





ANEXO 2

MEMORIA DE CÁLCULO DEL MÁSTIL

Memoria de cálculo de estructura				
Mástil de medición de recurso eólico				
Cliente	Proyecto	Fecha		
CFI	Mástil 84m	20-06-2018	Rev 0 Página 1 of 3	

MEMORIAS DESCRIPTIVA Y DE CÁLCULO



MÁSTIL ARRIOSTRADO DE 84m PARA MEDICIONES DE POTENCIAL EÓLICO

**SITIO: PARQUE EÓLICO CIUDAD RÍO GALLEGOS
PROVINCIA DE SANTA CRUZ**

CLIENTE: CFI


EDUARDO FALERO
Ingeniero Civil

Editado por:		Revisado por:		Aprobado por:	
Name	Eduardo Falero	Name	Gustavo Agis	Name	
Date	20-06-2018	Date		Date	

Memoria de cálculo de estructura				
Mástil de medición de recurso eólico				
Cliente	Proyecto	Fecha		
CFI	Mástil 84m	20-06-2018	Rev 0 Página 2 of 3	

1. Introducción

Se realizó un análisis estructural de un mástil arriostrado modelo TNX 450 de 84m de altura, a ser instalado en emplazamientos cercanos a la ciudad de Río Gallegos, provincia de Santa Cruz.

El Análisis Tridimensional de la estructura, se realizó para evaluar los niveles de tensiones en los elementos componentes y la capacidad resistente de la misma, para soportar las cargas solicitadas en las condiciones de instalación.

2. Normativa

- **CIRSOC 102 - 2005** – “Reglamento Argentino de Acción del Viento sobre las Construcciones”
- **CIRSOC 306 – 2016** – “Reglamento Argentino de Estructuras de Acero para Antenas”

3. Fundamentos del análisis

Se consideró un análisis no-lineal por métodos computacionales para la determinación del comportamiento de la estructura bajo el sistema de cargas solicitado. El modelo tridimensional de la estructura se creó mediante la utilización del software diseñado para el cálculo de este tipo de estructura.

Las cargas preponderantes en el análisis de una estructura de este tipo corresponden a la carga de viento sobre la estructura, las riendas, y el conjunto de antenas a ser instaladas. Para la determinación de las cargas y los criterios a aplicar correspondientes, se adoptó la CIRSOC 306.

4. Hipótesis consideradas



Según la zona de implantación de las estructuras, la velocidad de viento a considerar según la CIRSOC 102:05 es de 218km/h en una ráfaga de 3 segundos a 10m de altura con probabilidad de que ocurra una vez cada 50 años.

Se admite una velocidad de servicio de 27 m/s para el cálculo de las deformaciones.

A los efectos de adaptar las estructuras a los alrededores, se han considerado los siguientes parámetros de la CIRSOC 306:16,

Clasificación de la estructura:	CLASE I
Categoría de exposición:	C
Categoría topográfica:	1
Velocidad del viento:	218Km/h

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Memoria de cálculo de estructura				
Mástil de medición de recurso eólico				
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CFI	Mástil 84m	20-06-2018	Rev 0 Página 3 of 3	

5. Descripción de la estructura

El mástil es de sección triangular constante con un ancho entre ejes de montantes de 41,8cm.

Los tramos (de dos tipos) están compuestos por montantes en caño de hierro de 1.1/4" SCH40 ($\varnothing_{ext}=42.2\text{mm}$ $e=3.56\text{mm}$ y de 1.1/2" SCH40 ($\varnothing_{ext}=48.3\text{mm}$ $e=3.7\text{mm}$), con diagonales de hierro redondo de $\varnothing 12\text{mm}$ dispuestas en trama tipo "Z" con un paso de diagonal de 42cm en toda su longitud.

Los puntos de anclajes serán 6 (3 interiores y 3 exteriores) dispuestos a 120°.

Los anclajes interiores distarán de la base central 35m, y los exteriores lo harán a una distancia de 65m.

Se utilizarán riendas de acero galvanizado de 7 hilos de 6mm (1/4") EHS con fuerzas de rotura de 3016kgf, y riendas de 7 hilos de 8mm (5/16") EHS con una fuerza a la rotura mínima de 5080kgf, ubicadas de acuerdo al esquema de elevación que se presenta más adelante.

6. Cargas consideradas

La estructura consta de cuatro niveles de soportes de anemómetros y/o veletas, según esquema de elevación presentado en este documento.

7. Calidad de los materiales

Montantes: Tubos y caños estructurales con costura, contruidos en chapa de acero de bajo carbono (Comercial), correspondiente como mínimo a un acero SAE/AISI 1020

$$f_y = 2142 \text{ kgf/cm}^2 \quad f_u = 3876 \text{ kgf/cm}^2$$

Diagonales: Tubos y caños estructurales con costura, contruidos en chapa de acero de bajo carbono (Comercial), correspondiente como mínimo a un acero SAE/AISI 1010

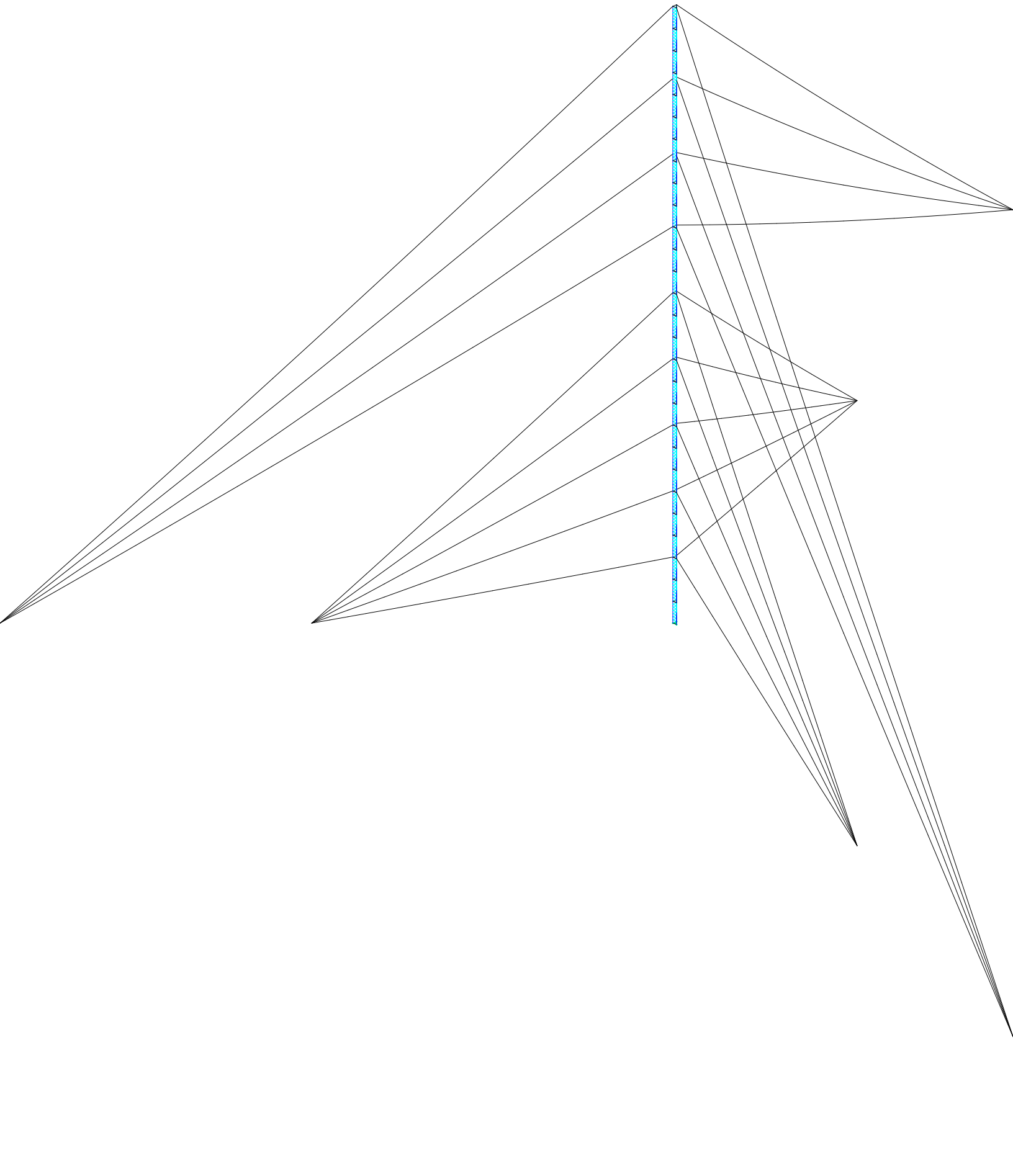
$$f_y = 1835 \text{ kgf/cm}^2 \quad f_u = 3379 \text{ kgf/cm}^2$$

Bulones: Para empalme de tramos, según A325

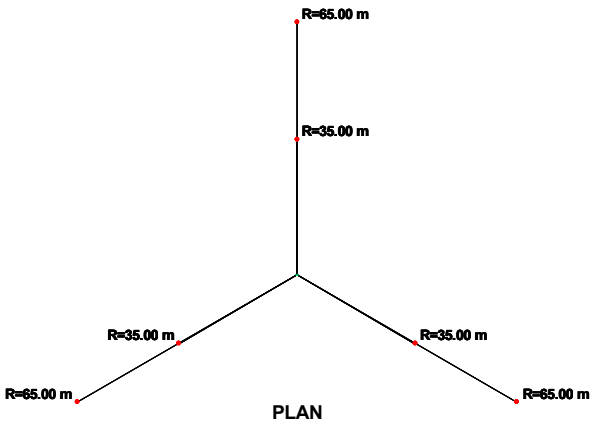
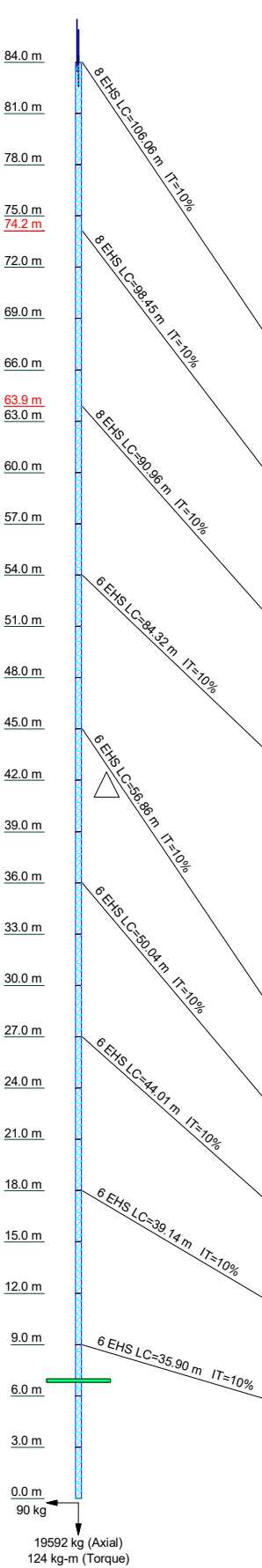
$$f_y = 6526 \text{ kgf/cm}^2 \quad f_u = 8157 \text{ kgf/cm}^2$$

Riendas: De fabricación comercial, con formación 1 x 7 hilos

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Name	Eduardo Falero	Name	Gustavo Agis	Name	
Date	20-06-2018	Date		Date	



Section	T28	T27	T26	T25	T24	T23	T22	T21	T20	T19	T18	T17	T16	T15	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	Caño 1 1/2" SCH40														Caño 1 1/4" sch40													
Leg Grade	SAE1020																											
Diagonals	SR 12mm																											
Diagonal Grade	SAE1010																											
Top Girts	SR 12mm																											
Bottom Girts	SR 12mm																											
Horizontals	SR 12mm																											
Face Width (m)	0.418																											
# Panels @ (m)	200 @ 0.42																											
Weight (kg)	1790.6	67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7



DESIGNED APPURTENANCE LOADING

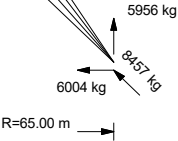
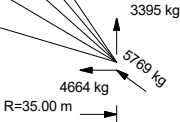
TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 10	85	Soporte anemometro	60
anemometro	85	Soporte anemometro	40
Soporte anemometro	85	anemometro	40
Soporte anemometro	83.5	Paneles	18
veleta	83.5	Paneles	15
anemometro	83.5	Gabinete Data Logger	8.5
Soporte anemometro	83.5	Gabinete de baterias	8
veleta	60	Plataforma trabajo	7
Soporte anemometro	60	Gabinete conexión LAN	1.5
anemometro	60		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
SAE1020	210059 kPa	380106 kPa	SAE1010	180000 kPa	331400 kPa

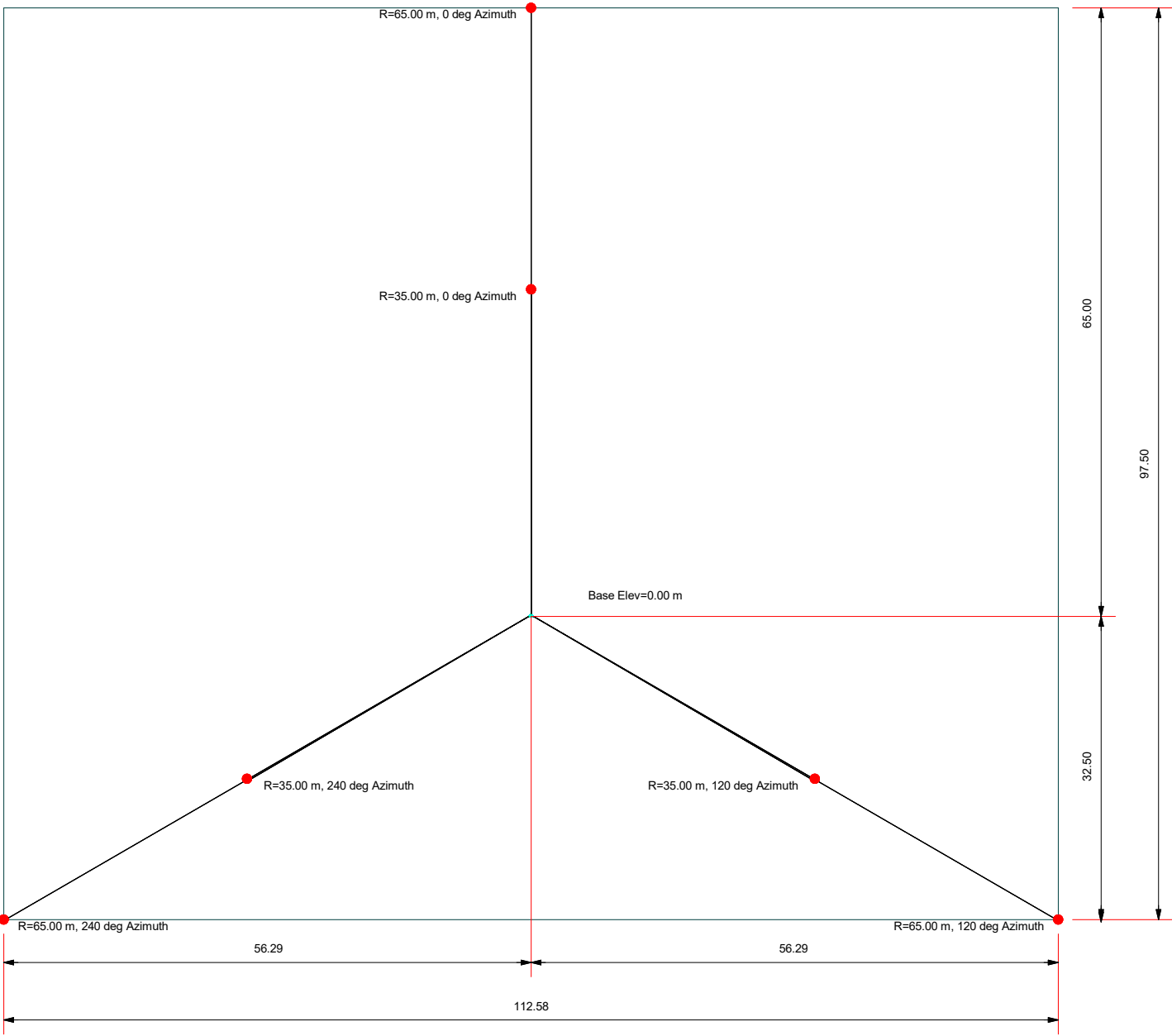
TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 218.0 kph basic wind in accordance with the TIA-222-G Standard.
3. Deflections are based upon a 97.2 kph wind.
4. TOWER RATING: 95.1%



