

Out of Scope



-----Original Message-----

From: James Finlayson [<mailto:james@zirkacircus.com>]

Sent: Monday, 2 September 2013 12:17 p.m.

To: Murray Usmar

Subject: Tent photos

Hi Murray

Side pole tied downs, double pegged, currently unbound for pull down

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Official Information Act



Out of Scope

-----Original Message-----

From: James Finlayson [<mailto:james@zirkacircus.com>]

Sent: Monday, 2 September 2013 12:19 p.m.

To: Murray Usmar

Subject: Kingpole cluster

Base plate with pegs and 4500kg puller for kingpole, 2 per pole, 8 in total

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Official Information Act



Out of Scope



-----Original Message-----

From: James Finlayson [<mailto:james@zirkacircus.com>]

Sent: Monday, 2 September 2013 12:22 p.m.

To: Murray Usmar


Subject: Kingpole

Kingpole from ground looking straight up

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Official Information Act



Out of Scope



-----Original Message-----

From: James Finlayson [<mailto:james@zirkacircus.com>]

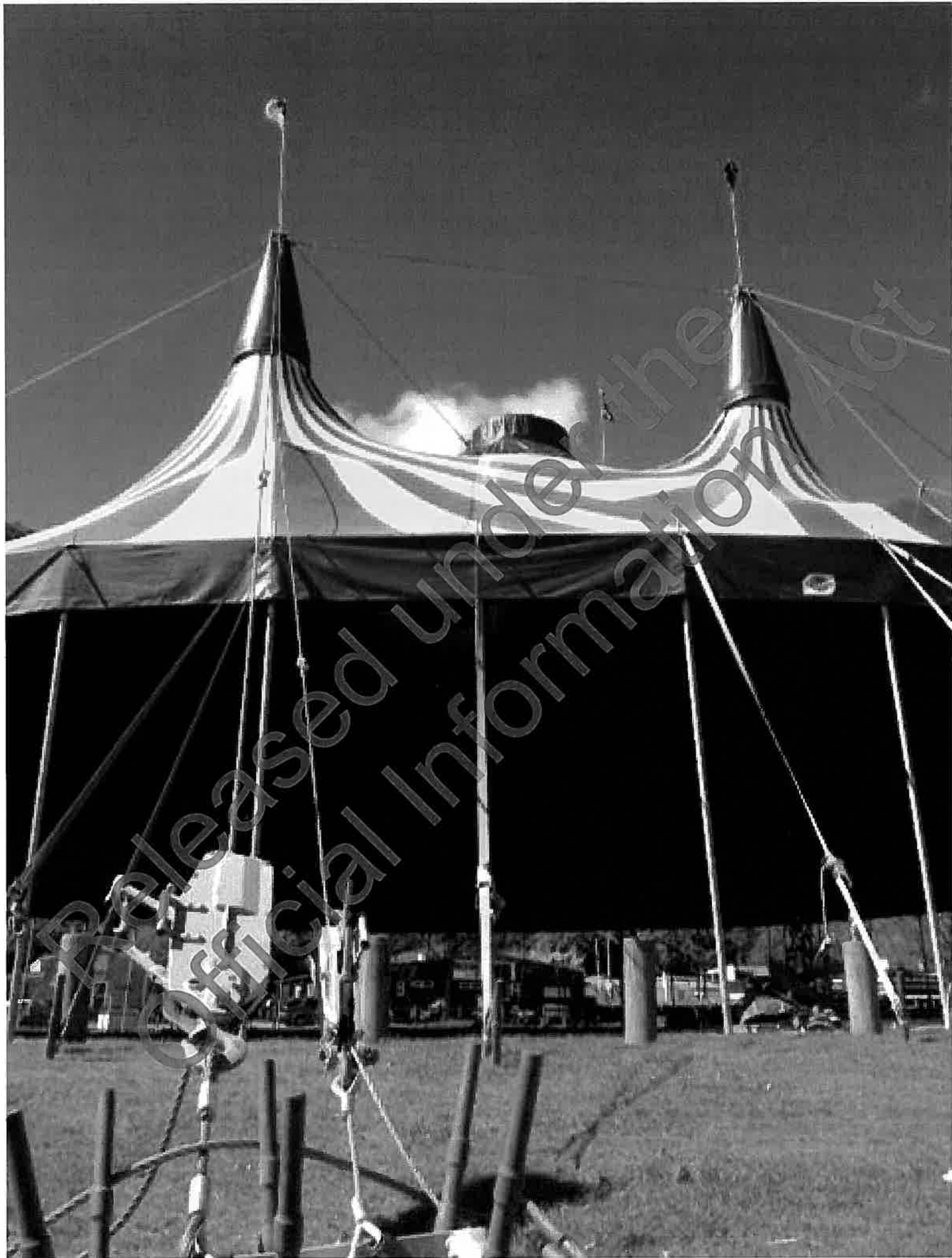
Sent: Monday, 2 September 2013 12:25 p.m.

To: Murray Usmar

Subject: Guy wires

Wider shot showing guys from ground up to top of poles

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Out of Scope

-----Original Message-----

From: Darrel Cheong

Sent: Thursday, 19 September 2013 9:02 a.m.

To: Murray Usmar

Subject: FW: Marquee Multiproof Application - DRAFT comments

Importance: High

Morning Murray

FYI below are my [draft] comments on the above matter. Currently awaiting Graeme to approve them. Will get the finalised comments to you ASAP.

Kind regards

Darrel Cheong

ADVISOR – BUILDING STANDARDS

Building System Performance Branch, Infrastructure and Resource Markets Ministry of Business, Innovation & Employment

Darrel.cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527 Level 8, 33 Bowen St, PO Box 1473, Wellington

From: Darrel Cheong

Sent: Wednesday, 18 September 2013 5:31 p.m.

To: Graeme Lawrance

Subject: Multiproof Application: Marquee
Importance: High

Graeme

The below points are our comments:

- More details of the poles/tent are needed. The Plan and photos provided do not tell much. Sections and Details drawings will be very helpful.
- How was Vr Ultimate of 38.8 m/s determined? Is this deemed as the worst case? How do they account for the different (perhaps higher) site wind speeds at the different regions? It is noted that the marquee erector shall determine the applicable wind speed for each specific location.
- What is Importance level of the structure? And what is the intended working life?
- Has the serviceability limit state (SLS) criteria been satisfied i.e. deflection limits?
- It is thought that horizontal forces don't cancel each other out all the time. There is a possibility of the winds pushing on one side and pulling on another, creating a 'worst-case scenario' for the coefficients Cpe
- Ground conditions providing adequate holding power is a rather big assumption. It is noted that the tent installer is responsible to confirm the holding power of the ground prior to each installation.
- Connection details between the anchors & cable, and guy & tent fabric?
- Materials specification (e.g. stiffness of cable, cable strength, tent fabric's weight, etc) and relevant test results (if any).

Let me know what you think.

Kind regards

Darrel Cheong
ADVISOR – BUILDING STANDARDS

Building System Performance Branch, Infrastructure and Resource Markets Ministry of Business, Innovation & Employment

Darrel.cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527 Level 8, 33 Bowen St, PO Box 1473, Wellington

From: Darrel Cheong
Sent: Monday, 16 September 2013 1:11 p.m.
To: Murray Usmar
Subject: Multiproof: Marquee

Hi Murray

Just thought I should let you know that Graeme and I are discussing this marquee application today and we should be able to give you some comments by tomorrow or the day after tomorrow.

Kind regards

Darrel Cheong
ADVISOR – BUILDING STANDARDS

Building System Performance Branch, Infrastructure and Resource Markets Ministry of Business, Innovation & Employment

Darrel.cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527 Level 8, 33 Bowen St, PO Box 1473, Wellington

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Out of Scope

-----Original Message-----

From: James Finlayson [mailto:james@zirkacircus.com]

Sent: Friday, 20 September 2013 1:09 p.m.

To: Murray Usmar

Subject: Zirka Circus Multi-Proof

Hi Murray

Just following up to see how things are progressing with the Multi-Proof Application...

If you can give me a progress report or anything would be great.

I'm trying to forward plan with councils etc.

Regards

James

--

James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)

www.zirkacircus.com

s 9(2)(a)

Out of Scope

-----Original Message-----

From: Darrel Cheong

Sent: Tuesday, 24 September 2013 11:48 a.m.

To: Murray Usmar

Cc: Graeme Lawrance

Subject: FW: Multiproof Application: Marquee

Murray

Below are our final comments on the marquee Multiproof application – after a review by Graeme. I have left the yellow highlights intact to show how they have changed from the previous email.

Kind regards

Darrel Cheong
ADVISOR – BUILDING STANDARDS

Building System Performance Branch, Infrastructure and Resource Markets Ministry of Business, Innovation & Employment

Darrel.cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527 Level 8, 33 Bowen St, PO Box 1473, Wellington

From: Graeme Lawrance

Sent: Monday, 23 September 2013 4:51 p.m.
To: Darrel Cheong
Subject: RE: Multiproof Application: Marquee

Darrel,

Comments provided below.

Happy to discuss

Cheers

Graeme

From: Darrel Cheong
Sent: Wednesday, 18 September 2013 5:31 p.m.
To: Graeme Lawrance
Subject: Multiproof Application: Marquee
Importance: High

Graeme

The below points are our comments:

[Graeme Lawrance]

- More details of the scope of application and the tent configuration to be covered are required. Provide sufficient sections through the tent to define the interior structure.
- More details of the poles/tent are needed [Graeme Lawrance] including compression capacity. [Graeme Lawrance] What is the purpose or purposes of the king post. The Plan and photos provided [Graeme Lawrance] are useful for getting an overview of the system but do not [Graeme Lawrance] provide sufficient detail. Sections and Detail [Graeme Lawrance] ed drawings will be required.
- How was Vr Ultimate of 38.8 m/s determined? Is this deemed as the worst case? How do they account for the different (perhaps higher) site wind speeds in the different regions [Graeme Lawrance] , e.g. can it be used in the Lee regions? It is noted that the marquee erector will determine the applicable wind speed for each specific location.

- What is Importance level [Graeme Lawrance] limit of the structure? And what is the intended working life?
- Has the serviceability limit state (SLS) criteria been satisfied i.e. [Graeme Lawrance] what deflection limits[Graeme Lawrance] are being worked to?
- [Graeme Lawrance] What is the basis for stating that horizontal forces don't cancel each other out all the time. There is a possibility of the winds pushing on one side and pulling on another, creating [Graeme Lawrance additive coefficients[Graeme Lawrance] , Cpe
- [Graeme Lawrance] Full anchorage details need to be provided including strength and stiffness. Types of ground [Graeme Lawrance] or soil conditions [Graeme Lawrance] to be covered need to be provided [Graeme Lawrance]. [Graeme Lawrance] What assessment of the ground needs to be done by the tent installer [Graeme Lawrance] prior to each installation[Graeme Lawrance] , e.g. does he need to get a geotechnical report to verify anchor suitability?
- [Graeme Lawrance] What are all the connection details[Graeme Lawrance] , e.g. those between the anchors&[Graeme Lawrance] tent cable[Graeme Lawrance] s[Graeme Lawrance] and between the cables and tent fabric?
- [Graeme Lawrance] Please provide a materials specification (e.g. stiffness of cable, cable strength, tent fabric's weight, etc) and relevant test results (if any).

Let me know what you think.

Kind regards

Darrel Cheong
ADVISOR – BUILDING STANDARDS

Building System Performance Branch, Infrastructure and Resource Markets Ministry of Business, Innovation & Employment

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From: Darrel Cheong
Sent: Monday, 16 September 2013 1:11 p.m.
To: Murray Usmar
Subject: Multiproof: Marquee

Hi Murray

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Kind regards

Darrel Cheong
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Out of Scope

From: James Finlayson [mailto:james@zirkacircus.com]

Sent: Wednesday, 25 September 2013 12:12 p.m.

To: Murray Usmar

Subject: Re: Zirka Circus Multi-Proof

Hi Murray

I will make the deposit of \$2000 today.

Regarding the structure and engineering, I have attached all the original documentation from the manufacturer.

This is a much more detailed than that PS1 document from Redco.

I guess I should have provided it to you originally however the councils only ever want the PS1 so that's what I sent you...

It lists all the standards etc as well as parameters, and shows all the modelling for structure. It also shows the engineering of the steelwork, as well as cables too.

The snow rating is 19kg/m² and original wind loading by Italian standards, and wind is 39m/s (140km/h).

I am not sure the process Redco used to produce their PS1 from these originals...

The contact at Redco is Mr Han Tong. I spoke to him and he is happy to discuss this with you or your people.

He can be contacted on 09 2650990 ext 902 email hant@redco.co.nz

Regards
James

--

James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)

www.zirkacircus.com

s 9(2)(a)

On Wed, Sep 25, 2013 at 11:08 AM, Murray Usmar <Murray.Usmar@mbie.govt.nz> wrote:

Hi James

I have just received information back from our Structural Engineers. They are requesting a number of design items that need clarification. A list of these is attached.

It is probably best for our Engineer to talk directly with your Engineer at Redco – please supply his name & contact details.

For this application to proceed we require a \$2,000.00 deposit. Either send a cheque (payable to Ministry of Business, Innovation and Employment) to the address below or lodge a payment into the following account:

Name: Ministry of Business, Innovation and Employment

Account Number: 03 0049 0005 128 00

Reference Details: MultiProof (insert applicant's name) [for example MultiProof, Zirka Circus]

Please send me a copy of the receipt when payment is made.

Regards

Murray Usmar

Assessor, National Multiple Use Approvals, Determinations and Assurance Team.
Building System Performance Branch, Infrastructure and Resource Markets Group.
Ministry of Business, Innovation and Employment
ddi: (04) 901 8365 | fax: (04) 917 0190 Level 10 33 Bowen Street Wellington 6011

PO Box 1473, Wellington 6140

Please note: my email address has changed to murray.usmar@mbie.govt.nz

From: James Finlayson [mailto:james@zirkacircus.com]

Sent: Friday, 20 September 2013 1:09 p.m.

To: Murray Usmar

Subject: Zirka Circus Multi-Proof

Hi Murray

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If you can give me a progress report or anything would be great.

I'm trying to forward plan with councils etc.

Regards

James

--

James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)

www.zirkacircus.com

s 9(2)(a)

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S T U D I O D ' I N G E G N E R I A  R D O L I N O

**DOTT. ING. DOMENICO ARDOLINO
DOTT. ING. GIOVANNA ARDOLINO
DOTT. ING. ALBERTO ARDOLINO
DOTT. ING. GEROLAMO OMETTO
DOTT. ING. SIMONE MUSNER**



**VIA DELLA MENDOLA, 46-D 39100 BOLZANO
TEL. 0471 270442 FAX 0471 270441
EMAIL: studio@studioardolino.it
P. IVA 02206630218**

PROJECT: *CARPENTRY FOR TENT Φ 35m
Flaming Phoenix Entertainment LTD*

CLIENT: *ANCESCHI ALBERTO E PAOLO snc*

CALCULATION REPORT OF THE STEEL STRUCTURES



Bolzano, 10/09/2012

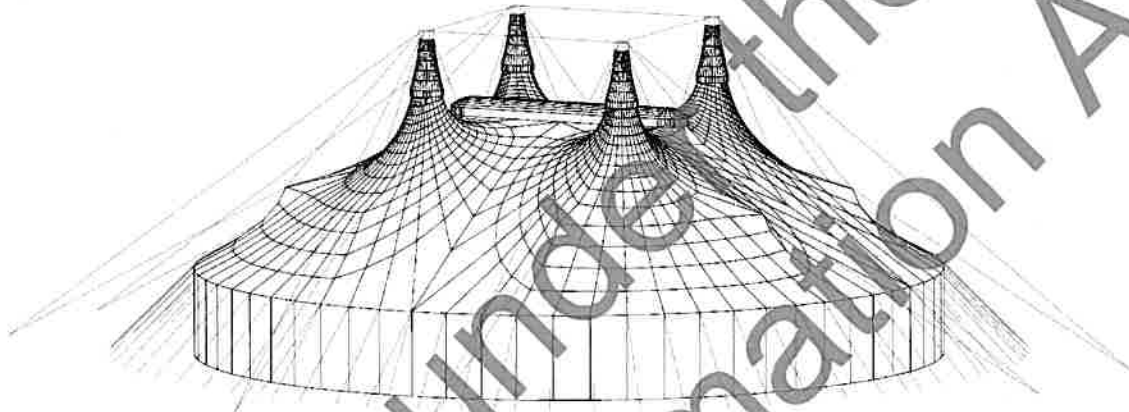
1	Overall description	3
2	Reference standard	4
3	Features of materials	5
4	Actions on structures	6
5	Wind Actions	7
6	Dome	12
7	Suspension of dome	17
8	King pole	18
9	Stabilization-rope of king poles	21
10	Mastring	22
11	Suspension of Mastring	23
12	Poles (Rondellstangen)	24
13	Stabilization of poles	25
14	NOTE	26

St. G.O.

1 OVERALL DESCRIPTION

The tent has a circular planimetry with a diameter of 35m and is supported by 4 king poles (H=15.50m). The king-poles support also the central dome. On the circumference the tent is supported by poles (H=4.00m).

8 steel ropes from the top of the king-poles and ropes from the top of poles stabilize the structure.



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2 REFERENCE STANDARD

DIN 4112 Fliegende Bauten

EN 1993-1-1 Eurocode 3: Design of steel structures – Part 1-1:

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3 FEATURES OF MATERIALS

Steel

Class		S 235		(Fe360)
E-Modulus		E	=	210.000MPa
Yeld strenght	t ≤ 40 mm	f_{yk}	=	235 MPa
Yeld strenght	t > 40 mm	f_{yk}	=	215 MPa
Ultimate strenght		f_{uk}	=	360 MPa

Rope AZN 636 AC

Ultimate strenght **f_{ptk} = 1770 MPa**

Diameter **φ = 12 mm**
 Self weight **s.w. = 0,60 kg/m**
 Ultimate Force **N = 95 kN**

Diameter **φ = 14 mm**
 Self weight **s.w. = 0,82 kg/m**
 Ultimate Force **N = 129 kN**

Diameter **φ = 16 mm**
 Self weight **s.w. = 1,07 kg/m**
 Ultimate Force **N = 165 kN**

Diameter **φ = 18 mm**
 Self weight **s.w. = 1,35 kg/m**
 Ultimate Force **N = 216 kN**

Diameter **φ = 20 mm**
 Self weight **s.w. = 1,68 kg/m**
 Ultimate Force **N = 265 kN**

TENT NAIZIL SPORT COVER

PVC-beschichtetes Polyestergewebe

Ultimate strenght **N = 3.0 kN/5cm**
 Self weight **s.w. = 0,80 kg/m²**

4 ACTIONS ON STRUCTURES

4.1 WIND

basic wind velocity		v_{ref}	39,0	m/s
basic velocity pressure		q_b	0,95	kN/m ²
Q_{wind}	wind pressure		1.40	kN/m²
c_p	pressure coefficient		0.3	

All the verification with wind consider the tent close. By strong wind the tent should be closed!

4.2 PRE-STRESS

F_v			0.50	kN/m
-------	--	--	-------------	-------------

4.3 SNOW

Q_{snow}			0.00	kN/mq
------------	--	--	-------------	--------------

4.4 SELF WEIGHT TENT

G_{tent}			0.008	kN/mq
------------	--	--	--------------	--------------

4.5 IMPOSED LOAD CUPOL

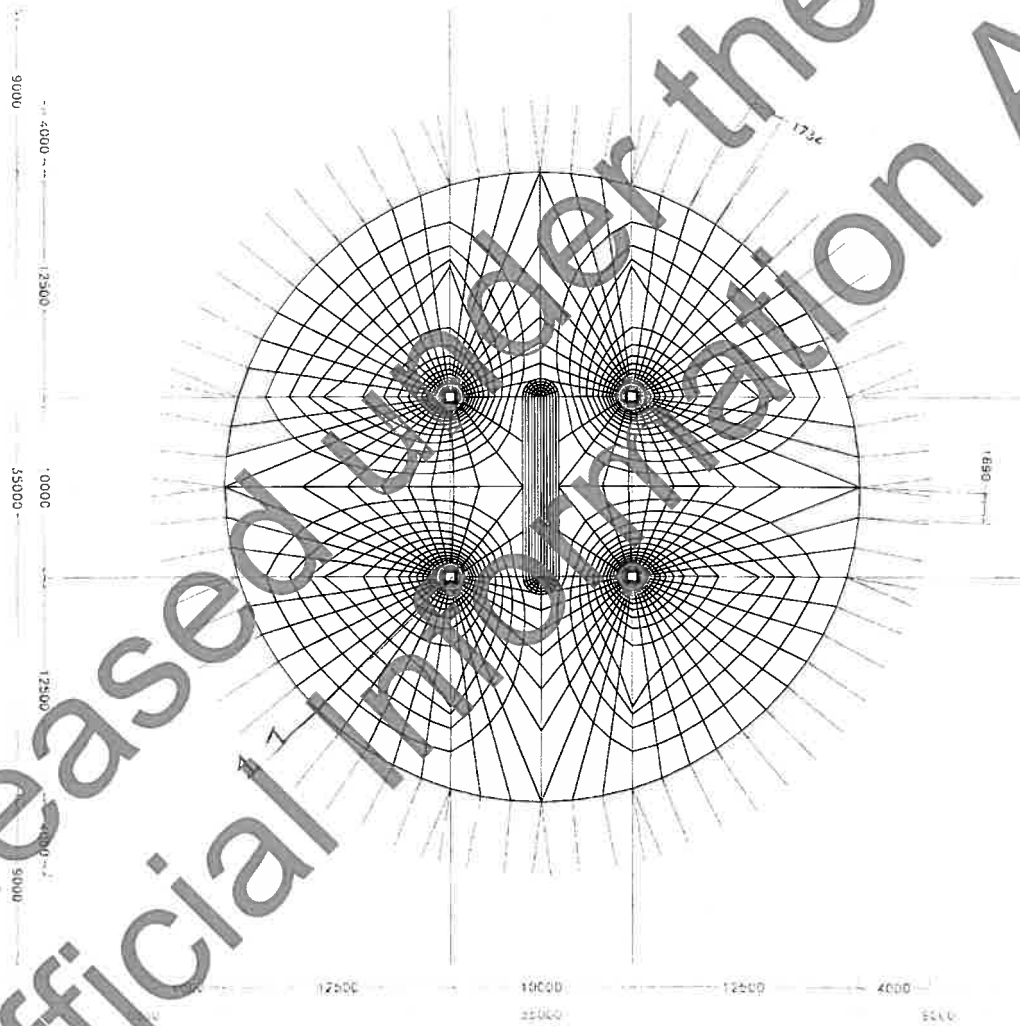
$Q_{V,cupol}$			1.00	kN/m
---------------	--	--	-------------	-------------

5 WIND ACTIONS

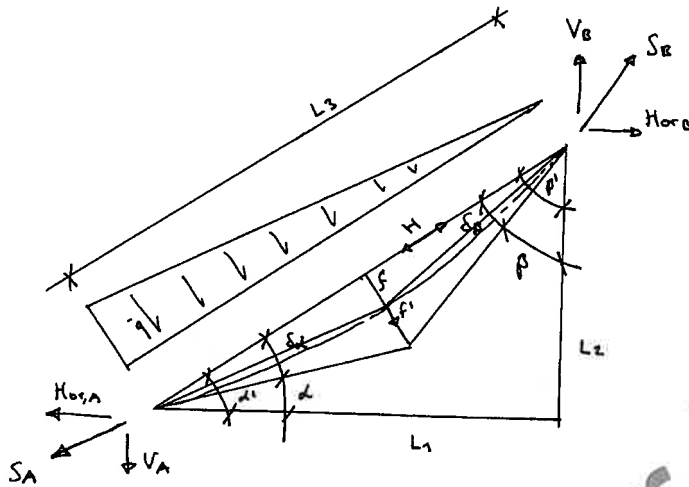
Combination 1: Windpressure + Prestress

5.1 WINDPRESSURE – SECTION 1

Simplified verification of section 1



$$q = 0.3 \times 1.40 \text{ kN/m}^2 + 0.008 \text{ kN/m}^2 = 0.428 \text{ kN/m}^2$$



$$L_1 = 10.50 \text{ m} \quad L_2 = 8.80 \text{ m} \quad L_3 = 13.70 \text{ m}$$

$$A = 1.00 \text{ m} \times 13.70 \text{ m} \times q / 3 = 4.56 \text{ m}^2 q$$

$$B = 1.00 \text{ m} \times 13.70 \text{ m} \times q / 6 = 2.28 \text{ m}^2 q$$

$$f = 150 \text{ cm}$$

$$f' = 1/20 = 77 \text{ cm}$$

$$F = 2.27 \text{ m}$$

$$H = 1.00 \text{ m} \times q \times (13.70 \text{ m})^2 / 15.6 / 2.27 \text{ m} = 6.67 \text{ m}^2 q$$

$$S_A = (A^2 + H^2)^{0.5} = 8.08 \text{ m}^2 q$$

$$S_B = (B^2 + H^2)^{0.5} = 7.05 \text{ m}^2 q$$

$$\delta_A = \arctan(A/H) = 34.4^\circ$$

$$\alpha' = \arctan(11.50/10.20) = 40.0^\circ$$

$$\alpha = 5.6^\circ$$

$$\delta_B = \arctan(B/H) = 18.9^\circ$$

$$\beta' = \arctan(10.20/11.50) = 50.0^\circ$$

$$\beta = 31.1^\circ$$

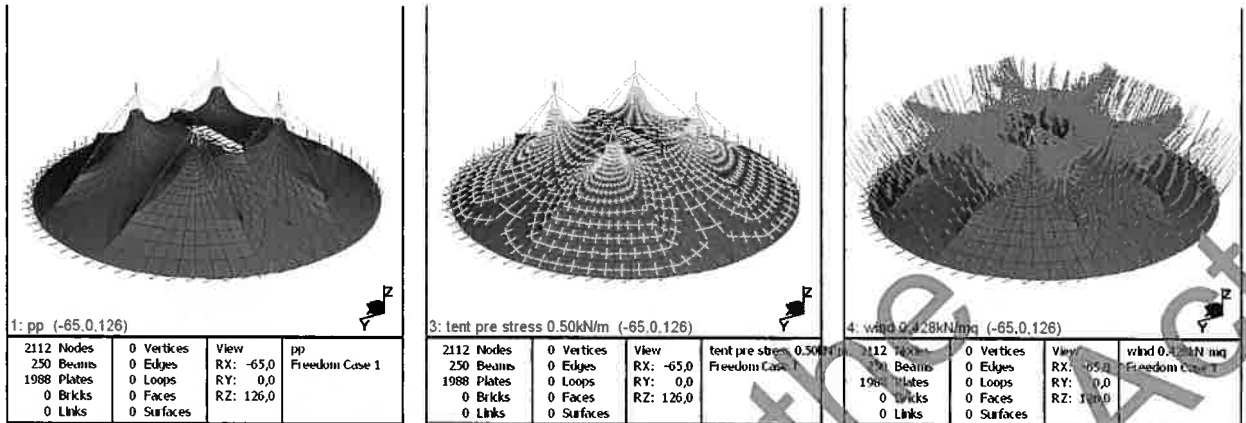
				kN		kN/m	
$H_A =$	$S_A \cos \alpha$	$=$	$8.04 \text{ m}^2 q$	3.34	$/1.0\text{m}$	3.34	
$V_A =$	$S_A \sin \alpha$	$=$	$0.79 \text{ m}^2 q$	0.34	$/1.0\text{m}$	0.34	(↑)
$H_B =$	$S_B \sin \beta$	$=$	$1.18 \text{ m}^2 q$	0.50	$/1.0\text{m}$	0.50	
$V_B =$	$S_B \cos \beta$	$=$	$6.04 \text{ m}^2 q$	2.58	$/1.0\text{m}$	2.58	(↓)

Pre-stress Loads

$H_A =$	0.5kN/m	$\cos \alpha$	$\times 1.0\text{m} =$	0.50	kN	$/1.0\text{m}$	0.50	
$V_A =$	0.5kN/m	$\sin \alpha$	$\times 1.0\text{m} =$	0.05	kN	$/1.0\text{m}$	0.05	
$H_B =$	0.5kN/m	$\sin \beta$	$\times 1.0\text{m} =$	0.26	kN	$/1.0\text{m}$	0.26	
$V_B =$	0.5kN/m	$\cos \beta$	$\times 1.0\text{m} =$	0.43	kN	$/1.0\text{m}$	0.43	(↓)
F_{Mast}	$(2.58+0.43) \text{ kN/m}$	\times	$\pi 35 \text{ m}$	$/$	4	$=$	83 kN	
$F_{\text{H,Mastring}}$	$(0.50+0.26) \text{ kN/m}$	\times	$\pi 35 \text{ m}$	$/$	4	$=$	21 kN	

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The simplified verification of section 1 is checked by a FEM Analysis with 3 load single cases: self weight, Prestress (0.5kN/m), Wind pressure (0,428 kN/m²).

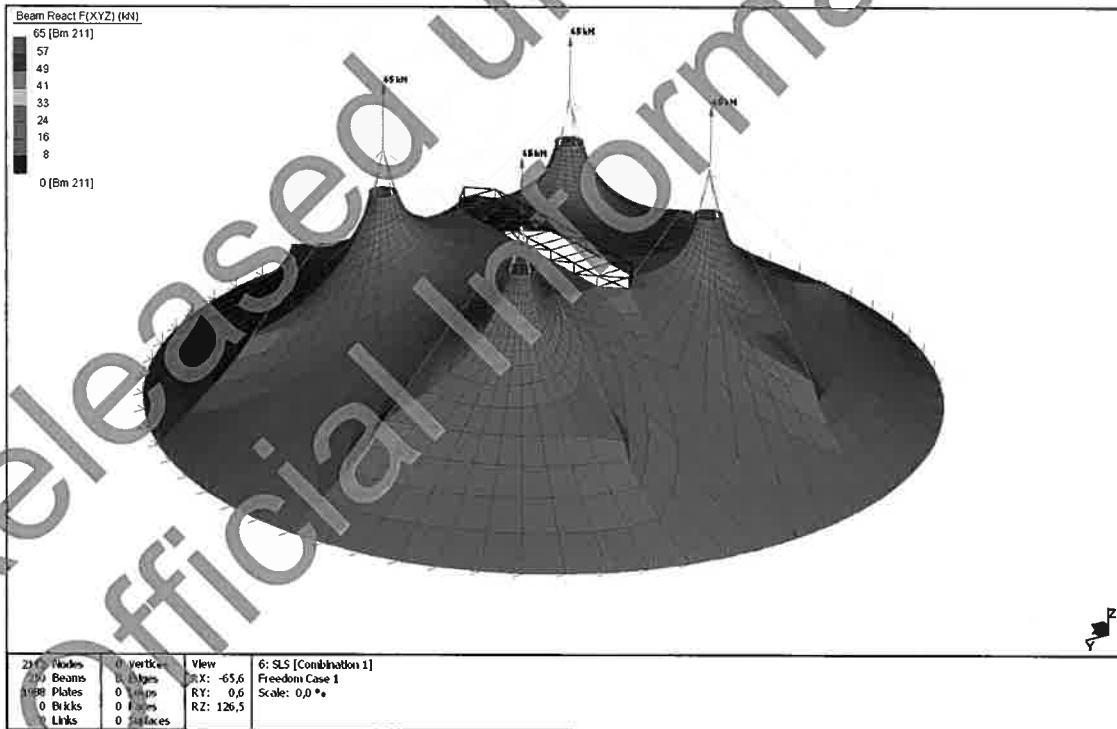


Struwin7 Release 2.3.7 (Licensed to STUDIO D'INGEGNERIA ARDOUNO B2)
 Model file: H:\547_Circo D35m\Mod\547_Circo D35.s17
 9 agosto 2012 2:31 pm

Results of FEM Analisis:

$F_{Mast} = 66 \text{ kN}$

$F_{Cupol} = 9.8 \text{ kN}$



Struwin7 Release 2.3.7 (Licensed to STUDIO D'INGEGNERIA ARDOUNO B2)
 Model file: H:\547_Circo D35m\Mod\547_Circo D35.s17
 Result file: H:\547_Circo D35m\Mod\547_Circo D35.s1a
 9 agosto 2012 11:34 am

In the verification of the steel structures are assumed the following value:

F_{Mast}	=	85	kN				
$F_{H, Mastring}$	=	25	kN				
F_{Cupol}	=	15	kN				
$F_{V, Cupol}$	=	0.5	kN	left and right	+	1.0	kN imposed load
$F_{H, Cupol}$	=	1.0	kN	left and right			

