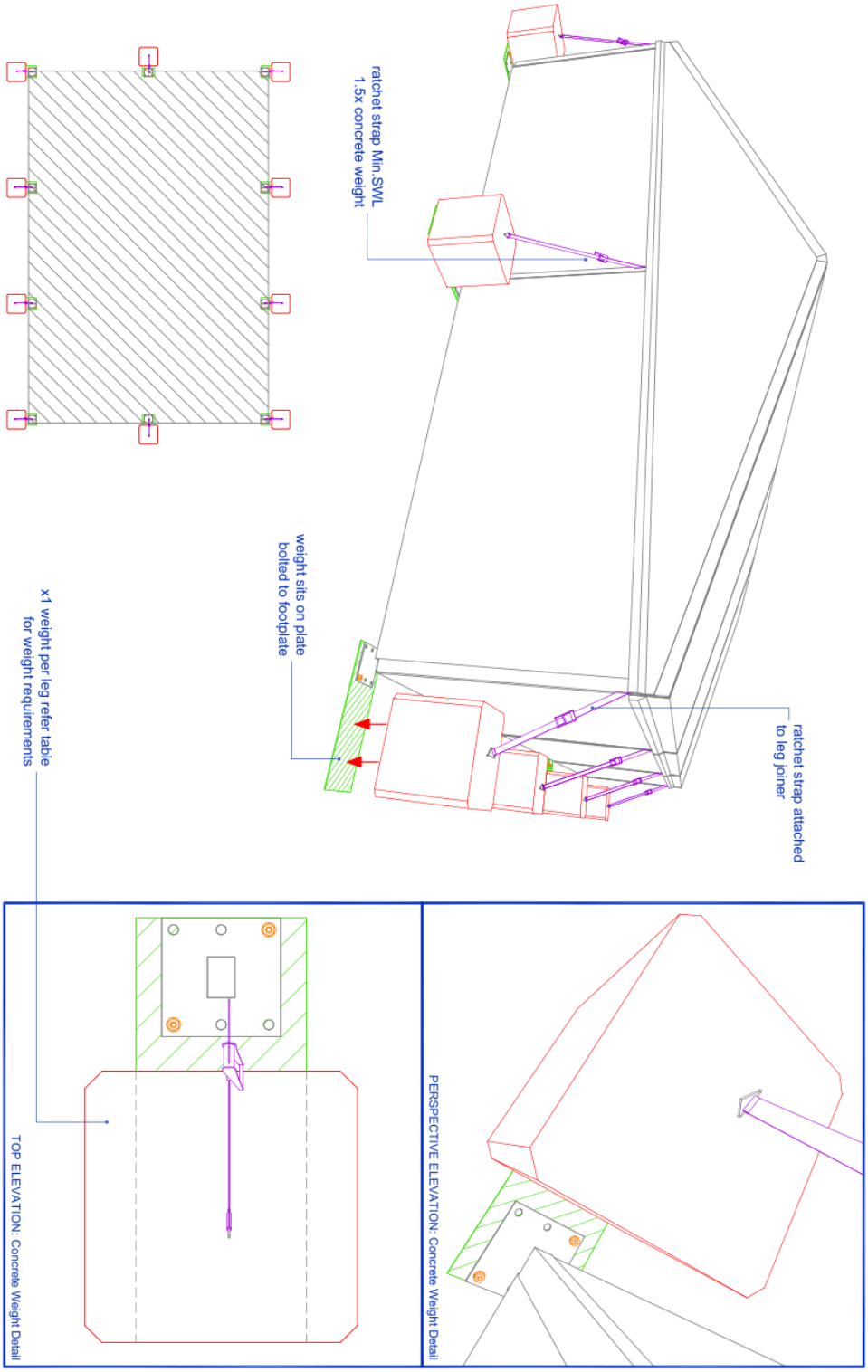
9 Appendix "B" – Hold Down Method Details



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