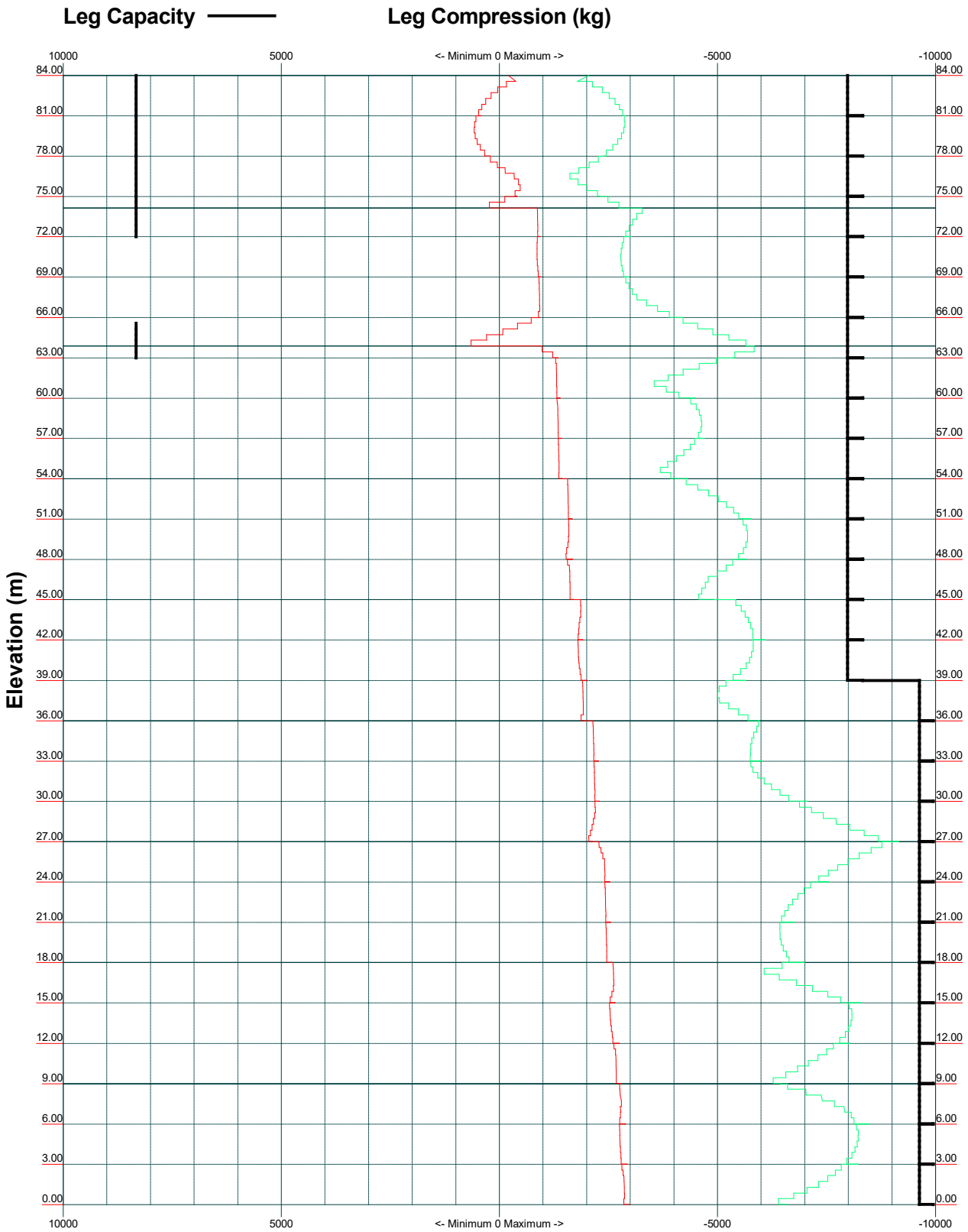
Job:	Cálculo Estructural		
	Project: Mástil Arriostrado H=84m_ Río Gallegos		
	Client: CFI	Drawn by:	App'd:
	Code: TIA-222-G	Date: 06/20/18	Scale: NTS
	Path:		Dwg No. E-1

Plot Plan



Job: Project: Client: Code: Path: Phone: FAX:	Cálculo Estructural		
	Mástil Arriostrado H=84m Río Gallegos		
	CFI	Drawn by:	App'd:
	TIA-222-G	Date: 06/20/18	Scale: NTS
			Dwg No. E-2

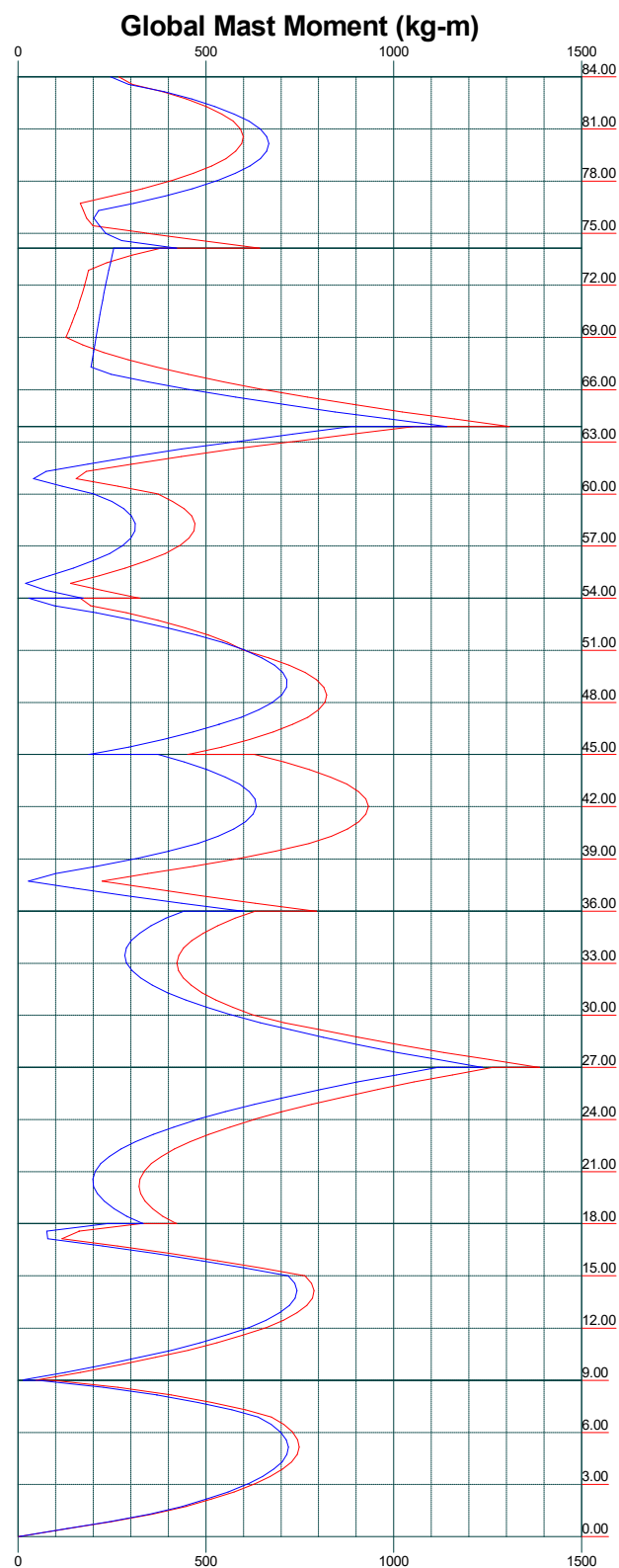
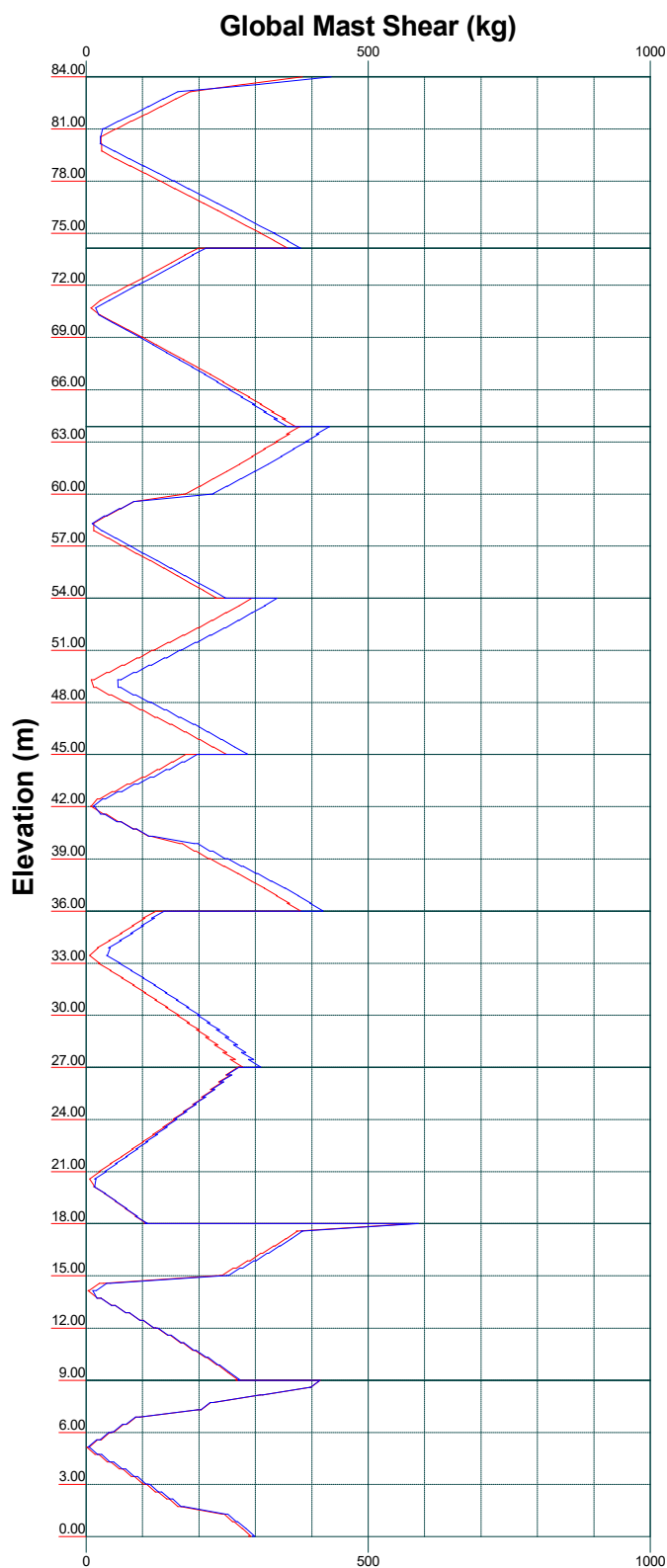
TIA-222-G - 218.0 kph Exposure C



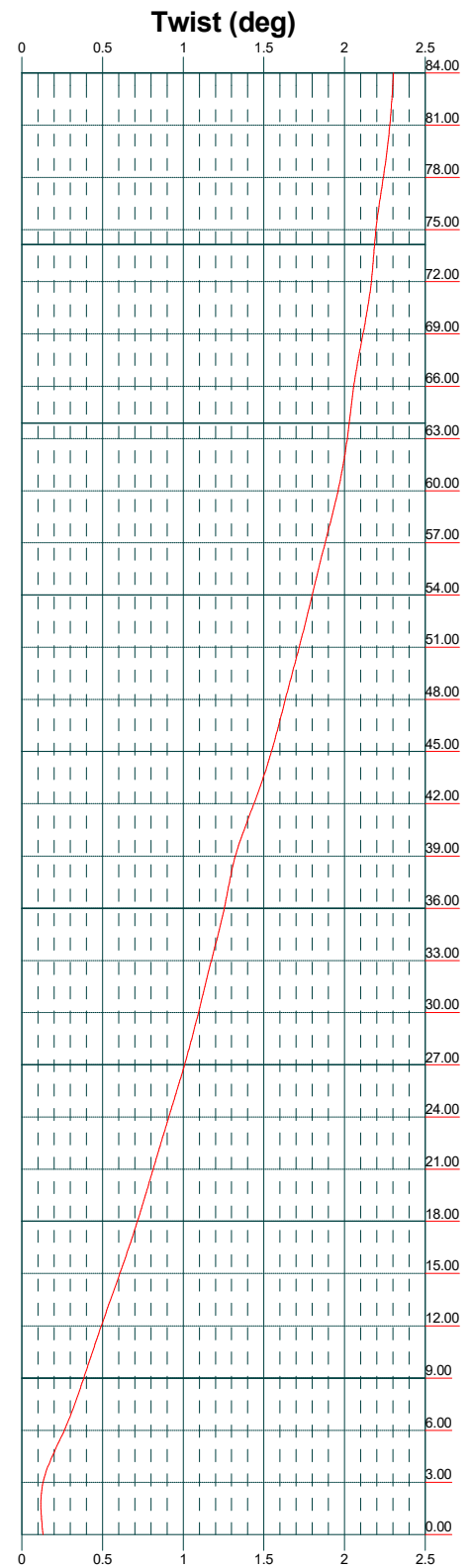
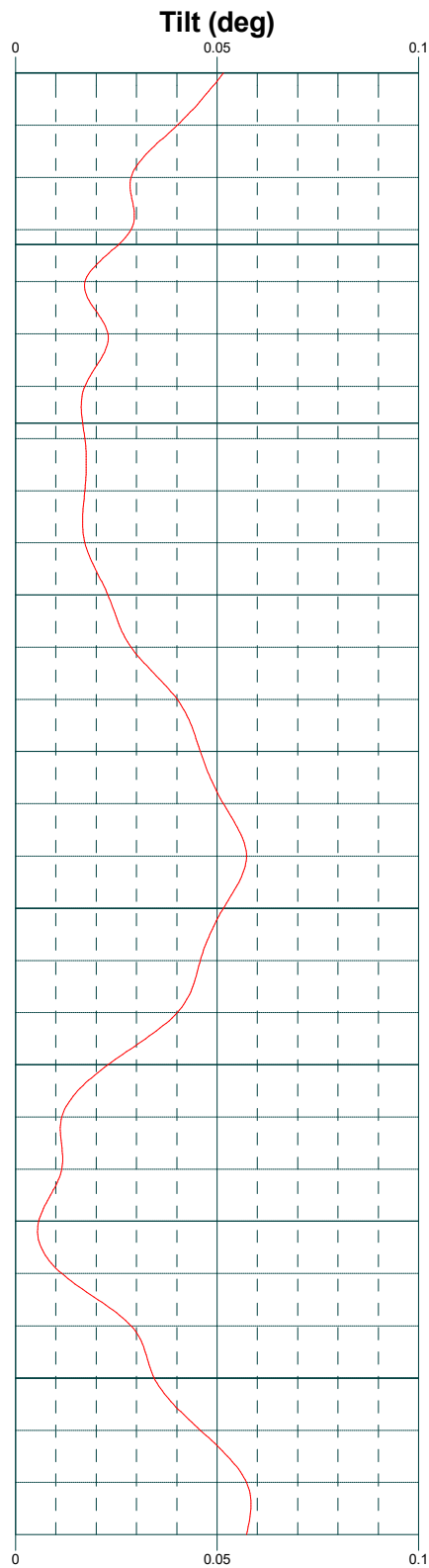
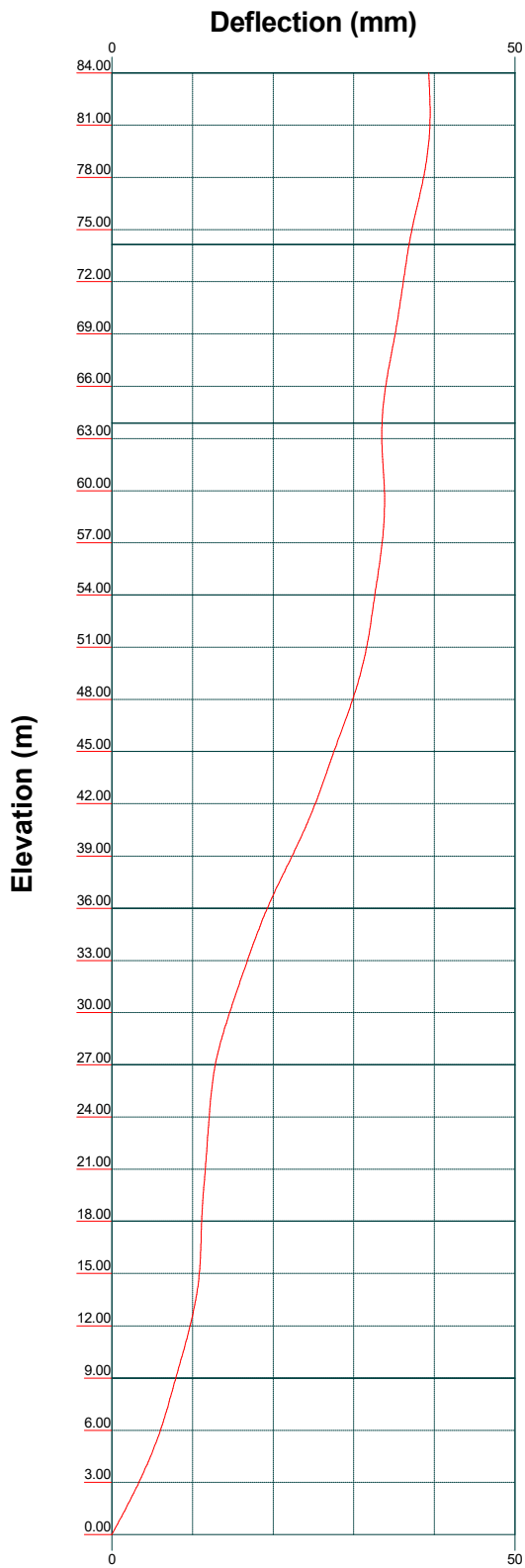
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	Mástil Arriostrado H=84m Río Gallegos		
	CFI	Drawn by:	App'd:
	TIA-222-G	Date: 06/20/18	Scale: NTS
			Dwg No. E-3