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6 DOME

Lattice structure	Currents	Rohr ϕ 48.3 x 2.90
	Diagonals	Rohr ϕ 26.9 x 2.50

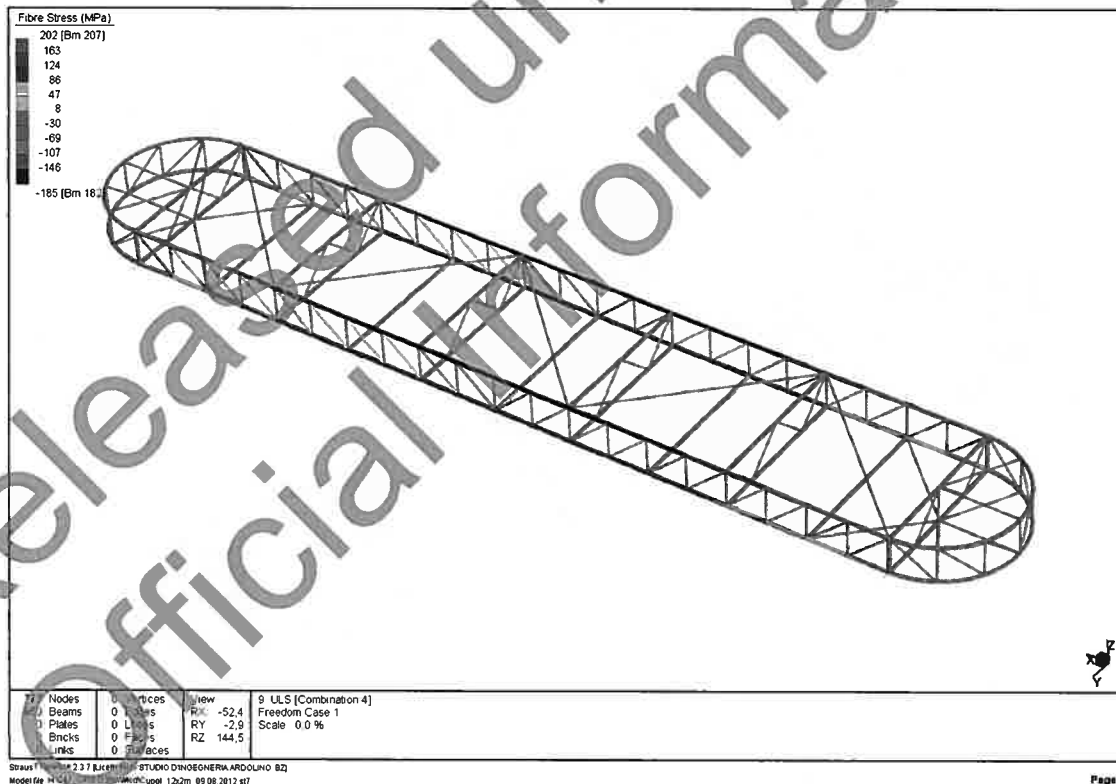
Characteristic values of Actions

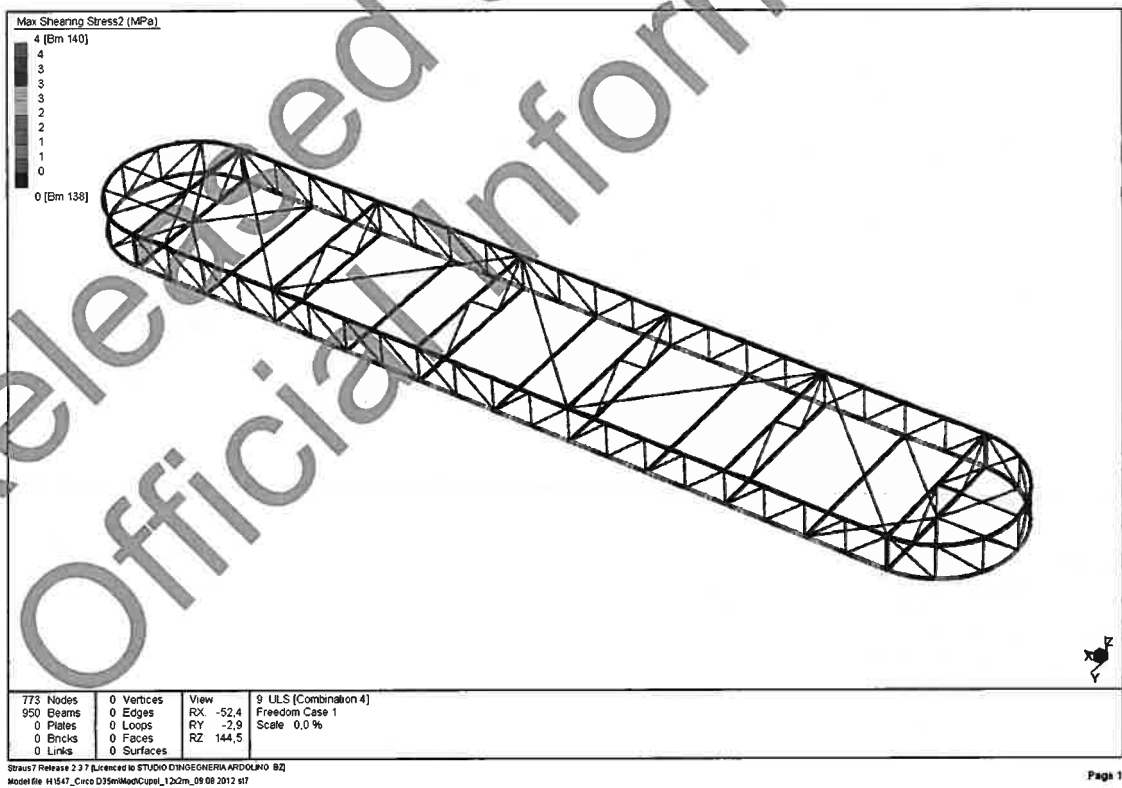
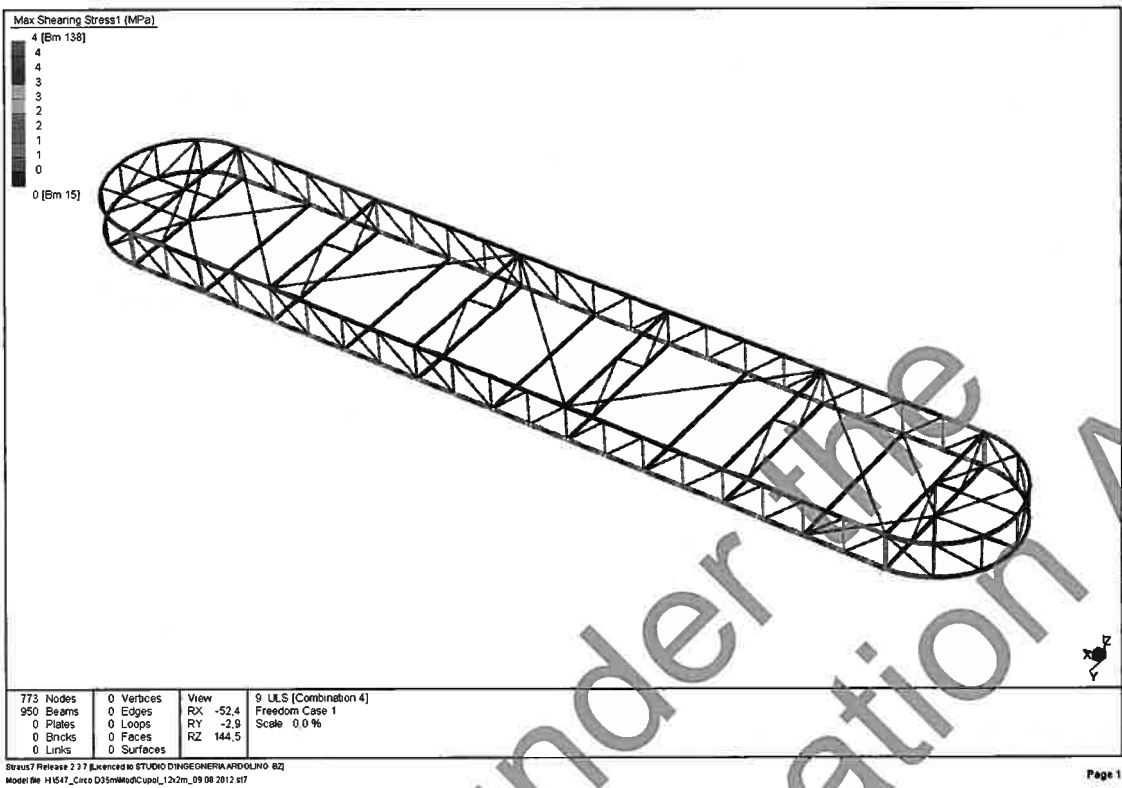
$F_{V, Dome}$	=	0.5 kN	left and right	+	1.0 kN	imposed load
$F_{H, Dome}$	=	1.0 kN	left and right			

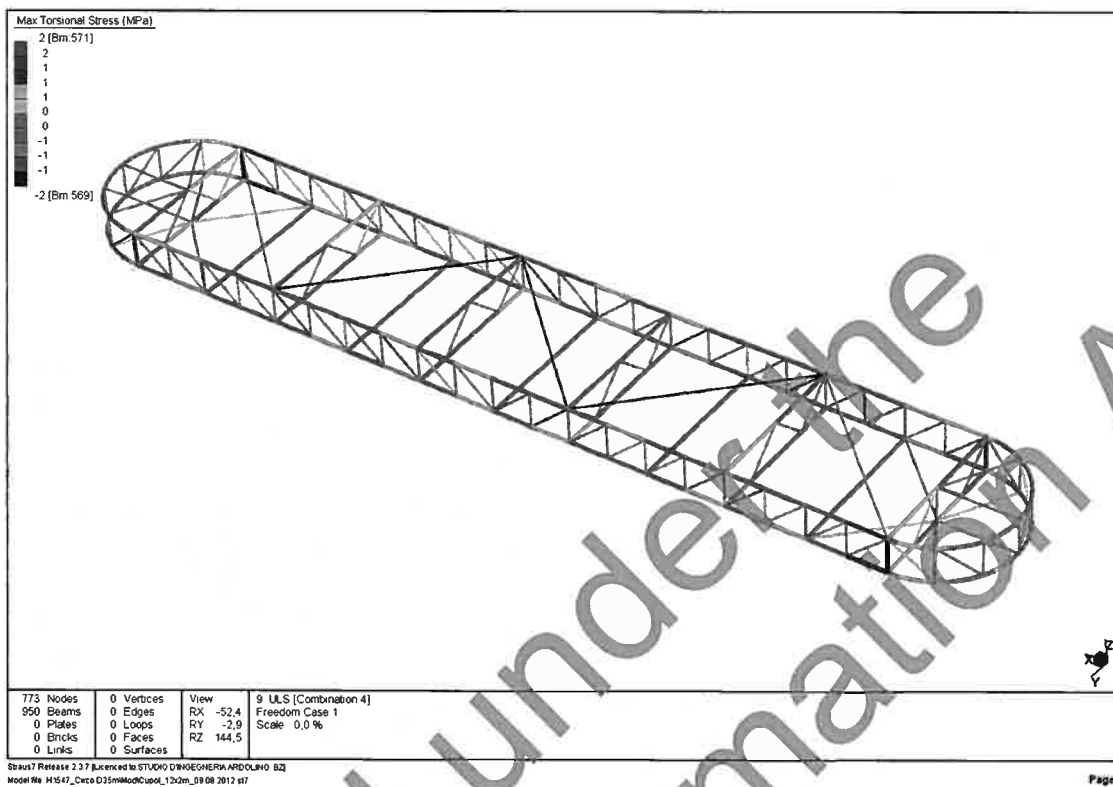
Design values of Actions

Self weight	s.w.	x	1.35			
$F_{V, Dome}$	1.5 kN/m	x	1.5	=	2.25 kN/m	
$F_{H, Dome}$	1.0 kN/m	x	1.5	=	1.50 kN/m	

Result of FEM linear static Analysis







ULS Verification

$$\begin{aligned}
 \sigma_v &= [\sigma_{N+M}^2 + 3(\tau_1^2 + \tau_2^2 + \tau_{Tors}^2)]^{0.5} \\
 &= [202^2 + 3(4^2 + 4^2 + 2^2)]^{0.5} \\
 &= 202 \text{ mPa} < 235/1.1 \text{ mPa} = 213 \text{ mPa}
 \end{aligned}$$

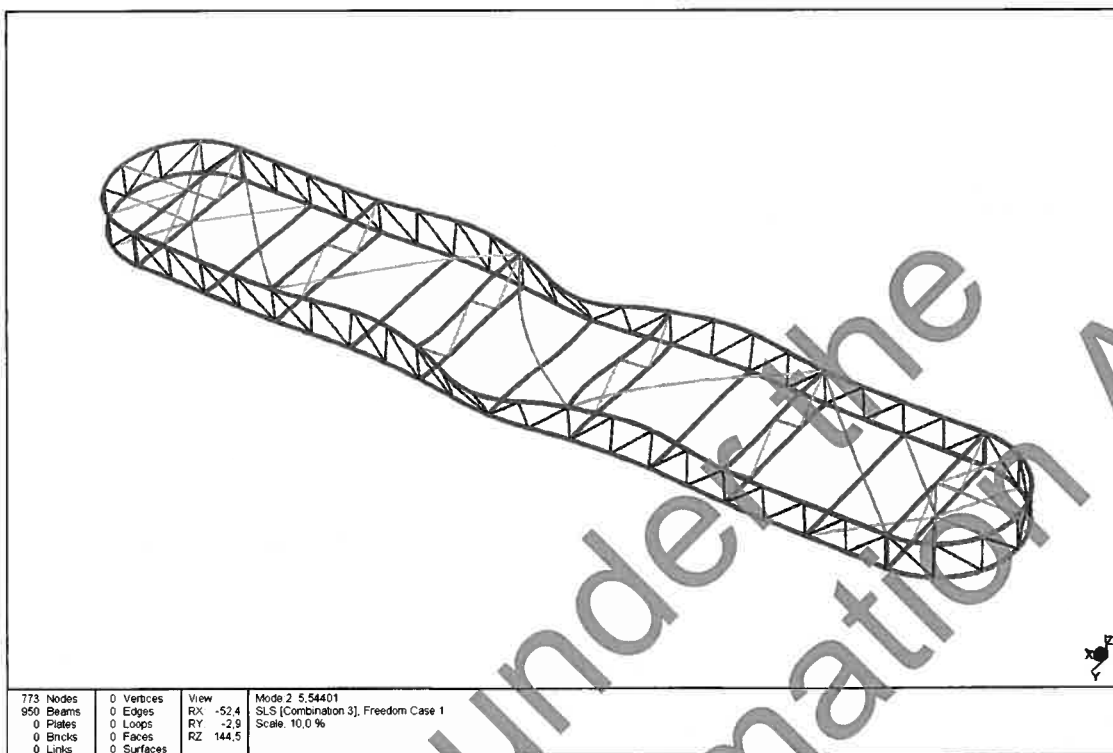
Welded connections

All the welded connection restore the complete resistance of the connected parts.

$$d_{min} > S_{tubc}$$

Buckling

First positive buckling-coefficient by a FEM linear buckling Analysis = 5.54



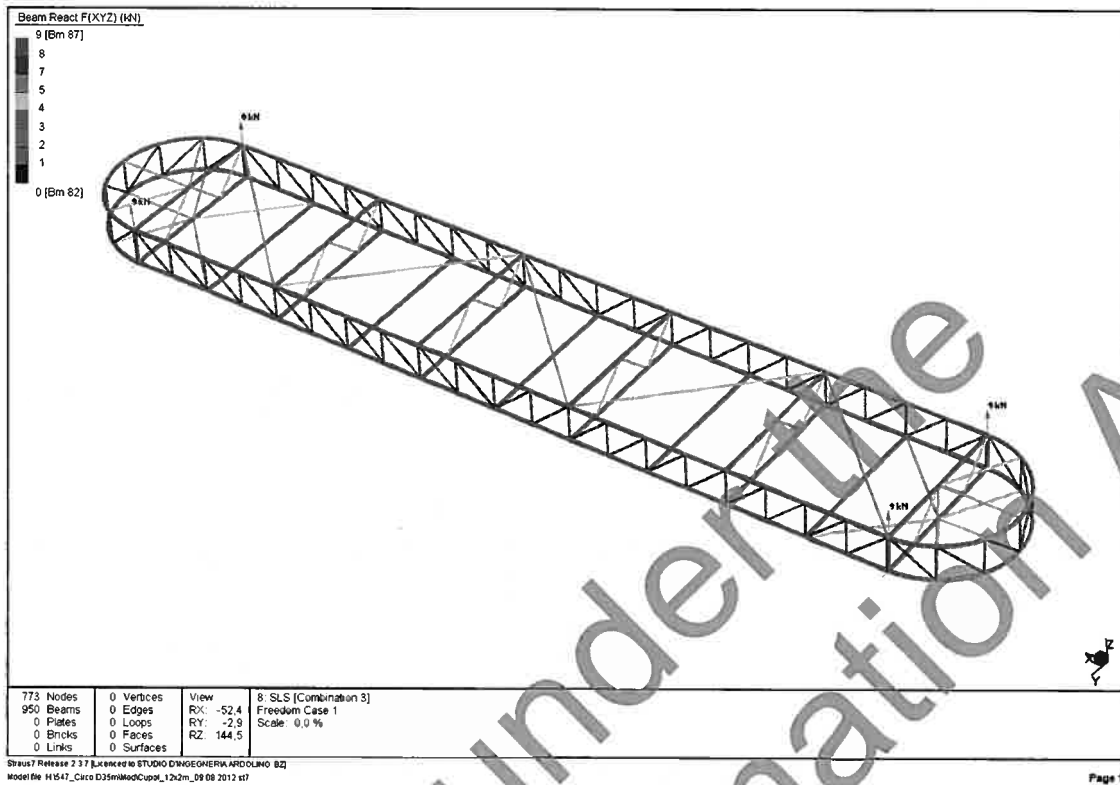
773 Nodes	0 Vertices	View	Mode 2 5,54401
950 Beams	0 Edges	RX -52,4	SLS (Combination 3), Freedom Case 1
0 Plates	0 Loops	RY -2,9	Scale 10,0 %
0 Bricks	0 Faces	RZ 144,5	
0 Links	0 Surfaces		

Strus7 Release 2.37 licensed to STUDIO D'INGEGNERIA APOLINO BQ
 Model file: H:\547_Circo D35m\Mod\547_Verifica statica_D35_ed 10.08.2012.slt

Page 1

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Reaction (SLS)



$V_{max} = 9 \text{ kN} \approx 9.7 \text{ kN}$ by global FEM Analysis

7 SUSPENSION OF DOME

Principal Rope

Rope ϕ 14 AZN 636 AC

Ultimate Force 129 kN

Reaction 9.7 kN

α 48 °

Tension 13 kN

S.F. 129 / 13 = 9.9 > 4.0

Rope and chain accessories, shackles, jams, thimbles, hooks etc., should correspond to the diameter and strength class of the rope.

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8 KING POLE

Lattice structure 400x400

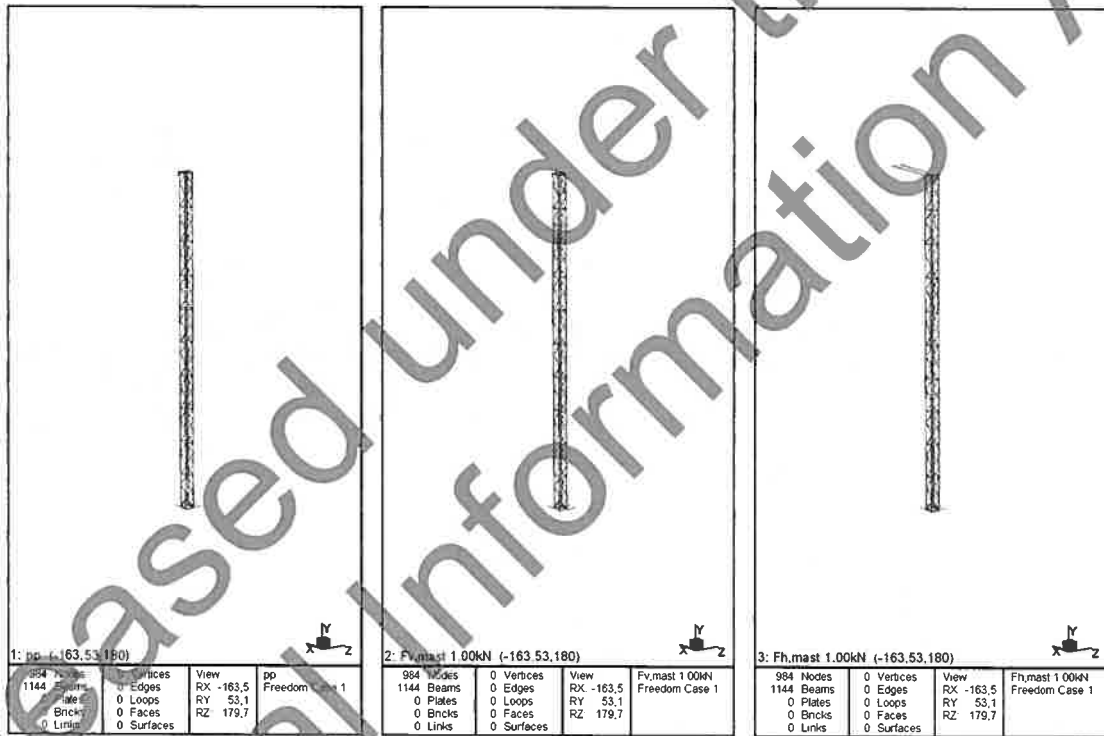
Currents ϕ 48.3 x 2.90

Diagonals ϕ 26.9 x 2.50

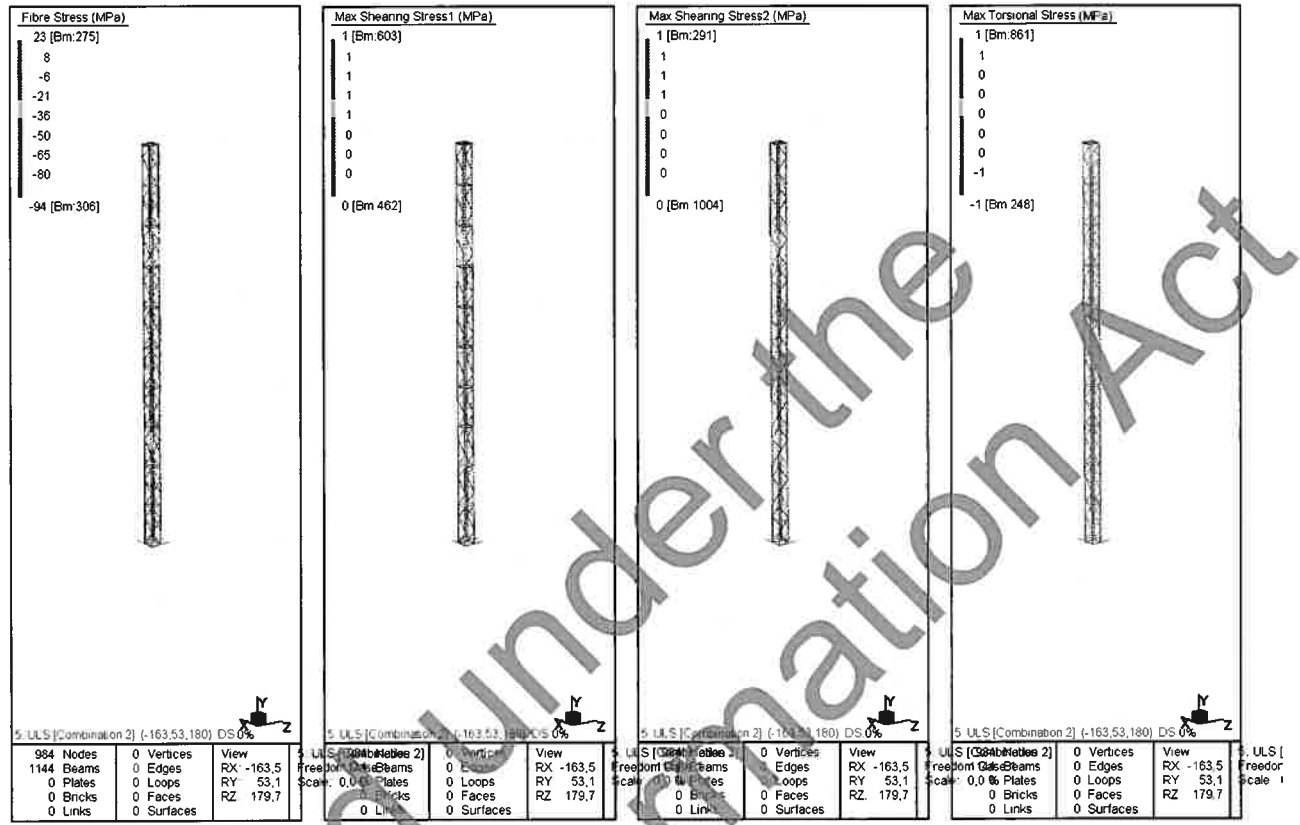
Es wurde eine lineare statische Analyse des ganzen System mit einem FEM Programm durchgeführt.

$$F_{Mast} = 85 \text{ kN} \times 1.50 = 127.5 \text{ kN}$$

$$F_{H,Mast} = 25 \text{ kN} \times 1.50 = 37.5 \text{ kN}$$



Result of FEM linear static Analysis



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Model file: H:\547_Circo D35m\Mod\547_Verifica statica_D35_ed 10.08.2012.doc

$$\begin{aligned} \sigma_v &= \left[\sigma_{N-M}^2 + 3(\tau_1^2 + \tau_2^2 + \tau_{Tors}^2) \right]^{0.5} \\ &= \left[94^2 + 3(1^2 + 1^2 + 1^2) \right]^{0.5} \\ &= 95 \text{ mPa} < 235/1.1 \text{ mPa} = 213.6 \text{ mPa} \end{aligned}$$

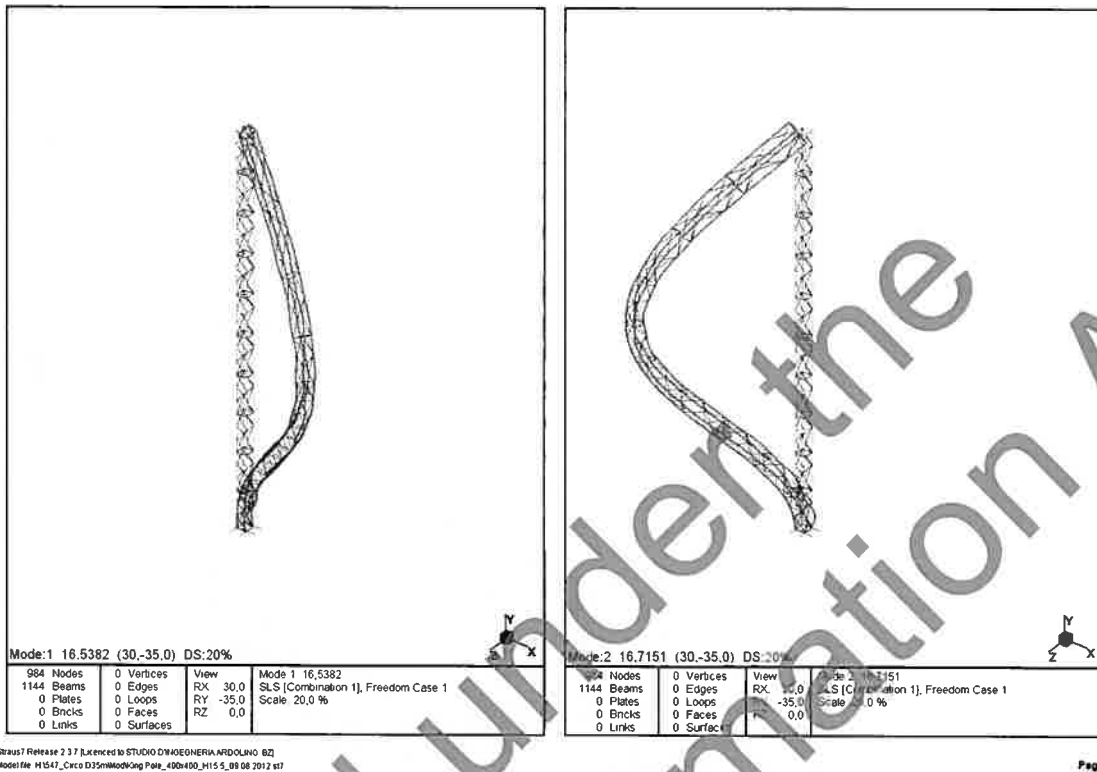
Welded connections

All the welded connection restore the complete resistance of the connected parts.

$$a_{min} > s_{tubc}$$

Buckling

First positive buckling-coefficient by a FEM linear buckling Analysis = 16.75



Ground pressure

Plate 700 x 700 x 8 mm

$$\sigma_{\text{ground}} = N / (b \cdot l) = (85) \text{ kN} / (0.70 \times 0.70) \text{ m}^2 = 173 \text{ kN/m}^2$$

Ground plate to be fixed with min 4 Nails.

9 STABILIZATION-ROPE OF KING POLES

$$\alpha = \tan^{-1} (15.50 / 21.50) = 36^\circ$$

According to „Beratungsergebnissen der Arbeitsgruppe Fliegende Bauten, Stand 03.03.1999“

Projected Tent surface	$35 \times 4 + 10 \times 7.5 + 12.5 \times 7.5 = 309 \text{ m}^2$				
$H_{\text{or, Mastabspannung}}$	$= 309 \text{ m}^2 \times (0.3 \times 1.40) \text{ kN/m}^2$	/	$(2 \times 2) =$	32	kN/Mast
$N_{\text{Mastabspannung}}$	$= 32 \text{ kN}$	/	$\cos 36^\circ =$	40	kN/Mast

Rope ϕ 16 AZN636AC

Ultimate Force 165 kN

S.F. 165 / 40 = 4.12 \geq 4.0

Soil Nails:

ϕ 4.5cm x 140cm ($l' = 130\text{cm}$)

Nail resistance $Z_{\text{Nail}} = 0.017 \times 4.5 \times 130 / 1.2 = 8.3 \text{ kN}$

Nr. Nails $N_{\text{rNail}} = 40 / 8.3 = 5 \text{ Soils Nails}$

Each stabilization-rope should be fixed by min 6 soil nails ϕ 4.5cm x 140 (granular thickened ground).

By bad ground resistance longer or a greater number of soil nails should be used.

10 MASTRING

φ 48.3 x 2.9 - Diameter= 1.20 m

$$A = 4.14 \text{ cm}^2$$

$$W = 4.43 \text{ cm}^3$$

$$i = 1.61 \text{ cm}$$

$$l_0 = 25 \text{ cm}$$

$$H = 25 \text{ kN}$$

$$V = 85 \text{ kN} \quad (\downarrow)$$

Characteristic values of Actions

$$h = 25 \text{ kN} / 1.20\text{m} \times \pi = 6.6 \text{ kN/m}$$

$$v = 85 \text{ kN} / 1.20\text{m} \times \pi = 22.6 \text{ kN/m}$$

Normal Load

$$Z = 6.6 \text{ kN/m} \times 1.20\text{m}/2 = 2.75 \text{ kN}$$

Moments

$$M_h = 6.6 \text{ kN/m} \times (0.25 \text{ m})^2 / 8 = 0.05 \text{ kNm}$$

$$M_v = 22.6 \text{ kN/m} \times (0.25 \text{ m})^2 / 8 = 0.18 \text{ kNm}$$

ULS - Resistance

$$\sigma_z = (1.5 \times 2.75) / 4.14 = 1.00 \text{ kN/cm}^2$$

$$\sigma_{Mh} = (1.5 \times 0.05 \times 100) / 4.43 = 1.70 \text{ kN/cm}^2$$

$$\sigma_{Mv} = (1.5 \times 0.18 \times 100) / 4.43 = 6.09 \text{ kN/cm}^2$$

$$\sigma_{tot} = 8.79 \text{ kN/cm}^2 < 21.3 \text{ kN/cm}^2$$

11 SUSPENSION OF MASTRING

Principal rope

4 x ϕ 12 AZN 636 AC

Ultimate Force	95	kN				
Reaction	85	kN				
Traction	85	/	4	=	21	kN
S.F.	=	95	/	21	=	4.52 > 4.0

Rope and chain accessories, shackles, jams, thimbles, hooks etc., should correspond to the diameter and strength class of the rope.

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12 POLES (RONDELLSTANGEN)

ϕ 60 x 3 - Abstand e = 1.7 m

$$A = 5.74 \text{ cm}^2 \quad W_{el} = 7.78 \text{ cm}^3 \quad W_{pl} = 10.44 \text{ cm}^3 \quad i = 2.02 \text{ cm} \quad l_0 = 400 \text{ cm}$$

$$H = 3.34 \text{ kN/m}$$

$$V = -0.34 \text{ kN/m } (\uparrow)$$

$$H_{wind} = 0.8 \times 0.25 \text{ kN/m}^2 \times 1.7 \text{ m} = 0.34 \text{ kN/m}$$

$$\Sigma H = 3.34 \text{ kN/m} \times 1.7 \text{ m} + 0.34 \text{ kN/m} \times 4 \text{ m} / 2 = 6.35 \text{ kN}$$

$$\Sigma V = -0.34 \text{ kN/m} \times 1.7 \text{ m} = -0.58 \text{ kN}$$

$$N = \Sigma H + \Sigma V = 5.77 \text{ kN}$$

$$M = 0.34 \text{ kN/m} \times (4.00 \text{ m})^2 / 8 = 0.68 \text{ kNm}$$

$$\varepsilon = 1$$

$$\lambda_1 = 93.9$$

$$\beta_A = 1$$

$$\underline{\lambda} = 2.11$$

$$\alpha = 0.21$$

$$\phi = 2.92$$

$$\chi = 0.20$$

$$\beta_{My} = 1.3$$

$$\mu_y = -2.61$$

$$\kappa_y = 1.5$$

$$N_{sd} / (\kappa A f_y / \gamma_M) + \kappa_y M_{y,ed} / (W_{pl} f_y / \gamma_M) < 1.00$$

$$0.22 + 0.44 = 0.66 < 1$$

Ground pressure

Plate 200 x 200 x 30 mm

$$\sigma_{ground} = N / (b l) = 5.77 \text{ kN} / (0.15 \times 0.15) \text{ m}^2 = 144 \text{ kN/m}^2$$

By granular thickened ground should be used wood-plate 20x20x3cm.

By bad ground condition should be used wood-plate 25x25x5cm.