Vx Vz

Mx Mz



Phone: FAX:	Job:	Cálculo Estructural		
	Project:	Mástil Arriostado H=84m_Río Gallegos		
	Client:	CFI	Drawn by:	App'd:
	Code:	TIA-222-G	Date:	06/20/18
	Path:	Scale: NTS		
				Dwg No. E-4



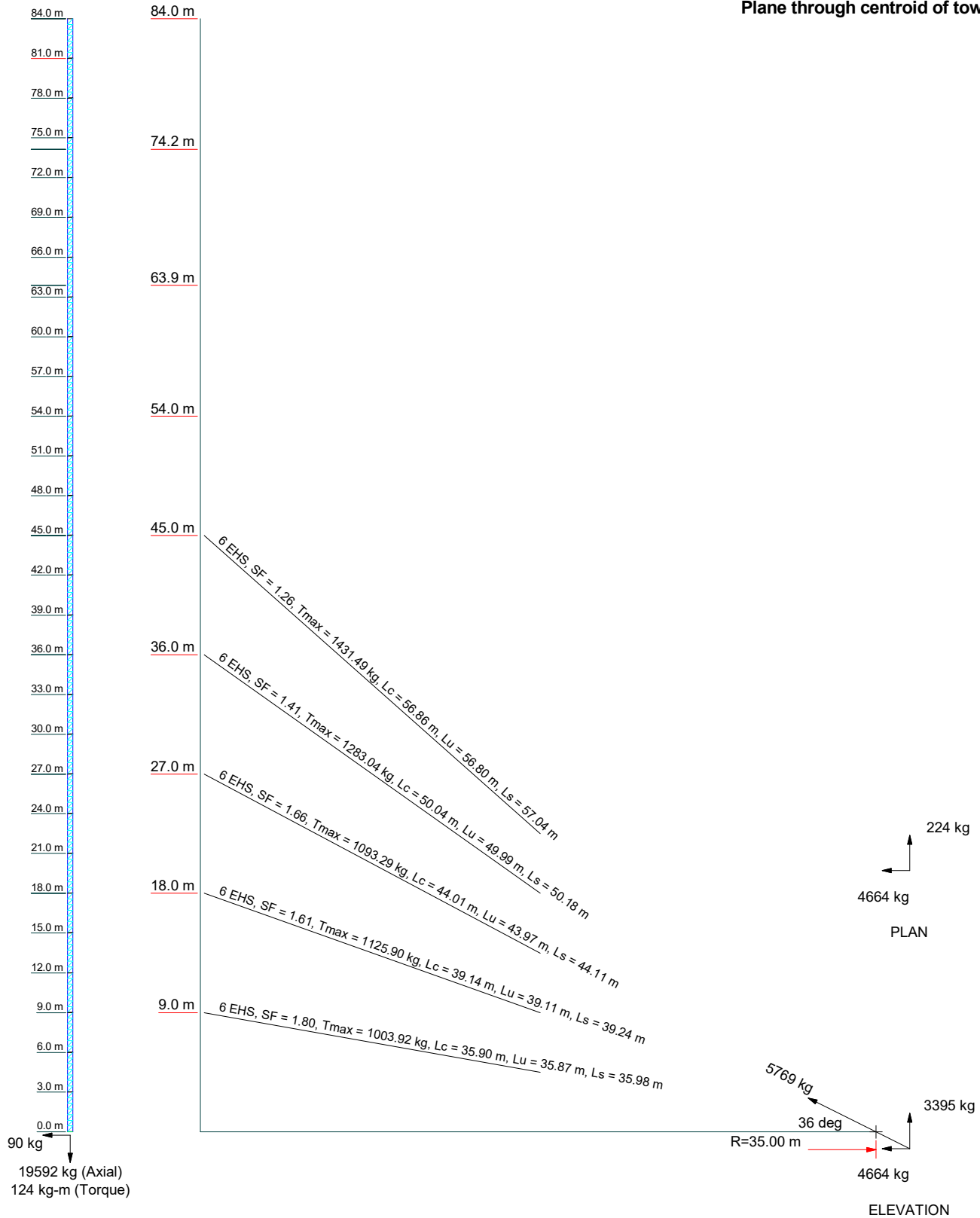
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	Project:	Mástil Arriostrado H=84m_Río Gallegos		
	Client:	CFI	Drawn by:	App'd:
	Code:	TIA-222-G	Date:	06/20/18
	Path:			
			Scale:	NTS
			Dwg No.	E-5

Guy Tensions and Tower Reactions

TIA-222-G - 218.0 kph Exposure C

Maximum Values

Anchor 'A'@35 m Azimuth 0 deg Elev 0 m
Plane through centroid of tower



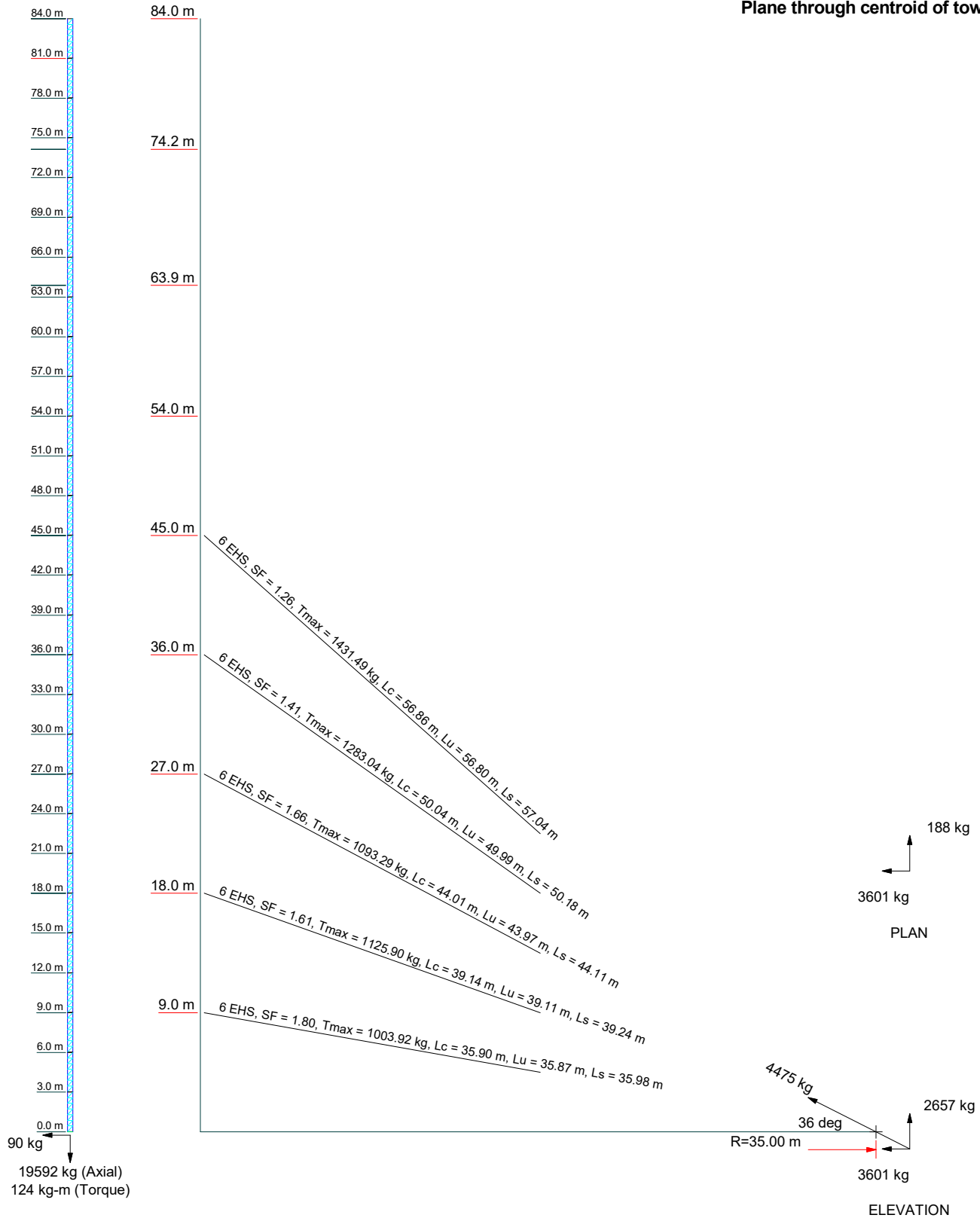
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	Project: Mástil Arriestrado H=84m Río Gallegos		
	Client: CFI	Drawn by:	App'd:
	Code: TIA-222-G	Date: 06/20/18	Scale: NTS
	Path:		Dwg No. E-6

Guy Tensions and Tower Reactions

TIA-222-G - 218.0 kph Exposure C

Maximum Values

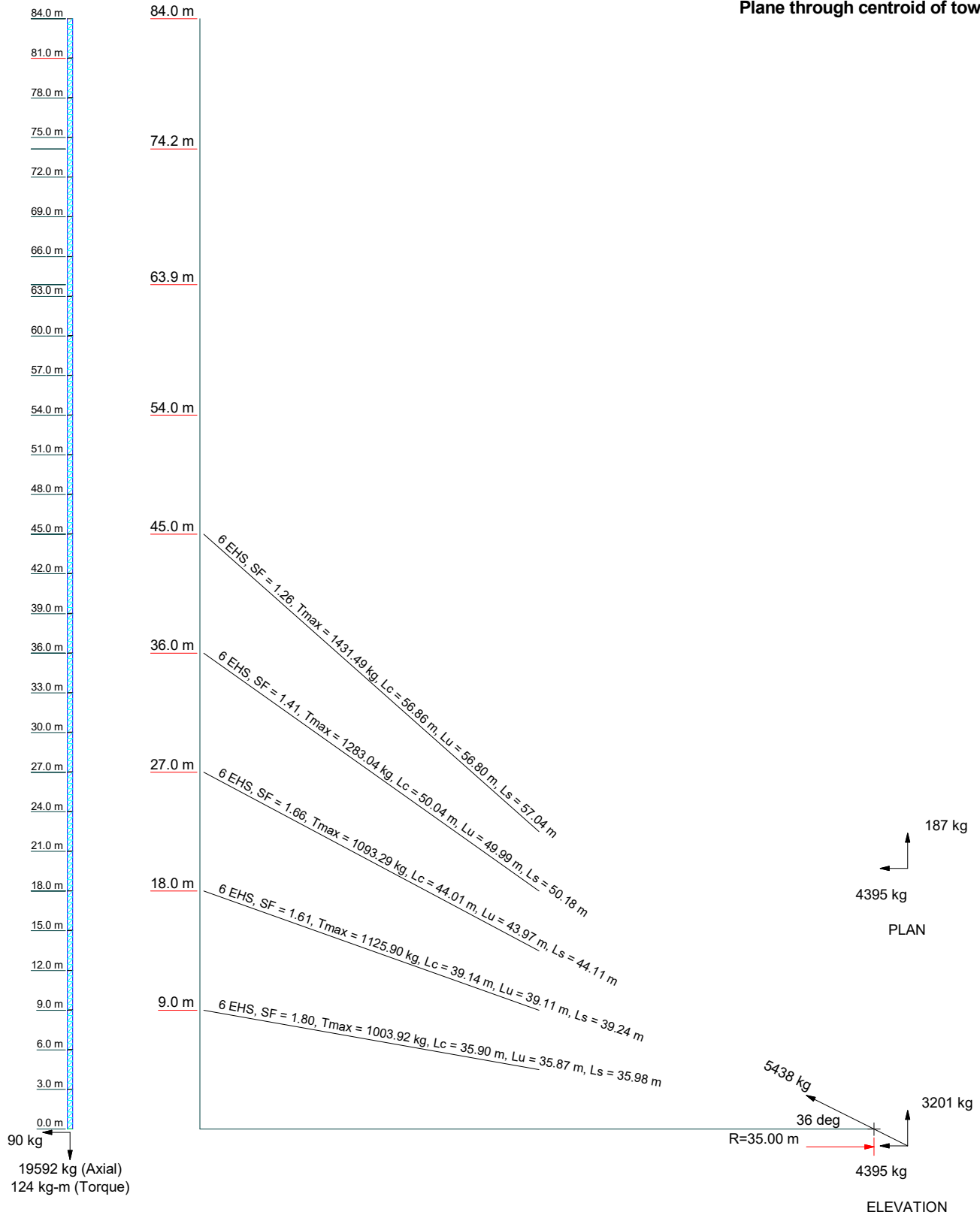
Anchor 'B'@35 m Azimuth 120 deg Elev 0 m
Plane through centroid of tower



Phone: FAX:	Job:	Cálculo Estructural		
	Project:	Mástil Arriestrado H=84m Río Gallegos		
	Client:	CFI	Drawn by:	App'd:
	Code:	TIA-222-G	Date:	06/20/18
	Path:	Scale: NTS		
			Dwg No.	E-6

Guy Tensions and Tower Reactions
TIA-222-G - 218.0 kph Exposure C

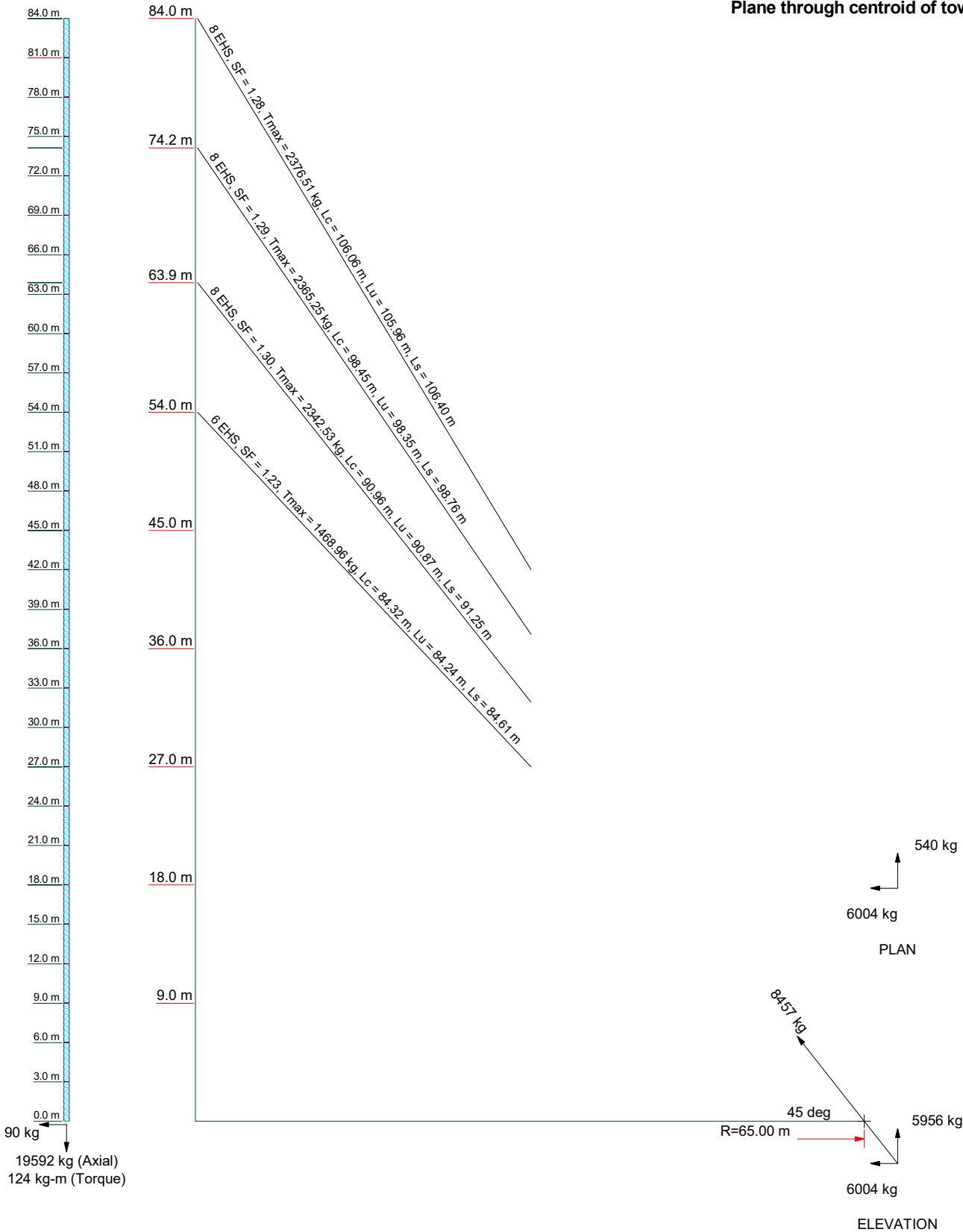
Maximum Values
Anchor 'C'@35 m Azimuth 240 deg Elev 0 m
Plane through centroid of tower