13 STABILIZATION OF POLES

$$\begin{aligned}
 Z_{\max} \quad 2^{0.5} \quad \Sigma H &= 8.98 \quad \text{kN} \\
 \text{Ultimate Force} &= 50 \quad \text{kN} \\
 \text{S.F.} &= 50 / 9 = 5.55 > 4.0
 \end{aligned}$$

Soil Nails:

ϕ 4.0cm x 120cm (l' = 110cm)

Nail resistance $Z_{\text{Nail}} = 0.017 \times 4.0 \times 110 / 1.2 = 6.23 \text{ kN}$

Nr. Nails $N_{\text{rNail}} = 8.98 / 6.23 = 2 \text{ Soils Nails}$

**Each stabilization-rope should be fixed by min 2 soil nails ϕ 4.0cm x 120 (granular thickened ground).
By bad ground resistance longer or a greater number of soil nails should be used.**

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14 NOTE

ACTION ON THE STRUCTURE

- Wind pressure: 1.40 kN/m²
- By strong wind the tent should be closed.
- Snow: 0.00 kN/m²
- Max imposed load on the dome 1.00 kN/m

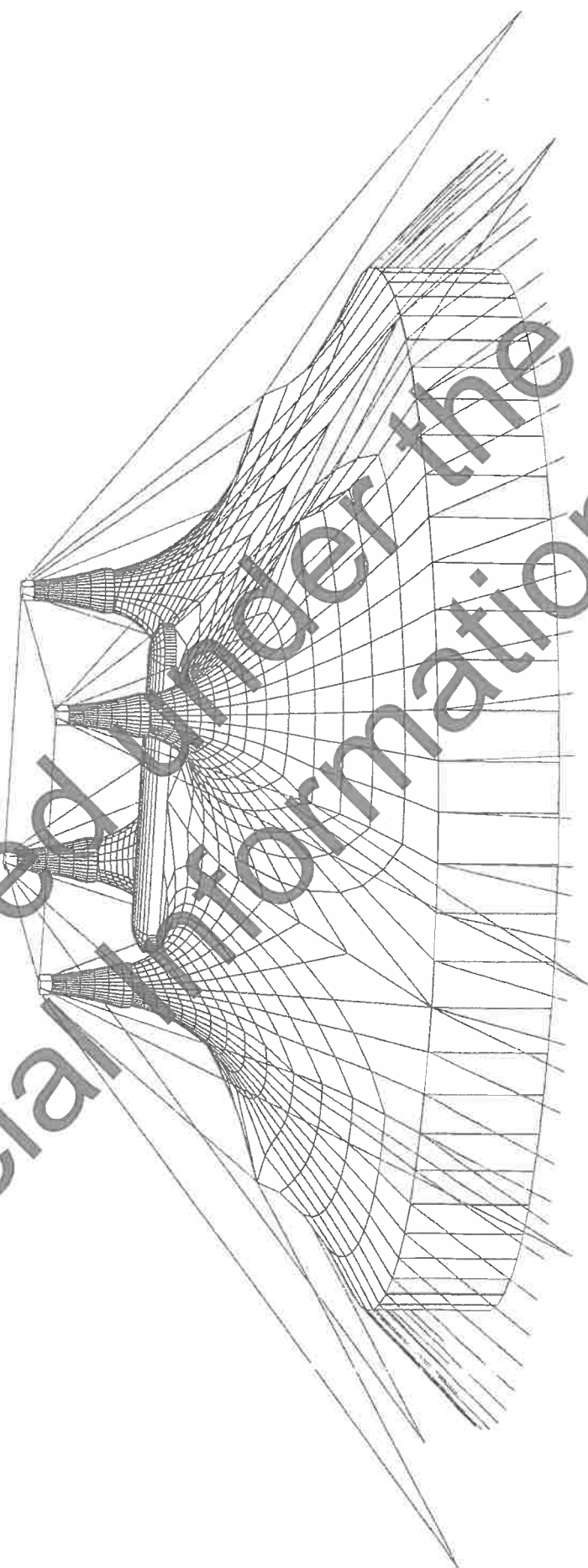
SOIL NAILS

- Each stabilization-rope of the king pole should be fixed by min 6 soil nails ϕ 4.5cm x 140 (granular thickened ground). By bad ground resistance longer or a greater number of soil nails should be used.
- the king pole plate should be fixed by min 4 soil nails.
- Each stabilization-rope of the poles should be fixed by min 2 soil nails ϕ 4.0cm x 120 (granular thickened ground). By bad ground resistance longer or a greater number of soil nails should be used.

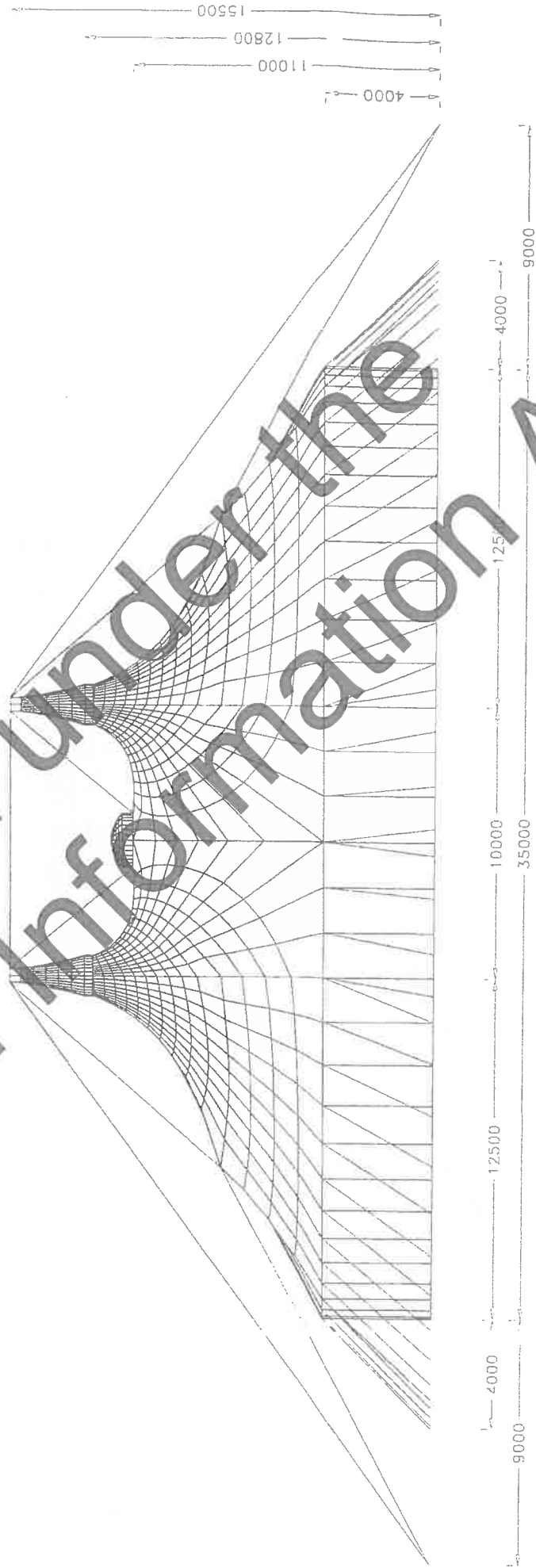
ASSEMBLY

- Assembly according to plane and instruction from producer.
- Rope and chain accessories, shackles, jams, thimbles, hooks etc., should correspond to the diameter and strength class of the rope.
- All the parts of the structure should be checked every montage/demontage. Defective parts should be substituted.
- The structure should not be modified without the written confirm of the producer.

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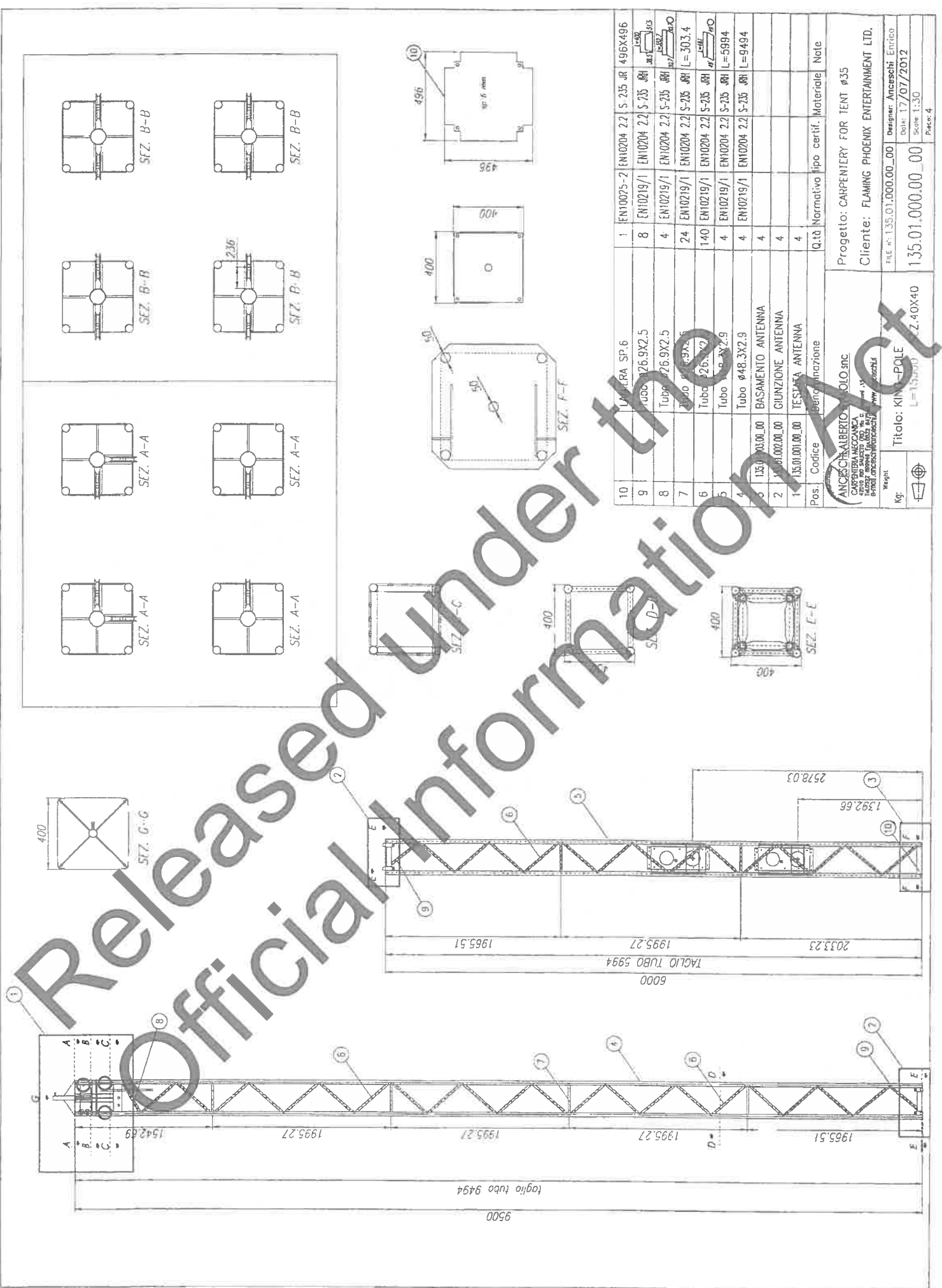
Tensoreda diametro mt. 15.00 - Antenne a mt. 10.00 x 10.00 - Ring diametro cm 120
Cupola mt. (1.00 + 10.00 + 1.00) x 2.00 - H. 11.00 - H. 12.80 - h. 4.00



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Tensodenda diametro mt. 35.00 - Antenne a mt. 10.00 x 10.00 - Ring diametro cm 120
Cupola mt. (1.00 + 10.00 + 1.00) x 2.00 - H. 11.00 - H. 12.80 - h. 4.00

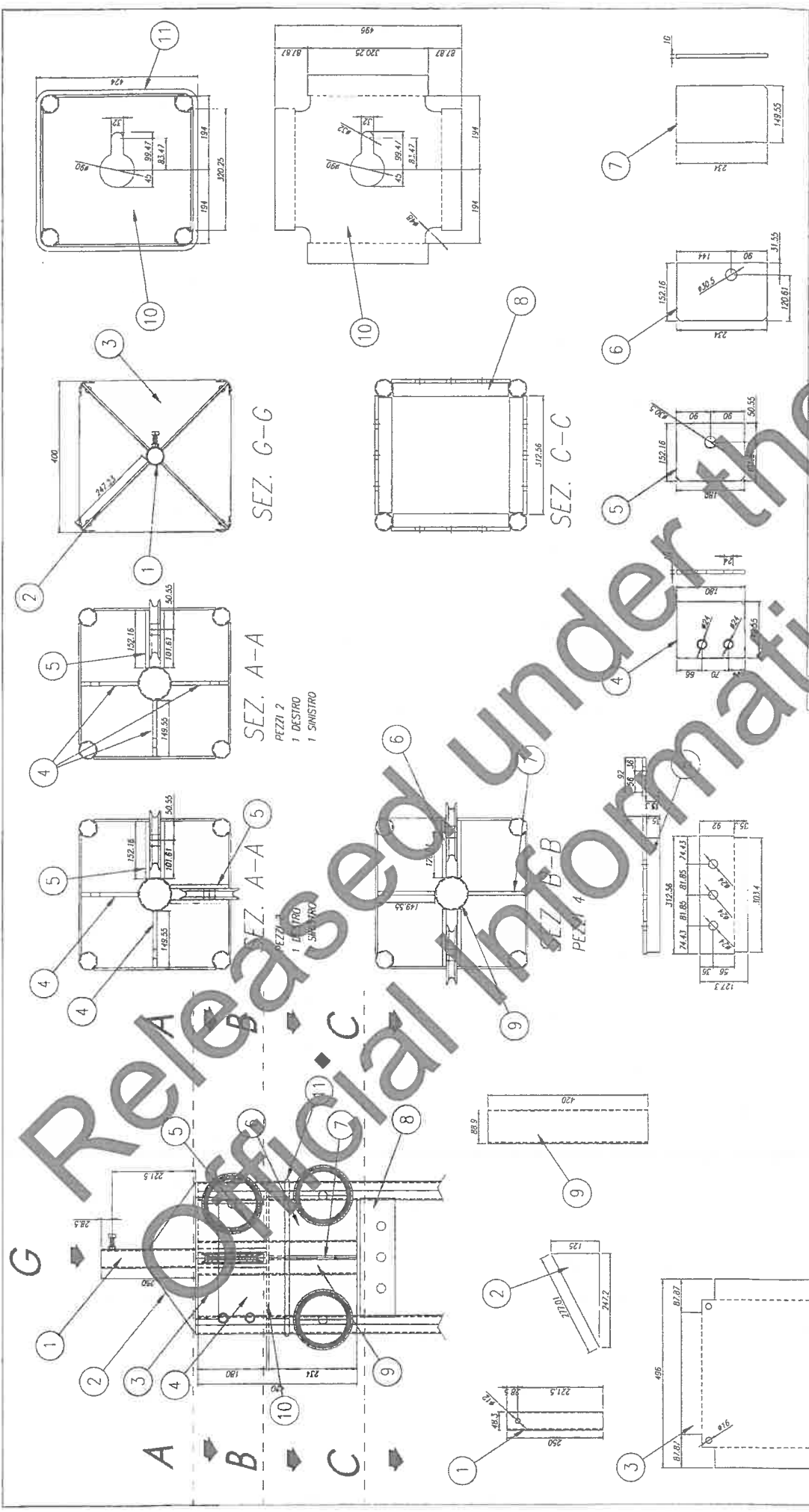




10	LAMIERA SP.6	EN10025-2 S. 235 JR	496X496
9	TUBO Ø26.9X2.5	EN10219/1 S. 235 JR	L=400
8	TUBO Ø26.9X2.5	EN10219/1 S. 235 JR	L=303.4
7	TUBO Ø26.9X2.5	EN10219/1 S. 235 JR	L=599.4
6	TUBO Ø26.9X2.5	EN10219/1 S. 235 JR	L=949.4
5	TUBO Ø48.3X2.9	EN10219/1 S. 235 JR	L=599.4
4	TUBO Ø48.3X2.9	EN10219/1 S. 235 JR	L=949.4
3	135.01.001.00 BASAMENTO ANTENNA		
2	135.01.002.00 GIUNZIONE ANTENNA		
1	135.01.001.00 TESTATA ANTENNA		
Pos.	Quantità	Normativo	lipo certif. Materiale Note

Progetto: CARPENTERY FOR TENT Ø35
 Cliente: FLAMING PHOENIX ENTERTAINMENT LTD.
 FILE n. 135.01.000.00_00 Designer: Anceschi Enrico
 Date: 17/07/2012 Scale: 1:30
 135.01.000.00_00
 L=135000
 Z.40X40
 Pagine: 4

ANGESCHIALBERTO LOLO SNC
 CARPENTERIA MECCANICA
 Via...
 Tel...
 Email...
 Web...
 Weight: Kg.
 Titolo: KINEM-POLE
 L=135000
 Z.40X40

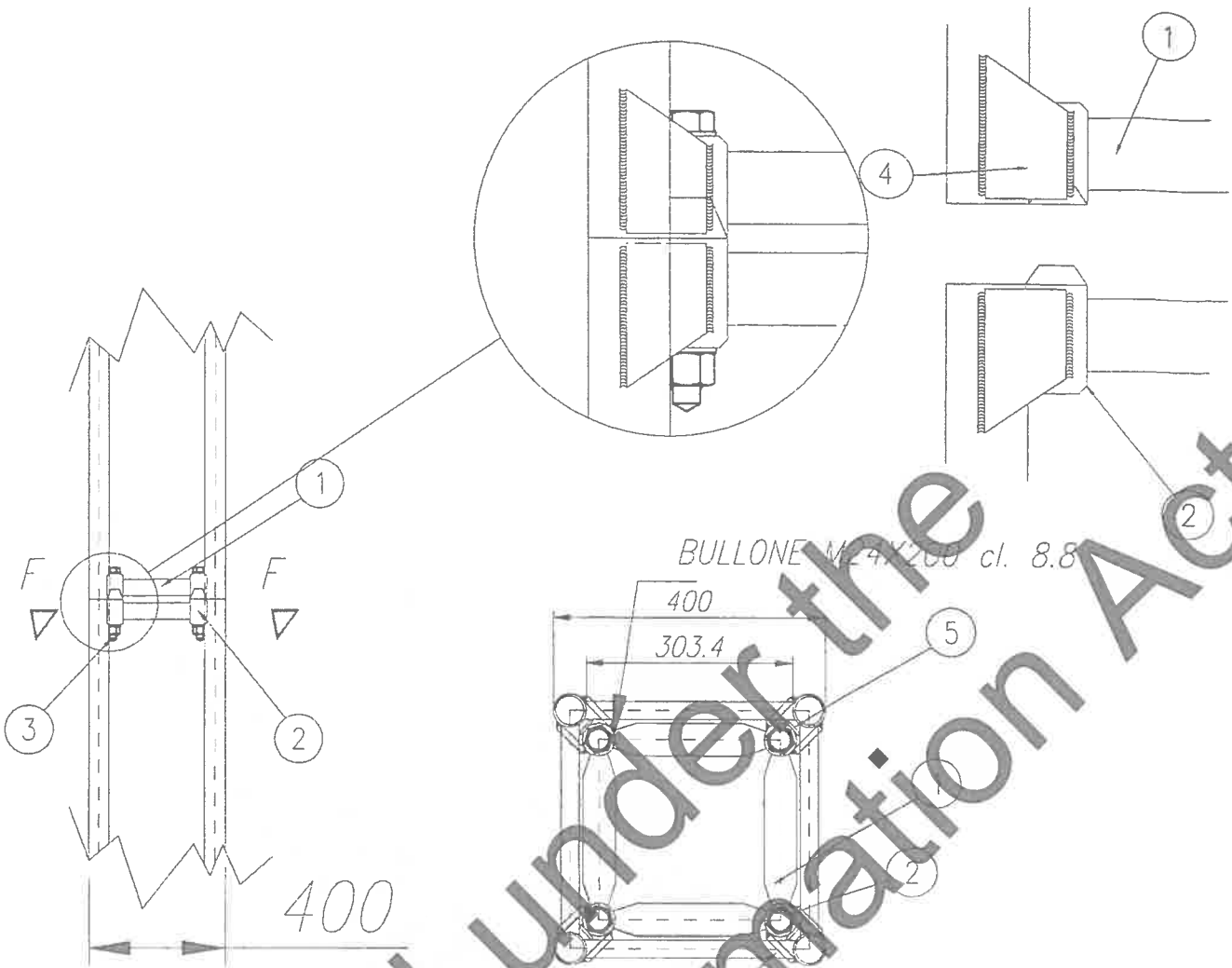


3	LAMIERA SP.6	EN10025-2	EN10204 2.2	S-235 JR	L=496X496
2	LAMIERA SP.6	EN10025-2	EN10204 2.2	S-235 JR	L=247.2X125
1	Tubo Ø48.3X2.9	EN10219/1	EN10204 3.1	S-355 JRH	L=250
Pos.	Denominazione	Q.tà Normativa tipo certif. Materiale Note			

11	tondo Ø12	EN10025-2	EN10204 2.2	S-235 JR	L=1558.4
10	LAMIERA SP.6	EN10025-2	EN10204 2.2	S-235 JR	L=496X496
9	Tubo Ø88.9X3	EN10219/1	EN10204 3.1	S-355 JRH	L=420
8	LAMIERA SP.10	EN10025-2	EN10204 2.2	S-235 JR	L=312.5X177.5
7	LAMIERA SP.10	EN10025-2	EN10204 2.2	S-235 JR	L=149.5X234
6	LAMIERA SP.10	EN10025-2	EN10204 2.2	S-235 JR	L=152.1X234
5	LAMIERA SP.10	EN10025-2	EN10204 2.2	S-235 JR	L=152.1X180
4	LAMIERA SP.10	EN10025-2	EN10204 2.2	S-235 JR	L=149.5X180

ANCESCHI ALBERTO ENGINEERING S.p.A.
 CAPRENSIA MECCANICA
 VIA S. GIUSEPPE 100 - 01018 CAPRENSIA (VT) - ITALIA
 email: anceschi@anceschi.it www.anceschi.it
 Weight Kg:
 Titolo: KING-POLE L=15500 SEZ. A-10
 L=15500 SEZ. A-10
 Designer: Anceschi Enrico
 Date: 17/07/2012
 Scale: 1:30
 Pièces: 4

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BULLONE M24X200 cl. 8.8

Proprietà di Anceschi Alberto e Paolo snc
Riproduzione e divulgazione vietata a termini di legge

Pos.	Codice	Denominazione	Q.tà	Materiale	Note
		Piatto 40x4	8	Fe 360-C EN 10025	L=60
4		Piatto 60x5	16	Fe 360-C EN 10025	L=45
3		Bullone m24x200	4	cl. 8.8	L=200
2		Tubo ø48x10	16	Fe 360-C EN 10025	L=90
1		Tubo ø48x3	4	Fe 360-C EN 10025	L=218

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 CARPENTERIA MECCANICA
 42010 RIO SALICETO (RE) Via G. Marconi ,15
 Tel.0522 699949 Fax.0522 647548
 e-mail.anceschi@anceschi.it www.anceschi.it

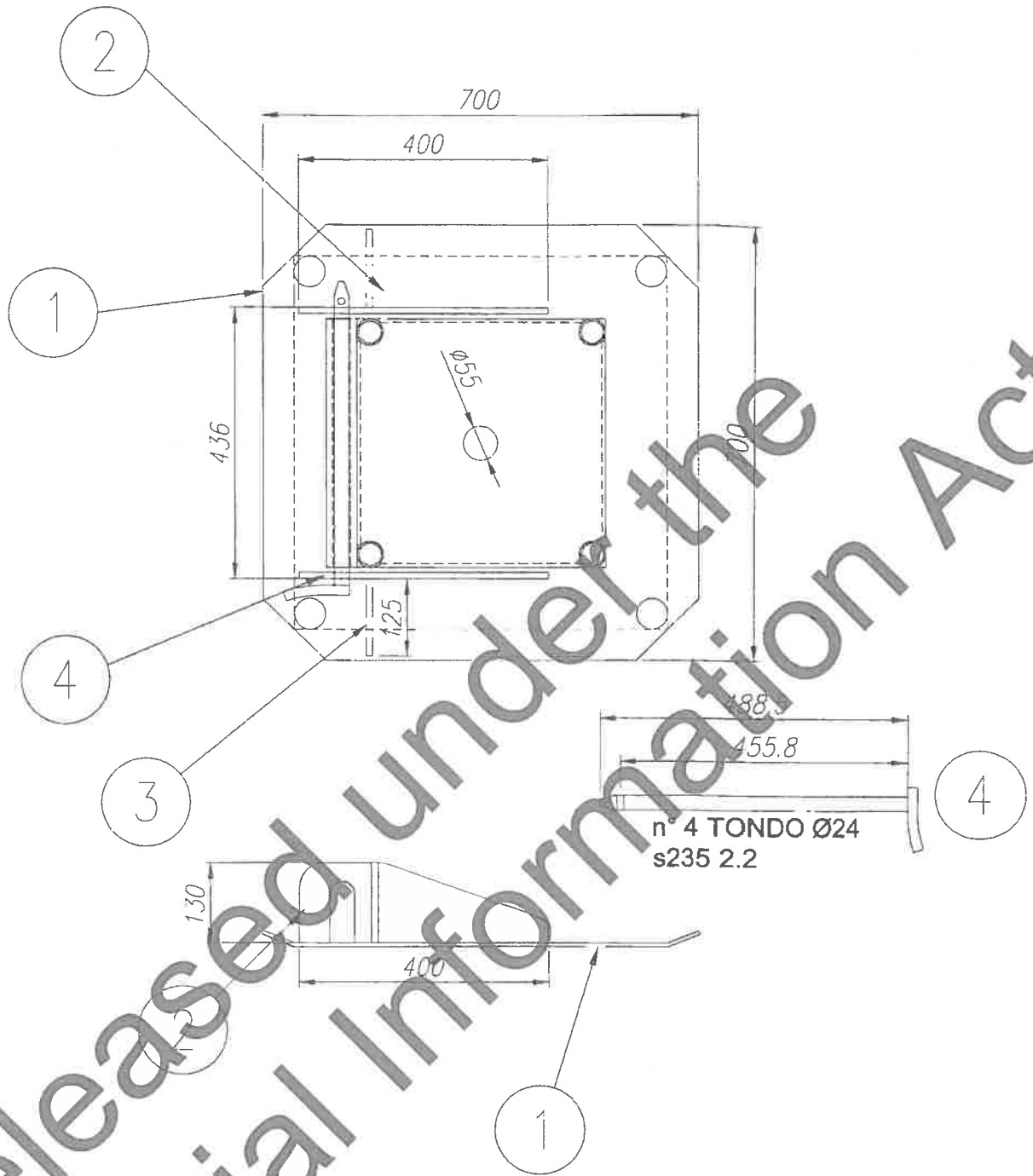
Weight
Kg:

Titolo: JOINT
KING-POLE

Progetto: CARPENTRY FOR TENT ø35
 Cliente: FLAMING PHOENIX ENTERTAINMENT LTD.

FILE n°: 135.01.002.00_00
 135.01.002.00_00

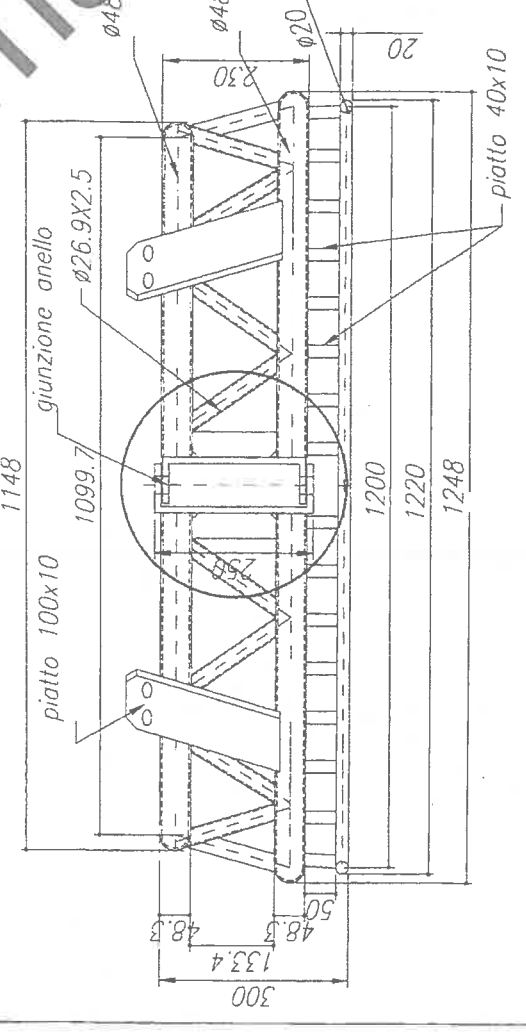
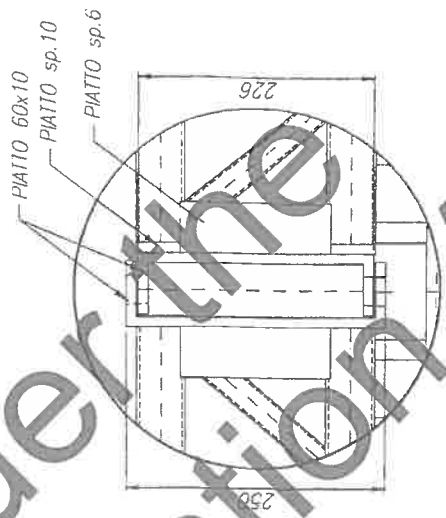
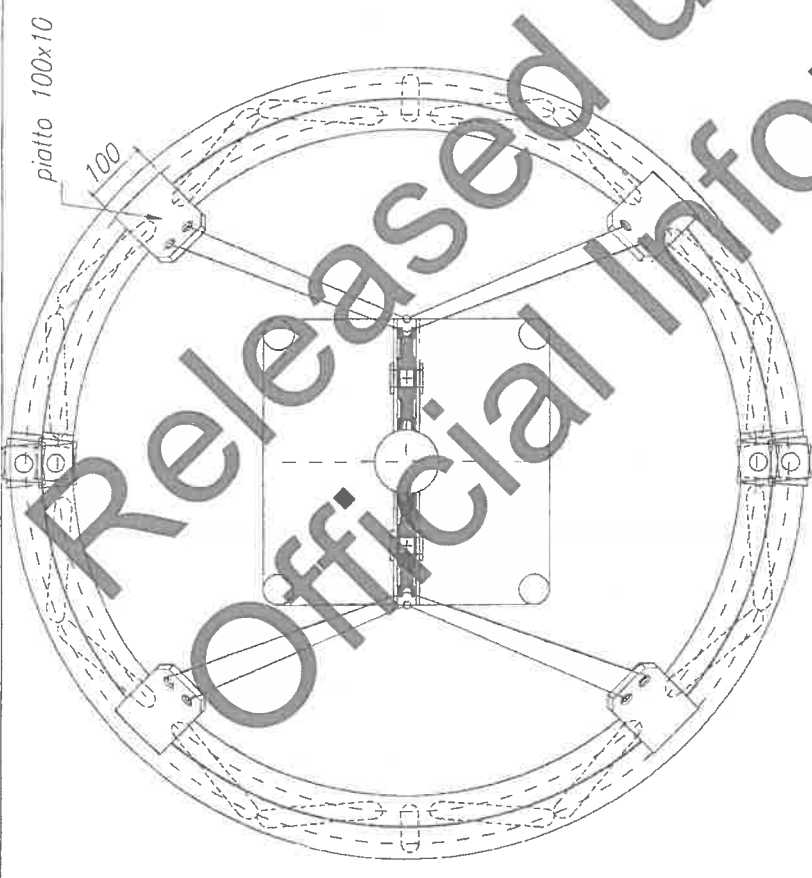
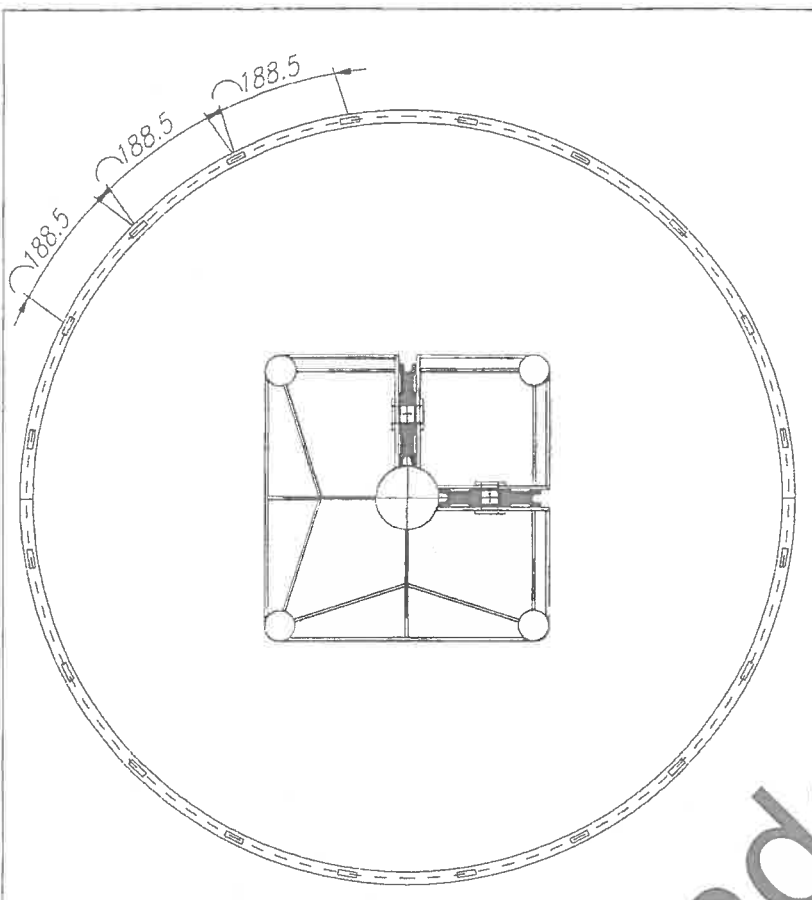
Designer: Anceschi Enrica
 Date: 17/07/2012
 Scale: 1:30
 Piece: 4



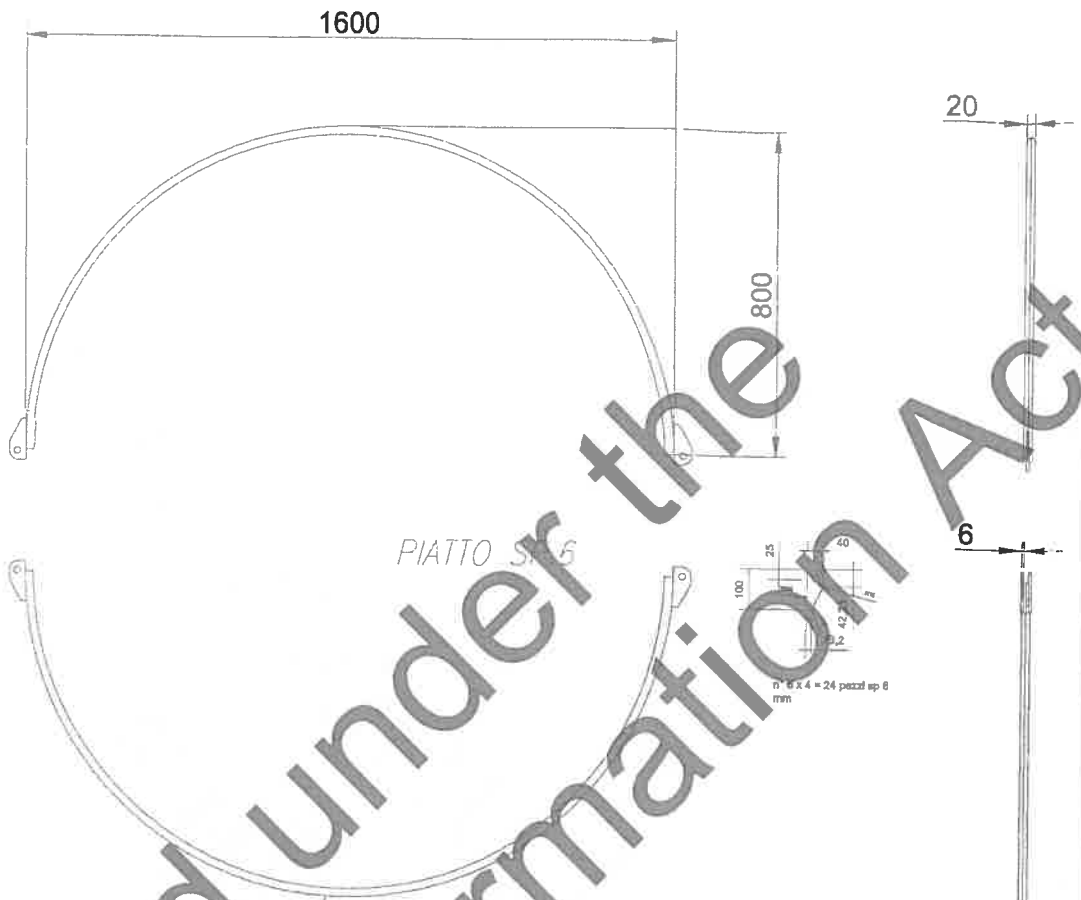
Proprietà di Anceschi Alberto e Paolo snc.
 Riproduzione o divulgazione vietata a termini di legge