Phone: FAX:	Job: Cálculo Estructural		
	Project: Mástil Arriostrado H=84m Río Gallegos		
	Client: CFI	Drawn by:	App'd:
	Code: TIA-222-G	Date: 06/20/18	Scale: NTS
	Path:		Dwg No. E-6

Guy Tensions and Tower Reactions
TIA-222-G - 218.0 kph Exposure C

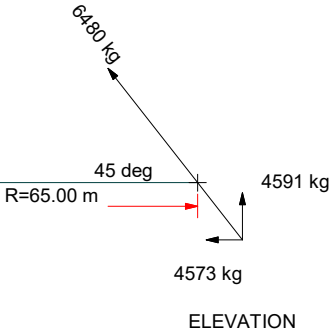
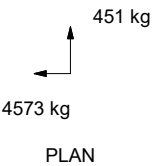
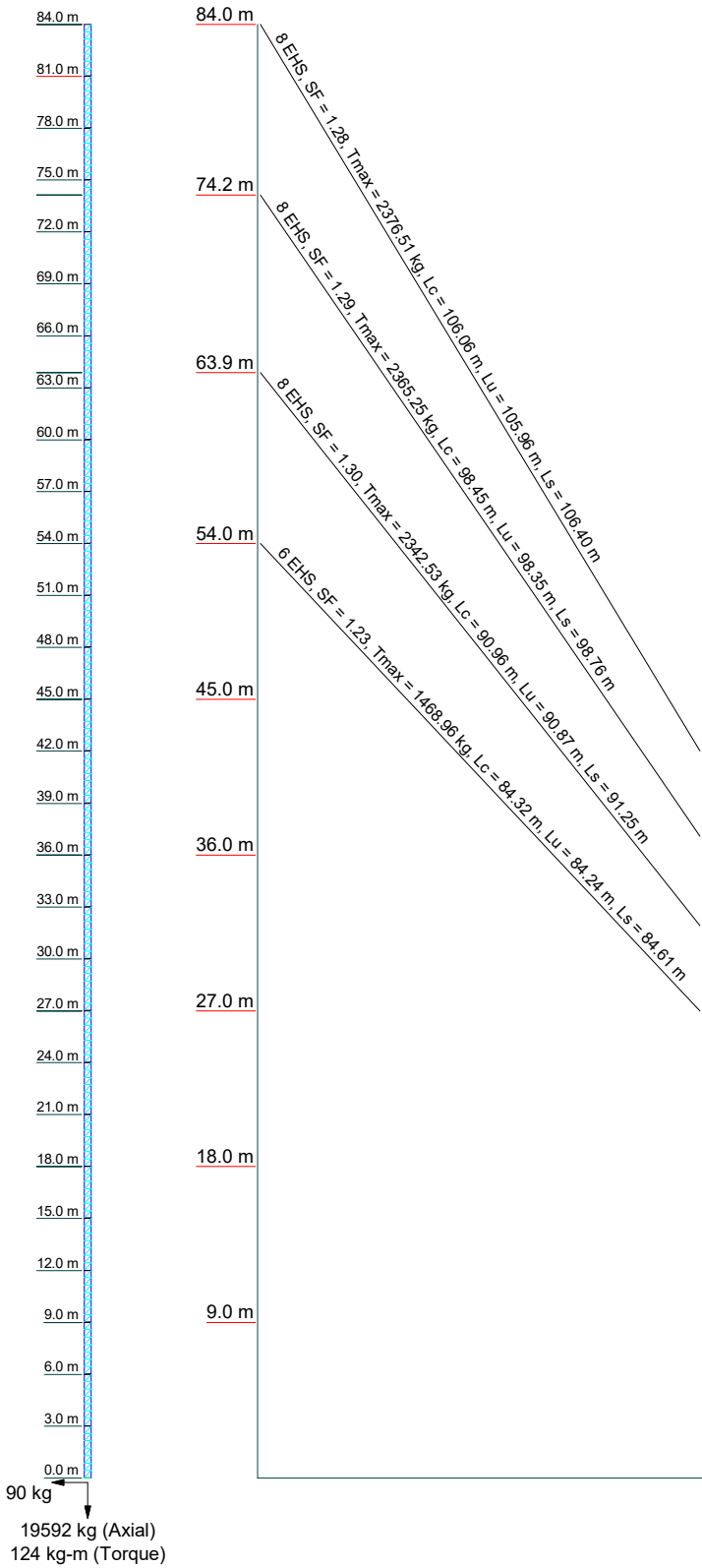
Maximum Values
Anchor 'A'@65 m Azimuth 0 deg Elev 0 m
Plane through centroid of tower



Job: Project: Client: Code: Path: Phone: FAX:	Cálculo Estructural		
	Mástil Arriestrado H=84m Río Gallegos		
	CFI	Drawn by:	App'd:
	TIA-222-G	Date: 06/20/18	Scale: NTS
			Dwg No. E-6
	Elaborado y revisado por: [Firma]		

Guy Tensions and Tower Reactions
TIA-222-G - 218.0 kph Exposure C

Maximum Values
Anchor 'B'@65 m Azimuth 120 deg Elev 0 m
Plane through centroid of tower

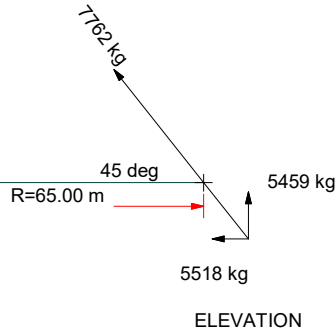
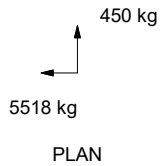
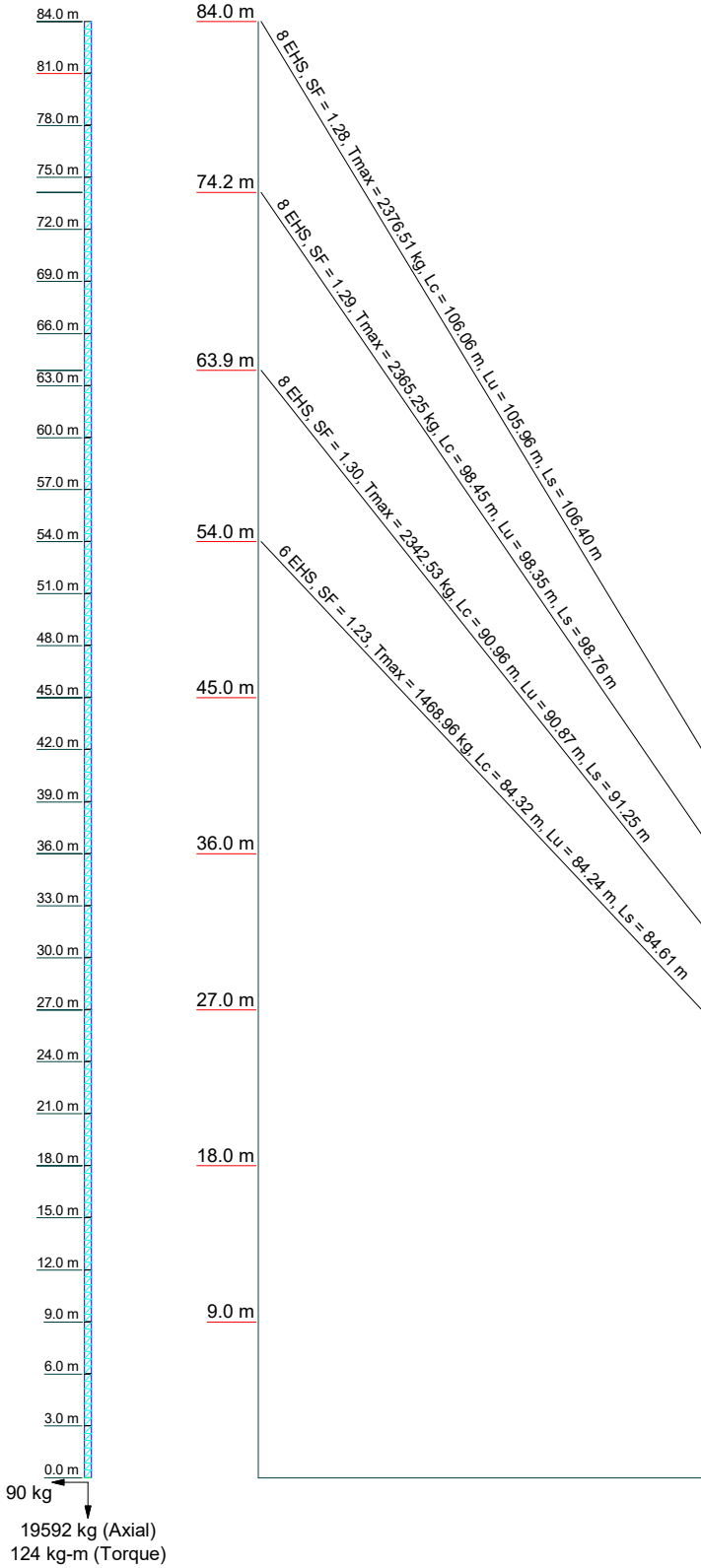


Job: Project: Client: Code: Path:	Cálculo Estructural		
	Mástil Arriestrado H=84m Río Gallegos		
	CFI	Drawn by:	App'd:
	TIA-222-G	Date: 06/20/18	Scale: NTS
			Dwg No. E-6

Phone: FAX:

Guy Tensions and Tower Reactions
TIA-222-G - 218.0 kph Exposure C

Maximum Values
Anchor 'C'@65 m Azimuth 240 deg Elev 0 m
Plane through centroid of tower

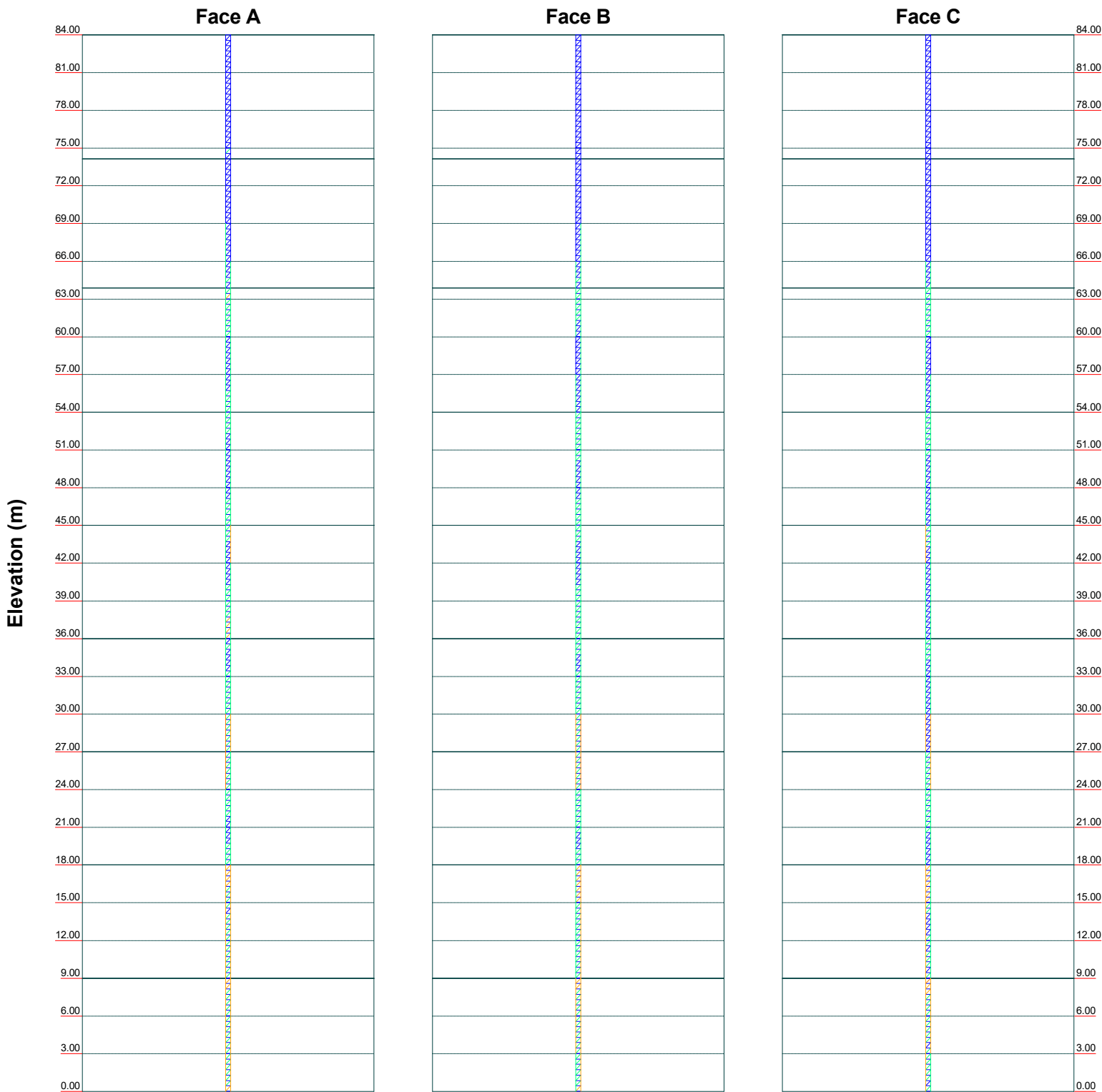


Job: Project: Client: Code: Path: Phone: FAX:	Cálculo Estructural		
	Mástil Arriestrado H=84m Río Gallegos		
	CFI	Drawn by:	App'd:
	TIA-222-G	Date: 06/20/18	Scale: NTS
			Dwg No. E-6

Stress Distribution Chart

0.00 - 84.00

■ > 100%
 ■ 90%-100%
 ■ 75%-90%
 ■ 50%-75%
 ■ < 50% Overstress



Phone: FAX:	Job:	Cálculo Estructural		
	Project:	Mástil Arriostrado H=84m_ Río Gallegos		
	Client:	CFI	Drawn by:	App'd:
	Code:	TIA-222-G	Date:	06/20/18
	Path:			
			Scale:	NTS
			Dwg No.	E-8

Tower Input Data

The main tower is a 3x guyed tower with an overall height of 84.00 m above the ground line.

The base of the tower is set at an elevation of 0.00 m above the ground line.

The face width of the tower is 0.42 m at the top and 0.42 m at the base.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

Basic wind speed of 218.0 kph.

Structure Class I.

Exposure Category C.

Topographic Category 1.

Crest Height 0.00 m.

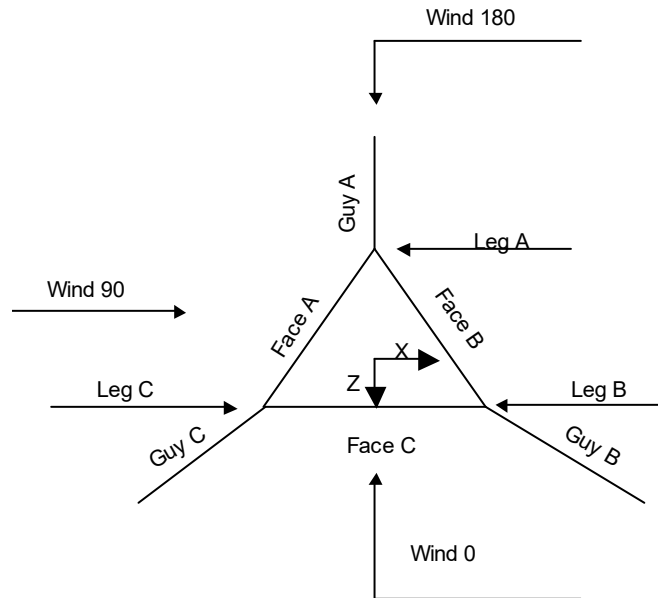
Deflections calculated using a wind speed of 97.2 kph.

Pressures are calculated at each section.

Safety factor used in guy design is 1.

Stress ratio used in tower member design is 1.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.