Pos.	Codice	Denominazione	Q.tà	Materiale	Note
4		Tubo tondo Ø24	1	Fe 360-C EN10025	L=500
3		Piatto 130x10	1	Fe 360-C EN10025	L=125
2		Piatto 130x10	1	Fe 360-C EN10025	L=400
1		Piastra sp.6	1	Fe 360-C EN10025	L=700X700

ANCESCHI ALBERTO E PAOLO snc CARPENTERIA MECCANICA 42010 RIO SALICETO (RE) Via G. Marconi ,15 Tel.0522 699949 Fax 0522 64794C e-mail .anceschi@anceschi.it www.anceschi.it		Progetto: CARPENTRY FOR TENT Ø35 Cliente: FLAMING PHOENIX ENTERTAINMENT LTD.	
Weight	Titolo: BASIS PLATE	FILE n°: 135.01.003.00_00	Designer: Anceschi Enrico
Kg:		135.01.003.00_00	Date: 17/07/2012
		Scale: 1:30	Piece: 4



ANCESCHI ALBERTO E PAOLO CARPENTERIA MECCANICA Via S. Coste, 15 10027, Sarnes, Tel. 027.647143 Email: anceschi@anceschi.it www.anceschi.it		Progetto: carpenteria for circus diam.35	
Titolo: BASKET OPENINALE Ø 1200		Cliente: F. PHOENIX . ENT .	
Kg:		PES n.: 135.03.000.00_00.dwg	
Weight		Designer: Anceschi Enrica	
Kg:		Date: 09/07/2012	
Kg:		Scale: 1:8	
Kg:		Pecce: 4	

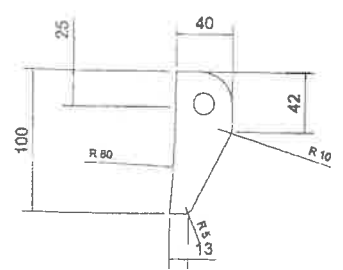


PIATTO Sp 6

n° 6 x 4 = 24 pezzi sp 6 mm

135.04.000.00
135.04.000.00

n° 6 x 4 = 24 pezzi sp 6 mm



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CARPENTERIA MECCANICA
42010 RIO SALICETO (RE) Via G. Marconi ,15
Tel.0522 699949 Fax.0522 64754C
e-mail.anceschi@anceschi.it www.anceschi.it

Progetto: CARPENTRY FOR CIRCUS ø35
Cliente: F . PHOENIX . ENT

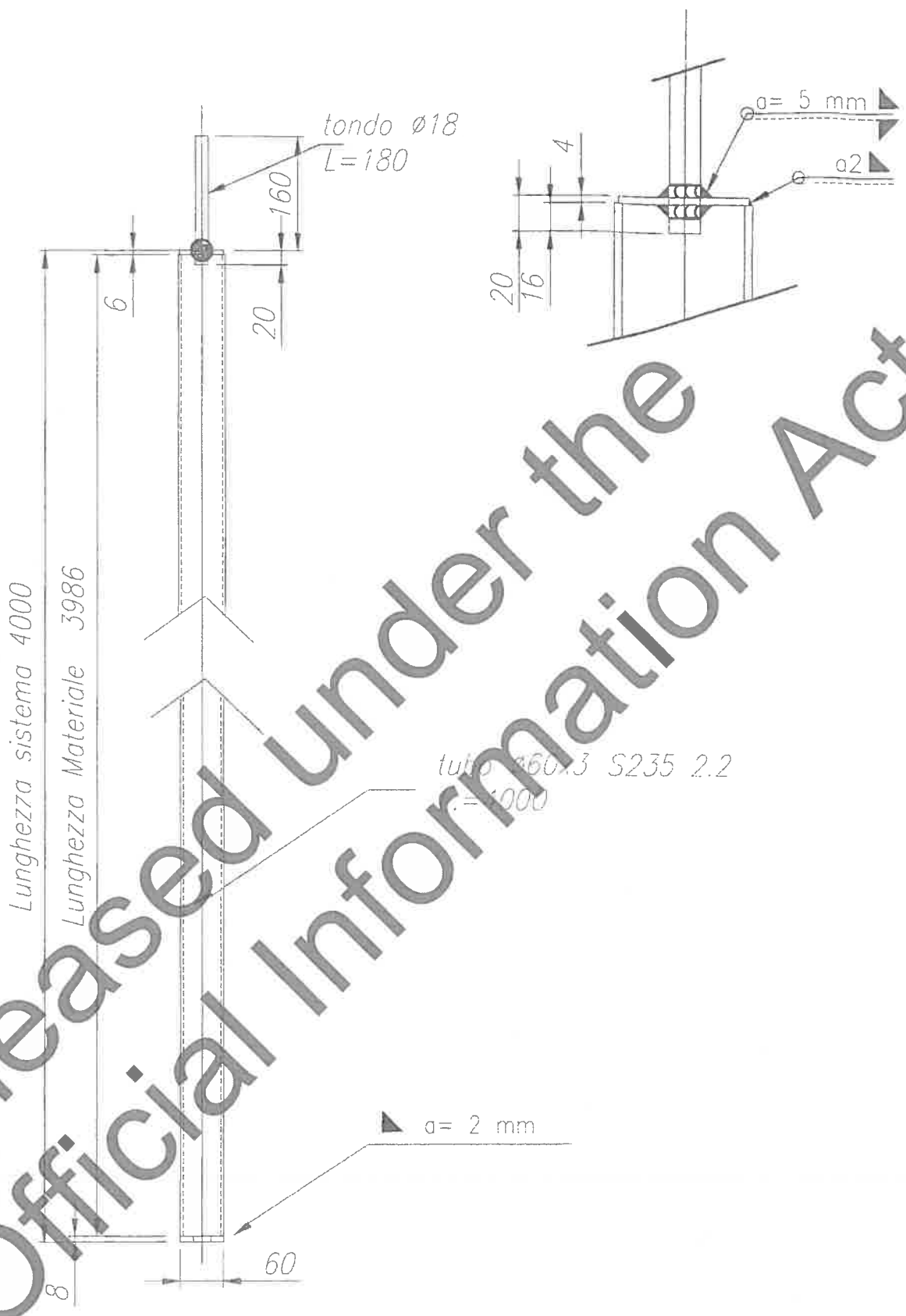
Weight:
Kg:

Titolo: RINGS

FILE n°: 135.04.000.00_00.dwg
135.04.000.00_00

Designer: Anceschi Enrico
Date: 09/07/2012
Scale: 1:18
Piece: 4

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 42010 PO SALICETO (RC) - Via G. Marconi, 15
 Tel: 0522 698949 - fax: 0522 647540
 e-mail: anceschi@anceschi.it www.anceschi.it

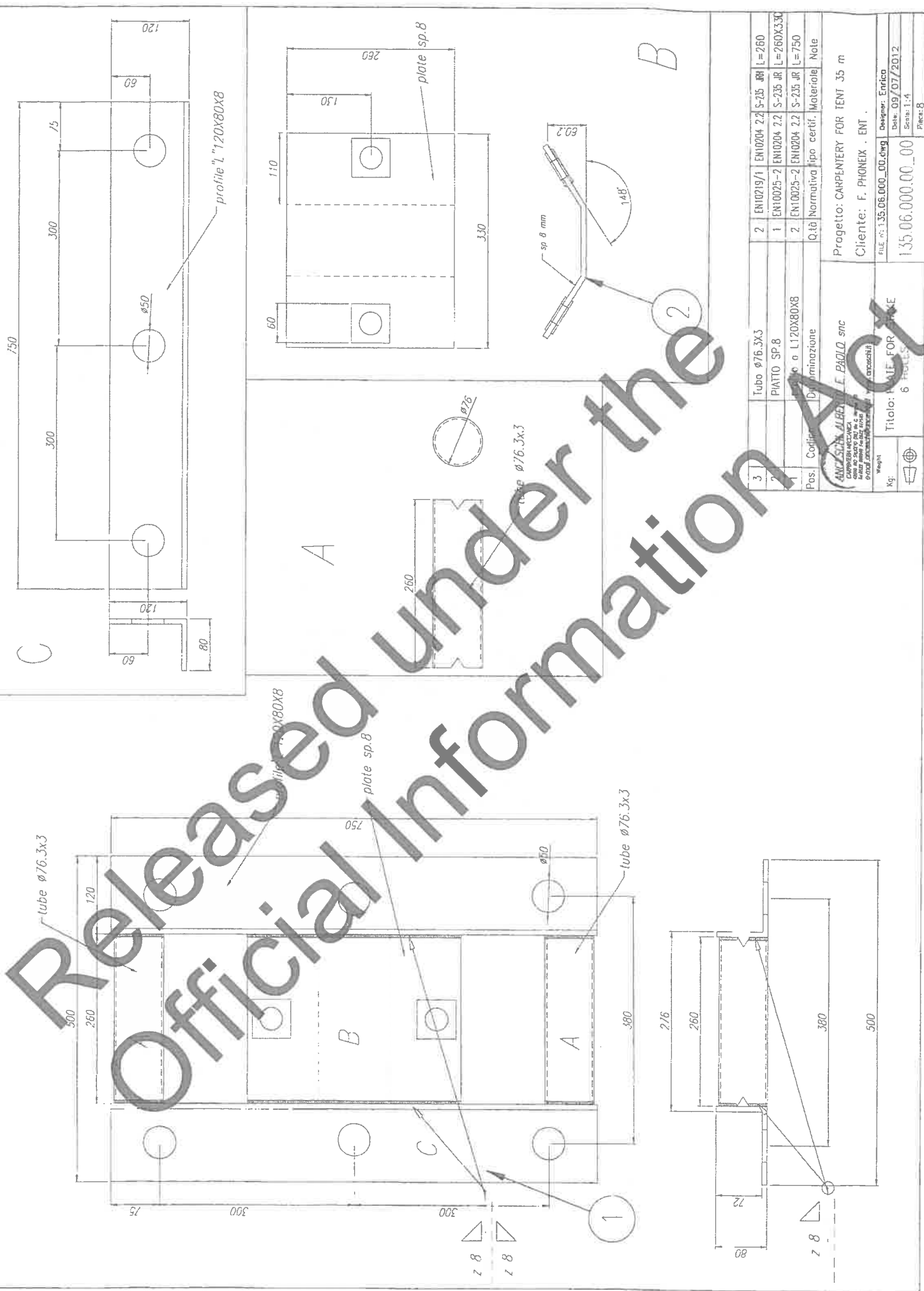
Progetto: CARPENTERY FOR TENT 35 m
 Cl'ente: F. PHONEIX . ENT

Weight
 Kg:

Titolo: POLES MT.4.00
 PIPE ø 60X3

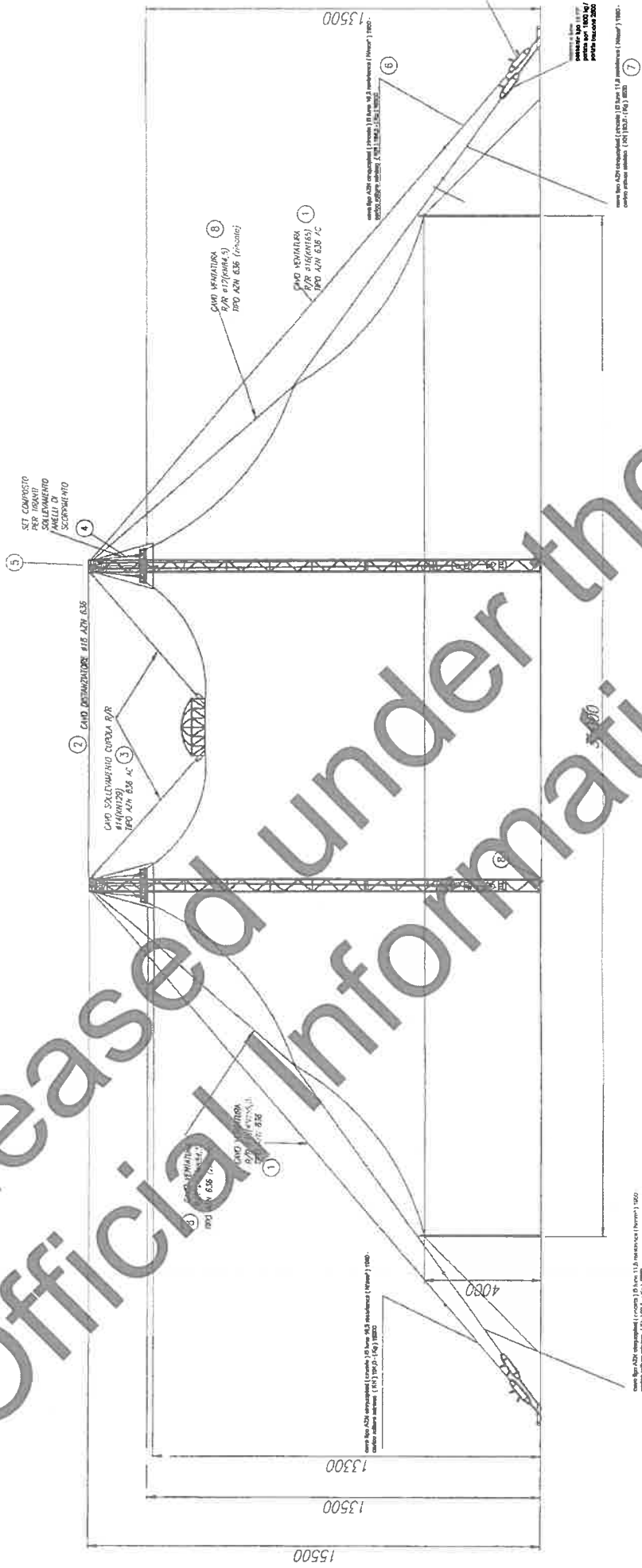
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Designer: Enrica
 Date: 09/07/2012
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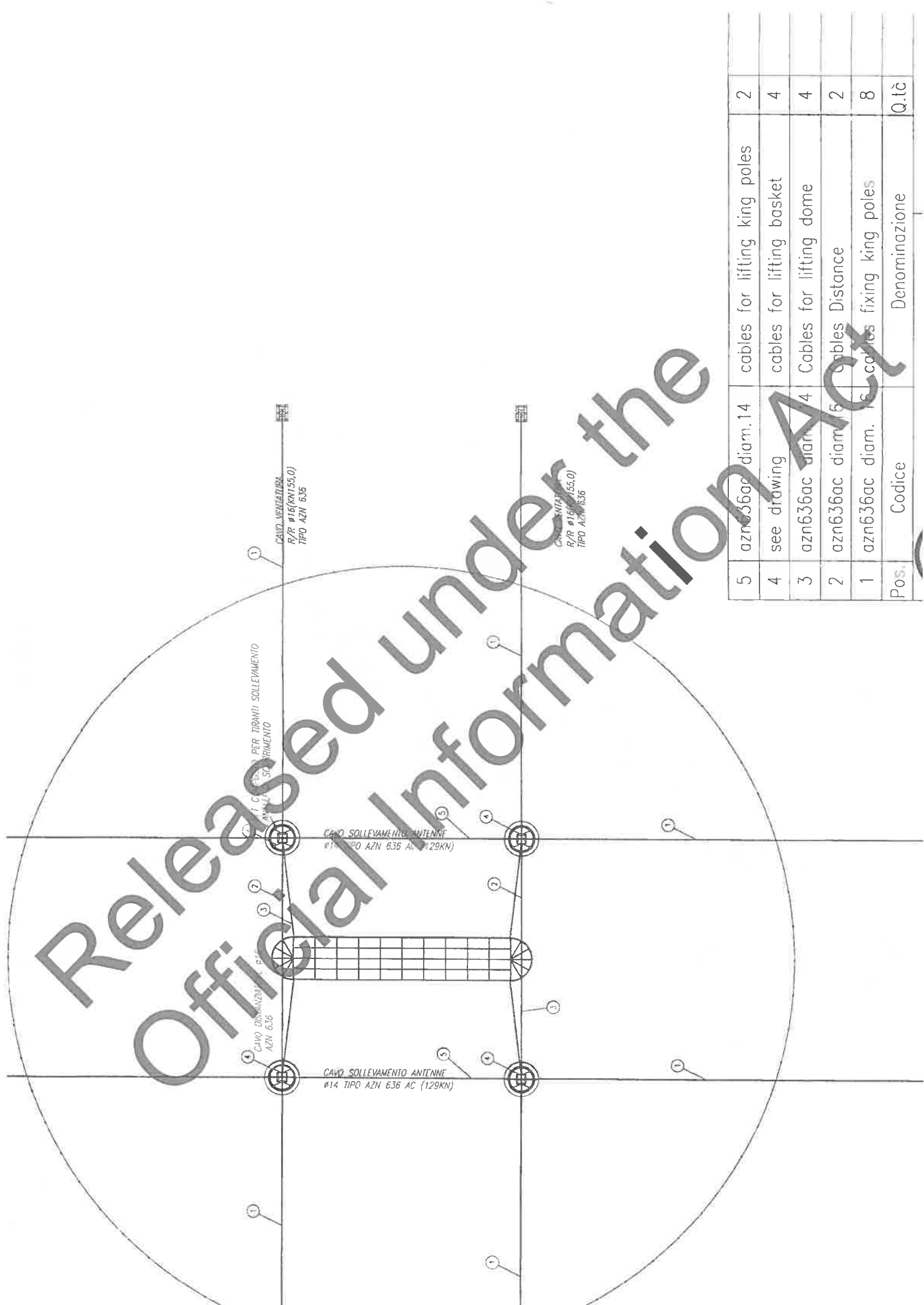


3	Tubo $\phi 76.3 \times 3$	2	EN10219/1 S-235 JR L=260
2	PIATTO SP.8	1	EN10025-2 S-235 JR L=260x330
2	PIATTO SP.8	2	EN10025-2 S-235 JR L=750
Pos.	Colore	Q.tà	Normativa tipo certif. Materiale Note
ANCI S.p.A. ALBERGHI E BAGNI snc CARPI (MO) - VIA S. GIUSEPPE 10 Tel. 059/430011 - Fax 059/430012 email: info@ancispa.it			
Progetto: CARPENTERY FOR TENT 35 m Cliente: F. PHONEIX . ENT . FILE: 135.06.000_00.dwg Designer: Enrica Date: 09/07/2012 Scale: 1:4 Weight: 135.06.000.00_00 Sheets: 1/4 Files: 8			
Titolo: PLATE FOR TUBE		6 HOLES	

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5	azn636ac diam.14	cables for lifting king poles	2
4	see drawing	cables for lifting basket	4
3	azn636ac diam.14	Cables for lifting dome	4
2	azn636 diam.14	Cables Distance	2
1	azn636 diam. 16	cables fixing king poles	8
Pos.	Codice	Denominazione	Q.tà



5	azn636ac diam. 14	cables for lifting king poles	2
4	see drawing	cables for lifting basket	4
3	azn636ac diam. 14	Cables for lifting dome	4
2	azn636ac diam. 16	Cables Distance	2
1	azn636ac diam. 16	cables fixing king poles	8
Pos.	Codice	Denominazione	Q.tà

SET COMPOSTO PER TIRANTI
 SOLLEVAMENTO ANELLI DI SCORRIMENTO

CAVO R/L Ø14 (129 KN) TIPO AZN 636 AC

CAVO R/R Ø12 (25 KN) TIPO AZN636 AC

CAVO R/R Ø12 (25 KN)
 TIPO AZN636 AC

4

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 Tel.0522 699949 Fax 0522 647540
 e-mail.anceschi@anceschi.it www.anceschi.it

Progetto: SET COMPOSTO PER TIRANTI

Cliente: Flaming Phoenix entrateniment

Weight

Kg:

Titolo: SOLLEVAMENTO ANELLI

FILE n°: 135.00.000.00

Designer: Enrico

135.00.000

Date:

Scale: 1:30

Piece:



Out of Scope

From: James Finlayson [mailto:james@zirkacircus.com]
Sent: Wednesday, 25 September 2013 12:45 p.m.
To: Murray Usmar
Subject: Re: Zirka Circus Multi-Proof

Payment made... Confirmation attached.
Receipt and invoice can either be emailed to me or posted to us at
P. O. Box 7178 Hamilton

Regards
James

On Wed, Sep 25, 2013 at 11:08 AM, Murray Usmar <Murray.Usmar@mbie.govt.nz> wrote:

Hi James

I have just received information back from our Structural Engineers. They are requesting a number of design items that need clarification. A list of these is attached.

It is probably best for our Engineer to talk directly with your Engineer at Redco – please supply his name & contact details.

For this application to proceed we require a \$2,000.00 deposit. Either send a cheque (payable to Ministry of Business, Innovation and Employment) to the address below or lodge a payment into the following account:

Name: Ministry of Business, Innovation and Employment

Account Number: 03 0049 0005128 00

Reference Details: MultiProof (insert applicant's name) [for example MultiProof, Zirka Circus]

Please send me a copy of the receipt when payment is made.

Regards

Murray Usmar

Assessor, National Multiple Use Approvals, Determinations and Assurance Team.
Building System Performance Branch, Infrastructure and Resource Markets Group.
Ministry of Business, Innovation and Employment
ddi: (04) 901 8365 | fax: (04) 917 0190 Level 10 33 Bowen Street Wellington 6011

PO Box 1473, Wellington 6140

Please note: my email address has changed to murray.usmar@mbie.govt.nz

From: James Finlayson [mailto:james@zirkacircus.com]

Sent: Friday, 20 September 2013 1:09 p.m.

To: Murray Usmar

Subject: Zirka Circus Multi-Proof

Hi Murray

Just following up to see how things are progressing with the Multi-Proof Application...

If you can give me a progress report or anything would be great.

I'm trying to forward plan with councils etc.

Regards

James

--

James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)

www.zirkacircus.com

s 9(2)(a)

newzealand.govt.nz - connecting you to New Zealand central & local government services

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--

James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)

www.zirkacircus.com

s 9(2)(a)

As at 12:40PM, Wednesday 25 September 2013

 **Payment Successful**

A payment has been made with the following details:

To: 03-0049-0005128-00
From Account: s 9(2)(a) (FLAMING PHOENIX)
Amount: \$2,000.00

Details to appear on their statement: Multiproof ZirkaCircus

Planning to pay this person again? Click 'Save this payee' and save them to your Payee List.

[Print](#)

[Save this payee](#)

Notes regarding electronic payments:

If your payment is being made to a non-ASB Account, you should allow up to 2 working days from the time of this transaction for the funds to be credited to the other bank account.

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ASB

Released under the Official Information Act

Out of Scope

From: Sue Brown
Sent: Wednesday, 2 October 2013 10:02 a.m.
To: Celerina Gieseke
Subject: RE: Transaction Print Out - Zirka Circus (Flaming Phoenix Entertainment Ltd)

Hi Celerina

Thank you. Is it possible for us to have a copy of the transaction print out too?

Thanks
Sue

From: Celerina Gieseke [<mailto:Celerina.Gieseke@dol.govt.nz>]
Sent: Wednesday, 2 October 2013 9:35 a.m.
To: Sue Brown
Cc: Celerina Gieseke
Subject: RE: Transaction Print Out - Zirka Circus (Flaming Phoenix Entertainment Ltd)

Hi Sue,

Confirmed received \$2,000 from Flaming Phoenix on 25/09/13.

Regards,
Celerina

From: Sue Brown [mailto:Sue.Brown@mbie.govt.nz]

Sent: Monday, 30 September 2013 10:35 a.m.

To: Celerina Gieseke

Subject: Transaction Print Out - Zirka Circus (Flaming Phoenix Entertainment Ltd)

Good Morning Celerina

A Multiproof applicant Zirka Circus (Flaming Phoenix Entertainment Ltd) has made a payment of \$2,000 by electronic banking.

They have sent us a copy of the transaction from their end - please see attachment

Can you please provide us with a transaction print out to confirm payment has been received?

Please let me know if you need any further information

Thank you

Kind regards

Sue

Sue Brown
Administrator

Determinations and Assurance
Building System Performance Branch
Infrastructure and Resource Markets Group
Ministry of Business, Innovation and Employment
DDI: (04) 901 8363 Extn 48363 | fax: (04) 917 0190
Level 10, 33 Bowen Street
PO Box 1473
Wellington 6140

Released under the
Official Information Act

Out of Scope

From: Murray Usmar
Sent: Wednesday, 16 October 2013 5:41 p.m.
To: hant@redco.co.nz
Cc: Darrel Cheong
Subject: MultiProof Application for Zirka Circus

Dear Han Tong

We have received a MultiProof application from James Finlayson of Zirka Circus for the approval of the design of his building – the circus marquee.

A MultiProof Approval is a statement issued by the Ministry that a building design complies with the NZ Building Code. In this case the circus marquee is the building.

Our Structural Engineering Consultants have made an assessment of the documentation supplied and have identified a number of items that require further clarification; the list is attached. Please review this list and provide information to Darrel Cheong. (Darrel.Cheong@mbie.govt.nz)

Below is an extract from the e-mail that James Finlayson sent to us.

Regards

Murray Usmar

Assessor, National Multiple Use Approvals, Determinations and Assurance Team.
Building System Performance Branch, Infrastructure and Resource Markets Group.
Ministry of Business, Innovation and Employment
ddi: (04) 901 8365 | fax: (04) 917 0190 Level 10 33 Bowen Street Wellington 6011

PO Box 1473, Wellington 6140

Please note: my email address has changed to murray.usmar@mbie.govt.nz

Regarding the structure and engineering, I have attached all the original documentation from the manufacturer.

This is a much more detailed than that PS1 document from Redco.

I guess I should have provided it to you originally however the councils only ever want the PS1 so that's what I sent you...

It lists all the standards etc as well as parameters, and shows all the modelling for structure. It also shows the engineering of the steelwork, as well as cables too.

The snow rating is 19kg/m² and original wind loading by Italian standards, and wind is 39m/s (140km/h).

I am not sure the process Redco used to produce their PS1 from these originals...

The contact at Redco is Mr Han Tong. I spoke to him and he is happy to discuss this with you or your people.

He can be contacted on 09 2650990 ext 902 email hant@redco.co.nz

Regards
James

--
James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)

Released under the
Official Information Act

Flaming Phoenix Entertainment Ltd – Zirka Circus

Please clarify the following items that were identified as a result of the assessment by our specialists:

B1 Structure

- Provide detailed drawings of how the marquee is constructed. The Plan and photos provided are useful for getting an overview of the system but do not provide sufficient detail. Sections and Detail drawings are be required.
- Provide a Design Features Statement detailing the following:
 - a) which elements are structural and which are non-structural,
 - b) how loads are transferred to the foundations (both for vertical and lateral loads),
 - c) what design standards have been used,
 - d) what design assumptions have been made
 - e) what loads (snow, wind and earthquake) has the building been designed for
 - f) what assumptions or limitations have been made about ground bearing capacity.More specifically:
- More details of the scope of application and the marquee configuration to be covered are required. Provide sufficient sections through the tent to define the interior structure.
- More details of the poles/tent are needed including compression capacity.
 - What is the purpose or purposes of the king post?
- How was Vr Ultimate of 38.8 m/s determined? Is this deemed as the worst case? How do they account for the different (perhaps higher) site wind speeds in the different regions, e.g. can it be used in the Lee regions? It is noted that the marquee erector will determine the applicable wind speed for each specific location.
- What is Importance level limit of the structure? And what is the intended working life?
- Has the serviceability limit state (SLS) criteria been satisfied i.e. what deflection limits are being worked to?
- What is the basis for stating that horizontal forces don't cancel each other out all the time. There is a possibility of the winds pushing on one side and pulling on another, creating additive coefficients, Cpe
- Full anchorage details need to be provided including strength and stiffness. Types of ground or soil conditions to be covered need to be provided. What assessment of the ground needs to be done by the marquee installer prior to each installation?
- *What are all the connection details, e.g. those between the anchors & marquee cables and between the cables and tent fabric?*
- Provide a materials specification (e.g. stiffness of cable, cable strength, marquee fabric's weight, etc) and relevant test results (if any).

Out of Scope

From: Murray Usmar
Sent: Wednesday, 16 October 2013 5:46 p.m.
To: James Finlayson
Cc: Darrel Cheong
Subject: RE: Zirka Circus Follow Up

Hi James

I have sent an e-mail to Han Tong at Redco, so the queries from our Engineers can be sorted.

Regards

Murray Usmar

Assessor, National Multiple Use Approvals, Determinations and Assurance Team.
Building System Performance Branch, Infrastructure and Resource Markets Group.
Ministry of Business, Innovation and Employment
ddi: (04) 901 8365 | fax: (04) 917 0190 Level 10 33 Bowen Street Wellington 6011

PO Box 1473, Wellington 6140

Please note: my email address has changed to murray.usmar@mbie.govt.nz

From: James Finlayson [<mailto:james@zirkacircus.com>]
Sent: Wednesday, 16 October 2013 9:41 a.m.
To: Murray Usmar
Subject: Zirka Circus Follow Up

Hi Murray

I'm just checking in to see if the liaison I arranged between Redco Engineering and you worked out and provided the answers you required for the Engineering questions regarding our tent?

We are getting along OK with councils granting full building consents or exemptions under section K, but with the summer season coming up (when councils sometimes struggle to cope with BC applications) we are hoping to have the multi-proof sorted out.

Zirka Circus will be set up in Masterton from Thurs 31 Oct through to Sunday 3 Nov (from where we head straight to the Ferry, as we will be in the South Island until Easter, first stop 2 weeks in Nelson).

If your Wellington staff do wish to see for themselves how we are set up, Masterton would be an ideal time, only an hour or so drive from Wellington.

We have implemented all the conditions outlined in the FEB, with particular attention to emergency lighting, alarms etc (these were the only items the Fire Engineer required that we did not already have to the new standards). The alarm is custom designed to fit our sound system, cutting the music feed but leaving PA active should announcements be required to assist with an evacuation.

Emergency lights (4x double lights as indicated in the FEB) activate on power failure, have easily visible warning lights, and are easily tested. (because we set up weekly or fortnightly, all systems are checked at that time, much more frequently than fixed buildings). New LED emergency exit signs have replaced the old fluoro ones, much more robust and also have better monitoring of status. These are maintained on at all times, but remain on in event of power failure.

Looking forward to hearing from you

Regards

James

--

James Finlayson

General Manager

Flaming Phoenix Entertainment Ltd (Zirka Circus)

www.zirkacircus.com

s 9(2)(a)

Out of Scope

From: Darrel Cheong
Sent: Thursday, 24 October 2013 5:27 p.m.
To: Murray Usmar
Subject: RE: MultiProof Application for Zirka Circus

Hi Murray

I am not sure what your timeline is on this application but thought I should let you know that I have not heard from Shaun or any other Redco personnel on this.

Kind regards

Darrel Cheong
ADVISOR – BUILDING STANDARDS

Building System Performance Branch, Infrastructure and Resource Markets
Ministry of Business, Innovation & Employment

Darrel.Cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527
Level 8, 33 Bowen St, PO Box 1473, Wellington

From: Murray Usmar
Sent: Thursday, 17 October 2013 12:48 p.m.

To: Darrel Cheong
Subject: FW: MultiProof Application for Zirka Circus

fyi

Murray Usmar

Assessor, National Multiple Use Approvals, Determinations and Assurance Team.
Building System Performance Branch, Infrastructure and Resource Markets Group.
Ministry of Business, Innovation and Employment
ddi: (04) 901 8365 | fax: (04) 917 0190 Level 10 33 Bowen Street Wellington 6011

PO Box 1473, Wellington 6140

Please note: my email address has changed to murray.usmar@mbie.govt.nz

From: Han Tong [<mailto:hant@redco.co.nz>]
Sent: Thursday, 17 October 2013 11:26 a.m.
To: Murray Usmar
Cc: Shaun Shabbot
Subject: FW: MultiProof Application for Zirka Circus

Dear Murray,

Thank you for the email. My colleague (Shaun) will response to your queries in due course.

Regards,

Han

From: Murray Usmar [<mailto:Murray.Usmar@mbie.govt.nz>]
Sent: Wednesday, 16 October 2013 5:41 p.m.
To: hant@redco.co.nz
Cc: Darrel Cheong
Subject: MultiProof Application for Zirka Circus

Dear Han Tong

We have received a MultiProof application from James Finlayson of Zirka Circus for the approval of the design of his building – the circus marquee.

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Our Structural Engineering Consultants have made an assessment of the documentation supplied and have identified a number of item that require further clarification; the list is attached. Please review this list and provide information to Darrel Cheong. (Darrel.Cheong@mbie.govt.nz)

Below is an extract from the e-mail that James Finlayson sent to us.

Regards

Murray Usmar

Assessor, National Multiple Use Approvals, Determinations and Assurance Team.
Building System Performance Branch, Infrastructure and Resource Markets Group.
Ministry of Business, Innovation and Employment
ddi: (04) 901 8365 | fax: (04) 917 0190 Level 10 33 Bowen Street Wellington 6011

PO Box 1473, Wellington 6140

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The snow rating is 19kg/m² and original wind loading by Italian standards, and wind is 39m/s (140km/h).

I am not sure the process Redco used to produce their PS1 from these originals...

The contact at Redco is Mr Han Tong. I spoke to him and he is happy to discuss this with you or your people.

He can be contacted on 09 2650990 ext 902 email hant@redco.co.nz

Regards
James

--

James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)

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Out of Scope

From: James Finlayson [mailto:james@zirkacircus.com]
Sent: Friday, 22 November 2013 2:50 p.m.
To: Murray Usmar
Subject: Zirka Circus

Hi Murray
I haven't heard anything at all since my last check in with you on 16 April.
How is progress with our Multi-Proof Application?

Regards
James

James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)

www.zirkacircus.com

s 9(2)(a)

Out of Scope

From: James Finlayson [mailto:james@zirkacircus.com]
Sent: Monday, 25 November 2013 10:12 a.m.
To: Murray Usmar
Subject: Re: Zirka Circus

Ok I will chase them up on Monday...
I didn't know that they hadn't responded to your request for information.
Cheers
James

On Friday, November 22, 2013, Murray Usmar wrote:

Hi James

The application is on hold awaiting information from Han Tong, as detailed below.

Murray Usmar

Assessor, National Multiple Use Approvals, Determinations and Assurance Team.
Building System Performance Branch, Infrastructure and Resource Markets Group.
Ministry of Business, Innovation and Employment
ddi: (04) 901 8365 | fax: (04) 917 0190 Level 10 33 Bowen Street Wellington 6011

PO Box 1473, Wellington 6140

Please note: my email address has changed to murray.usmar@mbie.govt.nz

Dear Murray,

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Regards,

Han

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Sent: Wednesday, 16 October 2013 5:41 p.m.

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Below is an extract from the e-mail that James Finlayson sent to us.

Regards

Murray Usmar

Assessor, National Multiple Use Approvals, Determinations and Assurance Team.
Building System Performance Branch, Infrastructure and Resource Markets Group.
Ministry of Business, Innovation and Employment
ddi: (04) 901 8365 | fax: (04) 917 0190 Level 10 33 Bowen Street Wellington 6011

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The contact at Redco is Mr Han Tong. I spoke to him and he is happy to discuss this with you or your people.

He can be contacted on 09 2650990 ext 902 email hant@redco.co.nz

Regards

James

--

James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)

From: James Finlayson [mailto:james@zirkacircus.com]
Sent: Friday, 22 November 2013 2:50 p.m.
To: Murray Usmar
Subject: Zirka Circus

Hi Murray

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How is progress with our Multi-Proof Application?

Regards

James

--

James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)

www.zirkacircus.com

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--

James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)

www.zirkacircus.com

s 9(2)(a)

Out of Scope

From: James Finlayson [mailto:james@zirkacircus.com]
Sent: Thursday, 28 November 2013 3:08 p.m.
To: Murray Usmar
Subject: another document

Hi Murray

Attached is a test certificate verifying our emergency lighting is electrically compliant...

I have been assured that the Redco Engineers are now working to answer your questions. I was very disappointed to find out they had done nothing in all this time, as I was sitting here thinking all was under way!

Regards

--
James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)

www.zirkacircus.com

s 9(2)(a)



**Electrical
Laser**

Laser Electrical Nelson

20 Elms St, Wakatu Estate
PO Box 3395, Richmond, Nelson
Phone: (03) 543 9222
Fax: (03) 543 9333

TEST CERTIFICATE

ISSUED BY: LASER ELECTRICAL
TO: ZIRKA CIVICS
IN RESPECT OF: Emergency lights
AT: Marchwood park

Laser Electrical Nelson has carried out and completed the functional testing on the below site:

Marchwood park Motueka

I, Paul Conlon, can confirm that all the functional testing requirements have been completed and passed on the above mentioned..... CIVICS tent emergency lights.....
In accordance with the requirements of ASNZS2293 PART2 1995

P. A. Conlon

Paul Conlon - IQP 107

27/11/13
Date

Out of Scope

From: James Finlayson [mailto:james@zirkacircus.com]

Sent: Friday, 29 November 2013 8:41 a.m.

To: Murray Usmar

Subject: Re: Redco Engineering response

Thanks Murray

Would you be able to send my response to your engineer also, as I believe it is required for perspective?

Regards

James

James Finlayson

On 29/11/2013, at 8:32 am, Murray Usmar <Murray.Usmar@mbie.govt.nz> wrote:

All the information from your Engineer has now been sent to our Engineer for assessment

Murray Usmar

Assessor, National Multiple Use Approvals, Determinations and Assurance Team.
Building System Performance Branch, Infrastructure and Resource Markets Group.
Ministry of Business, Innovation and Employment
ddi: (04) 901 8365 | fax: (04) 917 0190 Level 10 33 Bowen Street Wellington 6011

PO Box 1473, Wellington 6140

Please note: my email address has changed to murray.usmar@mbie.govt.nz

From: James Finlayson [<mailto:james@zirkacircus.com>]

Sent: Thursday, 28 November 2013 6:48 p.m.

To: Murray Usmar

Subject: Redco Engineering response

Hi Murray

I received the copy today of the response to your questions from Shaun at Redco.

Please note that your questions were posed before I had provided you with the full Italian documentation (I only gave you the Redco PS1 documentation originally as that is all that's required when lodging a building consent).

I have attached again that full documentation, so your engineering team can see for themselves.

I am confident that this document provided all the explanations where Shaun has referred you back to the Manufacturer.

There is a lot of Jargon regarding the specifics of the tent. I am more than happy to clarify for you if required.

Where your staff queries the nature of the strength of fastenings etc, the document covers all the relevant cable strengths, peg lengths, shackles etc to be used. The tent fabric itself is only connected to the steel structure at the Bale Rings (called Mast Rings by the Italians). These circle the 4 kingpoles, and each one has 22 reinforced steel rings (88 in total for the tent), linked by chain. These fixing points are at least quadruple reinforced where the fabric and steel fittings are joined.

ALL RIGGING, SHACKLES, PEGS, FITTINGS and FASTENINGS were supplied with the tent, by the manufacturer, to their specifications. Should we need to replace any in future, they will be replaced to the same specs, by our rigging company, Shaws Wire Ropes, of Cambridge). All fittings and shackles are standard, off the shelf and safety rated. We have not altered or modified anything on the tent.

Duration of structure: The longest the tent remains erected on our entire 2 year tour schedule is 4 weeks (Auckland ASB Showgrounds on Tarmac carpark, and Hamilton, The Base shopping mall, gravel carpark when wintering over). The shortest is 3 days, in small south Island towns (Winton, Cromwell, Hokitika). Average duration is 1 week (this is why we need a multiproof)

Regarding the points Shaun makes that place the onus on us as the erectors and operators of the Tent (weather and ground condition):

We constantly monitor Met Service through internet and text alerts for weather warnings.

Wind. We keep a high quality anemometer on site at all times. The reality is that the tent cannot be erected if the wind is in excess of 30km/h (8m/s). It only meets its wind rating when fully erect, tensioned, and closed. We are therefore very cautious about wind strength, for safety of staff and equipment.

Likewise, it is not possible to take the tent down safely if the wind is in excess of approx 40km/h, due to billowing and again the safety of our staff. It is by far the best option to leave the tent up and fully tensioned.

Once the tent is up and secured with sidewalls in place, it is rated for 39m/s which is 140km/h. This, as I'm sure you are aware, is extreme, (the highest gusts we have so far encountered were 110km/h in Invercargill).

Having experienced that wind strength, which was very safe structurally, if a bit noisy, we know it is quite distracting for the public. We have therefore instituted a company policy that we won't run a show if the wind is in excess of 100km/h.

Pegs and ground strength. (Note, the Italian Documentation refers to the pegs as "Soil Nails"). We always check the holding ability of the ground before erecting the tent. Being on our third tour and almost always returning to the same parks, we do know the pluses and minuses of various sites now.

The assumption of "Good Ground NZS3604" is fine but given that the pegs for the main guys of the tent are 50 meters apart, and the ground is always a park or public space of some description, not a building site prepared by civil engineers, we have to be certain that the site is appropriate.

This involves our years of experience, knowledge of the sites, and feel of the pegs going into the ground. They are hammered in by a 400kg hydraulic hammer on the front of a 5 ton loader. The operator and supervisor can immediately see the ground quality by observing the resistance when hammering the pegs. If in doubt we do a "Pull Test" with the loader (It is rated to lift 2.8tons) to ensure the ground will hold. When pulled on the same angle as the guy wires pull, it is almost impossible to move the pegs).

We always adhere to the manufacture's recommendations of 2 pegs per side pole, and six per main guy wire, and have never had any issues with them holding. Likewise we only use the manufacturers anchor plates for the main guys, and factory supplied pegs, with no issues of movement.

Having said that, we carry an extra set of pegs (70x 120x4cm for side poles, 32x 140x4.5cm for main guy wires) so that should we encounter extreme winds, we are able to add another peg per side pole plus 4 per main guy should they be needed. that is 33% more for side poles and 66% for main guys, which is over 2 tons of extra pegs!

We have never had any problems with the pegs holding, whether on rocky ground (e.g Marine Parade reserve, Napier) or peat (Rimu Road, Paraparaumu).

Snow. We only operate in the upper North Island during winter months. Almost all sites we use everywhere in NZ are at or near sea level (with the exception of Queenstown, which we only visit in January). When ordering the tent I was told that the Euro standard is for 19kg/m² for snow, which the tent meets or exceeds. However I note in the static calcs that this figure is not included.

HOWEVER: We would not attempt to erect the Tent if there was a forecast of snow (as stated above, we only winter in Auckland/ Northland or Waikato/Bay of Plenty). In the extremely unlikely event that the Tent is up, and cannot be brought down due to wind strength, when snow falls to the extent that it is standing on the tent, we would not open to the public.

Being a tent, we have enough issues with audience comfort in the winter months, even in the North, as while we can preheat with blast heaters, we can't run them with the audience in the tent, and it is extremely cold... Just no point in even considering operating in snow.

I realise that there is a lot of onus on us as the operators, that might not be applicable to a permanent, rigid building. I would like to point out in defense of these circumstances, that we have never had any issues whatsoever with the structure or indeed public safety. It is simply not in our interests to risk either the safety of our audience, our staff, our reputation, or indeed our massive investment in the equipment. Some councils require me to complete a PS3 producer statement for the construction (erection) of the Tent, which I am happy to do as I would not put it up if I wasn't certain (barring acts of God) that the tent is meeting all requirements as per manufacturer and council requirements.

Finally, If your technical staff are not satisfied with explanations and documentation, I once again extend an invitation to visit us on site to view how the structure functions.

Best Regards

James

--

James Finlayson

General Manager

Flaming Phoenix Entertainment Ltd (Zirka Circus)

www.zirkacircus.com

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Section A - Application Details

Application number:	10057	
Applicant's name:	Flaming Phoenix Entertainment Ltd (Zirka Circus)	
Application type	"Big Top" Circus Marquee	
Advisor Client Services:	Sue Brown	Phone: ext 48363 Email: sue.brown@mbie.govt.nz
Assessor (lead)	Murray Usmar	Phone: ext 48365 Email: murray.usmar@mbie.govt.nz
Peer Reviewer (assigned)	Nick Saunders	Phone: ext 48708 Email: nick.saunders@mbie.govt.nz
Date task assigned		
Required Completion Date		

The purpose of Application Peer Review is to identify any perceived risk areas in relation to an Application's proposed building structure and external envelope, and to ensure that adequate documentation exists to support compliance with the Building Code.

Section B - The Project

Project Description: (as application form) "Big Top" Circus Marquee

Section C – Peer Review Activity

Building Code Clause:	Element:	Component:	How Complies & Comments:	Worksheet reference:
C1			See clause OBJECTIVES ONLY	
C2 Prevention of Fire Occurring			N/A No fixed appliances used.	
C3 Fire Affecting Areas Beyond the Fire Source		Test	Membrane fabric complies with required tests	
C4 Movement to Place of Safety		Escape Routes	Shown by evidence that the code requirements are satisfied	
C5 Access and Safety for Fire-fighting Operations			complies with required tests	
C6 Structural Stability				
F6 Visibility in Escape Routes		lighting system	complies with required tests	
F7 Warning systems		fire alarm		
F8 Signs		signage	complies with F8/AS1	

Section D – Peer Review Conditions

Any Conditions/limitations required to be placed on the application. (includes any additional inspections required)	
1.	NONE
2.	
3.	
4.	
5.	
6.	

Section E – Time and Costs

Timesheet Details

Date	Name	Hours Allocated
AUG 12	NICK SAUNDERS	3
NOV 12	NICK SAUNDERS	3
DEC 12	NICK SAUNDERS	2
	TOTAL HOURS	8

Disbursements Costs (excl. GST)

Date	Details (include full details)	Amount (\$)
	TOTAL COSTS	

I Nick Saunders confirm that the above time is a true and accurate record of the time allocated to this application.

Authorised Signature 

Date 5/12/13

Section F – Recommendation

To: Lead Assessor

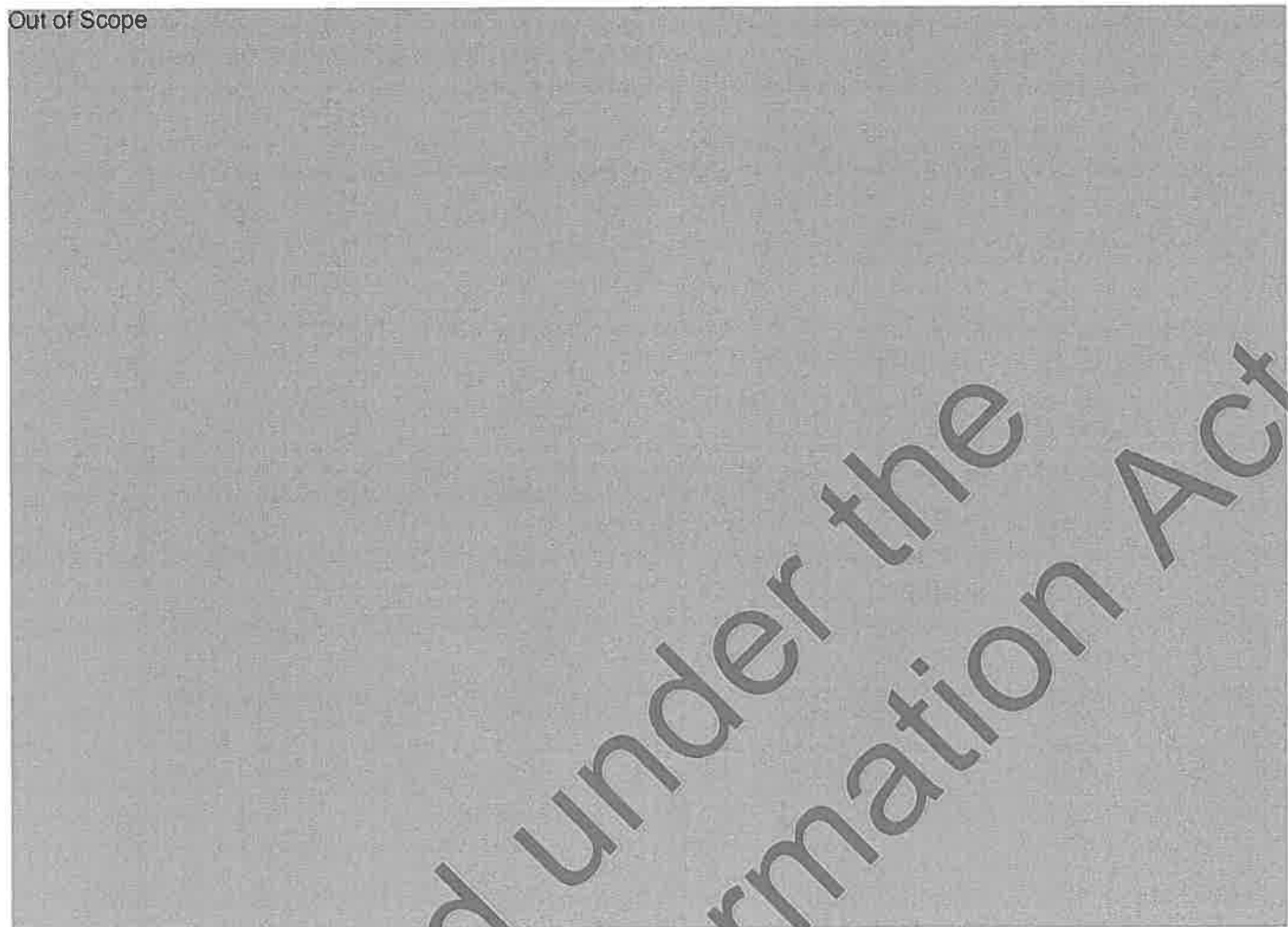
I Nick Saunders recommend that this application be approved / not approved for a National Multiple-Use Approval

Authorised Signature 

Date 5/12/13

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Out of Scope



From: Darrel Cheong
Sent: Thursday, 16 January 2014 3:13 p.m.
To: Murray Usmar
Subject: RE: Zirka Circus Multi-Proof

Hi Murray

They have not responded at all. The last correspondence is as attached.

Kind regards

Darrel Cheong
GRADUATE ENGINEER

Building System Performance Branch, Infrastructure and Resource Markets
Ministry of Business, Innovation & Employment

Darrel.Cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527
Level 8, 33 Bowen St, PO Box 1473, Wellington

From: Murray Usmar
Sent: Thursday, 16 January 2014 2:01 p.m.
To: Darrel Cheong
Subject: FW: Zirka Circus Multi-Proof

Hi Darrel

Has Redco been in contact with you regarding the Zirka Circus Marquee?

See e-mail from the applicant below.

Murray Usmar

Assessor, National Multiple Use Approvals, Determinations and Assurance Team.
Building System Performance Branch, Infrastructure and Resource Markets Group.
Ministry of Business, Innovation and Employment
ddi: (04) 901 8365 | fax: (04) 917 0190 Level 10 33 Bowen Street Wellington 6011

PO Box 1473, Wellington 6140

Please note: my email address has changed to murray.usmar@mbie.govt.nz

From: James Finlayson [<mailto:james@zirkacircus.com>]

Sent: Thursday, 16 January 2014 1:36 p.m.

To: Murray Usmar

Subject: Zirka Circus Multi-Proof

Hi Murray

Happy New Year!

So, here we are in 2014. My customary questions -
Did the engineers at Redco provide your engineering team with enough info?
Is there anything I can do at this stage to facilitate the processing?

And, any chance of an ETA on the final outcome?

Cheers

James

--

James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)
www.zirkacircus.com

s 9(2)(a)

Please Note:

New Address:

P. O. Box 1153
Pukekohe 2340

Out of Scope

From: Shaun Shabbot [mailto:shauns@redco.co.nz]
Sent: Friday, 7 February 2014 11:44 a.m.
To: Darrel Cheong
Cc: James Finlayson; Murray Usmar; Chrissie Green
Subject: RE: Zirka Circus

Dear Darrel

We have addressed the points as follows.

- The sequence of Structural Calculations undertaken dated February 2013 (Project No.: 11326) This has been amended. Hopefully much more clearer.
- The use of a Factor of Safety of 1.5
After going through the calculations, we allowed a 1.5 factor of safety on the peg to be conservative. Instead of designing for a working load of 13.33kN for a single peg, we designed for **8.86kN**.
- The assumption of horizontal forces cancelling each other out, thus only the uplift is considered
We are no longer assuming the horizontal forces to be cancelling out. After careful study, this was a very incorrect assumption

Attached is the revised PS1 and calculations with the an attached calculations from the structural engineer who has designed the Marquee.

Any queries please don't hesitate to call or email.

Regards

Shaun Shabbot
Design Engineer, BEng



Auckland Office
P: 09 265 0990 | F: 09 265 0991
Unit 2B, 9 Laidlaw way, East Tamaki
Auckland 2016
www.redco.co.nz

Chartered Professional Engineers

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From: Darrel Cheong [<mailto:Darrel.Cheong@mbie.govt.nz>]
Sent: Thursday, 5 December 2013 4:12 p.m.
To: Shaun Shabbot
Cc: James Finlayson; Murray Usmar
Subject: RE: Zirka Circus

Hi Shaun

As discussed today, please provide more comments on the following points for us to further assess the application:

- The sequence of Structural Calculations undertaken dated February 2013 (Project No.: 11326)
- The use of a Factor of Safety of 1.5
- The assumption of horizontal forces cancelling each other out, thus only the uplift is considered

Thanks.

Kind regards

Darrel Cheong
GRADUATE ENGINEER
Building System Performance Branch, Infrastructure and Resource Markets
Ministry of Business, Innovation & Employment
Darrel.Cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527
Level 8, 33 Bowen St, PO Box 1473, Wellington

From: Shaun Shabbot [<mailto:shauns@redco.co.nz>]
Sent: Thursday, 28 November 2013 4:43 p.m.
To: Murray Usmar
Cc: James Finlayson; Han Tong; Graham Rundle; Darrel Cheong
Subject: Zirka Circus

Dear Murray,

I am replying to your email on the 16th October 2013 to my colleague Han Tong in regards to the Zirka Circus for James Finlayson.

The structure is considered to be ONLY temporary and to be constructed when the wind speed is not greater than $V_{ULTIMATE}$ 38.8m/s. The marquee erector shall determine the applicable wind speed for each specific location. A wind anemometer may be used to ensure the actual site wind speeds do not exceed the limitations.

If the wind speed exceeds the limitations that have been put forward, the structure may NOT be erected. If the structure is already up, then it will need to be dismantled or further hold down measures are to be taken.

I went through the document that you have sent us and have gone through and answered any questions which are unclear.

B1 Structure

1. Provide detailed drawings of how the marquee is constructed. The Plan and photos provided are useful for getting an overview of the system but do not provide sufficient detail. Sections and Detail drawings are required. – Client will need to get these details from the manufacturer
2. Provide a Design Features Statement detailing the following:
 - a. Which elements are structural and which are non-structural, All elements are structural.
 - b. How loads are transferred to the foundations (both for vertical and lateral loads), All the vertical lifts loads are transferred by the pegs. All the lateral loads are transferred down from the posts.
 - c. What design standards have been used, The Italian engineer has used Eurocode 3: Design of steel structures for calculating the strength capacity of the members of the structure. The structure has been calculated for the wind speed of 39m/s.
 - d. What design assumptions have been made Good ground in accordance to NZS3604
 - e. What loads (snow, wind and earthquake) has the building been designed for - The marquee is not designed to handle snow loads. Earthquake will be negligible due to the weight of the infrastructure. Wind load ($V_{ULTIMATE}$) of up to 38.8m/s
 - f. What assumptions or limitations have been made about ground bearing capacity? Good ground in accordance to NZS3604. This will need to be checked prior to construction.

More specifically:

- More details of the scope of application and the marquee configuration to be covered are required. Provide sufficient sections through the tent to define the interior structure. – Client will need to get these details from the manufacturer
- More details of the poles/tent are needed including compression capacity. – Client will need to get these details from the manufacturer
 - What is the purpose or purposes of the king post? – To take the lateral loading and transfer it to the foundation.
- How was V_r Ultimate of 38.8 m/s determined? Is this deemed as the worst case? How do they account for the different (perhaps higher) site wind speeds in the different regions, e.g. can it be used in the Lee regions? It is noted that the marquee erector will determine the applicable wind speed for each specific location. – The V_r ultimate is determined by the capacity the pegs and the marquee structure has been designed for. The marquee can also be erected on exposed hilltop (>30m) and wind speed limitation should be reduced by 50%. ANYTHING outside these limitations and the Marquee CAN NOT be constructed
- What is Importance level limit of the structure? And what is the intended working life? – Importance level 3, less than 6 months. The structure will only be put up for shows and is not permanent.
- Has the serviceability limit state (SLS) criteria been satisfied i.e. what deflection limits are being worked to? – No SLS criteria. The building is not permanent and will be dismantled after shows.
- What is the basis for stating that horizontal forces don't cancel each other out all the time. There is a possibility of the winds pushing on one side and pulling on another, creating additive coefficients, C_{pe}
Due to the symmetry of the tent, horizontal forces can cancel each other out therefore uplift force is only considered. No big openings are allowed in the marquee.
- Full anchorage details need to be provided including strength and stiffness. – It's a temporary structure. Guyed with pegs will be holding the structure.
- Types of ground or soil conditions to be covered need to be provided. What assessment of the ground needs to be done by the marquee installer prior to each installation? The ground will need to be checked if it is "Good ground" in terms of NZS3604.
- *What are all the connection details*, e.g. those between the anchors & marquee cables and between the cables and tent fabric? – Client will need to get these details from the manufacturer

- Provide a materials specification (e.g. stiffness of cable, cable strength, marquee fabric's weight, etc) and relevant test results (if any). – Client will need to get these details from the manufacturer

If there is any more questions please do not hesitate to contact me ☺

Regards

Shaun Shabbot
Design Engineer, BEng



Auckland Office
P: 09 265 0990 | F: 09 265 0991
Unit 2B, 9 Laidlaw way, East Tamaki
Auckland 2016
www.redco.co.nz

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NEW CIRCUS MARQUEE

ZIRCA CIRCUS

STRUCTURAL CALCULATIONS

Project No. 11326

Prepared by: **Shaun Shabbot**
BE

February 2014

Reviewed by: **Graham Rundle**
BE M.I.PENZ IntPE

Approved by: **Graham Rundle**
BE M.I.PENZ IntPE

CONTENTS:

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Producer Statement

Summary and Recommendations

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Loadings

2

Pegs Calculations

3-4

Appendix A - Structural Calculations for the Marquee

5



adding 'enginuity' to building projects

Providing the services of:

Chartered Professional Engineers

Redco NZ Ltd
Redco House
470 Otumoetai Road
TAURANGA 3110
Telephone: 07 571 7070
Facsimile: 07 571 7080
Email: red@redco.co.nz
www.redco.co.nz



Quality
ISO 9001



Environment
ISO 14001

sustainable
BUSINESS NETWORK
MEMBER





Building Code Clause(s) B.1.....

PRODUCER STATEMENT – PS1 – DESIGN

(Guidance notes on the use of this form are printed on the reverse side)*

ISSUED BY: Redco.NZ Ltd.....
(Design Firm)

TO: Zirca Circus.....
(Owner/Developer)

TO BE SUPPLIED TO: All.....
(Building Consent Authority)

IN RESPECT OF: New Circus Marquee (Redco Project No. 11326).....
(Description of Building Work)

AT: Short term event site.....
(Address)

..... LOT..... DP..... SO.....

We have been engaged by the owner/developer referred to above to provide Structural Engineering.....
(Extent of Engagement)..... services in respect of the requirements of

Clause(s) B.1..... of the Building Code for

All or Part only (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:

Compliance Documents issued by Department of Building & Housing .B.1/M.1 & AS1.....
(verification method / acceptable solution)

Alternative solution as per the attached schedule..... OR

The proposed building work covered by this producer statement is described on the drawings titled New Circus Marquee...
..... and numbered 1.....;

together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

- (i) Site verification of the following design assumptions NZS.3604:2011 "Good ground".....
- (ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code.

I, Claude Antony Carter Cook..... am: CPEng 240891..... #
(Name of Design Professional)

Reg Arch..... #

I am a Member of: IPENZ NZIA and hold the following qualifications: ..BE..M.IPENZ..CPEng..IntPE.....

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*.

The Design Firm is a member of ACENZ YES NO

SIGNED BY Claude Antony Carter Cook..... ON BEHALF OF Redco.NZ.Ltd.....
(Design Firm)

Date 7/02/2014..... *(signature)*.....

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000*.

This form is to accompany Form 2 of the Building (Forms) Regulations 2004 for the application of a Building Consent.

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1992. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suite of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design	Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;
PS2 Design Review	Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;
PS3 Construction	Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2003 ¹ or Schedules E1/E2 of NZIA's SCC 2007 ²
PS4 Construction Review	Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate. This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence-based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Members of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA) provides additional assurance of the design firm's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ) this provides additional assurance about the standing of the firm.

Persons or firms meeting the criteria satisfy the term "suitably qualified independent design professional".

* Professional Indemnity Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5) (OL1-OL4)². The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

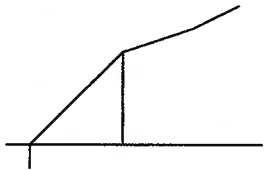
- ¹ *Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2003*
- ² *NZIA Standard Conditions of Contract SCC 2007 (1st edition)*
- ³ *Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)*

www.acenz.org.nz
www.ipenz.org.nz
www.nzia.co.nz



Summary and Recommendations

Project No. I1326

Configuration	Wind speed	Requirements
Guyed with pegs 	0-120kph	2 pegs each guy rope
	>120kph	Circus Tent to be dismantled or further hold down measures to be taken

- For wind speeds up to 120 kph the structure has to have guy ropes attached as per above table. In addition all openings in the marquee must be zipped shut for wind speeds exceeding 50 kph, except to allow patrons access to and egress from the marquee.
- For wind speeds exceeding 120 kph the marquee is not to be occupied and it is recommended that the marquee be dismantled or further hold down measures to be taken.

Notes:

- The Marquee has been structurally designed by Via Della Mendola dated 10/09/2012. The structural calculation of the Marquee has been designed to the wind speed 120kph. These calculations are attached.
- All structures are considered to be temporary structures.
- The marquee erector shall determine the applicable wind speed for each specific location.
- If the marquee is to be erected on an exposed hilltop (>30m) the wind speed limitation should be reduced by 50%.
- Alternatively a wind anemometer may be used to ensure the actual site wind speeds don't exceed the limitations above.
- No big openings are allowed in the marquee. All openings must be zipped shut for wind speeds exceeding 50kph.
- The marquee is not designed to support any snow loads.
- To avoid ponding the fabric must be stretched tightly.

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CALCULATIONS

Page 2

Client: **Flaming Phoenix Entertainment Ltd (Zirca Circus)**

9 Dec '13

Project: **New Circus Marquee**

Project No. **11326**

Dead:	Roof:	Roofing	0.01 KPa
		Framing	0.00 KPa
		Ceiling	0.00 KPa
		q_{G roof} =	0.01 KPa

Max Wind pressure acting on peps

Wind:

V_{R Ultimate} = 39.0 m/s Maximum wind speed calculated for the Marquee structure

$$V_{(des)} = V_R M_d (M_{(z,cat)} M_s M_t) \quad (Eq 2.2)$$

$$= 40.97 \text{ m/s}$$

$$q(z) = 0.6 V_{d(z)}^2 \times 10^{-3} \quad (Eq 2.4)$$

Ultimate q_(z) = 1.0

M_(z,cat) = 0.96 z = 7.500 m Category 2
 M_s = 1.0 Table 4.3
 M_t = 1.10 M_h = 1.10 Table 4.4
 M_d = 1.0 M_{lee} = 1.0 4.4.3

Pressure coefficients:

C_{pi} = 0.2 -0.2 Elevation = 500 m

Up-wind, roof C_{pe} = -0.8

Down-wind, roof C_{pe} = -0.8

$$p_{wv} = (K_a K_c K_l K_p C_{pe} - K_c C_{pi}) q(z)$$

Roof: p_{wEC} = -1.0
 Roof: p_{wCD} = -1.0

Roof slope, α = 40 deg. b = 35.00 m
 d/b = 1.00 d = 35.000 m
 h/d = 0.21 h = 7.500 m
 K_a = 1.0 Table 5.4
 K_l = 1.0 Table 5.6
 K_p = 1.0 Table 5.8
 K_c = 1.0 Table 5.5

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Wind Load Calculations

NOTE No allowances have been made for dead load of roof or cupola frame.

Maximum Capacity of Pegs Calculations

Calculations of Max wind speed for standard pegging arrangement
 Plan area of room 962m²
 No of Guy Poles and Pegs 72
 Roof Area per pegs 13.4m²
 Typical peg: 1.2m Long x 32mm Φ

Max Holding power of single Peg
 13.33kN = 1360kG (See attached chart App A)
 Allow Factor of safety 1.5

Therefore, working strength of Peg $\frac{13.33}{1.5} = 8.86kN$

For each segment of tent roof
 Max. F = 8.86kN
 $= \sum Pz Az$
 Az = 13.4m²
 Pz = Cp Qz
 Cp = 1
 Qz = $\frac{F}{A} = 0.66kPa$

This is the allowable pressure (Qz) for a tent installation using 1 Peg per Guy Point. This assumes that the ground conditions provide adequate holding power.

NOTE: IT IS THE RESPONSIBILITY OF THE TENT INSTALLER TO CONFIRM THE HOLDING POWER OF THE GROUND PRIOR TO EACH INSTALLATION

Maximum Allowable Wind Speed For A Single Peg From NZS 4203:1992

$Qz = 0.6v_z^2 \times 10^{-3} = 0.66kPa$ Φ = 35m Az
 $v_z = \sqrt{\frac{Qz \times 10^{-3}}{0.6}} = 33.2min/sec \times 60 sec/min \times 60 min/hour \times 1km / 1000m = 120 km/hour$ **Allowable**

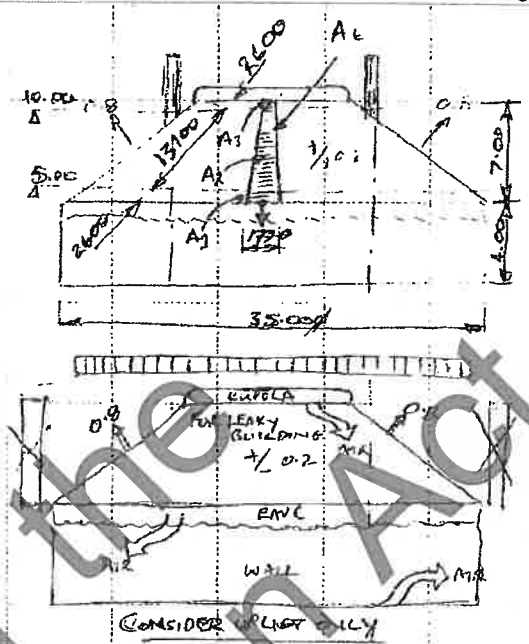
- A = 962 m² (249)
- >5 Φ = 30.14m Az
- A = 713 m² (686)
- >10 Φ = 5.86m Az
- A = 27 m² (27)

Multiplayer (M_z) = M₁ M_{zcat} M_s M_t M_r
 Serviceability Category 2

H _t	M ₁	M _{zcat}	M _s	M _t	M _r	M _z	A _s
<5	0.7	0.91	1.0	1.1	1.0	0.7707	3.89
5-10	0.7	1.00	1.0	1.1	1.0	0.7700	10.72
7-10	0.7	1.05	1.0	1.1	1.0	0.8085	0.42

Factor M as Follows:

H _t	M _z	A _s (m ²)	$\frac{M_z \times A_s}{A_z}$
<5	0.7707	3.89	0.203
5-10	0.7700	10.72	0.616
7-10	0.8085	0.42	0.25
	$\sum M =$		0.844



For Single Peg Arrangement

$$V = V_z \times M = 28.0 \text{ m/sec} \times 60 \text{ sec/min} \times 60 \text{ min/hour} \times 1 \text{ kM}/1000 \text{ m} = 100.8 \text{ km/hour} < 120 \text{ km/hour}$$

Allowable

To increase allowable wind speed, use larger pegs or double peg effects or double pegging is to increase holding power by 70%.