Corner & Starmount Guyed Tower

Tower Section Geometry

<i>Tower Section</i>	<i>Tower Elevation</i>	<i>Assembly Database</i>	<i>Description</i>	<i>Section Width</i>	<i>Number of Sections</i>	<i>Section Length</i>
	<i>m</i>			<i>m</i>		<i>m</i>
T1-T15	84.00-39.00			0.42	15	3.00
T16-T28	39.00-0.00			0.42	13	3.00

Tower Section Geometry (cont'd)

<i>Tower Section</i>	<i>Tower Elevation</i>	<i>Diagonal Spacing</i>	<i>Bracing Type</i>	<i>Has K Brace End Panels</i>	<i>Has Horizontals</i>	<i>Top Girt Offset</i>	<i>Bottom Girt Offset</i>
	<i>m</i>	<i>m</i>				<i>mm</i>	<i>mm</i>
T1-T15	84.00-39.00	0.42	Z Brace	No	Yes	0	25
T16-T28	39.00-0.00	0.42	Z Brace	No	Yes	0	25

Tower Section Geometry (cont'd)

<i>Tower Elevation</i>	<i>Leg Type</i>	<i>Leg Size</i>	<i>Leg Grade</i>	<i>Diagonal Type</i>	<i>Diagonal Size</i>	<i>Diagonal Grade</i>
<i>m</i>						
T1-T15 84.00-39.00	Pipe	Caño 1 1/4" sch40	SAE1020 (210059 kPa)	Solid Round	12mm	SAE1010 (180000 kPa)
T16-T28 39.00-0.00	Pipe	Caño 1 1/2" SCH40	SAE1020 (210059 kPa)	Solid Round	12mm	SAE1010 (180000 kPa)

Tower Section Geometry (cont'd)

<i>Tower Elevation</i>	<i>Top Girt Type</i>	<i>Top Girt Size</i>	<i>Top Girt Grade</i>	<i>Bottom Girt Type</i>	<i>Bottom Girt Size</i>	<i>Bottom Girt Grade</i>
<i>m</i>						
T1-T15 84.00-39.00	Solid Round	12mm	SAE1010 (180000 kPa)	Solid Round	12mm	SAE1010 (180000 kPa)
T16-T28 39.00-0.00	Solid Round	12mm	SAE1010 (180000 kPa)	Solid Round	12mm	SAE1010 (180000 kPa)

Tower Section Geometry (cont'd)

<i>Tower Elevation</i>	<i>No. of Mid Girts</i>	<i>Mid Girt Type</i>	<i>Mid Girt Size</i>	<i>Mid Girt Grade</i>	<i>Horizontal Type</i>	<i>Horizontal Size</i>	<i>Horizontal Grade</i>
<i>m</i>							
T1-T15 84.00-39.00	None	Flat Bar		A36 (248211 kPa)	Solid Round	12mm	SAE1010 (180000 kPa)
T16-T28 39.00-0.00	None	Flat Bar		A36 (248211 kPa)	Solid Round	12mm	SAE1010 (180000 kPa)

Tower Section Geometry (cont'd)

<i>Tower Elevation</i>	<i>Gusset Area (per face)</i>	<i>Gusset Thickness</i>	<i>Gusset Grade</i>	<i>Adjust. Factor A_f</i>	<i>Adjust. Factor A_r</i>	<i>Weight Mult.</i>	<i>Double Angle Stitch Bolt Spacing Diagonals</i>	<i>Double Angle Stitch Bolt Spacing Horizontals</i>
<i>m</i>	<i>m²</i>	<i>mm</i>					<i>mm</i>	<i>mm</i>
T1-T15 84.00-39.00	0.00	13	A36 (248211 kPa)	1	1	1.2	914	914
T16-T28 39.00-0.00	0.00	13	A36 (248211 kPa)	1	1	1.2	914	914

Tower Section Geometry (cont'd)

Tower Elevation <i>m</i>	Calc K Single Angles	Calc K Solid Rounds	K Factors ¹							
			Legs	X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
T1-T15	No	No	1	1	1	0.7	1	1	1	1
84.00-39.00				1	1	0.7	1	1	1	1
T16-T28	No	No	1	1	1	0.7	1	1	1	1
39.00-0.00				1	1	0.7	1	1	1	1

¹Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.

Tower Section Geometry (cont'd)

Tower Elevation <i>m</i>	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct mm	U	Net Width Deduct mm	U	Net Width Deduct mm	U	Net Width Deduct mm	U	Net Width Deduct mm	U	Net Width Deduct mm	U	Net Width Deduct mm	U
T1-T15	21	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
84.00-39.00														
T16-T28	21	1	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75	0	0.75
39.00-0.00														

Tower Section Geometry (cont'd)

Tower Elevation <i>m</i>	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size mm	No.	Bolt Size mm	No.	Bolt Size mm	No.	Bolt Size mm	No.	Bolt Size mm	No.	Bolt Size mm	No.	Bolt Size mm	No.
T1-T15	Flange	19	1	0	0	0	0	0	0	16	0	0	0	16	0
84.00-39.00		A325X		A325X		A325N		A325N		A325N		A325N		A325N	
T16-T28	Flange	19	1	0	0	0	0	0	0	16	0	0	0	16	0
39.00-0.00		A325X		A325X		A325N		A325N		A325N		A325N		A325N	

Guy Data

Guy Elevation <i>m</i>	Guy Grade	Guy Size		Initial Tension <i>kg</i>	%	Guy Modulus <i>kPa</i>	Guy Weight <i>kg/m</i>	<i>L_u</i> <i>m</i>	Anchor Radius <i>m</i>	Anchor Azimuth Adj. °	Anchor Elevation <i>m</i>	End Fitting Efficiency %
9	EHS	A	6	301.64	10%	14478986	1800.68	35.87	35.00	0.0000	0.00	90%
		B	6	301.64	10%	6.51	1800.68	35.87	35.00	0.0000	0.00	90%
		C	6	301.64	10%	14478986	1800.68	35.87	35.00	0.0000	0.00	90%
						6.51						
						14478986						
						6.51						
18	EHS	A	6	301.64	10%	14478986	1800.68	39.11	35.00	0.0000	0.00	90%
		B	6	301.64	10%	6.51	1800.68	39.11	35.00	0.0000	0.00	90%
		C	6	301.64	10%	14478986	1800.68	39.11	35.00	0.0000	0.00	90%
						6.51						
						14478986						
						6.51						

27	EHS	A	6	301.64	10%	14478986	1800.68	43.97	35.00	0.0000	0.00	90%
		B	6	301.64	10%	6.51	1800.68	43.97	35.00	0.0000	0.00	90%
		C	6	301.64	10%	14478986	1800.68	43.97	35.00	0.0000	0.00	90%
		6.51 14478986 6.51										
36	EHS	A	6	301.64	10%	14478986	1800.68	50.00	35.00	0.0000	0.00	90%
		B	6	301.64	10%	6.51	1800.68	50.00	35.00	0.0000	0.00	90%
		C	6	301.64	10%	14478986	1800.68	50.00	35.00	0.0000	0.00	90%
		6.51 14478986 6.51										
45	EHS	A	6	301.64	10%	14478986	1800.68	56.81	35.00	0.0000	0.00	90%
		B	6	301.64	10%	6.51	1800.68	56.81	35.00	0.0000	0.00	90%
		C	6	301.64	10%	14478986	1800.68	56.81	35.00	0.0000	0.00	90%
		6.51 14478986 6.51										
54	EHS	A	6	301.64	10%	14478986	1800.68	84.25	65.00	0.0000	0.00	90%
		B	6	301.64	10%	6.51	1800.68	84.25	65.00	0.0000	0.00	90%
		C	6	301.64	10%	14478986	1800.68	84.25	65.00	0.0000	0.00	90%
		6.51 14478986 6.51										
63.8753	EHS	A	8	508.02	10%	14478986	3050.74	90.88	65.00	0.0000	0.00	90%
		B	8	508.02	10%	6.51	3050.74	90.88	65.00	0.0000	0.00	90%
		C	8	508.02	10%	14478986	3050.74	90.88	65.00	0.0000	0.00	90%
		6.51 14478986 6.51										
74.1501	EHS	A	8	508.02	10%	14478986	3050.74	98.36	65.00	0.0000	0.00	90%
		B	8	508.02	10%	6.51	3050.74	98.36	65.00	0.0000	0.00	90%
		C	8	508.02	10%	14478986	3050.74	98.36	65.00	0.0000	0.00	90%
		6.51 14478986 6.51										
84	EHS	A	8	508.02	10%	14478986	3050.74	105.97	65.00	0.0000	0.00	90%
		B	8	508.02	10%	6.51	3050.74	105.97	65.00	0.0000	0.00	90%
		C	8	508.02	10%	14478986	3050.74	105.97	65.00	0.0000	0.00	90%
		6.51 14478986 6.51										

Guy Data(cont'd)

Guy Elevation m	Mount Type	Torque-Arm Spread m	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
9	Corner						
18	Corner						
27	Corner						
36	Corner						
45	Corner						
54	Corner						
63.8753	Corner						
74.1501	Corner						
84	Corner						

Guy Data (cont'd)

Guy Elevation m	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
9.00	A36	Solid Round				A36	Solid Round	

<i>Guy Elevation m</i>	<i>Diagonal Grade</i>	<i>Diagonal Type</i>	<i>Upper Diagonal Size</i>	<i>Lower Diagonal Size</i>	<i>Is Strap.</i>	<i>Pull-Off Grade</i>	<i>Pull-Off Type</i>	<i>Pull-Off Size</i>
18.00	(248211 kPa) A36	Solid Round				(248211 kPa) A36	Solid Round	
27.00	(248211 kPa) A36	Solid Round				(248211 kPa) A36	Solid Round	
36.00	(248211 kPa) A36	Solid Round				(248211 kPa) A36	Solid Round	
45.00	(248211 kPa) A36	Solid Round				(248211 kPa) A36	Solid Round	
54.00	(248211 kPa) A36	Solid Round				(248211 kPa) A36	Solid Round	
63.88	(248211 kPa) A36	Solid Round				(248211 kPa) A36	Solid Round	
74.15	(248211 kPa) A36	Solid Round				(248211 kPa) A36	Solid Round	
84.00	(248211 kPa) A36	Solid Round				(248211 kPa) A36	Solid Round	

Guy Data (cont'd)

<i>Guy Elevation m</i>	<i>Cable Weight A kg</i>	<i>Cable Weight B kg</i>	<i>Cable Weight C kg</i>	<i>Cable Weight D kg</i>	<i>Tower Intercept A m</i>	<i>Tower Intercept B m</i>	<i>Tower Intercept C m</i>	<i>Tower Intercept D m</i>
9	6.46	6.46	6.46		0.38	0.38	0.38	
18	7.04	7.04	7.04		1.9 sec/pulse 0.45	1.9 sec/pulse 0.45	1.9 sec/pulse 0.45	
27	7.92	7.92	7.92		2.1 sec/pulse 0.57	2.1 sec/pulse 0.57	2.1 sec/pulse 0.57	
36	9.00	9.00	9.00		2.4 sec/pulse 0.74	2.4 sec/pulse 0.74	2.4 sec/pulse 0.74	
45	10.23	10.23	10.23		2.7 sec/pulse 0.95	2.7 sec/pulse 0.95	2.7 sec/pulse 0.95	
54	15.17	15.17	15.17		3.1 sec/pulse 2.09	3.1 sec/pulse 2.09	3.1 sec/pulse 2.09	
63.8753	27.73	27.73	27.73		4.5 sec/pulse 2.44	4.5 sec/pulse 2.44	4.5 sec/pulse 2.44	
74.1501	30.01	30.01	30.01		4.9 sec/pulse 2.84	4.9 sec/pulse 2.84	4.9 sec/pulse 2.84	
84	32.33	32.33	32.33		5.3 sec/pulse 3.29	5.3 sec/pulse 3.29	5.3 sec/pulse 3.29	
					5.7 sec/pulse	5.7 sec/pulse	5.7 sec/pulse	

Guy Data (cont'd)

<i>Guy Elevation m</i>	<i>Calc K Single Angles</i>	<i>Calc K Solid Rounds</i>	<i>Torque Arm</i>		<i>Pull Off</i>		<i>Diagonal</i>	
			<i>K_x</i>	<i>K_y</i>	<i>K_x</i>	<i>K_y</i>	<i>K_x</i>	<i>K_y</i>
9	No	No			1	1	1	1
18	No	No			1	1	1	1
27	No	No			1	1	1	1
36	No	No			1	1	1	1

Guy Elevation m	Calc K Single Angles	Calc K Solid Rounds	Torque Arm		Pull Off		Diagonal	
			K _x	K _y	K _x	K _y	K _x	K _y
45	No	No			1	1	1	1
54	No	No			1	1	1	1
63.8753	No	No			1	1	1	1
74.1501	No	No			1	1	1	1
84	No	No			1	1	1	1

Guy Data (cont'd)

Guy Elevation m	Torque-Arm				Pull Off				Diagonal			
	Bolt Size mm	Number	Net Width Deduct mm	U	Bolt Size mm	Number	Net Width Deduct mm	U	Bolt Size mm	Number	Net Width Deduct mm	U
9	16 A325N	0	0	0.75	16 A325N	0	0	0.75	16 A325N	0	0	0.75
18	16 A325N	0	0	0.75	16 A325N	0	0	0.75	16 A325N	0	0	0.75
27	16 A325N	0	0	0.75	16 A325N	0	0	0.75	16 A325N	0	0	0.75
36	0 A325N	0	0	1	16 A325N	0	0	0.75	16 A325N	0	0	0.75
45	16 A325N	0	0	0.75	16 A325N	0	0	0.75	16 A325N	0	0	0.75
54	22 A325N	1	0	1	16 A325N	0	0	0.75	16 A325N	0	0	0.75
63.8753	16 A325N	0	0	0.75	16 A325N	0	0	0.75	16 A325N	0	0	0.75
74.1501	22 A325N	1	0	1	16 A325N	0	0	0.75	16 A325N	0	0	0.75
84	22 A325N	1	0	1	0 A325N	0	0	1	0 A325N	0	0	1

Guy Pressures

Guy Elevation m	Guy Location	z	q _z	q _z Ice	Ice Thickness mm
		m	kgsm	kgsm	
9	A	4.50	144.16		
	B	4.50	144.16		
	C	4.50	144.16		
18	A	9.00	166.04		
	B	9.00	166.04		
	C	9.00	166.04		
27	A	13.50	180.83		
	B	13.50	180.83		
	C	13.50	180.83		
36	A	18.00	192.12		
	B	18.00	192.12		
	C	18.00	192.12		
45	A	22.50	201.36		
	B	22.50	201.36		
	C	22.50	201.36		
54	A	27.00	209.24		
	B	27.00	209.24		
	C	27.00	209.24		
63.8753	A	31.94	216.77		
	B	31.94	216.77		
	C	31.94	216.77		
74.1501	A	37.08	223.69		
	B	37.08	223.69		
	C	37.08	223.69		
84	A	42.00	229.64		

<i>Guy Elevation m</i>	<i>Guy Location</i>	<i>z m</i>	<i>q_z kgsm</i>	<i>q_z Ice kgsm</i>	<i>Ice Thickness mm</i>
	B	42.00	229.64		
	C	42.00	229.64		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

<i>Description</i>	<i>Face or Leg</i>	<i>Allow Shield</i>	<i>Component Type</i>	<i>Placement m</i>	<i>Total Number</i>	<i>Number Per Row</i>	<i>Clear Spacing mm</i>	<i>Width or Diameter mm</i>	<i>Perimeter mm</i>	<i>Weight kg/m</i>
fi 8mm	A	No	Ar (CaAa)	84.00 - 80.00	4	2	6	0		0.18
fi 8mm	A	No	Ar (CaAa)	80.00 - 60.00	4	2	6	0		0.18
fi 8mm	A	No	Ar (CaAa)	60.00 - 40.00	6	3	6	0		0.00
fi 8mm	A	No	Ar (CaAa)	40.00 - 0.00	7	3	6	0		0.00

Feed Line/Linear Appurtenances Section Areas

<i>Tower Section</i>	<i>Tower Elevation m</i>	<i>Face</i>	<i>A_R m²</i>	<i>A_F m²</i>	<i>C_AA_A In Face m²</i>	<i>C_AA_A Out Face m²</i>	<i>Weight kg</i>
T1	84.00-81.00	A	0.000	0.000	0.000	0.000	2.16
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	81.00-78.00	A	0.000	0.000	0.000	0.000	2.16
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T3	78.00-75.00	A	0.000	0.000	0.000	0.000	2.16
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T4	75.00-72.00	A	0.000	0.000	0.000	0.000	2.16
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T5	72.00-69.00	A	0.000	0.000	0.000	0.000	2.16
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T6	69.00-66.00	A	0.000	0.000	0.000	0.000	2.16
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T7	66.00-63.00	A	0.000	0.000	0.000	0.000	2.16
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T8	63.00-60.00	A	0.000	0.000	0.000	0.000	2.16
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T9	60.00-57.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T10	57.00-54.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T11	54.00-51.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T12	51.00-48.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T13	48.00-45.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T14	45.00-42.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T15	42.00-39.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T16	39.00-36.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00