For Double Peg Arrangement

$$V = V_z \times M, F_2 = 8.86 \times 1.7 = 15.06 \text{ kN (70% increase for double peg) Allowable AS/NZS 1170:2002}$$

For each segment of tent roof

$$\begin{aligned} \text{Max. F} &= 15.06 \text{ kN} \\ &= \sum P_z A_z \\ A_z &= 13.4 \text{ m}^2 \\ P_z &= C_p Q_z \\ C_p &= 1 \\ Q_z &= \frac{F}{A} = 1.1 \text{ kPa} \end{aligned}$$

The MAXIMUM allowable speed for the Marquee superstructure is V_R 39m/s, therefore (from the Spreadsheet)

$$Q_z = \frac{F_z}{A} = 1.00 \text{ kPa}$$

$$V_z = \sqrt{\frac{Q_z \times 10^{-3}}{0.6}} = 40.8 \text{ m/s}$$

Refer to spreadsheet

$$V = V_z \times M$$

$$V_z = 40.8 \times 0.844$$

$$= 34.5 \text{ m/sec} = 124.2 \text{ km/hr}$$

$$= 38.8 \times 0.884$$

$$= 34.3 \text{ m/sec} = 124 \text{ km/hr}$$

Therefore, two pegs on each guy rope can ONLY handle a maximum wind speed of V_R 39m/s.

Effects of quarter poles on wind speed ratings.

This calculation takes no account of the effect of roof shape or quarter poles or resistance to wind uplift.

Provision is made in the design of the tent for each quarter pole attachment point to be securely guyed to the ground. This has the effect of reducing the tributary area assigned to each perimeter guy allowing the design wind speed to be further updated.

Appendix A - Structural Calculations for the Marquee

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Out of Scope

From: James Finlayson [mailto:james@zirkacircus.com]
Sent: Tuesday, 11 February 2014 12:40 p.m.
To: Murray Usmar
Subject: Flaming Phoenix Entertainment / Zirka Circus Address update

Hi Murray and Team, Hopefully we are nearing the end of the Multi-Proof Process. I received the revised PS1 and calculations from Redco last week. In the meantime, we have relocated our company to Pukekohe, so can you please pass on our updated contact details to your admin team...

Looking forward to reaching the end of this process! Cheers
James

New Postal Address:

P. O. Box 1153
Pukekohe 2340

New Registered Office
254 Aka Aka Rd
R.D. 3 Pukekohe 2678

--

James Finlayson
General Manager

Flaming Phoenix Entertainment Ltd (Zirka Circus)
www.zirkacircus.com
s.9(2)(a)

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Official Information Act

Out of Scope

From: Darrel Cheong
Sent: Monday, 17 February 2014 9:51 a.m.
To: Murray Usmar
Subject: FW: Marquee Superstructure

FYI

From: James Finlayson [mailto:james@zirkacircus.com]
Sent: Monday, 17 February 2014 9:47 a.m.
To: Shaun Shabbot; Darrel Cheong; Graham Rundle; Chrissie Green
Subject: Re: Marquee Superstructure

Hi Shaun Darrel and team...

s 9(2)(a)

Therefore, I will continually carry on with this work for him. Unfortunately, I have never been in charge of this part of the job before. I will try my best to answer all the technical questions, but I may have to ask for less technical explanations before I answer the questions, please excuse me.

Kind Regards
Jeni Hou
Managing Director
Flaming Phoenix Entertainment Ltd (Zirka Circus)
www.zirkacircus.com
s 9(2)(a)

On Thu, Feb 13, 2014 at 2:56 PM, Shaun Shabbot <shauns@redco.co.nz> wrote:

Darrel,

As discussed, if you can send back all the points that your raised on the phone, that would be great.

For those points that you said were from the NZS code, could you also please state the clause or STD so we can get things rolling asap ☺

Regards

Shaun Shabbot

Design Engineer, BEng

Auckland Office

P: 09 265 0990 | F: 09 265 0991

Unit 2B, 9 Laidlaw way, East Tamaki

Auckland 2016

www.redco.co.nz



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--

James Finlayson
General Manager
Flaming Phoenix Entertainment Ltd (Zirka Circus)
www.zirkacircus.com

s 9(2)(a)

Please Note:
New Address:

P. O. Box 1153
Pukekohe 2340

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Out of Scope

From: Shaun Shabbot [mailto:shauns@redco.co.nz]
Sent: Tuesday, 18 February 2014 12:40 p.m.
To: Darrel Cheong; Murray Usmar
Cc: James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green
Subject: RE: Zirka Circus

Good afternoon Darrel/ Murray,

- You need to demonstrate how the building meets two design points: ULS & SLS. Assuming that this is an Importance Level 3 structure which is for 'less than 6 months', the intensity event for ULS wind is 1/250 and 1/25 for SLS wind. Your claim of 'No SLS Criteria' [refer to highlights below] is not quite correct and I have not found any calculations for the SLS case. On the ULS case, NZS 1170 Part 2 gives regional wind speed demand of 43m/s (for A7 region, assuming that you do not erect the building in Wellington/Picton area) but this has not been taken into account appropriately. Your calculations show that you have only considered 39m/s which is non-compliant to NZS 1170

This has been revised.

The building has been structurally designed by an Italian Engineer which all his calculations has been attached. The structure has been designed for wind speed design of $V_{\text{design}} = 39\text{m/s}$ [Which is equivalent to the required to the NZS 1170 of 45m/s as shown below]

The importance Level for the structure is IL2 and had life span of less than 6months. Using NZS 1170 for return period of 1/500 at ULS gives us V_R Ultimate 45m/s.

Taking a V_R Ultimate 44m/s and multiplying all the M factors, we obtain the $V_{design} = 39m/s$ [Please view the spreadsheet]. This gives our structure a maximum wind speed of 140km/hr [= 39m/s x 60sec/min x 60 min/hr / 1000m/km]. We understand that it is 1m/s outside what is required from the NZS 1170.

However, we are putting a limitation to our design of the pegs as they cannot handle the NZS1170 wind speed. We are stating clearly that the structure is to be dismantled if the wind speed is greater than 100km/hr outside what is required.

- Next, I am wondering why NZS 4203:1992 was used when it has been superseded and does not contain the latest design information? In the PS1 Document, it is claimed that the design has been prepared in accordance with B1/VM1 & AS1 but NZS 4203:1992 has been excluded from B1/VM1 since 2008.
This has been revised

- The Italian Engineers' report have the self-weight of the sport cover as 0.8kPa but you have it as 0.01kPa in your calculations, 80 times less. I am unsure if you have neglected earthquake loading [refer to highlights below] based on this basis.
The Italian Engineer stated $0.8kg/m^2$. Therefore multiplying by $9.81N/kg$ would give 10Pa which is equal to 0.01kPa. We added all the dead loads together and got 0.05kPa. This is still minor and can be ignored when calculating the wind uplift.

- The drawings are in Italian and I struggle to understand them. It is important that drawings or calculations are localised to NZ conditions/context and they should clearly articulate assumptions/justifications made in calculations.
I have looked at the drawings myself. The calculations itself is all in English and there is no problem. The drawings are not too complicated to work out. For example, in Italian it says "Tensodenda Diametro mt. 35.m" which is obvious and means the diameter of the tent. All his descriptions in Italian can be easily interpreted by the dimensions he's put on his sketches.

It is sad news to us to hear about the passing of James, and we at RedCo are doing our best to complete this job for his wife.


Please find attached is all the calculations re-done with ps1.

Regards

Shaun Shabbot
Design Engineer, BEng

Auckland Office
P: 09 265 0990 | F: 09 265 0991
Unit 2B, 9 Laidlaw way, East Tamaki
Auckland 2016
www.redco.co.nz

Chartered Professional Engineers

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From: Darrel Cheong [<mailto:Darrel.Cheong@mbie.govt.nz>]

Sent: Thursday, 13 February 2014 4:41 p.m.

To: Shaun Shabbot

Cc: Murray Usmar; James Finlayson (james@zirkacircus.com); ChrissieG@redco.co.nz; grahamr@redco.co.nz

Subject: RE: Zirka Circus

Shaun

I am glad that after careful study, you found your previous assumption of horizontal forces cancelling each other out very incorrect.

The following points were raised in our phone discussion today:

- You need to demonstrate how the building meets two design points: ULS & SLS. Assuming that this is an Importance Level 3 structure which is for 'less than 6 months', the intensity event for ULS wind is 1/250 and 1/25 for SLS wind. Your claim of 'No SLS Criteria' [refer to highlights below] is not quite correct and I have not found any calculations for the SLS case. On the ULS case, NZS 1170 Part 2 gives regional wind speed demand of 43m/s (for A7 region, assuming that you do not erect the building in Wellington/Picton area) but this has not been taken into account appropriately. Your calculations show that you have only considered 39m/s which is non-compliant to NZS 1170
- Next, I am wondering why NZS 4203:1992 was used when it has been superseded and does not contain the latest design information? In the PS1 Document, it is claimed that the design has been prepared in accordance with B1/VM1 & AS1 but NZS 4203:1992 has been excluded from B1/VM1 since 2008.
- The Italian Engineers' report have the self-weight of the sport cover as 0.8kPa but you have it as 0.01kPa in your calculations, 80 times less. I am unsure if you have neglected earthquake loading [refer to highlights below] based on this basis.
- The drawings are in Italian and I struggle to understand them. It is important that drawings or calculations are localised to NZ conditions/context and they should clearly articulate assumptions/justifications made in calculations.

Other areas of concern would be where you have mentioned that 'Client will need to get these details from the manufacturer'.

Kind regards

Darrel Cheong

ADVISOR – BUILDING STANDARDS
Building System Performance Branch, Infrastructure and Resource Markets
Ministry of Business, Innovation & Employment
Darrel.Cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527
Level 8, 33 Bowen St, PO Box 1473, Wellington

From: Shaun Shabbot [<mailto:shauns@redco.co.nz>]

Sent: Thursday, 13 February 2014 12:34 p.m.

To: Darrel Cheong

Subject: RE: Zirka Circus

Darrel,

I will be calling you in 10mins! Hope you are in the office ☺

Regards

Shaun Shabbot
Design Engineer, BEng



Auckland Office
P: 09 265 0990 | F: 09 265 0991
Unit 2B, 9 Laidlaw way, East Tamaki
Auckland 2016
www.redco.co.nz

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NEW CIRCUS MARQUEE

ZIRCA CIRCUS

STRUCTURAL CALCULATIONS

Project No. 11326

Prepared by: **Shaun Shabbot**
BE

February 2014

Reviewed by: **Athir Mansoor**
BSc MEngSt

Approved by: **Graham Rundle**
BE M.I.PENZ IntPE

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5



Providing the services of

adding 'engineuity' to building projects

Chartered Professional Engineers

Redco NZ Ltd
Redco House
470 Otumoetai Road
TAURANGA 3110
Telephone: 07 571 7070
Facsimile: 07 571 7080
Email: red@redco.co.nz
www.redco.co.nz



Quality
ISO 9001



Environment
ISO 14001

sustainable
BUSINESS NETWORK
MEMBER



Building Code Clause(s) B1.....

PRODUCER STATEMENT – PS1 – DESIGN

(Guidance notes on the use of this form are printed on the reverse side*)

ISSUED BY: Redco.NZ Ltd.....
(Design Firm)

TO: Zirca Circus.....
(Owner/Developer)

TO BE SUPPLIED TO: All.....
(Building Consent Authority)

IN RESPECT OF: New Circus Marquee (Redco Project No. 11326)
(Description of Building Work)

AT: Short term event site.....
(Address)

..... LOT DP SO

We have been engaged by the owner/developer referred to above to provide Structural Engineering.....
(Extent of Engagement)..... services in respect of the requirements of

Clause(s) B1..... of the Building Code for
 All or Part only (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:

Compliance Documents issued by Department of Building & Housing B1/VM1 & AS1.....
(Verification method / acceptable solution)

Alternative solution as per the attached schedule..... or

The proposed building work covered by this producer statement is described on the drawings titled New Circus Marquee.....
..... and numbered 1.....;

together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

- (i) Site verification of the following design assumptions NZS.3604:2011 "Good ground".....
- (ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code.

I, Claude Antony Carter Cook..... am: CPEng 240891..... #
(Name of Design Professional)

I am a Member of: IPENZ NZIA and hold the following qualifications: BE, M, IPENZ, CPEng, IntPE..... #
 Reg Arch..... #

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*.
The Design Firm is a member of ACENZ YES NO

SIGNED BY Claude Antony Carter Cook..... ON BEHALF OF Redco.NZ Ltd.....
(Design Firm)

Date 7/02/2014..... (signature).....

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000*.

This form is to accompany Form 2 of the Building (Forms) Regulations 2004 for the application of a Building Consent.

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1992. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suite of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design	Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;
PS2 Design Review	Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;
PS3 Construction	Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2003 ¹ or Schedules E1/E2 of NZIA's SCC 2007 ²
PS4 Construction Review	Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate. This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence-based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

* Professional Indemnity Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5)³ (OL1-OL4)². The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

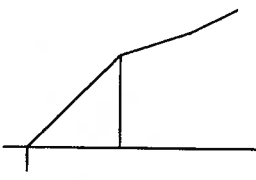
- ¹ *Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2003*
- ² *NZIA Standard Conditions of Contract SCC 2007 (1st edition)*
- ³ *Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)*

www.acenz.org.nz
www.ipenz.org.nz
www.nzia.co.nz



Summary and Recommendations

Project No. 11326

Configuration	Wind speed	Requirements
Guyed with pgs4 	0-100kph	2 pegs each guy rope (peg – 45mm Φ x 1.4m Long or similar)
	>100kph	Circus Tent to be dismantled or further hold down measures to be taken

- For wind speeds up to 100 kph the structure has to have guy ropes attached as per above table. In addition all openings in the marquee must be zipped shut for wind speeds exceeding 50 kph, except to allow patrons access to and egress from the marquee.
- For wind speeds exceeding 100 kph the marquee is not to be occupied and it is recommended that the marquee be dismantled or further hold down measures to be taken.

Notes:

- The Marquee has been structurally designed by Via Della Mendola dated 10/09/2012. The structural calculation of the Marquee has been designed to the wind speed 140kph. These calculations are attached.
- All structures are considered to be temporary structures.
- The structure is Importance Level 2
- The marquee erector shall determine the applicable wind speed for each specific location.
- If the marquee is to be erected on an exposed hilltop (>30m) the wind speed limitation should be reduced by 50%.
- Alternatively a wind anemometer may be used to ensure the actual site wind speeds don't exceed the limitations above.
- No big openings are allowed in the marquee. All openings must be zipped shut for wind speeds exceeding 50kph.
- The marquee is not designed to support any snow loads.
- To avoid ponding the fabric must be stretched tightly.

CALCULATIONS

Client: **Flaming Phoenix Entertainment Ltd (Zirca Circus)**

18 Feb '14

Project: **New Circus Marquee**

Project No. **11326**

Building is a light steel framed structure to be designed to withstand loadings from AS/NZS 1170

NB Ultimate limit state soil pressures have been used for the design using the definitions in NZBC Section B1 1170.0 General Principles

Importance Level for Building = **2**

Design Working Life = **< 6 month Table 3.1, 3.2**

Normal Structures and structures not falling into other levels

1170.1 Permanent, imposed and other actions

Dead:	Rope	0.04 kPa
	Tent Cover	0.01 kPa
		<u>0.00 kPa</u>
	q_{G roof} =	0.05 kPa

Floor:	Flooring	0.00 kPa
	Joists	0.00 kPa
	Ceiling	<u>0.00 kPa</u>
	q_{G floor} =	0.00 kPa

Live: Roof: q_{O roof} = 0.25 kPa

Floor: q_{O floor} = 1.50 kPa Table 3.1

1170.2 Wind actions

$V_{des} = V_R M_d (M_{fz,cat} M_s M_t)$ (Eq 2.2)
 $= 39.0$ m/s

Region = 4/7 R = 100

V_R Ultimate = 44 m/s Any Direction

$p_z = (0.5 r_{dir}) [V_{dir}]^2$ (Eq 2.4(1)) (Eq 2.4(1))

V_R Serviceability = 37 m/s Category 3 4.2.1

Ultimate p_z = 0.91 C_{fig} C_{dvn} kPa M_{fz,cat} = 0.89

Table 4.1(A) h = 15.5 m

Serviceability p_z = 0.65 C_{fig} C_{dvn} kPa M_s = 1.00

4.3 M_d = 1.0 3.3

M_t = 1.00

4.4 M_h = 1.0 4.4.2

Pressure coefficients:

M_{lee} = 1.0 4.4.3

C_{di} = 0 -0.3 Table 5.1

Site Elevation E = 100 m

Windward wall C_{pe} = 0.7 Table 5.2

Roof slope, α = 40 deg.

Leeward wall C_{pe} = -0.3

b = 35.0 m

Up-wind, roof C_{pe} = 0.2 Table 5.3

d = 35.0 m

Down-wind, roof C_{pe} = -0.9

d/b = 1.00

C_{dvn} = 1.0 Section 6

h/d = 0.44

$p_z = (C_{pe} K_a K_c K_j K_d - C_{di} K_e) C_{dvn} p_{fz}$ (Eq 2.4(1))

K_{aw} = 1.0 Table 5.4

Wall: p_{z AB} = 0.73 kPa 0.51 kPa

K_{ar} = 1.0 Table 5.4

Roof: p_{z BC} = 0.37 kPa 0.00 kPa

K_l = 1.0 Table 5.6

Roof: p_{z CD} = 0.22 kPa -0.66 kPa

K_o = 1.0 Table 5.8

Wall: p_{z DE} = 0.00 kPa -0.22 kPa

K_c = 0.8 5.4.3

Therefore, design wind speed in kph = 39 x 3.6 = **140.4 kph**

CALCULATIONS

Client: **Flaming Phoenix Entertainment Ltd (Zirca Circus)**

18 Feb '14

Project: **New Circus Marquee**

Project No. **11326**

HOLDING DOWN CAPACITY FOR THE TENT

Roof Area = 962 m²
 Assumed number of pegs = 72
 Tributary area/ pegs = 13.36 m² /pegs

Wind Uplift Load

C_p = 0.9
 W_{UPLIFT} = 0.819 kPa
 Uplift / peg = 0.819 x 13.36 = 10.94 kN
 Capacity of single peg

From the Loading spreadsheet
 Ultimate p_z = 0.91 kPa
 V_{design} = 38.94 m/s = 140.2 km/hr
 NOTE: Dead load has been ignored in the uplift calculations because the structure is very light and could be neglected. This is conservative calculations.
 This is the design load per peg for Uplift

D = 45 mm Diameter of the peg
 L = 1.4 m Length of the peg
 Perimeter area of peg = 0.141 m²

For good soils (stiff to hard clay), c_b for adhesion between soil and the peg is between 33-57 kPa

c_b = 33 kPa Taking the most critical case
 Depth of peg in ground = 1.2 m Assumption that top soil is 200mm and ignored
 Holding down force (peg) = 0.141 x 1.2 x 33 = 5.598 kN < 10.94 kN
 Not Good, single peg does not work

Therefore, try 2 pegs per each guy

Capacity of 2 pegs calculation

Capacity of single peg = 5.598 kN
 Number of pegs = 2
 Ultimate factor = 0.9
 Holding down force (2 pegs) = 5.598 x 2 x 0.9 = 10.08 kN < 10.94 kN
 Not Good, 2 pegs does not work

CHECK CAPACITY FOR PEG WITH HORIZONTAL FORCE (Using Brom's Formula in clay)

P* = 5.471 kN Horizontal design load for single peg
 e = 0.2 m Height of peg above ground
 B = 0.045 m Diameter of peg
 Spacing = 0.3 m Minimum Spacing between the two pegs
 B = 1.667 Spacing/4B
 Ø = 0.5 Reduction Factor
 N_c = 5
 e' = 0.268 m e + 1.5B
 e'' = 0.068 m 1.5B
 C_u = 50 Kpa Assumption of "Good Ground"
 C_u* = 83.33 kPa C_u x B
 L = 1.2 m Depth of peg into the ground
 L' = 1.133 m L - e''
 P_{Capacity} = 5.876 kN ØN_cC_uB[√{(2e'+L')²+L'²}-2e'+L']

Peg Ok in the horizontal direction

CHECK COMBINED ACTION OF HORIZONTAL FORCE AND WIND UPLIFT

P* = 5.5 kN
 P_{Capacity} = 5.9 kN
 N* = 10.9 kN
 N_{Capacity} = 10.1 kN
 P*/P_{Capacity} + N*/N_{Capacity} < 1.0 = 2.0 Not Good!

00 45mm φ x 1.4m peg do not work at this wind speed, decrease windspeed

CALCULATIONS

Page 4

Client: **Flaming Phoenix Entertainment Ltd (Zirca Circus)**

18 Feb '14

Project: **New Circus Marquee**Project No. **11326****HOLDING DOWN CAPACITY FOR THE TENT**

Roof Area	=	962 m ²
Assumed number of pegs	=	72 pegs
Tributary area/ pegs	=	13.36 m ² /pegs

Wind Uplift Load

C _p	=	0.9
W _{UPLIFT}	=	0.402 kPa

From the Loading spreadsheet

Ultimate pz	=	0.447 kPa	V _{design}	=	27.28 m/s
				=	98.22 km/hr

NOTE: Dead load has been ignored in the uplift calculations because the structure is very light and could be neglected. This is conservative calculations.

$$\text{Uplift / peg} = 0.402 \times 13.36 = 5.371 \text{ kN} \quad \text{This is the design load per peg for Uplift}$$

Capacity of single peg

D	=	45 mm	Diameter of the peg
L	=	1.4 m	Length of the peg
Perimeter area of peg	=	0.141 m ²	

For good soils (stiff to hard clay), c_b for adhesion between soil and the peg is between 33-57 kPa

c _b	=	33 kPa	Taking the most critical case
Depth of peg in ground	=	1.2 m	Assumption that top soil is 200mm and ignored
Holding down force (peg)	=	0.141 x 1.2 x 33 = 5.598 kN	> 5.371 kN

Ok! Single peg works!

Therefore, try 2 pegs per each guy

Capacity of 2 pegs calculation

Capacity of single peg	=	5.598 kN	
Number of pegs	=	2	
Ultimate factor	=	0.9	
Holding down force (2 pegs)	=	5.598 x 2 x 0.9 = 10.08 kN	> 5.371 kN

Ok! Two peg works!

CHECK CAPACITY FOR PEG WITH HORIZONTAL FORCE (Using Brom's Formula in clay)

P*	=	2.685 kN	Horizontal design load for single peg
e	=	0.2 m	Height of peg above ground
B	=	0.045 m	Diameter of peg
Spacing	=	0.3 m	Minimum Spacing between the two pegs
B	=	1.667	Spacing/4B
Ø	=	0.5	Reduction Factor
N _c	=	9	
e'	=	0.268 m	e+1.5.B
e'	=	0.068 m	1.5B
C _u	=	50 kPa	Assumption of "Good Ground"
C _u *	=	83.33 kPa	C _u x B
L	=	1.2 m	Depth of peg into the ground
L'	=	1.133 m	L-e"
P _{Capacity}	=	5.876 kN	$\frac{1}{2} N_c C_u B [\sqrt{ (2e'+L')^2 + L'^2 } - (2e'+L')]$

Peg Ok in the horizontal direction

CHECK COMBINED ACTION OF HORIZONTAL FORCE AND WIND UPLIFT

P*	=	2.7 kN
P _{Capacity}	=	5.9 kN
N*	=	5.4 kN
N _{Capacity}	=	10.1 kN
P*/P _{Capacity} + N*/N _{Capacity}	=	1.0

Okay!

Appendix A - Structural Calculations for the Marquee

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Out of Scope

From: Shaun Shabbot [mailto:shauns@redco.co.nz]
Sent: Tuesday, 18 March 2014 1:57 p.m.
To: Darrel Cheong; Murray Usmar
Cc: James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green; Rick Griffiths
Subject: RE: Zirka Circus

Good afternoon Darrel/Murray

All our calculations have been revised. This includes:

- The importance level of the building is now IL3 and Design working life of 5 years has been adopted
- Due to the shape of the structure and the triangulation effect, the only deflection could occur is the elongation of the guy ropes which is supposed to be minimal with strong type of Cable (129kN tension capacity)
- All loadings have been revised to NZS 1170
- Dead load has been revised to 0.05kPa as stated from the Italian Engineers calculations.
- Ground soil properties
 - The number of pegs required
 - The minimum strength allowed for the ground strength
 - The minimum shear and holding down force required for 6-peg arrangement for poor ground
- The connection plate (which has been already designed and produced by Steel Tech) between the guy rope and pegs

I hope this is all you require. If you need anything else, please contact me or Athir.

Regards

Shaun Shabbot
Design Engineer, BEng



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From: Darrel Cheong [<mailto:Darrel.Cheong@mbie.govt.nz>]
Sent: Thursday, 27 February 2014 1:05 p.m.
To: Shaun Shabbot; Murray Usmar
Cc: James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green
Subject: RE: Zirka Circus

Shaun

Thanks for following up with the application.

There are still outstanding issues which have not been appropriately addressed in your revised calculations. Rather than detailing them in an email, I was wondering if we could resolve them via a phone call or even in person?

Whilst we are happy to assist wherever possible, we have to be satisfied on reasonable grounds that the design would meet the Building Code requirements.

Kind regards

Darrel Cheong
ADVISOR – BUILDING STANDARDS
Building System Performance Branch, Infrastructure and Resource Markets
Ministry of Business, Innovation & Employment
Darrel.Cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527
Level 8, 33 Bowen St, PO Box 1473, Wellington

From: Shaun Shabbot [<mailto:shauns@redco.co.nz>]
Sent: Wednesday, 26 February 2014 2:47 p.m.
To: Darrel Cheong; Murray Usmar
Cc: James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green
Subject: RE: Zirka Circus

Good afternoon Darrel and Murray,

It has been over one week and no response. Is everything okay and finalized now?

Regards

Shaun Shabbot
Design Engineer, BEng



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NEW CIRCUS MARQUEE

ZIRCA CIRCUS

STRUCTURAL CALCULATIONS

Project No. I1326

Prepared by: **Shaun Shabbot**
BE

March 2014

Reviewed by: **Athir Mansoor**
BSc MEngSc

Approved by: **Graham Rundle**
BE MIPENZ IntPE

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adding 'engineuity' to building projects

Providing the services of:

Chartered Professional Engineers

Redco NZ Ltd
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Quality
ISO 9001



Environment
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sustainable
BUSINESS NETWORK
MEMBER





Building Code Clause(s) B1

PRODUCER STATEMENT – PS1 – DESIGN

(Guidance notes on the use of this form are printed on the reverse side*)

ISSUED BY: Redco NZ Ltd (Design Firm)

TO: Zirca Circus (Owner/Developer)

TO BE SUPPLIED TO: All (Building Consent Authority)

IN RESPECT OF: New Circus Marquee (Redco Project No. 11326) (Description of Building Work)

AT: Short term event site (Address)

LOT DP SO

We have been engaged by the owner/developer referred to above to provide Structural Engineering services in respect of the requirements of Clause(s) B1

All or Part only (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with: Compliance Documents issued by Department of Building & Housing B1/VM1 & AS1

Alternative solution as per the attached schedule

The proposed building work covered by this producer statement is described on the drawings titled New Circus Marquee and numbered together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to: (i) Site verification of the following design assumptions NZS 3604:2011 "Good ground" (ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code.

I, Claude Antony Carter Cook am: CPEng 240891 Reg Arch

I am a Member of: IPENZ NZIA and hold the following qualifications: BE, M, IPENZ, CPEng, IntPE

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*. The Design Firm is a member of ACENZ YES NO

SIGNED BY Claude Antony Carter Cook ON BEHALF OF Redco NZ Ltd (Design Firm)

Date 7/02/2014 (signature)

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000*.

This form is to accompany Form 2 of the Building (Forms) Regulations 2004 for the application of a Building Consent.

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1992. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suite of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design	Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;
PS2 Design Review	Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;
PS3 Construction	Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2003 ¹ or Schedules E1/E2 of NZIA's SCC 2007 ²
PS4 Construction Review	Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate. This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence-based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

* Professional Indemnity Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5)³ (OL1-OL4)². The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

- 1 *Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2003*
- 2 *NZIA Standard Conditions of Contract SCC 2007 (1st edition)*
- 3 *Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)*

www.acenz.org.nz
www.ipenz.org.nz
www.nzia.co.nz



16mm THICK
STEEL PLATE WITH
PEGS @ 300mm SPACING
GRADE G250

WELDED LOOP
32mmφ x 1040mm
(WHERE THE GUY ROPE
ARE ATTACHED)



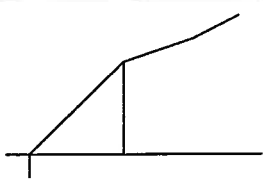
PLATE FOR GUY ROPE - PEG CONNECTION

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Chartered Professional Engineers

Summary and Recommendations

Project No. 11326

Configuration	Wind speed	Requirements
Guyed Rope 	0-140kph	4 pegs each guy rope for Firm clay (33kPa adhesion strength) OR 6 pegs each for Soft Clay (17.3kPa adhesion strength MIN)
	>140kph	Circus Tent to be dismantled or further hold down measures to be taken

For wind speeds up to 140 kph the structure has to have guy ropes attached as per above table. In addition all openings in the marquee must be zipped shut for wind speeds exceeding 50 kph, except to allow patrons access to and egress from the marquee.

For wind speeds exceeding 140 kph the marquee is not to be occupied and it is recommended that the marquee be dismantled or further hold down measures to be taken.

Notes:

- The Marquee has been structurally designed by Via Delta Mendola dated 10/09/2012. The structural calculation of the Marquee has been designed to the wind speed 140kph. These calculations are attached. The wind load used by the engineer is in accordance to NZ 1170.
- The structure is Importance Level 3, Design working life 5 years.
- The Marquee erector shall determine the applicable wind speed for each specific location and the ground conditions strength in accordance to the local authority.
- If the Marquee is to be erected on an exposed hilltop (>30m) the wind speed limitation should be reduced by 50%.
- Alternatively a wind anemometer may be used to ensure the actual site wind speeds don't exceed the limitations above.
- No big openings are allowed in the marquee. All openings must be zipped shut for wind speeds exceeding 50kph.
- The marquee is not designed to support any snow loads.
- To avoid ponding the fabric must be stretched tightly.
- Current peg design is 45mm Φ x 1.4m Long.
- The marquee may not be constructed on soft ground (Sand/silt) or soft clay with adhesion strength less than 17.3kPa.
- To construct marquee on soft ground, specific testing of the pegs capacity would be required to meet the design pullout and shear created by the wind in accordance with the local authority.
 (Minimum load required for pegs $N_{\text{Holding Down Force}} = 15.9\text{kN}$ and $V_{\text{Shear Force}} = 5.9\text{kN}$)

CALCULATIONS

Client: **Flaming Phoenix Entertainment Ltd (Zirca Circus)**

13 Mar '14

Project: **New Circus Marquee**

Project No. 11326

Building is a light steel framed structure to be designed to withstand loadings from AS/NZS 1170

NB Ultimate limit state soil pressures have been used for the design using the definitions in NZBC Section B1 1170.0 General Principles

Importance Level for Building = **3**

Design Working Life = **5 years** Table 3.1, 3.2

Major Structures (affecting crowds)

1170.1 Permanent, imposed and other actions

Dead:	Rope	0.04 kPa
	Tent Cover	0.01 kPa
		<u>0.00 kPa</u>
	q_{G roof} =	0.05 kPa

Floor:	Flooring	0.00 kPa
	Joists	0.00 kPa
	Ceiling	<u>0.00 kPa</u>
q_{G floor} =	0.00 kPa	

Live: Roof: **q_{O roof} = 0.25 kPa**

Floor: **q_{O floor} = 1.50 kPa** Table 3.1

1170.2 Wind actions

$$V_{des} = V_R M_d (M_{fz,cat} M_s M_t) \text{ (Eq 2.2)}$$

$$= 39.0 \text{ m/s}$$

Region = 11-7 R = 500

V_R Ultimate = 44 m/s Any Direction

$$p_z = (0.5 \rho v_{des}^2) (Eq 2.4(1))$$

V_R Serviceability = 37 m/s Category 3 4.2.1

Ultimate p_z = 0.91 C_{fig} C_{dvn} kPa M_{fz,cat} = 0.89

h = 15.5 m

Serviceability p_z = 0.65 C_{fig} C_{dvn} kPa M_s = 1.00

M_d = 1.0 3.3

M_t = 1.00

M_h = 1.0 4.4.2

Pressure coefficients:

M_{lee} = 1.0 4.4.3

C_{di} = 0 -0.3 Table 5.1

Site Elevation E = 100 m

Windward wall C_{pe} = 0.7 Table 5.2

Roof slope, α = 40 deg.

Leeward wall C_{pe} = -0.3

b = 35.0 m

Up-wind, roof C_{pe} = 0.7 Table 5.3

d = 35.0 m

Down-wind, roof C_{pe} = 0.9

d/b = 1.00

C_{dvn} = 1.0 Section 6

h/d = 0.44

$$p_z = (C_{pe} K_a K_c K_l K_b - C_{di} K_d) C_{dvn} p(z) \text{ (Eq 2.4(1))}$$

K_{aw} = 1.0 Table 5.4

Wall: p_{z AB} = 0.73 kPa 0.51 kPa

K_{ar} = 1.0 Table 5.4

Roof: p_{z BC} = 0.37 kPa 0.00 kPa

K_l = 1.0 Table 5.6

Roof: p_{z CD} = 0.22 kPa -0.66 kPa

K_b = 1.0 Table 5.8

Wall: p_{z DE} = 0.00 kPa -0.22 kPa

K_c = 0.8 5.4.3

Therefore, design wind speed in kph = 39 x 3.6 = **140.4 kph**

CALCULATIONS

Client: **Flaming Phoenix Entertainment Ltd (Zirca Circus)**

18 Feb '14

Project: **New Circus Marquee**

Project No. **11326**

HOLDING DOWN CAPACITY FOR THE TENT

Roof Area = 962 m²
 Assumed number of pegs = 72
 Tributary area/ pegs = 13.36 m²/pegs

Wind Uplift Load

C_p = 0.9
 W_{UPLIFT} = 0.819 kPa

From the Loading spreadsheet = 38.94 m/s
 Ultimate pz = 0.91 kPa V_{design} = 140.2 km/hr

NOTE: Dead load has been ignored in the uplift calculations because the structure is very light and could be neglected. This is conservative calculations.

Uplift / peg = 0.819 x 13.36 = 10.94 kN This is the design load per peg for Uplift

Capacity of single peg

D = 45 mm Diameter of the peg
 L = 1.4 m Length of the peg
 Perimeter area of peg = 0.141 m²

For good soils (stiff to hard clay), c_b for adhesion between soil and the peg is between 33-57 kPa

c_b = 33 kPa Taking the most critical case
 Depth of peg in ground = 1.2 m Assumption that topsoil is 200mm and ignored
 Holding down force (peg) = 0.141 x 1.2 x 33 = 5.598 kN < 10.94 kN
 Not Good, single peg does not work

Therefore, try 2 pegs per each guy

Capacity of 2 pegs calculation

Capacity of single peg = 5.598 kN
 Number of pegs = 2
 Ultimate factor = 0.9
 Holding down force (2 pegs) = 5.598 x 2 x 0.9 = 10.08 kN < 10.94 kN
 Not Good, 2 pegs does not work

CHECK CAPACITY FOR PEG WITH HORIZONTAL FORCE (Using Brom's Formula in clay)

P* = 5.471 kN Horizontal design load for single peg
 e = 0.2 m Height of peg above ground
 B = 0.045 m Diameter of peg
 Spacing = 0.3 m Minimum Spacing between the two pegs
 B/B = 1.667 Spacing/4B
 Ø = 0.5 Reduction Factor
 N_c = 9
 e = 0.268 m e+1.5.B
 e' = 0.068 m 1.5B
 C_u = 50 Kpa Assumption of "Good Ground"
 C_u* = 83.33 kPa C_u x B
 L = 1.2 m Depth of peg into the ground
 L' = 1.133 m L-e"
 P_{Capacity} = 5.876 kN ØN_cC_uB[√{(2e'+L')²+L'²}-2e'+L']

Peg Ok in the horizontal direction

CHECK COMBINED ACTION OF HORIZONTAL FORCE AND WIND UPLIFT

P* = 5.5 kN
 P_{Capacity} = 5.9 kN
 N* = 10.9 kN
 N_{Capacity} = 10.1 kN
 P*/P_{Capacity} + N*/N_{Capacity} < 1.0 = 2.0 Not Good!

∞ CURRENT 2-PEGS DO NOT WORK @ 140km/hr.

CALCULATIONS

 Client: **Flaming Phoenix Entertainment Ltd (Zirca Circus)**

18 Mar '14

 Project: **New Circus Marquee**

 Project No. **11326**
HOLDING DOWN CAPACITY FOR THE TENT

Roof Area = 962 m²
 Assumed number of pegs = 72 pegs
 Tributary area/ pegs = 13.36 m²/pegs

Wind Uplift Load

Cp = 0.9
 W_{UPLIFT} = 0.819 kPa

From the Loading spreadsheet = 39 m/s
 Ultimate pz = 0.91 kPa V_{design} = 140.2 km/hr

NOTE: Dead load has been ignored in the uplift calculations because the structure is very light and could be neglected. This is conservative calculations.

Uplift / peg = 0.819 x 13.36 = 10.94 kN This is the design load per peg for Uplift

Capacity of single peg

D = 45 mm Diameter of the peg
 L = 1.4 m Length of the peg
 Perimeter area of peg = 0.141 m²

For good soils (stiff to hard clay), cb for adhesion between soil and the peg is between 33-57 kPa

c_b = 33 kPa Taking the most critical case
 Depth of peg in ground = 1.2 m Assumption that topsoil is 200mm and ignored
 Holding down force (peg) = 0.141 x 1.2 x 33 = 5.598 kN

Capacity of 4 pegs

Capacity of single peg = 5.598 kN
 Number of pegs = 4
 Ultimate factor = 0.9

Holding down force (4 pegs) = 5.598 x 4 x 0.9 = 20.15 kN > 10.94 kN
 Ok! 4 peg works!

CHECK CAPACITY FOR PEG WITH HORIZONTAL FORCE (Using Brom's Formula in clay)

P* = 2.736 kN Horizontal design load for single peg
 e = 0.2 m Height of peg above ground
 B = 0.045 m Diameter of peg
 Spacing = 0.3 m Minimum Spacing between the three pegs
 B = 1.667 Spacing/4B
 Ø = 0.5 Reduction Factor
 Nc = 9
 e' = 0.268 m e + 1.5.B
 e'' = 0.048 m 1.5B
 Cu = 50 Kpa Assumption of "Good Ground"
 Cu* = 83.33 kPa Cu x B
 L = 1.2 m Depth of peg into the ground
 L' = 1.133 m L - e''
 P_{Capacity} = 5.876 kN $\phi NcCuB[\sqrt{\{(2e'+L')^2+L'^2\}}-(2e'+L')]$

Peg Ok in the horizontal direction

CHECK COMBINED ACTION OF HORIZONTAL FORCE AND WIND UPLIFT

P* = 2.7 kN
 P_{Capacity} = 5.9 kN
 N* = 10.9 kN
 N_{Capacity} = 20.2 kN
 P*/P_{Capacity} + N*/N_{Capacity} < 1.0 = 1.0

4 pegs work @ FIRM GROUND clay with minimum adhesion strength of 33kPa @ 39ms⁻¹ Design wind speed.

CALCULATIONS

Client: **Flaming Phoenix Entertainment Ltd (Zirca Circus)**

18 Mar '14

Project: **New Circus Marquee**

Project No. **11326**

HOLDING DOWN CAPACITY FOR THE TENT

Roof Area = 962 m²
 Assumed number of pegs = 72
 Tributary area/ pegs = 13.36 m² /pegs

Wind Uplift Load

C_p = 0.9
 W_{UPLIFT} = 0.819 kPa

From the Loading spreadsheet = 39 m/s
 Ultimate p_z = 0.91 kPa V_{design} = 140.2 km/hr

NOTE: Dead load has been ignored in the uplift calculations because the structure is very light and could be neglected. This is conservative calculations.

Uplift / peg = 0.819 x 13.36 = 10.94 kN This is the design load per peg for Uplift

Capacity of single peg

D = 45 mm Diameter of the peg
 L = 1.4 m Length of the peg
 Perimeter area of peg = 0.141 m²

For soft soils (silt and soft clay), c_b for adhesion between soil and the peg is between 10-33 kPa

c_b = 17.32 kPa Taking the most critical case that would work for the peg arrangement
 Depth of peg in ground = 1.2 m Assumption that top soil is 200mm and ignored
 Holding down force (peg) = 0.141 x 1.2 x 17.32 = 2.938 kN

Capacity of 6 pegs

Capacity of single peg = 2.938 kN
 Number of pegs = 6
 Ultimate factor = 0.9

Holding down force (4 pegs) = 2.938 x 6 x 0.9 = 15.87 kN > 10.94 kN
 O.K! 6 peg works!

CHECK CAPACITY FOR PEG WITH HORIZONTAL FORCE (Using Brom's Formula in clay)

P* = 1.824 kN Horizontal design load for single peg
 e = 0.2 m Height of peg above ground
 B = 0.045 m Diameter of peg
 Spacing = 0.3 m Minimum Spacing between the three pegs
 B = 1.667 Spacing/4B
 Ø = 0.5 Reduction Factor
 N_c = 9
 e' = 0.268 m e + 1.5.B
 e'' = 0.068 m 1.5B
 C_u = 50 Kpa Assumption of "Good Ground"
 C_u* = 83.33 kPa C_u x B
 L = 1.2 m Depth of peg into the ground
 L' = 1.133 m L - e''
 P_{Capacity} = 5.876 kN ØN_cC_uB[(√{(2e'+L')²+L'²})-(2e'+L')]

Peg Ok in the horizontal direction

CHECK COMBINED ACTION OF HORIZONTAL FORCE AND WIND UPLIFT

P* = 1.8 kN
 P_{Capacity} = 5.9 kN
 N* = 10.9 kN
 N_{Capacity} = 15.9 kN
 P*/P_{Capacity} + N*/N_{Capacity} < 1.0 = 1.0

∴ 6 pegs work work a soft clay with minimum adhesion strength of 17.3 kPa @ 39ms⁻¹ Design wind speed

CALCULATIONS

Client: **Flaming Phoenix Entertainment Ltd (Zirca Circus)**

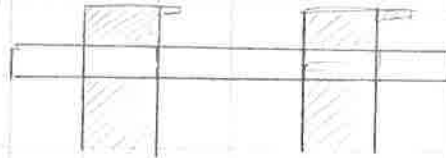
18 Feb '14

Project: **New Circus Marquee**

Project No. **11326**

PLATE CALCULATIONS (BENDING STRENGTH)

NEED TO CHECK BENDING STRENGTH OF THE PLATE (GR250)



THE PLATE IS SIMPLY SUPPORTED 6800mm OVER THE JOINTS



SIMPLY SUPPORTED CONFIGURATION CAN BE ASSUMED LIKE THIS WITH CRITICAL POINT OF FORCE OF $P = 10.94 \text{ kN}$.

$$M^* = \frac{10.94 \times 0.3}{4} = 0.82 \text{ kNm}$$

CAPACITY OF PLATE

$$M^* \leq \phi M_n \quad \phi = 0.9 \quad m = r_y z_y$$

$$f_y = 250 \text{ MPa}$$

$$z_y = \frac{300 \times 16^2}{6}$$

$$M_n = 0.9 \times 250 \times \frac{300 \times 16^2}{6} \times 10^{-3}$$

$$= 2.9 \text{ kNm} \quad \text{OKAY!}$$

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Appendix A - Structural Calculations for the Marquee

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Out of Scope

From: Darrel Cheong
Sent: Tuesday, 6 May 2014 4:55 p.m.
To: Murray Usmar
Cc: Graeme Lawrance; Theofanis Kostas
Subject: RE: Zirka Circus Multiproof

Murray

Further from our discussion, below are the outstanding issues with Zirka's application. I have put them in a draft response form.

Watched the news yesterday and it reminded me of Zirka. We certainly do not want this occurrence:
http://www.nzherald.co.nz/world/news/article.cfm?c_id=2&objectid=11249536

Like I have mentioned to you, Theo had a look at the calculations/drawings and he too thought there were (major) deficiencies in their submission.

"Jeni / Shaun

When Athir said he would revise the calculations, I expected something more substantial.

There are still outstanding issues which have not been addressed in your submission which was revised several times:

Superstructure (above-ground) Calculations:

- i) The superstructure calculations are done according to Eurocode 3 and they are in Italian/German language. On top of that, it is difficult to follow or understand the sequence of calculations presented. If you submit a design done overseas, it is important that drawings or calculations are translated to NZ conditions/context and they should clearly articulate assumptions/justifications made in calculations.
- ii) Structural configuration is insufficiently described; there is a lack of clarity regarding what the main structural elements are and where they are present. Details of many parts of structures are not found. For example, what is the nature of the pre-stress and how will it be implemented?
- iii) Consequently, load paths are unclear.
- iv) No mention of where/when the structure will be erected. This is important for snow and wind loadings
- v) Wind actions analysis is unclear and the FEM Analysis does not take into account positive/negative wind pressures, especially with the apparent presence of an opening at the top of the building
- vi) Geometric and material characteristics of lattice structure and pole are unclear
- vii) Working life of structure/parts should be taken into consideration for phenomena such as fatigue and replacement times needs to be stated. This is important as the 'design working life' of the superstructure has been changed from 'less than 6 months' to '5 years' now.
- viii) Material specifications should be presented.
- ix) Drawings submitted are shop drawings only, not IFC drawings.

Substructure (below-ground) Calculations:

- i) It is not clear how many guy ropes there are in total. Also unclear how many pegs in total
- ii) Wind uplift per peg is calculated based on 72 pegs for the 4-peg and 6-peg configuration. This results in equal uplift per peg for both configurations. I would have thought the uplift per peg decreases as the number of peg increases
- iii) Redco assumed 'soft soils' as having adhesion of 10 – 33 kPa but calculated the 'most critical' case as 17.32kPa. This needs more explanation?
- iv) The peg's lateral capacity formula was calculated using Broms method but the equation used is different from Broms (1964)
- v) Like superstructure, the wind analysis is insufficient and unclear
- vi) Previous correspondence mentioned that king posts will take the lateral loading and transfer it to the foundation. There are no sufficient details of the foundation mentioned and no foundation-related calculations
- vii) 'Good ground' definition in NZS 3604:2011 excludes potentially compressible ground (i.e. soft soils) such as clay. The 'good ground' assumption is used in this design even for soft soils
- viii) Pictures/photos of steel plate for guy-pegs are different from the sketch"

Thanks
Darrel

From: Shaun Shabbot [<mailto:shauns@redco.co.nz>]

Sent: Tuesday, 29 April 2014 11:44 a.m.

To: Darrel Cheong

Cc: Murray Usmar; James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green

Subject: Zirka Circus

Darrel,

No word from you in regards to Zirka Circus job, Can you please confirm the status.

Regards

Shaun Shabbot
Design Engineer, BEng



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Chartered Professional Engineers

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Out of Scope

From: Shaun Shabbot [mailto:shauns@redco.co.nz]

Sent: Wednesday, 2 July 2014 12:41 p.m.

To: Darrel Cheong

Cc: Murray Usmar; James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green; studio@studioardolino.it

Subject: RE: Zirka Circus

Darrel,

I have contacted the structural engineer from Italy to help answer the questions about his super structure. This is attached in the email.

Also the operator's and maintenance booklet of Zirka Circus.

From our end:

Substructure (below-ground) Calculations:

i) It is not clear how many guy ropes there are in total. Also unclear how many pegs in total. There is an error in our terminology. It should say the number of guy ropes not number of pegs. This has been revised on page 3.

ii) Wind uplift per peg is calculated based on 72 pegs for the 4-peg and 6-peg configuration. This results in equal uplift per peg for both configurations. I would have thought the uplift per peg decreases as the number of peg increases

Your question here is not clear. Hopefully this statement will help:

There is 72 guy ropes for the 4 to 6 peg configurations. The number of guy ropes will be constant. If the number of pegs is increased, the uplift force on each peg would decrease too. See page 3 when adding more

iii) Redco assumed 'soft soils' as having adhesion of 10 – 33 kPa but calculated the 'most critical' case as 17.32kPa. This needs more explanation?
This has been revised and explained in the summary page.

Redco believes that the Circus marquee should **not** be constructed on sand/silt clay. The Circus marquee can only be constructed on "Good Ground" in terms of NZS3604 and this is covered by our PS1.

If tent is to be constructed on ground that does not meet this requirement, it will require specific testing and redesign and is outside the scope of this design.

iv) The peg's lateral capacity formula was calculated using Broms method but the equation used is different from Broms (1964)
It is still a valid formula that is used in structural calculations when you know the depth but do not know the horizontal capacity of the force created by the pile.

v) Like superstructure, the wind analysis is insufficient and unclear
This has been designed in accordance to AS/NZS 1170 and calculated on the page 2. Could you please explain what it is that is unclear and insufficient?

vi) Previous correspondence mentioned that king posts will take the lateral loading and transfer it to the foundation. There are no sufficient details of the foundation mentioned and no foundation-related calculations
The lateral load will be transferred from the king posts by the ropes which will transfer in turn to the foundation (pegs). See page 3 for calculations of each peg in shear, tension and combination of the two forces.

vii) 'Good ground' definition in NZS 3604:2011 excludes potentially compressible ground (i.e. soft soils) such as clay. The 'good ground' assumption is used in this design even for soft soils
This has been revised and we have restricted the design to "Good Ground" in accordance to NZS 3604.

viii) Pictures/photos of steel plate for guy-pegs are different from the sketch"
We have not received any photos, so please send us the photos that you are referring too.

However, please refer to the sketch only as we received it from the steel manufacturer in New Zealand that James Finlayson was dealing with and will be used on site for construction.

ix) Is there any test data to verify strength of pegs?
There is no test data required for the pegs. There will be testing required if the circus marquee is to be installed on not "good ground" in terms of NZS3604.

Regards

Shaun Shabbot
Design Engineer, BEng



Auckland Office
P: 09 265 0990 | F: 09 265 0991
Unit 2B, 9 Laidlaw way, East Tamaki
Auckland 2016
www.redco.co.nz

Chartered Professional Engineers

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This e-mail message is intended only for the individual or entity named above, and may contain CONFIDENTIAL INFORMATION.

From: Darrel Cheong [<mailto:Darrel.Cheong@mbie.govt.nz>]
Sent: Friday, 9 May 2014 5:47 p.m.
To: Shaun Shabbot
Cc: Murray Usmar; James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green
Subject: RE: Zirka Circus

Jeni / Athir / Shaun

There are still outstanding issues which have not been addressed in your submission which was revised several times:

Superstructure (above-ground) Calculations:

- i) The superstructure calculations are done according to Eurocode 3 and they are in Italian/German language. On top of that, it is difficult to follow or understand the sequence of calculations presented. If you submit a design done overseas, it is important that drawings or calculations are translated to NZ conditions/context and they should clearly articulate assumptions/justifications made in calculations.
- ii) Structural configuration is insufficiently described; there is a lack of clarity regarding what the main structural elements are and where they are present. Details of many parts of structures are not found. For example, what is the nature of the pre-stress and how will it be implemented?
- iii) Consequently, load paths are unclear.
- iv) No mention of where/when the structure will be erected. This is important for snow and wind loadings
- v) Wind actions analysis is unclear and the FEM Analysis does not take into account positive/negative wind pressures, especially with the apparent presence of an opening at the top of the building
- vi) Geometric and material characteristics of lattice structure and pole are unclear
- vii) Working life of structure/parts should be taken into consideration for phenomena such as fatigue and replacement times needs to be stated. This is important as the 'design working life' of the superstructure has been changed from 'less than 6 months' to '5 years' now.
- viii) Material specifications should be presented.
- ix) Drawings submitted are shop drawings only, not Issued For Construction (IFC) drawings.

Substructure (below-ground) Calculations:

- x) It is not clear how many guy ropes there are in total. Also unclear how many pegs in total
- xi) Wind uplift per peg is calculated based on 72 pegs for the 4-peg and 6-peg configuration. This results in equal uplift per peg for both configurations. I would have thought the uplift per peg decreases as the number of peg increases
- xii) Redco assumed 'soft soils' as having adhesion of 10 – 33 kPa but calculated the 'most critical' case as 17.32kPa. This needs more explanation?
- xiii) The peg's lateral capacity formula was calculated using Broms method but the equation used is different from Broms (1964)
- xiv) Like superstructure, the wind analysis is insufficient and unclear
- xv) Previous correspondence mentioned that king posts will take the lateral loading and transfer it to the foundation. There are no sufficient details of the foundation mentioned and no foundation-related calculations
- xvi) 'Good ground' definition in NZS 3604:2011 excludes potentially compressible ground (i.e. soft soils) such as clay. The 'good ground' assumption is used in this design even for soft soils
- xvii) Pictures/photos of steel plate for guy-pegs are different from the sketch"
- xviii) Is there any test data to verify strength of pegs?

Thanks.

Kind regards

Darrel Cheong

GRADUATE ENGINEER

Building System Performance Branch, Infrastructure and Resource Markets
Ministry of Business, Innovation & Employment

Darrel.Cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527
Level 10, 33 Bowen St, PO Box 1473, Wellington

From: Shaun Shabbot [<mailto:shauns@redco.co.nz>]

Sent: Tuesday, 29 April 2014 11:44 a.m.

To: Darrel Cheong

Cc: Murray Usmar; James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green

Subject: Zirka Circus

Darrel,

No word from you in regards to Zirka Circus job, Can you please confirm the status.

Regards

Shaun Shabbot
Design Engineer, BEng



Auckland Office

P: 09 265 0990 | F: 09 265 0991
Unit 2B, 9 Laidlaw way, East Tamaki
Auckland 2016
www.redco.co.nz

Chartered Professional Engineers

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NEW CIRCUS MARQUEE

ZIRCA CIRCUS

STRUCTURAL CALCULATIONS

Project No. I1326

Prepared by: **Shaun Shabbot**
BE

July 2014

Reviewed by: **Athir Mansoor**
BSc MEngSt

Approved by: **Graham Rundle**
BE M.IPENZ IntPE

CONTENTS:

Page

Producer Statement

Sketch of Guy rope to Peg Plate

SKI

Summary and Recommendations

1

Wind Loading Calculations

2

Holding down Capacity for Tent Calculations [Cohesive]

3

Peg Plate Strength in Bending Calculations

4

Appendix A - Structural Calculations for the Marquee

5



adding 'enginuity' to building projects

Providing the services of:

Chartered Professional Engineers

Redco NZ Ltd
Redco House
470 Otumoetai Road
TAURANGA 3110
Telephone: 07 571 7070
Facsimile: 07 571 7080
Email: red@redco.co.nz
www.redco.co.nz





Building Code Clause(s) B.1.....

PRODUCER STATEMENT – PS1 – DESIGN

(Guidance notes on the use of this form are printed on the reverse side*)

ISSUED BY: Redco NZ Ltd.....
(Design Firm)

TO: Zirca Circus.....
(Owner/Developer)

TO BE SUPPLIED TO: All.....
(Building Consent Authority)

IN RESPECT OF: New Circus Marquee (Redco Project No. 11326).....
(Description of Building Work)

AT: Short term event site.....
(Address)

..... LOT..... DP..... SO.....

We have been engaged by the owner/developer referred to above to provide Structural Engineering.....
(Extent of Engagement)..... services in respect of the requirements of
Clause(s) B.1..... of the Building Code for
 All or Part only (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:
 Compliance Documents issued by Department of Building & Housing B.1/M1 & AS1.....
(Verification method / acceptable solution)..... or
 Alternative solution as per the attached schedule.....

The proposed building work covered by this producer statement is described on the drawings titled New Circus Marquee.....
..... and numbered 1.....
together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:
(i) Site verification of the following design assumptions NZS 3604:2011 "Good ground".....
(ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code.

I, Claude Antony Carter Cook..... am: CPEng 240891..... #
(Name of Design Professional)

Reg Arch..... #
I am a Member of: IPENZ NZIA and hold the following qualifications: BE, M, IPENZ, CPEng, IntPE.....

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*.
The Design Firm is a member of ACENZ YES NO

SIGNED BY Claude Antony Carter Cook..... ON BEHALF OF Redco NZ Ltd.....
(signature)..... (Design Firm)

Date 7/02/2014.....
Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000*.

This form is to accompany Form 2 of the Building (Forms) Regulations 2004 for the application of a Building Consent.

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1992. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suite of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design	Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;
PS2 Design Review	Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;
PS3 Construction	Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2003 ¹ or Schedules E1/E2 of NZIA's SCC 2007 ²
PS4 Construction Review	Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate. This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence-based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

* Professional Indemnity Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5)³ (OL1-OL4)². The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

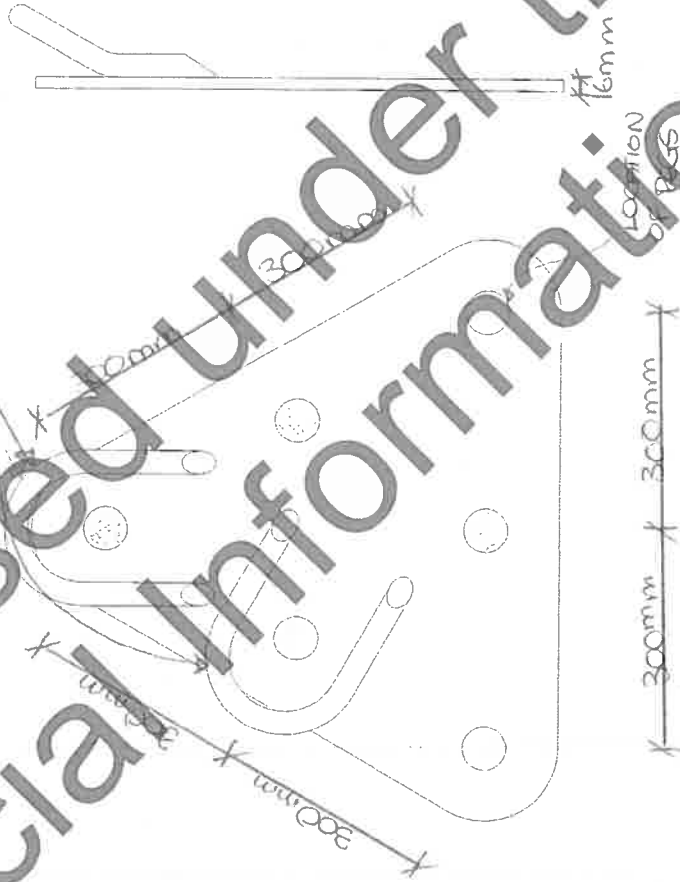
- ¹ *Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2003*
- ² *NZIA Standard Conditions of Contract SCC 2007 (1st edition)*
- ³ *Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)*

www.acenz.org.nz
www.ipenz.org.nz
www.nzia.co.nz



16mm THICK
STEEL PLATE WITH
PEGS @ 300mm SPACING
GRADE G250

WELDED LOOP
32mm ϕ x 1040mm
(WHERE THE GUY ROPES
ARE ATTACHED)



300mm x 300mm

PLATE FOR GUY ROPE - PEG CONNECTION

Released under the
Official Information Act



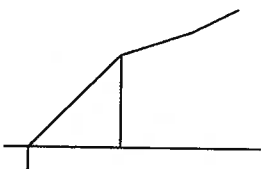
adding 'enginuity' to building projects

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 Email: red@redco.co.nz
 www.redco.co.nz

Chartered Professional Engineers

Summary and Recommendations

Project No. 11326

Configuration	Wind speed	Requirements
Guyed Rope 	0-140kph	6 pegs each guy rope for Firm clay (33kPa lowest adhesion strength value) and "Good Ground" in terms of NZS3604.
	>140kph	Circus Tent to be dismantled or further hold down measures to be taken.

For wind speeds up to 140 kph the structure has to have guy ropes attached as per above table. In addition all openings in the marquee must be zipped shut for wind speeds exceeding 50 kph, except to allow patrons access to and egress from the marquee.

For wind speeds exceeding 140 kph the marquee is not to be occupied and it is recommended that the marquee be dismantled or further hold down measures to be taken.

Notes:

- The Marquee has been structurally designed by Via Della Mendola dated 10/09/2012. The structural calculation of the Marquee has been designed to the wind speed 140kph. These calculations are attached. The wind load used by the engineer is in accordance to NZ 1170.
- The structure is Importance Level 3, Design working life 5 years.
- The Marquee erector shall determine the applicable wind speed for each specific location and the ground conditions strength in accordance to the local authority.
- If the Marquee is to be erected on an exposed hilltop (>30m) the wind speed limitation should be reduced by 50%.
- Alternatively a wind anemometer may be used to ensure the actual site wind speeds don't exceed the limitations above.
- No big openings are allowed in the marquee. All openings must be zipped shut for wind speeds exceeding 50kph.
- The marquee is not designed to support any snow loads.
- To avoid ponding the fabric must be stretched tightly.
- Current peg design is 45mm Φ x 1.4m long.
- The marquee may only be constructed on "Good Ground" in terms of NZS3604. If it is not good ground, specific testing of the pegs capacity would be required to meet the design pullout and shear created by the wind in accordance with the local authority.
- The Marquee is not to be constructed on sand/ cohesionless ground. This will require further testing and design



sustainable
 BUSINESS NETWORK
 MEMBER

- Engineering Reports (Civil, Structural & Fire)
- Building Designs
- Structural Draughting (CAD)
- Project Management

CALCULATIONS

Client: **Flaming Phoenix Entertainment Ltd (Zirca Circus)**

13 Mar '14

Project: **New Circus Marquee**

Project No. **11326**

Building is a light steel framed structure to be designed to withstand loadings from AS/NZS 1170

NB Ultimate limit state soil pressures have been used for the design using the definitions in NZBC Section B1 1170.0 General Principles

Importance Level for Building = **3**

Design Working Life = **5 years** Table 3.1, 3.2

Major Structures (affecting crowds)

1170.1 Permanent, imposed and other actions

Dead:
 Rope 0.04 kPa
 Tent Cover 0.01 kPa
 0.00 kPa
q_{G roof} = 0.05 kPa

Floor:
 Flooring 0.00 kPa
 Joists 0.00 kPa
 Ceiling 0.00 kPa
q_{G floor} = 0.00 kPa

Live: Roof: q_{o roof} = 0.25 kPa

Floor: q_{o floor} = 1.50 kPa Table 3.1

1170.2 Wind actions

$V_{des} = V_R M_d (M_{fz,cat} M_s M_t)$ (Eq 2.2)
 = 39.0 m/s

Region = 11.7 R = 500

V_R Ultimate = 44 m/s Any Direction

$p_z = (0.5 r_{ref}) (V_{des})^2$ (Eq 2.4(1)) (Eq 2.4(1))

V_R Serviceability = 37 m/s Category 3 4.2.1

Ultimate p_z = 0.91 C_{fig} C_{dvn} kPa M_{fz,cat} = 0.89

Table 4.1(A) h = 15.5 m

Serviceability p_z = 0.65 C_{fig} C_{dvn} kPa M_s = 1.00

4.3 M_d = 1.0 3.3

M_t = 1.00

4.4 M_h = 1.0 4.4.2

M_{lee} = 1.0 4.4.3

Pressure coefficients:

C_{bi} = 0 0.3 Table 5.1

Site Elevation E = 100 m

Windward wall C_{pe} = 0.7 Table 5.2

Roof slope, α = 40 deg.

Leeward wall C_{pe} = -0.3

b = 35.0 m

Up-wind, roof C_{pe} = 0.7 Table 5.3

d = 35.0 m

Down-wind, roof C_{pe} = -0.7

d/b = 1.00

C_{dvn} = 1.0 Section 6

h/d = 0.44

$p_z = (C_{pe} K_a K_c K_l K_o - C_{bi} K_d) C_{dvn} p_{fz}$ (Eq 2.4(1))

K_{aw} = 1.0 Table 5.4

Wall: p_{z AB} = 0.73 kPa 0.51 kPa

K_{ar} = 1.0 Table 5.4

Roof: p_{z BC} = 0.37 kPa 0.00 kPa

K_l = 1.0 Table 5.6

Roof: p_{z CD} = 0.22 kPa -0.66 kPa

K_o = 1.0 Table 5.8

Wall: p_{z DE} = 0.00 kPa -0.22 kPa

K_c = 0.8 5.4.3

Therefore, design wind speed in kph = 39 x 3.6 = **140.4 kph**

CALCULATIONS

 Client: **Flaming Phoenix Entertainment Ltd (Zirca Circus)**

 Project: **22 - Helms Residence**

 Project No. **11326**
HOLDING DOWN CAPACITY FOR THE TENT FOR PEGS WITH GOOD GROUND ASSUMPTION [Cohesive Soil]

 Roof Area = 962 m²
 Number of Guy Ropes = 72 rope
 Tributary area/ number of ropes = 13.36 m² /rope

CHECK THE WIND UPLIFT LOADS FOR THE PEG

C_p	=	0.9	From the Loading spreadsheet	V_{design}	=	38.94 m/s
W_{UPLIFT}	=	0.819 kPa	Ultimate p_z	=	0.91 kPa	= 140.2 km/hr
Uplift / peg	=	0.819 x 13.36	NOTE: Dead load has been ignored in the uplift calculations because the structure is very light and could be neglected. This is conservative calculations. This is the design load per peg for Uplift.			
Capacity of single peg	=	10.94 kN				
D	=	45 mm	Diameter of the peg			
L	=	1.4 m	Length of the peg			
Perimeter area of peg	=	0.141 m ²				

For good soils (stiff to hard clay), cb for adhesion between soil and the peg is between 33-57 kPa

c_b	=	33 kPa	Taking the most critical case		
Depth of peg in ground	=	1.2 m	Assumption that topsoil is 200mm and ignored		
Holding down force (peg)	=	0.141 x 1.2 x 33	=	5.598 kN	< 10.94 kN
					Not Good, single peg does not work

Therefore, try more pegs per each guy

Capacity of pegs calculation

Capacity of single peg	=	5.598 kN	
Number of pegs	=	6 pegs	
Ultimate factor	=	0.9	
Holding down force for 6 pegs	=	5.598 x 6 x 0.9	= 30.23 kN > 10.94 kN
			Ok! Pegs configuration works!

CHECK CAPACITY FOR PEG WITH HORIZONTAL FORCE (Using Brom's Formula in clay [Cohesive])

P^*	=	1.824 kN per Peg	Horizontal design load for single peg
D	=	0.045 m	Diameter of peg
Spacing	=	0.3 m	Minimum Spacing between the two pegs
B	=	1	Spacing/4B (Must be 1 or less)
ϕ	=	0.5	Reduction Factor
N_c	=	9	
C_u	=	50 kPa	Assumption of "Good Ground"
C_u^*	=	50 kPa	$C_u \times B$
f	=	0.2 m	Assumed distance above the ground surface
e_0	=	0.068 m	$1.5 \times D$
e	=	0.268 m	$f + e_0$
D'	=	1.133 m	Depth of pile - e_0
$P_{Capacity}$	=	3.526 kN	$N_c \times \phi \times C_u^* \times D \times [\sqrt{\{(2e'+D')^2 + D'^2\}} - (2e'+D')]$
			Peg Ok in the horizontal direction

CHECK COMBINED ACTION OF HORIZONTAL FORCE AND WIND UPLIFT

P^*	=	1.8 kN	
$P_{Capacity}$	=	3.5 kN	
N^*	=	10.9 kN	
$N_{Capacity}$	=	30.2 kN	
$P^*/P_{Capacity} + N^*/N_{Capacity} < 1.0$	=	0.9	Ok!

CALCULATIONS

Client: **Flaming Phoenix Entertainment Ltd (Zirca Circus)**

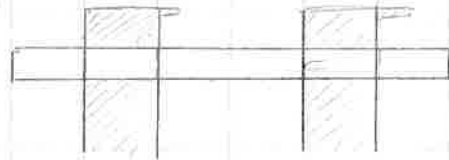
18 Feb '14

Project: **New Circus Marquee**

Project No. **11326**

A) PLATE CALCULATIONS (BENDING STRENGTH)

NEED TO CHECK BENDING STRENGTH OF THE PLATE (GR 250)



THE PLATE IS SIMPLY SUPPORTED @ 800mm C/C



SIMPLY SUPPORTED CONFIGURATION CAN BE RESOLVED LIKE THIS WITH EQUAL PULL OUT FORCE OF 10.94kN.

$$M^y = \frac{10.94 \times 0.3}{4} = 0.82 \text{ kNm}$$

CAPACITY OF PLATE

$$M^y \leq \phi M_p \quad \phi = 0.9 \quad f_y = 250$$

$$f_y = 250 \text{ MPa}$$

$$Z_y = \frac{300 \times 16^2}{6}$$

$$\phi M_p = 0.9 \times 250 \times \frac{300 \times 16^2}{6} \times 10^{-3}$$

$$= 299 \text{ kNm} \quad \text{SO OKAY!}$$

B) TENSILE STRENGTH

$$N_{uT} \leq \phi N_t$$

$$\phi = 0.9$$

$$N_t = f_y A_s$$

$$f_y = 250 \text{ MPa}$$

$$A_s = \frac{d^2 \pi}{4}$$

$$= \frac{45^2 \pi}{4}$$

$$\phi N_t = 0.9 \times 250 \times \frac{45^2 \pi}{4} = 357 \text{ kN} \gg N_{uLIFT}$$

Appendix A - Structural Calculations for the Marquee

Released under the
Official Information Act

Released under the
Official Information Act

Out of Scope

From: Darrel Cheong
Sent: Tuesday, 29 July 2014 12:31 p.m.
To: Shaun Shabbot
Cc: James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green; arnop@redco.co.nz
Subject: Zirka Circus

Shaun

Thanks for your email. I already have a meeting scheduled for us next week on Tuesday 5 August 2014 from 2 - 4pm in Galaxy meeting room, which is located on Level 3. We are based at 33 Bowen Street, Wellington Central. As soon as your Principal Engineer arrives, he can take the lift to Level 3 and report to Reception. Reception will then guide you to the room.