<i>Tower Section</i>	<i>Tower Elevation m</i>	<i>Face</i>	<i>A_R</i> <i>m²</i>	<i>A_F</i> <i>m²</i>	<i>C_AA_A</i> <i>In Face</i> <i>m²</i>	<i>C_AA_A</i> <i>Out Face</i> <i>m²</i>	<i>Weight</i> <i>kg</i>
T17	36.00-33.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
T18	33.00-30.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
T19	30.00-27.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
T20	27.00-24.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
T21	24.00-21.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
T22	21.00-18.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
T23	18.00-15.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
T24	15.00-12.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
T25	12.00-9.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
T26	9.00-6.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
T27	6.00-3.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
T28	3.00-0.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00

Shielding Factor Ka

<i>Tower Section</i>	<i>Feed Line Record No.</i>	<i>Description</i>	<i>Feed Line Segment Elev.</i>	<i>K_a</i> <i>No Ice</i>	<i>K_a</i> <i>Ice</i>
T1	1	fi 8mm	265.75 - 275.59	1.0000	1.0000
T2	1	fi 8mm	262.47 - 265.75	1.0000	1.0000
T2	2	fi 8mm	255.91 - 262.47	1.0000	1.0000
T3	2	fi 8mm	246.06 - 255.91	1.0000	1.0000
T4	2	fi 8mm	236.22 - 246.06	1.0000	1.0000
T5	2	fi 8mm	226.38 - 236.22	1.0000	1.0000
T6	2	fi 8mm	216.54 - 226.38	1.0000	1.0000
T7	2	fi 8mm	206.69 - 216.54	1.0000	1.0000
T8	2	fi 8mm	196.85 - 206.69	1.0000	1.0000
T9	3	fi 8mm	187.01 - 196.85	1.0000	1.0000
T10	3	fi 8mm	177.17 - 187.01	1.0000	1.0000
T11	3	fi 8mm	167.32 - 177.17	1.0000	1.0000

<i>Tower Section</i>	<i>Feed Line Record No.</i>	<i>Description</i>	<i>Feed Line Segment Elev.</i>	<i>K_a No Ice</i>	<i>K_a Ice</i>
T12	3	fi 8mm	157.48 - 167.32	1.0000	1.0000
T13	3	fi 8mm	147.64 - 157.48	1.0000	1.0000
T14	3	fi 8mm	137.80 - 147.64	1.0000	1.0000
T15	3	fi 8mm	131.23 - 137.80	1.0000	1.0000
T15	4	fi 8mm	127.95 - 131.23	1.0000	1.0000
T16	4	fi 8mm	118.11 - 127.95	1.0000	1.0000
T17	4	fi 8mm	108.27 - 118.11	1.0000	1.0000
T18	4	fi 8mm	98.43 - 108.27	1.0000	1.0000
T19	4	fi 8mm	88.58 - 98.43	1.0000	1.0000
T20	4	fi 8mm	78.74 - 88.58	1.0000	1.0000
T21	4	fi 8mm	68.90 - 78.74	1.0000	1.0000
T22	4	fi 8mm	59.06 - 68.90	1.0000	1.0000
T23	4	fi 8mm	49.21 - 59.06	1.0000	1.0000
T24	4	fi 8mm	39.37 - 49.21	1.0000	1.0000
T25	4	fi 8mm	29.53 - 39.37	1.0000	1.0000
T26	4	fi 8mm	19.69 - 29.53	1.0000	1.0000
T27	4	fi 8mm	9.84 - 19.69	1.0000	1.0000
T28	4	fi 8mm	0.00 - 9.84	1.0000	1.0000

Discrete Tower Loads

<i>Description</i>	<i>Face or Leg</i>	<i>Offset Type</i>	<i>Offsets: Horz Lateral Vert m m m</i>	<i>Azimuth Adjustment °</i>	<i>Placement m</i>		<i>C_AA_A Front m²</i>	<i>C_AA_A Side m²</i>	<i>Weight kg</i>
Lightning Rod 10	A	From Face	0.00 0.00 0.00	0.0000	85.00	No Ice	0.12	0.12	10.00
veleta	A	Stand-Off Left	0.00 0.00 0.00	0.0000	83.50	No Ice	0.02	0.02	2.00
anemometro	A	Stand-Off Right	0.00 0.00 0.00	0.0000	85.00	No Ice	0.02	0.02	2.00
Soporte anemometro	A	Stand-Off Left	0.00 0.00 0.00	0.0000	83.50	No Ice	0.18	0.04	10.00
Soporte anemometro	A	Stand-Off Right	0.00 0.00 0.00	0.0000	85.00	No Ice	0.18	0.04	10.00
anemometro	A	Stand-Off Right	0.00 0.00 0.00	0.0000	83.50	No Ice	0.02	0.02	2.00
Soporte anemometro	A	Stand-Off Left	0.00 0.00 0.00	0.0000	83.50	No Ice	0.18	0.04	10.00
veleta	A	Stand-Off Left	0.00 0.00 0.00	0.0000	60.00	No Ice	0.02	0.02	2.00
Soporte anemometro	A	Stand-Off Left	0.00 0.00 0.00	0.0000	60.00	No Ice	0.18	0.04	10.00
anemometro	A	Stand-Off Left	0.00 0.00 0.00	0.0000	60.00	No Ice	0.02	0.02	2.00

<i>Description</i>	<i>Face or Leg</i>	<i>Offset Type</i>	<i>Offsets: Horz Lateral Vert m m m</i>	<i>Azimuth Adjustment °</i>	<i>Placement m</i>		<i>C_AA_A Front m²</i>	<i>C_AA_A Side m²</i>	<i>Weight kg</i>
SopORTE anemometro	A	Stand-Off Left	0.00 0.00 0.00	0.0000	60.00	No Ice	0.18	0.04	10.00
SopORTE anemometro	A	Stand-Off Left	0.00 0.00 0.00	0.0000	40.00	No Ice	0.18	0.04	10.00
anemometro	A	Stand-Off Left	0.00 0.00 0.00	0.0000	40.00	No Ice	0.02	0.02	2.00
Plataforma trabajo	B	None		0.0000	7.00	No Ice	0.40	0.40	50.00
Paneles	B	None		0.0000	15.00	No Ice	0.72	0.39	20.00
Paneles	B	None		0.0000	18.00	No Ice	0.72	0.39	20.00
Gabinete conexión LAN	B	None		0.0000	1.50	No Ice	0.30	0.00	5.00
Gabinete de baterias	B	None		0.0000	8.00	No Ice	0.30	0.00	65.00
Gabinete Data Logger	B	None		0.0000	8.50	No Ice	0.30	0.00	10.00

Bolt Design Data

<i>Section No.</i>	<i>Elevation m</i>	<i>Component Type</i>	<i>Bolt Grade</i>	<i>Bolt Size mm</i>	<i>Number Of Bolts</i>	<i>Maximum Load per Bolt kg</i>	<i>Allowable Load kg</i>	<i>Ratio Load Allowable</i>	<i>Allowable Ratio</i>	<i>Criteria</i>
T1	84	Leg	A325X	19	1	682.90	13455.50	0.051 ✓	1	Bolt Tension
T2	81	Leg	A325X	19	1	955.76	13455.50	0.071 ✓	1	Bolt Tension
T3	78	Leg	A325X	19	1	756.42	13455.50	0.056 ✓	1	Bolt Tension
T4	75	Leg	A325X	19	1	829.35	13455.50	0.062 ✓	1	Bolt Tension
T5	72	Leg	A325X	19	1	948.98	13455.50	0.071 ✓	1	Bolt Tension
T6	69	Leg	A325X	19	1	966.59	13455.50	0.072 ✓	1	Bolt Tension
T7	66	Leg	A325X	19	1	1403.42	13455.50	0.104 ✓	1	Bolt Tension
T8	63	Leg	A325X	19	1	1657.73	13455.50	0.123 ✓	1	Bolt Tension
T9	60	Leg	A325X	19	1	1462.18	13455.50	0.109 ✓	1	Bolt Tension
T10	57	Leg	A325X	19	1	1493.53	13455.50	0.111 ✓	1	Bolt Tension
T11	54	Leg	A325X	19	1	1428.21	13455.50	0.106 ✓	1	Bolt Tension
T12	51	Leg	A325X	19	1	1862.47	13455.50	0.138 ✓	1	Bolt Tension
T13	48	Leg	A325X	19	1	1783.78	13455.50	0.133 ✓	1	Bolt Tension
T14	45	Leg	A325X	19	1	1807.01	13455.50	0.134 ✓	1	Bolt Tension
T15	42	Leg	A325X	19	1	1939.65	13455.50	0.144 ✓	1	Bolt Tension
T16	39	Leg	A325X	19	1	1731.43	13455.50	0.129 ✓	1	Bolt Tension
T17	36	Leg	A325X	19	1	1979.99	13455.50	0.147 ✓	1	Bolt Tension
T18	33	Leg	A325X	19	1	1922.52	13455.50	0.143 ✓	1	Bolt Tension
T19	30	Leg	A325X	19	1	2293.74	13455.50	0.170 ✓	1	Bolt Tension
T20	27	Leg	A325X	19	1	2923.79	13455.50	0.217 ✓	1	Bolt Tension
T21	24	Leg	A325X	19	1	2379.27	13455.50	0.177 ✓	1	Bolt Tension
T22	21	Leg	A325X	19	1	2144.61	13455.50	0.159 ✓	1	Bolt Tension
T23	18	Leg	A325X	19	1	2161.99	13455.50	0.161 ✓	1	Bolt Tension
T24	15	Leg	A325X	19	1	2673.18	13455.50	0.199 ✓	1	Bolt Tension
T25	12	Leg	A325X	19	1	2552.99	13455.50	0.190 ✓	1	Bolt Tension
T26	9	Leg	A325X	19	1	2202.87	13455.50	0.164 ✓	1	Bolt Tension

Section No.	Elevation m	Component Type	Bolt Grade	Bolt Size mm	Number Of Bolts	Maximum Load per Bolt kg	Allowable Load kg	Ratio Load Allowable	Allowable Ratio	Criteria
T27	6	Leg	A325X	19	1	2729.12	13455.50	0.203 ✓	1	Bolt Tension
T28	3	Leg	A325X	19	1	2613.35	13455.50	0.194 ✓	1	Bolt Tension

Guy Design Data

Section No.	Elevation m	Size	Initial Tension kg	Breaking Load kg	Actual T_u kg	Allowable ϕT_n kg	Required S.F.	Actual S.F.
T1	84.00 (A) (1371)	8 EHS	508.02	4572.22	2376.51	2743.33	1.000	1.154 ✓
	84.00 (B) (1370)	8 EHS	508.02	4572.22	1846.76	2743.33	1.000	1.485 ✓
	84.00 (C) (1369)	8 EHS	508.02	4572.22	2171.99	2743.33	1.000	1.263 ✓
T4	74.15 (A) (1368)	8 EHS	508.02	4572.22	2365.25	2743.33	1.000	1.160 ✓
	74.15 (B) (1367)	8 EHS	508.02	4572.22	1817.46	2743.33	1.000	1.509 ✓
	74.15 (C) (1366)	8 EHS	508.02	4572.22	2173.80	2743.33	1.000	1.262 ✓
T7	63.88 (A) (1365)	8 EHS	508.02	4572.22	2342.53	2743.33	1.000	1.171 ✓
	63.88 (B) (1364)	8 EHS	508.02	4572.22	1765.35	2743.33	1.000	1.554 ✓
	63.88 (C) (1363)	8 EHS	508.02	4572.22	2151.72	2743.33	1.000	1.275 ✓
T11	54.00 (A) (1362)	6 EHS	301.64	2714.74	1468.96	1628.85	1.000	1.109 ✓
	54.00 (B) (1361)	6 EHS	301.64	2714.74	1156.23	1628.85	1.000	1.409 ✓
	54.00 (C) (1360)	6 EHS	301.64	2714.74	1362.03	1628.85	1.000	1.196 ✓
T14	45.00 (A) (1359)	6 EHS	301.64	2714.74	1431.49	1628.85	1.000	1.138 ✓
	45.00 (B) (1358)	6 EHS	301.64	2714.74	1090.41	1628.85	1.000	1.494 ✓
	45.00 (C) (1357)	6 EHS	301.64	2714.74	1333.14	1628.85	1.000	1.222 ✓
T17	36.00 (A) (1356)	6 EHS	301.64	2714.74	1283.05	1628.85	1.000	1.270 ✓
	36.00 (B) (1355)	6 EHS	301.64	2714.74	1038.29	1628.85	1.000	1.569 ✓
	36.00 (C) (1354)	6 EHS	301.64	2714.74	1223.62	1628.85	1.000	1.331 ✓
T20	27.00 (A) (1353)	6 EHS	301.64	2714.74	1093.29	1628.85	1.000	1.490 ✓
	27.00 (B) (1352)	6 EHS	301.64	2714.74	901.61	1628.85	1.000	1.807 ✓
	27.00 (C) (1351)	6 EHS	301.64	2714.74	1054.73	1628.85	1.000	1.544 ✓
T23	18.00 (A) (1350)	6 EHS	301.64	2714.74	1125.89	1628.85	1.000	1.447 ✓
	18.00 (B) (1349)	6 EHS	301.64	2714.74	845.56	1628.85	1.000	1.926 ✓
	18.00 (C) (1348)	6 EHS	301.64	2714.74	1057.13	1628.85	1.000	1.541 ✓
T26	9.00 (A) (1347)	6 EHS	301.64	2714.74	1003.92	1628.85	1.000	1.622 ✓
	9.00 (B) (1346)	6 EHS	301.64	2714.74	738.38	1628.85	1.000	2.206 ✓
	9.00 (C) (1345)	6 EHS	301.64	2714.74	929.47	1628.85	1.000	1.752 ✓

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>A</i> <i>mm</i> ²	<i>P_u</i> <i>kg</i>	ϕP_n <i>kg</i>	Ratio $\frac{P_u}{\phi P_n}$
T1	84 - 81	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-2874.02	7982.46	0.360 ¹
T2	81 - 78	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-2876.73	7982.46	0.360 ¹
T3	78 - 75	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-2299.19	7982.46	0.288 ¹
T4	75 - 72	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-3270.71	7982.46	0.410 ¹
T5	72 - 69	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-2971.28	7982.46	0.372 ¹
T6	69 - 66	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-4190.63	7982.46	0.525 ¹
T7	66 - 63	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-5842.50	7982.46	0.732 ¹
T8	63 - 60	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-4973.19	7982.46	0.623 ¹
T9	60 - 57	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-4698.31	7982.46	0.589 ¹
T10	57 - 54	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-4480.58	7982.46	0.561 ¹
T11	54 - 51	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-5778.50	7982.46	0.724 ¹
T12	51 - 48	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-5689.46	7982.46	0.713 ¹
T13	48 - 45	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-5351.35	7982.46	0.670 ¹
T14	45 - 42	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-6093.47	7982.46	0.763 ¹
T15	42 - 39	Caño 1 1/4" sch40	3.00	0.42	31.0 K=1.00	432	-5818.96	7982.46	0.729 ¹
T16	39 - 36	Caño 1 1/2" SCH40	3.00	0.42	26.8 K=1.00	516	-5956.44	9630.45	0.619 ¹
T17	36 - 33	Caño 1 1/2" SCH40	3.00	0.42	26.8 K=1.00	516	-6024.07	9630.45	0.626 ¹
T18	33 - 30	Caño 1 1/2" SCH40	3.00	0.42	26.8 K=1.00	516	-7064.02	9630.45	0.734 ¹
T19	30 - 27	Caño 1 1/2" SCH40	3.00	0.42	26.8 K=1.00	516	-9158.67	9630.45	0.951 ¹
T20	27 - 24	Caño 1 1/2" SCH40	3.00	0.42	26.8 K=1.00	516	-8771.39	9630.45	0.911 ¹
T21	24 - 21	Caño 1 1/2" SCH40	3.00	0.42	26.8 K=1.00	516	-7137.82	9630.45	0.741 ¹
T22	21 - 18	Caño 1 1/2" SCH40	3.00	0.42	26.8 K=1.00	516	-6998.16	9630.45	0.727 ¹
T23	18 - 15	Caño 1 1/2" SCH40	3.00	0.42	26.8 K=1.00	516	-8276.84	9630.45	0.859 ¹
T24	15 - 12	Caño 1 1/2" SCH40	3.00	0.42	26.8 K=1.00	516	-8083.93	9630.45	0.839 ¹
T25	12 - 9	Caño 1 1/2" SCH40	3.00	0.42	26.8 K=1.00	516	-7658.95	9630.45	0.795 ¹
T26	9 - 6	Caño 1 1/2" SCH40	3.00	0.42	26.8 K=1.00	516	-8477.42	9630.45	0.880 ¹
T27	6 - 3	Caño 1 1/2" SCH40	3.00	0.42	26.8	516	-8230.39	9630.45	0.855 ¹

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>A</i> <i>mm</i> ²	<i>P_u</i> <i>kg</i>	ϕP_n <i>kg</i>	Ratio $\frac{P_u}{\phi P_n}$
T28	3 - 0	Caño 1 1/2" SCH40	3.00	0.42	K=1.00 26.8 K=1.00	516	-7840.07	9630.45	0.814 ¹ ✓ ✓

¹ $P_u / \phi P_n$ controls

Diagonal Design Data (Compression)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>A</i> <i>mm</i> ²	<i>P_u</i> <i>kg</i>	ϕP_n <i>kg</i>	Ratio $\frac{P_u}{\phi P_n}$
T1	84 - 81	12mm	0.60	0.60	139.1 K=0.70	113	-386.18	892.73	0.433 ¹ ✓
T2	81 - 78	12mm	0.60	0.60	139.1 K=0.70	113	-285.32	892.73	0.320 ¹ ✓
T3	78 - 75	12mm	0.60	0.60	139.1 K=0.70	113	-433.71	892.73	0.486 ¹ ✓
T4	75 - 72	12mm	0.60	0.60	139.1 K=0.70	113	-466.57	892.73	0.523 ¹ ✓
T5	72 - 69	12mm	0.60	0.60	139.1 K=0.70	113	-277.57	892.73	0.311 ¹ ✓
T6	69 - 66	12mm	0.60	0.60	139.1 K=0.70	113	-408.71	892.73	0.458 ¹ ✓
T7	66 - 63	12mm	0.60	0.60	139.1 K=0.70	113	-698.08	892.73	0.782 ¹ ✓
T8	63 - 60	12mm	0.60	0.60	139.1 K=0.70	113	-666.67	892.73	0.747 ¹ ✓
T9	60 - 57	12mm	0.60	0.60	139.1 K=0.70	113	-403.13	892.73	0.452 ¹ ✓
T10	57 - 54	12mm	0.60	0.60	139.1 K=0.70	113	-513.53	892.73	0.575 ¹ ✓
T11	54 - 51	12mm	0.60	0.60	139.1 K=0.70	113	-599.88	892.73	0.672 ¹ ✓
T12	51 - 48	12mm	0.60	0.60	139.1 K=0.70	113	-492.52	892.73	0.552 ¹ ✓
T13	48 - 45	12mm	0.60	0.60	139.1 K=0.70	113	-539.87	892.73	0.605 ¹ ✓
T14	45 - 42	12mm	0.60	0.60	139.1 K=0.70	113	-518.86	892.73	0.581 ¹ ✓
T15	42 - 39	12mm	0.60	0.60	139.1 K=0.70	113	-627.48	892.73	0.703 ¹ ✓
T16	39 - 36	12mm	0.60	0.60	139.1 K=0.70	113	-745.19	892.73	0.835 ¹ ✓
T17	36 - 33	12mm	0.60	0.60	139.1 K=0.70	113	-494.43	892.73	0.554 ¹ ✓
T18	33 - 30	12mm	0.60	0.60	139.1 K=0.70	113	-597.79	892.73	0.670 ¹ ✓
T19	30 - 27	12mm	0.60	0.60	139.1 K=0.70	113	-660.52	892.73	0.740 ¹ ✓
T20	27 - 24	12mm	0.60	0.60	139.1 K=0.70	113	-659.82	892.73	0.739 ¹ ✓
T21	24 - 21	12mm	0.60	0.60	139.1 K=0.70	113	-586.54	892.73	0.657 ¹ ✓
T22	21 - 18	12mm	0.60	0.60	139.1 K=0.70	113	-496.52	892.73	0.556 ¹ ✓
T23	18 - 15	12mm	0.60	0.60	139.1 K=0.70	113	-791.85	892.73	0.887 ¹ ✓
T24	15 - 12	12mm	0.60	0.60	139.1	113	-545.00	892.73	0.610 ¹ ✓

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>A</i> <i>mm</i> ²	<i>P_u</i> <i>kg</i>	ϕP_n <i>kg</i>	Ratio $\frac{P_u}{\phi P_n}$
T25	12 - 9	12mm	0.60	0.60	K=0.70 139.1	113	-638.93	892.73	0.716 ¹
T26	9 - 6	12mm	0.60	0.60	K=0.70 139.1	113	-814.74	892.73	0.913 ¹
T27	6 - 3	12mm	0.60	0.60	K=0.70 139.1	113	-551.46	892.73	0.618 ¹
T28	3 - 0	12mm	0.60	0.60	K=0.70 139.1	113	-696.53	892.73	0.780 ¹

¹ $P_u / \phi P_n$ controls

Horizontal Design Data (Compression)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>A</i> <i>mm</i> ²	<i>P_u</i> <i>kg</i>	ϕP_n <i>kg</i>	Ratio $\frac{P_u}{\phi P_n}$
T1	84 - 81	12mm	0.42	0.42	139.3 K=1.00	113	-80.44	890.36	0.090 ¹
T2	81 - 78	12mm	0.42	0.42	139.3 K=1.00	113	-53.48	890.36	0.060 ¹
T3	78 - 75	12mm	0.42	0.42	139.3 K=1.00	113	-156.93	890.36	0.176 ¹
T4	75 - 72	12mm	0.42	0.42	139.3 K=1.00	113	-171.26	890.36	0.192 ¹
T6	69 - 66	12mm	0.42	0.42	139.3 K=1.00	113	-14.84	890.36	0.017 ¹
T7	66 - 63	12mm	0.42	0.42	139.3 K=1.00	113	-76.75	890.36	0.086 ¹
T8	63 - 60	12mm	0.42	0.42	139.3 K=1.00	113	-35.86	890.36	0.040 ¹

¹ $P_u / \phi P_n$ controls

Top Girt Design Data (Compression)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>A</i> <i>mm</i> ²	<i>P_u</i> <i>kg</i>	ϕP_n <i>kg</i>	Ratio $\frac{P_u}{\phi P_n}$
T3	78 - 75	12mm	0.42	0.42	139.3 K=1.00	113	-36.84	890.36	0.041 ¹
T4	75 - 72	12mm	0.42	0.42	139.3 K=1.00	113	-95.08	890.36	0.107 ¹
T7	66 - 63	12mm	0.42	0.42	139.3 K=1.00	113	-18.50	890.36	0.021 ¹
T8	63 - 60	12mm	0.42	0.42	139.3 K=1.00	113	-22.33	890.36	0.025 ¹

¹ $P_u / \phi P_n$ controls

Bottom Girt Design Data (Compression)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio $\frac{P_u}{\phi P_n}$
	m		m	m		mm ²	kg	kg	
T2	81 - 78	12mm	0.42	0.42	139.3 K=1.00	113	-37.01	890.36	0.042 ¹
T3	78 - 75	12mm	0.42	0.42	139.3 K=1.00	113	-90.38	890.36	0.102 ¹
T6	69 - 66	12mm	0.42	0.42	139.3 K=1.00	113	-16.33	890.36	0.018 ¹
T7	66 - 63	12mm	0.42	0.42	139.3 K=1.00	113	-32.77	890.36	0.037 ¹
T28	3 - 0	12mm	0.42	0.42	139.3 K=1.00	113	-24.66	890.36	0.028 ¹

¹ P_u / φP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio $\frac{P_u}{\phi P_n}$
	m		m	m		mm ²	kg	kg	
T1	84 - 81	Caño 1 1/4" sch40	3.00	0.42	31.0	432	477.09	8331.04	0.057 ¹
T2	81 - 78	Caño 1 1/4" sch40	3.00	0.42	31.0	432	578.20	8331.04	0.069 ¹
T3	78 - 75	Caño 1 1/4" sch40	3.00	0.42	31.0	432	207.31	8331.04	0.025 ¹
T4	75 - 72	Caño 1 1/4" sch40	3.00	0.42	31.0	432	229.64	8331.04	0.028 ¹
T7	66 - 63	Caño 1 1/4" sch40	3.00	0.42	31.0	432	653.42	8331.04	0.078 ¹

¹ P_u / φP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio $\frac{P_u}{\phi P_n}$
	m		m	m		mm ²	kg	kg	
T1	84 - 81	12mm	0.60	0.60	198.7	113	205.21	1868.30	0.110 ¹
T2	81 - 78	12mm	0.60	0.60	198.7	113	95.15	1868.30	0.051 ¹
T3	78 - 75	12mm	0.60	0.60	198.7	113	249.84	1868.30	0.134 ¹
T4	75 - 72	12mm	0.60	0.60	198.7	113	268.67	1868.30	0.144 ¹
T6	69 - 66	12mm	0.60	0.60	198.7	113	35.66	1868.30	0.019 ¹
T7	66 - 63	12mm	0.60	0.60	198.7	113	117.46	1868.30	0.063 ¹
T8	63 - 60	12mm	0.60	0.60	198.7	113	63.19	1868.30	0.034 ¹

¹ $P_u / \phi P_n$ controls

Horizontal Design Data (Tension)

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>A</i> <i>mm</i> ²	<i>P_u</i> <i>kg</i>	ϕP_n <i>kg</i>	Ratio $\frac{P_u}{\phi P_n}$
T1	84 - 81	12mm	0.42	0.42	139.3	113	259.69	1868.30	0.139 ¹
T2	81 - 78	12mm	0.42	0.42	139.3	113	182.76	1868.30	0.098 ¹
T3	78 - 75	12mm	0.42	0.42	139.3	113	284.47	1868.30	0.152 ¹
T4	75 - 72	12mm	0.42	0.42	139.3	113	890.46	1868.30	0.477 ¹
T5	72 - 69	12mm	0.42	0.42	139.3	113	179.17	1868.30	0.096 ¹
T6	69 - 66	12mm	0.42	0.42	139.3	113	267.88	1868.30	0.143 ¹
T7	66 - 63	12mm	0.42	0.42	139.3	113	969.51	1868.30	0.519 ¹
T8	63 - 60	12mm	0.42	0.42	139.3	113	447.69	1868.30	0.240 ¹
T9	60 - 57	12mm	0.42	0.42	139.3	113	263.47	1868.30	0.141 ¹
T10	57 - 54	12mm	0.42	0.42	139.3	113	350.17	1868.30	0.187 ¹
T11	54 - 51	12mm	0.42	0.42	139.3	113	427.28	1868.30	0.229 ¹
T12	51 - 48	12mm	0.42	0.42	139.3	113	323.26	1868.30	0.173 ¹
T13	48 - 45	12mm	0.42	0.42	139.3	113	365.24	1868.30	0.195 ¹
T14	45 - 42	12mm	0.42	0.42	139.3	113	367.42	1868.30	0.197 ¹
T15	42 - 39	12mm	0.42	0.42	139.3	113	413.60	1868.30	0.221 ¹
T16	39 - 36	12mm	0.42	0.42	139.3	113	508.69	1868.30	0.272 ¹
T17	36 - 33	12mm	0.42	0.42	139.3	113	350.70	1868.30	0.188 ¹
T18	33 - 30	12mm	0.42	0.42	139.3	113	396.17	1868.30	0.212 ¹
T19	30 - 27	12mm	0.42	0.42	139.3	113	455.69	1868.30	0.244 ¹
T20	27 - 24	12mm	0.42	0.42	139.3	113	463.45	1868.30	0.248 ¹
T21	24 - 21	12mm	0.42	0.42	139.3	113	389.65	1868.30	0.209 ¹
T22	21 - 18	12mm	0.42	0.42	139.3	113	342.13	1868.30	0.183 ¹
T23	18 - 15	12mm	0.42	0.42	139.3	113	560.89	1868.30	0.300 ¹
T24	15 - 12	12mm	0.42	0.42	139.3	113	358.63	1868.30	0.192 ¹
T25	12 - 9	12mm	0.42	0.42	139.3	113	443.52	1868.30	0.237 ¹
T26	9 - 6	12mm	0.42	0.42	139.3	113	567.24	1868.30	0.304 ¹
T27	6 - 3	12mm	0.42	0.42	139.3	113	364.34	1868.30	0.195 ¹

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio $\frac{P_u}{\phi P_n}$
	m		m	m		mm ²	kg	kg	
T28	3 - 0	12mm	0.42	0.42	139.3	113	469.93	1868.30	0.252 ¹

¹ P_u / φP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio $\frac{P_u}{\phi P_n}$
	m		m	m		mm ²	kg	kg	
T1	84 - 81	12mm	0.42	0.42	139.3	113	817.28	1868.30	0.437 ¹
T2	81 - 78	12mm	0.42	0.42	139.3	113	64.80	1868.30	0.035 ¹
T3	78 - 75	12mm	0.42	0.42	139.3	113	103.75	1868.30	0.056 ¹
T4	75 - 72	12mm	0.42	0.42	139.3	113	155.43	1868.30	0.083 ¹
T5	72 - 69	12mm	0.42	0.42	139.3	113	101.42	1868.30	0.054 ¹
T6	69 - 66	12mm	0.42	0.42	139.3	113	98.98	1868.30	0.053 ¹
T7	66 - 63	12mm	0.42	0.42	139.3	113	145.50	1868.30	0.078 ¹
T8	63 - 60	12mm	0.42	0.42	139.3	113	241.21	1868.30	0.129 ¹
T9	60 - 57	12mm	0.42	0.42	139.3	113	157.33	1868.30	0.084 ¹
T10	57 - 54	12mm	0.42	0.42	139.3	113	142.60	1868.30	0.076 ¹
T11	54 - 51	12mm	0.42	0.42	139.3	113	454.58	1868.30	0.243 ¹
T12	51 - 48	12mm	0.42	0.42	139.3	113	177.76	1868.30	0.095 ¹
T13	48 - 45	12mm	0.42	0.42	139.3	113	156.82	1868.30	0.084 ¹
T14	45 - 42	12mm	0.42	0.42	139.3	113	381.40	1868.30	0.204 ¹
T15	42 - 39	12mm	0.42	0.42	139.3	113	140.72	1868.30	0.075 ¹
T16	39 - 36	12mm	0.42	0.42	139.3	113	225.60	1868.30	0.121 ¹
T17	36 - 33	12mm	0.42	0.42	139.3	113	402.78	1868.30	0.216 ¹
T18	33 - 30	12mm	0.42	0.42	139.3	113	172.46	1868.30	0.092 ¹
T19	30 - 27	12mm	0.42	0.42	139.3	113	214.20	1868.30	0.115 ¹
T20	27 - 24	12mm	0.42	0.42	139.3	113	402.84	1868.30	0.216 ¹
T21	24 - 21	12mm	0.42	0.42	139.3	113	211.38	1868.30	0.113 ¹
T22	21 - 18	12mm	0.42	0.42	139.3	113	169.34	1868.30	0.091 ¹
T23	18 - 15	12mm	0.42	0.42	139.3	113	433.55	1868.30	0.232 ¹
T24	15 - 12	12mm	0.42	0.42	139.3	113	212.40	1868.30	0.114 ¹

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio $\frac{P_u}{\phi P_n}$
	m		m	m		mm ²	kg	kg	
T25	12 - 9	12mm	0.42	0.42	139.3	113	196.26	1868.30	0.105 ¹
T26	9 - 6	12mm	0.42	0.42	139.3	113	408.37	1868.30	0.219 ¹
T27	6 - 3	12mm	0.42	0.42	139.3	113	186.29	1868.30	0.100 ¹
T28	3 - 0	12mm	0.42	0.42	139.3	113	198.16	1868.30	0.106 ¹

¹ P_u / φP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio $\frac{P_u}{\phi P_n}$
	m		m	m		mm ²	kg	kg	
T1	84 - 81	12mm	0.42	0.42	139.3	113	65.90	1868.30	0.035 ¹
T2	81 - 78	12mm	0.42	0.42	139.3	113	104.27	1868.30	0.056 ¹
T3	78 - 75	12mm	0.42	0.42	139.3	113	161.34	1868.30	0.086 ¹
T4	75 - 72	12mm	0.42	0.42	139.3	113	103.61	1868.30	0.055 ¹
T5	72 - 69	12mm	0.42	0.42	139.3	113	99.48	1868.30	0.053 ¹
T6	69 - 66	12mm	0.42	0.42	139.3	113	148.88	1868.30	0.080 ¹
T7	66 - 63	12mm	0.42	0.42	139.3	113	242.01	1868.30	0.130 ¹
T8	63 - 60	12mm	0.42	0.42	139.3	113	164.96	1868.30	0.088 ¹
T9	60 - 57	12mm	0.42	0.42	139.3	113	142.11	1868.30	0.076 ¹
T10	57 - 54	12mm	0.42	0.42	139.3	113	364.83	1868.30	0.195 ¹
T11	54 - 51	12mm	0.42	0.42	139.3	113	176.39	1868.30	0.094 ¹
T12	51 - 48	12mm	0.42	0.42	139.3	113	154.71	1868.30	0.083 ¹
T13	48 - 45	12mm	0.42	0.42	139.3	113	317.83	1868.30	0.170 ¹
T14	45 - 42	12mm	0.42	0.42	139.3	113	140.70	1868.30	0.075 ¹
T15	42 - 39	12mm	0.42	0.42	139.3	113	224.99	1868.30	0.120 ¹
T16	39 - 36	12mm	0.42	0.42	139.3	113	351.81	1868.30	0.188 ¹
T17	36 - 33	12mm	0.42	0.42	139.3	113	171.98	1868.30	0.092 ¹
T18	33 - 30	12mm	0.42	0.42	139.3	113	215.46	1868.30	0.115 ¹
T19	30 - 27	12mm	0.42	0.42	139.3	113	354.83	1868.30	0.190 ¹
T20	27 - 24	12mm	0.42	0.42	139.3	113	212.34	1868.30	0.114 ¹
T21	24 - 21	12mm	0.42	0.42	139.3	113	169.87	1868.30	0.091 ¹