Please find my comments below in black and highlighted yellow.

Superstructure (above-ground) Calculations:

- i) The superstructure calculations are done according to Eurocode 3 and they are in Italian/German language. On top of that, it is difficult to follow or understand the sequence of calculations presented. If you submit a design done overseas, it is important that drawings or calculations are translated to NZ conditions/context and they should clearly articulate assumptions/justifications made in calculations. WE WERE ASKED FROM THE MANUFACTURER (ANCESCHI) TO VERIFY THE STEEL STRUCTURES ACCORDING TO THE EUROPEAN CODE (EUROCODE 3); I' SORRY, BUT I DON'T KNOW THE CODE OF NZ

AND THE POSSIBLE DIFFERENCES IN THE VERIFICATIONS. THE EC3 SHOULD BE ALSO IN ENGLISH LANGUAGE. <http://www.eurocodes.co.uk/EurocodeDetail.aspx?Eurocode=3>

This is the biggest concern that we have to date. Again, it is important that drawings and calculations are translated to NZ conditions/context. As a whole, we struggle to understand the drawings and the sequence of calculations by Studio D'ingegneria Ardolino. For example, there are lots of abbreviations used which need explanation as to what they are. Assumptions are not stated and drawings are not in English.

- ii) Structural configuration is insufficiently described; there is a lack of clarity regarding what the main structural elements are and where they are present. Details of many parts of structures are not found. For example, what is the nature of the pre-stress and how will it be implemented? AS DESCRIBED AT PAG. 3 AND FROM THE DRAWINGS AT PAG. 29+29+39+40, THE MAIN STRUCTURE CONSIST OF 4 KING POLES (H=9.50m) + 4 BASKETS (1 FOR EACH POLE) + 1 CENTRAL DOME + 64 PERIMETRAL POLES (H=4m). THE KING POLES SURRECT THE TENT BY THE 4 BASKETS AND THE CENTRAL DOME BY CABLE. THE TENT IS ALSO SURRECTED ALONG THE PERIMETER BY THE PERIMETRAL POLES. THE KING POLES ARE MAINTAINED IN THEIR POSITION BY 8 CABLES. EACH POLES ON THE PERIMETER IS ALSO STABILIZED BY CABLE. THE PRESTRESS OF THE TENT IS DONE BY ALL THE CABLES ON THE PERIMETER. IT IS DIFFICULT TO SAY THE EXACT VALUE, SO WE ASSUMED ON THE SAFETY SITE A VALUE OF 0.50KN/M.

As mentioned above, we struggle to understand the drawings and the terminologies. Could not find the 64 perimetral poles bit and the drawings do not articulate the structural configuration well.

- iii) Consequently, load paths are unclear. SEE ii)

What are the lateral and gravity systems?

- iv) No mention of where/when the structure will be erected. This is important for snow and wind loadings. SEE MAXIMAL LOADS AT PAG. 6

I read $Q_{wind} = 1.4 \text{ kPa}$ and $C_p = 0.3$ but there is no justification on how these were reached and how this C_p is different from the C_{pe}/C_{pi} in 1170.2

- v) Wind actions analysis is unclear and the FEM Analysis does not take into account positive/negative wind pressures, especially with the apparent presence of an opening at the top of the building. THE STRUCTURE IS CALCULATED ONLY FOR THE WORST SITUATION (WIND IN PRESSURE). ALL THE VERIFICATION WITH WIND CONSIDER THE TENT CLOSE. BY STRONG WIND THE TENT SHOULD BE CLOSED! THERE IS NO OPENING ON THE TOP.

Again, it is unclear what pages 10 + 11 are governed by. We would like to see how the 'worst situation' is reached.

- vi) Geometric and material characteristics of lattice structure and pole are unclear MATERIAL IS DESCRIBED AT PAG 5 (Steel S235-Fe360) and GEOMETRY+MATERIAL ARE DESCRIBED IN THE DRAWINGS AT PAGES 41+42

We do not have Page 42. And where are all these steel fabricated from?

- vii) Working life of structure/parts should be taken into consideration for phenomena such as fatigue and replacement times needs to be stated. This is important as the 'design working life' of the superstructure has been changed from 'less than 6 months' to '5 years' now. WE HAVEN'T CONSIDERED THE FATIGUE BECAUSE THE ONLY IMPOSED LOADS IS WIND AND NORMALLY FATIGUE VERIFICATION ARE NOT REQUESTED FOR WIND (FATIGUE CAN BE IMPORTANT FOR A BRIDGE, WHERE YOU HAVE $10E6$ OF CICLES OF imposed loads/no loads). THE STRUCTURE NEEDS MANUTENTION AND A CECK THAT THE

STRUCTURAL ELEMENTS ARE OK AT EVERY MONTAGE/DEMONTAGE, see pag. 26. FOR SURE THE DESIGN WORKING LIFE OF ALL THE STRUCTURE IS > 5 YEARS, BUT A CECK SHOULD BE DONE AT EVERY MONTAGE/DEMONTAGE.

Noted

- viii) Material specifications should be presented. MATERIAL IS DESCRIBED AT PAG 5 (Steel S235-Fe360) AND IN EACH DRAWING

They are in Italian

- ix) Drawings submitted are shop drawings only, not Issued For Construction (IFC) drawings. THE DRAWINGS FROM PAGE 27 TO 41 ARE ALL THE DRAWINGS SUBMITTED FROM THE MANUFACTURER (ANCESCHI).

Noted

Substructure (below-ground) Calculations:

- i) It is not clear how many guy ropes there are in total. Also unclear how many pegs in total. There is an error in our terminology. It should say the number of guy ropes not number of pegs. This has been revised on page 3.

Unclear how you have arrived to 72 ropes as there are 64 surrounding poles and 4 king poles, cannot find useful information in the drawings. Also, how are ropes for king poles different from the ropes for the surrounding poles?

- ii) Wind uplift per peg is calculated based on 72 pegs for the 4-peg and 6-peg configuration. This results in equal uplift per peg for both configurations. I would have thought the uplift per peg decreases as the number of peg increases. Your question here is not clear. Hopefully this statement will help:

There is 72 guy ropes for the 4 to 6 peg configurations. The number of guy ropes will be constant. If the number of pegs is increased, the uplift force on each peg would decrease too. See page 3 when adding more.

See (i)

- iii) Redco assumed 'soft soils' as having adhesion of 10 – 33 kPa but calculated the 'most critical' case as 17.32kPa. This needs more explanation? This has been revised and explained in the summary page.

Redco believes that the Circus marquee should **not** be constructed on sand/silt clay. The Circus marquee can only be constructed on "Good Ground" in terms of NZS3604 and this is covered by our PS1.

If tent is to be constructed on ground that does not meet this requirement, it will require specific testing and redesign and is outside the scope of this design.

You mentioned in Note #11 of 'Summary and Recommendations' page that the marquee is not to be constructed on sand/cohesionless ground, which means silt/clay is encouraged. However, you mentioned here that it should not be constructed on sand/silt clay. It is confusing and conflicting. We would prefer testing done beforehand.

- iv) The peg's lateral capacity formula was calculated using Broms method but the equation used is different from Broms (1964)

It is still a valid formula that is used in structural calculations when you know the depth but do not know the horizontal capacity of the force created by the pile.

Is there literature supporting this?

v) Like superstructure, the wind analysis is insufficient and unclear
This has been designed in accordance to AS/NZS 1170 and calculated on the page 2. Could you please explain what it is that is unclear and insufficient?

It is unclear how you have arrived to M_z cat = 0.89 as the circus locations are not stated. Also, in page 3, it is unclear how you arrive to ultimate $p_z = 0.91\text{kPa}$ and how $C_p = 0.9$. Unclear how the 'worst case' is reached.

vi) Previous correspondence mentioned that king posts will take the lateral loading and transfer it to the foundation. There are no sufficient details of the foundation mentioned and no foundation-related calculations
The lateral load will be transferred from the king posts by the ropes which will transfer in turn to the foundation (pegs). See page 3 for calculations of each peg in shear, tension and combination of the two forces.

Do you mean wind (lateral load) -> king post -> guy ropes -> pegs?

vii) 'Good ground' definition in NZS 3604:2011 excludes potentially compressible ground (i.e. soft soils) such as clay. The 'good ground' assumption is used in this design even for soft soils
This has been revised and we have restricted the design to "Good Ground" in accordance to NZS 3604.

33kPa was used as the most critical case, is there any literature supporting this?

viii) Pictures/photos of steel plate for guy-pegs are different from the sketch"
We have not received any photos, so please send us the photos that you are referring too.

However, please refer to the sketch only as we received it from the steel manufacturer in New Zealand that James Finlayson was dealing with and will be used on site for construction.

Noted

ix) Is there any test data to verify strength of pegs?
Please refer to page 4 of the calculations.

Page 4 does not verify the strength of pegs. We would like to view the performance of the 45mm-diameter 1.4m-long pegs

Kind regards

Darrel Cheong
GRADUATE ENGINEER

Building System Performance Branch, Infrastructure and Resource Markets Group
Ministry of Business, Innovation & Employment

Darrel.Cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527
Level 10, 33 Bowen St, PO Box 1473, Wellington

From: Shaun Shabbot [mailto:shauns@redco.co.nz]
Sent: Monday, 28 July 2014 11:05 a.m.
To: Shaun Shabbot; Darrel Cheong
Cc: James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green; arnop@redco.co.nz
Subject: RE: Zirka Circus

Darrel,

We are still waiting for your reply

My principle engineer would like to come and meet you in Wellington next week. We would appreciate an email with your concerns so we can prepare ourselves for anything that requires to be covered.

We would like to finalize everything in that meeting,

Regards

Shaun Shabbot
Design Engineer, BEng



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Auckland 2016
www.redco.co.nz

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From: Shaun Shabbot [mailto:shauns@redco.co.nz]
Sent: Tuesday, 22 July 2014 10:44 a.m.
To: 'Darrel Cheong'
Cc: 'James Finlayson'; Athir Mansoor; Graham Rundle; Chrissie Green; 'studio@studioardolino.it'; 'arnop@redco.co.nz'
Subject: RE: Zirka Circus

Darrel,

As stated on Friday via phone, I have spoken to my principle (Graham Rundle) to come and have a meeting with you in the next couple of weeks.

If you can email your concerns so I can give him all the documentations, so he will be able to prepare anything that has not been already covered.

Regards

Shaun Shabbot
Design Engineer, BEng



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From: Darrel Cheong [<mailto:Darrel.Cheong@mbie.govt.nz>]
Sent: Wednesday, 2 July 2014 4:32 p.m.
To: Shaun Shabbot
Cc: James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green; studio@studioardolino.it
Subject: RE: Zirka Circus

Still aren't working unfortunately.

From: Shaun Shabbot [<mailto:shauns@redco.co.nz>]
Sent: Wednesday, 2 July 2014 4:13 p.m.
To: Darrel Cheong
Cc: Murray Usmar; James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green; studio@studioardolino.it
Subject: RE: Zirka Circus

Darrel,

Attached are the emails again. Hope they work this time.

Regards

Shaun Shabbot
Design Engineer, BEng



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Auckland 2016
www.redco.co.nz

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From: Darrel Cheong [<mailto:Darrel.Cheong@mbie.govt.nz>]
Sent: Wednesday, 2 July 2014 4:06 p.m.
To: shauns@redco.co.nz
Cc: Murray Usmar; James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green; studio@studioardolino.it
Subject: FW: Zirka Circus

Shaun

Thanks for getting back to us on this. However, have you checked these attachments that you sent twice? They seem indecipherable/corrupt to me.

Hope you can enlighten us ASAP so that we can get this finished.

Kind regards

Darrel Cheong
GRADUATE ENGINEER
Building System Performance Branch, Infrastructure and Resource Markets Group
Ministry of Business, Innovation & Employment

Darrel.Cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527
Level 10, 33 Bowen St, PO Box 1473, Wellington

From: Shaun Shabbot [mailto:shauns@redco.co.nz]

Sent: Wednesday, 2 July 2014 1:09 p.m.

To: Darrel Cheong

Cc: Murray Usmar; James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green; studio@studioardolino.it

Subject: RE: Zirka Circus

Darrel,

Please ignore previous email.

I have contacted the structural engineer from Italy to help answer the questions about his super structure. This is attached in the email.

Also the operator's and maintenance booklet of Zirka Circus.

From our end:

Substructure (below-ground) Calculations:

i) It is not clear how many guy ropes there are in total. Also unclear how many pegs in total. There is an error in our terminology. It should say the number of guy ropes not number of pegs. This has been revised on page 3.

ii) Wind uplift per peg is calculated based on 72 pegs for the 4-peg and 6-peg configuration. This results in equal uplift per peg for both configurations. I would have thought the uplift per peg decreases as the number of peg increases. Your question here is not clear. Hopefully this statement will help:

There is 72 guy ropes for the 4 to 6 peg configurations. The number of guy ropes will be constant. If the number of pegs is increased, the uplift force on each peg would decrease too. See page 3 when adding more

iii) Redco assumed 'soft soils' as having adhesion of 10 – 33 kPa but calculated the 'most critical' case as 17.32kPa. This needs more explanation? This has been revised and explained in the summary page.

Redco believes that the Circus marquee should **not** be constructed on sand/silt clay. The Circus marquee can only be constructed on "Good Ground" in terms of NZS3604 and this is covered by our PS1.

If tent is to be constructed on ground that does not meet this requirement, it will require specific testing and redesign and is outside the scope of this design.

iv) The peg's lateral capacity formula was calculated using Broms method but the equation used is different from Broms (1964). It is still a valid formula that is used in structural calculations when you know the depth but do not know the horizontal capacity of the force created by the pile.

v) Like superstructure, the wind analysis is insufficient and unclear. This has been designed in accordance to AS/NZS 1170 and calculated on the page 2. Could you please explain what it is that is unclear and insufficient?

vi) Previous correspondence mentioned that king posts will take the lateral loading and transfer it to the foundation. There are no sufficient details of the foundation mentioned and no foundation-related calculations. The lateral load will be transferred from the king posts by the ropes which will transfer in turn to the foundation (pegs). See page 3 for calculations of each peg in shear, tension and combination of the two forces.

vii) 'Good ground' definition in NZS 3604:2011 excludes potentially compressible ground (i.e. soft soils) such as clay. The 'good ground' assumption is used in this design even for soft soils
This has been revised and we have restricted the design to "Good Ground" in accordance to NZS 3604.

viii) Pictures/photos of steel plate for guy-pegs are different from the sketch"
We have not received any photos, so please send us the photos that you are referring too.

However, please refer to the sketch only as we received it from the steel manufacturer in New Zealand that James Finlayson was dealing with and will be used on site for construction.

ix) Is there any test data to verify strength of pegs?
Please refer to page 4 of the calculations.

Regards

Shaun Shabbot
Design Engineer, BEng



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From: Darrel Cheong [<mailto:Darrel.Cheong@mbie.govt.nz>]
Sent: Friday, 9 May 2014 5:47 p.m.
To: Shaun Shabbot
Cc: Murray Usmar; James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green
Subject: RE: Zirka Circus

Jeni / Athir / Shaun

There are still outstanding issues which have not been addressed in your submission which was revised several times:

Superstructure (above-ground) Calculations:

- i) The superstructure calculations are done according to Eurocode 3 and they are in Italian/German language. On top of that, it is difficult to follow or understand the sequence of calculations presented. If you submit a design done overseas, it is important that drawings or calculations are translated to NZ conditions/context and they should clearly articulate assumptions/justifications made in calculations.
- ii) Structural configuration is insufficiently described; there is a lack of clarity regarding what the main structural elements are and where they are present. Details of many parts of structures are not found. For example, what is the nature of the pre-stress and how will it be implemented?
- iii) Consequently, load paths are unclear.
- iv) No mention of where/when the structure will be erected. This is important for snow and wind loadings
- v) Wind actions analysis is unclear and the FEM Analysis does not take into account positive/negative wind pressures, especially with the apparent presence of an opening at the top of the building
- vi) Geometric and material characteristics of lattice structure and pole are unclear

- vii) Working life of structure/parts should be taken into consideration for phenomena such as fatigue and replacement times needs to be stated. This is important as the 'design working life' of the superstructure has been changed from 'less than 6 months' to '5 years' now.
- viii) Material specifications should be presented.
- ix) Drawings submitted are shop drawings only, not Issued For Construction (IFC) drawings.

Substructure (below-ground) Calculations:

- x) It is not clear how many guy ropes there are in total. Also unclear how many pegs in total
- xi) Wind uplift per peg is calculated based on 72 pegs for the 4-peg and 6-peg configuration. This results in equal uplift per peg for both configurations. I would have thought the uplift per peg decreases as the number of peg increases
- xii) Redco assumed 'soft soils' as having adhesion of 10 – 33 kPa but calculated the 'most critical' case as 17.32kPa. This needs more explanation?
- xiii) The peg's lateral capacity formula was calculated using Broms method but the equation used is different from Broms (1964)
- xiv) Like superstructure, the wind analysis is insufficient and unclear
- xv) Previous correspondence mentioned that king posts will take the lateral loading and transfer it to the foundation. There are no sufficient details of the foundation mentioned and no foundation-related calculations
- xvi) 'Good ground' definition in NZS 3604:2011 excludes potentially compressible ground (i.e. soft soils) such as clay. The 'good ground' assumption is used in this design even for soft soils
- xvii) Pictures/photos of steel plate for guy-pegs are different from the sketch"
- xviii) Is there any test data to verify strength of pegs?

Thanks.

Kind regards

Darrel Cheong

GRADUATE ENGINEER

Building System Performance Branch, Infrastructure and Resource Markets
Ministry of Business, Innovation & Employment

Darrel.Cheong@mbie.govt.nz | Telephone: +64 (4) 901 8527
Level 10, 33 Bowen St, PO Box 1473, Wellington

From: Shaun Shabbot [<mailto:shauns@redco.co.nz>]

Sent: Tuesday, 29 April 2014 11:44 a.m.

To: Darrel Cheong

Cc: Murray Usmar; James Finlayson; Athir Mansoor; Graham Rundle; Chrissie Green

Subject: Zirka Circus

Darrel,

No word from you in regards to Zirka Circus job, Can you please confirm the status.

Regards

Shaun Shabbot
Design Engineer, BEng



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Out of Scope

From: Debbie Scott [mailto:debbie@onfire.co.nz]
Sent: Friday, 22 May 2015 6:22 p.m.
To: Murray Usmar; John Gardiner
Cc: Mell Quigley
Subject: Zirka Circus

Hi Murray and John

As discussed with you this evening I think it would be good to clarify your email to Hastings District Council with respect to the fire design for Zirka Circus that was submitted in 2013 for a Multiproof Consent. I believe it would be fair to say that the fire design complies with C1-C6 as was considered necessary by the stakeholders for a temporary circus tent structure.

The fire engineering design was undertaken to an old version of C/VM2 - it was a current version at the time.

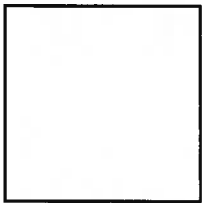
The fire engineering design was undertaken following a fire engineering brief (FEB) meeting with stakeholders from OnFire Consulting, MBIE, Zirka Circus, NZFS Engineering Unit and Engineering Operations. The circus tent could not be made to fully comply with C1-C6 using the Verification Method C/VM2 given the type of structure, temporary nature and number of people. Therefore a number of agreements were made to enable the fire design to proceed.

The fire design was completed with the above agreements and sent to MBIE as part of the Multiproof application. I understand that the fire design was accepted and signed off by MBIE however the multiproof process then stalled ^{s.9(2)(a)}

I understand that Zirka are continuing to use the fire design to submit to various Councils and therefore I am understandably receiving a number of queries from various Councils when they apply for Building Consent. I have told Zirka they need to complete their multiproof application as they will continue to get these problems given other Councils were not party to the agreements made by the stakeholders and the design was also undertaken to an old version of C/VM2 which is now not applicable for new Consent applications.

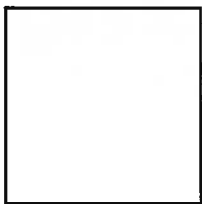
I hope this helps.

Thanks and Kind Regards
Debbie



Debbie Scott
Principal Fire Engineer
BE Hons, ME Dist. (Fire), FIPENZ, CPEng, IntPE(NZ), PMSFPE

OnFire is celebrating 10 years in Business this month!



OnFire Consulting Limited
Suite 3.4, Axis Building
91 St Georges Bay Road
Parnell, Auckland 1052

477 Alexandra Street
PO Box 226
Te Awamutu 5840

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Ms S(2)(a)
www.onfire.co.nz
Waikato, Auckland & Bay of Plenty

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Out of Scope

From: Debbie Scott [mailto:debbie@onfire.co.nz]

Sent: Monday, 25 May 2015 9:27 a.m.

To: jeni@zirkacircus.com; Alan Moule; John Gardiner; Murray Usmar; naomi@zirkacircus.com

Subject: Zirka PS1

Hi All

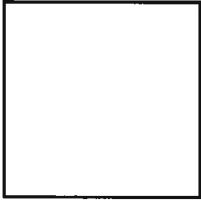
I'm back in the office and have gone through the Zirka file. Here is the PS1 from the file.

The PS1 is different from your average PS1 given there is no address and the design was done to C/VM2 with modifications and agreements by stakeholders given the special situation of this being a circus tent of temporary nature in many towns and cities in NZ.

Hopefully this helps the situation. I understand there was some talk about me not giving a PS1 which is not correct. I was out of the office till late last week and then the last I heard it was going for peer review and therefore the issues were larger than just providing a PS1 and the PS1 was therefore not as necessary. Apologies if I got this wrong.

Kind Regards

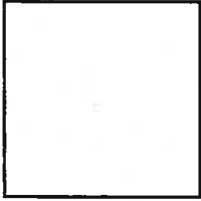
Debbie



Debbie Scott

Principal Fire Engineer
BE Hons, ME Dist. (Fire), FIPENZ, CPEng, IntPE(NZ), PMSFPE

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PRODUCER STATEMENT - PS1 - DESIGN

(Guidance notes on the use of this form are printed on the reverse side*)

ISSUED BY: OnFire Consulting Ltd (Design Firm)
TO: Zirka Circus (Owner/Developer)
TO BE SUPPLIED TO: various BCA's in New Zealand (Building Consent Authority)
IN RESPECT OF: Fire engineering for circus tent (Description of Building Work)
AT: various locations throughout New Zealand (Address)
LOT: 11

We have been engaged by the owner/developer referred to above to provide Fire Engineering services in accordance with the requirements of Clause(s) C1-C6 of the Building Code for All or Part only (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:
[] Compliance Documents issued by Department of Building & Housing
[] Alternative solution as per the attached schedule. modified as agreed to by NZFS and MBIE agreed by stakeholders

The proposed building work covered by this producer statement is described on the drawings titled Fire Report - Zirka Circus and numbered number 1942 dated 21/8/13 together with the specification and attachments set together with the schedule attached to this statement.

On behalf of the Design Firm subject to:
(i) Site verification of the following design assumptions: N/A
(ii) All proposed products meeting the specification requirements;

I believe on the grounds that the building constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code.
I, Debbie Scott am: [] CPEng 2.10.6.54 # [] Reg Arch #

On behalf of: [] NZIA and hold the following qualifications: BE (Hons), ME Dist (Fire)

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*. The Design Firm is a member of ACENZ YES NO

SIGNED BY: Debbie Scott ON BEHALF OF OnFire Consulting (Design Firm)
Date: 22/8/13 (signature)

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000*.

This form is to accompany Form 2 of the Building (Forms) Regulations 2004 for the application of a Building Consent.

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1992. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suite of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design	Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement establishing reasonable grounds to issue a Building Consent;
PS2 Design Review	Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's statement as a basis for establishing reasonable grounds to issue a Building Consent;
PS3 Construction	Forms commonly used as a certificate of compliance with building work under NZS 3910:2003 ¹ or Schedules E1/E2 of the Building Act ² ;
PS4 Construction Review	Intended for use by a suitably qualified design professional (P/CA) who undertakes construction monitoring of the building work where the BCA requires a producer statement prior to issuing a Code Compliance Certificate. This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Professional who has undertaken a contract of services for the design and construction of building work, and is signed by a person authorised to verify the processes within the firm. The Design Professional must be a suitably qualified independent design professional (P/CA) who is registered on a competence-based register, either as a Chartered Engineer, Registered Architect or Registered Professional Engineer. The Design Professional must be a member of the Institution of Professional Engineers New Zealand (IPENZ), the New Zealand Institute of Architects (NZIA) or the Chartered Professional Engineers New Zealand (CPEANZ). The Design Professional must be a member of the Institution of Professional Engineers New Zealand (IPENZ), the New Zealand Institute of Architects (NZIA) or the Chartered Professional Engineers New Zealand (CPEANZ).

A competent design professional is one who has a suitable qualification and proven competence in the design and construction of building work. The Design Professional must be a member of the Institution of Professional Engineers New Zealand (IPENZ), the New Zealand Institute of Architects (NZIA) or the Chartered Professional Engineers New Zealand (CPEANZ). The Design Professional must be a member of the Institution of Professional Engineers New Zealand (IPENZ), the New Zealand Institute of Architects (NZIA) or the Chartered Professional Engineers New Zealand (CPEANZ).

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ), the New Zealand Institute of Architects (NZIA) or the Chartered Professional Engineers New Zealand (CPEANZ), provides additional assurance of the design professional's competence. The Design Professional must be a member of the Institution of Professional Engineers New Zealand (IPENZ), the New Zealand Institute of Architects (NZIA) or the Chartered Professional Engineers New Zealand (CPEANZ).

Persons or firms providing design services must satisfy the term "suitably qualified independent design professional".

* Professional Registration / Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Construction Phase
The Design Professional must be a suitably qualified independent design professional (P/CA) who is registered on a competence-based register, either as a Chartered Engineer, Registered Architect or Registered Professional Engineer. The Design Professional must be a member of the Institution of Professional Engineers New Zealand (IPENZ), the New Zealand Institute of Architects (NZIA) or the Chartered Professional Engineers New Zealand (CPEANZ).

How to provide Producer Statement PS4

Building Consent Authorities should ensure that the Design Firm is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

- 1 *Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2003*
- 2 *NZIA Standard Conditions of Contract SCC 2007 (1st edition)*
- 3 *Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)*

www.acenz.org.nz
www.ipenz.org.nz
www.nzia.co.nz



Out of Scope

From: Jeni Hou [mailto:jeni@zirkacircus.com]
Sent: Tuesday, 26 May 2015 12:49 a.m.
To: Michael Skelton (michaels@hdc.govt.nz)
Cc: Murray Usmar; John Gardiner; brettc@hdc.govt.nz
Subject: Re: Hastings DC exemption for the Zirka Circus Marquee [UNCLASSIFIED]

Hi Michael,

Please find the following answers to the last two inquiries you might want us to clarify according to the email from John.

1). You may wish to know what procedures Zirka follow to establish correct assembly as well as making sure any components that have been damaged or worn in earlier erection and disassembly are identified and replaced if needed

The Zirka Marquee is erected by a trained crew under the supervision of Zirka Tent Manager Kevin Qiao, who has been in charge of erecting circus marquee since 2007 while he was working for the previous NZ touring circus – Weber Brother Circus. Kevin also checks all the components of the marquee carefully before each erection.

ALL RIGGING, SHACKLES, PEGS, FITTINGS and FASTENINGS were supplied with the tent, by the manufacturer, to their specifications. If any of them being damaged or worn, they will be replaced to the same specs, by our rigging company, Shaws Wire Ropes, of Cambridge. All fittings and shackles are standard, off the shelf and safety rated.

We have not altered or modified anything on the tent.

We have never had any issues whatsoever with the structure or indeed public safety. It is simply not in our interests to risk either the safety of our audience, our staff, our reputation, or indeed our massive investment in the equipment.

2). The design as submitted was for a design maximum wind speed of 120 kph (which is a very strong wind and the European design standard) but you may wish to know what procedures Zirka have in place to monitor the wind speed and evacuate if necessary.

We constantly monitor Met Service through internet and text alerts for weather warnings.

We keep a high quality anemometer on site at all times. The reality is that the tent cannot be erected if the wind is in excess of 30km/h (8m/s). It only meets its wind rating when fully erect, tensioned, and closed. We are therefore very cautious about wind strength, for safety of staff and equipment.

Once the tent is up and secured with sidewalls in place, it is rated for 120km/h.

We have also instituted a company policy that we won't run a show if the wind is in excess of 90km/h.

Hope these clarified your might be questions and we can move forward. Looking forward to receiving the approval from you in the morning, then will give us time to move onto site and start to setting up to be able to show on Thursday (to be honest, we are pretty tight with setting up time already).

Kind Regards

Jeni

Jeni Hou
Managing Director
Flaming Phoenix Entertainment Ltd (Zirka Circus)
Ph: s 9(2)(a)
<http://www.zirkacircus.com>

Please Note:
New Address:

P. O. Box 28093
Rototuna
Hamilton 3256

On Mon, May 25, 2015 at 5:26 PM, John Gardiner <John.Gardiner@mbie.govt.nz> wrote:

To: Building Regulatory Manager, Hasting District Council

Note: Regarding the granting of an exemption under “2 Territorial and regional authority discretionary exemptions” of Schedule 1 of the Building Act 2004

This note has two sections. The first is the Legislative test you are applying and the second is documentation received in the MultiProof application which may be used to support the test Hasting District Council are making.

1 Legislative Test and guidance on its application

The Act says:

2. Territorial and regional authority discretionary exemptions

Any building work in respect of which the territorial authority or regional authority considers that a building consent is not necessary for the purposes of this Act because the authority considers that:

(a) the completed building work is likely to comply with the building code; or

(b) if the completed building work does not comply with the building code, it is unlikely to endanger people or any building, whether on the same land or on other property.

General Guidance provided by MBIE on Schedule 1 which be found at www.building.govt.nz/bc-no-consent

For Exemption 2 the Guidance states

Exemption 2 allows territorial authorities (city or district councils) or regional authorities (regional councils) to use their discretion to exempt any proposed building work from the requirement to obtain a building consent if the territorial or regional authority considers that the circumstances in (a) or (b) of the exemption are met.

This is the only exemption in Schedule 1 which requires a territorial or regional authority to make a decision about any proposed building work. For all the other exemptions, it is up to the owner to decide whether an exemption in Schedule 1 applies.

This exemption can be applied across a wide range of building work. At one end of the scale, the council may choose to exempt simple, low-risk, repetitive-type building work; eg relating to farm buildings, proprietary garages or bus shelters (typically buildings of importance level 1 from Building Code clause A3 – Building importance levels).

At the other end of the scale, the building work could be for complex engineered projects where the construction will be designed and supervised by chartered professional engineers. These might include complex temporary stage and lighting towers, or major infrastructure projects such as motorway tunnels, electrical substations for rail networks or substantial wharf repairs. In these cases, the work is likely to comply, because skilled professionals are doing or supervising the work, and furthermore, council's processing and inspecting procedures would add little value to the overall process.

As a territorial or regional authority:

You should have procedures for making formal decisions under exemption 2 that meet the criteria of subclauses (a) and (b) above.

When determining the likelihood of compliance, we suggest your considerations include:

- any substantial previous demonstration of competence in carrying out similar work by the people who will carry out this work (eg a history of previous building work in the council's district)
- the complexity of the building work relative to the competence of the people who will carry it out, and
- any independent quality assurance systems or checks that will be applied in the course of the work.

In determining the likelihood of endangerment, we suggest your considerations include:

- the location of the building work (eg whether it is high density urban or remote rural), and
- how close it will be to the property boundary and/or other buildings.

In all cases, we recommend that you (the territorial or regional authority) record your decision, the reason for it and the outcome, and place this information on the property file relating to the building work.

Note that the building work does not have to comply with the Building Code, see 2 (b) above. The test is whether it is unlikely to endanger people or any building, whether on the same land or on other property.

2 In regards to the Zirka MultiProof application and use of information provided to support the Clause 2 Test

I confirm that we have an application for a National Multiple-Use Approval (MultiProof) for the design of the Zirka Circus marquee. The process is not complete at this stage,

In respect of the C clauses, I can confirm that Protection from Fire aspect of the Building Code (i.e. the C clauses) has been reviewed and it was concluded that the proposal complies and no further information was sought from the applicant.

The fire design went through the following process prior to it being accepted as being compliant.

The fire engineering design was undertaken following a fire engineering brief (FEB) meeting with stakeholders from OnFire Consulting, MBIE, Zirka Circus, NZFS Engineering Unit and Engineering Operations. The circus tent could not be made to fully comply with C1-C6 using the Verification Method C/VM2 given the type of structure, temporary nature and number of people. Therefore a number of agreements were made to enable the fire design to proceed. The fire design was completed with the above agreements and sent to MBIE as part of the Multiproof application, this was agreed by MBIE

For the B clauses we were not able to conclude as being compliant, because of the documents submitted were German and Italian and related to compliance to European Standards.

As a result an FRI was submitted to the applicants seeking more information, to date these have not been supplied which I understand relates to the MultiProof applicant's widow not being in a position to manage the processes involved with seeking information from her engineer.

However I make the following observations which may be useful for Hastings DC to make their decision:

-You have the PS1 from the Engineer

-You may wish to know what procedures Zirka follow to establish correct assembly as well as making sure any components that have been damaged or worn in earlier erection and disassembly are identified and replaced if needed

-The design as submitted was for a design maximum wind speed of 120 kph (which is a very strong wind and the European design standard) but you may wish to know what procedures Zirka have in place to monitor the wind speed and evacuate if necessary.

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John Gardiner

Manager Determinations and Assurance, Building Systems Performance Branch

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