Section No.	Elevation <i>m</i>	Size	<i>L</i> <i>m</i>	<i>L_u</i> <i>m</i>	<i>Kl/r</i>	<i>A</i> <i>mm</i> ²	<i>P_u</i> <i>kg</i>	ϕP_n <i>kg</i>	Ratio $\frac{P_u}{\phi P_n}$
T22	21 - 18	12mm	0.42	0.42	139.3	113	386.91	1868.30	0.207 ¹
T23	18 - 15	12mm	0.42	0.42	139.3	113	220.89	1868.30	0.118 ¹
T24	15 - 12	12mm	0.42	0.42	139.3	113	196.26	1868.30	0.105 ¹
T25	12 - 9	12mm	0.42	0.42	139.3	113	362.87	1868.30	0.194 ¹
T26	9 - 6	12mm	0.42	0.42	139.3	113	187.40	1868.30	0.100 ¹
T27	6 - 3	12mm	0.42	0.42	139.3	113	198.30	1868.30	0.106 ¹
T28	3 - 0	12mm	0.42	0.42	139.3	113	56.92	1868.30	0.030 ¹

¹ $P_u / \phi P_n$ controls

Section Capacity Table

Section No.	Elevation <i>m</i>	Component Type	Size	Critical Element	<i>P</i> <i>kg</i>	ϕP_{allow} <i>kg</i>	% Capacity	Pass Fail
T1	84 - 81	Leg	Caño 1 1/4" sch40	3	-2874.02	7982.46	36.0	Pass
		Diagonal	12mm	46	-386.18	892.73	43.3	Pass
		Horizontal	12mm	43	259.69	1868.30	13.9	Pass
		Top Girt	12mm	4	817.28	1868.30	43.7	Pass
		Bottom Girt	12mm	8	65.90	1868.30	3.5	Pass
		Guy A@84	8	1371	2376.51	2743.33	86.6	Pass
		Guy B@84	8	1370	1846.76	2743.33	67.3	Pass
		Guy C@84	8	1369	2171.99	2743.33	79.2	Pass
T2	81 - 78	Leg	Caño 1 1/4" sch40	51	-2876.73	7982.46	36.0	Pass
		Diagonal	12mm	60	-285.32	892.73	32.0	Pass
		Horizontal	12mm	63	182.76	1868.30	9.8	Pass
		Top Girt	12mm	52	64.80	1868.30	3.5	Pass
		Bottom Girt	12mm	57	104.27	1868.30	5.6	Pass
T3	78 - 75	Leg	Caño 1 1/4" sch40	97	-2299.19	7982.46	28.8	Pass
		Diagonal	12mm	108	-433.71	892.73	48.6	Pass
		Horizontal	12mm	111	-156.93	890.36	17.6	Pass
		Top Girt	12mm	102	103.75	1868.30	5.6	Pass
T4	75 - 72	Bottom Girt	12mm	105	-90.38	890.36	10.2	Pass
		Leg	Caño 1 1/4" sch40	145	-3270.71	7982.46	41.0	Pass
		Diagonal	12mm	192	-466.57	892.73	52.3	Pass
		Horizontal	12mm	181	890.46	1868.30	47.7	Pass
		Top Girt	12mm	150	-95.08	890.36	10.7	Pass
		Bottom Girt	12mm	151	103.61	1868.30	5.5	Pass
		Guy A@74.1501	8	1368	2365.25	2743.33	86.2	Pass
		Guy B@74.1501	8	1367	1817.46	2743.33	66.3	Pass
T5	72 - 69	Guy C@74.1501	8	1366	2173.80	2743.33	79.2	Pass
		Leg	Caño 1 1/4" sch40	193	-2971.28	7982.46	37.2	Pass
		Diagonal	12mm	238	-277.57	892.73	31.1	Pass
		Horizontal	12mm	235	179.17	1868.30	9.6	Pass
		Top Girt	12mm	196	101.42	1868.30	5.4	Pass
T6	69 - 66	Bottom Girt	12mm	201	99.48	1868.30	5.3	Pass
		Leg	Caño 1 1/4" sch40	243	-4190.63	7982.46	52.5	Pass
		Diagonal	12mm	252	-408.71	892.73	45.8	Pass
		Horizontal	12mm	255	267.88	1868.30	14.3	Pass
		Top Girt	12mm	246	98.98	1868.30	5.3	Pass
T7	66 - 63	Bottom Girt	12mm	249	148.88	1868.30	8.0	Pass
		Leg	Caño 1 1/4" sch40	291	-5842.50	7982.46	73.2	Pass
		Diagonal	12mm	300	-698.08	892.73	78.2	Pass
		Horizontal	12mm	307	969.51	1868.30	51.9	Pass
		Top Girt	12mm	294	145.50	1868.30	7.8	Pass
		Bottom Girt	12mm	297	242.01	1868.30	13.0	Pass
		Guy A@63.8753	8	1365	2342.53	2743.33	85.4	Pass
		Guy B@63.8753	8	1364	1765.35	2743.33	64.4	Pass

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	ϕP_{allow} kg	% Capacity	Pass Fail
T8	63 - 60	Guy C@63.8753	8	1363	2151.72	2743.33	78.4	Pass
		Leg	Caño 1 1/4" sch40	339	-4973.19	7982.46	62.3	Pass
		Diagonal	12mm	384	-666.67	892.73	74.7	Pass
		Horizontal	12mm	381	447.69	1868.30	24.0	Pass
		Top Girt	12mm	342	241.21	1868.30	12.9	Pass
T9	60 - 57	Bottom Girt	12mm	345	164.96	1868.30	8.8	Pass
		Leg	Caño 1 1/4" sch40	387	-4698.31	7982.46	58.9	Pass
		Diagonal	12mm	431	-403.13	892.73	45.2	Pass
		Horizontal	12mm	428	263.47	1868.30	14.1	Pass
		Top Girt	12mm	388	157.33	1868.30	8.4	Pass
T10	57 - 54	Bottom Girt	12mm	393	142.11	1868.30	7.6	Pass
		Leg	Caño 1 1/4" sch40	435	-4480.58	7982.46	56.1	Pass
		Diagonal	12mm	444	-513.53	892.73	57.5	Pass
		Horizontal	12mm	447	350.17	1868.30	18.7	Pass
		Top Girt	12mm	438	142.60	1868.30	7.6	Pass
T11	54 - 51	Bottom Girt	12mm	439	364.83	1868.30	19.5	Pass
		Leg	Caño 1 1/4" sch40	483	-5778.50	7982.46	72.4	Pass
		Diagonal	12mm	527	-599.88	892.73	67.2	Pass
		Horizontal	12mm	523	427.28	1868.30	22.9	Pass
		Top Girt	12mm	484	454.58	1868.30	24.3	Pass
T12	51 - 48	Bottom Girt	12mm	488	176.39	1868.30	9.4	Pass
		Guy A@54	6	1362	1468.96	1628.85	90.2	Pass
		Guy B@54	6	1361	1156.23	1628.85	71.0	Pass
		Guy C@54	6	1360	1362.03	1628.85	83.6	Pass
		Leg	Caño 1 1/4" sch40	531	-5689.46	7982.46	71.3	Pass
T13	48 - 45	Diagonal	12mm	575	-492.52	892.73	55.2	Pass
		Horizontal	12mm	572	323.26	1868.30	17.3	Pass
		Top Girt	12mm	533	177.76	1868.30	9.5	Pass
		Bottom Girt	12mm	537	154.71	1868.30	8.3	Pass
		Leg	Caño 1 1/4" sch40	579	-5351.35	7982.46	67.0	Pass
T14	45 - 42	Diagonal	12mm	587	-539.87	892.73	60.5	Pass
		Horizontal	12mm	590	365.24	1868.30	19.5	Pass
		Top Girt	12mm	582	156.82	1868.30	8.4	Pass
		Bottom Girt	12mm	585	317.83	1868.30	17.0	Pass
		Leg	Caño 1 1/4" sch40	625	-6093.47	7982.46	76.3	Pass
T15	42 - 39	Diagonal	12mm	670	-518.86	892.73	58.1	Pass
		Horizontal	12mm	667	367.42	1868.30	19.7	Pass
		Top Girt	12mm	628	381.40	1868.30	20.4	Pass
		Bottom Girt	12mm	631	140.70	1868.30	7.5	Pass
		Guy A@45	6	1359	1431.49	1628.85	87.9	Pass
T16	39 - 36	Guy B@45	6	1358	1090.41	1628.85	66.9	Pass
		Guy C@45	6	1357	1333.14	1628.85	81.8	Pass
		Leg	Caño 1 1/4" sch40	673	-5818.96	7982.46	72.9	Pass
		Diagonal	12mm	684	-627.48	892.73	70.3	Pass
		Horizontal	12mm	687	413.60	1868.30	22.1	Pass
T17	36 - 33	Top Girt	12mm	677	140.72	1868.30	7.5	Pass
		Bottom Girt	12mm	681	224.99	1868.30	12.0	Pass
		Leg	Caño 1 1/2" SCH40	721	-5956.44	9630.45	61.9	Pass
		Diagonal	12mm	732	-745.19	892.73	83.5	Pass
		Horizontal	12mm	735	508.69	1868.30	27.2	Pass
T18	33 - 30	Top Girt	12mm	726	225.60	1868.30	12.1	Pass
		Bottom Girt	12mm	729	351.81	1868.30	18.8	Pass
		Leg	Caño 1 1/2" SCH40	769	-6024.07	9630.45	62.6	Pass
		Diagonal	12mm	808	-494.43	892.73	55.4	Pass
		Horizontal	12mm	811	350.70	1868.30	18.8	Pass
T19	30 - 27	Top Girt	12mm	772	402.78	1868.30	21.6	Pass
		Bottom Girt	12mm	777	171.98	1868.30	9.2	Pass
		Guy A@36	6	1356	1283.05	1628.85	78.8	Pass
		Guy B@36	6	1355	1038.29	1628.85	63.7	Pass
		Guy C@36	6	1354	1223.62	1628.85	75.1	Pass
T20	27 - 24	Leg	Caño 1 1/2" SCH40	819	-7064.02	9630.45	73.4	Pass
		Diagonal	12mm	828	-597.79	892.73	67.0	Pass
		Horizontal	12mm	831	396.17	1868.30	21.2	Pass
		Top Girt	12mm	822	172.46	1868.30	9.2	Pass
		Bottom Girt	12mm	825	215.46	1868.30	11.5	Pass
T21	24 - 21	Leg	Caño 1 1/2" SCH40	867	-9158.67	9630.45	95.1	Pass
		Diagonal	12mm	876	-660.52	892.73	74.0	Pass
		Horizontal	12mm	879	455.69	1868.30	24.4	Pass
		Top Girt	12mm	870	214.20	1868.30	11.5	Pass
		Bottom Girt	12mm	871	354.83	1868.30	19.0	Pass
T22	21 - 18	Leg	Caño 1 1/2" SCH40	915	-8771.39	9630.45	91.1	Pass

Section No.	Elevation m	Component Type	Size	Critical Element	P kg	ϕP_{allow} kg	% Capacity	Pass Fail	
T21	24 - 21	Diagonal	12mm	952	-659.82	892.73	73.9	Pass	
		Horizontal	12mm	955	463.45	1868.30	24.8	Pass	
		Top Girt	12mm	916	402.84	1868.30	21.6	Pass	
		Bottom Girt	12mm	919	212.34	1868.30	11.4	Pass	
		Guy A@27	6	1353	1093.29	1628.85	67.1	Pass	
		Guy B@27	6	1352	901.61	1628.85	55.4	Pass	
		Guy C@27	6	1351	1054.73	1628.85	64.8	Pass	
		Leg	Caño 1 1/2" SCH40	963	-7137.82	9630.45	74.1	Pass	
		Diagonal	12mm	1006	-586.54	892.73	65.7	Pass	
		Horizontal	12mm	1003	389.65	1868.30	20.9	Pass	
T22	21 - 18	Top Girt	12mm	964	211.38	1868.30	11.3	Pass	
		Bottom Girt	12mm	968	169.87	1868.30	9.1	Pass	
		Leg	Caño 1 1/2" SCH40	1011	-6998.16	9630.45	72.7	Pass	
		Diagonal	12mm	1020	-496.52	892.73	55.6	Pass	
		Horizontal	12mm	1023	342.13	1868.30	18.3	Pass	
T23	18 - 15	Top Girt	12mm	1013	169.34	1868.30	9.1	Pass	
		Bottom Girt	12mm	1015	386.91	1868.30	20.7	Pass	
		Leg	Caño 1 1/2" SCH40	1059	-8276.84	9630.45	85.9	Pass	
		Diagonal	12mm	1096	-791.85	892.73	88.7	Pass	
		Horizontal	12mm	1099	560.89	1868.30	30.0	Pass	
		Top Girt	12mm	1060	433.55	1868.30	23.2	Pass	
		Bottom Girt	12mm	1063	220.89	1868.30	11.8	Pass	
		Guy A@18	6	1350	1125.89	1628.85	69.1	Pass	
		Guy B@18	6	1349	845.56	1628.85	51.9	Pass	
		Guy C@18	6	1348	1057.13	1628.85	64.9	Pass	
T24	15 - 12	Leg	Caño 1 1/2" SCH40	1107	-8083.93	9630.45	83.9	Pass	
		Diagonal	12mm	1116	-545.00	892.73	61.0	Pass	
		Horizontal	12mm	1119	358.63	1868.30	19.2	Pass	
		Top Girt	12mm	1108	212.40	1868.30	11.4	Pass	
		Bottom Girt	12mm	1113	196.26	1868.30	10.5	Pass	
T25	12 - 9	Leg	Caño 1 1/2" SCH40	1155	-7658.95	9630.45	79.5	Pass	
		Diagonal	12mm	1164	-638.93	892.73	71.6	Pass	
		Horizontal	12mm	1167	443.52	1868.30	23.7	Pass	
		Top Girt	12mm	1158	196.26	1868.30	10.5	Pass	
		Bottom Girt	12mm	1159	362.87	1868.30	19.4	Pass	
T26	9 - 6	Leg	Caño 1 1/2" SCH40	1203	-8477.42	9630.45	88.0	Pass	
		Diagonal	12mm	1246	-814.74	892.73	91.3	Pass	
		Horizontal	12mm	1243	567.24	1868.30	30.4	Pass	
		Top Girt	12mm	1204	408.37	1868.30	21.9	Pass	
		Bottom Girt	12mm	1207	187.40	1868.30	10.0	Pass	
T27	6 - 3	Guy A@9	6	1347	1003.92	1628.85	61.6	Pass	
		Guy B@9	6	1346	738.38	1628.85	45.3	Pass	
		Guy C@9	6	1345	929.47	1628.85	57.1	Pass	
		Leg	Caño 1 1/2" SCH40	1251	-8230.39	9630.45	85.5	Pass	
		Diagonal	12mm	1260	-551.46	892.73	61.8	Pass	
T28	3 - 0	Horizontal	12mm	1263	364.34	1868.30	19.5	Pass	
		Top Girt	12mm	1252	186.29	1868.30	10.0	Pass	
		Bottom Girt	12mm	1257	198.30	1868.30	10.6	Pass	
		Leg	Caño 1 1/2" SCH40	1299	-7840.07	9630.45	81.4	Pass	
		Diagonal	12mm	1308	-696.53	892.73	78.0	Pass	
		Horizontal	12mm	1311	469.93	1868.30	25.2	Pass	
		Top Girt	12mm	1302	198.16	1868.30	10.6	Pass	
		Bottom Girt	12mm	1303	56.92	1868.30	3.0	Pass	
		Summary							
		Leg (T19)						95.1	Pass
Diagonal (T26)						91.3	Pass		
Horizontal (T7)						51.9	Pass		
Top Girt (T1)						43.7	Pass		
Bottom Girt (T22)						20.7	Pass		
Guy A (T11)						90.2	Pass		
Guy B (T11)						71.0	Pass		
Guy C (T11)						83.6	Pass		
Bolt Checks						21.7	Pass		
RATING =						95.1	Pass		